SECTION 133423

MODULAR PRECAST CONCRETE CELLS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes pre-engineered, prefinished modular precast concrete cells and related precast concrete elements, complete and in-place. Work includes the following:

1. Modular precast concrete units including mezzanine balcony slabs as applicable.
2. Insulation in exterior wall assembly and wall facing with form liner finish.
3. Thermally enhanced stainless steel security/detention windows with security glazing.
4. Detention doors, door frames, hinges, and hardware preparation; prime painted.
5. Chase access doors, door frames, hinges, and hardware preparation; prime painted.
6. Embeds in concrete and connecting devices for precast concrete modular units.
7. Epoxy paint for interior cell walls and ceilings.
8. Security light fixtures with lamps.
9. Embedded electrical nonmetallic tubing conduit, wiring, electrical boxes, devices, and security cover plates at interior of cell.
10. Prefinished security grilles at supply and exhaust air with opposed blade dampeners.
11. Stainless steel combination plumbing units with valving for typical and handicapped cells.
12. Security sealants and tamperproof fasteners at interior of cell.
13. Prefinished wall mounted detention bunks, desks, stools, shelf with hooks.
14. Stainless steel mirrors, and grab bars in handicapped accessible cells.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 033000 - Cast-In-Place Concrete for installing anchors and imbedded items in cast-in-place concrete.
2. Section 055000 – Metal Fabrications for metal stairs and handrails.
3. Section 087100 – Door Hardware for door locks.
4. Section 099000 – Painting and Coating for field painting of doors and frames.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for prefinished precast concrete modular cells.

B. Shop Drawings: Include the following:

1. Overall geometry, elevations, sections, and dimensions of all modular precast units, reinforcement, anchors inserts, embedded to cast-in place items, lifting devices, and connections to other work. Detail reinforcement in accordance with ACI 315.
2. Mechanical and electrical layouts indicating location of all equipment and routing of conduit, and specified wire colors as coordinated through responsible party.
3. Cut sheets for all fixtures, furniture, detention equipment.
4. Concrete mix designs for review and approval by Architect prior to release for manufacturing of each item.

C. Schedule: Including dates for submittals, approvals, production, delivery, and erection.

D. USGBC LEED Submittals: For projects seeking LEED certification, submit the following:

1. Credit MR 4: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. Credit MR 5: Product data indicating location of material manufacturer for regional materials. Include statement indicating cost for each regional material.
   a. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regional materials.
   b. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
   c. Include statement indicating percentage by weight of regional materials for each regionally manufactured product.

E. Erection Drawings And Calculations: For prefinished precast concrete modular cells indicating compliance with design requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Separate drawings of individual components will not be required for this submission.

F. Thermal Calculations: Provide calculations complying with ASHRAE/IESNA Standard 90.1 and confirming the effective thermal resistance for the concrete sandwich wall system. The insulated concrete module sandwich walls must be constructed to maintain the effective acceptable material R-Value of the walls with less than one percent reduction due to penetrations and connection detailing. The reduction in thermal performance must be calculated by using the Isothermal Planes method of R-Value calculation.

G. Maintenance Data: For prefinished precast concrete modular cells, components and accessories, to include in maintenance manuals.

H. Engineer’s Qualifications: For manufacturer’s structural engineer responsible for engineering.

I. Electronic Files: If requested by the Architect, submit manufacturer’s BIM model for use in Architect’s and Contractor’s BIM models for the project.

1.3 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, erection drawings and structural calculations, and other data prepared by a qualified professional engineer.

1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of prefinished precast concrete modular cells that are similar to those indicated for this Project in material, design, and extent.

B. Precast Cell Manufacturer (PCM) Qualifications: For manufacturers not named in this specification, submit documentation for the following during the addenda period for response by the Architect. Bids will only be accepted from acceptable manufacturers.

1. The PCM shall have a minimum of ten years experience in design and production of precast concrete pre-finished modular cells.

2. The PCM shall have a minimum of ten completed projects of equal or greater size as this project.
3. The PCM must have daily production capability to meet the schedule for this project.
4. The production facility must be certified by PCI or NPCA, prior to bid date.
5. The PCM shall submit to the Architect information listed below:
   a. List of similar projects including: Project name, location of project, name of owner, date of project, Number of cells.
   b. References for projects listed above including the name, address, phone number and contact person for all the following: Owner, Architect, Construction Manager, Contractor.
   c. Information regarding insurance and bonding capability including name of carrier, types and limits.
   d. Current staff including resumes of all key personnel including Engineer performing structural design.
   e. Description of facilities to be used for this project and provide list of all established production facilities available to the PCM
   f. Other pertinent data, which would assist in the evaluation of qualification.
6. The PCM shall list all deviations from individual manufactured products specified in this Section.
7. The Owner reserves the right to inspect the previous projects and contact any or all parties to determine qualifications.

C. Erector's Qualifications: Company specializing in erecting the work of this Section with 3 years of documented experience; qualified and acceptable to the PCM.

D. Plywood Chase Mockup:

1. The PCM shall provide at the job site, from approved precast cell geometry Shop Drawings, a plywood typical cell chase mock-up, representing one story. The plywood mockup is for coordination between subcontractors only and is not for use for changing the geometry of the chase.
2. The PCM shall provide all required plumbing fixtures, valves, HVAC grilles, and all other items as specified in this section required for coordination between trades utilizing the chase mockup.
3. Mechanical, electrical, security, and fire protection subcontractors shall promptly provide all utilities within in the chase to provide a complete chase mockup.
4. Once approved, the plywood chase mockup will serve as the standard for the project. This mockup must be approved before the precast cell mockup production, in order to identify any adjustments to the arrangement of utility rough-ins and connection locations for the convenience of installation and maintenance of the utilities by others.

E. Precast Cell Mockup:

1. After approval of the precast cell Shop Drawings and identified adjustments required by mechanical and electrical subcontractors, the PCM will fabricate, outfit and finish a one-story, 2 cell module (of typical cells) at the fabricating plant prior to the fabrication of remaining cell units.
2. The purpose of the cell mockup will be to identify quality assurance expectations of the final product with regards to finishes on furniture, walls, and floors, and not the placement of equipment.
3. The review and approval of the concrete mockup shall take place at the fabricator's plant. Overall cell geometry and location of cast in items are not subject to adjustment during this review except by approved change order.

4. After written approval, of the cell mockup, the remaining units may be fabricated. Architect or Owner shall be permitted to inspect the fabricated units at any time at the production facility.
5. The approved typical cell mockup shall be delivered to the job site and erected and will be used as a quality reference standard for the job. The approved standard cell mockup will be incorporated into the project as one of the last units to be erected.

1.4 TESTING DURING FABRICATION

A. Testing: All testing of precast concrete elements shall be performed by an ACI Level 1 certified technician employed by the precast manufacturing plant. Sampling and testing for quality control during placement of concrete is to include the following:

1. Sampling Newly Placed Concrete: ASTM C172, except as modified to account for self-consolidating concrete (SCC).
2. Slump Flow: ASTM C1611 for Self Consolidating Concrete: The slump cone can be upright or inverted, but consistency with either method is required. The slump cone shall be placed on a base plate of non-absorbing material and shall be filled in one lift without rodding or strike off. The cone shall then be lifted at a certain speed until contact with the concrete ceases. The resulting concrete sample patty is then measured in two perpendicular directions. The two measured diameters are averaged and the slump flow is reported in inches. One test for each days pour of each different mix design used. Additional tests when concrete consistency is an issue.
3. Air Content: ASTM C173, modified for SCC, volumetric method for lightweight and normal concrete; ASTM C231, modified for SCC, pressure method for normal weight concrete; one for each day's pour of each mix design used. Also test each time a set of compressive strength specimens are molded.
4. Concrete Temperature: test hourly when air temperature is 40°F (4°C) and below, and when 80°F (27°C) and above, and each time a set of compressive strength specimens are made.
5. Compression Test Specimen: ASTM C31, except as modified for SCC, one set of seven cylinders for each compressive strength test, unless otherwise directed by Architect designer. Mold and store cylinders for laboratory cured test specimens (except when field cure test specimens are required).
6. Compressive Strength Tests: ASTM C39, one set for each day's pour, plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; two specimens tested at 7 days, 3 specimens tested at 28 days. The remaining two specimens are for checking strip strength. (One of the 28 day cylinders may be held if necessary).

B. Coordination for Cast-in Anchorage (Embedments): Coordinate installation of anchorages for prefinished precast concrete modular cells. Furnish sleeves, concrete inserts, anchor bolts, and items with integral anchors that are to be embedded in concrete bases. Include setting drawings, templates, and directions for installing anchorages. Deliver such items to Project site in time for installation under the work of Section 033000 "Cast-In-Place Concrete."

C. Preinstallation Conference: Conduct conference at Project site.

1. Inspect and discuss power and control system roughing-in and other preparatory work performed by other trades.
2. Review and finalize a construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review sequence of installation.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle precast elements in position consistent with their design. Lift and support only from the manufacturer's designated support points. Lifting or handling devices shall be capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

B. Protect units to prevent staining, chipping, or spalling of concrete. Store off the ground. Protect finishes from weather and dirt. Do not deface date of production and piece type for each unit.

1.6 SITE CONDITIONS

A. Field Measurements: Verify precast cell unit anchorages and supports by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating precast cell units without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Oldcastle Precast Modular Group, 200 Keystone Drive, Telford, PA 18969; (215) 257-2255.

B. Other manufacturers proposed for use shall submit qualification package per Quality Assurance article Paragraph 1.3 B above for review prior to bid date.

2.2 PERFORMANCE REQUIREMENTS

A. Provide modular precast cells consisting of a monolithically cast five-sided module including ceilings and walls. Coordinate installation of windows, doors and frames, furnishings, electrical and plumbing fixtures and other items as specified in this section. Six-sided modules, tapered walls, or panelized construction will not be allowed. Cell walls shall be of uniform thickness from top to bottom of walls. Balcony may be cast as an integral or separate component and erected in the field as applicable to project requirements.

B. Engineer and size components to withstand code required physical and seismic loads, and the following:

1. Superimposed loads of dayroom roof onto front walls of cells, and superimposed loads of attic roof and walls onto cell walls, and superimposed loads of utility, shower and janitor closet rooms onto sides of adjacent cells.
2. Railing and guardrail loads.

C. Prefinished precast concrete modular cells shall conform to dimensions and configuration indicated on the drawings and the following:

1. Maximum allowable deflection per ACI 318, L/360 unless indicated otherwise.
2. Threaded inserts for support and attachment of cell furnishings, fixtures and cell light fixtures.

3. Embeds/inserts for the support of balcony stairs and balcony guardrail.
4. Required fire ratings: As indicated on the Drawings.

2.3 CONCRETE MATERIALS

A. Portland Cement: Conform to ASTM C150.

B. Fly Ash: Conform to ASTM C618, except the loss on ignition shall not exceed 3.0-percent by weight.

C. Ground Granulated Blast Furnace Slag: Conform to ASTM C989.

D. Aggregates: Conform to ASTM C33.

E. Admixtures: Conform to ASTM C494. Self-consolidating concrete may be proportioned with a viscosity-modifying admixture to improve stability. Acceptable admixture: Sika Visocrete or other approved equal.

F. Water: Potable

G. Batching: Concrete must be batched at PCM manufacturing facility, no ready mix concrete will be allowed for use with the precast cells and components.

2.4 PROPORTIONING AND DESIGNING CONCRETE MIXES

A. Concrete 28-Day Specified Compressive Strength: 5,000 psi minimum.

B. Water to Cementitious Materials Ratio: 0.45 maximum with an allowable variation during production of +/- 0.02.

C. Slump/Slump Flow Limits, Self-Consolidating Concrete: Minimum 23 inch slump flow, maximum 28 inch slump flow.

D. Cementitious Materials: 650 pounds per cubic yard, minimum.

E. Curing: Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or accelerated methods. No steam curing or accelerated curing methods will be allowed.

2.5 REINFORCEMENT

A. Reinforcing Steel: ASTM A615-Grade 60 deformed steel bars.

B. Welded Wire Reinforcement: ASTM A185 (Plain Wire) and ASTM A497 (Deformed Wire).

2.6 CONCRETE ACCESSORIES

A. Connecting and Supporting Devices: ASTM A36 carbon steel plates, angles, items cast into concrete, items connected to steel framing members, inserts, conforming to PCI MNL-123, prime painted, all items at the exposed to weather in the finished structure to be galvanized.

B. Grout: Non-shrink, non-metallic, minimum strength of 6000 psi (41.4 MPa) at 28 days.

C. Shim Packs and Bearing Pads: As recommended by PCM.

D. Bolts, Nuts and Washers: High strength steel, quenched and tempered alloy steel, or corrosion resistant chromium-nickel type as required by design, ASTM A307 or A325

E. Prime Paint: Zinc rich alkyd (except for weld plates and surfaces in contact with concrete).

F. Embeds/Carriers: As required for installation of modular precast cell balcony railings, windows, door frames, and embed plates; threaded insert for mounting of light fixtures and detention finishes.

G. Forms: Reusable externally reinforced steel forms of the Precast Cell Manufacturer's design meeting the shapes and dimensions indicated on the shop drawings, approved cell geometry drawings and the tolerance requirements indicated herein.

H. Sealer: Cell floor sealer for use on cell floors integrated with the precast cell unit. Sealer shall be Ashford Formula manufactured by Curecrete Chemical Company, Inc. Springville, UT.

2.7 EXTERIOR WALL INSULATION AND FACING

A. Cell Module Insulation System:

1. Provide extruded polystyrene rigid board insulation having the physical properties defined by ASTM C578 for Type IV material with provisions as follows:
   a. Compressive resistance: 25-psi minimum
   b. Flexural strength: 50-psi minimum
   c. Water absorption: 0.1 percent maximum by volume per ASTM C272.
   d. Pre-installed, high-strength, polymer twist-lock retainers, designed to position the fiber composite connectors within the pre-fabricated insulation sheets.
   e. Follow the manufacturer's instructions on storing and handling insulation.
2. Provide non-conductive, non-corrosive, fiber-composite connectors, having the following physical properties and attributes:
   a. Minimum tensile strength of 120,000psi, minimum glass content of 76 percent by weight, and a coefficient of thermal expansion of 5x10-6 in/in/°F, nominal.
   b. Proven accelerated aging testing. Provide reports showing compliance with ASTM C581.
   c. Provide fire resistance testing. Provide reports or analysis showing compliance with a minimum fire resistance of 2 hours.
3. Manufacturer: Thermomass, 1000 Technology Drive, Boone, Iowa 50036 (800) 232-1748.

B. Form Liner: Form liner shall be an elastomeric formliner used for a textured finish on all exterior insulated walls. Form Liner shall be manufactured by Dayton Superior, Miamisburg, OH, (937) 866 0711, or Architectural Polymers, New Ringgold, PA (570) 386-3777 or Scott System, Inc. Denver, CO (303) 373 2500.

C. Dovetail Anchor Slots for Masonry Veneer Finish (When Applicable): Dovetail anchor slots for abutting masonry, type as manufactured by RKL No.110 Styrofoam-Filled 22 gage galvanized sheet metal standard dovetails slot. Dovetail shall be taped with 2 inches wide standard duct tape prior to casting to prevent concrete leakage into dovetail. Provide dovetail anchors at intersection of precast to masonry.

2.8 CELL COMPONENTS

A. Thermally Enhanced Stainless Steel Detention Windows. Window shall be stainless steel frame (14 ga.) welded and sealed in corners. Window manufactured by CM Security Group Inc. Montreal, QC or Hopes Windows, Jamestown, NY.

1. The windows shall be fabricated providing no less than three square feet of clear viewing area.
2. Quality Control Tests:
   a. Air infiltration test: ASTM E283, Maximum Air infiltration 0.15 CFM/Sq. Ft. of area with pressure differential across the window unit of 1.56 PSF.
   b. Water Penetration Test: ASTM E331, No water penetration for 15 minutes when the window is subjected to a rate of flow of 5 gal/hr./sq.ft.
   c. ASTM F1592 Standard Test method for detention hollow metal vision systems.
   d. Materials: Perimeter framing formed from 14 gauge 304 stainless steel. Glazing beads shall be 14 gauge "Z" profile thermally enhanced. All screws shall be tamper-resistant truss head stainless steel screws.
      1) Finish Powder Coated Thermally Enhanced Glass Stops on Exterior: Color as selected by Architect, 2B finish on interior.
   e. Fabrication: Fabricate windows in accordance with approved shop drawings. Color to be selected at time of shop drawing approval.
      1) Frame members shall be coped and welded at corners for maximum strength and silicone sealed for weather-tightness.
      2) All windows shall be designed for outside glazing using screw applied glazing beads.

B. Security Hollow Metal Door and Frames: Manufactured by Habersham Metal Products Co., Cornelia, GA, (706) 778-2212 or equal.

1. Hollow Metal Doors:
   a. Materials: Doors shall be constructed of material conforming to ASTM A653/A653M (A60). Door face sheets shall be 14 gauge sheets. Doors shall be 2 inches in thickness and constructed using vertical steel stiffeners of 16 gauge minimum welded a maximum of 3 inches on center. All mortised hardware reinforcing shall be made of 7 gauge steel. All surface mounted hardware shall be of gauges to meet recommended thread engagement of hardware manufacturer. Doors and frames should be prepped per hardware schedule; universal lock pockets are not acceptable. Basis of design, to receive Southern Steel 10120AM or Folger Adam 120M Lock and Southern Steel 220L-4 or Folger Adam 524 Door Position Switch. PCM shall provide door hinges only, and temporary lock for construction purposes.
   b. Food Pass Openings (As Applicable): The food pass opening shall be a flush opening fabricated using interior channels, securely welded to the inside of both face sheets. The food pass shutter shall be constructed using two 10 gauge steel plates spot welded together to produce and inset fit to prevent tampering.
   c. Door Construction: Edges continuously welded and ground smooth. Glazing shall be applied with 1/4 - 20 torx security head screws at 8 inches on center minimum. Door shall be constructed in accordance with NAAMM 863-90 and should meet performance specified in ASTM 1450.
   d. Finishing: Door shall be prime painted under this specification section and both sides of door, door edges, and frame shall be finish painted by the on site painting contractor.
2. Hollow Metal Door Frames:
   a. Materials: Frames shall be constructed of materials conforming to ASTM A653/A653M (A60). Frames shall be constructed of 12-gauge minimum thickness sheet steel. Anchors of 12-gauge minimum or 5/8-nelson stud shall be required at 4 locations per jamb, 2 locations per head. Stainless steel hinge reinforcing of minimum 7 gauge with angle backup full width of hinge shall be required. Lock enclosing reinforcement shall be constructed of a unitized box of no less than 10 gauge. Frame to be prepped for Southern Folger lock. Universal lock pockets are not allowed.

b. Construction: Frames shall be continuously welded the full width and depth of frame corner joint with face welded and ground smooth. Frame shall have a bolt-on spreader bar at bottom of frame to prevent warping. Minimum height of doorstop shall be 5/8 inch. Conduit used shall be 3/4 inch in diameter. All hardware reinforcing shall be protected with steel mortar guards that protect from leakage that would interfere with installation or operation of hardware. Frames shall be constructed in accordance with NAAMM 863-90 and should meet performance specified in ASTM 1450.
c. Finishing: PCM shall prime paint both sides of cell doors and frames. Finish painting by on site painting contractor.

C. Swing Chase Access Door:

1. Four-Sided Frame: Single rabbet, 12 Ga. hollow metal steel frame.
2. Door: Hollow metal door with 14 Ga. face sheets. (Prime Painted)
3. Lock: Prepare door for a heavy-duty detention-type lock with paracentric key tumbler. Model number Southern Steel 1010A. Lock supplied by others.
4. PCM shall prime paint both sides of chase door and frame. Finish painting by on site painting contractor.

D. Glazing for Security Cell Window: 9/16 inch ArmorProtect Plus made up of 1/8 inch heat strengthened glass, 0.050 urethane interlayer, 1/8 inch polycarbonate, 0.050 urethane interlayer, 1/8 inch heat strengthened glass. Glass shall pass HP White Level A ballistics and Level 1 forced entry tests. Glass manufactured by Oldcastle Building Envelope (866) 653-2278 or equal.

E. Glazing for Security Cell Door: 3/8 inch tempered glass, manufactured by Oldcastle Building Envelope. Provide 2 percent attic stock and store where directed on site.

F. Glazing Tape and Blocks:

1. Glazing Tape: Butyl rubber extruded preformed architectural glazing tape.
2. Setting Blocks: Thermoplastic setting blocks - 90 durometer shore hardness thermoplastic rubber.
3. Window Sealant: See specification for Type 3 sealant following.

G. Joint Sealants: Shop applied.

1. Backer Rod: Compressible rod stock of expanded, extruded polyethylene.
2. Type 1 Sealant: Flexible security sealant - two part, non-sag, cold applied, chemically-curing elastomeric polyurethane - Pecora DYNAFLEX is installed around all furniture, light fixtures and plumbing fixtures.
3. Type 2 Sealant: Non secure sealant. Neutral, one-part silicone sealant - Dow Corning 795 Silicone Building Sealant is installed on window frame to glazing joints. (Cap Bead).
4. Type 3 Sealant: Non secure sealant, one part, non-sag polyurethane sealant - Pecora DYNATROL is installed on exterior windows and joints.

H. Fixed Wall Mounted Bunk: Provide prefinished wall-mounted bunks security bolted to wall. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent salt solution test. Bunk shall be 29 inches W by 80-3/8 inches L by 11 inches H, 10 gauge hot rolled P&O steel.

I. Fixed Bunk Mounted Ladder: Provide prefinished bunk mounted ladder security bolted to bunks as specified above. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent salt solution test.

J. Fixed Wall Mounted Desk: Provide prefinished wall-mounted desks security bolted to wall. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent Salt Solution test. Desk shall be 12 inches W by 18 inches D by 6 inches H, 10 gauge hot rolled P&O steel.

K. Fixed Wall Mounted Seat: Provide prefinished wall-mounted seat security bolted to wall. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent salt solution test.

L. Fixed Wall Mounted Shelf w/ Safety Hooks: Provide prefinished wall-mounted shelf security bolted to wall. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent Salt Solution test.

M. Snap-Off Security Bolts: Security Bolts shall be made from mild steel and zinc plated. Manufactured by Tanner Nut and Bolt Corp. or equal.

N. Threaded Inserts: Threaded inserts shall be made from die cast zinc alloy material. Manufactured by Tanner Nut and Bolt Corp. or equal.

O. Cell Wall and Ceiling Surfacer and Paint:

1. Filler/surfacer shall be applied to substrate to fill bug holes and honeycombs. Filler/surfacer material shall be one component, polymer modified Portland cement. ProSpec RubCrete as manufactured by Bonsal American, Charlotte, NC, (800) 738-1621, shall be the standard of quality. The filler/surfacer shall meet the following test requirements.
   a. TTM-58 freeze thaw adhesion, Method C. Result-10 cycles wet 4B.
   b. ASTM D 1735 Humidity 1000 hours Result-4C.
   c. ASTM D 4541 Pull off adhesion 3 trials Result-283 PSI.
2. Cell wall and ceiling shall receive a two-component high performance epoxy coating system. Total dry film thickness not less than 8 mils applied in two coats. The coating shall be Amerlock 400 VOC as manufactured by PPG. The coating shall meet the following product description and test requirements.
3. Generic Description: High-solids epoxy coating.
4. Finish: High gloss.
5. Volume Solids: 83 percent +/- 3 percent.
6. Volatile Organic Compounds: Comply with VOC requirements of SCAQMD Rule 1113.
   a. Abrasion: ASTM D 4060: Result, no more than 102 mg loss after 1000 cycles.
   b. Adhesion: ASTM D 4541: Result, no less than 350 PSI pull.
   c. Hardness: ASTM D 3363 (Pencil): Result, must pass 6H (gouge).
   d. Stain Resistance (ketchup, grape juice, blood and coffee): Result, complete removal and no staining upon solvent wash.
   e. Urine Resistance (exposed to urine 7 days): Result, less than 1 percent gloss loss and no more than 2.5 DE color change.

P. Cell Mirror: Mirror shall be Type 430 bright-annealed stainless steel. Mirror shall be wall mounted with pin-torx security screws. Manufactured by Willoughby Industries, Inc. Indianapolis, IN (800) 428-4065, Model number MR-2 (SM-1216-FA) or Acorn Engineering Co., City of Industry, CA, (800) 488-8999, Model number 1817.

Q. Combination Lavatory/Water Closet Unit: Manufactured by Willoughby Industries, Inc. Indianapolis, IN (800) 428-4065, Model number 1546 or 1545 (ADA Compliant) or Acorn Engineering Co., City of Industry, CA, (800) 488-8999, Model number 1415 or 1432 (ADA Compliant) combination stainless steel security type lavatory/water closet with the following features:

1. Fabricate from 14 gauge, type 304 stainless steel, seamless weld with exposed surfaces satin finished.

2. Water consumption: 1.6 gallons of water per flush.
3. Blowout type, concealed wall supply, off floor mounting, wall outlet.
4. Trap: Minimum 3 ½ inch seal, capable of passing a 2 1/8 inch ball.
5. Flush valve: (see Flush Valves).
6. Toilet flushing extension.
7. Multi sided lavatory bowl (12-3/4 inches by 8-1/4 inches by 5 inches deep).
8. Integral fast drain with elbow waste.
9. Chase mounted brass p-trap with cleanout.
10. Penal type filler/bubbler.
11. Pneumatic lavatory valve (see Lavatory Controls).
12. Toilet waste extension with 3 inches no-hub cleanout tee with PVC pinned plug, 3 inches no-hub coupling.
13. Recess tissue holder.
14. Cabinet interior with fire resistant, sound deadening material.
15. Wall sleeve: Minimum 20 gauge galvanized steel, with ½ inch diameter steel bars, extending into frame, and welded in place.
16. Toilet bowl protector.

R. Flush Valves shall be Regal Hydraulic flush valve model number 9603 manufactured by Sloan.

1. Control Mechanism: Diaphragm.
2. Flush valve assemblies: Flush valve, stop check, tailpiece and vacuum breaker.
3. Valve Materials:
   a. Valve body: Brass or bronze
   b. Valve Internal Parts: Corrosion resistant materials that will not be affected by the action of or contact with water.
4. Operating Features:
   a. Valve operators shall employ the non-hold open feature.
5. Push Button Valve Operators: Hydraulic type.

S. Lavatory Controls - Provide the following for each lavatory:

1. Metering valves: Construction type.
2. Body with integral check stops, and strainer: Brass or bronze.
3. Push buttons and strainer screen: Stainless Steel.
4. Pneumatic Housings: Thermoplastic.
5. Air and Water Feed Lines: FDA approved polyethylene tubing.
6. Valve cover for mounting valve on chase wall.
7. Operation: Pneumatic valve, hot and cold mixing, hand push button operation requiring less than 5 lbs. of force to actuate. Valve capable of remote mounting (up to 10 feet) from actuation push button.
   a. Timing Cycle: Adjustable from two seconds to over one minute delivering full flow during the entire cycle. Maximum flow: 0.5 gallons per minute
   b. All adjustments shall be concealed.

T. HVAC Grilles:

1. Face Plate: 11 gauge stainless steel - Mill finish, perforated with 5/16 inch holes on 7/16 inch staggered centers continuously welded to sleeve.
2. Sleeve: 10 Gage cold rolled steel formed with welded seams, length consistent with wall thickness. Nelson studs welded to sleeve on each of four sides of sleeve, 3 inches long by 3/8 inch diameter.
3. Auxiliary Sleeve: 14 gauge cold roll steel formed with welded or lapped seams. Auxiliary sleeves shall extend 1 inch beyond the back of the wall and inserted into primary sleeve, attached with bolts.

4. Damper: Opposed blade, constructed of steel, adjustable through face with removable key.
5. Finish: All steel surfaces primed with a coat of rust inhibiting prime coat. HVAC grills manufactured by Anemostat Products, Carson, CA, or equal.

U. Cell Light Fixtures:

1. Surface mount correctional light fixture with hinged door.
2. 12 inches by 48 inches, 14 Gauge cold rolled steel housing.
3. Three 4 foot long T8 fluorescent lamps located on one ballast.
4. Ballast to be 120 volt instant start electronic.
5. Inner lens to be 0.125 inch prismatic acrylic, outer lens (inmate side) to be 0.250 inch clear polycarbonate.
6. Torx security screws to be used at all locations accessible to inmate.
7. Fixture to have integral LED night light. Light fixture manufactured by Kenall, Gurnee, IL or equal.

V. Security Cover Plates: Cover plate should be made from 14 gauge cold rolled steel for maximum protection of devices. Devices when installed are recessed below surface of cover plate. Back plate should be made from galvanized 11 gauge steel with 1/4-20 threaded inserts installed. Fasteners should be standard stainless steel center-pin reject torx screws. Cover plates should be powder coated with a baked white polyester powder coating. Models WSP/WPP, manufactured by Kenall, Gurnee, IL or equal.

W. Electrical Conduit and Connectors:

1. Conduit shall be rigid schedule 40 PVC non-metallic conduit, 3/4 inch inside diameter, 1.050 inch outside diameter. Manufactured by Carlon part number 49007-010.
2. Couplings, adapters, fittings and preformed radius elbows shall be schedule 40 rigid PVC, as manufactured by Carlon.
3. Washers should be attached to each connector to prevent leakage of concrete. Washers shall be flat non-metallic 3/4 inch washers, part number Carlon E943EW.

X. Electrical Boxes - Electrical boxes should be stamped steel masonry boxes

1. Single gang box shall be a 2-1/2 inches deep by 3-3/4 inches high by 1-13/16 inch wide with concentric conduit knockouts.
2. Double gang box shall be 2-1/2 inches deep by 3-3/4 inches high by 3-5/8 inches wide with concentric conduit knockouts.
3. Intercom box shall be coordinated with security electronic contractor.
4. All electrical boxes to receive #12 stranded grounding pigtail wire.
5. All boxes to be sealed with caulk and tape to prevent leakage.

Y. Electrical Devices

1. Duplex Receptacle - 20 amp rated, 125 volt NEMA 5-20R device. Leviton part number 5362.
2. GFI Receptacle - 20 amps rated, 125 volt AC at receptacle and feed thru. Shall be a NEMA 5-20R configuration with indicator light. Leviton part number 7899.
3. Switch - 20 amps rated, 120/277 bolt back and side wired device. Part number is a Leviton 1221-2.

Z. Wire and Cable - Cell wiring shall be No 12 stranded THHN copper wire with insulation.

2.9 FABRICATION

A. Fabrication shall conform with PCI MNL-116. Maintain plant records and quality control program during production of precast members. Make records available upon request.

B. Ensure that all accessories, fixtures, and appurtenances shown to be cast-in are as specified and available prior to placing concrete.

C. Forms shall be of a permanent type, such as steel, that provide a smooth finished product utilizing permanent steel forms with non-tapering walls.

D. Surface Preparation: Forms shall be cleaned before each use.

E. Manufacturing Tolerances: Precast concrete modular units shall conform to the following:

1. Length, single cell or double cell +/- 3/8 in. (+/- 10mm).
2. Width, single cell +/- 1/4 in. (+/- 6mm).
3. Width, double cell +/- 1/2 in. (+/- 13mm).
4. Height and depth, +/- 1/4 in. (+/- 6mm).
5. Balcony width, single or double cell +/- 1/2 in. (+/- 13mm).
6. Wall thickness, + 1/4 inch, - 0 in. (+ 6 mm, 0 mm).
7. Plate recess, +1/4 in., -1/8 in. (+ 6 mm, - 3 mm).
8. Tipping of plates, +/- 1/8 in. (+/- 3 mm).
9. Location of embedments +/- 1/2 in. (+/- 13 mm).
10. Position of electrical boxes +/- 1 in. (+/- 25 mm).
11. Out of square of electrical boxes: Comply with PCI MNL 116.
12. Floor thickness, +/- 1/4 in. (+/- 6 mm).
13. Local smoothness, 1/4 in. per 10 ft. any surface (6mm per 3m).
14. Concrete cover on reinforcing, +/- 1/4 in. (+/- 6 mm).

F. Walls of precast concrete modular cell units will be vertical walls void of any tapering. Both faces of all walls to be straight and parallel with one another.

2.10 FINISHING

A. General: Component surfaces shall be formed as shown on the approved shop drawings. Bearing surfaces of all components shall be square, true and free from honeycomb.

B. Smooth Concrete Finish: Provide smooth surface finish free of form marks, pockets, sand streaks, and honeycomb, with uniform color and texture.

1. Interior face of units shall have a steel form finish as obtained with a well-designed mix and proper vibration. Small air pockets (1/4 inch) and pits will be acceptable. Chips and spalls which occur during transportation and erection shall be patched satisfactorily as far as conformity to original shape, texture, and structural adequacy.
2. Exterior face of modular units will be allowed to have small air pockets and pits. Chips and spalls, which occur during transportation and erection, shall be patched satisfactorily as far as conformity to original shape, texture and structural adequacy. The exterior finish shall be a form liner finish as specified by the Architect. Conform to PCI MNL 116 Appendix C.

C. Unacceptable Finish Conditions: The acceptability of the appearance shall be made in comparison with the approved mockup in good daylight conditions. The module and approved mockup should be viewed with the unaided eye at a distance of 20 feet or greater. Except as

specifically approved, or inherent in the design of the units, the following is a partial list of finish defects that will be properly repaired when visible at a 20 foot distance:

1. Ragged or irregular edges.
2. Excessive air pits and voids evident on exposed surface.
3. Adjacent flat and return surfaces with more than slight difference in exposure.
4. Casting lines evident from different placements.
5. Visible form joints or irregular surfaces greater than 1/16 of an inch.
6. Rust staining on surfaces.
7. Foreign material embedded in the face of the module unit.

PART 3 - EXECUTION

3.1 PREPARATION

A. The PCM shall provide a full-time job-site coordinator during all periods of precast erection. Coordinator shall attend a pre-construction conference with the major subcontractors, Construction Manager and Architect prior to start of erection.

B. Assure that all ancillary work required under other contracts are complete, and that required access to installation locations is assured for the full term of the work, prior to effecting delivery. Finished units may be stored on the project site.

C. Ensure that all lifting devices, used for placement of cell modules and precast wall panels, are as supplied by the manufacturer.

3.2 ERECTION

A. Comply with manufacturer's lifting diagrams. Erect members without damage to structural capacity, shape, or finish. Repair damaged members. Align and maintain uniform horizontal and vertical joints, as erection progresses.

B. Provide for full uniform transfer of loads in walls between cells and to foundation, using grout bed, properly designed pads, or other method as required by the design.

C. Secure units in place as required by the design, to resist vertical and lateral loads. Perform welding, in accordance with AWS D1.1. Protect finished surfaces from weld spatter.

D. Allow access for mechanical, plumbing and electrical subcontractors for utility connections and utility system testing.

3.3 FIELD QUALITY ASSURANCE

A. Erection Tolerances: Erect members level, plumb, and true within the following allowable tolerances:

1. Plan Location from Building Grid Datum: +/- 1/4 inch.
2. Support Elevation from Nominal Elevation:
   a. Maximum Low: 1/2 inch.
   b. Maximum High: 1/4 inch.
3. Plumb in any 10 Feet of Element Height: 1/4 inch.
4. Maximum Jog in Alignment of Matching Edges: 1/4 inch.
5. Joint Width (governs over joint taper): +/- 1/4 inch.

6. Joint Taper: Maximum 3/8 inch.
7. Joint Taper Over 10 Foot Length: 1/4 inch.

3.4 CLEANING

A. After completing installation, repair any damage and clean units as recommended by manufacturer.

END OF SECTION