

To: All Vendors Bidding on The College of New Jersey Roscoe West Hall '68 Student Services Renovation

From: Lauren Manning Finance & Business Services

Date: April 6, 2023

ADDENDUM NO. 2

ISSUE DATE: April 6, 2023

REFERENCE: The College of New Jersey Roscoe West Hall '68 Student Services Renovation Bid No. AB230019 Date of Original Bidding Documents: March 16, 2023

INTENT: This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents and Prior Addenda if any, as identified above. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

Vendor Questions:

Question 1: Page 3 of the RFP only mentions Rooms 203 & 205 in the scope of work; there is no mention of the First floor.

Response: This project is separated into two phases. Phase I will only consist of work located in the penthouse mechanical room and the two rooms (203 and 205) located on the second floor. There are some penetrations through the second-floor deck to the first-floor plenum that are included in this project, as well as some electrical work near the first-floor electrical room. No other work on the first floor should be included in this bid.

Question 2: Drawings M100, M101, ED 101, E101 & E301 are obscured with a grey layer and are not legible.

Response: Drawings M100, M101, ED 101, E101 & E301 contain information that pertains to the first floor (Phase 2) of the building renovation and thus is not included in this bid's scope of work.



Question 3: Please provide any required vendors for the project – such as Fire Alarm and Building Management Systems.

Response: The building fire alarm and HVAC (BMS) system controls are maintained through Honeywell. Our point of contact at Honeywell is Ed Mogck, ed.mogck@honeywell.com, 856-261-1080.

Question 4: 60 days seems to be too tight of a construction schedule. I believe the project will require approx. 90 days.

Response: A revised milestone schedule has been included in this addendum. The new construction window will be from May 22, 2023 through September 1, 2023. This window provides approximately 72 working days.

We also understand that material availability will be a critical component in meeting our project schedule. Therefore, we are willing to make reasonable adjustments to the schedule as needed based on product availability.

Question 5: Please confirm that all steel work is in phase 2 and we will not need to name a steel sub for this bid.

Response: Confirmed. No steel work in Phase 1 scope.

Question 6: What is the height of the existing steel deck from top of slab?

Response: Assume this refers to underside of steel roof deck from top of penthouse concrete floor slab. According to the as-built drawings, the height from the penthouse concrete floor deck to the steel roof deck is 12'-8". If this is reference to the second-floor concrete deck to the top of the penthouse concrete waffle slab deck, the as-built drawings indicate a height 13'-2" (total thickness of the waffle slab is approximate 1'-3").

TCNJ Clarifications:

Clarification 1: This bid is only for Phase 1 of the building renovation. All work will be primarily concentrated on the penthouse mechanicals and second floor rooms 203 & 205.



Clarification 2: The general contractor will only be responsible for the installation of conduit and backboxes for all AV and IT components. TCNJ will be soliciting AV/IT vendors through a State Contract to complete the AV/IT cabling and faceplate installations. A Telecommunications Responsibility Matrix has been included in the attached Revised Specifications for further clarification regarding the installation of AV & IT components.

Clarification 3: The bidder is to include an allowance of \$50,000 in the total base bid amount for unforeseen conditions.

Attachments:

- 1. Revised Bid Proposal Form
- 2. Revised Milestone Schedule
- 3. Revised Specifications
- 4. Revised Plan Narrative
- 5. Revised Plans

END OF ADDENDUM NO. 2

COST SHEET SINGLE BID (LUMP SUM): BASE BID, ALTERNATE PROPOSALS, AND UNIT PRICES

To: The College of New Jersey

Construction of Roscoe West Hall '68 Student Services Renovation for:

Date

A. BID:

1.Base:

Part A (Construction of Roscoe West Hall '68 Student Services Renovation): \$

Part B (Allowance):

_____, the Undersigned, in accordance with We, _ the published advertisement inviting proposals, will furnish all labor, material, equipment and services necessary for the complete construction, as defined in the advertisement, specimen contract, specifications, addendums/clarifications/bulletins, drawings, and proposal, for the Contract amount indicated below for the above noted project in strict accordance with the Contract Documents and Addenda thereto for the total sum of:

TOTAL OF PART A AND B (INCLUDING ALLOWANCE):

(words)

General Construction (Single overall Prime Contract)

2. Add /Deduct Alternate: None

1. Check List for Bidders: A check list has been provided in these specifications for the use in completing this proposal. Bidders are encouraged to reference said list to minimize the opportunity for errors by the bidder.

B. STATEMENT:

We, the Undersigned, acting through its authorized officers and intending to be legally bound, agree that this bid proposal shall constitute an offer by the Undersigned to enter into a Contract with the acts and things therein provided and accept this offer at any time during said period by notifying the Undersigned of the acceptance of said offer.

Dated

Firm Name

\$50,000

Dollars <u>\$____</u>

Phone Number		
Address _		
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Dated:		
STATE OF	99	
	SS.	
COUNTY OF		
		say that the several matters stated in this the State or employee of the College are
interested in any way in the		the state of employee of the Conege are
Sworn and subscribed bet		
	Bid	der signs above line
this day of	20	-
Print Name	and	Title



ROSCOE WEST HALL '68 STUDENT SERVICES RENOVATION TCNJ PROJECT #: WE220

MILESTONE SCHEDULE As of March 31, 2023

Request for Proposals Released	March 16, 2023				
Pre-bid Meeting	March 24, 2023				
Cut off for questions	March 28, 2023				
Addendum #1 Issued	March 31, 2023				
Addendum #2 Issued	April 6, 2023				
Bids Received	April 11, 2023 April 18, 2023				
Notice of Intent to Award issued	April 13, 2023 April 20, 2023				
Notice to Proceed issued by	April 21, 2023 April 28, 2023				
Preconstruction and Submittals	May 2023				
Construction Begins in Field	May 30, 2023 May 22, 2023				
Substantial Completion by	August 1, 2023 September 1, 2023				
Punch List Completion	September 29, 2023				
Contract Closed by	December 1, 2023				

SECTION 000101 PROJECT TITLE PAGE

PROJECT MANUAL FOR THE COLLEGE OF NEW JERSEY ROSCOE HALL STUDENT SERVICES RENOVATION



ARCHITECT'S PROJECT NUMBER: 22031600 2000 PENNINGTON ROAD, EWING, NJ 08618 DATE: 04-06-2023 ISSUED FOR: ADDENDUM #2 PREPARED BY: NORR

END OF SECTION

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PROCUREMENT AND CONTRACTING REQUIREMENTS

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- B. 000110 Table of Contents

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- B. 010250 MEASUREMENT AND PAYMENT
- C. 011000 PROJECT PROCEDURES
- D. 013000 SUBMITTALS AND SUBSTITUTIONS
- E. 013100 QUALITY CONTROL
- F. 013200 TEMPORARY FACILITIES
- G. 013220 PHOTOGRAPHIC DOCUMENTATION
- H. 013300 CONTRACT CLOSEOUT
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A. 284600 - Fire Detection and Alarm

END OF SECTION

SECTION 010100 SUMMARY OF WORK

PART 1- GENERAL

1.01 RELATED DOCUMENTS

DRAWINGS AND GENERAL PROVISIONS OF THE SPECIFICATIONS, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND OTHER DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. THE PROJECT CONSISTS OF ALL WORK NOTED ON THE DRAWINGS AND IN THESE SPECIFICATIONS. WORK INDICATED AS "PHASE 2" ON DRAWINGS SHOULD BE EXCLUDED FROM BID AT THIS TIME. 1. PROJECT LOCATION: THE COLLEGE OF NEW JERSEY, EWING NEW JERSEY

2. OWNER: THE COLLEGE OF NEW JERSEY, STATE OF NEW JERSEY

1.03 CONTRACTS

A. THE PROJECT CONTRACT IS BETWEEN THE COLLEGE OF NEW JERSEY AND THE SINGLE PRIME CONTRACTOR PERFORMING THE WORK SPECIFIED.

B. DEFINITION OF EXTENT OF CONTRACT WORK: THE CONTRACT DOCUMENTS, SPECIFICATIONS, PROJECT DRAWINGS, MANUFACTURER'S INSTALLATION HANDBOOKS, TCNJ FORM OF AGREEMENT, AND THE CONTRACTORS RESPONSE TO THE RFP REPRESENT THE EXTENT OF THE CONSTRUCTION CONTRACT.

1.04 CONTRACTORS USE OF PREMISES

A. GENERAL: DURING THE CONSTRUCTION PERIOD THE CONTRACTOR SHALL HAVE FULL USE OF THE PREMISES FOR CONSTRUCTION OPERATIONS, INCLUDING USE OF THE SITE. THE CONTRACTOR'S USE OF THE PREMISES IS LIMITED ONLY BY THE OWNER'S RIGHT TO PERFORM WORK, RETAIN OTHER CONTRACTORS ON PORTIONS OF ASSOCIATED PROJECTS, OR TO ACCESS THE BUILDING FOR THE OCCUPANTS.

1. CONTRACTOR IS TO COORDINATE THEIR WORK WITH THE ACTIVITIES FOR EACH WORK LOCATION.

B. USE OF THE SITE: LIMIT USE OF THE PREMISES TO AREAS REQUIRED FOR EQUIPMENT AND MATERIAL STORAGE AND ACCESS TO THE ROOF AREA. CONFINE OPERATIONS TO AREAS WITHIN CONTRACT LIMITS INDICATED. DO NOT DISTURB PORTIONS OF THE SITE BEYOND THE AREAS IMMEDIATELY ADJACENT TO THE BUILDING WHERE THE WORK IS BEING PERFORMED.

1. OWNER OCCUPANCY: ALLOW FOR OWNER OCCUPANCY AND USE BY THE PUBLIC.

2. DRIVEWAYS AND ENTRANCES: KEEP DRIVEWAYS AND ENTRANCES SERVING THE PREMISES CLEAR AND AVAILABLE TO THE OWNER, THE OWNER'S EMPLOYEES, AND EMERGENCY VEHICLES AT ALL TIMES. DO NOT USE THESE AREAS FOR PARKING OR STORAGE OF MATERIALS UNLESS PREVIOUSLY APPROVED BY THE OWNER. SCHEDULE DELIVERIES TO MINIMIZE SPACE AND TIME REQUIREMENTS OR STORAGE OF MATERIALS AND EQUIPMENT ON -SITE.

3. BURIAL OF WASTE MATERIALS: DISPOSAL OF ORGANIC AND HAZARDOUS MATERIALS ON-SITE EITHER BY BURIAL OR BURNING, WILL NOT BE PERMITTED.

4. PARKING IS ALLOWED WITH IN THE CONSTRUCTION FENCE ONLY. IF MORE PARKING IS NEEDED, THERE IS ADDITIONAL PARKING PROVIDED AT THE COLLEGES CARLTON AVENUE PARKING LOT. THE CONTRACTOR IS RESPONSIBLE TO SHUTTLE WORKERS BACK AND FORTH AS NEEDED.

C. USE OF THE EXISTING BUILDING: MAINTAIN ANY EXISTING BUILDING IN A WEATHERTIGHT CONDITION THROUGHOUT THE CONSTRUCTION PERIOD. REPAIR DAMAGE CAUSED BY CONSTRUCTION OPERATIONS. TAKE ALL PRECAUTIONS NECESSARY TO PROTECT THE BUILDING, ITS CONTENTS, COMPONENTS, AND SYSTEMS AND ITS OCCUPANTS DURING THE CONSTRUCTION PERIOD.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3- EXECUTION

1. SEE EXHIBIT (NEXT PAGE) FOR TELECOMMUNICATIONS RESPONSIBILITY MATRIX.

ENDOF SECTION

			TI	ELECOMMUNICATI	ONS RESPONSIBIL	ITY MATRIX						
		FURNISH					INSTALL					
	TELECOM	SECURITY	AV	ELECTRICAL	GENERAL		TELECOM	SECURITY		ELECTRICAL	GENERAL	
DESCRIPTION	CONTRACTOR	CONTRACTOR	CONTRACTOR	CONTRACTOR	CONTRACTOR	OWNER	CONTRACTOR	CONTRACTOR	AV CONTRACTOR	CONTRACTOR	CONTRACTOR	OWNER
GENERAL COMMUNICATIONS												
(AV/TELECOMMUNICATIONS/SECURITY)												
GROUNDING AND BONDING FOR TELECOMMUNICATIONS												
BACKBONE (e.g BUSBARS)				*						*		
ELECTRICAL PANELS)				*						*		
EQUIPMENT IN TELECOMMUNICATIONS ROOMS (e.g EQUIPMENT RACKS)	*						*					
POWER WIRING, 120V, 208V, 480V, 600V				*						*		
HANGERS (J-HOOKS, SADDLE BAGS)	*						*					
CONDUITS AND BACKBOXES				*						*		
CONDUIT SLEEVES, AND SLEEVE SEALS				*						*		
NON-CONDUIT RACEWAYS				*						*		
FIRESTOP [1]	*	*	*	*	*		*	*	*	*	*	
DEVICE ALLTHREAD DROPS [2]		٠	•	•			*	*	•	•		
STRUCTURED CABLING												
NETWORK RACK & CABLE MANAGEMENT						*						*
CABLE TRAY	*						*					
PATCH CABLES												
FOR IT EQUIPMENT						*						*
FOR AV EQUIPMENT			+						*			
FOR CONTROL SYSTEMS				*						*		
NETWORK EQUIPMENT						*						*
WIRELESS DEVICES (WAPs)						*						*
COMMUNICATIONS CABLING	*						*					
TERMINATION BLOCK	*						*					
AUDIO-VIDEO COMMUNICATIONS												
AUDIO-VIDEO CABLING			•						*			
AUDIO-VIDEO RACKS									*			
AUDIO-VIDEO PATCH PANELS									*			
AUDIO-VIDEO FLAT PANEL DISPLAYS			*						*			
FLAT PANEL DISPLAY MEDIA BACKBOXES				*						*		
BLOCKING/FRAMING FOR MEDIA BACKBOXES					*						*	
POWER RECEPTACLES (LINE VOLTAGE)				*						*		
AUDIO-VIDEO SPEAKERS, AMPLIFIERS, SIGNAL PROCESSORS									*			
AUDIO-VIDEO CONTROL SYSTEMS			*						*			
ELECTRONIC SAFETY AND SECURITY												
DATA CABLING	*						*					
DOOR CONTROL CABLING	*						*					
INTRUSION DETECTION, SURVEILLANCE, AND ACCESS CONTROL DEVICES						*						*
POWER RECEPTACLES/CONNECTIONS (LINE VOLTAGE)				*								
OTER REGER POLEO, CONTECTIONO (LINE VOETAGE)		I	I		l	l		l				
GENERAL NOTES												
A. FILLED GRAY CELLS WITH AN ASTERISK (*) INDICATE THAT WORK WILL BE	COMPLETED BY ENTITY STATE	AT TOP OF COLUMN										
NUMBERED NOTES [#]	COM LETED DI ENTITI STATE	ATT TOT OF COLONIN.										
1 FIRESTOPPING SHALL BE PROVIDED AND INSTALLED BY EACH INDIVIDUAL	CONTRACTOR AS REOLURED TO	MAINTAIN FIRE-RATING	S OF WALLS DURING THE	COLIRSE OF THAT ENTITY								
2 DEVICE ALLTHREAD DROPS SHALL BE PROVIDED AND INSTALLED BY EACH INDIVIDUAL					S SCOPE OF WORK.							
2 DEVICE ALLITINEAU UNOPS STALL BE PROVIDED AND INSTALLED BY EACH	INDIVIDUAL CONTRACTOR AS	REQUIRED DURING THE U	OURSE OF THAT ENTITY S	SCOPE OF WORK.								

SECTION 017423.05 DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Final cleaning of telecommunication spaces before installation of IT Equipment

1.02 REFERENCES

- A. Abbreviation and Acronyms
 - 1. IT Information Technology
 - 2. HEPA High-Efficiency Particulate Air

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination
 - 1. Liaise with the Owner three (3) weeks before the IT equipment installation date and complete cleaning, including any rework for non-conforming cleaning three (3) days before IT equipment installation date.
- B. Scheduling
- C. Notification
 - 1. Notify the Contract Administrator:
 - a. Where the document references unavailable sections
 - b. Where conflicts arise from requests in the documentation, implement the most onerous provision.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

- A. Use materials which will not create hazards to health or property, and which will not damage surfaces
- B. Use only materials as recommended by the manufacturer of the surface being cleaned.
- C. Vacuum
 - 1. HEPA filter

2.02 SOURCE QUALITY-CONTROL

- A. Tests and Inspections
 - 1. Visual inspection of cleanliness.
 - a. Run white cloth along the surface and inspect.
 - b. The cloth should not show any discoloration.
 - c. Perform on various surfaces at high and low level.
- B. Nonconforming Work
 - 1. Rework.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions
 - 1. Check actual site conditions before starting any Work.
 - 2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the cleaning.

3.02 PREPARATION

- A. Protection of In-Place Conditions
 - 1. Install dust mat to the exterior and interior of the space.
 - 2. Construct dust containment barrier to exterior of the space.

- B. Surface preparation
 - 1. Remove any debris or dust that may dislodge in the future during maintenance or installation of new cables.
- C. Demolition/Removal
 - 1. Remove all debris.

3.03 CLEANING

- A. Perform a broom clean.
- B. Vacuum floor and all surfaces
 - 1. Start from the top and work down and out toward the space's exit.
 - 2. Remove larger, loose dust and dirt.
- C. Damp wipe walls, ceiling and floors from top to bottom to remove attached dust and debris.
- D. Damp wipe ductwork.
- E. Use a non-damp anti-static cloth to clean cabinets, racks, shelves, patch panels, cables, and containment.
- F. Clean as recommended by Manufacturer.
 - 1. Do not use materials or methods which may damage the surface or surrounding construction.
- G. Waste Management: Recycle all detritus.

3.04 SITE QUALITY-CONTROL

- A. Site Tests and Inspections
- 1. Perform visual inspection at least three (3) days before installation of equipment.
- B. Nonconforming Work: Complete cleaning three (3) days before installation of equipment.

3.05 PROTECTION

A. Protect the space from any adjacent activities which may introduce dust or debris into the space.

END OF SECTION

SECTION 270526 GROUNDING AND BONDING FOR COMMUNICAITONS SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: a uniform telecommunication grounding (earthing) and bonding infrastructure and its interconnection to other building systems.
 - 1. Busbars
 - 2. Grounding and bonding connectors
 - 3. Ground lugs
- B. Related Requirements.
 - 1. Section 27 05 33 Conduits and Backboxes for Communications Systems
 - 2. Section 27 15 13 Communications Copper Horizontal Cabling

1.02 REFERENCES

- A. Abbreviation and Acronyms
 - 1. ANSI American National Standards Institute
 - 2. AWG American Wire Gauge
 - 3. BICSI Building Industry Consulting Services International
 - 4. DC Direct Current
 - 5. EIA Electronics Industries Alliance
 - 6. GE Grounding Equalizer
 - 7. ISO International Organization for Standardization
 - 8. IEEE Institute of Electrical and Electronics Engineers
 - 9. NECA We Are the National Electrical Contractors Association
 - 10. NEMA National Electrical Manufacturers Association
 - 11. NFPA National Fire Protection Association
 - 12. NRTL Nationally Recognized Testing Laboratory
 - 13. PMP Project Management Professional
 - 14. RCDD Registered Communications Distribution Designer
 - 15. RTPM Registered Telecommunications Project Manager
 - 16. TAA Trade Agreements Act
 - 17. TECH Technician
 - 18. TIA Telecommunications Industry Association
 - 19. TGB Telecommunications Grounding Busbar
 - 20. TMGB Telecommunications Main Grounding Busbar
 - 21. UL Underwriters Laboratory, an NRTL
- B. Reference Standards
 - 1. ANSI/BICSI/NECA-607 Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings, 2011
 - 2. ANSI/NECA/BICSI 568-2006 Standard for Installing Commercial Building Telecommunications Cabling
 - 3. ANSI/TIA-607-C Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises, 2015
 - 4. BICSI Information Transport Systems Installation Methods Manual (ITSIMM) 7th Edition
 - 5. BICSI Telecommunications Methods Manual (TDMM) 13th Edition
 - 6. IEEE 81-2012 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
 - 7. NECA 1-2015: Standard for Good Workmanship in Electrical Construction
 - 8. NEMA VE 2 Cable Tray Installation Guidelines, 2013
 - 9. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination
 - 1. Install and coordinate the Work in cooperation with interrelated Work.
- B. Scheduling
 - 1. Review the Contract Documents and the overall construction schedule to determine all interfacing and timing of the Work.
- C. Notification
 - 1. Notify the Contract Administrator:
 - a. Where the document references sections that are unavailable.
 - b. Where conflicts arise from requests in the documentation, request clarification from the Consultant through the project's RFI process.

1.04 ACTION SUBMITTALS

- A. General: Submit per Division 01, Section 01 33 00
- B. Product Data: Manufacturer's technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- C. Shop Drawings:
 - 1. Provide schematic drawings of the complete grounding system identifying all connection points.
 - 2. Include the the location of system ground electrode connections and the routing of aboveground and underground electrode conductors.
- D. Samples: Submit a sample for each component.
- E. Special Procedure Submittals
 - 1. Deliver-in-time installation strategy.
- F. Qualification Statements
 - 1. Project Manager
 - a. Provide a statement for Project Manager who should possess a Registered Communications Distribution Designer qualification, be in good standing with BICSI, and has demonstrable experience managing similar projects in size and scope to this project.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance Contracts: For each product
- B. Operation and Maintenance Data: For each product
- C. Warranty Documentation: For the system
- D. Record Documentation
 - 1. Record drawings indicating the location of all components and component identification.
 - 2. Test reports indicating the resistance to ground at each busbar.

1.06 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals
 - 1. Restriction of Hazardous Substances Directive compliant
- B. Qualifications
 - 1. Manufacturers:
 - a. ISO 9001 Quality Management Certification
 - b. ISO 14001 Environmental Management Certification
 - c. All components of the grounding and bonding system shall be from the same Manufacturer.
 - 2. Suppliers
 - a. Manufacturer's Approved Status

- 3. Installers
 - a. Site supervisor:
 - (a) BICSI Technician (TECH)
 - b. Project Manager
 - 1) BICSI Registered Communications Distribution Designer (RCDD)
 - 2) Project management certification, one of the following at minimum:
 - (a) Project Management Professional (PMP)
 - (b) BICSI Registered Telecommunications Project Manager (RTPM)
 - (c) Manager (RTPM)

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver in manufacturer's original unopened and undamaged packages with manufacturer's labels legible and intact.
 - a. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
 - 2. Inspect manufacturer's packages upon receipt.
- B. Storage and Handling Requirements: Protect from moisture, falls and compaction.
- C. Packaging Waste Management: Recycle all materials.

1.08 SITE CONDITIONS

A. Ambient Conditions: Do not conduct the test to report for completeness of the system until the electrical power for the entire site is live and operational.

1.09 WARRANTY

A. Warranty Period: One year from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Manufacturer List
 - a. Chatsworth Products, Inc.
 - b. CommScope, Inc.
 - c. Ortronics by Legrand North America, LLC.
 - d. Harger
 - Substitution Limitations: Submit substitution request in accordance with Section 01 25 00

 Substitution Procedures.
- B. Description
 - 1. Regulatory Requirements
 - a. UL Listed for Grounding and Bonding Equipment (UL 467).
 - b. Trade Agreements Act (TAA) Compliant.
- C. Performance/Design Criteria
 - 1. Capacities
 - a. Primary Bonding Busbar (PBB) formerly Telecommunications Main Grounding Busbar (TMGB)
 - 1) Pre-drilled copper busbar with holes to accommodate standard sized lugs.
 - 2) Minimum dimensions: 6 mm (0.25 in.) thick x 100 mm (4 in.) high x 510 mm (20 in.) long.
 - 3) Hole pattern to accommodate two-hole lugs per the recommendation of NECA/BICSI 607-2011 and TIA-607-B.
 - 4) Accommodate grounding lugs of 8 mm (5/16 in.) diameter with 16 mm (5/8 in.) hole centers and 11 mm (7/16 in.) diameter with 25 mm (1 in.) hole centers.

- 5) Have wall-mount stand-off brackets, assembly screws and insulators creating a 50 mm (2 in.) separation from the wall.
- b. Secondary Bonding Busbar formerly Telecommunications Grounding Busbar (TGB)
 - 1) Pre-drilled copper busbar with holes to accommodate standard sized lugs.
 - 2) Minimum dimensions: 6 mm (0.25 in.) thick x 50 mm (2 in.) high x 300 mm (20 in.) long.
 - 3) Have one row with nine (9) attachment points for two-hole grounding lugs.
 - Hole pattern to accommodate two-hole lugs per the recommendation of NECA/BICSI 607-2011 and TIA-607-B.
 - 5) Accommodate grounding lugs of 8 mm (5/16 in.) diameter with 16 mm (5/8 in.) hole centers and 11 mm (7/16 in.) diameter with 25 mm (1 in.) hole centers.
 - 6) Have wall-mount stand-off brackets, assembly screws and insulators creating a 50 mm (2 in.) separation from the wall.
- c. Bonding Conductors
 - 1) Copper
 - 2) When insulated, listed for the application.
 - 3) Sized at 6.5 kcmil/m (2 kcmil/ft) of conductor length.
 - (a) TBB and TBC to be minimum #4/0.
 - 4) Minimum bonding conductor size shall be 6 AWG.
 - 5) Size bonding conductors per Figure 5.4.4.1 of TIA-607.
 - 6) The bonding conductor insulation shall be green. If not insulated, permanently marked with green color.
- d. Bonding Accessories
 - 1) Two Mounting Hole Ground Terminal Block
 - (a) Electroplated tin aluminum extrusion.
 - (b) Accept conductors ranging from 14 AWG through 2 AWG.
 - (c) The conductors shall be held in place by two stainless steel set screws.
 - (d) Have two 6.4 mm (1/4 in.) holes spaced on 15.8 mm (5/8 in.) centers to allow secure two-bolt attachment to the rack or cabinet.
 - (e) Ground terminal block shall be UL Listed as a wire connector.
 - 2) Compression Lugs
 - (a) Electroplated tinned copper.
 - (b) Have two holes spaced on 15.8 mm (5/8 in.) or 25.4 mm (1 in.) centers, as stated below, to allow secure two-bolt connections to busbars.
 - (c) Sized to fit a specific size conductor, sizes 6 AWG to 4 AWG.
 - (d) Compression lugs shall be UL Listed as wire connectors.
 - 3) Antioxidant Joint Compound
 - (a) Oxide inhibiting joint compound for copper-to-copper, aluminum-toaluminum or aluminum-to-copper connections.
 - (b) Equipment Ground Jumper.
 - (c) 300 mm (24 in.) L insulated ground jumper with a straight two-hole .compression lug on one end and an L-shaped two-hole compression lug on the other end.
 - (d) Ground conductor is an insulated green/yellow stripe 6 AWG wire.
 - (e) Lugs made from electroplated tinned copper and have two mounting holes spaces 13 mm (0.5 in.) to 16 mm (0.625 in.) apart that accept 6 mm (1/4 in.) screws.
 - (f) UL Listed.
 - 4) Accessory Products:
 - (a) Provide any accessory products related to the copper connectors required to provide a complete and functional infrastructure system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions
 - 1. Check actual site conditions before starting any Work.
 - 2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.02 INSTALLATION

- A. Install as per:
 - 1. The manufacturer's recommended installation instructions
 - 2. ANSI/NECA/BICSI 568-2006
 - 3. ANSI/BICSI/NECA-607
 - 4. BICSI ITSIMM
 - 5. NECA-1
 - 6. NFPA 70
- B. Wall-Mount Busbars
 - 1. Attach busbars to the wall with appropriate hardware according to the manufacturer's installation instructions.
 - 2. Make conductor connections to the TMGB or TGB with two-hole bolt-on compression lugs sized to fit the busbar and the conductors.
 - 3. Attach each lug with stainless steel hardware after preparing the bond according to the manufacturer's recommendations and treating the bonding surface on the busbar with an antioxidant joint compound to help prevent corrosion at the bond.
- C. Rack-Mount Busbars and Ground Bars
 - 1. Add a rack-mount horizontal or vertical busbar or ground bar to each rack or cabinet.
 - 2. Attach rack-mount busbars and ground bars to racks or cabinets according to the manufacturer's installation instructions.
 - 3. Bond the rack-mount busbar or ground bar to the room's TMGB or TGB with appropriately sized hardware and conductor.
- D. Ground Terminal Block
 - 1. Bond every rack and cabinet to the TMGB or TGB.
 - 2. Make the minimum bonding connection to racks and cabinets with a rack-mount two-hole ground terminal block sized to fit the conductor and rack and installed according to manufacturer recommendations.
 - 3. Remove paint between rack/cabinet and terminal block, clean surface and use antioxidant between the rack and the terminal block to help prevent corrosion at the bond.
- E. Pedestal Clamp
 - 1. Bond every sixth raised access floor pedestal with a minimum 6 AWG conductor to the TMGB or TGB using a pedestal clamp sized to fit the pedestal and the conductor and installed according to the manufacturer's recommendations.
 - 2. If pedestal clamps are used to construct a signal reference grid, bond the signal reference grid to the TMGB or TGB and bond each rack and cabinet to the signal reference grid using a compression tap or similar non-reversible bonding component sized to fit both conductors.
 - 3. Remove paint between the pedestal and pedestal clamp, clean surface and use antioxidant between the pedestal and the clamp to help prevent corrosion at the bond.
 - 4. Remove insulation from conductors where wires attach to the pedestal clamp.
- F. Equipment Ground Jumper Kit
 - 1. Bond equipment to a vertical rack-mount busbar or ground bar using ground jumper according to the manufacturer's recommendations.
 - 2. Clean the surface and use antioxidant between the compression lugs on the jumper and the rack-mount busbar or ground bar to help prevent corrosion at the bond.

3.03 REINSTALLATION

- A. No additional burden to the Owner regarding costs, network downtime, or end-user interruption shall result from the reinstallation of specified components.
- B. Coordinate any reinstallation work, in writing, with the Owner.

3.04 SITE QUALITY CONTROL

- A. Site Tests and Inspections: Test the resistance to ground at each busbar to certify performance of the grounding and bonding system.
 - 1. Verify that the grounding system resistance to ground does not exceed 5 ohms.
 - 2. Measure using a four-terminal fall-of-potential method as defined in IEEE 81.
 - 3. Measure with an un-energized electrical distribution system in normally dry conditions not less than 48 hours after the last rainfall.
 - 4. Measure with an energized electrical distribution system in normally dry conditions not less than 48 hours after the last rainfall.
- B. Nonconforming Work: Reinstall.

3.05 CLEANING

- A. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.
- B. Waste Management: Recycle all detritus.

3.06 PROTECTION

A. Protect the grounding and bonding system from subsequent construction operations.

END OF SECTION

SECTION 270533 CONDUITS AND BACKBOXES FOR COMMUNICAITONS SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Conduit, fittings and bodies, including multi-cell conduit.
 - 2. Junction boxes, pull boxes and gutters.
 - 3. Measured pull tape.
- B. Related Requirements
 - 1. Section 27 05 26 Grounding and Bonding for Communication Systems
 - Section 27 15 13 Communications Copper Horizontal Cabling

2. Sectio

- A. Abbreviation and Acronyms
 - 1. AFF Above Finish Floor
 - 2. ANSI American National Standards Institute
 - 3. BICSI Building Industry Consulting Services International
 - 4. EMT Electric Metallic Tubing
 - 5. ENT Electrical Nonmetallic Tubing
 - 6. ID Inside Diameter
 - 7. ISO International Organization for Standardization
 - 8. NEC NEC Corporation of America
 - 9. NECA National Electrical Contractors Association
 - 10. NEMA National Electrical Manufacturers Association
 - 11. NFPA National Fire Protection Association
 - 12. NRTL Nationally Recognized Testing Laboratory
 - 13. OD Overall Diameter
 - 14. PVC Polyvinyl Chloride
 - 15. PMP Project Management Professional
 - 16. RCDD Registered Communications Distribution Designer
 - 17. RTPM Registered Telecommunications Project Manager
 - 18. TAA Trade Agreements Act
 - 19. TDMM Telecommunications Distribution Methods Manual
 - 20. TIA Telecommunications Industry Association
 - 21. UL Underwriters Laboratory, an NRTL
- B. Reference Standards
 - 1. ANSI/NECA/BICSI 568-2006 Standard for Installing Commercial Building Telecommunications Cabling
 - 2. ANSI/TIA 568.1-D Commercial Building Telecommunications Cabling Standard
 - 3. BICSI Information Transport Systems Installation Methods Manual (ITSIMM) 7th Edition
 - 4. BICSI Telecommunications Methods Manual (TDMM) 13th Edition
 - 5. NECA 1-2015: Standard for Good Workmanship in Electrical Construction
 - 6. NEMA VE 2 Cable Tray Installation Guidelines, 2013
 - 7. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination
 - 1. Install and coordinate the Work in cooperation with interrelated Work.
- B. Scheduling
 - 1. Review the Contract Documents and the overall construction schedule to determine all interfacing and timing of the Work.

- C. Notification
 - 1. Notify the Contract Administrator:
 - a. Where the document references sections that are unavailable.
 - b. Where conflicts arise from requests in the documentation, request clarification from the Consultant through the project's RFI process.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings:
 - 1. Provide schematic drawings locating all outlet backboxes and conduit stubups, including wall-mounted and floor boxes.
- C. Samples: Submit a sample for each component.
- D. Special Procedure Submittals
 - 1. Deliver-in-time installation strategy.
- E. Qualification Statements
 - 1. Project Manager
 - a. Provide a statement for Project Manager who should possess a Registered Communications Distribution Designer qualification, be in good standing with BICSI, and has demonstrable experience managing similar projects in size and scope to this project.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each product
- B. Warranty Documentation: For the system
- C. Record Documentation
 - 1. Record drawings indicating the location of all components and component identification.

1.06 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals
 - 1. Restriction of Hazardous Substances Directive compliant
- B. Qualifications
 - 1. Manufacturers:
 - a. ISO 9001 Quality Management Certification
 - b. ISO 14001 Environmental Management Certification
 - c. ISO 27001 Information Security Management Certification
 - 2. Suppliers
 - a. Manufacturer's Approved Status
 - 3. Installers
 - a. Site supervisor:
 - (a) BICSI Technician (TECH)
 - b. Project Manager
 - 1) BICSI Registered Communications Distribution Designer (RCDD)
 - 2) Project management certification, one of the following at minimum:
 - (a) Project Management Professional (PMP)
 - (b) BICSI Registered Telecommunications Project Manager (RTPM)
 - (c) Manager (RTPM)

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver in manufacturer's original unopened and undamaged packages with manufacturer's labels legible and intact.

- a. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
- 2. Inspect manufacturer's packages upon receipt.
- B. Storage and Handling Requirements: Protect from moisture, falls and compaction.
- C. Packaging Waste Management: Recycle all materials.

1.08 WARRANTY

A. Warranty Period: One year from date of Substantial Completion.

PART 2 PRODUCTS

2.01 COMPONENTS – TWISTED PAIR BACK BOX

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Manufacturer List
 - a. Randl Industries, Inc.
 - b. Thomas & Betts.
 - Substitution Limitations: Submit substitution request in accordance with Section 01 25 00

 Substitution Procedures.
- B. Description
 - 1. Regulatory Requirements
 - a. Not applicable
- C. Performance/Design Criteria
 - 1. 127 mm x 127 mm x 72.5 mm (5 in. x 5 in. x 2.875 in.)
 - 2. Side knockouts:
 - a. One (1) $1\frac{1}{4}$ " on each side.
 - 3. Integral cable management within the box
 - 4. Galvanized steel

2.02 COMPONENTS – EXTENSION RING

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Manufacturer List
 - a. Randl Industries, Inc.
 - b. Thomas & Betts.
 - 2. Substitution Limitations: Submit substitution request in accordance with Section 01 25 00 Substitution Procedures.
- B. Description
 - 1. Regulatory Requirements
 - a. Not applicable
- C. Performance/Design Criteria
- D. 127 mm x 127 mm x 13 mm (5 in. x 5 in. x 0.5 in.)
- E. Galvanized steel
- F. Extension ring for twisted pair back box to allow presentation of standard 106-style face plate.

2.03 SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Manufacturer List
 - a. Atkore International.
 - b. ABB Installation Products, Inc.
 - c. Condux International, Inc.
 - d. Eaton Corporation Plc.
 - e. Emerson Electric Co.
 - f. Fibertek Inc.
 - g. Hubbell Incorporated.

- h. Triangle Wire and Cable, Inc.
- i. Zekelman Industries.
- Substitution Limitations: Submit substitution request in accordance with Section 01 25 00

 Substitution Procedures.
- B. Description
 - 1. Regulatory Requirements
 - a. As appropriate to the component:
 - UL Listed for Standard for Electrical Intermediate Metal Conduit Steel (UL 1242)
 - 2) UL Listed for Conduit, Tubing and Cable Fittings (UL 514B)
 - 3) UL Listed for Hardware for the Support of Conduit, Tubing and Cable (UL 2239)
 - 4) UL Listed for Electrical Rigid Metal Conduit Steel (UL 6)
 - b. Trade Agreements Act (TAA) Compliant
- C. Types
 - 1. Rigid Steel Conduit:
 - a. Atkore International, Triangle Wire and Cable, Inc. Zekelman Industries,
 - 2. PVC-Coated Steel Conduit:
 - a. Rob-roy Industries, Inc. (Rob-Roy Red) or Occidental Coating Company (O-Cal Blue).
 - 3. PVC Rigid Conduit:
 - a. Carlon, Rob-roy Industries, Inc. or Cantex.
 - 4. Multi-Cell Raceway Electrical Metallic Tubing (EMT) Conduit:
 - a. Carlon Multi-Gard Multi-Cell Raceway EMT or submitted and owner-approved equivalent.
 - 5. Multi-Cell Raceway Galvanized Steel Conduit:
 - a. Carlon Multi-Gard Multi-Cell Raceway Galvanized Steel or submitted and ownerapproved equivalent.
 - 6. Conduit Fittings and Bodies:
 - a. Crouse-Hinds, Appleton Electric, Killark Electric Manufacturing Company or O-Z/Gedney.
 - 7. Measured pull tape pull tape printed with sequential footage markings for accurate measurements:
 - a. Fibertek, Condux International
- D. Requirements
 - 1. Fabricate conduit, fittings, and bodies to form a continuous support system for communications cables.
 - 2. PVC-Coated Rigid Steel Conduit and Fittings: Follow NEMA RN1 (Type A).
 - 3. Rigid Steel Galvanized Conduit and Fittings Before Coating:
 - a. Follow FS WW-C-581d, ANSI C80.1, and UL 6.
 - b. Pass bending, ductility, and thickness of zinc coating in ANSI C80.1.
 - Nonmetallic Conduit and Fittings: Pass NEMA TC2, UL 651 and 651A and FS W-C-1094A. EMT fittings shall be formed steel compression ring type. Die cast fittings are not allowed.
 - 5. All conduits, fittings, junction and pull boxes shall be UL Listed.
 - 6. All conduits, fittings, junction and pull boxes shall comply with the NEC.
 - 7. Conduit Bodies: Follow UL 514B and FS W-C-58C. Furnish sufficient coating for touch up after installation.
 - 8. Conduit Fittings
 - a. All fittings shall be compression or threaded.
 - b. Fittings shall provide a secure connection for pulling communications cables.
 - c. Setscrew fittings are not permitted.
 - 9. Conduit "condulets" are not permitted.

- 10. Non-metallic conduits are not permitted in above-ground installations. Conversion fittings are required for non-metallic (below ground) to metallic (above-ground) transitions.
- 11. Measured pull tape
 - a. Shall be pre-lubricated, woven polyester, low friction, and high abrasion resistant yarn.
 - b. Minimum average tensile strength shall be 54.43 kgs (1130 lbs.) for 38.1 mm (1.5 in.) and smaller conduits and innerduct.
 - c. Minimum average tensile strength shall be 816.46 mm (1800 lbs.) for conduits larger than 38.1 mm (1.5 in.).
- 12. Junction boxes, gutters, pull boxes
 - a. All junction boxes, gutters and pull boxes shall comply with NEC Article 314.
 - b. All junction boxes, gutters and pull boxes shall meet the following minimum material requirements:
 - 1) 16-gauge steel or larger.
 - 2) Seams shall be continuously welded and grounded smooth.
 - 3) Continuous hinge (where possible).
 - 4) External screws and clamps.
 - 5) External mounting feet (where possible).
 - 6) Oil-resistant gasket and adhesive.
 - 7) ANSI 61 gray polyester powder coating inside and out over phosphatized surface.
 - 8) UL 50 type 12.
 - c. All junction boxes, gutters and pull boxes shall be provided with the following:
 - 1) Proper knockouts for the required number of conduits.
 - 2) Shall be provided with proper bushings for conduits and/or cabling.
 - 3) Shall have a securely installed hinged access cover.
 - d. All junction boxes, gutters and pull boxes shall be securely installed.
 - e. All junction and pull box sizes for single and multiple conduit runs shall comply with BICSI TDMM.
 - f. Gutter sizes for single conduit runs shall comply with BICSI TDMM.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions
 - 1. Check actual site conditions before starting any Work.
 - 2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.02 INSTALLATION

- A. Install as per:
 - 1. The manufacturer's recommended installation instructions
 - 2. ANSI/NECA/BICSI 568-2006
 - 3. BICSI ITSIMM
 - 4. NECA-1
 - 5. NFPA 70
- B. Locations and Types:
 - 1. Install PVC-coated conduits in outdoor above-ground locations, inside valve vaults and wet wells, and in corrosive and wet environments.
 - 2. Install PVC conduits in buried duct banks or encased in concrete. Use PVC-coated rigid steel elbows for stubouts.
 - 3. Install exposed conduit parallel or perpendicular to lines of existing construction and grouped together where possible, without interfering with use of premises or working

areas. Prevent safety hazards and interference with operating and maintenance procedures.

- 4. Conduit may pass through areas with temperature differential of 20 degrees F or more. Seal with proper fitting at barrier between areas of differing temperature.
- 5. Do not install conduit in interference with equipment placement or operation; piping; structural members; maintenance access; indicated future equipment.
- 6. Contractor's RCDD supervisor shall coordinate with Drawings of other disciplines to determine availability of space for installation.
- C. Conduit Sizing, Arrangement and Support:
 - 1. Conduit fill shall comply with TIA-569-C.
 - 2. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for thirty percent additional conduits whenever possible.
 - 3. Support un-encased conduit with clamps, hangers, straps and metal framing channel attached to building structure.
 - 4. Arrange conduit supports to prevent alignment distortion by wire pulling operations. Fasten conduits using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
 - 5. For conditions where existing supports are insufficient, install rigid support system, securely attached to building structural members only, plumb, level and in true alignment with related and adjoining work.
 - 6. Support conduit 50.8 mm (2 in.) and larger at 3.05 m (10 ft.) on center maximum, and conduit 38.1 mm (1.5 in.) and smaller at 2.43 m (8 ft.) on center maximum.
 - 7. Fasten 38.1 mm (1.5 in.) and smaller conduit to concrete, masonry or steel with either one-hole malleable iron conduit straps, or "Korn" clamps, or U-bolts; for larger diameters, use two-hole straps. Use "clamp backs" for strapping conduits to planar surfaces.
 - 8. Provide PVC-coated or stainless steel supports for PVC-coated conduit.
 - 9. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
 - 10. Allow minimum 6.35 mm (0.25 in.) clearance from vertical surfaces to prevent dirt and moisture buildup behind conduit.
- D. Design Considerations:
 - 1. Contractor's RCDD supervisor shall coordinate material changes to design with the Program Manager.
 - 2. Fabricate bends free of indentations or elliptical sections.
 - 3. The minimum bend radius is six times the conduit ID for a 50.8 mm (2 in.) conduit or less.
 - 4. The minimum bend radius is ten times the conduit ID for a conduit greater than 2 inches.
 - 5. The minimum bend radius is eight times the conduit ID for a conduit supporting the TBB for a 50.8 mm (2 in.) conduit or less.
 - 6. Below grade conduit shall extend four inches AFF with a bushing.
 - 7. Ceiling conduit or sleeves shall extend four inches below finished ceiling with a bushing.
 - 8. All stubbed conduit ends shall be provided with a ground bushing.
 - 9. All conduit penetrations shall be provided with the proper conduit sleeves.
 - a. Sleeves shall extend three inches AFF or four inches below finished ceiling, with a bushing.
 - b. Sleeves shall be installed in the communications room floor or ceiling a minimum of 50.8 mm (2 in.) to 101.6 mm (4 in.) on center from the wall.
 - c. Conduit floor sleeves shall be spaced in increments to equal the conduit outside diameter from each other.
 - d. Shall be installed in a single tier or row from left to right horizontally.
 - 1) If two tiers or rows are required the conduits shall be staggered between tiers.
 - 2) No more then two tiers or rows are permitted.

- 10. Cable support anchors shall be installed 457.2 mm (18 in.) to 609.6 mm (24 in.) above the sleeves.
 - a. All conduit penetrations shall comply with all applicable fire codes. All conduit penetrations in fire-rated walls or floors shall be sealed and fire proofed to at least the rating of the penetration area.
 - b. Conduits shall be routed in the most direct route, with the fewest number of bends possible.
 - c. There shall be no continuous conduit sections longer than 30.48 m (100 ft.). For runs that total more than 30.48 m (100 ft.), insert junction or pull boxes (or gutters if appropriate) so that no continuous run between pull boxes is greater than 30.48 m (100 ft.)
 - d. There shall be no more than two 90-degree bends (180 degrees total) between conduit pull boxes.
 - e. Terminate conduit in sheet metal enclosures. Outdoor enclosures shall be furnished with threaded hubs. Side penetrations in the enclosure are not permitted.
 - f. Changes in direction shall be accomplished with sweeping bends observing minimum bend radius requirements above. Do not use pull boxes for direction changes unless specifically designated otherwise in the Drawings.
 - g. Unless otherwise noted in the Drawings, conduits entering pull boxes shall be aligned with exiting conduits.
 - h. Pull boxes shall be placed in readily accessible locations at a height to clear the ceiling grid with box door open.
- E. Separation requirements following are the minimum separation requirements between communications and power cables.
 - 1. Unshielded power lines or electrical equipment in proximity to open or non-metal pathways:
 - a. Less than 2 kVA 127 mm (5 in.)
 - b. 2 to 5 kVA 304.8 mm (12 in.)
 - c. Greater than 5 kVA 609.6 mm (24 in.)
 - 2. Unshielded power lines or electrical equipment in proximity to grounded metal conduit pathway:
 - a. Less than 2 kVA 63.5 mm (2.5 in.)
 - b. 2 to 5 kVA 152.4 mm (6 in.)
 - c. Greater than 5 kVA 304.8 mm (12 in.)
 - 3. Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal conduit pathway:
 - a. 2 to 5 kVA 76.2 mm (3 in.)
 - b. Greater than 5 kVA 152.4 mm (6 in.)
- F. Installation:
 - 1. Install conduit mechanically secure, mechanically protected from physical harm, electrically continuous, and neat in appearance. Ensure interior of conduit is clean and smooth to permit pulling conductors without damage to insulation. Wrench- tighten threaded connections.
 - 2. Cut conduit ends square, leaving a flat conduit face. Do not use plumbing pipe cutters.
 - 3. Deburr ends.
 - 4. Cut threads with standard conduit dies providing 19.05 mm (0.75 in.) taper per foot and of proper length to make joints and terminals tight and without deformation.
 - 5. Use thread cutting oil continuously during threading. Remove metal cuttings and oil after cutting and before painting (if any).
 - 6. Use non-corrosive "Carbozinc No. 11" manufactured by Carboline Company, coal tar enamel or zinc rich epoxy primer on threads of steel conduit before connection.
 - 7. Use only strap wrenches to tighten joints in plastic coated rigid steel conduit. Replace conduit and fittings showing cuts, nicks and threader chuck jaw marks and other damage. Use solvent, or the same patching material, to seal around edges of conduit fitting covers.

- 8. Protect conduit terminations from mechanical damage, and prevent entry of moisture, dirt and foreign matter into the conduit system by properly capping terminations.
- 9. Fit conduit crossing structure expansion joints with approved expansion fittings and bonding jumpers.
- 10. Seal annular space at conduit penetrations through structures and pavement airtight and watertight.
- 11. Provide measured pull tape in all conduits and innerduct prior to cable installation. Measured pull tape shall be replaced with standard pull tape (non-measured) when each cable is installed.
- G. Horizontal Conduit Routes
 - 1. Horizontal Conduits
 - a. Horizontal (station) conduit is defined as the conduit run between the communications outlet and the cable tray or communications room as indicated on Drawings.
 - b. Each horizontal conduit run shall be a 1 ¼ in. metallic conduit and shall be home run from each communications outlet box to the equipment room, terminating equipment or cable tray, as indicated in Drawings.
 - c. Each route shall be installed with the least amount of conduit bends.
 - d. Each single horizontal conduit run shall be provided with a junction or pull box every 30.48 m (100 ft.) maximum distance.
 - e. Each dual horizontal conduit run shall be provided with a junction or pull box every 30.48 m (100 ft.). The quantity of conduits entering the junction or pull box shall equal the number of conduits exiting the junction or pull box.
 - f. Each terminating (outlet end) conduit connection shall be provided with the proper connecting bushing fitting.
 - g. Each originating end (communications room end) shall be provided with the proper connecting ground bushing fitting and properly bonded to ground.
 - 2. Horizontal Junction/Outlet Boxes
 - a. Each horizontal conduit shall be terminated into an outlet box.
 - b. Each outlet box shall be provided a single-gang mudring.
 - c. Each outlet box shall be a 5" x 5" Telecommunications back box with two (2) 1 ¼ in. knockouts on top, bottom and each of the sides.
 - d. Each conduit home run shall be provided with a deep 101.6 mm (4 in.) junction box (w/cover) at 30.48 m (100 ft.) intervals and 152.4 mm (6 in.) above each ceiling and wall intersection.
 - 3. Horizontal conduit entrance in communications rooms wall entry
 - a. Horizontal conduits shall enter the communications room wall 304.8 mm (12 in.) to 457.2 mm (18 in.) above the top of the cable tray.
 - b. Conduit wall stubs shall be spaced in increments equal to the conduit OD from each other.
 - c. All conduit wall stubs shall be extended to the terminating equipment, electronics, or cable tray, as noted in Drawings.
 - d. Conduit crossovers are not permitted.
 - 4. Horizontal conduit entrance in communications rooms ceiling entry
 - a. Horizontal conduits shall enter or be extended from the equipment room ceiling 304.8 mm (12 in.) to 457.2 mm (18 in.) above the top of the cable tray.
 - b. Ceiling conduit stubs shall be spaced in increments equal to the conduit OD from each other.
 - c. All ceiling conduit stubs shall be extended to the terminating equipment, electronics, or cable tray, as noted in Drawings.
 - d. Conduit crossovers are not permitted.
 - 5. Horizontal conduit entrance in communications rooms floor entry
 - a. Horizontal conduits shall enter the communications room floor two inches to four inches on center from the wall and shall be stubbed 152.4 mm (6 in.) AFF.

- b. Conduit floor stubs shall be spaced in increments equal to the conduit OD from each other.
- All conduit floor stubs shall be extended to the terminating equipment, electronics, or C. cable tray, as noted in Drawings, by routing up the wall, between the wall and the wall-mounted cable tray side rail, and extending 304.8 mm (12 in.) to 457.2 mm (18 in.) above the top of the cable tray. d.
 - Conduit crossovers are not permitted.
- Horizontal conduit-to-cable tray 6.
 - Only the terminating end of horizontal communication conduits shall be attached to a. the cable tray.
 - b. Non-communications conduit shall not be attached to the cable tray in any fashion.
 - Conduit terminating end shall be attached to cable tray side rail with "conduit-to-cable C. tray" clamps. No other form of attachment shall be permitted.
 - d. Top or bottom cable tray conduit feeds and attachments are not permitted.
- **Riser Conduit Routes** 7.
 - Riser conduit entrance in communications rooms wall entry а
 - Riser conduits shall enter the communications room wall a minimum of 609.6 1) mm (24 in.) above the top of the cable tray.
 - 2) Conduit wall stubs shall be spaced in increments to equal the conduit OD from each other.
 - 3) Riser conduits shall be installed in a single tier or row from left to right horizontally.
 - (a) If two tiers or rows are required the conduits shall be staggered between tiers.
 - (b) No more then two tiers or rows are permitted.
 - b. All conduit wall stubs shall be extended to and over the cable tray to access cable tray pathway.
 - All riser conduit stubs shall be provided with the proper universal drop-out/ waterfall C. cable exit runway, which shall be supported by and mounted to channel strut.
 - Conduit crossovers are not permitted. d.
 - Riser conduit entrance in communications rooms floor entry e.
 - Riser conduits shall enter the communications room floor 50.8 mm (2 in.) to 1) 101.6 mm (4 in.) on center from the wall and shall stub up 152.4 mm (6 in.) AFF.
 - Conduit floor stubs shall be spaced in increments to equal the conduit OD from 2) each other.
 - 3) Riser conduits shall be installed in a single tier or row from left to right horizontally.
 - (a) If two tiers or rows are required the conduits shall be staggered between tiers.
 - (b) No more then two tiers or rows are permitted.
- 8. Exiting cable shall be extended to the bottom of the cable tray and be provided with cable support anchors and secured with supporting hardware every 152.4 mm (6 in.) above the conduit bushings.
- 9. Conduit floor stubs shall be extended to the terminating equipment, electronics, or cable tray, only when noted in Drawings. When required conduits shall be routed up the wall, between the wall and the wall-mounted cable tray side rail, and extended 304.8 mm (12 in.) to 457.2 mm (18 in.) above the top of the cable tray.
- 10. The riser cable shall be extended in the cable tray to the terminating equipment, as noted in the Drawings.
- 11. Conduit crossovers are not permitted.
- 12. All metallic conduits shall be grounded to the telecommunications ground bus bar at each end.
- H. Multi-Cell Raceway

- 1. All multi-cell galvanized steel entry conduit stubs shall be transitioned to multi-cell EMT egress conduit.
- 2. All multi-cell galvanized steel conduit room stubs shall be transitioned to multi-cell EMT conduit using the proper metallic connecting fittings.
- 3. Within the communications rooms, only non-metallic Riser Gard innerduct shall be extended from the conduit stub to the terminating equipment.
- 4. Manufacturer's non-metallic connecting fitting shall be used at all connections.

3.03 REINSTALLATION

- A. No additional burden to the Owner regarding costs, network downtime, or end-user interruption shall result from the reinstallation of specified components.
- B. Coordinate any reinstallation work, in writing, with the Owner.

3.04 SITE QUALITY CONTROL

A. Nonconforming Work: Reinstall

3.05 CLEANING

- A. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.
- B. Waste Management: Recycle all detritus.

3.06 PROTECTION

A. Protect the grounding and bonding system from subsequent construction operations.

END OF SECTION

SECTION 270800 COMMISSIONING OF COMMUNICAITONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Requirements for all Structured Cabling System (SCS) testing, including certification and documentation of all test results to confirm the installed connectivity system complies with industry standards and specific category and performance ratings.
- B. Related Requirements
 - Section 27 15 13 Communications Copper Horizontal Cabling

1. Sectio

	Α.	Abbreviation and Acronyms
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- 1. ACR Attenuation to Crosswalk Ratio
- 2. ACR-F Attenuation Crosstalk Ratio Far-end
- 3. ANSI American National Standards Institute
- 4. BICSI Building Industry Consulting Services International
- 5. CA Contract Administrator
- 6. CSV Comma-Separated Values
- 7. DC Direct Current
- 8. FEXT Far end crosstalk
- 9. FP Fabry-Perot laser
- 10. ITSIMM Information Technology Systems Installation Methods Manual
- 11. IEC International Electrotechnical Commission
- 12. ISO International Organization for Standardization
- 13. ISP Internet Service Provider
- 14. LED Light-emitting diode
- 15. LOMMF Laser Optimized Multimode Fiber
- 16. NEMA National Electrical Manufacturers Association
- 17. NEXT Near-end Crosstalk
- 18. NFPA National Fire Protection Association
- 19. NRTL Nationally Recognized Testing Laboratory
- 20. NVP Nominal Velocity of Propagation
- 21. OD Overall Diameter
- 22. OLTS Optical Loss Test Set
- 23. OSP Online Service Provider
- 24. OTDR Optical Time Domain Reflectometer
- 25. PC Personal Computer
- 26. PMP Project Management Professional
- 27. PS Power Sum
- 28. RCDD Registered Communications Distribution Designer
- 29. RTPM Registered Telecommunications Project Manager
- 30. SCS Structured Cabling Test
- 31. ScTP Screened Twisted-Pair
- 32. SOW Statement of Work 33. TAA Trade Agreements
- 33. TAATrade Agreements Act34. TECHBICSI Technician
- 35. TIA Telecommunications Industry Association
- 36. UL Underwriters Laboratory, an NRTL
- 37. USB Universal Serial Bus
- 38. UTP Unshielded Twisted-Pair
- 39. VCSEL Vertical-cavity surface-emitting laser

- B. Definitions
 - 1. Margin is the difference between the measured value and the corresponding test limit value.
 - 2. Worst-case margin identifies the smallest margin over the entire frequency range; the point at which the measured performance is closest to the test limit.
- C. Reference Standards
 - 1. ANSI/TIA-1152-A Requirements for Field Test Instruments for Balanced Twisted Pair Cabling
 - 2. ANSI/TIA 568-D.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standard
 - TIA-526-7-A Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, Adoption of IEC 61280-4-2 edition 2: Fibre-Optic Communications Subsystem Test Procedures – Part 4-2: Installed Cable Plant – Single-Mode Attenuation and Optical Return Loss Measurement
 - 4. TIA-526-14-C Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; Modification of IEC 61280-4-1 edition 2, Fiber-Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant-Multimode Attenuation Measurement
 - 5. ISO/IEC 14763-2 Information technology -- Implementation and operation of customer premises cabling -- Part 2: Planning and installation, 2012
 - BICSI Information Transport Systems Installation Methods Manual (ITSIMM) 7th Edition

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Install and coordinate the Work in cooperation with interrelated Work.

- B. Scheduling
 - 1. Review the Contract Documents and the overall construction schedule to determine all interfacing and timing of the Work.
- C. Notification
 - 1. Notify the Contract Administrator:
 - a. Where the document references sections that are unavailable.
 - b. Where conflicts arise from requests in the documentation, request clarification from the Consultant through the project's RFI process.
 - c. Three (3) days before field testing.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Certificates: Calibration and service record of each certification test device
 - 1. Provide proof that the test device calibration is within the Manufacturer's recommended period.
- C. Special Procedure Submittals
 - 1. Deliver-in-time installation strategy.
- D. Qualification Statements
 - 1. Project Manager
 - a. Provide a statement for Project Manager who should possess a Registered Communications Distribution Designer qualification, be in good standing with BICSI, and has demonstrable experience managing similar projects in size and scope to this project.

1.05 CLOSEOUT SUBMITTALS

A. Record Documentation:

- 1. Present all test results verifying the installed link, permanent link and channel performance parameter results for all cable types at least one (1) week before the placement of any active electronics in telecommunication spaces.
- 2. The test result submittal shall contain the following:
 - a. Testing, verification, and documentation of all performance specification parameters for data cables in all telecommunication spaces.
 - b. Identify the types of cable test device(s) and interface adapters used during testing and certification when presenting the results for each type of cable and each test procedure.
 - c. Print directly from the testing device software application in both paper and electronic.
 - d. Present paper results in a three (3) ring binder, sectioned according to floor and cable type.
 - 1) Where applicable:
 - 2) OSP
 - 3) ISP
 - 4) Copper horizontal
 - 5) Copper backbone
 - 6) Optical fiber cable horizontal
 - 7) Optical fiber cable backbone
 - e. Present electronic results on a USB drive in the testing device's native file type with a copy of the electronic software used to generate the test results.
- 3. The last calibration/service record of each certification test device.
- B. Copper Test Results Documentation
 - 1. Transfer the test results/measurements into a Microsoft Windows-based database utility that allows for the maintenance, inspection and archiving of these test records.
 - 2. Guarantee that the measurement results transfer to the USB drive unaltered (i.e., as saved in the test device) at the end of each test and that these results cannot be modified at a later time.
 - 3. The database for the completed job shall be stored and delivered on USB including the software tools required to view, inspect, and print any selection of test reports.
 - 4. Provide a PDF of the test results.
 - a. The identification of the link per the naming convention defined in Section 27 05 53.
 - b. The overall pass/fail evaluation of the link-under-test including the NEXT Headroom (overall worst-case) number.
 - c. The date and time the test results were saved in the memory of the test device.
 - 5. General Information to be provided in the electronic database with the test results information for each link:
 - a. The identification of the customer site as specified by the end-user.
 - b. The identification of the link per the naming convention defined in the overall system documentation.
 - c. The overall pass/fail evaluation of the link-under-test.
 - d. The name of the standard selected to execute the stored test results.
 - e. The cable type and the value of NVP used for length calculations.
 - f. The date and time the test results were saved in the memory of the test device.
 - g. The brand name, model and serial number of the test device.
 - h. The identification of the test device interface.
 - i. The revision of the test device software and the revision of the test standards database in the test device.
 - j. Length
 - 1) Identify the wire-pair with the shortest electrical length, the value of the length rounded to the nearest 100 mm (~ 4 in.) and the test limit value.
 - k. Propagation delay:

- 1) Identify the pair with the shortest propagation delay, the value measured in nanoseconds (ns) and the test limit value.
- I. Delay Skew:
 - 1) Identify the pair with the largest value for delay skew, the value calculated in nanoseconds (ns) and the test limit value.
- m. Insertion Loss (Attenuation):
 - 1) Minimum test results documentation as explained in Part 2 for the worst pair.
- n. Return Loss:
 - 1) Minimum test results documentation as explained in Part 2 for the worst pair as measured from each end of the link.
- o. NEXT, ACR-F:
 - 1) Minimum test results documentation as explained in Part 2 for the worst pair combination as measured from each end of the link.
- p. PS-NEXT and PS ACR-F:
 - 1) Minimum test results documentation as explained in Part 2 for the worst pair as measured from each end of the link.
- q. DC Loop Resistance.
- r. DC Resistance Unbalance.
- s. Plot Data.
- C. Optical Fiber Test Results Documentation
 - 1. Transfer test results saved within the field test instrument onto a USB drive formatted for use in a Microsoft Windows PC.
 - 2. Do not save the test results as CSV.
 - 3. Contain the following information.
 - a. The identification of the customer site as specified by the end-user.
 - b. The name of the test limit selected to execute the stored test results.
 - c. The name of the personnel performing the test.
 - d. The date and time the test results were saved in the memory of the test device.
 - e. The manufacturer, model and serial number of the field test instrument.
 - f. The version of the test software and the version of the test limit database held within the test instrument.
 - g. The fiber identification number.
 - h. The length for each optical fiber.
 - i. The index of refraction used for length calculation when using a length capable OLTS.
 - j. OLTS attenuation link and channel measurements at the appropriate wavelength(s) and the margin (the difference between the measured attenuation and the test limit value).
 - k. The overall pass/fail evaluation of the link-under-test for OLTS measurements.
 - I. A picture or image of each fiber end-face and a pass/fail status of the end-face based upon visual inspection.

D. Software

- 1. Any specialist software necessary to view, inspect and print any selection of test results or report in the testing device's native file type.
- 2. Licenses.
- 3. Subscriptions.
- 4. Software and Firmware Operational Documentation.

1.06 QUALITY ASSURANCE

- 1. Testing Team
 - a. Test Technician:
 - 1) BICSI Technician (TECH)
 - 2) Manufacturer certified to use their test device

- (a) Fluke Certified Cabling Test Technician Program
- b. Project Manager
 - 1) BICSI Registered Communications Distribution Designer (RCDD)
 - 2) Project management certification, one of the following at minimum:(a) Project Management Professional (PMP)
 - (b) BICSI Registered Telecommunications Project Manager (RTPM)
 - (c) Manager (RTPM)

1.07 SITE CONDITIONS

A. Ambient Conditions: Do not conduct any testing for certification of copper cabling until the electrical power for the entire site is live and operational.

PART 2 PRODUCTS

2.01 COPPER CABLE TEST DEVICE

- A. Manufacturer List
 - 1. Fluke Corporation
- B. Product Options
 - 1. Select analyzer to comprehensively certify each category rated connection and record results verifying compliance with TIA performance specifications to meet the category rating of the system.
 - a. DTX CableAnalyzer
- C. Performance/Design Criteria
 - 1. Capacities
 - a. Must comply with the accuracy requirements for field test device as defined in ANSI/TIA-1152.
 - b. Must meet or exceed TIA Level IV compliant network cable testing device certification by an independent laboratory, such as Intertek, for verification of high speed, TIA-568 compliant cables.
 - c. Copper test equipment capable of certifying Category-3, Category-5e, Category-6, Category-6A, Category 7 and Category 8 UTP/ScTP links or channels independent of termination hardware configuration (8P8C, jack or 110-style) for each level of performance.
 - d. Provide full two-way auto test of Category-3, 5E, 6, 6A, 7 and 8 twisted-pair links.
 - e. Store full frequency sweep data for all tests and print color graphical reports for all swept measurements.
 - f. Be within the device test manufacturer's recommended calibration period.
 - g. The test device including the appropriate interface adapter must meet the specified accuracy requirements for the permanent link test configuration (baseline accuracy plus adapter contribution) as specified in ANSI/TIA-1152.
 - h. The 8P8C test plug shall fall within the values specified in ANSI/TIA-568-D.2 for NEXT, FEXT and Return Loss.
 - i. The adapter cord cable cannot be of twisted-pair construction.
 - 2. Be capable of conducting the following tests as per ANSI/TIA-568-D.2
 - a. Wire Map:
 - 1) If test device determines wiring is correct reports pass.
 - 2) Include the continuity of the shield connection if present.
 - b. Length:
 - 1) Capable of measuring the length of all pairs of a basic link or channel based on the propagation delay measurement and the average value for NVP.
 - 2) Calculate the physical length of the link using the pair with the shortest electrical delay.
 - 3) Report and use for making the pass/fail decision.

- 4) The pass/fail criteria are based on the maximum length allowed for the Permanent Link configuration (90 m (~ 295 ft))) plus 10 percent to allow for the variation and uncertainty of NVP.
- c. Insertion Loss (Attenuation):
 - 1) Test through the required frequency range in maximum step size of 1 MHz.
 - 2) Measure insertion loss at the same frequency intervals as NEXT Loss to provide a more accurate calculation of the ACR parameter.
 - 3) Minimum test results documentation (summary results):
 - (a) Identify the worst wire-pair (1 of 4 possible).
 - (b) The test results for the worst wire-pair must show the highest attenuation .value measured (worst-case), the frequency at which this worst-case value occurs, and the test limit value at this frequency.
- d. NEXT Loss:
 - 1) Test pair-to-pair NEXT loss for each wire-pair combination from each end of the link (a total of 12 pair combinations).
 - 2) Measure through the required frequency range.
 - 3) Does not exceed the maximum step size for NEXT Loss measurements as defined in ANSI/TIA-568-D.2 Table 1.
 - 4) Minimum test results documentation (summary results):
 - (a) Identify the wire-pair combination that exhibits the worst-case NEXT margin and the wire-pair combination that exhibits the worst value of NEXT (worst-case).
 - (b) Include the frequency at which it occurs as well as the test limit value at this frequency.
- e. PS-NEXT Loss:
 - 1) Evaluate and report for each wire-pair from both ends of the link-under-test (a total of eight results).
 - 2) Evaluate through the required frequency range, and the step size may not exceed the maximum step size defined in ANSI/TIA-568-D.2 as shown in Table 1.
 - 3) Minimum test results documentation (summary results):
 - (a) Identify the wire-pair that exhibits the worst-case margin and the wire-pair that exhibits the worst value for PS-NEXT.
 - (b) Identify for the tests performed from each end.
 - (c) Include the frequency at which it occurs as well as the test limit value at this frequency.
- f. ACR-F, pair-to-pair:
 - 1) Measure for each wire-pair combination from both ends of the link-under-test.
 - 2) Measure through the required frequency range, and the maximum step size for FEXT Loss measurements shall not exceed the maximum step size defined in ANSI/TIA-568-D.2 as in Table 1.
 - 3) Minimum test results documentation (summary results):
 - (a) Identify the wire-pair combination that exhibits the worst-case margin and the wire-pair combination that exhibits the worst value for ACR-F.
 - 4) Identify for the tests performed from each end.
 - 5) Include the frequency at which it occurs as well as the test limit value at this frequency.
- g. PS ACR-F Loss:
 - 1) Minimum test results documentation (summary results):
 - (a) Identify the wire-pair that exhibits the worst pair combinations for the tests performed from each end.
 - (b) Include the frequency at which it occurs as well as the test limit value at this frequency.
- h. Return Loss:

- 1) Measure from both ends of the link-under-test for each wire-pair.
- Measure through the required frequency range in frequency increments that do not exceed the maximum step size defined in ANSI/TIA-568-D.2 as shown in Table 1.
- 3) Minimum test results documentation (summary results):
 - (a) Identify the wire-pair that exhibits the worst-case margin and the wire-pair that exhibits the worst value for Return Loss.
 - (b) Identify the wire pairs for the tests performed from each end.
 - (c) Include the frequency at which it occurs as well as the test limit value at this frequency.
- i. Propagation Delay:
 - 1) Perform for each of the four wire pairs.
 - 2) Minimum test results documentation (summary results):
 - (a) Identify the wire-pair with the worst-case propagation delay.
 - (b) Include the propagation delay value measured as well as the test limit value.
- j. Delay Skew as defined in ANSI/TIA-568-D.2
 - 1) Minimum test results documentation (summary results):
 - (a) Identify the wire-pair with the worst-case propagation delay (the longest propagation delay).
 - (b) The report shall include the delay skew value measured as well as the test limit value.
- k. DC Loop Resistance
 - 1) Not to exceed 6.4 Ohm for all four pairs.
 - 2) Minimum test results documentation (summary results):
 - (a) Identify DC Loop Resistance.
- I. DC Resistance Unbalance
 - 1) Not to exceed 120 milliohms or 7.5 percent whichever is greater.
 - 2) Report DC Resistance Unbalance for the following pairs:
 - (a) 1,203,6
 - (b) 1,2-4,5
 - (c) 1,2-7,8
 - (d) 3,6-4,5
 - (e) 3,6-7,8
 - (f) 4,5-7,8
- 3. Minimum test results documentation (summary results):
 - a. DC Resistance Unbalance.
- 4. Alien Crosstalk
 - a. Sampling size as per ISO/IEC 14763-2.

2.02 OPTICAL FIBER TEST DEVICE

- A. Manufacturer List
 - 1. Fluke Corporation
- B. Substitution Limitations: Submit substitution request in accordance with Section 01 25 00 Substitution Procedures.
- C. Product Options
 - Select analyzer to comprehensively certify each optical fiber connection and record results verifying compliance with TIA performance standards and manufacturer specifications.
 a. OptiFiber Pro OTDR.
- D. Performance/Design Criteria
 - 1. Capacities

- a. The optical fiber source shall permit full end-to-end testing of multimode, Single-mode and LOMMF optical fiber cabling fully compliant with industry standards and manufacturer recommendations.
- b. Available source types and wavelengths shall be as follows:
- c. Multimode 850nm LED, and 1300nm LED.
- d. Single-mode 1310nm FP Laser and 1550nm FP Laser.
- e. LOMMF 850nm VCSEL and 1310nm FP Laser.
- f. The built-in power meter shall be calibrated to read 850, 1310 and 1550nm wavelengths.
- g. All test equipment shall be capable of storing full frequency sweep data for all tests and printing graphical color reports for all swept measurements.
- h. Within the calibration period recommended by the test device's manufacturer to achieve the manufacturer's specified measurement accuracy.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions
 - 1. Check actual site conditions before starting any Work.
 - 2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.
- B. Evaluation and Assessment
 - 1. Verify that all telecommunications cabling is installed and supported, terminated, mounted in an appropriate housing or terminated on the applicable component and labeled before certification testing and documentation.
 - 2. Verify that all outlets, cables, patch panels, and associated components are fully assembled and labeled before field testing.
 - 3. Redo any testing performed on incomplete systems.

C.

3.02 PREPARATION

- A. Ensure that field test instruments have the latest software and firmware installed.
- B. Verify certification test device universal interface adapters and manufacturer patch cords that enable permanent link verification are in new condition are do not indicate any twisting or kinking resulting from incorrect storage of the test device interface adapters.
- C. Inspect optical fiber patch cords and ensure that connector surfaces are clean and free of defects.

3.03 TESTING (APPLICABLE TO ALL CABLE PLANT)

- A. Certification test 100 percent of the installed cabling plant
- B. Certify all existing cabling noted to remain.
- C. Certify all existing cabling relocated as part of the new cable plant.
- D. Follow manufacturers' instructions and recommended industry standards and guidelines to complete all TIA/EIA testing procedures to verify performance levels
- E. Follow manufacturer requirements for self-calibration procedures
- F. Follow BICSI ITSIMM
- G. Perform all tests required by local authorities in addition to tests specified herein
- H. Ensure circuit/cable IDs reported by the test instrument match the printed label ID
- I. Update test device software to show specific project information including but not limited to:
 - 1. Date and time of testing
 - 2. Project name

- 3. Field technician's name
- 4. Cable identification number
- 5. Cable manufacturer, type and part number

3.04 COPPER CABLE TESTING

- A. Test every cabling link in the installation in accordance with the field test specifications defined in ANSI/TIA-568-D.2.
- B. To pass the test, all measurements (at each frequency in the required frequency range) must meet or exceed the limit value determined in ANSI/TIA-568-D.2.
- C. Test each cable for:
 - 1. Wire Map
 - 2. Length
 - 3. Insertion Loss
 - 4. NEXT (Near-end Crosstalk) Loss
 - 5. PS-NEXT (Power sum Near-end Crosstalk) Loss
 - 6. ACR-F Loss
 - 7. PS ACR-F Loss
 - 8. Return Loss
 - 9. Propagation Delay
 - 10. Delay Skew
 - 11. DC Loop Resistance
 - 12. Alien Crosstalk
- D. Test the installed twisted-pair horizontal links the point of termination in the telecommunications space to the telecommunication outlet in the work area for compliance with the Permanent Link performance specification as defined in ANSI/TIA-568-D.2.
- E. 100 percent of the installed cabling links must pass the requirements of ANSI/TIA-568-D.2 and as further detailed in this Section.
- F. Diagnose and correct any failing link.
 - 1. Follow the corrective action with a new test to prove that the corrected link meets the performance requirements.
 - 2. Provide the final and passing result of the tests for all links in the test results submission.
- G. Use a permanent link interface adapter for the test device that can be calibrated to extend the reference plane of the Return Loss measurement to the permanent link interface.

3.05 OPTICAL FIBER CABLE TESTING

- A. Record link and channel test results from the OLTS in the test device
- B. Test each cabling segment (connector to connector).
- C. Test each cabling channel (equipment to equipment).
- D. Use high-quality test cords of the same fiber type as the cabling under-test.
- E. The test cords for OLTS testing shall be between 1 m (~ 3 ft.) and 5 m (~ 15 ft.) in length.
- F. Optical loss testing for backbone links.
 - 1. Test multimode backbone links at 850 nm and 1300 nm in accordance with TIA-526-14-C, Method B, One Reference Jumper or the equivalent method.
 - 2. Test single-mode backbone links at 1310 nm and 1550 nm in accordance with TIA-526-7-A, Method A.1, One Reference Jumper or the equivalent method.
 - 3. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices (i.e., link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers).
 - 4. Use the One Reference Jumper Method specified by TIA-526-14-C, Method B and TIA-526-7-A, Method A.1 or the equivalent method.

- 5. Follow the procedures established by these standards or application notes to conduct performance testing accurately.
- G. OTDR testing
 - 1. Test fiber links at the appropriate operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.
 - a. Multimode: 850 nm and 1300 nm.
 - b. Single-mode: 1310 nm and 1550 nm.
 - 2. Test each fiber link and channel in both directions.
 - 3. Install a launch cable between the OTDR and the first link connection.
 - 4. Install a receive cable after the last link connection.
- H. Magnified end-face inspection
 - 1. Inspect fibers at 250 times or 400 times magnification, as applicable.
 - a. Use 250 times magnification for inspecting multimode and single-mode fibers.
 - b. Use 400 times magnification for a detailed examination of single-mode fibers.
 - 2. Diagnose and correct scratched, pitted or dirty connectors.
 - 3. Record end-face images in the memory of the test device.
- I. Length Measurement
 - 1. Electronically measure and record the length of each fiber using an OLTS.
- J. Polarity Testing
 - 1. Test paired duplex fibers in multi-fiber cables to verify polarity in accordance with Clause E.5.3 of ANSI/TIA 568-D.2 using an OLTS.

3.06 SITE QUALITY CONTROL

- A. Site Tests and Inspections
 - 1. Make available for inspection the test results as soon as the tests are complete.
 - 2. Consider all optical fiber cabling that returns a Fail test to have failed.
 - 3. The pass or fail condition for the link-under-test is determined by the results of the required individual tests (detailed in Section 4.2.2 of ANSI/TIA-1152). Any fail or fail result yields a fail for the link-under-test. To achieve an overall pass condition, the results for each test parameter must be pass.
 - 4. Consider any link-under-test that returns a pass condition to have failed.
- B. Verification
 - 1. After testing the CA or the telecommunications designer will select a random sample of 5 percent of the installed links and witness the re-testing of those links.
 - 2. The CA shall compare these results to the initial test results.
 - 3. If more than 2 percent of the sample results differ in terms of the pass/fail determination, retest all links under the supervision of the CA's representative and bear all associated costs.

3.07 CLEANING

- A. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.
- B. Waste Management: Recycle all detritus.

3.08 PROTECTION

A. Protect the grounding and bonding system from subsequent construction operations.

END OF SECTION

SECTION 271513 COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Four-pair unshielded twisted-pair copper horizontal workstation cabling to distribute network signals from telecommunications distribution spaces to workstation outlet locations.
 - 1. Category 6 horizontal cabling
- B. Related Requirements
 - 1. Section 27 08 00 Commissioning of Communications

1.02 REFERENCES

- A. Abbreviation and Acronyms
 - 1. AHJ Authority Having Jurisdiction
 - 2. ANSI American National Standards Institute
 - 3. AWG American Wire Gage
 - 4. BICSI Building Industry Consulting Services International
 - 5. NECA National Electrical Contractors Association
 - 6. NEMA National Electrical Manufacturers Association
 - 7. INSTC BICSI Installer 2, Copper
 - 8. INST1 BICSI Installer 1
 - 9. ISO International Organization for Standardization
 - 10. NFPA National Fire Protection Association
 - 11. NRTL Nationally Recognized Testing Laboratory
 - 12. PMP Project Management Professional
 - 13. RCDD Registered Communications Distribution Designer
 - 14. RTPM Registered Telecommunications Project Manager
 - 15. TIA Telecommunications Industry Association
 - 16. TAA Trade Agreements Act
 - 17. TECH BICSI Technician
 - 18. UL Underwriters Laboratory, an NRTL
 - 19. UTP Unshielded Twisted-Pair
- B. Definitions

1. U/UTP

- Unshielded Twisted-Pair with no overall shielding
- C. Reference Standards
 - 1. ANSI/TIA-568.1-D Commercial Building Telecommunications Cabling Standard
 - 2. ANSI/TIA-568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standard
 - 3. ANSI/NECA/BICSI 568-2006 Standard for Installing Commercial Telecommunications Building Telecommunications Cabling
 - 4. BICSI Telecommunications Methods Manual (TDMM) 13th Edition
 - 5. BICSI Information Transport Systems Installation Methods Manual (ITSIMM) 7th Edition

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination
 - 1. Install and coordinate the Work in cooperation with interrelated Work.
- B. Scheduling
 - 1. Review the Contract Documents and the overall construction schedule to determine all interfacing and timing of the Work.
- C. Notification
 - 1. Notify the Contract Administrator:

- a. Where the document references sections that are unavailable.
- b. Where conflicts arise from requests in the documentation, request clarification from the Consultant through the project's RFI process.

1.04 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product indicated, specified or required; include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Submit including plans, elevations, sections, details, and attachments to other Work.
 - 1. Coordinate shop drawings with 27 11 16 Communications Cabinets, Racks, Frames and Enclosures.
 - 2. Indicate the complete configuration of each unique cabinet and rack.
 - 3. Provide room layout for all racks, including existing racks with full dimensionality.
- C. Special Procedure Submittals
 - 1. Deliver-in-time installation strategy.
- D. Qualification Statements
 - 1. Project Manager
 - a. Provide a statement for Project Manager who should possess a Registered Communications Distribution Designer qualification, be in good standing with BICSI, and has demonstrable experience managing similar projects in size and scope to this project.
 - 2. Manufacturer's installation certification
 - a. Provide a statement describing the training that installers undergo to receive installation certifications. Describe whether the training is online or in-person, whether candidates are observed pulling and terminating cable, and what the is pass and fail criteria.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each product
 - 1. Manufacturer's manual for the specific piece of equipment
- B. Warranty Documentation: For the system
- C. Record Documentation: Record drawings indicating the location of all the components and component identification.

1.06 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals
 - 1. Restriction of Hazardous Substances Directive compliant
- B. Qualifications
 - 1. Manufacturers:
 - a. ISO 9001 Quality Management Certification
 - b. ISO 14001 Environmental Management Certification
 - c. ISO 27001 Information Security Management Certification
 - d. All components of the vertical cable management system shall be from the same Manufacturer. Who shall be the same manufacturer of the articles from Section 27 11 16.
 - 2. Suppliers
 - a. Manufacturer's Approved Status
 - 3. Installers
 - a. Site supervisor:
 - 1) BICSI Technician (TECH)
 - 2) Manufacturer certified to install their system.
 - b. Installers

- 1) INSTC
- 2) Manufacturer certified to install their system.
- c. Installer's aides
 - 1) INST1
 - 2) Manufacturer certified to install their system.
- d. Project Manager
 - 1) BICSI Registered Communications Distribution Designer (RCDD)
 - 2) Project management certification, one of the following at minimum:
 - (a) Project Management Professional (PMP)
 - (b) BICSI Registered Telecommunications Project Manager (RTPM)
 - (c) Manager (RTPM)

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver in manufacturer's original unopened and undamaged packages with manufacturer's labels legible and intact.
 - a. Except if removing packaging offsite to reduce waste as part of a documented deliver-in-time installation strategy.
 - 2. Inspect manufacturer's packages upon receipt.
- B. Storage and Handling Requirements: Protect from moisture, falls and compaction.
- C. Packaging Waste Management: Recycle all materials.

1.08 SITE CONDITIONS

- A. Ambient Conditions
 - 1. Do not install the equipment in an environment that is not temperature-regulated as per the manufacturer's instructions.
 - 2. Do not install the equipment in an environment that is dirtier than one would ordinarily expect for the room function.

1.09 WARRANTY

- A. Manufacturer Warranty
 - 1. Warranty Period: 25 years from the date of Substantial Completion.

PART 2 PRODUCTS

2.01 FOUR-PAIR UTP CATEGORY 6 CABLING

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that you may incorporate into the Work include, but are not limited to, the following:
 - 1. Manufacturer List
 - a. CommScope Inc.
 - 2. Substitution Limitations: None Permitted.
 - 3. Basis of design products:
 - a. Commscope/TE TE620P-BLxx Blue Sheath Cabling
 - b. Commscope/TE TE620P-WTxx White Sheath Cabling
- B. Description

1.

- Regulatory Requirements
- a. UL Listed
- b. TAA Compliant
- C. Performance/Design Criteria
 - 1. ANSI/TIA-568.2-D Category 6 copper UTP, twenty-four (24) AWG cable plenum rated cable.
 - 2. ANSI/TIA-568.2-D Category 6 copper UTP, twenty-four (24) AWG cable riser rated cable.
 - 3. Use riser rated cable where AHJ allows.

D. Provide any accessory products related to the UTP copper cabling required to provide a complete and functional infrastructure system.

2.02 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that you may incorporate into the Work include, but are not limited to, the following:
 - 1. Manufacturer List
 - a. CommScope Inc.
 - 2. Substitution Limitations: None Permitted.
 - 3. Basis of design products:
 - a. Label Holder:
 - 1) COMMSCOPE/TE 6630-2-004-05: Type105 Label holder block (for UMS bkt)
 - 2) COMMSCOPE/TE 6089-2-015-01: Type 105 flip label holder
 - 3) COMMSCOPE/TE 6631-3-100-03: Type 105 flip label holder stock
 - b. Termination Block
 - 1) COMMSCOPE/TE 6636-1-596-46 : 96pr Ultim8 Kit (UMS Bkt, T105 Label block, U8 blocks)
 - 2) COMMSCOPE/TE 6468-5-060-06 : Ultim8 cable termination block, 8pr 10PK
 - c. Wallfield cable management
 - 1) COMMSCOPE/TE 6657-2-005-19/04: 19", 4-ring cable manager (horizontal wire management)
 - d. Jacks and Assemblies
 - 1) COMMSCOPE/TE 6830-1-830-01: White, voice applications
 - 2) COMMSCOPE/TE 6830-1-830-06: Blue, Office and similar general-user
 - 3) data applications
 - 4) COMMSCOPE/TE 6830-1-830-07: Green, Camera locations
 - 5) COMMSCOPE/TE 6830-1-830-08: Yellow, Media Control Applications
 - e. Plastic Faceplate: High-impact plastic.
 - 1) COMMSCOPE/TE 6644-1-152-02 : 1G 2P Faceplate
 - 2) COMMSCOPE/TE 6644-1-154-02 : 1G 4P Faceplate
 - 3) COMMSCOPE/TE 6644-1-164-02 : 2G 4P Faceplate
 - 4) COMMSCOPE/TE 6644-1-168-02 : 2G 8P Faceplate
 - f. 2. Wall phone Metal Faceplate:
 - 1) AllenTel AT630-A4: Wall phone mounting plate, screw tml, 4cond, stainless
 - g. 3. Surface Mount 2-port Box
 - 1) COMMSCOPE/TE 6644-1-222-02: 2P surface mount box
 - h. Blank Inserts
 - 1) COMMSCOPE/TE 6645-1-160-02: Blank insert
- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-C, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Horizontal Cabling Connecting Blocks (Voice and Data): Provide UMS brackets and blocks for the number of cables terminated on the block, plus 25 percent spare of both UMS brackets and blocks. Integral with connector bodies, including plugs and jacks where indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions
 - 1. Check actual site conditions before starting any Work.
 - 2. Ensure all preceding Work associated with the telecommunications system is accurate and complete before proceeding with the installation or use of products specified in this section.

3.02 PREPARATION

- A. Surface Preparation
 - 1. Clean telecommunication spaces before installing equipment.
 - a. Vacuum the space's surfaces.

3.03 INSTALLATION

- A. Install as per:
 - 1. The manufacturer's recommended installation instructions
 - 2. ANSI/TIA-568-D.0
 - 3. ANSI/NECA/BICSI 568-2006
 - 4. BICSI ITSIMM
 - 5. NECA-1
- B. Install all cables with proper attention paid to bend radii, pulling method, attachment method, and pulling forces as per ITSIMM.
- C. Follow the cable manufacturer's specifications for each particular cable type.
- D. Visually inspect for sufficient bend radius during and after pulling.
- E. Support cabling at least every 1.5 mm (~ 5 ft.).
- F. Label cables at both ends 300 mm (~ 1 ft.) from each cable end.
- G. Label cables contained in conduit at every pull box.
- H. Install appropriate sheath construction for the environment so that they meet the approval of the AHJ.
- I. Meet all TIA and industry standards with special regards to maximum stripping length of cable jackets. Do not remove more than 10 mm (.378 in.) of cable jacket from the termination points.
- J. Tolerances
 - 1. Coordinate outlet positions on site and assume that outlets may move 3 m (~ 10 ft.) from their drawn position.

3.04 REPAIR

A. Remove and replace any cable failing to meet the requirements of the site quality control site tests and inspections.

3.05 REINSTALLATION

- A. No additional burden to the Owner regarding costs, network downtime, or end-user interruption shall result from the reinstallation of specified components.
- B. Coordinate any reinstallation work, in writing, with the Owner.

3.06 SITE QUALITY CONTROL

- A. Site Tests and Inspections
 - 1. Conduct tests as described in Section 27 08 00 Commissioning of Communications
- B. Nonconforming Work: Reinstall

3.07 CLEANING

- A. Clean as recommended by Manufacturer. Do not use materials or methods which may damage the surface or surrounding construction.
- B. Waste Management: Recycle all detritus.

3.08 PROTECTION

A. Protect the grounding and bonding system from subsequent construction operations.

END OF SECTION

SECTION 27 41 16

INTEGRATED AUDIOVISUAL SYSTEMS

PART 1 - GENERAL

1.1 SYSTEM DESCRIPTION

- A. It is the intent of these specifications to provide a complete working audio visual system ready for the Owner's use. System acceptance shall be judged on the successful adherence to the installation instructions of this Specification.
- B. Any item not specifically shown on the drawings or called for in the specifications, but normally required to conform to the intent, are to be considered as part of the Work.
- C. Any given item type of equipment or material shall be the product of one manufacturer throughout the facility. Multiple manufacturers of any one item will not be permitted, unless specifically noted otherwise.
- D. These specifications are equipment and performance specifications and are considered to be one all-encompassing package with the drawings. Actual installation shall be as engineered by the AV contractor with prior approval by the Design Professional.
- E. Provide audio visual devices and equipment with performance levels and capacities as noted herein.

1.2 SCOPE OF WORK

- A. General: Provide audio visual systems design, engineering, and installation within all phases and spaces of the Project. Systems are to include all devices, equipment, installation, programming, and commissioning in accordance with requirements of the contract documents and drawings.
 - 1. The Work detailed within the Contract Documents has been specified to meet certain requirements for performance, appearance, and costs. It shall be the responsibility of the AV Contractor to implement the guidelines and requirements contained in the Contract Documents and translate them into a complete design package containing all elements necessary for a complete, operational, and functionally integrated Audio-Visual System(s).

Provide all work as detailed in the Contract Documents as a turnkey installation including all material, labor, engineering, warranties, taxes, freight, and permits. Only items and requirements specifically stated to be provided by others shall not be a requirement for this Section of the Work.

- B. Work Included:
 - 1. Base AV Work
 - a. Refer to Sections listed in Part 2 for scope requirement and system descriptions for each System Type.
- C. Work Specified Elsewhere
 - 1. Installation of raceway, pull-boxes, plywood backboards and floor-boxes (provided under electrical Work). Coordination is required within the design to verify the appropriate raceways are in place.
 - 2. Cutting, patching and painting of walls, unless damaged performing the work described herein.
- D. Coordinated Work
 - 1. Coordinate with related trades to schedule the Work and ensure a complete installation in accordance with the schedule outlined by the Owner.
 - 2. Installation of support structure. Coordination is required within design to verify size and overall dimensions required.
- E. Design Intent
 - 1. The design intent of the system may require equipment not listed in the attached spreadsheet, but are indicated elsewhere in the contract documents, in either the drawings or the written specification or is required for normal or intended operation of the system. It is the sole responsibility of the Bidder to reconcile the contract documents with the equipment and labor required for this project. In all cases, the most stringent requirements of the contract documents shall be followed.
 - 2. The AV Contractor is to research, design and engineer a complete working and turnkey solution. That solution is to be provided as a part of this bid return with all components of that solution identified inclusive of Manufacturer, Model Number, Quantities (either provided in these documents herein or required for the AVC proposed solution), itemized costs, associated cut sheets as well as a system diagram equal to the level of detail of other fully designed systems within this specification.
 - a. In this situation, the bidder is required to submit 3 references of similar size and complexity within the last 3 years in support of the components identified to include Contact Name, Address, Phone Number and detailed description of the system and application.
 - 3. No claims for additional equipment required will be allowed if the sole reason for such claims is that the equipment was not listed in the attached spreadsheet. It is the sole responsibility of the Bidder to verify the completeness of the proposed solution included in the AVC's bid.

1.3 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Refer to the following Sections for specifications related to the Work:
 - 1. Section 26 05 00 Common Work Results for Electrical
 - 2. Section 27 05 26 Grounding and Bonding for Communications Systems

- C. Refer to the following Sections for specifications for the Data Network:
 - 1. Section 27 21 00 Data Communications
 - 2. Section 27 21 12 Data Communications Network Security Appliances
 - 3. Section 27 21 26 Data Communications Network Management
 - 4. Section 27 21 29 Data Communications Switches
- D. Refer to the following standards for performance verification related to the Work:
 1. INFOCOMM 10-201X, AV Systems Performance Verification

1.4 DOCUMENT ORDER OF PRECEDENCE

- A. While it is the AV Contractor's responsibility to verify the completeness and accuracy of their proposed turnkey solution the following shall serve as general guidance for the order of precedence of any conflicting information.
 - 1. Specifications (including equipment schedules) and TA-700 series drawings
 - 2. TA Infrastructure Package (TA-300 series)

1.5 RELATED WORK

- A. The CM's General Conditions shall be considered part of this Specification. Unless this Section contains statements, which are more definitive or more restrictive than those contained in the Contractor's General Conditions, this Specification shall not be interpreted as waiving or overruling any requirements expressed in the General Conditions.
- B. AV Contractor shall coordinate with CM on raceway/junction box locations for audio visual equipment and routing of audio, video, control, and power cables/raceway from equipment, terminal and pull boxes to system equipment racks. Including but not limited to attending coordination meetings, weekly project meetings, and participating in coordination DWG process.
- C. Related Work: Equipment and materials provided and installed by others, unless otherwise shown in this Section or the Drawings, shall include but are not limited to:
 - 1. Section 26 05 00 Common Work Results for Electrical
 - 2. Section 26 05 26 Grounding and Bonding for Electrical Systems
 - 3. Section 26 05 29 Hangers and Supports for Electrical Systems
 - 4. Section 26 05 33 Raceway and Boxes for Electrical Systems
 - 5. Section 26 05 36 Cable Trays for Electrical Systems
 - 6. Section 26 09 23 Lighting Control Devices
 - 7. Section 26 09 43 Network Lighting Controls

1.6 DEFINITIONS

- A. The following shall serve as general identifiers as specified herein.
 - 1. Architect NORR
 - 2. Consultant Shen Milsom & Wilke LLC (SMW).
 - 3. Owner The College of New Jersey
 - 4. AV Contractor The AV Contractor is the firm submitting a proposal to furnish and install the Work as defined within this Specification.
 - 5. Project TCNJ Roscoe Hall Student Services Renovation
 - 6. Work The term "Work" means all construction and services specified within this document. The Work includes all related labor, materials, equipment, and services provided, or to be provided, by the AV Contractor to fulfill the proposal's obligations.

- 7. Drawings The term "Drawings" means all Audio Visual Systems, Architectural, Electrical Drawings and associated sketches, details, riser diagrams, relative to this project.
- B. As used in the Drawings and Specifications for the Work, certain non-technical words and phrases shall be understood to have specific meanings as follows, regardless of indications to the contrary in the General Conditions or other documents governing the Work.
 - 1. "Furnish" Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the Audio Visual Systems Work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased items are free of all liens, claims, or encumbrances.
 - 2. "Install" Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the Work.
 - 3. "New" Manufactured within the past year and never before used.
 - 4. "Provide" Furnish and Install.
- C. Regardless of their usage in codes or other industry standards, certain words or phrases as used in the Drawings or Specifications for the Work, shall be understood to have the specific meanings as ascribed to them in the following list:
 - 1. "Circuit" Any specific run of circuitry
 - "Circuitry" Any Work which consists of wires, cables, raceways, and/or specialty wiring method assemblies complete with associated junction boxes, pull boxes, outlet boxes, joints, couplings, splices, and connections except where limited to a lesser meaning by specific description.
 - "Concealed" (as applied to circuitry) Covered completely by building materials, except for penetrations (by boxes and fittings) to a level flush with the surface as necessitated by functional or specified accessibility requirements.
 - 4. "Exposed" (as applied to circuitry) Not covered in any way by building materials.
 - 5. "Normal Work Conditions" Locations within building confines that are not damp, wet, or hazardous and that are not used for air handling.
 - 6. "Patch Panel" A System of terminal blocks, patch cords, and backboards that facilitate administration of cross-connecting cables.
 - "Raceway" Any pipe, duct, extended enclosure, or conduit (as specified for a particular System) which is used to contain wires and which is of such nature as to require that the wires be installed by a "pulling in" procedure.
 - 8. "Riser" Shall refer to the portion of the installation that transmits between building floors (or between Audio Visual Systems rooms), also referred to as "Backbone Cabling".
 - "Audio Visual Closet" The enclosed area or room specifically designated for the routing, termination, and/or cross connecting of Audio Visual Systems cable (i.e. riser cable) to other Audio Visual Systems cable and/or equipment.
 - "AV Systems Control Room" and/or "AV Systems Headend" The enclosed area or room specifically designated for the routing, termination, and/or cross connecting of Audio Visual System cable (i.e. riser cable) to other Audio Visual System cable, and/or equipment and racks.
 - 11. "AV System(s)" Audio Visual System(s), includes all components contained herein that work in conjunction to create and completely integrated and fully functioning system as described within the Drawings and Specifications
 - 12. "Audio Visual Systems Wiring" see "Circuitry"
 - 13. "Audio Visual Systems Work" See "Scope of Work"
 - 14. "Standard" (as applied to wiring devices) Not of a separately designated individual type.
 - 15. "Subject to Mechanical Damage" Exposed within 2,200 mm of the floor in mechanical rooms, manufacturing spaces, vehicular spaces, or other spaces where heavy items are moved around or rigged as a common practice or as required for replacement purposes.
 - 16. "System" See "AV Systems"

17. "Wiring" - see "Circuitry"

18. "AVC" – Audio Visual Systems Contractor

- D. Where the word "conduit" is used without specific reference to type, it shall be understood to mean "raceway".
- E. Reference to "U.L. (Materials Construction) Standards" shall mean the "Standards for Safety" published by Underwriters Laboratories, Inc.

1.7 REFERENCES

- A. The Audio Visual Systems shall be installed in accordance with the latest applicable revisions pertaining to all applicable national, state, and local codes and standards including, but not limited to the following:
 - 1. Local Governing Authorities Having Jurisdiction
 - 2. Any portion of the audiovisual work not subject to the requirements of an electrical code published by a specific authority having jurisdiction over such work shall be governed by the National Electrical Code and any and all applicable sections of the National Fire code, as published by the National Fire Protection Association.
 - 3. Installation procedures, methods and conditions shall be in compliance with the latest requirements of the Federal Occupational Safety and Health Administration (OSHA), the Americans with Disabilities Act (ADA) and the Architectural Barriers Act (ABA).
 - 4. The AV Contractor is responsible for all costs incurred to meet these codes and conditions.
 - 5. Additional codes and requirements pertaining to the work:
 - a. NFPA-72 National Fire Alarm and Signaling Code
 - b. International and National Electric Codes (IEC/ NEC)
 - c. IEC 60268-16 Third Edition 2003-05 Objective rating of speech intelligibility
 - d. ANSI/Infocomm
 - 1) 10:2013 Audiovisual Systems Performance Verification
 - 2) 1M:2009 Audio Coverage Uniformity Standard in Enclosed Listener Areas
 - 3) 2M:2010 Standard Guide for Audiovisual Systems Design and Coordination
 - 4) 3M:2011 Projected Image System Contrast Ratio
 - 5) X3T9.5 FDDI
 - 6) X3T9.5 CDDI
 - e. Sustainable Technology Environments Program
 - f. Underwriters Laboratories, Inc. (UL)
 - g. Society of Motion Picture and Television Engineers (SMPTE)
 - h. Building Industry Consulting Service International (BICSI) Telecommunications Distribution Methods Manual - latest edition.
 - i. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
 - j. ANSI/TIA/EIA-569 Commercial Building Standards for Telecommunications Pathways and Spaces
 - k. ANSI/TIA/EIA-606-A. Administration Standard for Commercial Telecommunications Infrastructure
 - I. TIA-607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
 - m. EIA RS-232 Serial Communications Electrical Interface
 - n. EIA RS-310-C Racks, Panels and Associated Equipment
 - o. FCC Part 15
 - p. FCC Part 68
 - q. IEEE 802.3
 - r. IEEE 802.5
 - s. Article 770 Optical Fiber Cables

- t. Article 800 Communications Circuits
- u. NFPA 70 National Electrical Code
- v. NFPA 75 Protection of Electronic Computer / Data Processing Equipment
- w. United States Green Building Council (USGBC): Leadership in Energy & Environmental Design(LEED®): Green Building Rating System for New Construction & Major Renovations (NC) Version 3.0 (2009) www.usgbc.org.

1.8 AV CONTRACTOR'S GENERAL CONDITIONS

- A. The AV Contractor represents that they are familiar with, and have expertise in the Work of this nature and scope. The AV Contractor further agrees that they shall provide all Work as may be required to make a complete job of that which may not be fully defined in the Contract Documents.
- B. The AV Contractor shall comply with all of the regulations, including safety regulations of national, city, local and other government agencies having jurisdiction concerning the work of the AV Contractor. The AV Contractor shall give all notices and comply with all laws, ordinances, codes, rules, and regulations bearing on the conduct of the Work. If the AV Contractor performs any work, which is contrary to such laws, ordinances, codes, rules and regulations, they shall make all changes for compliance and bear all associated costs.
- C. The AV Contractor shall be responsible to provide and maintain a storage facility. If this storage facility is required to be on-site it shall be the AV Contractor's responsibility to coordinate the size and spatial requirements with the Owner and CM. The AV Contractor shall assume full responsibility for the storage facility and all contents, unless otherwise indicated by the Owner.
- D. The AV Contractor shall provide all protection necessary to safeguard their work from damage by their operations and the operations of others. Unless the AV Contractor proves to the Owner's satisfaction that the Work has been damaged by others, the AV Contractor shall promptly repair, adjust, and clean all defective installations and bear all associated costs.
- E. All of the AV Contractor's work shall be tested and inspected by all authorities having jurisdiction and in accordance with all Specifications. The AV Contractor shall coordinate and cooperate fully and shall provide at no additional cost to the Owner, manpower, blueprints, facilities, scaffolds, etc. to reasonably assist the inspectors.
- F. The project documentation is, in general, diagrammatic and/or developed to communicate design intent. The AV Contractor shall coordinate the installation of all devices and/or equipment with the Owner and CM prior to installation based on the existing field conditions.
- G. The AV Contractor shall examine the site and the Contract Documents and review with the Owner and CM the designated areas of access, delivery, and storage for the AV Contractor's use. The AV Contractor agrees that such areas are satisfactory and sufficient for their needs in the completion of their work and in conformance with the terms of this Contract.
- H. The Owner reserves the right to furnish any materials necessary for the Project.
- I. All permits required for any part of the AV Contractor's work shall be procured and paid for by the AV Contractor. The AV Contractor shall determine all permits required and transmit this information to the CM.

- J. The Owner shall provide to the AV Contractor AutoCAD backgrounds for all required floor plans for the facility. All pre-fabrication and record drawings required for the Project and as stated herein, shall be completed within the latest version of AutoCAD.
- K. The AV Contractor, upon receiving notice from Owner that the AV Contractor has furnished inferior, improper or unsound work or materials (including equipment), or work or materials at variance with that which is specified, will, within 24 hours, proceed to remove such work or materials and make good all other work or materials damaged thereby, and, at the option of the Owner, the AV Contractor shall immediately replace such work or materials with work or materials as specified. The removal, replacement, and repair shall be performed at such times and with manpower sufficient, in the judgment of the Owner, so as to avoid disturbance to occupants, or other ongoing work for the Project.
 - 1. If the AV Contractor does not remove such unsound Work within a reasonable time, the Owner may remove it and may store the material at the expense of the AV Contractor. If the AV Contractor does not pay the expenses of such removal within ten (10) days' time thereafter, the Owner may, upon written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs and expenses that should have been borne by the AV Contractor and all expenses of the sale.
- L. The AV Contractor shall remove all previously installed AV equipment from the spaces as part of the process to install the new room equipment systems. Only equipment utilized in the final operational systems to remain.
- M. The Owner shall have the authority at all times, until final completion and acceptance of the Work, to inspect and reject work and materials which in its judgment are not in conformity with the Drawings and Details, Room Data Sheets and Specifications, and its decision in regard to character and value of Work shall be final and conclusive on both contracting parties. If the Owner permits said Work or materials to remain, the Owner shall be allowed the difference in value or shall at its election have the right to have said Work or materials repaired or replaced, as well as the damage caused thereby, at the expense of the AV Contractor, at any time within one (1) year after the completion of the entire project, or within such longer period as may be covered by any guaranty; and neither payments made to the AV Contractor, nor any other acts of the Owner, shall be construed as evidence of acceptance, waiver, or estoppels.
 - 1. Any expense incurred by the Owner in connection with the foregoing, shall be borne by the AV Contractor, and the Owner may withhold money due to the AV Contractor or recover money already paid to the AV Contractor, to the extent of such expense.
- N. It shall be understood that the Room Data Sheets, Specifications and Drawings are complementary. Where there are conflicts within the documents, the overall design intent shall govern.
- O. To the extent that they govern the Work, the contract documents, Specifications and Drawings also govern change order Work, if any.
- P. The Drawings for the Work utilize symbols and schematic diagrams that have no dimensional significance. The Work shall be installed to fulfill the diagrammatic intent expressed on the Drawings, field layouts, and shop drawings of all trades.
 - 1. AVC is required to supply fully dimensioned elevations and mounting details for all AV components within a space for client and consultant approval.
 - a. Compliance will require field measuring of spaces and comprehensive understanding of any existing equipment which is to be reused in the new system.

- Q. Certain details appear on the Drawings for the Work that are specified with regard to the dimensioning and positioning of the Work. These are intended only for general information purposes. They do not obviate field coordination for individual items of the indicated Work.
- R. Information as to general construction and architectural general construction and architectural features and finishes shall be derived from the structural and architectural drawings and specifications, and may require ongoing coordination with the Architect and CM.
- S. Ratings of devices, materials, and equipment specified without reference to specific performance criteria shall be understood to be nominal or nameplate ratings established by means of industry standard procedures.
- T. It is the intent of the Drawings and Specifications to provide complete operating Audio Visual Systems. All Work necessary to provide such a System shall be performed. Any discrepancies shall be brought to the Consultant's attention.
- U. The Work called for under this Contract shall be carried on simultaneously and/or in the appropriate sequence with the Work of other trades and Owner functions in such a manner as to not delay the overall progress of the construction project. The AV Contractor is responsible for all coordination of the Work with other trades.
- V. Include in the Work all necessary supervision and issuing of all coordination information to any other trades who are supplying work to accommodate the Audio Visual Systems installation.
- W. For items of equipment which are to be installed but not purchased as part of the Work, the Work shall include:
 - 1. Coordination of delivery
 - 2. Unloading from delivery trucks
 - 3. Safe handling and field storage up to the time of permanent placement in the project
 - 4. Correction of any damage to the item(s)
 - 5. Mounting in place and connection(s) as specified
- X. Items which are to be installed, but not purchased as part of the Work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the Work will be considered only if presented in writing within one (1) week of the date of delivery to the project of the items in question. The Work includes all procedures necessary to put in satisfactory operation all items for which no claims have been submitted as outlined above.

1.9 WARRANTY AND MAINTENANCE

- A. AV Contractor shall provide a one (1) year warranty for the Work with optional costs for 2 & 3 as noted above. The warranty shall cover all Work, Systems, and subsystems against defects in materials and workmanship. The Work as specified herein, including all materials and labor, but excepting any existing devices and equipment which are incorporated in the completed Work, shall be warranted to be free from defects in design, workmanship, and materials. Further, the AV Contractor shall warrant that the completed Systems, including all components (except those, which are existing or provided by others), are of sufficient size and capacity to fulfill the requirements of the Specifications.
- B. In order to maintain certain manufacturer's warranties, system equipment must be installed, aligned and serviced by those installers recognized and authorized by said manufacturers to be capable of performing such duties. If a certain installer is not so authorized by a particular

manufacturer, it is solely their responsibility to make such arrangements to come into such compliance and they shall bear all costs and consequences thereof.

- C. The warranty shall be valid and initiated following the date of System acceptance by the Consultant and/or Owner. System acceptance shall commence when all parts, components, sub-Systems, and Systems have been tested, shown to be working in accordance with the Specification, and approved by the Owner
 - 1. The Bidder is to provide costs for Extended Warranties to cover years 2 and 3 as separate line items.
- D. Warranty Service:
 - 1. In the event that defects in the materials and/or workmanship are identified during the warranty period, the AV Contractor shall provide all labor and materials as may be required for prompt correction of the defect.
 - 2. All manufacturers' equipment warranties shall be activated in the Owner's name and shall commence on the date of system acceptance. In the case of AV Contractor-modified equipment, the manufacturer's warranty is normally voided. In such cases, the AV Contractor shall provide the User with a warranty equivalent to that of the original manufacturer.
 - 3. All repairs required following Substantial Completion of the rooms shall be scheduled at the User's convenience. In no case will the User allow such repairs to interrupt or delay a regularly scheduled event. Notwithstanding the above, all repairs within the regular period of usage must be completed within 24 hours of notification of a failure; 2nd and /or 3rd shift warranty repair activity should be anticipated.
 - 4. Provide written notice to the Owner documenting any Work performed during the warranty period, including any preventative maintenance Work performed.
 - 5. Provide loaner equipment that is fully compatible with the Audio Visual Systems for any equipment not field repairable.
 - 6. Loaner equipment for components that must be shipped to/from the manufacturer or distributor shall be on site and operational within 48 hours of the component failure. Furnish lists of equipment that will require shipment from the manufacturer or distributor and lead times associated with that equipment.
- E. The Bidder shall offer a separate annual service contract, covering all installed systems. The frequency of those visits, as identified and determined by the Bidder and there experience, shall be at regular intervals, in order to perform operational checks of the system(s) and equipment, to clean and service computers, tape machines, and other critical items, to lubricate moving parts as recommended by respective manufacturers and to adjust and align displays and other hardware to insure maintenance of optimum graphical performance. If the Bidder believes certain equipment may require more frequent (or less frequent) servicing that should be identified by component. The service contract shall commence immediately after expiration of the warranty period. A "per-component" price for the service contract shall be submitted with the bid. Provide a detailed plan for and schedule for all suggested periodic maintenance with the bid and describe the potential impact of these tasks with the operation of the room.
- F. The Bidder shall also submit separate pricing for other, non-routine, emergency, "on-call" service visits and an "in-shop" hourly rate for repair and maintenance work.
- G. Service and service contract related costs FOR YEAR 1 shall be incorporated with the costs for the system's base-bid. Costs associated with extended service for years 2 and 3, shall be carried as a separate line item.
- H. The AV Contractor shall specify the cost for a 2nd and 3rd year service contracts with pricing valid through the end of the 1st year contract.

- 1. Owner will not sign contracts for years 2 and 3 until satisfactory completion of Year 1 pricing to remain valid.
- I. Additional terms Warranty / Extended Service Options must include the following (at a minimum):
 - 1. Phone time to live agent: <60 seconds
 - 2. 1-hour Callback time
 - 3. Unlimited Remote Technical Support
 - 4. Emergency On-site Support: 4-hour SLA for calls received by 1pm
 - 5. Standard On-site Support:
 a. 4-hour SLA for calls received by 1pm (First 6 months)
 b. Next Business Day SLA After Month 6
 - 6. Unlimited Emergency and Standard Service Visits
 - 7. Year 1 to include 1 PM Vist
 - 8. Years 2 and 3 to include 2 PM Visits
 - 9. Equipment Repair As per Manufacturer Warranties
 - a. However, all replacement parts to be overnighted or same-day when possible
 - 10. Video Conference Equipment All Poly VC equipment to have supporting warranty and enhanced support provided
 - 11. Provide preferred Hourly Support Rates
 - 12. Provide pricing (alternate) for 3-month full time dedicated resource following system acceptance

1.10 PROJECT MANAGEMENT

- A. The AV Contractor shall provide a Project Manager to oversee and coordinate all activities on the Project
- B. Project Manager's Duties and Responsibilities:
 - 1. The AV Contractor shall provide to the Owner, as a part of the prefabrication submittal, the name of the Project Manager that will provide all duties and responsibilities as specified herein, during the term of the project.
 - 2. The Project Manager shall maintain the ability of making all managerial decisions on behalf of the AV Contractor on a day-to-day basis and shall retain the authority of accepting notices of deduction, inspection reports, payment schedules and any other project related correspondence on behalf of the owner.
 - 3. The Project Manager shall schedule and attend project management meetings, during which time all System related issues are discussed, scheduled, confirmed, and/or resolved.
 - 4. The Project Manager shall be available during normal business hours (0800 hours to 1700 hours) within two (2) hours by telephone during the term of the project.
 - a. After normal business hours, the Project Manager shall be available within four (4) hours by telephone during the term of the project.
 - b. In the event that the Project Manager is not available within the allotted time frame, the AV Contractor may designate another employee to temporarily act as the Project Manager in all correspondence with the Owner.
 - c. The AV Contractor shall ensure that any individual temporarily assuming the duties of the Project Manager is at equal or higher level in the AV Contractor's managerial chain of command.
 - 5. Upon notification by the Owner, of any project related installation issue, or issue that may contradict the Specifications as stated herein, the Project Manager shall respond to such issue, verbally and/or in writing within an eight (8) hour period

- a. Responses to such issues as stated above shall include a clear understanding of the issue, along with a tentative plan of action, reflecting milestones and/or deadlines to resolve the issue.
- b. Where appropriate, based on the overall importance of the project issue, the Project Manager shall follow-up their initial response with a written response to the issue within 24 hours of identification of the issue.
- 6. On a PER ROOM BASIS and prior to the initiation of the Work, the Project Manager shall submit a schedule reflecting key milestones of the Work, including but not limited to the following:
 - a. Bid award
 - b. Kick-off meeting
 - c. Prefabrication submittal
 - d. Ordering, delivery, and installation
 - e. Shop Fabrication
 - f. Shop Acceptance Testing
 - g. Equipment delivery to Site
 - h. Project management schedule
 - i. Payment schedule
 - j. Site Installation Schedule inclusive of Hardware and Software
 - k. Systems training
 - I. Delivery of As-Built documentation
 - m. Delivery of Operations & Maintenance Manuals
 - n. Final System test
 - o. Acceptance of System
- 7. The Project Manager shall coordinate the schedule with overall project milestone dates as set by owner and CM. The Project Manager shall update the schedule on a weekly basis to reflect the status of each key milestone as the Work progresses.
- 8. As the System installation progresses, the Project Manager shall be capable of discussing any/or all of the above mentioned items at the request of the Owner, and shall address each item, as it relates to the current status of the Work.

1.11 SUBMITTALS

- A. Furnish submittals in accordance with general requirements specified in Division 1, and Construction Managers submittal procedures
 - 1. All submissions are to be processed via the CM and then forwarded to the A/E team for tracking and response purposes
- B. Prefabrication Submittals
 - 1. Submit pre-fabrication submittals in accordance with the Owner's construction schedule.
 - 2. Pre-fabrication submittals shall consist of product data, shop drawings, samples, and a detailed completion schedule. Partial submittals will not be accepted without prior written approval from the Architect.
 - 3. Pre-fabrication submittals shall be furnished in electronic formats as defined by the General Conditions under Part 1 of the Project Specifications.
 - 4. No portion of the Work shall commence nor shall any equipment be procured until the Architect has approved the pre-fabrication submittals in writing.
 - 5. A letter of transmittal identifying the name of the Project, AV Contractor's name, date submitted for review, shall accompany pre-fabrication submittals and a list of items transmitted.
- C. Product data required as part of the pre-fabrication submittal shall include the following:

- 1. Submit manufacturer's product data sheets for all materials and equipment proposed for use on the project sorted by room and indexed.
- 2. Submit manufacturer's product data sheets for all fire stopping materials proposed for use on the project.
- 3. Equipment schedules listing all System components, manufacturer, model number and the quantity of each
- 4. General functional descriptions for each System
- 5. Manufacturer's data specification sheets for all System components, including any warranty information.
 - a. Mark each product data sheet to show applicable choices and options (sheets containing more than one device or component model number shall be clearly marked to delineate items included in the Work)
 - b. Manufacturer's Data: For each manufactured device submit manufacturers' specifications and print photograph of the proposed device. Include engineering descriptions, principle of operation, application, and proposed model, style or size clearly indicated.
- 6. A complete list of cable and wiring types, sizes, manufacturer, and model number
- 7. A complete list of finishes and sample graphics, including custom art work and custom graphics (if applicable)
- 8. List of parts inventory to provide manufacturer recommended service and maintenance of the Work
- D. Shop Drawings shall include the following:
 - 1. AVC is required to supply fully dimensioned elevations and mounting details for all AV components within a space for client and consultant approval.
 - a. Compliance will require field measuring of spaces and comprehensive understanding of any existing equipment which is to be reused in the new system.
 - b. Compliance will require comprehensive understanding on existing and re-usable cable pathways
 - 2. Detailed plan views and elevations of AV Control and/or Head-end rooms (in addition to relevant telecommunications rooms) showing raceway, sleeves, cable tray, cable paths, equipment racks, equipment cabinets, termination blocks, power receptacles and grounding bus bars.
 - 3. Drawings to show evidence of coordination with other trades.
 - 4. Cable run sheets denoting cable type, signal type, termination type, cable number designation, start point and end point.
 - 5. Cable termination schedules showing cable transmission and device location. Provide schedules in printed and electronic format.
 - 6. Floor plan drawings indicating device locations with device legends
 - 7. System riser diagram with all devices, wire runs, conduit sizes required, and wire designations
 - 8. Schematic block diagrams for each System showing all equipment, interconnects, data flow, etc.
 - 9. Wiring diagrams for each subsystem defining the interconnection of all inputs and outputs for all equipment.
 - 10. Fabrication shop drawings for all custom equipment (if applicable)
 - 11. Plans and elevations of the Audiovisual equipment racks and/or custom furniture (including consoles, desks, and lecterns) quantifying all equipment to be mounted therein for review and approval by Owner.
 - 12. The AV Contractor shall submit samples of any equipment components upon request of the Owner.
 - 13. Samples submitted shall be the latest version of equipment.
 - 14. It is the responsibility of the AV Contractor to confirm all dimensions, quantities, and the coordination of materials and products supplied by the AV Contractor with other trades.

Approval of shop drawings containing errors does not relieve the AV Contractor from making corrections at their expense.

- E. Record Documentation shall include all information required in the Pre-fabrication Submittals but revised to reflect "as installed" conditions.
 - 1. General Description and Requirements
 - a. Submit Record Documentation in accordance with the CM's construction schedule.
 - b. Record Documentation shall consist of Record Drawings and Operation and Maintenance Manuals.
 - c. Provide a letter of transmittal with Record Documentation identifying the name of the Project, AV Contractor's name, date submitted for review, and a list of items transmitted.
 - d. Prior to the final acceptance of the Work, submit two draft sets of the Record Drawings portion of Record Documentation to the Architect. The draft copy shall be used during the final acceptance testing by the Architect.
 - e. Update all record documentation to reflect changes or modifications made during final acceptance testing as required and submit three blue/black lines and one reproducible set.
 - f. Provide cable test results for all cables installed under this Work, tested and documented as described herein.
 - g. Provide Owner with Operation and Maintenance Manuals including wiring diagrams, parts lists, shop drawings and manufacturers' information on all equipment and cables provided by the AV Contractor. Manuals shall be provided in a high quality, 3-ring binder and completely indexed.
 - h. Provide Owner with all systems programming on electronic media. All programming and source code is to be considered as a work for hire and will be the property of the Owner upon completion of the project. All code must be provided uncompiled.
 - 2. Record Drawings
 - a. Produce all Record "as-built" Drawings using the latest version of AutoCAD. Record drawings shall, at a minimum, include the following:
 - 1) Floor plan drawings indicating device locations, with device legends indicating manufacturers and model numbers for each device
 - 2) Floor plan drawings indicating wire routing, wire routing shall be delineated in straight line runs and be tagged with cable identification and terminal strip numbers to coincide with the installation
 - 3) Mounting details for all equipment and hardware
 - 4) Functional block diagrams for each subsystem
 - 5) Wiring details showing rack elevations, equipment wiring and terminations, and inter-rack wiring
 - 6) Wiring diagrams for all custom circuitry including interfaces to various control output controlled devices, lighting control interfaces, projection screens, operable window treatments, motorized doors/partitions, etc.
 - 7) Wiring diagrams for each System, wiring diagrams shall be identical to those laminated and located within the door of the equipment room where the subject equipment racks are located.
 - 8) Typical point-to-point wiring diagrams for each piece of equipment and groups of equipment within the System
 - 9) Layout details for each riser location, including Audiovisual panels, power supplies, junction boxes, conduit, and any other Audiovisual related equipment
 - 3. Operation and Maintenance Manuals
 - a. Operation and Maintenance Manuals shall apply to all Audio Visual related devices, equipment and software modules.
 - b. Operation and Maintenance Manuals shall be formatted as follows:
 - 1) Bind each manual in a hard-back loose-leaf binder.
 - 2) Identify each manual's contents on the cover.

- Provide a table of contents and tabulated sheets for each manual. Place tab sheets at the beginning of each chapter or section and at the beginning of each appendix if applicable.
- 4) Any hardware manual demonstrating more than one model number of device on any one page shall be clearly marked as to delineate which model has been implemented in the Work.
- c. Operation and Maintenance Manuals shall include, at a minimum, the following:
 - 1) Operational description of each subsystem
 - 2) Detailed programming descriptions for each subsystem
 - 3) Explanations of subsystem interrelationships
 - 4) Electrical schematics for each piece of equipment specified
 - 5) Power-up and power-down procedures for each subsystem
 - 6) Description of all diagnostic procedures
 - 7) A menu tree for each subsystem
 - 8) Setup procedures for each component of the subsystems
 - 9) A list of manufacturers, their local representatives, and subcontractors that have performed Work on the Project
 - 10) Installation and service manuals for each piece of equipment
 - 11) Maintenance schedules for all installed components
- d. Operation and Maintenance Manuals shall include a separate section for each software program incorporated into the Project. The software section shall include, at a minimum, the following information:
 - 1) Definitions of all software related terms and functions
 - 2) Description of required sequences
 - 3) Directory of all disk files
 - 4) Description of all communications protocols, including data formats, command characters, and a sample of each type of data transfer
 - 5) Instructions for manufacturer supplied report generation
 - 6) Instructions for custom report generation
 - 7) Database format and data entry requirements
- F. Procedure for Resubmitting
 - 1. Make corrections or changes in O & M and/or Record Drawings as required by the Architect and resubmit when the Architect's stamp requires re-submittal.
 - 2. Clearly identify changes made other than those specifically requested by the Architect when resubmitting Record Drawings. Changes shall be clouded or similarly highlighted as coordinated with the Architect. Only changes that have been specifically requested by the Architect or have been clouded by the AV Contractor will be reviewed on resubmittals.
 - 3. Any drawing sheets added to the resubmittal shall be clearly identified and clouded, and shall not change the sheet numbering scheme for previously issued Record Drawings.
 - 4. The AV Contractor shall be responsible for any delays caused by the re-submittal process.
 - 5. Re-submittal Review Fees
 - a. If the Architect rejects the AV Contractor's Record Submittal (Rejected, Revise, and Resubmit) more than two times, the Architect will be compensated for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the AV Contractor's Application for Payment.
- G. Status Reports
 - 1. After the award of contract, the AV Contractor is responsible for providing weekly status reports outlining his progress on the project. These reports should include information on the work completed during the week, the work to be completed during the upcoming week and any potential scheduling issues. The following should be included in this Status Report:

- 2. Expected date of project submittals, including equipment cut sheets, shop drawings, control system interface designs, etc.
- 3. Anticipated completion date and percentage complete of in-house rack fabrication and testing, prior to shipping to the job-site.
- 4. Anticipated completion date and percentage complete of control system programming, prior to shipping to the job-site.
- 5. Schedule and percentage complete of on-site wiring and supervision.
- 6. Schedule and percentage complete of on-site installation.
- 7. Schedule for owner training.
- 8. Schedule for systems checkout and turnover to the Owner.

1.12 QUALITY ASSURANCE

- A. Installer Training Process: AV Contractor's labor force shall have certified installers who attended training programs of the proposed system preparing them to perform the work.
- B. The Installer for this Project is to be certified by all manufacturers of the installed equipment that the AV Contractor proposes.
- C. Registered and Certified supervisors- AV Contractor must have all supervisory personnel certified for the type of work they are overseeing (installation and design) from Infocomm International (CTS-I/D)
- D. The AV Contractor shall also have personnel on staff and available to work on this project with the following Certifications:
- E. Cisco CCNA Routing & Switching
- F. Microsoft MCSE Productivity
- G. In addition, for any projects employing wireless data, the AV Contractor shall also have personnel with the following certifications:
- H. Cisco CCNA Wireless
- I. Microsoft MCSE Mobility
- J. Quality assurances for audio visual systems includes a multi-step program consisting of prequalification procedure for manufacturers and installation specialists; products phase; installation; operating instruction and training; and the submission of maintenance and operating manuals.
- K. The AV Contractor shall have local in-house engineering and project management capabilities consistent with the requirements of the Work.
- L. By submitting a bid, the AV Contractor thereby certifies that it is qualified in all areas pertaining to, directly or indirectly, the Work. In the event the AV Contractor becomes unable to complete the Work in accordance with the Contract Documents, or the satisfaction of the Owner, it shall be the responsibility of the AV Contractor to retain the services of applicable manufacturers' representatives to expeditiously complete the Work in accordance with the Owner's construction schedule with no additional cost to the Owner.

- M. The AV Contractor shall provide factory-certified technicians to install, commission, and maintain the Work. All installing personnel shall be licensed as required by local and/or state jurisdictions.
- N. The AV Contractor shall ensure compliance with, and have a thorough understanding of, all local codes and contract conditions pertaining to this Project.
- O. The AV Contractor shall maintain an inventory of spare parts and other items critical to System operation and as necessary to meet the emergency service requirements of this Project.
- P. Product Standards
 - 1. All equipment and materials for contained herein shall be the products of recognized manufacturers and shall be new.
 - 2. New equipment and materials shall:
 - a. Be Underwriters Laboratories, Inc. (U.L.) listed and approved where specifically called for; or where normally subject to such U.L. labeling and/or listing services.
 - b. Be without blemish or defect.
 - c. Be products that meet with the acceptance of the agency inspecting the Audio Visual Systems work.
 - 3. It is the intent of these specifications that wherever a manufacturer of a product is specified, and the terms "other approved" or "approved equal" are used, the substituted item must conform in all respects to the specified item. Consideration will not be given to claims that the substituted item meets the performance requirements with lesser construction. Performance as delineated in schedules and in the specifications shall be interpreted as minimum performance.
 - 4. Substituted equipment or optional equipment, where permitted and approved, must conform to space requirements. Any substituted equipment that cannot meet space requirements, whether approved or not, shall be replaced at the AV Contractor's expense. Any modifications of related Systems as a result of substitutions shall be made at the AV Contractor's expense.
 - 5. The approval of shop drawings, or other information submitted in accordance with the requirements hereinbefore specified, does not ensure that the Audiovisual Consultant, Architect, or the Owner attests to the dimensional accuracy, dimensional suitability of the material, or mechanical performance of equipment. Approval of shop drawings does not invalidate the Drawings and Specifications.
 - 6. Substitutions of equipment shown on the schedules or designated by model number in the specifications will not be considered if the item is not a regular catalogued item carried by the manufacturer.
 - 7. Within the Specifications, certain manufacturers have been listed. These manufacturers are listed for example purposes (unless followed by "No Exceptions"). The AV Contractor may substitute manufacturers and models that may be more cost effective or readily available than that specified. However, all substitutions shall meet or exceed the specified functional and technical requirements. Acceptance of such substitutions is at the discretion of the Consultant and/or Owner.

1.13 Owner Furnished Equipment

- A. The AV Contractor shall be responsible for obtaining any new or existing OFE equipment from the Owner. Existing equipment shall be brought back to the AV Contractor's facility where they shall ascertain that the OFE equipment is performing at or above factory specifications.
- B. If existing equipment is not operating "as-new", or is missing accessories necessary to be properly integrated with the rest of the system as intended, the AV Contractor shall provide a

proposal, including a time line, for returning the equipment to "as-new" condition, provide the needed accessories, arrange to have the owner replace equipment, or submit a proposal for replacement or alternative equipment.

1.14 Owner Furnished Data Network

- A. For audiovisual systems that make use of an owner furnished network, the AV Contractor shall determine the following:
 - 1. Is the network existing, or will it be built new
 - 2. If it is to be new, what is the schedule to make it useable so that the AV Systems can be deployed and tested in a timely fashion.
- B. The AV Contractor shall co-ordinate with the Owner to obtain details of the data network, and shall verify that sufficient network connectivity (both passive "infrastructure" and active switch ports with adequate bandwidth etc.) will be provided for the AV Systems to operate correctly.
- C. The AV Contractor shall further co-ordinate with the Owner to verify compatibility/interoperability between that Owner's data network and the audiovisual systems, and shall identify in writing any potential deficiencies or areas of concern, prior to commencing on-site installation.

1.15 USER TRAINING

A. The Contractor shall provide on-the-job training by a suitably qualified instructor, to personnel designated by the Owner, to instruct them in the operation and maintenance of the systems. In the event the Contractor does not have qualified instructors on staff for certain sophisticated equipment, the contractor will provide a manufacturer's representative for such instruction to the owner at no additional cost. All training shall take place after the systems are operational and accepted. There shall be a minimum of 80 hours, of end-user training included in these specification durations to be specified by Owner. Owner is to retain 10% of contract fee until completion of acceptance.

1.17 PUBLICATION

A. No information relative to the project or work, whether covered in this specification or otherwise may be released for publication without prior written consent and approval from the owner.

1.18 INFORMATION TO BE SUBMITTED WITH THE BID RETURN

- A. AV Contractor Qualifications
 - Work specified herein shall be the responsibility of a single Audio Visual Systems AV Contractor. Bid submission shall document a minimum of five (5) years' experience in the fabrication, assembly, and installation of Systems of similar technology, complexity and size as the project specified herein. The documentation submitted shall include 3 verifiable references of projects within the last 3 years. Specific information to be provided shall be: a. Location
 - b. Owner (inclusive of contact information)
 - c. Construction Manager (inclusive of contact information)
 - d. Audiovisual Consultant (inclusive of contact information)
 - e. Date of Project initiation
 - f. Date of Project Completion
 - g. Contract Value (Contractors Value)
 - h. Is there a Service Contract in place Duration
 - i. Current relationship with owner/users
 - 2. Indication of Microsoft Teams and Poly certifications
- B. Equipment Costs:
 - 1. The bid return shall include detailed lists of all equipment to be supplied. Each piece of equipment shall be individually priced. An itemized listing is provided in Appendix A, Audiovisual Bill of Materials attached to this specification.
 - 2. In the event that the equipment list spreadsheet is made available to the bidders electronically, Shen Milsom & Wilke, LLC. is not responsible for any formulas that may be resident in the spreadsheet. The results of any calculations in the spreadsheet are the sole responsibility of the Bidder.
 - 3. Equipment costs shall reflect all required modifications and accessories. All substitutions for specified equipment shall be listed and individually priced on a separate page.
 - 4. Itemized equipment pricing submitted with bid returns shall also represent unit pricing for components should additions to systems requirements change after contract award.
 - 5. Equipment totals from each equipment list shall be entered in the Master Recapitulation of Costs form.
- C. Non-Equipment Costs.
 - 1. Non-equipment costs shall be furnished separately on the Master Recapitulation of Costs form. These non-equipment costs shall be detailed for each of the following categories: Engineering: Including all required designs, drawings, run sheets, instruction manuals, etc.
 - Pre-installation: Including all fabrication, modification, assembly, rack wiring, etc., performed on the Contractor's premises.
 - 3. Installation: Including all on-site installation and wiring, coordination and supervision, testing, checkout, Owner training, etc. performed on the Owner's premises.
 - 4. General and Administrative: Including all G&A expenses, shipping, insurance, and guarantees.
 - 5. Taxes (if any are applicable).

1.19 ADMINISTRATIVE/STAFFING

- A. Describe your companies administrative organizational structure, including:
 - 1. Number of years in business.
 - 2. Core business
 - 3. Staff/headcount
 - a. Resumes of key personnel. Resumes must reflect skills relating to audio, video, teleconferencing (audio and video), networked audio, networked video, videowalls, videowall processors, control centers, mission critical facilities integrated control systems, programming, project management, etc. Resumes must be submitted for those individuals who will actually be assigned to this project and must include all training background information and certificates (i.e., technical product and ICIA). Upon award of contract, those personnel assigned to the project may NOT be changed without the written approval of the owner
 - b. Locations of all staffed and operational offices complete with the number of technical support personnel in each office and geographic area of coverage.
 - c. Identify area of servicing expertise by staff member inclusive of all relevant manufacturer training and certifications.
 - d. Identify the nearest service facility to this installation site and describe how you approach field service requests. Consider a requirement for an emergency 4 hour on-site response time as well as normal field service requests.
- B. Sub-Contracting/Teaming
 - 1. The AV Contractor must state if they intend to utilize a subcontractor in a systems servicing support role and provide said subcontractor's name and address and technical qualifications with the bid return as noted above. The subcontractor shall comply with all the same rules, regulations, laws and codes, licenses, etc. as required by the AV Contractor and as specified herein. The Owner reserves the right to approve or disapprove any subcontractor proposed by AV Contractor.
 - 2. If the Bidder proposes to subcontract any portion of the system installation work, any such subcontractors shall be clearly identified and their responsibilities and qualifications detailed in the Bidder's bid submission. Any and all work performed by a subcontractor shall be considered fully as part of the primary Bidder's contract and responsibility.
 - 3. For each proposed subcontractor, the bid must include at least three client references, with contact names and phone numbers, for comparable projects accomplished by those subcontractors.
 - 4. If it is the intent of the Bidder to "team" with one or more additional AV contractors, then this must be clearly stated and so identified in the Bidder's bid return. The AV Contractor (Bidder) who is returning the bid shall be considered as the "prime" with respect to these circumstances, and will assume and accept full responsibility for the performance of all members of the "team," including themselves and all other subcontractors engaged in the performance of the contract.
 - 5. Work specified herein shall be the responsibility of a single Audio Visual Systems AV Contractor. Bid submission shall document a minimum of five (5) years' experience in the fabrication, assembly, and installation of Systems of similar complexity as specified herein. The Systems are defined as combination of audio, video, AV control, systems programming (of AV devices) and network interface which are to encompass all system types as specified in this document The documentation shall include the names, locations, points of contact and DETAILED descriptions for at least three (3) installations of the type and complexity specified herein.
 - 6. The AV Contractor warrants that both they and their subcontractors are licensed as required by the authorities having jurisdiction and as required by local ordinances.
- C. User Serviceability & Service Training

- 1. Define and identify specifically what equipment and equipment components can be field repaired/replaced by the users and at what level of manufacturer provided training is required.
- 2. The bidder should provide a list of recommend spares and quantities, providing part numbers and unit costs as appropriate for all critical components and Sub-Systems

1.20 EXCEPTIONS AND PROPOSED MODIFICATIONS

- A. Should the Bidder wish to propose recommendations that will enhance the performance of the audiovisual system(s), or reduce costs without loss of performance, such comments shall be made in the bid submissions. All suggestions that are of value to the Owner shall be taken into consideration in the evaluation of bid returns. All such proposals shall be made as "alternate(s)", with the appropriate cost modifications clearly shown separate and apart from the costs of the system "as specified."
- B. Any and all exceptions to specifications, related drawings, general conditions and terms & conditions must be made with the bid submission. In the absence of exceptions, these specifications and related drawings shall be binding in letter and intent upon the successful Bidder. It is further required, and the Owner shall expressly rely on the fact, that the Bidder has examined all designs and specifications in detail and is prepared to accept full responsibility for the performance of the complete system installation as designed and specified. It is further required, and the Owner shall expressly rely on the fact, that the Bidder has reviewed and accepted current site conditions.

1.21 SUBSTITUTIONS/ALTERNATE EQUIPMENT & SOLUTIONS

- A. All bids and equipment shall be submitted on the basis of the equipment list that is included as part of this specification. All specified equipment should be considered to be "or approved equal" unless specifically noted herein. The Bidders are invited to propose alternate equipment/solutions. However, all such proposals shall be submitted separately and will be identified as "alternate(s)" with equipment costs shown as separate and apart from the costs of the equipment "as specified."
- B. Proposals for alternate equipment or /solutions will receive careful and equitable consideration if differences do not result in a departure from the overall intent of the system design and operation, and are demonstrated to be in the best interests of the User.
- C. All such proposals for alternate equipment/solutions shall be submitted at the time of Bid Return and accompanied by complete technical information, systems drawings and specifications, and "cut-sheets" for the equipment so proposed. The Bidder shall identify any and all substantive differences between the "alternate" and "specified" equipment.

PART 2 - PRODUCTS

2.1 DETAILED SPECIFICATIONS - OPERATIONAL SUMMARY

- A. General Programming Requirements
 - 1. Primary room capabilities are dictated by UC platform running on Poly or hardware. It is expected that Day 1 will be operating with a page flip between Microsoft Teams and BYOD mode.

- For rooms with audio DSPs and mic muting functions:
 a. All mics to mute together with codec mute state sync and mic mute indicators to track
- B. BYOD mode to be made available where supported by the hardware
- C. Room-By-Room Programming Requirements
 - 1. Digital Signage Room 212
 - a. Display:
 - 1) 65" Flat Panel display
 - b. Video sourses:
 - 1) TVs to have cable at each location with control via handheld remote.
 - 2) Media Player to be mounted behind display for signage (content and management by others)
 - c. Audio:
 - 1) Built-in display speakers
 - 2. Study Rooms 201, 202, 209, 210, 211
 - a. Display:
 - 1) 55" Flat Panel Display
 - b. Video Source:
 - 1) OFE PC
 - 2) Wireless sharing appliance
 - 3) HDMI & USB Laptop input (located on wall at tabletop height)
 - c. Audio:
 - 1) Internal display speakers.
 - d. Videoconferencing:
 - 1) Logitech Meetup All in one camera sound bar.
 - e. Control:
 - 1) Push button panel on display wall adjacent to the display.
- D. Training / Support Materials
 - 1. AVC shall provide comprehensive single page quick start guides that are printed and laminated.
 - a. This document will outline common use operations as well as simple trouble shooting steps
 - b. (3) revisions within the first year of installation should be planned to document changes in programming or improved documentation based on end-user feedback.
 - 2. AVC shall create comprehensive operations manuals for the systems providing for more advanced troubleshooting steps for system failures as well as to document more advanced operations of the system, specifically the larger auditoriums.
 - a. Part 1 outlines additional operations manual requirements.

2.2 AUDIOVISUAL EQUIPMENT LIST

A. See the attached, detailed equipment lists for the audiovisual systems. These lists are provided for the purpose of soliciting bids. The bidders are responsible for supplying all equipment necessary to provide complete and working systems, whether the equipment is specifically enumerated herein.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine the areas to receive the work and the conditions under which the Work would be performed. AV Contractor shall remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General

- 1. Installation shall include the delivery to the installation site, unloading, setting in place, fastening to walls, floors, ceilings, counters, or other structures where required, interconnecting wiring of the system components, equipment alignment and adjustment, programming and configuration and all other work whether or not expressly required herein which is necessary to result in complete and fully operational systems.
- 2. Prior to ordering equipment, the contractor shall coordinate the frequencies of all wireless devices to prevent unwanted interaction between devices and rooms. This includes, but is not limited to, wireless microphones, assisted listening system devices, wireless control panels, etc.
- 3. All accessories, including rack mounting hardware, power supplies, etc., shall be obtained from the original equipment manufacturer. Unless otherwise noted or specified, third party accessories shall not be used.
- 4. If, in the opinion of the Contractor, an installation practice is desired or required, which is contrary to these specifications or drawings, a written request for modification shall be made to the Design Team. Modifications shall not commence without written approval from the Design Team
- 5. During the installation, and up to the date of final acceptance, the Contractor shall be under obligation to protect his finished and unfinished work against damage and loss. In the event of such damage or loss, the damage shall be replaced or repaired at no cost to the Owner.
- B. Physical Installation
 - 1. All equipment shall be firmly secured in place unless requirements of portability dictate otherwise.
 - 2. All equipment shall have an engraved plaque permanently affixed, denoting its function.
 - 3. Fastenings and supports shall be adequate to support their loads with a safety factor of at least three. All boxes, equipment, etc., shall be secured plumb and square.
 - 4. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
 - 5. Trim and Escutcheon Components
 - a. To insure a proper finished appearance, the AV Contractor shall furnish and install trim/escutcheon components at all conditions where A/V components pass through the finished ceilings. This would include but not be limited to video projector supports, television monitor/receiver supports and any other component which is not specifically supplied with integral flanges/trim components; i.e. speaker mounts, assistance listening devices, etc.
 - b. The visible component of any trim should be minimal in size, preferably no wider than 1/2". All trim components at the ceiling plane shall be finished to match the approved ceiling finish. The audiovisual contractor should obtain a sample from the General Contractor, including any custom color information, or standard color numbers.

- c. All visible components and finish options shall be submitted to the Design Team for review and approval prior to fabrication.
- C. Cable Installation
 - 1. All wire bundles are to be neat and combed free of cable crossovers.
 - 2. All cables, regardless of length, shall be marked with a permanent, self-laminating wraparound number or letter cable marker at both ends, similar to the Panduit "Pan-Code" system. Labels must be computer-generated for legibility. Wire labels done by hand in the field must be replaced with computer generated labels. There shall be no unmarked cables at any place in the system. Marking codes used on cables shall correspond to codes shown on drawings and or run sheets. All labeling must be reviewed and approved by Owner prior to installation as part of the shop drawing process.
 - 3. All cables shall be grouped according to the signals being carried. In order to reduce signal contamination, separate groups shall be formed for the following cable families:
 - a. Power cables
 - b. Control cables
 - c. Video cables
 - d. Audio cables carrying signals less than 20 dBm
 - e. Audio cables carrying signals between 20 dBm and +20 dBm
 - f. Audio cables carrying signals above +20 dBm
 - 4. As a general practice, all power cables, control cables, and high level cables shall be run on the left side of an equipment rack as viewed from the rear. All other cables shall be run on the right side of an equipment rack, as viewed from the rear.
 - 5. Cables ties shall be placed at appropriate intervals of no greater than six inches for vertical bundles, two inches for horizontal bundles.
 - 6. All vertical cable bundles shall be attached to the rack frame.
 - 7. All cables shall be continuous lengths without splices. All system wire, after being cut and stripped, shall have the wire strands twisted back to their original lay and be terminated by approved soldered or mechanical means. Except where noted otherwise in the specifications, NO BARE WIRE TERMINATIONS WILL BE ACCEPTED. Heat-shrink tubing shall be used to insulate the ground or drain wire. Unused wires at the end of a cable shall remain unstripped and shall be laid back and held in place with wire ties.
 - 8. All solder connections shall be made with rosin-core solder using temperature-controlled solder stations. Care shall be taken to avoid cold or cracked solder joints. Any connections that do not appear to be clean and shiny, or which show signs of cracking, shall be resoldered by the contractor before final acceptance of the system.
 - 9. Mechanical connections using insulated, crimp-type connectors shall be bonded to the connector by soldering the wire to the metal part of the connector.
 - 10. Connections made with screw actuated pressure type terminal strips shall be made by stripping approximately 1/4 inch of insulation from the stranded conductor. Then the untinned wire shall be inserted into the terminal and the screw tightened using a secure fitting precision screwdriver.
 - 11. Terminal blocks, boards, strips or connectors shall be furnished for all cables which interface with racks, cabinets, consoles, or equipment modules. No audio cables shall run directly to the audio patch panel jacks. Each audio patch panel shall be furnished with an audio terminal block, and all audio cables to and from the audio patch panel shall terminate on this block.
 - 12. All wire markers shall face a common direction.
 - 13. All cables shall have proper connector housing.
 - 14. Cables shall not protrude from the back of racks.
 - 15. All cable entry shall be through the tops of racks or through entrance holes in the base of the rack. No cable shall enter racks through front, rear or side panel openings.
 - 16. Unless otherwise called for in these specifications and drawings, the following cables, or their approved equals, shall be used in these systems:

Туре	Manufacturer	Non-Plenum	Plenum
RF-CATV (Horizontal-RG6)	Belden	1189A	1189P
RF-DBS/DSS (Horizontal-RG6)	Belden	1829A	1829P
RF-CATV (Vertical-RG11)	Belden	1617A/7731	1153A
RF-50 Ohm (Horizontal RG-8)	Times Microwave	Microwave	LMR400
Video (Baseband & SDI)	Belden	1505A	1506A
S-Video	Belden	1807A	7700A
Control (4 conductor shielded)	Belden	1502R	1502P
Control (12 conductor shielded)	Belden	9556	6309FE
Audio	Belden	9451/1266A	9451P
Audio (8 Ohm program speakers)	Belden	8473	1861A
Audio (70 Volt Speaker)	Belden	8461	1863A
Video, RGB (RG6)	Belden	7721A	None
Video, RGB (RG59)	Belden	7796A	1826A
Multi-Channel Audio	Belden	8774	88778
Digital Audio (110 Ohm)	Belden	1800B	1801B
4-Fiber Riser Cable			
Tight-Buffered 50 µm multimode (OM3)	Corning Cable Systems		004T88-31180-29
			LANmark-1000
Category 6e	Berk-Tek		Enhanced Category 6 UTP
Category 6	Berk-Tek		LANmark-6 CAT 6 UTP Plenum
Category 5e	Berk-Tek		LANmark-350 Prem. Cat 5e

- D. Note: These cable types are cited to illustrate the type and quality of cable required. Unless otherwise noted, cables from other manufacturers, i.e. Canare, Crestron, CommScope, Extron, Gepco, Liberty, etc. will be considered if data sheets indicating equivalency are submitted to Consultant for approval prior to installation.
 - 1. It is the responsibility of the Audiovisual Contractor to verify, furnish and install the correct CATV cable type and connectors, as per the local CATV provider.
 - 2. Unless otherwise noted, all video and computer video cables are to be terminated using seventy-five ohm (75 Ohm) connectors, with a captive center pin.
 - 3. Cables running in plenum areas without conduit shall be plenum rated cable, and match the specified cable above. It is the responsibility of the Bidder to inspect the electrical drawings, and verify in what spaces plenum cable shall be used. No claims for additional monies, based on the use of plenum cable, will be allowed.
 - 4. All cables that can be terminated in the field (except video and pulse cables, which must be cut to an electrical length) shall be cut to the length dictated by the run. No splices shall be permitted in any pull boxes without prior permission of the Consultant. For equipment mounted on casters, in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length.
 - 5. No cable shall be installed with a bend radius less than that recommended by the cable manufacturer.

- 6. Where cables are installed in architectural niches, ensure that the cables are black, unless otherwise directed, to reduce visibility from the audience.
- 7. Where cables are visible, the cables will be sheathed in a color wrap that has been submitted for approval by the Design Team.
- E. CABLE SEPARATION
 - 1. Cable separation of cables for runs greater than 24'.
 - a. Microphone Level 12" from all other circuits.
 - b. Line Level and Control 12" from any circuit with signal of 20dB or greater than Line Level and Control cables.
 - c. Speaker level circuits 12" from other circuits.
 - d. Video and Data 12" from any circuit with signal of 20dB or greater than Video and Data.
 - e. AC Power Circuits 12" from all other circuits.
 - f. Required conduit separation are given for all audiovisual pathways on plans
- F. CABLE SUPPORT
 - 1. Supporting method in accordance with Section 26 05 00
 - Individual runs throughout building Support cable at 600mm on center and 100mm at any change in direction. Support from building structure. Cables on top of ceiling tiles will be rejected. Cable supported by ceiling grid support wires will be rejected.
 - Cable Bundles Where multiple cable combine support at 300mm on center and 100mm at any change in direction. Support from building structure. Cables on top of ceiling tiles will be rejected. Cable supported by ceiling grid support wires will be rejected.
- G. RACK CABLING
 - 1. Neatly train and lace cables.
 - 2. Route Cables from components to lacing bars installed on rear rack rail.
 - 3. Provide services loops for each cable.
 - 4. Cable separation of cables for runs within Equipment rack.
 - a. Microphone Level 50mm from all other circuits.
 - b. Line Level and Control 50 mm from any circuit with signal of 20dB or greater than Line Level and Control cables.
 - c. Speaker level circuits 50mm from other circuits.
 - d. Video and Data 50 mm from any circuit with signal of 20dB or greater than Video and Data.
 - e. AC Power Circuits 50mm from all other circuits.
- H. APPROVED WIRE TERMINATION MEANS
 - 1. Solder Connections For connectors utilizing Solder Cups
 - 2. Terminal strip Connectors For termination of blunt cut cables, cable to be tinned prior to termination
 - 3. Multi Pin connectors Utilize connector manufacturers crimper
 - 4. Crimp Cap Terminations For Loudspeaker circuits at individual devices. Distribution cable termination to utilize terminal strip connectors.
- I. CONNECTION PLATE RECEPTACLES (unless otherwise specified)
 - 1. All connection plate receptacles must be labeled properly according to Owner approved labeling scheme.
 - 2. Audio (microphone or line level) XLR type.
 - 3. Audio (loudspeaker level) Neutrik Speakon®.
 - 4. Intercom XLR or ¼ inch diameter tip/ring/sleeve type, or as required by the intercom system. Jack shall be insulated from panel type.
 - 5. Video BNC type.
 - 6. VGA DB-15HD jack, isolated from panel type, with hex nuts

- 7. DVI (Inclusive of DVI-A, DVI-I and DVI-D signal types) DVI-I type connector unless otherwise specified.
- 8. HDMI HDMI with locking nut.
- 9. USB USB Type A
- 10. Category 5/6 RJ45 Type
- 11. RF "F" type. Receptacles shall be insulated from panel type.
- 12. Note: All connectors on wall plates, or in other exposed locations, are to be recessed.
- J. PATCH PANELS
 - 1. Patch Panel Assignments
 - a. All patch panels shall be wired so that signal "sources" (outputs from) appear on the upper row of a row pair; and all "loads" (inputs to) appear on the lower row of a row pair.
 - 2. Patch Panel Designation Strips
 - a. All audio and video patch panel designation strips shall utilize alphanumeric identifications and descriptive information. The jack position in each horizontal row shall be numbered sequentially from left to right. The horizontal jack rows shall be lettered sequentially from top to bottom. The alphanumeric identification of each jack shall be included on the functional block drawings, as well as on reproductions of these drawings, which shall be mounted in an appropriate location near the patch bays.

K. MOUNTING HEIGHTS

- 1. Coordinate locations of the following with mounting heights as indicated on Architectural, Electrical and Audiovisual drawings.
 - a. Technical wall plates
 - 1) AV input/output connections
 - 2) Flat panel display panel connections
 - 3) Video projector connections
 - 4) Annotation panel connections
 - 5) Networked Digital Clocks
 - 6) PTZ cameras
 - 7) Wall mounted speaker boxes
 - b. Control panels
 - c. Pull boxes
 - d. Other devices as required
- L. Grounding Procedures
 - 1. In order to minimize problems resulting from improper grounding, and to achieve maximum signal-to-noise ratios, the following grounding practices shall be adhered to in order to maintain the integrity of the grounding system:
 - a. General
 - b. Because of the great number of possible variations in grounding systems, it shall be the responsibility of the Contractor to follow good engineering practice, as outlined below, and to deviate from these practices only when necessary to minimize crosstalk, ground loops, ground-induced noise, and to maximize signal-to-noise ratios in the audio, video, and control systems.
 - c. System Power Ground: A single primary "system ground" shall be established for the system in each particular area. All grounding conductors in that area shall connect to this primary system ground.
 - The system ground shall be provided at the audio equipment rack for the area, and shall consist of a copper bar of sufficient size to accommodate all secondary ground conductors. A copper conductor having a maximum of 0.1 Ohms total resistance shall connect the primary system ground bar to the nearest approved ground. The Contractor shall be responsible for determining if the metallic conduit is properly electrically bonded to the building ground system.

- 2) Secondary system grounding conductors shall be provided between all racks, audio consoles, and audiovisual system equipment local to the area. Each of these grounding conductors shall have a maximum of 0.1 Ohms total resistance.
- 3) Under no conditions shall the AC neutral conductor, either in the power panel or in a receptacle outlet, be used as a system ground, except as specifically defined by NFPA 70 for bonding.
- 4) Ungrounded equipment with either an inline transformer or a 2-prong plug, shall be bonded to the rack bus bar using #12awg cable.
- d. Audio Cable Shields
 - All audio cable shields shall be grounded at one point only. There are no exceptions. For inter and intra-rack wiring, this requires that the shield be connected at one end only. For ungrounded portable equipment, such as microphones, the shield shall be connected at both ends but grounded at only one end.
- e. Video Receptacles
 - 1) All video receptacles that are provided and installed by the Contractor shall be insulated from the mounting panel, outlet box, or wireway. Unless otherwise detailed herein, this shall be accomplished by using insulated-from-panel type receptacles.
- f. Audio Receptacles
 - 1) All audio receptacles that are provided and installed by the Contractor shall be insulated from the mounting panel, outlet box, or wireway. Unless otherwise detailed herein, this shall be accomplished by using insulated-from-panel type receptacles.
- g. General
 - Because of the great number of possible variations in grounding systems, it shall be the responsibility of the AV Contractor to follow good engineering practice, as outlined above, and to deviate from these practices only when necessary to minimize crosstalk and to maximize signal-to-noise ratios in the audio, video, and control systems.

3.3 PERFORMANCE STANDARDS

- A. Unless restricted by the published specifications of a particular piece of equipment, or unless otherwise required under the Detailed Specifications, the following performance standards shall be met by each system. The signal paths for the above Performance Standards shall be as follows: From all source inputs to all signal destinations. See Contractor System Checkout Section III-T for testing procedures.
 - 1. Analog Audio
 - a. Frequency ResponseWithin plus or minus 0.5dB, 20 Hz to 20,000 Hzb. Signal to Noise Ratiogreaterthan(includingcrosstalkandhum
 - all input/output levels) c. Total Harmonic Distortion 0.05% maximum from 20 Hz to 20.000 Hz.
 - d. Input Levels
 - e. Microphone (Nominal) -50dbu
 - f. Overload (Minimum gain) -5dbu
 - g. Maximum Gain -26dbu
 - h. Line (Nominal) +4dbu
 - i. Overload (Minimum gain) +24dbu
 - j. Maximum Gain +9dbu
 - k. Input Common Mode Rejection >100db
 - I. Output Levels

	m. Line (Nominal) +4dbu					
	n. Maximum +24dbi		L			
	o. Output Impedance	< 0.5 O	nms			
-	p. Load Impedance >150 C	Jnms				
2.	Analog Video (signal)					
	a. Frequency Response	•	olus or minus 0.	5dB, DC to 4.2	MHz	
	b. Signal to Noise Ratio	55		dB		minimum
	(peak	to		RMS)	u	nweighted,
	DC to 4.2 MHz					
	c. Crosstalk 45		dB			minimum
	unweighted DC to 4.2					
	d. Line and Field Tilt:	2% max	kimum			
	e. Differential Gain: 3% ma	iximum				
	f. Differential Gain: 2 degre	ees maxiı	mum			
	SDI – Per SMPTE 259M					
	HD SDI – Per SMPTE 2921					
	HD SDI (Dual Link) – Per S		24M			
	3G SDI – Per SMPTE 424					
	HDMI – Per HDMI Ver. 1.3	b				
8.	DVI – Per DVI Ver. 1.0					
	Analog NTSC Video					
10.	COMPOSITE VIDEO SIGN					
	a. Signal 1V P-P 75 Ω(3.58	, 4.43MH	z) NTSC, PAL,	or SECAM as a	appropriate	
11.	S-VIDEO SIGNAL					
	a. Signal Y: 1.0V p-p, 75 Ω	C: 0.286	√ p-p, 75Ω(3.58	3, 4.43MHz) NT	SC, PAL, or S	SECAM as
	appropriate					
12.	COMPONENT VIDEO (Bet					
	a. Signal Y: 1.0V p-p, 75	ΩPB/CB	: 07V p-p,75Ω	2PR/CR: 0.7V p-	-p, 75 Ω	
13.	RF Broadband					e
	a. The RF Broadband syste	em shall n	neet or exceed	the published sta	andards of th	e following
	organizations:					
	1) FCC Part 15 Rules					
	2) FCC Part 76 Rules					-
	3) NCTA-02 Recomm	nended	Practices for	Measurements	on Cable	lelevision
	Systems.		· · · ·			
	b. Visual Carrier Level +7 +					
	c. Visual Carrier Level +5 +					
	d. Visual Carrier to Noise R					
	e. Maximum Loss from com	nmon	45 dB or less	point to any tap	at channel V	VVV(433.25
	MHz)		07.10			
	f. Maximum Loss from com		37 dB or less p	oint to any tap a	it channel 2(5	5.25 MHZ)
14.	Audio Video Bridging (AVB	,	· · · · -			
	a. IEEE 802.1AS: Timing a				pplications	
	b. IEEE 802.1Qat: Stream I					
	c. IEEE 802.1Qav: Forward			ie-Sensitive Stre	eams	
45	d. IEEE 802.1BA: Audio Vid	aeo Briag	ing Systems			
15.	Cobranet Audio		h 1 1 1 1	:44!		
40	a. Protocol not subject to pe	ertormand	ce-based subst	itution.		
16.	Dante Audio		h 1 1 1 1	:44:		
	a. Protocol not subject to pe	enormano	Je-pased subst	itution.		

- a. Protocol not subject to performance-based substitution.17. Audiovisual System, Control System and User Interface Programming
 - a. Control system user interfaces pages and programming shall be designed for this project exclusively. While there are a great number of design approaches to designing the user interface, the following guidelines shall be adhered to:

- The use of custom system programming from prior projects and/or 'modules' provided by a given manufacturer or programmer may or may not meet the functional intent of the systems and work described herein. It is the responsibility of the AV Contractor to meet the functional intent of the systems in this specification, including any and all necessary modification of program code or creation of custom modules as required.
- 2) The operation(s) of all system(s) are to match the functional intent already implemented at the owner's facilities as applicable.
- 3) All panels are to have the time and date as icons, in the same position on every page.
- 4) All panels are to have a title, indicating the piece of equipment and/or functionality being controlled.
- 5) Final programming shall include capability to remotely control all functions of the audiovisual system. Only functions required for normal use shall appear on top level pages while underlying "Tech Pages" shall provide access to full manufacturer's remote control functionality.
- 6) Devices similar in nature shall be programmed to operate with a common format.
- 7) No individual component shall be programmed to function atypically.
- 8) Whenever the same button appears on more than one page, it will be in the same position on each page.
- 9) Where feasible, multi-level access to controls should be implemented. See paragraph "e", above.
- b. During performance testing, all equipment shall be operated under standard conditions as recommended by the manufacturer.
- c. Please see Detailed Specifications for further information on specific control system programming requirements.
- B. Performance Test Signal Paths
 - 1. The signal paths for the above Performance Standards shall be as follows:
 - a. Audio:
 - 1) From all source inputs (for microphones, audio tape units, video tape units, etc.) through all mixers, switchers, etc., to all signal destinations.
 - b. Video:
 - 1) From all sources of the above signal paths. This shall not exempt the AV Contractor from the responsibility of checking all paths and outlets for appropriate compliance with the Performance Standards, see section below for detailed requirements.
- C. Optical
 - 1. All optical projection systems shall meet the following performance standards:
 - a. The total averaged light output from a projector, in lumens, shall be within plus-or-minus 15% of that specified by the projector manufacturer.
 - b. The "corner" location shall be defined as the four points determined by intersecting lines drawn 5% of the distance in from the focused edges of the image.
 - c. The light meter used for the above measurements shall be a properly calibrated footcandle (or lux) meter and shall be cosine-corrected.
 - 2. Projectors, lenses, and mirrors shall be solidly mounted and braced, so that there will be no observable movement in the image induced by motor vibration or other mechanical operations.

3.4 CONTRACTOR SYSTEM CHECKOUT

A. Before Commissioning Tests are scheduled, the Contractor shall perform his own system checkout based upon an approved testing procedure for the systems. The Contractor shall

furnish all required test equipment and shall perform all work necessary to determine and/or modify performance of the system to meet the requirements of this specification. The Contractor shall submit a testing plan which shall be in accordance with ANSI-INFOCOMM standard 10-2013-Audiovisual Systems Performance verification for approval by the individual or firm representing the Owner during the Audiovisual Installation. At a minimum, the following sub-components of the Audiovisual System shall be tested and verified:

- 1. Cable and Connectors
 - a. All cables and connectors shall be tested and verified to comply with the manufacturer's specifications and design intent
 - b. Cable test results shall be submitted in advance of the Commissioning for review by the Owner's Representative
- 2. Devices
 - a. All devices shall meet the functionality as specified by manufacturer.
 - b. If any device is found to deviate from the manufacturer's functionality it shall be replaced by the Audiovisual Systems Contractor at no cost to the Owner.
- 3. Signal Types
 - a. The Audiovisual System shall be tested to comply with all video and audio standards as specified in the Performance Standards section and described by the design intent.
- 4. System Function
 - a. The cables and connectors, devices, and signal types shall meet the functional requirements as specified by the design intent.
 - b. Acceptable testing procedures may include but is not limited to that which is described in the detailed specifications such as (streaming, push-to-talk, annotation, etc.)
- 5. Document that all matrix switching crosspoints have been tested and verified.
- 6. Provide documentation that all Cobranet / Dante / AVB bundles and audio signal lines have been tested and verified.
- 7. Test all audio and video systems for compliance with the Performance Standards, using the example procedure outlined in appendix A:
 - a. Test Equipment: The following test equipment (or submit equivalent for approval) shall be used to test the systems on site.
 - 1) Audio check:
 - a) Time based measurement system, Goldline TEF20 or SIA Smaart live with laptop PC, calibrated omnidirectional mic, and appropriate interface
 - b) Audio test set, Audio Precision ATS-1DD
 - c) Media representative of all types found in the subject system
 - d) Audio cables as required to connect test equipment to the system
 - e) Set of terminations, adapters etc.
 - 2) Video checks:
 - a) Video, Component, RGBS, RGBHV and Digital video signal generator, Extron VTG 400 DVI
 - b) Digital Video test generator with EDID and HDCP components, PureLink HDG-8000 PRO
 - c) Media and portable hardware (i.e laptop) representative of all types found in the subject system including but not limited to Blu-ray [™] players and discs (provide discs with and without HDCP encrypted content), mobile PC/Tablets.
 - d) RGB cable, Extron BNC-5-6'HR
 - e) Video cable
 - f) Set of terminations, 'T' pieces etc.
 - 3) Gain Setting
 - a) Adjust all systems (end to end within a system) for maximum signal-to-noise ratio. No hiss should be audible through any loudspeaker at the completion of gain structure setting, and all audio gain stages should clip simultaneously.
- 8. Signal Paths
 - a. Video/Audio

- Connect the output of the video signal generator to a floor box/table/rack connector and select the "Full Field Color Bar" signal. Connect the combined waveform monitor/vectorscope to a final output point, e.g. an input to a picture monitor or video projector. Ensure that the test signal is routed to the selected output.
- 2) Measure and record the signal amplitudes.
- 3) Repeat item '1' after selecting the "Multiburst, 50 IRE" test signal.
- 4) Measure and record the signal amplitudes.
- 5) Repeat item '1' after selecting the "Modulated 5-step" test signal.
- 6) Measure and record the signal differential phase and gain.
- 7) Repeat item #'s '1' through '6' for other video signal paths.
- 8) Repeat item '1' after selecting the Window test signal.
- 9) Measure and record the signal line and field tilt.
- 10) Repeat item '1' after connecting the Black Burst signal from a rear mounted connector.
- 11) Measure and record the signal/noise ratio.
- 12) Connect the output of the audio test set to a floor box/table/rack program audio connector and connect the input of the audio test set to a final output point, e.g. an input to a program speaker power amplifier. Ensure that the test signal is routed to the selected output, that the volume control is set to 100% and that the equalizers are bypassed.
- 13) Measure and record the signal/noise ratio, total harmonic distortion and frequency response.
- 14) Repeat items '12' and '13' for other audio signal paths.
- 15) Connect the output of the audio test set to a floor box/table/rack speech audio connector and connect the input of the audio test set to a final output point, e.g. an input to a speech speaker power amplifier. Ensure that the test signal is routed to the selected output, that the volume control is set to 100% and that the equalizer is bypassed.
- 16) Measure and record the signal/noise ratio, total harmonic distortion and frequency response.
- 17) Repeat items '15' and '16' for other audio signal paths.
- 18) DVI: Connect the DVI output of the signal generator to a floorbox/table/rack connector and select the SMPTE & PLUGE signal at the various computer scan rates as follows:
 - a) 640 x 480 31.5 kHz H, 60 Hz V
 - b) 640 x 480 37.5 kHz H, 75 Hz V
 - c) 800 x 600 38 kHz H, 60 Hz V
 - d) 832 x 624 49.7 kHz H, 75 Hz V
 - e) 1024 x 768 48 kHz H, 60 Hz V
 - f) 1280 x 768 48 kHz H, 60 Hz V
 - g) 1366 x 768 47.8 kHz H, 60 Hz V
 - h) 1280 x 1024 64 kHz H, 60 Hz V
 - i) 1400 x 1050 63.9 kHz H, 60 Hz V
 - j) HD 720p 45 kHz H, 60 Hz V
 - k) HD 1080i 33.75 kHz H, 30/60 Hz V
 - I) HD 1080p 33.75 kHz H, 30/60 Hz V
- 19) Check that the image is correctly displayed on the picture monitor(s) and/or by the video projector.
- 20) Repeat item '2' using Crosshatch signal, checkerboard signal and H Pattern signal.
- 21) Repeat item '2' for other DVI connection locations.
- 22) Connect the output of the audio signal generator to a floorbox/table/rack 'Left' and 'Right' connectors and select the 1 kHz tone. Check that the signal is emitted from the left and right program speakers.
- 23) Repeat item 'v' for other audio connection location.

- 24) Note: Whenever possible, include computer sources provided by the Owner, at the desired resolution, in your testing.
- 25) Note: The term "RGB" is used generically. The system will be tested with the sync format dictated by functional requirements, including, but not limited to, sync-ongreen, composite sync and separate horizontal and vertical sync. Whenever possible, include computer sources provided by the Owner, at the desired resolution, in your testing.
- b. At the conclusion of the tests, return all equipment settings to previously calibrated positions.
- c. Provide written records of all test results in spreadsheet form.
- d. Check all control functions, from all controlling devices to all controlled devices, for proper operations.
- e. Adjust, balance, and align all equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for all level controls, and record these settings in the "System Operation and Maintenance Manual".
- f. Check all optical projection images for average light level, light fall-off, and image alignment and size to comply with the Performance Standards and specifications drawings. Check to determine that all projectors, projector bases, carts, tables, and mirrors are rigid and vibration-less in operation.
- g. Maintain documentation of all performance tests for reference by the Consultant during the System Acceptance Tests.

3.5 COMMISSIONING TESTS

- A. Commissioning Tests will not be performed until the Contractor's System Checkout has been completed and the test results have been reviewed. The Commissioning Tests will be supervised by the Owner's Representative and shall consist of the following at a minimum:
 - 1. A physical inventory of all equipment on site and will be compared to equipment lists in the contract documents.
 - 2. The operation of all system equipment shall be demonstrated by the Contractor.
 - 3. Review of final As-Build documentation as described in the "Contractors Documentation" section of this specification.
 - 4. Both subjective and objective tests will be required by the Owner's Representative to determine compliance with the specifications. The Contractor shall be responsible for providing test equipment for these tests.
 - 5. All final, "as-built" drawings, run sheets, manuals, and other required documents, as detailed in Part I, shall be on hand. Two complete sets of these documents shall be delivered to the Owner at this time. (One complete set shall have been delivered to the Consultant prior to the scheduling of Acceptance Tests).
- B. In the event further adjustment is required, or defective equipment must be repaired or replaced, tests may be suspended or continued at the option of the Owner's Representative.
- C. Any charge for additional time incurred by the Owner's Representative required to over-see the system tests, due to improper system installation or previous failed systems, shall be the responsibility of, and charged directly to the contractor

END OF SECTION



ADDENDUM 2 NARRATIVE

April 6, 2023

Addendum 2 Narrative

Project No.	Attention
22-0316-00	Robert Clougher
Project Name	Company
TCNJ 68' Roscoe Hall Student Services Renovation	The College of New Jersey
Project Location	Address
Ewing, NJ	2000 Pennington Road
	Ewing, NJ
Date Reviewed	-
April 5, 2023	
Prepared by	

Ramon Turner

Below is a list of revisions in the TCNJ 68' Roscoe Hall Student Services Renovations Contract Documents Addendum 2, dated 2023-04-06. Clouded revisions in these documents were made after the Issued for Bid documents dated 2023-03-02.

Sheet	Revision
AD101	Sheet removed from project scope.
AD102	Added general note to protect existing to remain cabling.
A101	Sheet removed from project scope.
A102	Added general note to route above ceiling cabling through sleeves as required, not bury cables in partitions.
A401	Sheet removed from project scope.
A700	Updated partition types to show in use types.
A710	Revised lockset types for classroom & storage hardware sets.
A901	Sheet removed from project scope.
A911	Sheet removed from project scope.
A912	Revised furniture layout.
M001	Revised Sheet List
MD101	Sheet removed from project scope.
MD102	Reduced demolition scope to only include area of work.
M102	Reduced new work scope to only include VAV boxes in area of work.
M103	Added duct smoke detectors in the main return duct to the air handlers.
M500	Removed fin tube detail
M600	Revised schedule sheet to only include items in this phase of work.
M700	Removed hydronic heating diagram from scope. Added noting for controls responsibility.



Revised Sheet List
Sheet removed from project scope.
Revised Sheet List
Sheet removed from project scope.
Sheet removed from project scope.
Revised TV symbol to indicate media back box instead of coaxial connection.
Added General Notes I and J to clarify scope of work for data demolition.
Added General Notes I and J to clarify scope of work for data demolition.
Added General Notes I and J to clarify scope of work for data demolition.
Added existing WAPs to be removed for coordination. Added General Notes I and J to clarify scope of work for data demolition.
Revised General Note C per client instructions. Added General Notes J and K for clarification and expansion of scope. Removed WAPs from plans for clarity. Added receptacles in meeting rooms per client feedback. Added mounting heights to select receptacles. Modified select keynotes to clarify scope of work and division of responsibilities.
 Revised General Note C per client instructions. Added General Notes J and K for clarification and expansion of scope. Removed WAPs from plans for clarity. Added receptacles in meeting rooms per client feedback. Added mounting heights to select receptacles. Modified select keynotes to clarify scope of work and division of responsibilities. Added digital display per coordination Revised furniture layout per client direction and modified devices accordingly
Revised General Note C per client instructions. Added General Notes J and K for clarification and expansion of scope.
Modified keynote to clarify WAP scope
Modified keynote to clarify WAP scope
Revised General Note C per client instructions. Added General Notes J and K for clarification and expansion of scope.
Revised General Note C per client instructions. Added General Notes J and K for clarification and expansion of scope.
Revised General Note C per client instructions. Added General Notes J and K for clarification and expansion of scope.
New Sheet – added coordination details and diagrams Moved TMGB connections diagram to sheet; revised detail for Secondary Bus Bar
Removed TMGB connections diagram, moved to E501
Updated circuitry in panel LB per new furniture layout.

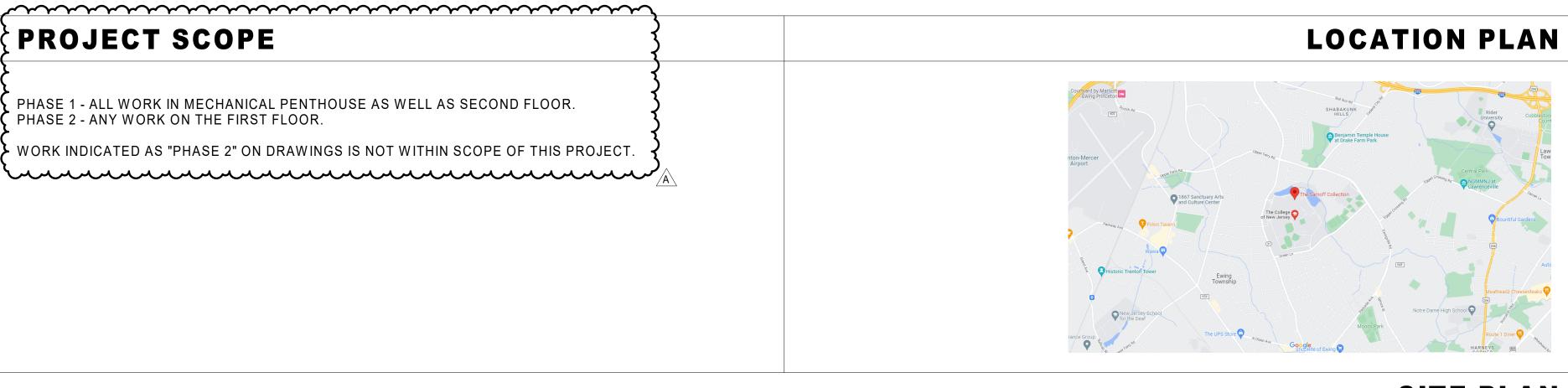


	ABBREV		
ABBREVIA	BREVIATIONS ARE GENERAL AND MAY NO TIONS IN DRAWINGS MAY OR MAY NOT US	SE PERIODS	
(M) (N)	MODIFIED NEW CONSTRUCTION	KIT KO	KITCHEN KNOCKOUT
(E) (S) (R)	EXISTING CONSTRUCTION SURPLUS RELOCATED EQUIPMENT	LAM LAV	LAMINATE LAVATORY
((() ଜୁ ଡୁ	AT CENTERLINE	LBS LF	POUNDS LINEAR FEET
		LP LSF	LOW POINT LINOLEUM SHEET FLOORING
AB ABV A/C	ANCHOR BOLT OR AIR BARRIER ABOVE AIR CONDITIONING	LTF MAS	LINOLEUM TILE FLOORING
A/C ACT ADA	ACOUSTICAL CEILING TILE AMERICANS WITH DISABILITIES ACT	MAS MAX MECH	MASONRY MAXIMUM MECHANICAL
AFF AFG	ABOVE FINISH FLOOR ABOVE FINISH GRADE	MFR MH	MANUFACTURER MANHOLE
ALT	ALUMINUM ALTERNATIVE	MIN MIR	MINIMUM MIRROR
APPROX ARCH AUTO	ARCHITECTURAL	MISC MO MP	MISCELLANEOUS MASONRY OPENING METAL PANEL
AVE	AVENUE OR AVERAGE	MRD MTD	METAL ROOF DECK MOUNTED
BB BD	BULLETIN BOARD BOARD	MTL MWK	METAL MILLWORK
BLDG BLK BLVD	BUILDING BLOCK OR BLOCKING BOULEVARD	N NA	NORTH OR NEUTRAL NOT APPLICABLE
BM BO	BEAM BOTTOM OF	NE NIC	NORTHEAST NOT IN CONTRACT
BOD	BASIS-OF-DESIGN OR BOTTOM OF DECK	NO., # NOM	NUMBER NOMINAL
BOF BOC BOT	BOTTOM OF FRAMING BASE OF CURB BOTTOM	NR NSF NTS	NOT REQUIRED NET SQUARE FEET NOT TO SCALE
BRG BTWN	BEARING BETWEEN	NW	NORTHWEST
BU	BUILT-UP		ON CENTER OR OVER COUNTER OUTSIDE DIAMETER
CAB CC CEM	CABINET CENTER TO CENTER CEMENT	O/H, OH OPG OPH	OVERHEAD OPENING OPPOSITE HAND
CFM CFL	CUBIC FEET PER MINUTE COUNTER FLASHING OR COMPACT	OPP OSA	OPPOSITE OUTSIDE AIR
CG	FLUORESCENT LAMP CORNER GUARD	OSB OTB	ORIENTED STRAND BOARD OUT TO BID
CHT CIP CJ	CEILING HEIGHT CAST IN PLACE CONTROL JOINT OR	P PC	POLE PHOTO-CELL LIGHTING
CL	CONSTRUCTION JOINT CENTERLINE	PEF PFT	POURED EPOXY FLOORING PORCELAIN FLOOR TILE
CLG CLR	CEILING CLEAR	PH P/L, PL	PHASE AND PHARMACY PROPERTY LINE
CMU CMP CO	CONCRETE MASONRY UNIT CORRUGATED METAL PIPE CONCRETE OPENING AND CLEAN-	PL PLAM PLUMB	PLATE PLASTIC LAMINATE PLUMBING
CO COL	CONCRETE OPENING AND CLEAN- OUT COLUMN	PLUMB PWD PNL	PLUMBING PLYWOOD PANEL
CONC CONT	CONCRETE CONTINUOUS	PROP PSF	PROPOSED POUNDS PER SQUARE FOOT
CORR CPT	CORRIDOR CARPET	PSI PT	POUNDS PER SQUARE INCH PAINT OR PAINTED
CT CW CWT		PTD PTFR	PAPER TOWEL DISPENSER OR PAINTED PRESSURE TREATED FIRE
DBL	DOUBLE	PVC	RESISTIVE POLYVINYL CHLORIDE
DET/DTL DEPT	DEPARTMENT	PVMT	PAVEMENT
DF DIA DIM	DRINKING FOUNTAIN DIAMETER DIMENSION	QSM QT QTR	QUARTZ SURFACE MATERIAL QUARRY TILE QUARTER
DN DWG	DOWN DRAWING	QTY	QUANTITY
E	EAST	R RA	RADIUS RETURN AIR OR RELIEVING ANGLE
EA EB EIFS	EACH EXPANSION BOLT EXTERIOR INSULATION FINISH	RD RE REFR	ROAD, ROUND OR ROOF DRAIN REFERENCE, REFER TO REFRIGERATION OR
EJ	SYSTEM EXPANSION JOINT	REINF	REFRIGERATOR
EL, ELEV ELEC	ELEVATION ELECTRIC OR ELECTRICAL	REQ'D REQ	REQUIRED REQUIRED
EST	ELECTRICAL PANELBOARD ESTIMATE OR ESTIMATED	REV RF	REVISION RUBBER FLOORING ROOF HATCH
EQUIP EW	EQUAL OR EQUIVALENT EQUIPMENT EACH WAY	RFH ROW RM	RIGHT OF WAY ROOM
EWC EXH	ELECTRIC WATER COOLER EXHAUST	RO RVS	ROUGH OPENING REVERSE (SIDE)
EXP EXST EXT	EXPANSION EXISTING EXTERIOR	S SA	SOUTH SUPPLY AIR
FA		SAN SC	SANITARY SEWER
FD FDN	FOUNDATION	SCHED	SEAT COVER DISPENSER SCHEDULE
FDC FE FEC	FIRE DEPARTMENT CONNECTION FIRE EXTINGUISHER FIRE EXTINGUISHER CABINET	SD SEAL	SMOKE DETECTOR, SOAP DISPENSER AND STORM DRAIN SEALANT
FFE FFL	FINISH FLOOR ELEVATION FINISH FLOOR LEVEL	SECT/SEC SF	SECTION SQUARE FOOT/FEET
FH FHC	FIRE HYDRANT FIRE HOSE CABINET FINISH (ED)	SE	SPRAYED FIRE-RESISTIVE MATERIAL
FLR	FLOOR (ING)	SHR SHT SHTG	SHEET
F.O.C. F.O.F.	FACE OF CURB/CONCRETE FACE OF FINISH	SIM SK	SIMILAR SKETCH
F.U.S.	FACE OF STUDS	SL SND	
F.O.T. FPWH FRP	FACE OF TREAD FROST-PROOF WALL HYDRANT FIBER REINFORCED PLASTIC FIRE-RETARDANT TREATED WOOD	SNR SPEC SQ	SANITARY NAPKIN RECEPTACLE SPECIFICATION SQUARE
FRF, FRT, FRTW	FIRE-RETARDANT TREATED WOOD	SS	SANITARY SEWER, STAINLESS STEEL
FS, F FT	FIRE SERVICE FOOT OR FEET	SSM SST	SOLID SURFACE MATERIAL STAINLESS STEEL
FTG FURR FWP	FOOTING FURRING FABRIC WALL PANEL	SSWC ST STA	STAINLESS STEEL STAINLESS STEEL WALL CLADDING STREET STATION
F W P G		STA STD STL	STANDARD
GA. GAL	GAUGE	STRUC SUSP	STRUCTURAL SUSPENDED SOUTHWEST
GB	GALVANIZED GRAB BAR	SW SYM	SOUTHWEST SYMETRICAL
GC GFI, GFCI	GENERAL CONTRACTOR GROUND FAULT CIRCUIT INTERRUPTER	T TB	TREAD AND TRANSFORMER TOWEL BAR
GFRC GFRG	GLASS FIBER REINFORCED CONCRETE GLASS FIBER REINFORCED GYPSUM	TC T&G	TOP OF CURB TONGUE & GROOVE
GI GLB		TD TELE	TELEPHONE
GND GSF GWB	GLUE-LAM BEAM GROUND GROSS SQUARE FEET GYPSUM WALL BOARD GLASS WALL TILE	TEMP TG THK	TEMPERATURE TEMPERED GLASS THICK(NESS)
		THRES TO	THRESHOLD TOP OF
HB HC HD	HOSE BIBB HANDICAPPED	TOC	TOP OF CURB/CONCRETE OR TABLE OF CONTENTS
HM	HIGH DENSITY HOLLOW METAL HORIZONTAL	TOD TOF TOM	TOP OF DECK TOP OF FRAMING TOP OF MASONRY
HP	HIGH POINT AND HORSEPOWER	TOP TOS TOW	TOP OF PAVEMENT/PARAPET TOP OF SLAB
HT HVAC	HOUR HEIGHT HEATING VENTILATING AND AIR	TPD	TOILET PAPER DISPENSER
ID	CONDITIONING INSIDE DIAMETER	TS TYP	TUBE STEEL AND TEMP SENSOR TYPICAL
IE IG	INVERT ELEVATION ISOLATED GROUND	UDL UF	UNIFORM DISTRIBUTED LOAD UPHOLSTERY FABRIC
IG U IN	INSULATED GLAZING UNIT	UNO UR	UNLESS NOTED OTHERWISE URINAL
INSUL INT INV	INSULATION INTERIOR AND INTERCOM INVERT	V VB	VOLTS AND VENT VAPOR BARRIER
JAN	JANITOR	VENT VERT	VENTILATION VERTICAL
JC	JANITOR CLOSET	VEST VIF	VESTIBULE VERIFY IN FIELD
		VCT VR VTR	VINYL COMPOSITION TILE VENT RISER VENT THRU ROOF
		VWC	VINYL WALL COVERING
		W W/	WEST, WATTS AND WATER WITH
		W/O WB WC	WITHOUT WALL BASE WATER CLOSET OR WALL COVERING
		W C W D W G L	WATER CLOSET OR WALL COVERING WOOD WIRE GLASS
		WOM WP	WALK OFF MAT WATERPROOF OR WORK POINT
		WR WRB WT	WASTE RECEPTACLE WEATHER-RESISTIVE BARRIER WINDOW TREATMENT
		W V W V W W F	WATER VALVE WELDED WIRE FABRIC

PROJECT SCOPE

4

ROSCOE HALL STUDENT SERVICES INTERIOR RENOVATION 2000 PENNINGTON ROAD EWING, NJ 08628



3



ISSUED FOR ADDENDUM #2: APRIL 6TH, 2023

SITE PLAN

2

<u>ARCHITECT, STRUCTURAL & MEP ENGINEER:</u>

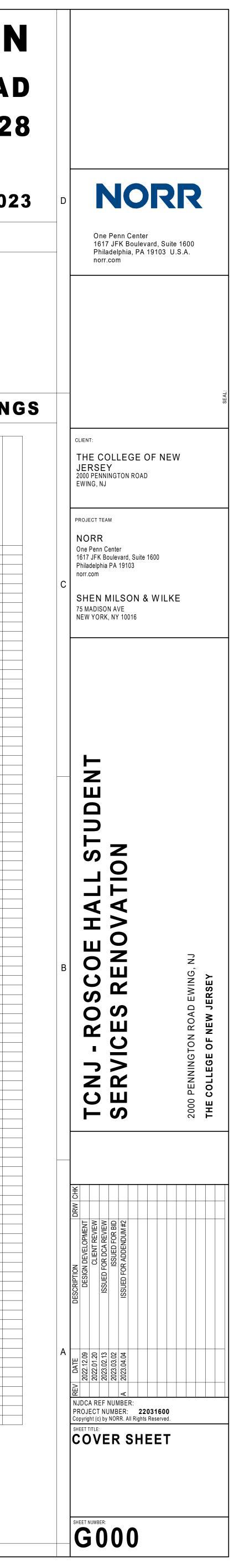
NORR GENERAL PARTNERSHIP 1617 JFK BLVD PHILADELPHIA, PA 19103 CONTACT(S): RAMON TURNER TEL: 215.525.4849 FAX: 215.525.4852 RAMON.TURNER@NORR.COM

AV/IT CONSULTANT:

SHEN MILSON & WILKE 75 MADISON AVENUE NEW YORK, NY 10016 CONTACT(S): ROBERT HADDID TEL: 212.725.6800 EMAIL: RHADDAD@SMWLLC.COM

INDEX OF DRAWINGS

		2022.12.09 - DESIGN DEVELOPMENT	2023.01.20 - CLIENT REVIEW	2023.02.13 - DCA REVIEW	2023.03.02 ISSUED FOR BID	2023.04.07 ISSUED FOR ADDENDUM #2	
GENERAL							
G000 G001	COVER SHEET GENERAL REQUIREMENTS	Х	X X	X X	X X	X	
G002	ACCESSIBILITY & MOUNTING LOCATION STANDARDS, REGULATORY SIGN DETAILS		X	X	X		
G101	CODE ANALYSIS & LIFE SAFETY PLANS		X	X	X	Х	
STRUCTURAL							
S101 S201	FRAMING PLANS FRAMING DETAILS			X X	X X	X X	
ARCHITECTUR	RAL FIRST FLOOR DEMOLITION PLAN- (OMITTED)	Х	X	X	X		
AD101 AD102	SECOND FLOOR DEMOLITION PLAN	X	X	X	X	X	
A101	FIRST FLOOR PLAN (OMITTED)	Х	X	X	X		
A102 A401	SECOND FLOOR PLAN FIRST FLOOR REFLECTED CEILING PLAN (OMITTED)	X X	X X	X X	X X	X	
A402	SECOND FLOOR REFLECTED CEILING PLAN	X	X	X	X	X	
A600	MILLWORK ELEVATIONS	Х	Х	Х	Х		
A601 A602	INTERIOR ELEVATIONS	X X	X X	X X	X X		
A602 A700	INTERIOR ELEVATIONS PARTITION TYPES	X X	X X	X	X	X	
A710	DOOR AND FRAME TYPES, SCHEDULE, DETAILS, GLAZING TYPES	Х	X	X	X	X	
A740	FINISH SCHEDULE, TRANSITION DETAILS	X	X	X	X		
A800 A901	DETAILS FIRST FLOOR FINISH PLAN (OMITTED)	X X	X X	X X	X X		<u> </u>
A901 A902	SECOND FLOOR FINISH PLAN	X	X	X	X	X	
A911	FIRST FLOOR FURNITURE & EQUIPMENT PLAN (OMITTED)	Х	Х	Х	Х		
A912	SECOND FLOOR FURNITURE & EQUIPMENT PLAN	Х	Х	Х	Х	Х	
MECHANICAL							
M001	COVERSHEET	Х	X	X	X	Х	
MD101	FIRST FLOOR DEMOLITION PLAN (OMITTED)	X	X	X			
MD102 MD103	SECOND FLOOR DEMOLITION PLAN PENTHOUSE DEMOLITION PLAN	X X	X X	X X	X X	X X	
M100	BASEMENT NEW WORK PLAN (OMITTED)	X	X	X			
M101	FIRST FLOOR NEW WORK PLAN (OMITTED)	Х	Х	Х			
M102 M103	SECOND FLOOR NEW WORK PLAN PENTHOUSE NEW WORK PLAN	X X	X	X	X	X	
M500	DETAILS	X	X X	X X	X X	X X	
M600	SCHEDULES	Х	Х	Х	Х	Х	
M700	CONTROLS	Х	X	X	X	X	
PLUMBING							
P-001	COVERSHEET	Х	X	X	X	Х	
PD-101	PLUMBING FIRST FLOOR PLAN - DEMOLITION (OMITTED)	X	X	X			
P-101 P-102	PLUMBING FIRST FLOOR PLAN (OMITTED) PLUMBING SECOND FLOOR PLAN	X X	X X	X X	X	X	
P-500	DETAILS AND SCHEDULES	Х	X	X	X	X	
ELECTRICAL	ELECTRICAL COVER SHEET	Х	X	X	X	x	
E001		Х	X			X	
	BASEMENT FLOOR DEMOLITION PLAN			X	X		
ED100 ED101	FIRST FLOOR DEMOLITION PLAN (OMITTED)	Х	Х	Х	Х	Х	
ED100 ED101 ED102	FIRST FLOOR DEMOLITION PLAN (OMITTED) SECOND FLOOR DEMOLITION PLAN	X X	X X	X X	X X	X X	
ED100 ED101 ED102 ED103	FIRST FLOOR DEMOLITION PLAN (OMITTED)	Х	Х	Х	Х	Х	
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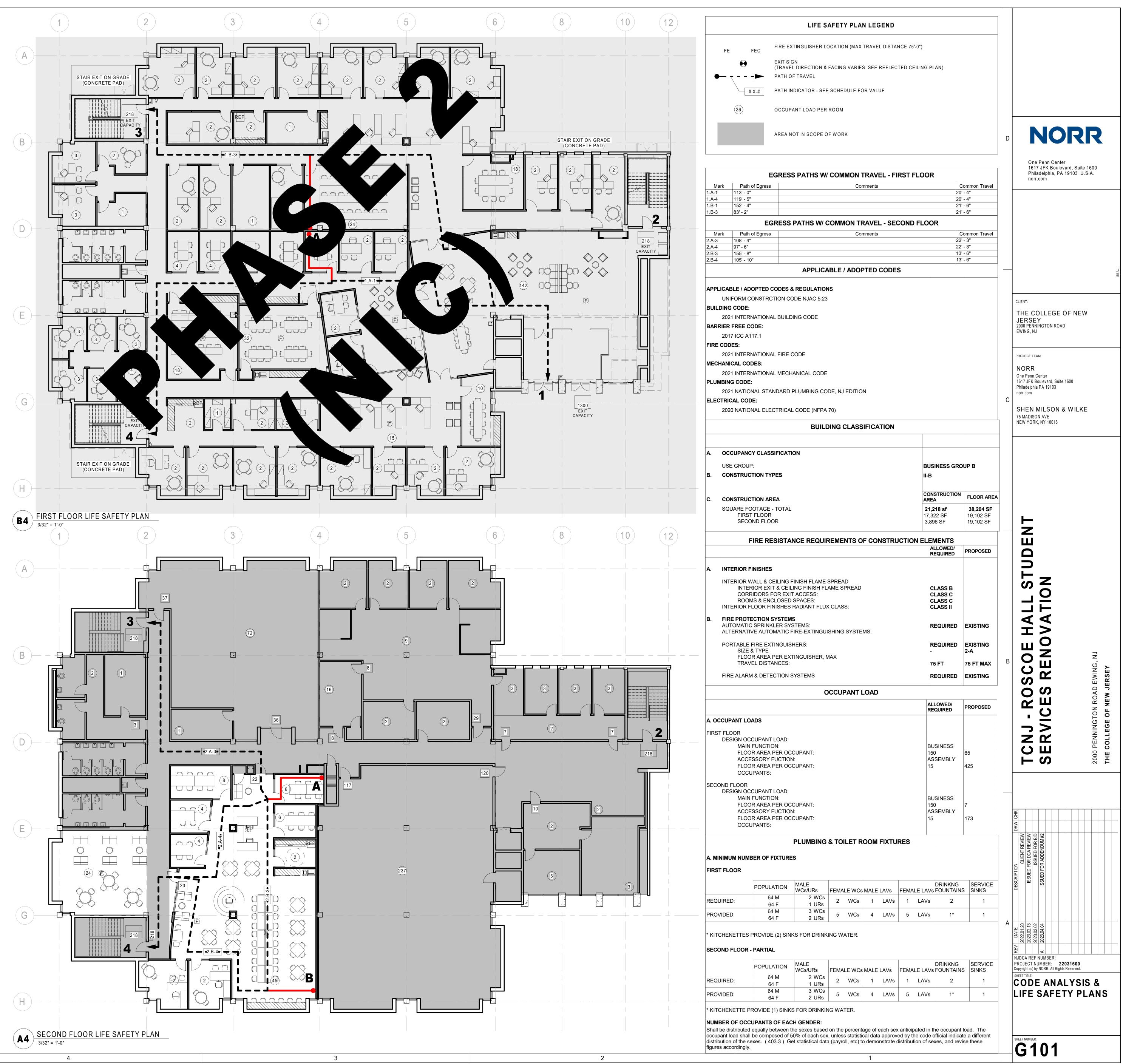
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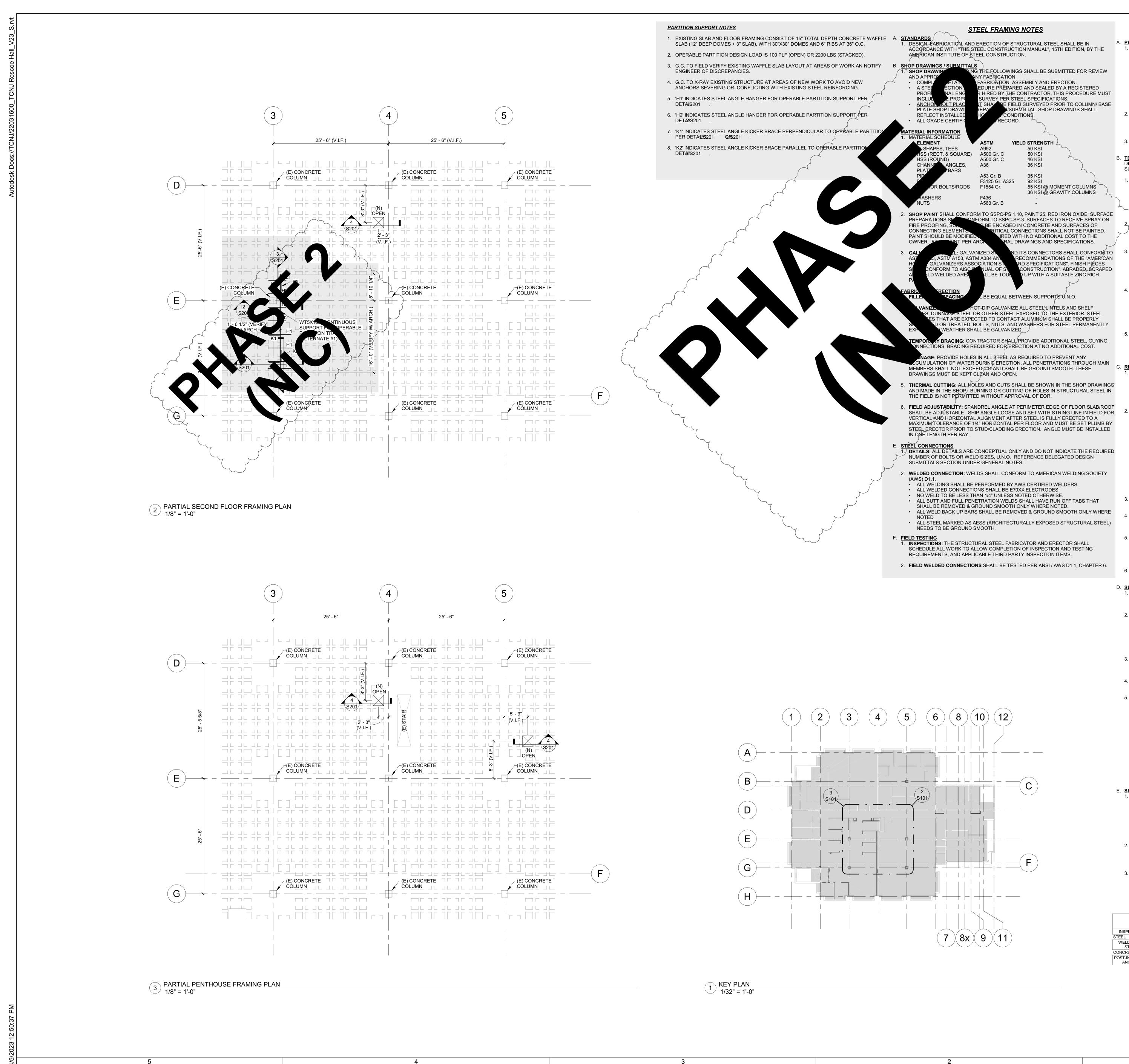
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STRUCTURAL NOTES

A. PROJECT REFERENCES: 1. CODE: WORK SHALL BE EXECUTED IN FULL COMPLIANCE WITH THE APPLICABLE PROVISIONS OF ALL LAWS, BY-LAWS, STATUTES, ORDINANCES, CODES, RULES, REGULATIONS, AND LAWFUL ORDERS OF PUBLIC AUTHORIJES BEARING ON THE PERFORMANCE AND EXECUTION OF THE WORK.

CODES AND STANDARDS							
BUILDING CODE	ASCE 7-16						
RISK CATEGORY	11						
FM APPROVED PARAMETERS	NO						

- 2. **PROJECT SPECIFICATIONS:** NOTES AND SPECIFICATIONS GIVEN ON THE STRUCTURAL DRAWINGS ARE EXCERPTS FROM THE RELATING PROJECT SPECIFICATIONS. THEY ARE NEITHER COMPLETE NOR DO THEY REPLACE THE CONTRACT SPECIFICATIONS.
- 3. MATERIAL STANDARDS: REFERENCED STANDARDS OR PUBLICATIONS SHALL PERTAIN TO MOST CURRENT DATA, STANDARD OR PUBLICATION..
- B. <u>**TEMPORARY BRACING, SHORING AND METHODS:**</u> CONTRACTOR REPONSIBLE FOR THE DESIGN, ADEQUACY, AND SAFETY OF SHORING, BRACING, OTHER TEMPORARY SUPPORTS, AND METHODS OF CONSTRUCTION.
- 1. **STABILITY:** THE CONTRACTOR SHALL INSURE THE STABILITY OF ALL ELEMENTS INCLUDING, BUT NOT LIMITED TO EXCAVATION, FLOORS, ROOFS, WALLS, FOUNDATIONS, AND ADJACENT PROPERTY AS PROJECT CONDITIONS REQUIRE. THE STRUCTURAL ENGINEER ASSUMES NO RESPONSIBILITY FOR THE STRUCTURE DURING THE ENTIRE CONSTRUCTION PERIOD. BRACE BASEMENT/PIT WALLS UNTIL SUPPORTING FLOORS ARE PLACED AND WALL/FLOOR HAS REACHED DESIGN STRENGTH. BACKFILL BOTH SIDES OF WALLS SIMULTANEOUSLY
- **DADING:** THE BUILDING IS DESIGNED ONLY FOR PERMANENT LOADS APPLIED TO THE STRUCTURE IN ITS FINAL CONFIGURATION. DO NOT PLACE MATERIAL OR EQUIPMENT ON FLOORS OR FLOORS IN EXCESS OF THE INDICATED DESIGN LIVE LOADS, AVOID IMPACT LOADS.
- SURCHARGE: IN NO CASE SHALL HEAVY EQUIPMENT BE PERMITTED CLOSER THAN 8'-0" FROM ANY FOUNDATION/BASEMENT WALL. IF THE CONTRACTOR DEEMS IT NECESSARY TO OPERATE SUCH EQUIPMENT CLOSER THAN 8'-0", THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE AND, AT HIS OWN EXPENSE, PROVIDE ADEQUATE SUPPORTS OR WALL BRACES TO WITHSTAND THE ADDITIONAL LOADS SUPERIMPOSED FROM SUCH EQUIPMENT.
- SITE SAFETY: THE CONTRACTOR SHALL BE SOLEY RESPONSIBLE FOR MAINTAINING CONDITIONS OF PUBLIC AND WORKER SAFETY DURING EXECUTION OF THE WORK. THIS SHALL INCLUDE COMPLIANCE WITH ALL OSHA, STATE AND LOCAL REGULATIONS/LAWS AS WELL AS PREPARING AND FILING A SITE SAFETY PLAN OR PROVIDING OTHER WRITTEN SAFETY ASSURANCES AS REQUIRED. ALL CONSTRUCTION METHODS SHALL COMPLY WITH THE REQUIREMENTS OF CHAPTER 33 OF THE IBC, "SAFEGUARDS DURING CONSTRUCTION".
- DAMAGE: CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING TEMPORARY MEASURES TO PROTECT THE PREMISES INCLUDING EXISTING FACILITIES, STRUCTURES, AND UTILITY LINES FROM ANY DAMAGE AND REPAIR ALL DAMAGE CAUSED BY THE CONTRACTOR WITH NEW MATERIALS TO MATCH EXISTING TO THE SATISFACTION OF THE OWNER, ARCHITECT AND/OR ENGINEER.
- **REVIEW AND COORDINATION** EXISTING CONDITIONS, DIMENSIONS, AND ACCESSIBILITY SHALL BE VERIFIED BY ALL CONSTRUCTION TRADES IN FIELD, PRIOR TO SHOP DRAWING PREPARATIONS AND PROCEEDING WITH THE WORK. IF EXISTING CONDITIONS DO NOT PERMIT EXECUTION OF THE WORK IN ACCORDANCE WITH THE SHOWN DETAILS. THE CONTRACTOR MUST SUBMIT A SKETCH WITH PROPOSED MODIFICATION. APPROVAL MUST BE GRANTED BY THE ENGINEER PRIOR TO START OF WORK.
- **CONSTRUCTION DOCUMENTS: THE CONTRACTOR SHALL COORDINATE** STRUCTURAL PLANS, DETAILS AND DIMENSIONS WITH ALL OTHER CONSTRUCTION DOCUMENTS BEFORE PROCEEDING WITH THE WORK. DISCREPANCIES WITHIN OR BETWEEN OTHER CONSTRUCTION DOCUMENTS SHALL BE NOTIFIED TO THE ENGINEER AND ARCHITECT PRIOR TO BID AND EXECUTION OF THE WORK.
- MATERIAL STRENGTHS OR QUANTITIES: IF DISCREPANCIES OCCUR REGARDING MATERIAL STRENGTHS OR QUANTITIES, HIGHER STRENGTH, AND GREATER QUANTITY SHALL BE USED.
- DIMENSIONS AND ELEVATIONS SHOWN ON STRUCTURAL DRAWINGS ARE GENERATED BY OTHER DISCIPLINES. WITH THE EXCEPTION OF DIMENSIONS OF STRUCTURAL MEMBERS. ANY DIMENSIONS OR ELEVATIONS OMITTED OR NOT SHOWN ON THE STRUCTURAL DRAWINGS SHOULD BE OBTAINED FROM THE OTHER TRADE CONSTRUCTION DOCUMENTS.
- 3. INTENT: ALL DETAILS, SECTIONS, AND NOTES ARE INTEDED TO BE TYPICAL AND SHALL BE CONSTRUED TO APPLY TO SIMILAR CONDITIONS ELSEWHERE.
- **BID:** UNLESS DRAWING IS PART OF THE FULL SET OF DOCUMENTS LABELED "ISSUED FOR BID," DO NOT CONSIDER IT AS THE BASIS FOR A BID. ALL ESTIMATES BASED ON OTHER DRAWINGS ARE USED AT THE ESTIMATOR'S SOLE RISK.
- 5. CHANGES REQUESTED BY THE CONTRACTOR WILL BE DONE AT NO COST TO THE OWNER. APPROVAL OF CONTRACTOR REQUESTED CHANGES IN NO WAY STATES OR IMPLIES APPROVAL OF A CHANGE IN SCOPE OR CHANGE IN CONTRACT COST. THE CONTRACTOR SHALL MAKE NO DEVIATION FROM THE CONTRACT DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF THE ENGINEER OF RECORD.
- 6. ERRORS: COSTS OF INVESTIGATION AND/OR REDESIGN DUE TO CONTRACTOR ERRORS WILL BE AT THE CONTRACTORS EXPENSE.
- SUBMITTALS: **REVIEW SCHEDULE: SUBMIT SHOP DRAWINGS FOR REVIEW AT LEAST 14 DAYS (10** WORKING DAYS) BEFORE RETURNED SUBMITTALS WILL BE NEEDED. ANY REVIEW THAT IS REQUIRED MORE QUICKLY WILL BE AT THE CONTRACTORS EXPENSE.
- 2. COMPLETENESS: A CONTRACTOR'S STAMP CERTIFYING THAT THEY HAVE VERIFIED ALL FIELD MEASUREMENTS, CONSTRUCTION CRITERIA, MATERIALS AND SIMILAR DATA AND HAVE CHECKED EACH DRAWING FOR COMPLETENESS, COORDINATION AND COMPLIANCE WITH THE CONTRACT DOCUMENTS MUST BE PRESENT ON ALL SUBMITTALS FOR REVIEW BY THE ENGINEER OF RECORD. IF REVIEWS OF INCOMPLETE SHOP DRAWINGS/SUBMITTALS ARE REQUIRED, THOSE SUBMITTALS SHALL BE MARKED AS INCOMPLETE UNTIL THEY BEAR SUCH STAMP FROM THE G.C
- 3. ORIGINAL DOCUMENTS: IN NO CASE SHALL THE CONTRACT DOCUMENTS BE USED/REPRODUCED AS A BASIS FOR SHOP DRAWINGS. SHOP DRAWINGS SHALL BE ORIGINAL DRAWINGS NOT COPIES OF THE CONTRACT DOCUMENTS.
- 4. REJECTION: SUBMITTALS NOT MEETING THE CRITERIA LISTED IN THIS SECTION WILL NOT BE REVIEWED.
- 5. **DELEGATED DESIGN:** DELEGATED DESIGNS SHALL CLEARLY INDICATE THE APPLICABLE CODES, DESIGN CRITERIA, CONNECTION DETAILS, AND LOAD CAPACITY OF COMPONENTS/SYSTEMS BEING PROVIDED.
- a. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND CALCULATIONS SIGNED AND SEALED BY A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CONSTRUCTION FOR THE FOLLOWING: STEEL CONNECTIONS A. GRAVITY, BRACE FRAME, MOMENT CONNECTIONS
- B. FRAMING TO SUPPORT PRECAST/ARCH. CLADDING b. DELEGATED ELEMENTS AND CONNECTIONS SHALL BE ARRANGED SUCH THAT
- NO ECCENTRICITIES OR TORSION IS CREATED ON THE PRIMARY STRUCTURE. ADDITIONAL BRACING TO RESOLVE SUCH FORCE SHALL BE DETAILED BY THE DELEGATED DESIGNER AND FURNISHED BY THE CONTRACTOR. CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING EMBED ITEMS AND HARDWARE AS REQUIRED.

E. SPECIAL INSPECTIONS (STRUCTURAL): **RESPONSIBILITIES**:

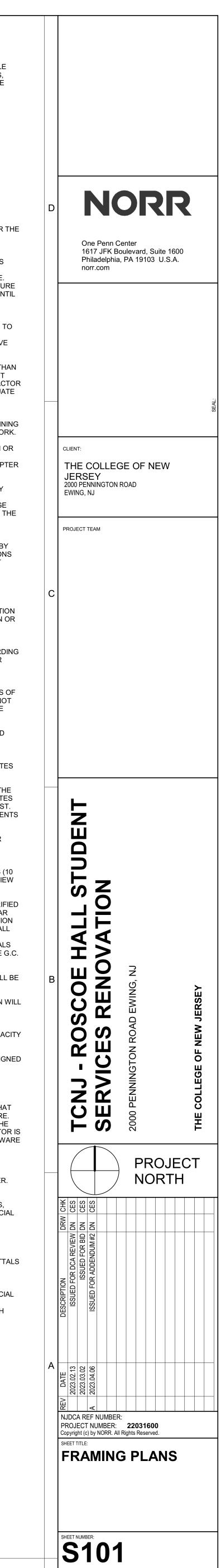
 THIRD PARTY INSPECTION AGENCY SHALL BE CONTRACTED BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FILING AND OBTAINING PERMITS AND SIGN-OFFS FROM THE DEPARTMENT OF BUILDINGS. SPECIAL INSPECTIONS AND TESTS, STATEMENTS OF SPECIAL INSPECTIONS. RESPONSIBILITIES OF CONTRACTORS, SUBMITTALS TO THE BUILDING OFFICIAL AND STRUCTURAL OBSERVATIONS SHALL MEET THE APPLICABLE REQUIREMENTS OF IBC CHAPTER 17

2. STATEMENT OF SPECIAL INSPECTIONS: MATERIALS, PROCEDURES AND WORKMANSHIP OF LISTED STRUCTURAL ELEMENTS SHALL BE VERIFIED FOR COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS AND APPROVED SUBMITTALS PER THE CORRESPONDING REFERENCES.

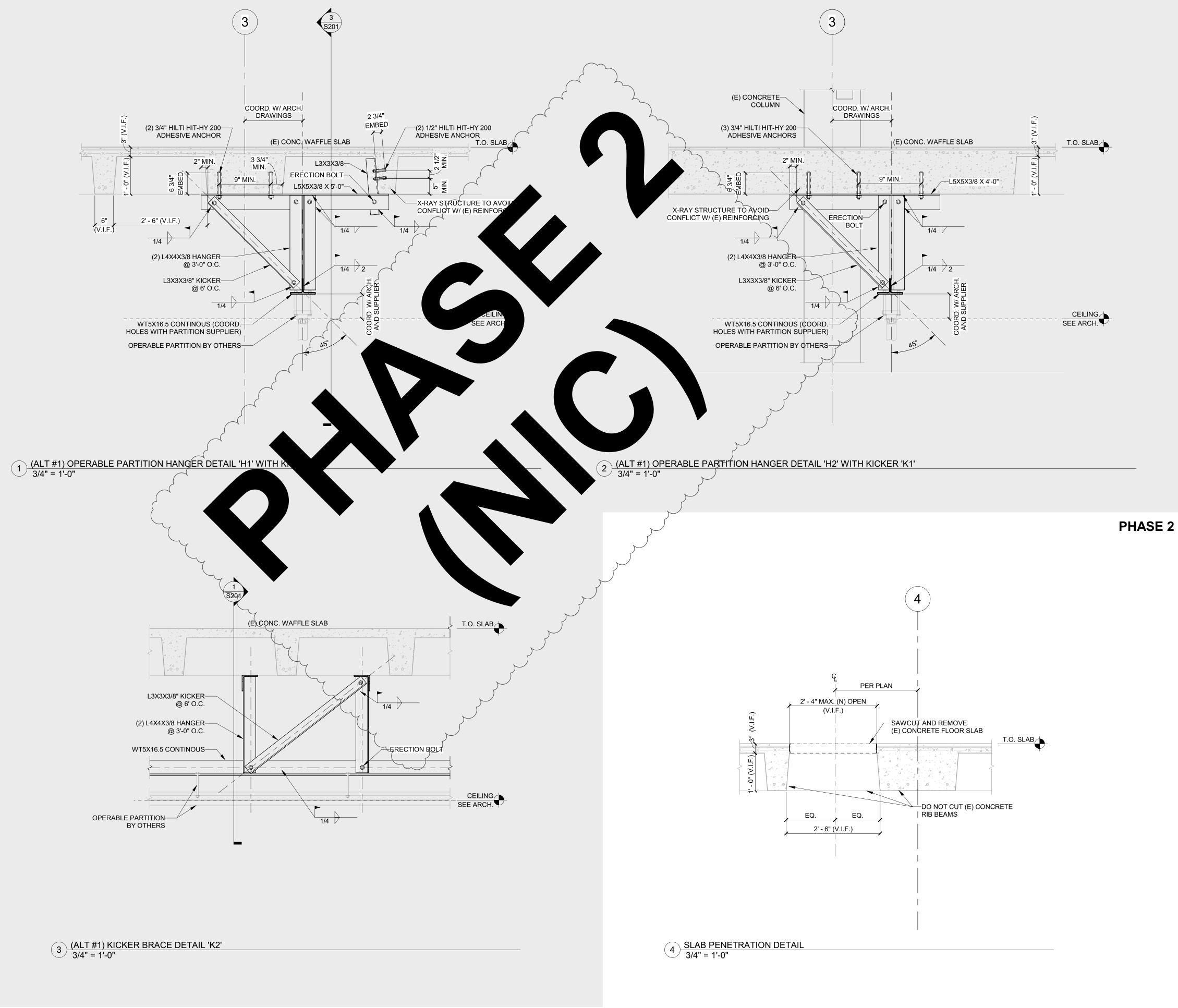
3. INSPECTION DEFINITIONS: • C - CONTINUOUS: CONSTANT MONITORING OF IDENTIFIED TASKS BY A SPECIAL INSPECTOR OVER THE DURATION OF PERFORMANCE OF SAID TASKS. P - PERIODIC: INTERMITTANTLY INSPECTED DURING THE COURSE OF EACH WORK DAY TO INSURE THAT APPLICABLE REQUIREMENTS ARE BEING MET. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS AT CONTRACTOR'S RISK.

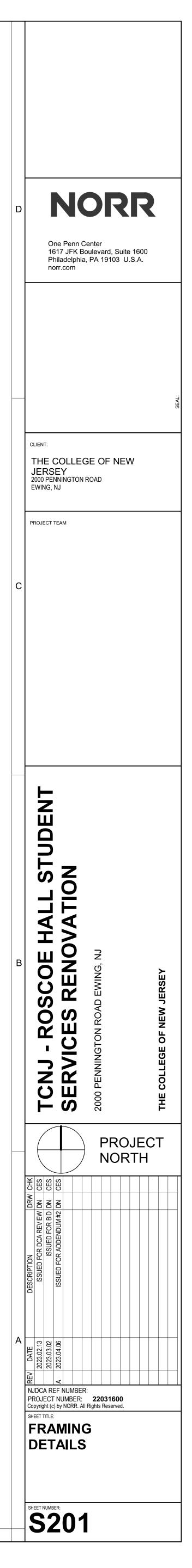
STATEMENT OF SPECIAL INSPECTIONS (IBC '18)

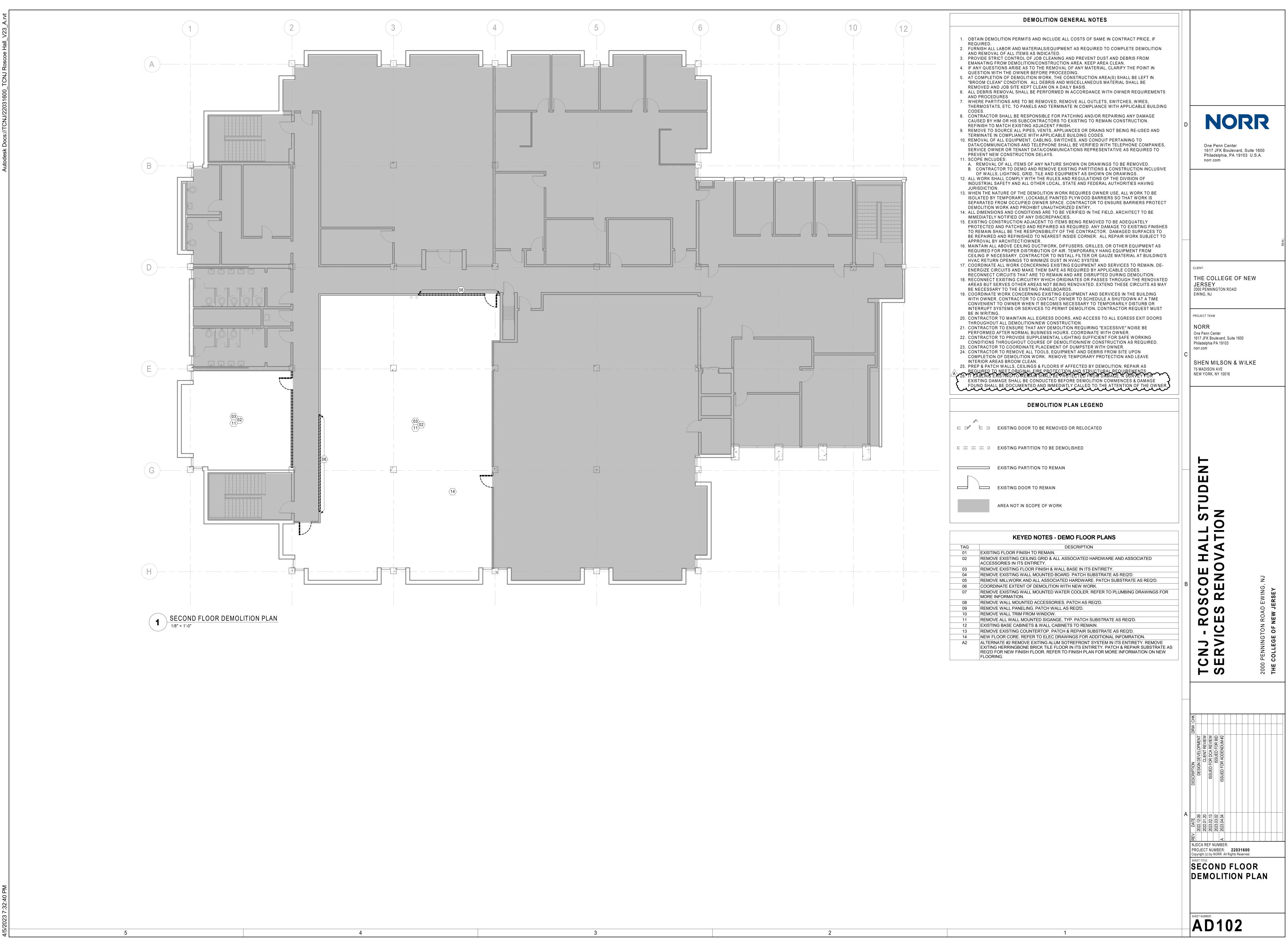
INSPECTION	VERIFICATION AND INSPECTION ITEM	IBC 18	REFERENCE	TYPE
STEEL				
WELDING OF STEEL	WELDING OF STRUCTURAL STEEL	1705.2	AISC 360 N.5.4, AWS D1.1	C,P
CONCRETE				
POST-INSTALLED ANCHOR	ANCHORS INSTALLED IN HARDEND	1705.3	ACI 318: 17.8.2	С

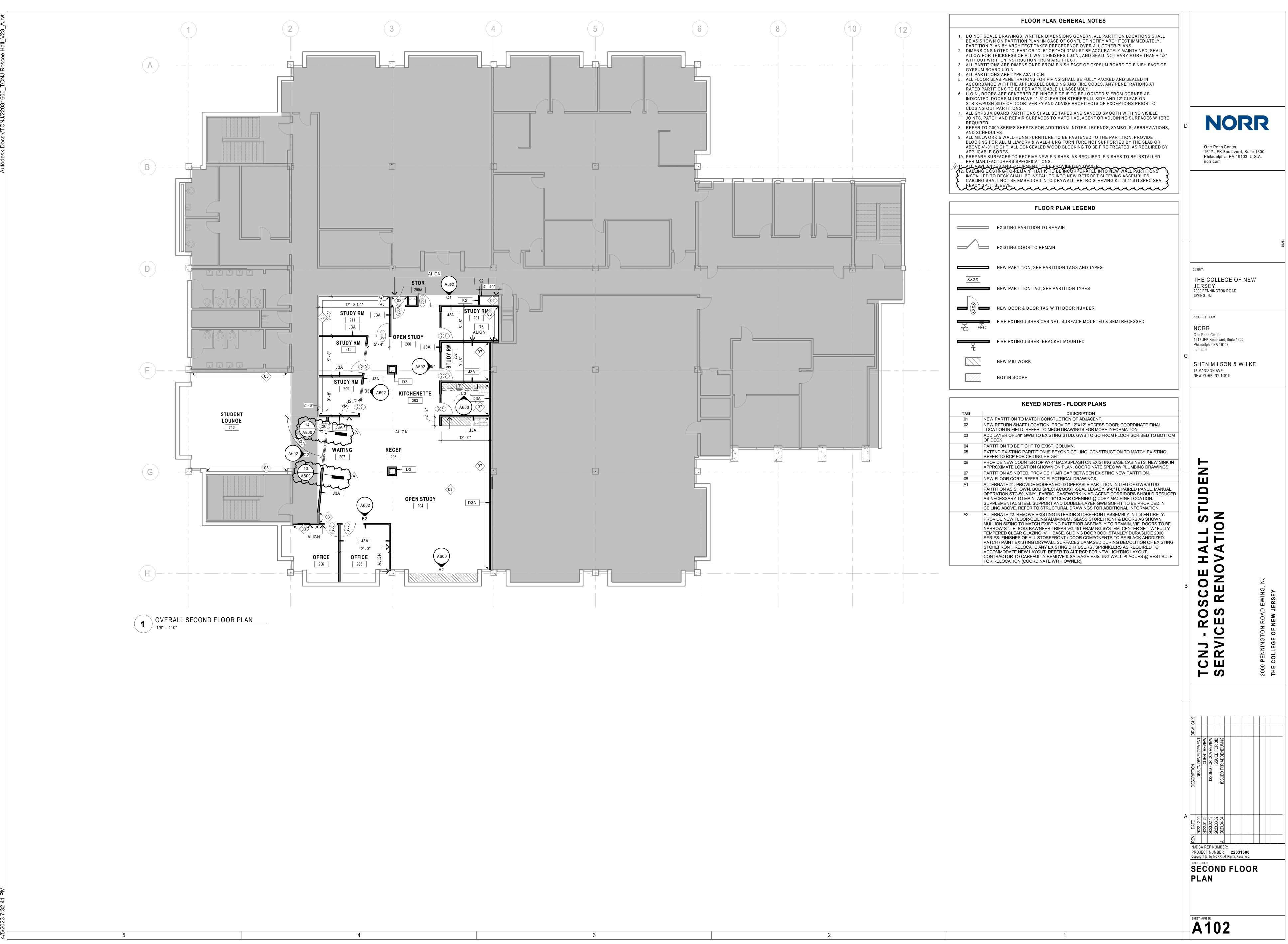


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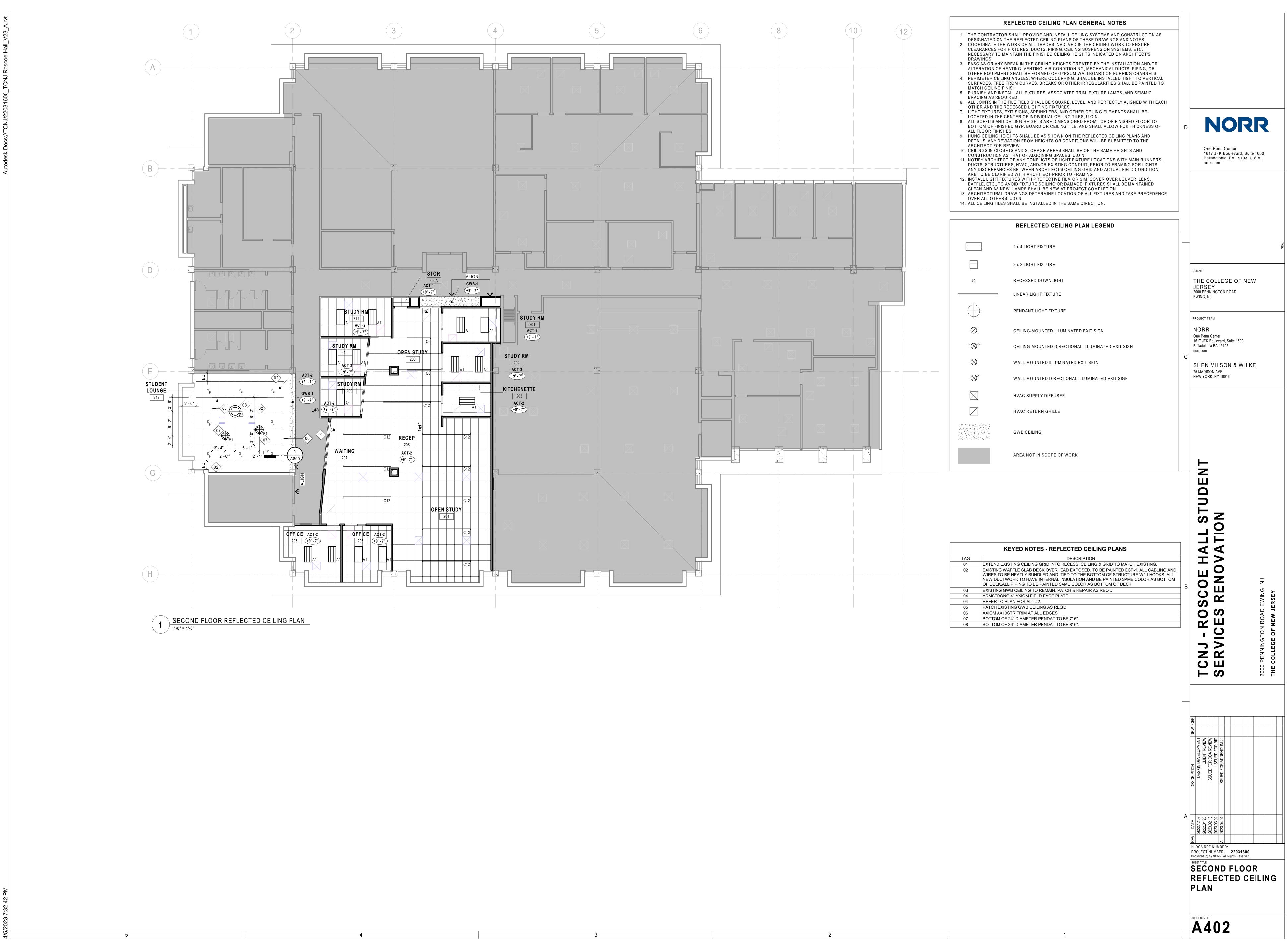




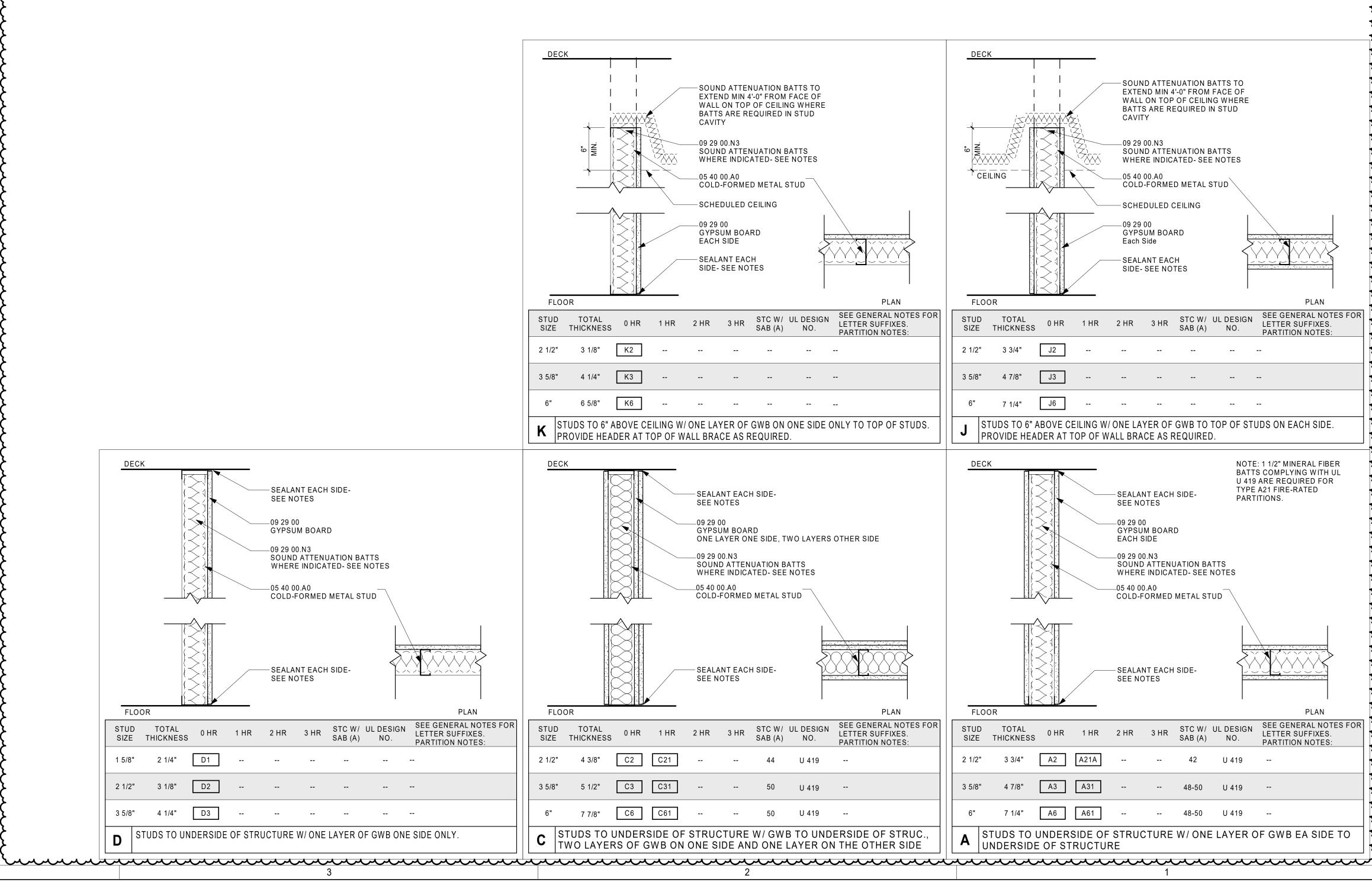


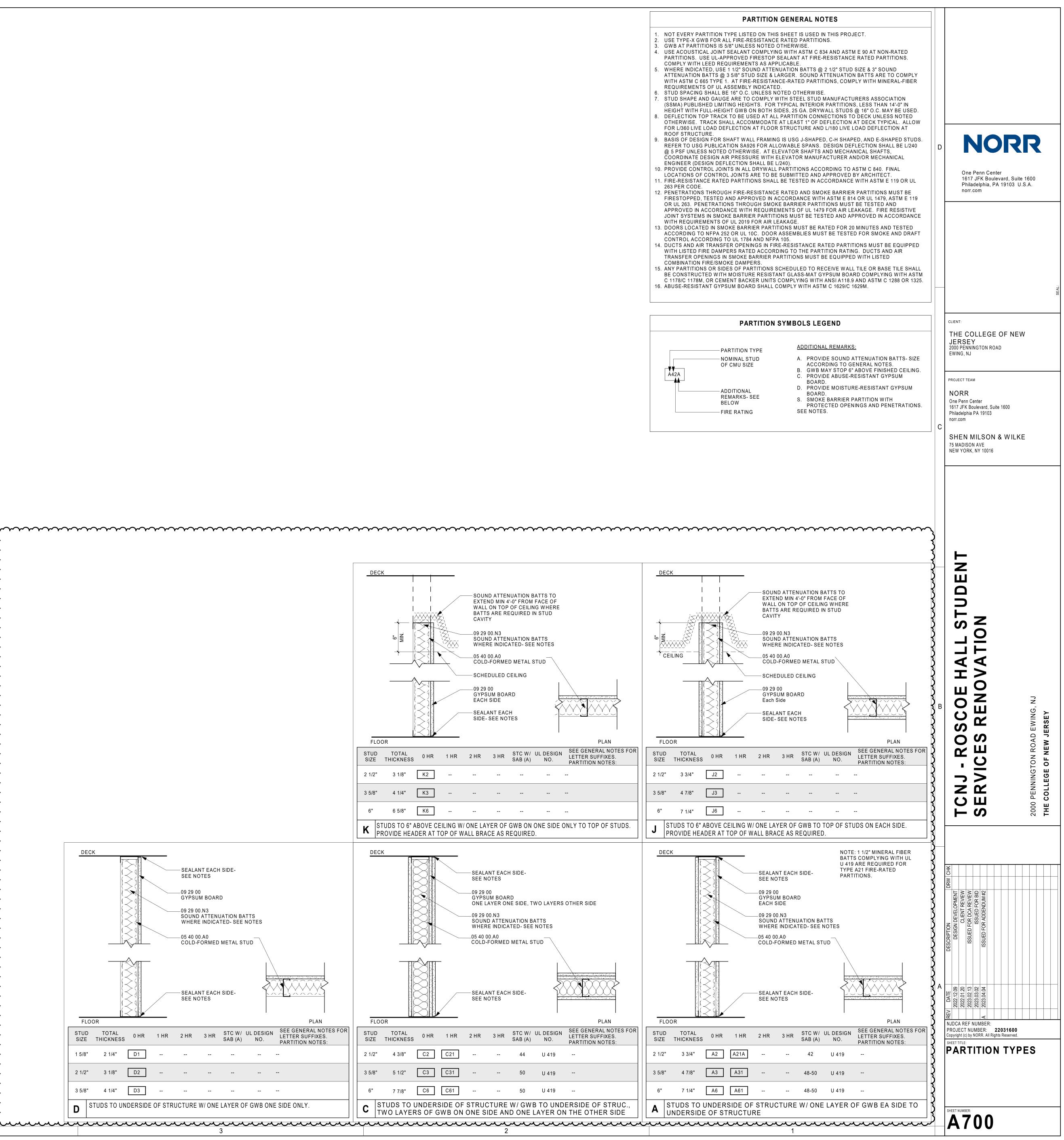


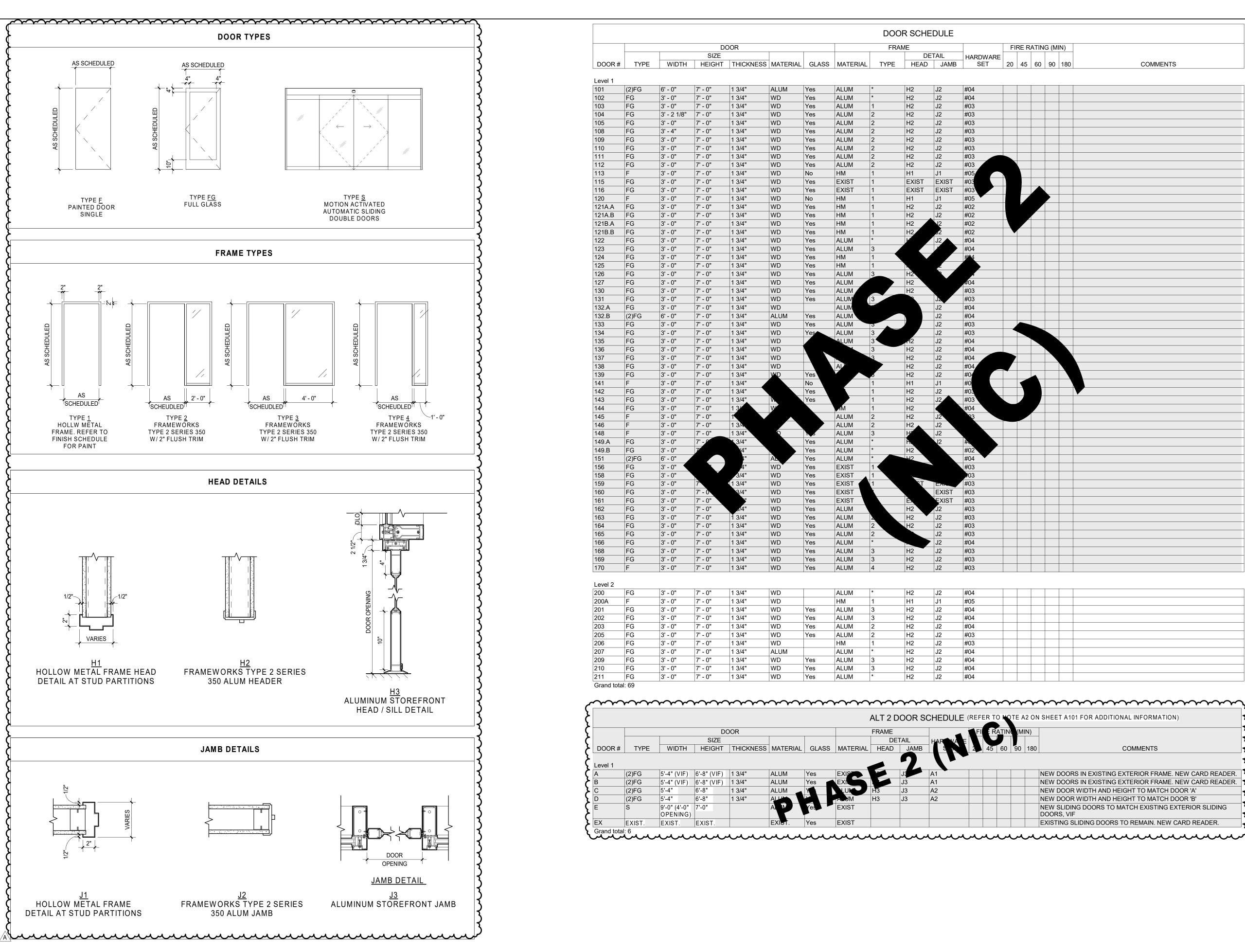
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	KEYED NOTES - REFLECTED CEILING PLANS
TAG	DESCRIPTION
01	EXTEND EXISTING CEILING GRID INTO RECESS. CEILING & GRID TO MATCH EXISTING
02	EXISTING WAFFLE SLAB DECK OVERHEAD EXPOSED. TO BE PAINTED ECP-1. ALL CAE WIRES TO BE NEATLY BUNDLED AND TIED TO THE BOTTOM OF STRUCTURE W/ J-HO NEW DUCTWORK TO HAVE INTERNAL INSULATION AND BE PAINTED SAME COLOR AS OF DECK.ALL PIPING TO BE PAINTED SAME COLOR AS BOTTOM OF DECK.
03	EXISTING GWB CEILING TO REMAIN. PATCH & REPAIR AS REQ'D
04	ARMSTRONG 4" AXIOM FIELD FACE PLATE
04	REFER TO PLAN FOR ALT #2.
05	PATCH EXISTING GWB CEILING AS REQ'D
06	AXIOM AX10STR TRIM AT ALL EDGES
07	BOTTOM OF 24" DIAMETER PENDAT TO BE 7'-6".







3

4

COMMENTS		G (MIN)	ATING	FIRE R/			N 4 -				DOOR						
COMMENTS	100				-			FRA									
	180	90 18	60	20 45	HARDWARE SET	ETAIL JAMB	HEAD	TYPE	MATERIAL	GLASS	MATERIAL	THICKNESS	SIZE HEIGHT	WIDTH	TYPE		
					#04	J2	H2	*	ALUM	Yes		1 3/4"	7' - 0"	6' - 0"	(2)FG		
					#04 #03	J2 J2	H2 H2	*	ALUM ALUM	Yes Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#03	J2	H2	2		Yes		1 3/4"	7' - 0"	3' - 2 1/8"	FG		
					#03	J2	H2	2	ALUM	Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#03	J2	H2	2		Yes		1 3/4"	7' - 0"	3' - 4"	FG		
					#03 #03	J2 J2	H2 H2	2 2		Yes Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#03	J2	H2	2		Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#03	J2	H2	2		Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#05	J1 EXIST	H1 EXIST	1	HM EXIST	No Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	F FG		
					#03	EXIST	EXIST	1	EXIST	Yes		1 3/4"	7' - 0"	3' - 0"	FG		
			4		#05	J1	H1	1	HM	No		1 3/4"	7' - 0"	3' - 0"	F		
					#02 #02	J2 J2	H2 H2	1	HM HM	Yes Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#02 #02	J2 12	H2 H2	1	HM	Yes Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#02	5 2	H2	1	HM	Yes	WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#04	J2	-	*	ALUM	Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#04 #04			3	ALUM HM	Yes Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
								1	HM	Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					ŧ		H2	3		Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#04 #03		H2 H2		ALUM ALUM	Yes Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#03		12	3		Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#04	J2			ALUM		WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#04	J2			ALUM	Yes	ALUM	1 3/4"	7' - 0"	6' - 0"	(2)FG		
					#03 #03	J2 J2		3		Yes Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#04	J2	12	3			WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#04	J2	H2	3			WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#04 #04	J2 J2	H2 H2	3			WD WD	1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#04	J2	H2	0	AP	Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#0	J1	H1	1		No		1 3/4"	7' - 0"	3' - 0"	F		
					#03 #03	J2 J2	H2 H2	1		Yes Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#03 #04		H2	1	ıМ	163	W ^r	1 3/4	7' - 0"	3' - 0"	FG		
					13	J2	H2	2				1	7' - 0"	3' - 0"	F		
						J2	H2 H ²	2				1 3/4 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	F		
					#	J2 J2		3	ALUM ALUM	Yes		1 3/4"	7'-0	3'-0"	FG		
					#02		H2	*	ALUM	Yes		(4"	7	3' - 0"	FG		
					#04		42	*	ALUM	Yes		<u>4"</u>		6' - 0"	(2)FG		
					#03 #03			1	EXIST EXIST	Yes Yes		4" 3/4"		3' - 0" 3' - 0"	FG FG		
					#03	EAL	ম	1		Yes		1 3/4"	7	3' - 0"	FG		
					#03	EXIST			EXIST	Yes		3/4"	7' - 0		FG		
					#03 #03	EXIST J2	Ex H2		EXIST ALUM	Yes Yes		» 14"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#03 #03	J2 J2	H2 H2		ALUM	Yes		1 3/4"	7' - 0"	3' - 0"	FG		
					#03	J2	H2	2	ALUM	Yes	WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#03 #04	J2		2 *	ALUM ALUM	Yes Yes		1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG		
					#04 #03	► J2 J2	H2	^ 3		Yes Yes		1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#03	J2	H2	3	ALUM	Yes	WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#03	J2	H2	4	ALUM	Yes	WD	1 3/4"	7' - 0"	3' - 0"	F		
					#04	J2	H2	*	ALUM		WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#05	J1	H1	1	HM	N c -	WD	1 3/4"	7' - 0"	3' - 0"	F		
					#04 #04	J2 J2	H2 H2	3 3		Yes Yes	WD WD	1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#04 #04	J2	H2	2		Yes	WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#03	J2	H2	2		Yes	WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#03 #04	J2 J2	H2 H2	1	HM ALUM		WD ALUM	1 3/4" 1 3/4"	7' - 0" 7' - 0"	3' - 0" 3' - 0"	FG FG		
					#04 #04	J2 J2	H2 H2	3		Yes	WD	1 3/4"	7' - 0'' 7' - 0"	3' - 0"	FG		
					#04	J2	H2	3	ALUM	Yes	WD	1 3/4"	7' - 0"	3' - 0"	FG		
					#04	J2	H2	*	ALUM	Yes	WD	1 3/4"	7' - 0"	3' - 0"	FG al: 69		

							ALT 2 D	OOR SO	CHEDULE	(REFI	ER TO	HOT	ΓΕ Α	2 O N	SHEET A101 FOR ADDITIONAL INFORMATION)
		DC	OOR				FRAME		FILE RATING (MIN)						
		SIZE					DET	TAIL	HARTYA						
TYPE	WIDTH	HEIGHT	THICKNESS	MATERIAL	GLASS	MATERIAL	HEAD	JAMB	S S		45	60	90	180	COMMENTS
								2							
(2)FG	5'-4" (VIF)	6'-8" (VIF)	1 3/4"	ALUM	Yes	EXIS		J	A1						NEW DOORS IN EXISTING EXTERIOR FRAME. NEW CARD R
(2)FG	5'-4" (VIF)	6'-8" (VIF)	1 3/4"	ALUM	Yes 💼	EXI		J3	A1						NEW DOORS IN EXISTING EXTERIOR FRAME. NEW CARD R
(2)FG	5'-4"	6'-8"	1 3/4"	ALUM 🖌	Y	LUK	H3	J3	A2						NEW DOOR WIDTH AND HEIGHT TO MATCH DOOR 'A'
(2)FG	5'-4"	6'-8"	1 3/4"	ALL		MEAN	H3	J3	A2						NEW DOOR WIDTH AND HEIGHT TO MATCH DOOR 'B'
S	9'-0" (4'-0" OPENING)	7'-0"		Al T	Yes	EXIST									NEW SLIDING DOORS TO MATCH EXISTING EXTERIOR SLID DOORS, VIF
EXIST.	EXIST.	EXIST.		EXIST.	Yes	EXIST									EXISTING SLIDING DOORS TO REMAIN. NEW CARD READER
al: 6															

ALTERNATE #2 DOOR HARDWARE SET #A1 - EXTERIOR VESTIBULE DOORS - DOUBLE: 2 - CONTINUOUS GEARED HINGE (ALUMINUM)

2 - PULLS (1-1/4" DIAMETER, 12" CTC, ALUMINÚM) 2 - PUSH BARS (1-1/4" DIAMETER, ALUMINUM) 1 - INTERCHANGEABLE CORE CYLINDER 1 - MULLION CYLINDER KIT 2 - SURFACE CLOSERS (HEAVY-DUTY, ADA COMPLIANT W/ STOP)

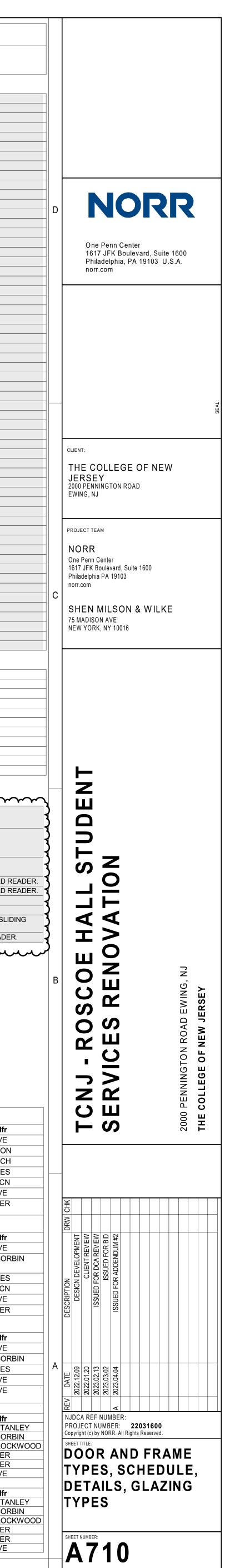
2 - BOTTOM RAIL SWEEP & DRIP 1 - THRESHOLD (ALUMINUM, THERMALLY-BROKEN HALF SADDLE) 1 - WEATHERSEAL

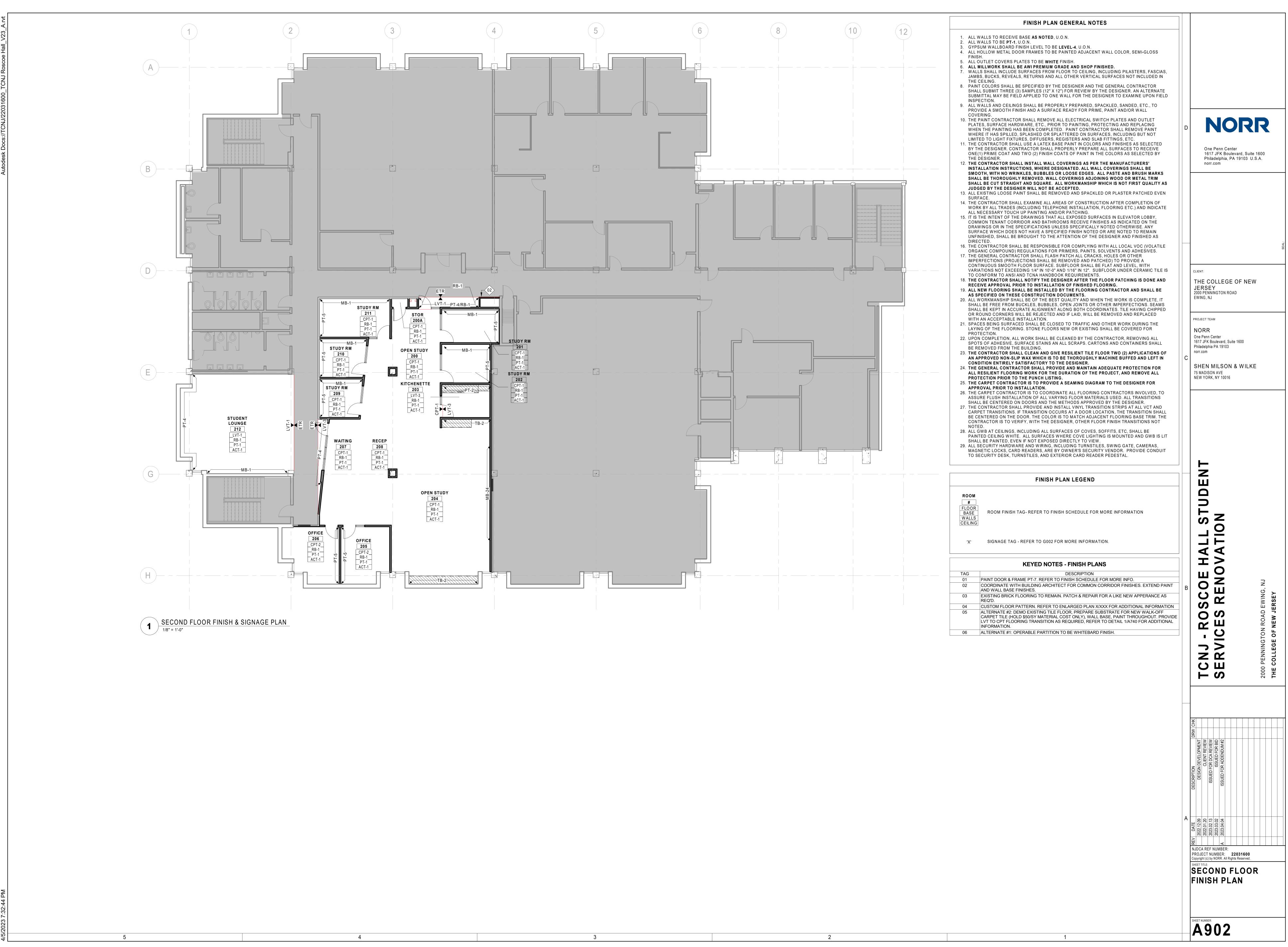
CARD READER, REQUEST TO EXIT DEVICE & MISC. EQUIPMENT BY SECURITY VENDOR. GENERAL CONTRACTOR TO COORDINATE WORK. SET #A2 - INTERIOR VESTIBULE DOORS - DOUBLE: 2 - CONTINUOUS GEARED HINGE (ALUMINUM) 2 - PULLS (1-1/4" DIAMETER, 12" CTC, ALUMINÚM) 2 - PUSH BARS (1-1/4" DIAMETER, ALUMINUM)

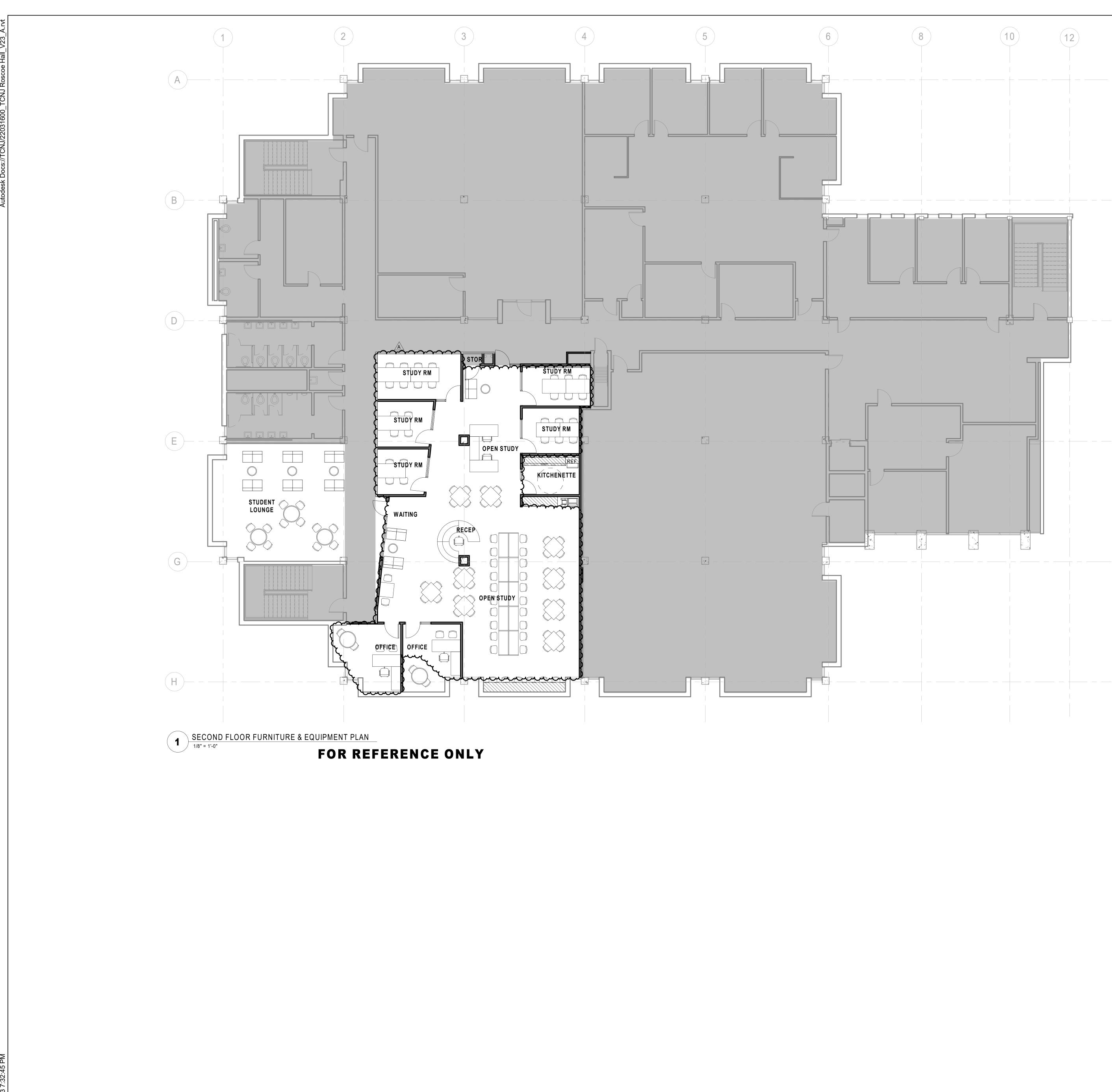
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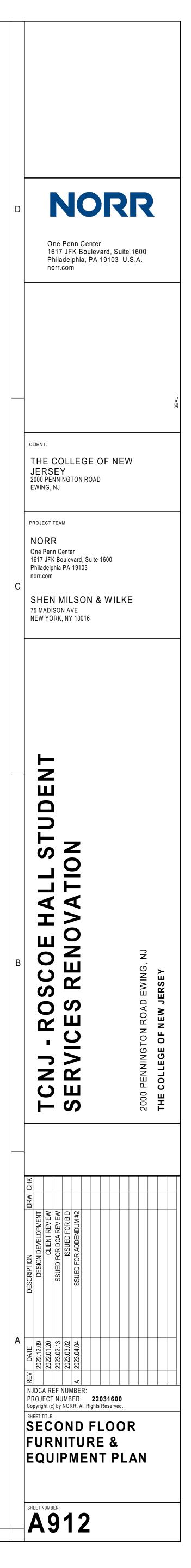
2 - SURFACE CLOSERS (HEAVY DUTY, ADA COMPLIANT W/ STOP) 1 - THRESHOLD (ALUMINUM, HALF SADDLE) 1 - WEATHERSEAL NOTE: FINISHES OF ALL DOOR COMPONENTS TO BE BLACK ANODIZED

Qty	Description	Catalog Number	Finish	Mfr
3 EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1 EA	PANIC HARDWARE	99-L-06	626	VON
1 EA	SFIC RIM CYLINDER	80-159	626	SCH
1 EA	PERMANENT CORE	1C7	626	BES
1 EA	SURFACE CLOSER	4040XP EDA TBWMS	689	LCN
1 EA	FLOOR STOP	FS17-26D	630	IVE
1	DOOR SEAL	188S-BK	S-Bk	ZER
Hardwa	re Group No. 02 MULTIPURP	DSE		
Qty	Description	Catalog Number	Finish	Mfr
3	HUNGE	5BB1 4.5 X 4.5	652	IVE
1 /A		ML 2002 x NSA x MR w/ thumb	000	COR
	- Lunn	turn on interior	626	
1	PERMANENT CORE	1C7	626	BES
1	SURFACE CLOSER	4040XP TBWMS REG	689	LCN
1	WALL STOP	WS406/407CCV	630	IVE
1	DOOR SEAL	188S-BK	S-Bk	ZER
Hardwa	re Group No. 03 OFFICES			
Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	5BB1 4.5 X 4.5	652	IVE
1	OFFICE LOCK	ML 2054 x NSA x MR (F04)	626	COF
1	PERMANENT CORE	1C7	626	BES
1	FLOOR STOP	FS17-26D	630	IVE
3	SILENCER	SR64	GRY	IVE
Hardwa	re Group No. 04 PASSAGE			
Qty	Description	Catalog Number	Finish	Mfr
3		CB168		STA
	V V PASSAGE LUCK	ML2010 x NSA (F01)	626	COR
1	WALLSTOP	WS401/402 SERES		ROC
<u>1</u> 1	HEAD & JAMB SEALS SILL SEAL/SWEEP	328A Jambs/428A Head 39A		ZER ZER
3	SILENCER		GRY	IVE
	re Group No. 05 STORAGE	31(04	ORT	
Qty	Description	Catalog Number	Finish	Mfr
3	HINGE	CB168		STA
1	STORAGE LOCK	ML 2057 x NSA x MR (F07)	626	COF
1	WALL STOP	WS401/402 SERES		ROC
1	HEAD & JAMB SEALS	328A Jambs/428A Head		ZER
1	SILL SEAL/SWEEP	39A		ZER
	SILENCER	SR64	GRY	IVE

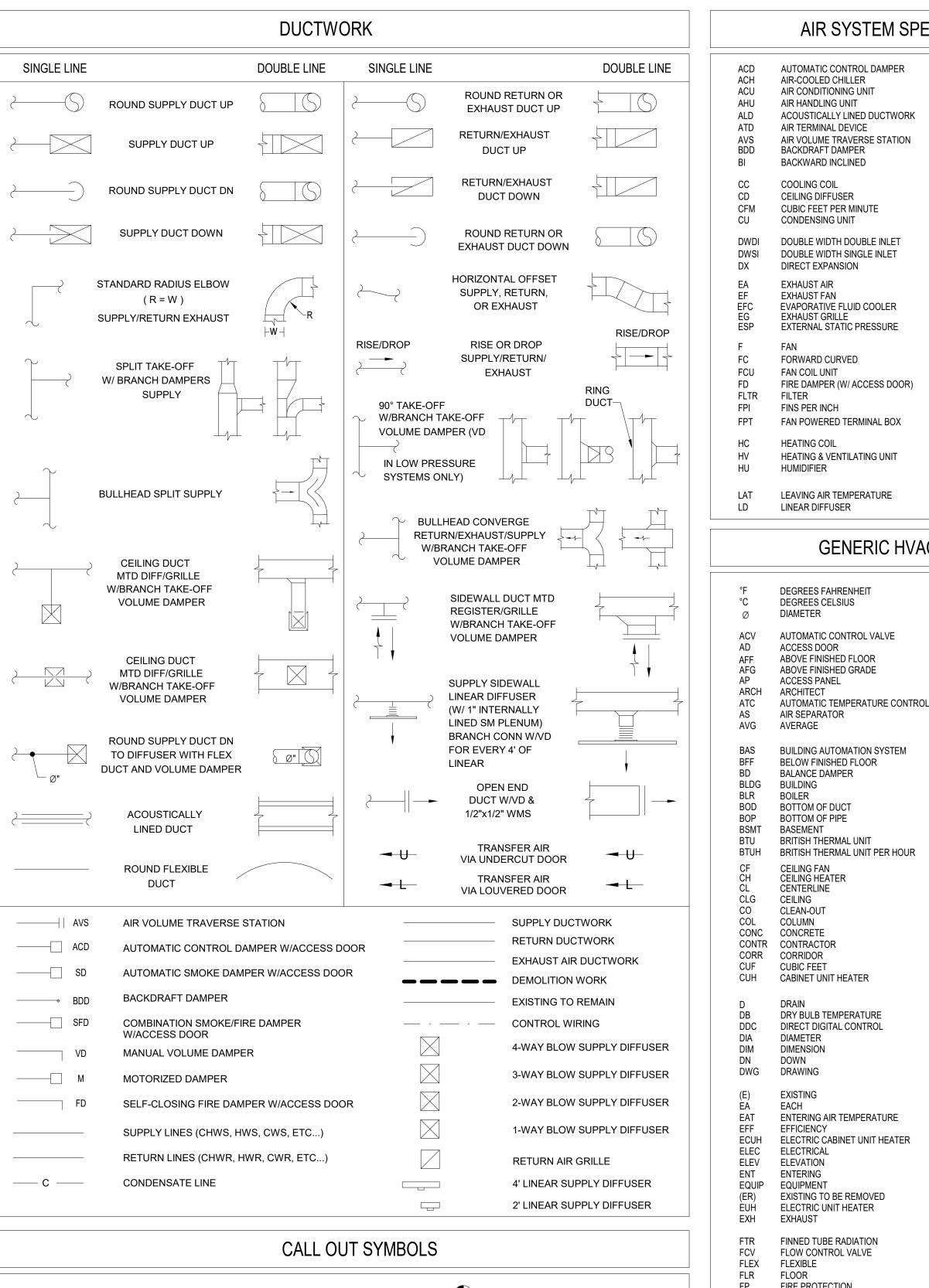


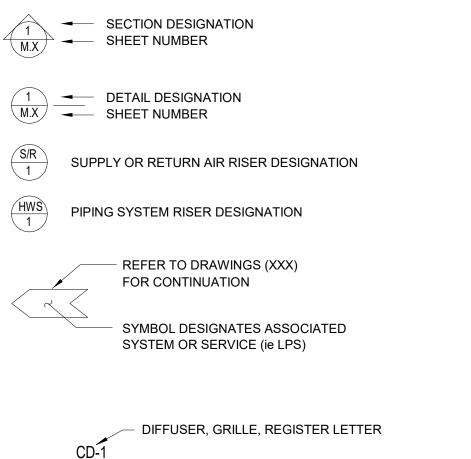






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01107	— NECK SIZE
8 "Ø −	
150 CFM -	— DESIGN CFM
	DEGIGIN

4

CONNECT TO EXISTING LIMIT OF REMOVAL SMOKE DETECTOR RETURN/EXHAUST AIR FLOW SUPPLY AIR FLOW

H

1

THERMOSTAT TEMPERATURE SENSOR HUMIDITY SENSOR OR HUMIDISTAT STATIC PRESSURE SENSOR

REMOTE TEMPEATURE SENSOR

REVISION CLOUD

REVISION NUMBER

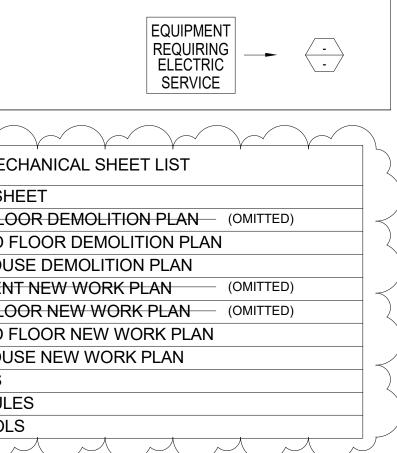
ENTERING AIR TEMPERATURE ECUH ELECTRIC CABINET UNIT HEATER ELEC ELECTRICAL FP FIRE PROTECTION FPM FEET PER MINUTE FT FEET FT/SEC FEET PER SECOND FURN FURNISHED GAS G GAL GALLONS GALV GALVANIZED GC GENERAL CONTRACTOR GPH GALLONS PER HOUR GPM GALLONS PER MINUTE GWB GYPSUM WALL BOARD Н HEIGHT HD HEAD HP HORSEPOWER GENERIC HVAC SYSTEM TAGS EQUIPMENT <u>NOT</u> REQUIRING - -ELECTRIC SERVICE MECHANICAL SHEET LIST M001 COVERSHEET - MD101 FIRST FLOOR DEMOLITION PLAN (OMITTED) MD102 SECOND FLOOR DEMOLITION PLAN MD103 PENTHOUSE DEMOLITION PLAN M100 BASEMENT NEW WORK PLAN (OMITTED) M101 FIRST FLOOR NEW WORK PLAN (OMITTED) M102 SECOND FLOOR NEW WORK PLAN M103 PENTHOUSE NEW WORK PLAN M500 DETAILS M600 SCHEDULES M700 CONTROLS

3

SPECIFIC	ABBRE	EVIATIONS
	OA OBD OED	OUTSIDE AIR OPPOSED BLADE DAMPER OPEN END DUCT
RK	PHC	PREHEAT COIL
Ν	RA RF RG RHC RLF RTU	RETURN AIR RETURN FAN RETURN GRILLE REHEAT COIL RELIEF ROOF TOP UNIT
	SA SATT SCR SD SEF SF S/FD SP SWDI SWSI	SUPPLY AIR SOUND ATTENUATOR SCREEN SMOKE DAMPER SMOKE EXHAUST FAN SUPPLY FAN COMBINATION AUTOMATIC SMOKE/ FIRE DAMPER W/ ACCESS DOOR STATIC PRESSURE SINGLE WIDTH DOUBLE INLET SINGLE WIDTH SINGLE INLET
R)	TE TF TSP	TOILET EXHAUST TRANSFER FAN TOTAL STATIC PRESSURE
	VD VAV VVE WMS WH	VOLUME DAMPER VARIABLE AIR VOLUME BOX VARIABLE VOLUME EXHAUST BOX WIRE MESH SCREEN WALL HEATER

GENERIC HVAC ABBREVIATIONS

	HR HZ HX ID IN INSUL	HOUR HERTZ HEAT EXCHANGER INSIDE DIAMETER INCHES INSULATION
	KW KVA	KILOWATT KILOVOLT AMPERE
L	L LB LD LF LVG	LENGTH POUND LINEAR DIFFUSER LINEAR FEET LEAVING
	M MAX MBH MCA MCC MECH MD MFR MIN MTD MU	ONE THOUSAND MAXIMUM THOUSAND BRITISH THERMAL UNITS / H MINIMUM CIRCUIT AMPS MOTOR CONTROL CENTER MECHANICAL 24 VOLT MOTORIZED CONTROL DAMPEI MANUFACTURER MINIMUM MOUNTED MAKEUP WATER
	(N) N/A NC NIC NOM NTS	NEW NOT APPLICABLE NOISE CRITERIA NOT IN CONTRACT NOMINAL NOT TO SCALE
	OB OD ODP OV	OCTAVE BAND OUTSIDE DIAMETER OPEN DRIP PROOF OUTLET VELOCITY
	PCF PD PH PLBG PRESS PSIA PSIG PVC	POUNDS PER CUBIC FOOT PRESSURE DROP PHASE PLUMBING PRESSURE POUNDS PER SQUARE INCH ABSOLUTE POUNDS PER SQUARE INCH GAUGE POLYVINYL CHLORIDE
	(RE) RET REQD RH RM RPM	
	SPECS SQ SQFT	SPECIFICATIONS SQUARE SQUARE FEET
	SS STD STDBY SUP TEMP TOD TOP TYP	STAINLESS STEEL STANDARD STANDBY SUPPLY TEMPERATURE TOP OF DUCT TOP OF PIPE TYPICAL
	UH	UNIT HEATER
	V VEL VFD VTR	VENT VELOCITY VARIABLE FREQUENCY DRIVE VENT THROUGH ROOF
	W W/ W/O WB WG	WIDTH WITH WITHOUT WET BULB TEMPERATURE WATER GAUGE



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	HVAC GENERAL NOTES	
	INSTALL ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. INSTALL UNITS PLUMB AND LEVEL, FIRMLY ANCHORED IN LOCATIONS INDICATED, AND MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES.	
	ALL MATERIAL SHALL BE SUBMITTED TO THE A/E VERIFYING IT IS ADEQUATE FOR INSTALLATION PER THE SPECIFICATIONS AND DRAWING. VERIFY DIMENSIONS AND CLEARANCES AT BUILDING BEFORE COMMENCING WORK.	
	MECHANICAL CONTRACTOR SHALL PROVIDE TWO FILTER CHANGES PRIOR PROJECT COMPLETION	
	IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ACTUAL LOCATION OF EXISTING STRUCTURAL MEMBERS AND COORDINATE INSTALLATION OF THE EQUIPMENTS ACCORDINGLY.	
	THE CONTRACTOR SHALL FULFILL ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS AND SHALL COMPLETE THE IMPROVEMENTS SHOWN ON THE DRAWINGS. ALL SYSTEMS SHALL BE FINISHED, TESTED, AND BALANCED, ADJUSTED, AND PROVEN FULLY OPERATIONAL AND USEABLE.	
	EXCEPT WHERE SPECIFICALLY SHOWN OR SPECIFIED OTHERWISE, EXISTING WORK IS TO REMAIN. WHERE PIPES, CONTROL DEVICES AND WIRING WHICH ARE TO REMAIN IN-SERVICE ARE DISCONNECTED FOR THE	
	REMOVAL OR RELOCATION OF EQUIPMENT OR BECAUSE OF BUILDING ALTERATIONS, THEY SHALL BE RE-CONNECTED.	
	TRANSITION RECTANGULAR DUCTWORK ON BOTTOM AND SIDES. MAINTAIN TOP OF DUCTWORK LEVEL AND AS HIGH AS POSSIBLE. PROVIDE VOLUME DAMPER AT EACH BRANCH DUCTWORK.	
	CONTRACTOR SHALL COORDINATE VOLTAGE AND PHASE OF EACH PIECE OF EQUIPMENT WITH THE ELECTRICAL CONTRACTOR PRIOR TO ORDERING.	
	MOUNT THERMOSTATS AND FAN SWITCHES WHERE INDICATED ON PLANS 48" AFF UNLESS NOTED OTHERWISE.	
	MAKE OFFSETS AND TRANSITIONS TO COORDINATE WITH OTHER TRADES WITHOUT ADDITIONAL EXPENSE TO THE OWNER.	
	PROVIDE FIRE DAMPERS IN DUCT PENETRATIONS THROUGH RATED WALLS AND FLOORS. EXACT LOCATIONS OF ALL CEILING AIR DEVICES SHALL BE COORDINATED WITH LIGHT FIXTURES, SPRINKLER HEADS AND	
	OTHER CEILING MOUNTED FIXTURES AT JOB SITE. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN. CONTRACTOR SHALL PROVIDE NEW THERMOSTATS ARE LOCATIONS INDICATED ON DRAWING. CONTRACTOR SHALL REMOVE EXISTING THERMOSTATS AND CONTROLS.	
	PROJECT NOTES:	
	THE SCOPE OF WORK SHALL INCLUDE PROVIDING ALL WORK INDICATED, AND COORDINATION WITH ALL TRADES. SCOPE OF WORK IS INDICATED ON THE CONTRACT DOCUMENTS INCLUDING THE DRAWINGS AND THE SPECIFICATIONS, WHICH ARE COMPLIMENTARY. WORK INDICATED IN ANY CONTRACT DOCUMENT SHALL BE CONSIDERED PART OF THE SCOPE OF WORK. IN GENERAL, WORK REQUIREMENTS ARE NOT INDICATED IN BOTH DOCUMENTS. WHERE DOCUMENTS CONFLICT WITHIN THEMSELVES OR WITH CODES AND REGULATIONS, PROVIDE THE HIGHER QUANTITY AND QUALITY AND FOLLOW THE STRICTER REQUIREMENTS.	
	ALL MOUNTING HEIGHTS ARE TO BOTTOM UNLESS OTHERWISE INDICATED.	
(1)-	TRADES AND REQUEST CLARIFICATION PRIOR TO ROUGHING, OR INSTALLATION.	
/ Hr.	ALL RETURN AIR DEVICES LOCATED INSIDE AREA OF WORK SHALL BE PROVIDED WITH RETURN AIR SOUND BOOT PER DETAIL 12 ON M500.	
PER		
	LEGEND NOTES:	
	THIS SHEET IS A GENERAL LIST OF SYMBOLS AND ABBREVIATIONS AND SHALL BE USED AS A DICTIONARY TO DEFINE ITEMS INDICATED ON DRAWINGS. NOT ALL SYMBOLS OR ABBREVIATIONS ARE NECESSARILY USED ON THIS PROJECT.	
	PROJECT INTRODUCTION	
тс	1. PROJECT MISSION STATEMENT:	
TE	A. TO IMPLEMENT MODIFICATIONS/ADDITIONS TO AN EXISTING MECHANICAL SYSTEMS WITHIN ROSCOE HALL. THE WORK SHOULD BE PERFORMED IN A SAFE MANNER WHILE MEETING ALL OF TCI REQUIREMENTS. UPON COMPLETION, ALL UPGRADES WILL FUNCTION PROPERLY AND EFFICIENTLY DESIGNED.	
	2. PROJECT DESCRIPTION: THE PROJECT CONSISTS OF CONTROL INTERGRATION TO THE CAMPUS SYSTEM, MODIFICATION OF	
	DUCTWORK SERVING THE AREAS OF WORK INDICATED ON THE ARCHITECTURAL DRAWINGS. 3. SCOPE:	
	A. THE FOLLOWING IS A BRIEF SCOPE OF THE WORK FOR THIS PROJECT (NOT INTENDED TO BE ALL INCLUSIVE):	
	1) SYSTEMS TO REMAIN INTACT: LIGHTING FIXTURES, SPRINKLER SYSTEM, HVAC / HEATING SYSTEMS	
	2) SYSTEMS TO BE MODIFIED AND / OR EXTENDED: 1ST AND 2ND FLOOR MECHANICAL SYSTEMS IN AREA OF WORK	
	3) SYSTEMS TO BE DEMOLISHED: EXISTING LOW PRESSURE DUCT IN AREAS OF WORK, DUAL DUCT VAV BOXES, PNEUMATIC CO	NTROI S
	 4) SYSTEMS TO BE CLEANED: CONTRACTOR SHALL DISCONNECT AND INSPECT ALL FINTUBE BASEBOARD ON 1ST FLOOR AN OF WORK ON 2ND FLOOR FOR CLOGGED OR FOULED TUBING. CONTRACTOR SHALL FLUSH TH 	ID AREA
	5) TEST AND BALANCE:	
	PRIOR TO AND WORK THE CONTRACTOR SHALL PROVIDE PREVENATIVE MAINTENANCE AND T BALANCE REPORT FOR (E)AHU-1, (E) AHU-2, AND (E) AHU-3. CONTRACTOR SHALL PROVIDE BAL REPORT FOR AIR DEVICES FOR (E) AHU-2 AND (E) AHU-3. CONTRACTOR SHALL NOTIFY TCNJ AI OF ANY DISCREPANCIES.	ANCE
	DESIGN CRITERIA	

<u>GENERA</u>L

ENTIRE INSTALLATION SHALL COMPLY WITH ALL LOCAL AND STATE CODES AND OTHER AUTHORITIES HAVING JURISDICTION. TCNJ SHALL SECURE AND PAY FOR ALL REQUIRED PERMITS. TCNJ WILL SCHEDULE ALL INSPECTIONS REQUIRED FOR THIS WORK.

APPLICABLE CODES AND REFERENCES

INTERNATIONAL BUILDING CODE, 2018 EDITION.

UCC MECHANICAL CODE, 2021 EDITION WITH AMENDMENTS.

NJ STATE FIRE CODE - 2015 EDITION WITH AMENDMENTS.

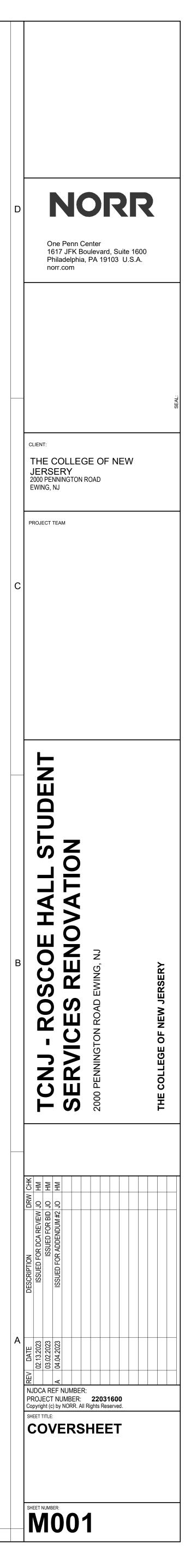
NATIONAL ELECTRICAL CODE - 2017 EDITION.

NEW JERSEY ADMINISTRATIVE CODE AND REHABILITATION SUBCODE.

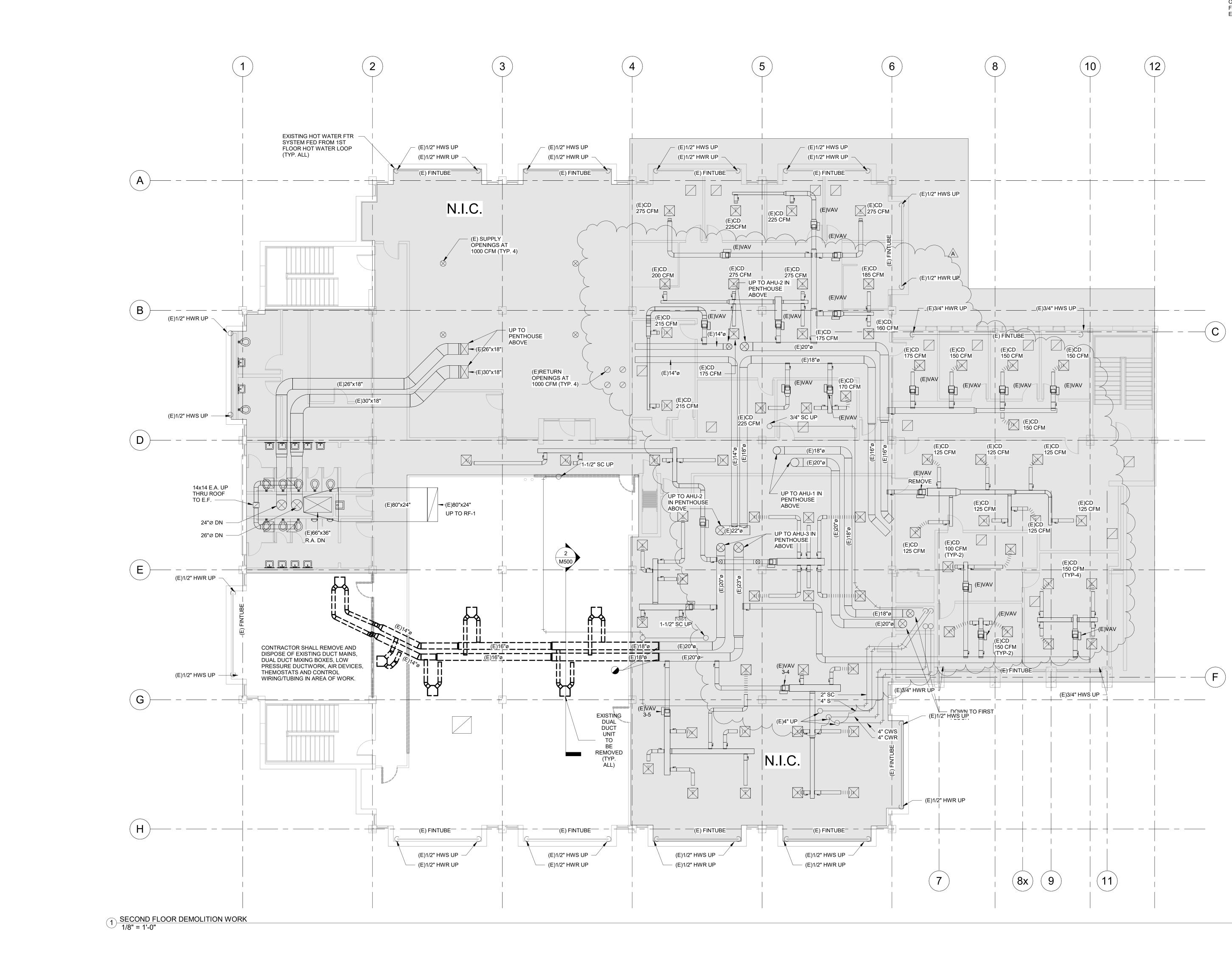
ENERGY STANDARD FOR BUILDINGS EXCEPT LOW RISE RESIDENTIAL BUILDINGS 2019 OF NJ. ASHRAE 90.1, 2019 ENVIRONMENTAL PROTECTION AGENCY HAZARDOUS WASTE REGULATIONS.

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REVIEWING AGENCIES NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS



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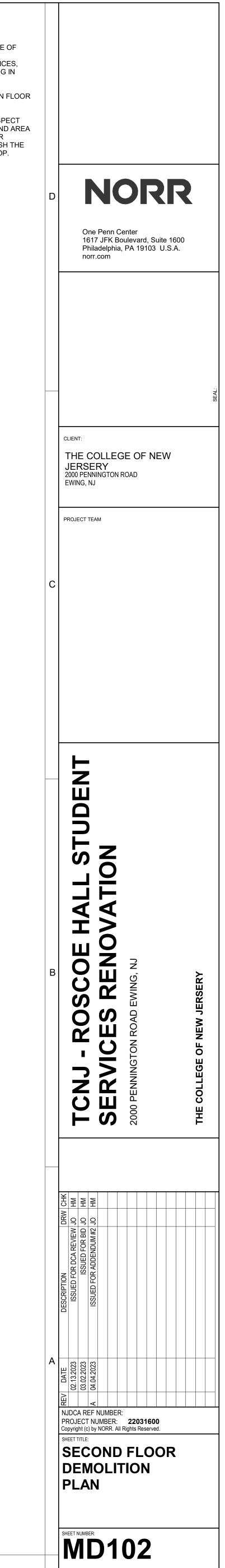
DRAWING NOTES:

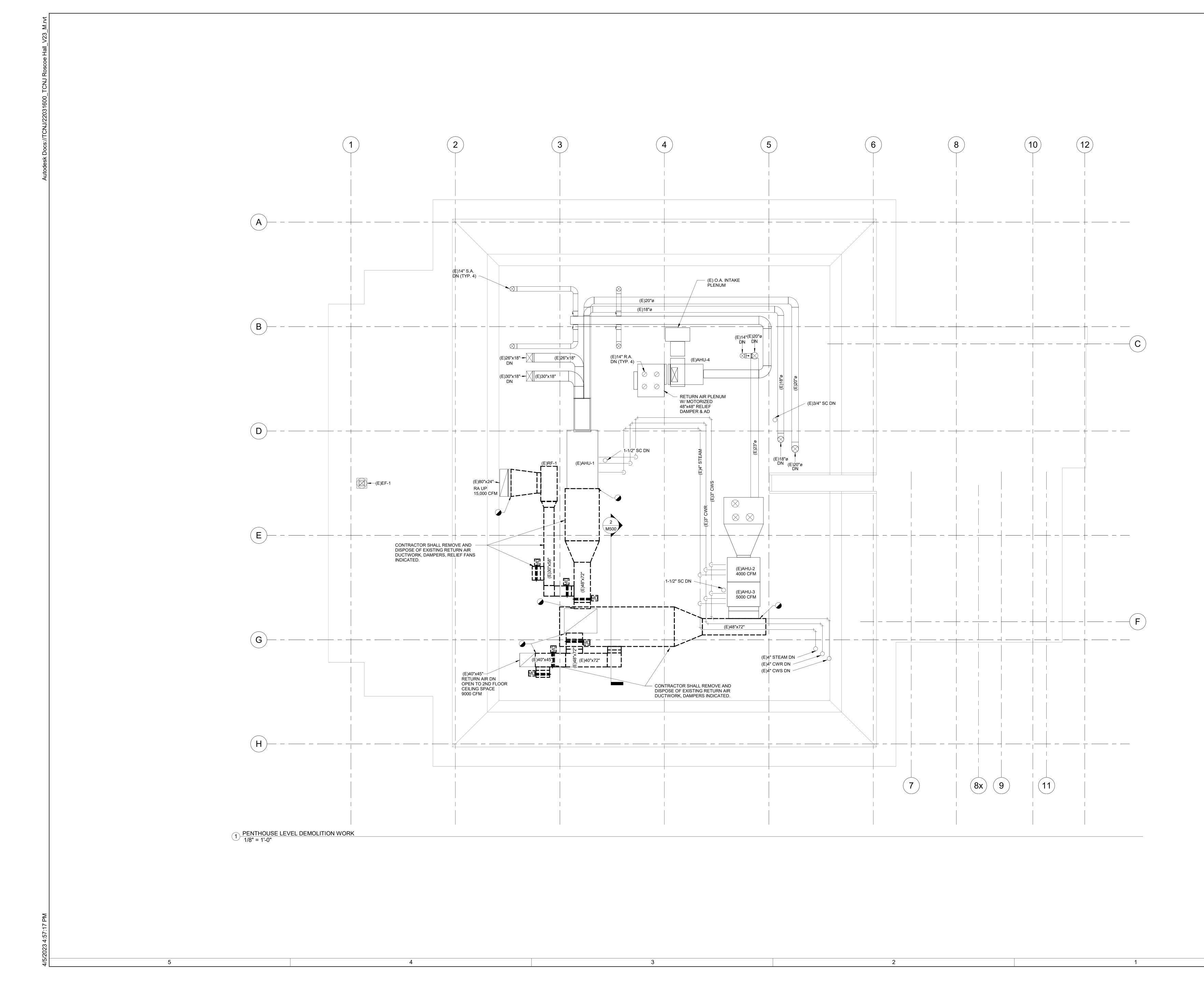
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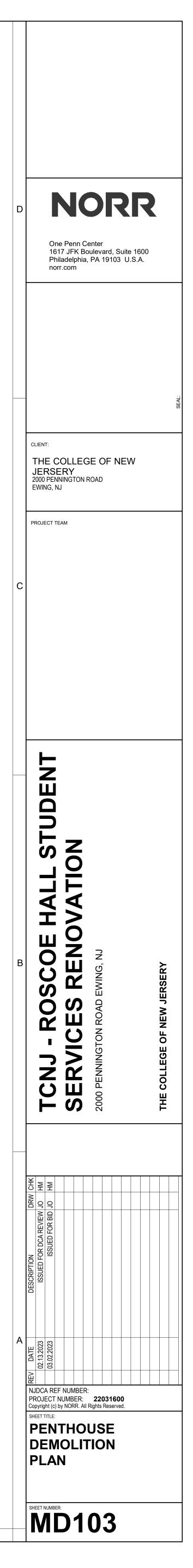
1. CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING DUCT MAINS, LOW PRESSURE DUCTWORK, SUPPLY AND RETURN AIR DEVICES, THEMOSTATS AND CONTROL WIRING/TUBING IN AREA OF WORK.

2. ALL SINGLE DUCT VAV BOXES INDICATED ON FLOOR PLAN ARE TO BE REMOVED.

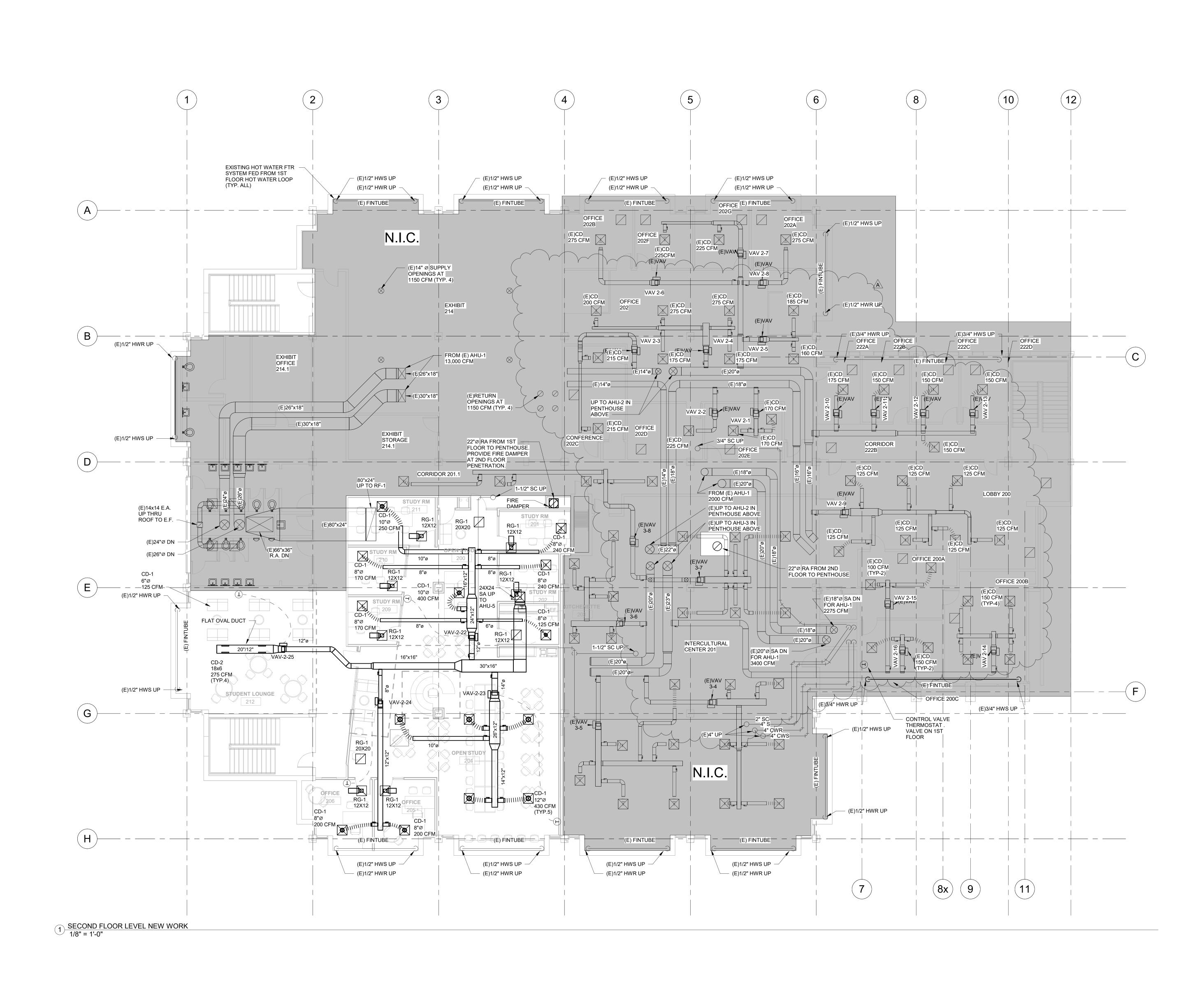
> CONTRACTOR SHALL DISCONNECT AND INSPECT ALL FINTUBE BASEBOARD ON 1ST FLOOR AND AREA OF WORK ON 2ND FLOOR FOR CLOGGED OR FOULED TUBING. CONTRACTOR SHALL FLUSH THE ENTIRE EXISTING HOT WATER HEATING LOOP.

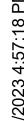


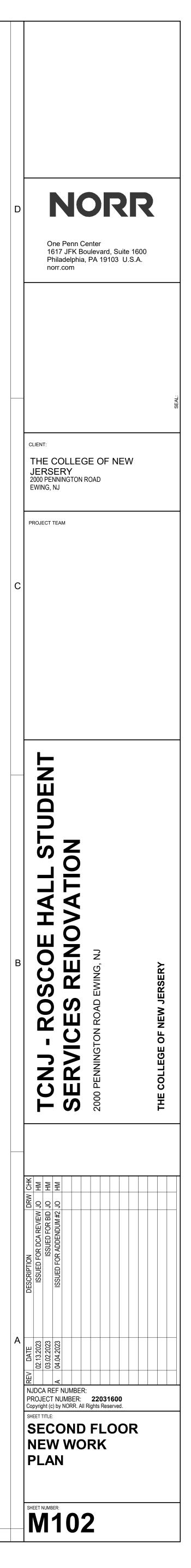




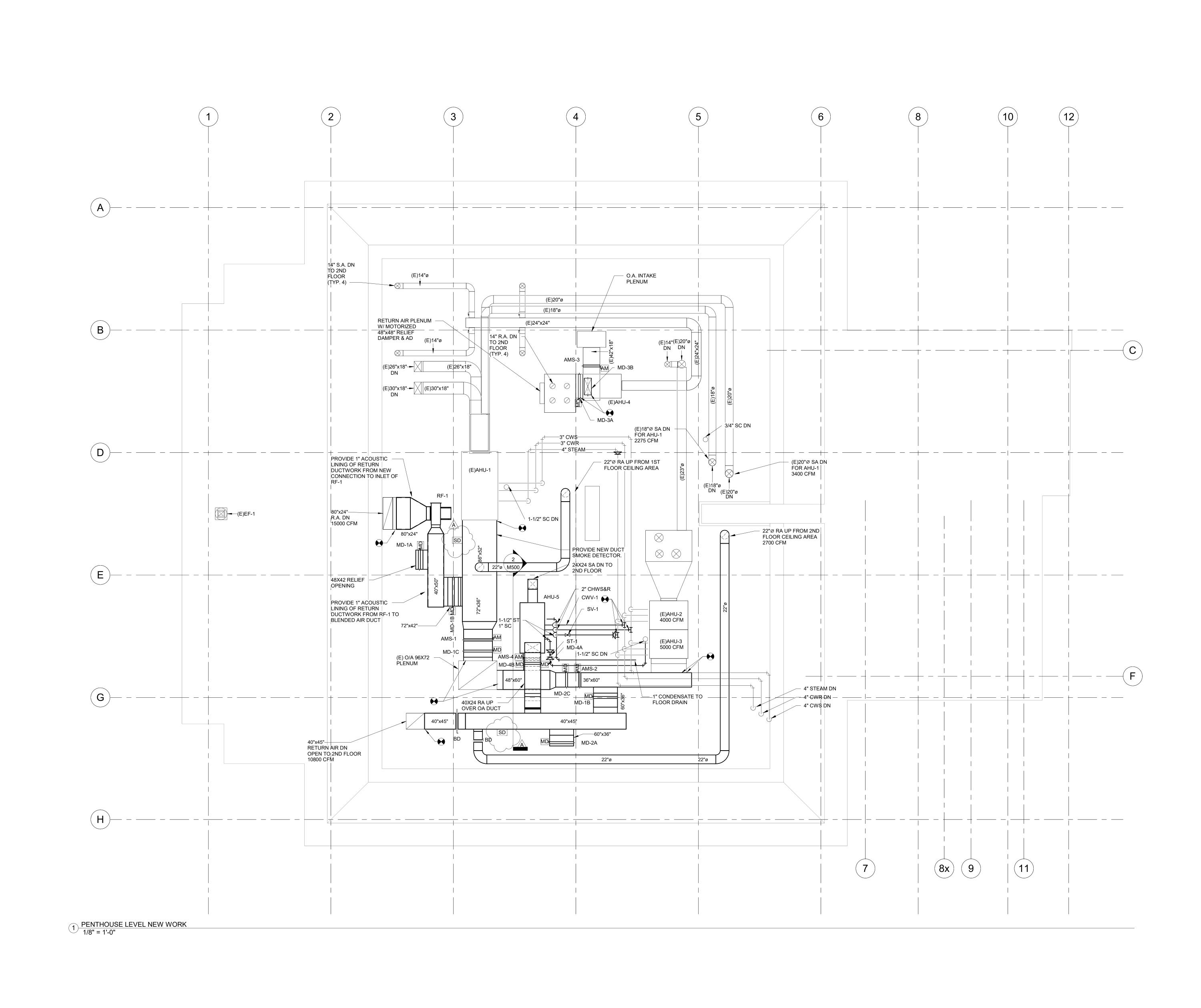








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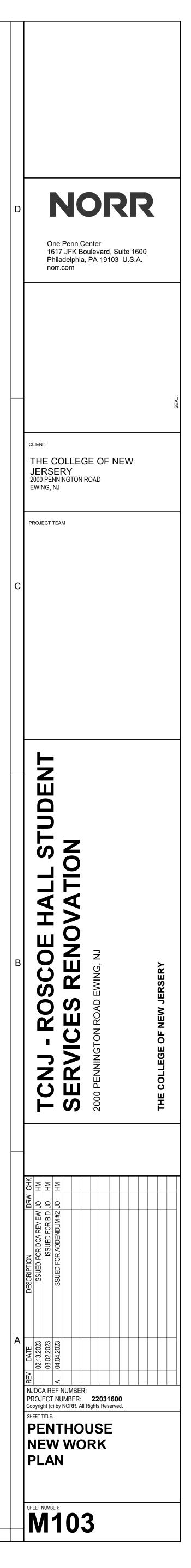
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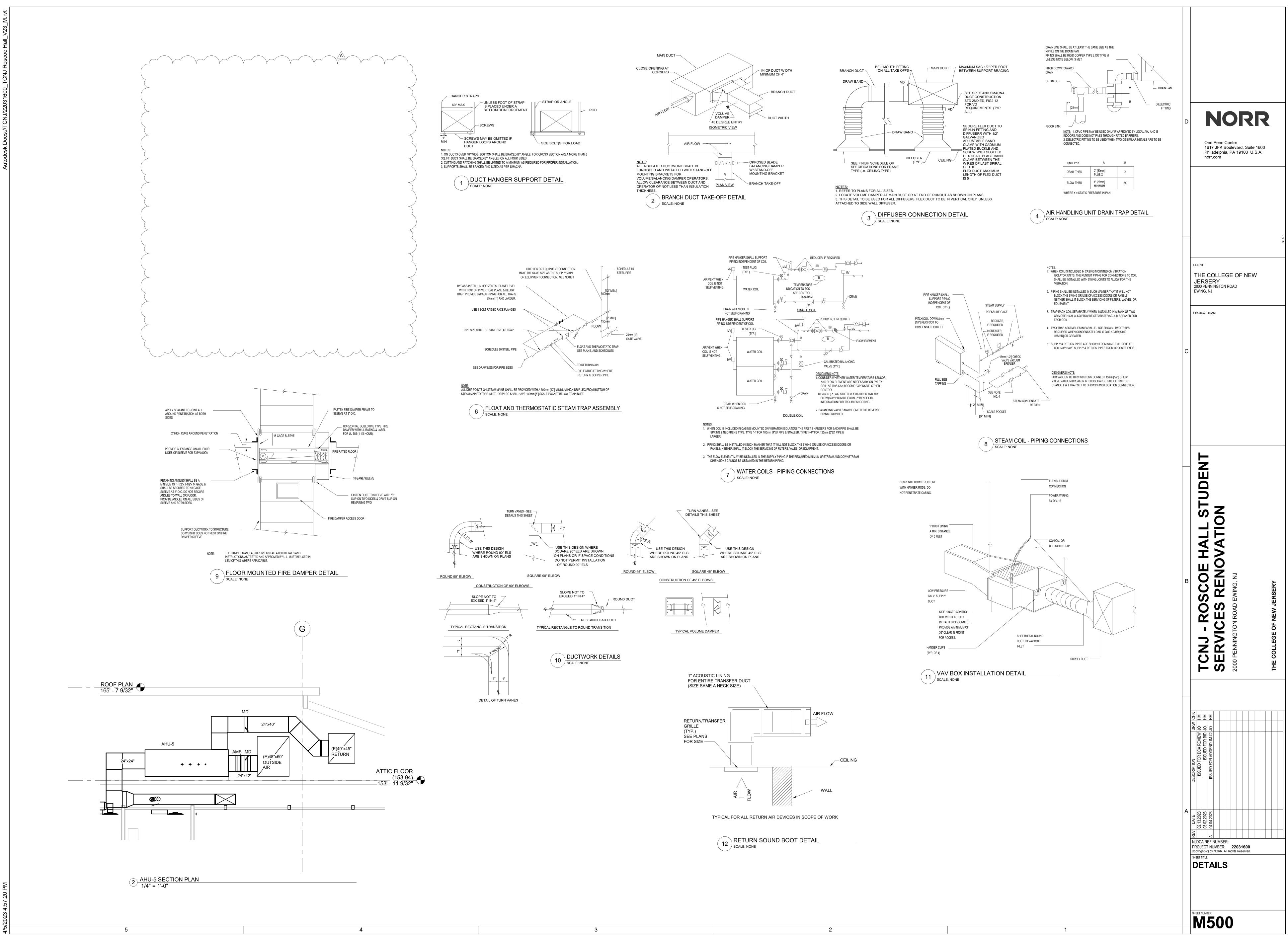
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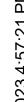


EXIST	ING AIR		ER S	CHE	DULI	E FO	OR I	REFE		CE																							
				FA	N DATA					MOTOR DAT	ГА										COC	LING COIL DATA						PREHEAT	COIL DATA		FI	LTER	
				TOTAL SP	b		MIN.		STARTER	EL	ECTRICAL D	ATA	CAPACITY	SENS.	MIN O.A.		AIR	2				WATE	ER		DESIGN		AIR		STE	AM DATA			MANUF/
UNIT No.	LOCATION	SERVICE	CFM	(IN.)	ESP	RPM	BHP	MHP	TYPE	VOLTS	PHASE	HZ	TOTAL MBH	MBH	CFM	SP (IN. H Ø)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	GPM	PD (FT. H Ø)	EWT (°F)	LWT (°F)	PRESS. (PSIG)	SP (IN. H Ø)	EAT (°F)	LAT (°F)	PRESS. (IN PSIG)	FLOW (LBS/HR)	TYPE	MIN. EFF	MODEL #
(E)AHU-1	ATTIC MER	1ST FLR	15000	3.75	2.0	1061	103	20	VFD	480	3	60	1038	569	4200	1.23	88	74	53.3	53.1	207.5	7	45	55	150	0.17	40	70	5	515.0	2"TA	30%	TRANE LPCAA30D
(E)AHU-2	ATTIC MER	2ND FLR	4000	3.0	2.0	1200	3.4	5	VFD	480	3	60	239	137	650	.41	88	74	55.25	55.1	48	16.9	45	55	150	0.09	33	70	5	169.4	2"TA	30%	TRANE LPCAA10D
(E)AHU-3	ATTIC MER	2ND FLR	5000	3.0	2.0	1242	4.1	5	VFD	480	3	60	305	174	1350	.42	88	74	54.6	54.1	61	16.2	45	55	150	0.06	40	70	5	171.7	2"TA	30%	TRANE LPCAA14D
(E)AHU-4	ATTIC MER	SARNOFF	4300	3.0	2.0	1200	3.4	5	VFD	480	3	60	239	137	1050	.66	88	74	56.7	56.6	33	5.4	45	59.5	150	0.12	48	75	5	132.9	2"TA	30%	TRANE SIZE 10
														-											II						-		

1. CONTRACTOR SHALL BALANCE UNIT SUPPLY AIR FLOW, OUTSIDE AIR FLOW, CHILLER WATER FLOW, STEAM SUPPLY FLOW TO VALUES IN SCHEDULE.

NEW AIR HANDLER SCHEDULE

				-
UNIT No.	LOCATION	SERVICE	CFM	
AHU-5	ATTIC MER	1ST FLR	4500	
1. PROVIDE	E WITH BASE RAIL A	ND SUPPLY FAN VF	Đ	



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-	DULL	-																												
	F	N DATA				М	OTOR DATA	ł										COC	LING COIL DATA						PREHEAT	COIL DATA		FIL	TER	
	TOTAL SE	b		MIN.		STARTER	ELE	CTRICAL D	ATA	CAPACITY	SENS.	MIN O.A.		AIR					WATE	R		DESIGN		AIR		STE	AM DATA			MANUF/
М	(IN.)	ESP	RPM	BHP	MHP	TYPE	VOLTS	PHASE	HZ	TOTAL MBH	MBH	CFM	SP (IN. H Ø)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	GPM	PD (FT. H Ø)	EWT (°F)	LWT (°F)	PRESS. (PSIG)	SP (IN. H Ø)	EAT (°F)	LAT (°F)	PRESS. (IN PSIG)	FLOW (LBS/HR)	TYPE	MIN. EFF	MODEL #
00	3.475	2.0	1221	4.55	5	VFD	480	3	60	166.5	124.5	1050	1.23	78.6	65.4	53.3	53.1	33.2	6.46	45	55	150	0.13	58	70	5	65.5	2"TA	30%	TRANE UCCAA12C
				•											·	·											•			

AIRFLOW MONITORING STATION

MARK	SERVICE	SIZE LXW	MANUFACTURER & MODEL NO. OR EQUAL	REMARKS
AMS-1	(E) AHU-1	72X36	RUSKIN TDP05K-E	1
AMS-2	(E) AHU-2&3	36X60	RUSKIN TDP05K-E	1
AMS-3	(E) AHU-4	42X18	RUSKIN TDP05K-E	1
AMS-4	AHU-5	42X24	RUSKIN TDP05K-E	1
NOTES:				

1.PROVIDE WITH BACNET INTERFACE

STEAM TRAP SCHEDULE

TAG	QUANTITY	LOCATION	SYSTEM	CONNECTION SIZE IN.	STEAM PRESSURE PSIG	MANUFACTURER & MODEL	NOTES
ST-1	1	AHU-5	STEAM COILS	3/4"	0-15	BARNES AND JONES FT2015-4	1

MOTORIZED DAMPER SCHEDULE

MARK	SERVICE	SIZE LXW	MAX PRESS DROP IN. W.C.	MOTOR OPERATOR TYPE	MANUFACTURER & MODEL NO. OR EQUAL	REMARKS
MD-1A	(E) AHU-1	48X42	0.10	ELECTRIC	RUSKIN CD36	1
MD-1B	(E) AHU-1	72X36	0.10	ELECTRIC	RUSKIN CD36	1
MD-1C	(E) AHU-1	72X36	0.10	ELECTRIC	RUSKIN CD36	1
MD-2A	(E) AHU-2&3	60X36	0.10	ELECTRIC	RUSKIN CD36	1
MD-2B	(E) AHU-2&3	60X36	0.10	ELECTRIC	RUSKIN CD36	1
MD-2C	(E) AHU-2&3	36X60	0.10	ELECTRIC	RUSKIN CD36	1
MD-3A	(E) AHU-4	42X18	0.10	ELECTRIC	RUSKIN CD36	1
MD-3B	(E) AHU-4	42X18	0.10	ELECTRIC	RUSKIN CD36	1
MD-4A	AHU-5	42X24	0.10	ELECTRIC	RUSKIN CD36	1
MD-4B	AHU-5	42X24	0.10	ELECTRIC	RUSKIN CD36	1

NOTES:

1. PROVIDE 24V ELECTRIC DAMPER ACTUATOR AND WIRE TO BAS SYSTEM. DAMPERS WIDER THAN 48" WILL BE PROVIDED WITH 2 ACTUATORS.

(E) AHU-5		Minimum Supply Air (CFM)	Area	Area Outdoor Air Rate (CFM/ft²)	Time Averaged Occupancy (Occupants)	People Outdoor Air Rate (CFM/person) E	Air Distribution Effectiveness	Space Outdoor Air (CFM)	Breathing Zone Outdoor Air (CFM)	Spa Ventilati Efficier
Zone Name / Space Name	Mult.	(Vpz)	(Az)	(Ra)	(Pz)	(Rp)	(Ez)	(Voz)	(Vbz)	(E [,]
Zone 1										
200 OPEN STUDY	1	98	476.0	0.06	10.0	5.00	0.80	98	79	3.0
201 STUDY RM	1	47	120.0	0.06	6.0	5.00	0.80	47	37	0.8
202 STUDY RM	1	46	116.0	0.06	6.0	5.00	0.80	46	37	0.8
203 KITCHENETTE	1	32	95.0	0.06	4.0	5.00	0.80	32	26	0.8
204 OPEN STUDY	1	441	1300.0	0.06	55.0	5.00	0.80	441	353	0.8
205 OFFICE	1	25	169.0	0.06	2.0	5.00	0.80	25	20	0.8
206 OFFICE	1	26	181.0	0.06	2.0	5.00	0.80	26	21	0.8
209 STUDY RM	1	33	100.0	0.06	4.0	5.00	0.80	33	26	0.8
210 STUDY RM	1	33	111.0	0.06	4.0	5.00	0.80	33	27	0.8
211 STUDY RM	1	63	171.0	0.06	8.0	5.00	0.80	63	50	0.8
212 STUDENT LOUNGE	1	202	687.0	0.06	24.0	5.00	0.80	202	161	0.8
	1		687.0							

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DIFFU	SER AND REGIS	TER SCHED	DULE					
SYMBOL	TYPE	FRAME	FACE SIZE (IN.)	COLOR	MATERIAL	MAX. SP (IN/WG)	MAKE & MODEL	NOTES
CD-1	CEILING DIFFUSER	LAY-IN	REFER TO PLANS	WHITE	STEEL	0.07	TITUS, OMNI	
CD-2	SPIRAL DUCT GRILLE	SURFACE	REFER TO PLANS	WHITE	STEEL	0.07	TITUS, S8F	
RG-1	RETURN GRILLE	LAY-IN	REFER TO PLANS	WHITE	STEEL	0.07	TITUS, 350FL	

RETURN FAN SCHEDULE

TAG	TYPE	CFM	RPM	EXT. S.P.	DRIVE TYPE	ELECTR	CAL DATA VOLTS/PH/HZ	SERVICE	MFR & MODEL	NOTES
RF-1	UTILITY SET	15,000	998	1.0	BELT	7.5 HP	460/3/60	AHU-1 RELIEF	COOK 300 CPA	1 - 3
NOTES:				1						

1. FAN SHALL OPERATE CONTINUOUSLY. 2. PROVIDE VFD OPERATION

3. UNIT TO BE INSTALLED LEVEL. ALL STARTERS SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR.

CONTROL VALVE SCHEDULE - DDC

TAG	SERVICE	SIZE NPT	CV FLOW FACTOR	MAXIMUM PRESSURE PSI	VOLTAGE	CYCLE	MATERIAL	MANUFACTURER	MODEL	REMARKS
HWV-1	HOT WATER	1-1/2"	10	150	24 VAC	60	BRASS	BELIMO	B329	NORMALLY OPEN
HWV-2	HOT WATER	1-1/2"	10	150	24 VAC	60	BRASS	BELIMO	B329	NORMALLY OPEN
HWV-3	HOT WATER	1/2"	1.9	150	24 VAC	60	BRASS	BELIMO	B311	NORMALLY OPEN
HWV-4	HOT WATER	1/2"	1.5	150	24 VAC	60	BRASS	BELIMO	B311	NORMALLY OPEN
CWV-1	CHILLED WATER	2"	29	150	24 VAC	60	BRASS	BELIMO	B349	NORMALLY OPEN
SV-1	STEAM	1-1/2"	28	15	24 VAC	60	BRASS	BELIMO	B240	NORMALLY OPEN

VARIABLE AIR VOLUME TERMINAL BOX SCHEDULE

			MAXIMUM	MINIMUM	MIN. S.P.	ELE	ECTRICAL			
TAG	UNIT SERVED	AREA SERVED	COOLING CFM	COOLING CFM	DROP (IN WG)	VOLTS	PHASE	HZ	MANUFACTURER & MODEL No.	NOTES
VAV-2-22	AHU-5	OPEN STUDY 200 STUDY, 201/202/209-211	1425	420	0.17	120	1	60	TITUS DESV-12	1 - 12
VAV-2-23	AHU-5	OPEN STUDY 204	2150	645	0.17	120	1	60	TITUS DESV-14	1 - 12
VAV-2-24	AHU-5	OFFICE 205/206	400	120	0.17	120	1	60	TITUS DESV-06	1 - 12
VAV-2-25	AHU-5	STUDENT LOUNGE 212	1100	330	0.17	120	1	60	TITUS DESV-10	1 - 12

NOTES:

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1. COORDINATE CONTROL REQUIREMENTS WITH BASE BUILDING CONTROL SYSTEM. 2. ALL VAV BOXES SHALL BE TESTED, CERTIFIED AND SEALED IN ACCORDANCE WITH ARI STANDARD 880. 3. ALL WIRING REQUIRED FOR CONTROL FUNCTION BY HVAC CONTRACTOR.

4. CONTROLS TO BE PROVIDED AND MOUNTED BY THE CONTROLS CONTRACTOR. 5. VAV BOX DAMPER SHALL BE PERMITTED TO OPEN (ABOVE MINIMUM POSITION) IN THE HEATING MODE TO SATISFY THERMOSTAT SETPOINT.

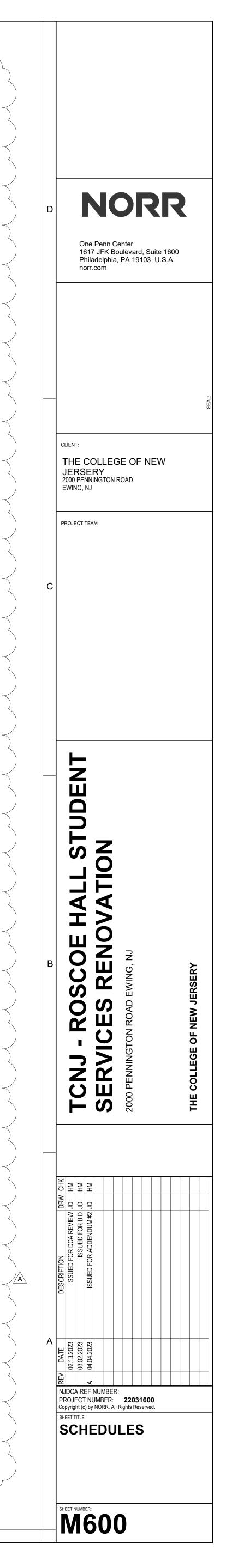
6. STATIC PRESSURE BASED ON MAXIMUM DESIGN CFM WITH VOLUME CONTROL DAMPER IN FULL OPEN POSITION. PROVIDE RADIATED SOUND INDUCTION DAMPER TO ASSIST IN BALANCING.

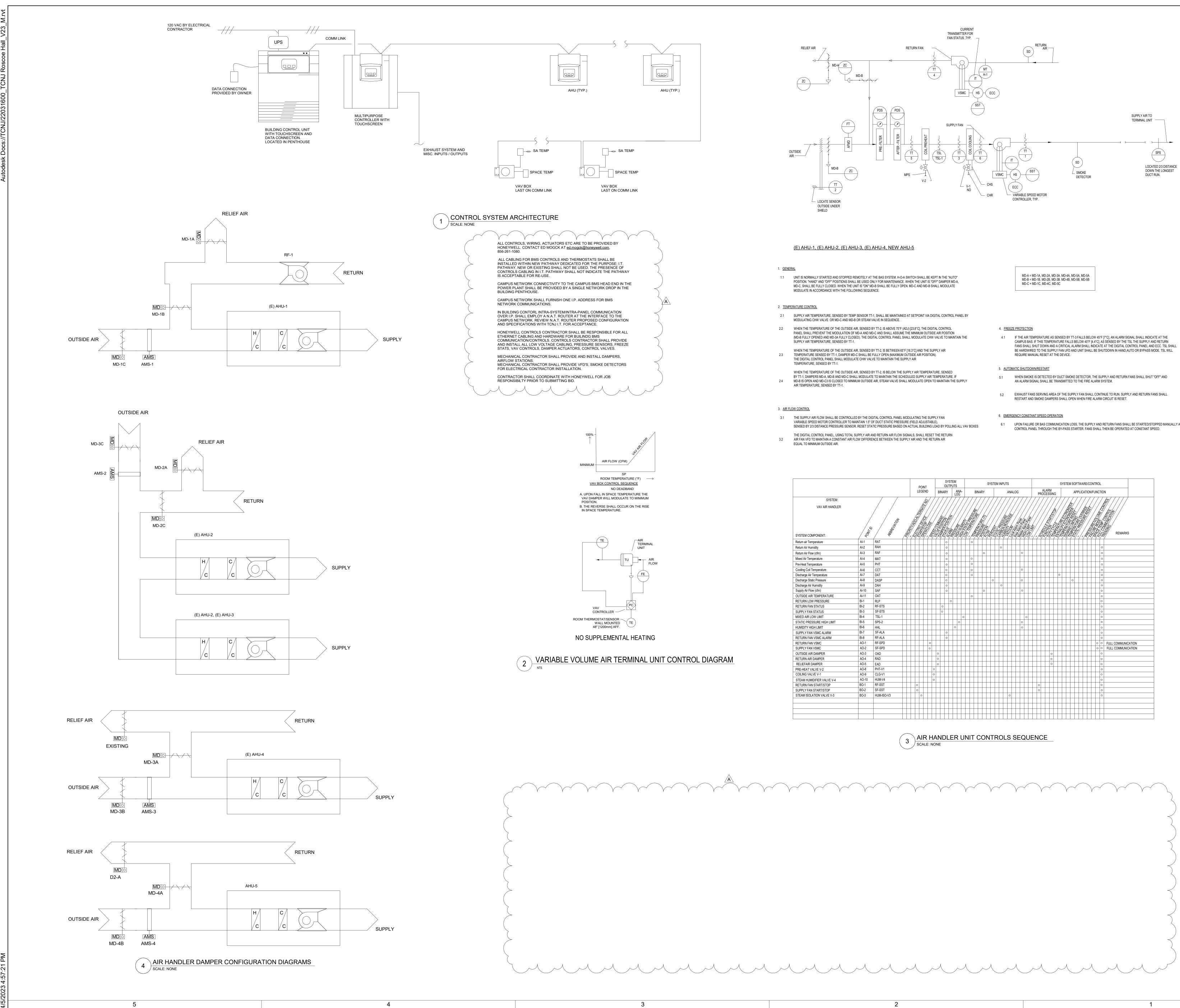
8. PROVIDE 7-DAY PROGRAMMABLE HEATING/COOLING THERMOSTAT WITH NIGHT SETBACK & ON/OFF/AUTO SWITCH. 9. VAV BOXES SHALL BE GALVANIZED, GALLVENEALED METAL IS NOT ACCEPTABLE.
 10. DUCTWORK DOWNSTREAM OF ALL VAV BOXES SHALL BE LINED WITH 1" ACOUSTICAL LINING, MINIMUM OF 6'-0" FROM VAV BOX.

11. CONTROL SEQUENCE SHALL INCLUDE EARLY MORNING WARM UP, VAV CONTROL BOTH FOR HEATING AND COOLING AND AUTOMATIC

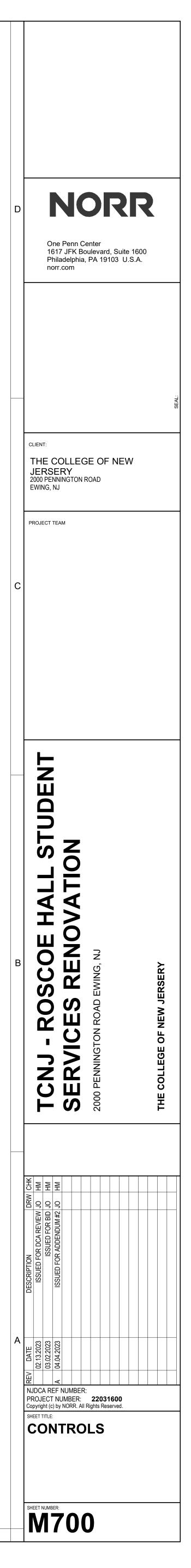
1

CHANGE OVER. 12. PROVIDE REQUIRED SERVICE SPACE IN FRONT OF CONTROL PANEL OF VAV BOXES AS PER MANUFACTURER'S RECOMMENDATION.





- UPON FAILURE OR BAS COMMUNICATION LOSS, THE SUPPLY AND RETURN FANS SHALL BE STARTED/STOPPED MANUALLY AT THE DIGITAL



	LEG	END	
SANITARY PIPING A.F.F. OR GRADE		S	
SANITARY PIPING B.F.F. OR GRADE		S	
GREASE WASTE PIPING A.F.F. OR GRADE		GW	
GREASE WASTE PIPING B.F.F.		GW	
INDIRECT WASTE PIPING A.F.F. OR GRADE		IW	
INDIRECT WASTE PIPING B.F.F. OR GRADE		IW	
STORM PIPING A.F.F. OR GRADE		ST	
STORM PIPING B.F.F. OR GRADE		ST	
CONDENSATE DRAIN		C	
VENT PIPING A.F.F. OR GRADE			
VENT PIPING B.F.F. OR GRADE			
LOW PRESSURE NATURAL GAS		G	
2 PSI NATURAL GAS		2G	
COLD WATER			
HOT WATER			
HOT WATER RECIRC.	 		
FILTER WATER			
		FW TP	
EXISTING SANITARY PIPING		(E)SAN	
EXISTING GREASE WASTE PIPING		(E)GW	
EXISTING INDIRECT WASTE PIPING		(E)W	
EXISTING STORM PIPING		(E)ST	
EXISTING VENT PIPING		(E)V	
EXISTING LOW PRESSURE NATURAL GAS		(E)G	
EXISTING 2 PSI NATURAL GAS	-	(E)2G	
EXISTING COLD WATER		(E)CW	
EXISTING HOT WATER		(E)HW	
EXISTING HOT WATER RECIRC.		(E)HWR	
	GATE ► BALL 5		
SOLENOID VALVE	sv 🛱	AQUASTAT	
PRESS. RED. VALVE		VACUUM RELEIF VALVE	Υ
GAS COCK	▼	BALANCING VALVE	
GREASE INTERCEPTOR	GI 🗾	MIXING VALVE	-×-
WATER FILTER		T&P RELIEF VLAVE	A [−]
HUB DRAIN	HD 🚫	CAPPED OUTLET	E
FLOOR SINK	FS 🔀	WATER HAMMER	Р
FLOOR / AREA DRAIN	FD O AD O	BACKFLOW PREVENTION DEVICE	-~~
GROUND / FLOOR CLEAN OUT	GCO 🚫 FCO 🚫	BACKWATER VALVE	BWV
WALL CLEAN OUT	-	CHECK VALVE	
HORIZONTAL CLEAN OUT		FROST PROTECTED WALL HYDRANT	+ FPWH
TRAP PRIMER		WALL HYDRANT	——++ FPWH ——++ WH
	SP O	HOSE BIBB	——————————————————————————————————————
TRENCH DRAIN		WATER METER	WM
P TRAP	8 5	GAS METER	GM
PIPE DROP & RISE		PRESSURE GAUGE	Ŷ
PIPE UP OR DOWN		ROOF DRAIN	RD 💿
WATER TIGHT PIPE SLEEVE		OVERFLOW ROOF DRAIN	OF 💿
PIPE BREAK	<u> </u>	CONNECT TO EXISTING	Ð
		TO BE REMOVED	
VENT THROUGH ROOF (VTR)		1	
VENT THROUGH ROOF (VTR)	— — —	CIRCULATING PUMP	

4

		VIATIONS	
SYMBOL	DESCRIPTION	SYMBOL	D
AD AFF AP ARCH	AREA DRAIN ABOVE FINISHED FLOOR ACCESS PANEL ARCHITECTURAL	LAV LDR	L
BFP BFF BLDG BWV	BACKFLOW PREVENTER BELOW FINISHED FLOOR BUILDING BACKWATER VALVE	MAX MIN MS NC NO NTS	N N N N N
CLG CODP CONN CONT	CEILING CLEANOUT DECK PLATE CONNECTION CONTINUATION	NIC OFD PRV	N C F
CW DF DIA	COLD WATER DRINKING FOUNTAIN DIAMETER	RD RPZ RWC	F F F
DI DN DR	DIRONIZED WATER DOWN DRAIN	S SA SH	
EA EL EQ EVAC EWC	EACH ELEVATION EQUAL VACUUM CONDENSATE ELECTRIC WATER COOLER	SK SSK SS ST	
EXIST / EX	EXISTING FLOOR CLEANOUT	TW TP	T T
FD F.F. FL	FLOOR DRAIN FINISH FLOOR FLOOR	UR UOI	l l
FW FPWH	FILTERED WATER FROST PROTECTED WALL HYDRANT	V VTR VS	\ \ \
G GPM GW GCO	GAS PIPING GALLONS PER MINUTE GREASE WASTE GRADE CLEANOUT	W W/O WC	V V V
HB HW HWR	HOSE BIBB HOT WATER HOT WATER RETURN	WCO WFU WH WS	C V V V
INV. IW	INVERT LEVEL INDIRECT WASTE		

	PLUMBING	G LEGEND				
COLD WATER PIPE						
HOT WATER PIPE						
HOT WATER RETURN PIPE		S				
SANITARY PIPE						
VENT PIPE						
SERVICE SYSTEM PIPE X = SYSTEM ABBR. (E)X = EXISTING SYSTEM G = NATURAL GAS <2PSIG 2G = NATURAL GAS (2PSIG) RWC = RAINWATER / STORM	WATER	x				
2-WAY VALVE	Ŕ	GLOBE VALVE				
3-WAY VALVE	Ŕ	GRADE CLEANOUT				
ACCESS PANEL		HOSE BIBB	†			
AIR ADMITTANCE VALVE	\square	HOT WATER				
ANGLE VALVE	⊢⊠	RETURN VALVES	I∰H⊗H [®] ∖I ^I I€ 0.5 GPM			
BACKFLOW PREVENTER (BALL DOUBLE CHECK)	<u>Fri</u>	INLINE PUMP				
BACKFLOW PREVENTER		NEEDLE VALVE	Ą			
(GATE DBLE CHECK) BACKFLOW PREVENTER		PLUG VALVE				
(RPZ)	€BFP]€	PRESSURE GAUGE	↓ ↓			
BALANCING VALVE	Ø	PRV				
BALL VALVE (2-PIECE)	Ē	RELIEF VALVE	Ľ.,			
BALL VALVE (3-PIECE)		ROOF DRAIN	$(\bar{0}) \bigcirc$			
BUTTERFLY VALVE	þ	SOLENOID VALVE				
CAP		STRAINER	Γ.			
CHECK VALVE		THERMOMETER				
CLEANOUT		UNION				
FLOOR CLEANOUT		WALL HYDRANT	T T			
FLOOR DRAIN		WHA / SA	Ę			
GATE VALVE	\square					

3

DESCRIPTION LAVATORY LEADER MAXIMUM MINIMUM MOP SINK NORMALLY CLOSED NORMALLY OPEN NOT TO SCALE NOT IN CONTRACT OVER FLOW ROOF DRAIN PRESSURE REDUCING VALVE

ROOF DRAIN REDUCED PRESSURE BFP RAIN WATER CONDUCTOR

SANITARY SHOCK ARRESTER

SHOWER SINK SERVICE SINK SOIL STACK

STORM WATER PIPING

TEMPERED WATER TRAP PRIMER

URINAL UNLESS OTHERWISE INDICATED

VENT VENT THROUGH ROOF VENT STACK

WASTE WITHOUT

WATER CLOSET CLEANOUT WALL PLATE WATER SUPPLY FIXTURE UNITS WALL HYDRANT WASTE STACK

NARY TO DEFINE ITEMS INDICATED ON S PROJECT.

2

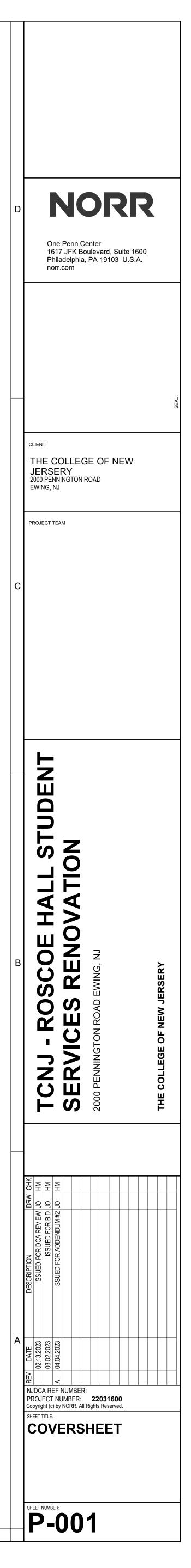
PLUMBING GENERAL NOTES

- PLUMBING SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES INDICATED ON THIS DRAWING ARE TYPICAL. PLUMBING DRAWINGS MAY NOT INDICATE ALL SYMBOLS AND ABBREVIATIONS SHOWN ON THIS DRAWING.
- 2. ALL PIPING AND EQUIPMENT SHOWN ON DRAWINGS ARE DIAGRAMMATIC ONLY.

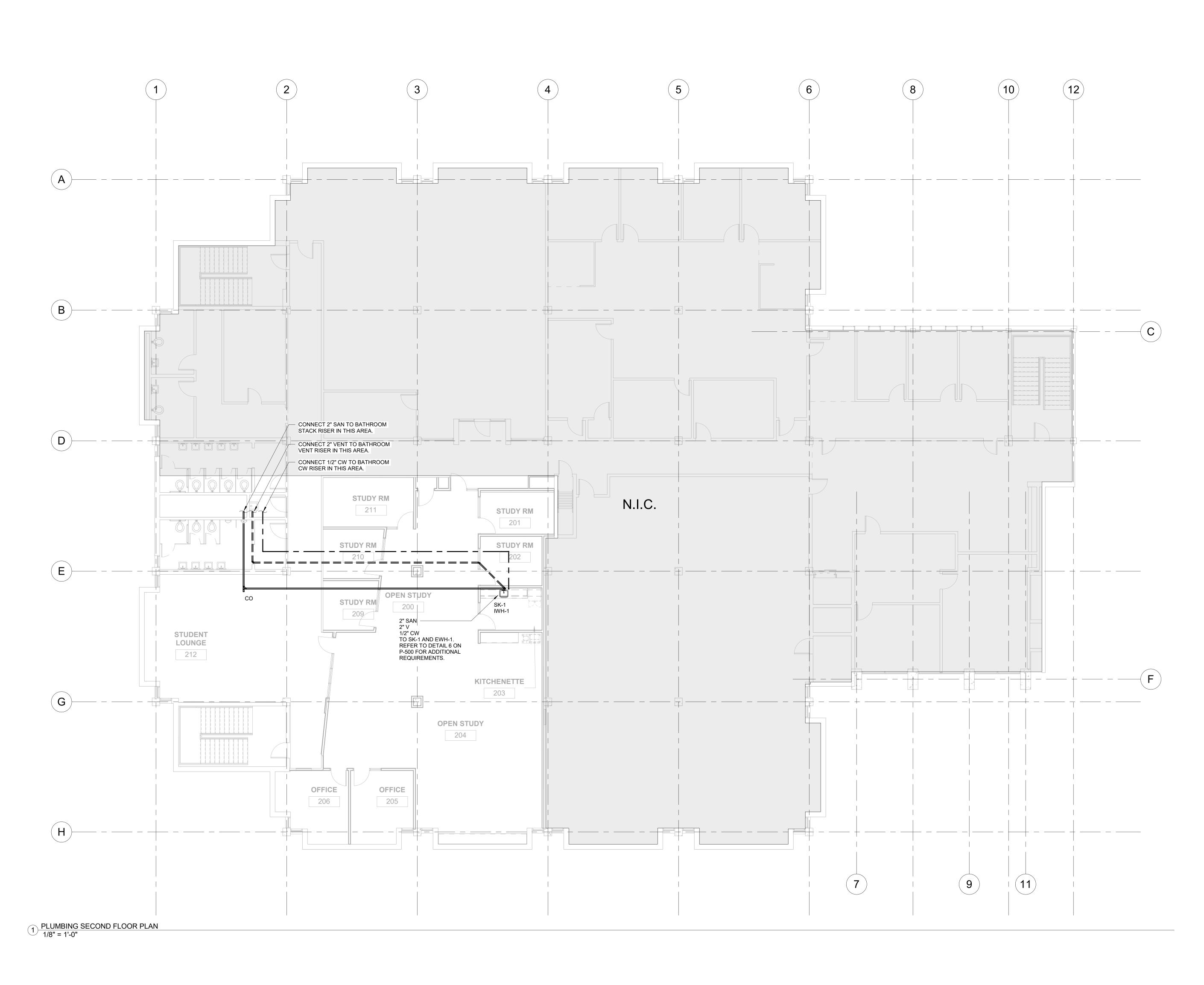
STAIRWAY.

- 3. THE ENTIRE PLUMBING SYSTEM SHALL BE IN CONFORMANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS. APPLICABLE PLUMBING CODE IS THE 2018 INTERNATIONAL PLUMBING CODE. CONFORM TO APPLICABLE BUILDING CODES AND THE OWNER'S INSURANCE AGENCY. PROCURE ALL LICENSES, PERMITS, CERTIFICATIONS, AND AGENCY APPROVALS PRIOR TO COMMENCING FABRICATION OR INSTALLATION. PROVIDE ALL REQUIRED DOCUMENTS, CALCULATIONS AND DRAWINGS.
- 4. THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR CUTTING/PATCHING OF ALL WALLS, CEILING AND FLOORS FOR INSTALLATION OF PLUMBING SYSTEMS
- 5. PLUMBING SYSTEMS SHALL NOT BE LOCATED IN ELECTRICAL EQUIPMENT ROOMS, TRANSFORMER VAULT, ELECTRICAL CLOSETS, TELE DATA ROOMS OR SIMILAR AREAS CONTAINING ELECTRICAL EQUIPMENT 6. DO NOT INSTALL PIPING OVER, AROUND, IN FRONT OF, BEHIND OR DIRECTLY BELOW ELECTRICAL EQUIPMENT, SWITCHES,
- TERMINALS OR SIMILAR ELECTRICAL EQUIPMENT. MAINTAIN 42" IN FRONT OF 480VAC EQUIPMENT. 36" IN FRONT OF 240VAC EQUIPMENT. CONFORM TO NEC. NO PLUMBING SYSTEMS SHALL PENETRATE INTO OR PASS THROUGH STAIRWAYS UNLESS IT IS FOR SERVICING THE
- INSTALL PIPING IN A CONCEALED MANNER, STRAIGHT, AND PLUMB FORM RIGHT ANGLES PARALLEL WITH BUILDING WALLS. LOCATE GROUPS OF PIPES PARALLEL TO EACH OTHER. PIPE WILL BE LOCATED TO PERMIT ACCESS FOR SERVICE VALVES.
- 9. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY FLOW, STATIC AND RESIDUAL PRESSURE BE PERFORMING A HYDRANT FLOW TEST OF THE EXISTING STREET MAIN AT THE POINT OF NEW CONNECTION OR AS CLOSE AS POSSIBLE.
- 10. COORDINATE PLUMBING SYSTEM SHUT DOWN REQUIREMENTS WITH OWNER. NOTIFY OWNER A MINIMUM OD 48 HOURS
- PRIOR TO SYSTEM SHUT DOWN.
- 11. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES BETWEEN CONSTRUCTION DOCUMENTS AND EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
- 12. ONLY CAST IRON PIPING FOR SANITARY AND VENTING SHALL BE INSTALLED IN PLENUM SPACES. THE PLUMBING CONTRACTOR SHALL VERIFY / COORDINATE THE EXACT PLENUM SPACES WITH THE HVAC PLANS AND CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
- 13. CHECK ARCH, ELEC, MECHANICAL, & FP DRAWINGS FOR WORK SHOWN TO BE DONE BY PC.
- 14. COORDINATE PLUMBING WORK WITH OTHER DISCIPLINES, SEE SPECIFICATIONS FOR INFORMATION REGARDING COORDINATION DRAWINGS. PROVIDE DEDUCTIONS FOR ANY OWNER AGREED REDUCTIONS IN PIPING RUNS. COORDINATE ROUGH-IN INFORMATION WITH FIXTURES AND EQUIPMENT SUPPLIERS. COORDINATE PLUMBING FIXTURE LOCATIONS WITH ARCHITECTURAL PLANS.
- 15. COORDINATE ALL BELOW GRADE PLUMBING PIPING WITH FOUNDATION ELEVATIONS AND SITE UTILITY INVERTS. VERIFY EXISTING ELEVATIONS AND INVERTS PRIOR TO CONSTRUCTION.
- 16. PROVIDE PIPING PENETRATIONS WITH FIRE RATINGS EQUAL TO OR GREATER THAN, THE FIRE RATING OF THE WALL OR FLOOR PENETRATED. COORDINATE PIPE PENETRATIONS WITH CONCRETE CONSTRUCTION. PROVIDE CORE DRILLED PENETRATIONS AT ALL LOCATIONS WHERE CONCRETE OR MASONRY WALLS OR FLOORS HAVE BEEN CONSTRUCTED PRIOR TO PLUMBING PIPING INSTALLATION. CORING SIZES AND LOCATIONS SHALL BE APPROVED BY THE ARCHITECT/ENGINEER. EXTEND SLEEVES 2" ABOVE FLOOR SLAB IN ALL WET AREAS SUCH AS MECHANICAL ROOMS AND WASH AREA.
- 17. PROVIDE FLUSH TYPE ACCESS DOORS OR PANELS FOR ALL VALVES OR APPARATUS LOCATED IN CHASES, WALLS, NON ACCESSIBLE CEILINGS OR FLOOR.
- 18. PROVIDE CLEANOUTS FOR ALL HORIZONTAL STORM AND SANITARY PIPING AT EVERY CHANGE IN DIRECTION AND AT THE BASE OF ALL STACKS.
- 19. PROVIDE PIPE IDENTIFICATION LABELS WITH DIRECTIONAL FLOW ARROWS ON ALL HORIZONTAL RUNS EVERY 20ft.
- 20. SUPPORT ALL PIPING IN CONFORMANCE WITH SPECIFICATIONS AND THE PLUMBING CODE. SEE PLUMBING CODE FOR SPACING REQUIREMENTS.
- 21. PROVIDE BACKFLOW PREVENTION DEVICES ON ALL WATER CONNECTIONS TO HVAC EQUIPMENT AND IRRIGATION SYSTEMS
- 22. PROVIDE WATER HAMMER ARRESTORS ON SUPPLY LINES TO FLUSH VALVES, SOLENOID VALVES AND AUTOMATIC VALVES, . IN CONFORMANCE WITH PDI AND LOCAL ORDINANCES. INSTALL IN ACCESSIBLE LOCATIONS FOR MAINTENANCE
- 23. PROVIDE SHUT-OFF VALVES WITHIN 2ft. OF MAINS ON ALL BRANCH PIPING SERVING PLUMBING FIXTURES, EQUIPMENT OR
- CASEWORK, CONNECT SERVICE BRANCHES TO TOP OF MAINS.
- 24. PROVIDE DRAIN VALVES AND HOSE CONNECTIONS AT ALL LOW POINTS IN SERVICE PIPING SYSTEM 25. SLOPE ALL PIPING IN CONFORMANCE WITH SPECIFICATIONS AND THE PLUMBING CODE
- 26. PROVIDE CLOSED CELL MOLDED VINYL INSULATION ON EXPOSED LAVATORY DRAINS AND SUPPLIES FOR HANDICAPPED
- 27. PROVIDE PIPING MATERIAL IN CONFORMANCE WITH THE SPECIFICATIONS AND THE PLUMBING CODE
- 28. TEST ALL PLUMBING SYSTEMS IN CONFORMANCE WITH THE SPECIFICATIONS AND THE PLUMBING CODE
- 29. DISINFECT DOMESTIC WATER SYSTEM IN CONFORMANCE WITH THE SPECIFICATIONS AND THE PLUMBING CODE 30. INSTALL PLUMBING FIXTURES AND EQUIPMENT IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS AND THE PLUMBING CODE
- 31. PROVIDE PIPE SLEEVES THROUGH CONCRETE BEAMS WHERE REQUIRED, COORDINATE WITH THE ARCHITECTURAL AND STRUCTURAL DRAWINGS
- 32. PROVIDE RETENTION STRAPES ON ALL ABOVE & BELOW GROUND CAST IRON NO-HUB FITTINGS AT CHANGE OF DIRECTION IN PIPES OF 5" AND LARGER AS REQUIRED BY CISPI 301. (SEE DETAIL ON DRAWING P501)
- 33. THE FIRE PROTECTION CONTRACTOR SHALL REVIEW THE ARCHITECTURAL REFLECTED CEILING, ELEVATION AND SECTION PLANS AS PART OF THIS CONTRACT FOR ADDITIONAL INFORMATION SUCH AS CEILING HEIGHTS, TYPES, SOFFITS AND OR OTHER DEVICE LOCATIONS.

		PLUMBING SHEET LIST	Â
	P-001	COVERSHEET	
_	PD-101	PLUMBING FIRST FLOOR PLAN - DEMOLITION (OMITTED)	
	P-101	PLUMBING FIRST FLOOR PLAN (OMITTED))
	P-102	PLUMBING SECOND FLOOR PLAN	
	P-500	DETAILS AND SCHEDULES	







2

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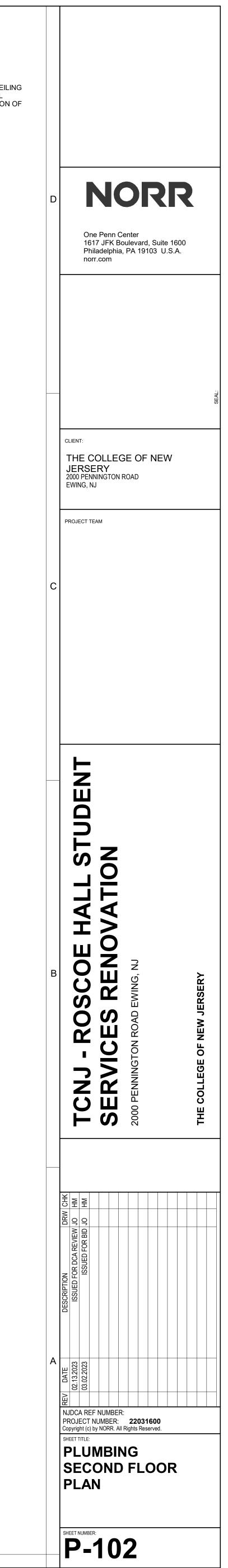
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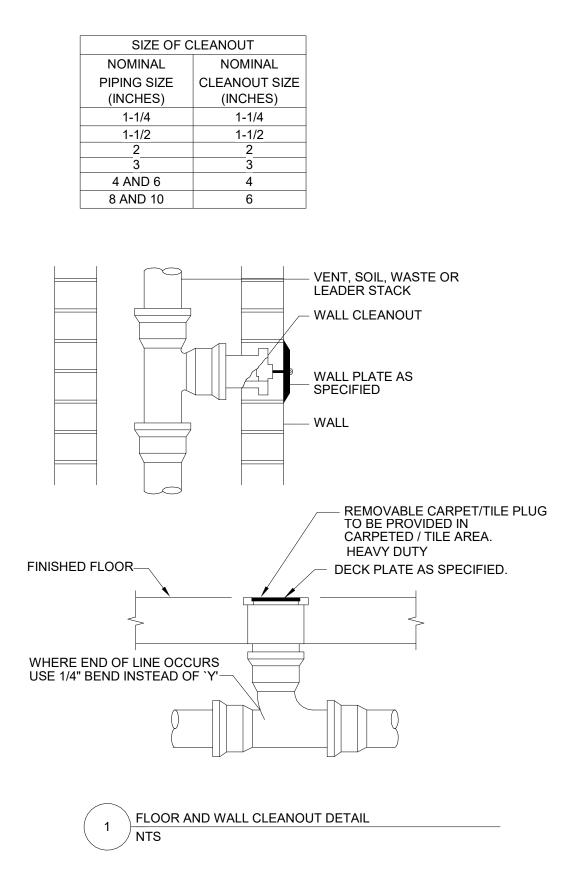
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DRAWING NOTES:

1

1. SANITARY PIPING IS INSTALLED IN THE CEILING OF THE 1ST FLOOR. CONTRACTOR SHALL COORDINATE REMOVAL AND INSTALLATION OF CEILING FOR THIS WORK.





MANUFACTURER & MODEL NUMBER PROFLO - "PLOMOSA" 17-13/16" X 15-15/16"	FAUCET DELTA 101-DST	CARRIER OR SUPPOR	T TRIM	- COLOR	AMPS	VOLTS	EP	CW	нw	SAN	VENT	CW	HW GF	
	DELTA 101-DST	UNDER MOUNTED	LEONARD -270-LF										GF	PM
			MIXING VALVE	STAINLESS STEEL	-	-	-	1/2"	1/2"	2"	2"	.5	.5 0.	9.5 PROVIDE WITH LOW FLOW THREAD AERATOR
		/						l		I	I		I	
LALTY SCHEDULE														
	-	BASIS OF DESIGN (APPROVED MA												
~ /	IALTY SCHEDULE	IALTY SCHEDULE												

PLUM	BING SPECIALTY SCH	EDULE				
		DECODIDEION	BASIS OF DESIGN (APF	PROVED MANUFACTURERS ARE LISTED IN	SPECIFICATIONS)	
SYMBOL	LOCATION	DESCRIPTION	MANUFACTURER	ТҮРЕ	MODEL	MATER
IWH-1	INSTANTANEOUS WATER HEATER	UNDER COUNTER TANKLESS WATER HEATER	RHEEM	6.0 KW @ 220 V, 25 AMPS.	RTEX-6	-

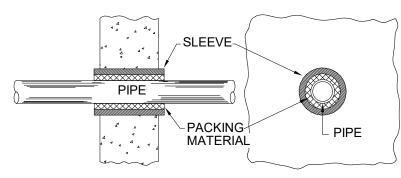
PIPE MATERIAL SCHEDULE

FIFE WATERIAL SCHEDULE	l					
SERVICE	SIZE	MATERIAL	SCHEDULE/	INSULA	TION	REMARKS
SERVICE	SIZE	WATERIAL	TYPE	TYPE	THICK	REWIARKS
UNDERGROUND SANITARY WASTE PIPING	ALL	CAST IRON	SERVICE			HUB AND SPIGOT FITTINGS
ABOVE GROUND SANITARY WASTE AND VENT PIPING	ALL	CAST IRON	SERVICE			HUBLESS FITTINGS
DOMESTIC COLD WATER	ALL	COPPER	TYPE L	FIBER GLASS	2"	1 - 2
DOMESTIC HOT WATER	ALL	COPPER	TYPE L	FIBER GLASS	2"	1 - 2
DOMESTIC HOT WATER RETURN	ALL	COPPER	TYPE L	FIBER GLASS	2"	1 - 2
CONDENSATE	ALL	COPPER	TYPE L			3

NOTES: 1. PROVIDE SOLDER FITTINGS AND JOINTS. 2. PROVIDE ALL WITH ALUMINUM JACKETING. 3. PROVIDE WITH 3/4" ARMAFLEX INSULATION

NOTES:

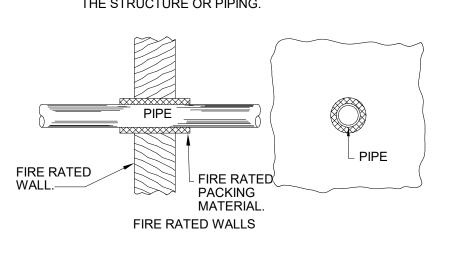
- NO STRUCTURAL STRAIN SHOULD BE TRANSMITTED FROM ANY WALL TO THE PIPING SYSTEM. THE SLEEVING, RELIEVING ARCH, OR STRUCTURAL BEAM SUPPORT METHODS PROTECT THE PIPING FROM SUPERIMOSED LOADS. THE "PACKING" MATERIAL AROUND THE PIPE IS FLEXIBLE ENOUGH TO RESPOND TO SETTLING IN THE STRUCTURE OR PIPING.
- 2. FIRE RATED PACKING MATERIAL TO BE BY 3M. CAULK CP 25N/S
- 3. FOR ALL PIPING PASSING THRU MEZZANINE FLOOR PACK WITH 3M, CAULK CP255/L
- 4. SEE ARCHITECTURAL DRAWINGS FOR FIRE RATED WALLS.



CONCRETE AND FOUNDATION WALLS

NOTE: NOTE. NO STRUCTURAL STRAIN SHOULD BE TRANSMITTED FROM ANY WALL TO THE PIPING SYSTEM. THE SLEEVING, RELIEVING ARCH, OR STRUCTURAL BEAM SUPPORT METHODS PROTECT THE PIPING FROM SUPERIMOSED LOADS. THE "PACKING" MATERIAL AROUND THE PIPE IS FLEXIBLE ENOUGH TO RESPOND TO SETTLING IN THE STRUCTURE OR PIPING.

3



2 PIPE THRU WALL DETAIL NTS

4

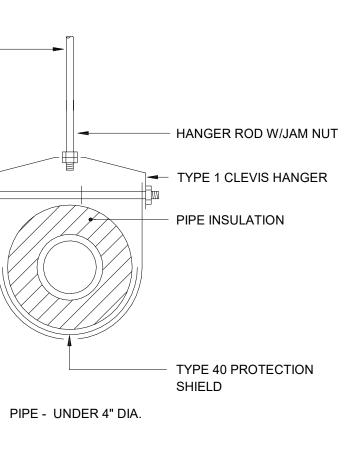
CONTRACTOR SHALL VERIFY LOCATION OF WATER DISPENSER ON REFRIGERATOR WITH ARCHITECTURAL ELEVATIONS. 1/2" CW 🗕 1 1/4" V 🗕 1/2"HW

TO "C" CLAMP----

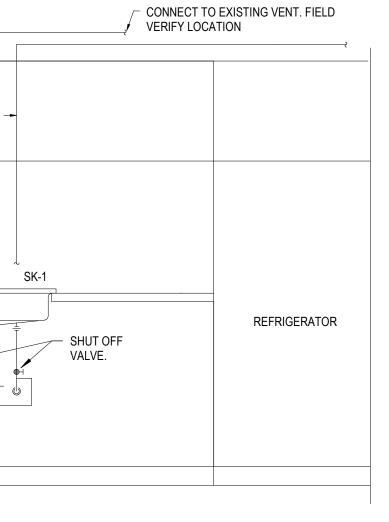
5 KITCHENETTE - DETAIL NTS

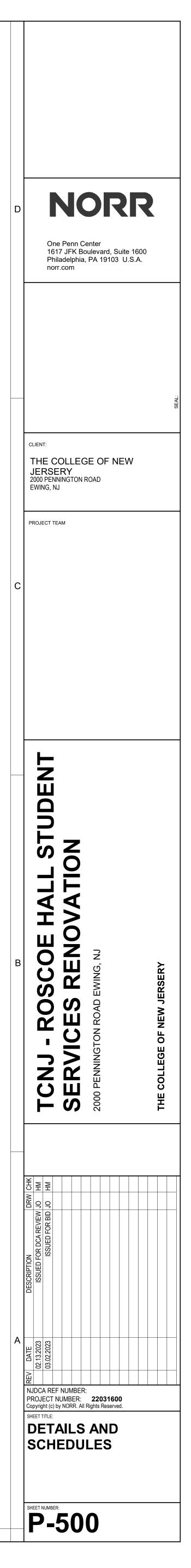
MODEL #	SYMBOL	FIXTURE UNIT RATING
5005	A	1-11
5010	B	12-32
5020	C	33-60
5030	D	61-113
5040	E	114-154
5050	F	155-330
 INSTALL IN I NEVER UPSI FLOW IF POS SHOWN ABO LOCATE (WH BATTERIES (20-FEET OF THE LAST AN FOR BATTEL OVER 20-FEE INSTALLED. FOR BATTEL OVER 20-FEE INSTALLED. HAVE A COM GREATER TH THE ENTIRE THE LAST AN BRANCH LIN LOCATED AT ARE EQUAL ON HOT WA LENGHT WHI ON A PORTIO SHALL BE LO THE PLUMBI 	HORIZONTAL DE DOWN. IN SSIBLE. SIZE (VE. SINGLE F (A) JUST BEF(DF FIXTURES LESS. LOCAT ID NEXT TO L RY OF FIXTUF THE TWO HYD BINED FIXTUF ID NEXT TO L BINED FIXTUF BRANCH LINE ID NEXT TO L E. THE OTHE THE BRANCH LENGHT OF F TER BRANCH ERE PLUMBIN DN OF THE LII DCATED AT A NG FIXTURES CCESS PANEL	1M CERTIFICATION. OR VERTICAL POSITION, BUT ISTALL IN LINE WITH WATER THE UNITS PER THE TABLES IXTURES OR APPLIANCES - ORE THE FIXTURE VALVE. - LENGTH OF BATTERY TED HYDROTROL BETWEEN AST FIXTURES. RES HAVING A BRANCH LINE TWO HYDROTROLS SHALL BE OROTROLS SELCTED SHALL RE UNIT RATING EQUAL TO OF AL FIXTURE UNIT DEMAND OF E. LOCATED ONE BETWEEN AST FIXTURES ON THE R HYDROTROL SHALL BE H MID POINT SO THAT THERE TIPE ON EACH SIDE. LINES OVER 20-FEET IN IG FIXTURES ARE INSTALLED NE THE SECOND HYDROTROL POINT HALF THE DISTANCE OF INSTALLED. .S, COORDINATE WITH THE G.C

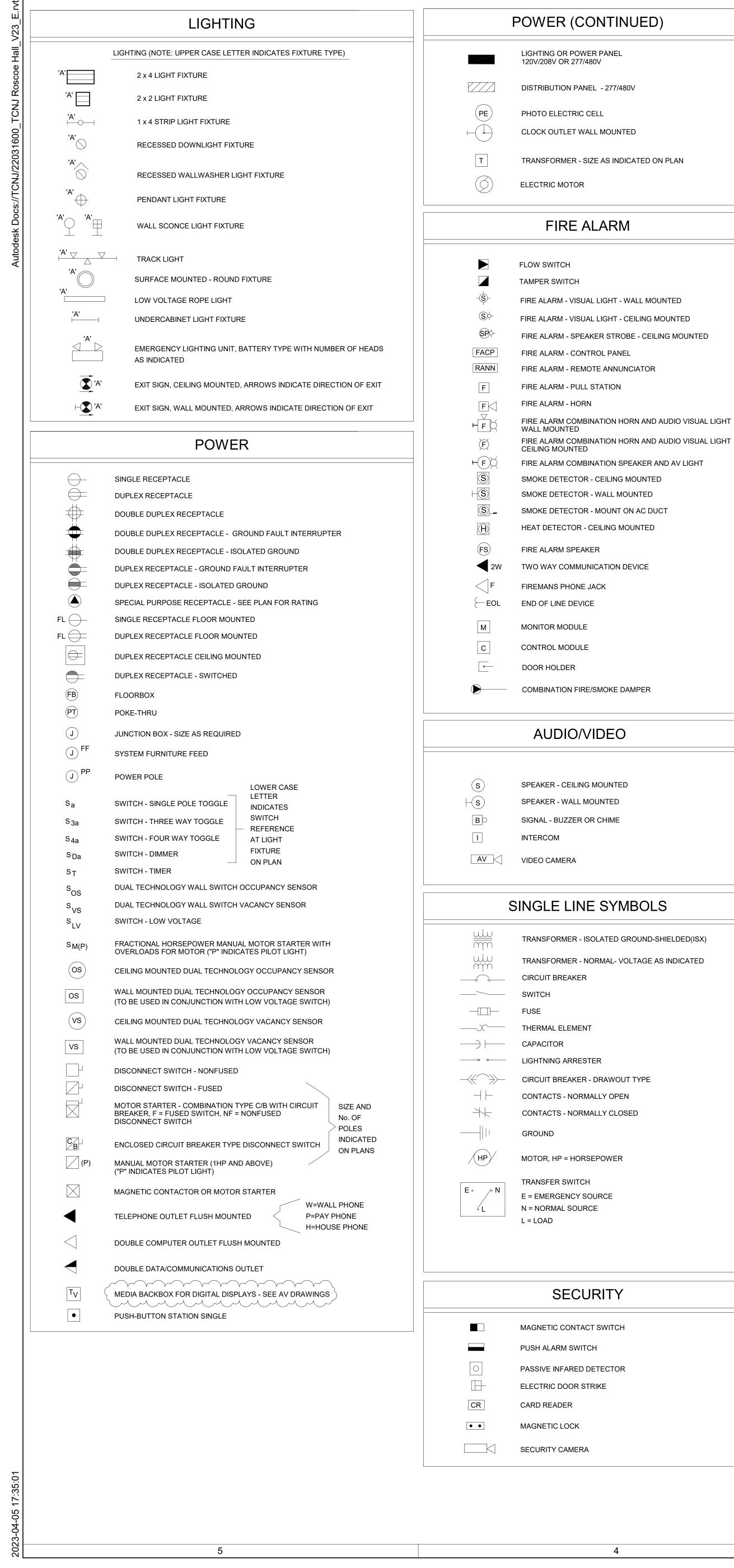
1



3 TYPICAL PIPE HANGER DETAIL NTS







Νι	JEI	D)	

FIRE ALARM COMBINATION HORN AND AUDIO VISUAL LIGHT

AC

AFF

AL

AFG

ATS

AWG

BOC

BFC

CATV

CCTV

CKT

CLG

CO

CP

СТ

CU

DC

DE

DP

DS

DT

EC

EF

EM

EMT

EOL

EUH

EWC

FACP

FDR

GC

GFI

GND

HID

HP

HPS

HT

ΗW

ΗZ

IG

IMC

INC

JB

KCMIL

KVA

KVAR

KW

FA

ECB

E.HTR

CB

CC

OTHERWISE NOTED AND MUST CONFO REQUIREMENTS UNLESS OTHERWISE	
2. CONTRACTOR TO VERIFY FINAL LOCA ARCHITECT AND/OR INTERIOR DESIG	
3. WHERE DEVICES FALL ON TWO SURF DEVICE TO BE ON A SINGLE FINISH. C	
FIRE ALARM GONG AND BELL (WALL MOUNTED)	6'-8" MAX. HT. OR 6" BELOW CLG. WHICHEVER IS LOWER
FIRE ALARM STROBE LIGHT & SIGNALING DEVICES (WALL MOUNTED)	ENTIRE LENS IS NOT LESS THAN 80" AND NOT GREATER 96" AFF. WHERE LOW CEILINGS DO NOT PERMIT MOUNTING AT MIN. 80", DEVICE SHALL BE MOUNTED WITHIN 6" OF THE CEILING.
TOP OF LIGHTING AND/OR POWER PANELS IN COMMON BUILDING SPACES TOP OF TELEPHONE CABINET(MAXIMUM)	6' - 2" AFF
TOP OF LIGHTING AND/OR POWER PANELS IN LIVING UNITS	4' - 6" AFF TO HIGHEST OPERABLE DEVICE
TOP OF BACK MOUNTED EXIT FIXTURE (NOT LOCATED ABOVE DOORS)	12" BELOW FINISHED CEILING TO CENTERLINE
TOP OF SAFETY DISCONNECT SWITCH, CONTACTORS, MAGNETIC MOTOR STARTERS	6' - 0" MAXIMUM AFF
'++'	6" BELOW FINISHED CEILING
'+'	4' - 0" AFF OR 6" ABOVE COUNTER
Ų.	BELOW COUNTER
TELEPHONE (TOP OF COIN SLOT) TELEPHONE OUTLET (WALL), LIGHT SWITCHES	3' - 6" AFF
MANUAL CONTROL DEVICES, FIRE ALARM PULL STATION, FIRE PHONE JACKS	3' - 6" AFF
RECEPTACLES, TELEPHONE OUTLETS (DESK) TELEVISION OUTLETS COMPUTER OUTLETS	1' - 6" (MIN.) AFF
FINISHED FLOOR ELEV. (BASE)	0' - 0"

MOUNTING HEIGHTS

AMPERE(S)	LP	
	LPS	LOW PRESSURE SODIUM
AMP FRAME ABOVE FINISHED FLOOR	MATV	MASTER ANTENNA TELEVISION MECHANICAL CONTRACTOR
ABOVE FINISHED GRADE	MC	MOTOR CONTROL CENTER
ALUMINUM	MCC MCM	THOUSAND CIRCULAR MIL(S)
AMP TRIP	MAGSTR	MAGNETIC STARTER
AUTOMATIC TRANSFER SWITCH	MH	MAGNETIC STARTER
AMERICAN WIRE GUAGE	MIC	MICROPHONE
BOTTOM OF CONDUIT	MTD	MOUNTED
BELOW FINISHED CEILING	MTG	MOUNTING
CONDUIT	MTC	MOTOR
CABLE TELEVISION	MUH	MAKE-UP AIR UNIT
CIRCUIT BREAKER	NC	NORMALLY CLOSED
CONTROL CABINET	NF	NONFUSED
CLOSED CIRCUIT TELEVISION	NIC	NOT IN CONTRACT
CIRCUIT	NL	NIGHT LIGHT
CEILING	NO	NORMALLY OPEN
CONDUIT ONLY	NTS	NOT TO SCALE
CONTROL PANEL	OL	OVERLOAD ELEMENT
CURRENT TRANSFORMER	PC	PLUMBING CONTRACTOR
COPPER	PE	PHOTO ELECTRIC CELL
DIRECT CURRENT	PF	POWER FACTOR
DUAL ELEMENT	PL	PILOT LIGHT
DOUBLE POLE	PP	POWER PANEL
DISCONNECT SWITCH	PRI	PRIMARY
DOUBLE THROW	PS	PULL SWITCH
ELECTRICAL CONTRACTOR	PTZ	PAN/TILT/ZOOM CAMERA
ENCLOSED CIRCUIT BREAKER	R	RELAY
EXHAUST FAN	RC	REMOTE CONTROL
ELECTRIC HEATER	RCP	REFLECTED CEILING PLAN
EMERGENCY LIGHTING	RECPT	RECEPTACLE
ELECTRICAL METALLIC TUBING	SATV	SATELLITE ANTENNA TELEVISION
END OF LINE RESISTOR	SEC	SECONDARY
ELECTRIC UNIT HEATER	SP	SINGLE POLE
ELECTRIC WATER COOLER	SPKR	SPEAKER
FUSED	ST	SHUNT TRIP
FIRE ALARM	SW	SWITCH
FIRE ALARM CONTROL PANEL	SWBD	SWITCHBOARD
FEEDER	T	TELEPHONE
FLOOR	TC	
	TD	
	TDC	
	TDO	
	TV	TELEVISION
HORSEPOWER	TYP	
HIGH PRESSURE SODIUM ELECTRIC HEAT TRACE	UFD UG	UNDERFLOOR DUCT UNDER GROUND
HEAVYWALL RIGID CONDUIT	UH	UNIT HEATER
HERTZ(FREQ. IN CYCLES PER SECOND)	UON	UNLESS OTHERWISE NOTED
INTERCOM	V	VOLTS
ISOLATED GROUND	V VA	VOLTS VOLT AMPERE(S)
INTERMEDIATE METALLIC CONDUIT	VAR	VOLT AMPS REACTIVE
INCANDESCENT	VP	VAPOR PROOF
JUNCTION BOX	W	WATTS
THOUSAND CIRCULAR MIL(S)	WP	WEATHERPROOF
KILOVOLT AMPERE(S)	XFMR	TRANSFORMER
KILOVAR(S)	XP	EXPLOSION PROOF
KILOWATT(S)		-
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	ELECTRICAL SHEET LIST
GENERAL	E001 ELECTRICAL COVER SHEET
	ED100 BASEMENT FLOOR DEMOLITION PLAN
ALL EQUIPMENT AND DEVICES SHOWN ON PLANS SHALL	ED101 FIRST FLOOR DEMOLITION PLAN (OMITTED)
BE NEW AND BY DIVISION 26 CONTRACTOR, UON.	ED102 SECOND FLOOR DEMOLITION PLAN
(EX) EXISTING EQUIPMENT TO REMAIN	ED103 PENTHOUSE FLOOR DEMOLITION PLAN
(R) EXISTING EQUIPMENT TO BE REMOVED	E101 FIRST FLOOR POWER & SYSTEMS PLAN (OMITTED)
	E102 SECOND FLOOR POWER & SYSTEMS PLAN
(ER) EXISTING EQUIPMENT TO BE RELOCATED	E103 PENTHOUSE FLOOR POWER & SYSTEMS PLAN
(RE) RELOCATED EXISTING EQUIPMENT	E201 FIRST FLOOR LIGHTING PLAN (OMITTED)
TERMINATION POINT OF DEMOLITION	E202 SECOND FLOOR LIGHTING PLAN
	E301 FIRST FLOOR HVAC POWER & FIRE ALARM PLAN (OMITTED)
	E302 SECOND FLOOR HVAC POWER & FIRE ALARM PLAN
KEY NOTE	E303 PENTHOUSE FLOOR HVAC POWER & FIRE ALARM PLAN
DETAIL CALL OUT	E501 ELECTRICAL DETAILS
EXXX	E600 ELECTRICAL SINGLE LINE DIAGRAM
	E601 RISER DIAGRAMS AND SCHEDULES
	E700 PANEL SCHEDULES
LIFE SAFETY SCOPE OF WORK	
 THE ELECTRICAL CONTRACTOR SHALL SUPPLY AND INSTALL ALL FIRE ALARM DEVICES INCLUDING BUT NOT LIMITED TO: 	
A. PULL STATIONS - ADDRESSABLE TYPE	
B. SMOKE DETECTORS - ADDRESSABLE TYPE	
C. STROBE LIGHTS - (WALL MOUNTED) ADA TYPE - 80" A.F.F.	
D. SPEAKERS - SET TO 15Db ABOVE AMBIENT SOUND.	
E. WIRING FROM ALL DEVICES TO THE FACP	

G. WIRING FROM THE FACP TO FLOW AND TAMPER SWITCHES INCLUDING ADDRESSABLE MODULES. 2. ELECTRICAL CONTRACTOR SHALL INCLUDE ALL FIRE ALARM MANUFACTURER'S TECHNICIAN TIME IN BASE PRICE. 3. ELECTRICAL CONTRACTOR SHALL INCLUDE FEES FOR ALL TESTING INCLUDING LOCAL FIRE DEPARTMENT SMOKE TEST IN BASE PRICE. 4. ELECTRICAL CONTRACTOR SHALL INCLUDE ALL DEMOLITION AND REWIRING AS NECESSARY TO MAINTAIN THE INTEGRITY OF THE FIRE ALARM SYSTEM DURING CONSTRUCTION. 5. EXISTING FIRE ALARM STROBE LIGHTS ARE NOT TO BE REMOVED UNTIL NEW STROBE LIGHTS ARE INSTALLED. 6. ALL FIRE ALARM DEVICES, PANELS, POWER SUPPLIES, AMPLIFIERS AND WIRING SHALL BE BY NOTIFIER/HONEYWELL OR APPROVED COMPATIBLE ALTERNATE OF THE EXISTING SYSTEM, AND MUST BE U.L. LISTED FOR THE SYSTEM.

EXISTING ADDRESSABLE LOOP AS REQUIRED). 8. ELECTRICAL CONTRACTOR SHALL SUPPLY AND INSTALL NEW STROBE LIGHT POWER SUPPLY AND SPEAKER AMPLIFIERS AS REQUIRED INCLUDING ALL WIRING, CONTROL MODULES, HARDWARE AND SOFTWARE.

PROGRAM LOADED INTO THE EXISTING FIRE ALARM SYSTEM FOR A COMPLETE OPERATIONAL SYSTEM.

NATIONAL ELECTRICAL CODE. 11. THE CONTRACTOR SHALL SUPPLY AND INSTALL ALL WIRING AND DEVICES TO PROVIDE A COMPLETE, OPERATING, AND APPROVED SYSTEM.

LEGEND NOTES

THIS SHEET IS A GENERAL LIST OF SYMBOLS AND ABBREVIATIONS AND SHALL BE USED AS A DICTIONARY TO DEFINE ITEMS INDICATED ON DRAWINGS. NOT ALL SYMBOLS OR ABBREVIATIONS ARE NECESSARILY USED ON THIS PROJECT.

F. WIRING FROM THE FACP TO THE REMOTE ANNUNCIATOR

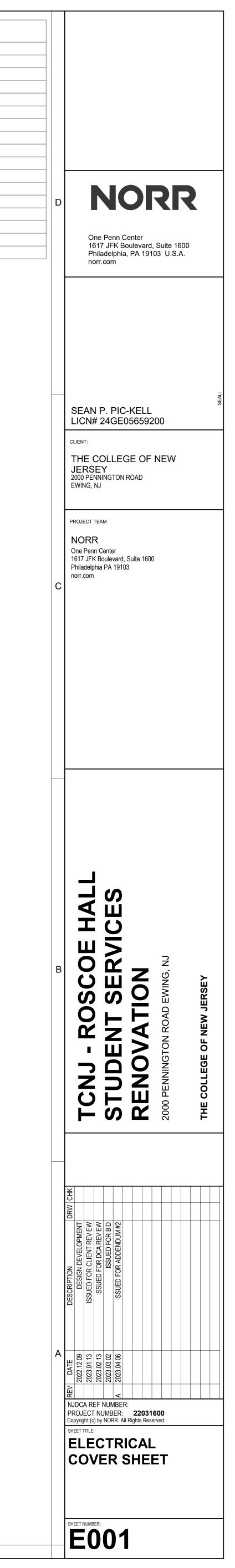
ELECTRICAL CONTRACTOR SHALL UTILIZE THE EXISTING ADDRESSABLE FACP AND INSTALL A NEW 3/C #16 SHIELDED LOW IMPEDANCE CABLE FROM THE ADDRESSABLE FACP TO ALL DEVICES (EXTEND THE

9. ELECTRICAL CONTRACTOR SHALL INCLUDE IN BASE PRICE ALL SOFTWARE PROGRAMMING AND FINAL

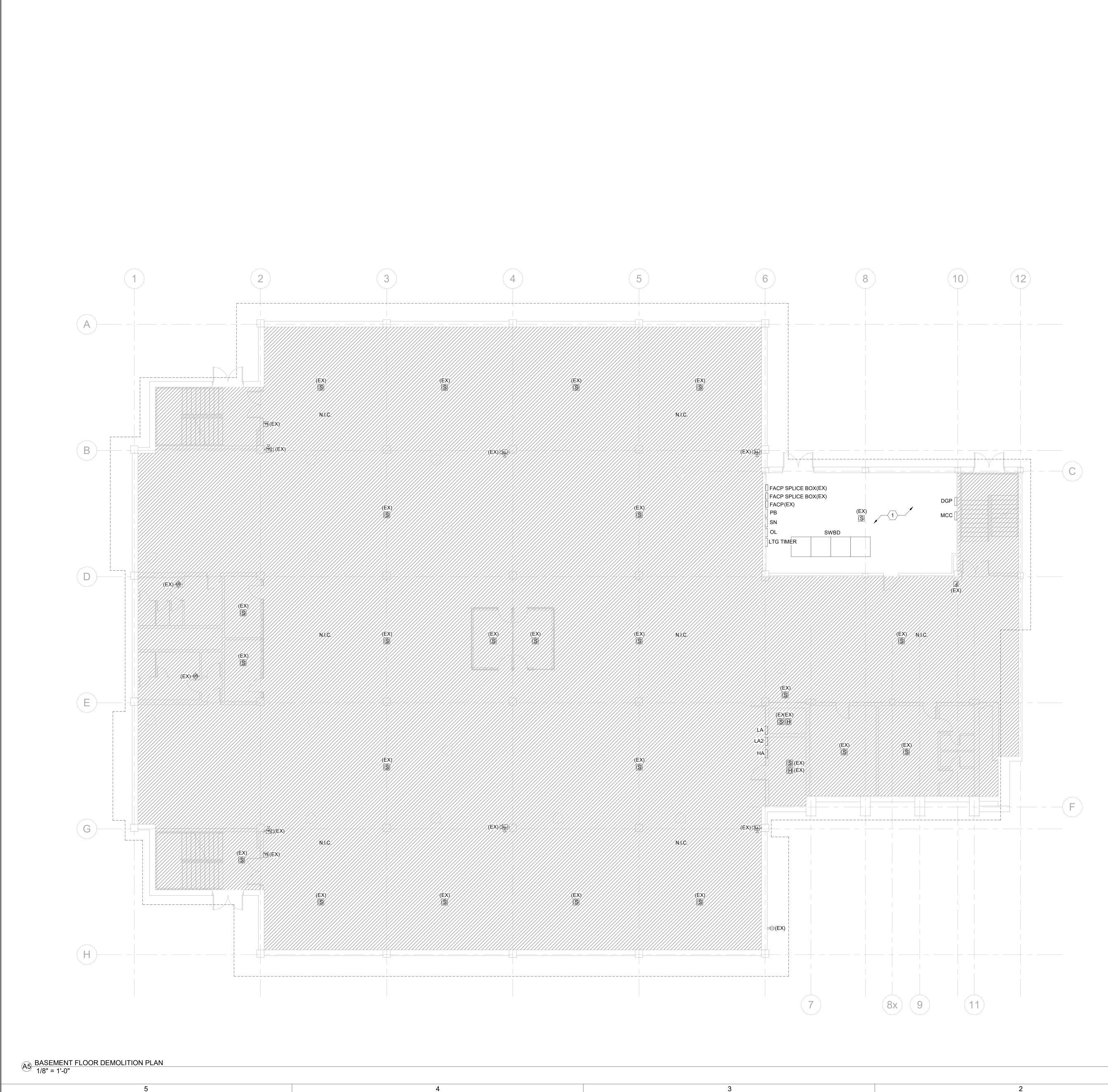
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10. ALL FIRE ALARM WORK SHALL COMPLY WITH THE LOCAL BUILDING CODE, NFPA 72, AND THE







GENERAL DEMOLITION NOTES

A. COORDINATE ALL WORK CONCERNING EXISTING EQUIPMENT AND SERVICES TO REMAIN DE-ENERGIZE CIRCUITS AND MAKE THEM SAFE AS REQUIRED. RECONNECT CIRCUITS THAT ARE TO REMAIN AND ARE DISRUPTED DURING DEMOLITION.

B. REMOVE EXPOSED OR ACCESSIBLE WIRING, TO EQUIPMENT OR OUTLETS TO BE REMOVED, UNLESS OTHERWISE INDICATED. LABEL AND TERMINATE WIRING TO REMAIN.

C. WHERE EXISTING OUTLETS ARE TO REMAIN AND ARE CUT OFF BY THE REMODELING THEY SHALL RE-CONNECTED TO CIRCUITS AS REQUIRED BY JOB CONDITIONS.

D. LEGALLY DISPOSE OF EQUIPMENT WHERE EXISTING EQUIPMENT IS INDICATED TO BE REMOVED. OFFER EQUIPMENT TO OWNER AND DISPOSE OF EQUIPMENT THE OWNER DOES NOT WISH TO RETAIN. PROVIDE DOCUMENTATION INDICATING LEGAL DISPOSAL OR RECYCLING OF MATERIALS REMOVED. RECYCLE FLUORESCENT AND HID LAMPS, PROVIDE DOCUMENTATION.

E. WIRING INDICATED TO BE REMOVED OR SERVING EQUIPMENT TO BE REMOVED SHALL BE REMOVED BACK TO THE SOURCE OR TO THE NEXT JUCNTION POINT IF THE WIRING SERVES OTHER OUTLETS THAT WILL REMAIN. CONDUIT OVER UNDISTURBED CEILINGS SHALL REMAIN AND BE LABELED ABANDONED ON EACH END WITH END POINTS INDICATED.

F. RECONNECT EXISTING CIRCUITRY WHICH ORIGINATES OR PASSES THROUGH THE RENOVATED AREAS BUT SERVES OTHER AREAS NOT BEING RENOVATED. EXTEND THESE CIRCUITS AS MAY BE NECESSARY TO THE EXISTING PANELBOARDS.

G. COORDINATE WORK CONCERNING EXISTING EQUIPMENT AND SERVICES IN THE BUILDING. COORDINATE REQUIRED POWER INTERRUPTIONS AND PERFORM AT TIME CONVENIENT TO OWNER. INCLUDE COSTS FOR REQUIRED PREMIUM TIME.

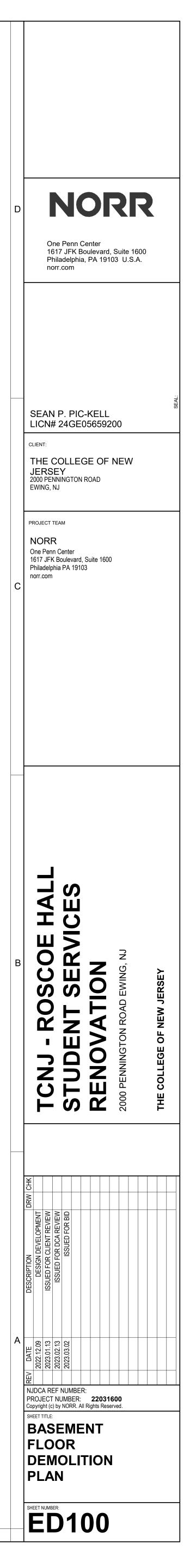
H. VERIFY THE INTEGRITY AND CONDITION OF THE EXISTING BRANCH CIRCUIT WIRING THAT IS TO BE RE-USED. REPLACE WIRING FOUND TO BE NON-FUNCTIONAL,

I. DATA WIRING TO BE REMOVED SHALL BE DEMOLISHED BACK TO SOURCE NETWORK EQUIPMENT; UNUSED CONNECTIONS AT NETWORK EQUIPMENT SHALL BE LABELED AS 'SPARE'. CONDUIT OVER UNDISTURBED CEILINGS ζ shall remain and be labeled abandoned on each end with end points JINDICATED.

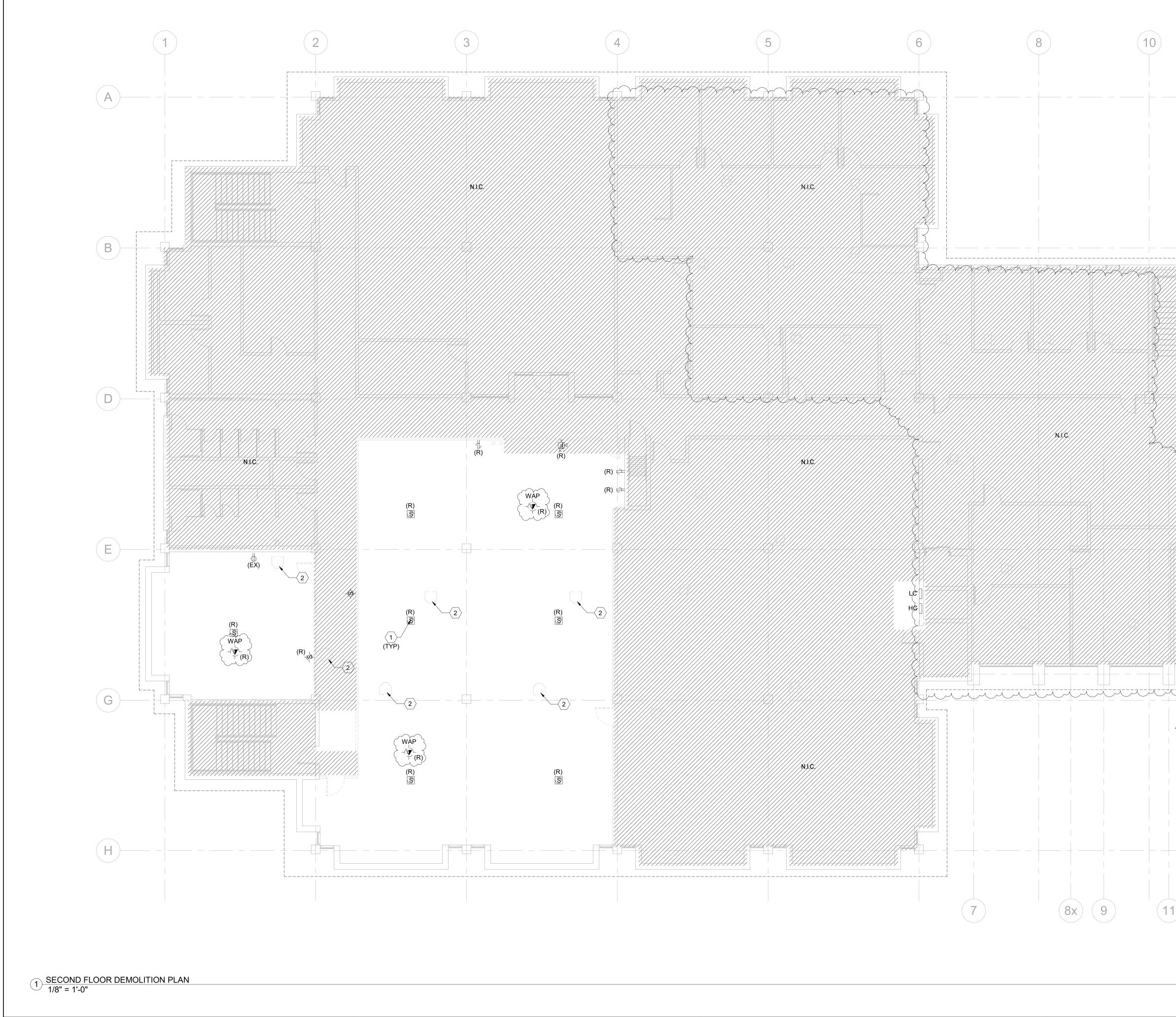
 $^{\succ}$ J. DATA CABLING EXISTING TO REMAIN SHALL BE PROTECTED FROM DAMAGE $\stackrel{\scriptstyle imes}{\scriptstyle \sim}$ COURING CONSTRUCTION. A SURVEY FOR EXISTING DAMAGE SHALL BE $^{\succ}$ conducted prior to demolition; any damaged data cabling shall be $\stackrel{\scriptstyle <}{ au}$ DOCUMENTED AND IMMEDIATELY REPORTED TO OWNER.

ELECTRICAL KEYNOTES

1 ALL ELECTRICAL EQUIPMENT, DEVICES, FEEDERS, CONDUIT, ASSOCIATED CONTROLS, LIGHT FIXTURES, AND LIGHTING CONTROLS ARE EXISTING TO REMAIN WITHIN THIS SPACE. AREA SHOWN FOR COORDINATION WITH OTHER SCOPE ITEMS.







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GENERAL DEMOLITION NOTES

A. COORDINATE ALL WORK CONCERNING EXISTING EQUIPMENT AND SERVICES TO REMAIN DE-ENERGIZE CIRCUITS AND MAKE THEM SAFE AS REQUIRED. RECONNECT CIRCUITS THAT ARE TO REMAIN AND ARE DISRUPTED DURING DEMOLITION.

B. REMOVE EXPOSED OR ACCESSIBLE WIRING, TO EQUIPMENT OR OUTLETS TO BE REMOVED, UNLESS OTHERWISE INDICATED. LABEL AND TERMINATE WIRING TO REMAIN.

C. WHERE EXISTING OUTLETS ARE TO REMAIN AND ARE CUT OFF BY THE REMODELING THEY SHALL RE-CONNECTED TO CIRCUITS AS REQUIRED BY JOB CONDITIONS.

D. LEGALLY DISPOSE OF EQUIPMENT WHERE EXISTING EQUIPMENT IS INDICATED TO BE REMOVED. OFFER EQUIPMENT TO OWNER AND DISPOSE OF EQUIPMENT THE OWNER DOES NOT WISH TO RETAIN. PROVIDE DOCUMENTATION INDICATING LEGAL DISPOSAL OR RECYCLING OF MATERIALS REMOVED. RECYCLE FLUORESCENT AND HID LAMPS, PROVIDE DOCUMENTATION.

E. WIRING INDICATED TO BE REMOVED OR SERVING EQUIPMENT TO BE REMOVED SHALL BE REMOVED BACK TO THE SOURCE OR TO THE NEXT JUCNTION POINT IF THE WIRING SERVES OTHER OUTLETS THAT WILL REMAIN. CONDUIT OVER UNDISTURBED CEILINGS SHALL REMAIN AND BE LABELED ABANDONED ON EACH END WITH END POINTS INDICATED.

F. RECONNECT EXISTING CIRCUITRY WHICH ORIGINATES OR PASSES THROUGH THE RENOVATED AREAS BUT SERVES OTHER AREAS NOT BEING RENOVATED. EXTEND THESE CIRCUITS AS MAY BE NECESSARY TO THE EXISTING PANELBOARDS.

G. COORDINATE WORK CONCERNING EXISTING EQUIPMENT AND SERVICES IN THE BUILDING. COORDINATE REQUIRED POWER INTERRUPTIONS AND PERFORM AT TIME CONVENIENT TO OWNER. INCLUDE COSTS FOR REQUIRED PREMIUM TIME.

H. VERIFY THE INTEGRITY AND CONDITION OF THE EXISTING BRANCH CIRCUIT WIRING THAT IS TO BE RE-USED. REPLACE WIRING FOUND TO BE NON-FUNCTIONAL

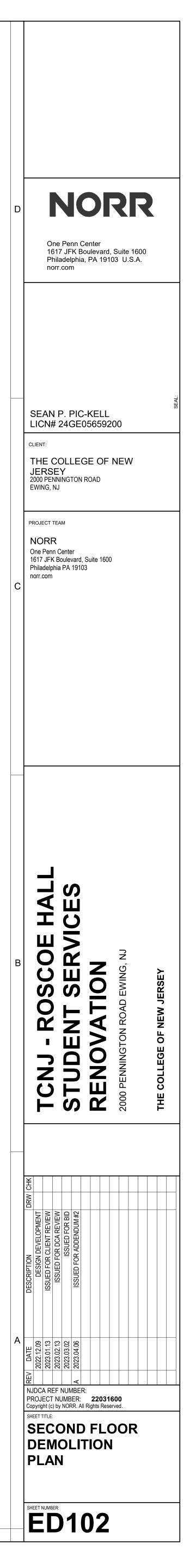
I. DATA WIRING TO BE REMOVED SHALL BE DEMOLISHED BACK TO SOURCE NETWORK EQUIPMENT; UNUSED CONNECTIONS AT NETWORK EQUIPMENT SHALL BE LABELED AS 'SPARE'. CONDUIT OVER UNDISTURBED CEILINGS ζ shall remain and be labeled abandoned on each end with end points JINDICATED.

 $^{\circ}$ J. DATA CABLING EXISTING TO REMAIN SHALL BE PROTECTED FROM DAMAGE $\stackrel{\sim}{
m o}$ DURING CONSTRUCTION. A SURVEY FOR EXISTING DAMAGE SHALL BE $^{\succ}$ conducted prior to demolition; any damaged data cabling shall be $\stackrel{\scriptstyle <}{ au}$ DOCUMENTED AND IMMEDIATELY REPORTED TO OWNER.

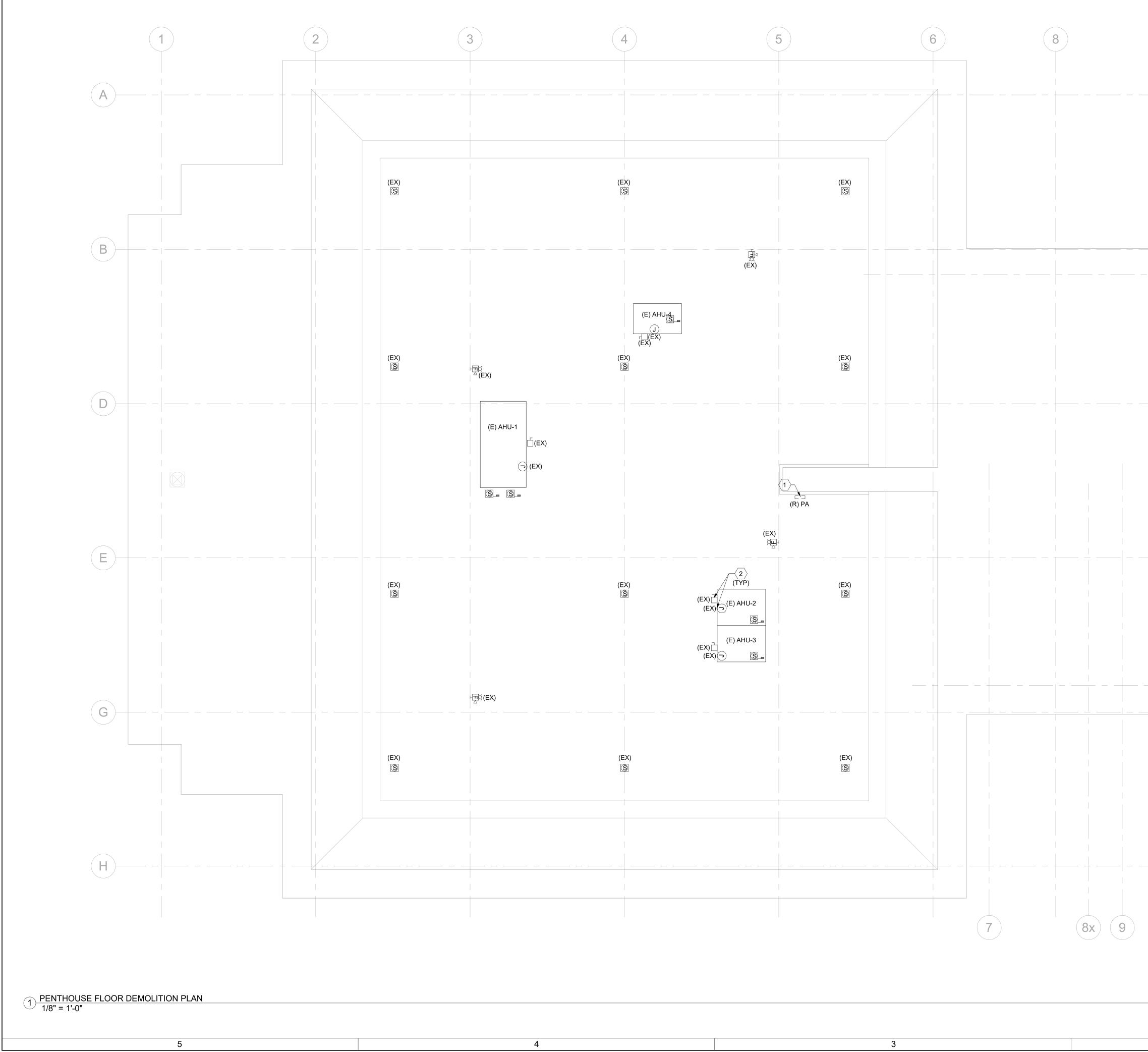
ELECTRICAL KEYNOTES

PANEL, LABEL ANY CIRCUITS AS 'SPARE'.

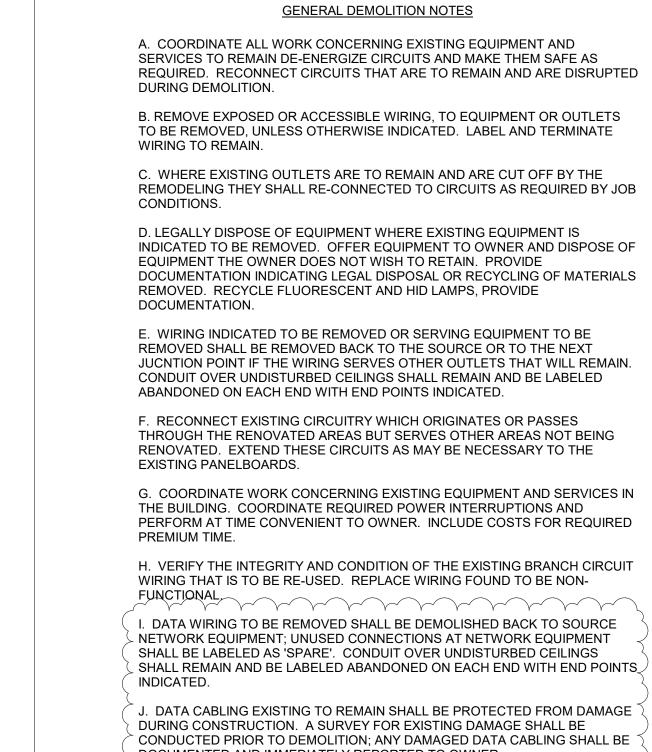
1 DISCONNECT AND REMOVE EXISTING FIRE ALARM DEVICES IN SCOPE, REMOVE CIRCUIT TO NEAREST NAC PANEL OR NEAREST DEVICE TO REMAIN. FIRE ALARM SHALL REMAIN OPERATIONAL THROUGHOUT CONSTRUCTION, COORDINATE DEMOLITION WITH OWNER. 2 DISCONNECT AND REMOVE ANY ASSOCIATED ELECTRICAL EQUIPMENT SERVING HVAC UNIT. REMOVE ALL CONDUIT AND WIRING BACK TO SOURCE







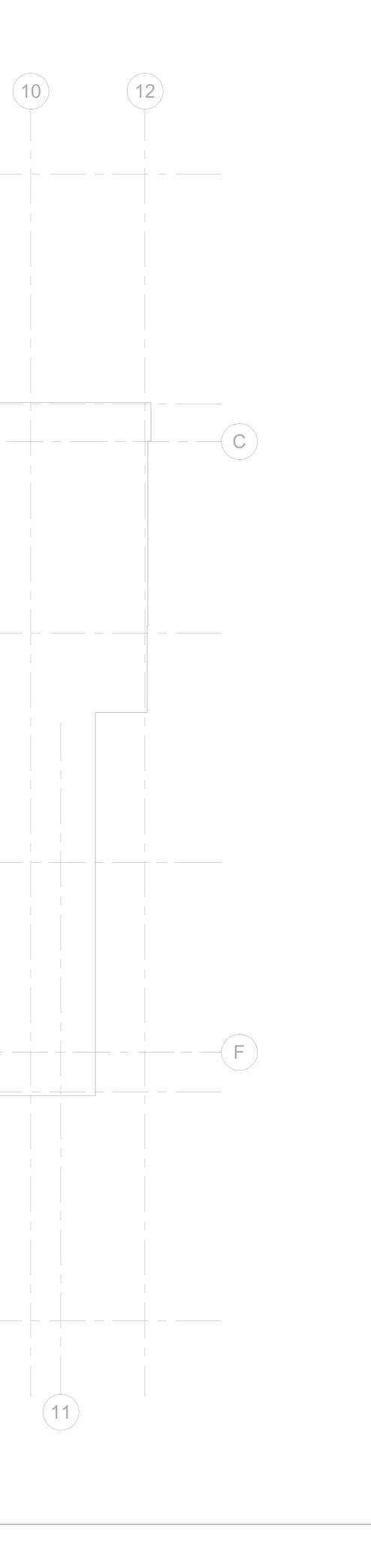
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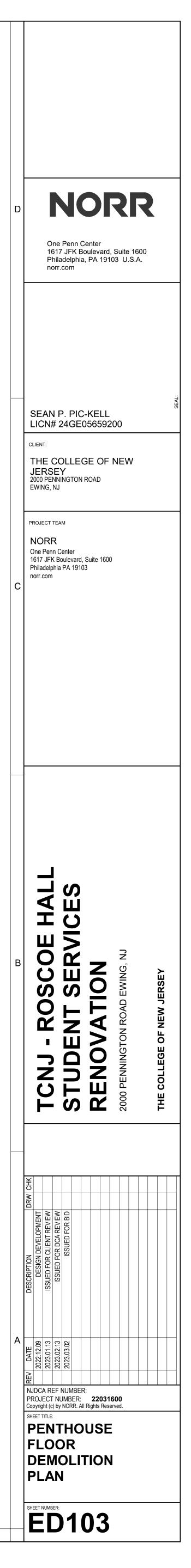


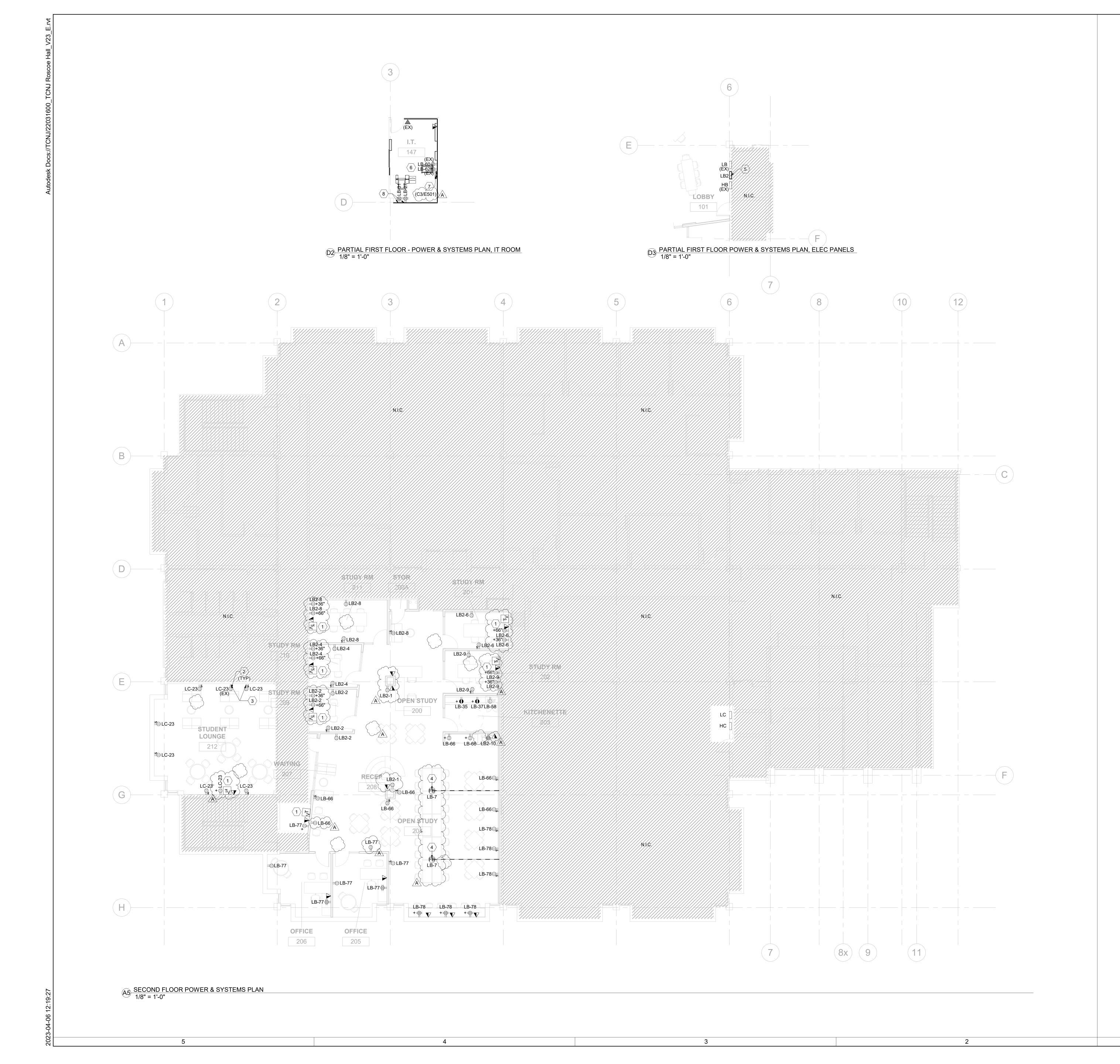


- EXISTING ELECTRICAL PANEL 'PA' FOR PENTHOUSE HVAC EQUIPMENT, TO BE REPLACED. DISCONNECT AND REMOVE PANEL, RETAIN EXISTING BRANCH CIRCUIT FEEDERS AND CONDUIT TO HVAC EQUIPMENT IN AREA FOR NEW WORK.
 EXISTING AHU TO REMAIN. SHUT DOWN AND LOCK OUT POWER AND
- CONTROL CIRCUITS AS REQUIRED FOR DEMOLITION, RETAIN ALL EXISTING CIRCUITRY FOR RE-USE. ALL AHUS ARE POWERED FROM PANEL 'PA' ON THIS PLAN; VERIFY CONTROL CIRCUITING IN FIELD. COORDINATE WORK WITH OTHER TRADES PRIOR TO DEMOLITION.

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GENERAL POWER NOTES

A. FOR ELECTRICAL SYMBOLS, ABBREVIATIONS, REFER TO DRAWING E001.
B. CONTRACTOR SHALL PROVIDE COMPLETE AND ACCURATE CIRCUIT DIRECTORIES FOR ALL NEW AND EXISTING PANELS AFTER NEW WORK IS COMPLETED.

- C. CONTRACTOR SHALL COORDINATE ALL TELE/DATA AND AUDIO/VISUAL PATHWAY REQUIREMENTS WITH DIVISION 27 CONTRACTOR AND SPECIFICATIONS. SEE AUDIO/VISUAL AND TELE/DATA DARWINGS BY OTHERS FOR FURTHER INFORMATION; DEVICES SHOWN FOR COORDINATION ONLY.
- D. PROVIDE A JUNCTION BOX AND PULL STRING FROM EACH CARD READER/ELECTRIC DOOR STRIKE TO SECURITY EQUIPMENT RACK IN IDF ROOM. PROVIDE FIRE ALARM CONTACT AT SECURITY EQUIPMENT RACK FOR CARD READERS/ELECTRIC DOOR TO RELEASE UPON GENERAL ALARM OF FIRE ALARM SYSTEM.
- E. FIRE ALARM SHALL BE OPERATIONAL AND MAINTAINED DURING ALL ASPECTS OF DEMOLITION AND NEW CONSTRUCTION.

F. MAINTAIN THE CONTINUITY OF ALL EXISTING TO REMAIN OUTSIDE THE

- SCOPE OF WORK AREA. G. ALL ELECTRICAL OUTLETS AND JUNCTION BOXES SHALL BE STAGGERED
- WITHIN THE WALL TO AVOID SOUND TRANSMISSION. H. ALL NEW FIRE ALARM DEVICES TO BE CONNECTED TO EXISTING FIRE ALARM SYSTEM. PROVIDE NEW WIRING AND CONDUIT TO ALL NEW FIRE ALARM DEVICES. NEW DEVICES SHALL MATCH EXISTING SYSTEM DEVICES. PROVIDE NEW BATTERIES, STROBE SYNC MODULES, HARDWARE, SOFTWARE, ETC AT THE FIRE ALARM CONTROL PANEL NECESSARY TO SUPPORT NEW
- I. EXACT DEVICE LOCATIONS AND MOUNTING HEIGHTS SHALL BE DETERMINED BY FINAL FURNITURE PLANS, PROVIDED BY OWNER.

FIRE ALARM DEVICES.

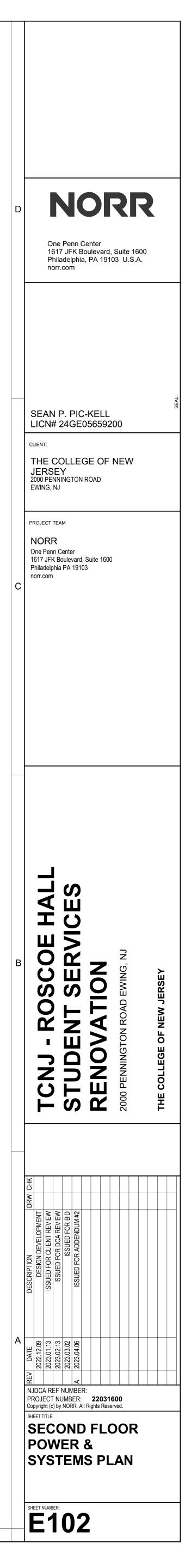
- COORDINATE WITH FURNITURE PLANS PRIOR TO ROUGH-IN. J. REFER TO TELECOMMUNICATIONS RESPONSIBILITY MATRIX IN DIVISION 1 SPECIFICATIONS FOR FURTHER INFORMATION REGARDING TELE-DATA, AUDIO-VIDEO, AND SECURITY SCOPE OF WORK.
- K. EXISTING CABLING TO REMAIN THAT PASSES THROUGH NEW WALL PARTITIONS INSTALLED TO DECK SHALL BE INSTALLED THROUGH NEW RETROFIT SLEEVING ASSEMBLIES TO PENETRATE THE PARTITION. DISCONNECT, REROUTE, AND RECONNECT CABLING THROUGH RETROFIT SLEEVE. CABLING SHALL NOT BE EMBEDDED INTO DRYWALL. RETROFIT

SLEEVING KIT SHALL BE STI SPEC SEAL READY SPLIT SLEEVE, 4".

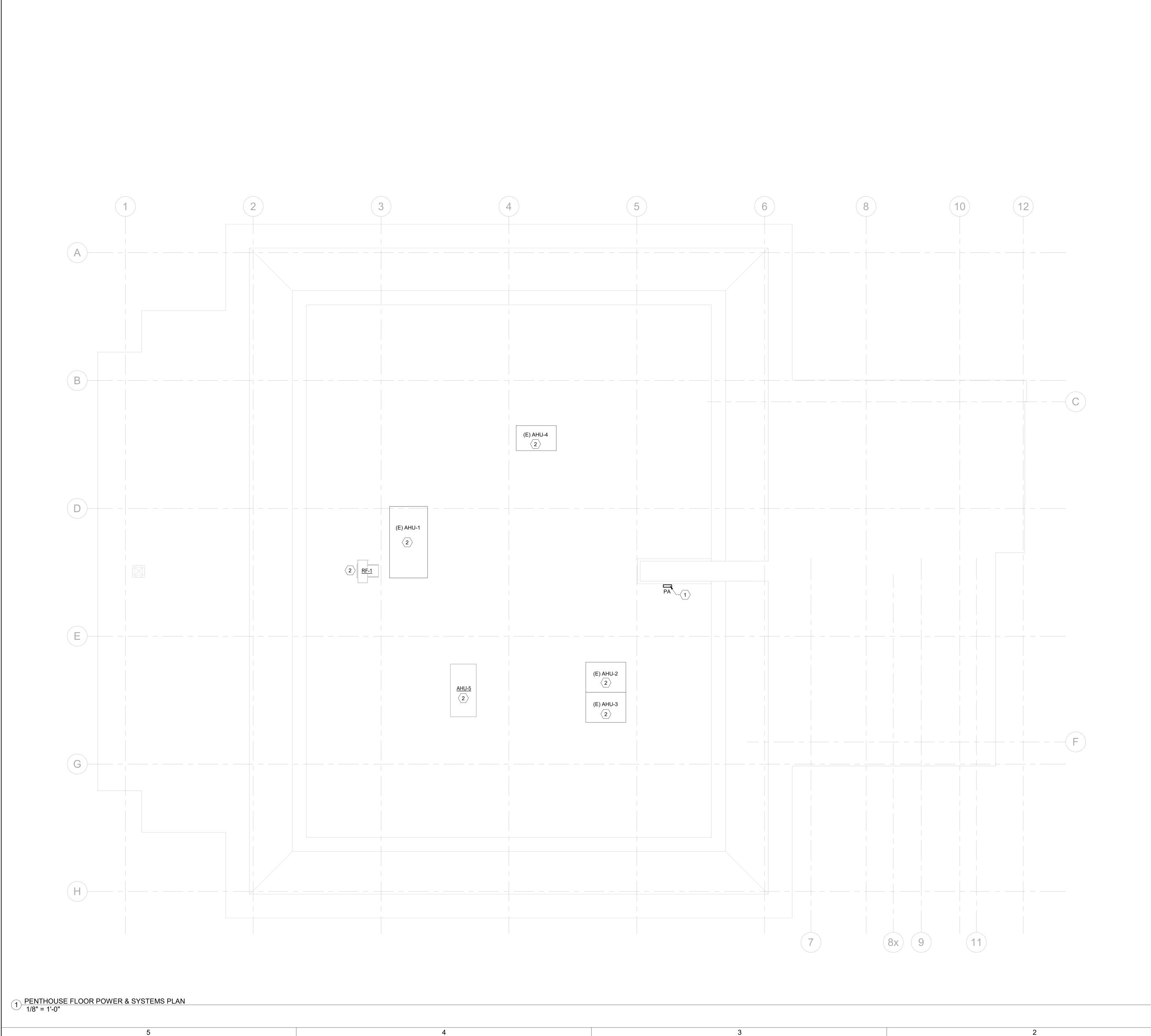
<u>~</u> 1	PROVIDE DUPLEX RECEPTACLE AND (2) SPARE 2"x5" JUNCTION BOXES FOR DISPLAY, MOUNTED WITHIN WALL-BOX. WALL-BOX PROVIDED AND INSTALLED BY E.C., BLOCKING BY G.C.; CONFIRM SPECIFICATIONS WITH DIVISION 27 CONTRACTOR PRIOR TO PURCHASE. PROVIDE 1-1/4"C WITH PULLSTRING FROM EMPTY JUNCTION BOXES UP TO ABOVE ACCESSIBLE CEILING. DATA, AV DEVICES AND CABLING BY OTHERS. VERIFY FINAL MOUNTING HEIGHTS WITH AV/IT DRAWINGS PRIOR TO ROUGH-IN.
2	FOR LINE VOLTAGE DEVICES AND FIXTURES WITH DESIGNATION (EX), DEVICES SHALL RETAIN ORIGINAL CIRCUIT U.O.N. FOR EXISTING DEVICES TO BE RECIRCUITED, PROVIDE NEW FEEDERS AND CONDUIT AND PROVIDE NEW PANEL-CIRCUIT LABEL ON RECEPTACLE COVER PLATE.
3	EXTEND AND REWORK EXISTING CIRCUIT TO NEW DEVICES. PROVIDE NEW FEEDERS AND CONDUIT AS REQUIRED. RE-CONNECT FEEDERS TO NEW BREAKER DESIGNATION AS SHOWN.
4	PROVIDE FURNITURE STYLE POKE-THRU, WIREMOLD MODEL#4FFATC OR APPROVED EQUAL, MOUNTED IN ACCESSIBLE LOCATION. CONNECT POWER FEEDERS TO FURNITURE POWER. PROVIDE (1) 3/4" CONDUIT FOR POWER TO NEAREST FULL-HEIGHT WALL, COORDINATE EXACT ROUTING IN FIELD. COORDINATE POWER REQUIREMENTS WITH FURNITURE VENDOR PRIOR TO INSTALLATION.
5	PROVIDE NEW SUBPANEL IN EXISTING LOCATION. SEE ONE-LINE DIAGRAM AND PANEL SCHEDULES FOR FURTHER INFORMATION.
6	EXISTING IT ROOM TO REMAIN. ALL ITEMS IN THIS SPACE SHALL BE EXISTING TO REMAIN OR BY OTHERS U.O.N., INCLUDING BUT NOT LIMITED TO: ELECTRICAL EQUIPMENT, DEVICES, FEEDERS, CONDUIT, CONTROL WIRING, HVAC EQUIPMENT AND ASSOCIATED CONTROLS, LIGHT FIXTURES AND LIGHTING CONTROLS. SEE TELE/DATA DRAWINGS FOR FURTHER INFORMATION:
7	PROVIDE NEW SECONDARY BUSBAR (SBB) PER DETAIL REFERENCED. PROVIDE NEW TELECOMMUNICATIONS BONDING CONDUCTOR (TBS) SYSTEM FROM PRIMARY BUS BAR (PBB) IN FIRST FLOOR ELECTRICAL ROOM TO SECONDARY BUS BAR IN SECOND FLOOR IT ROOM. BOND SBB TO NEAREST PANEL ON SAME FLOOR (LOCATED NEAR ELEVATOR IN LOBBY 101) PER DETAIL ON E501, VERIFY ROUTING IN FIELD. REFER TO BONDING INFRASTRUCTURE SCHEMATIC ON E501 FOR FURTHER INFORMATION. COOPDINATE POULTING IN FIELD WITH G.C. AND DIVISION

 INFORMATION. COORDINATE ROUTING IN FIELD WITH G.C. AND DIVISION 27 CONTRACTOR PRIOR TO CONSTRUCTION.
 PROVIDE NEW RECEPTACLES FOR NEW SERVER RACK. PROVIDE (2) HOT, (1) NEUTRAL AND (1) GROUND WIRE FOR EACH RECEPTACLE, ALL #10 AWG, FOR FUTURE 208V/30A RECEPTACLES; CAP AND LABEL FEEDERS IN JUNCTION BOX. COORDINATE FINAL LOCATION WITH IT CONTRACTOR.

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GENERAL POWER NOTES

A. FOR ELECTRICAL SYMBOLS, ABBREVIATIONS, REFER TO DRAWING E001.
B. CONTRACTOR SHALL PROVIDE COMPLETE AND ACCURATE CIRCUIT DIRECTORIES FOR ALL NEW AND EXISTING PANELS AFTER NEW WORK IS COMPLETED.

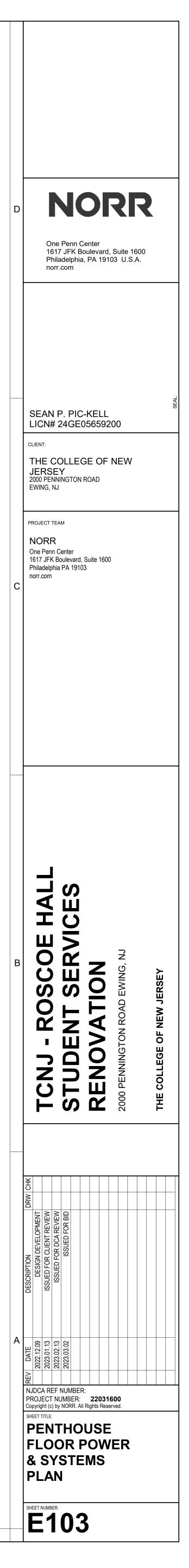
- COMPLETED. C. CONTRACTOR SHALL COORDINATE ALL TELE/DATA AND AUDIO/VISUAL PATHWAY REQUIREMENTS WITH DIVISION 27 CONTRACTOR AND SPECIFICATIONS. SEE AUDIO/VISUAL AND TELE/DATA DARWINGS BY OTHERS FOR FURTHER INFORMATION; DEVICES SHOWN FOR COORDINATION ONLY.
- D. PROVIDE A JUNCTION BOX AND PULL STRING FROM EACH CARD READER/ELECTRIC DOOR STRIKE TO SECURITY EQUIPMENT RACK IN IDF ROOM. PROVIDE FIRE ALARM CONTACT AT SECURITY EQUIPMENT RACK FOR CARD READERS/ELECTRIC DOOR TO RELEASE UPON GENERAL ALARM OF FIRE ALARM SYSTEM.
- E. FIRE ALARM SHALL BE OPERATIONAL AND MAINTAINED DURING ALL ASPECTS OF DEMOLITION AND NEW CONSTRUCTION.F. MAINTAIN THE CONTINUITY OF ALL EXISTING TO REMAIN OUTSIDE THE
- SCOPE OF WORK AREA. G. ALL ELECTRICAL OUTLETS AND JUNCTION BOXES SHALL BE STAGGERED
- WITHIN THE WALL TO AVOID SOUND TRANSMISSION. H. ALL NEW FIRE ALARM DEVICES TO BE CONNECTED TO EXISTING FIRE ALARM SYSTEM. PROVIDE NEW WIRING AND CONDUIT TO ALL NEW FIRE ALARM DEVICES. NEW DEVICES SHALL MATCH EXISTING SYSTEM DEVICES. PROVIDE NEW BATTERIES, STROBE SYNC MODULES, HARDWARE, SOFTWARE, ETC AT THE FIRE ALARM CONTROL PANEL NECESSARY TO SUPPORT NEW
- I. EXACT DEVICE LOCATIONS AND MOUNTING HEIGHTS SHALL BE DETERMINED BY FINAL FURNITURE PLANS, PROVIDED BY OWNER.

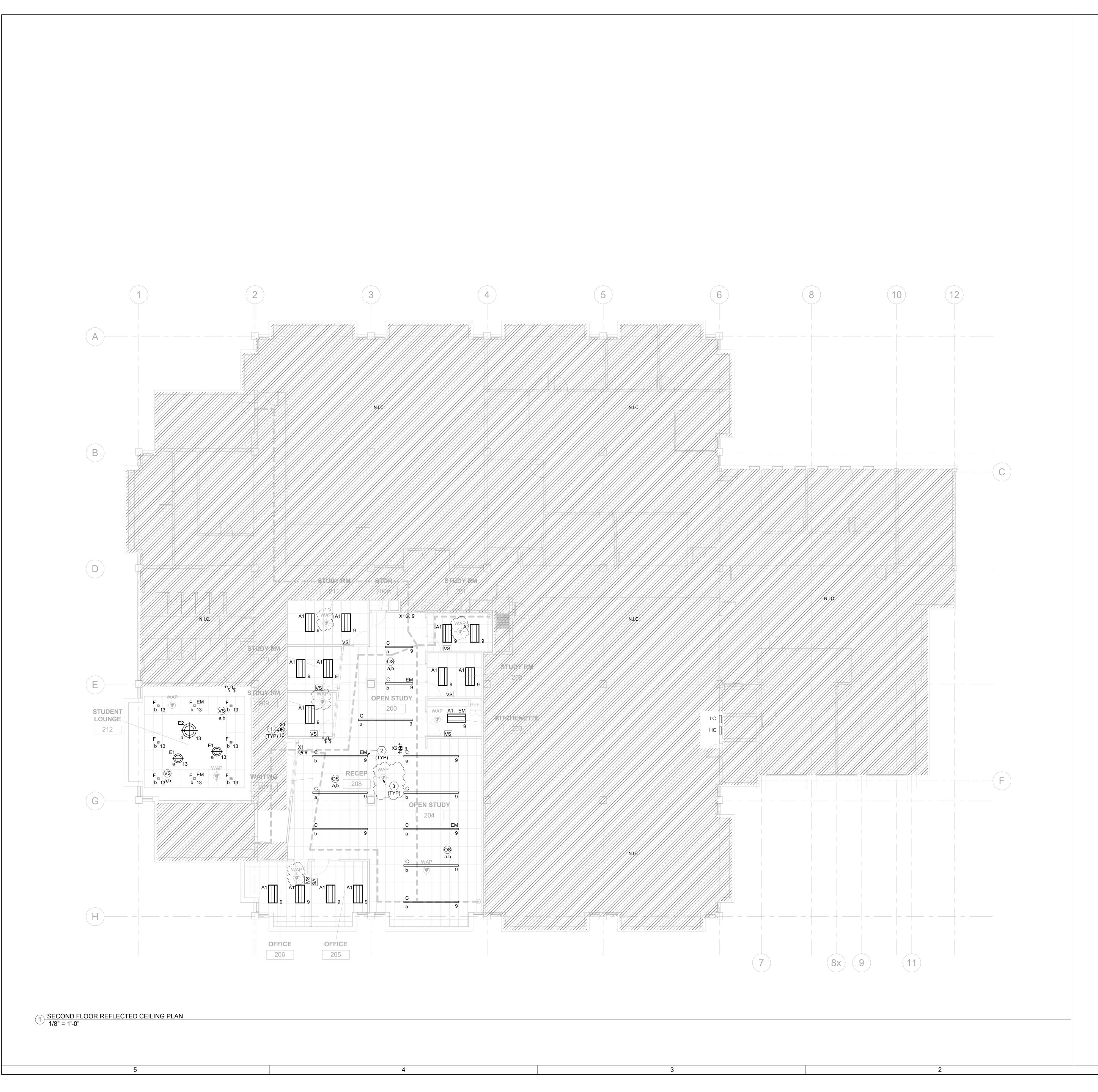
FIRE ALARM DEVICES.

- COORDINATE WITH FURNITURE PLANS PRIOR TO ROUGH-IN. J. REFER TO TELECOMMUNICATIONS RESPONSIBILITY MATRIX IN DIVISION 1 SPECIFICATIONS FOR FURTHER INFORMATION REGARDING TELE-DATA, AUDIO-VIDEO, AND SECURITY SCOPE OF WORK.
- K. EXISTING CABLING TO REMAIN THAT PASSES THROUGH NEW WALL PARTITIONS INSTALLED TO DECK SHALL BE INSTALLED THROUGH NEW RETROFIT SLEEVING ASSEMBLIES TO PENETRATE THE PARTITION. DISCONNECT, REROUTE, AND RECONNECT CABLING THROUGH RETROFIT SLEEVE. CABLING SHALL NOT BE EMBEDDED INTO DRYWALL. RETROFIT SLEEVING KIT SHALL BE STI SPEC SEAL READY SPLIT SLEEVE, 4".

ELECTRICAL KEYNOTES 1 PROVIDE NEW SURFACE-MOUNTED PANEL, SQUARE-D OR APPROVED EQUAL. SEE ONE-LINE DIAGRAMS AND PANEL SCHEDULES FOR FURTHER

INFORMATION. 2 SEE E30x DRAWINGS FOR INFORMATION REGARDING MECHANICAL SCOPE.





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GENERAL LIGHTING NOTES

- A. FOR ELECTRICAL SYMBOLS, ABBREVIATIONS, REFER TO DRAWING E001.
 B. FOR LIGHTING FIXTURE DESCRIPTIONS, REFER TO LIGHTING FIXTURE SCHEDULE ON DRAWING E601.
- C. FOR ACTUAL LOCATION OF CEILING MOUNTED LIGHTING FIXTURES, REFER TO ARCHITECTURAL REFLECTED CEILING DRAWING(S). FOR ACTUAL LOCATION OF WALL MOUNTED LIGHTING FIXTURES AND TASK LIGHTING, REFER TO ARCHITECTURAL ELEVATIONS AND DETAILS.
- D. UNLESS OTHERWISE INDICATED CONNECT ALL NORMAL POWER LIGHTING FIXTURES ON THIS DRAWING TO PANEL 'HC'.

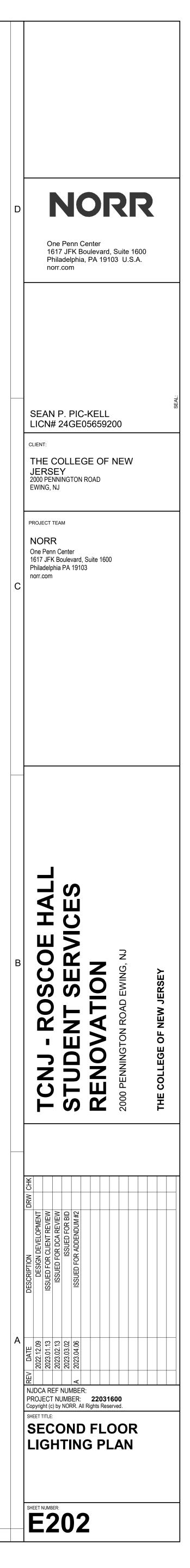
E. CONNECT EXIT SIGNS, EMERGENCY BATTERY UNITS AND EMERGENCY BATTERY BALLAST UNITS TO THE UNSWITCHED SIDE OF LOCAL EMERGENCY LIGHTING CIRCUIT OR CIRCUIT INDICATED, TO MONITOR AC CIRCUIT AND FOR CONTINUOUS BATTERY CHARGING.

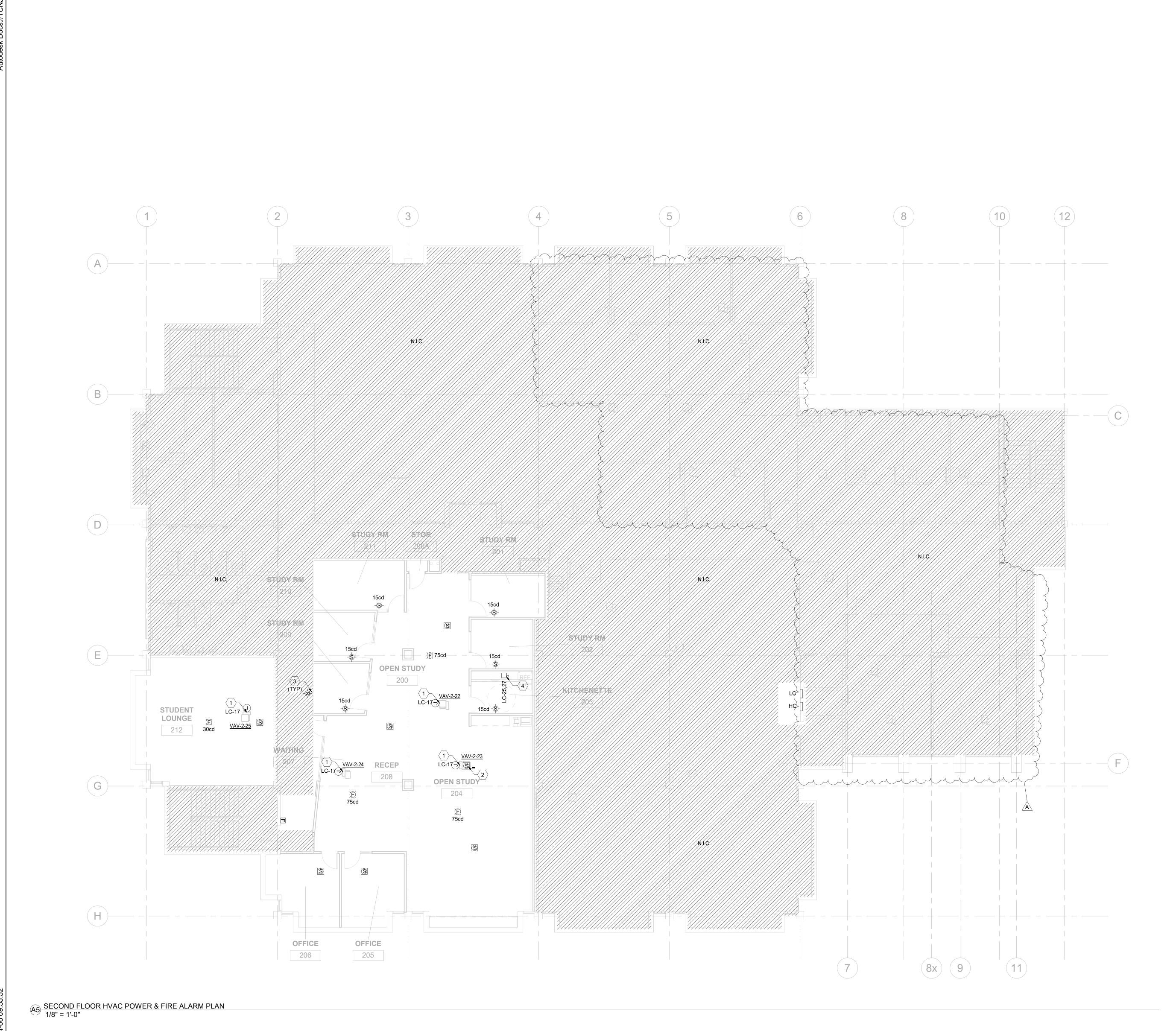
- F. ALL LIGHTING FIXTURES WITHIN A SPACE SHALL BE CONTROLLED BY INDICATED SWITCH AND/OR SENSOR WITHIN THAT SPACE.
- G. THE TOTAL CONNECTED LOAD SHALL NOT EXCEED 1600 WATTS FOR A 20A, 120V CIRCUIT OR 3600W FOR A 20A, 277V CIRCUIT.

H. ALL LUMINAIRES, LIGHTING CONTROL DEVICES, POWER CIRCUITS AND CONTROL WIRING SHOWN ON PLANS SHALL BE NEW AND BY DIVISION 26 CONTRACTOR, UON.

ELECTRICAL KEYNOTES

1	FOR ALL EXIT SIGNS AND FIXTURES LABELED 'NL', FIXTURES SHALL BE ON 24/7 FOR SECURITY AND WIRED AHEAD OF ALL LOCAL SWITCHING CONTROLS.
2	FOR ALL FIXTURES LABELED 'EM', PROVIDE EMERGENCY BATTERY BACKUP IN FIXTURE CAPABLE OF 1400 LUMEN OUTPUT FOR 90 MINUTES. SEE LIGHTING FIXTURE SCHEDULE AND MANUFACTURER SPECIFICATIONS FOR APPROPRIATE MODEL OPTION:
3	CEILING-MOUNTED WIRELESS ACCESS POINT. PROVIDE JUNCTION BOXES AT LOCATIONS IN OPEN OR GWB CEILING ONLY; DEVICE, CABLING, AND INSTALLATION BY OTHERS. DEVICES SHOWN FOR COORDINATION ONLY. COORDINATE LOCATIONS WITH ARCHITECTURAL RCP AND DIVISION 27 CONTRACTOR PRIOR TO CONSTRUCTION.





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GENERAL POWER NOTES

A. FOR ELECTRICAL SYMBOLS, ABBREVIATIONS, REFER TO DRAWING E001.
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- C. CONTRACTOR SHALL COORDINATE ALL TELE/DATA AND AUDIO/VISUAL PATHWAY REQUIREMENTS WITH DIVISION 27 CONTRACTOR AND SPECIFICATIONS. SEE AUDIO/VISUAL AND TELE/DATA DARWINGS BY OTHERS FOR FURTHER INFORMATION; DEVICES SHOWN FOR COORDINATION ONLY.
- D. PROVIDE A JUNCTION BOX AND PULL STRING FROM EACH CARD READER/ELECTRIC DOOR STRIKE TO SECURITY EQUIPMENT RACK IN IDF ROOM. PROVIDE FIRE ALARM CONTACT AT SECURITY EQUIPMENT RACK FOR CARD READERS/ELECTRIC DOOR TO RELEASE UPON GENERAL ALARM OF FIRE ALARM SYSTEM.
- E. FIRE ALARM SHALL BE OPERATIONAL AND MAINTAINED DURING ALL ASPECTS OF DEMOLITION AND NEW CONSTRUCTION.F. MAINTAIN THE CONTINUITY OF ALL EXISTING TO REMAIN OUTSIDE THE
- SCOPE OF WORK AREA. G. ALL ELECTRICAL OUTLETS AND JUNCTION BOXES SHALL BE STAGGERED
- WITHIN THE WALL TO AVOID SOUND TRANSMISSION. H. ALL NEW FIRE ALARM DEVICES TO BE CONNECTED TO EXISTING FIRE ALARM SYSTEM. PROVIDE NEW WIRING AND CONDUIT TO ALL NEW FIRE ALARM DEVICES. NEW DEVICES SHALL MATCH EXISTING SYSTEM DEVICES. PROVIDE NEW BATTERIES, STROBE SYNC MODULES, HARDWARE, SOFTWARE, ETC AT THE FIRE ALARM CONTROL PANEL NECESSARY TO SUPPORT NEW
- I. EXACT DEVICE LOCATIONS AND MOUNTING HEIGHTS SHALL BE DETERMINED BY FINAL FURNITURE PLANS, PROVIDED BY OWNER.

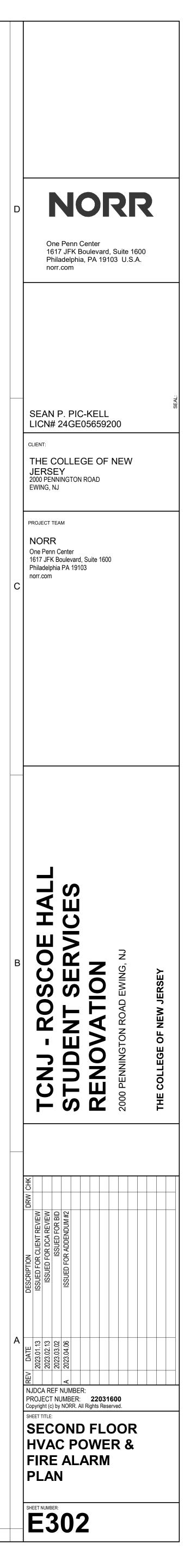
FIRE ALARM DEVICES.

2

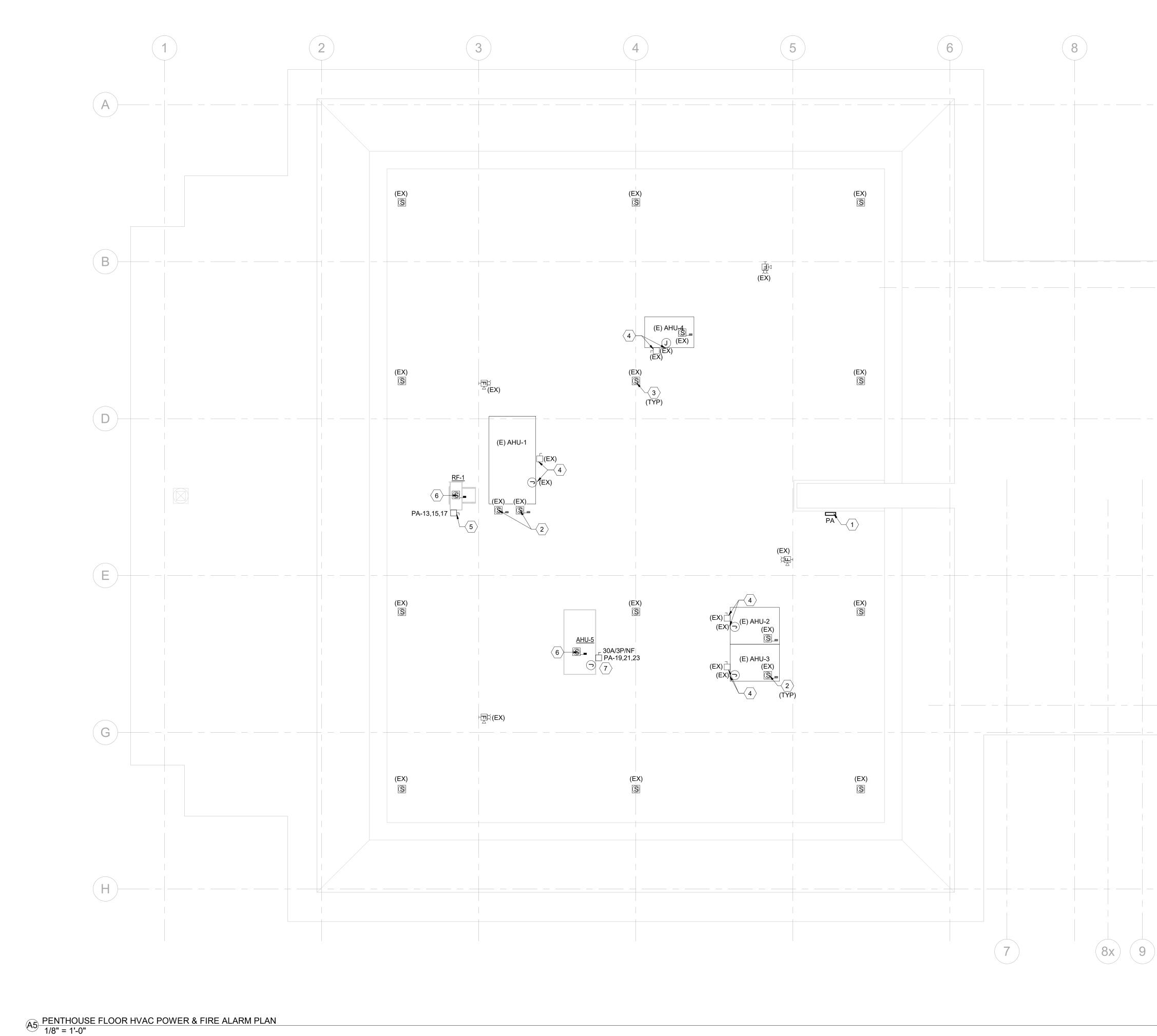
- COORDINATE WITH FURNITURE PLANS PRIOR TO ROUGH-IN. J. REFER TO TELECOMMUNICATIONS RESPONSIBILITY MATRIX IN DIVISION 1 SPECIFICATIONS FOR FURTHER INFORMATION REGARDING TELE-DATA, AUDIO-VIDEO, AND SECURITY SCOPE OF WORK.
- K. EXISTING CABLING TO REMAIN THAT PASSES THROUGH NEW WALL
 PARTITIONS INSTALLED TO DECK SHALL BE INSTALLED THROUGH NEW
 RETROFIT SLEEVING ASSEMBLIES TO PENETRATE THE PARTITION.
 DISCONNECT, REROUTE, AND RECONNECT CABLING THROUGH RETROFIT
 SLEEVE. CABLING SHALL NOT BE EMBEDDED INTO DRYWALL. RETROFIT
 SLEEVING KIT SHALL BE STI SPEC SEAL READY SPLIT SLEEVE, 4".

ELECTRICAL KEYNOTES

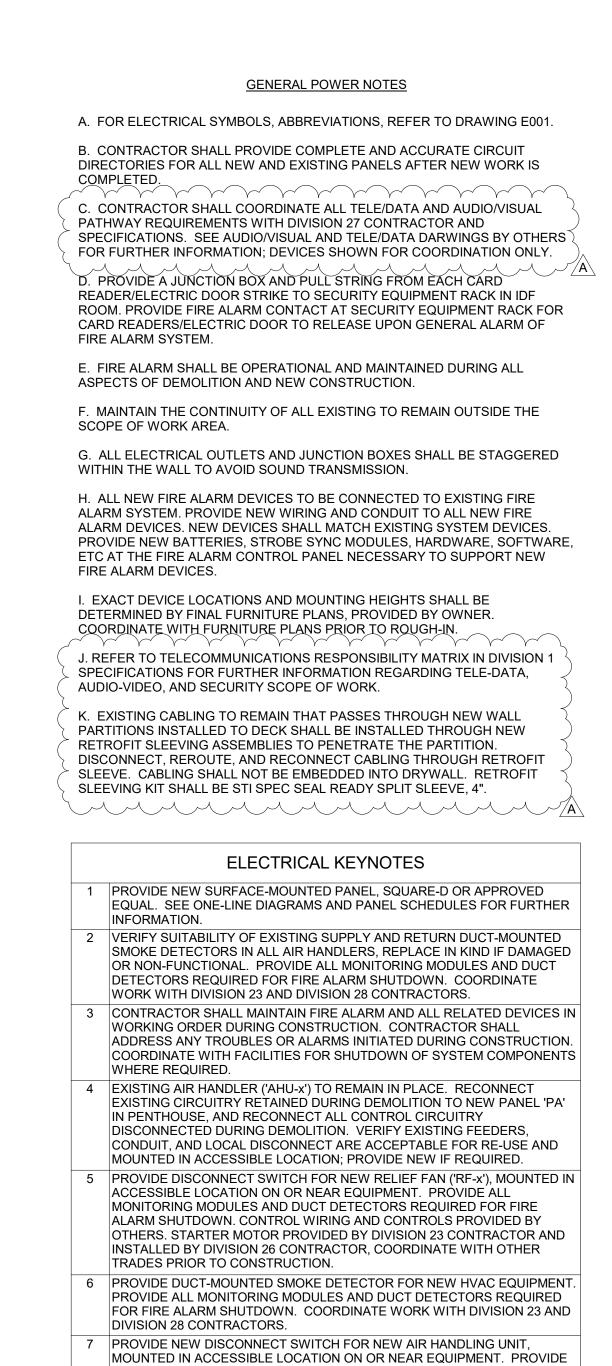
- 1 PROVIDE 120V CIRCUIT FOR NEW VAV BOX CONTROL, CONNECT TO 24VDC TRANSFORMER AT VAV BOX. CONTROLS AND LOW VOLTAGE CONTROL WIRING BY OTHERS. PROVIDE ALL MONITORING MODULES AND DUCT DETECTORS REQUIRED FOR FIRE ALARM SHUTDOWN AS REQUIRED BY NFPA 72. COORDINATE WITH DIVISION 23 CONTRACTOR.
- 2 PROVIDE DUCT-MOUNTED SMOKE DETECTOR FOR NEW HVAC EQUIPMENT. PROVIDE ALL MONITORING MODULES AND DUCT DETECTORS REQUIRED FOR FIRE ALARM SHUTDOWN. COORDINATE WORK WITH DIVISION 23 AND DIVISION 28 CONTRACTORS.
- 3 CONTRACTOR SHALL MAINTAIN FIRE ALARM AND ALL RELATED DEVICES IN WORKING ORDER DURING CONSTRUCTION. CONTRACTOR SHALL ADDRESS ANY TROUBLES OR ALARMS INITIATED DURING CONSTRUCTION. COORDINATE WITH FACILITIES FOR SHUTDOWN OF SYSTEM COMPONENTS WHERE REQUIRED.
- 4 PROVIDE TOGGLE DISCONNECT SWITCH AND ALL REQUIRED CONTROL CIRCUITRY FOR NEW ELECTRIC WATER HEATER, MOUNTED BELOW COUNTER WITHIN MILLWORK. INSTALL DISCONNECT SWITCH IN ACCESSIBLE LOCATION. COORDINATE WITH DIVISION 22 CONTRACTOR.





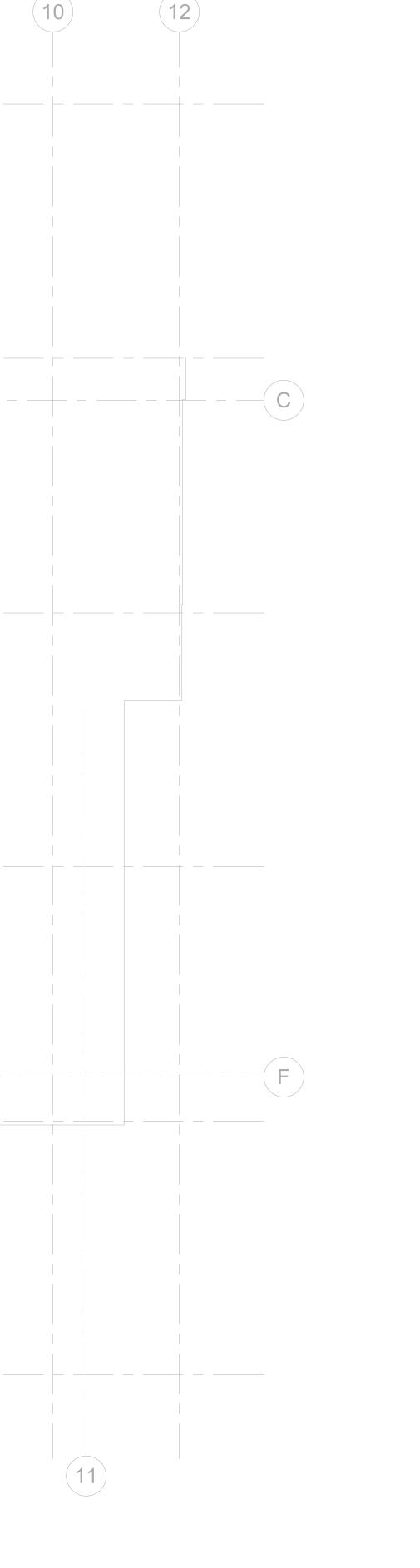


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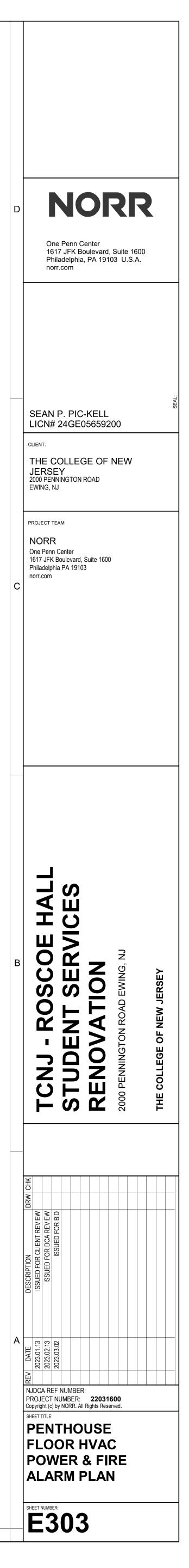


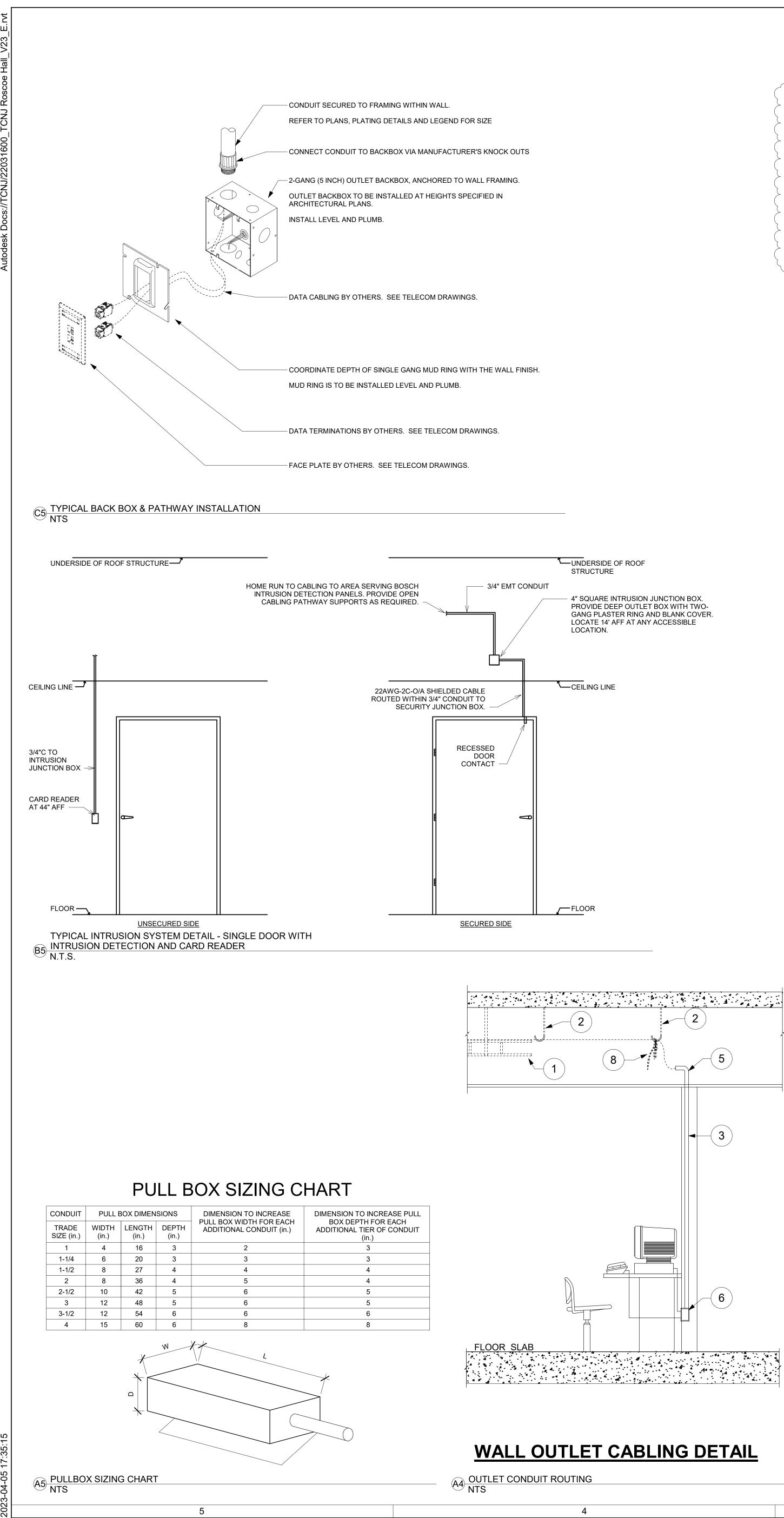
MOUNTED IN ACCESSIBLE LOCATION ON OR NEAR EQUIPMENT. PROVIDE ALL MONITORING MODULES AND DUCT DETECTORS REQUIRED FOR FIRE ALARM SHUTDOWN. CONTROL WIRING AND CONTROLS PROVIDED BY OTHERS. COORDINATE WITH OTHER TRADES PRIOR TO CONSTRUCTION.

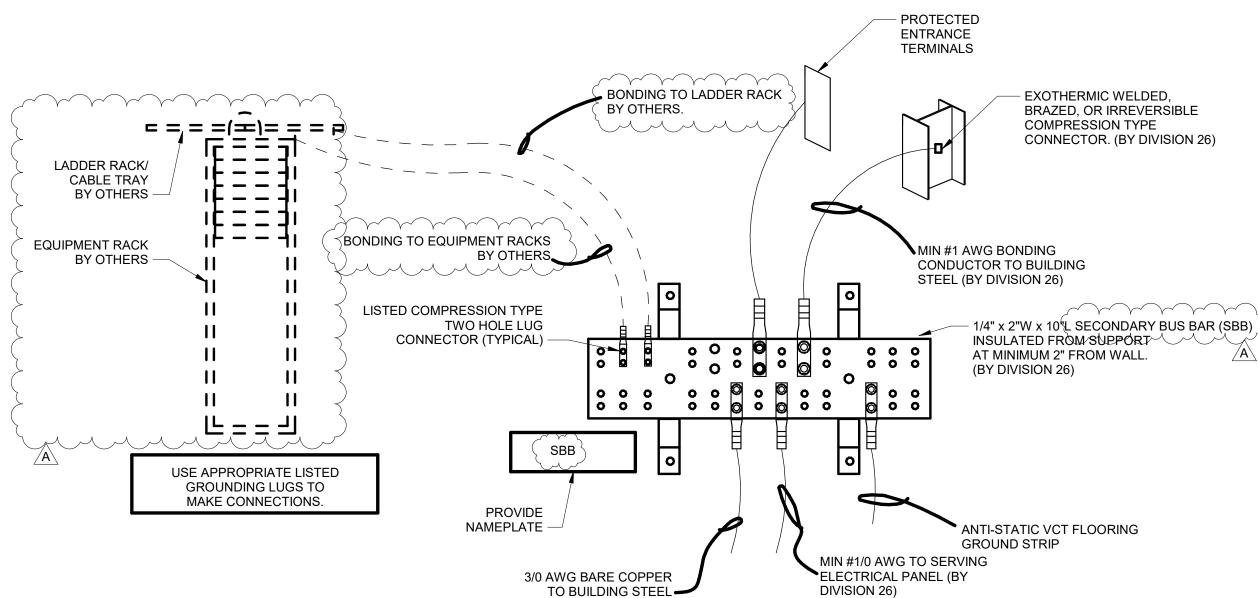
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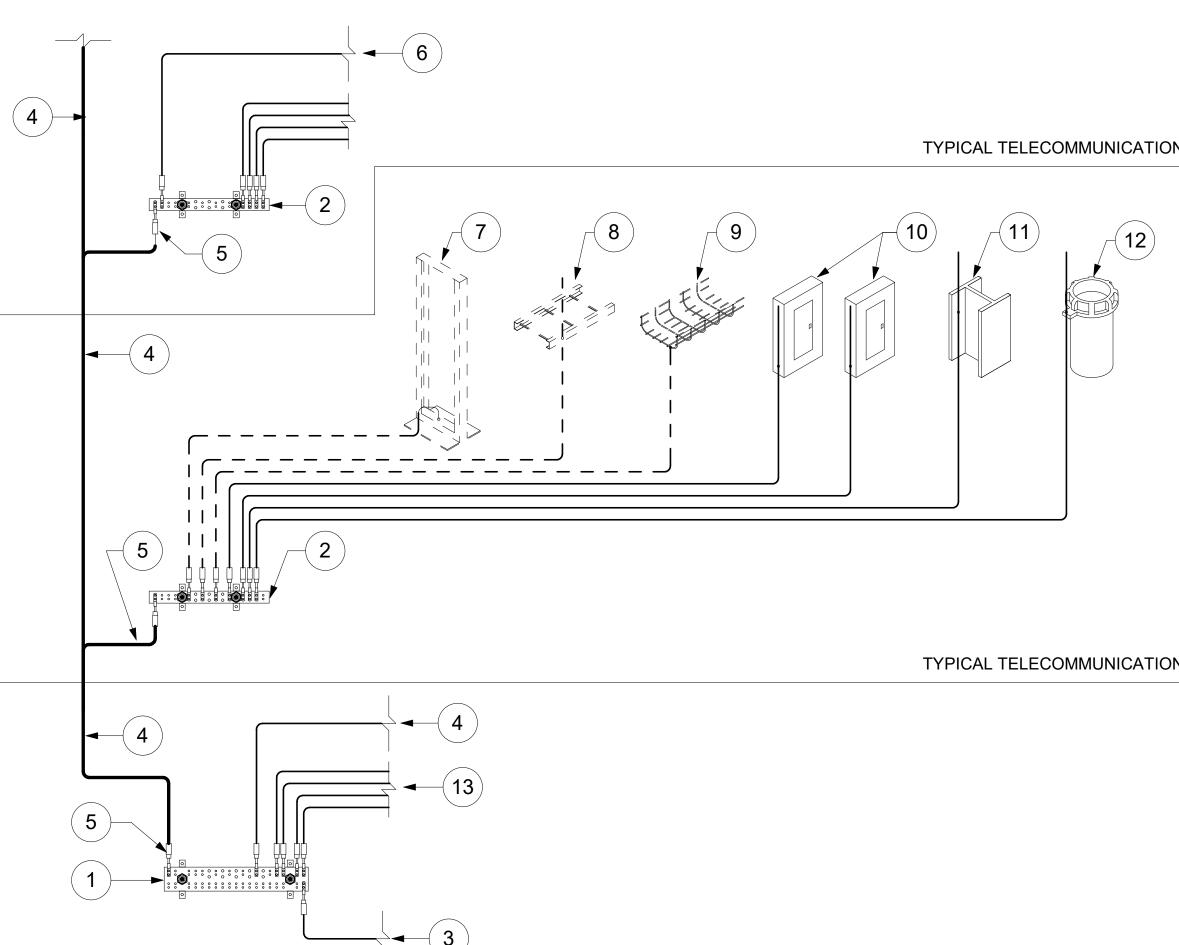
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C3 SBB CONNECTIONS DIAGRAM NO SCALE



B3 TYPICAL BONDING INFRASTRUCTURE SCHEMATIC

CEILING SLAB 2 5) 8 ACCESSIBLE CEILING -(4) 7 FLOOR SLAB FLOOR SLAB

FLOOR BOX CABLING DETAIL

- 3

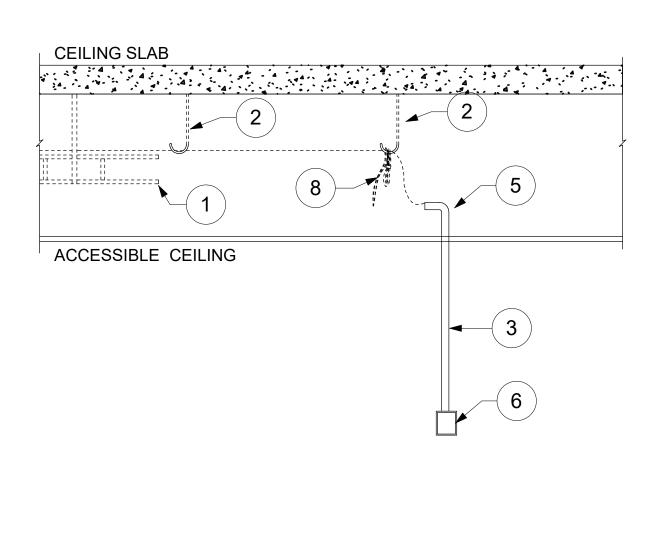
TYPICAL TELECOMMUNICATIONS ROOM

TYPICAL TELECOMMUNICATIONS ROOM

- BONDING INFRASTRUCTURE KEYNOTES
- 1. PRIMARY BONDING BUSBAR (PBB): 4 INCH x 20 INCH x 1/4 INCH (HEIGHT x LENGTH x THICK) WALL-MOUNTED RECTANGULAR COPPER BUSBAR, PREDRILLED FOR TWO-HOLE LUG CONNECTIONS AND LISTED FOR THE INTENDED USE. MOUNT BUSBAR WITH 4 INCH STANDOFFS TO PROVIDE CLEARANCE. 2. SECONDARY BONDING BUSBAR (SBB): 2 INCH x 20 INCH x 1/4 INCH (HEIGHT x LENGTH x THICK) WALL-
- MOUNTED RECTANGULAR COPPER BUSBAR, PREDRILLED FOR TWO-HOLE LUG CONNECTIONS AND LISTED FOR THE INTENDED USE. MOUNT BUSBAR WITH 4 INCH STANDOFFS TO PROVIDE CLEARANCE. 3. TELECOMMUNICATIONS BONDING CONDUCTOR (TBC). INSTALL TBC BETWEEN THE PBB AND THE GROUNDING ELECTRODE AT THE BUILDING'S ELECTRICAL ENTRY FACILITY. TBC SHALL BE A #3/0 AWG
- CONDUCTOR INSTALLED IN A DIRECT PATH WITH THE SHORTEST LENGTH PRACTICAL; MAXIMUM LENTH IS 30 FEET. 4. TELECOMMUNICATIONS BONDING BACKBONE (TBB). INSTALL TBB TO EACH TELECOMMUNICATIONS
- RISER (STACKED TELECOMMUNICATIONS ROOMS), OR TO ANY STAND-ALONE TELECOMMUNICATIONS ROOM. 5. BOND ALL BUSBARS (PBB AND SBB'S) TO TBB. USE DOUBLE-LUG CONNECTORS AT THE BUSBAR, AND
- EXOTHERMIC WELDS AT THE TBB. DO NOT DOUBLE-LOAD CONNECTIONS AT BUSBAR. 6. BONDING BACKBONE CONNECTOR (BBC): INSTALL BBC BETWEEN ALL TELECOMMUNICATIONS
- ROOMS ON THE TOP FLOOR AND EVERY THREE (3) FLOORS BELOW.
- 7. BONDING OF ALL TELECOMMUNICATION RACKS, CABINETS, EQUIPMENT FRAMES, ETC BY OTHERS. 8. BONDING OF ALL LADDER RACKS BY OTHERS.
- 9. BONDING OF ALL CABLE TRAYS BY OTHERS.
- 10. BOND THE AC ELECTRICAL GROUND (ACEG) IN EACH ELECTRICAL PANEL SERVING THE ROOM TO THE BONDING BUSBAR. ALL CONNECTIONS WITHIN THE ELECTRICAL DISTRIBUTION PANEL ARE TO BE MADE BY A LICENSED ELECTRICIAN. CONNECT TO BUSBAR WITH #6 AWG CONDUCTORS WITH TWO-LUG CONNECTORS.
- 11. BOND THE BUSBAR TO BUILDING STRUCTURAL STEEL USING A #6 AWG CONDUCTOR WITH TWO-LUG CONNECTORS. 12. BOND ALL METALLIC CONDUITS AND SLEEVES ENTERING THE TELECOMMUNICATIONS SPACE TO THE BONDING BUSBAR USING #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS.

13. BOND ALL TYPICAL ITEMS OUTLINED IN KEYNOTES 7 - 12 TO THE BONDING BUSBAR.

ENTRY FACILITY OR EQUIPMENT ROOM



1. CABLE TRAYS PROVIDED AND INSTALLED BY OTHERS. SEE TELECOM DRAWINGS.

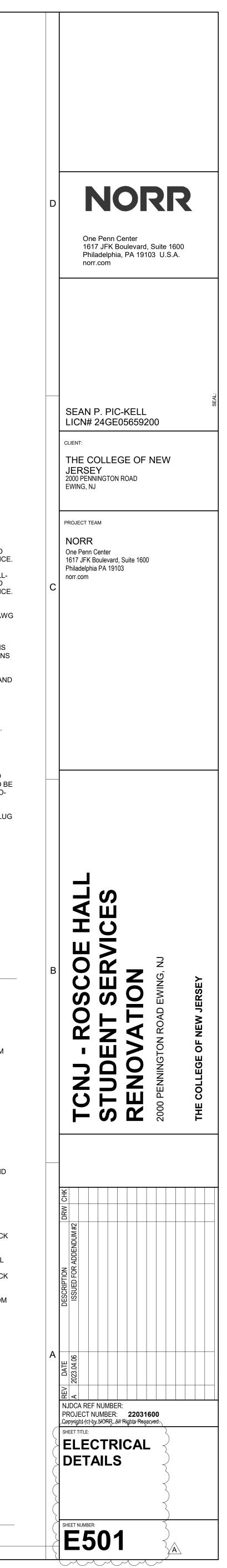
OUTLET CONDUIT AND BACKBOX NOTES

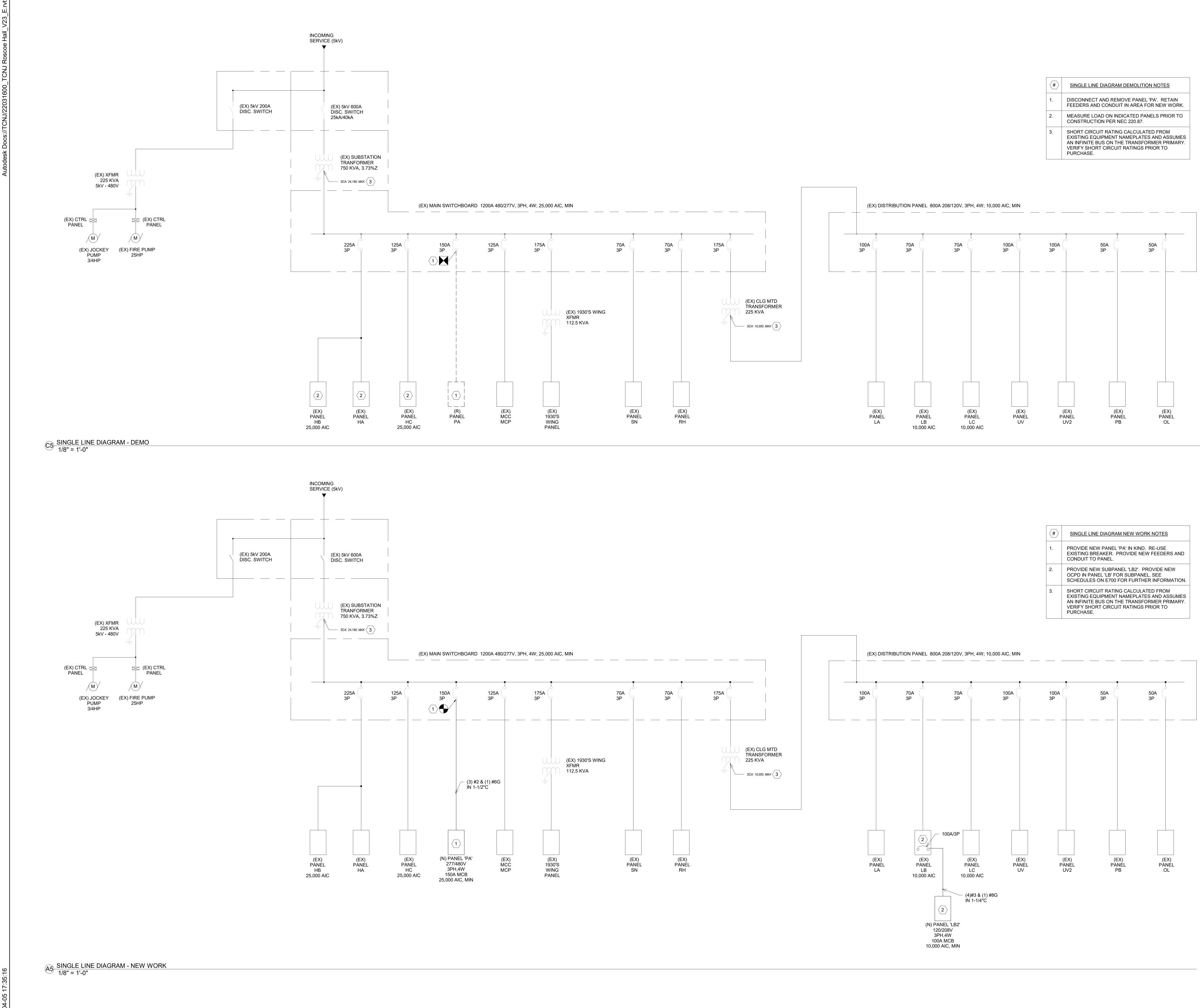
- 2. J-HOOKS PROVIDED AND INSTALLED BY OTHERS. SEE TELECOM DRAWINGS.
- 3. INSTALL CONDUIT WITHIN WALL. MINIMUM SIZE IS 1 1/4", REFER TO OUTLET TYPES FOR SIZING.
- 4. CONDUIT TRENCHED IN SLAB, WITH TURN UP AND STUB UP INTO WALL.
- 5. PROVIDE BEND TAKING CONDUIT FROM VERTICAL TO HORIZONTAL. - BEND RADIUS SHALL BE 6-TIMES THE CONDUIT'S INTERIOR DIAMETER FOR CONDUITS 2 INCHES AND SMALLER, AND 10-TIMES THE CONDUIT'S INTERIOR DIAMETER FOR CONDUITS 2 1/2 INCHES AND LARGER - PROVIDE NON-METALLIC BUSHING. INSTALL BUSHING PRIOR TO THE INSTALLATION OF THE CABLE.
- 6. 2-GANG (4-INCH) OUTLET BACKBOX WITH INTEGRAL CABLE MANAGEMENT, AND MUD RING. COORDINATE WITH GENERAL CONTRACTOR FOR MUD RING DEPTH. - PROVIDE 12 INCHES OF SLACK ON CABLES INSTALLED WITHIN BACK BOX.
- 7. 2-GANG (4-INCH) OUTLET FLOOR BOX OR POKE THRU WITH INTEGRAL CABLE MANAGEMENT. - PROVIDE 12 INCHES OF SLACK ON CABLES INSTALLED WITHIN BACK BOX.
- 8. DATA CABLING PROVIDED AND INSTALLED BY OTHERS. SEE TELECOM DRAWINGS.

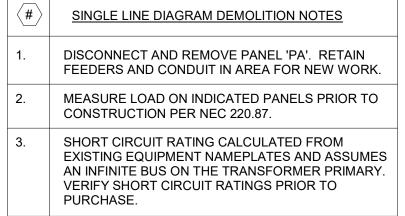
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FLOOR SLAB FLOUR SLAD

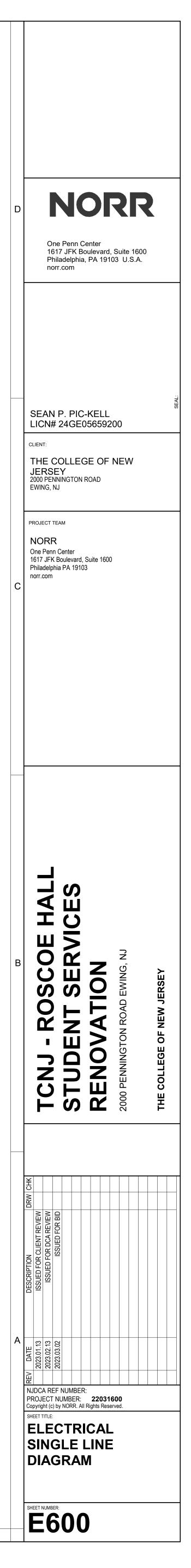
WALL TELEPHONE CABLING DETAIL

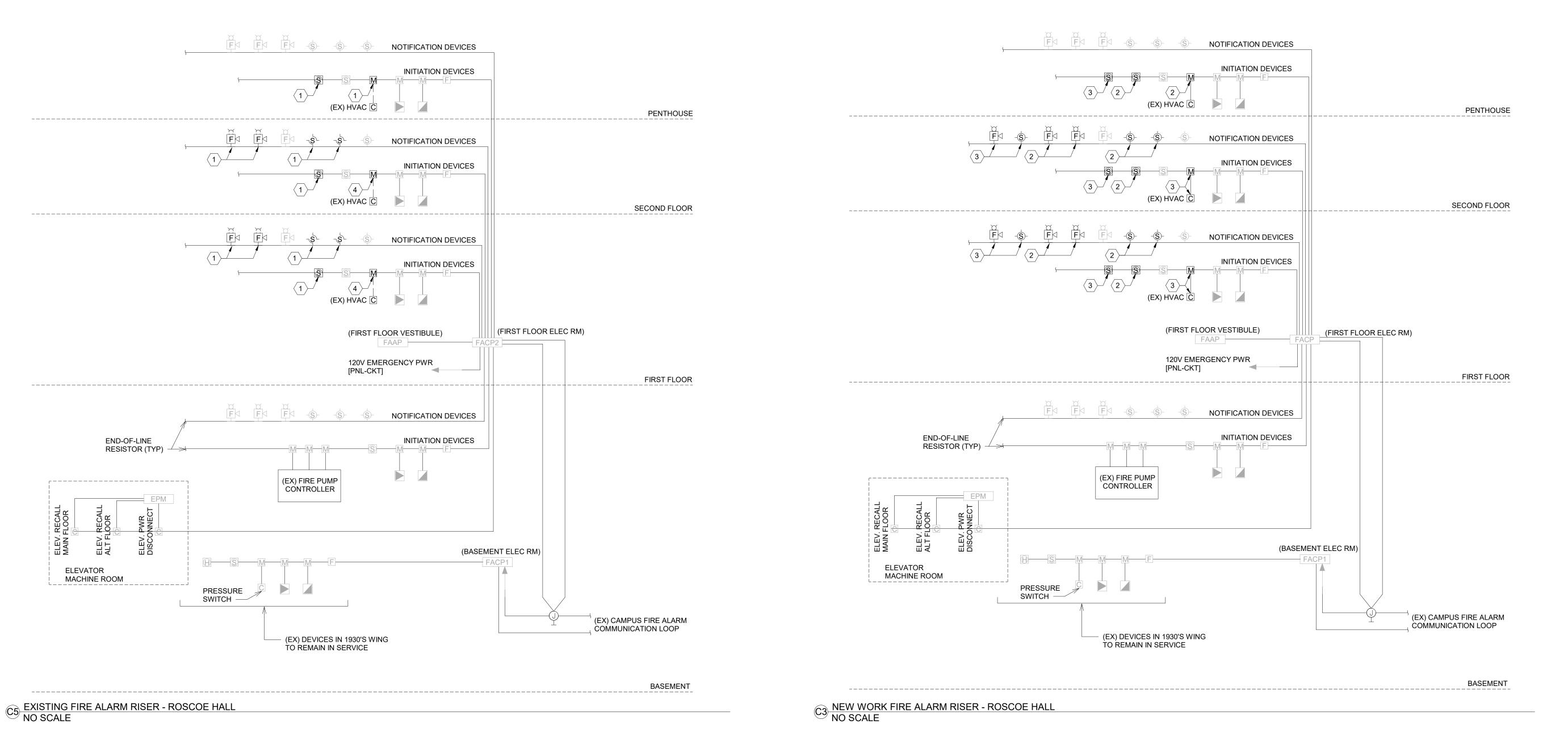






(#)	SINGLE LINE DIAGRAM NEW WORK NOTES
1.	PROVIDE NEW PANEL 'PA' IN KIND. RE-USE EXISTING BREAKER. PROVIDE NEW FEEDERS AND CONDUIT TO PANEL.
2.	PROVIDE NEW SUBPANEL 'LB2'. PROVIDE NEW OCPD IN PANEL 'LB' FOR SUBPANEL. SEE SCHEDULES ON E700 FOR FURTHER INFORMATION.
3.	SHORT CIRCUIT RATING CALCULATED FROM EXISTING EQUIPMENT NAMEPLATES AND ASSUMES AN INFINITE BUS ON THE TRANSFORMER PRIMARY. VERIFY SHORT CIRCUIT RATINGS PRIOR TO PURCHASE.





2'X2' LED 24" L 36" L REC SING	DESCRIPTION I' LED LAY-IN FIXTURE I' LED LAY-IN FIXTURE D LINEAR FIXTURE LED PENDANT FIXTURE LED PENDANT FIXTURE CESSED LED DOWNLIGHT GLE-FACE LED EXIT SIGN	MANUFACTURER LITHONIA LITHONIA WILLIAMS PABLO LIGHTING PABLO LIGHTING WILLIAMS LUMAPRO	35K 40L LRX4G-XX-L8/835-DMA(-EM /10W)-DIM-UNV SOLI DR 24 WHT	35 W 80 W	UNV UNV UNV UNV UNV UNV	5310 lm 4371 lm 1800 lm 2500 lm 5600 lm	MOUNTING CEILING INLAY CEILING INLAY RECESSED CEILING SUSPENDE CEILING SUSPENDE RECESSED	DED LED DED LED	PROVIDE TYPE 'EM' FIXTURES WITH BATTERY DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN PROVIDE TYPE 'EM' FIXTURES WITH BATTERY DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN VERIFY FIXTURE LENGTH WITH ARCHITECTUF 'EM' FIXTURES WITH OPTION '-EM/10W', WITH DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN PROVIDE WITH FACTORY-AVAILABLE 3500K O PROVIDE WITH FACTORY-AVAILABLE 3500K O PROVIDE TYPE 'EM' FIXTURES WITH OPTION '- CAPABLE OF DELIVERING 1400 LUMEN OUTPU	Y BACKUP CAPABLE OF NUTES. Y BACKUP CAPABLE OF NUTES. RAL DRAWINGS. PROVIDE TYPE BATTERY BACKUP CAPABLE OF NUTES. OPTION OPTION '-EM/10W', WITH BATTERY BACKUP	(M SIGNAL INDICATOR (LED) M SIGNAL (BUZZER ON FACP) ERVISORY SIGNAL INDICATOR (LED)	RVISORY SIGNAL (BUZZER ON FACP) JBLE SIGNAL INDICATOR (LED) ROUBLE SIGNAL (BUZZER ON FACP)	ORY DEVICE BY FLOOR (LCD DISPLAY) (NEAR FACP) BELL (NEAR FACP) LL (NEAR FACP) LL (NEAR FACP) FIRE ALARM SYSTEM	IORNS THROUGHOUT PREMISES STROBES THROUGHOUT PREMISES	JVER 2000 CFM) THE GROUND FLOOR (OR DESIGNATED FI DENS JURITY DOORS	אטריד דעטעאס WER SHUNT TRIP ע פוכאנאי	ыымы АL
2'X4' 2'X2' LED 24" L 36" L REC SING DOU	LED LAY-IN FIXTURE LED LAY-IN FIXTURE LED PENDANT FIXTURE LED PENDANT FIXTURE LED PENDANT FIXTURE CESSED LED DOWNLIGHT GLE-FACE LED EXIT SIGN	LITHONIA LITHONIA WILLIAMS PABLO LIGHTING PABLO LIGHTING WILLIAMS	STAKS 2X4 AL06 SWWY 35K 40L STAKS 2X2 AL03 SWWY 35K 40L LRX4G-XX-L8/835-DMA(-EM /10W)-DIM-UNV SOLI DR 24 WHT SOLI DR FSH 36 WHT 4DS-L20/835(-EM/10W)-DIM -UNV-R-W-OF-CS-MWT	40 W 34 W 13.1 W/ft 35 W 80 W 17.4 W	UNV UNV UNV UNV UNV UNV	5310 lm 4371 lm 1800 lm 2500 lm 5600 lm	CEILING INLAY CEILING INLAY RECESSED CEILING SUSPENDE CEILING SUSPENDE	LED LED LED LED DED LED DED LED	PROVIDE TYPE 'EM' FIXTURES WITH BATTERY DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN PROVIDE TYPE 'EM' FIXTURES WITH BATTERY DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN VERIFY FIXTURE LENGTH WITH ARCHITECTUF 'EM' FIXTURES WITH OPTION '-EM/10W', WITH DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN PROVIDE WITH FACTORY-AVAILABLE 3500K O PROVIDE WITH FACTORY-AVAILABLE 3500K O	Y BACKUP CAPABLE OF NUTES. Y BACKUP CAPABLE OF NUTES. RAL DRAWINGS. PROVIDE TYPE BATTERY BACKUP CAPABLE OF NUTES. OPTION OPTION '-EM/10W', WITH BATTERY BACKUP	(M SIGNAL INDICATOR (LED) M SIGNAL (BUZZER ON FACP) ERVISORY SIGNAL INDICATOR (LE	RVISORY SIGNAL (BUZZER ON FA JBLE SIGNAL INDICATOR (LED) ROUBLE SIGNAL (BUZZER ON FACF	ORY DEVICE BY FLOOR (LCD DISPL (NEAR FACP) BELL (NEAR FACP) LL (NEAR FACP) LL (NEAR FACP) FIRE ALARM SYSTEM	IORNS THROUGHOUT PREMISES STROBES THROUGHOUT PREMISES	JVER 2000 CFM) THE GROUND FLOOR (OR DESIGNA DENS JURITY DOORS	אטטיד דעטטאס WER SHUNT TRIP ע פוכאנאי	оюман АL
LED 24" L 36" L REC SING DOU	LINEAR FIXTURE LED PENDANT FIXTURE LED PENDANT FIXTURE CESSED LED DOWNLIGHT GLE-FACE LED EXIT SIGN	WILLIAMS PABLO LIGHTING PABLO LIGHTING WILLIAMS	STAKS 2X2 AL03 SWWY 35K 40L LRX4G-XX-L8/835-DMA(-EM /10W)-DIM-UNV SOLI DR 24 WHT SOLI DR FSH 36 WHT 4DS-L20/835(-EM/10W)-DIM -UNV-R-W-OF-CS-MWT	13.1 W/ft 35 W 80 W 17.4 W	UNV UNV UNV UNV	1800 lm 2500 lm 5600 lm	RECESSED CEILING SUSPENDE CEILING SUSPENDE	DED LED DED LED	PROVIDE TYPE 'EM' FIXTURES WITH BATTERY DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN VERIFY FIXTURE LENGTH WITH ARCHITECTUF 'EM' FIXTURES WITH OPTION '-EM/10W', WITH DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN PROVIDE WITH FACTORY-AVAILABLE 3500K O PROVIDE WITH FACTORY-AVAILABLE 3500K O PROVIDE TYPE 'EM' FIXTURES WITH OPTION '-	Y BACKUP CAPABLE OF NUTES. RAL DRAWINGS. PROVIDE TYPE BATTERY BACKUP CAPABLE OF NUTES. OPTION OPTION '-EM/10W', WITH BATTERY BACKUP	(M SIGNAL INDICATOR (LED M SIGNAL (BUZZER ON FAC ERVISORY SIGNAL INDICATO	RVISORY SIGNAL (BUZZER JBLE SIGNAL INDICATOR (L KOUBLE SIGNAL (BUZZER O)	ORY DEVICE BY FLOOR (LCD (NEAR FACP) BELL (NEAR FACP) LL (NEAR FACP) LL (NEAR FACP) FIRE ALARM SYSTEM	ORNS THROUGHOUT PREM STROBES THROUGHOUT PRE	JVER 2000 CFM) THE GROUND FLOOR (OR DE DENS JURITY DOORS	WER SHUNT TRIP	JUGINAL
24" L 36" L REC SING	LED PENDANT FIXTURE LED PENDANT FIXTURE CESSED LED DOWNLIGHT GLE-FACE LED EXIT SIGN	PABLO LIGHTING PABLO LIGHTING WILLIAMS	/10W)-DIM-UNV SOLI DR 24 WHT SOLI DR FSH 36 WHT 4DS-L20/835(-EM/10W)-DIM -UNV-R-W-OF-CS-MWT	35 W 80 W 17.4 W	UNV UNV UNV	2500 lm 5600 lm	CEILING SUSPENDE	DED LED DED LED	 'EM' FIXTURES WITH OPTION '-EM/10W', WITH DELIVERING 1400 LUMEN OUTPUT FOR 90 MIN PROVIDE WITH FACTORY-AVAILABLE 3500K O PROVIDE WITH FACTORY-AVAILABLE 3500K O PROVIDE TYPE 'EM' FIXTURES WITH OPTION '- 	BATTERY BACKUP CAPABLE OF NUTES. OPTION OPTION '-EM/10W', WITH BATTERY BACKUP	M SIGNAL INDICATO M SIGNAL (BUZZER C ERVISORY SIGNAL IN	RVISORY SIGNAL (BL JBLE SIGNAL INDICA ROUBLE SIGNAL (BUZ	ORY DEVICE BY FLOC ORY DEVICE BY FLOC (NEAR FACP) BELL (NEAR FACP) LL (NEAR FACP) LL (NEAR FACP) FIRE ALARM SYSTEM	ORNS THROUGHOUT STROBES THROUGHO	JVER 2000 CFM) THE GROUND FLOOR (DENS CURITY DODRS	WER SHUNT TRIP	aiuival AL
36" L REC SING DOU	LED PENDANT FIXTURE CESSED LED DOWNLIGHT GLE-FACE LED EXIT SIGN	PABLO LIGHTING WILLIAMS	SOLI DR FSH 36 WHT 4DS-L20/835(-EM/10W)-DIM -UNV-R-W-OF-CS-MWT	80 W 17.4 W	UNV UNV	5600 lm	CEILING SUSPENDE	DED LED	PROVIDE WITH FACTORY-AVAILABLE 3500K O PROVIDE TYPE 'EM' FIXTURES WITH OPTION '-	OPTION '-EM/10W', WITH BATTERY BACKUP	M SIGNAL (I M SIGNAL (I ERVISORY 5	RVISORY S JBLE SIGNA KOUBLE SIG	ORY DEVICE ORY DEVICE (NEAR FACP) BELL (NEAR L (NEAR FAC FIRE ALARM	HORNS THRC	THE GROUNE PENS	WER SHUN	AL
RECI SING DOU	CESSED LED DOWNLIGHT GLE-FACE LED EXIT SIGN	WILLIAMS	4DS-L20/835(-EM/10W)-DIM -UNV-R-W-OF-CS-MWT	17.4 W	UNV				PROVIDE TYPE 'EM' FIXTURES WITH OPTION '-	'-EM/10W', WITH BATTERY BACKUP	M SIGN/ M SIGN/	RVISOR JBLE SIG KOUBLE	ORY DEV ORY DEV (NEAR FA BELL (NE L (NEAR	HORNS TH	THE GROU	WER SH	AL
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DOU		LUMAPRO	53RH94	3 W							AR AR						N U U U
					UNV		RECESSED	LED	PROVIDE ALL FIXTURES WITH BATTERY BACK FULL OUTPUT FOR 90 MINUTES.	KUP CAPABLE OF DELIVERING	ION AL	LE SUF ION TR DIBLE	PERVIS A BELL A BELL BLE BE BLE BE	LARM LARM	JNITS (DR TO HOLD (VIN JL VTOR P M SIGN	BLE SI
SHTING FIXTURE NOTES:	JBLE-FACE LED EXIT SIGN	LUMAPRO	53RH94	3 W	UNV		RECESSED	LED	PROVIDE ALL FIXTURES WITH BATTERY BACK FULL OUTPUT FOR 90 MINUTES.	KUP CAPABLE OF DELIVERING	COMN AUDIB COMN	AUDIB COMN .TE AU	TE SU ALARN WATE TROUI	FIRE A	N AC L EVATO DOOR	-UUUN ELEVA ALARI	SUPE TROU
							-			FIRE ALARM SEQUENCE OF OPERATIONS MATRIX	ACTIVATE ACTIVATE ACTIVATE	ACTIVATE ACTIVATE ANNUNCIA	ACTIVATE ACTIVATE ACTIVATE ACTIVATE NOTIFY BP	ACTIVATE ACTIVATE	SHUTDOW RECALL EI RELEASE I	RELEASE - ACTIVATE TRANSMIT	TRANSMIT
PRIOR TO SUBMISSION OF	OF FIXTURE CUTS AND/OR PURCHASE, THE CONTRACTOR IS RES	PONSIBLE TO REVIEW THE CONDITIONS OF INSTALLAT	TION TO DETERMINE THAT NO CONFLICTS WILL EXIST FOR THE A	APPROPRIATE INSTALLATI	ION OF THE FIXTURE.					SYSTEM INPUTS	CENTRAL U				REQ'D FIRE SA	AFET CE	NTRAL OF
PROVIDE ALL HARDWARE	E REQUIRED FOR MOUNTING OF FIXTURE IN SPECIFIED CEILING	TYPE. COORDINATE CEILING TYPE WITH ARCHITECTUP	RAL PLANS AND DETAILS.							1 PULL STATION	XX				X X X X		
ALL LIGHTING FIXTURES SI	SHALL BE DLC-APPROVED.									2 WATER FLOW SWITCH 3 SMOKE DETECTOR	XX				X X X X X X X X	X X	
PROVIDE ALL LUMINAIRES	S WITH INTEGRAL LED LAMPS WITH COLOR TEMPERATURE OF 3	500 DEGREES KELVIN.								4 AC DUCT SMOKE DETECTOR	X X X X		X X X		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\hat{\mathbf{x}}$ $\hat{\mathbf{x}}$	
MANUFACTURERS CATALO	LOG NUMBERS ARE PROVIDED AS A BASIS OF DESIGN & LEVEL C	DE QUALITY REQUIRED. ALTERNATE MANUFACTURER'S	S EQUIPMENT MUST MEET OR EXCEED THIS LEVEL OF QUALITY	'& PHYSICAL CHARACTER	RISTICS. ELECTRICAL CON	ITRACTOR IS RESPONSIBLE	E FOR ANY COORDINATION			5 AREA HEAT DETECTOR	XX				X X X X		
	LTERNATE MANUFACTURER'S EQUIPMENT. ACCEPTABLE ALTER									6 ELEV SHAFT HEAT DETECTOR						X	
										7 TAMPER SWITCH 8 FIRE ALARM AC POWER FAILURE		X	X X X				X
										9 FIRE ALARM SYSTEM LOW BATTERY	^						^ X
										10 OPEN CIRCUIT		XX	X X				X
												X X	X X				X
LIGHTIN]			12 NOTIFICATION APPLIANCE CIRCUIT SHORT 13 CO DETECTOR	X	X X X	X X				

TYPE	DESCRIPTION	MANUFACTURER/CATALOG NO.	MOUNTING	VOLTAGE	TIME DELAY	REMARKS
VS	DUAL-TECHNOLOGY, WALL MOUNTED VACANCY SENSOR WITH DIMMER	HUBBELL CONTROL SOLUTIONS LHDMMTS-2-N-W	WALL		30 MIN.	SENSOR SHALL BE PROGRAMMED TO VACANCY (I PROVIDE BLUETOOTH CONTROLLER NXBTX
OS	DUAL-TECHNOLOGY, CEILING MOUNTED OCCUPANCY SENSOR	HUBBELL CONTROL SOLUTIONS NXOS-OM-DT2	CEILING	24V	30 MIN.	SENSOR SHALL BE PROGRAMMED TO OCCUPANC PROVIDE ROOM CONTROLLER NXRC-2RD
VS	DUAL-TECHNOLOGY, CEILING MOUNTED VACANCY SENSOR	HUBBELL CONTROL SOLUTIONS NXOS-OM-DT2	CEILING	24V	30 MIN.	SENSOR SHALL BE PROGRAMMED TO OCCUPANC PROVIDE ROOM CONTROLLER NXRC-2RD
S. D	DUAL-TECHNOLOGY, WALL MOUNTED VACANCY SENSOR, WITH DIMMER	HUBBELL CONTROL SOLUTIONS NXSW-OO-WH	WALL		30 MIN.	SENSOR SHALL BE PROGRAMMED TO VACANCY (I

NOTE:

1. PROVIDE BLUETOOTH BRIDGE MODULE NXBTC FOR TIME CLOCK OPERATION OF CORRIDOR LIGHTS.

ACANCY (MANUAL-ON) MODE. BTX
CCUPANCY (AUTO-ON) MODE. D
CCUPANCY (AUTO-ON) MODE. D
ACANCY (MANUAL-ON) MODE.

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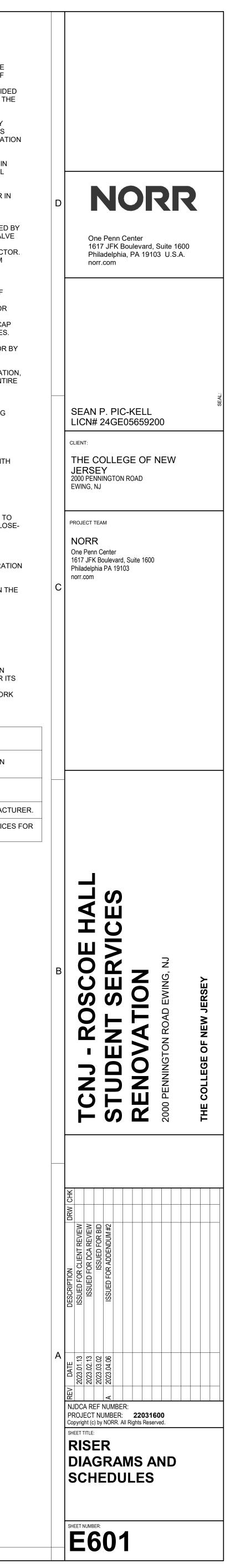
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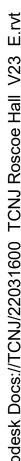
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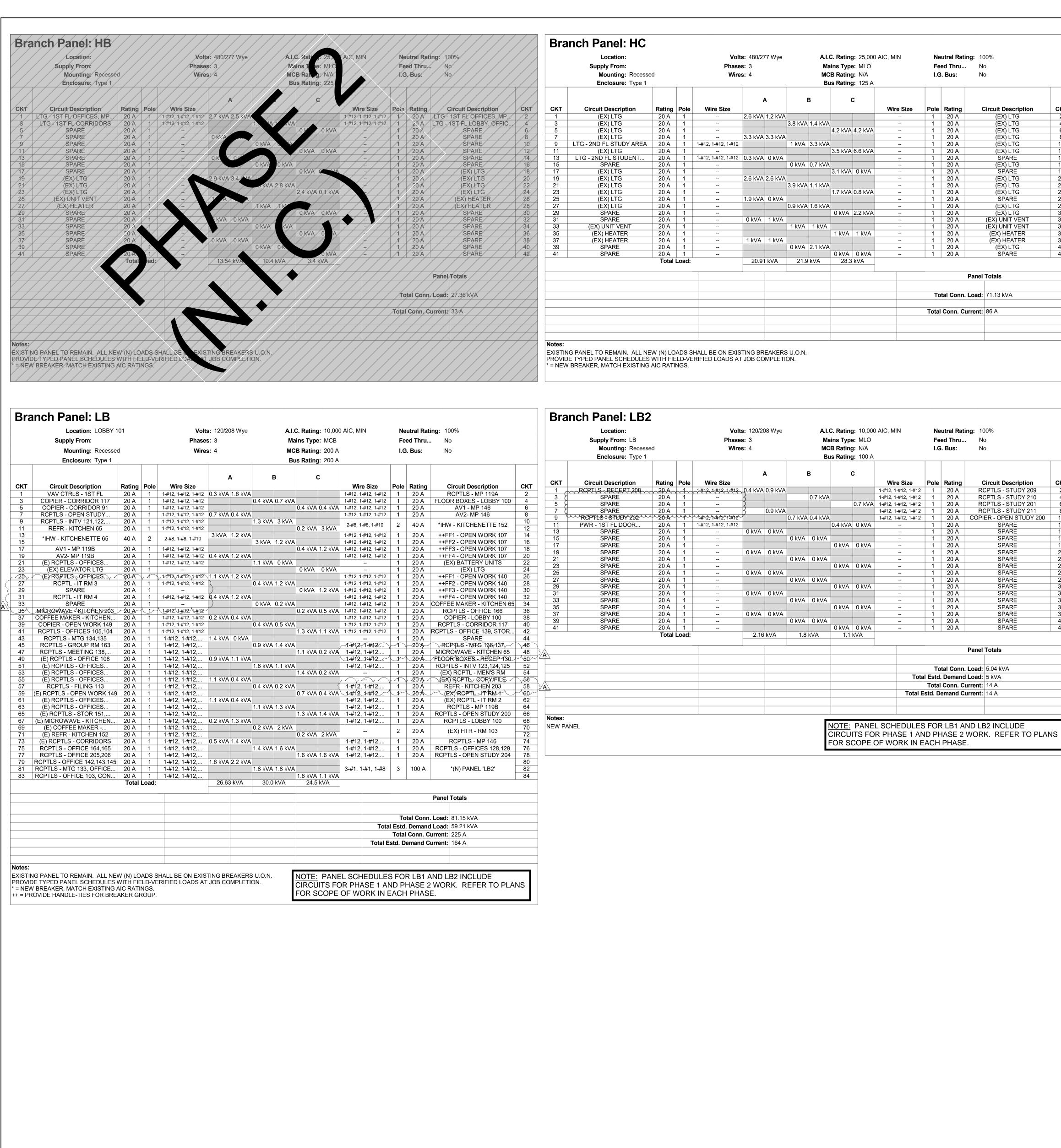
GENERAL FIRE ALARM NOTES

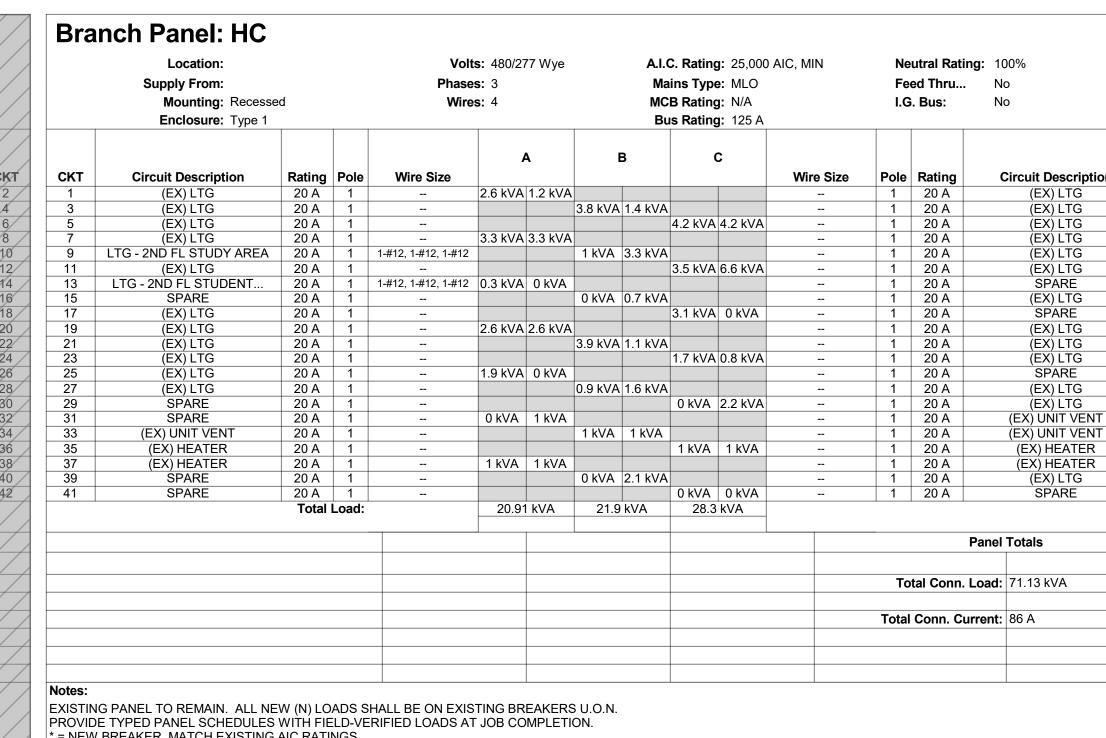
- 1. THE SCHEMATIC FIRE ALARM RISER IS INTENDED TO INDICATE THE MAJOR FIRE ALARM COMPONENTS AND GENERAL SEPARATION OF INDICATING, INITIATING, COMMUNICATIONS, AND ANNUNCIATION CIRCUITS AS REQUIRED BY THE PROJECT. WIRING IS TO BE PROVIDED AS REQUIRED BY THE FIRE ALARM EQUIPMENT MANUFACTURER. THE RISER DIAGRAM IS A GENERAL INDICATION OF EQUIPMENT TO BE PROVIDED AND DOES NOT NECESSARILY INDICATE ALL ITEMS OR APPURTENANCES WHICH MAY BE REQUIRED TO PROVIDE A FULLY OPERATIONAL SYSTEM. ALL SUCH ITEMS ARE TO BE PROVIDED AS INDICATED IN THE SPECIFICATIONS AND AS REQUIRED FOR OPERATION OF THE SYSTEM.
- ACTIVATION OF SMOKE DETECTOR AT TOP OF ELEVATOR SHAFT, IN LOBBIES OR IN ELEVATOR MACHINE ROOM SHALL INITIATE RECALL SEQUENCE.
- 3. ACTIVATION OF HEAT DETECTOR AT TOP OF ELEVATOR SHAFT OR IN ELEVATOR MACHINE ROOM SHALL INITIATE ELEVATOR POWER SHUTDOWN.
- 4. TAMPER/FLOW SWITCH DEVICES TO BE FURNISHED AND INSTALLED BY FIRE PROTECTION SYSTEM CONTRACTOR AT ALL SUPERVISED VALVE LOCATIONS AND LOCATIONS INDICATED ON FIRE PROTECTION DRAWINGS. DEVICES TO BE WIRED BY THE FIRE ALARM CONTRACTOR. COORDINATE EXACT LOCATIONS WITH FIRE PROTECTION SYSTEM CONTRACTOR.
- SINGLE/MULTIPLE STATION SMOKE DETECTORS SHALL BE AS 5 MANUFACTURED BY GENTEX. DETECTORS SHALL BE CAPABLE OF BEING INTERCONNECTED WITH OTHER DETECTORS FOR SIMULTANEOUS OPERATION AND HAVE A CONTACT AVAILABLE FOR FUTURE CONNECTION TO THE BUILDING FIRE ALARM SYSTEM. SINGLE/MULTIPLE STATION DETECTORS LOCATED WITHIN HANDICAP ACCESSIBLE LIVING UNITS SHALL BE SUPPLIED INTEGRAL STROBES.
- FIRE ALARM ZONES SHALL BE THE SAME AS SPRINKLER ZONES, OR BY 6. FLOOR AREA WHICHEVER IS SMALLER.
- 7. ACTIVATION OF ANY COMMON AREA SMOKE DETECTOR, PULL STATION, OR FLOW SWITCH SHALL INITIATE A GENERAL ALARM FOR THE ENTIRE BUILDING. ACTIVATION OF A TAMPER SWITCH SHALL SEND A SUPERVISORY SIGNAL TO THE CENTRAL MONITORING LOCATION.
- PROVIDE FULLY ADDRESSABLE SYSTEM CAPABLE OF ADDRESSING 8 EACH DEVICE.
- 9. ALL CONCEALED INITIATING DEVICES SHOULD HAVE A REMOTE INDICATING LIGHT LOCATED IN AN ACCESSIBLE LOCATION.
- 10. FACP SHALL BE SUPPLIED WITH BATTERY BACKUP TO COMPLY WITH NFPA 72. ALSO PROVIDE THE APPROPRIATE DIALER TO NOTIFY A CENTRAL MONITORING LOCATION OR CENTRAL STATION.
- 11. FIRE PUMP AND GENERATOR MONITOR POINTS SHALL INITIATE A SUPERVISORY ALARM UPON ACTIVATION.
- THE INSTALLING ELECTRICAL CONTRACTOR SHOULD BE ADVISED TO 12. PREPARE THE FOLLOWING DOCUMENTATION AT THE PROJECT CLOSE-
 - OUT: SET OF 'AS-BUILT' DRAWINGS AS APPROVED BY THE FIRE 1. MARSHALL.
 - RECORD OF COMPLETION (A DOCUMENT THAT ACKNOWLEDGES THE FEATURES OF INSTALLATION, OPERATION
- (PERFORMANCE), SERVICE AND EQUIPMENT). MANUAL CONTAINING A 'SEQUENCE OF ALARM' AND A 3. MANUFACTURERS SHEET FOR EACH DEVICE INSTALLED IN THE
- FIRE ALARM SYSTEM INCLUDING THE MAIN CONSOLE. 13. ALL MANUAL PULL STATIONS SHALL BE PROVIDED WITH CLEAR, PROTECTIVE COVER ASSEMBLIES. INSPECT ALL EXISTING PULL
- STATION COVERS FOR DAMAGE AND REPLACE AS REQUIRED. 14. FIRE ALARM ZONES SHALL NOT EXCEED 22,500 SF IN AREA NOR
- EXCEED 300 FEET IN LENGTH PER 2021 IBC, SECTION 907.6.4
- EXISTING FIRE ALARM RISER WAS DETERMINED FROM AS-BUILT 15. DRAWINGS AND NOT ALL DEVICES ON SYSTEM MAY BE SHOWN ON THESE DRAWINGS. ENGINEER ASSUMES NO RESPONSIBILITY FOR ITS ACCURACY OTHER THAN CONFORMANCE WITH THE DESIGN CONCEPTS. E.C. SHALL SURVEY AND FIELD-VERIFY SCOPE OF WORK PRIOR TO BID.

(#)	FIRE ALARM KEYED NOTES
1.	DISCONNECT EXISTING FIRE ALARM INITIATION AND NOTIFICATION DEVICES, RETAIN FOR SCOPE IN NEW WORK.
2.	RECONNECT EXISTING FIRE ALARM DEVICES RETAINED DURING DEMOLITION. PROVIDE NEW SIGNAL CABLING AS REQUIRED.
3.	PROVIDE NEW DEVICES AS REQUIRED, MATCH EXISTING MANUFAC
4.	DISCONNECT, REMOVE AND DISCARD EXISTING FIRE ALARM DEVICE EXISTING HVAC EQUIPMENT TO BE DEMOLISHED.









- 3

Dranch Danaly DA

	Location:				s: 480/2	77 Wye			-) AIC, MIN			ng: 100%
	Supply From:			Phase	s: 3			Ma	ins Type	: MCB		Feed Thru No I.G. Bus: No		
	Mounting: SURF.	ACE		Wire	s: 4			MC	B Rating	150 A :				
	Enclosure: Type 1							Bu	s Rating	: 225 A				
						4	E	3	C	>				
кт	Circuit Description	Rating	Pole	Wire Size							Wire Size	Pole	Rating	Circuit Description
1	*/=)	05.4	~	0 110 4 110 4 1140	7.5 kVA	2.1 kVA		0.4.13/4			0 1144 4 1144 4 1144	_	45.4	*/=>
3	*(E) AHU-1	35 A	3	3-#8, 1-#8, 1-#10			7.5 kVA			2412/4	3-#14, 1-#14, 1-#14	3	15 A	*(E) AHU-2
5 7					2.1 k V/A	2.1 kVA			7.5 kVA	2.1 KVA				
9	*(E) AHU-3	15 A	3	3-#14, 1-#14, 1-#14	2.1 KVA	2.1 KVA	2.1 kVA	2 1 kVA			3-#14, 1-#14, 1-#14	3	15 A	*(E) AHU-4
11							KV/		2.1 kVA	2.1 kVA	• " ' ', ' " ' ' ', ' " ' '		1077	
13					3.1 kVA									
15	*RF-1	15 A	3	3-#14, 1-#14, 1-#14			3.1 kVA							
17									3.1 kVA					
19					2.1 kVA							1	20 A	SPARE
21	*AHU-5	20 A	3	3-#12, 1-#12, 1-#12			2.1 kVA					1	20 A	SPARE
23									2.1 kVA	0 kVA		1	20 A	SPARE
25	SPARE	20 A	1		0 kVA	0 kVA						1	20 A	SPARE
27	SPARE	20 A	1				0 kVA	0 kVA	0.1.1.(0.1.1.4		1	20 A	SPARE
29	SPARE	20 A	1		0.10/0				0 kVA	0 kVA		1	20 A	SPARE
31 33	SPARE SPARE	20 A	1		0 kVA	0 kVA	0.101/0	010/0				1	20 A	SPARE SPARE
33 35	SPARE SPARE	20 A 20 A	1				0 kVA	UKVA	0 kVA	0 1/1/0		1	20 A 20 A	SPARE SPARE
35 37	SPARE SPARE	20 A 20 A	1		0 kVA	0 kVA			UKVA	UKVA		1	20 A 20 A	SPARE SPARE
39	SPARE	20 A	1		UKVA	UKVA	0 kVA	0 k V A				1	20 A 20 A	SPARE
41	SPARE	20 A	1				01071	0 10 7 1	0 kVA	0 kVA		1	20 A	SPARE
		Total		1	18.97	⊥ 7 kVA	19.0	kVA	19.0					
												-		Panel Totals
												-	401 0	
														Load: 56.91 kVA
											Tota			Load: 56.91 kVA
														rrent: 68 A
											Total E	std. D	emand Cu	rrent: 68 A

REPLACEMENT PANEL

PROVIDE TYPED PANEL SCHEDULES WITH FIELD-VERIFIED LOADS AT JOB COMPLETION. * = PROVIDE HACR BREAKER

(E) INDICATES EXISTING CIRCUIT TO BE RECONNECTED TO NEW PANEL.

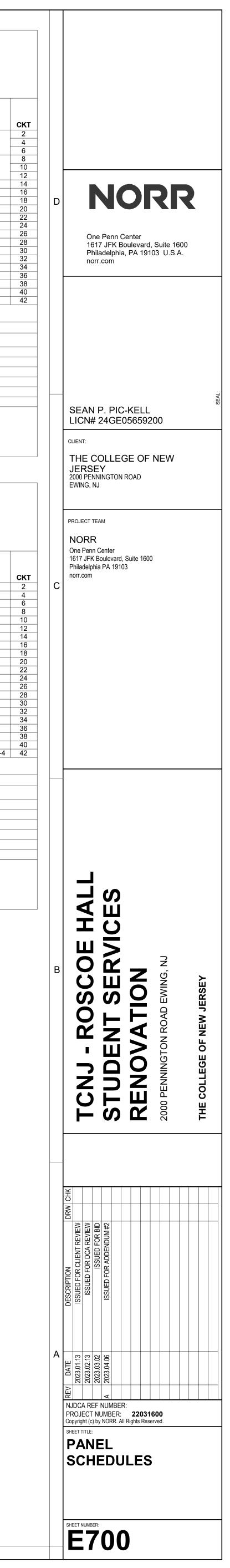
	Location: Supply From:			Volt Phase	s: 120/208 Wye		C. Rating: ins Type:		AIC, MIN		eutral Rati ed Thru	ing: 100% . No
							•••					
	Mounting: Recesse	d		Wire	s: 4		B Rating:			I.G	i. Bus:	No
	Enclosure: Type 1			1		Bu	is Rating:	225 A				
					А	В	с					
СКТ	Circuit Description	Rating	Pole	Wire Size					Wire Size	Pole	Rating	Circuit Descript
1	(EX) RCPTLS - SARNOFF	20 A	1		0.7 kVA 0.7 kVA					1	20 A	(EX) RCPTLS
3	(EX) RCPTLS - SARNOFF	20 A	1			0.7 kVA 0.7 kVA				1	20 A	(EX) ACTIVE
5	(EX) RCPTLS - SARNOFF	20 A	1				0.7 kVA ().7 kVA		1	20 A	(EX) ACTIVE
7	(EX) RCPTLS	20 A	1		0.7 kVA 0 kVA					1	20 A	SPARE
9	SPARE	20 A	1			0 kVA 0.7 kVA				1	20 A	(EX) RCPTLS - MP I
11	(EX) RCPTLS - MP ROOM	20 A	1				0.7 kVA ().7 kVA		1	20 A	(EX) RCPTLS - MP I
13	(EX) RCPTLS - MP ROOM	20 A	1		0.7 kVA 0.7 kVA					1	20 A	(EX) ACTIVE
15	(EX) RCPTLS - MP ROOM	20 A	1			0.7 kVA 0.7 kVA				1	20 A	(EX) RCPTLS - MP I
17	VAV CTRLS - 2ND FL	20 A	1	1-#12, 1-#12, 1-#12			0.2 kVA 1	1.2 kVA		1	20 A	(EX) TRACK LT
19	(EX) ACTIVE	20 A	1		0.7 kVA 1.2 kVA					1	20 A	(EX) TRACK LT
21	(EX) ACTIVE	20 A	1			0.7 kVA 1.2 kVA				1	20 A	(EX) TRACK LT
23	RCPTLS - STUDENT LOUNG	20 A	1	1-#12, 1-#12, 1-#12			1.4 kVA 1	1.2 kVA		1	20 A	(EX) TRACK LT
25	*IHW - KITCHENETTE 203	30 A	2	2-#10, 1-#10, 1-#10	3 kVA 1.2 kVA					1	20 A	(EX) TRACK LT
27				,		3 kVA 1.2 kVA				1	20 A	(EX) TRACK LT
29	(EX) UNIT HTR - MEN'S RR	20 A	1				1.5 kVA ().5 kVA		1	20 A	(EX) FILTER
31	(EX) RCPTLS	20 A	1		0.7 kVA 0.7 kVA					1	20 A	(EX) RCPTLS - MP I
33	(EX) PROJECTOR SCREEN	20 A	1			0.3 kVA 0.7 kVA				1	20 A	(EX) RCPTLS - MP I
35	(EX) PROJECTOR SCREEN	20 A	1				0.3 kVA 1	I.5 kVA		1	20 A	(EX) ACCU-1
37	(EX) BMS CTRL	20 A	1		0.3 kVA 0.1 kVA					1	20 A	(EX) EF-1
39	(EX) UNIT HTR - WOMEN'S RR		1			1.5 kVA 0.1 kVA	0710/0			1	20 A	(EX) EF-2
41	(EX) RCPTLS - ROOF	20 A	1				0.7 kVA (1	20 A	(EX) MTR DAMPERS
		Iotai	Load:		11.54 kVA	12.3 kVA	11.6 k	(VA				
												Panel Totals
										То	tal Conn.	. Load: 35.44 kVA
									Το	tal Estd	. Demand	I Load: 35.44 kVA
												urrent: 98 A
									Total			urrent: 98 A
									rotal	Esia. D		

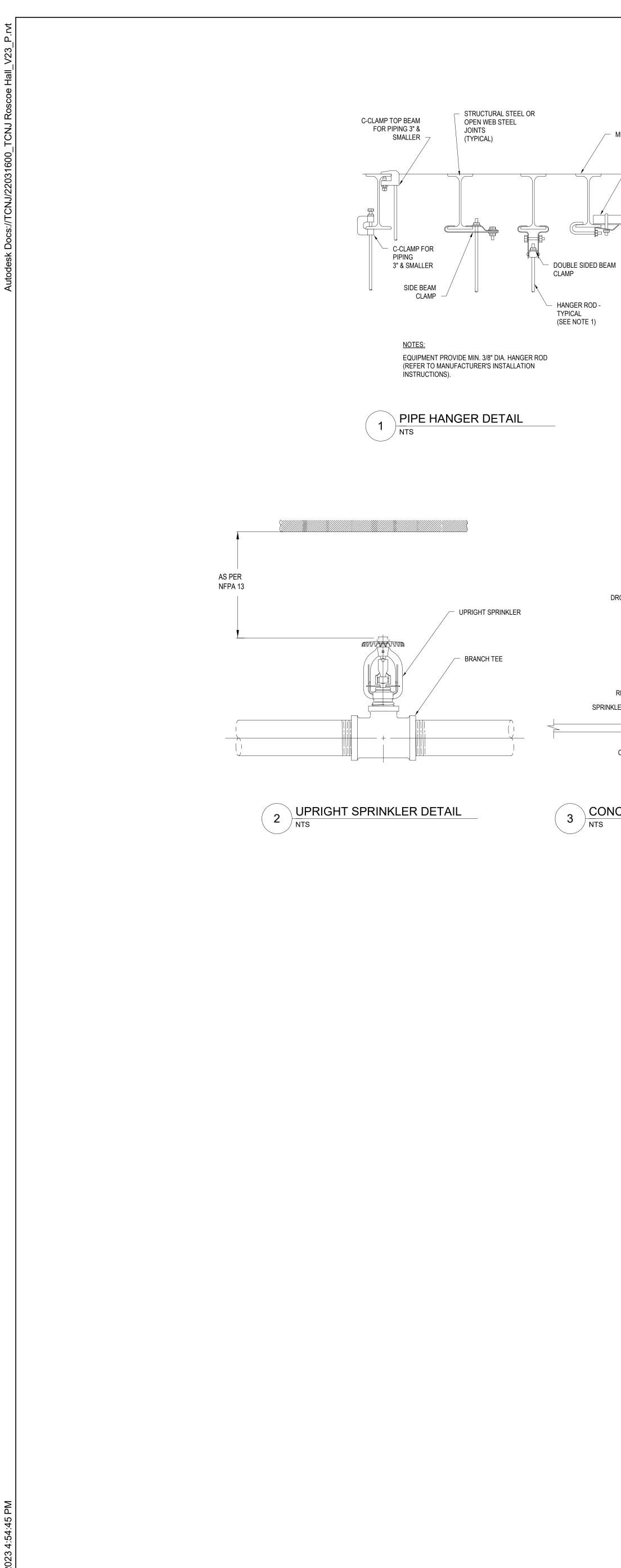
EXISTING PANEL TO REMAIN. ALL NEW (N) LOADS SHALL BE ON EXISTING BREAKERS U.O.N. PROVIDE TYPED PANEL SCHEDULES WITH FIELD-VERIFIED LOADS AT JOB COMPLETION.

СКТ

* = NEW BREAKER, MATCH EXISTING AIC RATINGS.

2





	GENERAL NOTES
	1. THESE GENERAL NOTES ARE APPLICABLE TO ALL FIRE PROTECTION DRAWINGS.
METAL DECKING METAL CHANNEL STRUT NUT AND	 THESE GENERAL NOTES ARE DIAGRAMMATIC IN NATURE AND SHOW THE GENERAL INTENT OF WORK. SEE DETAILS, RISERS, AND SPECIFICATION FOR ADDITIONAL INFORMATION. THE CONTRACTOR IS RESPONSIBLE FOR A COMPLETE SYSTEM FOR FULL BUILDING COVERAGE. ADDITIONAL SRINKLERS AND PIPING MAY BE REQUIRED TO ACCOMMODATE CONDITIONS SUCH AS SOFFITS, DUCTWORK, STRUCTURE, LIGHTING, EQUIPMENT, BOOK STACKS, ETC. THE CONTRACTOR SHALL PROVIDE A COMPLETE SPRINKLER INSTALLATION IN CONFORMANCE WITH NFPA 13, NFPA 14, FEDERAL AND STATE CODES AND THEIR APPLICABLE SUPPLEMENTS, AND THE REQUIREMENTS OF THE OFFICE OF THE STATE FIRE MARSHAL.
WASHER TYPICAL TYPICAL	3. REFER TO NFPA 13 FOR EXACT SPACING, DENSITY, AND LOCATION REQUIREMENTS. CONTRACTOR SHALL INSTALL QUICK RESPONSE TYPE SPRINKLER IN ENTIRE BUILDING. USE OF EXTENDED COVERAGE, QUICK RESPONSE, TYPE SPRINKLER MAY BE USED WITH THE APPROVAL OF THE AUTHORITY HAVING JURISDICTION.
CLEVIS HANGER	4. SPRINKLERS IN FINISHED LAYIN TILE CEILING AREAS SHALL ALWAYS BE LOCATED IN THE CENTER OF CEILING TILES UNLESS INDICATED OTHERWISE.
EAM	5. REVIEW THE ARCHITECTURAL REFLECTED CEILING, ELEVATION AND SECTION PLANS AS PART OF THIS CONTRACT FOR ADDITIONAL INFORMATION SUCH AS CEILING HEIGHTS, TYPES, SOFFITS AND OR OTHER DEVICE LOCATIONS.
	6. REVIEW THE ELECTRICAL DIVISION DRAWINGS AND COORDINATE THE FIRE PROTECTION WORK WITH LOCATIONS OF LIGHT, AND CEILING MOUNTED DEVICES WHICH MAY INTERFERE WITH SPRINKLER LOCATIONS OR SPRAY PATTERNS.
PIPE	7. REVIEW THE HVAC DIVISION DRAWINGS AND COORDINATE THE FIRE PROTECTION WORK WITH LOCATIONS OF CEILING MOUNTED DEVICES SUCH AS DIFFUSERS, GRILLS, REGISTERS, AND ALSO THE LOCATIONS OF HEAT PRODUCING EQUIPMENT AND DUCTWORK REQUIRING SPRINKLER PROTECTION BELOW IT.
¢.	8. PROVIDE PIPE EXPANSION JOINTS ALL BUILDING EXPANSION JOINT LOCATIONS AND EXPANSION LOOPS AT ALL BUILDING EXPANSION/SEISMIC JOINT LOCATIONS AS REQUIRED PER NFPA 13 AND BUILDING CODES. REVIEW ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR EXACT LOCATIONS OF EXPANSION AND SEISMIC JOINTS. SEISMIC SEPARATION ASSEMBLIES SHALL BE INSTALLED WHERE SPRINKLER PIPING, REGARDLESS OF SIZE, CROSSES BUILDING SEISMIC SEPARATION JOINTS ABOVE GROUND LEVEL IN ACCORDANCE WITH NFPA 13. 20. PROVIDE U.L. LISTED SWING JOIN ASSEMBLIES (METRAFLEX FIRELOOP,) WHERE SPRINKLER PIPING CROSSES BUILDING EXPANSION JOINTS. 21. PIPING, PIPE HANGERS AND SUPPORTS SHALL BE PROVIDED WITH SEISMIC RESTRAINT BRACING PER NFPA 13, STATE AND LOCAL REQUIREMENTS.
	9. PERFORM A FLOW TEST WITNESSED BY A REPRESENTATIVE OF THE OFFICE OF THE AUTHORITY HAVING JURISDICTION, OWNER, ARCHITECT, ENGINEER, DATA RECORDED AT THE TIME OF THIS FLOW TEST SHALL INCLUDE: DATE OF TEST, TIME OF TEST, WITNESSES PRESENT, ALL PARTIES SHALL BE NOTIFIED OF THE DATE AND TIME OF THE TEST PRIOR TO ANY FUTURE FLOW TESTS. THE CONTRACTOR SHALL USE THE FLOW DATA FROM THIS TEST FOR HIS/HER HYDRAULIC CALCULATIONS. REFER TO SPECIFICATION FOR ADDITIONAL REQUIREMENTS.
	10. ALL PIPE SIZES SHOWN ON THE CONTRACT DOCUMENTS ARE ADEQUATELY SIZED FOR THE NEW SPRINKLER SYSTEM. THE PIPE SIZES SHOWN ARE SUBJECT TO CHANGE UPON THE COMPLETION OF THE FIRE PROTECTION CONTRACTOR'S HYDRAULIC CALCULATIONS.
	11. MAKE PROVISIONS FOR DRAINING THE ENTIRE SYSTEM PER NFPA 13.
	12. PROVIDE SPRINKLER LAYOUT SHOP DRAWINGS, SEISMIC BRACING CALCULATION AND HYDRAULIC CALCULATIONS SIGNED AND STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF THE PROJECT. THESE DRAWINGS AND CALCULATIONS SHALL BE SUBMITTED TO AND APPROVED BY AN AUTHORITY HAVING JURISDICTION AND OWNER'S INSURANCE CARRIER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL PROVIDE COPIES OF AN AUTHORITY HAVING JURISDICTION AND OWNER'S INSURANCE CARRIER'S APPROVALS WITH THEIR SHOP DRAWING SUBMITTAL.
	13. UNOCCUPIED SPACES WITHOUT CEILINGS SHALL BE PROVIDED WITH UPRIGHT SPRINKLERS.
DROP NIPPLE BRANCH LINE	14. SPRINKLERS SHALL BE INSTALLED UNDER FIXED OBSTRUCTIONS OVER 4 FEET (1.2M) WIDE PER NFPA 13. THE CONTRACTOR SHALL VERIFY ALL DUCTWORK DIMENSIONS IN THE FIELD AND INSTALL SPRINKLERS AS REQUIRED.
	15. VERIFY THE DISTANCE BETWEEN CEILING AND BOTTOM OF STRUCTURAL BEAMS IN ALL AREAS WITH REFLECTIVE CEILINGS.
	16. ALL HORIZONTAL PIPING SHALL BE LOCATED ABOVE THE CEILING OR IN SOFFIT SPACES UNLESS NOTED OTHERWISE.
	17. VERIFY AND COORDINATE VALVE IDENTIFICATION REQUIREMENTS WITH OWNER STANDARDS IN THE FIELD.
	18. FLOW AND TAMPER SWITCHES SHALL BE PROVIDED WHERE INDICATED; ALL WIRING SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR. ALL WORK SHALL BE COORDINATED BETWEEN TRADES IN THE FIELD.
REDUCER	19. SPRINKLER PROTECTION SHALL BE REQUIRED IN ALL ELECTRICAL EQUIPMENT AND COMMUNICATION ROOMS, ETC. SPRINKLER HOODS OR SHIELDS SHALL BE INSTALLED TO PROTECT IMPORTANT ELECTRICAL EQUIPMENT FROM SPRINKLER DISCHARGE. HOODS/SHIELDS SHALL BE OF A NON-COMBUSTIBLE MATERIAL. SPRINKLER SHALL NOT BE REQUIRED WHERE ALL THE FOLLOWING CONDITIONS ARE MET:
COVER PLATE NEW CEILING	 A. THE ROOM IS DEDICATED TO ELECTRICAL EQUIPMENT ONLY. B. ONLY DRY TYPE ELECTRICAL EQUIPMENT IS USED. C. ELECTRICAL EQUIPMENT IS INSTALLED IN A 2 HOUR, FIRE RATED, ENCLOSURE INCLUDING PROTECTION OF PENETRATIONS. D. NO COMBUSTIBLE STORAGE IS PERMITTED TO BE STORED IN THE ROOM.
	20. THE SPRINKLER EQUIPMENT ROOM AND FIRE PROTECTION EQUIPMENT COMPONENTS (E.G. VALVES, PIPING, TAMPER SWITCHES, FLOW ALARMS, ECT) SHALL REQUIRE PROPER IDENTIFICATION AS PER THE REQUIREMENT OF NFPA13.
NCEALED SPRINKLER TYPE DETAIL	21. THE SUBMISSION OF AUTOMATIC FIRE SUPPRESSION (SPRINKLER) SYSTEM SHOP DRAWINGS (E.G. INFORMATION RELATIVE TO SPRINKLERS, FITTINGS, CHECK VALVES, EXPOSURE TO HAZARDS, EXTENT OF SYSTEM COVERAGE, SUPPRESSION SYSTEM DESIGN CRITERIA, WATER SUPPLY SOURCE, SUPPLY AND EXTINGUISHING AGENTS, LOCATION AND METHOD OF OPERATION FOR DETECTION AND ALARM DEVICES,ECT.) SHALL BE REQUIRED FOR REVIEW AND EVALUATION AS PER IBC, 2009: THE STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS (NFPA-13) AND THE HUD MAP CHAPTER 5 GUIDELINES.
	22. SPRINKLERS ARE REQUIRED IN CONCEALED SPACES PER NFPA 13 SECTION 8.15.1
	23. CONTRACTOR SHALL COORDINATE HEAD TYPE WIT HARCHITECTURAL CEILING PLANS.

3

FIRE PROTECTION CONSTRUCTION PROCEDURES

- 1. IT IS SOLELY THE FIRE PROTECTION CONTRACTOR'S RESPONSIBILITY TO OBTAIN APPROVAL OF SHOP DRAWINGS FROM THE OWNERS INSURANCE CARRIER AND THE AUTHORITY HAVING JURISDICTION. ANY INSTALLATION OF THE SPRINKLER SYSTEM WITHOUT APPROVED PLANS SHALL BE AT THE SOLE RISK AND EXPENSE OF THE CONTRACTOR.
- 2. THE FIRE PROTECTION CONTRACTOR MUST CONTACT THE OWNERS CONSTRUCTION COORDINATOR AND REQUEST WHENEVER THE SPRINKLER MAIN IS TO BE ISOLATED AND/OR DRAINED. THIS PROCEDURE MUST BE ADHERED TO WHEN PRESSURE TESTING AND/OR PLACING ANY PORTION OF SYSTEM IN OR OUT OF SERVICE.
- 3. THE OWNER'S CONSTRUCTION COORDINATOR AND THE AUTHORITY HAVING JURISDICTION SHALL WITNESS ALL SYSTEM PRESSURE TESTS. CONTRACTOR MAKING THE TEST SHALL PROVIDE 24 HOURS NOTICE TO ALL REQUIRED TO BE IN
- 4. ALL WORK SHALL MEET THE REQUIREMENTS OF NFPA STANDARDS. INSTALLATION PROCEDURES SHALL COMPLY WITH THE SAFETY RULES OF OSHA AND THE STATE OF PENNSYLVANIA FIRE SAFETY CODE.

ATTENDANCE.

- 5. THE FIRE PROTECTION CONTRACTOR MUST PROVIDE A FIRE WATCH WHENEVER ANY WELDING IS DONE WITHIN THE AREA BEING WORKED, DURING THE WIELDING OPERATION, AND FOR ONE HOUR AFTER WELDING IS COMPLETE.
- 6. NO STOCK OF FURNISHINGS SHALL BE ALLOWED IN THE AREAS BEING WORKED UNTIL THE ENTIRE SYSTEM IS COMPLETED IN ACCORDANCE WITH THE ABOVE NOTES AND APPROVED BY THE AUTHORITY HAVING JURISDICTION.
- PROVIDE A MATERIAL TEST AND CERTIFICATION FORM TO THE AUTHORITY HAVING JURISDICTION AND OWNER'S INSURANCE CARRIER SO AS TO CERTIFY THAT THE SPRINKLER SYSTEM WAS INSTALLED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, SPECIFICATIONS, FEDERAL, STATE, AND LOCAL CODES AND PROCEDURES.
- 8. UPON COMPLETION OF SYSTEM INSTALLATION, PERFORM A HYDROSTATIC TEST ON ALL PIPING AND ATTACHED APPURTENANCES IN THE PRESENCE OF AN AUTHORITY HAVING JURISDICTION. THE SYSTEM SHALL BE HYDROSTATIC ALLY TESTED AT A PRESSURE OF 200 PSI AND SHALL MAINTAIN THAT PRESSURE WITHOUT LOSS FOR 2 HOURS. TEST FAILURE SHALL BE DETERMINED BY A DROP IN GAUGE PRESSURE OR VISUAL LEAKAGE. THE TEST PRESSURE SHALL READ FROM A GAUGE LOCATED AT THE LOWEST ELEVATION POINT OF THE SYSTEM OR PORTION BEING TESTED. ALL TESTING THE SYSTEM SHALL BE IN ACCORDANCE WITH NFPA 13 AND NFPA 25.
- 9. CONSTRUCTION PHASING OF THE PROJECT, THE EXISTING AREAS OF FIRE PROTECTION MUST BE MAINTAINED. THE FIRE PROTECTION CONTRACTOR IS TO PROVIDE SERVICE TO THESE AREAS FROM THE NEW FIRE PROTECTION SERVICE AS REQUIRED.

SPRINKLER SYSTEM DESIGN CRITERIA SYMBOLS

	AREA	-	AREA OF SCOPE
SYSTEM TYPE	SYSTEM TYPE	HAZARD	HAZARD CLASSIFICATION
DESIGNMDENSITY GPM/SQ.FT.	DENSITY	MIN. AREA	REMOTE DESIGN AREA
SPRINKLER ACTIVATION TEMPERATURE	SPKR. TEMP	MAX SF/HD	MAXIMUM SQ.FT. / SPRINKLER

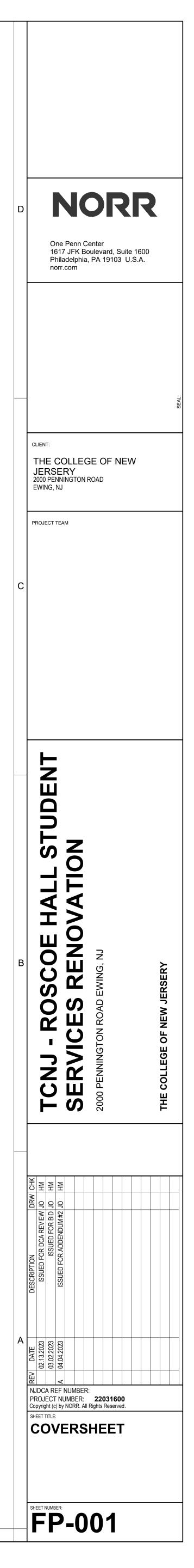
		FIRE PROTECTION SHEET LIST	
	FP-001	COVERSHEET	$ \sum $
	FP-101	FIRE PROTECTION FIRST FLOOR PLAN (OMITTED)	
(FP-102	FIRE PROTECTION SECOND FLOOR PLAN	
			\sim

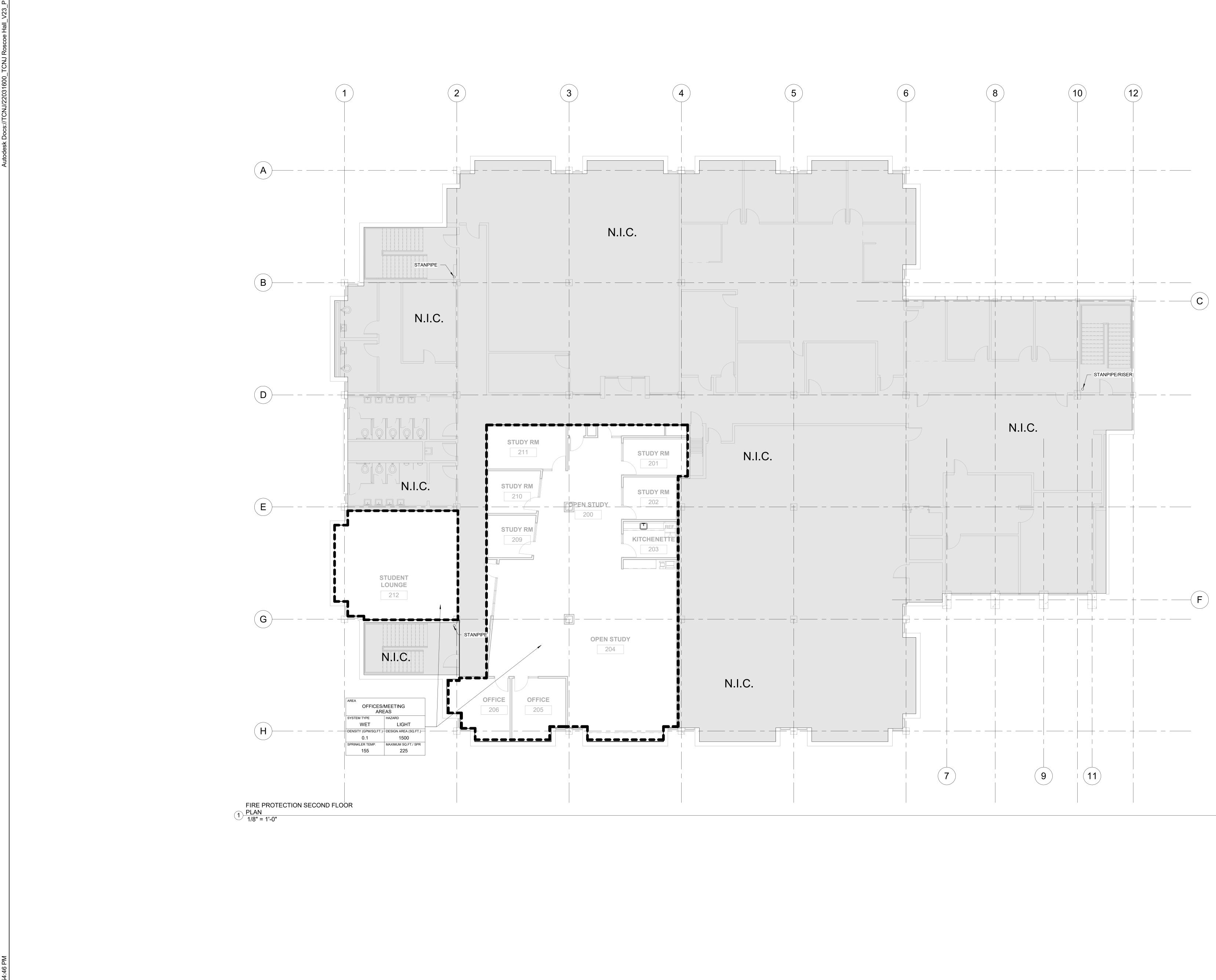
	LEG	IEND	
FIRE SERVICE PIPING		F	
SPRINKLER PIPING		SPR	
FIRE PUMP TEST HEADER PIPING		FPTH	
FIRE DEPARTMENT CONNECTION PIPING		FDC	
STANDPIPE		WSP	
COMBINATION SPRINKLER / STANDPIPE		SPR/WSP	
DRY STANDPIPE		DSP	
ALARM CHECK VALVE W/ SUPERVISORY SWITCH.		VALVE	GATE M BALL
DOUBLE CHECK DETECTOR ASSEMBLY (DCDA)		BACKFLOW PREVENTION DEVICE	
EXISTING SPRINKLER	0	FIRE DEPARTMENT CONNECTION	\langle
EXISTING SIDE WALL TYPE SPRINKLER	\triangleleft	CAPPED OUTLET	[
SIDE WALL TYPE SPRINKLER	•	CHECK VALVE	
CONCEALLED SIDE WALL SPRINKLER		PRESSURE GAUGE	\bigcirc
PENDENT TYPE SPRINKLER	۲	WATER TIGHT PIPE SLEEVE	
CONCEALLED TYPE PENDENT SPRINKLER	Ì	PIPE BREAK	\
UPRIGHT TYPE SPRINKLER	•	PIPE DROP	
DRY TYPE SPRINKLER	×	PIPE UP OR DOWN	OO
REMOVE EXISTING SPRINKLER	×	FIRE HOSE VALVE	₹ţ

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LEGEND

24. CONTRACTOR SHALL PROVIDE SPRINKLER HEADS ABOVE AND BELOW DUCT AND CEILIGN CLOUDS AS REQUIRED BY NFPA.



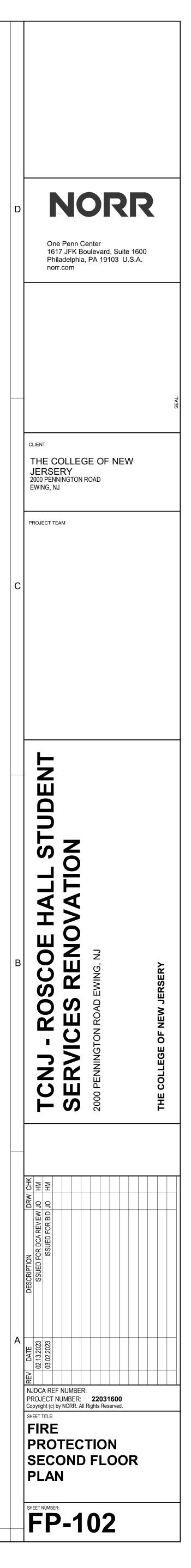


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SMW.rvt	DRAWING LIST:	ABBRE	EVIATIONS:
V23	NUMBERNAMETT000TELECOM TITLE SHEETTT001TELECOM OUTLET SCHEDULESTT101TELECOM OVERALL PLAN - FIRST FLOORTT102TELECOM OVERALL PLAN - SECOND FLOORTT201TELECOM OVERALL RCP - FIRST FLOOR	AC AFC AFF AHJ APPROX ARCH	ACOUSTIC / ACOUSTICAL ABOVE FINISHED CEILING ABOVE FINISHED FLOOR AUTHORITY HAVING JURISDIC APPROXIMATE ARCHITECT / ARCHITECTURAL
TCNJ Roscoe Hall	TT201 TELECOM OVERALL RCP - PIRST FLOOR TT202 TELECOM OVERALL RCP - SECOND FLOOR TT301 TELECOM ROOM ENLARGED PLANS TT601 TELECOM OUTLET AND TERMINATIONDETAILS	AV BDF BLDG	AUDIOVISUAL BUILDING DISTRIBUTION FACI BUILDING
Autodesk Docs://TCNJ/22031600_1	TT602 TELECOM PATHWAYS AND CABLE ROUTING DETAILS TT603 TELECOM GROUNDING AND BONDING DETAILS	BOTT CAT 3 CAT 5E CAT 6 CATV CCTV CLG CLR CMP CMR CONN CONT CP	BOTTOM CATEGORY - 3 RATED CABLE CATEGORY - 5E RATED CABLE CATEGORY - 6 RATED CABLE COMMUNITY ANTENNA TELEV CLOSED CIRCUIT TELEVISION CEILING CLEAR COMMUNICATIONS PLENUM R COMMUNICATIONS RISER RAT CONNECTION CONTINUOUS CONSOLIDATION POINT
		DEPT DET DIA DIM DWG	DEPARTMENT DETAIL DIAMETER DIMENSION DRAWING
		EA ELEV EC ENCL EQ EQPT (E)	EACH ELEVATION EMPTY CONDUIT ENCLOSURE EQUAL EQUIPMENT EXIST / EXISTING
		FB FIN FT	FLOOR BOX FINISH FOOT / FEET
		GC GND	GENERAL CONTRACTOR GROUND
		HT HOR	HEIGHT / HIGH HORIZONTAL
		ID IDF INT ISP	INSIDE DIAMETER INTERMEDIATE DISTRIBUTION INTERIOR INSIDE PLANT (CABLE)
		LOMMF MAX MDF	LASER OPTIMIZED MULTIMOD MAXIMUM MAIN DISTRIBUTION FACILITY
		MECH MH MIN MMF MPOE	MECHANICAL MAINTENANCE HOLE MINIMUM MULTI - MODE FIBER MINIMUM POINT OF ENTRY
		MTD MTG	MOUNTED MEETING
		NIC NTS OC	NOT IN CONTRACT NOT TO SCALE ON CENTER
		OD OFCI OFE OFOI OSP	OUTSIDE DIAMETER OWNER FURNISHED / CONTRA OWNER FURNISHED EQUIPME OWNER FURNISHED, OWNER OUTSIDE PLANT CABLE
		PB PBX PR	PULLBOX PRIVATE BRANCH EXCHANGE PAIR
		REC REQ RM	RECESSED REQUIREMENT ROOM
		SC SCHED SECT SMF SHT STD	SECURITY SCHEDULE SECTION SINGLE - MODE FIBER (ZERO \ SHEET STANDARD
	1. INSTALL FIRESTOP TO ALL SLAB AND WALL PENETRATIONS PROVIDED FOR THE	TEL TELC	TELEPHONE TELECOM
	 INSTALLATION OF TELECOMMUNICATIONS CABLE AS REQUIRED TO MAINTAIN FIRE RATING OF SLAB OR WALL. REVIEW ARCHITECT'S PLANS FOR PARTITION TYPES. 2. CABLE TERMINATION HARDWARE INDICATED ON RACK ELEVATIONS MAY BE APPROXIMATE TO INDICATE TYPICAL ORGANIZATION OF TERMINATION HARDWARE. CONTRACTOR SHALL COMPARE THE RACK ELEVATIONS TO THE CABLING REQUIRED 	TEMP TGB TMGB TSER THK TR TR TYP	TEMPORARY TELECOMMUNICATIONS GROU TELECOMMUNICATIONS MAIN TELECOMMUNICATIONS SERV THICK TELECOMMUNICATIONS ROOM TYPICAL
	BY THE CONTRACT DOCUMENTS AND FURNISH AND INSTALL TERMINATION HARDWARE IN SUFFICIENT QUANTITIES TO TERMINATE CABLES.	TV UPS	TELEVISION UNINTERRUPTIBLE POWER SU
			UNSHIELDED TWISTED PAIR UNLESS OTHERWISE NOTED VERIFY IN FIELD
	 A. PROPERLY LABEL ALL CABLES, RECEPTACLES, CONNECTION BLOCKS, GROUNDING BARS, RACKS, CABINETS, OUTLETS AND PATCH PANELS. GROUNDING BUSBARS, RACKS, CABINETS. 	W/ WAP W/O	VERTICAL WITH WIRELESS ACCESS POINT WITHOUT
	B. PRIOR TO SYSTEM ACCEPTANCE, THE CONTRACTOR SHALL SUBMIT AN AS-BUILT LABEL REPORT PROVIDING THE ROOM NUMBERS AND CABLE LENGTHS FOR EACH OF THE INSTALLED CABLES.	WP WT W	WATERPROOF WEIGHT WIDE
	 A. LABEL SHALL BE MECHANICALLY PRINTED ON ADHESIVE-BACKED LABEL STOCK OF LAMINATED PLASTIC (E.G. P-TOUCH). B. LABEL SHALL BE APPLIED TO PLASTIC SELF-LAMINATING CABLE TAG (E.G. PANDUIT 	\mathbf{P}	
	 PST-FOBLINK). TAG SHALL BE ATTACHED TO CONDUCTOR. C. LABEL EACH BONDING CONDUCTOR ON EACH END, AND WHEN PASSING THROUGH - WALLS/BULKHEADS WITH LABEL TEXT CODE THAT INDICATES TERMINAL 		
	D. COORDINATE WITH OWNER FOR LABEL TEXT. OWNER SHALL FURNISH FINAL LABEL- TEXT FOR PRODUCTION AND INSTALLATION BY CONTRACTOR.		
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•
JSTICAL CEILING FLOOR NG JURISDICTION
HITECTURAL
BUTION FACILITY / FRAME
ATED CABLE RATED CABLE ATED CABLE ENNA TELEVISION TELEVISION
IS PLENUM RATED IS RISER RATED
POINT
ACTOR

TRIBUTION FACILITY / FRAME

MULTIMODE FIBER

/ CONTRACTOR INSTALLED EQUIPMENT , OWNER INSTALLED

EXCHANGE

ER (ZERO WATER PEAK)

IONS GROUNDING BUSBAR IONS MAIN GROUNDING BUSBAR IONS SERVICE ENTRENCE ROOM IONS ROOM

POWER SUPPLY TED PAIR SE NOTED

SYMBOL	DESCRIPTION	CAT-A QTY	CONNECTOR & CABLE COLOR				
STANDAF	RD WALL MOUNTED DATA OUTLETS - IT						
$\mathbf{\overset{3}{\vee}}$	STANDARD THREE POSITION DATA OUTLET	3	(2) BLUE (1) WHITE				
3-EX	THREE POSITION DATA OUTLET - EXISTING TO REMAIN	NA	NA				
STANDAF	RD FURNITURE FED DATA OUTLETS - IT						
F3	FURNITURE FED THREE POSITION DATA OUTLET FOR CUBICLE WORK STATIONS	3	(2) BLUE (1) WHITE				
STANDAF	RD CEILING MOUNTED DATA OUTLET - IT						
WAP	WIRELESS ACCESS POINT OUTLET	2	BLUE				
STANDARD WALL MOUNTED DATA OUTLETS - AUDIOVISUAL							
AV2	TWO POSITION DATA OUTLET FOR AUDIOVISUAL IO PANEL	1	BLUE				
AR V	SIX POSITION DATA OUTLET FOR AUDIOVISUAL RACK	6	BLUE				
STANDAF	RD FLOOR MOUNTED DATA OUTLETS - AUDIOV	ISUAL					
AV2	STANDARD TWO POSITION DATA OUTLET IN FLOOR BOX	2	BLUE				
STANDAF	RD CEILING MOUNTED DATA OUTLET - AUDIOVI	SUAL	1				
	STANDARD ONE POSITION CEILING OUTLET	1	BLUE				
AV2 	STANDARD TWO POSITION CEILING OUTLET	2	BLUE				
STANDAF	RD WALL & CEILING MOUNTED DATA OUTLETS	- SECURII	ΓY				
SC 	STANDARD CAMERA CEILING OUTLET	1	BLACK				

3

N THE TELECOM ROOM
MOUNTING / REMARKS
" AFF UON
F .
OORDINATE WITH FURNITURE INSTALLATON
OUNT IN BISCUIT JACK IN CEILING WITH A 6' ERVICE LOOP
OORDINATE OUTLET TO BE INSTALLED ADJACENT
" AFF.
OUNT IN AUDIOVISUAL FLOOR BOX (FLOOR BOX (OTHERS).
OUNT IN BISCUIT JACK IN CEILING WITH A 6' ERVICE LOOP. COORDINATE WITH AV STALLATION.
OUNT IN BISCUIT JACK IN CEILING WITH A 6' ERVICE LOOP. COORDINATE WITH AV STALLATION.
OUNT IN BISCUIT JACK IN CEILING WITH A 6' ERVICE LOOP.
MINATE IN THE DESIGNATED TELECOM ROOM. CURITY CAT-6A CONNECTORS, PATCH CORDS,

2

PATHWAY NOTES:

COORDINATE WALL BOX LOCATIONS AND DIMENSIONS WITH ARCHITECTURAL AND ELECTRICAL PLANS.

2. COORDINATE WITH ELECTRICAL DRAWINGS FOR LOCATION OF ALL TELECOMMUNICATIONS OUTLETS.

3. INSTALL CONDUIT AND LADDER RACK CABLE TRAY FOR TELECOMMUNICATIONS WIRING TO MAINTAIN A MINIMUM OF 5" SEPARATION FROM FLUORESCENT LIGHTING.

IF CONFLICTS ARE FOUND BETWEEN THE TELECOMMUNICATIONS DRAWINGS AND ANY OTHER DRAWINGS ASSOCIATED WITH THE PROJECT, NOTIFY THE ARCHITECT AT ONCE AND HAVE LOCATION VERIFIED BEFORE OUTLETS ARE INSTALLED. ANY REASONABLE CHANGE IN LOCATION OF OUTLETS PRIOR TO ROUGH-IN SHALL NOT INVOLVE ADDITIONAL EXPENSE TO THE PROJECT. THE TERM "REASONABLE" SHALL BE INTERPRETED AS MOVING OUTLET LOCATIONS A MAXIMUM OF 10' IN ANY DIRECTION FROM THE LOCATION INDICATED ON THE DRAWINGS.

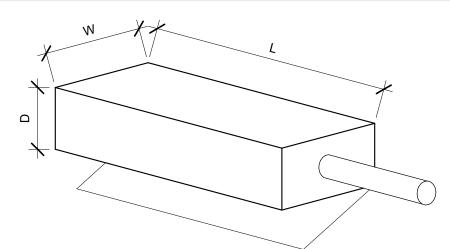
MAINTAIN MINIMUM BEND RADIUS OF 10X O.D. FOR CONDUITS GREATER THAN 2" DIAMETER. MAINTAIN MINIMUM BEND RADIUS OF 6X O.D. FOR CONDUITS EQUAL TO OR LESS THAN 2" DIAMETER.

6. PROVIDE PULL BOXES (SIZE AS NOTED) AFTER EVERY 100 FT (30m) OF RUN OR AFTER EVERY 180-DEGREES OF BEND.

DO NOT INSTALL PULL BOXES IN LIEU OF A BEND.

PULL BOX SIZING CHART

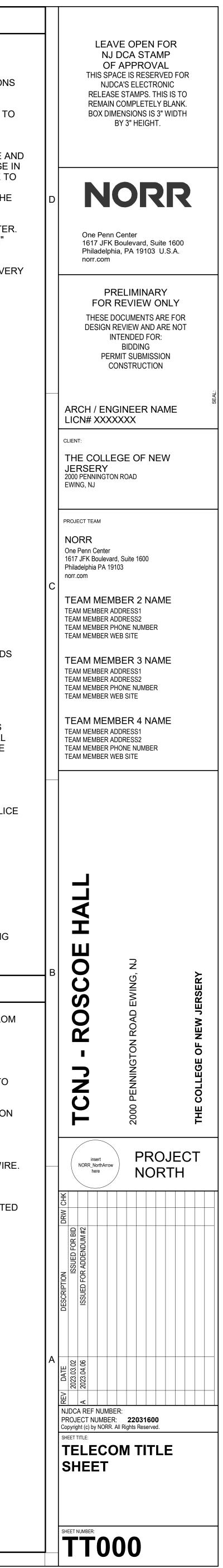
CONDUIT	DUIT PULL BOX D		ISIONS		DIMENSION TO INCREASE PULL BOX DEPTH FOR EACH		
TRADE SIZE (in.)	WIDTH (in.)	LENGTH (in.)	DEPTH (in.)	PULL BOX WIDTH FOR EACH ADDITIONAL CONDUIT (in.)	ADDITIONAL TIER OF CONDUIT (in.)		
1	4	16	3	2	3		
1-1/4	6	20	3	3	3		
1-1/2	8	27	4	4	4		
2	8	36	4	5	4		
2-1/2	10	42	5	6	5		
3	12	48	5	6	5		
3-1/2	12	54	6	6	6		
4	15	60	6	8	8		



- 8. REAM AND BUSH THE ENDS OF ALL CONDUITS. PROVIDE PLASTIC BUSHINGS ON THE ENDS OF ALL CONDUITS.
- 9. PROVIDE AND LEAVE IN PLACE A PULL STRING IN EACH CONDUIT.
- 10. STUB UP CONDUIT SLEEVES THROUGH SLABS 3" ABOVE FINISHED FLOORS.
- 11. PROVIDE HANGERS, ANCHORS, MOUNTING HARDWARE, GROUND LUGS AND STRAPS AS REQUIRED TO ENSURE PROPER INSTALLATION OF PATHWAY COMPONENTS. INSTALL ALL COMPONENTS AS PER MANUFACTURERS RECOMMENDATIONS AND PER ALL APPLICABLE CODES.
- 12. GROUND ALL CONDUITS AND LADDER RACK AS PER MANUFACTURERS' RECOMMENDATIONS AND PER ALL APPLICABLE CODES.
- 13. PROVIDE AT ALL LADDER RACK AND CABLE TRAY LOCATIONS: RUNWAY DROPOFFS. SPLICE HARDWARE, GROUND STRAPS, THERMAL EXPANSION PLATES, TERMINATION KITS, END SUPPORT KITS AND CEILING SUPPORT HARDWARE.
- 14. PROVIDE FOR ALL BASKET TYPE CABLE TRAY LOCATIONS, CONNECTION HARDWARE GROUND STRAPS, THERMAL EXPANSION PLATES, SUPPORT BRACKETS AND CEILING SUPPORT HARDWARE AND WATER FALLS.
- 15. WHERE CABLE IS RUN ABOVE NON-ACCESSIBLE (I.E. GYPSUM BOARD) CEILING CONSTRUCTION, CONDUIT AND PULL BOXES MUST BE INSTALLED TO PROPERLY ROUTE CABLE.
- 16. PROVIDE J-HOOKS AND CABLE STRAPS TO SUPPORT CABLE ABOVE ACCESSIBLE CEILING CONSTRUCTION, EXCEPT IN AREAS WHERE CABLE TRAY OR CONDUIT IS INDICATED.

CABLING NOTES:

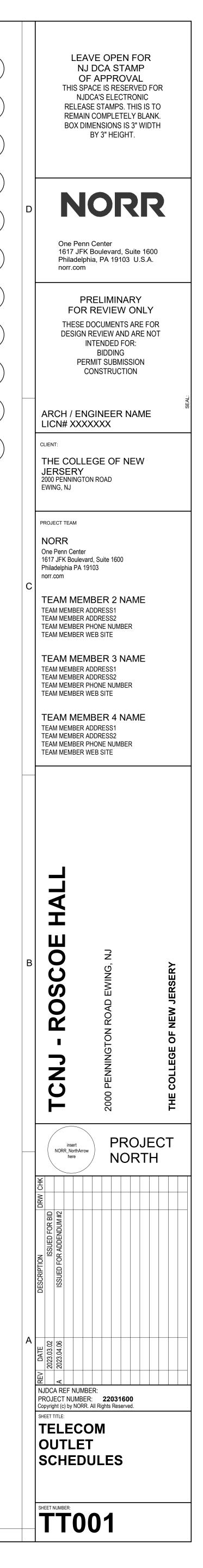
- 1. INSTALL TELECOMMUNICATIONS WIRING TO MAINTAIN A MINIMUM OF 5" SEPARATION FROM FLUORESCENT LIGHTING.
- 2. PROVIDE DESIGNATION LABELS FOR ALL TERMINATION BLOCKS, PATCH PANELS, AND WORKSTATION OUTLET FACEPLATES.
- 3. PROVIDE NONCONTINUOUS CABLE SUPPORTS (J-HOOKS) NO GREATER THAN 5' APART TO SUPPORT CABLES WHERE NO CABLE TRAYS AND CONDUITS ARE PROVIDED.
- 4. INSTALL EACH CABLE SET INDICATED BY THE SYMBOLS LIST FROM THE OUTLET LOCATION TO THE RESPECTIVE SERVING TELECOM ROOM.
- 5. REPORT TO THE DESIGN TEAM ANY HORIZONTAL CABLE THAT EXCEEDS 250 FT. (75m).
- 6. DO NOT RUN LOW-VOLTAGE CABLE DIRECTLY PARALLEL TO ELECTRICAL OR GROUND WIRE. IF CABLES MUST CROSS, DO SO AT PERPENDICULAR ANGLES.
- 7. THE CONTRACTOR SHALL PROVIDE 10 FEET (3.05m) OF EXTRA CABLE IN THE TELECOM ROOM AND 12-18 INCHES (304-457mm) ABOVE DATA OUTLET INSTALLATIONS UNLESS NOTED DIFFERENTLY ON THE OUTLET DETAIL FOR RETERMINATIONS AND TO ACCOMMODATE MOVES, ADDS, AND CHANGES.



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				CABLES
				PER
Zone ID	LABEL	Mark	Туре	DEVICE
200	3	316	WALL - STANDARD (3) POSITION DATA OUTLET	3
200	3	318	WALL - STANDARD (3) POSITION DATA OUTLET	3
200	WAP	419	CEILING - STANDARD (2) PORT DATA OUTLET - WIRELESS ACCESS POINT	2
200	WAP	428	CEILING - STANDARD (2) PORT DATA OUTLET - WIRELESS ACCESS POINT	2
201	AV2	577	CEILING - STANDARD (2) POSITION CEILING OUTLET - AV	2
201	AV2	901	WALL - STANDARD (2) POSITION DATA OUTLET - AV	2
202	AV2	579	CEILING - STANDARD (2) POSITION CEILING OUTLET - AV	2
202	AV2	898	WALL - STANDARD (2) POSITION DATA OUTLET - AV	2
204	3	304	WALL - STANDARD (3) POSITION DATA OUTLET	3
204	3	307	WALL - STANDARD (3) POSITION DATA OUTLET	3
204	3	310	WALL - STANDARD (3) POSITION DATA OUTLET	3
204	3	631	WALL - STANDARD (3) POSITION DATA OUTLET	3
204	WAP	422	CEILING - STANDARD (2) PORT DATA OUTLET - WIRELESS ACCESS POINT	2
204	WAP	425	CEILING - STANDARD (2) PORT DATA OUTLET - WIRELESS ACCESS POINT	2
204	WAP	437	CEILING - STANDARD (2) PORT DATA OUTLET - WIRELESS ACCESS POINT	2
205	3	301	WALL - STANDARD (3) POSITION DATA OUTLET	3
206	3	298	WALL - STANDARD (3) POSITION DATA OUTLET	3
208	3	313	WALL - STANDARD (3) POSITION DATA OUTLET	3
209	AV2	571	CEILING - STANDARD (2) POSITION CEILING OUTLET - AV	2
209	AV2	895	WALL - STANDARD (2) POSITION DATA OUTLET - AV	2
209	AV2	915	CEILING - STANDARD (2) POSITION CEILING OUTLET - AV	2
210	AV2	573	CEILING - STANDARD (2) POSITION CEILING OUTLET - AV	2
210	AV2	892	WALL - STANDARD (2) POSITION DATA OUTLET - AV	2
211	AV2	575	CEILING - STANDARD (2) POSITION CEILING OUTLET - AV	2
211	AV2	889	WALL - STANDARD (2) POSITION DATA OUTLET - AV	2
212	WAP	413	CEILING - STANDARD (2) PORT DATA OUTLET - WIRELESS ACCESS POINT	2
212	WAP	416	CEILING - STANDARD (2) PORT DATA OUTLET - WIRELESS ACCESS POINT	2



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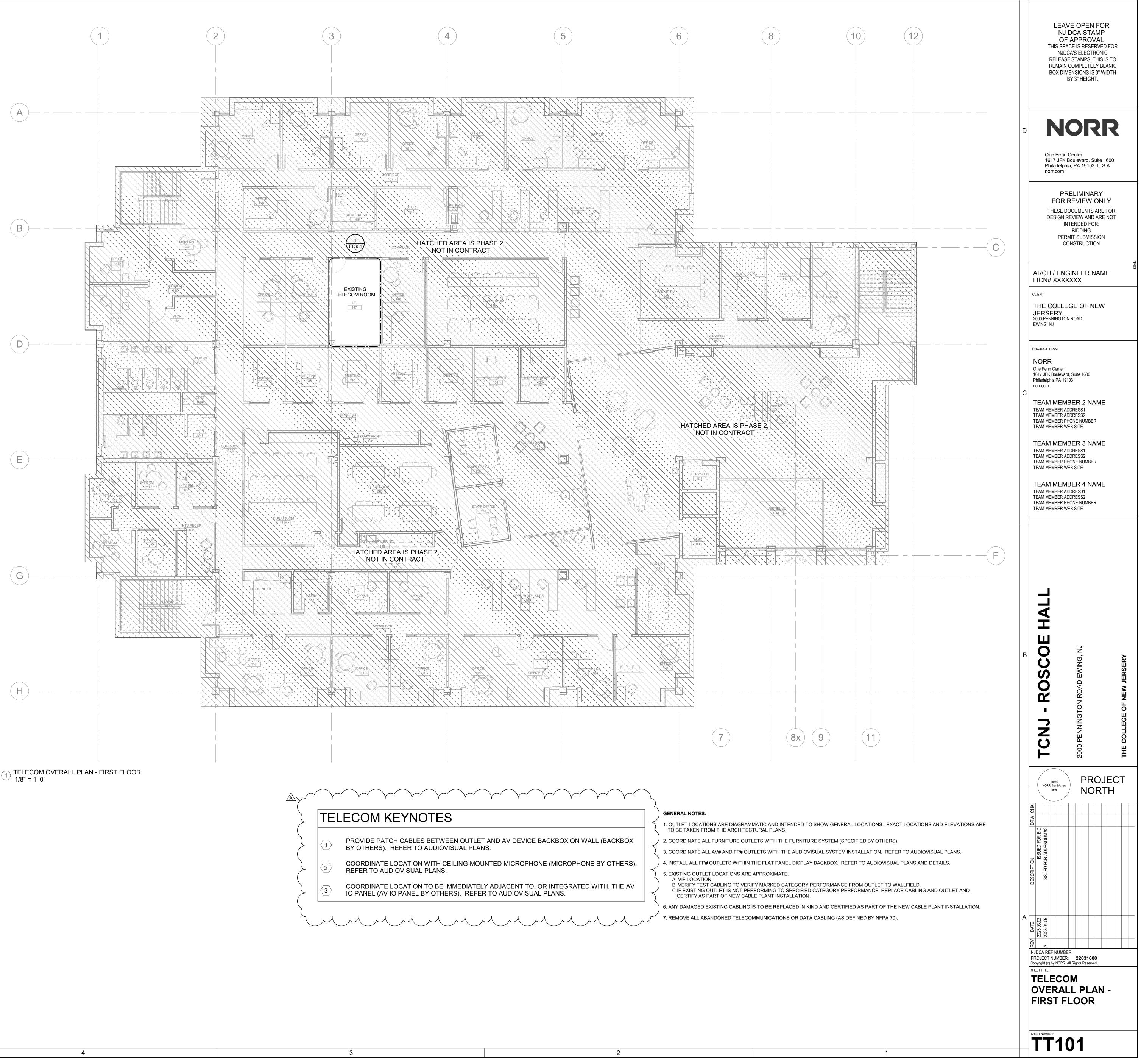
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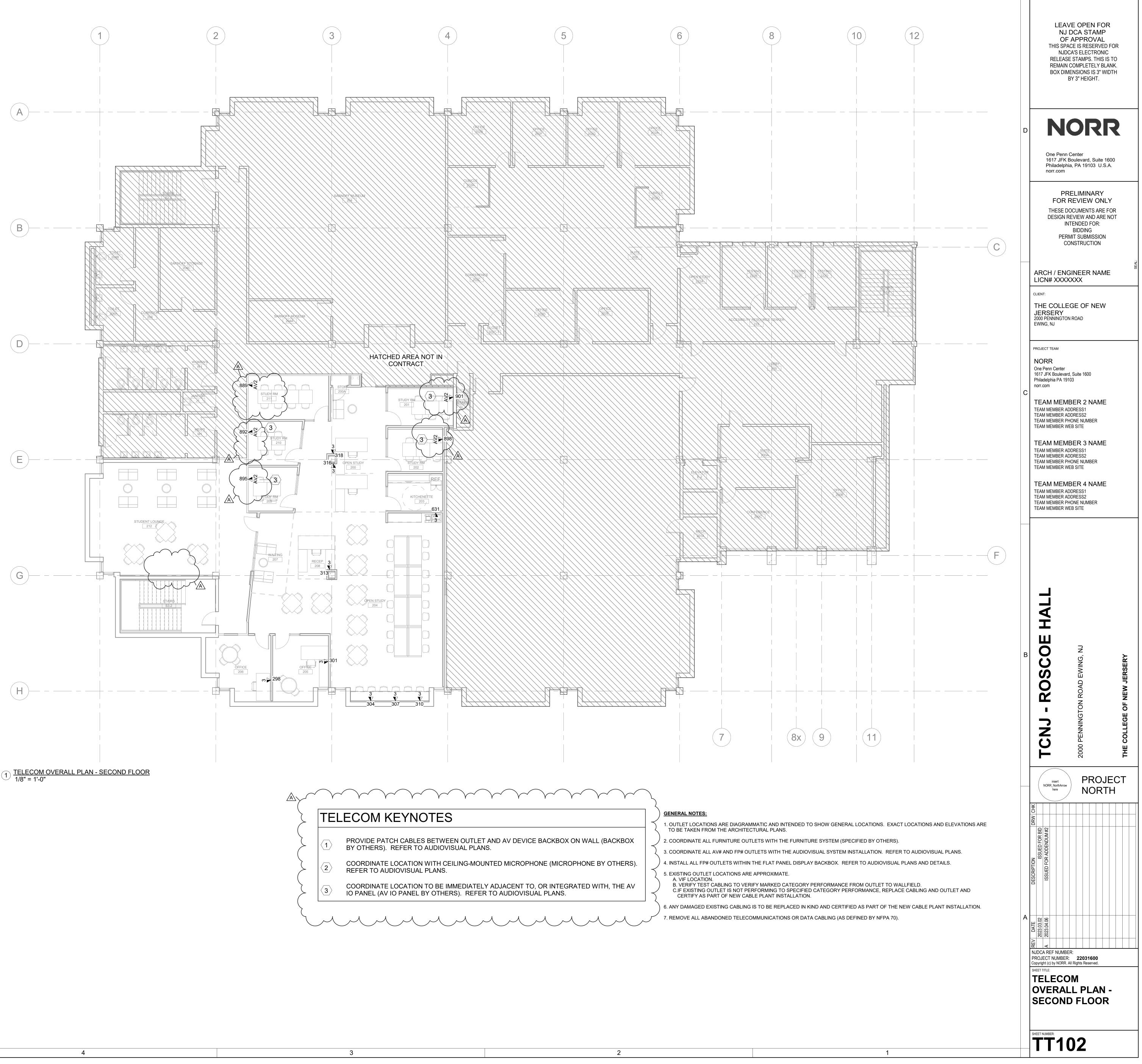
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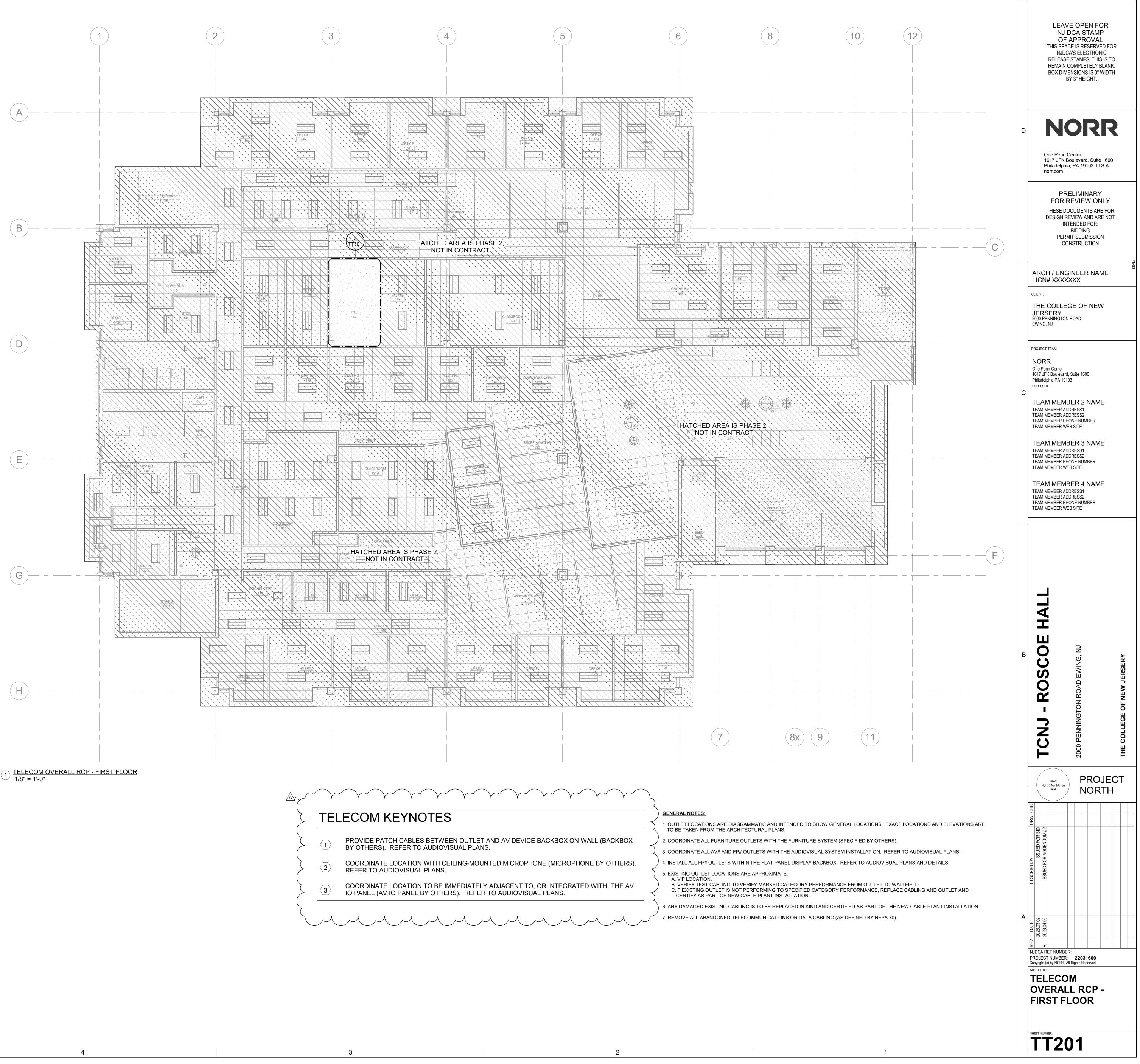
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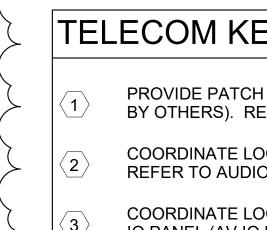
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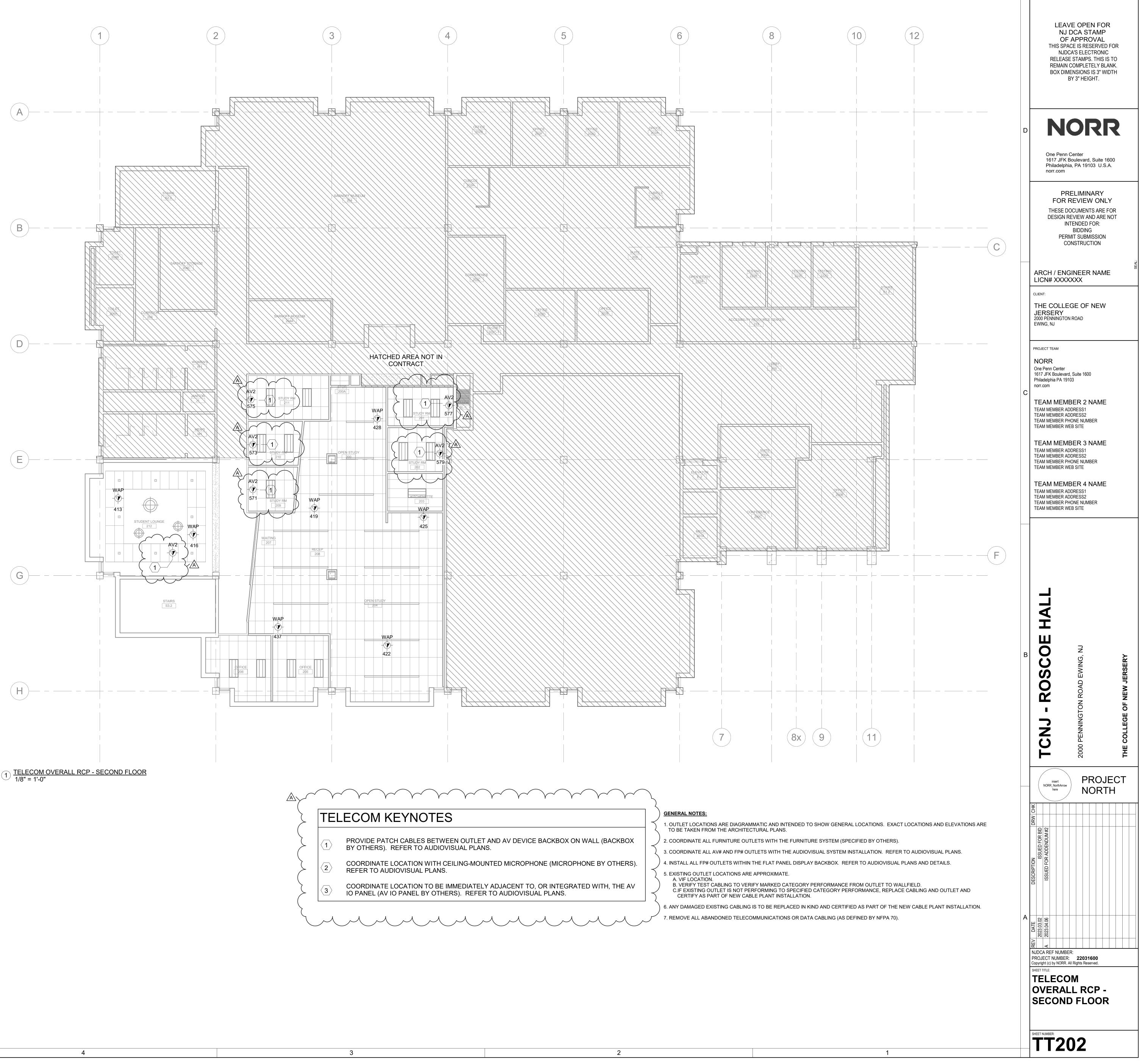
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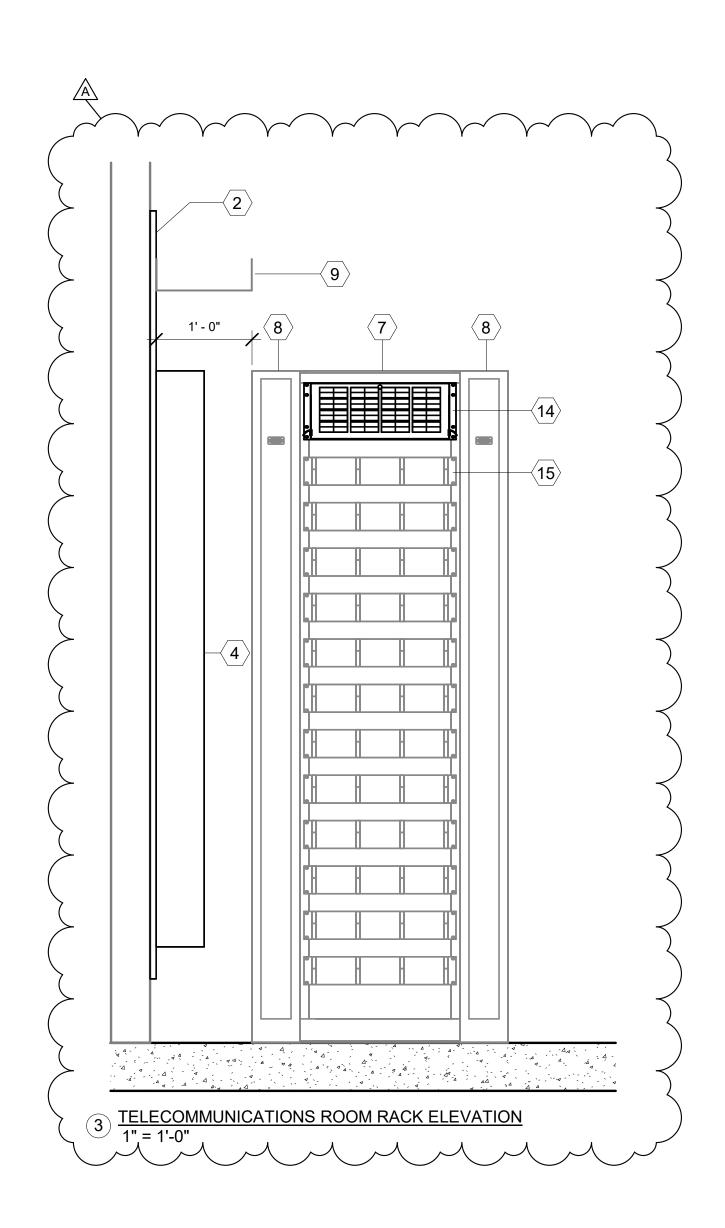
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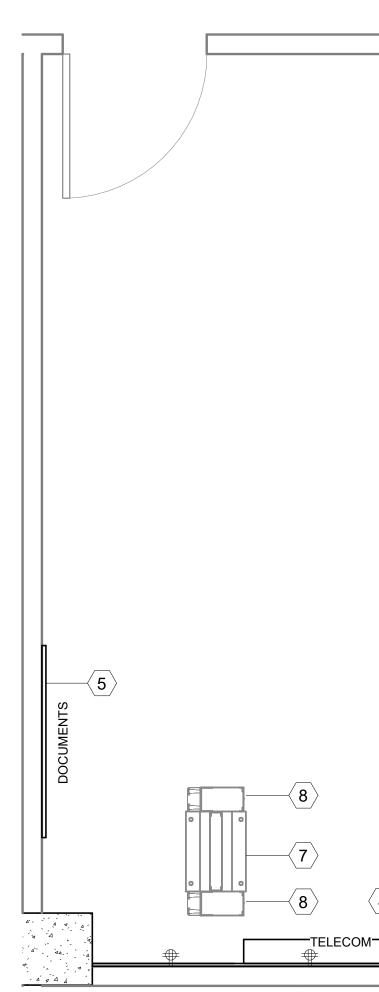
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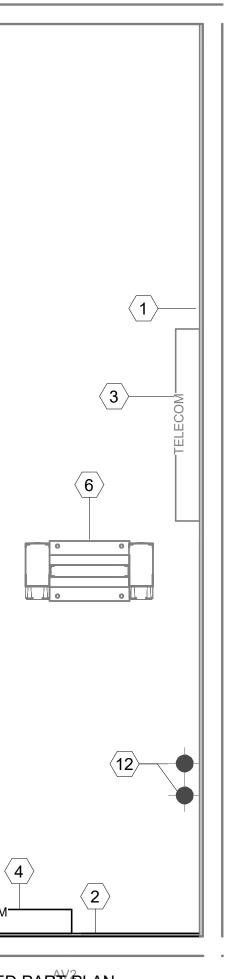


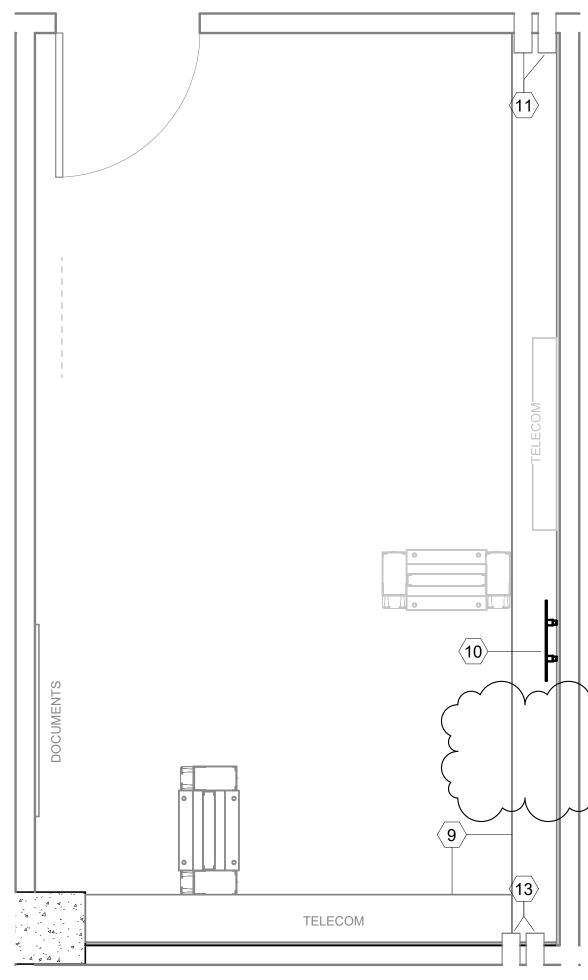


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 $1 \frac{\text{TELECOMMUNICATIONS ROOM}^{\text{FENLARGED PART PLAN}}{1/2" = 1'-0"}$

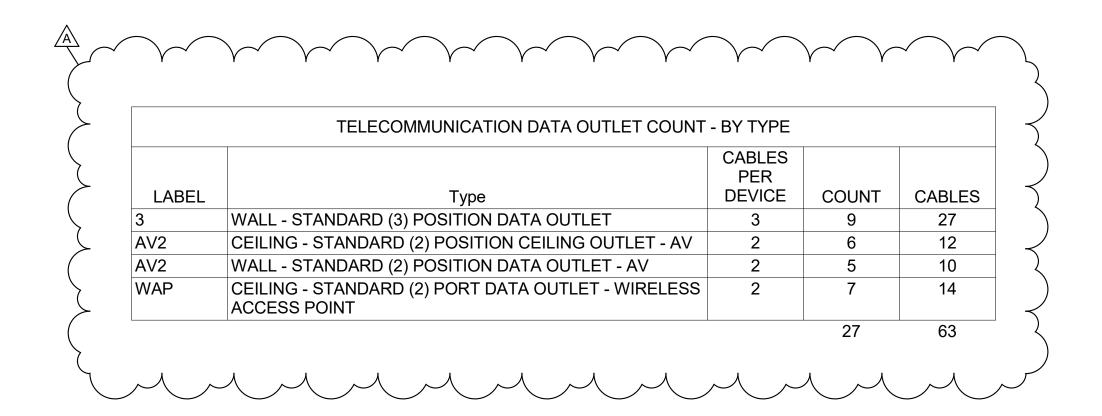






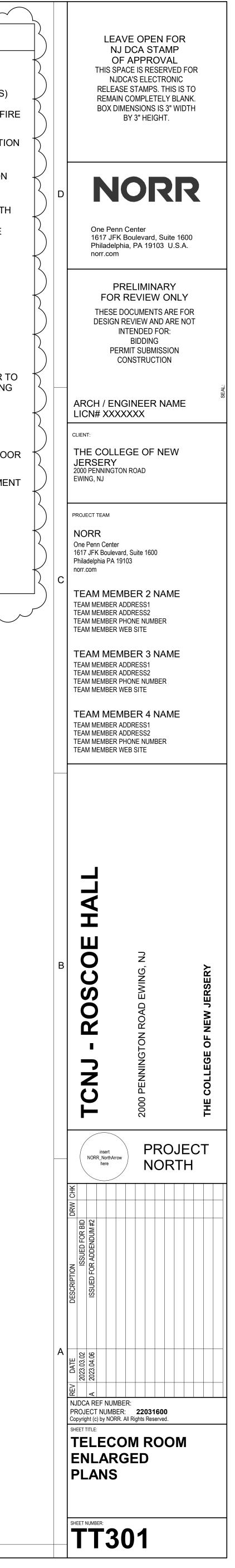
2 TELECOMMUNICATIONS ROOM ENLARGED OVERHEAD PART PLAN 1/2" = 1'-0"

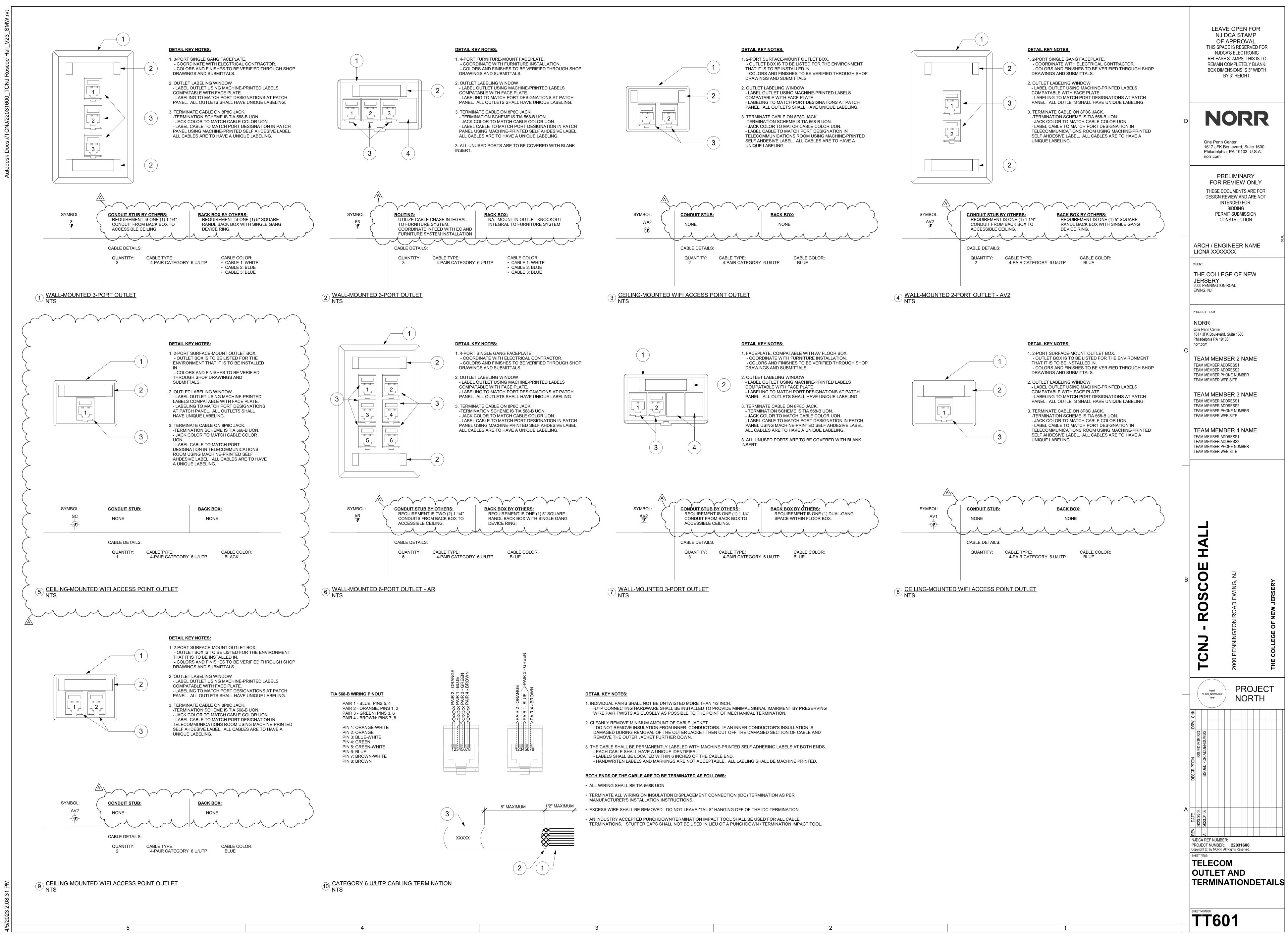
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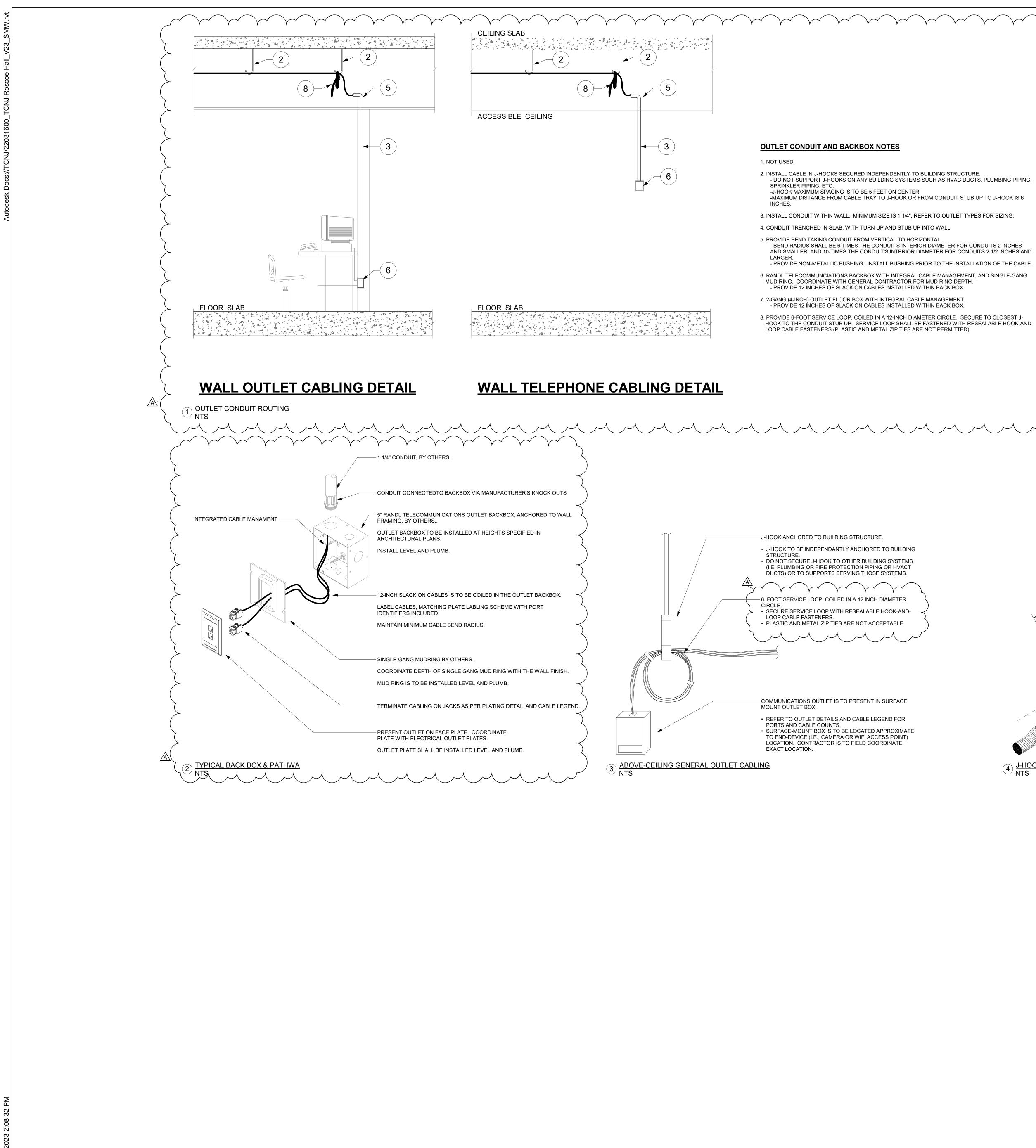
γ 	
	LECOM ROOM KEYNOTES
	EXISTING TELECOMMUNICATIONS BACKBOARD TO REMAIN
2	TELECOMMUNICATIONS BACK BOARD: 4 FT x 8 FT x 3/4 IN (WIDTH x HEIGHT x THICKNESS) FIRE RATED PLYWOOD, MOUNTED 8 IN AFF TO BOTTOM. PAINT PLYWOOD TO MATCH EXISTING WITH TWO (2) LAYERS OF FIRE RESISTANT PAINT (DO NOT COVER PLYWOOD FI RATING STAMP).
$\langle 3 \rangle$	EXISTING TELECOMMUNICATIONS CABLING TERMINATED ON WALL-MOUNTED TERMINATION BLOCKS. REMOVE ALL ABANDONED / UNTERMINATED CABLING.
4	NEW TELECOMMUNICATIONS CABLING TO TERMINATE ON WALL-MOUNTED TERMINATION BLOCKS.
5	PROVIDE AS-BUILT DOCUMENTATION. MOUNT DOCUMENTS TO WALL AND PROTECT WITH 1/8 IN THICK CLEAR PLEXIGLASS. AS-BUILT DRAWINGS TO INCLUDE: ROOM LAYOUT; LADDER RACK LAYOUT; RACK ELEVATIONS, INCLUDING PATCH PANEL LABELING; CABLE PULL SCHEDULE; LABLING SCHEME; INTER-BUILDING CONNECTIVITY.
6	EXISTING RACK AND CABLE MANAGERS, TO REMAIN.
$\langle 7 \rangle$	2-POST 42RU (7FT TALL) DATA RACK, BY OTHERS (OFOI). SHOWN FOR COORDINATION PURPOSES ONLY.
8	6 IN SINGLE-SIDED VERTICAL CABLE MANAGER, BY OTHERS (OFOI). SHOWN FOR COORDINATION PURPOSES ONLY.
9	EXISTING WIRE MESH CABLE TRAY TO REMAIN.
(10)	NEW BONDING BUSBAR TO REPLACE EXISTING BONDING BUSBAR BY EC (OR GC'S ASSIGNED PERSONNEL AS PER DIVISION 01 SPECIFICATIONS) TO BOND NEW BUSBAR T BUILDING AC ELECTRICAL GROUND, BUILDING STEAL, AND ELECTRICAL PANEL SERVICING THE TELECOM ROOM. BOND ALL EXISTING RACKS, LADDER RACKS, CABLE TRAYS, AND CONDUITS ENTERING THE TELECOMMUNICATIONS ROOM TO NEW BONDING BUSBAR.
$\langle 11 \rangle$	NOT USED
(12)	EXISTING CONDUIT PATHWAY TO BASEMENT TO REMAIN. ALL NEW CABLING TO 2ND FLO TO BE INSTALLED WITHIN PATHWAY. RESEAL ALL FIRESTOPPING AS REQUIRED.
13	EXISTING CONDUIT PATHWAY TO 2ND FLOOR TO REMAIN. ALL NEW CABLING TO BASEME TO BE INSTALLED WITHIN PATHWAY. RESEAL ALL FIRESTOPPING AS REQUIRED.
14	TERMINATE ALL FIBER FROM INTER-BUILDING CONNECTIONS IN RACK-MOUNTED FIBER ENCLOSURE.
(15)	2RU HORIZONTAL CABLE MANAGERS, BY OTHERS (OFOI)
(16)	NOT USED

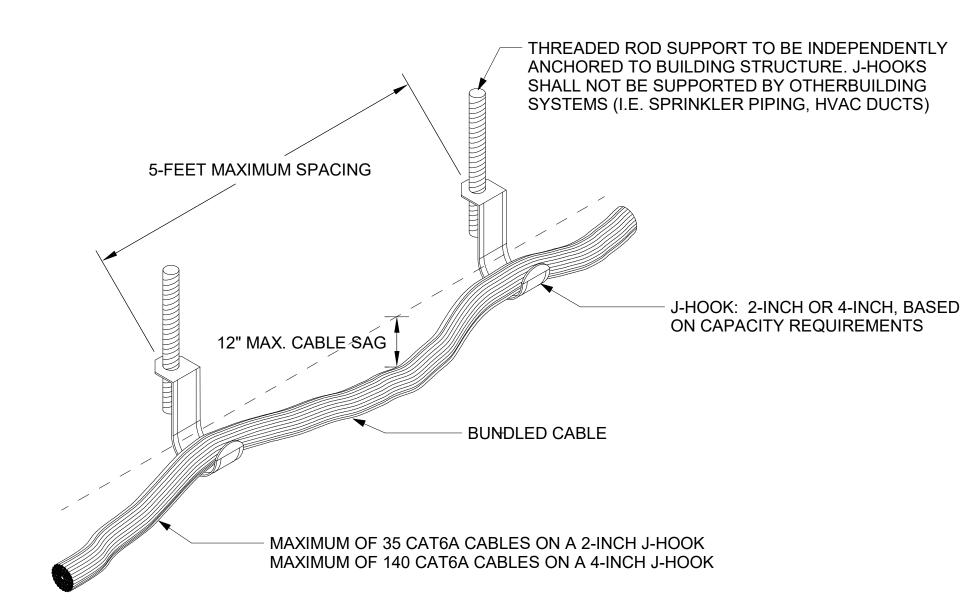




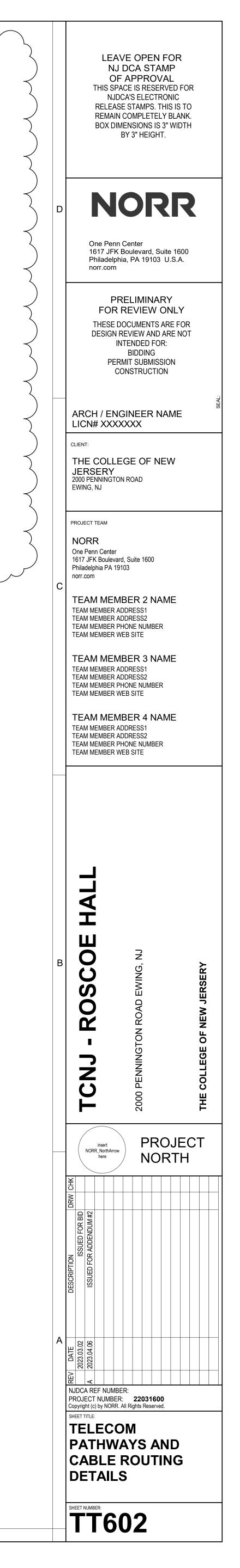
CABLE COLOR:
BLUE

SYMBOL:	CONDUIT STUB:		BACK BO	<u>X:</u>	$\overline{)}$
AV1	NONE	λ λ	NONE	E 	л л
	CABLE DETAILS:				
	QUANTITY: 1	CABLE TYPE: 4-PAIR CATEGORY	6 U/UTP	CABLE COLOR: BLUE	



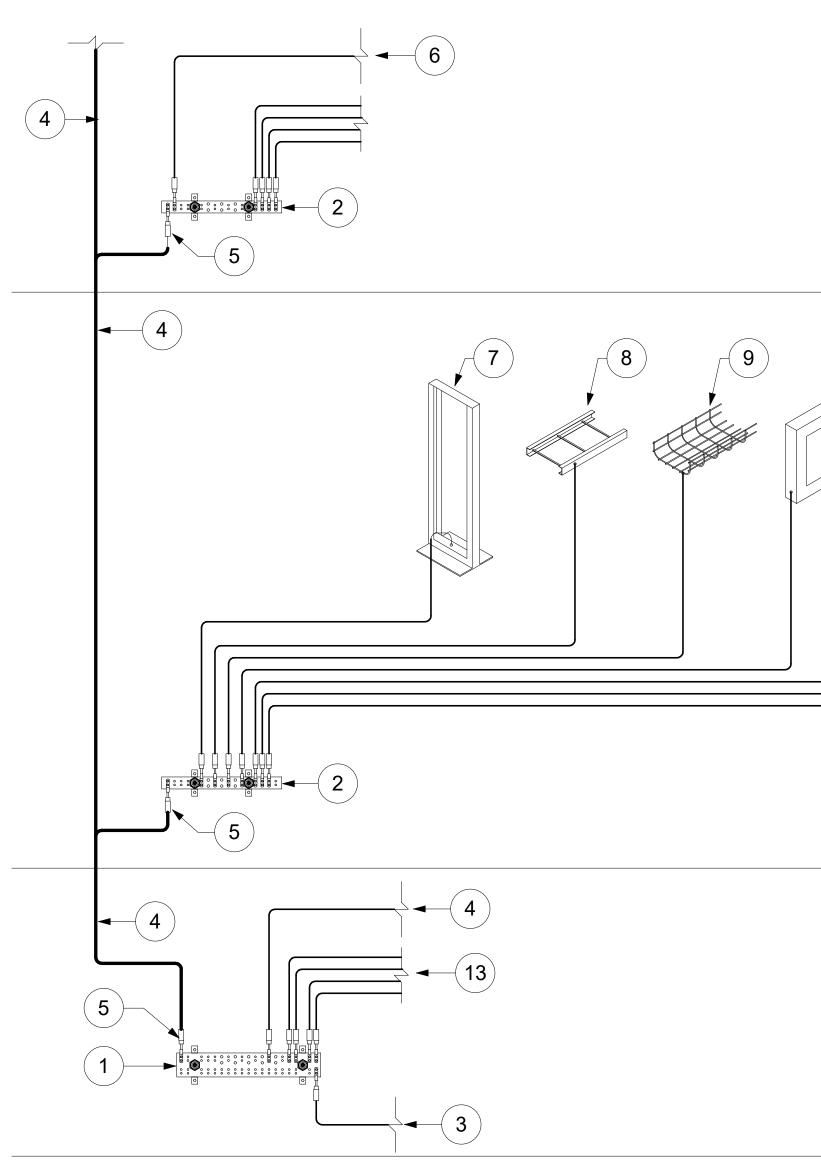


4 J-HOOK CABLE SUPPORT NTS

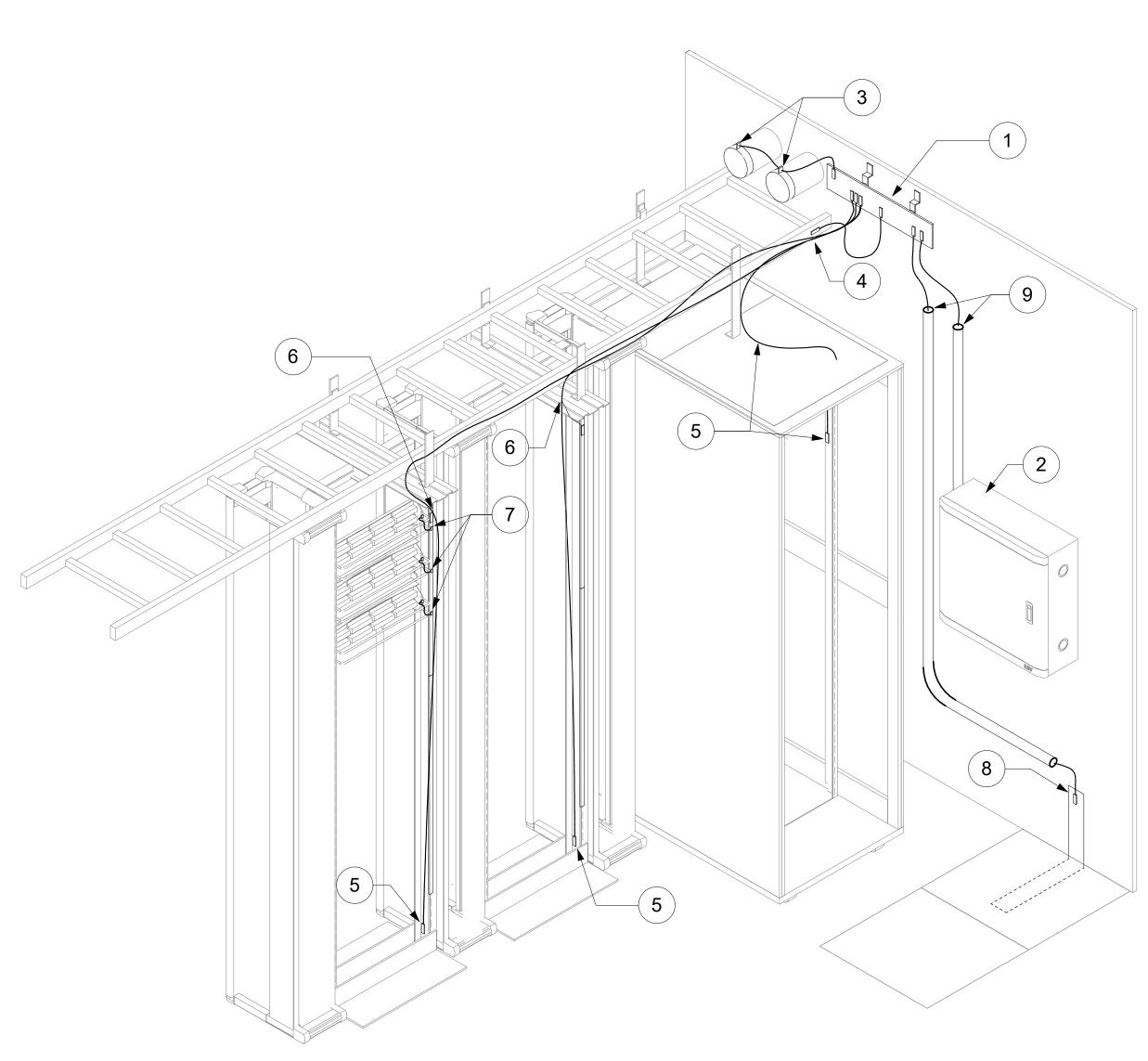


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1 TYPICAL BONDING INFRASTRUCTURE SCHEMATIC



2 TYPICAL BONDING INFRASTRUCTURE DETAIL NTS

3

4

TYPICAL TELECOMMUNICATIONS ROOM

- - TYPICAL TELECOMMUNICATIONS ROOM
 - ENTRY FACILITY OR EQUIPMENT ROOM

2

- **BONDING INFRASTRUCTURE KEYNOTES** 1. PRIMARY BONDING BUSBAR (PBB): 4 INCH x 20 INCH x 1/4 INCH (HEIGHT x LENGTH x THICK) WALL-
- MOUNTED RECTANGULAR COPPER BUSBAR, PREDRILLED FOR TWO-HOLE LUG CONNECTIONS AND LISTED FOR THE INTENDED USE. MOUNT BUSBAR WITH 4 INCH STANDOFFS TO PROVIDE CLEARANCE. 2. SECONDARY BONDING BUSBAR (SBB): 2 INCH x 20 INCH x 1/4 INCH (HEIGHT x LENGTH x THICK) WALL-

MOUNTED RECTANGULAR COPPER BUSBAR, PREDRILLED FOR TWO-HOLE LUG CONNECTIONS AND

- LISTED FOR THE INTENDED USE. MOUNT BUSBAR WITH 4 INCH STANDOFFS TO PROVIDE CLEARANCE.
 3. TELECOMMUNICATIONS BONDING CONDUCTOR (TBC). INSTALL TBC BETWEEN THE PBB AND THE GROUNDING ELECTRODE AT THE BUILDING'S ELECTRICAL ENTRY FACILITY. TBC SHALL BE A #3/0 AWG CONDUCTOR INSTALLED IN A DIRECT PATH WITH THE SHORTEST LENGTH PRACTICAL; MAXIMUM
- LENTH IS 30 FEET. 4. TELECOMMUNICATIONS BONDING BACKBONE (TBB). INSTALL TBB TO EACH TELECOMMUNICATIONS RISER (STACKED TELECOMMUNICATIONS ROOMS),OR TO ANY STAND-ALONE TELECOMMUNICATIONS ROOM.
- 5. BOND ALL BUSBARS (PBB AND SBB'S) TO TBB. USE DOUBLE-LUG CONNECTORS AT THE BUSBAR, AND EXOTHERMIC WELDS AT THE TBB. DO NOT DOUBLE-LOAD CONNECTIONS AT BUSBAR.
- 6. BONDING BACKBONE CONNECTOR (BBC): INSTALL BBC BETWEEN ALL TELECOMMUNICATIONS ROOMS ON THE TOP FLOOR AND EVERY THREE (3) FLOORS BELOW.
- 7. BOND ALL RACKS, CABINETS, EQUIPMENT FRAMES, ETC TO BONDING BUSBAR AS PER MANUFACTURER'S INSTRUCTIONS. USE #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS AT THE BUSBAR. DO NOT USE LUG HOLES TO BOND MULTIPLE UNITS TO THE BONDING BUSBAR. ALL RACKS, CABINETS, EQUIPMENT FRAMES, ETC ARE TO BE INDEPENDENTLY BONDED TO THE BONDING BUSBAR.
- 8. BOND ALL LADDER RACKS AS A SINGLE SYSTEM TO THE BONDING BUSBAR AS PER THEIR MANUFACTURER'S INSTRUCTIONS. USE #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS AT THE BUSBAR. LADDER RACKS ARE TO BE BONDED DIRECTLY TO THE BONDING BUSBAR AND ARE NOT TO BE USED AS A BONDING CONDUCTOR FOR ANY OTHER SYSTEM.
- 9. BOND ALL CABLE TRAYS AS A SINGLE SYSTEM TO THE BONDING BUSBAR AS PER THEIR MANUFACTURER'S INSTRUCTIONS. USE #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS AT THE BUSBAR. USE #6AWG CONDUCTORS WITH MANUFACTUER'S BONDING CLAMPS/CONNECTORS TO BOND NON-CONTINUOUS SEGMENTS OF CABLE TRAY. CABLE TRAYS ARE TO BE BONDED DIRECTLY TO THE BONDING BUSBAR AND ARE NOT TO BE USED AS A BONDING CONDUCTOR FOR ANY OTHER SYSTEM.
- 10. BOND THE AC ELECTRICAL GROUND (ACEG) IN EACH ELECTRICAL PANEL SERVING THE ROOM TO THE BONDING BUSBAR. ALL CONNECTIONS WITHIN THE ELECTRICAL DISTRIBUTION PANEL ARE TO BE MADE BY A LICENSED ELECTRICIAN. CONNECT TO BUSBAR WITH #6 AWG CONDUCTORS WITH TWO-LUG CONNECTORS.
- 11. BOND THE BUSBAR TO BUILDING STRUCTURAL STEEL USING A #6 AWG CONDUCTOR WITH TWO-LUG CONNECTORS.12. BOND ALL METALLIC CONDUITS AND SLEEVES ENTERING THE TELECOMMUNICATIONS SPACE TO
- THE BONDING BUSBAR USING #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS. 13. BOND ALL TYPICAL ITEMS OUTLINED IN KEYNOTES 7 - 12 TO THE BONDING BUSBAR.
- DETAIL GENERAL NOTES:
 TELECOMMUNICATIONS BONDING AND GROUNDING BY THE ELECTRICAL CONTRACTOR, AND IS SHOWN IN ENTIRTY FOR COMPLETION.
 SOME ELEMENTS OF THE BONDING INFRASTRUCTURE SYSTEM ARE NOT APPLICABLE TO THIS
- PROJECT AND ARE NOT TO BE INSTALLED.COORDINATE WITH ELECTRICAL CONTRACTOR AND GENERAL CONTRACTOR.

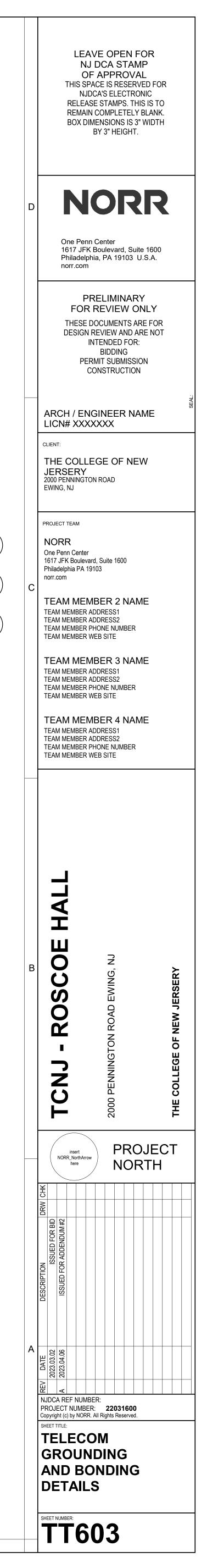
- REFER TO DIVISION 1 SPECIFICATIONS FOR SCOPE DIVISION ON BONDING AND GROUNDING SYSTEM.
- **BONDING KEYNOTES** 1. TELECOMMUNICATIONS BONDING BUSBAR (PBB OR SBB) BONDED TO GROUND AND THE

INSTRUCTIONS.

SHOWN.

- TELECOMMUNICATIONS BONDING BACKBONE (TBB) AND TO BUILDING STEEL. CONNECTIONS NOT SHOWN.
- 2. BOND THE AC ELECTRICAL GROUND (ACEG) IN EACH ELECTRICAL PANEL SERVING THE ROOM TO THE BONDING BUSBAR. ALL CONNECTIONS WITHIN THE ELECTRICAL DISTRIBUTION PANEL ARE TO BE MADE BY A LICENSED ELECTRICIAN. CONNECT TO BUSBAR WITH #6 AWG CONDUCTORS WITH TWO-LUG CONNECTORS.
- 3. BOND ALL METALLIC CONDUITS AND SLEEVES ENTERING THE TELECOMMUNICATIONS SPACE TO THE BONDING BUSBAR USING #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS. FOR CONDUITS, PROVIDE GROUNDING BUSHINGS. ALL CONDUITS IN A GROUP MAY BE BONDED TOGETHER WITH ONE (1) CONDUCTOR TO THE BUSBAR.
- 4. BOND ALL LADDER RACKS AS A SINGLE SYSTEM TO THE BONDING BUSBAR AS PER THEIR MANUFACTURER'S INSTRUCTIONS. USE #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS AT THE BUSBAR. LADDER RACKS ARE TO BE BONDED DIRECTLY TO THE BONDING BUSBAR AND ARE NOT TO BE USED AS A BONDING CONDUCTOR FOR ANY OTHER SYSTEM.
 BOND ALL RACKS, CABINETS, EQUIPMENT FRAMES, ETC TO BONDING BUSBAR AS PER MANUFACTURER'S INSTRUCTIONS. USE #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS AT THE BUSBAR. DO NOT USE LUG HOLES TO BOND MULTIPLE UNITS TO THE BONDING BUSBAR. ALL RACKS, CABINETS, EQUIPMENT FRAMES, ETC ARE TO BE INDEPENDENTLY BONDED TO THE BONDING BUSBAR.
- 5. BOND ALL LADDER RACKS AS A SINGLE SYSTEM TO THE BONDING BUSBAR AS PER THEIR MANUFACTURER'S INSTRUCTIONS. USE #6 AWG CONDUCTORS WITH DOUBLE-LUG CONNECTORS AT THE BUSBAR. LADDER RACKS ARE TO BE BONDED DIRECTLY TO THE BONDING BUSBAR AND ARE NOT TO BE USED AS A BONDING CONDUCTOR FOR ANY OTHER SYSTEM.
- BOND RACK BONDING BUSBAR (RBB) TO THE CONDUCTOR BONDING THE RACK TO THE BONDING BUSBAR. USE EXOTHERMIC WELD OR IRREVERSIBLE CRIMP.
 BOND COPPER PATCH PANELS, FIBER ENCLOSURES, PDU AND UPS UNITS, AND ALL INSTALLED RACK-MOUNT EQUIPMENT TO RACK BONDING BUSBAR AS PER MANUFACTURER'S INSTALLATION
- 8. BOND STATIC DISSIPATIVE FLOOR TILE TO BONDING BUSBAR. INSTALL 18 INCH x 2 INCH MINIMUM (LENGTH x WIDTH) COPPER BONDING STRIP OVER CONCRETE SLAB AND EXTEND ON WALL AS
- 9. ROUTE BONDING CONDUCTORS WITHIN CONDUIT MOUNTED TO WALL FOR ANY VERTICAL TRANSITION GREATER THAN 6 INCHES.
- DETAIL GENERAL NOTES:
 TELECOMMUNICATIONS BONDING AND GROUNDING BY THE ELECTRICAL CONTRACTOR, AND IS SHOWN IN ENTIRTY FOR COMPLETION.
- SOME ELEMENTS OF THE BONDING INFRASTRUCTURE SYSTEM ARE NOT APPLICABLE TO THIS PROJECT AND ARE NOT TO BE INSTALLED.
- COORDINATE WITH ELECTRICAL CONTRACTOR AND GENERAL CONTRACTOR.
- REFER TO DIVISION 1 SPECIFICATIONS FOR SCOPE DIVISION ON BONDING AND GROUNDING SYSTEM.

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V.rvt	DRAWING LIST:	ABBREV	/IATIONS:
Autodesk Docs://TCNJ/22031600_TCNJ Roscoe Hall_V23_SMW.rvt	DKAVVING LIST: NUMBER NAME TA000 AUDIOVISUAL TITLE SHEET TA102 AUDIOVISUAL OVERALL PLAN - SECOND FLOOR TA302 AUDIOVISUAL ENLARGED PLANS TA501 AUDIOVISUAL SPERS - SECOND FLOOR TA703 AUDIOVISUAL SYSTEM DIAGRAMS SECOND FLOOR	A AC AA AFC AA AFC AA AFF A AFF AA AS AA AV AA AWG A C C C CAT-3 T CAT-5E T CAT-6E T CAT-6E T CAT-6E T CAT-6E T CB C CCTV C CAT-6E T CB C COND C CCTV C CCTT C COAX C C C C C C C C C C C C C C C C C C C	MPERES BOVE COUNTER T FINISHED CEILIN BOVE FINISHED FL BOVE SLAB BOVE TABLE SURF UDIOVISUAL MERICAN WIRE GA ONDUIT IA/EIA CATEGORY IA/EIA CATEGORY IA/EIA CATEGORY IA/EIA CATEGORY EILING BOX LOSED CIRCUIT TE IRCUIT OAXIAL CABLE ENTER LINE ONDUCTOR EILING ONSOLIDATION PO OPPER IGITAL VIDEO REC RAWING ONDUCTOR MERGENCY LECTRICAL METAL MPTY CONDUIT XISTING OILED/UNSHIELDE IRE ALARM IRE ALARM CONTR LOOR BOX
╞	SYMBOL LEGEND:		IBER OPTIC LAT PANEL
ŀ	REFERS TO EQUIPMENT SCHEDULE (EQS)		ROUND UNG CEILING
			ERTZ
		IDF IN	ITERMEDIATE DIS
-	REFERS TO DATA T## XX## P## REFERS TO FOWER SYMBOL SCHEDULE TYP SYMBOL SCHEDULE (PSS) DENOTES TYPICAL DENOTES TYPICAL	LV LO MAX N MER N MC N MIC N MDF N MH N MH N MIN N MM N MTD N	OW VOLTAGE AXIMUM ECHANICAL EQUIF AIN CROSS CONN ICROPHONE AIN DISTRIBUTION ANHOLE INIMUM IULTIMODE OUNTED AIN TELECOMMUN
	AUDIOVISUAL EQUIPMENT SCHEDULE - MASTER	N N	EUTRAL ORMALLY CLOSED
	DEVICE ID TYPE 8" AV POKE THRU AVI01 AV INPUT PLATE AVI02 AV INPUT PLATE TABLE TOP	NIC N NID N NTS N NO N	ORMALLY CLOSEL OT IN CONTRACT ETWORK INTERFA OT TO SCALE ORMALLY OPEN UMBER
	BPC01WALL MOUNTED BUTTON CONTROL PANELCAM01WALL MOUNTED PTZ CAMERA		UTSIDE DIAMETER
	CAM02CEILING MOUNTED PTZ CAMERAERK01AV 4-POST RACKFPD0155" FLAT PANEL DISPLAY	OSP O	UTSIDE PLANT
	FPD0135 TEAT PANEL DISPEATFPD0265" FLAT PANEL DISPLAYFPD0375" FLAT PANEL DISPLAYFPD0485" FLAT PANEL DISPLAYFPD0598" FLAT PANEL DISPLAYMIC01MICROPHONE-CIRCULAR CEILING ARRAYPRS01PROJECTOR SCREEN WALL MOUNTED ROLL UPRMS01ROOM SCHEDULE PANEL - SURFACE	PP P PB P PR P PBX P PBX P PNL P POE P PRJ P	ATCH PANEL ULLBOX AIR RIVATE BRANCH E ANEL OWER OVER ETHE ROJECTOR AN/TILT/ZOOM
	SPK01RECESSED CEILING SPEAKERTP01WALL MOUNTED 7" TOUCH PANEL		OOM ACEWAY
	VCB01 VIDEO CONFERENCE SOUND BAR VPJ01 POLL MOUNTED PROJECTOR WAT01 WIRELESS MIC ANTENNA INFRASTRUCTURE SCHEDULE - MASTER	SB S SM S SP S ST S	CREW COVER BO) PEAKER BACK BO) INGLE MODE PEAKER TRAND HIELDED TWISTED
	TAG # DESCRIPTION	TEMP T	O BE DETERMINED EMPORARY
	AV22-GANG JUNCTION BOXAV5UNISTRUT MOUNTING TO STRUCTURE ABOVEAV6MOUNTED TO GLASSPT018" AV POKE THRU	TR T TS T, TSER T TV T	ELECOMMUNICATI ELECOMMUNICATI AMPER SWITCH ELECOMMUNICATI ELEVISION YPICAL
	SB1SPECIALTY BACK BOXWB1WALL BOX CHIEF PAC 526	UPS U	NLESS OTHERWIS NINTERRUPTIBLE
	NETWORK SCHEDULE - MASTER TAG # # OF DROPS CABLE	VA V VIF V VM V VOIP V	NSHIELDED TWIST OLT/AMPERES ERIFY IN FIELD OLTMETER OICE OVER INTER
	T01 1 CATAGORY 6 T02 2 CATAGORY 6	w w	APOR PROOF /ATTS
	T06 6 CATAGORY 6 POWER SCHEDULE - MASTER TAG # TYPE	WAP W WM W WP W WS W WT W	/IDE AREA NETWO /IRELESS ACCESS /IRE MANAGEMEN [®] /ATERPROOF /ORKSTATION /ATER TIGHT /IREWAY
	P01120/20A DUPLEX RECEPTACLE. 5-20R - QTY1P02120/20A DUPLEX RECEPTACLE. 5-20R - QTY2P03DEDICATED 120/20A DUPLEX RECEPTACLE, 5-20R - QTY2P04120/20A DEDICATED CIRCUIT - HARDWIRED	XFRM T	RANSFORMER
4/5/2023 1:19:22 PM	5		2

TIONS:	GENERAL	NOTES:					
RES COUNTER ISHED CEILING	1. POWER AND DA ELECTRICAL EN SET.	ATA REQUIREMEN NGINEER, ARCHIT					
FINISHED FLOOR FINISHED PLATFORM OR RAISED FLOOR SLAB TABLE SURFACE	2. WHERE POWER TAPED AND THE SYSTEMS EQUI	E BOXES COVERE					
VISUAL CAN WIRE GAGE JIT		IT RUNS ON THES UIT IS TO BE DET AL AND ELECTRIC	ERMINED BY T				
CATEGORY 3 RATED CATEGORY 5E RATED CATEGORY 6A RATED CATEGORY 6E RATED G BOX D CIRCUIT TELEVISION	4. HIGH LEVEL/HIG NOT TO BE RUN PARALLEL TO A FOLLOWING TA		DS (SUCH AS I AUDIO/VIDEO DUITS OR CAE TES THAT THE	CONDUITS O BLING, MINIMU USE SHOULE	R CABLIN JM SEPAF) BE AVOI	G. IF HIGH ATION MU DED. SPA	HLEVEL JST BE N CINGS A
AL CABLE R LINE JCTOR G		MINIMUM	ACCEPTABLE	E DISTANCE B CONE		PARALLEI	L AV AN
DLIDATION POINT R				COMBINED	AMPACIT		
L VIDEO RECORDER NG		AV CONDUIT	POWER CONDUIT	UNDER 60A		WER CON	240A
JCTOR		ЕМТ	ЕМТ	2 FT.	3 FT.	4 FT.	NA
GENCY RICAL METALLIC TUBING (W/ PULL STRING ' CONDUIT				4 IN.	8 IN.	1 FT. 4 IN.	2 FT. 8 IN.
NG D/UNSHIELDED TWISTED PAIR		RIGID STEEL	RIGID STEEL	1 IN.	2 IN.	4 IN.	8 IN.
LARM LARM CONTROL PANEL							
BOX OPTIC	5. NO LARGE POW	ER TRANSFORME	RS OR MOTOR	RS SHOULD B	E LOCATE	ED WITHIN	1 50 FEE
ANEL	6. ALL AV CABLING IS TO BE UNSUP	G THAT IS RUN OP PORTED OR LAID					
ND CEILING	7. THE METHOD OF ACOUSTICALLY	F INSTALLATION C		,			
DIAMETER	8. INSTALL FIREST		AND WALL PEN	NETRATIONS	PROVIDE	D FOR THE	E INSTA
AREA NETWORK	CONTRACTOR S	HALL BE RESPON , COORDINATE SE	ISIBLE FOR VE	RIFYING THE	FIRE RAT	ING OF A	LL WALI
OLTAGE	9. ALL POWER, WIF	S FOR MATERIAL					CTRICAL
UM ANICAL EQUIPMENT ROOM CROSS CONNECT	COMPLIANCE.	AND JU					CINICAL
PHONE DISTRIBUTION FRAME	10. ALL OVERHEAD ENGINEER FOR	RIGGING REQUIE		-	WED AND	STAMPE	D FOR A
DLE JM	11. POWER BREAK	ER AND DISTRIBU	TION PANELS	ARE SIZED AI	ND SPECI	FIED BY T	HE ELE
MODE FED ELECOMMUNICATIONS EQUIPMENT ROOM	12. ALL CABLE TRA SECURELY FAST	Y THAT IS SURFA FENED AND LEFT				ED FLOOF	R OR AB
AL	13. POWER FOR AV	AND RELATED S					
ALLY CLOSED CONTRACT DRK INTERFACE DEVICE	14. ALL AV-RELATE WITH PULL WIRE	D EMPTY CONDU					
D SCALE ALLY OPEN ER	15. WHERE EXACT	DIMENSIONS ARE					
DE DIAMETER R FURNISHED EQUIPMENT DE PLANT	DIMENSIONS AR ACOUSTICAL TR	HE LOCATION OF E INDICATED, TH EATMENT. ROOM DIMENSIONS MU WILKE, LLC.	E REFERENCE	SURFACE SHON THE DRA	IALL BE T WINGS H	HE FINAL AVE BEEN	FINISHE I TAKEN
CADDRESS PANEL OX	16. NOTIFY OWNER OBTAIN CLARIFI	'S REPRESENTAT CATION BEFORE			IES BETW	EEN THE	EXISTIN
TE BRANCH EXCHANGE	17. ALL AV DEVICES MANUFACTUREF	S SHALL BE SECU R'S RECOMMENDI			D STRAIG	HT TO WA	ALLS, FL
R OVER ETHERNET CTOR LT/ZOOM	18. THERE SHALL B BOX WHERE THE	E A MINIMUM OF ERE ARE MORE T					
	19. MAINTAIN MINIM	IUM BEND RADIU	S OF 10X OD F	OR ALL AV-RE	ELATED C	ONDUITS.	
VAY	20. LIGHTING DESIC GOOD CONTRAS	GNER TO PROVID ST AND IMAGE SH		N A SEPARATI		G ZONE A	T THE S
V COVER BOX ER BACK BOX E MODE	21. AV CONTRACTO		RE CEILINGS, V				
	22. REFER TO AV E						
DED TWISTED PAIR	23. ALL POWER CIR					IDED BY D	DEDICAT
ORARY OMMUNICATIONS GROUND BAR OMMUNICATIONS ROOM	24. POWER FOR AL	E FED FROM DEDI				BE ON THE	ESAME
R SWITCH OMMUNICATIONS SERVICE ENTRANCE ROOM		UDE MOTORS, AF					
ISION AL S OTHERWISE NOTED ERRUPTIBLE POWER SUPPLY ELDED TWISTED PAIR AMPERES	REQUIREMENTS TECHNICAL EQU STRANDED COP SYSTEMS GROU POINT WITH A W SYSTEM GROUN	D APPLICABLE NE 5. ALL RACKS, ME JIPMENT SPACES PER BONDING CO INDING PURPOSE /RAP OF GREEN T ID". CONDUIT STU	EC REQUIREME TALLIC BACKB SHALL BE GRO ONDUCTOR AN S SHALL BE ID FAPE. ALL CAB	ENTS EXCEPT OARDS, CABL OUNDED TO T D COMPRESS DENTIFIED WIT LES AND BUS	WHERE E SHEAT HEIR RES OR CONI TH GREEN BARS SH	DRAWING HS, CABLE SPECTIVE NECTORS. NINSULAT IALL BE ID	S OR SF E TRAYS GROUN ALL WI TON OR DENTIFIE
(IN FIELD IETER OVER INTERNET PROTOCOL R PROOF	26. JUNCTION BOX RAISED DEVICE	ECT WIRE PULLS. COVERS: UNLESS COVERS ARE SP R ABOVE FINISHE	ECIFIED, MATC	CH COVÉR DE	РТН ТО М	ALL THIC	KNESS.
S AREA NETWORK ESS ACCESS POINT MANAGEMENT RPROOF STATION	27. POWER RECEP CEILING BOXES, TECHNICAL POW		CAL POWER RE IDED BY THE B ES IN RELATIO	ECEPTACLES, BUILDING CON N TO TECHNO	INCLUDII	NG THOSE R AND APF FRASTRU(E WITHIN PEAR ON

28. NETWORK OUTLETS FOR AUDIOVISUAL SYSTEMS: ALL NETWORK OUTLETS SHALL APPEAR ON THE NETWORK DRAWINGS. NETWORK SERVICES APPEARING ON THE AUDIOVISUAL DRAWINGS ARE REPRESENTATIVE OF NETWORK CONNECTIVITY REQUIREMENTS IN SUPPORT OF AUDIOVISUAL SYSTEMS. AS THE LOCATION OF NETWORK SERVICES IN RELATION TO TECHNOLOGY INFRASTRUCTURE IS CRITICAL. REFER TO THE STRUCTURED CABLING SYSTEM SPECIFICATIONS AND DRAWINGS FOR ADDITIONAL INFORMATION.

- 3

WN FOR REFERENCE ONLY AND ARE NOT FOR CONSTRUCTION. COORDINATE WITH D TELECOM DESIGNER DRAWINGS FOR LOCATION OF ALL OUTLETS IN THIS DRAWING

TERMINATING IN JUNCTION BOXES WITHOUT RECEPTACLES, THE WIRES SHALL BE SE CIRCUITS WILL BE CONNECTED BY OTHERS DURING INSTALLATION OF THE AV

INGS SHOW ONLY INTERCONNECTION BETWEEN TERMINATION POINTS. THE EXACT D BY THE COORDINATE PATHWAYS FOR ALL AV RELATED DEVICES WITH

CH AS FOR POWER DISTRIBUTION PANELS, LIGHTING, AND BRANCH CIRCUITS,) ARE VIDEO CONDUITS OR CABLING. IF HIGH LEVEL/HIGH CURRENT FEEDS MUST RUN OR CABLING, MINIMUM SEPARATION MUST BE MAINTAINED ACCORDING TO THE AT THE USE SHOULD BE AVOIDED. SPACINGS ASSUME THAT POWER CONDUCTORS SPACINGS CAN BE USED IF POWER CONDUCTORS ARE TWISTED PAIRS.

TABLE DISTANCE BETWEEN PARALLEL AV AND POWER

	CONDUITS									
COMBINED AMPACITY OF ALL PHASE CONDUC IN POWER CONDUIT										
	UNDER 60A	60A	120A	240A	400A					
	2 FT.	3 FT.	4 FT.	NA	NA					
	4 IN.	8 IN.	1 FT.	2 FT.	4 FT.					
	1 IN.	2 IN.	4 IN.	8 IN.	16 IN.					

MOTORS SHOULD BE LOCATED WITHIN 50 FEET OF AV EQUIPMENT SPACES.

E SHALL BE SUPPORTED FROM J-HOOKS NO GREATER THAN 3 FEET APART. NO CABLE CEILING TILES, BLACK IRON, OR OTHER CEILING MEMBERS.

ES IN WALLS, AND THE METHOD OF PASSAGE OF CONDUITS AND WIREWAYS THROUGH . BE COORDINATED WITH THE ACOUSTICAL CONSULTANT.

LL PENETRATIONS PROVIDED FOR THE INSTALLATION OF CABLE AND CONDUIT AS SLAB OR WALL. REVIEW ARCHITECT'S PLANS FOR PARTITION TYPES. THE OR VERIFYING THE FIRE RATING OF ALL WALLS AND FLOORS HAVING CABLING INSTALLATION WITH WORK OF OTHER TRADES. REFER TO ELECTRICAL

BOXES ARE TO BE REVIEWED BY ELECTRICAL ENGINEER FOR CODE AND SAFETY

'S ARE TO BE REVIEWED AND STAMPED FOR APPROVAL BY LICENSED STRUCTURAL

ANELS ARE SIZED AND SPECIFIED BY THE ELECTRICAL ENGINEER.

INTED ON SLAB BELOW RAISED FLOOR OR ABOVE EQUIPMENT RACKS SHALL BE

SHALL USE AN EIA/TIA 607 COMPLIANT GROUNDING SYSTEM, DESIGNED BY THE ETAIL SHEETS FOR ADDITIONAL GROUNDING REQUIREMENTS IF APPLICABLE.

L BE REAMED, CLEANED, CAPPED (WHERE APPROPRIATE), TAGGED, AND FURNISHED

DICATED, THE SCALE OF THIS DRAWING IS NOT SUFFICIENTLY ACCURATE FOR IENT, JUNCTION BOXES, OUTLET BOXES, WIREWAYS, PANELS, ETC. WHERE EXACT RENCE SURFACE SHALL BE THE FINAL FINISHED SURFACE INCLUDING ANY SIONS ON THE DRAWINGS HAVE BEEN TAKEN FROM PRELIMINARY ARCHITECTURAL /ERIFIED AND ANY DEVIATIONS CAUSING CHANGES MUST BE COORDINATED WITH

F ANY DISCREPANCIES BETWEEN THE EXISTING CONDITIONS AND THE AV DRAWINGS.

OUNTED PLUMB AND STRAIGHT TO WALLS, FLOORS, OR RACKS PER THE

LL BOX FOR EVERY 100' OF STRAIGHT EMPTY AV-RELATED CONDUIT AND ONE PULL /O 90° BENDS OR LESSER BENDS TOTALING 180° IN A CONDUIT RUN.

ING ON A SEPARATE DIMMING ZONE AT THE SCREEN/DISPLAY DEVICE TO ENSURE

NGS, WALLS AND ANY OTHER SURFACES AFFECTED BY THEIR WORK PRIOR TO

OR RISER DIAGRAMS FOR EMPTY CONDUIT SIZING.

S DRAWING SET TO BE PROVIDED BY DEDICATED BREAKER PANEL(S). NO NON-AV

DESIGNATED SPACE SHALL BE ON THE SAME ELECTRICAL PHASE, AND THIS PHASE ES, OR ANY OTHER SOURCE THAT CAN CAUSE SIGNAL INTERFERENCE.

IS SYSTEMS AND EQUIPMENT IN ACCORDANCE WITH ANSI/TIA/EIA-807 GROUNDING JIREMENTS EXCEPT WHERE DRAWINGS OR SPECIFICATIONS EXCEED NEC BACKBOARDS, CABLE SHEATHS, CABLE TRAYS, ETC. ENTERING OR RESIDING IN BE GROUNDED TO THEIR RESPECTIVE GROUND SYSTEM USING A MINIMUM OF #6 AWG OR AND COMPRESSOR CONNECTORS. ALL WIRES USED FOR TECHNICAL POWER L BE IDENTIFIED WITH GREEN INSULATION OR IDENTIFIED AT EACH TERMINATION L CABLES AND BUS BARS SHALL BE IDENTIFIED AND LABELED "TECHNICAL POWER OVIDE NYLON BUSHING ON ALL CONDUIT STUBS AND NON-TERMINATING CONDUIT

RWISE NOTED, ALL JUNCTION BOXES MUST BE PROVIDED WITH A COVER. WHERE , MATCH COVER DEPTH TO WALL THICKNESS. WHERE JUNCTION BOXES ARE NG HEIGHT, INSTALL JUNCTION BOXES WITH OPEN SIDE FACING DOWN.

VER RECEPTACLES, INCLUDING THOSE WITHIN FLOOR BOXES, WALL BOXES, OR THE BUILDING CONTRACTOR AND APPEAR ON THE ELECTRICAL DRAWINGS. LATION TO TECHNOLOGY INFRASTRUCTURE IS CRITICAL. REFER TO THE ELECTRICAL

2

ROOM READY: PLEASE FIND THE BELOW GUIDE TO REVIEW THE CONDITION OF THE AV CONFERENCE ROOMS PRIOR TO DELIVERY AND INSTALLATION OF THE MULTIMEDIA SYSTEMS. THE MULTIMEDIA SYSTEMS ARE DELIVERED AFTER THE ROOMS ARE 'READY' TO ENSURE A PROPER AND SECURE

- 1. ALL CONSTRUCTION IN THE CONFERENCE ROOM IS COMPLETE, INCLUDING: A. ALL ASSOCIATED ROOMS ARE FREE OF DEBRIS AND IS CLEAN B. ALL WALLS ARE COMPLETE WITH ANY BLOCKING, FABRIC WALL COVERINGS OR PAINT AS
- REQUIRED C. CEILINGS ARE COMPLETE AND CLOSED
- D. FLOOR FINISHES/CARPET IS INSTALLED

INSTALLATION OF THE MULTIMEDIA EQUIPMENT.

- E. ALL DOORS ARE INSTALLED AND KEYS/LOCKS PROVIDED F. ALL LIGHTING IS INSTALLED AND PROGRAMMED, IF CONTROLLABLE
- 2 ALL ELECTRICAL WORK RELATED TO THE AV SYSTEM IS COMPLETE, INCLUDING: A. INSTALLATION OF ALL CONDUIT, FLOOR BOXES, PULL BOXES, WIRE WAYS, ETC. B. INSTALLATION OF ALL 120V CIRCUITS IS COMPLETE C. INSTALLATION OF ALL TABLE AND FURNITURE RELATED POWER AND PULL BOXES ARE COMPLETE
- 3. ALL WINDOW TREATMENTS ARE INSTALLED AND PROGRAMMED, IF CONTROLLABLE
- 4 ALL PHONE, BRI, LAN CONNECTIONS ARE LIVE AND CHANNEL TESTED A. ALL CABLES AND BOXES MUST BE LABELED AND MATCH MULTIMEDIA TELECOM SHEET B. ALL LAN CONNECTIONS MUST BE TESTED AND CONFIGURED PER THE MULTIMEDIA **TELECOM SHEET**
- 5. THE CONFERENCE ROOM TABLE AND CREDENZA ARE INSTALLED AND CUTOUTS FOR VENTILATION CONFIRMED

NOTE: PROJECT SPECIFIC 'ROOM READY' IS A MINIMUM OF 4-6 WEEKS PRIOR TO EXPECTED SYSTEM OPERATION DATES.

SCOPE OF WORK BETWEEN TRADES:

SCOPE OF WORK	FURNISH	INS
IN-WALL BLOCKING SUPPORT FOR AV MOUNTS		
MOTORIZED PROJECTION SCREENS		
PROJECTION GLASS		
WALL AND CEILING SPEAKER CUTOUTS		
FURNITURE CUTOUTS FOR AV EQUIPMENT (UNLESS PROVIDED BY FURNITURE PROVIDER)		
MOTORIZED PROJECTION LIFTS		
STRUT CHANNEL AND/OR BLACK IRON AS REQUIRED FOR CEILING MOUNTED AV DEVICES		
CABLE CONTAINMENT INCLUDING:		
- CONDUIT WITH MEASURED PULLSTRINGS		
- CABLETRAY, LADDERTRAY, AND WIREWAYS		
- FLOORBOXES		
- JUNCTION BOXES, PULL BOXES, AND BACKBOXES		
POWER OUTLETS		
DEDICATED DISTRIBUTION PANELS, LOAD CENTERS, AND POWER ISOLATION TRANSFORMERS		
AV CABLING (LOW VOLTAGE)		
AV TERMINATIONS		
CUSTOM ENGRAVED AV COVER PLATES		
J-HOOKS AND OTHER SUPPORTS REQUIRED FOR OPEN-RUN AV CABLING		
AV DEVICE WALL MOUNTS		
AV DEVICES (AS DESCRIBED IN THE AV BID DOCS)		
VOICE/DATA NETWORK CABLING (FIBER AND TWISTED PAIR)		
VOICE/DATA COVER PLATES		
CATV CABLING		
LIGHTING & SHADE CONTROL INTERFACE		

REFER TO AV DETAIL SHEETS FOR ADDITIONAL SCOPE DELINEATION AND INFORMATION

DEFINITION OF TERMS

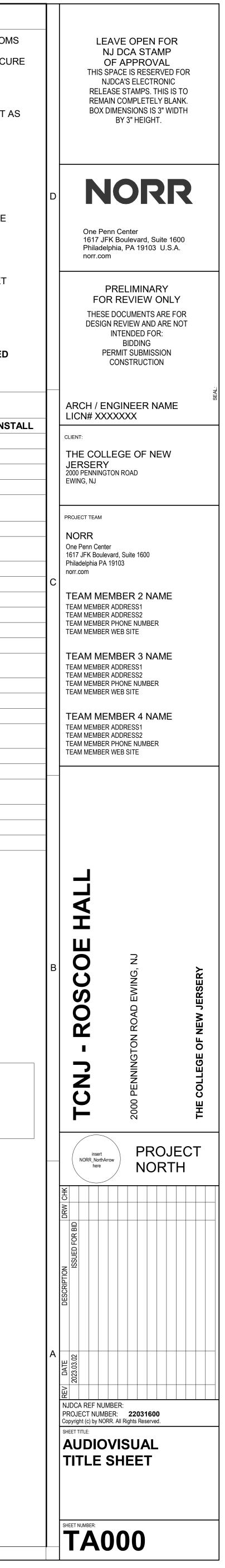
FURNISH - TO PURCHASE AND DELIVER TO THE PROJECT SITE COMPLETE WITH EVERY NECESSARY APPURTENANCE AND SUPPORT. PURCHASING SHALL INCLUDE PAYMENT OF ALL SALES TAXES AND OTHER SURCHARGES AS MAY BE REQUIRED TO ASSURE THAT PURCHASED ITEMS ARE FREE OF ALL LIENS. CLAIMS, OR ENCUMBRANCES.

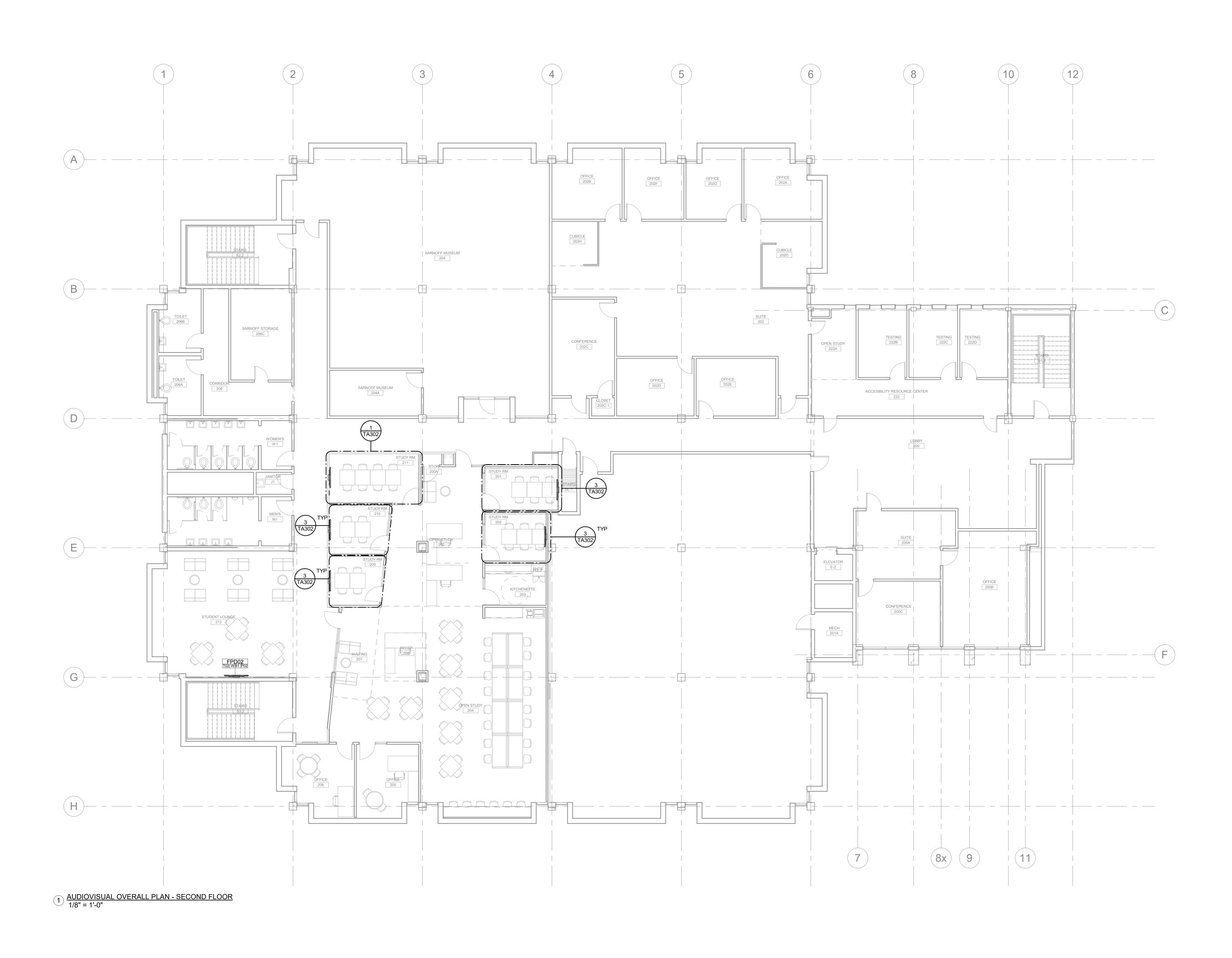
INSTALL - TO UNLOAD AT THE DELIVERY POINT AT THE SITE AND PERFORM EVERY OPERATION NECESSARY TO ESTABLISH SECURE MOUNTING AND CORRECT OPERATION AT THE PROPER LOCATION IN THE PROJECT, ALL AS PART OF THE WORK.

LEGEND FOR SCOPE OF WORK BETWEEN TRADES:

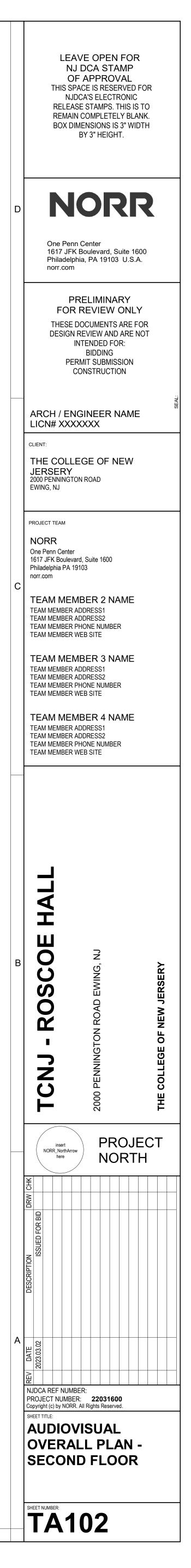
- GC = GENERAL CONTRACTOR EC = ELECTRICAL CONTRACTOR
- AV = AUDIOVISUAL CONTRACTOR
- O = OWNER

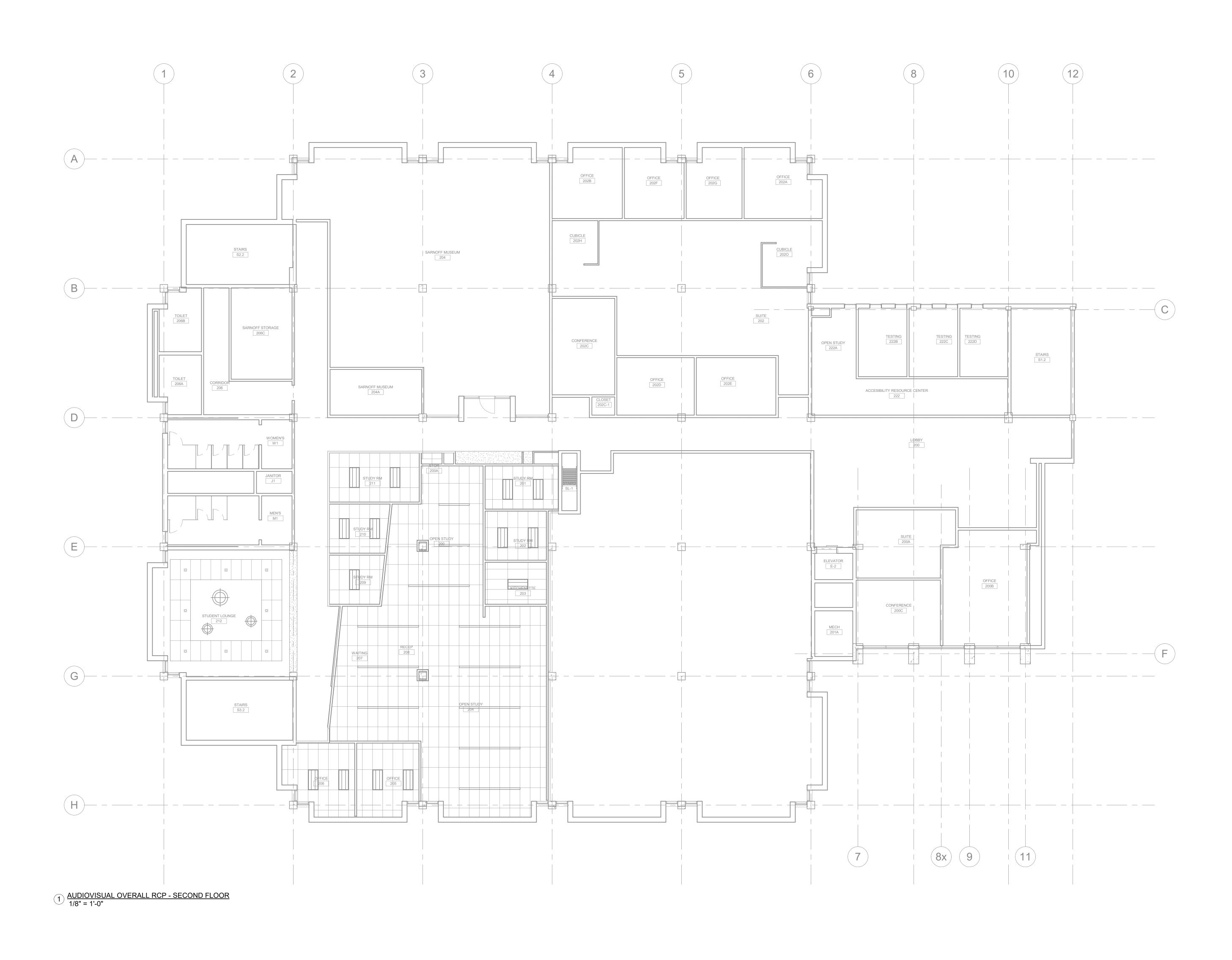
ST = STRUCTURED CABLING, OR TELECOMMUNICATIONS CONTRACTOR



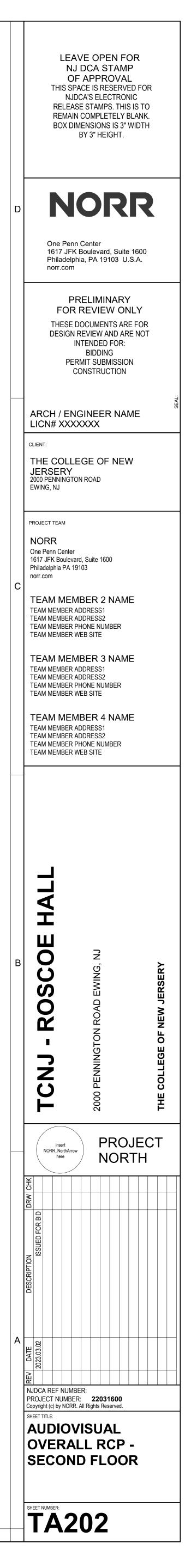


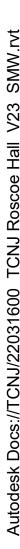
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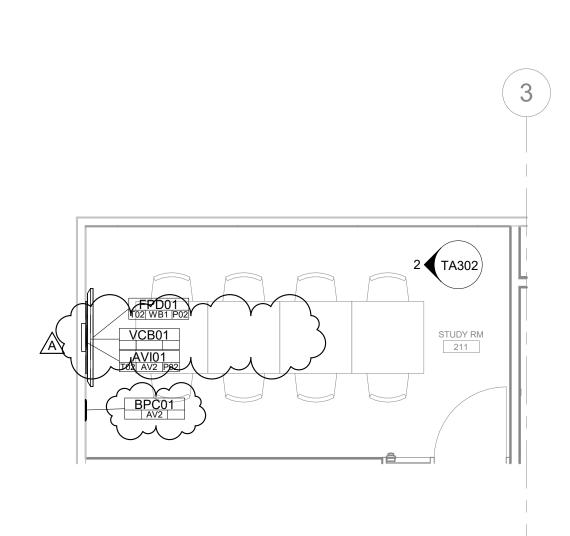


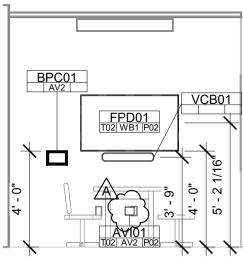


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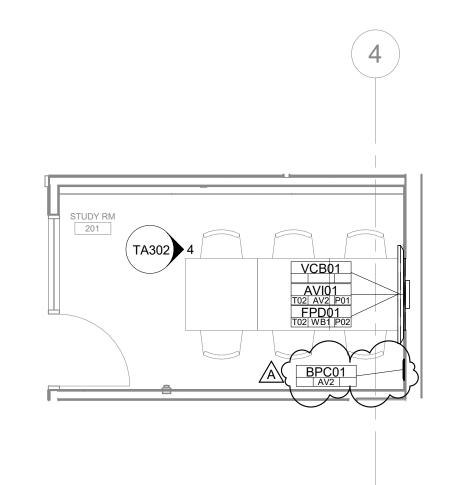


1 <u>AUDIOVISUAL ENLARGED PLAN - SECOND FLOOR - STUDY ROOM 211</u> 1/4" = 1'-0"

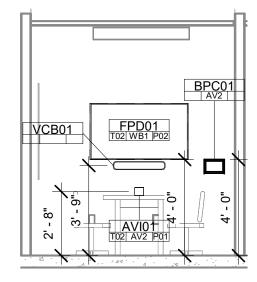




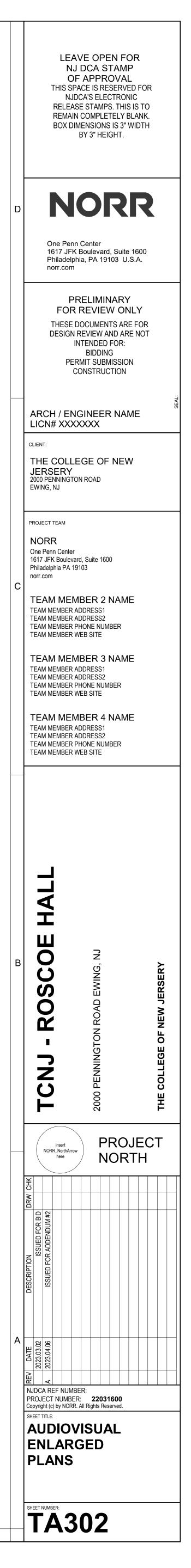




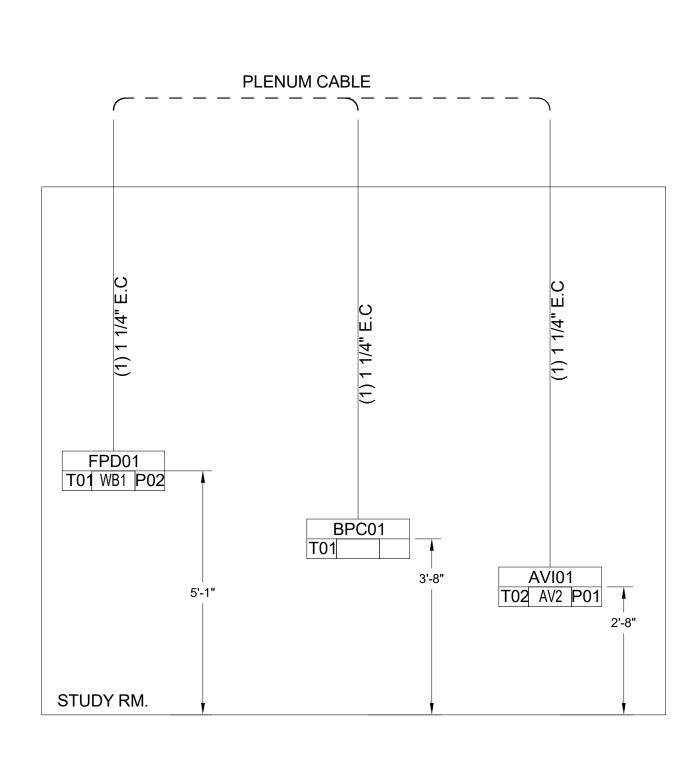
3 AUDIOVISUAL ENLARGED PLAN - SECOND FLOOR - STUDY ROOMS 201, 202, 209, 210 1/4" = 1'-0"



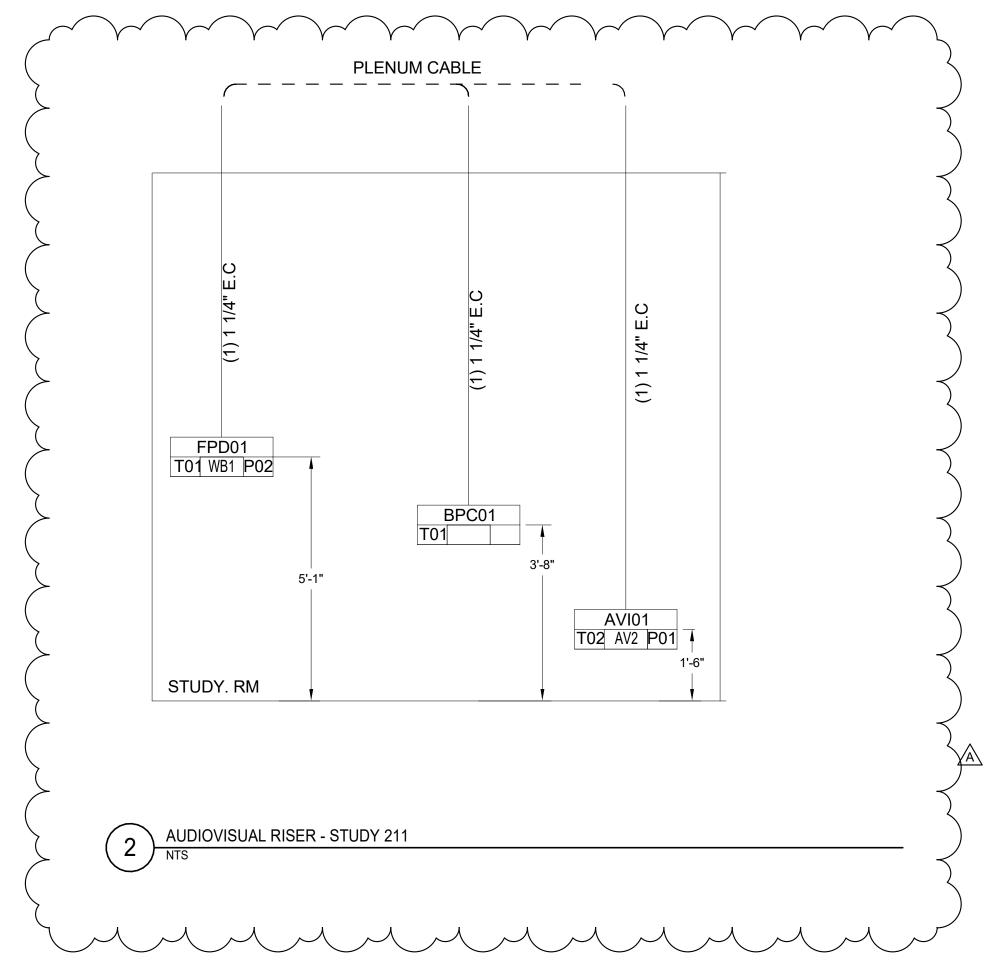
AUDIOVISUAL ELEVATION - SECOND FLOOR - STUDY ROOMS 201, 202, 209, 210 1/4" = 1'-0"

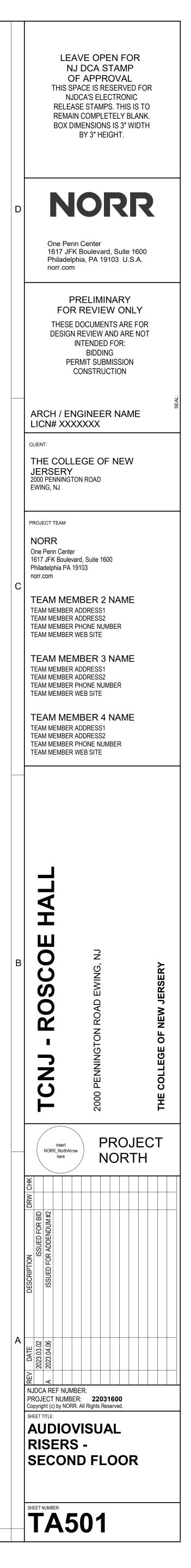


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AUDIOVISUAL RISER - STUDY ROOMS -201, 202, 209, 210, 211





NO SCALE

