



# City of Lexington

LEXINGTON RACQUET CENTER

Lexington, Nebraska  
January 10, 2023

Bid Date:  
January 31, 2023 at 2:00pm



# WILKINS

ARCHITECTURE | DESIGN | PLANNING

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Kearney, NE 68845 | WilkinsADP.com

City of Lexington  
**LEXINGTON RACQUET CENTER**

**Project Information**



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Project Number: 2261  
Date: January 10, 2023

I, Caitlin E. Snyder, Registered Architect, am the Coordinating Professional on this project.

City of Lexington  
**LEXINGTON RACQUET CENTER**

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**SECTION 00 2113**  
**INSTRUCTIONS TO BIDDERS**

**INVITATION**

**1.1 BID SUBMISSION**

- A. Bids signed and under seal, executed, dated, and submitted for the furnishing of all labor, materials, and equipment for the City of Lexington, Lexington Racquet Center prior to:
  - 1. Date: January 31, 2023.
  - 2. Time: 2:00 p.m. (CST)
  - 3. Place: City of Lexington, City Clerk's office.
  - 4. Location: 406 E 7th Street, Lexington, NE 68850.
  - 5. Emailed or faxed bids will NOT be accepted.
- B. Offers will be opened publicly immediately after the time for receipt of bids. The Owner will consider the bids received for the furnishing of said labor, materials and equipment necessary for the proper construction of the aforesaid project.
- C. The General, Mechanical and Electrical, will be under one Bid. All subcontractor quotations shall be sent to the General Contractor.
- D. Bid Security is required to be submitted with bid proposal form. Make payable to City of Lexington in the amount of 5% of the Lump Sum Bid Amount. Bid Security shall be of cashiers check, certified check, or Bid Bond issued by a Surety licensed to conduct business in the State of Nebraska. Form of Bid Bond is AIA Document A310. Any agent signing a bid bond on behalf of the Surety must attach a Power of Attorney effectively evidencing the agent's authority to bind the Surety to the performance of the Bid Bond.
- E. Performance Bond: The Contractor shall be required to furnish acceptable bonds to complete the work and pay for all labor and materials used, said bonds to be in the amount of 100% of total amount of the Contract. See Document A701, Instructions to Bidders.
- F. Taxes: The Contractor by virtue of his contract with City of Lexington, becomes a purchasing agent for the Owner on their behalf and under Statute 77-2702 **does not pay sales tax**.
- G. Davis-Bacon Act: This project is subject to the provisions and mandates of the Davis-Bacon Act as administered by the United States Department of Labor, Wage and Hour Division.
  - 1. Contractor(s) must provide a breakout between all Materials and Labor and separate Applications for Payment must be submitted for the Davis-Bacon Act applicable work and the NON-Davis-Bacon Act applicable work.
  - 2. WAGE DETERMINATIONS for can be found at: <https://sam.gov/wage-determination/>
- H. Insurance: Prior to the start of the work, completed copies of the Certificate of Insurance, AIA Document G705 shall be submitted to the Owner and Architect.
- I. There is **NO** Pre-Bid Conference scheduled.

**1.2 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS**

- A. Work of this proposed Contract comprises building construction and site development, including general construction, structural, mechanical, and electrical Work.
- B. All work shall be furnished in strict accordance with the Bid Documents dated, January 10, 2023 and prepared by Wilkins Architecture Design Planning, L.L.C.. Bids will be received only upon the printed forms furnished by the Architect.

**1.3 CONTRACT TIME**

- A. Perform the Work within the time stated under Work Sequence in Section 01 1000 - Summary.

- B. The bidder, in submitting an offer, accepts the Contract Time period stated for performing the Work. The completion date in the Agreement shall be the Contract Time added to the commencement date.

## **BID DOCUMENTS AND CONTRACT DOCUMENTS**

### **2.1 DEFINITIONS**

- A. Bid Documents: Contract Documents including Project Manual, Construction Drawings and all issued Addenda.

### **2.2 AVAILABILITY**

- A. Bid Documents may be obtained from the following supplier:
1. Standard Digital Imaging, 4424 South 108th Street, Omaha, NE 68137, (402) 592-1292.
- B. Bid Document Information can be obtained online from the following supplier:
1. Standard Digital Imaging Plan Room; [www.standarddigital.com](http://www.standarddigital.com). The following information can be obtained and viewed:
    - a. Instructions to Bidders
    - b. Bid Form
    - c. Specifications Table of Contents
    - d. Section 01 1000 - Summary, Work Sequence
    - e. Addenda/Addendums
    - f. Construction Drawing Images  
IMAGES ARE NOT FOR BIDDING - FOR REFERENCE ONLY IN ORDERING
- C. A deposit in the amount of \$75.00 (**made payable to Wilkins Architecture Design Planning, L.L.C.**) will be required for each set of bidding documents. If shipping is required there is a non refundable amount determined and made payable to Standard Digital Imaging These checks are to be sent to Standard Digital Imaging prior to receipt of documents. The deposit will be returned in full only if a qualified bid is submitted and the Bid Documents are returned within fifteen (15) days of the bid determination, or if the Contractor decides not to submit a Proposal and the Bid Documents are returned with seven (7) days prior to the bid opening.
- D. **ALL BID DOCUMENTS SHALL BE RETURNED to the office of Wilkins Architecture Design Planning, L.L.C., 2908 West 39th Street, Suite A, Kearney, NE 68845.**

### **2.3 EXAMINATION**

- A. Bid Documents may be examined at:
- Standard Digital Imaging: [www.standarddigital.com](http://www.standarddigital.com).
  - Omaha Builders Exchange: [www.omahaplanroom.com](http://www.omahaplanroom.com).  
4159 S 94th St., Omaha, NE 68127.
  - Lincoln Builders Bureau: [www.buildersbureau.com](http://www.buildersbureau.com).  
5910 S. 58th Suite #C, Lincoln, NE 68516.  
[info@buildersbureau.com](mailto:info@buildersbureau.com)
  - Builders Plan Service: [www.gichamber.com](http://www.gichamber.com).  
309 West 2nd, Grand Island, NE 68801.
  - Hastings Builders Bureau: [www.hastingschamber.com](http://www.hastingschamber.com).  
301 South Burlington, Hastings, NE 68902.
  - Kearney Plan Service: [www.kearneycoc.org](http://www.kearneycoc.org).  
1007 2nd Avenue, PO Box 607 Kearney, NE 68848.
  - Central Nebraska Plan Service  
111 West 6th Street, North Platte, NE 69101.
  - Phelps County Development Corporation: [www.phelpscountyne.com](http://www.phelpscountyne.com).  
502 East Avenue, Holdrege, NE 68949.  
[stacy@phelpscountyne.com](mailto:stacy@phelpscountyne.com).
  - Norfolk Builders Exchange: [www.norfolkareachamber.com](http://www.norfolkareachamber.com).

405 Madison Avenue, Norfolk, NE 68701.  
Columbus Area Chamber of Commerce: [www.thecolumbuspage.com](http://www.thecolumbuspage.com).  
753 33rd Ave., Columbus, NE 68602-0515.  
Fremont Chamber of Commerce: [www.fremontne.org](http://www.fremontne.org).  
605 Broad Street, Fremont, NE 68025.  
Plains Builders Exchange, Inc.: [www.plainsbuilders.com](http://www.plainsbuilders.com).  
220 N Kiwanis Ave, Sioux Falls, SD 57104.  
[info@plainsbuilders.com](mailto:info@plainsbuilders.com)  
Siouxland Construction Alliance: [www.siouxlandconstructionalliance.com](http://www.siouxlandconstructionalliance.com).  
3900 Stadium Dr, Sioux City, IA 51106.  
[scplanroom@siouxlan.net](mailto:scplanroom@siouxlan.net).  
Sioux Falls Builders Exchange: [www.sfbx.com](http://www.sfbx.com).  
1418 C Ave, Sioux Falls, SD 57104.  
ConstructConnect: [www.constructconnect.com](http://www.constructconnect.com).  
3825 Edwards Road, Ste. 800 Cincinnati, OH 45209  
(877)-865-5191.  
[cic@constructionindustrycenter.com](mailto:cic@constructionindustrycenter.com).  
Construction Industry Center: [www.constructionindustrycenter.com](http://www.constructionindustrycenter.com).  
(605) 343-5252.  
2771 Plant St. Rapid City, SD 57702.  
[chrissy@constructionindustrycenter.com](mailto:chrissy@constructionindustrycenter.com)  
Dodge Data & Analytics (Electronic Plan Room): [www.construction.com](http://www.construction.com).  
3315 Central Ave, Hot Springs, AR 71913.  
iSqFt: [www.isqft.com](http://www.isqft.com).  
(800) 364-2056 ext. 8191.  
Reed Construction Data: [www.cmbgroup.com](http://www.cmbgroup.com).  
30 Technology Drive So. Suite 500, Norcross, GA 30092.

- B. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.
- C. Immediately notify Architect upon finding discrepancies or omissions in the Bid Documents.
- D. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.
- E. Immediately notify Architect upon finding discrepancies or omissions in the Bid Documents.

## 2.4 INQUIRIES/ADDENDA

- A. Addenda may be issued during the bidding period. All Addenda become part of Contract Documents. Include resultant costs in the Bid Amount.
- B. Verbal answers are not binding on any party.
- C. Clarifications requested by bidders must be in writing not less than four (4) days before date set for receipt of bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients.
- D. **No technical questions will be answered by the Architect's /Engineer's office(s) during the twenty-four (24) hours immediately preceding the bid opening time and date.**

## 2.5 PRODUCT/ASSEMBLY/SYSTEM SUBSTITUTIONS

- A. General Requirements for Substitution Requests:
  - 1. Project Manual establishes standards for products, assemblies, and systems.
  - 2. Submit requests only for elements for which substitution is specifically allowed in the Project Manual.
  - 3. Provide sufficient information to determine acceptability of proposed substitutions.

4. Provide complete information on required revisions to other work to accommodate each proposed substitution.
- B. Substitution Request Time Restrictions:
  1. Where the Bid Documents stipulate a particular product, substitutions will be considered up to ten (10) days before receipt of bids.
- C. Substitution Request Form:
  1. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
- D. Review and Acceptance of Request:
  1. Architect may approve the proposed substitution and will issue an Addendum to known bidders.
- E. The Owner reserves the right to negotiate any proposed Voluntary Alternates only with the apparent low bidder with selection based on the Base Bid and selected Alternate(s).
- F. The Architect does not intend to issue any addenda to the bidding documents within three (3) working days of the bid opening time and date.

## **SITE ASSESSMENT**

### **3.1 SITE EXAMINATION**

- A. All Bidders are required to make a careful, close examination of the entire building areas before submitting a bid.

## **OFFER ACCEPTANCE/REJECTION**

### **4.1 DURATION OF OFFER**

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of **thirty (30) days** after the bid closing date.

### **4.2 ACCEPTANCE OF OFFER**

- A. Owner reserves the right to accept or reject any or all offers and to pass upon the regularity or waive any irregularities of any bid. The Owner intends, but shall not be required, to interview the two (2) lowest responsible bidders to determine the lowest responsible bidder. Any award of contract shall be made to the lowest responsible bidder, taking into consideration the best interests of the Owner, the quality performance of the Contractor, and his ability to perform the work. The decision to award the contract shall be in the sole discretion of the Owner.
- B. After acceptance by Owner, Architect on behalf of Owner, will issue to the successful bidder, a written Notice To Proceed.

## **END OF SECTION**



**SECTION 00 3100**  
**AVAILABLE PROJECT INFORMATION**

**PART 1 GENERAL**

**1.1 REPORT OF GEOTECHNICAL INVESTIGATION**

- A. The Geotechnical Investigation Report is included in this project manual.
  - 1. Prepared by **Mid-State Engineering & Testing, Inc.**
- B. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect and Structural Engineer.
- C. The recommendations described within the subsurface investigation report are a requirement of this Contract, unless specifically indicated otherwise in the Contract Documents.

**1.2 ELECTRONIC DATA DISCLOSURE AGREEMENT**

- A. The agreement form required to be completed and signed to obtain electronic files from the Architect is included in this project manual.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



**MID-STATE  
ENGINEERING & TESTING**

**GEOTECHNICAL - CONSTRUCTION MATERIALS TESTING**

**REPORT OF  
GEOTECHNICAL INVESTIGATION**

**PROPOSED INDOOR TENNIS FACILITY  
W. 12<sup>TH</sup> STREET AND PARK STREET  
LEXINGTON, NEBRASKA**

**M.S. PROJECT NO. 200-101-29  
JANUARY 9, 2023  
A-7874**

**Prepared for:**

**Wilkins ADP  
2908 W 39<sup>th</sup> Street Suite A  
Kearney, NE 68845**



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Columbus, NE 68601  
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Norfolk, NE 68701  
Office: 402-379-2377



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**REPORT OF  
GEOTECHNICAL INVESTIGATION**

**PROPOSED INDOOR TENNIS FACILITY  
W. 12<sup>TH</sup> STREET AND PARK STREET  
LEXINGTON, NEBRASKA**

**M.S. PROJECT NO. 200-101-29  
JANUARY 9, 2023  
A-7874**

**INTRODUCTION**

This report presents the results of a geotechnical investigation performed for a proposed indoor Tennis Facility to be located at the corner of W. 12<sup>th</sup> Street and Park Street in Lexington, Nebraska. This report was authorized by Mr. Sertich of Wilkins ADP in an email on November 23, 2022, based on our November 3, 2022 written proposal of works and costs.

Included in this investigation were three (3) soil borings, lab evaluation, and a report of findings and recommendations. The scope of our report was limited to the following:

- Identify in-situ soil stratigraphy
- Evaluating the engineering properties of the soils encountered
- Recommending types and depths of foundation elements
- Evaluate soil bearing capacity and settlement
- Evaluate soil subgrade support characteristics for floor slab and pavement design.
- Identify current groundwater conditions
- Providing recommendations for earthwork and soil related construction with respect to the soils encountered

This report was prepared by Mid-State Engineering and Testing, Inc., by a professional engineer registered in the State of Nebraska. Recommendations are based on the applicable standards of the profession at the time of this study. This report was prepared for the exclusive use of the City of Lexington and their representatives for specific application to the planned construction. All work was conducted in accordance with generally accepted soil and foundation engineering practices.



### **PROJECT DESCRIPTION**

At this time, the anticipated construction will include an indoor tennis facility consisting of four (4) tennis courts with a center receiving area for spectators. A mezzanine covering approximately 800 ft<sup>2</sup> is planned in this area as well. At this time, the tennis facility is anticipated to consist of a slab on grade, pre-engineered metal building. The proposed parking lot is planned to be expanded to the south of in the general direction of the new building.

Maximum structural loads are anticipated to be on the order of 50 kips for isolated columns and 4 to 6 klf for walls (mezzanine walls). We anticipate the proposed site will be elevated approximately 12 to 18 inches above existing site elevations in order to promote positive surface drainage.

### **FIELD WORK**

Field exploration was performed on December 13, 2022. A total of three (3) soil borings were performed at the locations indicated on the included Site Plan (Appendix A). The exploratory borings were advanced to depths of 20 feet below existing site elevations with a truck-mounted rotary drilling rig using 4 ½-inch solid stem augers.

Soil samples were obtained at the sampling intervals noted on the Boring Logs (Appendix B). Recovered samples were extruded in the field, sealed in plastic containers, labeled, and protected for transportation to the laboratory for testing. Undisturbed samples, designated “U” samples, were obtained with a 3.0-inch (outside diameter), thin-walled, tube samplers hydraulically pushed in general accordance with ASTM D1587 (Thin-walled Sampling of Soils). Split-barrel samples, designated “S” samples, were obtained while performing Standard Penetration Tests (SPT) with a 1.50-inch (inside diameter), thick-walled sampler driven in accordance with ASTM D1586 (Penetration Test and Split-Barrel Sampling of Soils). The N-value, reported in blows per foot, equals the number of blows required to drive the split-barrel sampler over the last 12-inches of a normal 18-inch sampling interval.

The field boring logs were prepared by an experienced geotechnical engineer in general accordance with ASTM D2488, (Description of Soils by the Visual-Manual Procedure). Stratification lines represent the approximate boundary between soil types. In-Situ, the transition between sediments may be gradual. Water level readings were made in the drill holes at the times and under conditions noted on the boring logs.

### **LABORATORY TESTING**

Based on site stratigraphy and the construction proposed, a testing program was established to evaluate the engineering properties of the bearing strata. Specific tests performed include:

- Soil moisture contents
- Unit weights determinations
- Unconfined compression testing
- #200 washed sieve analysis
- Atterberg limits testing
- Field SPT Blow Counts



All tests were conducted in general accordance with current ASTM or state-of-the-art test procedures. Laboratory test results are provided on the Boring Logs (Appendix B) and Soil Summary (Appendix C).

Soil moisture contents, unit weight determinations, sand contents along with Field SPT Blow counts were used to determine the overall uniformity/variability of the site soils and for evaluation of bearing capacity and settlement.

Unconfined compression tests define the stress versus strain characteristics and related shear strengths of the soil.

Atterberg limits testing and sieve analyses were used to classify the soils based on the Unified Soils Classification System, and to quantify soil plasticity.

Based on the results of the testing program, the field logs were reviewed and supplemented as shown in Appendix B. These final logs are a summation of visual evaluations performed in field and lab, and the additional information gained through the laboratory testing program.

**SITE CONDITIONS**

The proposed tennis facility site is located in the southeast corner of the intersection of W. 12<sup>th</sup> Street and Park Street and is situated within the west baseball diamond south of the existing parking lot. The building site is mostly grass covered and has very little elevation difference. To provide positive drainage, we anticipate the building pad will be elevated approximately 12 to 18 inches above existing elevations.

**SOIL CONDITIONS**

This site is situated within the historic Platte River valley in west central Nebraska. The generalized subsurface profile for this region consists of stream deposited silts and clays atop sands and gravels. Within the 20-foot depths investigated, the soils encountered at this site consist of Old Fill material atop Alluvial Sand deposits.

The Old Fill material was encountered in all three (3) boring locations and varied in depth. The fill extended to depths of 5, 2 and 2 feet below existing grades in boring locations DH-1 thru DH-3, respectively. This material was described as light grey brown, brown, and dark brown, slightly moist to moist, stiff to hard, lean clays and silts with varying amounts of sands. These deposits exhibit the following range in in-situ engineering properties:

Moisture Contents (%).....	7 – 17
Dry Unit Weight (pcf) .....	107 – 114
Unconfined Compressive Strength (tsf) .....	1.7 – 4.3
Material Finer than #200 Sieve (%).....	52 – 61
Plastic Indexes .....	6 – 18

Based on Atterberg limits tests and visual evaluation, these soils generally classify as low to moderately plastic lean clays (CL) and silty clays (CL-ML) with varying amounts of fine sand.



Alluvial sands were encountered below the old fill material in all boring locations, extending beyond the bottom of the 20-foot borings. These deposits were described as light brown, slightly moist to saturated, loose to firm, clayey sands and poorly graded sands. These deposits exhibit the following range in in-situ engineering properties:

Moisture Contents (%).....	2 – 15
Dry Unit Weight (pcf) .....	99
Material Finer than #200 Sieve (%).....	1 – 48
Plastic Index .....	17
Standard Penetration Blow Counts (N) .....	7 – 16

Based on lab and visual evaluation, these deposits generally classify as poorly graded sands (SP) and clayey sands (SC).

### GROUNDWATER

At the time of drilling, groundwater was encountered at approximate depths of 13 feet below existing site elevations and stabilized measurements (wet cave) at the end of drilling at a depth of approximately 10 feet below grade. Groundwater at these depths is not expected to impact the slab on grade construction or foundation performance of the building proposed at this time. It should be noted, however, that groundwater levels will fluctuate depending on weather patterns, irrigations practices, or other factors which may differ from those at the time of drilling.

### CONCLUSIONS AND RECOMMENDATIONS

#### GENERAL

Based on information obtained during the drilling operations, lab evaluation, and our previous experience within Lexington, it is our opinion that with proper design and site improvement, the site will be suitable for the proposed construction. The primary concerns are the old fill material encountered throughout the proposed building area and control of total and differential settlement.

Variable old fill depths of 2 to 5 feet are indicated throughout the proposed tennis facility area. While a majority of the fill evaluated in our laboratory indicate relatively good soil support, little is known regarding placement of this old fill material and inconsistencies associated with undocumented fill material are possible. In addition to the old fill soils, the underlying Alluvial sand deposits were found to have a variable loose to firm consistency.

Based on the soil conditions indicated and the unknowns associated with the encountered fill, we recommend removing 12 inches of topsoil, vegetation and all old fill soils identified from the building. Additionally due to an inconsistent bearing condition and the uncertainties with the old fills and somewhat loose natural soils, we recommend over excavating additional material as needed to provide a minimum of two feet of new structural fill below and around all load bearing footings. Upon completion, we recommend the resultant subgrade be scarified, moisture conditioned and recompacted in the presence of the engineer. Unstable old fill soils identified at this time will have to be removed and replaced with new structural fill.



To verify bearing conditions, we recommend all over excavated subgrades be observed and approved by the Engineer prior to structural fill placement. Any substandard conditions identified at this time will need to be corrected as directed by the engineer.

In addition to the recommendations for foundation support and over excavation processes, we recommend the floor slab and any new pavement subgrades be over-excavated as needed to provide a minimum of 12-inches of structural fill below floor slabs and pavement sections. We recommend all stripped and over-excavated subgrades be observed by the Geotechnical Engineer prior to structural fill placement. Due to the required overexcavations and the anticipation of elevating the site 12 to 18 inches, a majority of this work will be completed during the excavation and backfilling process. Any inconsistencies or instability identified at this time will need to be corrected as directed by the Geotechnical Engineer.

Recommendations regarding these and other aspects of this project are included in the following section of this report.

#### **FOUNDATION ANALYSIS**

If the recommendations presented in this report are followed, this site appears suitable for use of a conventional shallow foundation system. The selection of an allowable soil bearing pressure for foundation design must fulfill two requirements. First, structural loads must be sufficiently less than the ultimate bearing capacity of the foundation to insure stability. Second, settlement must not exceed an amount, which will produce adverse behavior of the superstructure.

In order to meet the previous criteria, we have explored both the bearing capacity and load settlement characteristics of the on-site soil assuming maximum loads of 6 kips per linear foot for walls and 50 kips for isolated columns. A maximum total settlement of 1 inch and differential settlement on the order of ½ inch are generally considered acceptable and were used in our analyses. The allowable bearing pressure is expressed in terms of the net pressure transferred to the soil.

In the event the recommendations presented in this report are followed and foundation elements bear atop two (2) feet of newly placed and compacted structural fill, all of which are approved by the soils engineer or representative working under their supervision, a net allowable soil bearing pressure of up to 2,500 pounds per square foot is recommended for design of shallow foundation elements. Foundation elements designed in this manner will limit maximum total settlement, due to the foundation loads, to approximately 1 inch or less, while limiting differential settlement to approximately ½ inch per 100 lineal feet.

We recommend exterior footings and footings in unheated areas be founded at a minimum depth of 42 inches below surrounding grade for frost protection. Interior footings may be placed directly below the floor slab. All footings will require steel reinforcement and should conform to local code sizes.

We recommend concrete for footings be designed utilizing a minimum cement content of 564 lb/yd<sup>3</sup> and a minimum compressive strength of 3,500 psi. We recommend structural concrete be reinforced and conform to local building code requirements.





### **EARTHWORK AND EXCAVATIONS**

Prior to overall site grading, we recommend topsoil and vegetation be stripped and stockpiled. Once stripped, we recommend excavating the proposed building's footings and over-excavating in order to provide a minimum of twelve (12) inches of structural fill beneath floor slab, tennis courts, and any exterior pavement sections, two (2) feet below all foundation elements, and any unsuitable old fill material to be removed as determined by the soils engineer. We recommend the resultant subgrade be observed by the engineer to verify bearing conditions and the suitability of the subgrade soils prior to fill placement. We recommend the resultant subgrade be scarified, moisture conditioned, and compacted in the presence of the engineer or representative working under their supervision. Any instability detected during performance of this work will need to be addressed as recommended by the soils engineer or representative.

Based on laboratory testing and evaluation of the site soils during excavation, it is anticipated that most of the site soils will be considered suitable for reuse as structural fill. All site soils shall be clear of any old construction debris or deleterious material associated with the old fill. If new fill is required, we recommend new fill consist of lean clay for workability. If lean clay fill is utilized, we recommend this material have a maximum plastic index of 25 and a sand content less than 50%. Clean sands may be difficult to form footings and consequently should not be utilized above footing elevations. We recommend structural fill be placed in loose lifts of 8 inches or less in thickness, with each lift compacted to a minimum of 95 percent of the material's standard proctor maximum dry density (ASTM D698). We recommend soil moisture content at the time of compaction be controlled to between -3 and +3 percent of optimum (ASTM D698).

We recommend backfill soils for utility trenches below footings and floor slabs be placed in 6 inch loose lifts with each lift compacted to a minimum of 95 percent of the material's standard Proctor maximum dry density (ASTM D698). Backfill in grassy areas may be compacted to a minimum of 90 percent of the material's standard Proctor maximum dry density (ASTM D698). Due to the cohesive nature of the on-site soils, clean granular fill and backfill which can provide an avenue for water reaching the bearing soils is not recommended within 10 feet of the structure. The only exception being excavations which extend into clean alluvial sands.

We recommend a technician, working under the supervision of an experienced soils engineer, periodically monitor earthwork operations to evaluate compliance with the above recommendations.

Trenching and excavation activities should conform to federal and local regulations as a minimum. Based on the cohesive and semi-cohesive soils encountered across the site, it will be feasible to utilize trench type footings for construction.

### **FLOOR SLAB AND TENNIS COURT SUBGRADES**

To provide uniform support for floor slabs and tennis court surfaces, we recommend the subgrade be reworked and compacted immediately prior to concrete placement. We recommend the floor slab and tennis court areas be over-excavated to provide a minimum of twelve (12) inches of select structural fill, as outlined in the "Earthwork" section of this report, below floor slab and tennis court areas. We recommend over-excavated subgrades be scarified, moisture conditioned, and compacted in the presence of the engineer or representative working under their supervision prior to fill placement.



Corrective action will need to be taken with any unsuitable or unstable soil conditions identified at that time.

We recommend fill below floor slabs and tennis court surfaces be compacted to a minimum of 95 percent of the material's standard Proctor maximum dry density (ASTM D698). We recommend soil moisture be controlled within -3 and +3 percent of optimum. If a granular cushion is used beneath the floor slab, this layer should have a uniform thickness and be compacted by vibration prior to concrete placement.

We recommend concrete for floor and tennis court slabs have a minimum cement content of 564 lb/yd<sup>3</sup> and a minimum compressive strength of 3,500 psi. An entrained air content of 3 to 5 percent is recommended for strength and workability. This mix can also be used for exterior sidewalks by increasing the entrained air content to 5 to 8 percent.

### **PAVEMENT SUBGRADES**

At this time, it is expected the new parking area along the south side of the existing parking lot will consist of concrete construction. Pavement performance is directly affected by the degree of compaction, uniformity, and stability of the subgrade soils. This is particularly important where heavy traffic is expected. Due to traffic consisting primarily of cars and light trucks, we recommend pavement areas be over-excavated to provide a minimum of twelve (12) inches of select structural fill, as outlined in the "Earthwork" section of this report, below paving. We recommend over-excavated subgrades be scarified, moisture conditioned, and compacted in the presence of the engineer or representative working under their supervision prior to fill placement. We recommend structural fill be compacted to a minimum of 95 percent of the material's standard Proctor maximum dry density (ASTM D698). We recommend soil moisture be controlled within -3 and +3 percent of optimum.

If the recommendations presented in this report are followed and structural fill as recommend is provided below paving a soaked CBR of 4 and a modulus of subgrade reaction (k for pavements) of 135 pci may be used for pavement design. Additional subgrade support could be achieved through the addition of crushed materials or other subgrade stabilization alternatives.

Pavement thickness should be determined based on traffic volume and standard pavement design procedures. Portland Cement Concrete should be air-entrained and have a minimum compressive strength of 4,000 psi (600 psi flexural strength).

### **SURFACE DRAINAGE AND LANDSCAPING**

The success of the shallow foundation and slab-on-grade floor system is contingent upon keeping the subgrade soils at a relative constant moisture content and not allowing surface drainage an avenue to reach the bearing soils. Positive surface drainage away from the structure must be maintained at all times. We recommend landscaped areas be designed and built in such a way that irrigation and other surface water will be collected and carried away from foundation elements.

We recommend the final grade of the foundation backfill and any overlying pavement have a positive slope away from foundation walls on all sides. A minimum slope of 1 inch per foot for the first 5 to 10 feet is recommended. However, the slope may be decreased if the ground surface next to foundations is covered with concrete slabs or asphalt pavements. A minimum slope of 2 percent is



recommended for all other areas. We recommend pavement and exterior slabs next to structures be carefully sealed against moisture intrusion at the joints.

All downspouts and faucets should discharge onto splash blocks that slope away from foundation walls and extend a minimum of 3 feet from the building foundation.

**GENERAL COMMENTS**

If any changes in the nature, design, or location of this project are planned, the conclusions and recommendations contained in this report shall not be considered valid unless those changes are reviewed and the conclusions of this report either modified or verified in writing by the geotechnical engineer.

The analysis and recommendations submitted in this report are based in part upon the data obtained from three (3) soil borings. The nature and extent of variations of the on-site soils between borings may not become evident until construction. If variations appear, it will be necessary to re-evaluate the recommendations of this report.

It is recommended the geotechnical engineer be allowed to review the final design and specifications to verify compliance with respect to the recommendation of this study. It is also recommended the geotechnical engineer be retained to provide QA/QC Engineering and testing services during the earthwork, excavation, and foundation construction phase of the project to verify site suitability and to provide recommendations if subsurface conditions differ from those expected.

Respectfully Prepared by:  
Mid-State Engineering & Testing, Inc.



Scott A. Barnett, P.E.  
Nebraska Reg. #E-13769

APPENDIX A

BORING LOCATION PLAN

# Geotechnical Investigation Boring Location Plan

Indoor Tennis Facility - Lexington, Nebraska  
M.S. #200-101-29

- Legend**
- Boring Locations
  - 📍 Indoor Tennis Facility Location
  - 📍 Park Street
  - 📍 Plum Creek Park
  - 📍 W. 11th Street



W. 11th Street

W 11th St

Park Street

Verix

Indoor Tennis Facility Location

Plum Creek Park

100 ft



APPENDIX B

BORING LOGS

# BORING LOG

**PROJECT:** Indoor Tennis Facility  
**LOCATION:** Lexington, Nebraska  
**JOB NO.:** 200-101-29  
**DATE:** 12.13.2022

DRILL HOLE NO.		LOCATION OF DRILL HOLE					ELEVATION		DATUM		TOTAL DEPTH				
DH-1		As Per Boring Location Plan					-		-		20'				
WATER LEVEL OBSERVATIONS						TYPE OF SURFACE		DRILLER							
WHILE DRILLING		END OF DRILLING		HOURS		Landscape Grass		MID-STATE ENGINEERING							
13 1/2'		10'		N/A		4 1/2" Solid Stem Auger		James A Kostal, E.I.T.							
DEPTH (ft)	SAMPLE NO. & TYPE	N-value BLOWS / ft	REC (%)	COLOR	MOIST	CONS.	SOIL TYPE (Class)	GEOLOGIC DESCRIPTION & OTHER REMARKS		MOIST (%)	DRY WEIGHT (pcf)	Qu (tsf)	% PASS #200 SIEVE	PLASTIC INDEX	DEPTH (ft)
								6" Top Soil							
	U-1			Brown	Moist	Very Stiff	CL	FILL MATERIAL w/ Fine Sand		16.8	107.0				
5	U-2			Light Greyish Brown						16.6	114.4	2.2	52.2		5
10	S-3	(16) 6/4/12		Light Brown	Slightly Moist	Firm	SP	ALLUVIAL SAND DEPOSITS -Fine to Medium Sand					0.9		10
					Saturated			w/ Trace of 1/2" - 1" Rock		3.1					
15	S-4	(6) 2/3/3				Loose		-Medium to Coarse Sand		12.0					15
20	S-5	(10) 4/5/5				Firm				12.4			2.1		20
								Bottom of Boring 20'							
25															25
30															30
35															35





# BORING LOG

PROJECT: Indoor Tennis Facility  
 LOCATION: Lexington, Nebraska  
 JOB NO. 200-101-29 DATE 12.13.2022

DRILL HOLE NO.		LOCATION OF DRILL HOLE					ELEVATION		DATUM		TOTAL DEPTH				
DH-3		As Per Boring Location Plan					-		-		20'				
WATER LEVEL OBSERVATIONS						TYPE OF SURFACE			DRILLER						
WHILE DRILLING		END OF DRILLING		HOURS		Landscape Grass			MID-STATE ENGINEERING						
13'		10 1/2'		N/A		4 1/2" Solid Stem Auger			James A Kostal, E.I.T.						
DEPTH (ft)	SAMPLE NO. & TYPE	N-value BLOWS / ft.	REC (%)	COLOR	MOIST	CONS.	SOIL TYPE (Class)	GEOLOGIC DESCRIPTION & OTHER REMARKS		MOIST (%)	DRY WEIGHT (pcf)	Qu (tsf)	% PASS #200 SIEVE	PLASTIC INDEX	DEPTH (ft)
								6" Top Soil							
	U-1			Dark Brown	Moist	Stiff	CL-ML	FILL MATERIAL w/ Fine Sand		12.1	113.8	1.7		6	
5	S-2	(11) 2/4/7		Light Greyish Brown	Moist	Firm	SC	ALLUVIAL DEPOSITS -Fine Sand w/ Fines		15.4			28.2		5
10	S-3	(11) 4/5/6		Light Brown	Slightly Moist		SP	-Fine to Medium Sand		1.9			1.1		10
					Saturated			w/ Trace of 1/2" - 1" Rock							
15	S-4	(8) 3/4/4				Loose		-Fine to Coarse Sand		8.2					15
20	S-5	(9) 5/5/4								10.4			1.2		20
								Bottom of Boring 20'							
25															25
30															30
35															35

APPENDIX C

SUMMARY OF SOILS



# Mid-State

Engineering & Testing, Inc.  
279 Road 'D', Columbus, NE. 68601

## Soil Properties

## Unified Soils Classification (Including Identification and Description)

Group Symbols	Typical Names	Values as Subgrade When No Subjection to Protraction	Potential Frost Action	Compressibility and Expansion	Drainage Characteristics	Compaction Equipment	Typical Design Values	
							Dry Unit Weight (pcf) - ASTM-D-698	Subgrade Modulus (lb./sq. in.)
GW	Well-graded gravels, gravel-sand mixture, little or no fines	Excellent	None to Very Slight	Almost None	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	125-140	40-80
GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Good to Excellent	None to Very Slight	Almost None	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	110-140	30-60
GM	Silty gravels, gravel-sand-silt mixtures, <50% Silts & Clays	Good to Excellent	Slight to Medium	Slight	Fair to Poor	Rubber-tired roller Sheepfoot roller	115-135	20-60
GC	Clayey gravels, gravel-sand-clay mixtures, <50% Silts & Clays	Good	Slight to Medium	Slight	Poor to Practically Impervious	Rubber-tired roller Sheepfoot roller	100-145	30-60
SW	Well-graded sands, gravelly sands, little or no fines	Good	None to Very Slight	Almost None	Excellent	Crawler-type tractor rubber-tired roller	110-130	20-40
SP	Poorly graded sands, gravelly sands, little or no fines	Fair to Good	None to Very Slight	Almost None	Excellent	Crawler-type tractor rubber-tired roller	105-135	30-60
SM	Silty sands, sand-silt mixtures <50% Silts & Clays	Fair to Good	Slight to High	Slight	Fair to Poor	Rubber-tired roller Sheepfoot roller	120-135	15-40
SC	Clayey sands, sand-clay mixtures <50% Silts & Clays	Poor to Fair	Slight to High	Slight to Medium	Poor to Practically Impervious	Rubber-tired roller Sheepfoot roller	100-135	5-20
ML	Inorganic silts and very fine sands, rock flour, silty fine sands or clayey silts with slight plasticity	Poor to Fair	Medium to Very High	Slight to Medium	Fair to Poor	Rubber-tired roller Sheepfoot roller, close control of moisture	100-120	15 or Less
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Poor to Fair	Medium to Very High	Medium	Practically Impervious	Rubber-tired roller Sheepfoot roller	90-130	15 or Less
OL	Organic silts and organic silty clays of low plasticity	Poor	Medium to High	Medium to High	Poor	Rubber-tired roller Sheepfoot roller	90-105	5 or Less
MH	Inorganic silts, inorganic or diatomaceous fine sandy or silty soils, plastic silts	Poor	Medium to Very High	High	Fair to Poor	Sheepfoot roller Rubber-tired roller	90-105	10 or Less
CH	Inorganic clays or high plasticity fat clays	Poor to Fair	High	High	Practically Impervious	Sheepfoot roller Rubber-tired roller	90-115	15 or Less
OH	Organic clays of medium to high plasticity	Poor to Very Poor	High	High	Practically Impervious	Sheepfoot roller Rubber-tired roller	90-110	5 or Less
Pt	Peat and other highly organic soils	Not Suitable	Very High	Very High	Fair to Poor	Compaction Not Practical		



The data is subject to infection by virus, undetectable alteration, and deterioration. TEAM shall not be liable or assume responsibility for the presence of virus or the completeness or accuracy of information contained in the data after delivery to Recipient.

TEAM makes no warranties, express or implied, of merchantability and fitness for any particular purpose, as to either the information contained in the electronic data or to the electronic data itself. Under no circumstances shall the delivery of the data for use by Recipient be deemed a sale by the TEAM. TEAM makes no warranties, either expressed or implied of merchantability and fitness of data for any particular purpose. In no event shall the TEAM or Owner be liable for any loss of profit or any consequential damages.

**Restrictions** No amendment, modification, or discharge of this Agreement shall be valid or binding unless set forth in writing and duly executed by both parties.

Any waiver by either party of a breach of any provision of this Agreement shall not operate as, or be construed as, a waiver of any future breach of the provision, any other provision, or any subsequent breach.

**Procedure** Recipient shall provide a fully executed agreement to the TEAM prior to receiving the data. TEAM reserves the right to reject incomplete, illegible or altered agreements. TEAM will only release data after receiving a properly executed agreement.

**Authorization** The individual signing the agreement for the Recipient represents that he is a duly authorized agent of the Recipient requesting the data.

**Recipient:**

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Signature	Title	Date
-----------	-------	------

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Company

**SECTION 00 4100  
BID FORM**

**THE PROJECT AND THE PARTIES**

**TO: City of Lexington**

**FOR: City of Lexington, Lexington Racquet Center**

**SUBMITTED BY: (Bidder to enter name and address)**

Bidder's Full Name \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Telephone \_\_\_\_\_ E-mail \_\_\_\_\_

**OFFER**

The undersigned, being familiar with the local conditions affecting the cost of the Work, the Instructions to Bidders, Bid Form, Bidding Requirements, General Conditions, Supplemental Conditions, Specifications, Construction Drawings and Addenda which govern the purchase of material and labor and the awarding of contracts, hereby proposes to furnish all labor, materials, equipment and services required for the Construction of the proposed project and to perform such work in accordance with the Contract Documents for the following sums.

In submitting this bid, I agree:

To hold my bid open for **thirty (30)** days after the receipt of bids.

To enter into and execute an "Owner-Contractor Agreement", based upon this bid, if this bid is accepted by the Owner.

To perform all work required by the Contract Documents.

In submitting this Proposal, it is understood that the right is reserved by the Owner to accept any proposal which, in its judgment, is the lowest and best proposal, and to waive any irregularities or informalities in any proposal.

Amounts shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.

**BASE BID:** Provide all work as required by the Contract Documents for the sum of

\_\_\_\_\_ dollars

(\$ \_\_\_\_\_), in lawful money of the United States of America.

**CONTRACT TIME**

The undersigned Bidder hereby declares that he has visited the site of the work and has carefully examined the Contract Documents pertaining to the work covered by the above bid.

Complete all Work as required by the Contract Documents within the time stated in Section 01 1000 - Summary.

Identify (in calendar days) longer than industry expected lead-time materials and equipment with the perspective timeframe (if known) associated with this project and the stated Work requirements:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**ADDENDA**

The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Sum.

I have received Addendum \_\_\_\_\_ through \_\_\_\_\_, and have included their provisions in my bid.

**BID FORM SIGNATURE(S)**

The Corporate Seal of

\_\_\_\_\_

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

\_\_\_\_\_

(Authorized signing officer, Title)

(Seal)

Date and State of Incorporation: \_\_\_\_\_

**END OF BID FORM**



**SECTION 00 5000**  
**CONTRACTING FORMS AND SUPPLEMENTS**

**PART 1 GENERAL**

**1.1 Contractor is responsible for obtaining a valid license to use all copyrighted documents specified but not included in the Project Manual.**

**1.2 FORM PROVIDER:**

- A. Standard AIA Forms are available for purchase from the following address:  
AIA - Nebraska  
335 North 8th Street  
Suite A  
PO Box 80045  
Lincoln, Nebraska 68501-0045  
Phone: (402) 858-1929  
Fax: (402) 858-1929  
[www.aiane.org/contract\\_documents/](http://www.aiane.org/contract_documents/)

**1.3 AGREEMENT AND CONDITIONS OF THE CONTRACT**

- A. See Section 00 7200 - General Conditions for the General Conditions.  
B. The Agreement is based on AIA A101.  
C. The General Conditions are based on AIA A201.

**1.4 FORMS**

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
- B. Bid Form: Section 00 4100 (Copy attached).
- C. Bond Forms:  
1. Performance and Payment Bond Form: AIA A312.
- D. Post-Award Certificates and Other Forms:  
1. Submittal Transmittal Form: Contractor's Standard (with Architect's approval).  
2. Certificate of Insurance Form: AIA Documents G705.  
3. Schedule of Values Form: AIA G703.  
4. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).  
5. Stored Material Form: Supplementary Agreement for Storage Materials Off-Site.
- E. Clarification and Modification Forms:  
1. Request for Interpretation Form: Contractor's Standard (with Architect's approval).  
2. Architect's Supplemental Instructions Form: AIA G710.  
3. Architect's Supplemental Instructions Form: AIA G710.  
4. Construction Change Directive Form: AIA G714.  
5. Proposal Request Form: AIA G709.  
6. Change Order Form: AIA G701.
- F. Closeout Forms:  
1. Certificate of Substantial Completion Form: AIA G704.  
2. Affidavit of Payment of Debts and Claims Form: AIA G706.  
3. Affidavit of Release of Liens Form: AIA G706A.  
4. Consent of Surety to Final Payment Form: AIA G707.

## **1.5 REFERENCE STANDARDS**

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum; 2017.
- B. AIA A201 - General Conditions of the Contract for Construction; 2017.
- C. AIA A312 - Performance Bond and Payment Bond; 2010.
- D. AIA G701 - Change Order; 2017.
- E. AIA G702 - Application and Certificate for Payment; 1992.
- F. AIA G703 - Continuation Sheet; 1992.
- G. AIA G704 - Certificate of Substantial Completion; 2017.
- H. AIA G710 - Architect's Supplemental Instructions; 2017.
- I. AIA G714 - Construction Change Directive; 2017.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 00 7200  
GENERAL CONDITIONS**

**FORM OF GENERAL CONDITIONS**

- 1.1** The "General Conditions of the Contract for Construction", AIA Document A201, 2017 Edition, Articles 1 through 14 inclusive, is a part of this contract and is incorporated herein as fully as if here set forth.

**RELATED REQUIREMENTS**

- 2.1** SECTION 00 7300 - Supplementary Conditions.

**END OF SECTION**

**SECTION 00 7300  
SUPPLEMENTARY CONDITIONS**

**PART 1 GENERAL**

**SUPPLEMENTARY CONDITIONS TO AIA DOCUMENT A201:2017** The following supplements change, delete, or add to the General Conditions of the Contract for Construction. Where any part of the General Conditions are modified or voided by the Articles, the unaltered provisions of that part shall remain in effect.

**ARTICLE 3: CONTRACTOR**

"Labor and Materials," add:

3.4.4 Materials and/or workmanship not in compliance with the drawings and specifications or improperly installed shall be removed and replaced by the Contractor with no change in contract price.

3.4.5 Contractor shall familiarize himself with all the specified products and shall submit any objections he may have to the proposed use of any products in writing prior to the opening of bids.

3.4.6 New Employee Work Eligibility Status:

The Contractor is required and hereby agrees to use a federal immigration verification system to determine the work eligibility status of new employees physically performing services within the State of Nebraska. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work eligibility status of a newly hired employee.

If the Contractor is an individual or sole proprietorship, the following applies:

The Contractor must complete the United States Citizenship Attestation Form, available on the Department of Administrative Services website at [www.das.state.ne.us](http://www.das.state.ne.us).

If the Contractor indicates on such attestation form that he or she is a qualified alien, the Contractor agrees to provide the US Citizenship and Immigration Services documentation required to verify the Contractor's lawful presence in the United States using the Systematic Alien Verification for Entitlements (SAVE) Program.

The Contractor understands and agrees that lawful presence in the United States is required and the Contractor may be disqualified or the contract terminated if such lawful presence cannot be verified as required by Neb. Rev. Stat, § 4-108.

"Permits, Fees, Notices and Compliance with Laws" add:

3.7.1 The Contractor shall give notices and comply with laws, ordinances, rules, regulations and orders of public authorities bearing on performance of this Project. The Contractor shall secure and pay for permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Contractor's Work. The Contractor shall comply with federal, state and local tax laws, social security acts, unemployment compensation acts and workers' compensation acts insofar as applicable to the performance on this Project.

"Shop Drawings, Product Data and Samples," paragraph 3.12, add:

3.12.11 Only copies of approved shop drawings shall be used for construction.

"Cleaning Up," paragraph 3.15, add:

3.15.3 Remove labels from glass, fixtures, etc. Remove spots, marks, stain prints, and dirt from painted work, varnished work, hardware, tile, fixtures, and concrete. Remove temporary floor coverings, clean and finish floors as recommended by manufacturers.

## **ARTICLE 7: CHANGES IN WORK**

### **7.1.4 COST OF WORK Add the following requirements for additions or deletions to the Scope of Work:**

1. Computation of Change in Contract Amount:
  - a. Markup percentage shall include all overhead, profit, bonding and insurance.
  - b. The net cost shall be increased for additional work according to and not exceeding the following markup percentages:
    - 1) Contractor; for Work performed by Contractor's own forces: Fifteen (15) percent maximum.
    - 2) Contractor; for Work performed by Contractor's Subcontractors: Five (5) percent maximum.
    - 3) Subcontractor or Sub-subcontractor; for Work performed by that Subcontractor's or Sub-subcontractor's own forces: Ten (10) percent maximum.
  - c. The additional total Contract Sum cost will include net cost of additional approved work and maximum markup.
  - d. All deletions of work to the contract amount will be at cost with no markup.
  - e. Include full breakdown, including pricing documents from subcontractors.
  - f. This applicable to both Change Orders and Construction Change Directives.

## **ARTICLE 8: TIME**

### **8.1.2 Add the following:**

Delete the word "Agreement" and add "Notice to Proceed".

### **8.2 Progress and Completion: Supplement as follows:**

#### **8.2.4 Time for Completion:**

- a. It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the time for completion, as stated in the Proposal Form, of the Work to be done hereunder are ESSENTIAL CONDITIONS of this Contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on a date to be specified in the "Notice to Proceed", and shall be Substantially Complete specified in Work Sequence under Summary 01 1000.
- b. The Contractor agrees that said work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will insure full completion thereof within the time indicated. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the same, taking into consideration the average climatic change and usual industrial conditions prevailing in this locality.
- c. If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby breach his Contract and shall be in default thereafter the time stipulated in the Contract for completing the work.
- d. It is further agreed that time is of the essence of each and every portion of this Contract and of the specifications wherein a definite and certain length of time is fixed for the performances of any set whatsoever; and where under the Contract and additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this Contract.
- e. The Contract Time shall be adjusted only for changes pursuant to suspension of Work and excusable delays pursuant to Article 15 following. In the event the Contractor requests an extension of the Contract Time, he shall furnish such justification and supporting evidence as the Owner may deem necessary for a determination of whether or not the Contractor is entitled to an extension of time under the provisions of the Contract. The burden of proof to substantiate a claim for an extension of the Contract Time shall rest with the Contractor, including evidence that the cause was

beyond his control. The Owner shall base his findings of fact and decision on such justification and supporting evidence and shall advise the Contractor in writing thereof. If the Owner finds that the Contractor is entitled to any extension of the Contract Time, the Owner's determination of the total number of days extension shall be based upon the currently approved progress schedule and on all data relevant to the extension. Such data will be incorporated into the schedule in the form of a revision thereto, accomplished in a timely manner. The Contractor acknowledges and agrees that actual delays (due to said changes, suspension of Work, or excusable delays) in activities which, according to the schedule, do not affect the Contract Time, do not have any effect upon the Contract Time and therefore will not be the basis for a change therein. The Contractor acknowledges and agrees that time extensions will be granted only to the extent that excusable delays exceed the available float in the Contractor's schedule.

- f. Subject to other provisions of the Contract, the Contractor may be entitled to an extension of the Contract Time (but no increase in the Contract Sum) for delays arising from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, his Subcontractors or suppliers as follows:
- 1) Labor disputes and strikes (including strikes affecting transportation), that do, in fact, directly and critically affect the progress of the Work; however, an extension of Contract Time on account of an individual labor strike shall not exceed the number of days of said strike;
  - 2) Acts of God, tornado, fire, hurricane, blizzard, earthquake, typhoon, or flood that damage completed work or stored materials.
  - 3) Abnormal inclement weather; however, the Contract Time will not be extended due to normal inclement weather. Unless the Contractor can substantiate to the satisfaction of the Owner that there was greater than normal inclement weather considering the full term of the contract Time using a ten-year average of accumulated record mean values from climatological data compiled by the U. S. Department of Commerce, National Oceanic and Atmospheric Administration for the locale of the Project and that such alleged greater than normal inclement weather actually delayed the Work or portions thereof which had an effect upon the contract Time, the Contractor shall not be entitled to an extension of time. If the total accumulated number of calendar days lost due to inclement weather, from the start of Work until Substantial Completion exceeds the total accumulated number to be expected the Contract time shall be increased to include the excess number of calendar days lost.
  - 4) Acts of the public enemy, acts of the state, Federal or local government in its sovereign capacity, and acts of another Contractor in the performance of a contract with the Owner relating to the Project.

**ARTICLE 9: PAYMENTS AND COMPLETION (UNLESS CONTRARY TO STATE LAW)  
(Contractor's payments and retainage shall be as follows unless it conflicts with a state law.)**

"Applications for Payment," paragraph 9.3, add the following:

9.3.1.1, change to read: Such applications shall not include requests for payment on account of changes in the work which have been properly authorized by Construction Directives but not yet included in Change Orders.

9.3.2, add the following: The payments shall be in the amount of ninety percent (90%) for completed work and ninety percent (90%) for materials and equipment delivered to and properly stored on the job. The Owner will retain ten percent (10%) of the total cost of the Contract until substantial completion of the project or may choose to reduce the retainage at 50% completion to 0% on the remaining 50%. The total sum thus retained (5% of contract amount) shall be paid to the Contractor upon final completion of the Work.

9.3.3.1 Lien Releases and Receipted Bills, add the following: Before receiving any payment, except the first, the Contractor shall furnish to the Architect, along with his "Request for Payment," partial (or final as the case may be) lien releases covering all

materials used and subcontracts performed in connection with his contract through the date of the previous billing. In addition, the Contractor shall furnish with each request for payment, including the first, his own waiver of lien in the full amount of his request and shall include a list of subcontractors, sub-subcontractors, and suppliers whose lien releases will be furnished with the following month's request. Should the Contractor fail to furnish required lien releases, the amount of his "Request for Payment" not covered by such lien releases may not be certified.

9.3.3.2 Final Waivers of Lien, add the following: Before final payment will be made, the Contractor shall furnish final waivers of lien, or receipted bills, covering all materials used and subcontracts performed in connection with his contract, including his own final waiver of lien in the full amount of the contract.

9.8 "Substantial Completion", add the following:

9.8.6. The following information is the minimum submission of information required to be turned over to the Owner on the date of the Substantial Completion, by the Architect. The Contractor shall submit all of the required information to the Architect a minimum of 45 days after the date of the Substantial Completion. A Substantial Completion Certificate shall not be issued if the Contractor fails to provide this required submission.

1. Balancing reports on all H.V.A.C. systems.
2. Systems test reports:
  - a. Fire alarm
  - b. Fire sprinkler system
  - c. Fire extinguishers
3. Smoke/flame spread certificates:
  - a. Floor finishes
  - b. Window treatment
  - c. Wall finishes
  - d. Ceiling finishes
4. Copy of approved shop drawings. Bound in 3-ring binders.
5. Soil compaction tests.
6. Concrete tests.
7. Mechanical O & M Manuals.
8. Electrical O & M Manuals.
9. One copy of the Record drawings.
10. One copy of the Record provided specifications.
11. Warranty:
  - a. Roofing manufacturer
  - b. Wood door
  - c. Mechanical equipment
    - 1) Compressor
    - 2) Pumps
    - 3) Boilers
    - 4) Water heaters
12. Extra materials:
  - a. Paint
  - b. Vinyl wall fabric
  - c. Ceiling tile
  - d. Carpet
  - e. Sheet vinyl
  - f. Vinyl composition tile
13. Staff training on mechanical/electrical equipment:
  - a. The Contractor shall submit a signed letter or certificate signed by the maintenance supervisor and administrator stating that they have been trained and understand the operation of the equipment provided within this contract.
14. Turn over all keys and schedule to the Owner.
15. The Architect and Engineers shall add to this list as required.

**ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY**

Safety of Persons and Property, paragraph 10.2.4, change to read:

10.2.4 The use or storage of explosives or other hazardous materials shall not be permitted on this project.

**ARTICLE 11: INSURANCE**

11.1 Delete and replace as follows:

The contractor shall agree to protect, defend, indemnify, and hold the Owner, its officers, commissions, employees and agents free and harmless from and against any loss, penalties, damages, settlements, costs, charges, professional fees or other expenses or liabilities of every kind and character resulting from the error omission or negligent act of the contractor, its agents, employees or representatives, in the performance of the contractor's duties under any agreement resulting from award of this proposal. The Contractor is to indemnify the Owner to the fullest extent permitted by the law for Claims that are not covered by the Contract Documents protection requirements. The Owner, or any of its agencies, will not hold harmless or indemnify any respondent for any liability whatsoever.

The Contractor shall secure, pay for, and deliver to the Owner, Builders Risk, Completed Value insurance program for work to be performed on a Special Cause of Loss form. The named insured is to be the Owner, with the contractor and/or their subcontractors added as an additional insured as their interest may appear at the time of loss. Unless specifically authorized by the Owner, the amount of such insurance shall not be less than the Contract Price totaled in the bid. The policy shall cover no less than the losses due to "all risk" during the contract period and until the final work is accepted by the Owner. Any deductible, not to exceed \$10,000 per occurrence Amounts higher must be approved by the Owner), shall be borne by the contractor.

Such insurance policy shall not cover any tools, equipment, scaffolding, staging, towers, structure erected for housing workers and forms owned or rented by the contractors. Their insurance company shall have no right to subrogate against the Owner, Contractors and subcontractors for such loss.

It is agreed between the parties that the Owner shall not, under any circumstances, be responsible nor have any obligation for workers compensation benefits to the Contractors, its agents, employees and subcontractors or their agents and/or employees.

The Contractor shall be required to maintain and carry in force, for the duration of the contract, insurance coverage of the types and minimum liability as set forth below. The Owner will only accept coverage from an insurance carrier who offer proof that it is licensed to do business in the State of Nebraska, and carries a Best's rating of "A:V" or better; OR is as company mutually agreed upon by the City and the contractor.

**COMMERCIAL GENERAL LIABILITY**

Limits - Including Contractual Liability	
Each Occurrence:	\$1,000,000
Personal & Advertising Injury:	\$1,000,000
Products/Completed Operations Aggregate:	\$1,000,000
General Aggregate:	\$1,000,000

**AUTOMOBILE LIABILITY**

Policy shall protect the Contractor against claims for bodily injury and/or property damage arising out of the ownership or use of nay owned, hired and/or non-owned with a minimum of \$1,000,000 combined single limit.

**WORKERS' COMPENSATION**

This insurance shall protect the Contractor against all claims under applicable State Workers' Compensation Laws. The consultant shall also be protected against claims for injury, disease or death of employees which, for any reason, may not fall within the



provisions of a Workers' Compensation Law. The policy limits shall not be less than the following:

Workers' Compensation: Statutory

Employer's Liability

Bodily Injury by Accident: \$100,000 Each Accident

Bodily Injury by Disease: \$500,000 Policy Limit

Bodily Injury by Disease: \$100,000 Each Employee

Before, entering into a contract, the successful respondent shall furnish to the Owner a Certificate of Insurance verifying all of the forgoing coverage and identifying the Owner as an "additional insured" on the general liability policy. This inclusion shall not make the City a partner or joint venture with the Contractor in its operations herein.

Prior to any material change or cancellation, the Owner will be given thirty (30) days advance notice by registered mail to the stated address of the certificate holder.

In the event of an occurrence, it is further agreed that any insurance maintained by the Owner, shall apply in excess of and not contribute with insurance provided by policies named in this contract.

The certificate holder on the Certificate of Insurance shall list the Owner.

11.3.1, and 11.3.1.1, through 11.3.1.10 delete paragraphs in their entirety.

#### **ARTICLE 13: MISCELLANEOUS PROVISIONS**

Paragraph 13.2.2 Delete the paragraph in its entirety.

#### **ARTICLE 15: CLAIMS AND DISPUTES**

"Claims for Additional Time, paragraph 15.1.6.1, add:

15.1.6.2 The Contractor shall, within seven (7) days from the beginning of such delay, notify the Architect, in writing, of the causes of the delay, who shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of his decision in the matter. The Architect's decision shall be final.

ARBITRATION; paragraph 15.4.1, change the word "shall" in the third line to read: "may".

ARBITRATION; paragraph 15.4.2, change the word "shall" in the third line to read: "may".

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 1000**  
**SUMMARY**

**PART 1 GENERAL**

**1.1 PROJECT**

- A. Project Name: City of Lexington, Lexington Racquet Center.
- B. Project Address: 1110 North Park Street, Lexington, NE 68850.
- C. Owner's Name: City of Lexington.
- D. Architect's Name: Wilkins Architecture Design Planning, L.L.C..
- E. The Contract Documents, dated January 10, 2023 prepared for the project by Wilkins Architecture Design Planning, L.L.C.
- F. The Project consists of a new 31,125 SF pre-engineered metal building structure. The program includes four tennis courts, with a central core consisting of a reception area, space for spectator seating, restrooms, storage/mechanical, and a non-occupiable mezzanine.

**1.2 CONTRACT DESCRIPTION**

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5200 - Agreement Form.
- B. Project will be constructed under one (1) general construction contract.

**1.3 OWNER OCCUPANCY**

- A. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- B. Schedule the Work to accommodate Owner occupancy.

**1.4 CONTRACTOR USE OF SITE AND PREMISES**

- A. Arrange use of site and premises to allow:
  - 1. Owner occupancy.
  - 2. Use of site and premises by the public.
- B. Provide access to and from site as required by law and by Owner:
  - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
  - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- C. Utility Outages and Shutdown:
  - 1. Limit disruption of utility services to hours the building is unoccupied.
  - 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without seven (7) notice to Owner and authorities having jurisdiction.
  - 3. Prevent accidental disruption of utility services to other facilities.

**1.5 WORK SEQUENCE**

- A. ALL WORK MUST BE COMPLETED WITHIN THE SCHEDULE NOTED. The Work shall be conducted in a single phase as described in the schedule below:

January 31, 2023: Bids received from General Contractors at 2:00 p.m. (CST)

February 14, 2023: City Council awards bid/contract.

March 20, 2023: Construction Starts.

November 6, 2023: Substantial Completion.

November 20, 2023: Final Completion/Owner Occupy.

## **1.6 WORK SPECIFICATION FORMATS AND CONVENTIONS**

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 48-division format and CSI/CSC's "MasterFormat" numbering system.

**END OF SECTION**

**SECTION 01 2000  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Price and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for initial and final payments.

**1.2 RELATED REQUIREMENTS**

- A. Section 00 5000 - Contracting Forms and Supplements: Forms to be used.
- B. Section 00 7200 - General Conditions: Additional requirements for progress payments, final payment, changes in the Work.
- C. Section 00 7300 - Supplementary Conditions: Percentage allowances for Contractor's overhead and profit.
- D. Section 01 2100 - Allowances: Payment procedures relating to allowances.
- E. Section 01 7000 - Execution and Closeout Requirements: Closeout procedures.
- F. Section 01 7800 - Closeout Submittals: Project record documents.

**1.3 SCHEDULE OF VALUES**

- A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- B. Forms filled out by hand will not be accepted.
- C. 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.
  - 1. Submit draft of AIA Document G703 Continuation Sheets.
  - 2. Identification: Include the following Project identification on the Schedule of Values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of Submittal.
  - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents.
  - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  - 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
  - 6. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- D. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
  1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with Continuation Sheets.
    - b. Submittals Schedule.
    - c. Contractor's Construction Schedule.
- E. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment
- F. Revise schedule to list approved Change Orders, with each Application For Payment.

#### **1.4 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- E. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
- F. 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.
- G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- H. Submit one electronic copy of each Application for Payment.
- I. Submit hard copy of each Application for Payment, if Owner requests.
- J. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- K. Include the following with the application:
  1. Transmittal letter as specified for submittals in Section 01 3000.
  2. Partial release of liens from major subcontractors and vendors.
  3. Lien waivers.
  4. Affidavits attesting to off-site stored products.

#### **1.5 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 Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.

- C. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
  - 1. The document will describe the required changes and will designate method of determining any change in Contract Price or Contract Time.
  - 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 14 days.
- E. 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.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
- G. Substantiation of Costs: Provide full information required for evaluation.
  - 1. On request, provide the 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.
- H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. 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 Price.
- J. 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.
- K. Promptly enter changes in Project Record Documents.

## **1.6 APPLICATION FOR INITIAL PAYMENT**

- A. Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  - 1. List of subcontractors
  - 2. Schedule of Values.
  - 3. Contractor's Construction Schedule (preliminary if not final).
  - 4. Products list.
  - 5. Submittals Schedule (preliminary if not final).
  - 6. List of Contractor's staff assignments
  - 7. Copies of building permits.
  - 8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  - 9. Certificates of insurance and insurance policies.
  - 10. Performance and payment bonds.
  - 11. Data needed to acquire Owner's insurance.

## **1.7 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Price, 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 01 7000.
  - 2. Updated final statement, accounting for final changes to the Contract Sum.
  - 3. Meter readings of all utility services for which the Contractor has been paying after substantial completion.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 2100  
ALLOWANCES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Inspecting and testing allowances.
- B. Payment and modification procedures relating to allowances.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

**1.3 CASH ALLOWANCES**

- A. Costs include Contractor's cost for contracting, paying, coordinating and supervising Owner's supplied companies during project construction.
- B. At closeout of Contract, funds remaining will be credited to Owner by Change Order.

**1.4 INSPECTING AND TESTING ALLOWANCES**

- A. Costs Included in Inspecting and Testing Allowances: Cost of engaging an inspecting or testing agency; execution of inspecting and tests; and reporting results.
- B. Costs Not Included in the Inspecting and Testing Allowances:
  - 1. Costs of incidental labor and facilities required to assist inspecting or testing agency.
  - 2. Costs of testing services used by Contractor separate from Contract Document requirements.
  - 3. Costs of retesting upon failure of previous tests as determined by Architect.
- C. Payment Procedures:
  - 1. Submit one (1) copy of the inspecting or testing firm's invoice with next application for payment.
  - 2. Pay invoice on approval by Architect.
- D. At closeout of Contract, funds remaining will be credited to Owner by Change Order.

**1.5 ALLOWANCES SCHEDULE**

- A. Soils, Concrete and Special Testing allowance:
  - 1. Include an allowance for the sum of **\$8,000.00** in base bid for testings as specified.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 01 3000**  
**ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. General administrative requirements.
- B. Digital document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Progress photographs.
- G. Submittals for review, information, and project closeout.
- H. Number of copies of submittals.
- I. Submittal procedures.
- J. Contractor's use of Architect's CAD/BIM files.

**1.2 RELATED REQUIREMENTS**

- A. Section 00 7200 - General Conditions: Dates for applications for payment.
- B. Section 00 7300 - Supplementary Conditions: Duties of the General Contractor/Construction Manager.
- C. Section 01 3216 - Construction Progress Schedule: Form, content, and administration of schedules.
- D. Section 01 6000 - Product Requirements: General product requirements.
- E. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
- F. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

**1.3 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

**1.4 PROJECT COORDINATOR**

- A. Project Coordinator: General Contractor.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for all access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 1000 - Summary.

- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect through the Project Coordinator:
  - 1. Requests for Information.
  - 2. Shop drawings, product data, and samples.
  - 3. Test and inspection reports.
  - 4. Design data.
  - 5. Manufacturer's instructions and field reports.
  - 6. Applications for payment and change order requests.
  - 7. Progress schedules.
  - 8. Correction Punch List and Final Correction Punch List for Substantial Completion.
  - 9. Closeout submittals.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.1 DIGITAL DOCUMENT SUBMITTAL SERVICE**

- A. All documents transmitted for purposes of administration of the contract are to be in digital (PDF) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides digital stamping and signatures, and notifies addressees via email.
  - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
  - 2. Contractor and Architect are required to use this service.
  - 3. It is Contractor's responsibility to submit documents in allowable format.
  - 4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
  - 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply digital stamps (such as Adobe Acrobat, [www.adobe.com](http://www.adobe.com), or Bluebeam PDF Revu, [www.bluebeam.com](http://www.bluebeam.com)), unless such software capability is provided by the service provider.
  - 6. Paper document transmittals will not be reviewed; emailed digital documents will not be reviewed.
  - 7. All other specified submittal and document transmission procedures apply, except that digital document requirements to not apply to actual samples or color selection charts.
  - 8. Actual samples or color selection charts need to be photographed and attached to the digital format submittals for reference.
  - 9. Final project archiving copies to Owner and Architect.
- B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.
- C. Service: The selected service is:
  - 1. ORACLE | Submittal Exchange (800) 714-0024: [www.submittalexchange.com](http://www.submittalexchange.com).
- D. Service Duration: Service will need to be in effect for the duration of construction and up to one (1) year past the date of Substantial Completion.
- E. Training: One (1), one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.
- F. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

### **3.2 PRECONSTRUCTION MEETING**

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:
  - 1. Owner.
  - 2. Architect.
  - 3. Contractor.
  - 4. Design consultants.
  - 5. Major subcontractors and suppliers.
- 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. Scheduling activities of a Geotechnical Engineer.
  - 9. Use of premises.
  - 10. Responsibilities for temporary facilities and controls.
  - 11. Parking availability.
  - 12. Office, work and storage areas.
  - 13. First aid.
  - 14. Security.
  - 15. Progress cleaning.
  - 16. Working hours.
- D. Record minutes and distribute copies within two (2) days after meeting to participants, with electronic copies to Architect, Owner, participants, and those affected by decisions made.

### **3.3 PROGRESS MEETINGS**

- A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
  - 1. Contractor.
  - 2. Owner.
  - 3. Architect.
  - 4. Contractor's superintendent.
  - 5. Major subcontractors and suppliers.
- C. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of work progress.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems that impede, or will impede, planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Review of RFIs log and status of responses.
  - 7. Review of off-site fabrication and delivery schedules.
  - 8. Maintenance of progress schedule.
  - 9. Corrective measures to regain projected schedules.
  - 10. Planned progress during succeeding work period.
  - 11. Coordination of projected progress.

12. Maintenance of quality and work standards.
  13. Effect of proposed changes on progress schedule and coordination.
  14. Other business relating to work.
- D. Record minutes and distribute copies within two (2) days after meeting to participants, with electronic copies to Architect, Owner, participants, and those affected by decisions made.

### **3.4 CONSTRUCTION PROGRESS SCHEDULE**

- A. If preliminary schedule requires revision after review, submit revised schedule within ten (10) days.
- B. Within ten (10) days after joint review, submit complete schedule.
- C. Submit updated schedule with each Application for Payment.

### **3.5 PROGRESS PHOTOGRAPHS**

- A. Submit new photographs at least once a month, within three (3) after being taken.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to Architect.
- D. Views:
  1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
  2. Consult with Architect for instructions on views required.
  3. Provide factual presentation.
  4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- E. Digital Photographs: 24-bit color, minimum resolution of 1600 by 1200 ("2 megapixel"), in JPG format; provide files unaltered by photo editing software.
  1. File Naming: Include project identification, date and time of view, and view identification.

### **3.6 SUBMITTAL SCHEDULE**

- A. Submit to Architect for review a schedule for submittals in tabular format.
  1. Coordinate with Contractor's construction schedule and schedule of values.
  2. Format schedule to allow tracking of status of submittals throughout duration of construction.
  3. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.

### **3.7 SUBMITTALS FOR REVIEW**

- A. All submittals to be digital (PDF format).
  1. Actual samples or color selection charts to be sent to the Owner and Architect. High resolution photographs of all samples must be attached to the digital format submittals for reference.
- B. When the following are specified in individual sections, submit them for review:
  1. Product data.
  2. Shop drawings.
    - a. Review submittals prior to transmittal.
    - b. Determine and verify field measurements, field conditions, and conformance of submittal with requirements of Contract Documents.
    - c. Coordinate submittals with requirements of Work and of Contract Documents.

- d. Notify Architect in writing at time of submittal of any deviations from requirements of Contract Documents.
  - e. Apply Contractor's stamp, signed or initialed for each sheet of Shop Drawings, certifying to Contractor's review and coordination of information with requirements of Work and Contract Documents.
  - f. Any shop drawings submitted without this stamp of approval will not be considered and will be returned to the Contractor for resubmission.
3. Samples for selection.
    - a. Submit full range of manufacturers' standard colors, textures, and patterns for selection.
  4. Samples for verification.
    - a. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices.
    - b. Include identification on each sample, giving full information.
    - c. Include photo of each sample on shop drawing submittal.
  5. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
  6. Samples will be reviewed for aesthetic, color, or finish selection.
  7. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

### **3.8 SUBMITTALS FOR INFORMATION**

- A. All submittals to be digital (PDF format).
- B. 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.
- C. Submit for Architect's knowledge as contract administrator or for Owner.

### **3.9 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. Section 01 7800 - Closeout Submittals
- D. All submittals to be digital (PDF format).
- E. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
  1. Project record documents.
  2. Operation and maintenance data.
  3. Warranties.
  4. Bonds.
  5. Other types as indicated.
- F. Submit for Owner's benefit during and after project completion.

### 3.10 NUMBER OF COPIES OF SUBMITTALS

- A. Digital Documents: Submit one (1) digital copy in PDF format; an digitally-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one (1) of which will be retained by Architect. Include photo of samples with digital submittal.
  - 1. After review, produce duplicates.
  - 2. Retained samples will not be returned to Contractor unless specifically so stated.

### 3.11 SUBMITTAL PROCEDURES

- A. General Requirements:
  - 1. Use a single transmittal for related items.
  - 2. Transmit using approved form.
    - a. Use Contractor's form, subject to prior approval by Architect.
  - 3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  - 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  - 5. 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.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
  - 6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Submit via digital Document Submittal Service.
  - 7. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  - 8. Provide space for Contractor and Architect review stamps.
  - 9. When revised for resubmission, identify all changes made since previous submission.
  - 10. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
  - 11. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
  - 12. Submittals not requested will not be recognized or processed.
- B. Product Data Procedures:
  - 1. Submit only information required by individual specification sections.
  - 2. Collect required information into a single submittal.
  - 3. Submit concurrently with related shop drawing submittal.
- C. Shop Drawing Procedures:
  - 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  - 2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
  - 1. Transmit related items together as single package.
  - 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
  - 3. Include with transmittal high-resolution image files of samples to facilitate digital review and approval. Provide separate submittal page for each item image.

- E. All submittals to be digital (PDF format). No paper documents will be accepted. All mark up to be digital on original PDF document using PDF compatible software.
- F. Transmit each submittal with approved form.

### **3.12 CONTRACTORS USE OF ARCHITECT'S CAD/BIM FILES**

- A. General: CAD and/or BIM files may be provided to the Contractor or Subcontractor under the following conditions:
  - 1. The Architect reserves the right to distribute CAD and/or BIM files as deemed necessary. The Architect and its consultants reserve the right to charge a fee for the distribution of CAD and/or Revit files at their sole discretion.
  - 2. The CAD and/or Revit files distributed shall be used only as a background in the submittal procedures specified and for the Contractor's use during construction for this specific project.
  - 3. All Contractor(s) who would like to obtain CAD and/or BIM files must contact the Architect and request all construction document sheets required. The Architect's consultant CAD and/or BIM files will only be available through and shall be subject to limitation based on the consultant's own digital media transfer policy.
  - 4. The CAD file format available will typically be the Autodesk Autocad Release 2013 (.dwg) or newer. Autodesk Revit files will typically be the most current version available. All digital files will typically be distributed by either email, CD or digital document distribution service.
  - 5. Generally, only CAD files with floor plans and/or reflected ceiling plans shall be distributed. Distribution of any other type of construction document shall be approved by the Architect. All extraneous information such as dimensions, section markers, notes, etc. shall be removed from the CAD files. Under normal circumstances, walls, doors, room numbers and grid lines shall be the only information left in the CAD file. The title block and all reference to the design professional firm will be removed in their entirety, including all Architect and Engineer "seals".
- B. Disclaimers shall be attached to the CAD and/or BIM file distribution and shall read as follows:
  - 1. The end user of these CAD and/or Revit drawing files shall agree to defend, indemnify and hold harmless the Architect from all claims, damages, losses, expenses and attorney fees that may arise from their use. These CAD and/or BIM files may not be reproduced, altered or used without the explicit consent of the Architect.

**END OF SECTION**

**SECTION 01 3216**  
**CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Construction progress schedule, bar chart type.

**1.2 RELATED SECTIONS**

- A. Section 01 1000 - Summary: Work sequence.
- B. Section 01 3000 - Administrative Requirements.

**1.3 SUBMITTALS**

- A. Within ten (10) days after date of Agreement, submit preliminary schedule defining planned operations for the first sixty (60) days of Work, with a general outline for remainder of Work.

**1.4 SCHEDULE FORMAT**

- A. Electronic and hardcopy format.
- B. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- C. Sheet Size: Maximum 11 x 17 inches.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.1 CONTENT**

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
  - 1. Clearly identify critical path.
- B. Identify each item by specification section number.
- C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- D. Provide legend for symbols and abbreviations used.

**3.2 BAR CHARTS**

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

**3.3 REVIEW AND EVALUATION OF SCHEDULE**

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within ten (10) days.

**3.4 UPDATING SCHEDULE**

- A. Maintain schedules to record actual start and finish dates of completed activities.
  - 1. Update critical path when updating schedule.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.



- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.

### **3.5 DISTRIBUTION OF SCHEDULE**

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- C. Submit as outlined in Section 01 3000 - Administrative Requirements.

**END OF SECTION**

**SECTION 01 4000**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Submittals.
- B. Testing and inspection agencies and services.
- C. Control of installation.
- D. Mock-ups.
- E. Tolerances.
- F. Manufacturers' field services.
- G. Defect Assessment.

**1.2 RELATED REQUIREMENTS**

- A. Section 00 7200 - General Conditions: Inspections and approvals required by public authorities.
- B. Section 01 2100 - Allowances: Allowance for payment of testing services.
- C. Section 01 3000 - Administrative Requirements: Submittal procedures.
- D. Section 01 6000 - Product Requirements: Requirements for material and product quality.

**1.3 REFERENCE STANDARDS**

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2014.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2013.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.
- G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- C. Test Reports: After each test/inspection, promptly submit electronic 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. Compliance with Contract Documents.
  - k. When requested by Architect, provide interpretation of results.
2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- 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 complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- 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 thirty (30) days of observation to Architect for information.
  - 2. Submit for information for the limited purpose of assessing compliance 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 compliance with information given and the design concept expressed in the Contract Documents.
  - 2. Include and identify all trades for coordination.
  - 3. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

## 1.5 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. Comply with 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 Contract Documents by mention or inference otherwise in any reference document.

## 1.6 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Contractor shall employ and pay for services of an independent testing agency to perform specified testing and inspection.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
  - 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
  - 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.

## PART 3 EXECUTION

### 2.1 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.
- H. Work that has not been coordinated with other trades for the intended design and finish identified in the Contract Documents will **NOT** be accepted.

### 2.2 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- C. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- D. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
  - 1. Make corrections as necessary until Architect's approval is issued.
- E. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- F. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

## **2.3 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
  - 1. Contractor to coordinate field verification and installation of all trades to avoid accumulative tolerances and variations from the Contract Documents.
- 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.

## **2.4 TESTING AND INSPECTION**

- A. 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-compliance of Work or products.
  - 5. Perform additional tests and inspections required by Architect.
  - 6. Submit reports of all tests/inspections specified.
- B. 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.
- C. Contractor Responsibilities:
  - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  - 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 twenty-four (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.
- D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

## **2.5 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 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.

## **2.6 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not complying with specified requirements.

**END OF SECTION**

**SECTION 01 5000**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Temporary project signage
- I. Field offices.
- J. Temporary tree and plant protection.

**1.2 TEMPORARY UTILITIES**

- A. Owner will provide the following:
  - 1. Electrical power, consisting of connection to existing facilities.
  - 2. Water supply, consisting of connection to existing facilities.
- B. Use trigger-operated nozzles for water hoses, to avoid waste of water.

**1.3 TELECOMMUNICATIONS SERVICES**

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
  - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
  - 2. Internet Connections: Minimum of one; Cable modem or faster.
  - 3. Email: Account/address reserved for project use.
  - 4. Mobile Telephone: Phone with voicemail to be used at construction site by superintendent.
  - 5. Digital Camera: Camera to be used at construction site. Provide capabilities to send digital photos electronically.

**1.4 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.

**1.5 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.

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

## **1.6 FENCING**

- A. Construction: Contractor's option.

## **1.7 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.

## **1.8 INTERIOR ENCLOSURES**

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

## **1.9 SECURITY**

- A. Provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.

## **1.10 VEHICULAR ACCESS AND PARKING**

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- F. All contractor parking to be confined within the construction site.
- G. Do not allow vehicle parking on existing pavement.

## **1.11 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.
- E. Locate dumpsters, recycle bins and debris collection areas away from public view as much as possible.



### **1.12 TEMPORARY PROJECT SIGNAGE**

- A. Contractor signs allowed only with design, construction and location approved by Owner.

### **1.13 FIELD OFFICES**

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate six (6) persons.
- C. Locate offices a minimum distance of thirty (30) feet from existing and new structures.

### **1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of two (2) feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.

### **1.15 TEMPORARY TREE AND PLANT PROTECTION**

- A. All existing trees to remain shall be protected by temporary fencing at a minimum of 40'-0" for mature trees, measured from the tree trunk in all directions or a distance of 90% of tree height for smaller trees. A minimum of a 6 inch layer of fibrous mulch shall be placed inside of the fenced barrier protection zone. Signage shall be included on all 4 sides of the installed fence stating: TREE PROTECTION ZONE - "This fence shall not be removed."
- B. Trenching and digging near trees. When necessary, directional boring under the center of all deciduous trees is desired. When footing or trenching is required within the Protection Zone, roots that will be disturbed must be cleanly cut rather than ripped through. Trees that are of high value will require special consideration and additional protection steps.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 6000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Procedures for Owner-supplied products.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 1000 - Summary: Lists of products to be removed from existing building.
- B. Section 01 1000 - Summary: Identification of Owner-supplied products.

**1.3 DEFINITIONS**

- A. Basis of Design: Where specifications name a product, or refer to a product named, and include a list of manufacturers, provide the specified product or an approved comparable product by one of the other named manufacturers.

**1.4 SUBMITTALS**

- A. 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.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. 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.

**PART 2 PRODUCTS**

**2.1 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
  - 1. Made using or containing CFC's or HCFC's.

**2.2 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.

## **2.3 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver and place in location as directed; obtain receipt prior to final payment.

## **PART 3 EXECUTION**

### **3.1 SUBSTITUTION LIMITATIONS**

- A. Section 00 2113 - Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

### **3.2 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.

### **3.3 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### **3.4 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. See Section 01 7419.
- B. Store and protect products in accordance with manufacturers' instructions.

- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Do not store products directly on the ground.
- J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- K. Prevent contact with material that may cause corrosion, discoloration, or staining.
- L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- M. 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**

**SECTION 01 7000**  
**EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Pre-installation meetings.
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of Owner personnel.
- H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- I. General requirements for maintenance service.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.
- E. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.
- F. Section 01 5100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.
- G. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- H. Section 02 4100 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- I. Section 07 8400 - Firestopping.
- J. Individual Product Specification Sections.

**1.3 REFERENCE STANDARDS**

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
  - 1. On request, submit documentation verifying accuracy of survey work.
  - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.

3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that 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.
  6. Include in request:
    - a. Identification of Project.
    - b. Location and description of affected work.
    - c. Necessity for cutting or alteration.
    - d. Description of proposed work and products to be used.
    - e. Alternatives to cutting and patching.
    - f. Effect on work of Owner or separate Contractor.
    - g. Written permission of affected separate Contractor.
    - h. Date and time work will be executed.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

## 1.5 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

## 1.6 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- D. 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 and over adjacent property.
  1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
  2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
  1. Reference Construction Documents for other requirements not listed here.
  2. Minimize amount of bare soil exposed at one time.
  3. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
  4. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
  5. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- G. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

- H. 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. Comply with federal, state, and local regulations.
  - 1. Reference Construction Documents for other requirements not listed here.

## **1.7 COORDINATION**

- A. See Section 01 1000 for occupancy-related requirements.
- B. 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.
- C. Notify affected utility companies and comply with their requirements.
- D. 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.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated 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.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. 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**

### **2.1 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.2 PREPARATION**

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

### **3.3 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation 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 (4) 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 (2) days after meeting to participants, with two (2) copies to Architect, Owner, participants, and those affected by decisions made.

### **3.4 LAYING OUT THE WORK**

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Contractor shall locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on drawings.
- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- H. Utilize recognized engineering survey practices.
- I. Establish a minimum of two (2) permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
- J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Building foundation, column locations, ground floor elevations.
- K. Periodically verify layouts by same means.



- L. Maintain a complete and accurate log of control and survey work as it progresses.

### **3.5 GENERAL INSTALLATION REQUIREMENTS**

- A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
- B. 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.
- C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- F. Make neat transitions between different surfaces, maintaining texture and appearance.

### **3.6 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-complying work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
- I. Patching:
  - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
    - a. Patching installation proposal will be reviewed and approved by Owner and Architect prior to final installation.
  - 2. Match color, texture, and appearance.
  - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.7 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.

### **3.8 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. Prohibit traffic from landscaped areas.
- H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.9 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and owner seven (7) days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.10 DEMONSTRATION AND INSTRUCTION**

- A. Demonstrate operation and maintenance of products to Owner's personnel two (2) weeks prior to date of Substantial Completion.

1. Contractor to record high resolution digital video and submit with project closeouts for Owner use.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.
- D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

### **3.11 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

### **3.12 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
  1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- 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. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, 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.

### **3.13 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  1. Provide copies to Architect.
  2. Provide copies to Owner.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, 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 Substantial Completion inspection.
- E. Owner will occupy all of the building as specified in Section 01 1000.
- F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- H. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

### **3.14 MAINTENANCE**

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one (1) from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

**END OF SECTION**

**SECTION 01 7800  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

**1.2 RELATED REQUIREMENTS**

- A. Section 00 7200 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

**1.3 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- C. Operation and Maintenance Data:
  - 1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 2. Submit one copy of completed documents fifteen (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.
  - 3. Submit one set of revised final documents in final form within ten (10) days after final inspection.
- D. Warranties and Bonds:
  - 1. Submit originals in binder with cover, table of contents and index.
  - 2. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten (10) days after acceptance.
  - 3. Make other submittals within ten (10) days after Date of Substantial Completion, prior to final Application for Payment.
  - 4. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten (10) days after acceptance, listing the date of acceptance as the beginning of the warranty period.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.1 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. 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.

### **3.2 OPERATION AND MAINTENANCE DATA**

- A. Source Data: 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.

### **3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
  1. Product data, with catalog number, size, composition, and color and texture designations.
- 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.
- C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### **3.4 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. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

- C. 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.
- D. 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.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Additional Requirements: As specified in individual product specification sections.

### **3.5 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

- A. Provide one (1) hardcopy in three-ring binder for Owner use.
- B. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- C. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- D. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- E. Prepare data in the form of an instructional manual.
- F. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
    - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
- G. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

### **3.6 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten (10) 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 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.

**END OF SECTION**



## SECTION 03 3000

### CAST-IN-PLACE CONCRETE

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Slabs-on-grade.
  - 3. Concrete reinforcement

##### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

##### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Welding certificates.
- E. Qualification Data: For installer, manufacturer, and testing agency.
- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  - 1. Aggregates
- G. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Form materials and form-release agents.
  - 4. Steel reinforcement and accessories.
  - 5. Fiber reinforcement.
  - 6. Curing compounds.
  - 7. Floor and slab treatments.
  - 8. Bonding agents.

- 9. Adhesives.
  - 10. Semirigid joint filler.
  - 11. Joint-filler strips.
  - 12. Repair materials.
- H. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.
  - I. Field quality-control test and inspection reports.
  - J. Laboratory test reports for concrete materials and mix design tests in accordance with ACI 318 Chapter 5 requirements for laboratory trial batch method of "field experience method".
  - K. Shop Drawings: Submit shop drawings for reinforcement detailing fabrication, bending and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
  - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

### 2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- D. Plain-Steel Wire: ASTM A 82, galvanized.

### 2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
  - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

### 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type I or Type II
    - a. Cement is to have alkalinity of .6% or less.
  - 2. Fly Ash: ASTM C 618, Class C.
    - a. Limit the use of fly ash as follows:
      - 1) Fly ash shall not be used in slabs unless specifically directed by the finishing contractor.
      - 2) If the use of fly ash in slabs is elected, do not exceed 15% of cement content by weight with 1:1 replacement ratio.
      - 3) For all other concrete members do not exceed 30% of cement content by weight with 1:1 replacement ratio.
  - 3. Blended Hydraulic Cement ASTM C565, Type II.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S.
  - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal or NDOR 47B.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.

## 2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.6 FLOOR AND SLAB TREATMENTS

- A. Refer to Section 03 3930
- B. Under slab Vapor Barrier: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited. The vapor barrier shall have the following characteristics
  - 1. Permeance shall be less than 0.01 Perms [grains/(ft<sup>2</sup> \*hr \* in.Hg)] per ASTM E1745.
  - 2. Strength: ASTM E 1745, Class A
  - 3. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor barrier.
  - 4. Manufacturers:
    - a. Fortifiber Building Systems Group;
    - b. Insulation Solutions, Inc;
    - c. Interplast Group
    - d. Stego Industries, LLC;
    - e. Raven Industries, Inc;
    - f. Reef Industries, Inc;
    - g. Substitutions: See Section 016000 - Product Requirements.

## 2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

## 2.8 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
  4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
  4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.9 CONCRETE MIXTURES, GENERAL

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: 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.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- D. Mix designs to provide normal weight concrete which meet compressive required by the drawings. Use air entrained concrete for all concrete unless otherwise indicated. The maximum water cement ratios are to be as follows:
1. 4000 psi 28 day compressive strength; a maximum water cement ratio of .50
  2. 3500 psi 28 day compressive strength; a maximum water cement ratio of .53
  3. If submittals do not meet the requirements of ACI 318 Chapter 5, the following criteria shall be met:
    - a. 4000 psi 28 day compressive strength; a maximum water cement ratio of .48
    - b. 3500 psi 28 day compressive strength; a maximum water cement ratio of .50
  4. Addition of Water on Site: Water may be added to the concrete on site for adjustment of slump only to the limit of the specified water/cement ratio. In no case may the water/cement ratio be exceeded. Concrete supplier shall indicate in the mix design submittals the maximum amount of water per yard that can be added on site
- E. Air entrain all concrete except slabs, or unless otherwise noted. Total air content to be 5 to 7 percent as determined by ASTM C173..
- F. Up to 15% fly ash can be substituted for cement in slab concrete mixes with Architect's approval of mix design.
- G. Up to 30% fly ash can be substituted for cement in footing concrete mixes with Architect's approval

of mix design.

## 2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Is not allowed unless approved by engineer of record.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
  - 2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- H. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- I. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

- K. Granular Course: Place 3 ½" granular fill and compact with mechanical equipment to elevation tolerances of plus 0 inch (0 mm) or minus ¾ inch (19 mm) before installing vapor barrier.
  - 1. Place and compact a 1/2-inch- (13-mm-) thick layer of fine-graded granular material over granular fill.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of slabs, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
  - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

### 3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to amount approved by mix designs.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.



- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
  
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
  
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
  - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.7 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
  
- B. Select types of slab finishes required from remaining paragraphs. Coordinate finishes selected with finish schedule or indicate location of each finish on Drawings.
  
- C. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.
  - 1. Apply scratch finish to surfaces indicated.
  
- D. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces indicated to receive trowel finish..
  
- E. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces indicated, exposed to view, or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

- F. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated and where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

### 3.8 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 01 4000, will inspect finished slabs for conformance to specified tolerances.
- B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values: F(F) of 35; F(L) of 24, typical basement slab.
- C. Measure F(F) and F(L) in accordance with ASTM E1155, within 8 hours after the final trowling operation; report both composite overall values and local values for each measured section.
- D. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

### 3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

### 3.10 CONCRETE PROTECTING AND CURING

- A. Refer to Section 03 3930
- B. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- E. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- F. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.

- b. Continuous water-fog spray.
  - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
  3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project]
  4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.11 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

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

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

### 3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.

2. Steel reinforcement welding.
  3. Headed bolts and studs.
  4. Verification of use of required design mixture.
  5. Concrete placement, including conveying and depositing.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M.
    - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
  9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
  12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.

END OF SECTION 03 3000

## SECTION 05 3100

### STEEL DECKING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Non-Composite form deck.
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
  - 2. Division 05 Section "Structural Steel Framing" for shop-and field-welded shear connectors.
  - 3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
  - 4. Division 09 painting Sections for repair painting of primed deck.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.

##### 1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

##### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Steel Deck:
    - a. ASC Profiles, Inc.
    - b. Canam Steel Corp.;The Canam Manac Group.
    - c. Consolidated Systems, Inc.
    - d. DACS, Inc.
    - e. D-Mac Industries Inc.
    - f. Epic Metals Corporation.
    - g. Marlyn Steel Decks, Inc.
    - h. New Millennium Building Systems, LLC.
    - i. Nucor Corp.; Vulcraft Division.
    - j. Roof Deck, Inc.
    - k. United Steel Deck, Inc.
    - l. Valley Joist; Division of EBSCO Industries, Inc.
    - m. Verco Manufacturing Co.
    - n. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

### **2.2 NON-COMPOSITE FORM DECK**

- A. Metal Form Deck: Ribbed sheet steel:
  - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 33/230, with G60 galvanized coating.
  - 2. Minimum Metal Thickness as indicated in the drawings
  - 3. Nominal Height: As indicated in the drawings.
  - 4. Profile: As indicated in the drawings.
  - 5. Formed Sheet Width: As indicated in the drawings.
  - 6. Side Joints: Lapped, welded or lapped and mechanically fastened as indicated in the drawings.
  - 7. End Joints: Lapped, welded.
  - 8. Span Condition: Two or more continuous spans or as indicated in the drawings.

### **2.3 ACCESSORIES**

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth.



- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

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

#### **3.2 INSTALLATION, GENERAL**

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

#### **3.3 FLOOR-DECK INSTALLATION**

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
  - 1. Weld Diameter: 5/8 inch, nominal.
  - 2. Weld Spacing: Space and locate welds as indicated.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or as indicated, and as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
  - 2. Fasten with a minimum of 1-1/2-inch- long welds.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of [1-1/2 inches, with end joints as follows:
  - 1. End Joints: Lapped or butted at Contractor's option.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Install piercing hanger tabs at 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides, unless otherwise indicated. Coordinate with architectural requirements.

### **3.4 REPAIRS AND PROTECTION**

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
  - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

### **END OF SECTION 05 3100**

## SECTION 054000

### COLD-FORMED METAL FRAMING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Load bearing formed steel stud exterior wall framing.
- B. Formed steel joist framing and bridging.

##### 1.02 RELATED SECTIONS

- A. Section 092116 - Gypsum Board Assemblies: Lightweight, non-load bearing metal stud framing.

##### 1.03 REFERENCES

- A. AISI SG-973 - Cold-Formed Steel Design Manual; American Iron and Steel Institute; 1996.
- B. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2003.
- C. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2000.
- D. ASTM A 570/A 570M - Standard Specification for Structural Steel, Sheet and Strip, Carbon, Hot-Rolled; 1998.
- E. 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.
- F. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability; 2004.
- G. ASTM C 955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2003.
- H. ASTM C 1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2000.
- I. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2004.
- J. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 1998.
- K. MFMA (GU) - Guidelines for the Use of Metal Framing; Metal Framing Manufacturers Association; current edition.
- L. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2000).

##### 1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

##### 1.06 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with requirements of AISI

Specification for the Design of Cold-Formed Steel Structural Members.

1. Maintain one copy of document on project site.
- B. Manufacturer: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- C. Installer: Company specializing in performing the work of this section with minimum 5 years of experience.

### **1.07 PROJECT CONDITIONS**

- A. Verify that field measurements are as indicated on the drawings.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Metal Framing:
  1. Marino-Ware; Product \_\_\_\_: [www.marinoware.com](http://www.marinoware.com).
  2. MiTek Industries, Inc.; Product \_\_\_\_: [www.mii.com](http://www.mii.com).
  3. Unimast, Inc.; Product \_\_\_\_.
  4. Dietrick.
  5. Substitutions: See Section 016000 - Product Requirements.

### **2.02 FRAMING MATERIALS**

- A. Studs and Track: ASTM C 955; studs formed to channel shape with punched web; U-shaped track in matching nominal width and compatible height.
  1. Gage and depth: As indicated in the drawings.
  2. Galvanized in accordance with ASTM A 653/A 653M G60/Z180 coating.
  3. Provide components fabricated from ASTM A 1008/A 1008M, Designation SS steel.
- B. Joists and Purlins: Fabricated from ASTM A 653/A 653M steel sheet, with G60/Z180 hot dipped galvanized coating.
  1. Base Metal: Structural Steel (SS), Grade 33/230.
  2. Gage: As indicated in the drawings.
  3. Maximum Depth: As indicated in the drawings.
  4. Galvanized finish: G60/Z180.

### **2.03 ACCESSORIES**

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Plates, Gussets, Clips: Formed Sheet Steel, thickness determined for conditions encountered; finish to match framing components.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

### **2.04 FASTENERS**

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A 153/A 153M.
- B. Anchorage Devices: Power actuated.
- C. Welding: In conformance with AWS D1.1.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.

### **3.02 INSTALLATION OF STUDS**

- A. Install components in accordance with manufacturers' instructions and in accordance with ASTM C1007.
- B. Place full width continuous sill flashings under framed walls on cementitious foundations. Lap flashing joints 4 inches and seal.
- C. Align floor joist and wall studs; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.
- D. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.
- E. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- F. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- G. Install load bearing studs, brace, and reinforce to develop full strength and achieve design requirements. Provide bridging at 4'-0" oc maximum.
- H. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- I. Install intermediate studs above and below openings to align with wall stud spacing.
- J. Install studs tight to tracks and framing members above in exterior walls, load bearing walls, and where indicated.
- K. Attach cross studs to studs for attachment of fixtures anchored to walls.
- L. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- M. Touch-up field welds and damaged galvanized surfaces with primer.

### **3.03 INSTALLATION OF JOISTS AND PURLINS**

- 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 16 inches o.c.; not more than 2 inches from abutting walls. Connect joists to supports using fastener method.
- D. Set floor and ceiling joists parallel and level, with lateral bracing and bridging.
- E. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.
- F. Provide web stiffeners at reaction points.
- G. Touch-up field welds and damaged galvanized surfaces with primer.

### **3.04 ERECTION TOLERANCES**

- A. Maximum Variation from True Position: 1/8 inch.
- B. Maximum Variation of any Member from Plane: 1/8 inch.

**END OF SECTION**

**SECTION 05 5000**  
**METAL FABRICATIONS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Shop fabricated steel items.

**1.2 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 09 9123 - Interior Painting: Paint finish.

**1.3 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- G. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- K. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

**1.4 SUBMITTALS**

- A. See Section 01 3000 - 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.

**PART 2 PRODUCTS**

**2.1 MATERIALS - STEEL**

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 80, black finish.
- E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1.
- F. Welding Materials: AWS D1.1/D1.1M; 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.

## **2.2 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 continuous welds.
- 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. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

## **2.3 FABRICATED ITEMS**

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.
  - 1. Accessories: Bollard Cover: Provide at all bollards as indicated on drawings.
    - a. Basis of Design: IdealShield; 1/8 inch Flat Top Bollard Cover - Architectural: [www.idealshield.com](http://www.idealshield.com).
      - 1) Features: Grooved for tape application. No tape.
      - 2) Color: Yellow.
- B. Slotted Channel Framing System: Fabricate channels and fittings from structural steel complying with the referenced standards; hot-dipped galvanized per ASTM A653, Grade G90 finish. Provide bolts, hangers, post bases, end caps and fasteners for a complete installation.
  - 1. Product:
    - a. Basis of Design: Unistrut: [www.unistrut.us](http://www.unistrut.us).
- C. Miscellaneous Items: As shown on drawings.

## **2.4 FINISHES - STEEL**

- A. Prime paint steel items.
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Prime Painting: One coat.
- D. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.
- E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

## **2.5 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**

#### **3.1 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

#### **3.2 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

#### **3.3 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. Obtain approval prior to site cutting or making adjustments not scheduled.

#### **3.4 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 06 1000  
ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Roof-mounted curbs.
- B. Roofing nailers.
- C. Roofing cant strips.
- D. Preservative treated wood materials.
- E. Fire retardant treated wood materials.
- F. Communications and electrical room mounting boards.
- G. Concealed wood blocking, nailers, and supports.

**1.2 RELATED REQUIREMENTS**

- A. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- B. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

**1.3 REFERENCE STANDARDS**

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- F. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- G. PS 1 - Structural Plywood; 2009.
- H. PS 20 - American Softwood Lumber Standard; 2010.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.

**1.5 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, and installation.

## **PART 2 PRODUCTS**

### **2.1 GENERAL REQUIREMENTS**

- A. Reference Structural drawings for requirements not listed in this section.
- B. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Spruce-Pine-Fir (South), unless otherwise indicated.
  - 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
  - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at [www.alsc.org](http://www.alsc.org), and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
  - 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

### **2.2 DIMENSION LUMBER**

- A. Reference Structural drawings for requirements not listed in this section.
- B. Grading Agency: National Lumber Grades Authority (NLGA).
- C. Sizes: Nominal sizes as indicated on drawings, S4S.
- D. Moisture Content: S-dry or MC19.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

### **2.3 WOOD CONSTRUCTION PANELS**

- A. Reference Structural drawings for requirements not listed in this section.
- B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- C. Other Applications:
  - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
  - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
  - 3. Other Locations: PS 1, C-D Plugged or better.

### **2.4 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
  - 2. Anchors: Bolt or ballistic fastener for anchorages to steel.

### **2.5 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.
  - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

2. 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.
- B. Fire Retardant Treatment:
1. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, 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. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    - b. Treat lumber in contact with masonry or concrete.
  2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
    - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
    - b. Treat plywood in contact with masonry or concrete.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Coordinate installation of rough carpentry members specified in other sections.

### **3.2 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.3 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
  1. Blocking will extend the full length of items being installed.
  2. In concealed framing, solid 2x wood blocking will be used.
  3. In concealed framing, solid 1x wood or plywood blocking will **NOT** be allowed, unless noted otherwise.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Chalkboards and marker boards.
  - 8. Wall paneling and trim.
  - 9. Joints of rigid wall coverings that occur between studs.

### **3.4 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

### **3.5 INSTALLATION OF CONSTRUCTION PANELS**

- A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
  - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.
  - 4. Size and Location: As indicated on drawings.

### **3.6 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.

### **3.7 CLEANING**

- A. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**

**SECTION 06 4100**  
**ARCHITECTURAL WOOD CASEWORK**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Hardware.

**1.2 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 12 3600 - Countertops.

**1.3 REFERENCE STANDARDS**

- A. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- B. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
- C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit one (1) actual sample of each material scheduled for the following:
  - 1. Plastic laminates.
  - 2. Plastic edge banding materials.
  - 3. Thermoset melamine.

**1.5 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five (5) years of documented experience.
- B. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated.
- C. Delegated Design: Casework Fabricator will be responsible for all structural support, coordination, installation that fits the design intent along with best industry standards, method and products. All design solutions to be reviewed by Architect.

**1.6 MOCK-UPS**

- A. Provide mock-up of typical base cabinet and wall cabinet, including hardware and finishes for each type indicated.
- B. Locate where directed.
- C. No Architectural Wood Casework production can be initiated until mock-up has been approved by Architect.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from moisture damage.

## 1.8 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

## PART 2 PRODUCTS

### 2.1 CABINETS

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Cabinets:
  - 1. Cabinet Design Series: As indicated on drawings.

### 2.2 WOOD-BASED COMPONENTS

- A. High Performance Core:
  - 1. Particleboard shall conform to ANSI A208.1-1993, type M-3. Balanced 3-ply construction with moisture content not to exceed 8%.
  - 2. Non-Formaldehyde Cabinet Body Core:
    - a. Core material shall be formaldehyde free.
    - b. Cabinet body and drawer components and related panel substrate materials shall be , a non-formaldehyde resin composition board, or approved equal, engineered to meet the performance requirements of ANSI A208.1-1993 for Grade M3 Particleboard. No formaldehyde emissions. No exceptions.
  - 3. Cabinet components shall be of the following minimum core thickness:
    - a. 3/4 inch: Cabinet drawer body and drawer bottoms.
    - b. 1/4 inch: Cabinet backs.
    - c. 3/4 inch: Door and drawer face, base, upper, and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, cabinet back rear hang strips, structural dividers, exposed cabinet backs, and shelves in cabinets.
    - d. 1 inch: Door and drawer face, base, upper, and tall cabinet tops and bottoms, cabinet sides, and shelves in cabinets at 48 inches or larger in length.

### 2.3 LAMINATE MATERIALS

- A. Provide products/colors listed in **Materials List** as indicated on drawings.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as indicated.
  - 1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, color as selected.
  - 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, color as selected.
  - 3. Thermoset Melamine: TM, 0.020 inch nominal thickness, .
  - 4. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

### 2.4 COUNTERTOPS

- A. Countertops: See Section 12 3600.

### 2.5 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
  - 1. Thickness: 1mm.
  - 2. Thickness: 3mm.

3. Solid color: As selected by manufacturer's full range of solid colors by Architect.
  4. Wood Grain color: Color and wood grain pattern to match wood grain plastic laminate where occurs.
- C. Fasteners: Size and type to suit application.
- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- E. Concealed Joint Fasteners: Threaded steel.
- F. Tackboard: 1/4 inch colored composition cork laminated to 1/4 inch hardboard.
1. Color: As indicated on drawings.

## 2.6 HARDWARE

- A. Specialty Cabinet Hardware: Reference drawings for type and location of specialty cabinet hardware not specified below.
- B. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- C. Adjustable Shelf Supports: 5mm diameter line bored shelf holes spaced 32mm apart with metal 5mm diameter single pin shelf rest.
- D. Drawer and Door Pulls:
1. Provide two (2) pulls for each drawer 24 inches in width and greater.
  2. Product: Hafele; 106.69.120 Brushed Nickel, model H2125, brushed nickel, 96 mm center to center.
- E. Drawer Slide System:
1. Product:
    - a. Basis of Design: Blum, Inc.; TANDEM plus BLUMOTION: [www.blum.com](http://www.blum.com).
  2. Type: Full extension. Concealed.
  3. Static Load Capacity: Heavy Duty grade.
  4. Mounting: Bottom mounted.
  5. Features: Silent and soft closing.
- F. Concealed Hinges: European style concealed self-closing type, steel with satin finish.
1. Features: 3-dimensional adjustment, 110 degrees of opening with silent and soft closing.
  2. Product:
    - a. Basis of Design: Blum, Inc.; CLIP top BLUMOTION: [www.blum.com](http://www.blum.com).
- G. File Drawer Hanging Hardware: Manufacturer's standard sliding file hanging hardware with full extensions, commercial grade, side mounted, epoxy coated slides.
- H. Limit Stops:
1. Product: Hafele; Door Restraint 366.74.900.
- I. Wall Panel Concealed Fasteners: Standard 2-piece aluminum flat (1/4 inch max.) Z-clips or cleat hangers for installation of wall panels with concealed fasteners. Provide minimum 2 inch wide pieces.

## 2.7 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
1. All upper cabinets to be 14 inches deep with the dimension measuring from the outside finish face of wall to the outside finish face of the cabinet door, unless noted otherwise in the Drawings.

- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- E. Plastic Laminate (PL) Cabinets:
  - 1. Cabinets: Frameless (Eurostyle).
    - a. Exterior:
      - 1) All exposed surfaces: VGS.
      - 2) Cabinet box edge (face): VGS.
    - b. Interior:
      - 1) All exposed surfaces: TM.
      - 2) All interior shelf surfaces: VGS.
      - 3) All interior shelf edges: 1mm Plastic Edge Banding.
  - 2. Cabinet Doors: Full overlay.
    - a. Exterior:
      - 1) Front surface: VGS.
      - 2) All edges: 3mm Plastic Edge Banding.
    - b. Interior:
      - 1) Exposed surface: VGS.
  - 3. Drawers:
    - a. Exterior:
      - 1) Front surface: VGS.
      - 2) All drawer front edges: 3mm Plastic Edge Banding.
    - b. Interior:
      - 1) Sides and back drawer surfaces: TM.
      - 2) Bottom drawer surface: TM.
  - 4. Open Cabinets / Exposed Shelves:
    - a. Exterior:
      - 1) All exposed surfaces: VGS.
      - 2) Cabinet box edge (face): VGS.
    - b. Interior:
      - 1) All exposed surfaces: VGS.
      - 2) All interior shelf surfaces: VGS.
        - (a) All interior shelf edges: VGS.
- F. All exposed sides (including bottoms) of upper cabinets, cabinet doors, interior shelves, exposed shelves, and tall cabinets will be covered with material as defined.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

### **3.2 INSTALLATION**

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture 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. Accessories: Install in accordance with manufacturer's written instructions.
- F. Hardware: Install in accordance with manufacturer's written instructions.
- G. Limit Stops: Stops shall be provided on all hinged doors adjacent to cabinets or countertops of greater depth, or adjacent to walls and shall not allow contact between the door or door pull and any adjacent surfaces. Install at top of door and cabinet.

### **3.3 ADJUSTING**

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

### **3.4 CLEANING**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**END OF SECTION**

**SECTION 06 8316**  
**FIBERGLASS REINFORCED PANELING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Fiberglass reinforced paneling system (FRP).

**1.2 RELATED REQUIREMENTS**

- A. Section 09 2116 - Gypsum Board Assemblies.
- B. Section 10 2600 - Wall and Door Protection.

**1.3 REFERENCE STANDARDS**

- A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.
- B. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- C. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. FDA Food Code - Chapter 6 - Physical Facilities; current edition with Supplements, if any.
- F. ISO 846 - Plastics - Evaluation of the Action of Microorganisms; 1997.
- G. ISO 2812-1 - Paints and Varnishes - Determination of resistance to liquids - Part 1: Immersion in liquids; 2007.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Samples: Submit two (2) samples 6 x 6 inch in size illustrating material and surface design of panels.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for forty-eight (48) hours prior to installation.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Fiberglass Reinforced Paneling System:
  - 1. Crane Composites, Inc: [www.cranecomposites.com](http://www.cranecomposites.com).
  - 2. Substitutions: See Section 01 6000 - Product Requirements.

**2.2 PANEL SYSTEMS**

- A. Wall Panels:
  - 1. Product:
    - a. Basis of Design: Crane Composites, Inc; Glasbord.
  - 2. Panel Size: 4 by 8 feet.

3. Surface Design: Smooth.
4. Attachment Method: Adhesive only, with trim and sealant in joints.
5. Color/Finish: As selected by Architect from manufacturers full range.

## 2.3 MATERIALS

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
  1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. Impact Strength: Greater than 6 ft lb force per inch, when tested in accordance with ASTM D256.
  4. Surface Characteristics and Cleanability: Provide products that are smooth, durable, and easily cleanable, in compliance with FDA Food Code, Chapter 6 - Physical Facilities.
  5. Chemical Cleanability: Excellent chemical resistance to common cleaners and detergents when tested in accordance with ISO 2812-1.
  6. Biological Resistance: Rating of 0, when tested in accordance with ISO 846.
- B. Adhesive: Type recommended by panel manufacturer.
  1. Double-sided tape is **NOT** permitted.
- C. Sealant: Type recommended by panel manufacturer; color matching panel.
- D. Moldings, Trim and Caps: Matching one-piece polypropylene or vinyl edge protection, outside corners, inside corners and vertical divider bars as required by manufacturer for a complete installation.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

### 3.2 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- G. Remove excess sealant after paneling is installed and prior to curing.

**END OF SECTION**

**SECTION 07 2100**  
**THERMAL INSULATION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Board insulation at cavity wall construction, perimeter foundation wall, and underside of floor slabs.

**1.2 RELATED REQUIREMENTS**

- A. Section 07 2119 - Foamed-In-Place Insulation.
- B. Section 09 2116 - Gypsum Board Assemblies.

**1.3 REFERENCE STANDARDS**

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

**1.5 FIELD CONDITIONS**

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

**PART 2 PRODUCTS**

**2.1 APPLICATIONS**

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

**2.2 FOAM BOARD INSULATION MATERIALS**

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
  - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
  - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
  - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
  - 5. Manufacturers:
    - a. ACH Foam Technologies: [www.achfoam.com](http://www.achfoam.com).
    - b. Diversifoam: [www.diversifoam.com](http://www.diversifoam.com).
    - c. Dow Chemical Company: [www.dow.com](http://www.dow.com).

- d. Owens Corning Corporation: [www.ocbuildingspec.com](http://www.ocbuildingspec.com).
- e. Substitutions: See Section 01 6000 - Product Requirements.

## **2.3 MINERAL FIBER BLANKET INSULATION MATERIALS**

- A. Mineral Wool Blanket Thermal Insulation: Flexible or semi-rigid preformed insulation, complying with ASTM C665.
  - 1. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
  - 2. Thermal Resistance: As indicated on drawings.
  - 3. Thickness: As indicated on drawings or as required to achieve thermal resistance.
  - 4. Products:
    - a. Johns Manville: [www.jm.com](http://www.jm.com).
    - b. Knauf Insulation: [www.knaufinsulation.com](http://www.knaufinsulation.com).
    - c. ROCKWOOL (ROXUL, Inc): [www.rockwool.com](http://www.rockwool.com).
    - d. Thermafiber, Inc: [www.thermafiber.com](http://www.thermafiber.com).
    - e. Substitutions: See Section 01 6000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### **3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER**

- A. Install boards horizontally on foundation perimeter.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### **3.3 BOARD INSTALLATION UNDER CONCRETE SLABS**

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing slab.

### **3.4 BATT INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

### **3.5 PROTECTION**

- A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**

**SECTION 07 2119**  
**FOAMED-IN-PLACE INSULATION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Foamed-in-place insulation.
  - 1. In exterior framed walls.
  - 2. In exterior wall crevices.
  - 3. At junctions of dissimilar wall and roof materials.

**1.2 RELATED REQUIREMENTS**

- A. Section 07 2100 - Thermal Insulation.
- B. Section 08 1113 - Hollow Metal Doors and Frames.
- C. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

**1.3 REFERENCE STANDARDS**

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- F. FM 4880 - Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings and Exterior Wall Systems; 2010.
- G. NFPA 275 - Standard Method of Fire Tests for the Evaluation of Thermal Barriers; 2017.
- H. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.
- I. UL 1040 - Standard for Safety Fire Test of Insulated Wall Construction; Current Edition, Including All Revisions.
- J. UL 1715 - Standard for Safety Fire Test of Interior Finish Material; Current Edition, Including All Revisions.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene two (2) weeks prior to commencing work of this section.

**1.5 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, insulation properties, and preparation requirements.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than ten (10) years of documented experience.
- B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum five (5) years of documented experience.

## **1.7 FIELD CONDITIONS**

- A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.
- B. Do not apply foam when temperature is within 5 degrees F of dew point.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Foamed-In-Place Insulation:
  - 1. BASF Corporation: [www.spf.basf.com](http://www.spf.basf.com).
  - 2. Huntsman Building Solutions: [www.huntsmanbuildingsolutions.com](http://www.huntsmanbuildingsolutions.com).
  - 3. Johns Manville: [www.jm.com](http://www.jm.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.

### **2.2 MATERIALS**

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
  - 1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
    - a. Fire Protection: Provide 15-minute thermal barrier of 1/2 inch gypsum board or equivalent material complying with NFPA 275 test method, or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.
  - 2. Thermal Resistance: R-value of 5.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
  - 3. Water Vapor Permeance: Vapor retarder; 2 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
  - 4. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
  - 5. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
  - 6. Closed Cell Content: At least 90 percent.
  - 7. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
  - 8. Product:
    - a. Basis of Design: Johns Manville; JM Corbond III Closed Cell Spray Polyurethane Foam.

### **2.3 ACCESSORIES**

- A. Primer: As required by insulation manufacturer.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

### **3.2 PREPARATION**

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.
- C. Verify that mechanical and electrical services in ceilings, walls and floors have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.

### **3.3 APPLICATION**

- A. Apply insulation in accordance with manufacturer's instructions.
- B. See drawings for location and thickness.
- C. Apply insulation by spray method, to a uniform monolithic density without voids.
- D. Patch damaged areas.
- E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F. Trim excess away for applied trim or remove as required for continuous sealant bead.

### **3.4 PROTECTION**

- A. Do not permit subsequent construction work to disturb applied insulation.

**END OF SECTION**



**SECTION 07 8400  
FIRESTOPPING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.
- B. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

**1.3 REFERENCE STANDARDS**

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- C. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- D. ITS (DIR) - Directory of Listed Products; current edition.
- E. FM (AG) - FM Approval Guide; current edition.
- F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.
- G. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- H. UL (FRD) - Fire Resistance Directory; current edition.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

**1.5 QUALITY ASSURANCE**

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
  - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
  - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at [www.icc-es.org](http://www.icc-es.org) will be considered as constituting an acceptable test report.
- B. Installer Qualifications: Company specializing in performing the work of this section and:
  - 1. With minimum five (5) years documented experience installing work of this type.

## 1.6 MOCK-UPS

- A. Install one (1) firestopping assembly representative of each fire rating design required on project.
  - 1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
- B. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.
- C. If accepted, mock-up will represent minimum standard for this work.
- D. If accepted, mock-up may remain as part of this work. Remove and replace mock-ups not accepted.

## 1.7 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Firestopping Manufacturers:
  - 1. 3M Fire Protection Products: [www.3m.com/firestop](http://www.3m.com/firestop).
  - 2. A/D Fire Protection Systems Inc: [www.adfire.com](http://www.adfire.com).
  - 3. Hilti, Inc: [www.us.hilti.com](http://www.us.hilti.com).
  - 4. Nelson FireStop Products: [www.nelsonfirestop.com](http://www.nelsonfirestop.com).
  - 5. Specified Technologies Inc: [www.stifirestop.com](http://www.stifirestop.com).
  - 6. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  - 7. Substitutions: See Section 01 6000 - Product Requirements.

### 2.2 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- C. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- E. Fire Ratings: Refer to drawings for required systems and ratings.

### 2.3 FIRESTOPPING SYSTEMS

- A. Firestopping:
  - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

### **3.2 PREPARATION**

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

### **3.3 INSTALLATION**

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

### **3.4 CLEANING**

- A. Clean adjacent surfaces of firestopping materials.

### **3.5 PROTECTION**

- A. Protect adjacent surfaces from damage by material installation.

**END OF SECTION**

**SECTION 07 9200  
JOINT SEALANTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

**1.2 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Division 07 - Thermal and Moisture Protection.
- C. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
- D. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.
- E. Division 32 - Exterior Improvements: Exterior sealants.

**1.3 REFERENCE STANDARDS**

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- D. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- E. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).
- F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
  - 5. Substrates for which use of primer is required.
  - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
  - 7. Sample product warranty.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

## **1.5 QUALITY ASSURANCE**

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years documented experience and approved by manufacturer.

## **1.6 MOCK-UP**

- A. Construct properly prepared and finished sealant joints for each condition as a mock-up which shall be evaluated as uniform in appearance, color, texture, hiding and sheen. In order to determine whether a sealant joint has been properly finished, it shall be examined without magnification at a distance of thirty-nine (39) inches or one (1) meter, or more, under finished lighting conditions and from a normal viewing position.
- B. Install temporary or final overhead lighting prior to installation, especially where wall washing or cove type lighting is located either at the wall/ceiling interface, or mounted directly to the wall that will strike the finish at a straight down angle.
- C. The mock-up shall demonstrate to the Architect and Owner, the Contractor's understanding of the finished appearance expectations for final finished surfaces. Approval of the mock-up does not constitute approval of any deviations from the contract documents unless such deviations are specifically approved by the Architect in writing.
- D. Locate where directed by Architect.
- E. Mock-up may remain as part of the work.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Nonsag Sealants:
  - 1. Dow Corning Corporation: [www.dowcorning.com/construction](http://www.dowcorning.com/construction).
  - 2. Master Builders Solutions: [www.master-builders-solutions.us/en-us](http://www.master-builders-solutions.us/en-us).
  - 3. Momentive Performance Materials, Inc.: [www.momentive.com](http://www.momentive.com).
  - 4. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  - 5. Sika Corporation: [www.usa.sika.com](http://www.usa.sika.com).
  - 6. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Self-Leveling Sealants:
  - 1. Adhesives Technology Corporation: [www.atcepoxy.com](http://www.atcepoxy.com).
  - 2. Dow Corning Corporation: [www.dowcorning.com/construction](http://www.dowcorning.com/construction).
  - 3. Master Builders Solutions: [www.master-builders-solutions.us/en-us](http://www.master-builders-solutions.us/en-us).
  - 4. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  - 5. Sika Corporation: [www.usa.sika.com](http://www.usa.sika.com).
  - 6. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  - 7. W.R. Meadows, Inc: [www.wrmeadows.com](http://www.wrmeadows.com).
  - 8. Substitutions: See Section 01 6000 - Product Requirements.

### **2.2 JOINT SEALANT APPLICATIONS**

- A. Scope:
  - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:

- a. Wall expansion and control joints.
  - b. Joints between door, window, and other frames and adjacent construction.
  - c. Joints between different exposed materials.
  - d. Openings below ledge angles in masonry.
  - e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
- a. Joints between door, window, and other frames and adjacent construction.
  - b. Other joints indicated below.
- B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
- 1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
  - 2. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
  - 3. Control, Expansion and Soft Joints in exposed Masonry, Stone and Cast Stone: Textured nonsag polyurethane sealant.
  - 4. Control, Expansion and Soft Joints in exposed Vertical Concrete: Nonsag polyurethane sealant.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
- 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
  - 2. Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion.
  - 3. Floor Joints in Wet Areas: Self-leveling polyurethane "traffic-grade" sealant suitable for continuous liquid immersion.
  - 4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant.
  - 5. Typical Concrete Slab Floor Joints: Self-leveling polyurethane sealant.
- D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

### 2.3 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

### 2.4 NONSAG JOINT SEALANTS

- A. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
  - 1. Color: To be selected by Architect from manufacturer's full range.
- B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
  - 2. Color: To be selected by Architect from manufacturer's full range.
  - 3. Products:
    - a. Pecora Corporation; DynaTrol I-XL: [www.pecora.com](http://www.pecora.com).
    - b. Sika Corporation; Sikaflex-15 LM: [www.usa-sika.com](http://www.usa-sika.com).
    - c. Tremco Commercial Sealants & Waterproofing; Vulkem 116: [www.tremcosealants.com](http://www.tremcosealants.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
  - 1. Movement Capability: Plus and minus 50 percent, minimum.

2. Products:
  - a. Sika Corporation; Sikaflex-2c NS EZ Mix: [www.usa-sika.com](http://www.usa-sika.com).
  - b. Substitutions: See Section 01 6000 - Product Requirements.
- D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging and paintable; not intended for exterior use.
  1. Products:
    - a. Pecora Corporation; AC-20+: [www.pecora.com](http://www.pecora.com).
    - b. Tremco Global Sealants; 834 Acrylic Latex Caulking: [www.tremcosealants.com](http://www.tremcosealants.com).
    - c. Substitutions: See Section 01 6000 - Product Requirements.
- E. Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skinning, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.

## 2.5 SELF-LEVELING JOINT SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
  1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Color: Limestone Gray, at concrete to concrete joints.
  3. Products:
    - a. Sika Corporation; Sikaflex-1c SL: [www.usa-sika.com](http://www.usa-sika.com).
    - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; multicomponent; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
  1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Color: Limestone Gray, at concrete to concrete joints.
  3. Products:
    - a. Sika Corporation; Sikaflex-2c SL: [www.usa-sika.com](http://www.usa-sika.com).
    - b. Substitutions: See Section 01 6000 - Product Requirements.

## 2.6 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
  1. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
  2. Closed Cell and Bi-Cellular: 25 to 50 percent larger in diameter than joint width.
- B. Bond Breaking Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.

- C. Verify that backer rods are of the correct size.

### **3.2 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

### **3.3 INSTALLATION**

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. 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.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

### **3.4 POST-OCCUPANCY**

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width, i.e., at low temperature in thermal cycle. Report failures immediately and repair them.

**END OF SECTION**



**SECTION 08 1113  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Fire-rated hollow metal doors and frames.
- C. Thermally insulated hollow metal doors with frames.

**1.2 RELATED REQUIREMENTS**

- A. Section 08 7100 - Door Hardware.
- B. Section 09 9113 - Exterior Painting: Field painting.
- C. Section 09 9123 - Interior Painting: Field painting.

**1.3 ABBREVIATIONS AND ACRONYMS**

- A. ANSI: American National Standards Institute.
- B. NAAMM: National Association of Architectural Metal Manufacturers.
- C. NFPA: National Fire Protection Association.
- D. SDI: Steel Door Institute.
- E. UL: Underwriters Laboratories.

**1.4 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- D. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).
- E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- G. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
- H. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
- I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- J. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.
- K. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

- L. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- M. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- N. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- O. ITS (DIR) - Directory of Listed Products; current edition.
- P. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- Q. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- R. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- S. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.
- T. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- U. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- V. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- W. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.
- X. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- Y. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- Z. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

## **1.5 SUBMITTALS**

- A. See Section 01 3000 - 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 any indicated finish requirements.
- 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.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten (10) years documented experience.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
  - 1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Curries, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 3. Republic Doors, an Allegion brand: [www.republicdoor.com](http://www.republicdoor.com).
  - 4. Mesker Door: [www.meskerdoor.com](http://www.meskerdoor.com).
  - 5. Steelcraft, an Allegion brand: [www.allegion.com](http://www.allegion.com).
  - 6. Security Metal Products Corp.: [www.secmet.com](http://www.secmet.com).
  - 7. West Central Manufacturing: [www.westcentralmfg.com](http://www.westcentralmfg.com).
  - 8. Substitutions: See Section 01 6000 - Product Requirements.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. Requirements for Hollow Metal Doors and Frames:
  - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
    - a. Seal all joints weathertight.
  - 4. Door Edge Profile: Manufacturers standard for application indicated.
  - 5. Typical Door Face Sheets: Flush.
  - 6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
  - 7. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
    - a. Based on SDI Standards: Provide at least A40/ZF120 (galvanized) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvanized) for corrosive locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with 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.

### **2.3 HOLLOW METAL DOORS**

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors:
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 4 - Maximum-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 - Seamless.
    - d. Door Face Metal Thickness: 14 gauge, 0.067 inch, minimum.
    - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.

2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
  3. Door Thickness: 1-3/4 inches, nominal.
- C. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 - Seamless.
    - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
  2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
  3. Door Thickness: 1-3/4 inches, nominal.
- D. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 2 - Seamless.
    - d. Door Face Metal Thickness: 16 gauge, 0.053 inch, minimum.
  2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
    - a. Provide units listed and labeled by UL (DIR) or ITS (DIR).
    - b. Attach fire rating label to each fire rated unit.
    - c. Smoke and Draft Control Doors: Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;
      - 1) Maximum Air Leakage: 3.0 cfm/sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
      - 2) Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.
      - 3) Label: Include the "S" label on fire-rating label of door.
  3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
  4. Door Thickness: 1-3/4 inches, nominal.

## 2.4 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
  1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
  2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
  3. Weatherstripping: Separate, see Section 08 7100.
- D. Interior Door Frames, Non-Fire-Rated: Fully welded type.
  1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
- E. Interior Door Frames, Fire-Rated: Fully welded type.
  1. Fire Rating: Same as door, labeled.
  2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
  3. Seal: Separate, see Section 08 7100.

- F. Provide guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- G. Provide junction boxes and conduit knockouts in frames for all electronic and low-voltage hardware.
- H. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

## **2.5 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
  - 1. Fire-Rated Frames: Comply with fire rating requirements indicated.

## **2.6 ACCESSORIES**

- A. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
- B. Silencers: Resilient rubber, fitted into drilled hole; provide three (3) on strike side of single door, three (3) on center mullion of pairs, and two (2) on head of pairs without center mullions.
  - 1. ONLY provide on interior metal frames without door seals/gaskets.
- C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

### **3.2 PREPARATION**

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

### **3.3 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 7100.
  - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- E. Coordinate installation of electrical connections to electrical hardware items.
- F. Existing wall door frame anchors shall have the anchor heads countersunk with the holes filled with appropriate filler and sanded smooth. Anchors shall not be visible after installation.
- G. Install hand troweled grout in all interior door frames prior to installation.
- H. Install foamed-in-place insulation in all exterior door frames prior to installation.

### **3.4 TOLERANCES**

- A. Frame Installation Tolerances: As specified in ANSI/SDI A250.11.
  - 1. Opening Width: Plus or minus 1/16 inch, measured rabbet to rabbet at top, middle, and bottom of frame.
  - 2. Opening Height: Plus 1/16 inch, minus 1/32 inch. measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extensions at each jamb and across the head.
  - 3. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb, and perpendicular to frame head.
  - 4. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - 5. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - 6. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- B. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
  - 1. Non-Fire-Rated Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  - 2. Sound Control Doors: As required for sound control door hardware to fully function.
  - 3. Fire-Rated Doors: As specified in NFPA 80.
  - 4. Smoke-Control Doors: As specified in NFPA 105.
- C. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

### **3.5 ADJUSTING**

- A. Adjust for smooth and balanced door movement.

### **3.6 SCHEDULE - See Drawings**

**END OF SECTION**

**SECTION 08 3100**  
**ACCESS DOORS AND PANELS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Wall- and ceiling-mounted access units.
- B. Floor-mounted access door and frame units, interior.

**1.2 RELATED REQUIREMENTS**

- A. Section 08 7100 - Door Hardware: Mortise cylinder and core hardware.
- B. Section 09 9123 - Interior Painting: Field paint finish.

**1.3 REFERENCE STANDARDS**

- A. ITS (DIR) - Directory of Listed Products; current edition.
- B. UL (FRD) - Fire Resistance Directory; current edition.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- D. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.
- E. Project Record Documents: Record actual locations of each access unit.

**PART 2 PRODUCTS**

**2.1 WALL AND CEILING MOUNTED UNITS**

- A. Manufacturers:
  - 1. ACUDOR Products Inc: [www.acudor.com](http://www.acudor.com).
  - 2. Babcock-Davis: [www.babcockdavis.com](http://www.babcockdavis.com).
  - 3. Cendrex, Inc: [www.cendrex.com](http://www.cendrex.com).
  - 4. Karp Associates, Inc: [www.karpinc.com](http://www.karpinc.com).
  - 5. Milcor, Inc.: [www.milcorinc.com](http://www.milcorinc.com).
  - 6. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
  - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
  - 1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
  - 2. Style: Exposed frame with door surface flush with frame surface.
    - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
  - 3. Door Style: Single thickness with rolled or turned in edges.
  - 4. Heavy Duty Frames: 14 gauge, 0.0747 inch, minimum thickness.
  - 5. Single Steel Sheet Door Panels: 1/16 inch, minimum thickness.
  - 6. Heavy Duty Single Steel Sheet Door Panels: 14 gauge, 0.0747 inch, minimum thickness.
  - 7. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
    - a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for purpose indicated.

8. Steel Finish: Primed.
9. Door/Panel Size: As indicated on the drawings.
10. Hardware:
  - a. Hardware for Fire-Rated Units: As required for listing.
  - b. Hinges for Non-Fire-Rated Units: Concealed, hinged-arm guide at top and bottom of panel.
  - c. Handle: No handle.
  - d. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
    - 1) Mortise cylinder and core as specified in Section 08 7100.
  - e. Number of Latches Required: As recommended by manufacturer for size of unit.
  - f. Inside Latch Release: Mechanism that allows door/panel to be opened from inside.

## 2.2 FLOOR-MOUNTED ACCESS UNITS

- A. Manufacturers:
  1. ACUDOR Products Inc: [www.acudor.com](http://www.acudor.com).
  2. Babcock-Davis: [www.babcockdavis.com](http://www.babcockdavis.com).
  3. BILCO Company; Type J - Channel Frame, steel: [www.bilco.com](http://www.bilco.com).
  4. Karp Associates, Inc: [www.karpinc.com](http://www.karpinc.com).
  5. Milcor, Inc.: [www.milcorinc.com](http://www.milcorinc.com).
  6. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
  7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Floor-Mounted Access Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
  1. Size: As indicated on drawings.
  2. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly that access doors are being installed.
    - a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for the purpose indicated.
  3. Hardware: Steel, hot-dipped galvanized.
    - a. Hinges: Removable pin.
- C. Interior Floor-Mounted Access Units: Aluminum, minimum 1/4 inch thick.
  1. Design Load: Design to support live load of 150 psf with deflection not to exceed 1/180 of span.
  2. Operation: Manual opening, and dampened self-closing.
  3. Cover: 1 inch deep recess with edge molding.
  4. Lift Handle: Recessed, non-removable.
  5. Finish: Mill finish.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

### 3.3 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.



- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

**END OF SECTION**

**SECTION 08 3613**  
**SECTIONAL DOORS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Sectional doors.
- B. Electric operators and controls.
- C. Operating hardware, tracks, and support.

**1.2 RELATED SECTIONS**

- A. Section 05 5000 - Metal Fabrications: Steel frame and supports.
- B. Section 06 1000 - Rough Carpentry: Rough wood framing and blocking for door opening.
- C. Section 07 9200 - Joint Sealants: Perimeter sealant and backup materials.
- D. Division 26 Electrical: Conduit from electric circuit to door operator and from door operator to control station.
- E. Division 26 Electrical: Power to disconnect.

**1.3 REFERENCES**

- A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

**1.4 DESIGN / PERFORMANCE REQUIREMENTS**

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
  - 1. Design pressure of 20 lb/sq ft.
- B. Wiring Connections: Requirements for electrical characteristics.
  - 1. 115 volts, single phase, 60 Hz.
- C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

**1.5 SUBMITTALS**

- A. Submit under provisions of 01 3000 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

**1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.

- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five (5) years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.
- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weathertight location.

## 1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

## 1.9 WARRANTY

- A. Warranty: Manufacturer's limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for three (3) years or 20,000 cycles, whichever occurs first.
- B. Warranty: Manufacturer's limited door warranty for two (2) years for all parts and components.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers:
  1. Clopay Corporation: [www.clopaydoor.com](http://www.clopaydoor.com).
  2. Cornell Iron Works, Inc: [www.cornelliron.com](http://www.cornelliron.com).
  3. McKeon Door Company: [www.mckeondoors.com](http://www.mckeondoors.com).
  4. Overhead Door Corporation: [www.overheaddoor.com](http://www.overheaddoor.com).
  5. Raynor: [www.raynor.com](http://www.raynor.com).
  6. The Cookson Company: [www.cooksondoor.com](http://www.cooksondoor.com).
  7. Wayne-Dalton, a Division of Overhead Door Corporation: [www.waynedalton.com](http://www.waynedalton.com).
  8. Substitutions: See Division 01 - General Requirements for substitution procedures.

### 2.2 SECTIONAL DOOR

- A. Insulated Sectional Door:
  1. Product:
    - a. Basis of Design: Overhead Door Corporation; 596 Series.
    - b. Basis of Design: Raynor; TM200.
  2. Door Assembly: Metal/foam/metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.
    - a. Panel Thickness: 2 inches (51 mm).
    - b. Exterior Surface: Flush, textured.
    - c. Exterior Steel: 20 gauge, galvanized.
    - d. End Stiles: 16 gauge with thermal break.
    - e. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
      - 1) Standard cycle spring: 10,000 cycles.
    - f. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
    - g. Thermal Values: R-value of 17.40; U-value of 0.057.
    - h. Air Infiltration: 0.08 cfm at 15 mph; 0.08 cfm at 25 mph.

- i. Sound Transmission: Class 26.
- j. Partial Glazing of Steel Panels:
  - 1) 1/2 inch (12.5 mm) Low E Insulated Tempered glazing.
- 3. Finish and Color: Baked-on Kynar polyvinylidene fluoride high performance coating:
  - a. Interior Color: Architect to select from manufacturer's standard colors.
  - b. Exterior Color: Architect to select from manufacturer's standard colors.
- 4. Windload Design: Provide to meet the Design/Performance requirements specified.
- 5. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- 6. Lock:
  - a. Interior mounted slide lock with interlock switch for automatic operator.
- 7. Weatherstripping:
  - a. EPDM bulb-type strip at bottom section.
  - b. Flexible Jamb seals.
  - c. Flexible Header seal.
- 8. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
  - a. Size:
    - 1) 3 inch (76 mm).
  - b. Type:
    - 1) High lift. Coordinate and verify available headroom height in field.
- 9. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
  - a. Entrapment Protection: Required for momentary contact, includes radio control operation.
    - 1) Photoelectric sensors monitored to meet UL 325/2010.
  - b. Operator Controls:
    - 1) Push-button and key operated control stations with open, close, and stop buttons.
    - 2) Flush mounting.
    - 3) Interior location.
  - c. Special Operation:
    - 1) Radio control operation.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify electric power is available and of correct characteristics.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.2 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.3 INSTALLATION**

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.

- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.
- F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

### **3.4 CLEANING AND ADJUSTING**

- A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
- B. Clean doors, frames and glass.
- C. Remove temporary labels and visible markings.

### **3.5 PROTECTION**

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

**END OF SECTION**

## SECTION 08 4523

### INSULATED TRANSLUCENT FIBERGLASS SANDWICH PANEL WALL SYSTEM

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Flat factory prefabricated structural insulated translucent sandwich panels.
- B. Aluminum installation system.
- C. Aluminum sill flashing.

##### 1.2 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry.
- B. Section 07 9000 - Joint Sealants.
- C. Section 13 3419 - Metal Building Systems.

##### 1.3 SUBMITTALS

- A. Submit manufacturer's product data. Include construction details, material descriptions, profiles and finishes of components.
- B. Submit shop drawings. Include elevations and details.
- C. Submit manufacturer's color charts showing the full range of colors available for factory-finished aluminum.
  - 1. When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated below. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.
    - a. Sandwich panels: 14 inch x 28 inch units
    - b. Factory finished aluminum: 5 inch long sections
- D. Submit Installer Certificate, signed by installer, certifying compliance with project qualification requirements.
- E. Submit product reports from a qualified independent testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed reports will be acceptable if for current manufacturer and indicative of products used on this project.
  - 1. Reports required are:
    - a. International Building Code Evaluation Report
    - b. Flame Spread and Smoke Developed (UL 723) – Submit UL Card
    - c. Burn Extent (ASTM D 635)
    - d. Color Difference (ASTM D 2244)
    - e. Impact Strength (UL 972)
    - f. Bond Tensile Strength (ASTM C 297 after aging by ASTM D 1037)
    - g. Bond Shear Strength (ASTM D 1002)
    - h. Beam Bending Strength (ASTM E 72)
    - i. Insulation U-Factor (NFRC 100)
    - j. NFRC System U-Factor Certification (NFRC 700)
    - k. Solar Heat Gain Coefficient (NFRC or Calculations)
    - l. Condensation Resistance Factor (AAMA 1503)
    - m. Air Leakage (ASTM E 283)
    - n. Structural Performance (ASTM E 330)
    - o. Water Penetration (ASTM E 331)
    - p. 1200°F Fire Resistance (SWRI)

- q. Daylight Autonomy

## 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications
  - 1. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten consecutive years and which can show evidence of those materials being satisfactorily used on at least six projects of similar size, scope and location. At least three of the projects shall have been in successful use for ten years or longer.
  - 2. Panel system must be listed by an ANSI accredited Evaluation Service, which requires quality control inspections and fire, structural and water infiltration testing of sandwich panel systems by an accredited agency.
  - 3. Quality control inspections shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with AC177 "Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems" as issued by the ICC-ES.
- B. Installer's Qualifications: Installation shall be by an experienced installer, which has been in the business of installing specified panel systems for at least two consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

## 1.5 PERFORMANCE REQUIREMENTS

- A. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.
  - 1. When requested, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 2. Standard panel system shall have less than 0.01 cfm/ft<sup>2</sup> air leakage by ASTM E 283 at 6.24 PSF (50 mph) and no water penetration by ASTM E 331 at 15 PSF; and structural testing by ASTM E 330.
  - 3. Structural Loads; Provide system capable of handling the following loads:
    - a. Live Load: As indicated in Structural Drawings.
    - b. Snow Load: As indicated in Structural Drawings.
    - c. Drift Load: As indicated in Structural Drawings.
    - d. Wind Load: As indicated in Structural Drawings.

## 1.6 DELIVERY STORAGE AND HANDLING

- A. Deliver panel system, components and materials in manufacturer's standard protective packaging.
- B. Store panels on the long edge; several inches above the ground, blocked and under cover in accordance with manufacturer's storage and handling instructions.

## 1.7 WARRANTY

- A. Submit manufacturer's and installer's written warranty agreeing to repair or replace panel system work, which fails in materials or workmanship within one year of the date of delivery. Failure of materials or workmanship shall include leakage, excessive deflection, deterioration of finish on metal in excess of normal weathering, defects in accessories, insulated translucent sandwich panels and other components of the work.
- B. Installer shall provide same length of Warranty as requested from Manufacture.

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Kalwall Corporation
  - 1. Representative: SGH concepts.: [www.sghconcepts.com](http://www.sghconcepts.com).

B. Substitutions: Not permitted.

## 2.2 PANEL COMPONENTS

### A. Face Sheets

1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.
  - a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.
  - b. Face sheets shall not deform, deflect or drip when subjected to fire or flame.
2. Interior face sheets:
  - a. Flame spread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flame spread rating no greater than 50 and smoke developed no greater than 250 when tested in accordance with UL 723.
  - b. Burn extent by ASTM D 635 shall be no greater than 1 inch.
3. Exterior face sheets:
  - a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D 2244 after 5 years outdoor South Florida weathering at 5° facing south, determined by the average of at least three white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
  - b. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact minimum of 70 ft. lbs. without fracture or tear when impacted by a 3-1/4" diameter, 5 lb. free-falling ball per UL 972.
  - c. The exterior face shall have a permanent glass erosion barrier embedded beneath the surface to provide maximum long-term resistance to reinforcing fiber exposure. Sacrificial surface films or coatings are not acceptable erosion barriers. Exterior face surface loss shall not exceed .7 mils and 40 mgs when tested in accordance with ASTM D4060-90 employing CS17 abrasive wheels at a head load of 500 grams for 1000 cycles.
4. Appearance:
  - a. Exterior face sheets: Smooth .070 thick and Crystal in color.
  - b. Interior face sheets: Smooth .045 thick and White in color.
  - c. Face sheets shall not vary more than  $\pm 10\%$  in thickness and be uniform in color.

### B. Grid Core

1. Thermally Broken I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I-beam shall be no less than 7/16".
2. I-beam Thermal break: Minimum 1", thermoset fiberglass composite. Pour and debridge is not acceptable.

### C. Laminate Adhesive

1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives".
2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C 297 after two exposures to six cycles each of the aging conditions prescribed by ASTM D 1037.
3. Minimum shear strength of the panel adhesive by ASTM D 1002 after exposure to four separate conditions:
  - a. 50% Relative Humidity at 68° F: 540 PSI
  - b. 182° F: 100 PSI
  - c. Accelerated Aging by ASTM D 1037 at room temperature: 800 PSI
  - d. Accelerated Aging by ASTM D 1037 at 182° F: 250 PSI



## 2.3 PANEL CONSTRUCTION

- A. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.
  - 1. Thickness: 2 3/4 inches.
  - 2. Light transmission: 26%
  - 3. Solar heat gain coefficient: .26U.
  - 4. Panel U-factor by NFRC certified laboratory: thermally broken grid: .23U.
  - 5. Complete insulated panel system shall have NFRC certified U-factor of .26U.
  - 6. Grid pattern: Nominal size 12 x 24 inch; pattern Reverse Shoji (horizontal).
- B. Standard panels shall deflect no more than 1.9 inches at 30 PSF in 10' 0" span without a supporting frame by ASTM E 72.
- C. Standard panels shall withstand 1200° F fire for minimum one hour without collapse or exterior flaming.
- D. Thermally broken panels: Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.

## 2.4 BATTENS AND PERIMETER CLOSURE SYSTEM

- A. Closure system: Extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite screw type closure system.
- B. Sealing tape: Manufacturer's standard, pre-applied to closure system at the factory under controlled conditions.
- C. Fasteners: 300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.
- D. Finish:
  - 1. Manufacturer's factory applied finish, which meets the performance requirements of AAMA 2604.
  - 2. Color: Architect to selected from manufacturer's standards.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Installer shall examine substrates, supporting structure and installation conditions.
- B. Do not proceed with panel installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Metal Protection:
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
  - 2. Where aluminum will contact concrete, masonry or pressure treated wood, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by manufacturer.

### 3.3 INSTALLATION

- A. Install the panel system in accordance with the manufacturer's suggested installation recommendations and approved shop drawings.
  - 1. Anchor component parts securely in place by permanent mechanical attachment system.
  - 2. Accommodate thermal and mechanical movements.

3. Set perimeter framing in a full bed of sealant compound, or with joint fillers or gaskets to provide weather-tight construction.
- B. Install joint sealants at perimeter joints and within the panel system in accordance with manufacturer's installation instructions.

### **3.4 CLEANING**

- A. Clean the panel system interior and exterior, immediately after installation.
- B. Refer to manufacturer's written recommendations.

**END OF SECTION**

## SECTION 08 7100

### DOOR HARDWARE

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Electromechanical door hardware.
  - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Division 08 Section "Hollow Metal Doors and Frames".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 70 - National Electrical Code.
  - 4. NFPA 80 - Fire Doors and Windows.
  - 5. NFPA 101 - Life Safety Code.
  - 6. NFPA 105 - Installation of Smoke Door Assemblies.
  - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
  - 1. ANSI/BHMA Certified Product Standards - A156 Series.
  - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
  - 3. ANSI/UL 294 - Access Control System Units.
  - 4. UL 305 - Panic Hardware.
  - 5. ANSI/UL 437- Key Locks.

### 1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, 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. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  - 3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.
  - 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.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
  - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
    - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
    - b. Complete (risers, point-to-point) access control system block wiring diagrams.
    - c. Wiring instructions for each electronic component scheduled herein.
  - 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format.

Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

#### 1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.

2. Plans for existing and future key system expansion.

3. Requirements for key control storage and software.

4. Installation of permanent keys, cylinder cores and software.

5. Address and requirements for delivery of keys.

- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  3. Review sequence of operation narratives for each unique access controlled opening.
  4. Review and finalize construction schedule and verify availability of materials.
  5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

#### 1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

#### 1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

## 1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

## PART 2 - PRODUCTS

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
  - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

### 2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  - 1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
    - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
  4. Hinge Options: Comply with the following:
    - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
  5. Manufacturers:
    - a. McKinney (MK) - TA/T4A Series, 5 knuckle.
    - b. dormakaba Best (ST) - F/FBB Series, 5 knuckle.
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Manufacturers:
    - a. Bommer Industries (BO).
    - b. Pemko (PE).

## 2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
  1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
  2. Furnish dust proof strikes for bottom bolts.
  3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
  4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
  5. Manufacturers:
    - a. Rockwood (RO).
    - b. Trimco (TC).
- B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.



1. Manufacturers:
  - a. Rockwood (RO).
  - b. Trimco (TC).
  
- C. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
  1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
  2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
  3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
  4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
  5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
  
  6. Manufacturers:
    - a. Rockwood (RO).
    - b. Trimco (TC).

## 2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
  1. Manufacturers:
    - a. Match Existing, Field Verify.
  
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
  1. Threaded mortise cylinders with rings and cams to suit hardware application.
  2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  4. Tubular deadlocks and other auxiliary locks.
  5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  6. Keyway: Match Facility Standard.
  
- C. Keying System: Each type of lock and cylinders to be factory keyed.
  1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
  2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  3. Existing System: Field verify and key cylinders to match Owner's existing system.
  
- D. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

E. Construction Keying: Provide construction master keyed cylinders.

F. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

## 2.5 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:
  - a. Lund Equipment (LU).
  - b. MMF Industries (MM).
  - c. Telkee (TK).

## 2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.

1. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
2. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
3. Locks are to be non-handed and fully field reversible.
4. Manufacturers:
  - a. dormakaba Best (BE) - 9K Series.
  - b. Schlage (SC) - ND Series.
  - c. Yale Commercial (YA) 5400LN Series.

## 2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

## 2.8 ELECTRIC STRIKES

- A. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.

1. Manufacturers:
  - a. HES (HS) - 9700 Series.

- B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

## 2.9 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
  7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
  8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
    - a. dormakaba Best (PR) - Apex 2000 Series.
    - b. Yale (YA) - 6000 Series.

## 2.10 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
  4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Heavy duty surface mounted door closers shall have a 25-year warranty.
  2. Manufacturers:
    - a. LCN Closers (LC) – 4040XP Series.
    - b. Norton Rixson (NO) - 7500 Series.
    - c. Sargent Manufacturing (SA) - 351 Series.

## 2.11 ARCHITECTURAL TRIM

### A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. Rockwood (RO).
  - b. Trimco (TC).

## 2.12 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:
  - a. Rockwood (RO).
  - b. Trimco (TC).

## 2.13 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
  1. Pemko (PE).
  2. Reese Enterprises, Inc. (RE).

## 2.14 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
  1. Manufacturers:
    - a. Sargent Manufacturing (SA) - 3280 Series.
    - b. Securitron (SU) - DPS Series.
- B. Switching Power Supplies: Provide power supplies with either single or dual voltage configurations at 12 or 24VDC. Power supplies shall have battery backup function with an integrated battery charging circuit and shall provide capability for power distribution, direct lock control and Fire Alarm Interface (FAI) through add on modules. Power supplies shall be

expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs.

1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
2. Manufacturers:
  - a. Securitron (SU) - AQD Series.
  - b. Altronix (AS) - Maximal 3.

## 2.15 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

## 2.16 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

### 3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
  - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.



### 3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
  - 1. Quantities listed are for each pair of doors, or for each single door.
  - 2. The supplier is responsible for handing and sizing all products.
  - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
  - 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Manufacturer's Abbreviations:
  - 1. MK - McKinney
  - 2. PE - Pemko
  - 3. SU - Securitron
  - 4. RO - Rockwood
  - 5. YA - Yale
  - 6. HS - HES
  - 7. RF - Rixson
  - 8. NO - Norton
  - 9. OT - Other

## Hardware Sets

### Set: 1.0

Doors: 001A

2 Continuous Hinge	CFM83HD1 x Height Required		PE
1 Mullion	KRM200	600	YA
2 Rim Exit Device, Classroom	6105ED AU626F	630	YA
5 Cylinder	x Type Required	626	YA
2 Surface Closer	CPS7500	689	NO
2 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1 Threshold	253x3AFG		PE
1 Gasketing	2891APK TKSP8		PE
1 Mullion Gasketing	5110BL		PE
2 Sweep	3452CNB TKSP8		PE
2 Astragal	18041CNB TKSP8		PE

Notes: Doors normally closed, latched and secured.  
Entry by lever when doors unlocked by cylinder in exit device trim.  
Free egress at all times.

Install gasketing prior to soffit mounted hardware. Do not notch gasketing for soffit mounted hardware.

### Set: 2.0

Doors: 001B

2 Continuous Hinge	CFM83HD1 x Height Required		PE
1 Mullion	KRM200	600	YA
2 Rim Exit Device, Classroom	6105ED AU626F	630	YA
5 Cylinder	x Type Required	626	YA
1 Electric Strike	9700	630	HS
2 Surface Closer	CPS7500	689	NO
2 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1 Threshold	253x3AFG		PE
1 Gasketing	2891APK TKSP8		PE
1 Mullion Gasketing	5110BL		PE
2 Sweep	3452CNB TKSP8		PE
2 Astragal	18041CNB TKSP8		PE
1 Position Switch	DPS-M / W		SU
1 Card Reader	Provided by Security Contractor		OT
1 Power Supply	AQD1		SU

Notes: Doors normally closed, latched and secured.  
Entry by lever when doors unlocked by cylinder in exit device trim or valid card read.  
Free egress at all times.

Install gasketing prior to soffit mounted hardware. Do not notch gasketing for soffit mounted hardware.

**Set: 3.0**

Doors: 001C, 001D

2 Continuous Hinge	CFM83HD1 x Height Required		PE
2 Push Plate	70C-RKW	US32D	RO
2 Pull Plate	BF 111x70C	US32D	RO
2 Surface Closer	CPS7500	689	NO
2 Kick Plate	K1050 10" x 1-1/2" LDW CSK BEV	US32D	RO

**Set: 4.0**

Doors: 003A, 003C, 005A, 005B

1 Continuous Hinge	CFM83HD1 x Height Required		PE
1 Rim Exit Device, Nightlatch	6105ED AU627F	630	YA
1 Cylinder	x Type Required	626	YA
1 Surface Closer	CPS7500	689	NO
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1 Threshold	253x3AFG		PE
1 Rain Guard	346A TKSP8		PE
1 Gasketing	2891APK TKSP8		PE
1 Sweep	3452CNB TKSP8		PE

Notes: Doors normally closed, latched and secured.  
Entry by key override.  
Free egress at all times.

Install gasketing prior to soffit mounted hardware. Do not notch gasketing for soffit mounted hardware.

**Set: 5.0**

Doors: 009B

6 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1 Auto Flush Bolt	2842	US26D	RO
1 Dust Proof Strike	570	US26D	RO
1 Storeroom Lock	AU 5405LN	626	YA
1 Coordinator	2600 Series x Mtg. Brackets as Req.	Black	RO
2 Surface Closer	7500	689	NO
2 Kick Plate	K1050 10" x 1-1/2" LDW CSK BEV	US32D	RO
2 Wall Stop	400	US26D	RO
1 Gasketing	S88BL		PE
2 Astragal	18041CNB TKSP8		PE

**Set: 6.0**

Doors: 009A

6 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1 Auto Flush Bolt	2842	US26D	RO
1 Dust Proof Strike	570	US26D	RO
1 Storeroom Lock	AU 5405LN	626	YA
1 Coordinator	2600 Series x Mtg. Brackets as Req.	Black	RO
2 Surface Closer	CPS7500	689	NO
2 Kick Plate	K1050 10" x 1-1/2" LDW CSK BEV	US32D	RO
1 Gasketing	S88BL		PE
2 Astragal	18041CNB TKSP8		PE

**Set: 7.0**

Doors: 003B

1 Hardware supplied with door 00

Mark	Hardware
001A	1.0
001B	2.0
001C	3.0

001D	3.0
003A	4.0
003B	7.0
003C	4.0

005A	4.0
005B	4.0
009A	6.0
009B	5.0

END OF SECTION 08 7100

## SECTION 08 8000

### GLAZING

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds.

##### 1.2 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.
- B. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 10 2800 - Toilet, Bath, and Laundry Accessories: Factory framed mirrors.

##### 1.3 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- E. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- H. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
- I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- K. GANA (GM) - GANA Glazing Manual; 2009.
- L. GANA (SM) - GANA Sealant Manual; 2008.
- M. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.
- N. ICC (IBC) - International Building Code; 2015.
- O. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2004).
- P. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.
- Q. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
- R. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting two (2) before starting work of this section; require attendance by each of the affected installers.

#### **1.5 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Submit one (1) sample 12 by 12 inch in size of glass units, showing coloration and design.
- E. Samples: Submit two (2) 6 inch long beads of glazing sealant, color as selected.
- F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.6 QUALITY ASSURANCE**

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten (10) years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five (5) years documented experience.
- D. Construct a single window and door/frame system in each final wall construction for review by Owner and Architect prior to all storefront/door installation. Include all flashing, glazing and sealant.

#### **1.7 FIELD CONDITIONS**

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

#### **1.8 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

### **PART 2 PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Glass Fabricators:
  - 1. Viracon, Inc: [www.viracon.com](http://www.viracon.com).
  - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Float Glass Manufacturers:
  - 1. Cardinal Glass Industries: [www.cardinalcorp.com](http://www.cardinalcorp.com).

2. Guardian Glass, LLC: [www.guardianglass.com](http://www.guardianglass.com).
3. Pilkington North America Inc: [www.pilkington.com/na](http://www.pilkington.com/na).
4. Saint Gobain North America: [www.saint-gobain.com](http://www.saint-gobain.com).
5. Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com](http://www.vitroglazings.com).

## 2.2 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  1. Design Pressure: Calculated in accordance with applicable codes.
  2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
  4. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
  1. In conjunction with weather barrier related materials described in other sections, as follows:
    - a. Air Barriers: See Section 07 2700.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
  1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  3. Solar Optical Properties: Comply with NFRC 300 test method.
- D. Sealed Insulating Glass Unit Surface Designations (Double Pane):
 

Exterior to Interior

  1. Exterior surface of outboard lite: #1 surface.
  2. Interior surface of outboard lite: #2 surface.
  3. Exterior surface of inboard lite: #3 surface.
  4. Interior surface of inboard lite: #4 surface.

## 2.3 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
  1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
  2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
  3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
  4. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

## 2.4 INSULATING GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
  1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
  2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
  3. Warm-Edge Spacers: Flexible silicone with polyisobutylene (PIB) primary seal.
    - a. Spacer Width: As required for specified insulating glass unit.
  4. Spacer Color: Black.
  5. Edge Seal:

- a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
- 6. Color: Black.
- 7. Purge interpane space with dry air, hermetically sealed.
- B. Type ITC - Insulating Glass Units: Vision glass, double glazed.
  - 1. Applications: Exterior glazing unless otherwise indicated.
  - 2. Space between lites filled with argon.
  - 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
    - b. Low-E Coating:
      - 1) Basis of Design: Cardinal Glass Industries; LoE3-366 on #2 surface.
      - 2) Basis of Design: Vitro Architectural Glass (formerly PPG Glass) Solarban 70XL on #2 surface.
  - 4. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
  - 5. Total Thickness: 1 inch.
  - 6. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.24, nominal.
  - 7. Visible Light Transmittance (VLT): 63 percent, nominal.
  - 8. Solar Heat Gain Coefficient (SHGC): 0.27, nominal.
  - 9. Visible Light Reflectance, Outside: 11 to 12 percent, nominal.
  - 10. Glazing Method: Dry glazing method, tape and gasket spline.

## 2.5 GLAZING UNITS

- A. Type TC - Monolithic Interior Vision Glazing:
  - 1. Applications: Interior glazing unless otherwise indicated.
  - 2. Glass Type: Fully tempered float glass.
  - 3. Tint: Clear.
  - 4. Thickness: 1/4 inch, nominal.
  - 5. Glazing Method: Dry glazing method, gasket glazing.
- B. Type FRG - Fire-Resistance-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and blocks radiant heat, as required to achieve indicated fire-rating period exceeding 45 minutes.
  - 1. Product:
    - a. Basis of Design: Technical Glass Products; Pilkington Pyrostop.
  - 2. Applications:
    - a. Glazing in fire-rated door assembly.
    - b. Glazing in fire-rated window assembly.
    - c. Glazing in sidelites, borrowed lites, and other glazed openings in fire-rated wall assemblies.
    - d. Other locations as indicated on drawings.
  - 3. Safety Glazing Certification: 16 CFR 1201 Category II.
  - 4. Glazing Method: As required for fire rating.
  - 5. Fire-Rating Period: As indicated on drawings.
  - 6. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with 1, local building code, and authorities having jurisdiction.
- C. Type FRG - Fire-Protection-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and does not block radiant heat, as required to achieve fire-doors indicated fire-rating period of 45 minutes or less.
  - 1. Product:
    - a. Basis of Design: Technical Glass Products; Firelite NT.
  - 2. Applications:
    - a. Glazing in fire-rated door assembly.



- b. Glazing in fire-rated window assembly.
- c. Other locations as indicated on drawings.
- 3. Safety Glazing Certification: 16 CFR 1201 Category II.
- 4. Glazing Method: As required for fire rating.
- 5. Fire-Rating Period: As indicated on drawings.
- 6. Markings for Fire-Protection-Rated Glazing Assemblies: Provide permanent markings on fire-protection-rated glazing in compliance with 1, local building code, and authorities having jurisdiction

## **2.6 GLAZING COMPOUNDS**

- A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; clear color.
- C. Manufacturers:
  - 1. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
  - 2. Dow Corning Corporation: [www.dowcorning.com/construction](http://www.dowcorning.com/construction).
  - 3. Momentive Performance Materials, Inc: [www.momentive.com](http://www.momentive.com).
  - 4. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  - 5. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  - 6. Substitutions: See Section 01 6000 - Product Requirements.

## **2.7 ACCESSORIES**

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
- C. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

## **PART 3 EXECUTION**

### **3.1 VERIFICATION OF CONDITIONS**

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

### **3.2 INSTALLATION, GENERAL**

- A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

### **3.3 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)**

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

### **3.4 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)**

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- F. Carefully trim protruding tape with knife.

### **3.5 CLEANING**

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than three (3) days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

### **3.6 PROTECTION**

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

**END OF SECTION**

**SECTION 09 2116**  
**GYPSON BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.

**1.2 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 06 8316 - Fiberglass Reinforced Paneling.
- C. Division 07 - Thermal and Moisture Protection: Insulation.
- D. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- E. Section 09 9123 - Interior Painting.
- F. Division 26 - Electrical.

**1.3 REFERENCE STANDARDS**

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- G. ASTM C954 - 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; 2015.
- H. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- I. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- J. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.
- K. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.

- L. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- N. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- O. GA-216 - Application and Finishing of Gypsum Board; 2013.
- P. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2008.
- Q. GA-600 - Fire Resistance Design Manual; 2015.
- R. ICC (IBC) - International Building Code; 2015.
- S. UL (FRD) - Fire Resistance Directory; current edition.

#### **1.4 SUBMITTALS**

- A. See Section 01 3000 - 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.
- E. Samples: Submit two (2) samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.
- F. Installer's Qualification Statement.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five (5) years of documented experience.

### **PART 2 PRODUCTS**

#### **2.1 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
  1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.
  1. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
  2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
  3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

#### **2.2 METAL FRAMING MATERIALS**

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
  1. Clarkwestern Dietrich Building Systems LLC: [www.clarkdietrich.com](http://www.clarkdietrich.com).
  2. Marino: [www.marinoware.com](http://www.marinoware.com).

3. Phillips Manufacturing Co: [www.phillipsmfg.com](http://www.phillipsmfg.com).
  4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Structural Steel Framing for Application of Gypsum Board: See Section 05 4000.
- C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
1. Studs: "C" shaped with flat or formed webs.
    - a. Stud Thickness: As indicated on drawings. 20 gauge minimum.
  2. Runners: U shaped, sized to match studs.
  3. Ceiling Channels: C-shaped.
  4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
- D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection and prevent 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 S100.
  2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.
  3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
  4. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-resistance rating of the wall assembly.

### 2.3 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
1. American Gypsum Company: [www.americangypsum.com](http://www.americangypsum.com).
  2. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  3. Georgia-Pacific Gypsum: [www.gpgypsum.com](http://www.gpgypsum.com).
  4. National Gypsum Company: [www.nationalgypsum.com](http://www.nationalgypsum.com).
  5. PABCO Gypsum: [www.pabco gypsum.com](http://www.pabco gypsum.com).
  6. USG Corporation: [www.usg.com](http://www.usg.com).
  7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  4. Thickness:
    - a. Vertical Surfaces: 5/8 inch.
    - b. Ceilings: 5/8 inch.
    - c. Where indicated or needed: 1/4 inch.
    - d. Where indicated or needed: 3/8 inch.
    - e. Multi-Layer Assemblies: Thicknesses as required or as indicated on drawings.
    - f. Flexible or Curved Surfaces: Thicknesses as required or as indicated on drawings.
  5. Paper-Faced Products:
    - a. American Gypsum Company; FireBloc Type X Gypsum Wallboard.
    - b. CertainTeed Corporation; Type X Drywall.
    - c. National Gypsum Company; Gold Bond BRAND Fire-Shield Gypsum Board.
    - d. USG Corporation; Sheetrock Brand Gypsum Panels.
    - e. Substitutions: See Section 01 6000 - Product Requirements.
- C. Impact Resistant Wallboard:

1. Applications: As indicated on drawings.
2. Core: Fire-resistance rated gypsum core, with additives to enhance mold/mildew resistance, surface indentation resistance, impact resistance and moisture and mold resistant.
3. Surface paper: Abrasion resistant, 100 percent recycled content moisture/mold/mildew resistant paper on front, back and long edges.
4. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
6. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
7. Hard Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
8. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
9. Paper-Faced Type: Gypsum wallboard, as defined in ASTM C1396/C1396M.
10. Type: Fire-resistance-rated Type X, UL or WH listed.
11. Thickness: 5/8 inch.
12. Edges: Tapered.
13. Products:
  - a. Georgia-Pacific Gypsum; DensArmor Plus Fireguard Impact-Resistant.
  - b. National Gypsum Company; Gold Bond Hi-Impact XP Gypsum Board.
  - c. USG Corporation; Sheetrock Brand Mold Tough VHI Firecode X Panels.
  - d. Substitutions: See Section 01 6000 - Product Requirements.

## 2.4 GYPSUM WALLBOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.
  1. Thickness: Full thickness of cavity as indicated on drawings. 3-1/2 inch minimum.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
  1. Corner Beads: Low profile, for 90 degree outside corners.
  2. Splayed Corner Beads: 120 to 135 degree outside corner.
  3. Expansion Joints:
    - a. Type: V-shaped metal with factory-installed protective tape.
    - b. Type: Off-angle inside corner expansion.
  4. Edge Trims: U-trim or L-trim for finished gypsum wall board edge.
  5. Special Trim:
    - a. Locations: Where indicated on drawings.
    - b. Basis of Design: Trim-Tex; Tear Away L Bead: [www.trim-tex.com](http://www.trim-tex.com).
      - 1) Material: PVC.
      - 2) Finish: Painted.
    - c. Basis of Design: Trim-Tex; Caulk Channel Tear Away: [www.trim-tex.com](http://www.trim-tex.com).
      - 1) Material: PVC.
      - 2) Channel: 1/4 x 3/16 inch.
      - 3) Finish: Sealed and painted.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
  1. Tape: 2 inch wide, creased paper tape for joints and corners.
  2. Joint Compound: Drying type, vinyl-based, ready-mixed.
  3. Joint Compound: Setting type, field-mixed.

- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.
- G. 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**

### **3.1 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.2 FRAMING INSTALLATION**

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
  - 1. Level ceiling system to a tolerance of 1/1200.
  - 2. Laterally brace entire suspension system.
  - 3. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs at 16 inches on center.
  - 1. Extend partition framing to structure in all locations.
  - 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: Vertical.
- F. Furring for Fire-Resistance Ratings: Install as required for fire-resistance ratings indicated and to GA-600 requirements.
- G. Blocking: Install wood blocking for support of:
  - 1. Framed openings.
  - 2. Wall-mounted cabinets.
  - 3. Plumbing fixtures.
  - 4. Toilet partitions.
  - 5. Toilet accessories.
  - 6. Wall-mounted door hardware.
  - 7. Wall and ceiling mounted equipment.
  - 8. Corner guards.

### **3.3 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. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

### 3.4 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board perpendicular to framing, with ends and edges occurring over firm bearing.
  1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Double-Layer Non-Rated: Use gypsum board for first layer, placed perpendicular to framing or furring members, with ends and edges occurring over firm bearing. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- F. Installation on Metal Framing: Use screws for attachment of gypsum board.
- G. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

### 3.5 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
  1. Not more than twenty four (24) feet apart on wall and ceilings and as indicated on drawings.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Reveal Mouldings: Install at locations shown on drawings and in accordance with manufacturer's instructions.

### 3.6 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with joint compound and finish with joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  1. Level 5: Walls and ceilings to receive paint finish and wall coverings, unless otherwise indicated.
    - a. Where Level 5 gypsum board finish is indicated, provide a thin, uniform skim coat of joint compound over entire surface. Use joint compound specified for third coat. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects, tool marks, or ridges, and ready for decoration.
  2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  3. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
  4. Level 0: Temporary partitions and surfaces indicated to be finished in later stage of project.
- C. Typical Gypsum Board **Level 5** Finish (minimums):
  1. Setting Compound 20 or 45:
    - a. Used for large holes, repairs or large joints.
  2. All Purpose Compound:
    - a. First Coat: Joints with tape (embed) – 8 inch wide. 24 hour dry time.



- b. Second Coat: Joints – 10 inch wide. 24 hour dry time.
    - c. Third Coat: Feathering or tapering, as necessary.
  - 3. Topping Compound:
    - a. Skim coat entire surface.
- D. 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.

### **3.7 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.
- B. Walls with Wall Coverings: Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction nor vary at a rate greater than 1/16 inch per foot.

**END OF SECTION**

**SECTION 09 9113  
EXTERIOR PAINTING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints, stains, and varnishes.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
  - 6. Marble, granite, slate, and other natural stones.
  - 7. Floors, unless specifically indicated.
  - 8. Ceramic and other types of tiles.
  - 9. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
  - 10. Exterior insulation and finish system (EIFS).
  - 11. Glass.
  - 12. Concealed pipes, ducts, and conduits.

**1.2 RELATED REQUIREMENTS**

- A. Division 05 - Metals: Field-applied paint on items.
- B. Division 08 - Openings: Field-applied paint on items.
- C. Division 09 - Finishes: Other applied finishes.
- D. Section 09 9123 - Interior Painting.

**1.3 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, [www.paintinfo.com](http://www.paintinfo.com).
- E. SSPC-SP 1 - Solvent Cleaning; 2015.
- F. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).
- G. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003.

#### **1.4 SUBMITTALS**

- A. See Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three (3) paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
  - 2. Allow thirty (30) days for approval process, after receipt of complete samples by Architect.
- D. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

#### **1.5 EXTRA MATERIALS**

- A. Extra Paint and Finish Materials: One (1) unopened gallon of each color, clearly labeled, from each paint system and from the same product run.
- B. Label each container with color in addition to the manufacturer's label.

#### **1.6 QUALITY ASSURANCE**

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years experience and approved by manufacturer.

#### **1.7 DELIVERY, STORAGE, AND HANDLING**

- 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.

#### **1.8 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Manufacturers:
  - 1. Diamond Vogel Paints: [www.diamondvogel.com](http://www.diamondvogel.com).
  - 2. PPG Paints: [www.ppgpaints.com](http://www.ppgpaints.com).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 6000 - Product Requirements.

### **2.2 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
  - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 3. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
  - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
  - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens listed in **Materials List** as indicated on drawings; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
  - 1. MPI Gloss Level and Sheen Standards:
    - a. Gloss Level 1: a traditional matte finish - flat. Flat.
    - b. Gloss Level 2: a high side sheen flat - a "velvet-like" finish. Low Sheen.
    - c. Gloss Level 3: a traditional "egg-shell-like" finish. Egg-Shell.
    - d. Gloss Level 4: a "satin-like" finish. Satin.
    - e. Gloss Level 5: a traditional semi-gloss. Semi-gloss.
    - f. Gloss Level 6: a traditional gloss. Gloss.
    - g. Gloss Level 7: a high gloss. High Gloss.
- E. Colors: Provide colors listed in **Materials List** as indicated on drawings; where color is not indicated, color will be selected later by Architect from the manufacturer's full line.

### **2.3 PAINT SYSTEMS - EXTERIOR**

- A. Basis of Design: Sherwin-Williams Company.

1. Unprimed Steel:
  - a. Primer: 1 coat Pro-Cryl Universal Acrylic Metal Primer B66-310 series.
  - b. Finish: 2 coats DTM Alkyd Enamel B55 series, Semi-Gloss.
2. Primed Steel:
  - a. Finish: 2 coats DTM Alkyd Enamel B55 series, Semi-Gloss.
3. Galvanized Steel:
  - a. Primer: 1 coat Pro-Cryl Universal Acrylic Metal Primer B66-310 series.
  - b. Finish: 2 coats DTM Alkyd Enamel B55 series, Semi-Gloss.

## 2.4 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. 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. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
  2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete:
  1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
  2. Clean concrete according to ASTM D4258. Allow to dry.
  3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- H. Masonry:

1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
  2. Prepare surface as recommended by top coat manufacturer.
- I. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
  2. Prepare surface according to SSPC-SP 2.
- J. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### **3.3 APPLICATION**

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- 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.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### **3.4 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**

**SECTION 09 9123**  
**INTERIOR PAINTING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints, stains, and varnishes.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
  - 1. Mechanical and Electrical:
    - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
  - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
  - 6. Marble, granite, slate, and other natural stones.
  - 7. Floors, unless specifically indicated.
  - 8. Ceramic and other tiles.
  - 9. Brick, architectural concrete, cast stone, integrally colored plaster, and stucco.
  - 10. Glass.
  - 11. Acoustical materials, unless specifically indicated.
  - 12. Concealed pipes, ducts, and conduits.

**1.2 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-In-Place Concrete.
- B. Division 08 - Openings: Field-applied paint on items.
- C. Division 09 - Finishes: Other applied finishes.
- D. Section 09 9113 - Exterior Painting.

**1.3 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- D. SSPC-SP 1 - Solvent Cleaning; 2015.
- E. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).
- F. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- G. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003.

## 1.4 SUBMITTALS

- A. See Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
  - 2. MPI product number (e.g., MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three (3) paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
  - 2. Allow thirty (30) days for approval process, after receipt of complete samples by Architect.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

## 1.5 EXTRA MATERIALS

- A. Extra Paint and Finish Materials: One (1) unopened gallon of each color, clearly labeled, from each paint system and from the same product run.
- B. Label each container with color in addition to the manufacturer's label.

## 1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years documented experience and approved by manufacturer.

## 1.7 MOCK-UP

- A. Construct a properly prepared and finished surface as a mock-up which shall be evaluated as uniform in appearance, color, texture, hiding and sheen. It shall be free of foreign material, lumps, skins, runs, sags, holidays, misses, or insufficient coverage. It will need to have a surface free of drips, spatters, spills or overspray caused by the contractor. In order to determine whether a surface has been properly finished, it shall be examined without magnification at a distance of thirty-nine (39) inches or one (1) meter, or more, under finished lighting conditions and from a normal viewing position.
- B. The mock-up shall demonstrate to the Architect and Owner, the contractor's understanding of the finished appearance expectations for final finished surfaces. Approval of the mock-up does not constitute approval of any deviations from the contract documents unless such deviations are specifically approved by the Architect in writing.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the work.



## **1.8 DELIVERY, STORAGE, AND HANDLING**

- 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.

## **1.9 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
  - 1. If a single manufacturer cannot provide specified products; minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
- B. Manufacturers:
  - 1. Diamond Vogel Paints: [www.diamondvogel.com](http://www.diamondvogel.com).
  - 2. PPG Paints: [www.ppgpaints.com](http://www.ppgpaints.com).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 6000 - Product Requirements.

### **2.2 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
  - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 3. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
  - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:

- a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
- 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens listed in **Materials List** as indicated on drawings; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
  - 1. MPI Gloss Level and Sheen Standards:
    - a. Gloss Level 1: a traditional matte finish - flat. Flat.
    - b. Gloss Level 2: a high side sheen flat - a "velvet-like" finish. Low Sheen.
    - c. Gloss Level 3: a traditional "egg-shell-like" finish. Egg-Shell.
    - d. Gloss Level 4: a "satin-like" finish. Satin.
    - e. Gloss Level 5: a traditional semi-gloss. Semi-gloss.
    - f. Gloss Level 6: a traditional gloss. Gloss.
    - g. Gloss Level 7: a high gloss. High Gloss.
- E. Colors: Provide colors listed in **Materials List** as indicated on drawings; where color is not indicated, color will be selected later by Architect from the manufacturer's full line.

## 2.3 PAINT SYSTEMS - INTERIOR

- A. Basis of Design: Sherwin-Williams Company.
  - 1. Unprimed Steel:
    - a. Primer: 1 coat Pro-Cryl Universal Acrylic Metal Primer B66-310 series.
    - b. Finish: 2 coats DTM Alkyd Enamel B55 series, Semi-Gloss.
  - 2. Steel Primed:
    - a. Finish: 2 coats DTM Alkyd Enamel B55 series, Semi-Gloss.
  - 3. Galvanized Steel:
    - a. Primer: 1 coat Pro-Cryl Universal Acrylic Metal Primer B66-310 series.
    - b. Finish: 2 coats DTM Alkyd Enamel B55 series, Semi-Gloss.
  - 4. Exposed Ceiling with Steel Structure:
    - a. Primer: 1 coat Pro-Cryl Universal Acrylic Metal Primer B66-310 series.
    - b. Finish: 2 coats Pro Industrial WB Acrylic Dryfall B42-80 series, Flat.
  - 5. Gypsum Wallboard (Walls):
    - a. Primer: 1 coat ProMar 200 Zero VOC Interior Latex Primer B28W2600.
    - b. Finish: 2 coats Pro Industrial Pre-Catalyzed WB Epoxy K45 series, Egg-Shell.
  - 6. Gypsum Wallboard (Ceilings):
    - a. Primer: 1 coat ProMar 200 Zero VOC Interior Latex Primer B28W2600.
    - b. Finish: 2 coats ProMar 200 Zero VOC Interior Latex B30, Flat.

## 2.4 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
  3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  4. Concrete Floors and Traffic Surfaces: 8 percent.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Concrete:
  1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
  2. Clean concrete according to ASTM D4258. Allow to dry.
  3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- G. Masonry:
  1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
  2. Prepare surface as recommended by top coat manufacturer.
- H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- J. Galvanized Surfaces:
  1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
  2. Prepare surface according to SSPC-SP 2.
- K. Ferrous Metal:
  1. Solvent clean according to SSPC-SP 1.
  2. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- L. Wood Surfaces 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. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### **3.3 APPLICATION**

- A. Apply products in accordance with manufacturer's written 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 in thicknesses specified by manufacturer.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### **3.4 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**

**SECTION 10 2113.19**  
**SOLID PLASTIC (HDPE) TOILET COMPARTMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Solid plastic (HDPE) toilet compartments.
- B. Urinal screens.

**1.2 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Blocking and supports.
- B. Section 10 2800 - Toilet, Bath, and Laundry Accessories.

**1.3 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

**1.5 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Samples: Submit two (2) samples of partition panels, 4 x 4 inch in size illustrating panel finish, color, and sheen.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Solid Plastic Toilet Compartments:
  - 1. AJW Architectural Products: [www.ajw.com](http://www.ajw.com).
  - 2. Accurate Partitions Corporation: [www.accuratepartitions.com](http://www.accuratepartitions.com).
  - 3. Ampco Products, Inc: [www.ampco.com](http://www.ampco.com).
  - 4. American Specialties, Inc.: [www.americanspecialties.com](http://www.americanspecialties.com).
  - 5. Bobrick Washroom Equipment, Inc.: [www.bobrick.com](http://www.bobrick.com).
  - 6. General Partitions Mfg. Corp: [www.generalpartitions.com](http://www.generalpartitions.com).
  - 7. Global Steel Products Corp: [www.globalpartitions.com](http://www.globalpartitions.com).
  - 8. Hadrian Manufacturing Inc.: [www.hadrian-inc.com](http://www.hadrian-inc.com).
  - 9. Metpar Corp: [www.metpar.com](http://www.metpar.com).
  - 10. Partition Systems International of South Carolina: [www.psisc.com](http://www.psisc.com).
  - 11. Rockville Partitions: [www.rockvillepartitions.com](http://www.rockvillepartitions.com).

12. Sanymetal, A Crane Plumbing Company: [www.sanymetal.com](http://www.sanymetal.com).
13. Scranton Products: [www.scrantonproducts.com](http://www.scrantonproducts.com).
14. Substitutions: Section 01 6000 - Product Requirements.

## 2.2 PLASTIC TOILET COMPARTMENTS

- A. Accessibility: Comply with ADA Standards.
- B. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), floor-mounted headrail-braced.
  1. Color/Texture:
    - a. Provide colors/textures listed in **Materials List** as indicated on drawings.
- C. Doors:
  1. Thickness: 1 inch.
  2. Width: 24 inch.
  3. Width for Handicapped Use: 36 inch, out-swinging.
  4. Height: 55 inch.
- D. Panels:
  1. Thickness: 1 inch.
  2. Height: 55 inch.
  3. Depth: As indicated on drawings.
- E. Pilasters:
  1. Thickness: 1 inch.
  2. Width: As required to fit space; minimum 3 inch.
- F. Urinal Screens: Wall mounted with full-height brackets and vertical floor mounted pilaster.

## 2.3 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A666, Type 304 stainless steel with No. 4 finish, 3 inch high, concealing floor fastenings.
  1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Hollow stainless steel, 1 inch by 1-1/2 inch size, with anti-grip profile and cast socket wall brackets.
- C. Wall and Pilaster Brackets: Full-height continuous type, satin stainless steel.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
  1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- E. Hardware: Satin stainless steel:
  1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
  2. Nylon bearings.
  3. Latch and Keeper: Surface-mounted slide latch with flat rubber-faced combination door strike and keeper, with provision for emergency access, meeting requirements for accessibility at accessible compartments.
  4. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
  5. Coat hook with rubber bumper; one per compartment, mounted on back of door.
  6. Coat hook with rubber bumper mounted on interior of ADA stall door.
  7. Door bumper on exterior of ADA stall door.
  8. Provide door pull for outswinging doors.
- F. Chrome-plated or nickel-plated hardware and accessories are **NOT** permitted.

## **PART 3 EXECUTION**

### **3.1 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.

### **3.2 INSTALLATION**

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

### **3.3 TOLERANCES**

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

### **3.4 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 10 2600**  
**WALL AND DOOR PROTECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Corner guards.

**1.2 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Blocking for wall and corner guard anchors.
- B. Section 09 2116 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

**1.3 REFERENCE STANDARDS**

- A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.
- B. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.
- C. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2014.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.
- C. Shop Drawings: Include plans, elevation, sections, and attachment details.
- D. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
  - 1. Submit two (2) sections of corner guards, 6 inches long.
- E. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.
- B. Protect work from moisture damage.
- C. Protect work from UV light damage.
- D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.
- E. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.



## 1.6 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Provide five (5) year manufacturer and installer warranty for metal crash rails.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures or internal connection failures.
    - b. Deterioration of materials beyond that expected of normal use, as intended by manufacturer.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Corner Guards:
  - 1. Arden Architectural Specialties, Inc.: [www.ardenarch.com](http://www.ardenarch.com).
  - 2. Babcock-Davis: [www.babcockdavis.com](http://www.babcockdavis.com).
  - 3. Construction Specialties, Inc.: [www.c-sgroup.com](http://www.c-sgroup.com).
  - 4. Inpro: [www.inprocorp.com](http://www.inprocorp.com).
  - 5. Tarkett Company: [commercial.tarkett.com](http://commercial.tarkett.com).
  - 6. Pawling Corp: [www.pawling.com](http://www.pawling.com).
  - 7. Substitutions: See Section 01 6000 - Product Requirements.

### 2.2 PERFORMANCE CRITERIA

- A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for compliance with applicable provisions of ASTM D256 and/or ASTM F476.
- B. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance complying with applicable provisions of ASTM D543.

### 2.3 PRODUCT TYPES

- A. Corner Guards **CG**: Extruded one-piece unit without splices.
  - 1. Product:
    - a. Basis of Design: InPro Corporation; Stainless Steel Corner Guards.
  - 2. Locations: As indicated on drawings.
  - 3. Mounting: Surface mounted with adhesive.
  - 4. Material: Type 304 stainless steel, No. 4 finish.
  - 5. Thickness: 16 gauge, 0.06 inch.
  - 6. Style: Outside 90 degree corners.
  - 7. Width of Wings: 1-1/2 inches.
  - 8. Height: Full height. See drawings and verify in field.
- B. Heavy-Duty Adhesive: Appropriate to substrate and in accordance to manufacturer's written instructions.
  - 1. Double-sided tape **NOT** permitted.

### 2.4 FABRICATION

- A. Fabricate components with tight joints, corners and seams.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- B. Verify that field measurements are as indicated on drawings.

- C. Verify that substrate surfaces for adhered items are clean and smooth.
  - 1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer. Follow adhesive manufacturer's recommendations for remedial measures at locations and/or application conditions where adhesion test's results are unsatisfactory.
- D. Start of installation constitutes acceptance of project conditions.

### **3.2 INSTALLATION**

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.
- B. Install corner guard on top of wall base. For full height, extend to ceiling and cut at bottom of ceiling, if needed.
- C. Rigid Vinyl Sheet and Accessories: Install components in accordance with manufacturer's instructions, level and plumb. Install on floor with corner trims and top cap trim. Butt joints to be sealed with color matching sealant.

### **3.3 TOLERANCES**

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

### **3.4 CLEANING**

- A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.
- B. Clean components in accordance with manufacturer's instructions.

**END OF SECTION**

**SECTION 10 2800**  
**TOILET, BATH, AND LAUNDRY ACCESSORIES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Commercial toilet accessories.
- B. Utility room accessories.

**1.2 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Blocking and supports.
- B. Section 10 2113.19 - Solid Plastic (HDPE) Toilet Compartments.

**1.3 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

**1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

**1.5 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Commercial Toilet, Shower, and Bath Accessories:
  - 1. AJW Architectural Products: [www.ajw.com](http://www.ajw.com).
  - 2. American Specialties, Inc: [www.americanspecialties.com](http://www.americanspecialties.com).
  - 3. Bobrick Washroom Equipment, Inc.: [www.bobrick.com](http://www.bobrick.com).
  - 4. Bradley Corporation: [www.bradleycorp.com](http://www.bradleycorp.com).
  - 5. Substitutions: Section 01 6000 - Product Requirements.

**2.2 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.
- B. Stainless Steel Sheet: ASTM A666, Type 304.

- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- E. Hidden Fasteners, Screws, and Bolts: Hot dip galvanized.
- F. Exposed Fasteners, Screws, and Bolts: Stainless steel, tamper-proof, security type.
- G. Chrome or nickel plated hardware and accessories are **NOT** allowed.

### **2.3 FINISHES**

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.
- C. Back paint components where contact is made with building finishes to prevent electrolysis.

### **2.4 COMMERCIAL TOILET ACCESSORIES**

- A. Accessibility: Comply with ADA Standards.
- B. Commercial Toilet Accessories: As indicated in **Accessory / Equipment Schedule** on drawings.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

### **3.2 PREPARATION**

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

### **3.3 INSTALLATION**

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

### **3.4 PROTECTION**

- A. Protect installed accessories from damage due to subsequent construction operations.

**END OF SECTION**

**SECTION 10 4313**  
**AUTOMATIC EXTERNAL DEFIBRILLATOR**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Automatic External Defibrillator (AED).
- B. AED cabinets.
- C. Accessories

**1.2 RELATED REQUIREMENTS**

- A. Section 10 4400 - Fire Protection Specialties.

**1.3 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, and location.
- C. Product Data: Provide color and finish and anchorage details.
  - 1. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- 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.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Automatic External Defibrillators (AED), Cabinets and Accessories:
  - 1. Zoll Medical Corporation: [www.zoll.com](http://www.zoll.com).
    - a. Product: Zoll AED Plus - Fully Automatic.
    - b. Product: Zoll Semi-Recessed Wall Cabinet.
  - 2. Substitutions: See Section 01 6000 - Product Requirements.

**2.2 AUTOMATIC EXTERNAL DEFIBRILLATORS (AED)**

- A. Automatic External Defibrillators:
  - 1. Meet local and national standards. FDA-approved.
  - 2. Automatic read heartbeat and administer shock when needed.
  - 3. Training CD.

**2.3 AED CABINETS**

- A. Semi-recessed Cabinet: ADA compliant cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
- B. Cabinet Trim Material: Steel sheet.
- C. Door Material: Steel sheet.
- D. Door Glazing: Plexiglass.

1. Graphics: Manufacturer's standard red lettering and AED logo placed on door glazing.
- E. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
  1. Provide projecting door pull and friction latch manufacturer's standard.
  2. Provide manufacturer's standard hinge permitting door to open 180 degree.
  3. 9 volt door open audio alarm.
- F. Finishes: Manufacturer's standard epoxy paint for the following:
  1. Color: White.
  2. Exterior of cabinet, door, and trim except for those surfaces indicated to receive another finish.
  3. Interior of cabinet and door.

## **2.4 ACCESSORIES**

- A. Automatic External Defibrillators Cabinet Wall Sign:
  1. Product:
    - a. Basis of Design: Uline; Projecting Sign - AED, 3-Way, Model S-21990: [www.uline.com](http://www.uline.com).
  2. Sign: Moisture resistant, v shape, 45 degree PVC with pre-drilled holes.
  3. Quantity: Provide one (1) sign above each cabinet.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install automatic external defibrillator cabinets in locations and at mounting heights indicated.
  1. Cabinets: 48 inches above finished floor to top of cabinet.

### **3.3 SCHEDULES**

- A. AED: Automatic External Defibrillator, Cabinet and Wall Sign at each location as indicated on Drawings.

**END OF SECTION**

**SECTION 10 4400**  
**FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Accessories.

**1.2 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 09 2116 - Gypsum Board Assemblies: Roughed-in wall openings.

**1.3 REFERENCE STANDARDS**

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.
- C. Shop Drawings: Indicate locations of cabinets, cabinet physical dimensions, rough-in measurements for recessed cabinets, locations of individual fire extinguishers, mounting measurements for wall bracket, installation procedures, and accessories required for complete installation.
- 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.

**1.5 FIELD CONDITIONS**

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Fire Extinguishers, Cabinets and Accessories:
  - 1. Amerex Corporation: [www.amerex-fire.com](http://www.amerex-fire.com).
  - 2. Ansul, a Tyco Business: [www.ansul.com](http://www.ansul.com).
  - 3. Babcock-Davis: [www.babcockdavis.com](http://www.babcockdavis.com).
  - 4. JL Industries, Inc.: [www.activarcpg.com](http://www.activarcpg.com).
  - 5. Larsen's Manufacturing Co.: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 6. Pyro-Chem, a Tyco Business: [www.pyrochem.com](http://www.pyrochem.com).
  - 7. Substitutions: See Section 01 6000 - Product Requirements.

**2.2 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.

1. Class: A:B:C type.
2. Size: 10 pound.
3. Finish: Baked polyester powder coat, red color.
4. Temperature range: Minus 40 degrees F to 120 degrees F.

## 2.3 FIRE EXTINGUISHER CABINETS

- A. Cabinet Construction: Non-fire rated.
  1. Formed primed steel sheet; 0.036 inch thick base metal.
- B. Cabinet Configuration: Semi-recessed type.
  1. Size to accommodate accessories.
  2. Door Style and Door Glazing: Vertical duo.
  3. Trim Projection: 2-1/2 inch rolled edge.
  4. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with continuous piano hinge.
- D. Door Glazing: Tempered glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.
- E. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- F. Fabrication: Weld, fill, and grind components smooth.
- G. Finish of Cabinet Exterior Trim and Door: Baked enamel.
  1. Color: **White**.
- H. Finish of Cabinet Interior: Match exterior.

## 2.4 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.
- B. Cabinet Signage:
  1. Identify fire extinguisher on cabinet with the lettering "FIRE EXTINGUISHER".
    - a. Location: Applied to exterior side of metal section of cabinet door.
    - b. Orientation: Vertical.
    - c. Lettering Color: Red.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mounting heights:
  1. Fire Extinguisher Cabinet: 54 inches above finished floor to top of cabinet.
- C. Secure rigidly in place.

### 3.3 SCHEDULES

- A. FE-1: Dry Chemical Fire Extinguisher and Cabinet.

**END OF SECTION**





**SECTION 12 3600  
COUNTERTOPS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Countertops for architectural cabinet work.
- B. Wall-hung counters, vanity tops and skirts.

**1.2 RELATED REQUIREMENTS**

- A. Section 06 4100 - Architectural Wood Casework.
- B. Section 07 9200 - Joint Sealants: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.
- C. Sections 22 - Plumbing: For stainless steel sinks and fixtures and for installation and connection of sinks, fixtures, outlets, strainers, tailpieces, traps, vacuum breakers, stops, etc. All sink cutouts shall be by the Casework Contractor.
- D. Sections 26 - Electrical: For installation and final connection of wiring, conduit, and/or electrical items within casework.

**1.3 REFERENCE STANDARDS**

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- C. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- D. PS 1 - Structural Plywood; 2009.

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Installation Instructions: Manufacturer's installation instructions and recommendations.
- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

**1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than five (5) years of documented experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

## 1.7 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

## 1.8 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a one (1) year period after Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.1 COUNTERTOPS

- A. Solid Surfacing Countertops, Sills and Base: Solid surfacing sheet or plastic resin casting over continuous substrate.
  - 1. Flat Sheet Thickness: 1/2 inch, minimum.
  - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
    - a. Surface Color and Pattern: Provide products/colors listed in **Materials List** as shown on drawings.
  - 3. Other Components Thickness: 1/2 inch, minimum, unless noted otherwise.
  - 4. Exposed Edge Treatment: Built up to minimum 1-1/2 inch thick; 1/4 inch double round over or as indicated on drawings.
  - 5. Integral Back and End Splashes: Same sheet material, same construction or as indicated on drawings.
  - 6. Skirts, Aprons and Brackets: Same sheet material, same construction or as indicated on drawings.

### 2.2 MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 1 inch thick; join lengths using metal splines.
- B. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 1 inch thick; join lengths using metal splines.
- C. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- E. Joint Sealant: Mildew-resistant silicone sealant, clear.

### 2.3 HARDWARE

- A. Grommets: Standard plastic grommet set for wire management including liner and flip-top cap.
  - 1. Product: Doug Mockett & Company; TG: [www.mockett.com](http://www.mockett.com).
  - 2. Size: 2 inch diameter.
  - 3. Color: White.
  - 4. Locations: As indicated on drawings.

- B. Hidden Countertop L-Shaped Support Bracket:
  1. Product: Centerline Brackets; Front Mounting Countertop Support, CSA-0013-X: [www.countertopbracket.com](http://www.countertopbracket.com).
  2. Type: L-shaped bracket, 3/8 inch thick by 2-1/2 inch wide with 35 degree bevels, prefinished A-36 steel with three (3) countersunk 1/4 inch holes on each leg.
  3. Length: Horizontal leg length to be 4 inches less than overhang length. See drawings.
  4. Color: Black.
  5. Locations: As indicated on drawings.
- C. Hidden Countertop Floating Support Bracket:
  1. Product: Centerline Brackets; Floating Wall Mount, CSA-0004-X: [www.countertopbracket.com](http://www.countertopbracket.com).
  2. Type: Steel bar, 1/2 inch thick by 2-1/2 inch wide, prefinished A-36 steel.
  3. Length: Horizontal leg length to be 4 inches less than overhang length. See drawings.
  4. Color: Black.
  5. Locations: As indicated on drawings.
- D. Pencil Drawer:
  1. Product: Hafele; 3 Compartment, 429.59.340: [www.hafele.com](http://www.hafele.com).
  2. Locations: As indicated on drawings.
- E. Wall Panel Concealed Fasteners: Standard 2-piece aluminum flat (1/4 inch max.) Z-clips or cleat hangers for installation of wall panels with concealed fasteners. Provide minimum 2 inch wide pieces.

## 2.4 FABRICATION

- A. Fabricate in accordance with standards governing fabrication quality that are specified in Section 06 4100.
- B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  1. Join lengths of tops using best method recommended by manufacturer.
  2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
  3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- C. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
  2. Height: 4 inches, unless otherwise indicated.
- D. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- E. Wall-Mounted Counters: Provide skirts, aprons, and brackets as indicated on drawings, finished to match unless noted otherwise.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

### **3.2 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.3 INSTALLATION**

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between back/end splashes and vertical surfaces.
- C. Accessories: Install in accordance with manufacturer's written instructions.
- D. Wire Management System: Install in accordance with manufacturer's written instructions, unless noted otherwise. Install to bottom of countertop with stainless steel screws at 16 inches on center. Do not install with double sided tape or suction cups.

### **3.4 TOLERANCES**

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

### **3.5 CLEANING AND PROTECTION**

- A. Clean countertops surfaces thoroughly.
- B. Protect installed products until completion of project.
- C. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

**SECTION 13 3419**  
**METAL BUILDING SYSTEMS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Metal building systems that consist of integrated sets of mutually dependent components including structural framing, roof panels, wall panels, gutters and downspouts and accessories.

**1.2 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Section 08 1113 - Hollow Metal Doors and Frames.
- C. Division 09 - Finishes: Finish painting of shop-primed structural framing.
- D. Division 23 - Heating, Ventilating, and Air-Conditioning (HVAC): Metal louvers.

**1.3 DEFINITIONS**

- A. PEMB: Pre-Engineered Metal Building.
- B. Bay: Dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension from centerline of first interior main frame measured normal to end wall (outside face of end-wall column or outside face of secondary girt member, where applicable) for end bays.
- C. Building Length: Dimension of the building measured perpendicular to main framing from end wall to end wall (outside face of column to outside face of column or outside face of secondary girt member, where applicable).
- D. Building Width: Dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of column to outside face of column or outside face of secondary girt member, where applicable).
- E. Clear Span: Distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame or knee).
- F. Eave Height: Vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).
- G. Clear Height under Structure: Vertical dimension from finished floor to lowest point of any part of primary or secondary structure, not including crane supports, located within clear span.
- H. Terminology Standard: Refer to MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

**1.4 SYSTEM DESCRIPTION**

- A. General: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior. Include primary and secondary framing, metal roof panels, metal wall panels, and accessories complying with requirements indicated.
  - 1. Provide metal building system of size and with spacings, radii, slopes, and spans indicated.
- B. Primary Frame Type(s):
  - 1. Rigid Clear Span: Solid-member, structural-framing system with interior columns allowed only where indicated. Design intent for frame profiles is indicated in drawings.

- C. End-Wall Framing: Manufacturer's standard.
- D. Secondary Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.
- E. Eave Height: As indicated on Drawings.
- F. Bay Spacing: As indicated on Drawings.
- G. Roof Slope: As indicated on Drawings.
- H. Roof System: Manufacturer's standard vertical standing-seam or trapezoidal-rib standing-seam metal roof panels.
- I. Exterior Wall System: Manufacturer's standard metal wall panels.

## 1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Engineer metal building systems according to procedures in MBMA's "Metal Building Systems Manual."
  - 2. Design Code: International Building Code, IBC, 2018 edition.
  - 3. Energy Code: International Energy Conservation Code, IECC, 2018 edition.
  - 4. Design Loads:
    - a. Building Category III.
    - b. Roof Live Load: 20 psf.
    - c. Mech units: See Mechanical drawings
    - d. Ceiling-mounted equipment: See Architectural drawings
    - e. Snow
      - 1) Ground Snow Load: 25 psf
      - 2) Roof Snow Load: 20 psf with a min uniform of 25 psf
      - 3) Snow Exposure: 1.0.
      - 4) Thermal Factor: 1.0.
      - 5) Snow Importance Factor: 1.1.
      - 6) Unbalanced Snow ASCE 7-10 7.6
    - f. Wind:
      - 1) Ultimate Wind Speed: 121 mph (ULT).
      - 2) Exposure C
    - g. Seismic:
      - 1) Seismic Importance Factor: 1.1.
      - 2) Site Class D
      - 3)  $S_s = .08$
      - 4)  $S_1 = .04$
      - 5) Seismic Design Category A
  - 5. Primary frames and all roof components to withstand imposed loads with a maximum allowable deflection of  $L/180$  under total load and  $L/240$  under wind/live/snow load.
  - 6. Endwall columns and secondary components supporting brittle wall material to withstand imposed loads with maximum allowable deflection of  $L/360$  under wind/seismic load.
  - 7. Secondary components supporting metal wall material to withstand imposed loads with a maximum allowable deflection of  $L/120$  under wind/seismic load.
  - 8. Auxiliary Loads: Design to include loads for lights, fire sprinkler system, basketball goals, and fans as indicated on Drawings. Coordinate with suppliers for actual weights and locations.
  - 9. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 120 degrees F.

10. Roof drainage system to withstand rainfall intensity of 3 inches per hour with 5-minute duration, or as required by the local governing building code.
- B. Thermal Movements: Provide metal panel systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Thermal Performance: Provide insulated metal panel assemblies with the following maximum U-factors and minimum R-values for opaque elements when tested according to ASTM C 1363 or ASTM C 518:
  1. Metal Roof Panel Assemblies:
    - a. R-Value: R-35
  2. Metal Wall Panel Assemblies:
    - a. R-Value: R-30
  3. General:
    - a. Metal Building Systems provider is responsible for providing thermal performance of all building assemblies required to comply with current State of Nebraska energy code requirements.

## 1.6 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:
  1. Structural-framing system.
  2. Metal roof panels.
  3. Metal wall panels and metal liner panels.
  4. Insulation, air barriers and vapor retarders.
  5. Flashing and trim.
  6. Gutters and Downspouts.
  7. Accessories.
- B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.
  1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  2. Anchor-Bolt Plans: Submit anchor-bolt plans before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
  3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
    - a. Show provisions for attaching hoists, stage rigging equipment, speakers and lighting.
  4. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
    - a. Show roof-mounted items including equipment supports, pipe supports and penetrations, snow guards, and items mounted on roof curbs.
    - b. Show wall-mounted items including doors, windows, louvers, and lighting fixtures.
  5. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches.
    - a. Flashing and trim.
    - b. Gutters.
    - c. Downspouts.



- d. Louvers (Openings).
  - e. Auxiliary load locations.
- C. Samples for Initial Selection: For each type of building component with factory-applied color finish.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below.
  - 1. Metal Roof and Wall Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
- E. Product Certificates: For each type of metal building system, signed by product manufacturer.
  - 1. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
    - a. Name and location of Project.
    - b. Order number.
    - c. Name of manufacturer.
    - d. Name of Contractor.
    - e. Building dimensions including width, length, height, and roof slope.
    - f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
    - g. Governing building code and year of edition.
    - h. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (hoists).
    - i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
    - j. Building-Use Category: Indicate category of building use and its effect on load importance factors.
    - k. Include statement that metal building system and components were designed and produced in an IAS AC472 accredited facility and by an IAS AC472 accredited manufacturer.
- F. Welding certificates.
- G. Erector Certificate: Signed by roof manufacturer certifying that erector complies with requirements.
- H. Manufacturer Certificate: Signed by manufacturer certifying that products comply with requirements.
- I. Qualification Data: For erector, manufacturer and manufacturer's professional engineer.
- J. Material Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
  - 1. Structural steel including chemical and physical properties.
  - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 4. Shop primers.
  - 5. Nonshrink grout.
- K. Source quality-control test reports.
- L. Field quality-control test reports. Also reference "Allowances."
- M. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor retarders. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.

- N. Maintenance Data: For metal panel finishes to include in maintenance manuals.
- O. Warranties: Special warranties specified in this Section.

## **1.7 QUALITY ASSURANCE**

- A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- B. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.
  - 1. An IAS AC472 accredited Manufacturer that designs and produces metal building systems and components in an IAS AC472 Facility.
  - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer registered in the State where the project is located.
  - 3. The company manufacturing the products specified in this Section shall have a minimum of 10 years experience in the manufacture of steel building system. The manufacturing company shall operate under current IAS AC472 Accreditation.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal building system and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- E. Structural Steel: Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- F. Cold-Formed Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.
- G. Surface-Burning Characteristics: Provide thermal insulation and vapor-retarder-facing materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. Flame-Spread Index: 25 or less, unless otherwise indicated.
  - 2. Smoke-Developed Index: 450 or less, unless otherwise indicated.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness and with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

## 1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

## 1.10 COORDINATION

- A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.
- C. Coordinate attachment of structural steel, masonry, doors and windows, and other items that interface with the Metal Building Systems as shown in the drawings.

## 1.11 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: Thirty (30) years from date of Substantial Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam, metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
  - 1. Warranty Period: Twenty (20) years from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Metal Building System Product:
  - 1. Basis of Design: Chief Buildings.
- B. Manufacturers: Subject to compliance with requirements, provide the named Basis-of-Design product or a comparable product by one of the following:
  - 1. A & S Building Systems, Inc.: [www.a-s.com](http://www.a-s.com)
  - 2. ACI Building Systems, Inc.: [www.acibuildingsystems.com](http://www.acibuildingsystems.com)
  - 3. All American Systems: [www.allamericansys.com](http://www.allamericansys.com)
  - 4. Alliance Steel, Inc.: [www.allianceokc.com](http://www.allianceokc.com)
  - 5. American Buildings Company: [www.americanbuildings.com](http://www.americanbuildings.com)
  - 6. Associated Steel Group, LLC: 615-714-6234
  - 7. BC Steel Buildings: [www.bcsteel.com](http://www.bcsteel.com)
  - 8. Behlen Mfg. Co.: [www.behlenbuildingsystems.com](http://www.behlenbuildingsystems.com)
  - 9. Bigbee Steel Buildings: [www.bigbee.com](http://www.bigbee.com)
  - 10. Bluescope Buildings North America, Inc.: [www.bluescopesteel.com](http://www.bluescopesteel.com)
  - 11. Butler Manufacturing Company: [www.butlermfg.com](http://www.butlermfg.com)
  - 12. CBC Steel Buildings: [cbcsteelbuildings.com](http://cbcsteelbuildings.com)
  - 13. Ceco Building Systems: [www.cecobuildings.com](http://www.cecobuildings.com)
  - 14. Chief Buildings: [www.chiefbuildings.com](http://www.chiefbuildings.com)
  - 15. CO Building Systems, Inc.: [www.cobuildings.com](http://www.cobuildings.com)
  - 16. Dean Steel Buildings, Inc.: [www.deansteelbuildings.com](http://www.deansteelbuildings.com)
  - 17. Garco Building Systems: [www.garcobuildings.com](http://www.garcobuildings.com)

18. Golden Giant, Inc.: [www.goldengiant.com](http://www.goldengiant.com)
19. Gulf States Manufacturers: [www.gulfstatesmanufacturers.com](http://www.gulfstatesmanufacturers.com)
20. Heritage Building Systems: [www.heritagebuildings.com](http://www.heritagebuildings.com)
21. Inland Buildings: [www.inlandbuildings.com](http://www.inlandbuildings.com)
22. Kirby Building Systems, Inc.: [www.kirbybuildingsystems.com](http://www.kirbybuildingsystems.com)
23. Ludwig Buildings Enterprises, LLC: [www.ludwigbuildingsenterprises.com](http://www.ludwigbuildingsenterprises.com)
24. Mesco Building Solutions: [www.mescobuildingsolutions.com](http://www.mescobuildingsolutions.com)
25. Metallic Metal Building Company.: [www.metallic.com](http://www.metallic.com)
26. Mid-West Steel Buildings: [www.mid-weststeel.com](http://www.mid-weststeel.com)
27. NCI Building Systems, Inc.: [www.nclip.com](http://www.nclip.com)
28. Nucor Building Systems Group: [www.nucorbuildingsystems.com](http://www.nucorbuildingsystems.com)
29. Oakland Metal Buildings, Inc.: [www.oaklandmetalbldgs.com](http://www.oaklandmetalbldgs.com)
30. Pinnacle Structures, Inc.: [www.pinnaclestructures.com](http://www.pinnaclestructures.com)
31. Red Dot Buildings: [www.reddotbuildings.com](http://www.reddotbuildings.com)
32. Robertson Building Systems: [www.robertsonbuildings.com](http://www.robertsonbuildings.com)
33. Ruffin Building Systems, Inc.: [www.ruffinbuildingsystems.com](http://www.ruffinbuildingsystems.com)
34. SBC Building Systems, LLC: [www.sbcblgdsystems.com](http://www.sbcblgdsystems.com)
35. Schulte Building Systems, Inc.: [www.sbslp.com](http://www.sbslp.com)
36. Spirco Manufacturing: [www.spirco.com](http://www.spirco.com)
37. Star Building Systems.: [www.starbuildings.com](http://www.starbuildings.com)
38. Trident Building Systems: [www.tridentbuildingsystems.com](http://www.tridentbuildingsystems.com)
39. Tyler Building Systems, L.P.: [www.tylerbuilding.com](http://www.tylerbuilding.com)
40. United Structures of America, Inc.: [www.usebldg.com](http://www.usebldg.com)
41. Varco Pruden Buildings: [www.vp.com](http://www.vp.com)
42. Vulcan Steel Structures, Inc.: [www.vulcansteel.com](http://www.vulcansteel.com)
43. Whirlwind Steel Buildings, Inc.: [whirlwindsteel.com](http://whirlwindsteel.com)
44. Substitutions: See Section 01 6000 - Product Requirements.

## 2.2 STRUCTURAL-FRAMING MATERIALS

- A. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55 or ASTM A 529/A 529M, Grade 50 or 55.
- B. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
- C. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
- D. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
- F. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70.
- G. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G60 coating designation; mill phosphatized.
- H. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
  1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Structural Steel (SS), Grade 50 or 80; with Class AZ50 coating.
- I. Steel Joists: Manufactured according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Standard Specifications, Load Tables, and Weight Tables for Steel Joists

and Joist Girders," with steel-angle, top- and bottom-chord members; with end- and top-chord arrangements as indicated and required for secondary framing.

- J. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
  - 1. Finish: Plain.
- K. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
  - 1. Finish: Plain.
  - 2. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with splined ends.
    - a. Finish: Plain.
- L. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy hex steel structural bolts[ or tension-control, bolt-nut-washer assemblies with splined ends]; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.
- M. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  - 1. Configuration: Hooked.
  - 2. Nuts: ASTM A 563 heavy hex carbon steel.
  - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
  - 4. Washers: ASTM F 436 hardened carbon steel.
  - 5. Finish: Plain.
- N. Threaded Rods: ASTM A 307, Grade A.
  - 1. Nuts: ASTM A 563 heavy hex carbon steel.
  - 2. Washers: ASTM F 436 hardened carbon steel.
  - 3. Finish: Plain.
- O. Primer: SSPC-Paint 11, Type II, gray.

### **2.3 MATERIALS FOR FIELD-ASSEMBLED METAL PANELS**

- A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
- B. Surface: Smooth, flat finish.
- C. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings:
  - 1. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions, except as modified below:
  - 2. Color: To be selected by Architect from Manufacturer's full range of colors.

### **2.4 THERMAL INSULATION FOR FIELD-ASSEMBLED METAL WALL PANELS**

- A. Acceptable systems shall be the Simple Saver insulation system manufactured by Thermal Design (or Energy Saver System manufactured by Guardian/GBP Silvercote) with an installed total wall insulation assembly as prescribed for metal buildings by the required Energy Code, or with a tested R-Value meeting the minimum performance requirements of the same. Wall system shall be a single-layer system. A thermal break shall be applied or a thermal block shall be applied where there is no existing thermal break between metal panel and metal structure. The thermal break shall be 1" Snap-R thermal block or equivalent. System components include a five-year material warranty and shall meet the following minimum specifications:

1. Steel Strap: 100 KSI minimum yield high tensile strength steel, galvanized, primed and then painted the specified color on the exposed side with a clear coat primer on the unexposed side. Minimum size shall be 0.02 x 1" x continuous length. The strap color shall be: UVMAX® 8 White. Traverse strap pattern shall include one strap six (6) inches away from each rafter flange with the remaining space between rafters divided into equal spaces not to exceed five (5) feet. Longitudinal straps shall be nominally thirty (30) inches on-center, with two adjacent straps at the ridge line.
2. Fasteners: #12 x 3/4", plated self-drilling screws with sealing washers painted to match the specified color for fastening to light gauge steel (up to 12 GA purlins) or #12 x 11/4" plated self drilling screws with sealing washers, painted to match the specified color for heavier gauge steel (up to 3/8" purlins/bar joist) Always install two fasteners in the end of each strap for safety and to withstand installation stress, and one fastener at all other designated fastening points.
3. Syseal® Fabric (or Energy Saver FP: Fabric): Shall be woven reinforced high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene film. The fabric grade for the roof shall be: Syseal® FP (White). The fabric grade for the walls shall be: Syseal® FP.. The fabric shall comply with UL/ULC 723 or ASTM E84, and be Class A compliant with a low flame spread index of 25 or less based on ASTM E84 test standards. This material shall be manufactured in large custom pieces by extrusion welding from roll goods. Pieces shall be fabricated to substantially fit the large defined building areas with minimum practical sealing to be done on job site. Fabric shall be folded to allow for rapid pull-out on the strap support system.
4. Liner fabric perm rating shall be: 0.02 grains per hour per square foot based on ASTM E96, procedure B.
5. Sealants: Shall be Simple Saver System G524 (or Energy Saver sealant system)high tack solvent-based vapor barrier sealant for sealing vapor barrier laps and/or Syseal® Tape (double-sided bonding tape) 3/4" wide by 1/32" thick extruded vapor barrier sealant by Thermal Design.
6. Insulation: Shall be fiberglass blanket or batt insulation meeting ASTM C991 Type 1, ASTM E136 and ASTM E84-04 or other insulation form as may be recommended and submitted by the system manufacturer and approved by the architect during submittals.
7. Insulation Hangers: Shall be Fast-R insulation hangers for supporting insulation between wall girts.
8. Thermal Break (Block): Thermal break shall be: R5 minimum EPS or XPS thermal block. The selection shall be provided as thermal break where there is no existing thermal break.

## 2.5 THERMAL INSULATION FOR FIELD-ASSEMBLED METAL ROOF PANELS

- A. Acceptable systems shall be the Simple Saver insulation system (with free OSHA-accepted leading edge and through fall protection) manufactured by Thermal Design (or Energy Saver System manufactured by Guardian/GBP Silvercote) with an installed total roof insulation assembly as prescribed for metal buildings by the required Energy Code, or with a tested R-Value meeting the minimum performance requirements of the same. Roof system shall be a double-layer system. A thermal break shall be applied or a thermal block shall be applied where there is no existing thermal break between metal panel and metal structure. The thermal break shall be 1" Snap-R thermal block or equivalent. System components include a five-year material warranty and shall meet the following minimum specifications:
  1. Steel Strap: 100 KSI minimum yield high tensile strength steel, galvanized, primed and then painted the specified color on the exposed side with a clear coat primer on the unexposed side. Minimum size shall be 0.02 x 1" x continuous length. The strap color shall be: UVMAX® 8 White. Traverse strap pattern shall include one strap six (6) inches away from each rafter flange with the remaining space between rafters divided into equal spaces not to exceed five (5) feet. Longitudinal straps shall be nominally thirty (30) inches on-center, with two adjacent straps at the ridge line.
  2. Fasteners: #12 x 3/4", plated self-drilling screws with sealing washers painted to match the specified color for fastening to light gauge steel (up to 12 GA purlins) or #12 x 11/4" plated

self drilling screws with sealing washers, painted to match the specified color for heavier gauge steel (up to 3/8" purlins/bar joist). Always install two fasteners in the end of each strap for safety and to withstand installation stress, and one fastener at all other designated fastening points.

3. Syseal® Fabric: Shall be woven reinforced high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene film. The fabric grade for the roof shall be: Syseal® FP (White). The fabric shall comply with UL/ULC 723 or ASTM E84, and be Class A compliant with a low flame spread index of 25 or less based on ASTM E84 test standards. This material shall be manufactured in large custom pieces by extrusion welding from roll goods. Pieces shall be fabricated to substantially fit the large defined building areas with minimum practical sealing to be done on job site. Fabric shall be folded to allow for rapid pull-out on the strap support system. The fabric shall be certified for free fall protection by the manufacturer.
4. Liner fabric perm rating shall be: 0.02 grains per hour per square foot based on ASTM E96, procedure B.
5. Sealants: Shall be Simple Saver System G524 high tack solvent-based vapor barrier sealant for sealing vapor barrier laps and/or Syseal® Tape (double-sided bonding tape) 3/4" wide by 1/32" thick extruded vapor barrier sealant by Thermal Design.
6. Insulation: Shall be fiberglass blanket or batt insulation meeting ASTM C991 Type 1, ASTM E136 and ASTM E84-04 or other insulation form as may be recommended and submitted by the system manufacturer and approved by the architect during submittals.
7. Insulation Hangers: Shall be Fast-R insulation hangers for supporting insulation between roof purlins in roof pitches over 4:12.
8. Thermal Break (Block): Thermal break shall be: R5 minimum EPS or XPS thermal block.. The selection shall be provided as thermal break where there is no existing thermal break.

## 2.6 MISCELLANEOUS MATERIALS

- A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
  1. Fasteners for Metal Roof Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.
  2. Fasteners for Metal Wall Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with nylon or polypropylene washer.
  3. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
  4. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- C. Metal Panel Sealants:
  1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
  2. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

## 2.7 FABRICATION, GENERAL

- A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
  2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual": Chapter IV, Section 6, "Erection and Other Field Work" and Section 9 "Fabrication Tolerances."
- C. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

## 2.8 STRUCTURAL FRAMING

- A. General:
1. Primary Framing: Shop fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
    - a. Make shop connections by welding or by using high-strength bolts.
    - b. Join flanges to webs of built-up members by a continuous submerged arc-welding process.
    - c. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
    - d. Weld clips to frames for attaching secondary framing members.
    - e. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 6. Shop prime primary structural members with specified primer after fabrication.
  2. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
    - a. Make shop connections by welding or by using non-high-strength bolts.
    - b. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 6. Shop prime uncoated secondary structural members with specified primer after fabrication.
- B. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
    - a. Slight variations in span and spacing may be acceptable if necessary to meet manufacturer's standard, as approved by Architect.
  2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
  3. Exterior Column Type: Tapered.
  4. Rafter Type: Tapered.
- C. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch.



2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
- D. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet prepainted with coil coating, unless otherwise indicated, to comply with the following:
1. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes; nominal 2-1/2-inch-wide flanges.
    - a. Depth: As required to comply with system performance requirements.
  2. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 60 degrees to flange and with nominal 2-1/2-inch-wide flanges.
    - a. Depth: 8 inches maximum.
  3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes; to provide adequate backup for metal panels.
  4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary frame flanges.
  5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
  6. Base or Sill Angles: Minimum 3-by-2-by-0.0598-inch zinc-coated (galvanized) steel sheet.
  7. Purlin and Girt Clips: Minimum 0.0598-inch-thick, steel sheet.
  8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0598-inch thick, structural steel sheet.
  9. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch-thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
  10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- E. Bracing: Provide adjustable wind bracing as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch-diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
  2. Rigid Portal Frames: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
  3. Fixed-Base Columns: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
- F. Bolts: Provide plain finish bolts for structural-framing components that are primed or finish painted.
- G. Factory-Primed Finish: Apply specified primer immediately after cleaning and pretreating.
1. Prime primary, secondary, and end-wall structural-framing members to a minimum dry film thickness of 1 mil.
    - a. Prime secondary steel framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.
  2. Prime galvanized members with specified primer, after phosphoric acid pretreatment.

## 2.9 METAL ROOF PANELS

- A. Metal Roof Panel:
1. Vertical-Rib, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges; designed for sequential installation by mechanically attaching panels to supports using

concealed clips located under one side of panels and engaging opposite edge of adjacent panels with mechanical seaming.

- a. Product:
  - 1) Basis of Design: Chief Buildings; MSC Metal Roof Panel.
- b. Panel Coverage: 24 inches minimum.
- c. Panel Height: 3 inches minimum.
- d. Nominal Coated Thickness: 24 gauge.
- e. Panel Surface: Smooth/Ribbed.
- f. Exterior Finish: 70% PVDF.
- g. Clips: Manufacturer's standard, floating type to accommodate thermal movement.
- h. Joint Type: Manufacturer's standard mechanically seamed construction.
- i. Uplift Rating: UL 90.
- j. Color: **Chief Buildings; Emerald Green (EG).**

## 2.10 METAL WALL PANELS

- A. Metal Wall Panels:
  1. Corrugated-Profile, Exposed Fastener Metal Panels: Structural metal panel consisting of formed metal sheet with alternating curved ribs, installed by lapping edges of adjacent panels.
    - a. Product:
      - 1) Basis of Design: Chief Buildings; CS/AP Metal Wall Panel.
    - b. Coverage Width: 36 inches
    - c. Continuous Rib Spacing: 12 inches on center.
    - d. Rib Height: 1-1/8 inch.
    - e. Nominal Coated Thickness: 24 gauge.
    - f. Panel Surface: Smooth.
    - g. Exterior Finish: 70% PVDF.
    - h. MP-1 Color: **Chief Buildings; Parchment (PA).**
    - i. MP-2 Color: **Chief Buildings; Emerald Green (EG).**
- B. Metal Wall Liner Panels:
  1. Flush-Profile, Metal Liner Panels: Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels; designed for interior side of field-assembled metal wall panel assemblies and field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps.
    - a. Material: Aluminum-zinc alloy-coated steel sheet, 26 gauge.
    - b. Exterior Finish: Polyester.
    - c. Panel Coverage: 36 inches.
    - d. Panel Height: 1.125 inches.
    - e. Color: **White**, manufacturer's standard.

## 2.11 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
  1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
  2. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
  3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel sheet.
  4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
  6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1 inch standoff; fabricated from extruded polystyrene.
  7. UD clips are acceptable at corner zones.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
  2. Backing Plates: If required by the design, provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- D. Flashing and Trim: Formed from minimum 0.0159-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
  2. Opening Trim: Minimum 0.0159-inch-thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
    - a. Provide jamb covers that match metal wall panel color at all door/window openings.
- E. Gutters: Formed from minimum 0.0159-inch- thick, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters; spaced 36 inches o.c.
  2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
  3. Color: To match roof color.
- F. Downspouts: Formed from 0.0159-inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot long sections, complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters; spaced 10 feet o.c.
  2. Color: To match roof color.

- G. Louvers: Louvers and Vents are specified in Division 23. Metal Building Manufacturer is to provide the necessary structure to support and frame any and all specified louvers as indicated on drawings and as specified.
- H. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating roof panel.
  - 1. Locations: All sloped roof edges and as indicated on drawings.
  - 2. Product:
    - a. Basis of Design: S -5! Metal Roof Innovations, Ltd.; ColorGard: [www.s-5.com](http://www.s-5.com).
    - b.
  - 3. Clamps:
    - a. Model: S-5 and manufacturer's best selection for roofing type used.
    - b. Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch (9.525 mm) diameter, with round nose point.
    - c. Attachment bolts: 300 Series stainless steel, 18-8 alloy, 8 mm diameter, hex flange bolt.
    - d. Clips:
      - 1) Model: VersaClip for connecting cross member at each clamp.
  - 4. Cross Members:
    - a. Manufactured from 6000 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
    - b. Receptacle in face to receive color-matched metal strips.
    - c. Provide splice connectors ensuring alignment and structural continuity at end joints.
  - 5. Color Strips: Same material and finish as roof panels; obtained from roof panel manufacturer.
  - 6. Snow and Ice Clips:
    - a. Aluminum, with rubber foot, minimum 3 inches (76.2 mm) wide.
    - b. Model: SnoClip II for standing seam heights 1 inch (25.4mm) to 1.5 inch (38.1 mm).
    - c. Model: SnoClip III for standing seam heights 1.5 inch (38.1 mm) to 3.25 inch (82.55 mm).
- I. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

## **2.12 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated.

### 3.3 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.
  - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
    - a. Joint Type: Snug tightened or pretensioned.
- G. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts.
  - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  - 2. Locate and space wall girts to suit openings such as doors and windows.
  - 3. Locate canopy framing as indicated.
  - 4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- H. Steel Joists: Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications, Load Tables, and Weight Tables for Steel Joists and Joist Girders," joist manufacturer's written recommendations, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.
  - 2. Space, adjust, and align joists accurately in location before permanently fastening.

3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  4. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
  5. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
- I. Bracing: Install bracing in roof where indicated on erection drawings.
    1. Tighten rod and cable bracing in roof to avoid sag.
  - J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
  - K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

### **3.4 METAL PANEL INSTALLATION, GENERAL**

- A. Examination: Examine primary and secondary framing to verify that structural panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
  1. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.
- B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
    - a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
  2. Install metal panels perpendicular to structural supports, unless otherwise indicated.
  3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
  4. Locate and space fastenings in uniform vertical and horizontal alignment.
  5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- C. Lap-Seam Metal Panels: Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or metal panels. Install screws in predrilled holes.
  1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

### **3.5 METAL ROOF PANEL INSTALLATION**

- A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations.
1. Install ridge caps as metal roof panel work proceeds.
  2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Field-Assembled, Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
  2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
  4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
  5. Provide metal closures at peaks, rake edges, rake walls and each side of ridge caps.

### **3.6 METAL WALL PANEL INSTALLATION**

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
  2. Shim or otherwise plumb substrates receiving metal wall panels.
  3. When two rows of metal panels are required, lap panels 4 inches minimum.
  4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
  5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
  6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  7. Install screw fasteners in predrilled holes.
  8. Install flashing and trim as metal wall panel work proceeds.
  9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated, or if not indicated, as necessary for waterproofing.
  10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws.
  11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Field-Assembled, Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.
1. Field-Insulated Assemblies: Install thermal insulation as specified. Install metal liner panels over insulation on interior side of girts at locations indicated. Fasten with exposed fasteners as recommended by manufacturer.

### **3.7 THERMAL INSULATION INSTALLATION FOR FIELD-ASSEMBLED METAL PANELS**

- A. General: Install insulation concurrently with metal wall panel installation, in thickness indicated to cover entire wall, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
  2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
  3. Install Simple Saver System per manufacturer's requirements and recommendations.
- B. Roof Insulation: Comply with the following installation method:
1. Simple Saver Roof System (or Energy Saver System manufactured by Guardian/GBP Silvercote): Cut to length and install painted steel straps in the pattern and spacings as shown on the project shop drawings. The straps are installed in tension and span immediately below the bottom plane of the purlins. Position the pre-folded vapor barrier liner fabric on the strap platform along one eave purlin. Clamp the two bottom corners squarely at the eave and centered on the bay. Pull the other end of the pleat-folded fabric across the building width on the strap platform but below the purlins, pausing only at the ridge to fasten the straps and fabric into position where the plane of the roof changes. Once positioned, the remaining fasteners are installed from the bottom side at each purlin/strap intersection and the edges are sealed and trimmed along the rafters. A similar method can be used starting at the ridge purlin space and pulling the fabric to each eave. Insulation is unpacked and placed on the vapor liner system. Shake to the specified thickness. In two-layer systems, the second layer of insulation is placed over and perpendicular to the purlins as the roof sheeting is applied. It is important that the insulation cavity be filled or the cavities be ventilated to minimize the probability of condensation. Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place. Where metal roof panels attach directly to purlins, install thermal spacer blocks.
- C. Wall Insulation: Comply with the following installation method.
1. Simple Saver Wall System (or Energy Saver System manufactured by Guardian/GBP Silvercote): Sheet the building with just the thermal break applied to the exterior of the girts. Insulation is cut to the required lengths to fit vertically between the girts and installed in the girt spaces on Fast-R™ insulation hangers. Fluff the insulation to the specified thickness, making sure there are no gaps or voids. Insulate the complete wall section. Apply the wall vapor barrier fabric by clamping it into position over the eave strap. Once in position, the fasteners are installed through the wall straps, eave strap and into each roof strap, permanently clamping the wall fabric between them. Seal the wall fabric to the roof fabric to the base angle or base 'C' and on the column flanges. Additional straps are installed along the base angle and each column to retain the system permanently in place.

### 3.8 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  2. Install components for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  3. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form



- hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
  - D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
    1. Downspouts are to daylight at grade just above a splashblock to be provided by others.
  - E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

### **3.9 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified testing and inspecting agency to perform the following tests and inspections and to submit reports.
- B. Tests and Inspections:
  1. High-Strength, Field-Bolted Connections: Connections shall be inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1 and the following inspection procedures, at inspector's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- C. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.

### **3.10 CLEANING AND PROTECTION**

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing and accessories.
  1. Clean and prepare surfaces by SSPC-SP 6, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
  2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.
- D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

**END OF SECTION**

## SECTION 31 1000

### SITE CLEARING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Clearing and protection of vegetation.
- B. Removal of existing debris or site amenities.
- C. Removal of existing pavements.

##### 1.02 RELATED DOCUMENTS

- A. Geotechnical Reports:
  - 1. None

##### 1.03 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- D. Section 01 7419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
- E. Section 31 2010 - Earth Moving: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- F. Section 31 2200 - Grading: Topsoil stripping, stockpiling, and spreading.

##### 1.04 QUALITY ASSURANCE

- A. Clearing Firm: Company specializing in the type of work required.
  - 1. Minimum of 2 years of documented experience.

#### PART 2 PRODUCTS

##### 2.01 MATERIALS

- A. Fill Material: As specified in Section 31 2010 – Earth Moving

#### PART 3 EXECUTION

##### 3.01 SITE CLEARING

- A. Comply with other requirements specified in Section 01 7000.
- B. 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.

### **3.02 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.

### **3.03 VEGETATION**

- A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, 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 limits indicated on drawings.
  - 1. Exception: Specific trees and vegetation indicated on drawings to be removed.
- D. 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: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 24 inches.
  - 3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 24 inches.
  - 4. 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.
- E. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.
- F. 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.

### **3.04 DEBRIS AND OTHER SITE AMENITIES**

- A. Remove debris, junk, and trash from site.
- B. Remove existing landscaping or other site amenities as indicated on the drawings.
- C. The Owner shall have first right to removed items if they would like to salvage them. If not, removed items shall be removed from the site and properly disposed.
- D. Leave site in clean condition, ready for subsequent work.
- E. Clean up spillage and wind-blown debris from public and private lands.

### **3.05 REMOVAL OF EXISTING PAVEMENTS**

- A. Existing site pavements shall be removed as indicated on the drawings.
- B. Removal areas shall be marked with paint and verified by the Engineer/Architect prior to removals.
- C. Limits of removal shall be either to an existing joint whenever feasible.
- D. Pavements shall be full depth saw cut at the limits of removal to ensure a clean, straight surface remains (even when removing to a joint).
- E. All removed materials shall be hauled offsite and properly disposed at Contractor's expense.
- F. Any debris remaining from removal activities shall be cleaned and disposed.

**END OF SECTION 31 1000**

## SECTION 31 2000

### EXCAVATION, BEDDING, BACKFILLING & TRENCHING

#### PART 1 – GENERAL

##### 1.0 SCOPE

The work included in this section shall consist of furnishing all materials and equipment and performing all labor and services necessary to prepare the site and construct the facilities specified herein and shown on the plans. The work shall include clearing and grubbing of any or all types of materials, removal and stockpiling of topsoil, site grading, construction of embankments, trenching, dewatering, sheeting, shoring, bracing, and the backfilling and tamping of trenches and foundations. The Contractor shall perform all excavation to the depth shown of the plans or specified herein for all underground structures, including manholes, piers, and all other pipeline appurtenances show on the plans.

##### 1.1 GENERAL

Where construction of the utility requires removal and replacement of pavements, driveways and sidewalks, cutting shall be by use of a concrete saw. Any damage done outside the limits of the removals specified shall be repaired at the expense of the contractor. Direct payment will not be made for sawing, but shall be considered subsidiary to the items for which payment is made.

The contractor shall be responsible for providing, erecting and maintaining signage required for the work.

Comply with local requirements and specific requirement of the State of Nebraska. Special attention is directed to Title 29 Labor, Part 1518 – “Safety and Health Regulations for Construction” and Subpart P “Excavations, Trenching and Shoring.” Nothing contained in these specifications or Contract Documents shall relieve the contractor from complying with and Local, State, or Federal safety requirements.

No trees shall be removed unless shown on the plans or written instructions have been issued by the Engineer or his authorized representative.

#### PART 2 – PRODUCTS – Not Used

#### PART 3 - EXECUTION

##### 3.1 TRENCH EXCAVATION

- A. Common Excavation - The trench shall be excavated along the lines and to the grades by open cut from the surface of the ground and at the width and to the depth necessary for the proper construction of the utility and its appurtenances, according to the plans and these specifications. Excavation shall include the removal of all materials not classified as unclassified excavation, including clay, silt, sand, gravel, hard pan, loose shale, and other loose stones in masses and boulders measuring less than one-half cubic yard in volume.
- B. Unclassified Excavation – Excavation shall comprise of the satisfactory removal and disposition of all boulders measuring one-half cubic yard or more in volume and concrete or

masonry structures encountered during excavation. Dispose of the material at a site approved by the Engineer or his authorized representative.

- C. General Preparation of Sub-grade - During common trench excavation, in which adequate soil conditions are present the Contractor shall avoid over excavation of the pipe bed sub-grade.

Any part of the bottom of the trench excavated below the specified sub-grade shall be refilled with approved materials compacted in 8-inch lifts to 95% of maximum unit weight density in accordance with these specifications. If additional excavation is required to correct unstable foundation conditions, the Contractor shall notify the Engineer/Architect representative and agree on the material used.

- D. Trench Width - Cut utility trench walls vertically from bottom of trench to 1 foot above top of pipe. The width of the utility trench wall from bottom of trench to one foot above pipe shall be no greater than the width specified in the standard bedding details. Excessive trench width may be cause for providing a higher grade of pipe or bedding at no cost to the City. The width of the trench at the top of the pipe shall not be more than 18" larger than the diameter of the pipe if the outside diameter of the pipe is less than 33 inches and not more than 24 inches if the outside diameter of the pipe is larger than 33 inches.

### **3.2 BEDDING**

- A. Classes of Bedding - Bedding shall be defined as the area from the trench sub-grade as defined above to 12 inches above the top of the pipe. The Contractor shall use special care in placing this portion of the back fill so as to avoid injuring or moving the pipe. Embedment material must be placed and compacted uniformly on each side of the pipe to prevent lateral displacement. The Engineer or his authorized representative will determine in the field, following excavation, which sections of pipe shall receive granular bedding. The earth shall be thoroughly compacted in the bedding area in and around the pipe and joints with approved mechanical hand tampers.
- B. Concrete Cradle Bedding, Class A - The Contractor shall provide for the bedding of a ditch conduit in accordance with the standard detail titled Class A Bedding in which the lower part of the conduit is bedded in a cradle constructed of 2000 psi (140.7 kg/sq cm) concrete or better, having a minimum thickness under the pipe of one-fourth its outside diameter. The cradle shall be poured as a unit without horizontal construction joints. The remainder of the conduit is entirely surrounded to a height of 12 inches (30.5 cm) above its top by densely compacted backfill placed in lifts not exceeding 4 inches (10.2 cm) in thickness.
- C. First Class Bedding, Class B - The Contractor shall provide for the bedding of a ditch conduit in accordance with the standard detail titled Class B Bedding in which the pipe is carefully bedded on fine granular materials in an earth foundation that is carefully shaped to fit the lower part of the pipe for a width of at least 60% of its breadth, and in which the remainder of the conduit is entirely surrounded to a height of 12 inches (30.5 cm) above its top by densely compacted material that is carefully placed to fill completely all spaces under an adjacent to the pipe in lifts not exceeding 4 inches (10.2 cm) in thickness.
- D. Ordinary Bedding, Class C - The Contractor shall provide for the bedding of a ditch conduit in which the pipe is bedded with "ordinary" care in an earth foundation shaped to fit the lower part of the pipe in accordance with the standard detail titled Class C Bedding – Shaped Subgrade. The contractor, at his option may provide a granular foundation course in accordance with the standard detail titled Class C Bedding - Granular Foundation instead of earth shaped foundation. No additional payment will be made for said granular foundation. The lower 50% of outside breadth shall be to 95% of Standard density, ASTM D-698 or 75%

Relative density, ASTM D-2049 and in which the remainder of the pipe is surrounded to a height of at least 12 inches (30.5 cm) above it top by compacted backfill at above specified density. Carefully place and fill all spaces under and adjacent to the pipe in lifts not exceeding 8 inches (20 cm) loose measurement in thickness.

- E. Special Bedding, Class D - This method of bedding a ditch conduit in which little care is exercised to shape the foundation to accept the lower part of the conduit. The trench bottom shall support the entire length of the conduit. No bell holes are required.

### 3.3 TRENCH BACKFILL

- A. Backfilling - All backfill unless otherwise specified, shall be compacted to the minimum of 95% of the established Standard Density ASTM D-698 and at optimum moisture content, plus or minus 3% or a minimum of 75% Relative Density ASTM D-2049. All mechanical methods proven to create desired result can be used, with special care given to required pipe cover as per manufactures installation requirements. Test of the backfill will be done in accordance with the soil testing section of this specification. All testing and completed backfill must be completed to the satisfaction of the Engineer or his authorized representative. Water flushing for consolidation of backfill is not permitted.
- B. Common Trench Backfill - Backfill in the area above up to the top of the conduit bedding of pipe shall be designated as trench backfill. Trenches shall not be backfilled until all required tests are performed and until the system installed conforms to the requirements of the plans and specifications. The trenches shall then be carefully backfilled up to the top of the conduit bedding as specified in the section entitled Pipe Bedding. As backfilling proceeds, the entire mass shall be compacted with a mechanical compactors, provided, however, in all locations where plastic soils are encountered, the backfill material shall not be placed until the moisture content is optimum to obtain maximum density when tamped into place with mechanical tampers. Exercise extreme care in backfilling operations to avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion. Repair damages, distortions or misalignments to full satisfaction of Engineer.

Trench backfill and compaction testing shall adhere to the following requirements:

Under pavements and in Public Right-of-Way: The backfill material above the top of the conduit bedding shall be deposited in approximately 8 inch (20 cm) layers, loose measurement and compacted to the required densities. The Contractor is responsible for restoring any pavement or surfacing disturbed by his work in accordance with these contract documents. Observe specific pipe or conduit manufacturer's recommendations regarding methods of backfilling and compaction. Backfill shall be compacted to at least 95% of the maximum dry density (obtained at optimum moisture content plus or minus 3% for silt or clay with no required moisture content for sand) as determined by ASTM D-698.

Other Areas: Place backfill in lifts thickness capable of being compacted to densities specified. Maximum lift thickness shall be 2 feet but shall be a minimum of 3 feet above top of pipe. Observe specific pipe or conduit manufacturer's recommendations regarding methods of backfilling minimum cover above pipe and compaction methods. Backfill shall be compacted to at least 90% of the maximum dry density (obtained at optimum moisture content plus or minus 3% for silt or clay with no required moisture content for sand) as determined by ASTM D-698.

- C. Backfill around structures and appurtenances - Compaction of backfill within 3 feet of all structures and utility appurtenances, including but not limited to, valves, hydrants, manholes, and inlets. Shall be accomplished by hand methods using appropriate equipment for the soil type(s) encountered.

- D. Backfill Material - Materials excavated from the utility trench shall be reused for trench backfill material unless otherwise stated in the plan details. Any material containing frozen earth, large rocks, cinder, trash, vegetation, decomposing material or any other material deemed unsuitable by the Engineer or his authorized representative shall not be used.
- E. Backfill Moisture Control - All backfill and sub-grade material that is outside the specified moisture requirements must be moisture conditioned prior to placement. When additional moisture is needed apply to backfill uniformly and mix soils with mechanical equipment until soil is uniform in moisture content. Continue until soil contains proper moisture content to meet requirements and will obtain passing densities when compacted.  
  
Soil that is too wet to obtain specified compaction may be spread out and dried to proper moisture content. Materials may be disked, harrowed, or mixed with dryer material to assist in the drying process.
- F. Backfill Gravel - All gravel used for backfill shall consist of natural bank gravel having durable particles graded from fine to coarse in a reasonable uniform combination with no stones larger than 2 inches in size. It shall not contain a total of more than 10% by weight of loam or clay. No more than 15% shall pass a No. 200 sieve.
- G. Freezing Weather - Backfilling shall not be done in freezing weather, except by permission of the Engineer or his authorized representative, nor shall any fill be made where the material already in the trench is frozen. If construction proceeds at any time when frozen material is encountered and frozen material is placed in the trench line, all such trenches shall be re-compacted in the spring after frost conditions are no longer present in the ground. This recompaction of the trench shall include the removal of all material to a depth of 12 inches below the depth of the frozen material and the replacement and re-compaction of the trench to the proper grade with suitable material.
- H. Disposal of Surplus Material - The contractor shall dispose of all surplus material not needed for fills or other designated purposes. All material deemed unsuitable by the Engineer shall be disposed of properly and replaced with approved material.

### **3.4 MISCELLANEOUS**

- A. Protection of Existing Utilities and Properties - The accuracy of location of existing underground utilities as shown on the plans is not guaranteed. It shall be the duty of the Contractor to locate these utilities in advance of excavation and to protect them from damage after uncovering. No service lines are shown on the plans. The Contractor shall contact the owners of the utilities for assistance in locating these service lines. Any expense incurred by reason of damaged or broken lines shall be the responsibility of the Contractor.
- B. Abandonment of Utilities - When pipes, conduits, sewers, or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged or sealed with approved concrete plugs by the Contractor. Abandoned structures such as manholes or chambers shall be entirely removed unless otherwise specified or shown on the plans. All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation by the Contractor. All salvageable materials remain the property of the City of Kearney unless otherwise agreed upon.
- C. Survey Reference Protection - Give careful attention to maintain bench marks, survey monument and any survey staking during the project. The cost of re-staking of avoidable destruction to survey markers will be at the expense of the contractor. At any point an established survey point is disturbed notify proper personnel as to avoid the use of incorrect bench marks.



- D. Construction Right-of-Way - Project construction shall be contained to designate City right-of-ways during all phases. Any damaged to adjacent properties, structures, vegetation, or any damage claims resulting from operations outside of the City right-of-ways will be the sole responsibility of the Contractor.
- E. Protection - Barricade and fence open excavations or depressions resulting from work during non-working hours and when not working in immediate area.
- F. Settlement – The contractor shall be responsible for all settlement and erosions of backfill, fills and embankments which may occur within two years after the final completion and acceptance of the project.

### **3.5 CLEANUP**

- A. Project Clean-up – It shall be the complete responsibility of the Contractor to maintain the work site area in a clean and orderly manner. Every effort will be made to contain debris and wasted construction materials. All signage, drives, sprinklers, or any other utility damaged due to construction must be replace or restored to it original condition. Any temporary site access and storage areas will be restored to final condition.

### **3.6 TESTING**

- A. Soils Testing - Trench compaction testing shall adhere to the following requirements:

Under pavements and in Public Right-of-Way: Backfill shall be compacted to at least 95% of the maximum dry density (obtained at optimum moisture content plus or minus 3% for silt or clay with no required moisture content for sand) as determined by ASTM D-698. Test will be taken at a minimum 100 feet intervals horizontally and 2 feet intervals vertically of compacted area worked.

Other Areas: Backfill shall be compacted to at least 90% of the maximum dry density (obtained at optimum moisture content plus or minus 3% for silt or clay with no required moisture content for sand) as determined by ASTM D-698. Test will be taken at a minimum 300 feet intervals horizontally and 2 feet intervals vertically.

In place field density test will be performed for by the Owner. Costs of passing test will be paid for by the Owner. Where backfill compaction does not meet moisture density test requirements, performance of additional testing as required until compaction meets or exceeds requirements will be borne solely by the contractor. All cost associated with failing tests will be paid by the contractor.

The Engineer in charge shall be furnished a copy of the density testing results. Information on length or area worked material identification and description, test thickness such as probe length or sample depth, location of sample, elevation of sample, etc. shall be recorded for each sample.

Required proctor curves will be obtained by the Contractor at no additional cost to the Owner.

In the case tested backfill areas fail to meet established moisture, density requirements the cost for removal, recompaction of materials, and retesting shall be the responsibility of the Contractor. Retesting shall be preformed prior to the continuation of backfilling efforts. It will be the responsibility of the Contractor to schedule retesting as to avoid delays in progress.

- B. Geotechnical Laboratory Testing - At the expense of the Contractor the following laboratory tests shall be preformed by an independent testing laboratory to ensure compliance of all backfilled areas:

One Standard Density test (ASTM .D-698) for cohesive soils, and for each type of embedment or backfill material proposed.

One Relative Density test (ASTM D-2049) for cohesion-less soils, and for each type of embedment or backfill material proposed.

### **3.7 EROSION CONTROL**

- A. Soil Erosion and Sedimentation Control - The Contractor shall conduct his operations in such a manner that all soil is confined within the project limits and prevented from entering storm sewers, water courses, rivers, lakes, reservoirs, or wetlands.

The Contractor shall place a filter or barrier composed of straw, stone or other courses to prevent sedimentation in these structures. After the construction operations are completed, the Contractor shall remove these filters and clean all the sediment and debris from the catch basins, ditches, or other storm sewer structures.

Soil erosion and sedimentation control measures if indicated on the plans are considered as minimum requirements and are not to be considered as complete and all inclusive. Additional control measures as may be required due to circumstances or conditions at the time of construction or as directed by the City, or the designated Soil Erosion Control agency, shall be placed as required to insure conformance with all NPDES permitting requirements. Deviations from or additions to the erosion control measures shown on the plan shall be subject to the approval of the City or his authorized representative.

The cost of this work and other control measures which may be required or directed by the City shall be incidental to the cost of the project unless specific items have been provided in the proposal.

### **3.8 MEASUREMENT AND PAYMENT**

- A. Measurement and Payment - No separate payment will be made for Excavation, Trenching, Bedding, and Backfill or any related operations. These operations are included in the Bid for pipe installation and will be paid in accordance to the Bid.
- B. Disposal of Surplus Material - No measurement or direct payment will be made for disposal of stock piling surplus materials. The cost of disposal or stock piling surplus materials shall be considered subsidiary to the other items for which payment is made.
- C. Unsuitable Materials - All material deemed unsuitable by the Engineer and required to be removed from the job site, as well as approved replacement material not readily available at the job site, shall be measured and paid for by the cubic yard.

**END OF SECTION**

## SECTION 31 2010

### EARTH MOVING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Geotechnical Reports
  - 1. None

##### 1.02 SUMMARY

- A. Section Includes:
  - 1. Preparing subgrades.
  - 2. Excavating and backfilling for buildings and structures.
  - 3. Subsurface drainage backfill for walls and trenches.
  - 4. Excavating and backfilling trenches for utilities and pits for buried utility structures.
- B. Related Sections:
  - 1. Section 015000 "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
  - 2. Section 311000 "Site Clearing" for site stripping, grubbing, and removal of above- and below-grade improvements and utilities.
  - 3. Section 312200 "Grading" for stripping, stockpiling, and spreading topsoil.

##### 1.03 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer or Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

2. Bulk Excavation: Excavation more than 10 feet (3 m) in width and more than 30 feet (9 m) in length.
  3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer or Architect. Unauthorized excavation, as well as remedial work directed by Engineer or Architect, shall be without additional compensation.
- E. Fill: Soil materials used to raise existing grades.
- F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- G. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- H. Subbase: Granular material will not be allowed to be used as a leveling course for pavements.
- I. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### **1.04 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site borrow soil material proposed for fill and backfill as follows:
1. Classification according to ASTM D 2487.
  2. Laboratory compaction curve according to ASTM D 698 or ASTM D 1557.
- C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.
- D. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

#### **1.05 PROJECT CONDITIONS**

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify One Call for area where Project is located before beginning earth moving operations.
- C. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in place.

## **PART 2 - PRODUCTS**

### **2.01 SOIL MATERIALS**

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups SP, SM, SC, CL, or ML, or a combination of these groups, free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter, and having a liquid limit of less than 45, and plasticity index between 10 and 25.
- C. Unsatisfactory Soils: Soil classification groups GW, GP, SW, OL, OH, MH, MH5, CH, CH5, and PT according to ASTM D 2487 or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not meeting moisture requirements at the time of compaction.
  - 2. Also includes soils with a liquid limit greater than 40 or a plasticity index greater than 20.
- D. Engineered Fill: Cohesive soil material classified as CL, CL-ML, OR ML according to ASTM D2487 with a liquid limit less than 40 and a plasticity index between 10 and 20, free from organic and deleterious substances, compacted to 95% of standard proctor (ASTM D698) maximum dry density at moisture content of -3% to +3% of optimum. Recycled concrete materials such as crushed concrete can also be used for engineered fill.
- E. Subbase: Subbase for pavements shall be "Crushed Concrete Foundation Course" in accordance with Section 307 of the Nebraska Department of Transportation (NDOT) Standard Specifications for Highway Construction, 2017 Version.
  - 1. Subbase shall be installed to a minimum thickness of 6 inches thick under all vehicular pavements, including all parking lot and driveway pavements. Subbase shall extend to a minimum distance of 2 ft beyond the back of curb or outside edge of pavement.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### **3.02 DEWATERING**

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### **3.03 EXPLOSIVES**

- A. Explosives: Do not use explosives.

### **3.04 EXCAVATION, GENERAL**

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

### **3.05 EXCAVATION FOR STRUCTURES**

- A. Refer to Geotechnical Engineer recommendations.

### **3.06 EXCAVATION FOR UTILITY TRENCHES**

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.
- C. Excavate and backslope trenches as required to prevent slides or cave-ins. Install shoring, where required, to protect pavements or structures or where the depth of the trench makes back-sloping of trench sides impractical. Pile material a sufficient distance from the banks of the trench to avoid overloading, slides, or cave-ins.
  - 1. Clearance: 8 inches (200 mm) minimum to 12 inches (300 mm) maximum each side of pipe or conduit.
  - 2. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Geotechnical Engineer.
- D. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of each section of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  - 2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.

3. Shaping of trench bottoms and back-sloping or shoring of trench walls is unnecessary where pipes 4 inches (100 mm) in diameter and smaller can be assembled out of the trench and lowered into the excavation. Widths of trenches need only be wide enough to ensure proper alignment of pipe and installation of pipe to trench bottom without undue forcing.
4. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
5. Where plastic pipe is used, excavate trenches 6 inches (150 mm) deeper than elevation required to allow for bedding course.

### **3.07 UTILITY TRENCH BACKFILL**

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding material in trench bottoms as required by pipe manufacturer. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints.
  1. Use a natural excavated material for bedding for gravity sewer lines and a Class C bedding for pressure lines as indicated on the drawings and as recommended by the pipe manufacturer.
- C. Test piping prior to completing trench backfilling when tests call for inspection of joints. Install thrust blocking and minimal backfilling over pipes to prevent displacement of piping when performing pressurized testing of systems. Repair or replace pipe sections which fail, retest, and then complete backfilling operations.
- D. Backfill under pipe haunches and around bells. Continue backfilling in layers uniformly on each side of pipe to prevent lateral displacement. Compact backfill using hand, pneumatic, or mechanical compacting equipment as required preventing damage to the pipe. Compact to specified densities.
- E. Backfill voids with satisfactory soil while removing shoring and bracing.
- F. Place and compact initial backfill of satisfactory soil, free of particles larger than 3/4 inch (19 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.
  1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- G. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- H. Repair settlements and finish top of backfill trench as specified.

### **3.08 EXCAVATION FOR WALKS AND PAVEMENTS**

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### **3.09 SUBGRADE INSPECTION**

- A. Notify Geotechnical Engineer when excavations have reached required subgrade.

- B. If Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Geotechnical Engineer, without additional compensation.

### **3.10 UNAUTHORIZED EXCAVATION**

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Geotechnical Engineer.
  - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer or Architect.

### **3.11 STORAGE OF SOIL MATERIALS**

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees. Contractor shall coordinate with the Owner for onsite stockpile locations.

### **3.12 BACKFILL**

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, damp proofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring and bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### **3.13 SOIL FILL**

- A. Plow, scarify, bench, or break up and incorporate all fill material so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use engineered fill material.
  - 3. Under steps and ramps, use engineered fill.
  - 4. Under building slabs, use engineered fill.
  - 5. Under footings and foundations, use engineered fill.



- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

### **3.14 SOIL MOISTURE CONTROL**

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within -3% to +3% of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

### **3.15 COMPACTION OF SOIL BACKFILLS AND FILLS**

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Prior to placement of fill materials or concrete, the top 12 inches of subgrade shall be scarified, moisture conditioned, and compacted.
- D. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
  - 1. Under structures, footings, and floor slabs: Refer to procedures in Geotechnical Engineer recommendations.
  - 2. Under pavements, driving surfaces, and walkways, scarify and re-compact top 12 inches below subgrade and compact each layer of backfill or fill soil material at 98 percent.
  - 3. Under lawn or unpaved areas, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil materials at 95 percent.

### **3.16 GRADING**

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm)
  - 2. Walks: Plus or minus 1 inch
  - 3. Pavements: Plus or minus ½ inch

### **3.17 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner may engage a qualified special inspector to perform the following special inspections:
  - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  - 2. Determine that fill material and maximum lift thickness comply with requirements.
  - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Contractor shall engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer or Architect.
- E. Testing agency will test compaction of soils in place.
- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.
- G. Testing frequency shall be per Geotechnical Engineer recommendations, but no less frequent than is required per these Specifications.

### **3.18 PROTECTION**

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Engineer or Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### **3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer or Architect.

**END OF SECTION 31 2010**

## SECTION 31 2200

### GRADING

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Removal and storage of topsoil.
- B. Rough grading the site for building pads and paving.
- C. Topsoil and finish grading.

##### 1.02 RELATED REQUIREMENTS

- A. Section 31 1000 - Site Clearing.

##### 1.03 RELATED DOCUMENTS

- A. Geotechnical Reports:
  - 1. Dated Jan. 9<sup>th</sup>, 2023 – Mid-State Engineering

##### 1.04 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

##### 1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with Nebraska Department of Transportation (NDOT) standards.

#### PART 2 PRODUCTS

#### PART 3 EXECUTION

##### 3.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.

##### 3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Notify utility company to remove and relocate utilities.
- E. Protect site features to remain, including but not limited to bench marks and survey control points, from damage by grading equipment and vehicular traffic.

### **3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. See Section 31 2010 for filling procedures.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

### **3.04 SOIL STOCKPILING**

- A. Stockpile excavated topsoil on site.
- B. Stockpile subsoil to be re-used on site; remove remainder from site.
- C. Stockpiles: Location on the site to be determined by contractor, approved by architect.

### **3.05 FINISH GRADING**

- A. Before Finish Grading:
  - 1. Verify building and trench backfilling have been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
- C. Where topsoil is to be placed, scarify surface to depth of 3 inches.
- D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 6 inches.
- E. Place topsoil in areas where seeding or landscaping will occur.
- F. Place topsoil where required to level finish grade.
- G. Place topsoil to nominal depth of 6 inches.
- H. Place topsoil during dry weather.
- I. Remove roots, weeds, rocks, and foreign material while spreading.
- J. Spread topsoil manually to prevent damage near plants and buildings.
- K. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- L. Lightly compact placed topsoil.

### **3.06 CLEANING**

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- B. Leave site clean and raked, ready to receive landscaping.

**END OF SECTION 31 2200**

**SECTION 31 3116**  
**TERMITE CONTROL**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Chemical soil treatment.

**1.2 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Vapor barrier placement under concrete slab-on-grade.

**1.3 REFERENCE STANDARDS**

- A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; 1947 (Revised 2001).

**1.4 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.
- D. Test Reports: Indicate regulatory agency approval reports when required.
- E. Certificate of compliance from authority having jurisdiction indicating approval of toxicants.
- F. Manufacturer's Application Instructions: Indicate caution requirements .
- G. Record and document moisture content of soil before application.
- H. Maintenance Data: Indicate re-treatment schedule .
- I. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

**1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing this type of work and:
  - 1. Having minimum of five (5) years documented experience.
  - 2. Approved by manufacturer of treatment materials.
  - 3. Licensed in the State in which the Project is located.

**1.6 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five (5) year installer's warranty against damage to building caused by termites.
  - 1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and, if required, re-treat.

**PART 2 PRODUCTS**

**2.1 CHEMICAL SOIL TREATMENT**

- A. Toxicant Chemical: EPA (Title 7, United States Code, 136 through 136y) approved; synthetically color dyed to permit visual identification of treated soil.
- B. Manufacturers:
  - 1. Bayer Environmental Science Corp: [www.backedbybayer.com/pest-management](http://www.backedbybayer.com/pest-management).

2. FMC Professional Solutions: [www.fmcprosolutions.com](http://www.fmcprosolutions.com).
3. Syngenta Professional Products: [www.syngentaprofessionalproducts.com](http://www.syngentaprofessionalproducts.com).

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

#### **3.2 APPLICATION - CHEMICAL TREATMENT**

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Spray apply toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:
  1. Under Slabs-on-Grade.
  2. At Both Sides of Foundation Surface.
- D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
- E. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.
- F. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- G. Re-treat disturbed treated soil with same toxicant as original treatment.
- H. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

#### **3.3 PROTECTION**

- A. Do not permit soil grading over treated work.

**END OF SECTION**

**SECTION 32 1313**  
**CONCRETE PAVING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Nebraska Department of Transportation (NDOT) Standard Specifications for Highway Construction, 2017 Edition.

**1.02 SUMMARY**

- A. This Section includes exterior cement concrete pavement for the following:
  - 1. Driveways and roadways.
  - 2. Parking lots.
  - 3. Curbs and gutters.
  - 4. Walkways.
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
  - 2. Division 31 Section "Earthwork" for subgrade preparation, grading, and subbase course.

**1.03 DEFINITIONS**

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

**1.04 SUBMITTALS**

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: For manufacturer and testing agency.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
  - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:



1. Cementitious materials.
  2. Steel reinforcement and reinforcement accessories.
  3. Fiber reinforcement.
  4. Admixtures.
  5. Curing compounds.
  6. Applied finish materials.
  7. Bonding agent or epoxy adhesive.
  8. Joint fillers.
- F. Field quality-control test reports.
- G. Minutes of pre-installation conference.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
- C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete producer.
    - d. Concrete pavement subcontractor.

#### **1.06 PROJECT CONDITIONS**

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
  - 2. Products: Subject to compliance with requirements, provide one of the products specified.
  - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
  - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### **2.02 FORMS**

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
  - 1. Use flexible or curved forms for curves with a radius 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

### **2.03 STEEL REINFORCEMENT**

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- B. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
  - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

### **2.04 CONCRETE MATERIALS**

- A. Concrete mix shall comply with the requirements of the Nebraska Department of Transportation, Type 47B-4000 concrete as described in NDOT's Standard Specifications for Highway Construction, 2017 Edition.
- B. Cementitious Material: Use one of the following cementitious materials, of the same type, brand, and source throughout the Project:
  - 1. Blended Hydraulic Cement: ASTM C 595, Type IP, Portland-pozzolan cement.
- C. Concrete Aggregate: Crushed Limestone complying with NDOT Type 47-B Coarse Aggregate requirements. Provide material from NDOT approved source.

- D. Fine Aggregate: Sand-gravel complying with NDOT Type 47-B fine aggregate requirements. Provide material from an NDOT approved source.
- E. Water: ASTM C 94/C 94M.
- F. Air-Entraining Admixture: ASTM C 260.
- G. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- H. Fly Ash: No direct substitution of cement with fly ash will be permitted.

## **2.05 CURING MATERIALS**

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
  - 1. Available Products:
    - a. Axim Concrete Technologies; Cimfilm.
    - b. Burke by Edeco; BurkeFilm.
    - c. ChemMasters; Spray-Film.
    - d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
    - e. Dayton Superior Corporation; Sure Film.
    - f. Euclid Chemical Company (The); Eucobar.
    - g. Kaufman Products, Inc.; Vapor Aid.
    - h. Lambert Corporation; Lambco Skin.
    - i. L&M Construction Chemicals, Inc.; E-Con.
    - j. MBT Protection and Repair, ChemRex Inc.; Confilm.
    - k. Meadows, W. R., Inc.; Sealtight Evapre.
    - l. Metalcrete Industries; Waterhold.
    - m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
    - n. Sika Corporation, Inc.; SikaFilm.
    - o. Symons Corporation; Finishing Aid.
    - p. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
- E. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.
  - 1. Available Products:
    - a. Anti-Hydro International, Inc.; AH Curing Compound #2 WP WB.
    - b. Burke by Edoco; Resin Emulsion White.

- c. ChemMasters; Safe-Cure 2000.
- d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
- e. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
- f. Euclid Chemical Company (The); Kurez VOX White Pigmented.
- g. Kaufman Products, Inc.; Thinfilm 450.
- h. Lambert Corporation; Aqua Kure-White.
- i. L&M Construction Chemicals, Inc.; L&M Cure R-2.
- j. Meadows, W. R., Inc.; 1200-White.
- k. Symons Corporation; Resi-Chem White.
- l. Tamms Industries, Inc.; Horncure 200-W.
- m. Unitex; Hydro White.
- n. Vexcon Chemicals, Inc.; Certi-Vex Enviocure White 100.

## **2.06 RELATED MATERIALS**

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:
  - 1. Types I and II, non-load bearing, IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## **2.07 PAVEMENT MARKINGS**

- A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I, II or AASHTO M 248, Type N, F.
  - 1. Color: White, Yellow, Blue, As indicated
    - a. Parking stalls and hatched areas shall have 4" wide yellow striping to match existing parking lots.
- B. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes.
  - 1. Color: White, Yellow, Blue, As indicated
    - a. Parking stalls and hatched areas shall have 4" wide yellow striping to match existing parking lots.
- C. Glass Beads: AASHTO M 247, Type 1.

## **2.08 WHEEL STOPS**

- A. Wheel Stops: Precast, air-entrained concrete, 2500-psi minimum compressive strength, 4-1/2 inches high by 9 inches wide by 72 inches long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.
  - 1. Dowels: Galvanized steel, 3/4-inch diameter, 10-inch minimum length.
- B. Wheel Stops: Solid, integrally colored, 96 percent recycled HDPE or commingled postconsumer and postindustrial recycled plastic; UV stabilized; 4 inches high by 6 inches wide by 72 inches long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.
  - 1. Dowels: Galvanized steel, 3/4-inch diameter, 10-inch minimum length.

## **2.09 CONCRETE MIXTURES**

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 4000 psi.
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45
  - 3. Slump Limit: Comply with NDOT Specifications.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content of between 6.5 and 9.0 percent for slip-form pours and between 6.0 and 8.5 percent for hand pours.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing admixture, high-range, water-reducing admixture, high-range, water-reducing and retarding admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

## **2.10 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## 2.11 JOINT SEALANTS

- A. Materials, General:
  - 1. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Hot-Applied Joint Sealants (Roadways and Parking Lots)
  - 1. Hot-Applied, Single-Component Joint Sealant: ASTM D 6690, ASTM 3405, AASHTO M301, Type II or IV.
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - i. Crafco Inc; RoadSaver 201, RoadSaver 220, RoadSaver, 221, RoadSaver 231, or RoadSaver 534.
      - ii. Meadows, W.R.,Inc; Sealtight 3405M.
      - iii. Right Pointe; [JTS 3405 Parking Lot Sealant 007, or JTS 3405 Rubber 009.
- C. Cold Applied Joint Sealants (Walkways)
  - 1. Single-Component, Self-Leveling, Polyurethane Sealant for Concrete Joints. Sealant must be in compliance with ASTM D 5893, Type SL.
    - a. Color: Similar to material being sealed.
    - b. Available Products:
      - i. BASF-MasterSeal SL1 (formerly Sonolastic SL1)

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a loaded 10-wheel tandem-axle dump truck with single axle load not less than 9 tons.
  - 3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earthwork."
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

### 3.02 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

### **3.03 EDGE FORMS AND SCREED CONSTRUCTION**

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### **3.04 STEEL REINFORCEMENT**

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

### **3.05 JOINTS**

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
  - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
  - 1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
  - 2. Provide tie bars at sides of pavement strips where indicated.
  - 3. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
  - 1. Extend joint fillers full width and depth of joint.
  - 2. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
  - 3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
  - 4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  - 5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete pavement. Contraction joints shall be either grooved or sawn in walkways. Contraction joints shall be sawn only for vehicular pavements and parking lots.
  - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
  - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and in a timely manner before developing random contraction cracks. Any premature or random cracking will require removal and replacement of that entire cracked panel.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

### **3.06 CONCRETE PLACEMENT**

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site.
- F. Do not add water to fresh concrete after testing.
- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Screed pavement surfaces with a straightedge and strike off.
- J. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.



- K. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- L. Slip-Form Pavers: When automatic machine placement is used for pavement, produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
  - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
- M. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- N. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.
- O. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### **3.07 FLOAT FINISHING**

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Burlap Finish (Vehicular Pavements, ie. Parking Lots, Roadways, Driveways, etc.): Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
  - 2. Medium-to-Fine-Textured Broom Finish (Walkways): Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

### **3.08 CONCRETE PROTECTION AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection. Methods for protection shall be approved by the A/E prior to commencement of concrete placement.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  - 1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

### **3.09 PAVEMENT TOLERANCES**

- A. Comply with tolerances of ACI 117 and as follows:
  - 1. Elevation: 1/4 inch.
  - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
  - 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
  - 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
  - 5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
  - 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
  - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
  - 8. Joint Spacing: 3 inches.
  - 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
  - 10. Joint Width: Plus 1/8 inch, no minus.

### **3.10 PAVEMENT MARKING**

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

- B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

### **3.11 INSTALLATION OF JOINT SEALANTS**

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Cleaning of Joints: Clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
- C. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer.
- D. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.
- E. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of joint-sealant backings.
  - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
  - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- F. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
  - 1. Place joint sealants so they fully contact joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
  - 1. Remove excess joint sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- H. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

- I. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

### **3.12 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. All costs of testing shall be borne solely by the Contractor.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- F. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- H. If desired, the Owner may elect to hire their own testing agency to conduct tests side-by-side Contractor's agency to verify results.

### **3.13 REPAIRS AND PROTECTION**

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

**END OF SECTION 32 1313**

## SECTION 33 1000

### WATER UTILITIES

#### PART 1 – GENERAL

##### 1.1 SCOPE

- A. This specification is intended to define and/or limit the required quality standards of the materials furnished and the workmanship performed in connection with herein specified items of piping, fittings, valves and hydrants with all the required accessories and/or appurtenances, including in part: all labor, tools, materials and equipment for the complete work of this project which are in accordance with this specification and the applicable drawings.

##### 1.2 GENERAL

- A. The Contractor shall remove paving, as may be required, excavate the trenches and pits to the required dimensions; excavate bell holes; and maintain all streets and bridges for traffic control; sheet, brace and support the adjoining ground or structures where necessary; handle all drainage or groundwater; provide barricades guards and warning lights; lay and test pipe, castings, fittings, valves, hydrants and accessories; backfill and consolidate the trenches and pits; restore the roadway surface unless otherwise stipulated; supply required or remove surplus excavated material; and clean the site after the work.

Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, complete and compatible installation shall be furnished and installed as part of this work. The drawings show sizes and general arrangement of all pipes and appurtenances. Responsibility for handling and/or cutting exact lengths of pipe for proper make-up rests with the Contractor.

The work shall comply with the current requirements of the American Water Works Association (AWWA). Water distribution system installation must comply with State of Nebraska Department of Health and Human Services Standards.

#### PART 2 - MATERIALS

##### 2.1 WATER MAIN MATERIAL

- A. DUCTILE IRON PIPE – All mechanical joint, push-on, or restrained ductile iron pipe (D.I.P.) shall be thickness Class 50 for 16 inch diameter and smaller and pressure Class 350 for pipe larger than 16 inch diameter, meeting AWWA Standard Specifications C-150 and C-151. All ductile iron pipes shall have a standard thickness interior cement lining conforming to the requirements of AWWA Standard Specification C-104 and an exterior coating of bituminous material approximately one mil thick except for exposed pipe scheduled to be painted.

All joints shall be either push-on type with single vulcanized rubber gaskets or mechanical (gland type), unless otherwise specified, meeting AWWA Standard Specification C-111. Vulcanized rubber gaskets shall be visually free of defects and areas of foreign materials. When indicated, flanged joints shall be cement lined and shall conform to AWWA Standard Specification C-115. Gaskets shall be 1/8 inch thick.

Polyethylene Encasement for gray and ductile iron piping shall be furnished and installed according to AWWA C-105, Methods A or B. Repair all rips, punctures or other damage to the polyethylene with adhesive tape or short length of polyethylene tube cut open wrapped around

the pipe and secured in place. All fittings and valves shall also be covered and wrapped in accordance with manufacturer's instructions.

- B. POLYVINYL CHLORIDE (PVC) PLASTIC PIPE - The pipe shall meet the requirements of AWWA Standard Specification C-900, with a dimension ratio of 18. The pipe shall be joined by means of a rubber gasket-integral bell joint. Gaskets will conform to the requirements of ASTM F-477. Joints for plastic pressure pipes shall conform to ASTM D-3139 using flexible elastomeric seals. All pipe shall have a gasket bell section at least as strong as the pipe wall. The outside pipe diameters shall be cast iron pipe equivalent. Pipe lengths shall be nominal 20 ft. (6.10 m) with no more than 15% of footage supplied by the manufacturer in random lengths of not less than 10 feet (3.05 m) long. If pipe is to be stored for periods longer than 90 days, the pipe must be covered in a manner approved by the Engineer.
- C. FITTINGS – Fittings shall be mechanical joint conforming to AWWA Standard Specification C-153, C-104 and C-111. Fittings shall be formed from ductile iron and rated for 350 psi working pressure. Caps, plugs and miscellaneous fittings shall be provided conforming to AWW Standard Specification C-110. Bolts and nuts shall be an alloy steel conforming to ASTM A194. Provide polyethylene encasement on all water main fittings and valves in full compliance with AWWA C-105.
- D. FIRE HYDRANTS – Hydrants furnished shall conform to the requirements of the AWWA Standard Specification C-502. Hydrants shall open to the left (counter-clockwise) unless otherwise specified. Hydrants shall be designed to operate under 150 psi (10.5 kg/sq. cm) working pressure and tested at 300 psi (21.0 kg/sq. cm).

All water passages shall be of such form and size as to permit the full flow of water without undue loss by friction. Hydrants must have a positive drain, which will allow the water to escape readily from the standpipe when the hydrant valve is closed, but said drain opening must be closed as soon as the hydrant valve is partially opened. The valve stem and valve shall be removed without the necessity of exposure of the hydrant by excavation. Hydrants shall be suitable for the depth of the trench. Bury Depth of the fire hydrant shall be 5 ½ feet unless otherwise specified. If the elevation of a hydrant must be adjusted to conform to the finished grade, hydrant extension kits and grade locks will be allowed. Hydrant extension kits shall be of the same manufacture as the hydrant, no universal aftermarket kits will be allowed. All hydrants shall have a 5 ¼ inch (13.3 cm) valve opening, two 2 ½ inch (6.3 cm) hose nozzles and one 4 ½ inch (11.4 cm) steamer nozzle with the National Standard hose coupling thread, 6 inch (15.2 cm) mechanical joint inlet, and shall be Mueller Cat. No. A423. Bonnet and nozzle caps shall be factory painted yellow.

Where required, the Contractor shall furnish the fire hydrant extensions from the same manufacturer of the fire hydrant.

- E. VALVES – Valves shall be furnished as follows:
- (1) Valves 12 in. diameter and smaller to be resilient seat gate valves
  - (2) Valves 14 in. diameter and larger to be butterfly valves
  - (3) End connections as shown or drawings which are compatible with connection joint
  - (4) Shop drawings indicating valve pressure, flange rating valve body material valve trim, operator, internal lining material, dimensions, class, flow coefficients, etc.
  - (5) Handwheels for all exposed piping, valves with arrow and "OPEN" work casting impression.

Valves shall be installed according to manufacturer's directions. Valves shall be supported in such a way to minimize bending of the end connections. Operating wrench shall be able to free operating valve. The operating nut location, when not over the main, will be to the north or west of the main.

- F. GATE VALVES – Valves shall be resilient seat valves and shall comply with the requirements of the AWWA Standard Specification C-509. Valves shall have hub ends to fit the pipe for which they are to be used. An adjustable valve box of sufficient length for the depth of trench shall be furnished complete. All gate valves shall have a clear waterway of the full diameter of the valve and shall be opened by turning to the left. The operating nut shall have cast thereon an arrow indicating the direction of the opening. Each valve shall be designed for a maximum working pressure of 200 psi (14 kg/sq. cm). Prior to shipment from the factory, each valve shall be tested by hydraulic pressure equal to twice the working pressure. Unless otherwise specified, valves shall be resilient seat non-rising stem. Valves shall have “O” Ring packing and a 2 inch (5.1 cm) operating nut. Valve disc and entire inside of valve body shall be coated with a two part thermosetting epoxy coating, complying with AWWA C-550.

The number of turns to open shall be approximately 3 turns per inch. This will allow the Owner to continue to estimate the valve size in the future in accordance with standard procedures.

- G. VALVE BOXES – Valve boxes shall be domestic manufactured, and shall be constructed of cast iron or metal with a 3/16 inch (0.05 cm) minimum thickness at any point. The cover shall have cast thereon the word “WATER”. Two piece, Buffalo Type valve boxes shall be equivalent to Mueller screw type H-10360. Valve boxes shall be screw type size 666-S or approved equal. If valve boxes are not located in PCC paving (street, sidewalk, or driveway) a PCC pad shall be poured at the finished grade surface. If the valve box is located in a gravel or asphaltic street or driveway, the pad shall be 8 inches thick and 2.5 feet in diameter. If the valve box is located behind the back of curb in a grassed area the pad shall be 4 inches thick and 1.0 feet in diameter. Backfill around valve boxes shall be existing soil or approved backfill, do not backfill with PCC. Valve box shall be centered over operating nut.

Valve boxes shall be centered on valve nut using a rubber valve box adapter to center the valve box on valve nut equivalent to Larson V-guard or Adaptor, Inc. Adaptor II.

All valve boxes shall be furnished with 4” thick mud plugs and flexible polypropylene handle tested at 300 lb. force with hard hat plug manufactured by Infact or approved equal.

- H. TAPPING TEES, CROSSES AND VALVES – All tapping sleeves shall be stainless steel with stainless steel nuts and bolts. The tapping sleeve shall be equivalent to Ford Fast Tap FTSS, Mueller H-304SS or H-304MJ, rated for a minimum pressure of 200 psi, meeting all AWWA Standards.
- I. COUPLINGS – Compression Sleeve Couplings. Furnish and install flexible compression-sleeve type coupling. Incorporate units conforming to the following criteria.
- (1) Use compression sleeve couplings equal to Ford Style FC 1-ESH.
  - (2) Provide sleeves constructed of carbon steel having a minimum yield of 300,000 psi. Insure ends are smooth inside tapered for uniform gasket seating.
  - (3) Provide followers made of malleable iron ASTM A47 Grade 35018 or 32510 or Ductile Iron ASTM A536.
  - (4) Provide gaskets of special compound or GRS rubber with no reclaimed materials and with good resistance rating for service intended.
  - (5) Install stainless steel nuts and bolts.
  - (6) Finish cast parts with epoxy coating.
  - (7) Install coupling to allow space of not less than ¼ inch but not more than 1 inch.

## 2.2 WATER SERVICES (2” AND SMALLER)

- A. POLYETHYLENE (PE) PLASTIC TUBING (CTS) – Pipe 2” in diameter and smaller shall be High Density Polyethylene (HDPE) plastic tubing shall conform to the material requirements of HDPE



3608 (Formerly 3408) cell class 345464C per ASTM D3035 and shall comply with ANSI, NSF Standard 14/61 and AWWA C901. Tubing shall conform to ASTM 2737 for copper tube size (CTS) outside diameter (OD) controlled, SDR 9 (160 psi). Insert stiffeners shall be used with all fittings and polyethylene tubing (PET) and shall be solid 304 tubular stainless steel.

- B. CORPORATION STOPS – Corporation stops shall comply with AWWA Standard Specification C-800. Corporation stops shall have AWWA taper or Mueller thread on the inlet end, with copper service couplings for connections to the service lines. The corporation stops shall be rated to 300 psi and shall be a ball type corporation stop Mueller B-25008N and eighth bends shall be Mueller H-15010N 110 compression connection, or approved equal. All connections to the main shall be electrically insulated by means of approved insulating fitting if specified. Teflon tape shall be used on corporation stop threads when installed.
- C. TAPPING SADDLES – Tapping saddles shall be brass double strap saddles with threads compatible with corporation stops. Saddles will be Ford S-90, Mueller BR2B, or approved equal with maximum working pressure rating of 200 psi.
- D. CURB STOPS AND BOXES – Service stops shall comply with AWWA Standard Specification C-800. The stops shall be equal to Mueller Oriseal 110 conductive compression connection B-25163, 1- inch. Curb stops for 2 inch services shall be Mueller A-2360 thread by thread with plastic threaded plug.

Extension service boxes of the required length and having either screw or slide type adjustment, shall be installed at all service box locations and to the finished grade. The boxes shall have a housing of sufficient size to completely cover the service stop and shall be complete with identifying covers.

The box shall be equal to Mueller H-10300 with tapped 2" Minneapolis thread for services to 1" and H-10336 for services larger than 1" up to 2" or approved equal. The box shall rest on a cast iron foot piece, brick or other solid support and contain stationary rods. Wood will not be allowed as a permanent solid support. All 2" valves shall have a valve box per this standard specification.

## **PART 3 – EXECUTION**

### **3.1 CONSTRUCTION METHODS**

- A. The installation of the water main shall conform to the piping manufacturer's recommendation and according to the latest revisions of AWWA C-600 for Ductile Iron and C-605 for PVC. The pipeline shall be constructed in a trench which allows 6 foot (1.83 m) minimum cover or as indicated on the drawings, between the top of the pipe and finished grade. At ditch crossings there shall be 5 foot (1.53 m) of cover at the flow line of the ditch. The size of pipe to be installed shall be indicated on the drawings.

Pipe, fittings, valves and accessories shall be handled in such a manner to insure installation of materials in a sound and undamaged condition, and will conform in all respect to specified requirements. Particular care should be taken not to injure the pipe and lining of cast iron and ductile iron pipe.

Equipment, tools and methods used in unloading, reloading, hauling, and laying pipe and fittings shall be such that no damage is done thereto or to lining therein. Hooks used for insertion in ends of pipe shall have broad, well padded contact surfaces and shall be of such design and length that they will provide uniform support for a distance back from the end of the pipe of not less than one-third of the internal pipe diameter.

Cement lining in pipe or fittings which is broken or loosened in unloading or subsequent handling shall be sufficient cause for rejection of the pipe or fittings containing such damaged and loosened lining. Although defective linings may be repaired by and at the expense of the Contractor who may employ the pipe manufacturer to make such repairs, all repairs shall be made under the direct supervision of a representative of the pipe manufacturer.

All pipe or coating which is damaged shall be removed from the site at the Contractor's expense.

- B. Temporary signs and permanent signs shall conform to the requirements of Section 417 of the Nebraska Department of Roads Standard Specifications. Sign posts shall conform to section 1071 of the Nebraska Department of Roads Standard Specifications.

### **3.2 EXCAVATION, TRENCHING, BEDDING AND BACKFILLING**

- A. Excavation, trenching, bedding and backfilling shall conform to Section 31 2000 of this specification.
- B. Borrow required to bring trench to original grade shall be supplied by the Contractor. The borrow shall be approved by the Engineer.

### **3.3 WATER MAIN INSTALLATION**

- A. LOWERING OF WATER MAIN INTO TRENCH – Proper implements, tools and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves and hydrants shall be carefully lowered into the trench piece-by-piece by means of derrick, ropes or other suitable tools or equipment, in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench. If damage occurs to any pipe, fitting, valve, hydrant or water main accessories in handling, the damage shall be immediately brought to the attention of the Engineer. The Engineer shall prescribe corrective repairs or rejection of the damaged items.
- B. INSPECTION BEFORE INSTALLATION – All pipe and fittings shall be carefully examined for cracks and other defects while suspended above the trench immediately before installation into final position. Spigot ends shall be examined as this area is most vulnerable to damage from handling. Defective pipe or fittings shall be laid aside for inspection by the Engineer, who will prescribe corrective repairs or rejection.
- C. CLEANING OF PIPE AND FITTINGS – All lumps, blisters and excess coating shall be removed from the bell and spigot end of each pipe, and the outside of spigot and the inside of the bell shall be wire brushed and wiped clean, dry, and free from oil and grease before pipe is laid. Dirt and other foreign material must be removed from the barrel of pipe before it is laid.
- D. PLACEMENT OF PIPE – Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. The Engineer shall require a heavy, tightly woven canvas bag of suitable size to be placed over each end of the pipe section if placement is hampered by the entrance of soil into the pipe barrel. Canvas bags shall be removed at the time of connection to adjacent pipe. During laying operations, no debris, tools, clothing or other material shall be placed in the pipe. Pipe lines or runs intended to be straight shall be laid so. Deflections from a straight line or grade, made necessary by vertical curves and horizontal curves or offsets, shall not exceed the amount of deflection recommended by the pipe manufacturer. The Engineer is the only one who shall make the determination to change the alignment or grade. If an obstruction is encountered, the water main shall be lowered by means of a fitting, if the grade changes in excess of 2 vertical feet. A grade change of less than 2 vertical feet shall be

corrected by installing pipes at uniform grades with high and low areas located at fire hydrant locations.

If the specified or required alignment requires deflection in excess of those stipulated above, the Contractor shall provide either special bends as approved by the Engineer, or pipes in shorter lengths; in such length and number, that the angular deflection at any joint, as represented by the specified maximum deflections are not exceeded. As each length of pipe is placed in the trench, the spigot end shall be centered in the bell and the pipe forced into place with slow and steady pressure without jerky or jolting movements and brought to correct line and grade. The pipe shall be secured into place with approved backfill material tamped under it except at the bells. Precautions shall be taken to prevent dirt from entering the joint space. No wooden blocking shall be left at any point under the pipeline. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Engineer.

- E. **CUTTING OF PIPE** – The cutting of pipe for fittings and closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or cement lining to leave a smooth end at right angles to the horizontal axis of the pipe. The cutting method used shall be approved by the manufacturer's specifications and by the Engineer prior to any cuts.
- F. **BELL ENDS TO FACE DIRECTION OF LAYING** – Pipe shall be laid with the bell ends facing in the direction of laying, unless directed otherwise by the Engineer. Where pipe is laid on a grade of 10% or greater, the laying shall start at the bottom and shall proceed upward with bell ends of the pipe upgrade.
- G. **UNSUITABLE CONDITIONS FOR LAYING PIPE** – No pipe shall be laid when, in the opinion of the Engineer, trench conditions are unsuitable. Under no circumstances shall the pipe be laid in water. The contractor shall furnish all necessary equipment, labor and materials for pumping or otherwise removing any water that may enter or accumulate in the trenches or other excavations and keep them free from water until all work is constructed and set for sufficient time so water will not damage the work in any way or manner.
- H. **BRIDGING OF PIPE** – Concrete bridging may be required by the Engineer under certain conditions. The Engineer shall determine the size and location of concrete bridging to avoid settlement of the pipe being installed or settlement of existing underground utility pipes. This condition shall also apply to other underground utilities being installed over existing water mains. In certain instances, the Engineer may require the complete encasement of water mains by concrete. The size and location of these encasements shall be determined by the Engineer.
- I. **INSULATION BETWEEN DIFFERENT METALIC PIPE MATERIALS** – Wherever it is necessary to join cast iron pipe with pipe or fittings of dissimilar metal, a method of insulating against the passage of electric current shall be provided and shall be approved by the Engineer.

**3.4 GENERAL REQUIREMENTS OF PIPE JOINTING** – The requirements already set forth shall apply in addition to installation of joints in accordance with pipe manufacturer's recommendations approved by the Engineer.

- A. **MECHANICAL JOINTS** – The general requirements already set forth shall apply except that, where the terms "bell" and "spigot" are used, they shall be considered to refer to the bell and spigot ends of the lengths of mechanical joint pipe. The last eight inches (20.3 cm) outside of the spigot and inside of the bell of the mechanical joint pipe shall be thoroughly cleaned to remove oil, grit, excess coating and other foreign matter from the joint. The cast iron gland shall then be slipped in the spigot end of the pipe with the lip extension of the gland toward the socket, or bell end. The rubber gasket shall be placed on the spigot end with the thick edge toward the gland. Broken glands shall be replaced by the Contractor at his expense.

The entire section of the pipe shall be pushed forward to seat the spigot end in the bell. The gasket shall then be pressed into place within the bell; care shall be taken to locate the gasket evenly around the entire joint. The cast iron gland shall be moved along the pipe into position for bolting, all of the bolts inserted and the nuts screwed up tightly with the fingers. All nuts shall be tightened with a suitable wrench. Nuts spaced 180 degrees apart shall be tightened alternately in order to produce an equal pressure on all parts of the gland.

- B. PUSH-ON JOINTS – The general requirements already set forth shall apply except that, where terms “bell” and “spigot” are there used, they shall be considered to refer to the bell and spigot of the lengths of push-on joint pipe.

There is only one nominal dimension of the spigot outside diameter and the bell inside diameter for each size of push-on joint pipe. Similar dimensions of the caulked-joint bell-and-spigot pipe may vary with the class of pipe for each size in existing lines. Therefore, care should be taken that the outside diameter of the existing line is the same as the outside diameter of the push-on joint pipe being installed, otherwise a special adapter to join the two lines may be necessary.

The inside of the bell and the outside of the spigot end shall be thoroughly cleaned to remove oil, grit, excess coating and other foreign matter. The circular rubber gasket shall be flexed inward and inserted in the gasket recess of the bell. Since different types of pipe take different types of rubber gaskets, it shall be the responsibility of the Contractor to see that the proper types of gaskets are installed.

Sufficient lubricant shall be furnished with each order to provide a thin coat on each spigot end. The lubricant shall be non-toxic, shall impart no taste or odor to the conveyed liquid, and shall have no deleterious effect on the rubber gasket or pipe. The lubricant shall be of such consistency that it can be easily applied to the pipe in hot or cold weather and shall adhere to either wet or dry pipe.

The spigot end of the pipe shall be entered into the bell with care used to keep the joint from contacting the ground. The joint shall then be completed by forcing the plain end to the bottom of the bell with a forked tool or jack-type tool or other device approved by the Engineer. Pipe that is not furnished with a depth mark shall be marked before assembly so that the spigot end is inserted to the full depth of the joint. Field-cut pipe lengths shall be filed or ground to resemble the spigot end of such pipe as manufactured. Complete assembly instructions are available from the pipe manufacturer. If pipe is pushed home with a backhoe bucket, a wooden shield must be placed between the backhoe bucket and the end of the pipe.

- C. RESTRAINED JOINTS – Where specified or indicated upon drawings, install restrained joints of the following type:

- (1) Pipe 24 inches and smaller. For ductile iron pipe use retainer glands equal to Clow Mechanical Retainer Glands, Megalug Series 1100, or U.S. Pipe TR Flex. For polyvinyl chloride pipe use Ford Series 1500-CA, U.S. Pipe Field Lok, Megalug Series 2000 PVC.

Design joints for working pressure of 250 psi. Ensure that samples of restrained push-on joints have successfully been tested to 500 psi by manufacturer without leakage or joint separation in accordance with AWWA C101. All restrained joints where indicated on the drawings shall be incidental to the unit bids.

### **3.5 CONNECTIONS WITH EXISTING PIPE LINES**

- A. It shall be the Contractor’s responsibility to verify the existence and location of all water mains along the route of project. The omission from or the inclusion of locations on the drawings is not to be considered as the non-existence of or a definite location of existing utilities. The Contractor

shall take the necessary precautions to protect the existing water main from damage due to his operation, and any damage to or abuse of the water mains encountered shall be repaired by the Contractor at his expense.

Relocation of water main in conflict with construction operations will be the responsibility of the Contractor in accordance with the details as shown on the drawings. The Contractor shall coordinate all such conflicts with the Owner and the Engineer to insure restoration of the line as soon as possible. The Contractor shall furnish, install and remove all necessary valves, fittings, caps, etc. to keep the new and existing water main in service. The Contractor shall notify the Owner 24 hours prior to disturbance of any service. Water mains not in direct conflict with the sewer pipe cross-section shall be protected by the Contractor until his construction operations are a sufficient distance from such conflict to insure no damage thereto. Water mains not in direct conflict with construction and damaged by the Contractor shall be repaired and restored at the Contractors expense.

Where connections are made between new work and existing piping, such connections shall be made in a thorough and workmanlike manner, using suitable and proper fittings to suit the conditions encountered. Each connection with an existing water pipe shall be made at a time and under conditions which will least interfere with water service to customers affected thereby and as authorized by the Owner. Suitable facilities shall be provided for proper dewatering, drainage, and disposal of all water removed from the dewatered lines and excavations, without damage to adjacent properties.

- 1) CONNECTION – A connection to an existing water main that is not under pressure will be made with a fitting and compression sleeve couplings. The Contractor shall be responsible for controlling and disposing of the water in the trench, removal of plugs, fittings, thrust blocks, anchors, cutting of existing mains, installation couplings and/or sleeves, etc.
- 2) PRESSURE CONNECTION – A pressure connection shall include all necessary tapping tees, gate valves, and fittings needed to connect to the existing water mains. Pressure connections are to an existing water main that is under pressure. The Contractor shall be responsible for controlling and disposing of the water in the trench. A thrust block will be required.

### **3.6 RELATION OF WATER MAINS TO SEWERS**

- A. Public sewers shall be separated from public water mains according to the Nebraska Health and Human Services accepted “Recommended Standards for Water Works”, by the Committee of the Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Manager, 1997 Revised Edition.
  - 1) PARALLEL INSTALLATION – Water mains shall be laid at least 10 feet (3.05m) horizontally from any existing or proposed sewer. The distance shall be measured edge to edge.
  - 2) CROSSINGS – Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches (45.7 cm) between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, a full length of water pipe shall be located so both joints will be as far from the sewer as possible.

### **3.7 SETTING OF VALVE AND FITTINGS**

- A. Valves and fittings installed in trenches shall be located where indicated by the drawings and as directed by the Engineer. Valves, fittings, plugs, and caps shall be set and joined to pipe in the manner specified for cleaning, laying and joining pipe. Fittings will be blocked using only cast-in-

place concrete blocks unless otherwise approved by the Engineer. No wood blocking shall be allowed. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut of the valve, with the box cover flush with the surface of the finished pavement or such other level as may be directed by the Engineer.

### **3.8 SETTING OF FIRE HYDRANTS**

- A. Fire hydrants shall be in accordance with the Fire Hydrant Detail. Hydrants are to be set at such an elevation that the connecting pipe and distributing mains will have the same depth of cover. All hydrants shall stand plumb and shall have their steamer nozzle facing the curb or street. Around the base of the hydrant 10 cubic feet of crushed rock or gravel shall be placed so that the hydrant will completely drain when closed.

Backfill around the hydrant shall be firmly tamped to the surface of the finished grade and to a distance of 5 feet (1.52 m) around the hydrant. Before placing any hydrant, care shall be taken to see that all foreign material is removed from within the body or barrel. The stuffing boxes shall be tightened and the hydrant or valve opened and closed to see that all parts are in working condition.

### **3.9 INSTALLATION OF BRACING, SUPPORTING AND ANCHORING**

- A. Blocking, bracing, anchoring, or other acceptable means for the prevention of movement, shall be installed. All blocking, bracing, supporting and anchoring shall be in accordance with the Standard Blocking Detail and the Standard Fire Hydrant Detail with the use of concrete as specified in Concrete Paving section of this specification.

- 1) ANCHORAGE FOR FIRE HYDRANTS – The bowl of each hydrant shall be well braced against the undisturbed natural earth at the end of the trench with a concrete anchor placed behind and a precast block beneath the bowl. The fire hydrant valve shall be tied to the fire hydrant tee with anchor pipe or with two (2) ¾ inch (1.91 cm) or larger all-thread rods as shown on the Fire Hydrant Detail, Mega Lugs / retaining glands will be allowed.

Whenever a fire hydrant is the means of terminating a water main (such as in a cul-de-sac or dead end); the tie rods and concrete reverse anchors will be required for both the fire hydrant valve (which in this case is also a line valve on the main) and the fire hydrant lateral of the branch feeder pipe connected directly to the fire hydrant. Additional concrete anchors shall be as directed by the Engineer.

- 2) ANCHORAGE FOR PLUGS, CAPS, TEES, TAPS AND BENDS – Plugs, caps, tees and bends shall be provided with reaction backing in accordance with the Standard Blocking Detail. Reverse concrete anchor and tie backs are acceptable. Blocking shall be placed between solid ground and the fitting to be anchored; the area of bearing on the pipe and on the ground, in each instance, shall be shown or directed by the Engineer. No wood or precast blocks shall be used as a permanent blocking. Temporary blocking may be used as directed by the Engineer. Blocking will be required regardless of whether a tapping tee or tapping saddle is used. Such blocking will in all cases be sized and placed in a manner that will adequately transfer thrust reaction to solid undisturbed ground or the equivalent thereof.
- 3) FORMING FOR CONCRETE THRUST BLOCKS AND ANCHORS – All forming for concrete thrust blocks and anchors will be done by bulkheading around the shape of thrust block or anchor with burlap or reinforced paper sacks which have been filled with sand or earth, or other Engineer approved forming method. Filled sacks used to form concrete blocks will be left in place in the trench and backfill will be placed around and over them in the usual manner. Any bolt head or fitting must be left accessible when pouring concrete about them.

If the fitting is to be covered completely upon direction of the Engineer, then the joint must be wrapped with suitable polyethylene.

Minimum curing time for concrete anchors regardless of additives shall be thirty-six (36) hours for anchors containing 2 cubic yards (1.53 cu. M) or less, forty-eight (48) hours for anchors containing more than 2 cubic yards (1.53 cu. M) but less than 6 cubic yards (4.59 cu. M) and seventy-two (72) hours for anchors containing more than 6 cubic yards (4.59 cu. M) but less than 12 cubic yards (9.17 cu. M). Anchors containing more than 12 cubic yards (9.17 cu. M) will be cured as directed by the Engineer. Curing time for anchors having flanged rods or other accessories embedded in them for the purpose of tying pipe and/or fittings directly to the anchor will require approximately 25% additional curing time.

### 3.11 QUALITY ASSURANCE

- A. DISINFECTION – After favorable performance of the pressure test, thoroughly flush the entire potable water piping system with a velocity of not less than 3.0 feet per second. Before starting to flush new water mains, the City of Lexington's Utilities Department requires 24 hours of notice. Drain flushed water to location approved by the Owner. Each unit of the completed system shall be disinfected with chlorine before acceptance for domestic operation. All disinfection performed shall be accomplished under the supervision of the Engineer.
- B. METHOD – Disinfection shall be accomplished as described below by the AWWA Standard Specification C-651. The amount of chlorine applied shall be such as to provide a dosage of not less than fifty (50) mg/L. The chlorinating material shall be introduced to the waterlines and distribution system in an approved manner. If possible to do so, the lines shall be thoroughly flushed prior to the introduction of the chlorinating materials. After a contact period of not less than 24 hours, the heavily chlorinated water shall be flushed from the system with clean water until the residual chlorine content is not greater than two-tenths (0.2) mg/L. All valves in the lines being disinfected shall be opened and closed several times during the contact period. All chlorinated compounds shall conform to AWWA Standard Specifications B-300, B-301, and B-302.
- C. TESTING – After final flushing and before water main is placed into service, two sets of consecutive water samples, free of chlorine, taken at least 24 hours apart, shall be submitted to an approved State Department of Health and Human Services Laboratory for the detection of coliform and non-coliform bacteria. The results shall be submitted to the Engineer. If the laboratory analysis shows the water is unsafe to use, (presence of any coliform bacteria) disinfection and analysis shall be repeated until two consecutive zero coliform and non-coliform counts are obtained.

The Contractor shall collect and test for chlorine concentration prior to flushing and upon termination of flushing. The number of samples required shall be as indicated in AWWA C-651 which follows:

“Standard Condition After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. At least one set of samples shall be collected from every 1200 ft (366 m) of the new water main, plus one set from the end of the line and at least one set from each branch. All samples shall be tested for bacteriological quality in accordance with Standard Methods for the examination of Water and Wastewater, and shall show the absence of coliform organisms. A standard heterotrophic plate count may be required at the option of the owner (or owner's representative).

Special Conditions If trench water has entered the new main during construction or, if in the opinion of the owner (or owner's representative), quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 ft (61 m) and shall be identified by location. Samples shall be taken of water that stood in the new main for at least 16 hours after final flushing has been completed."

- D. PRESSURE AND LEAKAGE TESTS – The pipeline shall be subjected to pressure and leakage tests as specified herein and completed in accordance with the latest edition of AWWA Standards. The required pressure and leakage tests shall be made after all pipe laying and backfilling work has been completed. All concrete reaction blocks and bracing or restraining facilities shall be in place at least 7 days before the initial filling of the line, except where tension joints are used at bends.

The pressure and leakage tests shall be applied to the entire line, service connections and appurtenances. The Contractor shall be solely responsible for any and all damages to the pipelines, and to public and private property, which results from defective materials or workmanship. The section of the line to be tested shall slowly be filled with water and all air expelled from the pipe. Care shall be taken that all air valves are installed and open in the section being filled, and that the rate of filling does not exceed the venting capacity of the air valves.

- E. TEST EQUIPMENT AND FACILITIES – The Contractor shall perform the necessary work to fill the pipeline with test water, as specified. The Contractor shall furnish all pumping equipment, water meter, pressure gauge, and all equipment, materials, and facilities required for the tests. Test pressures shall be applied by means of a force pump of such design and capacity that the required pressure can be applied and maintained without interruption for the duration of each test. The water meter and pressure gauge shall be accurately calibrated and shall be subject to the approval of the Engineer.
- F. PRESSURE TEST – The low point in the pipeline for each test section shall be subjected to a test pressure of 150 psi (10.56 kg/sq. cm). Test pressure shall not exceed the rated pressure of the valves, pipe or appurtenances when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves. After the section of the line to be tested has been filled with water, the specified test pressure shall be applied and maintained for a period of not less than 2 hours and for whatever longer period as may be necessary for the Engineer to complete the inspection of the line under test or for the Contractor to locate any and all defective joints and pipeline materials. If repairs are needed, such repairs shall be made, the line refilled, and the test pressure applied as before; this operation shall be repeated until the line and all parts thereof withstand the test pressure in a satisfactory manner.
- G. LEAKAGE TEST – After the specified pressure test has been completed, the line being tested shall be subjected to a leakage test under a hydrostatic pressure of 150 psi (10.56 kg/ sq. cm). The pressure shall be maintained constant (within a maximum variation, plus or minus, of 5 psi) during the entire time that line leakage measurements are being made, so that the allowable leakage rate may be determined accurately from the leakage rate formula.

Leakage tests shall not be started until a constant test pressure has been established. Compression of air trapped in un-vented pipes or fittings will give false leakage readings under changing pressure conditions. After the test pressure has been established and stabilized, the line leakage shall be measured by means of a water meter installed on the line side of the force pump. Line leakage is defined as the total amount of water introduced into the line as measured by the meter during the leakage test. The pipeline, or tested section thereof, will not be accepted if and while it has a leakage rate in excess of that rate determined by the following formula for the specific type of pipe:



Ductile Iron Pipe

$$Q = \frac{LD(P)^{1/2}}{148,000}$$

148,000

Q = Maximum permissible leakage rate, in gallons per hours

L = Length of pipe tested, in feet

D = Nominal internal diameter of the pipe, in inches

P = Average test pressure, in pounds per square in (gauge)

Where the leakage test shows a leakage rate in excess of the permissible maximum, the Contractor shall make all necessary surveys in connection with the location and repair of leaking joints to the extent required to reduce the total leakage to an acceptable amount.

All joints in piping and closed valves shall be watertight and free from visible leaks during the prescribed tests. Each and every leak which may be discovered at any time prior to the expiration date of one year from and after the date of final acceptance of the work by the Owner shall be located and repaired by and at the expense of the Contractor, regardless of any amount that the total line leakage rate during the specified leakage test may be below the specified maximum rate.

**3.12 SUBMITTALS**

- A. Certification by Manufacturer - The Contractor shall furnish a statement from the manufacturer that the inspection and all the specified tests have been made and the results thereof comply with the requirements of the applicable standards herein specified for all materials furnished.
- B. Quality Control Testing – The Contractor shall submit but not be limited to the following:
  - 1. Chlorine Concentration Testing
  - 2. Bacteriological Quality Testing
  - 3. Pressure and Leak Testing
- C. WATERLINE FINAL ACCEPTANCE – The Contractor shall keep the waterline isolated from the existing water system until final approval from the Nebraska Department of Health and Human Services. After the Health Department approval, the Contractor shall return and open all valves to place the newly constructed lines into service after first flushing the lines.

The Owner will provide the water required to fill the main initially and will pay for the water required to flush the main once. Filling and flushing shall be performed during period of low usage. Flushing water will be based on a maximum of 8 hours total. Any additional refilling or re-flushing to be at the Contractor's expense at the City of Lexington current commercial water rates.

Contractor will coordinate with the City of Lexington Utility Department prior to flushing.

- D. Shop Drawings – The Contractor shall submit sufficient data and information to allow an evaluation of "or equal materials". If required, samples with detailed technical data shall be furnished. Shop drawings for, but not limited to, water main, fire hydrants, valves and boxes, meters, meter pits, service lines, curb stops, curb boxes, corporation stops, couplings, shall be submitted.

**END OF SECTION**

## SECTION 33 3000

### SANITARY SEWERAGE UTILITIES

#### PART 1 – GENERAL

##### 1.1 SCOPE

- A. The work covered by this section of the specification consists of furnishing all plant, labor, equipment, appliances, and materials, and for performing all operations in connection with the construction of the sewers including appurtenant structures complete in accordance with this section of the specifications and the applicable drawings.

##### 1.2 GENERAL

- A. The Contractor shall remove paving, as may be required, excavate the trenches and pits to the required dimensions; excavate bell holes; construct and maintain all bridges for traffic control; sheet, brace and support the adjoining ground or structures where necessary; handle all drainage valves, hydrants and accessories; backfill and consolidate the trenches and pits; restore the roadway surface unless otherwise stipulated; supply required or remove surplus excavated material; and clean the site of the work.
- B. Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, complete and compatible installation shall be furnished and installed as part of this work. The drawings show sizes and general arrangements of all pipes and appurtenances. Responsibility for handling and/or cutting exact lengths of the various sizes of pipe for proper make-up rests with the Contractor.

#### PART 2 - PRODUCTS

##### 2.1 GRAVITY SEWERS

- A. The Contractor shall furnish the Owner with certified records of the tests required herein made by the manufacturer or by a reliable commercial laboratory.
  - 1. **POLYVINYL CHLORIDE (PVC) SDR 35 SEWER PIPE** - PVC sewer pipe shall conform to the requirements of ASTM Standard Specification Type PSM Polyvinyl Chloride (PVC), Designation D-3034 with a minimum dimension ratio of 35 (PS46) for pipe diameter 15 inches or less. Pipe diameters over 15 inches shall meet ASTM F-679 (T-1). Pipe shall be furnished in minimum 12.5 feet lengths, and shall not exceed 20 feet.

PVC sewer pipe shall be single rubber gasket joint. The gaskets shall conform to ASTM F-477.

#### PART 3 – EXECUTION

##### 3.1 CONSTRUCTION METHODS

- A. EXCAVATION, TRENCHING AND BACKFILLING – Sanitary sewers shall conform to the requirements of Section 31 2010, “Earth Moving”.

Borrow required to bring trench to original grade shall be supplied by the Contractor. The borrow shall be approved by the Engineer.

- B. PIPE INSTALLATION – PVC shall be installed in accordance with ASTM D2321 or with the manufacturer's recommendations and approval of the Engineer. Pipe installation shall be in Class B bedding unless otherwise specified. Pipe laying shall proceed upgrade so that the spigot ends point in the direction flow. All pipes shall be laid with ends abutting and true to line and grade. The pipe shall be matched so that when laid, they will form a sewer with a smooth, uniform invert. Sockets shall be carefully cleaned before pipes are lowered into trenches. All joints shall be watertight, root resistant, durable, and any leaks or defects discovered shall be immediately repaired. Any pipe which has been disturbed after being laid shall be taken up, the joints cleaned and the pipe properly relaid.

The Contractor shall include furnishing, placing and compacting granular pipe bedding as per the Detail. The granular material shall be as specified. Gravel bedding shall also be provided for service reconnections. Bedding for service reconnections shall be incidental to the Bid.

Gradation for gravel bedding (PVC) shall be the following:

<b>Total Percent Retained On</b>	<b>Minimum</b>	<b>Maximum</b>
1-inch sieve		0
No. 4 sieve	5	39
No. 10 sieve	69	100
No. 200 sieve	94	100

- C. PLUGGING OF PIPE DURING INSTALLATION – Each time pipe laying work is stopped; the sewer shall be closed with a suitable plug to exclude water, foreign material and other objects. If any water, mud or foreign material should enter the new sewer, or any existing sewer connected thereto, the Contractor shall remove same at his expense and he shall be liable for any damage that may result thereby. Mud, water, etc.; to be removed, shall be pumped out of the sewer and shall not be flushed down into another sewer line or municipal utility.
- D. DEWATERING IN PIPE INSTALLATION – The Contractor shall furnish all necessary equipment, labor and materials for pumping or otherwise removing any water that may enter or accumulate in the trenches or other excavations and keep them free from water until work is constructed and set for sufficient time so water will not damage the work in any way. Water shall not be allowed to flow through any sewer until joints are sufficiently set and the trench backfill is made to a point where pipe settlement will not occur. Also water shall not be allowed to flow through any sewer where the flooding of basements or other damage is possible.
- E. Temporary signs and permanent signs shall conform to the requirements of Section 417 of the Nebraska Department of Roads Standard Specifications. Sign posts shall conform to section 1071 of the Nebraska Department of Roads Standard Specifications.

### 3.2 SEWER APPURTENANCES

- A. SERVICE CONNECTIONS – Service connections shall be located as shown on the drawings. Connections shall be constructed in accordance with the Service Connection Detail.
- B. ANCHORAGE FOR PLUGS, CAPS, WYES, AND BENDS – Plugs, caps, wyes and bends for pressure sewers shall be provided with a reaction backing in accordance with the Standard Blocking Detail. Reverse concrete anchor and tie backs are acceptable. Blocking shall be placed between solid ground and the fitting to be anchored; the area of bearing on the pipe and on the ground, in blocking. Temporary wood blocking may be used as directed by the Engineer.

All forming for concrete thrust blocks and anchors will be done by bulkheading around the shape of thrust block or anchor with burlap or reinforced paper sacks which have been filled

with sand or earth, or other Engineer approved forming method. Filled sacks used to form concrete blocks will be left in place in the trench and backfill will be placed around and over them in the usual manner. Any bolt head or fitting must be left accessible when pouring concrete around them.

- C. RELATION OF WATER MAINS TO SEWERS – Public Sewers shall be separated from public water mains according to “Recommended Standards for Sewage Works”, by the Committee of the Great Lakes-Upper Mississippi River Board of State Sanitary Engineer, (10 State Standards). Horizontal separation shall be 10 feet (3.05 m) measured from edge to edge. Vertical separation where a sewer crosses a water main shall not be less than 18 inches (45.7 cm), clear.
- D. ADAPTOR COUPLINGS – All connections to existing sewer, new sewers, stubouts, dissimilar types of new and old pipes shall be by means of a properly sized neoprene adaptor. The adaptor shall be encased in concrete.

**END OF SECTION**

## SECTION 33 4000

### STORM DRAINAGE UTILITIES

#### PART 1 – GENERAL

##### 1.01 SCOPE OF WORK

- A. The work covered by this division of the specifications consists of furnishing all labor, plant, equipment, appliances, and materials and performing all operations necessary to construct and complete storm and appurtenances in accordance with these specifications, the applicable drawings, and subject to the terms and conditions of the contract.

#### PART 2 – PRODUCTS

##### 2.01 STORM SEWER MATERIALS

- A. REINFORCED CONCRETE PIPE - All reinforced concrete pipe shall meet the requirements and specifications of Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, ASTM C-76, Minimum class shall be Class III, and subsequent revisions, or as otherwise shown in the plans. All reinforced concrete pipe shall be bedded in Class "C" Bedding per detailed drawings.
- B. REINFORCED CONCRETE LOW-HEAD PRESSURE PIPE - All Reinforced Concrete Low-Head Pressure Pipe shall comply with ASTM C-361
- C. REINFORCED CONCRETE ARCH CULVERT - All Reinforced Concrete Arch Culvert shall comply with ASTM C-506
- D. REINFORCED CONCRETE ELLIPTICAL CULVERT - All Reinforced Concrete Elliptical Culvert shall comply with ASTM C-507.
- E. HIGH DENSITY POLYETHYLENE PIPE: High-Density Polyethylene (HDPE) meeting AASHTO M 252 Type S or M 294 Type S, double wall, corrugated exterior with smooth interior, water-tight. Pipe shall be ADS N-12 WT or approved equal. All HDPE pipe shall be bedded per the granular bedding detail on the drawings.
- F. CORRUGATED METAL PIPE (CMP) – Corrugated metal pipe shall meet Section 1035 – Corrugated Metal Pipe from Nebraska Department of Transportation (NDOT) Standard Specifications, 2007 Edition.
  - 1) Flared End Sections shall meet Section 1036 from NDOT Standard Specifications.
  - 2) Flap Gates shall meet Section 1043 from NDOT Standard Specifications.
- G. POLYVINYL CHLORIDE (PVC) SDR 35 – PVC roof drain pipe shall conform to the requirements of ASTM Standard Specification Type PSM (Polyvinyl Chloride (PVC), Designation D-3034 with a minimum dimension ratio of 35 for pipe diameter 15 inches or less. Pipe shall be furnished in minimum 12.5 feet lengths, and shall not exceed 20 feet. All fittings shall be PVC SDR 35 solvent weld, compatible with pipe.
- H. STORM SEWER INLET FRAMES AND GRATES - The frames and grates shall be of cast iron with tensile strength test not less than Class 25.

- I. GRADE RINGS - Lay grade rings in mortar or preformed gasket material with sides plumb and top level. Seal joints with mortar and smooth interior with mortar. Extensions shall be watertight.
- J. MANHOLE RINGS AND COVER - Install frame and cover on top of manhole to positively prevent all infiltration or surfaces or groundwater into manhole. The frame shall be set in a bed of mortar with the mortar carried over the flange of the frame. Set frame so top of cover is flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed.
- K. GROUT - Standard premixed mortar conforming to ASTM C-387 or proportion 1 part Portland cement to 2 parts clean, well-graded sand that will pass a 1/8-inch screen. Mortar mixed for longer than 30 minutes shall not be used.
- L. CONCRETE - All concrete shall conform to the requirements of the Nebraska Department of Transportation Type 47B-3500.
- M. REINFORCING STEEL - All steel shall be thoroughly cleaned of oil, mill scale, rust, and dirt before it is tied in place, and shall be re-cleaned if necessary prior to placement of concrete. All steel shall be accurately positioned and securely tied with suitable wire, or clips at intersections, and shall be adequately supported by concrete or metal chairs, spacers, hangers, etc., to prevent movement during placement of the concrete.

Bars used shall be parallel to the centerline and surface of the slab or walls. Tolerance of this placement shall be plus or minus ¼ inch both horizontally and vertically.

The Contractor will be required to furnish suitable metal supports of a type and design approved by the Architect or his authorized representative for all steel reinforcing bars and for all dowel bars. No direct payment will be made for such work but will be considered as subsidiary work and the cost thereof included in the unit price for the Bid items for which payment is made.

The bars nearest and parallel to the forms shall be placed such that the minimum distance between the face of the bars and the forms shall be 2 inches.

At splices, bars shall be lapped at least 24 diameters or as shown in details and in all cases the lap shall be sufficient to transfer the stress between bars by bond and shear and to develop the full strength of each bar. Supports and ties shall be placed such that they will not be exposed or discolor the finished concrete.

In the event any steel moves or is displaced during placement of concrete, the steel shall be restored to its proper position before it is completely covered.

- N. REINFORCING BARS - Reinforcing steel bars shall meet the applicable requirements and conform to ASTM A-615, Grade 40, Deformed Bars.
- O. JOINT MATERIALS - All reinforced concrete pipe joints used in storm sewer applications shall be sealed with bituminous joint filler in accordance to manufactures specifications. Unless otherwise specified on the plans. Joints for pre-cast concrete structures shall comply with ASTM C-443
- P. BITUMINOUS JOINT FILLER - Plastic bituminous compound shall be homogeneous plastic bituminous paste; such as, "Tufflex", "Platico", or an approved equal. Joint material shall not be heated when placed. Sufficient amount of jointing compound shall be spread around bell of

pipe to allow complete filling of annular space between pipes when pulled into place. All joints shall be pointed and smoothed from inside pipe.

- Q. GASKET TYPE JOINTS - When gasket type joints are required, they shall conform to ASTM C443, Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets and subsequent revisions.
- R. LIFT HOLE - Lifting holes in concrete pipe sections, if approved by the Architect or his authorized representative, shall be securely plugged using a rubber "Syntex Lift Hole Plug", or equal. Plug to be of long lasting rubber, designed to be pounded into the lift hole without damage to the concrete pipe. Plug to fit snugly inside the hole, and provide a watertight seal. Grouting of lifting holes will only be permitted after review by the Architect or his authorized representative of materials, methods and protections of grouted plug as proposed by the Contractor.
- S. DRAIN BASINS – Drain basins shall be Nyloplast Drain Basin with 18" round ductile iron grates, unless otherwise noted on drawings. Basins and grates shall be rated for vehicular traffic loading.

### **PART 3 – EXECUTION**

#### **3.01 CONSTRUCTION METHODS**

- A. PROTECTION OF EXISTING UTILITIES - The accuracy of location of existing underground utilities as shown on the plans is not guaranteed. It shall be the duty of the Contractor to locate these utilities in advance of excavation and to protect them from damage after uncovering. No house service lines are shown on the plans. The Contractor shall contact the owners of the utilities for assistance in locating these service lines. Any expense incurred by reason of damaged or broken lines shall be the responsibility of the Contractor.
- B. STRUCTURE SUBGRADE PREPARATION - Sewer trenches shall be kept free from water by a method approved by the Architect or his authorized representative. The Contractor shall not pump waste water into a street or pump to a storm sewer unless approved in writing from the Architect. Reinforced concrete pipe shall be placed on a minimum 6" prepared subgrade and in accordance to the manufacturer's installation instructions.
- C. PIPE LAYING AND JOINTING - Pipe shall be protected at all times against impact shocks and free fall. Laying of pipe in finished trenches shall be commenced at the lowest point with the spigot ends on bell-and-spigot pipe and tongue ends on tongue-and-groove pipe pointing in the direction of the flow.

Provide drainage pipe of the size, and class indicated and install at the locations and elevations indicated on the contract drawings.

Pipe installation shall be in accordance with the pipe manufacturer's written installation instructions and with the applicable provisions or requirements of the following referenced handbooks and standard specifications:

Reinforced Concrete Pipe: American Concrete Pipe Association "Concrete Pipe Installation Manual".

Corrugated Steel Pipe: "Handbook of Steel Drainage & Highway Construction Products".

Pipe shall be laid on a smoothly-graded, prepared subgrade soil foundation true to alignment and grade as indicated on the contract drawings. Bell holes shall be hand-excavated so that the bottom of the pipe is in continuous contact with the surface of the prepared subgrade material.

Pipe laying shall proceed upstream with the spigot ends pointing in the direction of flow. Pipe shall not be laid in standing water or when trench or weather conditions are deemed unsuitable by the Architect or his authorized representative of representative thereof.

Approved backfill material shall be spaded and compacted into the "haunch" area under each side of the pipe so that all void spaces underneath the pipe are filled with compacted backfill material.

Approved backfill material shall be placed in the trench along the side of the pipe and compacted mechanically by hand up to the top of the pipe. Approved backfill material shall be placed and compacted a minimum of 12" above the top of the pipe.

- D. PLACEMENT OF PIPE - Pipe lines or runs intended to be straight shall be so laid. Deflections from a straight line or grade, made necessary by vertical curves or horizontal curves or offsets, shall not exceed the amount of deflection recommended by the pipe manufacturer.

If the specified or required alignment required deflections in excess of those stipulated above, the Contractor shall provide either special bends as approved by the Architect or his authorized representative, or pipes in shorter lengths; in such length and number, that the angular deflections at any joint, as represented by the specified maximum deflections, are not exceeded.

As each length of pipe is placed in the trench, the spigot end shall be centered in the bell and the pipe forced into place with a slow steady pressure without jerky or jolting movements and brought to correct line and grade. The pipe shall be secured into place with approved compacted backfill material. Precautions shall be taken to prevent dirt from entering the joint space.

- E. CUTTING PIPE - The cutting of pipe for fittings and closure pieces shall be done in a neat and workmanlike manner without damage to the pipe leaving a smooth end at right angles to the horizontal axis of the pipe. The cutting method used shall be approved by the Architect or his authorized representative prior to any cuts.

All pipe shall be carefully lowered into the trench piece-by-piece by means of a derrick, ropes or other suitable tools or equipment, in such a manner as to prevent damage. Under no circumstances shall pipe materials be dropped or dumped in the trench.

- F. PIPE BEDDING - The type of bedding used shall be as noted on the drawings and shall conform to the requirements of Section 31 20 00, "Excavation, Trenching, Bedding, and Backfilling."

- G. HORIZONTAL AND VERTICAL PIPE SEPARATION - Storm sewers shall be laid at least 10 feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge. Storm sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches (460 mm) between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the storm sewer. The crossing shall be arranged so that the storm sewer joints will be equidistant and as far as



possible from the water main joints. Where a water main crosses under a storm sewer, adequate structural support shall be provided for the sewer to maintain line and grade.

- H. **MANHOLES** - Manholes shall be constructed as indicated on the plans. Tops shall be fitted with cast iron rings and covers weighing approximately 450 pounds and satisfactory to the Architect. Manholes over three (3) feet in depth shall be equipped with cast iron steps placed on approximately sixteen (16) inch centers. Drop inlet manholes shall be constructed where indicated on the plans. Manholes of Precast sections conforming to ASTM C-478 specifications may be used. Proper grade rings shall be used to achieve final planned grade. Precast concrete sections for manholes shall be installed with bituminous joint filler.
- I. **STORM SEWER INLETS** - Storm sewer inlets shall be of the type as shown on the plans and constructed as per the detailed drawings. Construction of inlets shall conform to all methods of forming, and concrete placement outlined in these specifications.
- J. **EXCAVATION TRENCHING, BEDDING AND BACKFILLING** - Storm sewer excavation, trenching and backfilling shall conform to the requirements of Section 31 2000, "Earthwork."
- K. **FLOWABLE BACKFILL** - All excavations requiring flowable backfill as indicated on the plans shall be backfilled using nonshrinkable flowable backfill. The backfill shall be filled to the sub-grade of the undisturbed sidewalk, curb, gutter, paving, or earth surface. The flowable backfill shall be an approved mixture which flows easily around the utility being covered and develops a 28 day compressive strength of from 30 to 200 psi. Flowable backfill mix designs shall not be used without the approval of the Architect or his authorized representative.
- L. **EXPOSURE OF SANITARY PIPE OR MANHOLES** - The Contractor shall conduct the work at all times in such a manner as will insure no disruption to the normal function of the sanitary sewer collection system. Particular attention shall be paid to the threat of introduction of storm water or other waters to the piping and manholes of the collection system. The Contractor shall take whatever precautions are necessary, such as, but not limited to, installation of plugs in exposed pipes and manholes when work is not in progress or when leaving the work site. The Contractor will be held responsible for damages which may occur to either the collection system or to private property through introduction of storm water or other waters to exposed piping or manholes relating to the construction work.

### **3.02 DRAINAGE STRUCTURE CONSTRUCTION**

- A. **CONCRETE WORK** - The construction of forms, mixing, placing, finishing, and curing of concrete work, as well as the fabrication, placement, protection, and cleaning of reinforcement, shall conform to the applicable parts of this Section, and the Nebraska Department of Transportation Type 47B-4000.
- B. **FORM WORK** - Form materials when required shall be wood, metal or other suitable material that is straight and free from warp having sufficient strength to resist the pressures generated by the plastic concrete pouring processes without displacement. Trench wall may be used in place of forms, provided the finished wall thickness does not exceed twice the plan thickness. Form work shall be built to conform to the shape, lines, and dimensions of the concrete work and shall be set true to line and grade. Forms shall be braced and tied in a manner that will withstand the pressure created by fresh concrete and will not move, bulge, sag, or leak concrete. Surfaces shall be smooth. Lumber used once in forms shall have nails removed before reusing as formwork. Forms shall be clean and thoroughly oiled with a non-straining mineral oil before placing concrete. Temporary openings shall be provided at the bottom of the forms to facilitate cleaning and inspection. All exposed concrete edges shall be provided with

three fourths of an inch ( $\frac{3}{4}$ " ) chamfer unless another size of chamfer is shown on the plans. Chamfer strips shall be adequately secured to the forms.

- C. FORM REMOVAL – Forms shall not be removed until the member supported thereby has acquired sufficient strength to safely support its own weight, and the load imposed on it. Forms must remain in-place for a minimum of 24 hours unless otherwise approved by the Architect or his authorized representative. Special care shall be taken to not damage structure while stripping forms. Required backfilling shall begin a minimum of 7 days after concrete placement, after the concrete has sufficient strength.
- D. CONCRETE PLACEMENT - The Architect or his authorized representative must inspect the depth and character of the foundations, the formwork, and the placing of reinforcing steel and inserts before the concrete is placed. Unacceptable conditions shall be corrected before concrete is placed in the forms.

All water and debris shall be removed from the forms and excavations. Flowing water shall be diverted into side drains or sumps. Concrete shall be placed on clean, damp surfaces and shall not be placed on mud or on dry, porous earth.

Concrete shall be mixed and placed only when the temperature is at least forty degrees Fahrenheit (40°F) and rising.

Concrete shall be carried from the mixer to the forms in bottom dump concrete buckets, concrete buggies, or wheelbarrows, and shall be deposited as close as practical to its final position in the forms. Place in continuous horizontal layers, approximately twelve inches (12") thick, in order that it can be effectively consolidated with a minimum of lateral movement. Place each batch and each layer immediately following the preceding so that there will be no "cold joints" in the work, yet regulated in such a manner that the design pressure of the form work will not be exceeded. Work concrete into corners and around reinforcement and embedded items, with spades, in a manner that will fill all voids and prevent honeycombing and segregation of coarse aggregate.

Concrete shall not be allowed to drop freely more than five feet (5'). When the vertical distance for placement exceeds five feet (5'), the concrete shall be placed with a tremic.

Concrete shall be consolidated with mechanical, internal vibrating equipment supplemented with hand spading and tamping. Vibrators shall not be used for transporting concrete within the forms. Vibrating equipment shall maintain an impulse rate of not less than six thousand (6,000) impulses per minute when submerged in the concrete. At least one (1) spare vibrator, in good operating condition, shall be maintained on the job site as a relief. Vibrators shall be moved continuously from point to point the duration of vibration at any point being limited to that time necessary to consolidate the concrete without causing objectionable segregation. Apply vibrator at points spaced not farther apart than vibrator's effective radius and close enough to forms to vibrate surface effectively but not come in contact with form surfaces. Vibrator must penetrate fresh placed concrete and into previous layer of fresh concrete below.

Thin section work shall be thoroughly worked with a steel rod. Small diameter holes shall be drilled in form work beneath large wall sleeves and other inserts to prevent entrapment of air beneath the inserts.

Immediately remove any water that accumulates during placement of the concrete.

Top surfaces not covered shall be protected from rain and all other injurious conditions. Formwork and exposed reinforcing steel must not be jarred after concrete has taken its initial set.

Concrete found to be porous plastered, of less strength than specified, or otherwise defective, shall be removed and replaced in whole or in part, or repaired as directed by the Architect or his authorized representative, at no additional expense to the Owner.

E. FINISHING - Floor Slabs and Tops of Walls:

- Screed surface to true level planes.
- After initial water has been absorbed, float with wood float and trowel with steel trowel to smooth finish free from trowel marks.
- Do not absorb wet spots with neat cement.

Unexposed Slab Surfaces: Screed to true surface, bull float with wood float, and wood trowel to seal surface.

After removal of the forms, patch all rock pockets, form tie holes and irregularities with a stiff mixture of Portland cement and sand mixed in accordance with these specifications. Steel trowel all slabs and tops of walls. Finish exposed walls to produce a uniform, flat surface.

F. CONSTRUCTION JOINTS - Locate as shown or as approved.

G. PROTECTION AND CURING - Protect fresh concrete from direct rays of sunlight, drying winds, and wash by rain. Protect new surfaces and appurtenances from traffic for minimum of 14 days. Erect and maintain warning signs, lights and watchmen to direct traffic. Concrete shall be cured for at least 3 days after placement to protect it against loss of moisture, rapid temperature change, and mechanical injury.

Cure formed surfaces with curing compound applied in accordance with manufacturer's directions as soon as forms are removed and finishing is completed. Cure exposed surfaces within time frame provided by the manufacturer's directions.

Remove and replace concrete damaged by freezing.

H. WATERPROOFING – Waterproofing materials of the paint and/or membrane types shall be applied to concrete structures at the locations shown on the plans. Waterproofing paint and its application shall be shown on the plans or as specified by the manufacture.

I. CLEANING - Prior to laying pipe, placement of concrete, and installation of structure lids the interior of each pipe section and inlet/manhole structure shall be cleaned of all soil and debris. After laying and backfilling, all pipe interiors shall be free of all foreign material such as soil, cement mortar, joint compounds, etc. If large amounts of material have accumulated, the Architect may require flushing of the pipe. If flushing is required, any outlets into existing lines will be blocked so that no foreign material can be collected and disposed of in accordance to the National Pollution Discharge Elimination System requirements.

Insure all cleanup work is completed in a condition acceptable under these specifications. In case the cleanup work has not been done within the specified time, the Contractor will not begin any new work until the said delayed cleanup work has been done.

### 3.03 QUALITY ASSURANCE

- A. TESTING - Upon completion of sewer, each pipe line and manhole will be tested as specified by the Architect or his authorized representative. The Contractor shall furnish such tools, hose, and other equipment necessary for making such tests and shall be present during the inspection to note any deficiencies that may exist. Before final acceptance, all sewers shall be clean, shall comply with the specifications and all contract documents, and shall be acceptable to the Architect and municipal authorities.
- B. INSPECTION OF PIPE - Upon arrival at the job site, each section of pipe shall be inspected for compliance with the applicable piping materials product requirements. Any section of pipe found to be defective shall be immediately removed from the job site and shall be replaced.

Immediately prior to laying, each pipe section shall be visually inspected for defects or damage. Any damaged or defective pipe shall not be used.

Pipe roundness shall not vary from a true circle by more than 5% of the pipe's normal diameter and deviation from straight line parallel to pipe length shall not exceed 1/16" per linear foot measured on the concave side. Allowable deviation from vertical grade shown on the drawings shall be no more than 1/2" below or above the true grade line. In addition, vertical sags and crowns in the pipe joint shall be no more than 1/2" across any 16 feet of pipe length. Horizontal alignment between manholes shall be in accordance with the true line as shown on the drawings and shall not vary more than 1/2" across any single joint of pipe. Any sections of pipe found to be defective, damaged, or in poor alignment shall be taken up and re-laid or replaced at the Contractor's expense.

Storm sewer lines normally need not be tested, but if in the opinion of the Architect or his authorized representative, the workmanship and material do not appear to be satisfactory, the Architect or his authorized representative may require that the section be tested according ASTM C-828 standards, "Recommended Practice for Low-pressure Air Testing of Installed Sewer Pipe". If the line fails to meet the requirements of the test, the Contractor shall determine the source or sources of leakage and shall make repairs as necessary at no additional cost to the Owner. The pipe installation shall be retested after making repairs to verify that it meets the requirements of the test.

- C. EVALUATION OF BACKFILL - Trench backfill and compaction testing shall conform to the requirements of Section 31 2 00, "Earthwork."

All failing tests will be paid by the contractor. All testing will be done in accordance with the Excavation, Trenching, and Backfill section of these specifications.

### **3.04 ACCEPTANCE**

- A. ACCEPTANCE - Upon completion of a job, all debris and surplus materials shall be removed from the job by the Contractor. The Architect shall be notified, and shall make an inspection of the work.

### **3.05 SUBMITTALS**

- A. SUBMITTALS:
- Shop Drawings
  - Curing compound data

- Complete data on the concrete mix, including aggregate gradations and admixtures, in accordance with ASTM C-94.
- Manufacturer's application instructions for proprietary materials including pipe, joint material, concrete mixes, reinforcing details.
- Ready-mix delivery tickets for each truck in accordance with ASTM C-94.
- Material properties of the Reinforced Concrete Pipe.
- Sieve analysis and density curves for soils encountered.
- Laboratory tests and evaluation reports must also be submitted.
- Architect requested information.

**END OF SECTION 33 4000**