Larry Chilese Architects Inc.

HTRS School Addition
Humboldt Nebraska

ADDENDUM TWO 6/12/2014

Addendum Two Item One: Bid Bond Rate Shall be 5% of the proposal.

Addendum Two Item Two: No bids shall be withdrawn for a period of 60 days without express permission from the School Board.

Addendum Two Item Three: Specifications-Section 00800 1.3F-Clarification: City of Humboldt will issue Building Permit-permit fees to be the responsibility of the Owner.

Addendum Two Item Four: 2/A-15 Stair Hand Rail East face-due to 2" Pre-Cast Panel outset stands off 2" West and 4" on the East-dowel stair foundation into cast concrete only.

Addendum Two Item Five: Clarification Sheet i-15 Cabinet Hardware to be 4" wire pulls satin chrome, European Concealed fully adjustable 165 degree satin chrome hinges, full extension 500lbs Heavy Duty drawer slides

Addendum Two Item Six: Precast panels are 4"-3" insulation-4"- or 4-3-4-precast panels will not be allowed to be cast on-site-see precast specification attachment

Addendum Two Item Seven: All sidewalks to be 4" thick L3500 design mix 6x6x2.9x2.9

Addendum Two Item Eight: Sheet A-7 shows 4' overhang along West Façade Overhang and South Façade overhang. **Clarification:** West Façade Overhang is **5'** as per the detail sheet A-14/5, South façade overhang is **4'**.

Addendum Two Item Nine: All exterior paving is 6" thick, reinforcing as spec'd.

Addendum Two Item Ten: Dark Room Counter Detail Sht A-17 Stainless Steel is correct-noted on Sheet A-9 as a base cabinet-this is incorrect.

Addendum Two Item Eleven: Delete Stainless Steel Counter and Table shown in Concession Room #119 Detail Sheet A-18-

Addendum Two Item Twelve: Electrical: Sheets A-12-A13 show a recessed exterior step light on each side of the cast retaining wall on the South Entrance-quan [2] one ea side- Electrical

Drawings do not show those fixtures: Clarification: **Provide** [2] Cooper Lighting Zuma 1211-LP-CF9 Plane Light, Face Color plate "blue" from mfgr std Colors-LED Light-Center color white perimeter color blue.

Addendum Two Item Thirteen: Sheet E-5 **Electrical** Service and Distribution Diagram: Electrical contractor shall delete the C.T Compartment within the Main Distribution Panel 'MDP' and delete the NPPD Electric Meter. N.P.P.D. will install the C.T's and Meter on their Transformer.

Addendum Two Item Fourteen: Electrical Clarification: Sheet: Data1-2; All TV outlets to be located 7'-0" AFF
Add [1] additional data outlet Room #119 Concessions
Add [2] additional data outlets to Room #213 South Wall

Addendum Two Item Fifteen: Electrical: Room 121 Entrance Monitor adds [2] 120v wall outlets to East wall face.

Addendum Two Item Sixteen: Electrical: Electrical Specification Division 26 replaces previously issued Division 16 Spec.

Addendum Two Item Seventeen: Electrical: pad mount transformer location has changed from adjacent to the East side of the Building to 80' south and 40' East of the previous location-see attachment. This increases the length of the secondary service by approximately 100', the Transformer will be required to be protected by [5] 6" dia 10 ga concrete filled pipe Bollards, painted yellow, 36" above grade-36" below grade set in concrete.

Addendum Two Item Eighteen Electrical: The Electrical Contractor shall furnish and install a directionally bored 4" continuous conduit from the location of the existing power pole and new junction box, under the street Easterly to a riser pole approximately 130' away to the east. The existing power pole on School property will be removed by NPPD.

Addendum Two Item Nineteen: Roofing Clarification Sheet A-10 indicates roofing up wall 96'-corrected to 96". All EPDM to be 6 mil, spec'd and type as shown on Sheet A-10 Detail 3.

Addendum Two Item Twenty: FIRE MASHAL REVIEW ITEMS:

- **A.** Doors #118A & #118B shown as 90 min doors need to be replaced at construction outset to provide Fire Barrier during construction.
- **B.** Doors #118 & 118C revise from single leaf doors to pair of 3070 doors with panic devices, closures seals sweeps-removable mullions, thumb latch entry side.

C. Classrooms 211 and 212 {windowless rooms} **Add** shall each be provided with Electrical Fixture #9 (Battery/Emergency Exit Light) on their North Walls near exit door.

D. Room 308 {toilet} **Add** handicap grab bars to toilet using ADA clearances shown on Sheet A-9, add insulation to exposed sing drain and supply lines. Room **enlarges** southward 12". Width North to South changes from 5'-6" to 6'-6"

E. Architectural Sheet A-14 Detail #6: Clarification: Enclosed Soffit area at the 5' Overhang DOES NOT require Fire Sprinklers if plywood treated with Fire Retardant. **Add** Sheathing ¾" Plywood exposed in this area ONLY roof and wall face: Treat with **Flame Stop Inc. Flame Stop II** both sides entire concealed canopy area. Spray Rate 1 Gal/125 Sq Ft. (Dry Fire Sprinkler System will be accepted as an Alternate Solution in lieu of Flame Retardant)

Addendum Two Item Twenty One: Interior Sheet i1.7 Btm Right note FN-1: Provide Allowance for purchase and installation of a demountable Wall System **TO BE INCLUDED IN THE BID PROPOSAL COST: THE AMOUNT OF *$30,000.00***

Addendum Two Item Twenty Two: Room 207 Boiler Room: ADD an additional exit Door in Room #207 at Rooms North End. Door to be #207A and match #207 in size, type and Hardware and Fire Rating.

Addendum Two Item Twenty Three: STRUCTURAL SHEETS:
Attached revised Structural Sheets #'s S 2.0-S 2.2-S 3.2- S 3.3- S6.0. Total [5] sheets. These Sheets replace and supersede all previous sheets and Addendums.

Addendum Two Item Twenty Four: Clarification: Testing Services required and paid for by the General Contractor:
Dirtwork-all haulins-compactions-borrow pits-subgrades-etc., per Soils Report
Concrete-all cast concrete footings-grade beams-flatworks-paving etc.,

Addendum Two Item P-1

Sheet M-1, PLBG

1. Sanitary sewer piping extending from Toilet Rooms running south to Concessions Room #119 shall be labeled as 4" rather than 3" shown on drawing.

Addendum Two Item P-2

Sheet M-2, PLBG

1. Sanitary sewer piping extending from Concession Room to new sprinkler entrance location shall be labeled as 4".

Addendum Two Item M-1

CHANGES TO MECHANICAL SPECIFICATIONS:

Prior Approvals: The following manufacturers have received permission to bid products as equal to items or equipment specified:

Diffusers, Registers & Grilles	NAILOR
Louvers & Auto Dampers	GREENHECK
Variable Frequency Drives	EMERSON
Volume Control Boxes	NAILOR
Spiral Ductwork	SPIRAL PIPE OF TEXAS

Addendum Two Item M-2

SPRINKLERS,

Page 21-1, line 23: Change to read, "All wiring and conduit, and electrical connections to sprinkler system devices requiring power shall be furnished and installed by the Electrical Contractor".

Addendum Two Item M-3

SPRINKLERS

Page 21-3, lines 8 thru 30: Change to read as follows,

Piping 2" and smaller shall be Schedule 40 piping and fittings with threaded joints.

Piping 2-1/2" and larger shall be Schedule 10 piping with fittings made using grooved couplings.

Schedule 5 pipe will NOT be allowed.

Addendum Two Item M-4

SPRINKLERS

Page 21-4, line 32; ADD:

"Tamper switch on Post Indicator Valve shall be furnished and installed by Sprinkler Contractor. Post Indicator Valve furnished and installed by Utility Contractor, and conduit and wiring by Electrical Contractor."

Addendum Two Item M-5

SPRINKLERS

Page 21-5, line 8: Clarification item

Sprinkler work to be done as a part of this project shall only be installed to serve the new building addition. Existing system in all other areas of the existing building shall remain.

Addendum Two Item M-6

HVAC:

Page 23-74, line 27: Add the following feature; "BOILER SHUT-DOWN":

Emergency shut-down controls shall be furnished to comply with ASME CSD-1 safety shut-down. Switch shall be installed adjacent to door just inside Boiler Room. Switch shall be red "mushroom" type switch and shall be labeled "EMERGENCY BOILER SYSTEM SHUT-DOWN".

Addendum Two Item M-7

Sheet M-1, HVAC

Label supply register in Corridor #100 at column line "G" as a 14"x 6" R-1, 450 CFM.

Addendum Two Item M-8

Sheet M-2, MECH

Relocation of existing sprinkler entrance from room shown at Column "R" to new room at Column "T" is the only work involved with the existing sprinkler systems installed in the existing portions of the building.

Addendum Two Item M-9

Sheet M-3: - HVAC Plan

Hot and chilled water supply and return piping leaving Boiler Room #207 and extending to Mechanical Room #203 shall be labeled as 3" piping.

Addendum Two Item M-10

Sheet M-3: - HVAC Plan

Hot & chilled water supply and return piping shown in Mechanical Room #203 and extending up to Mechanical Room #303 shall be labeled 2-1/2" CWS & R and 2" HWS & R.

Addendum Two Item M-11

Sheet M-3: - HVAC Plan

Boiler Room #207 shall include ASME CSD-1 safety shut-down controls as mentioned elsewhere in this Addendum to the Mechanical Specifications CSD-1 safety shut-down shall interrupt power to gas valves on boilers to stop gas supply and boiler operation.

Addendum Two Item M-12

Sheet M-4: HVAC Plan

Piping from Mechanical Room 303 running down thru Dark Room #304 to Mechanical Room #203 below shall be labeled 2-1/2" CWS & R DN and 2" HWS & R DN .

Addendum Two Item M-13

Sheet M-4: HVAC Plan

Toilet Room #308; label exhaust fan serving room as EF-4, 100 CFM. Note discharge duct as a 6"Ø up thru roof.

Addendum Two Item M-14

Sheet M-4: HVAC Plan

Volume box controlling supply air to Classroom #307 shall be labeled VB-5, 1000 CFM.

Addendum Two Item M-15

Sheet M-4: HVAC Plan

Volume Box controlling supply air to Art Classroom #305 shall be labeled VB-6, 1400 CFM.

Addendum Two Item M-16

Sheet M-4: HVAC Plan

Add a new volume box in Corridor #306 in 10/6 duct supplying Toilet Rooms #301 & #302. Volume Box shall be labeled VB-2, 500 CFM.

Addendum Two Item M-17

Sheet M-4: HVAC Plan

Supply air registers in Wrestling Room #309 shall be labeled 18"x 8" D-3, 600 CFM EACH.

Addendum Two Item M-18

Sheet M-6

Enlarged Mechanical Room #203 shown on Detail #1, CWS&R and HWS&R piping leaving room and running to Boiler Room shall be labeled 3" CWS&R and 2-1/2" HWS&R.

Addendum Two Item M-19

Sheet M-6

Mechanical Room #303, Detail #2, chilled water S&R risers in Darkroom shall be labeled 2-1/2".

Addendum Two Item M-20

Sheet M-6

Mechanical Room #310, Detail #4,CWS&R and HWS&R risers running down to Boiler Room #207 shall be labeled 2-1/2" CWS&R and 2" HWS&R.

Addendum Two Item M-21

Sheet M-7-

Schedules and Details; Air Handling Unit Schedule, Add Note 3 beneath schedule as follows:

"3. Furnish duct or unit mounted smoke detectors on inlet side of return fans and interlock with AHU and RF power to shut down air handling systems if smoke in airstream is detected."

DIVISION 26 - ELECTRICAL

SECTION 26 00 00 - ELECTRICAL

PART 1 - GENERAL

SCOPE

This section is supplemental to the "General Conditions", "Supplemental General Conditions", and the "Special Conditions" as set forth on other pages of this specification, and shall apply to all phases of work specified, shown on the drawings, or required to provide for complete installation of the Electrical Systems for this project. Where at variance with the General Conditions, Supplemental General Conditions or the Special Conditions, these General Provisions - Electrical shall have preference.

The work covered by this specification shall include furnishing all labor, material, equipment and services to construct and install the complete electrical system as shown on the accompanying drawings and specified herein.

CODES

All work shall be in accordance with applicable state and local Codes. All work shall comply with the rules and recommendations of the National Fire Protection Association, all requirements of local utility companies, and the State Fire Inspection Bureau. These codes, rules, recommendations, and requirements shall take precedence if the drawings and specifications are not in conformance therewith.

PERMITS AND FEES

The Contractor shall familiarize himself with all requirements as to permits, fees, codes and ordinances, etc., and arrange to comply with them. All permits, licenses, fees, inspections, and arrangements required for the work under this contract shall be obtained by the Contractor at his expense.

MATERIALS AND EQUIPMENT

It is the intent of these specifications to establish quality standards of materials and equipment installed. Hence, specific items are identified by manufacturer, trade name or catalog designation.

If two or more different products are defined or indicated, or if

specifications and plans differ in this regard or in regard to the method of work to be performed, it shall be assumed that the product of greater quality and value and the greater amount of work be used for bidding purposes and the matter brought to the attention of the Architect-Engineer.

Should the Contractor propose to furnish materials and equipment other than those specified, as permitted by the 'or approved equal' clauses, he shall submit complete shop drawings or descriptive catalog material with his bid proposal and shall indicate any addition or deduction to the Contract price.

If no such material is submitted with his bid, he shall furnish materials and equipment exactly as specified.

The Architect-Engineer shall be the sole and final judge as to the quality of substitute materials and equipment.

Where such substitutions alter the design or space requirements indicated on the plans, the Contractor shall include all items of cost for the revised design and construction including cost of all allied trades involved.

In all cases where substitutions are permitted, the Contractor shall bear any extra cost of evaluating the equality of the materials and equipment to be installed.

All electrical products used on this project shall be listed and labeled by Underwriter's Laboratories Inc. (UL) and shall conform to the applicable standards of the National Electrical Manufacturers Assn. (NEMA)

All materials and equipment shall be new and previously unused unless otherwise indicated on the drawings.

The outside surface of most electrical equipment such as metal-clad and metal-enclosed switchgear, motor control centers, switchboards and panels are finished at the factory and great care shall be exercised not to damage this original finish during the installation of the equipment and during construction work. If the factory finish is damaged by the Contractors, the damaged area shall be refinished and the refinished surface shall be equivalent in every respect to the original surface including color, texture and smoothness of finish. Refinishing paint or lacquer if furnished with the equipment may be used: otherwise the paint or lacquer shall be obtained from the equipment manufacturer.

Where lighting panels, conduits, etc., are installed in finished areas, these will be painted by others under the painting specification to match the rest of the wall finish. Care must be taken to insure that hinges, locks, etc., are not filled with paint that will cause them to malfunction or chip the paint off the finish surface when operated.

All disconnect switches and starters shall have identification of the equipment served neatly stenciled on the switch, or labeled with an embossed plastic tape label made with a "Dymo-Tape" machine or equal. Tape shall be black, 1/2 inch wide with white letters. Label shall have the complete name of the equipment as well as its mark or number, such as "Air Handling Unit AH-1".

COORDINATION OF WORK

The contract drawings indicate the extent and the general location and arrangement of equipment, conduit and wiring. The Contractor shall study Architectural, Structural and Mechanical Plans and details so that the outlets and equipment will be properly located and readily accessible and so that possible installation conflicts will be averted. If concealed, access doors shall be provided. Lighting fixtures, equipment and outlets shall be located to avoid interference with mechanical or structural features; otherwise, lighting fixtures shall be symmetrically located according to the room arrangement. If any conflicts occur necessitating departures from the contract drawings, details of departures and reasons therefore shall be submitted as soon as practicable for written approval of the Architect-Engineer.

The location of all electrical equipment is approximate. The exact location of the electrical equipment shall be determined in the field to avoid interference with mechanical equipment and piping. When it becomes necessary to locate pipes above panels, and adequate drip shield shall be provided over the panel. All panels shall be located so as to be readily accessible by providing a three-foot clear space in the area directly in front of the panels. See NEC Art. (110.26) coordinate with other contractors.

Discrepancies shown on different plans, or between plans and actual field conditions, or between plans and specifications, shall be brought promptly to the attention of the Architect-Engineer for a decision.

All installation and workmanship shall be of the best quality and performed by experienced workmen.

FIXTURES AND EQUIPMENT FURNISHED BY OTHERS

Where the drawings indicate fixtures and equipment which are to be furnished and installed by others, and which require connections to the electrical systems, the Electrical Contractor shall furnish and install all rough-ins, and fittings, and shall make final connections to the fixtures and equipment. Rough-in locations shall be determined from the equipment itself or from the equipment manufacturer's shop drawings. This includes all mechanical equipment. shown on the drawings.

CUTTING FLOORS, WALLS OR CEILINGS

Cutting fitting, patching, repairing and finishing of carpentry work, metal work, or concrete work, etc., which may be required for this work shall be done by this Contractor at his expense and shall be done by craftsmen skilled in their respective trades. When cutting is required, it shall be done in such a manner as not to weaken walls, partitions or floors; and holes required to be cut must be drilled without breaking out around the holes.

Sleeves through floors and walls shall be black iron pipe, flush with walls, ceiling, or finished floors of a size to accommodate the raceway. Sleeves through outside walls shall be caulked with an approved caulking material.

The fire-resistant rating of walls, partitions, ceilings, and floors shall be maintained by sealing or caulking around penetration with approved fire resistant material or by the use of U.L. approved manufactured devices for this purpose. Poke through wiring will not be allowed.

POSITION OF OUTLETS

Center all outlets with regard to paneling, furring, trim, etc. Where several outlets occur in a room, they shall be symmetrically arranged. Outlets improperly located or installed shall be satisfactorily corrected. Damaged Finishes shall be repaired or replaced at the Contractor's expense. Outlets shall be set plumb, or horizontal, and shall extend to the finished surface of the wall, ceiling or floor, as the case may be without projecting beyond same.

Receptacles, switches, etc., shown on wood trim, cases or other fixtures shall be installed symmetrically; and, where necessary, shall be set with the long dimension of the plate horizontal, or ganged in tandem.

PROTECTION OF APPARATUS, ETC.

Take such precautions as necessary to properly protect all apparatus, fixtures, appliances, material, equipment and installation from damage of any kind. Failure to provide such protection to the entire satisfaction of the Architect-Engineer shall be sufficient cause for the rejection of any particular piece or pieces of materials, apparatus, equipment, etc., concerned.

EXISTING EXTERIOR ELECTRICAL LINES

Existing utility lines through the site will be rerouted by the proper administrative authorities. Other existing electrical or telephone lines that interfere with the proper installation of new work shall be relocated, sealed or removed as directed by the Architect-Engineer.

EXCAVATION AND BACKFILL

All excavation and backfill necessary for raceways of electrical systems shall be done under this division of the specifications. Excavation made too deep will be filled and compacted to density of surrounding undisturbed soil. Unstable soils not suitable for support shall be removed and replaced with suitable materials. Necessary grading shall be done to prevent water from entering trenches or excavations. Backfilling shall be done in six (6) inch layers of earth free from clods and stones--thoroughly tamped to a density equal to adjacent material. Where settlement occurs, excavation shall be opened and refilled and compacted. Pavement or walk cuts shall be repaved with materials identical to original surfaces in accordance with local codes or ordinances.

DEFECTIVE WORK OR MATERIAL

Work or material not in accordance with the plans and specifications or in any way defective, shall be removed at once on order of the Architect-Engineer. The Contractor shall replace or rebuild, at his own expense, with satisfactory material and in a workmanlike manner any work so removed and shall pay for any extra work of any other Contractor caused by removal of the defective work. If the Contractor does not correct such condemned work and remove rejected materials within a reasonable time, fixed by written notice, the Architect-Engineer may have them removed by others and charge the expense to the Contractor.

CLEANING

The Contractor shall maintain all areas free from hazardous or obstructive rubbish and debris, due to installation of the electrical work, during construction. When the electrical systems have been installed, the Contractor shall remove all rubbish and debris resulting from his work; from the building and site, and remove all paint, plaster and accumulated dirt from all electrical equipment and fixtures. All lighting fixture lenses, baffles, etc., shall be cleaned and spotless at the completion of the project.

TESTS

The Contractor shall furnish experienced personnel and all materials, equipment, and apparatus necessary for the adjusting and testing of all electrical equipment installed and/or connected under this contract. The responsibility of the Contractor shall include the tests for operation, short circuits, grounds, and interlocking of control wiring of all equipment with and to the satisfaction of the Owner and the Architect-Engineer.

SYMBOLS, SCHEDULES AND DETAILS

Shall be shown on the drawings.

SHOP DRAWINGS

Shop drawings and/or descriptive literature shall be submitted in accordance with these specifications for the equipment and materials listed below:

No work for which shop drawings are required is to be begun until after the review of said drawings. At least 5 copies of shop drawings shall be submitted, except as otherwise stated.

At the completion of the project, the Contractor shall furnish directly to the owner one complete set of approved shop drawings.

The review of such shop drawings will be only general in character and shall in no way relieve the Contractor from responsibility for the accuracy of the shop drawings or for proper fitting and construction of the work, nor from the necessity of furnishing any materials and workmanship required by the drawings and specifications which may not be indicated on shop drawings when reviewed.

SECTION NUMBER	DESCRIPTION
16350	Safety Switches
16360	Fuses
16400	Lighting Panels
16450	Motor Controls
16500	Lighting Fixtures
16600	Wiring Devices
16900	Fire Alarm System

EXISTING INTERIOR WIRING AND EQUIPMENT

Remove, abandon, or relocate as directed by the Architect-Engineer, all wiring in the area to be remodeled of the existing building, including conduits, wiring devices, fixtures, etc., which are shown on the drawings to be removed, abandoned or relocated, or which interfere with new construction. Electrical systems in areas not being remodeled shall not be disturbed. All existing equipment which is to remain and be reused shall be reconnected to the new electrical system as necessary. All materials removed shall become the property of the Contractor and shall be completely removed, by him, from the site.

ELECTRICAL SERVICE CONTINUITY

Arrange the work so that electrical power is available to the existing building at all times, except for short periods of interruption necessary for the performance of new work.

Connections shall not be interrupted without the Owner's approval as to time and duration. Connections to existing facilities shall not be disconnected until new or temporary connections are

installed.

ELECTRICAL SERVICE

The Electrical Contractor shall furnish and install the electrical service entrance and associated equipment of size and electrical characteristics as shown on the drawings.

This Contractor shall field verify existing conditions and locations of utility service prior to submitting bid, shall coordinate all work with the serving utility, and shall perform all work in accordance with the requirements, standards, and specifications of the serving utility.

This Electrical Contractor shall refer to the "General Conditions", "Supplemental General Conditions" and the "Special Conditions" as set forth on other pages of this specification for his responsibility with regard to temporary construction power and lighting.

SECTION 26 05 19 – POWER CONDUCTORS & CABLES

600 VOLT

All wire and cable for feeder and branch circuits shall be new and shall conform to the requirements of the current edition of the National Electrical Code and shall meet all relevant ASTM specifications. Conductors shall be coated soft-drawn copper and, unless otherwise noted on the plans and in these specifications, shall have insulation of the following types:

THHN for branch circuits in sizes No. 12 AWG to No. 4 AWG inclusive:
RHW or THW for feeders and branch circuits shall be new and shall conform to the requirements of the current edition of the National Electrical Code and shall meet all relevant ASTM specifications. Conductors shall be coated soft-drawn copper and, unless otherwise noted on the plans and in these specifications.

Wires shall be solid; No. 8 and larger, stranded. No wire smaller than No. 12 shall be used, except that wiring for signal and pilot control circuits may be no. 14. For excessively long runs (50 feet or more) from panelboard to first outlet, minimum size wire shall be no. 10 with conductors between outlets being No. 12. If in special cases, this distance must be exceeded, larger conductors of sizes noted on the plans shall be installed.

All wire and cable shall be delivered to the job in standard coils or reels with approved tag noting length, wire size, insulation type, and manufacturer's name; shall be suitable protected from weather and damage during storage and handling, and shall be in first-class condition when installed.

Wire and cable shall be as manufactured by one or more of the following manufacturers or approved equal:

Anaconda Wire and Cable Company	Rome Cable Corporation
General Cable Corporation	Phelps Dodge Copper Products Company
General Electric Company	

COLOR CODING

Wire and cable shall be factory color-coded by integral pigmentation, with a separate color for each phase and neutral conductor. The color code indicated in accompanying chart shall be used consistently throughout the electrical system installation

Conductor	120/208-240
Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Ground	Green or bare
Exit lights	Yellow

Where the system design engineer considers integral pigmentation color-coding not practicable (such as short runs, etc.,) he may permit use of paint or colored plastic tape. When tape is permitted, it shall be applied in a spiral half-lap manner over exposed conductor portions in manholes, boxes, panels, switchboards, and other enclosures.

INSTALLATION

No. conductors or cables shall be installed in conduits, ducts or raceways until the raceway system has been completed. No more than three circuits will be permitted in one raceway except where shown on the drawings. A common neutral may be used as permitted by the National Electrical Code. When installing conductors, the Electrical Contractor shall exercise due care to prevent damage to conductor or insulation. Where lubrication is required for pulling conductors or cables, it shall be a compound specifically prepared for cable pulling and shall not contain petroleum or other products which will have a deteriorating effect on the cable insulation. Each conduit shall have a separate green ground wire.

All feeder cables shall be continuous from origin to panel or equipment termination without running splices in intermediate pull or splice boxes. Where taps and splices are necessary and approved, they shall be made in approved splice boxes with suitable connectors. All conductors shall be continuous from outlet to outlet and no splices shall be made except within outlet or junction boxes. Junction boxes may be utilized where required. At least 6" of wire shall be left at outlet boxes for connecting fixtures and devices.

When direct burial outdoor underground circuits are installed where they will be beneath pavement, conductors shall be installed in PVC conduit. These circuits shall always have a separate ground wire over the entire length of the circuit.

SPLICES AND TAPS

For smaller than No. 6 wire shall be made using preinsulated twist-on connectors, "Scotchlock" type S, or Ideal "Wing Nuts." Pressure indent type connectors shall not be used. Connectors of the porcelain cup type shall not be used. Splices in wire larger than No. 6 shall be made with approved solderless lugs of the two bolt parallel groove type or the compression sleeve type

Taping of joints shall be done with vinyl plastic tape as manufactured by Minnesota Mining & Manufacturing Company, or an approved equal.

SECTION 26 05 26 - GROUNDING

Except where specifically indicated otherwise, all noncurrent-carrying metallic parts of the electrical system shall be grounded in an approved manner in accordance with the current edition of the National Electrical Code and all local codes.

All metal raceways, metal enclosures of electrical devices, switchgear enclosures, cabinets shielding and sheaths on cables, transformer enclosures, motor enclosures, supports, grounding conductor of nonmetallic sheathed cables, grounding conductor in nonmetallic raceways, and the neutral conductor of the wiring system shall be grounded.

SYSTEM GROUNDING

The ground connection shall be made at the main service equipment neutral on the supply side of the first switch or circuit breaker controlling the system and shall be extended by the shortest route to the street side of the metallic water main service and to a driven ground rod as per N.E.C. Article 250. There shall be a continuity of the grounding system to the interior water piping system. Care shall be taken to bond jumper around dielectric unions and sections of nonmetallic piping. Where no metallic water service is available, driven copper ground rods shall be used.

The grounding conductors shall be copper; bare or with green insulation of the size not less than required by the National Electrical Code or otherwise indicated and shall be installed in exposed conduit. All connections shall have clean contact surfaces and shall be made by means of compression connectors or suitable ground clamps. All connections shall be readily accessible for inspection at all times and shall never be concealed or made underground.

The maximum resistance between the service equipment ground and the metallic water service or driven ground rods shall not exceed 5 ohms.

EQUIPMENT GROUNDING

The electrical bonding of the entire electrical system shall be continuous from the service equipment to the individual outlets. Feeder raceways shall be bonded at both ends to service equipment, pull and junction boxes, cabinets, and other enclosures with grounding bushings. Other metallic raceway system shall be clean and connections tight to assure electrical continuity.

GROUNDED RECEPTACLES

Grounding continuity between grounded outlet boxes and the grounding circuits of receptacles shall be established by means of a bonding jumper between the outlet box and the receptacle grounding terminal or by use of the self grounding type receptacle, except when the box is surface mounted, in which case the retainer washers on the receptacle mounting screws shall be removed to permit metal to metal contact between yoke and outlet box.

NONMETALLIC RACEWAYS

A separate grounding conductor shall be installed in all PVC conduits and other nonmetallic raceways in accordance with National Electrical Code Article 352.60.

SECTION 26 05 33 - RACEWAY AND BOXES

All electrical work shall be installed in raceway systems which interconnect the various equipment items; provide mechanical protection to the conductors; permit easy installation and removal of cables; provide electrical protection to personnel; and, protect property against damage from possible electrical fires. Each raceway system shall have its own complement of associated fittings and necessary accessories developed to form a complete system.

Raceway system runs shown on the drawings are diagrammatic; exact locations shall be determined in the field.

Raceway systems shall be installed concealed except in unfinished areas and where indicated to be exposed on the drawings.

Concealed raceway systems shall be installed in walls, above ceilings, below floors or in furred-out spaces so as to be completely concealed from view by occupants during their normal activities in use of the space.

Exposed raceway systems shall be run in straight lines at right angles or parallel with walls, beams, columns, or building lines.

All raceway systems shall be supported by straps, suitable clamps, or hangers to provide a rigid installation. In no case shall raceway systems be supported or fastened to other pipe, or installed to prevent the ready removal of other pipe for repairs.

Care shall be used to avoid proximity to heating ducts and hot water lines. Where such crossings are unavoidable, raceway systems shall clear covering of line by at least six (6) inches.

Where raceway systems penetrate the roof seal, suitable pitch pockets or lead flashing shall be provided, to provide a completely watertight installation.

All raceway systems and other electrical equipment shall be grounded. See paragraph on "Grounding."

All raceway systems shall be thoroughly swabbed out with a dry swab to remove moisture and debris before conductors are drawn into place. All ends of raceways shall be tightly plugged with tapered plugs or capped bushings until the conductors are pulled, to prevent water and debris from entering.

All wiring, including low voltage and telephone wiring, installed in environmental air spaces shall be in metal conduit as per N.E.C. Article 300-22.

CONDUIT

Installed in the earth below floor slabs shall be rigid nonmetallic polyvinyl chloride conduit with a separate grounding conductor.

See paragraph on "Grounding." This PVC conduit shall extend to the first junction or outlet box above grade, where concealed in a wall. From there on, metallic conduit shall be used. For exposed installations, the PVC conduit shall be connected to a rigid metal conduit elbow below finished floor line.

Embedded in concrete shall be rigid nonmetallic polyvinyl chloride with a separate grounding conductor or rigid metal conduit at the Contractor's option. (See paragraphs below).

Used for feeders or exposed to the weather, or installed in mechanical equipment rooms, or used in exposed installations less than 5' 0" above the floor shall be rigid metal conduit, or intermediate metal conduit (N.E.C. art. 344)

Used for all motor connections and at other points of vibration shall be flexible metal conduit (Greenfield or Sealtite) in lengths not to exceed 24 inches. Flexible metal conduit may also be used where allowed by code if conditions warrant its use. See N.E.C. article 350.

All other conduit shall be rigid metal conduit, intermediate metal conduit, or electrical metallic tubing at the Contractor's option.

FLOORS ON GRADE

Raceways shall not be embedded in concrete slabs on grade, but may be installed below such slabs.

FLOORS NOT ON GRADE, WALLS & BEAMS

Raceways may be embedded in concrete floors not on grade, and in concrete walls and beams, if they are not larger in outside diameter than one-third the thickness of such floors, walls or beams; if they are spaced no closer than three diameters on center; if they do not displace any reinforcing steel; and, if they do not unduly impair the strength of the construction, in the opinion of the Architect-Engineer.

COLUMNS

Conduits may be embedded in concrete columns if the conduits do not displace more than 4 percent of the area of the cross section of the column; if they are spaced no closer that three diameters on center; if they do not displace any reinforcing steel; and, if they do not unduly impair the strength of the construction in the opinion of the Architect-Engineer.

SIZE

Minimum size conduit shall be 3/4 inch, unless otherwise noted. Other sizes shall be as indicated on the plans, or as required by the National Electrical Code for number and size of conductors installed. Flexible metal conduit may be sized as per N.E.C.

Article 348.

BENDS

The number of bends per run shall conform to the National Electrical Code limitations. Where more bends are necessary, a condulet or pull box shall be installed. Concealed conduits shall be run in a direct line with long sweep bends and offsets.

LOCKNUT AND BUSHING

Conduits shall be continuous from outlet to outlet, from outlets to cabinets, pull or junction boxes and shall be secured to all boxes with locknuts and bushings in such manner that each system shall be electrically continuous throughout. On all conduit l 1/4 inch trade size and larger, bushings shall be of the insulated type. Insulated bushings shall be grounding type where required by the National Electrical Code.

SUPPORTS

Conduits shall be securely supported at 8 feet intervals by straps, hangers, or supporting assemblies. Supports or fastenings shall be provided at each elbow and at the end of each straight run terminating at a box or cabinet. The use of perforated iron strap or wire hangers for supporting conduits will not be permitted.

CIRCUITS

All conduit systems must be installed complete before conductors are pulled in. No more than three circuits will be permitted in one raceway except where shown on the drawings. A common neutral may be used as permitted by the National Electrical Code.

RIGID METAL CONDUIT AND ELECTRICAL METALLIC TUBING

Shall be hot dipped galvanized mild steel as manufactured by National Electrical Products Company or approved equal, unless otherwise specified. All conduit shall have a continuous zinc coating throughout the entire interior and exterior surfaces of the conduit regardless of diameter. The interior of the conduit shall be perfectly smooth. All threads of rigid conduits shall be clean and sharp and shall be coated to conform with the remainder of the conduit. Each length of conduit shall be stamped with the name or trademark of the manufacturer and shall bear the Underwriter's label.

All conduits shall be cut square, threaded, reamed smooth and drawn up tight. Bends or offsets shall be made with standard conduit ells, field bends made with an approved bender or hickey, or hub-type conduit fittings.

Electrical metallic tubing shall use couplings and connectors of the threadless compression type. No indenter type fittings or

running threads will be permitted.

RIGID NONMETALLIC POLYVINYL CHLORIDE CONDUIT

Shall be Carlon, or equal schedule 40 heavy wall PVC. Conduit shall be of virgin PVC, equal to Thompson #287. Conduit fabricated from previously extruded chunks, slivers, or pellets, shall not be acceptable. Conduit and fittings shall be by the same manufacturer to assure a uniform system installation. Conduit and fittings shall carry the U.L. Label. Fittings shall be the solvent welding type.

PVC Conduit shall be as per ART. 352 N.E.C. and manufacturer's instruction for joining methods, bending, termination, and proper provisions for expansion and contraction. Factory bends shall be used for all bends except special requirements, and field bends shall be made in strict accord with N.E.C. requirements for radius of bends. Deformed or crushed bends shall be removed at the Contractor's expense. Equipment ground conductor shall be installed.50.

CONDUIT FITTINGS AND BOXES

Furnish and install conduit fittings, outlet boxes, junction boxes, and pull boxes as described below or approved equal. No aluminum or aluminum alloy fittings or boxes will be permitted to be used on this project. Catalog numbers shown are Steel City and indicate the quality desired.

CONDUIT FITTINGS

Where indicated on the plans, and noted in the specifications, outlets on exposed or exterior conduit systems shall be of the threaded-hub, cast feraloy, conduit type fitting suitable for the wiring devices to be installed. Covers shall be a type designed to fit the specified fittings, and where exposed to the elements, shall have neoprene gaskets. At building expansion joints, install conduit expansion joints, Crouse-Hinds type XJ, with grounding strap and clamps.

Rigid conduit: Couplings and connectors shall be of the standard conduit-threaded type.

Insulating Plastic Bushings -Series BU-504

EMT: Couplings and connectors shall be of the threadless compression type; no indenter or running thread types shall be used.

Couplings -Series TK-112

Connectors -Series TC-112

Flexible metallic conduit

Connectors -Series XC-402

Liquid tight flexible conduit:

Connectors -Series LT-202

OUTLETS BOXES

All outlet boxes shall be standard code gauge galvanized-steel type, with stamped knock-outs; at least 1 1/2 inch deep, except where shallower boxes required by structural conditions are approved; single or gang style type of size to accommodate devices noted. Boxes for other that lighting fixture outlets shall be not less than 4 inches square except that 4 by 2-inch boxes may be used where space is limited and with special approval only. Boxes shall be equipped with plaster ring or cover as necessary. Square cornered tile wall covers shall be installed on all boxes concealed in concrete block walls.

Outlet boxes shall comply with the National Electrical Code in regard to the allowable fill.

Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

Standard deep-type outlet boxes (concrete rings with appropriated covers) shall be used in floor-slab construction so concealed conduits entering sides of boxes can clear steel reinforcing rods.

Boxes shall be secured with toggle bolts or expansion anchors and steel bolts to masonry or concrete, with wood screws to wood, and with steel bolts to structural steel. Mounting straps, brackets or bar hangers shall be used as necessary to place boxes between structural studs.

Where boxes are installed concealed, the surface of the box, extension or ring shall be not more than 1/4 inch short of being flush with the finished surface. No box shall be installed so as to be inaccessible in the finished work.

All boxes must be of the one piece formed sheet-steel variety. Sectional or gangable boxes shall not be used.

Lighting Boxes	(concealed)	-Series H54561
Lighting Boxes	(concrete)	-Series 54541
Lighting Boxes	(exposed)	-Series 52151 or 54151
Switch, Receptacles and Junction Boxes	(flush)	-Series 52151

Gang Switch Boxes (concealed)	-Standard Gang Boxes 3G, 4G, and etc.	
Utility Boxes(Handy)(special)	-Series 58351	
Switch, Receptacles, Junction and Telephone Boxes (exposed)	-Series FS	
Tile Wall Covers	-Series 52-C-50	
Plaster Rings	-Series 52-C-13	

Mounting heights above finished floor (AFF) to the center of the outlet boxes shall be as follows, unless otherwise shown on the drawings: Where outlets are located above counters, chalkboard, etc., mounting clearances shall be double checked in the field. Height may be adjusted to nearest mortar joint in masonry walls.

Switches		+48"	
Wall Receptacles	(typical)	+18"	
Wall Receptacles	(above counters)	+44"	Field Coordinate
Telephone	(typical)	+18"	
Telephone	(wall)	+60"	
Bracket Lights		+84"	
Clock Outlets		+90"	Field Coordinate

FLOOR BOXES

Boxes for floor outlets shall be of the cast-metal, threaded-conduit-entrance, waterproof type with means for adjusting cover plate to finished floor level. Boxes shall be approximately 4 inch diameter and 3 1/2 inch deep, with an approved gasket or seal between adjusting ring and box.

Cover plates on floor boxes shall be of heavy brass with permanent ring or flange and rubber gasket. Plates shall have flip open cap for receptacle or other type of outlet as indicated by symbol on plans.

Watertight floor boxes shall be as manufactured by the Lew Electric Fitting Company, or approved equal.

JUNCTION BOXES

Where indicated on the plans and where necessary to terminate, tap-off or redirect multiple conduit runs, the Electrical Contractor shall furnish and install appropriately designed pullboxes. Boxes

shall be fabricated from code gauge sheet with galvanized finish. They shall have full-access screw covers mounted with corrosion-resistant machine screws. Covers shall be for surface or flush installation as noted. Box size shall be as required by the National Electrical Code for the number of conduits and conductors entering and leaving it. Where intermediate cable supports are necessary because of box dimensions, provide insulated, removable cross brackets to support the conductors. Where feeder splices are to be made, boxes shall be large enough to provide ample work space. Boxes shall be supported independently of conduits entering them. Brackets, rod hangers, bolts or other suitable supporting methods may be used.

PULL BOXES

Furnish and install pullboxes where necessary in the raceway system to facilitate conductor installation. In general conduit runs of more than 100 feet or with more than three right-angle bends, shall have a pullbox installed at a convenient intermediate location. All such pullboxes shall be indicated on the Contractor's Shop Drawings. All boxes shall be made of galvanized steel of metal gauge and physical size as required by the National Electrical Code for the number and size of conduits and conductors involved. Boxes shall have removable screw covers for flush and surface installation as indicated on the plans. Boxes shall be securely mounted to the building structure with supporting facilities independent of the conduits entering or leaving the boxes.

SECTION 26 24 16 - MAIN DISTRIBUTION PANELBOARD

GENERAL

Furnish and install the panelboard as herein specified and shown on the associated electrical drawings. The panelboard shall be furnished with an Underwriters' Laboratories service entrance label.

STRUCTURES

The panelboard shall be totally enclosed, dead front, free standing, front and rear aligned with front accessibility only required. The panelboard shall be Type 1 General Purpose. The framework shall be of UL gauge steel and secured together to support all cover plates, bussing and component devices during shipment and installation. Formed removable closure plates shall be used on the front, rear and sides. All closure plates are to be single tool, screw removable. Ventilation shall be provided when required. Each section shall include a single-piece removable top plate.

FINISH

All painted parts shall be pretreated and provided with a corrosion-resistant, UL Listed acrylic baked paint finish. The paint color shall be #4 medium light gray per ANSI standard Z55.1-1967.

FAULT WITHSTANDABILITY

The entire panelboard shall be suitable for operation at the specified available fault current. The panelboard shall be labeled to indicate the maximum available fault current rating, taking into account the structure, bussing, main disconnect, and branch circuit devices. The short circuit current rating shall not be less than 65,000 RMS symmetrical amperes. The branch circuit devices short circuit current rating shall be fully rated or determined by UL labeled series connected ratings.

BUSSING

The through-bus shall be tin-plated aluminum. The bussing shall be of sufficient cross sectional area to meet UL Standard 891 for temperature rise. The through bus shall be 100% fully rated and extend the full length of the panelboard. Provisions shall be provided for future splicing of additional sections from either end. The neutral bus shall be 100% rated.

The distribution section bus shall be of the same material as the through bus and shall be 100% fully rated. The distribution section neutral plate shall be of copper provided with Cu/Al lugs for the devices installed and future specified devices. The ground buss shall be sized per UL Standard 891 and of the same

material as the through bus.

UTILITY METERING COMPARTMENTS

The utility metering compartment shall be located in the service entrance section of the panelboard and connected for hot sequence metering. The utility metering compartment shall be barriered and covered with a single hinged door with sealing provisions.

MAIN DISCONNECT DEVICES

The main disconnect device shall be a circuit breaker. Voltmeter and ammeter shall be mounted in the door and supplied with the appropriate transformers and selector switches as required.

GROUP MOUNTED BRANCH DEVICES

The group-mounted branch devices are to be totally front accessible and front connectable. The connections to the distribution panel bussing shall be of a "blow-on" design such that the connections grip the bus bars firmly under high-fault conditions.

SHIPPING SPLITS

Panelboard shall be separated into shipping blocks. Each section shall be capable of being handled individually with the use of removable lifting bars or rollers and be clearly labeled with proper handling procedures.

Sections shall be capable of being joined at the job site with use of internal splice bars. These splice bars shall be preassembled onto the through bus and not shipped loose in a splice bar kit. The through bus splice bars shall utilize two bolts, one on each side of the shipping split, for each phase. Conical washers shall be used to provide a constant pressure once the proper torque is achieved. The through bus splice connection shall be capable of being maintained by the use of a single tool and shall be front accessible.

LIGHTING PANELS

Branch circuit protective devices for all lighting panels shall be single pole, 2 pole or 3 pole bolt-on type, thermal magnetic circuit breakers for alternating current. Panels shall be Square D type NQOB or equal.

The individual breakers shall be calibrated and sealed to eliminate tampering or unauthorized changes in calibration. Breakers shall be interchangeable and capable of being operated in any position. Two-pole and 3 pole branch circuit breakers shall be single-handle, common trip type. Fifteen and twenty amp breakers shall be (SWD) switching duty rated.

UL Class A (5 milliampere sensitivity) ground fault circuit protection shall be provided on 120V. AC branch circuits as specified on the plans or panelboard schedule. This protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection for branch circuit wiring. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional single pole circuit breaker.

NEUTRAL AND EQUIPMENT GROUND BARS

The neutral bar, shall be mounted on the opposite end of the panel from the main lugs or main circuit breaker and shall have suitable terminals for connection of neutral wires. A separate equipment ground bar shall be provided.

BRANCH CIRCUITS

The number and rating of branch circuits for each panel shall be as indicated on the drawings.

TANDEM

Or half sized circuit breakers will not be acceptable.

CABINETS AND FRONTS

Shall be of code gauge galvanized steel with ample wiring gutters on top, sides, and bottom.

Fronts shall include doors and have flush, brushed stainless steel, cylinder tumbler-type locks with catches and spring-loaded door pulls. All panelboard locks shall be keyed a like. Fronts shall have adjustable indicating trim clamps which shall be completely concealed when the doors are closed. Doors shall be mounted by completely concealed steel hinges. Fronts shall not be removable with door in the locked position. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. The directory shall be completed by typewriting to identify the load fed by each circuit. Fronts shall be of code gauge, full finished steel with rust-inhibiting primer and baked-enamel finish.

Cabinets shall be installed with the top at +72" above finished floor.

MANUFACTURER

All panels shall be of the same manufacture and shall be any one of the following, or equal:

Square D

General Electric

ITE

Cutler Hammer

SECTION 26 24 19 - MOTOR CONTROLS

The Electrical Contractor shall furnish and install electric motor starters where shown on the drawings and/or on the Motor Control Schedule; also the required feeders and control circuits. All motors shall be provided with disconnecting means as required by N.E.C.

Unless otherwise shown on the drawings, motors small than 1/2 HP shall be designed for operation on 120 volts, single phase. Motors 1/2 HP and larger shall be designed for operation on line to line voltage of the system (3 phase when available) as indicated in section "Electrical Service" and/or as shown on the Motor control Schedule.

Starters for 3 phase motors shall be line-voltage, magnetic type with 120 volt control. Provide 120 volt control-circuit transformers as required.

Where combination starter-disconnects are shown on the drawings the Electrical Contractor may furnish and install separate starter and disconnect if he so chooses and space allows.

Except where remote control is indicated, pushbuttons, selector switches, and/or pilot lights shall be furnished on the motor starter cover. Where remote controls are indicated they shall be flush mounted in finished areas and surface mounted in unfinished areas.

The Electrical Contractor shall be responsible for the selection of the proper size heater or thermal elements in the starters and the proper size fusetron in the fused switches as indicated by the motor name plate data.

Manual starting switches for 3 phase motors with overload protection shall be Square D Class 2510 or equal.

Manual starting switches for 1 phase motors with overload protection shall be Square D Class 2510 or equal.

Magnetic starters shall be Square D class 8536 or equal.

Starters indicated on the drawings by symbol to be raintight or weatherproof shall have NEMA type 3R enclosure.

Starters shall be mounted, where possible, at +54" above finished floor to center of enclosure.

Starters as manufactured by one of the following will be acceptable but all starters furnished by this Contractor for this work shall be of that one manufacture:

Square D

ITE Cutler Hammer

General Electric

TEMPERATURE CONTROL WIRING

Wiring for temperature controls which is shown on the electrical drawings shall be by the electrical Contractor. Wiring not shown but required for temperature control shall be by the Mechanical Contractor under Temperature Controls. Refer to the Temperature Control Section of the Mechanical Specifications and/or to the Motor Control Schedule.

SECTION 26 27 26 - WIRING DEVICES

Furnish and install wiring devices as indicated by symbols on the drawings and as follows or approved equal.

SWITCHES

Shall be as located at +48" above finished floor. Where more than one switch is shown at an outlet, switches shall be installed under a gang plate in an order appropriate to outlet location.

Single Pole		Bryant No. 4901-GRY
Double Pole		Bryant No. 4902-GRY
Three Way		Bryant No. 4903-GRY
Four Way		Bryant No. 4904-GRY
Pilot light	(For Lights)	Bryant No. 4901-PLR120
	(For Motors)	Bryant No. 4901-PLG120

RECEPTACLES

Shall be mounted at +18" above finished floor or at +44" above finished floor where above counters, etc., or as otherwise shown.

Three wire grounded receptacles shall be installed in the outlet boxes so that the grounding terminal hole or slot is on the top, above the current-carrying slots.

Where indicated on the plans the top half of the receptacles shall be switch controlled while the bottom half remains energized at all times. All receptacles shall be of the self-grounding type, which satisfies the National Electrical Code and eliminated the need for the bonding jumper, where possible and as follows or approved equal.

Duplex Receptacles	Bryant No. 5362-GRY
Floor Receptacles	Lew Electric Fitting Co. No. 632 5B-DFB
Clock Receptacle	Bryant No. 2828-GS
30A-250 Volt Receptacles	Bryant No. 9340

Architect will make final selection of device body colors.

PLATES

Furnish and install wall plates for all wiring devices. Plates on flush devices shall be satin finish, stainless steel. Architect

will make final selection of plate material and finish. Where devices are installed on exposed fittings or boxes, the plates shall be galvanized steel and of a type designed to fit the outlet box. Blank covers shall be installed on all boxes without devices or fixtures of same type as installed on devices in that room or area.

TIME SWITCHES

Time switches shall be Tork Series 7300ZL or equal with astronomic dial and reserve power feature. Switches shall be three pole and of amperage capacity as required or as shown on the drawings.

DIMMER SWITCHES

All dimmer switches shall be silicon gated solid state similar to Lutron Nova Series or equal and of wattage shown on the drawings or as required.

SECTION 26 28 13 - FUSES

Fuses shall be furnished and installed in each fused safety switch and elsewhere as shown on the drawings. Fuses shall be Fusetrons, as manufactured by the Bussman Company or the equivalent by the Economy Fuse Company, and shall be of the proper size for the load served.

All fused switches shall be labeled with proper type fuses and amperage.

Fuses for circuits over 600 amp shall have a minimum interrupting capacity of 200,000 rms amps and shall be of silver-sand type Bussman Company Hi-Cap or equal.

SPARE FUSES

A set of three spare fuses of all sizes installed on the project shall be furnished.

SECTION 26 28 16 -SAFETY SWITCHES

The Electrical Contractor shall furnish and install safety (disconnect) switches where shown on the drawings, where shown in the Motor Control Schedule for motors, and/or where required by the National Electrical Code. Safety switches shall be unfused, type (HD) heavy duty quick-make, quick-break, and in NEMA type I general purpose enclosure unless other wise shown on the drawings. Switches for motor circuits shall be horsepower rated for dual-element fuses (Max.).

Switches indicated on the drawings by symbol to be raintight or weather-proof shall have NEMA type 3R enclosure.

Switches shall be mounted, where possible, at +54" above finished floor to center of enclosure.

Switches as manufactured by one of the following will be acceptable but all switches furnished by this Contractor for this work shall be of that one manufacture:

Square D

ITE

General Electric

Cutler Hammer

SECTION 26 50 00 - LIGHTING

The Electrical Contractor shall furnish all luminaries, lighting equipment and components shown on the plans by identifying symbols with fixture numbers, as listed in the Lighting Fixture Schedule and as specified herein or approved equal. The lighting fixtures specified, establish the quality standards which will be used to judge fixtures of other manufacturers. See "General Provisions" - Electrical for substitute fixtures. The Architect-Engineer shall be the sole and final judge as to the equality of substitute fixtures. All fixtures and their components shall bear the Underwriters' Laboratories Label of approval.

The Electrical Contractor shall furnish all labor and materials required to install the specified equipment in the manner indicated, including all necessary supports and hangers, plaster frames where necessary, recessing boxes, etc. Attention is called to N.E.C. Article 410-XI. These required clips for suspended ceilings shall be furnished and installed by the Electrical Contractor.

Where required, fireproof boxes or tents, for recessed fluorescent fixtures in accordance with the Building Materials Directory of Underwriters Laboratories, which are necessary to insure the fire resistive rating of the ceiling will be furnished and installed by the ceiling Contractor. The Electrical Contractor shall coordinate this installation and assure that at lease 1/2 inch clear air space exists around the fixture to all for proper cooling of the lighting fixture. Such lighting fixtures shall be UL approved for installation into fire-rated ceilings and shall be quipped with premium ballasts.

The Electrical Contractor shall also furnish and install all lamps and accessory wiring. Lamps shall be of size, shape, and characteristics as required by the manufacturer.

The locations of fixtures in mechanical equipment spaces are approximate. The exact locations shall be determined after most of the mechanical equipment is in place.

The Electrical Contractor shall coordinate ceiling types with lighting fixture trim types and shall coordinate special provisions for recessed fixtures prior to shop drawing submittal.

LAMPS

All lamps shall be manufactured by Sylvania, Philips or General Electric. Lamps of other manufacturers may be installed only after written approval is obtained from the Architect. Failure to obtain said approval will result in the rejection of all lamps installed, and all costs therein shall be borne by this Contractor.

Incandescent lamps shall be inside frosted rated at 130 volts

unless otherwise indicated and of size and type as shown on the drawings or required by the manufacturer.

All fluorescent lamps shall be bi-pin rapid start type, standard cool white in color, energy-saving second generation full light output type, unless otherwise shown on the Fixture Schedule.

All High Intensity Discharge lamps when installed in open-type fixtures shall be of the self-extinguishing type if glass envelope is broken.

BALLASTS

Ballasts for fluorescent lamps shall be electronic rapid start, energy-saving type, high power factor, series type, CBM (Certified Ballast Manufacturers) certified, ETL approve, and Class 'P' rated.

Ballasts for HID lamps shall be Sound rating 'A' high power factor constant wattage type.

SECTION 26 53 00 - EXIT LIGHTS

Furnish and install all exit lights as shown on the drawings. Exit light fixtures shall be as indicated in the lighting fixture schedule.

Exit light wiring shall be connected to the local area lighting circuit. The exit light system shall conform to all applicable requirements of the National Board of Fire Underwriters.

SECTION 27 13 00 - TELEPHONE SYSTEM

The Electrical Contractor shall be responsible for the empty conduits he has installed to be sure that they are open, not plugged, and can have wires pulled through them.

BRANCH CIRCUIT RACEWAYS

In plenums and areas used for environmental supply or return air, telephone wiring must be installed in metallic conduit. Coordinate with mechanical air systems.

In areas not used for environmental air, telephone conduit may be stubbed up above the removable ceiling space and wiring run without conduit, unless otherwise indicated on the drawings.

SECTION 28 31 00 - FIRE ALARM

GENERAL

The Contractor shall furnish and install an addition to the existing complete automatic and manual fire alarm system as specified herein and indicated on the drawings. The existing system is Cerberus Pyrotronics .

The system shall include a power supply, rechargeable battery and battery charger, signal indicating devices, audible and visual alarm devices, a complete wiring system, and all accessory devices required to provide a complete operating system.

The system shall comply with the applicable provisions of the National Fire Protection Association Standard Number 72 and meet all requirements of the local authorities having jurisdiction. All equipment and devices shall be listed by the Underwriter's Laboratories Incorporated or approved by the Factory Mutual Laboratories.

To establish the type and quality of system desired, the equipment specified is that of Cerberus Pyrotronics Company.

EXISTING CONTROL PANEL

Model PXL totally power limited and microprocessor based flush mounted. The fire alarm control panel shall detect the operation of any signal indicating device, indicate by alphanumeric display the area of the alarm condition and operate all alarm and auxiliary devices.

Zones shall be as determined.

The control panel shall include the necessary capability to provide complete operating, supervising, and control of the entire system. All control panel components shall be contained in a steel cabinet with hinged door and key lock finished in Red baked enamel. Terminals and other necessary facilities shall be provided in the control panel to permit transmission of trouble and alarm signals over leased or privately owned telephone cable to remote station receiving panel.

Collective Zone Interface devices and Control Element devices shall be provided as necessary to interface into the system as address points.

Furnish and install alphanumeric display remote annunciators at locations shown. Model RAN with required flush back-box.

POWER SUPPLY

The fire alarm system main power supply shall operate from 120 volt A.C. obtained from the building service on the line side of the main service equipment. This connection shall be made in conduit in accordance with local and national codes. Separate over-current protection shall be provided, marked "FIRE ALARM".

The power supply shall be equipped with a trickle charger and standby power shall be provided by wet cell batteries of sufficient capacity to operate the fire alarm system under normal supervisory conditions for 72 hours and operate all alarm signals for 15 minutes at a time during the 72 hour period.

PRODUCTS OF COMBUSTION DETECTORS

Shall be Model DI-3 with DB-3S base or equivalent, installed flush mounted in finished areas and as shown on the plans. All detectors shall operate on the ionization principle, activated by the presence of combustion products or gases produced by burning or smoldering materials. Remote alarm lamps shall be installed where detectors are mounted concealed.

AUTOMATIC HEAT DETECTORS

Shall be Rate-Anticipation Fixed Temperature type model DT-3. Detectors rated at 135 degrees F. shall be used for ordinary areas where normal ceiling temperatures do not exceed 100 degrees F., or at 200 degrees F. for intermediate areas where ceiling temperatures may normally be expected to exceed 100 degrees F. but not 150 degrees F. Detectors shall have smooth ceiling UL rating of 50'x 50' (2,500 sq. ft.) and shall be installed to give full coverage in accord with UL spacing requirement for both fixed temperature and rate anticipation.

MANUAL STATION

Shall be non-code, spring release type Model MS-151. Stations shall be suitable for flush mounted and shall be installed +48" above finished floor. Provide double action protective hood over the manual station to prevent unauthorized activation.

ALARM BELLS

Shall be 6 inch bells semi-flush mounted at +90" above finished floor and with weather proofing where necessary.

AUDIO/VISUAL ALARM

Shall be Model HSD series Horn/Strobe with strobe of required intensity,designed to operate on system voltage and meet ADA requirements.

FAN SHUT-OFF RELAYS

Furnish and install fan relays to shut off all exhaust fan and air handling unit motors when an alarm occurs.

AIR DUCT DETECTORS

The Electrical Contractor shall furnish and install duct detectors in the supply and return air ducts of the air handling units as shown on the drawings as required by the National Fire Protection association Standard Number 90A. These detectors shall be connected to the control circuit to shut down the air handling unit and to sound the general alarm upon actuation.

DOOR HOLDER/RELEASE

Fire door holder/release shall be Model SDH-2D flush mounted or Model SDH-3D surface mounted.

WIRING

All wiring shall be in accordance with local and national codes and Article 210 of the National Board of Fire Underwriters' Standard Number 72. Unless otherwise specified minimum wire size shall be 12 gauge for A.C. and power supply connections, 16 gauge for audible alarm circuits, and 18 gauge for signal initiating circuits.

TESTING, GUARANTEE, AND SERVICE

A factory trained representative of the manufacturer shall supervise the final testing of the system and it shall be subject to approval and acceptance of the responsible engineer. On completion of the acceptance tests, the Owner or his representative shall be instructed in the operation and testing of the system.

The fire alarm system shall be free from defects in workmanship and materials, under normal use and service, for a period of one year from the date of acceptance or beneficial occupancy; whichever is earlier. Any equipment shown to be defective in workmanship or material shall be repaired, replaced, or adjusted free of charge.

The equipment manufacturer shall be represented by a local service organization, and the name of this organization shall be furnished to the Architect and Owner. The local service organization shall furnish, gratis to the Owner, a one year maintenance and inspection contract effective from the date of final acceptance. The contract shall provide four inspections during the contract year.

SUBMITTAL FOR APPROVAL

Prior to the submittal to the Architect-Engineer of the fire alarm and detector system data, working drawings of the proposed system including wiring diagrams, and list of equipment used, shall be submitted to the office of the State Fire Marshal for review. Shop drawings submitted to the Architect-Engineer shall bear the seal of approval of, or be accompanied by a letter of approval from the office of the State Fire Marshal.

1

SECTION 034500 - PRECAST ARCHITECTURAL 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. Architectural precast concrete cladding
2. Insulated, architectural precast concrete units.
3. Thin-brick-faced, architectural precast concrete units.
4. Stone-faced, architectural precast concrete units.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing connection anchors in concrete.
2. Section 034900 "Glass-Fiber-Reinforced Concrete (GFRC)."
3. Section 047200 "Cast Stone Masonry" for wet- or dry-cast cast stone facings, trim, and accessories.
4. Section 051200 "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.
5. Section 055000 "Metal Fabrications" for kickers and other miscellaneous steel shapes.
6. Section 071900 "Water Repellents" for water-repellent finish treatments.
7. Section 085113 "Aluminum Windows" for windows set into architectural precast concrete units.

1.4 DEFINITIONS

A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

C. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.

D. Shop Drawings:

1. Detail fabrication and installation of architectural precast concrete units.
2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
4. Indicate details at building corners.
5. Indicate separate face and backup mixture locations and thicknesses.
6. Indicate type, size, and length of welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
8. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
9. Include plans and elevations showing unit location and sequence of erection for special conditions.
10. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
11. Indicate relationship of architectural precast concrete units to adjacent materials.
12. Indicate locations, dimensions, and details of thin-brick units, including corner units and special shapes, and joint treatment.
13. Indicate locations, dimensions, and details of stone facings, anchors, and joint widths.
14. 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.

E. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of three,

representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches (300 by 300 by 50 mm).

1. When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.
2. Samples for each thin-brick unit required, showing full range of color and texture expected. Include Sample showing color and texture of joint treatment.

    a. Grout Samples for Initial Selection: Color charts consisting of actual sections of grout showing manufacturer's full range of colors.
    b. Grout Samples for Verification: Showing color and texture of joint treatment.

F. Delegated-Design Submittal: For architectural precast 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 governing panel 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 architectural precast concrete.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data

B. Welding certificates.

C. Material Certificates: For the following items:

1. Cementitious materials.
2. Reinforcing materials and prestressing tendons.
3. Admixtures.
4. Bearing pads.
5. Structural-steel shapes and hollow structural sections.
6. Thin-brick units and accessories.
7. Stone anchors.
8. Insulation.

D. Material Test Reports: For aggregates.

E. Preconstruction test reports.

F. Source quality-control test reports.

G. Field quality-control

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance to erect **[Category A (Architectural Systems) for non-load]** **[Category S2 (Complex Structural Systems) for load]**-bearing members.

B. Installer Qualifications: A precast concrete erector who has retained a "PCI-Certified Field Auditor" to conduct a field audit of a project in same category as this Project and who can produce an Erectors' Post-Audit Declaration.

C. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Designated as a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units**[at time of bidding]**[**or designated as an APA-certified plant for production of architectural precast concrete products**].
2. Fabricator is located within 500 miles (800 km) of Project site.

D. Testing Agency Qualifications: An independent testing agency**[, acceptable to authorities having jurisdiction,]** qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

E. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

G. Sample Panels: After sample approval and before fabricating architectural precast concrete units, produce a minimum of **[two]** sample panels approximately **[16 sq. ft. (1.5 sq. m)]** in area for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.

1. Locate panels where indicated or, if not indicated, as directed by Architect.
2. Damage part of an exposed-face surface for each finish, color, and texture, and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
3. After acceptance of repair technique, maintain one sample panel at manufacturer's plant and one at Project site in an undisturbed condition as a standard for judging the completed Work.
4. Demolish and remove sample panels when directed.

H. Range Samples: After sample panel approval and before fabricating architectural precast concrete units, produce a minimum of **[three]** **[five]** sets of samples, approximately **[16 sq. ft. (1.5 sq. m)]** in area, representing anticipated range of each color and texture on Project's units. Maintain one set of range samples at Project

site and remaining range sample sets at manufacturer's plant as color and texture approval reference.

I. Mockups: After sample panel[**and range sample**] approval but before production of architectural precast concrete units, construct full-sized mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup as indicated on Drawings including [**aluminum framing, glass, sealants,**] and architectural precast concrete complete with anchors, connections, flashings, and joint fillers.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

J. Preconstruction Testing Mockup: Provide a full-size mockup of architectural precast concrete indicated on Drawings for preconstruction testing. See Section for preconstruction testing requirements.

1. Build preconstruction testing mockup as indicated on Drawings including [**aluminum framing, glass, sealants,**] and architectural precast concrete complete with anchors, connections, flashings, and joint fillers.
2. Build preconstruction testing mockup at testing agency facility.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Stone Anchor Testing: Engage a qualified testing agency to perform preconstruction testing according to ASTM C 1354/C 1354M or ASTM E 488, modified as follows:

1. Furnish test specimens, including stone anchors, that are representative of materials proposed for incorporation into the Work.
2. Anchorage Tests: Test 12 inches (300 mm) square samples for[**each combination of**] stone variety, orientation of cut, finish, and anchor type proposed for use on Project. Test for shear and tensile strength of anchorage system.

1.10 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground or other rehandling.

B. Support units during shipment on nonstaining shock-absorbing material.

C. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

D. Place stored units so identification marks are clearly visible, and units can be inspected.

E. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

F. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Fabricators: Subject to compliance with requirements, **[provide products by the following] [provide products by one of the following] [available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following]**:

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design architectural precast concrete units**[including stone facing system]**.

B. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

C. Calculated Fire-Test-Response Characteristics: Provide architectural precast concrete units with fire-resistance rating indicated as calculated according to **[ACI 216.1 (ACI 216.1M)] [PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete,"]** and acceptable to authorities having jurisdiction.

D. Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:

1. Loads: As indicated.
2. Dead Loads:
3. Live Loads:
4. Wind Loads: **applicable wind loads or wind-load criteria, positive and negative for various parts of building as required by applicable building code or ASCE/SEI 7, including basic wind speed, importance factor, exposure category, and pressure coefficient>**.

5. Seismic Loads: **applicable seismic design data including seismic performance category, importance factor, use group, seismic design category, seismic zone, site classification, site coefficient, and drift criteria**>.
6. Project-Specific Loads: **applicable loads**>.
7. Design precast concrete units 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 as follows:

    a. Upward and downward movement of **[1/2 inch (13 mm)] [3/4 inch (19 mm)] [1 inch (25 mm)]**.

8. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of **[80 deg F (26 deg C)] [120 deg F (67 deg C)]**

9. Fire-Resistance Rating: Select material and minimum thicknesses to provide **[1] [2]** -hour fire rating.
10. Window Washing System: Design precast units supporting window washing system indicated to resist pull-out and horizontal shear forces transmitted from window washing equipment.
11. Vehicular Impact Loads: Design spandrel beams acting as vehicular barriers for passenger cars to resist a single **[6000-lb (26.7-kN)]** <**Insert value**> load applied horizontally in any direction to the spandrel beam, with anchorages or attachments capable of transferring this load to the structure. Design spandrel beams assuming the load to act at a height of 18 or 27 inches (457 or 686 mm) above the floor or ramp surface, whichever is more severe, on an area not to exceed 1 sq. ft. (0.0929 sq. m).

2.3 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous and true 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] [to match those used for precast concrete design reference sample]**. Use 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 final hardening of newly placed concrete mixture to depth of reveal specified.

2.4 REINFORCING MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **[25] [60]** percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Galvanized Reinforcing Bars: [**ASTM A 615/A 615M, Grade 60 (Grade 420)**] [**ASTM A 706/A 706M**], deformed bars, with ASTM A 767/A 767M, Class II zinc coating and chromate treatment.[**Galvanize after fabrication and bending.**]

E. Epoxy-Coated Reinforcing Bars: [**ASTM A 615/A 615M, Grade 60 (Grade 420)**] [**ASTM A 706/A 706M**], deformed bars, [**ASTM A 775/A 775M**] [**or**] [**ASTM A 934/A 934M**] epoxy coated.

F. Steel Bar Mats: ASTM A 184/A 184M, fabricated from [**ASTM A 615/A 615M, Grade 60 (Grade 420)**] [**ASTM A 706/A 706M**], deformed bars, assembled with clips.

G. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from [**as-drawn**][**galvanized-**]steel wire into flat sheets.

H. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

I. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, [**plain**] [**deformed**], flat sheet, [**Type 1 bendable**] [**Type 2 nonbendable**] coating.

J. 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 117.

2.5 PRESTRESSING TENDONS

A. Prestressing Strand: ASTM A 416/A 416M, Grade 270 (Grade 1860), uncoated, seven-wire, low-relaxation strand.

1. Coat unbonded post-tensioning strand with post-tensioning coating complying with ACI 423.7 and sheath with polypropylene tendon sheathing complying with ACI 423.7. Include anchorage devices and coupler assemblies.

2.6 CONCRETE MATERIALS

A. Regional Materials: Precast architectural concrete shall be manufactured from aggregates[**and cement**] that have been extracted or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

B. Portland Cement: ASTM C 150/C 150M, 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.

C. Supplementary Cementitious Materials:

1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.

2. Metakaolin: ASTM C 618, Class N.
3. Silica Fume: ASTM C 1240, with optional chemical and physical requirement.
4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
5. Blended Hydraulic Cement: ASTM C 595, **[Type IS, portland blast-furnace slag] [Type IP, portland-pozzolan] [Type I (PM), pozzolan-modified portland] [Type I (SM), slag-modified portland]** cement.

D. Normal-Weight Aggregates: Except as modified by PCI MNL 117, 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.

1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.

a. Gradation: **[Uniformly graded] [Gap graded] [To match design reference sample]**.

2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.

E. Lightweight Aggregates: Except as modified by PCI MNL 117, ASTM C 330/C 330M, with absorption less than 11 percent.

F. Coloring Admixture: ASTM C 979/C 979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.

G. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

H. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

I. 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/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
7. Plasticizing Admixture: ASTM C 1017/C 1017M, Type I.
8. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
9. Corrosion Inhibiting Admixture: ASTM C 1582/C 1582M.

2.7 STEEL CONNECTION MATERIALS

A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.

B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or Type B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

C. Carbon-Steel Plate: ASTM A 283/A 283M, Grade C.

D. Malleable Iron Castings: ASTM A 47/A 47M, Grade 32510 or Grade 35028.

E. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30 (Grade 415-205).

F. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.

G. Carbon-Steel Structural Tubing: ASTM A 500/A 500M, Grade B or Grade C.

H. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65 (Grade 450).

I. Deformed-Steel Wire or Bar Anchors: ASTM A 496/A 496M or ASTM A 706/A 706M.

J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A or ASTM F 1554, Grade 36 (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.

K. High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563 (ASTM A 563M); and hardened carbon-steel washers, ASTM F 436 (ASTM F 436M).

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/A 123M or ASTM A 153/A 153M] [electrodeposition according to ASTM B 633, SC 3, Types 1 and 2]**.

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] [SSPC-Paint 25]** according to SSPC-PA 1.

N. Welding Electrodes: Comply with AWS standards.

2.8 STAINLESS-STEEL CONNECTION MATERIALS

A. Stainless-Steel Plate: ASTM A 666, Type 304, Type 316, or Type 201.

B. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy Group 1 or 2 (ASTM F 738M, Grade A1 or A4) hex-head bolts and studs; ASTM F 594, Alloy Group 1 or 2 (ASTM F 836M, Grade A1 or A4) stainless-steel nuts; and flat, stainless-steel washers.

1. Lubricate threaded parts of stainless-steel bolts with an antiseize thread lubricant during assembly.

C. Stainless-Steel-Headed Studs: ASTM A 276, Alloy 304 or Alloy 316, with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

2.9 BEARING PADS

A. Provide one of the following bearing pads for architectural precast 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, Type A durometer hardness of 50 to 70, ASTM D 2240, minimum tensile strength 2250 psi (15.5 MPa), ASTM D 412.
2. Random-Oriented-Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Type A durometer hardness of 70 to 90, ASTM D 2240; capable of supporting a compressive stress of 3000 psi (20.7 MPa) with no cracking, splitting, or delaminating in the internal portions of pad. Test one specimen for every 200 pads used in Project.
3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; Type A durometer hardness of 80 to 100, ASTM D 2240; complying with AASHTO's "AASHTO LRFD Bridge Design Specifications," Division II, Section 18.10.2; or with MIL-C-882E.
4. Frictionless Pads: PTFE, glass-fiber reinforced, bonded to stainless or mild-steel plate, or random-oriented-fiber-reinforced elastomeric pads; of type required for in-service stress.
5. High-Density Plastic: Multimonomer, nonleaching, plastic strip.

2.10 ACCESSORIES

A. Reglets: Specified in Section 076200 "Sheet Metal Flashing and Trim."

B. Reglets: [**PVC extrusions,**] [**Stainless steel, Type 302 or Type 304,**] [**Copper,**] felt or fiber filled, or with face opening of slots covered.

C. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.

2.11 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C 150/C 150M, 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/C 1218M.

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/C 1107M, 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 1218M.

C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.12 THIN BRICK AND ACCESSORIES

A. Products: Subject to compliance with requirements, **[provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]**:

1.

B. Thin Brick: Not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) thick, and as follows:

1. Dimensional Tolerances: Plus 0 inch (0 mm) or minus 1/16 inch (1.6 mm) for any dimension 8 inches (203 mm) or less and plus 0 inch (0 mm) or minus 3/32 inch (2.4 mm) for any dimension more than 8 inches (203 mm).
2. Out-of-Square Tolerance: Plus or minus 1/16 inch (1.6 mm).
3. Warpage Tolerance: Plus 0 inch (0 mm) or minus 1/16 inch (1.6 mm).
4. Variation of Shape from Specified Angle: Plus or minus one degree.
5. Modulus of Rupture: Not less than 250 psi (1.7 MPa) when tested according to ASTM C 67.
6. Tensile Bond Strength: Not less than 150 psi (1.0 MPa) when tested before and after freeze-thaw test according to ASTM E 488 as modified: Adhere a steel plate with a welded rod on a single thin-brick face with epoxy for each test.
7. 24-Hour Cold-Water Absorption: Not more than 6 percent when tested according to ASTM C 67.
8. Freeze-Thaw Resistance: No detectable disintegration or separation after 300 freezing-and-thawing cycles when tested according to ASTM C 666/C 666M, Method B.
9. Chemical Resistance: Tested according to ASTM C 650 and rated "not affected."
10. Efflorescence: Tested according to ASTM C 67 and rated "not effloresced."
11. Surface Coating: Thin brick with colors or textures applied as coatings shall withstand 50 cycles of freezing and thawing; ASTM C 67 with no observable difference in applied finish when viewed from 10 feet (3 m).
12. Back Surface Texture: Scored, combed, wire roughened, ribbed, keybacked, or dovetailed.

C. Regional Materials: Thin brick shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

D. Special Shapes: Include corners, edge corners, and end edge corners.

E. Face Size: **[2-1/4 inches (57 mm) high by 7-5/8 inches (194 mm) long] [2-1/4 inches (57 mm) high by 11-5/8 inches (295 mm) long] [3-5/8 inches (92 mm) high by 7-5/8 inches (194**

mm) long] [3-5/8 inches (92 mm) high by 11-5/8 inches (295 mm) long] <Insert dimensions>.

F. [**Where indicated to "match existing,"**]provide thin brick matching color, texture, and face size of existing adjacent brick work.

1. **<Insert information on existing brick if known>.**

G. Face Color and Texture: [**Match Architect's samples**] [**Match color, texture, and face size of adjacent existing brick**].

H. Sand-Cement Mortar: Portland cement, ASTM C 150/C 150M, Type I, and clean, natural sand, ASTM C 144. Mix at ratio of 1 part cement to 4 parts sand, by volume, with minimum water required for placement.

I. Pointing Grout: Packaged, polymer-modified, sanded grout complying with ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, [**provide products by the following**] [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Bostik, Inc.
b. C-Cure.
c. Custom Building Products.
d. DAP Products Inc.
e. Jamo Inc.
f. Laticrete International, Inc.
g. MAPEI Corporation.
h. Merkrete by Parex USA, Inc.
i. ProSpec.
j. SGM Inc.
k. Summitville Tiles, Inc.
l. TEC Specialty Products Inc.
m. **<Insert manufacturer's name>.**

2. Polymer Type: Acrylic resin in [**dry, redispersible form, packaged with other dry ingredients**] [**liquid-latex form for adding packaged dry-grout mix**].
3. Colors: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**].

2.13 STONE MATERIALS AND ACCESSORIES

A. Stone facing for architectural precast concrete is specified in Section 044200 "Exterior Stone Cladding."

B. Anchors: Stainless steel, ASTM A 276, Type 304 or Type 316, of temper and diameter required to support loads without exceeding allowable design stresses.

1. Fit each anchor leg with neoprene grommet collar of width at least twice the diameter and of length at least five times the diameter of anchor.

C. Sealant Filler: Single-component, nonsag, neutral-curing, silicone sealant; Class 25, Use NT (nontraffic), and Use M (masonry) that complies with applicable requirements in Section 079200 "Joint Sealants" and that does not stain stone:

1. Products: Subject to compliance with requirements, **[provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]**:

a. BASF Building Systems; Omniseal 50.
b. Dow Corning Corporation; 756 SMS.
c. GE Advanced Materials - Silicones; NB SCS9000.
d. Tremco Incorporated; Spectrem 2.

D. Sealant Filler: Single-component, nonsag, urethane sealant; Class 25, Use T (traffic), and Use M (masonry) that complies with applicable requirements in Section 079200 "Joint Sealants" and that does not stain stone:

1. Products: Subject to compliance with requirements, **[provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]**:

a. BASF Building Systems; **[Sonolastic NP 1] [Sonolastic Ultra]**.
b. Sika Corporation; Sikaflex - 1a.
c. Tremco Incorporated; Vulkem 116.

E. Epoxy Filler: ASTM C 881/C 881M, 100 percent solids, sand-filled nonshrinking, nonstaining of type, class, and grade to suit application.

1. Elastomeric Anchor Sleeve: 1/2 inch (13 mm) long, Type A durometer hardness of 60, ASTM D 2240.

F. Bond Breaker: **[Preformed, compressible, resilient, nonstaining, nonwaxing, closed-cell polyethylene foam pad, nonabsorbent to liquid and gas, 1/8 inch (3.2 mm) thick] [Polyethylene sheet, ASTM D 4397, 6 to 10 mils (0.15 to 0.25 mm) thick]**.

2.14 INSULATED PANEL ACCESSORIES

A. Molded-Polystyrene (EPS) Board Insulation: ASTM C 578, **[Type XI, 0.70 lb/cu. ft. (12 kg/cu. m)] [Type I, 0.90 lb/cu. ft. (15 kg/cu. m)] [Type VIII, 1.15 lb/cu. ft. (18 kg/cu. m)] [Type II, 1.35 lb/cu. ft. (22 kg/cu. m)] [Type IX, 1.80 lb/cu. ft. (29 kg/cu. m)]**; **[square] [ship-lap]** edges; with thickness of **<Insert dimension>**.

B. Extruded-Polystyrene (XPS) Board Insulation: ASTM C 578, **[Type X, 1.30 lb/cu. ft. (21 kg/cu. m)] [Type IV, 1.55 lb/cu. ft. (25 kg/cu. m)] [Type VI, 1.80 lb/cu. ft. (29 kg/cu. m)]**

[Type VII, 2.20 lb/cu. ft. (35 kg/cu. m)] **[Type V, 3.00 lb/cu. ft. (48 kg/cu. m)]**; **[square]** **[ship-lap]** edges; with thickness of **<Insert dimension>**.

C. Polyisocyanurate Board Insulation: ASTM C 591, **[Type I, 1.8 lb/cu. ft. (29 kg/cu. m)]** **[Type II, 2.5 lb/cu. ft. (40 kg/cu. m)]** **[Type III, 3.0 lb/cu. ft. (48 kg/cu. m)]** unfaced, with thickness of **<Insert dimension>**.

D. Wythe Connectors: **[Glass-fiber-reinforced vinylester connectors]** **[Polypropylene pin connectors]** **[Stainless-steel pin connectors]** **[Bent galvanized reinforcing bars or galvanized welded wire trusses]** **[Epoxy-coated carbon-fiber grid]** **[Fiberglass trusses]** manufactured to connect wythes of precast concrete panels.

2.15 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Use a single design mixture for units with more than one major face or edge exposed.
2. Where only one face of unit is exposed use either a single design mixture or separate mixtures for face and backup.

B. Limit use of fly ash and ground granulated blast-furnace slag to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.

C. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.

D. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.

E. Normal-Weight Concrete Mixtures: Proportion **[face mixtures]** **[face and backup mixtures]** **[full-depth mixture]** **[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 (34.5 MPa) minimum.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.

G. Lightweight Concrete Backup Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
2. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. ft. (1842 kg/cu. m), plus or minus 3 lb/cu. ft. (48 kg/cu. m), according to ASTM C 567.

H. 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 117.

I. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.16 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 architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished work.
2. Edge and Corner Treatment: Uniformly **[chamfered]** **[radiused]**.

2.17 THIN-BRICK FACINGS

A. Place form liner templates accurately to provide grid for thin-brick facings. Provide solid backing and supports to maintain stability of liners while placing thin bricks and during concrete placement.

B. Securely place thin-brick units face down into form liner pockets and place concrete backing mixture.

C. Completely fill joint cavities between thin-brick units with sand-cement mortar, and place precast concrete backing mixture while sand-cement mortar is still fluid enough to ensure bond.

D. Mix and install pointing grout according to ANSI A108.10. Completely fill joint cavities between thin-brick units with pointing grout, and compress into place without spreading grout onto faces of thin-brick units. Remove excess grout immediately to prevent staining of thin brick.

1. Tool joints to a **[slightly concave]** **[V-]**shape when pointing grout is thumbprint hard.

E. Clean faces and joints of thin-brick facing.

2.18 STONE FACINGS

A. Accurately position stone facings to comply with requirements and in locations indicated on Shop Drawings. Install anchors, supports, and other attachments indicated or necessary to

secure stone in place. Keep concrete reinforcement a minimum of 3/4 inch (19 mm) from the back surface of stone. Use continuous spacers to obtain uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

1. Stone to Precast Anchorages: Provide anchors in numbers, types and locations required to satisfy specified performance criteria, but not more than 24 inches (600 mm) o.c. around perimeter of stone facing panels with a minimum of four anchors per panel.

B. Fill anchor holes with [**sealant filler and install anchors**] [**epoxy filler and install anchors with elastomeric anchor sleeve at back surface of stone**].

1. Install minimum 0.006-inch- (0.15-mm-) thick polyethylene sheet to prevent bond between back of stone facing and concrete substrate and to ensure no passage of precast matrix to stone surface.
2. Install 1/8-inch (3-mm) polyethylene-foam bond breaker to prevent bond between back of stone facing and concrete substrate and to ensure no passage of precast matrix to stone surface. Maintain minimum projection requirements of stone anchors into concrete substrate.

2.19 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 117 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 reinforcing exceeds limits specified in ASTM A 775/A 775M, 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 strands to maintain at least 3/4-inch (19-mm) minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches (38 mm) 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 reinforcement 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 architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

G. Prestress tendons for architectural precast concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 117.

1. Delay detensioning or post-tensioning of precast, prestressed architectural 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.

H. Comply with requirements in PCI MNL 117 and requirements 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 (25 mm) 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 internal and external 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 117.

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 117 for hot- and cold-weather concrete placement.

M. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.

N. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

O. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.20 INSULATED PANEL CASTING

A. Cast, screed, and consolidate bottom concrete wythe supported by mold.

B. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation holes, 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 (65 deg C) in bottom concrete wythe.

2.21 FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

B. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with the following product tolerances:

1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:

    a. 10 feet (3 m) or under, plus or minus 1/8 inch (3 mm).
    b. 10 to 20 feet (3 to 6 m), plus 1/8 inch (3 mm), minus 3/16 inch (5 mm).
    c. 20 to 40 feet (6 to 12 m), plus or minus 1/4 inch (6 mm).
    d. Each additional 10 feet (3 m), plus or minus 1/16 inch (1.5 mm).

2. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:

    a. 10 feet (3 m) or under, plus or minus 1/4 inch (6 mm).
    b. 10 to 20 feet (3 to 6 m), plus 1/4 inch (6 mm), minus 3/8 inch (10 mm).

c. 20 to 40 feet (6 to 12 m), plus or minus 3/8 inch (10 mm).
d. Each additional 10 feet (3 m), plus or minus 1/8 inch (3 mm).

3. Total Thickness or Flange Thickness: Plus 1/4 inch (6 mm), minus 1/8 inch (3 mm).
4. Rib Thickness: Plus or minus 1/8 inch (3 mm).
5. Rib to Edge of Flange: Plus or minus 1/8 inch (3 mm).
6. Distance between Ribs: Plus or minus 1/8 inch (3 mm).
7. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or minus 1/8 inch/72 inches (3 mm/1830 mm) or 1/2 inch (13 mm) total, whichever is greater.
8. Length and Width of Block-outs and Openings within One Unit: Plus or minus 1/4 inch (6 mm).
9. Location and Dimension of Block-outs Hidden from View and Used for HVAC and Utility Penetrations: Plus or minus 3/4 inch (19 mm).
10. Dimensions of Haunches: Plus or minus 1/4 inch (6 mm).
11. Haunch Bearing Surface Deviation from Specified Plane: Plus or minus 1/8 inch (3 mm).
12. Difference in Relative Position of Adjacent Haunch Bearing Surfaces from Specified Relative Position: Plus or minus 1/4 inch (6 mm).
13. Bowing: Plus or minus L/360, maximum 1 inch (25 mm).
14. Local Smoothness: 1/4 inch/10 feet (6 mm/3 m).
15. Warping: 1/16 inch/12 inches (1.5 mm/300 mm) of distance from nearest adjacent corner.
16. Tipping and Flushness of Plates: Plus or minus 1/4 inch (6 mm).
17. Dimensions of Architectural Features and Rustications: Plus or minus 1/8 inch (3 mm).

C. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.

1. Weld Plates: Plus or minus 1 inch (25 mm).
2. Inserts: Plus or minus 1/2 inch (13 mm).
3. Handling Devices: Plus or minus 3 inches (75 mm).
4. Reinforcing Steel and Welded Wire Reinforcement: Plus or minus 1/4 inch (6 mm) where position has structural implications or affects concrete cover; otherwise, plus or minus 1/2 inch (13 mm).
5. Reinforcing Steel Extending out of Member: Plus or minus 1/2 inch (13 mm) of plan dimensions.
6. Tendons: Plus or minus 1/4 inch (6 mm), vertical; plus or minus 1 inch (25 mm), horizontal.
7. Location of Rustication Joints: Plus or minus 1/8 inch (3 mm).
8. Location of Opening within Panel: Plus or minus 1/4 inch (6 mm).
9. Location of Flashing Reglets: Plus or minus 1/4 inch (6 mm).
10. Location of Flashing Reglets at Edge of Panel: Plus or minus 1/8 inch (3 mm).
11. Reglets for Glazing Gaskets: Plus or minus 1/8 inch (3 mm).
12. Electrical Outlets, Hose Bibs: Plus or minus 1/2 inch (13 mm).
13. Location of Bearing Surface from End of Member: Plus or minus 1/4 inch (6 mm).
14. Allowable Rotation of Plate, Channel Inserts, and Electrical Boxes: 2-degree rotation or 1/4 inch (6 mm) maximum over the full dimension of unit.
15. Position of Sleeve: Plus or minus 1/2 inch (13 mm).
16. Location of Window Washer Track or Buttons: Plus or minus 1/8 inch (3 mm).

D. Thin-Brick-Faced Architectural Precast Concrete Units: Restrict the following misalignments to 2 percent of number of thin bricks in a unit.

1. Alignment of Mortar Joints:

   a. Jog in Alignment: 1/8 inch (3 mm).
   b. Alignment with Panel Centerline: Plus or minus 1/8 inch (3 mm).

2. Variation in Width of Exposed Mortar Joints: Plus or minus 1/8 inch (3 mm).
3. Tipping of Individual Thin Bricks from the Panel Plane of Exposed Thin-Brick Surface: Plus 0 inch (0 mm); minus 1/4 inch (6 mm) less than or equal to depth of form liner joint.
4. Exposed Thin-Brick Surface Parallel to Primary Control Surface of Panel: Plus 1/4 inch (6 mm); minus 1/8 inch (3 mm).
5. Individual Thin-Brick Step in Face from Panel Plane of Exposed Thin-Brick Surface: Plus 0 inch (0 mm); minus 1/4 inch (6 mm) less than or equal to depth of form liner joint.

E. Stone Veneer-Faced Architectural Precast Concrete Units:

1. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated: Plus or minus 1/4 inch (6 mm).
2. Variation in Joint Width: 1/8 inch in 36 inches (3 mm in 900 mm) or a quarter of nominal joint width, whichever is less.
3. Variation in Plane between Adjacent Stone Units (Lipping): 1/16-inch (1.5-mm) difference between planes of adjacent units.

2.22 FINISHES

A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved **[design reference sample]** **[sample panels]** **[mockups]** and as follows:

1. Design Reference Sample: **<Insert description and identify fabricator and code number of sample>**.
2. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.
3. As-Cast Surface Finish: Provide surfaces to match approved sample for acceptable surface, air voids, sand streaks, and honeycomb.
4. Textured-Surface Finish: Impart by form liners or inserts.
5. Bushhammer Finish: Use power or hand tools to remove matrix and fracture coarse aggregates.
6. Exposed-Aggregate Finish: Use chemical retarding agents applied to concrete forms and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
7. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
8. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attach.

9. Honed Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.
10. Polished Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.
11. Sand-Embedment Finish: Use selected stones placed in a sand bed in bottom of mold, with sand removed after curing.
12. Thin-Brick Facing: See "Thin-Brick Facings" Article.
13. Stone Facing: See "Stone Facings" Article.

B. Finish exposed **[top]** **[back]** surfaces of architectural precast concrete units to match face-surface finish.

C. Finish exposed **[top]** **[back]** surfaces of architectural precast concrete units with smooth, steel-trowel finish.

D. Finish unexposed surfaces of architectural precast concrete units with as cast finish.

2.23 SOURCE QUALITY CONTROL

A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, ASTM C 1610/C 1610M, ASTM C 1611/C 1611M, ASTM C 1621/C 1621M, and ASTM C 1712.

B. Owner will employ an independent testing agency to evaluate architectural precast concrete fabricator's quality-control and testing methods.

1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.

C. Strength of precast concrete units is considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.

D. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M and ACI 318 (ACI 318M).

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.
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.

E. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

F. Defective Units: Discard and replace recast architectural concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete 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. Do not install precast concrete units until supporting cast-in-place concrete has attained minimum allowable design compressive strength and supporting steel or other structure is structurally ready to receive loads from precast concrete units.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

1. Install temporary steel or plastic spacing shims as precast 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 grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

4. Unless otherwise indicated, maintain uniform joint widths of 3/4 inch (19 mm).

C. Connect architectural precast 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. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

1. Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
2. Welds not specified shall be continuous fillet welds, using no less than the minimum fillet as specified by AWS.
3. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- (0.1-mm-) thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780/A 780M.
4. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
5. Visually inspect welds and remove, reweld, or repair incomplete and defective welds.

E. 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.
2. For slip-critical connections, use one of the following methods to assure proper bolt pretension:

    a. Turn-of-Nut: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
    b. Calibrated Wrench: According to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
    c. Twist-off Tension Control Bolt: ASTM F 1852.
    d. Direct-Tension Control Bolt: ASTM F 1852.

3. For slip-critical connections, use method and inspection procedure approved by Architect and coordinated with inspection agency.

F. Grouting or Dry-Packing Connections and Joints: Grout connections where required or indicated. 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. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

A. Erect architectural precast concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

B. Erect architectural precast concrete units level, plumb, square, and in alignment, without exceeding the following noncumulative erection tolerances:

1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch (13 mm).
2. Plan Location from Centerline of Steel: Plus or minus 1/2 inch (13 mm).
3. Top Elevation from Nominal Top Elevation: As follows:

    a. Exposed Individual Panel: Plus or minus 1/4 inch (6 mm).
    b. Non-Exposed Individual Panel: Plus or minus 1/2 inch (13 mm).
    c. Exposed Panel Relative to Adjacent Panel: 1/4 inch (6 mm).
    d. Non-Exposed Panel Relative to Adjacent Panel: 1/2 inch (13 mm).

4. Support Elevation from Nominal Support Elevation: As follows:

    a. Maximum Low: 1/2 inch (13 mm).
    b. Maximum High: 1/4 inch (6 mm).

5. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet (30 m): 1 inch (25 mm).
6. Plumb in Any 10 Feet (3 m) of Element Height: 1/4 inch (6 mm).
7. Maximum Jog in Alignment of Matching Edges: 1/4 inch (6 mm).
8. Joint Width (Governs over Joint Taper): Plus or minus 1/4 inch (6 mm).
9. Maximum Joint Taper: 3/8 inch (10 mm).
10. Joint Taper in 10 Feet (3 m): 1/4 inch (6 mm).
11. Maximum Jog in Alignment of Matching Faces: 1/4 inch (6 mm).
12. Differential Bowing or Camber, as Erected, between Adjacent Members of Same Design: 1/4 inch (6 mm).
13. Opening Height between Spandrels: Plus or minus 1/4 inch (6 mm).

3.4 FIELD QUALITY CONTROL

A. Special Inspections: **[Owner will engage] [Engage]** a qualified special inspector to perform the following special inspections and prepare reports:

1. Erection of loadbearing precast concrete members.

B. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests and inspections and prepare test reports.

C. 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.

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

E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS

A. Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.

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 (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780/A 780M.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.6 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. 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 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.

END OF SECTION 034500

COLUMN SCHEDULE

MARK	SIZE	BASE PL SIZE	CAP PLATE SIZE	ANCHOR BOLTS	DETAIL	
C1	HSS6X6X1/4	3/4" X 1'-0" X 8"	1/2"	4-3/4" X 1'-4"	F	
C3	W8X24	3/4" X 1'-2" X 1'-2"	1/2"	4-3/4" X 1'-4"	E	
C4	W8X31	1 1/2" X 1'-4" X 10"	1/2"	4-3/4" X 1'-4"	D	
C5	W10X33	1" X 1'-4" X 1'-0"	1/2"	4-3/4" X 1'-4"	C	
C6	W10X45	1 3/8" X 1'-0" X 1'-4"	5/8"	4-3/4" X 1'-4"	B	
C7	W10X60	2 1/4" X 1'-8" X 1'-0"	5/8"	4-1" DIA. X 1'-8" **	A	

1 TYPICAL ASTM F1554 GR 36 BOLT WITH 1/4" X 2" X 2" ANCHOR PLATE WASHERS
2 ASTM F1554 GR 50 BOLT WITH 1/4" X 2" X 2" ANCHOR PLATE WASHERS MARKED ON PLANS AS **
3 PROVIDE 1 1/2" NON-SHRINK 5000 PSI GROUT AT ALL BASE PLATES ON CONCRETE FOOTINGS.
4 ALL EXPOSED ANCHOR BOLTS TO BE GALVANIZED.
5 ** USE 4" GAGE ON CAP PLATE BOLTS ON GRID A1

C.I.P. CONC. WALL REINFORCING SCHEDULE

MARK	WALL THICKNESS	REINFORCING		
			INSIDE FACE	OUTSIDE FACE
①	8"	VERT	#5 @ 1'-0" O.C. CENTERED	
		HORIZ	#5 @ 1'-2" O.C. CENTERED	
②	10"	VERT	#4 @ 1'-0" O.C.	#4 @ 1'-0" O.C. EW
		HORIZ	#4 @ 1'-0" O.C.	#4 @ 1'-0" O.C. EW
③	1'-0"	VERT	#5 @ 1'-0" O.C.	#4 @ 1'-6" O.C. EW
		HORIZ	#4 @ 10" O.C.	#4 @ 10" O.C.
④	1'-4"	VERT	#5 @ 1'-0" O.C.	#4 @ 1'-6" O.C. EW
		HORIZ	#4 @ 10" O.C.	#4 @ 10" O.C.

SPREAD FOOTING SCHEDULE

MK NO	PLAN SIZE	DEPTH	HORIZ. REINF
F6.0	6'-0" X 6'-0"	1'-2"	7-#5 EA. WAY BOT.
F6.6	6'-6" X 6'-6"	1'-4"	8-#5 EA. WAY BOT.
F7.0	7'-0" X 7'-0"	1'-6"	6-#6 EA. WAY BOT.
F7.6	7'-6" X 7'-6"	1'-7"	6-#7 EA. WAY BOT.
F8.0	8'-0" X 8'-0"	1'-8"	6-#7 EA. WAY BOT.
F9.0	9'-0" X 9'-0"	1'-10"	10-#6 EA. WAY BOT.
F9.6	9'-6" X 9'-6"	2'-0"	8-#7 EA. WAY BOT.
F10.0	10'-0" X 10'-0"	2'-0"	9-#7 EA. WAY BOT.
F10.6	10'-6" X 10'-6"	2'-2"	10-#7 EA. WAY BOT.
F11.0	11'-0" X 11'-0"	2'-3"	9-#8 EA. WAY BOT.
F11.6	11'-6" X 11'-6"	2'-4"	9-#8 EA. WAY BOT.

2

GRADE BEAM SCHEDULE

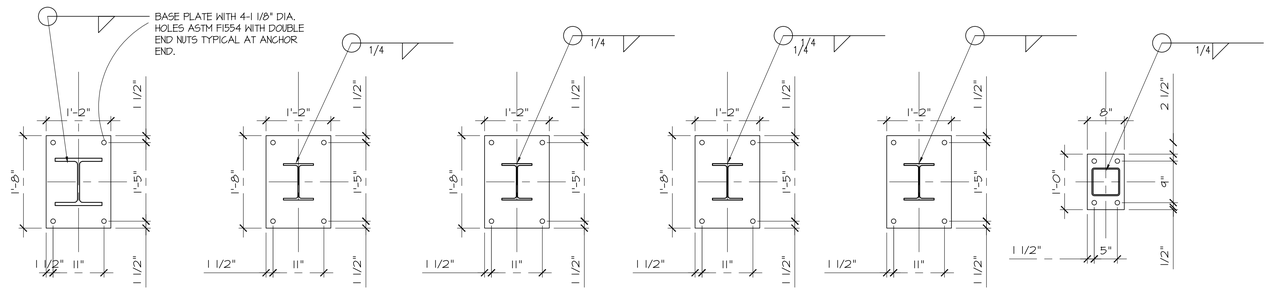
MK NO	WIDTH	DEPTH	REINFORCING
GB0.8	8"	3'-4"	1-#5 CONT. TOP & BOT. W/ #4 STIRRUPS @ 1'-6" O.C.
GB1.6	1-6"	3'-4"	3-#6 CONT. TOP & BOT. W/ #4 STIRRUPS @ 1'-6" O.C.
GB2.0	2-0"	3'-4"	4-#6 CONT. TOP & BOT. W/ #4 STIRRUPS @ 1'-6" O.C.
GB2.6	2-6"	3'-4"	4-#6 CONT. TOP & BOT. W/ #4 STIRRUPS @ 1'-6" O.C.
GB3.0	3-0"	3'-4"	3-#6 CONT. TOP & BOT. W/ #4 STIRRUPS @ 1'-6" O.C.
GB3.6	3-6"	3'-4"	4-#7 CONT. TOP & BOT. W/ #4 STIRRUPS @ 1'-6" O.C.

NOTE: MIN. STEEL MAY NOT BE MEET IN FLEXURE IN SOME CASES FOR FOOTINGS AND GRADE BEAMS.. ACI 318 ALLOWS LESS THAN MIN. STEEL PER SECTION 10.5.3, WHEN STEEL SUPPLIED IS 1.33 TIMES THAT REQUIRED BY ANALYSIS.

CONTINUOUS FOOTING SCHEDULE

MK NO	WIDTH	DEPTH	REINFORCING
CF1.6	1'-6"	1'-0"	3-#5 CONT. AT BOTTOM
CF2.2	2'-2"	1'-0"	4-#5 CONT. AT BOTTOM

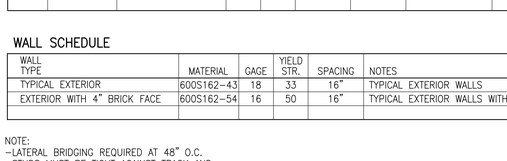
2



DETAIL A
DETAIL A
DETAIL B
DETAIL C
DETAIL D
DETAIL E
DETAIL D

STEEL DECK ATTACHMENT SCHEDULE FOR ROOF DECKING

FASTENER	TEK SCREWS	HILTI POWDER ACTUATED OR PNUEMATIC FASTENERS	WELDING
INTERMEDIATE	DO NOT USE	36/5 PATTERN TYP.	36/4 PATTERN TYP.
SIDE MARGINS	DO NOT USE	1'-6" O.C. MAX.	1'-6" O.C. MAX.
END SUPPORTS	DO NOT USE	36/7 PATTERN TYP.	36/5 PATTERN TYP.
SIDE SEAMS	3/SPAN	DO NOT USE	DO NOT USE



FASTENERS SHALL BE 12-24x1/2 TEKS/5 OR 12-24x7/8 TEKS/4 (AS APPROPRIATE TO THE THICKNESS OF THE MATERIAL WITH A HEX WASHER HEAD

TEK SCREWS TO SHEET METAL SIDE SEAMS SHALL BE 12-24x7/8 TEKS/1 WITH HEX WASHER HEAD.

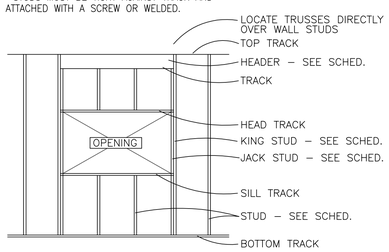
HEADER SCHEDULE

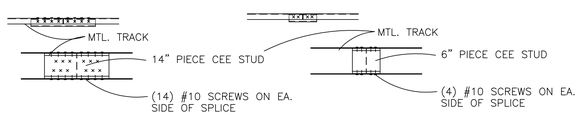
HEADER TYPE	MATERIAL	SIZE	GAGE	YIELD STR.	# KING STUDS	# JACK STUDS	#10 SCREWS REQ. INTO KING STUDS	MISC.
H1	(2) 800S162	(2) 1 5/8"x6" CEE	18	33	2	1	4	–
H2	(2) 800S162	(2) 1 5/8"x8" CEE	16	33	2	–	6	ICU SWING/SLID

WALL SCHEDULE

WALL TYPE	MATERIAL	GAGE	YIELD STR.	SPACING	NOTES
TYPICAL EXTERIOR	600S162-43	18	33	16"	TYPICAL EXTERIOR WALLS
EXTERIOR WITH 4" BRICK FACE	600S162-54	16	50	16"	TYPICAL EXTERIOR WALLS WITH BRICK

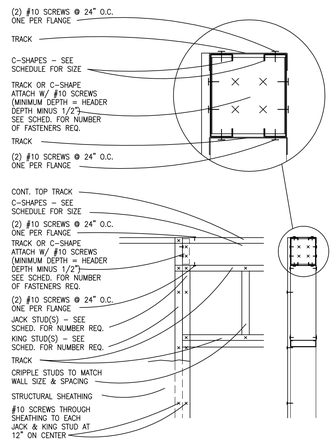
NOTE:
-LATERAL BRIDGING REQUIRED AT 48" O.C.
-STUDS MUST BE TIGHT AGAINST TRACK AND ATTACHED WITH A SCREW OR WELDED.





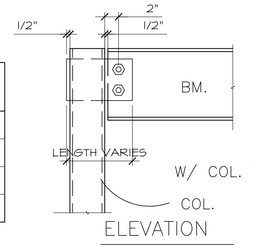
SPLICE @ SHEAR WALLS

TYPICAL SPLICE

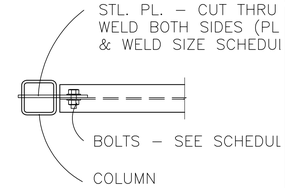


CONNECTION SCHEDULE

REACTION (KIPS)	NO. BOLTS 3/4" DIA.	PLATE	WELD
0-12	2	3/8"x6"	1/4"
13-18	3	3/8"x9"	1/4"
19-25	4	3/8"x1'-0"	1/4"
26-33	5	3/8"x1'-3"	1/4"



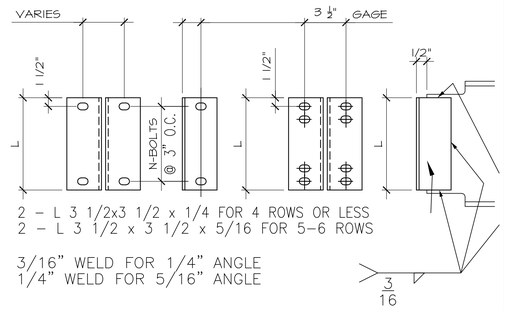
ELEVATION



PLAN

STANDARD FRAMED BEAM SCHEDULE

BEAM SIZE	NO. OF 3/4" DIA. A325N BOLTS	SIZE OF DOUBLE ANGLES
W8	2	2 – L 4 x 3 1/2 x 1/4
W12	3	2 – L 4 x 3 1/2 x 1/4
W14	3	2 – L 4 x 3 1/2 x 1/4
W16	4	2 – L 4 x 3 1/2 x 1/4
W18	5	2 – L 4 x 3 1/2 x 5/16
W21	6	2 – L 4 x 3 1/2 x 5/16
W24	7	2 – L 4 x 3 1/2 x 5/16
W27	8	2 – L 4 x 3 1/2 x 5/16
W33	9	2 – L 4 x 3 1/2 x 5/16



2 – L 3 1/2x3 1/2 x 1/4 FOR 4 ROWS OR LESS
2 – L 3 1/2 x 3 1/2 x 5/16 FOR 5-6 ROWS

3/16" WELD FOR 1/4" ANGLE
1/4" WELD FOR 5/16" ANGLE

HTRS HUMBOLT HIGH SCHOOL 2014

Larry Chilese Architects, Inc., Lincoln, Nebraska

Schedules

PROJECT NO: --
DRAWN BY: --
CHECKED BY: --
© Copyright SSD 2014

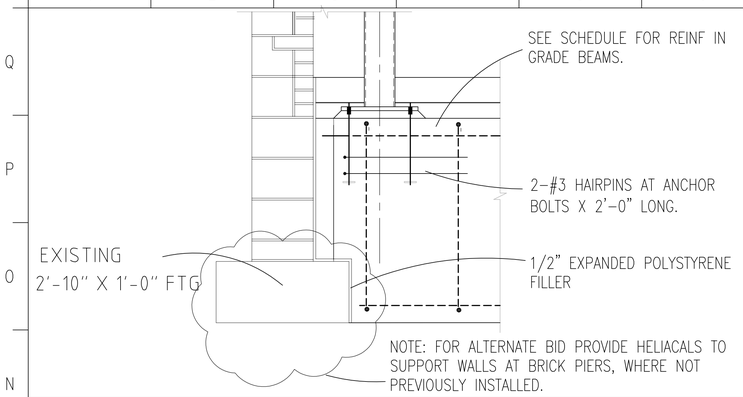
REVISIONS
1 Addendum #1 See CFS and SFS
2
3
4
5
6
7
8
9

ISSUE DATE

Structural Systems Design, Inc.
Lee A. Prochnow
8303 SW 24th Street
Lincoln, NE 68823
Phone: (402) 421-1133
FAX: (402) 421-1344

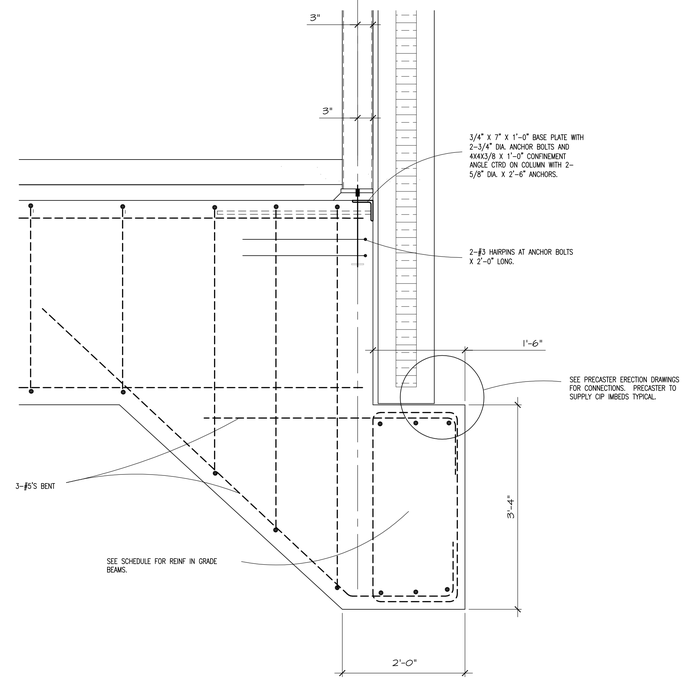
LEE A. PROCHNOW E-4172 REGISTERED PROFESSIONAL ENGINEER STATE OF NEBRASKA

S6.0

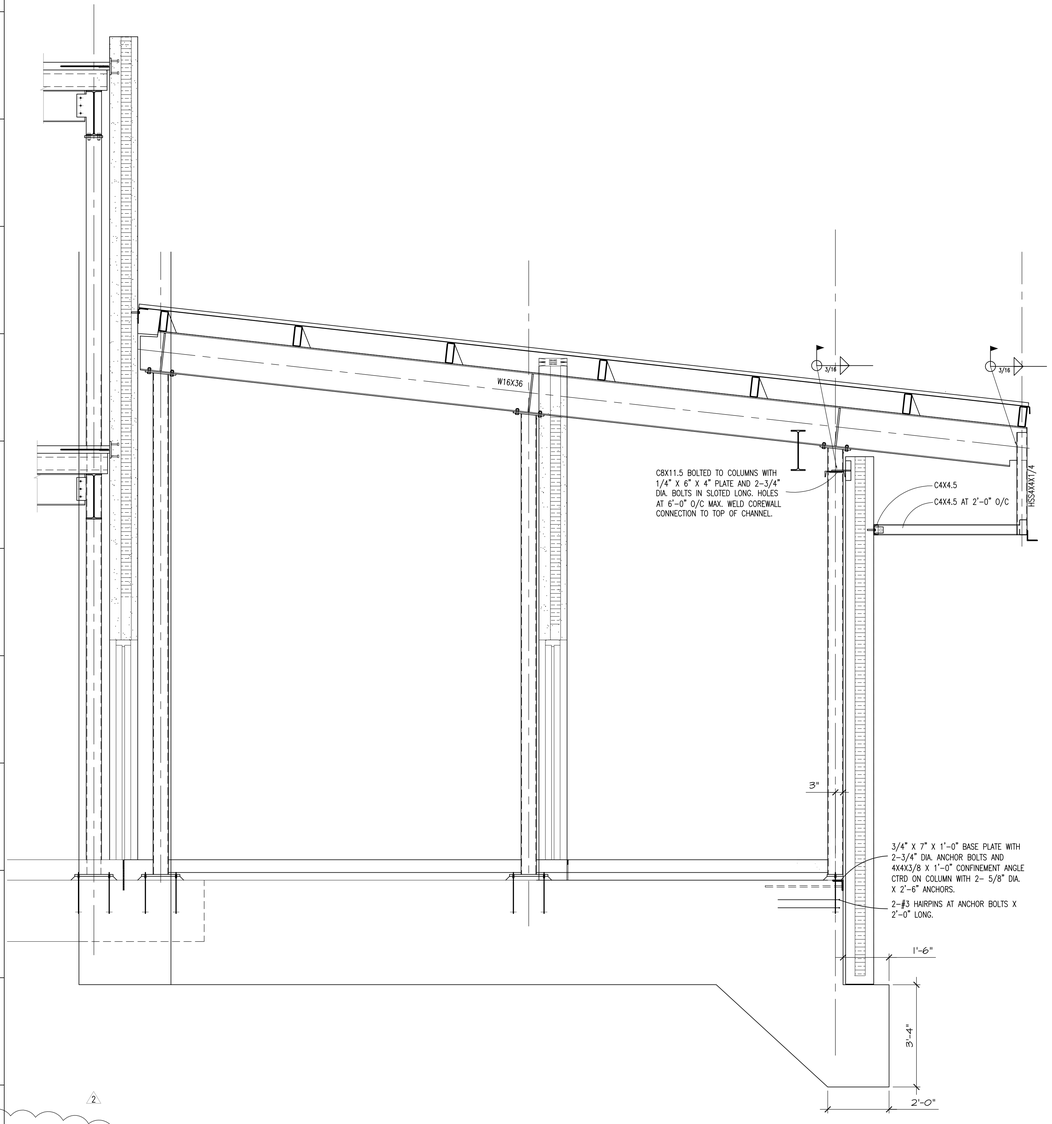


N1	SECTION
1"=1'-0"	

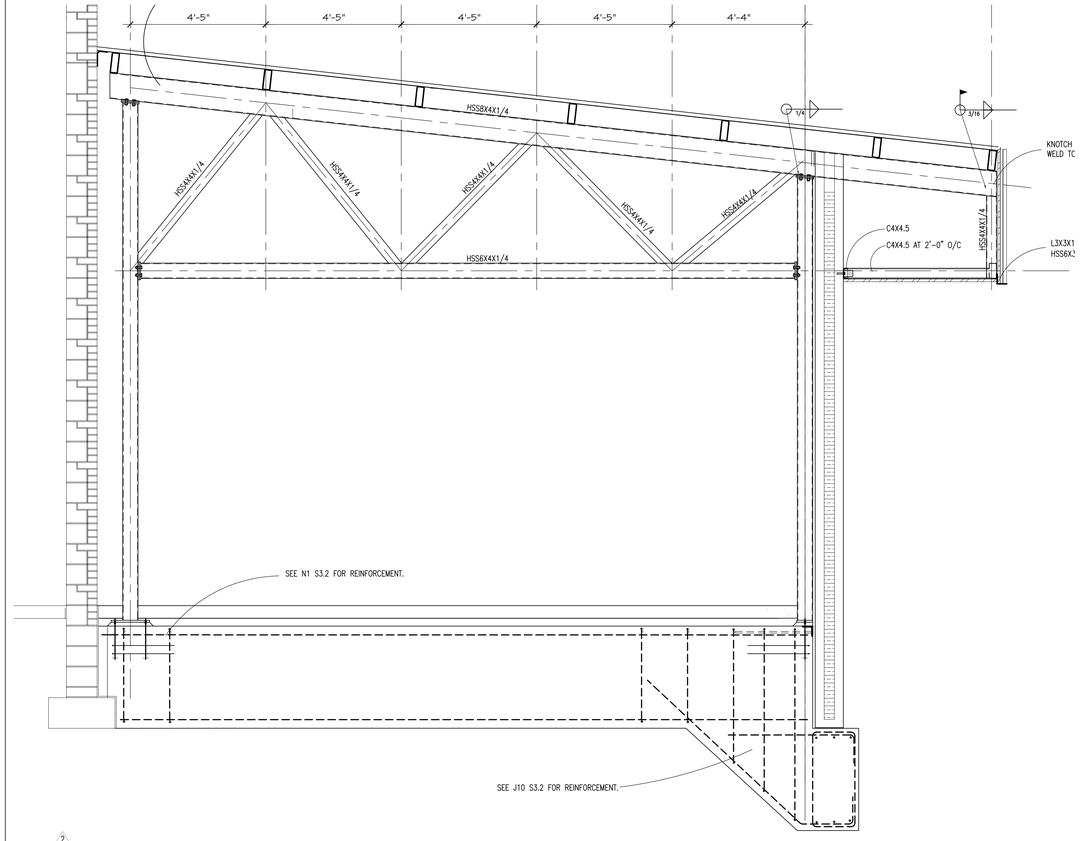
N7	SECTION
1"=1'-0"	



J10	SECTION
1"=1'-0"	



A1	SECTION
1/2"=1'-0"	



A10	TRUSS A
1/2"=1'-0"	

HTRS HUMBOLT HIGH SCHOOL 2014

Larry Chilese Architects, Inc., Lincoln, Nebraska

Details

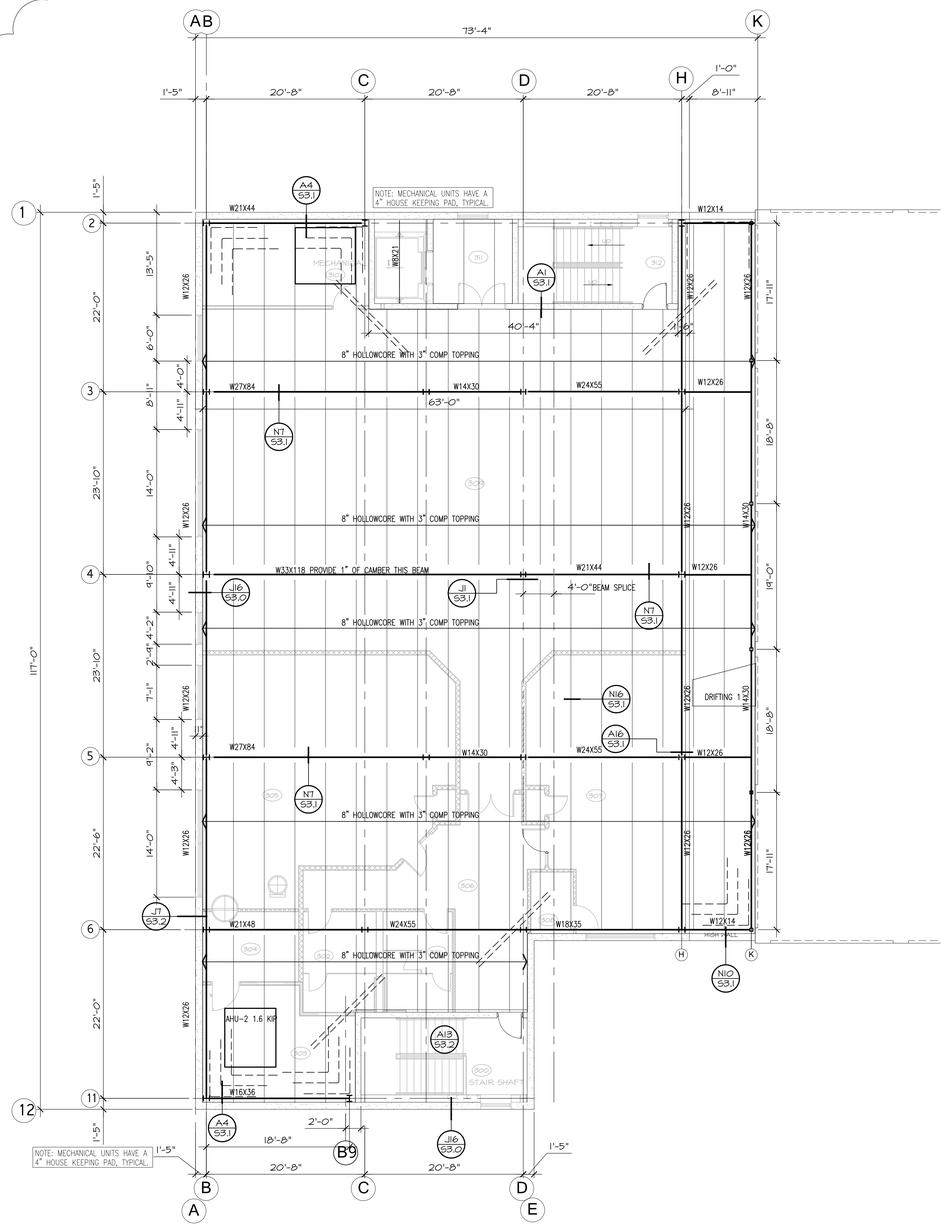
PROJECT NO: --
DRAWN BY: --
CHECKED BY: --
© Lamprecht SSD 2014

ISSUE DATE
REVISIONS
1. Addendum 2 See section scale change

Structural Systems Design, Inc.
Lincoln Office
6305 SW 24th Street
Lincoln, NE 68523
Phone: (402) 421-1133
FAX: (402) 421-1344

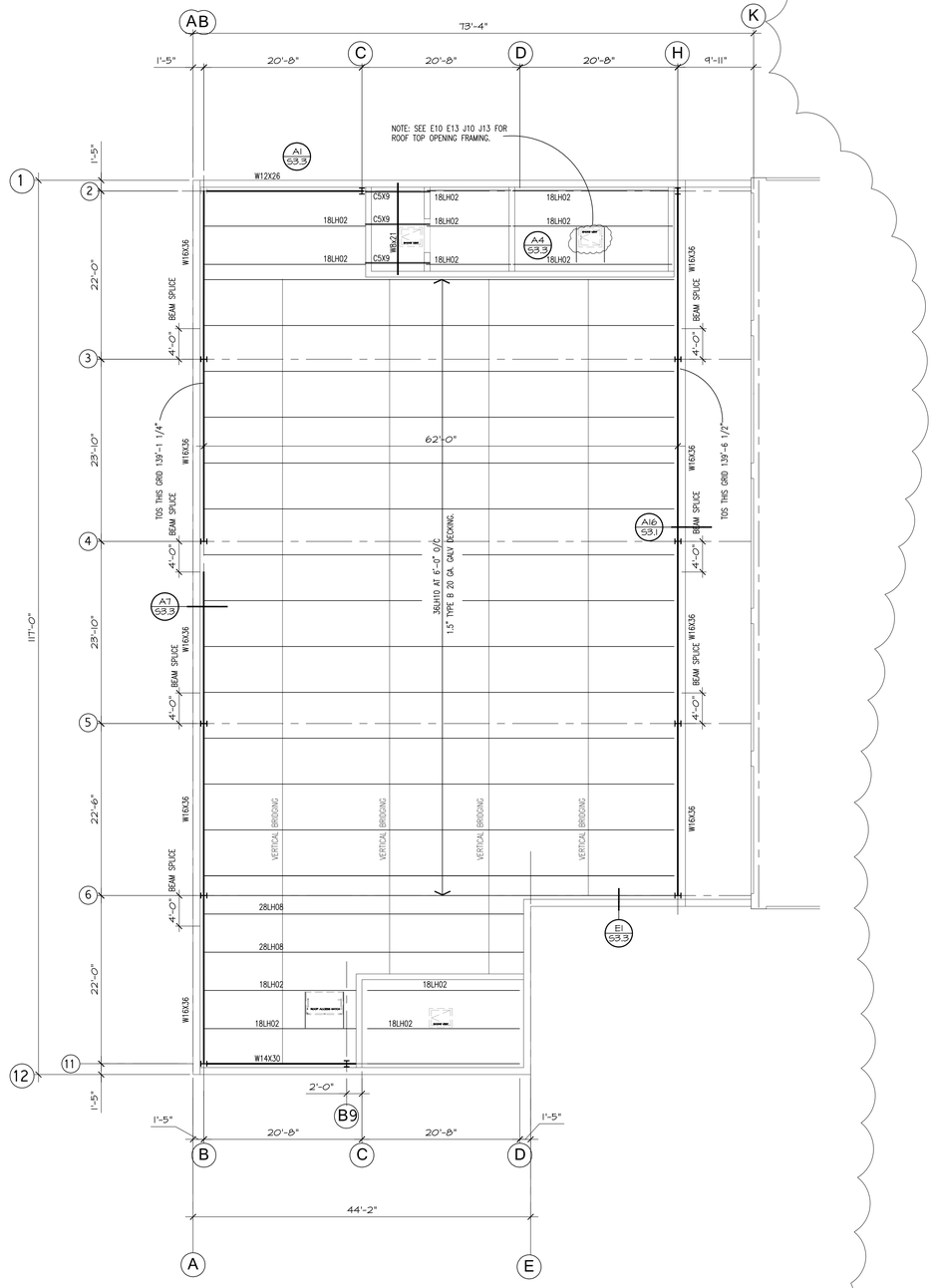
DEAN PROCHNOW E-4132 STRUCTURAL ENGINEER STATE OF NEBRASKA

S3.2



THIRD FLOOR FRAMING PLAN

1/8" = 1'-0" TOS THIS FLOOR 125'-1"



PARTIAL ROOF FRAMING PLAN

1/8" = 1'-0"

HTRS HUMBOLT HIGH SCHOOL 2014

Larry Chilese Architects, Inc., Lincoln, Nebraska

-- --

Layouts

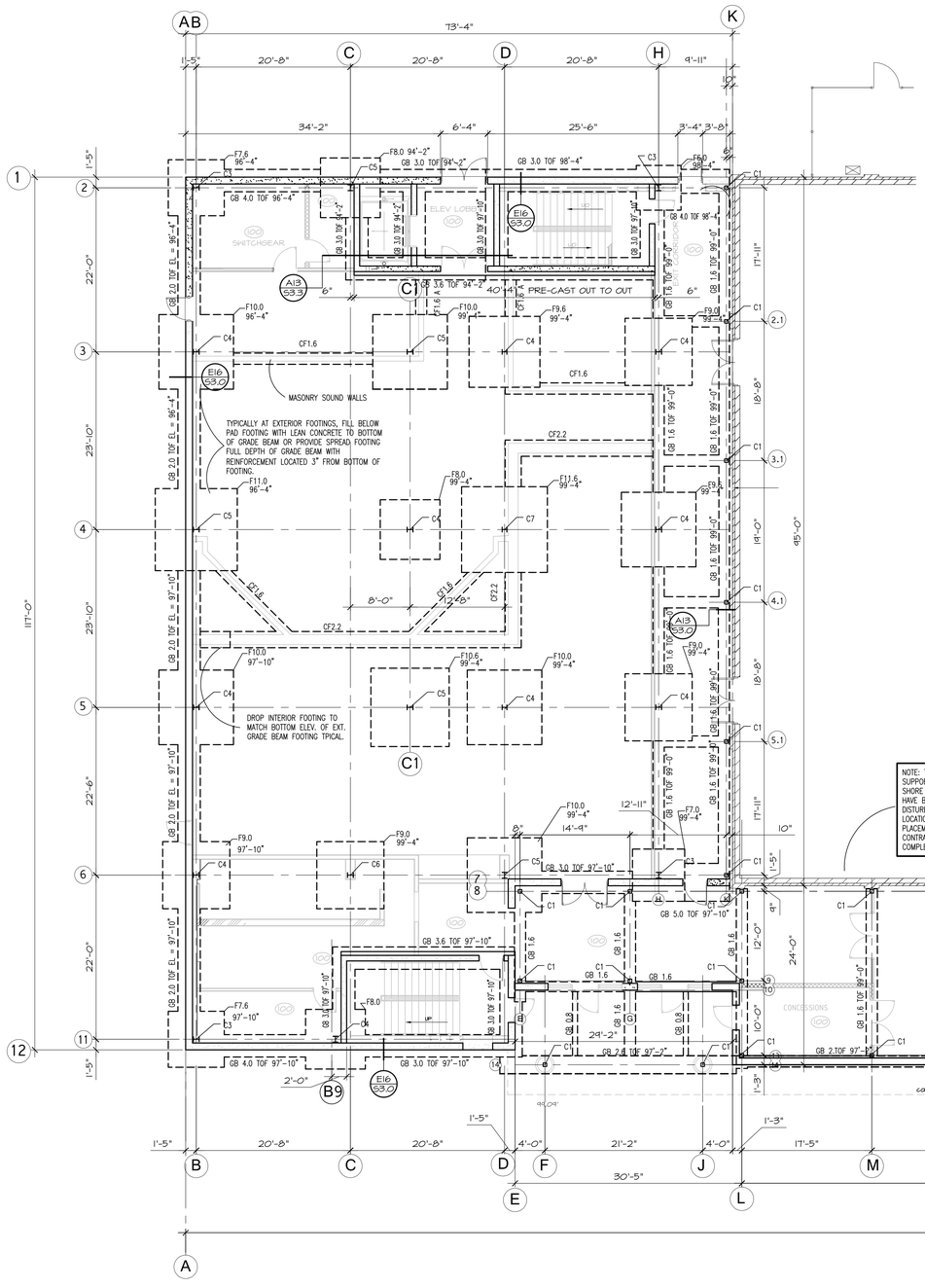
PROJECT NO: --
DRAWN BY: --
CHECKED BY: --
© COPYRIGHT SSD 2014

REVISIONS	ISSUE DATE
1. ADDENDUM #1	6-4-14
2. Addendum 2. See scale change	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

Structural Systems Design, Inc.
Lee Anne Peck
8200 SW 24th Street
Lincoln, NE 68523
Phone: (402) 421-1133
FAX: (402) 421-1244

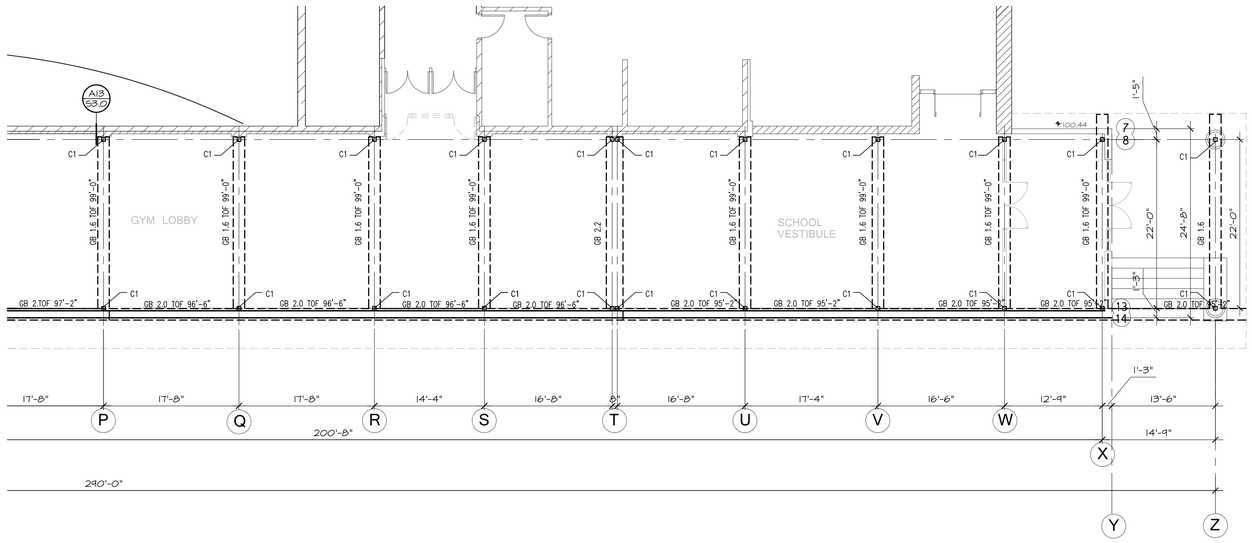
PROFESSIONAL STRUCTURAL ENGINEER
DEAN PROCHNOW
E-4132
STATE OF NEBRASKA

S2.2



PARTIAL FOOTING FOUNDATION PLAN

1/8" = 1'-0" FINISH FLOOR 100'-0"



PARTIAL FOOTING FOUNDATION PLAN

1/8" = 1'-0" FINISH FLOOR 100'-0"

HTRS HUMBOLT HIGH SCHOOL 2014

Larry Chilese Architects, Inc., Lincoln, Nebraska

Layouts

PROJECT NO: --
DRAWN BY: --
CHECKED BY: --
© Copyright 2013 2014

REVISIONS	ISSUE DATE
1. -	-
2. -	-
3. -	-
4. -	-
5. -	-
6. -	-
7. -	-
8. -	-
9. -	-

Structural Systems Design, Inc.
Lincoln, Nebraska
6305 SW 24th Street
Lincoln, NE 68523
Phone: (402) 421-1133
FAX: (402) 421-1344

DEAN PROCHNOW E-4178 REGISTERED PROFESSIONAL STRUCTURAL ENGINEER STATE OF NEBRASKA

S2.0