

# CONSTRUCTION NOTES

- The Construction Documents include but are not limited to: The Construction Notes, Division 1, and the Specifications. The Construction Documents shall be taken as a whole and used in connection with one another for complete descriptions of the work. If the contractor discovers any discrepancy between the Documents, the Contractor shall request in writing clarification from the Architect.
- The drawings are diagrammatic and are not to be scaled. Information shown at a larger scale supercedes that of a smaller scale. The Contractor shall field verify conditions and dimensions prior to ordering or fabricating any component of the work. If the Contractor discovers any discrepancy between the Documents, the Contractor shall request in writing clarification from the Architect prior to commencing any associated work.
- Existing conditions are shown for reference only. The Contractor shall field verify all existing conditions prior to submittal of bids. Site visits shall be coordinated with the Owner's Representative in accordance with the provisions of the Construction Documents. Notify Architect of any discrepancies found. Verify dimensions of all owner-furnished operating equipment to ensure proper coordination with construction. No allowance shall be made for any extra expense to which the Contractor may incur due to failure or neglect on his part to make such verifications.
- Any errors, omissions or conflicts found in the various parts of the Construction Documents shall be brought to the attention of the Architect and Owner's Representative before proceeding with the work. The Architect and Owner's Representative shall be notified in writing of any materials suspected of being hazardous. Work in the affected area shall be confined and suspended until the Owner's Representative can take the appropriate steps to test and abate the materials in question, if required.
- The Contractor is responsible for protecting existing conditions to remain. Any existing condition that is damaged or altered during construction shall be returned to its previous state including, but not limited to: quality of materials, matching textures, finishes and colors, etc. The Contractor is responsible for jobsite cleanup as the work progresses. Contractor shall provide dust covers as required to contain dust and debris within construction area(s). Broom clean all areas each day. Keep dirt to a minimum. Adjacent areas shall be kept free of dust and debris at all times.
- Written dimensions take precedence. Do not scale drawings.
- All dimensions noted "(E)" meaning existing are to be field verified prior to laying out new work.
- Schedule all work with the Facility Manager prior to the start of construction.
- The construction schedule and procedure shall be approved by the Facility Manager prior to the start of construction.
- All construction shall conform to the requirements of the California Building Code, 2016 edition, and any other governing codes, amendments, rules, regulations, ordinances, laws, orders, approvals, etc that are required by the public and University of California authorities. Nothing in the contract documents is to be construed as requiring or permitting work contrary to these codes, laws, and statutes. In the event of conflict, the most stringent requirements shall apply.
- Existing concrete, structural slab and existing concrete walls contains reinforcing bars. Locate existing bars by non-destructive methods prior to cutting in or drilling into concrete. Cutting through existing reinforcing bars is prohibited, except where specifically permitted in structural drawings.
- All removed items to be retained by the Owner shall be delivered to a place of storage at the site as directed. All other items shall be disposed of off-site in a legal manner.
- Where demolition exposes or damages existing floors or any existing adjacent material to remain, patch and repair as required to match the adjacent finish or material, U.O.N.
- Materials listed are all new, U.O.N.
- Coordination with other contracts: if any part of the Contractor's work depends upon the work of a separate Contractor, this Contractor shall inspect such other work and promptly report in writing to the Architect any defects in such other work that render it unsuitable to receive the work of this Contractor. Failure of this Contractor to so inspect and report shall constitute acceptance of the other Contractor's work, except as to defects which may develop in other Contractor's work after execution of this Contractor's work.
- Verify all architectural details with the structural, mechanical, electrical drawings, and with elevator requirements before the ordering of, or installation of, any item of work.
- All utilities required for the continuous operation of all existing facilities must be maintained in service at all times.
- Where existing construction is cut, damaged, or remodeled, patch with materials to match in kind, quality, finish appearance and performance.
- Work shall be executed in a careful and orderly manner with the least possible disturbance to public and to occupants of existing building.
- Contractor shall assume sole responsibility for safety of all persons on or about the construction site, in accordance with applicable laws and codes. Guard against all hazards in accordance with the safety provisions of the latest manual of accident prevention published by the Associated General Contractors of America.
- Contractor shall leave premises and all affected areas clean and in an orderly manner ready for move-in. This is to include cleaning of all glass (including interior of exterior glass) and frames, both new and existing. Clean all exposed surfaces and new equipment after completion.
- Any request for substitution shall be submitted to the Architect for review and shall not be purchased or installed without Architect's written permission.
- All change orders and addendums shall be signed by The Owner, The Architect and the responsible Engineer(s) prior to submitting for approval by the Fire Marshal in jurisdiction.
- All construction shall be parallel to existing building grid lines, U.O.N.
- Window sizes and door head heights are nominal dimensions. Refer to manufacturer for actual rough opening sizes.
- "Furnish" denotes supply and deliver to the project, ready for installation and in operable condition.
- "Install" denotes place in final position, complete, anchored, connected and in operable condition.
- "Provide" denotes furnish and install, complete and ready for intended use.
- Fire blocks and draftstops constructed in accordance with CBC 708 to be provided as follows:
  - At the ceilings and floor levels in concealed spaces of new stud walls and partitions, and at ten foot intervals along length of wall.
  - At intersections between concealed vertical and horizontal spaces (soffits, etc.).
  - At openings around vents, pipes, etc., at ceiling and floor penetrations.
- Materials exposed in return air plenums must meet the specific requirements for such an application in the 2013 California Electric Code and the 2013 California Mechanical Code. This includes the telephone and computer cables.
- Contractor shall maintain a current and complete set of Construction Documents on the jobsite during all phases of construction for use of all trades and shall provide all subcontractors with current construction documents as requested.
- Contractor shall be responsible for correction of work at his own expense for work installed in conflict with the contract documents.
- See all Consultant Drawings for additional General Notes.

# University of California, Berkeley

## Cory 333 Office Renovation

Project Number: 17408A  
CAAN: 1325  
February 2018

### DIRECTORY

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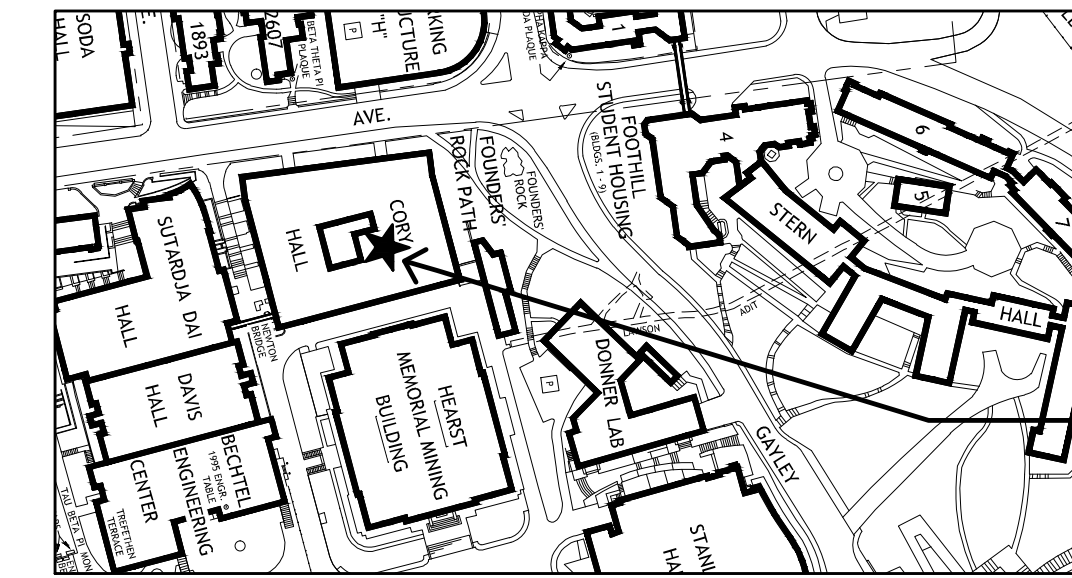
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Tel: (707) 980-4049

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  - A1.2 Path of Travel-2
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### VICINITY MAP



PROJECT LOCATION

### PROJECT DATA

**Location:** 3rd Floor, Cory Hall  
University of California, Berkeley

**Description:** The scope of this project is to remodel the existing lounge space (Room 333) located on the North side of Cory Hall, 3rd Floor and provide two new offices. The two existing offices at Rooms ### & ### will also be renovated with full height walls dividing the offices. Work to include, demolition, new walls, new windows, new doors & finishes.

**Size:** TBD

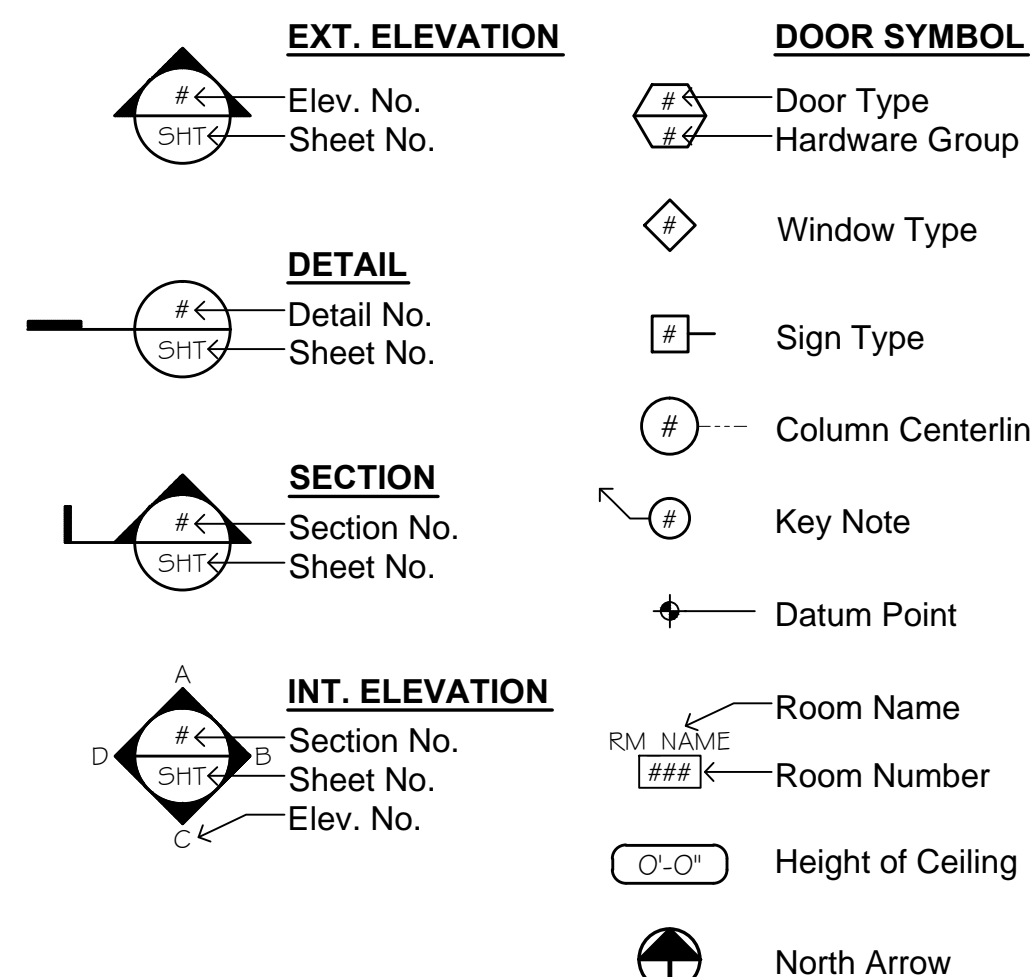
**Occupancy:** No change

**Basis of Design:** 2016 California Building Code  
2016 California Mechanical Code  
2016 California Electrical Code  
2010 ADA Standards for Accessible Design  
(Appendix A of 28 CFR Part 36)

### ABBREVIATIONS

& And	D Dryer	G Gas	N North	SND Sanitary Napkin Disp.
∠ Angle	DBL Double	GA Gauge	(N) New	SPEC Specification
@ At	DEPT Department	GALV Galvanized	N.I.C. Not In Contract	SQ Square
⊕ Centerline	D.F. Driwing Fountain or Douglas Fir	G.B. Grab Bar	NO Number	ST, STL Stainless Steel
∅ Diameter	DET Detail	GL Glass/Glazing	NOM Nominal	See Struct. Dwg.
# Pound or Number	DN Down	GND Ground	NTS Not To Scale	STD Standard
ABV Above	DISP Disposer /Dispenser	GR Grade	OBS Obscure	STL Steel
A.C. Acoustical Tile / Air Conditioner	DN Down	GSM Galvanized Sheet Metal	O.C. On Center	STOR Storage
ACOUS Acoustical	DR Door	GYP Gypsum	O.D. Outside Diameter	STRUCT Structural
A.D. Area Drain	DW Dishwasher	HB Hose Bibb	OFF Office	SUSP Suspended
ADD'L Additional	DWR Drawer	HC Hollow Core	OPNG Opening	S.V. Sheet Vinyl
ADJ Adjustable / Adjacent	DS Downspout	HD Hand or Head	OPP Opposite	T Tread
AFF. Above Finish Floor	DWG Drawing	HDW Hardwood	P Pole	T.B. Towel Bar
AGGR Aggregate	E East	HDWE Hardware	PRCST Precast	T.C. Top of Curb
ALUM Aluminum	E.A. Expansion Joint	HM Hollow Metal	PL Plate	TEL Telephone
APPROX Approximate	ELECT Electrical	HORIZ Horizontal	P.LAM Plastic Laminate	TEMP Tempered
ARCH Architectural	ELEV Elevation or Elevator	HR Hour or Handrail	PLAS Plaster	TER Terrazzo
ASB Asbestos	EMER Emergency	HT Height	PLYWD Plywood	T&G Tongue and Groove
ASPH Asphalt	ENCL Enclosure	I.D. Inside Diameter / Identification	PT Paint / Point / Pressure-Treated / Post-Tensioned	THK Thick / Thickness
AV Audio/Visual	ENCL Enclosure	INCAND Incandescent	PTN Partition	T.O.P Top of Plate
BD Board	ENCL Enclosure	INSUL Insulation	PVC Polyvinyl Chloride	T.O.P Top of Pavement
BITUM Bituminous	EQ Equal	INT Interior	Q.T. Quarry Tile	TPD Toilet Paper Dispenser
BLDG Building	EQUIP Equipment	I.S.A. Int'l. Symbol of Accessibility	R Riser/Radiis	T.O.W Top of Wall
BLK Block	(E) Existing	JAN Janitor	(R) Remove	TYP Typical
BLKG Blocking	EXP Expansion	JT Joint	R.D. Roof Drain	UNF Unfinished
BM Beam	EXT Exterior	KIT Kitchen	REF Reference	U.O.N. Unless Otherwise Noted
BOT Bottom	F.A. Fire Alarm	LAB Laboratory	REFR Refrigerator	UR Urinal
BR Bedroom	FAU Forced Air Unit	LAM Laminate	REGTR Register	VERT Vertical
CABT. Cabinet	F.D. Floor Drain	LAV Lavatory	REINF Reinforced	V.GDF Vertical Grain Douglas Fir
C.B. Catch Basin	FDN Foundation	LIN Linen	REQ'D Required	V.I.F. Verify In Field
CEM Cement	FEC Fire Extinguisher Cabinet	LT Light	RESIL Resilient	WF West / Washer
CER Ceramic	FHC Fire Hose Cabinet	MAX Maximum	RM Room	WC Water Closet
C.I. Cast Iron	FIN Finish	MBR Master Bedroom	R.O. Rough Opening	WD Wood
CLG Ceiling	FL Floor	MC Medicine Cabinet	RWD Redwood	WDD Window
CLOS Closet	FLASH Flashing	MECH Mechanical	RWL Rain Water Leader	WH Water Heater
CLR Clear	FLUOR Fluorescent	MED Medicine	S South	WIO Without
CMU Conc. Masonry Unit	F.O.C. Face of Conc.	MEMB Membrane	SC Solid Core	WP Waterproof
COL Column	F.O.F. Face of Finish	MTD Mounted	SCD Seat Cover Dispenser	WR. Water Resistant
CONC Concrete	F.O.S. Face of Stud	MTL Metal	SCHED Schedule	WT Weight
CONN Connection	FPD Fire Protection Drawings	MFR Manufacturer	SD Soap Dispenser	WWF Welded Wire Fabric
CONSTR Construction	F.R.T. Fire Retardant Treated	MH Manhole	S.E.D. See Elec. Dwgs.	
CONT Continuous	FTG Footing	MIN Minimum	SECT Section	
CORR Corridor	FUT Future	MISC Miscellaneous	SH Shelf	
CPT Carpet		M.O. Masonry	SHR Shows	
CTS Counter/sunk		MTD Mounted	SHR Shows	
CNTR Counter		MUL Mullion	SHR Shows	
CTR Center			SHR Shows	

### SYMBOLS



### CALIFORNIA STATE FIRE MARSHAL

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REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

REVISIONS	BY
80% Progress 01.19.18	BR
90% CDs 02.05.18	BR

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PROGRESS

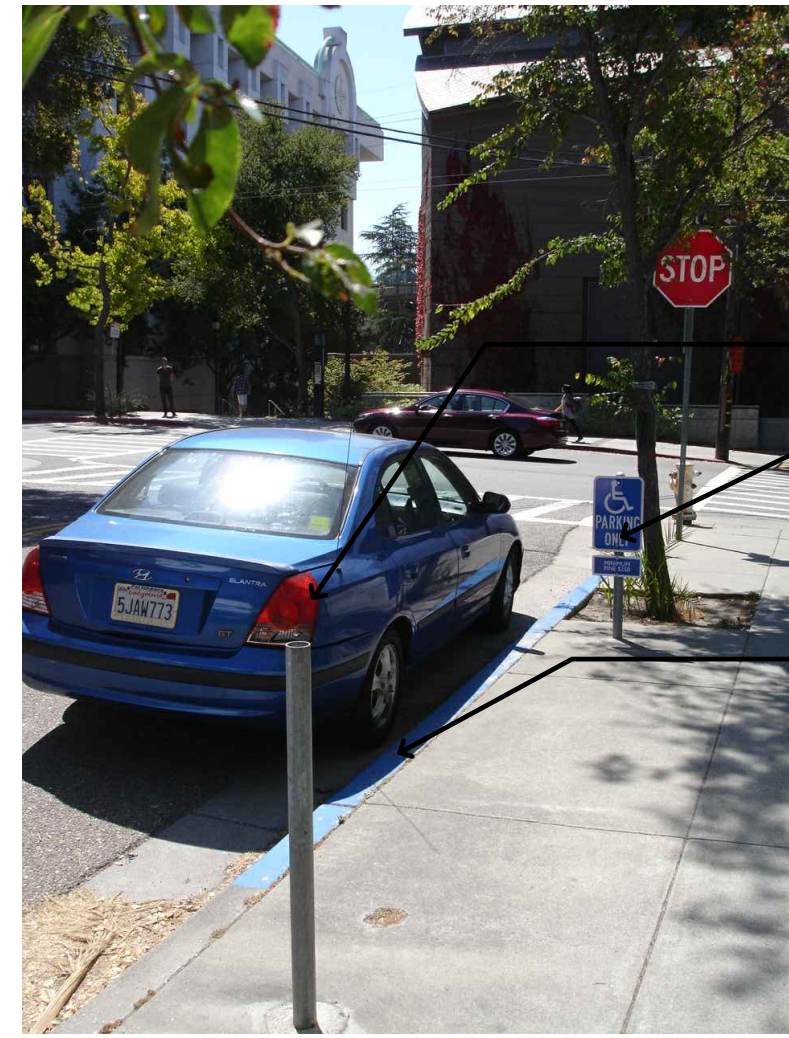
COVER SHEET

UC Berkeley  
Cory 333  
Office Renovation  
Berkeley, CA  
Proj. No.: 17408A  
CAAN: 1325

DATE FEBRUARY 2018  
DRAWN BY BR  
JOB Cory Rm 333  
SHEET  
A0

PROGRESS  
NOT FOR CONSTRUCTION





PAINTED I.S.A. (BENEATH CAR)  
I.S.A. PARKING SIGN W/  
MINIMUM FINE \$250  
CURB PAINTED BLUE

6 (E) SIGNAGE @ ACCESSIBLE PARKING SPACE  
A1.1 N.T.S.

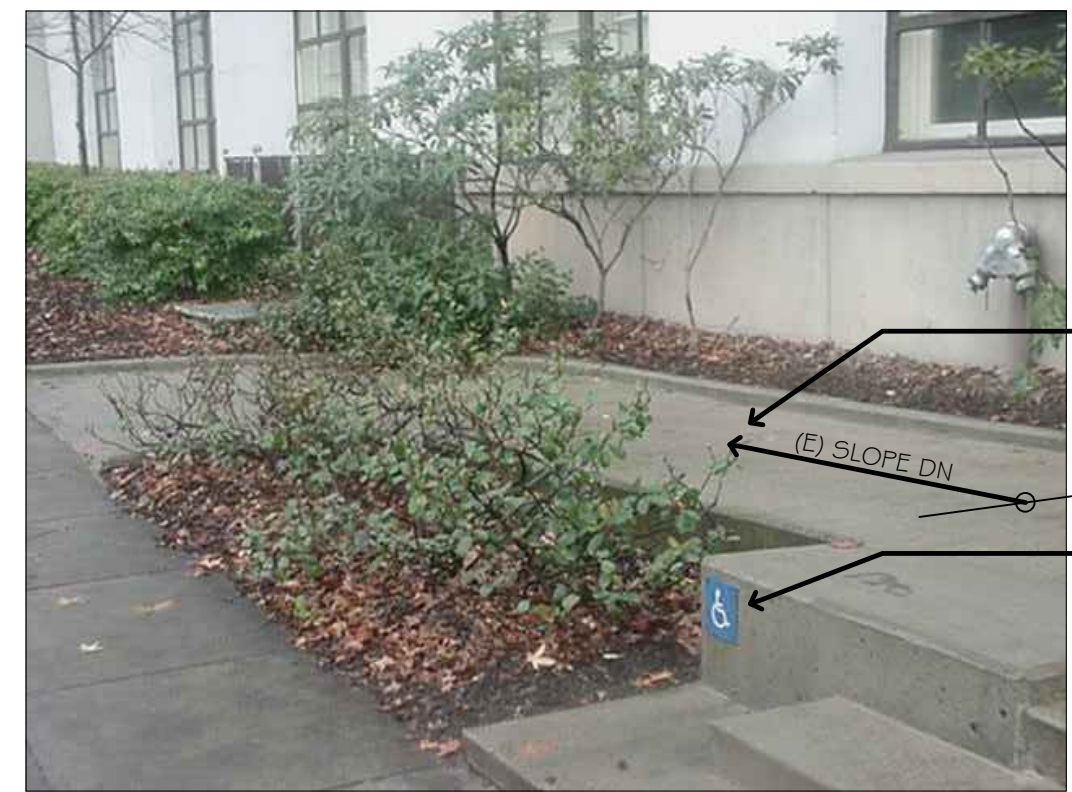


CURB PAINTED BLUE  
I.S.A. SURFACE IDENTIFICATION

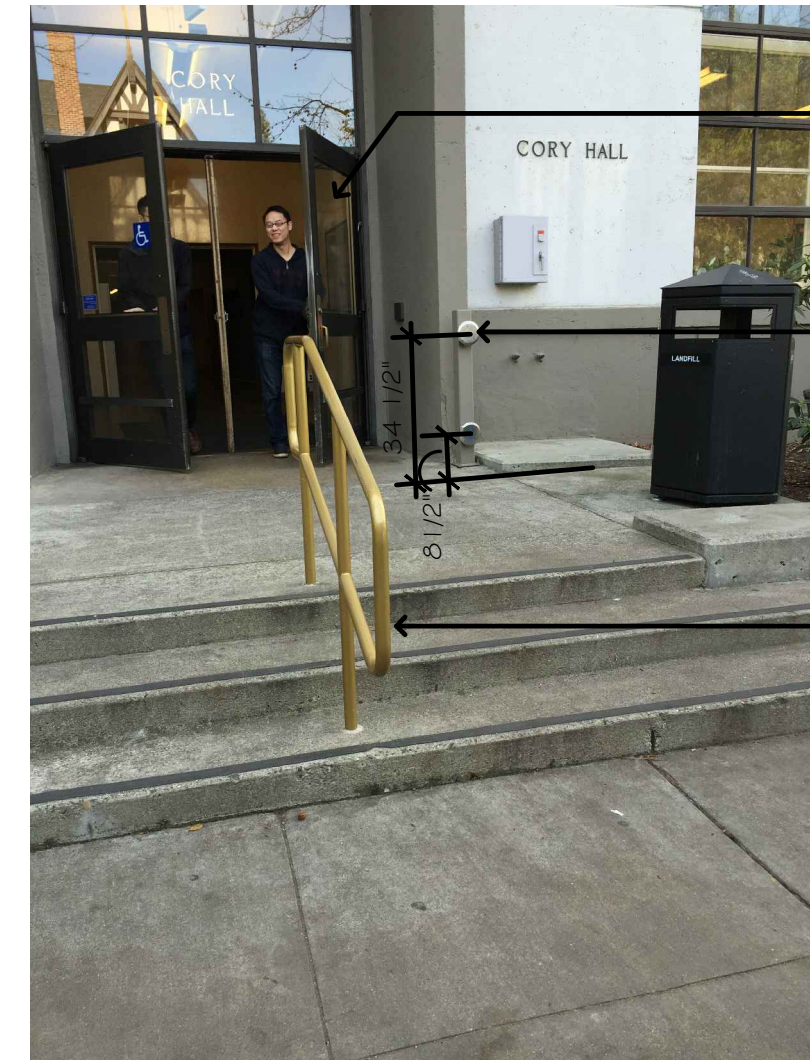
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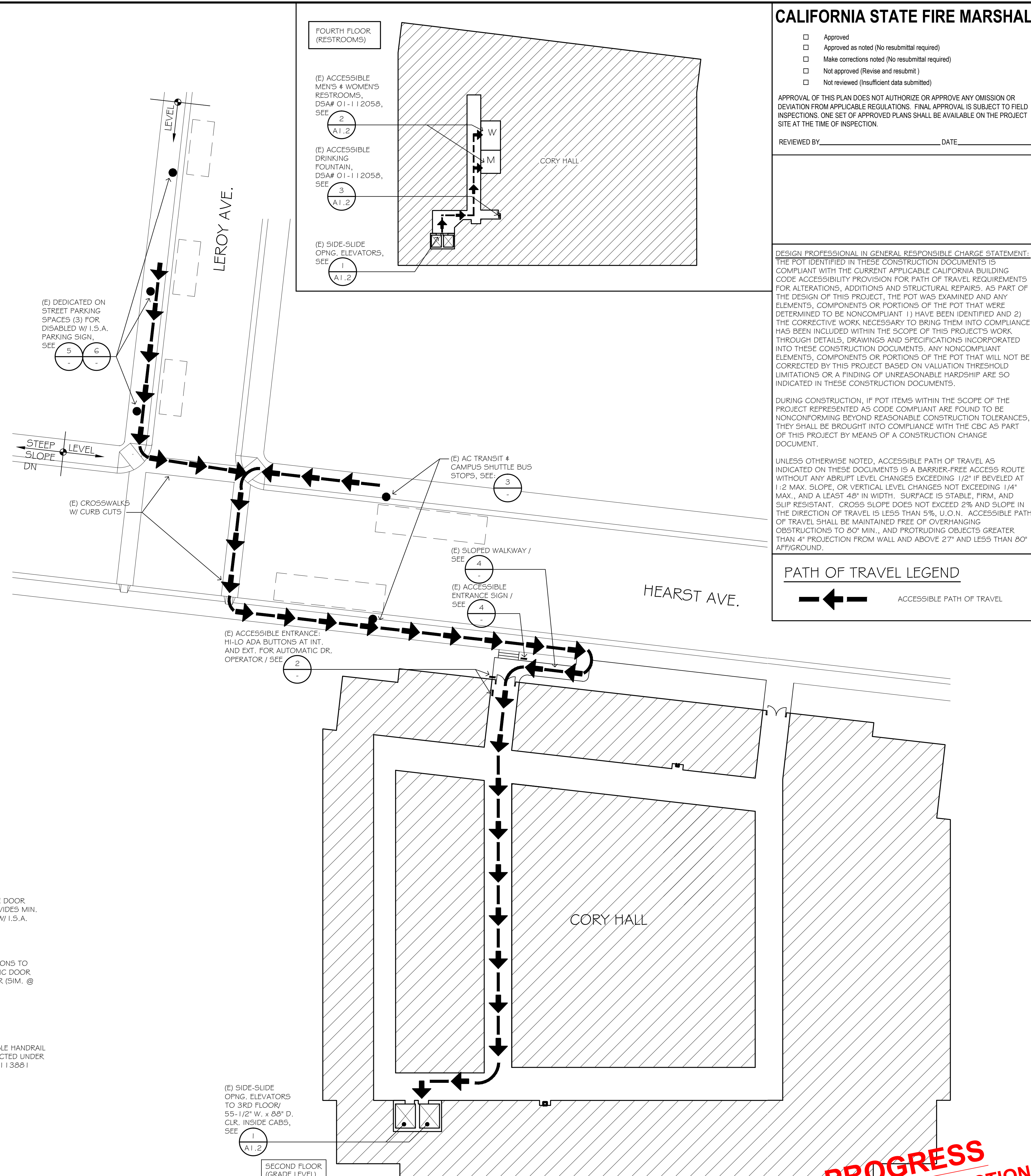
3 (E) BUS STOP & MAIN ENTRANCE  
A1.1 N.T.S.



4 (E) SLOPED WALKWAY @ MAIN ENTRANCE  
A1.1 N.T.S.



2 (E) GRADE LEVEL MAIN ENTRANCE  
A1.1 N.T.S.



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REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE STATEMENT:  
THE POT IDENTIFIED IN THESE CONSTRUCTION DOCUMENTS IS COMPLIANT WITH THE CURRENT APPLICABLE CALIFORNIA BUILDING CODE ACCESSIBILITY PROVISION FOR PATH OF TRAVEL REQUIREMENTS FOR ALTERATIONS, ADDITIONS AND STRUCTURAL REPAIRS. AS PART OF THE DESIGN OF THIS PROJECT, THE POT WAS EXAMINED AND ANY ELEMENTS, COMPONENTS OR PORTIONS OF THE POT THAT WERE DETERMINED TO BE NONCOMPLIANT 1) HAVE BEEN IDENTIFIED AND 2) THE CORRECTIVE WORK NECESSARY TO BRING THEM INTO COMPLIANCE HAS BEEN INCLUDED WITHIN THE SCOPE OF THIS PROJECT'S WORK THROUGH DETAILS, DRAWINGS AND SPECIFICATIONS INCORPORATED INTO THESE CONSTRUCTION DOCUMENTS. ANY NONCOMPLIANT ELEMENTS, COMPONENTS OR PORTIONS OF THE POT THAT WILL NOT BE CORRECTED BY THIS PROJECT BASED ON VALUATION THRESHOLD LIMITATIONS OR A FINDING OF UNREASONABLE HARDSHIP ARE SO INDICATED IN THESE CONSTRUCTION DOCUMENTS.

DURING CONSTRUCTION, IF POT ITEMS WITHIN THE SCOPE OF THE PROJECT REPRESENTED AS CODE COMPLIANT ARE FOUND TO BE NONCONFORMING BEYOND REASONABLE CONSTRUCTION TOLERANCES, THEY SHALL BE BROUGHT INTO COMPLIANCE WITH THE CBC AS PART OF THIS PROJECT BY MEANS OF A CONSTRUCTION CHANGE DOCUMENT.

UNLESS OTHERWISE NOTED, ACCESSIBLE PATH OF TRAVEL AS INDICATED ON THESE DOCUMENTS IS A BARRIER-FREE ACCESS ROUTE WITHOUT ANY ABRUPT LEVEL CHANGES EXCEEDING 1/2" IF BEVELED AT 1:2 MAX. SLOPE, OR VERTICAL LEVEL CHANGES NOT EXCEEDING 1/4" MAX., AND A LEAST 48" IN WIDTH. SURFACE IS STABLE, FIRM, AND SLIP RESISTANT. CROSS SLOPE DOES NOT EXCEED 2% AND SLOPE IN THE DIRECTION OF TRAVEL IS LESS THAN 5%, U.O.N. ACCESSIBLE PATH OF TRAVEL SHALL BE MAINTAINED FREE OF OVERHANGING OBSTRUCTIONS TO 80" MIN., AND PROTRUDING OBJECTS GREATER THAN 4" PROJECTION FROM WALL AND ABOVE 27" AND LESS THAN 80" AFF/GROUND.

PATH OF TRAVEL LEGEND



REVISIONS	BY
80% Progress 01.19.18	BR
90% CDs 02.05.18	BR

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PROGRESS

PATH OF TRAVEL - 1

UC Berkeley  
Cory 333  
Office Renovation  
Berkeley, CA  
Proj. No.: 17408A  
CAAN: 1325

DATE	FEBRUARY 2018
DRAWN BY	BR
JOB	Cory Rm 333
SHEET	A1.1

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NOT FOR CONSTRUCTION

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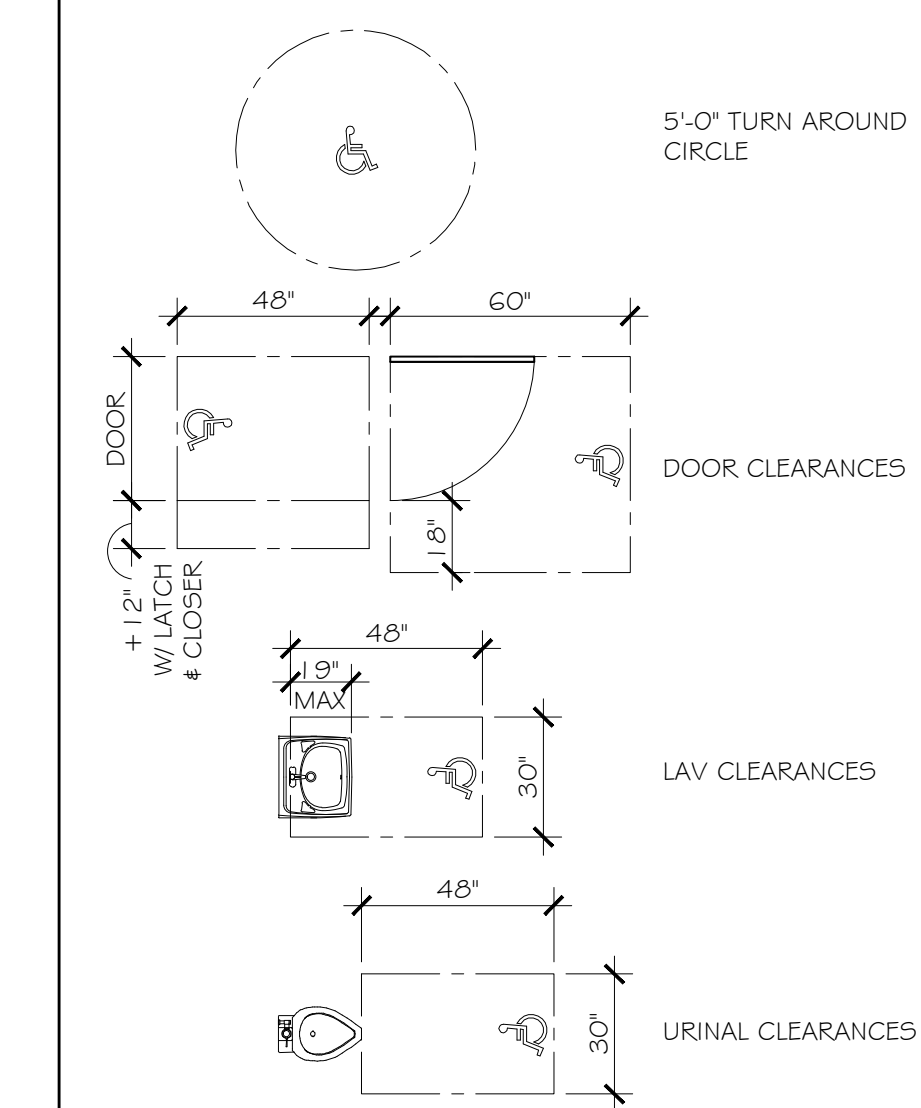
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90% CDs 02.05.18	BR

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**ACCESSIBILITY CLEARANCES**



**PROGRESS**

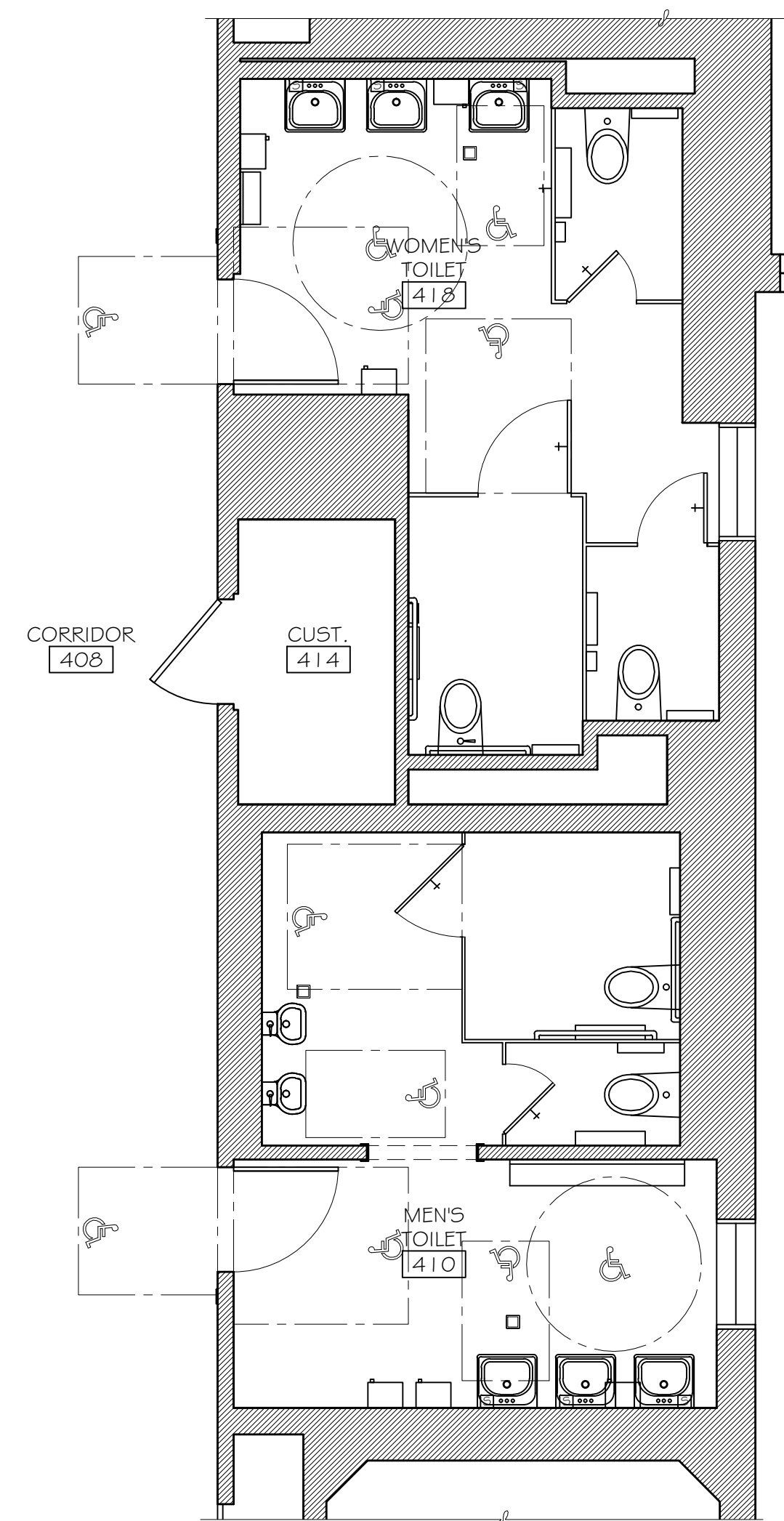
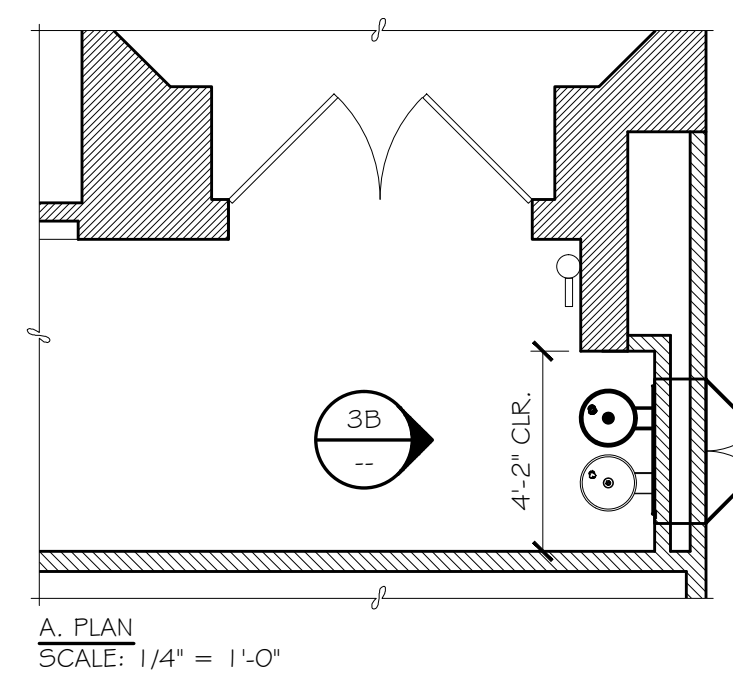
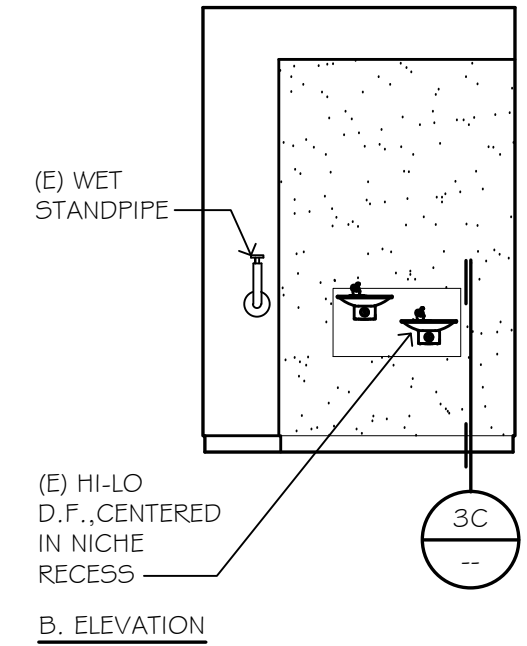
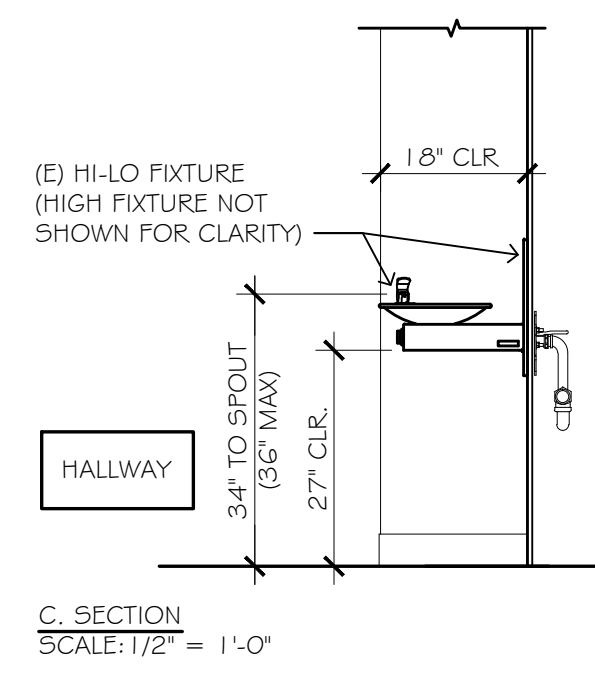
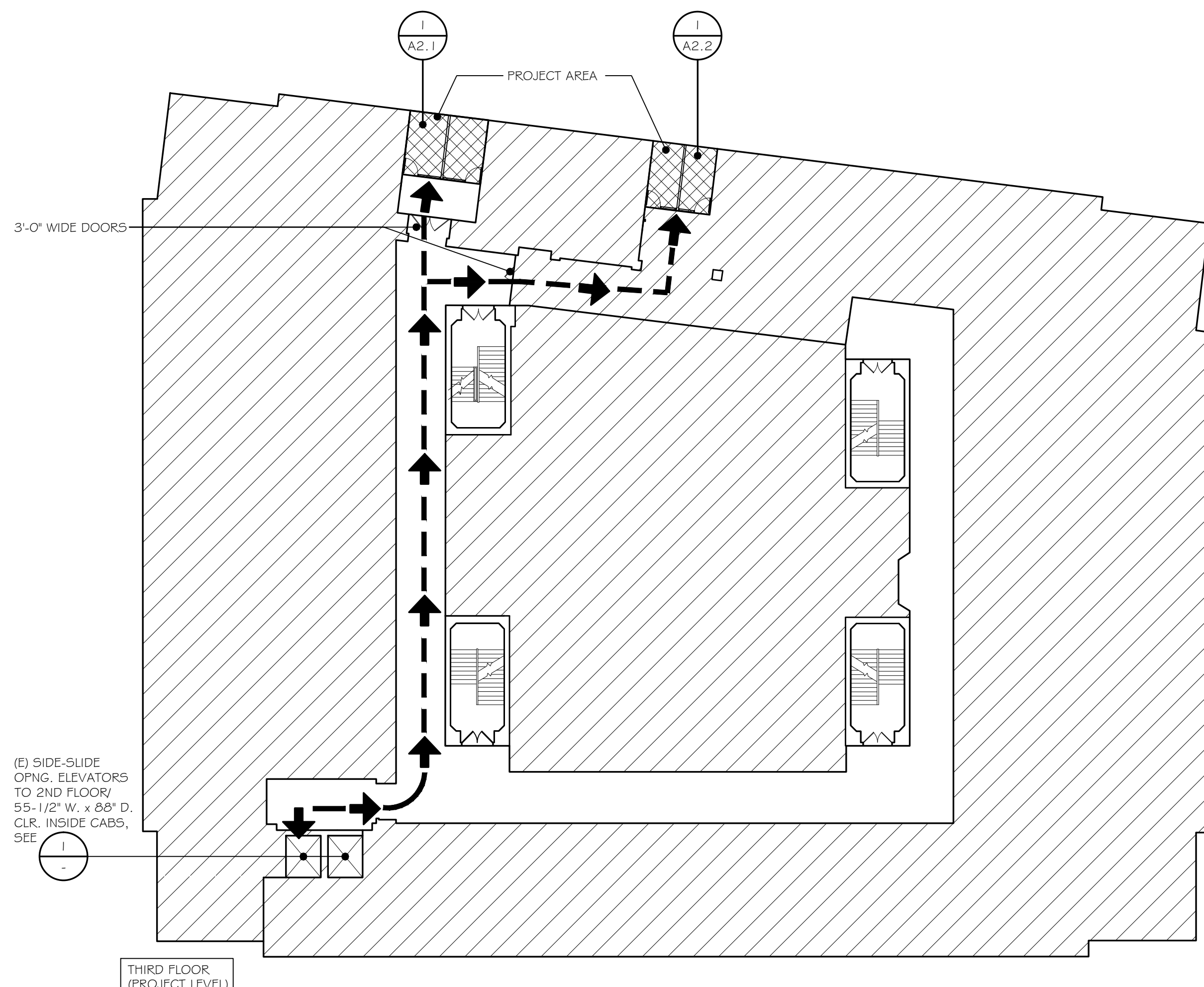
**PATH OF TRAVEL - 2**

Proj. No.: 17408A  
 CAAN: 1325

UC Berkeley  
**Cory 333**  
 Office Renovation  
 Berkeley, CA

DATE	FEBRUARY 2018
DRAWN BY	BR
JOB	Cory Rm 333
SHEET	

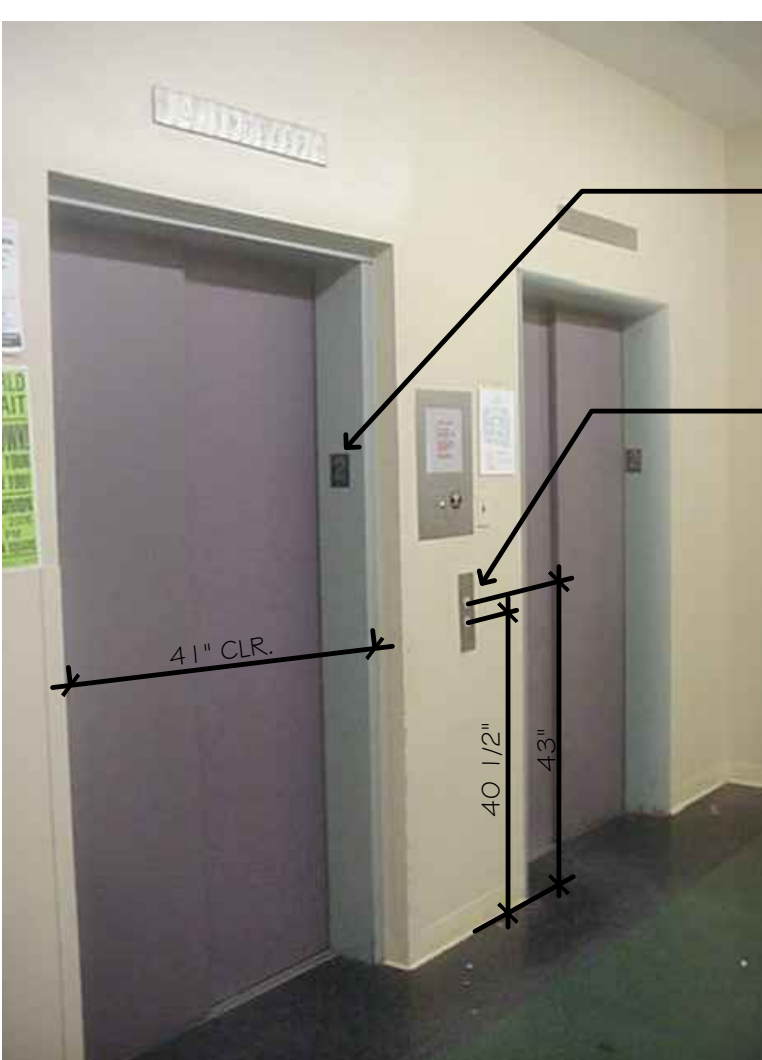
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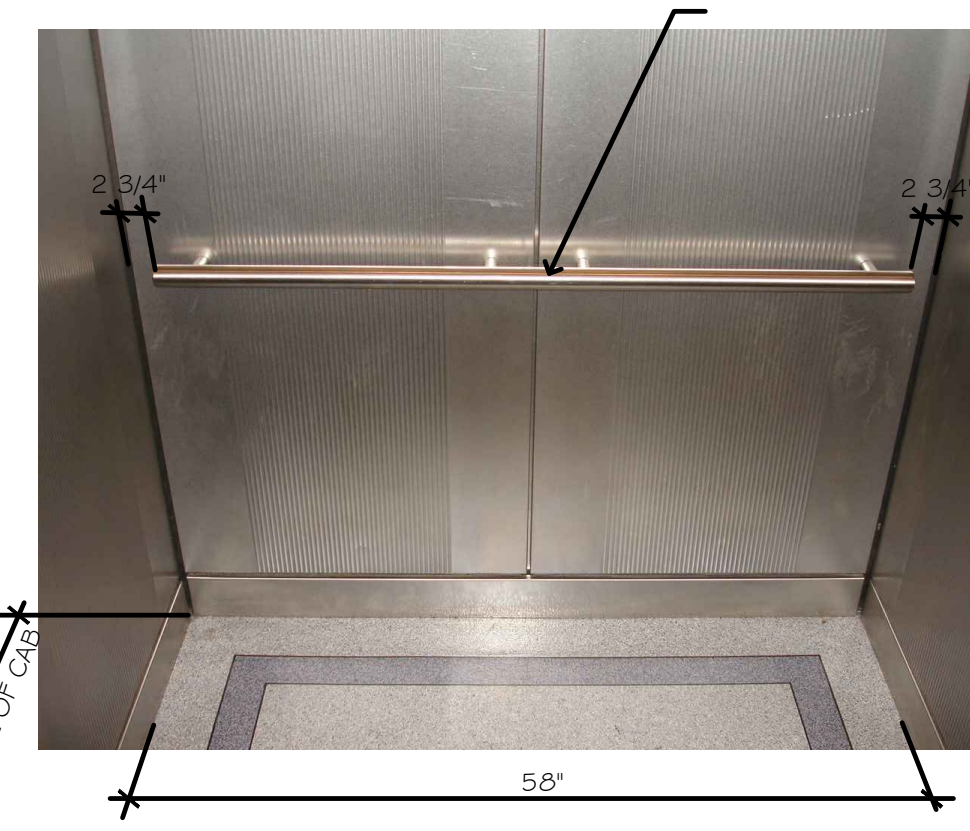
**4** PATH OF TRAVEL / THIRD FLOOR  
 A1.2 N.T.S.

**3** (E) ACCESSIBLE D.F. @ 4TH FLOOR  
 A1.2 SCALE: AS NOTED CONSTRUCTED UNDER DSA# 01-112058

**2** (E) ACCESSIBLE TOILETS @ 4TH FLOOR  
 A1.2 SCALE: 1/4" = 1'-0" CONSTRUCTED UNDER DSA# 01-112058



**1** (E) ELEVATOR  
 A1.2 N.T.S.



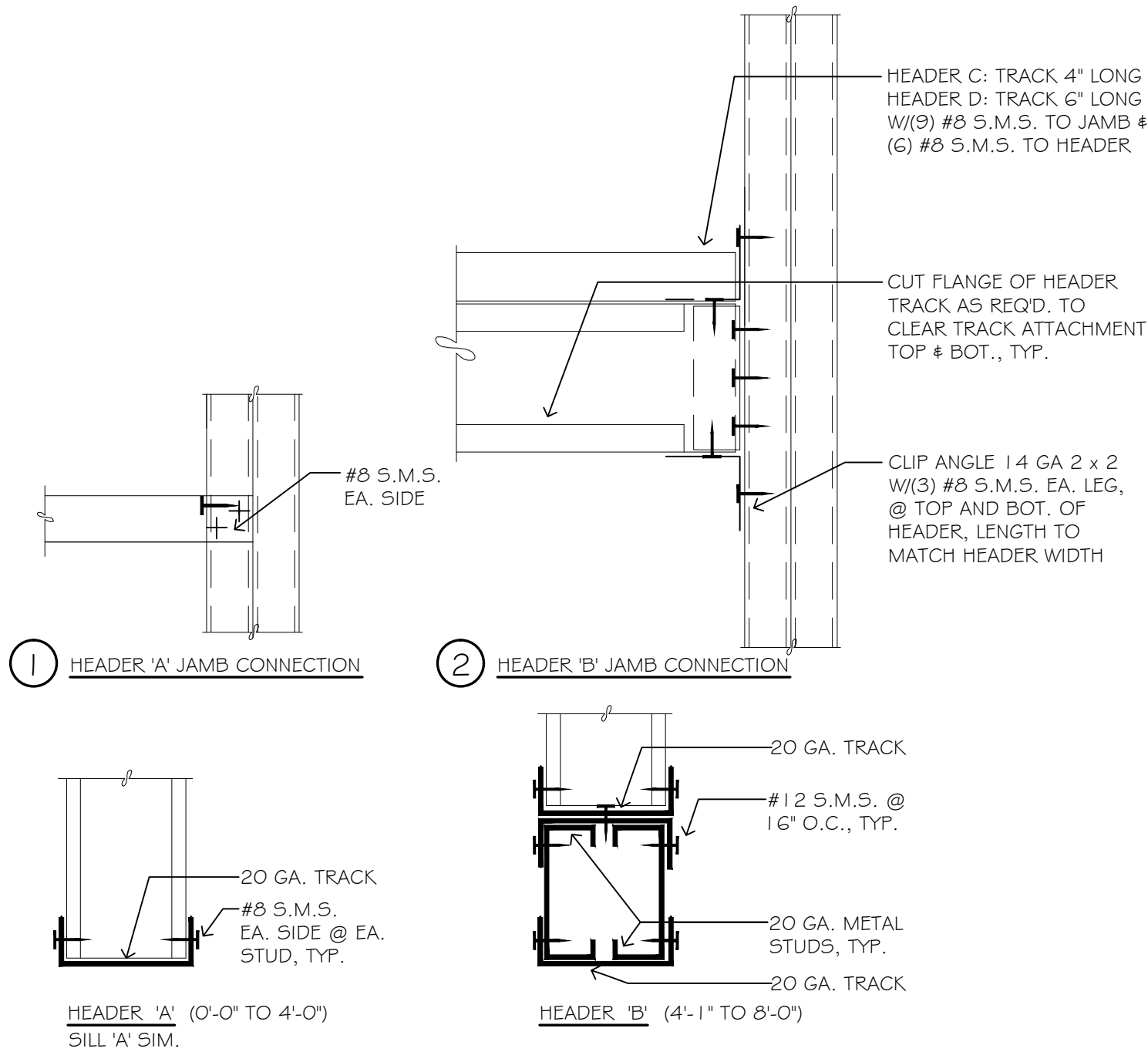
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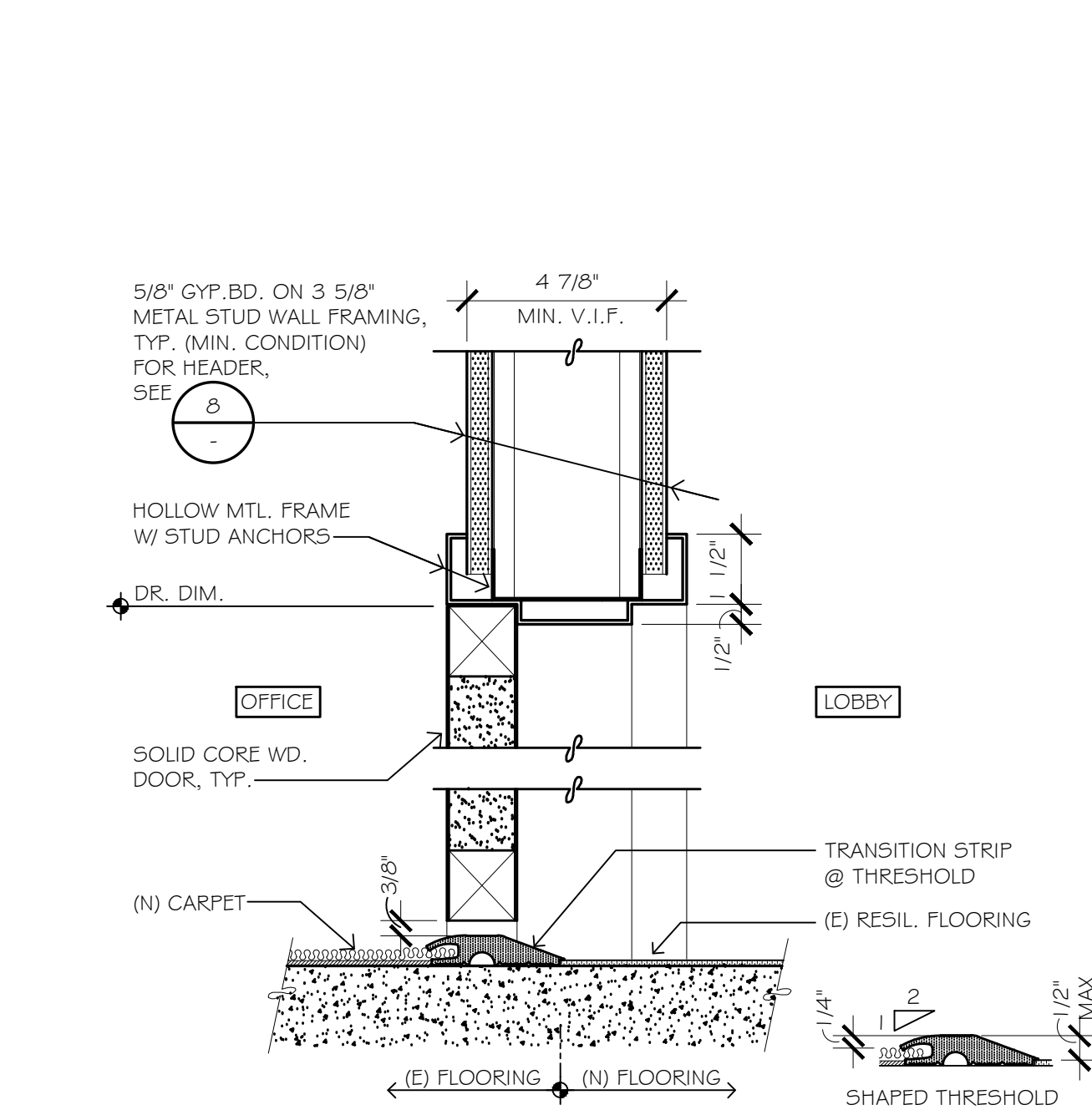


**INTERIOR METAL STUD FRAMING NOTES**

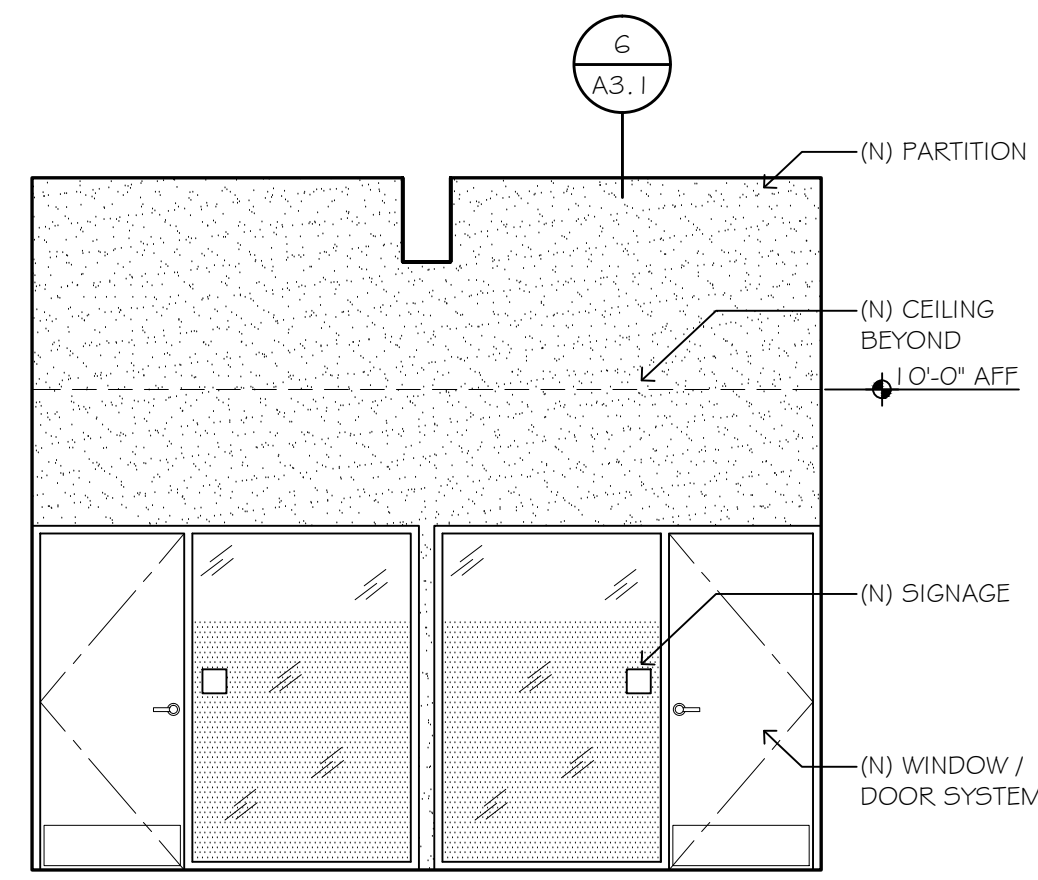
- THE SECTION DESIGNATIONS USED TO CALL OUT METAL STUD MEMBERS ARE PER ICBO REPORT NO. 4943 DEVELOPED BY THE METAL STUD MANUFACTURER'S ASSOCIATION (MSMA). THE MINIMUM SECTION PROPERTIES OF METAL STUD SECTIONS SHALL BE IN ACCORDANCE WITH THIS ICBO REPORT. USE THE FOLLOWING METAL STUD SIZES UNLESS OTHERWISE NOTED:
  - STUDS: 20 GAUGE CC STUDS WITH 1-3/8 INCH FLANGE WIDTH; DEPTH AS INDICATED ON DWGS.
  - TRACKS: 20 GAUGE WT TRACKS WITH 1-1/2 INCH FLANGE WIDTH; DEPTH TO MATCH STUD DEPTH
  - COMPENSATION CHANNELS: 20 GAUGE WITH 1-1/2 INCH FLANGE WIDTH; DEPTH TO MATCH STUD DEPTH
- METAL STUD MATERIAL SHALL BE AS FOLLOWS:
  - 18 GAUGE & LIGHTER: ASTM A446, GRADE A, GALVANIZED STEEL SHEET, 33 KSI YIELD STRENGTH
  - 16 GAUGE & HEAVIER: ASTM A446, GRADE D, GALVANIZED STEEL SHEET, 50 KSI YIELD STRENGTH
- SHEET METAL SCREWS (S.M.S.): USE #8, #10 OR #12 S.M.S. AS INDICATED ON THE DWGS. THE S.M.S. TYPE SHALL BE AS FOLLOWS:
  - WHERE SCREW HEAD IS OVERLAID WITH GYPSUM BOARD OR OTHER FINISH - USE WAFER HEAD SELF-DRILLING
  - WHERE SCREW HEAD IS NOT OVERLAID WITH GYPSUM BOARD OR OTHER FINISH - USE HEX HEAD SELF-DRILLING
- POWDER-ACTUATED DEVICES (PAD): DN TYPE PINS WITH 0.145 SHANK DIAMETER & 1 - 1/8 INCH PENETRATION BY HILTI INC. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS
- EXPANSION BOLTS (EB): KWIK BOLT II BY HILTI INC.; USE EMBEDMENT AS INDICATED ON THE DWGS. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS
- EPOXY ANCHORS (EA) & HIGH STRENGTH EPOXY ANCHORS (HSEA): HIT HY 150 INJECTION ADHESIVE ANCHOR BY HILTI INC. ROD MATERIAL SHALL BE ASTM A36 FOR NORMAL EA & ASTM A193, GRADE B7 FOR HSEA. USE DIAMETER & EMBEDMENT AS INDICATED ON THE DWGS. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS
- MACHINE BOLTS (MB): ASTM A307 BOLTS
- LIGHT GAUGE STEEL CONNECTORS CALLED OUT ON THE DWGS. REFER TO CONNECTORS BY SIMPSON STRONG TIE COMPANY. INSTALL CONNECTORS IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS
- WELDING SHALL BE IN ACCORDANCE WITH AWS D1.3



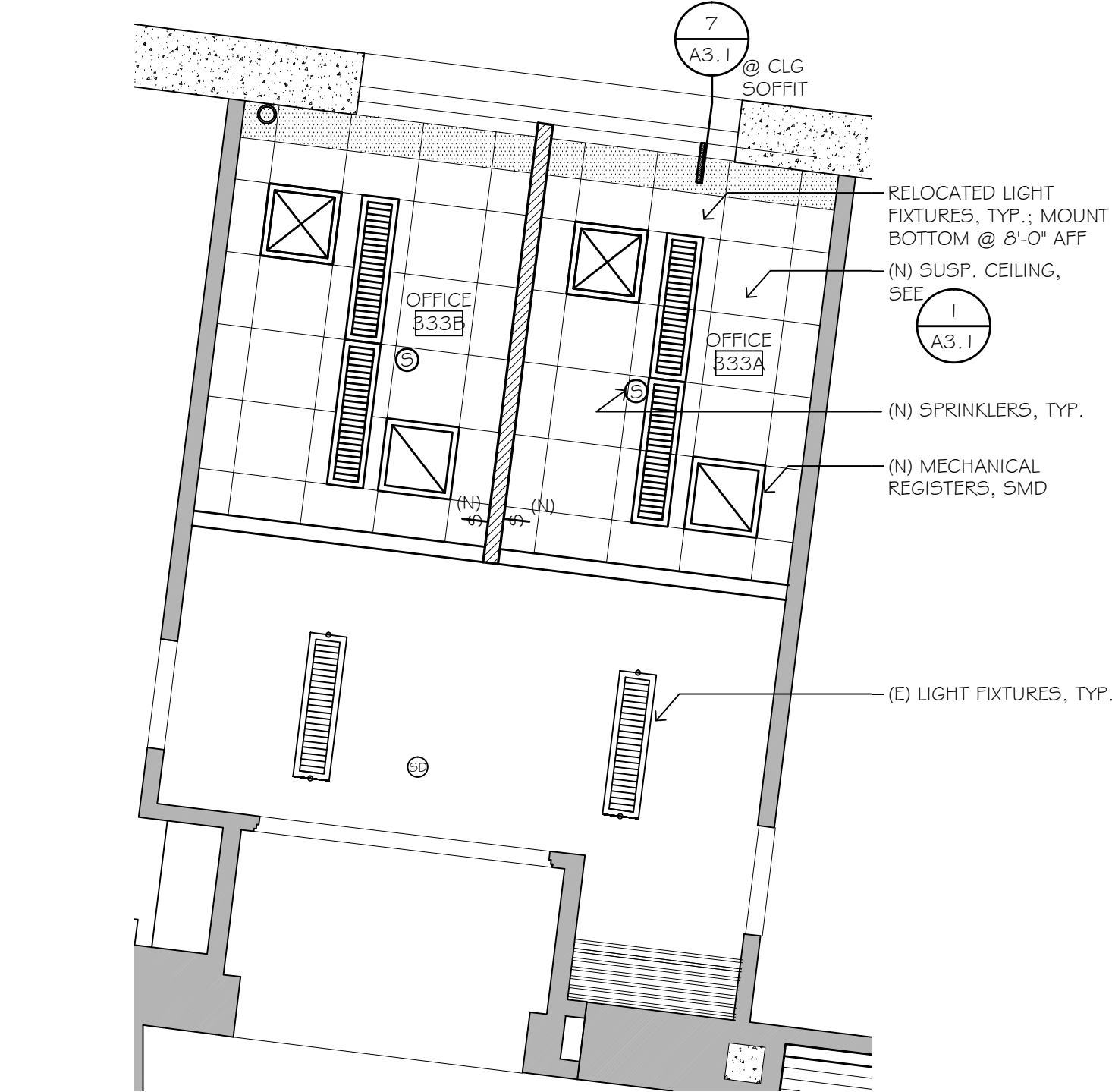
**8 TYP. DOOR DETAIL**  
A2.1 SCALE: 3" = 1'-0"



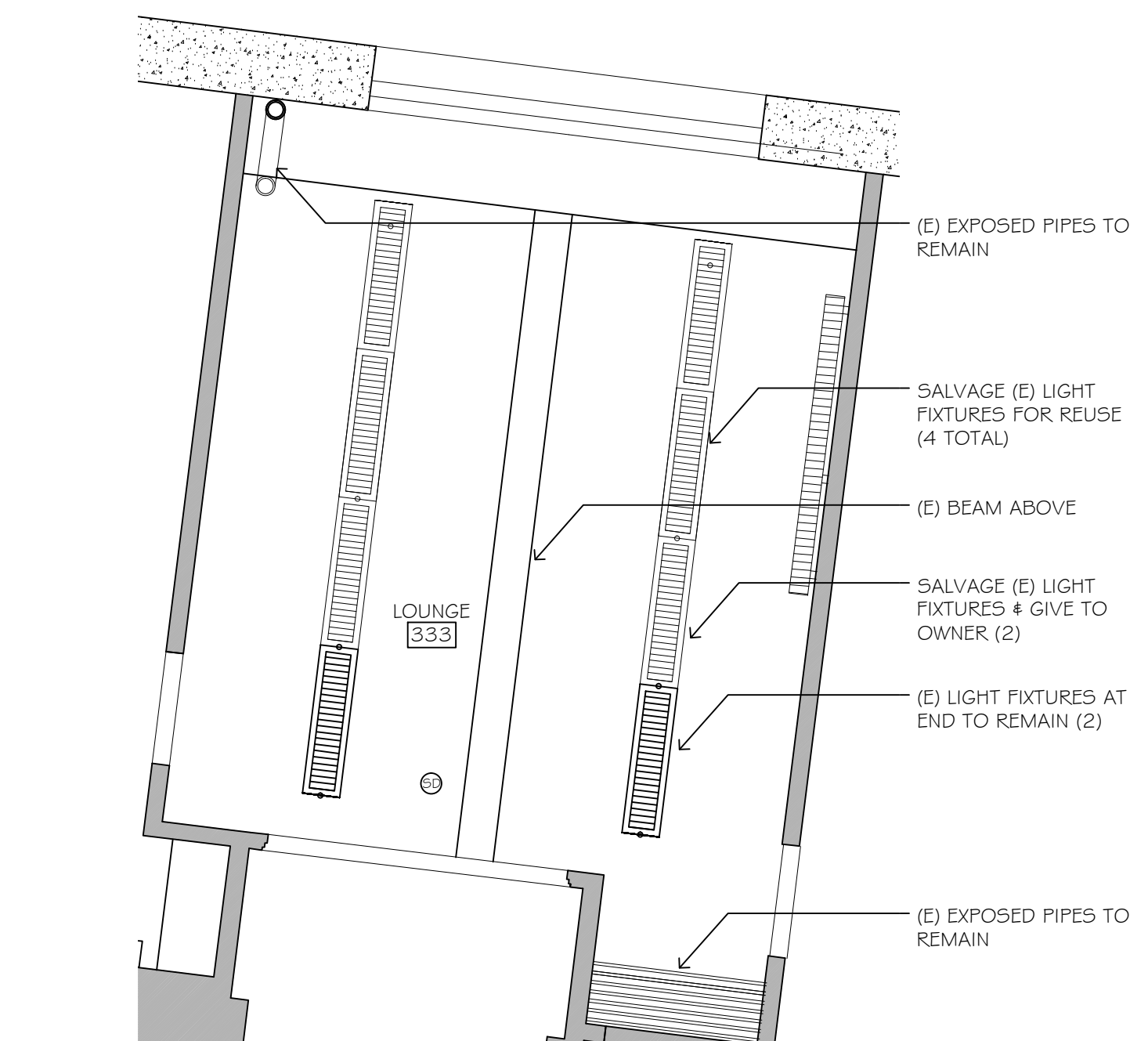
**7 TYP. DOOR DETAIL**  
A2.1 SCALE: 3" = 1'-0"



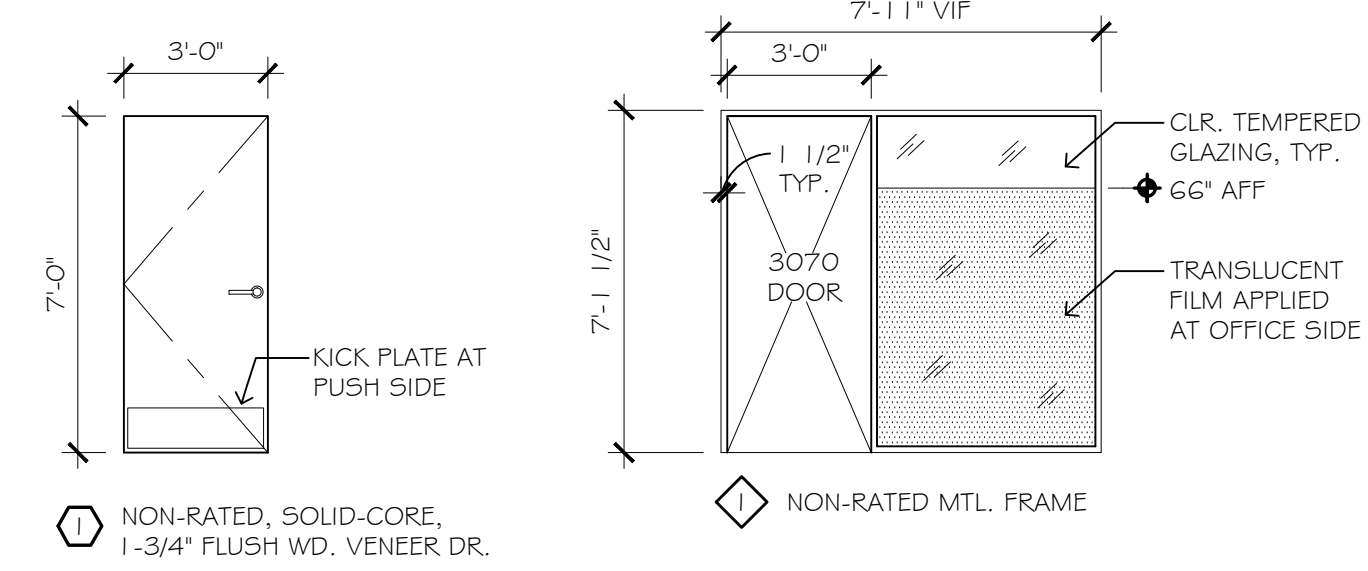
**6 ELEVATION @ RMS 333 & 333A**  
A2.1 SCALE: 1/4" = 1'-0"



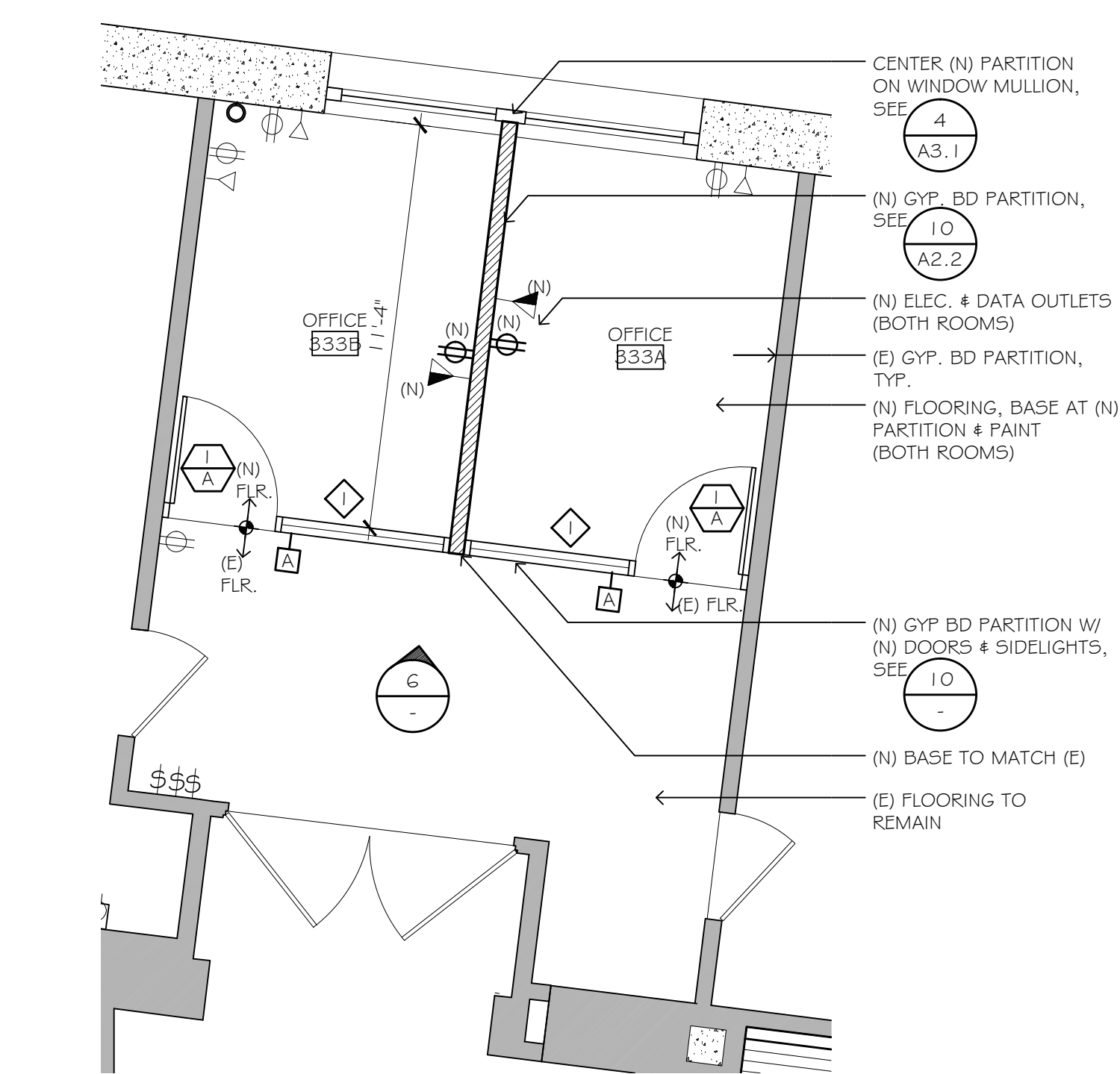
**5 ROOM 333 & 333A - (N) RCP**  
A2.1 SCALE: 1/4" = 1'-0"



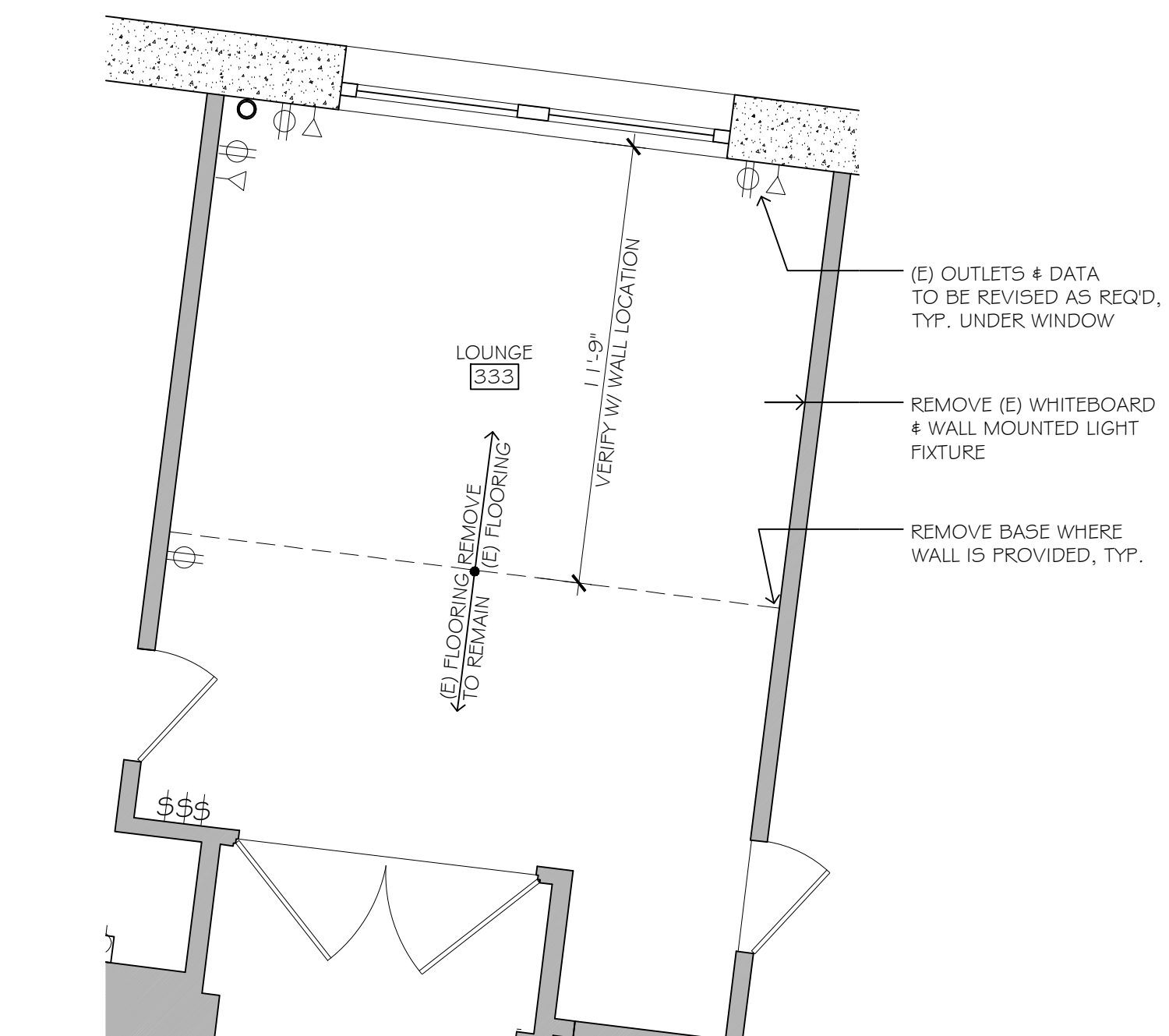
**4 ROOM 333 LOUNGE - RCP DEMO**  
A2.1 SCALE: 1/4" = 1'-0"



**3 DOOR & WINDOW SCHEDULE**  
A2.1 SCALE: 1/4" = 1'-0"



**2 ROOM 333 & 333A - (N) WORK**  
A2.1 SCALE: 1/4" = 1'-0"



**1 ROOM 333 LOUNGE - DEMOLITION**  
A2.1 SCALE: 1/4" = 1'-0"

**CALIFORNIA STATE FIRE MARSHAL**

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REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

**DEMOLITION NOTES:**

- PROTECT EXISTING OBJECTS & FINISHES NOTED TO REMAIN
- HAND OVER UN-USED LIGHT FIXTURES TO OWNER

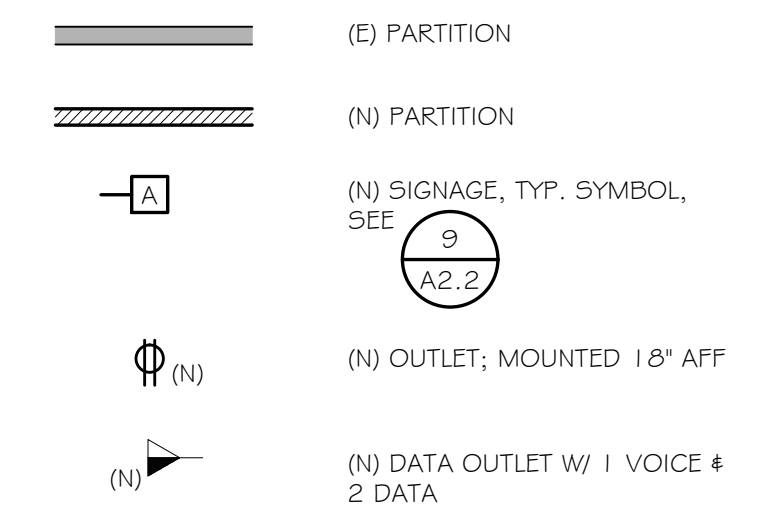
**DEMOLITION LEGEND:**



**FLOOR PLAN NOTES:**

- PATCH & REPAIR (E) WALLS AS REQD
- ROOM NAMES & NUMBERS TO BE IDENTIFIED BY OWNER PRIOR TO FABRICATION

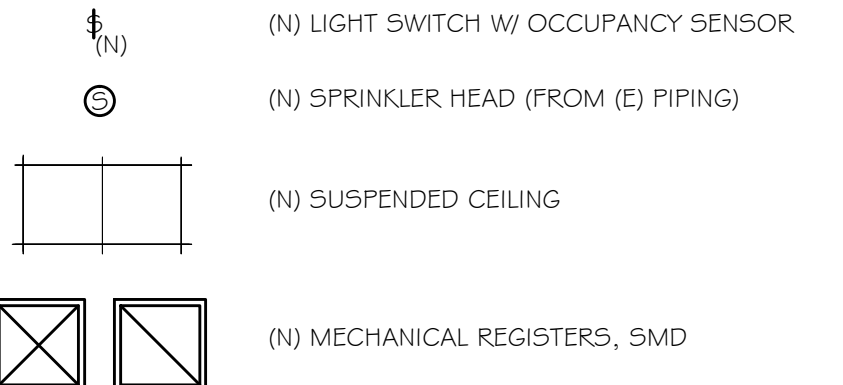
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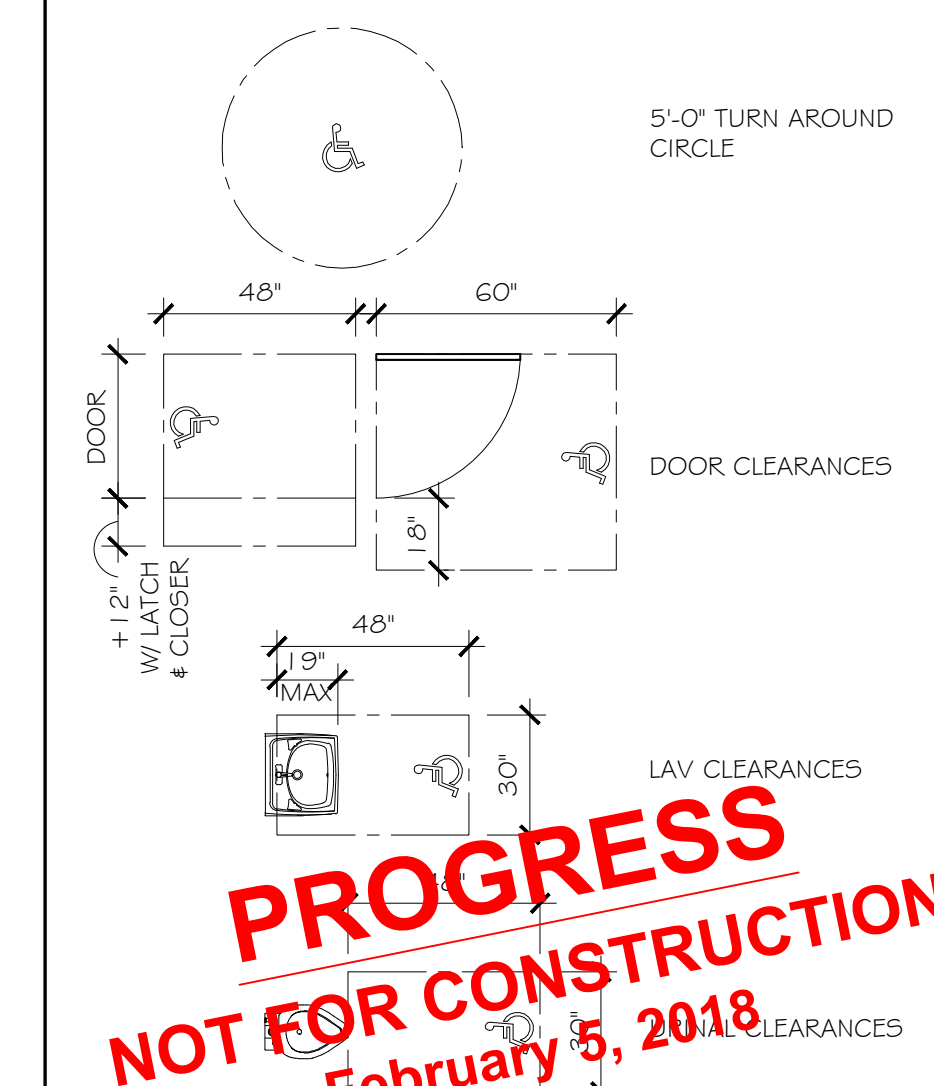
**RCP NOTES:**

- PROTECT EXISTING CEILING ELEMENTS TO REMAIN

**RCP LEGEND:**



**ACCESSIBILITY CLEARANCES:**



REVISIONS	BY
80% Progress 01.19.18	BR
90% CDs 02.05.18	BR

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Berkeley, CA 94710  
ph. (510) 601-6465  
shafferarchitects.com

**PROGRESS**

**DEMOLITION, (N) FLOOR PLAN & RCP ROOMS 333 & 333A**

UC Berkeley  
**Cory 333**  
Office Renovation  
Berkeley, CA  
Proj. No.: 17408A  
CAAN: 1325

DATE: FEBRUARY 2018  
DRAWN BY: BR  
JOB: Cory Rm 333  
SHEET

**A2.1**

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REVISIONS	BY
80% Progress 01.19.18	BR
90% CDs 02.05.18	BR

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 ph. (510) 601-6465  
 shafterarchitects.com

**PROGRESS**

**DEMOLITION, (N) FLOOR PLAN & RCP ROOMS - & -**

UC Berkeley  
**Cory 333**  
 Office Renovation  
 Berkeley, CA  
 Proj. No.: 17408A  
 CAAN: 1325

DATE: FEBRUARY 2018  
 DRAWN BY: BR  
 JOB: Cory Rm 333  
 SHEET: A2.2

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REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

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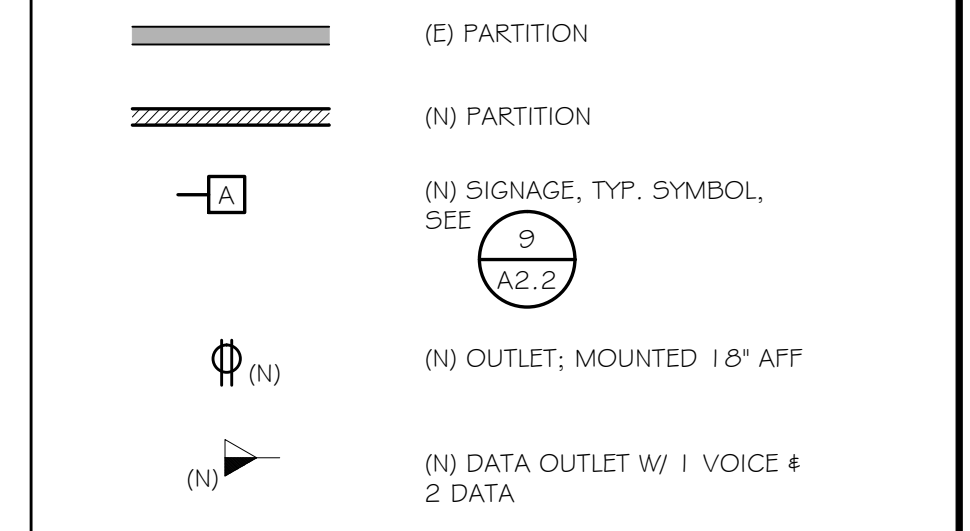
**DEMOLITION LEGEND:**



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- ROOM NAMES & NUMBERS TO BE IDENTIFIED BY OWNER PRIOR TO FABRICATION

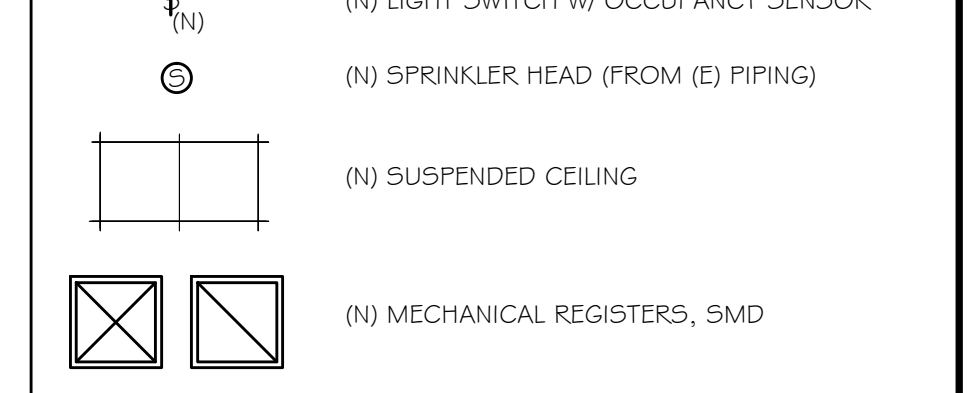
**FLOOR PLAN LEGEND:**



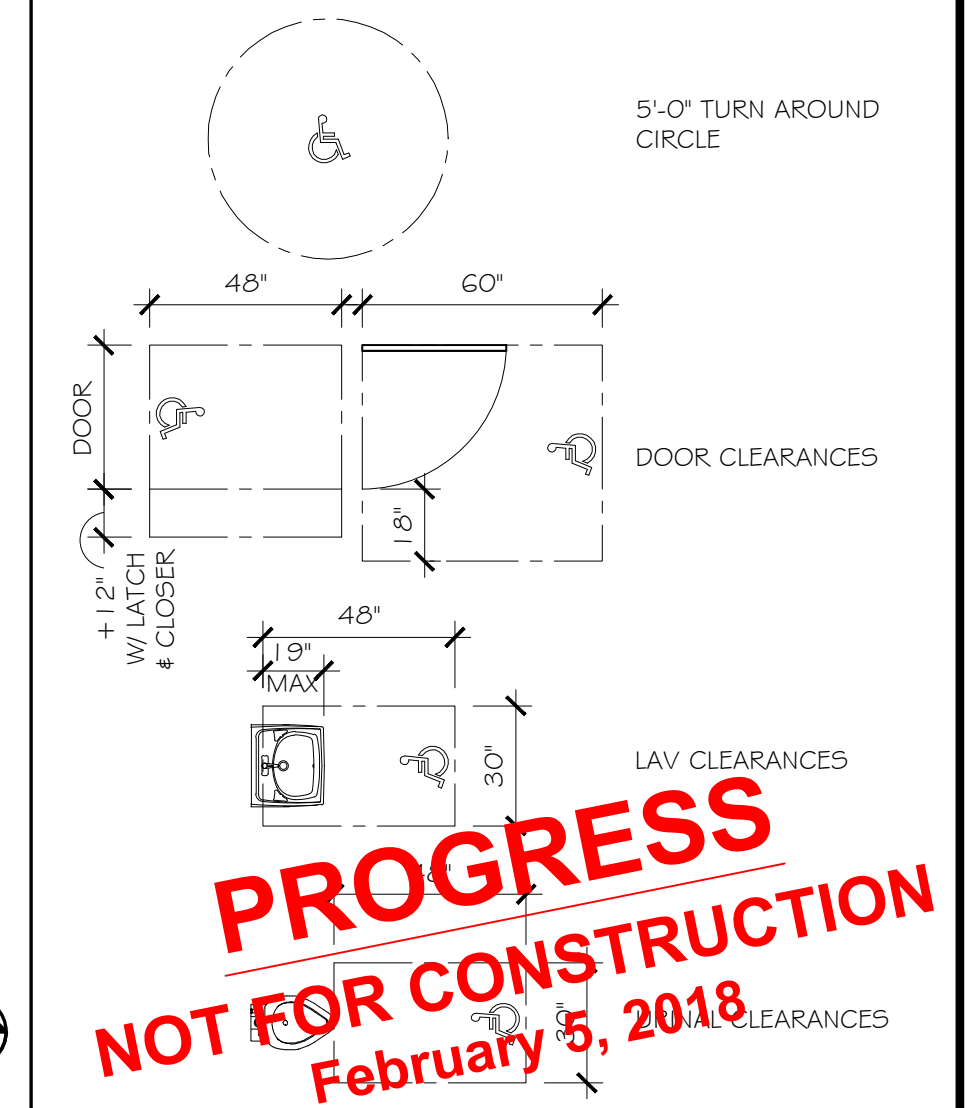
**RCP NOTES:**

- PROTECT EXISTING CEILING ELEMENTS TO REMAIN

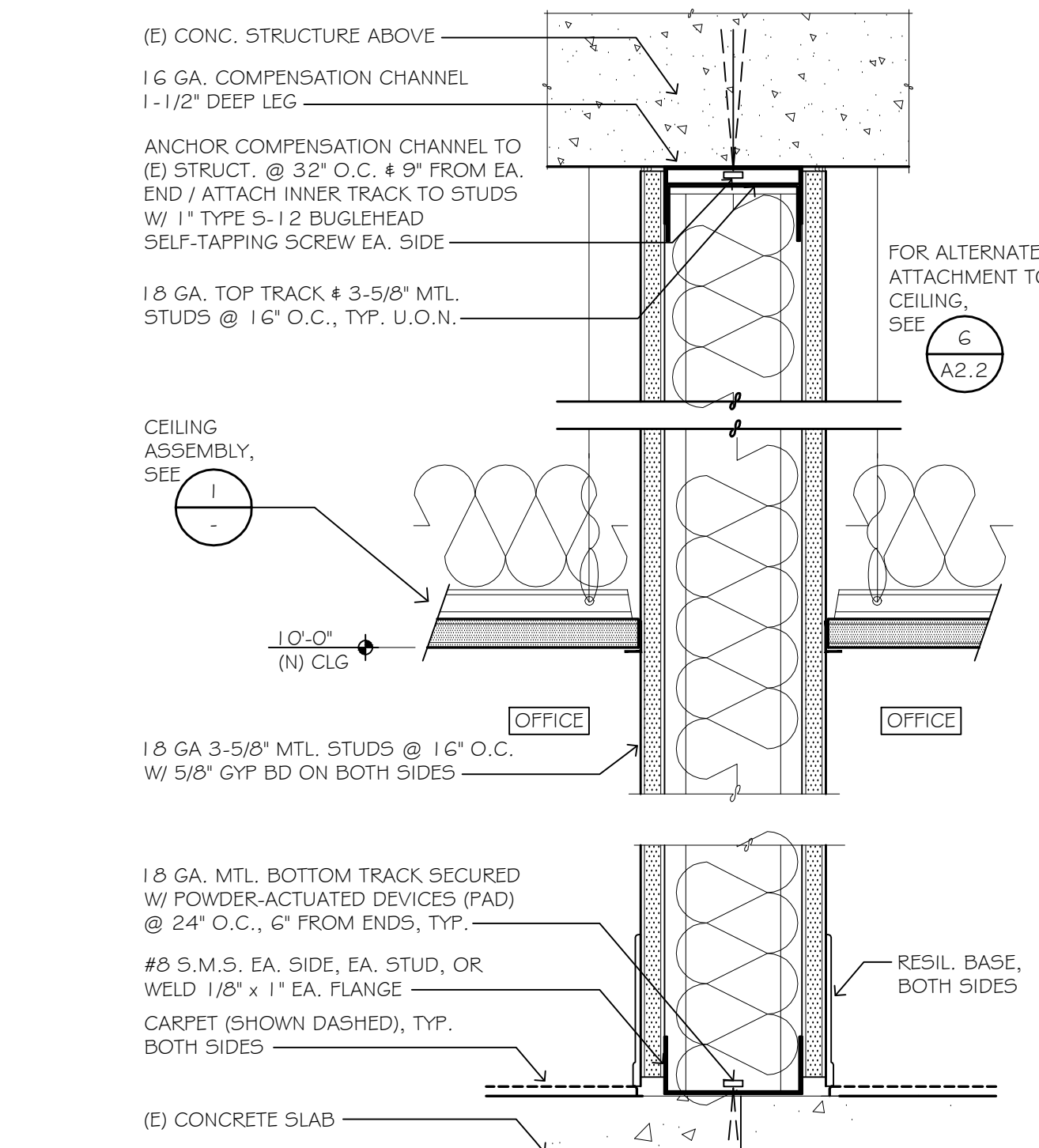
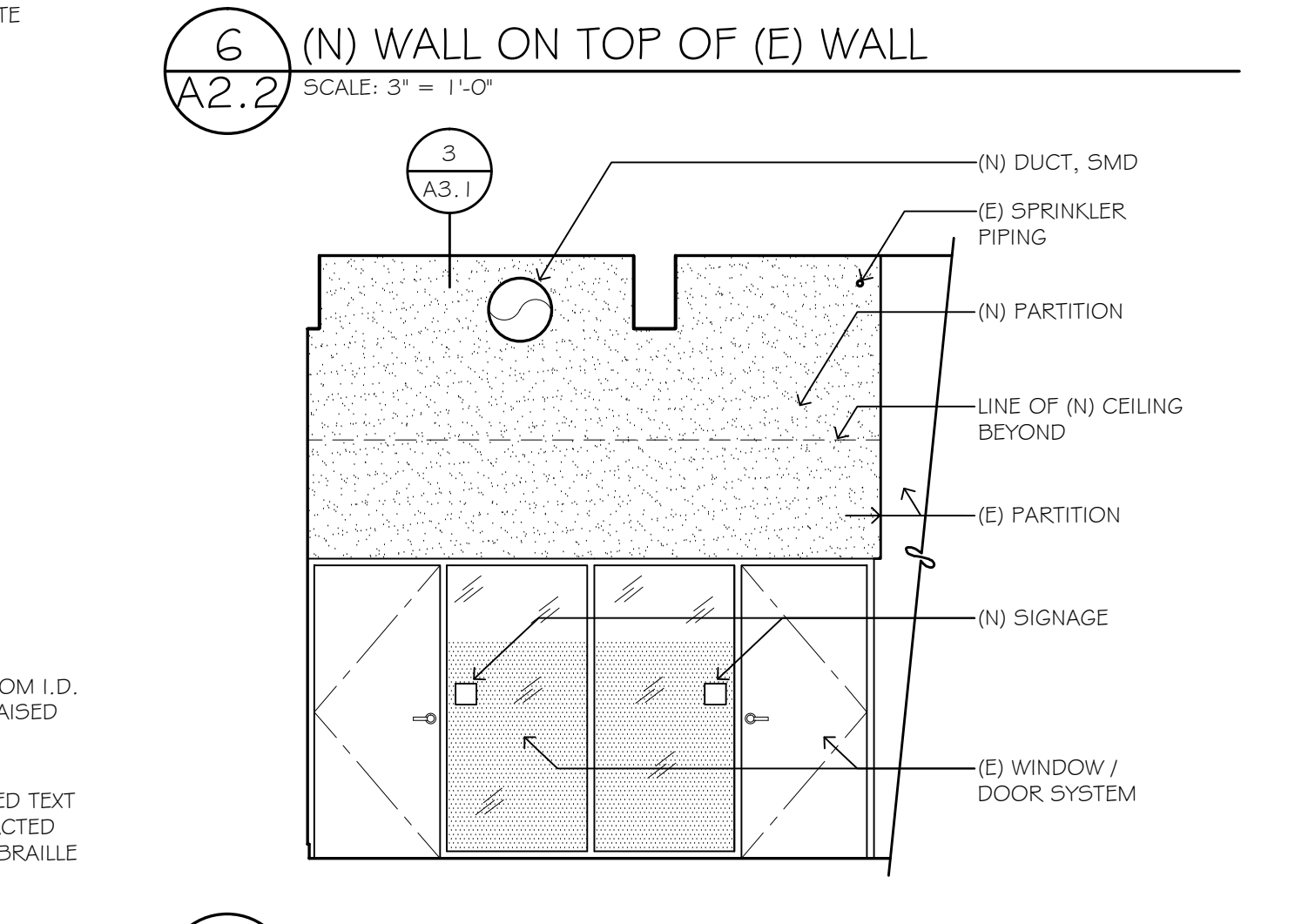
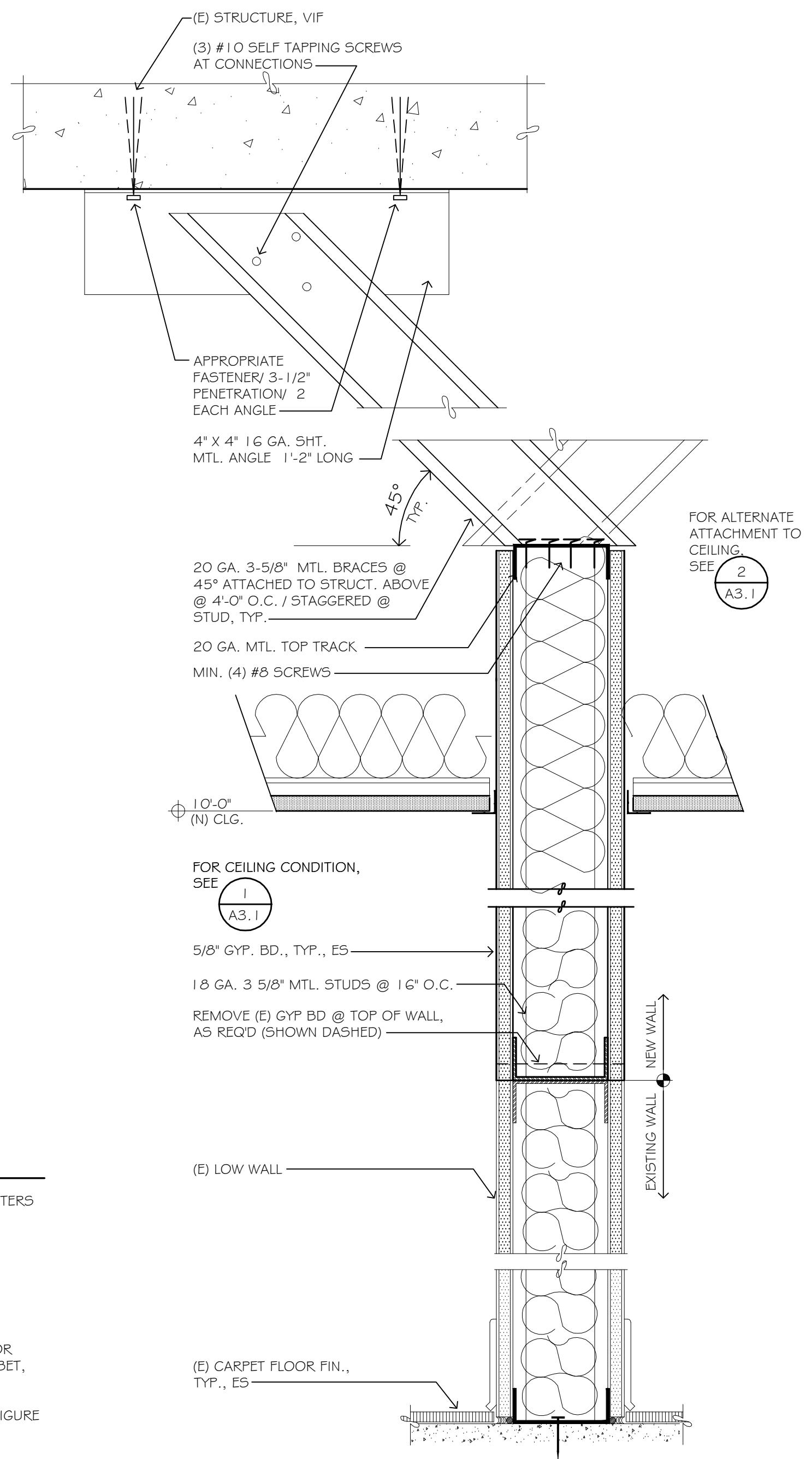
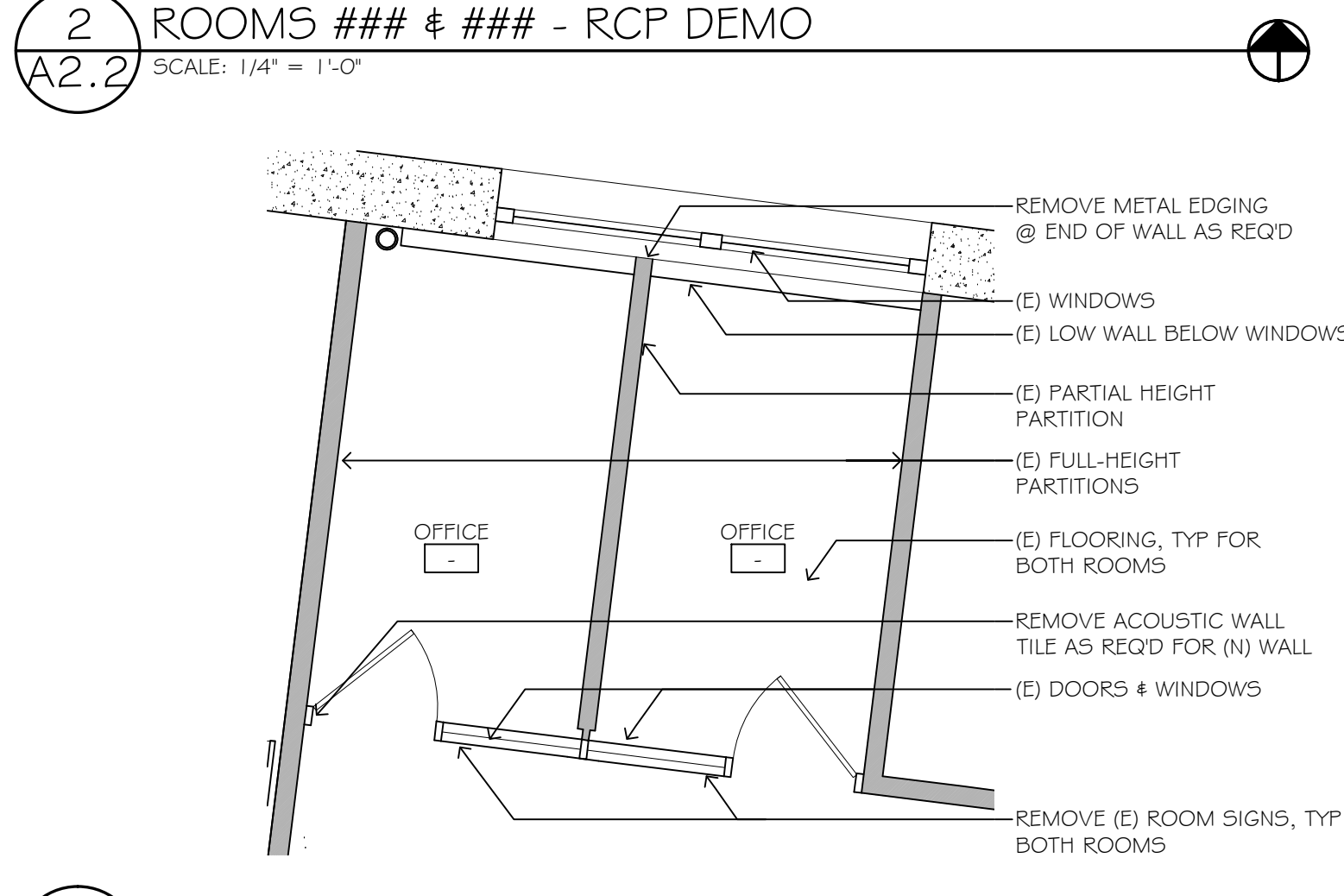
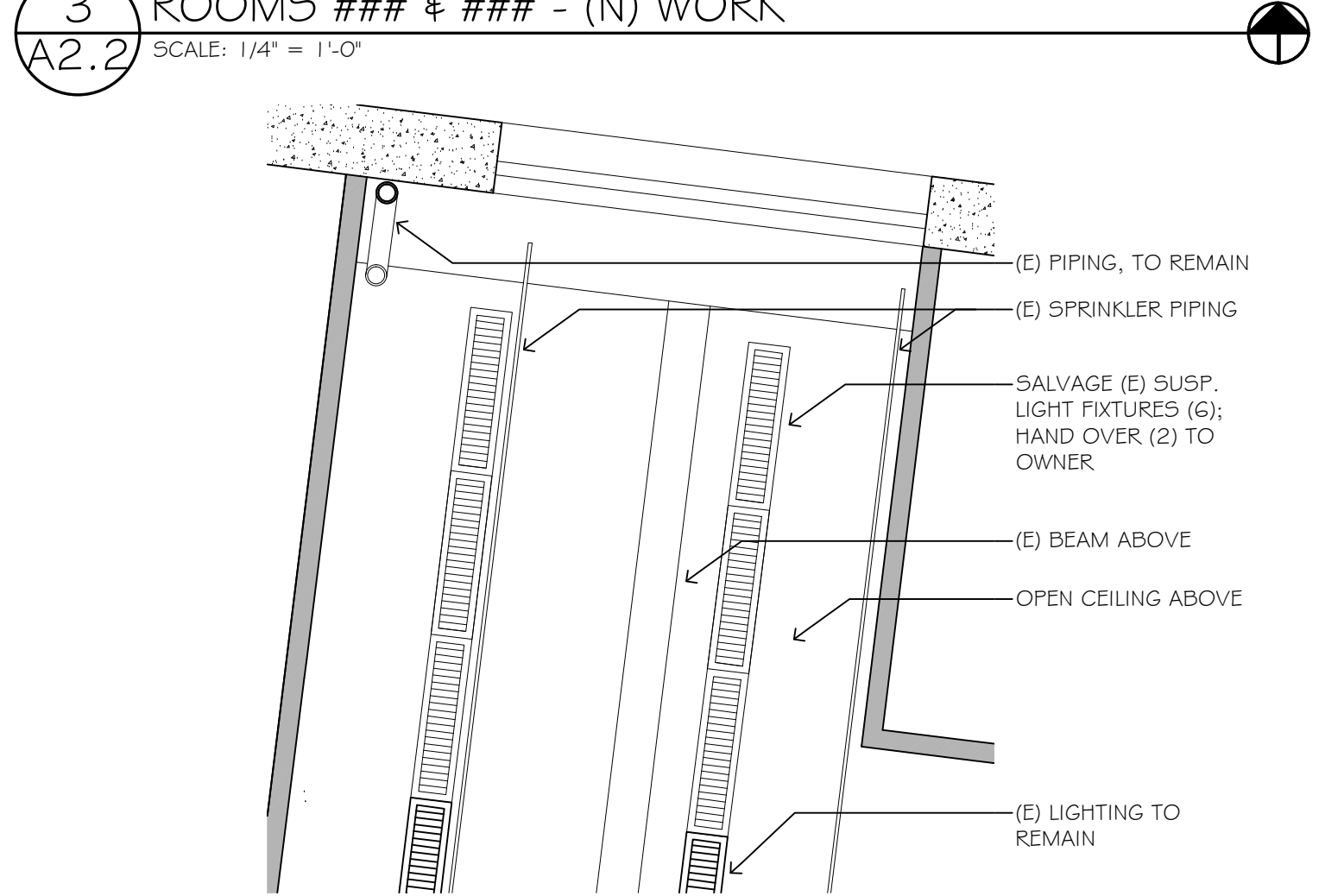
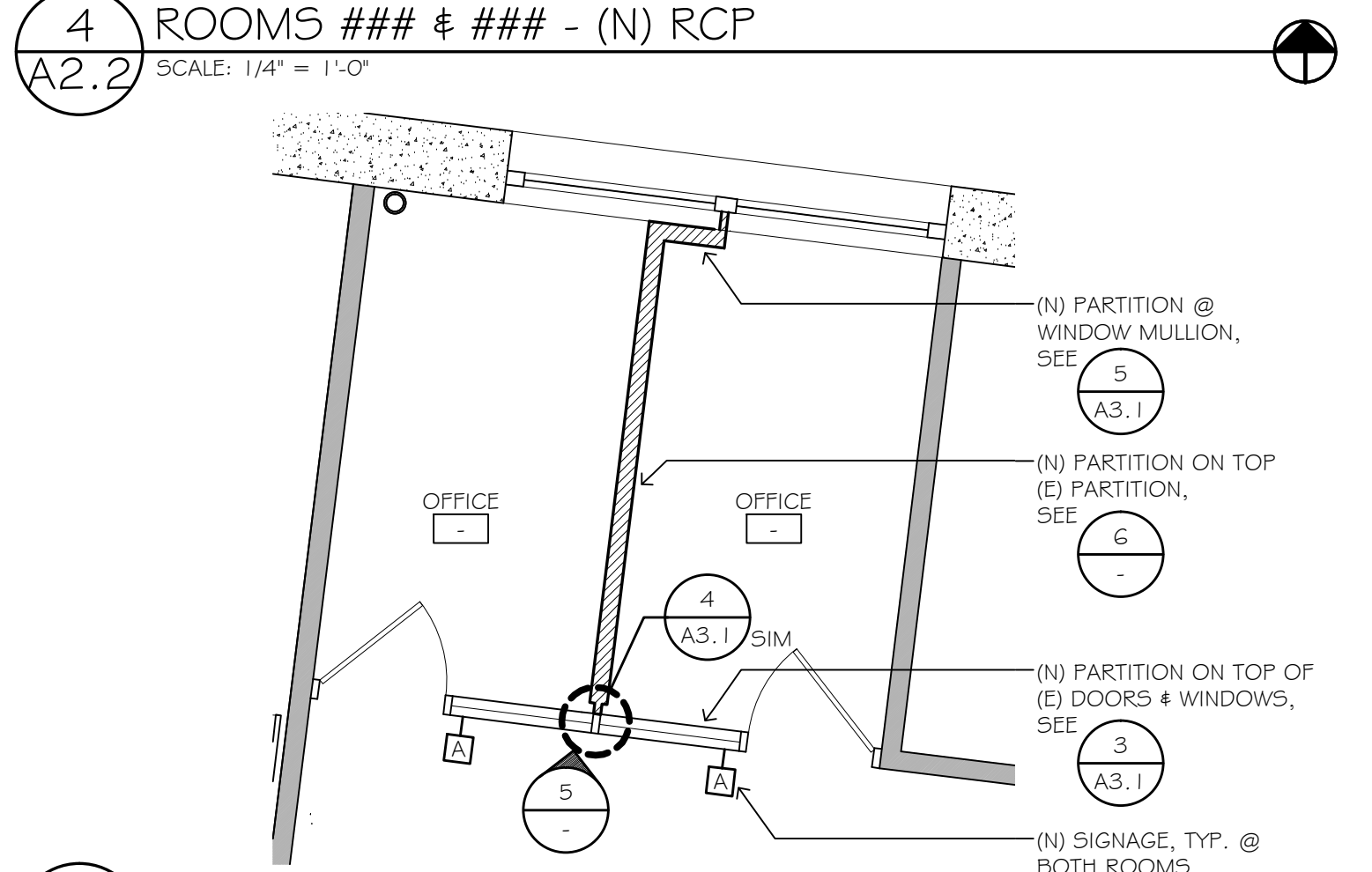
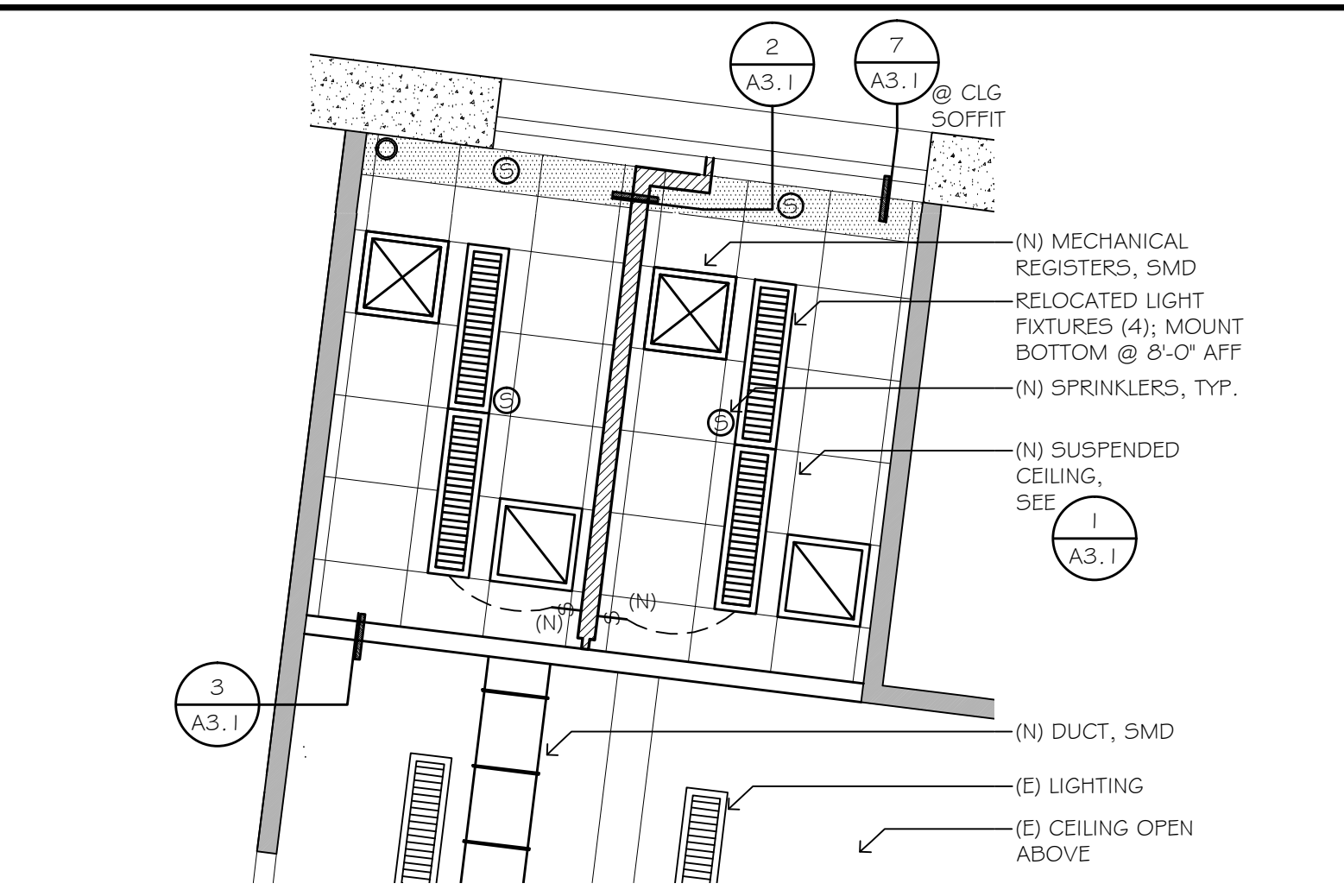
**RCP LEGEND:**



**ACCESSIBILITY CLEARANCES:**



**PROGRESS**  
 NOT FOR CONSTRUCTION  
 February 5, 2018



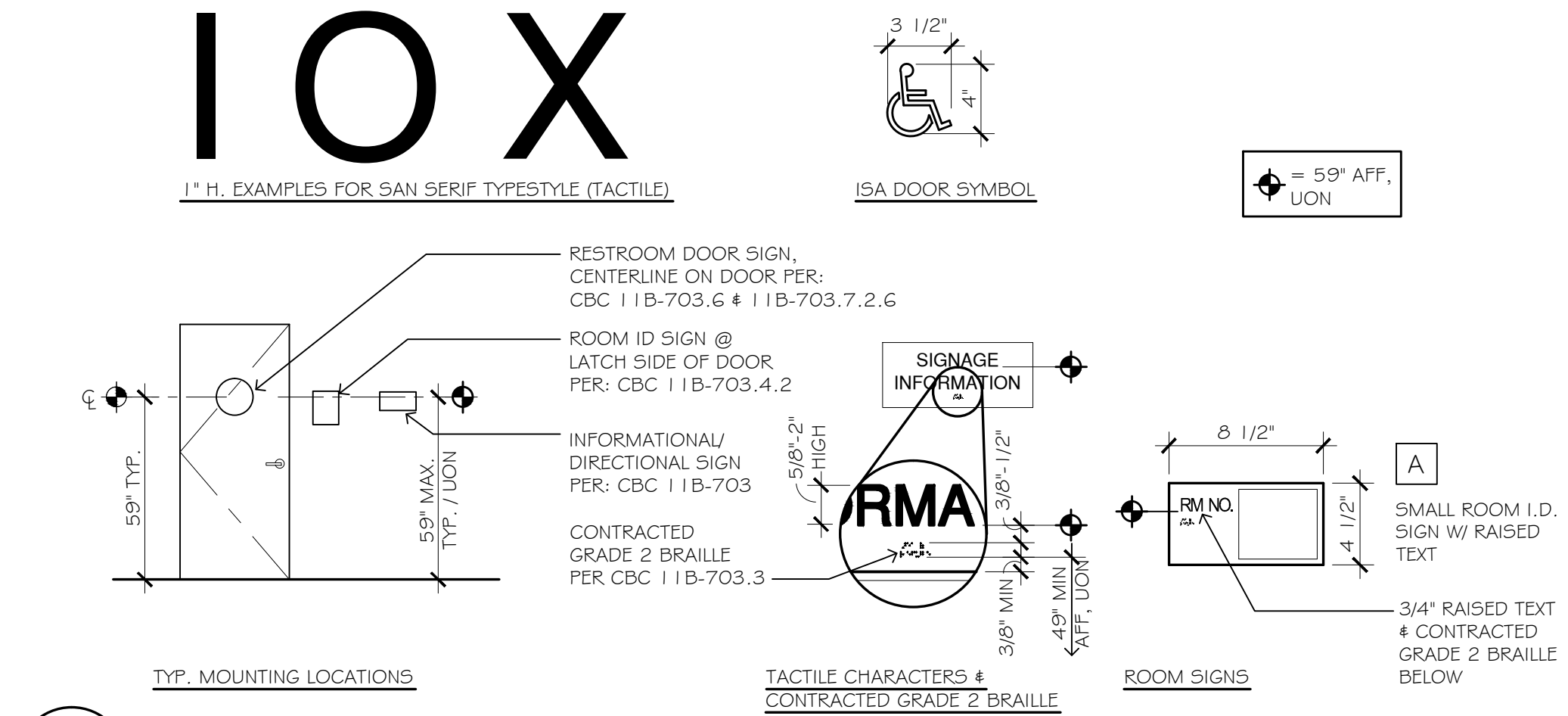
GENERAL NOTES:  
 ALL SIGNAGE (EXCEPT FOR REFLECTIVE PARKING AND TRAFFIC SIGNS) MUST HAVE NON-GLARE BACKGROUNDS AND CHARACTERS. CHARACTERS AND SYMBOLS MUST CONTRAST WITH THEIR BACKGROUND, EITHER LIGHT ON A DARK BACKGROUND OR DARK ON A LIGHT BACKGROUND  
 RAISED CHARACTERS SHALL BE SANS SERIF, UPPERCASE AND 1/32" MIN. ABOVE THEIR BACKGROUND, PER CBC 11B-703.2  
 TOILET FACILITY GEOMETRIC DOOR SIGNAGE SHALL HAVE A MIN. OF 1/8" ROUNDED CORNERS W/ 1/16" MIN. EASED EDGES ON ALL SIDE  
 TEXT SHALL BE IN A HORIZONTAL FORMAT  
 BRAILLE SHALL BE CONTRACTED (GRADE 2) AND CA. SHALL HAVE A DOMED OR ROUNDED SHAPE. THE INDICATION OF UPPERCASE LETTER OR LETTERS SHALL ONLY BE USED BEFORE THE FIRST WORD OF SENTENCES, PROPER NOUNS AND NAMES, INDIVIDUAL LETTERS OF THE ALPHABET, INITIALS AND ACRONYMS  
 BRAILLE SHALL BE POSITIONED BELOW THE CORRESPONDING TEXT IN A HORIZONTAL FORMAT, FLUSH LEFT OR CENTERED. REFER TO CBC, FIGURE 11B-703.3.1 FOR BRAILLE MEASUREMENT  
 SIGNS AND IDENTIFICATION DEVICES SHALL BE FIELD INSPECTED AFTER INSTALLATION AND APPROVED BY THE ENFORCING AGENCY PRIOR TO THE ISSUANCE OF A FINAL CERTIFICATE OF OCCUPANCY PER CHAPTER 1, DIVISION II, SECTION 111, OR FINAL APPROVAL WHERE NO CERTIFICATE OF OCCUPANCY IS ISSUED. THE INSPECTION SHALL INCLUDE, BUT NOT BE LIMITED TO, VERIFICATION THAT BRAILLE DOTS AND CELLS ARE PROPERLY SPACED AND THE SIZE, PROPORTION AND TYPE OF RAISED CHARACTERS ARE IN COMPLIANCE WITH THESE REGULATIONS.

**IOX**  
 1" H. EXAMPLES FOR SAN SERIF TYPESTYLE (TACTILE)

RESTROOM DOOR SIGN, CENTERLINE ON DOOR PER: CBC 11B-703.6 & 11B-703.7.2.6  
 ROOM ID SIGN @ LATCH SIDE OF DOOR PER: CBC 11B-703.4.2  
 INFORMATIONAL/DIRECTIONAL SIGN PER: CBC 11B-703  
 CONTRACTED GRADE 2 BRAILLE PER CBC 11B-703.3

RESTROOM DOOR SIGN, CENTERLINE ON DOOR PER: CBC 11B-703.6 & 11B-703.7.2.6  
 ROOM ID SIGN @ LATCH SIDE OF DOOR PER: CBC 11B-703.4.2  
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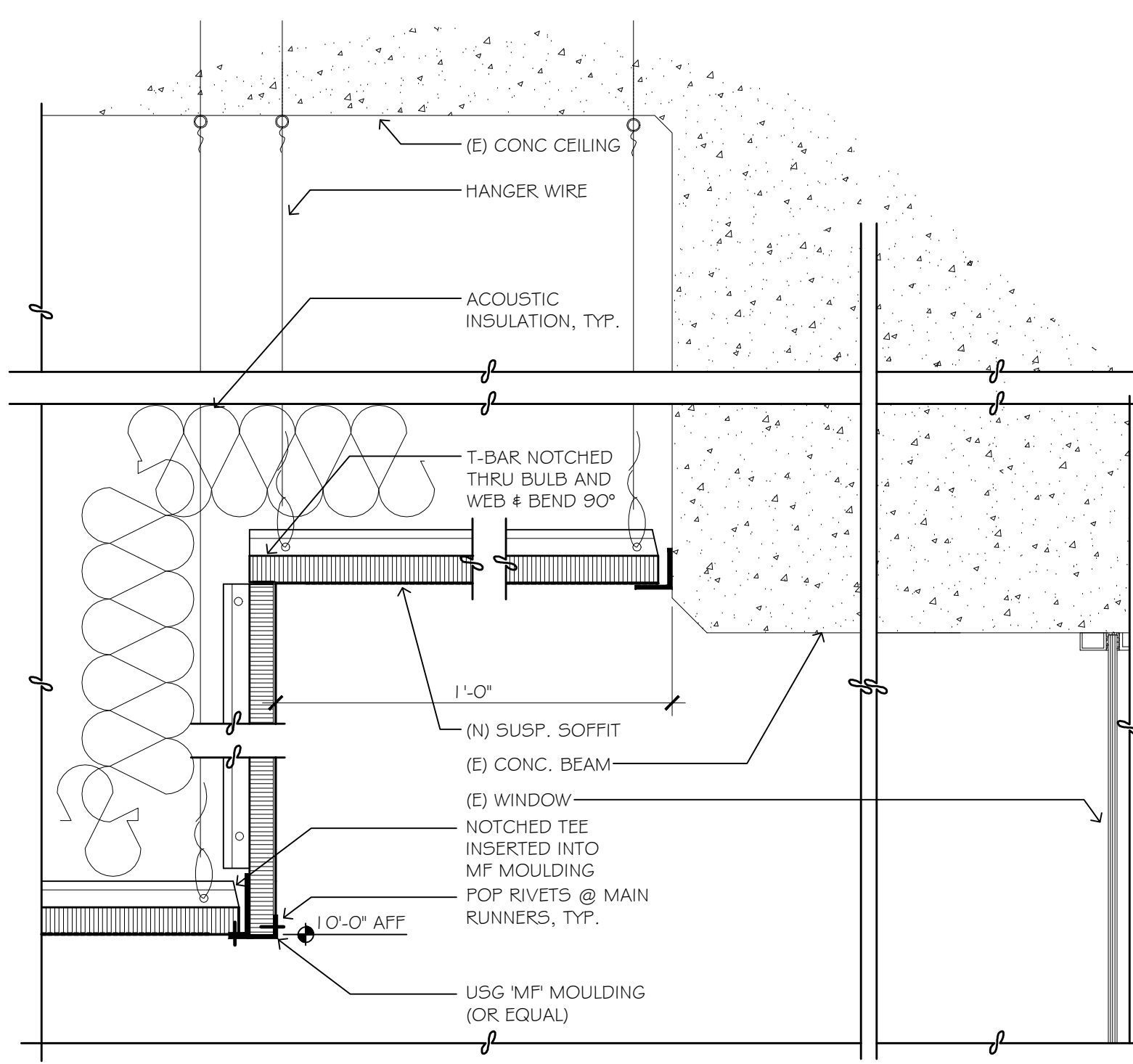
RESTROOM DOOR SIGN, CENTERLINE ON DOOR PER: CBC 11B-703.6 & 11B-703.7.2.6  
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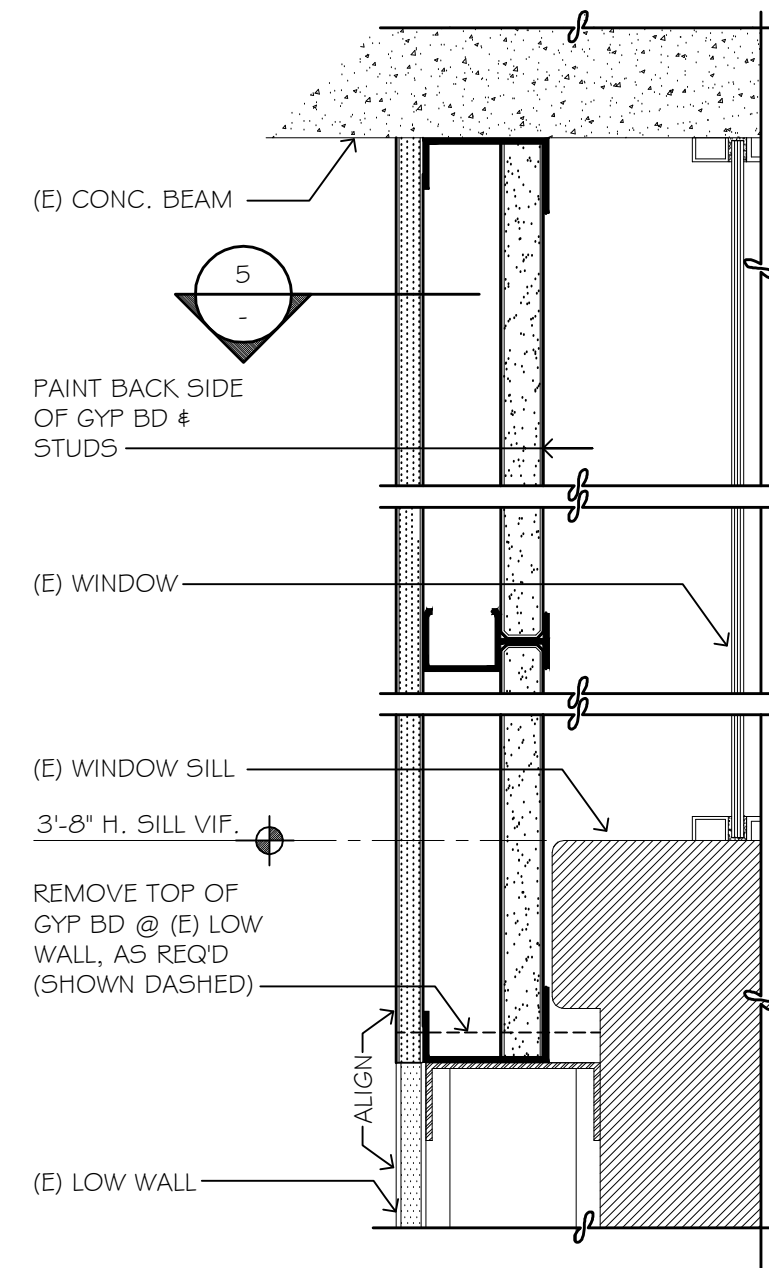
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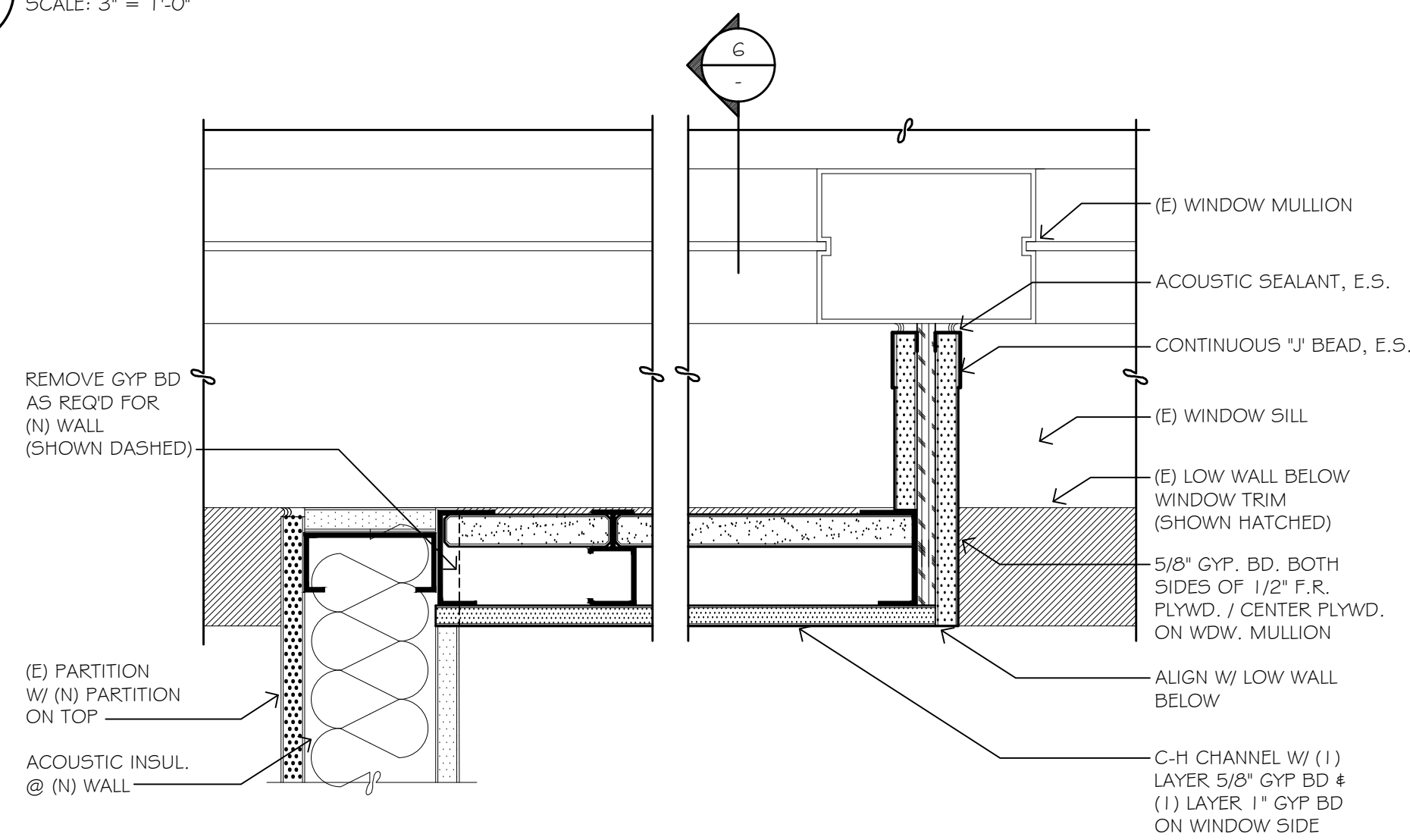
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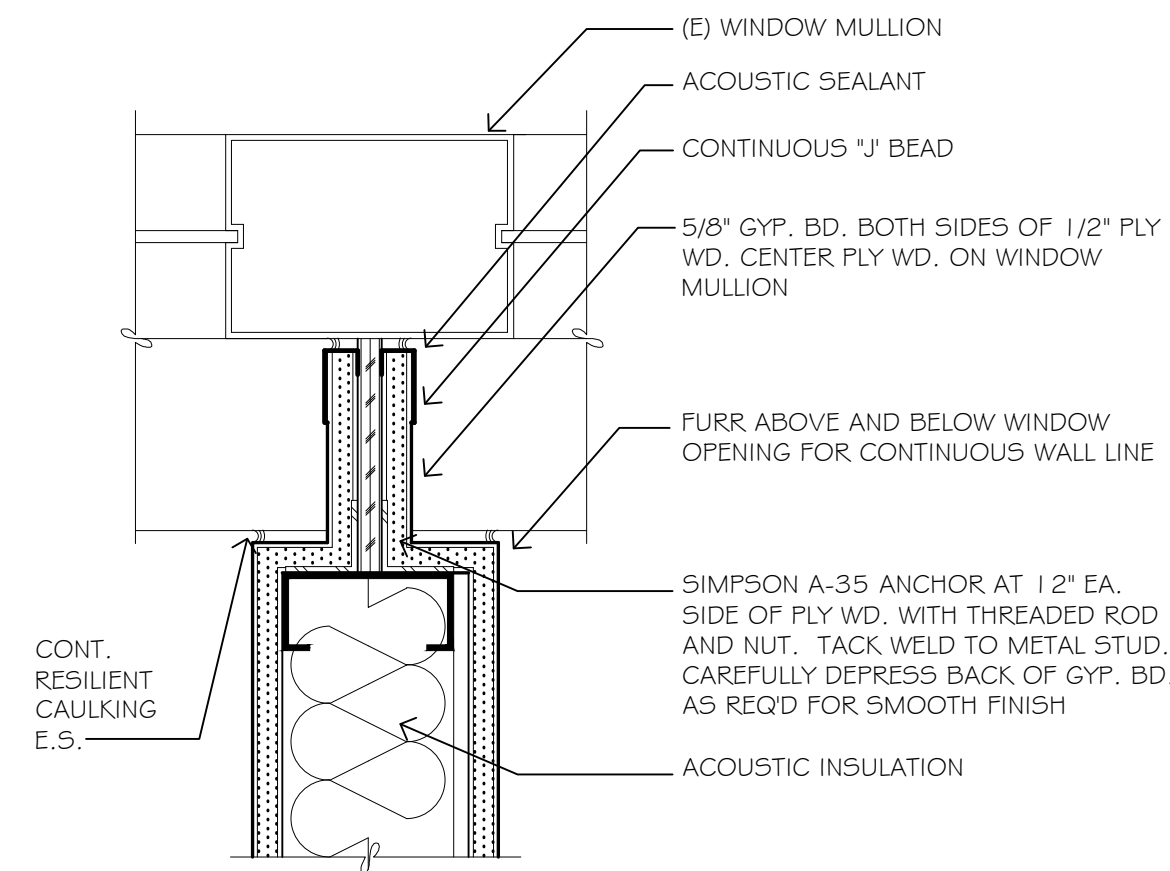
7 (N) CEILING SOFFIT @ (E) CONC. BEAM  
A3.1 SCALE: 3" = 1'-0"



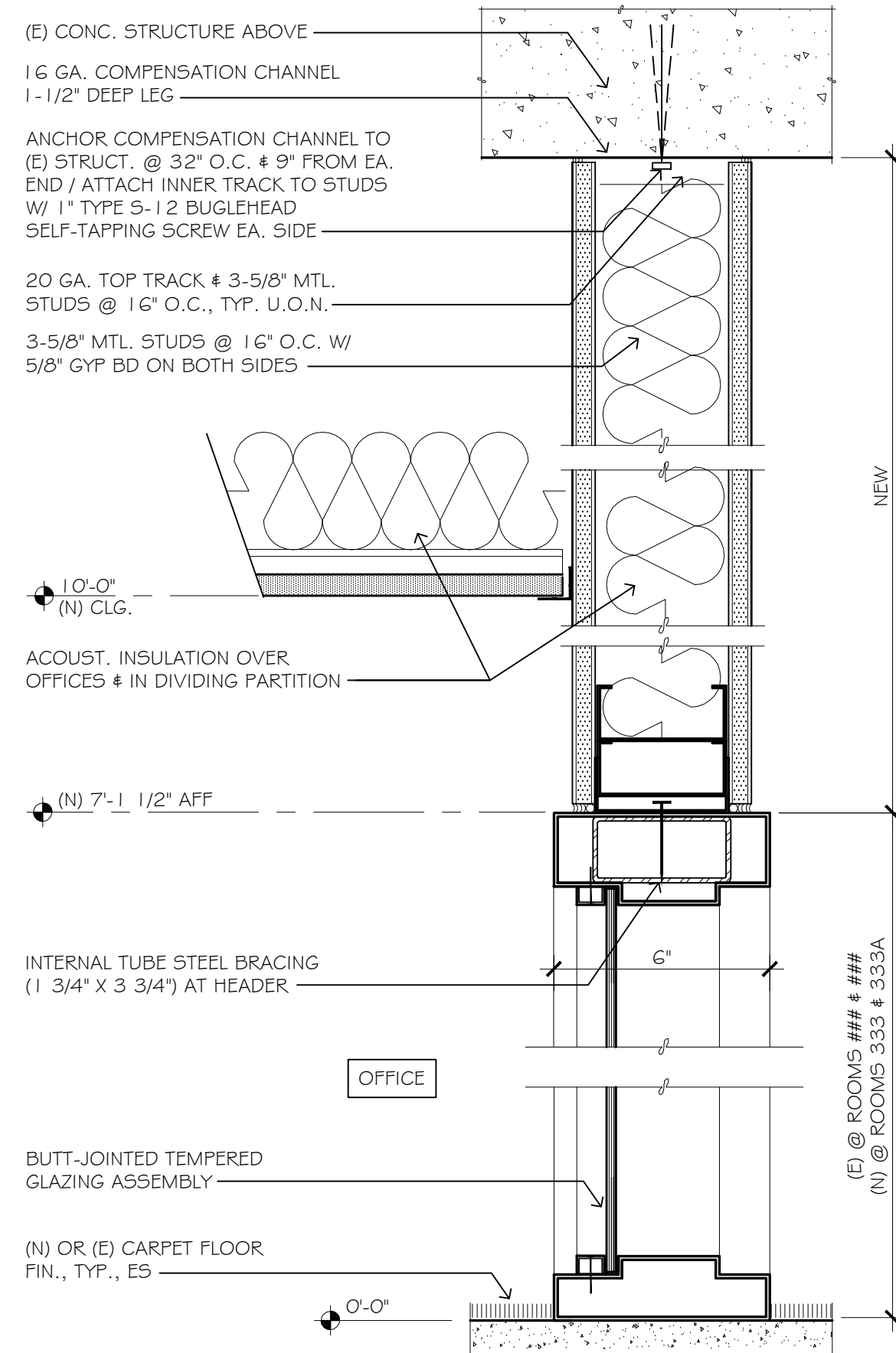
5 (N) INFILL PARTITION @ WINDOW SILL  
A3.1 SCALE: 3" = 1'-0"



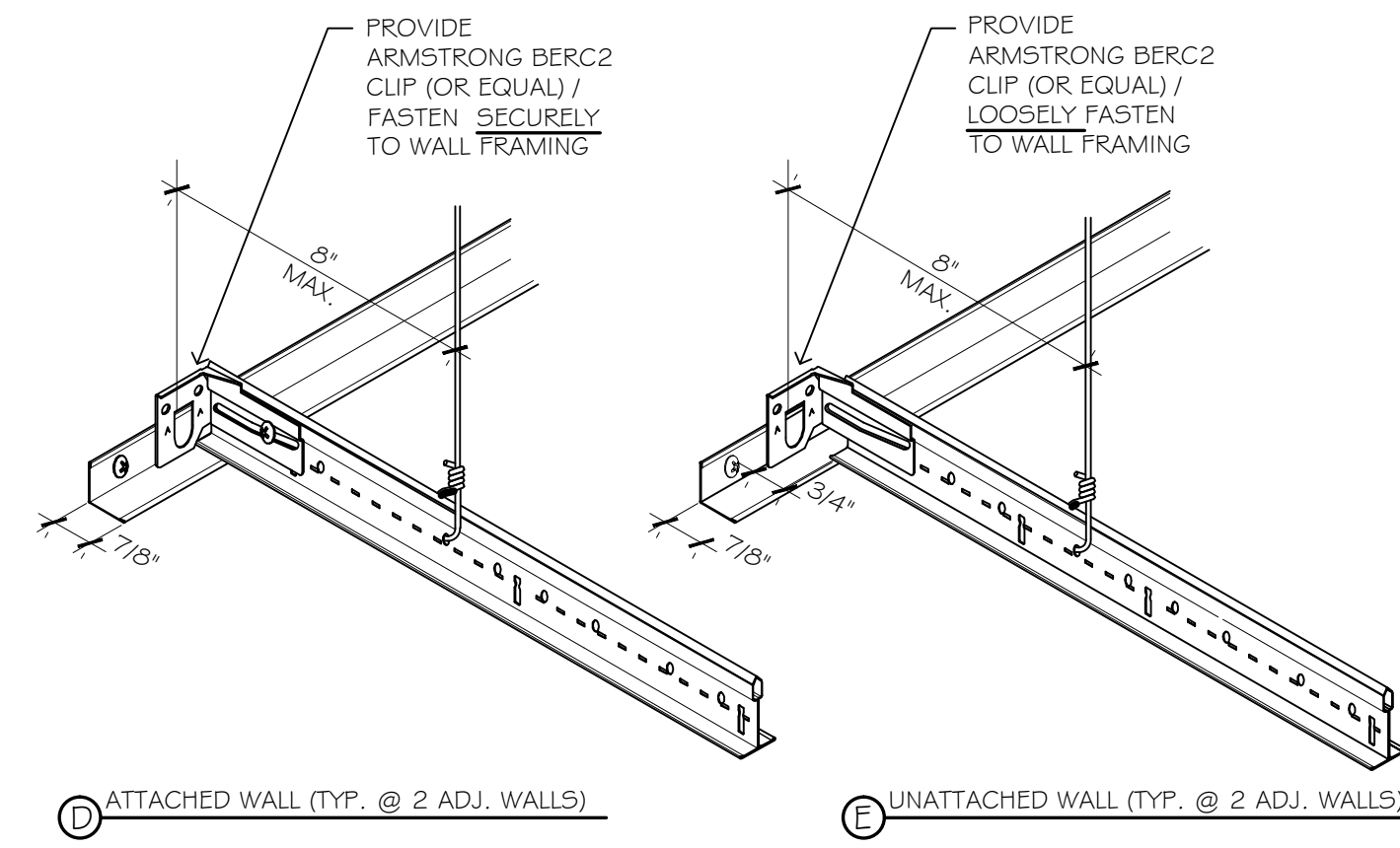
6 (N) PARTITION DETAIL @ WINDOW  
A3.1 SCALE: 3" = 1'-0"



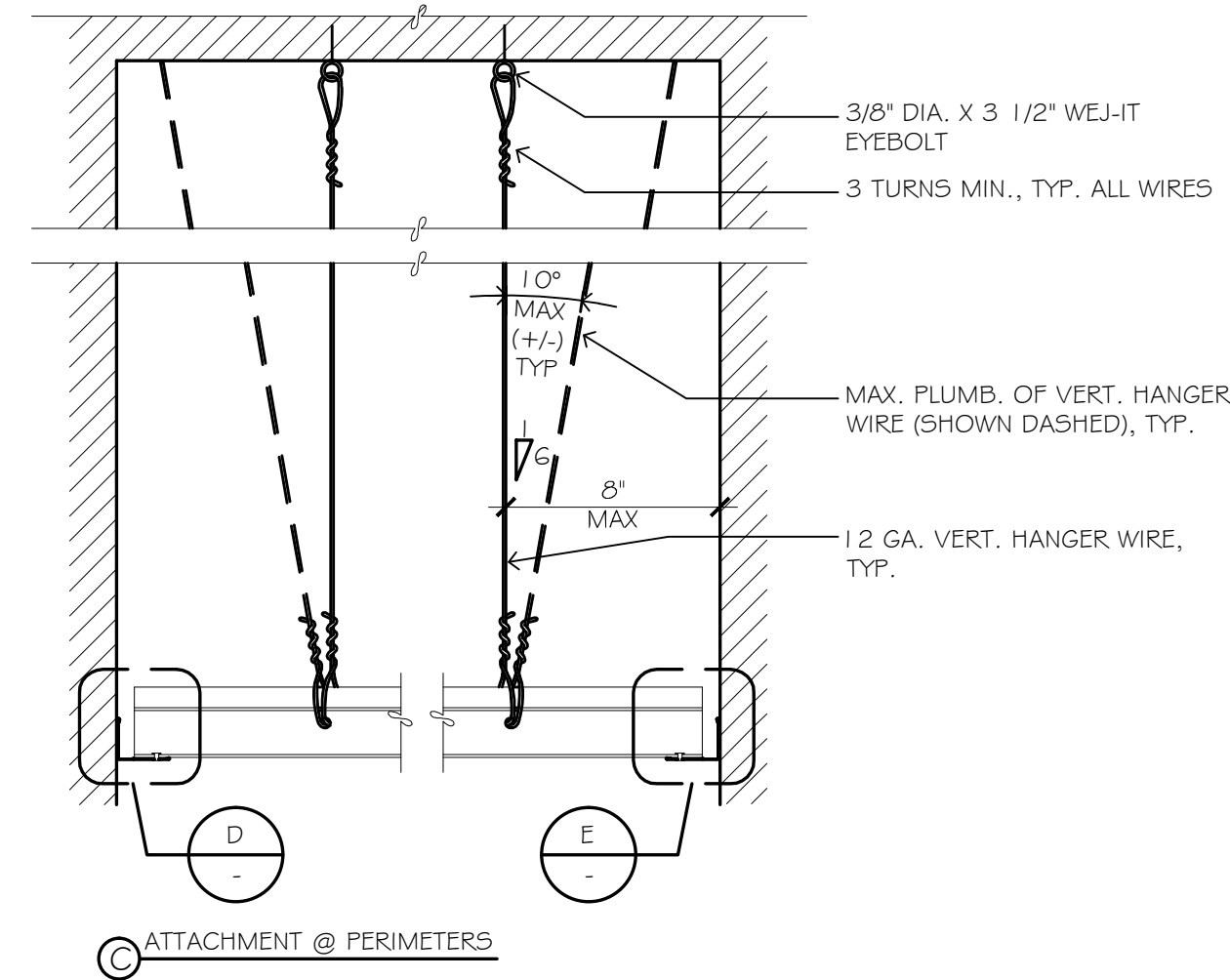
4 (N) WALL TO WINDOW MULLION  
A3.1 SCALE: 3" = 1'-0"



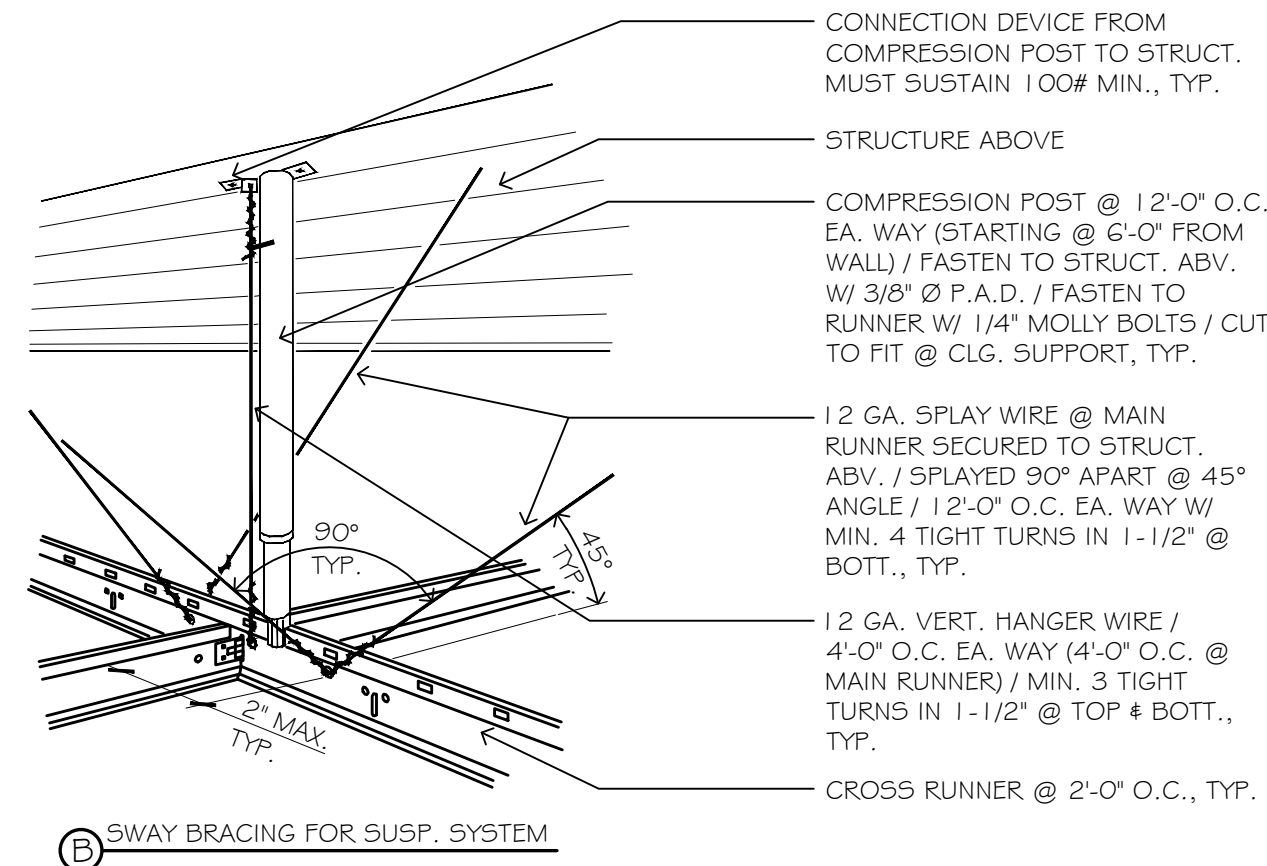
3 (N) PARTITION DETAIL @ (E) PARTITION / WINDOW  
A3.1 SCALE: 3" = 1'-0"



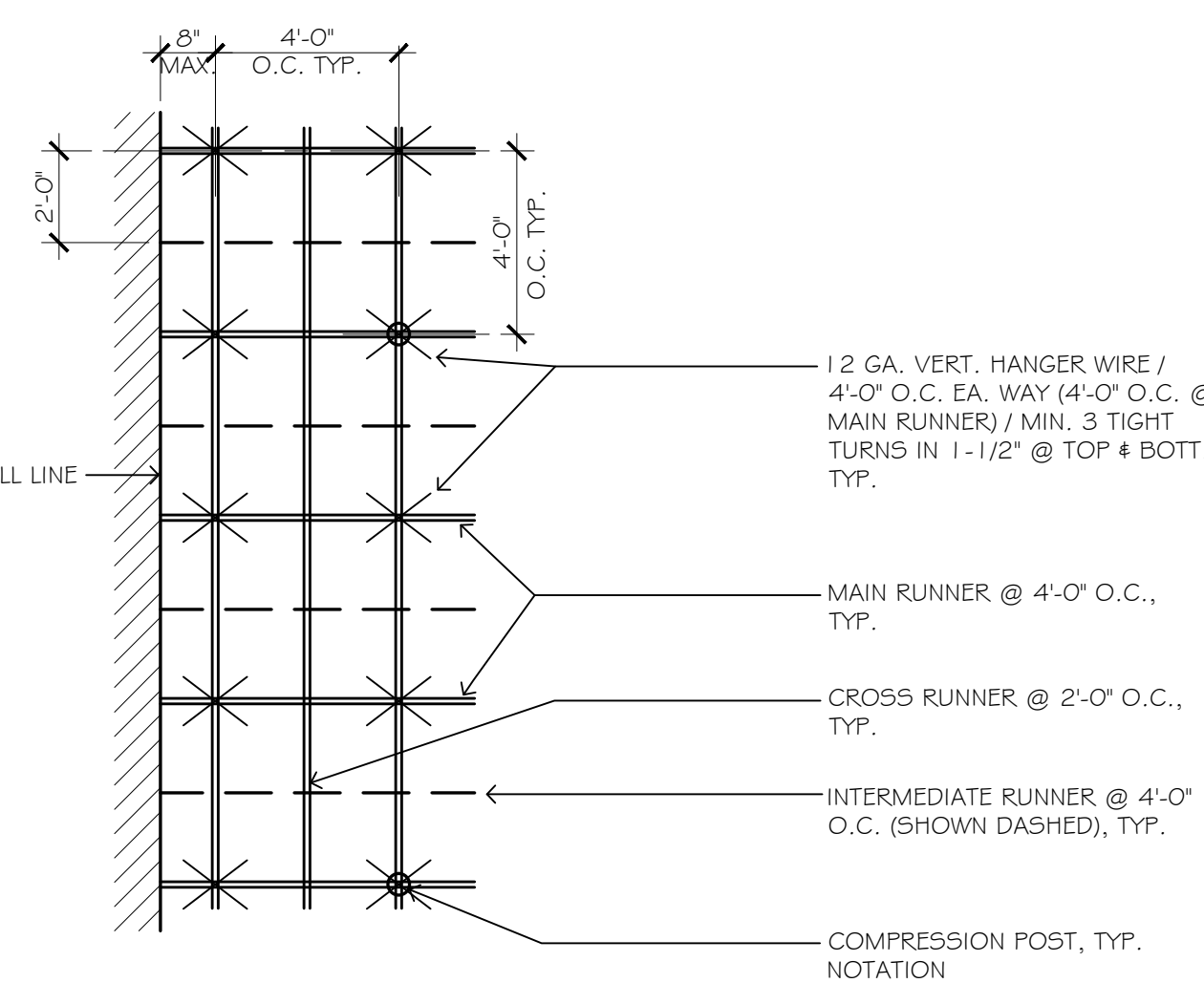
1 TYP. SUSPENDED CEILING SYSTEM  
A3.1 SCALE: 3" = 1'-0"



2 ATTACHMENT @ PERIMETERS



3 SWAY BRACING FOR SUSP. SYSTEM



4 CLG. DIAGRAM

CALIFORNIA STATE FIRE MARSHAL

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REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

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2. HAND OVER UN-USED LIGHT FIXTURES TO OWNER

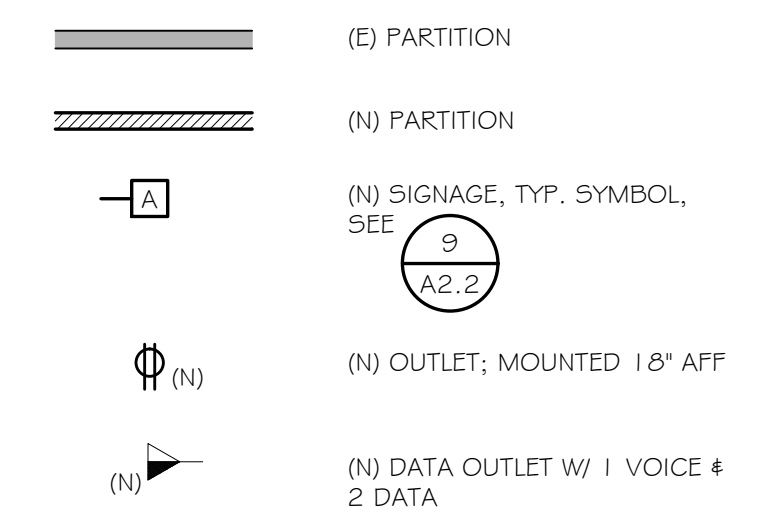
DEMOLITION LEGEND:



FLOOR PLAN NOTES:

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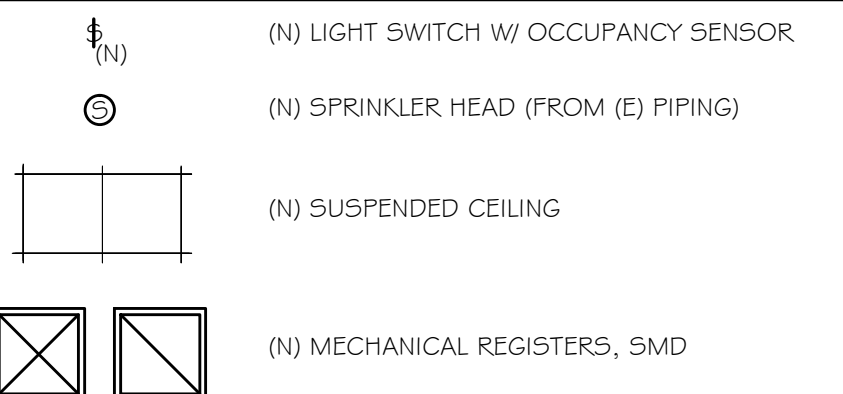
FLOOR PLAN LEGEND:



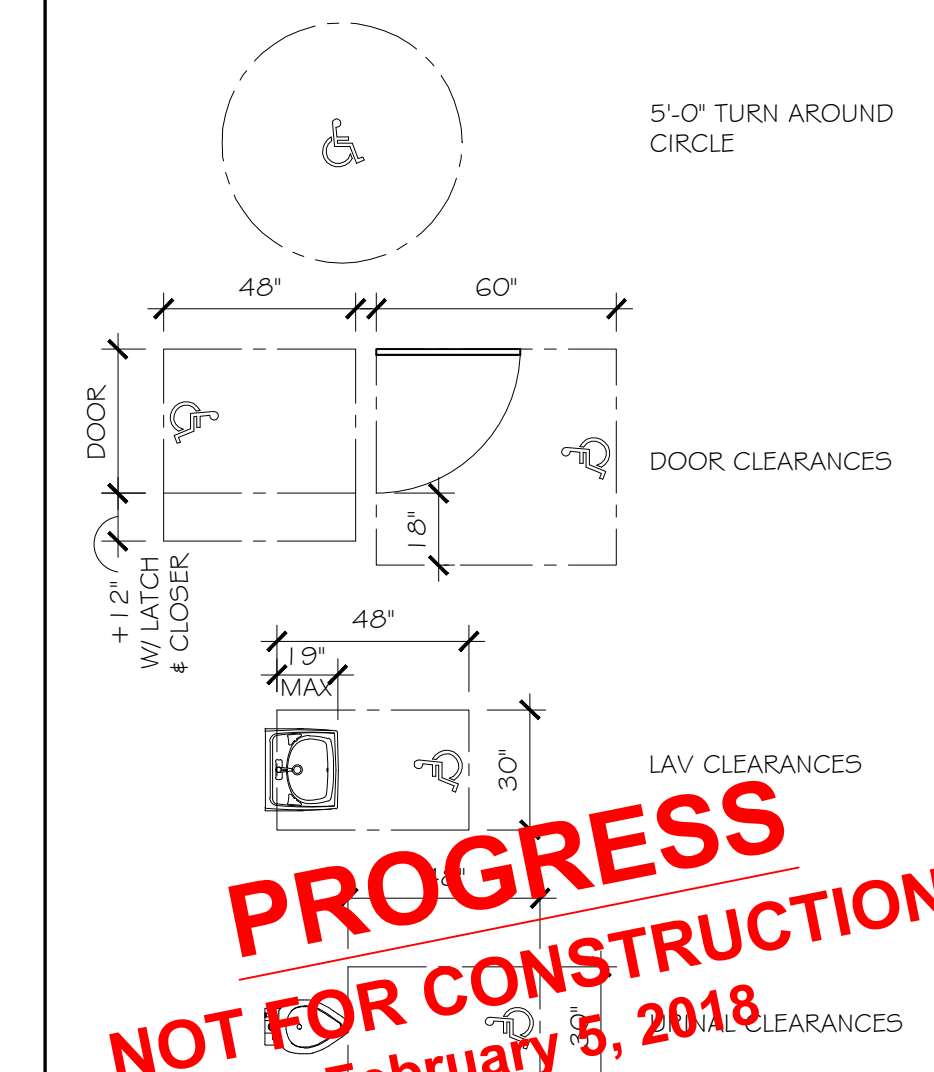
RCP NOTES:

1. PROTECT EXISTING CEILING ELEMENTS TO REMAIN

RCP LEGEND:



ACCESSIBILITY CLEARANCES:



**PROGRESS**  
**NOT FOR CONSTRUCTION**  
February 5, 2018

REVISIONS	BY
80% Progress 01.19.18	BR
90% CDs 02.05.18	BR

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**PROGRESS**

**DETAILS**

Proj. No.: 17408A  
CAAN: 1325

UC Berkeley  
**Cory 333**  
Office Renovation  
Berkeley, CA

DATE: FEBRUARY 2018  
DRAWN BY: BR  
JOB: Cory Rm 333  
SHEET

**A3.1**



**SHORTFORM SPECIFICATIONS:  
Cory Hall: Room 333 Office Renovation**

**DIVISION 1: GENERAL CONDITIONS:** By Owner

**DIVISION 2: DEMOLITION**

1. Quality Assurance:
  - a. Protect existing structures and facilities from damage. Items damaged as a result of demolition operations shall be repaired and replaced at no cost to the Owner
  - b. Perform work so as to provide the least interference and most protection to existing facilities and improvements to remain
2. Demolition and Salvage:
  - a. See Drawings for extent of demolition and salvage work, including floor finishes, light fixtures, sprinkler piping
  - b. Perform demolition work only with authorization from Owner at mutually agreeable times
  - c. Perform demolition as much as possible with small tools
  - d. Items noted to be salvaged and reinstalled shall be removed with caution to avoid damage and to present a like-new appearance after reinstallation, to the maximum extent possible
  - e. Items noted to be salvaged and not reinstalled shall be removed with caution to avoid damage and shall be transmitted to storage area designated by Owners Representative
3. Cutting:
  - a. Cut or drill new openings to correct size as shown or required
  - b. Make new openings neat; approximate profiles shown
  - c. Take care not to damage reinforcing or structural steel to remain
4. Patching:
  - a. Repair or replace any surfaces to remain which become exposed, defaced, or damaged as a result of alterations or demo work at no increase in costs to Owner. Make all such repairs with materials equal in kind and quality to match existing adjacent surfaces
5. Project Conditions:
  - a. Maintain access to existing corridors, stairs and other adjacent or used facilities
  - b. Provide dust barriers, debris containers, removal routes and disposal to protect areas to remain. Provide cleanup services to maintain cleanliness of adjacent spaces from dust caused by demolition work
  - c. Temporary Partitions:
    1. Erect and maintain dustproof partitions and temporary enclosures to limit dust migration and to separate areas from fumes and noise
    2. Provide temporary barricades as required to prevent injury to people and damage to adjacent facilities to remain. Coordinate barricade location with Owner's Representative prior to installation
6. Shut Downs:
  - a. Contractor shall give Construction & Design 12 calendar day advance notice for all utility, fire sprinkler system and fire alarm system shut down requests

**DIVISION 3: CONCRETE**

None

**DIVISION 4: MASONRY**

None

**DIVISION 5: METALS**

None

**DIVISION 6: WOOD AND PLASTICS**

1. Plywood:
  - a. Scope: Provide plywood stiffener at office privacy separator centered on window mullion, as detailed in the Drawings
  - b. Plywood Material:
    1. Fire retardant treated
    2. FSC certified source
    3. Binders: Non-urea formaldehyde
    4. Thickness: As noted on drawings
    5. Finish: Raw

**DIVISION 7: THERMAL AND MOISTURE PROTECTION**

1. Acoustical Insulation:
  - a. Scope: Provide acoustical insulation at the following locations:
    1. At all new partitions between Offices
    2. Above all new acoustical tile ceilings at Offices
  - b. Material: IIG MinWool Group, MinWool-1200 Sound Attenuation Fire Batts; 2.5 pcf density; noncombustible; flame spread/smoke developed: 5/0
    1. Thickness:
      - aa. Partitions: 3"
      - bb. Above Ceilings: 4"
  - c. Installation:
    1. Install per manufacturer's recommendations
    2. Fasteners: Provide all staples, nails and other devices to attach and hold insulation in place
    3. Fit insulation tightly between framing members, at end joints of insulation, and around piping and electrical work. Stagger end joints between studs

**DIVISION 8: DOORS/WINDOWS/GLAZING**

1. Existing Doors and Frames to Remain:
  - a. Scope:
    1. Touch up finishes at doors and frames for "like-new" appearance
    2. Adjust doors and hardware for smooth operation
2. New Wood Doors:
  - a. Scope: Provide new wood doors at new Alcove 33 Offices
  - b. Acceptable wood door manufacturers
    1. Marshfield Door Systems, Inc. (Basis of Design)
    2. Oregon Door Company
    3. Or approved equal
  - c. Wood Doors:
    1. Marshfield Signature Door Series: Environmental Class Particleboard Core
    2. Door sizes & thickness: As noted in Drawings
    3. Faces: Wood veneer, plain sliced Red Oak
      - aa. Finish: Enviroclad UV stain finish; clear
    4. Stiles at Wood Veneer Face Doors: Veneer band to match face
    5. Hardware: Doors shall be factory prepared to receive new hardware as specified below
  - d. Installation:
    1. Coordinate installation of doors with installation of frames and hardware
    2. Install doors plumb and square
    3. Hang doors to obtain free swinging operation without binding, sticking or sagging
    4. Where installation requires on-site cutting, reseal cut surfaces

5. Touch up factory finishes as required assuring complete integrity of finish system
6. Adjust doors for correct closing and latching
- e. Submittals:
  1. Shop drawings and catalog cuts for all new doors
  2. Provide 2 finish samples of wood veneer door face material
3. Aluminum Frame/Sidelight Assemblies:
  - a. Acceptable manufacturers:
    1. Built Rite Frame System, as manufactured by DWS, Inc.; (510) 797-4584
    2. Wilson Partitions "Snap-On Trim Profile, Series 200"
    3. Or approved equal
  - b. Materials:
    1. Aluminum frames and frame components manufactured from 6063-T5 alloy extruded aluminum conforming to ASTM B221
    2. Finish: Prefinished, manufacturer's standard dark bronze
  - c. Fabrication:
    1. Aluminum Frames:
      - aa. Depth: 4 7/8", with 2" x 3/8" snap-on aluminum casings, mitered cut
      - bb. Frames shall be "knock-down" type, with notched header
    2. Glazing: Clear tempered glass as specified in Glazing section below
  - d. Coordinate installation of frames with installation of new wood doors and hardware
  - e. Submittals: Provide shop drawings and catalog cuts for new aluminum interior window frames
4. Door Hardware
  - a. Scope: Provide hardware at new door
  - b. Finish: Satin Chromium, 626, U.O.N.
  - c. Keying: Contact Owner for keying requirements
  - d. Cylinders: 7-Pin, Small Format Interchangeable Core (SFIC) cylinders required at all locksets (UC Lockshop standard)
  - e. Hardware Groups:
 

Group A (Single door / office function / non-rated assembly)			
Hinges	3	McKinney	T4B3386, 4.5 x 4.5
Mortise Lockset	1	Schlage	L9050BD-06 x 626
Kickplate (push-side)	1	Rockwood	K1050, B3E, 10"x 34", US32D316
Wall Bumper	1	Trimco	1271TB
Weatherstrip	1 set	Pemko	S88BL
  - f. Submittal: Catalog cuts for all new door hardware
5. Glazing:
  - a. Scope: Clear tempered glazing at sidelights
  - b. Tempered Glazing:
    1. Glazing to be clear, 5/16" thick, tempered glass, with polished edges; impact safety rated
    2. Labeling: Each piece of safety glazing shall be permanently labeled with a ceramic frit bearing the product and manufacturer's name, testing laboratory, rating and safety standards. Glazing without label will be rejected
6. Decorative/Privacy Window Film:
  - a. Scope: Apply to bottom portion of new sidelights, at locations shown on Drawings
  - b. Window Film: 3M Window Films, or equal
    1. Type: Fasara Glass Finishes, polyester transparent/opaque privacy glazing film
    2. Product Code: Mat Crystal
    3. Product Family: Frost/ Mat
  4. Shading Coefficient %: 0.94
  5. Visible Light Reflectance: 9%
  6. Visible Light Transmission: 84%
  - c. Installation: Comply with manufacturer's product data, including technical bulletins, product catalog installation instructions, and product carton instructions for installation
  - d. Submittals: Provide product data and manufacturer's installation instructions for decorative window film

5. Painting
  - a. Scope: Provide new paint finish at all new, existing and patched gypsum board partitions within the area of work
  - b. All interior paints and coatings used shall be certified according to the latest "Green Seal Environmental Standard for Paints" (GS-11), Green Seal, Inc. (<http://www.greenseal.org/index.cfm>) and shall satisfy requirements of the California Air Resources Board (CARB). Acceptable manufacturers include Benjamin Moore "Eco-Spec WB Interior Latex Paint"; Sherwin-Williams "Harmony Interior Acrylic Latex"; Dunn-Edwards "Ecoshield" or "Enso"; or approved equal
  - c. Indoor Air Quality:
    1. VOC limits for interior paints and coatings are defined by the latest GS- 11 as follows:
      - aa. Interior Paints and Primers: Non-flat: 150, Flat: 50
  - d. Materials selected for coating systems for each type surface shall be the product of a single manufacturer:
    1. Thinner: As recommended by each manufacturer for its respective product
    2. Linseed Oil: Pure first quality, conforming to Federal Specification TT-0-364 or ASTM 0260
    3. Colors and Finishes:
      - aa. Partitions: Match existing, verify in field
      - bb. Patching adj. to work area: Match existing, verify in field
  - e. Interior Paint Systems: Omit first coat at previously painted surfaces
    1. Finish on Gypsum Board
      - 1 coat Wall Board Primer
      - 1 coat Pigmented PVA Sealer
      - 2 coats Acrylic Latex Enamel
  - f. Number of coats scheduled is minimum requirement; provide additional finish coats as required to produce full, even coverage. DO NOT thin paint.
  - g. Protect all surfaces not receiving paint from damage due to painting operations
  - h. Submittals:
    1. Product data for all painting materials
    2. Brushouts of each color/finish for approval and/or adjustment by Owner's Representative
4. Suspended Acoustical Tile Ceilings:
  - a. Scope: Provide new suspended acoustical tile ceiling assemblies as shown on the Drawings and specified below
  - b. Suspension System:
    1. Products: Same as Armstrong World Industries, Inc., "Silhouette XL Bolt Slot System" (25% re-cycle content), 24" x 24" module size, or approved equal
    2. Comply with ASTM C635. Shall be ICBO approved for Seismic Zone 4 compliance
    3. Structural Classification: Intermediate duty
    4. Edge Molding: Electro-galvanized cold-rolled steel angle, same as Armstrong No. 7875 "Shadow Molding" with 1/2" reveal, with manufacturer's standard inside and outside corners
    5. Splices, End Connections, Clips and Other Accessories
      - aa. Electro-galvanized steel
      - bb. Design to provide strong, rigid, lock-type connections preventing movement or displacement of joined components and permitting disassembly without damage to component parts
      - cc. Seismic suspension clips: Armstrong World Industries, Inc. BERC2 Clips, or equal, as shown on Drawings
    6. Rough Suspension:
      - aa. Hanger Wire: Minimum 12-gage, galvanized, soft-annealed, mild steel wire
      - bb. Wire Ties: 18-gage, galvanized, annealed steel wire
    7. Install suspension system in accordance with manufacturer's recommendations for seismic installations, compatible with perimeter shadow molding
    8. Finish: Baked polyester paint, "White Aluminum" color
  - c. Acoustical Units:
    1. Suspended Ceiling Assemblies: Armstrong World Industries, Inc., "Cirrus Tile and Lay-In," Item No. 538, or approved equal
      - aa. Size: 24 inches x 24 inches x 7/8 inch, "Beveled Tegular 9/16 inch" edge
      - bb. NRC Range: 0.70
      - cc. CAC Range: 38
      - dd. Color: White
      - ee. Fire Performance: Class A (UL)
      - ff. Recyclable Content: 82%
    2. Extra Stock: One box of each product specified, delivered to Owner's Representative
  - d. Submittal: Material samples and catalog cuts for suspension system components and acoustical units
5. Carpet:
  - a. Carpet Tile:
    1. Scope: Provide new carpet tile flooring where shown on the Drawings
    2. New carpet tile:
      - aa. Manufacturer: Shaw Contract Group, "REWOVEN" Collection
      - bb. Style names/ numbers: TRACE / 5T005
      - cc. Color name: Underground
      - ee. Color number: 83505
      - ff. Yarn: Eco solution Q Nylon
      - gg. Secondary backing: ecoworx® tile with recycled content
      - hh. Construction: Multi-level pattern cut/loop
      - ii. Gauge: 1/10
      - jj. Shaw Green Edge Certified
      - kk. Pile height: 1/4"
  - b. Test Requirement: Provide evidence that carpet tile materials shall comply with the requirements of ASTM Standard E 648 and have a specific optical density smoke rating not to exceed 450 per ASTM E 662
  - c. Installation:
    1. Direct glue-down, per manufacturer's recommendations, using low VOC adhesive, OR Shaw Contract Group "LokDots" pressure sensitive, odor-free carpet tile installation system
    2. Pattern: Monolithic
    3. Carpet shall fit neatly around all corners or other obstructions
  - d. Extra Stock: Provide to Owner's representative one carton extra stock of each type of carpet tile used
  - e. Submit 2 samples of carpet tile materials for approval by Owner's Representative
6. Resilient Base:
  - a. Scope:
    1. Provide new resilient base at new walls
    2. Patch resilient base at existing walls disturbed by the Work

**DIVISION 9: FINISHES**

1. Metal Support Systems:
  - a. Scope: Provide new metal stud framed partitions and infill walls as shown on Drawings
  - b. Floor and Ceiling Tracks:
    1. Cold-formed galvanized steel
    2. Minimum Thickness: Gauge to equal or be heavier than stud used
    3. Width: Acceptable stud manufacturer's regular type or proper width for stud specified
    4. Shapes:
      - aa. Standard partitions: Steel C-runner, formed to hold studs securely in place
      - bb. Shaft wall (at partition in front of existing window): 2 1/2" J-runners
  - c. Prefabricated Steel Studs: Comply with manufacturer's recommendations for span, length, and height
    1. Cold-formed galvanized steel, sizes shown on Drawings
    2. Thickness: 20 gauge (0.0346") minimum, 18 gauge (0.0451") minimum at 15'-4" high partitions or higher
    3. Shapes:
      - aa. Standard partitions: Roll-formed 3-5/8" C-channel with punched openings along web and knurled flanges
      - bb. Shaft wall (at partition in front of existing window): 2 1/2" C-H steel studs
  - d. Channels/blocking: Cold-rolled galvanized steel
    1. Thickness: 18 gauge (0.0451"), minimum
    2. Minimum Weight Per Lineal Foot
      - aa. Depth 3/4 Inch: 0.30 pounds
      - bb. Depth 1-1/2 Inch: 1.12 pounds
  - e. Stiffeners: 3/4 inch
  - f. Attach studs to floor and ceiling track by method recommended by stud manufacturer
  - g. Resilient Sound Isolation Clips:
    1. Product: PAC International, Inc., Model RSIC-1 Clip
    2. Install in accordance with manufacturer's recommendations
  - h. Submittal: Catalog cuts for all metal framing components and resilient sound isolation clips. Submit only those products proposed for use in the project
2. Gypsum Board:
  - a. Scope:
    1. New and patched walls within the remodeled areas
    2. Patch (e) wall finishes where partitions are opened for installation of new mechanical work
  - b. Materials: As manufactured by U.S. Gypsum Company, National Gypsum or equal
    1. ASTM C 1396 complying with requirements of ASTM C36
    2. Products:
      - aa. Standard partitions: Thickness: 5/8 inch, Type X, Gypsum Board
      - bb. Shaft wall areas: 1" Gypsum Liner Panel plus 5/8 inch, Type X, Gypsum Board
    3. Edges: Tapered and rounded
    4. Surface texture: Smooth, Level 5
    5. Joint Tape and Compound: Vinyl, dry or premixed joint compound, applied in two coats to joints and screw heads; paper tape, 2 in. wide, embedded in first layer of

**CALIFORNIA STATE FIRE MARSHAL**

- Approved
- Approved as noted (No resubmittal required)
- Make corrections noted (No resubmittal required)
- Not approved (Revise and resubmit)
- Not reviewed (Insufficient data submitted)

APPROVAL OF THIS PLAN DOES NOT AUTHORIZE OR APPROVE ANY OMISSION OR DEVIATION FROM APPLICABLE REGULATIONS. FINAL APPROVAL IS SUBJECT TO FIELD INSPECTIONS. ONE SET OF APPROVED PLANS SHALL BE AVAILABLE ON THE PROJECT SITE AT THE TIME OF INSPECTION.

REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

REVISIONS	BY
80% Progress 01.19.18	BR
90% CDs 02.05.18	BR

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[shafferarchitects.com](http://shafferarchitects.com)

**PROGRESS**

**SHORT-FORM SPECIFICATIONS - 1**

UC Berkeley  
**Cory 333**  
 Office Renovation  
 Berkeley, CA  
 Proj. No.: 17408A  
 CAAN: 1325

DATE	FEBRUARY 2018
DRAWN BY	BR
JOB	Cory Rm 333
SHEET	A4.1

**PROGRESS  
NOT FOR CONSTRUCTION**



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REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

REVISIONS	BY
80% Progress 01.19.18	BR
90% CDs 02.05.18	BR

- b. Material:
  1. Manufacturer: Burke Flooring "BurkeBase" rubber base, Type TS, or equal
  2. Type: Straight/toeless
  3. Color: Match existing, verify in field"
- c. Installation: Adhesive; using type and brands of water-resistant, no or low-VOC adhesive as recommended by manufacturer of resilient base material for conditions of installation
- d. Submittal: Submit 2 samples of resilient base materials for approval by Owner's Representative

**DIVISION 10: SPECIALTIES**

- 1. Identifying Devices (Signage)
  - a. Scope: Signage shown on the Drawings shall be provided and installed by Owner
  - b. Signs for Accessible Access shall comply with California Code of Regulations, Title 24, Part 2 (State Building Code) and ADA requirements
  - c. Products:
    1. Manufacturer: Priority Architectural Graphics, San Francisco CA, or equal
    2. Substrate Material: Acrylic based substrate, 1/8" thickness, with matte, non-glare finish. Clear non-glare front layer with an integrated color back layer
    3. Tactile Text: Acrylic based applique, 1/32" matte non-glare sheet, ADA compliant
      - aa. Font: Arial, all caps, unless otherwise noted
      - bb. Height: As noted in Signage Schedule
      - cc. Color: Black
    4. Braille: California Grade 2 braille, clear, 0.060" diameter bead braille, pressure fit into CNC milled holes
  - d. Signage Types:
    1. Type A / Room I.D. Sign:
      - aa. New signs to match existing room I.D. signage at the adjacent rooms, verify in field
      - bb. Sign panel to have tactile letters and California Grade 2 Braille dots
  - e. Confirm text of all signage with Owner's Representative
  - f. Signage to be adhesive applied to glazing in accordance with manufacturer's recommendations. Signage applied to glazing shall have matching back panel at opposite side of glass to conceal adhesive attachment
  - g. Provide Shop Drawings for approval by Owner's Representative before fabrication

**DIVISION 11: EQUIPMENT AND APPLIANCES**

None

**DIVISION 12: FURNISHINGS**

Note: All Furnishings by others

- 1. Window Coverings:
  - a. Scope: Provide bottom-up window blinds in offices within area of work
  - b. Products:
    1. Bottom-up Blinds:
      - aa. Manufacturer: Levelor Window Treatment Systems, Riviera Series, or approved equal
      - bb. Louvers: Aluminum, Riviera 1", DustGuard, Color: 860 Mercury
      - cc. Tilt Operation: Manual with wand, control located on most accessible side of each blind
      - dd. Valence: Match color of louvers
      - ee. Mounting: Bottom-up operation, with height of blind in full extended position aligned with intermediate window mullion, as shown on the Drawings. Field verify sizes of all blinds and confirm mounting and operation requirements with Owner's Representative before fabrication
  - c. Submittals:
    1. Submit two samples of blind slat material illustrating finish and color
    2. Submit shop drawings of typical bottom-up blind installation methods

**DIVISION 13: SPECIAL CONSTRUCTION**

None

**DIVISION 14: CONVEYING SYSTEMS**

None

**DIVISION 15: MECHANICAL / PLUMBING**

- 1. Mechanical System Modifications:
  - a. Provide mechanical work within the remodeled areas, as shown and specified on the Mechanical Drawings
  - b. See Division 2 for system shut-down notification requirements
- 2. Fire Sprinkler System Modifications:
  - a. Provide design-build modifications to the fire sprinkler system within the limits of Work areas, as shown and specified on the Fire Protection Drawings
  - b. Fire sprinkler drawings, calculations and product data, prepared and assembled by a C16 licensed contractor, shall be submitted to the Campus Fire Marshal for review and approval before proceeding with the work
  - c. See Division 2 for system shut-down notification requirements, if necessary

**DIVISION 16: ELECTRICAL**

- 1. Electrical System Modifications:
  - a. Scope:
    1. Provide Design/Build electrical system services within the remodeled areas, in accordance with the power, data, lighting, and switching layouts shown on the Drawings. New work shall comply with all current applicable codes and regulations
    2. All devices and installation techniques are to meet Campus Construction Design [http://realestate.berkeley.edu/sites/default/files/uc\\_berkeley\\_real\\_estate\\_campus\\_design\\_standards.pdf](http://realestate.berkeley.edu/sites/default/files/uc_berkeley_real_estate_campus_design_standards.pdf) and ADA requirements
      - aa. Mounting heights of new switches and convenience outlets shall be installed at ADA accessible heights
      - bb. Existing switches and convenience outlets to remain that are not at ADA accessible heights shall be relocated to accessible heights
    3. Campus Design Standards specific to telecom and data systems are described online at <http://ist.berkeley.edu/telecom/hso/pm-sd/standards/construction-planning/intrabuilding>
  - b. Switching device specifications, quantities and locations are diagrammatic. Design/Build contractor shall modify as required to provide complete, code-compliant system. Contractor to review proposed device locations for approval by Owner's Representative prior to installation
  - c. Contractor shall provide junction boxes and conduits, stubbed out 6" above ceiling, for new data outlets shown on the Drawings. Data cabling and devices to be provided by Owner
  - d. New work shall comply with all current applicable codes and regulations
    1. Mounting heights of new switches and convenience outlets shall be installed at ADA accessible heights
    2. Existing switches and convenience outlets to remain that are not at ADA
  - e. New lighting shall comply with Title 24 energy conservation requirements; design/build contractor shall provide verification of compliance. Light fixture and lamp quantities shown on the Drawings and described in these specifications are diagrammatic and shall be adjusted by design/build contractor as required to comply with energy codes

- f. Provide egress lighting at 1 footcandle minimum under normal power and 1 footcandle average under emergency power
- g. Color for all new electrical devices: White. At existing devices to remain, replace non-white devices with new, white devices
- h. See Division 2 for system shut-down notification requirements
- i. Submittals:
  1. Electrical contractor to provide the following information with their Design/Build Drawings:
    - aa. Title 24 – Energy Calculation Worksheets
    - bb. Load calculation for panels when additional load is connected
  2. Drawings to be submitted for review to UCB inspection office before work commences
  3. Catalog cuts for all new switching devices and lighting fixtures
- 2. Occupancy Sensor Switches: Ultrasonic, self-contained for wall applications. Sensors and components to be approved/certified by the California Energy Commission, Title 24
  - a. Wall Sensor Type: Universal P.I.R. that can be wired for two-level control and operate at either 120 volt or 277 volt power. Provide 15 sec to 30 minute adjustable off delay feature
  - b. Manufacturer: Greengate Lighting Controls by Cooper Controls, or approved equal
- 3. Lighting:
  - a. Salvage, clean & re-install light fixtures as shown in the Drawings
  - b. Clean & hand over light fixtures not being re-installed to Owner
  - c. Relocated Light Fixtures / See Reflected Ceiling Plan for locations:
    1. Re-wire fixtures for independent control at each Office
    2. Adjust stem lengths at fixtures reinstalled in Offices to place fixtures at heights shown in the Drawings
- 4. Fire Alarm System Modifications:
  - a. Scope: Provide design-build fire alarm system modifications as required within the limits of Work areas, and any other modifications to the fire alarm or life-safety systems in the remodeled areas required by code and the Campus Fire Marshal
  - b. Siemens to provide design-build modifications to serve the project. Drawings of fire alarm/ life safety system work shall be submitted to Campus Fire Marshal for review and approval prior to installation
  - c. See Division 2 for system shut-down notification requirements

**END OF SHORTFORM SPECIFICATIONS**

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**PROGRESS**

**SHORT-FORM SPECIFICATIONS - 2**

UC Berkeley  
**Cory 333**  
 Office Renovation  
 Berkeley, CA  
 Proj. No.: 17408A  
 CAAN: 1325

DATE	FEBRUARY 2018
DRAWN BY	BR
JOB	Cory Rm 333
SHEET	A4.2

**PROGRESS NOT FOR CONSTRUCTION**



## MECHANICAL LEGEND

SYMBOLS	ABB'R	SERVICE
		EQUIPMENT IDENTIFICATION
		DETAIL OR SECTION SHEET NUMBER
		NORTH ARROW (REFERENCE)
		POINT OF CONNECTION
		POINT OF DEMOLITION
		KEYED NOTE
		SUPPLY DUCT RISER
		EXHAUST DUCT RISER
	CD1	CEILING SUPPLY DIFFUSER
	R1/E1	CEILING RETURN/EXHAUST
		FIRE SPRINKLER HEAD
	WSR(G)	WALL SUPPLY REGISTER (GRILLE)
	WER(R)	WALL EXHAUST REGISTER
	R	INCLINED DUCT RISE IN FLOW DIRECTION
	D	INCLINED DUCT DROP IN FLOW DIRECTION
	AL	ACOUSTICALLY LINED DUCT
	FC	FLEXIBLE DUCT CONNECTION
	FP	FLEXIBLE CONNECTION
	(N)	NEW
	(E)	EXISTING
		(E) PIPE TO BE REMAIN
		(E) PIPE TO BE REMOVED
	AP/AD	ACCESS PANEL/ACCESS DOOR
	UP	ALL SERVICES
	DN	ALL SERVICES
	V, VR, VTR	VENT, VENT RISE, VENT THRU ROOF
		DIRECTION OF FLOW
	S/W	SANITARY OR WASTE
	SD	STORM DRAIN
	F	FIRE SPRINKLER
	CW	COLD WATER
	HW	HOT WATER
	HWR	HOT WATER RETURN
	V	VENT
	FCO	FLOOR CLEANOUT
	G	GAS
	CD	CONDENSATE DRAIN
		3-WAY CONTROL VALVE
		2-WAY CONTROL VALVE
	BC	BALANCING COCK
		BALANCING VALVE
		BALL VALVE
	BV	BUTTERFLY VALVE
	PRV	PRESSURE REDUCING VALVE
	TCV	TEMPERATURE CONTROL VALVE
	GV	GATE VALVE
	GLV	GLOBE VALVE
	CKV	CHECK VALVE
		STRAINER
	AVA	AIR VENT VALVE-AUTOMATIC
	AVM	AIR VENT VALVE-MANUAL
	PGA	PRESSURE GAUGE
	U	UNION CONNECTION
		PETE'S PLUG
	TH	THERMOMETER
	T	THERMOSTAT
		TEMPERATURE GAUGE
		TEMPERATURE SENSOR
		FLOW SWITCH/SENSOR
		PRESSURE SENSOR/TRANSMITTER
		MAGNETIC STARTER
	DI	DIGITAL INPUT
	DO	DIGITAL OUTPUT
	AI	ANALOG INPUT
	DO	ANALOG OUTPUT
		ELECTRICAL CONTROL WIRING
		PNEUMATIC CONTROL
	CHWS/R	CHILLED WATER SUPPLY/RETURN
	HWS/R	HEATING WATER SUPPLY/RETURN
	CWS/R, PWS/R	COOLING OR PROCESS WATER SUPPLY/RETURN
	TWS/R	COOLING TOWER WATER SUPPLY/RETURN

## ABBREVIATIONS

ACU	AIR CONDITIONING UNIT
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
AP	ACCESS PANEL
BDD	BACKDRAFT DAMPER
BHP	BREAK HORSEPOWER
CD	CONDENSATE DRAIN
OCD	OVERFLOW DRAIN
CFF	CAP FOR FUTURE
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CLG	CEILING
CU	CONDENSING UNIT
DN	DOWN
DT	DRIP TRAP
(E)	EXISTING
EF	EXHAUST FAN
ESP	EXTERNAL STATIC PRESSURE
FS	FIRE SPRINKLER
FC	FAN COIL (WATER COIL)
DXFC	SPLIT DX FAN COIL
FPM	FEET PER MINUTE
FSD	FIRE SMOKE DETECTOR
LPS	LOW PRESSURE STEAM CONDENSATE
LPR	LOW PRESSURE STEAM
MFR	MANUFACTURER
(N)	NEW
NC	NORMALLY CLOSED
NFPA	NATIONAL FIRE PROTECTION ASSOC.
NO	NORMALLY OPEN
PG	PRESSURE GAUGE
PLBG	PLUMBING
POC	POINT OF CONNECTION
PSI	POUND PER SQUARE INCH
PSIG	POUND PER SQUARE INCH GAUGE
(R)	RELOCATED
RF	RETURN FAN
RIC	ROUGH IN AND CONNECT
RIO	ROUGH IN ONLY
RPM	REVOLUTION PER MINUTE
SD	SMOKE DETECTOR
SF	SUPPLY FAN
SS	STAINLESS STEEL
STD	STANDARD
STL	STEEL
TH	THERMOMETER
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
V	SANITARY VENT
VTR	VENT THRU ROOF
WPD	WATER PRESSURE DROP
WP	WEATHER OR WATER PROOF
WT	WEIGHT

## GENERAL NOTES

- ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST APPLICABLE LOCAL AND STATE CODES AND REGULATIONS:
  - CALIFORNIA BUILDING CODE 2016
  - CALIFORNIA MECHANICAL CODE 2016
  - CALIFORNIA PLUMBING CODE 2016
  - CALIFORNIA FIRE CODE 2016
  - CALIFORNIA ELECTRICAL CODE 2016
  - UNIVERSITY OF CALIFORNIA, BERKELEY DESIGN STANDARDS LATEST EDITION
- ALL DUCTS OR PIPING SHOWN ON PLANS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED TO DETERMINE EXACT LOCATION. CERTAIN VERTICAL AND HORIZONTAL DIMENSIONS ARE SHOWN IN DUCTS AND PIPES TO INDICATE THEIR GENERAL POSITION IN RELATIONSHIP TO THE SYSTEMS WITHIN THE SPACE AVAILABLE FOR SYSTEM INSTALLATION. PROVIDE ADDITIONAL PIPING OFFSETS AS REQUIRED, AND TO COORDINATE WITH INSTALLATION REQUIREMENTS OF OTHER SYSTEMS AT NO ADDITIONAL COST TO THE OWNER. ALL DIMENSIONS ARE IN INCHES OR OTHERWISE NOTED.
- WHERE EXISTING CONSTRUCTION IS CUT, DAMAGED, OR REMODELED, PATCH WITH MATERIALS TO MATCH IN KIND, QUALITY, AND PERFORMANCE.
- CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR SAFETY OF ALL PERSONS ON OR ABOUT THE CONSTRUCTION SITE, IN ACCORDANCE WITH APPLICABLE LAWS AND CODES. GUARD ALL HAZARDOUS IN ACCORDANCE WITH THE SAFETY PROVISIONS OF THE LATEST MANUAL OF ACCIDENT PREVENTION PUBLISHED BY THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA AND OSHA.
- REFER TO SMACNA SEISMIC GUIDELINES AND STANDARDS FOR DUCT AND PIPE SUPPORT AND EQUIPMENT SEISMIC BRACINGS.
- COORDINATE WORK WITH THE OWNER AND ALL OTHER TRADES.
- SEAL AIR TIGHT ALL DUCT OR PIPE PENETRATIONS THROUGH WALL. SEALANT SHALL BE 3M BRAND PRODUCTS. BRACE ALL PIPES AND EQUIPMENT TO WITHSTAND FORCES AS REQUIRED BY THE STATE AND LOCAL CODES. ALL PIPE AND DUCT PENETRATION THROUGH FLOORS AND CORRIDOR WALLS SHALL BE PROTECTED WITH 26-GA GALVANIZED SHEET METAL COLLARS SECURELY FASTENED TO THE FLOOR OR WALL STRUCTURE.
- PROTECT THE PUBLIC FROM INJURY DURING PROGRESS OF WORK BY POSTING WARNING SIGNS, GUARD LIGHTS AND BARRICADES.
- THE CONTRACTOR SHALL PROVIDE DUST BARRIER PLASTIC COVERS, SCREEN AND TENTING AT ALL TIMES TO CONTAIN DUST AND DEBRIS WITHIN THE DESIGNATED WORK AREA. LOCATING AND INSTALLATION OF DUST PROTECTION COVERS AND TENTING TO BE APPROVED BY THE OWNER PRIOR TO INSTALLING. CONTRACTOR SHALL CLEAN WORK AREA AND REMOVE DEBRIS AT THE END OF EACH WORKING DAY. DISPOSAL OF DEBRIS AND EXCESS MATERIAL SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. PROVIDE TEMPORARY FILTERS ON FAN COILS AND OTHER FANS OR AIR-HANDLING UNITS. FILTERS SHALL BE MERV 8 MINIMUM.
- THE EXISTING MECHANICAL AND ELECTRICAL SYSTEMS SHALL BE MAINTAINED IN OPERATION DURING THE DEMOLITION AND INSTALLATION OF NEW WORK. WHEN A SYSTEM SHUTDOWN IS NECESSARY, OBTAIN A WRITTEN APPROVAL FROM THE OWNER PRIOR TO SHUTTING DOWN ANY MECHANICAL ELECTRICAL SYSTEMS. SUBMIT WRITTEN REQUEST 12 DAYS PRIOR TO SCHEDULE SYSTEM SHUTDOWN.
- VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. VERIFY DIMENSIONS OF OWNER FURNISHED EQUIPMENT TO ENSURE PROPER COORDINATION WITH CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES FOUND. NO ALLOWANCE SHALL BE MADE FOR ANY EXPENSE TO WHICH THE CONTRACTOR MAY INCUR DUE TO FAILURE OR NEGLECT ON HIS PART TO MAKE SUCH VERIFICATION.
- ANY ERRORS, OMISSIONS OR CONFLICTS FOUND IN THE VARIOUS PARTS OF THE CONSTRUCTION DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT OR ENGINEER AND OWNER BEFORE PROCEEDING WITH THE WORK.
- PENETRATIONS THROUGH EXISTING CONCRETE WALL, FLOOR OR ROOF SHALL BE VERIFIED FOR STRUCTURAL REINFORCEMENTS. X-RAY ARE REQUIRED TO LOCATE REINFORCEMENT PRIOR TO CONCRETE CORE DRILLING OR CUTTING. OBTAIN OWNER'S WRITTEN APPROVAL PRIOR TO CORE DRILLING AND CUTTING.
- CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTION OF WORK AT HIS OWN EXPENSE FOR WORK INSTALLED IN CONFLICT WITH CONSTRUCTION DOCUMENTS.
- CONTRACTOR SHALL LEAVE PREMISES AND ALL AFFECTED AREAS CLEAN AND IN ORDERLY MANNER READY FOR MOVE-IN OR FACILITY OPERATION.
- AIR DUCTS JOINTS SHALL BE SEALED TO MEET THE REQUIREMENTS ON CALIFORNIA TITLE 24 CODES.
- PROVIDE ADEQUATE CLEARANCE AND ACCESS TO EQUIPMENT FOR SERVICE AND MAINTENANCE. EQUIPMENT CLEARANCES SHALL MEET THE REQUIREMENT OF THE MANUFACTURER.
- EXPLORATORY WORK TO SEARCH FOR PIPING, PLUMBING OR DUCT FOR CONNECTIONS TO EXISTING BUILDING SYSTEM INCLUDING POINT OF CONNECTIONS UNDER FLOOR SLAB, IN WALLS AND CEILING SHALL BE INCLUDED AT NO COST TO THE OWNER. CUTTING, PATCHING AND RESTORATION OF FLOORS, WALLS, CEILING AND FINISH SHALL BE INCLUDED IN THIS WORK AT NO COST TO THE OWNER. RESTORATION OF WALL OR FLOOR FINISH SHALL MATCH EXISTING.

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REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

## SCOPE OF WORK

GENERAL: THIS SCOPE OF WORK IS AN OUTLINE OF WORK INVOLVE FOR THIS PROJECT AND IS NOT INTENDED TO DESCRIBE THE COMPLETE SCOPE OF WORK. THE DETAILED REQUIREMENTS ARE INDICATED ON EACH DRAWING AND SPECIFICATION SECTION. THE REQUIREMENTS INDICATED ON THE DRAWINGS AND SPECIFICATIONS ARE MINIMUM REQUIREMENTS.

- MODIFY EXISTING SUPPLY AND EXHAUST VENTILATION AS INDICATED. PROVIDE NEW CEILING MOUNTED AIR REGISTERS. ADJUST TO AIRFLOW INDICATED.
- PROVIDE (2) NEW FAN COIL UNITS AND ASSOCIATED DUCTWORK, AIR REGISTERS, DDC CONTROL SYSTEM, WALL MOUNTED THERMOSTAT, CONTROL VALVE AND PIPING ASSEMBLY, SPRING VIBRATION ISOLATORS, SUPPORTS AND ANCHORS AND NON-FUSED DISCONNECT.
- REPLACE ALL MIXING BOXES AND ASSOCIATED DAMPERS AND ACTUATORS. FINAL CONTROL WIRING CONNECTIONS TO THE DAMPERS ACTUATORS SHALL BE PROVIDED BY THE CONTRACTOR. ALL CONTROL DAMPERS AND BELIMO DAMPER ACTUATORS SHALL BE BELIMO.
- PROVIDE ALL CHILLED WATER CONTROL VALVES AND ASSOCIATED ACTUATORS AND PIPING. FINAL CONTROL WIRING CONNECTIONS SHALL BE PROVIDED BY THE CONTRACTOR. ALL CONTROL VALVES AND ACTUATORS SHALL BE BELIMO.
- PROVIDE CHILLED WATER PIPING, VALVES, INSULATION, PIPING SUPPORT AND ANCHOR.
- PROVIDE CONDENSATE DRAIN PIPING AND ASSOCIATED INSULATION, SUPPORTS AND ANCHORS.
- PERFORM FUNCTIONAL TESTING AND COMMISSIONING OF ALL FAN COIL UNITS AND ASSOCIATED CONTROLS.
- PROVIDE TRAINING FOR THE OPERATION AND MAINTENANCE OF THE FAN COIL AND ASSOCIATED CONTROLS. SET THERMOSTATS TO INDICATED SETPOINT. PROVIDE WRITTEN REPORT LISTING ALL THERMOSTATS AND SENSORS WITH CORRESPONDING SETPOINTS.

## WORK TO BE PROVIDED BY OWNER

- OWNER WILL PROVIDE DDC CONTROLS FOR THE FAN COILS. CONTRACTOR TO PROVIDE THE BELIMO ACTUATORS FOR CONTROL VALVES, CONTROL DAMPERS AND ECM FINAL CONNECTIONS TO ALL CONTRACTOR FURNISHED DEVICES.
- TESTING AND BALANCING FOR ALL AIR OUTLETS AND RETURN REGISTERS, FAN COIL UNIT FOR AIR FLOW, WATER FLOW, SUPPLY AIR TEMPERATURE, COIL PRESSURE DROPS AND EQUIPMENT PERFORMANCE INCLUDING STATIC PRESSURE, COOLING CAPACITY PER AABC PROCEDURES STANDARDS. SUBMIT A CERTIFIED TESTING AND AIR BALANCING REPORT PER AABC.

## DRAWING INDEX

- M1.0 LEGEND, SYMBOLS, GENERAL NOTES, SCOPE OF WORK, DRAWING INDEX
- M1.1 EQUIPMENT SCHEDULES
- M2.0 HVAC PLANS
- M3.0 HVAC DETAILS
- M4.0 HVAC CONTROLS
- M5.1 SPECIFICATIONS
- M5.2 SPECIFICATIONS
- M5.3 SPECIFICATIONS


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## LEGEND, SYMBOLS SCOPE OF WORK DRAWING INDEX

UC Berkeley  
**Cory 333 & 337**  
 Office Renovation  
 Berkeley, CA  
 Proj. No.: 17408A  
 CAAN: 1325

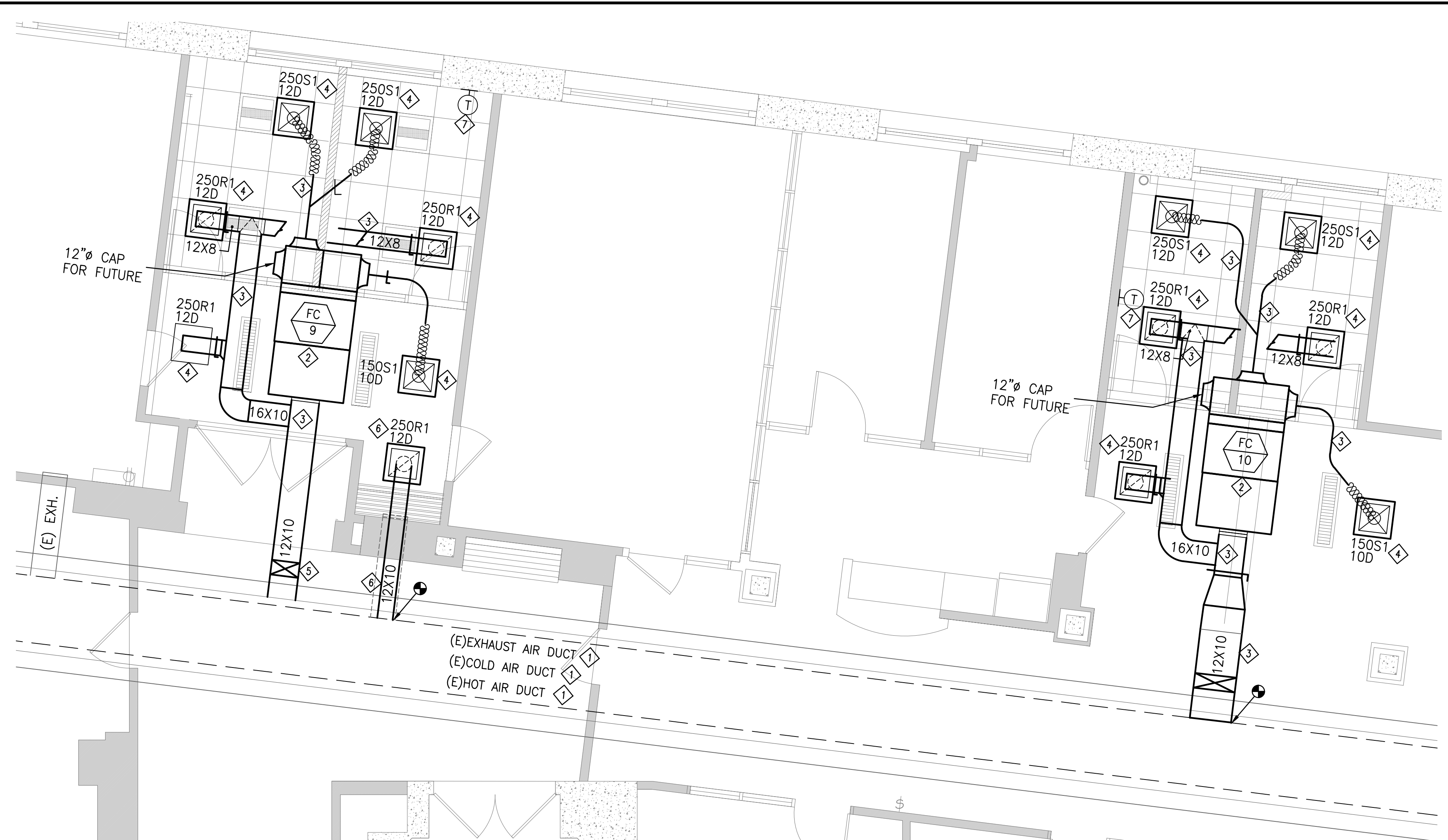
DATE	FEBRUARY 2018
SCALE	AS NOTED
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JOB	Cory Rm 333
SHEET	

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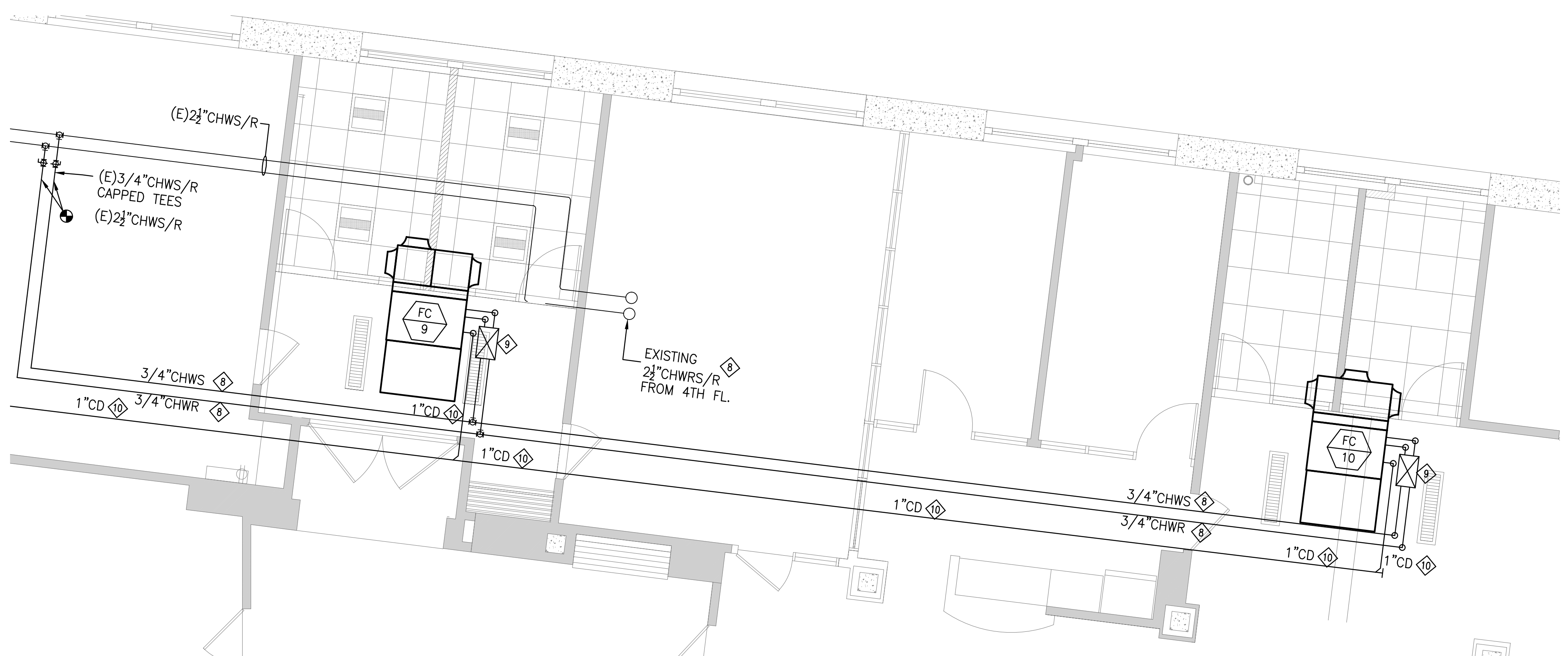








1 HVAC PLAN - DRYSIDE  
M2.1 SCALE: 1/8" = 1'-0"



2 HVAC PLAN - WETSIDE  
M2.1 SCALE: 1/8" = 1'-0"

**CALIFORNIA STATE FIRE MARSHAL**

Approved  
 Approved as noted (No resubmittal required)  
 Make corrections noted (No resubmittal required)  
 Not approved (Revise and resubmit)  
 Not reviewed (Insufficient data submitted)

APPROVAL OF THIS PLAN DOES NOT AUTHORIZE OR APPROVE ANY OMISSION OR DEVIATION FROM APPLICABLE REGULATIONS. FINAL APPROVAL IS SUBJECT TO FIELD INSPECTIONS. ONE SET OF APPROVED PLANS SHALL BE AVAILABLE ON THE PROJECT SITE AT THE TIME OF INSPECTION.

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

**GENERAL NOTES:**

- VERIFY EXISTING DUCTS, PIPING AND EQUIPMENT LOCATION PRIOR TO INSTALLATION OF NEW WORK. COORDINATE CLEARANCES AND ACCESS WITH ARCHITECTURAL DRAWINGS.
- REFER TO DETAIL 1/M3.0 FOR RECTANGULAR DUCT DETAIL.
  - REFER TO DETAIL 2/M3.0 FOR TYPICAL ROUND DUCT SUPPORT.
  - REFER TO DETAIL 3/M3.0 FOR TYPICAL RECTANGULAR DUCT SUPPORT.
  - REFER TO DETAIL 4/M3.0 FOR ROUND DUCT DETAIL.
  - REFER TO DETAIL 5/M3.0 FOR TYPICAL PIPE SUPPORT DETAIL.
  - REFER TO DETAIL 6/M3.0 FOR COOLING COIL PIPING HOOK-UP DETAIL.
  - REFER TO DETAIL 7/M3.0 FOR FAN COIL UNIT SUPPORT DETAIL.
  - REFER TO DETAIL 8/M3.0 FOR AIR DIFFUSER/ REGISTER SUPPORT.
  - REFER TO DETAIL 1/M4.0 FOR FAN COIL CONTROLS.
  - CONTRACTOR SHALL DETERMINE THE FINAL LOCATION OF THE FAN COILS. LOCATE FAN COILS TO CLEAR BUILDING STRUCTURE, EXISTING ELECTRICAL, PIPING AND OTHER OBSTRUCTIONS IN THE CEILING CAVITY. COORDINATE INSTALLATION WITH ARCHITECTURAL DRAWINGS. PROVIDE ADEQUATE ACCESS TO FILTERS, MOTORS AND VALVES.

**NEW CONSTRUCTION KEYED NOTES:**

- EXISTING DUCT, CHILLED WATER PIPING, HEATING WATER PIPING, CONDENSATE DRAIN PIPING, AIR REGISTER, OR EQUIPMENT TO REMAIN. CAP AND SEAL UN-USED OPENINGS.
- PROVIDE NEW FAN COIL COMPLETE WITH SUPPORT AND ANCHORING, COOLING AND HEATING WATER PIPING, CONDENSATE DRAIN PIPING CONTROL VALVE AND DDC CONTROLS. SEE DRAWING M1.1 FOR SCHEDULED REQUIREMENTS. SEE DETAIL 7/M3.0 FOR SUPPORT AND DETAIL 6/M3.0 FOR PIPING, VALVES AND CONTROLS. PROVIDE LOCAL DISCONNECT SWITCH, SERVICE RECEPTACLE AND LIGHTING PER CMC 1106.4.
- PROVIDE NEW SUPPLY AIR, RETURN AIR AND EXHAUST AIR DUCTWORK FOR FAN COIL AIR DISTRIBUTION AND AS INDICATED. DUCTWORK SHALL BE FABRICATED AND SUPPORTED PER LATEST EDITION OF SMACNA STANDARDS. PROVIDE INSULATED FLEXIBLE DUCT AND VOLUME DAMPERS AT EACH CONNECTION TO THE DIFFUSERS AND EXHAUST REGISTERS. MAXIMUM LENGTH OF FLEXIBLE DUCTS SHALL NOT EXCEED 6 FEET. SUPPORT FLEXIBLE DUCT PER MANUFACTURER'S RECOMMENDATIONS AND SMACNA STANDARDS. INSULATE ALL AIR DUCTS.
- PROVIDE NEW SUPPLY AIR DIFFUSERS AND EXHAUST REGISTERS. SEE M1.1 FOR SCHEDULED REQUIREMENTS.
- ROOM OUTSIDE AIR (O.A.) SUPPLY AIR VENTILATION: REMOVE AND DISPOSE EXISTING REGISTER. MODIFY AND EXTEND SUPPLY AIR DUCT TO FEED DIRECTLY TO THE NEW FAN COIL INLET. REPLACE EXISTING HOT & COLD MIXING BOX, DAMPERS AND ACTUATORS. NEW ACTUATOR SHALL BE BELIMO 24VAC AND CONTROLS. ADJUST TO NEW AIRFLOW INDICATED. VERIFY EXACT LOCATION AND SIZE AT POINT OF CONNECTION.
- ROOM EXHAUST AIR VENTILATION: REMOVE AND DISPOSE EXISTING REGISTER AND MODIFY EXISTING DUCTWORK AND PROVIDE AIR NEW AIR REGISTER AS INDICATED. ADJUST TO NEW AIRFLOW INDICATED. VERIFY EXACT LOCATION AND SIZE AT POINT OF CONNECTION.
- PROVIDE CONTROLS TO OPERATE THE FAN COILS AND MODULATE COOLING AND HEATING COIL CONTROL VALVE TO MAINTAIN THE ROOM TEMPERATURE AT SETPOINT. INSTALL ROOM THERMOSTAT 48" FROM THE FINISHED FLOOR TO THE TOP OF THERMOSTAT.
- PROVIDE NEW CHILLED WATER PIPING. VERIFY SIZE AND LOCATION AT POINT OF CONNECTION. NOTIFY THE OWNER PRIOR TO CUTTING OR CLOSING OF EXISTING PIPING OR VALVES. INSULATE ALL NEW CHILLED WATER PIPING, VALVES AND ACCESSORIES WITH 1" PRE-MOLDED FIBERGLASS WITH ASJ. PROVIDE PVC INSULATION JACKET. LABEL PIPING TO ANSI STANDARDS.
- PROVIDE 3/4" CHWS/R, CONTROL VALVE ASSEMBLY AND CONTROLS TO MODULATE COOLING AND HEATING COIL CONTROL VALVE FOR EACH FAN COIL UNIT TO MAINTAIN THE ROOM TEMPERATURE AT 74°F. SEE DETAIL 6/M3.0 FOR DETAILED PIPING REQUIREMENTS.
- PROVIDE NEW CONDENSATE DRAIN PIPING FOR ALL FAN COIL UNITS. PROVIDE 3/4" DRAIN PIPING FOR EACH FAN COIL. SLOPE DRAIN AT 1/8" PER FOOT TOWARDS EXISTING DRAIN RECEPTOR. PROVIDE CLEANOUT AT EVERY CHANGE OF DIRECTION. PROVIDE CLEANOUT AT EVERY 75 FEET OF STRAIGHT RUN. PIPING MATERIAL SHALL BE COPPER TYPE L WITH SOLDERED JOINTS. SUPPORT PIPE AT EVERY 5 FOOT INTERVAL. PIPING SHALL BE IN COMPLIANCE WITH CPC 2016. INSULATE DRAIN PIPE WITH 1/2" FIBERGLASS WITH ASJ AND PVC JACKET TO 10 FEET FROM THE FAN COIL. TERMINATE AT EXISTING DRAIN. PROVIDE INDIRECT DRAIN RECEPTOR OR FUNNEL DRAIN WITH P-TRAP.

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**HVAC PLANS**

UC Berkeley  
**Cory 333 & 337**  
Office Renovation  
Berkeley, CA

DATE: FEBRUARY 2018  
SCALE: AS NOTED  
DRAWN BY: EPCE  
JOB: Cory Rm 333  
SHEET: **M2.0**

Proj. No.: 17408A  
CAAN: 1325



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**HVAC DETAILS**

UC Berkeley  
**Cory 333 & 337**  
 Office Renovation  
 Berkeley, CA  
 Proj. No.: 17408A  
 CAAN: 1325

DATE	FEBRUARY 2018
SCALE	AS NOTED
DRAWN BY	EPCE
JOB	Cory Rm 333
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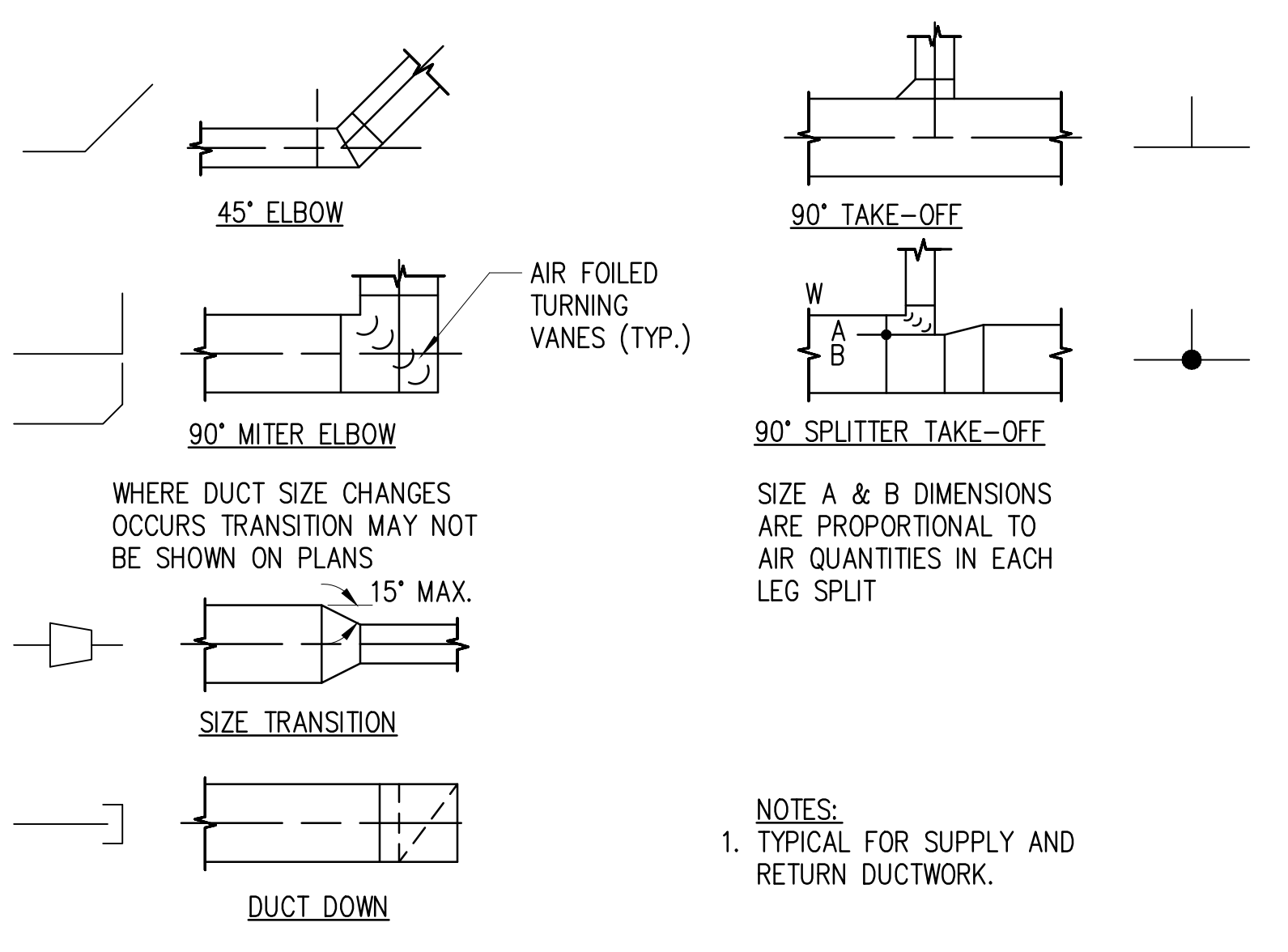
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**CALIFORNIA STATE FIRE MARSHAL**

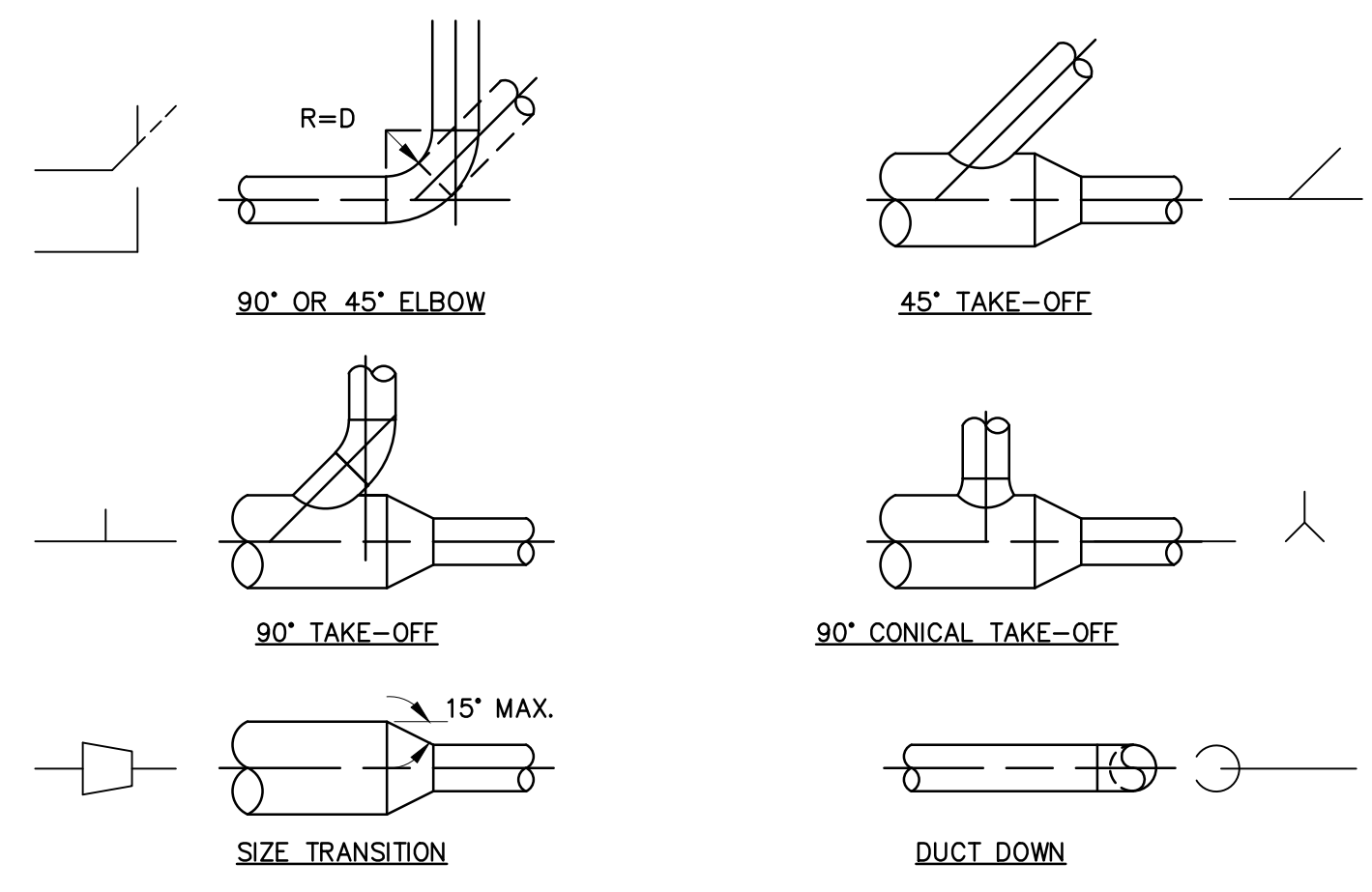
Approved  
 Approved as noted (No resubmital required)  
 Make corrections noted (No resubmital required)  
 Not approved (Revise and resubmit)  
 Not reviewed (Insufficient data submitted)

APPROVAL OF THIS PLAN DOES NOT AUTHORIZE OR APPROVE ANY OMISSION OR DEVIATION FROM APPLICABLE REGULATIONS. FINAL APPROVAL IS SUBJECT TO FIELD INSPECTIONS. ONE SET OF APPROVED PLANS SHALL BE AVAILABLE ON THE PROJECT SITE AT THE TIME OF INSPECTION.

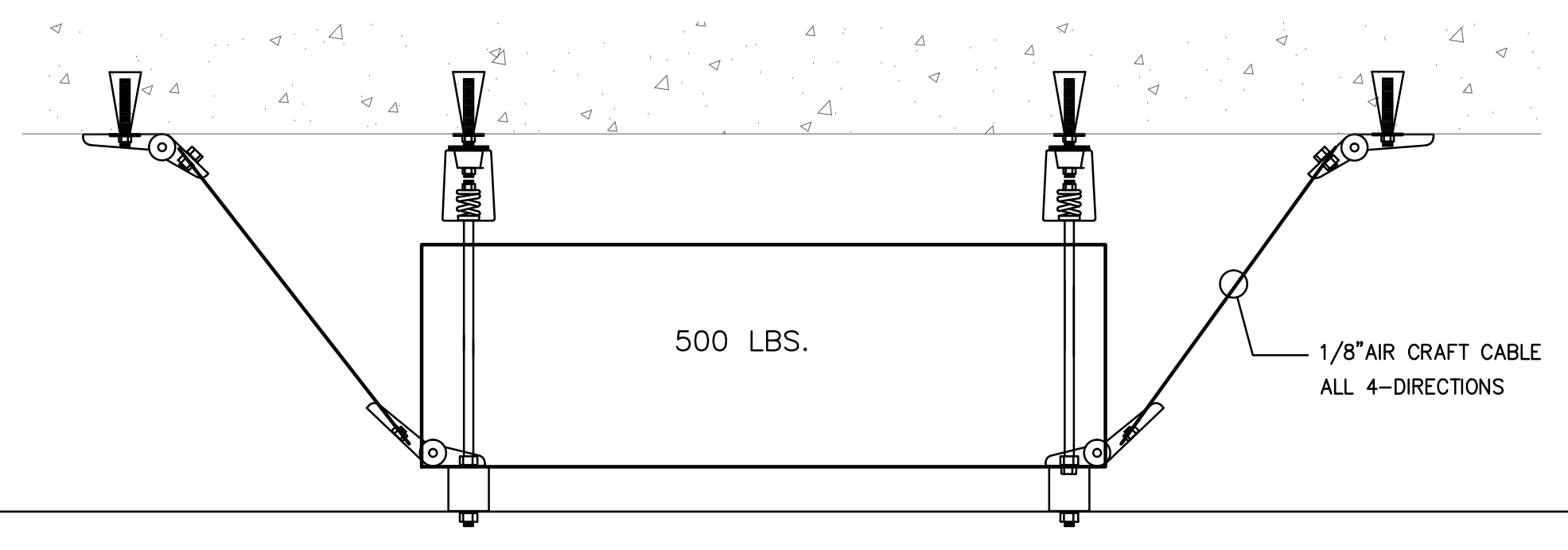
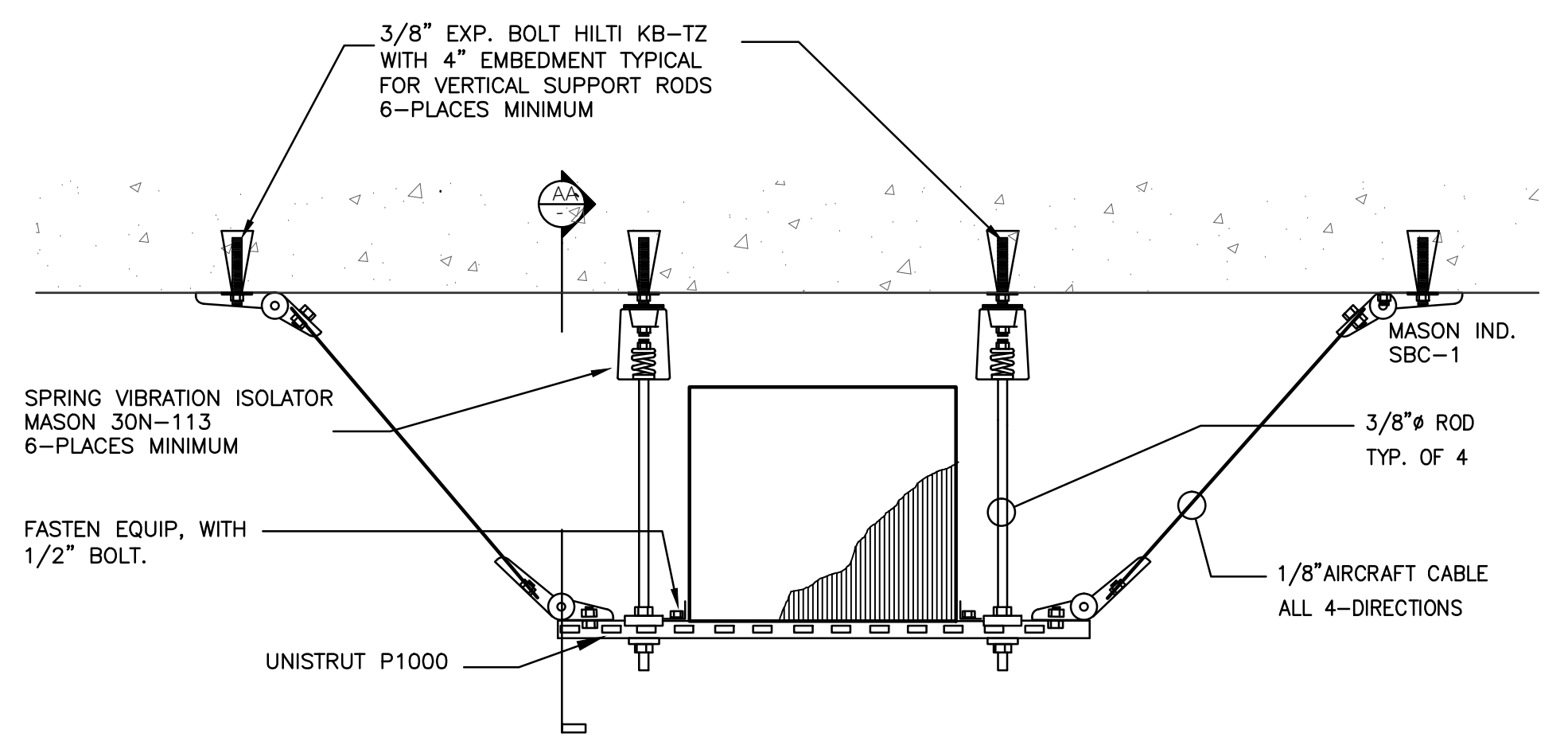
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**1** RECTANGULAR DUCT DETAIL  
 M3.0 SCALE: N.T.S.

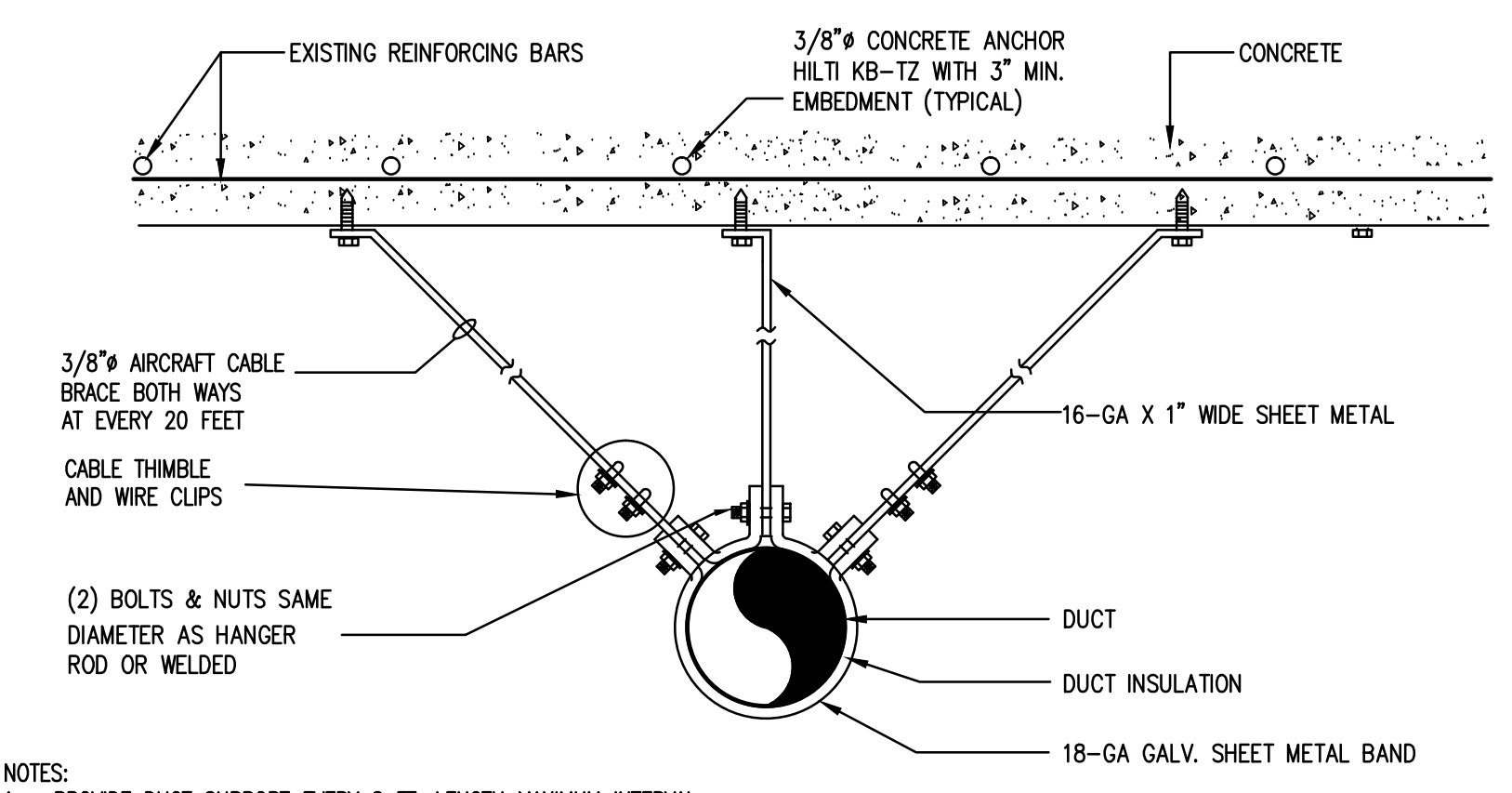


**4** ROUND DUCT DETAIL  
 M3.0 SCALE: N.T.S.



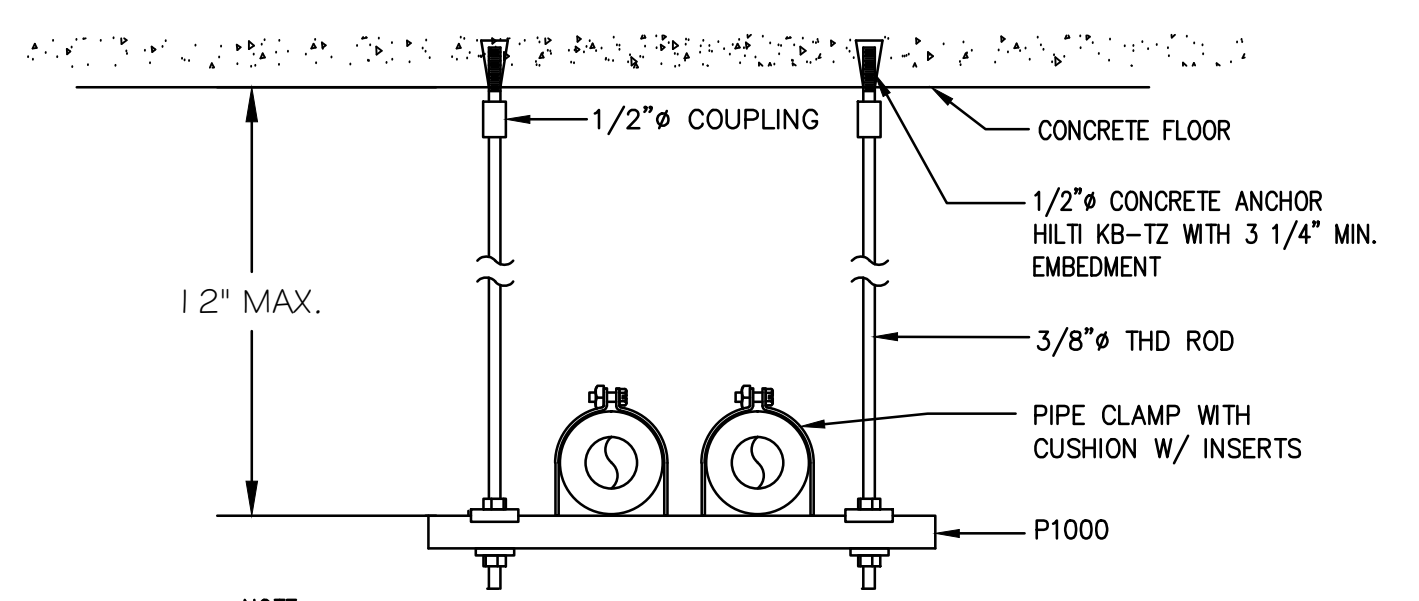
NOTES: ALL EXPANSION ANCHORS SHALL BE EMBEDDED 4 1/2" MINIMUM INTO CONCRETE.

**7** FAN COIL UNIT SUPPORT DETAIL  
 M3.0 SCALE: N.T.S.



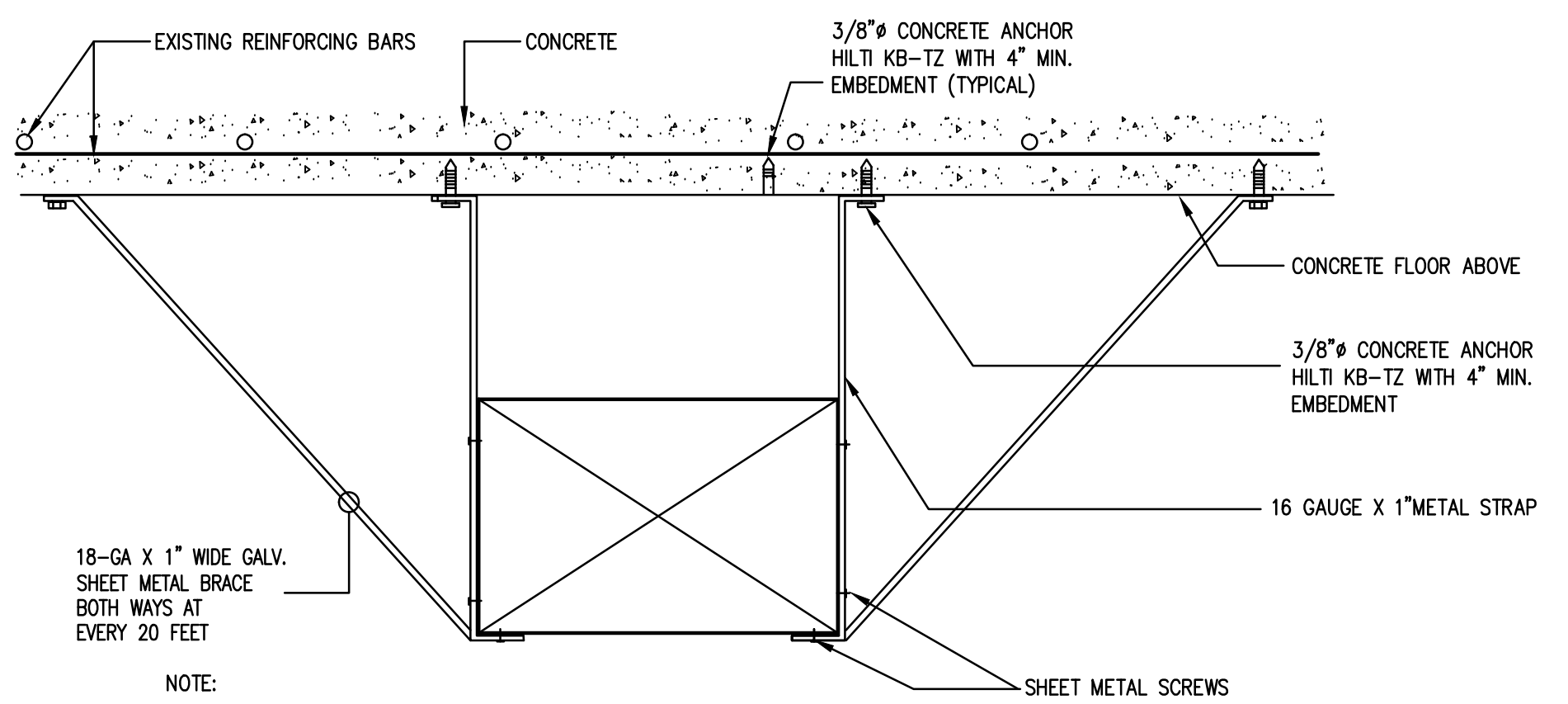
NOTES:  
 1. PROVIDE PROTECTIVE SUPPORT EVERY 8 FEET MAXIMUM INTERVAL.  
 2. CONCRETE SHALL NOT BE CUT UNTIL AFTER CONCRETE REINFORCING BARS, ENCASED CONDUIT OR ENCASED PIPES ARE LOCATED BY THE CONTRACTOR USING NON-DESTRUCTIVE METHODS. OBTAIN WRITTEN APPROVAL FROM OWNER'S REPRESENTATIVE PRIOR TO DRILLING AND CUTTING EXISTING BUILDING STRUCTURES.

**2** TYPICAL ROUND DUCT SUPPORT  
 M3.0 SCALE: N.T.S.



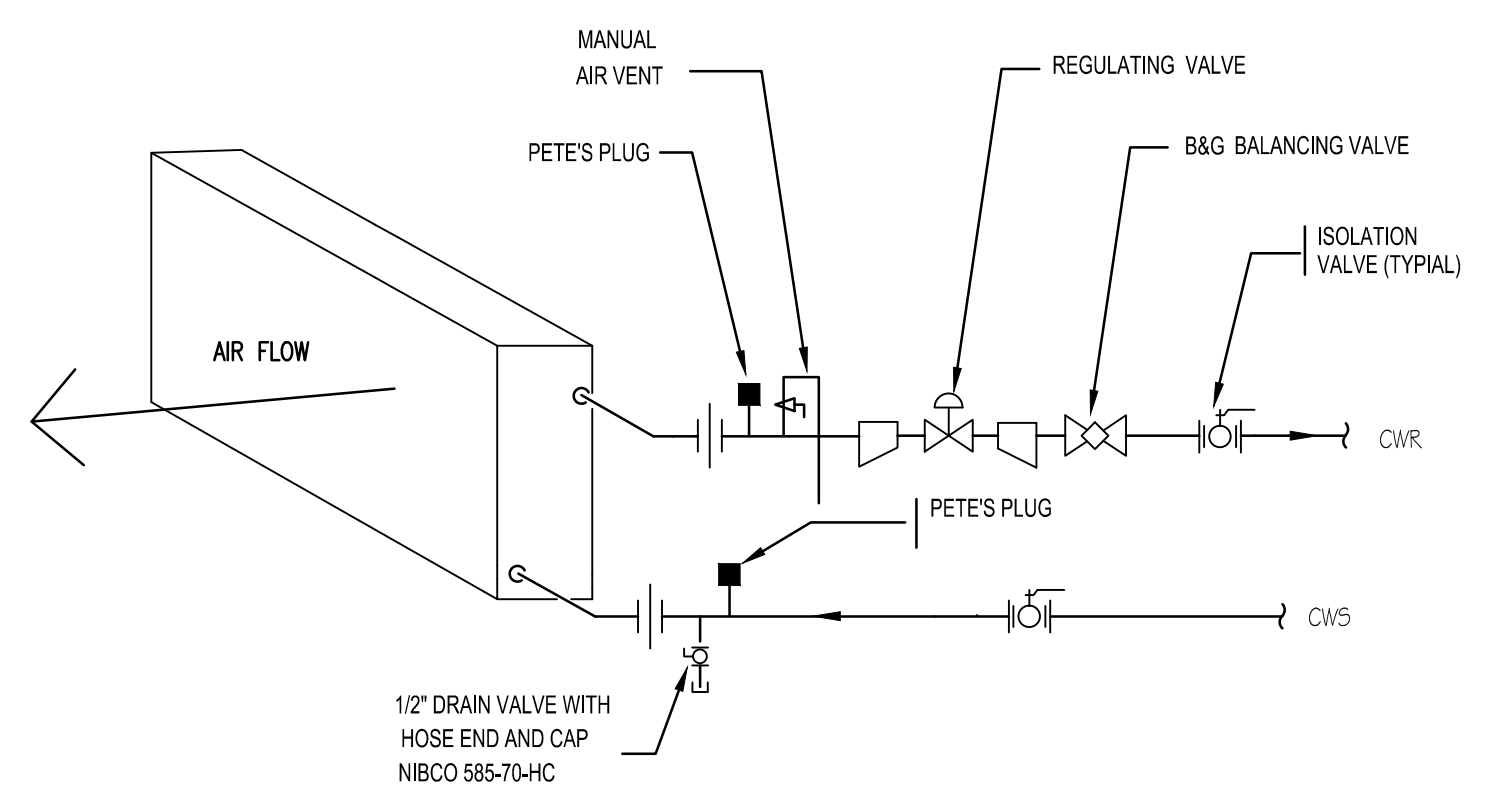
NOTE:  
 1. INDEPENDENT CLEVIS HANGER IS ACCEPTABLE.  
 2. PROVIDE 4-WAY BRACE AT 10 FEET INTERVAL FOR VERTICAL SUPPORT OVER 12'.

**5** TYPICAL PIPE SUPPORT DETAIL  
 M3.0 SCALE: N.T.S.



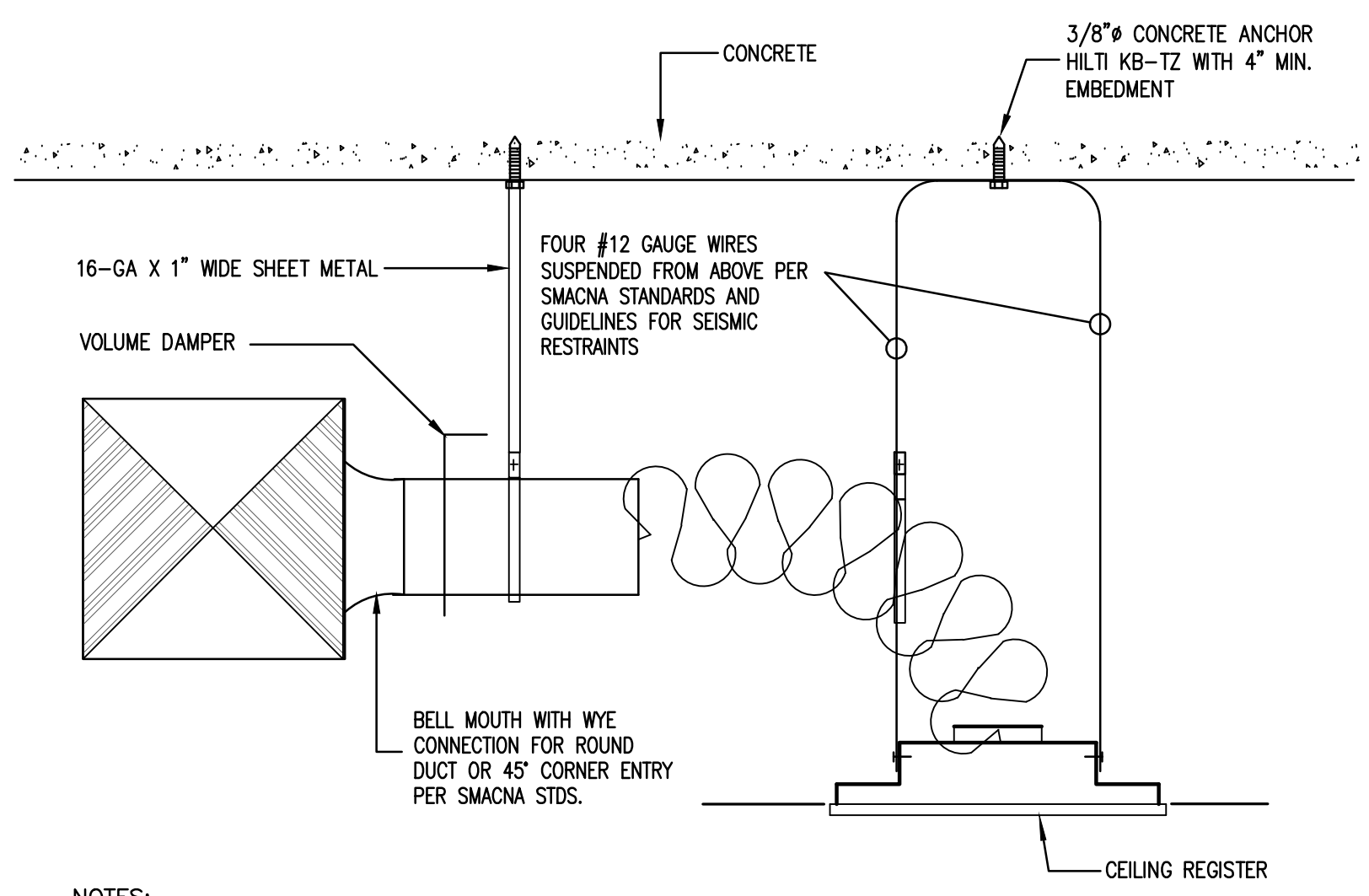
NOTE:  
 1. PROVIDE DUCT SUPPORT EVERY 8 FT LENGTH.  
 2. PROVIDE DUCT SUPPORT AT EVERY CHANGE OF DIRECTION.

**3** TYPICAL RECTANGULAR DUCT SUPPORT  
 M3.0 SCALE: N.T.S.



NOTES:  
 1. COORDINATE LEFT OR RIGHT HAND CONNECTION AS REQUIRED.  
 2. PROVIDE LOW VOLTAGE DDC CONTROLS. PROVIDE 120VAC TO 24VAC TRANSFORMER.  
 3. PROVIDE GRISWOLD CONTROL "QUICKSET" CCP-201S ASSEMBLY OR BELIMO ASSEMBLY SHALL INCLUDE QUICK SET MANUAL BALANCING VALVES, ISOLATION BALL VALVES, UNIONS, DRAIN VALVES WITH HOSE END, PRESSURE TEMPERATURE TEST VALVE AND MANUAL AIR VENT.

**6** COOLING COIL PIPING HOOK-UP DETAIL  
 M3.0 SCALE: N.T.S.



NOTES:  
 1. FLEXIBLE DUCT SHALL NOT EXCEED 5 FEET IN LENGTH.  
 2. FLEXIBLE DUCT SHALL BE FLEXIBLE AIR DUCT SHALL BE THERMAFLEX TYPE M-KE REINFORCED INSULATED TYPE RATE AT 4"WC POSITIVE PRESSURE CLASS.  
 3. PROVIDE VOLUME DAMPER ON ALL CONNECTIONS TO AIR DIFFUSERS.

**8** AIR DIFFUSER/REGISTER DETAIL  
 M3.0 SCALE: N.T.S.







# SPECIFICATIONS

## MECHANICAL GENERAL REQUIREMENTS

- GENERAL: FURNISH ALL SERVICES, SKILLED AND COMMON LABOR, AND ALL APPARATUS AND MATERIALS REQUIRED FOR THE COMPLETE INSTALLATION OF HVAC, PLUMBING AND FIRE PROTECTION AS SHOWN AND WITHIN THE INTENT OF THE DRAWINGS AND/OR THESE SPECIFICATIONS.
  - QUALITY ASSURANCE:
    - MANUFACTURER: COMPANY SPECIALIZING IN MANUFACTURING OF PRODUCTS SPECIFIED IN THIS SECTION, WITH DOCUMENTED EXPERIENCE OF MORE THAN FIVE (5) YEARS.
    - INSTALLER: COMPANY SPECIALIZING IN EXECUTING THE SCOPE OF WORK SPECIFIED IN THIS SECTION, WITH DOCUMENTED EXPERIENCE OF MORE THAN FIVE (5) YEARS.
  - SUBMITTALS: SHOP DRAWINGS, OPERATION AND MAINTENANCE MANUAL, A COMPLETE LIST OF MATERIALS AND EQUIPMENT PROPOSED SHALL BE SUBMITTED TO THE PROJECT MANAGER FOR APPROVAL. THE LIST SHALL INCLUDE FOR EACH ITEM: THE MANUFACTURER, THE MANUFACTURER'S CATALOG NUMBER, TYPE OR CLASS, THE RATING, CAPACITY, SIZE, ETC.
- SHOP DRAWING DATA SHALL INCLUDE THE FOLLOWING:
- MANUFACTURER'S MODEL AND CATALOG DATA.
  - COMPLETE WIRING, DUCT AND PIPING CONNECTION DIAGRAMS FOR EACH TRADE.
  - DIMENSIONS, CAPACITIES, RATINGS, MATERIALS AND FINISHES.
  - DATA SHEET CLEARLY MARKED WITH STANDARD AND OPTIONAL FACTORY ITEMS BEING PROPOSED.
  - EACH SHOP DRAWING IS REQUIRED TO BEAR THE REVIEW STAMP OF THE CONTRACTOR.

- SUBSTITUTIONS: INSTALLATION OF ANY APPROVED SUBSTITUTED EQUIPMENT IS THE SUBCONTRACTOR'S RESPONSIBILITY, AND ANY CHANGES REQUIRED TO WORK INCLUDED UNDER OTHER DIVISIONS FOR INSTALLATIONS OF APPROVED SUBSTITUTED EQUIPMENT MUST BE MADE TO THE SATISFACTION OF THE OWNER AND WITHOUT CHANGE IN CONTRACT PRICE. APPROVAL BY THE OWNER OF SUBSTITUTED EQUIPMENT AND/OR DIMENSION DRAWINGS DOES NOT WAIVE THESE REQUIREMENTS.

INSTALLATION: INSTALL PRODUCTS AND MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, CONTRACT DRAWINGS AND REVIEWED SUBMITTALS.

- MATERIALS SHALL BE CAREFULLY HANDLED AND STORED UNDER COVER IN MANNER TO PREVENT DEFORMATION AND DAMAGE TO THE MATERIALS AND TO SHOP FINISHES, AND TO PREVENT RUSTING AND THE ACCUMULATION OF FOREIGN MATTER ON THE METAL WORK. WORK SHALL BE REPAIRED AND CLEANED PRIOR TO ERECTION.
- WORK SHALL BE ERECTED SQUARE, PLUMB AND TRUE AND ACCURATELY FITTED
- METAL WORK SHALL BE RIGIDLY BRACED AND SECURED TO SURROUNDING CONSTRUCTION, AND SHALL BE TIGHT AND FREE OF RATTLE, VIBRATION, OR NOTICEABLE DEFLECTION AFTER INSTALLED.
- WHERE DISSIMILAR METALS ARE TO COME INTO CONTACT WITH ONE ANOTHER, ISOLATE BY APPLICATION OF A HEAVY COATING OF BITUMINOUS PAINT ON CONTACT SURFACES IN ADDITION TO SHOP COAT SPECIFIED ABOVE. DO NOT PERMIT THE BITUMINOUS PAINT IN ANY WAY TO REMAIN ON SURFACES TO BE EXPOSED OR TO RECEIVE SEALANT.
- UNGLAZED FERROUS METALS UNDER THIS SECTION SHALL BE GIVEN A SHOP COAT OF RUST INHIBITIVE PRIMER OF TYPE SPECIFIED ABOVE.

## GUARANTEE REQUIREMENTS

- GUARANTEE SHALL BE IN ACCORDANCE WITH DIVISION 1, AND THE REQUIREMENTS OF THE GENERAL CONDITIONS.
- MANUFACTURERS SHALL PROVIDE THEIR STANDARD GUARANTEES FOR WORK UNDER THIS CONTRACT, UNLESS SPECIFIED OTHERWISE. HOWEVER, SUCH GUARANTEES SHALL BE IN ADDITION TO AND NOT IN LIEU OF ALL OTHER LIABILITIES WHICH THE MANUFACTURER AND CONTRACTOR MAY HAVE BY LAW OR BY OTHER PROVISIONS OF THE CONTRACT DOCUMENTS.
- UPON RECEIPT OF NOTICE FROM THE OWNER OF FAILURE OF ANY PART OF THE SYSTEMS OR EQUIPMENT DURING THE GUARANTEE PERIOD, THE AFFECTED PART OR PARTS SHALL BE REPLACED BY THE RESPONSIBLE CONTRACTOR.

## COORDINATION

- GENERAL
  - LOCATIONS OF PIPING, DUCTWORK, CONDUITS AND EQUIPMENT SHALL BE ADJUSTED TO ACCOMMODATE THE NEW WORK WITH INTERFERENCE ANTICIPATED AND ENCOUNTERED DURING INSTALLATION. CONTRACTOR SHALL DETERMINE THE EXACT ROUTING AND LOCATION OF SYSTEMS PRIOR TO FABRICATION OR INSTALLATION OF ANY SYSTEM COMPONENT. ACCURATE MEASUREMENTS AND COORDINATION DRAWINGS WILL HAVE TO BE COMPLETED TO VERIFY DIMENSIONS AND CHARACTERISTICS OF THE VARIOUS SYSTEMS' INSTALLATIONS.
  - LINES WHICH PITCH SHALL HAVE THE RIGHT-OF-WAY OVER THOSE WHICH DO NOT PITCH. FOR EXAMPLE, WASTE PIPING SHALL NORMALLY HAVE THE RIGHT-OF-WAY. LINES WHOSE ELEVATIONS CANNOT BE CHANGED SHALL HAVE THE RIGHT-OF-WAY OVER LINES WHOSE ELEVATIONS CAN BE CHANGED.
  - OFFSETS, TRANSITIONS AND CHANGES OF DIRECTION SHALL BE MADE AS REQUIRED TO MAINTAIN PROPER HEADROOM AND PITCH OF SLOPING LINES WHETHER OR NOT INDICATED ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE MANUAL AIR VENTS, TRAP ASSEMBLIES AND DRAINS AS REQUIRED TO EFFECT THESE OFFSETS, TRANSITIONS AND CHANGES IN DIRECTION, AS APPLICABLE.
  - THE CONTRACT DRAWINGS ARE DIAGRAMMATIC ONLY INTENDING TO SHOW GENERAL RUNS AND LOCATIONS OF PIPING, DUCTWORK, EQUIPMENT, TERMINALS AND SPECIALTIES AND NOT NECESSARILY SHOWING EACH REQUIRED OFFSET, DETAIL ACCESSORY OR EQUIPMENT TO BE CONNECTED. ACCURATELY LAY OUT WORK WITH WORK SPECIFIED IN OTHER SECTIONS TO AVOID CONFLICTS AND TO OBTAIN A NEAT AND WORKMANLIKE INSTALLATION WHICH WILL AFFORD MAXIMUM ACCESSIBILITY FOR OPERATION, MAINTENANCE AND HEADROOM.
  - FINAL LOCATION OF AIR DISTRIBUTION DEVICES AND SPRINKLER HEADS SHALL BE COORDINATED WITH THE ARCHITECTURAL REFLECTED CEILING PLANS AND OTHER ARCHITECTURAL DETAILS, AS APPLICABLE. OFFSETS OF DUCTWORK, ADDED SHEET METAL, ELBOWS AND FLEXIBLE CONNECTIONS, SHALL BE PROVIDED AS REQUIRED TO COMPLY WITH THE ARCHITECTURAL REFLECTED CEILING PLANS AND INSTALLATION DETAILS. OBTAIN APPROVAL OF LOCATIONS OF ALL DEVICES FROM OWNER'S REPRESENTATIVE IN THE FIELD PRIOR TO INSTALLATION.
  - WORK SHALL BE INSTALLED IN A WAY TO PERMIT REMOVAL (WITHOUT DAMAGE TO OTHER PARTS) OF COILS, FILTERS, CONTROL APPURTENANCES, FAN SHAFTS AND WHEELS, FILTERS, BELT GUARDS, SHEAVES AND DRIVES AND ALL OTHER SYSTEM COMPONENTS PROVIDED UNDER THIS CONTRACT REQUIRING PERIODIC REPLACEMENT OR MAINTENANCE. ALL PIPING SHALL BE ARRANGED IN A MANNER TO CLEAR THE OPENINGS OF SWINGING OVERHEAD ACCESS DOORS, CEILING TILES AND CLEANING ACCESS DOORS IN DUCTWORK.
  - WORK SHALL INCLUDE COOPERATION WITH AND ASSISTANCE TO THE FACILITIES MONITORING AND CONTROL SYSTEM CONTRACTOR AS REQUIRED TO PROVIDE A COMPLETE AND FUNCTIONAL HVAC CONTROL SYSTEM.

## AS-BUILT DOCUMENTS

- CONTRACTOR SHALL INDICATE PROGRESS BY COLORING-IN VARIOUS PIPES, DUCTS AND ASSOCIATED APPURTENANCES EXACTLY AS THEY ARE ERECTED. THIS PROCESS SHALL INCORPORATE BOTH THE CHANGES AND OTHER DEVIATIONS FROM THE ORIGINAL DRAWINGS WHETHER RESULTING FROM JOB CONDITIONS ENCOUNTERED OR OTHER CAUSES.
- UPON COMPLETION OF THE PROJECT, THE CONTRACTOR SHALL SUBMIT HIS MARKED-UP DRAWINGS TO THE OWNER'S REPRESENTATIVE FOR REVIEW AND COMMENT.

## MATERIALS

MATERIALS MANUFACTURERS SHALL BE AS SPECIFIED FOR EACH PRODUCT IN EACH SECTION. EQUAL PRODUCT SUBSTITUTIONS SHALL BE SUBJECT TO REVIEW AND APPROVAL BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COST AND/OR ANY DELAY INCURRED IN REVIEW AND APPROVAL FOR ANY SUBSTITUTIONS.

- MATERIALS SHALL BE DELIVERED TO THE SITE AND STORED IN ORIGINAL SEALED CONTAINERS, SUITABLY SHELTERED FROM THE ELEMENTS, BUT READILY ACCESSIBLE FOR INSPECTION BY THE OWNER'S REPRESENTATIVE UNTIL INSTALLED. ITEMS SUBJECT TO MOISTURE DAMAGE SUCH AS CONTROLS AND FILTERS SHALL BE STORED IN DRY, HEATED SPACES.
- CONTRACTOR SHALL HAVE HIS MATERIAL TIGHTLY COVERED AND PROTECTED AGAINST DIRT, WATER AND CHEMICAL OR MECHANICAL INJURY AND THEFT. AT THE COMPLETION OF THE WORK, EQUIPMENT AND MATERIALS SHALL BE CLEANED, POLISHED THOROUGHLY AND TURNED OVER THE OWNER IN A CONDITION SATISFACTORY TO THE OWNER'S REPRESENTATIVE. DAMAGE OR DEFECTS DEVELOPING BEFORE ACCEPTANCE OF THE WORK SHALL BE MADE GOOD AT THE CONTRACTOR'S EXPENSE.
- MAKE NECESSARY FIELD MEASUREMENTS TO ASCERTAIN SPACE REQUIREMENTS, FOR CONNECTIONS TO BE PROVIDED AND SHALL FURNISH AND INSTALL SUCH SIZES AND SHAPES OF EQUIPMENT TO ALLOW FOR THE FINAL INSTALLATION TO CONFORM TO THE DRAWINGS AND SPECIFICATIONS.
- MANUFACTURER'S DIRECTIONS SHALL BE FOLLOWED COMPLETELY IN THE DELIVERY, STORAGE, PROTECTION AND INSTALLATION OF ANY EQUIPMENT. PROMPTLY NOTIFY THE OWNER'S REPRESENTATIVE IN WRITING OF ANY CONFLICT BETWEEN ANY REQUIREMENTS OF THE CONTRACT DOCUMENTS AND THE MANUFACTURER'S DIRECTIONS AND OBTAIN THE OWNER'S REPRESENTATIVE'S WRITTEN INSTRUCTIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL BEAR ALL COSTS ARISING IN CORRECTING ANY DEFICIENCIES THAT SHOULD ARISE DUE TO WORK THAT DOES NOT COMPLY WITH THE MANUFACTURER'S DIRECTIONS OR WRITTEN INSTRUCTIONS FROM THE OWNER'S REPRESENTATIVE.
- WHERE MATERIAL OF THE ACCEPTABLE MANUFACTURERS REQUIRES DIFFERENT ARRANGEMENT OR CONNECTIONS FROM THOSE SHOWN, INSTALL THE EQUIPMENT TO OPERATE PROPERLY AND IN HARMONY WITH THE ORIGINAL INTENT OF THE DRAWINGS AND SPECIFICATIONS. AS APPROVED BY THE OWNER'S REPRESENTATIVE, SUBMIT DRAWINGS SHOWING THE PROPOSED INSTALLATION. IF THE PROPOSED INSTALLATION IS APPROVED, THE CONTRACTOR SHALL MAKE ALL NECESSARY CHANGES INCLUDING LOCATION OF ROUGH-IN CONNECTIONS, ELECTRICAL REQUIREMENTS, PIPING, SUPPORTS, INSULATION, ETC. CHANGES SHALL BE MADE AT NO INCREASE IN THE CONTRACT AMOUNT OR ADDITIONAL COST TO THE OWNER.
- EQUIPMENT OF ONE TYPE (AIR REGISTERS, SPRINKLER HEADS, ETC.), SHALL BE THE PRODUCT OF ONE MANUFACTURER.

## USE OF PREMISES

- CONFINE TOOLS, EQUIPMENT, MATERIALS AND CONSTRUCTION TO THE LIMITS INDICATED ON THE DRAWINGS AND DIRECTED BY THE OWNER'S REPRESENTATIVE.
- THE RESPONSIBILITY FOR THE SAFE WORKING CONDITIONS AT THE SITE SHALL REMAIN WITH THE CONTRACTOR. THE OWNER AND OWNER'S REPRESENTATIVE SHALL NOT BE DEEMED TO HAVE ANY RESPONSIBILITY OR LIABILITY IN CONNECTION THEREWITH.

## EQUIPMENT AND MATERIALS

- EQUIPMENT AND MATERIALS MANUFACTURERS SHALL BE AS SPECIFIED FOR EACH PRODUCT.
- CONTRACTOR SHALL HAVE EQUIPMENT TIGHTLY COVERED AND PROTECTED AGAINST DIRT, WATER AND CHEMICAL OR MECHANICAL INJURY AND THEFT. AT THE COMPLETION OF THE WORK, EQUIPMENT AND MATERIALS SHALL BE CLEANED, POLISHED THOROUGHLY AND TURNED OVER THE OWNER IN A CONDITION SATISFACTORY TO THE OWNER'S REPRESENTATIVE. DAMAGE OR DEFECTS DEVELOPING BEFORE ACCEPTANCE OF THE WORK SHALL BE MADE GOOD AT THE CONTRACTOR'S EXPENSE.
- MAKE NECESSARY FIELD MEASUREMENTS TO ASCERTAIN SPACE REQUIREMENTS, FOR EQUIPMENT AND CONNECTIONS TO BE PROVIDED AND SHALL FURNISH AND INSTALL SUCH SIZES AND SHAPES OF EQUIPMENT TO ALLOW FOR THE FINAL INSTALLATION TO CONFORM TO THE DRAWINGS AND SPECIFICATIONS.
- MANUFACTURER'S DIRECTIONS SHALL BE FOLLOWED COMPLETELY IN THE DELIVERY, STORAGE, PROTECTION AND INSTALLATION OF ANY EQUIPMENT. PROMPTLY NOTIFY THE OWNER'S REPRESENTATIVE IN WRITING OF ANY CONFLICT BETWEEN ANY REQUIREMENTS OF THE CONTRACT DOCUMENTS AND THE MANUFACTURER'S DIRECTIONS AND OBTAIN THE OWNER'S REPRESENTATIVE'S WRITTEN INSTRUCTIONS BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL BEAR ALL COSTS ARISING IN CORRECTING ANY DEFICIENCIES THAT SHOULD ARISE DUE TO WORK THAT DOES NOT COMPLY WITH THE MANUFACTURER'S DIRECTIONS OR WRITTEN INSTRUCTIONS FROM THE OWNER'S REPRESENTATIVE.
- WHERE EQUIPMENT OF THE ACCEPTABLE MANUFACTURERS REQUIRES DIFFERENT ARRANGEMENT OR CONNECTIONS FROM THOSE SHOWN, INSTALL THE EQUIPMENT TO OPERATE PROPERLY AND IN HARMONY WITH THE ORIGINAL INTENT OF THE DRAWINGS AND SPECIFICATIONS. AS APPROVED BY THE OWNER'S REPRESENTATIVE, SUBMIT DRAWINGS SHOWING THE PROPOSED INSTALLATION. IF THE PROPOSED INSTALLATION IS APPROVED, THE CONTRACTOR SHALL MAKE ALL NECESSARY CHANGES INCLUDING LOCATION OF ROUGH-IN CONNECTIONS, ELECTRICAL REQUIREMENTS, PIPING, SUPPORTS, INSULATION, ETC. CHANGES SHALL BE MADE AT NO INCREASE IN THE CONTRACT AMOUNT OR ADDITIONAL COST TO THE OWNER.
- EQUIPMENT OF ONE TYPE (SUCH AS VALVES, FANS, AIR HANDLING UNITS, AIR TERMINALS, PLUMBING FIXTURES, SPRINKLER HEADS, ETC.), SHALL BE THE PRODUCT OF ONE MANUFACTURER.
- EQUIPMENT PREPURCHASED ON BEHALF OF THE OWNER OR BY THE OWNER, IF ASSIGNED TO THE CONTRACTOR, SHALL BE RECEIVED, INSPECTED AND INSTALLED, AS IF IT WAS PURCHASED BY THE CONTRACTOR.
- CONFINE TOOLS, EQUIPMENT, MATERIALS AND CONSTRUCTION TO THE LIMITS INDICATED ON THE DRAWINGS AND/OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
- THE RESPONSIBILITY FOR THE SAFE WORKING CONDITIONS AT THE SITE SHALL REMAIN WITH THE CONTRACTOR. THE OWNER AND OWNER'S REPRESENTATIVE SHALL NOT BE DEEMED TO HAVE ANY RESPONSIBILITY OR LIABILITY IN CONNECTION THEREWITH.

## START-UP AND COMMISSIONING

- ASSIST OWNER IN PREPARING PRIOR TO THE SCHEDULED START-UP DATE. THE PROGRAM WILL CONSIST OF THE DESIGN, START-UP, AND OPERATION OF THE MECHANICAL, PLUMBING, FIRE PROTECTION, AND BUILDING AUTOMATION SYSTEMS.

## MECHANICAL IDENTIFICATION

- PLASTIC TAGS: LAMINATED THREE-LAYER (DOUBLE-SIDED) PLASTIC WITH ENGRAVED BLACK LETTERS ON LIGHT, CONTRASTING BACKGROUND COLOR.
- STENCILS: WITH CLEAN-CUT SYMBOLS AND LETTERS OF FOLLOWING SIZE:

OUTSIDE DIAMETER OR PIPE INSULATION OR PIPE	COLOR FIELD LENGTH	LETTER HEIGHT
3/4" - 1-1/4"	8"	1/2"
1-1/2" - 2"	8"	3/4"
- EQUIPMENT: IDENTIFY EQUIPMENT WITH PLASTIC NAMEPLATES.
- VALVES: IDENTIFY VALVES IN MAIN AND BRANCH PIPING WITH TAGS INDICATING PIPING SYSTEM (P/CWSR, CHWS & RM, NO. SERVED).
- PIPING: IDENTIFY PIPING, CONCEALED OR EXPOSED, WITH STENCILED PAINTING. TAGS MAY BE USED ON SMALL DIAMETER PIPING. IDENTIFY SERVICE, FLOW DIRECTION, AND PRESSURE. INSTALL IN CLEAR VIEW AND ALIGN WITH AXIS OF PIPING. LOCATE IDENTIFICATION NOT MORE THAN 20 FEET APART ON STRAIGHT RUNS INCLUDING RISERS AND DROPS, ADJACENT TO EACH VALVE AND TEE, AT EACH SIDE OF PENETRATION OF STRUCTURE OR ENCLOSURE, AND AT EACH OBSTRUCTION.
- STENCILING AND IDENTIFICATION-STENCIL EACH PIECE OF NEW AND EXISTING EQUIPMENT INCLUDING TANKS, ETC., WITH THE EQUIPMENT TAGS SCHEDULED ON THE DRAWINGS. USE MINIMUM 2" HIGH CHARACTERS.
- IDENTIFY ALL PIPES WITH SPECIFIED MARKERS:
  - INSTALL MARKERS EVERY 10' ON MAINS, AT ALL BRANCH TAKE-OFF AND ADJACENT TO VALVES AND COCKS.
  - INSTALL PIPE MARKER USING PRESSURE SENSITIVE ADHESIVE IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS. THE MARKER SHALL COMPLETELY COVER THE CIRCUMFERENCE OF THE PIPE AND OVERLAP ITSELF.
- PIPE IDENTIFICATION
  - PIPING, EXCEPT THAT PIPING WHICH IS WITHIN INACCESSIBLE CHASES, SHALL BE IDENTIFIED WITH SEMI-RIGID PLASTIC IDENTIFICATION MARKERS. DIRECTION OF FLOW ARROWS ARE TO BE INCLUDED ON EACH MARKER. EACH MARKER BACKGROUND SHALL BE APPROPRIATELY COLOR CODED WITH A CLEARLY PRINTED LEGEND TO IDENTIFY THE CONTENTS OF THE PIPE IN CONFORMANCE WITH THE 'SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS' (ASME A13.1-1981). SNAP-AROUND MARKERS SHALL BE USED FOR OVERALL DIAMETERS UP TO 6" AND STRAP-AROUND MARKERS SHALL BE USED ABOVE 6" OVERALL DIAMETERS. MARKERS SHALL BE LOCATED ADJACENT TO EACH VALVE, AT EACH BRANCH, AT EACH CAP FOR FUTURE, AT EACH RISER TAKE-OFF, AT EACH PIPE PASSAGE THROUGH WALL, AT EACH PIPE PASSAGE AT 20' - 0" INTERVALS MAXIMUM. NON-POTABLE WATER LINES AND OUTLETS SHALL BE IDENTIFIED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CALIFORNIA STATE PLUMBING CODE. IDENTIFICATION SHALL AS REQUIRED IN UC BERKELEY DESIGN STANDARDS 23 50 00, PART 18.
  - VALVE TAGS AND CHARTS
    - PROVIDE VALVE TAGS ON MAIN AND BRANCH PIPING VALVES REGARDLESS OF SERVICE.
    - VALVES SHALL BE DESIGNATED BY DISTINGUISHING NUMBERS AND LETTERS CAREFULLY COORDINATED WITH A VALVE CHART. VALVE TAGS SHALL BE 18 GAUGE POLISHED BRASS, 1 1/2" DIAMETER WITH STAMPED BACK FILLED LETTERS. LETTERING SHALL BE 1/2" HIGH FOR TYPE SERVICE AND 1/2" FOR VALVE NUMBER. TAG SHALL BE ATTACHED TO VALVES WITH APPROVED BRASS "S" HOOKS, OR BRASS JACK CHAIN. WHENEVER A VALVE IS ABOVE A HUNG CEILING, THE VALVE TAG SHALL BE LOCATED IMMEDIATELY ABOVE THE HUNG CEILING. VALVES THAT ARE EQUIPPED WITH CHAIN OPERATORS SHALL HAVE ADDITIONAL TAG SECURED TO THE HOOR OR CHAIN THAT SUPPORTS THE SWAGED CHAIN.
    - FURNISH A MINIMUM OF (2) TYPED VALVE LISTS TO BE FRAMED UNDER GLASS OR PLEXIGLASS. EACH CHART SHALL BE ENCLOSED IN AN APPROVED 0.015" THICK PLASTIC CLOSURE FOR PERMANENT PROTECTION. VALVE NUMBERS SHALL CORRESPOND TO THOSE INDICATED ON THE RECORD DRAWINGS AND ON THE PRINTED VALVE LISTS. THE PRINTED LIST SHALL INCLUDE THE VALVE NUMBER, LOCATION AND PURPOSE OF EACH VALVE. IT SHALL STATE OTHER NECESSARY INFORMATION SUCH AS THE REQUIRED OPENING OR CLOSING OF ANOTHER VALVE WHEN ONE VALVE IS TO BE OPENED OR CLOSED. PRINTED FRAME VALVE LISTS SHALL BE DISPLAYED IN EACH MECHANICAL ROOM OR IN A LOCATION DESIGNATED BY THE OWNER'S REPRESENTATIVE.
- DUCTWORK IDENTIFICATION
  - DUCTWORK (SUPPLY, RETURN, EXHAUST) SERVING MULTIPLE SPACES OR FLOORS SHALL BE IDENTIFIED WITH DIRECTIONAL FLOW ARROWS AND UNIT IDENTIFICATION NUMBERS (I.E., AHU-1, EX-1) ON THE SIDE OF EACH DUCT (OR BOTTOM IF ABUTTING OTHER SYSTEMS OR OBSTRUCTIONS). DUCTWORK STENCILS SHALL BE 2 INCH HIGH LETTERING.
  - LABEL EACH DUCT CONNECTION TO A FUME HOOD WITH THE EXHAUST FAN NUMBER SERVING IT, USING ONE-INCH (1") MINIMUM HEIGHT BLACK LETTERING
- EQUIPMENT NAMEPLATES
  - PROVIDE EQUIPMENT NAMEPLATES WITH UNIT NUMBER AND SERVICE DESIGNATION.
  - EQUIPMENT NAMEPLATES SHALL BE 3/4" X 1 1/2" LONG, 0.02" ALUMINUM WITH A BLACK ENAMEL BACKGROUND WITH ENGRAVED NATURAL ALUMINUM LETTERS. NAMEPLATE SHALL HAVE PRESSURE SENSITIVE TAPE DACKING.
  - THE NAMEPLATE SHALL CONTAIN THE UNIT OR EQUIPMENT DESIGNATION (AHU) FOR AIR HANDLING UNIT, 'FCU' FOR FAN COIL UNIT, 'P' FOR CIRCULATING PUMP, ETC.), UNIT NUMBER AND AREA OR SYSTEM SERVED.
  - NAMEPLATES FOR EXTERIOR EQUIPMENT SHALL BE APPLIED WITH WATERPROOF ADHESIVE.
  - IDENTIFICATION SHALL AS REQUIRED IN UC BERKELEY DESIGN STANDARDS 23 50 00, PART 18.

## DUCT INSULATION

- EXTERNALLY-INSULATED ROUND DUCTWORK, INSULATION SHALL BE 1 1/2" THICK FLEXIBLE GLASS FIBER; ASTM C612; COMMERCIAL GRADE; "K" VALUE OF 0.29 AT 75°F; 0.002-INCH FOIL-SCRIM FACING.
- FOR EXTERNALLY-INSULATED, SQUARE OR RECTANGULAR DUCTWORK, INSULATION SHALL BE 1 1/2" THICK RIGID GLASS FIBER, ASTM C612, CLASS 1, "K" VALUE OF 0.24 AT 75°F; 0.002-INCH FOIL-SCRIM FACING.
- FIRE RATED DUCT WRAP - 3M FIREMASTER, GLT FIRESTOP BLANKET, OR EQUAL. DUCT WRAP SHALL BE UL LISTED FOR AIR DUCTS FOR 1 HOUR AND 2 HOUR APPLICATIONS.
- ADHESIVES: WATERPROOF, FIRE-RETARDANT TYPE.
- INDOOR JACKET: POLYVINYL CHLORIDE (PVC).
- VAPOR BARRIER: NON-FLAMMABLE, FIRE-RESISTANT, POLYMERIC RESIN, COMPATIBLE WITH THE INSULATION.
- LAGGING ADHESIVE: FIRE RESISTIVE IN ACCORDANCE WITH ASTM E84, NFPA 255, UL 723 OR COMPARABLE STANDARD BY ANY NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) RECOGNIZED UNDER 29 CFR 1910.7.
- IMPALE ANCHORS: GALVANIZED STEEL, 12 GAUGE (2.5MM), SELF-ADHESIVE PAD.
- TIRE WIRE: ANNEALED STEEL, 16 GAUGE (1.5MM).
- DO NOT USE ASBESTOS IN ANY FORM.

## PIPE INSULATION

- GLASS-FIBER INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN COMPLYING WITH THE FOLLOWING:
- PREFORMED PIPE INSULATION: 1" THICK FIBERGLASS INSULATION COMPLY WITH ASTM C 547, TYPE I, WITH FACTORY-APPLIED, ALL-PURPOSE, VAPOR-RETARDANT JACKET.
- PREFABRICATED THERMAL INSULATING FITTING COVERS: COMPLY WITH ASTM C 450 FOR DIMENSIONS USED IN PERFORMING INSULATION TO COVER VALVES, ELBOWS, TEES, AND FLANGES.
- TYPE A: GLASS-FIBER INSULATION, ASTM-C-547, "K" VALUE OF 0.24 AT 75°F, NON COMBUSTIBLE.
- TYPE D: EXPANDED PERLITE, ASTM, MAXIMUM WATER-VAPOR TRANSMISSION
- PVC JACKET: HIGH-IMPACT, ULTRAVIOLET-RESISTANT PVC; 20 MILS THICK; ROLL STOCK READY FOR SHOP OR FIELD CUTTING AND FORMING.
- ADHESIVE: AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
- PVC JACKET COLOR: COLOR-CODE PIPING JACKET AS DETERMINED BY EXISTING CONDITIONS.
- SHAPES: 45 AND 90-DEGREE, SHORT AND LONG-RADIUS ELBOWS, TEES, VALVES, FLANGES, REDUCERS, END CAPS, SOIL-PIPE HUBS, TRAPS, MECHANICAL JOINTS,
- ADHESIVE: AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
- ELBOWS: PREFORMED 45 AND 90-DEGREE, SHORT AND LONG-RADIUS ELBOWS; SAME MATERIAL, FINISH, AND THICKNESS AS JACKET.
- INSULATION BANDS: STAINLESS STEEL ASTM A666, TYPE 304, 3/4 INCH WIDE; 0.02 INCH THICK STAINLESS STEEL.
- INSULATE FITTINGS AND VALVES WITH PRE-MOLDED INSULATION.

## CALIFORNIA STATE FIRE MARSHAL

- Approved
- Approved as noted (No resubmittal required)
- Make corrections noted (No resubmittal required)
- Not approved (Revise and resubmit)
- Not reviewed (Insufficient data submitted)

APPROVAL OF THIS PLAN DOES NOT AUTHORIZE OR APPROVE ANY OMISSION OR DEVIATION FROM APPLICABLE REGULATIONS. FINAL APPROVAL IS SUBJECT TO FIELD INSPECTIONS. ONE SET OF APPROVED PLANS SHALL BE AVAILABLE ON THE PROJECT SITE AT THE TIME OF INSPECTION.

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

## DUCTWORK

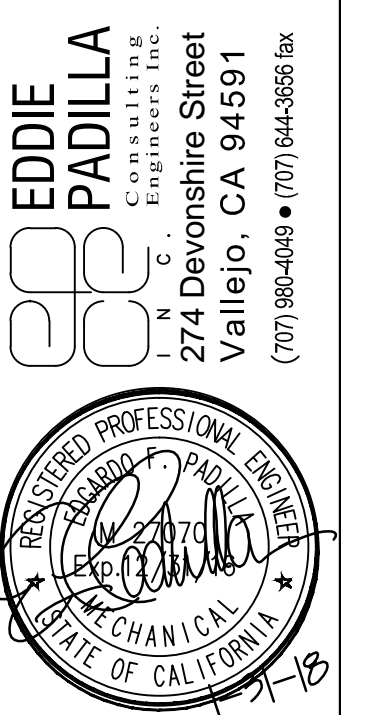
- UNLESS OTHERWISE SPECIFIED HEREIN OR NOTED ON THE DRAWINGS, CONSTRUCT DUCTS, PLENUMS AND ACCESSORIES OF GALVANIZED SHEET STEEL PER SMACNA 1995 DUCT CONSTRUCTION STANDARD (DCS), TABLES 1-3 THROUGH 1-13.
- DUCT DIMENSIONS INDICATED ON THE DRAWINGS ARE CLEAR INSIDE DIMENSIONS. THE SHEET METAL DIMENSIONS SHALL BE INCREASED TO ACCOMMODATE INTERNAL LINER WHERE LINER IS REQUIRED.
- THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE ARRANGEMENTS OF THE PRINCIPAL APPARATUS, DUCTWORK AND PIPING AND SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. BECAUSE OF THE SCALE OF THE DRAWINGS, IT IS NOT POSSIBLE TO SHOW ALL OFFSETS, RISES, DROPS, RISES, FITTINGS AND ACCESSORIES. CAREFULLY INVESTIGATE THE STRUCTURE, FINISH CONDITIONS, AND THE WORK OF OTHER SECTIONS AFFECTING THE WORK AND ARRANGE DUCTWORK, PIPING, EQUIPMENT AND ACCESSORIES, ACCORDINGLY. PROVIDE THE BEST POSSIBLE ARRANGEMENT SO AS TO PROVIDE THE MAXIMUM HEADROOM AND ACCESS TO APPARATUS. THIS WORK SHALL BE INCLUDED IN THE PROJECT WITHOUT EXTRA CHARGE.
- IN ADDITION TO SHEET METAL DUCTWORK PROVIDED UNDER THIS CONTRACT FURNISH AND INSTALL, OR INSTALL AS FURNISHED BY OTHER SECTIONS, ACCESSORIES AND DEVICES INCLUDING SMOKE DETECTORS, PLENUMS, CANOPY HOODS AND BLANK OFF PANELS AT UNUSED LOUVER AREAS.
- DUCT SYSTEMS SPECIFIED TO BE INSTALLED UNDER THIS CONTRACT, SHALL CONFORM TO THE DRAWINGS, SPECIFICATIONS, STANDARDS, DETAILS AND RECOMMENDATIONS OF THE LATEST EDITION OF SMACNA "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE"; AND "ROUND AND INDUSTRIAL DUCT CONSTRUCTION STANDARDS" (HEREINAFTER REFERRED TO AS DUCT MANUAL) WHERE THE REQUIREMENTS UNDER THIS SECTION EXCEED THE REQUIREMENTS OF THE DUCT MANUAL. THE SPECIFICATION SHALL GOVERN. WHEREVER THE WORD "SHOULD" APPEARS, REPLACE WITH THE WORD "SHALL".
- SUBMIT DUCT FABRICATION STANDARDS AND METHODS OF INSTALLATION, IN COMPLIANCE WITH SMACNA AND THESE SPECIFICATIONS. FOR REVIEW BY THE OWNER'S REPRESENTATIVE, CLEARLY INDICATING THE COMBINATION OF METAL GAUGES AND REINFORCEMENT INTENDED FOR USE FOR EACH PRESSURE CLASSIFICATION. DUCT FABRICATION SHALL NOT BE ALLOWED UNTIL A SATISFACTORY REVIEW OF THIS STANDARD HAS BEEN PERFORMED.
- DUCT WORK SHALL BE GALVANIZED STEEL SHEET METAL SHALL CONFORM TO ASTM A653 (G-90) HAVING NOT LESS THAN 0.45 OZ. OF ZINC ON EACH SIDE OF EACH SQUARE FOOT OF SHEET. OTHER DUCT MATERIALS SHALL BE AS HEREINAFTER SPECIFIED AS APPLICABLE TO THIS CONTRACT. DUCTWORK SHALL BE CONSTRUCTED TO 2" W.C. PRESSURE CLASS PER SMACNA STANDARDS.
- JOINT SEALING: REFER TO SMACNA DCS, TABLE 1-2 FOR DUCT SEALING REQUIREMENTS.
  - SEALANT: WATER BASED ELASTOMERIC COMPOUND, GUN OR BRUSH GRADE, MAXIMUM 25 FLAME SPREAD AND 50 SMOKE DEVELOPED (DRY STATE) SPECIFICALLY FOR SEALING DUCTWORK. USE PRODUCTS AS RECOMMENDED BY MANUFACTURER FOR LOW, MEDIUM, OR HIGH PRESSURE SYSTEMS.
  - PROVIDE LIQUID SEALANT, WITH OR WITHOUT COMPATIBLE TAPE, FOR LOW CLEARANCE, SLIP JOINTS AND HEAVY, PERMANENTLY ELASTIC MASTIC TYPE WHERE CLEARANCES ARE LARGER. OIL BASE CAULKING AND GLAZING COMPOUNDS ARE NOT ACCEPTABLE. DESIGN POLYMERIC #1020 OR DURO DYNE DSW, OR EQUAL.
- TAPE: USE ONLY TAPE SPECIFICALLY DESIGNATED BY THE SEALANT MANUFACTURER. SMACNA RECOMMENDS THAT FOIL TAPE NOT BE USED AND THAT PRESSURE SENSITIVE TAPE NOT BE USED ON BARE METAL SURFACE OR ON DRY SEALANT.
- GASKETS: FOR FLANGED JOINTS USE MANUFACTURERS RECOMMENDATION.
- DUCT SEALANT SHALL BE APPLIED TO ALL JOINTS, SEAMS, TAPE, FITTINGS AND CONNECTIONS TO VAV TERMINALS AND CEILING SUPPLY RETURN AND EXHAUST REGISTERS.
- FACTORY MADE JOINTS SUCH AS DUCTMATE OR TDC LOCK-FORMER DUCT JOINT SYSTEMS ARE ACCEPTABLE PROVIDED TEST REPORTS CERTIFY THAT THEY ARE EQUIVALENT TO SMACNA STANDARDS.
- RECTANGULAR DUCT LONGITUDINAL SEAMS SHALL BE PITTSBURGH LOCK 3/8" MINIMUM POCKET.
- DUCT LEAKAGE SHALL NOT EXCEED 8% FOR TOTAL AC UNIT AIRFLOW CAPACITY.
- ROD SUPPORT FOR EXPOSED DUCT SHALL HAVE METAL STIFFENERS. REFER TO SMACNA STANDARDS.

## FLEXIBLE DUCT

- FLEXIBLE DUCT SHALL BE FLEXMASTER TYPE 8, THERMAFLEX TYPE M-KE, OR EQUAL. FLEXIBLE DUCT (INSULATED) SHALL BE UL 181, CLASS 1 LISTED AIR DUCT AND CONSTRUCTED IN ACCORDANCE WITH NFPA 90A AND 90B. IT SHALL HAVE A SMOKE/FLAME SPREAD RATING OF 50/25.
- DUCT MATERIAL SHALL BE OF A SOUND TRANSPARENT FOIL. THE MATERIAL SHALL BE MECHANICALLY LOCKED TO THE OUTSIDE HELIX. (USE OF ADHESIVES TO LOCK FABRIC IN PLACE ARE UNACCEPTABLE.) THE HELIX IS CONSTRUCTED OF A CORROSIVE RESISTANT GALVANIZED STEEL, FORMED AND MECHANICALLY LOCKED TO THE DUCT FABRIC ON THE OUTSIDE TO PREVENT TEARING OF THE FLEXIBLE DUCT.
- INSULATED FLEX SHALL HAVE A GRAY FIRE RETARDANT POLYETHYLENE OUTER JACKET WITH AN 80Z DENSITY, 1 1/2" THICK FIBERGLASS INSULATION BLANKET, FACTORY WRAPPED.
- THE FLEXIBLE DUCT SHALL BE SUPPORTED AS REQUIRED TO PREVENT SAGGING. FLEXIBLE DUCT WITH EXCESSIVE SAGGING WILL NOT BE APPROVED.
- FLEXIBLE DUCT SHALL BE 5 FEET MAXIMUM.

REVISIONS	BY
90% CDs	02.05.18 EP

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## SPECIFICATIONS

UC Berkeley  
**Cory 333 & 337**  
Office Renovation  
Berkeley, CA  
Proj. No.: 17408A  
CAAN: 1325

DATE	FEBRUARY 2018
SCALE	AS NOTED
DRAWN BY	EPCE
JOB	Cory Rm 333
SHEET	

# M5.1



HANGERS AND SUPPORTS

1.1 GENERAL

- A. FURNISH AND INSTALL HANGERS, SUPPORTS AND ASSEMBLIES FOR THE MECHANICAL SYSTEMS. THIS SHALL INCLUDE PIPING, DUCTS AND EQUIPMENT SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS
B. IN ADDITION TO SPECIAL HANGERS AND SUPPORTS SPECIFIED ELSEWHERE IN THIS SECTION AND SHOWN ON THE DRAWINGS FOR DUCTS, PIPING AND EQUIPMENT, FURNISH AND INSTALL SAFE AND SUBSTANTIAL MEANS OF SUPPORT FOR THE MECHANICAL SYSTEMS. SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL FOR ALL SUPPORTS, PIPING, DUCTWORK, EXHAUST PIPE, HANGERS AND SUPPORTS IN MECHANICAL ROOMS, PENTHOUSES AND ENERGY PLANT SHALL BE INSTALLED WITH VIBRATION ISOLATORS AND SEISMIC RESTRAINTS.
C. MATERIALS SHALL BE NEW AND MANUFACTURED FOR THE SPECIFIC PURPOSE OF SUPPORTING SYSTEMS, EQUIPMENT, PIPES, DUCTS, CONDUITS AND ACCESSORIES.
D. SYSTEM COMPONENTS SHALL BE INSTALLED IN ACCORDANCE WITH LOCAL CODES INCLUDING VIBRATION ISOLATION AND SEISMIC RESTRAINT AS REQUIRED AND SPECIFIED UNDER SECTIONS 15240 AND 15245.

1.3 REFERENCES

- A. APPLICABLE PROVISIONS OF THE FOLLOWING CODES AND TRADE STANDARD PUBLICATIONS SHALL APPLY TO THE WORK OF THIS SECTION, AND ARE HEREBY INCORPORATED INTO, AND MADE A PART OF THE CONTRACT DOCUMENTS.
B. MATERIAL STANDARDS SHALL BE AS SPECIFIED OR DETAILED HEREINAFTER AND AS FOLLOWING:
1. ASME B31.9 - BUILDING SERVICES PIPING, THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, 1998 (WITH 1991 AGENDA).
2. ASHRAE 1992 SYSTEMS AND EQUIPMENT HANDBOOK, CHAPTER 42.
3. ASTM F 708 - STANDARD PRACTICE FOR DESIGN AND INSTALLATION OF RIGID PIPE HANGERS, 1992.
4. MSS SP-58 - PIPE HANGERS AND SUPPORTS - MATERIALS, DESIGN AND MANUFACTURE, MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, 1993.
5. MSS SP-69 - PIPE HANGERS AND SUPPORTS - SELECTION AND APPLICATION; MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE FITTINGS INDUSTRY, 1991.
6. MSS SP-89 - PIPE HANGERS AND SUPPORTS - FABRICATION AND INSTALLATION PRACTICES; MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, 1991.
7. SMACNA SEISMIC RESTRAINT GUIDELINES.

1.4 SUBMITTALS

- A. PROVIDE SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
B. BRACKETS AND HANGERS SHALL BE SUBMITTED FOR REVIEW. INCLUDE THE METHOD OF HANGING AND SUPPORTING PIPING, DUCTWORK AND EQUIPMENT.
C. THE OWNER'S REPRESENTATIVE IS TO BE NOTIFIED WHEN THE FIRST BRACKET IS ASSEMBLED SO THAT THE INSTALLATION CAN BE INSPECTED IN THE FIELD.
D. PROVIDE LOCATION OF INSERTS TO BE USED FOR HANGING DUCTWORK, PIPING AND EQUIPMENT AND THE WEIGHT OF COMPONENTS (INCLUDING WATER WEIGHT).

1.5 QUALITY ASSURANCE

- A. MANUFACTURER, COMPANY SPECIALIZING IN MANUFACTURING OF PRODUCTS SPECIFIED IN THIS SECTION, WITH DOCUMENTED EXPERIENCE OF MORE THAN TEN (10) YEARS.
B. INSTALLER, COMPANY SPECIALIZING IN EXECUTING THE SCOPE OF WORK SPECIFIED IN THIS SECTION, WITH DOCUMENTED EXPERIENCE OF MORE THAN FIVE (5) YEARS.
C. WELDERS: CERTIFIED IN ACCORDANCE WITH ASME.
D. PROVIDE CERTIFICATE OF COMPLIANCE FROM AUTHORITY HAVING JURISDICTION, INDICATING APPROVAL OF WELDERS.

QUALITY STANDARDS

- 1. INSTALLATION: CONFORM TO ASME B31.9 CODE FOR INSTALLATION OF PIPING SYSTEM AND ASTM F708 FOR DESIGN AND INSTALLATION OF PIPE HANGERS.
2. WELDING MATERIALS AND PROCEDURES: CONFORM TO ASME (BPV IX) AND APPLICABLE STATE LABOR REGULATIONS.
3. PIPING SHALL BE HUNG TO TRUE ALIGNMENT, USING APPROPRIATE AND SUBSTANTIAL HANGER ARRANGEMENTS, WIRE AND STRAP HANGERS WILL NOT BE PERMITTED. HANGERS SHALL BE LOCATED SO THAT PIPING AND HANGERS WILL BE CLEAR OF OTHER PIPING, HANGERS, CONDUITS, LIGHTING AND OTHER OBSTRUCTIONS.
4. THE HANGING AND SUPPORTING OF PIPING AND EQUIPMENT SHALL CONFORM TO RECOMMENDATIONS OF THE MANUFACTURERS OF SAME AND AMERICAN NATIONAL STANDARD, ANSISMS SP-58 AND SP-69 LATEST EDITION, EXCEPT WHERE REQUIREMENTS OF THIS SPECIFICATION EXCEED THE ABOVE REFERENCED STANDARDS.
5. DUCTWORK SHALL BE SUPPORTED PER SMACNA GUIDELINES.

2.1 HANGERS AND SUPPORTS

- A. PIPE SUPPORTS SHALL BE OF TYPE AND FIGURE NUMBER AS SPECIFIED.
B. MANUFACTURERS SHALL BE B-LINE, CARPENTER & PATTERSON, GRINNELL, OR EQUAL. PRODUCTS OF A SINGLE MANUFACTURER ARE LISTED BELOW TO ESTABLISH MINIMUM STANDARDS.
C. BRACKET ASSEMBLIES FOR SUPPORTING PIPING ARE TO BE FABRICATED BY WELDING AND IRREGULAR SURFACES ARE TO BE SMOOTHED UP BY GRINDING AND APPROVED BY THE OWNER'S REPRESENTATIVE. SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW FOR EACH TYPE BRACKET. THE OWNER'S REPRESENTATIVE IS TO BE NOTIFIED WHEN THE FIRST BRACKET IS ASSEMBLED SO THAT INSTALLATION CAN BE INSPECTED IN THE FIELD. EXPOSED HANGERS, SUPPORTS AND BRACKETS ARE TO BE GIVEN (2) COATS OF RUST RESISTANT PAINT OF THE COLOR AS SELECTED BY THE OWNER'S REPRESENTATIVE. ADDITIONALLY, PROVIDE FOR OWNER'S REPRESENTATIVE'S REVIEW, THE FOLLOWING:
1. METHOD OF HANGING AND SUPPORT OF PIPING, DUCTS AND OTHER EQUIPMENT.
2. LOCATION OF SUPPORT ANCHORS TO BE USED FOR HANGING DUCTWORK, PIPING AND EQUIPMENT TO BE HUNG INCLUDING THE WEIGHT OF WATER, VALVES AND INSULATION.
D. PIPE SUPPORTS SHALL BE OF TYPE AND ARRANGEMENT AS HEREINAFTER SPECIFIED. THEY SHALL BE SO ARRANGED AS TO PREVENT EXCESSIVE BENDING STRESSES BETWEEN SUPPORTS.
E. BRACKET CLAMP AND ROD SIZES INDICATED IN THIS SPECIFICATION ARE MINIMUM SIZES ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR STRUCTURAL INTEGRITY OF ALL SUPPORTS. STRUCTURAL HANGING MATERIALS SHALL HAVE A SAFETY FACTOR OF (5) BUILT IN. BEAM CLAMPS SHALL BE 2 SIDED STEEL CLAMPS, WITH LISTED SAFETY STRAPS, DESIGNED TO FIRMLY ATTACH TO THE FLANGE OF THE BEAM WITH THE LOAD DIRECTED DOWNWARD ON THE CENTERLINE OF THE BEAM WEB. BEAM CLAMPS SHALL BE B-LINE #B3055, OR EQUAL.
F. OTHER FORMS OF HANGERS AND SUPPORTS SHALL BE USED TO ACCOMMODATE SPECIAL OR UNUSUAL JOB CONDITIONS OR CONDITIONS NOT COVERED HEREIN, SUBJECT TO THE APPROVAL OF THE OWNER'S REPRESENTATIVE. WHEN SPECIAL CONDITIONS REQUIRE THE USE OF CONCRETE INSERTS WHICH ARE NOT "BUILT IN", SUCH INSERTS MAY BE USED IN LOCATIONS APPROVED BY THE OWNER'S REPRESENTATIVE AND SHALL BE PHILLIPS "RED HEAD", HILTI, OR EQUAL. EXPLOSIVE POWDER STUDS OR DETONATOR ASSISTED STUDS OR ANCHORS WILL NOT BE PERMITTED.
G. PIPES SHALL BE HUNG FREE OF DEPENDENCE ON PIPE SLEEVES FOR SUPPORT.
H. THREADED PIPE, CHAINS, WIRE AND PERFORATED STRAPS WILL NOT BE ACCEPTED. NO PIPING SHALL BE SUPPORTED FROM DUCTWORK, CONDUIT OR OTHER PIPING. SYSTEM COMPONENTS AND EQUIPMENT SHALL BE INDEPENDENTLY SUPPORTED. STAGGER AND DISTRIBUTE HANGERS ON PARALLEL PIPING TO AVOID OVERLOADING OF EXISTING CONSTRUCTION.
I. HANGERS AND SUPPORTS USED FOR SYSTEMS EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153-73 OR A123. RODS AND NUTS SHALL BE ELECTRO-GALVANIZED.
J. HORIZONTAL WATER, DRAIN, WASTE, VENT AND RAINWATER PIPING SHALL BE HUNG WITH CLEVIS STEEL HANGERS, B-LINE #B3100 OR EQUAL. GROUPS OF PIPES IN THE SAME HORIZONTAL PLANE AND WITH THE SAME PITCH MAY BE SUPPORTED ON B-LINE #3160 OR EQUAL GANG HANGERS. WALL BRACKETS SHALL BE B-LINE #B3066 AND #B3077 OR EQUAL. INSTALL HANGERS ON BOTH SIDES OF EACH HUBLESS COUPLING ON STRAIGHT RUNS OF CAST IRON PIPE.
K. UNLESS OTHERWISE NOTED, MAXIMUM PIPE HANGER SPACING SHALL NOT EXCEED THE RECOMMENDATIONS OF THE PIPE MANUFACTURER AND THE FOLLOWING:
1. FOR 1 1/2" AND SMALLER COPPER PIPES: 6'-0" O.C.
2. FOR 2" AND LARGER COPPER PIPES: 10'-0" O.C.
3. IN ADDITION, HANGERS SHALL BE INSTALLED WITHIN 2'-0" OF EACH CHANGE IN DIRECTION AND ON EACH SIDE OF VALVES 3" IN SIZE AND UP.
4. PIPE SUPPORTS SHALL COMPLY WITH CMC 2016 TABLE 313.3.

M. HANGER RODS SHALL BE OF STEEL AND NOT LESS IN DIAMETER THAN:

- 1. FOR PIPE 3" AND UNDER: 3/8"
2. FOR PIPE 6" AND UNDER: 1/2"
3. FOR PIPE 8" TO 10": 5/8"
N. CHILLED WATER PIPING SHALL BE INSULATED WITH B-LINE #B3380CW OR EQUAL HIGH DENSITY HYDROUS CALCIUM SILICATE SHIELDS WHERE HANGERS OCCUR. SPECIAL CARE SHALL BE EXERCISED TO ASSURE A CONTINUOUS VAPOR BARRIER INSTALLATION TO PROTECT THE SYSTEM AND PREVENT SWEATING.
O. PIPES SUSPENDED AT AN ELBOW SHALL BE HUNG USING GRINNELL #HS 93 OR EQUAL PLATE LUGS WITH B-LINE #B3201 OR EQUAL FORGED STEEL CLEVIS.
D. SPRING HANGER LOCATIONS SHALL BE PROVIDED AS SPECIFIED HEREIN, UNDER VIBRATION ISOLATION, AND SHALL BE PRE-ENGINEERED TO MEET LOADS AND MOVEMENTS IN ACCORDANCE WITH ANSI B.31.1.10, WHERE APPLICABLE.
E. DROP RODS FOR HANGERS MAY BE USED WHEREVER POSSIBLE AND SHALL BE INSTALLED PRIOR TO SLABS BEING POURED. DROP ROD DETAILS SHALL BE SUBMITTED TO THE OWNER'S REPRESENTATIVE FOR REVIEW.
F. HANGERS USED ON UNINSULATED COPPER PLUMBING PIPE SHALL BE FELT LINED.

3.1 INSTALLATION

- A. HANGERS AND SUPPORTS
1. INSTALL IN ACCORDANCE WITH ASME B31.9, ASTM F 708, OR MSS SP-89 OR NFPA-13.
2. INSTALL HANGERS TO PROVIDE MINIMUM 1/4" INCH SPACE BETWEEN FINISHED COVERING AND ADJACENT WORK.
3. PLACE HANGERS WITH 24 INCHES OF EACH HORIZONTAL ELBOW AND ON EACH SIDE OF VALVES 3" IN SIZE AND UP.
4. USER HANGERS WITH 1-1/2" INCH MINIMUM VERTICAL ADJUSTMENT. DESIGN HANGERS FOR PIPE MOVEMENT WITHOUT DISENGAGEMENT OF SUPPORTED PIPE.
5. SUPPORT PIPING TO PREVENT EXCESSIVE STRESS AND STRAIN.
6. SUPPORT VERTICAL PIPING AT EVERY FLOOR. SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZONTAL PIPING. CAST IRON NO-HUB PIPING SHALL HAVE SUPPORT AT BASE OF VERTICAL STACKS IN ACCORDANCE WITH THE CALIFORNIA PLUMBING CODE TABLE 3.2.
7. WHERE SEVERAL PIPES CAN BE INSTALLED IN PARALLEL AND AT THE PITCH AND SAME ELEVATION, PROVIDE MULTIPLE OR TRAPEZE HANGERS. CHILLED WATER, HOT WATER, STEAM AND CONDENSATE PIPING SHALL NOT BE INSTALLED TOGETHER ON TRAPEZE HANGERS.
8. PRIME COAT (2 COATS RUST INHIBITIVE PAINT) EXPOSED STEEL HANGERS AND SUPPORTS. HANGERS AND SUPPORTS LOCATED IN CRAWL SPACES, PIPE SHAFTS, AND SUSPENDED CEILING SPACES ARE NOT CONSIDERED EXPOSED.
B. PROVIDE CLEARANCE IN HANGERS AND FROM STRUCTURE AND OTHER EQUIPMENT FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS. REFER TO SECTION 15083.
C. PROVIDE ACCESS WHERE VALVES, DAMPERS AND CONTROLLERS ARE NOT EXPOSED. (COORDINATE SIZE AND LOCATION OF ACCESS DOORS).
D. SLOPE PIPING AND ARRANGE SYSTEMS TO DRAIN AT LOW POINTS. USE ECCENTRIC REDUCERS ON HORIZONTAL HYDRONIC PIPING TO MAINTAIN TOP OF PIPE LEVEL.
E. WHERE PIPE SUPPORT MEMBERS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAPE, BRUSH CLEAN AND APPLY TWO COATS OF ZINC RICH PRIMER TO WELDS.
F. PREPARE EXPOSED UNFINISHED PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES, READY FOR FINISH PAINTING.

MECHANICAL SEISMIC RESTRAINTS

1.1 GENERAL

- A. FURNISH AND INSTALL NECESSARY SEISMIC RESTRAINTS FOR MECHANICAL PIPING, DUCTWORK, AND EQUIPMENT IN ACCORDANCE WITH THE CALIFORNIA BUILDING CODE AND THE REQUIREMENTS OF THIS SPECIFICATION.
B. THE WORK IN THIS SECTION SHALL INCLUDE THE FOLLOWING:
1. SEISMIC RESTRAINTS FOR ISOLATED EQUIPMENT AND PIPING.
2. SEISMIC RESTRAINTS FOR NON-ISOLATED EQUIPMENT AND PIPING.

1.2 SUBMITTALS

- A. THE SUBMITTAL SHALL BE PREPARED AND STAMPED BY A CIVIL OR STRUCTURAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA.
B. THE FOLLOWING INFORMATION SHALL BE INCLUDED FOR EACH PIECE OF EQUIPMENT OR SYSTEM: DIMENSIONS, WEIGHT AND CENTER OF GRAVITY, CALCULATION, THE SEISMIC RESTRAINT DETAIL, INCLUDING ANCHORING METHODS APPROPRIATE FOR THE SUPPORTING STRUCTURE.
B. QUALIFICATIONS
1. MANUFACTURER, COMPANY SPECIALIZING IN THE DESIGN AND MANUFACTURING OF SEISMIC RESTRAINTS SPECIFIED IN THIS SECTION, WITH DOCUMENTED EXPERIENCE OF MORE THAN FIVE (5) YEARS.
2. INSTALLER, COMPANY SPECIALIZING IN EXECUTING THE SCOPE OF WORK SPECIFIED IN THIS SECTION WITH DOCUMENTED EXPERIENCE OF MORE THAN FIVE (5) YEARS.
C. QUALITY STANDARDS: UPON COMPLETION OF SEISMIC RESTRAINT INSTALLATION, THE CONTRACTOR AND THE ANCHORAGE ENGINEER SHALL INDICATE THAT, TO THE BEST OF THEIR KNOWLEDGE, THE SEISMIC ANCHORAGE WAS INSTALLED ACCORDING TO THE APPROVED SUBMITTAL AND ANY APPROVED REVISIONS THERETO. THIS REPORT SHALL ALSO IDENTIFY CHANGES MADE FROM THE APPROVED SUBMITTAL. REPORTS MAY BE SUBMITTED BY SYSTEM, OR BY LINE GROUPS OF COMPONENTS, OR FOR THE ENTIRE INSTALLATION COVERED BY THIS SPECIFICATION SECTION.

1.3 SEISMIC RESTRAINT REQUIREMENTS

- A. GENERAL
1. FLOOR OR ROD MOUNTED MECHANICAL EQUIPMENT, REGARDLESS OF WEIGHT OR VIBRATION ISOLATION REQUIREMENTS, SHALL BE RESTRAINED TO THE STRUCTURE TO ALLOW FOR REQUIRED ACCELERATION.
2. DESIGN OF RESTRAINTS MUST CONSIDER CAPACITY OF STRUCTURAL ELEMENTS. PROJECT STRUCTURAL ENGINEER SHALL BE CONSULTED PRIOR TO DESIGN OF RESTRAINTS FOR LARGE OR UNUSUAL LOADS.
B. PIPING RESTRAINT REQUIREMENTS
1. PIPE BRACING SHALL BE: 40'-0" MAXIMUM TRANSVERSELY; 80'-0" MAXIMUM LONGITUDINALLY; AND WITHIN 4'-0" EACH CHANGE OF DIRECTION. LONGITUDINAL RESTRAINTS SHALL BE COORDINATED WITH PIPE ANCHOR AND GUIDE LOCATIONS NECESSARY TO CONTROL THERMAL EXPANSION.
2. SEISMIC RESTRAINTS ARE NOT REQUIRED ON THE FOLLOWING:
a. PIPING LESS THAN 1 1/2", WITHIN MECHANICAL EQUIPMENT ROOMS.
b. OTHER PIPING LESS THAN 2 1/2".
c. THE EXCLUSION FOR BRACING COVERED BY FOOTNOTE 14 OF TABLE 16-0 OF THE CBC CAN ONLY BE USED FOR PIPES AND DUCTS WITH HANGERS LESS THAN 12" IN LENGTH.
3. SUSPENDED PIPE, NOT EXCLUDED BY DIAMETER OR DISTANCE FROM STRUCTURE ALLOWANCES, SHALL HAVE SEISMIC RESTRAINT.
4. TRAPEZE HANGERS SUPPORT PIPING WHERE EACH INDIVIDUAL ELEMENT DOES NOT REQUIRE BRACING, WILL REQUIRE SEISMIC RESTRAINT WHEN THE AGGREGATE WEIGHT OF ALL ELEMENTS SUPPORTED ON THE TRAPEZE ASSEMBLY EXCEEDS 10 POUNDS PER FOOT. WEIGHT SHALL BE DETERMINED ASSUMING ALL PIPES AND CONDUIT ARE FILLED WITH WATER.

- C. ISOLATED EQUIPMENT RESTRAINT REQUIREMENTS: PROVIDE SEISMIC RESTRAINT FOR VIBRATION ISOLATORS FOR PUMP.
D. NON-ISOLATED EQUIPMENT RESTRAINT REQUIREMENTS

2.1 SEISMIC RESTRAINT - GENERAL

- A. MANUFACTURER OF VIBRATION ISOLATOR TYPE SEISMIC RESTRAINT SHALL BE MASON INDUSTRIES (MI), VIBREX, AMBER-BOOTH (AB), KINETICS NOISE CONTROL (KNC), VIBRATION ELIMINATOR CO. (VEC), VIBRATION MOUNTINGS & CONTROLS (VMC), OR EQUAL. PRODUCTS OF MASON INDUSTRIES ARE LISTED BELOW TO ESTABLISH MINIMUM STANDARDS.
B. SEISMIC RESTRAINTS SHALL BE CAPABLE OF ACCEPTING, WITHOUT FAILURE, SEISMIC FORCES DETERMINED IN ACCORDANCE WITH THE CALIFORNIA STATE BUILDING CODE. THEY SHALL MAINTAIN THE EQUIPMENT IN A CAPTIVE POSITION AND NOT SHORT CIRCUIT ISOLATION DURING NORMAL OPERATING CONDITIONS. ISOLATORS SHALL HAVE PROVISIONS FOR BOLTING AND/OR WELDING TO THE STRUCTURE.
C. METAL PARTS OF SEISMIC RESTRAINT EQUIPMENT INSTALLED OUT-OF-DOORS SHALL BE COLD DIP GALVANIZED, CADMIUM PLATED, OR NEOPRENE OR PVC COATED AFTER FABRICATION. GALVANIZING SHALL MEET ASTM ALT SPRAY TEST STANDARDS AND FEDERAL TEST STANDARD #14.

CALIFORNIA STATE FIRE MARSHAL

Approval stamp and signature area for California State Fire Marshal, including checkboxes for 'Approved', 'Approved as noted', 'Make corrections noted', 'Not approved', and 'Not reviewed'. Includes a signature line and date field.

TESTING, ADJUSTING AND BALANCING

THE TAB CONTRACTOR SHALL PROVIDE LABOR, INSTRUMENTS AND MATERIALS NECESSARY TO COMPLETELY TEST, ADJUST AND BALANCE HVAC SYSTEMS AND EQUIPMENT INSTALLED UNDER THIS CONTRACT.

- 1. REFERENCES:
A. AABC MN-1 NATIONAL STANDARD FOR TESTING AND BALANCING HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS, 1989.
B. ASHRAE 111 - PRACTICES FOR MEASUREMENT, TESTING, ADJUSTING AND BALANCING OF BUILDING HEATING, VENTILATION, AIR-CONDITIONING AND REFRIGERATION SYSTEMS, 1988.
2. SUBMITTALS
A. FIELD REPORTS: INDICATE DEFICIENCIES, RECOMMEND IN SYSTEMS THAT WOULD PREVENT PROPER TESTING, ADJUSTING AND BALANCING OF SYSTEMS.
B. PRIOR TO COMMENCING WORK, SUBMIT REPORT FORMS OR OUTLINES INDICATING ADJUSTING, BALANCING AND EQUIPMENT DATA REQUIRED.
C. PROVIDE REPORTS IN LETTER SIZE, 3 RING BINDER MANUAL, COMPLETE WITH INDEX PAGE AND INDEXING TABS WITH COVER IDENTIFICATION AT FRONT AND SIDE. INCLUDE SET OF REDUCED DRAWINGS WITH AIR OUTLETS AND EQUIPMENT IDENTIFIED TO CORRESPOND WITH DATA SHEETS AND INDICATING THERMOSTAT LOCATIONS.
D. TEST REPORTS: INDICATE DATA ON AABC MN-1 FORMS, FORMS PREPARED FOLLOWING ASHRAE 111, OR FORMS CONTAINING INFORMATION INDICATED IN SCHEDULES.
E. INCLUDE THE FOLLOWING ON THE TITLE PAGE OF EACH REPORT.
a. NAME OF TESTING, ADJUSTING AND BALANCING AGENCY.
b. ADDRESS OF TESTING, ADJUSTING AND BALANCING AGENCY.
c. TELEPHONE NUMBER OF TESTING, ADJUSTING AND BALANCING AGENCY.
d. PROJECT NAME.
e. PROJECT LOCATION.
f. PROJECT UNIVERSITY'S REPRESENTATIVE.
g. PROJECT ENGINEER.
h. PROJECT CONTRACTOR.
i. REPORT DATE.
3. QUALITY ASSURANCE
A. TESTING AND BALANCING AGENCY SHALL BE A MEMBER OF AABC WITH A MINIMUM OF TEN (10) YEARS OF DOCUMENTED EXPERIENCE.
B. AN AABC CERTIFIED TESTING AND BALANCE ENGINEER (TBE) SHALL BE RESPONSIBLE FOR CERTIFICATION OF THE TOTAL WORK OF THIS SECTION.
4. SYSTEM DESCRIPTION
A. THIS PROJECT REQUIRES THE BALANCING OF NEW FAN COIL UNITS.
B. PROVIDE THE SERVICES OF AN INDEPENDENT TEST AND BALANCE FIRM THAT SPECIALIZES IN TESTING AND BALANCING OF HVAC SYSTEMS. THE FOLLOWING SERVICES SHALL BE PROVIDED:
a. PERFORM AIR AND WATER SYSTEM TESTING, ADJUSTING AND BALANCING FOR THE NEW FAN COIL UNITS.
b. PERFORM FUNCTIONAL TESTING FOR THE NEW FAN COIL UNITS.
6. NOTIFICATION AND SCHEDULING
A. THE SCHEDULE FOR TESTING AND BALANCING THE HVAC SYSTEM SHALL BE ESTABLISHED BY THE UNIVERSITY, IN COORDINATION WITH THE TESTING AND BALANCING AGENCY, AND APPROVED BY THE UNIVERSITY'S REPRESENTATIVE.
B. THE TESTING AND BALANCING AGENCY IS RESPONSIBLE FOR INITIATING THIS CONTINUING COORDINATION TO DETERMINE SCHEDULE FOR FINAL TESTING AND BALANCING SERVICES.
C. BEFORE TESTING AND BALANCING COMMENCES, THE TESTING AND BALANCING AGENCY SHALL RECEIVE NOTIFICATION, IN WRITING, FROM THE UNIVERSITY THAT THE SYSTEM IS OPERATIONAL, COMPLETE, AND READY FOR BALANCING.
7. GENERAL
A. THE TAB CONTRACTOR SHALL PROVIDE ALL TESTING INSTRUMENTS USED FOR BALANCING AIR AND WATER SYSTEMS. TESTING INSTRUMENTS SHALL HAVE BEEN CALIBRATED WITHIN A PERIOD OF SIX (6) MONTHS PRIOR TO BALANCING. TYPES, SERIAL NUMBERS AND DATES OF CALIBRATION OF ALL INSTRUMENTS SHALL BE LISTED IN THE FINAL AIR BALANCE REPORTS HEREIN SPECIFIED.
B. IN THE EVENT IT BECOMES NECESSARY FOR THE UNIVERSITY TO BALANCE THE HVAC SYSTEMS CORRECTLY, AFTER THE BALANCING IS COMPLETE, THE COST OF THIS WORK WILL BE BACK CHARGED TO THE TAB CONTRACTOR.
8. THE TAB CONTRACTOR SHALL PREPARE SCHEMATIC DIAGRAMMATIC DRAWINGS FOR THE FOLLOWING:
A. ALL FAN COIL UNITS.
B. THE DRAWINGS WILL BE 1-LINE AIRFLOW SCHEMATICS. THE DRAWINGS SHALL INDICATE THE AIR QUANTITIES MEASURED AT AIR OUTLETS, INLETS, AND TEMPERATURE SETPOINT.
C. IN ADDITION TO THE DUCT SCHEMATIC DRAWINGS, THE TAB CONTRACTOR SHALL PREPARE INDIVIDUAL SCHEMATIC DRAWINGS FOR EACH FAN COIL UNIT INDICATING THE UNIT CFM, TOTAL PRESSURE DROP, BHP, MOTOR FLA, RPM. THE DRAWINGS SHALL BE PRODUCED ON AUTOCAD RELEASE 2010 (OR HIGHER), AND A DISC AND ONE (1) SET OF REPRODUCIBLE YELLOWS SHALL BE SUBMITTED TO THE UNIVERSITY THROUGH THE ARCHITECT. FOR HIS USE. ALL COSTS ASSOCIATED WITH THE PRODUCTION OF THE DOCUMENTS SHALL BE INCLUDED UNDER THE BALANCING CONTRACTOR'S CONTRACT.
9. WATER SYSTEM BALANCING AND TESTING PROCEDURES
A. OPEN ALL VALVES TO FULL POSITION, INCLUDING COIL STOP VALVES, RETURN LINE BALANCING COCKS AND ALL BYPASS VALVES, INCLUDING SYSTEM DIFFERENTIAL PRESSURE BYPASS VALVE IF APPLICABLE.
B. REMOVE, CLEAN AND/OR REPLACE ALL STRAINERS.
C. EXAMINE WATER IN SYSTEM TO DETERMINE IF IT HAS BEEN TREATED AND IS CLEAN.
D. CHECK ALL AIR VENTS AT HIGH POINTS OF WATER SYSTEMS TO MAKE SURE THEY ARE INSTALLED PROPERLY AND ARE OPERATING FREELY.
E. MAKE CERTAIN ALL AIR IS REMOVED FROM CIRCULATING SYSTEM.
F. CHECK AND SET OPERATING TEMPERATURE OF SYSTEMS TO DESIGN REQUIREMENTS.
G. COMPLETE AIR BALANCING MUST HAVE BEEN ACCOMPLISHED BEFORE WATER BALANCE IS BEGUN.
H. SET ALL TEMPERATURES CONTROLS SO THAT ALL COOLING COILS ARE CALLING FOR FULL COOLING.
I. SET CHILLED WATER AND CONDENSER WATER SYSTEMS TO PROPER GPM DELIVERY.
J. CHECK LEAVING WATER TEMPERATURE, RETURN WATER TEMPERATURE AND PRESSURE DROP THROUGH ALL COILS. RESET TO CORRECT DESIGN TEMPERATURES.
K. BALANCE EACH CHILLED WATER COIL AND ALL OTHER HEATING ELEMENTS.
L. AFTER MAKING ADJUSTMENTS TO COILS AND OTHER HEATING ELEMENTS, RESET SETTING AT PUMPS, AS REQUIRED TO OBTAIN PROPER FLOWS.
M. DETERMINE SYSTEM OPERATING DIFFERENTIAL PRESSURE, SET ANY DIFFERENTIAL PRESSURE VALVES FOR PROPER OPERATION.
N. UPON COMPLETION OF FLOW READINGS AND COIL ADJUSTMENTS, AND AFTER WATER BALANCE IS COMPLETE, PERMANENTLY MARK ALL BALANCING VALVES, COCKS AND FLOW METERS SO THAT THEY CAN BE RESTORED TO THEIR CORRECT POSITION IF DISTURBED. PROPERLY SET MEMORY STOP ON ALL BALANCING VALVES SO EQUIPPED.
O. AFTER THE BALANCING CONTRACTOR SETS ALL WATERFLOW BALANCING DEVICES TO PROPER DESIGN GPM, HE SHALL MARK THE GPM FLOWS ON THE PIPING SCHEMATIC DRAWINGS.
10. SYSTEM PERFORMANCE VERIFICATION
A. AT THE TIME OF FINAL INSPECTION, THE TEST AND BALANCE AGENCY SHALL RECHECK, IN THE PRESENCE OF THE UNIVERSITY'S REPRESENTATIVE, SPECIFIC AND RANDOM SELECTIONS OF DATA, AIR QUANTITIES, AND AIR MOTION RECORDED IN THE CERTIFIED REPORT.
B. POINTS AND AREAS FOR RECHECK SHALL BE SELECTED BY THE OWNER'S REPRESENTATIVE.
C. MEASUREMENT AND TEST PROCEDURES SHALL BE THE SAME AS APPROVED FOR WORK FORMING BASIS OF CERTIFIED REPORT.
D. SELECTIONS FOR RECHECK, SPECIFIC PLUS RANDOM, WILL NOT NORMALLY EXCEED 25% OF THE TOTAL NUMBER TABULATED IN THE REPORT, EXCEPT THAT SPECIAL AIR SYSTEMS MAY REQUIRE A COMPLETE RECHECK FOR SAFETY REASONS.
E. FOLLOWING SYSTEM VERIFICATION OF THE CERTIFIED REPORT BY THE OWNER'S REPRESENTATIVE, THE SETTINGS OF ALL VALVES, SPLITTERS, DAMPERS, AND OTHER ADJUSTMENT DEVICES SHALL BE PERMANENTLY MARKED BY THE TESTING AND BALANCING AGENCY SO THAT ADJUSTMENT CAN BE RESTORED IF DISTURBED AT ANY TIME. DEVICES SHALL NOT BE MARKED UNTIL AFTER SYSTEM VERIFICATION.

Table with columns: REVISIONS, BY. Row 1: 90% CDs, 02.05.18, EP.

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**HYDRONIC PIPING AND SPECIALTIES**

- WORK INCLUDED
- A. FURNISH AND INSTALL HYDRONIC PIPING INCLUDING FITTINGS, FLANGES, UNIONS, BOLTING, GASKETS, WELDING, THREADING, SOLDERING AND SPECIALTIES AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN FOR A COMPLETE AND OPERATIONAL SYSTEM.
  - B. PRODUCTS SPECIFIED IN THIS SECTION INCLUDE HVAC HYDRONIC PIPE AND FITTINGS, SPECIALTIES AND ACCESSORIES.
  - C. SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE CALIFORNIA BUILDING CODE, INCLUDING THE CALIFORNIA PLUMBING AND MECHANICAL CODES.

**QUALITY ASSURANCE**

- A. **QUALIFICATIONS**
  1. MANUFACTURER: COMPANY SPECIALIZING IN MANUFACTURING OF PRODUCTS SPECIFIED IN THIS SECTION, WITH DOCUMENTED EXPERIENCE OF MORE THAN TEN (10) YEARS.
  2. INSTALLER: COMPANY SPECIALIZING IN EXECUTING THE SCOPE OF WORK SPECIFIED IN THIS SECTION, WITH DOCUMENTED EXPERIENCE OF MORE THAN TEN (10) YEARS.
  3. WELDERS: CERTIFIED IN ACCORDANCE WITH ASME (BPV IX). PROVIDE CERTIFICATE OF COMPLIANCE, INDICATING APPROVAL OF WELDERS.
- C. **QUALITY STANDARDS**
  1. INSTALLATION: CONFORM TO ASME B31.3 CODE FOR INSTALLATION OF PIPING SYSTEM.
  2. WELDING MATERIALS AND PROCEDURES: CONFORM TO ASME (BPV IX) AND APPLICABLE STATE LABOR REGULATIONS.

**HYDRONIC PIPING**

- A. **GENERAL**
  1. HYDRONIC PIPING AND FITTINGS SHALL BE NEW, FIRST QUALITY MATERIAL SUITABLE FOR CONTINUOUS OPERATION UNDER THE CONDITIONS SPECIFIED. MATERIAL SHALL BE IN CONFORMANCE WITH ANSI STANDARDS.
  2. PIPE SHALL BE A PRODUCT OF THE UNITED STATES OF AMERICA. PIPING SHALL BE CLEARLY MARKED WITH MATERIAL SPECIFICATION, PIPE AND MATERIAL SHALL COMPLY WITH THE REQUIREMENTS AND RECOMMENDED PRACTICES OF ASME B31.1 POWER PIPING CODE (LATEST EDITION AND ADDENDA).
  3. ELBOWS SHALL BE LONG RADIUS ANSI B16.5 UNLESS OTHERWISE SPECIFIED.
  4. FITTINGS SHALL BE USED AT ALL BRANCH CONNECTIONS FROM HEADERS.
  5. ACCEPTABLE FITTINGS SHALL BE TEES, WELDOLETS, "THREEDOLETS" AND "SOCKOLETS" WILL ALSO BE ALLOWED AS SPECIFIED. FISHMOUTH OR SHAPED nipples WILL NOT BE ALLOWED.
  6. PROVIDE DRAINS AT LOW POINTS AND VENTS AT HIGH POINTS OF PIPING SYSTEMS AND BETWEEN PUMPS AND CHECK VALVES. DUE TO DIAGRAMMATIC NATURE OF THE PIPING SYSTEMS, NOT ALL DRAINS, VENTS AND TRAP ASSEMBLIES ARE SHOWN. HOWEVER, CONTRACTOR SHALL INCLUDE ALL DEVICES REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM.
  7. PIPE AND FITTINGS WITH THREADED ENDS SHALL HAVE IPS THREADS CUT CLEAN AND TRUE AND IN CONFORMANCE WITH THE ANSI B1.20.1.
  8. THREADED PIPE AND FITTINGS SHALL BE MADE UP WITH SPECIAL CARE TO AVOID MARRING OR DAMAGING PIPE AND FITTING SURFACES.
  9. THREADED JOINTS IN STEEL AND IRON PIPE SHALL BE MADE UP WITH PIPE THREAD COMPOUND OR OTHER COMPOUND SUITABLE FOR DESIGN TEMPERATURE AND PRESSURE OF PIPING. THREADED JOINTS IN COPPER PIPE SHALL BE MADE UP WITH TEFLON PIPE TAPE, PETROLEUM GAS GRADE, WOUND ON MALE THREADS, GLOOLOCK AS VIEWED FROM END OF PIPE.
  10. PROVIDE HIGH TEMPERATURE BRASS, BRONZE OR CAST IRON (AS APPROPRIATE) DIELECTRIC UNIONS OR FLANGES BETWEEN DISSIMILAR PIPE TO PREVENT GALVANIC ACTION, AS REQUIRED. GASKETS SHALL BE SUITABLE FOR OPERATION UP TO DESIGN TEMPERATURE OF THE PIPING.
  11. NO JOINTS SHALL BE "BACKED OFF" TO ALIGN PIPE AND FITTINGS.
  12. GAUGE LINES SHALL BE STAINLESS STEEL WITH COMPRESSION FITTINGS.
  13. USE COPPER ANTI-SEIZE COMPOUND ON FLANGE BOLTS. TORQUE BOLTS TO SUITABLE VALUES USING TORQUE WRENCHES.
- B. **TUBING**: COPPER TUBING, HARD DRAWN TEMPER, TYPE K OR TYPE L, AS SPECIFIED, ASTM B 88. SOLDERED JOINTS.
- C. **FITTINGS**: WROUGHT COPPER, SOCKET SOLDER-TYPE JOINT, ASTM B 88 AND ANSI B16.22. COUPLINGS SHALL BE OF THE STAKED STOP TYPE.
- D. **UNIONS**: SOCKET SOLDER-JOINT ENDS, CAST BRONZE, ASTM B 62. DIMENSIONS SHALL BE IN ACCORDANCE WITH ANSI B16.18.
- E. **SOLDER**: 95% TIN, 4% COPPER, 0.5% SILVER, WITH NON-ACID FLUX. 95-5 TIN ANTIMONY SOLDER IS NOT ALLOWED. SOLDER WITH ANY LEAD CONTENT IS NOT ALLOWED. USE SILVER BRAZING ALLOY, AS SCHEDULED, OR SILVER BRAZING ALLOY, AS SPECIFIED. ALL SOLDER JOINTS OF PIPING THAT CONVEY FLAMMABLE MATERIALS SHALL BE MADE WITH BRAZING ALLOYS HAVING MELTING POINTS ABOVE 1000 F. (ANSI B31.2, NFPA 51.31, 58). SILVER BRAZING ALLOY SHALL BE ANSIWA8 AS 8. CLASSIFICATION BC01.5 CONTAINING 15% SILVER, 80% COPPER, 5% PHOSPHOROUS.
- F. **MECHANICAL COUPLINGS AND FITTINGS**: MECHANICAL COUPLING SHALL BE APPLICABLE FOR STEEL PIPING ONLY UNLESS OTHERWISE INDICATED. PROVIDE MECHANICAL COUPLING IN LIEU OF WELDED FITTINGS AND JOINTS OR WATER SERVICE NOT EXCEEDING 120" IN EXPOSED AREAS AND MECHANICAL ROOMS. MECHANICAL COUPLING AND FITTINGS WILL NOT BE ACCEPTABLE FOR PIPING IN SHAFTS AND CONCEALED SPACES, INCLUDING SPACES ABOVE CEILINGS.
  - 1) MECHANICAL COUPLINGS: MALLEABLE IRON, ASTM A47, GRADE 32510, PROVIDE:
    - a) WORKING PRESSURES UP TO 6" IPS: 700 PSI
    - b) GROOVED TYPE OR STEEL SHOULDER ENDS
    - c) GASKETS: EPDM, ASTM D2000, VICTAULIC FLUSH/SEAL GRADE "E" EPDM, GRINNELL GRADE "E" EPDM, OR EQUAL
    - d) BOLTS: OVAL NECK TRAP TYPE, ASTM A193
  - 2) LUBRICANT: SUITABLE FOR SERVICE AND SUBMITTED FOR APPROVAL. WITH WRITTEN APPROVAL FROM COUPLING MANUFACTURER STATING IT IS ACCEPTABLE AND DOES NOT AFFECT GUARANTEE.
  - 3) FITTINGS: GROOVED TYPE, DUCTILE IRON ASTM A538 OR MALLEABLE IRON AS SPECIFIED FOR COUPLINGS TO 12"
  - 4) COMPANION PIPE GROOVING: AS PER COUPLING AND FITTING MANUFACTURER'S RECOMMENDATIONS.
  - 5) SIMILAR TO VICTAULIC STYLE HF-70.
  - 6) IF ANY OTHER LUBRICANT OR OTHER MANUFACTURER'S GASKETS ARE USED AT THE SITE, ALL GASKETS AT ALL JOINTS SHALL BE REPLACED.
  - 6) NO MECHANICAL COUPLINGS SHALL BE USED IN INACCESSIBLE LOCATION SUCH AS ABOVE PLASTER CEILINGS WITHOUT ACCESS DOORS. IF ACCESS DOORS ARE USED AT EACH JOINT IN SHAFTS, DOOR SHALL CLEARLY ACCESS JOINTS. FURNISH ACCESS DOORS, COORDINATE EACH LOCATION, AND OBTAIN WRITTEN APPROVAL FOR EACH LOCATION FROM THE UNIVERSITY'S REPRESENTATIVE.
  - 7) ELBOWS SHALL BE LONG RADIUS OR GREATER.
  - 8) THE FOLLOWING ARE NOT ACCEPTABLE:
    - a) VICTAULIC FIT PRODUCTS
    - b) VICTAULIC HOLE CUT PRODUCTS
    - c) REDUCING COUPLING
  - 9) VALVES SHALL MEET THE VALVE SPECIFICATION AND MAY BE GROOVED OR FLANGED. THE VICTAULIC 300 BUTTERFLY VALVE OR EQUAL MAY BE USED IN PLACE OF THE SPECIFIED BUTTERFLY VALVES IN VICTAULIC SYSTEMS.
  - 10) STRAINERS SHALL BE WYE TYPE.
- G. **VALVES AND SPECIALTIES**
  - A. BALL VALVES: TYPE VB-101 (THROUGH 3"); 3-PIECE CONSTRUCTION, THREADED BRONZE BODY WITH STAINLESS STEEL OR CHROME PLATED BRASS BALL, TEFLON SEATS AND PACKING, BLOWOUT-PROOF STEM, 600 PSI WOG, FULL PORT SIZES THROUGH 2-1/2 INCH AND CONVENTIONAL PORT SIZE FOR 3 INCHES. INSTALL INCREASING AND REDUCING FITTINGS AS REQUIRED. PROVIDE EXTENDED STEM WHERE REQUIRED TO CLEAR INSULATION. ALL VALVES FOR THE NATURAL GAS SYSTEMS SHALL BE AGA CERTIFIED AND UL LISTED. RED-WHITE, NIBCO T-995-Y-66 THROUGH 2-1/2 INCHES AND NIBCO T-990-V FOR 3 INCHES, OR EQUAL.
  - B. CIRCUIT BALANCING VALVES: VB-7.01: MULTI-TURN, GLOBE STYLE CIRCUIT BALANCING VALVE. VALVE BODY SHALL BE THREADED BRONZE FOR SIZES UP TO 2 INCHES, AND PLANGED CAST IRON FOR LARGER SIZES. VALVE SHALL PROVIDE TIGHT SHUT-OFF AGAINST A WORKING PRESSURE OF 200 PSI AT 250 DEGREES F. FLOW MEASURING TAPS SHALL PROVIDE POSITIVE SHUT-OFF AGAINST SYSTEM PRESSURE AND BE SUITABLE FOR QUICK CONNECTION TO A PORTABLE DIFFERENTIAL PRESSURE METER. VALVE SHALL HAVE A VERNIER TYPE RING SCALE WITH AT LEAST FOUR 360-DEGREE TURNS BETWEEN FULL OPEN AND FULL CLOSED, AND A MEMORY STOP LOCKING DEVICE. INSULATE VALVE WITH REMOVABLE FORMED BLOCK INSULATION. ARMSTRONG, CBV, TOUR AND ANDERSON, NIBCO, OR EQUAL.
  - C. AIR VENT VALVES: PROVIDE AND INSTALL MANUAL AIR VENTS, CRANE 88, LUNKENHEIMER 906-BS, OR EQUAL, IN ALL HOT-WATER HEATING AND CHILLED-WATER COOLING SYSTEMS AT LOCATIONS SHOWN ON DRAWINGS, AT ALL HIGH POINTS, AND OTHER POINTS NECESSARY TO FREE THE PIPING SYSTEM OF AIR. THE AIR VENT ASSEMBLIES SHALL CONSIST OF 1/4-INCH COPPER TUBING CONNECTED TO THE TOP OF THE HIGH POINT, OR OTHER LOCATION, AND EXTENDED DOWN TO EASILY ACCESSIBLE 1/4-INCH GLOBE VALVES MOUNTED, GROUDED AND TAGGED, APPROXIMATELY 4 FEET ABOVE THE FLOOR. THE VALVES SHALL INDIVIDUALLY DISCHARGE THROUGH 1/4-INCH COPPER TUBING TO NEAREST FLOOR DRAIN, HOPPER DRAIN, OR TO THE OUTSIDE, IF DRAIN LINE ROUTING IS NOT SHOWN ON THE DRAWINGS.
- 3.1 **PIPING INSTALLATION**
  - A. PROVIDE PIPING SYSTEMS AS SHOWN ON THE DRAWINGS AND OTHERWISE REQUIRED TO MAKE A COMPLETE, WORKABLE AND NEAT JOB. INSTALLING VALVES, APPURTENANCES, SPECIAL TIES, UNIONS AND GASKETS. USE CARE ARRANGING PIPING AS SHOWN ON THE DRAWINGS AND SHALL CAREFULLY EXAMINE THE ARRANGEMENTS WHERE OFFSETS ARE INDICATED AND FOLLOW DETAILS AS SHOWN.
  - B. PIPING SHALL BE RUN TO TRUE ALIGNMENT GENERALLY PARALLEL OR PERPENDICULAR TO ADJACENT BUILDING WALLS, FLOORS AND CEILINGS AND WITH UNIFORM GRADES AND SPACING SO AS TO PRESENT A NEAT AND WORKMANLIKE APPEARANCE.
  - C. CARE SHALL BE PAID TO THE EXACT LOCATIONS FOR PIPING AND EQUIPMENT WITH RESPECT TO EQUIPMENT, DUCTS, CONDUITS, SLABS, BEAMS AND JOINTING FIXTURES. SO AS TO PROVIDE MAXIMUM ACCESS TO ALL MECHANICAL AND ELECTRICAL EQUIPMENT IN THE BUILDINGS. THE DRAWINGS AND SPECIFICATIONS COVERING OTHER WORK TO BE DONE IN THE BUILDINGS SHALL BE CAREFULLY STUDIED AND ARRANGEMENTS MADE TO AVOID CONFLICT.
  - D. THE DRAWINGS SHALL BE FOLLOWED WHERE THEY ARE DEFINITE AND PROVIDED SUCH PROCEDURE CAUSES NO OBJECTIONABLE CONDITIONS OR DOES NOT CONFLICT WITH OTHER SPECIFICATIONS. THE SUPPLIER OF WATER TREATMENT EQUIPMENT, MANUFACTURERS, THE DRAWINGS ARE INTENDED TO INDICATE THE SIZES OF PIPING CONNECTIONS AND IF CERTAIN SIZES ARE OMITTED, OR UNCLEAR, OBTAIN ADDITIONAL INFORMATION BEFORE PROCEEDING.
  - E. ROUGH IN FOR EQUIPMENT REQUIRING CONNECTIONS TO THE MECHANICAL WORK. OBTAIN ALL NECESSARY DATA ON EXACT LOCATIONS, SIZES, CONNECTIONS, FITTINGS AND ARRANGEMENTS AND EXACT ROUTINGS AS MAY BE REQUIRED FOR PROPER INSTALLATION.

**HYDRONIC PIPING AND SPECIALTIES CONT.**

- A. BUSHINGS SHALL NOT BE USED FOR REDUCERS. REDUCING FITTINGS SHALL BE USED FOR CHANGES IN PIPE SIZE AND SHALL BE AS FOLLOWS:
  1. HORIZONTAL WATER PIPING: ECCENTRIC FLAT ON TOP FOR VENTING.
  2. VERTICAL WATER PIPING: CONCENTRIC.
- G. UNIONS OR FLANGES SHALL BE PROVIDED IN CONJUNCTION WITH EQUIPMENT, COILS, CONTROL VALVES AND SPECIALTIES IN PIPE LINES AND AT POINTS NECESSARY TO PROVIDE REASONABLE ACCESS TO THE PIPING SYSTEMS.
- H. ENDS OF PIPES SHALL BE REAMED CLEAN AND PIPES SHALL BE STRAIGHTENED BEFORE ERECTION AND MEASURES SHALL BE TAKEN TO PRESERVE THIS CLEANLINESS AFTER ERECTION.
- I. SUPPORT PIPING INDEPENDENTLY AT EQUIPMENT SO THAT THE EQUIPMENT IS NOT STRESSED BY PIPING WEIGHT OR EXPANSION.
- J. ARRANGE PIPING FOR MAXIMUM ACCESSIBILITY FOR MAINTENANCE AND REPAIR. LOCATE VALVES FOR EASY ACCESS AND OPERATION.
- K. PROVIDE DIELECTRIC FITTINGS BETWEEN DISSIMILAR PIPE MATERIALS TO PREVENT GALVANIC ACTION.
- L. PROVIDE PROPER PROVISION FOR EXPANSION AND CONTRACTION IN ALL PORTIONS OF PIPE WORK. TO PREVENT UNDUE STRAINS ON PIPING OR APPARATUS CONNECTED, PROVIDE DOUBLE SWINGS AT RISER TRANSFERS AND OTHER OFFSETS TO TAKE UP EXPANSION. ARRANGE RISER BRANCHES TO TAKE UP MOTION OF RISER. BRANCH RUNOUTS TO EQUIPMENT SHALL HAVE A MINIMUM OF (3) ELBOWS, ADEQUATELY SPACED.
- M. PIPING CONNECTIONS TO EQUIPMENT SHALL BE MADE WITH OFFSETS PROVIDE WITH UNIONS AND/OR FLANGES SO ARRANGED THAT THE EQUIPMENT CAN BE SERVICED OR REMOVED WITHOUT DISMANTLING THE PIPING. IF EQUIPMENT, WHEN COMMISSIONED, BECOMES AIR BOUND OR STRATIFIED, NECESSARY MODIFICATIONS SHALL BE MADE TO PIPING AND EQUIPMENT, FURRING, FLOORS, WALLS AND CEILINGS, AT THE CONTRACTOR'S EXPENSE.
- N. PIPE PITCH, UNLESS OTHERWISE INDICATED ON THE DRAWINGS, SHALL BE AS FOLLOWS:
  1. WATER PIPING:
    - a. UP TO 1" PIPE: 1" IN 40'-0"; UP IN DIRECTION OF FLOW.
    - b. 1 1/4" LARGER: 1" IN 100'-0"; UP IN DIRECTION OF FLOW.
  2. CONDENSATION DRAINAGE:
    - a. PREFERRED: 1/4 IN./FT., DOWN IN DIRECTION OF FLOW.
    - b. MINIMUM: 1/8 IN./FT., DOWN IN DIRECTION OF FLOW.
- O. PROVIDE DRAIN CONNECTIONS AT LOW POINTS IN WATER PIPING AND WHERE NOTED:
  1. IN EQUIPMENT ROOMS.
    - a. TO 3" PIPE: 3/4" BALL VALVE.
    - b. 4" TO 8": 1 1/2" BALL VALVE.
  2. EXCEPT IN EQUIPMENT ROOMS: 1/2" BALL VALVE WITH CAPPED HOSE CONNECTION.
- P. PROVIDE MANUAL AIR VENTS AT HIGH POINTS AND WHERE REQUIRED TO EXPEL AIR:
  1. TO 3" PIPE: LINE SIZE AIR CHAMBER, 12" LONG, 1/2" BALL VALVE.
  2. 4" AND LARGER: LINE SIZE AIR CHAMBER, 6" LONG, 1/2" BALL VALVE.
- Q. PROVIDE AUTOMATIC AIR VENTS AT HIGH POINTS LOCATED IN MECHANICAL EQUIPMENT ROOMS. AUTOMATIC VENTS SHALL BE PIPED TO NEAREST FLOOR DRAIN OR SERVICE SINK.
- R. COPPER TUBING AND GALVANIZED STEEL SHALL NOT BE MIXED IN ANY ONE RUN OF PIPING, EXCEPT AS OTHERWISE SPECIFIED HEREIN.
- S. DURING CONSTRUCTION, TEMPORARILY CLOSE OPEN ENDS OF PIPES WITH SHEET METAL CAPS OR DUCT TAPE TO PREVENT DEBRIS FROM ENTERING PIPING SYSTEMS.
- T. JOINTS IN PIPING SYSTEMS, FOR ALL SERVICES, SHALL BE MADE TIGHT AND LEAKPROOF AGAINST DESIGN PRESSURES. LEAKS IN SCREWED OR FLANGED JOINTS WHICH CANNOT BE ELIMINATED BY NORMAL WRENCH TIGHTENING METHODS SHALL BE REPAIRED AT THE JOINT. UNDER NO CIRCUMSTANCES SHALL CHALKING BE ALLOWED. NO JOINTS SHALL BE BACKED OFF TO ALIGN PIPE FITTINGS.
- U. PROVIDE PIPE HANGERS AND SUPPORTS AS INDICATED.
- V. PROVIDE VIBRATION ISOLATION AND SEISMIC RESTRAINT OF PIPING AS INDICATED.
- 3.2 **WELDING**
  - A. WELDING DONE UNDER THIS CONTRACT SHALL BE PERFORMED BY EXPERIENCED WELDERS IN A NEAT AND WORKMANLIKE MANNER. WELDING DONE SHALL BE IN ACCORDANCE WITH ASME B31.1 POWER PIPING CODE (LATEST EDITION AND ADDENDA), FURNISH TO THE UNIVERSITY FOR APPROVAL AND RECORD THE FOLLOWING:
    1. WELDING PROCEDURE SPECIFICATIONS (WPS) FOR EACH PROCEDURE TO BE USED
    2. PROCEDURE QUALIFICATION RECORD (PQR)
    3. WELDING OPERATOR QUALIFICATION TESTS (WQO) FOR EACH WELDER TO BE EMPLOYED.
  - B. DOCUMENTS SHALL BE ON FORMS SIMILAR TO THE FORMS REFERENCED IN THE ASME BOILER & PRESSURE VESSEL CODE, SECTION IX, LATEST EDITION. THESE RECORDS SHALL BE FURNISHED TO THE UNIVERSITY FOR THIS PROJECT NOT LESS THAN (2) WEEKS PRIOR TO ANY WELDING. WELDERS TO BE EMPLOYED ON THIS WORK SHALL BE CERTIFIED IN ACCORDANCE WITH THE ASME. THE CONTRACTOR SHALL TEST WELDERS TO THESE PROCEDURES WITHIN (3) MONTHS OF THE WORK BEGINNING TO CERTIFY THEM FOR THIS WORK. THE ABOVE FORMS SHALL BE CLEARLY MARKED SPECIALLY FOR THE CONTRACTOR'S USE AND CERTIFIED BY THE APPROPRIATE PERSONNEL. DOCUMENTS PREPARED FOR OTHERS USE ARE NOT ALLOWED. FAILURE TO PROVIDE THESE FORMS TO THE SATISFACTION OF THE UNIVERSITY'S REPRESENTATIVE, WILL RESULT IN THE REPLACEMENT OF THE MECHANICAL CONTRACTOR WITH ONE WHO CAN MEET THESE REQUIREMENTS, AT NO ADDITIONAL COST TO THE UNIVERSITY. NO DELAYS OR COST INCREASES TO THE OVERALL PROJECT SCHEDULE WILL BE ACCEPTED DUE TO NON-COMPLIANCE WITH THE ABOVE.
  - C. BEVEL PIPING ON BOTH ENDS BEFORE WELDING, AS REQUIRED AND DEFINED IN ANSI B16.25 FIG. 2A FOR OPEN BUTT WELDING.
  - D. MITERED ELBOWS ARE NOT PERMITTED. ODD ANGLE ELBOWS SHALL BE CUT FROM LONG RADIUS ELBOWS.
  - F. BEFORE THE START OF ANY WELDING, REMOVE CORROSION PRODUCTS AND OTHER FOREIGN MATERIAL FROM THE SURFACE TO BE WELDED. ON COIL COATED PIPING, CLEAN OIL FROM INSIDE AND OUTSIDE OF PIPE WITHIN 1'-0" OF AREA TO BE WELDED. MONITOR PIPE TEMPERATURE 1'-0" FROM WELD POINT ON PIPE WITH HAND-HELD TEMPERATURE INDICATOR. IF PIPE TEMPERATURE EXCEEDS 300° AT ANY TIME, STOP WELDING UNTIL PIPE COOLS OFF.
  - G. WELDING SHALL BE PERFORMED BY THE MANUAL, SHIELDED METALLIC ARC PROCESS, USE DIRECT CURRENT EXCLUSIVELY.
  - H. ELECTRODES TO BE USED WITH THE MANUAL, SHIELDED METALLIC ARC METHOD SHALL CONFORM TO ASTM A 233, CLASSIFICATION E-601 AND E-70. USE 610 ELECTRODES FOR OPEN BUTT JOINTS EXCEPT ON OIL PIPING AND 7018 FOR FILLER PASSES. THE SIZE OF ELECTRODES, VOLTAGES, CURRENTS, THICKNESS AND NUMBER OF PASSES OR BEADS SHALL BE IN ACCORDANCE WITH ACCEPTED WELDING PROCEDURES. NO WELDING OF ANY KIND SHALL BE DONE WHEN THE TEMPERATURE OF THE BASE METAL IS LOWER THAN 50°. MATERIAL TO BE WELDED DURING FREEZING TEMPERATURES SHALL BE MADE WARM AND DRY BEFORE WELDING IS STARTED. TEMPERATURE OF METAL SHALL BE "WARM TO THE HAND," OR APPROXIMATELY 80°F.
  - I. WELDERS ENGAGED IN WORK PERFORMED UNDER THIS SECTION SHALL HAVE BEEN QUALIFIED IN ACCORDANCE WITH TEST REQUIREMENTS OF SECTION IX OF THE ASME BOILER AND PRESSURE VESSEL CODE. EACH OPERATOR SHALL IDENTIFY HIS PRODUCTION WELDS BY MARKING HIS REGULARLY ASSIGNED IDENTIFICATION NUMBER OR MARK WITHIN 1" OF THE WELD. CONTRACTOR SHALL SUBMIT TO THE UNIVERSITY'S REPRESENTATIVE A COMPLETE LIST OF THE INDIVIDUAL NUMBERS OF IDENTIFYING MARKS AND OPERATOR'S NAME. A COPY OF EACH OPERATOR'S CERTIFICATE SHALL BE FILED WITH THE UNIVERSITY'S REPRESENTATIVE.
  - J. WELDMENTS SHALL BE REVIEWED BY THE UNIVERSITY'S REPRESENTATIVE. ANY WELDMENT JUDGED DEFECTIVE BY THE UNIVERSITY'S REPRESENTATIVE FROM A VISUAL INSPECTION SHALL BE CUT OUT AND TESTED IN THE PRESENCE OF THE UNIVERSITY'S REPRESENTATIVE. IN THE EVENT ANY WELDER CONSISTENTLY PRODUCES A HIGH PERCENTAGE OF UNSATISFACTORY PRODUCTION WELDS, HE SHALL BE DISCHARGED AT THE REQUEST OF THE UNIVERSITY, EVEN THOUGH HE IS ABLE TO PRODUCE SATISFACTORY WELDS WHEN ESPECIALLY TESTED. REMOVAL AND REPLACEMENT OF TEST COUPONS AND SAMPLINGS SHALL BE DONE AT THE EXPENSE OF THE CONTRACTOR. THE UNIVERSITY RESERVES THE RIGHT TO ULTRASONICALLY OR RADIOGRAPHICALLY TEST ANY WELDS FOR FULL PENETRATION.
  - K. PAINT ALL EXTERNAL SURFACES OF WELDS WITH A HIGH TEMPERATURE ZINC RICH PAINT PRIOR TO INSULATION BEING APPLIED.
  - L. WELDS IN ALL HIGH TEMPERATURE HOT WATER (S3) OR GREATER SHALL BE SUBJECT TO RANDOM 2% X-RAY TEST REQUIREMENT. THIS X-RAY SHALL BE PERFORMED BY AN INDEPENDENT TESTING COMPANY. TESTING COMPANY SHALL EMPLOY CERTIFIED WELD INSPECTORS. THE WELDS SHALL MEET THE X-RAY REQUIREMENTS IN ANSI B31.1. PROVIDE INDEPENDENT INSPECTION SERVICES.
- 3.3 **CLEANING AND BLOWING OUT**
  - A. THE EQUIPMENT AND PIPING INSTALLED UNDER THIS SECTION SHALL BE BLOWN OUT UNDER PRESSURE AND CLEANED OF FOREIGN MATTER, THROUGH TEMPORARY CONNECTIONS WHERE NECESSARY, BEFORE THE SYSTEM IS PLACED IN SERVICE. PRECAUTIONS SHALL BE USED TO PREVENT FOREIGN MATTER FROM GETTING INTO EQUIPMENT AND PIPING DURING CONSTRUCTION. THE SUPPLIER OF WATER TREATMENT EQUIPMENT AND CHEMICALS SHALL RECOMMEND AND FURNISH CHEMICALS FOR THE PURPOSE OF CLEANING AND BLOWING OUT OF ALL SYSTEMS. CHEMICALS, MATERIALS, INSTRUMENTS AND LABOR SHALL BE PROVIDED BY THE CONTRACTOR.
  - B. THE SURFACES OF ALL EQUIPMENT AND PIPING SHALL BE CLEAN UPON COMPLETION OF THE WORK.
  - C. PIPE LINE STRAINERS SHALL BE CLEANED IMMEDIATELY BEFORE BEING TURNED OVER TO THE UNIVERSITY FOR ACCEPTANCE. THE OWNER'S REPRESENTATIVE SHALL WITNESS THE REMOVAL/CLEANING OF ALL STRAINERS PRIOR TO THE OWNER ACCEPTANCE.
  - D. DURING CLEANING PROCESS, HAMMER WELDS TO REMOVE SLAG, WELD SLAG AND OTHER DEBRIS.
- 3.4 **TESTING**
  - A. FURNISH LABOR, MATERIAL, INSTRUMENTS, SUPPLIES AND SERVICES AND BEAR COSTS FOR THE ACCOMPLISHMENT OF THE TESTS HEREIN SPECIFIED. CORRECT DEFECTS APPEARING UNDER TEST AND REPEAT THE TESTS UNTIL NO DEFECTS ARE DISCLOSED; LEAVE THE EQUIPMENT CLEAN AND READY FOR USE.
  - B. PERFORM TESTS OTHER THAN HEREIN SPECIFIED WHICH MAY BE REQUIRED BY THE CALIFORNIA BUILDING CODE, INCLUDING THE CALIFORNIA PLUMBING AND MECHANICAL CODES. FURNISH NECESSARY TESTING APPARATUS. MAKE TEMPORARY CONNECTIONS AND PERFORM TESTING OPERATIONS REQUIRED. AT NO ADDITIONAL COST TO THE UNIVERSITY. EQUIPMENT AND PIPING SHALL BE TESTED AND FOUND TIGHT. INSULATED OR OTHERWISE CONCEALED PIPING SHALL BE TESTED BEFORE BEING CLOSED IN. LEAKING JOINTS SHALL BE CORRECTED, RETESTED AND FOUND TIGHT. SUCH TESTS SHALL CONFORM TO THE REQUIREMENTS OF THE CALIFORNIA PLUMBING AND MECHANICAL CODES, BUT SHALL NOT BE LESS THAN THE EQUIVALENT OF THE TESTS CALLED FOR HEREIN. THREADED JOINTS THAT LEAK SHALL NOT BE SEAL-WELDED TO CORRECT LEAKAGE.
  - C. TESTS PERFORMED SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR LEAKS WHICH MAY DEVELOP AFTER THE TESTS ARE MADE.
  - D. PIPING SYSTEMS SHALL BE SUBJECT TO A HYDROSTATIC TEST AT 1 1/2 TIMES OPERATING PRESSURE MEASURED AT THE HIGHEST POINT IN THE SYSTEM BUT NOT LESS THAN 150 PSI FOR A PERIOD OF (4) HOURS WITHOUT DROP IN PRESSURE. TESTS SHALL BE RECORDED BY MEANS OF BRISTOL RECORDING DEVICE AND RECORDER WITNESSED BY UNIVERSITY INSPECTOR. TESTS OF PIPING SYSTEMS SHALL BE CONDUCTED BEFORE CONNECTIONS TO EQUIPMENT ARE MADE AND BEFORE PIPING IS COVERED, BURIED OR OTHERWISE CONCEALED. SYSTEMS FOUND TO HAVE LEAKS SHALL BE SUBJECT TO FURTHER TESTS WHEN FAULTY JOINTS HAVE BEEN REPAIRED OR REPLACED. WELDED JOINTS SHALL BE SUBJECT TO A HAMMER TEST WHILE UNDER PRESSURE.
- 3.5 **EQUIPMENT INSTALLATION**: HYDRONIC SYSTEM EQUIPMENT AND SPECIALTIES SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DRAWINGS AND REVISIONS SUBMITTEDS.

**FAN COIL UNIT (CONCEALED FAN COIL UNITS)**

1. ACCEPTABLE MANUFACTURER: PRICE HVAC OR EQUAL.
2. SUBMITTALS: PROVIDE TYPICAL CATALOG OF INFORMATION INCLUDING ARRANGEMENTS, CONTROLS, COIL DATA, FAN HP, RPM.
3. GENERAL: ASSEMBLY SHALL CONSIST OF CASING, COOLING COIL, FILTER, FAN MOTOR AND ACCESSORIES. CONTROLS COMPLETE WITH INDIVIDUAL THERMOSTAT OR AS OTHERWISE INDICATED. ASSEMBLY SHALL PERFORM AS HORIZONTAL UNIT WITH DUCTED REAR RETURN AND FRONT SUPPLY AIR OUTLET CONNECTIONS.
  - A. BASIC UNIT: FURNISH AND INSTALL CONCEALED DIRECT DRIVE TERMINAL UNITS. UNITS SHALL BE COMPLETELY FACTORY ASSEMBLED INCLUDING VALVE PACKAGE AND TESTED THROUGH THE COMPLETE ASSEMBLY AND SHIPPED AS ONE PIECE. UNITS SHALL INCLUDE CHASSIS, RETURN AIR PLENUM, COIL, FOIL FACE INSULATION, CHILLED WATER COIL, DOUBLE DRAIN PAN AND AS SCHEDULED, REMOVABLE FAN BOARD, ECM MOTOR AND CONTROLLER, BLOWER 0-10VDC VARIABLE SPEED CONTROLLED. POSITIVE SLOPED 1500 HOUR SALT SPRAY CERTIFIED CONDENSATE TRAYS WITH EXTERNAL INSULATION, AND MERV 13. UNITS SHALL BE ETI, UL, OR CSA-US LISTED IN COMPLIANCE WITH UL/ANSI STANDARD 1995, AND CERTIFIED AS COMPLYING WITH THE CURRENT EDITION OF ARI 440.
  - B. FAN COIL UNITS COMPLETE WITH VALVE PACKAGED BRAZED TO COIL MUST BE RUN AND FLOW TESTED AS A COMPLETE ASSEMBLY PRIOR TO SHIPMENT BY THE MANUFACTURER AT 350 PSIG COMPRESSED AIR.
  - C. UNIT SHALL BE FABRICATED OF HEAVY GAUGE GALVANIZED STEEL PANELS ABLE TO MEET 125 HOUR SALT SPRAY TEST PER ASTM B-117; EXCEPT CONDENSATE TRAY WHICH SHALL BE EPOXY POWDER COATED TO MEET 1500 HOUR SALT SPAY TEST PER ASTM D1654, ASTM D714.
  - D. UNIT MOUNTING SHALL BE BY TO INTEGRAL 90 DEGREE OPPOSED SLOTS TO RUBBER ISOLATORS ON THREADED RODS.
  - E. CABINET: ALL UNIT CHASSIS SHALL BE FABRICATED OF HEAVY GAUGE GALVANIZED STEEL PANELS ABLE TO MEET 125-HOUR SALT SPRAY TEST PER ASTM B-117. ALL EXTERIOR PANELS SHALL BE INSULATED WITH 1/2" THICK, 3.35 POUND PER CUBIC FOOT, DUAL DENSITY FIBERGLASS INSULATION RATED FOR A MAXIMUM AIR VELOCITY OF 3800 F.P.M. INSULATION SHALL CONFORM TO UL 181 FOR EROSION AND NFPA 90A AND 90B FOR FLAME SPREAD (25) AND SMOKE DEVELOPED (50) RATING PER ASTM E-84 AND UL 723 AND CAN/JULC, S102-488. UNITS SHALL HAVE A MINIMUM 1" DUCT COLLAR ON THE DISCHARGE. PLENUM PANEL SHALL HAVE A MINIMUM 1" DUCT COLLAR ON THE RETURN. THE MOTOR, FAN AND FILTER SHALL BE REMOVABLE FROM BOTTOM ACCESS PANEL WITH TWO SCREWS FOR EASY REMOVAL, AND ACCESS FOR SERVICE AND IS ALSO EQUIPPED WITH A SAFETY CHAIN.
  - F. CASING SHALL HAVE FACTORY-APPLIED BAKED ENAMEL FINISH.
  - G. CABINET INSULATION SHALL BE FOIL BOARD INSULATION SHALL MEET OR EXCEED THE REQUIREMENTS STATED ABOVE, AND IN ADDITION, MEET ASTM STANDARDS G665 AND G-1136 FOR BIOLOGICAL GROWTH IN INSULATION. INSULATION SHALL BE LINED WITH ALUMINUM FOIL, FIBERGLASS SCRIM REINFORCEMENT, AND 30-POUND KRAFT PAPER LAMINATED TOGETHER WITH A FLAME RESISTANT ADHESIVE. ALL EXPOSED EDGES SHALL BE SEALED TO PREVENT ANY FIBERS FROM REACHING THE AIR STREAM.
  - H. UNIT MOUNTING SHALL BE BY HANGER AND SLOTTED HANGING BRACKETS PROVIDED AT FOUR LOCATIONS, FOR EASY INSTALLATION, EXPOSED UNITS PROVIDED WITH 1/2" MOUNTING KNOCKOUTS IN FOUR PLACES.
  - I. EXTERIOR PANELS SHALL BE FABRICATED OF 18 AND 20 GAUGE GALVANIZED STEEL WITH 1/2" FOIL FACE INSULATION CONFORMING TO UL181 FOR EROSION, NFPA 90A AND 90B FOR FLAME SPREAD (25) AND SMOKE DEVELOPED (50) RATING PER ASTM E-84 AND UL 723 AND CAN/JULC. SUPPLY AND RETURN AIR DUCT COLLAR SHALL BE 1".
4. COOLING COIL
  - A. PROVIDE COOLING COIL WITH 3/8-INCH OR 5/8-INCH COPPER TUBE MECHANICALLY EXPANDED INTO COPPER FINS, LEAK TESTED UNDER WATER. PROVIDE MANUAL AIR VENTS. COILS ASSEMBLY SHALL BE FACTORY INSTALLED.
  - B. PROVIDE DRAIN PAN OF MINIMUM 18-GAUGE GALVANIZED STEEL. INTERIOR AND EXTERIOR SURFACES SHALL BE INSULATED WITH FIRE-RETARDANT, CLOSED-CELL FOAM. PITCH PAN FOR POSITIVE DRAINAGE WHEN UNIT IS LEVEL. PROVIDE DRAIN PAN CONNECTION ON THE SAME SIDE AS ALL OTHER ACCESS.
  - C. CONDENSATE TRAYS: PRIMARY CONDENSATE DRAIN PANS SHALL BE SINGLE WALL, HEAVY GAUGE, EPOXY POWDER COATED TO MEET 1500 HOUR SALT SPRAY TEST PER ASTM D1654, ASTM D714, OR TYPE 304 STAINLESS STEEL. STAINLESS STEEL SHALL BE EXTERNALLY INSULATED AND MEET OR EXCEED THE REQUIREMENTS STATED BELOW, AND EXTEND UNDER THE ENTIRE COOLING COIL. DRAIN PANS SHALL BE OF ONE-PIECE CONSTRUCTION AND BE POSITIVELY SLOPED FOR CONDENSATE REMOVAL. DRAIN PANS SHALL HAVE PRIMARY AND SECONDARY DRAIN CONNECTIONS. THE DRAIN PANS SHALL BE EXTERNALLY INSULATED WITH CLOSED CELL FOAM INSULATION. THE INSULATION SHALL CARRY NO MORE THAN A 25/50 FLAME SPREAD AND SMOKE DEVELOPED RATING PER ASTM E-84 AND UL 723 AND FUNGI RESISTANT PER ASTM G21/C1338, BACTERIA RESISTANT PER ASTM G22 AND MOLD GROWTH PER UL 181.
  - D. PROVIDE 2-WAY CONTROL VALVE DELUXE PACKAGE:
    - a. TWO SHUTOFF BALL VALVES WITH MEMORY STOP AND PRESSURE AND TEMPERATURE (T/P) PORTS.
    - b. AUTOMATIC TEMPERATURE CONTROL VALVE (ATC), 2-WAY CONTROL VALVE, GLOBE STYLE WITH METAL-ON-METAL SEAT.
    - c. HIGH CLOSE-OFF PRESSURE OR 50 PSI.
    - d. INLINE SUPPLY STRAINER BLOWDOWN VALVE WITH HOSE CONNECTION AND CAP.
    - e. AUTOMATIC CIRCUIT SETTER.
    - f. COIL UNIONS.
    - g. WIRING.
  - E. FAN SHALL BE AUTOMATICALLY CONTROLLED. MOUNT ELECTRICAL COMPONENTS IN CONTROL BOX WITH REMOVABLE COVER. INCORPORATE SINGLE POINT ELECTRICAL CONNECTION POWER SOURCE. ELECTRICAL ENCLOSURE SHALL NEMA 1.
  - F. FACTORY MOUNT TRANSFORMER FOR CONTROL VOLTAGE ON ELECTRIC AND ELECTRONIC CONTROL UNITS. PROVIDE TERMINAL STRIP IN CONTROL BOX FOR FIELD WIRING THERMOSTAT AND POWER SOURCE.
  - G. FACTORY WIRE FAN TO THE TERMINAL STRIP.
  - H. PROVIDE DISCONNECT SWITCH.
6. CONTROLS
  - A. PROVIDE CONTROL HARDWARE, INCLUDING CONTROL VALVES AND ACTUATORS AS INDICATED.
  - B. FAN COIL UNITS SHALL INCLUDE A DDC CONTROL PACKAGE WITH NEMA1 CONTROL PANEL, ELECTRONIC THERMOSTAT WITH FOLLOWING FEATURES:
    - a. ON/OFF SWITCH.
    - b. FAN SPEED CONTROLS.
    - c. PRICE DDC CONTROLLER PIC MODEL.
    - d. DDOLED THERMOSTAT WITH MOTION DETECTOR WITH 2-HOUR DELAY.
    - e. CONTROLLER SHALL DDC PROGRAMMABLE TO MEET THE REQUIREMENTS OF THE FAN COIL CONTROL SEQUENCE OF OPERATION.
7. FAN ASSEMBLY
  - A. INTERNALLY SUSPEND AND ISOLATED FAN/MOTOR ASSEMBLY FROM CASING ON RUBBER VIBRATION ISOLATORS.
  - B. FAN SHALL BE A DYNAMICALLY BALANCED, FORWARDLY CURVED, DWID CENTRIFUGAL TYPE CONSTRUCTION OF HEAVY GAUGE ZINC COATED GALVANIZED STEEL FOR CORROSION RESISTANCE. THE FAN ASSEMBLY SHALL BE EASILY REMOVABLE FOR SERVICING THE MOTOR AND BLOWER AT OR AWAY FROM THE UNIT. THE ENTIRE FAN ASSEMBLY SHALL BE ABLE TO COME OUT OF THE UNIT BY REMOVING TWO WING NUTS AND UNPLUGGING THE MOTOR. THE BLOWER ASSEMBLY MUST REMOVE FROM AS BOTTOM. PLENUM UNIT FAN ASSEMBLIES SHALL BE EASILY SERVICED THROUGH AN ACCESS PANEL PROVIDED.
  - C. FAN MOTOR SHALL BE BRUSHLESS ELECTRONICALLY COMMUTATED MOTOR (ECM) DC MOTOR WITH PERMANENT MAGNET ROTOR. BRUSHLESS DC MOTOR SHALL BE FURNISHED WITH AN INTEGRAL MICROPROCESSOR BASED CONTROLLER THAT INCLUDES SENSORLESS CONSTANT FLOW OPERATION BY AUTOMATICALLY ADJUSTING TO PERFORMANCE IN RESPONSE TO SYSTEM CONTROLS AT THE DESIGN CFM OUTPUT BASED ON CONTROLLER LOGIC AND A COMPLETELY VARIABLE 0-10VDC BUT WILL DELIVER DESIGN CFM AT VARIABLE SYSTEM BY AUTOMATICALLY ADJUSTING TO THE SPEED-TORQUE CURVE OF THE MOTOR BY FACTORY CALIBRATION OF THE MOTOR TO THE UNIT. INPUT FROM THE FACTORY SUPPLIED UNITARY CONTROL ROOM SENSORS/THERMOSTAT UNIT SHALL BE 0/1 CERTIFIED OPEN BACNET COMPATIBLE. MOTOR SHALL BE DIRECT MOUNTED TO BLOWER WITH HEAVY GAUGE WIRE FRAME AND RUBBER ISOLATORS, AUTOMATIC RESET THERMAL OVERLOAD PROTECTION. VOLTAGE AS LISTED ON SCHEDULE.
9. PIPING PACKAGE ASSEMBLY: PIPING PACKAGE SHALL CONSIST OF 0-10VDC FULLY PROPORTIONAL CHARACTERIZED BALL VALVE, CHARACTERIZED BALL VALVE CLOSE OFF PRESSURE SHALL EQUAL 200 PSI AND SHALL ELIMINATE THE REQUIREMENTS FOR FLOW CONTROL DEVICES, STRAINERS AND TEST PORTS. THE UNITS SHALL BE SELF-BALANCING WHICH DOES NOT ELIMINATE THE EQUIPMENT TO BALANCE MAIN PIPING LOOPS. PIPING ASSEMBLY SHALL BE PACE DELUXE WITH 2-WAY CONTROL VALVE.
10. FILTERS
  - A. PROVIDE 2-INCH-THICK DISPOSABLE MERV 13 FILTERS. FILTERS SHALL BE REMOVABLE FROM THE SAME SIDE AS COIL ACCESS WITH OUT REMOVAL PANELS.
11. OTHER REQUIREMENTS: PROVIDE INTAKE PLENUM AND DELIVERY PLENUM WITH ROUND DUCT CONNECTIONS.
12. INSTALLATION
  - A. SUPPORT FAN COIL UNITS FROM THE STRUCTURE ABOVE WITH AS INDICATED ON THE PLANS. PROVIDE ADDITIONAL SUPPORT IF REQUIRED BY THE MANUFACTURER.
  - B. CONNECT DUCTWORK AS INDICATED ON THE PLANS.
  - C. PROVIDE CAPPED INSTRUMENT TEST HOLES ON EACH SIDES OF HEATING AND COOLING COILS, FANS AND UNIT AT DUCT CONNECTIONS.
  - D. PROVIDE TESTING AND COMMISSIONING BY THE EQUIPMENT AND CONTROL. BY THE MANUFACTURER OR AUTHORIZED REPRESENTATIVES.
  - E. PROVIDE MINIMUM ONE (1) YEAR WARRANTY ON ALL PARTS AND LABOR FROM DATE OF ACCEPTANCE OR AS OTHERWISE REQUIRED BY THE OWNER.

**CALIFORNIA STATE FIRE MARSHAL**

Approved

Approved as noted (No resubmittal required)

Make corrections noted (No resubmittal required)

Not approved (Revise and resubmit)

Not reviewed (Insufficient data submitted)

APPROVAL OF THIS PLAN DOES NOT AUTHORIZE OR APPROVE ANY OMISSION OR DEVIATION FROM APPLICABLE REGULATIONS. FINAL APPROVAL IS SUBJECT TO FIELD INSPECTIONS. ONE SET OF APPROVED PLANS SHALL BE AVAILABLE ON THE PROJECT SITE AT THE TIME OF INSPECTION.

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REVISIONS	BY
90% CDs	02.05.18 EP

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**SPECIFICATIONS**

UC Berkeley  
**Cory 333 & 337**  
Office Renovation  
Berkeley, CA

Proj. No.: 17408A  
CAAN: 1325

DATE	FEBRUARY 2018
SCALE	AS NOTED
DRAWN BY	EPCE
JOB	Cory Rm 333

**M5.3**