

July 15, 2015:

**ADDENDUM NO. 2
to the
Iowa Department of Transportation
Proposal No. 14648
North Des Moines Maintenance Facility
Letting Date: 7/22/2015**

Notice To Bidders:

This Addendum is issued to incorporate the following additions, deletions, corrections, and/or clarifications to the terms or specifications and shall hereby be considered a part of the final contract documents. This Addendum shall supersede, modify and/or change all statements to the contrary in the bid proposal and shall take precedence over previous terms or specifications.

CHANGE: The Bidders Questions, Requests for Clarification & Changes (no later than) Date has been extended to 7/20/2015 at 8:00a.m.

Changes to the Drawings:

Sheet SP-3: Clarification - Phase 3 Demolition of existing buildings will not be completed until the Owner has moved from those buildings to the new Buildings. The completion date for the new Maintenance Building is September 1, 2016. Contractor will be responsible for backfilling trenches and holes where existing building footings are removed to the existing grade around the Phase 3 demolition building only.

Sheet SP-4: Replace Sheet SP-4 with Revised Sheet SP-4R dated 7-15-2015. Notes and arrows have been modified for clarification.

Sheet A-0, Wall Type 2: The thin brick can be incorporated in a 12" thick wall as long as the interior structural side remains 4" thick and the thickness of insulation and type of insulation used is sufficient to achieve R-21.

Sheet A-1: Replace Sheet A-1 with Revised Sheet A-1R dated 7-15-2015.

Sheet A-2: Replace Sheet A-2 with Revised Sheet A-2R dated 7-15-2015

Sheet A-3: Replace Sheet A-3 with Revised Sheet A-3R dated 7-15-2015.

Sheet A-6: Replace Sheet A-6 with revised sheet A-6R dated 7-15-2015.

Sheet A-7: Drain tile location is shown on sheet M100 and flows to the storm retention area on North side of property.

Sheet A-9, Detail 1/A-9: Clarifications:

- a) All sidewalks on the site will be Type 1 Sidewalk detail will be used for all sidewalks except where it abuts parking stalls where detail 1/ A-11 will be used.
- b) Where gravel is shown abutting concrete or asphalt, the thickness of gravel shall be 6" thick.

Sheet A-10: Replace Sheet A-10 with revised sheet A-10R dated 7-15-2015

Sheet A-11: Replace Sheet A-11 with revised Sheet A-11R dated 7-15-2015

Sheet A-12R: Replace Sheet A-12R with Revised Sheet A-12R2 dated 7-15-2015

Changes to Specifications:

Section 00 0115: Replace with revised Specification Section 00 0115 dated 07-15-2015

Section 01 4000, Paragraph 1.06.A.: Add the following: Contractor is required to pay for all third party testing and independent testing including manufacturer equipment that is provided by the contractor testing and commissioning. The IDOT will be responsible for paying for testing and commissioning of equipment that is provided by the IDOT. The IDOT will perform concrete core break testing and asphalt testing as required by specifications at no charge to General Contractor.

Section 01 5000, Paragraph 1.06.A: Add the following: Provide and maintain 4'-0" high minimum Vinyl Construction Fencing along the west side of the new maintenance Building to provide separation between the existing building and the new construction. Provide barricades and-or fencing around any excavated holes or trenches as per OSHA requirements until they are backfilled.

Section 03 3000, Paragraph 2.12.D: Color of concrete to be standard gray color.

Section 03 3000, Paragraph 3.4.A: Provide 6 mil vapor barrier under office floor slab and 15 mil Stego Vapor Barrier under the Storage Bay, Mechanics Bay, Wash Bay, and Brine Building floor slabs.

Section 03 3511, Paragraph 2.03.A: Imported sand has not been required on previous projects and the IDOT have not had much problem with shale pops. Bid project with sand available in Des Moines area.

Section 03 3511: Add Paragraph 2.04 – Tie Down Fixtures: Hold down devices in concrete floor of storage and mechanics bay to be Buske #527 with Buske Cover #526. Provide drainage through concrete to sub-base aggregate for drainage of water out of tie down fixture.

Section 03 4100: Replace with revised Specification Section 03 4100 dated 07-15-2015

Section 03 4500: Replace with revised Specification Section 03 4500 dated 07-15-2015

Section 06 4100: Replace with revised Specification Section 06 4100 dated 07-15-2015

Section 07 2100: Replace with revised Specification Section 07 2100 dated 07-15-2015

Section 07 8100: Delete this section

Section 07 8123: Intumescent fire protection to be sprayed on steel column located in office area only.

Section 07 8205: Delete this section.

Section 08 3613: Replace with revised Specification Section 08 3613 dated 07-15-2015

Section 08 3620, Paragraph 2.01.A: Delete Clopay Model 950 from list of approved manufacturers

Section 08 5313, Paragraph 2.01.A.1.: Change manufacturer to Alside, Inc., Performance Series Silver: www.alside.com

Section 10 1101: Replace with revised Specification Section 10 1101 dated 07-15-2015

Section 11 5213: Replace with revised Specification Section 11-5213 dated 07-15-2015.

Substitutions Requests:

Fixture ES-1: Guardian G1996 Safety Station Eye/Face Wash approved as an acceptable manufacturer.

Floor Drain FD-3: Watts FD-100-Er is approved as an acceptable manufacturer.

The information contained in this Addendum modifies, supplements or replaces information contained in the Bidding Documents dated May 21st, 2015 and is hereby made a part of the Contract Documents.

Acknowledge receipt of this Addendum in the space provide on the Form of Bid.

Addendum consists of #Pages pages (plus # attch pages (if any) pages of attachments).

ADDENDUM INDEX

APPLICABLE TO THE PROJECT MANUAL:	Items #1 through Item #6 inclusive.
APPLICABLE TO THE DRAWINGS:	Items #7 through Item #15 inclusive.
ATTACHMENTS:	None.

APPLICABLE TO THE PROJECT MANUAL

ITEM #1 SECTION 22 15 19 – GENERAL-SERVICE PACKAGED AIR COMPRESSORS AND RECEIVERS

- A. **Add** the following words to Subparagraph 2.3.C.1: duplex.
- B. In Subparagraph 2.3.C.7, **change** the word “vertical” to “horizontal”.

ITEM #2 SECTION 23 09 33 – TOXIC AND COMBUSTIBLE GAS DETECTION

- A. **Add** the following paragraph to Article 2.5: In Wash Bay 117, provide splash guard enclosure: BW Technologies Model 1309K0003 (6”H x 8-3/4”W x

- B. **Add** the following Article:

2.7 CENTRAL CO/NOX CONTROLLER

- A. Description: Controller for centralized gas detection monitoring.
- B. Power: 24 VAC, provide 120V to 24 VAC transformer in NEMA 1 junction box.
- C. Size: 11”W x 8” High x 2.8” Deep.
- D. Basis of Design: Honeywell 301C.
- E. Network Capacity: (3) RS-485 channels up to 96 transmitter inputs.
- F. Relay Output: 5A 30 VDC.
- G. Alarm Levels (4) fully programmable alarm levels.

- H. Outputs: 4 DPDT relays; 65 dBA buzzer.
- I. Time Delays: 0, 30, and 45 seconds. Also, 1-99 minutes before and after alarm.
- J. Location: Storage Bay.

ITEM #3 SECTION 23 25 00 – HVAC WATER TREATMENT FOR CLOSED-LOOP SYSTEMS

- A. **Add** the following Article:
 - 2.3 PROPYLENE GLYCOL SOLUTION
 - A. Glycol: Inhibited propylene glycol as manufactured under the trade name of DowFrost.
 - B. Water:
 - 1. Good quality water with the following maximum levels:
 - a. Chloride Ions ~ 25 ppm.
 - a. Sulfate (SO4) Ions ~ 25 ppm.
 - a. Total hardness Ions ~ 25 ppm.
 - 2. Other acceptable processed waters:
 - a. Distilled.
 - a. Deionized.
 - C. Mix heating water loop to 25% propylene glycol strength.

ITEM #4 SECTION 23 34 23 – HVAC POWER VENTILATORS

- A. **Delete** Article 2.3 in its entirety and replace with the following:
 - 2.3 DIRECT DRIVE HOOD REVERSIBLE FOUR WAY PROPELLER FAN
 - A. Description: Roof mounted, four function: exhaust, supply,
 - B. Wheel:
 - 1. Cast aluminum, airfoil, reversible design of the blades and hubs.
 - C. Motors:
 - 1. Permanently lubricated, heavy duty ball bearing type to match with the fan load and furnished at the specific voltage and phase.
 - D. Drive Frame:
 - 1. Galvanized steel.
 - E. Fan Hood:
 - 1. Material type: Steel.
 - 2. Hood panels are arched with interlocking seams for weather protection.
 - 3. Supporting members are galvanized steel angles.
 - F. Birdscreen:
 - 1. Constructed of ½ inch galvanized steel mesh.
 - G. Protective Guards:
 - 1. Mounted to the bottom of the plenum to protect fan
 - H. Plenums:
 - 1. Galvanized steel.
 - 2. Supported at the roof curb by mounting channels.
 - I. Bases:
 - 1. Material type: Steel.
 - J. Fan Panels:

1. Constructed of heavy gauge steel with formed flanges and a double Venturi.
- K. Dampers:
1. Actuator controlled.
 2. Low leakage control damper.
 3. Constructed of galvanized steel frames and blades.
- L. Options/Accessories:
1. Control Center:
 - a. Operating Mode: SRM-CC, modified with SDR.
 - b. Allows operator to manually change the modes of operation of the fan from a convenient remote location.
 - c. Controls are based in a NEMA-1 cabinet constructed of steel.
 - d. Mode selector switch shall be used to engage the fan functions: exhaust, supply, recirculate, and mix.
 - e. Temperature control available with mix mode only to maintain preset temperature.
 - f. Custom control cabinet. See fan schedule.
 2. Curb Seal:
 - a. Rubber seal between the fan and the roof curb
 3. Disconnect Switches:
 - a. NEMA -1 rated: for indoor application, no water.
 - b. Positive electrical shut-off.
 4. Finishes:
 - a. Types: Baked Enamel
 5. Plenum Extension
 - a. Extension: 20 inches
 6. Roof Curbs:
 - a. Material: Galvanized
 - b. Insulation thickness: 1.5 inches
 - c. Coating Type: None

ITEM #5 SECTION 23 83 16 – RADIANT-HEATING HYDRONIC PIPING

- A. **Delete** Paragraph 1.2.A in its entirety and replace with the following: PE-RT: Polyethylene raised temperature tubing.
- B. In Paragraph 2.1.B and Subparagraph 3.2.A.1, **change** the word “PEX” to “PE-RT”.

ITEM #6 SECTION 26 32 13 – ENGINE GENERATORS

- A. **Add** Paragraph 2.1.C as follows:
 - “C. Approved Manufacturers:
 1. Generac Power Systems
 2. Caterpillar Generators”

APPLICABLE TO DRAWINGS

ITEM #7 SHEET MH100 – FLOOR PLAN – MECHANICAL HVAC

- A. **Move** (1) CO/NO2 monitoring panel from Mechanical 115 to Wash Bay 117.
- B. **Add** (1) additional CO/NO2 monitoring panel to the following areas:
 1. Storage Bay 112, west wall.
 2. Mechanical Bay 113, west wall.
 3. Wash Bay 117, west wall.

- C. **Add** (1) central CO/NO2 controller to Storage Bay 112, west wall near supply/exhaust fan control panel. **Provide** (2) #14 AWG THHN wires in ½” EMT conduit from the central controller to each monitoring panel: Provide (4) #14 AWG THHN wires in ½” EMT between central controller and fan controller.

ITEM #8 SHEET MP100 – FLOOR PLAN – MECHANICAL PIPING

- A. In the Infloor heating schedule, **change** the tube quantity per manifold and flow rate to the corresponding values listed below:
1. Zone SB-1: 12 tubes per manifold, 12 GPM.
 2. Zone SB-2: 12 tubes per manifold, 12 GPM.
 3. Zone SB-3: 12 tubes per manifold, 12 GPM.
 4. Zone SB-4: 12 tubes per manifold, 12 GPM.
 5. Zone SB-5: 12 tubes per manifold, 12 GPM.
 6. Zone SB-6: 12 tubes per manifold, 12 GPM.

ITEM #9 SHEET M-501 – MECHANICAL DIAGRAMS

- A. On detail 3, **delete** manual fan control for EF-1 and EF-3, including low voltage wiring. **Provide** single control panel to control EF-1, EF-2, SF-1, and SF-3 fans and dampers. **Provide** single point wiring for power supply to all fans/controls.
- B. On detail 3, **delete** the words “through thermostat” for keyed note #2.
- C. On detail 4, **delete** manual fan control for EF-7, including low voltage wiring. **Provide** single control panel to control SF-2, and EF-7 fans and dampers. **Provide** single point wiring for power supply to all fans/controls.
- D. On detail 4, **delete** the words “through thermostat” for keyed note #2.

ITEM #10 SHEET M-600 – MECHANICAL SCHEDULES

- A. On the fan schedule, **delete** the values from the schedule and **replace** with the following:
1. EF-1 // STORAGE BAY 112 // GREENHECK // ESRMD-30-625 // 8000 // 0.25 // 1160 // DIRECT // 2 // 208 // 3 // 4,6,9.
 2. EF-2 // STORAGE BAY 112 // GREENHECK // ESRMD-30-625 // 8000 // 0.25 // 1160 // DIRECT // 2 // 208 // 3 // 4,6,9.
 3. EF-7 // MECHANICS BAY 113 // GREENHECK // ESRMD-24-240 // 3800 // 0.25 // 1160 // DIRECT // 0.5 // 208 // 3 // 4,6,10.
 4. SF-1 // STORAGE BAY 112 // GREENHECK // ESRMD-36-614 // 8000 // 0.125 // 870 // DIRECT // 1 // 208 // 3 // 4,6,9.
 5. SF-2 // MECHANICS BAY 113 // GREENHECK // ESRMD-24-420 // 3800 // 0.125 // 1160 // DIRECT // 1 // 208 // 3 // 4,6,10.
 6. SF-3 // STORAGE BAY 112 // GREENHECK // ESRMD-36-614 // 8000 // 0.125 // 870 // DIRECT // 1 // 208 // 3 // 4,6,9.
- B. On the fan schedule, change the words “switch” to “dry contact” for keyed notes #5 and #6.
- C. On the fan schedule, **add** the following remarks:
9. Provide single control panel to control EF-1, EF-2, SF-1, and SF-3 fans and dampers. Control panel shall have an off/supply/mix/recirc selector switch, mix mode controlled by temperature controller, variable frequency drive for the exhaust fan room airflow tracking, and a 60-minute timer with hold function. Single point wiring for power supply to all fans/controls.
 10. Provide single control panel to control EF-7 and SF-2 fans and dampers. Control panel shall have an off/supply/mix/recirc selector switch, mix mode controlled by temperature controller, variable frequency drive for the exhaust fan room airflow tracking, and a 60-minute timer with hold function. Single point wiring for power supply to

all fans/controls.

- D. On the expansion tank schedule, **delete** the values from the schedule and **replace** with the following: ET-1 // TACO // CX300-125 // DIAPHRAGM // 79 // 41 // 20 // 24-inches round x 53-3/8" Tall.
- E. On the pump schedule, change the flow rates (GPM) to the corresponding values listed below:
 - 1. Pump ZP-SB-1: 12 GPM.
 - 2. Pump ZP-SB-2: 12 GPM.
 - 3. Pump ZP-SB-3: 12 GPM.
 - 4. Pump ZP-SB-4: 12 GPM.
 - 5. Pump ZP-SB-5: 12 GPM.
 - 6. Pump ZP-SB-6: 12 GPM.

ITEM #11 SHEET EP100 – FLOOR PLAN – ELECTRICAL POWER AND TELECOMMUNICATION

- A. **Move** (1) CO/NO2 monitoring system from Mechanical 115 to Wash Bay 117. **Change** circuit from "A-14" to "A-15".
- B. **Add** (1) additional CO/NO2 monitoring panel to the following areas and circuit as indicated:
 - 1. Storage Bay 112, west wall, circuit C-5.
 - 2. Mechanical Bay 113, west wall, circuit A-9.
 - 3. Wash Bay 117, west wall, circuit A-13.
- C. **Add** (1) central CO/NO2 controller to the following area:
 - 1. Storage Bay 112, west wall near supply/exhaust fan control panel, circuit C-3.
- D. **Change** all standard duplex receptacles in Mechanic Bay 113 and Storage Bays 112 to weather-resistant receptacles with GFCI protection.
- E. **Add** GFCI protection to all receptacles marked with 'WP'.
- F. **Change** circuit feeding "EF-7 and SF-2" from "A-31,33" to "A-49,51,53".
- G. **Change** circuit feeding "SF-1 and SF-3" from "C-18,20" to "C-50,52,54".
- H. **Change** circuit feeding "EF-1 and EF-2" from "C-14,16" to "C-44,46,48".

ITEM #12 SHEET EP101 – BRINE BUILDING - ELECTRICAL

- A. Lighting Fixture Schedule:
 - 1. **Add** Precision Paragon SNL Series to the list of F1 approved equals

ITEM #13 SHEET EP102 – POLE BARN BUILDING - ELECTRICAL

- A. Lighting Fixture Schedule:
 - 1. **Add** ILP HIGH BAY FROSTED Series to the list of F1A approved equals.

ITEM #14 SHEET EP600 – ELECTRICAL SCHEDULES

	DESCRIPTION	WIRES	LOAD	BKR	PH
31	SPARE			2P-20A	A
33					B

A. **R**⁴⁹
e⁵¹
v⁵³
i
s
e

EF-7, SF-2	(3)-#12, #12, 3/4"	3314	3P-20A	A
				B
				C

PANEL A schedule as follows:

B. **Revise** PANEL C schedule as follows:

PH	BKR	LOAD	WIRES	DESCRIPTION	
A	1P-20A			SPARE	14
B	1P-20A			SPARE	16
C	1P-20A			SPARE	18
A	1P-20A			SPARE	20
A	2P-25A	5404	(3)-#10, #10, 3/4"	EF-1, EF-2	44
B					46
C					48
A	2P-20A	1730	(3)-#12, #12, 3/4"	SF-1, SF-3	50
B					52
C					54

ITEM #15 SHEET EL600 – FLOOR PLAN – ELECTRICAL LIGHTING SCHEDULES

A. Lighting Fixture Schedule:

1. **Add** Precision Paragon SNL Series to the list of F2 approved equals.
2. **Add** Lithonia 2VTL Series to the list of F4 approved equals.
3. **Add** Philips EvoGrid Series to the list of F4 approved equals.
4. **Add** Lithonia LE Series to the list of X1 approved equals.
5. **Add** Chloride 55L Series to the list of X1 approved equals.
6. **Add** Evenlite NEX Series to the list of X2 approved equals.
7. **Add** Lithonia LV Series to the list of X2 approved equals.
8. **Add** Spaulding Lighting Poles to the list of P1 approved equals.
9. **Add** Spaulding Lighting Poles to the list of P2 approved equals.

**Please see attached specification changes.
Please see addendum 2 plan changes.**

All Bidders must sign and return this Addendum for the bid opportunity referenced above. Failure to do so may subject the Bidder to disqualification. If a bid response has already been submitted, this Addendum shall be signed and emailed or faxed to the Purchasing Section prior to the scheduled Letting Date.

Company Name *(please print)*

Date

Signature

Sincerely,

Jody McNaughton, Purchasing Agent III
Phone No. 515-239-1298 Fax No. 515-239-1538
Jody.McNaughton@dot.iowa.gov

SECTION 00 0115

LIST OF DRAWING SHEETS (REV. 7-15-2015)

ARCHITECTURAL DRAWINGS:

GRADING PLANS

- 01 VK-1 SITE SURVEY
- 02 SD-1 SITE DEMOLITION PLAN
- 03 SP-1 QUANTITIES & TYPICAL DRAWINGS
- 04 SP-2 GENERAL LAYOUT
- 05 SP-3 GRADING CONTOURS
- 06 SP-4 SITE PLAN
- 07 SP-5 NPDES EROSION CONTROL PLAN

GARAGE PLANS

- 08 A-0 GENERAL NOTES, ABBREVIATIONS, & LEGENDS
- 09 A-1 FLOOR PLAN
- 10 A-2 ENLARGED OFFICE FLOOR PLAN
- 11 A-3 ENLARGED FLOOR PLAN- GARAGE MECHANICAL
- 12 A-4 REFLECTED CEILING PLAN- OFFICE AREA
- 13 A-5 EXTERIOR ELEVATIONS
- 14 A-6 ROOF PLAN
- 15 A-7 DETAILS
- 16 A-8 DETAILS
- 17 A-9 DETAILS
- 18 A-10 BUILDING SECTION
- 19 A-11 WALL DETAIL, ROOF DETAILS, & SITE DETAILS
- 20 A-12 DOOR, WINDOW, & ROOM FINISH SCHEDULES
- 21 SOOO STRUCTURAL NOTES
- 22 SOO1 FOOTING PLAN & DETAILS
- 23 S-3 ROOF STRUCTURAL PLANBUILDING SECTION
- 24 S-4 ROOF STRUCTURAL DETAILS
- 25 G-001 MECHANICAL LEGEND
- 26 MS100 MECHANICAL SITE PLANS
- 27 FS100 FLOOR PLAN-FIRE SUPPRESSION
- 28 FS400 OFFICE AREA PARTIAL PLAN- FIRE SPRINKLER
- 29 P-101 FLOOR PLAN- PLUMBING
- 30 P-400 OFFICE AREA PARTIAL PLANS- PLUMBING
- 31 P-600 PLUMBING SCHEDULES
- 32 M-500 MECHANICAL DETAILS
- 33 M-501 MECHANICAL DIAGRAMS
- 34 M-600 MECHANICAL SCHEDULES
- 35 MH100 FLOOR PLAN- MECHANICAL HVAC
- 36 MH400 OFFICE AREA PARTIAL PLAN, MECHANICAL HVAC
- 37 MP100 FLOOR PLAN- MECHANICAL PIPING

- 38 MP101 FLOOR PLAN- COMPRESSED AIR PIPING
- A. 39 G-002 ELECTRICAL LEGEND
- B. 40 ED100 ELECTRICAL SITE DEMOLITION
- C. 41 ES100 ELECTRICAL SITE PLAN
- D. 42 EL100 FLOOR PLAN- LIGHTING
- E. 43 EL500 ELECTRICAL LIGHTING DETAILS
- F. 44 EL600 ELECTRICAL LIGHTING SCHEDULES
- G. 45 EP100 FLOOR PLAN- ELECTRICAL POWER & TELECOMMUNICATIONS
- H. 46 EP400 PARTIAL PLANS- ELECTRICAL POWER & TELECOMMUNICATIONS
- I. 47 EP500 ELECTRICAL POWER DETAILS
- J. 48 EP600 ELECTRICAL SCHEDULES

BRINE BUILDING PLANS

- 01 BA-1 BRINE BUILDING PLAN & BRINE TANK CONTAINMENT
- 02 BA-2 BRINE BUILDING PLAN & NOTES
- 03 S002 FOOTING PLANS & ROOF FRAMING PLAN
- A. 04 S003 BRINE BUILDING- DETAILS
- B. 05 P-102 BRINE BUILDING- PLUMBING
- C. 06 MH101 BRINE BUILDING- MECHANICAL (HVAC)
- D. 07 EP101 BRINE BUILDING- ELECTRICAL

POLE BUILDING PLANS

- 01 PA-1 POLE BUILDING PLAN & ELEVATIONS
- 02 PA-2 POLE BUILDING ELEVATION- CONTINUED
- 03 PA-3 POLE BUILDING DETAILS
- A. 04 EP102 POLE BUILDING ELECTRICAL

END OF LIST OF DRAWINGS

SECTION 03 4100 (Rev. 7-15-2015)

PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Precast roof double tees.
 - 2. Precast insulated wall panels.
- B. Related Requirements:
 - 1. Section 03 3000 "Cast-in-Place Concrete" for placing connection anchors in concrete.
 - 2. Section 05 1200 "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site one week prior to commencing work of this section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and, if required, water-absorption tests.
- C. Shop Drawings:
 - 1. Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
 - 2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.
 - 3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
 - 4. Indicate separate face and backup mixture locations and thicknesses.
 - 5. Indicate type, size, and length of welded connections by AWS standard symbols.
 - 6. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
 - 7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 - 8. Include and locate openings larger than 10 inches. Where additional structural support is required, include header design.

9. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
 10. Indicate relationship of precast structural concrete units to adjacent materials.
 11. Indicate shim sizes and grouting sequence.
 12. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Show precast structural concrete unit types, connections, types of reinforcement, including special reinforcement, and concrete cover on reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from precast structural concrete.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.
- C. Material Certificates: For the following:
1. Cementitious materials.
 2. Reinforcing materials and prestressing tendons.
 3. Admixtures.
 4. Bearing pads.
 5. Insulation.
 6. Structural-steel shapes and hollow structural sections.
- D. Material Test Reports: For aggregates, by a qualified testing agency.
- E. Source quality-control reports.
- F. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
1. Designated as a PCI-certified plant as follows:
 - a. Group C, Category C4 - Prestressed Deflected Strand Structural Members.
- B. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance, to erect Category S1 - Simple Structural Systems.

- C. Installer Qualifications: An experienced precast concrete erector who has retained a "PCI-Certified Field Auditor" to conduct a field audit of a project installed by erector in Category S1 - Simple Structural Systems and who can produce an Erectors' Post Audit Declaration, according to PCI MNL 127, "PCI Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products."
- D. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- E. Quality-Control Standard: For manufacturing procedures, testing requirements, and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
- F. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code - Steel."
 - 2. AWS D1.4, "Structural Welding Code - Reinforcing Steel."

1.7 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.
- B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
 - 1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
 - 2. Place adequate dunnage of even thickness between each unit.
 - 3. Place stored units so identification marks are clearly visible, and units can be inspected.
- C. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.
- D. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fabricators: Participates in the Precast Concrete Institute plant certification program and is designated as a PCI Certified plant. Manufacturers include, but are not limited to, the following:
 - 1. Coreslab Structures, Omaha, Nebraska.
 - 2. PDM Precast, Inc., Des Moines, Iowa.
 - 3. Wells Concrete, Albany, Minnesota.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design precast structural concrete units.
- B. Design Standards: Comply with ACI 318 and with design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.
- C. Structural Performance: Fabricator to design precast units to support superimposed dead loads, live loads, seismic loads, sway displacement, diaphragm loads, lateral earth loads, and wind loads as indicated on drawings and as required for compliance with the current International Building Code. All precast insulated wall panels and roof double tees shall be prestressed.
 - 1. Design precast structural concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements. Maintain precast structural concrete deflections within limits of ACI 318.
 - a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of minus 18 to plus 120 deg F.
 - 2. Walls shall be designed as shear walls to resist wind loading. Roof double tees shall be designed as shear diaphragms to resist wind loading.
- D. Structural Design:
 - 1. Provide complete design, calculations, and drawings, prepared and signed by a professional engineer experienced in the design of architectural and structural precast units and licensed in the State of Iowa.
 - 2. Maintain the general design concept as shown without increasing or decreasing size of members and without altering profiles and alignment, except as accepted by the Architect.
 - 3. Make the necessary provisions in the design to accommodate all stresses to be encountered.
 - 4. Every precast panel shall be free to move to accommodate the forces acting on it, such as temperature, wind, and building deformations, using a system of bearing and tie-back supports as generally indicated on the drawings. The precast contractor shall be responsible for designing and detailing all supports using the general information shown on the Drawings as a guide only. Special cases of support encountered during the design process shall be brought to the attention of the Architect for purposes of consultation. Typical inserts shown shall be designed and detailed by the precast fabricator.

2.3 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 - 1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain, or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

- B. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Furnish with manufacturer's recommended form-release agent that does not bond with, stain, or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.
- C. Surface Retarder: Chemical set retarder, capable of temporarily delaying setting of newly placed concrete mixture to depth of reveal specified.

2.4 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.
- C. Steel Bar Mats: ASTM A 184, fabricated from ASTM A 615, Grade 60, deformed bars, assembled with clips.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497 or ASTM A 1064, flat sheet.
- F. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.5 PRESTRESSING TENDONS

- A. Pretensioning Strand: ASTM A 886, Grade 270, indented, seven-wire, low-relaxation strand.

2.6 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
 - 1. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33/C 33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
 - 1. Water-Reducing Admixtures: ASTM C 494, Type A.
 - 2. Retarding Admixture: ASTM C 494, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 4. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
 - 5. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 - 7. Plasticizing Admixture: ASTM C 1017, Type I.
 - 8. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.7 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36.
- B. Carbon-Steel-Headed Studs: ASTM A 108, Grade 1010 through 1020, cold finished, AWS D1.1, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. Carbon-Steel Plate: ASTM A 283, Grade C.
- D. Malleable-Iron Castings: ASTM A 47, Grade 32510 or Grade 35028.
- E. Carbon-Steel Castings: ASTM A 27, Grade 60-30.
- F. High-Strength, Low-Alloy Structural Steel: ASTM A 572.
- G. Carbon-Steel Structural Tubing: ASTM A 500, Grade B or Grade C.
- H. Wrought Carbon-Steel Bars: ASTM A 675, Grade 65.
- I. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706.
- J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers, ASTM F 844.
- K. High-Strength Bolts and Nuts: ASTM A 325 or ASTM A 490, Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563; and hardened carbon-steel washers, ASTM F 436.
 - 1. Do not zinc coat ASTM A 490 bolts.
- L. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123 or ASTM A 153.
 - 1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
 - 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.

- M. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.
- N. Welding Electrodes: Comply with AWS standards.
- O. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

2.8 BEARING PADS

- A. Provide one of the following bearing pads for precast structural concrete units as recommended by precast fabricator for application:
 - 1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D 2240; minimum tensile strength 2250 psi, ASTM D 412.
 - 2. Random-Oriented-Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. 70 to 90 Shore, Type A durometer hardness, ASTM D 2240; capable of supporting a compressive stress of 3000 psi with no cracking, splitting, or delaminating in the internal portions of pad. Test one specimen for every 200 pads used in Project.
 - 3. High-Density Plastic: Multimonomer, nonleaching, plastic strip.

2.9 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218.
- B. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218.
- C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881, of type, grade, and class to suit requirements.

2.10 INSULATED FLAT-WALL PANEL ACCESSORIES

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, with thickness of 4 inch sandwiched between 3 inch exterior and 5 inch interior precast concrete panels.
- B. Polyisocyanurate Board Insulation: ASTM C 591, unfaced, with thickness of 4 inch sandwiched between 3 inch exterior and 5 inch interior precast concrete panels.

- C. Design and construct panels to maintain overall R-value of 21 (RSI- value of 5.25), with less than one percent change due to penetrations and connections, when calculated in accordance with ASHRAE 90.1, isothermal planes method.
- D. Wythe Connectors: Manufacturer's standard to connect wythes of precast concrete panels.

2.11 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
 - 1. Limit use of fly ash to 20 percent replacement of portland cement by weight.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested according to ASTM C 1218.
- D. Normal-Weight Concrete Mixtures: Proportion face and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: Limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
- H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.12 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
 - 1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
- B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Edge and Corner Treatment: Uniformly chamfered.

2.13 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1 and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.
- D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified in ASTM A 775, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
 2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 3. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 4. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses and specified in-place loads.
- G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
 1. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete unit.
 2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.

3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
 4. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.
 5. Protect strand ends and anchorages with a minimum of 1-inch thick, nonmetallic, nonshrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.
- H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- I. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
- J. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
1. Place backup concrete mixture to ensure bond with face-mixture concrete.
- K. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.
1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.
- L. Comply with PCI MNL 116 procedures for hot- and cold-weather concrete placement.
- M. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that does not show in finished structure.
- N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- O. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

2.14 CASTING INSULATED WALL PANELS

- A. Cast, screed, and consolidate wythe supported by mold.
- B. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.
- C. Ensure bottom wythe and insulation layer are not disturbed after bottom wythe reaches initial set.

- D. Cast, screed, and consolidate top wythe to meet required finish.
- E. Maintain temperature below 150 deg F in bottom concrete wythe.

2.15 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 116 product dimension tolerances as well as position tolerances for cast-in items.

2.16 COMMERCIAL FINISHES

- A. Grade A Finish: Repair surface blemishes and fill air holes with the exception of air holes 1/16 inch in width or smaller, and form marks where the surface deviation is less than 1/16 inch. Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.
- B. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

2.17 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements and ASTM C 1610, ASTM C 1611, ASTM C 1621, and ASTM C 1712.
- B. Strength of precast structural concrete units is considered deficient if units fail to comply with ACI 318 requirements for concrete strength.
- C. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42.
 - 1. A minimum of three representative cores shall be taken from units of suspect strength, from locations directed by Architect.
 - 2. Test cores in an air-dry condition or, if units are wet under service conditions, test cores after immersion in water in a wet condition.
 - 3. Strength of concrete for each series of three cores is considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
 - 4. Report test results in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports include the following:
 - a. Project identification name and number.
 - b. Date when tests were performed.
 - c. Name of precast concrete fabricator.
 - d. Name of concrete testing agency.
 - e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

- D. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- E. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install precast concrete units until supporting, cast-in-place concrete has attained minimum allowable design compressive strength and until supporting steel or other structure is structurally ready to receive loads from precast concrete units.

3.2 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.
- B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, shoring, and bracing as required to maintain position, stability, and alignment of units until permanent connections are complete.
 - 1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 3. Remove projecting lifting devices and use plastic patch caps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - 4. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
 - 1. Do not permit connections to disrupt continuity of roof flashing.
- D. Field cutting of precast units is not permitted without approval of Architect.

- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.
- F. Welding: Comply with applicable requirements in AWS D1.1 and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
 - 2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
 - 3. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
 - 4. Visually inspect welds and remove, reweld, or repair incomplete and defective welds.
- G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
 - 1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot.
- H. Grouting or Dry-Packing Connections and Joints: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled.
 - 1. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces.
 - 2. Fill joints completely without seepage to other surfaces.
 - 3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
 - 4. Place grout end cap or dam in voids at ends of hollow-core slabs.
 - 5. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
 - 6. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.
- B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Visually inspect field welds and test according to ASTM E 165 or to ASTM E 709 and ASTM E 1444. High-strength bolted connections are subject to inspections.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.

- D. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.5 REPAIRS

- A. Repair precast structural concrete units if permitted by Architect.
 - 1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

3.6 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

3.7 SCHEDULES

- A. Precast insulated wall panels: As noted on plans.
- B. Precast roof double tees: 8'-0" nominal width.
- C. Precast foundations for hoop building: 8'-0" minimum width.

END OF SECTION

SECTION 03 4500
PRECAST ARCHITECTURAL CONCRETE (REV. 7-15-2015)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural precast concrete wall panels.
- B. Supports, anchors, and attachments.
- C. Intermediate and perimeter joint seals.
- D. Grouting under panels.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Admixtures.
- B. Section 07 9005 - Joint Sealers: Perimeter joints with sealant and backing.

1.03 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.
- B. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013 (ANSI/ASHRAE/IESNA Std 90).
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2014.
- F. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
- G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- H. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- I. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- J. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2014.
- K. ASTM C1088 - Standard Specification for Thin Veneer Brick Units Made From Clay or Shale; 2014.
- L. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2010 w/Errata.
- N. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; American Welding Society; 2011.
- O. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete; 2010.
- P. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; Precast/Prestressed Concrete Institute; 2007.
- Q. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; Seventh Edition, 2010.
- R. PCI MNL-122 - Architectural Precast Concrete; Precast/Prestressed Concrete Institute; 2007, Third Edition.
- S. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; 1988, Second Edition.

- T. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; Precast/Prestressed Concrete Institute; 2000.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.
- C. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, dimensions, openings, and relationship to adjacent materials.

1.06 QUALITY ASSURANCE

- A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in Des Moines, Iowa.
- B. Fabricator Qualifications:
 - 1. Plant certified under Precast/Prestressed Concrete Institute Plant Certification Program; product group and category A1 - Architectural Precast Concrete.
 - 2. Fabricator Qualifications: Precast concrete fabricator accredited by IAS according to IAS AC157.
- C. Welder Qualifications: Qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handling: Lift and support precast units only from support points.
- B. Blocking and Lateral Support During Transport and Storage: Use materials that are clean, non-staining, and non-harmful to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.
- C. Protect units to prevent staining, chipping, or spalling of concrete.
- D. Mark units with date of production in location that will be concealed after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Precast Concrete: Office Wall Panels
 - 1. Wells Concrete.
 - 2. Coreslab Structures
 - 3. PDM Precast.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PRECAST UNITS

- A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
 - 1. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
 - 2. Calculate structural properties of units in accordance with ACI 318.
 - 3. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 - 4. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.
- B. Finish Type A: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.

- C. Finish Type D: Thin brick veneer. Remove excess concrete from joints and faces of thin brick units. Protect adjacent surfaces.

2.03 REINFORCEMENT

- A. Comply with requirements of Section 03 2000.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 40 - 40,000 psi.
 - 1. Deformed billet-steel bars.
- C. Steel Welded Wire Reinforcement (WWR): ASTM A 185.

2.04 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Fine and Coarse Structural Aggregates: ASTM C33.
- C. Lightweight Structural Aggregate: ASTM C330.
- D. Air Entrainment Admixture: ASTM C260/C260M.
- E. Grout:
 - 1. Non-shrink, non-metallic, minimum 10,000 psi, 28 day strength.

2.05 THIN BRICK

- A. Thin Brick: ASTM C1088.
 - 1. Type: TBX.
 - 2. Size: Manufacturer's standard Modular.
 - 3. Thickness: 5/8 inch.
 - 4. Tolerances: 1/16 inch.
 - 5. Color, texture, range, special shapes: As selected by Architect from manufacturer's standard range of colors, textures and blends.

2.06 SUPPORT DEVICES

- A. Connecting and Support Devices; Anchors and Inserts: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
 - 1. Clean surfaces of rust, scale, grease, and foreign matter.

2.07 INSULATION

- A. Integral Insulation: Rigid extruded polystyrene insulation.
 - 1. Design and construct panels to maintain overall R-value of 5.4/inch at 40 degrees , with less than one percent change due to penetrations and connections, when calculated in accordance with ASHRAE 90.1, isothermal planes method.
 - 2. Provide minimum insulation thickness of 4 inches.

2.08 ACCESSORIES

- A. Bearing Pads: Vulcanized elastomeric compound molded to size; Shore A Durometer ____; 1/8 inch thick, smooth both sides.

2.09 FABRICATION

- A. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.
- B. Use form liners in accordance with manufacturer's instructions.
- C. Place thin brick in form liner in accordance with manufacturer's instructions. Mix bricks from several cartons for uniform distribution of color variations.
- D. Maintain consistent quality during manufacture.
- E. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.
- F. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.
- G. Cast rigid insulation into units.

- H. Remove protective coating from thin brick using method recommended by manufacturer. Do not damage brick or concrete material in joints.

2.10 FABRICATION TOLERANCES

- A. Conform to PCI MNL-117 and PCI MNL-135, except as specifically amended below.
 - 1. Maximum Variation From Nominal Face Dimensions: Plus or minus 1/8 in.
 - 2. Maximum Variation From Square or Designated Skew: Plus or minus 1/8 inch in 10 feet.
 - 3. Maximum Variation from Thickness: Plus or minus 1/8 in.
 - 4. Maximum Misalignment of Anchors, Inserts, Openings: Plus or minus 1/8 inch.
 - 5. Maximum Bowing of Members: Plus or minus length/360.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.02 PREPARATION

- A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.03 ERECTION

- A. Erect units without damage to shape or finish. Replace or repair damaged panels.
- B. Erect units level and plumb within allowable tolerances.
- C. Align and maintain uniform horizontal and vertical joints as erection progresses.
- D. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.
- E. Weld units in place. Perform welding in accordance with AWS D1.1/D1.1M.
- F. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers. Pack grout to base of unit.

3.04 TOLERANCES

- A. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-135 .

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK (REV. 7-15-2015)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.
- C. Factory finishing.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 12 3600 - Countertops.
- C. Section 09 9000 - Painting and Coating: Site finishing of cabinet exterior.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
- E. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- F. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).
- G. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- H. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 2 inches square, illustrating proposed cabinet and shelf unit substrate and finish.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum 5 years of documented experience.
- B. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.07 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Teragren: www.teragren.com: Iowa Metro Hardwoods Co. 800.351.9293
- B. Moso Veneer: www.mosoveneer.com
- C. Danzer Specialty Veneers Inc.: www.interforest.com: Edinburg, IN
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CABINETS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards (AWS) for Premium Grade.
- B. Plastic Laminate Faced Cabinets: Custom grade.
- C. Cabinets:
 - 1. Finish - Exposed Interior Surfaces: Decorative laminate.
 - 2. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
 - 3. Casework Construction Type: Type A - Frameless.
 - 4. Interface Style for Cabinet and Door: Style 1 - Overlay; reveal overlay.
 - 5. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
 - a. Premium Grade:
 - 1) Provide vertical run and match for doors, drawer fronts and false fronts within each cabinet unit.

2.03 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.

2.04 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Wilsonart International, Inc: www.wilsonart.com.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as follows:
 - 1. Horizontal Surfaces: HGL, 0.039 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 3. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, colors as scheduled, finish as scheduled.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
 - 1. Color: As selected by Architect from manufacturer's standard range.

2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
- C. Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.

1. Product: 117.31.320 manufactured by Hafele.
- D. Drawer Slides:
 1. Type: Full extension.
 2. Static Load Capacity: Heavy Duty grade.
 3. Mounting: Side mounted.
 4. Stops: Integral type.
- E. Hinges: Concealed (fully mortised) self-closing type, steel with polished finish.

2.07 FABRICATION

- A. Cabinet Style: Flush overlay.
- B. Cabinet Doors and Drawer Fronts: Flush style.
- C. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- D. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.
- E. Provide cutouts for plumbing fixtures and as required on plans. Verify locations of cutouts from on-site dimensions with Owner. Seal cut edges.

2.08 FACTORY FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
- C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- D. Finish work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards (AWS), Section 5 - Finishing for Grade specified and as follows:
 1. Transparent:
 - a. System - 12, Polyurethane, Water-based.
 - b. Stain: As selected by Architect.
 - c. Sheen: Semigloss.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units, countertops, and back and side-splashes.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets and counter bases to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

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

3.04 CLEANING

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

END OF SECTION

SECTION 07 2100
THERMAL INSULATION (REV. 7-15-2015)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall, underside of floor slabs, and exterior wall behind wall finish, below overhead doors, and in metal door frames
- B. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.
- C. Fill perimeter window and door shim spaces and cracks with caulk on cracks 1/2" or smaller and spray foam in cracks 1/2" to 2" wide.
- D. Board insulation over membrane waterproofing.

1.02 RELATED REQUIREMENTS

- A. Section 03 4100 - Structural Precast Concrete: Insulation in precast panels.
- B. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.
- C. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.
- D. Section 07 8400 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.
- E. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2014.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- D. Samples: Submit manufacturer's sample, minimum 6 inches square.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying material name and manufacturer.
- B. Storage: Store materials in a clean, dry area in accordance with manufacturer's instructions.
- C. Handling: Protect materials during handling and installation to prevent damage.

1.06 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Heated Concrete Slabs: Extruded polystyrene
- B. Insulation at Perimeter of Foundation: Extruded polystyrene board.
- C. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.
- D. Lay-In Acoustical Insulation Above Drywall Ceilings: Batt insulation with no vapor retarder.
- E. Insulation Over Roof Deck: Polyisocyanurate board.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. R-value; 1 inch of material at 72 degrees F: 5, minimum.
 - 4. Board Size: 48 x 96 inch.
 - 5. Board Thickness: 2 inches.
 - 6. Board Edges: Square.
 - 7. Compressive Resistance: 15 psi.
 - 8. Board Density: 1.3 lb/cu ft.
 - 9. Water Absorption, Maximum: 0.3 percent, by volume.
 - 10. Manufacturers:
 - a. Dow Chemical Co: www.dow.com.
 - b. Owens Corning Corporation; Foamular XPS: www.ocbuildingspec.com.
 - c. Pactiv Building Products; GreenGuard XPS TYPE IV 25 PSI: greenguard.pactiv.com.
 - 11. Substitutions: See Section 01 6000 - Product Requirements.
- B. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C 1289; Type I, aluminum foil both faces; Class 2, glass fiber-reinforced core.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. Compressive Strength: 16 psi
 - 4. Board Size: 48 x 96 inch.
 - 5. Thermal Resistance: R-value of 5.4 minimum per inch.
 - 6. Board Edges: Square.
 - 7. Manufacturers:
 - a. Atlas Wall CI Board, division of Atlas Roofing Corporation; EnergyShield: www.atlasroofing.com.
 - b. Dow Chemical Co: www.dow.com.
 - c. GAF: www.gaf.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.

2.03 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Flame Spread Index: - 5 (Class A), Smoke Developed - 35 (Class A), when tested in accordance with ASTM E84.
 - 2. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 3. Formaldehyde Content: Zero.
 - 4. Thermal Resistance: 3.5 inch = R-13, 5.5 inch = R-21.

5. Thickness: Match wall thickness.
6. Sound Attenuation: STC of .43 - .50.
7. Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville Corporation: www.jm.com.
 - c. Owens Corning Corp: www.owenscorning.com.
8. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Sheet Vapor Retarder: Black polyethylene film for above grade application, 10 mil thick.
- B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- C. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.
- D. Air Baffle: Soffit insulation baffle.
 1. Manufacturer: Berger Building Products 1-800-523-8852.
 2. Material: Non-porous PVC.
 3. Size: 41 x 22 inches.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER - ONLY AT OVERHEAD DOORS

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

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Install boards horizontally on walls.
 1. Place boards to maximize adhesive contact.
 2. Install in running bond pattern.
 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Extend boards over expansion joints, unbonded to wall on one side of joint.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.04 BOARD INSTALLATION UNDER CONCRETE SLABS

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

3.05 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
- F. Staple or nail facing flanges in place at maximum 6 inches on center.
- G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

- H. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over member face.
- I. Tape seal tears or cuts in vapor retarder.
- J. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.
- K. Install insulation baffles in soffit.

3.06 PROTECTION

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

3.07 SCHEDULES

- A. Office Area Ceiling Insulation: R49 Cotton Fiber Insulation, in layers at right angles.
- B. Stud wall insulation: R-21 Cotton Fiber Insulation.
- C. Wall cavity spaces and cracks surrounding door and window frames. (1/2" or less caulk with sealant, 1/2" to 2" gap fill with Spray foam insulation. See section 07 2119)
- D. Above Deck Insulation: Rigid insulation on top of precast tees (R-38 minimum).
- E. Rigid Insulation: Fill inside of hollow metal door and window frames on exterior walls
- F. Rigid Insulation: Under hydronic slab heating tubing (R-10 minimum).
- G. Rigid Insulation: Perimeter foundation walls at overhead doors (R-10 minimum)

END OF SECTION

SECTION 08 3613
SECTIONAL DOORS (REV. 7-15-2015)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead insulated sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Rough wood framing for door opening.
- B. Section 07 9005 - Joint Sealers: Perimeter sealant and backup materials.
- C. Section 08 7100 - Door Hardware: Lock cylinders.
- D. Section 08 8000 - Glazing: Glazing for door lights.
- E. Section 09 9000 - Painting and Coating: Finish painting.
- F. Section 26 0534 - Conduit: Empty conduit from control units to door operator.
- G. Section 26 2717 - Equipment Wiring.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- D. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; Door & Access Systems Manufacturers' Association, International; 2004.
- E. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2011.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Samples: Submit two panel finish samples, illustrating color and finish.
- E. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- F. Operation Data: Include normal operation, troubleshooting, and adjusting.
- G. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for electric motor and transmission.
- D. Provide 10 year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Other Acceptable Manufacturers:
 - 1. Clopay Corporation: www.clopaydoor.com.
 - 2. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
 - 3. CHI Overhead Doors: www.chiohd.com

2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: Stile and rail steel with solid panels construction with standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 - 2. Door Nominal Thickness: 2 inches thick.
 - 3. Exterior Finish: Factory finished with acrylic baked enamel; color as selected by Architect.
 - 4. Interior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
 - 5. Operation: Electric.
- B. Door Panels: Stile and rail construction, of steel sheet .0179 inch thick, with welded joints; rabbeted weather joints at meeting rails.
- C. Stiffener plates to be added to top two panels.

2.03 DOOR COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch thick; 3 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Rollers: Support rollers shall have stainless steel axels, sealed steel bearings, and High-Density-Polyurethane (HDPE) tires on stainless steel wheels (on Brine Building and Wash Bay doors only).
- C. Hinge Assemblies: Heavy duty hinges and adjustable rollers holders and HDPE rollers of stainless steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side (Storage and Mechanics Bay and Pole Building doors).
- D. Lift Mechanism: Torsion spring on cross head shaft, with braided stainless steel lifting cables.
 - 1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.
- E. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- F. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- G. Head Weatherstripping: EPDM rubber seal, one piece full length.
- H. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

- I. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Insulation: Foamed-in-place polyurethane, bonded to facing.
 - 1. R value of 17.5.

2.05 ELECTRICAL OPERATION (TYPE 1 OPERATORS)

- A. Electrical Characteristics:
 - 1. 1/3 hp; manually operable in case of power failure, transit speed of 12 inches per second.
 - 2. 115 volts, single phase, 60 Hz.
- B. Motor: NEMA MG1, Type 1 (Type 1 Operator), NEMA MG1, Type 4 and 12 with carwash modification (Type 2 Operator).
- C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- D. Disconnect Switch: Factory mount disconnect switch in control panel.
- E. Electric Operator: Side mounted on cross head shaft (Type 1), adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.
- F. Control Station: Standard three button (open-close-stop) momentary type control for each electric operator. Waterproof three button, momentary type control in Wash Bay and Brine Building.
 - 1. 24 volt circuit.
 - 2. Surface mounted.
 - 3. Locate at inside door jamb (Operator Type 1).
- G. Radio Control Antenna Detector.
- H. Hand Held Transmitter: (Type 1 Operators) Digital control, resettable.
 - 1. Provide 20) programmable 4 button operators.
- I. Photo Electric Sensor: furnish system to detect obstructions and reverse door without requiring door to contact obstruction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Install treated lumber frame construction. See plans for location of lumber.
- C. Anchor assembly to wood frame construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.

- F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- G. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 9005.
- H. Install perimeter trim and weatherstripping.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch in ten feet.
- B. Maximum Variation from Level: 1/16 inch in ten feet.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.
- B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

3.07 PROTECTION

- A. Protect installed products from damage during subsequent construction.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

3.08 SCHEDULE

Opening No.:	Door Type	Operator Type
112G	HDPE	Type 1
112H	HDPE	Type 1
112I	HDPE	Type 1
112J	HDPE	Type 1
112K	HDPE	Type 1
112L	HDPE	Type 1
112M	HDPE	Type 1
112N	HDPE	Type 1
112O	HDPE	Type 1
112P	HDPE	Type 1
112Q	HDPE	Type 1
113B	HDPE	Type 1
113C	HDPE	Type 1
113E	HDPE	Type 1

Pole Building: All overhead doors are Uninsulated with no Electric Operators

END OF SECTION

SECTION 10 1101
VISUAL DISPLAY BOARDS (REV. 7-15-2015)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Markerboards and Tackboards.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on markerboard, tackboard, tackboard surface covering, trim, and accessories.
- C. Manufacturer's printed installation instructions.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Visual Display Boards:
 - 1. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 VISUAL DISPLAY BOARDS

- A. Markerboards: Porcelain enamel on steel, laminated to core.
 - 1. Color: White.
 - 2. Steel Face Sheet Thickness: 24 gage, 0.0239 inch .
 - 3. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
 - 4. Backing: Aluminum foil, laminated to core.
 - 5. Height: 48 inches.
 - 6. Length: 8 feet, in one piece.
 - 7. Frame: Extruded aluminum, with concealed fasteners.
 - 8. Frame Finish: Anodized, natural.
 - 9. Accessories: Provide chalk tray.
- B. Tackboards: Fine-grained, homogeneous natural cork.
 - 1. Cork Thickness: 1/8 inch.
 - 2. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.
 - 3. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
 - 4. Height: 36 inches.
 - 5. Length: 48 inches, in one piece.
 - 6. Frame: Extruded aluminum, with concealed fasteners.
 - 7. Frame Profile: As indicated on drawings
 - 8. Frame Finish: Anodized, natural.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.

3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at date of Substantial Completion.

3.04 SCHEDULE

- A. Corridor 102: Two 48 x 96 inch tackboards.
- B. Conference Room 104: One 48 x 96 inch markerboard.

END OF SECTION

SECTION 11 5213
PROJECTION SCREENS (REV. 7-15-2015)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Front projection screen assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking in walls and ceilings.
- B. Section 09 5100 - Acoustical Ceilings: Suspended panel ceilings for recessed screens.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 2100 - Allowances, for cash allowances affecting this section.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: For custom installations, indicate dimensions, verified field measurements, mounting details, and interface with adjacent construction.
- D. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Iowa Department of Transportation's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Experienced in manufacturing products specified in this section.
- B. Installer Qualifications: Experienced in installation of the work of this section.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver projection screens to project site in manufacturer's original unopened packaging. Inspect for damage and size before accepting delivery.
- B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F. Stack according to manufacturer's recommendations.
- C. Acclimate screens to building temperatures for 24 hours prior to installation, or in accordance with manufacturer's recommendations.

1.07 FIELD CONDITIONS

- A. Maintain interior of building between 60 degrees F and 75 degrees F during and after installation of projection screens.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide ____ year manufacturer warranty for projection screen assembly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bretford: www.bretford.com.
- B. Da-Lite Screen Company: www.da-lite.com.
- C. Draper, Inc: www.draperinc.com.

- D. Stewart Filmscreen Corporation: www.stewartfilmscreen.com.
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRONT PROJECTION SCREENS

- A. Front Projection Screens: Factory assembled unless otherwise indicated.
 - 1. Dimensions: As indicated on drawings.
 - 2. In Conference Room 104: Manual, matte light diffusing fabric screen, ceiling recessed.
 - a. Screen Viewing Area: 48 inch high x 96 inch wide.
- B. Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
 - 1. Material: Matte white vinyl on fiberglass backing, with nominal gain of 1.0 over viewing angle not less than 70 degrees from axis, horizontally and vertically.
 - 2. Seams: No seams permitted in fabric up to 96 inch high by 72 inch wide.
- C. Masking Borders: White, on four sides.
- D. Concealed-in-Ceiling Screen Cases: Steel; integral roller brackets.
 - 1. Door Slat: Self trim; self-closing and -opening.
 - 2. Case Finish: Baked enamel.
 - 3. Case Color: White.
 - 4. End Caps: Steel; finished to match case.
- E. Manually-Operated Screens:
 - 1. Roller: 1-3/4 inch aluminum; spring loaded with locking device.
 - 2. Screen Pull: Ring on bottom bar.
 - 3. Vertical Tensioning: Screen fabric weighted at bottom with steel bar with plastic end caps.
 - 4. Horizontal Tensioning: Tensioning bar.
- F. Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate is finished and ready to accept screen installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that openings for recessed screens are correctly sized.
- D. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.02 PREPARATION

- A. Coordinate screen installation with installation of projection systems.
- B. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, fire suppression, and registers and grilles.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.
- B. Do not field cut screens.
- C. Install screens in mountings as specified and as indicated on drawings.
- D. Install plumb and level.
- E. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch up, repair, or replace damaged products before Substantial Completion.

END OF SECTION