



September 15th, 2023

ADDENDUM NO. 03



Bob Eley, PE
S. Ross Barkley, AIA, LEED AP
T. Doug Dale, AIA
Jeffrey R. Barnes, AIA, ASID
Leigh G. Jaunsen, AIA, LEED AP BD+C
Russ S. Blount, AIA, LEED AP
Jason M. Agostinelli, AIA

UMMC #209-576
MS CENTER FOR MEDICALLY FRAGILE CHILDREN
P.O. Box 1122
Jackson, MS 39215

NOTICE TO ALL DOCUMENT HOLDERS:

The following modifications and clarifications to the drawings and specifications are to be included as part of the Contract Documents. All items/questions up to and from the pre-bid conference not addressed in this Addendum will be addressed in future addenda.

ELEY|BARKLEY|DALE
Planning ▪ Architecture ▪ Interiors
265 N. Lamar Blvd.
Suite D
Oxford MS, 38655

p 662.234.2149 ▪ f 662.846.0948

306 3rd Street
P O Box 1196
Cleveland, MS 38732

p 662.846.0180 ▪ f 662.846.0948

One Jackson Place, Suite 250
188 East Capitol Street
Jackson, MS 39201-2100

p 601.352.5411 ▪ f 601.352.5362

161 Lameuse Street
Suite 201
Biloxi MS, 39530

p 228.374.1409 ▪ f 228.374.1414

ebdarch.com

GENERAL ITEMS

ITEM NO. 01 ELECTRONIC BID SUBMISSION

CLARIFICATION: Electronic bids may be submitted at http://www.ms.gov/dfa/contract_bid_search ; Please reference RFx # 3160006084

ITEM NO. 02 CONSTRUCTION TIME

CLARIFICATION: GC to provide amount of time required to complete the Work as shown on the Bid Form.

ITEM NO. 03 EMERGENCY GENERATORS

CLARIFICATION: Owner to provide Emergency Generators, Fuel , Testing & Start Up of generators.

ITEM NO. 04 PROJECT MGMT SOFTWARE

CLARIFICATION: GC Provide the architect (2) and owner (1) with access to licenses for either Procore, Submittal Exchange, or Autodesk Construction Connect construction project management software.

ITEM NO. 05 EQUIPMENT BLOCKING

CLARIFICATION: GC to provide in-wall blocking for all wall and ceiling mounted equipment and fixtures listed on sheet A-800 and shown throughout interior elevations and equipment reference plans.

ITEM NO. 06 CLOSED-CELL SPRAY FOAM INSULATION

CLARIFICATION: Remove all references to closed-cell spray foam insulation from drawings & specifications in their entirety. Crawlspace to be "Semiheated" requiring no floor insulation above.

ITEM NO. 07 FIBER CEMENT FURRING

CLARIFICATION: Remove references to vertical treated wood and metal z-furring at exterior fiber cement-clad walls. Provide composite framing support as listed in specification section 074646; Part 2.3 – Continuous Insulation System and modified herein.

ITEM NO. 08 WEATHER BARRIER

CLARIFICATION: Continuous weather barrier at all exterior walls to be Fluid-applied membrane air barrier equal to Perm-A-Barrier VPS 50RS UV Stable manufactured by GCP Applied Technologies. Include associated liquid-applied flashings around wall openings & penetrations. Remove any references to commercial building wrap and accessories. Refer to attached specification section.

ITEM NO. 09 VINYL WINDOW EXTERIOR FINISH

CLARIFICATION: Exterior clad window color by Marvin, as an "or equal" substitute to Andersen windows to be "Stone White".

ITEM NO. 10 ABUSE RESISTANT XP GYPSUM WALL BOARD

CLARIFICATION: Gypsum Wall board located in Bedrooms, Corridors, Day Rooms, Exam, Wash, Family Lounge, Dining to be Abuse-Resistant type.

SPECIFICATIONS

ITEM NO. 11 SPEC SECTION 004200 – BID PROPOSAL FORM

REPLACE: Section in its entirety with attached revised form. Added Temporary Casing sizes, Additional Spoils & Select Fill Unit Costs to Bid Form.

ITEM NO. 12 SPEC SECTION 012100 – CASH ALLOWNACES

REPLACE: Section in its entirety with attached revised section. Added Allowances for Electrical, water & sewer utility connections to 1.6 Schedule of Allowances.

ITEM NO. 13 SPEC SECTION 02830 – CHAIN LINK FENCING AND GATES

ADD: Section in its entirety. Chain link fence to be included as part of Alternate #1.

ITEM NO. 14 SPEC SECTION 072726 – FLUID-APPLIED MEMBRANE AIR BARRIERS

ADD: Section in its entirety.

ITEM NO. 15 SPEC SECTION 074646 – FIBER CEMENT SIDING – 2.3 CONTINUOUS INSULATION SYSTEM

REVISE: B. Composite Framing Support note b. to read: *“1-1/2” deep girt installed vertically and attached through the wall sheathing at each exterior steel stud. Attachment to comply with design pressures noted on the Structural Drawings.*”

ITEM NO. 16 SPEC SECTION 074646 – FIBER CEMENT SIDING – 2.3 CONTINUOUS INSULATION SYSTEM

REVISE: C. Insulation note 1. to read: *“1. Manuf/ Product: Foamular NGX Insulating Sheathing by Owens Corning”*

REVISE: note a. to read *“Insulation: 1-1/2” thick Extrude Polystyrene (XPS) Rigid foam insulation with Laminated film on both sides for added strength”*

**ITEM NO. 17 SPEC SECTION 092216 – NON-STRUCTURAL METAL FRAMING
2.2 – B. STUDS AND TRACKS – 2. MIN BASE THICKNESS**

REVISE: Line “0.0296 inch” to read *“0.0296 inch or 20 ga EQ”*.

ITEM NO. 18 SPEC SECTION 101423.16 – ROOM-IDENTIFICATION PANEL SIGNAGE

REMOVE: Section in its entirety. Scope will be Owner-Provided.

ITEM NO. 19 SPEC SECTION 122413 – ROLLER WINDOW SHADES

REPLACE: Section in its entirety with attached revised section.

ITEM NO. 20 SPEC SECTION 260100 – BASIC ELECTRICAL REQUIREMENTS

REPLACE: Section in its entirety with attached revised section. Added Paragraph 1.02.K “Utility Companies Coordination and Fees”.

ITEM NO. 21 SPEC SECTION 271500 – COMMUNICATIONS HORIZONTAL CABLING – 1.05 A

ADD: Line *“3. The cabling contractor must be Siemens certified”*.

ITEM NO. 22 APPENDIX – DIS CABLING STANDARD V.8

ADD: Document to Specifications Appendix as a reference.

DRAWINGS

ITEM NO. 23 SHEETS C4.2 – CRAWLSPACE & FOUNDATION DRAINAGE PLAN

REPLACE: Sheet in its entirety with attached sheet C-4.2. Revised foundation drain perforated pipe to 6”.

ITEM NO. 24 SHEETS A-001 – ARCHITECTURAL SITE PLAN

REPLACE: Sheet in its entirety with attached sheet A-001. Added Dtl. 9 “Monument Sign Elevation”.

ITEM NO. 25 SHEETS A-111 – FLOOR PLAN - ANNOTATED

ADD: Note “Floor Door” to Maintenance Room #33. Final opening placement to be coordinated with precast hollow-core plank structure prior to fabrication and installation.

ITEM NO. 26 SHEETS A-141 – REFLECTED CEILING PLAN

REVISE: Note at puck soffit vents to read as follows; “*Fiber cement soffit panel w/ integral vents, typical*”.

ITEM NO. 27 SHEETS A-401 THRU A-405 - GENERAL INTERIOR ELEVATION NOTES LEGEND; NOTE 6

REVISE: Note 6 to read “*RS2 Roller Shades to be installed at resident room windows. RS1 Single Roller Shades to be installed at all other exterior windows*”.

ITEM NO. 28 SHEET A-522 – MISC DETAILS

ADD: Sheet in its entirety with attached sheet A-522. Added Dtl. 1 “Typical Board & Batten Wall Assembly Details”, Dtl. 2 “Typical Gyp. Bd. Ceiling Detail”. Added Dtl. 3 “Plaque Detail” & Dtl. 4 “Resident Millwork – Open Cubby”.

ITEM NO. 29 SHEETS A-801 – EQUIPMENT PLAN (FOR REFERENCE ONLY)

REPLACE: Sheet in its entirety with attached sheet A-801. Clarified RS1 & RS2 locations.

ITEM NO. 30 SHEET M-201 – MECHANICAL SCHEDULES - SELF-CONTAINED PACKAGED UNIT SCHEDULE

REVISE: note #15 under Features/Accessories to read as follows: “*Variable speed compressors shall be capable of modulation from 25 Hz to 100 Hz. The minimum unit capacity shall be 15% of full load or less.*”

ITEM NO. 31 SHEET E-003 – ELECTRICAL DETAILS; DTL 2

REMOVE: Detail 2 “Flood Light Detail – Flag Pole” in its entirety.

ITEM NO. 32 SHEET E-201 – LIGHTING PLAN

REPLACE: Sheet in its entirety with attached sheet E-201R. Added switching for all bedroom lighting. Added homerun circuits for all bedroom “normal power” lighting.

ITEM NO. 33 SHEET E-501 – LIGHTING PLAN

REPLACE: Sheet in its entirety with attached sheet E-501R. Added lighting circuits in Panel “NPI1”.

Q & A

ITEM NO. 34

QUESTION: On detail sheet E-003. There is a flood light mounting detail for flag pole fixture, but there is no information on the E-000 luminaire schedule or E-101 location. Can you provide clarification?

RESPONSE: The flag pole has been removed as part of VE, therefore there will be no flood light at the flag pole for this project. This detail will be removed from the plans.

ITEM NO. 35

QUESTION: On site plan sheet E-101. There is a 4-inch conduit running underneath the current roadway that links to the MDF at the IHL building for fiber. However, this conduit is not indicated on the existing conditions and demolition plan C-2.0, unlike other utilities. Could you confirm if this conduit exists?

RESPONSE: This information was provided by UMMC Ownership Group. Contractor shall include all related work in bids as noted on drawings, assuming conduit exists as noted.

ITEM NO. 36

QUESTION: On site plan sheet E-101 and detail sheet E-001. There are (4) 4-inch PVC conduits displayed to supply primary power to the utility transformer. These conduits are only shown at the end of the main circle roadway. According to Entergy engineer, there is an Entergy pull box located near the library signage. Entergy also suggested possibly installing a switch cabinet at the pull box location to provide power to the new building’s transformer. Please advise if this is where these (4) 4-inch PVC primary conduits should be run.

RESPONSE: Contractor shall include installation of all 4” conduits stubbed out as shown on plans. Additional wiring and raceways for the electrical service and any electrical utility equipment shall be provided by the utility company under an allowance.

QUESTION: In Specification Section 26 05 43, 1.02 B. When preparing bids, the electrical contractor must account for all fees charged by the utility company for setting up service. The exact cost cannot be determined during the bidding process. Please include an allowance for this expense.

RESPONSE: Refer to Specification revisions included in this addendum.

NO MORE ITEMS

Encl: C-4.2, A-001, A-522, A-801, E-201R, E-501R (24x36), Section 004200 (2 pages 8.5x11), Section 012100 (2 pages 8.5x11), Section 02830 (6 pages 8.5x11), Section 072726 (5 pages 8.5x11), Section 122413 (7 pages 8.5x11), Section 260100 (9 pages 8.5x11), DIS Cabling Standards (31 pages 8.5x11)

Cc: All Document Holders

BID PROPOSAL FORM

Date: _____

Proposal From: _____
(Bidder)

Facilities Services
The University of Mississippi Medical Center
2500 North State Street
Jackson, Mississippi 39216-4505

RE: Bid File # _____

To whom it may concern:

Having carefully examined the Contract Documents and all addenda for the referenced Project, as well as the premises and conditions affecting the work, I, the undersigned, propose to furnish all labor, materials, and services required by the Contract Documents in accordance with the conditions of said Contract Documents for the sums set forth below:

BASE BID:
_____ (\$ _____).

ALTERNATE #1:
_____ (\$ _____).

UNIT COSTS: **DRILLED PIER LENGTH:** **TEMPORARY CASING:**
ADD \$_____/LF ADD \$_____/LF (24")
DEDUCT \$_____/LF ADD \$_____/LF (18")

 ADDN'L SPOILS REMOVAL: **ADDN'L SELECT FILL:**
ADD \$_____/CUYD ADD \$_____/CUYD

I (We) agree to hold our bid open for acceptance for sixty (60) calendar days from the date of bid opening.

If awarded this Contract, I, (We), agree to execute a Contract and start Work on a date to be set in a Notice to Proceed and to complete the entire work in _____ days, subject to the terms and conditions of the Contract.

As required by Section 002113-1.6, "Bid Security", Bid Security in the form of a _____ is attached hereto in the amount of _____ and shall become the property of the Owner in the event the Agreement and required Bonds are not executed within the time set forth herein before as liquidated damages for the delay and additional expense to the Owner caused thereby.

ADDENDUM RECEIPT: The receipt of the following Addenda to the Bidding Documents is hereby acknowledged:

Addendum No. _____ dated _____
Addendum No. _____ dated _____
Addendum No. _____ dated _____

Our Corporation is chartered under the laws of the State of _____, and the names, titles and business addresses of the principal officers are as follows (non-residents Bidders see Section 002113, Paragraph 1.5):

Name: _____ Title: _____

Address: _____

Name: _____ Title: _____

Address: _____

Name: _____ Title: _____

Address: _____

(TO BE FILLED IN IF A PARTNERSHIP)

Our Partnership is composed of the following individuals:

Name: _____ Title: _____

Address: _____

Name: _____ Title: _____

Address: _____

Name: _____ Title: _____

Address: _____

Notice of acceptance of our bid may be mailed, telegraphed or delivered to:

SIGNED: _____

BY: _____

TITLE: _____

CERTIFICATE OF RESPONSIBILITY NO.: _____
(TO BE FILLED IN IF A CORPORATION)

SECTION 012100
CASH ALLOWANCES

1 PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Costs Included in Allowances.
- B. Contractor Costs Included in Contract Sums.
- C. Architect Responsibilities.
- D. Contractor Responsibilities.
- E. Schedule of Allowances.

1.2 COSTS INCLUDED IN ALLOWANCES

- A. Cost of product to Contractor or subcontractors, less applicable trade discounts.
- B. Delivery to site.
- C. Labor required under allowance, only when labor is specified to be included.
- D. Applicable taxes.

1.3 CONTRACTOR COSTS INCLUDED IN CONTRACT SUM

- A. Products handling at site, including unloading, uncrating, inspection for damage and storage.
- B. Protection of products from elements and from damage.
- C. Labor for installation and finishing, except when installation is specified as part of allowance.
- D. Other expenses required to complete installation.
- E. Contractor overhead and profit.

1.4 ARCHITECT RESPONSIBILITIES

- A. Consult with Contractor in consideration of products, suppliers, and installers.
- B. Select products, obtain Owner's written decision, and transmit full information to Contractor.
- C. Obtain proposals when requested.

1.5 CONTRACTOR RESPONSIBILITIES

- A. Assist Architect in determining suppliers and installer
- B. Make recommendations for Architect consideration.
- C. On notification of selection execute purchase agreement with designated supplier and installer.

- D. Arrange for and process shop drawings, product data, and samples.
- E. Install, adjust, and finish products as may be required.

1.6 SCHEDULE OF ALLOWANCES

\$200,000 - Include in the Bid, for inclusion in the Contract Sum, the amount (lump sum) of \$200,000.00 (Two Hundred Thousand Dollars) to procure the DDC Building Controls System for this project. The DDC Building Controls System is described in Specification Section 230980 "Controls and Instrumentation" illustrated on Division 23 drawings. This allowance is to be carried by the MECHANICAL contractor.

\$20,000 - Include in the Bid, for inclusion in the Contract Sum, the amount (lump sum) of \$20,000.00 (Twenty Thousand Dollars) to procure site electrical connection with local utility company. This allowance is to be carried by the ELECTRICAL contractor.

\$40,000 - Include in the Bid, for inclusion in the Contract Sum, the amount (lump sum) of \$40,000.00 (Forty Thousand Dollars) to procure site water and sewer connection with local utility provider. This allowance is to be carried by the MECHANICAL contractor.

END OF SECTION

SECTION 02830

CHAIN LINK FENCING AND GATES

PART 1. GENERAL

1.1 SCOPE OF WORK: The work covered by this Section shall consist of furnishing all plant, labor, equipment, material, and performing all operations in connection with erecting the fencing, gate assemblies and appurtenances as detailed on the Drawings or specified herein.

1.2 RELATED SECTIONS:

None.

1.3 DEFINITIONS:

- A. Type I: Type I Fencing is defined as chain link fencing with a barbed wire arm affixed to the top of each post and fitted with three (3) strands of barbed wire.
- B. Type II: Type II Fencing is defined as chain link fencing without barbed wire but with each post fitted with a metal cap.
- C. Fence Height: The height specified on the Drawings or in the Contract Documents shall mean the height of the chain link fabric. If Type I fencing is specified, then the height of the barbed wire supporting arm and strands shall be in addition to the specified height of the fence.

1.4 QUALITY ASSURANCE

- A. Erector Qualifications: Erector must be a firm experienced in the erection of fencing of the type specified and approved by the manufacturer.
- B. Design Criteria: Comply with the standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric" and Federal Specification RR-F-191/1A, unless otherwise shown or specified.
- C. Source Quality Control: Provide each type of fence and gate as a complete unit produced by a single manufacturer, including necessary erection accessories, fittings and fastenings.
- D. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:
 - 1. ASTM A 120, Specification for Blank and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe of Ordinary Uses.
 - 2. ASTM A 153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 3. ASTM C 94, Ready-Mixed Concrete.
 - 4. ASTM F 552, Standard Definitions of Terms Relating to Chain Link Fencing.

5. Chain Link Fence Manufacturers Institute, Galvanized Steel Chain-Link Fence Fabric.
6. Chain Link Fence Manufacturers Institute, Standard Guide for Polyvinyl Chloride (PVC)-Coated Steel Chain Link Fence Fabric.
7. Federal Specification, RR-F-191/1A, Fencing, Wire and Post, Metal (Chain-Link Fence Fabric).

1.5 SUBMITTALS

- A. Samples: When requested, submit for approval, samples approximately 6 inches long, or 6 inch square of fabric material, framework members, and typical accessories. ENGINEER'S review will be for color and texture only. Compliance with all other requirements is the exclusive responsibility of CONTRACTOR.
- B. Shop Drawings:
 1. Submit for approval Shop Drawings for fences and gates, including plan layout and details illustrating fence height, location and sizes of posts, rails, braces, gates, and footings, hardware list and erection procedures.
 2. Submit for approval copies of manufacturer's technical data test reports on physical properties, and installation instructions for steel fences and gates.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Deliver material in manufacturer's original packaging with all tags and labels intact and legible.
- B. Handling of Materials: Handle and store material in such manner as to avoid damage.

PART 2. MATERIALS

2.1 GENERAL

- A. Pipe sizes specified are commercial pipe sizes.
- B. Tube sizes specified are nominal outside dimension.
- C. Roll-formed section sizes are the nominal outside dimensions.
- D. Finish for Framework and Appurtenances: Furnish the following finishes for steel framework and appurtenances:
 1. Galvanized finish with minimum weights of zinc as follows:
 - (a) Pipe: ASTM A 120, Schedule 40, 1.8 ounce zinc per square foot.
 - (b) Hardware and Accessories: ASTM A 153 zinc weight per Table I, Federal Specification RR-F-191/1A.

2.2 FABRIC

- A. Furnish chain link fabric as follows:
1. One-piece fabric widths constructed of No. 9 gage wires.
 2. 2-inch mesh.
 3. Top and bottom selvages twisted and barbed.
 4. Galvanized finish with not less than .30 ounces zinc per square foot complying with ASTM A 392.
 5. Fabric Height: As shown on Drawings or specified in the Contract Documents.

2.3 POSTS, RAILS AND BRACES

- A. End, Corner, and Pull Posts: Furnish end, corner, and pull posts of the minimum sizes and weights as follows;
1. Up to 8 feet fabric height: 2.875 inches O.D. pipe weighing 4.64 or greater pounds per linear foot.
- B. Line Posts: Furnish line posts of the minimum sizes and weights as follows: Space posts 10 feet on centers maximum, unless otherwise shown.
1. Up to 8 feet fabric height: 2.375 inches O.D. pipe weighing 3.11 or greater pounds per linear foot.
- C. Gate Posts: Furnish gate posts for supporting each leaf of the double gate installation as follows: for gates equal to or greater than six (6) feet in width, use 4.000 inch O.D. pipe weighing 6.56 or greater pounds per linear foot. For gates less than six (6) feet in width, use 2.875 inch O.D. pipe weighing 4.64 or greater pounds per linear foot.
- D. Top Rail: Furnish top rails, unless otherwise shown, of the following:
1. 1.660 inch O.D. pipe weighing 1.85 pounds per linear foot.
 2. Furnish in manufacturer's longest lengths, with expansion type couplings, approximately 6 inches long, for each joint. Provide means for attaching the top rail securely to each gate, corner, pull, and end post.
- E. Tension Wire: Furnish tension wire consisting of galvanized 7 gage coiled spring wire. Locate at bottom of fabric only.
- F. Barbed Wire Supporting Arms: Furnish pressed steel, wrought iron, or malleable iron barbed wire supporting arms, complete with provisions for anchorage to posts attaching 3 rows of barbed wire to each arm. Supporting arms shall be integral with post top weather cap. Provide single 45 degree arm, one for each post where shown.
- G. Barbed Wire: 3 strand, 11 gage wire with 14 gage, 4-point aluminum alloy barbs spaced 5 inches on center galvanized per manufacturer's standards.

- H. Post Tops: Pressed steel, wrought iron, or malleable iron, designed as a weathertight closure cap, for tubular posts. Furnish one cap for each post unless equal protection is afforded by combination post top cap and barbed wire supporting arm, where barbed wire is required. Furnish caps with openings to permit through passage of the top rail.
- I. Stretcher Bars: One piece lengths equal to full height of fabric, with a minimum cross-section of $\frac{3}{16}$ inch by $\frac{3}{4}$ inch. Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into the post.
- J. Stretcher Bar Bands: Steel, wrought iron or malleable iron, spaced not over 15 inches on center to secure stretcher bars to end, corner, pull, and gate posts. Bands may also be used with special fittings for securing rails to end, corner, pull and gate posts.

2.4 GATES

- A. Fabricate gate perimeter frames of tubular members. Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories. Space so that frame members are not more than 8 feet apart. Fabricate as follows:
 - 1. 1.90 inch O.D pipe weighing 2.25 pounds per linear foot.
- B. Assemble gate frames by butt welding for rigid connections. Use same fabric as for fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to gate frame at not more than 15 inches on center. Attach hardware with rivets or by other means which will provide security against removal or breakage.
- C. Install diagonal cross-bracing consisting of $\frac{3}{8}$ inch diameter adjustable length truss rods on gates where necessary to ensure frame rigidity without sag or twist.
 - 1. Where barbed wire is shown above gates, extend the end members of gate frames 1 foot-0 inch above the top member and prepare to receive 3 strands of wire. Provide necessary clips for securing wire to extensions.
- D. Gate Hardware: Furnish the following hardware and accessories for each gate.
 - 1. Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180 degrees gate opening. Provide 1½ pair of hinges of reach leaf over 6 feet nominal height.
 - 2. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
 - 3. Keeper: Provide keeper of all vehicle gates, which automatically engages the gate leaf and holds it in the open position until manually released.
 - 4. Double Gates: Provide gate stops for double gates, consisting of mushroom type or flush plate with anchors. Set in concrete to engage the center drop rod or plunger bar. Include locking device and padlock eyes as an integral part of the latch, using one padlock for locking both gate leaves.

2.5 MISCELLANEOUS MATERIALS AND ACCESSORIES:

- A. Wire Ties: For tying fabric to line posts, use 9-gage wire ties spaced 12 inches on center. For tying fabric to rails and braces, use 9 gage wire ties spaced 24 inches on center. For tying fabric to tension wire, use 11 gage hog rings spaced 24 inches on center. Finish of ties to match fabric finish.
 - 1. Manufacturer's standard procedure will be accepted if of equal strength and durability.
- B. Concrete: Refer to ASTM C 94, Ready-Mixed Concrete.

PART 3. CONSTRUCTION REQUIREMENTS

- 3.1 INSPECTION: CONTRACTOR and his installer must examine the conditions under which the fence and gates are to be installed and notify the ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the ENGINEER.
- 3.2 PREPARATION: Do not begin fence installation and erection before the final grading is completed, with finish elevations established.
- 3.3 INSTALLATION
 - A. Excavation: Drill holes of diameters and spacings shown, for post footings in firm, undisturbed or compacted soil.
 - 1. If not shown on the Drawings, excavate holes to the minimum diameters as recommended by fence manufacturer.
 - 2. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than the post bottom with bottom of posts set not less than 36 inches below the surface when in firm, undisturbed soil.
 - a. Spread soil from excavations uniformly adjacent to the fence line, or on adjacent areas of the site, as directed.
 - B. Setting Posts: Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.
 - 1. Center and align posts in holes 3 inches above bottom of excavation.
 - 2. Place concrete around posts in a continuous pour, and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
 - 3. Trowel finish tops of footings, and slope or dome to direct water away from posts. Extend footings for gate posts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.

- C. Concrete Strength: Allow concrete to attain at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than 7 days after placement, before rails, tension wires, barbed wire, or fabric is installed. Do not stretch and tension fabric and wires, and do not hang gates until the concrete has attained its full design strength.
- D. Top Rails: Run rail continuously through post caps or extension arms. Provide expansion couplings as recommended by fencing manufacturer.
- E. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.
- F. Tension Wire: Install tension wires at bottom of fencing by weaving through the fabric and tying each post with not less than 6-gauge galvanized wire, or by securing the wire to the fabric.
- G. Fabric: Leave approximately 2 inches between finish grade and bottom selvage, except where bottom of fabric extends into concrete. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.
- H. Stretcher Bars: Thread through or clamp to fabric 4 inches on center, and secure to posts with metal bands spaced 15 inches on center.
- I. Barbed Wire: Install 3 parallel wires on each extension arm; on security side of fence, unless otherwise indicated. Pull wire taut and fasten securely to each extension arm.
- J. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.
- K. Tie Wires: Use U-shaped wires conforming to diameter of pipe. Clasp pipe and fabric firmly with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.
- L. Fasteners: Install nuts for tension band and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.4 ADJUSTMENT AND CLEANING

- A. Adjust all fencing and gates and leave in good working condition.
- B. Repair or replace any broken or bent components as directed by the Engineer.
- C. Protect gates and fencing from construction traffic until acceptance of the Work.
- D. Repair coatings damaged in the shop or during field erection by recoating with manufacturer's recommended repair compound, applied per manufacturer's direction.

END OF SECTION 02830

SECTION 072726

Fluid-Applied Membrane Air Barriers, Vapor Permeable

PART 1 — GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:

1. Materials and installation methods for fluid-applied, vapor permeable air barrier membrane system located in the non-accessible part of the wall.
2. Materials and installation methods to bridge and seal air leakage pathways in roof and foundation junctions, window and door openings, control and expansion joints, masonry ties, piping and other penetrations through the wall assembly.

- B. Related Sections include the following:

1. Section 03300 – Cast-In-Place Concrete
2. Section 04810 – Unit Masonry Assemblies
3. Section 06161 - Gypsum Sheathing
4. Section 07115 – Bituminous Dampproofing
5. Section 07131 – Self-Adhering Sheet Waterproofing
6. Section 07530 – Elastomeric Membrane Roofing
7. Section 07620 – Sheet Metal Flashing and Trim
8. Section 07920 – Joint Sealants

1.03 DEFINITIONS

- A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. The building envelope shall be designed and constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:
1. It must be continuous, with all joints made airtight.
 2. It shall have an air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 1.57 psf (equal to 0.02L/s/sq. m @ 75 Pa), when tested in accordance with ASTM E2178.
 3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
 4. It shall be durable or maintainable.
 5. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.
 6. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
 - a. Foundation and walls.
 - b. Walls and windows or doors.
 - c. Different wall systems.
 - d. Wall and roof.
 - e. Wall and roof over unconditioned space.
 - f. Walls, floor and roof across construction, control and expansion joints.

- g. Walls, floors and roof to utility, pipe and duct penetrations.

1.05 REFERENCES

- A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated.
- B. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components
- C. American Society for Testing and Materials (ASTM)
 - 1. ASTM D412 Standard Test Methods for Rubber Properties in Tension
 - 2. ASTM D1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - 3. ASTM E96 Test Methods for Water Vapor Transmission of Materials
 - 4. ASTM E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 - 5. ASTM D4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - 6. ASTM E1186 Standard Practice for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems
 - 7. ASTM E2178 Standard Test Method for Air Permeance of Building Materials
 - 8. ASTM E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

1.06 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
- B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 1. Include details of interfaces with other materials that form part of air barrier.
 - 2. Include details of mockups.
- C. Samples: Submit representative samples of the Air Barrier Membrane for approval.
- D. Qualification Data: For Applicator.
- E. Warranty: Submit a sample warranty.

1.07 QUALITY ASSURANCE

- A. Manufacturer: Air barrier materials shall be manufactured and marketed by a firm with a minimum of 20 years of experience in the production and sales of waterproofing and air barriers. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.
- B. Source Limitations: Obtain primary air-barrier material and air barrier assembly materials from a single manufacturer. Should project require a vapor impermeable and a vapor permeable air barrier on same project, obtain vapor-impermeable and vapor permeable air barrier from a single manufacturer.
- C. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this project, whose work has resulted in applications with a record of successful in-service performance.
- D. Mockups: Before beginning installation of air barrier, provide air barrier work for exterior wall assembly mockups, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.
 - 1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
 - 2. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
- E. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Preinstallation conference shall include the Contractor, Air Barrier Applicator, Architect, and air barrier manufacturer's representative. Agenda for meeting shall include but not be limited to the following:
 - 1. Review of submittals.
 - 2. Review of surface preparation, minimum curing period and installation procedures.
 - 3. Review of special details and flashings.
 - 4. Sequence of construction, responsibilities and schedule for subsequent operations.
 - 5. Review of mock-up requirements.
 - 6. Review of inspection, testing, protection and repair procedures.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
- B. Do not double-stack pallets of fluid applied components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
- C. Sequence deliveries to avoid delays, but minimize on-site storage.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a wet substrate or during snow, rain, fog, or mist.

1.10 WARRANTY

- A. Material Warranty: Provide written 5 year material warranty issued by the air barrier manufacturer upon successful completion of the work.

PART 2 — PRODUCTS

2.01 FLUID-APPLIED AIR BARRIER MEMBRANE

- A. Perm-A-Barrier VPL 50RS UV Stable manufactured by GCP Applied Technologies www.gcpat.com; a STPE fluid-applied, UV stable, air barrier membrane with early wash-off resistance. Product shall have the following minimum physical properties:
 1. Air Permeance: ASTM E2178: Not to exceed 0.004 cfm/sq. ft. under a pressure differential of 1.57 psf (equal to 0.02L/s/sq. m @ 75 Pa)
 2. Assembly Air Permeance: ASTM E2357: Not to exceed 0.04 cfm/sq.ft. under a pressure differential of 1.57 psf (equal to 0.2 L/s/sq. m @ 75 Pa)
 3. Water Vapor Permeance: ASTM E96, Method B: 13 perms at 20 mils
 4. Pull Adhesion: ASTM D4541: Min. 30 pli, or substrate failure
 5. Elongation: ASTM D412 – Die C: Min. 250%
 6. Pliability, Low Temperature Flexibility: ASTM D1970: Pass at -40F (-40C)
 7. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly

2.02 TRANSITION MEMBRANE AND FLEXIBLE MEMBRANE WALL FLASHING

- A. TRANSITION MEMBRANE: Perm-A-Barrier NPS Detail Membrane; a self-adhered membrane that does not require a primer fabricated in various widths for detail areas conforming with the following:
 1. Puncture Resistance: ASTM E154: Min. 40 lbs. (178 N)
 2. Pliability, Low Temperature Flexibility ASTM D1970: Pass at -20F (-29C)
 3. Tensile Strength: ASTM D412: Min. 400 psi (2.8 MPa)
 4. Elongation: ASTM D412: Min. 200%
- B. FLEXIBLE MEMBRANE WALL FLASHING: Perm-A-Barrier Wall Flashing; a 32 mil (0.8 mm) of self-adhesive rubberized asphalt integrally bonded to 8 mil (0.2 mm) of cross-laminated, high-density polyethylene film to provide a min. 40 mil (1.0 mm) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following:
 1. Puncture Resistance: ASTM E154: Min. 80 lbs.(356 N)
 2. Pliability, Low Temperature Flexibility: ASTM D1970: Pass at -45F (-43C)
 3. Tensile Strength: ASTM D412, Die C Modified: Min. 1,200 psi (8.3 MPa)
 4. Elongation: ASTM D412, Die C: Min. 200%

2.03 PENETRATIONS & TERMINATION SEALANT

- A. Sealant and Liquid Flashing for Terminations and Flashing of Rough Openings: Perm-A-Barrier Universal Flashing & Sealant; a single component sealant.
- B. Liquid Membrane for Details, Terminations and Substrate Preparation: Bituthene Liquid Membrane; a two-part, elastomeric, trowel grade material.

PART 3 — EXECUTION

3.01 EXAMINATION

- A. Verify that substrates and conditions are ready to accept the Work of this section. Notify authority having jurisdiction in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

3.02 SURFACE PREPARATION

- A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone, debris and any material that may interfere with proper adhesion of the air barrier to the substrate. Use repair materials and methods that are acceptable to manufacturer of the air barrier assembly.
- B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws in accordance with exterior sheathing manufacturers written instructions.
- C. Masonry Substrates: Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat. Mortar joints shall be struck full and flush with the surface of the masonry substrate to receive air barrier.
- D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- E. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with a lean mortar mix, non-shrinking grout or parge coat.
- F. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- G. At changes in substrate plane, apply a sealant acceptable to the air barrier manufacturer or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.
- H. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- I. Mask off adjoining surfaces not to receive air barrier to prevent spillage and overspray.

3.03 AIR BARRIER MEMBRANE INSTALLATION

- A. Refer to manufacturer's literature for installation instructions.
- B. Apply air barrier membrane to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- C. Install air barrier to dry surfaces at air and surface temperatures in accordance with manufacturer's recommendations, at locations indicated on Construction Documents.
- D. Fill joints in exterior sheathing prior to application of field membrane in accordance with manufacturer's instructions.
- E. Coordinate the installation of air barrier with roof installer to ensure continuity of membrane with roof air barrier.
- F. Do not expose air barrier membrane to sunlight beyond limits reported in manufacturer's literature prior to enclosure.
- G. Inspect installation prior to enclosing and repair punctures, voids, deficient lapped seams and damaged areas in membrane in accordance with manufacturer's instructions.

3.04 TRANSITION MEMBRANE INSTALLATION

- A. Install membrane according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
- B. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of membrane to substrate with termination sealant.
- D. Wall Openings: Perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition membrane so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates.
- E. Roll membrane with roller immediately after placement.
- F. Inspect installation prior to enclosing and repair punctures, voids, deficient lapped seams and damaged areas in membrane. Slit and flatten fish-mouths and blisters. Patch with membrane sized to extend 6 in. (150 mm) beyond the area to be patched in all directions.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of air barrier system has been provided.
 - 3. Substrates are smooth, clean, free of cavities, protrusions, and in accordance with air barrier manufacturer's requirements.
 - 4. Site conditions for application temperature and dryness of substrates have been maintained.

5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 6. Laps in membrane have complied with minimum requirements and have been shingled in the correct direction, or termination sealant has been applied on exposed edges, with no fish-mouths.
 7. Termination sealant has been applied on cut edges.
 8. Membrane has been firmly adhered to substrate.
 9. Compatible materials have been used.
 10. Transitions at changes in direction and structural support at gaps have been provided.
 11. Connections between assemblies have complied with requirements for cleanliness, preparation of surfaces, structural support, integrity, and continuity of seal.
 12. All penetrations have been sealed.
- C. Tests: Testing to be performed will be determined by Owner's testing agency. Air barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, smoke pencil with pressurization or depressurization.
- D. Remove and replace deficient air barrier components and retest as specified above.

3.06 CLEANING AND PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier that has been exposed to UV light beyond limits reported in manufacturer's literature.
- C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Remove masking materials after installation.

End of Section

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Manually operated roller shades with rollers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
- C. Strike Off Approval: A strike off approval is required on the printed roller shade before production.
- D. Samples: For each exposed product and for each color and texture specified, 10 inches long.
- E. Samples for Initial Selection: For each type and color of shadeband material.
 - 1. Include Samples of accessories involving color selection.
- F. Samples for Verification: For each type of roller shade.
 - 1. Shadeband Material: Not less than 10 inches square. Mark interior face of material if applicable.
 - 2. Roller Shade: Full-size operating unit, not less than 16 inches wide by 36 inches long for each type of roller shade indicated.
 - 3. Installation Accessories: Full-size unit, not less than 10 inches long.
- G. Product Schedule: For roller shades.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

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- B. Product Certificates: For each type of shadeband material.
 - C. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency .
- 1.5 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.
- 1.6 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: Fabricator of products.
 - B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.
- 1.9 FIELD CONDITIONS
- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS (RS-1)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Hunter Douglas; Manual Clutch-Operated RB 500+ or a comparable product by one of the following:

1. Draper Inc.
2. Lutron Electronics Co., Inc.
3. MechoShade Systems, Inc.

- B. Chain-and-Clutch Operating Mechanisms: Complying with ANSI/WCMA A100.1, The Standard for Safety of Window Coverings. With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Manufacturer's standard .
 - a. Loop Length: Full length of roller shade .
 - b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain-Retainer Type: Clip, jamb mount .
2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criterion is more stringent.

- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of interior face of shade .
2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller .
3. Shadeband-to-Roller Attachment: Manufacturer's standard method .

- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

- E. Shadebands:

1. Shadeband Material: Light-filtering fabric .
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material .

- F. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped .

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- b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 4 inches .
- c. Finish: Clear Anodized
2. Endcap Covers: To cover exposed endcaps.
3. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
4. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
5. Installation Accessories Color and Finish: As selected from manufacturer's full range .

2.3 MANUAL, DUAL-ROLLER SHADES (RS-2)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Draper Inc.; Dual Roller FlexShade or a comparable product by one of the following:
 1. Hunter Douglas Contract.
 2. Lutron Electronics Co., Inc.
 3. MechoShade Systems, Inc.
 4. Springs Window Fashions; SWFcontract.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shades for service.
 1. Dual Roller Fascia. Endcaps with Fascia designed for surface mounting of dual roller window shades.
 - a. Endcaps: 1028 steel stamping.
 - b. Fascia: L-shaped cover of extruded aluminum, .060 wall. Assembly snaps onto endcaps without exposed fasteners
 - c. Finish: Clear Anodized
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- E. Inside Shadebands:
 1. Shadeband Material: Light-filtering fabric .
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material .
- F. Outside Shadebands:
 1. Shadeband Material: Light-blocking fabric .
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Bottom Bar with Wool Pile .
 - b. Color and Finish: Clear Anodized Aluminum .
 3. 2-1/2" side channels with wool pile.

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G. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped .
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 7 inches.
 - c. Finish: Clear Anodized Aluminum.
2. Endcap Covers: To cover exposed endcaps.
3. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
4. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
5. Installation Accessories Color and Finish: Clear Anodized Aluminum .

2.4 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701 . Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 1. Roller Shades - Shade Fabric 1 (RS1):
 - a. Source: Hunter Douglas
 - b. Fabric: Glacier Screen + Basketweave .
 - c. Color: White/Pearl
 - d. Openness Factor: 5% Openness.
- C. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.
 1. Roller Shade - Shade Fabric 2 (RS2):
 - a. Source: Hunter Douglas
 - b. Fabric: Glacier Screen + RD
 - c. Color: To be selected from manufacturers standard selections.
 - d. Openness Factor: 0% Openness

2.5 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
 2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

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- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4 , provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
 2. Skylight Shades: Provide battens and seams at uniform spacings along shadeband as required to ensure shadeband tracking and alignment through its full range of movement without distortion or sag of material.
 3. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.
- C. Roller Shade Locations: At exterior windows .

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

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- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 122413

SECTION 26 01 00

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section
- B. Section Includes: This section provides basic electrical requirements.

1.02 BASIC ELECTRICAL REQUIREMENTS

- A. Quality Assurance:
 - 1. Workers possessing the skills and experience obtained in performing work of similar scope and complexity shall perform the Work of this Division.
 - 2. Refer to other sections of the Specifications for other qualification requirements.
- B. Drawings and Specifications Coordination:
 - 1. For purposes of clearness and legibility, Drawings are essentially diagrammatic and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer's data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.
 - 2. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduit. Install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.
 - 3. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.
 - 4. Outlet locations shall be coordinated with architectural elements prior to start of construction. Locations indicated on the Drawings may be distorted for clarity.
 - 5. Coordinate electrical Work with all other Work.
 - 6. The scope of the electrical work includes furnishing, installing testing and warranty of all Electrical work and complete electrical systems shown on the electrical drawings and specified herein.
 - 7. The drawings and specifications complement each other and together complete the contract documents for the electrical work included in this project. Neither the drawings or the specifications are complete without the other. Any item mentioned in either document is binding. Where conflicts arise between the drawings and the specifications, the more stringent requirement shall prevail.
 - 8. The contractor shall provide and install all electrical systems to provide a complete package as indicated by the contract documents. The documents are intended to provide an outline for the required installations. The contractor shall ultimately provide a complete and operational system at the conclusion of the project.

9. Details are provided as they relate to the installation. Contractor shall provide and install all miscellaneous components, parts, materials, fasteners, splices, and any other incidental items necessary to provide a complete installation.
 10. Free standing electrical equipment and transformers shall be installed on housekeeping pads. Pads shall be a minimum of 3" thick with #2 rebar grid at 6" on-center. Pads shall be a minimum of 2" larger in each direction than the width and depth of the equipment. All pads shall have a minimum of 3/4" chamfer on all edges and broom finished. Crown pads slightly so as not to hold water where they are installed outdoors. Adjust pads dimensions and construction details where noted specifically on drawings.
- C. Terminology:
1. Signal Systems: Applies to clock, bell, fire alarm, annunciator, sound, public address, buzzer, telephone, television, inter-communication, and security systems.
 2. Low Voltage: Applies to signal systems operating at 120 volts and less, and power systems operating at less than 600 volts. Medium voltage: Applies to power systems operating at more than 600 volts.
 3. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.
- D. Regulations: Work shall comply with the requirements of authorities having jurisdiction and the Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.
- E. Structural Considerations for Conduit Routing:
1. Where conduits pass through or interfere with any structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, contractor shall submit shop drawings to the architect for approval.
 2. Holes required for conduit entrances into speaker poles, floodlight poles or other poles, shall be drilled with the conduit nipple or coupling welded to poles. Welds shall be provided by the electric arc process and shall be continuous around nipple or coupling.
- F. Electrically Operated Equipment and Appliances:
1. Furnished Equipment and Appliances:
 - a. Work shall include furnishing and installing wiring enclosures for, and the complete connection of electrically operated equipment and appliances and electrical control devices which are specified to be furnished and installed in this or other sections of the Specifications, wiring enclosures shall be concealed except where exposed Work is indicated on the Drawings.
 - b. Connections shall be provided as necessary to install equipment ready for use. Equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets are of incorrect electrical characteristics or any specified equipment fails to operate properly, repair and/or replace the outlet and/or equipment.

2. Equipment and Appliances Furnished by Others:
 - a. Equipment and appliances indicated on Drawings as "not in contract" (NIC), "furnished by others," or "furnished by the Owner," will be delivered to the Project site. Required electrical connections shall be performed for such equipment and appliances. Motorized equipment will be furnished factory-wired to a control panel or junction box unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches where required.
 - b. Connections to equipment furnished under this Division shall be part of the Work of this section. Work shall include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit, and connections only for equipment furnished with factory installed internal wiring, except as further limited by Drawings and this Specification. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push-button stations, selector switches, conduit, junction boxes, and wiring necessary for a complete electrical installation. Work shall also include furnishing and installing conduit and boxes for HVAC control systems, furnished under Mechanical Divisions. Devices and equipment furnished shall be of same type used elsewhere on the Work or as specified.
 - c. Electrical equipment furnished under other sections, for installation and connection under Work of this section, will be delivered to the Project site ready for installation.
 - d. Equipment furnished under other sections, and requiring electrical connection under this section, will be set in place as part of the Work of the section furnishing such equipment unless noted otherwise. If electrical connections exceed the requirements of the specified equipment, it shall be the responsibility of the contractor or vendor supplying the equipment to compensate the electrical contractor for any and all work to make the electrical connections to the equipment being supplied. Any discrepancies shall immediately be brought to the engineers' attention for coordination between all other disciplines. All increased costs shall be the responsibility of the contractors, not the owner, architect, or engineer.
 - e. Suitability and condition of equipment furnished under other sections shall be determined in advance of installation. Immediate notice of damage, unsuitability, or lack of parts shall be given to the entity providing such equipment.
- G. Protection of Materials:
 1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.
- H. Cleaning:
 1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.

2. Thoroughly clean parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster, and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped and corners and cracks scraped out. Exposed rough metal shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.
 3. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- I. Permits and Regulations:
1. Include payment of all permit and inspection fees applicable the work in this Division.
 2. Work must conform to the National Electric Code, National Electrical Safety Code, and other applicable local, state, and federal laws, ordinances, and regulations. Where drawings or specifications exceed code requirements, the drawings and specifications shall govern. No work shall be installed which is less than minimum legal standards.
 3. All work performed under this Division shall be inspected and approved by the Local Authority having Jurisdiction.
- J. Site Inspection:
1. Each and all bidders shall inspect the project site prior to bidding.
 2. Existing site conditions shall be compared with the information shown on the drawings. Immediately report any discrepancies to the Architect. After project bid date, no allowances will be made for failure to have made inspections.
 3. During construction, the contractor shall exercise care and take appropriate precautionary measures to prevent any damage to the existing structures, sidewalks, utilities, communications, etc. during the project. The Contractor shall correct all damage caused by or during the project. Contractor shall provide not less than (2) and not more than (10) working days advance written, electronic, or telephonic notice of the commencement, extent, location and duration of the excavation work to Mississippi One-Call System, Inc. (1-800-227-6477) and any nonmembers operator(s) of any underground utility lines or underground facilities in and near the excavation area, so that Mississippi One-Call System, Inc operator(s) and any non-member operator(s) may locate and mark the location of underground utility lines and underground facilities in the excavation area.
- K. Utility Companies Coordination and Fees:
1. **UNDERGROUND UTILITY CONDUIT, WIRING, AND EQUIPMENT WORK FROM THE EDGE OF THE CONSTRUCTION PROPERTY LIMITS TO UTILITY POINT OF CONNECTION, SHALL BE INCLUDED AS AN ALLOWANCE ITEM ONLY. ALLOWANCE FOR THIS WORK SHALL BE \$20,000.00 FOR WORK RELATED TO THE ELECTRICAL PRIMARY SERVICE. ALL OTHER WORK SHOWN SPECIFICALLY INCLUSIVE TO THE SITE AND ON THE DRAWINGS SHALL BE INCLUDED IN BASE BID.**
 2. Allowance shall include direct CONTRACTOR AND UTILITY costs (labor and materials) for NEW INSTALLATIONS as required.

3. Allowance includes direct costs only with no contractor overhead or markup. The entire amount of the allowance shall be for the owner's use in material components and installation.
 4. Successful contractor shall coordinate with the owner, utility company, architect, and engineer to provide new services for the facility as detailed on the drawings.
 5. Contractor shall inspect and verify the existing utilities at the project site prior to bidding.
 6. During construction, the successful contractor shall contact the local utility companies to verify and coordinate service arrangements with each. For base bid, this contractor shall install all service entrance conduits, pads, duct banks, etc, and as noted on drawings, to meet the requirements of the respective utility company. In instances where contract documents' requirements are more stringent than utility company requirements, the drawings and specifications shall take precedence.
 7. The electrical contractor shall be responsible for and shall include in his bid all based bid installation costs and allowance costs. The utility company cannot order materials and transformers for this project until it has received the allowance payment(s) noted. Due to long lead items, it is imperative that the payments be made at the beginning of the project.
 8. The Contractor must coordinate with owner during the project for connection of permanent power to the facility, however, the contractor shall not utilize the permanent utilities unless written permission is granted by the owner. The local utility and authority having jurisdiction shall approve when permanent power may be installed in order to provide electrical start-up and check-out of equipment. Upon written permission of use of permanent electrical power, contractors shall pay any charges for power consumption while utilizing permanent power until the building or facility has been accepted by the owner.
- L. Temporary Lighting and Power for Construction:
1. The electrical contractor shall provide and install temporary lighting during the period of construction. Temporary lighting shall be provided to meet all local ordinances, codes, and safety requirements. Lighting shall be installed in all open, general, and thoroughfare areas of construction. This shall not include any task lighting specifically required by any trade to complete their work or installations.
 2. The electrical contractor shall provide and install temporary power during the construction period as required to complete the project installation. Contractor shall coordinate with the general contractor, utility company, and/or owner to provide 120/240 volt power for the project. All devices shall be provided with ground fault circuit protection. Power shall be provided in central work area(s). This shall not include any remote power needs for any specific trades. For power requirements at voltages other than those listed above, the contractor shall coordinate connection requirements with the local utility company.
 3. All temporary lighting and power installations shall meet local and national codes and be approved by the local authority having jurisdiction.
 4. Temporary services shall be removed at completion of the project. Permanent utilities shall not be used during the Project except with the written permission of the Owner.

1.03 SUBMITTALS

- A. Where indicated submit to architect, (7) copies of Shop Drawings including control diagrams, list of materials, catalog cuts, technical data, manufacturer's specifications, and applicable installation details.

1.04 RECORD DRAWINGS

- A. The Electrical Contractor shall maintain, at the project site, a separate set of prints of the contract documents and shall show all changes and variations, in a neat and clearly discernible manner, which are made during construction. Upon completion of the work, these drawings shall be turned over to the Architect. Provide the following as-built documents including all contract drawings regardless of whether corrections were necessary and include in the transmittal: "2 sets of CDs and prints for Owner's use, one set of CDs, prints for Architect / Engineers Records". Delivery of these as-built electronic files and prints are a condition of final acceptance.
- B. **AT THE BEGINNING OF THE PROJECT, CONTRACTOR SHALL OBTAIN ORIGINAL ELECTRICAL DRAWING FILES AND BACKGROUND DRAWINGS, IN ELECTRONIC FORMAT. DRAWINGS MAY BE OBTAINED WITH PERMISSION FROM THE ARCHITECT AND ENGINEER. ALL PLAN REVISIONS AND LABELING SHALL BE CLEARLY LABELED AND COORDINATED WITH THE ELECTRICAL ENGINEER. CONTRACTOR IS SOLELY RESPONSIBLE FOR THE ACCURACY AND COMPLETENESS OF THE AS-BUILT DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE TO KEEP UP-TO-DATE, ELECTRONIC AS-BUILTS FOR ALL ELECTRICAL INSTALLATIONS. AS-BUILT DRAWINGS SHALL BE COMPLETED USING AUTOCAD 2007 OR EARLIER VERSION AND SHALL INCLUDE THE FOLLOWING WHERE APPLICABLE:**
1. Indicate all addendum changes to documents.
 2. Remove Engineer's Seal, name, address, and logo from drawings.
 3. Mark documents RECORD DRAWINGS.
 4. Clearly indicate: DOCUMENT PRODUCED BY:
 5. Indicate all changes to construction during construction. Indicate actual routing of all conduit, etc that were deviated from construction drawings.
 6. Indicate exact location of all underground electrical raceways, and elevations.
 7. Correct schedules to reflect (actual) equipment furnished and manufacturer.
 8. During the execution of work, maintain a complete set of Drawings and specifications upon which all locations of equipment, devices, and all deviations and changes from the construction documents in the work shall be recorded.
 9. Exact location of all electrical equipment in building. Label panel schedules to indicate actual location.
 10. Exact location of all electrical equipment in and outside of the building.
 11. Exact location of all outdoor lighting poles and equipment.
 12. Location, size and routing of all feeder conduits, equipment, etc. shall be accurately and neatly shown to dimension.
 13. Exact location of all roof mounted equipment, wall, roof and floor penetrations.
 14. Cloud all changes.
 15. Update all panel schedules with all additional circuits added or deleted through construction. Identify each circuit to include all information specified for directory cards for circuit identification in panelboards.

- C. At the conclusion of the project, Provide the following as-built documents including all contract drawings regardless of whether corrections were necessary and include in the transmittal: "2 sets of CDs and prints for Owner's use, one set of CDs, prints for Architect / Engineers Records". Delivery of these as-built electronic files and prints are a condition of final acceptance.

1.05 OPERATION AND MAINTENANCE MANUALS

- A. The Electrical Contractor shall submit to architect (3) copies each of operating and maintenance manuals for each piece of equipment applicable to the project.
- B. All shop drawings, installation, operation, and maintenance manuals, wiring diagrams, parts lists, and other information including warranties and technical support, shall be obtained from each manufacturer.
- C. Assemble all information into three-ring binders or other suitable binding. Add an index and/or tabbed and labeled sections of all items submitted.
- D. The Electrical Contractor shall at all times, maintain a clean set of construction document plans on site. Any and all deviations from the construction documents shall be marked, and clearly noted in red ink. All changes shall exactly indicate the revisions or changes to the design documents. Upon completion of the project, (2) clean sets of "red-line" construction as-built documents shall be submitted to the architect. Unclear, illegible, or inaccurate plans will be returned to the contractor for correction and resubmission. As-built documents shall be corrected by the Electrical Contractor and resubmitted at no additional cost.

1.06 INSPECTIONS AND PUNCH LIST

- A. The Electrical Contractor shall survey and inspect his work and develop his own punch list to confirm that work is complete and finished. He shall then notify the General Contractor that work is complete and ready for inspection by the Architect. It is not the Architects or Engineers obligation to perform a final inspection until the contractor states his work has been inspected and is complete and ready for final inspection.
- B. Request to the Architect, Engineer, or Owner for final inspection may be accompanied by a limited list of known deficiencies with a brief explanation or status of deficiencies and schedule for completion of each. Correction of these items shall be completed within (30) days of inspection or before final acceptance of occupancy.

1.07 WARRANTY

- A. The Electrical Contractor shall warrant all workmanship, equipment, and materials installed under this contract for a period of (1) year minimum from the date of final acceptance as agreed between the Contractor and the Architect, unless indicated by other sections of these specifications.
- B. Any equipment, materials, etc. proving to be defective during the warranty period shall be corrected or replaced without any expense to the Owner or other parties. This provision shall not be construed to include general maintenance items or luminaire lamps or correcting errors on the part of the owner, owner's personnel, or owner's representative.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and Equipment furnished under this contract shall be in strict accordance with the specifications and drawings and shall be new and of best grade and quality. When two or more items of equal and similar materials and construction are required, they shall be of the same manufacturer.
- B. All electrical equipment and materials shall bear the Underwriters Laboratories, Inc. label, and shall comply with the NEC and NFPA requirements as applicable.

2.02 MATERIALS AND EQUIPMENT SELECTION

- A. Selection of Materials and Equipment furnished under this contract shall be determined by the following:
 - 1. Where trade names, brands, and manufacturer's part numbers are listed, the exact equipment listed shall be furnished. Where more than one name is used, the contractor shall have the option of selecting between those specified. All products used shall be equal to that specified and shall be of best quality.
 - 2. When the words "or equal" appear, specific approval must be obtained from the Architect during the bidding period in sufficient time to be included in an addendum. The same shall apply for equipment and materials not named in the specifications, where approval is sought.
 - 3. Alternate materials and/or equipment must be submitted for approval a minimum 2 weeks prior to project bid date.

- B. Before bidding, when preparing shop drawings, and prior to rough-in for installation, the contractor shall verify that adequate space is available for entry and installation of the item including any accessories. Also that adequate space is available for servicing equipment and required code clearances are satisfied.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Advise the general contractor or architect before starting the Work of this Division.
- B. Exposed conduits shall be painted to match the surfaces adjacent to installation. Refer to painting and coating section of specifications.
- C. Salvaged materials, if applicable, removed from buildings shall be removed from the Project site as required by the general contractor.
- D. Trenches outside of barricade limits shall be backfilled and paved within 24 hours after being inspected. Provide traffic plates during the time that trenches are open in traffic areas and in areas accessible to nonconstruction personnel.
- E. Where structural walls are cored for new conduit runs, separation between cored holes shall be 3 inches edge to edge, unless otherwise required by the Architect. All coring to be laid out and reviewed by Architect prior to drilling. Contractor to verify location of structural steel, rebar, stress cabling, or similar prior to lay out.
- F. Electrical equipment shall be braced and anchored as indicated on the Drawings.

3.02 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

DIS CABLING STANDARD V.8

General

1. The systems indicated below and specified in detail hereinafter require specialized skill and experience in their installation. Installation vendors must adhere to these requirements.
 - a) Telephone Cabling System
 - b) Data Cabling System
2. Each system must be installed in strict accordance with all applicable codes including ANSI, UL, TIA, and NFPA standards which apply.
3. System components must be purchased from a factory authorized company who maintains a complete inventory of spare parts and who has an active and experienced service organization capable of providing repair service within 24 hours.

Telephone Cabling System

1. Telephone requirements must be verified with UMC Telecommunications before installation. UMC is currently in the process of moving to a VOIP environment. Analog lines should be restricted, but not inclusive to emergency communications, conference lines, backup voice services.
2. Installation must include conduit system with conductors, boxes, backboards and plates. Stainless steel wall plates, equal to AT630/6, must be installed for wall mount.
3. Boxes must be mounted with center 12" above floor for desk mount or 40" above floor for wall mount, or at nearest masonry joint to height specified. Boxes must be a standard receptacle box, 2" X 4", with appropriate depth single gang raised cover.
4. Telephone conduits and rough-in provisions not less than 6" from a source of alternating current must be used, unless separated by grounded metallic partition.
5. Telephone backboards must be 3/4" plywood long dimension vertical. Backboard must be painted with two (2) coats of fire-retardant black paint. Each backboard must have duplex receptacle property located and connected to dedicated circuit.

6. Each telephone backboard must have a #6 stranded ground wire installed. Ground wire must originate from the service equipment ground and must be installed in 3/4" conduit. Conduit should be bonded to grounding conductor at all wire exit point and install bushing. Bonding conductor may be installed from backboard to backboard or radially from service equipment. Splices, if required, must be made with compression fittings.
7. Telephone cable must be "gray" in color, 4 pair, and plenum Category 6 compliant cable.
Pair color-coding to cable strands to match existing scheme for the system (Blue/White, Orange/White, Green/White and Brown/White).
8. Cables to be routed from outlet through furniture raceway or conduit from accessible ceiling must have sufficient length to reach through the furniture to the underside of the desk. All other cables must have at least 3 feet of slack in the wall coiled behind the outlet.
9. Cables must be identified on both ends in accordance with the method currently used for the campus system. The currently used method is (terminal room-jack number) for example if the backboard is in room G024, the first cable going to that room should be labeled G024-001, the last would be G024-213 according to the number of telephone cables being installed. Outlet covers should have a clearly visible label on the outside that corresponds to the same number at the telephone backboard.
10. All cables to terminate at outlet using receptacle and plate to match ivory color as required by UMC Communication Services. Siemen CT or Z-Max wall plates with Z-Max Cat 6 or greater receptacles wired in accordance with TIA-T568A wiring configuration must be used. For cables that terminate in modular furniture and do not have a box for a receptacle, MX-SM1-20 or SP-3-01 for single outlets and MX-SM2-20 or SP-6-01 for dual or larger outlets must be used. Note: To ensure TIA Category 6 transmission performance, wire the modular jack from center to outside. Paired conductors must not be untwisted more than 1/2 inch. Cables must be terminated in Siemen panels or boxes. Termination information for all cables at both ends must be applied. Z-Max patch panel and cable terminations are allowed in place of a backboard style punch down panels.
11. Any existing telephone outlets and cables that are in remodeled areas which are scheduled to be demolished are to be removed from wall. ANY disconnection at telephone terminals must be performed by UMC personnel.

1. INTRODUCTION

1.1 Contractor Qualifications and Training Contractors must be fully conversant and capable in the cabling of low voltage applications such as, but not limited to data, voice and imaging network systems. The Contractor must at a minimum possess the following qualifications:

- Personnel trained and certified in the design of the Siemen Cabling System[®].
- Personnel trained and certified to install the Siemen Cabling System[®].
- The Designer and Installer must show proof of current certification of the Siemen Cabling System[®] via an updated card given after attending the 5- day course or a re-certification class given every two years.
- Must be able to provide a Siemen 20-year warranty on all horizontal copper cabling.

The contractor must provide references of the type of installation provide in this specification

- Personnel trained and certified in fiber optic cabling, splicing, termination and testing techniques. Personnel must have experience using a light meter and OTDR. The installation of all fiber optics cabling and related fiber termination equipment must be by a trained technician with a minimum of (2) years' experience. The technician must have been trained through a nationally recognized course, such as courses offered by Siecor and AT&T. Contractor/installer must be responsible for furnishing all specialized tools required for proper installation.
- Personnel trained in the installation of pathways and support for housing horizontal and backbone cabling.
- Personnel must be knowledgeable in local, state, province and national codes, and regulations. All work must comply with the latest revision of the codes or regulations. When conflict exists between local or national codes or regulations, the most stringent codes or regulations must be followed.

The contractor must be in business a minimum of five (5) years.

- Must have personnel fluent in the use of Computer Aided Design and possess and operate CAD software using .DWG or .DXF format.
- Must possess current liability insurance certificates.

All Contractors who are engaged to provide cabling for UMMC must strictly adhere to the Campus Cabling Standards. Any deviation must be approved on a case-by-case basis by DIS.

The telecommunications contractor shall be a firm which is regularly and professionally engaged in the business of the applications, installation, and testing of the specified telecommunications systems and equipment. The telecommunications contractor shall

demonstrate experience in providing successful telecommunications systems that includes, as applicable, outside plant and broadband cabling within the past 3 years.

2. SCOPE OF WORK

The contractor must provide and install a structured cabling system. This includes but not limited to the installation of copper and fiber optic data cables, data receptacles, data cover plates, data connectors, racks, patch panels, fiber termination boxes and miscellaneous hardware for a complete structured data cabling system.

3. GENERAL REQUIREMENTS

Cabling system installations are to be based on the requirements described in this standard and the TIA Commercial Building Telecommunications Standards and Technical Service Bulletins.

- Only 24 or 48 port patch panels should be installed.
- Patch panels are to contain one port for every outlet cabled, plus a minimum of 20% spares.
- Cable management panels are to be utilized to organize excess slack at rack locations.
- Patch panels, work area outlets and installer should comply with T-568B configuration for termination.
- New conduit installations must be concealed in walls and ceilings.
- Plenum rated cabling must be used when required by the environment.
- Cabling routed close to EMF generating equipment must be at least 15ft. beyond equipment and ground raceway.
- Cable must be continuous from outlet to terminal rack. No splicing is permitted. Termination permitted only at outlet and terminal rack.

4. TECHNICAL

4.1 Horizontal Cabling

The Horizontal Subsystem is the portion of the telecommunications cabling system that extends from the work area data communications outlet/connector to the horizontal cross-connect in the data communications closet. It consists of the data communications outlet/connector, the horizontal cables, and that portion of the cross-connect in the telecommunications closet serving the horizontal cables.

4.1.1 Cable Types **Twisted-Pair Cabling**

All qualified cables must exceed the most severe requirements provided in the Industry Requirements by the worst-case margins listed below for all specified frequencies (except where noted):

Parameter	UTP Cable Performance			
	100	200	250	
Insertion Loss (dB)	19.6	28.7	32.6	
NEXT Loss (dB)	47.3	42.8	41.3	
PSNEXT Loss (dB)	45.3	40.8	39.3	
ELFEXT (dB)	30.8	24.8	22.8	
PSELFEXT (dB)	28.8	22.8	20.8	
Return Loss (dB)	21.1	19.0	18.3	
Propagation Delay (ns)	518	516	516	
Delay Skew (ns)	35	35	35	

Attenuation

Qualified cables must exhibit worst-case attenuation less than the values derived using the equation below from 1 to 250 MHz where f is the frequency in MHz. In addition, qualified cables must exhibit worst case attenuation performance of less than 32.8 dB/100m at 250 MHz.

$$\text{cable}_{\text{atten}} \leq 1.79\sqrt{f} + .017 \cdot f + \frac{0.198}{\sqrt{f}}$$

NEXT Loss

Qualified cables must exhibit worst case NEXT loss greater than the values derived using the equation below from 1 to 250 MHz where f is the frequency in MHz. In addition, qualified cables must exhibit worst case NEXT loss performance of greater than 38.3 dB at 250 MHz.

Frequency (MHz)	NEXT Loss (dB)
$1 \leq f < 10$	$\text{cable}_{\text{NEXT Loss}} \geq 45.3 - 15 \cdot \log\left(\frac{f}{100}\right)$
$10 \leq f \leq 300$	$\text{cable}_{\text{NEXT Loss}} \geq 47.3 - 15 \cdot \log\left(\frac{f}{100}\right)$

Power Sum NEXT (PS NEXT) Loss

Qualified cables must exhibit worst case PS NEXT loss greater than the values derived using the equation below from 1 to 250 MHz where f is the frequency in MHz. In addition, qualified cables must exhibit worst case PS NEXT loss performance of greater than 36.3 dB at 250 MHz.

Frequency (MHz)	PS NEXT Loss (dB)
$1 \leq f < 10$	$\text{cable}_{\text{PS NEXT Loss}} \geq 43.3 - 15 \cdot \log\left(\frac{f}{100}\right)$
$10 \leq f \leq 300$	$\text{cable}_{\text{PS NEXT Loss}} \geq 45.3 - 15 \cdot \log\left(\frac{f}{100}\right)$

Attenuation to Crosstalk Ratio – Far End (ACRF)

Qualified cables must exhibit worst case ELFEXT greater than the values derived using the equation below from 1 to 250 MHz where f is the frequency in MHz. In addition, qualified cables must exhibit worst case ACRF performance of greater than 19.8 dB at 250 MHz.

$$\text{cable}_{\text{ELFEXT}} \geq 30.8 - 20 \cdot \log\left(\frac{f}{100}\right)$$

Power Sum Attenuation to Crosstalk Ratio (PSACRF)

Qualified cables must exhibit worst case PSACRF greater than the values derived using the equation below from 1 to 250 MHz where f is the frequency in MHz. In addition, qualified cables must exhibit worst case PSACRF performance of greater than 16.8 dB at 250 MHz.

$$\text{cable}_{\text{PSSELFEXT}} \geq 28.8 - 20 \cdot \log\left(\frac{f}{100}\right)$$

Return Loss

Qualified cables must exhibit worst case return loss greater than the values derived using the equations below from 1 to 250 MHz where f is the frequency in MHz. In addition, qualified cables must exhibit worst case return loss performance of greater than 17.3 dB at 250 MHz.

Frequency (MHz)	Return Loss (dB)
$1 \leq f < 10$	$20 + 6 \cdot \log(f)$ dB
$10 \leq f < 20$	26 dB
$20 \leq f \leq 300$	$26 - 7 \cdot \log(f/20)$ dB

Delay Skew

Qualified cables must exhibit worst case propagation delay less than the values derived using the equation below from 1 to 250 MHz where f is the frequency in MHz. In addition, qualified cables must exhibit worst case propagation delay performance of less than 478 ns/100m at 250 MHz.

Nominal Velocity of Propagation (NVP)

Qualified cables must exhibit worst case delay skew of less than 73% from 1 to 250 MHz.

In addition to the requirements listed above, bundled or hybrid cable must also meet the following requirements:

- Be in groupings of 4-pair units.
- Be power sum NEXT tested where any disturbed pair within the hybrid/bundle cable must be 3 dB better than the specified pair-to-pair NEXT loss of a single 4-pair cable of the same category.

4.1.1.1 Copper (4-pair UTP)

UTP cables must:

- be manufactured by one of the following:
 - Berk-Tek
 - Siemen
 - Mohawk
 - Superior Essex
- be 100 Ω 4-pair, Category 6 cable or greater
- be appropriate for the environment in which it is installed

4.1.1.2 Copper (4-pair ScTP)

ScTP cables must be manufactured by one of the following:

- Berk-Tek
- Siemen
- Mohawk
- Superior Essex
- be 100 Ω 4-pair, Category 6 cable or greater.
- meet the requirements of ANSI/TIA-568-C.2 and ISO/IEC 11801:2011 Ed 2.2.
- meet the same transmission requirements of UTP as specified in ANSI/TIA 568-C.2 and ISO/IEC 11801:2011 Ed 2.2.
- be appropriate for the environment in which it is installed.
- be grounded at one end, in the telecommunications closet

4.1.1.3 Fiber

Optical fiber cables must:

- be manufactured by one of the following:
 - Berk-Tek
 - Siemen
 - Mohawk
 - Corning
- be appropriate for the environment in which it is installed.
- A minimum of 12 strands of Singlemode fiber with a minimum of 6 strands terminated should be run between all LIU's.

4.1.1.3.1 Fiber Connectors

As of April 2017, UMMC does not support the installation of ST/SC Connectors on Fiber Terminations or the use of Multimode Fiber. All Terminations should follow the specifications outlined in section 4.1.1.3.1.2.

4.1.1.3.1.2 Fiber (LC)

LC Connectors Must:

- have a quick field termination process which does not require power.
- have a termination process which incorporates use of a reliable adhesive.
- have a buffered fiber version consisting of 2 parts (connector housing and boot).
- have a jacketed fiber version consisting of 3 parts (connector housing, crimp sleeve, boot).
- have a metal coupling nut to assure optimum durability.
- have a radial-ramped coupling nut which facilitates mating/de-mating.
- utilize a precision ceramic ferrule.
- have a typical Insertion Loss = 0.40 db.
- be ANSI/TIA-568-c.3 and ISO/IEC 11801:2011 Ed 2.2 Compliant
- be made by an ISO 9001 Certified Manufacturer

4.1.2 Cable Routing

All horizontal cables, regardless of media type, must not exceed 90 m (295 ft.) from the TO in the work area to the FD/HC.

The physical topology of the horizontal cabling shall be configured as a star with each TO connected to a FD/HC. Each Work Area shall be served by a FD/HC located on the same or adjacent floors.

Horizontal pathways must be installed or selected such that the minimum bend radius of horizontal cables is kept within manufacturer specifications both during and after installation.

In open ceiling cabling, cable supports must be provided by means that are structurally independent of the suspended ceiling, its framework, or supports. Non-continuous cable supports such as hangers and hooks shall not be spaced more than 1.5m (5ft) apart.

Telecommunications pathways, spaces and metallic cables which run parallel with electric power or lighting must be installed with a minimum clearance of 50 mm (2 in).

All cable routes must be approved by UMMC Telecommunications prior to installation of the cabling.

No splicing can be inserted between the horizontal portion of the cross-connect in the telecommunication closet.

In the telecommunications closet where cable trays or cable racking are used, appropriate means of cable management must be used; i.e. reusable color-coded hook and loop cable managers (ties) to create a neat appearance and practical installation.

Enclosed pathways should have pull points within 30m (100ft) of each other. No section of conduit should contain more than two 90-degree bends, or equivalent, between pull points. At least one nylon pull cord should be provided in a conduit.

Cables routed in a suspended ceiling must not be draped across ceiling tiles. Open ceiling pathway systems must be mounted a minimum of 75mm (3 inches) above ceiling grid with a minimum of 300mm (12 inches) shall be provided above the open pathway system.

All cables installed in wet locations shall be rated for that environment.

No horizontal cabling shall be installed directly onto an untreated concrete floor.

4.1.3 Work Area

This section outlines specifications for the work area equipment cords, and telecommunications outlets at the users work area. The connection between the information outlet and the device is achieved by means of this subsystem.

4.1.3.1 Work Area Equipment Cords

The Work Area Equipment Cords must meet or exceed the following criteria:

4.1.3.1.1 Modular Equipment Cords: Category 6

Category 6 modular equipment cords must:

- be round, and consist of eight insulated 24 AWG, stranded copper conductors, arranged in four color-coded twisted-pairs within a flame-retardant jacket.
- be equipped with modular 8-position (RJ45 style) plugs on both ends, wired straight-through with standards compliant wiring (568-A or 568-B) configuration.
- use modular plugs which exceed FCC CFR 47-part 68 subpart F and IEC 603-7 specifications, and have 50 micro inches of gold plating over nickel contacts.
- maintain shield continuity through the modular plug shield not via the contacts when screened (ScTP) cords are used.
- be available in any custom length and standard lengths of 1, 6 and 10 feet.
- The combined length of balanced twisted-pair patch/equipment cords shall not exceed 5m (16ft).

Electrical Specifications:

- have a mutual capacitance: 17.5pF/ft. (56. pF/m) maximum.
- have a characteristic impedance: $100 \Omega \pm 15\%$ from 1 to 100 MHz.
- be 100% transmission tested with laboratory grade network analyzers for proper performance up to 350 MHz. Vendor must guarantee cords are compatible with Category 6 links.
- be UL VERIFIED for TIA Category 6 electrical performance. - be UL LISTED 1863.
- be made by an ISO 9001 Certified Manufacturer.

4.1.3.1.2 Fiber Equipment Cords (jumpers)

Fiber equipment cords must:

- be available in standard lengths of 1, 3, and 5 meters, custom lengths must also be available, and must meet or exceed standards as defined in ANSI/TIA-568-C.3 and ISO/IEC 11801:2011 Ed 2.2.
- utilize simplex or duplex fiber cable that is 50/125 micron multimode*, OFNR riser grade, and meets the requirements of UL 1666.
- attenuation must not exceed 3.5 dB/km @ 850 nm wavelength or 1.0 dB/km @ 1300 nm.
- cable jacket color must be yellow. The connectors must be LC in accordance with TIA-568-C.3 and must include a ceramic ferrule.
- terminated connectors must exhibit a maximum insertion loss of 0.75 dB with an average of 0.50dB when tested at either 850 nm or 1300 nm wavelengths.
- be made by an ISO 9001 Certified Manufacturer.
- be UL 1666 approved.

****Note: UMMC no longer installs Multimode Fiber in new construction or renovations.***

4.1.3.2 Information Outlets (Wall Mount)

4.1.3.2.1 Category 6 (maximum 4 outlets per single gang faceplate)

All information outlets for 100 Ω , 22-26 AWG copper cable must:

- be available in black, white, gray, ivory and light ivory.
- accommodate a minimum of two 8-position / 8-conductor modular jacks.
- utilize compliant pin technology 310 style insulation displacement connectors which allow the use of a 4-pair impact tool.
- allow for a minimum of 200 re-terminations without signal degradation below standards compliance limit.
- have available a gravity feed (45 degree angled) design.
- utilize reactance balanced pair technology to address data circuit applications up to 250 MHz.
- provide universal application / multi-vendor support.
- support industry standards for T568A or T568B wiring options.

- be removable from the front with the faceplate mounted in place, and allow for the jack to pass through the faceplate without re-termination.
- have a hinged door option for areas having excessive airborne contaminants.
- provide color-coded snap-in icons available for circuit identification.
- be constructed of high impact, flame-retardant thermoplastic.
- be available in a screened version for 100 Ω ScTP cable.
- meet the following performance specifications:

Parameters	Worst	Typical
Insertion Loss (dB)	0.12	0.14
NEXT* (dB)	0.84	4.37
FEXT* (dB)	2.1	5.1
Return Loss (dB)	6.9	8.3

4.1.3.2.2 Fiber (maximum 4 outlets per single gang faceplate)

All information outlets for fiber cable must:

- be available in black, white, gray, ivory and light ivory.
- be flush mounted, gravity feed (45 degree angled) design. - accommodate a minimum of two LC style adapters.
- accept single-mode LC connectors.
- provide universal application/multi-vendor support.
- be removable from the front with the faceplate left mounted in place, and allow for the jack to pass through the faceplate without re-termination.
- be equipped with dust covers for unused ports.
- have color-coded, snap-in icons available for circuit identification. - be made of high impact flame-retardant thermoplastic.
- be made by an ISO 9001 Certified Manufacturer.

4.1.3.3 Information Outlets (High Density)

4.1.3.3.1 Category 6 (maximum 6 outlets per single gang faceplate)

All high-density information outlets for 100 Ω 22-26 AWG copper cable must:

- be available in black, white, gray, ivory and light ivory.
- be 8-position / 8-conductor with coherent pairing of IDC pins.
- have available a gravity feed (45 degree angled) design.
- provide universal application/multi-vendor support.
- support industry standards for T568A or T568B wiring options on each individual outlet.

- allow installation from the front or rear of the faceplate, and allow for the jack to pass through the faceplate without re-termination.
- be side-stackable for high density solutions.
- allow termination without the use of special termination tools.
- be available in a screened version for 100 Ω ScTP cable.
- have a protective, hinged or flexible door to protect the outlet from dust and other airborne contaminants.
- provide color-coded, slide-in icons available for circuit identification.
- be constructed of high impact, flame-retardant thermoplastic.
- have, as an option, an outlet which can be mounted into an IEC 60603-7 compliant opening (keystone).

Electrical Specifications:

Margin over category 6 @ 250MHz		
Parameters	Worst Case	Typical
Insertion Loss (dB)	0.12	0.14
NEXT* (dB)	0.84	4.37
FEXT* (dB)	2.1	5.1
Return Loss (dB)	6.9	8.3

4.1.3.3.2 Fiber (High Density) (maximum 6 outlets per single gang faceplate)

All information outlets for fiber cable must:

- be available in black, white, gray, ivory and light ivory.
- be flush mounted, gravity feed (45 degree angled) design.
- accommodate a minimum of two LC style adapters.
- accept singlemode connectors.
- provide universal application/multi-vendor support.
- allow installation from the front or rear of the faceplate, and allow for the adapter to pass through the faceplate opening.
- be equipped with dust covers for unused ports.
- have color-coded, slide-in icons available for circuit identification.
- be made of high impact, flame-retardant thermoplastic.
- be made by an ISO 9001 Certified Manufacturer.

4.1.3.4 Faceplates

All faceplates must:

- be applicable to both fiber and copper applications.
- have designation labels for circuit identification together with a clear plastic cover.
- be available in single-gang and double-gang configurations.
- have as a minimum the standard colors of black, white, gray, ivory and light ivory.
- have optional modular furniture adapters available.

- have stainless steel options available.
- be made by an ISO 9001 Certified Manufacturer.

4.1.3.5 Information Outlets (Surface Mount) Low Profile

4.1.3.5.1 Outlets

4.1.3.5.1.1 Category 6

All Surface Mount Information Outlets for 100 Ω , 22-26 AWG, copper cable must:

- utilize compliant pin technology 310-style insulation displacement connectors (IDC) and allow the use of a 4-pair impact tool.
- allow for a minimum of 200 re-terminations without signal degradation below standards compliance limit.
- have solid state construction for transmission performance.
- utilize reactance balanced pair technology to address data circuit applications up to 250 MHz
- comply with FCC CFR 47-part 68 subpart F and IEC 603-7 specifications, and have 50 micro inches of gold plating over nickel contacts.
- provide universal application/multi-vendor support.
- support industry standards for T568A or T568B wiring options. - allow removal from the front when mounted in place.
- be available in a screened version for 100 S2 ScTP cable. - be available in single port, modular increments.
- be UL VERIFIED for TIA/EIA Category 6e electrical performance - be UL LISTED 1863 and CSA C22.2 approved
- have Austel "C-Tick" A95/0141
- be made by an ISO 9001 Certified Manufacturer
- Note: UMMC's standard configuration for new and renovated installs is a dual drop per gang plate unless a more cables are specifically specified.

4.1.3.5.1.2 Fiber

All Surface Mount Information Outlet Bezels for fiber cable must:

- be available in black, white, gray, ivory and light ivory.
- accommodate a minimum of 1 adapter and up to a maximum of 2 adapters per bezel.
- accommodate singlemode LC fiber connectors.
- support industry standards for LC connectors.
- provide universal application/multi-vendor support.
- provide dust covers for unused ports.
- be constructed of high impact, flame-retardant thermoplastic.
- be made by an ISO 9001 Certified Manufacturer.

4.1.3.5.2 Surface Mount Boxes

All low profile, surface mount boxes, used for mounting surface mount information outlets must:

- be available in 1-, 2-, 4-, or 6- port versions.
- have built-in cable management for both fiber and copper applications.
- be available in black, white, gray, ivory and light ivory.
- have at least three sides with breakouts and an opening in the base for cable or raceway entry.
- provide for an optional spring-loaded shutter door for added protection from dust and other airborne contaminants.
- have a designation area for printed or adhesive labels for circuit identification.
- have optional magnets which can be internally mounted.
- have color-coded snap in for circuit identification.

Size:

- port box must not exceed 61.8 mm (2.43 in.) width, 44.6 mm (1.76 in.) length and 27.9 mm (1.10 in.) height.
- 2-port box must not exceed 70.6 mm (2.78 in.) width, 66.3 mm (2.61 in.) length and 27.9 mm (1.10 in.) height.
- 4-port box must not exceed 90.6 mm (3.55 in.) width, 115.5 mm (4.55 in.) length and 27.9 mm (1.10 in.) height.
- 6-port box must not exceed 101.6 mm (4.00 in.) width, 165.1mm (6.50 in.) length and 27.9 mm (1.10 in.) height.
- be made by an ISO 9001 Certified Manufacturer

4.1.3.6 Multimedia Information Outlet Housings 4.1.3.6.1 Fiber Outlet Box

All multimedia/fiber outlet boxes must:

- be designed to mount to a recessed single gang electrical box.
- not extend further than 22.25 mm (.88 in) from wall surface.
- be available in black, white, gray, ivory and light ivory.
- be capable of accommodating up to 6 fiber or coaxial ports in addition to an industry standard single gang faceplate and outlets (not included).
- provide universal application/multi-vendor support.
- provide dust covers for unused ports.
- be capable of integrating fiber, UTP, ScTP and coax connectivity outlets.
- have the ability to remove the fiber cover without disturbing the copper single-gang faceplate and connectors.
- have the ability to remove the single gang faceplate without disturbing the fiber connections.
- have an optional extended cover for protecting external fiber connectors.

- provide universal (singlemode) adapter bezels to accommodate LC connections.
- have optional bezels available for coaxial applications.
- provide incoming fibers with strain relief in addition to storage and management for up to 1 meter (3.28 ft.) of slack for as many as 6 fibers while maintaining minimum bend radius requirements.
- have color-coded, snap-in icons for circuit identification.
- have write-on designation labels for circuit identification, with clear pressure release covers, compliant with TIA/EIA-606 administrative standards.
- be made by an ISO 9001 Certified Manufacturer

***Commscope HD-1U-FX, UD-2U-FX, or UD-4u-FX are required for Fiber LIU's with 360DPis-LC-SM Modules used for termination.**

4.1.4 Telecommunications Closets

The Telecommunications Closet is generally considered to be a floor serving facility. The Horizontal Cross-connect links the Horizontal Subsystem and the Backbone Subsystem together. The Horizontal Cross-connect must consist of rack or wall mounted wiring blocks or panels for termination of copper cables or rack or wall mount interconnect centers or fiber management panels/trays for the termination of Singlemode optical fibers. Cross-connect spaces include the labeling of hardware for providing circuit identification and patch cords or cross-connect wire used for creating circuit connections at the cross-connect.

The telecommunications closet must be equipped to contain telecommunications equipment, cable terminations, and associated cross-connects.

Separation from sources of EMI must be in accordance with ANS/TIA-569-D and local codes.

Communication grounding / earthing and bonding must be in accordance with applicable codes and regulations. It is recommended that the requirements of IEC 61000-5-2 – Ed 1.0, ANSI/TIA-607-C, or both be observed throughout the entire cabling system.

The telecommunications closet must not be shared with building services that may interfere with the telecommunications systems or be used for custodial services. (Exceptions to this for leased spaces will be approved on a case-by-case basis via written approval from DIS Senior Mgmt.)

Lighting in the telecommunications closet must be a minimum of 500 lx (50-foot candles) at the lowest point of termination.

A minimum of two dedicated duplex or two dedicated simplex electrical outlets, each on a separate circuit, must be provided for equipment power. Additional convenience duplex outlets should be placed at 1.8 m (6 ft.) intervals around the perimeter walls.

***Commscope HD-1U-FX, UD-2U-FX, or UD-4u-FX are required for Fiber LIU's with 360DPis-LC-SM Modules used for termination.**

4.1.4.1 Copper Termination Patch Panels (UTP/ScTP)

The termination panels must support the appropriate Category 6 media/applications and facilitate cross-connection and inter-connection using modular Category 6 patch cords. The panels must be sized to fit an EIA standard, 19-inch relay rack, or be capable of mounting to a wall.

4.1.4.1.1 Modular Patch Panel

The panel must:

- be made of black anodized aluminum in 24- and 48- ports configurations.
- have cutouts to fit the variety of information outlets used at the work area, supporting UTP, ScTP, LC fiber adapters, as well as coaxial applications.
- have cutouts which allow terminated jacks to pass through the panel for easy rearrangement.
- be available in two sizes for each port quantity to allow for custom administration of the network.
- have changeable ports which are removed from the front of the panel to allow custom configuration or modification to the panel.
- be available with no ports to act as a filler between rack hardware and equipment.
- have port identification numbers provide on both the front and rear of the panel.

Electrical Specifications:

- be consistent with the electrical specifications of the work area outlets specified in sections 4.1.3.2.1 and 4.1.3.2.2 above.
- be made by an ISO 9001 Certified Manufacturer.

4.1.4.1.2 Patch Panel (High Density)

The panel must:

- be made of black anodized aluminum, in 24 - and 48-port configurations.
- accommodate at least 24 ports for each rack mount space (1rms = 44.5 mm [1.75 in.]).
- have circuit boards tested in both directions as required by ANSI/TIA-568-C.2 and ISO/IEC 11801:2011 Ed 2.2.
- have Category 6 jacks available in both T568A and T568B wiring schemes, with 310-style termination.
- allow for a minimum of 200 re-terminations without signal degradation below standards compliance limit.
- have modular ports compliant with FCC CFR 47-part 68 subpart F and IEC 60603-7 with 50 micro inches of gold plating over nickel contacts.
- be fully enclosed front and rear for physical protection of printed circuit board.
- have cable tie eyelets and a rear cable management bar for strain relief.
- have port identification numbers on both the front and rear of the panel.

- have an optional adhesive circuit identification and color coding designation strips provided with the panel.
- provide self-adhesive, clear label holders and white designation labels with the panel, with optional color labels available.
- be available in a 24-port ScTP version which exceeds the transfer impedance requirements of ISO/IEC 11801. This panel must accept two types of cable preparation for termination.
- accept 110 style patch plugs as a means of termination.

Electrical Specifications (continues next page):

Parameters	Worst	Typical
Insertion Loss (dB)	0.13	0.15
NEXT* (dB)	0.75	4.0
FEXT* (dB)	2.0	4.9
RETURN LOSS (DB)	6.5	8.0

* **Tested in both Differential and Common modes**

4.1.4.1.3 Modular Patch Panel (High Density)

The panel must:

- be made of black, light weight, high strength brushed aluminum in 24- and 48-port configurations.
- have openings to fit the variety of information outlets used in the work area supporting UTP, ScTP, fiber LC adapters, as well as coaxial applications, each opening can handle four or six jack modules.
- have openings which allow terminated jacks to pass through panel for easy rearrangement.
- have port identification numbers on both the front and rear of the panel.
- provide for proper termination and grounding of 100 Q ScTP cable.
- accommodate at least 24 ports for each rack mount space (1rms = 44.5 mm [1.75 in.]).
- be available with an integrated rear wire management bar.
- be provided with self-adhesive, clear label holders and white designation labels.
- also be available with no ports to act as a filler between rack hardware and equipment.
- have mounting slots compatible with CEA-310-E.

Electrical Specifications:

- be consistent with the electrical specifications of the work area outlets specified in section 4.1.3.3.1 above.

- be made by an ISO 9001 Certified Manufacturer.

4.1.4.2 Cross-connect (Jumper) Wire and Patch Cords

The type of cross-connect and or patch cords used must meet or exceed the same category rating of connecting hardware installed.

4.1.4.2.1 Patch Cords

Where applicable, the contractor must supply patch cords (factory assembled plug-ended jumpers) for patch panel and terminal blocks.

4.1.4.2.1.1 Modular Patch Cords: Category 6

All Category 6 compliant, modular equipment cords must:

- Be factory assembled and 100% transmission tested with laboratory grade network analyzers for proper performance up to 250 MHz
- Be backwards compatible with lower performing categories (Category 5e, 5, etc...) Be equipped with identical modular 8-position plugs on both ends, wired straight through with standards compliant wiring
- Utilize patented metallic isolator shields pairs inside plug for optimum NEXT performance and a 360-degree crimp for providing excellent plug-to-cable strain relief without causing pair deformation
- Obtain the required performance without use of printed circuit board components Incorporate internal stranded cordage isolator within a round, flame-retardant jacket to provide extended flex life and maintain ideal pair geometry
- Use bend relief compliant boots (with optional color-coded icons) to ensure proper Category 6 performance and feature a latch guard to protect against snagging
- Use modular plugs which exceed FCC CFR 47-part 68 subpart F and IEC 60603-7 specifications, have 50 micro-inches minimum of gold plating over nickel contacts and are resistant to corrosion from humidity, extreme temperatures, and airborne contaminants
- Be available in standard lengths of 1', 3', 5', 7', 10', and 15' with custom lengths available upon request
- Offer multiple cable colors (with color matching boots) in standard colors. Yellow cable color for data configurations.
- Be certified by Underwriters Laboratories to United States Standards and C22.2 Canadian Telecommunications Standards

Meet the following performance specifications:

Frequency (MHz)	Attenuation (dB/100m)	PS ELFEXT (dB)	PS NEXT (dB)
1	2.4	67.8	72.3
4	4.5	55.8	63.3
10	7.1	47.8	57.3
16	9.1	43.7	54.2
20	10.2	41.8	52.8
31.25	12.8	37.9	49.9
50	18.5	31.9	45.4
100	23.8	27.8	42.3
200	34.8	21.8	37.8
250	39.4	19.8	36.3

4.1.4.2.1.2 Fiber Patch Cords (Jumpers)

Fiber equipment cords must:

- be available in standard lengths of 1, 3 and 5 meters. Custom lengths must also be available, and must meet or exceed standards as defined in ANSI/TIA-568-C.3 and ISO/IEC 11801:2011 Ed 2.2.
- be either simplex or duplex OFNR riser grade cable, with attenuation at wavelength 1310 nm being 1.0 dB/km and at wavelength 1550 nm 1.0 dB/km.
- cable jacket color must be yellow. The connectors must be LC in accordance with TIA/EIA-568-A and must include a ceramic ferrule.
- be terminated with ceramic tip connectors in the standards based LC style. These connectors must have a maximum attenuation of 0.5dB and a minimum return loss of 40dB.
- be made by an ISO 9001 Certified Manufacturer.
- be UL 1666 approved.

4.1.4.3 Frames

4.1.4.3.1 Standard Floor Distribution Frame

For rack mounted installations in a telecommunication closet the installer must use a 19 in x 7 ft. 4-post equipment rack. The rack must:

- have 76 mm (3 in) by 152 mm (6 in) vertical cable channels as side rails.
- have channels capable of utilizing and re-locating up to ten reusable hook and loop cable managers.
- have ten high capacity cable managers provided for the front of the rack which can be used for horizontal or vertical cable management and easily twist and lock into place without the use of screws or tools.
- have standard CEA-310-E mounting holes and cable routing openings in the front, rear and side of the channels.
- be made of aluminum.

- have two optional vertical cable management channels 152 mm (6 in) x 2.1 m (7 ft.) and 76 mm (3 in) x 2.1 m (7 ft.) which can be located between racks. The channel must include cable retainers which can be hinged left or right and be located in any position along the channel.
- have floor mounting holes and a ground lug for 0-6-gauge ground cable provided.
- be made by an ISO 9001 Certified Manufacturer

4.1.4.3.2 Wall Mounting Brackets

Wall brackets must:

- be constructed as a single piece.
- be available in 2, 3, 4 and 6 rack mount spaces, but be designed in 1 rms increments.
- be hinged on one side with standard CEA-310-E mounting holes. –
- mount standard 19-inch patch panels.
- mount with the hinge to the right or the left.
- be able to mount to a standard 19-inch rack.
- have a cable access hole in the rear support.
- be 150mm (6 in) deep.
- be made by an ISO 9001 Certified Manufacturer

‡ Listed below are some of the requirements for cable installation; however, full adherence to the TIA-568 Standard must be followed in all cable installations.

4.2 Backbone Cabling

Cables allowed for use in the backbone include: 4-pair 100 Ω unshielded / screened twisted-pair, 100 11 UTP multi-pair copper cables, and a minimum of 12 strands of 8.7-10 micron Singlemode optical fiber cables with a minimum of 6 terminated. MDF closets should have a minimum of 24 strands of 8.7-10 micron singlemode Optical Fiber with a minimum of 24 strands terminated. The cable must support voice, data and imaging applications. The bending radius and pulling strength requirements of all backbone cables must be observed during handling and installation.

4.2.1 Intrabuilding

The cable route within a building connecting closet to closet or closet to the equipment room is called the Intrabuilding Backbone Subsystem. It links the Main Distribution Frame (MDF) in the equipment room to Intermediate Distribution Frame (IDF) in the Telecommunications Closets (TC). It consists of the backbone transmission media between these locations and the associated connecting hardware terminating this media.

4.2.1.1. Cable Types

4.2.1.1.1 Copper - 4-pair UTP

UTP cables must be manufactured by one of the following:

- Siemen

- Berk-Tek
- be 100 Ω 4-pair Category 6 cable.
- be appropriate for the environment in which it is installed.

4.2.1.1.2 Copper (4-pair ScTP)

ScTP cables must

- be manufactured by one of the following: Siemen, Berk-Tek, CommScope
- be 100 Ω 4-pair Category 6 cable.
- meet the requirements of ANS/TIA-568-D.0 and ISO/IEC 11801:2011 Ed 2.2.
- meet the same transmission requirements of UTP as specified in ANSI/TIA-568-C.2 and ISO/IEC 11801:2011 Ed 2.2.
- be appropriate for the environment in which it is installed.
- be grounded at one end in the telecommunications closet.

4.2.1.1.3.1 Fiber Connectors

As of April 2017, UMMC does not support the installation of ST/SC Connectors on Fiber Terminations or the use of multimode Fiber. All Terminations should follow the specifications outlined in section 4.2.1.1.3.1.1.

4.2.1.1.3.1.1 Fiber (8.7-10/125 Micron Singlemode)

Singlemode optical fiber cable must:

- be manufactured by one of the following: Siemen, Berk-Tek, CommScope, Corning
- be appropriate for the environment in which it is installed.

4.2.1.2 Cable Routing

The backbone subsystem must include cable installed in a vertical manner between floor IDF and the MDF in a multi-story building and cable installed horizontally between the IDF and MDF in a long single-story building like a school or factory.

Unless otherwise recommended by the manufacturer, all fiber cables will be run in innerduct. Fibers will be terminated in the TC's using LC connectors in wall mounted Interconnect Centers (See LIU Standards) or rack mounted panels equipped with sufficient ports, slack storage space and splice trays if required to terminate and secure all fibers.

Adequate riser sleeve/slot space must be available with the ability to ingress the area at a later date, in all TCs such that no drilling of additional sleeves/slots is necessary.

The backbone cables must be installed in a star topology, emanating from the MDF to each IDF.

Backbone pathways must be installed or selected such that the minimum bend radius of backbone cables is kept within manufacturer specifications both during and after installation.

***Commscope HD-1U-FX, UD-2U-FX, or UD-4u-FX are required for Fiber LIU's with 360DPis-LC-SM Modules used for termination.**

4.2.1.2 Cabling of Leased Spaces

Pre-existing cabling of Leased Spaces may differentiate from the DIS Cabling Standard guidelines, but must be approved on a case-by-case basis via written approval from DIS Senior Management prior to acceptance of Lease. Leased area must at least meet the IEEE Standards of Category 5e cabling or new cable must be budgeted for.

If Cabling does not meet at least Category 5e specifications, new cabling must be run in accordance with the UMMC Cabling Standards in section 4.1.3.5.1.1.

4.2.2 Interbuilding

When a distribution system encompasses more than one building, the components that provide the link between buildings constitute the Interbuilding Backbone Subsystem. This subsystem includes the backbone transmission media, associated connecting hardware terminating this media, and electrical protection devices to mitigate harmful voltages when the media is exposed to lightning and/or high voltage power surges that pass through the building cable. It is normally a first-level backbone cable beginning at the MDF in the equipment room of the hub building and extending to the IDF in the equipment room of a satellite building.

4.2.2.1 Cable Types

The Interbuilding media chosen must be suitable for the environment in which it is installed and provide the appropriate protection for the environment. Four-pair, 100 S2 unshielded / screened twisted-pair, 100 SI UTP multi-pair copper cables, and 8.7-10/125-micron Singlemode optical fiber cables must be used as the backbone cables. The cable must support voice, data and imaging applications.

Interbuilding backbone cable types must be as specified in section 4.2.1.1 Intrabuilding.

4.2.2.2 Cable Routing

The backbone subsystem must include cable installed between buildings via underground, tunnel, direct buried, aerial or any combination of these from the MDF to an IDF in a multi-building campus.

Unless otherwise recommended by the manufacturer, all fiber cables will be run in innerduct. Fibers will be terminated in the TC's using LC connectors in wall mounted Interconnect Centers or rack mounted panels equipped with sufficient ports, slack storage space and splice trays if required to terminate and secure all fibers.

In an underground system, adequate underground conduit space must be available and accessible at each building. The conduits must not exceed a 40% fill factor. All underground systems must be designed to prevent water runoff from entering the building.

The backbone cables must be installed in a star topology, emanating from the MDF to each satellite building telecommunications closet. All Interbuilding cables must be installed to the applicable codes and regulations.

Singlemode Optical fiber must be run for all Interbuilding backbone segments.

Backbone pathways must be installed or selected such that the minimum bend radius and pulling tension of backbone cables is kept within cable manufacturer specifications both during and after installation.

4.2.3 Equipment Room

The Equipment Subsystem consists of shared (common) electronic communications equipment in the equipment room or telecommunications closet and the transmission media required to terminate this equipment on distribution hardware.

The equipment room must be equipped to contain telecommunications equipment, cable terminations, and associated cross-connects.

Separation from sources of EMI must be as specified, in section 4.3.2.2.

Communication grounding / earthing and bonding must be in accordance with applicable codes and regulations. It is recommended that the requirements of IEC 61000-5-2, ANSI/TIA-607-C, or both be observed throughout the entire cabling system.

The equipment room must not be shared with building services that may interfere with the telecommunications systems or be used for custodial services.

Lighting in the equipment room must be a minimum of 500 lx (50-foot candles) at the lowest point of termination.

A minimum of two dedicated duplex or two dedicated simplex electrical outlet each on a separate circuit must be provided for equipment power. Additional convenience duplex outlets should be placed at 1.8 m (6 ft.) intervals around the perimeter walls.

4.2.3.1. Copper Connecting Hardware and Patch Cords

Specifications can be found in the Horizontal sections 4.1.3 and 4.1.4.

4.2.3.2. Fiber Connecting Hardware and Patch Cords

Specifications can be found in the Horizontal sections 4.1.3 and 4.1.4.

4.2.3.2.1 Singlemode Fiber Patch Cords

All singlemode fiber optic patch cords must:

- be either simplex or duplex OFNR riser grade cable, with attenuation at wavelength 1310 nm being 1.0 dB/km and at wavelength 1550 nm 1.0 dB/km.
- have a yellow jacket.

- be terminated with ceramic tip connectors in the standard based LC style. These connectors must have a maximum attenuation of 0.5dB and a minimum return loss of 40dB.
- be made by an ISO 9001 Certified Manufacturer.
- be UL 1666 approved.

4.3 Installation

4.3.1 Site Survey

Prior to placing any cable pathways or cable, the contractor must survey the site to determine job conditions will not impose any obstructions that would interfere with the safe and satisfactory placement of the cables, and to arrange the removal of any obstructions with the Project Manager accordingly.

4.3.2 Physical Installation 4.3.2.1 Cable Pathways

Pathways must be designed and installed to meet applicable local and national building and electrical codes or regulations.

Grounding / Earthing and bonding of pathways must comply with applicable codes and regulations.

Pathways must not have exposed sharp edges that may come into contact with telecommunications cables.

The number of cables placed in a pathway must not exceed manufacture specifications, nor will the geometric shape of a cable be affected.

Pathways must not be located in elevator shafts.

4.3.2.2 Cable Routes and Clearances

Horizontal distribution cables must not be exposed in the work area or other locations with public access.

Cables routed in a suspended ceiling must not be draped across the ceiling tiles. Cable supports must be mounted a minimum of 12 inches above the ceiling grid supporting the tiles.

Cable supports in a suspended ceiling must be structurally independent of the suspended ceiling, its framework, or supports, and not be spaced more than 1.5 m (5 ft.) apart. (Example – J Hook wall hangers)

The installation of telecommunications cabling must maintain a minimum clearance of 3 m (10 ft.) from power cables in excess of 480 Vrms.

No telecommunications cross-connects must be physically located within 6 m (20 ft.) of electrical distribution panels, step down devices or transformers which carry voltages in excess of 480 Vrms.

4.3.2.3 Work Area Termination

All UTP/ScTP cables wired to the telecommunications outlet/connector must have 4-pairs terminated in eight-position, non-keyed modular outlets in the work area. All pairs must be terminated.

The telecommunications outlet/connector must be securely mounted at planned locations.

The height of the telecommunications faceplates must be to applicable codes and regulations.

4.3.2.4 Pulling Tension

The maximum cable pulling tensions must not exceed manufacturer's specifications.

4.3.2.5 Bend Radius

The maximum cable bend radius must not exceed manufacturer's specifications. In spaces with UTP/ScTP cable terminations, the maximum bend radius for 4-pair cable must not exceed four times the outside diameter of the cable and ten times for multi-pair cable. This must be done unless this violates manufacturer specifications.

During the actual installation, bend radius on 4-pair cable must not exceed eight times the outside diameter of the cable and ten times for multi-pair cable. This must be done unless this violates manufacturer specifications.

4.3.2.6 Slack

In the work area, a minimum of 300 mm (12 in) should be left for UTP/ScTP, while 1 m (3 ft.) is left for fiber cables.

In telecommunications closets a minimum of 3ft of slack should be left for all UTP cables. A minimum of 25 ft. of slack should be left for all Fiber Optic cables. This slack must be neatly managed on trays or other support types.

4.3.2.7 Cable Tie Wraps

Tie wraps must be used at appropriate intervals to secure cable and to provide strain relief at termination points. These wraps must not be over tightened to the point of deforming or crimping the cable sheath to prevent damaging the internal cables or fiber optics.

Velcro straps must be used in the telecommunications closets to secure cables in order to facilitate easy reconfiguration of the cable.

Hook and loop cable managers should be used in the closet where reconfiguration of cables and terminations may be frequent.

4.3.2.8 Grounding

All grounding / earthing and bonding must be done to applicable codes and regulations.

4.3.2.9 Fire protection

Properly installed firestop systems must be installed to prevent or retard the spread of fire, smoke, water, and gases through the building. This requirement applies to openings designed for telecommunications use that may or may not be penetrated by cables, wires, or raceways.

4.4 Testing

4.4.1 Testing Procedures

Testing of cable channels must be performed prior to system cut-over.

4.4.1.1 Copper Testing

All Category 6 field testing must be performed with an approved Level III balanced twisted-pair field test device.

All installed Category 6 channels must perform equal to or better than the minimum requirements as specified by the table below (next page):

Parameter	Performance	Performance	Performance
	@ 100MHz	@	@
Insertion Loss	20.3 dB	29.7 dB	33.7 dB
NEXT Loss	42.1 dB	37.5 dB	36.1 dB
PS NEXT Loss	40.6 dB	36.1 dB	34.6 dB
ACR	21.8 dB	7.8 dB	2.4 dB
PS ACR	20.3 dB	6.4 dB	0.9 dB
ELFEXT	23.9 dB	17.9 dB	15.9 dB
PS ELFEXT	20.9 dB	14.9 dB	12.9 dB
Return Loss	14.0 dB	11.0 dB	10.0 dB
Propagation	528 ns	527 ns	526 ns
Delay Skew	40 ns	40 ns	40 ns

Category 3, balanced twisted-pair horizontal and backbone cables, whose length does not exceed 90 m (295 ft.) for the basic link, and 100 m (328 ft.) for the channel must be 100 percent tested according to ANSI/TIA/EIA-568-B.1. Test parameters include wire map plus ScTP shield continuity (when present), insertion loss, length and NEXT loss (pair-to-pair). NEXT testing must be done in both directions.

All balanced twisted-pair backbone cables exceeding 90 m (295 ft.) or 100 m (328 ft.) must be 100% tested for continuity if applications assurance is not required.

Category 6 balanced twisted-pair horizontal and backbone cables, whose length does not exceed 90 m (295 ft.) for the basic link, and 100 m (328 ft.) for the channel must be 100 percent tested according to ANSI/TIA-568-C.2. Test parameters include wire map plus ScTP shield continuity (when present), length, NEXT loss (pair-to-pair), NEXT loss (power sum), ELFEXT loss (pair-to-pair), ELFEXT loss (power sum), return loss, insertion loss, propagation delay, and delay skew.

Test Equipment Criteria

All balanced twisted-pair field testers must be factory calibrated each calendar year by the field test equipment manufacturer as stipulated by the manuals provided with the field test unit. The calibration certificate must be provided for review prior to the start of testing.

Autotest settings provided in the field tester for testing the installed cabling must be set to the default parameters.

Test settings selected from options provided in the field testers must be compatible with the installed cable under test.

4.4.1.2 Fiber Optic Testing

Fiber horizontal and backbone cables must be 100% tested for length, polarity, and attenuation at 1310 nm or 1550 nm for the appropriate singlemode cable in at least one direction.

Length must be tested using an OTDR. The warranty offered must be for both link and/or channel coverage for horizontal and backbone cables. The testing performed must be done in accordance with the type of warranty required.

All fiber optic testing should be performed with a Fluke® OTDR or CertiFiber, or other approved device.

4.5. Administration Documentation

4.5.1 Labeling

4.5.1.1 Cables

Horizontal and backbone cables must be labeled at each end. The cable or its label must be marked with its identifier.

4.5.1.2 Faceplates

A unique identifier must be marked on each faceplate to identify it as connecting hardware.

Each port in the faceplate must be labeled with its identifier. Each faceplate must be labeled as follows:

TC Room Number "-" Patch Panel Number "-" Port Number

Eg. N174-2-47, this faceplate label would indicate that this outlet is terminated in TC room number "N174", on the patch panel numbered "2", and in port 47.

Patch panels are number numerically and sequentially, starting at one (1) from top to bottom.

Patch Panels will be labeled when installed with a "Tested On" Date in the following format (Month,Date,Year)

4.5.1.3 Racks, Panels, Blocks

A unique identifier must be marked on each piece of connecting hardware to identify it as connecting hardware.

Each port on the connecting hardware must be labeled with its identifier.

4.5.2 Drawings

As-built drawing must be supplied by the contractor showing the locations of and identifiers for all:

- Horizontal cable routing and terminations
- Telecommunications outlets/connectors
- Backbone cable routing and terminations
- Wall, ceiling, and floor penetrations

4.5.3 Records

All records must be created by the installation contractor and turned over to owner at the completion of work. The format must be computer based and both soft copies and hard copies must be part of the As-built package. The minimum requirements include:

Each closet must have a documented chart that matches Patch Panel and port to a room number that the work area end is terminated in. See section 4.5.3.1 for an example chart.

Cable records must contain the identifier, cable type, length, termination positions at both ends, manufacturer, and part number.

Connecting hardware records must contain the identifier, type of hardware and the amount of positions.

Connecting hardware positions records must contain the identifier, type of position, and the cable identifier attached to it.

All UTP tests should be delivered in CSV electronic form and in printed report form.

Test documentation on all cable types must be included as part of the As-built package.

4.5.3.1 Example Documentation Chart WIRING CLOSET # H200

Patch Panel Number	Port Number	WA Room Number
1	1	H260
1	2	H261
1	...	
1	48	H299
2	1	H300
2	2	H301
2		
2	48	H399

General Patch Cable Requirements

1. Patch Cable Color Code

Category 6 Cable (copper)

Color	Description
Red	Used for network switch to network switch connections on the network. Some of the newer switches can eliminate this cable because it is done internally. Sometimes called a "Ethernet crossover cable". *No longer used
Orange	Network connections for the remote card access systems throughout the UMC's main campus and parts of the Jackson Medical Mall.
Yellow	Generally used for data network connections to the campus network system. Cable is used to connect PCs, printers, IP cameras, and any other network dependent device to the network.
Green	Voice-over-IP (VoIP) telephone connection to a network switch. The customer facing end is green and the wiring closet color is yellow. This color does not apply to analog telephones.
Blue	Used for Johnson Controls and other Vendors for Door Access and NAE/NCE Environmental Monitors
Violet	Used in some areas for Access Point Patch Cables and/or Basic Sciences
Pink	Analog telephone connections for network devices or interfaces. This is not for the telephone handset on personnel's desk.
White	No longer used
Gray	Generally used for older analog telephone connections to the campus telephone system.

Fiber Optics Cable (single and multi-mode)

Color	Description
Red	MM/SM fiber used to make data connections from fire panel to fire panel or other emergency systems requiring fiber connections. UMC's fire system is on an isolated fire loop around the main campus.
Orange	Multi-mode fiber cable (MM) - data network connections *See section 4.1.1.3
Yellow	Single-mode fiber cable (SM) - for data network connections
Green	Currently not designated for anything.
Blue	MM fiber used to connect Physical Facilities systems throughout the campus back to Physical Facilities for monitoring. An example of a environmental system would be the main campus building's HVAC system.
Violet	Currently not designated for anything.
Pink	Currently not designated for anything.
White	Close-circuit security cameras that require the fiber infrastructure to transmit video to UMC Campus police.

2. UMMC Cable Labeling

This standard sets requirements for the network and telephone cabling colors and labeling for UMMC.

2.1 Items to label

The following cable types and equipment must be labeled:

Fiber optics riser and patch cables CATx copper riser and patch cable Telephone riser and patch cables

2.2 Label description for documenting cable

For usability and durability, labels require the following specifications:

- 1) The label should be highly resistant to wear and tear, fluctuating temperatures, chemicals, solvents, water, and UV-light
- 2) Label size should be 37mm x 25.4mm or 1.46" x 1"
- 3) Labels should be printed from an industrial type label printer
 - a. Examples:
 - DYMO Rhino Pro 5200
 - Brother PT - 7600

2.3 Label content

The following information is required on cable labels:

- 1) Source Rack Number/Rack Unit space/Port #

2) Destination Rack Number/Rack Unit space/Port #

Example 1: C6/30/U2 C8/28/D5

Where source is rack C6, rack unit number 30, uplink port 2 on the Nexus 2000 switch and destination is rack C8, rack unit number 28, downlink port 5 on the Nexus 5000 switch

Example 2: C15/1/C1-17 F14/30/B8

Where source is rack C15, rack unit numbers 1-10, port 17 on the C1 column of the blade chassis and destination is rack F14, rack unit numbers 30-42, port 8 on the Bottom row of the DCX.

Note: Rack U number designated is always the lowest number of the piece of equipment. In the example above, the blade chassis utilizes U numbers 1-10 but only U number 1 is on the label.

All Panel Labels will be labeled with a "Tested On" Date indicating the date the cable(s) was tested and determined as "good".

Approval

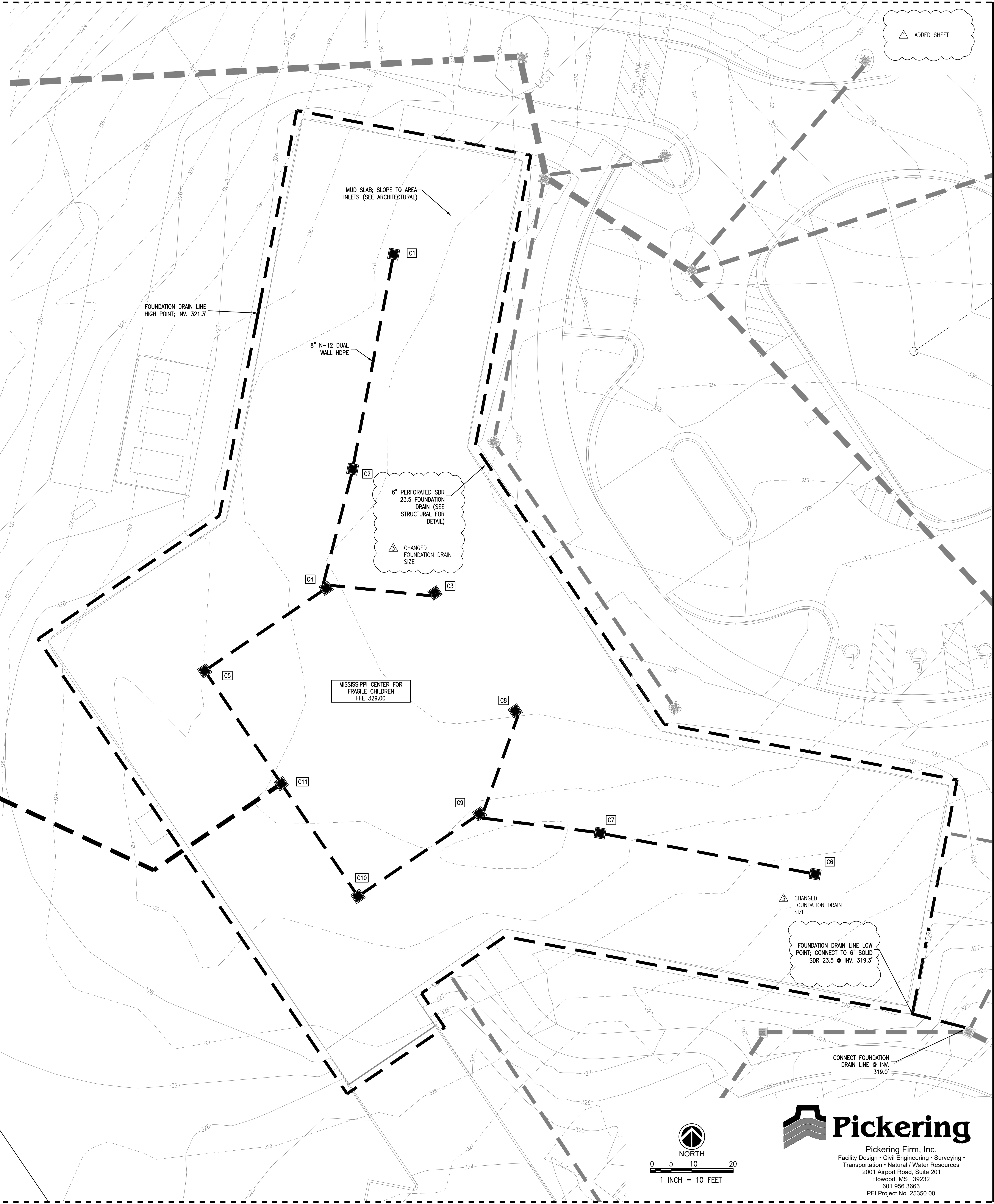
Manager Data and Voice Communications	Allen Williams		
Director, IT Enterprise Serv & Int	Russ Donald		
CTO	Kevin Yearick		

GRADING AND DRAINAGE NOTES:

- EARTHWORK OPERATIONS SHALL BE PERFORMED PER THE RECOMMENDATIONS OF THE GEOTECHNICAL INVESTIGATION, REPORT NO. 180424 PREPARED BY BURNS COOLEY DENNIS, INC. DATED OCTOBER 1, 2018.
- ALL AREAS SHALL BE COMPACTED PER THE RECOMMENDATIONS OF THE GEOTECHNICAL INVESTIGATION REPORT PREPARED BY BURNS COOLEY DENNIS, INC (98% STANDARD PROCTOR (ASTM D-698) AND ±3% OPTIMUM MOISTURE CONTENT). ALL EFFORTS AND COSTS ASSOCIATED WITH PROCESSING AND/OR DRYING OUT OVER SATURATED SUITABLE MATERIAL IN ORDER TO ACHIEVE OPTIMUM MOISTURE AND COMPACTION SHALL BE INCLUDED IN THE UNIT PRICE FOR UNCLASSIFIED EXCAVATION, OR OTHER ITEMS. THIS SHALL BE NO ADDITIONAL COST TO THE OWNER.
- SUBGRADES SHALL BE PROOF-ROLLED WITH A LOADED DUMP TRUCK TO DETECT ZONES OF UNSUITABLE AND/OR EXCESSIVELY WET SOILS. IF PUMPING BEGINS, COMPACTION SHALL BE STOPPED IMMEDIATELY AND RESUMED ONLY WHEN THE MATERIAL IS SUFFICIENTLY DRY THAT PUMPING DOES NOT OCCUR.
- GRADING SHALL PROVIDE POSITIVE DRAINAGE AWAY FROM BUILDING PERIMETER.
- SEE SHEET C1.0 FOR ADDITIONAL GRADING AND DRAINAGE NOTES.
- SEE SHEET C4.0 FOR SITE GRADING.
- SEE ARCHITECTURAL FOR MUDSLAB DESIGN AND ELEVATIONS.

CRAWLSPACE DRAINAGE - PIPE DATA						
FROM	INV. ELEV.	TO	INV. ELEV.	PIPE SIZE (IN.)	SLOPE (%)	LENGTH (FT.)
C1	320.30	C2	320.04	8" N-12 DUAL WALL HDPE	0.51	51
C2	320.04	C4	319.89	8" N-12 DUAL WALL HDPE	0.54	28
C3	320.04	C4	319.89	8" N-12 DUAL WALL HDPE	0.60	25
C4	319.89	C5	319.71	8" N-12 DUAL WALL HDPE	0.55	33
C5	319.71	C11	319.54	8" N-12 DUAL WALL HDPE	0.52	31
C6	320.30	C7	320.04	8" N-12 DUAL WALL HDPE	0.51	51
C7	320.04	C9	319.89	8" N-12 DUAL WALL HDPE	0.54	28
C8	320.04	C9	319.89	8" N-12 DUAL WALL HDPE	0.60	25
C9	319.89	C10	319.71	8" N-12 DUAL WALL HDPE	0.55	33
C10	319.71	C11	319.54	8" N-12 DUAL WALL HDPE	0.55	31
C11	318.14	C12	317.00	12" HP STORM	0.50	228

CRAWLSPACE DRAINAGE - STRUCTURE DATA				
STRUC. NO.	STRUC. TYPE	TOPOGRADE ELEV.	INVERT ELEV.	
C1	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	320.30	
C2	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	320.04	
C3	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	320.04	
C4	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	319.89	
C5	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	319.71	
C6	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	320.30	
C7	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	320.04	
C8	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	320.04	
C9	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	319.89	
C10	12" PVC DRAIN BASIN (STANDARD TOP)	321.80	319.71	
C11	15" PVC DRAIN BASIN (STANDARD TOP)	321.80	318.14	
C12	PIPE END	-	317.00	

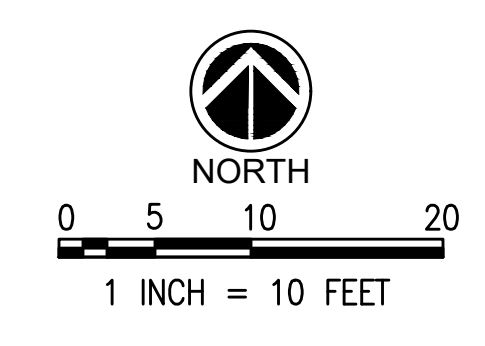


△ ADDED SHEET

6" PERFORATED SDR 23.5 FOUNDATION DRAIN (SEE STRUCTURAL FOR DETAIL)
 △ CHANGED FOUNDATION DRAIN SIZE

△ CHANGED FOUNDATION DRAIN SIZE
 FOUNDATION DRAIN LINE LOW POINT; CONNECT TO 6" SOLID SDR 23.5 @ INV. 319.3'

CONNECT FOUNDATION DRAIN LINE @ INV. 319.0'



Pickering
 Pickering Firm, Inc.
 Facility Design • Civil Engineering • Surveying •
 Transportation • Natural / Water Resources
 2001 Airport Road, Suite 201
 Flowood, MS 39232
 601.956.3663
 PFI Project No. 26350.00

E B D
 Eley | Barkley | Dale PA
 One Jackson Place
 Suite 250
 188 E. Capital Street
 Jackson, MS 39201-2100

Professional Engineer
 License No. 17153/23
 State of Mississippi

THE UNIVERSITY OF MISSISSIPPI
MEDICAL CENTER

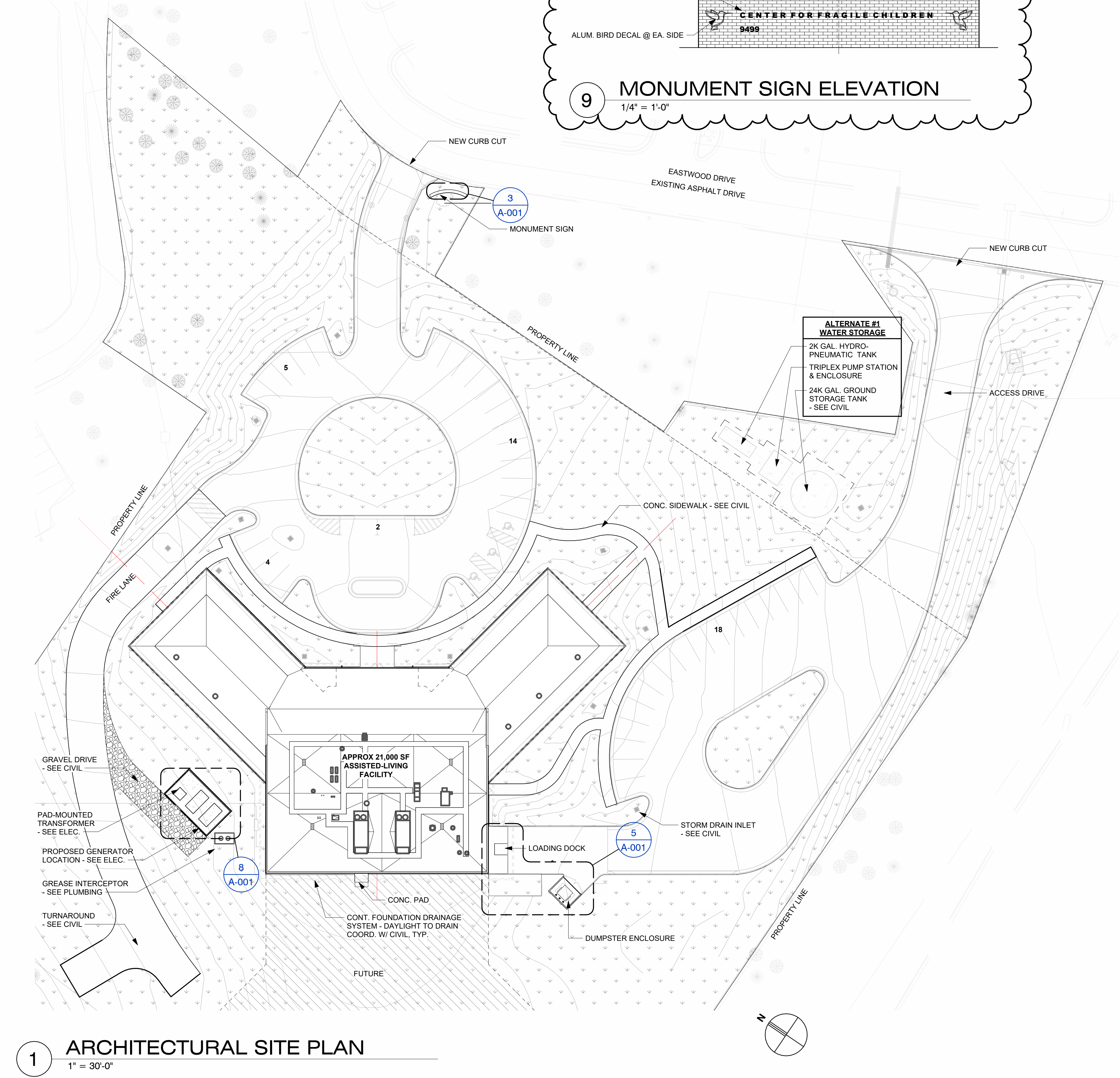
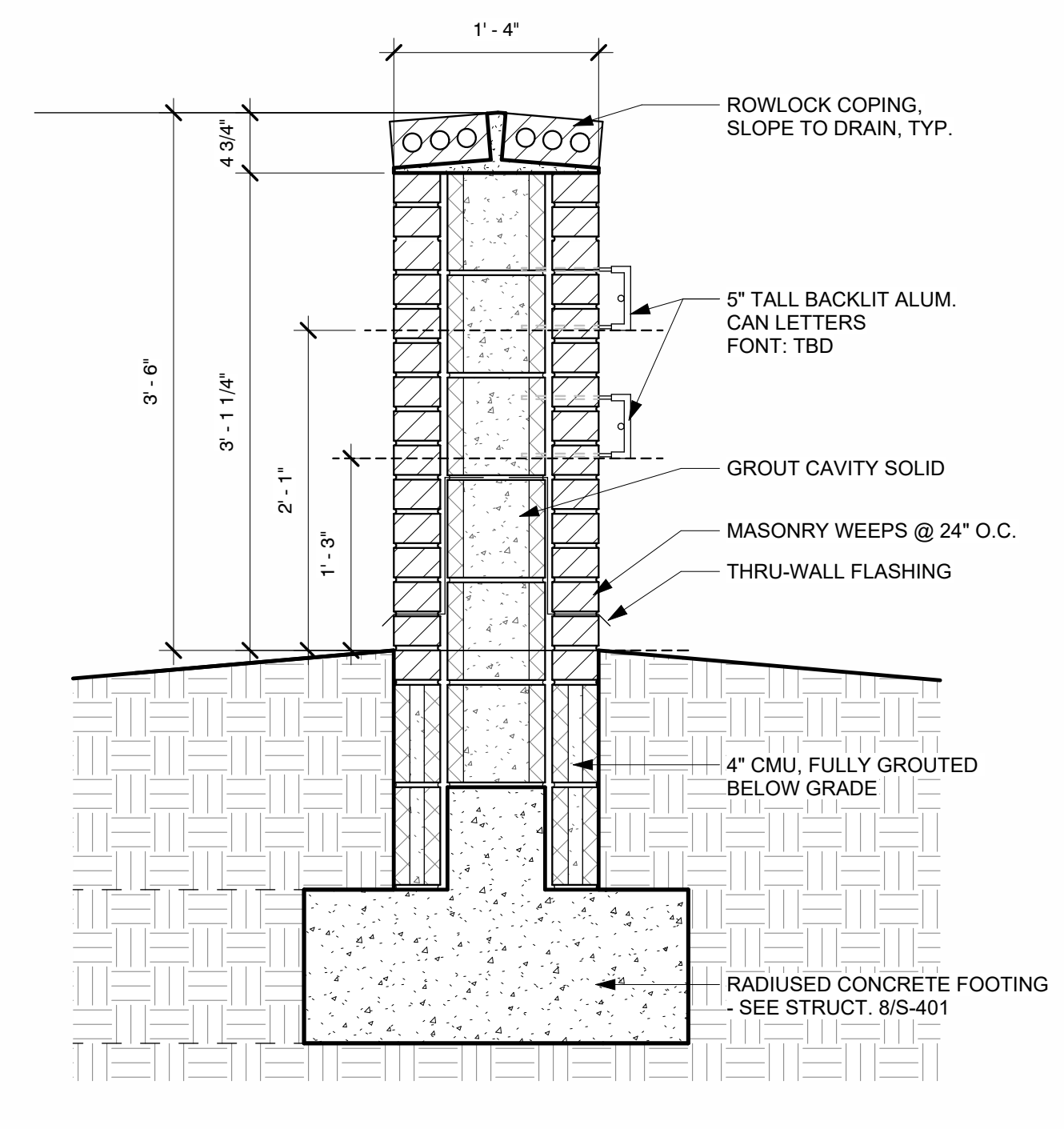
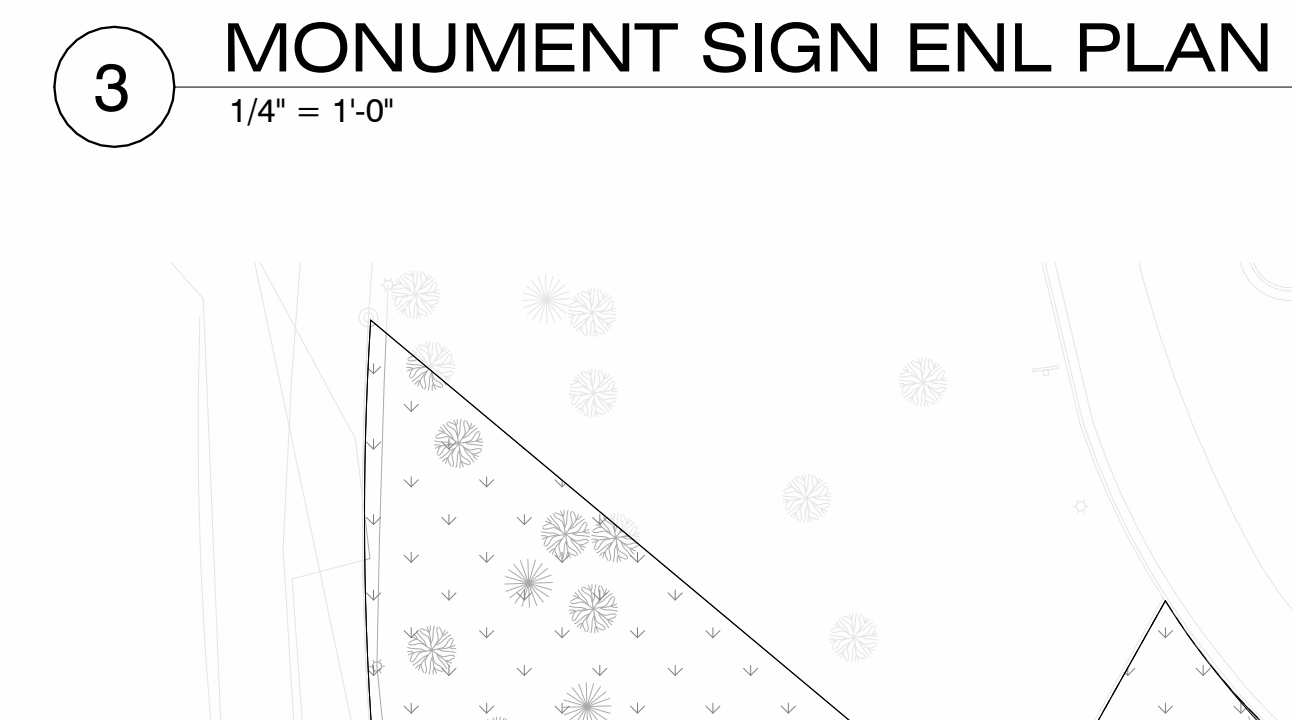
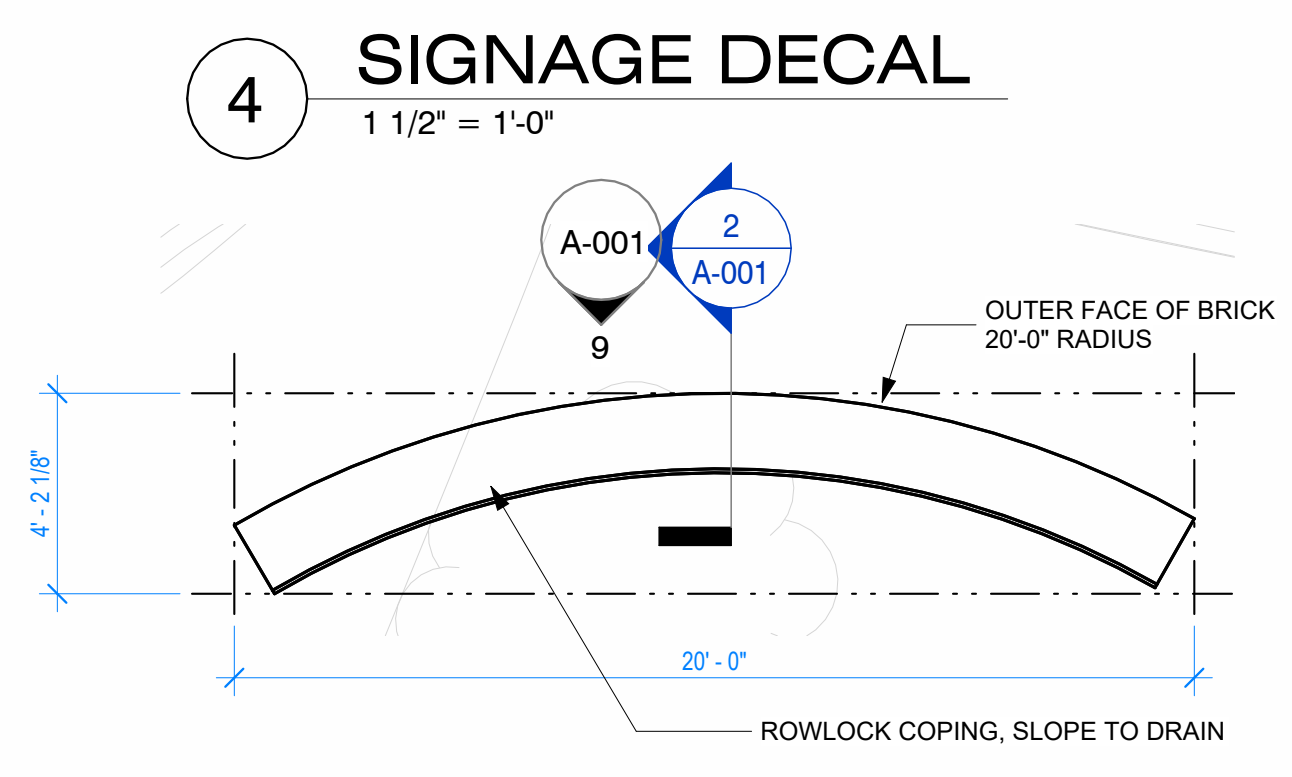
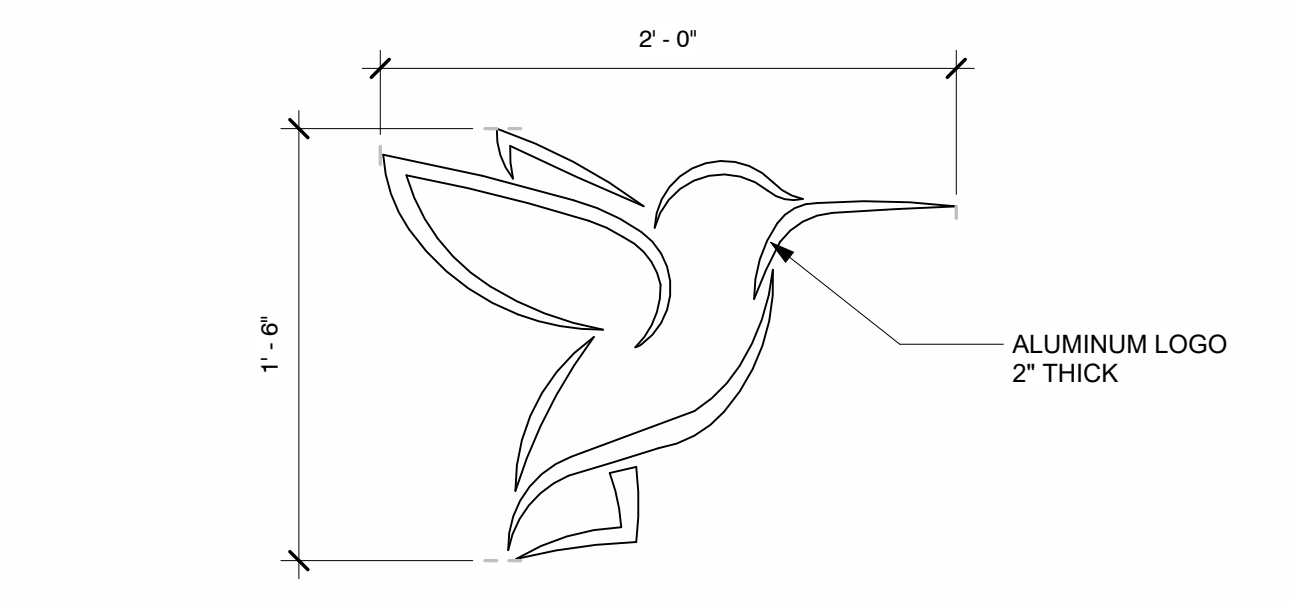
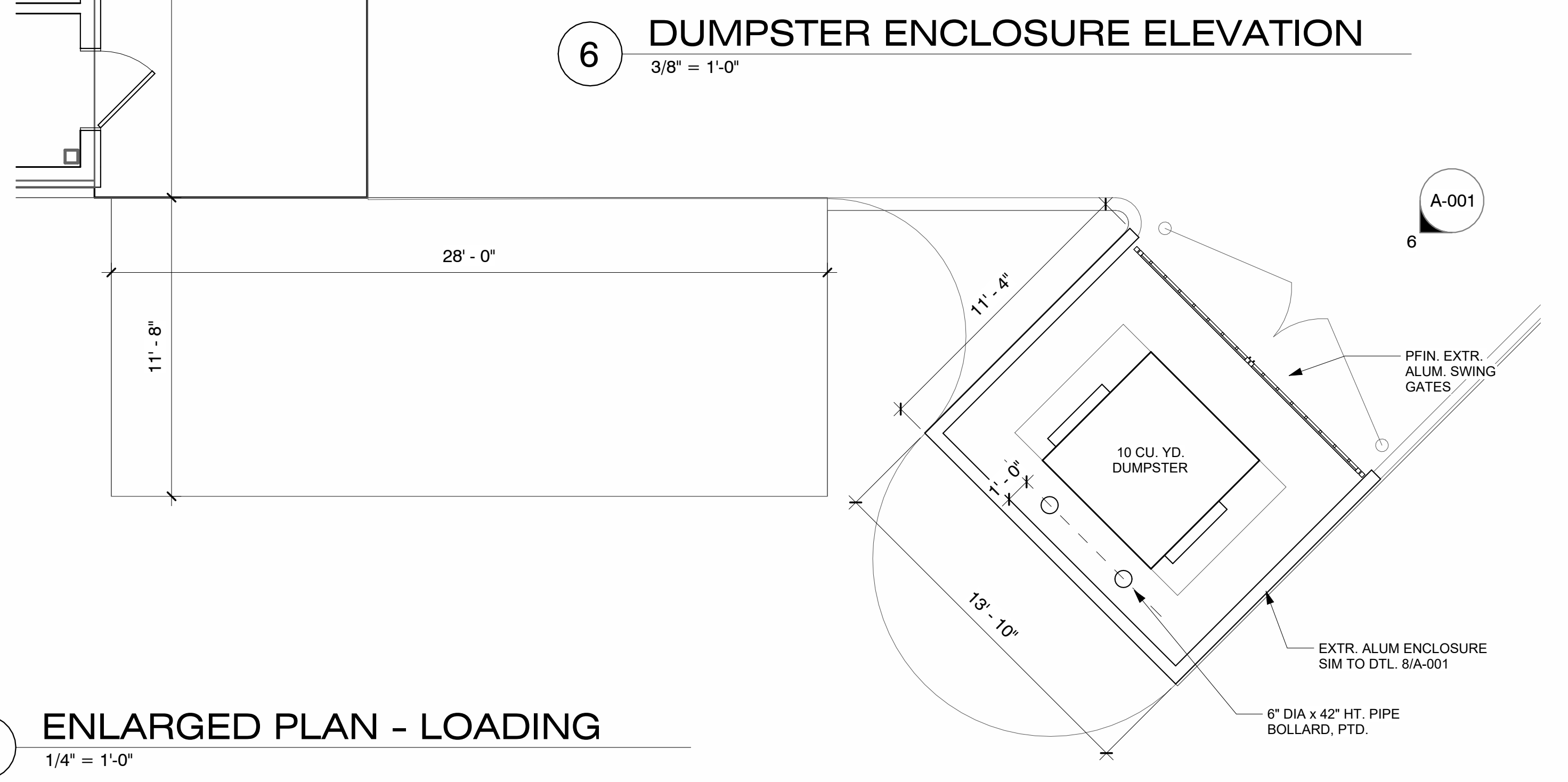
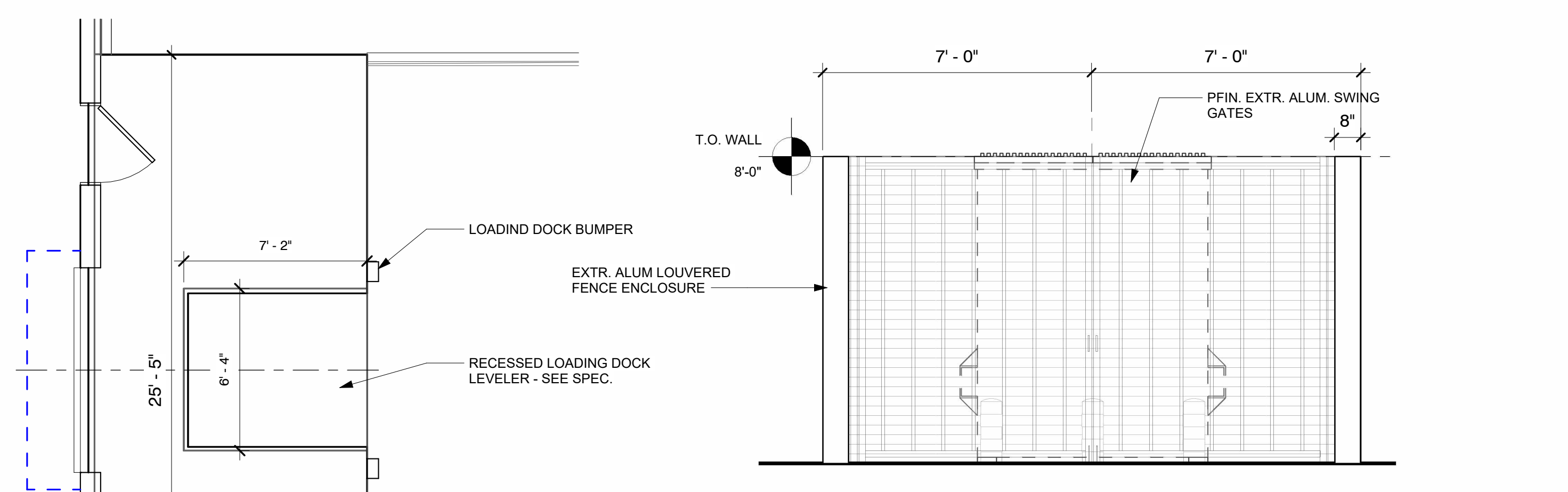
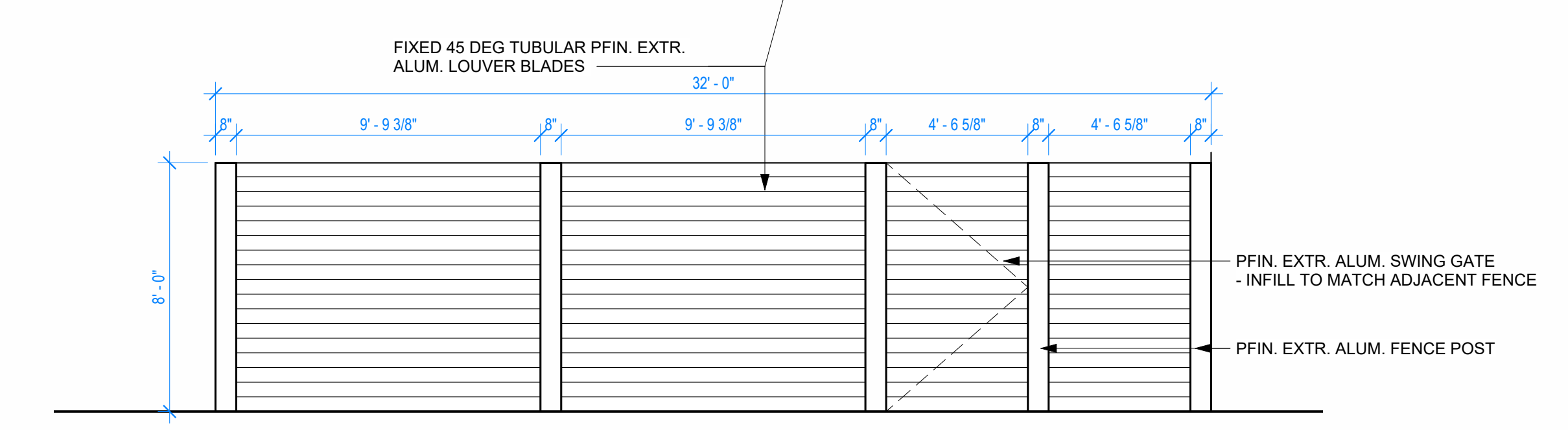
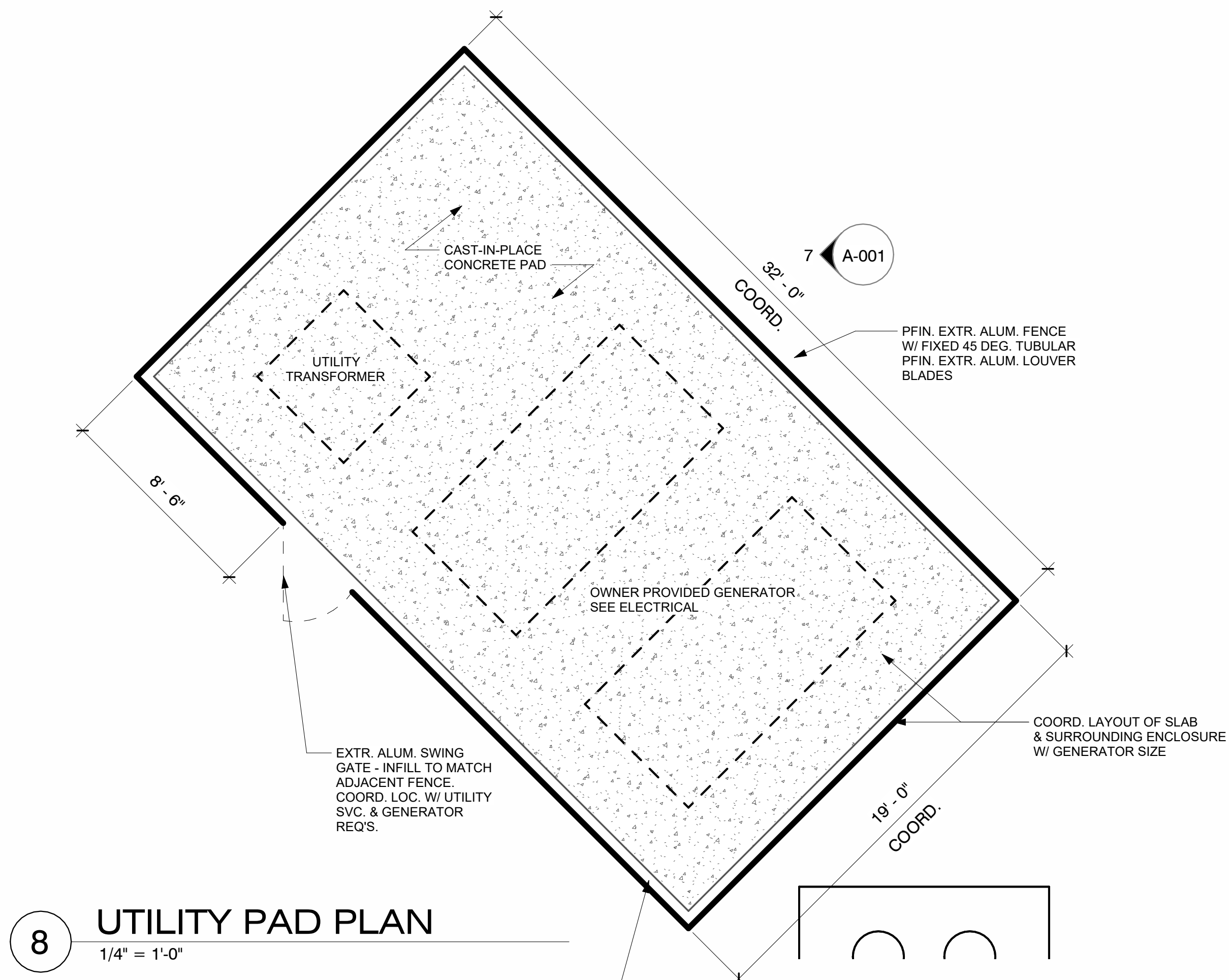
**Mississippi Center for
 Fragile Children**
 Jackson, MS

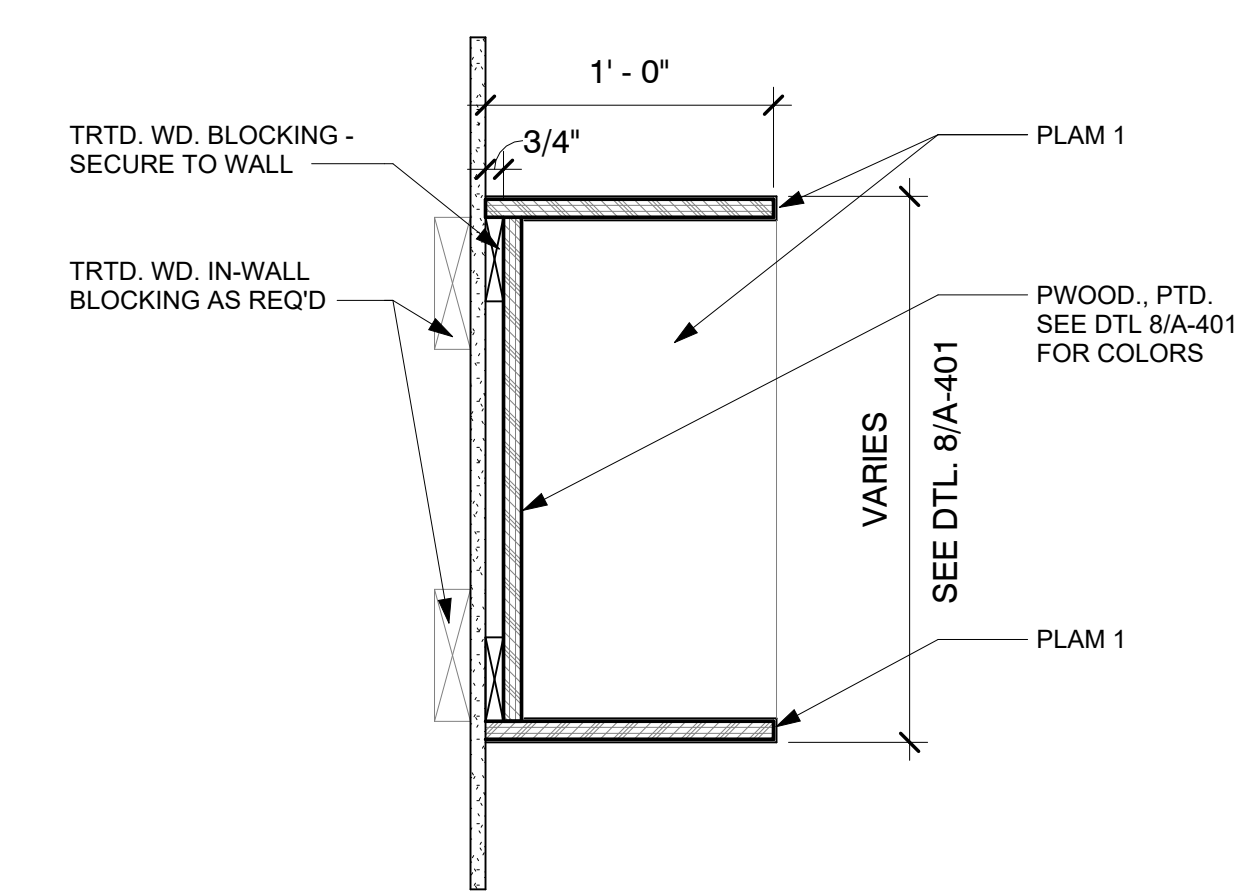
Construction Documents

Project No: 209-571
 Date: 7/13/23
 Drawn By: SB
 Checked: PR
 Revisions: ADDENDUM 1 8-31-23
 Revisions: ADDENDUM 3 9-14-23
 Revisions:
 Revisions:

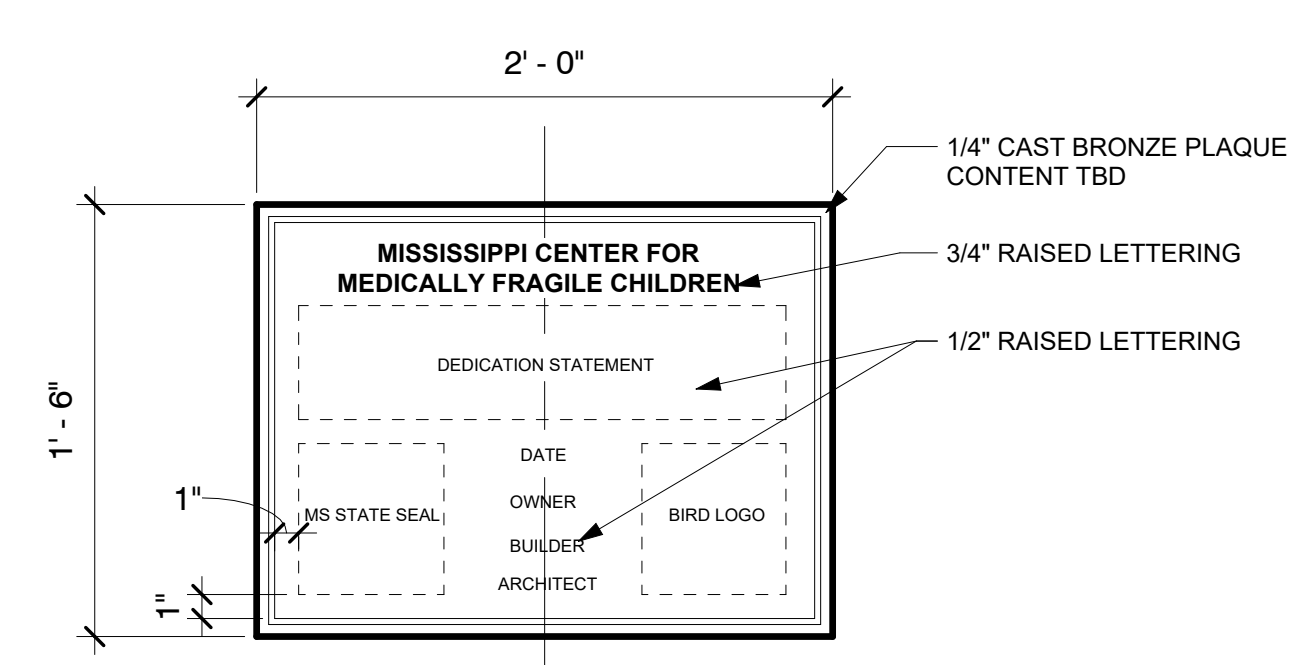
Crawlspace and
 Foundation Drainage Plan

C-4.2

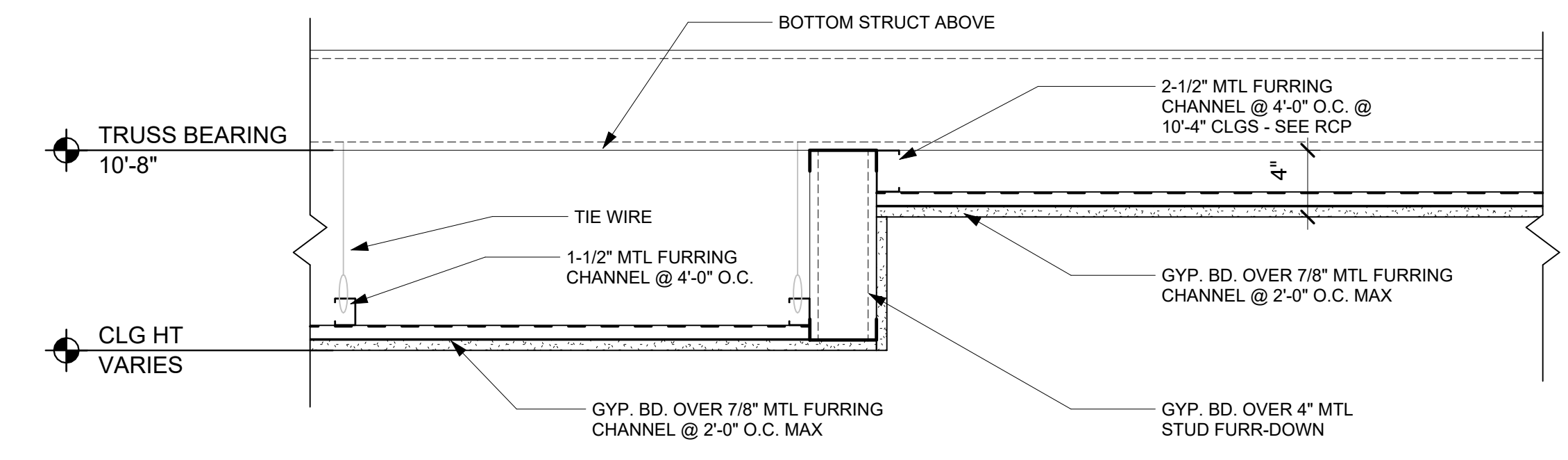




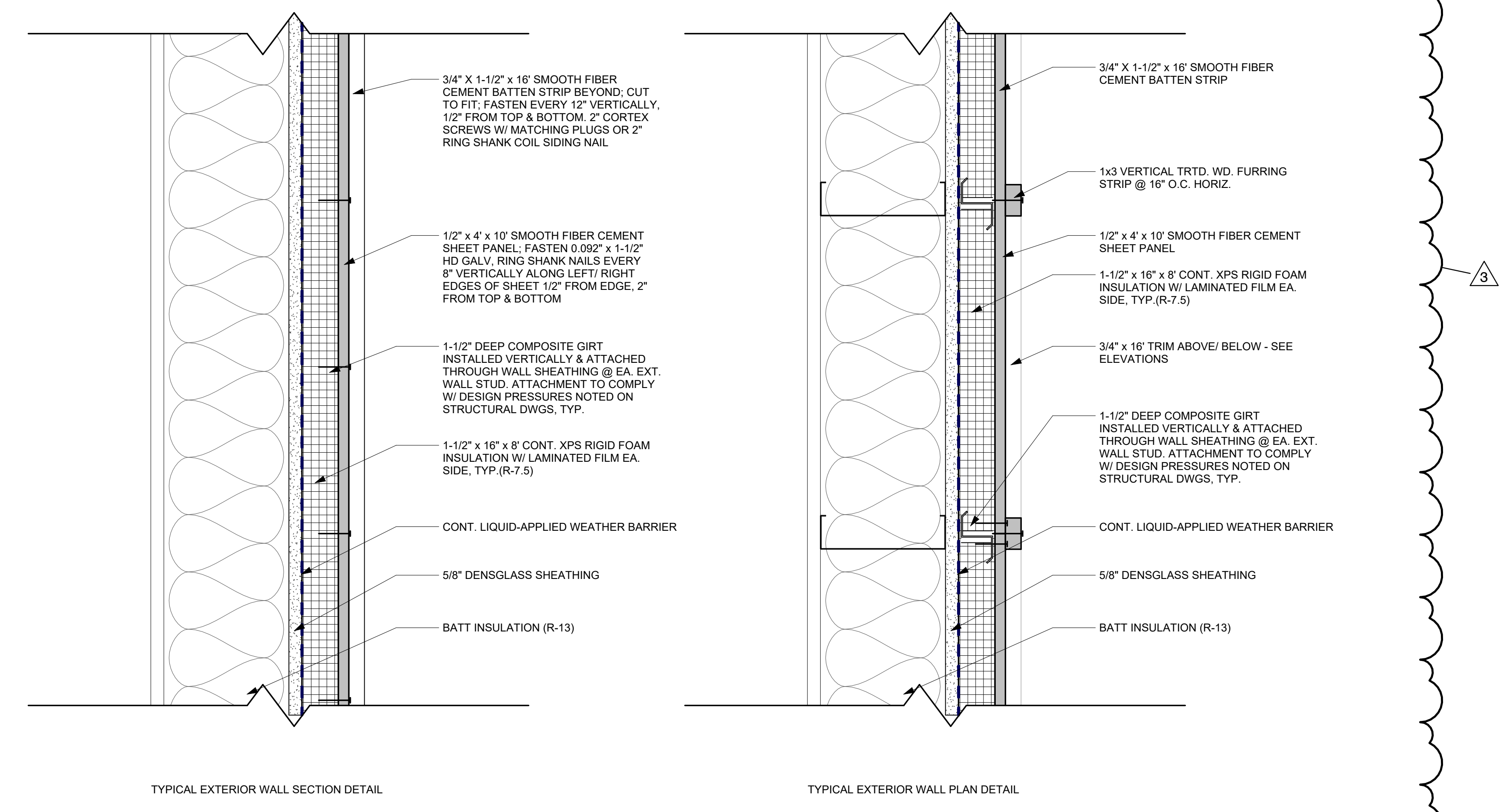
4 Resident Millwork - OPEN CUBBY
 1 1/2" = 1'-0"



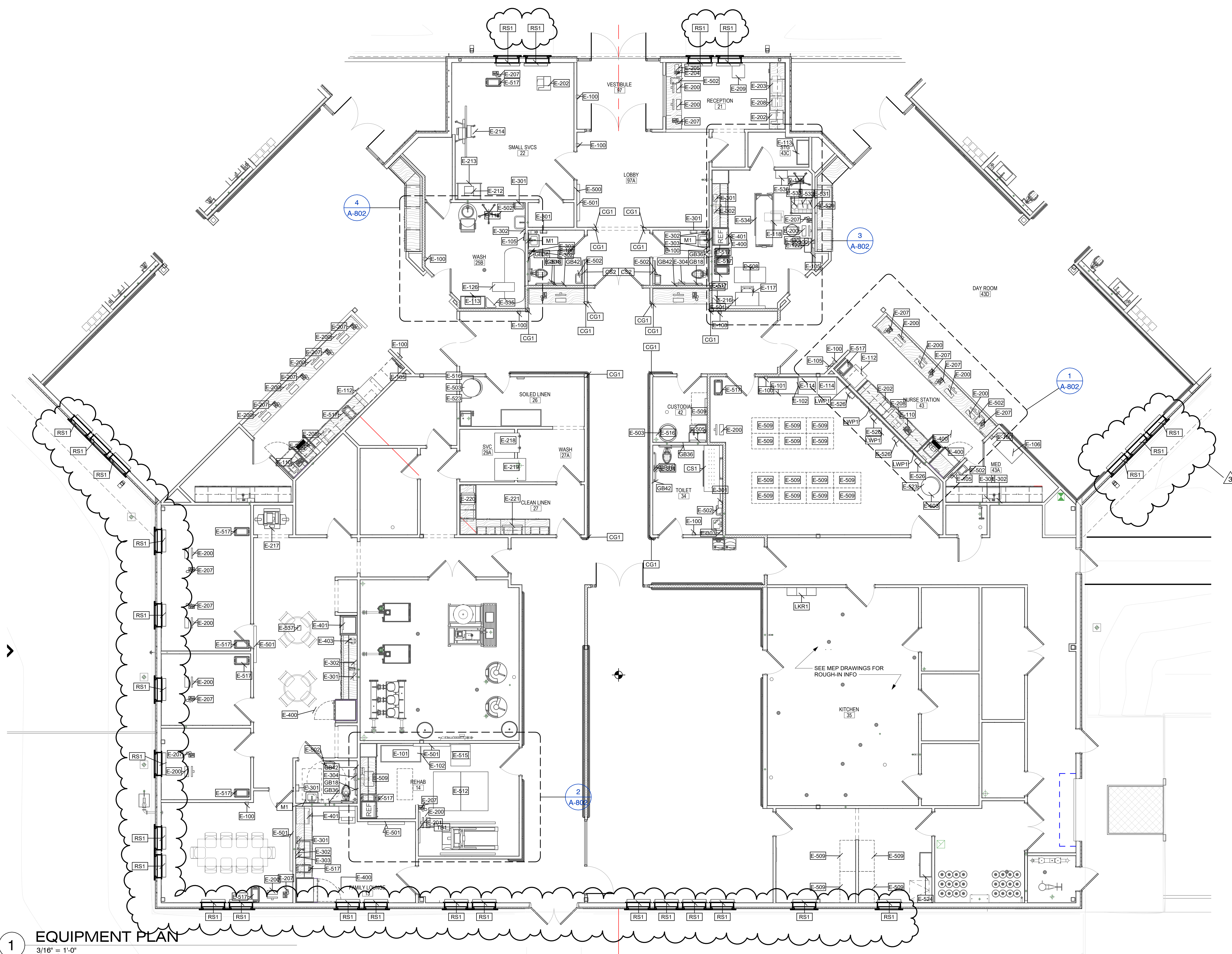
3 PLAQUE DETAIL
 1 1/2" = 1'-0"



2 TYPICAL GYP BD CEILING DETAIL
 1 1/2" = 1'-0"

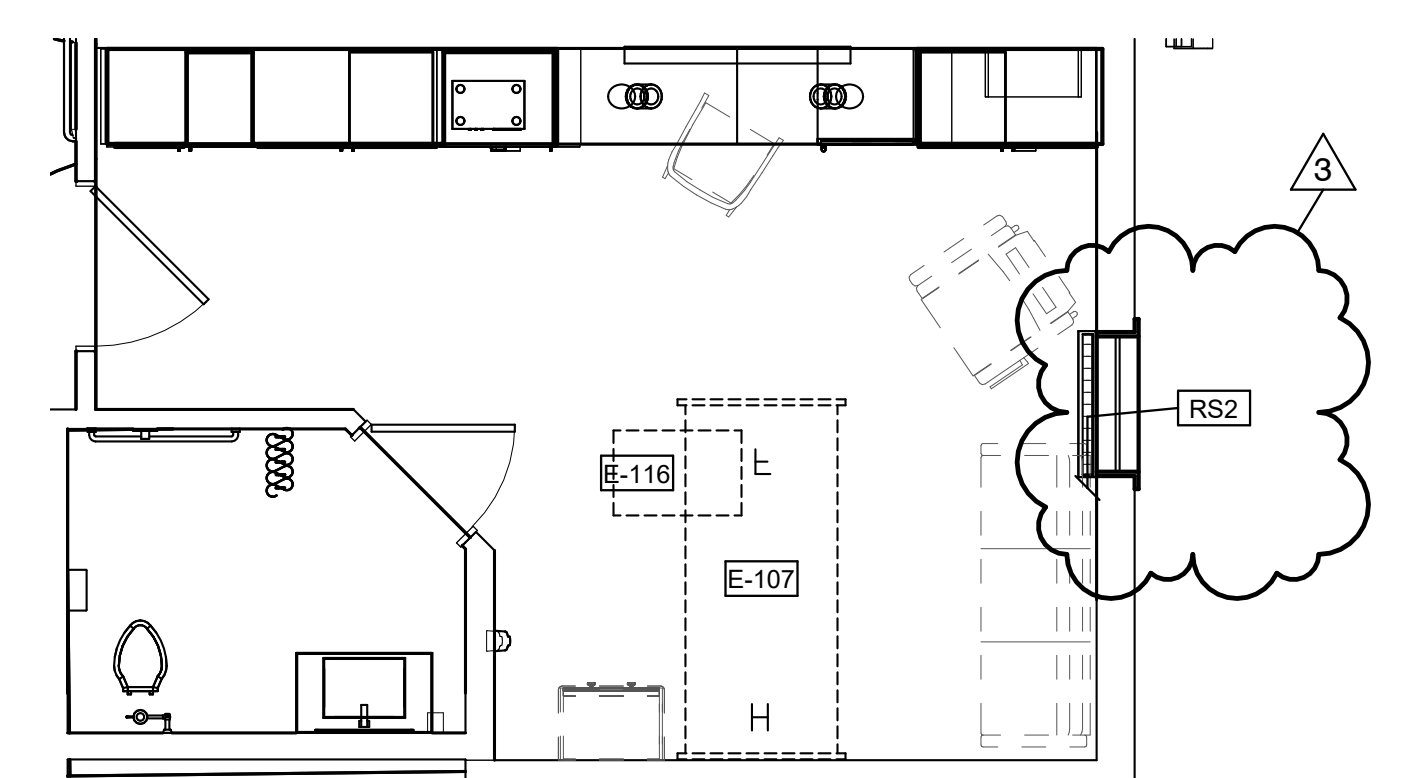


1 TYPICAL BOARD & BATTEN WALL ASSEMBLY DETAILS
 3" = 1'-0"



1 EQUIPMENT PLAN
3/16" = 1'-0"

Mark	Equipment Name	Mounting Heights
<varies>	<varies>	<varies>
CG1	Corner Guard	See Elevations for Height
CS1	Changing Station	See Typ. Accessory Mounting Height
CS2		
E-100	Hand Sanitizer	WALL MOUNT 44" AFF
E-101	Linen Cart	SEPARATE CLEAN + SOILED LAUNDRY
E-102	Cart Cover	
E-105	Glove Dispenser	44" AFF
E-106	Medication Cart	
E-107	Resident Bed	
E-110	Vital Sign Monitor	
E-112	Metro Cart	
E-113	Storage Cabinets	
E-114	Blanket Warmer	
E-115	IV Hook Supply	
E-116	Resident Bed Table	
E-117	Feeder Seat	
E-118	General Exam Light	
E-122	Biohazard Receptacle	
E-126	Hoyer Lift	
E-200	Personal Computer	
E-201	Computer Screen Protector	
E-202	Multi Functional Printer	
E-203	Document Scanner	
E-204	Credit Card Processor	
E-205	E - Signature Pad	
E-206	Shred Box	
E-207	Telephone	
E-208	Zebra Arm Band Printer	
E-209	Drop Safe and Cash Drawer	
E-212	Laptop	
E-213	Laptop Cart	
E-214	Mobile Smart Board	
E-216	Adjustable Height Table	
E-217	Printer / Fax - Free Standing	
E-218	Washer Commercial	
E-219	Dryer - Commercial	
E-220	Laundry Labeling System	
E-221	Iron and Press Board	
E-301	Paper Towel Dispenser	See Typ. Accessory Mounting Height
E-302	Soap Dispenser	See Typ. Accessory Mounting Height
E-303	Soap Dispenser	See Typ. Accessory Mounting Height
E-304	Toilet Paper Dispenser	See Typ. Accessory Mounting Height
E-400	Refrigerator (See Equipment List for more detail)	
E-401	Microwave	
E-403	Coffee Maker	
E-406	Nugget Ice Maker	
E-500	TV Monitor (See Equipment List for More Detail)	Refer to Elevations for Mounting Height
E-501	TV Monitor (See Equipment List for More Detail)	Refer to Elevations for Mounting Height
E-502	Receptacle 28 Quart	
E-503	Receptacle 44 Gallon Dolly	
E-505	4 Product Dispensing System	48" AFF
E-508	Small 2x4 Foldable Mat	
E-509	Shelving	
E-512	High / Low Mat - Electric	
E-513	Treadmill	
E-515	Stairs (wood)	
E-516	Receptacle 44 Gallon	
E-517	Receptacle 24 Gallon	
E-523	Receptacle 44 Gallon Lid	
E-524	Storage Cabinets	
E-526	Louvered Wall Panel Bins	
E-529	Movable Cart	
E-530	Hydraulic Stool	
E-531	AED	
E-532	Philips Portable Monitor	
E-533	Portable Suction	
E-534	Stretcher	
E-535	Hamper - Triangular Shaped	
E-536	Step Stool	
E-537	Charging Station	
E-542	DVD Player	
E-7		
GB18	Grab Bar - 18"	See Typ. Accessory Mounting Height
GB36	Grab Bar - 36"	See Typ. Accessory Mounting Height
GB42	Grab Bar - 42"	See Typ. Accessory Mounting Height
GB60	Grab Bar - 36"	See Typ. Accessory Mounting Height
LKR1	Double Tier Lockers	
LWP1	Louvered Wall Panels	Refer to Elevations for Mounting Height
M1	Mirror - Wall Mounted	See Typ. Accessory Mounting Height
RS1	Roller Shades - Shade Fabric 2	Refer to Elevations for Mounting Height
RS2	Roller Shades - Shade Fabric 1	Refer to Elevations for Mounting Height
SCS	Shower Curtain	
TB1	Tackboard	See Typ. Accessory Mounting Height



2 TYP. BEDROOM EQUIPMENT PLAN
1/4" = 1'-0"



Eley | Borkley | Dale PA
One Jackson Place
Suite 250
188 E. Capitol Street
Jackson, MS 39201-2100



THE UNIVERSITY OF MISSISSIPPI
MEDICAL CENTER

Mississippi Center for
Fragile Children
Jackson, MS

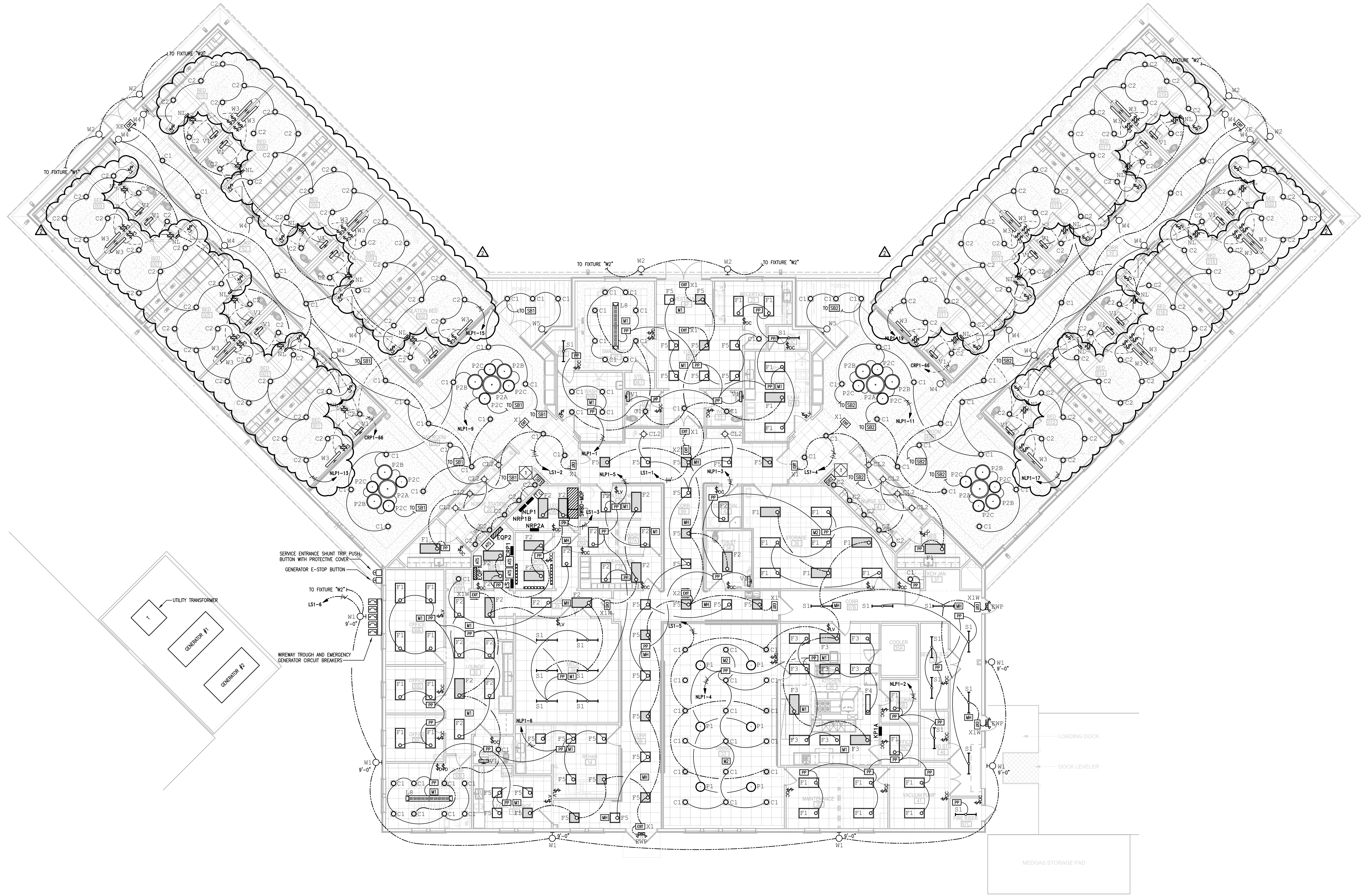


100% CONSTRUCTION DOCUMENTS

Project No: 209-576
Date: 7/13/2023
Drawn By: WT
Checked: JB
Revisions:
Revisions:
Revisions:
Revisions:

EQUIPMENT PLAN (FOR REFERENCE ONLY)

A-801



1 LIGHTING PLAN
1/8" = 1'-0"

- GENERAL LIGHTING NOTES:**
1. ALL SWITCHES AND LIGHTING CONTROLLERS ARE LOW VOLTAGE, UNLESS NOTED OTHERWISE.
 2. ALL ROOMS OR AREAS SHALL HAVE LIGHTING "ROOM CONTROLLER" POWER PACK OR EQUIVALENT.
 3. WHERE DIMMER SWITCHES ARE SHOWN, POWER PACKS SHALL HAVE DIMMING CAPABILITIES.
 4. WHERE MULTIPLE SWITCHES ARE SHOWN IN INDIVIDUAL ROOMS OR AREAS, PROVIDE MULTIPLE POWER PACKS AS REQUIRED FOR OPERATION.
 5. REFER TO LIGHTING CONTROL DETAIL FOR ADDITIONAL INFORMATION.
 6. IN PATIENT ROOMS ONLY, ALL SWITCHES SHALL BE STANDARD, LINE VOLTAGE, TOGGLE OR DIMMER SWITCHES.
 7. REFER TO ARCHITECTURAL REFLECTIVE CEILING PLAN FOR LOCATIONS OF ALL LIGHT FIXTURES.

- SPECIFIC LIGHTING NOTES:**
- SWITCHBANK LOCATION FOR DIMMERS AND FAN SWITCHES AT DAY ROOM, CORRIDOR, PORCH, AND NURSE STATION - SEE SWITCHBANK DETAIL. COORDINATE EXACT LOCATION WITH ARCHITECTURAL.



141 E. QUINCY BLVD., SUITE #111
SOUTHPORT, MISSISSIPPI 39286-1111
(601) 833-0000
WEC PROJECT # 22-09A.22

SWITCHBOARD				BUSS: 1600 AMP	VOLT: 120/208V, 3-PHASE, 4 WIRE	AIC RATING: 65,000			
SWBD-MDP				MAINS: 1600 M.B. S.T.	MOUNT: FREE STANDING, NEMA 1	LOCATION: ELEC. ROOM			
CKT.	BREAKER			LOAD DESCRIPTION	FEEDER	NOTES	LOAD (AMPS)		
	FRAME	TRIP	POLES				A	B	C
1	1600	1600	3	MAIN BREAKER	(4) SETS 4-600				
SECTION 1									
2	400	400	3	PANEL "EQP1" THRU ATS	4-600, 1-3G	300.3	305.1	281.3	
3	400	400	3	PANEL "EQP2" THRU ATS	4-600, 1-3G	308	308	287.9	
4	225	225	3	PANEL "ORP1" THRU ATS	4-400, 1-4G	172.1	171.3	167.6	
5	100	100	3	PANEL "LS1" THRU ATS	4-3, 1-8G	55.2	49.8	59	
6	225	225	3	SPARE					
7	400	400	3	SPARE					
8	-	-	3	SPARE					
SECTION 2									
9	100	100	3	PANEL "NLP1"	4-3, 1-8G	35.2	32	34.9	
10	225	225	3	PANELS "NRP1A"	4-400, 1-4G	142	138	127.9	
11	225	225	3	PANELS "NRP2A"	4-400, 1-4G	81	82.5	82.9	
12	225	225	3	PANEL "KP1A"	4-400, 1-4G	146.4	136.6	129	
13	225	225	3	SPARE					
14	100	100	3	SPARE					
15	-	-	3	SPARE					
16	-	-	3	SPARE					
CONNECTED LOADS (AMPS PER PHASE)					1240.2	1223.3	1170.5		
DEMAND LOADS (AMPS PER PHASE)					868.1	856.3	819.4		
TOTAL CONNECTED LOAD					1030.61	KVA			
TOTAL DEMAND LOAD					721.42	KVA			

NOTES:
1. SHUNT TRIP MAIN BREAKER
2. PROVIDE TVSS
3. MAIN BREAKER AND ALL FEEDER BREAKERS SHALL HAVE GROUND FAULT PROTECTION

PANEL				BUSS: 100 AMP	VOLT: 120/208V, 3 PHASE, 4 WIRE	AIC RATING: 10,000				
NLP1				MAINS: M.L.O.	MOUNT: SURFACE, NEMA 1	LOCATION: ELECTRICAL ROOM				
CKT.	BKR.	DESCRIPTION	FEEDER	LOAD (AMPS)			FEEDER	DESCRIPTION	BKR.	CKT.
				A	B	C				
1	201	LIGHTS (LOBBY, RECEPT, EXAM)	2-12, 1-12G	6.8		4.9	2-12, 1-12G	LIGHTS (CORR, EQUIP, OFFICE)	201	2
3	201	LIGHTS (CORR, STOR, TLT)	2-12, 1-12G	6		5.4	2-12, 1-12G	LIGHTS (DINING, KITCHEN)	201	4
5	201	LIGHTS (LINEN, LOUNGE, OFFICE)	2-12, 1-12G	6.9		4.3	2-12, 1-12G	LIGHTS (CONF, REHAB, LOUNGE)	201	6
7	201	LIGHTS (CRAWLSPACE)	2-12, 1-12G	9.1		3	2-8, 1-10G	LIGHTS (SITE)	201	8
9	201	LIGHTS (DAY RM, CORRIDOR)	2-12, 1-12G	9.9		2.3	2-8, 1-10G	LIGHTS (SITE)	201	10
11	201	LIGHTS (DAY RM CORRIDOR)	2-12, 1-12G	9.9		5.4	2-8, 1-10G	LIGHTS (SITE)	202	12
13	201	LIGHTS (BEDROOMS)	2-12, 1-12G	3		5.4	2-8, 1-10G	LIGHTS (SITE)	202	14
15	201	LIGHTS (BEDROOMS)	2-12, 1-12G	3		5.4	2-8, 1-10G	LIGHTS (SITE)	202	16
17	201	LIGHTS (BEDROOMS)	2-12, 1-12G	3		5.4	2-8, 1-10G	LIGHTS (SITE)	202	18
19	201	LIGHTS (BEDROOMS)	2-12, 1-12G	3		5.4	2-8, 1-10G	LIGHTS (SITE)	202	20
21	201	SPARE							201	22
23	201	SPARE							201	24
25	201	SPARE							201	26
27	201	SPARE							201	28
29	201	SPARE							201	30
CONNECTED LOADS PER PHASE					A phase	35.2	amps			
					B phase	32.0	amps			
					C phase	34.9	amps			

PANEL				BUSS: 225 AMP	VOLT: 120/208V, 3 PHASE, 4 WIRE	AIC RATING: 10,000				
KP1A				MAINS: M.L.O.	MOUNT: FLUSH, NEMA 1	LOCATION: KITCHEN				
CKT.	BKR.	DESCRIPTION	FEEDER	LOAD (AMPS)			FEEDER	DESCRIPTION	BKR.	CKT.
				A	B	C				
1	3	DISHWASHER (KITCHEN)	3-8, 1-10G	24.8		40	3-8, 1-10G	UTILITY DISTRIBUTION SYSTEM "UDS" (KITCHEN)	803	2
3	403	DISHWASHER (KITCHEN)	3-8, 1-10G	24.6		40	3-8, 1-10G	UTILITY DISTRIBUTION SYSTEM "UDS" (KITCHEN)	803	4
5	7	DISHWASHER BOOSTER HEATER (KITCHEN)	3-10, 1-10G	20.4		40	2-12, 1-12G	REFRIG. (KITCHEN)	201	6
7	303	DISHWASHER BOOSTER HEATER (KITCHEN)	3-10, 1-10G	20.4		3	2-12, 1-12G	REC. (KITCHEN)	201	8
9	13	HOT WELLS (KITCHEN)	3-12, 1-12G	9.8		6	2-12, 1-12G	REC. (SERVING/DINING)	201	10
11	203	HOT WELLS (KITCHEN)	3-12, 1-12G	9.8		13.3	2-12, 1-12G	REC. (SERVING/DINING)	201	12
13	201	STAND MIXER (KITCHEN)	2-12, 1-12G	9.8		6	2-12, 1-12G	REC. (OFFICE)	201	14
15	201	FREEZER (KITCHEN)	2-12, 1-12G	9.8		6	2-12, 1-12G	HEAT TAPE (WALK-IN COOLER)	201	16
17	201	REC. (KITCHEN, DRY STORAGE)	2-12, 1-12G	3		2.5	2-12, 1-12G	LIGHTS/INTLS (WALK-IN COOL)	201	18
19	201	SPARE				4	2-12, 1-12G	EVAP. COIL (WALK-IN COOLER)	201	20
21	201	SPARE				6.4	2-12, 1-12G	COND. UNIT (WALK-IN COOLER)	202	22
23	201	SPARE				6.4	2-12, 1-12G	COND. UNIT (WALK-IN COOLER)	202	24
25	201	SPARE				4.4	2-12, 1-12G	KEF-02 (EXHAUST FAN)	201	26
27	201	SPARE				6.9	3-12, 1-12G	KEF-01 (EXHAUST FAN)	1503	28
29	201	SPARE				6.9	3-12, 1-12G	KEF-01 (EXHAUST FAN)	1503	30
31	201	SPARE				6.9	3-12, 1-12G	KEF-01 (EXHAUST FAN)	1503	32
33	201	SPARE				6.9	3-12, 1-12G	KEF-01 (EXHAUST FAN)	1503	34
35	201	SPARE				6.9	3-12, 1-12G	KEF-01 (EXHAUST FAN)	1503	36
37	201	SPARE				6.9	3-12, 1-12G	KEF-01 (EXHAUST FAN)	1503	38
39	201	SPARE				6.9	3-12, 1-12G	KEF-01 (EXHAUST FAN)	1503	40
41	201	SPARE				6.9	3-12, 1-12G	KEF-01 (EXHAUST FAN)	1503	42
CONNECTED LOADS PER PHASE					A phase	146.4	amps			
					B phase	136.6	amps			
					C phase	129.0	amps			

NOTES:
1. "S.T." - PROVIDE SHUNT TRIP BREAKER

PANEL				BUSS: 225 AMP	VOLT: 120/208V, 3 PHASE, 4 WIRE	AIC RATING: 10,000				
NRP1A				MAINS: M.L.O.	MOUNT: SURFACE, NEMA 1	LOCATION: ELECTRICAL ROOM				
CKT.	BKR.	DESCRIPTION	FEEDER	LOAD (AMPS)			FEEDER	DESCRIPTION	BKR.	CKT.
				A	B	C				
1	201	REC. (RECEPTION)	2-12, 1-12G	4.5		9	2-12, 1-12G	REC. (SMALL SVCS)	201	2
3	201	PRINTER (RECEPTION)	2-12, 1-12G	8		4.5	2-12, 1-12G	REC. (SMALL SVCS)	201	4
5	201	REC. (VESTIBULE, LOBBY)	2-12, 1-12G	6		6	2-12, 1-12G	REC. (WASH)	201	6
7	201G	EDF (LOBBY)	2-12, 1-12G	8		10	2-12, 1-12G	PATIENT LIFT (WASH)	201	8
9	201	REC. (EXAM)	2-12, 1-12G	7.5		3	2-12, 1-12G	REC. (TLTS)	201	10
11	201	REC. (LINEN, WASH)	2-12, 1-12G	7.5		6	2-12, 1-12G	REC. (CORRIDOR)	201	12
13	201	REC. (CORR, LOUNGE)	2-12, 1-12G	6		9	2-12, 1-12G	REC. (OFFICE)	201	14
15	201	PRINTER (LOUNGE)	2-12, 1-12G	10		9	2-12, 1-12G	REC. (OFFICE)	201	16
17	201	REC. (LOUNGE)	2-12, 1-12G	6		6	2-12, 1-12G	REC. (CONFERENCE)	201	18
19	201	MICROWAVE (LOUNGE)	2-12, 1-12G	10		6	2-12, 1-12G	REC. (CONFERENCE)	201	20
21	201	REC. (LOUNGE)	2-12, 1-12G	6		6	2-12, 1-12G	REC. (FAMILY LOUNGE)	201	22
23	201	TREADMILL (REHAB)	2-12, 1-12G	6		10	2-12, 1-12G	MICROWAVE (FAMILY LOUNGE)	201	24
25	201	REC. (REHAB)	2-12, 1-12G	6		10	2-12, 1-12G	WASHER (FAMILY LOUNGE)	201	26
27	201	REC. (REHAB)	2-12, 1-12G	7.5		15	2-12, 1-12G	WASHER (FAMILY LOUNGE)	201	28
29	201	REC. (REHAB)	2-12, 1-12G	6		15	3-10, 1-10G	DRYER (FAMILY LOUNGE)	3002	30
31	201	REFRIG. (REHAB)	2-12, 1-12G	8		7.5	2-12, 1-12G	REC. (BEDROOM)	201	32
33	201	REC. (FAMILY LOUNGE)	2-12, 1-12G	6		6	2-12, 1-12G	REC. (BEDROOM)	201	34
35	201	EF-20 (EXHAUST FAN)	2-12, 1-12G	4.4		6	2-12, 1-12G	REC. (BEDROOM)	201	36
37	201	REC. (DAY ROOM)	2-12, 1-12G	6		7.5	2-12, 1-12G	REC. (BEDROOM)	201	38
39	201	REC. (DAY ROOM)	2-12, 1-12G	7.5		7.5	2-12, 1-12G	REC. (BEDROOM)	201	40
41	201	REC. (BEDROOM)	2-12, 1-12G	6		6	2-12, 1-12G	REC. (BEDROOM)	201	42
43	201	REC. (BEDROOM)	2-12, 1-12G	7.5		7.5	2-12, 1-12G	REC. (BEDROOM)	201	44
45	201	REC. (BEDROOM)	2-12, 1-12G	7.5		6	2-12, 1-12G	REC. (BEDROOM)	201	46
47	201	REC. (BEDROOM)	2-12, 1-12G	6		6	2-12, 1-12G	REC. (BEDROOM)	201	48
49	201	REC. (BEDROOM)	2-12, 1-12G	6		7.5	2-12, 1-12G	REC. (BEDROOM)	201	50
51	201	REC. (BEDROOM)	2-12, 1-12G	7.5		7.5	2-12, 1-12G	REC. (DAY ROOM)	201	52
53	201	REC. (BEDROOM)	2-12, 1-12G	7.5		7.5		SPARE	201	54
55	201	REC. (BEDROOM)	2-12, 1-12G	6				SPARE	201	56
57	201	REC. (BEDROOM)	2-12, 1-12G	6				SPARE	201	58
59	201	REC. (BEDROOM)	2-12, 1-12G	6				SPARE	201	60
CONNECTED LOADS PER PHASE					A phase	142.0	amps			
					B phase	138.0	amps			
					C phase	127.9	amps			

NOTES:
1. "G" - PROVIDE GFCI BREAKER

PANEL				BUSS: 225 AMP	VOLT: 120/208V, 3 PHASE, 4 WIRE	AIC RATING: 10,000				
NRP2A				MAINS: M.L.O.	MOUNT: SURFACE, NEMA 1	LOCATION: ELECTRICAL ROOM				
CKT.	BKR.	DESCRIPTION	FEEDER	LOAD (AMPS)			FEEDER	DESCRIPTION	BKR.	CKT.
				A	B	C				
1	201	REC. (CORR, CUSTODIAL, TLT)	2-12, 1-12G	4.5		7.5	2-12, 1-12G	REC. (CORRIDOR, JANITOR)	201	2
3	201	REC. (STORAGE)	2-12, 1-12G	4.5		8	2-12, 1-12G	REC. (STORAGE, LOADING)	201	4
5	201G	EDF (CORRIDOR)	2-12, 1-12G	8		8	2-12, 1-12G	REC. (VACUUM PUMP)	201	6
7	201	REC. (DINING)	2-12, 1-12G	4.5		4.5	2-12, 1-12G	REC. (EQUIP REPAIR)	201	8
9	201	REC. (DINING)	2-12, 1-12G	4.5		6	2-12, 1-12G	REC. (MAINT OFFICE)	201	10
11	201	REC. (CORRIDOR)	2-12, 1-12G	6		7.5	2-12, 1-12G	REC. (CRAWLSPACE)	201	12
13	201	SPARE				4.5	2-12, 1-12G	REC. (CRAWLSPACE)	201	14
15										