

SECTION 13 4200 – PRE-FABRICATED PRECAST CONCRETE STRUCTURES

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes engineering and structural design information or parameters, off-site fabrication, delivery, and on-site erection of all precast concrete structures and other related precast concrete elements that are included in the building manufacturer's scope of work. This Section is SUBORDINATE to the Detailed Specifications for site specific designs and the associated manufacturing drawings, sections, approvals, certificates and configurations as required by client and/or code compliance.
- B. Pre-fabricated precast concrete structure includes the following:
1. Exterior walls
 2. Interior walls
 3. Roof Slab
 4. Floor Slab
 5. Interior finishes (in areas noted)
 6. Mechanical and electrical components (as indicated on drawings)
- C. Building Sizes: Building may consist of multiple sections designed so that the sections may be joined together to form a complete structure that maintains a positive alignment of floors, walls, and roof.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide prefabricated concrete structure capable of withstanding the following design loads within limits and under conditions indicated:
1. Risk Category III or IV
 2. Wall Dead Load: 65 psf
 3. Floor Live Loads: 150 psf
 4. Floor Dead Load: 45 psf
 5. Roof Live Load: 40 psf
 6. Roof Dead Load: 45 psf
 7. Basic Wind Speed (3-sec Gust)(Vult): 190 mph
 8. Wind Exposure Category: C
 9. Ground Snow Load: 30 psf
 10. Roof Snow Load: 35 psf
 11. Seismic Design Cat: D
 12. Seismic Importance Factor: 1.25
 13. Seismic Site Class: D
 14. Basic Seismic Force Resisting System: Bearing wall system w/ ordinary reinforced concrete shearwalls.
 15. Seismic Analysis Procedure: Equivalent Lateral Force Procedure
 16. Design framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live load deflection, shrinkage and creep of primary building structure, and other building movements. Member deflections shall meet the limits of ACI 318 and PCI MNL-116.

1.3 DESIGN REQUIREMENTS

- A. Structure Interface and Integration with Building: Design precast concrete units to integrate and interface with building components, concrete structures, mechanical and electrical components, and other related systems. Provide precast concrete units to conform to the dimensions and configurations shown on the contract bid documents.
- B. Precast concrete structures shall be cast as four, five, or six-sided as dictated by project design.
- C. All work shall conform to the standards of the applicable building codes:
 - 1. International Building Code, 2006 – 2015 Edition
 - 2. Americans with Disabilities Act, Current Edition
 - 3. International Mechanical Code, 2006 – 2015 Edition
 - 4. International Plumbing Code, 2006 – 2015 Edition
 - 5. National Electrical Code, 2002 – 2014 Edition
 - 6. International Fire Code, 2006 – 2015 Edition
 - 7. International Energy Conservation Code, 2006 – 2015 Edition

1.4 REFERENCE STANDARDS

- A. American Concrete Institute (ACI)
 - 1. ACI 117, Standard Specifications for Concrete Construction and Materials.
 - 2. ACI 301, Structural Concrete for Buildings
 - 3. ACI 304, Measuring, Mixing, Transporting, and Placing Concrete.
 - 4. ACI 309, Consolidation of Concrete.
 - 5. ACI 318, Building Code Requirements for Reinforced Concrete
- B. American Society Testing and Materials (ASTM)
 - 1. ASTM A36, Carbon Structural Steel
 - 2. ASTM A82, Steel Wire for Concrete Reinforcement
 - 3. ASTM A108, Steel Bars, Carbon, Cold-Finished, Standard Quality
 - 4. ASTM A153, Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 5. ASTM A185, Welded Steel Wire Fabric for Concrete Reinforcement
 - 6. ASTM A497, Welded Deformed Steel Wire Fabric for Concrete Reinforcement
 - 7. ASTM A615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 8. ASTM C33, Concrete Aggregates
 - 9. ASTM C150, Portland Cement
 - 10. ASTM C494, Chemical Admixtures for Concrete
 - 11. ASTM C618, Coal Fly Ash for Use as a Mineral Admixture in Concrete
- C. American Welding Society (AWS)
 - 1. AWS D1.1, Structural Welding Code – Steel
 - 2. AWS D1.4, Structural Welding Code – Reinforcing Steel
- D. Concrete Reinforcing Steel Institute (CRSI): CRSI Manual of Standard Practice
- E. Precast/Prestressed Concrete Institute (PCI)
 - 1. PCI MNL-116, Manual of Quality Control for Plants and Production of Precast and Prestressed Concrete Products
 - 2. PCI MNL-120, Design Handbook: Precast and Prestressed Concrete

3. PCI MNL-123, Manual of Design Connections for Precast/Prestressed Concrete
4. PCI MNL-124, PCI Design for Fire Resistance of Precast/Prestressed Concrete
5. PCI MNL-127, Recommended Practice for Erection of Precast Concrete

1.5 SUBMITTALS

- A. Product Data: Manufacturers catalog cut-sheets, published specifications, and material description for each sub-component that is incorporated in the pre-fabricated precast concrete structure, and other if requested by Client\Owner\Architect.
- B. Shop Drawings:
 1. Fabrication drawings and attachment of the various components, including reinforcement detailing, bending, and placing concrete reinforcement in compliance with ACI 318 and CRSI Manual of Standard Practice.
 2. Elevations, sections, and dimensions for all precast concrete units including anchors, inserts, and embedded cast-in place items.
 3. Mechanical, electrical, and plumbing layouts indicating location of all respective equipment, and routing of conduits and plumbing lines.
 4. Drawings and structural calculations shall be signed and sealed by a Professional Engineer registered in the State of the project, who is experienced in the design of the precast concrete equipment shelters.

1.6 QUALITY ASSURANCE

- A. General: Precast Concrete Structure Manufacturer shall perform work in compliance with applicable requirements of ACI 318, and PCI MNL-116, PCI MNL-120, PCI MNL-123, PCI MNL-124, and PCI MNL-127.
- B. Provide Owner and Architect access to manufacturing facility for inspections.
- C. Manufacturer Qualifications: A firm that complies with the following requirements and is experienced in producing precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.
 1. Assumes responsibility for engineering structural precast concrete units to comply with performance requirements. The responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 2. Has sufficient production capacity to produce required units without delaying the Work.
 3. Is registered with and approved by authorities having jurisdiction.
 4. Plant of manufacturer shall be certified by the Precast/Prestressed Concrete Institute (PCI).
 5. Must have a minimum of ten (10) years documented experience in the design and production of precast concrete building components.
 6. Must have a minimum of ten (10) completed projects of equal size and magnitude of this project.
- D. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, "PCI Design Handbook – Precast and Prestressed Concrete," applicable to types of structural precast concrete units indicated.
- E. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products."
- F. Comply with camber and dimensional tolerances of ACI 318 and PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction.

- G. Product Options: Drawings indicate size, profiles and dimensional requirements of precast concrete units and are based on the specific types of units indicated. Other fabricators' precast concrete units complying with requirements may be considered. Refer to Division 1 Section "Substitutions."
- H. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel"; and AWS D1.4, "Structural Welding Code – Reinforcing Steel."
- I. Fire Resistance: Where indicated, provide structural precast concrete units whose fire resistance meets the prescriptive requirements of the governing code or has been calculated according to ACI 216.1/TMS 0216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies," and is acceptable to authorities having jurisdiction.

1.7 PRODUCT STORAGE, DELIVERY, AND HANDLING

- A. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, staining, and to prevent cracking, distortion, warping or other physical damage.
- B. Store units, unless otherwise specified, with dunnage the full length of long walls of each building.
- C. Place stored units so identification marks are clearly visible, and units can be inspected.
- D. Deliver all structural precast concrete units in such quantities and at such times to assure compliance with the schedule and proper setting sequence to ensure continuity of installation.
- E. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
- F. Place dunnage of even thickness between each unit.
- G. Lift and support units only at designated points shown on the Shop Drawings.

1.8 SEQUENCING

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

1.9 CONCRETE TESTING SERVICE

The fabricator shall employ a full time quality assurance person or persons to perform material evaluation tests and to design concrete mixes.

1.10 SINGLE-SOURCE ENGINEERING RESPONSIBILITY

Provide engineered pre-fabricated concrete structure to support the local design codes, with design approved and certified by a qualified registered professional engineer in the state of which a project is located.

1.11 PROFESSIONAL ENGINEERING QUALIFICATIONS

A professional engineer who is legally authorized to practice in the state of the project and who is experienced in providing engineering services Pre-Fabricated Precast Concrete Structures and have resulted in installing pre-fabricated concrete structures similar to those indicated for this Project and with a record of successful in-service performance.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Provide materials and products to fabricate precast concrete structures in compliance with applicable requirements and reference standards.
 - 1. Provide pre-fabricated precast concrete structures consisting of four, five, or six-sided units. Coordinate installation of hollow metal door and window frames, electrical, plumbing, fixtures and other items as specified in this section.

2.2 ACCEPTABLE MANUFACTURERS

- A. Fibrebond Corporation or equal

2.2 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Metal or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Forms for Unexposed Finish Concrete: Metal or another acceptable material.
- C. Form Release Agent: Provide Fister – Q2 form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 REINFORCING MATERIALS

- A. Rebar: ASTM A615 Gr. 60 and/or ASTM A706 (for welding applications only).
- B. Welded Wire Fabric: ASTM A497.

2.4 STRUCTURAL MATERIALS

- A. Structural Beam/Channels: ASTM A992.
- B. Structural Tubing: ASTM A500 Gr. B.
- C. Angles/Flats: ASTM A36.

2.5 CONCRETE MATERIALS

- A. Portland Cement: TXI: ASTM C 150, Type 1.
 - 1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
- B. Fine aggregate in accordance with ASTM C 33. Provide aggregates from a single source for exposed concrete.
- C. Aggregates: Light-weight aggregate in accordance with ASTM C 330. Provide aggregates from a single source for exposed concrete.
- D. Water: Potable.

- E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- F. Water-Reducing Admixture: ASTM C 494, Type F & G.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Basis of Design: Pro-Mix, Propel Excell 25.
 - b. Additional Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Pro-Mix Co.
 - 2. Euclid Chemical Co.
 - 3. Grace & Co.
 - 4. Sika Corp.
- G. High-Range Water-Reducing Admixture: ASTM C 494, Type E.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Basis of Design: Pro-Mix Turbo Cast
 - b. Additional Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Pro-Mix
 - 2. Euclid Chemical Co.
 - 3. W.R. Grace & Co.
 - 4. Sika Corp.

2.6 RELATED MATERIALS

- A. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type 1, Class A. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.
 - 1. Products: Subject to compliance with requirements, provide one of the following (or approved equivalent):
 - a. Confilm, Pro-Mix Co.
 - b. Eucocure, Euclid Chemical Co.
 - c. Masterkure, Master Builders, Inc.
 - d. CS-309, W.R. Meadows, Inc.
 - e. Kure-N-Seal, Sonneborn-Chemrex.
 - f. Stontop CS2, Stonhard, Inc.
- B. Epoxy Adhesive: ASTM C 881, two-component gel epoxy suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
 - 1. Products: Subject to compliance with requirements, provide one of the following (or approved equivalent):
 - a. Basis of Design: Sika Hi-Mod 31.
 - b. Additional Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. The Burke Co.
 - 2. Euclid Chemical Co.
 - 3. L & M Construction Chemicals, Inc.
 - 4. Master Builders, Inc.

- C. Roof Joint Epoxy: ASTM C 881, two-component gel epoxy suitable for use on dry or damp surfaces.
 - 1. Products: Subject to compliance with requirements, provide one of the following (or approved equivalent):
 - 2. Basis of Design: Prairie Epoxy 7095

2.7 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- B. Proportion of concrete mixes: Expanded Clay Shale light weight concrete.
 - 1. Designed Unit Weight: 115 (+/- 2) pounds per cubic foot.
 - 2. Concrete strip strength: 2,750 psi at 24 hours.
 - 3. Concrete compressive strength: 5,000 psi at 28 days.
- C. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. The target slump limit shall be 7 (+/- 2) inches.
 - 2. The slump shall be monitored by full time quality assurance plant personnel.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by fabricator when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.8 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability or when pumping concrete.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F (10 degrees C).
- C. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.9 CONCRETE MIXING

- A. Concrete: Comply with requirements of ASTM C 94. Concrete must be produced/batched at the manufacturing facility location. Transit mixed concrete will not be accepted.

PART 3 – EXECUTION

3.1 GENERAL

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

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 318 and PCI MNL-116 limits: Provide Class B tolerances for concrete surfaces exposed to view.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, recesses, anchorages and inserts, and other features required in the Work.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
- D. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- E. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 PLACING REINFORCEMENT

- A. General: Comply with ACI 318, PCI MNL-116, and CSRI: Manual of Standard Practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
- B. Clean reinforcement of earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.4 INSTALLING EMBEDDED ITEMS

- A. General: Comply with PCI MNL-123 "Manual of Design for Connection for Precast and Prestressed Concrete Products" and as specified. Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

3.5 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.

3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and PCI MNL-116 "Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products" as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- E. Consolidate placed concrete by mechanical vibrating equipment. Use equipment and procedures for consolidation of concrete complying with ACI 309 and PCI MNL-116.
- F. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of forms, until completing placement of a panel or section.
- G. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
- H. Bring slab surfaces to correct level with a straightedge and strike off.
- I. Maintain reinforcing in proper position on chairs during concrete placement.

3.7 FINISHING

- A. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- B. Non-Formed Finish: Provide an acceptable, level surface on non-formed concrete surfaces with power screed or power trowel equipment. Repair and patch defective areas with fins and other projections completely removed and smoothed.

3.8 QUALITY CONTROL TESTING DURING FABRICATION

- A. General: The fabricator will employ a full time quality assurance person or persons to perform tests and to submit test reports.
- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 2. Slump: ASTM C 143; one test at point of discharge for each structure cast; additional tests when concrete consistency seems to have changed.
 3. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 4. Compressive-Strength Tests: ASTM C 39; one set for each day's pour or for each structure cast; one specimen tested at 24 hours, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results may be reported in writing to Architect and Contractor at their request. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 24 hour tests and 28-day tests.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

3.9 CONSTRUCTION DESCRIPTIONS

- A. Exterior Walls:
1. Exterior wall panels will be of solid or "ribbed" walls will be a minimum of four inches in thickness. Properly reinforced 5000-PSI lightweight concrete should be used for all roof panels. Panels should be poured to include all attachments necessary to lift and fully assemble the building units. Wall panels should be poured on flat smooth steel form-work. Small air pockets (1/4") and pits will be acceptable.
- B. Roofs:
1. Building roofs will be constructed of six-inch "ribbed" panel construction. Roofs must be bolted to adjoining walls. Properly reinforced 5000-PSI lightweight concrete should be used for all roof panels. Concrete ribs will be placed a maximum of 48" on center. Concrete ribs will be of adequate size to resist the loadings applicable of the building design.
- C. Floors:
1. Building floors should be of six-inch ribbed construction with proper rib size and spacing to meet the required floor loadings. Increased floor thickness (up to 8") may be required to meet floor live load requirements. Properly reinforced 5000-PSI lightweight concrete should be used for all floor panels. Concrete ribs will be placed a maximum of 48" on center. Concrete ribs will be of adequate size to resist the loadings applicable of the building design. Reinforcement should be properly placed in the concrete panel to provide adequate reinforcement, spacing and cover as required by ACI 318. Panels should be poured to include all attachments necessary to lift and fully assemble the building units. All concrete units should be poured on flat smooth steel form-work. Floor must be bolted to adjoining walls. All structures to be shipped with floor systems fully assembled to walls.
- D. Transportation:
1. All buildings must be shipped fully assembled including walls, floors and roof. Building units should be transported to the site in a manner and with proper bracing to keep buildings from shifting or racking

during the transportation process. Proper shipping protection should be used under the building units to keep any concrete floors from contacting trailer decks and absorb bumps during transport. Any openings must be weatherproofed during transport to the extent deemed necessary by the building supplier to keep any interior components from getting damaged.

E. Site Installation:

1. Building units to be set onto foundations adequately installed for this type of construction. High density plastic shims are to be placed under each unit at intervals to achieve a setting surface level to +/- 1/8". During the installation process of the building units all wall and roof joints should be maintained flush and plumb with one and other. After final positioning of building units, all horizontal and vertical seams shall be weatherproofed. All building-to-foundation and building-to-building section interconnections shall be installed (anchored or welded) to meet code requirements for the installation. Connections must be designed and approved by a licensed structural engineer. All interior and exterior building joints shall be finished in a manner that complies with architectural finish schedule.

PART 4 – LIST OF STANDARD COMPONENTS/EQUIPMENT/FINISHES

4.1 GENERAL

- A. This section of the specification provides a list of standard components, equipment and finishes for pre-fabricated precast concrete structures. The list is generic and may not contain all components/equipment/finishes to address all location, design, or specific customer requirements.

4.2 EXTERIOR

- B. Aggregate or Stenciled Brick exterior finish, per client request.
- C. Trim Painted to match.
- D. Peaked roof with overhang.
- E. Membrane roofing system.
- F. Exterior penetrations as required and coordinated with client.

4.3 INTERIOR

- A. Walls covered with insulation, sheetrock and 5/8" NuPoly wall finish.
- B. Ceiling covered with insulation, sheetrock and 5/8" NuPoly wall finish.
- C. Flooring: 1/8" x 12" x 12" vinyl floor tile over concrete.
- D. Interior trim package.

4.4 MECHANICAL

- A. 3'-6" x 7'-0" steel door, 18 gauge, and cast-in steel frame.
- B. Door painted to match exterior trim.
- C. Non-removable pinned ball bearing hinges.
- D. Best deadbolt
- E. Door pull handles.
- F. Heavy gauge steel finish lockguard.
- G. Door closer.
- H. Door holder.
- I. Magnetic weatherstripping.
- J. Drip strip over door.

- K. Door stop.
- L. Door sweep.
- M. Door threshold.
- N. Door strikeplate.
- O. Door canopy.
- P. Cable Entrance –4" entry ports with caps as required.
- Q. Cable tray as required.
- R. Telco/power entries as required.

4.4 ELECTRICAL

- A. Utility panel as required.
- B. Halo ground ring with drops and equipment ground.
- C. Ground bars as required.
- D. 4" x 4" galvanized wireway with no knockouts.
- E. Penetrations as required.
- F. 67 watt incandescent exterior light with switch, motion detector and photo cell as required.
- G. Ten (10) fluorescent 2-bulb, 32 watt interior lights with lenses, energy saving ballasts and switches.
- H. Emergency/Exit light with battery backup.
- I. 20 amp, interior duplex receptacles.
- J. Twistlock receptacles as required.
- K. One (1) 20 amp, exterior GFCI type duplex receptacle.
- L. Conduit, wire, junction boxes and sealtite as required.

4.5 HVAC

- A. Redundant wall-mounted commercial grade air conditioners sized as required.
- B. Supply and return air grills.
- C. Low ambient kit.
- D. Anti-cycle relay.

- E. Lead lag controller.
- F. Two (2) 60-amp fusible pull-out disconnects for HVAC units.

4.6 ALARMS

- A. Intrusion alarm.
- B. High temperature alarm.
- C. Photoelectric smoke detector, 120 volt.
- D. Other alarms as required.

END OF SECTION 13 4200