



State of Utah

JON M. HUNTSMAN, JR.  
Governor

GARY R. HERBERT  
Lieutenant Governor

Department of Administrative Services

KIMBERLY K. HOOD  
Executive Director

Division of Facilities Construction and Management

GREGG BUXTON  
Director

## ADDENDUM #4

Date: March 14, 2008

To: Contractors

From: S'ean Crawford, Project Manager, DFCM

Reference: Utah Department of Transportation  
New Panguitch Maintenance Station

DFCM Project No. 07010900

Subject: **Addendum No. 4**

Pages	Addendum	10	pages
	Revised Bid Form	2	pages
	Specification Section 03052	5	pages
	Specification Section 03300	12	pages
	Specification Section 07412	5	pages
	Specification Section 10425	5	pages
	Specification Section 13125	26	pages
	Specification Section 15491	3	pages
	<b>Total 8.5 x 11 pages</b>	<b>68</b>	<b>pages</b>
Large Format	<b>Complete Drawing Set</b>	<b>62</b>	<b>pages</b>

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**Note:** *This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.*

**4.1 SCHEDULE CHANGES:** There are no schedule change per this addendum, the Revised Project Schedule dated March 12, 2008 is current.

**4.2 REVISED DRAWINGS:** The complete drawing set has been revised, due to delays, the drawings and specifications were not released with Addendum #2, as indicated on the drawings and spec sections. The Addendum #2 drawings and specifications are being issued with addendum #4 and will be considered part of the contract in entirety.

**4.3 QUESTIONS RECEIVED:** Contractor Questions and Agency comments have been addressed and included in the revision of the Construction Documents.

**4.4 PRODUCT APPROVALS:**

Listed products and manufactures are approved for bidding. This approval does not relieve the supplier, bidder or manufacture from satisfying the intent of the contract documents including addenda in every aspect. Failure to conform to the design quality may result in later disapproval. If any product is disapproved after bidding, the product supplier shall supply specified equipment at no extra cost to the owner. Items listed are approved in general and specific details of performance, ratings, model number, etc. are required as part of the shop drawing process and shall be as submitted.

- 4.4.1 Spec. Section 10100: Marker Boards:
  - a. Visual Display Boards: AARCO
  - b. Visual Display Boards: Newline
  
- 4.4.2 Metal Building Manufacturers:
  - c. Frontier Steel Buildings
  
- 4.4.3 Mechanical Equipment:
  - a. Furnace: York
  - b. Condensing Unit: York
  - c. Louvers: Cesco, Greenheck, American Warming
  - d. Motorized Control Dampers: Cesco, Greenheck
  - e. Manual Volume Dampers: Air-Rite, Greenheck
  - f. Flexible Duct: Thermaflex
  - g. Backdraft Dampers: Greenheck
  - h. Ceiling Mounted Ventilators: Greenheck, ACME
  - i. Propeller Fans: Greenheck
  - j. Grilles, Registers & Diffusers: Titus
  - k. Gravity Roof Hoods: Air-Rite Manufacturing
  - l. Gas Fired Radiant Heaters: AmiRad, Solaronics
  - m. Exhaust Fans: Soler & Palau
  
- 4.4.4 Plumbing Equipment:
  - a. Flush Valve: Delany, Moen
  - b. Faucets: Moen
  - c. Emergency Eyewash: Acorn Safety
  - d. Mixing Valve: Acorn Safety
  - e. Stops and supplies: EBC, McGuire
  - f. Grid drain/P-trap: EBC, McGuire
  - g. Insulation Kit: EBC
  - h. Plumbing products: Briggs/Sayco, Josam
  
- 4.4.5 Lighting Equipment:
  - a. Light fixtures: Lithonia, LSI, H.E. Williams
  - b. Light Control: PCI
  - c. Emergency Lighting: Exitronix
  - d. Occupancy Sensors: Novitas

#### **4.5 DESCRIPTION OF GENERAL ADDENDUM ITEMS:**

**4.5.1** Add alternate #5 – Motorized Gate – Sheet AE706 – has been changed to sheet AE700 to be included with the base bid.

**4.5.2** The building will be reoriented by mirroring the building along grid 3 on the site plan. The entry and exit of utilities will be modified accordingly. See the Addendum 2 Civil drawing(s) for additional information. The four outside building corner locations remain unchanged. All drawings for all disciplines have been revised showing new building orientation.

**4.5.3** Contractor to allow \$10,000.00 lump sum for bedrock blasting for footings, with the unused amount to be credited back to the State at the conclusion of foundation work.

**4.5.4** No Metal Building Manufacturer will be allowed to incorporate mezzanine framing with Metal Building Structure.

**4.5.5** Specification Sections: The following Specification Sections have been updated and are re-issued as per this Addendum. Sections 03300, 10425, 13125 and 15491 modify the previously provided section. Sections 03052 and 07412 are included as contractor's options only, use of these systems is in lieu of the sections or materials they replace as defined within the new specification section.

- 03052-Concrete Waterproofing System – Addendum #4
- 03300-Cast in Place Concrete – Addendum #4
  - Updated Paragraph 2.5.C.3 to coordinate with the structural drawing S001 requirements of 4500 psi concrete with a maximum 0.45 water/cement ratio.
- 07412-Metal Wall Sandwich Panels – Addendum #4
- 13125-Metal Building Systems – Addendum #4
  - Added the request for 55% Al-Zn (Galvalume) roof panels
  - Changed the wall panel paint system to silicone polyester
  - Clarified the application of the collateral load
- 10425-Signs – Addendum #4
  - Coordinated Signage required with Lubrication Equipment Specification
- 15491-Lubrication Equipment – Addendum #4
  - Revised Section 2.1.A
  - Revised Section 2.2.A.2 to coordinate Lubrication Equipment required with Signage Specifications.
  - Added Section 3.1.E to label all hose lines

**4.5.6** Contractor to provide and install conduit and pull boxes for phone system. Wiring and installation will be provided by State ITS department.

#### **4.6 CIVIL ADDENDUM ITEMS:**

##### **4.6.1 C100:**

- a. Moved sander rack to new location.
- b. Moved Salt Pond location to be 40 foot minimum from sander rack.
- c. Removed “Gravel Paving” area hatching and references.
- d. Moved Salt Storage Building to be 5 feet from north edge of asphalt.
- e. Added asphalt hatch underneath Mixing Area.
- f. Removed “Alt. #5” from slide gate references.
- g. Replaced “Card Reader” call out to read “Key Pad Only Req’d”
- h. Changed “Frost Freeze Hydrant” call out to read “Hydrant Req’d (See Mechanical Plans)”

- i. Added “Van Accessible Sign” call out as per I.B.C. Plan Correction Sheet dated February 6, 2008 – Item #7.
- j. Removed “SMH Req’d” call outs.
- k. Labeled new Transformer and Condenser Unit locations.
- l. Labeled fire hydrant (located next to employee parking) “to be done by others”

**4.6.2 C200:**

- a. Moved sander rack to new location.
- b. Moved Salt Pond location to be 40 foot minimum from sander rack.
- c. Removed “Gravel Paving” area hatching and references.
- d. Moved Salt Storage Building to be 5 feet from north edge of asphalt.
- e. Added asphalt hatch underneath Mixing Area.
- f. Removed “Alt. #5” from slide gate references.
- g. Replaced “Card Reader” call out to read “Key Pad Only Req’d”
- h. Changed “Frost Freeze Hydrant” call out to read “Hydrant Req’d (See Mechanical Plans)”
- i. Removed “SMH Req’d” call outs.
- j. Labeled new Transformer and Condenser Unit locations.
- k. Labeled fire hydrant (located next to employee parking) “to be done by others”.
- l. Added Key Notes showing utilities to stub 5 feet from building and utility continuation to be done by others.
- m. Removed off-site utilities.
- n. Labeled new water meter size and location.

**4.6.3 C300:**

- a. Moved sander rack to new location.
- b. Moved Salt Pond location to be 40 foot minimum from sander rack.
- c. Moved Salt Storage Building to be 5 feet from north edge of asphalt.
- d. Updated proposed contours do to the new location of the Salt Pond, the new location of the valley line along the north side of the Salt Storage Building, and the new location of the ADA Van Accessible parking stall.
- e. Added Earthwork cut/fill quantities

**4.6.4 C401:**

- a. Moved sander rack to new location.
- b. Moved Salt Pond location to be 40 foot minimum from sander rack.
- c. Moved Salt Storage Building to be 5 feet from north edge of asphalt.
- d. Updated proposed contours do to the new location of the Salt Pond, the new location of the valley line along the north side of the Salt Storage Building, and the new location of the ADA Van Accessible parking stall.

**4.6.5 C600:**

- a. Removed Frost Free Hydrant Detail-F.
- b. Added “Van Accessible Sign” detail to Detail-H as per I.B.C. Plan Correction Sheet dated February 6, 2008 – Item #7.

## **4.7 ARCHITECTURAL ADDENDUM ITEMS:**

### **4.7.1 G000:**

- a. Revised Code Analysis; fire sprinklers are not a part of this project.
- b. Add General Note #3.

### **4.7.2 AE101:**

- a. Revised Mezzanine Mech/Elect. Layout.
- b. Added 5<sup>th</sup> lube barrel, hose reel & signage.
- c. Deleted lockers & concrete pad @ storage room wall.
- d. Revised Training room layout, relocate refrigerator & marker board.
- e. Show owner furnished gas stove & vent hood.

### **4.7.3 AE121:**

- a. Added 5<sup>th</sup> lube barrel, hose reel & signage.
- b. Delete 2 suspended light fixtures at Grids 5G & 5A.

### **4.7.4 AE141:**

- a. Add second row of snow guard system at each side of roof.
- b. Add Heat tape in “Zig-Zag pattern” at each roof edge.

### **4.7.5 AE201:**

- a. Revised Exterior Color Schedule as shown
- b. Decrease size of fascia panel at oil pit canopy.
- c. Add second line of standing seam metal roof 2 pipe Snowguard system @ each side of roof ridge.

### **4.7.6 AE202:**

- a. Revised Exterior Color Schedule as shown.
- b. Decrease size of fascia panel at oil pit canopy.
- c. Add Heat tape in “Zig-Zag pattern” at each roof edge.
- d. Add second line of standing seam metal roof 2 pipe Snowguard system @ each side of roof ridge.

### **4.7.7 AE301:**

- a. Added 5<sup>th</sup> lube barrel, hose reel & signage.
- b. Deleted lockers & concrete pad @ storage room wall.
- c. Deleted suspended light fixture above work bench.
- d. Added wall mounted light fixtures above work bench.

### **4.7.8 AE311:**

- a. Show structural Mezz. framing at A2/AE311.

### **4.7.9 AE401:**

- a. Deleted lockers & concrete pad @ storage room wall.
- b. Increase Grab Bar dim. to 24”.
- c. Revise detail A2/AE401

### **4.7.10 E402:**

- a. Added 5<sup>th</sup> lube barrel, hose reel & signage.
- b. Deleted suspended light fixture above work bench.
- c. Revised interior elevation D3/AE402 to show owner furnished gas stove & vent hood.

- 4.7.11 AE403 –**
- a. Revise Stair details to show weld symbols.
  - b. Add Detail B5/AE403 to show fixed railing condition.
  - c. Indicate removable section of landing at guardrail condition.
- 4.7.12 E501 –**
- a. Revise Wall Types “H” & “K” to be Type “X” gypsum board.
- 4.7.13 AE502 -**
- a. Show wall mounted light fixture above workbench.  
Provide 6” curb at locker condition to allow for flush installation of lockers.
  - a. Add additional “ATF” signage
- 4.7.14 AE503 -**
- a. Include Snowguard fence system in detail A4/AE503.
- 4.7.15 AE601 –**
- a. Revised door schedule to show door frame widths.
  - b. Revised plywood attachment at column conditions.
- 4.7.16 AE602 -**
- a. Revised Room finish legend as shown.
  - b. Revised Room finish schedule as shown.
- 4.7.17 AE700 -**
- a. Delete card reader requirement from gate control.
- 4.7.18 AE 701 – Add Alt. #1:**
- a. Delete 2 bays from Sander Rack.
  - b. Delete 2 light fixtures from back of Sander Rack.
  - c. Added Welded “D” rings to each beam.
  - d. Added Galvanized Chains @ each bay.
- 4.7.19 AE 702 – Add Alt. #2**
- a. Delete 2 concrete bollards.
  - b. Revised fire hose connection.
- 4.7.20 AE 703 – Add Alt. #3**
- a. Delete exterior light fixtures from north sided of Salt Storage Building.
  - b. Revise Fascia panel height at West & East side to be straight @ EL. 118’-0”.
  - c. Louver & light fixtures to be pre finished Kynar 500 “Bone White” or equal.
- 4.7.21 AE 704 – Add Alt. #3**
- a. Revise Fascia panel height at West & East side to be straight @ EL. 118’-0”.
- 4.7.22 AE 705 – Add Alt. #4**
- a. Delete all downspouts & rain gutters from Open Storage Building only. Delete Heat tape requirements from Open Storage Building only.
  - b. Revise Exterior Color Schedule as shown, all exterior fixtures to be pre finished: Kynar 500 “Bone White” or equal.
  - c. Delete light fixtures from back of Open Storage Building.
  - d. Delete wall pack light fixtures from front of building.
  - e. Relocate Flood lights at front of building to locations as shown.

#### **4.8 STRUCTURAL ADDENDUM ITEMS:**

##### **4.8.1 S001 -**

- a. Updated Basis of Design to clarify loading requirements to include the site elements.
- b. Updated Concrete section to coordinate the Salt Storage building concrete requirements with specification 03300 Cast in Place Concrete.
- c. Updated Epoxy section for approved epoxies with current ICC report.
- d. Updated Special Inspection section for added clarification regarding approved fabricators and to add special inspection requirements for the metal stud framing

##### **4.8.2 S101 -**

- a. Update housekeeping pad Thickness to be 6”.
- b. Deleted housekeeping pad at about Grid C/1.75
- c. Updated control joint layout

##### **4.8.3 S102 -**

- a. Updated control joint layout in Open Storage Building.
- b. Deleted 2 bays from Sander Rack.
- c. Updated Wash rack to show columns on the inside of the beams rather than outside

##### **4.8.4 S201 -**

- a. Updated Details C1, C4, and C5 to show columns on the inside of beams.
- b. Updated Detail A2 to show the column attachment to the baseplate.

##### **4.8.5 S501 -**

- a. Updated Details A1, A5, and B4 to better show the relationship of the metal wall panel by the Pre-manufactured metal building supplier and the concrete foundation wall.
- b. Updated Detail A3 to change the housekeeping pad thickness to 6”.
- c. Added the slope marks to detail B4 “At opening in Wall” to emphasize the change in slope occurring in the slabs at the roll-up door locations.

##### **4.8.6 S502 -**

- a. Updated Detail A5 to better show the relationship of the metal wall panel by the Pre-manufactured metal building supplier and the concrete foundation wall.
- b. Updated Details B3 and B4 so show the closure angle attachment to the metal stud wall.
- c. Updated Detail C1 to clarify the minimum fill requirements under the footings.

#### **4.9 MECHANICAL ADDENDUM ITEMS:**

##### **4.9.1 M001 -**

- a. Revised schedules to require white finish on louvers.

##### **4.9.2 M201 -**

- a. Relocated Radiant Tube Heaters for lights.

##### **4.9.3 M601 -**

- a. Revised Detail 7 adding drain pan and housekeeping pad.

#### **4.10 PLUMBING ADDENDUM ITEMS:**

##### **4.10.1 P001 -**

- a. Added Gas Pipe Line Schematic.
- b. Added Utility Schedule and Cold Water Supply Requirements.
- c. Added Hose Hydrants to Plumbing Fixture Schedule.
- d. Revised Specification on Water Cooler on the Plumbing Fixture Schedule.

##### **4.10.2 P201 -**

- a. Added Key Note 25 regarding Radiant Tube Heater condensate and piping.
- b. Removed future gas piping.
- c. Added Key Note 26 regarding gas piping to Open Storage Building.
- d. Added Key Note 27 regarding double check valve for water piping to Wash Rack.
- e. Relocated vent lines for grease interceptor.
- f. Removed box note referencing civil drawings.

##### **4.10.3 P301 -**

- a. Added Wash Rack Plan.
- b. Added Hose Hydrants and stop & waste valve at Wash rack.
- c. Relocated water heaters.
- d. Added gas line to gas range in training room.
- e. Added Key Note 18, regarding water pressure regulating station.

##### **4.10.4 P601 -**

- a. Revised Detail 2, added Seismic Valve detail.

##### **4.10.5 P602 -**

- a. Revised Detail 1, adding first pour concrete for trench drain installation.
- b. Revised Detail 6 combining water heater detail and water pressure regulating detail.
- c. Added Detail 7, Stop & Drain Valve.
- d. Added Detail 8, Seismic restraint of piping systems

#### **4.11 ELECTRICAL ADDENDUM ITEMS:**

- 4.11.1** Revise Specification "SECTION 16129 ELECTRICAL HEAT-TRACING SYSTEM" as indicated.

##### **PART 2 PRODUCTS**

###### **2.1 HEATING CABLE**

###### **A - Manufacturers**

- 1 Raychem – change model number to GM-1XT
- 2 Thermon – change model number to RGS-1
- 3 Easyheat - change model number to SR51J
- 4 Chromalox - change model number to SRF5-1RG

###### **2.2 CONTROLLER**

**C - Power:** 120 VAC with contact ampere rating as required for the length of cable powered. Provide a 30-mA trip ground-fault circuit breaker to feed each cable run.

**4.11.2 All Electrical Sheets** – The possibility of a future back-up generator created the need to move all essential loads to a panel that would be backed up by the generator upon loss of power. This resulted in a rearrangement of all loads on the existing panels and the addition of another panel. Therefore, almost all circuits shown on the drawings have been changed.

**4.11.3 E001 -**

- a. Added EF-4 and WH-1 to Mechanical Equipment Schedule, changed MOCP for F-1.
- b. A transfer switch, future generator, and Panel C were added to the Power Riser. Some conduit sizes were changed to match rearrangement of equipment.
- c. Light Fixture schedule – changed L5 part number because it does not need to have remote capacity. Added L12 for emergency egress circuit.

**4.11.4 E002 -**

- a. Revised all panel schedules and load calculations. Added Panel C.

**4.11.5 E101:**

- a. Relocated POC for telephone.
- b. relocated gate light L10.
- c. Relocated transformer, electrical service equipment and panels and equipment on mezzanine.
- d. Modified Key Note 1 to refer to Power Riser for details of responsibility.

**4.11.6 E201 -**

- a. Added Key Note 9 to clarify lighting placements.
- b. Added Type L12 battery pack at Type L8 fixtures in order to power the emergency egress circuit contained inside L8 fixture.

**4.11.7 E202 -**

- a. Removed two lights from North side of Salt Storage Building.
- b. Removed two lights from West side of Sander Rack
- c. Added Key Note 3 to clarify lighting placements.

**4.11.8 E203 -**

- a. Relocated EF-3 and Panel B
- b. Removed one L7 fixture from the North and South sides of the building and two L7 fixtures from the East side of the building. Added one L6 fixture above the North and South man doors.
- c. Added two L4s to the Open Storage area and one L4 to the Closed Storage area.
- d. Added 3-way switching for the L1 fixtures.
- e. Added EF-4 and controls in the Open Storage area.
- f. Removed welding receptacle in the Open Storage area.
- g. Added Key Note 7 to clarify lighting placements.
- h. Added Type L12 battery pack at Type L8 fixtures in order to power the emergency egress circuit contained inside L8 fixture.

**4.11.9 E301 -**

- a. Mezzanine: Relocated Panels M and A and added Panel C. Relocated EF-2 and telephone board. Added three WH-1s.
- b. Relocated service equipment to front of building closer to transformer location.
- c. Relocated two existing welding receptacles to NE and SE corners and added one welding receptacle to SW corner.
- d. Relocated junction boxes for gutter heat tape to NE and SE corners of building. Added a circuit for roof de-icing. Modified Key Note 9 to clarify.
- e. Relocated burners and vacuum pumps.
- f. Added receptacles to columns in center of room.

**4.11.10 E401 -**

- a. Deleted Detail 2.
- b. Removed wall switch requirement for L6s in Panel Schedule LCP. Added "W/ Ind" to wall switch requirement for L7s in Panel Schedule LCP.
- c. Added Comcheck Compliance Statement.

**End of Addendum #4**



**BID FORM – REVISED  
PER ADDENDUM NO. 4 DATED MARCH 14, 2008**

NAME OF BIDDER \_\_\_\_\_ DATE \_\_\_\_\_

To the Division of Facilities Construction and Management  
4110 State Office Building  
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with your invitation for bids for the **PANGUITCH MAINTENANCE STATION REPLACEMENT UTAH DEPARTMENT OF TRANSPORTATION – PANGUITCH, UTAH - DFCM PROJECT NO. 07010900** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: \_\_\_\_\_

**BASE BID:** For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_)  
(In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 1:** For all work shown on the Drawings and described in the Specifications and Contract Documents for the Sander Rack, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_)  
(In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 2:** For all work shown on the Drawings and described in the Specifications and Contract Documents for the Wash Rack, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_)  
(In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 3:** For all work shown on the Drawings and described in the Specifications and Contract Documents for the Salt Storage Building, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_)  
(In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 4:** For all work shown on the Drawings and described in the Specifications and Contract Documents for the Open Storage Building, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_ )  
(In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 5:** For all work shown on the Drawings and described in the Specifications and Contract Documents to install the Metal Wall Sandwich Panels as specified in section 007412, in lieu of installing the specified Manufacturer's standard field assembled insulated wall panels, I/we agree to complete I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_ )  
(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by **November 3, 2008**, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **\$500.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of \_\_\_\_\_

The undersigned Contractor's License Number for Utah is \_\_\_\_\_.

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract.

The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable 100% Performance and Payment bonds are not delivered within the time set forth.

Type of Organization: \_\_\_\_\_ (Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws: \_\_\_\_\_

Respectfully submitted,

ADDRESS:

\_\_\_\_\_  
Name of Bidder

**SECTION 03052 – CONCRETE WATERPROOFING SYSTEM – ADDENDUM #2**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

**A. SECTION INCLUDES:**

1. This section specifies an integral concrete waterproofing system that can be used as a contractor's option entirely in lieu of the 03053 CONCRETE WATERPROOFING ADMIXTURE previously specified.
2. This section includes: Furnishing of all labor, materials, services and equipment necessary for the supply and installation of cementitious crystalline waterproofing mixed in concrete prior to placement as indicated on drawings and/or as specified.
3. This section includes crystalline waterproofing treatment of construction joints between successive concrete pours.
4. This section includes: Cleaning of concrete surface.

**1.02 RELATED SECTIONS:**

- A. Section 03300 – Cast In Place Concrete
- B. REPLACES - Section 03053 – Concrete Waterproofing Admixture
- C. Section 03054 – Oliophobic Sealer
- D. Section 07901 – Caulking and Sealants

**1.03 SYSTEM DESCRIPTION**

- A. The complete systems include Cementitious Crystalline Waterproofing a blend of Portland cement, fine treated silica sand and active proprietary chemicals. When mixed with water and applied as an integral admixture, the active chemicals cause a catalytic reaction which generates a non-soluble crystalline formation of dendritic fibers within the pores and capillary tracts of concrete. This process causes concrete to become permanently sealed against the penetration of liquids from any direction in conjunction with the crystalline waterproofing treatment of construction joints between successive concrete pours. In addition, the completed system shall be warranted for five (5) years as a total and complete system. When appropriately cured the system shall be sealed using the product as described in Section 03054 – Oliophobic Sealer.

**1.04 REFERENCES**

- A. ACI 305R - Hot Weather Concreting; 1999.
- B. ACI 306R - Cold Weather Concreting; 1988.
- C. ACI 308 - Standard Practice for Curing Concrete; 1992 (Re-approved 1997).
- D. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 1999.
- E. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 1998a.

- F. ASTM C 666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing; 1997.
- G. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction; 1998a.
- H. COE CRD-C 48 - Standard Test Method for Water Permeability of Concrete; 1992.
- I. NSF 61 - Drinking Water System Components - Health Effects; 2000a.

1.05 SUBMITTALS

- A. Submittals shall comply with the General Conditions and Division-1 Specification Sections. Submit the following:
  - 1. Submit under provisions of Section 01300.
  - 2. Product Data: Manufacturer's printed data sheet, for specified products.
  - 3. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
    - i. Testing Agency: Independent laboratory meeting the requirements of ASTM E329 and certified by the United States Bureau of Standards, Army Corp of Engineers, and American Concrete Institute.
  - 4. Certificates: Product certificates notarized by manufacturer certifying that:
    - i. Materials comply with specified performance characteristics and physical requirements.
    - ii. Installer is qualified and approved by manufacturer.
  - 5. Manufacturer's installation instructions.

1.06 QUALITY ASSURANCE

- A. MANUFACTURER QUALIFICATIONS: Minimum 10 years experience manufacturing and having at least 10 finished installations of crystalline waterproofing of the type and approximate project scope or greater specified.
- B. CONCRETE BATCH OPERATOR QUALIFICATIONS: Certified by Manufacturer for mixing and use of Crystalline Waterproofing Admixture Products.
- C. PRE-INSTALLATION MEETING: Prior to installation, conduct a meeting with the General Contractor, owner's representative, Architect, concrete installer, installers of adjacent work and work penetrating concrete, and admixture waterproofing manufacturer's representative to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements; notify the Owner and Architect at least one week in advance of meeting.
- D. APPLICATOR: Waterproofing applicator shall be experienced in the installation of cementitious crystalline waterproofing materials as demonstrated by at least 10 previous successful installations, and shall be approved by the manufacturer in writing.
- E. TECHNICAL CONSULTATION: Provide minimum of 1 person who shall be present during execution of Work, who shall be thoroughly experienced in installation of specified materials, and who shall direct Work performed under this section. The waterproofing

manufacturer's representative shall provide technical consultation on waterproofing application.

- F. INSTALLER CERTIFICATION: Upon completion of application of waterproofing, submit certification that specified materials were applied in accordance with approved manufacturer's recommended procedures.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. DELIVERY: Deliver packaged waterproofing materials to project site in original undamaged containers, with manufacturer's name, labels, product identification and seals intact.
- B. STORAGE: Store all material in a secure, dry and temperature controlled area on pallets maintaining temperatures as recommended by the manufacturer's until installed.
- C. HANDLING: A sufficient quantity of all materials including but not limited to waterproofing and construction joint products shall be stored on site or be readily available prior to starting the work to insure that the work will be continuous from start to completion without delay due to material shortage or unavailability.

#### 1.08 WARRANTY

- A. MANUFACTURER'S WARRANTY: Manufacturer's Warranty: Provide manufacturer's standard warranty document executed by authorized company official; warranty period: minimum Ten (10) years, commencing on Date of Substantial Completion.
- B. APPLICATOR'S WARRANTIES: Applicator shall warrant the waterproofing and construction joint system(s) against defects caused by faulty workmanship or materials for a period of Five (5) years from Date of Substantial Completion. The warranty will cover the surfaces treated and will bind the applicator to repair, at his expense, any and all leaks through the treated surfaces which are not due to structural weaknesses or other causes beyond applicator's control such as fire, earthquake, tornado and hurricane.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS/ MATERIALS

- A. The following candidate manufacturers are capable of producing equipment and/or products that will satisfy the requirements of this Section. This statement, however, shall not be construed as an endorsement of a particular manufacturer's product, nor shall it be construed that a named manufacturer's standard product will comply with the requirements of this Section. Candidate manufacturers include, listed below.

- 1. ACCEPTABLE MANUFACTURERS:  
Xypex Chemical Corporation  
13731 Mayfield Place  
Richmond, B.C., Canada  
V6V 2G9  
Tel: 800-961-4477 or 604-273-5265  
Fax: 604-270-0451

- 2. Approved equals will be considered in accordance with provisions set forth in section 1600 of the project specifications.

3. Obtain all waterproofing products from a single source.

## 2.02 PRODUCTS:

- A. Waterproofing Admixture: Xypex Admix C-500, C-1000 or C-2000; compound of Portland cement, fine treated silica sand and active chemicals; provide product and mix ratio of at least 2% Xypex with up to 15% fly ash that produce concrete that complies with specified requirements in Section 03300 and the following:
  1. Chemically Resistant for pH Levels of 3 to 11 constant contact and pH Levels of 2 to 12 periodic contact per ASTM C267-77, ASTM C672-76.
  2. Potable Water Approved per National Safety Foundation (ANSI/NSF) 61.
  3. Freeze-Thaw and De-icing Chemical Resistance per ASTM C672-76.
  4. Radiation Resistance per USANI N69-1967
  5. Crack Sealing ability for re-sealing cracks up to .04 mm (1/64") per ASTM C856-88.
  6. Withstand 175 PSI water pressure penetration test per U.S. Army Corps of Engineers CRD-C-48-73.
  7. Concrete Admixture shall not decrease the compressive strength of the concrete mix design (28 day compressive strength test), ASTM C 39/C 39M.

## 2.03 MIXES

- A. GENERAL: Mix waterproofing material by volume with clean water which is free from salt and deleterious materials. Mix waterproofing material in quantities that can be applied within 20 to 30 minutes from time of mixing. As mixture thickens, stir frequently, but do not add additional water. Do not mix bonding agents or admixtures with crystalline waterproofing materials.

## PART 3 - EXECUTION

### 3.01 CONCRETE MIXING AND PLACING

- A. Comply with requirements of Section 03300.
- B. Add waterproofing admixture at time of batching and blend thoroughly, following manufacturer's instructions.
- C. Hot weather comply with ACI 305R; Cold weather comply with ACI 306R.
- D. Moist cure concrete in accordance with ACI 308; if moist curing is not possible, use Xypex Gamma Cure curing compound complying with ASTM C 309.
- E. Consult Manufacturer for mixing instructions, set times and retardation applications.

### 3.02 CONSTRUCTION JOINTS

- A. Comply with manufacturer's instructions, including product data, technical bulletins, catalog installation instructions, and product packaging labels.

- B. Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions,
- C. Mix materials in accordance with manufacturer's instructions.
- D. Wet cold joint surface and saturate with clean water to enhance the crystalline formation process within concrete; remove excess surface water before application of slurry coat.
- E. Apply slurry coat if needed uniformly with semi-stiff bristle brush or spray under conditions and application rate recommended by manufacturer.
- F. Place subsequent pour while slurry coat is still green, but after reaching initial set.

### 3.03 FIELD QUALITY CONTROL

- A. Do not cover admixture treated concrete with other construction until it has been observed by Manufacturer's field representative and Architect/Engineer.
- B. After removal of forms, repair honeycombing, rock pockets, tie holes, faulty construction joints, cold joints, and cracks using waterproofing admixture Manufacturer's products and recommended procedures.
- C. MANUFACTURER'S FIELD SERVICES: Provide Manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of concrete batching and product installation in accordance with Manufacturer's and Engineer's instructions.
- D. FLOOD TESTING:
  - 1. Plug or dam drains and fill area with water to a depth of two inches (50 mm) or to within 0.5 inch (12.5 mm) of top of waterproofing treatment.
  - 2. Let water stand for 24 hours.
  - 3. If leaks are discovered, make repairs and repeat test until no leaks are observed.

### 3.04 CLEANING AND PROTECTION

- A. Protect installed concrete from damage during construction.
- B. Do not apply paint or other coatings for at least 21 days; before applying coatings neutralize waterproofed surface as recommended by waterproofing manufacturer.
- C. CLEANING: Clean spillage and soiling from adjacent surfaces using appropriate cleaning agents and procedures.
- D. PROTECTION: Take measures to protect completed treated concrete from damage after application.

END OF SECTION 03052

SECTION 03300 - CAST-IN-PLACE CONCRETE – ADDENDUM #2

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.
- B. Related Work Specified Elsewhere:
  - 1. 03052 Concrete Waterproofing System – Addendum #2.
  - 2. 03053 Concrete Waterproofing Admixture.
  - 3. 03054 Oliophobic Topical Concrete Sealer.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Cast-in-place concrete includes but is not limited to the following:
  - 1. Foundations and footings.
  - 2. Slabs-on-grade.
  - 3. Stem walls.
  - 4. Equipment pads and bases.
  - 5. Suspended slabs.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others if requested by Architect.
  - 1. Letter from concrete supplier, certifying type of cement to be used in concrete mix.
- C. Shop drawings for reinforcement detailing fabricating, 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.
- D. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:
  - 1. Waterstops
- E. Laboratory test reports for concrete materials and mix design test.
- F. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
  - 1. International Building Code, Chapter 19.
  - 2. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
  - 3. ACI 318, "Building Code Requirements for Reinforced Concrete."
  - 4. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Testing Service: Provide a qualified testing agency, acceptable to Architect, to provide pre-construction testing and material evaluation tests.
- C. Materials and installed work may require testing and retesting at any time during progress of Work. Retesting of rejected materials for installed Work, shall be done at Contractor's expense.
- D. Special Inspection: Owner will provide special inspection services for concrete work as required by Contract Documents.
  - 1. General: Contractor to coordinate work with the special inspection requirements of this section, the latest edition in practice of the International Building Code, Chapter 17, and specific requirements of the Owner.

## 1.5 WARRANTY

- A. Provide two year written guarantee to the End User, in form approved by the Architect to promptly remove and/or repair defective concrete (cracking, spalling, pitting or honeycombing) as directed by Architect and at Contractor's expense. New replacement work shall carry a similar new two year written guarantee. Guarantee shall start from Date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
  - 1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
  - 1. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

- E. Chamfer exterior corners and edges of permanently exposed concrete 3/4" by 3/4".

## 2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Epoxy-Coated Reinforcing Bars: ASTM A 615, Grade 60, deformed bars, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- C. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
  - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
  - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

## 2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I/II.
  - 1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
- B. Fly Ash: Conform to ASTM C 618 Class C or F
- C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.
  - 1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
- D. Water: Potable.
- E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
    - a. Air-Mix or Perma-Air, Euclid Chemical Co.
    - b. Darex AEA or Daravair, W.R. Grace & Co.
    - c. MB-VR or Micro-Air, Master Builders, Inc.
    - d. Sika AER, Sika Corp.
- G. Water-Reducing Admixture: ASTM C 494, Type A.
- H. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.
- I. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

## 2.4 RELATED MATERIALS

- A. Sand Cushion: Clean, manufactured or natural sand.
- B. Bonding Agent: Polyvinyl acetate or acrylic base.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
    - a. Polyvinyl Acetate (Interior Only):
      - 1) Euco Weld, Euclid Chemical Co.
      - 2) Everweld, L&M Construction Chemicals, Inc.
      - 3) Ready Bond, Symons Corp.
    - b. Acrylic or Styrene Butadiene:
      - 1) SBR Latex, Euclid Chemical Co.
      - 2) Daraweld C, W.R. Grace & Co.
      - 3) Everbond, L&M Construction Chemicals, Inc.
      - 4) Acryl-Set, Master Builders Inc.
- C. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
    - a. Euco Epoxy System #452 or #620, Euclid Chemical Co.
    - b. Concesive Standard Liquid, Master Builders, Inc.
    - c. Sikadur 32 Hi-Mod, Sika Corp.
- D. Dress Coat: Second coat of water-based acrylic membrane curing compound, same product used for curing; see para. C. above.

## 2.5 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by laboratory trial batch. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
  - 1. Do not use the same testing agency for field quality control testing.
- B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect. Allow 14 days for review response.
- C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
  - 1. Footings, 3,000-psi, 28-day compressive strength (minimum 5 bag mix); water-cement ratio: 0.53 maximum.
  - 2. Foundations, 3,000-psi, 28-day compressive strength (minimum 5.6 bag mix); water-cement ratio: 0.53 maximum.
  - 3. Salt storage building footing and foundations: 4,500-psi, 28-day compressive strength (minimum 6 bag mix); water-cement ratio: 0.45 maximum.
  - 4. Slabs-on-grade and all other concrete: 4,000-psi, 28-day compressive strength (minimum 6 bag mix); water-cement ratio: 0.45 maximum.
  - 5. Fly Ash Conform to ASTM C 618 Class C or F
  - 6. For air-entrainment requirements see paragraph 2.6.C.

- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as described below. Modification of slump limits shall not be made without prior approval from the Engineer.
  - 1. Slabs: Not more than 4 inches.
  - 2. Reinforced foundation systems: Not less than 2 inch and not more than 4 inches.
- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted and accepted by Architect before using in Work.

## 2.6 ADMIXTURES

- A. Use water-reducing admixture in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use air-entraining admixture in exterior exposed concrete including foundation stem walls, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 6-1/2 percent plus or minus 1-1/2 percent.
- D. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

## 2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
  - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Coordinate the installation of joint materials, vapor barrier, and other related materials with placement of forms and reinforcing steel.

### 3.2 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:
  - 1. Provide Class A tolerances for concrete surfaces exposed to view.
  - 2. Provide Class C tolerances for other concrete surfaces.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required

finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
- D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer all exposed corners and edges unless noted otherwise, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

### 3.3 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

### 3.4 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.
- B. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
  - 1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."
- C. Shrinkage (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown on drawings. Depth and width of saw cut per details on drawings.
  - 1. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.

2. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
3. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

### 3.5 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

### 3.6 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, non-residual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
  1. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.

### 3.7 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
  1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
  2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within

limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
  2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
  3. Maintain reinforcing in proper position on chairs during concrete placement.
- F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified. Concrete should not be placed when temperature is above 95 F unless approved by the Architect.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
  3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
  4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.
- I. Notify Architect/Engineer minimum 24 hours prior to commencement of operations.

### 3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed architectural finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas per Section 3.15 with fins and other projections completely removed and smoothed and voids repaired when forms are removed. Refer to drawings for tie pattern and placement.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces

adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.9 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, and other bonded applied cementitious finish flooring material, and where indicated.
  - 1. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
  - 2. Do not apply curing compounds to surfaces which receive tile finishes or in any way interfere with concrete performance.
- B. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
  - 1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) 17 (floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
- C. Non-slip Broom Finish: Apply a non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
  - 1. Immediately after float finishing, roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

### 3.11 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete slabs from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial slab curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Wet cure all unformed concrete surfaces. Curing compound may be used only where its use will not adversely affect the application of hardners/sealers or finish floor covering, as approved by the Architect by submittal documenting compatibility prior to the application of the curing compound.

- D. Provide moisture curing by the following methods:
1. 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. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  2. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
    - a. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete. Fugitive dye required in all curing compounds.
- E. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces by leaving forms in place for the full curing period. Forms may be removed, but continue curing by an approved moisture curing method.

### 3.12 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after maintaining not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing operations are started and protection operations are maintained.

### 3.13 REUSING FORMS

- A. 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-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

### 3.14 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms to satisfaction of Architect.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.

1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
  2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas 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.
- C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
  2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
  3. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter and areas retaining more than 1/8" deep liquid to nearest designated joint, by cutting out and replacing with new concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- F. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- G. Repair methods not specified above may be used, subject to acceptance of Architect.

### 3.15 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: Owner to provide a testing agency to perform material tests, special inspections and to

submit test reports. Contractor to coordinate with testing agency for sequence of work and inform testing agency when work is ready for testing and inspections.

- B. Sampling and testing for quality control during concrete placement to include the following:
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
    - a. Slump: ASTM C 143; one test at point of discharge for each 20 cu. yd. of each type of concrete; additional tests when concrete consistency seems to have changed.
    - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each 20 cu. yd. of each type of air-entrained concrete.
    - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
    - d. Compression Test Specimen: ASTM C 31; one set of three standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
    - e. Compressive-Strength Tests: ASTM C 39; one set of three cylinders for each 20 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, one specimen tested at 28 days, and one specimen retained in reserve for later testing if required.
- C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
1. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- D. Test results will be reported in writing to Owner, Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed (see 1.4.C).

END OF SECTION 03300

SECTION 07412 - METAL WALL SANDWICH PANELS – ADDENDUM #2

PART 1 - GENERAL

1.1 SUMMARY

1. This section specifies an exterior grade insulated metal sandwich panel system that can be used as a contractor's option entirely in lieu of the exterior metal panels and glass-fiber-blanket insulation with vapor retarder facing described in 13125 METAL BUILDING SYSTEMS previously specified. This section includes all steel-faced, factory-assembled panels with insulating foam core and protective inner metal skin surface.
2. This section includes all related metal trim, accessories, fasteners and sealants indicated on the contract drawings as part of this section.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Structural designs shall have been determined from independent tests conducted in accordance with ASTM E72 "Chamber Method."
- B. Thermal Performance: Panels shall provide a "U" value of .042 BTU/Hr./Sq. Ft./°F, corrected to 15 mph wind outside and still air inside, when determined from tests conducted in accordance with ASTM C236 by a recognized testing laboratory.
- C. Air Leakage: Panel joints shall be tested for air leakage in accordance with ASTM E283/AAMA 501. The leakage rate for metal wall panels shall not exceed 0.01 CFM/SF at a pressure difference of 40 psf.
- D. Water Penetration: Panel joints shall be tested for water penetration in accordance with ASTM E331/AAMA501. There shall be no water penetration for metal wall panels at a pressure difference of 50 psf.
- E. Fire Tests: Panels shall be qualified by laboratory scale and/or full scale fire tests for acceptance by building code and insurance authorities. Evidence of fire performance shall include the following:
  1. Underwriters Laboratories, Inc. classified and labeled for "Surface Burning Characteristics of Building Materials," UL 723 (ASTM E84).
    - a. Core Material (5"): Flame Spread 20, Smoke Developed 400.
    - b. Finished Panels 2" to 5" metal wall panels: Flame Spread 15, Smoke Developed 250-450.
  2. Factory Mutual Approved and labeled for "Class 1 Insulated Wall & Roof/Ceiling Panels", Factory Mutual Standard 4880 (1994), to 30 ft. (max) high, 5 in. maximum thickness.
  3. Factory Mutual listed and labeled for "Surface Burning Characteristics of Building Materials", ASTM E84-95.
    - a. Core Material (5"): Flame Spread 25, Smoke Developed 180.

4. Southwest Research Institute listed and labeled for “Surface Burning Characteristics of Building Materials”, ASTM E84-95.
  - a. Finished Panels 5” metal wall planes: Flame Spread 10, Smoke Developed 130.

1.3 SUBMITTALS

- A. Furnish detailed shop drawings, approved by the manufacturer, to the architect (owner) for review. Drawings shall show profile, panel thickness, gauge of interior and exterior sheets, location and type of fasteners, gauges, shape and method of attachment of all trim, location and type of sealants and any other details as may be required for a weathertight installation. Do not proceed with manufacture of materials prior to review of shop drawings and field verification of all dimensions.
- B. Furnish manufacturer’s data describing the products to be used on the project.
- C. Furnish actual samples of prefinished metal for color selection.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  1. The manufacturer shall have a minimum of ten (10) years experience in the production of factory foamed-in-place metal skinned insulated panels and be able to show experience with projects of similar size and complexity.
  2. The manufacturer shall be certified by the American Institute of Steel Construction (AISC) verifying it has sustained audits to confirm it has a continuing quality control program.
- B. Installer Qualifications:
  1. The installer shall have a minimum of five (5) years experience installing metal skinned insulated panels on projects of similar size and complexity.

1.5 WARRANTY

- A. The manufacturer shall warrant for one (1) year from the date of shipment that the product is not defective in workmanship or material.
- B. The manufacturer, upon shipment of materials, shall furnish a warranty:
  1. Covering paint finish against cracking, chalking, blistering, peeling, flaking and chipping for a period of twenty (20) years.
- C. The contractor shall issue a warranty for two (2) years from the date of substantial completion against defects in material installation and workmanship.

PRODUCTS

1.6 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
    - a. IPS Insulated Panel Systems, 13202 Murphy Road, Stafford Texas 77477. Telephone: (281) 499-2605 or (800) 729-9324. Fax: (281) 499-3363. Approved equals will be considered in accordance with provisions set forth in section 1600 of the project specifications.
    - b. Centria Architectural Systems, 1005 Beaver Grade Road, Moon Township, PA 15108-2944. Telephone: (412) 299-8000 or (800) 759-7474. Fax: (412) 299-8317. Approved equals will be considered in accordance with provisions set forth in section 1600 of the project specifications.
    - c. Approved equals will be considered in accordance with provisions set forth in section 1600 of the project specifications.

1.7 PANEL DESIGN

- A. The panels shall be completely prefabricated in the factory using pre-coated, precision roll-formed steel faces chemically bonded to foamed-in-place rigid modified isocyanurate core. A vapor barrier of no more than .02 perm rating shall be provided.
- B. Panel units shall be:
  - 1. Metal wall panel – 36" wide, 3" thick or greater as needed to comply with the R-19 insulation requirement. The panel joint shall be a concealed fastener design with an offset shiplap that allows both panel faces to be mechanically attached to supports. The faces shall be stucco embossed and have a mesa pattern or other approved by Architect.

1.8 MATERIALS

- A. Exposed face of the panel shall be aluminum zinc alloy coated steel with a minimum AZ50 coating class, conforming to ASTM A792 or steel G90 (min.) coating class, conforming to ASTM A653. Material thickness shall be 24 gauge steel minimum.
- A. Interior face shall be 26 gauge steel G60 (min.) coating class, conforming to ASTM A653, or aluminum zinc alloy coated steel AZ 50 (min.) coating class, conforming to ASTM A792.
- B. Insulating foam core shall be foamed-in-place rigid modified isocyanurate using an HCFC blowing agent and have the following physical properties:
  - 1. Density: 2.0 pcf (nom.)
  - 2. Compressive strength: 23 psi

3. Tensile strength: 39 psi
4. Shear strength: 26 psi
5. Closed cell: 93%
6. Cold aging: 1% volume decrease after 7 days at -20°F
7. Heat aging: 3% volume increase after 28 days at 200°F
8. Humid aging: 4% volume increase after 28 days at 158°F and 100% RH

- C. Trim and flashing shall be formed sheet metal that is equal in thickness and finish to that furnished for the panel faces.
- D. All exposed fasteners shall be stainless steel, stainless steel clad, aluminum or cast zinc-aluminum alloy painted to match adjacent colors. All aluminum rivets shall be mill finish and unpainted.
- E. Sealants shall be:
1. Field applied vapor barrier sealant in the panel joints shall be a butyl based material that is non-skinning, non-drying, resealable and shall have a service temperature range of –60°F to 250°F.
  2. Field applied weather sealant shall be a silicone based material with excellent adhesion and cohesion properties and shall have a service temperature range of –60°F to 400°F
- F. Panel clips shall be heavy gauge galvanized steel and concealed in the panel joint

## 1.9 FINISHES

### A. Exterior face:

1. 24 gauge metal skin minimum with Signature® 300 – Premium 70% resin Kynar 500®/Hylar 5000® paint system, or approved equal utilizing manufacturer's available colors.

### B. Interior face:

1. Interior face shall be 26 gauge steel G60 (min.) coating class, conforming to ASTM A653, or aluminum zinc alloy coated steel AZ 50 (min.) coating class, conforming to ASTM A792 with white polyester interior paint finish.

## PART 2 - EXECUTION

### 2.1 INSPECTION

- A. Panel Erector shall examine the alignment of the structural steel before installation of the panels. The steel shall be aligned to the tolerances established in the AISC Code of Standard Practice, Section 7, and the supplement modification controlling Section 7.11.3, adjustable items. The maximum deviation of steel alignment should be limited to 3/16" from the control with a 1/8" maximum change in deviation for any member for any 10'-0" run of panel. The erector shall not proceed until defects are corrected by the responsible contractor
- B. Inspect all material included in this contract prior to installation. Manufacturer to be notified of any unacceptable material prior to installation, including freight damage

2.2 INSTALLATION

- A. Erector shall familiarize himself with all erection instructions and drawings before starting work.
- B. Install metal panels, clips, fasteners, trim and related sealants in accordance with approved shop drawings. Panels shall be cut in the field for bevels and openings. Flashing and trim shall be installed and in proper alignment for best appearance. Sealants shall be installed without skips or voids to insure weathertightness and integrity of the vapor barrier system

2.3 DAMAGED MATERIAL

- A. Repair or replace all damaged material to the satisfaction of the architect and/or contractor if damage has been caused by the manufacturer or panel erector. The general contractor or builder shall be responsible for the protection of completed or installed areas from damage by other trades. Installed areas or portions of the work shall be inspected by the owner or general contractor and approved immediately following the completion of such areas. Subsequent damage will then be the responsibility of others
- B. Remove all debris and metal filings from the panel and trim surfaces at the end of each work period to prevent damage to the panels and possible rust staining

END OF SECTION 07412

SECTION 10425 – SIGNS – ADDENDUM #2

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following types of signs:
  - 1. Panel signs, Dimensional letters and numbers.

1.3 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- C. Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.
  - 1. Provide message list for each sign required, including large-scale details of wording and lettering layout.
  - 2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
- D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.
  - 1. Samples for initial selection of color, pattern, and texture:
    - a. Cast Acrylic Sheet and Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.
  - 2. Samples for verification of color, pattern, and texture selected and compliance with requirements indicated:
    - a. Cast Acrylic Sheet and Plastic Laminate: Provide a sample panel not less than 8 inches by 8 inches for each material, color, texture, and pattern required. On each panel include a representative sample of the graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.

1.4 QUALITY ASSURANCE

- A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.
- B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

- C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the Proposer.

## 1.5 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delay.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. Manufacturers of Panel Signs:
    - a) Utah Correctional Industries
    - b) Allenite Signs; Allen Marking Products, Inc.
    - c) American Graphics Inc.
    - d) Andco Industries Corp.
    - e) APCO Graphics, Inc.
    - f) ASI Sign Systems, Inc.
    - g) Best Manufacturing Co.
    - h) Grimco, Inc.
    - i) Innerface Sign Systems, Inc.
    - j) Kaltech Industries Group, Inc.
    - k) Mills Manufacturing, Inc.
    - l) Mohawk Sign Systems.
    - m) Seton Identification Products.
    - n) Signature Signs, Inc.
    - o) Supersine Company (The).
    - p) Or, pre-approved equal.

### 2.2 MATERIALS

- A. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F (80 deg C), and of the following general types:
  - 1. Transparent Sheet: Where sheet material is indicated as "clear," provide colorless sheet in matte finish, with light transmittance of 92 percent, when tested according to the requirements of ASTM D 1003.
  - 2. White Translucent Sheet: Where sheet material is indicated as "white," provide white translucent sheet of density required to produce uniform brightness and minimum halation effects.
  - 3. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.
- B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

- C. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance.
- D. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are non-fading for the application intended.

### 2.3 PANEL SIGNS

- A. Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
  - 1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.
- B. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:
  - 1. Edge Condition: Square cut.
  - 2. Corner Condition: Corners rounded to 3/4-inch radius unless indicated otherwise.
- C. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.
- D. Raised Copy: Machine-cut copy characters from matte-finished opaque acrylic sheet and chemically weld onto the acrylic sheet forming sign panel face. Produce precisely formed characters with square cut edges free from burrs and cut marks.
  - 1. Panel Material: Matte-finished opaque acrylic sheet.
  - 2. Raised Copy Thickness: Not less than 1/32 inch.

### 2.4 INFORMATION FOR SIGNS AS FOLLOWS:

- A.
  - 1. Message: "STORAGE ROOM" – On two lines
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.
- B.
  - 1. Message: "TRAINING ROOM" – On two lines
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.
- C.
  - 1. Message: "OFFICE"
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.
- D.
  - 1. Message: "GREASE"
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.
- E.
  - 1. Message: "ENGINE OIL "
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.
- F.
  - 1. Message: "GEAR OIL (90W)"
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.

- G.
  - 1. Message: "HYDRAULIC FLUID"
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.
- H.
  - 1. Message: "ATF"
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.
- I.
  - 1. Message: "DURING THE USE OF A TORCH OR WELDING DEVICE A FIRE EXTINGUISHER SHALL BE LOCATED NEAR THE WELDING / CUTTING OPERATION AND A "FIRE WATCH" PERSON SHALL OVERSEE OPERATION"
  - 2. Letter Height: 1 1/4 inches.
  - 3. Letter Style: Helvetica.
- J.
  - 1. Message: "RESTROOM"
  - 2. Letter Height: 3/4 inches.
  - 3. Letter Style: Helvetica.
  - 4. Provide all ADA Compliant graphics & Braille Text
- K.
  - 1. Message: "ENTRANCE"
  - 2. Letter Height: 3/4 inches.
  - 3. Letter Style: Helvetica.
  - 4. Provide all ADA Compliant graphics & Braille Text

## 2.5 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
  - 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
  - 1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
  - 2. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

### 3.2 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10425



**SECTION 13125 - METAL BUILDING SYSTEMS – ADDENDUM NO. 2**

**PART I - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Structural framing.
  - 2. Roof panels.
  - 3. Wall panels.
  - 4. Fascia and Soffit panels.
  - 5. Insulation and vapor barrier.
  - 6. Building components, as follows: provide and install misc. framing for mechanical units and grills, framing for lighting support, overhead door frames, doors, windows, equipment and other items not listed which will rely on the building for support.
  - 7. Accessories and trim.
- B. Related Sections include the following: List below only products, construction, and equipment that the reader might expect to find in this Section but are specified elsewhere.
  - 1. Division 3 Section "Cast-in-Place Concrete" for concrete foundations and anchor-bolt installation including concrete waterproofing systems.
  - 2. Division 8 Section "Sectional Overhead Doors." for requirements of support for overhead door.
  - 3. Division 8 Section "Door Hardware" for finish door hardware and keying to be used with metal building system.
  - 4. Division 8 Section "Glazing" for glass and glazing to be used with metal building system.
  - 5. Division 9 Section "Painting" for shop-applied finishes not standard with metal building system manufacturer.
  - 6. Division 9 Section "Gypsum board Assemblies" for application of fire rated assemblies to metal building systems.
  - 7. Division 15 Section "Mechanical" for required coordination of equipment with wall, soffit and roof.
  - 8. Division 16 Section "Interior Exterior Building Lighting" for required coordination of equipment with wall, and soffit.

**1.3 DEFINITIONS**

- A. Bay Spacing: 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 perpendicular to end wall (outside face of end-wall girt).
- B. Building Length: Dimension of the building measured perpendicular to main framing from end

wall to end wall (outside face of girt to outside face of girt).

- C. Building Width: Dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of girt to outside face of girt).
- D. 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).
- E. 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).
- F. 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.
- G. Terminology Standard: Refer to MBMA's "Low Rise 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 PERFORMANCE REQUIREMENTS

- 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, roof and wall panels, and accessories complying with requirements indicated, including those in this Article.
- B. Metal Building System Design: Of size, spacing, slope, and spans indicated, and as follows:
  - 1. Primary Frame Type: Provide the following:
    - Rigid Clear Span: Solid-member structural-framing system with interior columns as indicated.
  - 2. End-Wall Framing: Manufacturer's standard, for buildings required to be expandable to the east, as follows:
    - a. Provide primary frame, capable of supporting one-half of a bay design load, and end-wall columns.
    - b. Flush-framed girts.
  - 3. Eave Height: Manufacturer's standard height, as indicated by nominal height on Drawings.
  - 4. Bay Spacing: See plans.
  - 5. Roof Slope: 1 inch per 12 inches (See plans).
  - 6. Roof System: Manufacturer's standard standing-seam roof panels with high clip, vapor barrier, thermal block, and insulation.
  - 7. Exterior Wall System: Manufacturer's standard field-assembled insulated wall panels.
- C. 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 "Low Rise

- Building Systems Manual."
2. Design Loads: As indicated.
  3. Live Loads: Include vertical loads induced by the building occupancy indicated on Drawings. Include loads induced by maintenance workers, materials, and equipment for roof live loads. Building Occupancy: (20 psf minimum).
  4. Roof Snow Loads: Include vertical loads induced by the weight of snow ( $P_g=64$  psf). Allow for unbalanced and drift loads.
  5. Wind Loads: Include horizontal loads induced by a basic wind speed corresponding IBC 90 mph 3 second gust, Exposure C, Wind Importance Factor 1.0.
  6. Collateral Loads: Include additional dead loads other than the weight of metal building system for permanent items such as sprinklers, mechanical systems, electrical systems, and ceilings. This applies to all building structures except the Salt Storage Building. (5 psf minimum)
  7. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations.
  8. Deflection Limits: Engineer assemblies to withstand design loads with deflections no greater than the following:
    - a. Purlins and Rafters: Vertical deflection of 1/240 of the span.
    - b. Girts: Horizontal deflection of 1/180 of the span.
    - c. Roof Panels: Vertical deflection of 1/180 of the span.
    - d. Wall Panels: Horizontal deflection of 1/180 of the span.
  9. Design primary frame of the Salt Storage Building spanning the width of the building with a pinned connection at one base and a roller connection type at the opposite end so that no thrust forces are transmitted to the concrete foundation wall under gravity load cases.
  10. Design secondary framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.
- D. Seismic Performance: Design and engineer metal building systems capable of withstanding the effects of earthquake motions determined according to the International Building Code, Soil Profile D.
- E. Thermal Movements: Provide metal building roof and wall 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.
- F. Thermal Performance: Provide metal building roof and wall assemblies with the following thermal-resistance values (R-value):
1. Roof Assemblies: R19.
  2. Wall Assemblies: R13.

- G. Air Infiltration for Roof Panels: Provide roof panel assemblies with permanent resistance to air leakage through assembly of not more than 0.09 cfm/sq. ft. of fixed roof area when tested according to ASTM E 1680 at a static-air-pressure difference of 4 lbf/sq. ft.
- H. Air Infiltration for Wall and Soffit Panels: Provide wall panel assemblies with permanent resistance to air leakage through assembly of not more than 0.09 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 4 lbf/sq. ft.
- I. Water Penetration for Roof Panels: Provide roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 1646 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 24 lbf/sq. ft.
- J. Water Penetration for Wall and Soffit Panels: Provide wall panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.
- K. Wind-Uplift Resistance: Provide roof panel assemblies that meet requirements of UL 580 for the following wind-uplift resistance:
  - 1. Class 90. With additional requirements for resistance to 95 mph winds.

#### 1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes and available colors as indicated on the drawings for each type of the following metal building system components:
  - 1. Structural-framing system.
  - 2. Roof panels.
  - 3. Wall panels.
  - 4. Insulation.
  - 5. Vapor retarders.
  - 6. Trim and closures.
  - 7. Accessories.
  - 8. Overhead door mounting details.
  - 9. Mechanical louvers and fan mounting details.
  - 10. Recessed soffit lighting.
  - 11. Mechanical roof penetrations.
  - 12. Doors and windows.
- B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other Work.
  - 1. For installed components 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: 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. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

4. Roof and Wall Panel Layout Drawings: Show layouts of panels on support framing, details of edge conditions, joints, panel profiles, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work.  
Accessory Drawings: Include details of the following items, at a scale of not less than 2 inches per 12 inches: Include details of reinforcement and installation requirements for all accessories specified in other sections.
  - a. Ventilators. Coordinate with mechanical.
  - b. Louvers. Coordinate with mechanical.
  - c. Gutters.
  - d. Downspouts.
  - e. Lighting.
  
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of the following products with factory-applied color finishes as required to match the selected colors: Design intent is to match the colors of the existing open storage building on-site; roof, walls and trim & closure colors as used on existing building.
  1. Roof panels.
  2. Wall panels.
  3. Soffit panels.
  4. Trim, gutter and closures.
  5. Accessories.
  
- D. Samples for Verification: For the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected, in the profile and style indicated. Prepare Samples from the same material to be used for the Work.
  1. Roof Panels: 12-inches long by actual panel width (24"). Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.
  2. Architectural Wall Panels: 12-inches long by actual panel width (12"). Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.
  3. Soffit Panels: 12-inches long by actual panel width (12"). Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.
  4. Trim and Closures: 12-inches long. Include fasteners and other exposed accessories.
  5. Vapor Retarders: 6-inch square samples.
  6. Accessories: 12-inch long samples for each type of accessory.
  
- E. Product Certificates: Signed by manufacturers of metal building systems certifying that products furnished comply with requirements.
  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 zone or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
  - 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. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
- F. Welding Certificates: Copies of certificates for welding procedures and personnel.
- G. Erector Certificates: Signed by manufacturer certifying that erectors comply with requirements.
- H. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements. Include evidence of manufacturing experience.
- I. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- J. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
- 1. Thermal insulation.
  - 2. Vapor retarders.
- K. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating the following current products comply with requirements:
- 1. Insulation and Vapor Retarders: Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
- L. Surveys: Show final elevations and locations of major members. Engage a qualified engineer or land surveyor to perform surveys and certify their accuracy. Indicate discrepancies between actual installation and the Contract Documents.
- M. Warranties: Special warranties specified in the provisions of the contract documents.

#### 1.6 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. Professional Engineer Qualifications: A professional engineer who is legally qualified to

practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal building systems that are similar to those indicated for this Project in material, design, and extent.

- C. **Manufacturer Qualifications:** A firm experienced in manufacturing metal building systems similar to those indicated for this Project and with a record of successful in-service performance.
  - 1. Member of MBMA.
  - 2. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components, AISC-Certified Facility, Category I.
  - 3. **Engineering Responsibility:** Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.
- D. **Surveyor Qualifications:** A land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.
- E. **Source Limitations:** Obtain each type of metal building system component through one source from a single manufacturer.
- F. **Product Options:** Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
  - 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.
- G. **Welding:** Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and AWS D1.3, "Structural Welding Code--Sheet Steel." All welding shall be done by certified welders per AWS in the last 12 months.
- H. **Regulatory Requirements:** Fabricate and label structural framing to comply with special inspection requirements at point of fabrication for welding and other connections required by authorities having jurisdiction.
- I. **Structural Steel:** Comply with AISC S335, "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design"; or AISC S342, "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- J. **Cold-Formed Steel:** Comply with AISI SG-671, "Specification for the Design of Cold-Formed Steel Structural Members," and AISI SG-911, "Load and Resistance Facet Design Specification for Steel Structural Members," for design requirements and allowable stresses.
- K. **Preinstallation Conference:** Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to metal building systems including, but not limited to, the following:

1. Inspect and discuss condition of foundations and other preparatory work performed by other trades.
2. Review structural load limitations.
3. Review and finalize construction schedule and verify availability of materials, Erector's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.
5. Review weather and forecasted weather conditions and procedures for unfavorable conditions.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package roof and wall panels for protection during transportation and handling.
- B. Handling: Unload, store, and erect roof and wall panels to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store roof and wall panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

**1.8 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with installation only when weather conditions permit roof and wall panel installation to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Verify metal building system foundations by field measurements before metal building fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  1. Established Dimensions for Foundations: Where field measurements cannot be made without delaying the Work, establish foundation dimensions and proceed with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
  2. Established Dimensions for Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating roof and wall panels without field measurements, or allow for field-trimming panels. Coordinate roof and wall construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

**1.9 COORDINATION**

- A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and form work requirements are specified in Division 3 Section "Cast-in-Place Concrete."
- B. Coordinate installation of roof curbs, equipment supports, roof, wall and soffit penetrations.

1.10 WARRANTY

- A. General Warranty: 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. Special Warranty on Panels: Written warranty, executed by manufacturer agreeing to repair or replace roof and wall panels that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: five years from date of Substantial Completion.
- C. Special Warranty on Panel Finishes: Written warranty, signed by manufacturer agreeing to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.
  - 1. Warranty Period for Roof Panels: 20 years from date of Substantial Completion.
  - 2. Warranty Period for Wall Panels: 20 years from date of Substantial Completion.
- D. Special Warranty on Standing-Seam Roof Panel Weather tightness: Written warranty, signed by manufacturer agreeing to repair or replace standing-seam roof panel assemblies that fail to remain weather tight within specified warranty period.
  - 1. Warranty Period: 20 years from date of Substantial Completion.

PART II – PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. American Buildings Company.
  - 2. Butler Manufacturing Company.
  - 3. Metallic Building Co.
  - 4. Portland Systems.
  - 5. Varco-Pruden Buildings; a United Dominion Company.
  - 6. Other manufactures meeting the requirements may be accepted. Prior approval from the Architect required. See section 01631 for substitution requirements.

2.2 STRUCTURAL-FRAMING MATERIALS

- A. Structural-Steel Shapes: ASTM A 36/A 36M or ASTM A 529/A 529M.
- B. Steel Plate, Bar, or Strip: ASTM A 529/A 529M, ASTM A 570/A 570M, or ASTM A 572/A 572M; 50,000-psi minimum yield strength.

- C. Steel Tubing or Pipe: ASTM A 500, Grade B or ASTM A 53, Grade B.
- D. Structural-Steel Sheet: Hot-rolled, ASTM A 570/A 570M, Grade 50 or Grade 55; hot-rolled, ASTM 568/A 568M; or cold-rolled, ASTM A 611, structural-quality, matte (dull) finish.
- E. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 50, with G60 (Z180) coating designation; mill phosphatized.
- F. 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 and the following requirements:
  - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality. Galvalume accepted.
- G. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers. Size bolts for primary systems shall be 5/8" diameter.
  - 1. Finish: Hot-dip zinc coating, ASTM A 153, Class C.
- H. Anchor Rods, Bolts, Nuts, and Washers: As follows:
  - 1. Unheaded Rods: ASTM A 572/A 572M, Grade 50 (Grade 345).
  - 2. Headed Bolts: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.
  - 3. Washers: ASTM A 36/A 36M.
- I. Primers: As selected by manufacturer for resistance to normal atmospheric corrosion, compatibility with finish paint systems, capability to provide a sound foundation for field-applied topcoats despite prolonged exposure, and as follows:
  - 1. Primer: Manufacturer's standard, lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

### 2.3 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M and the following requirements:
  - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality. Aluminum-zinc alloy-coated steel accepted.
  - 2. Surface: Smooth, flat, mill finish.
  - 3. Trapezoidal Structural Standing Seam Roof System, field seamed system 3" High. Roof panels begin and end with a 3" high seam, and concealed fasteners as manufactured by MBCI, Model Double-Lok or prior approved equal.
  - 4. Architectural wall panel, 12" wide, 24 gauge minimum, smooth with beads at 4" on center. Concealed fastener system. MBCI, model number FW120-2 or prior approved equal.

5. Architectural Soffit panel, 24 gauge minimum, smooth with beads at 4" on center. Concealed fastener system. MBCI, Artisan series L12 with beads or prior approved equal.
- B. Panel Sealants: Provide the following:
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
  2. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in panels and remain weathertight; and as recommended by metal building system manufacturer. Non hardening.

## 2.4 INSULATION MATERIALS

- A. Fire-Test-Response Characteristics for Insulation: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1. Surface-Burning Characteristics: ASTM E 84.
  2. Combustion Characteristics: ASTM E 136.
- B. Glass-Fiber-Blanket Insulation: Thermal insulation, complying with ASTM C 991, Type II, of 0.5-lb/cu. ft. density, thickness as indicated, with a flame-spread rating of 25 or less, and 2-inch wide, continuous, vapor-tight edge tabs.
1. Type II: Faced one side with nonreflective vapor-retarder membrane.  
Class A: Membrane-faced surface with a flame-spread rating of 25 or less.
  2. Type II: 1.35-lb/cu. ft. minimum density.
  3. Type II: Applied with a water based liquid adhesive.
- C. Vapor-Retarder Facing: Complying with ASTM C 1136, with permeance not greater than the following when tested according to ASTM E 96, Desiccant Method:
1. Composition: Semi-gloss White Polypropylene-faced, scrim-reinforced foil, with permeance not greater than 0.02 perm.
  2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. CGI Silvercote, Inc.
    - b. Lamtec Corporation.
    - c. Owens-Corning Fiberglas Corporation.
    - d. Simple Saver System as designed by Thermal design, Inc. (800-255-0776).
- D. Retainer Strips: 0.019-inch thick, formed, galvanized steel or PVC retainer clips colored to match insulation facing (White).

2.5 MISCELLANEOUS MATERIALS

- A. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- B. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and with a 30-minute working time.
- C. Shop Primer for Galvanized Metal Surfaces: Zinc dust, zinc-oxide primer selected by manufacturer for compatibility with substrate. Comply with FS TT-P-641.
- D. Finish Painting: Refer to Division 9 Section "Painting." Coordinate primer that is required and compatible with the finish coat system.
- E. Flexible weather resistant EPDM pipe flashing. Isolates piping from building movement. Acceptable product, Dektite as manufactured by ITW Buildex (708-595-3500) or prior approved equal.
- F. Gypsum Board: Type X, of thicknesses indicated, complying with ASTM C 442 or ASTM C 36.

2.6 FABRICATION, GENERAL

- A. General: Design components and field connections required for erection to permit easy assembly and disassembly.
  - 1. Fabricate components in a manner that once assembled in the shop, they may be disassembled, repackaged, and reassembled in the field.
  - 2. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
  - 3. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.
- B. 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.
  - 1. Make shop connections by welding continuous or by using high-strength bolts.
  - 2. Join flanges to webs of continuous built-up members by a continuous submerged arc-welding process.
  - 3. Brace compression flange of primary framing by angles connected between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
  - 4. Weld clips to frames for attaching secondary framing members.
  - 5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.

- C. Secondary Framing: Shop-fabricate framing components to indicated size and section by roll-forming or break-forming, with base plates, 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.
  - 1. Make shop connections by welding or by using high-strength bolts.
  - 2. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime secondary structural members with specified primer after fabrication.
- D. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply the specified air-dried primer immediately after cleaning and pretreating.
  - 1. Prime primary, secondary, and end-wall steel framing members with specified primer to a minimum dry film thickness of 1 mil.  
Prime secondary steel framing formed from metallic-coated steel sheet with red-oxide polyester paint, with a minimum dry film thickness of 0.5 mil on each side.
  - 2. Prime galvanized members, after phosphoric acid pretreatment, with manufacturer's standard zinc dust, zinc-oxide primer.
- E. Tolerances: Comply with MBMA's "Low Rise Building Systems Manual": Chapter IV, Section 9, "Fabrication and Erection Tolerances."

## 2.7 STRUCTURAL FRAMING

- A. 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. If build-up sections are used out of plate, continuous welding shall be employed on at least one side and intermittent welds on the opposite side to suite design requirements.
  - 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
  - 2. Rigid Frames: I-shaped frame sections fabricated from continuous shop-welded, built-up steel plates Minimum plate thickness of 1/4" or structural-steel shapes.
  - 3. Frame Configuration: Two-directional sloped.
  - 4. Exterior Column Type: Straight or Tapered
  - 5. Rafter Type: Tapered.
- B. 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 0.125 inch.
  - 2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch.

- C. 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; minimum 2-1/2-inch wide flanges.
  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 45 to 50 degrees to flange and with minimum 2-1/2-inch wide flanges.
  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 both roof and wall panels.
  4. Flange and Sag Bracing: Minimum 1-5/8-by-1-5/8-inch structural-steel angles, with a minimum thickness of 0.0598 inch, to stiffen primary frame flanges.
  5. Base or Sill Angles: Minimum 3-by-2-by-0.0747-inch zinc-coated (galvanized) steel sheet.
  6. Purlin and Girt Clips: Minimum 0.0747-inch thick, zinc-coated (galvanized) steel sheet.
  7. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0747-inch thick, zinc-coated (galvanized) steel sheet.
  8. 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.
  9. 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.
- D. Canopy Framing: Provide canopy framing as indicated on architectural drawings.
1. Type: Construct using standard secondary framing members indicated above.
- E. Bracing: Provide adjustable wind bracing as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade D; or ASTM A 529/A 529M, Grade 50; 1/2-inch diameter steel; threaded full length or threaded a minimum of 12 inches at each end.
  2. Cable: Cable bracing is not allowed.
  3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
  4. 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.

5. 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.
  6. Diaphragm Action of Panels: Design metal building to resist wind forces through diaphragm action of roof, wall panels and rod bracing.
  7. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.
- F. Bolts: Provide shop-painted bolts unless structural-framing components are in direct contact with roof and wall panels. Provide zinc-plated bolts when structural-framing components are in direct contact with roof and wall panels. The primary frame shall use a minimum bolt size of 5/8" diameter A325 or higher strength.

## 2.8 ROOF PANELS

- A. Structural Standing-Seam Roof Panels: Manufacturer's standard panels complying with the following:
1. Ribbed Roof Panels: Fabricate from 55% Al-Zn unpainted alloy coated steel sheets (commonly called Galvalume), factory formed to provide 24-inch coverage; with 3-inch high (including seam), raised trapezoidal major ribs at panel edges, and intermediate stiffening ribs symmetrically spaced between major ribs for full length of panel. Field seamed. Comply with the following:  
Material: steel panel with aluminum coating with galvanic protection of a zinc coating protected.
    - b. Yield Strength: 50 ksi.
    - c. Metal Thickness: 0.0239 inch minimum.
    - d. Joint Type: Folded, mechanically seamed type.
    - e. Clip System: Floating to accommodate thermal movement (high clip system).
- B. Roof Panel Accessories: Provide components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of roof panels, unless otherwise indicated.
1. Closures: Provide closures at eave and ridge, fabricated of same metal as roof panels.
  2. Clips: Minimum 0.0625-inch thick, stainless-steel panel clips designed to withstand negative-load requirements.
  3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch thick, stainless-steel or nylon-coated aluminum sheet.
  4. Thermal Spacer Blocks: Where panels attach directly to purlins, provide 1-inch thick, thermal spacer blocks; fabricated from extruded polystyrene.
  5. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

- C. Exterior Finish: Unpainted natural finish.
- D. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5 mil.

## 2.9 WALL PANELS

- A. Uninsulated Wall Panels: Provide manufacturer's standard Architectural panels complying with the following:
  - 1. Beaded Panels: Fabricate from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 12-inch coverage, beads at 4-inches o.c. Design panels for mechanical attachment to structure using concealed fasteners, lapping major ribs at panel edges. Comply with the following:  
Material: Zinc-coated (galvanized) steel. Or Aluminum-zinc alloy-coated steel
    - b. Yield Strength: 50 ksi.
    - c. Metal Thickness: 22 gauge minimum or as required for wind exposure.
    - d. Panel Thickness: 1.5 inches.
  - B. Wall Panel Accessories: Provide components required for a complete wall panel assembly, including trim, copings, mullions, sills, corner units, clips, seam covers, battens, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.
    - 1. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- C. Exposed Finish for Exterior Panels: Apply the following coil coating:
  - 1. Silicone Polyester Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and siliconized polyester color topcoat containing not less than 75 percent polyvinylidene fluoride resin by weight, with a total minimum dry film thickness of 1 mil and 30 percent reflective gloss when tested according to ASTM D 523.
    - a. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of five Hunter units.
  - 2. Colors, Textures, and Glosses: As selected by Architect from manufacturer's full range for these characteristics.
- D. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5 mil.

## 2.10 FASCIA AND SOFFIT PANELS

- A. Fascia Panels: Manufacturer's standard panels complying with the following:
  - 1. Match roof panel profile and material and coloring.

2. Flat-Pan Panels: Fabricate from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 12-inch coverage; with 1-inch high, inverted-L, standing-seam, vertical ribs at panel edges. Design panels for mechanical attachment to fascia supports using concealed clips in side laps. Factory apply sealant at each interlocking joint. Comply with the following:
  - a. Material: Zinc-coated (galvanized) steel.
  - b. Yield Strength: 50 ksi.
  - c. Metal Thickness: 24 gauge minimum.
  - d. Joint Type: As standard with manufacturer.
  - f. Clip System: Floating to accommodate thermal movement.

#### 2.11 OVERHEAD DOORS AND FRAMES

- A. Overhead door support framing shall be designed to resist applicable wind loads and shall consist of channel or tube steel jambs as shown with a structural header at the top of the opening. Twenty four gauge galvanized steel flashing, color coordinated, provided to conceal panel edges around the opening unless otherwise specified. Provide weatherstripping at jambs and head.
- b. Service Doors: Refer to Division 8 Section "Sectional Overhead Doors."

#### 2.12 WINDOWS

- A. N.A.

#### 2.13 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer, and complying with the following:
  1. Provide sheet metal accessories of same material and in same finish as roof and wall panels, unless otherwise indicated.
- B. 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 roof or wall sheets by means of plastic caps or factory-applied coating. Comply with the following:
  1. Fasteners for Roof and Wall Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of panels.
  2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
  3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- C. Flashing and Trim: Form from 0.0179-inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. 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. Finish flashing and trim with same finish system as adjacent roof or wall panels.
  1. Opening Trim: Painted subframing of suitable thickness to protect overhead door operation. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

- D. Gutters: Form from 0.0179-inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. 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." Furnish gutter supports spaced 36-inches o.c., fabricated from same metal as gutters. Provide bronze, copper, or aluminum wire ball strainers at outlets. Finish gutters to match roof fascia and rake trim.
  - 1. See special detailing.
- E. Downspouts: PVC piping 3" sealed water tight.
  - 1. See special detailing.
- F. Louvers: Refer to Division 10 Section "Louvers and Vents."
- G. Snow Guards: Not Required.
  - 1. PlasticType Guard: N.A.
    - a. Available Products: N.A.
- H. Closures: Closed-cell, laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match roof and wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- I. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

#### 2.14 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.

#### 2.15 SOURCE QUALITY CONTROL

- A. Owner may employ an independent testing agency to perform source quality-control testing and special inspections, and to prepare test reports.
  - 1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
  - 2. Allow Owner's testing agency access to places where structural framing is being fabricated or produced. Cooperate with Owner's testing agency and provide samples of materials as may be requested for additional testing and evaluation.
  - 3. Special inspections will not be required when fabrication is performed by a fabricator registered and approved by authorities having jurisdiction to perform such work without special inspection.

- B. Correct deficiencies in or remove and replace structural framing that inspections and test reports indicate do not comply with requirements.
- C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with requirements.
- D. Shop-bolted connections will be tested and inspected according to RCSC's "Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Shop-bolted connections will be tested and inspected according to RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  - 1. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.
- F. In addition to visual inspection, shop welding will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option:
  - 1. Liquid-Penetrant Inspection: ASTM E 165.
- G. In addition to visual inspection, shop-welded shear connectors will be inspected and tested according to requirements of AWS D1.1 for stud welding and as follows:
  - 1. Bend tests may performed when visual inspections reveal either less than a continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Tests may be conducted on additional shear connectors when weld fracture occurs on shear connectors already tested, according to requirements of AWS D1.1.
- H. Testing agency will report test results promptly and in writing to Owner, Contractor and Architect.

### PART III – EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of metal building system.
- B. Before erection proceeds, survey elevations and locations of concrete and masonry bearing surfaces, baseplates, and anchor bolts to receive structural framing. Verify compliance with requirements and metal building system manufacturer's tolerances.
  - 1. Engage land surveyor to perform surveying.

#### 3.2 PREPARATION

- A. Clean substrates of substances, including oil, grease, rolling compounds, incompatible primers, and loose mill scale, that impair bond of erection materials.
- B. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

#### 3.3 ERECTION

- A. Erect metal building system according to manufacturer's written 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 in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Baseplates and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting baseplates and bearing plates. Clean bottom surface of baseplates and bearing plates.
  - 1. Set baseplates and bearing plates for structural members on wedges, shims, or setting nuts.
  - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of baseplate or bearing plate before packing with grout.
  - 3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
  - 4. Comply with manufacturer's written instructions for proprietary grout materials.
- E. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when 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. Tighten bolts by turn-of-the-nut method.
- 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. Hold rigidly to a straight line by sag rods.
  - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  - 2. Locate and space wall girts to suit door and window arrangements and heights.
  - 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. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
  2. Locate interior end bay bracing only where indicated.
- I. 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 building structural frame.

### 3.4 ROOF PANEL INSTALLATION

- A. General: Provide roof panels of full length from eave to ridge when possible. Install panels perpendicular to purlins.
1. Field cutting by torch is not permitted.
  2. Rigidly fasten eave end of roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.
  3. Provide weatherseal under ridge cap.
  4. Flash and seal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  5. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
  6. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
  7. Locate and space fastenings in true vertical and horizontal alignment.
  8. Install ridge caps as roof panel work proceeds.
  9. Locate panel splices over, but not attached to, structural supports. Stagger panel splices to avoid a four-panel lap splice condition.
  10. Provide weather-resistant escutcheons for pipe and conduit penetrating roofing panels.
- B. Standing-Seam Roof Panels: Fasten roof panels to purlins with concealed clips at each standing-seam joint. Install clips over top of insulation at location and spacing determined by manufacturer.
1. Install clips to supports with self-drilling fasteners.
  2. Crimp standing seams with manufacturer-approved motorized seamer tool so clip, panel, and factory-applied side-lap sealant are completely engaged.
  3. At panel splices, nest panels with minimum 6-inch end lap, sealed with butyl sealant and fastened together by interlocking clamping plates.

### 3.5 WALL PANEL INSTALLATION

- A. General: Provide panels full height of building. Install panels perpendicular to girts.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weather tight enclosure. Avoid "panel creep" or application not true to line.
  2. Unless otherwise indicated, begin panel installation at corners with center of rib lined up with line of framing.
  3. Field cutting by torch is not permitted.
  4. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws.
  5. Fasten flashing and trim around openings and similar elements with self-tapping screws.
  6. When two rows of panels are required, lap panels 4 inches minimum. Locate panel splices over structural supports.
  7. Install continuous thermal break on all girts.
  8. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
  9. Provide weather-resistant escutcheons for pipe and conduit penetrating exterior walls.
  10. Flash and seal wall panels with weather closures under eaves and rakes, along lower panel edges, and at perimeter of all openings.
  11. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing. Handle and apply sealant and backup according to sealant manufacturer's written instructions.
  12. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
  13. Locate and space fastenings in true vertical and horizontal alignment.
  14. Align wall panel joints with soffit panels and roof panel.
- B. Uninsulated Panels: Install wall panels on exterior side of girts. Attach panels to supports with concealed fasteners as recommended by manufacturer.

### 3.6 FASCIA AND SOFFIT PANEL INSTALLATION

- A. General: Provide panels full width of fasciae and soffits. Install panels perpendicular to support framing.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted panels one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
  2. Field cutting by torch is not permitted.

3. Fasten flashing and trim around openings and similar elements with self-tapping screws.
  4. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
  5. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
  6. Locate and space fastenings in true vertical and horizontal alignment.
  7. Align all seams with wall panels.
- B. Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

### 3.7 INSULATION INSTALLATION

- A. General: Install insulation concurrently with panel installation, according to manufacturer's written instructions and as follows:
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. Replace any section of exposed vapor barrier / insulation that is exposed to view if the damage exceeds 1".
  4. Fall protection requirements as required by authorities shall be maintained during installation.
- B. Blanket Insulation: Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation with both sets of facing tabs sealed to provide a complete vapor retarder. Comply with the following installation method:
1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by panels fastened to secondary framing.
  2. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder facing tabs up and over purlin, overlapping adjoining facing of next insulation course maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
  3. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

### 3.8 DOOR INSTALLATION

- A. General: Comply with manufacturer's written instructions for installing doors, hardware,

operators, and other door components. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for panels.

- B. Hardware: N.A.
- C. Personnel Doors and Frames: N.A.

### 3.9 WINDOW INSTALLATION

- A. General: Comply with manufacturer's written instructions for installing windows, hardware, Operators, and other door components. Coordinate installation with wall flashings and other components. Seal perimeter of each window frame with elastomeric sealant used for panels.

### 3.10 ACCESSORY INSTALLATION

- A. General: Install gutters, downspouts, ventilators, louvers, and other accessories according to manufacturer's written instructions, with positive anchorage to building and weathertight mounting. Coordinate installation with flashings and other components.
  - 1. Install gutter as shown on detail.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide for thermal expansion of metal units; conceal 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).
  - 3. Separations: Separate metal from incompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
- 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: PVC down spouts as detailed. Join sections to provide a water tight Seal from gutter to birdsmooth flow into catch basin. Provide fasteners designed to hold downspouts securely 1-inch away from walls and structure; locate fasteners at top and bottom and at approximately 60-inches o.c. in between.
  - 1. Provide elbow at base of downspout to direct water away from building.

- E. Pipe Flashing: Form EPDM flashing around pipe penetration and roof panels. Fasten and seal to roof panel as recommended by manufacturer.
- F. Continuous Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports according to manufacturer's written instructions. Join sections with splice plates and end-cap skirt assemblies where required to achieve indicated length. Install preformed filler strips at base to seal ventilator to roof panels.
- G. Louvers: Set louvers complete with necessary hardware, anchors, dampers, weather guards, and equipment supports according to manufacturer's written instructions. Locate and place louver units level, plumb, and at indicated alignment with adjacent work.
  - 1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
  - 2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
  - 3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
  - 4. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses, where required to make louver joints weathertight. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

### 3.11 ERECTION AND LOCATION TOLERANCES

- A. Structural-Steel Erection Tolerances: Comply with erection tolerance limits of AISC S303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Roof Panel Installation Tolerances: Shim and align units within installed tolerance of 1/4 inch in 20-feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Wall Panel Installation Tolerances: Shim and align units within installed tolerance of 1/4 inch in 20-feet on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- D. Door Installation Tolerances: Fit doors in frames within clearances specified in SDI 100.

### 3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field quality-control testing.
- B. Extent and Testing Methodology: Testing and verification procedures will be required of high-strength bolted connections. AISC and RCSC allow turn-of-the-nut method, calibrated wrench, alternative design bolts, and direct-tension indicators for bolt-tension testing. Add actual requirements if other than AISC's "10 percent" will be inspected.
  - 1. Bolted connections will be visually inspected.
  - 2. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Load and Resistance Factor Design Specification for

Structural Joints Using ASTM A 325 or A 490 Bolts."

- C. Testing agency will report test results promptly and in writing to Contractor and Architect.

3.13 ADJUSTING

- A. N.A.Delete paragraph and subparagraph below if hardware is specified in Division 8 Section "Door Hardware."

3.14 CLEANING AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean, prepare, and prime or reprime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates.
  - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
  - 2. Apply compatible primer of same type as shop primer used on adjacent surfaces.
- B. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- C. Roof and Wall Panels: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.
  - 1. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- D. Windows: Clean metal surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts. Clean glass promptly after installing windows.

END OF SECTION

**SECTION 15491 – LUBE EQUIPMENT**

**GENERAL**

**1.1 RELATED DOCUMENTS**

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

B. Division 5 Metals.

**1.2 DESCRIPTION**

A. This section includes the following:

1. Air compressor.

B. Provide complete and functional installation in compliance with requirements of the state and local Fire Marshal offices, and all applicable codes and ordinances.

1. Design piping to meet operational pressures for each system.

**1.3 SUBMITTALS**

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Diagram for bolt hole pattern for reel mounting.

2. Shop drawings indicating piping location and type of pipe used between barrels and reels.

3. Product data on reels, reel accessories, pumps, compressor, piping and necessary products for fully operational system.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

A. Acceptable Manufacturers: Provide equipment, piping and accessories in accordance with products and the manufacturers requirements listed in the sections that follow.

**2.2 HOSE REELS**

A. Provide hose reels and pumps.

1. Grease Service:

a. 1 each - Air operated pump for 400 lb. drum, 50:1 ratio, with drum cover, follower plate, connecting hoses and air regulator with gauge. (Lincoln 926 or equal).

b. 1 each - Reel package including reel, 50 ft. or 1/4 in. hose, ball stop, swivel, control valve and connecting hose. (Lincoln 85051 or equal).

2. Oil Service:

a. Waste Oil Transfer Pump: Waste oil tank furnished by Owner, installed by Contractor.

1) 1 each - Air operated diaphragm pump, 1" x 1" with wall bracket (Roper Model 100B10AAL) or equal.

2) 1 each – 3/8" x 3'-0" connect hose & 1 each – 3/4" x 5'-0" connect hose or equal.

3) 1 each - Airline Trio – Air Regulator w/ Gauge, Filter & Lubricator (Watts Model C10-02FRLBJCB-1/4") or equal.

- 4)1 each – 3/8"x 3'-0" Min. Air Hose as needed.
  - 5)For above listed items: Or Balcrank Waste Oil Kit, #4140-015.
  - 6)For connection to waste oil tank provide & install 1 each Dry break coupler & Nipple. (3/4" Balcrank 4140-003 & 4140-004) with 15'-0" 3/4" x 3/4" flexible oil hose and pipe nipple threaded connection at wall penetration (Balcrank #8261) or equal.
  - 7)1 each - mobile oil reservoir- 24 gallon 19.25" bowl, dry-break hydraulic evacuation nipple, 45" to 72" height adjustment large diameter rubber wheels (Balcrank Spillguard premium duty drain #4110-012) or equal.
  - b.4 each Air operated pump for 55 gal. drums, 4:1 ratio, with bung adaptor, connection hoses and air regulators with gauge. (Lincoln 424 or equal).
  - c.Engine Oil:
    - 1)1 each - Reel package including reel, 50 ft. of 1/2 in. hose, ball stop, metered control and connecting hose. (Lincoln 85057 or equal).
  - d.Gear oil:
    - 1)1 each - Reel package including reel, 50 ft. of 1/2 in. hose, ball stop, metered control and connecting hose. (Lincoln 85055 or equal).
  - e.Hydraulic:
    - 1)1 each - Reel package including reel, 50 ft. of 1/2 in. hose, ball stop, metered control and connecting hose. (Lincoln 85057 or equal).
  - f.Automatic Transmission Fluid:
    - 1)1 each - Reel package including reel, 50 ft. of 1/2 in. hose, ball stop, metered control and connecting hose. (Lincoln 85055 or equal).
- 3.Air Service:
- a.2 each - Air hose reel package including reel, 50 ft. of 3/8 inch hose, ball stop, air coupler and air chuck. (Lincoln 85063 or equal).
- 4.Water Service:
- a.2 each - Water hose reel package including reel, 50 ft. of 3/8 inch hose, ball stop, water bib and connecting hose. (Lincoln 85065 or equal).

#### B.Piping

- 1.Lube Oil: Hydraulic Carbon Steel Tubing, ASTM A179, 5/8", .049 wall for Oils and 5/8", .083 wall for grease. a. Fittings: SWAGELOK Tub Fittings (10,000 lb. compression).
- 2.Air and Water: Copper tube, ASTM B88, type L, drawn.  
Fittings: Brass compression type, ANSI B16.26.

C.Provide reel support framing as required for attachment to lube reel wall support.

### 2.3AIR COMPRESSOR

A.Air compressor to meet or exceed the following requirements:

- 1.Mounting: Vertical tank.
- 2.Type: Two-stage, reciprocating, air cooled with cast iron cylinder.
- 3.Receiver: 80-gallon capacity, minimum.
- 4.Capacity: 24.0 cfm free air, minimum.
- 5.Pressure: 140 to 175 psi.
- 6.Motor: 7.5 HP, 208 volt, three phase.
- 7.Control: Start/stop, with provision for no load start. Include magnetic starter.

B.Provide one complete set of replacement filters, and two complete sets of parts lists and shop (repair) manuals.

C.Submit warranty and Owner's manual at completion of project.

## 2.4 MISCELLANEOUS SHOP EQUIPMENT

- A. Provide shop equipment, as specified and shown on the plans, complete with accessories.
- B. Provide certified drawings for rough-in of all anchors and concrete forming.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's installation instructions. Install equipment and systems to facilitate safe, trouble-free operation and maintenance.
- B. Coordinate grades with the architectural plans.
- C. Conform to requirements of the governing Fire Marshal.
- D. Refer to Division 2 Section "Earthwork" for specifications on excavation and backfill.
- E. Install identification labels on all hose reels.

### 3.2 COORDINATION

- A. Coordinate all equipment with ductwork, plumbing fixtures, air lines, piping, etc.
- B. All mounting and finish requirements.
- C. Provide equipment as scheduled and shown on the plans.

END OF SECTION 15491