

**COLLEGE OF DUPAGE
REGULAR BOARD MEETING**

BOARD APPROVAL

1. **SUBJECT**

McAninch Arts Center (MAC) 153 Classroom Renovation Project General Contractor

2. **REASON FOR CONSIDERATION**

Construction projects that exceed the statutory limit of \$50,000 must be approved by the Board of Trustees.

3. **BACKGROUND INFORMATION**

Originally constructed in 1986 to teach theater and lighting, the only upgrades to this classroom have been to replace worn seats and routine replacement of projection systems. The existing seven-tiered space does not allow flexibility to facilitate discussions or other types of pedagogies that do not involve primarily lecture. The renovation from seven tiers to four tiers would lend itself to interactivity between students and provide sufficient workspace and access to power and data to facilitate group projects. The renovation will also improve exiting safety. Construction is planned to start in late May 2018 due to class schedules, and anticipated completion in late August 2018.

A legal notice for an Invitation for Bids was published on March 13, 2018 in the Daily Herald; the invitation was also posted to the College of DuPage Purchasing website and distributed to in-district Chambers of Commerce. Sixty-two (62) vendors were directly solicited. Fifty-one (51) vendors downloaded the bid document. A Pre-Bid meeting and site visit was held on March 19, 2018 at 1:00 p.m. in the College of DuPage Purchasing Department Conference Room (BIC 1B03A). A public opening of the bids was held on March 28, 2018 at 2:00 p.m. in the College of DuPage Purchasing Department Conference Room (BIC 1B03A). The following individuals were in attendance: Jacoby Radford (COD Purchasing Manager), Susan Castellanos (COD Buyer/Recorder), John McGarry (COD Buyer/Facilitator), Ellen Roberts (COD Director of Business Affairs), Philip Gieschen (COD Coordinator, Risk Management/Agent of the Board), Don Inman (COD Senior Project Manager) and representatives from three (3) companies. Two (2) bids were received. No women/minority owned businesses submitted a bid.

The following is a recap of the bid tabulation:

Vendor	Total Base Bid
Integral Construction, Inc.	\$283,532.00
Rafalo Corporation	\$425,000.00

Recommended award in bold. No alternatives were requested in this bid package; therefore, none is offered in the bid responses.

A successful scope review meeting has been conducted with the lowest bidder, Integral Construction, Inc., who has recently successfully completed several projects at the College.

Budget Status

GL Account	FY2017	FY2018		
	Prior Year Spend	Annual Budget	YTD Spend	Available Balance
03-90-36827-5804001	\$ -	\$ 286,000	\$ 397	\$ 285,603
<i>MAC 153 Room Renovation : Building Remodeling Exps</i>				
FY2018 Request				<u>\$ 283,532</u>

**YTD Spend equals actuals plus committed as of 04/05/2018.*

This purchase supports Goal #8 Infrastructure of the Strategic Long Range Plan: Maintaining, improving and developing structures, systems, and facilities necessary for the delivery of high quality education and meaningful cultural events.

This purchase complies with State Statute, Board Policy and Administrative Procedures.

4. RECOMMENDATION

That the Board of Trustees awards the McAninich Arts Center (MAC) 153 Classroom Renovation Project to the lowest responsible bidder, Integral Construction, Inc., 320 Rocbaar Drive, Romeoville, IL 60446 for the lump sum bid amount of \$283,532.00.

Staff Contact: Bruce Schmiedl – Director, Facilities Planning & Development

BOARD APPROVAL

SIGNATURE PAGE FOR

McAninch Arts Center (MAC) 153 Classroom Renovation Project General Contractor

ITEM(S) ON REQUEST

That the Board of Trustees awards the McAninch Arts Center (MAC) 153 Classroom Renovation Project to the lowest responsible bidder, Integral Construction, Inc., 320 Rocbaar Drive, Romeoville, IL 60446 for the lump sum bid amount of \$283,532.00.



BOARD CHAIR

4/19/18

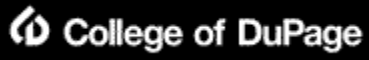
DATE



BOARD SECRETARY

4/19/18

DATE



Purchasing Department

425 Fawell Boulevard
Glen Ellyn, Illinois 60137-6599
PHONE (630) 942-2355
FAX (630) 942-4322

2018-B0042 MAC 153 Renovation

ADDENDUM # 1

March 23, 2018

.....

This addendum is being issued to update the specifications and provide additional information.

This information becomes part of the Bid Documents upon receipt. Please review and incorporate into your Bid accordingly.

For which Bids are scheduled to be received on March 28, 2018 no later than 2:00 p.m., Central Time.

Bids will be received by the College of DuPage, District 502, at the office of the Purchasing Manager, Berg Instructional Center (BIC) Building, **Room 1B03**, 425 Fawell Blvd., Glen Ellyn, IL 60137.

The signed Addendum acknowledgment is required to be returned with your Bid no later than the due date set forth for this Invitation to Bid.

Below are revisions to the bid specifications:

See attached files, which answer the questions:

1. **Exhibit A Question and Answers, Exhibit B Revised Scope of Work, Exhibit C, New Spec Exhibit D, Three (3) New Specification Drawings.**

EXHIBIT A – QUESTIONS AND ANSWERS

Questions and Answers

Q1 – Where is Pres Elevation 2B (A11)

A1 – The Pres Elevation nomenclature is in error, Revised drawing A11 issued with this addendum removes that erroneous language.

Q2 – Please provide connection detail for the panels on the wall as well as the manufacturer and type of panels.

A2 – See revised specifications 09 84 33, paragraph 4.2.1, issued with this addendum.

Q3 – Please Provide Room Finish Schedule with the type of flooring used where, as well as the wall covering and paint and base.

A3 – The finishes in the room are described in the drawing tag on 2/!5-01 along with the legend below that drawing. RB-2 is described on 8/A44-01. Wall panels are noted on A44-02.

Q4 – Describe HVAC work at the existing control room.

A4 – See revised drawing MFP11-01 issued with this addendum.

Q5 – Please provide specs on owner furnished items.

A5 – The College specifications which are out for bid and may change are shown in the table below.

Qty	Description
3	<u>Extron DTP HDMI 4K 230 D Rx (60-1441-22)</u> DTP Receiver for HDMI - Decorator-Style Wallplate Receives HDMI plus control and analog audio up to 230 feet (70 meters) over a shielded CATx cable Supports computer and video resolutions up to 4K Compatible with CATx shielded twisted pair cable Accepts additional analog stereo audio signals Supported HDMI specification features include data rates up to 10.2 Gbps, Deep Color up to 12-bit, 3D, HD lossless audio formats, and CEC pass-through
1	<u>Extron Ceiling Speakers</u> SF 3C LP SoundField XD 3" Full-Range 8 Ohm Ceiling Speakers with 4" Low Profile Composite Back Can (60-1311-13)
1	<u>Epson Projector No Lens</u> EPSON PRO L1505UHNL NO LENS, BLACK, WUXGA, 12K LUMENS EPSV11H910820
2	<u>Epson Projectors With Lens</u> POWERLITE 700U WUXGA (3LCD ULTRA-SHORT THROW LASER DISPLAY WITH MOUNT) EPSV11H878520W
1	<u>Epson Projector Lens</u> EPSON MIDDLE THROW LENS #4 FOR G7000/L1000 SERIES EPSV12H004M0B
1	<u>Epson Projector Mount</u> ELPMB48 High Ceiling Mount
1	<u>Projector Screen</u> DA-LITE CINEMA CONTOUR FIXED FRAME SCREEN 120"X 192" 226"D (HD PROGRESSIVE 1.1 SCREEN SURFACE) DAL21898V
2	<u>Projector Screen</u> DA-LITE CINEMA CONTOUR FIXED FRAME SCREEN 65"X104" 123"DD (HD PROGRESSIVE 1.1 SCREEN SURFACE) DAL21886V
2	<u>Extron XTP DTP 24 cable</u> is a shielded twisted pair cable. 1,000 ft. roll Extron part # (22-236-03)
10	<u>XTP DTP 24 Plug, Package of 10</u> Extron part # (101-005-02)
1	<u>SPK18/1000</u> Non-Plenum 1000' (305 m) spool Extron Part # (22-150-03)

EXHIBIT B – REVISED SCOPE OF WORK

SCOPE OF WORK – MAC 153 CLASSROOM RENOVATION PROJECT

All work as indicated on Perkins+Will drawings and specifications and as noted below

This project is intended to be awarded in the Spring of 2018, with contracts, submittals and coordination to occur which allows demolition to begin the last week in May and complete the second week of August.

This project permitting authority is the Village of Glen Ellyn. Prior to the College receiving a permit, the awarded contractor and their subcontractors must be registered with the Village of Glen Ellyn. The College has submitted the application for permit, and will pay the review and inspection fees to obtain the partial permit for construction. Fire Alarm and Sprinkler submittals are submitted by this contractor. Review and Inspection fees for those two trades are paid by the contractor, who will be reimbursed by the College.

Awarded bidder will execute and comply with terms and conditions of sample contract attached to this bid package.

Prior to final payment, contractor will provide all certified payrolls and completed prevailing wage forms (attached to this bid package) for all companies performing work on the campus under this agreement.

Schedule Clarifications

The project will be awarded in the Spring 2018. The Classroom is available to begin construction activities May 20. The classroom must be operational August 20. The work under this contract must be complete by August 13 in order to allow for furniture installation and final hook ups.

The apparent successful bidder as part of pre-award activities will provide a list of long lead items, such as glass handrail system, lighting system, doors and frames, etc.

Addendum 1 Clarifications

Bidder will include in their Lump Sum Bid, a \$3,000.00 allowance for potential revisions to the catwalk. The current drawings show the spiral stair being removed, however, future access via something like a ships ladder will be provided, under this contract.

Bidders are advised that the College does not want to salvage the auditorium seating. The Contractor will demolish and remove from the property these items.

Bidders are advised that where new or revised HVAC controls and programming are required in the project this work is included in the bidder's scope and must be performed by the College's control contractor, Siemens.

Include demolition of Exhaust fan thermostat, conduit and cabling/wiring complete.

Existing control room supply diffuser and return grille are existing to be reused. Remove from existing ceiling and temporarily support from structure. Install into new ceiling. Modify existing ductwork as required

.

EXHIBIT C – SPECIFICATION

SECTION 09 84 33
SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. Sound-absorbing wall panels, including installation accessories.
- B. Related Sections:
 - 1. Non-loadbearing metal framing: Section 09 22 16.
 - 2. Gypsum board: Section 09 29 00.
 - 3. Acoustical wall panels: 09 84 13.

1.2 ACTION SUBMITTALS

- A. Product Data: Manufacturer's literature for materials descriptions, installation and maintenance instructions.
- B. Shop Drawings:
 - 1. Layout and details of wall panels. Show locations of items which are to be coordinated with, or penetrate the wall panels.
 - 2. Show elevations and details indicating profiles and configuration of each wall panel. Include attachments to building structure. Indicate location, size, material, thickness of material and spacing of attachment framing and fasteners.
 - 3. Show dimensions taken from field verified measurements. Show adjacent construction and building structure used for attachment of wall panels and adjacent materials. Show joints and fasteners, sizes, spacing and note materials and types of fasteners.
- C. Samples:
 - 1. Initial Color Selection: Manufacturers standard color selection samples.
 - 2. Panel Edge: 12-inch- long Sample(s) showing each edge profile, corner, and finish.
 - 3. Core Material: 12-inch- square Sample at corner.
 - 4. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Signed copies of specified warranty.

- A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed sound-absorbing wall panel installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Acoustic Wall Panels: Obtain each sound-absorbing wall panel from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. Fire-Test-Response Characteristics: Provide acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site in manufacturer's unopened packing, clearly indicating manufacturer's name, brand and other identifying information.
- B. Store materials in a dry location, off the ground and in a manner to prevent damage, deterioration, and intrusion of foreign matter. Replace materials which have been damaged or are otherwise unsuitable. When ascertained, immediately remove damaged or otherwise unsuitable materials from the job site.

1.7 PROJECT/SITE CONDITIONS

- A. Environmental Limitations: Do not install sound-absorbing wall panels until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a permanent level of lighting or a lighting level of not less than 50 fc is provided on surfaces to receive the units.
- C. Air Quality Limitations: Protect sound-absorbing wall panels from exposure to airborne odors, such as tobacco smoke, paint and install panels under conditions free from odor contamination of ambient air.

- D. Field Measurements: Verify wall surface dimensions by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 MOCKUP INSTALLATION

- A. Before installing sound-absorbing wall panels, build mockup required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect 7 days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting sound-absorbing wall panel fabrication.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed.
 - 7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Provide the following mock-ups:
 - 1. Not less than three typical wall panels including attachments.

1.9 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, signed by manufacturer agreeing to repair or replace components of sound-absorbing wall panel system that fail in performance, materials, or workmanship within specified warranty period. Failure in performance includes, but is not limited to, acoustical performance. Failure in materials includes, but is not limited to, distortion of facing or warping of core.
- C. Warranty Period: Provide warranty for 2 years from date of Substantial Completion signed by the Manufacturer and Installing Contractor submitted to the Architect.
- D. This warranty is in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design Product: "InStyle Ecooustic Panels" **also known as "Ecooustic E3 Tiles" or "Ecooustic Panel 25mm"** (Unika Vaev).

1. Acceptable Manufacturers:
 - a. ~~Filzfelt~~ **Filzfelt**.
 - b. Kirei.
 - c. MCD.

2.2 MATERIALS

- A. Polyester Acoustical Panel
1. Color: To be selected from manufacturer's standard colors.
 2. Type: Panel.
 3. Thickness: 0.53".
 4. Noise Reduction Coefficient 0.50.
 5. Fire Rating: Class A.
- B. Adhesive: As recommended by the panel manufacturer for the substrate indicated.
- C. Trim Moldings: Manufacturer's Standard; size to match panel thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine surfaces to receive the parts of the Work specified herein. Verify dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of the supporting construction.
- B. Install per manufacturer's directions. Shim as required to achieve a smooth monolithic appearance.
1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions, unless otherwise shown and bring faces of wall panels to the same plane.
 2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating wall panels.
 3. No fasteners are to be visible on the exposed surface of the wall panels.
- C. Scribe and cut wall panels for accurate fit at penetrations by other work through walls. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness for stretcher-leveled metal sheet.
- D. Install edge moldings and trim of type indicated at perimeter of wall panel areas and where necessary to conceal edges of wall panels. Show method of edge trim attachment and design of edge trims on submitted shop drawings.

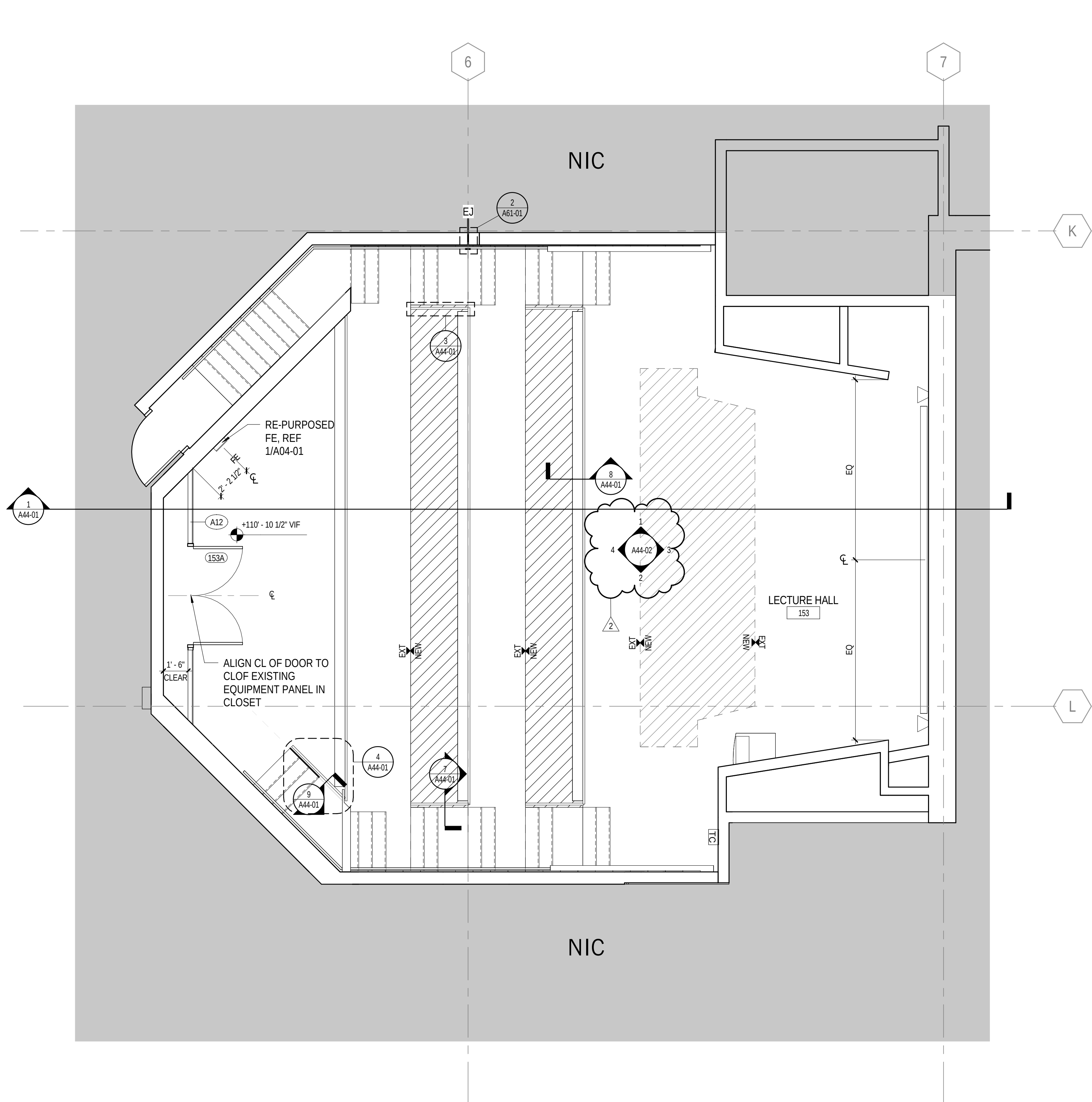
1. Do not use exposed fasteners, including pop rivets, on moldings and trim.

3.2 CLEANING AND PROTECTION

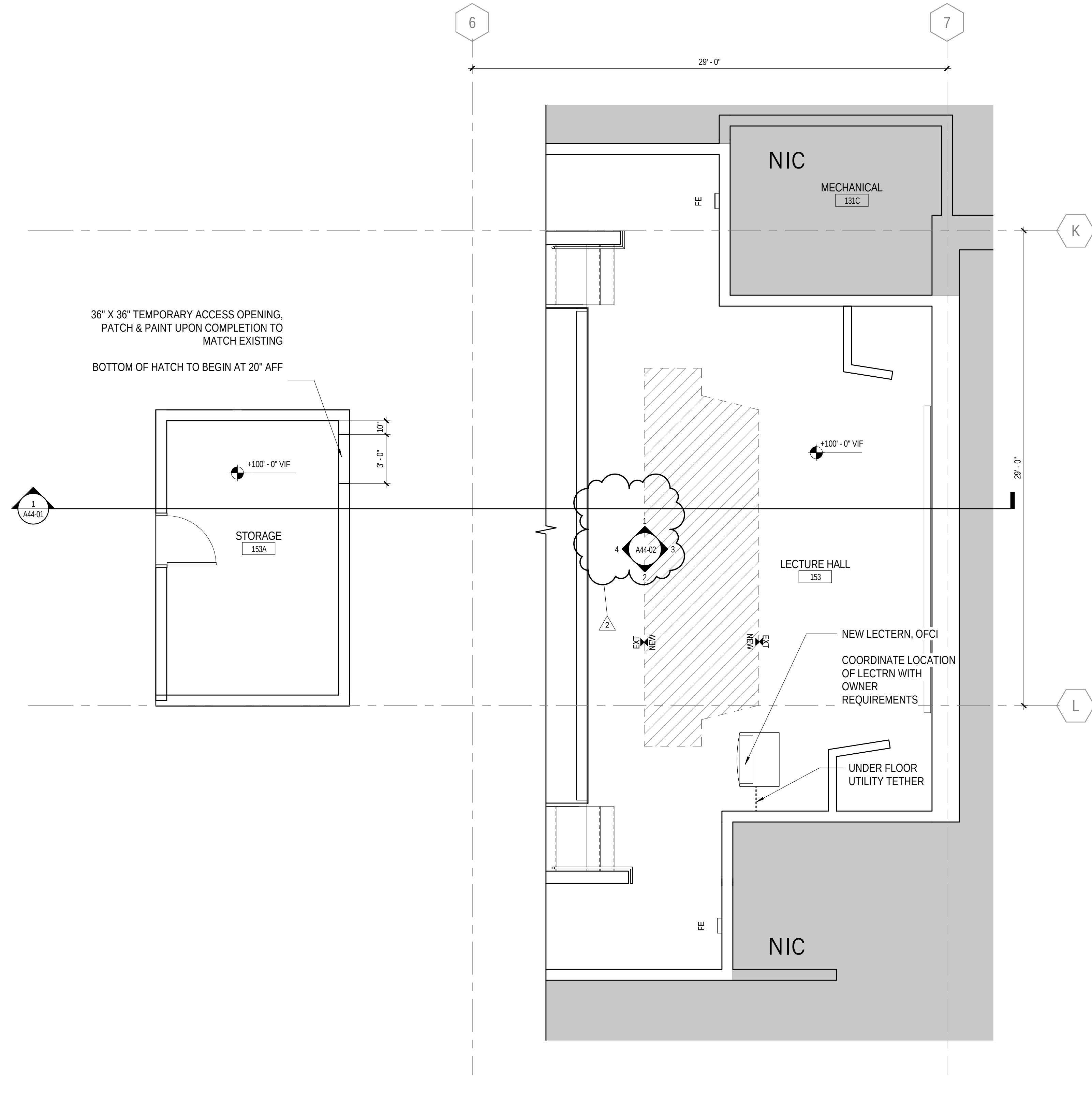
- A. Upon completion of the work, remove unused materials, debris, containers and equipment from the project site. Clean and repair floors, walls and other surfaces that have been stained, marred or otherwise damaged by work under this Section.
- B. Protect wall panels during the construction period so that they will be without any indication of deterioration or damage at the time of acceptance by the Owner.

END OF SECTION

EXHIBIT D – SPECIFICATION DRAWINGS



3 LEVEL 02 FLOOR PLAN
1/4" = 1'-0"



1 LEVEL 01 FLOOR PLAN
1/4" = 1'-0"

CONSTRUCTION PLAN LEGEND	CONSTRUCTION PLAN GENERAL NOTES
DENOTES AREA "NOT IN CONTRACT" EXISTING CONSTRUCTION TO REMAIN NEW PARTITION DOOR TAG (NEW DOOR) EXISTING DOOR NEW FLOOR EXTENSION - GEOFOAM INFILL WITH CONCRETE TOPPING PARTITION TYPE TAG TEMPORARY CONSTRUCTION DUST PARTITION EXISTING TIME CLOCK TO REMAIN	1. ALL NEW PARTITIONS SHALL BE TYPE A-41, UNO, REFER TO SHEET A61-01 FOR MORE INFORMATION. PARTITION TYPES AND FIRE RESISTIVE RATINGS INDICATED ARE TO BE CONTINUOUS FOR THE LENGTH AND HEIGHT OF THE PARTITION. 2. TYPICAL DIMENSIONS ARE TO THE FINISHED FACE OF PARTITION, UNO. PARTITIONS DIMENSIONED TO CENTERLINE OF STUD ARE SO NOTED. 3. LAYOUT PARTITIONS FOR ARCHITECT TO REVIEW FOR DESIGN INTENT. DO NOT PROCEED WITH INSTALLATION OF RUNNERS OR STUDS WITHOUT THIS REVIEW. 4. LOCATE DOORS 4" FROM FACE OF INTERSECTING PARTITION TO INSIDE EDGE OF DOOR FRAME, UNO. 5. THE CONTRACTOR SHALL PATCH AND REPAIR ALL EXISTING AND NEW WALL SURFACES AS REQUIRED PRIOR TO APPLYING FINISHES. 6. WHERE EXISTING WALL BASE OR WALLCOVERING HAS BEEN REMOVED, SKIM COAT WALL SURFACE TO MAKE SMOOTH TO MATCH ADJACENT CONSTRUCTION SO AS NOT TO TELEGRAPH THROUGH FOR NEW FINISH. 7. WHERE NEW PARTITION IS A CONTINUATION OF AN EXISTING PARTITION, THE FACE OF THE NEW PARTITION SHALL BE ALIGNED WITH THE FACE OF THE EXISTING PARTITION 8. WHERE PARTITION IS TO ALIGN WITH THE FACE OF AN EXISTING DRYWALL CORNER OR EDGE, REMOVE THE EXISTING CORNER BEAD, TAPE, APPLY JOINT COMPOUND, AND SAND SMOOTH. NEW AND EXISTING DRYWALL TO BE IN THE SAME PLANE WITH NO VISIBLE JOINTS. 9. THE CONTRACTOR SHALL SURVEY FLOOR ELEVATIONS TO DETERMINE SCOPE OF FLOOR LEVELING AND REMEDIAL REPAIR WORK. THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK ALL COSTS THAT ARE ASSOCIATED WITH FLOOR LEVELING AND ASSOCIATED REMEDIAL REPAIR WORK. FLOOR SHALL BE LEVEL WITHIN 1/4" IN 10'-0" RADIUS. 10. OPENINGS IN GYPSUM BOARD FOR ELECTRICAL AND COMMUNICATION RECEPTACLE, PIPING, DUCTWORK, AND OTHER PENETRATIONS SHALL MAINTAIN TIGHT TOLERANCES. EXPOSED EDGES SHALL BE COVERED BY TRIM PLATES OR ESCUTCHEONS. 11. PARTITIONS NOT DIMENSIONED ARE GENERALLY LOCATED BY ONE OF THE FOLLOWING CRITERIA: A. CENTERLINE: CENTER OF PARTITION ALIGNS WITH THE CENTER OF GRIDLINE OR OBJECT CENTERLINE (SUCH AS A COLUMN OR MULLION), CENTER THE OVERALL PARTITION WIDTH RATHER THAN STUD WIDTH ON THE LINE. B. ALIGN: LOCATE PARTITION FLUSH WITH FACE OF GYPSUM BOARD, OR OTHER SURFACE INDICATED. C. MAINTAIN DIMENSIONS NOTED AS "MINIMUM", "CLEAR", OR "HOLD". 12. ALL EXISTING CONCRETE WALLS AND CONCRETE OR STEEL COLUMNS ARE TO BE FURRED-OUT WITH METAL STUDS OR HAT CHANNELS AS MINIMALLY AS REQUIRED FOR THE INSTALLATION OF CONDUIT, JUNCTION BOXES, ACCESSORIES, BLOCKING, ETC., EXCEPT WHERE THE WALLS AND COLUMN ENCLOSURES ARE REQUIRED TO ALIGN OR ARE DIMENSIONED TO THE CONTRARY. 13. PROVIDE METAL BACKING PLATES OR SOLID WOOD BLOCKING (FIRE TREATED) IN PARTITIONS FOR MILLWORK, FURNITURE AND WALL ATTACHED ITEMS. COORDINATE PLACEMENT OF BLOCKING PRIOR TO CLOSING WALLS. 14. EXPOSED WOOD SHALL BE FINISH GRADE HARDWOOD - FILLED, SANDED, PRIMED AND READY FOR SCHEDULED FINISH. 15. SEAL PENETRATIONS IN GYPSUM BOARD CONSTRUCTION ABOVE FINISHED CEILING TO PREVENT SOUNDS LEAKAGE AT ACOUSTICAL PARTITIONS AND AT DEMISING PARTITIONS, UNO. PENETRATIONS AND OPENINGS ABOVE CEILING IN EXISTING PARTITIONS SHALL BE FILLED OR SEALED TO MATCH EXISTING WALL CONSTRUCTION. 16. OPENINGS IN RATED WALLS, FLOORS, CEILINGS AND ROOF ASSEMBLIES SHALL BE SEALED WITH A FIRE RESISTIVE JOINT SYSTEM OR PROTECTED WITH A FIRE-RATED CHASE. 17. WHEN UNDIMENSIONED PARTITIONS APPEAR IN CONJUNCTION WITH DOOR OPENINGS, DOOR WIDTH AND DOOR FRAME DETAILS DETERMINE LOCATION OF ADJACENT WALLS AND FRAMES.

2	ADDENDUM 01	03/21/2018
1	ISSUE FOR BID & PERMIT	03/07/2018
1	ISSUE	DATE
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	

TITLE

OVERALL FLOOR
PLANS

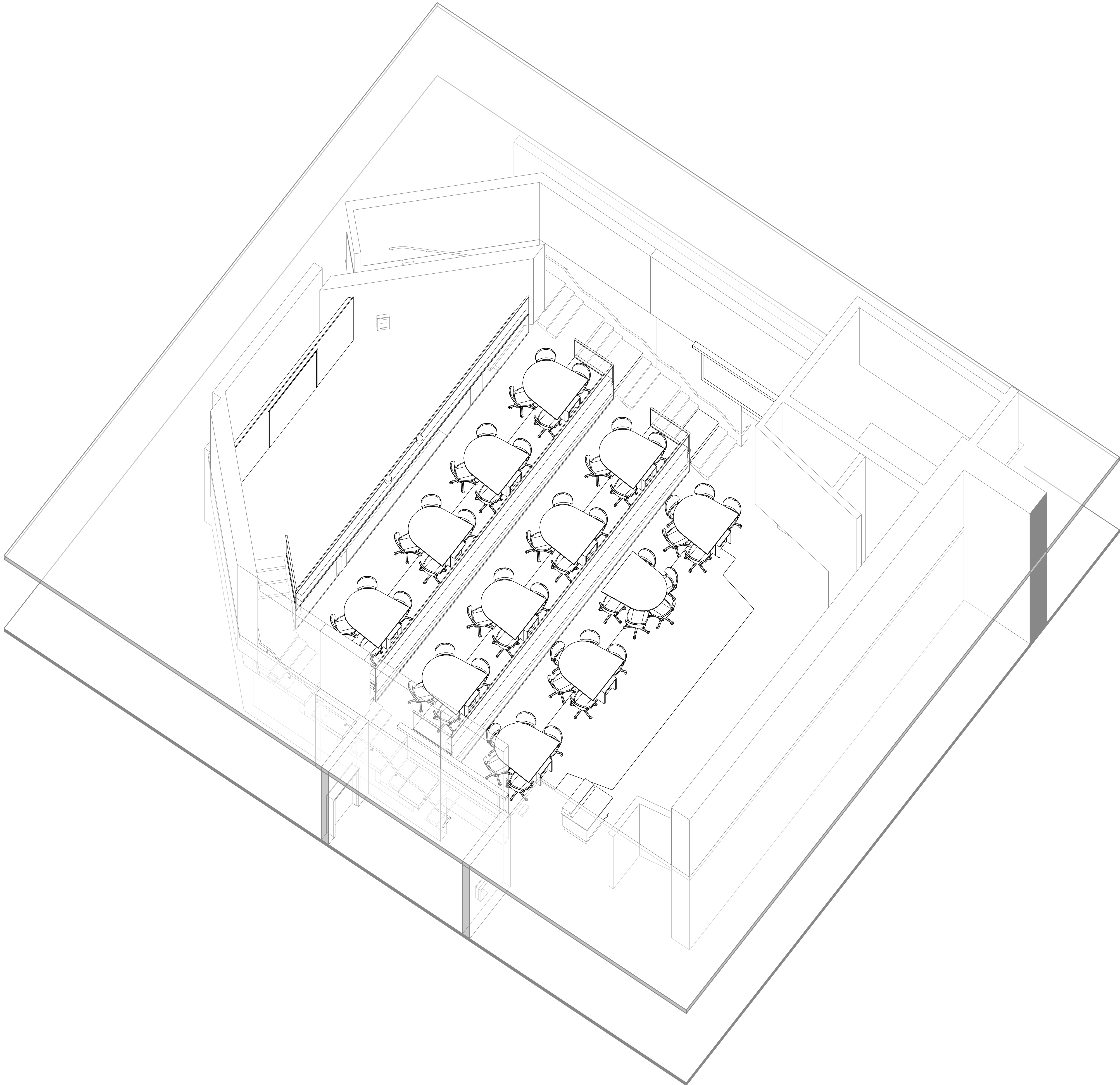
SHEET NUMBER

A11-01

MAC ROOM 153 RENOVATION
COLLEGE OF DUPAGE

425 FAWELL BLVD.
GLEN ELLYN, IL 60137

OWNER	ARCHITECT	MEPFP	STRUCTURE
COLLEGE OF DUPAGE 425 FAWELL BOULEVARD GLEN ELLYN, IL 60137 630.942.4046 (TEL) CONTACT: DON INMAN INMAND86@COD.EDU	PERKINS + WILL 410 N. MICHIGAN AVENUE, SUITE 1600 CHICAGO, IL 60611 312.755.0770 (TEL) 312.755.0775 (FAX) CONTACT: RICK YOUNG rick.young@perkinswill.com	MECHANICAL SERVICES ASSOCIATES CORP. 111 S. VIRGINIA STREET CRYSTAL LAKE, IL 60014 815.788.8901 (TEL) 815.788.8908 (FAX) CONTACT: ROBERT LARSEN RLARSEN@MSA-CE.COM	C.E. ANDERSON & ASSOCIATES 175 NORTH FRANKLIN STREET SUITE 410 CHICAGO IL 60606 312.750.1701 (TEL) 312.750.1704 (FAX) CONTACT: JUDY A. BRADY, S.E., R.A. JBRADY@CEA-SE.COM



DRAWING INDEX	
SHEET NUMBER	SHEET NAME
01-GENERAL	
G00-00	COVER SHEET
G01-01	CODE COMPLIANCE PLAN OVERALL
03-STRUCTURE	
S1.0	PARTIAL PLANS
04-ARCHITECTURAL	
A00-01	REFERENCE SHEET
A04-01	DEMOLITION FLOOR PLAN
A05-01	DEMOLITION REFLECTED CEILING PLAN
A11-01	OVERALL FLOOR PLANS
A12-01	REFLECTED CEILING PLAN
A15-01	FURNITURE PLAN & FINISH SCHEDULE
A44-01	INTERIOR SECTION & SECTION DETAILS
A44-02	INTERIOR ELEVATIONS
A61-01	INTERIOR DETAILS & PARTITION TYPES, DOOR SCHEDULE & DETAILS
06-ELECTRICAL	
E00-01	ELECTRICAL NOTES AND DETAILS
E00-02	FIRE ALARM SYSTEM NOTES AND DETAILS
E00-03	TECHNOLOGY SYSTEMS NOTES AND DETAILS
E04-01	FIRST FLOOR ELECTRICAL DEMOLITION PLANS
E11-01	FIRST FLOOR ELECTRICAL PLANS
E11-02	FIRST FLOOR PLAN - ELECTRICAL
07-MECHANICAL	
MP211-01	FIRST & SECOND FLOOR MECHANICAL & FIRE PROTECTION

PROJECT DATA

- PROJECT DESCRIPTION:
INTERIOR RENOVATION OF APPROX. 1,211 SF ON LEVEL 1/2 OF AN EXISTING EDUCATIONAL BUILDING.
- JURISDICTION: GLEN ELLYN, IL
- OCCUPANCY CLASSIFICATION:
IBC: 2009 GROUP BUSINESS-B
- CONSTRUCTION TYPE:
TYPE 1B, FULLY SPRINKLERED
- REQUIRED CODES:

ICC 2009 INTERNATIONAL BUILDING CODE
ICC 2009 INTERNATIONAL RESIDENTIAL CODE
ICC 2009 INTERNATIONAL FIRE CODE
ICC 2009 INTERNATIONAL MECHANICAL CODE
ICC 2009 INTERNATIONAL PROPERTY MAINTENANCE CODE
ICC 2009 INTERNATIONAL FUEL GAS CODE
IECC 2015
NEC 2012 NATIONAL ELECTRICAL CODE
DUPAGE COUNTY COUNTYWIDE STORMWATER FLOODPLAIN ORDINANCE, 2013
ILLINOIS STATE PLUMBING CODE, 2004 (SUPERCEDED BY ILLINOIS STATE PLUMBING CODE, 2014)
ILLINOIS, NFPA 101 LIFE SAFETY CODE, 2009

SITE MAP

VICINITY MAP

BLDG CODE STATEMENT OF COMPLIANCE

I CERTIFY THAT THESE ARCHITECTURAL DOCUMENTS DESCRIBED WITHIN WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION, AND TO THE BEST OF MY KNOWLEDGE, CONFORM TO ALL APPLICABLE CODES AND REGULATIONS OF DUPAGE COUNTY AND THE STATE OF ILLINOIS, AND THAT I AM A DULY REGISTERED ARCHITECT UNDER THE LAWS OF THE STATE OF ILLINOIS.

NAME: _____

SIGNED: _____ DATE: _____

ARCHITECT'S ILLINOIS LICENSE NUMBER: _____

ADA / IAC COMPLIANCE

I HAVE PREPARED, OR CAUSED TO BE PREPARED UNDER MY DIRECT SUPERVISION, THE ATTACHED PLANS AND SPECIFICATIONS AND STATE THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND TO THE EXTENT OF MY CONTRACTUAL OBLIGATION, THEY ARE IN COMPLIANCE WITH THE ENVIRONMENTAL BARRIERS ACT (410 ILCS 25) AND THE ILLINOIS ACCESSIBILITY CODE (711 ILL. ADM. CODE 400).

NAME: _____

SIGNED: _____ DATE: _____

ARCHITECT'S ILLINOIS LICENSE NUMBER: _____

PERKINS
+ WILL

The Wrigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
1 312.755.0770
1 312.755.0775
www.perkinswill.com

GENERAL CONTRACTOR

STRUCTURAL ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MEP ENGINEERING
MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014
MECHANICAL SERVICES ASSOCIATES
CORP.

NOTE: DOCUMENTS ARE
INCOMPLETE AND MAY NOT BE
USED FOR REGULATORY
APPROVAL, PERMITTING, OR
CONSTRUCTION PURPOSES.

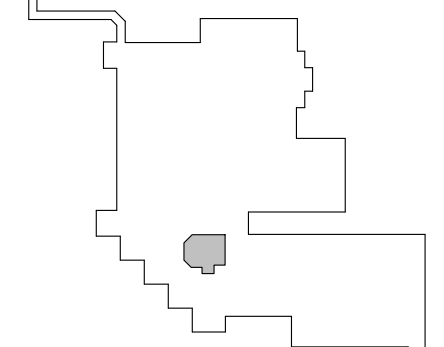
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

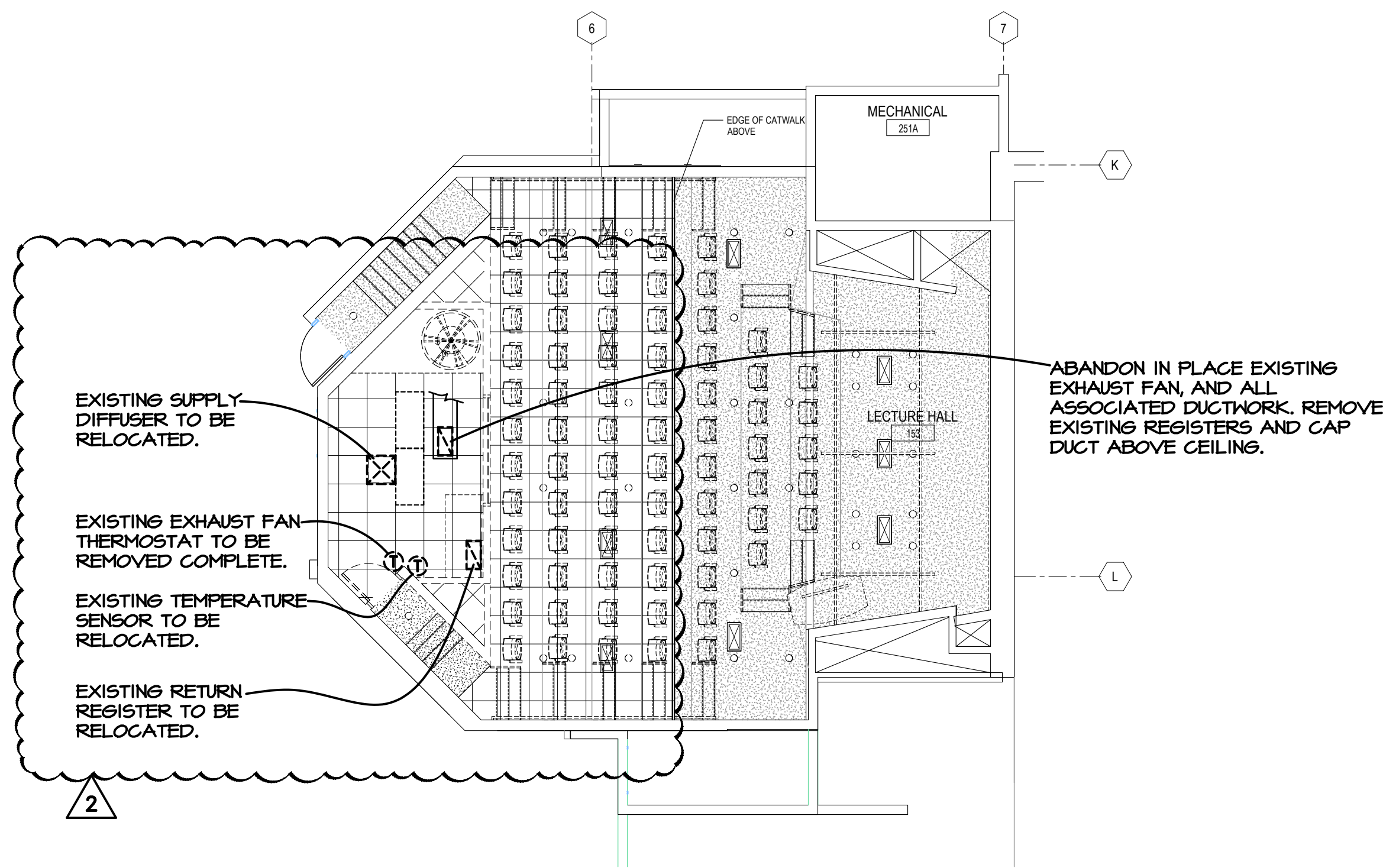
2	ADDENDUM 01	03/21/2018
1	ISSUE FOR BID & PERMIT	03/07/2018
#	ISSUE	DATE
Job Number		024303.007
Drawn		JA
Checked		MD
Approved		MD
TITLE		

COVER SHEET

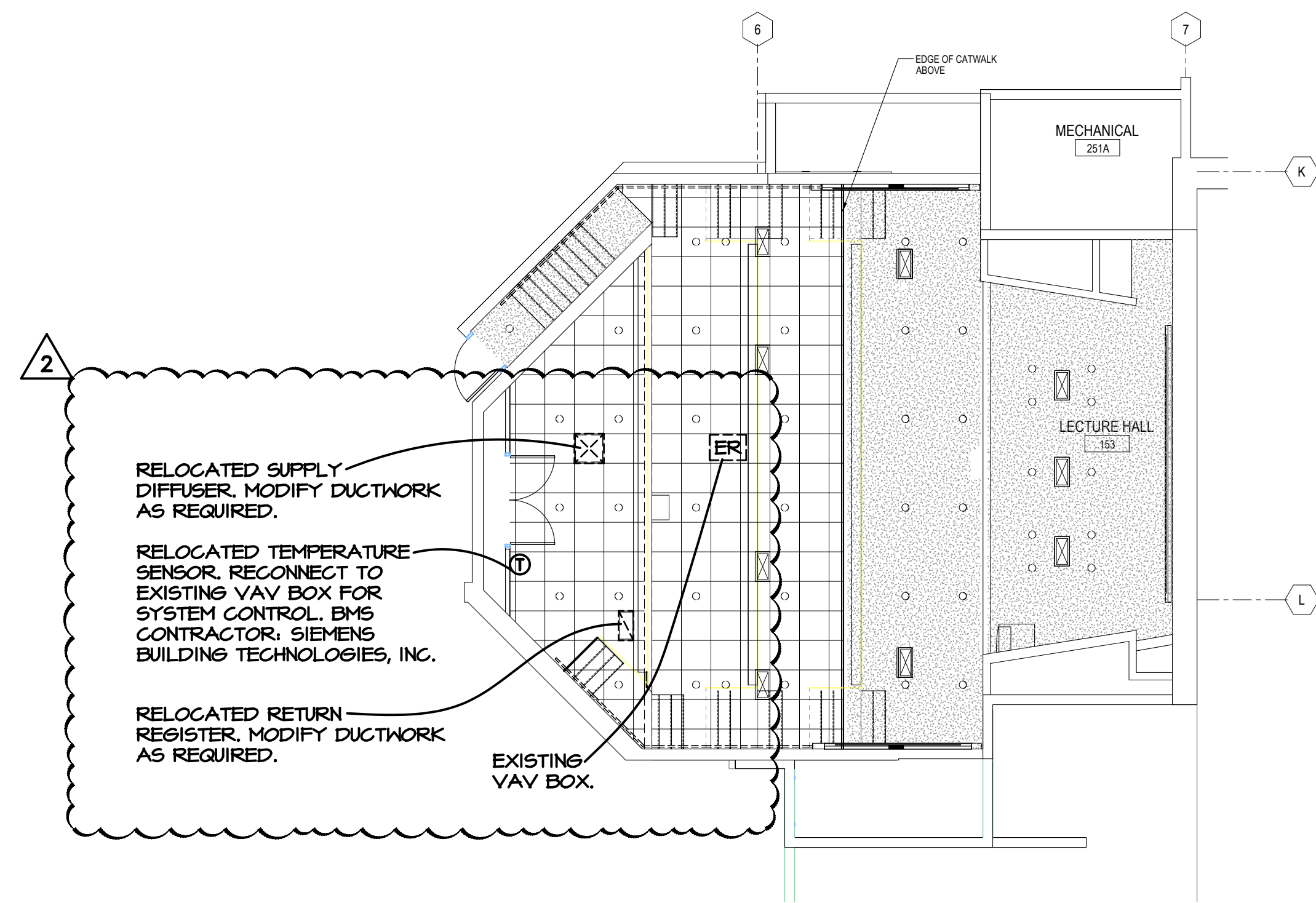
SHEET NUMBER

G00-00

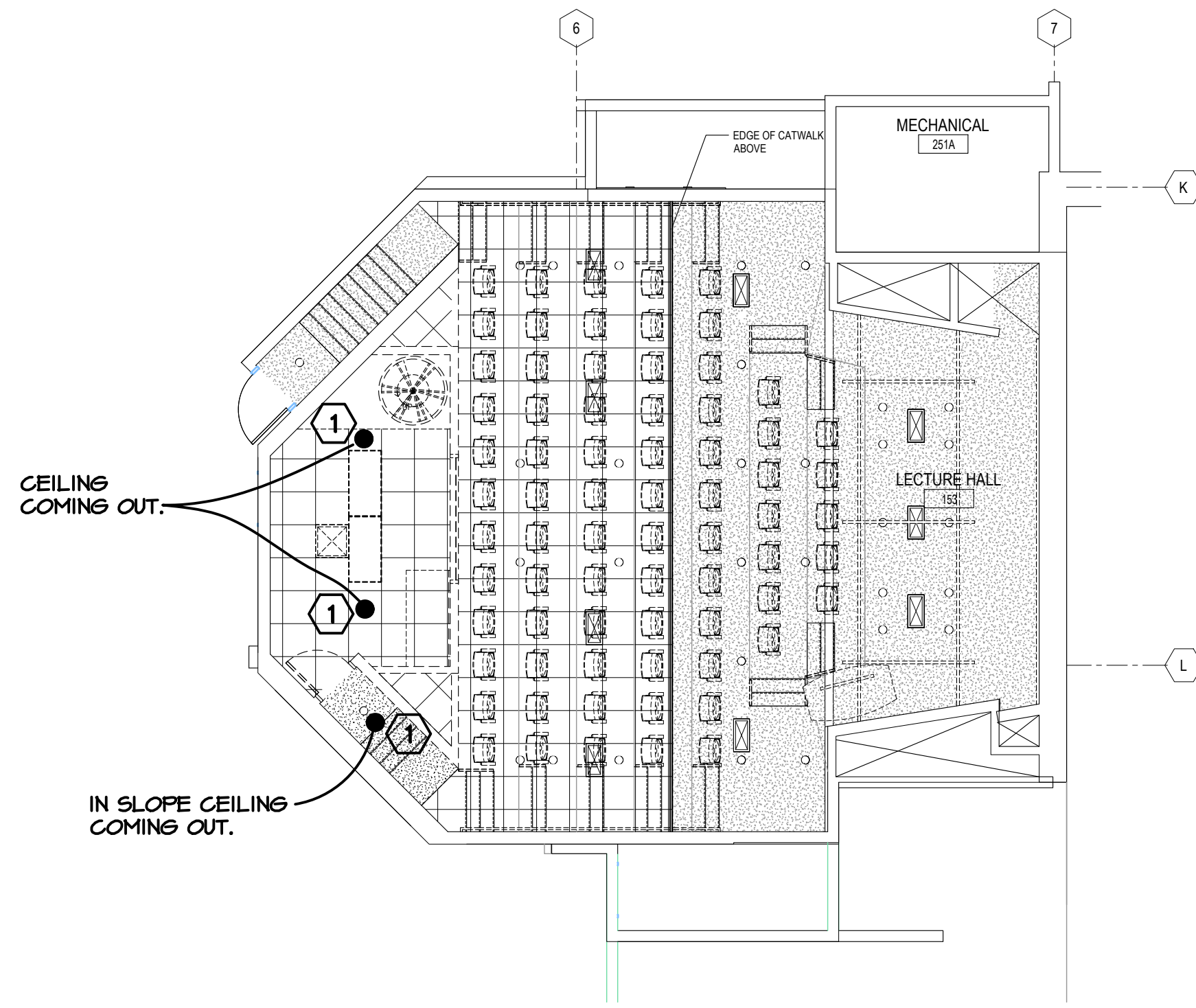
Copyright © 2018 Perkins+Will



① LEVEL 02 - PARTIAL FLOOR PLAN - MECHANICAL DEMO
1/8" = 1'-0"



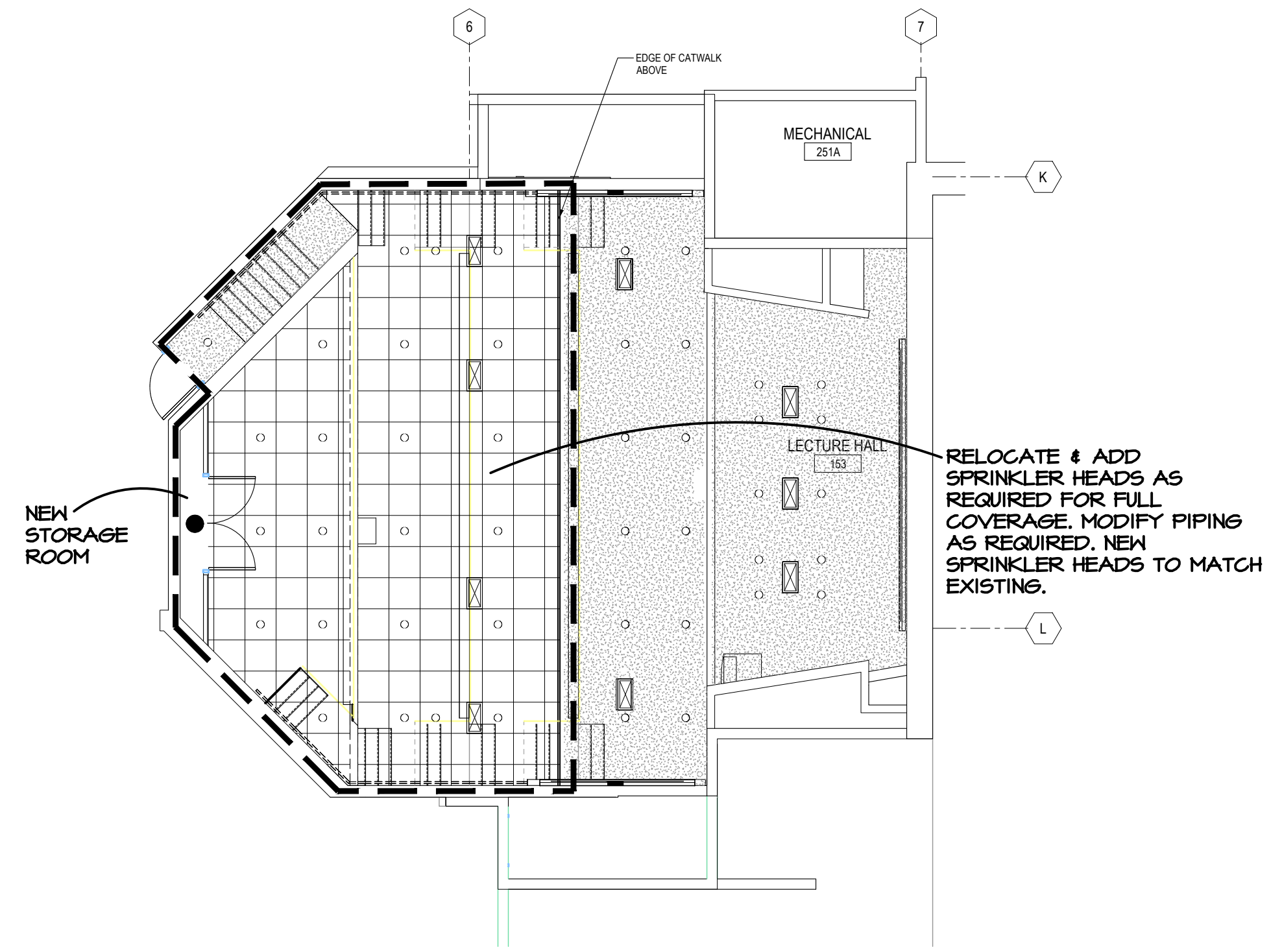
② LEVEL 02 - PARTIAL FLOOR PLAN - MECHANICAL NEW WORK
1/8" = 1'-0"



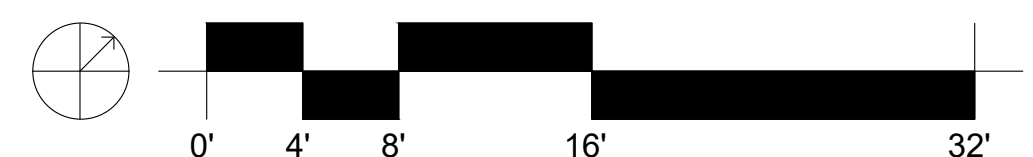
③ LEVEL 02 - PARTIAL FLOOR PLAN - FIRE PROTECTION DEMO
1/8" = 1'-0"

FIRE PROTECTION PLAN NOTES:

- ① EXISTING SPRINKLER HEADS TO BE REMOVED. CAP PIPING AND PREPARE FOR NEW WORK.



⑤ LEVEL 02 - PARTIAL FLOOR PLAN - FIRE PROTECTION NEW WORK
1/8" = 1'-0"



PERKINS + WILL

The Wrigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
T 312.755.0770
F 312.755.0775
www.perkinswill.com

GENERAL CONTRACTOR

STRUCTURAL ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MEP ENGINEERING
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014



11-30-17
Date of Expiration

RKL

Date Signed: June-26-2017

NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION PURPOSES.

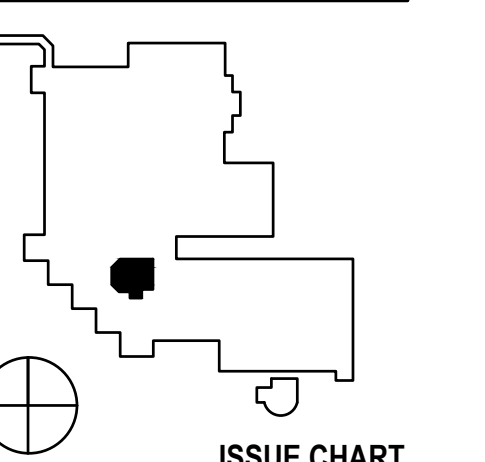
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
ELLEN LYNN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

ISSUED FOR BID AND PERMIT 07 MAR 2018

NO.	REVISION	DATE
1	ADDENDUM 01	03/21/2018
2	ISSUE FOR BID & PERMIT	03/07/2018
3	DATE	DATE

Job Number 024303.007

Drawn JT/JD/CC

Checked MC/REL

Approved MC/REL

TITLE

1st & 2nd FLOOR

MECHANICAL AND FIRE

PROTECTION PLANS

SHEET NUMBER

MFP11-01

Copyright © 2017 Perkins+Will

2018-B0042 MAC 153 Renovation

ADDENDUM # 1

March 23, 2018

.....

This signed Addendum is required to be returned with your Bid no later than the due date set forth for this Invitation to Bid. If you have already submitted your Bid, please submit this signed form via email to purchasing@cod.edu.

You can submit this completed addendum to the Purchasing Office by one of the means below:

All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.

ACKNOWLEDGMENT

You can submit this completed addendum to the Purchasing Office by one of the means below:

1. If you have not yet submitted your bid, please sign this addendum and include with your sealed bid.
2. If you have already submitted your bid, please sign and return to the Purchasing office via email at purchasing@cod.edu no later than the scheduled bid deadline. We will make sure it accompanies your bid.

You also have the option of withdrawing your bid, if necessary.

ACKNOWLEDGEMENT:

I HAVE RECEIVED THIS ADDENDUM # _____

Company Name: _____

Address: _____

Authorized Signature: _____

BIDDER: _____



COMMUNITY COLLEGE DISTRICT NO. 502

BID NUMBER: 2018-B0042

MAC 153 Classroom Renovation Project

BIDS DUE: Wednesday, March 28, 2018 at 2:00 p.m. Central Time

In the event of College closure due to inclement weather, bid deadline will be extended to the next business day at the same time.

RETURN BIDS TO:

**COLLEGE OF DUPAGE
PURCHASING DEPARTMENT
BIC BUILDING, ROOM 1B03
425 FAWELL BLVD.
GLEN ELLYN, ILLINOIS 60137**

Issue Date:

March 13, 2018

ISSUED BY THE COLLEGE OF DUPAGE PURCHASING DEPARTMENT

Purchasing Department

425 Fawell Boulevard
Glen Ellyn, Illinois 60137-6599
<http://www.cod.edu>

PHONE (630) 942-2217

March 13, 2018

INVITATION TO BID

Sealed bids for **MAC 153 Classroom Renovation Project** will be received by the College of DuPage, District 502, at the office of the Purchasing Manager, Berg Instructional Center (BIC) Building, Room 1B03, 425 Fawell Blvd., Glen Ellyn, IL 60137, until **2:00 p.m. Central Time, Wednesday, March 28, 2018**, at which time they will be publicly opened. In the event of College closure due to inclement weather, bid deadline will be extended to the next business day at the same time.

A pre-bid meeting has been scheduled for **Monday, March 19, 2018 at 1:00 p.m.** in the Purchasing Office, BIC 1B03 at 425 Fawell Blvd., Glen Ellyn, IL. 60137. A site visit will immediately follow. The pre-bid conference is not mandatory, but highly recommended.

Any bid received after the date and time stated above will be returned unopened. College of DuPage shall not be responsible for bids that are not received at the specific office location indicated above by the stated deadline. Failure by a delivery service company or person to meet the deadline will not excuse the Respondent from the deadline requirement. It is solely, the bidder's responsibility, to ensure that adequate time is allowed for timely and accurate delivery.

Prices offered shall be F.O.B. Destination, College of DuPage, 425 Fawell Blvd., Glen Ellyn, IL 60137. Prices must be firm. No bids will be accepted on the basis of a price prevailing at the time of shipment.

The award(s) of the contract will be made to the lowest responsible and qualified bidder whose bid complies with all the requirements prescribed. Brand or trade names in bid specifications are used for identification purpose only.

Respondents may download the Bid in addition and any future addenda from the College's Purchasing website at the following URL address: <http://cod.edu/about/purchasing/requests/index.aspx>.

No bid shall be withdrawn for a period of ninety (90) days after the bid opening date without the consent of the College.

LEGAL NOTICE

BID NOTICE

No. 2018-B0042

The College of DuPage is accepting sealed bids for **MAC 153 Classroom Renovation Project**. Bid documents may be downloaded from the Purchasing Website at www.cod.edu/about/purchasing/requests/ by clicking on the link for this bid and following the instructions.

Bids are due to the College of DuPage Purchasing Department in the Berg Instructional Center (BIC) Building, Room 1B03, 425 Fawell Blvd., Glen Ellyn, IL 60137 up to and no later than **2:00 p.m. Central Time, Wednesday, March 28, 2018**, at which time they will publicly opened.

A Bid Security in the form of a bid bond, cashier's check or certified check in the amount of 10% of the total base bid is required for this project.

A pre-bid conference and site visit is scheduled for Monday, March 19, 2018 at 1:00 p.m. in the Purchasing Office, BIC 1B03 at 425 Fawell Blvd, Glen Ellyn IL 60137. A site visit will immediately follow. The pre-bid conference is not mandatory, but highly recommended.

The College of DuPage is committed to the economic development of disadvantaged business enterprises; qualified Minority, Women, and Persons with Disabilities Owned Businesses are highly encouraged.

The College of DuPage Board of Trustees Reserves the right to reject any and all responses. This invitation is issued in the name of the Board of Trustees of College of DuPage, Community College District 502, Glen Ellyn, Illinois.

Table of Contents

	BID SUBMISSION CHECKLIST	5
1.0	GENERAL INFORMATION.....	6
1.1	DEFINITIONS.....	6
1.2	BIDS TO CONFORM TO REQUIREMENTS OF LEGAL ADVERTISING.....	6
1.3	COMPLIANCE.....	6
1.4	COMPLIANCE WITH LAWS - PUBLIC CONTRACTS	6
1.5	REGULATIONS.....	6
1.6	BID MODIFICATIONS	7
1.7	PRICES FIRM	7
1.8	AWARD OF CONTRACT	7
1.9	CONSIDERATION OF BIDS	7
1.10	COMPETENCY OF BIDDER	7
1.11	BIDDER WARRANTIES	8
1.12	PAYMENT TERMS.....	8
1.13	PAYMENT REMITTANCE.....	8
1.14	CASH BILLING DISCOUNTS.....	8
1.15	LOCAL BUSINESS PREFERENCE.....	8
1.16	EQUAL EMPLOYMENT OPPORTUNITY	8
1.17	TAX EXEMPTION.....	8
1.18	HOLD HARMLESS CLAUSE	8
1.19	CONTRACTORS LIABILITY INSURANCE	9
1.20	PREVAILING WAGE ACT	9
1.21	BUSINESS ENTERPRISE PROGRAM.....	9
2.0	INSTRUCTIONS TO BIDDERS	11
2.1	OUTSIDE DOCUMENT DISCLAIMER	11
2.2	BLACKOUT PERIOD	11
2.3	REQUESTS FOR INFORMATION/CLARIFICATION.....	11
2.4	PRE-BID MEETING	11
2.5	BID DEADLINE AND SUBMISSION.....	11
2.6	EXCEPTIONS	12
2.7	ERROR IN BID	12
2.8	WITHDRAWAL OF BIDS	12
2.9	NOTICES.....	12
2.10	BID DEPOSIT	13
2.11	PERFORMANCE AND PAYMENT BOND	13
3.0	BID SPECIFICATIONS	14
3.1	SCOPE OF WORK – MAC 153 CLASSROOM RENOVATION PROJECT	14
4.0	BID FORM.....	15
5.0	BUSINESS ENTERPRISE PROGRAM	16
6.0	CERTIFICATIONS **Required**	23
7.0	SIGNATURE PAGE **Required**	24
8.0	CONFLICT OF INTEREST DISCLOSURE AND NON-COLLUSION FORM **Required**	25
	EXHIBIT A – PROJECT MANUAL SPECIFICATIONS.....	26
	EXHIBIT B – SPECIFICATION DRAWINGS	492
	EXHIBIT C – PREVAILING WAGE FORM	512
	EXHIBIT D – SMALL PROJECTS AGREEMENT.....	513

BID SUBMISSION CHECKLIST

Things to Remember When Submitting a Response to an Invitation to Bid for the College of DuPage

1. ☐ **Read the *entire* document.** In your review, note critical items such as: blackout period, required goods and services, submittal dates, submission requirements, etc.
2. ☐ **Note the contact information provided.** The Purchasing Office Buyer at purchasing@cod.edu is the single point of contact for this Invitation to Bid and is the only person with whom you are allowed to communicate regarding this bid. This person is an excellent source of information for any questions you may have.
3. ☐ **Take advantage of the “question and answer” period.** Submit your questions to the Purchasing Department by the date in the Invitation to Bid and view the answers given in the formal addenda issued for the Invitation to Bid. All addenda issued for an Invitation to Bid will be emailed to each company that downloaded the bid documents and will include all questions asked and answered concerning the Invitation to Bid. Please ensure when downloading the bid documents, you use a valid email address.
4. ☐ **Do not alter, add to, or delete and part of the Bid documents without prior approval.** Please refer to the section titled *Exceptions* for instruction on how to request a deviation to the original Invitation to Bid.
5. ☐ **Ensure all Addenda are signed.** Before submitting your response, check the College Purchasing website at <http://www.cod.edu/about/purchasing/requests/index.aspx> to see whether any addenda were issued for this Bid request. If so, you must submit a signed copy of the addenda along with your bid response.
6. ☐ **Review and read the bid document again to make sure you have addressed all requirements.**
*Your original response and the requested electronic copy (flash drive) must be identical and be complete.
*Bids will not be accepted if Sections 6, 7, and 8 are not completed. (Please note there are two (2) signature lines in Section 8 that must be signed.)
*If your company is a Certified Women-Owned, Minority-owned, or Persons with Disability-owned business, please include a copy of any and all certifications.
7. ☐ **Submit your response on time.** Note the date and time listed on the front page of the Invitation to Bid and be sure to submit all required items on time. Late responses will not be accepted and will be returned, unopened. Ensure the box (s) containing your proposal is appropriately labeled. Please allow adequate time for delivery to the Purchasing Department.
8. ☐ **Important dates to know:**
 - Bid Publication Date – 3/13/18
 - Pre-Bid Meeting – 3/19/18
 - Questions Due – 3/20/18
 - Bids Due – 3/28/18 at 2:00 p.m.
 - Target Board Approval Date – 4/19/18

1.0 GENERAL INFORMATION

1.1 DEFINITIONS

- A. BIDDER** shall mean the individual or business entity submitting a Bid to supply any or all of the services or goods required by the Bid Documents.
- B. BID** shall mean the Bid Documents as completed by the Bidder which constitutes the Bidder's offer.
- C. CONTRACT** shall mean the agreement between the College and Contractor as set forth in the Bid Documents and as awarded by the College of DuPage Board of Trustees.
- D. BID DOCUMENTS** shall mean collectively the Instructions to Bidders, General Conditions, Special Conditions, Specifications, Attachments, and Addenda, if any, Bid, Site Inspection Certificate, Contractor Certifications and Forms for Minority Participation. The above documents shall be considered as one integrated document setting forth the obligations of the parties.
- E. CONTRACTOR** shall mean the individual or business entity submitting a Bid and to whom the College of DuPage Board of Trustees awards the Contract.
- F. COLLEGE** shall mean the College of DuPage, Community College District No. 502, a body politic and corporate of the State of Illinois.
- G. DIRECTOR** shall mean the person or persons authorized by the College to act in connection with this Contract. Such authorization shall not include any power to change the scope of the Contract or to obligate the College to pay additional sums beyond the amount of the Contract awarded by the College of DuPage Board of Trustees.
- H. PURCHASING MANAGER** shall mean the Purchasing Manager of the College of DuPage.
- I. SPECIFICATIONS** shall mean the description of the required services, Contract Goods, equipment, personnel, volume and use statistics and all requirements for the scope of work set forth in the Bid Documents.

1.2 BIDS TO CONFORM TO REQUIREMENTS OF LEGAL ADVERTISING

The College will not entertain or consider any Bid responses: (i) received after the exact time specified in the legal advertisements; (ii) not accompanied by the required bid deposit/bond, if required; or (iii) in any other way failing to comply fully with the conditions stated in the legal advertisement.

1.3 COMPLIANCE

Submissions under this Invitation to Bid shall be for items at least equal to or better than the quality and performance characteristics stated herein. The burden of proof that product and services meet specifications shall be documented by the bidder and be provided as part of the submitted bid. Failure to provide complete documentation of the product compliance with specifications required may result in bid rejection.

1.4 COMPLIANCE WITH LAWS - PUBLIC CONTRACTS

This Contract is a competitively bid public contract of the College of DuPage subject to laws and ordinances governing public contracts. The Bidder shall at all times observe and comply with all laws, ordinances, regulations and codes of the Federal, State and other local government agencies which may in any manner affect the preparation of the Bid or the performance of the Contract. If the Bidder observes that any of the Bid Documents are at variance therewith, it shall promptly notify the Purchasing Manager in writing and necessary changes shall be effected by appropriate modification.

1.5 REGULATIONS

The Contractor or Subcontractor, warrants that they are familiar with and they shall comply with all Federal, State, and Local Laws, statutes, ordinances, rules and regulations and the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of the Contract, including, without limitation, Workmen's Compensation Laws, minimum salary and wage statutes and regulations, laws with respect to permits and licenses and fees in connection therewith, laws regarding maximum working hours and regulations with respect to use of explosives. No plea of misunderstanding or ignorance thereof will be considered. Whenever required, the Contractor, or Subcontractor, shall furnish the college with satisfactory proof of compliance with said Federal, State and Local Laws, statutes, ordinances, rules, regulations, orders, and decrees.

1.6 BID MODIFICATIONS

Unless indicated, it is understood that bids are in strict accordance with specification requirements. Bids shall be deemed final, conclusive, and irrevocable. No bid shall be subject to correction or amendment for any error or miscalculation. Bid prices shall include cost of materials as specified, any applicable discounts and shipping. Installation costs shall be included only when indicated on page one. Installation shall include, but is not limited to, all assembly required, setting in place, and mounting all materials at various campus locations.

1.7 PRICES FIRM

All prices quoted in the Bid shall be firm and will not be subject to increase during the term of the Contract awarded to the Contractor, except as otherwise provided in the Bid Documents.

1.8 AWARD OF CONTRACT

The award of the contract will be made within ninety (90) calendar days after the opening of bids to the lowest responsible and qualified bidder whose bid complies with all the requirements prescribed. The successful bidder will be notified by electronic mail that their bid has been accepted and that they have been awarded the contract. Notification will also be posted on the College's Purchasing website at <http://www.cod.edu/about/purchasing/>. Failure to execute performance as per accepted bid may result in legal action by the College of DuPage to recover damages.

If a contract is not awarded within ninety (90) days after the opening of bids, a bidder may file a written request with the Purchasing Manager on the withdrawal of their bid and the Purchasing Manager will permit such withdrawal.

The bid security (if required) of all except the three (3) low bidders will be returned promptly after the bids have been checked, tabulated, and the relation of the bids established. Bid security of the three (3) lowest bidders, if required in legal notice, will be returned as soon as the contract and the bond of the successful bidder have been promptly executed and approved. If contracts cannot be awarded promptly, the College may permit the three (3) lowest bidders to substitute bid bonds for bank cashier's checks, bank drafts or certified checks submitted with their bids. Bid bonds executed by corporate surety companies shall be satisfactory to the Owner, but such substitution shall not be made until a period of fifteen (15) days has elapsed after the date of opening of bids and bond forms furnished by the College shall be used.

1.9 CONSIDERATION OF BIDS

The College reserves the right to reject or accept any or all Bid responses, to extend the bidding period, to waive technicalities in the documents and/or to direct that the project be abandoned or rebid prior to award of the Contract.

1.10 COMPETENCY OF BIDDER

No Bid will be accepted from or Contract awarded to a Bidder that is in arrears or is in default to the College upon any debt or Contract, or that is a defaulter, as surety or otherwise upon any obligation to said College, or has failed to perform faithfully any previous contract with the College.

1.11 BIDDER WARRANTIES

The submission of a Bid shall constitute a warranty that: (i) Bidder has carefully and thoroughly reviewed the Bid Documents and has found them complete and free from ambiguities and sufficient to describe the Contract work; (ii) Bidder and all workmen and/or employees it intends to use in the performance of this Contract are skilled and experienced in the type of work or services called for by the Bid Documents; and (iii) neither the Bidder nor any of its employees, agents, suppliers or subcontractors have relied on any verbal representations from the College, or any of the College's employees, agents, or consultants, in preparing the Bid.

1.12 PAYMENT TERMS

All invoices must be provided to the College for services rendered directly to the College. Undisputed invoices will be paid within sixty (60) days of receipt of properly submitted invoices to the Contractor, in accordance with the Local Government Prompt Payment Act.

1.13 PAYMENT REMITTANCE

All College vendors are required to receive payment from the College via an Automated Clearing House (ACH) transfer. Instructions to register for ACH payments will be sent, upon request, to successful bidders. Failure to comply with the ACH requirements may result in termination of the contract or purchase order. College ACH transfers typically occur the third week of each month. Invoices must be received at least 3 weeks prior to each ACH payment release. You are strongly encouraged to set up your account upon notice of award to avoid a delay payment.

1.14 CASH BILLING DISCOUNTS

Cash billing or percentage discounts for payment will not be considered in evaluating Bids.

1.15 LOCAL BUSINESS PREFERENCE

When two (2) or more responsible bidders submit the same low bid, the contract award will be determined by drawing lots in a public meeting unless one bidder is a local bidder within the District boundaries and one is a non-local bidder, in which event the local bidder will be awarded the contract.

1.16 EQUAL EMPLOYMENT OPPORTUNITY

In the hiring of employees for the performance of work under the Contract and any subcontract thereunder, no Contractor or Subcontractor shall, by reason of race, color, sex, religion, national origin, ancestry, age, marital status, disability, unfavorable military discharge or sexual orientation discriminate against any citizen of the United States, in the employment of Labor or workers, who are qualified and available to perform work to which the employment is related. Neither shall any Contractor or Subcontractor, or any person on behalf of either, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, color, sex, religion, national origin, ancestry, age, marital status, disability, unfavorable military discharge or sexual orientation.

1.17 TAX EXEMPTION

College of DuPage District #502 is exempt from Federal, State and Municipal taxes. Exemption certificates will be furnished upon request.

1.18 HOLD HARMLESS CLAUSE

The Respondent agrees to indemnify, hold harmless and defend College of DuPage, its agents, servants, and employees, and each of them against, and hold it and them harmless from, any and all lawsuits, claims, demands, liabilities, losses and expenses, including court costs and attorney's fees, for or on account of any injury to any person, or any death at any time resulting from such injury, or any damage to property, which may arise or which may be alleged to have arisen out of or in connection with the work covered by this contract.

1.19 CONTRACTORS LIABILITY INSURANCE

The Contractor shall not commence work under this contract until all insurance required herein is obtained and approved by the Owner. Nor shall the Contractor allow any subcontractor to commence work until all similar insurance required of the subcontractor has been so obtained.

The Contractor shall furnish the College of DuPage with a Certificate of Insurance, with College of DuPage, its trustees, officers, agents, employees, and any other parties designated by COD named as an additional insured for Commercial General and Automobile Liability, showing the minimum coverage indicated below. Insurance companies must have a Best Rating of at least A VI and otherwise be acceptable to the College. Workers' compensation insurance shall include a waiver of subrogation in favor of the College of DuPage. The College will also be shown as the certificate holder. Further, the Certificate of Insurance shall state that coverage provided is primary to any other coverage available to College of DuPage. An endorsement page showing coverage must accompany the certificate of insurance. The foregoing certificate shall contain a provision that coverage afforded under the policies will not be cancelled or non-renewed until at least sixty (60) days prior written notice has been given to College of DuPage.

TYPE OF INSURANCE

MINIMUM INSURANCE COVERAGE

Combined Single Limit Per Occurrence/Aggregate

Commercial General Liability including:

1. Premises – Operations	\$1,000,000 / \$2,000,000
2. Explosion, Underground and Collapse Hazard	
3. Products/Completed Operations	
4. Contractual Insurance	
5. Broad Form Property Damage	
6. Independent Contractors	
7. Bodily Injury	

Automobile Liability

Owned, Non-owned, or Rented	\$1,000,000 / \$2,000,000

Workers' Compensation and Employers' Liability	As Required by Applicable Laws

Professional Liability	If Performance Specifications are Required by the Contract

1.20 PREVAILING WAGE ACT

When applicable, and as a condition of receiving payment, Contractor must pay its employees prevailing wages in the locality in which the work is to be performed as establish for Public Works (construction and maintenance of a public work) prevailing wage and other requirements under Contract for Public Workers 820 ILCS 130/4. When required by the College Contractor shall provide a copy of the certified payroll on request. Contractor is responsible for contacting the Illinois Department of Labor to ensure understanding of prevailing wage requirements.

The prevailing rates of wages are determined by the Illinois Department of Labor and are available on the Department's official website: <http://www.illinois.gov/idol/Laws- Rules/CONMED/Pages/prevailing-wage-rates.aspx>. The College of DuPage has adopted the resolution regarding the prevailing wage rates for DuPage County in accordance with Illinois Prevailing Wage Act and are available the College's website: http://www.cod.edu/about/purchasing/illinois_prevailing_wage_act.aspx.

1.21 BUSINESS ENTERPRISE PROGRAM

The College of DuPage encourages the participation of qualified minorities, females, and persons with disabilities owned businesses in public contracts. It is the practice of the College to ensure full and equitable economic opportunities to persons and businesses that compete for business with the College of DuPage, including minorities, females, and persons with disabilities owned business enterprises. The College is committed to the economic development of disadvantaged business enterprises and the

award of contracts to businesses owned by minorities, females, and persons with disabilities for services to the extent provided by the Business Enterprise for Minorities, Females and Persons with Disabilities Act ("Act"), 30 ILCS 575.

END OF SECTION

2.0 INSTRUCTIONS TO BIDDERS

2.1 OUTSIDE DOCUMENT DISCLAIMER

The College of DuPage cannot warrant, represent, or guarantee the accuracy or completeness of documents which have not been obtained directly from the College. If you have obtained these documents from a third party source, the College is not responsible for any loss or damage including, but not limited to, time, money, or goodwill arising from errors, inaccuracies or omissions in any third party bid documents.

To obtain official documents, please visit: <https://www.cod.edu/about/purchasing/requests/index.aspx> . Click on the link for this project, and follow the prompts to enter your information onto our vendor list and download the original documents. This will ensure your contact information is registered on our vendor list, and we can send you any addenda that may be issued. This website is the only official website for prospective bidders to obtain digital copies of bid documents. It is the responsibility of each prospective bidder to verify the completeness of their printed bid documents before submitting a bid and accompanying executed addenda acknowledgement, and other required forms.

2.2 BLACKOUT PERIOD

Under no circumstances are respondents to contact or discuss this Invitation to Bid, or any of the information contained herein or about this project in general, with any College of DuPage trustee, employee, vendor, contractor or subcontractor, other than using the methods outlined in this bid. Respondents are strictly forbidden from visiting the College's locations or approaching any College trustee, employee, vendor, contractor or subcontractor for any information related to this Invitation to Bid or this project without the direct knowledge and authorization in writing in advance from the Purchasing Manager or Buyer. Violation of these provisions may subject the respondent to immediate disqualification.

Initial your understanding of this requirement

2.3 REQUESTS FOR INFORMATION/CLARIFICATION

If any firm submitting a bid for this project is in doubt as to the true meaning of the specifications or other documents or any part thereof, bidder shall request clarification from the Purchasing Department. Questions must be submitted in writing and be directed via email to the Purchasing Department at purchasing@cod.edu no later than **March 20, 2018 at 12:00 p.m. Central Time**. Questions for which answers are provided will be communicated to all registered recipients of bid documents via addendum. All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.

2.4 PRE-BID MEETING

The College will hold a Pre-Bid Meeting at the College of DuPage, Glen Ellyn Campus, 425 Fawell Blvd, Berg Instructional Center, Room 1B03A, Glen Ellyn, IL at **1:00 p.m. on March 19, 2018**. All parties interested in responding to the BID are urged to attend in person. The College will clarify the objectives of the BID and answer questions during the Pre-Bid Meeting.

2.5 BID DEADLINE AND SUBMISSION

To be assured of consideration, Bids must be received by the College of DuPage in the College's in Purchasing Department, BIC-1B03, no later than **2:00 p.m. Central Time on Wednesday, March 28, 2018**. Failure by a delivery service company or person to meet the deadline will not excuse the Bidder from the deadline requirement. It is solely the Bidder's responsibility to ensure that adequate time is allowed for timely, accurate delivery and that the Bid is received as required.

All Bidders shall submit:

- One (1) **sealed** original copy of the Bid;
- and one flash drive** containing all completed documents

Bids must be in a sealed envelope and delivered to:

Purchasing Manager
College of DuPage
BIC Building - Room 1B03
425 Fawell Blvd.
Glen Ellyn, Illinois 60137

ATTN: Bid No. 2018-B0042

Bids must be received by the date and hour of the Bid Opening as shown in the legal advertisement. The sealed envelope submitted by the Bidder shall carry the following information on the face of the envelope: Bidder's name, address, Bid Notice Number, advertised date of Bid Opening and the hour designated for Bid Opening as shown in the legal advertisement. Unless otherwise stated, all blank spaces on the bid forms shall be fully completed. Bidder bears all responsibility for error or omissions in the submission of the Bid.

2.6 EXCEPTIONS

If any Respondent intends to take any deviations or exceptions from the Specifications or other bid Documents, Respondent shall submit to the Purchasing Manager/Buyer a written request for a deviation or exception at least 5 business days prior to the date and time of advertised bid opening date. If the Project Manager considers such deviation or exception acceptable, the Purchasing Manager/Buyer shall issue an Addendum setting forth such deviation or exception from the Specifications or other which shall be applicable to all Respondents submitting a response.

If no Addendum is issued by the Purchasing Manager/Buyer, then such deviation or exception shall be deemed rejected.

The College may reject any response containing deviations or exceptions not previously accepted through a written Addendum. A copy of such Addendum will be e-mailed or delivered to each Respondent receiving a set of such bid Documents. Respondent shall acknowledge receipt of each Addendum issued in the space provided on the bid form or via a signed addendum. Failure to acknowledge receipt of addenda may result in disqualification of the Bid. All written requests for deviations or exceptions shall be sent to purchasing@cod.edu.

Initial understanding of this requirement:

2.7 ERROR IN BID

Where a bidder claims to have made a mistake, such mistake must be called to the attention of the Purchasing Manager within twenty-four (24) hours after the opening of bids. Within forty-eight (48) hours of the bid opening, bidder shall submit to the College's designated contracting officer original documentary evidence and a detailed explanation of how the mistake was made. Failure to conform to this requirement precludes the bidder from withdrawing its bid based upon a bid mistake. If such notice, proof and explanations have been tendered, and the contracting officer is convinced that a bona fide mistake has been made, the contracting officer may recommend to the Board of Trustees that the bidder be allowed to withdraw its bid and recommend that the bid be awarded to the next lowest responsible, responsive bidder. If the Board determines by majority vote, that the bidder has made a bona fide error, no award will be made upon such bid and the bid security will be returned.

2.8 WITHDRAWAL OF BIDS

Bidders may withdraw their Bids at any time prior to the time specified in the legal advertisement as the date and hour set for the Bid Opening. However, no Bidder shall withdraw, cancel or modify its Bid response for a period of ninety (90) calendar days after said advertised Bid Opening.

2.9 NOTICES

All communications and notices between the College and Bidders regarding the Bid Documents shall be in writing and hand delivered or delivered via United States mail, postage prepaid, or via email. Notices to

the Bidders shall be addressed to the name and address or email address provided by the Bidders; notices to the Purchasing Manager shall be addressed to Purchasing Department, College of DuPage, BIC Building - Room 1B03, 425 Fawell Blvd., Glen Ellyn, Illinois 60137, or purchasing@cod.edu.

2.10 BID DEPOSIT

When required in the legal advertisement, the Bid shall be accompanied by cashier's check, certified check or surety bond in the amount shown in the legal advertisement or as may be prescribed in these Bid Documents. A certified or cashier's check shall be drawn on a responsible bank doing business in the United States and shall be made payable to the order of the College of DuPage. The Surety issuing the bond must have a general rating of "A", and shall be a Class V or higher in the financial size category as defined by Best's Key Rating Guide - Property and Casualty. Failure to submit the bid deposit shall constitute an informal Bid and such Bid shall be rejected.

The Bidder hereby agrees that the bid deposit shall be forfeited to the College as liquidated damages and not as penalty in the event Bidder fails to comply with the terms of this invitation to bid, or otherwise fails or refuses to honor the Bid upon award of the Contract by the College.

The bid deposit of all bidders will be returned, with the exception of the winning Contractor, after the College has awarded the Contract. The bid deposit of the Contractor will be returned after the Contract has been awarded and the Contractor has submitted all insurance documentation and the Performance and Payment Bond, as required by the Bid Documents.

***This project requires a bid deposit in the amount of 10% of the total base bid.**

2.11 PERFORMANCE AND PAYMENT BOND

The successful Bidder shall furnish a Performance and Payment Bond in the full amount of the Contract on the College Bid Form, a specimen of which is provided herein. The Surety issuing the Performance and Payment Bond must have a general rating of "A" and shall be a Class V or higher in the financial size category as defined by Best's Key Rating Guide-Property and Casualty.

In the event that the Bidder fails to furnish the Performance and Payment Bond within fourteen (14) calendar days after service of the Notice of Award, the College may elect to retain Bidder's bid deposit as liquidated damages and not as a penalty and the Contract may be terminated. The parties agree that the sum of the bid deposit is a fair estimate of the amount of damages that the College will sustain due to the Bidder's failure to furnish the Performance and Payment Bond and the termination of the Contract.

END OF SECTION

3.0 BID SPECIFICATIONS

3.1 SCOPE OF WORK – MAC 153 CLASSROOM RENOVATION PROJECT

The Contractor must furnish and install all work as indicated in Exhibit A, Project Manual Specifications, and Exhibit B, Specification Drawings, and as noted below.

This project is intended to be awarded in the Spring of 2018, with contracts, submittals and coordination to occur which allows demolition to begin the last week in May and complete the second week of August.

This project permitting authority is the Village of Glen Ellyn. Prior to the College receiving a permit, the awarded contractor and their subcontractors must be registered with the Village of Glen Ellyn. The College has submitted the application for permit, and will pay the review and inspection fees to obtain the partial permit for construction. Fire Alarm and Sprinkler submittals are submitted by this contractor. Review and Inspection fees for those two trades are paid by the contractor, who will be reimbursed by the College.

Awarded bidder will execute and comply with terms and conditions of sample contract attached to this bid package.

Prior to final payment, contractor will provide all certified payrolls and completed prevailing wage forms (attached to this bid package) for all companies performing work on the campus under this agreement.

Project Schedule:

The project will be awarded in the Spring 2018. The Classroom is available to begin construction activities May 20. The classroom must be operational August 20. The work under this contract must be complete by August 13 in order to allow for furniture installation and final hook ups.

The apparent successful bidder as part of pre-award activities will provide a list of long lead items, such as glass handrail system, lighting system, doors and frames, etc.

END OF SECTION

4.0 BID FORM

2018-B0042 MAC 153 Classroom Renovation Project

FIRM NAME, CONTACT NAME and PHONE NUMBER

The below prices include all stipulations and requirements of Addenda No. _____

Proposes to furnish all labor, materials, equipment and services as required to satisfactorily complete all work described here in as required for the construction and completion of the project where bid below.

MAC 153 Classroom Renovation Project	
Base Bid	\$

Comments:

Submitted by: _____(printed)

Submitted by: _____(signed)

END OF SECTION

5.0 BUSINESS ENTERPRISE PROGRAM

STATE OF ILLINOIS BUSINESS ENTERPRISE PROGRAM MINORITIES, FEMALES, PERSONS WITH DISABILITY PARTICIPATION AND UTILIZATION PLAN

The Business Enterprise for Minorities, Females and Persons with Disabilities Act (BEP) establishes a goal for community colleges contracting with businesses that have been certified as owned and controlled by persons who are minorities (MBE), female (FBE/ also referred to as WBE), or persons with disabilities (PDBE) (collectively, BEP certified vendor(s)). 30 ILCS 575

Contract Goal to be Achieved by Vendor: This solicitation includes a specific **BEP** participation goal of 20% based on the availability of BEP certified vendors to perform or provide the anticipated services and/or supplies required by this solicitation.

The BEP participation goal is applicable to all bids or offers. In addition to the award criteria established for this solicitation, the College will award this contract to a Vendor that meets the goal or demonstrates good faith efforts to meet the goal. This goal is applicable to change orders and allowances within the scope of work provided by the BEP certified vendors. If Vendor is an MBE and FBE certified vendor, the entire goal is met and no subcontracting with a BEP certified vendors is required; however, **Vendor must submit a Utilization Plan indicating that the goal will be met by self-performance.**

Following are guidelines for Vendor's completion of the Utilization Plan. The Utilization Plan must demonstrate that Vendor has either: (1) met the entire contract goal; or (2) made good faith efforts towards meeting the goal.

At the time of bid or offer, Vendor, or Vendor's proposed Subcontractor, must be certified with the Illinois Department of Central Management Services as a BEP certified vendor.

Failure to complete a Utilization Plan or provide Good Faith Effort documentation shall render the bid or offer non-responsive; and subject to rejection and/or disqualification in the College's sole discretion.

1. If applicable where there is more than one prime vendor, the Utilization Plan should include an executed Joint Venture Agreement specifying the terms and conditions of the relationship between the parties and their relationship and responsibilities to the contract. The Joint Venture Agreement must clearly evidence that the BEP certified vendor will be responsible for a clearly defined portion of the work and that its responsibilities, risks, profits and contributions of capital, and personnel are proportionate to its ownership percentage. It must include specific details related to the parties' contributions of capital, personnel, and equipment and share of the costs of insurance and other items; the scopes to be performed by the BEP certified vendor under its supervision; and the commitment of management, supervisory personnel, and operative personnel employed by the BEP certified vendor to be dedicated to the performance of the contract. Established Joint Venture Agreements will only be credited toward BEP goal achievements for specific work performed by the BEP certified vendor. **Each party to the Joint Venture Agreement must execute the bid or offer prior to submission of the bid or offer to the College.**
2. An agreement between a vendor and a BEP certified vendor in which a BEP certified vendor promises not to provide subcontracting or pricing quotations to other vendors is prohibited. The College may

request additional information to demonstrate compliance. Vendor agrees to cooperate promptly with the College in submitting to interviews, allowing entry to places of business, providing further documentation, and to soliciting the cooperation of a proposed BEP certified vendor. Failure to cooperate by Vendor and BEP certified vendor may render the bidder or offeror non-responsive or not responsible. **The contract will not be awarded to Vendor unless Vendor's Utilization Plan is approved by the College.**

3. **BEP Certified Vendor Locator References:** Vendor may consult CMS' BEP Vendor Directory at www.sell2.illinois.gov/cms/business, as well as the directories of other certifying agencies, but firms **must be certified with CMS as BEP certified vendors at the time of bid or offer.**
4. **Vendor Assurance:** Vendor shall not discriminate on the basis of race, color, national origin, sexual orientation or sex in the performance of this contract. Failure by Vendor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the College deems appropriate. This assurance must be included in each subcontract that Vendor signs with a subcontractor or supplier.
5. **Calculating BEP Certified Vendor Participation:** The Utilization Plan documents work anticipated to be performed, or goods/equipment provided by all BEP certified vendors and paid for upon satisfactory completion/delivery. Only the value of payments made for the work actually performed by BEP certified vendors, by subcontractors or suppliers to such vendors, is counted toward the contract goal. Applicable guidelines for counting payments attributable to contract goals are summarized below:
 - 5.1 The value of the work actually performed or goods/equipment provided by the BEP certified vendor shall be counted towards the goal. The entire amount of that portion of the contract that is performed by the BEP certified vendor, including supplies purchased or equipment leased by the BEP certified vendor shall be counted, except supplies purchased and equipment rented from the Prime Vendor submitting this bid or offer.
 - 5.2 A vendor shall count the portion of the total dollar value of the BEP contract equal to the distinct, clearly defined portion of the work of the contract that the BEP certified vendor performs toward the goal. A vendor shall also count the dollar value of work subcontracted to other BEP certified vendor. Work performed by the non- BEP certified party shall not be counted toward the goal. **Work that a BEP certified vendor subcontracts to a non-BEP certified vendor will not count towards the goal.**
 - 5.3 A Vendor shall count toward the goal 100% of its expenditures for materials and supplies required under the contract and obtained from a BEP certified vendor manufacturer, BEP certified regular dealer, or BEP certified supplier. A Vendor shall count toward the goal the following expenditures to BEP certified vendors that are not manufacturers, regular dealers, or suppliers:
 - 5.3.1 The fees or commissions charged for providing a bona fide service, such as professional, technical, consultant or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials or supplies required for performance of the contract, provided that the fee or commission is determined by College to be reasonable and not excessive as compared with fees customarily allowed for similar services.

- 5.3.2** The fees charged for delivery of materials and supplies required by the contract (but not the cost of the materials and supplies themselves) when the hauler, trucker, or delivery service is not also the manufacturer or a supplier of the materials and supplies being procured, provided that the fee is determined by the College to be reasonable and not excessive as compared with fees customarily allowed for similar services. The BEP certified vendor's trucking firm must be responsible for the management and supervision of the entire trucking operation for which it is responsible on the contract, and must itself own and operate at least one fully licensed, insured and operational truck used on the contract.
- 5.3.3** The fees or commissions charged for providing any bonds or insurance specifically required for the performance of the contract, provided that the fee or commission is determined by the College to be reasonable and not excessive as compared with fees customarily allowed for similar services.
- 5.4** BEP certified vendors who are performing on contract as second tier subcontractors may be counted in meeting the established BEP goal for this contract as long as the Prime Vendor can provide documentation indicating the utilization of these vendors.
- 5.5** A Vendor shall count towards the goal only expenditures to firms that perform a commercially useful function in the work of the contract.
- 5.5.1** A firm is considered to perform a commercially useful function when it is responsible for execution of a distinct element of the work of a contract and carries out its responsibilities by actually performing, managing, and supervising the work involved. The BEP certified vendor must also be responsible, with respect to materials or supplies used on the contract, for negotiating price, determining quality and quantity, ordering the materials or supplies, and installing the materials (where applicable) and paying for the material or supplies. To determine whether a firm is performing a commercially useful function, the College shall evaluate the amount of work subcontracted, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the credit claimed for its performance of the work, industry practices, and other relevant factors.
- 5.5.2** A BEP certified vendor does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction or contract through which funds are passed through in order to obtain BEP certified vendor participation. In determining whether a BEP certified vendor is such an extra participant, the College shall examine similar transactions, particularly those in which BEP certified vendors do not participate, and industry practices.
- 5.6** A Vendor shall not count towards the goal expenditures that are not direct, necessary and related to the work of the contract. Only the amount of services or goods that are directly attributable to the performance of the contract shall be counted. Ineligible expenditures include general office overhead or other Vendor support activities.
- 6. Good Faith Effort Procedures:** Vendor must submit Utilization Plans, subcontract documents, and/or Letters of Intent that meet or exceed the published goal. If Vendor cannot meet the stated goal, Vendor must document and explain within the Utilization Plan the good faith efforts it undertook to meet the goal. Utilization Plans are due at the time of and must be enclosed and sealed with the bid

or offer submission. Copies of subcontract documents and/or Letters of Intent shall be due upon request.

- 7. Contract Compliance:** Compliance with this section is an essential part of the contract. The following administrative procedures and remedies govern Vendor's compliance with the contractual obligations established by the Utilization Plan. **After approval of the Plan and award of the contract, the Utilization Plan becomes part of the contract.** If Vendor did not succeed in obtaining BEP certified vendor participation to achieve the goal and the Utilization Plan was approved and contract awarded based upon a determination of good faith, the total dollar value of BEP certified vendor work calculated in the approved Utilization Plan as a percentage of the awarded contract value shall become the contract goal.

- 7.1.** The Utilization Plan may not be amended after contract execution without the College's prior written approval.
- 7.2.** **Vendor may not make changes to its contractual BEP certified vendor commitments or substitute BEP certified vendors without the prior written approval of the College.** Unauthorized changes or substitutions, including performing the work designated for a BEP certified vendor with Vendor's own forces, shall be a violation of the utilization plan and a breach of the contract, and shall be cause to terminate the contract, and/or seek other contract remedies or sanctions.
- 7.3.** If it becomes necessary to substitute a BEP certified vendor or otherwise change the Utilization Plan, Vendor must notify the College in writing of the request to substitute a BEP certified vendor or otherwise change the Utilization Plan. The request must state specific reasons for the substitution or change. The College shall notify the Council or its delegate of the request to substitute a BEP certified vendor or change the Utilization Plan. The College reserves the right to approve or deny a request for substitution or other change in the Utilization Plan.
- 7.4.** Where Vendor has established the basis for the substitution to the College's satisfaction, it must make good faith efforts to meet the contract goal by substituting a BEP certified vendor. Documentation of a replacement BEP certified vendor, or of good faith efforts to replace the BEP certified vendor, must meet the requirements of the initial Utilization Plan. If the goal cannot be reached and good faith efforts have been made, Vendor may substitute with a non- BEP certified vendor or Vendor may perform the work.
- 7.5.** If a Vendor plans to hire a subcontractor for any scope of work that was not previously disclosed in the Utilization Plan, Vendor must obtain the approval of the College to modify the Utilization Plan and must make good faith efforts to ensure that BEP certified vendors have a fair opportunity to submit a bid or offer on the new scope of work.
- 7.6.** A new BEP certified vendor agreement must be executed and submitted to the College within five business days of Vendor's receipt of the College's approval for the substitution or other change.
- 7.7.** Vendor shall maintain a record of all relevant data with respect to the utilization of BEP certified vendors, including but without limitation, payroll records, invoices, canceled checks and books of account for a period of at least three years after the completion of the contract. Full access to these records shall be granted by Vendor upon 48 hours written demand by the College to any duly authorized representative thereof, or to any

municipal, state or federal authorities. The College shall have the right to obtain from Vendor any additional data reasonably related or necessary to verify any representations by Vendor. After the performance of the final item of work or delivery of material by the BEP certified vendor and final payment to the BEP certified vendor by Vendor, but not later than 30 calendar days after such payment, Vendor shall submit a statement confirming the final payment and the total payments made to the BEP certified vendor under the contract.

- 7.8.** The College will periodically review Vendor's compliance with these provisions and the terms of its contract. Without limitation, Vendor's failure to comply with these provisions or its contractual commitments as contained in the Utilization Plan, failure to cooperate in providing information regarding its compliance with these provisions or its Utilization Plan, or provision of false or misleading information or statements concerning compliance, certification status or eligibility of the BEP certified vendor, good faith efforts or any other material fact or representation shall constitute a material breach of this contract and entitle the College to declare a default, terminate the contract, or exercise those remedies provided for in the contract or at law or in equity.
- 7.9.** The College reserves the right to withhold payment to Vendor to enforce these provisions and Vendor's contractual commitments. Final payment shall not be made pursuant to the contract until Vendor submits sufficient documentation demonstrating compliance with its Utilization Plan.

UTILIZATION PLAN

The Utilization Plan and Letter of Intent must be sealed and submitted with Proposal.

_____ (Vendor) submits the following Utilization Plan as part
Respondent Name

of our bid or offer in accordance with the requirements of the BEP Program Status and Participation section of the solicitation for **MAC 153 Classroom Renovation Project, Bid Number 2018-B0042**. We understand that all subcontractors must be certified with the CMS BEP Program at the time of submission of all bids and offers. **We understand that compliance with this section is an essential part of this contract and that the Utilization Plan will become a part of the contract, if awarded.**

Vendor submits the following statement:

- ☐ Vendor is a BEP certified firm and plans to fully meet the goal through self-performance.
- ☐ Vendor has identified BEP certified subcontractor(s) to fully meet the established goal and submits the attached executed Letter(s) of Intent; or
- ☐ Vendor has made good faith efforts towards meeting the entire goal as indicated on the attached Utilization Plan, or a portion of the goal, and hereby requests a waiver (complete checklist below).

Vendor's person responsible for compliance with this BEP goal:

Name: _____ Title: _____

Telephone: _____ Email: _____

DEMONSTRATION OF GOOD FAITH EFFORTS TO ACHIEVE GOAL AND REQUEST FOR WAIVER

If the BEP participation goal was not achieved, the vendor must provide documented evidence of good faith efforts to achieve the goal.

Below is a checklist of actions that will be used to evaluate a Vendor's Demonstration of Good Faith Efforts and Request for Waiver. **Please check the actions which you completed.** If any other efforts were made to obtain BEP participation in addition to the items listed below, attach a detailed description of such efforts. The College reserves the right to review and audit the results of the vendor's efforts as described below.

- ☐ Utilize the Sell2Illinois website: www2.illinois.gov/cms/business to identify BEP certified vendors within the respective commodity/service codes denoted above and at a minimum email all listed vendors and solicit quotes from all vendors who express an interest via follow-up emails or telephone calls.
- ☐ Solicit through all reasonable and available means (e.g., attendance at a vendor conference, advertising and/or written notices) the interest of BEP certified vendors that have the capability to perform the work of the contract. Vendor must solicit this interest within sufficient time to allow the BEP certified vendors to respond to the solicitation. Vendor must determine with certainty if the BEP certified vendors are interested by taking appropriate steps to follow up initial solicitations and encourage them to submit a bid or proposal. Vendor must provide interested BEP certified vendors with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding promptly to the solicitation.
- ☐ Select portions of the work to be performed by BEP certified vendors in order to increase the likelihood that the goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate BEP certified vendor participation, even when Vendor might otherwise prefer to perform these work items with its own forces.
- ☐ Make a portion of the work available to BEP certified vendors and selecting those portions of the work or material needs consistent with their availability, so as to facilitate BEP certified vendor participation.
- ☐ Negotiate in good faith with interested BEP certified vendors. Evidence of such negotiation must include the names, addresses, email addresses, and telephone numbers of BEP certified vendors that were considered and an explanation as to why an agreement could not be reached.
- ☐ Thoroughly investigate the capabilities of BEP certified vendors and not reject them as unqualified without sound reasons.
- ☐ Make efforts to assist interested BEP certified vendors in obtaining lines of credit or insurance as required by the College.
- ☐ Make efforts to assist interested BEP certified vendors in obtaining necessary equipment, supplies, materials, or related assistance or services.

6.0 CERTIFICATIONS ****Required****

IMPORTANT: All bidders are required to complete and sign this form. Completed form must be returned with bid no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

THE UNDERSIGNED IS CAUTIONED TO CAREFULLY READ THESE CERTIFICATIONS PRIOR TO SIGNING THE SIGNATURE PAGE. SIGNING THE SIGNATURE PAGE SHALL CONSTITUTE A WARRANTY BY THE UNDERSIGNED THAT ALL THE STATEMENTS, CERTIFICATIONS AND INFORMATION SET FORTH WITHIN THESE CERTIFICATIONS ARE TRUE, COMPLETE AND CORRECT AS OF THE DATE THE SIGNATURE PAGE IS SIGNED. THE UNDERSIGNED IS NOTIFIED THAT IF THE COLLEGE LEARNS THAT ANY OF THE FOLLOWING CERTIFICATIONS WERE FALSELY MADE, THAT ANY CONTRACT ENTERED INTO WITH THE UNDERSIGNED SHALL BE SUBJECT TO TERMINATION.

- A. Prevailing Wage Act. To the extent required by law, Contractor shall not pay less than the prevailing wage as established pursuant to an Act Regulating the Wages of Laborers, Mechanics, and Other Workman employed under Contract for Public Workers 820 ILCS 130/1 *et seq.* Our company certifies that it is eligible for bidding on public contracts and has complied with section 11a of the Prevailing Wage Act, 820 ILCS 130.01-12. **Yes** _____ **No** _____
- B. Human Rights Act. To the extent required by law, Contractor shall abide by the Illinois Human Rights Act, 775 ILCS 10/0.01 *et seq.*
- C. Drug Free Workplace. To the extent required by law, Contractor shall abide with the requirements of the Drug Free Workplace Act 30 ILCS 580.1 *et seq.*
- D. Sexual Harassment Policy. Contractor represents by the signing of this agreement that it has a written sexual harassment policy that is in accordance with 775 ILCS 5/2-105 (A) (4).
- E. Non-debarment. By executing this agreement Contractor certifies that it has not been debarred from public contracts in the State of Illinois for violating either 33E-3 or 33E-4 of the Public Contracts Act, 720 ILCS 5/33E-1 *et seq.*
- F. Fair Employment Practice: Company is in compliance with all State and Federal laws regarding Fair Employment Practice as well as all rules and regulations. **Yes** _____ **No** _____
- G. Our company has an Equal Employment Opportunity and Affirmative Action Program which complies with Executive Order 11246, the Vietnam Era Veterans' Readjustment Assistance Act of 1974, and the Rehabilitation Act of 1973.
Yes _____ **No** _____
- H. Our company certifies that it is eligible for bidding on public contracts and is not in violation of either paragraph 33E-3 or 33E-4 of Public Act 86-150, 720ILCS 5 with regards to bid rigging/bid rotating.
Yes _____ **No** _____
- I. When required by law, the bidder and all bidder's subcontractors must participate in applicable apprenticeship and training programs approved by and registered with the United States Department of Labor's Bureau of Apprenticeship and Training as required by Illinois Public Act 093-0642.

ADVICE

- A. MINORITY/WOMAN-OWNED, DISADVANTAGED BUSINESS? YES _____ NO _____. If yes, please attach copy of certification and advise certification number and expiration date below:

Name of Certifying Entity: _____

Certification #: _____ Expiration Date: _____

- B. STATE NEGOTIATED COOPERATIVE AGREEMENT: YES _____ NO _____ Contract No. _____

Signature

Respondent/Company Official: _____ Date: _____

7.0 SIGNATURE PAGE ****Required****

BID NUMBER: 2018-B0042 - MAC 153 Classroom Renovation Project

IMPORTANT: All bidders are required to complete and sign this form. Completed form must be returned with bid to the Purchasing Department no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

Check One:

☐ **SOLE PROPRIETOR** ☐ **PARTNERSHIP** (and/or JOINT VENTURE) ☐ **LIMITED LIABILITY COMPANY**
☐ **CORPORATION**

The undersigned acknowledges receipt of a full set of Bid Documents and Addenda Numbers _____
(None unless indicated here). **All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.**

The undersigned makes the foregoing Bid subject to all of the terms and conditions of the Bid Documents. The undersigned certifies that all of the foregoing statements of the Vendor Certifications are true and correct. The undersigned warrants that all of the facts and information submitted by the undersigned in connection with this Bid are true and correct. Upon award and execution of this Contract by the College of DuPage Board of Trustees, the undersigned agrees that execution of this Bid shall stand as the undersigned's execution of this Contract.

BUSINESS NAME: _____

BUSINESS ADDRESS: _____

BUSINESS TELEPHONE: _____ FAX NUMBER: _____

EMAIL ADDRESS: _____

CELLULAR TELEPHONE NUMBER: _____

FEIN/SSN: _____

AUTHORIZED SIGNATURE: _____

PRINT NAME: _____

TITLE: _____

DATE: _____

Subscribed to and sworn before me this

_____ Day of _____, 2018. My commission expires: _____

X _____
Notary Public Signature Notary Seal

- * **Attach hereto a partnership resolution or other document authorizing the individual signing this Signature Page to so sign on behalf of the Partnership.**
- ** **If the LLC is not registered in the State of Illinois, a copy of a current Certificate of Good Standing from the state of incorporation must be submitted with this Signature Page.**
- *** **Attach either a certified copy of the by-laws, articles, resolution or other authorization demonstrating such persons to sign the Signature Page on behalf of the LLC.**
- *** **If the corporation is not registered in the State of Illinois, a copy of the Certificate of Good Standing from the state of incorporation must be submitted with this Signature Page.**
- **** **In the event that this Signature Page is signed by any persons other than the President and Secretary, attach either a certified copy of the corporate by-laws, a resolution or other authorization by the corporation, authorizing such persons to sign the Signature Page on behalf of the corporation.**

8.0 CONFLICT OF INTEREST DISCLOSURE AND NON-COLLUSION FORM ****Required****

IMPORTANT: All bidders are required to complete and sign this form. Completed form must be returned with bid no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

BID #: _____ DATE: _____

CONFLICT OF INTEREST DISCLOSURE

College of DuPage (COD) reserves the right, at its sole discretion, to reject any and all bids, revise the submission timeline as described in the solicitation, and to discontinue at any time the submission process as described in the solicitation. College of DuPage is requiring that any and all relationships with the College, its Administrators, Trustees, Committee members, COD Foundation Trustees, or any other Employee of the College be disclosed in writing as a part of any bid submitted. Contact with any employee of the College of DuPage during the pre-award period, except as noted in the solicitation, is strictly forbidden and is considered sufficient grounds for dismissal from the Bid/RFP process.

VENDOR CONFLICT OF INTEREST DISCLOSURE

Define the relationship with any College of DuPage Administrator, Trustee, Employee, COD Foundation Board member, Committee member, or their immediate family member, with which your company or any of its owners, officers, Trustees, employees, or their immediate family, does business or is likely to do business with, or for which there is an opportunity to influence a related College decision; include the name and relationship to any immediate family member.

☐

Vendor certifies that there is no known conflict of interest with any COD Administrator, Employee, Trustee, Committee member, or COD Foundation Trustee, or their immediate family.

Vendor Printed Name: _____ Title: _____

Signature: _____ Date: _____

NON-COLLUSION STATEMENT

The undersigned affirms that he/she is duly authorized to execute this contract and that this company, corporation, firm, partnership or individual has not prepared this bid in collusion with any other bidder, and that the contents of this bid as to prices, terms or conditions of said bid have not been Communicated by the undersigned nor by any employee or agent to any other person engaged in this type of business prior to the official opening of this bid.

Company Name: _____ Owners/Principal(s)
Name(s)/Title(s): _____
Vendor Address: _____ City, State, Zip: _____
Phone Number: _____ Fax Number: _____
Email Address: _____

Signature

Bidder/Company Official: _____ Date: _____

EXHIBIT A – PROJECT MANUAL SPECIFICATIONS

DOCUMENT 00 01 01
PROJECT TITLE PAGE

PROJECT MANUAL

College of DuPage MAC 153 Renovation

425 Fawell Blvd
Glen Ellyn, IL

FOR

COLLEGE OF DUPAGE

425 Fawell Blvd
Glen Ellyn, IL 60137

ARCHITECT

PERKINS+WILL

410 NORTH MICHIGAN AVENUE
SUITE 1600
CHICAGO, ILLINOIS 60611
312.755.0770

STRUCTURAL ENGINEER

CE Anderson & Associates
175 North Franklin Street
Suite 410
Chicago, IL 60606

MECHANICAL AND ELECTRICAL ENGINEER

Mechanical Services Associates Corp.
111 S. Virginia Street
Crystal Lake, Illinois 60014

DOCUMENT NO. 00 01 10
TABLE OF CONTENTS

The complete Project Manual for this project consists of this entire bound volume which is not to be separated for any reason. The Architect and Owner will not be responsible for any assumptions made by a Contractor or Subcontractor who does not receive a complete bound Project Manual containing all sections and documents listed in the Table of Contents.

The following listed documents comprise the Project Manual for the College of DuPage MAC 153 Renovation. Where numerical sequence of Sections or Divisions is interrupted, such interruptions are intentional.

PROJECT MANUAL

PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 01 01	Title Page
00 01 10	Table of Contents
00 21 00	Instruction to Bidders
00 41 13	Bid Form
00 63 72	Electronic File Transfer Agreement (Autocad Files)

SPECIFICATIONS GROUP

GENERAL REQUIREMENTS SUBGROUP

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00	Summary
01 22 00	Unit Prices
01 25 00	Substitution Procedures
01 26 00	Contract Modification Procedures
01 29 00	Payment Procedures
01 31 00	Project Management and Coordination
01 32 00	Construction Progress Documentation
01 33 00	Submittal Procedures
01 40 00	Quality Requirements
01 42 00	References
01 50 00	Temporary Facilities and Controls

01 60 00	Product Requirements
01 73 00	Execution Requirements
01 73 29	Cutting and Patching
01 74 19	Construction Waste Management and Disposal
01 77 00	Closeout Procedures
01 78 23	Operation and Maintenance Data
01 78 39	Project Record Documents
01 79 00	Demonstration and Training

FACILITY CONSTRUCTION SUBGROUP

DIVISION 02 - EXISTING CONDITIONS

02 41 19	Selective Demolition

DIVISION 03 - CONCRETE

Not Used

DIVISION 04 - MASONRY

04 20 00	Unit Masonry

DIVISION 05 - METALS

05 50 00	Metal Fabrications
05 73 12	Glazed Decorative Railing System

DIVISION 06 - WOOD, PLASTICS & COMPOSITES

06 10 00	Rough Carpentry

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 92 00	Joint Sealants

DIVISION 08 - OPENINGS

08 11 13	Hollow Metal Doors and Frames
08 31 00	Access Doors
08 71 00	Finish Door Hardware
08 80 00	Glazing

DIVISION 09 - FINISHES

09 22 16	Non-Structural Metal Framing
09 29 00	Gypsum Board
09 51 00	Acoustical Ceilings
09 65 13	Resilient Wall Base
09 68 13	Carpet Tile
09 83 00	Acoustic Finishes (Not Issued at This Time)
09 91 00	Painting

DIVISION 10 - SPECIALTIES

Not Used

DIVISION 11 - EQUIPMENT

Not Used

DIVISION 12 - FURNISHINGS

Not Used

DIVISION 13 - SPECIAL CONSTRUCTION

Not Used

DIVISION 14 - CONVEYING EQUIPMENT

Not Used

FACILITY SERVICES SUBGROUP

DIVISION 21 - FIRE SUPPRESSION

Not Used

DIVISION 22 - PLUMBING

Not Used

DIVISION 23 - HEATING, VENTILATING AND AIR-CONDITIONING

Not Used

DIVISION 25 - INTEGRATED AUTOMATION

Not Used

DIVISION 26 - ELECTRICAL

26 00 00	Electrical, General
26 05 00	Common Work Results for Electrical
26 05 19	Low-Voltage Electrical Power Conductors and Cables
26 05 23	Control-Voltage Electrical Power Cables
26 05 26	Grounding and Bonding for Electrical Systems
26 05 29	Hangers and Supports for Electrical Systems
26 05 33	Raceway and Boxes for Electrical Systems
26 05 53	Identification for Electrical Systems
26 27 26	Wiring Devices
26 28 16	Enclosed Switches and Circuit Breakers
26 51 00	Interior Lighting

DIVISION 27 - COMMUNICATIONS

27 05 00	Common Work Results for Communications
27 15 00	Communications Horizontal Cabling

DIVISION 28 - ELECTRONIC SAFETY & SECURITY

28 05 00	Common Work Results for Electronic Safety and Security
28 05 13	Conductors and Cables for Electronic Safety and Security
28 31 11	Digital, Addressable Fire-Alarm System

SITE AND INFRASTRUCTURE SUBGROUP

DIVISION 31 - EARTHWORK

Not Used

DIVISION 32 - EXTERIOR IMPROVEMENTS

Not Used

DIVISION 33 - UTILITIES

Not Used

END OF DOCUMENT

DOCUMENT NO. 00 21 00
INSTRUCTIONS TO BIDDERS

1.1 GENERAL

- A. Bids to be considered must be made in accordance with the instructions contained herein.
- B. The Project Manual includes a copy of the Bid Form. This is for the information and convenience of the bidder and is not to be removed, filled out or executed.
- C. Separate triplicate copies of the Bid Form are to be submitted as set forth hereinafter. Blank copies will be provided loose with the Project Manual for this purpose.
- D. Bidders are asked to return Documents obtained to the Owner under separate cover and not with their Bids.

1.2 PREPARATION

- A. Bids are to be submitted in triplicate on forms furnished.
- B. The wording of the Bid Form shall not be changed or supplemented except in accordance with the instructions.
- C. All blank spaces provided shall be filled in by typewriter or ink by the Bidder.
- D. Where both written numbers (words) and numerical figures are given, the written numbers (words) will govern in the event of conflict. Any erasures or corrections on the Bid Form must be initialed by the signed.
- E. Sign in longhand and type the name and position of the signer under signature. If the bidder is a partnership or co-partnership, each partner must sign; if a corporation, sign with the legal name of the corporation followed by the name of the state of incorporation, corporation seal and the legal signature of an officer authorized.

1.3 EXAMINATION OF SITE AND DOCUMENTS

- A. Each bidder by submitting his bid represents that he has read and understands the prepared Contract Documents and reference material and has compared them.
- B. Prior to submitting a proposal each Bidder shall examine and thoroughly familiarize himself with all existing conditions; including all applicable laws, ordinances, rules and regulations that may affect the work. Bidders shall visit the site, examine the grounds and all existing conditions, utilities and roads, and shall ascertain all conditions that might in any manner affect their work. The Drawings have been prepared on basis of surveys and observations of the site, and are intended to present an essentially accurate indication of physical conditions at the site. This,

however, shall not relieve Bidder of necessity for fully informing himself as to existing physical conditions. Ample time shall be permitted by the Owner to physically inspect the job site on the day of the pre-bid meeting. Each bidder by submitting his bid represents that he has visited the site, familiarized himself with the local conditions, compared the Contract Documents with any work in place and informed himself of all conditions, difficulties and restrictions attending the execution of the Work, including other work, if any, being performed.

- C. Failure to perform the above shall in no way entitle the bidder to additional consideration, compensation or relieve the bidder from any obligation with respect to his bid or to the Contract.

1.4 INTERPRETATION OF DOCUMENTS

- A. Each Bidder shall carefully examine all Contract Document and all addenda thereto, and shall thoroughly familiarize himself with detailed requirements thereof prior to submitting a proposal. Should a Bidder find discrepancies or ambiguities in, or omissions from Documents, or should he be in doubt as to their meaning, he shall at once, and in any event not later than 7 days prior to bid due-date, notify Architect who will send a written addendum to all Bidders. Oral conversations will not be binding. All inquiries shall be directed to the Architect's office, Perkins + Will, 410 North Michigan Avenue, Suite 1600, Chicago, Illinois, 60611, Attn: Michael Dolter, AIA, LEED AP BD+C, Senior Project Architect, Associate, 312.755.4666, Michael.Dolter@perkinswill.com
- B. Neither Owner nor Architect will be responsible for oral interpretations. Questions received less than 48 hours before the time set for receipt of bids cannot be answered.
- C. All addenda issued during the bidding period will be incorporated into the Contract Documents.
- D. Each bidder submitting a proposal must acknowledge receipt of addendum received in the blanks provided for this purpose in the Bid Form.

1.5 CONTRACTOR'S PROPOSED ALTERNATES

- A. If a bidder wishes to propose alternate products, methods or systems to those shown and specified, he may do so by indicating same in the space provided in the Bid Form. Refer also to Section 01 25 00 - SUBSTITUTION PROCEDURES of the Specifications.
- B. Should the Owner decide to accept any of such Contractor Proposed Alternates, the written contract or agreement will be so drawn as to include and define such accepted alternates, after which no substitutions or alternates will be permitted without formal Change Order.

1.6 BID SECURITY

- A. Bid security in the amount of 10 percent of the proposal shall be made payable, unconditionally, to the Owner. Security shall be certified check, cashier's check or bid bond issued by surety licensed to conduct business in the State of Illinois. All bid security will be returned as soon as practicable. If any bidder refuses to enter into a contract, or refuses to or is unable to furnish the required payment and performance bonds and insurances within 10 days after receipt of notice of acceptance of his bid, the Owner will retain his bid security as liquidated damages, but not as a penalty.

1.7 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

- A. Performance Bond and Labor and Material Payment Bond will be required warranting faithful performance of the Contract and payment of all Contract obligations. Bonds shall conform to requirements as set forth elsewhere in the Contract Documents. Costs for bonds shall be included in Base bid and amount of bonds shall be based upon the final contract amount. An irrevocable letter of credit may also be provided as an alternative to the required bond.

1.8 WITHDRAWAL AND MODIFICATIONS OF PROPOSALS

- A. Bids may be withdrawn by written or telegraphic request received from Bidders prior to the time fixed for opening.
- B. Telegraphic modifications of proposals will be considered if received prior to time set for receipt of bids. Telegraphic modifications shall not reveal amount of original or revised bid.
- C. No proposal may be withdrawn for a period of 60 days after opening, except by mutual consent of Owner and Bidder, and except that proposals may be withdrawn upon written or telegraphic request received from Bidder prior to time established for receipt of bids. Negligence on the part of Bidders in preparing proposals confers no right for withdrawal of proposals after opening.

1.9 RIGHTS RESERVED BY OTHERS

- A. Owner reserves right to reject any and all proposals when such rejection is in the interest of Owner, to reject proposals of a Bidder who has previously failed to perform properly, or complete on time, contracts of a similar nature, and to reject proposal of a Bidder who is not, in opinion of the Owner, in a position to satisfactorily perform the Contract. The Owner also reserves right to waive any informalities and technicalities in bidding. The Owner may also accept or reject any alternates that may be set forth, at the Owner's discretion. The Owner shall have the right to reject any and all bids not accompanied by a bid security or by other data required by the Bidding Documents or reject any bid which is incomplete or irregular.

1.10 BIDDER'S QUALIFICATIONS

- A. The Contractor bidding the project shall be actively engaged in work of the nature of the project described, and have adequate specialized work force and machines to do the work. Each bidder shall submit with his proposal a list of no less than four different construction projects that have been completed within the last three years and relate to the type of work specified herein as references.
- B. Under normal circumstances Contract will be awarded to lowest qualified Bidder, unless all bids are rejected. Owner reserves right, however, to award Contract in his best interest, and, therefore, reserves right to select a Bidder other than the lowest.

1.11 LICENSE OR ROYALTY FEES

- A. If the Project is designed to require or permit use of processes, articles, apparatus or equipment for which licenses, or royalty fees will be charged, fees shall be paid directly by Contractor to patentee, license or Owner or such processes, and fees shall be included in bid.

1.12 ESCALATION

- A. All prices quoted must represent the entire cost in accordance with the Contract Documents and no subsequent claim will be recognized for any increase in wage scales, material prices, cost indexes, or any other rates affecting the construction industry or this project.

1.13 TAXES AND FREIGHT RATES

- A. Bidder(s) shall not include in bid the Illinois sales tax on materials. The College of DuPage tax identification number will be provided to the successful bidder.
- B. Freight charges are to be included in bid.

1.14 WAGE RATES

- A. The Contractor is to comply with the requirements of Section 39S1 through 39S12, Chapter 48 of the Illinois Revised Statutes (1961) with reference to prevailing rates of wages he is to pay or cause to be paid not less than the prevailing rates of wages as found by the Owner or Department of Labor or as determined by the Court on Review to all laborers, workmen, and mechanics and is to employ only Illinois laborers on said project. Illinois Preference Act Action III.
- B. Comply with Federal Labor Standards, O.S.H.A. Regulations, and Equal Employment Requirements.

- C. The regulations of the above law are to be met by carrying out of the provisions of this Contract.

1.15 TIME FOR COMPLETION

- A. The Work is to commence at the time stated in the Contractor's Notice to Proceed or the Owner/Contractor Agreement and shall be completed on or before the times stated on the Bid Form.
- B. Such Notice to proceed may be given to the Contractor on any date after the Contractor has executed his Contract and furnished his Certificate of Insurance and Bonds to the Owner specified as required by the Owner.

1.16 SUBMISSION OF PROPOSALS

- A. Bids will be received at the time and place set forth in the Invitation To Bid. Bidders are responsible for delivery of their bids at or before the time and place so stated.
- B. Enclose bids and attachments in an opaque, sealed envelope addressed to the Owner. On the outside of the envelope shall appear the bidder's name and address. In the lower left hand corner, write or type the name of the project.

1.17 PUBLIC ACT 85-1295 (SB-2002)

- A. Public Act 85-1295 (BS 2002) which applies to this contract establishes criminal offenses relating to interference with public contracts and adds the following offenses to the Criminal Code of 1961 (Ill. Rev. Stat. 1987. ch. 38, new art. 33E):
 - 1. bid rigging (Sec. 33E-3)
 - 2. bid-rotating (Sec. 33E-4)
 - 3. acquisition or disclosure of
 - 4. bidding information by public official (Sec. 33E-5)
 - 5. interference with contract submission and award by public official (Sec. 33E-6)
 - 6. kickbacks (Sec. 33E-7)
 - 7. bribery of inspector employed by contractor (Sec. 33E-8)
 - 8. change orders (Sec. 33E-9)

1.18 PUBLIC ACT 86-799

- A. ILLINOIS DEPARTMENT OF LABOR PREVAILING FOR THE CITY OF Glen Ellyn. Prevailing Wages are to be included in the contracts and their advertised specifications to which any public body, as defined in Section 2 of the Prevailing Wage Act (Ill. Rev. Stat. 1987, Ch. 48, par. 39s-1), is a party, for the construction, reconstruction, maintenance and/or repair of public buildings or public works within

the State of Illinois which requires or involves the employment of laborers, workers, and mechanics, and owner/operators.

- B. Minimum wages, overtime rate and fringe benefits certified herein shall be paid. This scale of prevailing wages to be paid shall be posted by the contractor in prominent and easily accessible place at the site of work. This determination is the property of Illinois Department of Labor and shall not be altered without their consent in writing.
- C. The Contract is to comply with the Illinois prevailing wage law, as amended from time to time. Not less than the prevailing rate of wages as found by Owner or the Illinois Department of Labor shall be paid to all laborers, workers and mechanics performing work under the Contract. If the Department of Labor revises the prevailing rate of wages to be paid laborers, workers or mechanics under the Contract, Owner will notify Contractor and each Subcontractor of the change in the prevailing rate of wages; provided, however, regardless of whether Owner gives such notice, the revised prevailing rate of wages shall apply to the Contract and Contractor shall have the sole responsibility and duty to pay, and ensure that all Subcontractors pay, the revised prevailing rate of wages to each person to whom a revised rate is applicable. Revision of prevailing wages shall not result in an increase in the Contract sum or other cost to Owner. Contractor shall indemnify, defend and hold Owner harmless from any loss, including but not limited to Owner's attorneys fees, resulting from Contractor's failure to comply with this prevailing wage clause. All bonds applicable to the Contract shall include a provision as will guarantee the faithful performance of the obligation to pay the prevailing rate of wages."

END OF DOCUMENT

DOCUMENT NO. 00 41 13
BID FORM

A. BASE BID

The undersigned Bidder, having visited the site and carefully examined the conditions affecting the Work, the Instructions to Bidders, the Drawings and Project Manual, prepared by Perkins+ Will, hereby propose to furnish all labor, materials, tools, equipment, plant, transportation, machinery, supplies, insurance specified, taxes, and services, necessary to complete the construction of the interior renovation of Room 153 in the McAninch Arts Center at the College of DuPage in Glen Ellyn, IL in accordance with the Drawings and Project Manual, dated FEBRUARY 8, 2018, including Addenda Numbers _____, _____, _____, _____, issued prior to date of opening of Bids and hereby acknowledged, for the following considerations.

By submitting a Bid, the Bidder agrees that the Bidder has investigated and has satisfied itself as to the nature and location of the Work, the general and local conditions, and all matters that may in any way affect the Work or its performance, and that as a result of such examination and investigation, it fully understands the intent and purpose of the documents, conditions of bidding, and schedule requirements. Claims will not be allowed for additional compensation or extensions of time because of the Bidders' failure to follow the foregoing procedure and to become familiar with the Contract Documents and all conditions that might affect the Work.

BASE BID: For all Work complete, the sum of _____
_____ (\$ _____).

B. CONTRACTOR PROPOSED ALTERNATES

(Indicate by placing an "x" if a Contractor Proposed Alternate is attached.)

_____ Contractor Proposed Alternate is attached to this Bid Form which lists the Bidder's name, the Division(s) of Work affected, clearly describes the Alternate and states the change in price, indicating whether it is an addition or deduction from the Base Bid. More than one Alternate may be submitted.

C. UNIT PRICES

Unit Price No. 1: Rail-1 \$_____.00 per Lineal foot for Rail-1.

Unit Price No. 2: Rail-2 \$_____.00 per Lineal foot for Rail-2.

Unit Price No. 3: LED can fixture \$_____.00 per LED can fixture.

D. CHANGE ORDERS

On Change Orders, the allowance for overhead and profit combined, included in the total cost to the Owner, shall be based on the following schedule:

For the Contractor, for any Work performed by the Contractor's own forces, ____% of the cost.

For the Contractor, for Work performed by the Contractor's Subcontractor, ____% of the amount due the Subcontractor.

For each Subcontractor of Sub-subcontractor involved, for any Work performed by that Subcontractor's own forces, ____% of the cost.

For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, ____% of the amount due the Sub-subcontractor.

E. PRE-PURCHASED EQUIPMENT / ASSIGNED BIDS

The Owner has pre-purchased certain equipment that is to be installed by the Contractor. As identified on the drawings.

F. WORK UNDER SEPARATE CONTRACTS

As indicated in the Summary of Work, the Owner will separately contract certain parts of the Work.

G. LIST OF PROPOSED PRINCIPAL SUBCONTRACTORS

The undersigned Bidder proposes to employ the following subcontractors, subject to acceptance by the Owner and Architect:

<u>Type of Work</u>	<u>Subcontractor Name and Address</u>

Concrete

Masonry

Metal fabrications

Architectural woodwork

Drywall

Plumbing

HVAC

Electrical

H. SUBCONTRACTOR QUALIFICATION DATA

Owner reserves the right to request a complete list of subcontractors, to request qualification data for subcontractors, and to reject subcontractors.

I. LIST OF WORK NOT SUBCONTRACTED

The undersigned Bidder proposes to perform the following portions of the Work directly with its own forces.

J. CONTRACT PRICE BREAKDOWN

The undersigned Bidder has included in the Base Bid the following amounts for the portions of the Work listed below, as indicated on the Drawings and as described in the applicable sections of the Specifications.

General Conditions	\$ _____.
Masonry	\$ _____.
Light gage steel framing	\$ _____.
Metal roofing	\$ _____.
Concrete	\$ _____.
Steel	\$ _____.
Architectural Woodwork	\$ _____.
Drywall	\$ _____.
Acoustical Ceilings	\$ _____.
Plumbing	\$ _____.
HVAC	\$ _____.
Electrical	\$ _____.

The undersigned Bidder agrees, prior to award of the Contract and upon request of the Owner or Architect, to submit a complete "Contract Price Breakdown" showing the amounts allocated to the various trades, subcontractors' and Contractor's own Work, including costs related to the General Conditions, aggregating the total amount of the Contract Sum.

K. BID SECURITY

Bid security in the following form and amount is attached hereto in accordance with requirements of the Instructions to Bidders:

1. Bid Bond: \$ _____.
2. Certified Check: \$ _____.

L. TIME OF COMPLETION

The undersigned Bidder agrees, if awarded the Contract, to commence the Work within 10 consecutive calendar days after date of issuance of written Notice to Proceed, and to complete the Work within _____ consecutive calendar days from such issuance date.

M. EQUAL EMPLOYMENT OPPORTUNITY

The undersigned Bidder agrees to comply in the Agreement, with the provisions of the Executive Order 11246 as amended by the President of the United States on Equal Employment Opportunity and the rules and regulations issued pursuant thereto unless exempted.

N. TAX EXEMPT STATUS

The undersigned Bidder acknowledges that the Owner will issue to the successful Bidder a Tax Exempt Certificate and the Bidder affirms that no taxes for which payment is exempted thereby have been included in the pricing.

O. ACCEPTANCE OF BID

The undersigned Bidder agrees that the Contract Sum shall be the sum of the Base Bid and the selected Alternates.

The undersigned Bidder agrees that this Bid may be held by the Owner for a period not exceeding 60 days from the date stated for opening of bids.

If written notice of the acceptance of this bid is mailed or delivered to the undersigned Bidder within the time noted above after the date of opening of Bids, or at any time thereafter before this Bid is withdrawn, the undersigned Bidder agrees to execute and deliver a construction contract in the form prescribed by the Owner in accordance with the Bid as accepted, and to furnish a Performance Bond and a Labor and Material Payment Bond if required, with such surety or sureties as the Owner may approve, all within 10 days unless a longer period is allowed from date of request for the Bonds.

The undersigned Bidder understands and agrees that the Owner reserves the right to award the Contract in its best interests, to reject any or all bids, to waive any informalities in bidding, and to hold the bids for the period noted above.

P. SIGNATURE OF BIDDER

Bidder _____
(Firm Name)

By _____

Title _____

Address _____

Dated _____, 2018.

IF SUBMITTED BY AN INDIVIDUAL, PARTNERSHIP OR NON-INCORPORATED ORGANIZATION:

Names and Addresses of Members of Firm:

IF SUBMITTED BY A CORPORATION:

State of Incorporation _____

Names and Business Addresses of Officers:

President _____

Address _____

Secretary _____

Address _____

Treasurer _____

Address _____

MAC ROOM 153 RENOVATION
COLLEGE OF DUPAGE
Issue for Bid and Permit

PERKINS+WILL
024303.007
March 6, 2018

AFFIX CORPORATE SEAL HERE

NOTE: This proposal must bear the written signature of the Bidder. If the Bidder is a partnership, the proposal must be signed by a partner. If the Bidder is a corporation, the proposal must be signed by a duly authorized officer or agent of such corporation.

END OF BID FORM

DOCUMENT NO. 00 63 72
ELECTRONIC FILE TRANSFER AGREEMENT - AUTOCAD
(Architect and Contractor/Subcontractor - Autocad® Files)

Name: _____
(person requesting electronic files)
Company
:
Address:
State: _____ Zip
Code:
Tel No: _____ Fax No:
E-mail:
P+W Project MAC ROOM 153 RENOVATION, COLLEGE OF DUPAGE
Name:
P+W Project No: 024303.007
Description of
Data:

The undersigned Contractor / Subcontractor hereby requests Perkins+Will to provide drawing files in an electronic file format as described above.

The undersigned acknowledges that the true and accurate record of the design is the most recent issued printed hard copy of the design, not the requested electronic data. The undersigned agrees to hold harmless and indemnify Perkins+Will from and against all claims, liabilities, losses, damages and costs, including but not limited to attorney's fees, arising out of or in any way connected with the modification, misinterpretation, misuse or reuse by others of the electronic information provided by Perkins+Will.

The drawings files are for use on the above-mentioned project only and shall not be copied or distributed. The use of these drawing files does not relieve the Contractor / Subcontractor of any of the requirements or responsibilities for checking and coordination of the work as described in the Contract Documents. When modified for project-related services, the Contractor/Subcontractor shall add its company name, address, telephone number and contact information to the title block of each sheet, and all references to the Architect and its consultants shall be removed from the drawing.

Upon return receipt of this signed agreement and a certified check made payable to Perkins + Will, the drawing files will be transmitted to the designated Contractor / Subcontractor via courier, electronic mail or posted on the Perkins + Will file transfer protocol site or project web site.

ACKNOWLEDGED AND ACCEPTED:

PERKINS+WILL

MAC ROOM 153 RENOVATION
COLLEGE OF DUPAGE
ISSUED FOR BID

PERKINS+WILL
024303.007
FEBRUARY 8, 2018

Company

Name

Signature of Recipient

Title

Title

Date

Date

END OF 00 63 73

**SECTION 01 10 00
SUMMARY**

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of the Contract.
3. Work restrictions.
4. Use of premises.
5. Occupancy requirements.
6. Pre-purchase products.
7. Owner-furnished items.
8. Permits and fees.

B. Related Sections:

1. Temporary Facilities and Controls: Section 01 50 00

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: MAC ROOM 153 RENOVATION, COLLEGE OF DUPAGE

1. Project Location: Glen Ellyn, IL

B. Owner: College of DuPage

1. Owner's Representative: Don Inman, Senior Project Manager, 630.942.4063.

C. Architects:

1. Architect: Perkins+Will, 410 North Michigan Avenue, Suite 1600, Chicago, Illinois, 60611, Attn: Michael Dolter, AIA, LEED AP BD+C, Senior Project Architect, Associate, 312.755.4666, Michael.Dolter@perkinswill.com

D. The Work of this Contract: The Work includes but is not necessarily limited to the following:

1. Limited demolition in existing building.
2. New concrete work.
3. New masonry work.
4. New glass railing system.
5. New room finishes.
6. Mounting of Owner's equipment.

1.3 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract.

1.4 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
 - 1. Installation and wiring of A/V and technology systems.

1.5 WORK RESTRICTIONS

- A. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two weeks in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.
- B. Sequence for Execution: Certain portions of the Work are indicated on the Drawings to be performed in advance of work. The Contractor is advised to schedule and perform those portions of the Work in accordance with the indicated sequence.

1.6 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to Contract Limit Lines, Property Lines.
 - 2. Owner Occupancy: Allow for Owner occupancy of site and use by the public.
 - 3. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.7 OCCUPANCY REQUIREMENTS

- A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.
 - 1. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 2. Before Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will provide, operate, and maintain mechanical and electrical systems serving occupied portions of building.
 - 3. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.8 OWNER-FURNISHED ITEMS

- A. Owner will furnish projector mounts and projector screens. The Work includes providing building systems connections for Owner's equipment including but not limited to and plumbing, mechanical, and electrical connections.
 - 1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
 - 2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
 - 3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
 - 4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
 - 5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
 - 6. Owner will furnish Contractor the earliest possible delivery date for Owner furnished products. Using Owner furnished earliest possible delivery dates, Contractor is to designate delivery dates of Owner furnished items in Contractor's Construction Schedule.
 - 7. Contractor is to review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
 - 8. Contractor is responsible for receiving, unloading, and handling Owner furnished items at Project site.
 - 9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
 - 10. If Owner furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.

1.9 PERMITS AND FEES

- A. The Contractor is to apply and pay for building and other permits, including but not limited to; building, foundation, utility, street, barricade, environmental and

governmental permits and inspection fees. The Architect will assist in the application for Building permits.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

**SECTION 01 22 00
UNIT PRICES**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Contract Modification Procedures: Section 01 26 00.
 - 2. Quality Requirements: Section 01 40 00.

1.2 DEFINITIONS:

- A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Rail-1.

1. Description: Refer to Section 05 73 12 - Glazed Decorative Railing System.
2. Unit of Measurement: Lineal foot for Rail-1.

B. Unit Price No. 2: Rail-2.

1. Description: Refer to Section 05 73 12 - Glazed Decorative Railing System.
2. Unit of Measurement: Lineal foot for Rail-2.

C. Unit Price No. 3: LED can fixture.

1. Description: Refer to Section 26 51 00 - Interior Lighting.
2. Unit of Measurement: one LED can fixture.

END OF SECTION

**SECTION 01 25 00
SUBSTITUTION PROCEDURES**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Product Requirements: Section 01 60 00.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor (Construction Manager) of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than **15** days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

REQUEST FOR SUBSTITUTION

TO: Perkins+Will
410 North Michigan Avenue
Suite 1600
Chicago, Illinois 60611

FROM:

Name of manufacturer

Street address

City and state

Phone number and name of person to contact

PROJECT: MAC ROOM 153 RENOVATION, COLLEGE OF DUPAGE
Glen Ellyn, IL
Architect's Job Number: 024303.007

1. Specification Section and Paragraph numbers of product specified
_____.
2. Proposed Substitute
 - A. Name and Model No.:
 - B. Description:
 - C. Attach applicable Submittals as required by the referenced Specification Section, i.e. Product Data, Materials List, Shop Drawings, Samples, Design Data, Test Reports, and Certificates. Attach Shop Drawings to the effect of the proposed substitution on adjacent components of the Work.
 - D. Insert Numbers of applicable reference standards:
 - E. Attach a color chart, if applicable.
 - F. Attach installation instructions.
3. Manufacturer's Reputation: Attach the following:
 - A. Evidence of reputation for prompt delivery.
 - B. Evidence of reputation for efficiency in servicing products.
4. Comparison: Attach an itemized comparison of the proposed substitution with product specified. Significant qualities may include elements such as size, weight, durability, performance, and visual effects.
5. Changes in Work: Attach data relating to changes required in other work to permit use of proposed substitution and changes required in construction schedule and overall contract time. Coordinate changes or modifications needed to other parts of

SUBSTITUTION PROCEDURES

the Work and to construction performed by the Owner and separate Contractors that will be necessary to accommodate the proposed substitution.

6. Cost Data: Attach accurate cost data on proposed substitution in comparison with product specified.
7. Previous Installation: Provide the following information on similar projects on which proposed substitution was used, list projects in the locale of the project primarily and then in other areas that best represent its application on this project:

<u>Name and Address of Project</u>	<u>Date of Installation</u>	<u>Name, Address, and Phone # of Architect</u>

A.

B.

C.

D.

8. In making a request for substitution, the Manufacturer represents that:
 - A. He has examined the Drawings and Specifications and has determined that, to the best of his knowledge, the proposed substitution is appropriate for the use intended in the Drawings and Specifications.
 - B. He will provide the same or better warranty for substitution as for product or method specified.
 - C. The product is equal or better in quality and serviceability to the specified item.
9. In making a request for substitution, the Manufacturer represents that:
 - A. He has examined the Drawings and Specifications and has determined that, to the best of his knowledge, the proposed substitution is appropriate for the use intended in the Drawings and Specifications.
 - B. He will provide the same or better warranty for substitution as for product or method specified.
 - C. The product is equal or better in quality and serviceability to the specified item.

Name of Manufacturer and signature of Manufacturer's Rep.

Date

Name of Contractor and signature

Date

END OF SECTION

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections:
 - 1. Product Requirements: Section 01 60 00.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.3 PROPOSAL REQUESTS

- A. Owner Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- B. Contractor Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 6. Comply with requirements in Section 01 16 00 - Product Requirements if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use Architect's Form for Proposal Requests.

1.4 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor.

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates procedures to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

**SECTION 01 29 00
PAYMENT PROCEDURES**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections:
 - 1. Substitution Procedures: Section 01 25 00.
 - 2. Construction Progress Documentation: Section 01 32 00.

1.2 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Contractor's Construction Schedule.
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than 7 days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.

- e. Date of submittal.
- 2. Submit draft of AIA Document G703 Continuation Sheets.
- 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value: Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
- 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual Table of Contents. Provide several line items for principal subcontract amounts, where appropriate.
- 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
- 7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
- 9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- 10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Progress payments shall be submitted to Architect by the first of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- E. Payment Application Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included at end of this Section.
- F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- G. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- I. Preparation and Submittal of Draft (Pencil Copy):

1. Prepare draft copy of application for payment, arrange and coordinate a Contractor, Owner and Architect meeting to review the draft copy prior to submittal of the applications for payment.
 2. Provide 4 draft (pencil) copies within 2 business days before the day of the review meeting with Owner, Architect and Owner's Lender, if any. Submit substantiating data with each application copy: subcontractor applications for payment, copies of invoices, storage receipts, and data required by Owner and Owner's Lender.
 3. After review of pencil draft copy by Owner, Architect and Contractor, prepare application, use agreed upon data on Owner/Architect reviewed Schedule of Values and Owner/Architect reviewed pencil draft.
 4. Include specified information required for application preparation.
- J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. Copies of building permits.
 9. Initial progress report.
 10. Report of preconstruction conference.
 11. Certificates of insurance and insurance policies.
 12. Performance and payment bonds.
 13. Data needed to acquire Owner's insurance.
- K. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."

7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures
 - 2. Coordination drawings
 - 3. Administrative and supervisory personnel.
 - 4. Project meetings.
 - 5. Requests for Interpretation (RFIs).
- B. Each Contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
- C. Related Sections:
 - 1. Construction Progress Documentation: Section 01 32 00.
 - 2. Execution Requirements: Section 01 73 00.
 - 3. Closeout Procedures: section 01 77 00.

1.2 DEFINITIONS

- A. RFI: Request from Contractor seeking information or clarification of the Contract Documents.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled or required for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Startup and adjustment of systems.
 8. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.4 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.

- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect will so inform the Contractor, who shall make changes as directed and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Section 01 33 00 - Submittal Procedures.

- C. Refer to individual Sections for additional Coordination Drawing requirements for Work in those Sections.

1.5 KEY PERSONNEL

- A. Key Personnel Names: Within 10 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including office and cellular telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current.

- B. Administrative And Supervisory Personnel: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to invited attendees.

3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 10 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Critical work sequencing and long-lead items.
 - c. Designation of key personnel and their duties.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for RFIs.
 - f. Procedures for testing and inspecting.
 - g. Procedures for processing Applications for Payment.
 - h. Distribution of the Contract Documents.
 - i. Submittal procedures.
 - j. Preparation of Record Documents.
 - k. Use of the premises
 - l. Work restrictions.
 - m. Owner's occupancy requirements.
 - n. Responsibility for temporary facilities and controls.
 - o. Construction waste management and recycling.
 - p. Parking availability.
 - q. Office, work, and storage areas.
 - r. Equipment deliveries and priorities.
 - s. First aid.
 - t. Security.
 - u. Progress cleaning.
 - v. Working hours.
 3. Minutes: Record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Manufacturer's written recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.

- p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Installation procedures.
 - u. Coordination with other work.
 - v. Required performance results.
 - w. Protection of adjacent work.
 - x. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings:

- 1. Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests. Attendees will be Owner, Architect and Contractor.
- 2. Conduct separate coordination meetings with subcontractors. Owner and Architect will not be present at such meetings.
- 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Off-site fabrication.
 - 5) Access.
 - 6) Temporary facilities and controls.
 - 7) Quality and work standards.
 - 8) Status of correction of deficient items.
 - 9) Field observations.

- 10) RFIs.
 - 11) Status of proposal requests.
 - 12) Pending changes.
 - 13) Status of Change Orders.
 - 14) Pending claims and disputes.
 - 15) Documentation of information for payment requests.
 4. Minutes: Record the meeting minutes.
 5. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
 - E. Project Closeout Conference: schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for demonstration and training.
 - f. Preparation of Contractor's punch list.
 - g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - h. Submittal procedures.
 - i. Owner's partial occupancy requirements.
 - j. Installation of Owner's furniture, fixtures, and equipment.
 - k. Responsibility for removing temporary facilities and controls.
 4. Minutes: record and distribute meeting minutes.
- 1.7 REQUESTS FOR INTERPRETATION (RFIs)
- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. RFI Forms:
1. CSI form 13.2 or AIA Document G716.
 2. Software-generated form with substantially the same content as indicated above, acceptable to Architect, Owner and Construction Manager.
- D. Hard Copy RFIs: Identify each page of attachments with the RFI number and sequential page number.
- E. Software Generated RFIs: Software generated form with substantially the same content as indicated above.
1. Provide attachments of electronic files in Adobe Acrobat PDF format.
- F. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following work day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.

- e. Requests for information of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
- 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within ten days of receipt of the RFI response.
- G. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven working days if Contractor disagrees with response.
- H. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly with not less than the following:
- 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary (Start-up) Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Daily construction reports.
 - 4. Material location reports.
 - 5. Field condition reports.
 - 6. Special reports.
- B. Related Sections:
 - 1. Payment Procedures: Section 01 29 00.
 - 2. Project Management and Coordination: Section 01 31 00.
 - 3. Submittal Procedures: Section 01 33 00.
 - 4. Quality Requirements: Section 01 40 00.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for activities must equal the total Contract Sum, unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. PDF electronic file.
 - 2. Two paper copies.
- B. Start-up construction schedule.
 - 1. Approval of cost-loaded start-up construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Start-up Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.

- 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work or the Notice to Proceed until most recent Application for Payment.
- F. Daily Construction Reports: Submit at weekly intervals.
- G. Material Location Reports: Submit at monthly intervals.
- H. Field Condition Reports: Submit at time of discovery of differing conditions.
- I. Special Reports: Submit at time of unusual event.
- J. Qualification Data: For scheduling consultant.

1.4 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 - Project Management and Coordination. Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, interim milestones and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review time required for review of submittals and resubmittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review time required for completion and startup procedures.
 - 9. Review and finalize list of construction activities to be included in schedule.
 - 10. Review submittal requirements and procedures.
 - 11. Review procedures for updating schedule.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work or the Notice to Proceed, to date of Substantial Completion and final completion.
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 - Submittal Procedures in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include not less than 15 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 30 days for punch list and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.

5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
 1. Refer to Section 01 29 00 - Payment Procedures for cost reporting and payment procedures.

- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered RFIs.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 PREMILIMINARY (START-UP) CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit start-up horizontal bar-chart-type construction schedule within seven days of date established for commencement of the Work or the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first sixty days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's construction schedule within thirty days of date established for commencement of the Work or the Notice to Proceed. Base schedule on the start-up construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in ten percent increments within time bar.

2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (refer to special reports).
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.
 14. Change Orders received and implemented.
 15. Construction Change Directives received and implemented.
 16. Services connected and disconnected.
 17. Equipment or system tests and startups.
 18. Partial completions and occupancies.
 19. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 - 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 - 2. Meetings: Scheduling consultant shall attend meetings related to Project progress, alleged delays, and time impact.
- B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 1 week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections:
 - 1. Electronic File Transfer Agreement - Autocad: Document 00 63 72.
 - 2. Payment Procedures: Section 01 29 00.
 - 3. Project Management and Coordination: Section 01 31 00.
 - 4. Construction Progress Documentation: Section 01 32 00.
 - 5. Quality Requirements: Section 01 40 00.
 - 6. Closeout Procedures: Section 01 77 00.
 - 7. Project Record Documents: Section 01 78 39.
 - 8. Divisions 02 through 49 Sections for specific requirements for submittals in those Sections.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 CONTRACTOR'S USE OF ARCHITECT'S ELECTRONIC CAD FILES

- A. Electronic copies of CAD Drawings of the Contract Drawings can be provided by Architect for Contractor's use in preparing submittals.
- B. At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
 - 1. Complete and submit Document 00 63 72 - Electronic File Transfer Agreement – Autocad (Architect and Contractor/Subcontractor) with original signatures by party making request.
 - 2. Make payment required by the Electronic File Transfer Agreement (Architect and Contractor/Subcontractor) to Architect.
 - 3. CAD files will be sent electronically via e-mail.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action, Informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.

4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Identification – Paper: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Number each submittal using the Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- E. Identification – Electronic: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. Name each file using a project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., 024303.007-06 10 00.01). Name each resubmittal using an alphabetic suffix after another decimal point (e.g., P+W Project Number-06 10 00.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.

- c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Related physical samples submitted directly.
 - m. Other necessary identification.
5. Include the following information as keywords in the electronic file metadata:
- a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by the Architect.
- G. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- H. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- I. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.
1. Transmittal Form: Provide locations on form for the following information:
- a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Transmittal number, numbered consecutively.
 - k. Submittal and transmittal distribution record.
 - l. Remarks.
 - m. Signature of transmitter.
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the

Contract Documents, including minor variations and limitations. Include same label information as related submittal.

- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked "No Exceptions or Exceptions As Noted "
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals with mark by Architect indicating "No Exceptions" or "Exceptions As Noted".

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Procedures: Prepare and submit Submittals required by individual Specification Sections.
 - 1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 3. Action Submittals: Submit 3 paper copies of each submittal, unless otherwise indicated. Architect will return 2 copies.
 - 4. Informational Submittals: Submit 2 paper copies of each submittal, unless otherwise indicated. Architect will not return copies unless it does not comply with specified requirements.
 - 5. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 - Closeout Procedures.
 - 6. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Submit certificates and certifications signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 7. Test and Inspection Reports Submittals: Comply with requirements specified in Section 01 40 00 - Quality Requirements.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data as PDF electronic files.
 7. Number of Copies: Submit 3 copies of Product Data, unless otherwise indicated. Architect will return 2 copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal is based on Architect's electronic CAD drawings that is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Submit Shop Drawings in the following format
 - a. PDF electronic file.
 - b. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 - c. Number of Copies: Submit 3 opaque (bond) copies of each submittal. Architect will return 2 copies. Mark up and retain 1 returned copy as a Project Record Drawing.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit 3 full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return 2 sets with options selected.
 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit 3 sets of Samples. Architect will return 2 Sample sets.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least 4 sets of paired units that show approximate limits of variations.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
 2. Number and name of room or space.
 3. Location within room or space.
 4. Submit product schedule in the following format:
 - a. PDF electronic file.

- b. Number of Copies: Submit 3 copies of product schedule or list, unless otherwise indicated. Architect will return 2 copies.
 - c. Mark up and retain one returned copy as a Project Record Document.
- F. Submittals Schedule: Comply with requirements specified in Section 01 32 00 - Construction Progress Documentation.
- G. Application for Payment: Comply with requirements specified in Section 01 29 00 - Payment Procedures.
- H. Schedule of Values: Comply with requirements specified in Section 01 29 00 - Payment Procedures.
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
 - 4. Submit product schedule in the following format:
 - a. PDF electronic file.
 - b. Number of Copies: Submit 3 copies of subcontractor list, unless otherwise indicated. Architect will return 2 copies.
 - c. Mark up and retain 1 returned copy as a Project Record Document.
- J. Coordination Drawings: Comply with requirements specified in Section 01 31 00 - Project Management and Coordination.
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

- P. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- T. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 40 00 - Quality Requirements.
- U. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Section 01 78 23 - Operation and Maintenance Data.
- Y. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit four copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Section 01 77 00 - Closeout Procedures.
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. A – NO EXCEPTIONS: When the Architect marks a submittal "No Exceptions," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

2. B - EXCEPTIONS AS NOTED: When the Architect marks a submittal "Exceptions As Noted," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
 3. C – REVISE AND RESUBMIT: When the Architect marks a submittal "Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
 - a. Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.
 4. D - REJECTED: When the Architect marks a submittal "Rejected," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. The submittal does not conform to the design concept or meet requirements of the Contract Documents.
 - a. Do not use, or allow others to use, submittals marked "Rejected" at the Project Site or elsewhere where Work is in progress.
 5. E – FOR INFORMATION ONLY: Where a submittal is marked "For Information Only", the Architect will not return the submittal unless it does not comply with specified requirements.
 6. F – NOT REVIEWED: Submittals not required by the Contract Documents will be marked "Not Reviewed", the Architect will return the submittal without action.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with specified requirements. When returned the Architect will forward each submittal to appropriate party with comments.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality assurance and control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections:
 - 1. Construction Progress Documentation: Section 01 32 00.
 - 2. Cutting and Patching: Section 01 73 29.
 - 3. Divisions 02 through 41 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

- A. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the completed Work will be judged.
- D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

- E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- G. Source Quality Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of 5 previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality control service.
- C. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29CFR1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.

- b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups when directed, unless otherwise indicated.
- K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 03 through 33.

1.6 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.

3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.

- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.7 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION

SECTION 01 42 00
REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. Approved: When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. Directed: A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. Regulations: Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. Furnish: Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. Install: Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. Provide: Furnish and install, complete and ready for the intended use.
- I. Project Site: Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- J. General Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions (if any) and other Division 01 General Requirement Sections, apply to all sections of the work.
 - 2. The provisions or requirements of Division - 1 Sections apply to entire work of the Contract and where so indicated, to other elements which are included in the project.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated and except when to comply with standards having different revision dates as referenced in the indicated codes.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA)	(800) 872-2253
	Architectural Barriers Act (ABA)	
	Accessibility Guidelines for Buildings and Facilities	(202) 272-0080
	Available from Access Board www.access-board.gov	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	(215) 697-6257
	Available from Department of Defense Single Stock Point www.dodssp.daps.mil	
MILSPEC	Military Specification and Standards	(215) 697-6257
	Available from Department of Defense Single Stock Point www.dodssp.daps.mil	

1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute	(202) 452-7100

www.steel.org

ALCA	Associated Landscape Contractors of America www.alca.org	(800) 395-2522 (703) 736-9666
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (703) 733-0600
AWPA	American Wood-Preservers' Association www.awpa.com	(334) 874-9800
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association	(212) 297-2122

www.buildershardware.com

CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSI	Cast Stone Institute www.caststone.org	(770) 972-3011
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
FSC	Forest Stewardship Council www.fsc.org	52 951 5146905
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GS	Green Seal www.greenseal.org	(202) 872-6400
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance (The) www.igmaonline.org	(613) 233-1510

ISSFA	International Solid Surface Fabricators Association www.issfa.net	(702) 567-8150
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
MFMA	Metal Framing Manufacturers Association www.metalframingmfg.org	(312) 644-6610
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(281) 228-6200
NAIMA	North American Insulation Manufacturers Association (The) www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(703) 442-4890

NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NTMA	National Terrazzo & Mosaic Association, Inc. www.ntma.com	(800) 323-9736 (540) 751-0930
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting & Decorating Contractors of America www.pdca.com	(800) 332-7322 (314) 514-7322
PTI	Post-Tensioning Institute www.post-tensioning.org	(602) 870-7540
RCSC	Research Council on Structural Connections www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	Resilient Floor Covering Institute www.rfci.com	(301) 340-8580
SAE	SAE International www.sae.org	(724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 462-1930
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEI	Structural Engineering Institute www.seinstitute.com	(800) 548-2723 (703) 295-6195
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(703) 683-2075
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMACNA	Sheet Metal and Air Conditioning Contractors'	(703) 803-2980

	National Association www.smacna.org	
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
UL	Underwriters Laboratories Inc. www.ul.com	(800) 285-4476 (847) 272-8800
USGBC	U.S. Green Building Council www.usgbc.org	(202) 828-7422
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (Now WCSC)	
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ICBO	International Conference of Building Officials (See ICC)	
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)	
ICC	International Code Council www.iccsafe.org	(703) 931-4533

- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-6816
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(202) 366-4000
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
	(See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
USPS	Postal Service www.usps.com	(202) 268-2000

- E. Project Referenced Codes And Compliance Acts: Project Work is to conform with, but is not necessarily be limited to the following codes and regulations:

1. ICC 2009 INTERNATIONAL BUILDING CODE
2. ICC 2009 INTERNATIONAL RESIDENTIAL CODE
3. ICC 2009 INTERNATIONAL FIRE CODE
4. ICC 2009 INTERNATIONAL MECHANICAL CODE
5. ICC 2009 INTERNATIONAL PROPERTY MAINTENANCE CODE
6. ICC 2009 INTERNATIONAL FUEL GAS CODE
7. IECC 2015
8. NEC 2011 NATIONAL ELECTRICAL CODE
9. DUPAGE COUNTY COUNTYWIDE STORMWATER FLOODPLAIN ORDINANCE, 2013
10. ILLINOIS STATE PLUMBING CODE, 2004 (SUPERCEDED BY ILLINOIS STATE PLUMBING CODE, 2014)
11. ILLINOIS, NFPA 101 LIFE SAFETY CODE, 2009

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

**SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
 - 1. Submittal Procedures: Section 01 33 00.
 - 2. Execution Requirements: Section 01 73 00.
 - 3. Divisions 03 through 32 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.2 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect
 - 1. Openings: closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities are to be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, dumpster or waste disposal area, staging areas, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain Link Fencing: Minimum 2 inch, 0.148inch thick, galvanized steel, chain link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2-3/8 inch OD line posts and 2-7/8 inch OD corner and pull posts, with 1-5/8 inch OD top rails.
- B. Lumber and Plywood: Comply with requirements in Section 06 10 00 - Rough Carpentry.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 01 10 00 - Summary.

- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITIES - EXISTING BUILDINGS

- A. Water Service: Water service will be available from existing sources at no charge to the contractor.
- B. Sanitary Facilities: The Owner will designate existing toilets, wash facilities, and drinking water for use of construction personnel.
- C. Heating: The existing heating system will be utilized for temporary heating required by construction activities.
- D. Ventilation: The existing HVAC system will be utilized for temporary ventilation.
- E. Electric Power Service: Electric power service will be available from existing sources at no charge to the contractor.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Electric power to operate temporary lighting will be available from existing sources at no charge to the contractor.
- G. Telephone Service: Provide mobile telephone use at own cost.
- H. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common use facilities.
 1. Provide wireless internet WI-FI connection in primary field office for use of contractors, owner and architect.
 2. Provide DSL in primary field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion

will be permitted to use permanent facilities, under conditions acceptable to Owner.

- B. Building Permit Sign: Provide and place at the front of the Project, in a location acceptable to the Office of the "Inspector of Buildings," a sign at least 12 inches x 12 inches in size, with 1/8 inch thick clear polycarbonate plastic cover to post the building permit and address of the premises as given on the permit. Such sign may be transferred to other approved locations as the work progresses until the project is completed.
- C. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Section 01 73 00 - Execution Requirements for progress cleaning requirements.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- B. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, other construction operations, and similar activities.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- C. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire retardant plywood on construction operations side.
 - 2. Insulate partitions to provide noise protection to occupied areas.
 - 3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
 - 4. Protect air handling equipment.
 - 5. Weather strip openings.
- D. Temporary Fire Protection: Install and maintain temporary fire protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Operate Project identification sign lighting daily.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 - Closeout Procedures.

MAC ROOM 153 RENOVATION
COLLEGE OF DUPAGE
Issue for Bid and Permit

PERKINS+WILL
024303.007
March 6, 2018

END OF SECTION

**SECTION 01 60 00
PRODUCT REQUIREMENTS**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Sections include the following:
 - 1. Substitution Procedures: Section 01 25 00.
 - 2. References: Section 01 42 00.
 - 3. Closeout Procedures: Section 01 77 00.
 - 4. Divisions 03 through 33 Sections for specific warranty requirements for products and installations specified to be warranted.

1.2 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 INFORMATIONAL SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 3. Initial Submittal: Within fifteen days after date of commencement of the Work, submit three copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 4. Completed List: Within thirty days after date of commencement of the Work, submit three copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 5. Architect's Action: Architect will respond in writing to Contractor within five days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 - Submittal Procedures. Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Store cementitious products and materials on elevated platforms.
 - 5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather protection requirements for storage.
 - 7. Protect stored products from damage and liquids from freezing.
 - 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
 - 3. Refer to Divisions 03 through 32 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 - 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures:
 - 1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
 - 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
 - 3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 - 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

5. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system.
6. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
7. Where products are specified by name and accompanied by the term "or equal", "or approved equal", or "or other as approved by Architect, comply with provisions of Section 01 25 00 Substitution Procedures. The Architect is the sole determiner of what is equal, equivalent or acceptable for such products and substitutions.
8. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Section 01 25 00 Substitution Procedures for proposal of product.
9. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 2. Evidence that proposed product provides specified warranty.

3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 4. Samples, if requested.
- B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION

**SECTION 01 73 00
EXECUTION REQUIREMENTS**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Sections include the following:
 - 1. Project Management and Coordination: Section 01 31 00.
 - 2. Submittal Procedures: Section 01 33 00.
 - 3. Cutting and Patching: Section 01 73 29.
 - 4. Closeout Procedures: Section 01 77 00.

1.2 INFORMATIONAL SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of utilities and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for

installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Make the log available for reference by Architect

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom clean or vacuum the entire work area, as appropriate.
 - C. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
 - D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
 - E. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 - F. Waste Disposal: Burying or burning waste materials on project site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
 - G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
 - H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
 - I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.8 STARTING AND ADJUSTING
- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
 - B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
 - C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - D. Manufacturer's Field Service: If a factory authorized service representative is required to inspect field assembled components and equipment installation, comply with qualification requirements in Section 01 40 00 - Quality Requirements.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Section 01 73 29 - Cutting and Patching.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 01 73 29
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Divisions 03 through 32 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.3 ACTION SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least ten days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load carrying capacity or load deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - 1. Primary operational systems and equipment.
 - 2. Air or smoke barriers.
 - 3. Fire suppression systems.
 - 4. Mechanical systems piping and ducts.
 - 5. Control systems.
 - 6. Communication systems.
 - 7. Conveying systems.
 - 8. Electrical wiring systems.
 - 9. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include but are not limited to the following:]
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Exterior curtain wall construction.
 - 4. Equipment supports.
 - 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise and vibration control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.
- B. Related Sections include the following:
 - 1. Temporary Facilities and Controls: Section 01 50 00.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE GOALS

- A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work.
- B. Salvage/Recycle Goals: Owner's goal is to salvage and recycle as much nonhazardous construction waste as possible including the following materials:
 - 1. Demolition Waste:

- a. Concrete.
- b. Concrete reinforcing steel.
- c. Concrete masonry units.
- d. Wood studs.
- e. Plywood and oriented strand board.
- f. Wood paneling.
- g. Wood trim.
- h. Structural and miscellaneous steel.
- i. Rough hardware.
- j. Insulation.
- k. Doors and frames.
- l. Door hardware.
- m. Windows.
- n. Glazing.
- o. Metal studs.
- p. Gypsum board.
- q. Acoustical tile and panels.
- r. Carpet.
- s. Carpet pad.
- t. Equipment.
- u. Cabinets.
- v. Piping.
- w. Supports and hangers.
- x. Valves.
- y. Sprinklers.
- z. Mechanical equipment.
- aa. Refrigerants.
- bb. Electrical conduit.
- cc. Copper wiring.
- dd. Lighting fixtures.
- ee. Lamps.
- ff. Ballasts.
- gg. Electrical devices.
- hh. Switchgear and panelboards.
- ii. Transformers.
- 2. Construction Waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Insulation.
 - g. Carpet and pad.
 - h. Gypsum board.
 - i. Piping.
 - j. Electrical conduit.
 - k. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.

- 4) Plastic sheet and film.
- 5) Polystyrene packaging.
- 6) Wood crates.
- 7) Plastic pails.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 - Project Management and Coordination. Review methods and procedures related to waste management including, but not limited to, the following:
 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 2. Review requirements for documenting quantities of each type of waste and its disposition.
 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 5. Review waste management requirements for each trade.

1.5 SUBMITTALS

- A. Waste Management Plan: Submit three copies of plan within 30 days of date established for commencement of the Work.
- B. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- C. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

- B. Waste Identification: Indicate anticipated types and quantities of site clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
 - 1. Total quantity of waste.
 - 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 - 3. Total cost of disposal (with no waste management).
 - 4. Revenue from salvaged materials.
 - 5. Revenue from recycled materials.
 - 6. Savings in hauling and tipping fees by donating materials.
 - 7. Savings in hauling and tipping fees that are avoided.
 - 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
 - 9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with Section 01 50 00 - Temporary Facilities and Controls for operation, termination, and removal requirements.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on project site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Section 01 50 00 - Temporary Facilities and Controls for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE - GENERAL

- A. General: Recycle paper and beverage containers used by on project site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on project site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

**SECTION 01 77 00
CLOSEOUT PROCEDURES**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. Related Sections include the following:
 - 1. Payment Procedures: Section 01 29 00.
 - 2. Execution Requirements: Section 01 73 00.
 - 3. Operation and Maintenance Data: Section 01 78 23.
 - 4. Project Record Documents: Section 01 78 39.
 - 5. Demonstration and Training: Section 01 79 00.
 - 6. Divisions 03 through 32 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 8. Complete startup testing of systems.
 - 9. Submit test/adjust/balance records.

10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Section 01 29 00 - Payment Procedures.
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Architect will return annotated file.
 - b. Three paper copies. Architect will return two copies.

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within ten days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the Table of Contents of the Project Manual.
1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, in areas disturbed by construction activities of rubbish, waste material, litter, and other foreign substances.
 - b. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - c. Clean exposed hard surfaced finishes to a dirt free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
 - d. Remove debris and surface dust from limited access spaces, including plenums, shafts, trenches, equipment vaults, and similar spaces.
 - e. Sweep concrete floors broom clean in unoccupied spaces.
 - f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - h. Remove labels that are not permanent.
 - i. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

- 1) Do not paint over UL and similar labels, including mechanical and electrical nameplates.
 - j. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - k. Replace parts subject to unusual operating conditions.
 - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - p. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Maintenance manuals for the care and maintenance of products, materials, finishes, systems and equipment.
- B. Related Sections include the following:
 - 1. Submittal Procedures: Section 01 33 00.
 - 2. Closeout Procedures: Section 01 77 00.
 - 3. Project Record Documents: Section 01 78 39.
 - 4. Divisions 03 through 32 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 ACTION SUBMITTALS

- A. Initial Submittal: Submit 2 draft copies of each manual at least 10 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return 1 copy of draft and mark whether general scope and content of manual are acceptable.

1.4 INFORMATIONAL SUBMITTALS

- A. Final Submittal: Submit 1 copy of each manual in final form at least 10 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 10 days of receipt of Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of Contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a Table of Contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS - GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of Contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.

3. Name and address of Owner.
 4. Date of submittal.
 5. Name, address, and telephone number of Contractor.
 6. Name and address of Architect.
 7. Cross reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive Table of Contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple volume sets.
 2. Dividers: Heavy-paper dividers with plastic covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the Section on each divider, cross referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's Table of Contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's Table of Contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard printed maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training videotape, if available.

- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data

include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
1. Do not use original Project Record Documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."
- G. Comply with Section 01 77 00 - Closeout Procedures for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections:
 - 1. Electronic File Transfer Agreement: Document 00 63 72.
 - 2. Closeout Procedures: Section 01 77 00.
 - 3. Operation and Maintenance Data: Section 01 78 23.
 - 4. Divisions 03 through 32 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Submit 1 set of marked-up Record Prints, 2 sets of Record CAD Drawing files, and 3 copies printed from record plots. Plot and print each Drawing, whether or not changes and additional information were recorded.
 - 1) Electronic Media: CD-R.
- B. Record Specifications: Submit 2 copies of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit 2 copies of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Revisions to routing of piping and conduits.
 - d. Revisions to electrical circuitry.
 - e. Actual equipment locations.
 - f. Duct size and routing.
 - g. Locations of concealed internal utilities.
 - h. Changes made by Change Order or Construction Change Directive.
 - i. Changes made following Architect's written orders.
 - j. Details not on the original Contract Drawings.
 - k. Field records for variable and concealed conditions.
 - l. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:
1. Format: Same CAD program, version, and operating system as the original Contract Drawings.

2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Complete and submit Document 00 63 72 - Electronic File Transfer Agreement – Autocad with original signatures by party making request.
 5. Architect will furnish Contractor 1 set of CAD Drawings of the Contract Drawings for use in recording information.
 - a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
 - b. CAD Software Program: The Contract Drawings are available in Autocad.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
 3. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

MAC ROOM 153 RENOVATION
COLLEGE OF DUPAGE
Issue for Bid and Permit

PERKINS+WILL
024303.007
March 6, 2018

END OF SECTION

SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training videotapes.
- B. Related Sections include the following:
 - 1. Project Management and Coordination: Section 01 31 00.
 - 2. Divisions 03 through 32 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

- A. Instruction Program: Submit 2 copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. At completion of training, submit 3 complete training manuals for Owner's use.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance based test.
- E. Demonstration and Training Videotapes: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Architect.
 - d. Name of Contractor.

- e. Date videotape was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
2. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding videotape. Include name of Project and date of videotape on each page.

1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory authorized service representative, complying with requirements in Section 01 40 00 Quality Requirements, experienced in operation and maintenance procedures and training.
- C. Photographer Qualifications: A professional photographer who is experienced in video photography for construction projects.
- D. Preconstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 Project Management and Coordination. Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.4 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
1. Fire protection systems, including fire alarm, fire pumps and fire extinguishing systems.
 2. Intrusion detection systems.
 3. Heat generation, including pumps and water distribution piping.
 4. Refrigeration systems, including condensers pumps and distribution piping.
 5. HVAC systems, including air handling equipment, air distribution systems and terminal equipment and devices.
 6. HVAC instrumentation and controls.
 7. Electrical service and distribution, including transformers, panelboards, switchboards and motor controls.
 8. Lighting equipment and controls.
 9. Communication systems, including intercommunication, voice and data and television equipment.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 3. Emergencies: Include the following, as applicable:

- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.

- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect, with at least ten days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance based test.
- E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEOTAPES

- A. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.

- B. Videotape Format: Provide high-quality VHS color videotape in full-size cassettes.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
- D. Narration: Describe scenes on videotape by dubbing audio narration off-site after videotape is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
- E. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

END OF SECTION

**SECTION 02 41 19
SELECTIVE DEMOLITION**

PART 1 - GENERAL

1.1 SUMMARY

- A. Selective demolition work required to remove indicated portions of the existing building construction for installation or construction of the work of other sections.
- B. Related Sections:
 - 1. Cutting and Patching: Section 01 73 29.

1.2 INFORMATIONAL SUBMITTALS

- A. Schedule of selective demolition activities indicating the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
 - 2. Interruption of utility services.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Locations of temporary building interior partitions and means of egress.
- B. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- C. Predemolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

1.3 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed selective demolition Work similar to that indicated for this Project.
- B. Regulatory Requirements: Comply with laws, ordinances, rules and regulations of governmental authorities having jurisdiction over the demolition work.
 - 1. Comply with governing EPA notification regulations before starting selective demolition.
 - 2. Comply with hauling and disposal regulations of authorities having jurisdiction.
 - 3. Provide protection of persons and property in accordance with NFPA 241.

- C. In the event that unforeseen conditions or conflicts become known, notify the Architect of such conditions before proceeding with demolition work.
- D. Pre-Demolition Conference: Conduct a conference at the project site to review the conditions on the selective demolition work prior to the start of work. Review methods and procedures related to selective demolition including, but not limited to, the following
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review procedures for notification of building occupants.
- E. Definitions:
 - 1. Remove: Remove and legally dispose of items and construction except those indicated to remain the Owner's property.
 - 2. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.
 - 3. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.
 - 4. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

1.4 PROTECTION

- A. Provide temporary barricades, railings, platforms, lights, etc., required to protect the workmen, Owner's personnel and others from injury due to the selective demolition work. Provide free and safe passage of persons to and from building areas which are to remain.
- B. Repair any damage to the condition existing before damage to property of the Owner which is to remain in use, or that of any person, or persons on or off the site caused by the selective demolition work without additional expense to the Owner.
- C. Maintain regular traffic flow around the building areas unless otherwise directed.
- D. Provide shoring and bracing necessary to protect existing building construction to remain from damage by movement or collapse during the selective demolition operations. Maintain shoring and bracing until completion of work, remove when no longer required.

- E. During the demolition work, if any structure or portion thereof, is considered by governing authorities or Contractor to be unstable and presents a hazard, Contractor is to immediately notify the Owner. Take such precautions as necessary to protect and stabilize the construction until permanent conditions are established. If such unstable construction is to be removed, it has to be given priority and be immediately removed at no additional cost to the Owner.
- F. Existing Construction:
 - 1. The existing roof membrane, roof drains, connecting storm sewer piping and roof mounted skylights are to remain in place during the demolition work. Provide protection and maintain such during the demolition work.

1.5 FIRE PREVENTION

- A. Perform the demolition work in such a manner as to prevent fires. Remove debris promptly. Do not burn materials on the site.
- B. Protect combustible materials against ignition during acetylene cutting operations. Keep stairways and fire escapes unobstructed and available for use at all times.
- C. Instruct employees in the following:
 - 1. The location of the fire alarm box and telephone; also as to the manner of summoning the fire department without delay in the event of fire.
 - 2. The use of hand pumps, hose, water buckets and other fire extinguishing equipment.
 - 3. Maintenance of fire protection equipment in serviceable condition properly located and identified so that it will be available for immediate use.

1.6 PROJECT/SITE CONDITIONS

- A. The Drawings indicate existing construction diagrammatically. Verify at the project site exact locations, sizes, extent, quantities and conditions of the existing construction to be removed or to remain.
- B. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- C. Maintain access to existing walkways, corridors, paths of egress, exit ways and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- D. Owner assumes no responsibility for condition of areas to be selectively demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- E. Conditions not indicated in the Contract Documents nor on Drawings of existing construction, which are not observable or otherwise determinable without the use of uncommon equipment and procedures and which subsequently affect the scope or time of the work, may be considered to represent a change in the work. Refer to Section 01 26 00 - Contract Modification Procedures.
- F. Asbestos: It is not expected that asbestos will be encountered in the Work. If any materials suspected of containing asbestos are encountered, do not disturb the materials. Immediately notify the Architect and Owner.
 1. Asbestos will be removed by Owner under a separate contract.
- G. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

1.7 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials become the Contractor's property and are to be removed from the site with further disposition at the Contractor's option.
- B. Storage or sale of removed items or materials on-site will not be permitted.
- C. Historical items indicated remain the Owner's property.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 2. Use materials whose installed performance equals or surpasses that of existing materials.
- B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
- E. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.

3.2 PREPARATION AND PROTECTION

- A. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- B. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 1. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.
 - 2. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.
 - 3. Cover and protect furniture, furnishings, and equipment that have not been removed.
- C. Protection of Areas In Use: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
 - 1. Provide dust-tight partitions between areas where demolition work is being performed and areas which are finished, not in use, or other building and tenant areas.

2. Provide not less than 2 inches x 4 inches wood stud partitions with 1/4 inch plywood sheeting. Seal joints of sheeting airtight. Seal perimeter joints of partitions to the adjoining existing construction.
3. Provide hinged lockable doors of same construction as partitions. Provide doors of adequate size to allow for access and passage of workmen, equipment and materials.

3.3 UTILITY SERVICES

- A. Protect and maintain existing and temporary utility lines which are to remain in service in such a manner as to avoid interruption of these lines. Cap utility lines terminated by the selective demolition work.
- B. Coordinate locations of existing utility and building services located in walls, floors and ceilings prior to the start of work. Record such utilities and services on as-built record drawings.

3.4 BRACING AND SHORING

- A. Locate bracing and shoring to clear columns, floor framing construction and other permanent work. If necessary to move a brace or shore, install new bracing or shore prior to removal of the original.
- B. Install internal bracing, if required, to prevent spreading or distortion to braced frames and shores.
- C. Remove bracing and shoring not required to remain in place after construction.
- D. Repair or replace any damaged new or existing construction or materials resulting from placement or removal of bracing and shoring, or as a result of such operations on the project site at no additional cost to Owner.

3.5 REMOVAL OF MATERIALS

- A. In addition to what is specifically shown on the Drawings, remove items as necessary to provide access or to allow alterations and new work to proceed. Including such items as:
 1. Removal of abandoned items and items serving no useful purpose, such as framing, blocking, abandoned piping, conduit, ductwork, wiring, switches, junction boxes, fittings, anchors, fasteners and appurtenances associated with the removed or abandoned items or construction for a make ready condition for new construction or patching.
 2. Removal of unsuitable or extraneous materials not marked for salvage.
 3. Cleaning of surfaces and removal of surface finishes as needed to install new work and finishes.

- B. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members on lower levels.
- C. Cutting and Drilling:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame cutting operations. Maintain portable fire suppression devices during flame cutting operations.
 - 4. Maintain adequate ventilation when using cutting torches.
- D. Remove decayed, vermin infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
- E. Equipment and Material Loading Requirements: Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing. Verify exiting load capacity before the start of demolition work.
- F. Do not cause or impose impact loads or excessive vibration on the existing floor construction during selective demolition. Do not stack, pile or allow to accumulate demolition materials that would exceed the safe floor loading, except as noted on the structural demolition Drawings.
- G. Demolish non-loading bearing concrete and masonry walls, floor areas and other construction in reasonably small sections, using bracing and shoring as necessary to prevent walls, roof, floors and adjacent construction from collapsing. Cut concrete and masonry at junctures with construction to remain, using power driven masonry saw or hand tools; do not use power driven impact tools.
 - 1. Do not free fall materials, walls or other construction during selective demolition.
- H. Handle structural steel members individually. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- I. Remove resilient floor coverings and adhesive according to recommendations of the Resilient Floor Covering Institute's (RFCI), Recommended Work Practices for the Removal of Resilient Floor Coverings and Addendum.
 - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

- J. Remove air-conditioning equipment without releasing refrigerants.
- K. Wet down piled materials and materials being discharged into vehicles. Do not flood areas or materials, or allow water to accumulate on the site.
- L. Remove materials resulting from the selective demolition work from the site in such a manner as to avoid creating a nuisance as required by building management. Dispose of materials from the site in a legal manner on a daily basis at no additional cost to the Owner. Coordinate routes of removed materials through the building or buildings with the Owner's representative.
 - 1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.
- M. Leave each area of the building broom clean upon completion of the demolition work.
- N. Removed and Salvaged Items: Comply with the following:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.
- O. Removed and Reinstalled Items: Comply with the following:
 - 1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- P. Removal and Storage of Existing Doors and Door Frames for Reuse:
 - 1. Carefully remove existing doors and door frames indicated for salvage on the Drawings.
 - 2. Leave hardware on doors and frames.
 - 3. Provide covering and padding to protect finish surfaces and hardware from damage.
 - 4. Provide plastic banding at top, center and bottom of doors and door frames to maintain doors in frames.
 - 5. If doors are removed from frames, provide temporary spreader bars at the bottom of each frame.
 - 6. Transport doors and frames to Owner's storage area.
 - 7. Store doors and door frames in upright position with protective padding between units.
- Q. Removal and Storage of Existing Door Hardware for Reuse:

1. Remove existing door hardware items taking not do damage each item and the existing door and door frame.
2. Place each hardware set from a door into an individual box marked with a description of the contents.
3. Transport hardware sets to Owner's secure storage area designated by Owner.

3.6 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.
- B. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 1. Completely fill holes and depressions in existing masonry walls that are to remain with a compatible masonry patching material as approved by the Architect, applied according to manufacturer's written recommendations.
- C. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
- D. Floors and Walls: Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the existing and new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other specification sections.
 2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
 3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
- E. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.7 POLLUTION CONTROLS

- A. Do not use water inside the building to control dust. Use temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3.8 CLEANING

- A. Clean exterior adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.
- B. Clean building interior areas of selective demolition of dust, dirt, and debris as a result of selective demolition, leave areas broom clean.
- C. Remove containers, equipment, temporary construction and protection used for selective demolition.

3.9 SCHEDULE OF SALVAGED ITEMS

- A. Existing Items to Be Removed, Salvaged and Store for Reinstallation: Locations and quantities of the following are indicated on the Drawings:
 - 1. Doors
 - 2. Door frames
 - 3. Door hardware
 - 4. Fire extinguisher cabinets
 - 5. Fire extinguishers

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Unit masonry, including the following:

1. Concrete masonry units (CMU).
2. Mortar and grout materials.
3. Reinforcement:
 - a. Steel reinforcing bars.
 - b. Masonry-joint reinforcement.
4. Ties and anchors.
5. Miscellaneous masonry accessories.
6. Mortar and grout mixes.

B. Related Sections:

1. Metal fabrications: Section 05 50 00.
2. Joint sealants: Section 07 92 00.

C. Definitions

1. CMU(s): Concrete masonry unit(s).
2. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.2 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops the following installed compressive strengths (f'm) at 28 days, as follows, based on net area:

1. As indicated on the Drawings.
2. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Submit shop drawings indicating bar sizes, spacing, laps, locations and quantities of reinforcing steel, bending, cutting schedules and supporting devices. Indicate locations of openings, framing or special conditions affecting the work. Provide 1/4 inch scale elevations of walls showing reinforcing steel. Comply with ACI 315.

C. Samples:

1. One of each type of masonry anchor or assembly.
2. Special shape CMU: Furnish unit in each color specified or selected.
3. Mortar: Color sample selection sets for mortar colorants.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description and installation instructions for joint reinforcement, ties, anchors, membrane flashing, mortar net, preblended dry mortar mix, mortar colorants, repellents, and other accessories specified.
- B. Certification:
1. Copies of certification showing compliance with the requirements for masonry units, including fire resistance ratings.
 2. Copies of welding certificates for each welder involved in the Work.
- C. Mix Designs: Copies of grout mix design. For each type of mortar and grout. Include description of type and proportions of ingredients.
- D. Cleaning Procedures: Submit a written description of proposed masonry cleaning procedures, including the proposed materials and cleaning methods. Include masonry unit manufacturer's written approval of the proposed materials and methods.

1.5 QUALITY ASSURANCE

- A. Comply with laws, ordinances, rules, regulations and orders of public authorities having jurisdiction over this part of the Work.
- B. Comply with the applicable recommendations of the TEK Information Series, National Concrete Masonry Association, (NCMA), in addition to the requirements specified herein.
- C. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 40 00 "Quality Requirements" for mockups.
1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.
 2. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.

- D. Provide welding accordance with AWS, Standard Code for Arc and Gas Welding in Building Construction.

1.6 MOCKUP

- A. Prior to the start of masonry work construct a mockup installation of typical brick, limestone and CMU elements and materials as shown and indicated on the Drawings. Construct the mockup installation at a location on the project site mutually agreed upon by the Architect, Owner and Contractor. Include in the mockup materials, details, accessories and techniques that will be used in the actual building construction. Notify the Architect and Owner prior to the start of mockup construction.
 - 1. Construct mockup not less than 4 feet long and 4 feet high.
 - 2. Include in the mockup typical door/window opening details of jamb, sill, and head, top of wall or coping and typical outside and inside corners.
- B. The mockup installation will be reviewed by the Architect. Make changes or corrections to the mockup as directed by the Architect. After final review of the mockup, retain and use as a standard of quality and workmanship for the actual masonry work.
- C. Protect and maintain mockup installation until completion of masonry work. Provide adequate bracing to protect mockup from wind damage. Cover tops of walls and other elements to prevent passage of water. Install flashings and other accessories as would be required in the actual building construction.
- D. Remove mockup installation including any foundations when so directed by the Architect or Owner.

1.7 TESTING SERVICES

- A. The testing laboratory will be responsible for conducting and interpreting tests, state in each report whether or not the test specimens conform to requirements of the Contract Documents and specifically note any deviations.
- B. The Contractor is to cooperate with laboratory personnel, provide access to Work, and manufacturer's operations, and provide and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used which require testing.

1.8 DELIVERY, HANDLING AND STORAGE

- A. Deliver and handle materials in such a manner as to avoid damage. Store unit masonry and packaged material above ground on wood pallets or blocking and protect from the weather until used. Immediately remove from the project site damaged or otherwise unsuitable material when so ascertained.

1.9 PROJECT/SITE CONDITIONS

- A. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed, coated or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from mortar splatter by coverings spread over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
- B. Repair masonry construction where required due to damaged or defective work and where required to accommodate work of other trades, in a manner so that patching is not visually apparent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.

2.3 CONCRETE MASONRY UNITS

- A. CMU, General: ASTM C 90.
 - 1. Density Classification: Normal weight.
 - 2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 3. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

2.4 LINTELS

- A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- E. Aggregate for Grout: ASTM C 404.
- F. Water: Potable.

2.6 REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60, deformed.
- B. Reinforcement Bar Positioners: 0.142 inch wire units designed to fit into mortar bed joints, to span masonry unit cells, and to hold reinforcing bars in center of cells. Provide hot-dip galvanized units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: Mill-galvanized carbon steel.
 - 2. Wire Size for Side Rods: 0.148-inch diameter.

3. Wire Size for Cross Rods: 0.148-inch diameter.
4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
5. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

- D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

2.7 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel or stainless-steel wire.

- D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.105-inch- thick steel sheet, galvanized after fabrication or 0.109-inch- thick, stainless-steel sheet.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch-diameter, hot-dip galvanized steel or stainless-steel wire.

- E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

- B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.9 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.10 PROPORTIONING

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- B. Mortar: Proportions by Volume: ASTM C 270:
 - 1. Setting Mortar:
 - a. Type N, Natural: One part portland cement, one part lime and six parts sand.
 - 2. Pointing Mortar: Same as setting mortar.
- C. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1.
 - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

2.11 MIXING

- A. Mix cementitious materials and aggregate in a mechanical batch mixer for at least 5 minutes with the minimum amount of water to produce a workable consistency. Retemper mortar to replace water lost by evaporation, but not after mortar has begun to set. Use mortar within 2 hours after mixing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Verify that substrates are free of substances that impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- B. Lay concealed masonry with units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Build in items furnished by other trades, and leave accurate openings necessary for subsequent installation of other work, in a manner to maintain required strength and appearance of masonry construction. Provide not less than 8 inches thickness of masonry between adjacent chases, openings and recesses. Fill solidly around conduit and sleeves passing through masonry, with mortar.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- H. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above. Install compressible filler in other locations as indicated.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 - 3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

3.4 GENERAL – INSTALLATION

- A. CMU:
 - 1. Lay units with full mortar coverage on horizontal and vertical face shells.
 - 2. Bed webs courses of piers, columns and pilasters, and in the starting course on footings and solid foundation walls, and where adjacent to cells or cavities to be reinforced or filled with grout or concrete. Lay solid units with full head and bed joints.

- B. Provide mortar joints 3/8 inch thick except where otherwise shown or noted on the Drawings. Tool joints when thumbprint hard with a round jointer. Cut flush joints with surface on unexposed interior surfaces.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Provide preformed resilient filler strips specified, minimum 3/4 inch thick, between tops of walls and undersides of slabs, decks, beams and lintels, or against other abutting construction where shown on the Drawings. Set filler strips in joints as masonry is laid up with lengths of strips butted together and firmly compressed. Use solid masonry units or end units at such locations.
- F. Structural Steel to Masonry Wall - Anchors and Ties:
 - 1. Where indicated on the Drawings or required by conditions of the installation, provide flexible adjustable anchorage to column and beam steel framing.
 - 2. Weld offset steel straps or channel slots to steel framing to allow for the insertion of triangular ties, web ties and/or strap anchors.
 - 3. Provide triangular ties, web ties and/or strap anchors spaced as shown on the Drawings. If not shown, provide maximum spacing of ties and anchors 16 inches o.c. vertically and 32 inches o.c. horizontally.
- G. Dovetail Slot Anchor/Ties:
 - 1. Remove slot insert completely before installing anchor/ties.
 - 2. Install dovetail anchor/ties in cast-in-place dovetail slots spaced a maximum of 16 inches o.c. vertically and 32 inches o.c. horizontally unless shown or noted otherwise on the Drawings.
- H. Top of Wall Stabilizing Anchors:
 - 1. Install and anchor specified top of wall stabilizing anchors as shown on the Drawings, if not shown, install and space not more than 32 inches o.c. horizontally and anchor to structure.
 - 2. Install plastic tube in top of masonry wall to allow for insertion of pin anchor in tube.
- I. Provide threaded steel anchors where indicated to be built into masonry construction for attachment of work by other trades. Conform to requirements of ASTM A 307, and include nuts with hardened washers where required. Provide minimum 1/2 inch shank diameter by 10 inch length with pigtail or J hook end, where size and type are not indicated on Drawings. Provide hot-dip galvanized anchors.
- J. Grout Fill: Grout exterior hollow metal door frames, elevator door frames and interior hollow metal frames indicated or noted in masonry walls solidly with grout. Perform grouting without clogging holes, boxes or spaces required for the proper installation or operation of hardware.

3.5 PLACING JOINT REINFORCEMENT

- A. Provide continuous joint reinforcement in horizontal joints of multi and single wythe masonry construction at 16 inches o.c. vertically, unless otherwise noted or shown on the Drawings.
- B. Provide additional joint reinforcement in joint immediately above lintels, immediately below sills and at openings in walls and extend at least 2 feet beyond each side of opening.
- C. Place units to provide continuous reinforcement, with manufacturer's standard corner and tee sections at wall intersections; splice units together by lapping side bars a minimum of 6 inches at adjoining ends of lengths.

3.6 MOVEMENT JOINTS

- A. Provide vertical movement (control and building expansion) joints in masonry where shown on the Drawings. If not shown on the Drawings, comply with the recommendations of NCMA for movement joints as reviewed by the Architect prior to construction of joint.
- B. Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- C. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
- D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 "Joint Sealants," but not less than 3/8 inch.

3.7 LINTELS

- A. Install steel lintels where indicated.
- B. Provide concrete or masonry lintels where shown and where openings of more than 24 inches for CMU-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.8 PLACEMENT VERTICAL BAR REINFORCEMENT

- A. Provide vertical reinforcement of types required for locations indicated or specified. Remove deleterious matter from surfaces before placement, including loose rust and scale adversely affecting bond to mortar or grout. Install reinforcement in accurate position, aligned true and secured against displacement with reinforcement bar positioners spaced not more than 48 inches o.c. Provide a minimum mortar cover of 5/8 inch at exterior face of walls and 1/2 inch at other locations.
- B. Provide steel bars as vertical reinforcement in masonry construction where indicated or specified. Place vertical bar reinforcing in as continuous lengths as practicable, inserting after laying of masonry and before grouting.

3.9 BENDING, CUTTING AND SPLICING REINFORCEMENT

- A. Make bend and splices in reinforcement only where indicated or reviewed by Architect. Bend reinforcement only when cold, and prior to any placement in construction, forming around a steel pin of diameter at least six times the reinforcement size.
- B. Cut bars only by industry accepted sawing and shearing methods. Make ends of reinforcement straight, square, clean and free of defects before splicing. Bends and splices are not to be heated or welded at points of maximum stress.
- C. Clip and bend any tie wires as required to direct the ends away from external surfaces of masonry walls.
- D. Where welding is necessary, provide materials and perform welding in accordance with AWS requirements.

3.10 GROUTING OF REINFORCED WALL CONSTRUCTION

- A. General:
 - 1. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - a. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - b. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
 - 2. Generally use specified fine grout mixture to fill wall spaces up to 1-1/2 inches wide or to fill cells up to 4 inches size in hollow masonry units, and use specified coarse grout mixture only to fill spaces or cells having larger dimensions.
 - 3. Grout walls only after setting mortar has stiffened, and columns or pilasters have been braced or tied, as required to prevent displacement of masonry

and reinforcement or ties due to pressure of grout pours. Clean and wet surfaces of preceding pour before placing new grout. Remove debris, mortar droppings or other matter from cavities and cells before grouting.

4. Provide grouting in continuous manner, with not less than 30 minutes nor more than 1 hour between lifts of any given pour. If grouting is stopped more than 1 hour, bring masonry and grout to the same level before stopping.

B. Low Lift Grouting Method: Provide low lift grouting as the laying of masonry and placement of reinforcement progresses.

1. Place the first lift up to 16 inches height, but limit subsequent pours to maximum 12 inches lifts, placed before masonry coursing is 24 inches higher than preceding pour. Allow setting mortar to cure at least 4 hours prior to grouting of cells in adjacent hollow masonry units.
2. Provide grout keys by terminating grout lifts a minimum of 1-1/2 inch below mortar joints or 1-1/2 inches above bed joint when one course is laid above horizontal reinforcing.
3. Consolidate each grout lift with a rod to provide uniform flow into spaces of voids.
4. Place grout in cells up to top masonry course at a maximum 48 inches height above preceding pour.

3.11 CONSTRUCTION TOLERANCES

A. Provide unit masonry construction within the following tolerances:

1. Maximum variation from plumb in vertical lines and surfaces of columns, walls and arrises:
 - a. 1/4 inch in 10 feet.
 - b. 3/8 inch in a story height not to exceed 20 feet.
 - c. 1/2 inch in 40 feet or more.
2. Maximum variation from plumb for external corners, expansion joints and other conspicuous lines:
 - a. 1/4 inch in any story or 20 feet maximum.
 - b. 1/2 inch in 40 feet or more.
3. Maximum variation from level of grades for exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:
 - a. 1/4 inch in any bay or 20 feet.
 - b. 1/2 inch in 40 feet or more.
4. Maximum variation from plan location of related portions of columns, walls and partitions:
 - a. 1/2 inch in any bay or 20 feet.
 - b. 3/4 inch in 40 feet or more.
5. Maximum variation in cross sectional dimensions of columns and thicknesses of walls from dimensions shown on Drawings:
 - a. Minus 1/4 inch.
 - b. Plus 1/2 inch.

B. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.12 CLEANING MASONRY

- A. Cut out any defective joints and holes in exposed masonry, repoint with mortar and tool.
- B. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joint.
- C. Demonstrate cleaning procedure on sample wall area of 20 square feet in a location indicated by the Architect. Do not proceed with cleaning until the sample area has been reviewed by the Architect.
- D. Clean initially with stiff fiber brushes and water. If a cleaning agent is required:
 1. Submit written description of materials and methods for review by Architect prior to cleaning.
 2. Thoroughly wet surface of masonry on which no green efflorescence appears.
 3. Scrub with acceptable cleaning agent.
 4. Immediately rinse with clear water.
 5. Do small sections at a time.
 6. Work from top to bottom.
 7. Protect sash, metal lintels and other corrodible parts when masonry is cleaned with corrosive solutions.
 8. recommendations.
- E. At the conclusion of masonry work, remove scaffolding and equipment used in the work, clean up debris and refuse and surplus material and remove same from premises.

3.13 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

END OF SECTION

**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 - GENERAL

1.1 SUMMARY

A. Metal fabrications, including the following:

1. Loose lintels.
2. Shelf angles.
3. Steel weld plates and angles for casting into concrete not specified in other Sections.
4. Pipe handrails, guardrails and railings, not part of preassembled stair systems.
5. Roof and floor opening frames.
6. Corner guards.
7. Gratings and support.
8. Lateral support framing for CMU partitions.
9. Steel framing and supports for projector mounts and projector screens.
10. Slotted channel framing
11. Steel framing and supports for applications where framing and supports are not specified in other Sections.
12. Miscellaneous angles, shapes and fabrications shown on the Drawings.
13. Anchors, framing, fasteners and accessories.

B. Related Sections include the following:

1. Unit Masonry: Section 04 20 00.
2. Painting: Section 09 91 00.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design:

1. Design metal fabrications, including engineering calculations prepared by a qualified Structural Engineer, using structural performance requirements and design criteria indicated herein.
2. Contractor is responsible for the engineering and design of components and materials, as well as the installation of the metal fabrications.

B. Stairs, Handrails, Railings, Guardrails and Balustrade Infill Construction:

1. Stairs, Platforms and Landings: Design to withstanding the following:
 - a. A uniform load of 100 pounds per sq. ft.
 - b. Or a concentrated load of 300 pounds on an area of 4 sq. inches located in the center of the tread, whichever produces the greater stress or that load as required by local codes whichever is the greater.

- c. Limit deflection of treads, platforms, and framing members to $L/360$ or $1/4$ inch, whichever is less.
 2. Handrails: Design handrails and their anchors capable of withstanding the following:
 - a. A concentrated load of 200 pounds applied at any point in any direction on the handrail,
 - b. A uniform load of 50 pounds per lineal foot applied simultaneously in both vertical and horizontal directions.
 3. Railings and Guardrails: Design railings and guardrails and their anchors capable of withstanding the following:
 - a. A concentrated load of 200 pounds applied at any point in any direction along the top railing member.
 - b. A uniform load of 50 pounds per lineal foot applied in any direction at the required railing or guardrail height.
 - c. A uniform load of 200 pounds per lineal foot applied vertically downward at the top of the railing or guardrail.
 4. Balustrade Infill: Design infill areas (balustrade infill) of a railing or guardrail system, if shown on the Drawings, capable of withstanding a horizontal concentrated load of 50 pounds applied to a 1 square foot area at any point in the infill including intermediate rails and other elements of the infill. Infill load and other loads need not be assumed to act concurrently.
 5. Uniform and concentrated loads need not be assumed to act concurrently.
 6. When conflicts exist between the above specified load requirements and the specified standard or the governing code, provide fabrications designed to the stringent or greater requirement.
 7. Testing performed according to ASTM E 894 and ASTM E 935.
- C. Gratings and Supports:
1. Pedestrian Traffic: Provide sizes and spacing of bars as required to support a minimum live load of 100 lbs. per sq. ft., or concentrated load of 2,000 lbf., whichever produces the greater stress.
 2. Vehicular Traffic: Provide sizes and spacing of bars as required to support a uniform load of 250 lbf/sq. ft. or concentrated load of 8,000 lbf, whichever produces the greater stress.
- D. Information on Drawings and in the Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated on the Drawings by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines and relationships to one another and to adjoining construction. Performance characteristics are indicated by criteria specified herein subject to verification as specified.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's written approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect in accordance with Section 01 60 00 "Product Requirements" for review prior to submittal of shop drawings.

1.3 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. Where fabrications require calculations, provide shop drawings sealed and signed by the same State of Illinois Licensed Structural Engineer that prepared calculations.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Data: For the following:
 - 1. Grout.
 - 2. Shop and zinc primer.
- B. Welding certificates.
- C. Qualification Data: For Structural Engineer.
- D. Design Calculations: Provide for fabricated items requiring design calculations to substantiate design and installation conditions, prepared, sealed, and signed by a State of Illinois Licensed Structural Engineer. Submit design calculations for the following:
 - 1. Handrails, railings and guardrails.
 - 2. Gratings and supports.
 - 3. Support framing.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, Structural Welding Code--Steel.
 - 2. AWS D1.2, Structural Welding Code--Aluminum.
 - 3. AWS D1.3, Structural Welding Code--Sheet Steel.
 - 4. AWS D1.6, Structural Welding Code--Stainless Steel.
- C. Comply with AISC Manual.
 - 1. Code of Standard Practice for Steel Buildings and Bridges.
 - 2. Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.

- D. Specifications for Structural Joints Using High Strength Steel as approved by the Research Council on Structural Connections.
- E. General Requirements for Delivery of Rolled Steel Plates, Shapes, and Bars for Structural Use: ASTM A 6.
- F. Bar Grating: Comply with NAAMM, Metal Bar Grating Manual.
- G. Qualifications for Welding Work:
 - 1. Qualify welding processes and welding operators in accordance with the AWS, Standard Qualification Procedure.
 - 2. Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous twelve months. Provide recertification of welders as required.
- H. Comply with applicable portions of National Association of Architectural Metal Manufacturers (NAAMM) Metal Stairs and Pipe Railing Manuals.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on shop drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to project site in time for installation.
- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 METALS - GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

- A. W-Shapes: ASTM A 992, Grade 50.
- B. Channels and Angles: ASTM A 36.
- C. Steel Plates, Shapes, and Bars: ASTM A 36.
- D. Steel Sheet:
 - 1. Cold-Rolled: ASTM A 1008, Type B, structural steel, Grade 25, unless another grade is required by design loads indicated.
 - 2. Hot-Rolled: ASTM A 1011, Type B, or structural steel, Grade 30, unless another grade is required by design loads.
- E. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- F. Stainless Steel Bars and Shapes: ASTM A 276, Type 304.
- G. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- H. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads, black, galvanized for exterior or as noted on the Drawings.
- I. Steel Bars for Grating: ASTM A 569 or ASTM A 36.
- J. Stainless Steel Shapes: ASTM A 276, Type 304 and Type 316 where indicated herein.

- K. Rolled Steel Floor Plates: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D. Provide manufacturer's standard raised diamond pattern.
- L. Rolled Aluminum Alloy Tread Plate: ASTM B 632, alloy 6061-T6. Provide manufacturer's standard diamond pattern.
- M. Abrasive Surface Floor Plate: Steel plate, minimum 1/8 inch thick, with abrasive material metallurgically bonded to steel by proprietary process. Provide material with coefficient of friction (COF) of 0.6 or higher when tested according to ASTM C 1028. Provide one of the following:
 - 1. "Mebac" (IKG Borden, Clark, NJ 07066).
 - 2. "SLIP-NOT" (W. S. Molnar Company, Detroit, MI 48027).
- N. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4. Continuously slotted steel channels with in-turned lips, size and series as shown on the Drawings, if not shown, as required to support and resist the imposed loads, with assembly and mounting hardware as required by conditions of the fabrication and installation.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches unless otherwise indicated on the Drawings.
 - 2. Material: Cold-rolled steel, ASTM A 1008, structural steel, Grade 33, 0.0528-inch minimum thickness; galvanized after fabrication.
 - 3. Product: "Unistrut" (Unistrut Corporation, Wayne MI 48184) or other as approved by Architect.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A 563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.
- C. Steel Bolts and Nuts: Regular hexagon head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- D. Stainless Steel Bolts and Nuts: Regular hexagon head annealed stainless steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- E. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc coated anchor bolts where item being fastened is indicated to be galvanized.

- F. Eyebolts: ASTM A 489.
- G. Machine Screws: ASME B18.6.3.
- H. Lag Bolts: ASME B18.2.1.
- I. Wood Screws: Flat head, ASME B18.6.1.
- J. Plain Washers: Round, ASME B18.22.1.
- K. Lock Washers: Helical, spring type, ASME B18.21.1.
- L. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- M. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors in Interior Locations: Carbon steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.
 - 3. Provide one of the following:
 - a. "Kwick Bolt 3" (Hilti Corporation, Tulsa, OK 74121).
 - b. "Expansion Anchors" (Dur-O-Wall, Hauppauge, NY, 11788).
 - c. "Expansion Anchors" (ITW Redhead, Addison, IL 60101).
- N. Power Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with capability to sustain, without failure, a load equal to ten times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency. Provide manufacturer's substantiating data for each type and condition used as part of submittals.
- O. Chemical Fasteners: Insert type stud bonding system anchor for use with hardened portland cement concrete, and tension and shear capacities appropriate for application.
 - 1. Bonding Material: ASTM C 881, Type IV, Grade 3, two component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
 - 2. Stud: ASTM A 307, zinc coated carbon steel with continuous thread on stud, unless otherwise indicated.
 - 3. Washer and Nut: Zinc coated steel.

2.5 MISCELLANEOUS MATERIALS

- A. Wedge Inserts (Shelf Angle Support Insert Assembly):

1. Heavy box type ferrous casting inserts, duty ductile iron complying with ASTM A 47 or cast steel complying with ASTM A 27, hot-dip galvanized in accordance with ASTM A 153, with carbon steel wedge shaped askew bolts, round washers, shimmed washers and hex nuts hot-dip galvanized in accordance with ASTM A 153.
- B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- C. Universal Shop Primer: Fast curing, lead and chromate free, universal modified alkyd primer complying with MPI #79.
- D. Zinc Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
- E. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- F. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D 1187.
- G. Nonshrink, Nonmetallic Grout: Factory packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 - Cast-in-Place Concrete for normal weight, air entrained, ready mix concrete with a minimum 28-day compressive strength of 3,000 psi, unless otherwise indicated.

2.6 FABRICATION - GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.7 FABRICATION - PIPE HANDRAILS AND RAILINGS

- A. Fabricate pipe handrails and railings of design and dimensions shown on the Drawings. Fabricate with joints coped and welded around the joint, ground smooth or using solid fittings designed for this purpose, for bends, wall returns, cap tees and crosses welded around the joint and ground smooth.
- B. Close exposed ends of pipes by welding a round 3/16 inch thick steel plate over the opening or by use of a solid end fitting.
- C. Fabricate sleeves for setting handrail and guardrail support from galvanized steel, minimum 6 inches long, not less than 1/2 inch greater than the outside diameter of the vertical support. Provide steel plate closure at bottom of sleeve. Provide not less than two, 4 inch long x 3/8 diameter steel stud anchors welded to each side of the sleeve.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
1. Furnish inserts if units are installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill

bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition shop drawings.

- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc rich primer where indicated.

2.9 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

2.10 SHELF ANGLES

- A. Fabricate structural steel shelf angles of sizes shown on the Drawings for attachment to the building frame. Fabricate with slotted holes to receive 3/4 inch diameter bolts spaced not more than 24 inches o.c. and not less than 6 inches from end of angles unless shown otherwise on the Drawings. At inside and outside corners, provide mitered or coped angles to extend the horizontal leg into the corner for support of brick and flashing.

2.11 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated.

2.12 FABRICATION - GRATINGS AND SUPPORTS

- A. Provide steel bar gratings and frames of sizes and at locations shown on the Drawings. Provide each grating with tamper proof saddle type hold down clips.
- B. Fabricate unit with main bars and cross bars of rectangular cross-section, with flush top, slotted construction, mechanically interlocked and welded. Provide patterns,

spacing and bar sizes indicated on the Drawings or required by loads, complying with NAAMM, Metal Bar Grating Manual.

- C. Comply with FS-RR-G-661C, Type I. Provide steel supporting members as indicated or required, using welded construction to the extent feasible. Form gratings into sections as indicated or as necessary for proper access and handling.
- D. Form banded edges on panels and around openings through panels, where shown on the Drawings.

2.13 FABRICATION - CORNER GUARDS

- A. Provide steel corner guards on external corners of columns and walls in traffic area where shown on the Drawings. Unless otherwise shown on the Drawings, fabricate from 3-1/2 inches x 3-1/2 inches x 1/4 inch steel angles 4 feet high, with 1/2 inch diameter countersunk flat head concrete expansion type anchor bolts spaced 18 inches o.c., 4 inches from top and bottom, minimum three per angle leg.

2.14 FINISHES - GENERAL

- A. Comply with NAAMM's - Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.15 STEEL FINISHES

- A. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Interiors (SSPC Zone 1A): SSPC-SP-3, Power Tool Cleaning.
- B. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA-1, Paint Application Specification No.1, Shop, Field, and Maintenance Painting of Steel, for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on shop drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 INSTALLATION - PIPE HANDRAILS AND RAILINGS

- A. Install and anchor handrails and railings to supporting structure by welding wherever possible and by bolting elsewhere as reviewed by Architect. Support wall handrails with brackets as shown on Drawings. Maintain a minimum of 1-1/2 inches clearance between finish wall surface and the inside face of the handrail. At termination return ends of railing to walls.
- B. Existing Construction: Set railing standards by core drilling holes not less than 6 inches deep and 1 inch greater than the outside diameter or edge of the post standard. Clean holes of loose material, insert post standards and fill annular space with quick setting, non-shrinking, non-metallic cement (grout).
- C. New Construction: Install galvanized steel sleeves for embedded to receive railing standards where installed in new concrete or masonry. Set standards in sleeves and annular space between sleeve and support with quick setting, non-shrinking, non-metallic cement.

3.4 INSTALLATION - GRATINGS AND SUPPORTS

- A. Comply with the recommendations of the NAAMM, Metal Bar Grating Manual for installation methods, including clearances and standard anchoring details.
- B. Secure removable sections or units to the supporting members with the type and size of anchors indicated, if not indicated, as recommended by the grating manufacturer for the types of installations shown on the Drawings.
- C. Secure removable sections or units with tamperproof devices. Anchor non-removable sections or units by welding or tamperproof devices.
- D. Install gratings level and to proper elevations, plane and alignment with adjacent work. Provide and install anchors and accessories required for attachment to other construction to allow for removal and replacement of grating sections.

3.5 ADJUSTING AND CLEANING

- A. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0 mil dry film thickness.
- B. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 91 00 Painting.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

MAC ROOM 153 RENOVATION
COLLEGE OF DUPAGE
Issue for Bid and Permit

PERKINS+WILL
024303.007
March 6, 2018

END OF SECTION

SECTION 05 73 12
GLAZED DECORATIVE RAILING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Glazed decorative railing systems with non-welded joints for interior installation, including glass, fabrication and installation accessories.
- B. Related Sections:
 - 1. Metal fabrications: Section 05 50 00.
 - 2. Glazing: Section 08 80 00.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design:
 - 1. Design railing systems and anchorage, including engineering analysis prepared by a qualified Structural Engineer, using structural performance requirements and design criteria indicated herein.
 - 2. Engineer and design of components and materials, as well as the installation of the railing systems.
 - 3. Provide railing systems designed and constructed to comply with applicable codes and minimum values specified herein.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
 - 3. Testing performed according to ASTM E 894 and ASTM E 935.
- C. Anchors and Connections:
 - 1. Anchors, connections and assemblies connecting the railing system and associated fabrications to the supporting construction when shown on the Drawings are suggested locations for the railing system manufacturer/installer's information. Design the system, connections and anchors, including quantities and spacing and accessories and reinforcements necessary for fabrication, and installation of the railing system.

2. Notify the Architect in writing prior to the submittal of shop drawings of any changes in the proposed locations of connections and anchors.

1.3 PRICE AND PAYMENT PROCEDURES

- A. Submit unit prices for the work as indicated in the Bid Form.

1. Unit of Measurement: Lineal foot for Rail-1.
2. Unit of Measurement: Lineal foot for Rail-2.

1.4 DESIGN REQUIREMENTS

- A. Glazed Decorative Railing System Design:

1. Glazed decorative railing system shown on the Drawings is the intended design. Engineer the glazed decorative railing system to comply with the specified performance requirements, including designing and providing the connections and anchors, including connecting hardware, accessories and necessary for the glazed decorative railing system, transportation and erection.
2. Notify the Architect in writing prior to the submittal of shop drawings of any changes in the intended design of the glazed decorative railing system and anchors.
3. The Architect's review of shop drawings is not to be construed as removing responsibility from the glazed decorative railing system manufacturer for structural failures related to design, fabrication, transportation, erection and fabrication service.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: Include plans, elevations, sections, and attachment details indicating materials, dimensions, anchorage to the structure, fasteners, fittings, non-welded joints, locations, and spacing.
 1. Show glazing details indicate materials and thickness.
 2. Show finishes on metal surfaces.
 3. Show adjacent and structural support construction and method of attachment.
- B. Samples: One sample of typical full height vertical post and top rail with fittings, specified glass with attachment clamps, minimum 12 inches wide.

1.6 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description and installation instructions.
- B. Design Calculations: Submit design calculations prepared and sealed by Structural Engineer. Design glazed decorative railing system, fasteners and anchors in

accordance with the loading criteria specified herein and local code requirements. Test data will not be acceptable substitute for design calculations.

- C. Certifications: Signed copies of glazed decorative railing system manufacturer's written certification stating that the system conforms with the referenced performance and quality assurance requirements.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.7 QUALITY ASSURANCE

- A. Manufacturer/Fabricator Responsibilities:
 - 1. Provide glazed decorative railing system and accessories by a firm having undivided responsibility for the design, fabrication and installation (except for primary structural steel support structure) as shown on the Drawings and specified herein.
 - 2. Design Calculations: Submit design calculations to substantiate performance requirements specified, prepared by, signed and sealed by a Structural Engineer licensed in the State of Illinois. The responsibility for design and conformance with the performance requirements is that of the fabricator.
- B. Comply with laws, ordinances, rules, regulation, codes and orders of public authorities having jurisdiction over this part of the work.
- C. Comply with the following:
 - 1. Safety Glazing:
 - a. ASTM C 1048.
 - b. ASTM C 1172.
 - c. ANSI Z97.1.
 - d. 16 CFR 1201 CI and CII.
 - 2. GANA'S - Glazing Manual and Laminated Glazing Reference Guide.
- D. Provide metal fabrications complying with the National Association of Architectural Metal Manufacturers (NAAMM), Metal Finished Manual and Aluminum and AA Specifications for Aluminum Structures, current editions.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver glazed decorative railing system components to the project site clearly marked for proper identification.
- B. Store system components in accordance with the manufacturer's instructions, above ground, in dunnage and protected from construction activities and other causes of breakage or damage.
- C. Schedule delivery to the job site when area of installation is prepared for installation of railing system.

- D. Handle glazed decorative railing system components at the job site in such a manner as to prevent damage. Immediately remove from the project site damaged or otherwise unsuitable material and components when so ascertained.

1.9 MOCKUP

- A. Mockups: Before installing glazed decorative railing system, build mockup to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in the location indicated or, if not indicated, as mutually agreed upon by Architect and Contractor.
 - 2. Build mockups as shown on Drawings. If not shown on the drawings, build mockups for glazed decorative railing system consisting of 3 glass panels (including corner installation) with glass clamps, top railing and posts, top rail fittings, post base covers and anchorage system components.
 - 3. Notify Architect 7 days in advance of dates and times when mockups will be constructed.
 - 4. Obtain Architect's approval of mockups before fabricating glazed decorative railing system.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work
 - 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 RAIL-1 - ACCEPTABLE SYSTEMS AND MANUFACTURERS

- A. "Easy Glass Mod" (Q-railing USA Co., Tustin, CA 92780).
- B. "SRS Standoff" (C.R. Laurence Company, Los Angeles, CA 90058).
- C. "View" (Viva Railings LLC, Carrollton, TX 75007).
- D. "Button Rail" (Livers Bronze, Kansas City, Missouri 64132).
- E. "Point" (Trex Company, Inc., Winchester, VA 22603).

2.2 RAIL-2 - ACCEPTABLE SYSTEMS AND MANUFACTURERS

- A. "Easy Glass Pro" (Q-railing USA Co., Tustin, CA 92780).
- B. "PanelGrip" (The Wagner Companies, Butler, WI 53007).
- C. "GRS Taper-Loc" (C.R. Laurence Company, Los Angeles, CA 90058).

- D. "Shoe" (Viva Railings LLC, Carrollton, TX 75007).
- E. "Railglass" (Blumcraft, Pittsburgh, PA 15203).
- F. "Track Rail" (Trex Company, Inc., Winchester, VA 22603).

2.3 MATERIALS

- A. Tubing: ASTM A 554, Grade MT 316.
- B. Pipe: ASTM A 312, Grade TP 316.
- C. Castings: ASTM A 743, Grade CF 8M or CF 3M.
- D. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 316.
- E. Bars and Shapes: ASTM A 276, Type 316.

2.4 GLASS AND GLAZING MATERIALS

- A. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent flat glass), Quality-Q3. Provide products that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to 16 CFR 1201 for Category II materials.
 - 1. Glass Color: Clear
 - 2. Thickness for Glass Infill Panels: As required by structural loads, but not less than 1/2 inch.
- B. Laminated Glass: ASTM C 1172, Condition A (uncoated), Type I (transparent flat glass), Quality-Q3 with two plies of tempered glass and polyvinyl butyral interlayer.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. « Butacite » (E. I. duPont de Nemours & Co., Inc.).
 - b. "Saflex" (Solutia Inc.).
 - 2. Kind: LT (laminated tempered).
 - 3. Glass Color: Clear
 - 4. Interlayer Color: Clear, unless otherwise indicated
 - 5. Interlayer Color and Pattern: As selected by Architect from manufacturer's full range.
 - 6. Glass Plies for Glass Infill Panels: Thickness required by structural loads, but not less than 1/4 inch, each.
- C. Glazing Clamps for Glass Infill Panels: Glazing clamps with protective resilient inserts and related accessories supplied by glazed decorative railing manufacturer for installing glass infill panels in post-supported guardrails.

2.5 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Stainless-Steel Components: Type 316 stainless-steel fasteners.
 - 2. Dissimilar Metals: Type 316 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Provide concealed fasteners for connecting railing components and for attaching railings to other work unless.
 - 1. Provide tamper-resistant fasteners unless otherwise indicated.
 - 2. Adhesive: Structural epoxy adhesive for splice joints in top rail as supplied by glazed decorative railing manufacturer.
- D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593 and nuts, ASTM F 594.

2.6 FABRICATION

- A. Verify dimensions on site prior to shop fabrication. Fabricate and assemble items in the shop and mark each item to ensure proper installation at the project site. Disassemble for shipment only to the extent required by shipping limitations.
- B. Carefully match parts of the fabrication to maintain continuity of line and design. Join parts with hairline contact, flush and smooth with adjacent surfaces, using concealed fasteners.
- C. Fabricate railing systems of the thicknesses, sizes and shapes shown, or if not shown, as required to produce work of adequate strength and durability without deflections. Use proven details of fabrication, as required to achieve proper assembly and alignment of the various components of the work. Exposed to view surfaces of the fabrications shall not exhibit pitting, seam marks, roller marks, stains, grinder marks, discolorations or other imperfections of finishes.
- D. Cut material square and remove burrs from exposed edges, with no chamfer.
- E. Make exposed joints butt tight and flush.

- F. Close exposed ends of handrail by use of appropriate end cap.
- G. For posts set in concrete, furnish matching sleeves or inserts not less than 5 inches long.
- H. Provide brackets, fittings, inserts, bolts and fasteners with railing system, as may be required for proper support and anchorage to the construction and for other work.
- I. Cut, reinforce, drill and tap fabricated items as may be required to receive other items of work.
- J. Protect exposed metal finishes by covering with suitable covering prior to shipment.

2.7 STAINLESS STEEL FINISHES

- A. Remove or blend tool and die marks and stretch lines into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
 - 1. Bright, Directional Polish: No. 4 finish.
- C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- D. Wrap each fabrication with protective plastic sheeting prior to shipping.

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit infill areas indicated for Project, with edge and face clearances, edge and surface conditions, complying with written instructions of glazed decorative railing system manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate and furnish anchoring inserts, placement templates and installation instructions to those contractors installing such items.

- B. Examine surfaces and conditions of the installation to receive glazed decorative railing system. Installation of the railing system and associated construction shall constitute acceptance of the existing materials and conditions.

3.2 INSTALLATION

- A. Set glazed decorative railing system components accurately as measured from established building lines and levels, plumb and in true alignment with previously completed work. Install in accordance with the manufacturer's printed installation instructions and the final reviewed shop drawings.
- B. Install railing pots bases and anchor securely in place in the manner shown on the final reviewed shop drawings. Install post base covers over anchors and base plates.
 - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
- C. Install glass panel clamps on vertical post using manufactures concealed fasteners.
- D. Install laminated tempered glass panels in clamps with protective insert with roll distortion parallel to the bottom in accordance with the glass manufacturer's recommendations for the type of glass installation. Install glass panels with resilient protective inserts between glass and clamp faces. Secure in place between screw attached clamps.
- E. Install handrails on posts with manufacturer's standard fittings. Set handrails with hairline structural epoxy adhesive splice joints, straight and in line with each other.
- F. Do not cut or abrade finishes which cannot be completely restored in the field. Return units with such finishes to the manufacturer/fabricator for required alterations, followed by complete refinishing.

3.3 PROTECTION AND CLEANING

- A. Protect glazed decorative railing system components from damage immediately upon installation.
- B. Wash metal finishes just prior to final acceptance. Comply with instructions and recommendations of the glazed decorative railing system manufacturer for cleaning.
- C. Use streamers or ribbons suitably attached to the glass infill panels and held free of the glass. Do not apply warning markings directly to the glass.
- D. Remove and replace glass which is broken, cracked, chipped or damaged in any way and from any source, including weather, vandalism and accidents during the construction period at no additional cost to the Owner.
- E. Maintain glass in a reasonably clean condition during construction so that it will not become stained.

- F. Wash and polish glass on both faces and metal finishes just prior to final acceptance. Comply with instructions and recommendations of the glass manufacturer and glazed decorative railing system manufacturer for cleaning in each case.
- G. Remove and replace any glazed decorative railing system component that cannot be successfully repaired, at no additional cost to the Owner.
- H. Remove protective coverings when there is no longer any danger of damage to the metal surfaces of the system from other work yet to be performed in the same location. Restore protective coverings which have been removed or damaged during shipment or installation of the work, if such other work is yet to be performed.

END OF SECTION

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 - GENERAL

1.1 SUMMARY

- A. Rough carpentry and framing, including the following:
 - 1. Wood framing, blocking, furring, nailers and grounds for the anchor or support of other items or construction of every description including items reasonably implied but not specifically mentioned on the Drawings or specified herein to render the work secure and complete.
 - 2. Wood fire retardant treatment for lumber and plywood.
 - 3. Anchors, fasteners and hardware for the above.
- B. Related Sections:
 - 1. Gypsum board: Section 09 29 00.

1.2 ACTION SUBMITTALS

- A. Shop Drawings, Glue Laminate Members: Show laminate members, indicate configurations, dimensions, span, pitch, camber, and material species. Show connections.

1.3 INFORMATIONAL SUBMITTALS

- A. Product data for the following products:
 - 1. Metal framing anchors.
- B. Certification:
 - 1. Submit certification by treating plant stating chemicals and process used, net amount of salts retained and conformance with applicable standards.
 - 2. Preservative Treated Wood: Submit certification for waterborne preservative that moisture content was reduced to 19 percent maximum, after treatment for lumber and 15 percent for plywood.
 - 3. Fire Retardant Treatment: Submit certification by treating plant that fire retardant treatment materials comply with governing ordinances and that treatment will not bleed through finished surfaces.
- C. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for project.
 - 1. Metal framing anchors.

1.4 QUALITY ASSURANCE

A. Grading Rules:

1. Provide lumber conforming to the grading rules and wood species of the DOC Voluntary Product Standard PS-20.
2. Provide plywood conforming to the following:
 - a. Softwood Plywood - Construction and Industrial: DOC Product Standard PS-1.
 - b. Hardwood Plywood: DOC Product Standard PS-51.

B. Grading Marks: Identify lumber and plywood by official grade mark.

1. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded, where applicable and condition of seasoning at time of manufacture.
2. Softwood Plywood: Maximum grade trademark of the APA The Engineered Wood Association.
 - a. Type, grade, class and identification index.
 - b. Inspection, testing or grading agency.
3. Hardwood Plywood: Appropriate grade mark of qualified inspection, testing or grading agency.

C. Testing: ASTM E 84, maximum 25 flame spread rating.

D. Requirements of Regulatory Agencies:

1. Fire Hazard Classification: Underwriters' Laboratories, Inc., for treated lumber and plywood.
2. Working Stresses: Softwood Lumber, National Design Specification, American Forest & Paper Association (AFPA) American Wood Council (AWC).

E. Nailing:

1. Recommended Nailing Schedule of referenced framing standard and with AFPA, National Design Specifications for Wood Construction.
2. Roof Sheathing Fastening Schedules for Wind Uplift, APA The Engineered Wood Association.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Immediately upon delivery to job site, place materials in area protected from weather.
- B. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering, providing adequate air circulation or ventilation.
- C. Do not store seasoned materials in wet or damp areas.

- D. Protect fire retardant materials against high humidity and moisture during storage and erection.
- E. Protect sheet materials from corners breaking and damaging surfaces, while unloading.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber:

- 1. Dimension:
 - a. Specified lumber dimensions are nominal.
 - b. Actual dimensions conform to industry standards established by the American Lumber Standards Committee and the rules writing agencies.
- 2. Moisture Content: 19 percent maximum at time of permanent closing in of building or structure for lumber 2 inches or less nominal thickness.
- 3. Surfacing: Surface four sides (S4S), unless otherwise shown on the Drawings or specified.
- 4. Framing lumber, 2 inch to 4 inch thick, 2 inch to 4 inch wide, any commercial softwood species, unless otherwise shown on the Drawings or specified.
- 5. Boards: 1 inch to 2 inch thick; any commercial softwood species, No. 2 Common Grade.

B. Plywood:

- 1. Sheathing: APA Rated Sheathing, thickness as shown on the Drawings or if not shown provide 3/4 inch thick panels.
- 2. Subfloor: APA Rated Sheathing, Exposure 1, tongue-and-groove, thickness as shown on the Drawings or if not shown provide 3/4 inch thick panels.
- 3. Combination Subfloor Underlayment: APA Rated Stud-I-Floor, Exposure 1, tongue-and-groove, 3/4 inch thick unless noted otherwise on the Drawings.
- 4. Underlayment: APA C-C Plugged, Exposure Durability, Exterior, in areas where moisture is present, fire retardant treated, tongue-and-groove, 3/4 inch thick unless noted otherwise on the Drawings.
- 5. Marine Plywood: APA B-B Marine Grade, 3/4 inch thick unless noted otherwise on the Drawings.

C. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

- 1. Treatment shall not promote corrosion of metal fasteners.
- 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

2.2 METAL FRAMING ANCHORS AND HARDWARE

- A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated.
- B. Galvanized Steel Sheet: Hot-dip, zinc coated steel sheet complying with ASTM A 653, G60 coating designation; structural, commercial, or lock forming quality, as standard with manufacturer for type of anchor indicated.
- C. Rough Hardware: Zinc coated steel, unless otherwise shown on the Drawings or specified:
 1. Bolts: FS FF-B-575C.
 2. Nuts: FS FF-N-836C.
 3. Expansion Shields: FS FF-B-561C.
 4. Lag Screws and Bolts: FS FF-B-561C.
 5. Toggles Bolts: FS FF-B-588C.
 6. Wood Screws: FS FF-S-111D.
 7. Nails and Staples: FS FF-N-105B.
 8. Joist Hangers: Minimum 18 gage.
 9. Metal Cross Bridging: 16 gage.
 10. Bar and Strap Anchors: ASTM A 525, minimum 18 gage, hot-dip galvanized.
 11. Plyclips: Extruded aluminum alloy, ASTM B 221, 6063-T6.
- D. Acceptable Metal Framing Anchor Manufacturers:
 1. Heckman Building Products, Chicago, IL 60624.
 2. KC Metal Products, Inc., San Jose, CA 95131.
 3. Simpson Strong-Tie Company, Inc., Pleasanton, CA 94588.
 4. Southeastern Metal Manufacturing Company, Jacksonville, FL 32218.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine surfaces to receive the parts of the work specified herein. Verify dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of existing conditions.

3.2 INSTALLATION

- A. General: Frame wood members to a close fit, set accurately to required lines and levels and secure rigidly in place in accordance with the Drawings. Cut to fit framing, blocking, etc. to accommodate other work.

- B. Nailing: Provide as a minimum nailed connections for wood framing members in accordance with the National Design Specifications for Wood Construction, American Forest & Paper Association but not less than specified below, unless otherwise noted on the Drawings. Provide nails shown and noted as common unless otherwise noted. Clinch ends of nails which project from wood members when direct nailing is indicated.
- C. Miscellaneous Framing:
 - 1. Framing for Mechanical Work:
 - a. Frame members for passage of pipes and ducts to avoid cutting structural members.
 - b. Do not notch or bore framing members for passage of pipes or conduits without concurrence of the Architect.
 - c. Reinforce framing members where damaged by cutting.
- D. Plywood Wall Sheathing:
 - 1. Install with face grain horizontal.
 - 2. Allow minimum 1/16 inch space at end joints and 1/8 inch at edge joints; double these spacings under wet or humid conditions.
 - 3. Nail 6 inches o.c. along panel edges and 12 inches o.c. at intermediate supports with 6d common nails for panels 1/2 inch thickness and less and 8d nails for greater thicknesses.
- E. Subfloor and Underlayment:
 - 1. Install subfloor with face grain perpendicular to joists, end joint supported on joists. Install underlayment perpendicular to subfloor.
 - 2. Install lumber blocking between joists when tongue-and-groove panels are not used.
 - 3. Stagger end joints.
 - 4. Butt ends and edges, allowing 1/16 inch space between panels.
 - 5. Nail plywood 3/4 inch thick or less maximum of 6 inches o.c. at panel edges and 10 inches o.c. at intermediate supports with 6d ring shank or screw type nails with 1 inch penetration into structural members, except when supports are spaced 48 inches o.c., space nails maximum of 6 inch o.c. at supports with 1 inch penetration.
 - 6. Nail plywood 7/8 inch thick and greater with 8d common nails spaced maximum of 6 inches o.c. at panel edges and 10 inches at intermediate supports.
 - 7. Set nail heads into plywood 1/32 inch without dimpling surface or breaking surface fiber.
- F. Fire Retardant Treated Wood Products:
 - 1. Provide fire retardant treated wood for framing, blocking, furring, nailing strips, and plywood where shown on the Drawings and required by local codes.
 - 2. Apply two brush coats of same treatment used in original treatment to sawn or cut surfaces of fire treated lumber and plywood.

MAC ROOM 153 RENOVATION
COLLEGE OF DUPAGE
Issue for Bid and Permit

PERKINS+WILL
024303.007
March 6, 2018

END OF SECTION

**SECTION 07 92 00
JOINT SEALANTS**

PART 1 - GENERAL

1.1 SUMMARY

A. Joint sealants and installation accessories, including the following:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

B. Related Sections:

1. Unit masonry: Section 04 20 00.
2. Hollow metal doors and frames: Section 08 11 13.
3. Gypsum board: Section 09 29 00.
4. Acoustical ceiling panels: Section 09 51 00.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with stone or masonry substrates.
4. Submit not fewer than 8 pieces of each kind of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
6. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
7. Testing will not be required if joint sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with, joint substrates and other materials matching those submitted.

B. Preconstruction Field Adhesion Testing: Before installing sealants, field test their adhesion to project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to ASTM C 1193, Appendix X1, Method A - Field-Applied Sealant Joint Hand Pull Tab, or ASTM C 1521, Method A - Tail Procedure.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint Sealant Schedule: Include the following information:
 1. Joint sealant application, joint location, and designation.
 2. Joint sealant manufacturer and product name.
 3. Joint sealant formulation.
 4. Joint sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.

- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
 - 1. Joint-sealant location and designation.
 - 2. Manufacturer and product name.
 - 3. Type of substrate material.
 - 4. Proposed test.
 - 5. Number of samples required.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Laboratory Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Preconstruction Field Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Field Adhesion Test Reports: For each sealant application tested.
- H. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Comply with the applicable portions of ASTM C 1193 - Standard Guide for Use of Joint Sealants for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint sealant installations with a record of successful in-service performance.
- C. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- D. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and

cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

- E. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
- D. This warranty is in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40CFR59, Part 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Stain Test Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 JOINT SEALANTS

- A. S-2: Single Component, Nonsag Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT. Subject to compliance with requirements, provide one of the following:
 - 1. "Dynatrol I-XL" (Pecora Corporation).
 - 2. "Sikaflex - 1a" (Sika Corporation, Construction Products Division).
 - 3. "Dymonic and Vulkem 116" (Tremco Incorporated).
 - 4. "Masterseal NP1" (BASF).
- B. S-3: Multicomponent, Nonsag Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T. Subject to compliance with requirements, provide one of the following:
 - 1. "Dynatred" (Pecora Corporation).
 - 2. "Sikaflex - 2c NS" (Sika Corporation, Construction Products Division).
 - 3. "Masterseal NP2" (BASF).
 - 4. "Vulkem 227" (Tremco Incorporated).
- C. S-4: Acrylic Latex or Siliconized Acrylic Latex Joint Sealant: ASTM C 834, Type OP, Grade NF. Subject to compliance with requirements, provide one of the following:
 - 1. "AC-20+" (Pecora Corporation).
 - 2. "Tremflex 834" (Tremco Incorporated).

3. "Masterseal 520" (BASF).
- D. S-5: Single Component, Nonsag Neutral Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT. Subject to compliance with requirements, provide one of the following:
 1. "790" (Dow Corning Corporation).
 2. "SilPruf LM SCS2700" (GE Advanced Materials – Silicones).
 3. "Spectrem 1" (Tremco Incorporated).
 4. "890NST" (Pecora Corporation).
 - E. S-9: Butyl sealant: material with a movement capability of plus or minus 5 percent, conforming to ASTM C 1085.
 1. "Butyl Rubber Sealant BC-158" (Pecora Corp.).
 2. "PTI 757" (H. B. Fuller Company).
 3. "Tremco Butyl Sealant" (Tremco, Inc.).
 - F. S-10: Polyurea Joint Sealant: Two-part, fast setting, self-leveling, 100 percent solids, semi-rigid, for sealing parking garage floor slab, saw-cut, construction and control joints:
 1. "Euco QWIK Joint 200" (Euclid).
 2. "Masterseal CR 100" (BASF).
 - G. S-11: Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90. Subject to compliance with requirements, provide one of the following:
 1. "AC-20 FTR or AIS-919" (Pecora Corporation).
 2. "SHEETROCK Acoustical Sealant" (USG Corporation).
 3. "Acoustical Sealant" (Tremco, Inc.).

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, type and material as recommended and approved in writing by joint sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
 - 1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Remove laitance and form release agents from concrete.
 - 3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer or as indicated by preconstruction joint sealant substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written

instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile complying with ASTM C 1193, Figure 8A, unless otherwise indicated.
 - 4. Provide flush joint profile complying with ASTM C 1193, Figure 8B.
 - 5. Provide recessed joint configuration of recess depth and at locations complying with ASTM C 1193, Figure 8C.

- a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

- G. Acoustical Sealant Installation: At sound rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Field Adhesion Testing: Field test joint sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

- a. Perform 10 tests for the first 1,000 feet of joint length for each kind of sealant and joint substrate.
- b. Perform one test for each 1,000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to ASTM C 1193, Appendix X1, Method A - Field-Applied Sealant Joint Hand Pull Tab, or ASTM C 1521, Method A - Tail Procedure.

- a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

- a. Whether sealants filled joint cavities and are free of voids.
- b. Whether sealant dimensions and configurations comply with specified requirements.
- c. Whether sealants in joints connected to pulled out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field adhesion hand pull test criteria.

4. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

- B. Evaluation of Field Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing

or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT SEALANT SCHEDULE

- A. Joints in interior traffic surfaces S-10
- B. Joints in interior, moving construction, including door frames and tops of interior walls and partitions S-2, S-3 and S-5
- C. Joints exposed in non-moving interior construction S-4
- D. Joints concealed non-moving interior construction S-9
- E. Acoustical sound rating locations S-11

END OF SECTION

SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Interior expansion joint assemblies including, assembly and installation accessories required to complete each installation.
- B. Related Sections:
 - 1. Sound Absorbing Wall Units: Section 09 84 33.
 - 2. Acoustical Ceilings: Section 09 51 00.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Floor plan lay-out locating each type of assembly.
 - 2. Details of installations showing dimensions, width of joints, methods, types and spacing of anchors and adjacent related construction.
- C. Samples: 6 inch long sample pieces of each type joint assembly specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description and installation instructions.
- B. Product Test Reports: From a qualified testing agency indicating architectural joint systems comply with requirements, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain joint systems through one source from a single manufacturer. Coordinate compatibility with adjoining joint systems specified in other Sections.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, handle and store expansion joint assemblies and associated materials in such a manner as to prevent damage or deterioration in accordance with the manufacturer's recommendations. Packaged materials shall be in original

containers and wrappings with seals unbroken and labels intact until time of installation. Store materials above ground in a dry place under weatherproof covers. Damaged or otherwise unsuitable materials shall be immediately removed from the job site.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design Product: "Model FWF" (C/S) or comparable products, as approved by Architect of:
 - 1. MM Systems Corporation, Tucker. GA 30085.
 - 2. Balco USA, Wichita, KS 67217.

2.2 MATERIALS

- A. Aluminum:
 - 1. Extrusions: ASTM B 221, 6063-T5.
 - 2. Plate: ASTM B 209, 6061-T6.
 - 3. Finishes:
 - a. Concealed: Mill finish
 - b. Exposed to View: Class I, Clear Anodic Finish, complying with AAMA 611.
- B. Seals:
 - 1. Manufacturer's standard compressible resilient synthetic rubber extrusions designed to engage into continuous races in aluminum expansion joint cover extrusions.
- C. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, lubricants, adhesives, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.3 FABRICATION

- A. Provide expansion joint assemblies to accommodate joint widths shown on the Drawings for specified joint condition types. Fabricate special transitions, corner fittings and end closures as shown on the Drawings or as required by conditions of the installation.
- B. Provide anchors and accessories as required by conditions and materials present to installation and complete each installation.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine surfaces and construction to receive the joint cover assemblies and accessories. Verify dimensions of in-place and subsequent construction prior to fabrication.
- B. Fabrication or installation of the joint cover assemblies constitutes acceptance of the existing and related conditions and construction. Coordinate locations of assemblies in the construction for work to be accomplished by others required prior to joint assembly installation.

3.2 INSTALLATION

- A. Install and anchor joint cover assemblies and accessories in accordance with the manufacturer's printed instruction and the final reviewed Shop Drawings. Make allowance for change in joint size due to difference between installation and construction operating temperatures.
- B. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action by factory applied primer paint or a coat of bituminous paint, coatings shall not be exposed to view.
- C. Install units straight, plumb, level and in proper alignment with other work. Use tamperproof fasteners when exposed to view. Flush butt joints of the installation. Adjust cover to freely accommodate joint movement.
- D. Maintain continuity of joint systems with a minimum number of end joints and align metal members. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames. Adhere flexible filler materials, if any, to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

3.3 CLEANING AND PROTECTION

- A. After installation, cover and protect exposed portions of the joint cover assemblies from damage.
- B. Just prior to final acceptance, remove protective coverings and clean surfaces with plain water, or if required with a solution of water and mild household detergents as recommended by manufacturer. Remove and replace any component that cannot be successfully repaired.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Hollow metal doors and frames, including fabrication and installation accessories.
- B. Related Sections:
 - 1. Unit masonry: Section 04 20 00.
 - 2. Finish door hardware: Section 08 71 00.
 - 3. Non-Load Bearing Metal Framing: Section 09 22 16.
 - 4. Gypsum board: Section 09 29 00.
 - 5. Painting: Section 09 91 00.

1.2 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.3 ACTION SUBMITTALS

- A. Product Data: Copies of manufacturer's data for fabrication and installation instructions.
- B. Shop Drawings:
 - 1. Submit shop drawings for the fabrication and installation. Include details of each frame type, elevations of door design types, conditions at openings, details of anchorage to construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections.
 - 2. Provide a schedule of doors and frames using same reference numbers for details and openings as those on the Contract Document Drawings. Indicate fire-rated doors and frames, welded and knockdown frames.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

- B. Certification: When door assemblies required to be fire-rated that exceed manufacturer's capabilities or UL design maximum sizes, submit copies of Door and Frame Manufacturer's Label Certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to the requirements for labeled assemblies or products or units tested in accordance with ASTM E 2074.

1.5 QUALITY ASSURANCE

- A. Products: Provide standard welded hollow steel doors and frames by a single firm specializing in the production of custom hollow steel work as evidenced by a minimum of 10 consecutive years production experience.
- B. Provide standard hollow steel doors and frames conforming to the applicable recommended practices contained in the following:
 - 1. Standard: Steel Door Institute (SDI), Standard Steel Doors and Frames, SDI 100/ANSI/SDI A250.8, Recommended Specifications, except as herein modified.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Inspection: Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided the finish items are equal to new work; otherwise, remove and replace damaged items as directed.
- B. Storage: Store at the building site under cover. Place units on at least 4 inch high wood sills or on floors in a manner that will prevent rust and damage. Avoid the use of non-vented plastic or canvas shelters, which could create a humidity chamber. If the cardboard wrapper on the door becomes wet, remove the carton immediately. Provide a 1/4 inch space between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide hollow metal work by one of the following:
 - 1. Ceco Door Products; an Assa Abloy Group company.
 - 2. Curries Company; an Assa Abloy Group company.
 - 3. Steelcraft; an Allegion company.
 - 4. Republic Doors and Frames.

2.2 MATERIALS

- A. Hot-Rolled Steel Sheets and Strips: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 1011/ A 1011 M and ASTM A 568/ A 568M.
- B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 1008/ A 1008M and ASTM A 568/ A 568M.
- C. Structural Steel Shapes: ASTM A 36/ A 36M.
- D. Steel Bars: ASTM A 108.
- E. Steel Plate: ASTM A 283/ A 283M.
- F. Supports and Anchors: Fabricate of not less than 0.053 inch thick sheet metal. Galvanized after fabrication for units to be built into exterior walls, complying with ASTM A 1008/ A 1008M or ASTM A 1011/ A 1011M, hot-dip galvanized according to ASTM A 153/ A 153M, Class B.
- G. Shop Primer: Modified alkyd rust inhibiting primer paint as standard with door and frame fabricator.

2.3 FABRICATION – GENERAL

- A. Fabricate hollow metal units to be rigid, neat in appearance and free from defects, warp, buckle and shadows or surface deformations from welds. Accurately form metal to required sizes and profiles. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at the project site. Weld exposed joints continuously, grind, dress, and make smooth, flush, and invisible.
- B. Prepare hollow metal units to receive finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Specifications for Door and Frame Preparation for Hardware, current edition.
- C. Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with National Builders' Hardware Association "Recommended Locations for Builder's Hardware", current edition.

2.4 DOOR FABRICATION

- A. Provide full flush design doors, seamless hollow construction. Bevel both vertical edges 1/8 inch.
- B. Fabricate of hot or cold-rolled, stretcher leveled steel sheets. Construct doors with smooth, flush surfaces, continuously welded edge seams without visible joints or seams on exposed faces or stile edges.

- C. Interior Doors: SDI - Level 2 - Heavy Duty, Full Flush and Seamless, but not less than the following:
 - 1. Reinforce to SDI - Level 2. Use manufacturer's standard core.
 - 2. Reinforce tops and bottoms of interior doors with 0.042 inch thick horizontal steel channels spot welded at not more than 5 inches o.c. to the outer sheets.
 - 3. Provide not less than 0.0598 inch thick steel faces.
- D. Finish Hardware Reinforcement: Unless otherwise indicated herein, reinforce doors for scheduled finish hardware, as follows:
 - 1. Butt Hinges: Steel plate not less than 0.187 inch thick x 1-1/2 inches wide x 6 inches longer than hinge, secured by not less than six spot welds.
 - 2. Mortise Locksets and Dead Bolts: Not less than 0.067 inch thick steel sheet, secured with not less than two spot welds.
 - 3. Flush Bolts: Not less than 0.093 inch thick steel sheet, secured with not less than two spot welds.
 - 4. Surface Applied Closers: Not less than 0.093 inch thick steel sheet, secured with not less than six spot welds.

2.5 FRAME FABRICATION

- A. General:
 - 1. Fabricate frames unless noted otherwise of full welded unit construction, with corners full mitered, reinforced, continuously welded inside the full depth and width of frame miter, including returns, soffits and stops.
 - 2. Knockdown frames will not be acceptable as alternates for welded frames.
 - 3. Form frames of either cold or hot-rolled sheet steel.
 - 4. Interior Frames: Provide not less than 0.053 inch thick steel for interior openings, including 4 feet wide.
 - 5. For openings over 4 feet wide, increase thickness by at least 2 standard thickness.
- B. Welded Frame Corner Joints (Full Profile Welded) :
 - 1. Fabricate frame members stamped in the flats to a predetermined pattern, designed to provide mitered faces or trims and mitered stops.
 - 2. After fabricating head and jamb members, fit frames together engaging projecting tabs into corresponding slots in the head.
 - 3. Tightly close contact edges so that trim and faces are aligned straight, level and true.
 - a. Secure interlocking tabs where they pass thru head slots by welding.
 - b. Continuously weld back bends, soffits and returns together.
 - c. Continuously weld mitered trim joints on each side inside the frame section. Dress and finish exposed joints to produce invisible connections.
 - d. Weld head and jamb together along their intersecting depth and width inside the frame.
 - e. Weld jambs to head overhang along the length of each rabbet, inside the frame completely welding the full joint perimeter.

- f. Grind welds on exposed surfaces smooth and flush with adjoining surfaces.
 - C. Welded Frame Jamb Anchors: Furnish jamb anchors as required to secure frames to adjacent construction and as required by fire-rated assemblies, formed of not less than 0.042 inch thick galvanized steel unless noted otherwise.
 - 1. Metal Stud Partitions: Insert type with notched clip to engage metal stud, welded to back of frames. Provide at least four anchors for each jamb for frames up to 7 feet-6 inches in height; five anchors up to 8 feet jamb height; one additional anchor for each 24 inches or fraction thereof over 8 feet height.
 - D. Floor Anchors: Provide floor anchors for each jamb and mullion which extends to floor, formed of not less than 0.067 inch thick galvanized steel sheet; clip type anchors, with two holes to receive fasteners, welded to bottom of jambs.
 - E. Structural Reinforcing Members: Provide structural reinforcing members as a part of frame assembly, where indicated at mullions, transoms or other locations which are to be built into frame.
 - F. Head Reinforcing: For frames over 4 feet wide in masonry wall openings, provide continuous steel channel or angle stiffener, not less than 0.093 inch thick for full width of openings, welded to back of frame at head, except where not allowable for label requirements.
 - G. Finish Hardware Reinforcement: Unless otherwise indicated herein, reinforce frames for scheduled finish hardware, as follows:
 - 1. Butt Hinges and Pivots: Steel plate not less than 0.187 inch thick x 1-1/2 inches wide x 6 inches longer than hinge, secured by not less than six spot welds.
 - 2. Surface Applied Closers: Not less than 0.093 inch thick steel sheet, secured with not less than six spot welds.
 - H. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.
 - I. Rubber Door Silencers: Drill stop to receive three silencers on single door frames and four silencers on double door frames. Install plastic lugs to keep holes clear during construction.
 - J. Plaster Guards: Provide 0.016 inch thick steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware installation.
- 2.6 STOPS AND MOLDINGS
- A. Provide stops and moldings around openings in hollow metal door units.

- B. Form fixed stops and moldings integral with door or frame. Provide fixed stops on outside of hollow metal units exposed to exterior and on corridor side of interior units, unless otherwise indicated.

2.7 SHOP PAINTING

- A. Clean surfaces of fabricated units of mill scale, rust, oil, grease, dirt and other foreign matter.
- B. After fabrication, dress, fill and sand tool marks and surface imperfections as required to make faces and vertical edges smooth, level and free of irregularities.
- C. Pretreat cleaned surface in accordance with SSPC-PT-2, SSPC-PT3 or SSPC-PT4. Verify compatibility of primer with galvanized surfaces. Provide primer on galvanized surfaces that will not affect finish paint materials.
- D. Shop Applied Paint:
 - 1. Plain Steel: For steel surfaces, use rust inhibitive enamel or paint, either air drying or baking, suitable as a base for finish paints, complying with ANSI/SDI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install hollow metal units and accessories in accordance with the final reviewed shop drawings, manufacturer's written instructions, and as herein specified.
- B. Floor Anchors: Floor anchors may be set with power actuated fasteners instead of masonry anchorage devices and machine screws, if so approved by the Architect.
- C. Placing Frames: Comply with SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 - 2. Make field splices in frames as detailed on final shop drawing, welded and finished to match factory work.
 - 3. Remove spreader bars only after frames or bucks have been properly set and secured.
 - 4. Installation Tolerances: Adjust hollow metal door frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

- c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- D. Door Installation: Comply with SDI A250.8.
 - 1. Fit hollow metal doors accurately in their respective frames, with the following clearances:
 - a. Jambs and Head: 3/32 inch.
 - b. Meeting Edges, Pairs of Doors: 1/8 inch.
 - c. Bottom: 3/4 inch, where no threshold or carpet (except where scheduled as undercut).
 - d. Bottom: At threshold, carpet or thin-set ceramic tile: Not less than 1/4 inch and not greater than 3/8 inch from floor finish or top of threshold.
 - 2. For hardware refer to drawings.
- E. Wherever a frame contacts masonry or grout the non-exposed surfaces of that frame shall be protected from corrosion by coating those surfaces with a spray bituminous material. The sprayed coating shall be a minimum of 0.05" in thickness.

3.2 ADJUST AND CLEAN

- A. Final Adjustment: Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise unacceptable.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Access doors, including installation accessories.
- B. Related Sections:
 - 1. Unit masonry: Section 04 20 00.
 - 2. Painting: Section 09 91 00.

1.2 ACTION SUBMITTALS

- A. Shop Drawings: Plan, elevation and details of construction for each type of door specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description and installation instructions.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Karp Associates, Inc., Maspeth, NY 11378.
- B. Milcor Incorporated, Lima, OH 45804.
- C. Nystrom, Inc., Minneapolis, MN 55413.

2.2 ITEMS

- A. Type VII: Flush panel access door with exposed flange for various non-fire-rated constructions, one of the following:
 - 1. Karp, DSC-214M.
 - 2. Milcor, Style M.
 - 3. Nystrom, NT.

2.3 FABRICATION

- A. Type VII: Flush panel access door with exposed flange for various non-fire-rated constructions:
 - 1. Provide frame of 16 gage steel door frame with 14 gage flush steel door.
 - 2. Provide door and frame factory prime coated with baked enamel over a protective phosphate coating on the steel.
 - 3. Provide continuous pin mounted hinges on longest side opening 180 degrees.
 - 4. Provide flush locks, with metal cam and be a key operated cylinder lock.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine surfaces to receive the access doors. Verify dimensions of in-place and subsequent construction. Installation of the access doors shall constitute acceptance of the related construction.

3.2 INSTALLATION

- A. Install access doors as shown, or in the absence of details, in accordance with manufacturer's instructions.
- B. Following installation of the access doors, clean surfaces, lubricate and test operation of moving parts. Make adjustments in operation as necessary.

END OF SECTION

**SECTION 08 71 00
FINISH DOOR HARDWARE**

PART 1 - GENERAL

1.1 SUMMARY

- A. Finish door hardware for swing, sliding and folding doors.
- B. Related Sections:
 - 1. Hollow metal doors and frames: Section 08 11 13.
 - 2. Painting: Section 09 91 00.

1.2 ACTION SUBMITTALS

- A. Product Data.
- B. Samples:
 - 1. Samples for Verification: Submit minimum 2-by-4-inch plate samples of each type of finish required, except primed finish.
 - 2. Lockset Lever and Rose: 1 lockset with rose, if any, of each design and finish scheduled in the reviewed hardware schedule. Samples will be returned at the completion of the Work.
- C. Hardware Schedule:
 - 1. Provide hardware schedule containing a complete listing of finish hardware items required for the project, whether or not specifically named in the Specifications or indicated on the Drawings. The Architect's review of the schedule is not to be construed to relieve the Contractor of responsibility for errors or omissions in the schedule, nor of the responsibility to completely equip the project with finish hardware.
 - 2. Include in the schedule each door location, hand of door, complete list of each hardware set item per set, finish, manufacturer of each item and keying information. Use same reference numbers and letters for doors and sets as those on the Contract Documents.
- D. Keying Schedule: Submit separate detailed keying schedule for approval indicating clearly how the Owner's final instructions on keying of locks have been fulfilled.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Installation and maintenance instructions and catalog cut sheets for items scheduled.

- B. Template Notification: Written notification that required templates and a copy of the final reviewed hardware schedule have been sent to the hollow metal door and frame and aluminum door and frame, manufacturers for use in fabrication.
- C. Warranties: Copies of warranty for each item requiring a warranty.
- D. Operation and Maintenance Manuals: Upon completion, furnish 2 complete maintenance manuals to the Owner. Include the following items:
 - 1. Approved hardware schedule, catalog cuts and keying schedule.
 - 2. Hardware installation and adjustment instructions.
 - 3. Manufacturer's written warranty information.

1.4 QUALITY ASSURANCE

- A. Supplier Qualifications:
 - 1. The hardware supplier is to be an industry recognized company who has maintained and has been furnishing hardware in the project's vicinity for a period of not less than 2 years.
 - 2. The supplier of the finish hardware is to be a firm with not less than 5 years of consecutive experience in supplying finish hardware of the quantity and quantity specified for projects similar in size and complexity.
 - 3. The supplier of the finish hardware is to be a firm technically qualified and experienced in supplying building structures with finish hardware.
 - 4. The supplier is to employ a experienced certified Architectural Hardware Consultant (AHC) who is to be available, at reasonable times during the course of the hardware submittals, supply and installation, for consultation about the project hardware requirements to the Owner, Architect and Contractor.
 - 5. Refinements such as butt knuckle, clearance, strike lip lengths and adjustments, beveling of lock faces, handing of doors and centering of backsets will be expected and is to be indicated in the submitted hardware schedule.
- B. Supplier Responsibilities: The supplier is responsible for thoroughly detailing the entire project to assure that the items specified will properly function in the indicated locations. Should the items specified not work properly, it is the responsibility of the supplier to furnish suitable items of comparable quality as approved by the Architect to those being furnished throughout the project.
- C. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- E. Hardware Sets: The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a

detailed hardware schedule. Discrepancies, conflicting hardware and missing items are to be brought to the attention of the Architect with corrections made prior to the end of the bidding process. Omitted items not included in a hardware sets are to be scheduled with the appropriate additional hardware required for proper application and functionality.

F. Regulatory Requirements: Comply with provisions of the following:

1. Accessibility Standard: Where indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.
2. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks are not to require the use of a key, tool, or special knowledge for operation.
 - b. Door Closers: Not more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
 - c. Thresholds: Not more than 1/2 inch high.

G. Reference Standards:

1. ANSI/BHMA A156.

1.5 COORDINATION

- A. Coordinate layout and installation of recessed pivots and or closers with floor construction and finishes. Cast anchoring inserts into concrete.
- B. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Keying Meeting: Conduct meeting with the Owner or Owner's representative prior to submitting the Key schedule for Owner's review. Incorporate keying meeting decisions into final keying schedule including, but not limited to, the following:
 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 2. Final key system schematic diagram.
 3. Requirements for key control system.
 4. Address for delivery of keys.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Handle finish hardware in such a manner as to prevent damage. Store in a clean, dry, secure place.
- B. Package each set of hardware items together in sets, identified with set numbers in accordance with the final reviewed hardware schedule.

1. Package each item of hardware separately and labeled separately.
 2. Include in each package appropriate fastening installation instructions and templates.
 3. Deliver a complete schedule with shipped hardware.
- C. Should marking of any item become separated from the item, return the item to the supplier for marking.
- D. Immediately remove from the job site damaged or otherwise unsuitable items when so ascertained and replace with an identical item.

1.7 WARRANTY

- A. Provide Hardware Manufacturer's standard written form in which the hardware item manufacturer agrees to repair or replace door hardware components that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of operators and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 2. Warranty Period: 3 years from date of Substantial Completion, except as follows:
 - a. Mortise Locksets: 5 years from date of Substantial Completion.
 - b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS & FINISHES

- A. Materials and equipment are contained in the Hardware Schedule.
- B. Unless otherwise specified, provide various items of hardware with color and finish matching the finish specified for locksets and latchsets.
- C. Provide finishes of the same designation, that come from two or more sources, which match when the items are viewed at arms length and approximately 2 feet apart.
- D. Provide hue of color of each finish matching whether or not the base metal is cast, forged or stamped, or when plating is applied over steel, brass or bronze.
- E. Provide manufacturer's standard painted finish over bonderized and prime coated metal surfaces where required; the lacquer or enamel matching the finish of the locksets and latchsets unless otherwise specified.

F. Hardware Finishes:

1. Provide finishes as indicated in the herein hardware sets. Provide other hardware with matching finish unless noted otherwise.
2. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products
3. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

2.2 TEMPLATES

- A. Fabricate locks, hinges, closers and other hardware, to be mounted on hollow metal doors and frames to templates; furnish with machine screws. Furnish templates to hollow metal door and frame manufacturers and other manufacturers requiring such templates.

2.3 FASTENINGS

- A. Furnish hardware with screws and other fastenings suitable to assure permanent anchorage. Where exposed, provide fastenings of countersunk oval head type, (except use flat head for hinges), and matching finish of hardware being attached. Provide concealed fastenings. Exposed through and sex bolts are not acceptable. Do not attach hardware with self-tapping or sheet metal screws. Fasten floor type stops and holders to the floor with machine screws into expansion shields.

2.4 ACCEPTABLE MANUFACTURERS

- A. Proprietary names used to designate hardware in the schedule are not intended to imply that products of the manufacturer are required to the exclusion of equivalent products of other herein named or listed manufacturers. The Architect is to be informed in writing in accordance with Section 01 60 00 "Product Requirements" for approval of hardware items and manufacturers not specified on the project prior to submitting the hardware schedule.

2.5 ELECTRONIC HARDWARE

- A. For each item of electrified hardware specified, provide standard "Molex" type plug connectors to accommodate up to 12 wires. Provide Plug connectors that plug directly into through-door wiring harnesses, frame wiring harnesses, electric locking devices and power supplies.

2.6 HARDWARE ITEMS

- A. General: Subject to compliance with requirements, provide hardware as scheduled on drawings, or comparable products approved by Architect.
- B. Hanging Devices:
 - 1. Butt Hinges:
 - a. Complying with ANSI/BHMA A156.1 Grade 1.
 - b. Provide 3 hinges for every door.
 - c. Butt hinges: BB1279 (4 1/2 x 4 1/2" NPR (non rising pin) 626 finish_Hagar.
- C. Flush Bolts And Accessories:
 - 1. Provide manual and automatic flush bolts, dust-proof strikes and related accessories as indicated in the hardware schedule sets.
 - 2. Complying with BHMA A156.16, Grade 1.
 - 3. Ives FB458 B26D 12", dust proof (#DP2) pocket strike.
- D. Cylinders And Keying: core furnished by Owner.
- E. Locking Devices:
 - 1. Mortise Locksets:
 - a. Complying with ANSI/BHMA 156.13 Series 1000, Grade 1 Certified.
 - b. Schlage storeroom lock - #L9080BD 06N 626.
- F. Door Closers - Surface Mounted Door Closers – Heavy Duty:
 - 1. Complying with ANSI/BHMA 156.4, Grade 1 Certified.
 - 2. Glynn Johnson closer 440 cushion with Glynn Johnson 904.
 - 3. Do not install closers on exterior or corridor side of doors where possible.
- G. Silencers: Furnish rubber door silencers at hollow metal frames; 4 per pair Glynn Johnson (old part# GJ64/New Part# SR64).

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine and verify conditions of hardware installations. Installation of finish hardware and related items constitute acceptance of the existing conditions.

3.2 PRE-INSTALLATION ORIENTATION

- A. After delivery of hardware and prior to its installation, meet with the installer and manufacturers. Compare approved samples with actual hardware delivered to assure acceptability. Review catalogs, brochures, installation instructions and the

final hardware schedule. Rehearse installation procedures and workmanship, with special techniques of installation.

3.3 INSTALLATION

- A. Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.
- B. Install finish hardware plumb, level and true to line. Install each hardware item in compliance with the manufacturer's printed instructions and recommendations.
- C. Install finish hardware using supplied templates for each item. Cut and fit substrate to avoid substrate damage and weakening. Cover cut-outs with hardware item. Mortise work in correct locations and size, without gouging, splintering or causing irregularities in the finished work.
- D. Where cutting and fitting is required on substrates to be painted or stained, install, fit and adjust hardware prior to finishing work. Remove finish hardware and place in original packaging. Reinstall hardware after finishing.
- E. Attach thresholds to concrete surfaces using drilled-in lead expansion shields and countersunk flat-head bronze or stainless steel screws. Set thresholds in a continuous bed of polyurethane sealant.

3.4 MOUNTING HEIGHTS OF HARDWARE

- A. Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
- B. Where standards or specified heights conflict, consult the Architect for interpretation prior to mounting hardware.

3.5 FIELD QUALITY CONTROL

- A. The Architect and hardware supplier will do a final inspection prior to building completion to ensure that hardware was correctly installed and is in proper working order.
- B. Prior to the installation of hardware, manufacturer's representatives for locksets, closers, and exit devices is to arrange and hold a jobsite meeting to instruct the hardware installer's personnel on the proper installation of their respective products. Send a letter of compliance to the Architect indicating when this meeting is to be held and who will be in attendance.

3.6 CLEANING, TRAINING AND FINAL ADJUSTMENT

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
- B. Immediately prior to acceptance of the building by the Owner, lubricate hardware with graphite or special oil, test and adjust moving parts. Clean hardware to remove dust and stains.
- C. Instruct Owner's designated personnel in adjustment and maintenance of hardware and finishes during hardware adjustment. Furnish special tools to the Owner's Representative as required to adjust and maintain hardware.
- D. Where door hardware is installed more than one month prior to Final Completion or partial occupancy of a space or area, return to the installation during the week prior to Final Completion or partial occupancy and make final check and adjustment of hardware items in such space or area. Clean operating items as necessary to restore to proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment and air movement so that items operate properly.

3.7 PROTECTION

- A. Protect exposed hardware installed on doors during the construction phase. Install hardware at the latest possible time frame to avoid damage from construction activities. Replace damaged hardware.

END OF SECTION

**SECTION 08 80 00
GLAZING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Glass and glazing.
- B. Related Sections:
 - 1. Glazed Decorative Railing Systems: Section 05 73 12.
 - 2. Joint Sealants: Section 07 92 00.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement, and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Impact Loads For Interior Installations: Per applicable code or herein referenced industry standard.
 - b. Guardrails Infill: Design glass glazed decorative railing systems as a guardrail. Design glass to resist a horizontal impact load of 200 pounds applied to any 1 square foot of infill area, at any point, in any direction on the glass infill.

1.3 ACTION SUBMITTALS

- A. Product data.
- B. Samples for Initial Selection:
 - 1. Sets of laminated glass interlayer color and pattern selection samples.
 - 2. Sets of color samples of glazing sealant for each type of sealant used.
- C. Samples for Verification:
 - 1. 12 inch x 12 inch samples of each type glass.

2. 6 inch lengths of glazing tape.
3. Color samples of glazing sealant selected.
4. Laminated glass interlayer color and pattern selected.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description and installation instructions for glazing materials.
- B. Compatibility and Adhesion Test Report: Submit copies of statement from sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants and interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.
- C. Warranties: Signed copies of laminated glass warranties.

1.5 QUALITY ASSURANCE

- A. Comply with the following:
 1. GANA Publications: GANA's - Glazing Manual.
 2. Glazing Material: FS DD-G-451D, ANSI Z97.1, and ASTM C 1036.
 3. Glass Coating: ASTM C 1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
 4. Safety Glazing: ASTM C 1048, ASTM C 1172, ANSI Z97.1, ANSI Z97.1a, U.S. Consumer Product Safety Commission Standard 16 CFR 1201 CI and CII, and GANA'S - Glazing Manual and Laminated Glass Design Guide.
- B. Unless otherwise shown or governed by other referenced standards specified, conform with details and procedures of GANA, (Glass Association of North America) Glazing Manual.
- C. Installer Qualifications: An experienced installer, as evidenced by a minimum of 5 consecutive years experience, and who has completed glazing similar in material, design, and extent to that indicated for project and whose work has resulted in construction with a record of successful in-service performance.
- D. Source Limitations:
 1. Laminated Glass: Obtain laminated glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.
 2. Tempered Glass: Obtain tempered glass units from one manufacturer using the same type of glass and tempering process for units.
- E. In the event of a conflict between specified standards or references the more stringent or greater is to take precedent and be the one utilized for the design and installation.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver glazing materials to project site in manufacturer's unopened containers, fully identified with trade name, color, size, hardness, type, class and grade. Store each item in accordance with manufacturer's instructions. Immediately remove from the job site damaged or otherwise unsuitable material, when so ascertained.

1.7 WARRANTY

- A. Laminated Glass: Provide a written 5 year warranty from date of manufacture for laminated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
- B. The above warranties are in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Clear Float Glass: Complying with ASTM C 1036, Type I, Class 1, Quality q3, thickness as shown or specified, tempered in doors and adjacent lights where shown on Drawings or required by codes.
- B. Clear Laminated Glass: Complying with ASTM C 1172, two layers of tempered or heat strengthened clear glass laminated with 0.0350 inch thick clear polyvinyl butyral (PVB) interlayer, thickness as determined by the glass manufacturer to comply with the specified performance requirements, where shown on Drawings, provide interlayer by one of the following:
 - 1. « Butacite » (E. I. duPont de Nemours & Co., Inc.).
 - 2. "Watchguard" (VITRO).
 - 3. "Saflex" (Solutia Inc.).
- C. Glazing Tape: Polyisobutylene/Butyl, complying with ASTM C 1281:
 - 1. Dap, Inc., Butyl Rubber Tape.
 - 2. Pecora Corporation, G-66 or BB-50.
 - 3. Tremco, Tremco 400 Tape.
- D. Setting Blocks: Neoprene blocks, 70 to 90 Type A durometer hardness.
- E. Spacers: Neoprene blocks, 40 to 50 Type A durometer hardness, 3 inches long, self-adhesive on one face only.

2.2 HEAT TREATED TEMPERED AND HEAT STRENGTHENED GLASS

- A. Provide tempered and heat strengthened glass horizontally heat treated in accordance with FS DD-G-1430B. Fabricate tempered and heat strengthened glass units so that roll distortion lines are parallel to the bottom edge of the glass units and the bottom or sill of the glazing pocket into which the glass unit is being installed.
- B. Provide heat treated glass complying with ASTM C 1048 for Kind FT, Fully tempered.

2.3 GLAZING SEALANTS

- A. Provide products of type indicated, complying with the following requirements:
 - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

2.4 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine surfaces to receive the parts of the work specified herein. Verify dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of the related construction.

3.2 INSTALLATION - GENERAL

- A. Employ only experienced glazers who have had previous experience with the materials and systems being applied. Use tools and equipment recommended by the glass manufacturer.
- B. Measure openings and cut glass accurately to fit each opening with minimum edge clearances and bite on glass as specified by GANA. If glass is to be cut to size at project site deliver each piece to project at least 2 inches larger (in both dimensions) than required, so as to facilitate the cutting of clean cut edges without necessity of seaming or nipping. Do not seam, nip or abrade tempered glass at the job site.
- C. Maintain a minimum temperature of 40 deg F during glazing unless the manufacturer of the glazing materials specifically agrees to application of his materials at lower temperatures. If job progress or other conditions require glazing work when temperatures are below 40 deg F (or below minimum temperature recommended by the manufacturer), consult the manufacturer and establish the minimum provisions required to ensure satisfactory work. Record in writing to the manufacturer, with copy to the Architect, the conditions under which such glazing work proceeds and the provisions made to ensure satisfactory work.
- D. Clean glazing stops and rabbets to receive glazing materials of obstructions and deleterious substances which might impair the work. Remove protective coatings which might fail in adhesion or interfere with bond of sealants. Comply with manufacturer's instructions for final wiping of surfaces immediately before application of primer and glazing sealants or tapes.
- E. Prime surfaces to receive glazing sealants in accordance with manufacturer's recommendations, using recommended primers. Test materials and surfaces for adhesion of sealants.
- F. Inspect each piece of glass immediately before installation. Do not install pieces which have significant impact damage at edges, scratches or abrasion of faces or any other evidence or damage.
- G. Locate setting blocks at the quarter points of sill but no closer than 6 inches to corners of glass. Use blocks of proper size to support the glass in accordance with manufacturer's recommendations.
- H. Provide spacers for glass to separate glass from stops, except where continuous gaskets or tape are required. Locate spacers 36 inches o.c. maximum inside and out, with a minimum of 2 spacers per edge of glass. Provide thickness equal to sealant or compound thickness shown. Provide width as required for minimum of 3/8 inch bite on glass at edges.
- I. Set glass in a manner which produces greatest possible degree of uniformity in appearance. Face glass, which has dissimilar faces, with matching faces in the same direction. Set glass with bow (if any) to exterior.

- J. Install tempered and heat strengthened glass units with the roll distortion parallel to the bottom or sill glazing pocket in accordance with the glass manufacturer's recommendations for the type of glass installation.
- K. Do not use glazing materials from different sources in the same joint system unless the manufacturer of each material has stated in writing that his material is fully compatible with the other material.
- L. Use masking tape or other suitable protection to limit coverage of glazing materials to the surfaces intended for sealants.
- M. Glazing Tape:
 - 1. Butt or lap ends of sealant tape in accordance with the manufacturer's recommendations.
 - 2. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
 - 3. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
 - 4. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
 - 5. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 - 6. Do not remove release paper from tape until just before each glazing unit is installed.
- N. Clean excess sealant from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.

3.3 GASKET GLAZING (DRY)

- A. Install glass units in interior glazing channels using glazing channel manufacturer's standard extruded glazing gaskets and strips installed in accordance with manufacturer's printed installation instructions.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.4 PROTECTION AND CLEANING

- A. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free of glass. Do not apply warning markings directly to the glass.
- B. Remove and replace glass which is broken, cracked, chipped or damaged in any way and from any source, including weather, vandalism and accidents during the construction period at no additional cost to the Owner.
- C. Maintain glass in a reasonably clean condition during construction so that it will not become stained and will not contribute to the deterioration of glazing materials.
- D. Wash and polish glass on both faces just prior to final acceptance. Comply with instructions and recommendations of glass manufacturer and glazing materials manufacturer for cleaning in each case.

END OF SECTION

**`SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING**

PART 1 - GENERAL

1.1 SUMMARY

- A. Non-structural metal framing, including the following:
 - 1. Non-load bearing interior light gauge steel studs and furring.
 - 2. Ceiling and soffit suspension systems for interior gypsum board assemblies.
 - 3. Backing plates not provided by other trades for support of items attached to metal framing system.
 - 4. Supplementary parts and components, such as clips, fasteners, supplementary framing, and other miscellaneous accessories required for a complete installation.
- B. Related Sections:
 - 1. Metal Fabrications: Section 05 50 00.
 - 2. Rough carpentry: Section 06 10 00.
 - 3. Gypsum board: Section 09 29 00.

1.2 DEFINITIONS

- A. Gage: Gages of wire specified are American Steel & Wire Co.'s wire gages, unless otherwise indicated.

1.3 SYSTEM DESCRIPTION

- A. Delegated Design Requirements:
 - 1. Drawings of metal support system assemblies are diagrammatic and show design intent of finished profiles, shapes and forms; relationships between elements; location, identification, dimension and size of components, assemblies and accessories; and details and diagrams of connections.
 - 2. Unless otherwise indicated on the Drawings, engineer, fabricate, assemble, and install metal support systems to meet or exceed the criteria indicated; to conform to the profiles indicated; to satisfy applicable governing codes and regulations; and to provide structurally sound assemblies.
 - 3. If required by authorities having jurisdiction, prepare and submit reviewed shop drawings, specifications, load and deflection tables and any other supporting data required by authorities having jurisdiction for their review and approval, and pay fees incurred, prior to beginning installation.
- B. Performance Requirements: Unless otherwise indicated on the Drawings, engineer assemblies to withstand the loads prescribed by the authorities having jurisdiction, within the specified deflection limits.
 - 1. Lateral loading: 5 psf for interior partitions.

2. Limit metal framing systems deflection under load to the following:
 - a. $L/240$ where supporting gypsum board only.

1.4 ACTION SUBMITTALS

- A. Product Data: Include a list of proposed products and materials to be provided for complete assemblies, along with manufacturer's product data, specifications, typical installation details and other data for each material listed to prove compliance with the specified requirements.
- B. Shop Drawings: large scale, dimensioned shop drawings for Contractor-engineered assemblies.
 1. Show framing member size, gage designations, number, type, location, and spacing.
 2. Indicate component details, framing layout, framed openings, anchorage to structure, bracing, type and location of fasteners and welds, and accessories required for related work.
 3. Show metal gages, spacing of members and span dimensions.

1.5 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Design Data: When not indicated on the Drawings submit complete load and deflection tables properly annotated for the indicated framing sizes, spacing, span limits and gages to be used.
- B. Certificates:
 1. Mill certificates and galvanizing certificates: Signed by framing member/accessory manufacturer certifying compliance with material requirements.
 2. Welder certificates: Submit certificates verifying welders to be employed in this work have satisfactorily passed AWS qualification tests. If re-certification of welders is required, retesting will be Contractor's responsibility.
- C. Manufacturer's Installation Instructions: Submit manufacturer-prepared instructions concerning the proper preparation and installation framing members and framing accessories.

1.6 QUALITY ASSURANCE

- A. Installer's Qualifications: Firm and individuals with a minimum of 3 consecutive years experience in the installation of specified products on projects similar in material, design, complexity and extent to this Project, and whose work has resulted in applications with a record of successful in-service performance.
- B. Qualifications for Welding Work: Use qualified welders experienced in welding lightgage steel, and comply with AWS D1.1 and D1.3.

- C. Regulatory Requirements: Where fire-resistive construction is indicated, provide materials, accessories, and application procedures listed by UL, or tested according to ASTM E 119 for the type of construction shown, and approved by the authorities having jurisdiction.

1.7 HANDLING

- A. Delivery: Protect materials from excessive moisture in shipment, storage, and handling.
- B. Storage: Store off ground, either in a dry, ventilated, enclosed space or protected with suitable waterproof coverings.
- C. Handling: Protect metal framing units from rusting and damage.

1.8 SEQUENCING

- A. Coordinate placement of concealed internal wall reinforcement, such as backing plates, for items to be attached to metal support systems.
- B. Coordinate installation of ceiling and soffit suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorage to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.
- C. Furnish concrete inserts, and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide metal framing members from one of the following:
 - 1. MarinoWARE.
 - 2. SCAFCO Corporation.
 - 3. Clarkwestern Dietrich Building Systems LLC.
 - 4. Telling Industries.
 - 5. MBA Metal Framing.

2.2 STUDS, RUNNERS AND FURRING

- A. Framing Members - General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653, G40.
- B. Smooth Steel Studs: ASTM C 645, punched web complying with the following:

1. Protective coating: ASTM A 653, G40 galvanized coating.
2. Bracing: Where the wall finish does not adequately brace both flanges of studs, provide bracing or reduce allowable stresses for computing stud heights in compliance with requirements of the authorities having jurisdiction.
3. Uncoated Metal Thickness (Gage): Minimum 0.018 inch (Referenced as 25 gage), refer to the Drawings.

C. Dimpled Steel Studs and Runners:

1. Protective coating: ASTM A 653, G40 galvanized coating.
2. Bracing: Where the wall finish does not adequately brace both flanges of studs, provide bracing or reduce allowable stresses for computing stud heights in compliance with requirements of the authorities having jurisdiction.
3. Uncoated Metal Thickness: Minimum 0.015 inch.

D. Top and Bottom Tracks: As recommended by the manufacturer of each stud type and of the same gage as the studs in same wall or partition, unless otherwise indicated on the Drawings. Provide unpunched, screwable tracks with 1-1/4-inch flanges.

E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs .

F. Furring Channels: Minimum 0.018 inch thick (25-gage), galvanized, hat-shaped.

G. Horizontal stiffener, runner channels and bridging: Complying with ASTM A 1003, minimum 0.053 inch metal thick, channels fabricated of cold-rolled steel with flanges not less than 7/16-inch wide. Minimum weights as follows:

Channel Size	Flange Width	Pounds/1000 linear foot
3/4-inch	7/16-inch	300
1-1/2-inch	7/16-inch	475
2-inch	19/32-inch	590

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, minimum 0.062 inch diameter wire, or double strand of minimum 0.048 inch diameter wire.

B. Wire: ASTM A 641, Class 1 zinc coating, soft temper:

1. Hanger Wire: Minimum 0.12 inch diameter, unless otherwise indicated.
2. Diagonal Bracing Wire: 0.08 inch diameter, unless otherwise indicated.
3. Tie wire: 0.05 inch diameter, single-strand annealed steel or 0.04 inch diameter, galvanized, double-strand annealed steel.

- C. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

2.4 FASTENERS AND ACCESSORIES

- A. Screws: ASTM C 1002 for metal framing 0.024 inch thick (25-gage) and lighter; ASTM C 954 for heavier metal framing. Provide 3/8 inch head diameter, corrosion-resistant pan head screws; length and gage required by Code, or recommended by the metal framing manufacturer when not prescribed by Code.
- B. Shot pins: 0.140-inch diameter low velocity powder-actuated drive pins equivalent to Ramset/Red Head No. 1508, or other as approved by Architect, with 7/8-inch minimum penetration into concrete.
- C. Anchor bolts: ASTM A 307, non-headed type.
- D. Expansion shields: FS FF-S-325, except do not use lead, fiber and plastic shields.
- E. Welding electrodes: ASTM A 233, as recommended by AWS for the conditions of use and the metals to be welded.
- F. Isolation Strip at Exterior Walls - Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Correct conditions detrimental to the proper and timely completion of this work before proceeding with installation.

3.2 WALL INSTALLATION

- A. General:
 - 1. Erect metal framing systems in compliance with their manufacturer's recommendations, the reference standards, the Drawings and these Specifications.
 - 2. Use minimum 0.039 inch thick (20-gage) studs at the following locations:
 - a. Each side of door openings.
 - b. Where studs support backing plates, plumbing fixtures and wall-supported cabinets.

3. Do not attach metal framing to ducts, conduits or pipes. Do not allow metal framing and suspension wires to contact pipes.
4. Cut framing components squarely for a tight fit against abutting members. Erect framing plumb and level to provide solid backing for finish materials. Install steel studs in a wall/partition so that their flanges point in the same direction.
5. Do not exceed a 1/8-inch in 10-foot deviation (non-cumulative) from true lines and levels, nor 1/4-inch from true position. Perform necessary remedial work on framing to achieve specified tolerances.

B. Wall/Partition Framing:

1. Layout partitions and permanently mark on slabs.
2. Align and securely anchor ceiling and floor tracks to building construction. Space anchors within 6 inches of ends of each track segment and at 24 inches o.c. maximum. Do not drive fasteners closer than 2 inches to slab or curb edge.
3. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Frame openings in stud walls. Provide double studs, closer spacing, and additional reinforcement as detailed or required at doorframes, interior windows and recesses for equipment.
7. Frame both sides of control joints in gypsum board surfaces with separate studs and a discontinuous runner; do not bridge the joint with system components or accessories.
8. Assemble corners using a minimum of 3 studs.
9. Install studs in single length, without joints, extending from floor to underside of floor or roof structure above, except where indicated on the Drawings to stop at or above suspended ceilings. Splicing studs is not permitted without the Architect's approval.
10. Where studs stop at or above suspended ceilings, unless otherwise indicated, brace every fourth stud (maximum) with opposite stud bracing at 45 deg. angles securely anchored to the floor or roof above.
11. Attaching studs to runner: Attach studs to tracks by friction fit for single stud gypsum board partitions.
12. Attach the following studs to runner tracks with screws or with a crimping tool in compliance with the stud manufacturer's instructions, except where indicated to be welded.
 - a. Studs with gypsum board on only one side.
 - b. Studs on each side of doors.
 - c. Studs supporting wall hung plumbing fixtures.
 - d. Studs supporting wall hung urinal screens, toilet compartments, cabinets and equipment.

- e. Attach corner studs, partition intersections, studs on each side of doorjamb, and other openings in walls/partitions as specified above.
 - 13. Unless otherwise indicated, provide horizontal stiffeners consisting of 3/4-inch channels spaced at not more than 54 inches o.c. maximum in partitions/walls supporting wall supported cabinets. Attach stiffeners to each stud.
 - a. Provide an additional 3/4-inch channel 6 inches above door head and extend 2 stud spaces beyond jamb studs.
 - b. Install channels in longest possible lengths, lap 12 inches and wire-tie at joints. Do not tie channels on opposite sides of staggered and double stud partitions together.
 - 14. Double studs (face to face to form a tube) at locations adjacent to doors and openings. Extend studs at door openings to slab or deck above and anchor securely to bottom track (as specified in subparagraph 12.b. above) and to top slab or deck with clip angles.
 - a. Locate additional studs not more than 2 inches from door and window frames, abutting partitions, partition corners, and other construction.
 - b. Install a section of track over door and window frames with a clip angle at each end and attach securely to the adjacent vertical studs.
 - c. Install cut-to-length studs at the location of vertical joints and at standard spacing over the doorframe header extending to the ceiling track.
 - 15. Install studs 2 inches away from abutting concrete, steel columns or other structural elements. Extend the horizontal stiffeners and attach it to the structural element.
 - 16. Provide additional framing, as required, for attachment of electrical boxes, fire extinguisher cabinets and similar items located in stud walls.
- C. Furring:
- 1. Provide furring attached to concrete and metal framing to conceal utilities, furred soffits, and other furring as indicated.
 - 2. Furring to receive gypsum board shall be screw-on channels directly attached to backing material, or applied over runner channels as applicable.
 - 3. Furring to receive plaster shall be 3/4-inch cold-rolled channels wire tied to 1-1/2-inch runner channels.
 - 4. Space furring as indicated for studs.
- D. Install extra stud, furring members and angle runners at terminations of gypsum board work, and at openings and where required for support of other work occurring in the gypsum board work.
- 1. Install sheet metal strapping, studs, hat-shaped channels or stud runners in walls where shown on the Drawings or as required by the conditions of the installation, minimum same gage as stud framing, for the support and attachment of other work. Attach to stud framing with not less than three screws per stud.

3.3 INSTALLING SOFFIT SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- D. Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- E. Space main runners not over 4 feet O.C. in any dimension so that hanger wires do not support more than 12 square foot of ceiling.
- F. Hang suspended framing independent of walls, columns, pipes, ducts, and conduits, and their insulation.
- G. Provide recesses and openings where indicated for lighting fixtures, registers, access panels and other items to be installed in ceilings. Provide additional furring channels where required by opening condition.
- H. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.4 WELDING

- A. Perform welding in compliance with AWS recommendations with welders qualified to weld lightgauge metal. Provide stitch plates where studs are burned-through.
- B. Backing Plates:
 - 1. Backing plates may be omitted if anchorage for wall-hung items is directly into steel studs of 18-gage or heavier, or items are furnished with equal mounting devices.
 - 2. Wall-mounted and wall-hung items that require backing plates include, without limitation, the following:
 - a. Wall mounted supports.
 - 3. Unless otherwise indicated, plates not provided with fixtures and equipment shall be long enough to span, as a minimum, across 3 studs and may be one of the following:
 - a. 0.063 inch thick (16-gage) minimum steel plate by 4 inches wide.
 - b. 0.063 inch thick (16-gage) unpunched wide flange stud by 4 inches wide.
 - 4. Notch studs so that backing plate will be flush with exterior face of stud.

5. Weld plates continuously along contact surfaces at each stud crossing, or secure with 2 countersunk machine screws at each stud.

END OF SECTION

**SECTION 09 29 00
GYPSUM BOARD**

PART 1 - GENERAL

1.1 SUMMARY

- A. Gypsum board, including the following:
 - 1. Interior gypsum board.
 - 2. Installation accessories and finishing materials.
- B. Related Sections:
 - 1. Rough carpentry: Section 06 10 00.
 - 2. Joint sealants: Section 07 92 00.
 - 3. Hollow metal doors and frames: Section 08 11 13.
 - 4. Non-load bearing metal framing: Section 09 22 16.
 - 5. Painting: Section 09 91 00.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples:
 - 1. 12 inch long samples of corner bead, end bead, reglets, moldings and control joint trim.
 - 2. Sample of electrical box pad.

1.3 QUALITY ASSURANCE

- A. Provide gypsum wallboard construction complying with laws, ordinances, rules, regulations and orders of public authorities having jurisdiction over this part of the Work.
- B. Provide primary materials from a single manufacturer unless otherwise approved, in writing by the Architect, to insure total unit responsibility.
- C. Gypsum Wallboard:
 - 1. Provide installation of gypsum wallboard materials and systems construction complying with ASTM C 840, the manufacturer's current printed instructions and specifications and Gypsum Association, Standard GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Wall Board, and Standard GA 600 - Fire Resistance Design Manual, current editions, except as herein modified and as approved by the manufacturer.

2. In the event of a conflict between these specifications and the referenced standards, the more stringent or greater is to be utilized for the installation.

D. Fire Resistive Construction:

1. For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
2. Where gypsum board systems are indicated to have fire resistance ratings, including those required to comply with governing regulations, provide materials and installations identical with applicable assemblies which have been tested and listed by recognized authorities, including UL.
3. Deflection and Firestop Track: Provide top runner in fire resistance rated assemblies indicated as labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

- E. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings noted on the Drawings, provide materials and construction identical to those tested in the assembly indicated in accordance with ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

- F. Comply with the requirements of the local codes, ordinances, and regulations.

1.4 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other damage. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and environmentally conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.6 TESTS

- A. The Owner may have periodic sound tests made, at his option, as the work progresses. Contractor is required to make necessary modifications of partitions

that are found to be substandard (not meeting approximate sound attenuation levels established by tests listed in manufacturer's data sheets) for that particular partition construction. Provide partitions which meet or exceed the STC ratings shown on the Drawings for each partition type. Provide partitions which meet or exceed the STC ratings of the gypsum wallboard manufacturer for each partition type.

- B. Costs of testing of partitions when found to be substandard, are to be paid for by the Contractor, including cost of retesting of modified partitions. Cost of testing partitions found to meet required sound attenuation levels will be paid for by the Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE GYPSUM BOARD MANUFACTURERS

- A. Georgia-Pacific Corp.; Portland, OR 97204.
- B. Continental Building Products Inc., Herndon, VA 20170.
- C. National Gypsum Company, Charlotte, NC 28211.
- D. United States Gypsum Co.; Chicago, IL 60680.
- E. Certainteed Corporation, Valley Forge, PA19482.

2.2 GENERAL - PANELS

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 GYPSUM PANELS

- A. Gypsum Wallboard: Complying with FS SS-L-30 and ASTM C 1396; tapered with beveled or radial edge for finished joints, thickness as shown on the Drawings:
 - 1. Regular.
 - 2. Fire-Rated Type X or Type C (type as required by fire resistive rated assembly indicated on the Drawings.).
 - 3. Insulating (foil back).
 - 4. Abuse resistant.
 - 5. Water resistant (for toilet, bath, wet utility area walls).
 - 6. Water resistant Grade X (where indicated on the Drawings).
- B. Gypsum Abuse and Moisture Resistant Wallboard: Complying with ASTM C 1278, ASTM E 695 & ASTM C 1629, Level 3 for soft and hard body impact resistance, high

traffic area, impact and abrasion resistant, moisture and mold resistant, and fire resistant gypsum board panels with tapered edges for finished joints.

1. Thickness: As indicated on Drawings.
 2. Mold Resistance: ASTM D 3273, score of not less than 10.
 3. Products: Subject to compliance with the specified requirements provide one of the following:
 - a. "Aqua Tough Interior Panels" (USG).
 - b. "Hi-Impact XP" (National Gypsum).
 - c. "Protecta HIR 300 Type X" (Continental Building Products).
 - d. "Air Renew Extreme Abuse Resistant" (Certain Teed).
 - e. "Tough Rock Moldguard" (Georgia-Pacific).
- C. Gypsum Ceiling Board: Complying with ASTM C 1395; sag resistant, tapered with beveled or radial edge for finished joints, 1/2 inch thickness, regular and Grade X (fire-rated).
- D. Exterior Ceiling/Soffit Board: Weather and sag resistant gypsum board with beige water repellent paper facing, complying with ASTM C 931 & ASTM C 1396; tapered edge for finished joints, thickness as shown on the Drawings, regular and Grade X (fire-rated).

2.4 TRIM ACCESSORIES

- A. Interior Trim: Comply with ASTM C 1047.
1. Material: Paper faced galvanized steel sheet or rigid PVC.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Control (expansion) joint.
 - d. Tear-Away Bead: L-Shaped, exposed long flange receives joint compound.
- B. Control Joints: Roll formed zinc or extruded vinyl as standard with the wallboard manufacturer.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
1. Interior Gypsum Wallboard: Paper.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying type, all-purpose compound.
 - a. Use setting type compound for installing paper faced metal trim accessories.
3. Fill Coat: For second coat, use drying type, all-purpose compound.
4. Finish Coat: For third, coat, use drying type, all-purpose compound.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- C. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- D. Screws:
 1. Metal Studs: Type S and S-12 bugle head and pan head, sized to suit thickness, zinc plated for exterior use, complying with ASTM C 1002 and ASTM C 954.
 2. Gypsum: Type G, sized to suit thickness, zinc plated for exterior use, complying with ASTM C 1002 and ASTM C 954.
 3. Provide fasteners with a hot-dip zinc coating complying with ASTM A 153.
 4. Fastening to Metal Studs: Use 1-1/2 inches long, galvanized screws.
- E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 1. Fire Resistance Rated Assemblies: Comply with mineral fiber requirements of assembly.
- F. Acoustical Sealant: As specified in Section 07 92 00 – Joint Sealants
- G. Spot Grout: Joint treatment compound as recommended by the manufacturer for spot grouting hollow metal door and window frame anchors, complying with ASTM C 475.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. When the outside temperature is below 55 deg F, provide heat and maintain in areas where the work is to be performed. Provide heat continuously and uniformly at 55 deg F from one week prior to start of installation until gypsum board application and joint treatment is completed. Provide ventilation to remove excess moisture during joint treatment.
- B. Coordination with Sprayed Fire Resistive Materials: After sprayed fire resistive materials are applied, remove them only to extent necessary for installation of gypsum board assemblies and without reducing the fire resistive material thickness below that which is required to obtain fire resistance

3.3 APPLYING AND FINISHING PANELS - GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4 to 3/8 inch wide joints to install sealant.

- G. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- H. Spot-Grouting: At hollow metal door and window frames spot-grout each jamb anchor, filling the inside face of the jamb at each anchor.
- I. STC Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound flanking paths around or through assemblies, including sealing partitions above acoustical ceilings. Separate by 24 inches horizontally outlet boxes and other penetrations on opposite sides of the partition in separate stud cavities and treat with outlet box pads.
- J. Install sound attenuation blankets, where shown on the Drawings, pressure fit between studs. Fill voids. Openings and gaps, butt joints of blankets and support and secure in accordance with manufacturer's recommendation when not self-supporting.

3.4 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Regular Type: Vertical and horizontal surfaces, unless otherwise indicated.
 - 2. Type X & C: Where required for fire resistance rated assembly.
 - 3. Ceiling Board: Ceilings unless noted otherwise.
 - 4. Abuse Resistant Type: Where indicated on the Drawings
- B. Single Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire resistance rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire resistance rated assembly.
 - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 - 1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire resistance rated assembly. Stagger joints on opposite sides of partitions.

2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install controls joints in accordance with the following:
 1. Install control joints according to ASTM C 840.
 2. In specific locations as drawn for visual effect.
 3. Where a partition, wall, or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
 4. Where a wall or partition runs in an uninterrupted straight plane exceeding 30 lineal feet.
 5. Interior Ceilings with Perimeter Relief: Install control joints so that linear dimensions between control joints does not exceed 50 ft and total area between control joints does not exceed 2,500 sq. ft. Install a control joint or intermediate blocking where ceiling framing members change direction.
 6. Interior Ceilings without Perimeter Relief: Install control joints so that linear dimensions between control joints does not exceed 30 ft and total area between control joints does not exceed 900 sq. ft. install a control joint or intermediate blocking where ceiling framing members change direction.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners, unless otherwise indicated.
 2. LC-Bead: Use at exposed panel edges.
 3. Tear-Away Bead: Use at exposed panel edges.
- D. Apply wallboard screws with an electric driver. Drive screws not less than 3/8 inch from edges or ends of panels to provide a uniform dimple not over 1/32 inch deep.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 9 Sections.

3.7 CLEANING AND PROTECTION

- A. Take precautions to minimize spattering of joint treatment compounds and other materials on other work. Remove joint treatment compounds promptly from doors, frames, glass and other finishes and surfaces that could be stained or marred by these materials. Clean floors of gypsum wallboard materials and treatment compounds upon completion of the gypsum wallboard work. At completion of work, remove unused materials, scraps, containers and equipment. Remove dust accumulated during finishing operations, leave areas broom clean, ready for painting, wall covering, ceramic tile or other finishes.
- B. Provide temporary protection of finish surfaces in areas of high traffic and susceptible to damage from work of others. Maintain protection throughout the construction period so that the work will be without damage or deterioration at the time of Substantial Completion. Repair or replace any damaged work at no additional cost to the Owner. Remove temporary protection at completion of work or when required for completion of other work.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

**SECTION 09 51 00
ACOUSTICAL CEILINGS**

PART 1 - GENERAL

1.1 SUMMARY

- A. Acoustical ceiling panels and suspension systems including, intermediate support framing when required by the conditions of the installation.
- B. Related Sections:
 - 1. Gypsum board: Section 09 29 00.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide acoustic material conforming to the following minimum requirements:
 - 1. ACP-1:
 - a. Sound Absorption: ASTM C 423, NRC 0.45-0.55.
 - b. Sound Attenuation: ASTM E 413, CAC Range: 35-39.
 - c. Flame Spread: ASTM E 84, AIMA, Class I, FS-SS-S-118b, Class 25 (0-25).
 - d. Light Reflectance: ASTM C 523, 0.75 or greater.

1.3 ACTION SUBMITTALS

- A. Shop Drawings:
 - 1. Layout and details of acoustical ceilings.
 - 2. Show locations of items which are to be coordinated with, located in or supported by the ceilings.
- B. Samples:
 - 1. 12 inch square acoustical units for each type of unit.
 - 2. 12 inch lengths of each suspension system components with manufacturer's standard color selections.
 - 3. 12 inch lengths of edge trim system, with manufacturer's standard color selections.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description and installation and maintenance instructions.

1.5 QUALITY ASSURANCE

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
- B. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- C. Source Limitations for Ceiling Units and Suspension Systems: Obtain each acoustical ceiling panel and suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver unopened materials to the project site in manufacturer's unopened containers, clearly indicating manufacturer's name, brand, type, style, size, color, texture and other identifying information.
- B. Store materials in a dry location, off the ground and in a manner to prevent damage, deterioration and intrusion of foreign matter. Replace materials which have been damaged or are otherwise unsuitable. When ascertained, immediately remove damaged or otherwise unsuitable material from the project site.

1.7 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Do not install acoustical ceilings until wet work in the space has been completed and is nominally dry, and until work above ceilings has been completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.
- B. Sequencing: Coordinate with the work of trades above the ceiling and penetrating or supported by it. Do not start work until appropriate work above the ceiling is complete.
- C. Coordination: Coordinate with electrical, HVAC and fire protection trades to ensure edge configuration of light fixture, air diffusers and sprinkler heads to penetrate or to lay in ceilings are proper for the system and provide system layout that accommodates lighting pattern.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Armstrong World Industries, Inc., Lancaster, PA 17603.
- B. CertainTeed Corporation, Valley Forge, PA 19482.
- C. Rockfon, LLC, Chicago Metallic, Chicago, IL 60638.
- D. United States Gypsum, Chicago, IL 60606.

2.2 CEILING PANELS

- A. ACP-1 Acoustical Panels (24 inch x 24 inch, Lay-in): Mineral fiber acoustical panels; nominal 24 inch x 24 inch units not less than 5/8 inch thick, with tegular edges, factory applied washable white finish and flame spread not greater than 25.

2.3 CEILING SUSPENSION SYSTEM MATERIALS

- A. General: Comply with ASTM C 635 intermediate duty and heavy duty, as applicable to the type of suspension system required for the type of ceiling units indicated. Coordinate with other work supported by or penetrating through the ceiling, including light fixtures, HVAC equipment sprinklers and partition system.
- B. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, direct hung. Coordinate types of devices compatible with floor construction, verify with precast concrete plank manufacturer.
- C. Hanger Wires: Galvanized carbon steel, ASTM A 641, soft tempered, pre-stretched, yield stress load of at least three (3) times design load, but not less than 12 gage (0.016 inch).
- D. Edge Molding: Zinc coated steel or aluminum, configurations shown on the Drawings, or if not shown manufacturer's standard for system with baked enamel finish to match suspension systems.
- E. GS-5 Exposed Grid Suspension Systems (24 inch x 24 inch, Lay-in): Direct hung, intermediate duty, double web, snap grid, exposed main runners, cross runners (9/16 inch wide) with continuous 1/4 inch wide center regressed slot and accessories, with exposed cross runners and wall trim coped to lay flush with main runners with factory applied baked enamel (white) finish, one of the following:
 - 1. Armstrong, Silhouette XL.
 - 2. Rockfon, Chicago Metallic Corp., Ultraline 3500.
 - 3. USG, Fineline 1/4.
- F. Cold-Rolled Intermediate Support Channels: Minimum 1-1/2 inch, 475 lbs. per 1,000 lin. ft., complying with ASTM A 1008.

- G. Hold-Down (Retention) Clips for Non Fire Resistance Rated Ceilings: For interior ceilings consisting of acoustical panels weighing less than 1 lb/sq. ft., provide hold-down clips spaced 24 inches o.c. on cross tees.
- H. Decorative Edge Trim:
 - 1. Ceiling system manufacturer's standard fabricated extruded aluminum edge trim with baked enamel finish to match suspension systems.
 - 2. Provide edge trim units fabricated with concealed splices the same thickness and material as trim units.
 - 3. Provide concealed attachment clips for attaching edge trim to ends of grid members.
 - 4. Products: Provide one of the following:
 - a. Axion, Armstrong
 - b. Cloud Perimeter Trim, Certainteed
 - c. Compasso, USG
 - d. Infinity Perimeter Trim, Rockfon, Chicago Metallic

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine surfaces to receive the parts of the Work specified herein. Verify dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of the supporting construction.

3.2 INSTALLATION OF MECHANICAL GRID SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636 and current AIMA recommended procedures.
- B. System Installation:
 - 1. Unless otherwise shown on the Drawings or required by the systems manufacturer's printed installation instructions, install hangers 4 ft. o.c. in rows 4 ft. apart.
 - 2. Do not attach hangers to steel roof deck. Attach hangers to structural members or intermediate support channels.
 - 3. Furnishing inserts and intermediate support framing and directing placement of inserts and framing is the responsibility of the acoustical ceilings installer.
 - 4. Where supporting construction is steel, wrap the wire hanger around or through the steel member or attach by other secure methods.
 - 5. Wrap hanger around carrying channel, or if directly suspended, insert through hole in main tee and secure hanger with at least 3 turns around itself.
 - 6. Intermediate Support Channels:
 - a. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, or where spacing of primary support does accommodate hanger spacing,

- install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications
- b. When required by the conditions of the installation, install intermediate support cold-rolled channels spaced not more than 4 feet-6 inches above direct hung ceiling grid system.
 - c. Grid Clips: Install ceiling manufacturer's standard grid clips attached to cold-rolled channels and direct hung ceiling grid system not more than 4 feet-0 inches o.c.
7. Ceiling Grid: Install direct hung ceiling grid system to the ceiling panel model sizes shown on the Drawings and in accordance with the manufacturer's printed installation instructions.
- C. Coordinate spacing of hangers, carrying channels, runners, and molding with the location of ductwork, piping, conduit, electrical fixtures and other items occurring in or on ceilings.
- D. Provide additional hangers at corners of light fixtures at midpoint of cross tees adjacent to light fixtures and duct outlets and adjacent to main tee splices.
- E. Decorative Edge Trim:
- 1. Install edge trim moldings where indicated on the Drawings and elsewhere as needed to conceal edges of acoustical units and suspension grid which would otherwise be exposed to view after completion of the Work.
 - 2. Install edge trim on edges of ceiling grid with conceal clip system to conceal edges of grid system.

3.3 INSTALLATION OF PANELS

- A. Install acoustical panels in coordination with suspension system with edges concealed by support of suspension members and faces flush with grid webs. Arrange acoustical units and orient directionally patterned units in the configurations shown on the reflected ceiling plans and as directed by the Architect.
- B. Scribe or cut panels to fit accurately at penetrations.
- C. Use procedures that will minimize damage or soiling of the units during installation. Replace units which are damaged or cannot be adequately cleaned, as directed by the Architect at no additional cost to the Owner.
- D. Provide ceiling panel manufacturer's standard hold-down (retention) clips where shown or noted on the Drawings, or where required by conditions of the installation.

3.4 CLEANING AND PROTECTION

- A. Upon completion of the Work remove unused materials, debris, containers and equipment from the project site. Clean and repair floors, walls and other surfaces that have been stained, marred or otherwise damaged by work under this Section.
- B. Protect acoustical ceilings during the construction period so that they will be without any indication of deterioration or damage at the time of acceptance by Owner.

END OF SECTION

**SECTION 09 65 13
RESILIENT WALL BASE**

PART 1 - GENERAL

1.1 SUMMARY

- A. Resilient wall base, including installation materials.
- B. Related Sections:
 - 1. Unit masonry: Section 04 20 00.
 - 2. Gypsum board: Section 09 29 00.
 - 3. Carpet: Section 09 68 00.
 - 4. Carpet tile: Section 09 68 13.

1.2 ACTION SUBMITTALS

- A. Samples: Samples of vinyl base for color selection.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description, installation and maintenance instructions.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer, with not less than five (5) consecutive years experience, to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Receive materials in undamaged condition as packaged by the manufacturer with manufacturer's seals and labels intact.
- B. Store materials at the job site within the building and in a dry place at least 24 hours before installing flooring materials. Maintain space temperature not be less than 70 deg F nor more than 90 deg F.

- C. Immediately removed from the job site damaged or otherwise unsuitable material, when so ascertained.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Resilient Base:

1. Rubber: Complying with ASTM F 1861, Type TS, Group 1 or 2, .080 gage, coved in resilient flooring areas and straight in carpeted areas, set-on type.
2. Lengths: Coils in manufacturer's standard length.
3. Base types, heights, colors, products and manufacturers are indicated on the Drawings.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - c. Johnsonite.
 - d. Musson, R. C. Rubber Co.
 - e. Roppe Corporation, USA.
 - f. VPI, LLC; Floor Products Division.

- B. Adhesive: Water and alkali resistant, complying with recommendations of resilient flooring manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. When solvent-based adhesives are used, ventilate spaces; use spark-proof fans if natural ventilation is inadequate. Prohibit smoking.

3.2 INSTALLATION

- A. Mix and apply adhesive as recommended by the manufacturer. Cover surface evenly. Do not exceed the maximum working area of the material. Install base within time limits recommended. If adhesive films over or dries, remove the adhesive and recoat the area.
- B. Firmly adhere resilient base to walls, columns, and permanent bases. Use longest lengths practical. Form internal and external corners and end stops with preformed units. Corners may be hand formed if method is demonstrated and approved by the Architect. Do not use mitered corners. Scribe bases accurately to abutting surfaces.
- C. Remove excessive adhesive in accordance with manufacturer's instructions.

3.3 CLEANING

- A. Not less than 4 days after flooring installation, clean base. Wash thoroughly, with a cleaner recommended by the manufacturer, in accordance with manufacturer's printed instructions.

END OF SECTION

SECTION 09 68 13
CARPET TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. Carpet tile as shown on the Drawings and specified herein, including stair nosings, edge strips, subfloor preparation, and related materials of the carpet tile installation.
- B. Related Sections:
 - 1. Concrete floors: Structural drawings.
 - 2. Resilient wall base: Section 09 65 13.

1.2 QUALITY ASSURANCE

- A. Installer Qualifications: Provide carpet tile installation by firm experience in carpet tile installations of similar size as evidenced by not less than 5 consecutive years of carpet tile installations. Provide written evidence of such experience to the Architect upon request.
- B. Basis of Design: Products and manufacturers named in Part 2 establish the Basis of Design for products in terms of appearance, construction, and performance. Other manufacturers' products comparable in quality to named products and complying with requirements may be considered. Refer to Section 01 60 00 - Product Requirements.

1.3 ACTION SUBMITTALS

- A. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Stair Nosings: 6 inch long pieces and samples of manufacturer's complete color range.
 - 3. Edge Strips: 6 inch long pieces and samples of manufacturer's complete color range.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer`s Literature: Materials description and installation instructions for materials of the installation.
- B. Warranty: Signed copies of terms specified herein.

- C. Extra Material Receipt: Signed copies.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver installation materials to project site in original factory containers, labeled with identification of manufacturer and brand name
- B. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity. Lay flat, blocked off ground. Maintain minimum temperature of 68 deg F at least three days prior to and during installation in area where materials are stored.

1.6 WARRANTY

- A. General Warranty: Special warranty specified in this Article is not to deprive Owner of other rights Owner may have under other provisions of the Contract Documents and is in addition to, and is to run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Product Warranty: The carpet tile manufacturer is to provide a written warranty agreeing to replace defective carpet tiles in accordance with the General Conditions, except that warranty will be for 10 years, instead of 1 year. Provide written warranty signed by the Carpet Tile Manufacturer and the Installing Contractor and submit to the Architect.
 - 1. Defects include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber and delamination.

1.7 PROJECT/SITE CONDITIONS

- A. Substrate Conditions:
 - 1. No condensation on underside of 4-foot by 4-foot polyethylene sheet within 48 hours, fully taped at perimeter to substrate.
 - 2. If condensation is apparent on the underside of the sheet after 48 hours, it is improper to install carpet tile. Retest floors until no condensation is present on the underside of the sheet. Alternate methods of testing for moisture will be considered upon written request and review of the Architect.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- B. Carpet Tile: Full-size units in boxes, equal to 5 percent of amount installed for each type or color indicated, but not less than 10 sq. yd.
- C. Submit a copy of the Owner's representative signed itemized receipt for extra material required.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Carpet Tile: as indicated on Drawings.
- B. Carpets - Basis of Design Products: Carpet types, colors, patterns, products and manufacturers are indicated on the Drawings. Comparable products are subject to the Architect's approval and submission of substitution request in accordance with Section 01 60 00.
- C. Installation Adhesive: Water resistant and nonstaining, release adhesive as recommended by carpet tile manufacturer to comply with flammability requirements for installed carpet tile.
- D. Latex leveling compound: As recommended by the carpet and padding manufacturers.
- E. or manufactured by one of the following:
- F. Basis of Design Stair Nosings: "#13" (Roppe Corporation, Fostoria, Ohio 44830).
 - 1. Acceptable Manufacturers:
 - a. Burke Flooring, a Division of Burke Industries, Umatilla, FL 32784
 - b. Johnsonite Solon, OH 44139
 - c. Flexco Co., Tuscumbia, AL 35674
- G. Edge Strips: Solid vinyl of type shown on the Drawings, if not shown as selected by Architect from standard products and colors manufactured by one of the following:
 - 1. Burke Flooring, a Division of Burke Industries, Umatilla, FL 32784
 - 2. Johnsonite Solon, OH 44139
 - 3. Flexco Co., Tuscumbia, AL 35674

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation

tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects. Application or installation of materials constitutes acceptance of substrate.

- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Verify that floor lab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. If present remove in accordance with the carpet and adhesive manufacturer's requirements.
 - 2. Subfloor finishes comply with requirements specified in Section 03 30 00 - Cast-in-Place Concrete, for slabs receiving carpet tile.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- D. Test for Moisture: Perform one or both of the following tests as required by the flooring material manufacturer to determine the manufacturer's acceptable floor slab moisture before installation.
 - 1. Test floor slab for moisture by anhydrous calcium chloride method according to ASTM F 1869. Proceed with carpet tile installation only after substrates have maximum moisture-vapor-emission rate recommended by the carpet tile and adhesive manufacturers. Proceed with installation only after substrates pass testing.
 - 2. Test floor slab for humidity by ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes. Proceed with installation only after substrates have maximum level humidity in the floor slab recommended by the carpet tile and adhesive manufacturers. Proceed with installation only after substrates pass testing.
- E. Level subfloors to be free of irregularities. Fill irregularities in the subfloor height affecting the carpet installation and appearance with troweled latex underlayment to create a ramp-like effect.
- F. Just prior to installation of carpeting and related materials, dry subfloors, broom clean, and remove oil, grease, paint or concrete treatment that may interfere with adhesion of carpet adhesive.
- G. Broom and vacuum clean substrates to be covered immediately before installing carpet tile. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION - GENERAL

- A. Comply with manufacturer's recommendations for installation of carpet tile; maintain uniformity of carpet direction and lay of pile, unless otherwise indicated.

- B. Extend carpet tile under removable flanges and furnishings and into alcoves and closets of each space.
- C. Install stair nosings where indicated; anchor to substrate.
- D. Install carpet edge guard where edge of carpet tile is exposed; anchor guards to substrate.
- E. Install with pattern parallel to walls and borders. Install perimeter tiles as half-size or larger.
- F. Dry-fit sections of carpet tile prior to application of adhesive.
- G. Apply adhesive uniformly to substrate in accordance with manufacturer's instructions. Butt edges tight to form seams without gaps.
- H. Adhere perimeter tiles and partial tiles with a full spread of adhesive. Dry-fit cut tiles and apply adhesive to tile back after tile has been cut. In corridor areas, use full tiles down the center and cut perimeter tile borders.

3.3 CLEANING AND PROTECTION

- A. Remove adhesive from carpet tile surface with manufacturer's recommended cleaning agent.
- B. Vacuum using commercial machine with face-beater element. Remove soil. Replace carpet tiles where soil cannot be removed. Remove protruding face yarn.
- C. Adequately covered carpet tile and protected against damage of any kind during shipment and delivery to the job site, and until final acceptance by Owner. Protect by means of clean drop cloths or heavy reinforced non-staining paper. Damaged carpet tile will be rejected and is to be replaced by the Installer at no additional cost to the Owner. At the completion of the Work when directed by the Owner, remove covering, vacuum clean and clean carpet tile of any soiling removed to the satisfaction of the Owner.
- D. Remove rubbish, wrapping paper and salvages from the job site. Leave excess pieces of usable carpet tile with the Owner for future repairs.

END OF SECTION

SECTION 09 84 33
SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. Sound-absorbing wall panels, including installation accessories.
- B. Related Sections:
 - 1. Non-loadbearing metal framing: Section 09 22 16.
 - 2. Gypsum board: Section 09 29 00.
 - 3. Acoustical wall panels: 09 84 13.

1.2 ACTION SUBMITTALS

- A. Product Data: Manufacturer's literature for materials descriptions, installation and maintenance instructions.
- B. Shop Drawings:
 - 1. Layout and details of wall panels. Show locations of items which are to be coordinated with, or penetrate the wall panels.
 - 2. Show elevations and details indicating profiles and configuration of each wall panel. Include attachments to building structure. Indicate location, size, material, thickness of material and spacing of attachment framing and fasteners.
 - 3. Show dimensions taken from field verified measurements. Show adjacent construction and building structure used for attachment of wall panels and adjacent materials. Show joints and fasteners, sizes, spacing and note materials and types of fasteners.
- C. Samples:
 - 1. Initial Color Selection: Manufacturers standard color selection samples.
 - 2. Panel Edge: 12-inch- long Sample(s) showing each edge profile, corner, and finish.
 - 3. Core Material: 12-inch- square Sample at corner.
 - 4. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Signed copies of specified warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed sound-absorbing wall panel installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Acoustic Wall Panels: Obtain each sound-absorbing wall panel from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. Fire-Test-Response Characteristics: Provide acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site in manufacturer's unopened packing, clearly indicating manufacturer's name, brand and other identifying information.
- B. Store materials in a dry location, off the ground and in a manner to prevent damage, deterioration, and intrusion of foreign matter. Replace materials which have been damaged or are otherwise unsuitable. When ascertained, immediately remove damaged or otherwise unsuitable materials from the job site.

1.7 PROJECT/SITE CONDITIONS

- A. Environmental Limitations: Do not install sound-absorbing wall panels until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a permanent level of lighting or a lighting level of not less than 50 fc is provided on surfaces to receive the units.
- C. Air Quality Limitations: Protect sound-absorbing wall panels from exposure to airborne odors, such as tobacco smoke, paint and install panels under conditions free from odor contamination of ambient air.

- D. Field Measurements: Verify wall surface dimensions by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 MOCKUP INSTALLATION

- A. Before installing sound-absorbing wall panels, build mockup required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect 7 days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting sound-absorbing wall panel fabrication.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed.
 - 7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Provide the following mock-ups:
 - 1. Not less than three typical wall panels including attachments.

1.9 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, signed by manufacturer agreeing to repair or replace components of sound-absorbing wall panel system that fail in performance, materials, or workmanship within specified warranty period. Failure in performance includes, but is not limited to, acoustical performance. Failure in materials includes, but is not limited to, distortion of facing or warping of core.
- C. Warranty Period: Provide warranty for 2 years from date of Substantial Completion signed by the Manufacturer and Installing Contractor submitted to the Architect.
- D. This warranty is in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design Product: "InStyle Ecooustic Panels" (Unika Vaev).
 - 1. Acceptable Manufacturers:
 - a. Filxfelt.
 - b. Kirei.
 - c. MCD.

2.2 MATERIALS

- A. Polyester Acoustical Panel
 - 1. Color: To be selected from manufacturer's standard colors.
 - 2. Type: Panel.
 - 3. Thickness: 0.53".
 - 4. Noise Reduction Coefficient 0.50.
 - 5. Fire Rating: Class A.
- B. Adhesive: As recommended by the panel manufacturer for the substrate indicated.
- C. Trim Moldings: Manufacturer's Standard; size to match panel thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine surfaces to receive the parts of the Work specified herein. Verify dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of the supporting construction.
- B. Install per manufacturer's directions. Shim as required to achieve a smooth monolithic appearance.
 - 1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions, unless otherwise shown and bring faces of wall panels to the same plane.
 - 2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating wall panels.
 - 3. No fasteners are to be visible on the exposed surface of the wall panels.
- C. Scribe and cut wall panels for accurate fit at penetrations by other work through walls. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness for stretcher-leveled metal sheet.
- D. Install edge moldings and trim of type indicated at perimeter of wall panel areas and where necessary to conceal edges of wall panels. Show method of edge trim attachment and design of edge trims on submitted shop drawings.
 - 1. Do not use exposed fasteners, including pop rivets, on moldings and trim.

3.2 CLEANING AND PROTECTION

- A. Upon completion of the work, remove unused materials, debris, containers and equipment from the project site. Clean and repair floors, walls and other surfaces that have been stained, marred or otherwise damaged by work under this Section.
- B. Protect wall panels during the construction period so that they will be without any indication of deterioration or damage at the time of acceptance by the Owner.

END OF SECTION

**SECTION 09 91 00
PAINTING**

PART 1 - GENERAL

1.1 SUMMARY

A. Painting, coatings and finishing, including the following:

1. Painting and finishing of exterior and interior exposed items and surfaces as specified herein and scheduled and noted on the Drawings.
2. Surface preparation, priming and coats of paint specified are in addition to shop priming and surface treatment specified under other Sections, except as otherwise specified.
3. Paint as used herein means coating system materials, including primers, emulsions, enamels, sealers and fillers and other applied materials whether used as prime, intermediate or finish coats.
4. Paint exposed surfaces except where the natural finish of the material is obviously intended and specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas.

B. Related Sections:

1. Unit masonry: Section 04 20 00.
2. Metal fabrications: Section 05 50 00.
3. Hollow steel doors and frames: Section 08 11 13.
4. Access doors: Section 08 31 13.
5. Gypsum board: Section 09 29 00.
6. Applicable Sections of Division 26.

1.2 PAINTING NOT INCLUDED

A. General: The following categories of work are not included as part of the painter applied finish work or are included in other Sections of these Specifications, unless otherwise shown or specified.

1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various Sections for structural steel, metal fabrications, ornamental metal fabrications, hollow metal work and similar items.
2. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory finishing or installer finishing is specified for such items as (but not limited to) toilet enclosures, acoustic materials and casework.
3. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and inaccessible areas, furred areas, spaces and duct shafts.

4. Finished Metal Surfaces: Metal surfaces of anodized aluminum, aluminum paint finish system, stainless steel, chromium-plated, copper, bronze and similar finished materials will not required finish painting, except as otherwise indicated.
5. Operating Parts and Labels: Do not paint any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated. Do not paint over any code required labels, such as UL name or nomenclature plates.

1.3 ACTION SUBMITTALS

- A. Samples: Architect's review will be for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor. Provide a listing of the material and application for each coat of each finished sample, include color sample chips from manufacturer.
 1. Initial Color Selection: Prior to beginning painting work, Contractor will be furnished sample color chips and copies of Color Schedule for surfaces to be painted. Colors will be selected by the Architect.
 2. Draw-Downs: After initial colors have been selected provide actual paint draw-downs for each color and sheen specified.
- B. Paint Schedule: Submit copies of the paint schedule indicating each type of surface to be painted, paint product and generic description of paint product and each type of primer for each type of surface material.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description, installation and maintenance instructions for each type of paint.

1.5 QUALITY ASSURANCE

- A. Provide materials used on this part of the Work as hereinafter specified. No claims as to the suitability of any materials specified, or the applicator's inability to produce first class finishes with these materials will be considered unless such claims are made in writing prior to the start of the painting work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label.
- B. Provide labels on each container with the following information:
 1. Name of title of material.
 2. Manufacturer's stock number.

3. Manufacturer's name.
4. Contents by volume, for major pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.

1.7 PROJECT/SITE CONDITIONS

A. Existing Conditions:

1. Starting of painting work will constitute the applicator's acceptance of the surfaces and conditions within any particular area.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces or conditions otherwise detrimental to the formation of a durable paint film.

B. Protection:

1. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damages by cleaning, repairing or replacing and repainting.
2. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
3. During the progress of the work, remove from the project daily discarded paint materials, rubbish, cans and rags.
4. Upon completion of painting work, clean window glass and other paint splattered surface. Remove splattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

PART 2 - PRODUCTS

2.1 COLORS AND FINISHES

- A. Prior to beginning of work, sample color chips for surfaces to be painted will be furnished by the Architect. Match the colors of the chips and submit samples to the Architect as specified herein, before proceeding with the work.
- B. Final acceptance of colors will be from samples applied on the job.
- C. Proprietary names used to designate colors or materials are not intended to imply that products of the manufacturers are required to the exclusion of equivalent products of other named manufacturers, but the Architect is to be informed in writing of manufacturers and materials used on the job for various colors and finishes.

2.2 PAINT COORDINATION

- A. Provide finish coats which are compatible with prime paints used. Review other Sections of these Specifications in which prime paints are to be provided to ensure

compatibility of total coating system for various substrates. Upon request from other trades, furnish information on characteristics of specified finish materials, to ensure compatible prime coats as used. Provide barrier coats over incompatible primers or remove and reprime as required for specified finish coat.

2.3 PAINT MATERIALS

- A. Provide the best quality grade of the various types of coatings as regularly manufactured by approved paint materials manufacturers. Materials not displaying the manufacturer's identification as a well known standard, best grade product will not be acceptable.
- B. Provide undercoat paint compatible with and produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer and use only within recommended limits.
- C. Provide paint manufactured by one of the following:
 - 1. Benjamin Moore (Moore), Montvale, NJ 07645
 - 2. Glidden Professional, Cleveland, OH 44115
 - 3. PPG Pittsburgh Paints, Pittsburgh, PA 15222
 - 4. Pratt & Lambert (P & L), Buffalo, NY 14240
 - 5. Sherwin Williams (S-W), Cleveland, OH 44115
 - 6. Devco Paints, ICI Paints, Strongsville OH 44136
 - 7. MAB Paints, Broomall, PA 19008
 - 8. Tnemec Company, Inc., Kansas City, MO 64141
 - 9. Carboline Company, St. Louis, MO 63144
 - 10. Modac Products Company, Inc., Broomall, PA 19008
 - 11. Sonneborn Building Products, Minneapolis, Mn 55435
 - 12. Thoro Systems, Harris Specialty Chemicals, Inc., Jacksonville, FL 32256
- D. Refer to the Paint Schedule at the end of this Section and building exterior, interior elevations and schedules on the Drawings.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. General:
 - 1. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified for each particular substrate condition.
 - 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in-place and not to be finish painted or provide surface applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that contaminants from the cleaning process will not fall onto wet newly painted surfaces.

B. Cementitious Materials:

1. Prepare cementitious surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils and by roughening as required to remove glaze.
2. Determine the alkalinity and moisture content of the surface to be painted by performing appropriate tests. If the surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, correct this condition before application of paint. Do not paint over surfaces where the moisture content exceeds that permitted in manufacturer's printed directions.

C. Wood:

1. Clean wood surfaces to be painted of dirt, oil or other foreign substance with scrapers, mineral spirits and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other paint manufacturer approved sealer, before application of the priming coat. After priming fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sandpaper smooth when dried.
2. Prime, stain or seal wood required to be job painted immediately upon delivery to job. Prime edges, ends, face, undersides and backsides of such wood. When transparent finish is required, use spar varnish for back priming.
3. Seal tops and bottoms of wood door with a heavy coat of varnish or equivalent sealer immediately upon delivery to the job.

D. Ferrous Metals:

1. Clean ferrous surfaces which are not galvanized or shop coated of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
2. Touch up shop applied prime coats wherever damaged or bare, where required by other Sections of these Specifications. Clean and touch up with the same type shop primer.

- E. Galvanized Metal: Clean free of oil and other surface contaminants with a non-petroleum base solvent recommended by paint manufacturer.

3.2 SURFACE PREPARATION OF PREVIOUSLY COATED SURFACES

A. General:

1. Remove cracked and deteriorated sealants and caulking.
2. Remove chalk deposits and loose, blistered, peeling, scaling, or crazed finish to bare base material or sound substrate by scraping and sanding.
3. Wash surfaces with solution of TSP to remove wax, oil, grease, and other foreign material; rinse, and allow to dry. Exercise caution that TSP solution does not soften existing coating.

4. Abrade glossy surfaces by sanding or wiping with liquid de-glosser.
5. Remove mildew as specified above.
6. Test compatibility of existing coatings by applying new coating to small, inconspicuous area. If new coatings lift or blister existing coatings, provide test results and recommendations from paint manufacturer to Architect.
7. Apply specified primer to surfaces scheduled to receive coatings.

B. Gypsum Wallboard:

1. Fill cracks and voids with spackling compound.
2. Apply primer over bare surfaces and newly applied texture coatings.

C. Metal:

1. Remove rust from surfaces to bare metal in accordance with SP3 "Power Tool Cleaning".
2. Exercise care not to remove galvanizing.
3. Complete preparation as specified for new work.

D. Wood:

1. Fill cracks, crevices and nail holes with putty or wood filler.
2. Apply primer over bare surfaces and filler material.

3.3 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and, if necessary, strain the material before using.

3.4 PAINT APPLICATION

A. General:

1. Apply paint in accordance with the manufacturer's directions; use applicators and techniques best suited for the type of material being applied.
2. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance.
3. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment of furniture with prime coat only.

4. Paint interior surfaces of ducts, where visible through registers or grilles with a flat, non-specular black paint.
5. Finish exterior doors on tops, bottoms, and side edges same as exterior faces, unless otherwise indicated.
6. Sand lightly between each succeeding enamel or varnish coat.
7. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
8. Prime surfaces to receive vinyl, fabric, paper wall and other types of wall coverings, unless otherwise indicated.

B. Application Restrictions:

1. Do not apply water base paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 50 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.
2. Do not apply solvent thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 45 degF, unless otherwise permitted by the paint manufacturer's printed instructions.
3. Do not apply paint when the relative humidity exceeds 85 percent; or to damp or wet surfaces, unless otherwise permitted by the paint manufacturer's printed instructions. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application of drying periods.

C. Minimum Coating Thickness: Provide the following minimum coating thicknesses unless herein noted otherwise:

1. Apply each material at not less than the manufacturer's recommended spreading rate to provide a total dry film thickness of not less than 3 mils for the entire coating system of prime and finish coats of 3 coat work.
2. Provide a total dry film thickness of not less than 2 mils for the entire coating system of prime and finish coat for 2 coat work.

D. Prime Coats:

1. Apply a prime coat to material which is required to be painted or finished and which has not been prime coated by others.
2. Re-coat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
3. Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks or other surface imperfections.

E. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable.

F. Completed Work: Match reviewed samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 PAINT SCHEDULE

A. Interior:

1. Gypsum Wallboard Walls for Eggshell Finish:
 - a. One Coat:
 - 1) Moore Ecospec Interior Latex Primer Sealer (231)
 - 2) S-W Harmony Latex Wall Primer
 - 3) PPG Pure Performance Latex Primer
 - b. Two Coats:
 - 1) Moore Pristine Ecospec Interior Latex Eggshell (223)
 - 2) S-W Harmony Latex Eggshell
 - 3) PPG Pure Performance Latex Eggshell
2. Gypsum Wallboard Walls for Semi-Gloss Finish:
 - a. One Coat:
 - 1) Moore Ecospec Interior Latex Primer Sealer (231)
 - 2) S-W Harmony Latex Wall Primer
 - 3) PPG Pure Performance Latex Primer
 - b. Two Coats:
 - 1) Moore Pristine Ecospec Interior Latex Semi-Gloss (224)
 - 2) S-W Harmony Latex Semi-Gloss
 - 3) PPG Pure Performance Latex Semi-Gloss
3. Gypsum Wallboard Ceilings for Latex Flat Finish:
 - a. One Coat:
 - 1) Moore Ecospec Interior Latex Primer Sealer (231)
 - 2) S-W Harmony Latex Wall Primer
 - 3) PPG Pure Performance Latex Primer
 - b. Two Coats:
 - 1) Moore Pristine Ecospec Interior Latex Flat (219)
 - 2) S-W Harmony Latex Flat
 - 3) PPG Pure Performance Latex Flat
4. Concrete Unit Masonry Walls for Eggshell Finish:
 - a. One Coat:
 - 1) Moore Moorcraft Super Craft Latex Block Filler No. 285P
 - 2) S-W PrepRite Block Filler
 - 3) PPG 6-7 Speedhide
 - b. Two Coats:
 - 1) Moore Pristine Ecospec Interior Latex Eggshell (223)
 - 2) S-W Harmony Latex Eggshell
 - 3) PPG Pure Performance Latex Eggshell
5. Concrete Unit Masonry Walls for Semi-Gloss Finish:
 - a. One Coat:
 - 1) Moore Moorcraft Super Craft Latex Block Filler No. 285P
 - 2) S-W PrepRite Block Filler
 - 3) PPG 6-7 Speedhide
 - b. Two Coats:
 - 1) Moore Pristine Ecospec Interior Latex Semi-Gloss (224)
 - 2) S-W Harmony Latex Semi-Gloss
 - 3) PPG Pure Performance Latex Semi-Gloss
6. Shop Primed Metal - H.M. Doors and Frames for Semi-Gloss Finish:
 - a. Sand, scrape and spot prime with compatible primer
 - b. Two Coats:

- 1) Moore Pristine Ecospec Interior Latex Semi-Gloss (224)
 - 2) S-W Harmony Latex Semi-Gloss
 - 3) PPG Pure Performance Latex Semi-Gloss
7. Gypsum Wallboard (scheduled for wall covering):
- a. One Coat:
 - 1) Moore Ecospec Interior Latex Primer Sealer (231)
 - 2) S-W Harmony Latex Primer
 - 3) PPG Pure Performance Latex Primer

3.6 CLEAN UP

- A. Just prior to final completion and acceptance, examine painted and finished surfaces and retouch or refinish as necessary and required, to leave surfaces in perfect condition.
- B. Upon completion of work, remove paint and finishing spots and overspray from floors, glass and other surfaces. Remove rubbish, containers and accumulated material of whatever nature not caused by other trades from the project site and level work in a clean, orderly and acceptable condition.

END OF SECTION

**SECTION 26 00 00
ELECTRICAL, GENERAL**

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. General provisions of contract include the following: Bidding requirements, contract forms, provisions of contract, and Division 1. These provisions contain requirements which affect electrical work under Divisions 26, 27 and 28 and which must be complied with as a part of the work.
- B. Divisions 26, 27 and 28 are subdivided into various sections for general convenience.
- C. Provide items, articles, materials, operations and methods required by drawings and specifications including labor, equipment, supplies and incidentals necessary for completion of work in Divisions 26, 27 and 28.
- D. It is the intention of Divisions 26, 27 and 28 specifications and drawings to call for finished work, tested and ready for operation.
- E. Apparatus, appliance, material or work not shown on the contract drawings, but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and ready for operation, even though not specified or shown on the contract drawings, shall be furnished and installed without additional expense to Owner.
- F. Should there be any discrepancies or a question of intent, refer the matter to the architect for a decision before ordering any equipment or materials or before starting any related work.

1.2 WORK INCLUDED

- A. Electrical work is indicated on drawings and includes but is not limited to the following:
 - 1. Demolition and remodeling.
 - 2. Branch circuit wire and conduit.
 - 3. Lighting fixtures.
 - 4. Wiring devices such as boxes, switches, receptacles, etc.
 - 5. Special systems.
 - 6. Conduit fittings, supports, etc., though not shown.
 - 7. Circuit breakers, safety switches, fuses and other over current protection and safety devices.
- B. Contractor shall provide all temporary services required to maintain normal building operation during construction. Temporary interruption of services shall occur during non-school/business hours. Contractor shall be solely responsible for

determining construction sequencing and shall include all costs required for maintaining all mechanical, plumbing, and electrical services to the entire facility.

1.3 WORK NOT INCLUDED

- A. Unless otherwise stated, power wiring for all mechanical equipment is the responsibility of the electrical contractor with control wiring the responsibility of the mechanical contractor. This statement is not meant to preclude a different distribution of responsibility by the general contractor, who is responsible for a complete installation through interaction of subcontractors. Wiring (120 volt) between exhaust fan and powered damper and/or line voltage thermostats is by electrical contractor.

1.4 QUALITY ASSURANCE

- A. Each major component of equipment shall have the manufacturer's name, address, model number and ratings on a plate securely affixed in a conspicuous place.
- B. Code ratings, labels or other data which are die-stamped or otherwise affixed to the surface of the equipment, shall be in label of Underwriter's Laboratories, Inc. (UL). Approval must be obtained for materials furnished as equals. All proposals shall be prepared on the basis of using exactly the materials and items specified. If the contractor wishes to have other items considered, he must submit these items with his proposal and state the amount to be added or deducted.

1.5 ABBREVIATION

- A. Reference to a technical society, institution, association, or governmental authority is made in these specifications in accordance with the following abbreviations. All groups listed below do not necessarily apply to this project and are listed for informational purposes only:
 - 1. ASE: Association of Safety Engineers
 - 2. ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers 2013
 - 3. ASME: American Society of Mechanical Engineers
 - 4. EPA: Environmental Protection Agency
 - 5. IEEE: Institute of Electrical and Electronics Engineers
 - 6. MCAA: Mechanical Contractor's Association of America
 - 7. NEMA: National Electrical Manufacturers Association
 - 8. NEC: National Electrical Code 2011 and per Village of Glen Ellyn requirement, and incorporating all local amendments
 - 9. NFPA: National Fire Protection Agency
 - 10. ADA: Americans with Disabilities Act
 - 11. IBC: International Building Code 2009
 - 12. IFC: International Fire Code 2009
 - 13. IECC: Illinois Energy Conservation Code 2015
 - 14. IAC: Illinois Accessibility Code

1.6 SUBMITTALS

- A. Submit under provisions as described within the general requirements section.
- B. Shop Drawings:
 - 1. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.
 - 2. Contractor shall review all shop drawings prior to submitting them for Architect/Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any drawings that Contractor has not stamped with his review certification.
 - 3. Owner's representative shall have the right to review all materials, equipment, fixtures, motor control centers, panelboards, control panels, etc., and other appurtenances provided for this work before proceeding with the purchase and installation.
 - 4. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Owner's Representative to ascertain that the proposed equipment/fixtures and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment/fixtures being submitted.
 - 5. All shop drawings shall be submitted to permit Owner's Representative ample time to review before material is released for delivery to job.
 - 6. Contractor shall maintain a permanent file of shop drawings to turn over to Owner's Representative at completion of project.
 - 7. Submittals shall include 1/4" = 1'-0" dimensioned drawings of all electrical equipment rooms for review before installation continues.
 - 8. Equipment Drawings:
 - a. Provide complete set of shop drawings bound in permanent binder.
 - b. Provide typewritten list of each type, quantity and manufacturer of lamp installed.
 - c. Provide typewritten list of each type, quantity, size and manufacturer of fuse, motor overload heater, etc., installed.
 - d. Provide a complete list of all replaceable components for maintenance purposes.
- C. As-Built Drawings and Operation and Maintenance (O&M) Manuals: The contractor shall keep continuous, up-to-date records of all deviations and changes between the work as shown on the drawings and as actually installed. Upon completion of the work and as a condition prior to final acceptance and payment, he shall furnish directly to the Owner the project record data. The accuracy of this data shall be the responsibility of the contractor, who shall bear all expenses for any required corrections. As-builts shall be furnished on reproducible heavy bond paper and electronically in PDF **and** Autocad format (version selected by Architect). Obtain signed certification from an authorized Owner's representative. All devices turned over without a signature and later lost, will be replaced at the contractors expense. Provide five (5) sets of as-built information and O&M Manuals including electronic version.

1.7 JOB REQUIREMENTS

- A. The contractor shall keep himself informed as to the progress of the work and shall keep a sufficient force of workmen on the job so as not to delay the progress of the work.
- B. The contractor shall be responsible for the exact location of all outlets, and shall be responsible for all cutting and patching. No cutting shall be done without approval.
- C. The Owner reserves the right to change the position of outlets before the work is installed without extra charge. The contractor shall be responsible for determining exact locations in the field. In this sense the drawings are diagrammatic.
- D. The contractor shall obtain all the necessary measurements in order that his work may fit all parts of the work. He shall further verify all the necessary measurements at the building in order that his work may fit that already in place.

1.8 CODE REQUIREMENTS AND INSPECTION AUTHORITIES

- A. All work shall be installed according to the rules and regulations of the National Electrical Code, IBC, the Occupational Safety and Health Act, IAC and ADA regulations, and the local inspection authorities. This shall include all written provisions and amendments to the electrical code and all interpretive provisions and directives of the chief electrical inspector, which may be in effect or enacted and in force until the final acceptance of the work.
- B. The quality and type of work referred to above shall be regarded as the minimum requirements, and shall be exceeded where required by this specification.
- C. The contractor shall study the drawings and specifications prior to submitting his proposal and, if inspection authorities or labor conditions require work in addition to that specified or shown, the contractor shall state in his proposal the items involved and the additional amounts required for such items. After entering into a contract, the contractor agrees that all such items are included in his proposal and will not be cause for additional charges to the Owner.

1.9 DRAWINGS

- A. The small scale of the drawings does not permit duplication of all panels, feeders, junction boxes and other equipment on all sheets. Drawings are, in essence, diagrammatic and it is the contractor's responsibility to install a complete working system. Special care shall be exercised in the installation of the work to include all material and fittings necessary for a complete installation. Exact dimensions and locations of all outlets shall be verified on-the-job. Before preparing his proposal the contractor shall examine all architectural drawings and engineering drawings. If any discrepancies or details of the construction interfere with the work, he shall report the same and obtain written instructions as to the changes necessary. Should he neglect to do so, he shall make the necessary changes at his own expense. Modifications of drawings are permissible as long as coordinated with Engineer/Architect and allowed by Owner.

- B. The drawings show only the general routing of the conduit. The scale of the drawing does not permit the indication of all junction boxes, pull boxes, and fittings that may be required. The cost of such work shall be considered as part of the contract and extra payment will not be made for such work.
- C. Contractor shall refer to plans for the location of light fixtures, speakers, fire alarm devices, etc.
- D. Refer to all architectural drawings including casework drawings during installation of all light switches, outlets, phone jacks, computer jacks, and devices so that no conflicts will be encountered. Inform architect of any conflicts that occur before the installation of above said devices.

1.10 COOPERATION AND COORDINATION

- A. The contractor shall confer with other trades at the site, before installing his work, to avoid interferences so that maximum headroom and clearances may be maintained. In the event that interferences develop between work of various trades, the architect's decision will be final and additional compensation will not be allowed for moving of misplaced work.
- B. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
 - 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- C. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.
- G. The contractor shall coordinate the location of all devices and fixed casework locations prior to installing each device. Additional compensation will not be granted for relocation due to interferences with casework.
- H. Particular attention shall be paid to situations where recessed equipment, pipes and lights occur, or where work of several trades occurs together above suspended ceilings, in pipe shafts or in areas where space is limited.

- I. All fixtures, equipment, devices, switches and outlets shall be positioned to avoid all interferences with and to assure proper coordination with work of all other trades, cases, partitions, wall, floor and ceiling patterns, architectural features, etc. All recessed devices, fixtures, etc. shall be coordinated to work out conflicts and adjustments where such adjustments are warranted.
- J. The contractor shall provide and install junction box and conduit stubbed up above ceiling for mechanical contractor's thermostat and all other associated sleeves to accommodate thermostat cabling. Mount at 56-1/2" to center. Refer to mechanical drawings and coordinate with temperature control contractor for all thermostat locations.

1.11 TEST REQUIRED

- A. Any wiring devices, lighting fixtures or electrical apparatus in the contract, if grounded or shorted, shall be corrected or replaced at the contractor's expense.
- B. The contractor will be responsible for inspecting all existing systems that will be worked on (during the course of the construction project) before touching them. This shall cover, but not limited to the following systems: fire alarm system, paging/clock system, security camera system, local area network, local audio/video distribution system, etc.). This inspection will need to document any issues with the existing systems that are affecting their proper operation. If this report is not provided, the contractor is attesting that all systems were functional and properly operating before the start of the construction and will be responsible for all repairs. The onus is on the contractor to identify problems with any of the systems to the Owner prior to construction.

1.12 DEFECTIVE WORK AND MATERIAL

- A. All material or work found to be defective or not in strict conformity with drawings or different from requirements of drawings and specifications or defaced or injured through negligence of the contractor or his employees, through damage in shipments, or through action of fire or weather will be rejected and shall be immediately removed from premises by the contractor and satisfactory material and work substituted without delay.
- B. Any defective work or imperfect work shall be corrected immediately on notice from the architect. No previous inspection or certificate on account shall be held to relieve the contractor from his obligation to furnish sound material and to perform good and satisfactory work.

1.13 CUTTING, DRILLING, PATCHING AND PAINTING

- A. All cutting, drilling, patching and painting of wood construction, masonry, steel or iron work belonging to the building shall be done by the contractor in order that his work may be properly installed, and all disturbed construction or finish must be made good, but under no conditions must structural work be cut except upon approval by the architect.

- B. Cutting, patching and painting for electrical work shall be performed by this contractor unless noted otherwise. This contractor shall coordinate his work with the other trades for completing the work satisfactorily. Contractor is responsible for refinishing areas cut or patched by the execution of this work so as to match existing surrounding area. Trimmed cuts will be acceptable when approved by the architect.
- C. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- D. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

1.14 DEMOLITION AND REMODELING

- A. Work included:
 - 1. The work involved includes modifications, additions, and deletions to an existing electrical system. Contractor shall furnish all labor, equipment, supplies and incidentals necessary to alter the existing system to produce the desired result shown on the drawing and specified in the project manual.
 - 2. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
- B. Existing conditions:
 - 1. Building plans shown are compiled from sources believed to be accurate. However, the information shown on these plans is conceptual and the contractor shall be responsible for field verification of all dimensions, sizes, system voltages, quantities and extent of work. The contractor shall carefully examine the premises in order familiarize himself with existing conditions and fully understand the nature and scope of work.
 - 2. Drawings are strictly schematic and a complete coordinated, functional and code approved system is intended.
- C. Electrical demolition work shall include removal of all equipment, fixtures, piping, wire, receptacles and other electrical equipment and materials as shown on the drawings or necessary for the modification shown. Disconnect and remove all power wiring to mechanical equipment being removed.
 - 1. Contractor shall bear all expenses for legally disposing of all light fixtures and their related ballasts, lamps and battery packs. Follow all EPA (Environmental Protection agency) guidelines and submit proper paperwork with certification of above.
 - 2. Provide the Owner with the option to keep all light fixtures, exit signs, smoke detectors, ballasts, lamps, ADA notification devices, etc., removed and not reused as part of this work. If Owner decides to keep any item in whole or

part, deliver to location designated by Owner. Contractor shall properly dispose of all declined items.

D. Materials:

1. Requirements for equipment, supplies, and accessories that are to be added to the electrical system are specified in other sections.
2. Materials shall be new unless otherwise indicated. When so indicated existing equipment, supplies and accessories may be reused (sometimes relocated). Contractor must verify that existing materials are sound and fully functional for the design intended. Maintaining the condition of relocated materials is the responsibility of the contractor.

E. Conduit and wire:

1. At contractor's option, existing raceway may be reused if not removed and meets new application. Existing wiring for receptacle and lighting circuits may be reused if not removed and meets new application, unless otherwise indicated elsewhere. Wire and cable that has been removed shall not be reinstalled. Raceway that is in like-new condition may be reused if not removed. Raceway and power/lighting wire that is being reused shall be tested for continuity of conduction and ground for insulation resistance of conductor and splices. Contractor shall remove and replace all wiring which is defective at contractor's expense.

F. Existing service:

1. Existing building services shall be maintained and temporary services shall be provided when required at the contractor's expense. In the event that a shutdown cannot be avoided, the service interruption shall be with the minimum inconvenience to the occupants and with the approval of and under the supervision of the architect. In no case will the contractor interrupt service without the permission of the Owner or architect.
2. **Existing Building Systems: Contractor shall provide all temporary services required to maintain all building systems in working order during construction. Temporary interruption of building systems shall only occur during non-school/business hours. Contractor shall be solely responsible for determining construction sequencing and shall include all costs required for maintaining all mechanical, plumbing, and electrical systems throughout the entire facility.**

G. Revisions to the building:

1. Refer to the architectural drawings and details for exact locations of existing partitions to be remodeled, existing partitions to remain and new partitions. This contractor shall repair all damages to existing construction due to his demolition operation or installation of new work.

H. Abandoned equipment and materials:

1. Switches and Outlets: When noted on drawings, the contractor shall abandon switches and outlets by removing them and providing solid cover plates.

Electrical service to these devices shall be disconnected and/or spliced for resumption of service to devices not removed. Paint cover plate to match surrounding area. If box is prefinished material, install stainless steel cover plate.

2. Raceways and Wire: Cut and removed buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

I. Installation:

1. Remove electrical equipment and installations, indicated to be demolished.
2. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the work, remove damaged portions and install new products of equal capacity, quality, and functionality.
3. All materials, such as light fixtures, that are to be removed, are the property of the Owner. Contractor shall store material as directed by the Owner, or at Owner's direction, the contractor shall assume responsibility for legal disposal per EPA requirements.
4. When removal of existing materials causes voids in existing cover plates or uncovered junction boxes, etc, provide solid finished covers that protect the void or opening and match surrounding area as closely as possible.
5. Remove demolished material from project site. Coordinate with drawing for disposal of removed materials.
6. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.
7. All raceways and conduit shall be run concealed. Fish through existing walls and ceilings as required. In the event concealed conduit is impossible, surface mounted metallic raceways shall be used with the approval of the architect. Surface mounted conduit shall also be used when specifically designated on the drawings in locations where exposed conduit is the predominant wiring method currently in use. Contractor may modify or add to that system with exposed conduit necessary to achieve design results. Exposed conduit in finished areas shall not be installed unless approved by the architect. Conduit installation shall be accomplished in a neat workmanlike manner. Run tight to walls at ceiling edge. Coordinate final routings in the field with the architect prior to installation. All exposed conduits shall be painted to match surrounding area.
8. Existing lay in ceiling tiles shall be removed and reinstalled as required for the installation of new electrical work. Tiles damaged by this work shall be replaced with identical materials at the contractor's expense.
9. Where the work of one trade will interfere with the work of other trades, all trades shall assist in working out space conditions, make satisfactory adjustments and shall be prepared to submit and revise coordinated shop drawings.
10. With the approval of the architect/engineer and without additional cost to the Owner, make minor modifications in the work, including rerouting as required by interferences with structural general and work of other trades or for the proper execution of the work.
11. Work installed before coordinating with other trades so as to cause interference with their work shall be reworked, without additional cost to the Owner, as directed by the architect. The contractors shall make all necessary provisions to pursue their work in a manner which will assure that the

operation of the building is minimally impaired. This shall include, but not be limited to, delivery of supplies, temporary utility connections, etc. Storage of materials must be at locations approved by the Owner.

12. Circuits shown to the panels for load and wiring are diagrammatic. The contractor shall have the option on conduit fill and runs in accordance with local municipal code for rewiring on the revision portion and standard conduit fill for new work. Final decisions for revision and connection to the new and existing system will have to be made in the field. Circuits shall be picked up overhead or through the floor to existing and new panels. Verify in the field.

1.15 CHASES AND OPENINGS

- A. Provide to masonry or concrete trades, templates or details for chases and openings to be left in floors, walls and partitions to accommodate work for each trade.

1.16 CLEANING UP

- A. After the completion of the electrical installation, the entire system shall be thoroughly cleaned. Clean all foreign matter from all fixtures, equipment, and exterior of conduits. Remove all rubbish, debris, etc. accumulated from this operation during the course of the work and at the completion of the project. Legally dispose of same off-the-site.

1.17 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9.
 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

1.18 FIRE-STOPS

- A. Penetrations through fire rated walls and floors shall be sealed to the original hourly fire rating with a fire-stop system capable of preventing the passage of flames and hot gases when subject to the requirements of the test standards specific for Fire-Stops ASTM E119 and E814 (UL 1479). Refer to Division 7 for additional information and requirements. Utilize 3M, General Electric, Metalines Inc., Nelson Electric or Hilti products. The fire stop system installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

1.19 CONCRETE BASES

- A. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi, 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."
- C. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated.

1.20 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

1.21 SUBSTANTIAL AND FINAL COMPLETION

- A. The contractor shall provide written notification to the engineer that the project is substantially complete. The engineer will accomplish a substantial completion inspection and provide the contractor with a list of work requiring corrective action. Upon completion of the corrective work, the contractor shall provide written notice that all corrective work has been completed. The engineer will conduct an inspection of the corrective work. The contractor shall bear costs of correcting such work, including additional testing and inspections, and compensation for the engineer's services and expenses made necessary thereby.
- B. One final inspection will be conducted for completion of work after written notification from the contractor. Additional inspections will be conducted at the expense of the contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. See subsequent sections of the electrical division of these specifications for information.

2.2 GUARANTEE

- A. Electrical work shall be guaranteed for both materials and labor for a period of one year in accordance with the general conditions and Division 1.

- B. Manufacturer's equipment guarantees or warranties for periods of more than one year shall be included in the maintenance manuals.

PART 3 - EXECUTION

3.1 PREPARATION/INSTALLATION/APPLICATION

- A. Adapt the work to the job conditions and make such changes as required and authorized by the architect, such as moving to clear beams and joists, adjusting at columns, avoiding interference with windows, raising or lowering conduits, outlets and fixtures to permit the proper installation of other mechanical or electrical equipment.
- B. All work shall be performed by trained mechanics of the particular trade involved in a neat and workmanlike manner as approved by the architect.

3.2 PROTECTION

- A. Protect the materials and work of other trades from damage during installation of the work provided under Divisions 26, 27 and 28.
- B. Pay particular attention to the limited space available in certain locations of the project so that equipment may be installed without any interference.
- C. In all rooms with exposed or concealed ductwork or piping, the exact locations of lighting fixtures shall be coordinated so as to clear all ducts and piping and obtain uniform light distribution.

END OF SECTION

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 3. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.

- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounted items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for all penetrations. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls. If above accessible ceiling, sleeves can extend 1 inch out of wall.
- F. Extend sleeves installed in floors 2 inches above finished floor level or to above ceiling when concealing communication technology cabling.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway. All other sleeves for cabling shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Furnish and install sleeves for all low voltage cabling, including Data, Voice, Video, Paging, Clock, Thermostat, Fire Alarm, Security, etc. All sleeves shall be provided with end bushing/fitting to protect cabling. Sleeves shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required. Minimum sleeve size is 3/4 inch conduit.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Sleeves and sleeve seals for cables.
- B. Related Sections include the following:
 - 1. Division 26 Section "Identification for Electrical Systems."
 - 2. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2001 (Reapproved 2007).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010.
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2009).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2008.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).
- I. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- N. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- O. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for

Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.
- D. All devices and wiring shall be U.L. listed.

1.7 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Southwire Company.
 - 2. Triangle Wire and Cable.
 - 3. Cerro Wire, LLC.
 - 4. Encore Wire Corp.
- B. Copper Conductors: Comply with NEMA WC 70, 98 percent conductivity.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN/THWN-2, 75 deg C wet/90 deg C dry, XHHW-2, 90 deg C wet/dry and SO, minimum 600 V.

2.2 CONNECTORS AND SPLICES AND TERMINAL BLOCKS

- A. Manufacturers (for Connectors): Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. AMP Incorporated/Tyco International.
 - 3. Buchanan/Tyco.
 - 4. FCI-Burndy.
 - 5. Hubbell Power Systems, Inc.
 - 6. Ideal Industries, Inc.
 - 7. O-Z/Gedney; EGS Electrical Group LLC.
 - 8. 3M; Electrical Products Division.
 - 9. Thomas & Beits Corp.
 - 10. Tyco Electronics Corp.

- B. Manufacturers (for Terminal Blocks): Subject to compliance with requirements, provide products by one of the following:
 - 1. Burndy Products/FCI.
 - 2. General Electric Co.
 - 3. IlSCO.
 - 4. Pass & Seymour.
 - 5. Polaris.
 - 6. Square D Co.
 - 7. 3M Company.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
 - 1. Bolted or screwed mechanical pressure/connector block type (insulated), size 8 AWG and larger.
 - 2. Compression/crimped pressure type, size 8 AWG and larger.
 - 3. Twist-on pressure type plastic or nylon insulator cap with internal threaded core and spring insert, size 6 AWG and smaller.
- D. Terminal blocks: NEMA ICS4; modular, channel (rail) mounted with end-stops; solderless, box/clamp type terminals; 300 volt rated for control conductors, 600 volt rated for power conductors; wire size (cross-section) rated for applicable conductors; suitable for connection of copper conductors; with marking strips.

2.3 WIRING ACCESSORIES

- A. Electrical Tape:
 - 1. Manufacturers:
 - a. 3M: www.3m.com.
 - b. Plymouth Rubber Europa: www.plymouthrubber.com.
 - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 - 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
 - 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 - 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- D. Use mechanical compression for 6 AWG or larger or any connection made within any type of exterior junction box or device to include. Cover connector with insulating tape or heat shrinkable insulation equivalent to 150% conductor insulation.
- E. Outdoor boxes (Including building mounted boxes used for outdoor devices) and underground connections of any type #12 to #6 AWG.
 - 1. Ideal Weatherproof wire connectors or equal.
 - a. Silicon filled wire connectors designed to meet UL 486D standards
 - b. Size per manufacturer for number and wire sizes

2.4 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- C. Coordinate with Section 26 05 00 "Common Work Results for Electrical" for additional requirements.

2.5 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex Co.
 - 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- B. Feeders Concealed below Slabs-on-Grade, and in Crawlspace: Type THWN-2, single conductors in raceway.
- C. Exposed Branch Circuits, including in Crawlspace: Type THWN-2, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- E. Branch Circuits Concealed below Slabs-on-Grade: Type THWN-2, single conductors in raceway.
- F. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.
- G. Fire Alarm Circuits: Refer to drawings for requirements.
- H. Remote Control and Signal Cable:
 - 1. Control cable for Class I remote control and Signal circuits: Copper conductor, 600 volt THHN/THWN-2 insulation, rated 60 deg C, installed in raceway.
 - 2. Control cable for Class 2 or Class 3 remote control and Signal circuits: Copper conductor, 300 volt insulation, rated 60 deg C, individual conductors twisted together, shielded and covered with a PVC jacket; UL listed. Use plenum rated cable in plenum environments.
 - 3. Plenum cable for Class 2 or Class 3 remote control and Signal circuits: Copper conductor, 300 volt insulation, rated 60 deg C, individual conductors twisted together, shielded and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts and plenums.
 - 4. Coordinate open cabling requirements with local jurisdiction prior to bidding.
- I. Connections to removal light fixtures in grid ceilings: FMC with THHN/THWN-2, maximum length 6'-0" whips, with ground wire. Provide plenum rated raceways when required by local codes.
- J. Utilize type THWN-2 for underground feeders or branch circuits subject to becoming wet.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Install copper conductors:

1. Install minimum #12 AWG conductors, except install minimum #14 AWG conductors for control circuits.
 2. Install stranded conductors for #8 AWG and larger, and solid conductors for #10 AWG and smaller.
 3. Use minimum of #10 AWG conductor for 20 ampere, 120 Volt branch circuit home runs longer than 75 feet.
- B. Install a separate dedicated neutral conductor for each phase of both lighting and power multi-wire branch circuits. If a multi-wire branch circuit contains three phase wires, the circuit will require three dedicated neutrals. The use of multi-pole branch breakers to eliminate neutral conductors is not allowed.
- C. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- D. Completely and thoroughly swab raceway system before installing conductors.
- E. Provide protection for exposed cables where subject to damage.
- F. Install all power conductors in raceways. Install low voltage wiring in conduit unless otherwise indicated on drawings.
- G. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- H. Use U.L. listed pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- I. Pull conductors together where more than one is being installed in conduit. Place an equal number of conductors for each phase of a circuit in same raceway or cable. Make conductor lengths equal for all parallel circuits. Size conductors and raceways per NEC. Derate conductor ampacities per NEC.
- J. Install control conductors in conduit runs separate from power conductors.
- K. Install cables in conduits parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- L. Support according to Division 26 Section "Hangers and Supports for Electrical Systems," and as noted on drawings, above accessible ceiling; do not rest on ceiling tiles.
- M. Seal wall/floor penetrations according to Division 7 Section "Penetration Firestopping."
- N. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B. Thoroughly clean wires before installing lugs and connectors.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Tape uninsulated connectors with electrical tape to 150 percent of the insulating rating of conductor.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.
- D. Splice conductors only in accessible pull and junction boxes or outlet boxes. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- E. Install block connectors with insulating covers for copper conductor splices or taps, #8 AWG and larger.
- F. Install compression/crimped connectors for copper conductor control circuits terminal.
- G. Install twist-on connectors for copper conductor splices, #6 AWG and smaller, except install terminal blocks for connectors in pull and junction boxes containing 20 or more splices.
- H. Terminate spare conductors with electrical tape.

3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Coordinate with Section 26 05 00 "Common Work Results for Electrical" for additional requirements.
- C. Concrete Slabs and Walls: Install sleeves for all penetrations. Install sleeves during erection of slabs and walls.
- D. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both wall surfaces. If above accessible ceiling, sleeves can extend 1 inch out of wall.

- G. Extend sleeves installed in floors 2 inches above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and cable unless sleeve seal is to be installed. All other sleeves for cabling shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."
- L. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- M. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Furnish and install sleeves for all low voltage cabling, including Data, Voice, Video, Paging, Clock, Thermostat, Fire Alarm, Security, etc. All sleeves shall be provided with end bushing/fitting to protect cabling. Sleeves shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required. Minimum sleeve size is 3/4 inch conduit.

3.5 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.
- C. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test conductors for compliance with requirements.
 - 2. Perform each visual (for physical damage and proper connection) and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Torque test conductor connections and terminations to manufacturer's recommended values.
 - 4. Perform continuity test on power and equipment branch circuit conductors. Verify proper phasing connection.
 - 5. Megger test all wiring #8 AWG and larger, regardless of voltage.
 - 6. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

SECTION 26 05 23
CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. UTP Cabling – Refer to Specification Section 271500, "Communication Horizontal Cabling."
 - 2. RS-232 cabling.
 - 3. RS-485 cabling.
 - 4. Low-voltage control cabling.
 - 5. Control-circuit conductors.
 - 6. Identification products.

1.3 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of galvanized steel wire mesh bottom and side rails.
- B. EMI: Electromagnetic interference.
- C. IDC: Insulation displacement connector.
- D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- E. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- F. RCDD: Registered Communications Distribution Designer.
- G. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: For cable routing, showing cable route with relationship between the adjacent structural, electrical, and mechanical elements. Include the following:
 - 1. Vertical and horizontal offsets and transitions.
 - 2. Floor penetrations.
 - 3. Termination points.
- C. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Maintenance Data: For wire and cable to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test each pair of cables for open and short circuits.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install UTP and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. Support of Open Cabling: U.L. labeled for support of low voltage cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.
 - 4. Cable trays.
- B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."
 - 1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.

2.2 BACKBOARDS

- A. Description: Plywood, fire-retardant treated, 3/4 inches thick and sized as required for equipment. Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry."

2.3 RS-232 CABLE

- A. Plenum-Rated Cable: NFPA 70, Type CMP.
 - 1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 - 2. Fluorinated ethylene propylene insulation.
 - 3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 - 4. Fluorinated ethylene propylene jacket.
 - 5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned-copper drain wire.
 - 6. Flame Resistance: Comply with NFPA 262.

2.4 RS-485 CABLE

- A. Plenum-Rated Cable: NFPA 70, Type CMP.
 - 1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 - 2. Fluorinated ethylene propylene insulation.
 - 3. Unshielded.
 - 4. Fluorinated ethylene propylene jacket.
 - 5. Flame Resistance: NFPA 262, Flame Test.

2.5 LOW-VOLTAGE CONTROL CABLE

- A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - 1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - 2. Fluorinated ethylene propylene insulation.
 - 3. Unshielded.
 - 4. Fluorinated ethylene propylene jacket.
 - 5. Flame Resistance: Comply with NFPA 262.
- B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - 1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
 - 2. Fluorinated ethylene propylene insulation.
 - 3. Unshielded.
 - 4. Fluorinated ethylene propylene jacket.
 - 5. Flame Resistance: NFPA 262, Flame Test.

2.6 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, complying with UL 83.
- B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway or power-limited cable, concealed in building finishes, complying with UL 83.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.
- D. All cables installed in plenum environments shall be plenum rated.

2.7 IDENTIFICATION PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. HellermannTyton.
 - 3. Kroy LLC.
 - 4. Panduit Corp.
- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test cables according to TIA/EIA-568-C.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with TIA/EIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows if possible.
- E. Pathway Installation in Equipment Rooms:
 - 1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed or in the corner of room if multiple sheets of plywood are installed around perimeter walls of room.
 - 2. Install cable trays to route cables if conduits cannot be located in these positions.
 - 3. Secure conduits to backboard if entering room from overhead.
 - 4. Extend conduits 3 inches above finished floor or to above ceiling if entering top of racks.
 - 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- F. Backboards: Install backboards. Butt adjacent sheets tightly and form smooth gap-free corners and joints.
- G. Furnish and install sleeves through walls and floors where exposed cabling is allowed. Refer to Division 26 Section 26 05 00 "Common Work Results for Electrical" for additional information.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-C.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
9. Install end bushing/fittings on all conduit sleeves/stubs to protect cabling.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-C.
2. Install 110-style IDC termination hardware unless otherwise indicated.
3. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:

1. Install wiring in raceways. Comply with requirements specified in Division 26 Section "Raceway and Boxes for Electrical Systems."

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 48 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
4. Do not route cabling above top chord of bar joists or within 6 inches of roof deck to prevent damage caused by roofing nails.

F. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 72 inches long shall be neatly coiled not less than 12 inches in diameter below each feed point.

G. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-D recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.3 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables.

3.4 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits, No. 12 AWG.

3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

- A. For data communication wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.7 IDENTIFICATION

- A. Identify system components, wiring, and cabling according to TIA/EIA-606-C. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-C.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment.
- B. Related Sections, Include the Following:
 - 1. Division 26 "Low-Voltage Electrical Power Conductors and Cables."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:
 - 1. Grounding arrangements and connections for separately derived systems.
 - 2. Grounding for sensitive electronic equipment.
 - 3. Grounding devices.
- C. Qualification Data: For testing agency and testing agency's field supervisor.
- D. Field quality-control test reports. Submit written test reports to include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Operation and Maintenance Data: For grounding to include the following in emergency, operation, and maintenance manuals:
 - 1. Instructions for periodic testing and inspection of grounding features at test wells, ground rings and grounding connections for separately derived systems based on NETA MTS and NFPA 70B.

- a. Tests shall be to determine if ground resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if they do not.
- b. Include recommended testing intervals.

1.4 QUALITY ASSURANCE

- A. ANSI/IEEE 32 – Requirements, terms, and test procedures for neutral grounding devices.
- B. ANSI/IEEE C2 – National Electrical Safety Code.
- C. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with UL 467 for grounding and bonding materials and equipment.
- F. Comply with NEC Article 250 and local code requirements.
- G. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Grounding Conductors, Cables, Connectors, and Rods:
 - a. Apache Grounding/Erco Inc.
 - b. Boggs, Inc.
 - c. Chance/Hubbell.
 - d. Copperweld Corp.
 - e. Erco Inc.; Electrical Products Group.
 - f. Framatome Connectors/Burndy Electrical.
 - g. Harger Lightning Protection, Inc.

- h. Ideal Industries, Inc.
- i. ILSCO.
- j. Kearney/Cooper Power Systems.
- k. O-Z/Gedney Co.; a business of the EGS Electrical Group.
- l. Racor, Inc.; Division of Hubbell.
- m. Robbins Lightning, Inc.
- n. Superior Grounding Systems, Inc.
- o. Thomas & Betts, Electrical.
- p. Thompson Lightning Protection.

2.2 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction, green insulation.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Grounding Electrode Conductor: Stranded cable.
- D. Grounding Bus: Rectangular bars of annealed copper, 1/4 by 2 inches in cross section, unless otherwise indicated; with insulators.

2.3 CONNECTORS

- A. Comply with IEEE 837 and UL 467.
- B. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- C. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts, or compression type.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid copper conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 1 inch, minimum, from wall 6 inches above finished floor, unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.
- D. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- E. In raceways, use insulated equipment grounding conductors.
- F. Bond conductors together using thermoweld process.

3.2 EQUIPMENT GROUNDING

- A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
- B. Install insulated equipment grounding conductors with all feeders and branch circuits.
- C. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.

7. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- D. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.
- E. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- F. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- G. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location (when noted on drawings).
 1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus.
 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- C. Grounding and Bonding for Piping:
 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange.

Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- D. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
- E. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.

3.4 CONNECTIONS

- A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 2. Make connections with clean, bare metal at points of contact.
 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

- F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
- G. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
- B. Perform the following tests and inspections and prepare test reports:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 - 3. Prepare dimensioned drawings locating each test well, ground rod and ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
 - 2. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm.
- D. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
 - 3. Requirements when devices are installed in corrosive atmospheres.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.
- D. Corrosive Environment: Any area subject to chlorine, salt water, or other corrosive agent that causes deterioration and fatigue of materials.

1.4 REFERENCE STANDARDS

- A. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2009.
- B. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2006.
- C. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2010.
- D. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2009.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.5 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.
- E. Hot Dipped Galvanized Surfaces: Clean welds, bolted connections, cut and abraded areas and apply zinc rich galvanizing-repair paint to comply with ASTM A 780. Comply with manufacturers recommendations for hot dipped galvanized coating repair.
- F. Duplex Coating Surfaces: Clean welds, bolted connections, cut and abraded areas and apply zinc rich galvanizing-repair paint to comply with ASTM A 780. Finish with provided paint. Comply with manufacturers recommendations for hot dipped galvanized coating repair.

1.6 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Equipment supports.
- C. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

- B. Comply with NFPA 70.
- C. Hot Dipped Galvanized Coating: After fabrication, minimum 3 mil thickness; ASTM A123.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 2. Metallic Coatings: Hot-dip galvanized steel after fabrication and applied according to MFMA-4. To be used in all exterior, damp, wet locations.
 - 3. Nonmetallic Coatings: Manufacturer's standard corrosion-resistant coating with electro-deposition AC04416 coating with rust protection and fade resistant finish, acceptable to authority having jurisdiction. Applied according to MFMA-4.
 - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4, unless used in corrosive environment; see Notes 6 and 7 as follows.
 - 5. Channel Dimensions: Selected for applicable load criteria.
 - 6. Hot Dipped Galvanized Coating (For Corrosive Environment): After fabrication, minimum 3 mil thickness; ASTM A123.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.
 - 7. Hanger Rods: Threaded steel.
 - 8. Utilize anchoring devices suitable for corrosive environments when identified or encountered.
 - 9. Tapcons not allowed for mounting of large equipment, including cameras and light fixtures.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter. Maximum spacing for supports shall be 8 feet-0 inches on center and within 3 feet-0 inches of each junction box unless code requires more stringent spacing. Support wireways at intervals not to exceed 5 feet-0 inches.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. All materials installed in corrosive environments shall follow hot dipped galvanized process.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70. Requirements must be coordinate with structural engineer prior to installation.
 - 1. Conduit Supports:
 - a. Single run hangers: Conduit straps or clamps.
 - b. Group run hangers: Performed U-channel rack with conduit fittings, provide 25 percent spare capacity.
 - c. Hanger rods: Threaded steel, 1/4 inch diameter minimum.
 - d. Vertical run supports: Preformed U-channel struts with conduit fittings.
 - e. **Perforated straps and spring steel clips and clamps will not be permitted.**

- C. Equipment and Lighting Supports:
 - 1. U-channel: Preformed U-channel struts with fixture and conduit fittings, as applicable.
 - 2. Loose steel angles, channels, plates and tubing.
- D. For exterior roof applications utilize B-line C-port series supporting devices so as not to damage roof system.
- E. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 25 percent.
- F. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- G. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
- H. Install supports, anchors, sleeves and seals to rigidly fastened conduit, wireway and equipment.
- I. Welding supports to building structural members or fastening supports to roof deck or other conduit or pipe will not be permitted.
- J. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- K. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

- L. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- M. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- N. Support individual horizontal raceways with separate hangers or clamps.
- O. Fasten hanger rods, conduit clamps, outlets and junction boxes to building structure using beam clamps.
- P. Do not fasten supports to piping, ductwork, mechanical equipment or conduit.
- Q. In wet locations, install free-standing electrical equipment on concrete pads.
- R. Install surface mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall.
- S. Bridge studs top and bottom with channels in support flush mounted cabinets and panelboards in stud walls.
- T. Paint out systems where exposed in finished areas as directed by Architect.
- U. **Do not install conduits above top chord of bar joists, in web of roof decking, or within 6" of deck. This is to prevent roofing nails from puncturing conduits.**

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Hot Dipped Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780. Comply with manufacturers recommendations for hot dipped galvanized coating repair.

END OF SECTION

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Division 7 Section "Penetration Firestopping" for firestopping materials and installation at penetrations through walls, floors, ceiling, and other fire-rated elements.
 - 2. Division 26 Section "Wiring Devices" for devices installed in boxes.
 - 3. Division 26 Section "Identification for Electrical Systems" for identification requirements and products.
 - 4. Division 26 Section "Hangers and Supports for Electrical Systems."

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. RGS: Rigid galvanized steel.

1.4 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.
- G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association; 2005.
- H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- J. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- K. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- M. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- N. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.5 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, junction boxes, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Custom raceways.
 - 2. Custom enclosures and cabinets.
- C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Structural members in the paths of conduit groups with common supports.

2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.
- D. Qualification Data: For professional engineer and testing agency.
- E. Source quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: UL listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. UL 870 electrical wireways, auxiliary gutters and associated fittings.
- C. Comply with NFPA 70 and local code requirements for electrical materials and components.
- D. Federal Specifications:
 1. W-F406b fittings for cable, power, electrical and conduit, metal flexible.
 2. W-F408c fittings for conduit, metal, rigid thick wall and thin wall (EMT) type.
 3. WW-C-563A conduit, metal rigid: Electrical thin wall steel type (EMT); straight lengths, elbows and bends.
 4. WW-C-566C conduit, metal flexible.
 5. WW-C-581E conduit, metal, rigid and intermediate; and coupling, elbow, and nipple, electrical conduit: Steel zinc coated.
 6. W-C-582 conduit, raceway, metal and fitting: Surface.
- E. National Electrical Manufacturer Association NEMA:
 1. VE 1 1984 – Metallic cable tray system.
 2. NEMA 250 – 1985 enclose for electrical equipment (1000 V maximum).
- F. American National Standard Institute (ANSI):
 1. ANSI C80.1 – Rigid steel conduit zinc coated.
 2. ANSI C80.3 – Electrical metallic tubing (EMT), zinc coated.
 3. ANSI C80.6 – Intermediate metal conduit (IMC).
 4. ANSI/MEMA OS – Sheet steel galvanized boxes, device boxes, covers and box supports.

1.7 COORDINATION

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 METAL CONDUIT, TUBING AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Available metal conduit and tubing manufacturers::

a. RGS, IMC, and EMT:

- 1) Allied Tube and Conduit Co.
- 2) Republic Steel Corp.
- 3) Triangle PWC, Inc.
- 4) Wheatland Tube Co.

b. FMC:

- 1) Alflex Corp.
- 2) American Flexible Conduit Co.
- 3) Anaconda Metal Hose, Anamet, Inc.
- 4) Electric Flex Co.
- 5) Grinnel Co./Tyco International; Allied Tube and Conduit Division.

2. Available metal conduit and tubing fittings manufacturers:

a. RGS, IMC, EMT, and FMC Fittings:

- 1) Appleton Electric Co.
- 2) Cooper/Crouse-Hinds Co.
- 3) O-Z/Gedney Co.
- 4) Raco, Inc.
- 5) Regal Manufacturing Co.
- 6) IlSCO
- 7) Allied
- 8) Wheatland

b. Expansion Fittings:

- 1) Appleton Electric Co.
- 2) Cooper/Crouse-Hinds Co.
- 3) O-Z/Gedney Co.
- 4) Regal Manufacturing Co.
- 5) Spring City Electrical Manufacturing Co.
- 6) Thomas & Betts

c. Smoke and Fire-Stop Fittings:

- 1) O-Z/Gedney Co.
- 2) Spring City Electrical Manufacturing Co.
- 3) Thunderline Corp.

- 4) Anixter.
- d. Sealing and Drainage Fittings:
 - 1) Appleton Electric Co.
 - 2) Cooper/Crouse-Hinds Co.
 - 3) O-Z/Gedney Co.
 - 4) Thomas & Betts
 - 5) 3M
- e. Wall and Floor Seals:
 - 1) O-Z/Gedney Co.
 - 2) Spring City Electrical Manufacturing Co.
 - 3) Thomas & Betts
 - 4) Appleton
 - 5) Cooper/Crouse-Hinds
 - 6) Anixter.
- B. Aluminum Rigid Conduit: Not allowed.
- C. Minimum conduit size: 3/4 inch Trade Size except minimum 1 inch Trade Size for underground conduit; 1/2 inch Trade Size conduit will not be allowed unless approved by Owner in writing. Utilize red conduit for fire alarm conduit. Utilize green conduit for all raceways for dedicated grounding conductors. 3/8 inch Trade Size flexible metal conduit can be used for final connection to light fixtures.
- D. Rigid galvanized steel conduit (RGS) and intermediate metal conduit (IMC): FS WW-C-581; hot dip galvanized; ANSI C80.1, ANSI C80.6 zinc coated, standard threaded conduit couplings.
- E. RGS and IMC fittings: FS W-F-408; hot dip galvanized. Utilize insulated throat connectors/bushings where raceway enters box or other fitting to protect wires. Utilize case hardened lock nuts.
- F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
- G. Electrical Metallic Tubing (EMT): FS WW-C-563; ANSI C80.3 zinc coated, electro-galvanized. Utilize red conduit for fire alarm conduit.
- H. EMT Fittings: FS W-F-408; electro-galvanized; steel compression type; rain and concrete tight; insulated throat connectors and case hardened locknuts. Set screws not allowed. Utilize insulated throat connectors/bushings where raceway enters box or other fitting to protect wires. Utilize case hardened lock nuts.
- I. Flexible metal conduit (FMC): FS WW-C-566; hot dip galvanized steel.
- J. FMS Fittings: FS W-F-406, Type 1, Class 1, Style A; hot dip galvanized or zinc or cadmium electro-plated; connectors compatible with conduit. Utilize insulated

throat connectors/bushings where raceway enters box or other fitting to protect wires. Utilize case hardened lock nuts.

- K. LFMC: Constructed of single strip, flexible continuous, interlocked, and double-wrapped steel; hot dip galvanized inside and outside; coated with liquid-tight jacket of flexible polyvinyl chloride.
- L. LFMC Fittings: FS W-F-406, Type 1 Class 3, Style G; hot dip galvanized or zinc or cadmium electroplated; connectors compatible with conduit. Utilize insulated throat connectors/bushings where raceway enters box or other fitting to protect wires. Utilize case hardened lock nuts.
- M. Provide plenum rated FMC for all plenum environments required per local codes.
- N. Fittings: NEMA FB 1, compatible with conduit and tubing materials. Utilize insulated throat connectors/bushings where raceway enters box or other fitting to protect wires. Utilize case hardened lock nuts.
- O. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.
- P. Expansion Fittings: Specifically designed to permit 4 inches linear movement in conduit runs, and to make with adjoining conduit; iron or steel body, hot dip galvanized or zinc electroplated; with bonding jumper.
- Q. Sealing and Drainage Fittings: Corrosion resistant case metal body with openings for filling, inspection and drainage; corrosion resistant opening plugs; female hub, top and bottom; specifically designed for sealing vertical runs of conduit to restrict the passage of gases, vapors, and flames and to limit explosions; sealing compound as required and recommended by fitting manufacturer to provide a complete seal.
- R. Wall and Floor Seals: Factory assembled watertight seals suitable for sealing around conduit passing through concrete foundations, walls and floors; constructed with steel sleeves, iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps and cap screws.
- S. Concrete: As specified in Division 3.

2.2 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
 - 4. Wiremold.

- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated. Use NEMA Type 3R for wet locations.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type for interior and flanged-and-gasketed type for wet locations.
- E. Finish: Manufacturer's standard enamel finish.
- F. Construction: In accordance with UL 870.

2.3 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish (IVORY unless otherwise noted). Coordinate final color with Architect prior to ordering.
- B. Description: FS W-C-582; sheet metal channel with fitted cover, suitable for use as surface metal raceway.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Walker Systems, Inc.; Wiremold Company (The).
- C. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways. Minimum size WM 700 Series for power and data use. When multi-channel is required, use WM 4000 Series.
- D. Fittings: Couplings, elbows, and connectors designed for use with raceway system.
- E. Boxes and Extension Rings: Designed for use with raceway systems.
- F. Do not use wiremold raceway on exterior of buildings.
- G. Refer to drawings for additional information.
- H. Where it is impossible to conceal conduit or where specifically called for on the drawings furnish and install surface raceway. surface raceway will be continuous from wall to wall or from wall to equipment. Raceway will be run at wall at ceilings and all drops will be at corners, no drops will be run in the center of walls. Route at base, door or building trim to best fit into building lines.

2.4 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Erickson Electrical Equipment Company.
4. Hoffman.
5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
6. O-Z/Gedney; a unit of General Signal.
7. RACO; a Hubbell Company.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet Division.
10. Spring City Electrical Manufacturing Company.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Reference Standards:

1. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008.
4. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
5. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- C. Provide boxes compatible with conduit and of types, shapes, and sizes including box depths, to suit each respective location. Use 4 inch square by 2-1/2 inch deep boxes to accommodate wiring devices and technology cabling.
- D. Provide box covers of same material as box, unless otherwise indicated, and of types, shapes, and sizes to suit each respective location. Utilize non-magnetic stainless steel brushed satin finish Type 302/304 (0.040 inch thick) in all finished areas.
- E. Provide box accessories as required for mounting at each respective location including mounting brackets, wallboard hangers, extension rings, fixture studs, clamps, and straps.
- F. Provide boxes equipped with plaster rings where applicable to accommodate devices and associated faceplate. Provide access panels in all concealed junction box locations.
- G. Pull and Junction Boxes: Galvanized sheet steel; NEMA OS 1; welded seams; screw-on covers; equipped with stainless steel nuts, bolts, screws, and washers.
- H. Floor Boxes: Cast metal, concrete tight fully adjustable type; vertical adjusting rings; gasketed; brass floor plates, slush screw-on covers (refer to drawings for requirements).

- I. Receptacle Floor Fitting: Aluminum floor plates for standard duplex flush receptacles or telephone. Furnish with stainless steel screws. Provide carpet or tile rings as required (refer to drawings for requirements).
 - J. Interior Outlet Boxes: Galvanized sheet steel; NEMA OS 1; stamped concentric knockouts in back and sides; threaded screw holes with corrosion resistant screws for securing box covers and wiring devices.
 - K. Exterior Outlet Boxes: Corrosion resistant cast metal; NEMA FB 1 threaded conduit ends; weatherproof/gasketed.
 - L. Conduit Bodies (Condulets): Galvanized cast metal; threaded conduit entrance ends; removable covers, corrosion resistant screws.
 - M. Bushings, Knockout Closures and Locknuts: corrosion resistant punched steel box knockout closures and conduit locknuts; 150 deg C plastic bushings.
 - N. Strain Relief Grip: Woven steel mesh with connection fitting, designed to absorb pull, flexure and vibration exerted on cord or cable and prevent disconnection at wired terminals.
 - O. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat flanged, surface mounted junction box, UL listed as rain-tight. Cast aluminum box and cover with ground flange, neoprene gasket and stainless steel cover screws.
 - P. Provide plenum rated/listed boxes for all plenum rated areas required by local code.
 - Q. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - R. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.
 - S. Provide enclosures for terminal blocks, motor starters, switches, contactors, relays, control stations, controllers, transformers, and panel boards complying NEMA 250 and suitable for surface mounting, as follows:
 - 1. Exterior Locations: NEMA Type 3R
 - 2. All Other Locations: NEMA Type 1, unless otherwise indicated.
- 2.5 TECHNOLOGY SYSTEMS BOXES
- A. Manufacturer:

1. The new construction box specified herein shall be the WallSource Multi Service Box as manufactured by the Wiremold Company. Systems of other manufacturers may be considered. Written request for approval must be submitted to the engineer at least ten days prior to bid date. Each request shall include the name of the materials and a complete description of the proposed substitute.
2. Hubbell shall be considered equal.

B. Materials:

1. Box:
 - a. The box shall include the box, dividers and mounting brackets. The dimensions of each shall be a minimum of 32 cubic inches per gang and shall be manufactured of 16 gauge min. thick steel. The box shall accommodate standard power and communication devices.
 - b. The box shall have knockouts located on top and bottom, 2-1/4 inch from the face to accommodate combinations of 1/2 inch, 3/4 inch and 1 inch trade size conduits. Boxes of 4- or 6-gangs shall have knockouts to accommodate 1-1/2 inch trade size conduit.
 - c. The box shall have a separate ground terminal provided for each gang.
 - d. The box shall adjust for a flush installation with the finished wall. There shall be positive stops for surface mounting to 1/2 inch, 5/8 inch, 1 inch and 1-1/4 inch thick wallboard. Adjusting screws are located outside the box for adjustment prior to installation.
2. Device Mounting Bracket:
 - a. The self-leveling device mounting bracket shall accommodate standard power devices, connectivity inserts, and Wiremold 5507 Series faceplates. A mounting bracket designed to accept other manufacturer's devices shall be available. The bracket accommodates up to six power devices or 18 communications inserts. All Wiremold standard faceplates, mounting brackets and trim rings shall be color matched.
3. Fiber Optic/Category 6 Radius:
 - a. The depth of the box shall accommodate a 1-1/4 inch cable bend radius, which meets or exceeds the specifications for Fiber Optic and Category 6 cabling and TIA/EIA-569A requirements for communications pathways. A 1 inch controlled radius storage loop shall be available.
4. Device Covers:
 - a. Device cover plates in the following configurations must be available: duplex device cover plates, single 1.40 inch and 1.59 inch diameter receptacle cover plates, switch plates, GFCI cover plates, Sentrex® surge receptacle cover plates and other rectangular faced plates. Single-gang cover plates shall be of modular design and shall be compatible with Wiremold wire and cable management systems.
5. Communication Devices and Accessories:

- a. The box manufacturer will provide a complete line of connectivity outlets and modular multi-media inserts for voice, data, video, audio, etc. with faceplates and bezels to facilitate mounting.
 - b. A complete line of preprinted station and port identification labels, snap-in icon buttons and write-on station identification labels shall be available.
- 6. Support Bracket:
 - a. A support bracket for mounting on 16 inch center studs must be provided on boxes more than two gangs.
- 7. Dividers:
 - a. Dividers must be removable without any tools

2.6 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping" and Section 26 05 00 "Common Work Results for Electrical."

2.7 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex Co.
 - 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.
- C. Refer to Section 26 05 00 "Common Work Results for Electrical" for additional information and requirements.

PART 3 - EXECUTION

3.1 GENERAL

- A. Determine exact route and location of all electrical materials prior to installation.
- B. Verify exact locations and elevations of electrical materials with project and field engineer prior to installation, where dimensions are not indicated.
- C. Install electrical materials as indicated with offsets, fittings and changes in elevations as required to make adjustments for obstacles or interferences.
- D. Do not allow electrical materials installation to cause any equipment to be unserviceable or inoperable.

3.2 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit.
 - 2. Concealed Conduit, Aboveground: Rigid steel conduit.
 - 3. Underground Conduit: Rigid steel conduit or as indicated on drawings.
 - 4. In Slab Aboveground: Not allowed.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 6. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT or IMC or RGS.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT or IMC or RGS.
 - 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - 4. Installed Indoor, but Underground in Gravel Base Below Floor Slabs: RGS, as noted on drawings.
 - 5. Concealed in Ceilings and Interior Walls and Partitions: EMT or IMC or RGS.
 - 6. Install IMC and fittings except as follows:
 - a. Install EMT conduit and fittings if conduit size is 2 inches or smaller, unless another type of conduit and fittings are indicated.
 - b. Install RGS and fittings where noted or required by NFPA 70 or by federal state, and local governments or agencies having jurisdiction.

7. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations (Boiler Rooms).
 8. Damp or Wet Locations: Rigid steel conduit.
 9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 3R in damp or wet locations. Use NEMA Type 4x in Kitchens and areas subject to corrosion.
- C. Minimum Raceway Size: 3/4-inch trade size. Size conduit for conductors installed per NEC fill requirements. 3/8-inch trade size flexible metal conduit can be used for light fixtures, not to exceed 6 feet in length.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
 3. EMT: Use compression fittings. Set screw type not allowed.
- E. **Aluminum conduits not allowed.**

3.3 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Route all exposed conduit parallel or perpendicular to building lines and above accessible ceiling as required. Exposed conduit shall not be installed in finished areas unless permitted by the Owner and architect
1. Run parallel or banked raceways together on common supports.
 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
 3. All raceways and conduit shall be run concealed. Fish through existing walls and ceilings as required. In the event concealed conduit is impossible, surface mounted metallic raceways (wire mold) shall be used with the approval of the architect. Surface mounted conduit shall also be used when specifically designated on the drawings in locations where exposed conduit is the predominant wiring method currently in use. Contractor may modify or add to that system with exposed conduit necessary to achieve design results. Exposed conduit in finished areas shall not be installed unless approved by the architect. Conduit installation shall be accomplished in a neat workmanlike manner. Run tight to walls at ceiling edge. Coordinate final routings in the field with the architect prior to installation. All exposed conduits shall be painted to match surrounding area. See **Paragraph 3.6 – SURFACE RACEWAY** for additional information.

- C. Route conduit runs above the bottom chords of steel roof support joists. **Do not install conduits above top chord of bar joists, in web of roof decking, or within 6 inches of deck. This is to prevent roofing nails from puncturing conduits.**
- D. Maintain minimum of 6 inches clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances. Install horizontal raceway runs above water and steam piping.
- E. Complete raceway installation before starting conductor installation.
- F. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- G. Ensure conduit is aligned in a neat, uniform manner and arranged to maintain headroom
- H. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
- I. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent addition conduit.
- J. Do not fasten conduit with wire, perforated pipe straps or from ceiling grid support wires. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
- K. Install conduit free from dents and bruises. Plug ends to prevent entry of dirt, debris, and moisture during installation.
- L. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plan and keep straight legs of offsets parallel, unless otherwise indicated.
- M. Install raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- N. Arrange stub-ups so curved portions of bends are not visible above the finished slab. Protect stub-ups from damage where conduits rise through floor slabs.
- O. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- P. Conceal conduit and EMT within finished walls and ceilings, unless otherwise indicated.
- Q. Cut ends of conduit square. Ream ends of field-cut conduit and remove burrs.
- R. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Join conduit butt-tight in couplings.
 2. Use insulating bushings to protect conductors.
- S. Tighten nuts of threadless fittings/compression fittings with suitable tools.
- T. Use conduit bodies to make sharp changes in direction, around beams.
- U. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch size.
- V. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- W. Raceways Embedded in Slabs: Not allowed.
- X. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- Y. Terminations:
1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 2. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp or wet locations.
 3. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- Z. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- AA. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- BB. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic, rigid and flexible, as follows:
1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet
 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- CC. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting

in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
 3. Where conduit passes through concrete foundations, walls, and floors, to prevent the passage of water by hydrostatic pressure.
 - a. Tighten wall and floor sleeve seal nuts until sealing grommets have expanded to form watertight seal.
- DD. Where conduit penetrates fire-rated walls and floors, provide pipe sleeve two sizes larger than conduit; and fill sleeve with fire-resistive intumescent compound. Fire-stop installation shall be UL listed equal to or exceeding rating of wall, floor, or ceiling.
- EE. Route conduit through roof opening for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket.
- FF. Install expansion fittings complete with bonding jumpers where conduits cross building expansion joints.
- GG. Install smoke and fire-stop fittings where required by code.
- HH. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- II. All conduit stubs installed for communication cabling/technology cabling shall have bushing and end fittings installed so as to protect cables from being damaged when being pulled.
- JJ. Install conduit sleeves, J-hooks and other supports for communication/technology cabling contractor.
- KK. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections. Utilize plenum rated raceways when required by local codes.
- LL. For exterior roof applications utilize B-line C-port series supporting devices so as not to damage roof system.
- 3.4 BOXES INSTALLATION
- A. Rigidly fasten boxes or solidly embed boxes in concrete or masonry as applicable.

- B. Do not install round boxes where conduit must enter side of box.
- C. Install knockout closure to cap unused knockout holes where blanks have been removed.
- D. Provide electrical boxes as shown on drawings, and as required for splices, taps, wire pulling, equipment connection and code compliance.
- E. Electrical box locations shown on contract drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.
- F. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of required access doors with general contractor.
- G. Locate and install to maintain headroom and to present a neat appearance.
- H. **Do not install boxes back-to-back in walls.** Provide minimum 6-inch separation, except provide minimum 24-inch separation in acoustic-rated walls. Fill conduit openings with "duct seal" in acoustic-rated walls.
- I. Locate boxes in masonry walls, at center of cell, and install box flush with surface of wall. Coordinate masonry, cutting to achieve neat openings for boxes. Patch all over-cuts.
- J. Support junction boxes and pull boxes independently of conduit. Utilize junction boxes listed for ceiling fans/supporting method where ceiling fans are indicated. Support per manufacturer's direction.
- K. **Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems and where 277 volt light switches are used. Provide separate conduit feeds for each gang section.**
- L. Install boxes in walls without damaging wall insulation.
- M. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- N. Position junction boxes to located luminaires as shown on reflected ceiling plans.
- O. In accessible ceiling areas, position outlets and junction boxes within 6 inches of recessed luminaire, to be accessible through luminaire ceiling opening.
- P. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
- Q. Align wall mounted outlet boxes for switches and similar devices.

- R. Provide cast outlet boxes in exterior locations exposed to the weather and wet locations.
- S. Set floor boxes level and flush with finish flooring material.
- T. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

3.5 WIREWAY INSTALLATION

- A. Install wireway at lighting transformers and panel boards to allow for the neat and workmanlike arrangement of conduits.
- B. Install wireway system in accordance with manufacturer's installation instructions.
- C. Route wireway parallel or perpendicular to building lines.
- D. Maintain minimum of 12 inches clearance at flues and heat sources.
- E. Install wireway system with allowance for expansion and contraction.
- F. Ensure wireway is aligned in a neat uniform manner.

3.6 SURFACE RACEWAY (*ONLY WITH APPROVAL OF ARCHITECT*)

- A. Use in finished areas where exposed conduit is not acceptable.
- B. Use flat-head screws to fasten channel to surfaces, mount plumb and level.
- C. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
- D. Maintain grounding continuity between raceway components to provide a continuous grounding patch.
- E. Fastener Option: Use clips and straps suitable for the purpose.

3.7 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping" and Division 26 Section "Common Work Results for Electrical."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls. If above accessible ceiling, sleeves can extend 1 inch out of wall.
- F. Extend sleeves installed in floors 2 inches above finished floor level. Extend to top of data racks when cables enter top of rack.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Furnish and install sleeves for all low voltage cabling, including Data, Voice, Video, Paging, Clock, Thermostat, Fire Alarm, Security, etc. All sleeves shall be provided with end bushing/fitting to protect cabling. Sleeves shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required. Minimum sleeve size is 3/4 inch conduit.

3.8 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.9 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.10 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.11 CLEANING

- A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Warning labels and signs.
 - 5. Instruction signs.
 - 6. Equipment identification labels.
 - 7. Miscellaneous identification products.
- B. Match Owner's existing system identification standard. Utilize same type, size, color, text format used on existing systems. Field verify prior to ordering.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.
- C. Submit a complete nameplate listing for Owner approval.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with NFPA 70E – Standard for Electrical Safety in the Workplace: 2009.
- D. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- E. Comply with ANSI Z535.4 for safety signs and labels.

- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. BLUE – Power.
 - 2. YELLOW – Lighting.
 - 3. ORANGE – EM Circuits.
 - 4. RED – Fire Alarm.
- C. Use manufacturer colored raceways, True Color.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.4 FLOOR MARKING TAPE

- A. 2-inch-wide, 5-mil-pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated. Minimum size 7 inch by 10 inch unless noted otherwise.
- C. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
 - 3. Arc Flash Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
 - a. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data:
 - 1) Include orange header that reads "WARNING" where calculated incident energy is less than 40 calories per square cm.
 - 2) Include red header that reads "DANGER" where calculated incident energy is 40 calories per square cm or greater.
 - 3) Include the text "Arc Flash and Shock Hazard; Appropriate PPE Required" or approved equivalent.

2.6 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a BLACK background; use RED background for Emergency Systems. Minimum letter height shall be 3/8 inch.
- B. Fasteners for Nameplates and Signs: Self-tapping, rivets, stainless steel screws or No. 10/32, stainless steel machine screws with nuts and flat and lock washers (for NEMA-1 locations only). Utilize appropriate fixtures for wet locations.

2.8 CABLE TIES

- A. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F.
 - 5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior). All paint types to be reviewed/approved by the Architect before use.
 - 1. Exterior Concrete, Stucco, and Masonry (Other Than Concrete Unit Masonry):
 - a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
 - 1) Primer: Exterior concrete and masonry primer.
 - 2) Finish Coats: Exterior semigloss acrylic enamel.
 - 2. Exterior Concrete Unit Masonry:
 - a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a block filler.
 - 1) Block Filler: Concrete unit masonry block filler.

- 2) Finish Coats: Exterior semigloss acrylic enamel.
3. Exterior Ferrous Metal:
 - a. Semigloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.
 - 1) Primer: Exterior ferrous-metal primer.
 - 2) Finish Coats: Exterior semigloss alkyd enamel.
4. Exterior Zinc-Coated Metal (except Raceways):
 - a. Semigloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.
 - 1) Primer: Exterior zinc-coated metal primer.
 - 2) Finish Coats: Exterior semigloss alkyd enamel.
5. Interior Concrete and Masonry (Other Than Concrete Unit Masonry):
 - a. Semigloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.
 - 1) Primer: Interior concrete and masonry primer.
 - 2) Finish Coats: Interior semigloss alkyd enamel.
6. Interior Concrete Unit Masonry:
 - a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a block filler.
 - 1) Block Filler: Concrete unit masonry block filler.
 - 2) Finish Coats: Interior semigloss acrylic enamel.
7. Interior Gypsum Board:
 - a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
 - 1) Primer: Interior gypsum board primer.
 - 2) Finish Coats: Interior semigloss acrylic enamel.
8. Interior Ferrous Metal:
 - a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
 - 1) Primer: Interior ferrous-metal primer.
 - 2) Finish Coats: Interior semigloss acrylic enamel.
9. Interior Zinc-Coated Metal (except Raceways):
 - a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
 - 1) Primer: Interior zinc-coated metal primer.
 - 2) Finish Coats: Interior semigloss acrylic enamel.

- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- H. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl tape applied in bands. Install labels at 30-foot maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Power: Blue.
 - 2. Lighting: Yellow.
 - 3. EM Circuits: Orange.

4. Fire Alarm: Red.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes, use color-coding conductor tape to identify the phase.
 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. When wiring lighting switches for 3-way and 4-way travelers, use colors other than those specified above; i.e., pink, purple, etc.
 - e. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
 - D. Power-Circuit Conductor Identification: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
 - E. Branch-Circuit Conductor Identification: Label outside of all junction boxes above ceiling with panel and circuit information. Where there are conductors for more than three branch circuits in same junction or pull box, use marker tape. Identify each ungrounded conductor according to source and circuit number.
 - F. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
 - G. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
 - H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 1. Limit use of underground-line warning tape to direct-buried cables.
 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- J. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- L. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- M. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment.
- N. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label, 4 inches high.

- c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
2. Equipment to Be Labeled:
- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved or engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Switchboards.
 - e. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - f. Emergency system boxes and enclosures.
 - g. Motor-control centers.
 - h. Enclosed switches.
 - i. Enclosed circuit breakers.
 - j. Enclosed controllers.
 - k. Variable-speed controllers.
 - l. Push-button stations.
 - m. Remote-controlled switches, dimmer modules, and control devices.
 - n. Monitoring and control equipment.
 - o. UPS equipment.
 - p. Voice and data cable terminal equipment.
 - q. Master clock and program equipment.
 - r. Paging systems.
 - s. Audio/Video components, racks, and controls.
 - t. Fire-alarm control panel and annunciators.
 - u. Security and intrusion-detection control stations, control panels, terminal cabinets, and racks.
 - v. Terminals, racks, and patch panels for voice and data communication and for signal and control functions.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Twist-locking receptacles.
 - 3. Snap switches.
 - 4. Pendant cord-connector devices.
 - 5. Cord and plug sets.
 - 6. Floor service outlets and poke-through assemblies.
- B. Related Sections include the following:
 - 1. Division 27 Section "Communications Horizontal Cabling" for workstation outlets.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.

1.4 REFERENCE STANDARDS

- A. A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

- D. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).
- E. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.
- D. WD 1-1979 general-purpose wiring devices.
- E. WD 5 specific-purpose wiring devices.

- F. W-C-596 electrical power connector, plug, receptacle and cable outlet.
- G. W-S-896 switch, toggle.

1.7 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described in subparagraphs below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Switches: Two of each type, size.
 - 2. Receptacles: Two of each type, size.
 - 3. Keys: Minimum of 10 percent, but no fewer than ten (10).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 2. Leviton Mfg. Company Inc. (Leviton).
 - 3. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, DSCC W-C-596G and UL 498, NEMA industrial heavy duty spec grade class (federal specification listed); 2-pole, 3-wire one piece integral grounding strap with green hexagonal equipment ground screw; ground terminal and poles internally connected to mounting yoke; rated at 20 amperes, 125 volts; back and side wiring, metal plaster ears; NEMA configuration 5-20R, unless otherwise indicated. Terminals must accept #10 AWG wire.
 - 1. Hubbell HBL 5362
 - 2. Leviton 5362
 - 3. Pass and Seymour 5362A
- B. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, DSCC W-C-596G and UL 498,

industrial heavy duty spec grade similar to convenience receptacle, but with T.R. feature.

1. Description: Labeled to comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.

C. Switched type receptacles for energy control.

1. ASHRAE Energy Efficiency Standard 90.1: Standard 90.1 requires that 50 percent of all 125V, 20A receptacles in private offices, open offices, and computer classrooms be controlled by an automatic control device. Controlled receptacles need to be marked to differentiate them from non-controlled receptacles.
2. Permanent power symbol remains clearly visible on front face of device after installation.
3. Duplex, smooth nylon face, back and side wired. Hubbell #BR20C1.xx series, 125V, 20A.

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, industrial heavy duty spec grade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped, and meeting UL GFCI July 28, 2006, lock-out requirements and incorporates automatic self testing. Provide appropriate junction box size to fit receptacles.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A.
 1. Hubbell GFR5352A
 2. Leviton 7899
 3. Pass and Seymour 2094

2.4 PENDANT CORD-CONNECTOR DEVICES

- A. Description: Matching, locking-type plug and receptacle body connector; NEMA WD 6 configurations L5-20P and L5-20R, heavy-duty grade.
 1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
 2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.5 CORD AND PLUG SETS

- A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.6 SNAP SWITCHES

- A. Comply with NEMA WD 1, W-C-896F and UL 20.
- B. Wall switches: NEMA industrial heavy-duty spec grade class (federal specification listed); rated at 20 amperes, 120/277 volts; AC quiet quick make, quick break design; toggle handle with totally enclosed case; mounting yoke insulated from mechanism with stainless steel grounding clip; single pole, side wiring, metal plaster ears. Terminals must accept #10 AWG wire. Motor rating – 80%, tungsten rating – 100%.
 1. Single pole:
 - a. Hubbell HBL1221
 - b. Leviton 1221 – 2
 - c. Pass and Seymour PS20AC1I
 2. Two pole
 - a. Hubbell HBL 1222
 - b. Leviton 1222-2
 - c. Pass and Seymour PS20AC2I
 3. Three way
 - a. Hubbell 1223
 - b. Leviton 1223-2
 - c. Pass and Seymour PS20AC3I
- C. Pilot light switches: NEMA industrial heavy-duty spec grade class (federal specification listed); rated at 20 amperes, 120/277 volts, AC quiet quick make, quick break design; lighted red polycarbonate toggle handle, when switch in on position; neon lamp; mounting yoke insulated from mechanism with stainless steel group clip; single pole; side wiring. Terminals must accept #10 AWG wire. Motor rating – 80%, tungsten rating – 100%.
 1. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."
- D. Key-Operated Switches, 120/277 V, 20 A: NEMA industrial heavy-duty spec grade class (federal specification listed); rated at 20 amperes, 120/277 volts; AC quiet quick make, quick break design; toggle handle with totally enclosed case; mounting yoke insulated from mechanism with stainless steel grounding clip; single pole, side wiring, metal plaster ears. Terminals must accept #10 AWG wire. Motor rating – 80%, tungsten rating – 100%.

1. Description: Single pole, with factory-supplied key in lieu of switch handle.

E. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.

F. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

2.7 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Type 302/304, 0.040 inch thick, satin-finished stainless steel, non-magnetic. Coordinate exact finish with architect prior to ordering.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover. Receptacle covers to be of the "in-use" type.

2.8 FLOOR SERVICE FITTINGS (*REFER TO DRAWINGS FOR ADDITIONAL INFORMATION*)

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: As noted on drawings.

D. Power Receptacle: NEMA WD 6 configuration 5-20R, unless otherwise indicated.

E. Voice and Data Communication Outlet: As noted on drawings.

2.9 POKE-THROUGH ASSEMBLIES (*REFER TO DRAWINGS FOR ADDITIONAL INFORMATION*)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Wiremold Company (The).

- B. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
1. Service Outlet Assembly: Flush type with receptacles and space for RJ-45 jacks and A/V devices..
 2. Size: As required based on devices.
 3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
 4. Closure Plug: Arranged to close unused cored openings and reestablish fire rating of floor.
 5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, 4-pair, Category-5e/-6e voice data communication and A/V cables.
 6. Core floor at each location, size to be determined with manufacturer prior to coring holes. (Refer to drawings for additional information.) Protect all furnishings and area below from debris during coring.

2.10 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
1. Wiring Devices Connected to Normal Power System:
 - a. Ivory – For receptacles and switches.
 - b. Gray – For receptacles serving computers and adjacent data jacks.
 - c. Coordinate with Architect prior to ordering.
 2. Wiring Devices Connected to Emergency Power System: Red.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.

5. Install devices and assemblies level, plumb, and square with building lines.
6. Install wall dimmers 48 inches to top of cover plate above floor, derate ganged dimmers as instructed by manufacturer; do not use common neutral.
7. Mount receptacles horizontally with bottom of plate cover 16 inches above floor, unless otherwise indicated. Install ground pin to the right side.
8. Mount wall switches vertically with top of plate cover 48 inches above floor, unless otherwise indicated.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtail existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Clean dirt and debris from electrical boxes and remove moisture prior to installing wiring devices.
2. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
3. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
4. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
5. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
6. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
7. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
8. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections, unless device is rated for #10 wire.
9. Tighten unused terminal screws on the device.
10. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
11. When using stranded wires (when allowed) on receptacles and light switches, avoid fraying of wires around terminals. Wrap sides of devices with electrical tape when complete.

E. Device Plates:

1. Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
2. Remove wall plates and protect devices and assemblies during painting.
3. Install blank finished coverplates over all abandoned openings in finished areas.
4. Install blank finished coverplates over all telecommunication (voice data), video and other technology related junction boxes that are not activated with cabling.

F. Arrangement of Devices: Unless otherwise indicated, mount flush. Group adjacent switches under single, multigang wall plates.

G. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

1. **Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes. Coordinate with Owner prior to making up labels.**
2. Identify all circuitry information on all above ceiling junction boxes and within outlet and switch boxes. Black permanent marker labeling is acceptable.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION

SECTION 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Molded-case circuit breakers (MCCBs).
 - 4. Molded-case switches.
 - 5. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
- C. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2001 (R2006).
- D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.5 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Include evidence of U.L. listing for series rating of installed devices.
 - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
 - 6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Qualification Data: For qualified testing agency.
- D. Field quality-control reports.
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Manufacturer's field service report.
- F. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Submit on translucent log-log graph paper.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL, such as UL.
 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NFPA 70.
- F. All devices shall be U.L. listed.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 2. Altitude: Not exceeding 6600 feet.
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 1. Notify Architect, Construction Manager and Owner no fewer than seven days in advance of proposed interruption of electric service.
 2. Indicate method of providing temporary electric service.
 3. Do not proceed with interruption of electric service without Architect's, Construction Manager's and Owner's written permission.
 4. Comply with NFPA 70E.

1.8 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizing of switches, breakers and fuses with mechanical contractor and other tradesman equipment shop drawings prior to ordering equipment.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three (3) of each size and type.
 - 2. Fuse Pullers: Two for each size and type.
 - 3. Spare Indicating Lights: Six of each type installed.

1.10 WARRANTY

- A. Provide one year warranty on all parts and labor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. Siemens Energy & Automation, Inc.
 - 3. Square D; a brand of Schneider Electric.

2.2 FUSIBLE SWITCHES

- A. Type HD, Heavy Duty, Quick Make-Quick Break, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position, with load interrupter enclosed visible blade knife switch.
- B. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
5. Hookstick Handle: Allows use of a hookstick to operate the handle.
6. Lugs: Mechanical type, suitable for number, size, and conductor material.
7. Service-Rated Switches: Labeled for use as service equipment.

2.3 NONFUSIBLE SWITCHES

- A. Type HD, Heavy Duty, Quick Make-Quick Break, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position, with load interrupter enclosed visible blade knife switch.
- B. Accessories:
 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 4. Hookstick Handle: Allows use of a hookstick to operate the handle.
 5. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.4 MOLDED-CASE CIRCUIT BREAKERS

- A. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- B. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- C. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- D. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip) for Life Safety protection.
- E. Features and Accessories:
 1. Standard frame sizes, trip ratings, and number of poles.
 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.

3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits. Type HACR for heating, air conditioning and refrigeration equipment.

2.5 MOLDED-CASE SWITCHES

- A. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating. To be used in motor starting devices with overload relays.
- B. Features and Accessories:
 1. Standard frame sizes and number of poles.
 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
 3. Application Listing: Appropriate for application; Type HACR for heating, air conditioning and refrigeration equipment only and when used in conjunction with equipment provided with over-load protection.

2.6 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 2. Outdoor Locations: NEMA 250, Type 3R.
 3. Kitchen and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

2.7 FUSES

- A. Fuses 600 amperes and less: Dual element, current limiting, time delay, UL class RK 1, 600 volt Type LPS-RK or 250 volt type LPN-RK as required, UL listed, 200,000 AIC (RMS), Bussmann low-peak dual element fuses.
- B. Fuses 601 amperes and larger: Current limiting, time delay, UL class L, 600 volt Type KRP-C, UL listed, 200,000 AIC (RMS), Bussmann hi-cap time delay fuses.
- C. All fuses shall be of the same manufacturer.
- D. The over current device coordination was based on the fuse sizes and types specified. Any substitution of brand, size or type of fuse from that specified, must be preceded by the submittal of a complete coordination study for the substitute over current protection scheme.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated. Provide concrete bases where required and anchor all equipment.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1, NEMA PB 1.1 and PB 2.1.

3.3 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- E. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as required. DO NOT EXCEED NEC REQUIREMENTS.

3.6 CLEANING

- A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.
- B. Inspect exposed surfaces and repair damaged finishes.

3.7 TRAINING

- A. Provide training session for Owner's personnel. Provide Operation and Maintenance Manuals for each person. At completion of training, provide certification letter to Owner stating completion of training and attach copy of sign-in sheet showing all personnel present.

END OF SECTION

**SECTION 26 51 00
INTERIOR LIGHTING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior lighting fixtures.
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Lighting fixture supports.
- B. Related Sections include the following:
 - 1. Division 26 Section "Wiring Devices" for manual wall-box dimmers for incandescent lamps.
- C. All systems must conform to IECC 2015 and ASHRAE 90.1 2013.

1.3 REFERENCE STANDARDS

- A. ASHRAE – 90.1, 2013 – Energy standard for buildings except low rise residential buildings.
- B. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps - - Classification of Beam Patterns; 2006.
- C. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; Consolidated-2002.
- D. IECC – Illinois Energy Conservation Code 2015
- E. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (R2008).
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- G. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.

- H. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; 2006.
- I. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).
- J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 2009.
- L. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- M. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.
- N. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- O. UL 8750 - LED Lighting; Current Edition, Including All Revisions.

1.4 DEFINITIONS

- A. BF: Ballast factor.
- B. CEE: Consortium for Energy Efficiency.
- C. CRI: Color-rendering index.
- D. CU: Coefficient of utilization.
- E. DCEO: Department of Commerce and Economic Opportunity.
- F. DLC: Design Lights Consortium.
- G. EISA 2007: Energy Independence and Security Act of 2007.
- H. HID: High-intensity discharge.
- I. IESNA: Illuminating Engineering Society of North America.
- J. LED: Light emitting diode.
- K. LER: Luminaire efficacy rating.
- L. Luminaire: Complete lighting fixture, including ballast housing if provided.
- M. RCR: Room cavity ratio.

1.5 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Emergency lighting units including battery and charger.
 - 3. Ballast and/or electronic driver data.
 - 4. Energy-efficiency data.
 - 5. Life, output, and energy-efficiency data for lamps.
 - 6. Photometric data, in IESNA format, based on laboratory tests of each lighting fixture type, outfitted with lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. For specialized fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by the manufacturer.
 - b. Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.
- B. Shop Drawings: Show details for lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.
 - 1. Wiring Diagrams: Power and control wiring.
- C. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Lighting fixtures.
 - 2. Suspended ceiling components.
 - 3. Structural members to which suspension systems for lighting fixtures will be attached.
 - 4. Other items in finished ceiling including the following:
 - a. Air outlets and inlets.
 - b. Speakers.
 - c. Sprinklers.
 - d. Smoke and fire detectors.
 - e. Occupancy sensors.
 - f. Access panels.
 - 5. Perimeter moldings.
- D. Product Certificates: For each type of ballast used in fixtures, signed by product manufacturer.
- E. Qualification Data: For agencies providing photometric data for lighting fixtures.
- F. Field quality-control test reports.

- G. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
- H. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
- C. LED fixtures must be certified by DLC (Design Lights Consortium).
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use. All fixtures shall be U.L. listed.
- E. Comply with NFPA 70 and local code requirements.
- F. FMG Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.
- G. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.7 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.8 WARRANTY

- A. Standard Warranty: One year parts and labor on all fixtures unless manufacturer's warranty is greater.
- B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: Five (5) years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining four (4) years.

- C. Special Warranty for LED Fixtures: Manufacturer's standard form, made out to Owner and signed by fixture manufacturer agreeing to replace LED modules and drivers that fail in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Minimum five (5) years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps: 1 of each type and rating installed.
 2. Plastic Diffusers and Lenses: 1 of each type.
 3. Emergency Light Battery: One for each emergency lighting unit type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. LED Fixtures: Comply with UL 1598 and UL 8750. Test in accordance with IESNA LM-79 and LM-80 standards, and DLC certified.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.
4. Laminated Silver Metallized Film: 90 percent.

G. Plastic Diffusers and Covers:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch minimum unless different thickness is indicated.
 - b. UV stabilized.

H. Luminaire Accessories:

1. Luminaire disconnects:
 - a. Ideal PowerPlug or equal.
 - 1) Meets CEC and NEC code changes for non-residential fluorescent luminaires with ballasts.
 - 2) Perfect for OEM or retrofit lighting applications.
 - 3) Patented push-in technology quickly locks wires in place.
 - 4) Passes UL 2459 & CSA 182.3 finger probe requirements.
 - 5) Fits through 1/2 inch knockout.
 - 6) Pieces pull apart safely and easily.
 - 7) 3/8 inch strip length indicator.
 - 8) Thumb ridges provide superior grip.
 - 9) Ideal two or three wire standard version.

2.3 LIGHTING FIXTURES (*TO MATCH EXISTING TYPES IN AREA OF WORK*)

- A. Refer to drawings for lighting schedule.
- B. Acceptable Manufacturer's – Fluorescent Luminaries
 1. Focal Point.
 2. Axis.
- C. Acceptable Manufacturers – Recessed Fluorescent Down Lights.
 1. Cooper/Portfolio.
- D. Emergency Lights and Exit Signs
 1. Philips - Chloride

2.4 LED FIXTURES

- A. CRI of minimum 80, color temperature 4100 K. Refer to drawing schedule for additional information.
- B. Rated life of 50,000 hours.
- C. LEDs sources from one manufacturer.
- D. Driver capable of dimming from 100 to 0 percent of maximum light outputs and compatible with dimmer switch or dimming system used.
- E. Must be DLC compliant/approved.
- F. Operating voltage universal 120/277 V.
- G. Lens thickness at least 0.125 inch minimum unless otherwise indicated.
- H. Efficacy minimum rating of 85 lumens per watt.
- I. Include internal junction box.
- J. U.L. listed.

2.5 EXIT SIGNS

- A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life, 25 year.
 - a. Edge Glow type.
 - b. White Canopy.
 - c. With Support Kit.

2.6 EMERGENCY LIGHTING UNITS

- A. Description: Self-contained units complying with UL 924.
 - 1. Battery: Sealed, maintenance-free, lead-acid type, 5 year prorated warranty; nickel-cadmium type, 15 year prorated warranty. Full one year coverage warranty.
 - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level.

- When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 6. Wire Guard: Heavy-chrome-plated wire guard, one piece construction, protects lamp heads or fixtures. Refer to drawings for additional information.
 7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage. Required in all areas where normal lighting is provided by HID light fixtures.
 8. Remote Test (When Indicated): Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 9. Integral Self-Test (When Indicated): Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.7 LED LAMPS

A. Acceptable Manufacturers:

1. CREE
2. G.E.
3. Lighting Science.

B. All lamps shall be from one manufacturer and shall be Energy Star listed.

C. Low-Temperature Driver Capability: Rated by its manufacturer for reliable starting and operation of indicated lamp(s) at temperatures minus 20 deg F and higher.

D. Driver/LED Characteristics:

1. Power- multitap voltage for LED Class-I drivers with high performance heat sinks.
2. Power Factor: > 0.9 at full load.
3. Total Harmonic Distortion: < 20% at full load.
4. Integral weathertight electrical box with terminal strips (12Ga-20Ga) for easy power hookup.
5. Integral 10kV surge suppression protection standard.
6. To address inrush current, slow blow fuse or type C / D breaker should be used.
7. Patented NanoOptic Product Technology
8. CCT 4000K (+/- 300) as selected by the Owner during shop drawing process.
9. CRI- Minimum 80.

2.8 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.
- E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
- H. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer and provided by manufacturer to support their fixture. Cable support shall be anchored to structural steel and not ceiling system.
- I. Do not support fixtures from conduit or from ceiling grid system.

2.9 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

- A. Refer to drawings for light fixture schedule.

2.10 FINISHES

- A. Fixtures: Manufacturers' standard, unless otherwise indicated.
 - 1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
 - 2. Troffers to be painted after fabrication.

2.11 SOURCE QUALITY CONTROL

- A. Provide services of a qualified, independent testing and inspecting agency to factory test fixtures with ballasts and lamps; certify results for electrical ratings and photometric data.
- B. Factory test fixtures with ballasts and lamps; certify results for electrical ratings and photometric data.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture. Burn in all lamps per manufacturer's requirements to maintain warranty. Replace all failed lamps.
- B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings:
 - 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from lighting fixture corners. Rods/wire must be installed from structure and sized in order to support each fixture independently of grid. Wire shall have breaking strength of the weight of the fixture at a safety factor of 3 times units weight. Provide no more than 2" of slack in each fixture support cable after fixtures have been installed within grid.
 - 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application, per NEC 410-16-C.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees. Install at least one independent support rod or wire from structure to a tab on each end of lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end. Utilize uni-strut in order to keep individual fixtures in a row uniform in mounting heights. Refer to drawings for additional information. Paint out to match surrounding area.
 - 4. Continuous Extruded Rows: Suspend from structure with aircraft cable listed by manufacturer for application. Do not fasten to grid ceiling.
- D. Adjust aimable lighting fixtures to provide required light intensities.
- E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- F. All junction boxes used for supporting light fixtures will be heavy duty UL listed for the application. Do not support from ceiling grid. Support from structure and use grid to stabilize unit.
- G. All flexible metal conduit connections shall be 6 feet 0 inches or less and contain quick disconnect plug on end. Utilize plenum rated raceways when required per

local code. All light fixtures to receive power plug style disconnects installed on line side of fixture. Match existing fixture plug types.

- H. All conduit shall be supported from structure independently from grid ceiling and/or support wires. Do not anchor to ceiling or light fixture support wires.
- I. Provide flange kits for all fixtures recessed mounted in gypsum ceilings.
- J. Lock out all breakers serving Night Light/Emergency Lights and Exit Signs.
- K. Clean all fixtures and lenses. Touch up all scratches. Replace broken lenses.

3.2 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.
- C. Corroded Fixtures: During warranty period, replace fixtures that show any signs of corrosion.
- D. Five (5) months and eleven (11) months after fixture installation, contractor shall walk the building and replace all failed lamps and ballasts. DO NOT USE OWNER'S ATTIC STOCK. Provide documentation to Owner showing all fixtures that were worked on for the Owner's records. This procedure does not relieve the contractor from performing warranty work that is brought to their attention by the Owner.

END OF SECTION

SECTION 27 05 00
COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Communications equipment coordination and installation.
 - 2. Sleeves for pathways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common communications installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of communications equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR PATHWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of pathway or cable.
 - 3. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

- A. Comply with NECA 1.

- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for all penetrations. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls. If above accessible ceiling, sleeves can extend 1 inch out of wall.
- F. Extend sleeves installed in floors 2 inches above finished floor level. Stub to top of racks/cabinets when cables enter top of racks/cabinets.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and pathway (and raceways). All other sleeves for cabling shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Furnish and install sleeves for all low voltage cabling, including Data, Voice, Video, Paging, Clock, Thermostat, Fire Alarm, Security, etc. All sleeves shall be provided with end bushing/fitting to protect cabling. Sleeves shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required. Minimum sleeve size is 3/4 inch conduit.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION

SECTION 27 15 00
COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Pathways.
 - 2. UTP cabling, data Category-6.
 - 3. Cable connecting hardware and patch panels.
 - 4. Telecommunications outlet/connectors.
 - 5. Cabling system identification products.
 - 6. Cable management system.
- B. System shall be a complete operational Category-6 local area network system, excluding active devices. System shall be certified to this degree. See drawings for exact part/model numbers.

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
- C. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- D. EMI: Electromagnetic interference.
- E. IDC: Insulation displacement connector.
- F. LAN: Local area network.
- G. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- H. RCDD: Registered Communications Distribution Designer.

- I. UTP: Unshielded twisted pair.

1.4 REFERENCE STANDARDS

- A. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices; Rev A, 1988 (R 2002).
- B. TIA-492AAAB-A - Detail Specification for 50-um Core Diameter/125-um Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers; 2009.
- C. TIA-492CAAA - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers; 1998 (R 2002).
- D. TIA-526-7 - OFSTP-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant; 2002.
- E. TIA-526-14 - OFSTP-14 - Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant; Rev A, 1998(R2003).
- F. TIA/EIA-568-D.1 - Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements; Rev D, September 9, 2015.
- G. TIA/EIA-568-C.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components; Rev C, August 2009.
- H. TIA/EIA-568-D.3 - Commercial Building Telecommunications Cabling Standard - Part 3: Optical Fiber Cabling Components Standard, with Additional Transmission Performance Specifications for 50/125 um Optical Fiber Cables; Rev D, October 25, 2016.
- I. TIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces; 2009.
- J. TIA/EIA-606 - Administration Standard for the Telecommunications Infrastructure; Rev A, 2002.
- K. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A, 2002.
- L. UL 497 - Standard for Protectors for Paired-Conductor Communications Circuits; Current Edition, Including All Revisions.
- M. UL 1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords; Current Edition, Including All Revisions.
- N. UL 1863 - Standard for Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.5 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its

connecting hardware are called "permanent link," a term that is used in the testing protocols.

1. TIA/EIA-568-C.2-1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
 2. Horizontal cabling shall contain no transition points or consolidation points.
 3. Bridged taps and splices shall not be installed in the horizontal cabling.
- B. A work area is approximately 100 sq. ft., and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment. The maximum allowable length does not include an allowance for the length of 16 feet in the horizontal cross-connect.

1.6 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-C.2-1, when tested according to test procedures of this standard.
- B. Manufacturer products must be ISO 9001 compliant.

1.7 SUBMITTALS

- A. Product Data: For each type of product indicated.
1. For all cable, include the following installation data for each type used:
 - a. Nominal OD.
 - b. Minimum bending radius.
 - c. Maximum pulling tension.
 - d. Electrical characteristics.
- B. Shop Drawings:
1. All shop drawings shall include Contractor Approval Stamp and RCDD Stamp on submittals.
 2. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
 3. Cabling administration drawings and printouts.
 4. Wiring diagrams to show typical wiring schematics, including the following:
 - a. Patch panels.
 - b. Patch cords.
 - c. Distribution racks.
 - d. Workstation outlets.

5. Patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
 6. Cable route through building to each area's respective rack.
 7. Include house count table in spreadsheet/tabular format with shop drawings. Include house count, room, drop number and other identification features.
- C. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector. All must be BICSI Certified and listed as a Panduit Certified Installer.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications (Minimum 3 Years Experience Required): Cabling Installer must have personnel certified by BICSI on staff and listed as a Panduit Certified Installer.
1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
 2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: An NRTL.
1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 50 or less.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. All devices shall be U.L. listed.
- E. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-D.
- F. Grounding: Comply with ANSI-J-STD-607-A.

- G. Source Limitations: Obtain all products through one source from single manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test each pair of UTP cable for open and short circuits.
 - 2. Store materials in a dry, environmentally controlled, secure space.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. DO NOT ALLOW CABLES TO BE PAINTED. All cables painted will be replaced at the Contractor's expense.

1.11 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.
- C. Coordinate work with the Owner's Information Services Department.
 - 1. Meet jointly with LAN equipment suppliers and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
 - 2. Record agreements reached in meetings and distribute to other participants.
 - 3. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

1.12 WARRANTY

- A. Provide a comprehensive warranty from manufacturer of communication device system for no less than 25 years. This shall include a warranty on all parts and labor:
 - 1. The warranty and system performance guarantee program shall warrant the structured cabling system is free from defects in material and workmanship and will support any current or future Category-6 applications ratified by

IEEE, ANSI or ISO that is developed for an ANSI/TIA/EIA-568-C.2-1 compliant structured cabling system for a 25-year period from date of registered installation. This warranty shall also include a channel warranty covering all components (work area outlets, horizontal cable, connecting hardware in the horizontal cross-connect, the equipment cord at the work area, and the patch cord in the horizontal cross-connect). All devices must be manufactured by warranty provider.

- B. Provide a one-year warranty on all other associated equipment not covered under warranty indicated above.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. General Requirements: Comply with TIA/EIA-569-D.
- B. Cable Support: U.L. labeled for support of Category-6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings (minimum of 1-5/8 inch bearing surface).
 - 3. Straps and other devices.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
 - 1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high and 2-1/2 inches deep. Verify wall thickness and notify architect if problems encountered with installation of this box size. Include mud rings as required to match coverplates and drywall thickness.
 - 2. Comply with TIA/EIA-569-D for maximum length of conduit and bends between pull points, and for pull-box sizing.
 - 3. Use manufactured conduit sweeps and long-radius ells whenever possible.
 - 4. In telecommunications rooms, position conduit ends adjacent to a corner on backboard (in case of a single piece of plywood) or in the corner of room (where multiple sheets of plywood are installed around perimeter walls of room). Use cable trays to route cables if conduits cannot be located in these positions. Secure conduits to backboard when entering room from overhead.
 - 5. Install minimum 3/4-inch conduit stubs for all workstation devices. Stub out to above accessible corridor ceiling/to cable tray or J-hooks; otherwise, provide J-hooks and sleeves. Install end bushings and fittings for each stub.

2.2 UTP CABLE (*REFER TO DRAWINGS FOR ADDITIONAL INFORMATION*)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Panduit.
- B. Description: Category-6 100-ohm, 4-pair UTP, covered with a plenum rated jacket. Color-blue for data. Final color to be selected by Owner.
1. Comply with ICEA S-90-661 for mechanical properties.
 2. Comply with TIA/EIA-568-C.2-1 for performance specifications.
 3. Comply with TIA/EIA-568-C.2-1, Category-6.
 4. Listed and labeled by U.L. acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - a. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
 5. Operating Temperature Range: -20 deg C to 75 deg C.
- C. Horizontal Cabling: Data, Category-6 (Panduit PUP 60004-BU-UY):
1. All cables shall be Category-6, four pair, unshielded twisted pair (UTP) 23 AWG, sweep rated for 250 Mhz. Provide plenum type cables in all plenum environments.
 2. Cables shall be approved manufacturer (listed by the communication device manufacturer) to maintain the mission critical warranty requirement.
 3. Cable shall be 23 AWG solid bare copper, FEP insulated and isolated pairs (flex web), twisted pairs, unshielded, ripcord, (**BLUE for data**) plenum rated jacket and third party verified to EIA/TIA 568 Category-6 standards.
 4. Cable shall meet or exceed the following standards:
 - a. EIA/TIA 568-C, Category-6 "commercial building wiring standard"
 - b. IEEE 802.3ab (10 Base-T, 100 Base T-4, 100 Base-X, 1000 Base-T), ATM up to 155 Mbps and ISDN.
 - c. IEEE 802.12 (100 Base-VG)
 - d. IEEE 802.5 (4/16 Mbps token ring)
 - e. ATM PMD (155 Mbps/550 MHz video)
 - f. ANSI X3.263 (TP-PMD)
 - g. NEMA WC-63
 - h. UL
 - i. NEC (CM or CMP)
 - j. CEC – Canadian Electric Code (CM or CMP)
 - k. Plenum Cable – NEC (CMP), CSA (CMP), certified type PCC FT4 FT6
 5. The cable shall meet the following electrical transmission characteristics:
 - a. Channel Requirements:
 - 1) Insertion Loss:
 - a) 250 MHz
 - b) 33 dB
 - 2) NEXT:
 - a) 250 MHz

- b) 35.6 dB
- 3) PS NEXT:
 - a) 250 MHz
 - b) 34.2 dB
- 4) ACR:
 - a) 250 MHz
 - b) 6.7 dB
- 5) PS ACR:
 - a) 250 MHz
 - b) 5.3 dB
- 6) ELFEXT
 - a) 250 MHz
 - b) 19.3 dB
- 7) PS ELFEXT:
 - a) 250 MHz
 - b) 19.3 dB
- 8) Return Loss:
 - a) 250 MHz
 - b) 12.0 Db

2.3 UTP CABLE HARDWARE (*REFER TO DRAWINGS FOR ADDITIONAL INFORMATION*)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panduit Corp.

NOTE: Manufacturer must be recognized member of communication device manufacturer's warranty program.
- 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 and of type consistent throughout project.
- C. Connecting Blocks: 110-style IDC for Category-6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

- D. Patch Panel Panduit DP48688TGY: Category-6 modular patch panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables. Do not use more than 48 port patch panels.
 - 1. Number of Jacks per Field: One for each four-pair UTP cable indicated (22-26 AWG), plus spares adequate to suit specified expansion criteria.
 - 2. Mounting: Rack as noted on drawings.
 - 3. Wire Managers to be installed above and below each patch panel, both on front and rear sides.
- E. Jacks and Jack Assemblies Panduit CJ688TGBL: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
 - 1. All jacks (for data and voice) shall be eight position, high density Category-6, RJ-45 modular jacks with 110 terminations with T568B (AT&T) wiring configuration (**BLUE for Data**).
 - 2. Jack shall have the ability to accept color coded icons and include color coded wiring instructions on label.
 - 3. Jacks shall be UL 1863 listed and CSA certified. File numbers shall be made available.
 - 4. Jack contacts shall be beryllium copper with a minimum of 50 micro-inch gold plating.
 - 5. 110 contacts shall be tin lead plated IDC.
 - 6. Jacks shall meet FCC part 68.5
 - 7. Jacks shall meet TIA/EIA-568-C.2-1 and TSB40 standards.
 - 8. Jack housing shall be high impact 94 V-0 rated thermoplastic.
 - 9. Jack shall be suitable for wire sizes ranging from 22 – 26 AWG.
 - 10. Insulation on conductors shall be no larger than 0.050 inches O.D.
 - 11. Provide dust covers on all jacks.
 - 12. Jacks shall be stamped Category-6 on face and be visible once installed in coverplate.
 - 13. Category-6 ETL verified maximum useable bandwidth beyond 300 MHz with approved cable. ETL verified PSACR of 13.7 dB at 250 MHz.
- F. Patch Cords: Factory-made, four-pair cables in length and color selected by Owner; terminated with eight-position modular plug at each end. COLOR – BLACK for Data/Voice Workstations.
 - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category-6 performance. Patch cords shall have latch guards to protect against snagging.
 - 2. Patch cords shall have color-coded boots for circuit identification.
 - 3. Patch cords above ceilings shall be plenum rated.
 - 4. Patch cords will be provided by the Owner.

2.4 TELECOMMUNICATIONS WORKSTATION PLATES (*REFER TO DRAWINGS FOR ADDITIONAL INFORMATION*)

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-C-2.1. (Panduit Mini-Com)

- B. Workstation Outlets: Quantity as noted on drawings, -port-connector assemblies mounted in single or multigang faceplate. (See Drawings for additional information and details.)
 - 1. Metal Faceplate (When Identified): Stainless steel, complying with requirements in Division 26 Section "Wiring Devices," for use above ceilings for WAP and security cameras.
 - 2. Non-metallic Faceplates: For use at Desk Workstations (Panduit - Classic Series to match Owner's existing plates).
 - 3. For use with snap-in jacks.
 - a. Flush mounting jacks as noted on drawings.
 - 4. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.5 RGBHV DISTRIBUTION SYSTEM

- A. Final wall mounted connector shall be female to female 15-pin pass through type.
- B. VGA cable shall be field terminated at each end to male HD15 connectors.
 - 1. Terminations shall be gold pin HD15 solder-type pin body
- C. Cable shall be 5-coax shielded type, plenum rated. Cable shall include:
 - 1. Red, blue, green, sync, and hold signals
 - a. Coax 1 – Red
 - b. Coax 2 – Green
 - c. Coax 3 – Blue
 - d. Coax 4 – White
 - e. Coax 5 – Yellow
 - 2. Belden 1522A Series (or equal) plenum rated version of this shall be used.
- D. Verify connection type/method and raceway capacity based upon submitted cables and jacks.

2.6 S-VIDEO DISTRIBUTION SYSTEM

- A. Final wall mounted connector shall be female to female pass through type.
- B. S-Video cable shall be field terminated at each end to male S-video connectors.
 - 1. Terminations shall be solder type
- C. S-Video cable shall be 2-coax shielded type. Cable shall include:
 - 1. 1 Coax for Luminance
 - 2. 1 Coax for Chrominance

3. Cable shall be plenum rated, siamese constructed
 4. Belden 1808A Series (or equal) plenum rated version of this shall be used.
- D. Verify connection type/method and raceway capacity based upon submitted cables and jacks.

2.7 COMPOSITE-VIDEO (RCA) CABLE

- A. Final wall mounted connector shall be female to female pass through type.
- B. Audio cable shall be field terminated at each end to male RCA connectors.
1. Terminations shall be solder type.
- C. Cable shall be 18 AWG shielded composite video connecting plenum rated cable
1. Belden 1694A Series (or equal) plenum rated version of this shall be used.
- D. Verify connection type/method and raceway capacity based upon submitted cables and jacks.

2.8 HDMI CABLE

- A. Supports Ultra HD resolutions up to 4K x 2K.
- B. Cable Jacket Type: PVC – Polyvinyl Chloride Low Emitting Smoke.
- C. Cable Shield Type: Aluminum-Mylar Foil with Braid.
- D. Conductor: Minimum 24 AWG.
- E. Connector Plating: Gold.
- F. Fire Rating: CMP Rated (Plenum).
- G. Connector A: 1 – HDMI (19 pin) Male.
- H. Connector B: 1 – HDMI (19 pin) Male.
- I. Cable Length: As required.
- J. Color: Black.
- K. Connector Style: Straight.
- L. Warranty: Lifetime.
- M. Manufacturer: Belden or equivalent.

2.9 AUDIO (RCA) CABLE

- A. Final wall mounted connector shall be female to female pass through type.
 - 1. Stereo pair connectors shall be Red for right channel and White for left channel.
- B. Audio cables shall be field terminated at each end to male RCA connectors.
 - 1. Terminations shall be solder type.
- C. Cable shall be 25 AWG shielded low capacitance audio connecting plenum rated cable.
 - 1. Single Channel Audio: Belden 8421 Series (or equal) plenum rated version of this shall be used.
 - 2. Two Channel Audio: Belden 8416 audio Series (or equal) plenum rated version of this shall be used.
- D. Verify connection type/method and raceway capacity based upon submitted cables and jacks.

2.10 SURFACE RACEWAY

- A. The installation of surface mounted outlets and surface mounted station cable is anticipated at some locations where solid walls inhibit the installation of cable behind the wall. Nonmetallic surface raceway shall be used - no exposed cable shall be permitted.
- B. The surface raceway shall have a screw-applied base and have a snap on cover. The use of double-sided tape to anchor the raceways will not be permitted.
- C. Both the base and cover shall be manufactured of rigid PVC compounds and be suitable for painting.
- D. The raceway shall be of a color fitting the decor of the area and be paintable (by others). Approval of samples by the Engineer prior to installation is required (Upon request by Owner). All fittings including, but not limited to, extension boxes, elbows, tees, fixture boxes and fittings shall match the color of the raceway.
- E. Fittings and couplings shall be sized to insure that Category-6 and fiber optic cables that are routed through them do not exceed their recommended minimum bend radius requirements.
- F. The raceway and all system devices must be UL Listed and exhibit nonflammable self-extinguishing characteristics, tested to specifications of the UL94V-0.
- G. Raceway shall be sized to accommodate a 50% increase in the number of cables initially installed while maintaining a fill (ratio of cable area vs. raceway area) no greater than 60%. A nominal cable diameter of 0.2" (Voice and Data Cables) should be assumed.

- H. The non-metallic raceway shall be Panduit Pan-way L Series.

2.11 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with ANSI-J-STD-607-A.

2.12 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers. Handwriting is NOT allowed.
- B. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.13 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP cables on reels according to TIA/EIA-568-C.2-1 and TIA/EIA-568.3-D.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

- A. Examine pathway elements intended for cables.
 - 1. Verify proposed routes of pathways. Check raceways and other elements for compliance with space allocations, clearances, installation tolerances, hazards to cable installation, and other conditions affecting installation. Verify that cabling can be installed complying with EMI clearance requirements. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 2. Prepare wall penetrations and verify that penetrations of rated fire walls are made using products labeled for type of wall penetrated.
 - 3. Identify plan to support cables and raceways in suspended ceilings. Verify weight of individual types and sizes of cables. Verify that load capacity of cable support structures is adequate for each pathway.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

- B. Verify that surfaces are ready and clean to receive work.
- C. Verify that quantity and sizes of boxes/conduit are acceptable for installation of jacks and cabling.
- D. Make general contractor and architect aware of any condition on-site that may interfere or cause damage to installation of system.
- E. Beginning installation means installer accepts existing conditions.
- F. Installer shall coordinate work with all tradesmen.
- G. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Sections. Drawings indicate general arrangement of pathways and fittings.
- H. Comply with TIA/EIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.
- I. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- J. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- K. Pathway Installation in Communications Equipment Rooms:
 - 1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
 - 2. Install cable trays to route cables if conduits cannot be located in these positions.
 - 3. Secure conduits to backboard when entering room from overhead.
 - 4. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

3.2 APPLICATION OF MEDIA

- A. Horizontal Cable for Data and Voice Service: Use UTP Category-6 cable for runs between wiring closets and workstation outlets; **COLOR: BLUE for Data and Voice.**

3.3 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Comply with TIA/EIA-568-C.
 - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - 3. Comply with NECA 1.

4. Wiring Method: Install cables in raceway except within consoles, cabinets, and accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Support cabling with J-hooks or cable tray above accessible ceilings. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces. Install cabling in raceway where subject to damage: locker rooms, gyms, mechanical rooms, etc. Raceways and boxes are specified in Division 26 Section "Raceways and Boxes for Electrical Systems."
5. Install 110-style IDC termination hardware unless otherwise indicated.
6. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
7. Install cables using techniques, practices, and methods that are consistent with Category-6 rating of components and that ensure Category-6 performance of completed and linked signal paths, end to end.
8. Install cables without damaging conductors, shield, or jacket.
- 9. Do not paint cables as this will void the warranty.**
10. All horizontal cabling shall terminate back at each area's respective rack. Terminate on patch panel.
11. All cabling shall be routed through cable tray or J-hook assembly (as noted on drawings) above accessible corridor ceilings.
12. All Category-6 UTP cables must be within the Category-6 distance of 295 feet. The contractor shall notify the Owner of any locations that exceed this distance limitations prior to installation.
13. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
14. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
15. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
16. Contractor shall core floors as required for installation of data cabling. Verify all locations of codes with architect/engineer in field. All cores shall be sleeved and fire proofed, as required. Field verify all equipment and piping locations before making cores. Under no circumstances will any structural member be cut in this process.
17. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible.
18. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels. Do not install consolidation points. Do not splice cables.
19. Pulling Cable: Do not exceed manufacturer's written recommended pulling tensions. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
20. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
21. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals. Utilize J-hooks or cable tray.

22. Maintain a maximum UTP cable bend radius of four times the cable diameter, six times if in conduit.
23. Apply cable ties loosely and at random intervals.
24. Minimize the amount of jacket twisting and avoid stretching the cable.
25. Use an appropriate method for dressing and securing cables (i.e., cable ties – wide type, wire management panels, cable support bards and velcro straps).
26. Do not exceed a 90 degree bend.
27. Do not over tighten cable ties.
28. Do not over twist cables.
29. Do not exceed 25 lbs. of pulling tension. Pull cables simultaneously if more than one is being installed in same raceway. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor insulation. Use pulling means, including fish tape, cable, rope, and basket-weave wire or cable grips, that will not damage media or raceway.
30. Do not use staple guns to position or fasten cables.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-C.2-1.
2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry. Strip back only as much cable jacket as required for termination.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
4. **Do not run cables above top chord of bar joists and within 6 inches of the roof deck.**

E. Wiring within Wiring Closets and Enclosures:

1. Install fire rated plywood backboards on walls of equipment rooms and wiring closets when needed.
2. Mount patch panels on floor-mounted racks and include wire managers above and below, front and back, for each patch panel used.
3. Group connecting hardware for cables into separate logical fields.
4. Train conductors to terminal points with no excess.
5. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

F. Group connecting hardware for cables into separate logical fields.

G. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-D recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-D, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.
- D. Install sleeves as required for cabling access; install end bushing/fitting to protect cabling. Fireproof after cabling is installed.

3.5 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

- B. Comply with ANSI-J-STD-607-A.
- C. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
- D. Grounding Points:
 - 1. Locate grounding terminals in each equipment room, wiring closet, rack, and cabinet.
- E. Bonding Conductors:
 - 1. Where a panelboard for telecommunications is located in same room or space as a grounding busbar, bond to equipment ground bus of electrical panelboard.
 - 2. Extend from grounding busbars to ground terminals in equipment racks and cabinets.
 - 3. Extend from grounding busbars to building metal frame within room, or to metal frame external to room but readily accessible.
- F. Special Requirements:
 - 1. Bonding conductors shall be insulated copper, No. 6 AWG minimum.
 - 2. Install only in nonmetallic conduit, unless specifically required for protection of conductor. Metallic conduit, if used, shall be RMC. For RMC that exceeds 36 inches in length, conductors shall be bonded at each end of conduit.
 - 3. Bonding conductors shall be installed without splices unless approved by Architect because of special circumstances. Where splices are necessary, they shall be accessible and shall be located in telecommunications spaces. Splices shall be by irreversible compression connectors or by exothermic welding.

3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-C. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
 - 1. Administration Class: 2.
 - 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- C. See Division 27 Section "Communications Horizontal Cabling" for additional identification requirements. See Evaluations for discussion about TIA/EIA standard as it applies to this Section. Paint and label colors for equipment identification shall comply with TIA/EIA-606-C for Class 2 level of administration.

- D. Comply with requirements in Division 27 Section "Communications Horizontal Cabling" for cable and asset management software.
- E. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy on memory stick of final comprehensive schedules for Project, in electronic format compatible with Owner's equipment.
- F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Provide electronic copy to Owner in DVD/Memory Stick format compatible with Owner's equipment. (Microsoft® Word® format or other type as selected by Owner).
- G. Cable and Wire Identification and Administration:
 - 1. Administration
 - a. Administrative requirements include identifiers, records, record linkages and labeling for the purposes of administering building cabling, pathways and spaces and grounding/bonding within a facility. No hand-written labels.
 - b. The administrative system shall be developed in Microsoft Word format or other electronics program approved by the Engineer. Should the Contractor elect to provide documentation of the administrative system in a proprietary format, the owner shall be provided with a retail licensed version of the software by the Contractor allowing the full editing and reading the documentation.
 - c. Refer to the Administrative System Outline below for minimum requirements.
 - d. Identifiers:
 - 1) Identifiers shall be marked at the equipment to be administered.
 - 2) Identifiers shall be unique for each type of equipment. For example, in no case shall the identifier for a cable be the same as the identifier for a pathway.
 - e. Records:
 - 1) Provides descriptive information about the identified equipment.
 - f. Linkages:
 - 1) To be used to describe the connection between an identifier and a record. In addition, a linkage is used to point from one record to another record.
 - g. Presentation of Administrative System:

- 1) Provide reports cataloging the records for all equipment.
- 2) Sample reports shall be provided to show explanations of the meaning of all information in the record.
- 3) Provide reports showing the labeling scheme for all components of the Administrative system.

h. Administrative System Outline: The format of the outline is as follows:

- 1) Subsystem:
 - a) Required identifiers.
 - b) Linked records.
- 2) Pathways: Pathway identifier, type, fill, loading.
 - a) Cable records, space records, pathway records, grounding records.
- 3) Spaces: Space identifier, space type.
 - a) Pathway records, cable records, grounding records.
- 4) Cable: Cable identifier, cable type, total pair count, damaged pair count, unterminated pair count.
 - a) Termination records, splice records, pathway records, grounding records.
- 5) Cabling Termination Hardware: Termination identifier, hardware type, damaged position numbers.
 - a) Termination position records, space records, grounding records.
- 6) Termination Position: Termination position identifier, termination type.
 - a) Cable records, termination hardware records, space records.
- 7) Splice: Splice identifier, splice type.
 - a) Cable records, space records.
- 8) Telecommunications Main Ground Bar: TMGB identifier, busbar type, grounding conductor identifier.
 - a) Bonding conductor records, space records.
- 9) Bonding Conductors: Bonding conductor identifier, conductor type, busbar identifier.
 - a) Grounding busbar records, pathway records.

10) Telecommunications Ground Bar: TGB identifier, busbar type.

a) Bonding conductor records, space records.

2. Labeling

- a. Adhesive labels shall meet the requirements of UL 969 (Ref D-16) for legibility, defacement and adhesion. Exposure requirements of UL 969 for indoor and outdoor (as applicable) use shall be met.
- b. Insert labels shall meet the requirements of UL 969 for legibility, defacement and general exposure.
- c. Labeling shall be consistent for all common elements in the project. This consistency shall include label size, color, typeface and attachment method.
- d. Labels incorporating bar codes shall be either Code 39 conforming to USS-39 or Code 128 conforming to USS-128.

- 1) a. All Code 39 bar codes shall have a ratio between 2.5:1 and 3.0:1. Provide a minimum "quiet zone" of 0.25" on each side of the bar code.
- 2) A descriptive label for reading by personnel shall be provided with any bar code. Bar codes by themselves are not acceptable.

e. Color Code: Observe the following requirements for color coding:

- 1) Labels on each end of a cable shall be the same color for each termination.
- 2) Labels for cross-connects shall be two different colors at each termination fields, representative of the color of that field.
- 3) Orange (Pantone 15C) shall be used for the demarcation point.
- 4) Green (Pantone 353C) shall be used for the termination point of network connection on the facility side of the demark.
- 5) Purple (Pantone 264C) shall be used to identify the termination of cables from common equipment (PBX, computers, LANS, etc.)
- 6) White shall be used to identify the first-level backbone termination in the main cross-connect.
- 7) Gray (Pantone 422C) shall be used to identify the second-level backbone termination in the main cross-connect.
- 8) Blue (Pantone 291C) shall be used to identify the termination of station cabling at the telecommunications closet and/or equipment room end of the cable.
- 9) Brown (Pantone 465C) shall be used to identify the termination of the interbuilding backbone cable terminations.
- 10) Yellow (Pantone 101C) shall be used to identify the termination of auxiliary circuits, alarms, maintenance, security, etc.
- 11) Red (Pantone 184C) shall be used to identify the termination of key telephone systems.
- 12) In facilities that do not contain a main cross-connect, the color white may be used to identify second-level backbone terminations.

f. Tag all Category-6, Data Patch Panel and Voice Termination Blocks and optical fiber cables at both the Communications Equipment Room and

the information outlets using the following alphanumeric labeling system: Includes Data Patch Panel and Voice Termination Blocks.

- 1) The Telecommunications Administration System shall meet or exceed TIA/EIA-606-A standards.
- 2) All Telecommunications Outlets, Data Patch Panel, Voice Termination Blocks and Cables shall be clearly labeled using a Code identifying each information outlet location as unique throughout the College of DuPage Campus. The font type shall be similar to Arial, Bold Faced with font size of 14. All alternate font type and size must be approved by College of DuPage IT.
- 3) This code, which will identify cabling and terminations at both IDF and Media Outlet locations, shall be as follows: BB-XCC-F-###A
 - a) BB= the designation to identify the specific building.
 - b) XCC = the Telecommunications Closet (TC) serving that jack. The TC is designated by Floor (XX) and their geographic location on that floor (CC) (e.g. Northwest, Southeast, etc.).
 - c) F = the Floor on which the jack is located.
 - d) ### = a sequential number assigned to that jack.
 - e) A = Alpha designation used ONLY if multiple jacks of a given type (e.g. Voice or Data) are housed in the same Outlet assembly.
 - f) For example, "IC-2NW-3-123" designates the 123rd jack on the 3rd Floor served from the IDF in the Northwest area of the 2nd Floor of the IC building. If multiple Data cables would be contained in the outlet, they would be identified as "A", "B", "C", and so on.
- 4) This numbering sequence plus a two (2) character Building Designator shall be utilized in the Cable Management System for identification of station cabling. Building designations are as follows:
 - a) Arts Center = AR
 - b) Instructional Center = IC
 - c) K Building = KK
 - d) L Building = LL
 - e) M Building = MM
 - f) Open Campus Center (OCC) = OC
 - g) Physical Education = PE
 - h) Seaton Computing Center = SC
 - i) Student Resource Center (SRC) = SR
 - j) WDCB Tower = JJ
 - k) Westmont Center = WC
 - l) Naperville Center = NC
 - m) Davea (Addison) = AD
 - n) Bloomingdale Center = BC
 - o) Lombard Center = LC
 - p) Carol Stream Community Education Center = CC
 - q) West Chicago Community Education Center = WE

- r) H Building = HH
 - s) BIC Annex = BA
 - t) Early Childhood Education Center = EC
 - u) Technology Education Center = TC
 - v) Business & Community Education Center = BC
 - w) Parking Structure = PG
 - x) Health Careers and Natural Sciences Building = HS
 - y) Culinary Arts Center = CH
 - z) Homeland Security Education Center = HE
- 5) Hardware designations (HD) are as follows:
- a) Controller Termination block = TB
 - b) HID Proximity Reader = PR
 - c) Electrified Lock/lock Trim = EL
 - d) Power Supply (low voltage) = PS
 - e) Power Supply (line voltage) = XP
 - f) Remote Door Release/RTE = RX
 - g) Door Position/Contact switch = DS
 - h) Monitoring switch = MS
 - i) Dual Tech Motion Sensor = DT
 - j) Local Annunciation Device = LA
 - k) Data Converter = DC
 - l) CCTV Camera = CC
 - m) PTZ/Dome Camera = EC
 - n) Fiber Optic Transceiver = FT
 - o) Video Transmitter = VT
 - p) Video Receiver = VR
- 6) Where adding to an existing installation, cable identification numbering must be integrated into the established plan and must be approved by the Owner.
- 7) Where adding to an installation, both voice and data numbering must remain in a "matched" sequence. Throughout the building, at each location has the "same" numbering on the faceplate ID for both voice and data. Example: If the 4th location in a series is a "voice only" location, then the data patch panel would be skipping number 4 in its sequence. Therefore, if the numbers are continuing, (assuming the "next" location is both voice and data) the data patch panel's next number would be 5 (skipping # 4) with NO blank data jacks open on the data patch panel. By the same description, if a location in a series is a "data only", the voice designation strip would represent a "skip" in its sequence. Again the arrangement of the added cables would leave NO blanks on the 110-voice frame.
- 8) ALL labeling shall be machine generated (Panduit) in black ink on white background tags and be permanent. NO HAND WRITTEN LABELS SHALL BE ALLOWED.
- 9) Cables:
- a) ALL Cables shall be identified AT BOTH ENDS, within 4 inches of termination, using a self-laminating tag wrapped

around the cable (e.g. not a "flag"). The Contractor shall use labeler. Cable labels shall indicate cable designation and destination. In Station cables, for example, this designation shall be the Telecommunications Outlet identification.

10) Telecommunications Outlets:

- a) Telecommunications Outlets are to be labeled (1) on the cover of the assembly, (2) on the base of the assembly (if applicable) and (3) on each cable terminated at that location.
- b) Where multiple cables of a given type (e.g. "Data") are contained in a single outlet, the alpha-designator ("A", "B", "C", and so on) those jack positions shall be so labeled.

11) Data Patch Panels:

- a) Data Patch panels shall be clearly labeled as to the destination and position of each cable terminated on that panel. Cables shall be positioned in sequence of Outlet I.D.
- b) The TC designator may be omitted on each jack position provided that the panel itself includes the TC designator.
- c) Station cables shall be labeled within 4-inches of the cable choke at Data Patch Panels.
- d) Where closet servers information outlets on multiple floors, panel for each floor shall be in a different rack moving from left to right on the racks, (i.e., first rack on the left most position will receive all the cables coming from the first floor, the rack #2 to the right of the first rack will receive cables from second floor and son on).

12) Voice Termination Block:

- a) Each horizontal row (in pairs) of the Voice Termination Block shall be labeled with "Designation Strips" which identify the destination and position of each cable terminated on that block.
- b) Designation Strips shall be color coded to indicate the block's application. Color-coding shall be as follows:
 - (i) Inter-Building Cable (e.g. IC-PE or OCC-"K") = Brown
 - (ii) Intra-Building Cable (MDF-IDF) = White
 - (iii) Station Cable = Blue
- c) Blocks on which "Station" Cabling is terminated will be labeled as to identify Telecommunications Outlet I.D.s. Voice termination blocks on which "Backbone" or "Tie" Cabling is terminated will be labeled to identify Pair Count are identified (e.g. 1-25, 26-50, etc.). Assignment of Pair Count(s) shall consider the existing count and must be approved by Owner.

- H. Contractor shall bear all costs associated with walking each room/area for verification of actual room numbers prior to labeling, no exceptions. Please note that room numbers could change under this construction project.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Basic UTP Cabling Tests (up to 650 MHz):
 - 1. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.2-1. Perform tests with a tester that complies with performance requirements in Annex I, complying with measurement accuracy specified in Annex H. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - a. Conduct tests and inspections after installation has been completed to assure the Owner's requirements for installation have been met. Upon request, prior to Owner's acceptance, allow access by Owner to test the equipment and wiring system. The contractor shall be responsible for testing each run "end-to-end" (both ways) and certifying, in writing, that the cabling meets Category/Level-6 UTP specifications and is in proper working condition. Each UTP cable shall be fully tested with a level III tester (i.e., Lantek II-500 and Fluke DTX series or equal). The output from each UTP cable test/certification shall be printed out and provided to Owner in as-built/close-out documentation.
 - b. Required test data for UTP horizontal cables shall include: wire map, length attenuation, link test, plug de-embedding, ANEXT, AFEXT, PSA NEXT, PSAFNEXT, ACR, ACRF, PSACR, and PSACRF.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Wire-map test that reports open circuits, short circuits, crossed pairs, reversed pairs, split pairs, and improper terminations.
 - 4. Permanent link tests for cable length, insertion loss, near-end crosstalk loss, power sum near-end crosstalk loss, equal-level far-end crosstalk loss, power sum equal-level far-end crosstalk, return loss, propagation delay, and delay skew. Performance shall comply with minimum criteria in TIA/EIA-568-C.2-1 for Category-6 cable and as required by Manufacturer's Warranty.
 - 5. All test results shall be printed out and provided to Owner in Close-Out Documents. Provide electronic copy on DVD or Memory Stick.
- D. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

- E. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- F. Retest and inspect cabling to determine compliance of replaced or additional work with specified requirements.

3.8 MANUFACTURER'S FIELD SERVICE

- A. Upon acceptance of installation registration form, manufacturer will provide at a minimum 25 year warranty on all parts/cabling and labor to repair and/or replace any non-performing device.
- B. Manufacturer's representative shall visit the site to determine if the system complies with all requirements.

3.9 CLEANING

- A. Clean all devices of dust and debris.

3.10 DEMONSTRATION

- A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and extending wiring to establish new workstation outlets. Refer to Division 1 Section "Closeout Procedures" and "Demonstration and Training."
- B. Provide system demonstration. Show Owner as-builts and how all cabling was routed. Demonstrate method of tagging. Identify what rooms are fed from each rack. Identify spare capacity.
- C. Describe wiring of system and functionality of all jacks and related devices.

END OF SECTION

SECTION 28 05 00
COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Electronic safety and security equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electronic safety and security installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electronic safety and security equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for electronic safety and security items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 3. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

- A. Comply with NECA 1.

- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY PENETRATIONS

- A. Electronic safety and security penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for all penetrations. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls. If above accessible ceiling, sleeves can extend 1 inch out of wall.
- F. Extend sleeves installed in floors to reach equipment.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway. All other sleeves for cabling shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Furnish and install sleeves for all low voltage cabling, including Data, Voice, Video, Paging, Clock, Thermostat, Fire Alarm, Security, etc. All sleeves shall be provided with end bushing/fitting to protect cabling. Sleeves shall be sized based upon 40 percent NEC fill rate and allow for minimum of 50 percent expansion for future cables. Utilize multiple sleeves as required. Minimum sleeve size is 3/4 inch conduit.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION

SECTION 28 05 13
CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Control-circuit conductors.
 - 2. Fire alarm wire and cable.
 - 3. Identification products.

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. EMI: Electromagnetic interference.
- C. IDC: Insulation displacement connector.
- D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- E. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- F. RCDD: Registered Communications Distribution Designer.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For cables, include the following installation data for each type used:
 - a. Nominal OD.
 - b. Minimum bending radius.
 - c. Maximum pulling tension.
 - d. Electrical characteristics.

- B. Shop Drawings: Cable layout, showing cable route with relationship between adjacent structural, electrical, and mechanical elements.
- C. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Operation and Maintenance Data: For wire and cable to include in operation and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Allowable pulling tension of cable.
 - 2. Cable connectors and terminations recommended by the manufacturer.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An NRTL – U.L.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test each cable for open and short circuits.
 - 2. Store all hardware and cables in environmentally controlled room, dry location.

1.7 PROJECT CONDITIONS

- A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.
- B. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- C. **Do not allow cables to be painted.** All cables painted will be replaced at the contractor's expense.

1.8 WARRANTY

- A. One Year unless manufacturer's standard warranty is for greater length of time.
- B. Refer to other Divisions 26 and 27 for additional warranty requirements.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. Support of Open Cabling: U.L. labeled for support of low voltage cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 2. Lacing bars, spools, J-hooks, and D-rings (minimum of 1.7 inches bearing surface).
 3. Straps and other devices.
- B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."
- C. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep, as needed to accommodate devices being installed.

2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 inch thick. Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry".

2.3 LOW-VOLTAGE CONTROL CABLE

- A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. 1 pair, twisted, No. 16 AWG, stranded (19x29) and No. 18 AWG, stranded (19x30) tinned copper conductors. Coordinate sizes with equipment manufacturer requirements.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: Comply with NFPA 262.

2.4 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway.
- B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway and power-limited cable, complying with UL 83, concealed in building finishes.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.
- D. All cabling installed in plenum areas will be plenum rated.

2.5 FIRE ALARM WIRE AND CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Comtran Corporation.
 2. Helix/HiTemp Cables, Inc.; a Drake Company.
 3. Rockbestos-Suprenant Cable Corp.
 4. West Penn Wire; a brand of Belden Inc.
 5. Allied Wire and Cable.
 6. Coleman Cable Inc.
 7. Belden Cable.
- B. General Wire and Cable Requirements: U.L. listed and labeled as complying with NFPA 70, Article 760.
- C. Signaling Line Circuits: Twisted, shielded pair (or as required by manufacturer), plenum rated, fire protection listed, not less than No. 18 AWG and as recommended by system manufacturer.
- D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 1. Low-Voltage Circuits: No. 16 AWG, minimum, plenum rated.
 2. Line-Voltage Circuits: No. 12 AWG, minimum, plenum rated.
 3. If multi-pair cables are used, they shall be fire protection listed, plenum rated.

- E. **All fire alarm cabling to be RED and installed in RED conduit in concealed areas, walls, and above non-accessible ceilings.**

2.6 IDENTIFICATION PRODUCTS

- A. Manufacturers: Subject to compliance with requirements:
 - 1. Brady Corporation.
 - 2. HellermannTyton.
 - 3. Kroy LLC.
 - 4. PANDUIT CORP.
- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test cables according to TIA/EIA-568-C.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

- A. Install in a dedicated raceway system.
- B. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- E. Backboards: Install fire rated backboards, 3/4 inch thick as needed. Paint out WHITE; do NOT cover fire listing label.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems." for installation of supports for pathways, conductors and cables.

3.3 WIRING METHOD (*OTHER THAN FIRE ALARM*)

- A. Install wiring in metal raceways and wireways. Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be 3/4 inch. Control and data transmission wiring shall not share conduit with other building wiring systems.
- B. Install wiring in raceways except in accessible indoor ceiling spaces. Conceal raceways and wiring except in unfinished spaces and as indicated. Minimum conduit size shall be 3/4 inch. Control and data transmission wiring shall not share conduit with other building wiring systems. All cabling subject to damage (i.e., Receiving Rooms, Mechanical Rooms, Open Areas, etc.) shall be installed in raceway.
- C. Install cable, concealed in accessible ceilings, walls, and floors when possible.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- E. When exposed raceway is required, utilize IVORY surface mounted metallic wiremold raceway. Coordinate installation with Architect prior to rough-in. Utilize matching wiremold metallic back box for devices being installed.

3.4 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.
- C. General Requirements for Cabling:
 - 1. Comply with TIA/EIA-568-C.
 - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - 3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.

4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 48 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.

- b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
- c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
- 5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
- 6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.5 FIRE ALARM WIRING INSTALLATION

- A. Comply with NECA 1 and NFPA 72.
- B. Wiring Method: Install wiring in dedicated metal raceway according to Division 26 Section "Raceway and Boxes for Electrical Systems."
 - 1. Utilize RED conduit in concealed spaces in walls and above non-accessible ceilings.
 - 2. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
 - 3. When exposed raceway is required, utilize IVORY surface mounted metallic wiremold raceway. Coordinate installation with Architect prior to rough-in. Utilize matching wiremold metallic back box for devices being installed.
 - 4. Utilize plenum rated fire protection listed cabling for all exposed fire cable above accessible ceilings.
- C. Wiring Method:
 - 1. Signaling Line Circuits: Power-limited plenum rated fire alarm cables may be installed in the same cable or raceway as signaling line circuits.
- D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors. Do NOT use wire nuts with multiple cables.
- E. Cable Taps: Use numbered terminal strips in cabinets or equipment enclosures where circuit connections are made. **DO NOT MAKE SPLICES IN JUNCTION BOXES ABOVE CEILINGS.**
- F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. (Paint fire alarm system junction boxes and covers red.)

3.6 POWER AND CONTROL-CIRCUIT CONDUCTORS

- A. 120-V Power Wiring: Install according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.
- B. Minimum Conductor Sizes:
 - 1. Class 1 remote-control and signal circuits, No. 14 AWG.
 - 2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
 - 3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.7 CONNECTIONS

- A. Comply with requirements in Division 28 Section "Digital Addressable Fire-Alarm System" for connecting, terminating, and identifying wires and cables.

3.8 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA-569-B, "Firestopping" Annex A.
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.9 GROUNDING

- A. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.10 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:

1. Visually inspect cable jacket materials U.L. certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-C.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

SECTION 28 31 11
FIRE-ALARM AND VOICE-NOTIFICATION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to drawings for manufacturer, model numbers and additional requirements.

1.2 SUMMARY

- A. Section includes extension of an existing Notifier NFS2-3030 fire-alarm control unit, including voice evacuation system.
 - 1. Manual fire-alarm boxes.
 - 2. System smoke detectors.
 - 3. Heat detectors.
 - 4. Notification appliances, including audio speakers.
 - 5. Addressable interface monitor and control devices.

1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. NICET: National Institute for Certification in Engineering Technologies.
- C. LCD: Liquid Crystal Display.
- D. AHJ: Authorities Having Jurisdiction.
- E. MNS: Mass Notification System.

1.4 BUILDING CODES AND STANDARDS

- A. The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic designation only. The latest version of each listed publication shall be used as a guide unless the authority having jurisdiction has adopted an earlier version.
 - 1. FM Global (Factory Mutual (FM)): FM Approval Guide
 - 2. National Fire Protection Association (NFPA)
- B. National Fire Protection Association (NFPA):

1. NFPA-70 - National Electrical Code (NEC) 2014
2. NFPA-72 - National Fire Alarm and Signaling Code - with Mass Notification
3. NFPA 720 - Standard for inspection of carbon monoxide detection and wiring.
4. NFPA 101 - Life Safety Code 2015
5. IBC - International Building Code 2015
6. IFC - International Fire Code 2015
7. IMC - International Mechanical Code 2015

C. National Electrical Manufacture's Association (NEMA)

D. Underwriters Laboratories, Inc. (UL)

1. UL-864 - Control Units for Fire Protective Signaling Systems (9th Edition)
2. UL-268 - Smoke Detector for Fire Protective Signaling Systems
3. UL-217 - Smoke Detectors for Single and Multiple Station
4. UL-521 - Heat Detectors for Fire Protective Signaling Systems
5. UL-464 - Audible Signaling Appliances
6. UL-1971 - Visual Signaling Appliances
7. UL-38 - Manually Actuated Signaling Boxes
8. UL-1480 Standard for Speakers for Fire Alarm, Emergency, and Commercial and Professional Use
9. UL-1481 - Power Supplies for Fire Protective Signaling Systems
10. UL 2017 - Mass Notification Systems
11. UL 2572 - Control and Communication Units for Mass Notification Systems
12. UL 228 - Door Holding Devices
13. UL 268A - Smoke Detectors for Duct Application
14. UL 1283 - Electromagnetic Interference Filters
15. UL 1449 - Transient Voltage Surge Suppressors

1.5 REGULATORY REQUIREMENTS

- A. All equipment specified shall be UL/FM listed and cross listed for use with the main fire alarm control panel and shall bear the same manufacturer's name on the main control panel as well as all the remote devices. Systems having equipment with various manufacturers' names will not be acceptable. All control equipment shall be listed under UL category UOJZ as a single control unit and also UL/FM listed for power limited applications per NEC 760.

1.6 EXISTING SYSTEM DESCRIPTION

- A. Non-coded, UL Listed intelligent analog addressable system, digital voice communications with multiplexed signal transmission and survivable network nodes. The entire system shall be UL2572 Listed Mass Notification System.
- B. The System supplied under this specification shall utilize node-to-node, direct wired, multi priority peer-to-peer network operations where network control or remote voice command centers are located on the drawings. The system shall utilize independently addressed, input/output modules, audio amplifiers, and voice communications as described in this specification. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote

control panels, and LCD panels. Each panel shall be an equal, active functional member of the network, which is capable of making all local decisions and generating network tasks to other panels in the event of panel failure or communications failure between panels. Master/slave system configurations shall not be considered as equals.

- C. The fire alarm equipment and installation shall comply with the current provisions of the following latest edition UL and NFPA standards and shall be listed for its intended purpose and be compatibility listed to insure integrity of the complete system.
- D. The entire system shall be a UL464 Listed Audio Evacuation System. This includes all Control Panels, Remote Command Centers, Remote Microphones, Data Gathering Panels, Network Nodes, all amplifiers and all high fidelity speakers. All of these components shall be UL cross-listed together.
- E. The system performance specified herein is based upon a minimum design performance requirements utilizing high fidelity speakers with the following minimum selectable sound performance levels from 81.5; 84.1; 87.3; and 90.5 dBA (.25, .50, 1.0, 2.0 watts, respectively).
- F. Each Command Center shall be fully redundant on the network with redundant audio network, audio messages (up to 100 minutes of message storage capacity), paging microphone and the following:
 - 1. Command Center or Local Operator Console (LOC) with redundant audio messages, paging microphone and request for control switches & status indicators. Each Command Center shall have switches with LED annunciating control and requesting control as follows:
 - a. Request Take Control
 - b. Request Accepted
 - c. Request Deny
 - d. Restore command center to normal operation
 - e. Priority request override Take Control
- G. The Emergency Voice Paging System will provide multi-Channel audio paging and audio paging areas via a system microphone and telephone paging access. The paging system shall be used for routine and emergency paging.
 - 1. Existing paging areas to remain as is.
- H. Provide telephone access paging interface selectable with ten paging areas, plus all call.
- I. All remote local operating console (remote annunciator/LOC) shall have LCD display, paging microphone, audio zone selection switches and by-pass switches. Provide visual indication which microphone is active during paging operations. During local microphone paging the speakers located near by the microphone shall be muted through software programmable audio control relays. The LOC shall not override the Command Center operations.

- J. The fire alarm equipment and installation shall comply with the current provisions of the following latest edition standards (unless otherwise noted below) applicable to the jurisdictional authorities, including their local adoptions and amendments and it shall be listed for its intended purpose of a Mass Notification and Emergency Communication Signaling System and be compatibility listed to insure integrity of the complete system. It shall be listed to all of the UL Standards listed herein, without exception.

1.7 SUBMITTALS

- A. The Contractor shall not purchase any equipment for the system specified herein until the Owner and/or designated representative has approved the project submittals in their entirety and has returned them to the contractor. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications. The Contractor shall submit six (6) complete sets of documentation.
 1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to the Architect.
 2. Include all required fees for permit, drawing review and any inspection fees as required by City/Fire Department.
 3. Technical Submittals including Engineered Fire Alarm Installation layout Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Registered Professional Fire Protection Engineer which is a Licensed Professional Engineer who has passed the NCEES Principles and Practices of Fire Protection Engineering Examination licensed in the state which has jurisdiction.
 - b. NICET Level IV technician who has been certified at Level IV in the sub-field of Fire Alarm Systems Layout.
 - c. Submittals shall also include the Quality Assurance certifications of the Fire Alarm Technician (see Paragraph Section 1.8).
 - d. Distributor Qualifications: Provide documentation of the independently owned, Fire Alarm Distributor's qualifications, including all licenses, certificates and proof of authorization as a Manufacturer's Representative in Good Standing.
- B. Product Data: Product Data sheets with the printed logo or trademark of the manufacturer of all equipment. Indicated in the documentation shall be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification. The proposed equipment shall be subject to the approval of the Owner.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 1. Comply with all recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72.

2. Include voltage drop calculations for notification appliance circuits based on manufacturer-provided panel start voltage and point-to-point notification appliance circuit calculations. System Layout drawings prepared using the Lump Sum Method for visual strobe circuits are not acceptable.
 3. Include battery-size calculations. Batteries shall include a 30% safety factor above the minimum requirements derived from calculations, as required by NFPA 72.
 4. Power supplies shall be sized to furnish the total connected load in a worst-case condition, plus 30 percent spare capacity for future growth.
 5. Include fire alarm plans (AutoCAD drawings to scale), riser diagrams, point-to-points showing all devices and locations of all end of line resistors.
 6. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 7. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors in accordance with NFPA 72.
 8. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 9. Indicate speaker wattage tap settings for all speakers on the floor plans, calculate and show dB Line Loss calculations for all speaker circuits using the Lump sum method. dB Losses shall be no greater than 3.0 dB from amplifier start terminals to last device.
 10. Indicate all Acoustically Distinguishable Areas on the installation shop drawings.
 11. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits from end-to-end. "Home Run" indicators or other non-end-to-end wire path designations are not acceptable.
 12. Include programming matrix for all devices showing input and output functions.
- D. Operation and Maintenance Data: For fire-alarm systems and components to be included in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data, include the following:
1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.
 2. Provide "Record of Completion Documents" according to NFPA72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 3. Record copy of site-specific software database file, hardcopy printout and CD, with password for delivery to the owner. Proprietary system/service companies will not be acceptable.
 4. Provide "Maintenance, Inspection and Testing Records" according to NFPA72 article of the same name and include the following:
 - a. Frequency of testing of installed components.

- b. Frequency of inspection of installed components.
 - c. Requirements and recommendations related to results of maintenance.
 - d. Manufacturer's user training manuals (hardcopy) and electronic on CD.
- 5. Manufacturer's required maintenance related to system warranty requirements.
- 6. Abbreviated operating instructions for mounting at fire-alarm control unit.
- 7. Copy of NFPA 25 results.
- E. Software and Firmware Operational Documentation:
 - 1. CD of site-specific software database file with password and all product data sheets. Provide hard copy printout of the software program. Single Source Providers or Proprietary System/service companies will not be acceptable.
 - 2. Provide a list of global system settings.
 - 3. Provide a list of the contents of each system cabinet and their settings.
 - 4. Provide a list of all addressable devices with their addresses and settings.
 - 5. Software Modifications:
 - a. Provide the services of a factory trained and authorized Commercial Alarm Systems, LLC technician to perform all system software modifications, upgrades or changes.
 - b. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on the site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.
 - c. Upon submittal of "as-built drawings", contractor shall have 60-days to complete the graphic screens. Graphic screens shall match the as-built drawings.

1.8 QUALITY ASSURANCE

- A. All modifications to the existing Campus fire alarm network including connections to panels/nodes, revisions to programming, revisions to graphics, etc. shall be performed by the owner's preferred fire alarm service provider. **The Owner's preferred fire alarm service provider is Commercial Alarm Systems, LLC; contact James McCollam at 630-832-2844, JMcCollam@CASystemsLLC.com**
- B. Installer Qualifications: Fire Alarm distributor's employed personnel shall be trained and certified by manufacturer (a Notifier Authorized NESCO Systems Dealer with direct ties to the manufacturer) on the make and model of the fire alarm control panel specified for this Project. Installation shall be by personnel certified by NICET as a technician who has been certified at Level II in the sub-field of Fire Alarm Systems Layout.
- C. Project Manager Qualifications: Installation shall be supervised by personnel certified by NICET as Fire Alarm System Layout Level IV Technician (SET), an NFPA

Certified Fire Protection Specialist (CFPS) or an NCEES accredited Licensed Fire Protection Engineer (FPE).

- D. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single distributor and manufacturer. Components shall be compatible with, and operate as a fully U.L. listed extension of a U.L. 864 listed fire alarm control system.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA70, by a qualified testing agency, and marked for intended location and application.
- F. Fire Alarm Distributor Qualifications:
 - 1. Contractor shall utilize an Illinois Licensed Private Alarm Contractor Agency that is an authorized, independently owned Manufacturers representative of the specified fire alarm equipment manufacturer.
 - 2. Fire Alarm Distributor shall be a full service entity qualified to provide the engineering for the technical submittal, furnishing of the equipment, commissioning, testing and inspection services outlined herein including intelligibility testing and capable of providing full repair service to any fire alarm system and/or provide fire alarm system installation and design including, but not limited to, the following minimum requirements:
 - a. Qualified Fire Alarm Service Company with employees who meet the criteria defined by NFPA 72 for the qualifications of both System Designers and System Installers to include the requirements of the Authorities Having Jurisdiction (AHJ).
 - b. Certified Fire Alarm Service Inspectors with employees of the entity who are certified in Fire Protection Engineering Technology by the National Institute for Certification in Engineering Technologies (N.I.C.E.T.) in FIRE ALARM SYSTEMS – LEVEL II, minimum.
 - c. Five (5) Years of experience with intelligibility measurement technology and testing (minimum) is required for this project and the Fire Alarm Distributor shall provide intelligibility measurement equipment capable of registering and recording Intelligibility readings in accordance with IEC 60268-16, Sound System Equipment - Part 16: Objective Rating of Speech Intelligibility by Speech Transmission Index. Equipment shall have been calibrated within one (1) year of the commencement of the intelligibility testing for this project.
 - 3. Distributor shall be a registered Illinois legal entity (Corporation, Partnership, Professional Corporation or Limited Liability Company) in Good Standing with the Secretary of State of Illinois.
 - 4. Distributor entity shall hold a valid Illinois Private Alarm Contractor Agency License. Sub-contractors or licensed individual Private Alarm Contractors DO NOT meet this requirement.
 - 5. Distributor entity shall be qualified by the AHJ, including the Illinois Department of Professional Regulation to provide engineering design services for a fire alarm and mass notification system as evidenced by holding an Illinois Registered Professional Design Firm license. Sub-contractors or

individually licensed individual Registered Architects, Professional or Structural Engineers DO NOT meet this requirement.

6. All service employees of the entity shall have a valid Illinois Permanent Employee Registration Card (P.E.R.C.).

- G. Contractor must inspect the buildings and become familiarized with building construction prior to submitting their bid.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Architect, Construction Manager and Owner no fewer than seven (7) days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with interruption of fire-alarm service without Architect's, Construction Manager's and Owner's written permission.

1.10 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Store all devices in a clean, dry, heated space.
- B. After installation, protect equipment from damage by work of other trades.

1.12 PROTECTION/CLEANING

- A. Provide dumpster for all removed equipment at contractor's expense.
- B. Protect all areas working in. Provide tarps to cover all floors and equipment to avoid damage. Provide hard boards to cover specialized flooring areas to prevent damage/scratches to special surfaces. Thoroughly clean and vacuum all areas that work has been completed in.

1.13 ACCESSIBILITY

- A. Provide appropriate lifts and ladders to reach specified work. Do not use the Owner's equipment and supply.

1.14 WARRANTY and SOFTWARE SERVICE AGREEMENT

- A. The contractor shall warranty all materials, installation and workmanship for One (1) year from date of acceptance. A copy of any additional manufacturers' warranty shall be provided with closeout documentation and included with the operation and installation manuals.
- B. The System Supplier shall maintain a service organization with adequate spare parts stocked within 75 miles of the installation. Any defects that render the system inoperative shall be repaired within 4 hours of the Owner notifying the contractor.
- C. Technical Support: Beginning with Substantial Completion, provide software support for three (3) years, shall be included in this project.
- D. Detector Sensitivity Testing: During the warranty period, each year the contractor is to perform detector sensitivity testing and provide report to the Owner. Unless, the system is UL Listed to perform automatic sensitivity testing without any manual intervention and should detector fall outside of sensitivity window, the system will automatically indicated a devices trouble. A copy of UL letter is to be provided as proof of system operation.
- E. Upgrade Service: Update software as required to make fire alarm system modifications. Install and program software upgrades as needed. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - 1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.15 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Provide quantity equal to 2% percent of amount of each type installed, but no less than one (1) unit of each type.
 - a. Smoke Detectors, heat detectors, carbon monoxide detectors, manual pull stations, duct smoke detector, monitor modules and control modules:
 - b. Notification appliances; speakers, speaker-strobes and strobes.
 - 2. Keys: The installing contractor shall collect all equipment spare keys provided with each lockable or resettable device/cabinet and shall turn all of them over to the Owner at completion.

3. Owner's Stock shall not be used for warranty service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS (*NOTIFIER ONLY*)

- A. Manufacturers: The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling fire alarm system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.
- B. The Contractor shall provide, from the acceptable manufacturer's current product lines, equipment and components, which comply, with the requirements of these Specifications. Equipment or components, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.
- C. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, and will accommodate the future requirements and operations of the building Owner. All specified operational features must be met without exception.
- D. All control panel assemblies and connected (new) field appliances shall be provided by the same System Supplier, and shall be designed and tested to ensure that the system operates as specified. All equipment and components shall be installed in strict compliance with the manufacturer's recommendations.
- E. Approved Products: All panel devices and peripheral devices shall be of the standard product of single manufacturer and shall display the manufacturer's name of each component. The catalog numbers specified under this section are those of Notifier (a Honeywell Company) and shall constitute the type, product quality, material and desired operating features necessary for the completion of this projects intended design and function.
- F. Acceptable Manufacturers:
 1. Notifier

2.2 MANUFACTURER'S SERVICES

- A. The following supervision of installation shall be provided by a trained service technician who is employed by the manufacturer of the fire alarm equipment. The technician shall be UL and NICET Level III certified and have had a minimum of two (2) years of service experience in the fire alarm industry. The technician's name shall appear on equipment submittals and a letter of certification from the fire alarm manufacturer shall be sent to the project engineer. The manufacturer's service technician shall be responsible for the following items:

1. Pre-installation visit to the job site to review equipment submittals and verify method by which the system should be wired.
 2. During job progress, make periodic job site visits to verify installation and wiring of system.
 3. Upon completion of wiring, final connections shall be made under the supervision of this technician and final checkout and certification of the system.
 4. At the time of final checkout, technician shall give operational instructions to the Owner and/or his representative on the system.
- B. All job site visits shall be dated and documented in writing and signed by the electrical contractor. Any discrepancies will be noted on this document and a copy kept in the system job folder which will be turned over to the project engineer any time during the project.

2.3 EXISTING SYSTEMS OPERATIONAL DESCRIPTION

- A. Mass Notification initiated event shall override any event and take the highest system priority.
- B. Fire-alarm signal initiation shall be by one or more of the following devices:
1. Manual stations.
 2. Heat detectors.
 3. Beam detectors.
 4. Smoke detectors.
 5. Carbon monoxide detectors.
 6. Duct smoke detectors.
 7. Verified automatic alarm operation of smoke detectors.
 8. Automatic sprinkler system water flow.
 9. Heat detectors in elevator shaft and pit.
 10. Fire-extinguishing system operation.
- C. Fire-alarm signal shall initiate the following actions where applicable to this facility and jurisdiction:
1. Activate multiple channel pre-recorded voice messages preceded and followed by temporal tone.
 2. Continuously operate the visual notification appliances.
 3. Identify alarm at fire-alarm control unit and remote annunciators.
 4. Transmit an alarm signal to the remote alarm receiving station.
 5. Unlock electric door locks in designated egress paths.
 6. Release fire and smoke doors held open by magnetic door holders.
 7. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode.
 8. Close smoke dampers in air ducts of designated air-conditioning duct systems.
 9. Recall elevators to primary or alternate recall floors.
 10. Activate emergency shutoffs for gas and fuel supplies.
 11. Record events in the system memory.
 12. Record events by the system printer.

- D. Supervisory signal initiation shall be by one or more of the following devices and actions:
 - 1. Valve supervisory switch.
 - 2. Low-air-pressure switch of a dry-pipe sprinkler system.
 - 3. Elevator shunt-trip supervision.
 - 4. Duct smoke detector activation.
- E. System trouble signal initiation shall be by one or more of the following devices and actions:
 - 1. Open circuits, shorts, and grounds in designated circuits.
 - 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - 3. Loss of primary power at fire-alarm control unit.
 - 4. Ground or a single break in fire-alarm control unit internal circuits.
 - 5. Abnormal ac voltage at fire-alarm control unit.
 - 6. Break in standby battery circuitry.
 - 7. Failure of battery charging circuitry
 - 8. High or low battery charge.
 - 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
 - 10. Fire-pump power failure, including a dead-phase or phase-reversal condition.
 - 11. Low-air-pressure switch operation on a dry-pipe or pre-action sprinkler system.
- F. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer if specified.

2.4 EXISTING FIRE-ALARM CONTROL UNIT (*EXISTING SYSTEM DESCRIPTION*)

- A. The main control panel is a multi-processor based networked system designed specifically for detection, and one-way emergency audio communications applications. The control panel(s) is listed and approved for the application under the standard(s) as listed. The control panel is a Notifier NFS2-3030.
- B. The control panel(s) includes all required hardware, software and site-specific system programming to provide a complete and operational system. The control panel(s) is designed such that interactions between any applications can be configured, and modified using software provided by a single supplier. The control panel operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.
- C. The network of control panels shall include the following features.
 - 1. Ability to download all network applications and firmware from the configuration computer on the network or at any control panel (network node) location.
 - 2. Each control panel (network node) shall have an LCD display with common controls. The display shall be configurable to display the status of any and all

- combinations of alarm, supervisory, trouble, monitor, or group event messages.
3. From each LCD display on the system shall be capable of being programmed for control functions of any node or the entire network. The LCD display shall reside on the network as a node and continue to operate with fault on the network. An LCD can be programmed to be only operation when a node is operational in stand-alone mode, with a network fault.
 4. The system program shall have a minimum of 100 system definable Service Groups to facilitate the testing of installed system based on the physical layout of the system. Service groups that disable entire circuits serving multiple floors or fire zones shall not be considered as equal.
 5. Advanced Windows based programming with Program Version Reporting to document any and all changes made during system start-up or system commissioning. Time and date stamps of all modifications made to the program must be included to allow full retention of all previous program version data. The operator display shall clearly identify unacknowledged and acknowledged alarm, supervisory, trouble, and monitor status messages. The system shall provide the ability to download data from the analog/addressable detectors to a PC while the system is on-line and operational in the protected premises. The downloaded data may then be analyzed in a diagnostic program supplied by the system manufacturer.
 6. Provide system reports that list a detailed description of the status of system parameters for corrective action or for preventive maintenance. Reports shall be displayed on the operator interface or be capable of being sent to a printer.
 7. Provide an authorized operator with the ability to operate or modify system functions such as system time, date, passwords, holiday dates, restart the system and clear the control panel event history file.
 8. Provide an authorized operator the ability to perform test functions within the installed system.
 9. Supervision of system components, wiring, initiating devices and software shall be provided by the control panel. Failure or fault of system component or wiring shall be indicated by type and location on the LCD display. Software and processor operation shall be independently monitored for failure. The system shall provide fail-safe operation, with multiple-levels of system operation.
- D. Each network control panel shall be capable of:
1. Supporting up to 3180 intelligent analog/addressable points.
 2. Supporting up to ten (10) intelligent addressable loops, each loop supporting 159 detectors and 159 modules, total of 318 points.
 3. Supporting network connections up to 54 other control panels and annunciators.
 4. Support up ten network digital dialers with Contact ID or SIA format and TAP Pager protocol.
 5. Supporting multiple RS-232 communication ports and protocol.
 6. Supporting up to 4000 chronological history events.
 7. Total network response shall not exceed 3 seconds.
- E. Existing Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system

components including annunciation and supervision. Display alarm, supervisory, monitor, trouble and component status messages and control menu.

1. The common control switches and with corresponding LEDs provided as minimum will be; Reset Alarm Silence, Panel Silence, and Drill. It shall be able to add additional switches/LEDs as required.
2. The main control panel shall have display that is 16 lines by 40 character graphic LCD and backlit when active, 640 characters.
3. Provide 8 simultaneous events to be displayed. The first seven (7) highest priority events in addition to the most recent event. The events shall be automatically placed in event types (Alarm, Supervisory, Monitor & Trouble) for easy access and shall be possible to view the specific event type separately. Having to scroll through a mixed list of event types is not acceptable.
4. Provide an internal audible signal with different programmable patterns to distinguish between alarm, supervisory, trouble and monitor conditions.
5. This display shall be a Notifier CPU2-3030D (16 by 40 Characters).

F. Audio One-Way Voice Communication & Amplifier Performance Requirement

1. The voice communication system shall be multi-channel capable audio evacuation system, to allow the ability to have eight simultaneous announcements/paging. The audio channels shall be design as such (coordinate with Owner):
 - a. Mass Notification Message (HIGHEST PRIORITY)
 - b. Fire Message
 - c. Alert Message
 - d. Stand-by Message
 - e. Elevator Message
 - f. Stairwell Message
 - g. Security/Weather Threat
 - h. Manual Paging
2. The existing system custom digital voice message shall provide a minimum of 32 minutes and be created as a .wav file format. All messages shall be able to be created on-site without any special tools or burning of chips. Provide as minimum one twenty (20) watt supervised audio amplifier per paging zone. The system software shall be capable of selecting the required audio source signal for amplification. To enhance system survivability, each audio amplifier shall automatically provide an internally generated local 3-3-3, 1000 Hz temporal pattern output upon loss of the audio signal from the one-way emergency audio control unit, during an alarm condition.
 - a. List of Potential Recorded Messages to Use **(Existing Messages to be Maintained)**:
 - 1) Fire Alarm (Automatic and Pre-Recorded)
 - a) Tone Type: Three Pulse Temporal (NFPA 72, A.18.4.2.1)
 - b) Tone Cycles: 2 times before and after message (NFPA 72, 24.4.2.17.1)

- c) Tone Duration: Per NFPA 72, 18.4.2.1
 - d) Message Content: *"May I have your attention please. A fire emergency has been reported in the building. Please walk to the nearest exit and leave the building."*
- 2) Building Emergency (Evacuate)
- a) Tone Type: Chime (NFPA 72, A.18.4.2.1(b))
 - b) Tone Cycles: 2 times before and after message (NFPA 72, 24.4.2.17.1)
 - c) Tone Duration: Per NFPA 72, A.18.4.2.1(b)
 - d) Message Content: *"May I have your attention please. An emergency has been reported in the building. Please walk to the nearest exit and leave the building."*
- 3) Area Emergency (Shelter-in-Place)
- a) Tone Type: Chime or 1000 Hz tone
 - b) Tone Cycles: 2 times before the message only
 - c) Tone Duration: 3 seconds
 - d) Message Content: *"May I have your attention please. An emergency has been reported in the area. Please remain in the building and await further instructions."*
- 4) Severe Thunderstorm Warning
- a) Tone Type: Chime or 1000 Hz tone
 - b) Tone Cycles: 2 times before the message only
 - c) Tone Duration: 3 seconds
 - d) Message Content: *"May I have your attention please. The National Weather Service has issued a SEVERE THUNDERSTORM WARNING for this area; please take immediate shelter indoors."*
- 5) Tornado Warning
- a) Tone Type: Chime or 1000 Hz tone
 - b) Tone Cycles: 2 times before the message only
 - c) Tone Duration: 3 seconds
 - d) Message Content: *"May I have your attention please. The National Weather Service has issued a TORNADO WARNING for this area; please take immediate shelter in the tornado shelter, basement, or on the lowest level at the center of the building away from exterior windows and doors."*
- 6) Test
- a) Tone Type: Chime or 1000 Hz tone
 - b) Tone Cycles: 2 times before and after the message
 - c) Tone Duration: 3 seconds

- d) Message Content: *"May I have your attention please. This is a test of the building mass notification system. Please continue your normal duties. This is only a test."*
 - 7) All Clear
 - a) Tone Type: Chime or 1000 Hz tone
 - b) Tone Cycles: 2 times before and after the message
 - c) Tone Duration: 3 seconds
 - d) Message Content: *"May I have your attention please. An all clear has been issued; resume normal activities."*
 - 8) Microphone (LOC or ACU) Keying
 - a) Tone Type: Chime or 1000 Hz tone
 - b) Tone Cycles: Once
- 3. Audio amplifiers shall be power limited and protected from short circuits conditions on the audio circuit wiring. Each amplifier output shall be a supervised, dedicated, selectable 25/70 Vrms output. All circuit voltages to match existing system output.
- 4. Provide a standby audio amplifier per node that will automatically sense the failure of any primary amplifier installed in the same panel and replace the function of the failed amplifier.
- 5. Amplifier Minimum Sizing Specification shall be as follows:
 - a. 7.5 Watts per Trumpet Type Loudspeaker
 - b. 2 Watts per 8 inch cone type speaker
 - c. 1 Watts per 4 inch cone type speaker
 - d. 4 Watts per re-entrant horn-driver type speaker
 - e. Plus 30% spare capacity for each connected amplifier or speaker signal circuit switching module.
- G. Existing Emergency Voice Communication System with the following features:
 - 1. An audio control unit with Microphone for Paging.
 - 2. Provide 3-position switch for each evacuation signaling zone and "All-Call", with "Page FIRE", "Auto" and "Page ALERT" positions identified and two LED status indicators for each audio visual evacuation signaling "zone", one red and one yellow.
 - 3. These LED's shall illuminate to indicate respectively:
 - a. Evacuation signals activated (red).
 - b. Trouble in audio (speaker) or visual (strobe) circuit(s) (yellow).
- H. Provide 2-position switch for manually activate pre-recorded voice messages, with "Message Name" positions identified and one LED status indicators, one red. Provide minimum of 12 selector switches.
 - 1. These LED's shall illuminate to indicate respectively:
 - a. Message activated (red)

- I. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions
- J. Circuits Requirements:
 - 1. Signaling Line Circuits for Intelligent Analog Addressable Loop:
 - a. Style 4.
 - 2. Notification Appliance Circuits:
 - a. Style 4.
 - b. Maximum circuit loading not to exceed 75% of the visual circuits terminal capacity or the power supplies total amperage rating (i.e., no more than 6.0 amps on an 8.0 amp power supply).
 - 3. Activation of alarm notification appliances, smoke control, elevator recall and other functions shall occur within 3 seconds after the activation of an initiating device.
- K. Smoke-Alarm Verification:
 - 1. Initiate an audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 - 2. Activate U.L.-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
 - 3. Record events by the system memory.
 - 4. Sound general alarm if the alarm is verified.
 - 5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
 - 6. Coordinate final decision and program feature requirements with Fire Departments and Owner.
- L. Elevator Recall:
 - 1. Smoke detectors at the following locations shall initiate automatic elevator recall. Alarm-initiating devices, except those listed, shall not start elevator recall.
 - a. Elevator lobby detectors except the lobby detector on the designated floor.
 - b. Smoke detector in elevator machine room.
 - c. Smoke detectors in elevator hoistway.
 - 2. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
 - 3. Heat detector and water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.

- a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.
 - M. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.
 - N. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change to alternate settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values.
 - O. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, shall be powered by nominal 24-V dc source. Obtain 120-V power from emergency power panels on generator.
 - P. Secondary Power: Shall provide 60 hours supervisory and 15 minutes of alarm thereafter with batteries, automatic battery charger, and automatic transfer switch.
- 2.5 EXISTING REMOTE ANNUNCIATOR WITH ONE-WAY VOICE COMMUNICATION
(*COMMAND CENTER LLC*)
- A. Annunciator shall match those of fire-alarm control unit display functions for alarm, supervisory, monitor and trouble indications and common system controls including; acknowledging, silencing, resetting, and testing. The fire alarm bypass function switches and LCD Keypad may be housed separately in a locked enclosure to prevent unauthorized use and control of fire alarm system program control and bypass, but the Paging Microphone, Audio Selector and Message Selector Switches shall be housed in a listed enclosure which is capable of being fitted with an unlocked latching knob for the enclosure, such that these emergency communication and signaling controls are readily accessible for emergency signaling. The Contractor shall verify this feature with Owner prior to ordering equipment.
 - 1. This display is a Notifier LCD-160 Series unit and has the following minimum features:
 - a. LCD Display
 - b. Paging Microphone
 - c. Audio Selector Switches
 - d. Audio Message Selector Switches
 - e. System Bypass Switches
 - B. Existing Campus Fire Alarm Network Color Graphics Annunciation System:
 - 1. Programming and graphics software shall be provided to display on single or multiple screens, the status of every device located on a floor plan of the building. Alarms shall be audible and visual and shall annunciate regardless of the screen that is currently visible. Text on screens shall be a minimum of

- 1/10" high. Coordinate with the Owner, the floor plan on each screen prior to programming. A backup of all system programming and graphics shall be provided to the Owner.
2. Graphic screens shall match in style and color to existing graphic screens. Provide screens dividing building so that all text within rooms is clearly legible. Provide full floor screens with navigation buttons linked to area screens. Provide key-maps to every screen. Link key-maps to appropriate screen for proper navigation. Screens shall not divide rooms unless deemed necessary due to size.
3. Modify software and provide new maps showing all new areas created by this remodeling project.

2.6 NAC POWER SUPPLY

- A. The NAC power supply shall be independent unit that will provide power to visual strobe notification appliances. It shall be possible to configure the NAC's to follow the main panel's NAC or activate from intelligent synchronized modules. The booster NAC's must be configurable to operate independently at any one of the following rates: continuous synchronized, or 3-3-3 temporal. Fault conditions on the power supply shall not impede alarm activation of host NAC circuits or other power supplies. The NAC power supply must be able to provide concurrent power for notification devices, security devices, access control equipment and auxiliary devices such as door holders. . All the NAC Power Supplies shall be synchronized. The power supply shall support up to 24 amp hour batteries.
 1. Power supply shall be minimum of 8 amps and UL 864 Listed. Include battery back-up for 60 hours stand-by and 15 minutes of alarm thereafter. Include 25 percent spare capacity.
 2. Four independent 3.0 amp NAC circuits. Each being configurable as auxiliary power.
 3. All circuits shall be synchronized.
 4. Do not exceed 70 percent of each circuits rating so as to provide future capability.
 5. Shall be Notifier, model HPFF8 or equivalent to match existing building system.
 6. Obtain 120 V power from emergency power panels on generator. Install lock-out device on breaker.
 7. Do not mount above ceilings. Locate in equipment closets.
 8. Install smoke detector at this location for protecting unit or other detection device suitable for the application.

2.7 INTELLIGENT ANALOG SYSTEM SMOKE AND HEAT DETECTORS

- A. General Requirements for Intelligent Analog Detectors
 1. All devices shall match current type being used in the building. Automatically reports all alarm and trouble conditions.
 2. Automatically updates historic information including hours of operation, last maintenance date, number of alarms and troubles, time of last alarm1 and analog signal patterns for each sensing element just before last alarm.

3. Field Replaceable Smoke Sensing Chamber: Analog detectors must have a modular, removable smoke sensing chamber which can be removed for easy cleaning and/or convenient, cost effective service replacement without removing the detector base or resetting the device address, without removal of detector electronics and without requiring any system or device programming adjustments which necessitate a system re-test.
4. Addressing: It shall be possible to address each intelligent module using DIP or rotary switches.
5. Automatic Device Mapping: Each detector transmits wiring information regarding its location with respect to other devices on the circuit, creating an As-Built wiring diagram. This will also provide enhanced supervision of the device physical location and the device message shall reside with the location and not the device address. Devices installed in the wrong location will always report the correct message of the physical location.
6. Sensitivity Range: Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, less sensitive or least sensitive. It shall be possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. It shall be possible to program control panel activity to each level.
7. Pre-Alarm: Detector stores 20 pre-alarm sensitivity values to alert local personnel prior to the sensor reaching a full evacuation sensitivity. Sensitivity values can be set in 5% increments.
8. Environmental Compensation: The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal when the detector reaches 75% (Dirty) to 99% (More Dirty) compensation has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used.
9. Twin Status LEDs: Flashing Green LED shows normal; flashing RED shows alarm state; steady RED and steady GREEN show alarm state in stand-alone mode, visible from any direction.
10. UL Sensitivity Testing: The detector shall utilize a supervised microprocessor that is capable of monitoring the sensitivity of the detector. If the detector sensitivity shifts outside of the UL limits, a trouble signal is sent to the panel.
11. Device Replacement: The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.

B. Intelligent Photoelectric Detector

1. Provide intelligent analog addressable photoelectric smoke detectors at the locations shown on the drawings.
2. Provide Notifier FSP-851 Series.

C. Intelligent 135 Degree Fixed Temperature / Rate of Rise Heat Detector

1. Where called for on the contract drawings, provide intelligent combination fixed temperature/rate-of-rise heat detectors at the locations shown on the drawings. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 135 deg F and a rate-of-rise alarm point of 15 deg F per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft centers and be suitable for wall mount applications.
2. Provide Notifier FST-851 Series.

D. Detector Base Types

1. Provide standard detector mounting bases suitable for mounting on 1-gang, or 4 inch octagon box and 4 inch square box. The base shall, contain no electronics and support all series detector types. Bases with electronics or dip-switches are not acceptable.
 - a. Provide Notifier B210LP Series.

2.8 Intelligent Modules

- A. Address each intelligent module using DIP or rotary switches. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller.
 1. Reports all module conditions if the device is alarm or trouble condition.
 2. Automatically updates historic information including hours of operation, number of alarms and troubles, time of last alarm.
 3. Automatic Device Mapping: Each detector transmits wiring information regarding its location with respect to other devices on the circuit, creating an As-Built wiring diagram. This will also provide enhanced supervision of the device physical location.
 4. Twin Status LEDs: The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status.
 5. Input and output circuit wiring shall be supervised for open and ground faults.
 6. Two styles of modules shall be available, those designed for gang box mounting, and where multiple modules are required in a single location, plug in modules shall be provided with a Universal Input/Output motherboard.
- B. Intelligent Input Module. The Input Module shall provide one or two supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on North American 2-1/2 inches deep 1-gang boxes and 1-1/2 inches deep 4 inches square boxes with 1-gang covers. The single input module shall support the following circuit types:

1. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
 2. Normally-Open Alarm Delayed Latching (Waterflow Switches)
 3. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
 4. Normally-Open Active Latching (Supervisory, Tamper Switches)
 5. Provide Notifier FMM and FZM Series Devices.
- C. Intelligent Relay Module. Provide addressable control relay circuit modules shall provide one (1) form C dry relay contacts rated at 24Vdc @ 2 amps (pilot duty) to control external appliances or equipment. The position of the relay contact shall be confirmed by the system firmware. The module shall be suitable for mounting on North American 2-1/2 inches deep 1-gang boxes and 1-1/2 inches deep 4 inches square boxes with 1-gang covers.
1. Provide FRM Series Devices.
- D. NAC Control Module: Provide intelligent NAC control module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation. The gang box -mounted version shall be suitable for mounting in North American 2-1/2 inches deep 2-gang boxes and 1-1/2 inches deep 4 inches square boxes with 2-gang covers. The plug-In version shall plug into a universal multi-module motherboard. The NAC control module shall support the following operations:
1. 24volt NAC circuit
 2. Audio notification circuit 25v (match Owner's existing system)
 3. Telephone Power Selector with Ring Tone (Firefighter's Telephone)
 4. Visual Synchronized Output to Genesis appliances or to NAC Power Supply.
 5. Provide Notifier FCM Series.

2.9 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 2. The manual pull station will have an intelligent module integral of the unit.
 3. Station Reset: key operated switch shall match the control panel key.
 4. Manual pull stations that initiated an alarm condition by opening the unit are not acceptable.
 5. Provide Notifier NBG-12LX.

2.10 NOTIFICATION APPLIANCES (*MATCH OWNER'S EXISTING DEVICES*)

- A. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel specified to insure absolute compatibility between the appliances and the control

panels, and to insure that the application of the appliances are done in accordance with the single manufacturers' instructions.

- B. Any appliances, which do not meet the above requirements, and are submitted, for use must show written proof of their compatibility for the purpose intended. Such proof shall be in the form of documentation from all manufacturers which clearly states that their equipment (as submitted) are 100% compatible with each other for the purposes intended. All appliances shall be UL 1971, UL 1638 and UL 464 listed for Fire Protective Service. Speakers shall also be UL 1480F listed. Combination Speaker-Visual appliances may be used where shown on the contract drawings and standalone Visual Strobes and Speaker-Only devices may be used where shown on the contract drawings provided they meet the performance requirements specified herein for both audible and visual notification.
- C. Notification Appliances – Visual (Fire – Evacuation)
 - 1. Provide wall or ceiling mounted clear lens strobes with white body and "FIRE" markings. Strobes shall provide a smooth light distribution pattern field selectable candela 15 cd, 30 cd, 75 cd, and 110 cd flash output rating, UL1971 listed with in-out screw terminals shall be provided for wiring. The strobe (15, 30, 75, 110) candela rating shall be view from the side window to verify the setting. All strobes shall be synchronization to within 10 milliseconds for an indefinite period shall not require the use of separately installed remote synch modules. The strobes shall mount to one-gang electrical box.
 - 2. The device shall have plastic protective cover for during installation. All ceiling mounted devices shall be provided with junction box and T-grid support bar or other means of adequate support that is U.L. listed.
 - 3. The actual candela setting on the visual shall be marked on the appliance.
- D. Notification Appliance – High Fidelity Speaker
 - 1. High Fidelity White Speakers shall have a 4 inch Mylar/paper cone. The rear of the speakers shall be completely sealed protecting the cone during and after installation. In and out screw terminals shall be provided for wiring. Speakers shall provide 1/4w, 1/2w, 1w, and 2w power taps for use with 25V systems. The actual speaker wattage & strobe candela setting shall be view from the device window to verify the wattage setting, without removing the device. To make any changes to the speaker wattage will only require the removal of the cover plate.
 - 2. High Fidelity Speaker listed frequency response of 400 to 4,000 Hz and listed sound output of 90.5 dBA at 10 feet, as measured in reverberation room per UL-1480.
 - 3. Furnish devices with the following selectable minimum sound level output:
 - a. 1/4 watt – 81.5 dBA
 - b. 1/2 watt – 84.1 dBA
 - c. 1 watt – 87.3 dBA
 - d. 2 watt – 90.5 dBA
 - e. All ceiling mounted devices shall be provided with speaker back box and speaker truss support for T-grid ceilings or utilize other U.L. listed support means for other types of ceiling materials.

4. Provide Notifier SP/SPC Series.

E. Notification Appliance - Re-entrant Speakers (Mechanical, Storage, Unfinished Ceiling Locations and Exterior Use; Color Selected by Owner)

1. Provide 4 inch diameter red re-entrant speakers at loud ambient locations or for outdoor weatherproof installation. Weatherproof boxes shall be provided for outdoor mounting. Speakers shall provide 2w, 4w, 8w, and 15w power taps. The re-entrant speakers shall utilize a high-efficiency compression driver. Cone type drivers are not acceptable. At the 15 watt setting, the speaker shall provide a 102 dBA sound output over a frequency range of 400-4000 Hz. when measured in reverberation room per UL-1480.
2. Combination speaker strobes shall meet both sections of above.
3. Provide Notifier SPRK/SPSRK Series or SPSCRK Series.

2.11 SURGE PROTECTION

- A. Install surge protection on normal ac power for the FACP and its accessories.
- B. Install surge protectors recommended by FACP manufacturer. Install on all system wiring external to the building housing the FACP.
- C. Install surge protection on all lines entering the building and other out-buildings (i.e., mobile classrooms).
- D. Ground to building ground/water piping system as required.

2.12 SPRINKLER SYSTEM (*EXISTING*)

- A. Sprinkler Waterflow Switch: Switch shall have two (2) sets of N.O. contacts and adjustable retard chamber to compensate for water surge. Verify quantity in field.
- B. Sprinkler System Gate Valve Supervisory Switch: Verify quantity in field.
- C. Sprinkler System Dry System Pressure Switch and Alarm Switch: Existing.
- D. Provide addressable monitor module for each device listed above.

2.13 GUARDS FOR PHYSICAL PROTECTION

- A. Provide welded mesh of size and shape for the manual pull stations, smoke detectors, notification appliances at location noted on the drawings.

2.14 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V dc.
4. Provide Notifier FM-Series.
5. Coordinate Magnetic Hold opens with the General Trades and Door Hardware Contractors.
6. Contractor will field verify exact type to be used prior to bidding. Installation of devices must allow for at least 90 degree door swing if adjacent to wall. Utilize Sentronic type combination door holder/closer if not possible.

2.15 INSPECTION BAR CODES (*MATCH EXISTING SYSTEM*)

- A. Company shall provide a system for creating, updating and maintaining all service work, inspections, and maintenance performed as part of this specification to Inspection bar codes shall be installed on all initiating devices, annunciators, control panels and power supplies.
- B. Inspection bar codes used by the system must utilize Code 3 of 9 or other approved format, and contain a minimum of eight (8) digits that comprise a unique serial identifier within the Web-based Reporting System. There shall be no duplication of serial numbers. Serial number shall be printed below the bar code for identification purposes.
- C. Inspection bar codes shall be limited in size to no more than 2 inches in width, and 3/8 inches in height and shall include a Mylar or other protective coating to protect the bar code from fading due to sunlight or exposure.
- D. Inspection bar codes shall be installed on each device in such a manner as to require that scanning of the bar code take place no further than 12 inches from the device during inspection.
- E. Modify System for devices removed and new devices added. Include all location changes, device type, and new/existing serial numbers.

2.16 WIRE AND CABLE

- A. Signaling Line Circuits – Network Data: Plenum rated cable (FPLP) fire protection listed, twisted pair, not less than No. 16 AWG or as recommended by the manufacturer. Systems which use Shielded Wire requiring continuous foil shields and continuous drain wires are not acceptable, as they may lead to multiple ground faults and communication integrity faults.
- B. Signaling Line Circuits – Intelligent Loop: Plenum rated cable (FPLP) fire protection listed, non-Twisted pair, not less than No. 16 AWG or as recommended by the manufacturer. Systems which use Shielded Wire requiring continuous foil shields and continuous drain wires are not acceptable, as they may lead to multiple ground faults and communication integrity faults.
- C. Notification Appliance Circuits

1. Audio: Plenum rated (FPLP) fire protection listed, shielded, twisted pair, not less than No. 16 AWG or as recommended by the manufacturer. Include shield when required by manufacturer
2. Visual. Plenum rated (FPLP) fire protection listed, non-Twisted pair, not less than No. 14 AWG or as recommended by the manufacturer and required by the voltage drop calculations (it may be No. 12 AWG in some cases).

D. Manufacturers:

1. General Cable
2. Radix
3. Comtran Corp.
4. Helix
5. Belden
6. West Penn.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 and Article 760 for installation of fire-alarm equipment.
- B. All system devices (initiating and notification) shall be inspected and tested for operation including the operation of air handlers and roof top units under global shut down. All NAC panels shall be checked for supervision. See drawings for sequence of operation matrix to understand current operation of system. All devices not labeled shall be labeled per the specifications.
- C. The contractor shall download the current system software with all associated programmed devices onto an electronic disk for the Owner's safekeeping. Include a printout of all system devices, locations, nomenclature and their address. Have the Owner sign for the disk and print out prior to performing any work on the system.
- D. Coordinate the pretest date and time with the Owner a minimum of one week in advance. The Owner will be required to be present with the technician during the pretest. All tests done without the Owner's presence will be redone at the contractor's expense.
- E. Equipment Mounting: Install fire-alarm NAC panels on wall with tops of cabinets not more than 72 inches above the finished floor.
- F. Smoke- or Heat-Detector Spacing:
 1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
 3. Smooth ceiling spacing shall not exceed 30 feet.
 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix in NFPA 72.

5. HVAC: Locate detectors not closer than 5 feet from air-supply diffuser or return-air opening.
 6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.
 7. DO NOT INSTALL HEAT DETECTORS ABOVE MECHANICAL HEATING PIPES, ADJUST LOCATION ACCORDINGLY TO PREVENT FALSE ALARMS.
- G. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- H. Audible Alarm-Indicating Devices (when wall mounted): Install at 80 inches above finished floor to bottom or 6 inches below the ceiling, whichever is less. Install devices on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install ceiling mounted devices when shown.
- I. Visible Alarm-Indicating Devices (when wall mounted): Install at least 80 inches above finished floor to bottom or 6 inches below the ceiling, whichever is less. Install ceiling mounted devices when shown.
- J. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- K. Pull Stations: Mount top of unit at 48 inches above finished floor.
- L. Furnish and install additional power sub-panels as required to obtain power to new "NAC" panels. Two breakers from one existing 120/208 volt emergency power panel shall be removed to accommodate the installation of a two pole, 50 amp breaker. The sub-panel and feeder shall be rated for 50 amp single phase, three wire with ground. Conduit shall be type EMT. Install two breakers sized to match existing removed and reconnect to existing branch circuit. Extend wiring as required. Install additional single pole 15 amp breakers to power new "NAC" panels. Install lock-out device on breakers serving "NAC" panels. Install card directory. Panel shall be U.L. listed, equivalent to Square-D NQOD System. All bussing shall be copper. All breakers shall be "QOB" style.
- M. All "NAC" panels being remotely located shall be protected with a smoke detector. Mount detector above all panel locations and connect to system.
- N. If the contractor is unable to maintain an active fire alarm system during times of construction, a certified Fire Watchman (approved by the Fire Department) shall be hired to guard the building. All costs shall be part of this contract. No additional costs will be incurred by the Owner. At no time shall the building be left unprotected/unsupervised. String up temporary detectors throughout the building for protection as required. Remove once new system is operational.
- 3.2 WIRING INSTALLATION
- A. All wiring to be PLENUM RATED, FIRE PROTECTION LISTED.
- B. Install wiring according to the following:

1. NECA 1.
 2. TIA/EIA 568-C.
- C. All junction boxes and conduit above ceilings to be painted red and labeled "FIRE ALARM" in black lettering. Identify circuiting information for both initiating and notification circuits. All conduit concealed in walls or above ceilings to be red in color.
- D. Wiring Method: Install wiring in metal raceway according to Division 26 Section "Raceways and Boxes for Electrical Systems."
1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
 2. Fire alarm wiring may be installed exposed above accessible ceilings. All exposed wiring in unfinished areas to be installed in raceway up to ceiling structure for protection. All wiring installed exposed in finished areas will be installed in ivory metallic wiremold raceway. All raceways shall be stubbed out to above accessible ceilings. All exposed wiring above accessible ceilings shall be supported with J-hooks. All raceways stubs shall be provided with end bushing/fittings. All wiring installed above non-accessible ceilings shall be installed in conduit. All cabling subject to damage (i.e., receiving rooms, mechanical rooms, boiler rooms, etc.) shall be installed in raceway. Type to be selected by Owner/Engineer.
 3. No cabling shall be fastened to bar joists, electrical conduits, other system piping or raceway, ceiling system supports, etc. Utilize independent J-hooks and hangers.
 4. **Do not install conduit or cabling above top chord of bar joists or within 6 inches of roof deck so as to prevent damage from roofing nails.**
- E. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- F. Cable Taps: Use numbered terminal strips in cabinets or equipment enclosures where circuit connections are made. No cable taps will be allowed in junction boxes above ceiling.
- G. Color-Coding: Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Match Owner's existing color scheme.
- H. All fire alarm terminal and junction locations shall be identified in accordance with NFPA 70, Section 760-3 and the latest edition of the National Electrical Code. All junction and terminal boxes shall be painted red and stenciled "Fire Alarm." This

requirement is to prevent unintentional interference with the signaling circuits during testing, servicing and additional modifications to the system.

- I. Install new fire alarm zone maps (in plexi-glass frame with metallic frame boarder) showing new devices and "NAC" panels at both control and annunciator panel locations. Refer to drawings for additional information. Provide copy, including electronic copy, to Fire Department.
- J. Remove and replace ceiling systems as required for installation of work. Replace all damaged ceiling materials with type to match existing ceiling without any additional cost to the Owner.
- K. Where ceiling devices are removed and openings are abandoned, install blank coverplate and replace ceiling tile to match surrounding area.
- L. Where wall devices are removed and openings are abandoned, install blank finished coverplate. Furnish and install oversized coverplates as required to obtain a finished look. Paint out to match surrounding area.
- M. When raceway and devices are removed and leave existing walls and ceilings marked by absence of materials, existing walls and ceilings shall be patched and painted to match surrounding areas.

3.3 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements. Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are UL/FM listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated air-conditioning duct systems.
 - 2. Supervisory connections at valve supervisory switches.
 - 3. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems." Provide identification labels on all cabling entering all panels and junction boxes.
- B. Install framed instructions in a location visible from fire-alarm control unit.

- C. Paint power-supply disconnect switch red and label "FIRE ALARM."
- D. Program all addressable initiating devices with their true building location. Utilize Owner's final building room name and number plan. Do not use electrical drawing room labeling unless authorized by the Owner and verified by the Architect. Contractor shall bear all costs associated with walking each room/area for verification of actual room numbers prior to programming, no exceptions. Label all devices with their addressable identification and circuit numbering scheme. Use P-Touch label maker. Do not use markers.
- E. Inspection Bar Codes (match existing system):
 - 1. Inspection bar codes shall be installed on all initiating devices, annunciators, control panels and power supplies. These bar codes shall support future testing and archiving of the test via Owner's existing reporting system.
 - 2. Inspection bar codes used by the system must utilize Code 3 of 9 or other approved format, and contain a minimum of eight (8) digits that comprise a unique serial identifier within the Web-based Reporting System. There shall be no duplication of serial numbers. Serial number shall be printed below the bar code for identification purposes.
 - 3. Inspection bar codes shall be limited in size to no more than 2 inches in width, and 3/8 inch, in height and shall include a Mylar® or other protective coating to protect the bar code from fading due to sunlight or exposure.
 - 4. Inspection bar codes shall be installed on each device in such a manner as to require that scanning of the bar code take place no further than 12 inches from the device during inspection.

3.5 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100.

3.6 FIELD QUALITY CONTROL (*GENERAL*)

- A. Field tests shall be conducted by manufacturer's service representative and witnessed by the Owner, Engineer and authorities having jurisdiction (Fire Department). Notify local authorities having jurisdiction (AHJ), Owner and Engineer one (1) week in advance of inspection and testing, in writing with copies to Architect's/Engineer's office. Coordinate with owner in advance of scheduling with AHJ.
- B. Two (2) tests shall be required to be performed by the fire alarm manufacturer's representative/technician:
 - 1. First Test to be performed by contractor to ensure system is operating correctly.
 - 2. Second test to be performed with Owner, Engineer and Fire Department/County Inspector.

- C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- D. Tests and Inspections:
 - 1. Intelligibility testing (refer to Paragraph 3.8 for scope of this work).
 - 2. Certify compliance with test parameters. All tests shall be conducted under the direct supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.
 - a. Devices that are outside their marked sensitivity range shall be replaced.
 - 3. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
 - b. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - c. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 4. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 5. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4. Modify and adjust audible taps to meet room needs.
 - 6. Test audible appliances for the private operating mode according to manufacturer's written instructions. Modify and adjust audible taps to meet room needs.
 - 7. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 8. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
- E. Testing General:
 - 1. All Alarm Initiating Devices shall be observed and logged for correct zone and sensitivity. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the initials of the installing technician and date.

2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.
 3. The acceptance inspector shall be notified before the start of the required tests. All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector shall be corrected.
 4. Test reports shall be delivered to the acceptance inspector as completed.
 5. All test equipment, instruments, tools and labor required to conduct the system tests shall be made available by the installing contractor. The following equipment shall be a minimum for conducting the tests:
 - a. Ladders and scaffolds as required to access all installed equipment.
 - b. Multi-meter for reading voltage, current and resistance.
 - c. Two-way radios and flashlights.
 - d. A manufacturer recommended device for measuring air flow through air duct smoke detector sampling assemblies.
 - e. Decibel meter, complying with Type 2 Requirements in ANSI S1.4.
 - f. In addition to the testing specified to be performed by the installing contractor, the installation shall be subject to test by the acceptance inspector.
- F. After tests have been completed, obtain written certification from Fire Department and include in As-Built/O&M Documentation.
- G. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- H. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- I. Prepare test and inspection reports.
1. Upon completion of installation of fire alarm equipment, electrical contractor and fire alarm contractor shall provide to the engineer a signed, written statement substantially in the form as follows:
"The undersigned having been engaged as the electrical contractor and fire alarm contractor on the College of DuPage building confirms that the fire alarm equipment was installed in accordance with wiring diagrams, instruction and directions provided to us by the manufacturer and authorities having jurisdiction, and system as installed complies with local codes and NFPA codes."
- J. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- 3.7 ACCEPTANCE TESTING (*ADDITIONAL INFORMATION/PROCEDURES*)
- A. A written acceptance test procedure (ATP) for testing the fire alarm system components and installation will be prepared by the engineer in accordance with NFPA 72 and this specification. The contractor shall be responsible for the

performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.

- B. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.
- C. The installing contractor prior to the ATP shall prepare a complete listing of all device labels for alphanumeric annunciator displays.
- D. Loop Resistance Tests: Measure and record the resistance of each circuit with each pair of conductors in the circuit short-circuited at the farthest point from the circuit origin. The tests shall be witnessed by the owner and test results recorded for use at the final acceptance test.
- E. Preliminary Testing: Conduct preliminary tests and intelligibility tests to ensure that all devices and circuits are functioning properly. After preliminary testing is complete, provide a letter certifying that the installation is complete and fully operable. The letter shall state that each initiating and indicating device was tested in place and functioned properly. The letter shall also state that all panel functions were tested and operated properly. The Contractor and an authorized representative from each supplier of equipment shall be in attendance at the preliminary testing to make necessary adjustments.
- F. Final Acceptance Test: Notify the owner in writing when the system is ready for final acceptance testing. Submit request for test at least 14 calendar days prior to the test date. A final acceptance test will not be scheduled until meggar test results, the loop resistance test results, and the submittals required in Part 1 are provided to the owner. Test the system in accordance with the procedures outlined in NFPA 72.
 - 1. Verify that the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.
 - 2. Test each initiating and indicating device (public operating mode) and circuit for proper operation and response. Disconnect the confirmation feature for smoke detectors during tests to minimize the amount of smoke or test gas needed to activate the detector.
 - 3. Test the system for all specified functions in accordance with the contract drawings and specifications and the manufacturer's operating and maintenance manual.
 - 4. Visually inspect all wiring.
 - 5. Verify that all software control and data files have been entered or programmed into the FACP.
 - 6. Verify that Shop Drawings reflecting as-built conditions are accurate.
 - 7. Measure the current in circuits to assure that there is the calculated spare capacity for the circuits.
 - 8. Measure voltage readings for circuits to assure that voltage drop is not excessive.
 - 9. Measure the voltage drop at the most remote appliance on each notification appliance circuit.

- G. The acceptance inspector shall use the system record drawings in combination with the documents specified in this specification during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or all input and output functions. The items tested shall include but not be limited to the following:
1. System wiring shall be tested to demonstrate correct system response and correct subsequent system operation in the event of:
 - a. Open, shorted and grounded signal line circuits.
 - b. Open, shorted and grounded notification, releasing circuits.
 - c. Primary power or battery disconnected.
 2. System notification appliances shall be demonstrated as follows:
 - a. All alarm notification appliances actuate as programmed.
 - b. Audibility and visibility at required levels.
 3. System indications shall be demonstrated as follows:
 - a. Correct message display for each alarm input at the control display.
 - b. Correct annunciator light for each alarm input at each annunciator and graphic display as shown on the drawings.
 - c. Correct history logging for all system activity.
 4. System off-site reporting functions shall be demonstrated as follows:
 - a. Correct zone transmitted for each alarm input
 - b. Trouble signals received for disconnect
 5. Secondary power capabilities shall be demonstrated as follows:
 - a. System primary power shall be disconnected for a period of time as specified herein. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period as specified.
 - b. System primary power shall be restored for forty-eight hours and system-charging current shall be normal trickle charge for a fully charged battery bank.
 - c. System battery voltages and charging currents shall be checked at the fire alarm control panel.

3.8 INTELLIGIBILITY TESTING AND ACOUSTUIC ADJUSTMENT

- A. Installing Contractor and Fire Alarm Distributor Shall include in their bid all costs to provide two (2) full Intelligibility Tests of all Acoustically Distinguishable Spaces (ADS). Such tests shall be made and witnessed in the presence of the Owner and/or their designated representative.
- B. Intelligibility testing of the System shall be accomplished in accordance with NFPA 72 for Voice Evacuation Systems, IEC 60268-16, and ASA S3.2.

1. Following are the specific requirements for intelligibility tests:
 - a. Intelligibility Requirements: Verify intelligibility by measurement after installation.
 - b. Ensure that a CIS value greater than the required minimum value is provided in each area where building occupants typically could be found. The minimum required value for CIS is 0.65.
 - c. Areas of the building provided with hard wall and ceiling surfaces (such as metal or concrete) that are found to cause excessive sound reflections may be permitted to have a CIS score less than the minimum required value if approved by the AHJ installation, and if building occupants in these areas can determine that a voice signal is being broadcast and they must walk no more than 33 feet to find a location with at least the minimum required CIS value within the same area.
 - d. Areas of the building where occupants are not expected to be normally present are permitted to have a CIS score less than the minimum required value if personnel can determine that a voice signal is being broadcast and they must walk no more than 50 feet to a location with at least the minimum required CIS value within the same area.
 - e. Take measurements near the head level applicable for most personnel in the space under normal conditions (e.g., standing, sitting, sleeping, as appropriate).
 - f. The distance the occupant must walk to the location meeting the minimum required CIS value shall be measured on the floor or other walking surface as follows:
 - 1) Along the centerline of the natural path of travel, starting from any point subject to occupancy with less than the minimum required CIS value.
 - 2) Curving around any corners or obstructions, with a 12 inches clearance there from.
 - 3) Terminating directly below the location where the minimum required CIS value has been obtained.
 2. Use commercially available test instrumentation to measure intelligibility as specified by ISO 7240-19 and ISO 7240-16 as applicable. Use the mean value of at least three readings to compute the intelligibility score at each test location.
 3. Record all intelligibility readings for the ADS in the web-based bar code inspection and testing software and affix barcode to the nearest audible notification appliance closest to the entrance or exit from the ADS.
- C. Upon completion of fire alarm system installation, the contractor shall perform an audibility level check in all occupied spaces. Adjust all speakers to assure sound levels meet code:
1. 15 dB above average ambient sound levels or 5 dB above maximum ambient sound level (whichever is greater).

- D. Provide a preliminary report to the Owner and Owner's Representative for review. Include time for a review meeting to discuss the results and any areas for adjustments.
- E. Provide one (1) full speaker tap setting adjustment to each notification appliance within the entire audible notification appliance network. Adjust speaker wattage tap settings up or down based upon the direction provided by the Owner's Representative. Do not adjust speaker tap settings for speakers or areas which are not determined to need adjustment.
- F. Provide a second full Intelligibility Test and Final Intelligibility Report to the Owner and Owner's Representative for approval.

3.9 DOCUMENTATION (6 SETS REQUIRED)

- A. System documentation shall be furnished to the owner and shall include but not be limited to the following:
 - 1. System record drawings and wiring details including SIX (6) sets of drawings, and a DVD or Memory Stick with copies of the record drawings in DXF format for use in a CAD drafting program, and in "PDF" format.
 - 2. System operation, installation and maintenance manuals.
 - 3. System matrix showing interaction of all input signals with output commands.
 - 4. Documentation of system voltage, current and resistance readings taken during the installation, testing and ATP phases of the system installation.
 - 5. System program showing system functions, controls and labeling of equipment and devices.

3.10 ADJUSTING (FOR DEVICES INSTALLED)

- A. Occupancy Adjustments: When requested within 11 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.
- B. Annual Test and Inspection: Eleven months after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, semiannual, and annual periods. Use forms developed for initial tests and inspections. Repair/replace all defective parts at no additional cost to the Owner. Contractor shall schedule this with Owner at the ten month point after substantial completion. If this procedure is not done and the warranty has expired, the contractor/manufacturer will be liable for all defective parts after the warranty expiration period for an indefinite period of time.

3.11 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Refer to Division 01 Sections.
- B. The manufacturer's representative shall provide system training for up to four people as selected by the Owner. Training manuals will be provided for each person. The session will last at least two (2) hours and be video recorded (at Owner's discretion) for the Owner's future use. Contact the Owner at least two weeks prior to training for proper scheduling of the event. The contractor will provide to the Owner a typed outline of the events at the training session and a list of who attended.
- C. Training video to be saved to DVD compatible with Owner's PC/DVD player. Coordinate exact format with Owner.

END OF SECTION

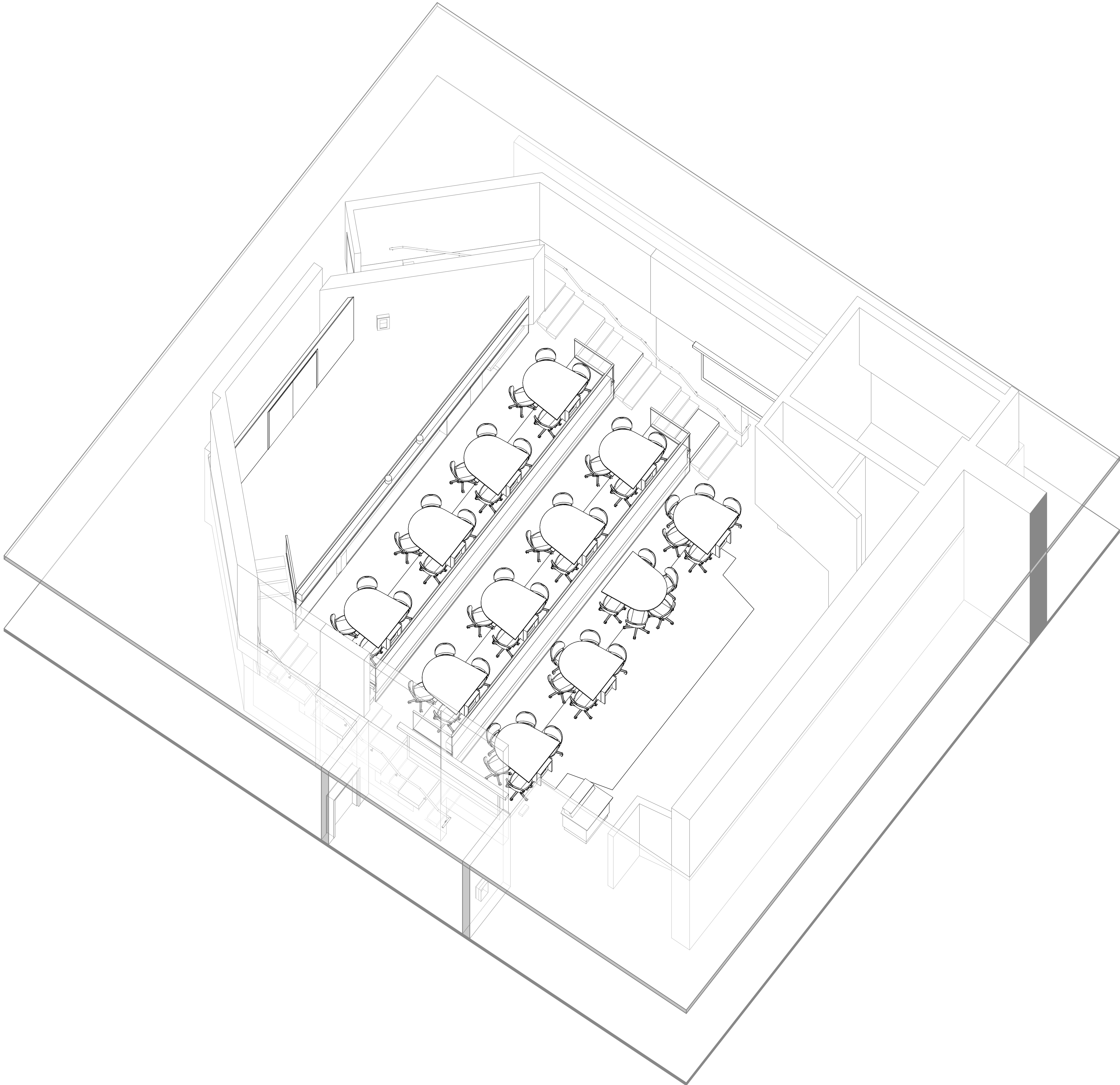
EXHIBIT B – SPECIFICATION DRAWINGS

MAC ROOM 153 RENOVATION

COLLEGE OF DUPAGE

425 FAWELL BLVD.
GLEN ELLYN, IL 60137

OWNER	ARCHITECT	MEPFP	STRUCTURE
COLLEGE OF DUPAGE 425 FAWELL BOULEVARD GLEN ELLYN, IL 60137 630.942.4046 (TEL) CONTACT: DON INMAN INMAND86@COD.EDU	PERKINS + WILL 410 N. MICHIGAN AVENUE, SUITE 1600 CHICAGO, IL 60611 312.755.0770 (TEL) 312.755.0775 (FAX) CONTACT: RICK YOUNG rick.young@perkinswill.com	MECHANICAL SERVICES ASSOCIATES CORP. 111 S. VIRGINIA STREET CRYSTAL LAKE, IL 60014 815.788.8901 (TEL) 815.788.8900 (FAX) CONTACT: ROBERT LARSEN RLARSEN@MSA-CE.COM	C.E. ANDERSON & ASSOCIATES 175 NORTH FRANKLIN STREET SUITE 410 CHICAGO IL 60606 312.750.1701 (TEL) 312.750.1704 (FAX) CONTACT: JUDY A. BRADY, S.E., R.A. JBRADY@CEA-SE.COM



DRAWING INDEX		
SHEET NUMBER	SHEET NAME	
	ISSUE FOR BID & PERMIT	
01-GENERAL		
G00-00	COVER SHEET	•
G01-01	CODE COMPLIANCE PLAN OVERALL	•
03-STRUCTURE		
S1.0	PARTIAL PLANS	•
04-ARCHITECTURAL		
A00-01	REFERENCE SHEET	•
A04-01	DEMOLITION FLOOR PLAN	•
A05-01	DEMOLITION REFLECTED CEILING PLAN	•
A11-01	OVERALL FLOOR PLANS	•
A12-01	REFLECTED CEILING PLAN	•
A15-01	FURNITURE PLAN & FINISH SCHEDULE	•
A44-01	INTERIOR SECTION & SECTION DETAILS	•
A44-02	INTERIOR ELEVATIONS	•
A61-01	INTERIOR DETAILS & PARTITION TYPES, DOOR SCHEDULE & DETAILS	•
06-ELECTRICAL		
E00-01	ELECTRICAL NOTES AND DETAILS	•
E00-02	FIRE ALARM SYSTEM NOTES AND DETAILS	•
E00-03	TECHNOLOGY SYSTEMS NOTES AND DETAILS	•
E04-01	FIRST FLOOR ELECTRICAL DEMOLITION PLANS	•
E11-01	FIRST FLOOR ELECTRICAL PLANS	•
E11-02	FIRST FLOOR PLAN - ELECTRICAL	•
07-MECHANICAL		
MFP11-01	FIRST & SECOND FLOOR MECHANICAL & FIRE PROTECTION	•

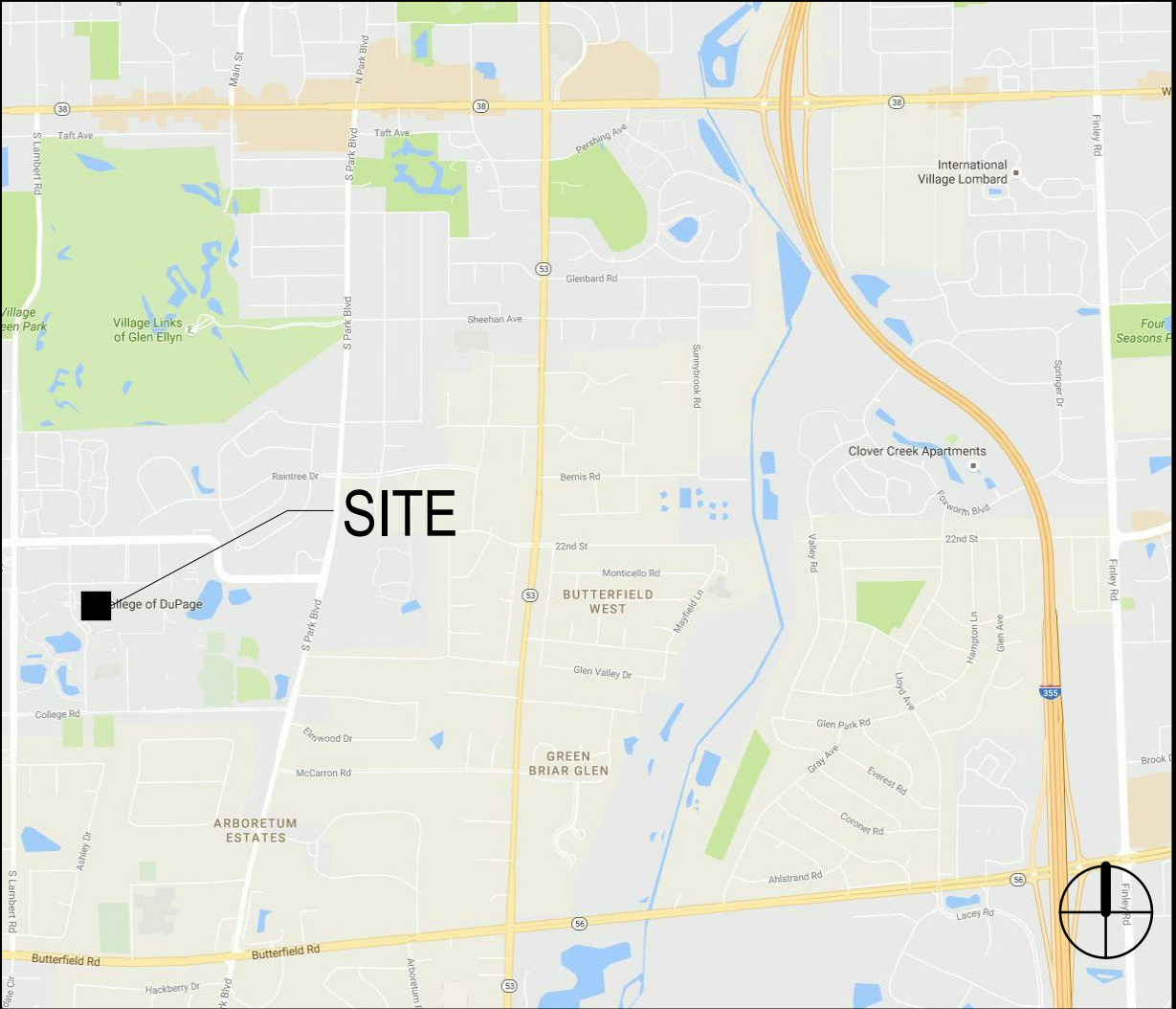
PROJECT DATA

- **PROJECT DESCRIPTION:**
INTERIOR RENOVATION OF APPROX. 1,211 SF ON LEVEL 1/2 OF AN EXISTING EDUCATIONAL BUILDING.
- **JURISDICTION:** GLEN ELLYN, IL
- **OCCUPANCY CLASSIFICATION:**
IBC: 2009 GROUP BUSINESS-B
- **CONSTRUCTION TYPE:**
TYPE 1B, FULLY SPRINKLERED
- **REQUIRED CODES:**
ICC 2009 INTERNATIONAL BUILDING CODE
ICC 2009 INTERNATIONAL RESIDENTIAL CODE
ICC 2009 INTERNATIONAL FIRE CODE
ICC 2009 INTERNATIONAL MECHANICAL CODE
ICC 2009 INTERNATIONAL PROPERTY MAINTENANCE CODE
ICC 2009 INTERNATIONAL FUEL GAS CODE
IECC 2015
NEC 2011 NATIONAL ELECTRICAL CODE
DUPAGE COUNTY COUNTYWIDE STORMWATER FLOODPLAIN ORDINANCE, 2013
ILLINOIS STATE PLUMBING CODE, 2004 (SUPERCEDED BY ILLINOIS STATE PLUMBING CODE, 2014)
ILLINOIS, NFPA 101 LIFE SAFETY CODE, 2009

SITE MAP



VICINITY MAP



BLDG CODE STATEMENT OF COMPLIANCE

I CERTIFY THAT THESE ARCHITECTURAL DOCUMENTS DESCRIBED WITHIN WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION, AND TO THE BEST OF MY KNOWLEDGE, CONFORM TO ALL APPLICABLE CODES AND REGULATIONS OF DUPAGE COUNTY AND THE STATE OF ILLINOIS; AND THAT I AM A DULY REGISTERED ARCHITECT UNDER THE LAWS OF THE STATE OF ILLINOIS.

NAME: _____
SIGNED _____ DATE _____
ARCHITECT'S ILLINOIS LICENSE NUMBER: _____

ADA / IAC COMPLIANCE

I HAVE PREPARED, OR CAUSED TO BE PREPARED UNDER MY DIRECT SUPERVISION, THE ATTACHED PLANS AND SPECIFICATIONS AND STATE THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND TO THE EXTENT OF MY CONTRACTUAL OBLIGATION, THEY ARE IN COMPLIANCE WITH THE ENVIRONMENTAL BARRIERS ACT (410 ILCS 25) AND THE ILLINOIS ACCESSIBILITY CODE (71 ILL ADM. CODE 400).

NAME: _____
SIGNED _____ DATE _____
ARCHITECT'S ILLINOIS LICENSE NUMBER: _____

PERKINS
+ WILL

The Wrigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
312.755.0770
312.755.0775
www.perkinswill.com

GENERAL CONTRACTOR

STRUCTURAL ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MEP ENGINEERING
MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014
MECHANICAL SERVICES ASSOCIATES
CORP.

NOTE: DOCUMENTS ARE
INCOMPLETE AND MAY NOT BE
USED FOR REGULATORY
APPROVAL, PERMITTING, OR
CONSTRUCTION PURPOSES.

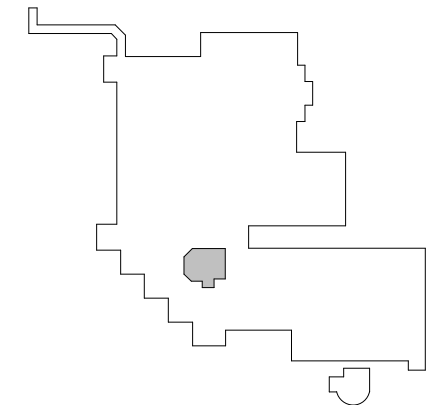
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

1	ISSUE FOR BID & PERMIT	03/07/2018
2	DATE	
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	
TITLE		

COVER SHEET

SHEET NUMBER

G00-00

Copyright © 2018 Perkins+Will

NOTE: DOCUMENTS ARE
INCOMPLETE AND MAY NOT BE
USED FOR REGULATORY
APPROVAL, PERMITTING, OR
CONSTRUCTION PURPOSES.

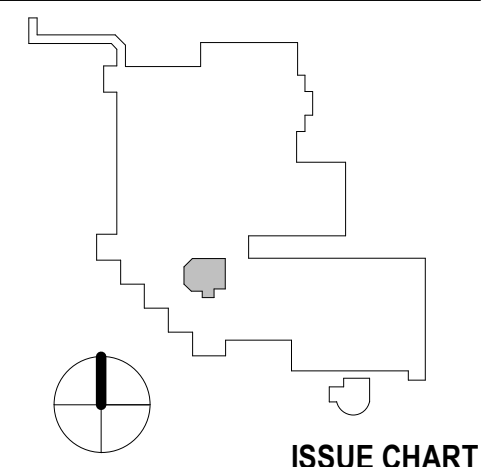
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



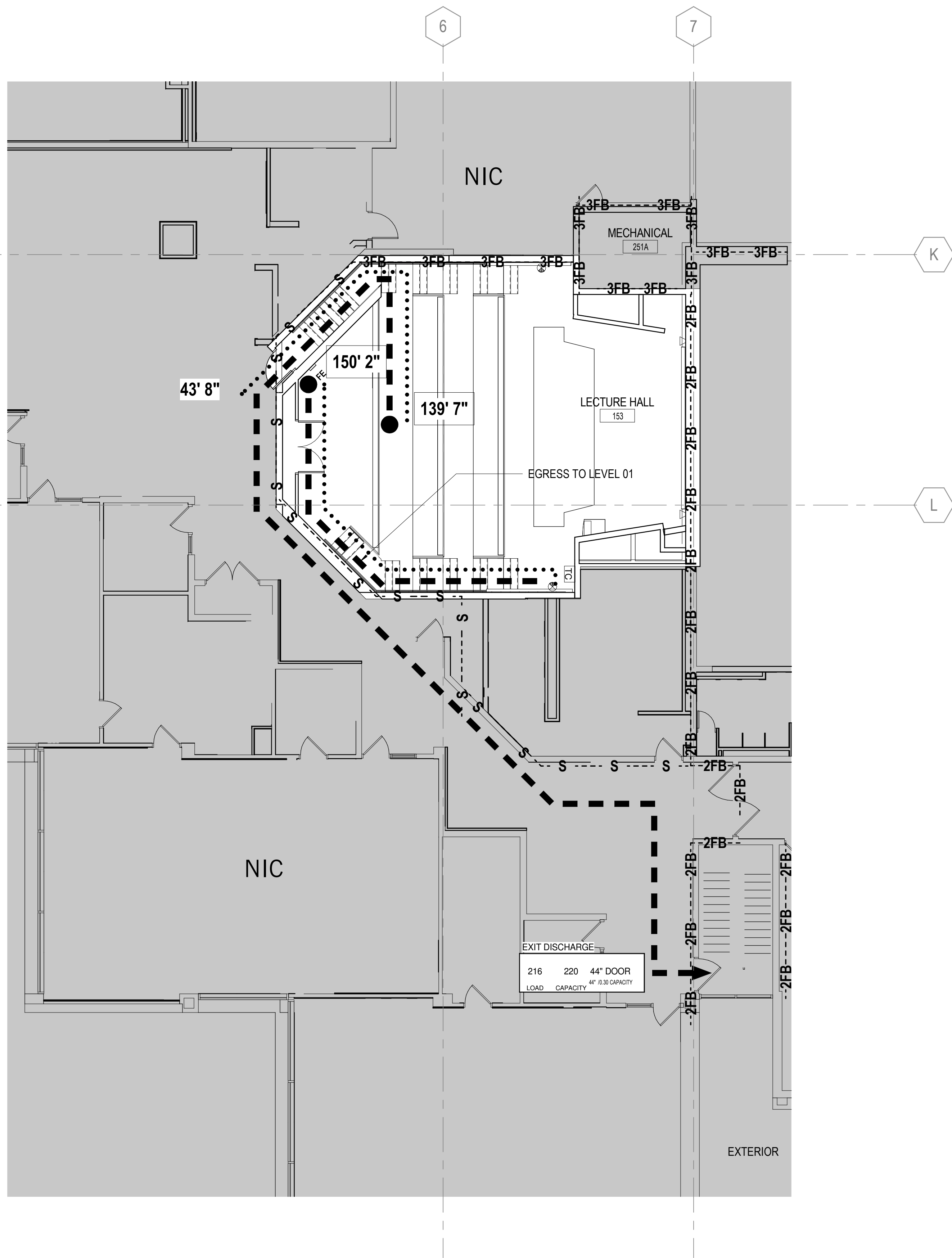
ISSUE CHART

1	ISSUE FOR BID & PERMIT	03/07/2018
2	REVISION	DATE
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	
TITLE		

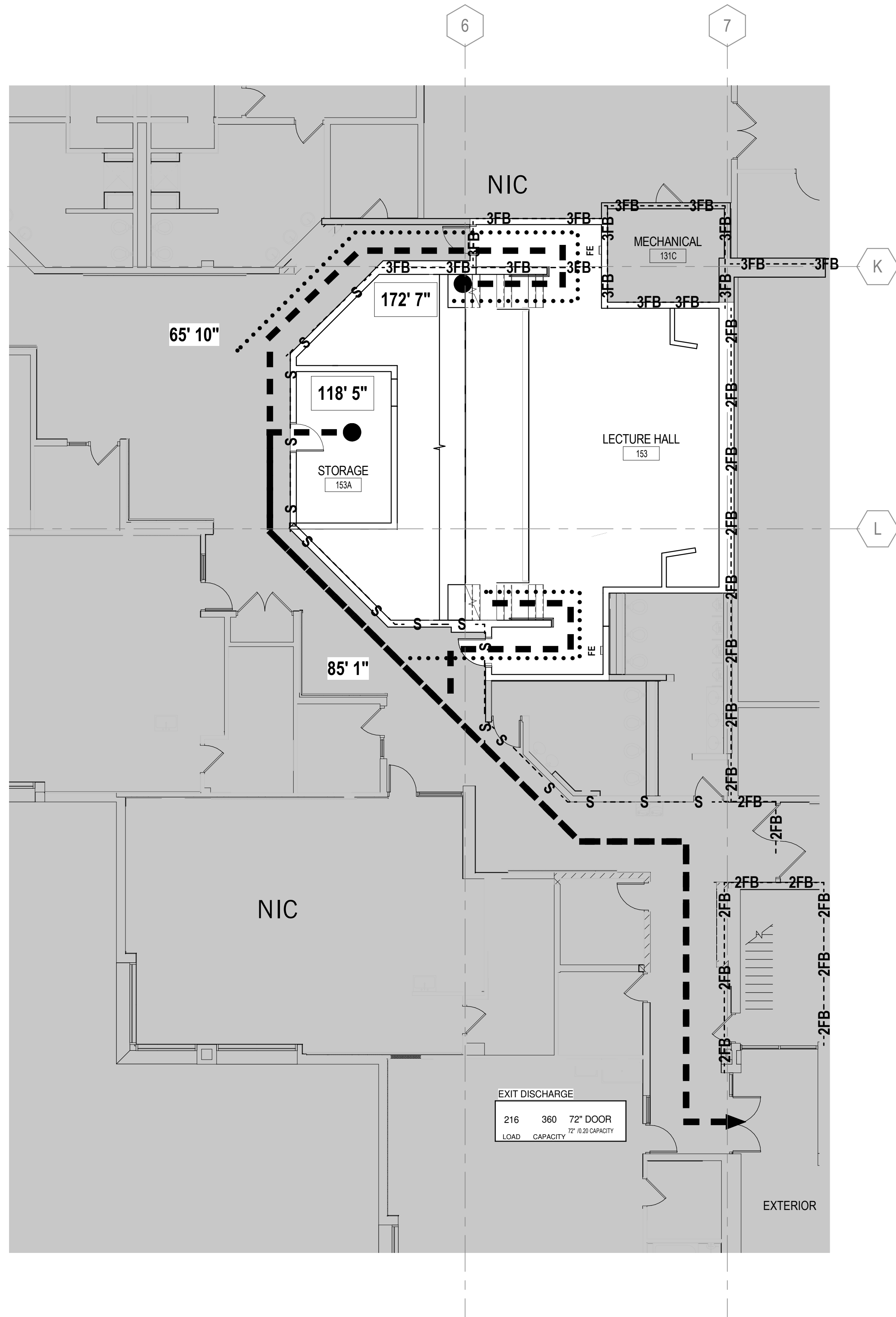
CODE COMPLIANCE
PLAN OVERALL

SHEET NUMBER

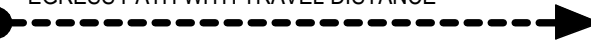
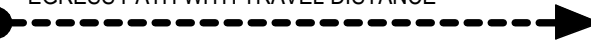
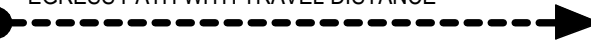
G01-01



2 LEVEL 02 CODE COMPLIANCE
1/8" = 1'-0"



1 LEVEL 01 CODE COMPLIANCE
1/8" = 1'-0"

ACCESSIBILITY NOTES	CODE ANALYSIS	LIFE SAFETY PLAN LEGEND																																								
1. PROJECT WILL COMPLY WITH IAC/ICC/ANSI. 2. PROJECT WILL COMPLY WITH ALL IAC 400.310, (PUBLIC FACILITIES), REQUIREMENTS UNDER IAC 400.320 (P), (TENANT WORK). THE AMOUNT AND EXTENT OF THE ALTERATIONS THAT ARE TO BE ACCESSIBLE PER IAC 400.310 SHALL FULLY COMPLY WITH IAC 400.310. 3. PROJECT WILL COMPLY WITH ALL FEDERAL REQUIREMENTS UNDER 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN, PUBLIC ACCOMMODATIONS AND COMMERCIAL FACILITIES, TITLE III. 4. PATH OF TRAVEL: PROJECT HAS A FULLY ACCESSIBLE ENTRY AT THE GROUND FLOOR. PROJECT HAS A FULLY ACCESSIBLE ROUTE FROM THE MAIN ENTRY TO THE ELEVATOR LOBBY. PROJECT HAS A FULLY ACCESSIBLE ELEVATOR LEADING TO THE FLOOR BEING ALTERED. 5. TOILET FACILITIES: PROJECT HAS A FULLY ACCESSIBLE MEN'S AND WOMEN'S TOILET ROOMS OR A SINGLE USER TOILET ROOM ON THE FLOOR BEING ALTERED. 6. DRINKING FOUNTAINS: PROJECT HAS AN ACCESSIBLE HI-LO DRINKING FOUNTAIN ON THE FLOOR BEING ALTERED. 7. OPERATING CONTROLS ALL CONTROLS AND OPERATING MECHANISMS TO BE WITHIN REACH RANGE PER IAC/ICC/ANSI. FORWARD/FRONT APPROACH AND SIDE/PARALLEL APPROACH REACH RANGE FOR ALL CONTROLS AND OPERATING MECHANISM TO BE 15" TO 48".	<table><tr><th colspan="2">CODE ANALYSIS</th></tr><tr><td colspan="2">SCOPE OF WORK</td></tr><tr><td colspan="2">ALTERATION TO EXISTING INTERIOR BUILD-OUT ON THE 1st/2nd FLOOR. NO CHANGE OF OCCUPANCY, THE AREA REMAINS B-BUSINESS.</td></tr><tr><td>AREA OF WORK</td><td>1,211 SF</td></tr><tr><td>OCCUPANCY TYPE</td><td>B - BUSINESS, A3 ACCESSORY</td></tr><tr><td>CONSTRUCTION TYPE</td><td>TYPE 1B EXISTING / FULLY SPRINKLERED</td></tr><tr><td colspan="2">EXIT REQUIREMENTS</td></tr><tr><td>TRAVEL DISTANCE TO EXIT</td><td>MAXIMUM ALLOWABLE = 250' ACTUAL MAXIMUM = 172' 7"</td></tr><tr><td>DEAD END CORRIDOR</td><td>MAXIMUM ALLOWABLE = 50' ACTUAL = 0'</td></tr><tr><td>COMMON PATH OF TRAVEL</td><td>MAXIMUM ALLOWABLE = 100' ACTUAL = 85'-1"</td></tr></table>	CODE ANALYSIS		SCOPE OF WORK		ALTERATION TO EXISTING INTERIOR BUILD-OUT ON THE 1st/2nd FLOOR. NO CHANGE OF OCCUPANCY, THE AREA REMAINS B-BUSINESS.		AREA OF WORK	1,211 SF	OCCUPANCY TYPE	B - BUSINESS, A3 ACCESSORY	CONSTRUCTION TYPE	TYPE 1B EXISTING / FULLY SPRINKLERED	EXIT REQUIREMENTS		TRAVEL DISTANCE TO EXIT	MAXIMUM ALLOWABLE = 250' ACTUAL MAXIMUM = 172' 7"	DEAD END CORRIDOR	MAXIMUM ALLOWABLE = 50' ACTUAL = 0'	COMMON PATH OF TRAVEL	MAXIMUM ALLOWABLE = 100' ACTUAL = 85'-1"	<table><tr><td></td><td>DENOTES AREA "NOT IN CONTRACT"</td></tr><tr><td></td><td>EXISTING NON-FIRE-RATED CONSTRUCTION TO REMAIN</td></tr><tr><td></td><td>NEW PARTITION</td></tr><tr><td>- S -</td><td>WALLS WITH EXISTING SMOKE DAMPERS, PROVIDE SMOKE DAMPERS FOR NEW DUCT WORK, WALLS EXISTING TO REMAIN</td></tr><tr><td>- 2FB -</td><td>2 HOUR FIRE BARRIER, EXISTING TO REMAIN</td></tr><tr><td>- 3FB -</td><td>3 HOUR FIRE BARRIER, EXISTING TO REMAIN</td></tr><tr><td>XXX'-X" </td><td>EGRESS PATH WITH TRAVEL DISTANCE</td></tr><tr><td>-</td><td>COMMON PATH OF TRAVEL</td></tr><tr><td>-</td><td>XXX'-X"</td></tr><tr><td>FE</td><td>FIRE EXTINGUISHER</td></tr></table>		DENOTES AREA "NOT IN CONTRACT"		EXISTING NON-FIRE-RATED CONSTRUCTION TO REMAIN		NEW PARTITION	- S -	WALLS WITH EXISTING SMOKE DAMPERS, PROVIDE SMOKE DAMPERS FOR NEW DUCT WORK, WALLS EXISTING TO REMAIN	- 2FB -	2 HOUR FIRE BARRIER, EXISTING TO REMAIN	- 3FB -	3 HOUR FIRE BARRIER, EXISTING TO REMAIN	XXX'-X" 	EGRESS PATH WITH TRAVEL DISTANCE	-	COMMON PATH OF TRAVEL	-	XXX'-X"	FE	FIRE EXTINGUISHER
CODE ANALYSIS																																										
SCOPE OF WORK																																										
ALTERATION TO EXISTING INTERIOR BUILD-OUT ON THE 1st/2nd FLOOR. NO CHANGE OF OCCUPANCY, THE AREA REMAINS B-BUSINESS.																																										
AREA OF WORK	1,211 SF																																									
OCCUPANCY TYPE	B - BUSINESS, A3 ACCESSORY																																									
CONSTRUCTION TYPE	TYPE 1B EXISTING / FULLY SPRINKLERED																																									
EXIT REQUIREMENTS																																										
TRAVEL DISTANCE TO EXIT	MAXIMUM ALLOWABLE = 250' ACTUAL MAXIMUM = 172' 7"																																									
DEAD END CORRIDOR	MAXIMUM ALLOWABLE = 50' ACTUAL = 0'																																									
COMMON PATH OF TRAVEL	MAXIMUM ALLOWABLE = 100' ACTUAL = 85'-1"																																									
	DENOTES AREA "NOT IN CONTRACT"																																									
	EXISTING NON-FIRE-RATED CONSTRUCTION TO REMAIN																																									
	NEW PARTITION																																									
- S -	WALLS WITH EXISTING SMOKE DAMPERS, PROVIDE SMOKE DAMPERS FOR NEW DUCT WORK, WALLS EXISTING TO REMAIN																																									
- 2FB -	2 HOUR FIRE BARRIER, EXISTING TO REMAIN																																									
- 3FB -	3 HOUR FIRE BARRIER, EXISTING TO REMAIN																																									
XXX'-X" 	EGRESS PATH WITH TRAVEL DISTANCE																																									
-	COMMON PATH OF TRAVEL																																									
-	XXX'-X"																																									
FE	FIRE EXTINGUISHER																																									
		<table><tr><th colspan="2">LIFE SAFETY NOTES</th></tr><tr><td colspan="2">1. ALL WORK IS TO BE IN ACCORDANCE WITH ALL CODES HAVING AUTHORITY OVER THIS PROJECT.</td></tr><tr><td colspan="2">2. FINAL LOCATIONS OF ALL LIFE SAFETY DEVICES AND FIXTURES ARE SUBJECT TO APPROVAL BY THE BUREAU OF THE FIRE PREVENTION.</td></tr></table>	LIFE SAFETY NOTES		1. ALL WORK IS TO BE IN ACCORDANCE WITH ALL CODES HAVING AUTHORITY OVER THIS PROJECT.		2. FINAL LOCATIONS OF ALL LIFE SAFETY DEVICES AND FIXTURES ARE SUBJECT TO APPROVAL BY THE BUREAU OF THE FIRE PREVENTION.																																			
LIFE SAFETY NOTES																																										
1. ALL WORK IS TO BE IN ACCORDANCE WITH ALL CODES HAVING AUTHORITY OVER THIS PROJECT.																																										
2. FINAL LOCATIONS OF ALL LIFE SAFETY DEVICES AND FIXTURES ARE SUBJECT TO APPROVAL BY THE BUREAU OF THE FIRE PREVENTION.																																										

GENERAL

GE.01 BEFORE SUBMITTING A PROPOSAL FOR THIS WORK, THE CONTRACTOR SHALL VISIT THE PREMISES AND ACQUAINT HIMSELF FULLY WITH THE EXISTING CONDITIONS. TEMPORARY CONSTRUCTION REQUIRED, QUANTITIES AND TYPES OF EQUIPMENT REQUIRED, ETC. HIS BID SHALL INCLUDE ALL SUMS REQUIRED TO DO THE WORK WITHIN THE EXISTING CONDITIONS. DISRUPTION OF NORMAL ACTIVITIES IN THE WORK AREA MUST BE KEPT TO A MINIMUM.

GE.02 THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONSTRUCTION, DIMENSIONS, MEMBER SIZES, AND ELEVATIONS FOR CONFORMANCE WITH THE DRAWINGS. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IMMEDIATELY.

GE.03 UNLESS NOTED OTHERWISE, DETAILS, SECTIONS, AND NOTES ON THE DRAWINGS ARE INTENDED TO BE TYPICAL FOR SIMILAR CONDITIONS.

GE.04 DIMENSIONS ON STRUCTURAL DRAWINGS ARE TO BE CHECKED AGAINST THE DRAWINGS OF OTHER DISCIPLINES, AND ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IMMEDIATELY.

GE.05 COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR LINTELS, METAL WALL FRAMING, SHELF ANGLES, SIZE AND LOCATION OF SLOPES, DEPRESSED AREAS, FINISH FILLS, CHAMFERS, GROOVES, SLEEVES, INSERTS, ETC.

GE.06 COORDINATE WITH MECHANICAL/ELECTRICAL PLUMBING DRAWINGS FOR DUCTWORK, PIPE SLEEVES, FLOOR DRAINS, INSERTS, HANGERS, TRENCHES, PITS, PADS, WALL AND SLAB OPENINGS, CONDUIT RUNS IN WALLS AND SLABS. SIZE AND LOCATION OF MACHINE OR EQUIPMENT SUPPORTS, BASES, ANCHOR BOLTS, ETC.

GE.07 SHOP DRAWINGS PREPARED BY THE CONTRACTOR AND/OR HIS SUPPLIERS SHALL BE REVIEWED BY THE ARCHITECT ONLY FOR CONFORMANCE WITH THE DESIGN INTENT. NO WORK SHALL BE STARTED WITHOUT SUCH REVIEW.

GE.08 SHOP DRAWINGS PREPARED BY SUPPLIERS AND SUBCONTRACTORS SHALL BE REVIEWED BY THE CONTRACTOR PRIOR TO SUBMISSION TO THE ARCHITECT.

GE.09 DESIGN LOADS, ALLOWABLE STRESSES AND STRUCTURAL CAPACITIES ARE BASED ON THE 2009 INTERNATIONAL BUILDING CODE. SEE DESIGN LOADS NOTES THIS SHEET.

SHORING AND BRACING

S8.01 INDIVIDUAL STRUCTURAL COMPONENTS ARE DESIGNED TO SUPPORT LOADS IN THEIR FINAL ERECTED POSITION AS PART OF THE TOTAL COMPLETED STRUCTURE. PROVIDE TEMPORARY SHORING, GUYING AND BRACING AS REQUIRED UNTIL ALL CONSTRUCTION AFFECTING LOAD CARRYING MEMBERS AND LATERAL STABILITY IS COMPLETED.

S8.02 CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR STABILITY OF STRUCTURE, ITS PARTS, AND JOB SITE SAFETY BY USE OF GUYING, BRACING, SHORING, BARRICADES, SAFETY RAILINGS AND DEVICES DURING THE ENTIRE PERIOD OF CONSTRUCTION.

S8.03 CONTRACTOR IS FULLY RESPONSIBLE FOR PROVIDING ALL TEMPORARY SHORING AND BRACING OF EXISTING ELEMENTS DURING CONSTRUCTION. ALL SHORING SHALL BE ADEQUATE TO SUPPORT ALL LOADINGS DURING MODIFICATION OF THE EXISTING BUILDING AND ERECTION OF THE NEW STRUCTURAL SUPPORT SYSTEM. TEMPORARY SHORING MUST REMAIN IN PLACE UNTIL ALL NEW STRUCTURAL MEMBERS SUPPORTING ELEMENTS ARE IN PLACE AND ALL NEW CONNECTIONS COMPLETED.

DESIGN LOADS

DL.01 THIS STRUCTURE HAS BEEN DESIGNED FOR THE FOLLOWING LOADS:

LIVE LOADS: CLASSROOM 50 PSF

HANDRAILS SHALL BE DESIGNED FOR A SIMULTANEOUS VERTICAL AND HORIZONTAL THRUST OF 50 PLF APPLIED AT THE TOP OF THE RAILING OR A CONCENTRATED LOAD OF 200 # IN ANY DIRECTION, WHICHEVER PRODUCES THE GREATEST STRESS.

CONCRETE AND FORMWORK

CO.01 ALL CONCRETE WORK SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING AMERICAN CONCRETE INSTITUTE PUBLICATIONS:

ACI 301 ACI 304 ACI 311
ACI 315 ACI 318 ACI 347

CO.02 SEE ARCHITECTURAL DRAWINGS FOR TYPE AND LOCATION OF ALL ARCHITECTURAL FINISHES, FLOOR FINISHES, AND FLOOR DEPRESSIONS.

CO.03 CONCRETE SHALL DEVELOP MINIMUM 28-DAY STRENGTH AS FOLLOWS:

SLABS: NMWT (145 PCF).....fc = 4,000 PSI

CO.04 NO CALCIUM CHLORIDE OR CHLORIDE-ION PRODUCING ADMIXTURE SHALL BE USED IN ANY CONCRETE.

CO.05 FORMWORK FOR ALL CONCRETE WHICH WILL BE EXPOSED IN THE COMPLETED BUILDING SHALL BE CONSTRUCTED FROM A SUITABLE PLASTIC SURFACED PLYWOOD WHICH WILL PRODUCE AN ACCEPTABLY SMOOTH SURFACE.

CO.06 EXPOSED EXTERNAL CONCRETE CORNERS SHALL BE CHAMFERED 3/4", UNLESS NOTED OTHERWISE.

CO.07 INTERIOR SLABS ON GRADE THICKNESSES AND REINFORCEMENT SHALL BE AS SHOWN AND NOTED ON THE PLANS, THICKENED OR DEPRESSED AS REQUIRED PER THE DETAILS. DEPRESSED SLABS SHALL MAINTAIN FULL THICKNESS UNLESS NOTED OTHERWISE. SEE REINFORCING STEEL NOTES FOR THE PLACEMENT OF WELDED WIRE FABRIC.

CO.08 NO SLAB SHALL HAVE COLD JOINTS IN A HORIZONTAL PLANE.

CO.09 NO OPENING SHALL BE MADE IN ANY STRUCTURAL MEMBER WITHOUT THE WRITTEN APPROVAL OF THE ARCHITECT.

REINFORCEMENT STEEL

RS.01 ALL CONCRETE REINFORCEMENT SHALL BE DETAILED, FABRICATED, LABELED, SUPPORTED AND SPACED IN FORMS, AND SECURED IN PLACE IN ACCORDANCE WITH THE PROCEDURES AND REQUIREMENTS OUTLINED IN THE LATEST EDITIONS OF THE "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE" (ACI 318) AND THE "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT" (ACI 315).

RS.02 CHECKED SHOP DRAWINGS SHOWING REINFORCEMENT DETAILS, INCLUDING STEEL SIZES, SPACING, AND PLACEMENT SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW PRIOR TO FABRICATION.

RS.03 ALL REINFORCEMENT STEEL SHALL BE HIGH STRENGTH NEW BILLET STEEL, CONFORMING TO THE LATEST EDITION OF ASTM A 615, GRADE 60.

RS.04 ALL WELDED WIRE FABRIC SHALL CONFORM TO THE LATEST EDITION OF ASTM A 185.

RS.05 THE FOLLOWING CLEAR COVER SHALL BE PROVIDED FOR REINFORCEMENT IN CAST-IN-PLACE CONCRETE, UNLESS NOTED OTHERWISE:

CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH.....3"

EXPOSED TO EARTH OR WEATHER:
#6 THROUGH #18 BARS.....2"
#5 BARS, 5/8" WIRE, AND SMALLER.....1-1/2"

NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND: SLABS & WALLS.....3/4"

PIERS, COLUMNS, AND BEAMS:
PRIMARY REINFORCEMENT, TIES, AND STIRRUPS.....1-1/2"

RS.06 PROVIDE ADEQUATE BOLSTERS, HIGH CHAIRS, SUPPORT BARS, ETC. TO MAINTAIN SPECIFIED CLEARANCES FOR THE ENTIRE LENGTH OF ALL REINFORCEMENT BARS. WELDED WIRE FABRIC SHALL BE SUPPORTED IN PROPER POSITION ON CHAIRS AND CARRIER BARS.

RS.07 ALL WELDED WIRE FABRIC SHALL BE LAPPED TWO (2) FULL MESH PANELS AT SIDE AND END LAPS AND TIED SECURELY. PROVIDE ADDITIONAL REINFORCEMENT WHERE SHOWN ON THE DRAWINGS. PLACE MESH 1" FROM THE TOP OF SLABS. NO ELECTRICAL CONDUIT SHALL BE PLACED ABOVE WELDED WIRE FABRIC IN SLABS.

RS.08 NO REINFORCEMENT STEEL SHALL BE WELDED IN ANY WAY UNLESS PRIOR WRITTEN APPROVAL IS GIVEN BY THE ARCHITECT.

RS.09 UNLESS NOTED OTHERWISE, ALL CONCRETE WORK SHALL CONTAIN AT LEAST MINIMUM REINFORCEMENT AS REQUIRED BY ACI 318.

MASONRY

MS.01 ALL MASONRY CONSTRUCTION SHALL CONFORM TO THE LATEST EDITION OF THE "BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES" (ACI 530/ASCE 5/TMS 402).

MS.02 ALL CONCRETE MASONRY UNITS SHALL BE NORMAL WEIGHT WITH TWO (2) CELLS AND CONFORM TO ASTM C 90.

MS.03 ALL MORTAR SHALL CONFORM TO ASTM C 270.

MS.04 ALL GROUT SHALL CONFORM TO ASTM C 476.

MS.05 THE MINIMUM SPECIFIED NET AREA COMPRESSIVE STRENGTH OF MASONRY (fm) SHALL BE 1500 PSI AND SHALL CONSIST OF THE FOLLOWING COMPONENTS:
CONCRETE MASONRY UNITS:
1500 PSI MINIMUM NET AREA COMPRESSIVE STRENGTH
PORTLAND CEMENT MORTAR, TYPE S
GROUT: 2000 PSI MINIMUM COMPRESSIVE STRENGTH

MS.06 ALL BAR REINFORCEMENT STEEL USED IN MASONRY SHALL BE HIGH STRENGTH NEW BILLET STEEL CONFORMING TO THE LATEST EDITION OF ASTM A 615, GRADE 60. REFER TO REINFORCEMENT STEEL NOTES THIS SHEET FOR ADDITIONAL INFORMATION.

MS.07 THE MINIMUM CLEAR DISTANCE BETWEEN PARALLEL REINFORCEMENT BARS, EXCEPT IN COLUMNS, SHALL BE EQUAL TO THE NOMINAL DIAMETER OF THE BAR OR 1", WHICHEVER IS GREATER.

MS.08 ALL REINFORCEMENT BARS SHALL BE COMPLETELY EMBEDDED IN GROUT AND SHALL HAVE A COVERAGE OF MASONRY NOT LESS THAN:
BARS LARGER THAN #5.....2"
#5 BARS AND SMALLER.....1 1/2"

MS.09 VERTICAL CELLS TO BE FILLED WITH GROUT SHALL BE ALIGNED TO PROVIDE A CONTINUOUS, UNOBSTRUCTED OPENING OF THE DIMENSIONS SHOWN. CELLS WHICH WILL CONTAIN VERTICAL REINFORCEMENT SHALL HAVE A MINIMUM TWO (2) INCH CLEAR OPENING.

MS.10 GROUT FOR FILLING REINFORCED OR NON-REINFORCED CELLS SHALL BE PLACED IN MAXIMUM FOUR (4) FOOT LIFTS AND CONSOLIDATED IN PLACE BY VIBRATION OR OTHER METHODS WHICH INSURE COMPLETE FILLING OF THE CELLS. ALL CELLS CONTAINING REINFORCEMENT BARS OR ANCHOR BOLTS SHALL BE FULLY GROUTED.

MS.11 PROVIDE ADEQUATE TEMPORARY BRACING AS REQUIRED DURING CONSTRUCTION TO WITHSTAND LATERAL LOADS AND THE PRESSURES OF FLUID GROUT.

MS.12 HOLLOW UNITS SHALL BE LAID WITH FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS. WEBS SHALL ALSO BE BEDDED WHERE THEY ARE ADJACENT TO CELLS TO BE REINFORCED OR FILLED WITH GROUT. IN THE STARTING COURSE ON FOOTINGS AND SOLID FOUNDATION WALLS, AND IN NON-REINFORCED OR GROUTED PIERS, PLASTERS AND COLUMNS.

MS.13 SOLID MASONRY UNITS SHALL BE LAID WITH FULL HEAD AND BED JOINTS.

MS.14 PROVIDE CONTINUOUS GALVANIZED HORIZONTAL MASONRY LADDER TIE REINFORCEMENT AT 16" O.C. MINIMUM VERTICALLY, UNLESS NOTED OTHERWISE. DO NOT USE TRUSS TIE REINFORCEMENT.

MS.15 ALL ANCHOR BOLTS CAST INTO MASONRY UNITS SHALL CONFORM TO ASTM A 307. ALL ADHESIVE, SLEEVE OR EXPANSION ANCHORS INTO MASONRY SHALL BE MANUFACTURED BY HLTI OR APPROVED EQUAL AND INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

MS.16 ALL STRUCTURAL MASONRY SHALL BE INSTALLED USING RUNNING BOND, UNLESS NOTED OTHERWISE.

MS.17 BOND AND INTERLOCK EACH COURSE OF EACH WYTHE AT ALL CORNERS AND INTERSECTIONS.

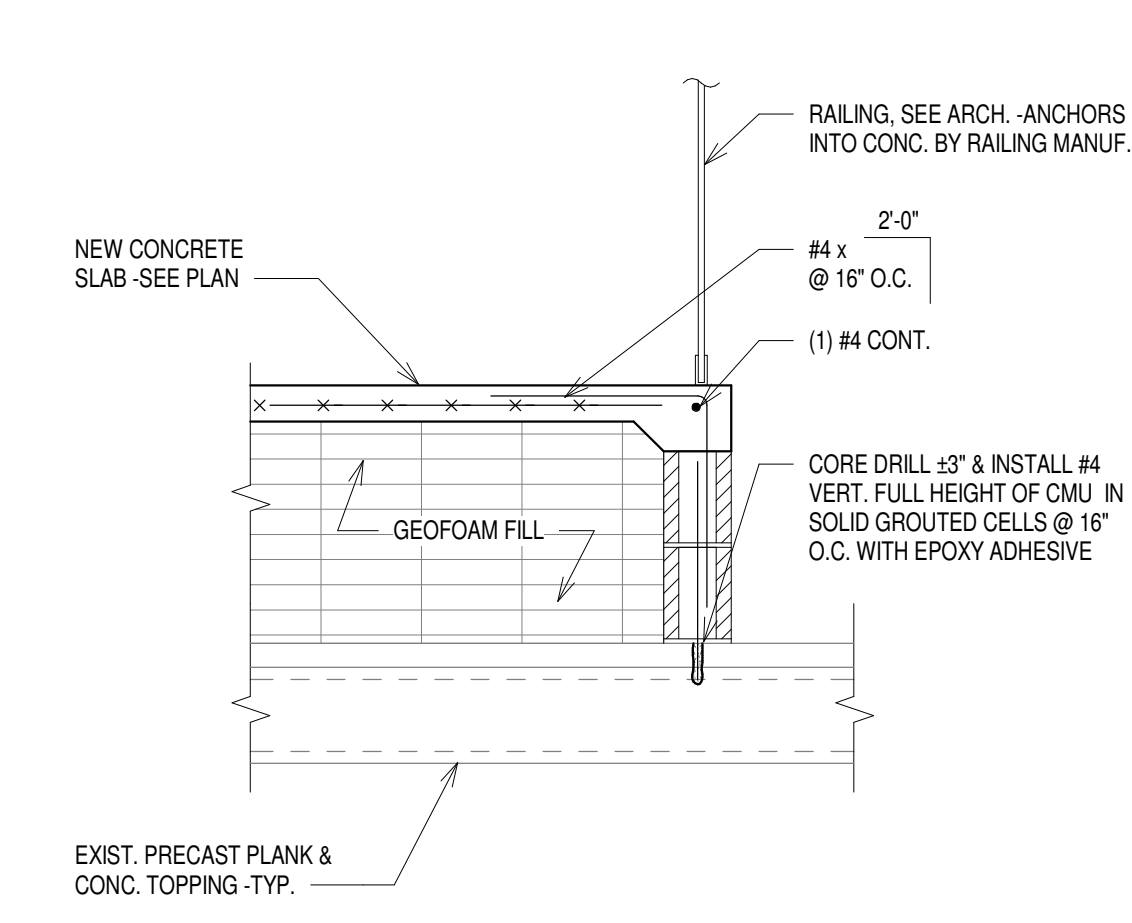
MS.18 ALL STRUCTURAL MASONRY SHALL BE INSTALLED USING RUNNING BOND, UNLESS NOTED OTHERWISE.

MS.19 PROVIDE ADEQUATE BOLSTERS, HIGH CHAIRS, SUPPORT BARS, ETC. TO MAINTAIN SPECIFIED CLEARANCES FOR THE ENTIRE LENGTH OF ALL REINFORCEMENT BARS. WELDED WIRE FABRIC SHALL BE SUPPORTED IN PROPER POSITION ON CHAIRS AND CARRIER BARS.

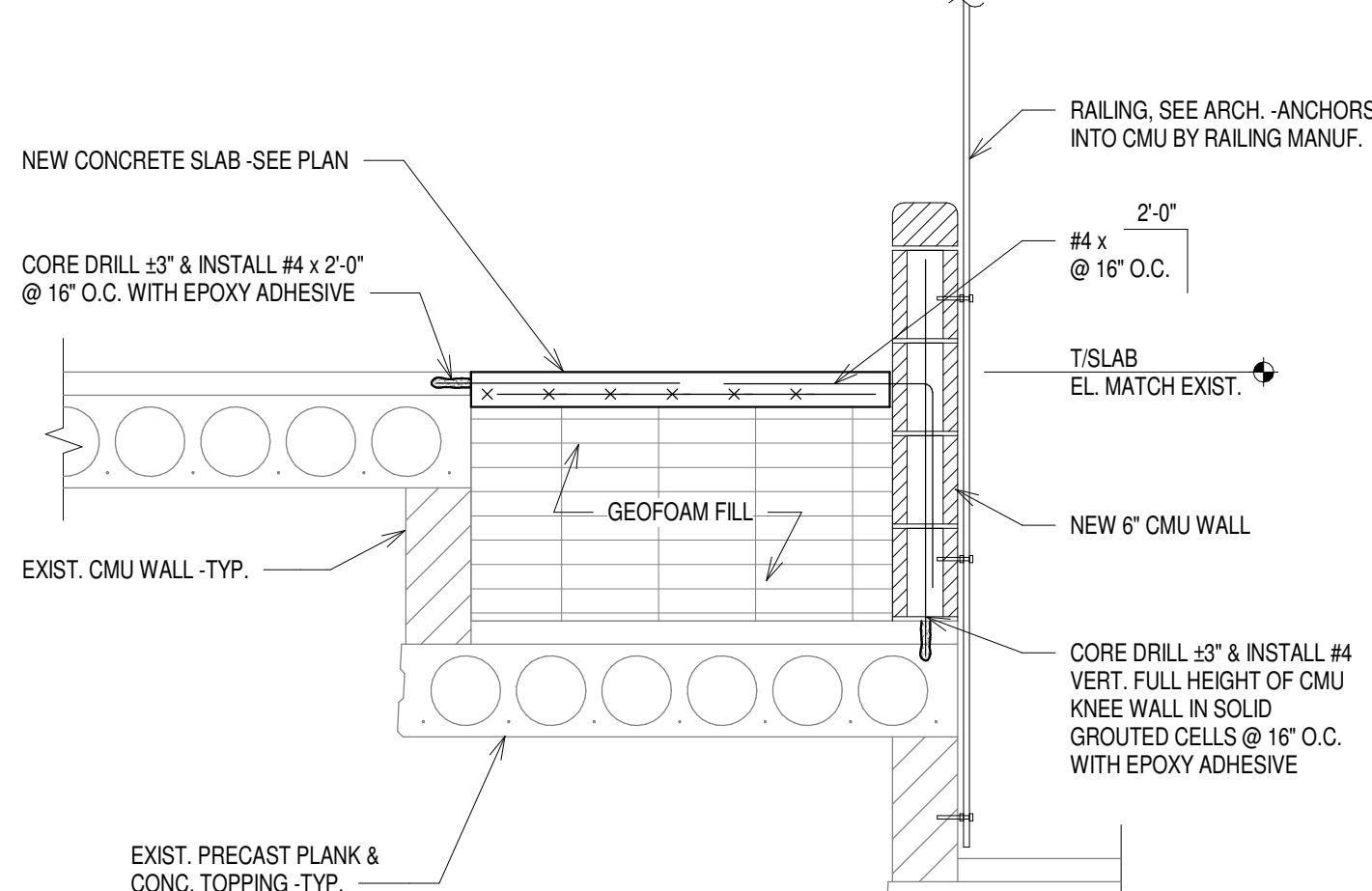
MS.20 NO REINFORCEMENT STEEL SHALL BE WELDED IN ANY WAY UNLESS PRIOR WRITTEN APPROVAL IS GIVEN BY THE ARCHITECT.

MS.21 UNLESS NOTED OTHERWISE, ALL CONCRETE WORK SHALL CONTAIN AT LEAST MINIMUM REINFORCEMENT AS REQUIRED BY ACI 318.

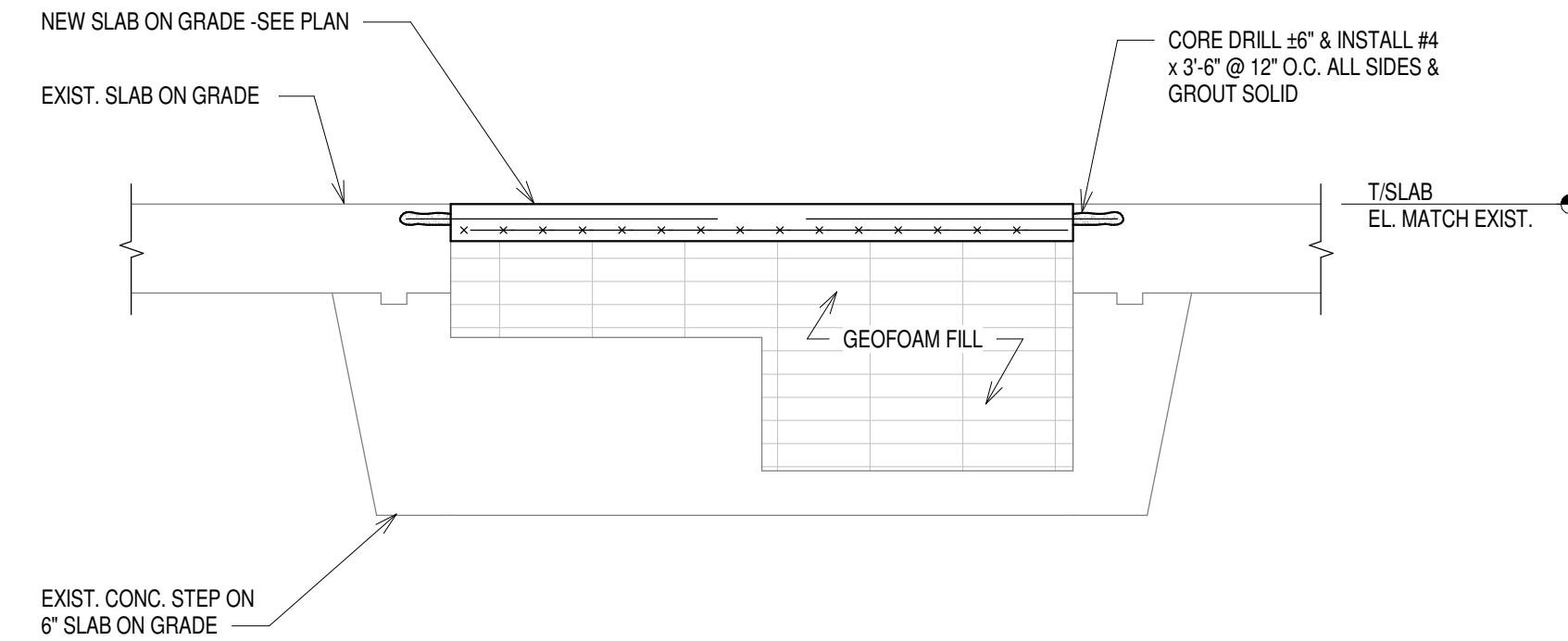
4 FRAMING DETAIL
3/4" = 1'-0"



3 FRAMING DETAIL
3/4" = 1'-0"

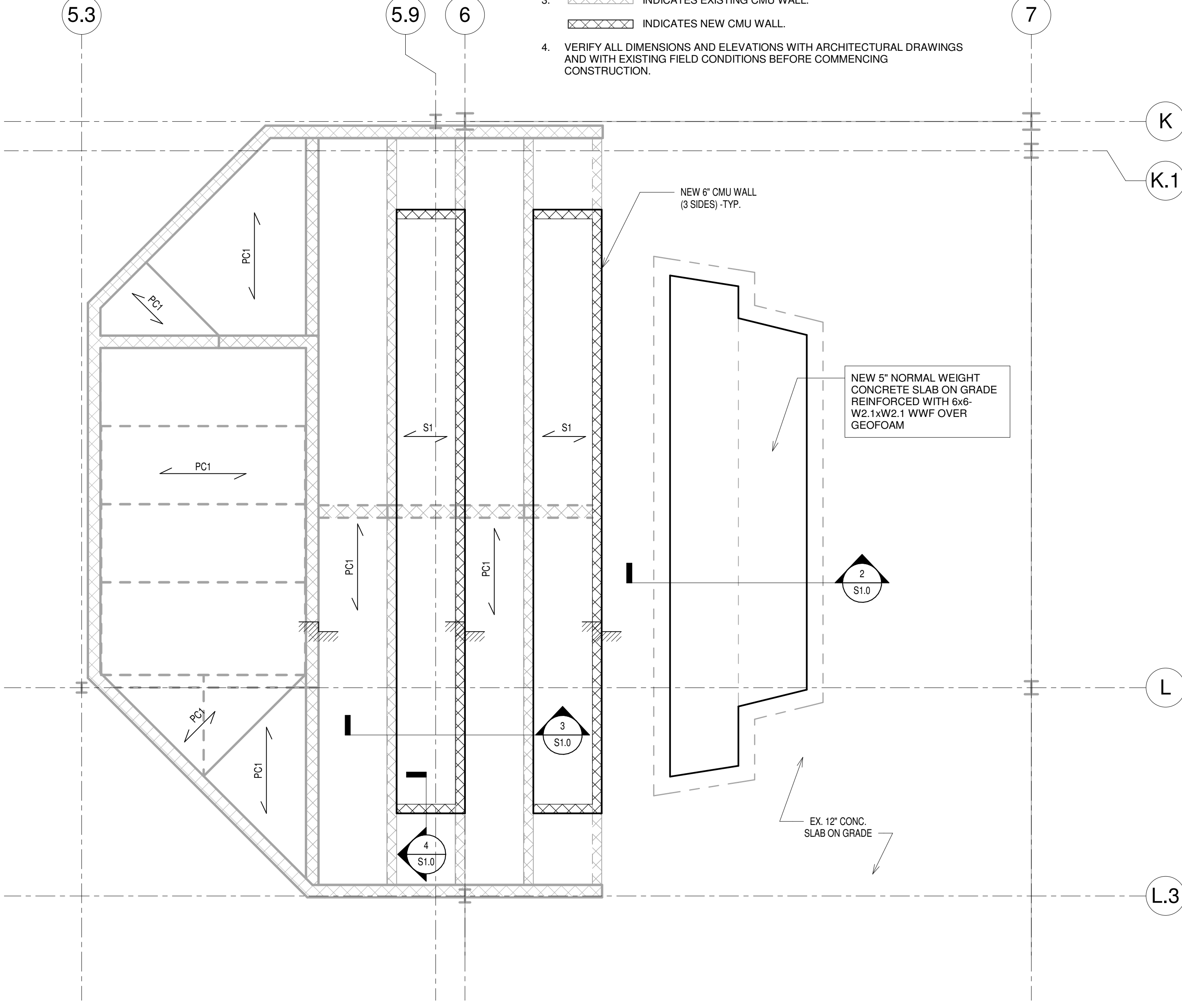


2 SLAB INFILL DETAIL
1/2" = 1'-0"



NOTES:

- "PC1" INDICATES EXISTING 8" PRECAST PLANK WITH 2" CONCRETE TOPPING.
- "S1" INDICATES 3" NORMAL WEIGHT CONCRETE SLAB REINFORCED WITH 6x6-W2.1xW2.1 WWF OVER GEOFOAM.
- INDICATES EXISTING CMU WALL.
- INDICATES NEW CMU WALL.
- VERIFY ALL DIMENSIONS AND ELEVATIONS WITH ARCHITECTURAL DRAWINGS AND WITH EXISTING FIELD CONDITIONS BEFORE COMMENCING CONSTRUCTION.



1 GROUND FLOOR PARTIAL FRAMING PLAN
1/4" = 1'-0"

PERKINS
+ WILL

The Wrigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
1312.755.0770
1312.755.0775
www.perkinswill.com

GENERAL CONTRACTOR

STRUCTURAL ENGINEERING

C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MEP ENGINEERING

MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014

NOTE: DOCUMENTS ARE
INCOMPLETE AND MAY NOT BE
USED FOR REGULATORY
APPROVAL, PERMITTING, OR
CONSTRUCTION PURPOSES.

PROJECT

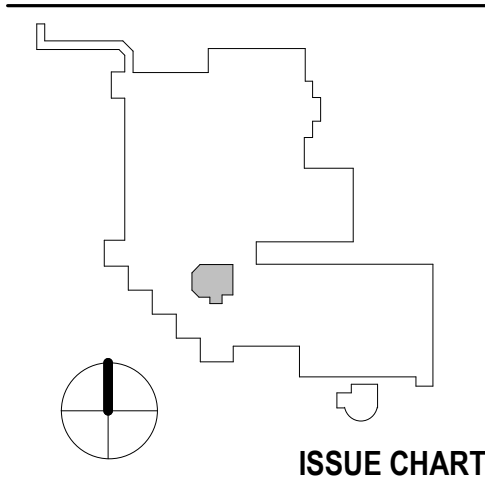
MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLAN ELLYN, IL 60137



Project Status Issue Date

COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

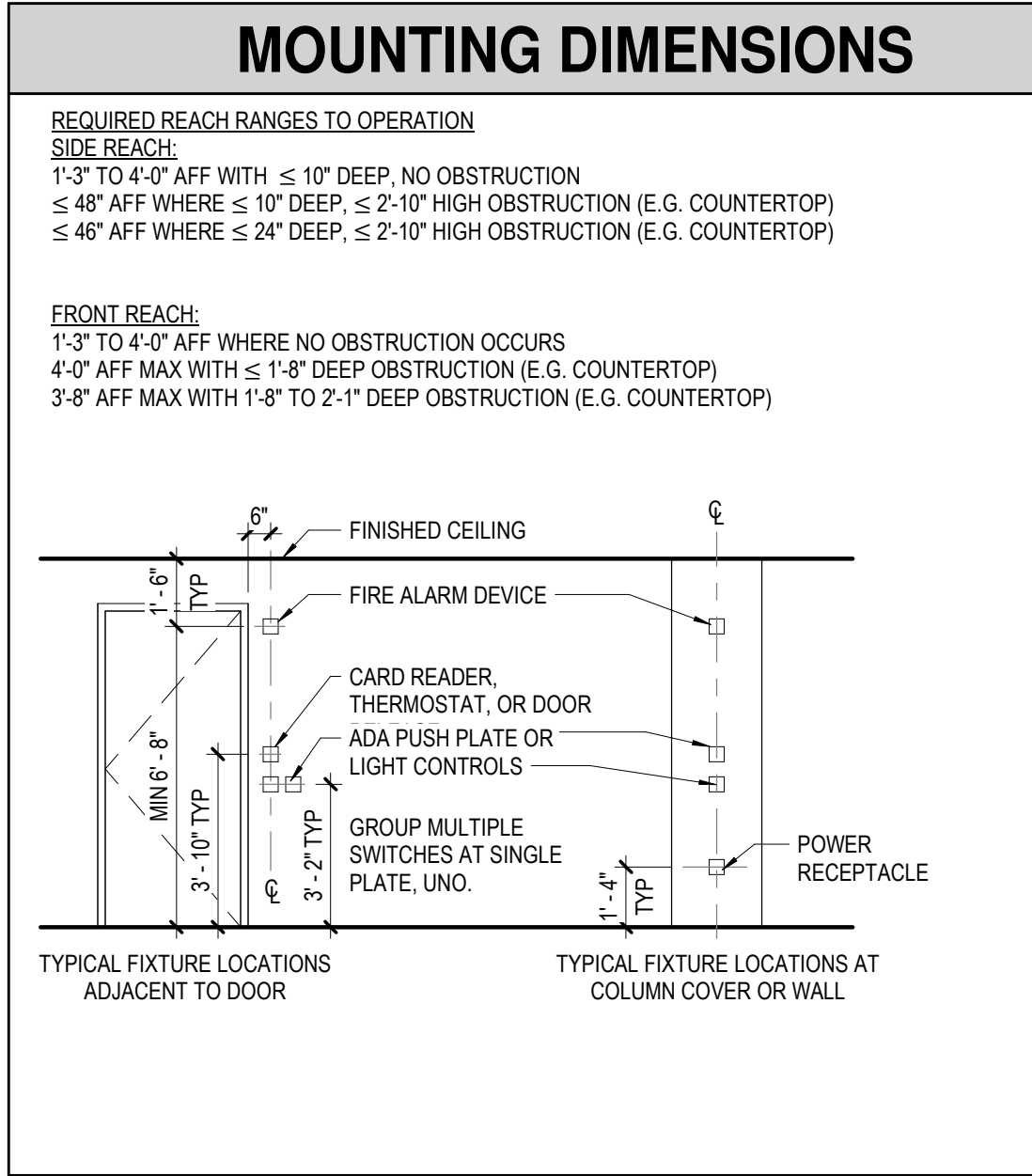
1	ISSUE FOR BID & PERMIT	03/07/2018
2	ISSUE	DATE
Job Number	024303.007	
Drawn	CMP	
Checked	CMP	
Approved	CEA	

TITLE

PARTIAL PLANS &
DETAILS

SHEET NUMBER

S1.0



ABBREVIATIONS LEGEND	
NOTE 1: ABBREVIATIONS WHEN USED IN COMPOSITION MAY INCLUDE PERIODS FOR CLARIFICATION NOTE 2: ABBREVIATIONS MAY BE DIFFERENT WHEN A PART OF A SCHEDULE	
AIR CONDITIONING (ED)	GA GAGE
ACC ACCESSIBLE	GALV GALVANIZED
ACST ACUSTICAL	GEN GENERAL
ADA AMERICANS WITH DISABILITIES	GFRG GLASS FIBER
ADJ ADJUSTABLE/ADJACENT	GRFC REINFORCED CONCRETE
AFB ABOVE FINISHED FLOOR	GRGL REINFORCED GYPSUM
AFG ABOVE FINISHED GRADE	GL GLASS
AGGR AGGREGATE	GL BLK GLASS BLOCK
AHU AIR HANDLING UNIT	GLU LAM GLUED LAMINATED WOOD
ALT ALTERNATE	GR LN GRADE LINE
ALUM ALUMINUM	GRFL GROUND FLOOR
AND AND	GSS GYPSUM SHEATHING BOARD
APC ACOUSTICAL PANEL CEILING	GT GREASE TRAP
APPROX APPROXIMATE	GYP BLD GYPSUM BOARD
ARCH ARCHITECTURAL, ARCHITECT	GYP PLAS GYPSUM PLASTER
ASPH ASPHALT	H HIGH
AUTO AUTOMATIC	HB HOSE BIBB
AWT ACOUSTICAL WALL TREATMENT	HC HOLLOW CORE
B/B BACK TO BACK	HDW HARDWARE
BC BACK OF CURB	HIC HARDWOOD
BD BOARD	HM HOLLOW METAL
BITUM BITUMINOUS	HRZ HORIZONTAL
BLDG BUILDING	HP HIGH POINT
BM BEAM/BENCHMARK	HSKP HOUSEKEEPING
BOU BOTTOM	HT HEIGHT
BUR BUILT-UP ROOFING	HVAC HEATING, VENTILATION, AIR CONDITIONING
CAB CABINET	HW HOT WATER
CB CATCH BASIN	ID INSIDE DIAMETER
CCTV CLOSED CIRCUIT TELEVISION	INCAND INCANDESCENT
CEM CEMENT	INSUL INSULATION
CF/CI CONTRACTOR FURNISHED, CONTRACTOR INSTALLED	INT INTERIOR
CF/CI CONTRACTOR FURNISHED, OWNER INSTALLED	INV INVERT
CF/CI CONTRACTOR FURNISHED, OWNER INSTALLED	JAN CLO JANITORS CLOSET
CFM CUBIC FEET PER MINUTE	KIT KITCHEN
CFMF COLD-FORMED METAL FRAMING	L LONG, LENGTH
CG CORNER GUARD	LAM LAMINATE (ED)
CI CAST IRON, CURB INLET	LAU LAUNDRY
CIP CAST-IN-PLACE	LAV LAVATORY
CJ CONTROL JOINT	LB POUND(S)
CL CENTER LINE	LF LINEAR FOOT, (FEET)
CEILING	LH LEFT HAND
CLO CLOSET	LIB LIBRARY
CLR CLEAR	LKR LOCKER
CM CENTIMETER	LL LIVE LOAD
CMU CONCRETE MASONRY UNIT	LONG LONGITUDINAL
CO CLEANOUT	LOC LOCATION
COL COLUMN	LPT LOW POINT
CONC CONCRETE	LT LIGHT
CONF CONFERENCE	LVR LOUVER
COORD COORDINATE	m METER
CORR CORRIDOR	MACH MACHINE
CP CARPET	MAINT MAINTENANCE
CPT CARPET TILES	MATL MATERIAL
CT CERAMIC TILE	MAX MAXIMUM
CTR CENTER/CONTOUR	MECH MECHANICAL
CUBIC	MEMB MEMBRANE
CW COLD WATER PIPING/ CHEMICAL WASTELINE	MEP MECHANICAL, ELECTRICAL, PLUMBING @ FIRE
D DEEP, DEPTH, PENNY (NAIL)	PROTECTION
DBL DOUBLE	MEZZ MEZZANINE
DEG DEGREE	MFR MANUFACTURER
DEMO DEMOLISH, DEMOLITION	MH MANHOLE
DEPT DEPARTMENT	MH MAGNETIC HOLD OPEN
DE DRINKING FOUNTAIN	MIN MINIMUM
DIA DIAMETER (EXTERIOR)	MISC MISCELLANEOUS
DIAG DIAGONAL	MISC MARKER BOARD
DIFF DIFFUSER	MM MILLIMETER
DIM DIMENSION	MO MASONRY OPENING
DISP DISPENSER	MTL METAL
DIV DIVISION	N NORTH
DL DEAD LOAD	NIC NOT IN CONTRACT
DR DOOR/ DRAIN	NO NUMBER
DS DOWNSPOUT	NOM NOMINAL
DW DRYWALL	NTS NOT TO SCALE
DWG DRAWING	O/O OUT TO OUT
E EAST	OC ON CENTER
EA EACH	OD OUTSIDE DIAMETER
EFS EXTERIOR INSULATION	OF/CI CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
EF AND FINISH SYSTEM	OFF OFFICE
EJ EXPANSION JOINT	OPH OPPOSITE HAND
EL ELEVATION	OPNG OPENING
ELAST ELASTOMERIC	OPP OPPOSITE
ELEC ELECTRICAL	ORD OVER/LOW ROOF DRAIN
ELEV ELEVATOR	PA PUBLIC ADDRESS
EMER EMERGENCY	PAR PARAPET, PARALLEL
EMER SHR EMERGENCY SHOWER	PCC PRE-CAST CONCRETE
ENGR ENGINEER	PERF PERFORATED
ENTR ENTRANCE	PERP PERPENDICULAR
EO ELECTRIC OUTLET	PLAM PLASTIC LAMINATE
EOS EDGE OF SLAB	PLAS PLASTER
EP ELECTRICAL PANEL	PLB PLUMBING
EQ EQUAL	PLYWD PLYWOOD
EQUIP EQUIPMENT	PNT PAINT
ETC ET CETERA	POL POLISHED
EW EXISTING TO REMAIN	PR PAIR
EW EACH WAY	PREFAB PREFABRICATED (ED)
EXH EXHAUST	PROJ PROJECT
EXIST EXISTING	PROP PROPERTY
EXP EXPANSION	PSF POUNDS PER SQUARE FOOT
EXT EXTERIOR, EXTERNAL	PSI POUNDS PER SQUARE INCH
FE FIRE EXTINGUISHER	PT POINT/PRESSURE TREATED
FEC FIRE EXTINGUISHER CABINET	PTD PAPER TOWEL
FF FINISH FACE	DISPENSER
FF EL FINISHED FLOOR ELEVATION	PTN PARTITION
FLR FLOOR	PVC POLYVINYL CHLORIDE
FLUOR FLUORESCENT	PVG PAVING
FO FINISHED OPENING	QT QUARRY TILE
FOC FACE OF CURB	QTY QUANTITY
FOF FACE OF FINISH	R THERMAL RESISTANCE, RADIUS, RISER
FOM FACE OF MASONRY	RB RUBBER BASE
FOS FACE OF SLAB/ FACE OF STUD	RC REINFORCED CONCRETE
FP FIRE PROTECTION/FIREPROOF	REF REFLECTED CEILING PLAN
FRTW FIRE RETARDANT TREATED WOOD	RCPTN RECEPTION
FT FOOT (FEET) FIRE TREATED	RD ROOF DRAIN
FTG FOOTING	REC RECESSED
FURG FURNISH FURNITURE	REF REFERENCE, REFRIGERATOR
FURN FURNITURE	REIN REINFORCE, REINFORCING
FUT FUTURE	REQD REQUIRE, REQUIRED
FV FIELD VERIFY	RESIL RESILIENT
	REV REVISION
	RF RESILIENT FLOORING
	RH RIGHT HAND
	RM ROOM
	RO ROUGH OPENING
	ROW RIGHT OF WAY
	RTF RUBBER TILE FLOOR
	RVL REVEAL

MATERIALS	
	COMPACTED FILL EARTH WORK
	UNDISTURBED SOIL
	GRAVEL, POROUS FILL
	SAND
	ASPHALT
	STRUCTURAL CONCRETE
	LIGHTWEIGHT CONCRETE
	TERRAZZO
	CUT STONE
	CAST STONE
	BRICK, COMMON FACE
	BRICK, GLAZED
	CONCRETE MASONRY UNIT
	STRUCTURAL CLAY TILE
	STEEL
	ALUMINUM/ORNAMENTAL METAL
	CONTINUOUS WOOD FRAMING
	BLOCKING OR SHIM
	FINISH WOODWORK
	PLYWOOD
	PARTICLE BOARD
	GYPSUM WALLBOARD
	WATERPROOFING/ DAMPROOFING/ AIR/ MOISTURE BARRIER
	RIGID INSULATION
	BATT INSULATION
	CARPETING (LARGE SCALE)
	RESILIENT FLOORING
	PLASTIC LAMINATE
	LEAD-LINED GYPSUM WALLBOARD
	GLASS
	GLASS BLOCK
	ACOUSTICAL CEILING BOARD
	WOOD FLOORING
	SPRAY-ON FIREPROOFING OR INSULATION
	EXTERIOR SHEATHING
	SOLID SURFACING
	EIFS
	PLASTER STUCCO W/ METAL LATH

SYMBOLS LEGEND	
COLUMN GRID DESIGNATION	
	0
	1.2
	A
NEW GRID	
	0
	2
	A
EXISTING GRID	
NOTE TAGS	
	"NOTES BY NUMBER"
	SPECIFICATION KEYNOTES
BUILDING SECTION TAG	
	SECTION DESIGNATION
	SHEET NUMBER
WALL / DETAIL SECTION TAGS	
	SECTION DESIGNATION
	SHEET NUMBER
DETAIL TAG	
	DETAIL DESIGNATION
	SHEET NUMBER
ENLARGED PLAN TAG	
	PLAN OR DETAIL DESIGNATION
	SHEET NUMBER
EXTERIOR ELEVATION TAG	
	ELEVATION DESIGNATION
	SHEET NUMBER
INTERIOR ELEVATION TAG	
	ELEVATION DESIGNATION
	SHEET NUMBER
	ELEVATION DESIGNATION/SHEET NUMBER
DOOR/FRAME IDENTIFICATION TAG	
	DOOR NUMBER
	FRAMED/DOOR TYPE

SYMBOLS	
	EQUIPMENT/APPLIANCE
	ACCESSORY
	PLUMBING FIXTURE
	FURNITURE (NO OUTLINE)
NORTH ARROW	
	PROJECT NORTH ARROW
	TRUE NORTH ARROW
WINDOW / GLAZING TYPE SYMBOL	
	1
PARTITION TAG	
	7XX
SHEET ID KEY	
DISCIPLINE	15/A-201
G - GENERAL	
C - CIVIL	
L - LANDSCAPE	
A - ARCHITECTURE	
S - STRUCTURAL	
M - MECHANICAL	
P - PLUMBING	
FP - FIRE PROTECTION	
E - ELECTRICAL	
K - KITCHEN	
NUMBER OF PLAN, DETAIL, ETC. ON SHEET	
DRAWING SERIES	

GENERAL PROJECT NOTES	
LANDLORD COORDINATION	
1. VERIFY THE BUILDING'S RULES FOR CONSTRUCTION WITH THE LANDLORD.	
2. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS WITH THE LANDLORD PERTAINING TO THE USE OF THE BUILDING ENTRANCES, WORKING COURSE, NOSEY WORK, ACCESS TO ADJACENT SPACES, SECURITY, OWNERSHIP OF SALVAGED ITEMS AND OTHER ITEMS DEEMED TO BE OF MUTUAL INTEREST.	
3. KEEP DRIVEWAYS, DOCKS AND ENTRANCES SERVING THE PREMISES CLEAR AND AVAILABLE TO THE LANDLORD AND THE LANDLORD'S TENANTS AND VENDORS AT ALL TIMES. DO NOT USE THESE AREAS FOR PARKING OR STORAGE OF MATERIALS. SCHEDULE DELIVERIES TO MINIMIZE SPACE AND TIME REQUIREMENTS FOR STORAGE OF MATERIAL AND EQUIPMENT ON SITE.	
4. COORDINATE ALL REQUIREMENTS FOR ELEVATOR ACCESS TIME AND EXPENSE WITH THE LANDLORD. ELEVATOR ACCESS EXPENSE IS TO BE BORNE BY THE CONTRACTOR UNLESS OTHERWISE INDICATED BY THE LANDLORD.	
5. THE CONTRACTOR SHALL COORDINATE WITH THE LANDLORD THE USE OF THE DESIGNATED TOILETS WITHIN THE BUILDING FOR USE BY THE CONTRACTOR'S PERSONNEL. USE OF EXISTING TOILETS FOR PERSONNEL OTHER THAN THOSE DESIGNATED BY THE LANDLORD WILL NOT BE PERMITTED. THE CONTRACTOR SHALL TAKE RESPONSIBILITY FOR THE PROTECTION OF THE TOILET FACILITIES, PROVIDING REGULAR MAINTENANCE AND STOCKING ALL NECESSARY SUPPLIES.	
6. AVOID INTERRUPTION OF SERVICES (ELECTRICAL, SIGNAL, MECHANICAL, FIRE PROTECTION, LIFE SAFETY, PLUMBING, ETC.) TO OCCUPIED AREAS OF THE BUILDING DURING CONSTRUCTION. IF SERVICE INTERRUPTIONS ARE UNAVOIDABLE, THE CONTRACTOR SHALL NOTIFY AND OBTAIN APPROVAL FROM THE LANDLORD AND TENANT AT LEAST 24 HOURS PRIOR TO THE ATTENTION OF THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.	
7. ALL WORK SHALL CONFORM TO ALL INDUSTRY AND MANUFACTURERS' PUBLISHED STANDARDS AND THE LANDLORD'S REQUIREMENTS FOR QUALITY OF MATERIALS AND WORKMANSHIP AS WELL AS ALL REQUIREMENTS IN THE DOCUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE TO BECOME FAMILIAR AND COMPLY WITH THE LANDLORD'S STANDARD DETAILS OF CONSTRUCTION. ANY CONFLICTING REQUIREMENTS OF THE SOURCES LISTED ABOVE SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.	
8. PENETRATIONS IN THE EXTERIOR BUILDING WALL ARE NOT ALLOWED, INCLUDING THOSE FOR OUTLETS AND BLOCKING, UNLESS EXPRESSLY ALLOWED BY THE LANDLORD.	
9. ALL PENETRATIONS IN FLOOR SLABS MUST BE APPROVED BY THE LANDLORD.	
PERMITS AND SAFETY	
1. THE COLLEGE WILL OBTAIN AND PAY FOR VILLAGE OF GLEN ELLYN CONSTRUCTION PERMIT. CONTRACTOR IS RESPONSIBLE TO OBTAIN VILLAGE APPROVAL FOR ANY REQUIRED FIRE ALARM OR SPRINKLER SYSTEM REVISIONS. COLLEGE WILL REIMBURSE CONTRACTOR FOR THOSE PERMIT FEES. CONTRACTOR IS RESPONSIBLE FOR SCHEDULING ALL GOVERNING AGENCY PERMIT INSPECTIONS, OBTAINING INTERMEDIATE AND FINAL INSPECTION SIGN OFF.	
2. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THE SAFETY OF THE PUBLIC AND THE WORKMEN ON THE JOB AND TO PREVENT ACCIDENTS OR INJURY TO ANY PERSONS ON, ABOUT, OR ADJACENT TO THE PREMISES WHERE THE WORK IS BEING PERFORMED. THE CONTRACTOR SHALL COMPLY WITH ALL OF THE LAWS, ORDINANCES, CODES, RULES AND REGULATIONS RELATIVE TO SAFETY AND THE PREVENTION OF ACCIDENTS.	
3. THE CONTRACTOR SHALL PROVIDE TEMPORARY WALLS, AS REQUIRED, TO ENCLOSE AND BARRICADE FOR SAFETY, AND FOR LOCALIZING AND MINIMIZING DUST AND NOISE FROM ANY OPERATIONS AND TO EFFECTIVELY SEPARATE WORK AREA FROM OTHER OCCUPIED AREAS OF THE BUILDING.	
4. PROVIDE ALL NECESSARY TEMPORARY POWER, LIGHTING, FIRE PROTECTION, ETC. AS REQUIRED DURING CONSTRUCTION.	
5. DO NOT OBSTRUCT ACCESS TO EXISTING EXITS OR REDUCE THE WIDTH OF EXIT ACCESS CORRIDORS AND HALLWAYS.	
CONSTRUCTION COORDINATION	
1. THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION OF ALL PARTS OF THE WORK STATED OR IMPLIED SO THAT NO WORK IS LEFT IN AN UNFINISHED OR INCOMPLETE CONDITION.	
2. WHERE SPECIAL COORDINATION IS NECESSARY, PREPARE MEMORANDA FOR DISTRIBUTION TO EACH PARTY INVOLVED OUTLINING SPECIAL REQUIREMENTS REQUIRED FOR COORDINATION. INCLUDE SUCH ITEMS AS REQUIRED NOTICES, REPORTS, AND ATTENDANCE AT MEETINGS.	
3. COORDINATE CONSTRUCTION ACTIVITIES INDICATED ON CONTRACT DOCUMENTS TO ASSURE EFFICIENT, ORDERLY, COMPLETE AND OPERATIONAL INSTALLATIONS OF EACH PART OF THE WORK. COORDINATE CONSTRUCTION OPERATIONS THAT ARE DEPENDENT UPON EACH OTHER FOR PROPER INSTALLATION, CONNECTION, AND OPERATION, WHEN MATERIALS APPLIED TO, OR ARE IN DIRECT CONTACT WITH WORK INSTALLED BY ANOTHER SUBCONTRACTOR. COORDINATION OF WORK IMPLIES ACCEPTANCE OF THE SUBSTRATE AS SUITABLE FOR THE APPLICATION INTENDED.	
4. CONFINE OPERATIONS TO AREAS WITHIN CONTRACT LIMITS INDICATED. PORTIONS OF THE SITE BEYOND AREAS IN WHICH CONSTRUCTION IS INDICATED ARE NOT TO BE DISTURBED.	
5. WHERE AVAILABILITY OF SPACE IS LIMITED, COORDINATE INSTALLATION OF DIFFERENT COMPONENTS TO ASSURE MAXIMUM ACCESSIBILITY OF REQUIRED MAINTENANCE, SERVICE AND REPAIR.	
6. COORDINATE TRADES TO PATCH FINISHES THAT ARE DAMAGED AS A RESULT OF CUTTING IN OF WORK.	
7. COORDINATE EXACT SIZE AND PLACEMENT OF EQUIPMENT BASE AND HOUSEKEEPING PADS WITH EQUIPMENT TO BE PROVIDED.	
CONTRACT DOCUMENTS	
1. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY AND ARE NOT INTENDED TO INCLUDE OR IMPLY ALL ITEMS REQUIRED FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK. REFER TO COMPLETE SET OF DOCUMENTS FOR APPLICABLE NOTES, ABBREVIATIONS, AND SYMBOLS.	
2. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING OF ANY OMISSIONS, DISCREPANCIES, AND/OR CONFLICTS IN THE DRAWINGS AND SPECIFICATIONS.	
3. DO NOT SCALE DRAWINGS. DIMENSIONS GOVERN. NOTIFY THE ARCHITECT IN WRITING OF ANY CONFLICTS OR DISCREPANCIES IN THE DIMENSIONS.	
4. LARGE SCALE DRAWINGS GOVERN OVER SMALL SCALE DRAWINGS.	
5. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS SHOWN ON THE DRAWINGS AT THE JOB SITE AND SHALL NOTIFY THE ARCHITECT OF ANY OMISSIONS, DISCREPANCIES, AND/OR CONFLICTS BEFORE PROCEEDING WITH THE PROJECT.	
6. WHERE MOUNTING HEIGHTS ARE NOT INDICATED, INSTALL INDIVIDUAL COMPONENTS AT STANDARD MOUNTING HEIGHTS RECOGNIZED WITHIN THE INDUSTRY FOR THE PARTICULAR APPLICATION INDICATED AND TO CURRENT ADA ACCESSIBILITY STANDARDS. REFER QUESTIONABLE MOUNTING HEIGHT DECISIONS TO THE ARCHITECT FOR FINAL DECISION.	
7. FOR ACCESS PANELS NOT SHOWN BUT REQUIRED BY PROVISIONS OF THE CONTRACT DOCUMENTS, LOCATE IN ACCORDANCE WITH APPLICABLE CODES. SUBMIT PROPOSED LOCATION TO THE ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.	
CONSTRUCTION	
1. NEW AND EXISTING OPENINGS IN RATED WALL, FLOOR, CEILING, AND ROOF ASSEMBLIES SHALL BE SEALED WITH PENETRATION SEALANT SYSTEMS MEETING OR EXCEEDING THE REQUIRED FIRE RESISTIVE RATINGS.	
2. MAINTAIN THE FIRE RATING OF CONSTRUCTION AROUND CABINETS, PANELS, AND BOXES RECESSED IN RATED WALL, FLOOR, AND CEILING ASSEMBLIES.	
3. PARTITION TYPES AND FIRE RESISTIVE RATINGS INDICATED ARE TO BE CONTINUOUS FOR THE LENGTH AND HEIGHT OF A PARTITION.	
4. PROVIDE CONTINUOUS PERIMETER FIRE SAFING BETWEEN FLOORS AND COORDINATE THE INSTALLATION WITH THE EXTERIOR WALL FIRE RATINGS OF SAFING SHALL MATCH FIRE RATINGS OF FLOOR CONSTRUCTION.	
5. PROVIDE NON-COMBUSTIBLE STIFFENERS, BRACING, BACKING PLATES AND BLOCKING REQUIRED FOR SECURE INSTALLATION OF DOORS AND DOOR-HARDWARE INCLUDING WALL-MOUNTED DOOR STOPS, MILLWORK, HANDRAILS, WALL-MOUNTED SHELVES, OPERABLE PARTITIONS, MISCELLANEOUS EQUIPMENT, AND SUSPENDED MECHANICAL AND ELECTRICAL EQUIPMENT.	
6. ISOLATE DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.	
7. SEALANTS EXPOSED TO VIEW SHALL BE COLOR AS SELECTED BY ARCHITECT. COORDINATE LOCATION OF SEALANT AND COMPATIBILITY OF SEALANTS WITH ADJACENT WORK INCLUDING MATERIALS AND OTHER CONTIGUOUS SEALANTS.	
EXISTING AND COMPLETED WORK	
1. CLEAN AND PROTECT CONSTRUCTION IN PROGRESS AND ADJOINING MATERIALS IN PLACE. APPLY PROTECTIVE COVERING WHERE REQUIRED TO ENSURE PROTECTION FROM DAMAGE OR DETERIORATION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ALL EXISTING CONDITIONS AND COMPLETED WORK WHILE FULFILLING THE OBLIGATIONS OF THIS CONTRACT.	
2. CLEAN AND MAINTAIN COMPLETED CONSTRUCTION AS FREQUENTLY AS NECESSARY THROUGHOUT THE DURATION OF THE CONSTRUCTION PERIOD. ADJUST AND LUBRICATED OPERABLE COMPONENTS TO ENSURE PROPER FUNCTION WITHOUT DAMAGING EFFECTS.	
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL, STORAGE, PROTECTION, AND REINSTALLATION OF THE EXISTING WINDOW TREATMENTS AT ALL WINDOWS SO AS TO RETURN THE WINDOW TREATMENTS TO THEIR ORIGINAL CONDITION AT THE CONCLUSION OF THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR DOCUMENTING THE CONDITION OF ALL EXISTING WINDOW TREATMENTS AT THE BEGINNING OF THE PROJECT. ANY DAMAGED WINDOW TREATMENTS THAT WERE NOT DOCUMENTED AS SUCH BY THE CONTRACTOR AT THE BEGINNING OF THE PROJECT SHALL BE REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE LANDLORD OR TENANT.	

PERKINS + WILL

The Wrigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
312.755.0775
www.perkinswill.com

GENERAL CONTRACTOR

STRUCTURAL ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO, IL 60606

MEP ENGINEERING
MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014
MECHANICAL SERVICES ASSOCIATES
CORP.

NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION PURPOSES.

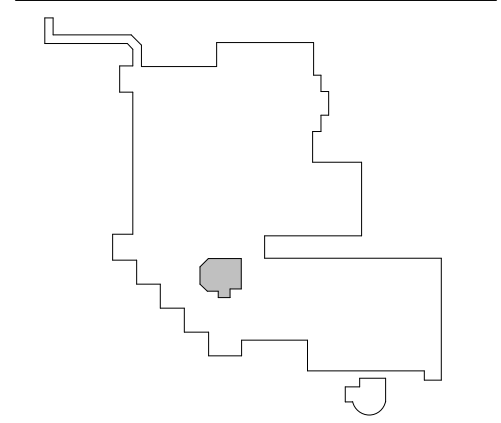
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



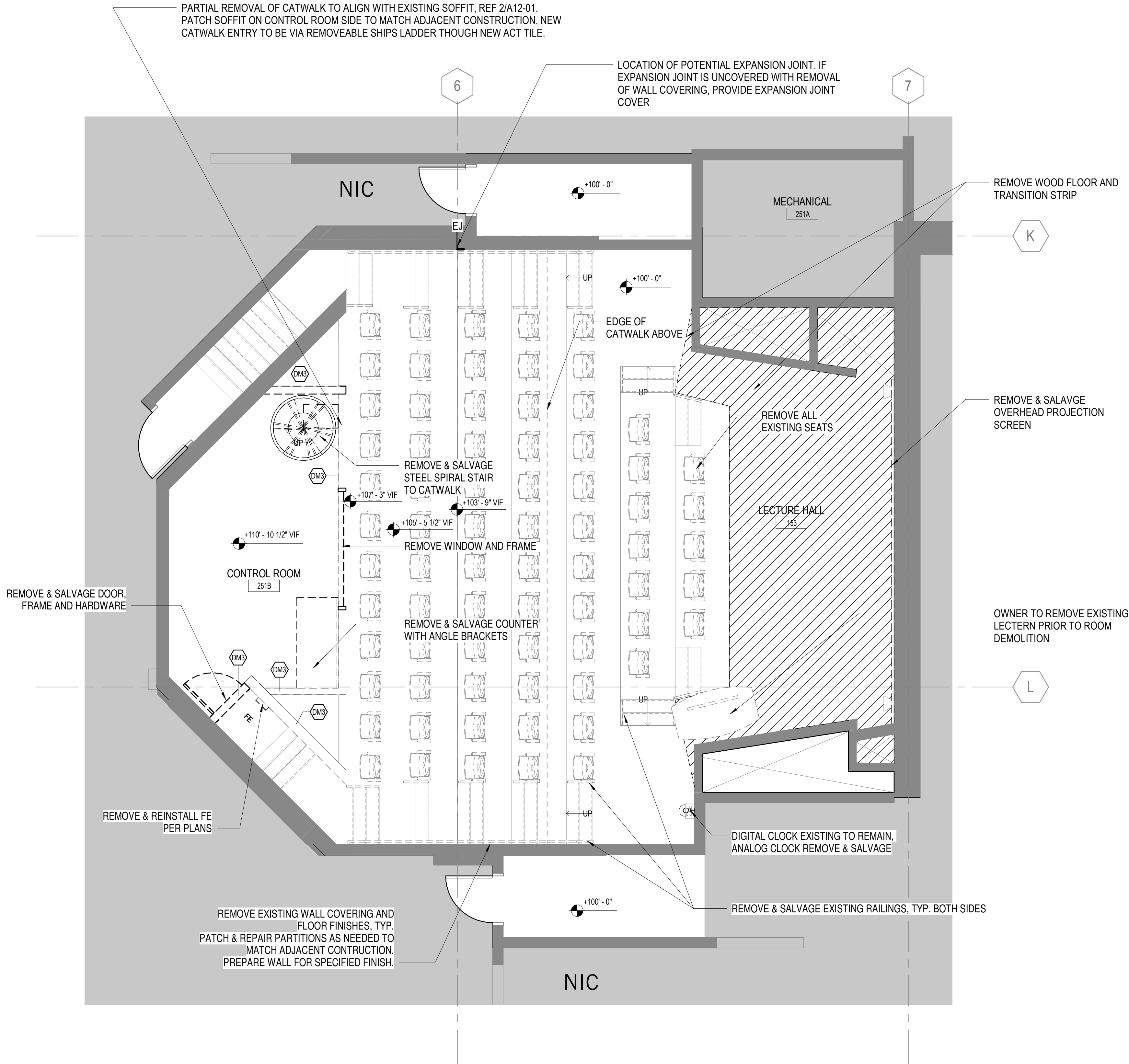
ISSUE CHART

1	ISSUE FOR BID & PERMIT	03/07/2018
1	DATE	DATE
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	
TITLE		

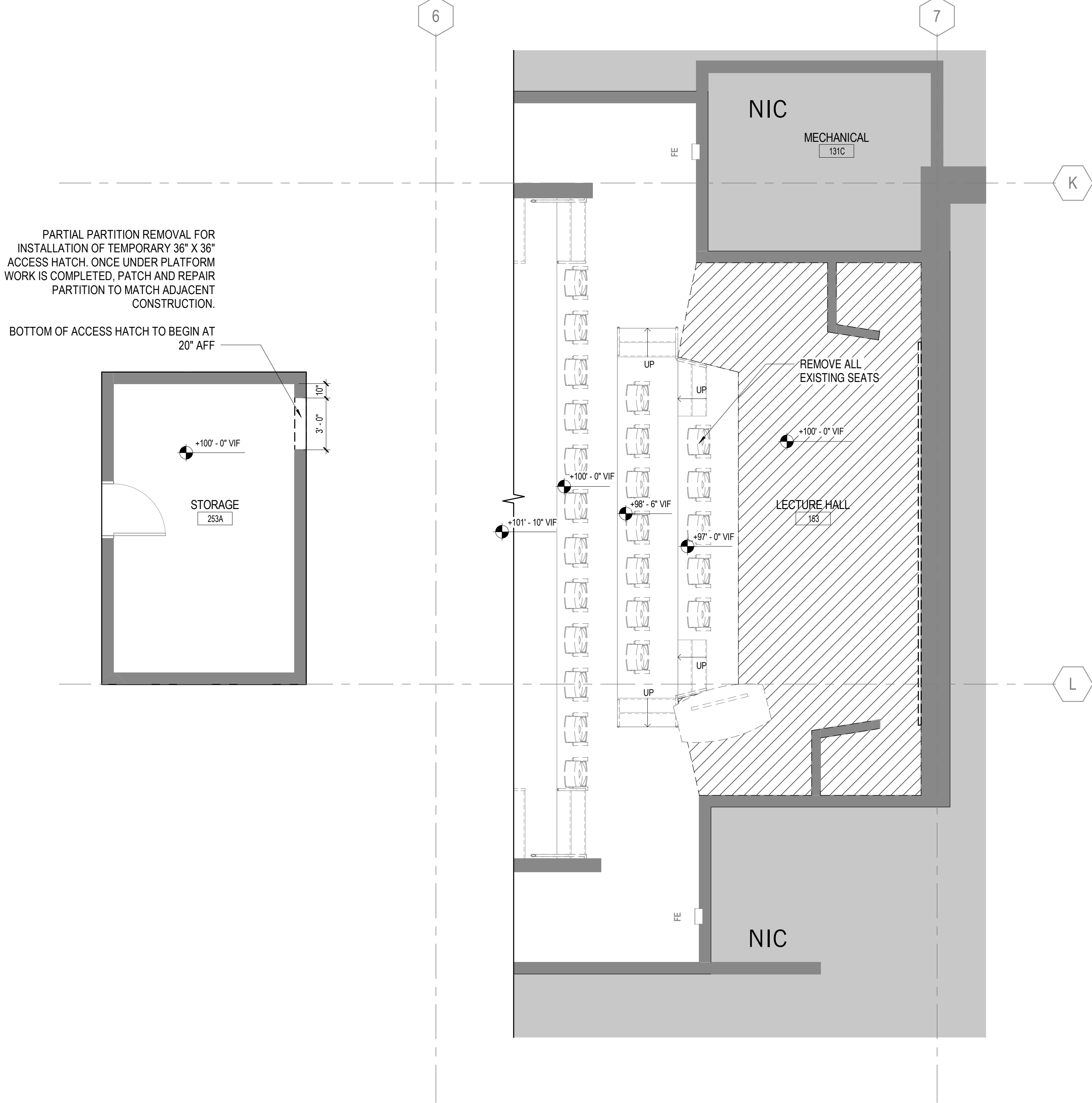
REFERENCE SHEET

SHEET NUMBER

A00-01



2 LEVEL 02 OVERALL DEMO FLOOR PLAN
1/4" = 1'-0"



1 LEVEL 01 OVERALL DEMO FLOOR PLAN
1/4" = 1'-0"

DEMOLITION PLAN KEYNOTES		DEMOLITION PLAN LEGEND	DEMOLITION PLAN GENERAL NOTES	
DM3 DEMOLISH EXISTING PARTITION		DENOTES AREA "NOT IN CONTRACT" EXISTING CONSTRUCTION TO REMAIN -- -- EXISTING CONSTRUCTION TO BE DEMOLISHED EXISTING DOOR AND FRAME TO REMAIN EXISTING DOOR AND FRAME TO BE DEMOLISHED EX EXISTING FIXTURE TO REMAIN ED EXISTING FIXTURE TO BE DEMOLISHED ER EXISTING FIXTURE TO BE RELOCATED EJ POTENTIAL EXISTING EXPANSION JOINT	1. THE CONTRACTOR SHALL FIELD SURVEY THE SITE OF PROPOSED WORK TO DETERMINE THE EXTENT AND NATURE OF THE DEMOLITION WORK. REFER TO ALL CONTRACT DOCUMENTS FOR ADDITIONAL REQUIREMENTS AND SCOPE OF DEMOLITION WORK. REFER TO THE MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS. 2. PROTECTION SHALL BE PROVIDED FOR BASE BUILDING CONSTRUCTION AND ALL EXISTING CONSTRUCTION TO REMAIN INCLUDING, BUT NOT LIMITED TO: FLOORING, PARTITIONS, WINDOW TREATMENTS, BASEBOARDS, CONVECTORS, DOORS, FRAMES, SOFFITS, FINISHES, ETC. 3. ALL WASTE MATERIALS OF ALL SUBCONTRACTORS SHALL BE REMOVED ON A DAILY BASIS, AND STRICT CONTROL SHALL BE EXERCISED OVER JOB CLEANING TO PREVENT ANY DIRT, DEBRIS OR DUST FROM AFFECTING ANY FINISHED AREAS WHETHER WITHIN OR OUTSIDE JOB SITE. BUILDING REFUSE FACILITIES SHALL NOT BE USED FOR THIS PURPOSE, UNLESS ARRANGEMENTS ARE MADE WITH LANDLORD DIRECTLY. DO NOT LET DEBRIS, RUBBISH, OR EXCESS CONSTRUCTION MATERIAL ACCUMULATE NOR OBSTRUCT EXITS AND EXIT PASSAGEWAYS. 4. THE CONTRACTOR SHALL REVIEW ALL EXISTING CONDUIT, WIRING, JUNCTION BOXES, ELECTRICAL COMMUNICATION, AND LIFE SAFETY DEVICES WITH THE LANDLORD AND OWNER PRIOR TO THE COMMENCEMENT OF ANY DEMOLITION WORK. ALL EXISTING ITEMS TO REMAIN SHALL BE PROPERLY MARKED AT THE PROJECT SITE IN ACCORDANCE WITH THE REQUIREMENTS OF THE LANDLORD AND OWNER. 5. COORDINATE WITH OWNER TO VERIFY THAT OWNER HAS REMOVED ALL ITEMS SCHEDULED OR PLANNED TO BE REMOVED BY OWNER. 6. THE CONTRACTOR SHALL PREPARE AN INVENTORY OF EXISTING ITEMS TO BE REUSED, SALVAGED, RELOCATED, AND/OR RETURNED TO THE LANDLORD OR OWNER. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER AND/OR LANDLORD TO DETERMINE ITEMS TO BE INVENTORIED, AND THE FORMAT OF THE INVENTORY PRIOR TO THE COMMENCEMENT OF WORK. CAREFULLY REMOVE AND NEATLY STORE AND PROTECT FROM DAMAGE ALL ITEMS IN THE CONTRACT DOCUMENTS TO BE REUSED, SALVAGED AND/OR RELOCATED AND LOCATION OF ON-SITE AND/OR OFF-SITE STORAGE. 7. ALL MATERIALS WHICH ARE NOT REQUIRED TO BE REUSED, SALVAGED AND RELOCATED SHALL BECOME THE PROPERTY OF THE CONTRACTOR. THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL HAULING AND DISPOSAL OF DEBRIS IN ACCORDANCE WITH STATE LAWS AND LOCAL ORDINANCES. 8. REMOVE ALL CONSTRUCTION INDICATED IN THE DOCUMENTS AS EXISTING TO BE REMOVED, INCLUDING, BUT NOT LIMITED TO: FLOOR AND CEILING, HANGERS, STRAPS AND MISCELLANEOUS APPURTENANCES RELATED TO THE ITEMS BEING REMOVED U.N.O. 9. WHERE PARTITIONS ARE BEING REMOVED, ALL ELECTRICAL OUTLETS AND SWITCHES SHALL BE DISCONNECTED AT SUPPLY JUNCTION BOXES AND SALVAGED. 10. WHERE PARTITIONS ARE BEING REMOVED, THERMOSTATS ARE TO BE REMOVED, STORED, AND RELOCATED AS INDICATED. 11. WHERE PLUMBING, WATER LINES, WASTES, AND VENTS ARE REMOVED, THEY SHALL BE DISCONNECTED AND CAPPED AT THE TAP CONNECTION; ADEQUATELY RECESS TO ACCOMMODATE PATCHING AND FINISH OF THE FINISH SURFACE. 12. WHERE EXISTING PARTITIONS ARE TO REMAIN, REMOVE EXISTING FINISH MATERIALS AND SURFACE MOUNTED ELEMENTS WHERE INDICATED. 13. WHERE TACKLESS CARPET AND/OR PAD ARE BEING REMOVED, REMOVE MECHANICAL ATTACHMENTS TO THE FLOOR, REMOVE ALL ADHESIVE TO LEAVE THE FLOOR WITH A SMOOTH FINISH. 14. WHERE GLUE DOWN CARPET, RESILIENT FLOORING OR OTHER GLUED FLOOR INSTALLATIONS ARE TO BE REMOVED, REMOVE ALL ADHESIVE TO LEAVE THE FLOOR WITH A SMOOTH FINISH. 15. REMOVE & SALVAGE ALL LOW VOLTAGE CABLING AND CONNECTORS THAT ARE NOT REQUIRED FOR THE OPERATION OF THE FINAL LOW VOLTAGE SYSTEM. 16. ALL EMPTY CONDUITS TO BE REMOVED. 17. REPAIR DEMOLITION PERFORMED IN EXCESS OF THAT REQUIRED AT NO COST TO OWNER OR ARCHITECT. IMMEDIATELY REPAIR ANY DAMAGES CAUSED TO ADJACENT FACILITIES BY DEMOLITION OPERATIONS. 18. OFFER ALL DOORS AND FRAMES NOT DESIGNATED FOR REUSE TO THE OWNER PRIOR TO DEMOLITION. 19. ALL COVER PLATES TO BE SALVAGED AND REUSED. ANY NOT REUSED TO BE RETURNED TO OWNER. 20. ALL FIXTURES AND APPURTENANCES, WITH THE EXCEPTION OF CEILINGS, TO BE SALVAGED AND OWNER GIVEN FIRST RIGHT OF REFUSAL.	

MEP ENGINEERING
MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014
MECHANICAL SERVICES ASSOCIATES
CORP.

NOTE: DOCUMENTS ARE
COMPLETE AND MAY NOT BE
USED FOR REGULATORY
APPROVAL, PERMITTING, OR
CONSTRUCTION PURPOSES.

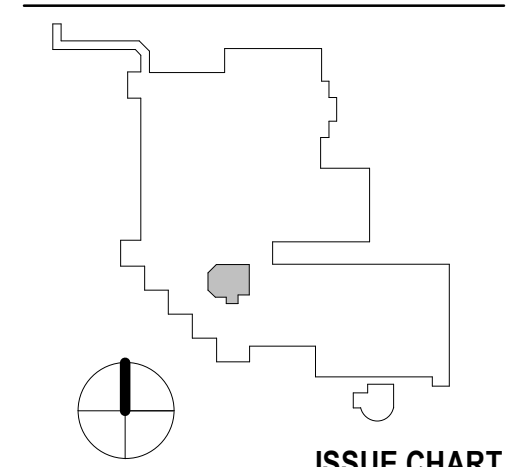
PROJECT

**MAC ROOM 153
RENOVATION**
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART



DEMOLITION RCP LEGEND		DEMOLITION REFLECTED CEILING PLAN GENERAL NOTES	
	DENOTES AREA "NOT IN CONTRACT"	1. THE CONTRACTOR SHALL FIELD SURVEY THE SITE OF PROPOSED WORK TO DETERMINE THE EXTENT AND NATURE OF THE DEMOLITION WORK. REFER TO ALL CONTRACT DOCUMENTS FOR ADDITIONAL REQUIREMENTS AND SCOPE OF DEMOLITION WORK. REFER TO THE MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS.	9. WHERE PLUMBING, WATER LINES, WASTES, AND VENTS ARE REMOVED, THEY SHALL BE DISCONNECTED AND CAPPED AT THE TAP CONNECTION; ADEQUATELY RECESS TO ACCOMMODATE PATCHING AND FINISH OF THE FINISH SURFACE.
	EXISTING CONSTRUCTION TO REMAIN	2. PROTECTION SHALL BE PROVIDED FOR BASE BUILDING CONSTRUCTION AND ALL EXISTING CONSTRUCTION TO REMAIN INCLUDING, BUT NOT LIMITED TO, FLOORING, PARTITIONS, WINDOW TREATMENTS, BASEBOARDS, CONNECTORS, DOORS, FRAMES, SOFFITS, FINISHES, ETC.	10. REMOVE ALL LOW VOLTAGE CABLING AND CONNECTORS THAT ARE NOT REQUIRED FOR THE OPERATION OF THE FINAL LOW VOLTAGE SYSTEM.
	EXISTING CONSTRUCTION TO BE DEMOLISHED	3. ALL WASTE MATERIALS OF ALL SUB-CONTRACTORS SHALL BE REMOVED ON A DAILY BASIS, AND STRICT CONTROL SHALL BE EXERCISED OVER JOB CLEANING TO PREVENT ANY DIRT, DEBRIS OR DUST FROM AFFECTING ANY FINISHED AREAS WHETHER WITHIN OR OUTSIDE JOB SITE. BUILDING REFUSE FACILITIES SHALL NOT BE USED FOR THIS PURPOSE. UNLESS ARRANGEMENTS ARE MADE WITH OWNER DIRECTLY, DO NOT LET DEBRIS, RUBBISH, OR EXCESS CONSTRUCTION MATERIAL ACCUMULATE NOR OBSTRUCT EXITS AND EXIT PASSAGeways.	11. ALL EMPTY CONDUITS TO BE REMOVED.
EX	EXISTING FIXTURE TO REMAIN	4. THE CONTRACTOR SHALL REVIEW ALL EXISTING CONDUIT, WIRING, JUNCTION BOXES, ELECTRICAL COMMUNICATION, AND LIFE SAFETY DEVICES WITH THE OWNER PRIOR TO THE COMMENCEMENT OF ANY DEMOLITION WORK. ALL EXISTING ITEMS TO REMAIN SHALL BE PROPERLY MARKED AT THE PROJECT SITE IN ACCORDANCE WITH THE REQUIREMENTS OF THE OWNER.	12. REPAIR DEMOLITION PERFORMED IN EXCESS OF THAT REQUIRED AT NO COST TO OWNER OR ARCHITECT. IMMEDIATELY REPAIR ANY DAMAGES CAUSED TO ADJACENT FACILITIES BY DEMOLITION OPERATIONS.
ED	EXISTING FIXTURE TO BE DEMOLISHED	5. COORDINATE WITH OWNER TO VERIFY THAT OWNER HAS REMOVED ALL ITEMS SCHEDULED OR PLANNED TO BE REMOVED BY OWNER.	13. ALL LIGHT FIXTURES AND COVER PLATES TO BE SALVAGED. COORDINATE WITH OWNER, REF: A12-01.
ER	EXISTING FIXTURE TO BE RELOCATED	6. THE CONTRACTOR SHALL PREPARE AN INVENTORY OF EXISTING ITEMS TO BE REUSED, SALVAGED, RELOCATED, AND/OR RETURNED TO THE OWNER. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER TO DETERMINE ITEMS TO BE INVENTORIED, AND THE FORMAT OF THE INVENTORY PRIOR TO THE COMMENCEMENT OF WORK. CAREFULLY REMOVE AND NEATLY STORE AND PROTECT FROM DAMAGE ALL ITEMS IN THE CONTRACT DOCUMENTS TO BE REUSED, SALVAGED AND/OR RELOCATED AND LOCATION OF ON-SITE AND/OR OFF-SITE STORAGE.	14. ALL UNUSED DEMOLISHED LIGHT FIXTURES TO BE SALVAGED AND RETURNED TO OWNER.
		7. ALL MATERIALS WHICH ARE NOT REQUIRED TO BE REUSED, SALVAGED AND RELOCATED SHALL BECOME THE PROPERTY OF THE CONTRACTOR. THE CONTRACTOR IS TO BE RESPONSIBLE FOR ALL HAULING AND DISPOSAL OF DEBRIS IN ACCORDANCE WITH STATE LAWS AND LOCAL ORDINANCES.	15. ALL DIMENSIONS, SPOT ELEVATIONS AND SLOPES TO BE FIELD VERIFIED.
		8. REMOVE ALL CONSTRUCTION INDICATED IN THE DOCUMENTS AS EXISTING TO BE REMOVED, INCLUDING, BUT NOT LIMITED TO, FLOOR AND CEILING, HANGERS, STRAPS AND MISCELLANEOUS APPURTENANCES RELATED TO THE ITEMS BEING REMOVED, U.N.O.	16. ALL FIXTURES AND APPURTENANCES, WITH THE EXCEPTION OF CEILINGS, TO BE SALVAGED AND OWNER GIVEN FIRST RIGHT OF REFUSAL.

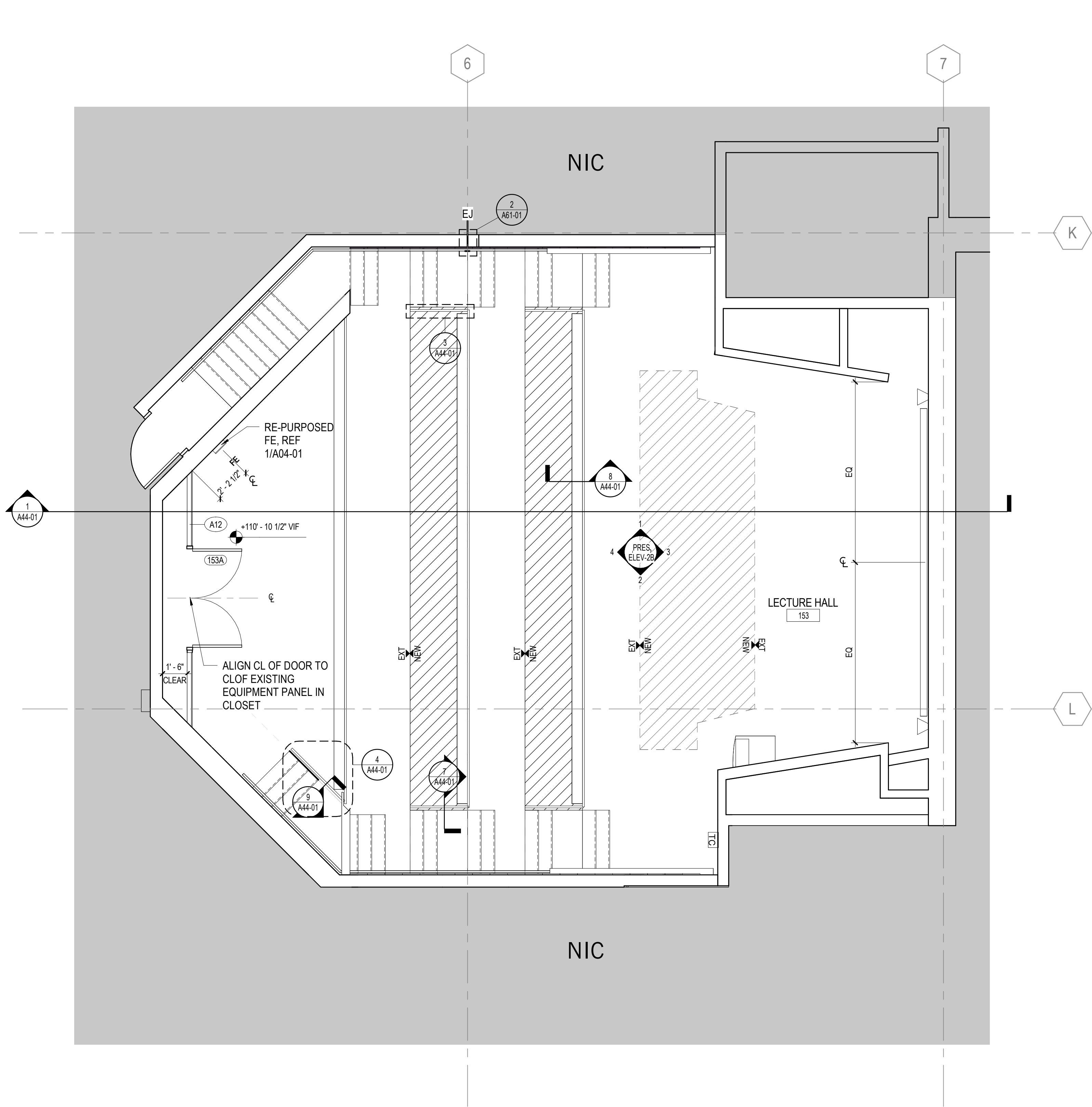
1	ISSUE FOR BID & PERMIT	03/07/2018
#	ISSUE	DATE
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	

TITLE

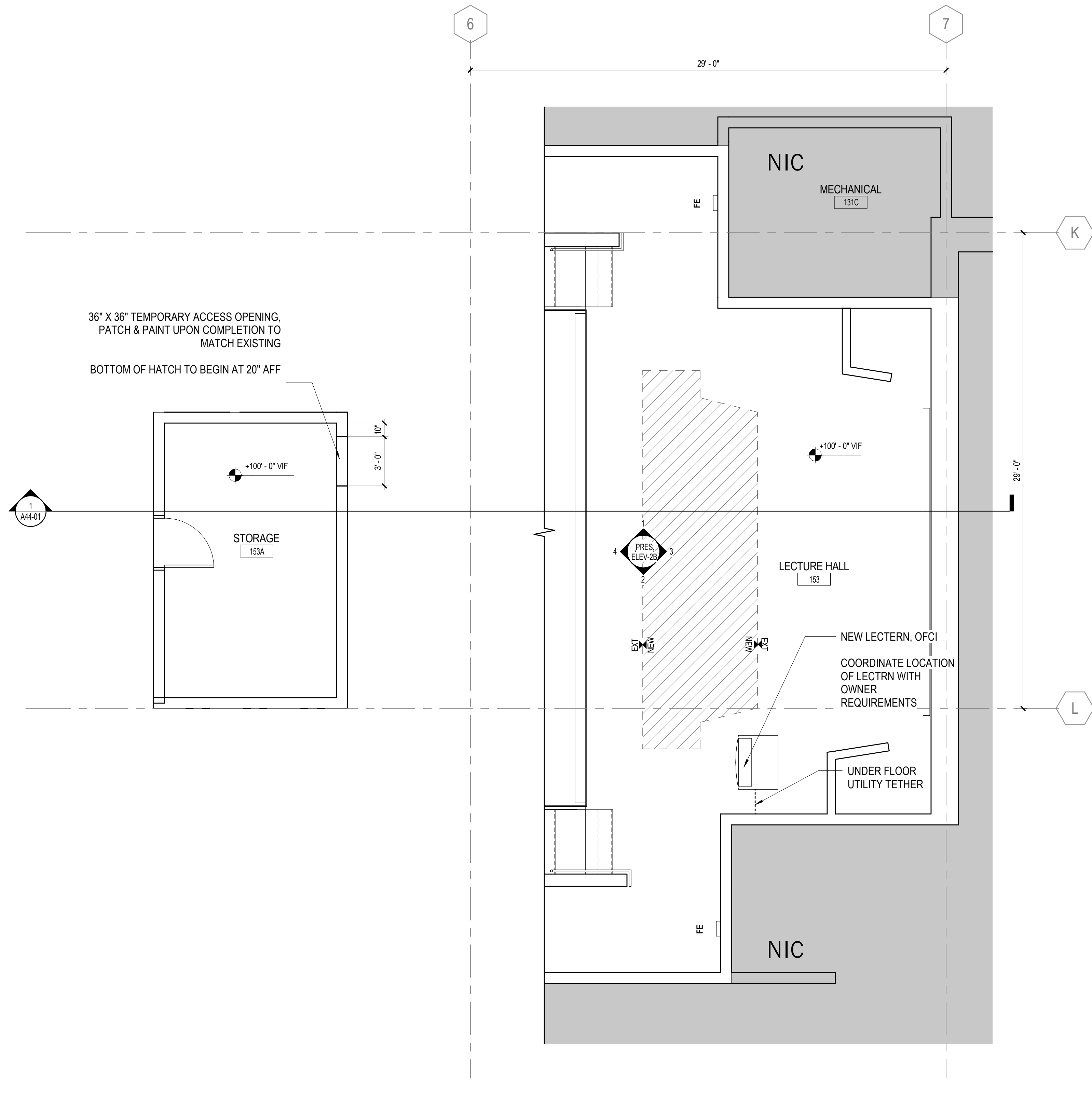
**DEMOLITION
REFLECTED CEILING
PLAN**

SHEET NUMBER

A05-01



③ LEVEL 02 FLOOR PLAN
1/4" = 1'-0"



① LEVEL 01 FLOOR PLAN
1/4" = 1'-0"

CONSTRUCTION PLAN LEGEND	CONSTRUCTION PLAN GENERAL NOTES
DENOTES AREA "NOT IN CONTRACT" EXISTING CONSTRUCTION TO REMAIN NEW PARTITION 151A DOOR TAG (NEW DOOR) EXISTING DOOR NEW FLOOR EXTENSION - GEOFOAM INFILL WITH CONCRETE TOPPING 1B PARTITION TYPE TAG TEMPORARY CONSTRUCTION DUST PARTITION TC EXISTING TIME CLOCK TO REMAIN	1. ALL NEW PARTITIONS SHALL BE TYPE A-1, UNO, REFER TO SHEET A61-01 FOR MORE INFORMATION. PARTITION TYPES AND FIRE RESISTIVE RATINGS INDICATED ARE TO BE CONTINUOUS FOR THE LENGTH AND HEIGHT OF THE PARTITION. 2. TYPICAL DIMENSIONS ARE TO THE FINISHED FACE OF PARTITION, UNO. PARTITIONS DIMENSIONED TO CENTERLINE OF STUD ARE SO NOTED. 3. LAYOUT PARTITIONS FOR ARCHITECT TO REVIEW FOR DESIGN INTENT. DO NOT PROCEED WITH INSTALLATION OF RUNNERS OR STUDS WITHOUT THIS REVIEW. 4. LOCATE DOORS 4" FROM FACE OF INTERSECTING PARTITION TO INSIDE EDGE OF DOOR FRAME, UNO. 5. THE CONTRACTOR SHALL PATCH AND REPAIR ALL EXISTING AND NEW WALL SURFACES AS REQUIRED PRIOR TO APPLYING FINISHES. 6. WHERE EXISTING WALL BASE OR WALLCOVERING HAS BEEN REMOVED, SKIM COAT WALL SURFACE TO MAKE SMOOTH TO MATCH ADJACENT CONSTRUCTION SO AS NOT TO TELEGRAPH THROUGH FOR NEW FINISH. 7. WHERE NEW PARTITION IS A CONTINUATION OF AN EXISTING PARTITION, THE FACE OF THE NEW PARTITION SHALL BE ALIGNED WITH THE FACE OF THE EXISTING PARTITION 8. WHERE PARTITION IS TO ALIGN WITH THE FACE OF AN EXISTING DRYWALL CORNER OR EDGE, REMOVE THE EXISTING CORNER BEAD, TAPE, APPLY JOINT COMPOUND, AND SAND SMOOTH. NEW AND EXISTING DRYWALL TO BE IN THE SAME PLANE WITH NO VISIBLE JOINTS. 9. THE CONTRACTOR SHALL SURVEY FLOOR ELEVATIONS TO DETERMINE SCOPE OF FLOOR LEVELING AND REMEDIAL REPAIR WORK. THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK ALL COSTS THAT ARE ASSOCIATED WITH FLOOR LEVELING AND ASSOCIATED REMEDIAL REPAIR WORK. FLOOR SHALL BE LEVEL WITHIN 1/4" IN 10'-0" RADIUS. 10. OPENINGS IN GYPSUM BOARD FOR ELECTRICAL AND COMMUNICATION RECEPTACLE, PIPING, DUCTWORK, AND OTHER PENETRATIONS SHALL MAINTAIN TIGHT TOLERANCES. EXPOSED EDGES SHALL BE COVERED BY TRIM PLATES OR ESCUTCHEONS. 11. PARTITIONS NOT DIMENSIONED ARE GENERALLY LOCATED BY ONE OF THE FOLLOWING CRITERIA: A. CENTERLINE: CENTER OF PARTITION ALIGNS WITH THE CENTER OF GRIDLINE OR OBJECT CENTERLINE (SUCH AS A COLUMN OR MULLION). CENTER THE OVERALL PARTITION WIDTH RATHER THAN STUD WIDTH ON THE LINE. B. ALIGN: LOCATE PARTITION FLUSH WITH FACE OF GYPSUM BOARD, OR OTHER SURFACE INDICATED. C. MAINTAIN DIMENSIONS NOTED AS MINIMUM, CLEAR, OR HOLD. 12. ALL EXISTING CONCRETE WALLS AND CONCRETE OR STEEL COLUMNS ARE TO BE FURRED-OUT WITH METAL STUDS OR HAT CHANNELS AS MINIMALLY AS REQUIRED FOR THE INSTALLATION OF CONDUIT, JUNCTION BOXES, ACCESSORIES, BLOCKING, ETC., EXCEPT WHERE THE WALLS AND COLUMN ENCLOSURES ARE REQUIRED TO ALIGN OR ARE DIMENSIONED TO THE CONTRARY. 13. PROVIDE METAL BACKING PLATES OR SOLID WOOD BLOCKING (FIRE TREATED) IN PARTITIONS FOR MILLWORK, FURNITURE AND WALL ATTACHED ITEMS. COORDINATE PLACEMENT OF BLOCKING PRIOR TO CLOSING WALLS. 14. EXPOSED WOOD SHALL BE FINISH GRADE HARDWOOD - FILLED, SANDED, PRIMED AND READY FOR SCHEDULED FINISH. 15. SEAL PENETRATIONS IN GYPSUM BOARD CONSTRUCTION ABOVE FINISHED CEILING TO PREVENT SOUNDS LEAKAGE AT ACOUSTICAL PARTITIONS AND AT DEMISING PARTITIONS, UNO. PENETRATIONS AND OPENINGS ABOVE CEILING IN EXISTING PARTITIONS SHALL BE FILLED OR SEALED TO MATCH EXISTING WALL CONSTRUCTION. 16. OPENINGS IN RATED WALLS, FLOORS, CEILINGS AND ROOF ASSEMBLIES SHALL BE SEALED WITH A FIRE RESISTIVE JOINT SYSTEM OR PROTECTED WITH A FIRE-RATED CHASE. 17. WHEN UNDIMENSIONED PARTITIONS APPEAR IN CONJUNCTION WITH DOOR OPENINGS, DOOR WIDTH AND DOOR FRAME DETAILS DETERMINE LOCATION OF ADJACENT WALLS AND FRAMES.

1	ISSUE FOR BID & PERMIT	03/07/2018
2	DATE	
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	

TITLE

OVERALL FLOOR
PLANS

SHEET NUMBER

A11-01

NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION PURPOSES.

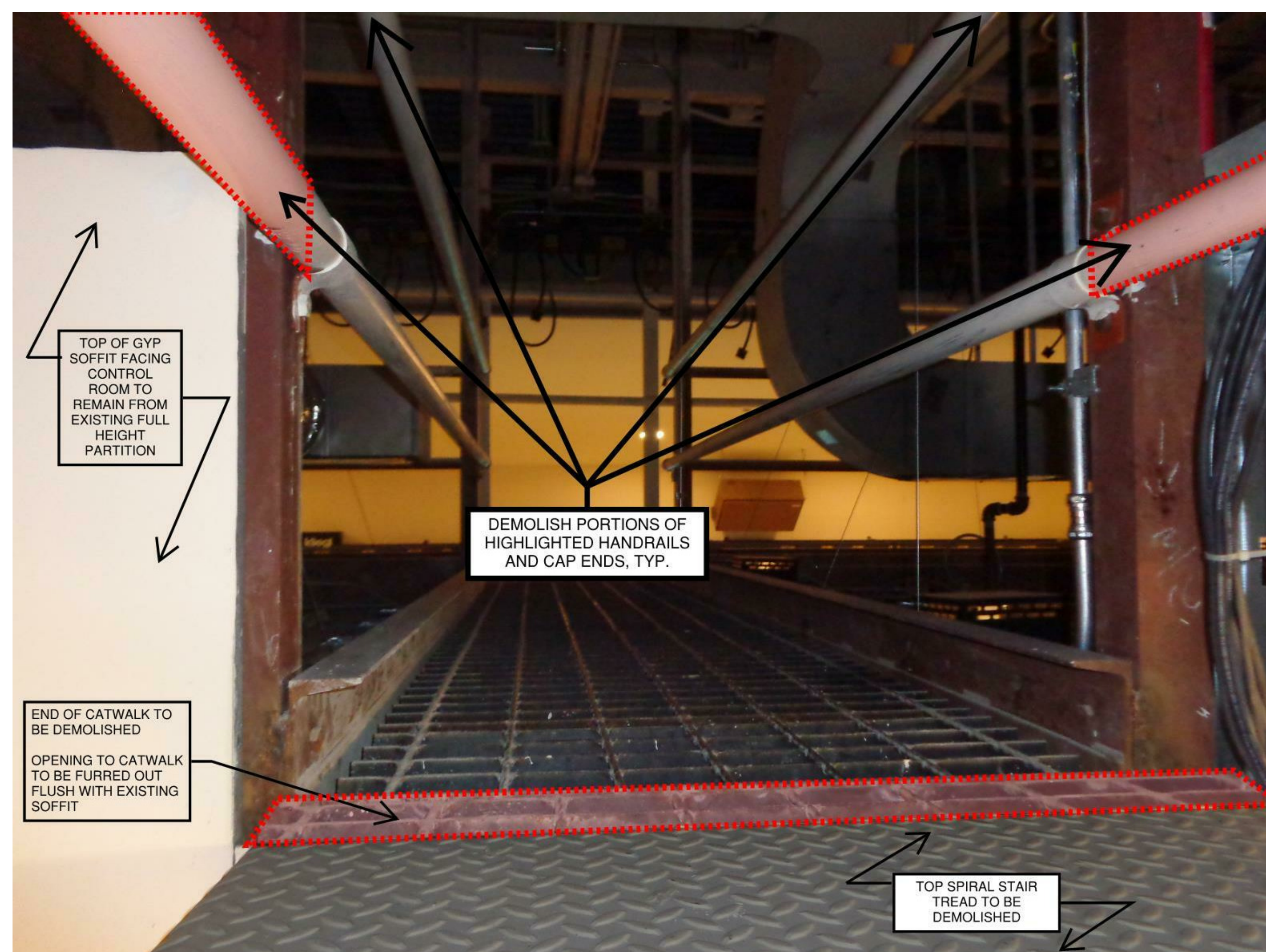
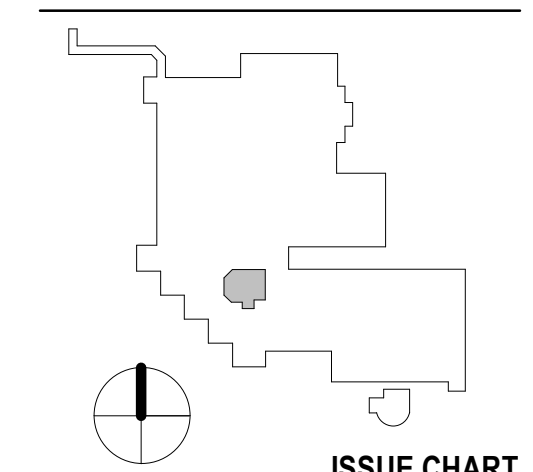
PROJECT

**MAC ROOM 153
RENOVATION**
425 FAWELL BLVD.
GLEN ELLYN, IL 60137

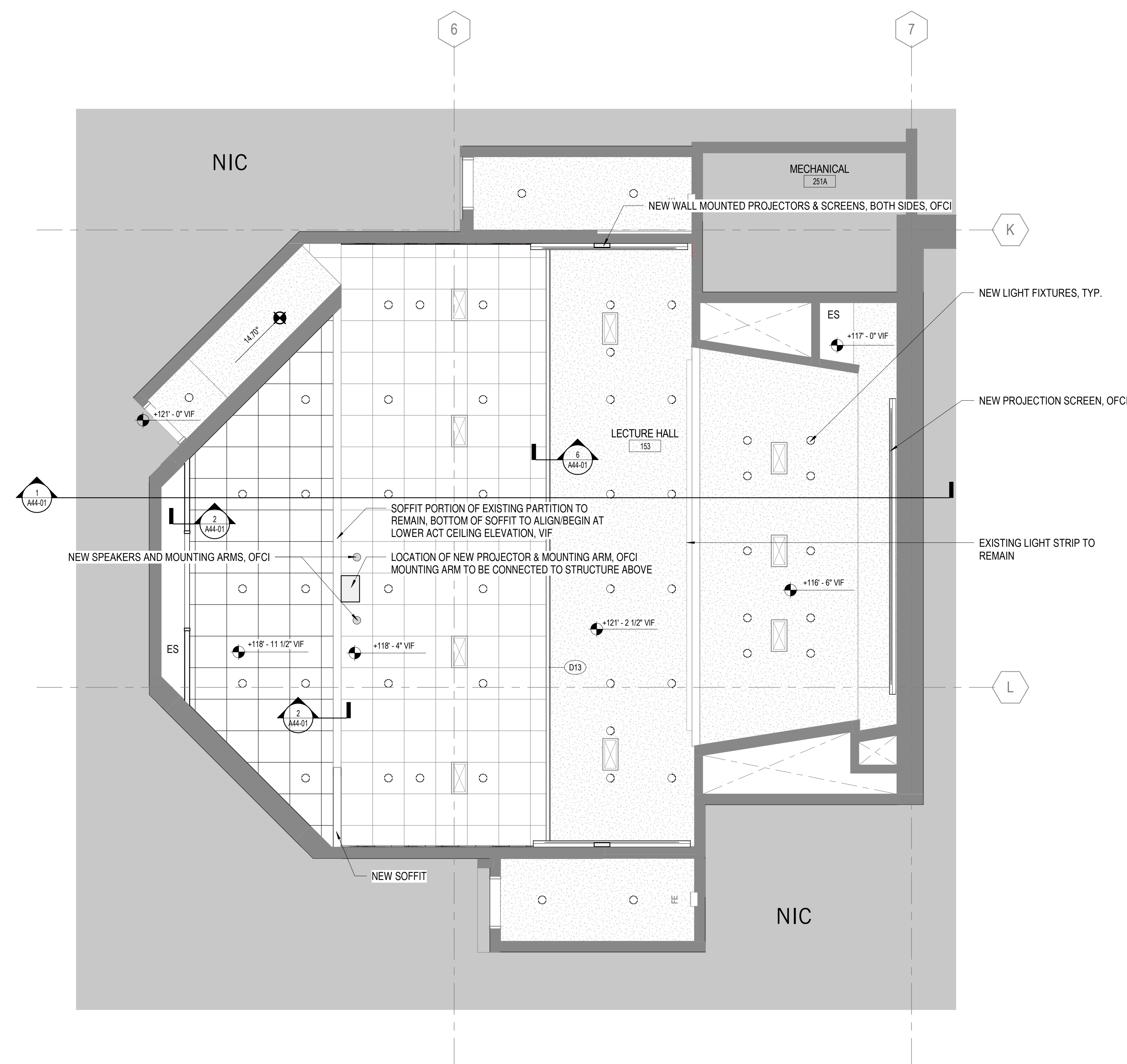


COLLEGE OF DUPAGE

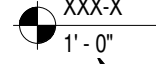
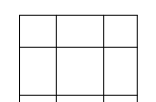
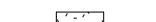
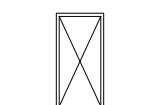
KEYPLAN



2 CATWALK ENTRY DEMOLITION
NOT TO SCALE



1 OVERALL REFLECTED CEILING PLAN
1/4" = 1'-0"

REFLECTED CEILING PLAN LEGEND	REFLECTED CEILING PLAN GENERAL NOTES
 CEILING MATERIAL  CEILING HEIGHT  DENOTES AREA "NOT IN CONTRACT"  ACOUSTICAL PANEL CEILING ACT-1 FOR NEW CONSTRUCTION  GYPSUM BOARD CEILING  EXISTING DIFFUSER ES EXPOSED STRUCTURE LIGHT FIXTURE SYMBOLS  RECESSED CAN FIXTURE	1. SEE ENGINEERING DRAWINGS FOR LOCATION OF ALL EXIT SIGNS, DIFFUSERS, FIRE PROTECTION SPRINKLER HEADS, SPEAKERS, EMERGENCY LIGHT FIXTURES, ETC. 2. REFER TO POWER AND COMMUNICATION PLANS FOR PLACEMENT OF ADDITIONAL CEILING MOUNTED ELECTRICAL DEVICES. VERIFY WITH ARCHITECT LOCATION OF VISIBLE CEILING ELEMENTS NOT SHOWN ON ARCHITECTURAL DRAWINGS PRIOR TO INSTALLATION. 3. CENTER ALL CEILING MOUNTED LIGHT FIXTURES, LIFE SAFETY DEVICES, SPEAKERS, SPRINKLERS AND OTHER ELEMENTS IN THE CENTER OF THE ACOUSTIC TILE IN BOTH DIRECTIONS, UNO. 4. LIGHTING FIXTURES ARE DIMENSIONED TO CENTER OF FIXTURE, UNLESS OTHERWISE NOTED. 5. ALIGN NEW LIGHT FIXTURES WITH EXISTING LIGHT FIXTURES, TYP. 6. IF LOCATION DIMENSIONS ARE NOT INDICATED, FINAL POSITION OF ANY/ALL EXPOSED ELEMENTS SHALL BE COORDINATED WITH ARCHITECT. 7. CENTER ALL ACT CEILINGS IN ROOM, UNO. CENTER FIXTURES IN CORRIDOR, UNO. 8. COORDINATE EXIT SIGNS W/ DOOR SWINGS. 9. PROJECTORS, SCREENS AND PROJECTION MOUNTING BRACKETS BY OWNER, UNO. 10. FINAL LOCATION OF PROJECTOR TO BE COORDINATED WITH OWNER EQUIPMENT SELECTION & IT DEPARTMENT. 11. MAIN PROJECTOR TO BE CEILING MOUNTED/SIDE PROJECTORS TO BE WALL MOUNTED, CENTERED ON PROJECTION SCREENS AND FREE FROM OBSTRUCTION BY PENDANT LIGHT FIXTURES OR OTHER OBJECTS, UNO. SEE CONSTRUCTION PLANS FOR DIMENSIONS FOR SCREENS NOT CENTERED IN ROOM. 12. LOCATE ACCESS PANELS AS INDICATED ON THE DRAWINGS. FOR ACCESS PANELS NOT SHOWN BUT REQUIRED BY PROVISIONS OF THE CONTRACT DOCUMENTS, LOCATE IN ACCORDANCE WITH APPLICABLE CODES. FIELD VERIFY LOCATION OF ACCESS PANELS, AND MARK ON WALL FOR ARCHITECT'S REVIEW. 13. VERIFY THAT CEILING AND ABOVE-CEILING ELEMENTS FIT IN PLENUM AS INDICATED BEFORE PROCEEDING WITH FRAMING CEILING. NOTIFY ARCHITECT IF RELOCATION IS REQUIRED OR IF SHIFTING OF GRID OR OTHER ELEMENT ARE NECESSARY. 14. INSTALL SIGHT BAFFLES AT RETURN AIR SLOTS. PAINT ANY NEW OR EXISTING AREA OR ITEM ABOVE THE CEILING VISIBLE FROM THE ROOM SIDE, INCLUDING DUCTWORK, NON-SPECULAR BLACK. 15. DO NOT HANG (SUPPORT) ANY ITEMS FROM METAL ROOF DECK. 17. GANG SWITCHES UNDER A SINGLE COVER/PLATE. SWITCHES THAT CANNOT BE GANGED TOGETHER SHALL BE LOCATED AS CLOSE TOGETHER AS POSSIBLE AND MOUNTED AT THE SAME HEIGHT. 18. THE CONTRACTOR SHALL FIELD SURVEY THE SITE OF THE PROPOSED WORK TO DETERMINE EXTENT AND NATURE OF THE DEMOLITION WORK. 19. WHERE INDICATED OR INFERRED, REMOVE THE EXISTING ACOUSTIC CEILING. 20. WHERE INDICATED OR INFERRED, REMOVE EXISTING LIGHT FIXTURES, SALVAGE FOR REINSTALLATION UNDER THIS CONTRACT, TURN OVER EXCESS FIXTURES TO THE OWNER. COORDINATE WITH ENGINEERING DRAWINGS.

1	ISSUE FOR BID & PERMIT	03/07/2018
#	ISSUE	DATE
Job Number		024303.007
Drawn	JA	
Checked	MD	
Approved	MD	

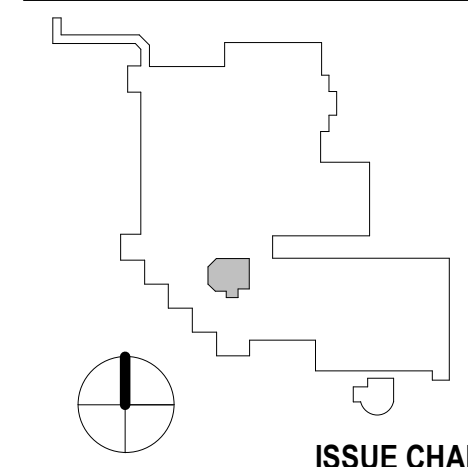
TITLE

REFLECTED CEILING
PLAN

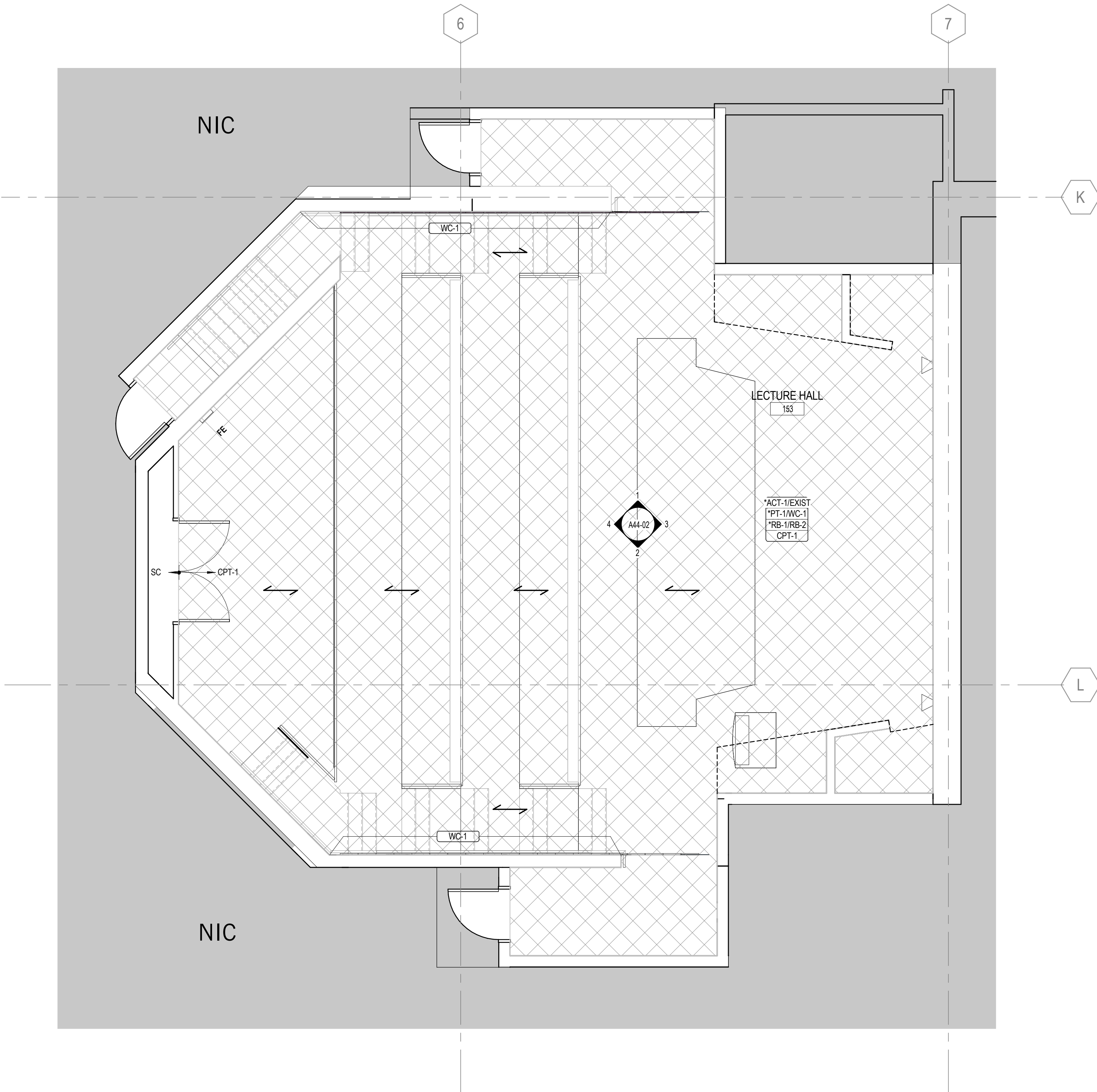
SHEET NUMBER

A12-01

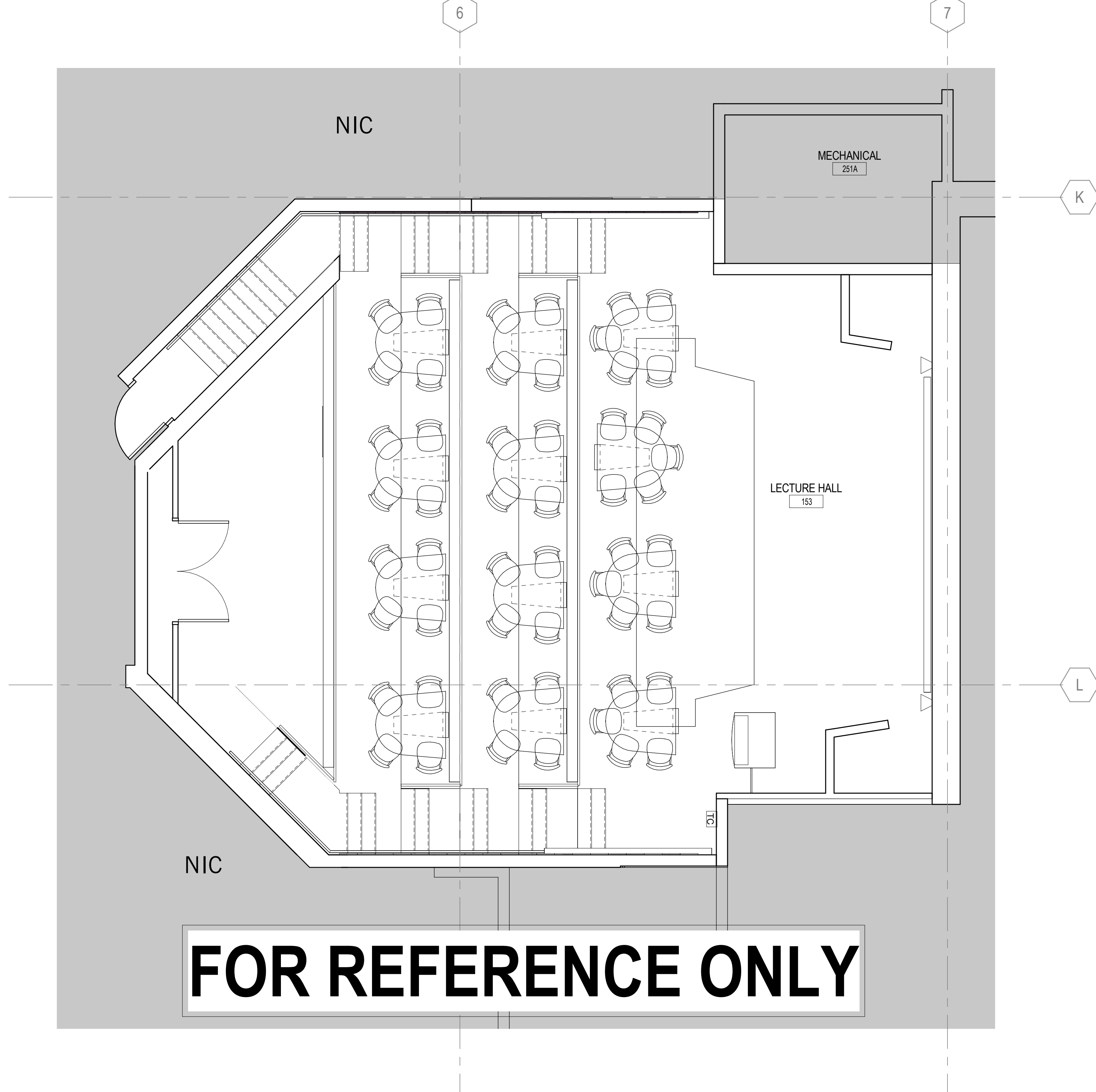
Copyright © 2018 Perkins+Will



1	ISSUE FOR BID & PERMIT	03/07/2018
#	ISSUE	DATE
Job Number		024303.007
Drawn		JA
Checked		MD
Approved		MD
TITLE		



2 OVERALL FINISH PLAN
1/4" = 1'-0"



1 OVERALL FURNITURE PLAN FOR REFERENCE ONLY
1/4" = 1'-0"

FINISH LEGEND

TAG	MANUFACTURER	STYLE	COLOR/FINISH	SIZE	COMMENTS	CONTACT
ACOUSTICAL PANEL CEILING						
ACT-1	MATCH EXISTING	MATCH EXISTING	MATCH EXISTING	24" x 24"	WITHIN TOP TIER AREA THAT WAS CONTROL RM	
FLOORING						
CPT-1	TANDUS CENTIVA	INPUT	CABLE JETTING	24" x 24"	-	Brandstedt, Nicolette <Nicolette.Brandstedt@arkett.com>
PAINT						
PT-1	BENJAMIN MOORE	COLOR PREVIEW	WHITE DOVE OC-17	-	-	Walker, Jason <jason.walker@benjaminmoore.com>
RESILIENT BASE & ACCESSORIES						
RB-1	JOHNSONITE	TRADITIONAL TOELESS 4"	460 COTTON W	4"	-	Scianna, Enza <Enza.Scianna@arkett.com>
RB-2	JOHNSONITE	TRADITIONAL TOELESS 4"	63 BURNT UMBER	4"	-	Scianna, Enza <Enza.Scianna@arkett.com>
WALL COVERING						
WC-1	UNIKA VAEV	E3 TILE - ECOUSTIC FELT	PEWTER	MEDIUM	BACKING COLOR TBD BY ARCHITECT	Chrissy Thompson <chrissy@therudergroup.com>
WC-2	UNIKA VAEV	E3 TILE - ECOUSTIC FELT	SKY	MEDIUM	BACKING COLOR TBD BY ARCHITECT	Chrissy Thompson <chrissy@therudergroup.com>
WC-3	UNIKA VAEV	E3 TILE - ECOUSTIC FELT	LIME	MEDIUM	BACKING COLOR TBD BY ARCHITECT	Chrissy Thompson <chrissy@therudergroup.com>

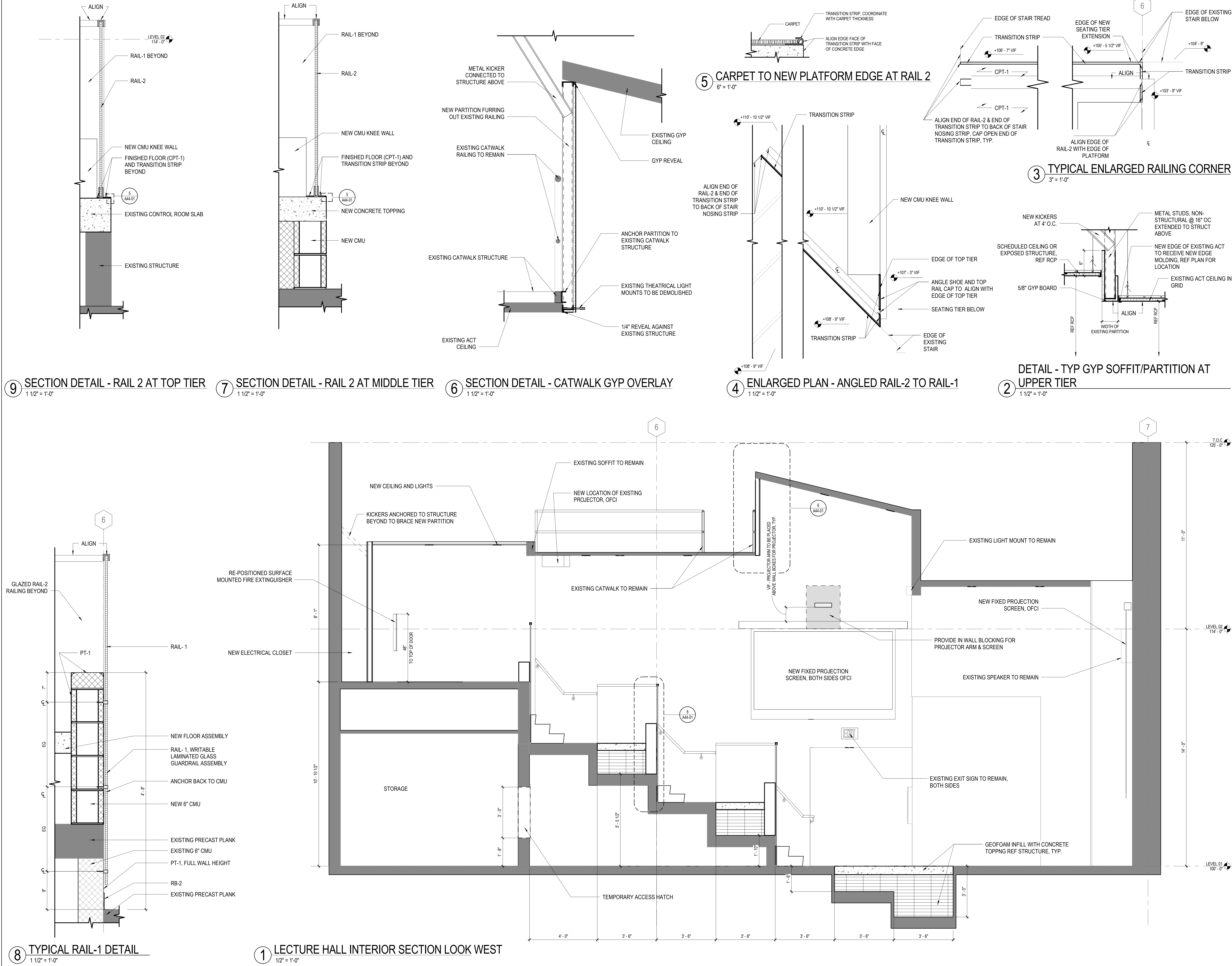
FINISH PLAN LEGEND

	DENOTED AREA "NOT IN CONTRACT"		EXISTING TO REMAIN. REFERENCE ENTIRE DOCUMENTS FOR ADDITIONAL WORK IN THIS AREA
	FINISH TAG		CPT-1
	EXISTING TO REMAIN		
	CEILING FINISH		
	WALL FINISH		
	BASE FINISH		
	FLOOR FINISH		
	DENOTES MULTIPLE FINISHES. REFER TO REFLECTED CEILING PLANS, FLOOR PATTERN PLANS AND/OR ELEVATIONS FOR INFORMATION.		
	MATERIAL TRANSITION TAG		
	MATERIAL PATTERN DIRECTION		
	MATERIAL SEAM		
	SEALED CONCRETE		
	FIRE EXTINGUISHER		

FINISH PLAN GENERAL NOTES

1. REFER TO SHEETS A44-01 & A61-01 FOR INTERIOR DETAILS.
2. ALL WALLS TO BE PAINTED PT-1, U.N.O.
3. RB-2 BASE AT RAIL-1 LOCATIONS.
4. DOORS AND FRAMES - PAINT TO MATCH ADJACENT WALL COLOR.

3/20/18 1:56:15 PM ARCHL_CDD_MAC_153-REV17 2017_detailed.rvt



NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION PURPOSES.

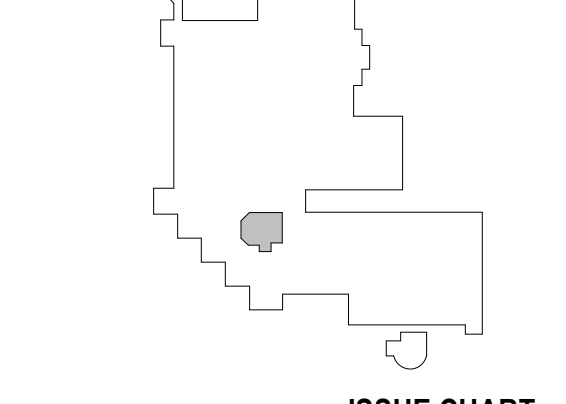
PROJECT

MAC ROOM 153 RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

1	ISSUE FOR BID & PERMIT	03/07/2018
2	DATE	
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	
TITLE		

INTERIOR SECTION & SECTION DETAILS

SHEET NUMBER

A44-01

Copyright © 2018 Perkins+Will

NOTE: DOCUMENTS ARE
INCOMPLETE AND MAY NOT BE
USED FOR REGULATORY
APPROVAL, PERMITTING, OR
CONSTRUCTION PURPOSES.

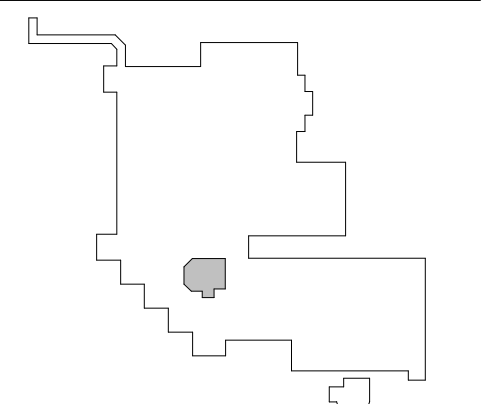
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



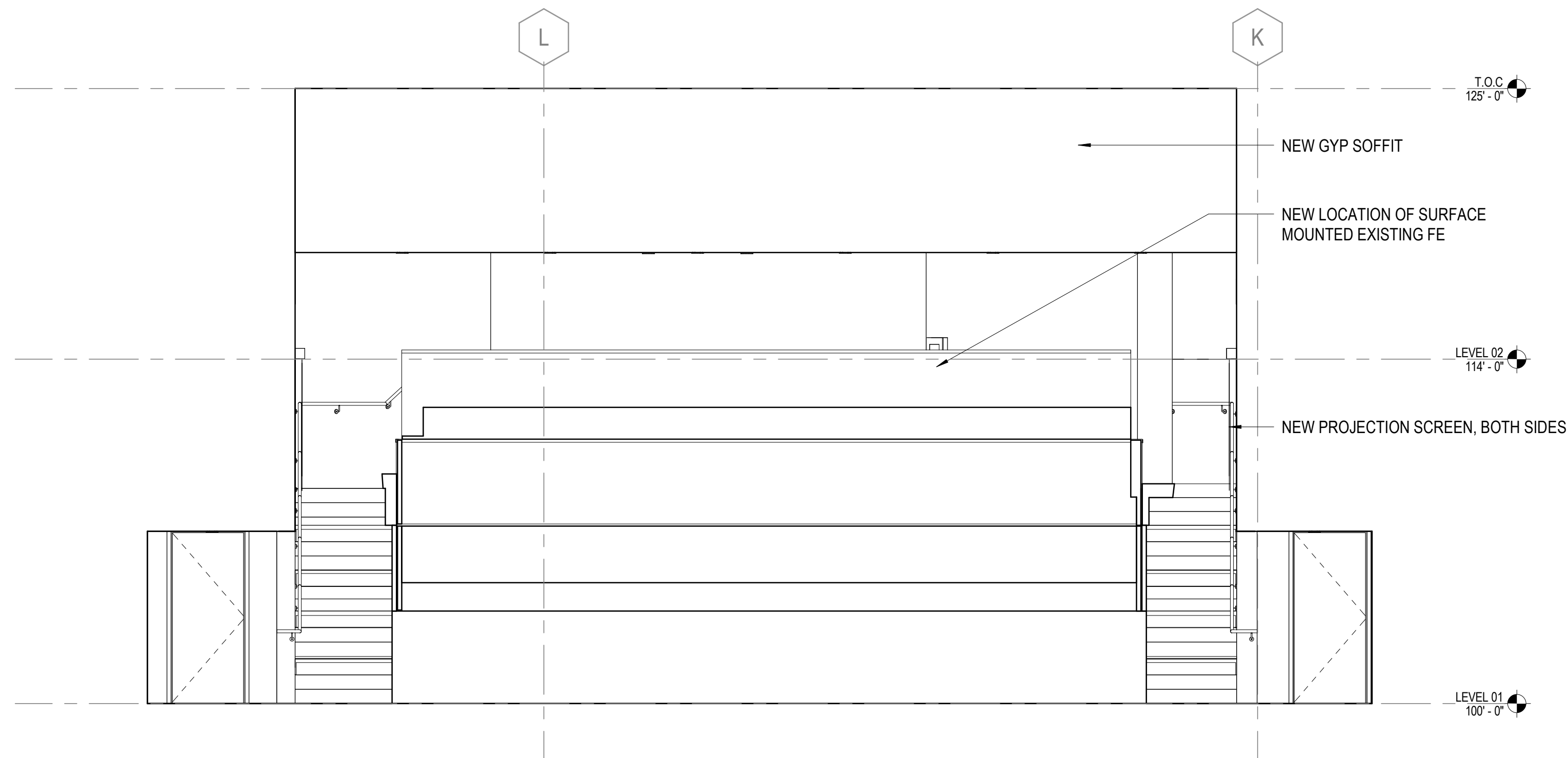
ISSUE CHART

1	ISSUE FOR BID & PERMIT	03/07/2018
2	ISSUE	DATE
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	
TITLE		

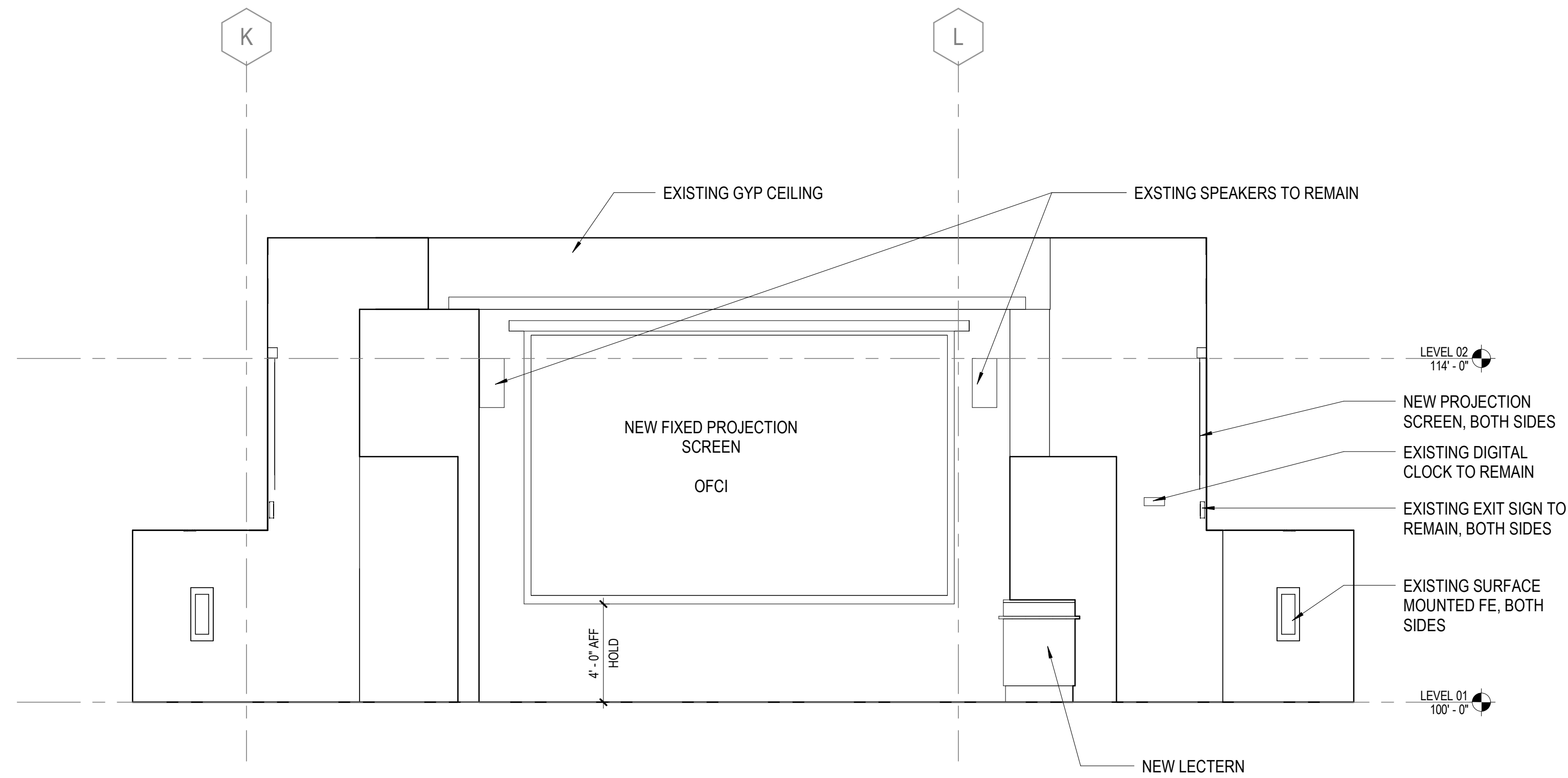
INTERIOR
ELEVATIONS

SHEET NUMBER

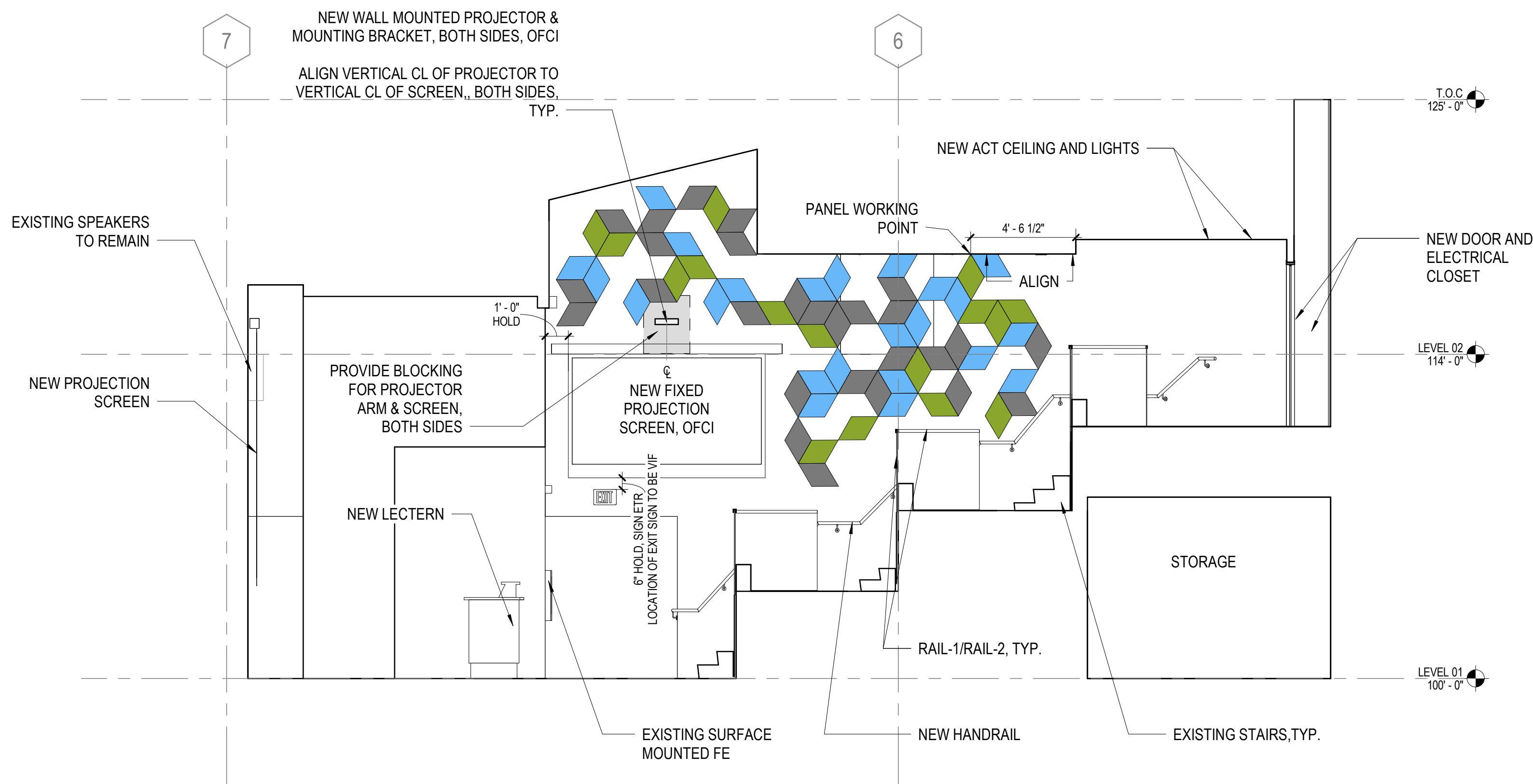
A44-02



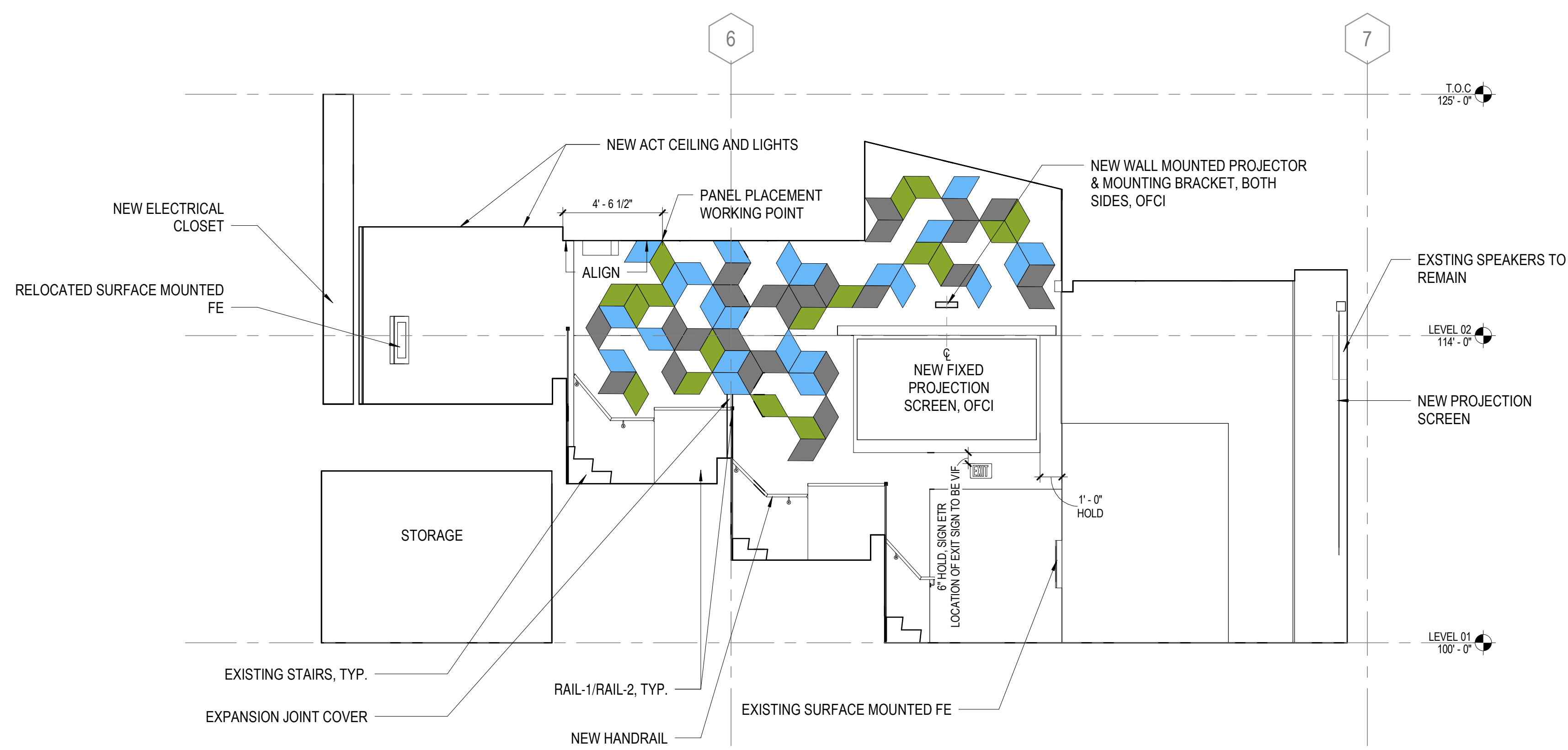
4 MAC RM SOUTH ELEVATION
1/4" = 1'-0"



3 MAC RM NORTH ELEVATION
1/4" = 1'-0"

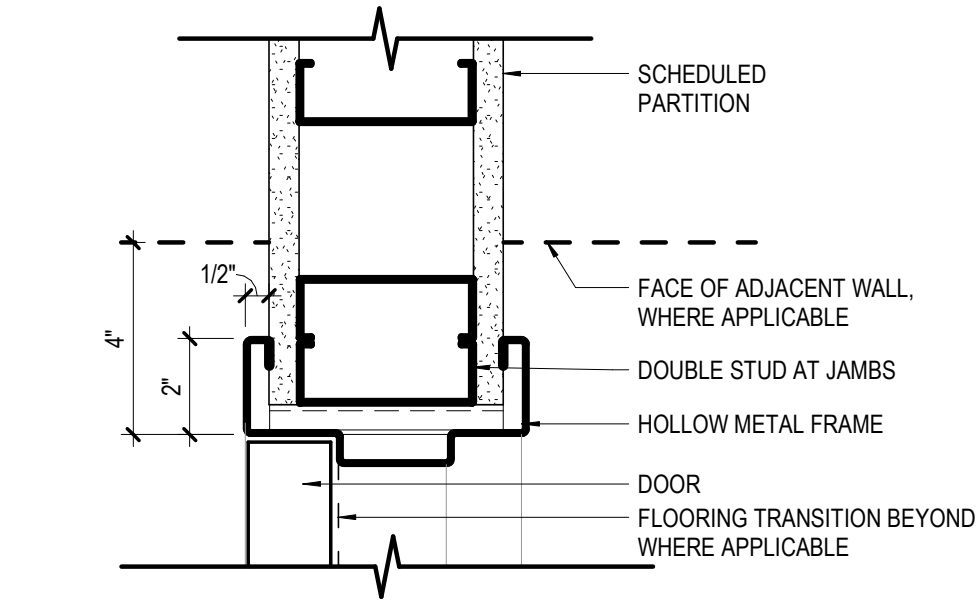


2 MAC RM EAST ELEVATION
1/4" = 1'-0"

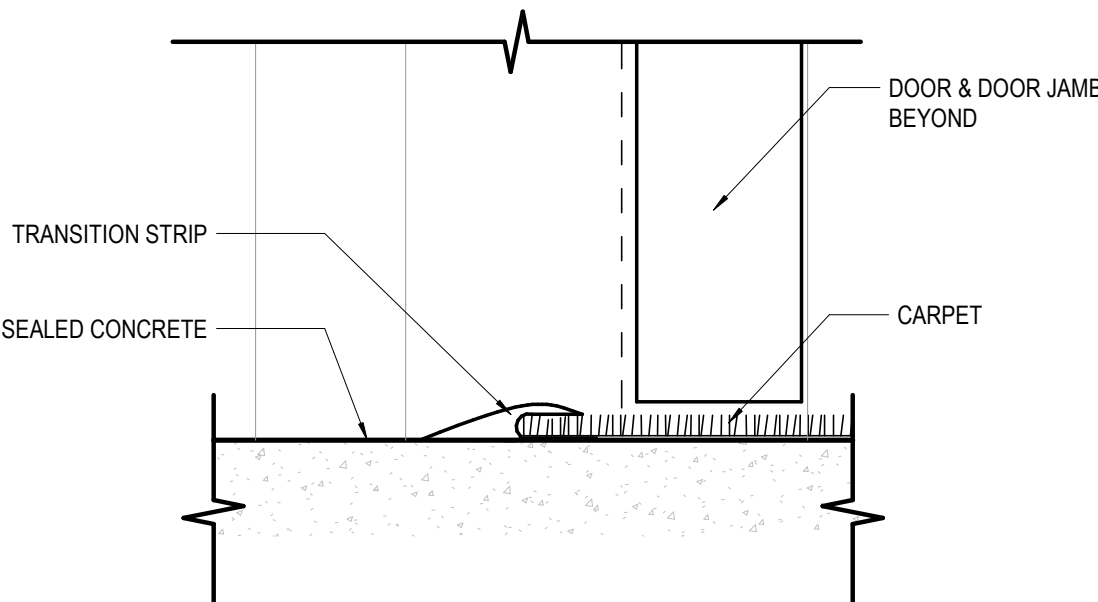


1 MAC RM WEST ELEVATION
1/4" = 1'-0"

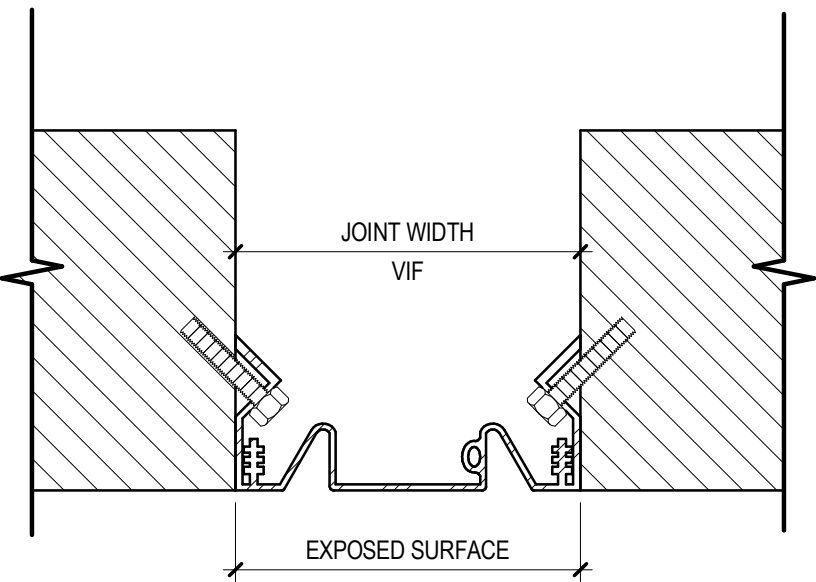
Door Schedule												
NUMBER	WIDTH	HEIGHT	Thickness	PANEL TYPE	PANEL MATERIAL	FRAME TYPE	FRAME MATERIAL	FRAME FINISH	HEAD	JAMB	SILL	HARDWARE
153A	6'-0"	7'-0"	1 3/4"	F	HM	A	HM	PNT	S/A61-01	S/A61-01	-	06 T1 00.1



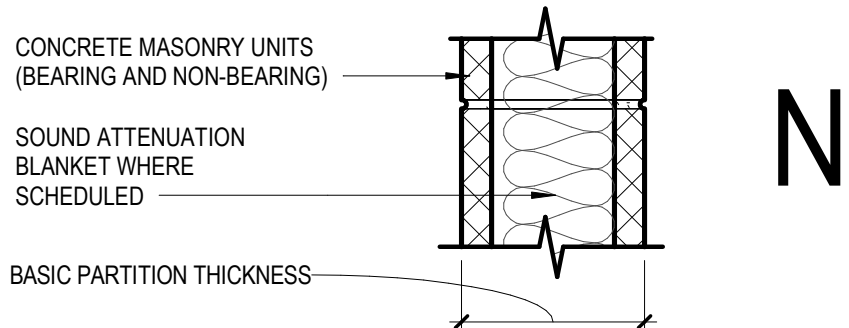
5 HM DOOR JAMB/HEAD
3" = 1'-0"
NOTE: PROVIDE HEAVY GAGE AT OPENINGS 4' AND GREATER



3 CARPET TO SEALED CONCRETE
6" = 1'-0"

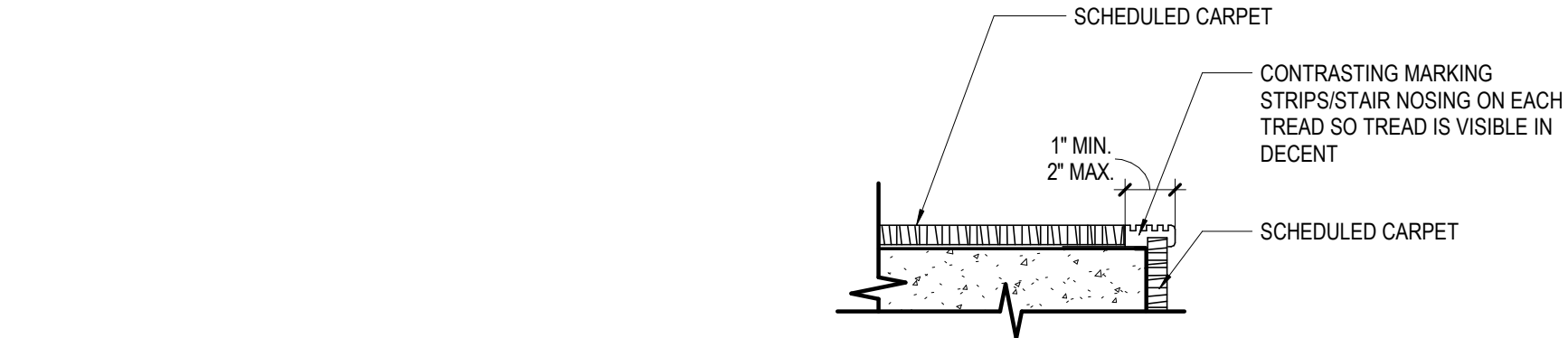


2 EXPANSION JOINT COVER
1 1/2" = 1'-0"

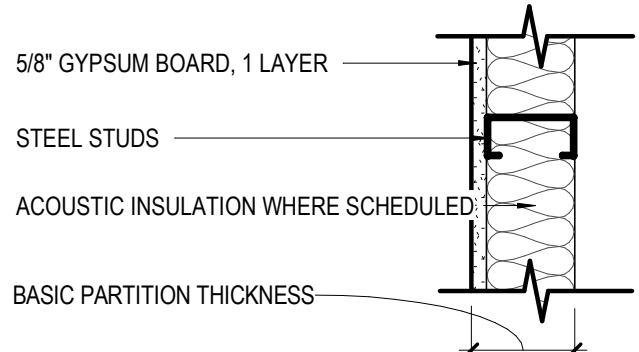


	N2	STC	N3	STC	N4	STC	N5	STC	N6	STC	HEAD
NON-FIRE RATED CMU TO STRUCTURE ABOVE	(N20)	40	(N30)	45	(N40)	50	(N50)	47	(N60)	51	
1-HR RATED CMU TO STRUCTURE ABOVE	(N31)	45	(N41)	50	(N51)	47	(N61)	51			
2-HR RATED CMU TO STRUCTURE ABOVE	(N32)	*	(N42)	*	(N52)	*	(N62)	*			
3-HR RATED CMU TO STRUCTURE ABOVE	(N33)	*	(N43)	*	(N53)	*	(N63)	*			
4-HR RATED CMU TO STRUCTURE ABOVE	(N34)	*	(N44)	*	(N54)	*	(N64)	*			
NON-FIRE RATED CMU TO 8' ABOVE CEILING	(N25)	*	(N35)	*	(N45)	*	(N55)	*	(N65)	*	
NON-FIRE RATED CMU TO UNDER SIDE OF CEILING	(N26)	*	(N36)	*	(N46)	*	(N56)	*	(N66)	*	
PARTIAL HEIGHT PARTITION	(N27)	*	(N37)	*	(N47)	*	(N57)	*	(N67)	*	
BASIC PARTITION THICKNESS	3 5/8"		5 7/8"		7 5/8"		9 5/8"		11 5/8"		
NOMINAL MASONRY THICKNESS	4"		6"		8"		10"		12"		
ACOUSTICAL INSULATION	-		-		YES		-		YES		
FIRE TEST NUMBER (WHERE APPLICABLE)	-		UL DESIGN U906 (1+2 HR) NOTE 3		UL DESIGN U905 (1+2 HR) U904 (3 HR) U901 (4 HR)		UL DESIGN U905 (1+2 HR) U904 (3 HR) U901 (4 HR)		UL DESIGN U905 (1+2 HR) U904 (3 HR) U901 (4 HR)		

- NOTE:
1. FILL CORE SPACE IN CMU WITH SOUND ATTENUATION BLANKET.
2. REFER TO UL DESIGN FOR ALLOWABLE COMPRESSIVE STRESS IN CMU.
3. REFER TO UL DESIGN FOR ADDITIONAL CMU CRITERIA.
4. FIGURES SHOWN ARE FOR NORMAL WEIGHT, HOLLOW CORE, CONCRETE MASONRY UNITS.

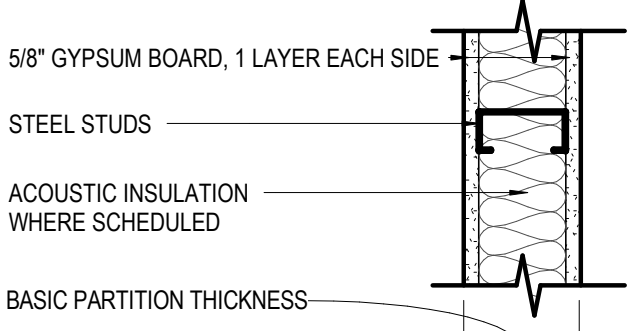


1 NOSING AT STAIRS
6" = 1'-0"



	D1	STC	D2	STC	D3	STC	D4	STC	D5	STC	D6	STC	D7	STC	D8	STC	D9	STC	HEAD DETAIL
NON-RATED WITH GYP BD TO STR ABOVE	(D11)	27	(D21)	28	(D31)	27	(D41)	30	(D51)	27	(D61)	30	(D71)	27	(D81)	31	(D91)	26	
NON-RATED TO 6" ABOVE CEILING	(D12)		(D22)		(D32)		(D42)		(D52)		(D62)		(D72)		(D82)		(D92)		
NON-RATED TO FINISHED CEILING	(D13)		(D23)		(D33)		(D43)		(D53)		(D63)		(D73)		(D83)		(D93)		
STUD SIZE	2 1/2"		2 1/2"		3 5/8"		3 5/8"		4"		4"		6"		6"		1 5/8"		
BASIC PARTITION THICKNESS (EXCLUDING ADDITIONAL FINISHES OR SEE NOTE A)	3 1/8"		3 1/8"		4 1/4"		4 1/4"		4 5/8"		4 5/8"		6 5/8"		6 5/8"		2 1/4"		
ACOUSTICAL INSULATION	NO		YES		NO		YES		NO		YES		NO		YES		YES		
FIRE TEST NUMBER (WHERE APPLICABLE)	-		-		-		-		-		-		-		-		-		
NOTES: 1. STUD SPACING SHALL BE 24" ON CENTER UNLESS NOTED OTHERWISE. 2. STC ARE PREDICTED USING THE "INSUL" COMPUTER PROGRAM AND/OR MANUFACTURER TEST DATA. 3. CONSTRUCTED ASSEMBLY MUST MEET INDICATED STC RATING, WHERE APPLICABLE.																			

- NOTES:
1. STUD SPACING SHALL BE 24" ON CENTER UNLESS NOTED OTHERWISE.
2. STC ARE PREDICTED USING THE "INSUL" COMPUTER PROGRAM AND/OR MANUFACTURER TEST DATA.
3. CONSTRUCTED ASSEMBLY MUST MEET INDICATED STC RATING, WHERE APPLICABLE.



	A1	STC	A2	STC	A3	STC	A4	STC	A5	STC	A6	STC	A7	STC	A8	STC	HEAD DETAIL
1-HR RATED WITH GYP BD TO STR ABOVE			A20	46	A30	39	A40	47	A50	39	A60	47	A70	40	A80	48	
NON-RATED W/ GYP BD TO STR ABOVE	A11	39	A21	46	A31	39	A41	47	A51	39	A61	47	A71	40	A81	48	
NON-RATED TO 6" ABOVE CEILING	A12		A22		A32		A42		A52		A62		A72		A82		
NON-RATED TO FINISHED CEILING	A13		A23		A33		A43		A53		A63		A73		A83		
PARTIAL HEIGHT	A14		A24		A34		A44		A54		A64		A74		A84		
STUD SIZE	2 1/2"		2 1/2"		3 5/8"		3 5/8"		4"		4"		6"		6"		
BASIC PARTITION THICKNESS (EXCLUDING ADDITIONAL FINISHES OR PER NOTE 4)	3 3/4"		3 3/4"		4 7/8"		4 7/8"		5 1/4"		5 1/4"		7 1/4"		7 1/4"		
ACOUSTICAL INSULATION	NO		YES		NO		YES		NO		YES*		NO		YES		
FIRE TEST NUMBER (WHERE APPLICABLE)	-		UL #U419		UL #U465		UL #U465		UL #U465		UL #U465		UL #U465		UL #U465		
NOTES:																	
1. STUD SPACING SHALL BE 24" ON CENTER UNLESS NOTED OTHERWISE.																	
2. STC ARE PREDICTED USING THE "INSUL" COMPUTER PROGRAM AND/OR MANUFACTURER TEST DATA.																	
3. CONSTRUCTED ASSEMBLY MUST MEET INDICATED STC RATING, WHERE APPLICABLE.																	

- NOTES:
1. STUD SPACING SHALL BE 24" ON CENTER UNLESS NOTED OTHERWISE.
2. STC ARE PREDICTED USING THE "INSUL" COMPUTER PROGRAM AND/OR MANUFACTURER TEST DATA.
3. CONSTRUCTED ASSEMBLY MUST MEET INDICATED STC RATING, WHERE APPLICABLE.

RAIL 1 & RAIL-2 GLAZING LEGEND	DOOR & FRAME TYPES LEGEND	GENERAL DOOR NOTES	ACOUSTICAL PARTITION NOTES	GENERAL PARTITION NOTES
		1. ALL WOOD DOORS SHALL BE 1-3/4" THICK SOLID CORE. 2. COORDINATE KEYING WITH OWNER/TENANT AND LANDLORD. 3. ALL LOCKSETS SHALL HAVE INTERCHANGEABLE CORES. 4. PROVIDE A STRIKE BOX AT ALL DOOR STRIKES. 5. ALL DOORS & HARDWARE SHALL COMPLY WITH ALL APPLICABLE ACCESSIBILITY CODES. 6. COORDINATE SECURITY REQUIREMENTS & PROGRAMMING WITH OWNER/TENANT, SECURITY/POWER DRAWINGS, & SECURITY VENDOR PRIOR TO FABRICATION OF DOORS AND FRAMES. 7. ALL ELECTRIFIED NON-MAGNETIC LOCKSETS SHALL BE FAIL-SECURE UNLESS NOTED OTHERWISE, AND INCLUDE MANUAL KEY OVERRIDE MATCHING BASE BUILDING KEYWAY. SEE NOTE BELOW FOR ELECTRO-MAGNETIC LOCK REQUIREMENTS. 8. PROVIDE Z-BRACKETS FOR ALL IN-SWINGING DOORS WITH ELECTRO-MAGNETIC LOCKS. 9. ALL DOORS WITH ELECTRO-MAGNETIC LOCKS SHALL COMPLY WITH THE FOLLOWING CRITERIA: (A) DOORLOCK SHALL UNLOCK WITH ACTIVATION OF BUILDING FIRE ALARM/DETECTION SYSTEM SYSTEM. (B) DOORLOCK SHALL UNLOCK UPON TROUBLE OR ABNORMAL CONDITION IN THE SUPERVISORY SYSTEM OF THE BUILDING FIRE ALARM/DETECTION SYSTEM. (C) DOORLOCK SHALL BE FAIL-SAFE - UNLOCK WITH LOSS OF POWER TO LOCK OR BUILDING. (D) DOORLOCK SHALL NOT HAVE BACK-UP POWER. (E) PROVIDE PNEUMATIC BYPASS PUSH BUTTON MARKED "PUSH TO EXIT" WHICH UNLOCKS DOOR BY INTERRUPTING POWER TO THE LOCK FOR MIN 30 SECS. BUTTON SHALL BE WITHIN 5' OF DOOR AND MOUNTED 42" ABOVE FLOOR. (F) PROVIDE KEY OVERRIDE AT SECURE SIDE OF THE DOOR. (G) NO ELECTRO-MAGNETIC LOCKING DEVICES SHALL BE INSTALLED OR OPERATED WITHOUT PRIOR APPROVAL OF THE FIRE PREVENTION BUREAU OR CORRESPONDING AUI.	THE FOLLOWING NOTES APPLY TO ALL PARTITIONS DESIGNATED TO HAVE A SOUND TRANSMISSION CLASS (STC) RATING ON THE PARTITION CHARTS. 1. ALL ACOUSTICAL PARTITIONS SHALL BE CONSTRUCTED IN ACCORDANCE TO THE REFERENCED TEST, WHERE APPLICABLE. 2. STAGGER AND SEAL ALL JOINTS ON ALL PARTITIONS WITH MULTIPLE LAYERS OF GYPSUM BOARD. 3. SEAL PARTITIONS AIR TIGHT AT FLOORS, SIDES, AND CEILINGS ON BOTH SIDES WITH NON-HARDENING ACOUSTICAL SEALANT. 4. ALL BATTS AND BLANKETS IN RATED PARTITIONS MUST BEAR THE REQUIRED (IF APPLICABLE) UL CLASSIFICATION MARKING AS TO FIRE-RESISTANCE. 5. AVOID COMPRESSING ACOUSTICAL BATT INSULATION AT BLOCKING AND RECESSED ITEMS IN ACOUSTIC RATED WALLS. 6. ACOUSTICALLY SEAL ALL WALL INTERSECTIONS, CONTROL JOINTS, CONDUIT, STRUCTURAL DUCT, AND PIPE PENETRATIONS UNLESS THE PARTITION IS ALSO FIRE-RATED, IN WHICH CASE FIRE-RATED DETAIL REQUIREMENTS TAKE PRECEDENCE FOR PENETRATION SEALING. 7. ELECTRICAL BOXES ON OPPOSITE SIDES OF ACOUSTICAL PARTITIONS SHOULD BE SEPARATED BY A MINIMUM OF ONE STUD AND FULLY SEALED. SEAL PRIOR TO CLOSING IN PARTITIONS AND PRIOR TO INSTALLING DEVICES AND COVER PLATES. VERIFY SEAL COMPLIANCE WITH STC REFERENCE TEST WHERE APPLICABLE.	1. REFER TO A15-01 FOR FINAL FINISHES ON PARTITIONS. 2. WHEN BLOCKING IS PROVIDED IN A PARTITION, USE A MINIMUM 0.033" (20 GA) STUD.

PERKINS + WILL

The Wrigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
1312.756.0770
1312.756.0775
www.perkinswill.com

GENERAL CONTRACTOR

STRUCTURAL ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MEP ENGINEERING
MECHANICAL SERVICES ASSOCIATES CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014
MECHANICAL SERVICES ASSOCIATES CORP.

NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION PURPOSES.

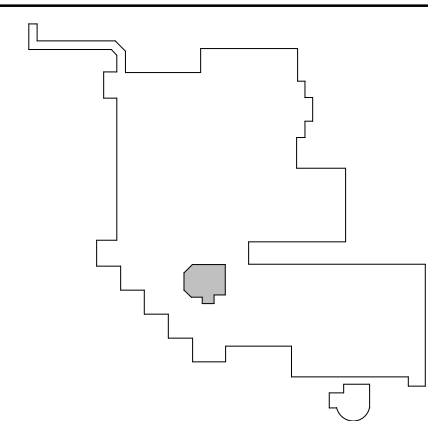
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

1	ISSUE FOR BID & PERMIT	03/07/2018
2	ISSUE	DATE
Job Number	024303.007	
Drawn	JA	
Checked	MD	
Approved	MD	

TITLE
INTERIOR DETAILS & PARTITION TYPES, DOOR SCHEDULE & DETAILS

SHEET NUMBER

A61-01

Copyright © 2018 Perkins+Will

NOTES RE: EXISTING CONDITIONS:

4. VERIFY EXISTING CONDITIONS AND LOCATIONS IN FIELD PRIOR TO SUBMITTING PROPOSAL. FAILURE TO DO SO SHALL NOT RELIEVE CONTRACTOR FROM PERFORMING THE WORK REQUIRED UNDER THIS CONTRACT.
5. MAKE NECESSARY MODIFICATIONS AND ADJUSTMENTS TO ALL ELECTRICAL ITEMS AND EQUIPMENT, BOTH NEW AND EXISTING, AS MAY BE REQUIRED BY THESE ALTERATIONS AND ADDITIONS.
6. DISCONNECT AT SOURCE AND REMOVE EXISTING ELECTRICAL MATERIALS AND EQUIPMENT AND ALL OTHER ELECTRICAL ITEMS WHICH ARE RENDERED OBSOLETE BY THESE ALTERATIONS AND ADDITIONS. THESE ARE THE PROPERTY OF THE OWNER AND SHALL EITHER BE REMOVED FROM THE SITE OR RETURNED TO THE OWNER'S STOCK AT THE DISCRETION OF THE OWNER.
7. DISCONNECT, REMOVE AND RELOCATE EXISTING ELECTRICAL MATERIALS AND EQUIPMENT AND ALL OTHER ELECTRICAL ITEMS WHICH INTERFERE OR ARE INTERFERED WITH, OBSTRUCT OR ARE OBSTRUCTED BY THESE LOCATIONS AS DIRECTED. RECONNECT SUCH ITEMS IN PROPER OPERATING CONDITION AT NEW LOCATIONS.
8. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN THE EXISTING BUILDING IN ELECTRICAL OPERATION AT ALL TIMES DURING THE ENTIRE CONSTRUCTION PERIOD. IF IT IS ABSOLUTELY NECESSARY TO SHUT DOWN THE ELECTRICALITY AT ANY TIME, THE CONTRACTOR SHALL CONSULT WITH THE OWNER AND MAKE ARRANGEMENTS TO DO SO AT THE OWNER'S CONVENIENCE. 48-HOUR PRIOR NOTICE SHALL BE GIVEN.
9. COORDINATE WORK WITH OTHER TRADES TO AVOID CONFLICTS AND DELAYS.
10. ALL CUTTING AND PATCHING AS REQUIRED FOR NEW WORK & ABANDONED DEVICES TO BE BY THE CONTRACTOR.
11. WHERE EXISTING CONDUITS HAVE BEEN MADE OBSOLETE BY THESE ALTERATIONS AND ADDITIONS AND IT IS IMPRACTICAL TO REMOVE SAME, CONTRACTOR SHALL:
 - a. CUT CONDUITS OFF AT SLAB OR WALL LINE
 - b. CAP ALL OBSOLETE CONDUIT.
12. WHERE THE EXISTING WIRING & CONDUIT SERVING ANY EXISTING ELECTRICAL EQUIPMENT IN AREA OF EXISTING BUILDING NOT BE ALTERED IS INTERFERED WITH, CONTRACTOR SHALL REROUTE AND RECONNECT ALL SUCH CONDUIT & WIRING.

NOTES RE: INSPECTING EXISTING BUILDING:

1. THE CONTRACTORS SHALL VISIT AND INSPECT THE EXISTING BUILDING AND SHALL THOROUGHLY FAMILIARIZE THEMSELVES WITH ACTUAL JOB CONDITIONS BEFORE SIGNING CONTRACTS. NO EXTRAS WILL BE ALLOWED FOR WORK WHICH MIGHT HAVE BEEN REASONABLY FORESEEN BY AN INSPECTION OF THESE PREMISES.
2. WHILE THE SIZE AND LOCATION OF NEW WORK AND EQUIPMENT IN THE EXISTING BUILDING HAS BEEN INDICATED ON THE DRAWINGS AS ACCURATELY AS POSSIBLE, CONTRACTOR SHALL ADJUST HIS WORK AS REQUIRED TO AVOID EXISTING DUCTS, PIPES, CONDUITS AND BEAMS NOT SHOWN ON PLANS. CONTRACTOR SHALL ADAPT HIS WORK TO MEET ALL ACTUAL CONDITIONS ON THE EXISTING PREMISES.
3. CONTRACTOR SHALL INSPECT THE PREMISES AND MAKE A DETAILED EXAMINATION OF ALL LOCATIONS WHERE NEW WORK IS TO BE INSTALLED AND SHALL EXAMINE EXISTING PIPING, CONDUITS, STRUCTURAL SUPPORTING BEAMS, ETC.
4. CONTRACTOR AFTER INSPECTING THE PREMISES AND THE DRAWINGS SHALL CALL TO THE ATTENTION OF THE ARCHITECT ANY LACK OF ANY NECESSARY MATERIAL OR CLERK WORK REQUIRED BY THE VARIOUS EQUIPMENT BEFORE CONTRACT BE SIGNED. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHANGES NECESSARY IF HE NEGLIGENCE TO DO SO.

NOTE:

ALL DEVICES SHOWN DOTTED, DASHED, OR INDICATED WITH A PLAN NOTE (INDICATING REMOVAL) ARE EXISTING TO BE REMOVED. ALL DEVICES SHOWN SOLID ARE EXISTING TO REMAIN. IF THE CONTRACTOR DEEMS IT NECESSARY FOR A DEVICE TO BE REMOVED, THEY SHALL COORDINATE IN FIELD WITH THE ARCHITECT/ENGINEER FOR APPROVAL.

I. PRIOR TO SUBMITTING THIS BID, THE CONTRACTOR SHALL VISIT THE PROJECT SITE AND THOROUGHLY ACQUAINT THEMSELVES WITH ALL EXISTING CONDITIONS AND DETERMINE HOW THEY EFFECTIVELY WORK. THEY SHALL INCLUDE IN THEIR BID ANY ALTERATION, RELOCATION, REROUTING, ETC... OF EXISTING FACILITIES, WIRING, CONDUIT, PANELBOARDS REQUIRED FOR INSTALLATION OF NEW WORK. UNDER NO CIRCUMSTANCES WILL THE CONTRACTOR BE GIVEN CONSIDERATION FOR ADDITIONAL COMPENSATION DUE TO THEIR NEGLIGENCE TO COMPLY WITH FOREGOING REQUIREMENTS.

2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE FOLLOWING CODES:
2009 INTERNATIONAL BUILDING CODE
2011 NATIONAL ELECTRICAL CODE
2009 INTERNATIONAL MECHANICAL CODE
2009 INTERNATIONAL FIRE CODE
ILLINOIS ACCESSIBILITY CODE
2015 ILLINOIS ENERGY CONSERVATION CODE
IN ADDITION TO THE ABOVE, FOLLOW ALL LOCAL CODES AND AMENDMENTS, UTILITY
COMPANY REQUIREMENTS AND ANY OTHER REQUIREMENTS APPLICABLE TO THIS JOB.
ELECTRICAL CONTRACTOR SHALL SUBMIT ANY REQUIRED DRAWINGS FOR
APPROVAL TO ANY AGENCIES REQUIRING THEM AND OBTAIN NECESSARY PERMITS
AND NO ADDITIONAL BID COSTS. ALL EQUIPMENT SHALL BE NEMA STANDARDS AND
SHALL BE UL LISTED.

3. MOUNT RECEPTACLES, DATA JACKS AND TELEPHONE JACKS AT 18" AFF TO CENTER UNLESS OTHERWISE NOTED.

REFER TO TECHNOLOGY NOTES AND DETAILS FOR ADDITIONAL INFORMATION ON DATA AND TELEPHONE JACKS.

4. MOUNT WALL SWITCHES AT 48" AFF TO CENTER. USE MULTI-GANG SWITCH BOXES. INSTALL COMPARTMENT DIVIDERS TO REDUCE VOLTAGE CONTACT 100 220VOLT OR LESS.
5. REFER TO ALL ARCHITECTURAL, AND CASEWORK DRAWINGS DURING INSTALLATION OF ALL SWITCHES, RECEPTACLES, TELEPHONE JACKS, PULL JACKS, JUNCTION BOXES, GLOVES, VISUAL STROBES/SPEAKER DEVICES, DATA STATIONS AND OTHER DEVICES SO THAT NO CONFLICTIONS WILL BE ENCOUNTERED. INFORM ARCHITECT OF ANY CONFLICTS THAT DO OCCUR BEFORE THE INSTALLATION OF ABOVE LISTED DEVICES.
6. MOUNT CONDUIT AND ELECTRICAL DEVICES FROM THE TOP CHORD OF BAR JOISTS ONLY. DO NOT RUN CONDUITS ABOVE TOP CHORD OF BAR JOIST, THROUGH WEB OF ROOF DECKING MATERIAL ABOVE OR WITHIN 6" OF ROOF DECK SO AS TO PREVENT DAMAGE FROM ROOFING NAILS.
7. THE ELECTRICAL CONTRACTOR SHALL USE THE FOLLOWING COLOR CODING SCHEME FOR CONDUITS RELATED TO POWER, LIGHTING, FIRE ALARM AND EMERGENCY CIRCUITS:
BLUE - POWER
YELLOW - LIGHTING
GREEN - GROUNDING SYSTEM
ORANGE - EMERGENCY
RED - FIRE ALARM
THERE SHALL BE NO DEVIATION FROM THIS REQUIREMENT. VERIFY WITH THE OWNER PRIOR TO ORDERING.
8. MINIMUM SIZE OF CONDUCTORS SHALL BE #12 AWG FOR POWER AND LIGHTING BRANCH CIRCUITS. USE #10 AWG MINIMUM IF RUNS ARE OVER 75 FEET. MINIMUM SIZE FOR "EMERGENCY CIRCUITS" SUCH AS EXIT SIGN AND EMERGENCY/NIGHT LIGHTS SHALL BE MINIMUM #10 AWG. SIZE ALL CONDUCTORS IN ACCORDANCE WITH N.E.C. SECTION 310-15. MAINTAIN PROPER CONDUIT FILL CAPACITIES AND SIZE CONDUCTORS IN ACCORDANCE WITH ADJUSTMENT FACTORS LISTED IN N.E.C. 310-15 TABLE NOTE #2a (MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A RACEWAY). USE MULTIPLE PARALLEL RACEWAYS TO AVOID DERATING OF CONDUIT CAPACITIES. OTHERS INCREASE SIZE OF CONDUCTORS SO AS TO FOLLOW N.E.C. REQUIREMENTS.

9. ELECTRICAL CONTRACTOR SHALL SIZE ALL CONDUCTORS OVER 75 FEET SO AS TO MAINTAIN A VOLTAGE DROP EQUAL TO OR LESS THAN 2%.
10. BALANCE ALL PHASE WIRES WITHIN 20%.
11. INSTALL A SEPARATE DEDICATED NEUTRAL CONDUCTOR FOR EACH PHASE OF BOTH LIGHTING AND POWER MULTI-WIRE BRANCH CIRCUITS. IF A MULTI-WIRE BRANCH CIRCUIT CONTAINS THREE PHASE WIRES, THE CIRCUIT WILL REQUIRE THREE DEDICATED NEUTRALS.
12. INSTALL GROUNDING WIRE TO ALL DEVICES. USE GREEN WIRE.
13. SUB CONDUITS FOR ALL TELEPHONE/DATA JACKS, AUDIO/VIDEO JACKS, ETC... OUT TO ABOVE ACCESSIBLE CEILING, INSTALL END BUSHINGS AND FITTINGS ON END OF EACH CONDUIT SUB IN ORDER TO PROTECT CABLING. MINIMUM SIZE 3/4" CONDUIT AND PER N.E.C. FILL RATE REQUIREMENTS.
14. ALL JUNCTION BOXES ABOVE CEILINGS SHALL HAVE PANEL AND CIRCUIT INFORMATION IDENTIFIED ON OUTSIDE OF COVERPLATE. ALL RECESSED WALL MOUNT CONDUIT/ FLOOR MOUNT JUNCTION BOXES SHALL HAVE PANEL AND CIRCUIT INFORMATION IDENTIFIED ON THE INSIDE OF THE JUNCTION BOX TOWARD FRONT OF BOX LIP SO AS TO BE VISIBLE WITHOUT REMOVING WIRING DEVICE.

15. SLEEVE AND FIREPROOF ALL PENETRATIONS THROUGH WALLS AND FLOORS. ALL CORING BY CONTRACTOR SHALL BE COORDINATED WITH ARCHITECT. PROVIDE AND INSTALL EXPANSION FITTINGS ON ALL CONDUITS AT BUILDING EXPANSION JOINTS. REFER TO ARCHITECTURAL.

16. FOR EXISTING ELECTRICAL PANELBOARDS AFFECTED BY NEW WORK, CONTRACTOR SHALL REVIEW EXISTING PANEL CARD DIRECTORIES AND VERIFY CORRECTNESS BY TRACING BRANCH CIRCUITS. UPDATE AND RECORD INFORMATION ON NEW PANEL CARD DIRECTORY. VERIFY CURRENT ROOM NAMES AND NUMBERS IN THE FIELD. DO NOT USE ROOM NAMES AND NUMBERS INDICATED ON THE DRAWINGS.

17. INSTALL BLANK PREFINISHED STAINLESS STEEL COVERPLATES ON ALL JUNCTION BOXES IN FINISHED AREAS NO LONGER USED AND CREATED BY DEMOLITION. USE BLANK GALVANIZED STEEL COVERPLATES FOR ALL BOXES ABOVE CEILINGS OR IN EXPOSED NON-FINISHED AREAS.

18. WHERE EXISTING CONDUIT AND WIRE CONFLICTS WITH NEW LIGHT FIXTURES BEING INSTALLED, CONTRACTOR SHALL REROUTE AROUND NEW LIGHT FIXTURE. EXTEND CONDUIT AND WIRING AS REQUIRED.

19. CONTRACTOR SHALL NOT DISTURB EXISTING COMPUTER/DATA CABLING UNLESS OTHERWISE INDICATED ON DRAWINGS.

20. ANY PORTIONS OF EXISTING CEILINGSS TO BE REMOVED BY CONTRACTOR FOR INSTALLATION OF THEIR WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION. MATCH EXISTING CEILING MATERIAL. PATCH AND PAINT AS REQUIRED.

21. ALL EXPOSED RACEWAYS INSTALLED IN FINISHED AREAS SHALL BE OF THE METALLIC WIREMOLD TYPE. EXPOSED CONDUIT WILL ONLY BE INSTALLED BY PERMISSION OF THE ARCHITECT. ALL EXPOSED CONDUIT INSTALLED IN FINISHED AREAS SHALL BE PAINTED TO MATCH SURROUNDING AREAS.

22. CONTRACTOR SHALL REFER TO ARCHITECTURAL CUTTING AND PATCHING SPECIFICATIONS FOR INFORMATION REGARDING PERFORMANCE STANDARDS AND PROCEDURES.

23. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LIGHT FIXTURE ORIENTATION AND PLACEMENT. VERIFY EXACT LOCATION OF ALL CEILING DEVICES (I.E. FIRE ALARM DEVICES, CEILING SPEAKERS) WITH ARCHITECTURAL REFLECTED CEILING PLANS FOR COORDINATION PRIOR TO INSTALLATION.

24. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL LIGHT FIXTURE MOUNTING HARDWARE INCLUDING PENDANTS, CANOPIES, TONG HANGERS, FLANGES, SAFETY CHAINS AND UNI-STRUT. WHEN PENDENT MOUNTING CONTINUOUS ROWS OF 4 FOOT FIXTURES, CONTRACTOR SHALL UTILIZE UNI-STRUT. PAINT OUT PENDANTS AND UNI-STRUT TO MATCH LIGHT FIXTURES. WIPE OIL FROM PENDANTS AND UNI-STRUT WITH CHEMICAL CLEANER PRIOR TO PAINTING.

25. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT ELECTRICAL REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH THE MECHANICAL CONTRACTOR AND MECHANICAL EQUIPMENT SHOP DRAWINGS PRIOR TO ORDERING CIRCUIT BREAKERS, DISCONNECT SWITCHES, STARTERS, FUSES, CONDUIT AND WIRING, ETC., ASSOCIATED WITH CONNECTION OF MECHANICAL EQUIPMENT TO ENSURE A COMPLETE WORKING INSTALLATION.

26. ALL FINAL CONNECTIONS MADE WITH FLEXIBLE CONDUIT FEEDING MECHANICAL EQUIPMENT SHALL BE LIQUIDTIGHT, FLEXIBLE METAL CONDUIT AND SHALL HAVE GROUNDING WIRE INSTALLED.

27. ALL OVERCURRENT PROTECTION AND WIRE SIZING FOR HVAC EQUIPMENT WILL BE COORDINATED BY THE CONTRACTOR WITH DRAWINGS AND MANUFACTURERS RECOMMENDATIONS.

GENERAL ELECTRICAL SYMBOLS					
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	CONCEALED CONDUIT & WIRING		COMPUTER OUTLET/JUNCTION BOX AND SWITCH		FIRE ALARM CONTROL PANEL
	HOME RUN		TELEPHONE OUTLET AND STUB		FIRE ALARM ANNUNCIATOR PANEL
	CONDUIT/WIRING UNDER SLAB		COMMUNICATION COMPUTER/PHONE OUTLET/JUNCTION BOX		FIRE ALARM "NAC" PANEL
	EXPOSED RACEWAY & WIRING		TV OUTLET/JUNCTION BOX		SMOKE DETECTOR
	GROUND/NEUTRAL/HOT WIRING		AUDIO/VISUAL STATION OUTLET		FIRE ALARM PULL STATION
	3/4-C" STUBBED ABOVE CEILING		WIRELESS ACCESS POINT		FIRE ALARM VISUAL STROBE
	JUNCTION BOX & FLEX CONDUIT		DIGITAL CLOCK		CEILING MOUNTED SPEAKER/STROBE DEVICE
	PULL BOX		SPEAKER		CEILING MOUNTED SPEAKER DEVICE
	POWER/LIGHTING PANEL		SPEAKER FLUSH TO CEILING		WALL MOUNTED SPEAKER/STROBE DEVICE
	SYSTEMS PANEL		MICROPHONE OUTLET		WALL MOUNTED SPEAKER DEVICE
	TRANSFORMER		VOLUME CONTROL SWITCH		EXISTING DEVICE TO REMAIN
	SINGLE RECEPTACLE		1 WAY WALL SWITCH		REMOVE & REPLACE DEVICE
	DUPLEX RECEPTACLE		3 WAY WALL SWITCH		
	QUAD-RECEPTACLE		4 WAY WALL SWITCH		
	SINGLE RCPt FLUSH TO FLR		DIMMER SWITCH		
	DUPLEX RCPt FLUSH TO FLR		KEY OPERATED WALL SWITCH		
	QUAD-RCPt FLUSH TO FLR		SINGLE FACE EXIT SIGN		
	SPECIAL RECEPTACLE		DOUBLE FACE EXIT SIGN		
	GROUND FAULT INTERRUPTER		EM LIGHT WITH BATTERY PACK		
	RECEPTACLE ABOVE COUNTER		EM BATTERY PACK WITH RECESSED MOUNTED EM LIGHT		
	PORTION OF RECEPTACLE SWITCHED		RECESSED CAN DOWN LIGHT		
	PLUG MOLD/ WIRE MOLD		RECESSED 2 X 4 FLUOR. LAMP		
	MOTOR/SWITCH DISC./ H.P.		RECESSED 2 X 2 FLUOR. LAMP		
	MOTOR/FUSED DISC./STARTER		RECESSED 1 X 4 FLUOR. LAMP		
	FUSED DISCONNECT SWITCH		SURFACE 2 X 4 FLUOR. LAMP		
	NON-FUSED DISCONNECT SWITCH		SURFACE 2 X 2 FLUOR. LAMP		
	MAGNETIC STARTER - F.V.N.R. H.O.A.		SURFACE 1 X 4 FLUOR. LAMP		
	FUSED DISCONNECT WITH STARTER		SURFACE STRIP FLUOR. LAMP		
	VARIABLE FREQUENCY DRIVE		LAMP ON EMERGENCY CIRCUIT		
			EMERGENCY/ NIGHT LIGHT		

The Wrigley Building
110 North Michigan Ave.
Suite 1600
Chicago, IL 60611
t 312.755.0770
f 312.755.0775
www.perkinswill.com

GENERAL
TRACTOR

STRUCTURAL
ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MEP
ENGINEERING
MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014

NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION PURPOSES.

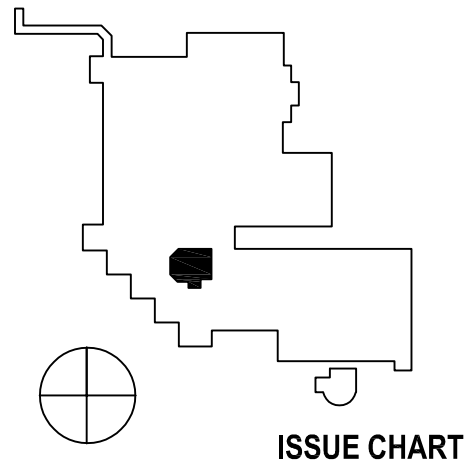
PROJECT

425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

1	ISSUE FOR BID & PERMIT	03/07/2018
MARK	ISSUE	DATE
Job Number	024303.007	
Drawn	JT/JD/CC	
Checked	MC/REL	
Approved	MC/REL	

TITLE

ELECTRICAL NOTES AND DETAILS

SHEET NUMBER

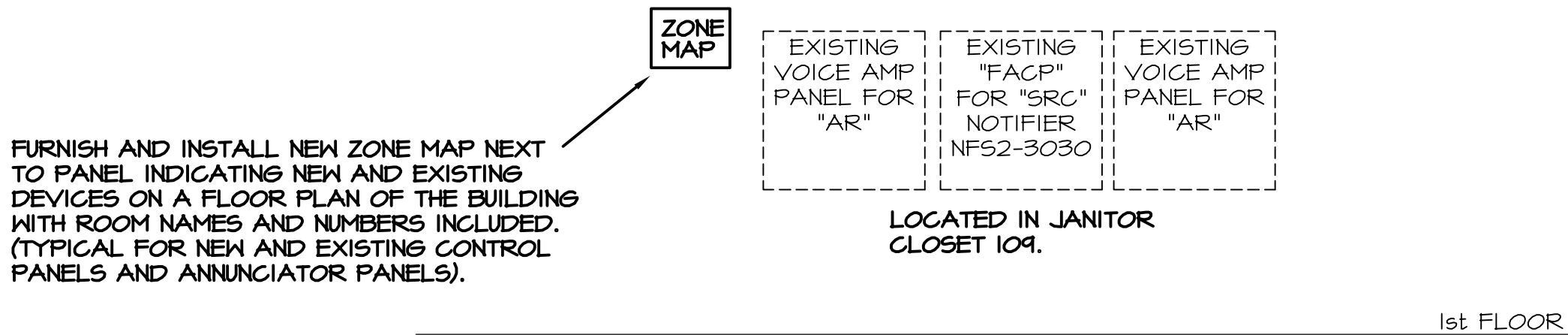
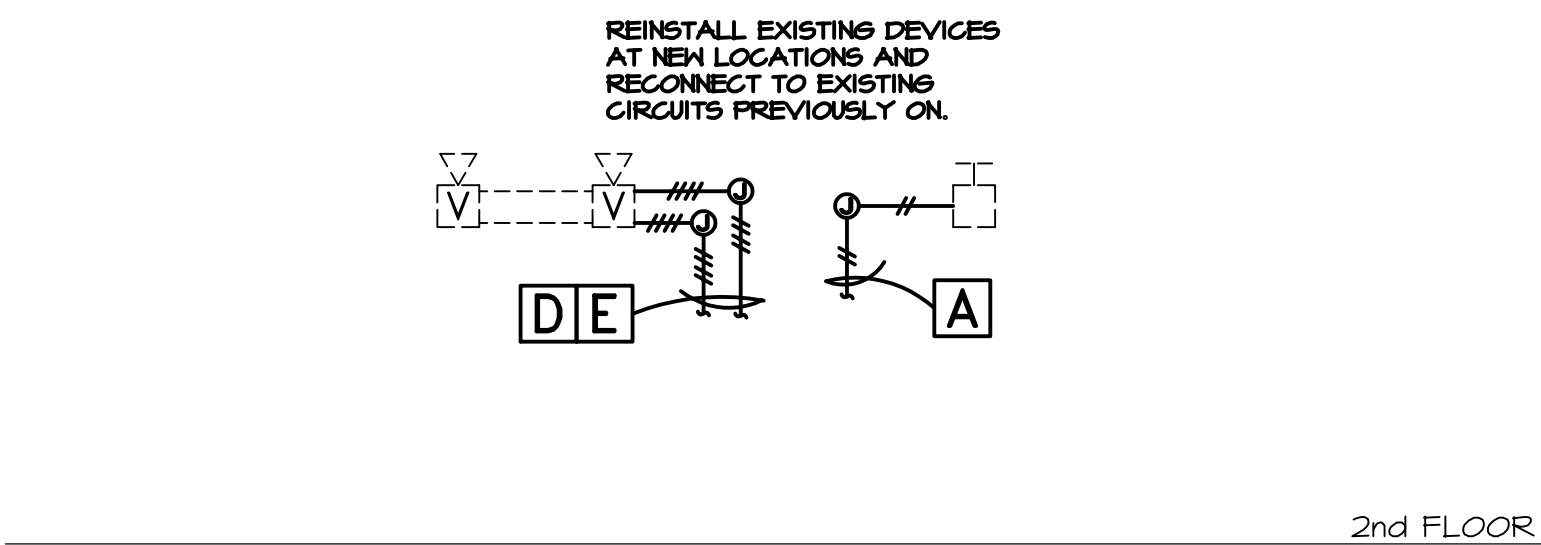
E00-01

FIRE ALARM DEVICE SCHEDULE				
TAG	MANUFACTURER	MODEL NUMBER	DESCRIPTION	REMARKS
[FACP -----]	NOTIFIER	EXISTING NF52-3030 SERIES	EXISTING ADDRESSABLE FIRE ALARM CONTROL PANEL WITH VOICE NOTIFICATION (REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS)	
[FAAP -----]	NOTIFIER	EXISTING	EXISTING FIRE ALARM ANNUNCIATOR PANEL WITH VOICE NOTIFICATION	UPDATE ZONE MAP AS REQUIRED.
INTERIOR NOTIFICATION CABLES	WEST PENN OR BELDEN EQUAL	609R5B - 12 GA. 1 PAIR 609R5B - 14 GA. 1 PAIR	UNSHIELDED PLENUM RATED	UTILIZE PROPER SIZE TO AVOID EXCESSIVE VOLTAGE DROP.
INTERIOR VOICE CABLES	WEST PENN OR BELDEN EQUAL	609R0B - 16 GA. 1 PAIR	SHIELDED PLENUM RATED	UTILIZE PROPER SIZE TO AVOID EXCESSIVE VOLTAGE DROP.
INTERIOR SLC LOOP CABLES	WEST PENN OR BELDEN EQUAL	D990 - 16 GA. 1 PAIR	PLENUM RATED	UTILIZE PROPER SIZE TO AVOID EXCESSIVE VOLTAGE DROP.
FIRE ALARM DEVICE SCHEDULE NOTES				
ALL DEVICES NEED TO COMPLY WITH U.L. 864 9th EDITION.				
COORDINATE EXACT MODEL NUMBERS WITH MANUFACTURER PRIOR TO ORDERING.				

FIRE ALARM SYSTEM GENERAL NOTES:

1. FIRE ALARM CONTRACTOR TO RELOCATE FIRE ALARM DEVICES IN LOCATIONS GIVEN AND WIRE BACK TO EXISTING FIRE ALARM CONTROL PANEL.
- FIRE ALARM WIRING SHALL BE PLENUM RATED AND MAY BE INSTALLED EXPOSED ABOVE ACCESSIBLE CEILINGS. ALL EXPOSED WIRING IN UNFINISHED AREAS TO BE INSTALLED IN RACEWAY UP TO CEILING STRUCTURE FOR PROTECTION. ALL WIRING INSTALLED EXPOSED IN FINISHED AREAS WILL BE INSTALLED IN IVORY METALLIC WIREMOLD TYPE RACEWAY. ALL RACEWAYS SHALL BE STUBBED OUT TO ABOVE ACCESSIBLE CEILINGS. ALL EXPOSED WIRING INSTALLED ABOVE ACCESSIBLE CEILINGS SHALL BE SUPPORTED WITH J-HOOKS. ALL RACEWAYS STUBS SHALL BE PROVIDED WITH END BUSHINGS/FITTINGS TO PROTECT THE CABLING. ALL WIRING INSTALLED ABOVE NON-ACCESSIBLE CEILINGS SHALL BE INSTALLED IN CONDUIT. ALL CABLING INSTALLED IN AREAS SUBJECT TO DAMAGE (I.E. MECHANICAL ROOMS, STORAGE ROOMS, ETC.) SHALL BE INSTALLED IN RACEWAY. TYPE TO BE SELECTED BY THE OWNER/ENGINEER. DO NOT INSTALL CABLING ABOVE TOP CHORD OF BAR JOISTS OR WITHIN 6" OF ROOF DECK SO AS TO PREVENT DAMAGE BY ROOFING NAILS. ALL EXPOSED CONDUIT AND INSTALLED IN FINISHED AREAS SHALL BE PAINTED OUT TO MATCH AREA COORDINATE WORK WITH THE ARCHITECT. ALL CONDUIT AND BOXES BEING USED SHALL BE RED IN COLOR.
2. PRIOR TO SUBMITTING BID, CONTRACTOR SHALL WALK BUILDING AND BECOME FAMILIARIZED WITH THE BUILDING CONSTRUCTION. TAKE NOTE TO ALL CEILING AND WALL MATERIALS PRIOR TO BIDDING. NO ADDITIONAL COST WILL BE INCURRED BY THE OWNER FOR WORK THAT COULD HAVE BEEN REASONABLY DETERMINED AND/OR AVOIDED HAD THE CONTRACTOR FIELD VERIFIED EXISTING BUILDING CONSTRUCTION TYPE AND CONDITIONS PRIOR TO BIDDING.
4. FIRE ALARM CONTRACTOR SHALL VERIFY THAT ALL FIRE ALARM DEVICES CONFORM TO ILLINOIS ACCESSIBILITY CODE REQUIREMENTS, ADA, IFC 2009 AND NFPA AND UL/ETI REQUIREMENTS.
5. FIRE ALARM CONTRACTOR TO PROVIDE AND INSTALL FIRE ALARM ZONE MAP IN A PLEXI-GLASS FRAME. MAPS TO BE MOUNTED NEXT TO CONTROL AND ANNUNCIATOR PANELS. GIVE (5) COPIES TO OWNER. SHOW ALL INITIATING DEVICES AND NAC PANELS.
6. EACH SIGNAL CIRCUIT SHALL NOT EXCEED 13 AMPS. ADJUST WIRE SIZES TO LIMIT VOLTAGE DROP AS PER NFPA 72 AND LOCAL CODE.
7. PROVIDE AND INSTALL ADDITIONAL POWER SUPPLIES/EXTENDER PANELS ("NAC" PANELS) AND AMPLIFIER PANELS AS REQUIRED FOR PROPER OPERATION OF NOTIFICATION CIRCUITS (STROBES AND SPEAKERS) AND TO MINIMIZE WIRING RUNS TO FIRE ALARM CONTROL PANEL AND TO MEET SLC CIRCUIT DISTANCE LIMITATIONS. "NAC" AND AMPLIFIER PANELS SHALL BE INSTALLED IN JANITOR CLOSETS OR STORAGE ROOMS IF APPROVED BY THE OWNER. "NAC" AND AMPLIFIER PANELS WILL NOT BE INSTALLED ABOVE CEILINGS OR IN CEILING SPACES. "NAC" AND AMP PANELS SHALL BE SUPERVISED. INSTALL DETECTOR AT EACH LOCATION TO PROTECT PANEL.
8. PROVIDE AND INSTALL RED PRE-FINISHED BACK BOX WHERE SURFACE MOUNTED BOXES ARE REQUIRED. INSTALL MANUFACTURER TRIM PLATE AS REQUIRED. COORDINATE COLOR PRIOR TO ORDERING. ALL EXTERIOR BOXES SHALL BE WEATHERPROOF "NIP" LISTED.
9. CONTRACTOR SHALL MAINTAIN AN OPERABLE FIRE ALARM SYSTEM AT ALL TIMES. AT NO TIME SHALL THE BUILDING BE LEFT UNPROTECTED WITHOUT NOTIFICATION IN WRITING TO OWNER AND FIRE DEPARTMENT. MINIMUM 48 HOURS ADVANCED NOTICE IS REQUIRED. CONTRACTOR SHALL HIRE FIRE DEPARTMENT APPROVED GUARD/FIRE DEPARTMENT PERSONNEL TO WATCH BUILDING WHEN LEFT UNPROTECTED. MINIMIZE SYSTEM DOWN TIME TO THE FULLEST EXTENT POSSIBLE. PROVIDE TEMPORARY DETECTION THROUGHOUT BUILDING DURING CONSTRUCTION TO PROTECT BUILDING.
- FIRE ALARM SYSTEM IS TO BE KEPT ACTIVE THROUGHOUT THE PROJECT. THERE MAY BE TIMES DURING THE DAY WHEN WORK IS BEING PERFORMED, THAT THE FIRE MONITORING SYSTEM HAS TO BE TAKEN OUT OF SERVICE. IF AND WHEN THIS SITUATION ARISES, THE FIRE DEPARTMENT NEEDS TO BE CONTACTED AND THE CORRESPONDING PANEL TAKEN OUT OF SERVICE. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE SYSTEM IS ACTIVE EACH DAY AND TO TAKE THE STATED STEPS NECESSARY TO TAKE THE SYSTEM OUT OF SERVICE IF NEEDED. WHETHER IT IS REQUIRED FOR THEIR OWN WORK OR AS DIRECTED BY THE CONSTRUCTION MANAGER FOR ANOTHER TRADES WORK. IN ADDITION SMOKE DETECTORS ARE TO BE PROVIDED OR KEPT IN SERVICE AT MINIMUM IN ORDER TO LEAVE THE BUILDING PROTECTED DURING WORK HOURS AND AFTER HOURS. THE REMAINDER OF THE SYSTEM IS TO BE KEPT UP AND RUNNING AS LONG AS POSSIBLE.
10. IN FINISHED AREAS WHERE EXISTING SURFACE MOUNTED BACKBOXES, WIREMOLD OR CONDUIT HAVE BEEN REMOVED, PATCH AND PAINT WALLS AND/OR CEILINGS TO MATCH SURROUNDING AREAS. COORDINATE WITH THE ARCHITECT AND OWNER. NEW DEVICES AND RACEWAYS MAY BE MOUNTED AT NEW LOCATIONS.
11. REMOVE AND REPLACE CEILING SYSTEMS AS REQUIRED FOR INSTALLATION OF RACEWAYS AND CABLING. REINSTALL CEILING SYSTEM WHEN COMPLETE. REPLACE ALL DAMAGED CEILING TILES WITH TYPE TO MATCH EXISTING.
12. ALL HALL AND FLOOR PENETRATIONS SHALL BE SLEEVED AND FIREPROOFED.
13. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS PER SPECIFICATIONS. INCLUDE ONE LINE RISER DIAGRAMS AND POINT-TO-POINTS. INCLUDE ACTUAL BUILDING WIRING PLANS SHOWING WIRING OF ALL DEVICES AND LOCATIONS OF ALL T-TAPS.
14. FIRE ALARM CONTRACTOR SHALL BE A LICENSED STATE OF ILLINOIS FIRE ALARM CONTRACTOR HOLDING AT LEAST A NICET LEVEL 2 CERTIFICATION.
15. SYSTEM INSTALLATION SHALL BE TESTED AND CERTIFIED PER NFPA 72 REQUIREMENTS. SYSTEM TESTING MUST BE REVIEWED AND ACCEPTED BY THE LOCAL FIRE DEPARTMENT.

NOTE:
OWNERS FIRE ALARM REPRESENTATIVE IS COMMERCIAL ALARM SYSTEMS, LLC.
CONTACT JAMES MCCOLLAM (630) 932-2844; jmcollam@casystemsllc.com
CONFORM TO STYLE-4 WIRING SCHEME.



TYPICAL PARTIAL FIRE ALARM RISER DIAGRAM
NO SCALE

QUANTITIES INDICATED ARE FOR INFORMATION
ONLY AND ARE NOT INTENDED TO INDICATE ALL
DEVICES AND/OR CIRCUITS. CONTRACTOR IS
RESPONSIBLE FOR DETERMINING ALL FINAL
QUANTITIES OF DEVICES AND CIRCUITS REQUIRED.

FIRE ALARM SYSTEM WIRE SCHEDULE	
A	(1) #16 GA. TWISTED (SIZE AS NEEDED), 2 CONDUCTOR UN-SHIELDED CABLE - (1) BLACK, (1) RED (ZONE INITIATED CIRCUIT) ADDRESSABLE NETWORK. COORDINATE WIRE SIZE AND SHIELDING REQUIREMENTS WITH SYSTEM MANUFACTURER.
B	(2) #14 GA. WIRE (REMOTE RELAY CONTROL CIRCUIT)
C	(2) #14 GA. WIRE - (1) BLACK, (1) RED (CONTROL ZAM, REMOTE LED, DUCT SMOKE & SPRINKLER BELL POWER AND C.O. DETECTOR POWER)
D	(2) #12 GA. OR #14 GA. WIRE AS REQUIRED - (1) BLACK, (1) RED (HORN, STROBE, HORN/STROBE POWER)
E	(1) #16 GA. TWISTED SHIELDED (SIZE AS NEEDED), 2 CONDUCTOR CABLE WIRE (VOICE CIRCUIT). SPEAKER WIRE SHALL BE COORDINATED WITH EACH FIRE ALARM MANUFACTURER. IN SOME CASES SHIELDED WIRE IS NOT REQUIRED AND WIRING ONLY NEEDS TO BE TWISTED PAIR. IN OTHER CASES MANUFACTURERS MAY REQUIRE BOTH CONTINUOUS SHIELDED AND TWISTED PAIR. COORDINATE FINAL WIRE TYPE WITH MANUFACTURER PRIOR TO SUBMITTING SHOP DRAWINGS.
F	(2) #18 GA. WIRE - (1) BLACK, (1) RED (ZONE INITIATING CIRCUIT)
NOTES:	
1. ALL CABLING TO BE PLENUM RATED FIRE PROTECTION LISTED.	
2. COORDINATE CABLING TYPES WITH MANUFACTURER FOR COMPATIBILITY PRIOR TO ORDERING.	

PERKINS
+ WILL

The Wigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
312.755.0770
www.perkinswill.com

GENERAL
CONTRACTOR

STRUCTURAL
ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014

NOTE: DOCUMENTS ARE
INCOMPLETE AND MAY NOT BE
USED FOR REGULATORY
APPROVAL, PERMITTING, OR
CONSTRUCTION PURPOSES.

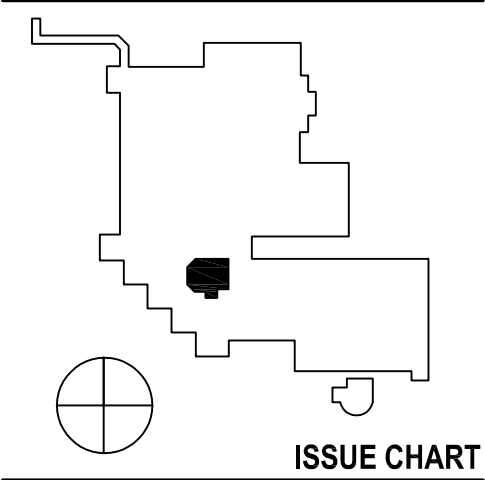
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

1	ISSUE FOR BID & PERMIT	08/07/2018
DATE	REVISION	DATE
Job Number	024303.007	
Drawn	JTJ/DCC	
Checked	MC/REL	
Approved	MC/REL	

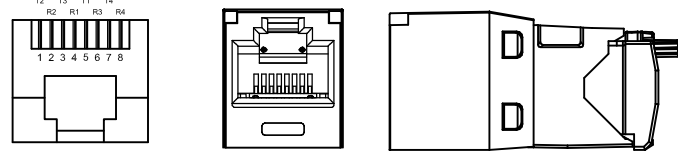
TITLE
FIRE ALARM SYSTEM
NOTES AND DETAILS

SHEET NUMBER

E00-02

COLOR	CATALOG #
DATA - CAT-6 - BLACK	T568B WIRING CJ688TGBL

T568B (AT&T)



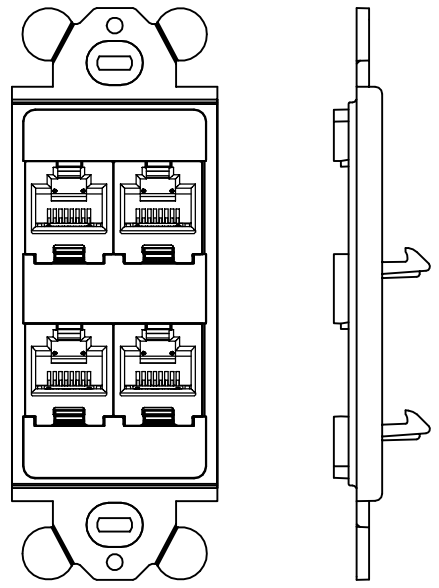
WIRING FORMAT

NOTES:

- JACKS ARE U.L. AND CSA LISTED.
- JACK CONTACTS ARE BERYLLIUM COPPER AND GOLD PLATED.
- MODULAR JACKS MEET OR EXCEED F.C.C. PART 68.5.
- JACK HOUSINGS ARE MADE OF HIGH IMPACT, 94 V-0 ABS RATED THERMOPLASTIC.
- COMPATIBLE WIRE SIZES: 22-24 AWG AND A MAX. INSULATION SIZE OF .050 INCH. SEE ABOVE FOR WIRING FORMATS.
- FOR MORE INFORMATION CONTACT YOUR CUSTOMER SERVICE REPRESENTATIVE.

PANDUIT MINI-COM TX6 PLUS SERIES MODULAR JACKS

NO SCALE

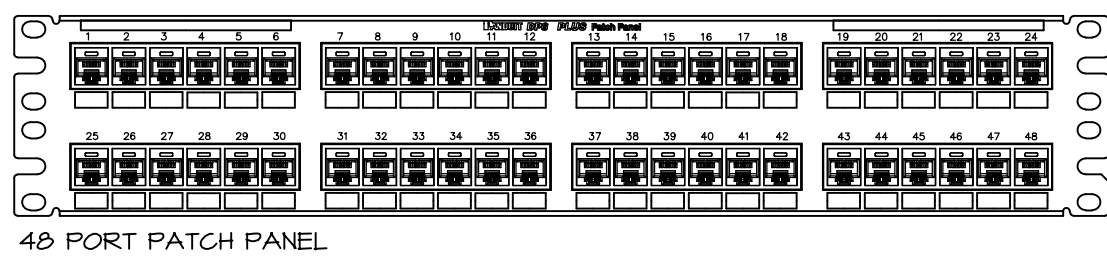
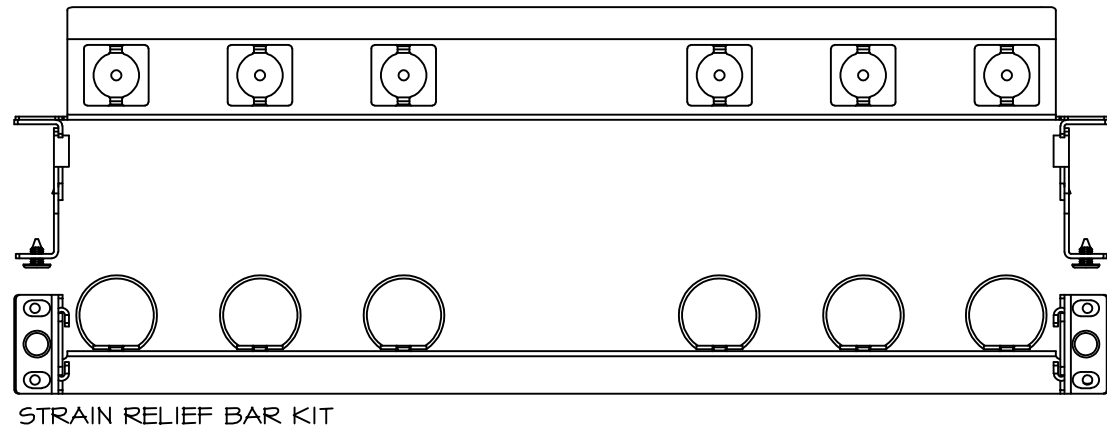


- C4** 4-PORT SINGLE-GANG MOUNTING FRAME. PANDUIT #CF64EI MOUNTING FRAME WITH (4) CAT-6 DATA JACKS INSTALLED. MOUNT INTO FLOOR BOX.

PANDUIT MINI-COM 4-PORT MOUNTING FRAME

NO SCALE

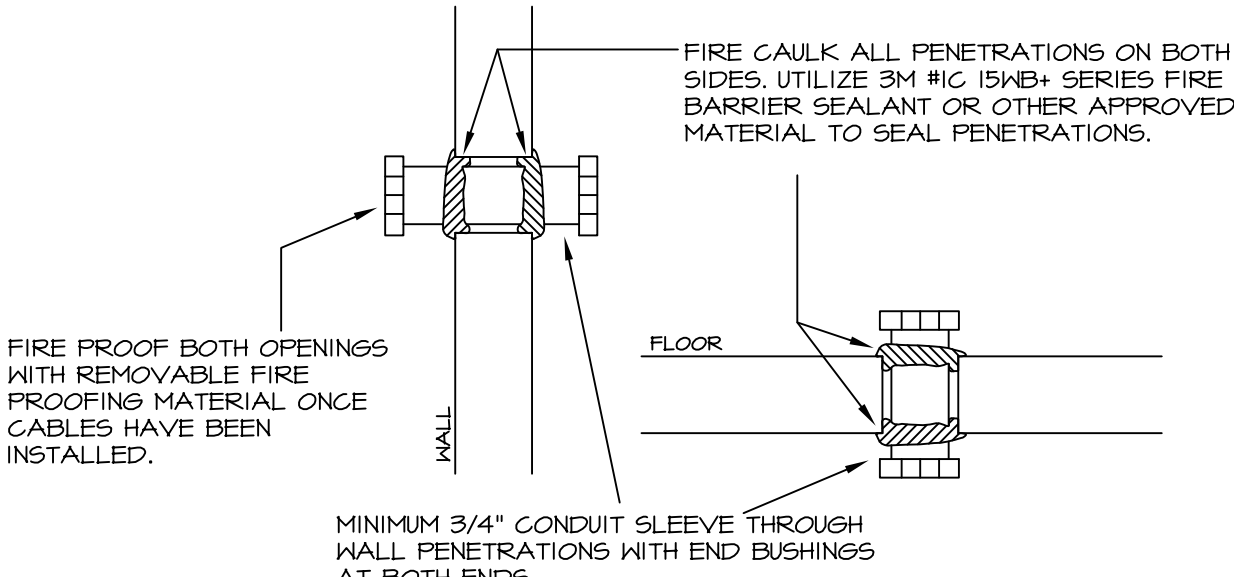
NETWORK DATA CABLE SCHEDULE				
CABLE TYPE	MANUFACTURER	MODEL NUMBER	DESCRIPTION	REMARKS
CAT-6 COPPER CABLE	PANDUIT	DATA CABLE, #PUP6004BU-UY BLUE	CAT-6 NETWORK CABLE PLENUM RATED 4-PAIRS, #23 AWG UTP	COLORS TO BE VERIFIED WITH OWNER PRIOR TO ORDERING.
CONTRACTOR SHALL FURNISH AND INSTALL CABLES AND CONNECTORS AS SPECIFIED TO INTERCONNECT ALL AS NOTED ON DRAWINGS AND RISER DETAILS. DETERMINE ALL REQUIRED LENGTHS OF CABLES IN FIELD PRIOR TO ORDERING. UPON COMPLETION OF WORK, CONTRACTOR SHALL TEST AND CERTIFY EACH CONNECTION FOR PROPER OPERATION.				



CONTRACTOR SHALL LABEL ALL PORTS AS REQUIRED TO REFLECT INSTALLATION. COORDINATE WITH OWNER FOR LABELING REQUIREMENTS.

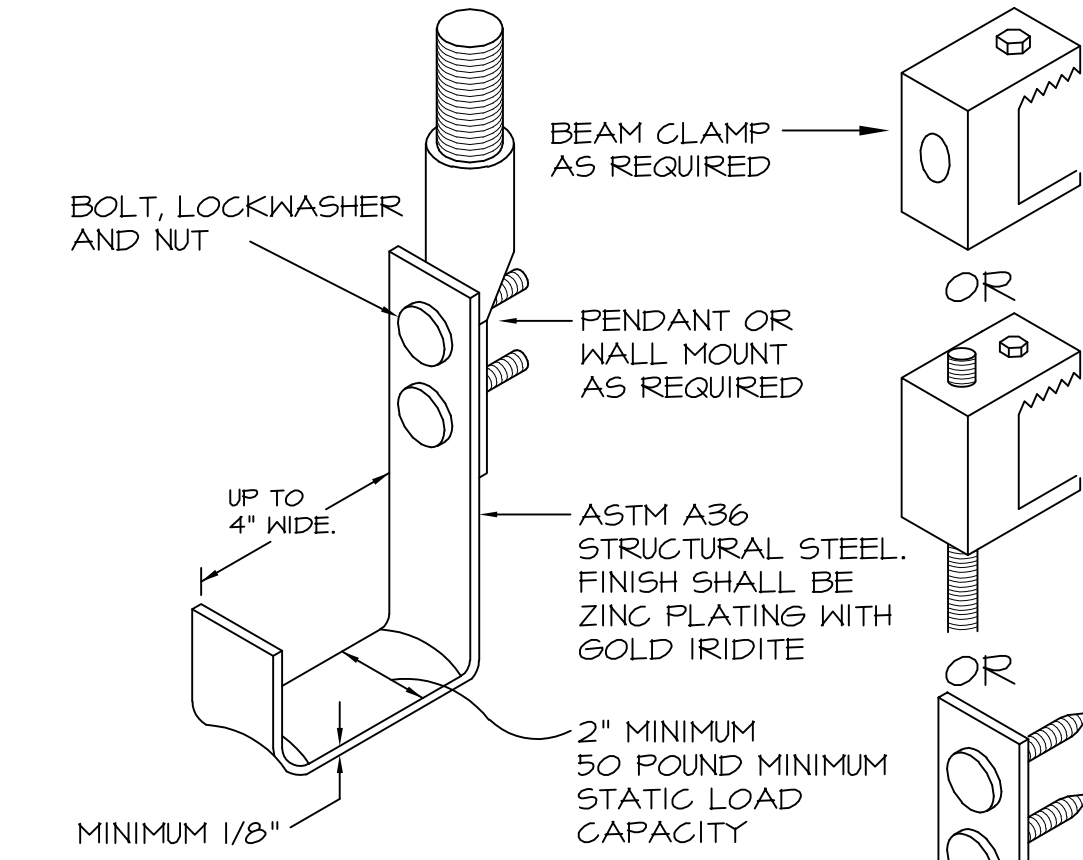
PANDUIT #DP SERIES CAT-6 24 & 48 PORT PATCH PANEL

NO SCALE



WALL/FLOOR PENETRATION DETAIL

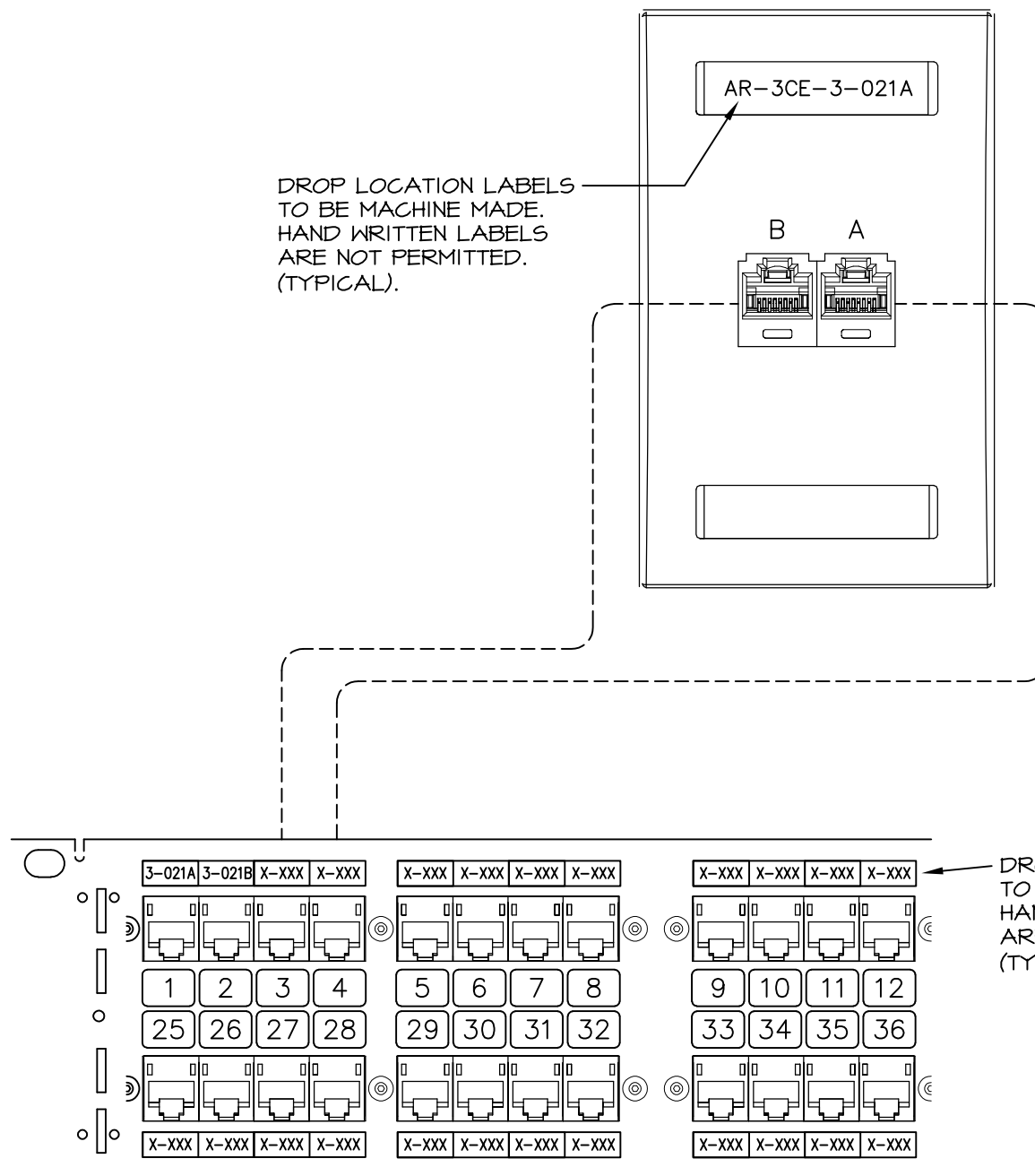
NO SCALE



J-HOOK DETAIL (BY CADDY)

NO SCALE

FOR INSTALLATION ABOVE LAY-IN CEILINGS.



LABELING NOTES:

- CONFIRM ALL ROOM NUMBERS WITH THE OWNER PRIOR TO LABELING.
- USE THE FOLLOWING FORMAT FOR ALL OUTLET AND PATCH PANEL LABELING: SEE DETAIL.
- BROTHER P-TOUGH GASTIC EZ LABEL, BRADY OR PRIOR APPROVED EQUAL SELF-ADHESIVE LABELS SHALL BE UTILIZED FOR ALL OUTLET AND PATCH PANEL LABELING. A SAMPLE OF EACH INFORMATION OUTLET WITH A MINIMUM OF EACH CABLE TERMINATED SHALL BE REQUIRED FOR APPROVAL.
- PLACE LABELS ON FACEPLATES AND INSIDE OUTLET BOXES FOR ALL OUTLET LOCATIONS.
- LABEL ALL PATCH PANEL TERMINATIONS WITH THE IDENTICAL NUMBER USED AT OUTLET LOCATIONS.
- LABEL ENDS OF ALL CABLING RUNS WITH PANDUIT #FAN-TY, BRADY OR EQUAL LABELS IN PERMANENT MARKER.
- LABEL ALL PATCH CORDS WITH PANDUIT #FAN-TY, BRADY OR EQUAL LABELS IN PERMANENT MARKER.
- LABELS ON FACEPLATES, PATCH PANELS AND BOTH ENDS OF CABLES SHALL MATCH.

DATA JACK AND PATCH PANEL LABELING DETAIL

NO SCALE

DATA/PHONE CABLE & DATA/PHONE JACK NOTES:

- CABLES:**
REFER TO "NETWORK DATA CABLE SCHEDULE" FOR DATA CABLE INFORMATION.

LEAVE 5'-0" OF BLACK OUT OF EACH STATION FOR TERMINATION ON JACK. LEAVE 15'-0" OF SERVICE LOOP ABOVE CEILING FOR POTENTIAL FUTURE JACK RELOCATION. MAINTAIN PROPER BEND RADIUS.
- ALL DATA CABLES TO BE RUN BACK TO LOCAL AREA RACK (REFER TO RISER DIAGRAM). MAINTAIN A MINIMUM CLEARANCE OF 5' AWAY FROM LIGHT FIXTURES.
- JACKS:**
DATA JACKS TO BE PANDUIT MINI-COM TX6 PLUS #CJ688TGBL CAT-6, RJ45 MODULAR JACK WITH 110 TERMINATION. COLOR TO BE BLACK.
- FACE PLATES:**
REFER TO FACEPLATE DETAILS FOR FACEPLATE INFORMATION.

ALL COMPUTER JACKS INDICATED BY "C4" SHALL RECEIVE A PANDUIT #CF64EI MINI-COM FRAME WITH (4) RJ45 CAT-6 JACKS AND CABLES MOUNTED IN FLOOR BOX.

PROVIDE EQUAL AMOUNTS OF 1BLU50 BLUE ICONS AND 1YEL50 YELLOW ICONS AS AMOUNT OF JACKS.
- EXISTING IDF* RACKS:**
FURNISH AND INSTALL ENOUGH PATCH PANELS TO COVER ALL CABLING AND HAVE A MINIMUM OF (15) SPARE PORTS. PATCH PANELS SHALL BE CAT-6, 110, PATCH PANEL PANDUIT #DP...688TGY (48 PORT OR 24 PORT AS REQUIRED) WITH EQUAL AMOUNTS OF BLUE ICONS, YELLOW ICONS AS AMOUNT OF PORTS AVAILABLE AND PANDUIT #SRBRM-KIT STRAIN RELIEF BAR KIT BEHIND EACH PATCH PANEL. FURNISH AND INSTALL PANDUIT #C6PH#2 CABLE MANAGEMENT PANELS ABOVE AND BELOW EACH PATCH PANEL. TERMINATE ALL DATA CABLES ON PATCH PANELS. PROVIDE PANDUIT LABELING KITS TO OWNER UPON COMPLETION OF WORK. PROVIDE BLUE 110 CAPS AND CLEAR DUST COVER ON ALL JACKS. UTILIZE PANDUIT #MLTP21-XO (PLENUM RATED) TAK-TY HOOK AND LOOP STRAPS AS REQUIRED FOR PATCH PANEL CABLE MANAGEMENT.
- PATCH CORDS:**
PATCH CORDS TO BE FURNISHED AND INSTALLED BY THE OWNER.
- RUN ALL CABLE ABOVE CEILING THROUGH CADDY CABLECAT "ORIGINAL" J-HOOKS (NO MORE THAN 3'-0" SPACING) SUITABLE FOR CAT-6 CABLING AND CABLE TIES (DO NOT OVER FASTEN). HOOKS TO BE HIDE BASE DESIGN WITH MINIMUM 2" BEARING SURFACE.
- PROVIDE 15 SPARE RJ45 JACKS TO OWNER UPON COMPLETION OF JOB.
- ALL SYSTEMS SHALL MEET OR EXCEED STATE OR LOCAL CODES AND ORDINANCES AND U.L. STANDARDS. THE ENTIRE PANDUIT SYSTEM SHALL BE PROVIDED WITH A 25 YEAR PANDUIT PATCH PANEL PERFORMANCE GUARANTEE WARRANTY AND SYSTEM PERFORMANCE GUARANTEE PROGRAM. INSTALLER SHALL THEREFORE FOLLOW TIA/EIA CAT-6 STANDARDS.
- INSTALLER SHALL BE A PANDUIT CERTIFIED COMPETENT INSTALLER IN THE FIELD OF COMPUTER DATA WIRING INSTALLATION.
- INSTALLER SHALL HAVE A MINIMUM OF THREE YEARS OF EXPERIENCE INSTALLING UTP CABLING FOR COMPUTER DATA SYSTEMS.
- SHOP DRAWINGS SHALL BE SUBMITTED FOR APPROVAL.
- PROVIDE ONE SET OF REPRODUCIBLE DRAWINGS INDICATING RECORD CONDITIONING OF EQUIPMENT LOCATION AND CABLING.
- PROVIDE ALL NECESSARY WIRING, HARDWARE, ETC., FOR A COMPLETE SYSTEMS INSTALLATION. PATCH CORDS TO BE PROVIDED BY THE OWNER.
- PROVIDE ALL NECESSARY WIRING, AS NOTED ON DRAWINGS. ALL EXPOSED WIRING SHALL BE RUN IN RIREMOLD, NO WIRING SHALL BE RUN EXPOSED ON CEILINGS, FLOORS, OR WALLS UNLESS APPROVED BY ARCHITECT OR INDICATED OTHERWISE ON DRAWINGS.
- ALL JACKS, PATCH PANELS, WIRES (BOTH ENDS) AND OTHER ACCESSORIES SHALL BE CLEARLY & PERMANENTLY IDENTIFIED AND LABELED. REFER TO LABELING DETAIL FOR ADDITIONAL INFORMATION. PROVIDE A WIRING LOG BOOK SHOWING ALL TERMINATION AND WIRING CORRESPONDING TO EACH ROOM. COORDINATE WITH OWNER.

 - REQUIRED TEST DATA FOR UTP SHALL INCLUDE WIRE MAP, LENGTH, ATTENUATION, NEXT (BOTH ENDS), LINK TESTS, CHANNEL TESTS, AND PROVIDE A PRINT OUT AND DISKETTE TO ENGINEER AND HUBBELL SALES REPRESENTATIVE. TEST DATA MUST BE PROVIDED FOR BOTH HORIZONTAL AND BACKBONE LINKS.
- CONDUCT CHANNEL TESTS & INSPECTIONS AFTER INSTALLATION HAS BEEN COMPLETED TO ASSURE THE OWNER'S REQUIREMENTS FOR INSTALLATION HAVE BEEN MET (FOLLOW TIA/EIA T568.6T & T2 STANDARDS). UPON REQUEST, PRIOR TO OWNER'S ACCEPTANCE, ALLOW ACCESS BY THE OWNER TO TEST THE EQUIPMENT & WIRING SYSTEM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CHANNEL TESTING EACH RUN "END-TO-END" AND CERTIFYING, IN WRITING, THAT THE CABLING MEETS CATEGORY/LEVEL 6 UTP SPECIFICATIONS AND IS IN PROPER WORKING CONDITION. EACH UTP CABLE SHALL BE FULLY TESTED. A MICROTEST CATEGORY-6 TESTER OR EQUIVALENT SHALL BE USED TO TEST/CERTIFY EACH UTP CABLE (USE A LEVEL 3 OWN SCANNER TESTER). THE OUTPUT FROM EACH UTP CABLE TEST/CERTIFICATION SHALL BE PRINTED AND PROVIDED TO OWNER.

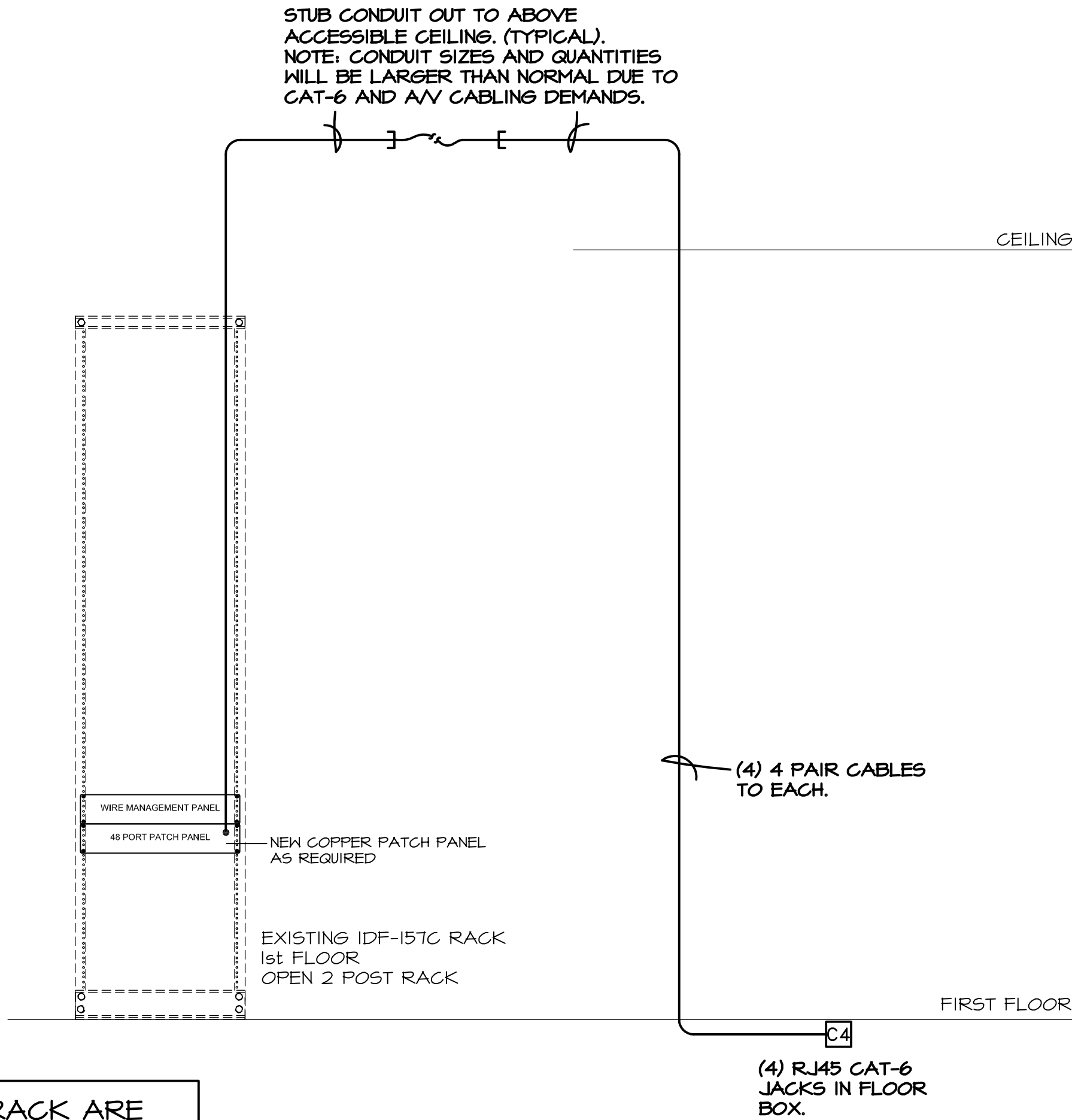
ALL UTP CABLES FROM ROOM LOCATIONS TO COMMUNICATIONS RACK PATCH PANELS MUST BE WITHIN THE CAT-6 DISTANCE OF 295 FEET. THE CONTRACTOR SHALL NOTIFY OWNER OF ANY LOCATIONS THAT EXCEED THE CATEGORY 6 UTP DISTANCE LIMITATION.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING COMPLETE DETAILED DOCUMENTATION OF "AS INSTALLED" FOR THE DATA NETWORK WIRING SYSTEM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETING DOCUMENTATION CHECKLISTS PROVIDED BY THE OWNER.

- THE CONTRACTOR SHALL PROVIDE A (25) TWENTY FIVE YEAR GUARANTEE OF THE INSTALLED SYSTEM AGAINST DEFECTS IN MATERIAL AND WORKMANSHIP. ALL LABOR AND MATERIALS SHALL BE PROVIDED AT NO EXPENSES TO THE OWNER. GUARANTEE PERIOD SHALL BEGIN ON THE DAY OF ACCEPTANCE BY THE OWNER/ENGINEER.
- CONTRACTOR SHALL CORE WALLS AS REQUIRED FOR INSTALLATION OF DATA CABLING. VERIFY ALL LOCATIONS OF CORES WITH ARCHITECT IN FIELD. ALL CORES SHALL BE SLEEVED & FIRE PROOFED AS REQUIRED. FIELD VERIFY ALL EQUIPMENT & PIPING LOCATIONS BEFORE MAKING CORES. UNDER NO CIRCUMSTANCES WILL ANY STRUCTURAL MEMBER BE CUT IN THIS PROCESS.
- NOTIFY OWNER OF ALL FLOOR CORE LOCATIONS PRIOR TO CORING FLOOR SO THAT FLOOR CONTENTS CAN BE VERIFIED.
- ALL CEILINGS SHALL BE REMOVED, REINSTALLED AND/OR REPLACED BY CONTRACTOR FOR INSTALLATION OF NEW CABLING. REPLACE ALL DAMAGED TILES WITH TYPE/STYLE TO MATCH EXISTING.
- FURNISH AND INSTALL CONDUIT SLEEVES THROUGH WALLS AS REQUIRED FOR INSTALLATION OF NEW DATA CABLING. REFER TO DRAWINGS FOR LOCATIONS AND SIZE OF CONDUITS. CONTRACTOR SHALL INCLUDE ADDITIONAL CONDUITS SLEEVES AS REQUIRED THAT ARE NOT INDICATED ON THE DRAWINGS. ALL CONDUIT SLEEVE PENETRATIONS SHALL BE MADE FIRE PROOFED. FURNISH AND INSTALL FITTINGS AND END BUSHINGS AT ENDS OF SLEEVES IN ORDER TO PROTECT CABLING.
- INSTALLATION PRACTICES:**
STRIP BACK ONLY AS MUCH CABLE JACKET AS IS REQUIRED FOR TERMINATION AND MAINTAIN PAIR TWISTS AS CLOSE AS POSSIBLE TO THE POINT OF MECHANICAL TERMINATION. AT A MINIMUM, NEVER ALLOW UNTWISTING OF CATEGORY 6 PAIRS TO EXCEED 0.5" MAXIMUM. MAINTAIN A MAXIMUM BEND RADIUS OF 4X THE CABLE DIAMETER (4-PAIR CABLES). 6X IF IN CONDUIT. APPLY CABLE TIES LOOSELY AND AT RANDOM INTERVALS. TRY TO MINIMIZE THE AMOUNT OF JACKET TWISTING. AVOID STRETCHING THE CABLE. USE APPROPRIATE METHODS FOR DRESSING AND SECURING CABLES (I.E. CABLE TIES, WIRE MANAGEMENT PANELS, CABLE SUPPORT BAR, RESEALABLE VELCRO STRAPS).

NEVER EXCEED A 90 DEGREE BEND. DO NOT OVER TIGHTEN CABLE TIES. DO NOT OVER TWIST CABLE (IT CAN LEAD TO TORN JACKETS). DO NOT EXCEED 25 lbs. OF PULLING TENSION. DO NOT USE STAPLE GUNS TO POSITION OR FASTEN CABLES.

DATA CABLE RUNS SHALL NOT EXCEED 100 METERS IN LENGTH PER EIA/TIA LIMITATIONS.



CABLE MANAGEMENT CABINET AND RACK ARE DIAGRAMMATIC ONLY. AMOUNT OF PATCH PANELS SHOWN DOES NOT REFLECT THE AMOUNT OF PATCH PANELS REQUIRED FOR COMPLETE WORKING SYSTEM. VERIFY EXACT AMOUNT OF PATCH PANELS IN FIELD.

PARTIAL DATA RISER DIAGRAM

NO SCALE

ALL DATA TO BE PLENUM RATED WHEN RUN ABOVE CEILING, OTHERWISE INSTALL IN RACEWAY.

PERKINS + WILL

The Whigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
312.755.0770
312.755.0775
www.perkinswill.com

GENERAL
CONTRACTOR

STRUCTURAL
ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014

NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION PURPOSES.

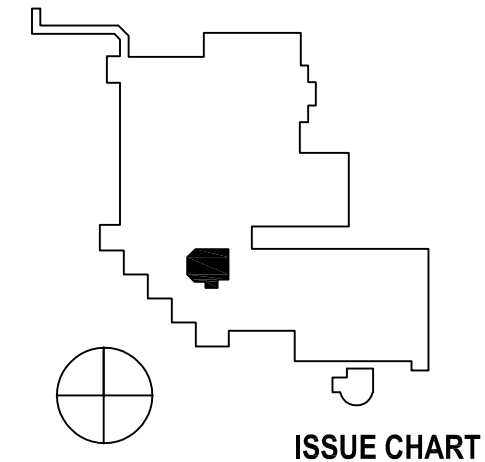
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



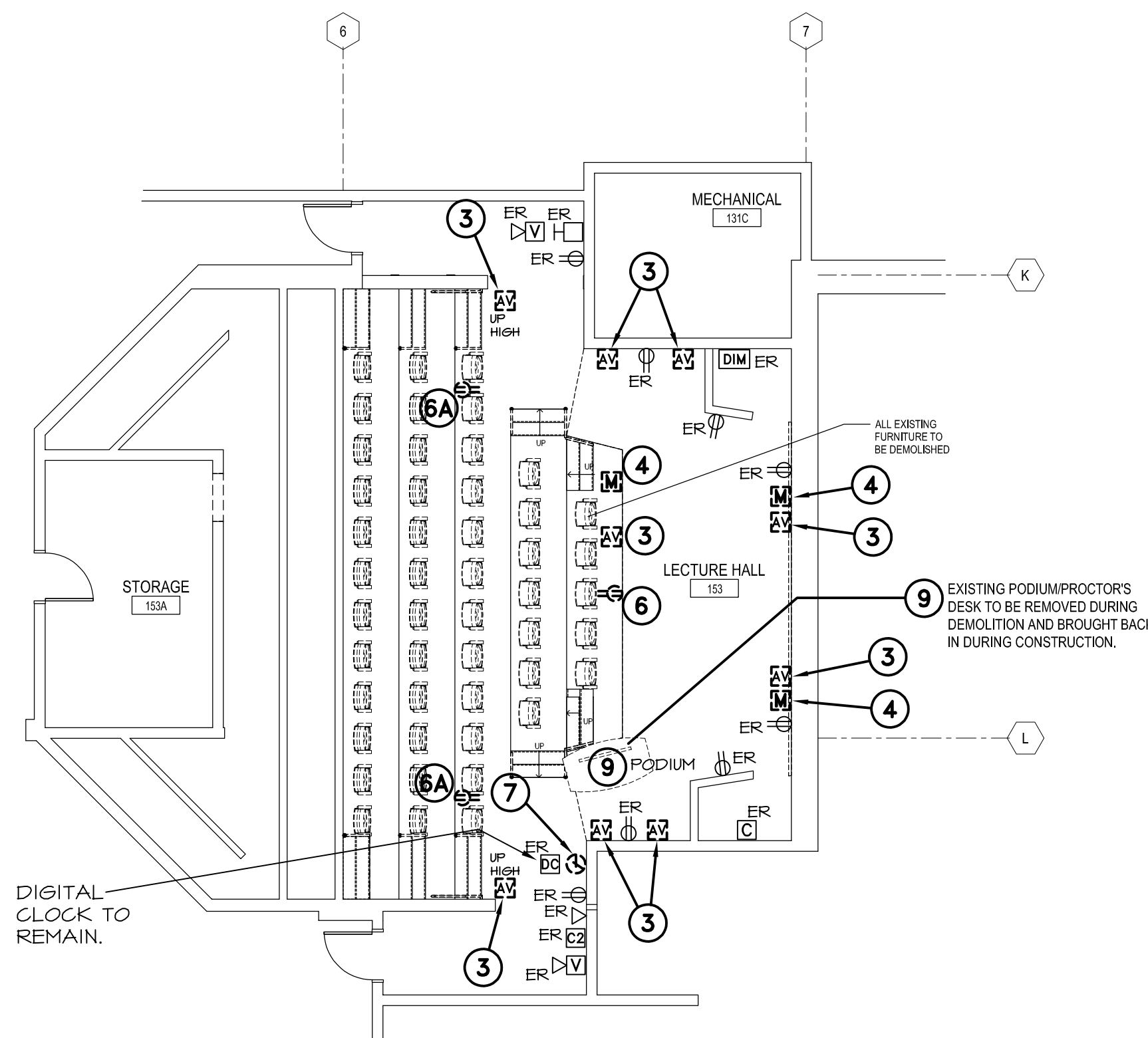
ISSUE CHART

1	ISSUE FOR BID & PERMIT	08/07/2018
DATE	REVISION	SHEET
Job Number	024303.007	
Drawn	JT/JD/CC	
Checked	MC/REL	
Approved	MC/REL	
TITLE		

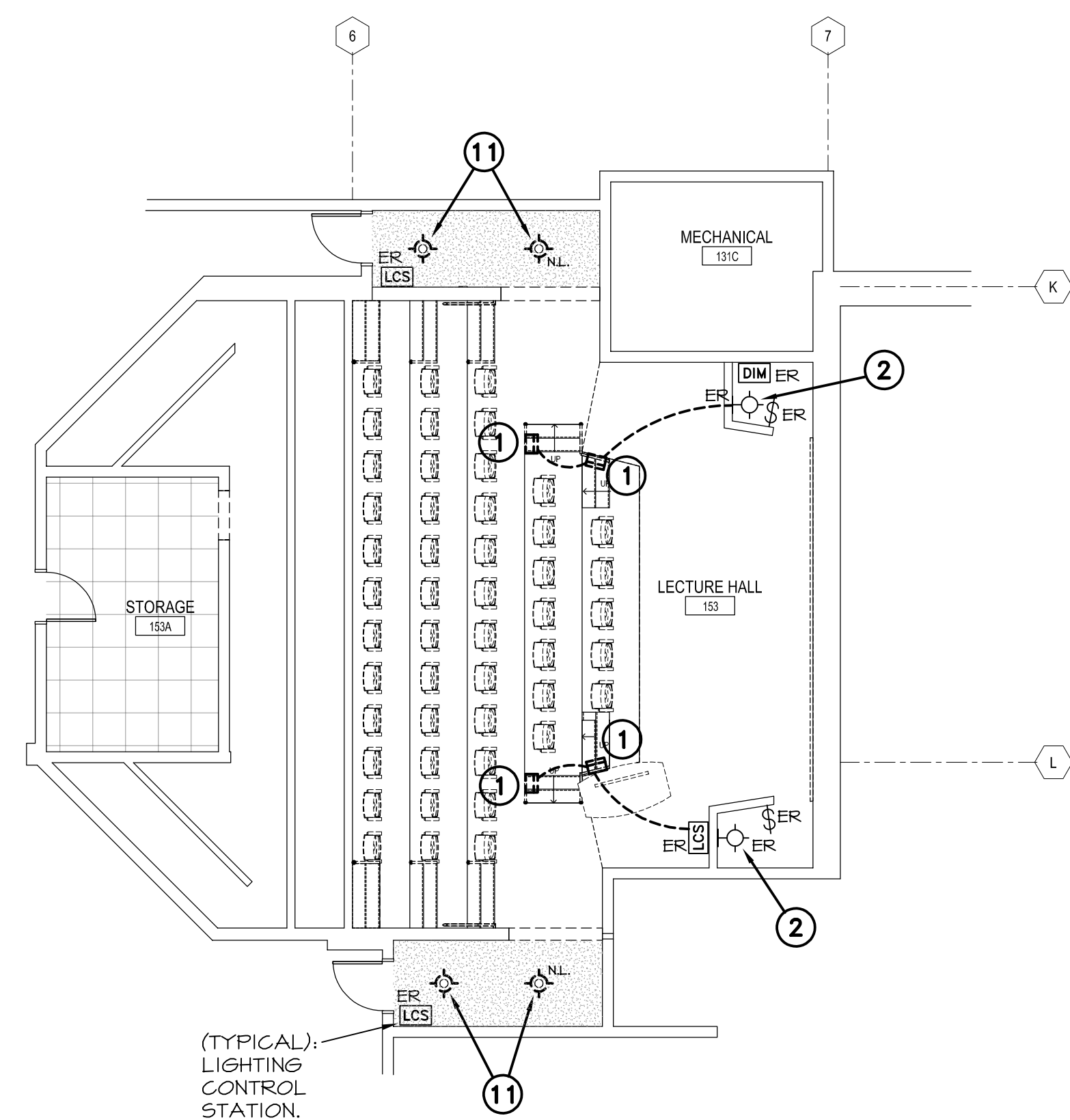
TECHNOLOGY SYSTEM
NOTES AND DETAILS

SHEET NUMBER

E00-03



1 LEVEL 01 - PARTIAL FLOOR PLAN - ELECTRICAL DEMO
1/8" = 1'-0"

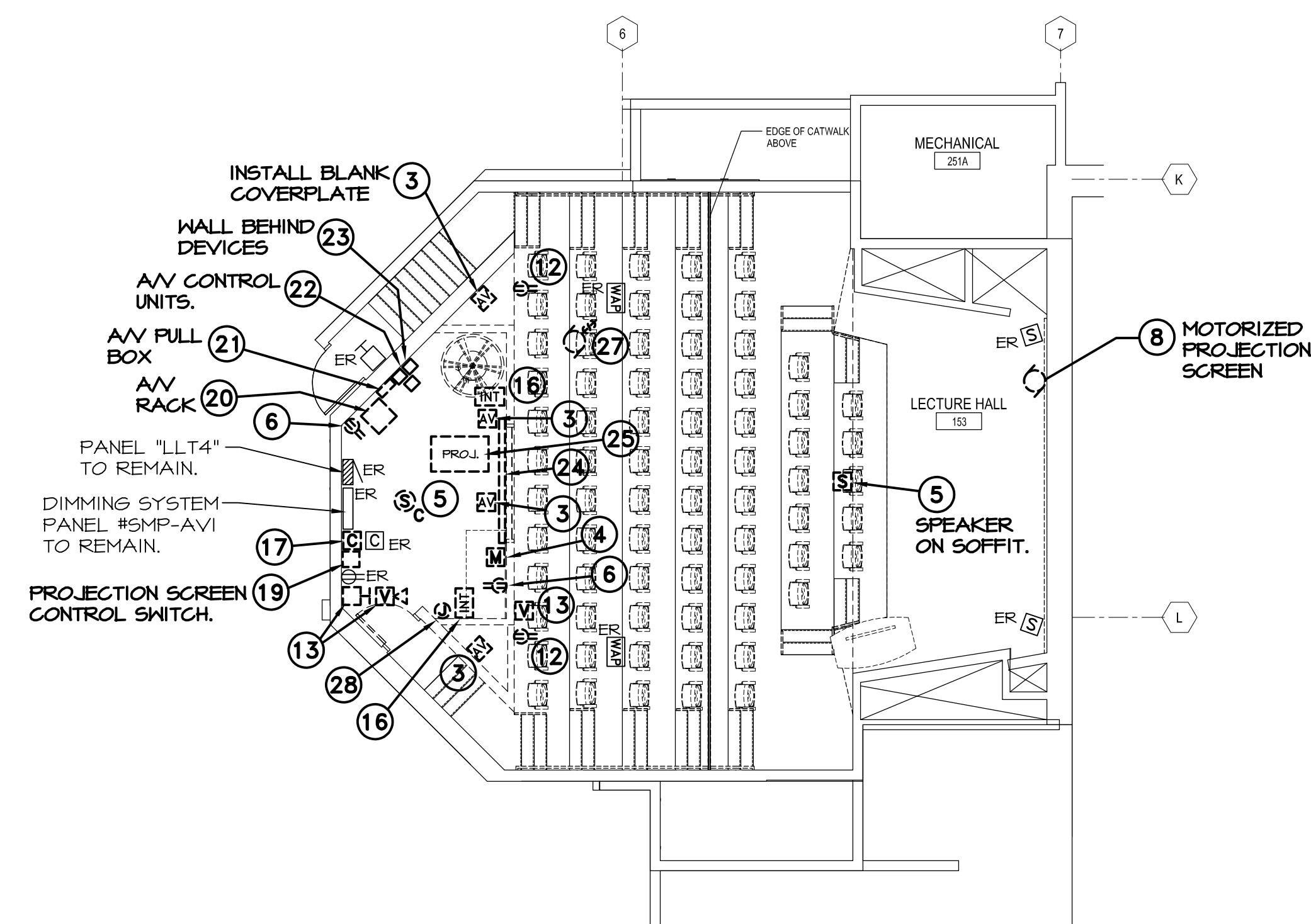


3 LEVEL 01 - PARTIAL FLOOR PLAN - LIGHTING DEMO
1/8" = 1'-0"

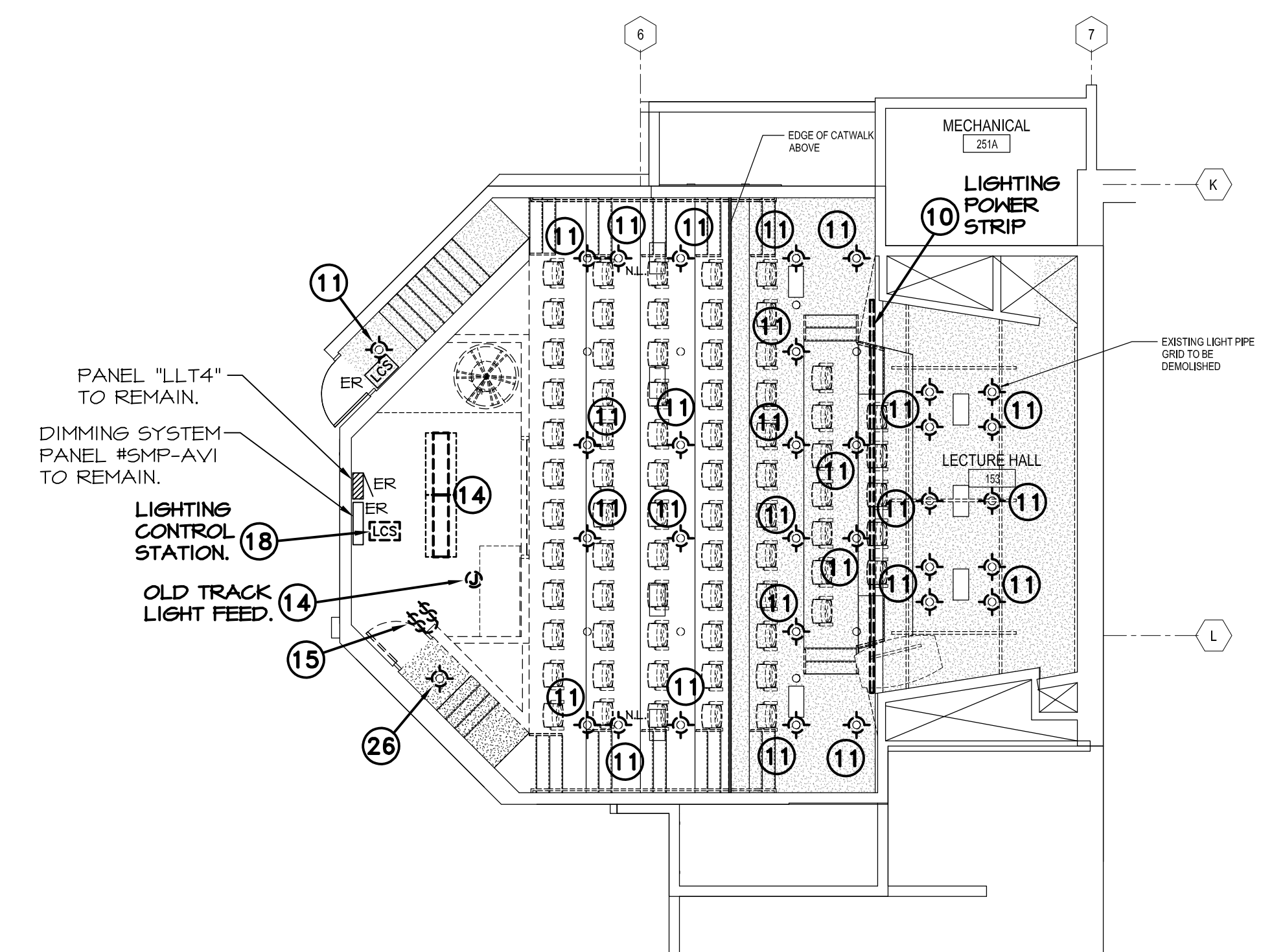
ELECTRICAL DEMOLITION PLAN NOTES:

- 1 STEP LIGHTS TO BE DISCONNECTED AND REMOVED. REMOVE WIRING BACK TO UNAFFECTED STEP LIGHT AND STAGE CLOSET WALL LIGHT AND BYPASS WIRING AS REQUIRED TO KEEP REMAINING STEP LIGHTS OPERATIONAL. EXISTING STEP LIGHT HOUSING CAN BE ABANDONED IN PLACE. SEAL CONDUIT OPENING.
- 2 STAGE STORAGE CLOSET LIGHT FIXTURE TO REMAIN. WIRING TO BE REMOVED BACK TO STEP LIGHT INDICATED TO BE REMOVED.
- 3 AUDIO/VIDEO JACKS AND CABLING TO BE DISCONNECTED AND REMOVED COMPLETE. PULL WIRING BACK TO SOURCE. PATCH WALL PER ARCHITECT'S DIRECTION.
- 4 MICROPHONE JACK AND CABLE TO BE REMOVED COMPLETE BACK TO SOURCE. PATCH WALL PER ARCHITECT'S DIRECTION. MICROPHONE BOX IN PIT TO HAVE CONDUIT OPENING SEALED.
- 5 SPEAKER TO BE DISCONNECTED AND REMOVED. TURN OVER TO THE OWNER AT THEIR DISCRETION, OTHERWISE DISPOSE OF. REMOVE WIRING BACK TO AMPLIFIER. COORDINATE WORK WITH OWNER AND ARCHITECT PRIOR TO REMOVAL.
- 6 POWER RECEPTACLE TO BE DISCONNECTED AND REMOVED. REMOVE WIRING BACK TO UNAFFECTED JUNCTION BOX AND BYPASS CONDUIT AND WIRING AS REQUIRED TO KEEP REMAINING DEVICES OPERATIONAL. BOX IN PIT TO BE REMOVED AND CONDUIT TO BE EXTENDED TO NEAR FLOOR BOXES TO BE INSTALLED.
- 6A POWER RECEPTACLE IN FACE OF RISER TO BE DISCONNECTED AND REMOVED. VERIFY IN THE FIELD IF THE RECEPTACLE/JUNCTION BOX IS THE "HOME RUN" OR INTERMEDIATE BOX FOR THE POWER CIRCUITS BACK TO THE POWER PANEL. REMOVE WIRING BACK TO NEAREST UNAFFECTED JUNCTION BOXES AS REQUIRED TO BE BYPASSED AS REQUIRED TO KEEP REMAINING DEVICES OPERATIONAL. JUNCTION BOX IN FACE OF RISER TO HAVE A BLANK FACEPLATE INSTALLED.
- 7 ANALOG CLOCK TO BE DISCONNECTED AND REMOVED. REMOVE CONDUIT AND WIRING BACK TO UNaffected DEVICE AND BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL. COORDINATE WORK WITH OWNER AND ARCHITECT PRIOR TO REMOVAL. PATCH AND PAINT WALL TO MATCH SURROUNDING AREA. TURN OVER TO THE OWNER AT THEIR DISCRETION, OTHERWISE DISPOSE OF.
- 8 PROJECTION SCREEN TO BE DISCONNECTED. REMOVE POWER FEED AND CONTROL WIRING BACK TO SOURCE AND PODIUM. REMOVE POWER CONDUIT AND WIRING BACK TO UNAFFECTED DEVICE AND BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL. COORDINATE WORK WITH OWNER AND ARCHITECT PRIOR TO REMOVAL.
- 9 PODIUM TO BE DISCONNECTED. REMOVE ALL LOW VOLTAGE CABLING (DATA, VOICE, VIDEO AND AUDIO) PER OWNER'S DIRECTION. REMOVE ALL DATA CABLING COMPLETE BACK TO IDF CLOSET. REMOVE VIDEO CABLING BACK TO PROJECTOR IN PROJECTION BOOTH. REMOVE POWER CONDUIT AND WIRING BACK TO UNAFFECTED DEVICE AND BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL. REMOVE FLOOR CABLING ENCLOSURE AND CABLING RAN UNDER FLOOR AND UP IN WIREWAY IN STORAGE CLOSET. TAG ALL CABLING CONNECTIONS IN PODIUM FOR RECONNECTION WHEN NEEDED. PODIUM PROJECTION SCREEN SWITCH AND CABLING TO BE REMOVED BACK TO PROJECTION SCREEN CONTROLLER.
- 10 THEATRICAL LIGHTING PLUS STRIP TO BE DISCONNECTED AND REMOVED COMPLETE. TURN OVER TO THE OWNER AT THEIR DISCRETION (FIRST RIGHT OF REFUSAL); OTHERWISE DISPOSE OF PER E.P.A. REQUIREMENTS. REMOVE CONDUIT AND WIRING BACK TO DIMMING RACK. COMPLETE OR BACK TO UNAFFECTED PLUS STRIP IF CONNECTED IN SUCH A MANNER. BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL. PATCH AND PAINT WALL TO MATCH SURROUNDING AREA.
- 11 LIGHT FIXTURE TO BE DISCONNECTED AND REMOVED. TURN OVER TO THE OWNER AT THEIR DISCRETION (FIRST RIGHT OF REFUSAL); OTHERWISE DISPOSE OF PER E.P.A. REQUIREMENTS. RETAIN CONDUIT AND WIRING FOR RECONNECTION TO NEW FIXTURES. PLEASE NOTE THAT FIXTURES WILL NEED TO BE REWIRED FOR NEW LED FIXTURES AND CIRCUIT ZONING WILL BE CHANGED.
- 12 RECEPTACLE TO BE DISCONNECTED AND REMOVED IF AFFECTED BY CONSTRUCTION; OTHERWISE TO REMAIN. REMOVE CONDUIT AND WIRING BACK TO UNAFFECTED JUNCTION BOX AND BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL.
- 13 FIRE ALARM DEVICES TO BE DISCONNECTED AND REMOVED. RETAIN FOR REINSTALLATION. REMOVE CONDUIT AND WIRING BACK TO UNAFFECTED JUNCTION BOX/DEVICE AND BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL. PLEASE NOTIFY OWNER OF WORK IN WRITING MINIMUM OF 7 DAYS IN ADVANCE BEFORE PERFORMING WORK. TAKING FIRE ALARM OUT OF SERVICE WILL NOT TAKE PLACE ON SCHOOL DAYS WHEN KIDS ARE PRESENT. COORDINATE WORK WITH OWNER AND ARCHITECT.
- 14 LIGHT FIXTURE TO BE DISCONNECTED AND REMOVED. TURN OVER TO THE OWNER AT THEIR DISCRETION (FIRST RIGHT OF REFUSAL); OTHERWISE DISPOSE OF PER E.P.A. REQUIREMENTS. REMOVE CONDUIT AND WIRING BACK TO UNAFFECTED JUNCTION BOX AND BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL.
- 15 LIGHT SWITCHES TO BE DISCONNECTED AND REMOVED. REMOVE CONDUIT AND WIRING BACK TO LIGHT FIXTURES COMPLETE. BYPASS CONDUIT AND WIRING AS REQUIRED TO MAINTAIN CATWALK LIGHTING OPERATIONAL.
- 16 INTERCOM STATION TO BE DISCONNECTED AND REMOVED. REMOVE CONDUIT AND WIRING BACK TO INTERCOM SYSTEM.
- 17 SURFACE MOUNTED DATA/MEDIA BOX, CABLING AND RACEWAY TO BE REMOVED COMPLETE. REMOVE ALL CABLING BACK TO IDF RACK. INSTALL BLANK COVERPLATES. RECESSED DATA/VOICE JACKS TO REMAIN. COORDINATE WORK WITH OWNER PRIOR TO DEMOLITION.
- 18 LIGHTING CONTROL STATION INSIDE OF THEATRICAL DIMMING PANEL TO BE DISCONNECTED AND REMOVED. RETAIN STATION FOR REINSTALLATION OUTSIDE OF ROOM PER OWNER'S DIRECTION.
- 19 PROJECTION SCREEN CONTROL SWITCH TO BE DISCONNECTED AND REMOVED COMPLETE. REMOVE WIRING BACK TO PROJECTION SCREEN. INSTALL BLANK COVERPLATE.
- 20 AV RACK TO BE DISCONNECTED AND REMOVED COMPLETE. TURN OVER TO THE OWNER. DO NOT PERFORM THIS WORK WITHOUT PRIOR COORDINATION WITH THE OWNER. REMOVE ALL CABLING COMPLETE BACK TO DEVICES SERVING. REMOVE POWER CONDUIT AND WIRING BACK TO POWER PANEL.
- 21 AV PULL BOX TO BE DISCONNECTED AND REMOVED COMPLETE. DO NOT PERFORM THIS WORK WITHOUT PRIOR COORDINATION WITH THE OWNER. REMOVE ALL CABLING COMPLETE BACK TO DEVICES SERVING. PATCH AND PAINT WALL TO MATCH SURROUNDING AREA.
- 22 AV CONTROL UNITS AND INPUT JACKS TO DISCONNECTED AND REMOVED COMPLETE. TURN OVER TO THE OWNER. DO NOT PERFORM THIS WORK WITHOUT PRIOR COORDINATION WITH THE OWNER. REMOVE ALL CABLING COMPLETE BACK TO DEVICES SERVING. PATCH AND PAINT WALL TO MATCH SURROUNDING AREA.
- 23 ALL OPENINGS IN THE WALL TO BE PATCHED IN PER THE ARCHITECTS DIRECTION.
- 24 FLUSHMOLD TO BE DISCONNECTED AND REMOVED. REMOVE WIRING BACK TO UNAFFECTED JUNCTION BOX AND BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL.
- 25 PROJECTOR TO BE CAREFULLY DISCONNECTED AND REMOVED AND TURNED OVER TO THE OWNER. REMOVE CABLING BACK TO PODIUM.
- 26 LIGHT FIXTURE TO BE DISCONNECTED AND REMOVED COMPLETE. REMOVE CONDUIT AND WIRING BACK TO UNAFFECTED LIGHT FIXTURE AND BYPASS CONDUIT AND WIRING SO AS TO KEEP REMAINING DEVICES OPERATIONAL.
- 27 EXHAUST FAN TO BE DISCONNECTED. REMOVE CONDUIT AND WIRING BACK TO UNAFFECTED DEVICE OR BACK TO PANEL WHICHEVER APPLIES. BYPASS CONDUIT AND WIRING AS REQUIRED TO KEEP REMAINING DEVICES OPERATIONAL. COORDINATE THIS WORK IN FIELD WITH ENGINEER AND OWNER PRIOR TO PERFORMING THIS WORK SO THAT SYSTEM CAN BE VERIFIED THAT IT ONLY SERVES THE PROJECTION BOOTH AND AFFECTS NO OTHER AREA.
- 28 JUNCTION BOX TO BE DISCONNECTED AND REMOVED. DISCONNECT AND REMOVE CONDUIT AND WIRE BACK TO NEAREST UNAFFECTED JUNCTION BOX. BYPASS CONDUIT AND WIRE AS REQUIRED TO KEEP REMAINING DEVICES OPERATIONAL.

ALL DEVICES REMOVED AND ARE NO LONGER PART OF THE PROJECT SHALL BE TURNED OVER TO THE OWNER AT THE OWNERS DISCRETION (FIRST RIGHT OF REFUSAL); OTHERWISE DISPOSE OF PER E.P.A. REQUIREMENTS.

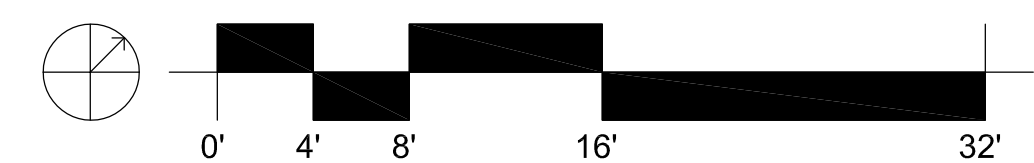


2 LEVEL 02 - PARTIAL FLOOR PLAN - ELECTRICAL DEMO
1/8" = 1'-0"



4 LEVEL 02 - PARTIAL FLOOR PLAN - LIGHTING DEMO
1/8" = 1'-0"

ITEMS SHOWN DASHED ARE TO BE REMOVED AS INDICATED.
ER ITEMS SHOWN SOLID WITH "ER" ARE EXISTING TO REMAIN.



PERKINS + WILL

The Wigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
312.755.0770
www.perkinswill.com

GENERAL CONTRACTOR

STRUCTURAL ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014

NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING OR CONSTRUCTION PURPOSES.

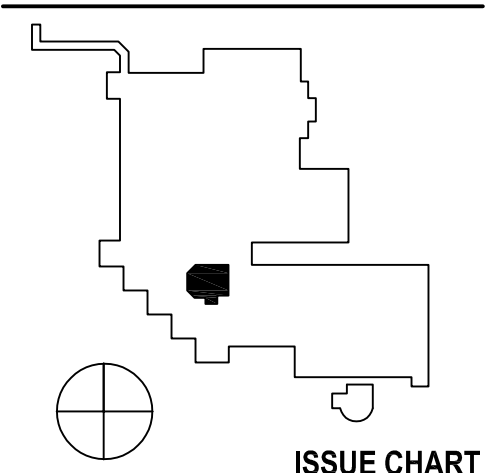
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUED FOR BID AND PERMIT 07 MAR 2018

1	ISSUE FOR BID & PERMIT	08/07/2018
DATE	DATE	DATE
Job Number	024303.007	
Drawn	JT/JD/C	
Checked	MC/REL	
Approved	MC/REL	
	TITLE	

1st Floor ELECTRICAL
DEMOLITION PLANS

SHEET NUMBER

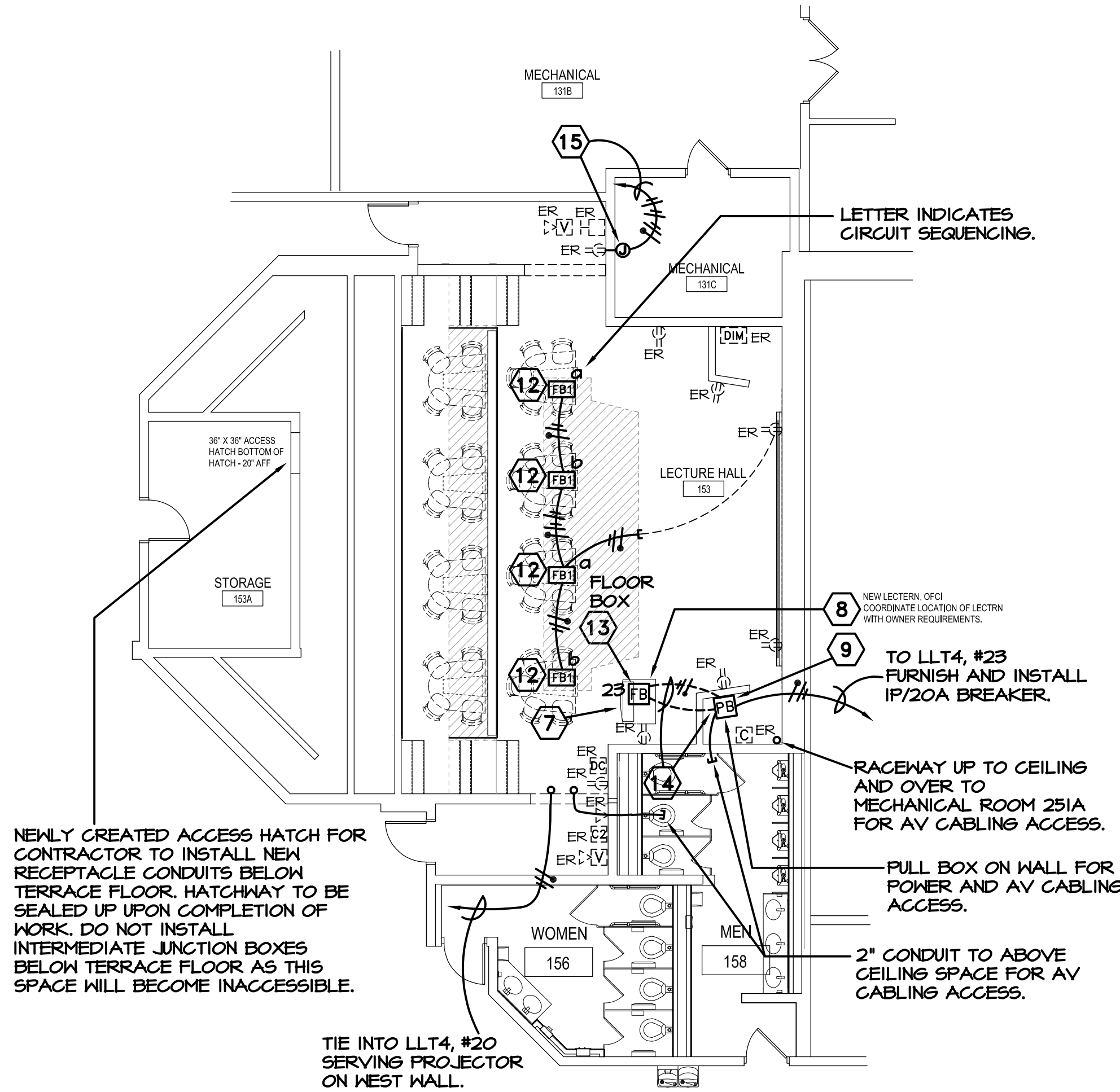
E04-01

Copyright © 2017 Perkins+Will

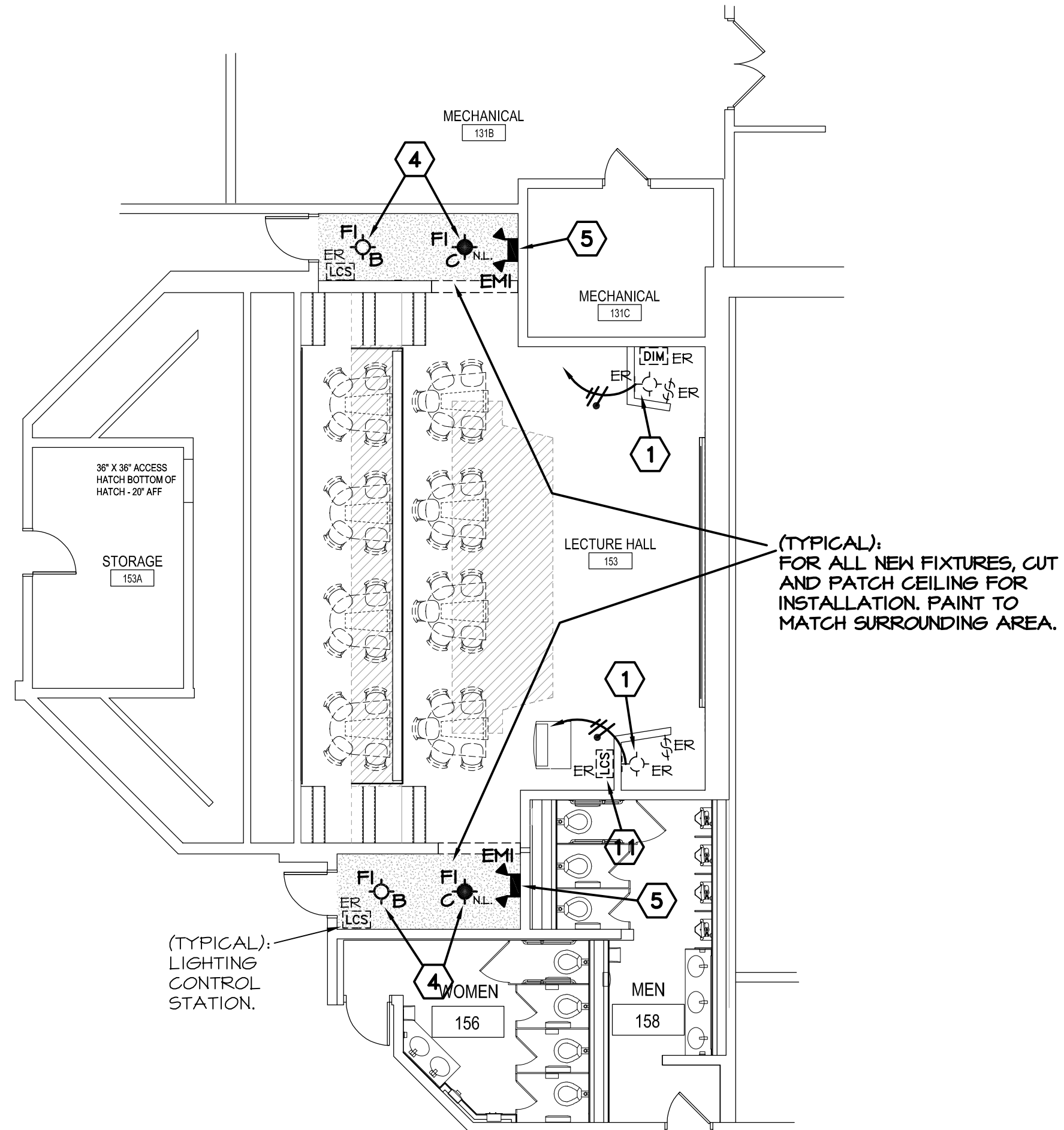
ELECTRICAL NEW WORK PLAN NOTES:

- EXISTING STORAGE ROOM LIGHT FIXTURE TO BE RECONNECTED TO EXISTING STEP LIGHT CIRCUIT. PREVIOUSLY ON FURNISH AND INSTALL. CONDUIT AND WIRING AS REQUIRED. CUT AND PATCH WALL AS REQUIRED. COORDINATE WORK WITH ARCHITECT. AT ARCHITECT'S DISCRETION UTILIZE METAL WIREMOLD AND BOX EXTENSIONS AS REQUIRED TO RE-FEED LIGHT FIXTURE VIA NEW FEED INTO LIGHT SWITCH. FIXTURE WAS PREVIOUSLY FED FROM STEP LIGHT THAT WAS DEMOLISHED.
- EXISTING FIRE ALARM DEVICES TO BE REINSTALLED AT THEIR NEW LOCATION. RECONNECT TO EXISTING CIRCUITS PREVIOUSLY FED FROM. TEST DEVICES OUT ONCE WORK HAS BEEN COMPLETED. PLEASE NOTIFY OWNER OF WORK IN WRITING MINIMUM OF 7 DAYS IN ADVANCE BEFORE PERFORMING WORK. TAKING FIRE ALARM OUT OF SERVICE WILL NOT TAKE PLACE ON SCHOOL DAYS WHEN KIDS ARE PRESENT. COORDINATE WORK WITH OWNER AND ARCHITECT.
- REINSTALL EXISTING ETC LIGHTING CONTROL STATION AT NEW LOCATION. FURNISH AND INSTALL BOX AND CONDUIT AS REQUIRED. FURNISH AND INSTALL A NEW 10 BUTTON COVERPLATE FOR THE DEVICE. CONNECT BACK TO EXISTING CONTROL CABLE AT PREVIOUS LOCATION. EXTEND CONDUIT AND WIRING AS REQUIRED. RELABEL STATIONS AS NEEDED TO COMPLY WITH NEW SCENES/PRESETS THE OWNER HAS SELECTED. ORDER OUT CUSTOM COVERPLATES AS REQUIRED.
- FURNISH AND INSTALL NEW LED LIGHT FIXTURES AS INDICATED AND THAT ARE COMPATIBLE WITH THE OWNER'S EXISTING ETC DIMMING SYSTEM. COORDINATE FIXTURE TYPE WITH OWNER PRIOR TO ORDERING. CUT AND PATCH CEILING AS REQUIRED FOR INSTALLATION OF NEW FIXTURE. RECONNECT FIXTURE PER NEW ZONING INDICATED. EXTEND CONDUIT AND WIRING AS REQUIRED TO ACHIEVE NEW ZONING. PLEASE NOTE LOCATION OF NIGHT LIGHTS AND THE REQUIREMENTS TO DIM THESE DEVICES (COORDINATE WITH THE OWNER). UPON LOSS OF POWER NIGHT LIGHTS TO COME ON TO 100%. ALL NEW ZONES ADDED SHALL BE WIRED BACK TO ETC DIMMER RACK #6 IN MAC 123 THEATRE WORKSHOP LOFT ELECTRICAL ROOM. FURNISH AND INSTALL NEW DIMMER MODULES AS REQUIRED FOR WORK. ETC #1202E FOR SENSOR-3 SR-48 SYSTEM. PROGRAM EXISTING DIMMING SYSTEM AND LIGHTING CONTROL STATIONS PER OWNER'S DIRECTION. RELABEL STATIONS AS NEEDED TO COMPLY WITH NEW SCENES/PRESETS THE OWNER HAS SELECTED. ORDER OUT CUSTOM COVERPLATES AS REQUIRED. INCLUDE ALL ASSOCIATED COSTS FOR THIS WORK INCLUDING CONTRACTING SOMEONE TO PROGRAM AND CERTIFY OPERATION OF THIS SYSTEM, ETC., PER THE OWNER'S REQUEST. FURNISH AND INSTALL ADDITIONAL CONDUIT AND WIRE AS REQUIRED FOR NEW LOCATIONS AND NEW FIXTURES.
- FURNISH AND INSTALL NEW CEILING MOUNTED EMERGENCY LIGHT FIXTURE AND HEAVY-DUTY GRID SUPPORT BAR. AND CONNECT TO LINE SIDE OF LIGHTING CIRCUIT PREVIOUSLY SERVING AREA. COORDINATE CONNECTION OF EMERGENCY LIGHTS WITH LIGHTING CONTROL SYSTEM. LIGHTS MUST NOT TURN ON WHEN ROOM LIGHTING IS TURNED OFF.
- INSTALL NEW EXTRON SPEAKER CABLE FROM (2) EXISTING SPEAKERS ON STAGE AND (2) NEW SPEAKERS (ONE ON BOTH SIDES OF NEW CEILING PROJECTOR) BACK TO LECTERN LOCATION VIA FLOOR BOX. COORDINATE WORK WITH OWNER. LEAVE AT LEAST AN 8'-0" SPEAKER WHIP AT LECTERN FOR MAKING FINAL CONNECTION TO LECTERN EQUIPMENT. LEAVE AT LEAST A 6'-0" COIL OF SLACK IN SPEAKER CABLE ABOVE CEILING AT EACH SPEAKER LOCATION FOR ADJUSTING SPEAKER LOCATION. FOR NEW CEILING SPEAKER LOCATIONS, FURNISH AND INSTALL A CEILING JUNCTION BOX WITH SUPPORT BRACKET AND FACEPLATE WITH GROMMET HOLE FOR SPEAKER CABLE ACCESS TO SPEAKER. SUPPORT FROM STRUCTURE ABOVE. COORDINATE FINAL CEILING SPEAKER LOCATION AND WORK WITH OWNER. COORDINATE EXTRON SPEAKER CABLE TERMINATION TYPE WITH THE OWNER.
- FURNISH AND INSTALL BLACK CABLE SOCK AROUND ALL NEW CABLES BEING INSTALLED TO NEW PODIUM FROM WALL BOX.
- PODIUM, FURNISHED AND INSTALLED BY THE OWNER.
- FURNISH AND INSTALL NEW WALL MOUNTED PULL BOX AND UNDERGROUND CONDUIT FOR OWNER'S PODIUM DATA AND AV CABLES. CONDUIT TO END AT NEW FLOOR BOX UNDER PODIUM. PULL BOX SIZE TO BE COORDINATED WITH THE OWNER TO ACCOMMODATE ALL DATA AND AV CABLES (MINIMUM 12"x12"). BOX AND COVERPLATE SHALL BE OF THE FINISHED TYPE. PAINT OUT PER ARCHITECT'S DIRECTION. FURNISH AND INSTALL METALLIC WIREMAY FROM TOP OF PULL BOX OUT TO ABOVE ACCESSIBLE CEILING FOR ALL DATA AND AV CABLES. LABEL ALL CABLES AND TAG PULL BOX WITH AV CABLES INFORMATION.
- NEW PROJECTOR IN CEILING. FURNISH AND INSTALL NEW QUAD RECEPTACLE AT CEILING (NOT ABOVE) FOR POWERING THE PROJECTOR. CONNECT PREVIOUSLY SERVING UNIT, OTHERWISE BACK TO POWER PANEL LLT4 AND INSTALL 1P/20A BREAKER. FURNISH AND INSTALL A 2 GANG, 4" DEEP FINISHED JUNCTION BOX FOR EXTRON AV FACEPLATE (ABOVE THE PROJECTOR) TO SERVICE THE NEW PROJECTOR. BOTH POWER OUTLET AND AV JUNCTION BOXES SHALL BE SUPPORTED WITH HEAVY-DUTY T-BAR SUPPORT BRIDGE AND SECURED TO STRUCTURE ABOVE. UTILIZE HUBBELL FINISHED METALLIC SURFACE MOUNTED RACEWAY AS REQUIRED IF SURFACE MOUNTING IS NECESSARY FOR FEEDING POWER AND AV CABLES TO PROJECTOR. SIZE RACEWAYS AS REQUIRED TO ACCOMMODATE (3) EXTRON XTP-DTP-24 CABLES AND POWER WIRING/RECEPTACLE. CUT, PATCH AND PAINT CEILING AS REQUIRED TO GAIN ACCESS FOR INSTALLATION OF ALL RACEWAY AND CABLES. COORDINATE WORK WITH ARCHITECT. INSTALL (3) EXTRON AV CABLES AND TERMINATE WITH XTP DTP 24 SHIELDED MALE CONNECTOR PLUGS AT EACH PROJECTOR BACK TO LECTERN LOCATION VIA FLOOR BOX. COORDINATE WORK WITH OWNER. WRAP ALL AV CABLES TO PROJECTOR WITH CABLE SOCK FOR NEAT APPEARANCE. LEAVE 6'-0" OF SLACK IN AV CABLES COILED UP ABOVE CEILING FOR PROJECTOR MOVEMENT.
- FOR EXISTING LIGHTING CONTROL STATION, PROGRAM EXISTING DIMMING SYSTEM AND LIGHTING CONTROL STATIONS PER OWNER'S DIRECTION. RE-LABEL STATIONS AS NEEDED TO COMPLY WITH NEW SCENES/PRESETS THE OWNER HAS SELECTED. ORDER OUT CUSTOM COVERPLATES AS REQUIRED TO MATCH THE OWNER'S REQUIREMENTS.
- NEW FLOOR BOX. MOUNT IN PIT AREA TO BE IN-FILLED. COORDINATE EXACT LOCATION IN THE FIELD WITH THE ARCHITECT PRIOR TO INSTALLATION. CONNECT TO EXISTING RECEPTACLE CIRCUITS SERVING AREA FROM PANEL "LLT4". FURNISH AND INSTALL ADDITIONAL CONDUIT AND WIRE AS REQUIRED FOR A COMPLETE INSTALLATION. EXTEND EXISTING CONDUIT PREVIOUSLY SERVING PIT AREA TO NEW FLOOR BOXES. FLOOR BOX TO BE HUBBELL #CFB6630 SERIES FLOOR BOX WITH #246CCVRAU COVER AND (2) NEMA 5-20R DUPLEX "15B" CHARGING RECEPTACLES.
- FURNISH AND INSTALL NEW HUBBELL FLOOR BOX #CFB6630CR SERIES FOR POWER, DATA AND AV CABLES. ROUTE CONDUITS UNDERGROUND BACK TO PULL BOX IN ADJACENT ROOM. CONNECT DATA CABLES BACK TO IDF RACK IN CLOSET 157C. SEAL ALL CONDUIT JOINTS/FITTINGS FROM WATER INFILTRATION. USE 3/4" CONDUIT FOR DATA CABLES, 3/4" FOR SPEAKER CABLES, 3/4" FOR POWER WIRING AND MINIMUM 2" CONDUIT FOR AV CABLES. COORDINATE DEPTH OF BOX AND CONCRETE POUR DEPTH FOR PROPER ELEVATION (INCLUDE COLLARS AS NEEDED) AND FINISHED COVER FLUSH WITH FINAL FLOOR MATERIAL TYPE (CARPET). COORDINATE LOCATION OF FLOOR BOX WITH ARCHITECT PRIOR TO INSTALLATION. FLOOR BOX WILL BE HUBBELL SIX GANG BOX #CFB6630CR WITH EPOXY COATING, RECTANGLE COVER 6106CCVREK2 SERIES (VERIFY COLOR AND TYPE WITH ARCHITECT). INSTALL CARPET INSET IN COVER. (2) FBMPREC PLATES WITH (2) SNAPDUBBY USB CHARGING DUPLEX RECEPTACLES-GRAY AND SNAP R15TAILS. (1) FBMPREC PLATE WITH (1) PANDUIT CF6416 4-JACK FRAME, (4) PANDUIT CAT-6 JACKS AND CABLES AND (1) FBMPFT PLATE FOR SPEAKER CABLES AND (1) FBMP516 WITH GROMMET FOR EXTRON AV CABLES. INSTALL DIVIDERS BETWEEN 120VOLT AND LOW VOLTAGE CABLES COMPARTMENTS. DO NOT MIX SPEAKER CABLES WITH OTHER CABLES IN SAME CONDUIT. CONNECT NEW QUAD OUTLET BACK TO EXISTING PANEL LLT4 IN LOFT. FURNISH AND INSTALL NEW 1P/20AMP BREAKER FOR NEW CIRCUIT AND LABEL CARD DIRECTORY. LEAVE 8'-0" AV CABLES WHIPS AT LECTERN FOR MAKING FINAL CONNECTION TO LECTERN EQUIPMENT. PROVIDE 8'-0" DATA PATCH CORDS FOR LECTERN EQUIPMENT. TERMINATE ALL EXTRON CABLES WITH EXTRON XTP DTP 24 SHIELDED MALE PLUGS (BOTH ENDS). COORDINATE EXTRON SPEAKER CABLES TERMINATION TYPE WITH THE OWNER. COORDINATE POWER CORD PATCH CORD REQUIREMENTS WITH OWNER SO CORDS ARE LONG ENOUGH TO REACH LECTERN EQUIPMENT.
- SAW CUT AND REMOVE FLOOR AS REQUIRED FOR INSTALLATION OF NEW FLOOR BOX AND ASSOCIATED CONDUITS TO ADJACENT ROOM. COORDINATE EXACT SAW CUT LOCATION WITH ARCHITECT. REMOVE PORTION OF WALL AND BASEBOARD AS NEEDED TO ACCESS ADJACENT ROOM AND REQUIRED FLOOR WORK. BACKFILL FLOOR AREA, COMPACT AND PATCH FLOOR AND GRIND LEVEL WHEN COMPLETE. PATCH AND PAINT WALL TO MATCH SURROUNDING AREA AND REINSTALL BASEBOARD. CONDUIT SHALL BE RGS TYPE WITH THREADED FITTINGS. SEAL ALL CONDUIT JOINTS/FITTINGS FROM WATER INFILTRATION.
- IF RECEPTACLE POWER CIRCUITS WERE INTERRUPTED BY REMOVAL OF RECEPTACLES IN THE STEP RISERS, FURNISH AND INSTALL JUNCTION BOX IN MECHANICAL ROOM AND CONNECT TO RECEPTACLE IN ENTRYWAY. RECONNECT RECEPTACLE CIRCUITS AS REQUIRED FOR A COMPLETE INSTALLATION. FURNISH AND INSTALL ADDITIONAL CONDUIT AND WIRE BACK TO PANEL "LLT4" AS REQUIRED FOR A COMPLETE INSTALLATION.
- FURNISH AND INSTALL A NEW QUAD RECEPTACLE AND A 2 GANG, 4" DEEP FINISHED JUNCTION BOX FOR EXTRON AV FACEPLATE (ABOVE THE NEW PROJECTION SCREEN AND BELOW THE PROJECTOR) TO SERVICE THE NEW PROJECTOR. RECESS BOXES AND DEVICES IN WALL IF DRYWALL. CUT AND PATCH AND PAINT AS REQUIRED TO INSTALL NEW WORK. IF WALL IS CMU, UTILIZE HUBBELL FINISHED METALLIC SURFACE MOUNTED RACEWAY AS REQUIRED IF SURFACE MOUNTING IS NECESSARY FOR FEEDING POWER AND AV CABLES TO WALL MOUNTED PROJECTORS. SIZE RACEWAYS AS REQUIRED TO ACCOMMODATE (3) EXTRON XTP-DTP-24 CABLES AND POWER WIRING/RECEPTACLE. CUT, PATCH AND PAINT CEILING AS REQUIRED TO GAIN ACCESS FOR INSTALLATION OF ALL RACEWAY AND CABLES. COORDINATE WORK WITH ARCHITECT. TERMINATE EXTRON CABLES WITH EXTRON XTP DTP 24 SHIELDED MALE PLUGS (BOTH ENDS). LEAVE 6'-0" OF SLACK IN AV CABLES COILED UP ABOVE CEILING FOR PROJECTOR MOVEMENT.

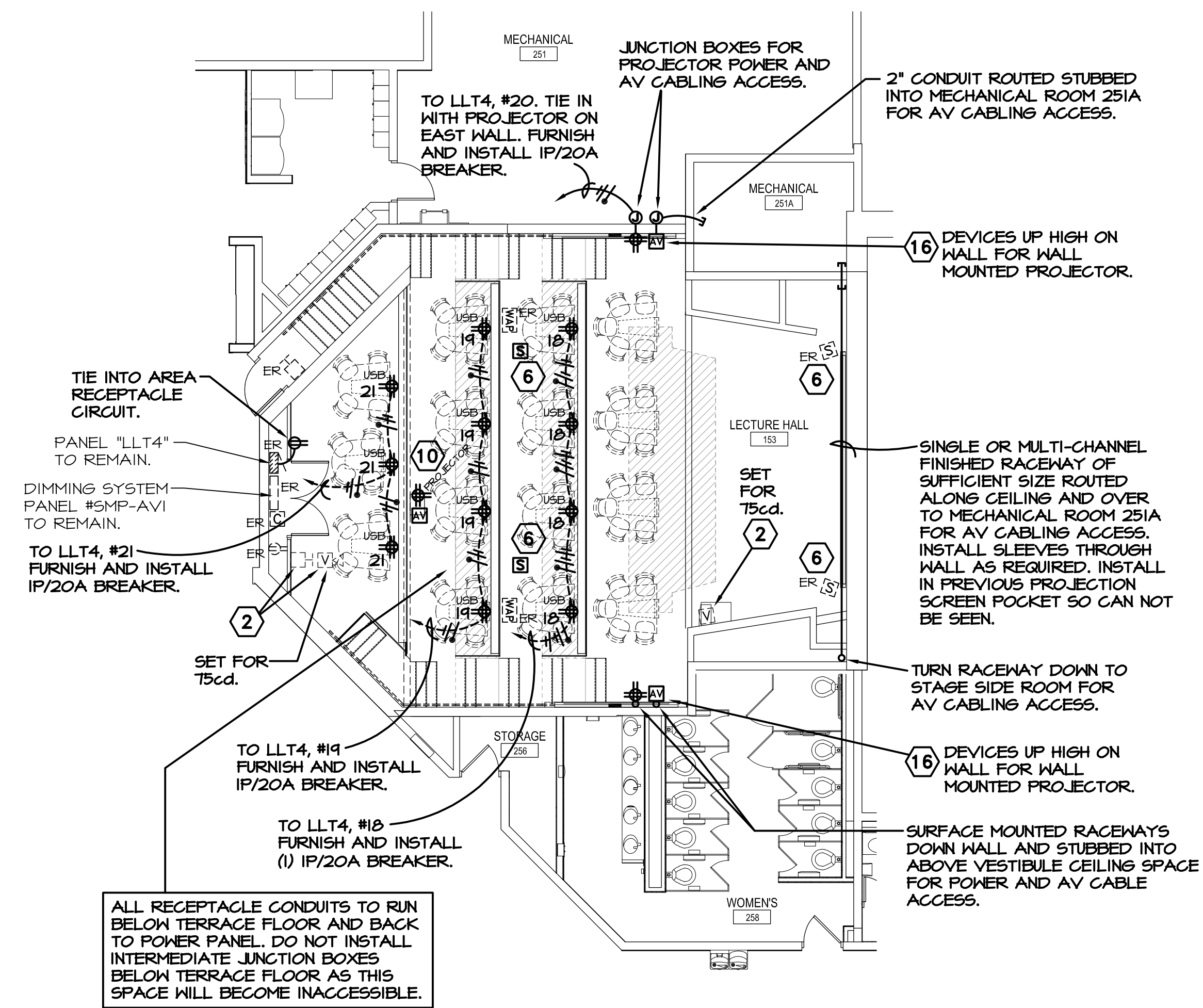
* PLEASE NOTE THAT THE 4" DEEP JUNCTION BOXES FOR THE EXTRON AV DEVICES IS NEEDED TO ACCOMMODATE THE EXTRA DEEP EXTRON DEVICES!



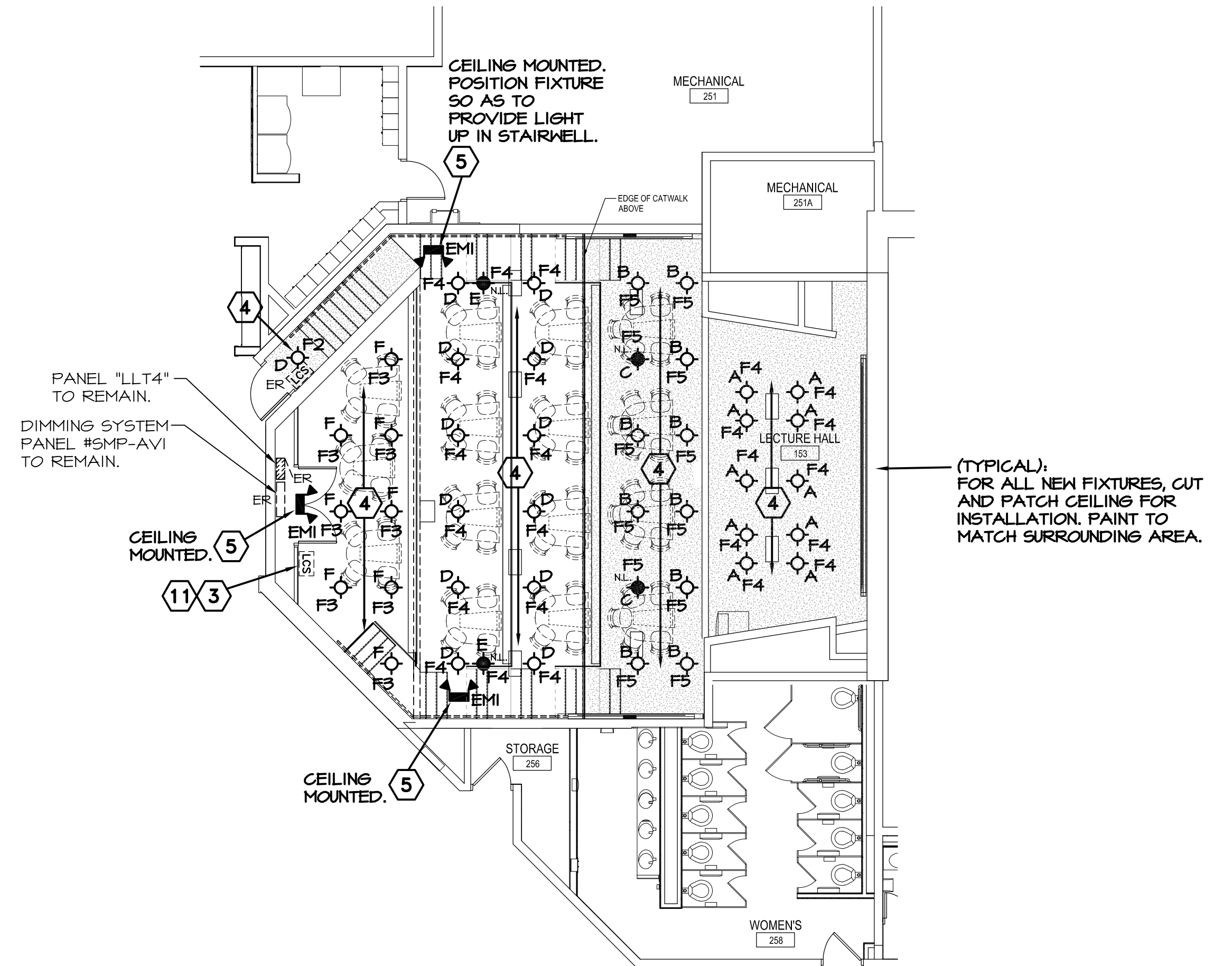
1 LEVEL 01 - PARTIAL FLOOR PLAN - ELECTRICAL NEW WORK
1/8" = 1'-0"



3 LEVEL 01 - PARTIAL FLOOR PLAN - LIGHTING NEW WORK
1/8" = 1'-0"



2 LEVEL 02 - PARTIAL FLOOR PLAN - ELECTRICAL NEW WORK
1/8" = 1'-0"



4 LEVEL 02 - PARTIAL FLOOR PLAN - LIGHTING NEW WORK
1/8" = 1'-0"

ALL DATA JACKS TO BE CONNECTED TO EXISTING IDF RACK SERVING AREA IN DATA CLOSET 157C.



PERKINS
+ WILL

The Wigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
312.755.0770
www.perkinswill.com

GENERAL
CONTRACTOR

STRUCTURAL
ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO IL 60606

MEP
ENGINEERING
MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014

NOTE: DOCUMENTS ARE
INCOMPLETE AND MAY NOT BE
USED FOR REGULATORY
APPROVAL, PERMITTING, OR
CONSTRUCTION PURPOSES.

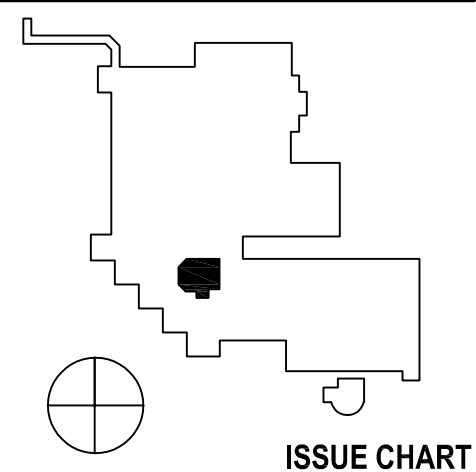
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

ISSUED FOR BID AND PERMIT 07 MAR 2018

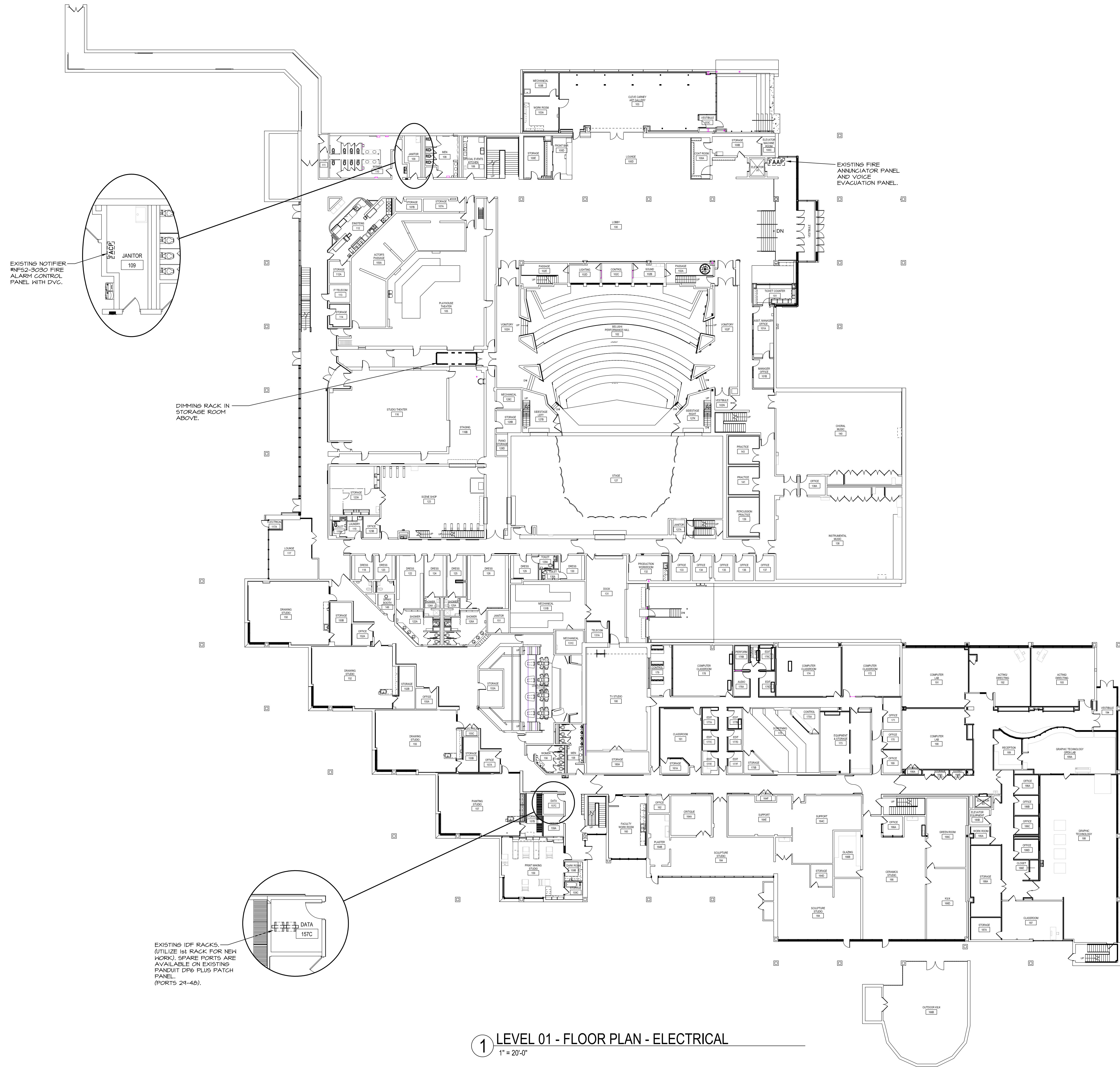
1	ISSUE FOR BID & PERMIT	03/07/2018
NOVEMBER	DATE	
Job Number	024303.007	
Drawn	JT/JD/CC	
Checked	MC/REL	
Approved	MC/REL	

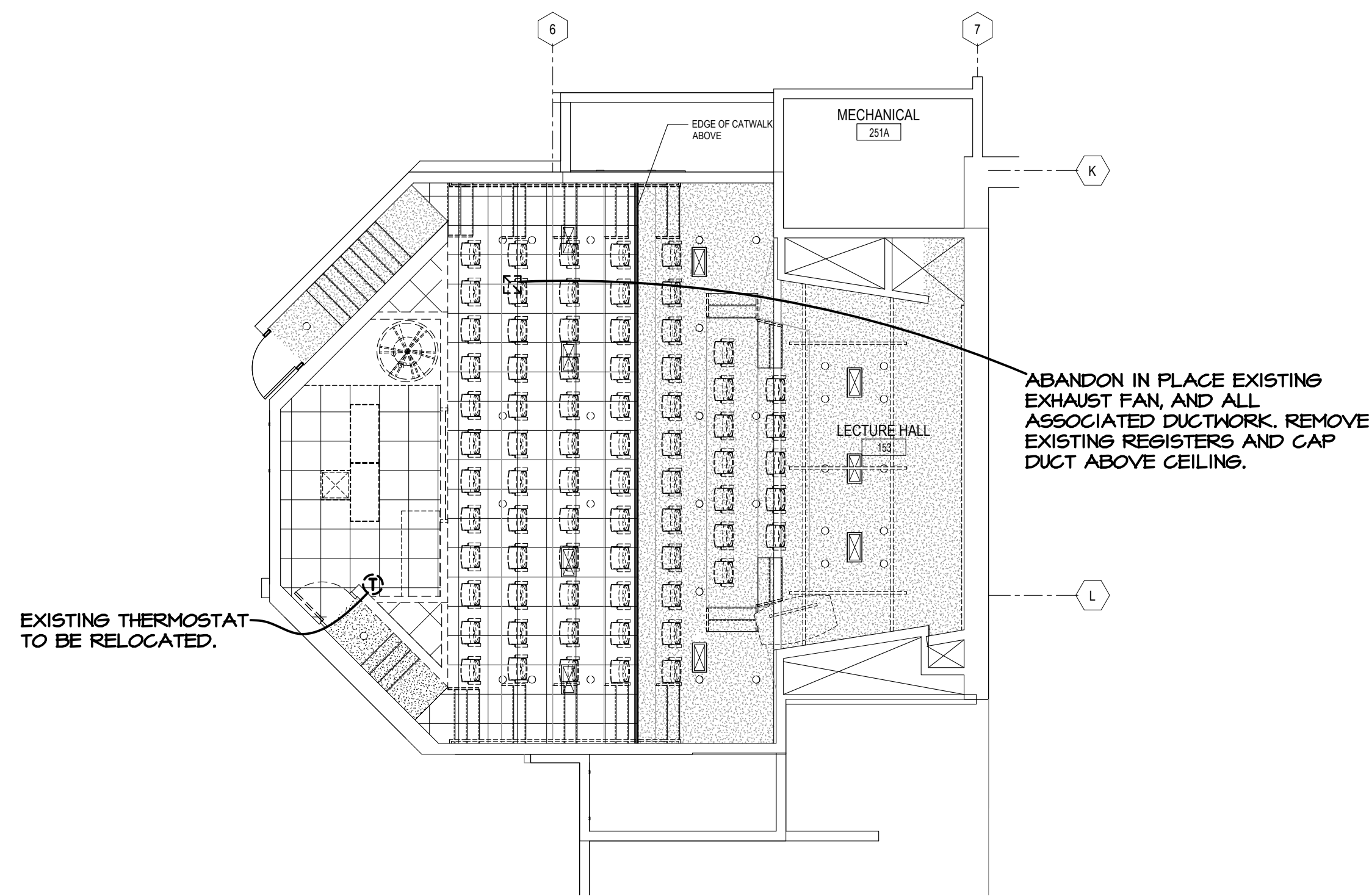
TITLE
FIRST FLOOR PLAN -
ELECTRICAL

SHEET NUMBER

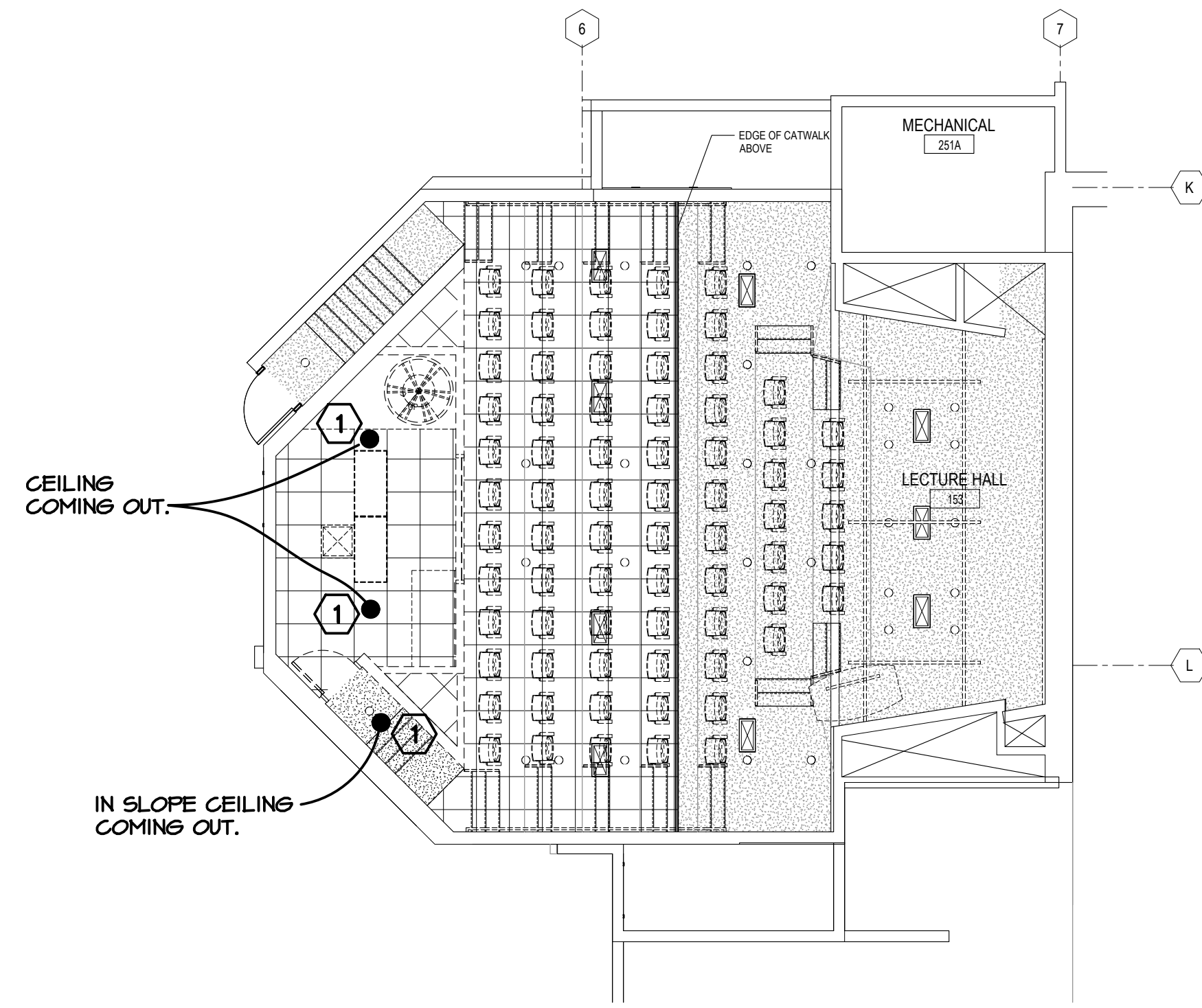
E11-02

Copyright © 2017 Perkins+Will





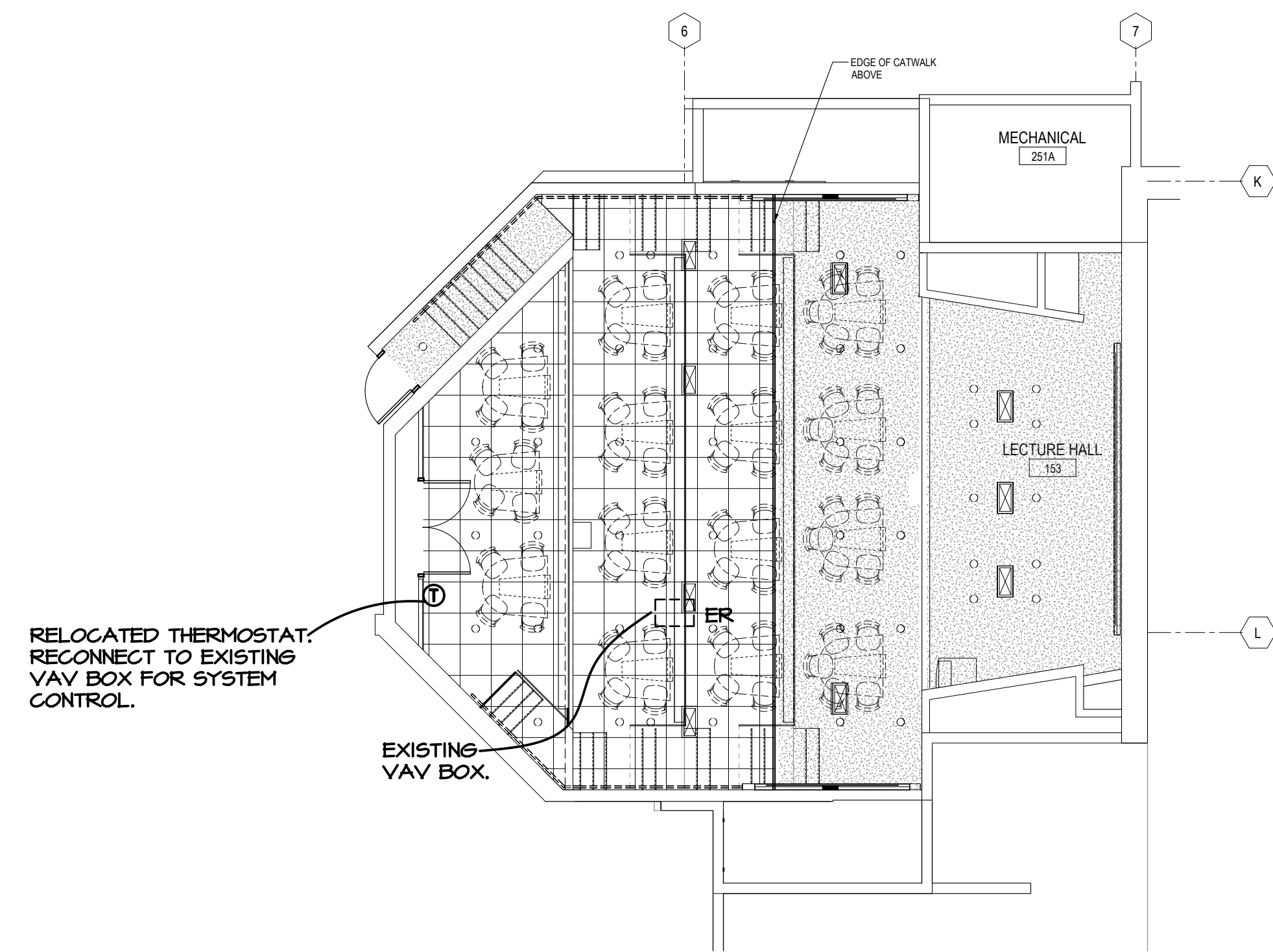
① LEVEL 02 - PARTIAL FLOOR PLAN - MECHANICAL DEMO
1/8" = 1'-0"



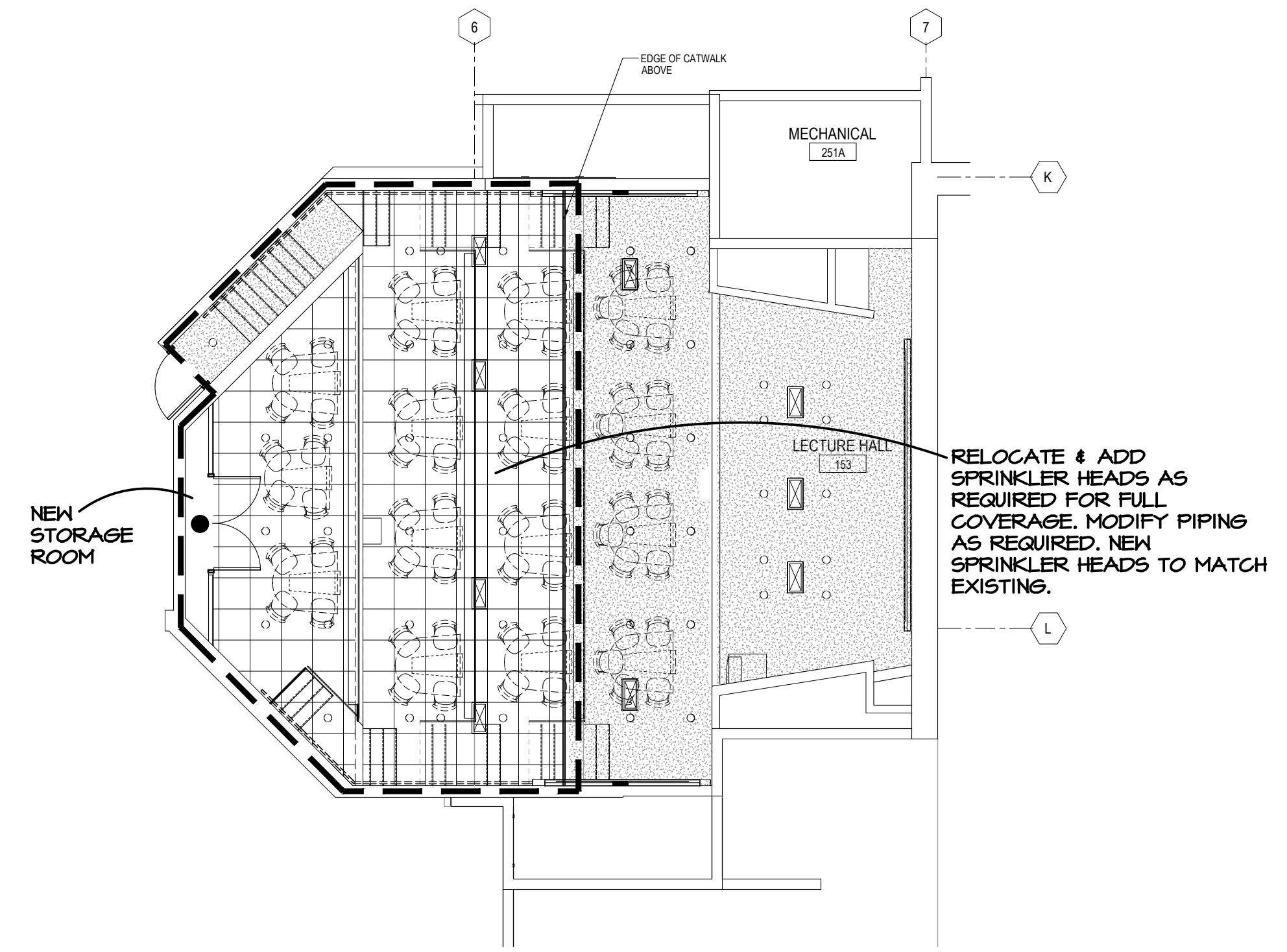
③ LEVEL 02 - PARTIAL FLOOR PLAN - FIRE PROTECTION DEMO
1/8" = 1'-0"

FIRE PROTECTION PLAN NOTES:

- ① EXISTING SPRINKLER HEADS TO BE REMOVED. CAP PIPING AND PREPARE FOR NEW WORK.



② LEVEL 02 - PARTIAL FLOOR PLAN - MECHANICAL NEW WORK
1/8" = 1'-0"



⑤ LEVEL 02 - PARTIAL FLOOR PLAN - FIRE PROTECTION NEW WORK
1/8" = 1'-0"



PERKINS + WILL

The Wrigley Building
410 North Michigan Ave.
Suite 1600
Chicago, IL 60611
1.312.755.0770
www.perkinswill.com

GENERAL CONTRACTOR

STRUCTURAL ENGINEERING
C.E. ANDERSON & ASSOCIATES
175 NORTH FRANKLIN STREET
SUITE 410
CHICAGO, IL 60606

MECHANICAL SERVICES ASSOCIATES
CORP.
111 S. VIRGINIA STREET
CRYSTAL LAKE, IL 60014



11-30-17
Date of Expiration

RLK
Date Signed: June-26-2017

NOTE: DOCUMENTS ARE INCOMPLETE AND MAY NOT BE USED FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION PURPOSES.

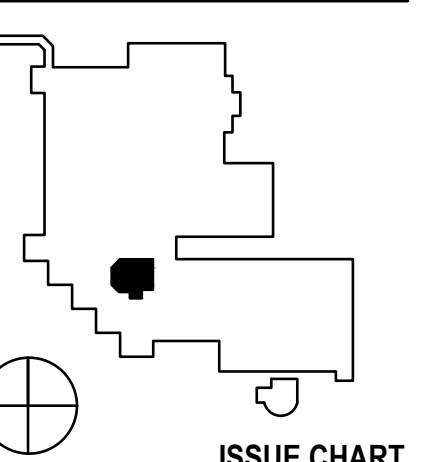
PROJECT

MAC ROOM 153
RENOVATION
425 FAWELL BLVD.
GLEN ELLYN, IL 60137



COLLEGE OF DUPAGE

KEYPLAN



ISSUE CHART

ISSUED FOR BID AND PERMIT 07 MAR 2018

1	ISSUE FOR BID & PERMIT	03/07/2018
DATE	DATE	DATE
Job Number	024303.007	
Drawn	JT/JD/CC	
Checked	MC/REL	
Approved	MC/REL	

TITLE

1st & 2nd FLOOR
MECHANICAL AND FIRE
PROTECTION PLANS

SHEET NUMBER

MFP11-01

Copyright © 2017 Perkins+Will

EXHIBIT C – PREVAILING WAGE FORM



Prevailing Wage Form

In an effort to meet the Prevailing Wage Survey requirements of the State of Illinois, the College of DuPage has established the Prevailing Wage Form that will assist in reporting Prevailing Wage information. Please complete the information below and return to the College of DuPage Project Manager.

Project Name: _____

Project Bid/RFP#: _____

Contractor Information:

Company Name	_____		
Address:	_____	Suite/Floor	_____
City:	_____	ST	_____
Zip Code	_____		
Phone:	_____	Fax:	_____

Contractor Contact Information:

First Name	_____	MI	_____	Last Name	_____
Title	_____	Email	_____		
City	_____	ST	_____	Zip	_____
Primary Phone:	_____				

College of DuPage Project Manager: _____ Date: _____

EXHIBIT D – SMALL PROJECTS AGREEMENT

COLLEGE OF DUPAGE
SMALL PROJECTS AGREEMENT FOR BIC MAC 153 CLASSROOM RENOVATION PROJECT
BETWEEN COMMUNITY COLLEGE DISTRICT 502 AND CONTRACTOR

THIS AGREEMENT ("**Agreement**") is made as of MAY 2018 by and among Community College District 502 (COLLEGE OF DuPAGE), ("**COD**") and General Trades ("**Contractor**").

COD and Contractor desire to enter into this Agreement, pursuant to which Contractor shall perform certain work in connection with the Project, as hereinafter provided. In consideration of the performance of work by Contractor and the payment for such work by COD, the parties agree as follows:

1. Scope of Project. Contractor shall perform work for COD in connection with the Project, including specifically, the matters set forth on Exhibit 1. Contractor shall perform all work with the highest standards of workmanship and materials. Contractor shall maintain a sufficient staff to perform all work in the most expeditious manner consistent with the interests of COD. Contractor shall promptly notify COD immediately in writing: (i) of any information required from COD so Contractor can complete its work in a timely manner; and (ii) of any work requested by COD that is not included in the scope of work provided in Exhibit 1.

The Contractor understands that COD may engage other Contractors or COD personnel to work in areas near the Contractor's work. Contractor shall cooperate with such others so that work is not disrupted or delayed.

The Contractor shall be solely responsible for means and methods selected in performing the Work. Contractor shall supervise all work so that it is performed in a safe and expeditious manner. Contractor shall be solely responsible for the safe work of its employees and its subcontractor's employees.

The work shall be completed Prior to Aug 15. Time is of the essence under this Agreement.

2. Payment to Contractor. COD shall pay Contractor for Contractor's work properly performed under this Agreement. Contractor's work shall be billed as set forth in Exhibit 2 and in no event shall the total amount due to Contractor under this Agreement exceed the total contract sum following, without COD's prior written approval:

Total Contract Sum: \$ TBD (numbers and words)

3. Defective Work and Guarantee. Contractor shall promptly correct any defective work. Payment by COD for any work otherwise determined to be defective shall not relieve Contractor of its obligation to correct. Contractor shall warrant and guarantee all work to be free from defect for one year following substantial completion of the work.

4. Indemnification and Insurance. Contractor hereby agrees to indemnify and hold COD, its trustees, officers, agents, employees and any other parties designated by COD (COD, its trustees, officers, agents, employees any other parties designated by COD hereinafter collectively called the "**Indemnitees**") harmless from all losses, claims, liabilities, injuries, damages and expenses, including but not limited to, all attorneys' fees, defense and court costs and expenses, that the Indemnitees may incur arising out of, or occurring in connection with, the acts, omissions, or breaches by Contractor of its duties and obligations under or pursuant to this Agreement. This indemnification obligation shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts. Contractor shall procure, at no expense to COD, the insurance coverages set forth in Exhibit 3. Contractor shall adhere to all provisions of Exhibit 3.

5. Performance and Payment Bond. For every Small Project greater than Five Thousand Dollars (\$5,000), Contractor shall procure, a performance and payment bond with a surety with a Best Rating of A, VI. Prior to commencement of any work on the Project, Contractor shall submit insurance and bonds. Any provisions contained within the bonds abrogating COD's rights or remedies, otherwise available in contract or law, are void.

6. Termination. COD may terminate this Agreement at any time, in whole or in part, with or without cause, upon written notice to Contractor. In the event this Agreement is terminated for convenience, Contractor shall be compensated for work properly rendered through the date of termination, as can be documented to the reasonable

satisfaction of COD. COD shall have no liability to Contractor beyond the date of termination. In no event shall contractor be compensated for anticipated profit or lost opportunity.

7. Liens. Upon COD's request, contractor shall submit mechanics' lien waivers in form acceptable to COD with each statement for work rendered or request for payment. Should liens be placed on the project by any subcontractor, contractor shall indemnify COD for all costs, expenses and attorneys fees incurred in the defense of such lien.

8. Materials. All materials incorporated into the work shall be new and of high quality. Contractor shall adhere to all manufacturer's recommendations. If requested by COD or otherwise set out in the contract documents, Contractor shall, before purchase of such material, submit to COD for COD's review, and in a format acceptable to COD, all product data and literature. All manufacturer's warranties shall be forwarded to COD prior to substantial completion of the work.

9. Changes in Scope of Work. COD may, without invalidating this Agreement, request changes in the scope of the work, whether taking the form of additions, deletions, or other revisions. No such work shall be performed unless and until such change is agreed in writing by COD and Contractor. If the change in work will result in a change in contract price, the change in price shall be calculated by 1) lump sum, 2) agreed unit rates, or 3) time and material reimbursable plus mark-up. COD shall solely select the method of pricing.

10. Successors and Assigns. Contractor shall not assign any rights under or interest in this Agreement without the prior written consent of the COD. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

11. Controlling Law. This Agreement is to be governed by the laws of the State of Illinois. Each party has reviewed and approved this Agreement and the rule of construction that resolves ambiguities against the drafting party shall not be employed in the interpretation of this Agreement.

12. Entire Agreement; Conflict. This Agreement incorporates COD's bid instruction and request documents and Contractor's bid. This Agreement represents the entire agreement between Contractor and COD and supersedes all prior negotiations or agreements, written or oral, which are not included herein. This Agreement may only be amended by written instrument executed by COD and Contractor. In the event of a conflict between this Agreement and a proposal from Contractor or any exhibits hereto, this Agreement shall control, followed by COD's bid instruction and request documents, and finally, by Contractor's bid.

13. Prevailing Wage Act. To the extent required by law, contractor shall not pay less than the prevailing wage as established pursuant to an Act Regulating The Wages of Laborers, Mechanics, and Other Workman employed under Contract for Public Workers 820 ILCS 130/1 *et seq*.

14. Human Rights Act. To the extent required by law, contractor shall abide by the Illinois Human Right Act, 775 ILCS 10/0.01 *et seq*.

15. Drug Free Workplace. To the extent required by law, contractor shall abide with the requirements of the Drug Free Workplace Act 30 ILCS 580.1 *et seq*.

16. Sexual Harassment Policy. Contractor represents by the signing of this Agreement that it has a written sexual harassment policy that is in accordance with 775 ILCS 5/2-105 (A)(4).

This Agreement has been executed the day and year provided above.

COLLEGE OF DUPAGE

Contractor:

By: _____

Name: Dr. Brian Caputo

Title: VP Administration, CFO

By: _____

Name: _____

Title: _____

SCOPE OF WORK

{List BID Package and any addendums}

EXHIBIT 2

Contractor shall submit monthly statements for work rendered. The statements will be based upon Contractor's work completed at the time of billing on the basis of actual work performed. COD shall make payments to Contractor sixty (60) days after receipt of Contractor's statements properly submitted. Monthly statements shall detail Amount Currently Due, Previous Amount Billed, and Balance of Contract Outstanding. In the event of termination for convenience by COD as herein provided, Contractor shall be paid for work properly rendered prior to termination, or as otherwise provided herein.

Requests for Payment shall be submitted no more than once per month in a format acceptable to COD.

Any terms or payment provisions, such as penalties or interest, contained on Contractor's invoices shall be of no effect.

COD may withhold payment from monies otherwise due to the Contractor to compensate the COD for the cost of repairing defective work or completing incomplete work in case of Contractor default.

If COD selects agreed unit rates as the method of payment for base scope work or change order work, the agreed unit rates are as set forth below:

UNIT RATE SCHEDULE

Description	Unit	Rate (\$)
NA		

Contractor shall be allowed 10% mark-up on change order work when time and material reimbursable method of pricing is selected.

CONTRACTOR'S LIABILITY INSURANCE

The Contractor shall not commence work under this contract until all insurance required herein is obtained and approved by the Owner. Nor shall the Contractor allow any subcontractor to commence work until all similar insurance required of the subcontractor has been so obtained.

The Contractor shall furnish the College of DuPage with a Certificate of Insurance, with Community College District 502, its trustees, officers, agents, employees, and any other parties designated by COD named as an additional insured for Commercial General and Automobile Liability, showing the minimum coverage indicated below. Insurance companies must have a Best Rating of at least A VI and otherwise be acceptable to the College. Workers' compensation insurance shall include a waiver of subrogation in favor of the College of DuPage. The College will also be shown as the certificate holder. Further, the Certificate of Insurance shall state that coverage provided is primary to any other coverage available to College of DuPage. An endorsement page showing coverage must accompany the certificate of insurance. The foregoing certificate shall contain a provision that coverage afforded under the policies will not be cancelled or non-renewed until at least sixty (60) days prior written notice has been given to College of DuPage.

TYPE OF INSURANCE

MINIMUM INSURANCE COVERAGE

Combined Single Limit Per Occurrence/Aggregate

Commercial General Liability including:

1. Premises – Operations	\$1,000,000 / \$2,000,000
2. Explosion, Underground and Collapse Hazard	
3. Products/Completed Operations	
4. Contractual Insurance	
5. Broad Form Property Damage	
6. Independent Contractors	
7. Bodily Injury	

Automobile Liability

Owned, Non-owned, or Rented	\$1,000,000 / \$2,000,000

Workers' Compensation and Employers' Liability	As Required by Applicable Laws.

Professional Liability	If Performance Specifications are Required by the Contract