

**Division 03 – Concrete**  
**Section 03410 - Structural Precast Concrete**  
**Guide Specification – Prefabricated Precast Concrete Cell Module**

**PART 1 – GENERAL**

1.1 SPECIFICATION INCLUDES

- A. Engineering, design codes and standards, submittals, delivery, storage and handling, quality assurance and acceptance.
- B. Product fabrication of precast concrete cell modules.
- C. Product fabrication of cell module exterior architectural wall finish (if applicable).
- D. Requirements for erection of precast concrete cell modules.

1.2 DESIGN, CODES, REGULATORY REQUIREMENTS, AND PERFORMANCE

- A. Engineer and fabricate precast concrete cell modules, provide materials and products complying with pertinent requirements of current edition of the Building Codes and reference standards.
- B. Building Codes and Regulatory Requirements:
  - 1. International Building Code – ICC
  - 2. International Mechanical Code – ICC
  - 3. International Plumbing Code – ICC
  - 4. International Energy Conservation Code - ICC
  - 5. National Electric Code – NFPA

C. Reference Standards:

- 1. Concrete:
  - a. American Concrete Institute (ACI):
    - 1) ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
    - 2) ACI 301 - Specifications for Structural Concrete for Buildings.
    - 3) ACI 318 - Building Code Requirements for Structural Concrete.
  - b. Concrete Reinforcing Steel Institute (CRSI) - CRSI Manual of Standard Practice.
  - c. Wire Reinforcement Institute (WRI) - WRI Manual of Standard Practice.
  - d. Precast/ Prestressed Concrete Institute (PCI)
    - 1) MNL-116- Manual for Quality Control: Structural Precast Concrete.
    - 2) MNL-124- Design for fire resistance of precast, prestressed concrete.
- 2. Welding:
  - a. American Welding Society (AWS):
    - 1) AWS D1.1 - Structural Welding Code - Steel
    - 2) AWS D1.4 - Structural Welding Code - Reinforcing Steel

- D. Design Requirements: Comply with building codes and ACI 318. Structurally connect each cell module to the foundation and cell module to cell module vertically.
  - 1. Floor Live Load: 40 pounds per square foot (psf) in cells and 100 psf for balconies.
  - 2. Wind Load per building code.
  - 3. Top of Upper Cell: 40 pounds per square foot.
  - 4. Seismic Load per building code.
  - 5. Cell Furniture Attachments, Embeds, and Inserts: Provide structural design and loading criteria for inmate cell furniture/furnishings. Engineer and design attachments.
  - 6. Provide six-sided construction with integral walls, floor and ceiling. The exterior wythe shall be cast horizontally to achieve a uniform architectural finish per the project plans and specifications. Chase floors shall have sufficient openings to allow for mechanical, electrical and plumbing risers. Any required fire-safing shall be furnished and installed by other trades.
  - 7. Maximum Allowable Deflection: As limited by governing building code for all structural elements and the requirements of the design.
  - 8. Interface design of units with furnishings, structural, mechanical, plumbing and electrical systems, and components shown or indicated to interface with cell modules.
  - 9. Accommodate system for construction tolerance, deflection of other building structural members and clearances of intended openings.
  - 10. Stair load on balcony not to exceed 2.0 kips at each stringer, total load not to exceed 4.0 kips. Angle of stair stringer with floor must be greater than or equal to 30 degrees. These loads apply to balconies up to 5'-0" in width.
- E. Fire Ratings: Refer to guidelines contained in PCI MNL-124 to achieve required fire ratings for floors, walls and roof assemblies as follows:

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1. Structural fire endurance exceeds 4 hours
  2. Heat transmission fire rating:
    - a. Load bearing exterior wall: 3 hours
    - b. Non-load bearing partition walls: 2 hours
    - c. Load bearing interior walls: 3 hours
    - d. Floor and ceiling at mezzanine: 2 hours
    - e. Ceiling at roof level: 2 hours
- G. Design the precast concrete cell modules to provide lateral stability for the housing units and the cells.

1.3 REFERENCES

- A. American Concrete Institute (ACI):
  1. ACI 301 - Specifications for Structural Concrete for Buildings.
  2. ACI 318 - Building Code Requirements for Structural Concrete.
- B. American Society for Testing and Materials (ASTM):
  1. ASTM A 36 - Specification for Structural Steel
  2. ASTM A 74 - Specification for Cast Iron Soil Pipe
  3. ASTM A 82 - Specification for Steel Wire, Plain, for Concrete Reinforcement.
  4. ASTM A 153 - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  5. ASTM A 185 - Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
  6. ASTM A 307 - Specification for Carbon Steel Bolts and Studs
  7. ASTM A 416 - Standard Specifications for Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete
  8. ASTM A 615 - Specification for Deformed and Plain Concrete Reinforcement
  9. ASTM A 706 - Specification for Deformed and Plain Wire for Concrete Reinforcement
  10. ASTM B 88 - Specification for Seamless Copper Water Tube for Plumbing Applications
  11. ASTM C 33 - Specification for Concrete Aggregates.
  12. ASTM C 330 - Specification for Lightweight Aggregates
  13. ASTM C 39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  14. ASTM C 94 - Specification for Ready-Mixed Concrete.
  15. ASTM C 150 - Specification for Portland Cement.
  16. ASTM C 172 - Practice for Sampling Freshly Mixed Concrete.
  17. ASTM C 231 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
  18. ASTM C 260 - Specification for Air-Entraining Admixtures for Concrete.
  19. ASTM C 494 - Specification for Chemical Admixtures for Concrete.
  20. ASTM C 578 - Specification for Preformed, Cellular Polystyrene Thermal Insulation
  21. ASTM C 1289 - Specification for Preformed, Cellular Isocyanurate Thermal Insulation
  22. ASTM C 1107 - Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
- 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. National Electrical Manufacturers Association (NEMA):
- F. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
- G. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)
  1. ASHRAE Standard 90.1 - 2004
- H. National Fire Protection Association (NFPA):
  1. NFPA 70 - National Electric Code
  2. NFPA - Life Safety Code
- H. Precast Concrete Institute
  1. PCI MNL 116 - Manual for 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 on Design of Connections for Precast and Prestressed Concrete Products.
  4. PCI MNL 124 - PCI Design for Fire Resistance of Precast Prestressed Concrete.
  5. PCI MNL 127 - Recommended Practice for Erection of Precast Concrete
- I. Steel Structures Painting Council (SSPC):
  1. SSPC- SP7 - Brush-Off Blast Cleaning

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- J. Underwriters Laboratories (UL), Inc.
  - 1. UL Standard 83 for THHN insulated copper wire
  - 2. UL Standard 514A for metallic outlet boxes

**1.4 SUBMITTALS**

- A. Submittals in this section are available upon request.
- B. Concept Drawings: Submit drawings as required prior to award of bid.
  - 1. Cell Configuration
  - 2. Cell Section Cuts
- C. Erection drawings: Submit erection drawings after award. Drawings to include the following:
  - 1. Module bearing plan, floor plans and elevations.
  - 2. Cell module upfit plans, elevations, sections, architectural exterior wall design and dimensioned layouts.
  - 3. Include details of joints, reinforcement, anchors, inserts, embedded and cast-in-place items, lifting devices.
  - 4. Connection details for mechanical, plumbing, electrical system components, HVAC and cell furnishings including embedments and attachment devices.
  - 5. Provide complete erection notes.
  - 6. Show lifting, setting, cell to cell and cell to foundation connections, and structural grout.
  - 7. Show proper module site storage dunnage and procedures.
- C. Cell Module Structural Calculations: Submit cell module structural design calculations. Calculation shall be prepared, signed, and sealed by a Structural Engineer registered in the state where the module has been manufactured.
- D. Product Data: Manufacturer's original catalog cut sheets, published specifications and material description for each sub-component incorporated into the precast cell module.
- E. Sample Control: Submit exterior architectural wall finish samples (if applicable):
  - 1. Provide 2'-0" x 2'-0" sample sizes for approval of each texture and color only.
  - 2. Provide a minimum size of 4'-0" x 4'-0" sample for approval for use as a mock-up for each specific color/texture. Keep one set of mock-ups at plant for control, provide one set of mock-ups for use at the jobsite as a standard for acceptance. Maintain jobsite mock-ups in similar exposure conditions to the completed cell modules. Removal of the mock-up sample from site is by others.
- F. Quality Control documentation shall be available from manufacturer's plant records:
  - 1. Concrete mix design
    - a. Mix Design
    - b. Slump, Unit Weight, Temperature, Air Content,
    - c. Release and 28 Day Compressive Strengths
  - 2. Control Test Reports
    - a. Pre-pour and post-pour inspections
    - b. Mechanical, electrical and plumbing inspections
    - c. Paint and coatings inspections
    - d. Final inspections
  - 3. Certifications:
    - a. PCI Plant Certification
    - b. Modules are manufactured under the supervision of a Professional Engineer registered in the state of manufacturing.
- G. Close-Out Submittals:
  - 1. Cell Module Warranty: Module manufacturer shall provide a certificate of limited warranty, commencing on the date of Substantial Completion and accruing for one year past the date of Substantial Completion of work performed by the cell module manufacturer. Substantial Completion by the cell module manufacturer is defined as completion of all field operations including erection of cell modules and MEP connections, if applicable.
  - 2. Component Product and Equipment Warranties: Copies of manufacturer's product and equipment warranties to be included in the module manufacturer's certificate of limited warranty.

**1.5 QUALITY ASSURANCE**

- A. General: Module manufacturer shall perform work in compliance with the applicable requirements and PCI MNL 116.
- B. Cell module manufacturer's Sole Responsibility is to provide the prefabricated precast concrete cell modules in conformance to this specification.
- C. Qualifications:

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1. Manufacturer: Plant of manufacture shall be certified by the Precast/Prestressed Concrete Institute (PCI) annually for production group and category C1. The manufacturer shall show that it has been manufacturing the work of this Section (detention modules) in each of the past five previous calendar years. The manufacturer must show documented precast detention module experience of five or more successfully completed projects of similar size, magnitude and specific scope as this project within the last 5 years. Manufacturer must have at least 5 multiple dayroom level detention facilities completed within the past 5 years. Plant of manufacture shall be a permanent correctional manufacturing facility with regular production of correctional modular units.
2. Quality Control System: Provide a complete quality control system that includes design controls, process controls, materials and vendor controls, complete record keeping and audit trails, distinct inspection marks, and 100% inspection of all mechanical, electrical, plumbing, structural systems and coatings. All plumbing and electrical systems shall be tested in the manufacturing facility.
3. Installer: The erector shall have erected projects utilizing the work of this Section with a minimum of five years documented experience or the module manufacturer must provide an on site supervisor.
4. Professional Engineer: Structural Engineer, licensed to practice in the state of fabrication and experienced in design and fabrication of precast concrete modular construction, under whose supervision the precast concrete components and structural anchorages are designed and manufactured.
5. Project Management: Fabricator and erector shall have a documented Project Management System, which describes the project execution process. This system shall have been in place for at least five (5) years and implemented on all projects of similar size and nature during that period. Fabricator and erector shall have a single Project Manager identified for this project who will oversee project execution from the point of contract execution to final completion.

**D. Tolerances:**

1. Cell Modules to meet tolerances recommended in PCI Manual 116 pages B50 & B51, "Modular Unit" and the following manufacturing tolerances (not to be confused with erection tolerances in SS 3.3)
  - a. Length or width: +/- 1/8" in 10', 1/4" total
  - b. Out of square: +/- 1/8" in 10', 1/2" total
  - c. Bow or warp: 1/2" total
  - d. Floor flatness: +/- 1/8" in 10', 1/4" total
  - e. Joint between wall and floor: +/- 1/8", 1/4" total in module
  - e. Wythe thickness: +/- 1/4" from design width
  - f. Insulation positioning: +/- 1/4" from true position
  - g. Reinforcement positioning: +/- 1/4" from true position
  - h. Opening / fixture location: +/- 1/4" from true position
  - i. Out of plumb/level: +/- 1/8" across fixture length/width
  - j. Chase plumbing alignment: +/- 1/4" from design position
  - k. Electrical Box angular rotation: +/- 1/4" (2°) measured at the perimeter
2. Security Doors to meet the requirements of the Hollow Metal Manufacturer's Association Manual 863-90 Detention Doors and Frames and the following tolerances:
  - a. Frame Squareness: +/- 1/16" jamb to jamb at the head
  - b. Frame Plumb: +/- 1/16" jamb from head to floor
  - c. Door to frame clearance will be 1/8" installed to +/- 1/16". Door may not drag.
  - e. Slider frame straightness: +/- 1/8" jamb from head to floor
3. Fabricated Steel items shall be build to +/- 1/8" and installed +/- 1/4" from true position.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Module manufacturer to provide transportation and delivery of cell module units to the job site.
  1. Deliver cell modules and chase complete with all components.
  2. Module manufacturer shall not be responsible for site storage or protection.
  3. Identification: Mark each unit prior to delivery with a unique serial number indexed to the manufacturer's quality control records.
- B. Handling: Handle precast cell module units in a manner consistent with their shape and design to ensure protection from damage during handling.
  1. Lift and support cell module units only from engineered support and lifting points.
  2. Provide lifting and handling devices capable of supporting units in positions during storage, transportation, and erection.

**1.7 ACCEPTANCE**

- A. Cell modules shall be thoroughly tested & inspected prior to shipping and contain no known defects in materials, products, equipment, or conditions of careless or unskilled workmanship.

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1. Precast components shall conform to the requirements of PCI manual 116.
  2. Modules shall be properly finished according to the requirements of this specification.
  3. Mechanical and electrical components, equipment, devices and component devices, provided as a part of a cell module unit, shall be functional and operate with care and attention under conditions of application specified by their manufacturer.
  4. Security detention components, equipment and devices, provided as a part of a cell module unit, shall be functional and operate with care and attention under conditions of application specified by their manufacturer.
- B. Modules accepted for erection by others shall be accepted as follows.
1. Visible defects shall be noted on the bill of lading upon arrival of a module. Signing the bill of lading constitutes acceptance, subject to any visible defects noted on the bill of lading.
  2. The owner shall notify the manufacturer in writing of any hidden defects within 24 hours of their discovery.
  3. Defects and claims shall be reported in writing and in no case after the period of erection ends.
- C. Modules accepted after erection service provided by manufacturer shall be accepted as follows.
1. A walk through inspection shall be conducted by the cell module manufacturer, the owner's representative and/or general contractor at completion of cell module erection.
  2. Modules shall be considered accepted when all deficiencies noted in the inspection have been corrected.
  3. Hidden defects shall be subject to Manufacturer's certificate of limited warranty
- D. No other representations of merchantability or fitness for a particular purpose, express or implied, are made except as provided herein or agreed in writing. Manufacturer's obligations shall be limited to repair or replacement of defects under this specification and shall not include consequential reparations.
- E. A certificate of limited warranty shall be furnished upon acceptance.

**PART 2 – PRODUCTS (*fabrication*)**

**2.1 GENERAL**

- A. Provide factory fabricated and assembled cell modules requiring only field placement and connections for use. Fabrication shall be in compliance with applicable requirements and reference standards. Panelized module systems are not allowed. Monolithic cell castings (walls and ceiling) with separately attached precast floor are required. Provide complete shop fabrication and finishing for precast concrete cell modules to include the following:
1. Interior surface finishes and coatings.
  2. Exterior architectural concrete wall finish on cell modules (if applicable, architectural finish may include color, texture, reveals and/or in-laid brick veneer).
  3. Hollow metal window frames substantially filled with concrete.
  4. Hollow metal cell door frames substantially filled with concrete.
  5. Hollow metal chase access door frame substantially filled with concrete.
  6. Hollow metal cell doors and hinges.
  7. Hollow metal chase access door with hinges. Installation of a permanent security lock is by others.
  8. Electrical conduit and junction boxes for cell light fixture and associated wiring for connection to field wiring.
  9. Detention furnishings, equipment and accessories including wall mounted writing surface, stool, bunk, mirror, shelf with hooks, embeds, inserts, security fasteners and security bolts. All connections to be bolted with exception of handicapped desk and grab bar which are attached with ¼"x1 ½" mushroom head stainless steel spikes.
  10. Water piping and waste plumbing from combination lavatory/toilet to the cast iron wye connection. Modules require field connection from utility chase to utility chase and utility chase to underground or plenum plumbing by others.
  11. Plumbing fixtures/valves, hydraulically activated flush valve with overflow preventer at the toilet. Pneumatic dual temperature metering valve at the lavatory.
  12. Wye strainers on supply hot and cold water lines to preclude fouling of equipment.
  13. Chase supply and exhaust ductwork as shown on standard module drawings. Modules require field connection from utility chase to utility chase and utility chase to base or plenum ductwork by others.
  14. Security air distribution grilles.
  15. Cell window glazing.
  16. Cell door glazing.
  17. Cell light fixture.

**2.2 CONCRETE MATERIALS AND ACCESSORIES**

- A. Portland Cement Concrete: 5000 PSI at 28 days, 1 to 3 inch slump prior to addition of plasticizers, proportioned and mixed in a mixer located on the plant site of manufacturer, with the following additional requirements. Transit mixed concrete is unacceptable.

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1. Portland Cement: ASTM C 150
  2. Fine Aggregate: ASTM C 33 or ASTM C 330
  3. Exterior Architectural Wall Face Mix: Aggregates shall be normal weight ASTM C33  
ASTM C 33, provide fine and coarse aggregates for each type of exposed finish from a single source for the entire job.  
Proportion mix by laboratory trial batch using materials to be employed on the project for each type of concrete required as noted on the drawings, complying with ACI 318.
  4. Coarse Aggregate: ASTM C 33 or ASTM C 330
  5. Light-Weight Aggregate: ASTM C 332
  6. Water: Potable
  7. Water/Cement Ratio: Maximum 0.45 by weight
- B. Concrete Admixtures: Chloride free
1. Less than 0.1 percent chloride ions by weight in the admixture.
  2. Water Reducing Agent: High range, conforming to ASTM C 494.
  3. Reinforcing Steel: ASTM A 615 or A706, Grade 60, deformed bars and welded steel wire fabric for concrete reinforcement; ASTM A 185 for wire mesh.
- C. Strand: Strands shall comply with ASTM A 416 as required by design.
- D. Cement Grout: Sand and Portland cement mixed in proportions for design of supported loads.
- E. Bearing Pads: Material type and thickness to be determined by design.
- F. Non-shrink grout: ASTM C 1107, factory pre-mixed, non-metallic.

### 2.3 CONCRETE EMBEDMENTS

- A. Cast-in Anchors:
1. Embedments for Connection and Supporting Devices: ASTM A 36, carbon steel plates, angles, items cast into concrete, items connecting steel framing members and inserts, conforming to PCI MNL-123; unpainted if not exposed to weather or view, otherwise painted to reduce the occurrence of rust.
  2. Bolts: ASTM A 307.
- B. Concrete Inserts:
1. Lifting Inserts: Integrally cast; design for lifting and erection capacity.
  2. Threaded Inserts: Suitable for mounting detention equipment accessories with threaded security fasteners.
- C. Steel Tie Wire: ASTM A 82, annealed, steel, galvanized.

### 2.4 FABRICATION ACCESSORIES

- A. General: Fabricate precast concrete cell modules in accordance with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-116, as specified for types of units required.
- B. For concrete see section; 2.6 Finishes D.
- C. Welding Electrodes: AWS D1.1
- D. Security caulk: Provide security sealant in all interior joints and around all attachments to cell walls.
1. "Pick resistant" caulk shall have a Shore A hardness of 55 (+/- 5). Pecora Dynaflex SC or equal.
  2. "Pick proof" caulk shall have a Shore D of 65 (+5 / -0). Pecora EP-1200 Dynapoxy, Adhesives Technology FE 2315 or equal.
- E. Detention Doors and Frames: Provide product shown below:
1. Cell Front Wall Doorframe (for swing door): Frames shall be one piece 12 gauge construction to receive 3'-0" x 7'-0" door. Frames shall be prepared for jamb-mounted locks (Southern Steel 10120, Folger Adams 120, RR Brinks 5020, or Airteq 9700, by others) and a door position switch (Southern Steel 200MRS, RR Brinks,201020, Folger Adams ASSW-105, and Airteq 6200 switch is by others). Jambs shall be prepared for locks keyed 1 side only and (3) 4<sup>1</sup>/<sub>2</sub>" Portland PH745 security hinges or equal. Necessary electrical conduit and lock pockets shall be integral to the frame completely sealed from grout leakage and routed through the concrete to the utility chase. By Slate (SDI) or equal.
  2. Cell Front Wall Doorframe (for slider door): Slider door openings shall be 2'-10" x 7'-0", and cased in 10 gauge frames with 2" headers. No doors, headers, conduits, lock pockets, or embedded items are provided for slider openings. Frames to be prepped with threaded inserts to allow for the installation of temporary plywood covers to restrict access during transportation, storage and construction. Plywood removal will be onsite, by others.
  3. Cell Front Wall Swing Doors: Doors to be 3'-0" x 7'-0" and shall be of security hollow metal construction with minimum 12 gauge material. Door shall have a 5" x 2'-0" security glazing vision light of two ply <sup>3</sup>/<sub>8</sub>" polycarbonate, Portland PH705 flush pull inside and Portland PH701 loop pull outside. Doors shall include (3) 4<sup>1</sup>/<sub>2</sub>" Portland PH745 security hinges. Slate or equal.
  4. Cell Front Wall Slider Door: Slider doors are not included in the cell module manufacturer's scope. Slider doors to be supplied by others.
  5. Chase Access Hatch Door and Frame: A nominal 2'-8" x 4'-0" access hatch shall be provided to the utility chase. The frame shall be a hollow metal single rabbet, 16 gauge construction with 2" headers. The door shall be a stiffened hollow metal door, left hand reverse (LHR) with 16 gauge mild steel skins, thickness is 2". Both frame and door shall be prepared for a mortised cylinder lock with a 2 <sup>3</sup>/<sub>4</sub>" backset and a 2 1/8" through bore and (2) mortised Portland PH745 hinges. Prep will fit deadbolt lock or equal

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(security lock is furnished and installed by others). A temporary fastener (removed by others after module erection) shall be provided to restrict access during transportation, storage and construction.

6. Detention Hollow Metal Windows: Cell windows shall be fixed horizontal slot type, with 3.0 SF of sight-glazing (2 - 5"x44" sight openings). Frames shall be minimum 12 gauge galvanized steel construction providing continuous casing within the cell and shall include a thermal break. The center impost dividing the sight opening shall include a 7/8" dia. tool resist steel rod. Security glazing shall be 3/8" two ply laminated polycarbonate material. Windows shall have adjustable stops to accommodate 3/8" or 7/8" thick glazing. The window frame shall receive an epoxy paint finish on the interior face to match the cell interior and a prime coat on the exterior. Hope's Series S30 or Slate (SDI) equal.
- F. Detention Furnishings, Equipment and Accessories: provide and coordinate installation:
1. Shelf with Garment Hooks: Shelf shall be 8" x 18" with (4) stainless steel safety type hooks. Shelf shall have folded and welded seamless edges. Construction to be 10 gauge steel with uncream color powder coat finish. Back plate to be punched for through wall security bolt connection (fastened to unit in adjoining cell). By Chief or equal.
  2. Detention Mirror: Mirror and frame shall be 12<sup>1</sup>/<sub>2</sub>" x 16<sup>1</sup>/<sub>2</sub>". Mirror shall be provided with wall embedded mounting plate. Construction shall be of minimum 20 gauge stainless steel plate with a highly polished surface and 16 gauge chrome frame, fastened with security fasteners. Handicap mirror and frame shall be 12<sup>1</sup>/<sub>2</sub>" x 31". By Chief or Equal.
  3. Bunk: Bunk shall be a wall-mounted 27" x 82" pan type bunk with folded and welded seamless edges. Construction shall be of minimum 10 gauge steel with uncream color powder coat finish. By Chief or equal.
  4. Desk: Desk shall be a wall mounted 2'-0" x 1'-6" pan type desk with folded and welded seamless edges. Desk shall be provided with heavy 3/16" flanged brackets for attachment to the wall utilizing a through wall security bolt connection (fastened to unit in adjoining cell). Construction shall be of minimum 10 gauge material with powder coat finish. By Chief or equal.
  5. Stool: Stool shall be wall mounted with a 12" diameter stool type seat. Seat shall be of minimum 16 gauge stainless steel with 1/8" steel reinforcement and supported by cantilevered pipe and plate construction. Back plate to be punched for through wall security bolt connection (fastened to unit in adjoining cell). By Chief or Equal.
  6. Handicap Desk: Desk shall be floor mounted with a removable 12 gauge swing out stool for wheelchair access. The writing surface shall be 36" wide, 20" deep and 31<sup>1</sup>/<sub>2</sub>" above finish floor (30" clear height). Construction shall be of minimum 10 gauge steel and finish to be uncream color powder coated. The desk shall be security fastened to the floor. By Chief or Equal.
  7. Security Fasteners: Fasteners shall be zinc or chrome plated detention grade steel security detention fasteners and tamper-resistant.
- G. Mechanical: Provide and coordinate installation of product shown below:
1. HVAC Supply and Exhaust: Supply and exhaust ductwork shall be 22 gauge galvanized with sealed Pittsburgh Lock corner construction. The ductwork shall be securely fastened to the module, caulked to be airtight. Exhaust ductwork is prepped for 6" dia. connections from module to module and module to site exhaust to be provided and installed by others. Each cell has independent exhaust ducts to allow for volume control and cell smoke detection (by others if required). Supply duct transition pieces shall contain a baffle to restrict pass through and communication between adjacent cells and shall have Armacell 1" thick closed cell insulation on surfaces exposed to the chase to retard condensation and to prevent potential water damage. Supply ductwork is prepped for 10" dia. connections from module to module and module to site supply to be provided, installed and balanced by others. A single supply duct connection can supply up to four cells (two utility chases). Supply and exhaust duct work does not include access doors.
  2. Security Diffusers: Two security HVAC grilles shall be provided between the cell and utility chase. Each grille shall be cast in place and construction shall consist of a minimum <sup>3</sup>/<sub>16</sub>" material with a perforated plate on the cell side having <sup>5</sup>/<sub>16</sub>" holes on <sup>7</sup>/<sub>16</sub>" centers (to create a 6" x 10" perforated opening).
- H. Electrical: Provide and coordinate installation of product shown below:
1. Cells shall be complete with a factory wired and factory tested electrical system including a cell light and night light. Each cell shall have a cast in intercom/call box to allow for field addition of security systems, intercom, call button, cell light switch, receptacle, etc. Power wiring, 120-volt or 277-volt, shall terminate in the chase with color coded wiring in a junction box for connection to field wiring by others. Provided with 12 gauge THHN insulated copper wire.
  2. Conduit and Junction Boxes: All conduit and junction boxes shall be cast into concrete walls and ceilings or face mounted in the utility chase. All junction boxes shall be stamped steel concrete-tight single or multi-gang boxes as indicated and meet UL Standard 514A for metallic junction boxes.
  3. Utility Chase Electrical Junction Box: There shall be a junction box in the chase for cell 120-volt or 277-volt power to be connected by others.
  4. Utility Chase Detention Equipment Junction Box: There shall be a junction box in the chase providing for field installation of security locks, signals, etc. Individual cast in place <sup>3</sup>/<sub>4</sub>" conduits shall connect each doorframe lock pocket to the junction box in the chase. These occur only with swing doors.
  5. Cell Intercom/Call Box: There shall be a cast in triple gang box with a <sup>3</sup>/<sub>4</sub>" nipple to the utility chase for connection by others if intercom, call button, light switch or receptacle is to be utilized (by others).
  6. Security Light Fixture: Light fixture shall be a 1'-0" x 4'-0" ceiling mounted fluorescent light fixture with night light. Housing shall be (1) piece die formed 14 gauge stainless steel with corners continuously seam welded and smooth for a single piece clamshell type barrier. The baseplate shall include a die-formed blade trap (min. of <sup>1</sup>/<sub>4</sub>" in depth) to prevent the concealment of contraband. Hinge to be a completely concealed internal heavy gauge drop-slot stainless steel piano type with <sup>1</sup>/<sub>8</sub>" diameter pin. Ballast shall be supplied for single circuit application with F32T8 lamps. Lens shall be .125" prismatic acrylic and .250" clear polycarbonate. Lens retention shall be continuous Z-channel brackets mounted to through-studs spaced at 6" (max) intervals. Fixture to be mounted using hardened security screws recessed to prevent gripping or prying. Fixture shall have a factory applied Aliphatic

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Urethane powder coating over a (5) stage iron phosphate pre-treatment. Reflectance: 92%. Gloss: 85%(Min) at 60 degrees. 2H salt spray: 500 hours. Kenall SSA Series or equal.

- I. Plumbing: Provide and Install products shown below.
1. Plumbing shall be as follows. Hot and cold water pressure plumbing shall be copper tube conforming to ASTM B 88. Manufacturer shall provide and install a cast iron wye fitting for plumbing waste and provide a 4" pinned clean out for each water closet. All copper pipe joints shall be soldered. Hot water shall be insulated with closed cell Armaflex ½" thick insulation. Hook up to building main supply water shall be by others per the project specification. All supply lines shall be completely flushed to eliminate all debris in the lines before making connections to cell modules and before using any valves (valves are sensitive to debris). All cell module bubblers and valves shall be adjusted by others. The water pressure must not exceed 100 PSIG static to avoid valve damage and the water pressure must maintain over 25 PSIG during flush for proper operation. Floor level modules shall include drain valves for the hot and cold water lines, these valves are for the purpose of purging the system. After disinfecting the system with chlorine, the system must be purged by the site plumbing contractor to reduce the potential for valve damage. Once the water has been turned on to the fixtures, all toilets shall be flushed (by others) a minimum of three times per week to avoid surface rusting and damage to valves.
  2. Stainless Steel Combination Security Lavatory/Water Closet: Entire fixture bracing and internal plumbing shall be type 304 stainless steel. Fixture body and bracing shall be fabricated from 14 gauge stainless steel. Fixture cabinet to be 15" wide. The construction shall be all welded with seamless exposed surfaces polished to a No. 4 satin finish. Toilet to have elongated bowl with contoured seat, integral crevice-free, self-draining flushing rim with positive afterfill. Toilet shall be provided with a Sloan model 9603-1.6RB hydraulic flush valve and overflow prevention. Toilet to be blowout jet type, 1.6 gallons per flush, which requires minimum flushing pressure of 25 PSI and a maximum of 80 PSI. Trap shall be fully enclosed, maintain a minimum 3½" seal, and pass a 2⅛" ball. Lavatory shall be 5" deep and furnished with the following standard equipment; fast drain outlet, ball type air vent, self-draining soap dish, toilet paper holder and filler/bubbler. Unexposed interior surfaces to be coated with sound deadening fireproof insulation. Anchoring to be by standard (6) point system: Threaded rod, support plates, and fasteners furnished. Fixture to be certified for performance and load capabilities to 5,000 pounds. Toilet fixtures to be floor mount. Toilet to be either right hand or left. Acorn, Willoughby or equal.
  3. Handicap Stainless Steel Combination Security Lavatory/Water Closet: Handicapped fixture shall be interchangeable with standard fixture in the location of plumbing hook-up and anchorage locations. Entire fixture bracing and internal plumbing shall be type 304 stainless steel. Fixture body and bracing shall be fabricated from 14 gauge stainless steel. Fixture cabinet to be 15" wide at wall interface. The construction shall be all welded with seamless exposed surfaces polished to a No. 4 satin finish. Toilet to have elongated bowl with Entire contoured seat, integral crevice-free, self-draining flushing rim with positive afterfill. Toilet shall be provided with a Sloan model 9603-1.6RB hydraulic flush valve and overflow prevention. Toilet to be blowout jet type, 1.6 gallons per flush, which requires minimum flushing pressure of 25 PSI. Trap shall be fully enclosed, maintain a minimum 3½" seal, and pass a 2⅛" ball. Lavatory shall be 5" deep and furnished with the following standard equipment; fast drain outlet, ball type air vent, self-draining soap dish, toilet paper holder and filler/bubbler. Unexposed interior surfaces to be coated with sound deadening fireproof insulation. Anchoring to be by standard (6) point system: Threaded rod, support plates, and fasteners furnished. Fixture to be certified for performance and load capabilities to 5,000 pounds. Toilet fixtures to be floor mount. Toilet to be provided with suicide resistant grab bars. Acorn, Willoughby or equal.
- J. Fire Protection: Provide as shown below.
1. Each cell shall include one 2" dia. hole to the utility chase and one 2" dia. hole above the chase access door to the utility chase. These holes are for the installation of institutional sidewall sprinkler heads; locations of holes to be provided by others. Sprinkler heads and associated piping shall be provided and installed by others.
  2. Smoke seals on security doors and chase doors are excluded.
- K. Insulation: Provide and install as shown below.
1. Exterior polyisocyanurate insulation shall be a minimum of 2" (nominal) thickness. Insulation shall extend the full panel width and shall closely abut the window frame so that gaps and uninsulated sections are less than 1% of insulated panel area.
  2. See ductwork for duct insulation.
  3. See plumbing for hot water pipe insulation.
- L. Exterior Wall "R" Value:
1. The exterior composite insulation system shall provide an "R" value ranging from 13.7 to 21.5 depending upon the thickness of insulation. The insulation system consists of exterior wythe, insulation and interior concrete wall panel.
- M. Identification: Provide permanent marking inside the utility chase to identify manufacturer, product mark number, and date cast.)
- 2.5 FINISHES
- A. Exposed Interior Steel: Surfaces shall be stainless steel, factory applied powder coating or epoxy paint (this may include furniture, plumbing fixture, window frames, door frames and HVAC grilles).
- B. Painted Concrete
1. Concrete surface preparation for factory painted surfaces:
    - a. Comply with coating manufacturer's recommendations for removing contaminants, efflorescence, form coatings and laitance.
    - b. Fill and patch voids with a material compatible with subsequent primer and finishing materials.
  2. Acceptable interior coating system.

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- a. Primer/Filler: A three component, acrylic-modified cement.
    1. Performance Criteria:
      - Density: (ASTM C905), method B 105lbs/ft
      - Compressive strength: (ASTM C109 modified) 2000 psi
      - Tensile strength (ASTM C579) 500
    2. Application: Apply two coats of sufficient thickness to fill minor surface irregularities, achieving a uniform surface
    3. PPG MegaSeal HSPC or approved equal.
  - b. Finish Coats: A two component modified aliphatic amine epoxy.
    1. Performance Criteria:
      - a. Adhesion - method: ASTM D4541  
Requirement: No less than 200 psi pull, average of three tests
      - b. Abrasion – method: ASTM D4060  
Requirement: No more than 102 mg loss after 1,000 cycles
      - c. Hardness – method: ASTM D 3363  
Requirement: Not less than HB rating
      - d. Moisture Vapor Transmission- ASTM F-1249  
Requirement: Not more than 5.12 grams/square meter, per 24 hours
      - e. USDA- incidental food contact. FDA 21 CFR 175.300 direct food contact.
    2. Application: Apply one coat (sprayed) with a DFT (dry film thickness) of 8-10 mils. Full coat shall be back rolled to achieve a stipple finish. Apply mist coat of 1.5-2.0 mils DFT over first full coat to achieve maximum hide.
    3. Color: Shall be PPG color pure white with 84.0% reflectance. Color change during the warranty period shall be no greater than PPG color pure white with 81.2% reflectance.
    4. PPG Amerlock 2 VOC or approved equal.
  - c. Unacceptable Interior Finish Conditions: Except as specifically approved, the following is a complete list of interior finish defects that are unacceptable and must be repaired.
    - A. Ragged or irregular edges or form marks greater than 1/16" that have not been ground smooth.
    - B. Any air pockets or voids greater than 1/4" in an exposed surface. Air pockets greater than .020" in size which are in a frequency greater than 1 per sq. ft., or smaller air pockets which are frequent and numerous and visible to a standing adult.
    - C. Wall paint that is peeling.
    - D. Wall paint that is less than 8 mils DFT.
    - E. Cracks in the paint greater than .005 inch.
- C. Caulk Finishes: Caulk joints must be smoothly tooled. Lumps, double line tooling, ragged or uneven tooling is not allowed. The following additional requirements apply:
1. Furniture caulk bead will be 1/4", +/- 1/8"
  2. Floor to wall caulk bead will be 1/2", +/- 1/8"
  3. Window caulk bead will be 1/8" x 1/4", +/- 1/8"
  4. Any seams or cracks greater than .020" in which contraband could be hidden shall be caulked.
- D. Concrete Finishes: Concrete surfaces shall be finished as follows.
1. Exterior (outside) Wall, Dayroom Wall: PCI Finish Grade B - Steel Form Finish. Airholes over 1/4" in size and air holes greater than 1/8" but less than 1/4" occurring in concentrations of greater than one per two square inches shall be filled. The following additional module requirements shall apply:
    - a. Cracks greater than .005" will be repaired. Dayroom face cracks will be ground smooth.
    - b. Form marks and irregularities greater than 1/16" will be ground smooth.
    - c. Fins over 1/8" will be reduced.
    - d. Spalls will be repaired to original conformance
    - e. Exterior wall blemishes visible from 50' will be cosmetically blended
    - f. The exterior wall (minimum of 2 1/2" wythe) shall be cast horizontally.
    - g. Patches will be tight, without shrinkage cracks and conform to original plane
    - h. This finish is not paint ready**
  2. Finish and Formed Surfaces of Cell Module Architectural Exterior Wall (if applicable):
    - a. Provide finishes for formed surfaces of the precast concrete exterior wall as indicated on the architectural drawings for each type of unit, and as follows:
      1. Standard Finish: Normal plant run finish produced in forms that impart a smooth finish to the concrete

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2. Reveals: Incorporate horizontal and vertical reveals as shown on the drawings.
  3. Smooth Finish as Cast: Cast horizontally using flat, smooth, non-porous forms.
  4. Textured Finish: Achieve finish on exterior face of cell module wall by utilizing fluted, sculptured or textured form liners.
  5. Sandblast Finish: A medium sandblast finish shall be achieved by blasting away cementitious materials/sand matrix to match approved mock-up sample.
  6. Special Finishes: Exposed face to match approved mock-up sample or mock-up panel as specified on the drawings.
3. Sidewalls: PCI Commercial Grade – As Cast Finish. Concrete may have form marks, surface air holes, water marks, streaks of color or cast marks, scaling, minor grout bleed and minor chips or spalls. Large fins, large joint bleeding or honeycomb and large spalls will be repaired. The following additional requirements will apply:
    - a. Sidewall finishes other than Commercial Grade shall be marked on erection drawings.
    - b. Cracks .013" and smaller do not require treatment.
  4. Top of module, underside of floor: Surface shall be struck off with a screed and trowelled with a bull float to  $\pm 1/4$ " of true plane. The following additional requirements apply:
    - a. Shim bearing areas will be hand finished locally smooth  $\pm 1/16$ "
    - b. Anchoring requirements will be determined on a project-by-project basis. Dowel holes shall be 3" diameter (cored) or 4" diameter (cast-in) by 14" deep (minimum) and  $\pm 1/4$ " from true position. Sleeved holes shall be formed with corrugated metal ducts. PVC sleeves are not acceptable.
  5. Underside of Balcony: Shall be machine trowelled to a hard slick finish. The following additional requirements apply:
    - a. No machine indentations or swirls are allowed.
    - b. Light junction box must be visible
- E. Concrete Cracks: It is normal for concrete to crack. Cracks will be measured for width and treated as follows:
1. Any working cracks or fresh cracks greater than .020" shall be evaluated by an engineer.
  2. Cracks larger than .013" shall be injected with epoxy designed for concrete repair.
  3. Cracks from .005" to .013" should be rubbed out if visible and aesthetically unappealing
  4. Cracks smaller than .005" may be ignored.
  5. Crack repairs will be cosmetically blended to the visual requirements of the surface receiving the repair.

**PART 3 – EXECUTION (erection guidelines)**

3.1 SCOPE

- A. Erection of precast cell modules shall proceed only in accordance with this section.

3.2 RESPONSIBILITY

- A. Cell modules will be delivered by module manufacturer. The owner's representative shall inspect each unit upon arrival. All visible defects shall be noted on the bill of lading. Signing the bill of lading constitutes acceptance, subject to any notes on the bill of lading. The module manufacturer shall be notified in writing within 24 hours of the discovery of any hidden defect subsequently discovered. Unless the module manufacturer is responsible for erection, the module manufacturer shall not be responsible for any site handling damage.
- B. The cell module manufacturer shall provide the owner or owner's agent erection drawing deliverables. Modules shall be handled and erected in accordance with the erection drawings and the Module Setting Plan (MSP). MSP shall be a part of the erection drawing deliverable. The module manufacturer is not responsible for any damage due to failure to follow directions herein.
- C. Prior to erection, the erector shall be responsible for verifying all dimensions, centerlines, and grades that affect the modules. Erector shall establish joint locations, control points, benchmarks, offset lines and elevation marks prior to installation.
- D. Before erection, erector shall ensure that all materials supplied by the module manufacturer are at the job site and readily available. This includes, but is not limited to, modules, shims, pads, and connecting hardware.
- E. If required, site mechanical contractors shall loosen/remove bolts in the utility chase to make modules to module connections as noted in module manufacturers MEP drawings.
- F. These dowel holes are the responsibility of others, cell module manufacturer to provide dowel hole location on erection drawings. Connection requirements may change based on loading requirements. Refer to erection drawings for actual connection details.
- G. Benchmark elevations and control grids in two directions provided by others.
- H. Footings and/or foundations to be clean and maintained clean for the lift of the erection cycle by others. Removal of overhead (or underground) utility lines by others.
- I. Adequate jobsite access for the erection of cell modules is required and shall be provided by others. Jobsite access shall include traffic management, traffic coordination, flagmen, etc. Additionally adequate access means trucks and cranes can move under their own power without assistance. Such access must be provided into the jobsite, inside structure footprint, and at perimeter (40' minimum). If

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necessary, graded ramps and roadways must also be provided for adequate access. Module manufacturer reserves the right to stop deliveries/erection if these requirements are not met, in which case the cost for all additional mobilization(s) will be the responsibility of the General Contractor.

- J. Protection of underground utilities and any other items buried under the crane and truck traveling area (new and/or existing) is by others.
- K. Module manufacturer does not include wash down of truck tires or equipment tires upon exiting the jobsite.
- L. Prior to the start or erection, all foundations and structural steel (supporting precast) are to be in place and ready to receive precast. In addition, all foundations in the path of the crane and/or trucks are to be covered (backfilled over). The supplying installation, and removal of these covers (backfill) is by others.

### 3.3 ERECTION TOLERANCES

- A. Erection tolerances shall be as stated in PCI Manual 120, latest edition except as noted herein. Tolerances are not cumulative.
- B. Erection tolerances for cell module shall be:
  - 1. plan location on project grid datum, +/- 1/2"
  - 2. top elevation; +/- 1/2", individual finished floor cell elevation, +/- 1/8"
  - 3. jog in alignment of faces, 1/4"
  - 4. balcony alignment at the walking surface after adjustment, 1/8"
  - 5. balcony alignment at the toe rail 1/4"
  - 6. joint width, +/- 1/4"
  - 7. cell door frame or hinges plumb, +/- 1/8"

### 3.4 PROTECTION

- A. Protection of cell modules after erection is the responsibility of others. Any damage, not noted on the walk through inspection, after erection is not the responsibility of the cell module manufacturer.
- B. Cell modules stored at the job shall be placed on wooden cribbing, which is firm and level and placed as shown on the module manufacturer's erection drawings.
- C. Cell modules shall be protected from dirt, stains, rainsplash, and mechanical damage during job site storage and erection. Final cell module cleaning will be by others.
- D. Cell doors and chase doors shall not be opened until mutual inspection by module manufacturer and owner's representative is completed in accordance with Section 1.7. Schedule chase inspection before proceeding with chase connections. A minimum of 48 units, or one building, shall be scheduled for inspection at one time, or as mutually agreed.
- E. Secure cell doors and chase doors with a temporary locking device. The device shall remain in place and shall only be removed by Tindall. Damage to the cell and chase shall be the responsibility of others.

### 3.5 SETTING MODULES

- A. Lifting shall proceed strictly in conformance with drawings.
- B. Only lifting and handling devices indicated on the drawings shall be used.
- C. Module elevation and plumb is adjusted by varying shim stack thickness. Shoot-in all foundation shims before setting module.
- D. It is the erector's responsibility to provide and install any temporary bracing, guys, or work platforms required to maintain position, stability, and alignment while modules are being set and connected.
- E. Schedule an inspection of all erected cells with the module manufacturer before proceeding with chase connections or as mutually agreed.
- F. All structural grout shall be high strength, non-shrink, and non-metallic, Dayton Superior or equal. Grout shall be furnished by module manufacturer and installed by erector.
- G. Module to module connection is made with a threaded rod that is screwed into the bottom of the module and secured with a grout hole connection, either in the module below or in the foundation.
- H. Erector shall be responsible to verify module elevation and plumb before grout in sleeve connection has set.
- I. Individual grout pads are required at wall intersections along the front (dayroom) and back (exterior) walls. Grout is not required at side horizontal joints. Additional grouting may be required for specific structures as a result of seismic analysis.
- J. Any visible grout bleed shall be cleaned before grout sets by erector.
- K. Flush erection anchors pockets that will be exposed to weather after erection is complete shall be grout filled after erection.
- L. All weld connections shall be in accordance with ANSI/AWS D1.1 using E70XX low hydrogen electrodes. Any weld exposed to weather after construction shall be cleaned and coated with zinc rich paint, Galvacon, ZRC, or equal.
- M. Adjacent balconies shall be adjusted into alignment with jacks or clamps. Do not adjust a balcony more than 3/8" in a 48-hour period. If applicable, weld balconies when adjustment is complete.
- N. Chips or spalls that occur during erection shall be patched to similar shape, color and texture.

**End of Section**