



# PORTLAND STATE UNIVERSITY

## 8TH FLOOR MARKET BUILDING TENANT IMPROVEMENT

### SITE & ZONING INFORMATION

PROJECT ADDRESS: 1600 SW 4TH AVE  
PORTLAND, OR 97201  
ZONE: CXd  
PLAN DISTRICT: CENTRAL CITY & SOUTH AUDITORIUM  
OVERLAY(S): d  
MAP #: 3229

### CODE NOTES

MINOR INTERIOR REMODEL  
PSU OFFICE RELOCATION AT MARKET CENTER BUILDING

REFER TO CITY FACILITIES PERMITS AGREEMENT: GVA KIDDER MATHEWS/WASH.  
CAPITAL MGMT AND CITY OF PORTLAND DATED 7/6/2010

2010 OSSC AND FP AGREEMENT  
TYPE 1 CONSTRUCTION  
GROUP B OCCUPANCY

FLOOR AREA = 14,000 SF +/-  
REMODEL AREA = 4,400 SF +/-  
EXISTING FIRE SPRINKLERS  
OCC. LOAD = 14,500SF/100SF PER OCC. = 145 OCC.  
145 OCC. < 501 OCC. (THRESHOLD FOR 3 REQ'D EXITS)  
THEREFORE (2) EXITS REQUIRED

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### ABBREVIATIONS

(E)	EXISTING	PL	PLASTIC LAMINATE
(N)	NEW	PLY	PLYWOOD
ACT	ACOUSTIC CEILING TILE	PTD	PAINTED
ALUM	ALUMINUM	RB	RUBBER BASE
BD	BOARD	RD	ROOF DRAIN
CF	CEILING FAN OR CLEAR FINISH	RDDO	ROOF DRAIN OVERFLOW DRAIN
CJ	CONTROL JOINT	REQ'D	REQUIRED
CLR	CLEAR	S4S	SURFACED FOUR SIDES
CONC	CONCRETE	SAN	SANITARY (SEWER)
OPT	CARPET	SHD	SHADE
CTG	CLEAR TEMPERED GLAZING	SIM	SIMILAR
DEMO	DEMOLITION; DEMOLISH	SS1L	STAINLESS STEEL
FDC	FIRE DEPARTMENT CONNECTION	SS	SOLID SURFACE MATERIAL
FEC	FIRE EXTINGUISHER CABINET	ST	STONE
FRP	FIBER REINFORCED PLASTIC	STL	STEEL
FS	FLOOR SINK	UNO	UNLESS NOTED OTHERWISE
GSF	GROSS SQUARE FEET/FOOTAGE	VFD	VARIABLE FREQUENCY DRIVE
GYP	GYP-SUM BOARD	W/F	WITH
HM	HOLLOW METAL	WC	WATER CLOSET
KDF	KNOCKDOWN FRAME	WB	WOOD BASE
KE	KITCHEN EQUIPMENT	WD	WOOD
LIN	LINOLEUM	WG	WATER GAUGE
MFR	MANUFACTURER(S)	WH	WATER HEATER
MTL	METAL	W/F	OWNER FURNISHED, CONTRACTOR
MISC	MISCELLANEOUS	OFCI	OWNER FURNISHED, CONTRACTOR
NC	NOISE CRITERIA	OD	OVERFLOW DRAIN
NSF	NET SQUARE FEET/FOOTAGE	P, PT	PAINT
OC	ON CENTER		
OCC,	OCCUPANT(S)		
OCCS			

PORTLAND STATE UNIVERSITY  
8TH FLOOR MARKET BLDG  
OFFICE REMODEL

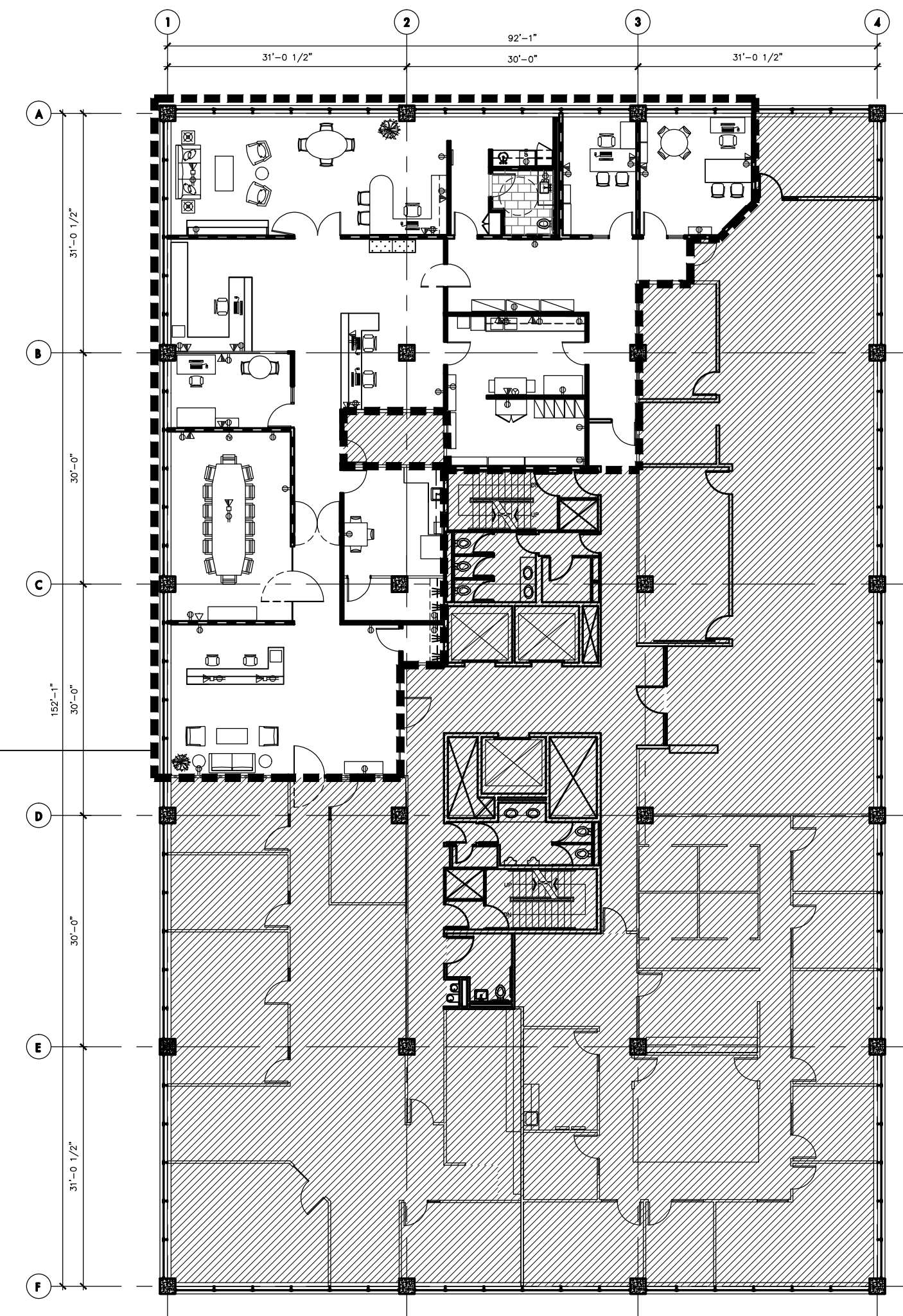
1600 SW 4th Avenue  
Portland, OR, 97201

## REVISED DRAWING SET

### GENERAL NOTES

- ALL WORK SHALL COMPLY WITH APPLICABLE BUILDING, PLUMBING, MECHANICAL, ELECTRICAL, AND FIRE CODES.
- IN PERFORMING PROFESSIONAL SERVICES FOR THIS PROJECT, DECA INC. ISSUES, EXPRESSES OR IMPLIES NO WARRANTIES OR CERTIFICATIONS.
- INFORMATION RELATING TO THE EXISTING BUILDING IS BASED ON DOCUMENTS PROVIDED BY PSU. ACTUAL CONDITIONS MAY VARY.
- CONTRACTOR SHALL VERIFY ALL CONDITIONS AND REPORT ANY DISCREPANCIES TO THE DESIGNER.
- CONTRACTOR SHALL PROVIDE SHORING, BRACING, SUPPORT AND PROTECTION AS REQUIRED TO MAINTAIN STRUCTURAL INTEGRITY OF THE BUILDING.
- CONTRACTOR IS RESPONSIBLE FOR ALL MEANS AND METHODS OF CONSTRUCTION.
- CONTRACTOR SHALL PROTECT EXISTING OCCUPANTS AND PROPERTY FROM DAMAGE DURING PERFORMANCE OF WORK.
- ALL PORTIONS OF THE BUILDING OUTSIDE THE SCOPE OF WORK WILL REMAIN OPEN TO THE PUBLIC. CONTRACTOR TO MAINTAIN ALL EGRESS PATHS AND EMERGENCY LIGHTING. ALL CORRIDORS SHALL REMAIN ACCESSIBLE DURING CONSTRUCTION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ACQUISITION OF ALL PERMITS INCLUDING PLUMBING, MECHANICAL AND ELECTRICAL PERMITS OR LICENSES IN CONNECTION WITH THE WORK REPRESENTED IN THESE DOCUMENTS AS REQUIRED BY LOCAL, COUNTY AND STATE ORDINANCES.
- SOLID BLOCKING SECURED TO STRUCTURE SHALL BE PROVIDED AT ALL WALL OR CEILING MOUNTED ACCESSORIES REQUIRING SUPPORT.
- ALL THROUGH-WALL MECHANICAL AND ELECTRICAL PENETRATIONS TO BE SMOKE-TIGHT.
- CONTRACTOR TO VERIFY THAT ALL EQUIPMENT & SYSTEMS ARE COORDINATED & DESIGNED TO FUNCTION WITH THE EXISTING BUILDING SYSTEMS.
- ALL PLUMBING TO HAVE ACCESSIBLE CLEANOUTS AND ISOLATION VALVES. OWNER TO DIRECT.
- GENERAL CONTRACTOR TO DISTRIBUTE COMPLETE DRAWING SETS, INCLUDING GENERAL NOTES, THIS SHEET, TO ALL SUBCONTRACTORS.
- CONTRACTOR TO PROVIDE ALL CONDUITS, JUNCTION BOXES AND FACEPLATES FOR TELEPHONE/DATA SYSTEM. COORDINATE LOCATIONS WITH OWNER.
- CONTRACTOR TO COORDINATE ALL LOW-VOLTAGE WORK INCLUDING AUDIO/VISUAL, FIRE ALARM & SIGNAL, TELEPHONE, CABLE, & TELEVISION.
- COORDINATE ALL ELECTRICAL, SPRINKLER, FIRE/ALARM SYSTEM AND MECHANICAL DUCTS, FITTINGS, CONDUITS AND FIXTURES IN AREA OR SPACES OF WORK WITH SCHEDULED WALL, FLOOR AND CEILING ASSEMBLIES AND FINISHES.

### AREA OF WORK



### 1 8TH LEVEL FLOOR PLAN

SCALE: 1/16"=1'-0"

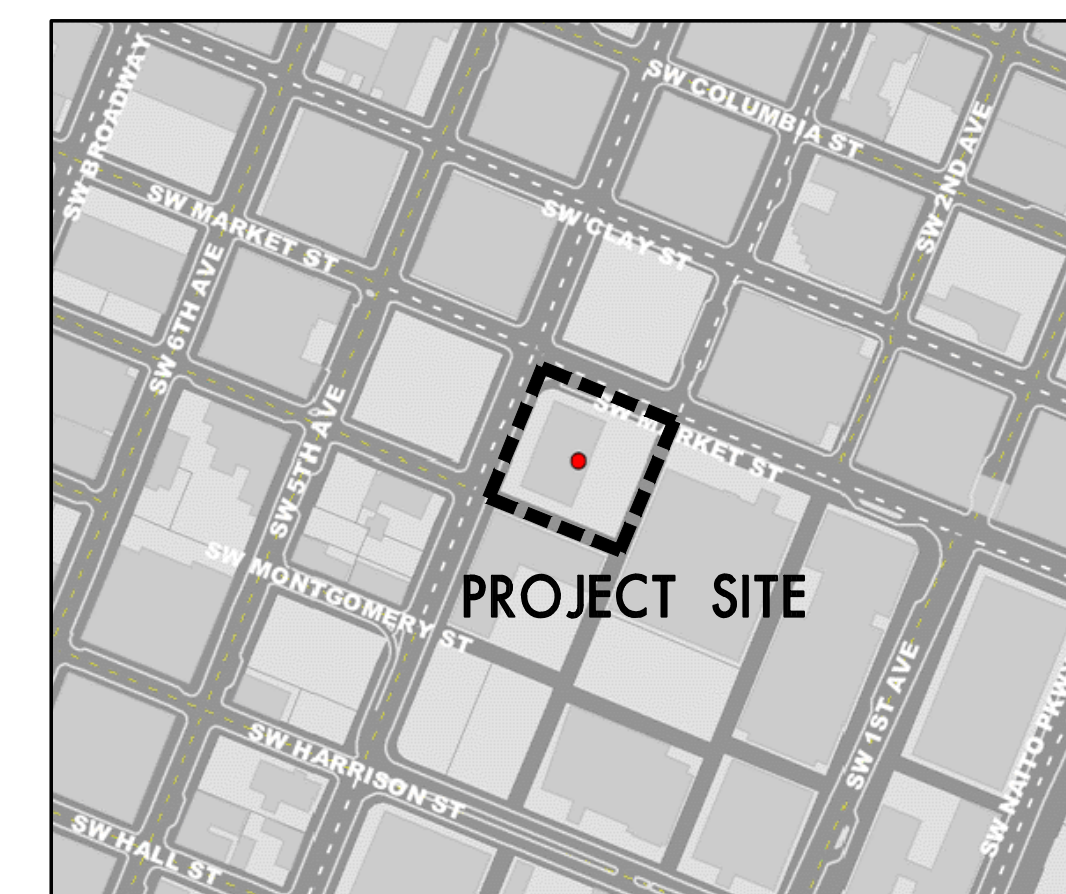
### PROJECT CONTACTS

<b>BUILDING MANAGEMENT:</b> Market Center Bldg. GVA Kidder Mathews Patricia Andersen, RPA, Mgr. (503) 221-2274 Fred McPherson, Bldg. Engr. (971) 255-2324 B-2 Flr. Suite B207	<b>ARCHITECTURE/INTERIORS</b> DECA Inc. Sallee Humphrey-PIC Laurel Danielson-Project Manager (503) 239-1987
<b>PROJECT MANAGER:</b> Kay Byrne-PSU (503) 725-3738	<b>STRUCTURAL ENGINEERING:</b> ABHT Structural Engineers Clinton Ambrose-ABHT (503) 243-6682
<b>OIT-TELECOM:</b> Don Walsh-PSU (503) 725-4434	<b>M/E/P ENGINEERING:</b> Insite Group Inc. Chris Wierman (503) 222-2044
<b>FACILITIES PERMITS:</b> City of Portland Scott Burris, Inspector Gary Boyles, Fire Marshal (503) 823-0652	

### SYMBOLS LEGEND

—	EXISTING CONSTRUCTION
—	NEW CONSTRUCTION - TO STRUCTURE
—	NEW CONSTRUCTION - FULL HEIGHT
—	EXISTING CONSTRUCTION - TO STRUCTURE
—	NEW CONSTRUCTION - PARTIAL HEIGHT
- - - -	EXISTING CONSTRUCTION TO BE REMOVED
—	GRID OR CENTER LINE
—	PROPERTY LINE
///	AREA NOT IN CONTRACT
⊙	BRACKET MOUNTED FIRE EXTINGUISHER
⊙	DUPLEX WALL RECEPTACLE
⊙	FOUR-PLY WALL RECEPTACLE
⊙+XX	RECEPTACLE XX" ABOVE FINISH FLOOR
⊙	DUPLEX CEILING RECEPTACLE
⊙	DUAL DUPLEX & DATA FLOOR RECEPTACLE
⊙	GROUND FAULT CIRCUIT INTERRUPTED OUTLET
⊙	TELEVISION RECEPTACLE
⊙	DUAL TEL/DATA WALL RECEPTACLE
⊙	DATA WALL RECEPTACLE
⊙	DATA CEILING RECEPTACLE
⊙	EXIT SIGN
⊙	PANIC BUTTON
⊙	SPECIAL PURPOSE OUTLET AS NOTED

### VICINITY MAP



Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

### DRAWING INDEX, PROJECT CONTACTS AND VICINITY MAP

Scale AS NOTED

Date APRIL 30, 2012

Sheet No. **G001**

DOOR SCHEDULE																
MARK	DOOR TYPE	DOORS					FRAMES			HARDWARE GROUP	HARDWARE					REMARKS
		MATERIAL	GLASS TYPE	FINISH	WIDTH	HEIGHT	TYPE	MATERIAL	FINISH		BUTTS	CLOSER	SILENCERS	F.L.R. STOP	WALL STOP	
850-A	D1	GLASS	CLEAR	-	4'-0"	8'-5"	-	-	-	2						2,6
850-B	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-C	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-D	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-E	D5	PT	-	PT	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						3
850-F	D1	GLASS	CLEAR	-	4'-0"	8'-5"	-	-	-	2						2,6
850-H	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-P	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-L	D3	WD	FROSTED	CL	5'-11"	8'-4"	-	WD	CLEAR	1						4,5,7
850-R	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-S	D2	GLASS	FROSTED FILM	-	6'-0"	8'-5"	-	-	-	2						1,6
850-T	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-U	D5	WD	CLEAR	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	3						10
850-V	D5	WD	-	PT	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-W	(E)	-	-	-	-	-	-	-	-	-						9
850-X	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						8
850-Y	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10
850-Z	D5	WD	-	CL	3'-0"	8'-4"	TIMELY	ALUM	SC108	1						10

**HARDWARE GROUPS:**

1. PROVIDE NEW ADA LEVER HARDWARE AT ALL NEW DOORS. BRUSHED ALUMINUM FINISH TO MATCH EXISTING REQUIRED BLDG HARDWARE STANDARD. ALL HARDWARE TO CONFORM TO PSU LOCKSMITH SPECIFICATIONS AND STANDARDS. SUBMIT HARDWARE SPECIFICATIONS CUTSHEETS FOR REVIEW PRIOR TO ORDERING.
2. ORL 84" EXTRA LENGTH LADDER STYLE BACK TO BACK PULLS, BRUSHED ALUMINUM HEADER & HINGE PLATES, FULLY CONCEALED FLOOR & CLNG. PIVOT HARDWARE. SUBMIT HARDWARE SPECIFICATIONS CUTSHEETS FOR REVIEW PRIOR TO ORDERING.
3. DOUBLE ACTING DOOR CLOSER LCN 6030 SERIES - CONCEALED IN 1-3/4" HEADER, AND ROLLER CATCH TO CONFORM TO PSU LOCKSMITH SPECIFICATIONS AND STANDARDS. DUMMY LEVERS SCHLAGE SPARTA SERIES TO MATCH BUILDING STANDARD. VERIFY WITH OWNER.

**DOOR SCHEDULE GENERAL NOTES:**

1. ALL EGRESS DOORS SHALL BE READILY OPERABLE FROM EGRESS SIDE WITHOUT THE USE OF A KEY OR SPECIAL KNOWLEDGE OR EFFORT.
2. VERIFY KEYING WITH OWNER
3. SUBMIT CUTSHEETS OF DOOR HARDWARE FOR REVIEW PRIOR TO CONSTRUCTION
4. DOOR FRAMES ARE TO BE TIMELY IN A ALUMATON (SC108) FINISH.
5. CONTRACTOR TO VERIFY DOOR HEIGHTS & WIDTHS
6. AT EXISTING ENTRANCE DOOR, PROVIDE ADA DOOR OPENER.

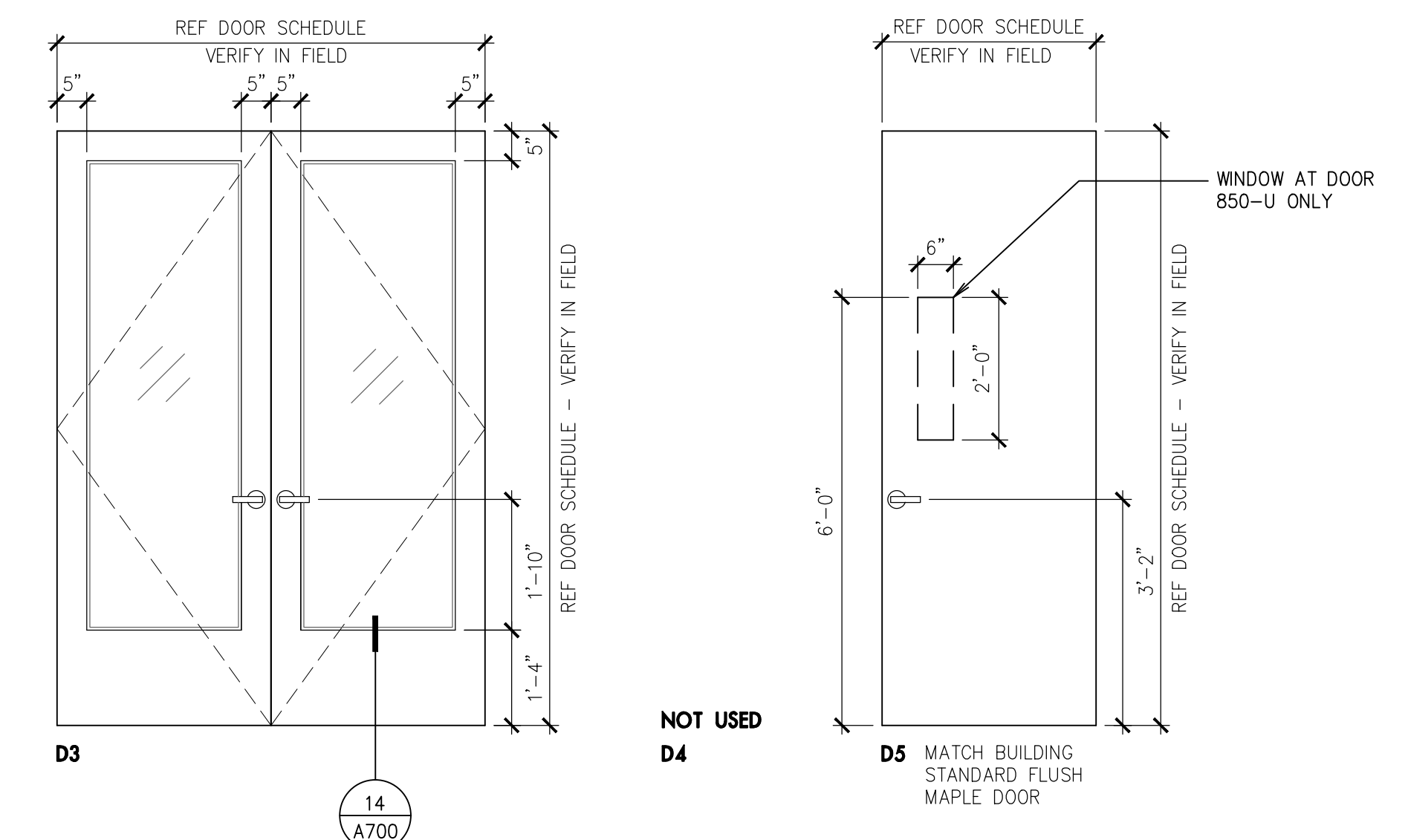
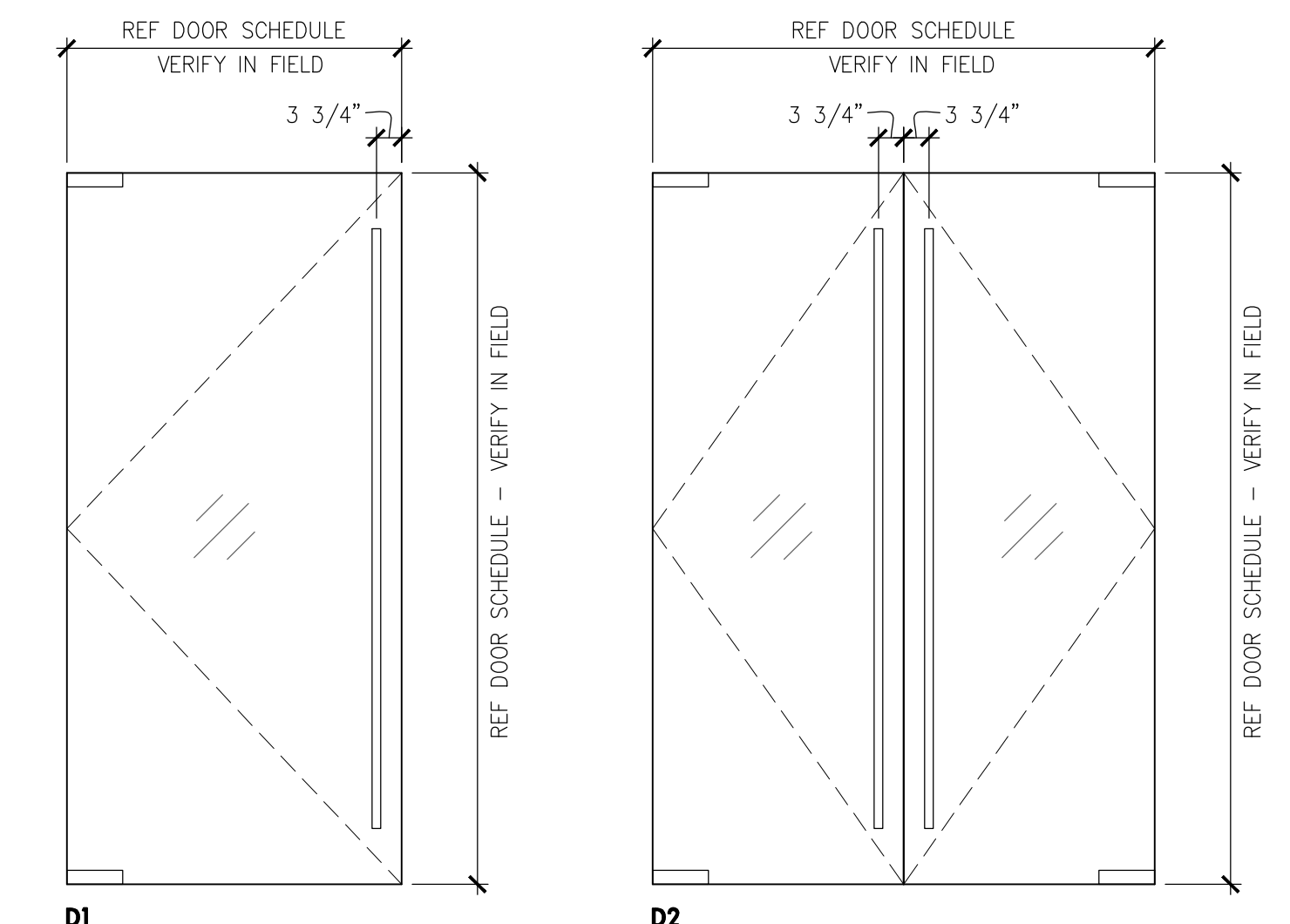
**FINISH:**

- WD- WOOD
- PT- PAINT GRADE WOOD, PAINTED
- CL- CLEAR FINISH

**REMARKS:**

1. FROSTED FILM ON CLEAR GLASS, TEMPERED. SUBMIT SAMPLE FOR APPROVAL
2. CLEAR, TEMPERED, SUBMIT SAMPLE FOR APPROVAL
3. PAINTED WOOD DOOR TO MATCH ADJACENT WALL COLOR
4. DOOR HARDWARE TO BE COORDINATED WITH PANIC BUTTON HARDWARE
5. DOOR TO HAVE ELECTRIC LOCK & HOLD OPEN
6. GLASS THICKNESS MINIMUM @ FRAMELESS GLASS DOORS
7. GLASS TO BE FROSTED/LAMINATED, TEMPERED, SUBMIT SAMPLE FOR APPROVAL
8. CARD KEY ACCESS
9. REINSTALL EXISTING DOOR IN NEW LOCATION. REVERSE DOOR SWING OUT. ADD FROSTED FILM AT RELIEF.
10. HOOK @ 5'-0" AFF ON BACK OF DOOR. PETER PEPPER PRODUCTS MODEL #2081AL. SUBMIT CUTSHEET TO DESIGNER FOR APPROVAL.

**DOOR TYPES:**



CEILING ASSEMBLIES			WALL ASSEMBLIES		
TAG	DESCRIPTION	FIRE RATING	TAG	DESCRIPTION	FIRE RATING
C1	(N) SUSPENDED CEILING SYSTEM ACOUSTIC INSUL. WHERE OCCURS (N) 2X4 ACOUSTIC CEILING TILE SEE ACT-1 FOR SPECIFICATIONS		1	TYP. NON-BEARING INT. WALL ACOUSTIC INSUL. WHERE OCCURS (1) LAYER 5/8" TYPE 'X' GYP. BD. METAL STUDS (1) LAYER 5/8" TYPE 'X' GYP. BD.	NONE
C2	NOT USED		2	TYP. NON-BEARING INT. WALL TO STRUCTURE ACOUSTIC INSUL. (1) LAYER 5/8" TYPE 'X' GYP. BD. METAL STUDS (1) LAYER 5/8" TYPE 'X' GYP. BD. FRAMING, GYP., ACOUSTIC INSUL. CONTINUE PAST CEIL. TO STRUCTURE, REF: 3/53	NONE
C3	BIDDER-DESIGNED SUPPORT SYSTEM- REFER TO STRUCTURAL DRAWINGS GYPSUM BOARD		4	(2) LAYERS 5/8" TYPE 'X' GYP. BD. RESILIENT CHANNEL METAL STUDS, SEE STRUCT. 5-1/2" ACOUSTIC INSULATION (2) LAYERS 5/8" TYPE 'X' GYP. BD. METAL STUDS PLUMBING WALL (1) LAYER 5/8" TYPE 'X' GYP. BD.	
			5	NOT USED	
			6	CONCRETE WALL, SEE STRUC. 7/8" METAL FURRING CHANNEL @ 16" O.C. (1) LAYER 5/8" TYPE 'X' GYP. BD.	

**deca.inc**

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8TH FLOOR MARKET BLDG  
OFFICE REMODEL**

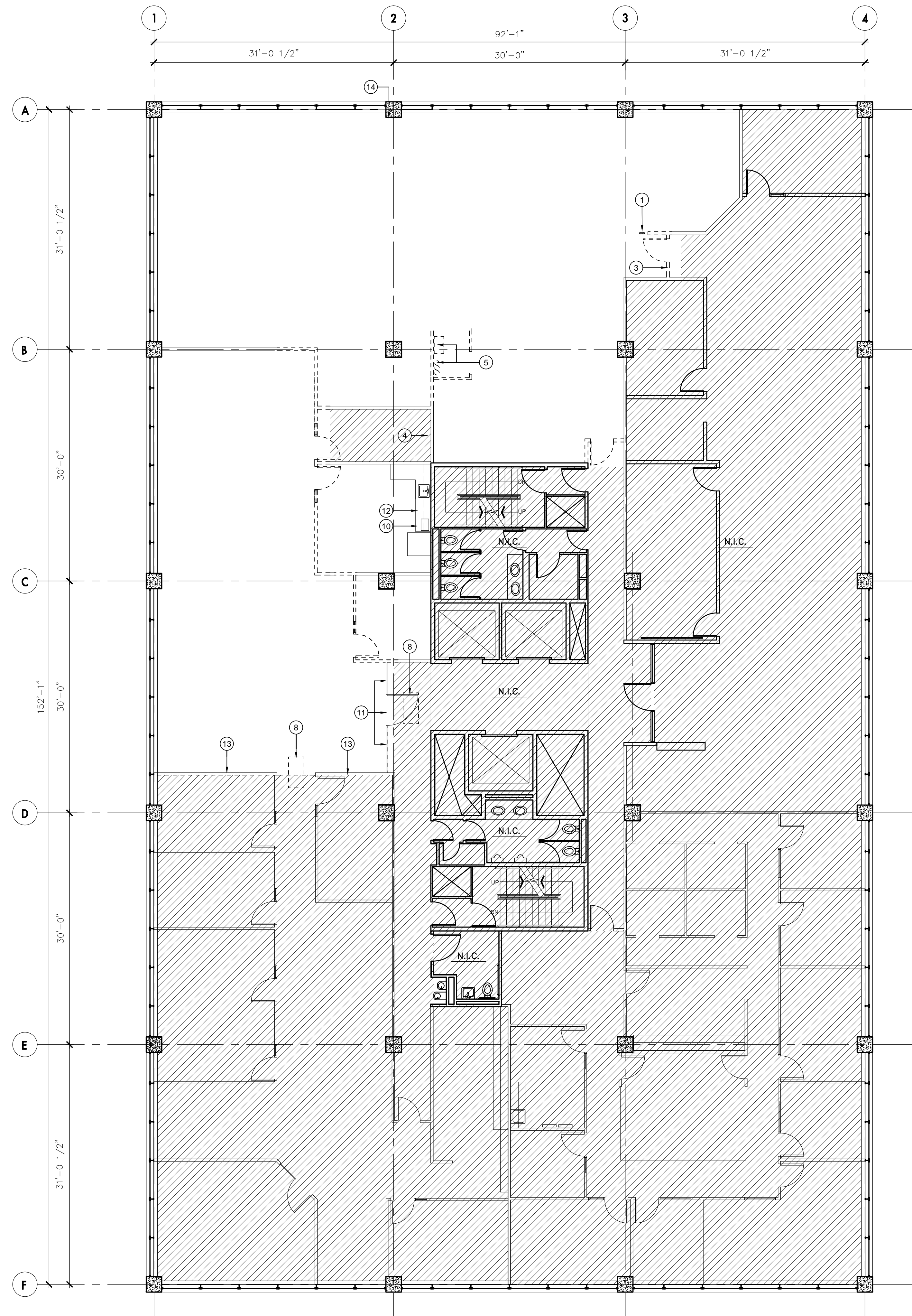
1600 SW 4th Avenue  
Portland, OR, 97201

**REVISED  
DRAWING SET**

Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**WALLTYPES  
& DOOR SCHEDULE**

Scale AS NOTED  
Date APRIL 30, 2012  
Sheet No. **A001**



**1 8TH LEVEL DEMOLITION PLAN**  
SCALE: 1/8"=1'-0"

### DEMOLITION NOTES

THIS SHEET

1. DEMOLISH AND REMOVE ALL WALLS, DOORS, FRAMES, RELITES, CASEWORK AND FIXTURES SHOWN DASHED, UNLESS NOTED OTHERWISE. CLEAN AND PREP SURFACES FOR NEW FINISH. PROTECT (E) OFFICE SPACE, ELEVATOR LOBBY, TELCO SERVER ROOM, KITCHEN, CORRIDOR AND RESTROOMS NOT IN SCOPE OF NEW WORK.
2. SEE SHEET A108 FOR WALL TYPES. CONTRACTOR TO DETERMINE IF DEMO IS REQUIRED TO ACCOMPLISH WALL TYPE SPECIFIED.
3. DEMOLISH AND REMOVE (E) CEILING GRID.
4. DEMO ALL (E) 2X4 & 2X2 LIGHT FIXTURES. SALVAGE TO OWNER.
5. REMOVE (E) CARPET TILE AND STORE FOR REUSE. PREP AND CLEAN SURFACE FOR REINSTALLATION OF (E) CARPET TILE.
6. DEMO (E) FLOOR OUTLETS AND PATCH AND REPAIR FLOOR AS REQUIRED.
7. REMOVE (E) BASE UNLESS NOTED OTHERWISE AND SALVAGE TO OWNER. PREP AND CLEAN SURFACE FOR NEW FINISH.
8. REMOVE ALL (E) VERTICAL OFFICE BLINDS & TRACKS & STORE FOR REUSE.
9. REMOVE ALL (E) DOOR HARDWARE & STORE FOR REUSE. PROVIDE INVENTORY OF MODEL AND STYLE AVAILABLE FOR REUSE.
10. EXISTING POWER AND LIGHTING CIRCUITS TO REMAIN. REUSE AT NEW CONSTRUCTION WHERE APPLICABLE.
11. REMOVE AND RELOCATE ALL (E) WALL AND CEILING MOUNTED EQUIPMENT INCLUDING SIGNAGE, CLOCKS, STROBES AND SPEAKERS. ALL NEW WORK TO BE APPROVED BY CITY FIRE MARSHALL.
12. PROVIDE EMERGENCY LIGHTING IN ALL SPACES. TIE INTO (E) BUILDING EMERGENCY POWER.
13. COMPLY WITH OWNER'S WASTE REMOVAL POLICIES. RECYCLE, REUSE AND SALVAGE REMOVED ITEMS WHERE POSSIBLE.
14. REMOVE AND RELOCATE MECHANICAL & ELECTRICAL TO ACCOMMODATE NEW CONSTRUCTION WHERE APPLICABLE.
15. PATCH AND REPAIR WHERE EXISTING WALLS THAT ARE TO BE DEMOLISHED MEET WITH WINDOW MULLIONS AND STRUCTURAL COLUMNS. PATCH AND REPAIR TO MATCH (E) MULLION COLOR OR MATCH NEW WORK AT COLUMNS.

### KEY NOTES

THIS SHEET

- ① EXISTING TELE/DATA WIRE DROP FROM CEILING THROUGH FLOOR SLAB. RELOCATE AS REQUIRED FOR NEW WORK, MUST REMAIN OPERATIONAL.
- ② NOT USED.
- ③ REUSE EXISTING DOOR AND RELITE IN NEW LOCATION. REVERSE DOOR SWING.
- ④ PROTECT EXISTING SERVER EQUIPMENT AT TELCO ROOM DURING CONSTRUCTION.
- ⑤ DEMO AND REMOVE (E) TELECOM CONDUIT AND CAP OFF AS REQUIRED BETWEEN FLOOR PENETRATIONS. VERIFY W/ OWNER.
- ⑥ NOT USED
- ⑦ NOT USED.
- ⑧ REMOVE (E) 2X4 LIGHT FIXTURE. PATCH (E) CEILING & PREP FOR REPLACEMENT FIXTURE.
- ⑨ NOT USED
- ⑩ REMOVE (E) DISHWASHER
- ⑪ PROTECT (E) ENTRY GLAZING FOR REUSE
- ⑫ PROTECT (E) CASEWORK AND FLOORING FOR REUSE
- ⑬ PROTECT (E) WOOD BASE, TOUCH-UP AND CLEAN FOR REUSE.
- ⑭ REMOVE AND PATCH (E) CONDUIT AT COLUMN. REMOVE (E) THERMOMETER AND RELOCATE WITH NEW WORK.

### LEGEND

THIS SHEET

- EXISTING TO REMAIN
- TO DEMOLISH
- AREA NOT IN CONTRACT

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**REVISED  
DRAWING SET**

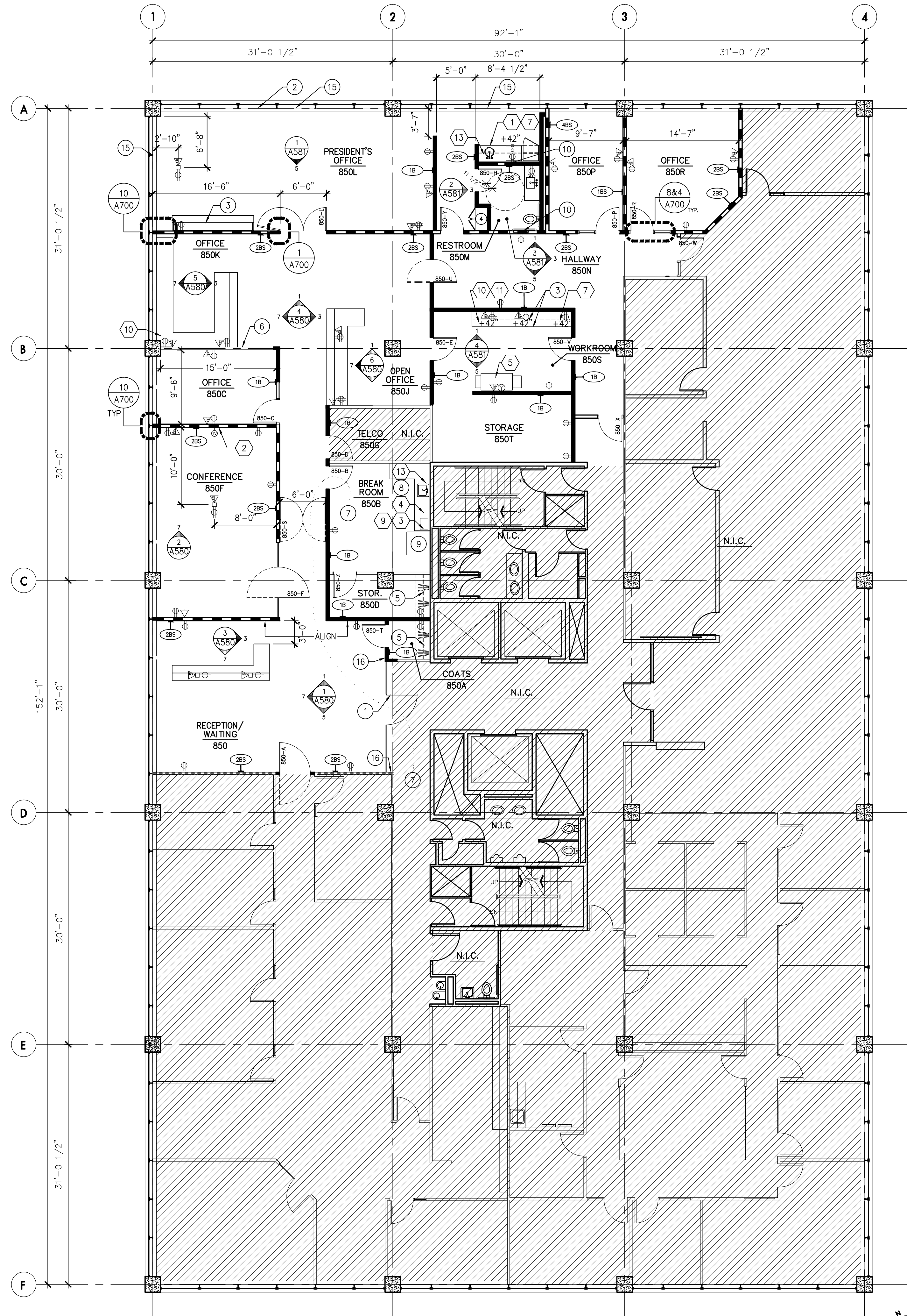
Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**8TH LEVEL  
DEMOLITION PLAN**

Scale 1/8"=1'-0"

Date APRIL 30, 2012

Sheet No. **A100**



1 8TH LEVEL FLOOR PLAN  
SCALE: 1/8"=1'-0"

**GENERAL NOTES**

THIS SHEET

- DIMENSIONS SHOWN ARE TO FACE OF FINISH, U.N.O.
- MAINTAIN ALL EXISTING RATED WALL ASSEMBLIES.
- WALL LOCATIONS ARE BASED OFF OF CENTERLINE OF WINDOW MULLIONS, TYP.
- PATCH, CAULK & FINISH ALL PENETRATIONS THROUGH FLOOR, WALLS AND CEILING OF CONDUITS, PIPING, DUCTS, ETC. TO MAINTAIN (E) FIRE RATINGS.
- PATCH & PREPARE ALL SURFACES, MATERIALS AND FINISHES AS REQUIRED TO RECEIVE NEW WORK.
- REFER TO ELECTRICAL DRAWINGS. CONTACT ARCHITECT WITH ANY DISCREPANCIES BETWEEN DRAWINGS. ANY ELECTRICAL OR DATA OUTLETS SHOWN ARE FOR DESIGN PURPOSES ONLY. CONTRACTOR TO CONFIRM CIRCUIT NEEDS.
- SIGNAGE, BOTH ILLUMINATED AND NON-ILLUMINATED TO BE OFCL.
- CLEAN AND TOUCH-UP (E) HEAT DUCT AT BASE OF WINDOWS, TYP.
- WINDOW COVERINGS (OFCL): USE OWNER'S EXISTING INVENTORY, RE-STRING AND RE-INSTALL, TYP.. PAINT (E) SOFFIT PRIOR TO WC INSTALLATION.
- INVENTORY AND USE (E) METAL STUDS, INSULATION AND OTHER MATERIALS CURRENTLY STORED IN THE SPACE AS MUCH AS POSSIBLE. COORDINATE WITH OWNER.
- (E) WOOD RAILING AT WINDOWS:  
BASE BID: LIGHT SAND, CLEAN & OIL, TYP.  
ADD. ALTERNATE #1: REMOVE, REFINISH, AND REINSTALL.  
ADD. ALTERNATE #2: REPLACE WITH NEW WHITE MAPLE HDWD, CLEAR FINISH.

**KEY NOTES**

THIS SHEET

- ADD MAGNETIC LOCK TO EXISTING DOOR: SCHLAGE M420. ALSO ADD ADA DOOR OPENER TO MATCH SIMILAR CONDITION ON 4TH FLOOR.
- DENTED WOOD RAIL AT WINDOW - SWAP WITH ONE IN LESS-VISIBLE AREA.
- BUILT IN CASEWORK. SEE ELEVATIONS AND DETAILS.
- BUILT IN MILLWORK WITH ADJUSTABLE SHELVING
- WALL MOUNTED COAT RACK WITH SHELF ABOVE, OFCL
- (E) WALL HAS GYP. BOARD ON SOUTH SIDE ONLY.
- MAINTAIN ACCESS TO EXISTING KITCHEN FOR OTHER OCCUPANTS ON THIS FLOOR AS MUCH AS POSSIBLE. NOTIFY OWNER IN ADVANCE WHEN ACCESS WILL BE UNAVAILABLE.
- (E) KITCHEN CASEWORK & PLUMBING TO REMAIN
- (E) KITCHEN REFRIGERATOR
- FULLY RECESSED WASHROOM ACCESSORY- SEE ELEVATIONS
- SAND & REFINISH/OIL (E) WOOD RAILING @ WINDOW GLAZING AT PRESIDENT'S OFFICE ONLY. PROVIDE SAMPLE FOR DESIGNER APPROVAL.
- NOT USED.
- NOT USED.
- NOT USED.
- INSTALL NEW VERTICLE BLINDS AT THIS ROOM ONLY. VERIFY IF EXISTING TRACK WILL WORK WITH NEW SPECIFICATION, SEE WC-1
- ADA DOOR BUTTON FOR EXISTING ENTRY DOOR.

**ELECTRICAL & DATA SYMBOLS LEGEND**

- FE BRACKET MOUNTED FIRE EXTINGUISHER
- ⊕ DUPLEX WALL RECEPTACLE
- ⊕+XX FOUR-PLEX WALL RECEPTACLE RECEPTACLE XX" ABOVE FINISH FLOOR
- ⊕ DUPLEX CEILING RECEPTACLE
- ⊕ DUAL DUPLEX & DATA FLOOR RECEPTACLE
- ⊕GFCI GROUND FAULT CIRCUIT INTERRUPTED OUTLET
- ⊕TV TELEVISION RECEPTACLE (CABLE)
- ⊕ DUAL TEL/DATA WALL RECEPTACLE
- ⊕ DATA WALL RECEPTACLE
- ⊕ EXIT SIGN
- ⊕ SPECIAL PURPOSE OUTLET AS NOTED

**LEGEND**

THIS SHEET

- EXISTING CONSTRUCTION
  - NEW CONSTRUCTION - TO STRUCTURE
  - NEW CONSTRUCTION - FULL HEIGHT
  - EXISTING CONSTRUCTION - TO STRUCTURE
  - /// AREA NOT IN CONTRACT
- WALL TYPE SYMBOLS:
- 1 = WALL TYPE
  - B = STUD SIZE
  - S = ACOUSTICAL INSUL. REQ'D
- METAL STUD SIZE KEY:
- A = 2"x2" AT 16" O.C.
  - B = 2"x4" AT 16" O.C.
  - C = 2"x6" AT 16" O.C.



**REVISED  
DRAWING SET**

Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**EQUIPMENT SCHEDULE**

THIS SHEET

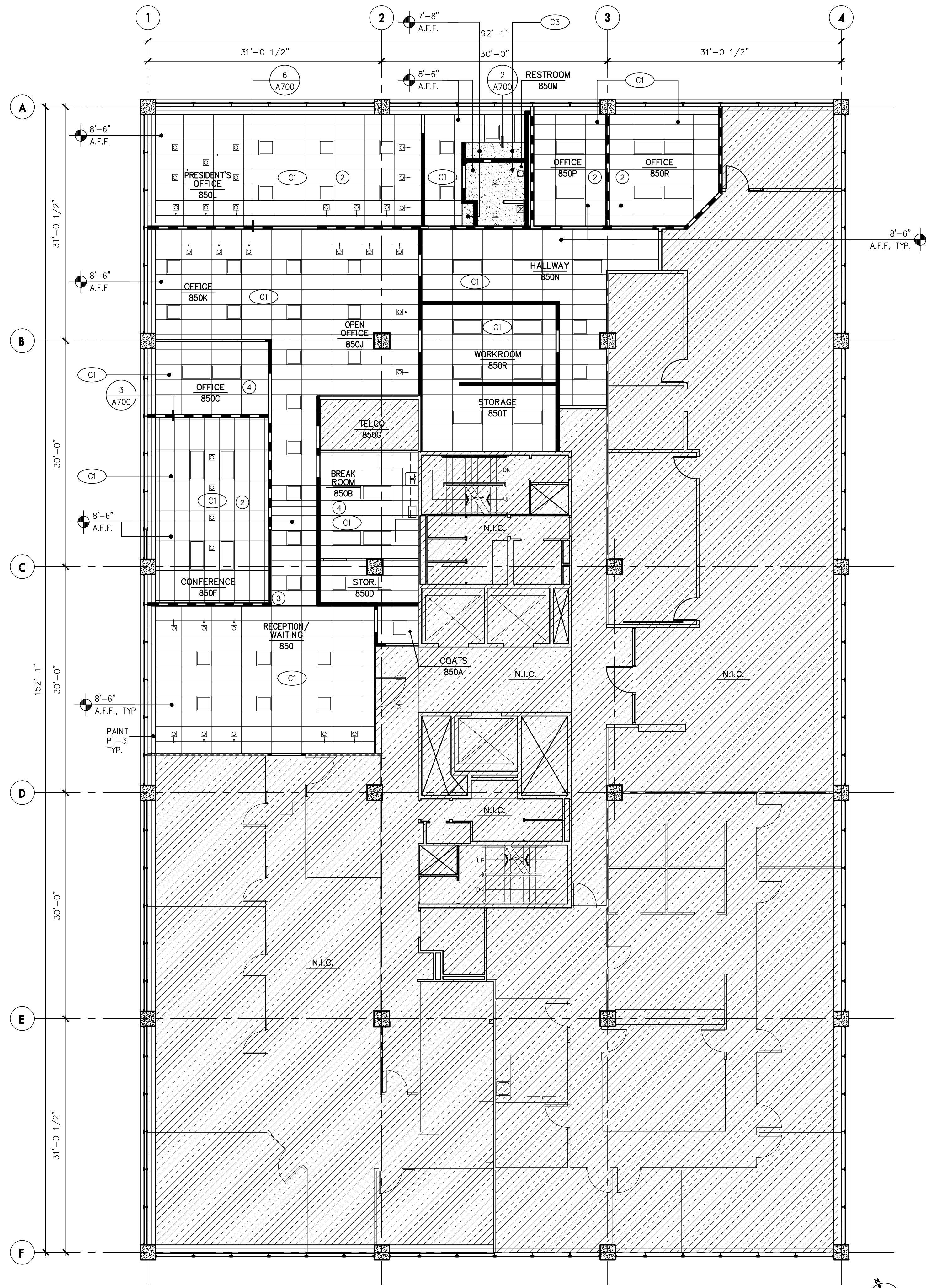
ITEM	DESCRIPTION:	(INCLUDED FOR REFERENCE ONLY - ACTUAL EQUIPMENT MAY VARY)
1	UNDER COUNTER REFRIGERATOR W/ 1/2" INSERT PANEL TO MATCH	
2	CABINETRY-MFR: ULINE ULN-29RB-15	
3	LARGE FORMAT TV/MONITOR, OFCL	
4	MFR: TBD	
5	NEW DISHWASHER, OFCL	
6	MRR: TBD, STAINLESS STEEL INTERIOR & EXTERIOR, QUIET (VFY W/OWNER)	
7	COFFEE MAKER WITH 1/2" WATER SUPPLY	
8	MFR: TBD	
9	COPY MACHINE: TBD (VERIFY SPECIFICATION & POWER REQUIREMENTS & MOUNTING HEIGHTS W/ OWNER)	
10	NOT USED	
11	COFFEE MAKER (NO WATER LINE REQUIRED)	
12	MFR: KEURIG	
13	NOT USED	
14	MICROWAVE	
15	MFR: TBD	
16	PRINTER	
17	MFR: TBD	
18	FAX MACHINE	
19	MFR: TBD	
20	NOT USED	
21	INSTANT HOT WATER	
22	MFR: SEE PLUMBING DRAWINGS	

**8TH LEVEL  
FLOOR PLAN  
& EQUIPMENT  
SCHEDULE**

Scale 1/8"=1'-0"

Date APRIL 30, 2012

Sheet No. **A108**

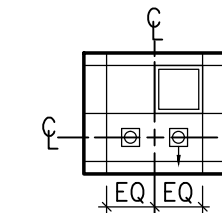


**1 8TH LEVEL REFLECTED CEILING PLAN**  
SCALE: 1/8"=1'-0"

**GENERAL NOTES**

THIS SHEET

1. PROVIDE NEW 2X4 CEILING GRID AND TILE. SEE FINISH LEGEND & SCHEDULE FOR SPECIFICATIONS.
2. PROVIDE EMERGENCY LIGHTING IN ALL SPACES TIE INTO (E) BUILDING EMERGENCY POWER.
3. CLEAN ALL REINSTALLED EQUIPMENT TO 'LIKE NEW' CONDITION.
4. VERIFY EXISTING FIRE SPRINKLER SYSTEM- REMOVE, RELOCATE, OR PROVIDE NEW AS REQUIRED TO ADJUST FOR NEW WORK. VERIFY EXISTING LAYOUT. FIRE MARSHALL TO APPROVE SEPARATE DESIGN LAYOUT AND NEW HEAD TYPE PER CODE. PROVIDE NEW SPRINKLER HEADS AND ESCUTCHEON PLATES TO MEET BUILDING STANDARDS.
5. PROVIDE PLUMBING SHUT-OFF VALVES IN EASILY ACCESSIBLE LOCATIONS ABOVE CEILING.
6. LOCATE ALARMS & STROBES AS REQUIRED PER CODE.
7. REFER TO INTERIOR ELEVATIONS FOR ADDITIONAL NOTES.
8. SEE ELECTRICAL DWGS. FOR LIGHT FIXTURE TYPES.
9. CONTRACTOR TO SUBMIT CUTSHEET OF EXIT SIGNS FOR APPROVAL.
10. SEE MECHANICAL FOR SUPPLY AND RETURN AIR DIFFUSER LOCATIONS.
11. CENTER FIXTURES, SPRINKLERS, ALARMS, ETC. ON THE 2X2 HALF OF 2X4 SCORED CEILING TILE U.N.O.



12. EXISTING LIGHT FIXTURE INVENTORY IN THE SPACE AS OF 4/23/12: (37)2X4'S, (5)2X2'S.

**KEY NOTES**

THIS SHEET

- 1 NOT USED
- 2 CENTER CEILING TILES HORIZONTALLY AND VERTICALLY IN ROOM AS SHOWN.
- 3 START FIRST FULL CEILING TILE HERE.
- 4 PROVIDE ACOUSTICAL INSULATION ABOVE CEILING, AT THE PERIMETER.
- 5 NOT USED
- 6 NOT USED

**LEGEND**

NOTE: SEE LIGHTING SCHEDULE/ELECTRICAL DWGS FOR FIXTURE TYPES & SPECIFICATIONS.

- 2X4 ACOUSTICAL CEILING TILE & GRID
- GYP. SOFFIT
- 2X4 DIRECT/INDIRECT FLUORESCENT FIXTURE, TO MATCH BUILDING STANDARD.
- 2X2 DIRECT/INDIRECT FLUORESCENT FIXTURE, TO MATCH BUILDING STANDARD.
- RECESSED LIGHT (DIMMABLE EXCEPT @ RESTROOM)
- DIRECTIONAL RECESSED LIGHT (DIMMABLE)
- WALL SCONCE LUMINAIRE, DIMMABLE
- SUPPLY/RETURN DIFFUSERS, SEE MECH



**REVISED  
DRAWING SET**

Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**8TH LEVEL  
REFLECTED CEILING PLAN**

Scale 1/8"=1'-0"

Date APRIL 30, 2012

Sheet No. **A208**

**FINISH LEGEND**

CODE	MFGR.	DESCRIPTION	COLOR/FINISH	SPECIFICATION NOTES	LOCATION	CONTACT
<b>ACOUSTICAL CEILING TILE:</b>						
ACT-1	Armstrong	Style: Mesa Second Look Angled Tegular Size: 2' x 4' x 3/4"	Color: White	See Manufacturer's Specs Grid: 15/16", white	See RCP	Tony Sipe P: 360.480.0486
ACT-2	NOT USED					
<b>BASE:</b>						
WB-1	Contractor to Source	Species: Maple Size: 4" Profile: See Detail	Finish: Clear	Match building standard Submit wood finish sample for designer's approval	Refer to Drawings For Location	
RB-1	Flexco	Style: Rubber Base Size: 4"	Color: 078 Umber	Straight Base @ Carpet Coved Based @ Resilient Flooring	Refer to Drawings For Location	Bret Biggs P: (503) 222-9367
<b>CARPET:</b>						
CPT-1	Patcraft	Style: Z8452 Cashmere EW24 Fiber: Eco Solution Q (R) Nylon Tufted Yam Weight: 28 OZ Size: Match (E) Carpet Installation: Match (E) Installation	Color: 00758- Lustrous Oyster	See Manufacturer's Specs Contractor to verify that the dye lot between the (E) Carpet tiles & new tiles is of a consistent quality throughout.	Refer to Drawings For Location	Rep: Patrick Orr P: (503) 332.8006
<b>CERAMIC BASE:</b>						
CB-1	Daltile	Style: Veranda Size: 6" x 12" (Cove Base) Finish: Unpolished	Color: P506 Leather Grout: SpectraLOCK PRO Epoxy Grout or equal Grout color: Laticrete #35 Mocha	See Manufacturer's Specs Grout lines to be equal and not exceed 1/8" width Outside Cove Corner Item # S-36E9T to be used at outside corners.	Refer to Drawings For Location	Rep: Hilary Noah P: 541.513.5843
<b>CERAMIC TILE:</b>						
CT-1	Daltile	Style: Veranda Size: 13"x20" Nominal Size: 12-7/8" x 19-1/2" Finish: Unpolished	Color: P506 Leather Grout: SpectraLOCK PRO Epoxy Grout or equal Grout color: Laticrete #35 Mocha	See Manufacturer's Specs Grout lines to be equal and not to exceed 1/8" width	Restroom Floor	Rep: Hilary Noah P: 541.513.5843
<b>PORCELAIN TILE:</b>						
T-1	Daltile	Style: Modem Dimensions Size: 4.25" x 12.75" Nominal Size: 4.25" x 12-7/8" Finish: Matte	Color: Biscuit K775 Matte Grout to match tile's body color Type: SpectraLOCK PRO Epoxy Grout color: Laticrete #90 Light Puter	See Manufacturer's Specs Grout lines to be equal and not to exceed 1/8" width Use Bull Nose Trim Piece S-44C9 @ top tile of restroom wainscot- size: 4.25"x12.75"	Restroom Wainscot	Rep: Hilary Noah P: 541.513.5843
<b>FABRIC WRAPPED PANEL:</b>						
FWP-1	NOT USED					
<b>INTERIOR PAINT</b>						
PT-1	Miller		Color: TBD Name: TBD Finish: Eggshell	Painter to provide 5x5' brush-out on site for designer to approve	See Interior Elevations	Rep: Amy Tacke P: 503.348.3307
PT-2	Miller		Color: TBD Name: TBD Finish: Eggshell	Painter to provide 5x5' brush-out on site for designer to approve	See Interior Elevations	Rep: Amy Tacke P: 503.348.3307
PT-3	Miller		Color: TBD Name: TBD Finish: Eggshell	Painter to provide 5x5' brush-out on site for designer to approve	See Interior Elevations	Rep: Amy Tacke P: 503.348.3307
PT-4	Miller		Color: TBD Name: TBD Finish: Satin	Painter to provide 5x5' brush-out on site for designer to approve	See Interior Elevations	Rep: Amy Tacke P: 503.348.3307
PT-5	Miller		Color: TBD Name: TBD Finish: Eggshell	Painter to provide 5x5' brush-out on site for designer to approve	See Interior Elevations	Rep: Amy Tacke P: 503.348.3307
PT-6	Miller		Color: TBD Name: TBD Finish: Eggshell	Painter to provide 5x5' brush-out on site for designer to approve	See Interior Elevations	Rep: Amy Tacke P: 503.348.3307
<b>LINOLEUM</b>						
LN-1	Mamoleum	Style: Match Existing	Color: Match Existing	See Manufacturer's Specs.		Rep: Cherie Macnabb P: 360.281.1918
LN-2	Mamoleum	Style: Real	Color: 3048 Graphite	See Manufacturer's Specs.		Rep: Cherie Macnabb P: 360.281.1918
<b>PLASTIC LAMINATE</b>						
PL-1	Fornica	Plastic Laminate	Color: 837-58 Name: Graphite	See Manufacturer's Specs	Restroom Vanity & Casework	
PL-2	Nevamar	Plastic Laminate	Color: VA5002T Name: Easy Elegance	See Manufacturer's Specs	Casework Tops	Grace Kradin P: 360.710.3787
PL-3	Nevamar	Plastic Laminate	Color: AL-5-1T Name: Herbal Allusion	See Manufacturer's Specs	Casework Fronts	Grace Kradin P: 360.710.3787
<b>WINDOW COVERINGS</b>						
WC-1	Levelor	Style: TBD Vertical Blinds	Color: TBD	See Manufacturer's Specs.	Office 850L	
<b>SOLID SURFACING MATERIAL:</b>						
SS-1	Paperstone	Countertop Thickness: 1"	Color: Gunmetal	See Manufacturer's Specs.	Office 850L	
SS-2	Pental	Chroma Style: BQ307P Size: 3/4" Slab	Color: Clay Pebble Polished	See Manufacturer's Specs.	President's Kitchenette & Resroom	Cindi Mahaffey p:503.445.8600
<b>WOOD</b>						
WD-1	NOT USED					
WD-2	Veridian Wood Products	Reclaimed Douglas Fir - Gym Bleachers Type: Solid Wood Paneling Thickness: 3/8" Size: 8" width	Finish: To match designers control sample	See Manufacturer's Specs. Submit wood finish sample for designer's approval	Reception Desk	Joe Mitchoff C 503-348-8828
WD-3	Veridian Wood Products	Old Growth Douglas Fir CVG Veneer Panels	TBD	See Manufacturer's Specs Submit wood finish sample for designer's approval	Casework	Joe Mitchoff C 503-348-8828
WD-4	Oregon Lumber Company	Worthington Species: Douglass Fir Ply Type Woca Oil Color: Ebony I-4 Size: Verify w/ Millworker Thickness: Verify w/ Millworker	TBD	Submit wood finish sample for designer's approval Millworker to verify size & thickness required to achieve reception desk counter.	Reception Desk	1-800-824-5671
WD-5	NOT USED					
WD-6	Contractor to Source	Species: Maple Profile: See Detail	Finish: Clear	Match building standard Submit wood finish sample for designer's approval	Solid doors Casework	
<b>Notes:</b>						
1	Contact information is provided to assist in locating materials, but is not limited to only one company/person as a source					
2	Latex paint is recommended unless the surfaces were originally painted with an oil-base paint product. Painter to verify and provide appropriate paint product recommendation.					
3	Contractor to submit samples of all finish materials for DECA's approval prior to commencing work. Finish samples are to match control samples and/or material specifications.					
4	Contractor to confirm lead times for products and materials and notify designer and project team of any long lead time items that would cause a delay					
5	Refer to drawings for complete finish location information					

**FINISH SCHEDULE**

	RM. NAME	FLOOR		BASE		WALLS						CEILING		REMARKS	REVISION	
		MATL	FIN	MATL	FIN	NORTH MATL	FIN	EAST MATL	FIN	SOUTH MATL	FIN	WEST MATL	FIN			MATL
850	RECEPTION/WAITING	CPT-1	-	WB-1	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	-	-	ACT-1		
850A	COATS	CPT-1	-	RB-1	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
850B	BREAK ROOM	EXISTING	-	WDB	CLR	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
850C	OFFICE	CPT-1	-	RB-1	-	GBD	PT-6	GBD	PT-6	GBD	PT-6	GBD	PT-6	ACT-1		
850D	STORAGE	CPT-1	-	RB-1	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
850F	CONFERENCE	CPT-1	-	WB-1	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
850G	TELCO ROOM	EXISTING	-	-	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
850J	OPEN OFFICE	CPT-1	-	WB-1	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
850K	OFFICE	CPT-1	-	WB-1	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
850L	OFFICE	CPT-1	-	WB-1	-	GBD	PT-5	GBD	PT-5	GBD	PT-5	GBD	PT-5	ACT-1	1	
850M	RESTROOM	CT-1	-	CB-1	-	GBD	PT-4	GBD	PT-4	GBD	PT-4	GBD	PT-4	GBD	PT-3	
850N	HALLWAY	CPT-1	-	WB-1	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
850P	OFFICE	CPT-1	-	RB-1	-	GBD	PT-6	GBD	PT-6	GBD	PT-6	GBD	PT-6	ACT-1		
850R	OFFICE	CPT-1	-	RB-1	-	GBD	PT-6	GBD	PT-6	GBD	PT-6	GBD	PT-6	ACT-1		
850S	WORKROOM	LIN-2	-	RB-1	-	GBD	PT-6	GBD	PT-6	GBD	PT-6	GBD	PT-6	ACT-1		
850T	STORAGE	LIN-1	-	RB-1	-	GBD	PT-1	GBD	PT-1	GBD	PT-1	GBD	PT-1	ACT-1		
<b>REMARKS</b>																
1 NEW VERTICAL BLINDS - WC-1																

**deca . inc**

935 SE Alder Street, Portland Oregon 97214  
tel 503 239 1987 fax 503 239 6558



**PORTLAND STATE UNIVERSITY  
8TH FLOOR MARKET BLDG  
OFFICE REMODEL**

1600 SW 4th Avenue  
Portland, OR, 97201

**REVISED  
DRAWING SET**

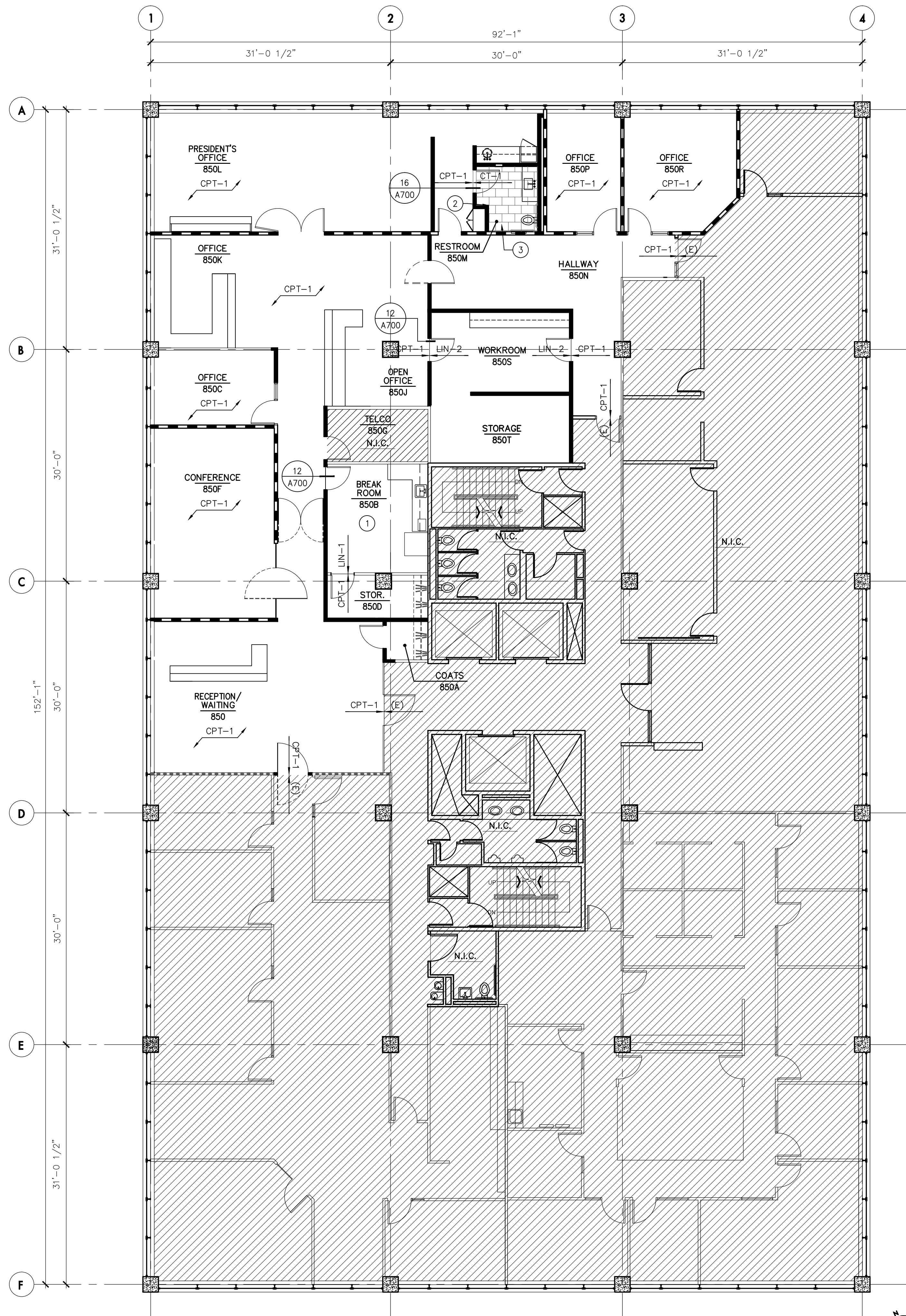
Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**FINISH LEGEND  
& SCHEDULE**

Scale 1/8" = 1'-0"

Date APRIL 30, 2012

Sheet No. **A300**



1 8TH LEVEL FLOOR FINISH PLAN  
SCALE: 1/8"=1'-0"

**GENERAL NOTES**

THIS SHEET

1. REFER TO FINISH LEGEND FOR SPECIFICATIONS.
2. REFER TO SHEET A700 FOR TYPICAL TRANSITION DETAILS.
3. ALL TRANSITIONS AND THRESHOLDS TO MEET THE REQUIREMENTS OF THE ADA.
4. REFER TO FINISH LEGEND AND SCHEDULE FOR MATERIALS AND FINISHES NOTED.
5. REFER TO INTERIOR ELEVATIONS FOR ADDITIONAL FINISH INFORMATION AND CALLOUTS.

**KEY NOTES**

THIS SHEET

- ① PATCH AND MATCH (E) LINOLEUM IN THIS AREA AS REQUIRED WITH NEW WORK.
- ② START FIRST FULL TILE HERE. PATTERN AS INDICATED.
- ③ INSTALL TILE IN A RUNNING BOND PATTERN

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**REVISED  
DRAWING SET**

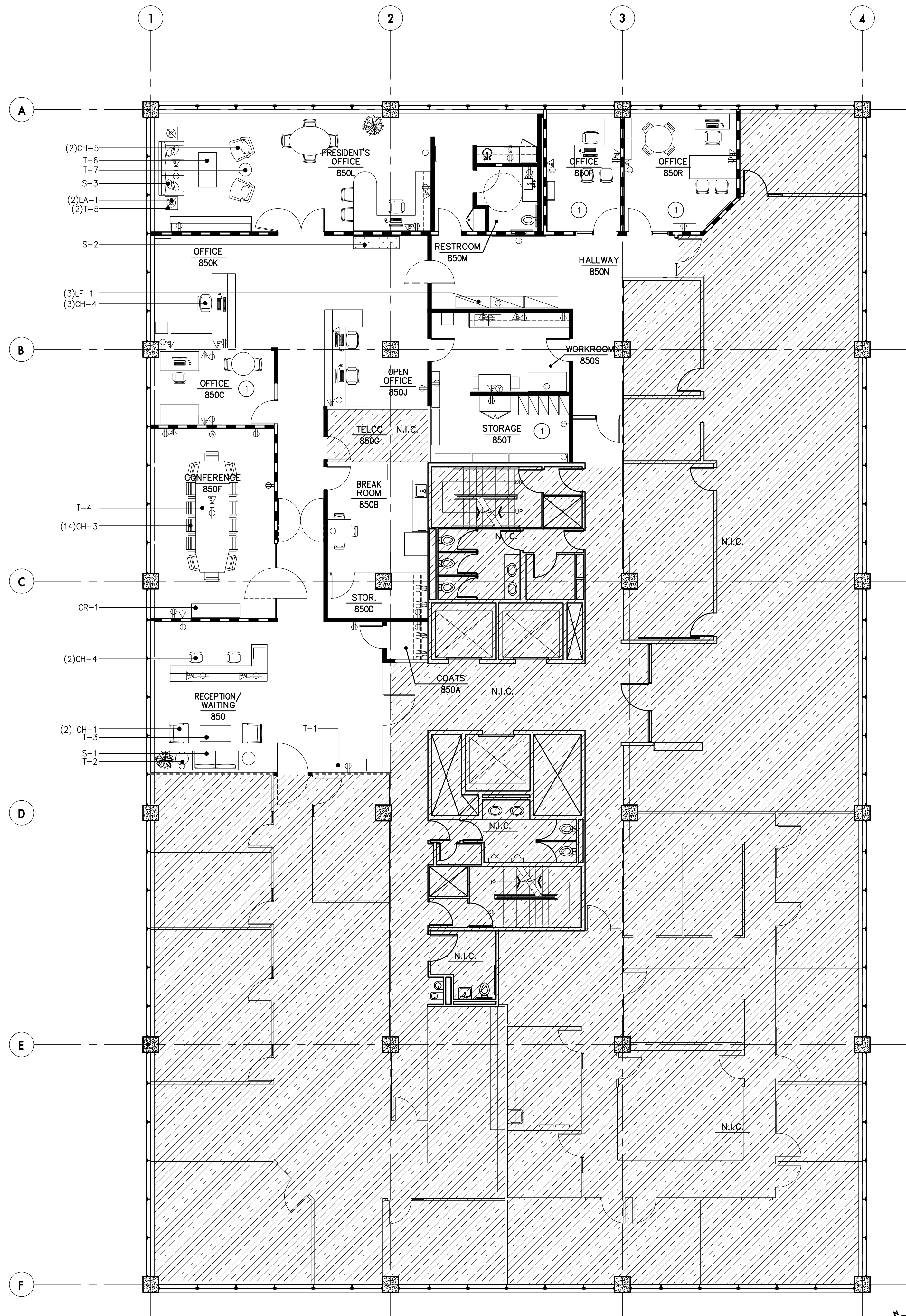
Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**8TH LEVEL  
FLOOR FINISH PLAN**

Scale 1/8"=1'-0"

Date APRIL 30, 2012

Sheet No. **A308**



**1 8TH LEVEL FURNITURE PLAN**  
SCALE: 1/8"=1'-0"

**GENERAL NOTES** THIS SHEET

1. REFER TO FURNITURE SPECIFICATIONS FOR ADDITIONAL INFORMATION

**KEY NOTES** THIS SHEET

① EXISTING FURNITURE TO BE REUSED.

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**REVISED  
DRAWING SET**

Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**8TH LEVEL  
FURNITURE PLAN**

Scale 1/8"=1'-0"

Date APRIL 30, 2012

Sheet No. **A408**





REVISED  
DRAWING SET

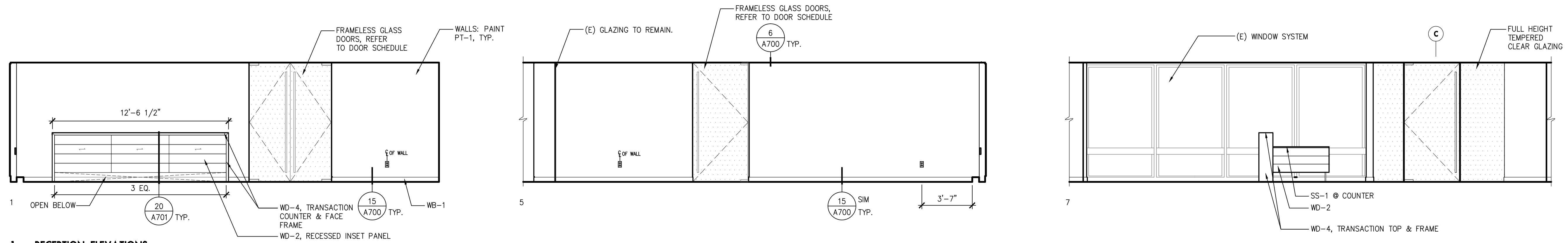
Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

INTERIOR ELEVATIONS

Scale 1/4"=1'-0"

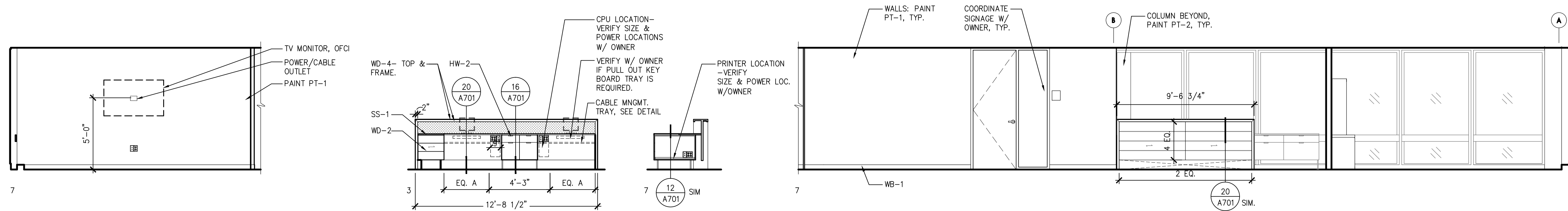
Date APRIL 30, 2012

Sheet No. **A580**



1 RECEPTION ELEVATIONS

SCALE: 1/4"=1'-0"



2 CONFERENCE ROOM ELEVATION

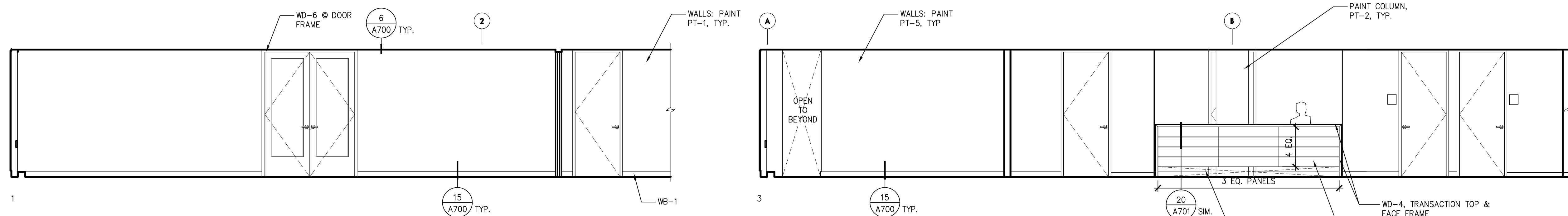
SCALE: 1/4"=1'-0"

3 RECEPTION DESK ELEVATION

SCALE: 1/4"=1'-0"

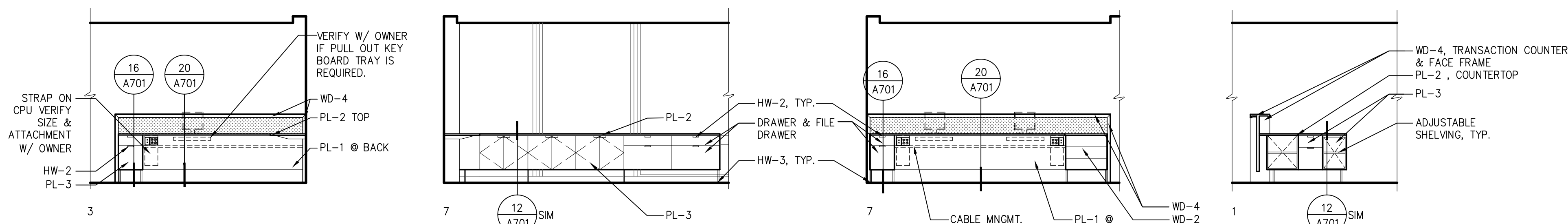
4 HALLWAY ELEVATIONS

SCALE: 1/4"=1'-0"



4 HALLWAY ELEVATIONS

SCALE: 1/4"=1'-0"



5 OFFICE 850K CASEWORK ELEVATIONS

SCALE: 1/4"=1'-0"

6 OPEN OFFICE 850J CASEWORK ELEVATIONS

SCALE: 1/4"=1'-0"

CASEWORK NOTES

- PROVIDE THE FOLLOWING CASEWORK SPECIFICATIONS:
  - PROVIDE SOLID CVG DOUG FIR BANDING @ ALL EXPOSED DRAWER & DOOR EDGES (EXCLUDING EDGE OF COUNTER TOP).
  - PROVIDE CONCEALED EUROPEAN-TYPE HINGES.
  - PROVIDE HEAVY-DUTY FULL EXTENSION HARDWARE ON ALL DRAWERS
  - ALL INTERIOR SURFACES OF CASEWORK TO WHITE MELAMINE, U.N.O.
  - PROVIDE SHOP DRAWINGS & SAMPLES (12"x12") FOR APPROVAL PRIOR TO CONSTRUCTION AND FABRICATION.

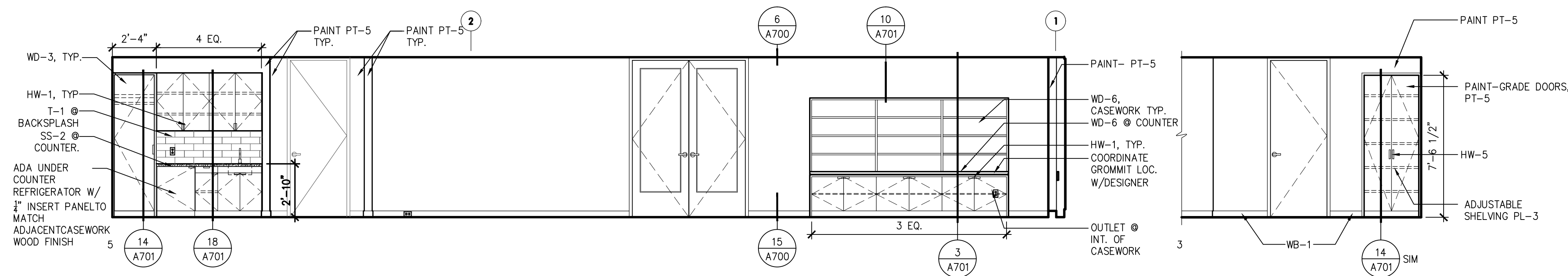
HARDWARE LEGEND:

- HW-1 DOUG MOCKETT & CO. DP3B- 4" TAB DRAWER PULL IN A SATIN CHROME FINISH.
- HW-2 DOUG MOCKETT & CO. DP3A- 3" TAB DRAWER PULL IN A SATIN CHROME FINISH.
- HW-3 DOUG MOCKETT & CO. FL13C-100 8-1/8" CORNER LEG IN A POLISHED ALUMINUM FINISH. VERIFY WITH CASEWORK CONTRACTOR.

NOTE: SUBMIT CUTSHEETS AND FINISH SAMPLES FOR APPROVAL PRIOR TO PURCHASING & FABRICATION



# REVISED DRAWING SET

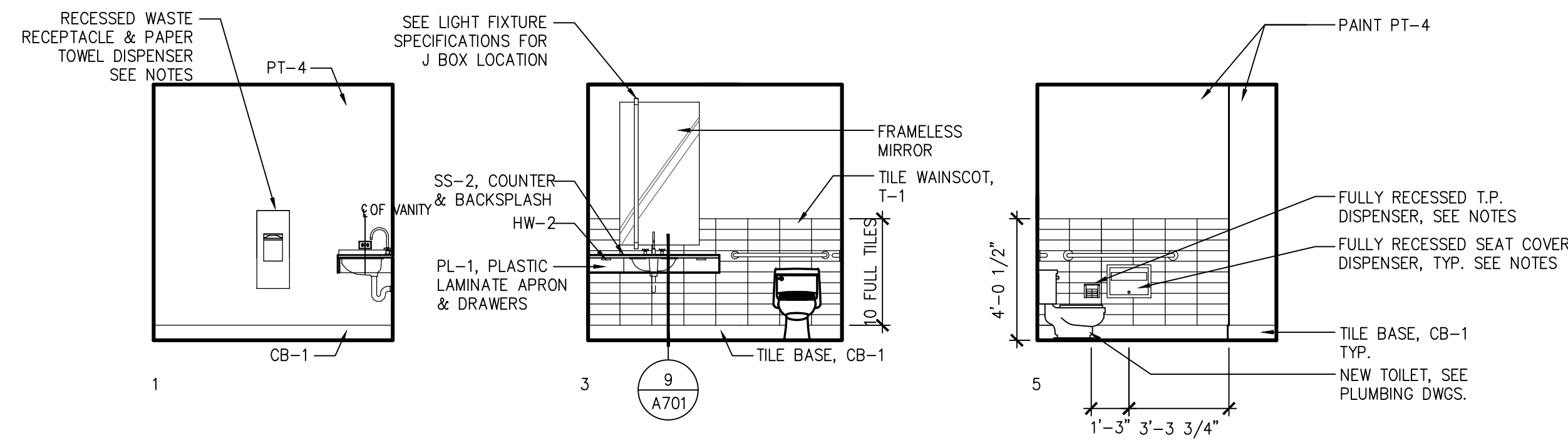


**1 OFFICE 850L ELEVATION**

SCALE: 1/4"=1'-0"

**2 OFFICE 850L ELEVATION**

SCALE: 1/4"=1'-0"

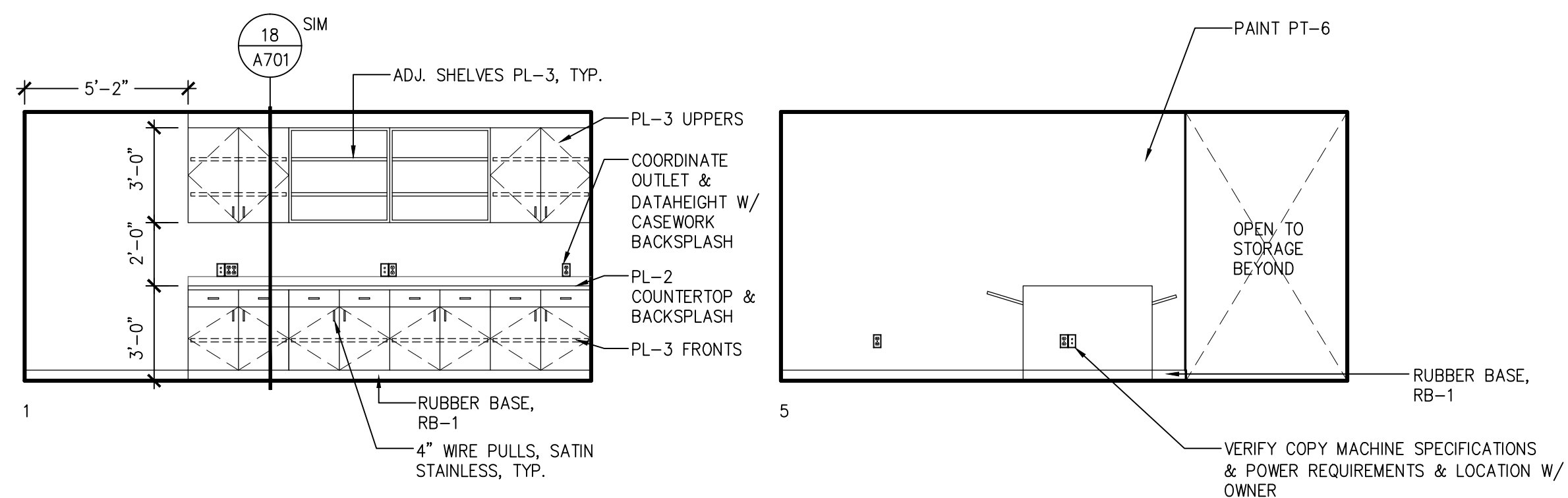


**3 PRESIDENT'S RESTROOM 850M ELEVATIONS**

SCALE: 1/4"=1'-0"

**RESTROOM ACCESSORIES:**

1. PROVIDE THE FOLLOWING WASHROOM ACCESSORIES SPECIFICATIONS:
  - A. RECESSED PAPER TOWEL DISPENSER/WASTE RECEPTACLE TO BE BOBRICK B-36903 TRIMLINE SERIES (RECESSED) SATIN-FINISH STAINLESS STEEL.
  - B. SEAT COVER DISPENSER TO BE BOBRICK B-3013 TRIMLINE SERIES (RECESSED) IN A SATIN-FINISH STAINLESS STEEL.
  - C. TOILET PAPER DISPENSER TO BE BOBRICK B-6637 (RECESSED) TOILET PAPER DISPENSER WITH STORAGE SPACE FOR EXTRA ROLL IN A SATIN-FINISH STAINLESS STEEL.
  - D. ADA GRAB BARS TO BE BOBRICK IN A SATIN-FINISH STAINLESS STEEL.
  - E. SEE PLUMBING DRAWINGS FOR PLUMBING FIXTURE SPECIFICATIONS.



**4 WORKROOM 850Q ELEVATIONS**

SCALE: 1/4"=1'-0"

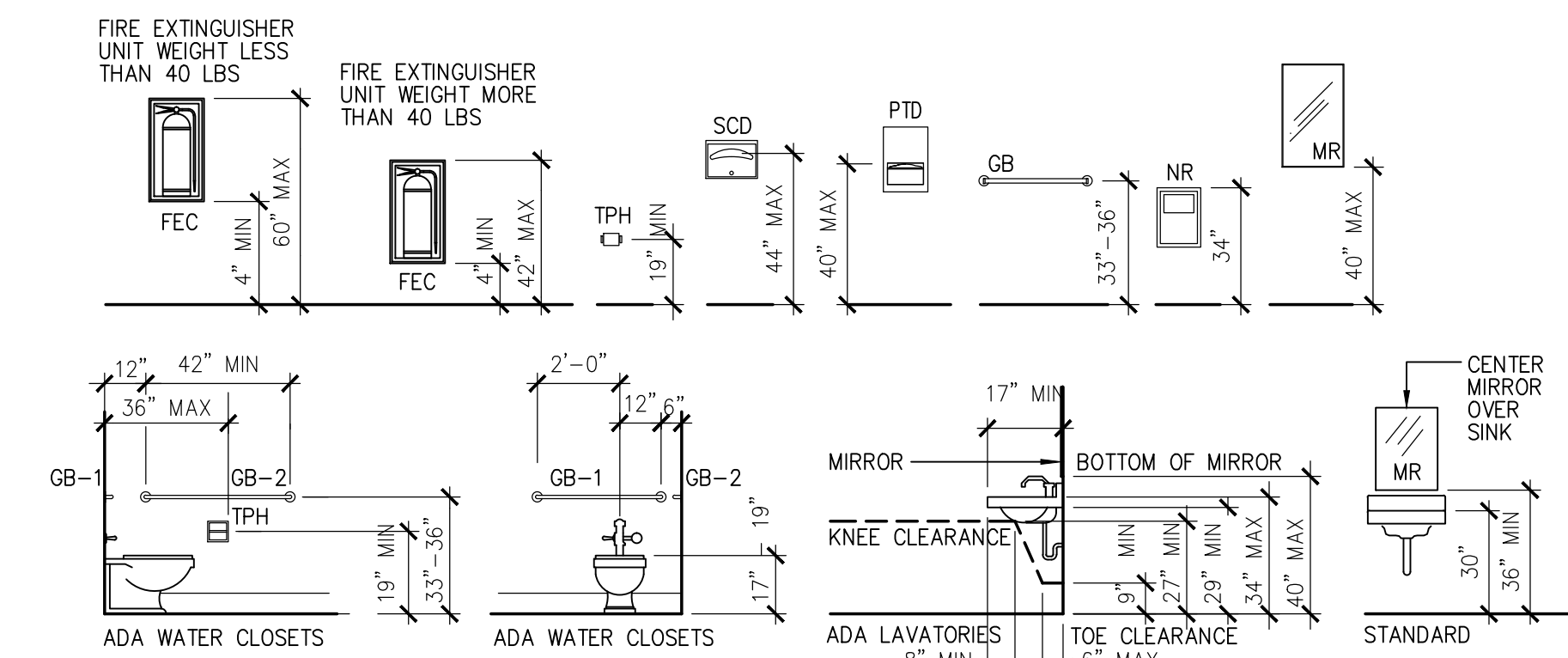
Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**INTERIOR ELEVATIONS**

Scale 1/4"=1'-0"

Date APRIL 30, 2012

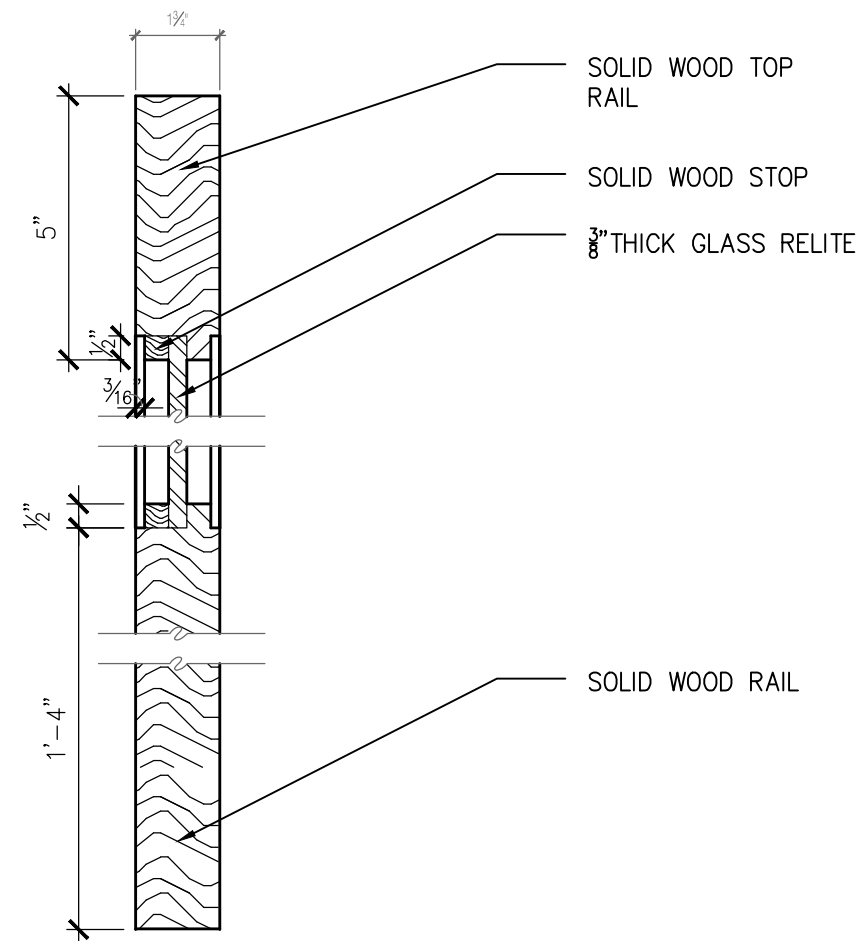
Sheet No. **A581**



**17 STANDARD MOUNTING HEIGHTS**

Scale: 1/4"=1'-0"

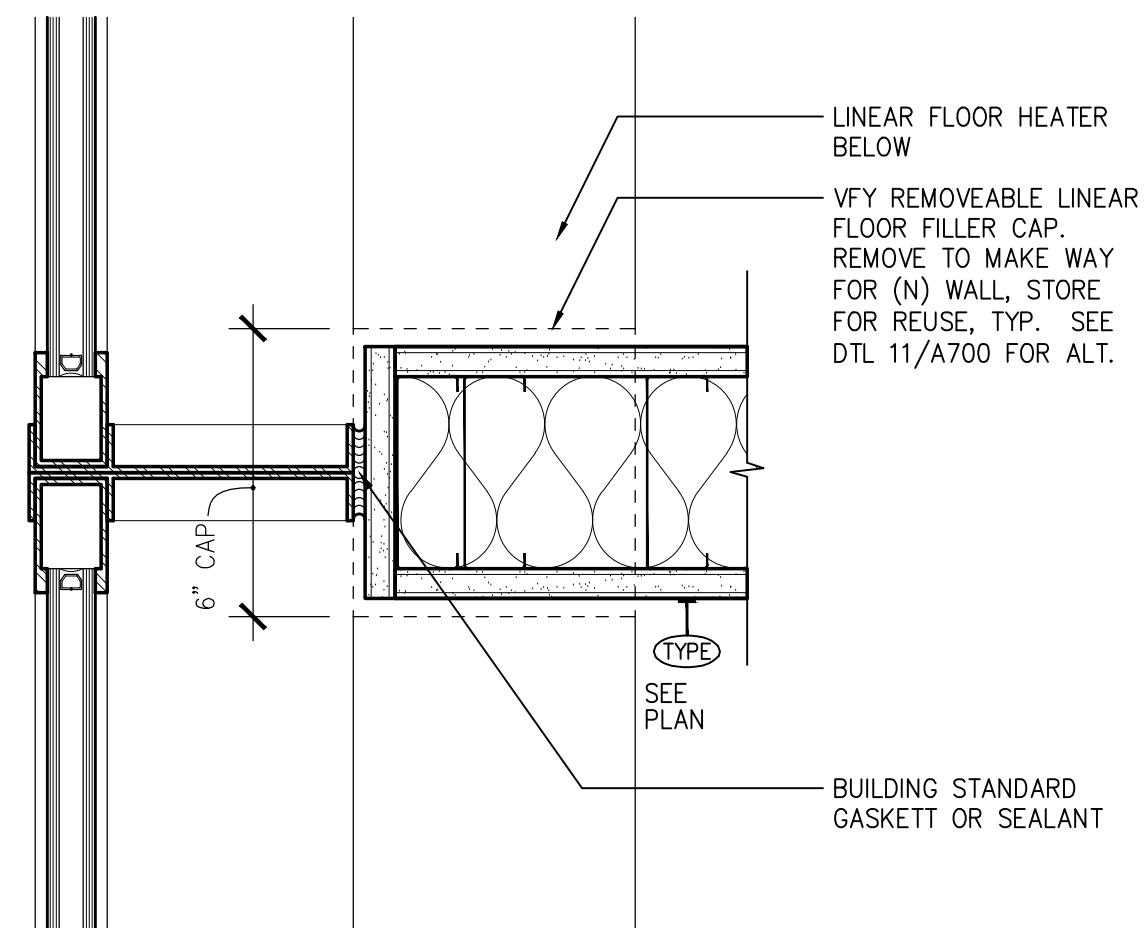
sunshine\_1301



**14 D3 DOOR PROFILE DETAIL**

Scale: 3"=1'-0"

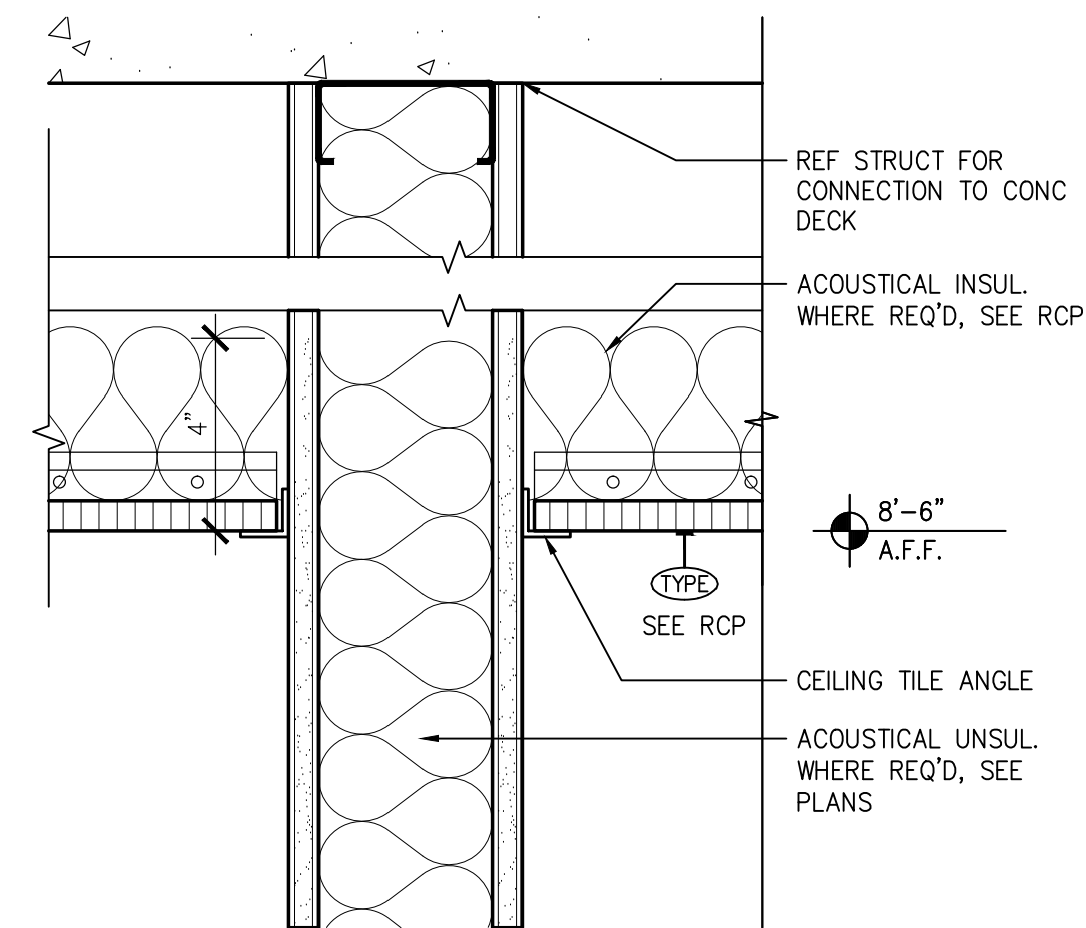
psu\_pres\_door\_detail



**10 TYP. WALL - MULLION CONNECTION**

Scale: 3"=1'-0"

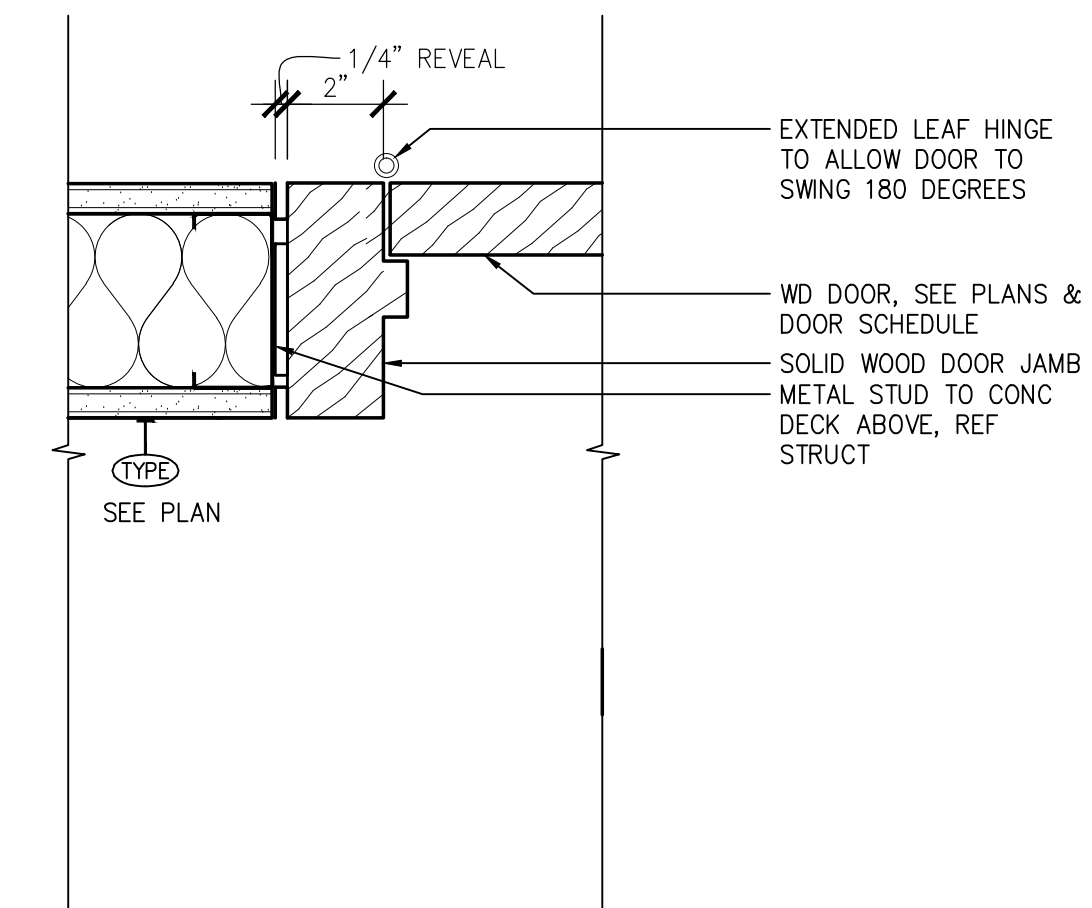
psu\_pres\_0503



**6 CEILING @ TYP. WALL TO STRUCTURE**

Scale: 3"=1'-0"

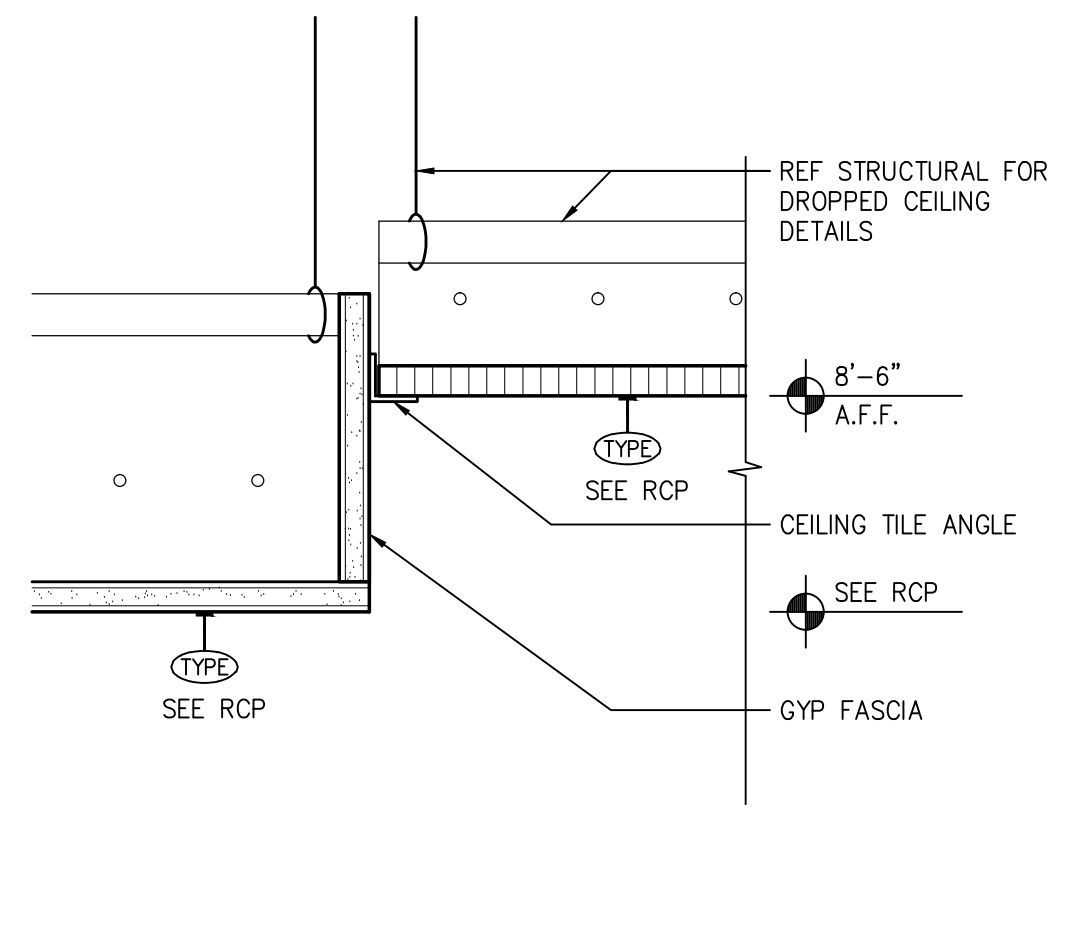
psu\_pres\_0903



**1 WALL @ DOOR JAMB**

Scale: 3"=1'-0"

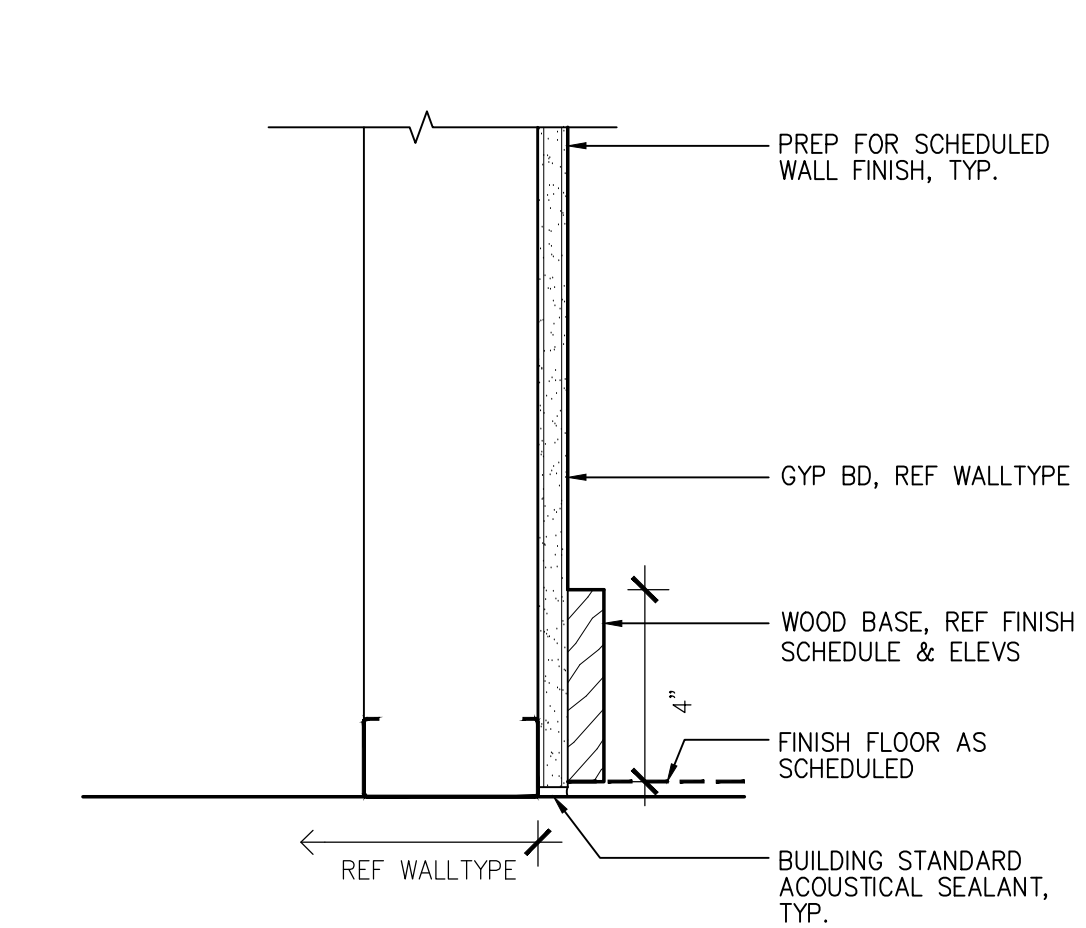
psu\_pres\_0507



**2 DROPPED CEILING**

Scale: 3"=1'-0"

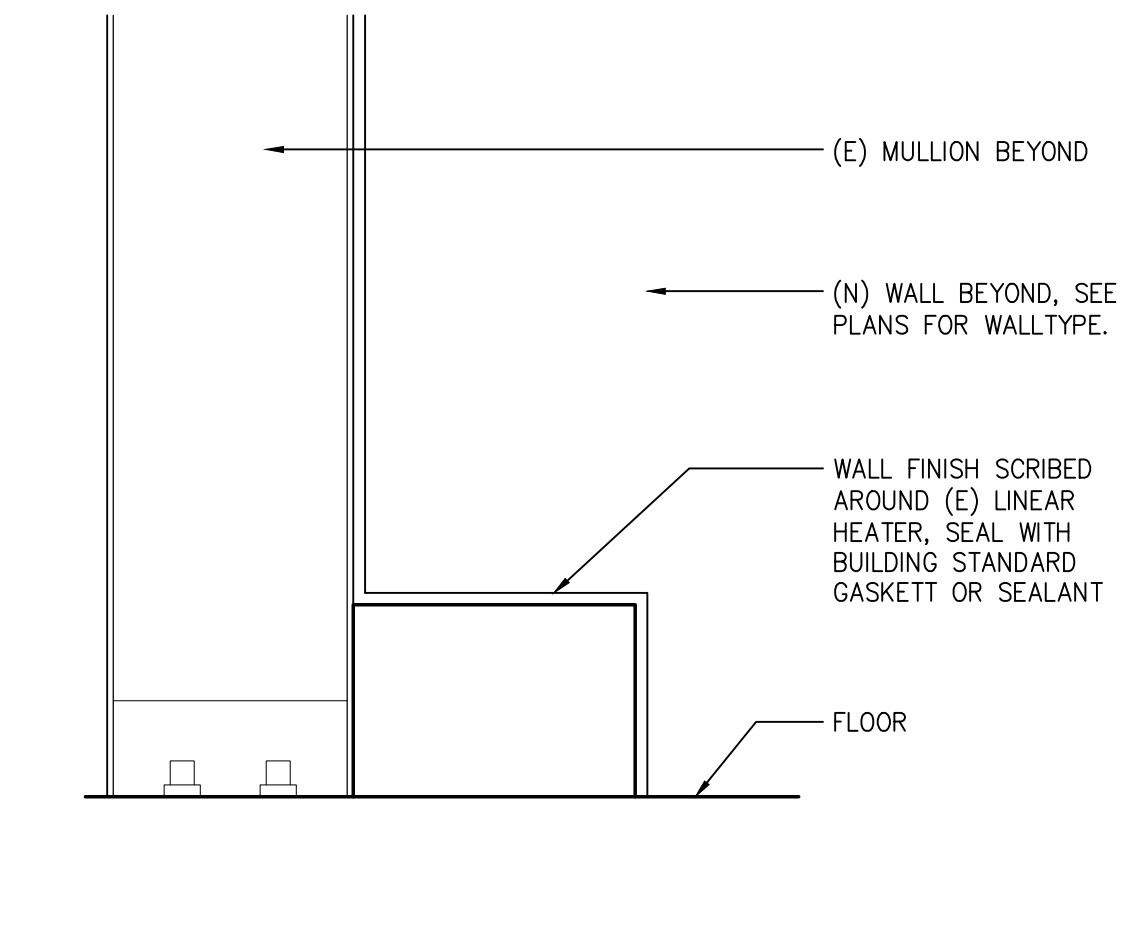
psu\_pres\_0901



**15 WOOD BASE DETAIL**

Scale: 3"=1'-0"

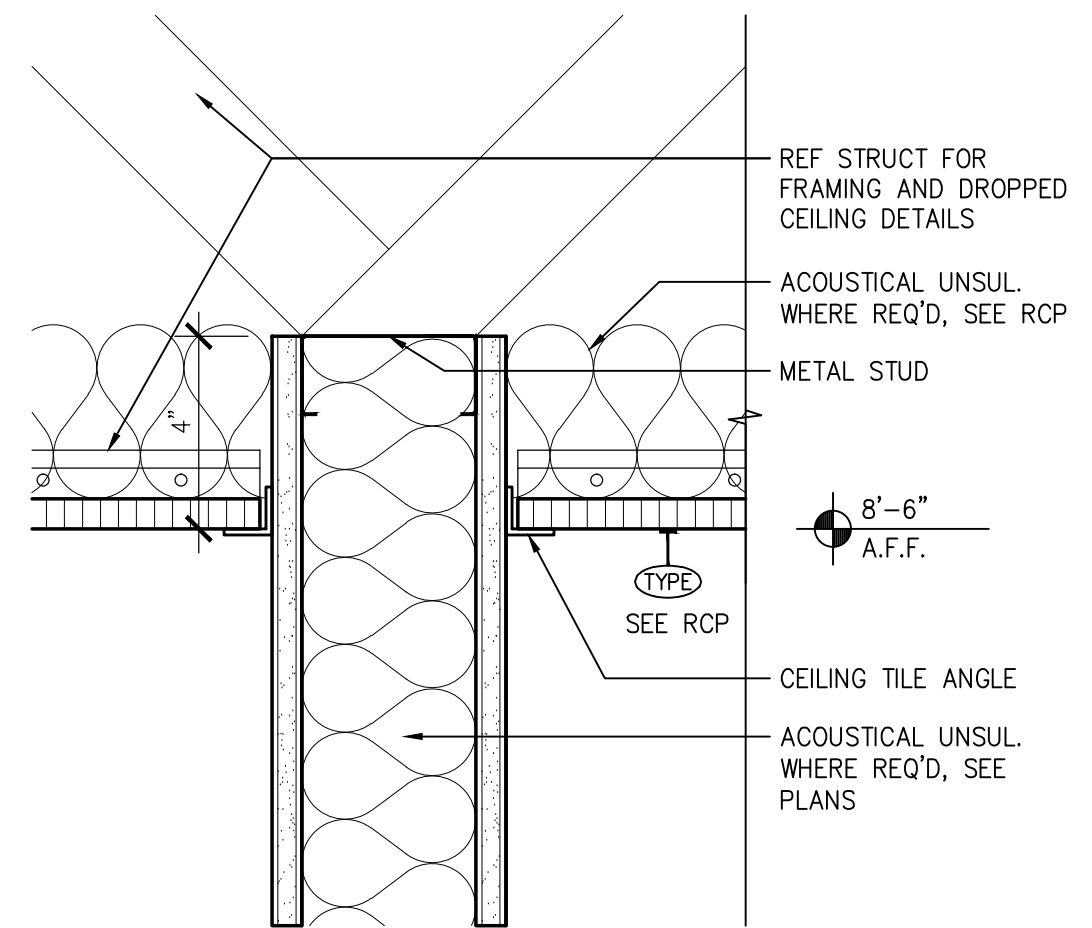
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**11 WALL - MULLION CONNECTION ALTERNATE**

Scale: 3"=1'-0"

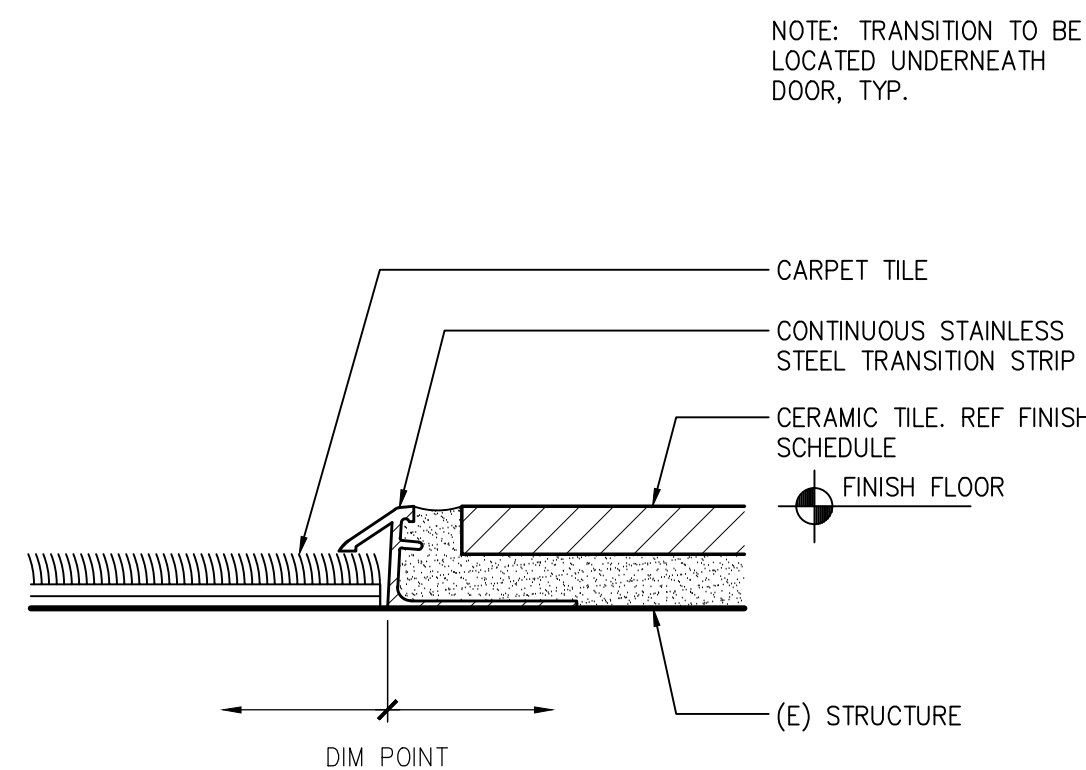
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**3 CEILING @ TYP. WALL**

Scale: 3"=1'-0"

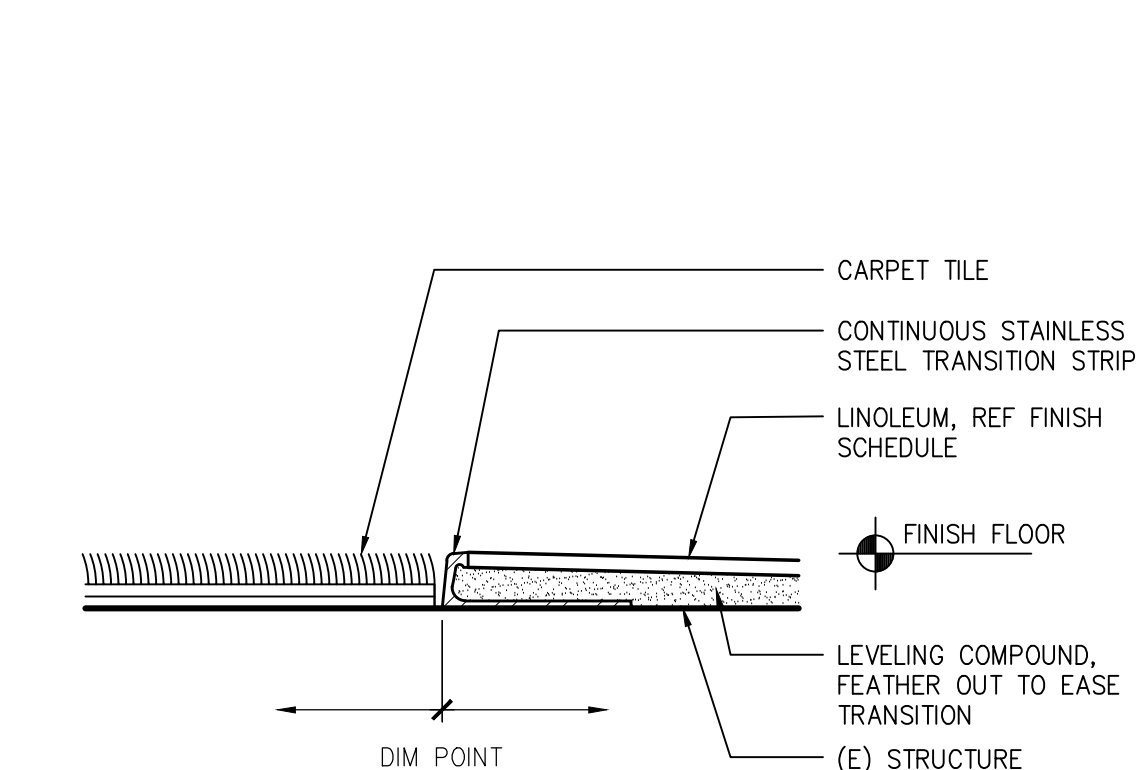
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**16 CPT- TILE TRANSITION**

Scale: FULL SCALE

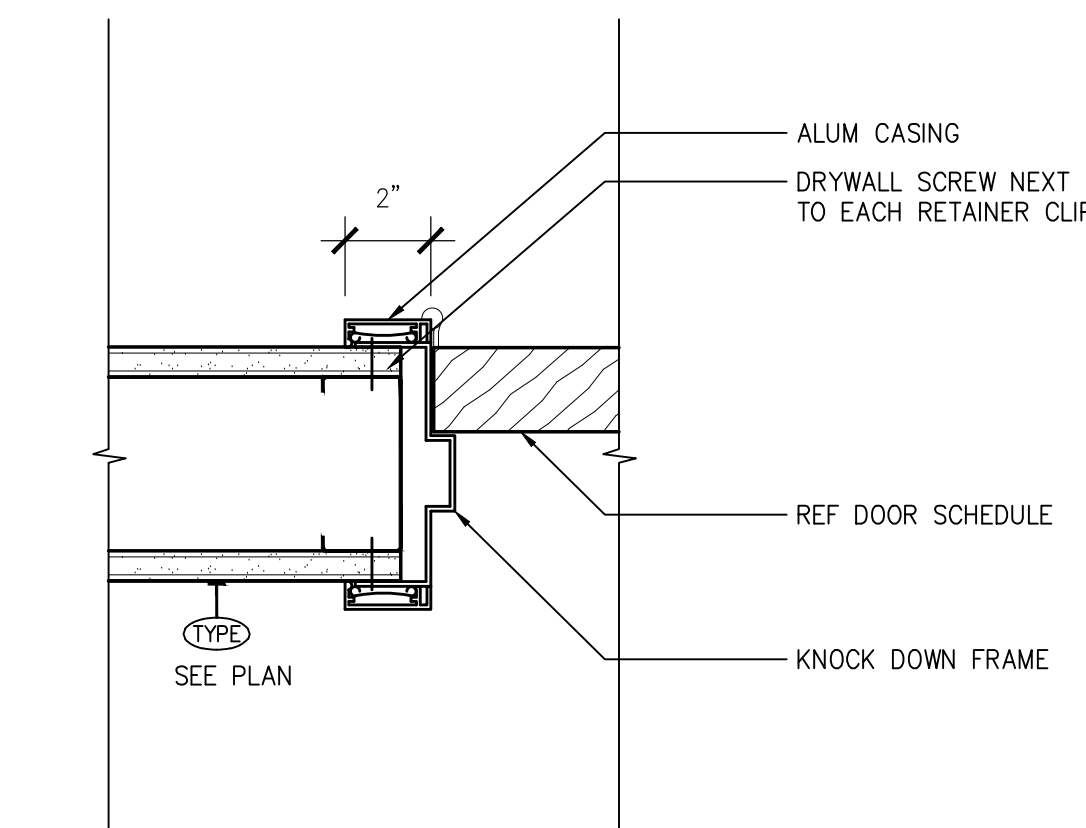
PSU PRES\_0904



**12 CPT - LINOLEUM TRANSITION**

Scale: FULL SCALE

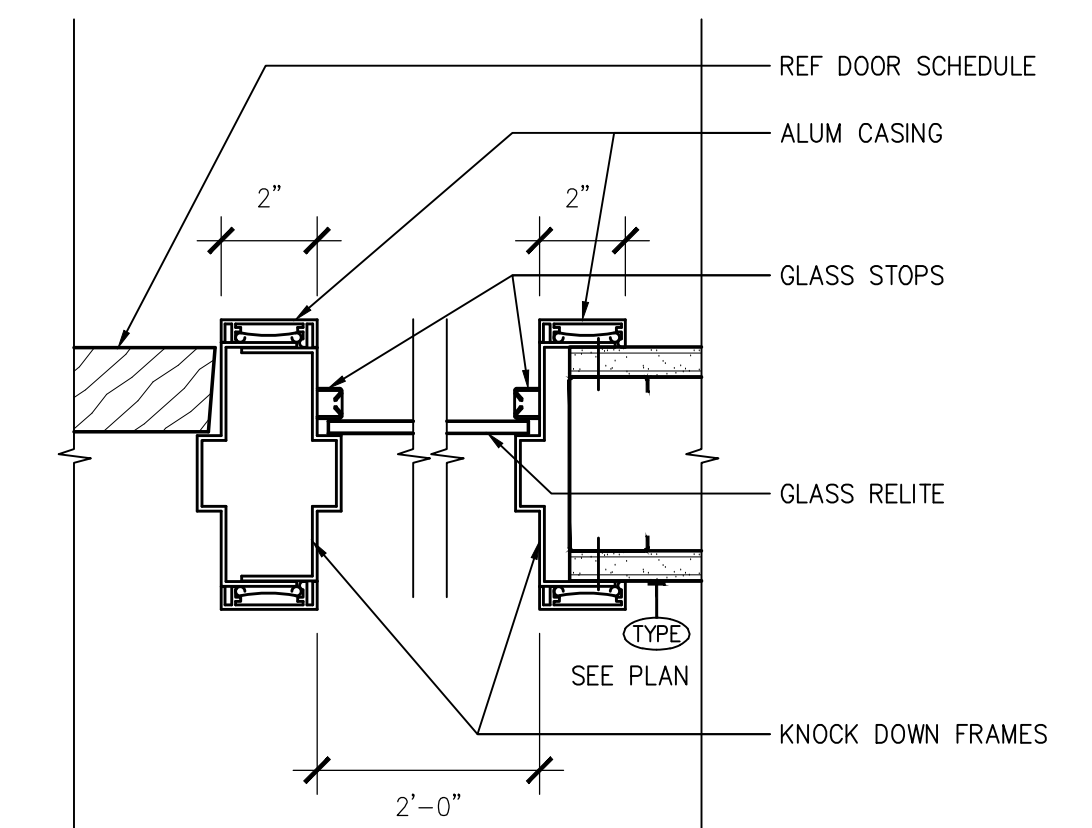
PSU PRES\_0505



**8 TYP ALUM DOOR JAMB**

Scale: 3"=1'-0"

psu\_pres\_0508



**4 TYP RELITE**

Scale: 3"=1'-0"

psu\_pres\_0510



NOTES THIS SHEET

- SEE SHEET A001 FOR WALL AND FLOOR ASSEMBLIES AND FOR TYPICAL PARTITION DETAILS AND LEGEND.

Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

DETAILS

Scale AS NOTED

Date APRIL 30, 2012

Sheet No. **A700**



# REVISED DRAWING SET

**NOTES THIS SHEET**

1. SEE SHEET A001 FOR WALL AND FLOOR ASSEMBLIES AND FOR TYPICAL PARTITION DETAILS AND LEGEND.

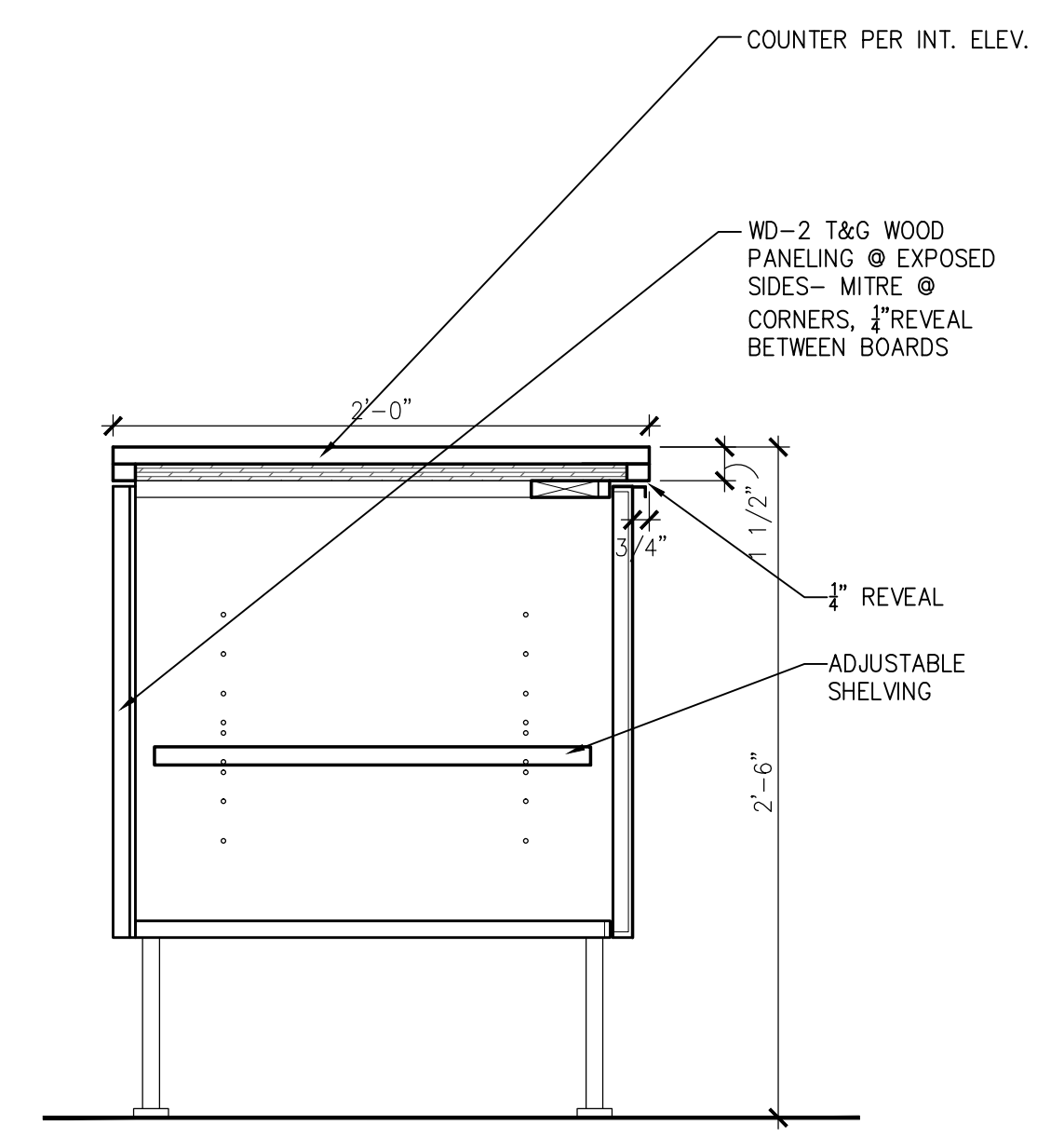
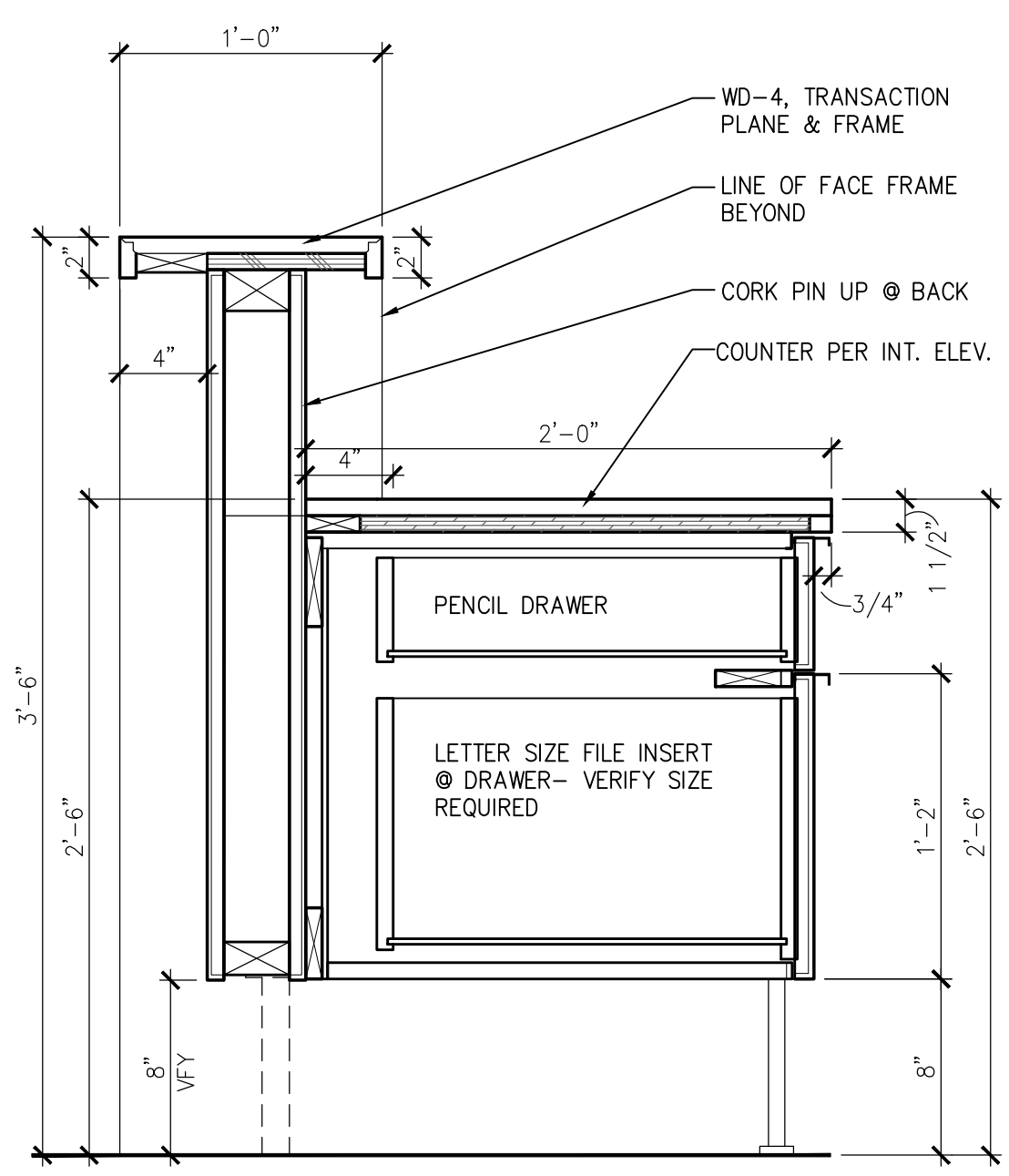
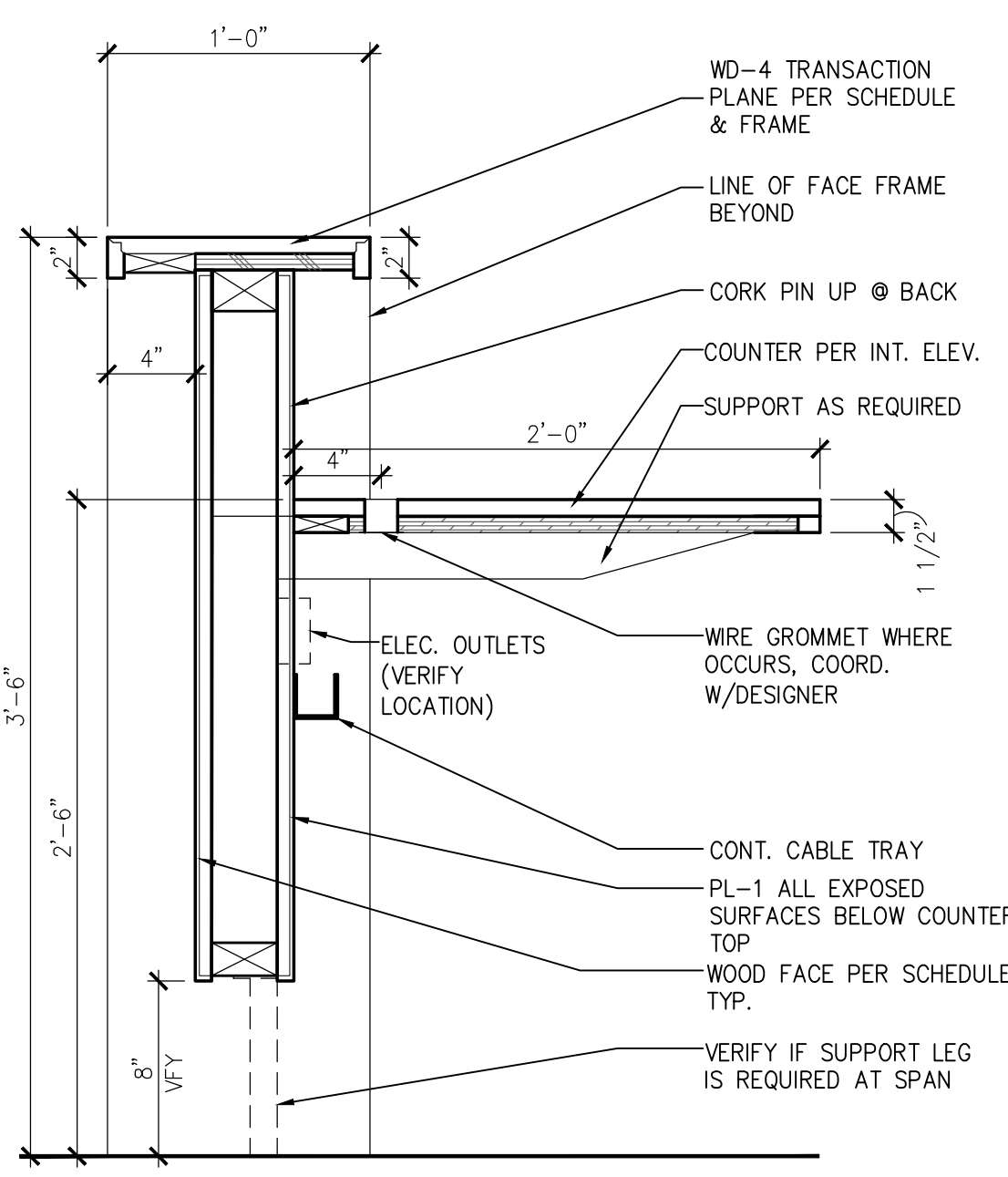
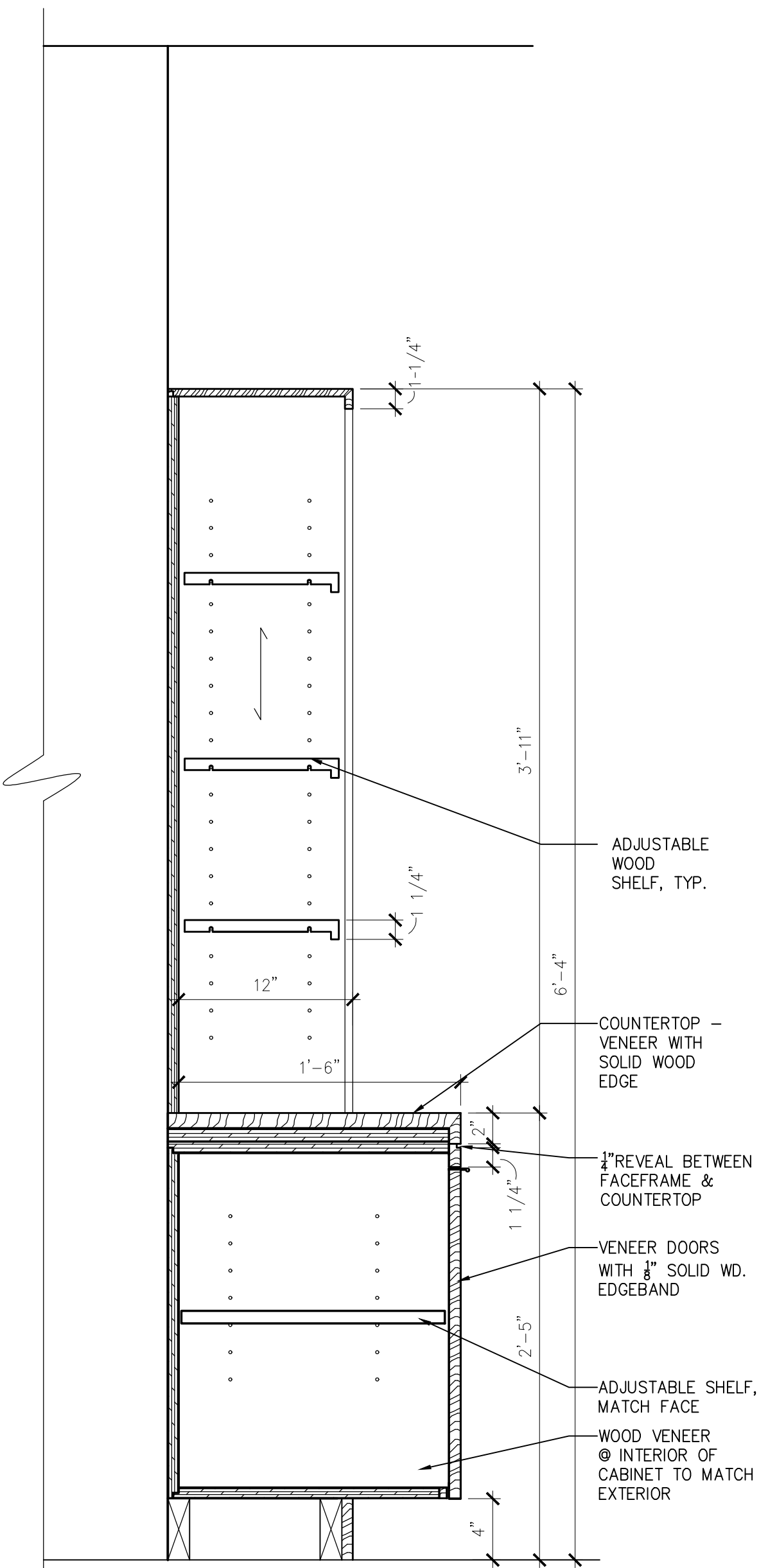
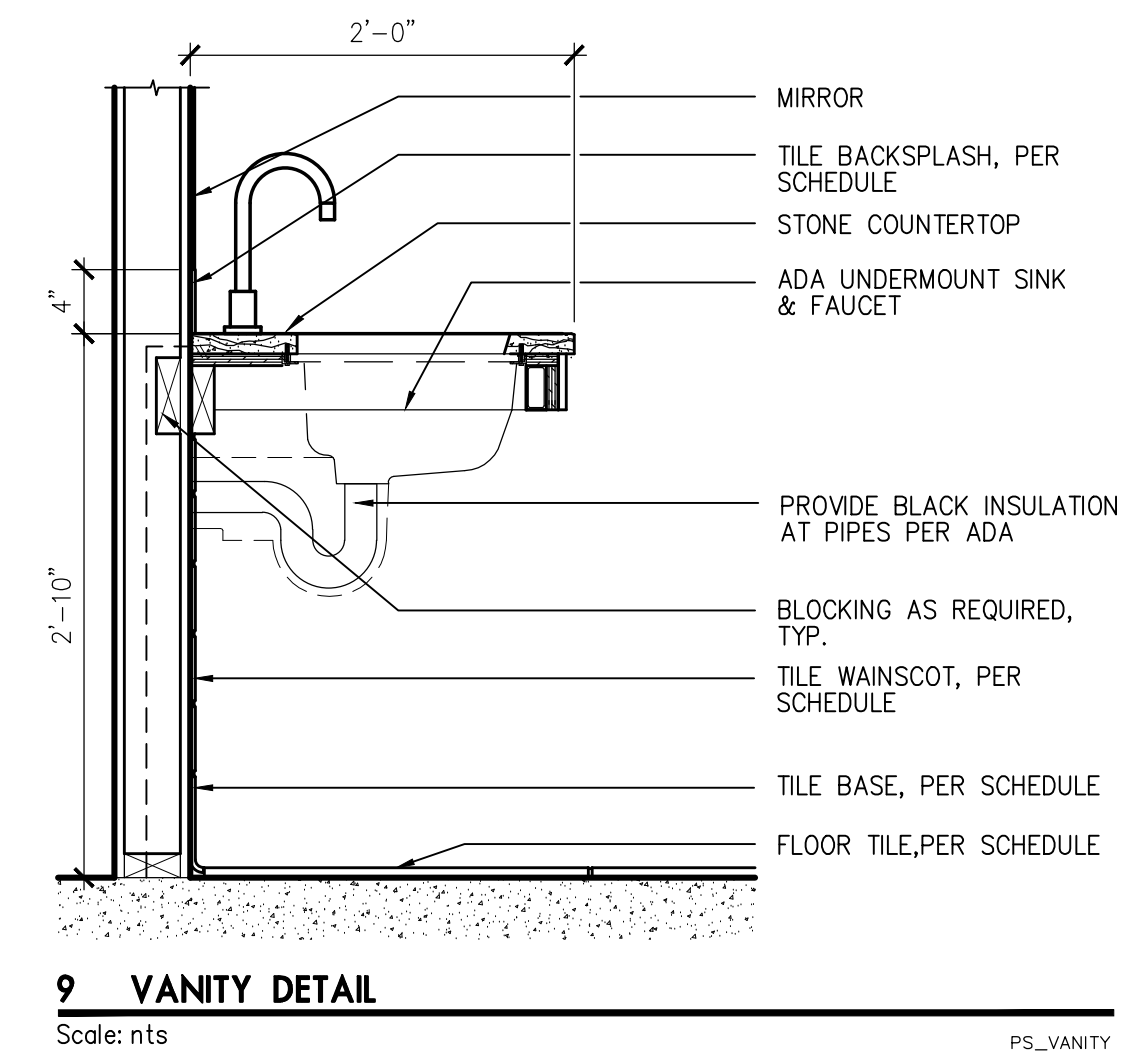
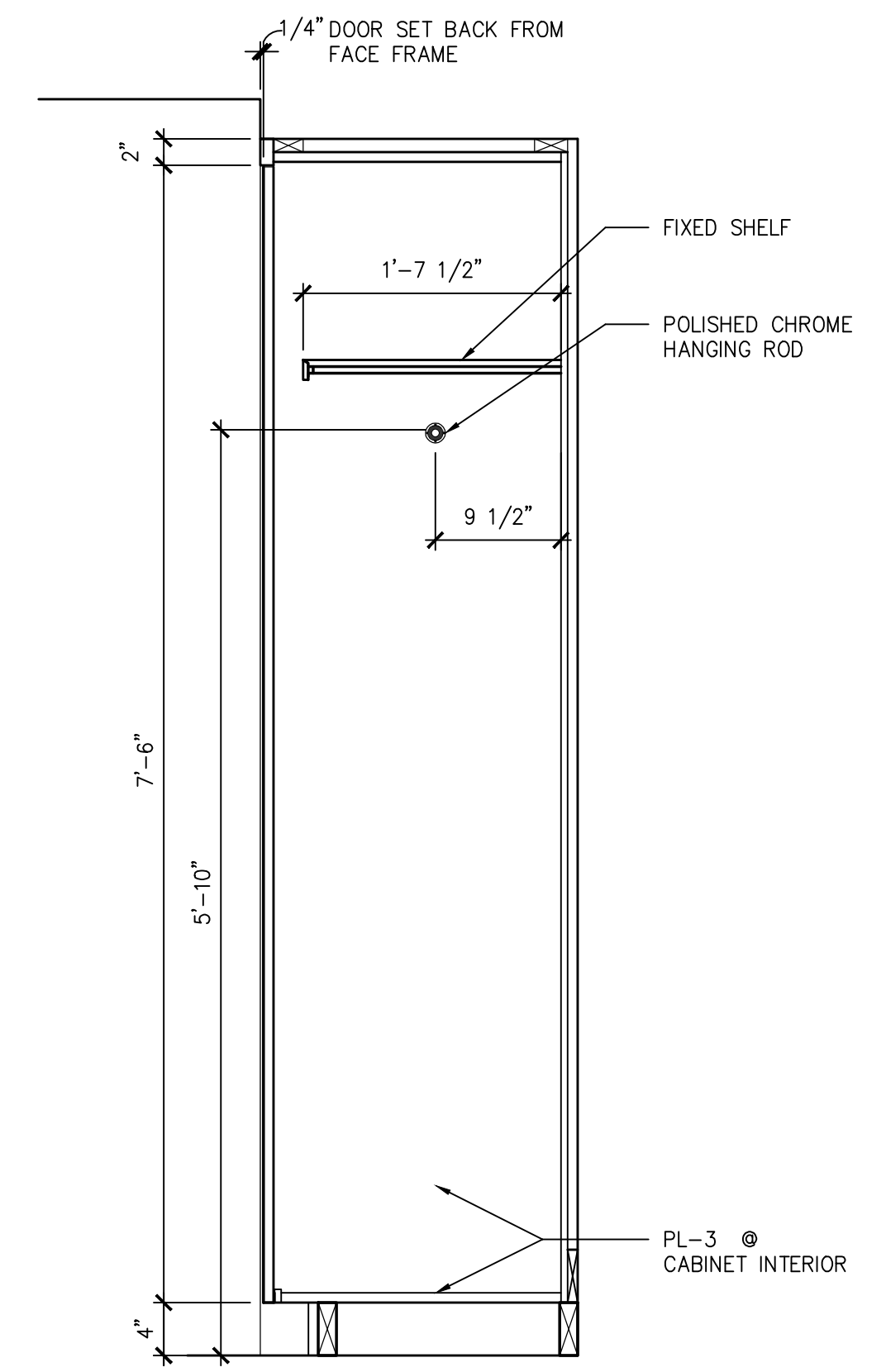
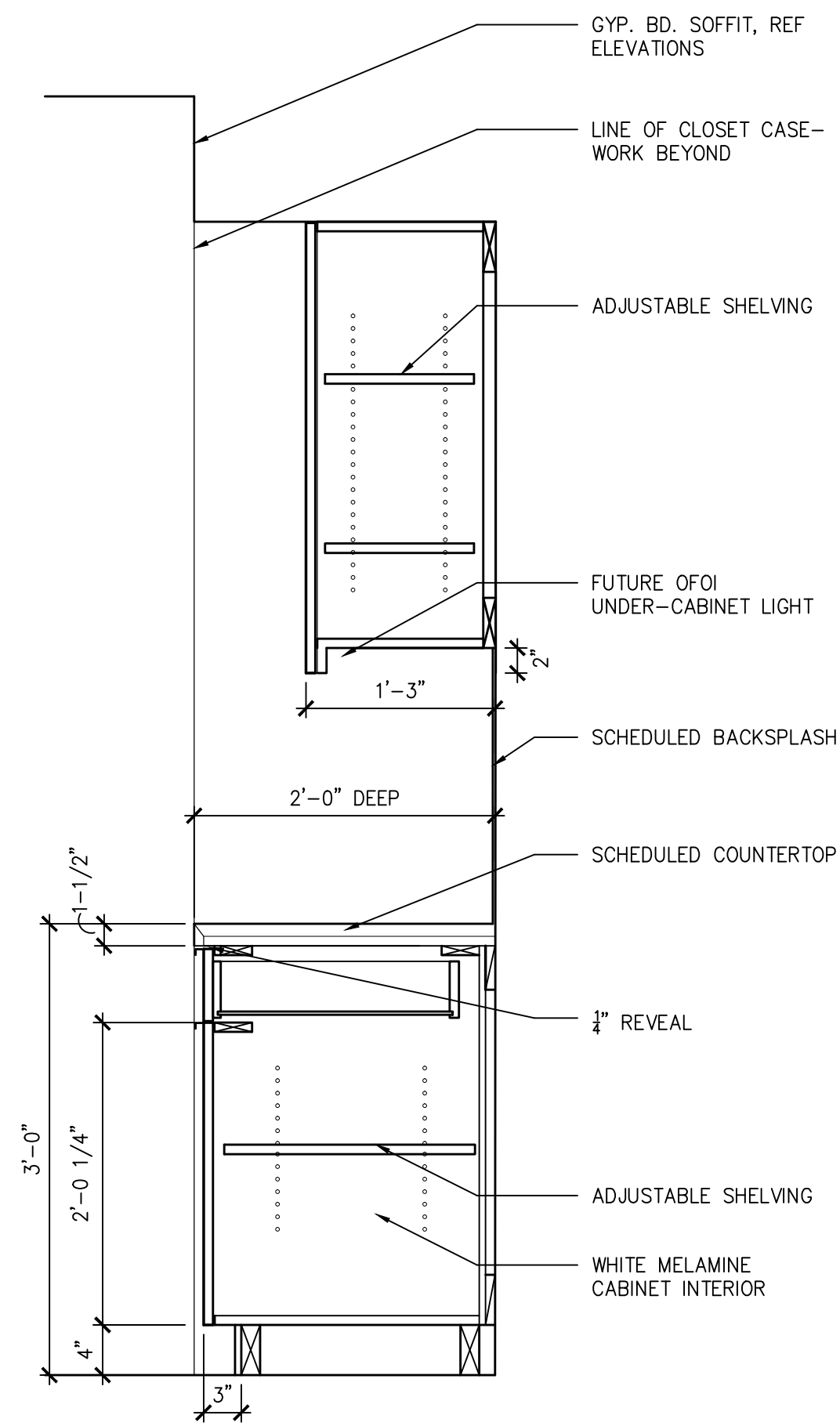
Issue	Revision	Date
CONSTRUCTION SET		04/30/2012

**DETAILS**

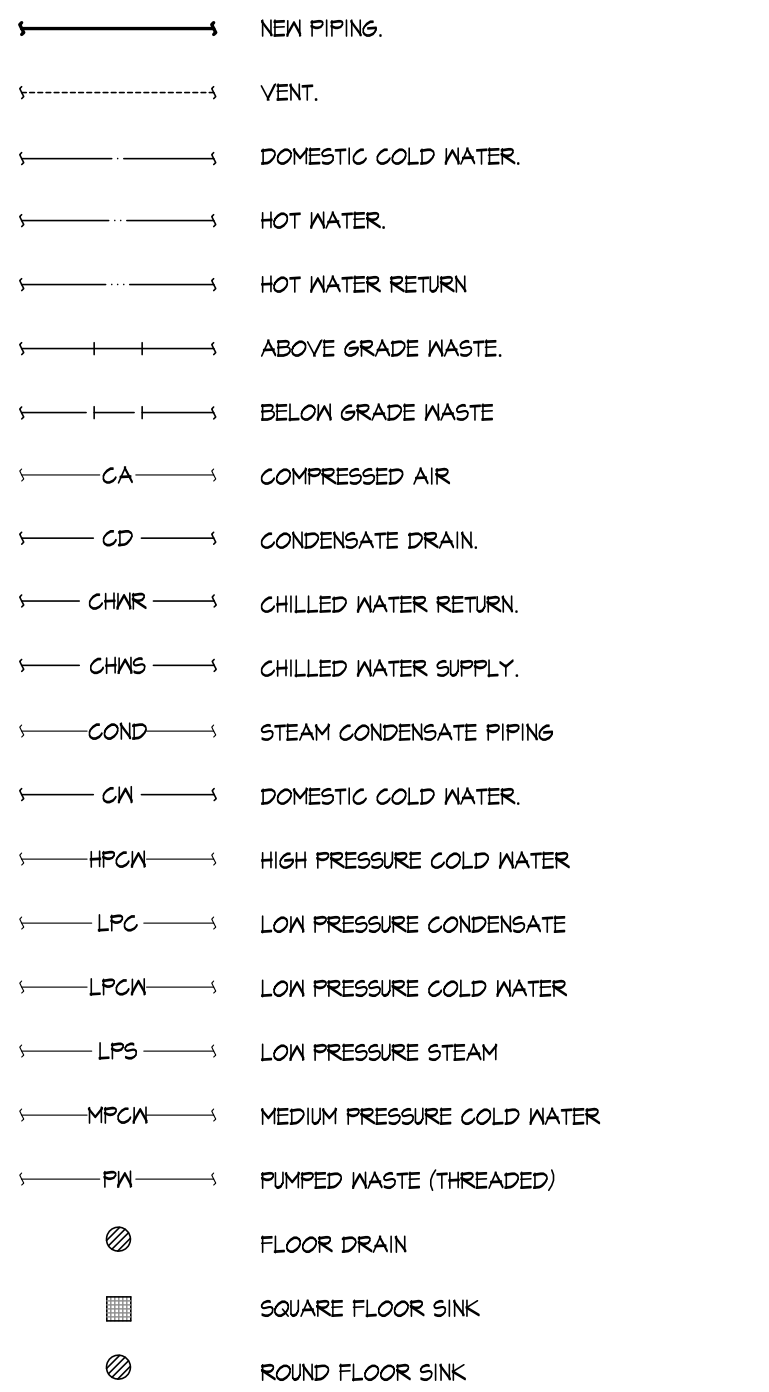
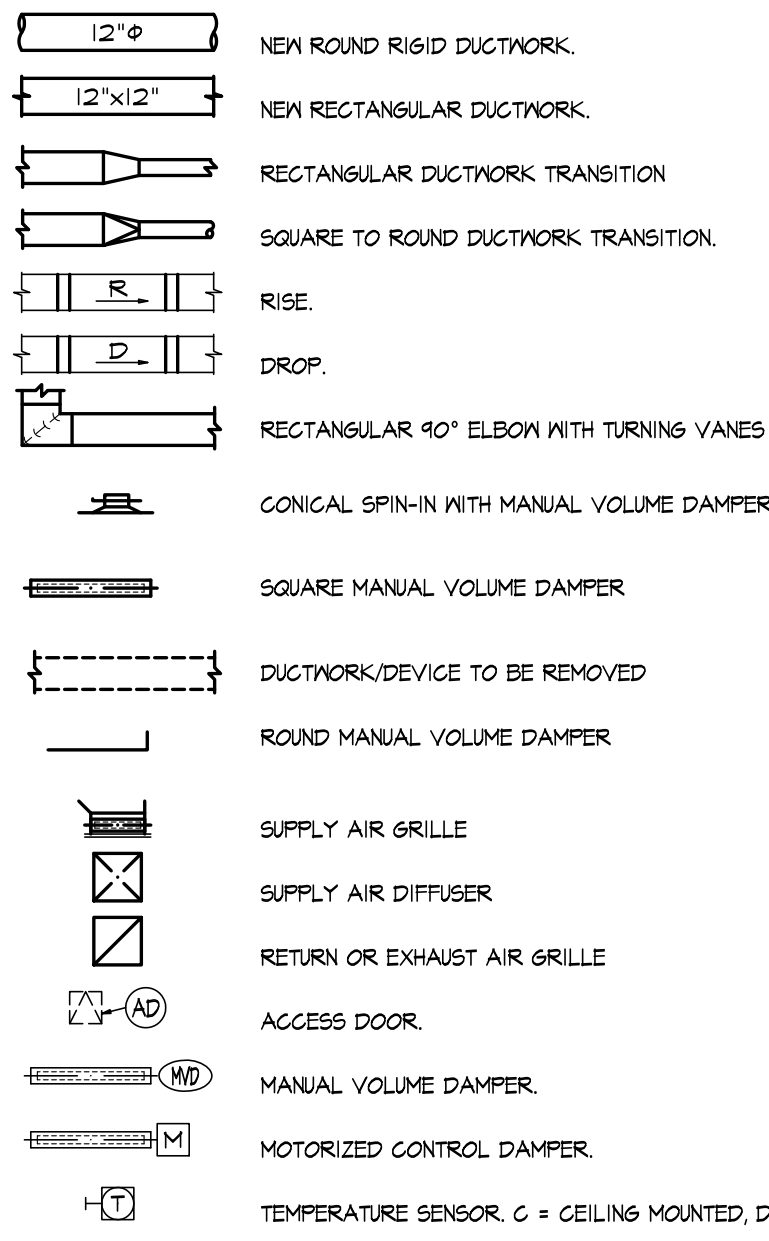
Scale AS NOTED

Date APRIL 30, 2012

Sheet No. **A701**



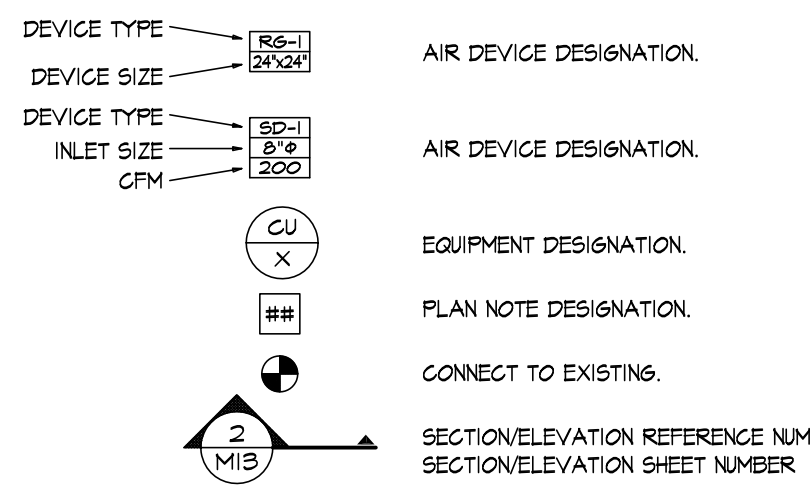
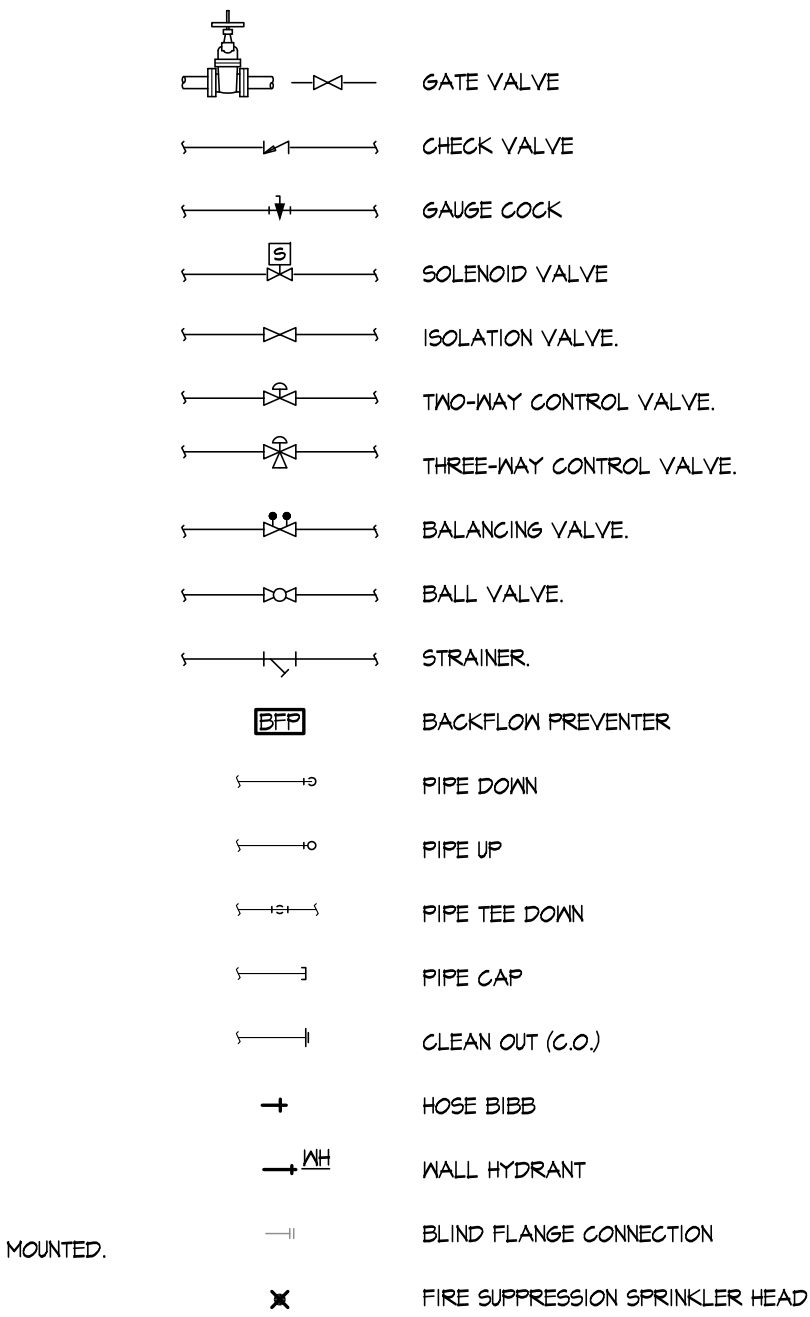
## MECHANICAL/PLUMBING SYMBOLS



### MECHANICAL NOTATIONS

ARF	ABOVE RAISED FLOOR.
AFF	ABOVE FINISHED FLOOR.
UNO	UNLESS NOTED OTHERWISE
FO / FC	FAIL OPEN / FAIL CLOSE
VTR	VENT THRU ROOF
AD	ACCESS DOOR
AHJ	AIR HANDLING UNIT
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CD	CONDENSATE DRAIN
IH	UNIT HEATER
FD	FIRE DAMPER
MVD	MANUAL VOLUME DAMPER
FTU	FAN TERMINAL UNIT
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
BOD	BOTTOM OF DUCT ELEVATION
BOP	BOTTOM OF PIPE ELEVATION
CG	ON CENTER
FD	FLOOR DRAIN
RG	RETURN GRILLE
TG	TRANSFER GRILLE
SD	SUPPLY DIFFUSER
SG	SUPPLY GRILLE
XVAV	EXISTING VAV TERMINAL UNIT
VAV	VARIABLE AIR VOLUME
CU	AIR COOLED CONDENSING UNIT
REF.102	REFERENCE DESIGNATION
	SHEET NUMBER
	DETAIL/PLAN NUMBER

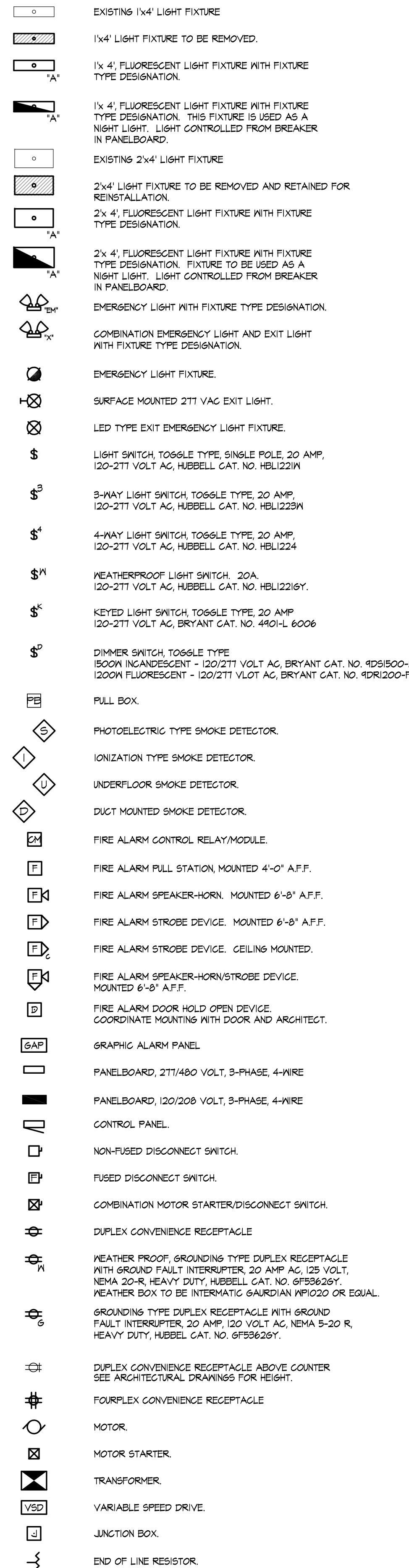
## MECHANICAL/PLUMBING SYMBOLS



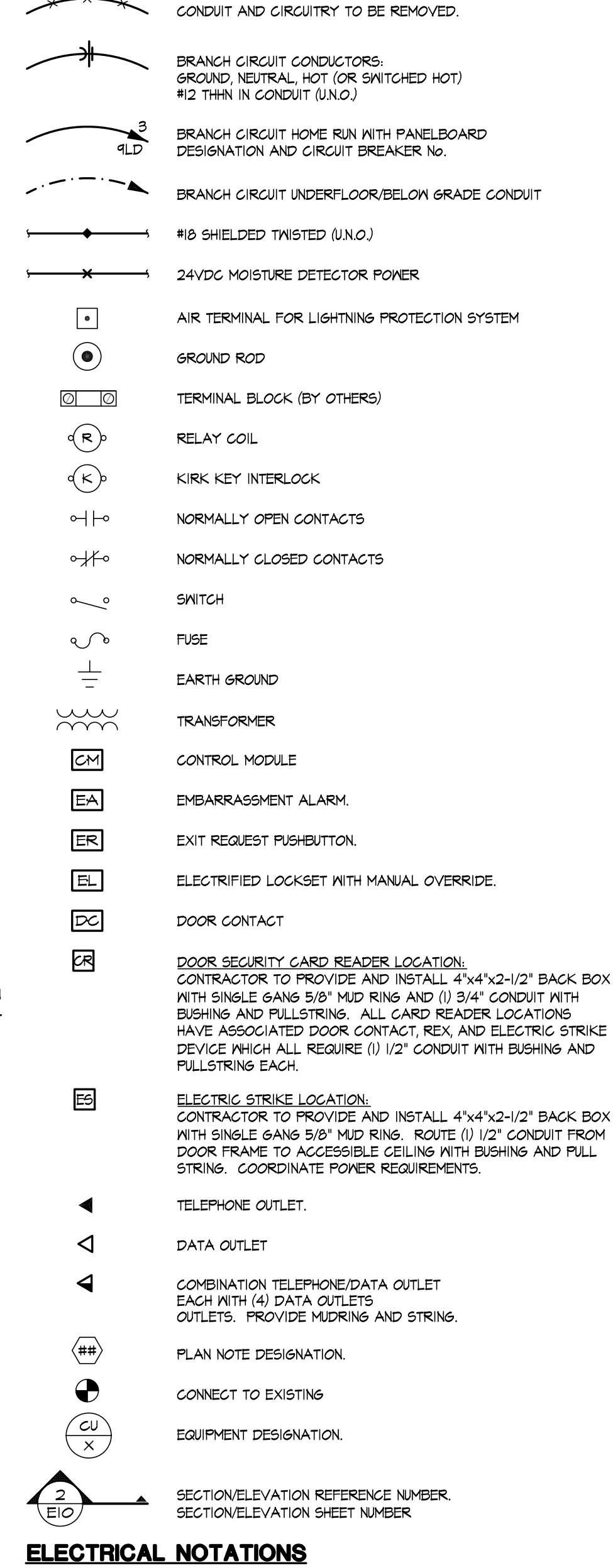
### MECHANICAL GENERAL NOTES

- THESE PLANS ARE SCHEMATIC IN NATURE AND ARE INTENDED TO DEPICT GENERAL SCOPE OF WORK. ALL WORK TO BE PERFORMED PER ALL LOCAL AND STATE CODES AND REGULATIONS.
- COORDINATE WORK WITH ALL OTHER TRADES.
- PROVIDE ALL REQUIRED OFFSETS AND TRANSITIONS AS NECESSARY TO AVOID OBSTRUCTIONS.
- PROVIDE FLEXIBLE CONNECTIONS ON ALL SUPPLY AND RETURN DUCTS CONNECTING TO AIR HANDLING UNITS.
- FURNISH AND INSTALL ALL GALVANIZED STEEL DUCTWORK AND HOUSINGS AS SHOWN ON DRAWINGS. ALL DUCTWORK SHALL BE IN CONFORMANCE WITH CURRENT SMACNA STANDARDS RELATIVE TO GAUGE, BRACING, JOINTS, ETC. SUPPORT HORIZONTAL RUNS OF DUCT FROM STRAP IRON HANGERS ON CENTERS NOT TO EXCEED 8'-0". DO NOT SUPPORT CEILING GRID, CONDUITS, PIPES, EQUIPMENT, ETC. FROM DUCTWORK. HVAC SIZES ON PLANS INDICATE CLEAR INSIDE DIMENSIONS. DUCTWORK SHALL BE MADE LARGER AS REQUIRED TO ACCOMMODATE ACOUSTIC LINING.
- RECTANGULAR DUCTWORK SHALL BE ASTM 680 GALVANIZED STEEL; ASTM A 653/A 653M DUCT-MATE AND/OR TDF QUALITY FLANGED WITH GASKETS.
- ALL DUCTWORK SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH SMACNA STANDARDS, MANUAL 15D. ALL SUPPLY AIR DUCT PRESSURE SHALL BE THE SAME AS THE EXTERNAL STATIC PRESSURE (ESP) OF THE EQUIPMENT SUPPLYING THE DUCT. THE EQUIPMENT (ESP) SHALL BE THE PRESSURE CLASS FOR THE ENTIRE SUPPLY DUCT SYSTEM.
- CONTRACTOR SHALL PERFORM TEST READINGS ON UNITS, FAN TERMINAL UNITS, ETC. AND ADJUST EQUIPMENT TO DELIVER SPECIFIED AMOUNTS OF AIR. A TESTING AND BALANCING REPORT LOG SHALL BE MADE SHOWING ALL AIR SUPPLY QUANTITIES, FAN AND UNIT TEST READINGS, ETC., AND TWO COPIES OF THE FINAL COMPLETION OF DATA SHALL BE SUBMITTED TO THE ENGINEER FOR EVALUATION. AIR FLOWS SHALL BE BALANCED TO WITHIN PLUS/MINUS 10% OF DESIGN REQUIREMENTS. ALL EQUIPMENT SHALL BE ADJUSTED TO OPERATE AS INTENDED BY THE DRAWINGS.
- ALL THERMOSTATS AND CONTROL DEVICES SHALL BE ADJUSTED TO OPERATE AS INTENDED. ADJUST FANS, ETC. FOR PROPER AND EFFICIENT OPERATION. CERTIFY TO ENGINEER THAT ALL ADJUSTMENTS HAVE BEEN MADE AND THAT SYSTEM IS OPERATING SATISFACTORILY. ADJUST ALL AIR DEVICES TO SUPPLY THE AMOUNT OF AIR SHOWN ON THE DRAWINGS. FURTHER ADJUSTMENTS SHALL BE MADE TO OBTAIN UNIFORM TEMPERATURE IN ALL SPACES. CALIBRATE SET, AND ADJUST ALL AUTOMATIC TEMPERATURE CONTROLS. CHECK PROPER SEQUENCING OF ALL INTERLOCK SYSTEMS, AND OPERATION OF ALL SAFETY CONTROLS.
- ALL TESTING AND BALANCING WORK SHALL BE PERFORMED BY A TESTING AND BALANCING AGENCY CERTIFIED BY NEBS OR AABC. THE CONTRACTOR SHALL PROVIDE PROPER CERTIFICATION TO THE ENGINEER AND THE OWNER PRIOR TO ANY TESTING AND BALANCING WORK. THE REPORT SHALL INCLUDE CERTIFICATION DOCUMENTATION. ALL BALANCING AND TEST REPORTS SHALL BE SUBMITTED ON STANDARD AABC FORMS OR EQUIVALENT FORMS BY NEBS OR AABC.
- THE OWNER AND ENGINEER ARE NOT RESPONSIBLE FOR THE CONTRACTOR'S SAFETY PRECAUTIONS OR TO MEANS, METHODS, TECHNIQUES, CONSTRUCTION SEQUENCES, OR PROCEDURES REQUIRED TO PERFORM HIS/HER WORK.

## ELECTRICAL SYMBOLS



## ELECTRICAL SYMBOLS



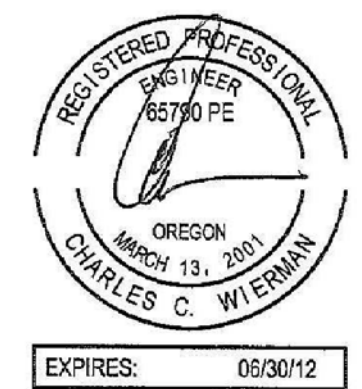
### ELECTRICAL NOTATIONS

ARF	ABOVE RAISED FLOOR.
AFF	ABOVE FINISHED FLOOR.
UNO	UNLESS NOTED OTHERWISE
ICC	INDEPENDENT CONTROLS CONTRACTOR
TSP	TWISTED SHIELDED PAIR
1/C	INDICATES SINGLE CONDUCTOR CABLE
*A' OR **	THESE LETTERS ADJACENT TO ANY SYMBOL INDICATES DEVICE BOTTOM TO BE MOUNTED 4\"/>

**GENERAL NOTES**  
1) THE SYMBOLS SHOWN ON THIS SHEET ARE A COMPLETE LIST OF SYMBOLS USED BY INSITE GROUP CONSULTING ENGINEERS AND NOT ALL SYMBOLS OR ABBREVIATIONS MAY BE USED ON THIS PROJECT.

### ELECTRICAL GENERAL NOTES

- THE SYMBOLS SHOWN ON THIS SHEET ARE A COMPLETE LIST OF SYMBOLS. NOT ALL SYMBOLS OR ABBREVIATIONS MAY BE USED ON THIS PROJECT.
- THESE DRAWINGS ARE SCHEMATIC IN NATURE AND INTENDED TO DEPICT THE GENERAL SCOPE OF WORK ON THIS PROJECT. FIELD VERIFICATION OF EXISTING CONDITIONS IS REQUIRED. ALL WORK PERFORMED UNDER THIS CONTRACT SHALL BE IN CONFORMANCE WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES HAVING JURISDICTION AND INSPECTION.
- COORDINATE POWER REQUIREMENTS AND FINAL LOCATIONS OF ALL EQUIPMENT DEVICES, ETC. WITH FINAL EQUIPMENT SELECTION AND INSTALL ALL NECESSARY DEVICES ALLOWING FOR END TERMINATION CONNECTIONS.
- ALL WIRING SHALL BE IN EMT TUBING OR MC CABLE AND SHALL BE CONCEALED. LOW VOLTAGE/COMMUNICATION WIRING IN MAY BE EXPOSED IN PLENUM SPACES, BUT MUST BE PLENUM RATED. LOW VOLTAGE WIRING IN OR ON WALLS SHALL BE IN EMT CONDUIT. PROVIDE 90 DEGREE ELBOW WHEN ENTERING PLENUM SPACES WITH APPROVED BUSHINGS AT CONDUIT TERMINATIONS.
- ALL FIRE RATED ASSEMBLIES SHALL BE MAINTAINED. CALCULATED AROUND ELECTRICAL PENETRATIONS WITH 3M GP-25 FIRE BARRIER CAULK (THICKNESS AS REQUIRED AND RECOMMENDED BY MANUFACTURER) TO MAINTAIN FIRE RESISTANCE RATINGS OF THE FIRE RATED ASSEMBLY.
- REFER TO ARCHITECTURAL PLANS FOR EXACT DIMENSIONS AND LOCATIONS OF ALL LIGHT FIXTURES AND DEVICES.
- THE LOCATIONS OF ALL EXISTING FIRE ALARMS SHOWN ARE CONSIDERED TO BE SCHEMATIC ONLY. FIELD VERIFY EXACT LOCATIONS.
- FURNISH, INSTALL AND CONNECT ALL WIRE, WIRING, CONDUIT, CONNECTORS, OUTLETS, ETC. NECESSARY TO ACHIEVE A COMPLETE ELECTRICAL INSTALLATION. ALTHOUGH SUCH WORK IS NOT SPECIFICALLY SHOWN OR SPECIFIED EQUIPMENT SHALL BE INSTALLED PER CODE REQUIREMENTS PROVIDING A SOUND, SECURE AND COMPLETE INSTALLATION.
- ADA COMPLIANCE: ALL ADA SPEAKER/STROBE UNITS SHALL BE MOUNTED 80\"/>



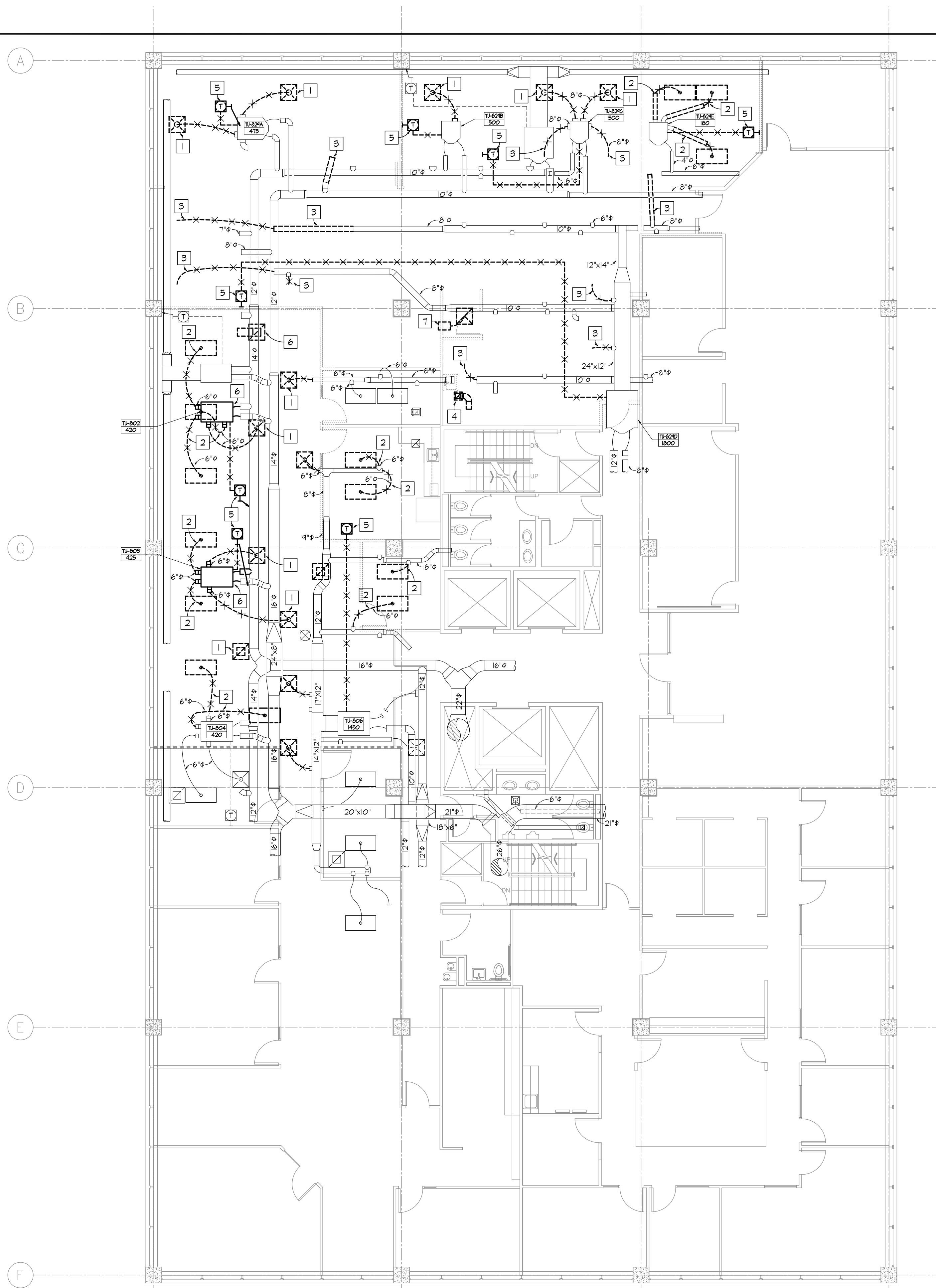
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PORTLAND STATE UNIVERSITY  
**MARKET CENTER BUILDING**  
MARKET CENTER BUILDING  
8TH FLOOR INTERIOR REMODEL

DATE:	DWN. BY:	CHK. BY:
04/20/2012	DAB	CCM
REVISIONS		

SHEET NUMBER  
**G1**  
DRAWING TYPE  
PERMIT SET  
CAD FILE  
PROJECT NO.  
10-2548-0

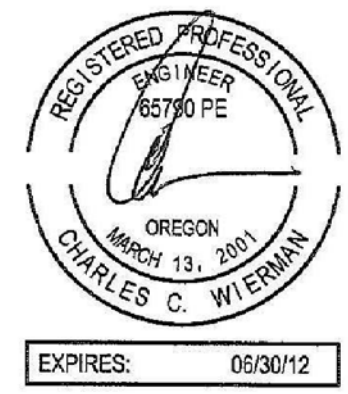


**PLAN NOTES:**

- 1 REMOVE EXISTING AIR DEVICE AND ASSOCIATED DUCTWORK, HANGERS, AND SUPPORTS BACK TO LOCATION SHOWN. CAP EXISTING DUCTWORK AIRTIGHT WHERE DUCTWORK IS NOT TO BE REUSED. RE: SHEET M2 FOR MECHANICAL NEW WORK.
- 2 REMOVE EXISTING DUCTWORK SUPPLYING EXISTING LIGHT TROFFER DIFFUSER TO LOCATION SHOWN. LIGHT TROFFER DIFFUSERS TO BE REMOVED BY ELECTRICAL CONTRACTOR.
- 3 REMOVE EXISTING DUCTWORK INCLUDING HANGERS AND SUPPORTS BACK TO LOCATION SHOWN. CAP EXISTING DUCTWORK AIRTIGHT WHERE DUCTWORK IS NOT TO BE REUSED. RE: SHEET M2 FOR MECHANICAL NEW WORK.
- 4 REMOVE EXISTING EXHAUST FAN INCLUDING ALL ASSOCIATED DUCTWORK, HANGERS, SUPPORTS, WIRING, CONDUIT, ETC.
- 5 REMOVE EXISTING TEMPERATURE SENSOR.
- 6 REMOVE EXISTING DUAL DUCT BOX AND ASSOCIATED DUCTWORK, HANGERS, AND SUPPORTS BACK TO LOCATION SHOWN. RETAIN DDC CONTROLS ON DUAL DUCT BOX AND RETURN TO OWNER. CAP EXISTING DUCTWORK AIRTIGHT WHERE DUCTWORK IS NOT TO BE REUSED. RE: SHEET M2 FOR MECHANICAL NEW WORK.
- 7 REMOVE EXISTING EXHAUST FAN INCLUDING ALL ASSOCIATED DUCTWORK, HANGERS, WIRING, CONDUIT, ETC.

**GENERAL NOTES:**  
 1) RE: SHEET M2 FOR MECHANICAL NEW WORK.  
 2) LIGHT TROFFER DIFFUSERS TO BE REMOVED BY ELECTRICAL CONTRACTOR.

**1 8TH FLOOR - MECHANICAL DEMOLITION**  
 SCALE: 1/8"=1'-0"



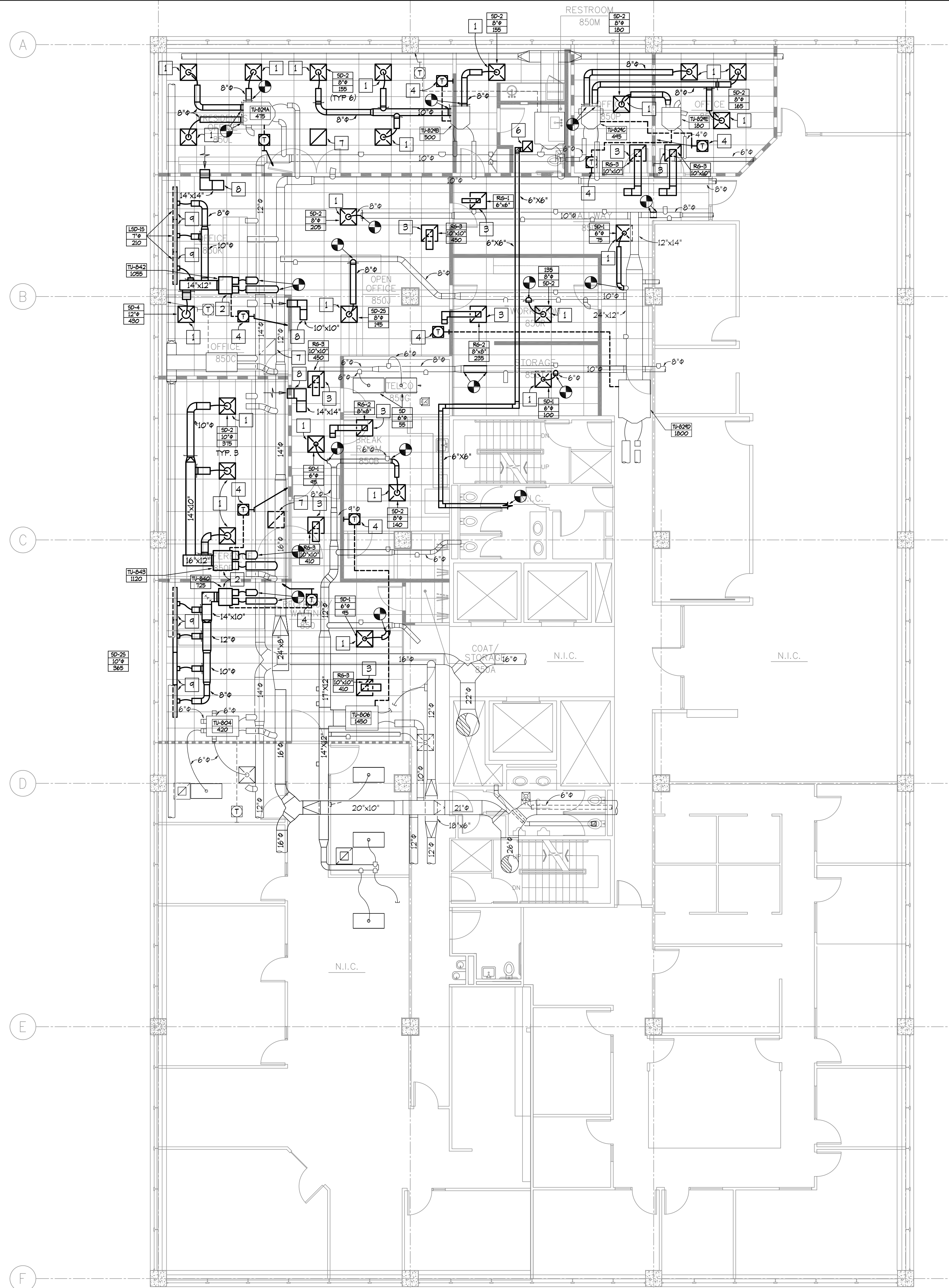
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PORTLAND STATE UNIVERSITY  
**MARKET CENTER BUILDING**  
 MARKET CENTER BUILDING  
 8TH FLOOR INTERIOR REMODEL

DATE	DWN. BY	CHK. BY
04/20/2012	DAB	CCM
REVISIONS		

<b>SHEET NUMBER</b>
<b>M1</b>
<b>DRAWING TYPE</b>
CAD SET
CAD FILE
<b>PROJECT NO.</b>
10-2548-0



**1 8TH FLOOR - MECHANICAL NEW WORK**  
SCALE: 1/8"=1'-0"

**PLAN NOTES:**

- 1 PROVIDE AND INSTALL NEW SUPPLY DIFFUSER AT LOCATION SHOWN. PROVIDE TITUS MODEL PAS 24"x24" STEEL WITH BORDER TYPE 3 (LAY-IN) STANDARD WHITE FINISH AND EARTHQUAKE TABS. PROVIDE AND INSTALL NEW SUPPLY AIR DUCTWORK AS NECESSARY TO SERVE DIFFUSER.
- 2 PROVIDE AND INSTALL NEW DUAL DUCT TERMINAL UNIT.
- 3 PROVIDE AND INSTALL NEW RETURN GRILL AT LOCATION SHOWN. PROVIDE TITUS MODEL PAR 24"x24" PERFORATED FACE WITH LAY-IN CEILING OPTION AND EARTHQUAKE TABS. PROVIDE NEW LINED RETURN DUCT BOOT.
- 4 PROVIDE AND INSTALL NEW WALL-MOUNTED INVENYS TEMPERATURE SENSOR TO MATCH EXISTING AT LOCATION SHOWN.
- 5 PROVIDE AND INSTALL NEW CEILING MOUNTED INVENYS TEMPERATURE SENSOR AT LOCATION SHOWN. THERMOSTAT TO CONTROL TERMINAL UNIT LOCATED ON FLOOR BELOW SERVING THIS ZONE.
- 6 PROVIDE AND INSTALL NEW CEILING MOUNTED IN-LINE EXHAUST FAN. PROVIDE COOK MODEL 66-122 WITH HANGING ISOLATOR KIT. CONNECT TO EXISTING EXHAUST DUCTS IN EXISTING RESTROOMS.
- 7 PROVIDE AND INSTALL NEW RETURN GRILL AT LOCATION SHOWN. PROVIDE TITUS MODEL PAR 24"x24" PERFORATED FACE WITH LAY-IN CEILING OPTION AND EARTHQUAKE TABS.
- 8 PROVIDE LINED RETURN AIR BOOT THROUGH FULL-HEIGHT MALL.
- 9 PROVIDE AND INSTALL NEW LINEAR SLOT SUPPLY DIFFUSER AT LOCATION SHOWN. PROVIDE AND INSTALL NEW SUPPLY AIR DUCTWORK AS NECESSARY TO SERVE DIFFUSER.

- GENERAL NOTES:**
- 1) EXISTING BUILDING AUTOMATION SYSTEM IS BY TAG. COORDINATE WITH BUILDING MANAGER PRIOR TO INSTALLING OR ALTERING CONTROLS.
  - 2) ALL RETURN AIR BOOTS SHALL HAVE 1" ACOUSTICAL DUCT LINER. DUCT DIMENSIONS SHOWN ON THE DRAWING ARE TO THE INSIDE OF THE LINER.
  - 3) ALL DUCTS SERVING A DIFFUSER SHALL HAVE A BALANCING DAMPER IF ONE IS NOT ALREADY INSTALLED.
  - 4) FIRE SPRINKLER SYSTEM DESIGN TO BE DEFERRED DESIGNED BY FIRE SPRINKLER CONTRACTOR. MODIFY EXISTING FIRE SPRINKLER SYSTEM TO MEET NFPA 13 AND THE AUTHORITY HAVING JURISDICTION. PROVIDE ALL NECESSARY DEMOLITION, SPRINKLER PIPING FITTINGS, SPRINKLER HEADS, DRAINS, DRAWINGS, CALCULATIONS, ETC. FOR COMPLETE FIRE PROTECTION SYSTEM. SEE ARCHITECTURAL DRAWINGS FOR ALL LOCATIONS OF WORK.
  - 5) RELOCATE EXISTING FIRE SUPPRESSION SPRINKLER HEADS AS NECESSARY TO ACCOMMODATE NEW ARCHITECTURAL WALL LAYOUT, NEW LIGHT FIXTURE LAYOUT, NEW DIFFUSER LOCATIONS, AND NEW RETURN AIR GRILLE LOCATIONS. ADJUST AND COORDINATE ROUTING OF SPRINKLER PIPING, SUPPLY AIR DUCTWORK, AND RETURN AIR BOOTS TO AVOID CONFLICTS. PROVIDE ALL NECESSARY SPRINKLER PIPING FITTINGS, PIPE HANGERS, SPRINKLER HEADS, ETC. RE. SHEET F31 FOR AREAS OF KNOWN CONFLICTS. ADDITIONAL CONFLICTS MAY EXIST. FIELD VERIFY EXISTING CONDITIONS.
  - 6) RETAIN AND RELOCATE TEMPERATURE SENSORS IN RETURN DUCT BOOTS THAT ARE REMOVED OR RELOCATED.
  - 7) UPDATE DDC SYSTEM GRAPHICS TO REFLECT MECHANICAL SYSTEM CHANGES. PROVIDE ALL NECESSARY WIRING, RELAYS, CONTROL PANELS, POWER SUPPLIES, PROGRAMMING, ETC. TO UPDATE SYSTEM.

**DIFFUSER AND GRILLE SCHEDULE**

TAG NO.	MANUFACTURER	MODEL	WIDTH	LENGTH	NECK SIZE	NOMINAL CFM	THROW AT 100 fpm	TOTAL PRESSURE	NC	NOTES
SD	-	-	24	24	VARIES	VARIES	-	-	-	1
SD-1	TITUS	PAS	24	24	6"φ	118	4 FT.	0.064"	16	4, 5
SD-15	TITUS	PAS	24	24	6"φ	118	4 FT.	0.064"	16	4, 6
SD-2	TITUS	PAS	24	24	8"φ	244	6 FT.	0.091"	27	4, 5
SD-25	TITUS	PAS	24	24	8"φ	244	6 FT.	0.091"	27	4, 6
SD-3	TITUS	PAS	24	24	10"φ	382	7 FT.	0.104"	32	4, 5
SD-35	TITUS	PAS	24	24	10"φ	382	7 FT.	0.104"	32	4, 6
SD-4	TITUS	PAS	24	24	12"φ	471	11 FT.	0.128"	30	4, 5
SD-45	TITUS	PAS	24	24	12"φ	471	11 FT.	0.128"	30	4, 6
LSO-15	PRICE	48"/SDS100	4"	48"	7"	280	19 FT.	0.188"	30	7
R6	-	-	24	24	VARIES	VARIES	-	-	-	3
R6-1	TITUS	PAR	24	24	6"x6"	125	-	0.09"	-	5
R6-15	TITUS	PAR	24	24	6"x6"	125	-	0.09"	-	6
R6-2	TITUS	PAR	24	24	8"x8"	267	-	0.13"	18	5
R6-25	TITUS	PAR	24	24	8"x8"	267	-	0.13"	18	6
R6-3	TITUS	PAR	24	24	10"x10"	486	-	0.17"	25	5
R6-35	TITUS	PAR	24	24	10"x10"	486	-	0.17"	25	6
R6-4	TITUS	PAR	24	24	12"x12"	800	-	0.23"	31	5
R6-45	TITUS	PAR	24	24	12"x12"	800	-	0.23"	31	6

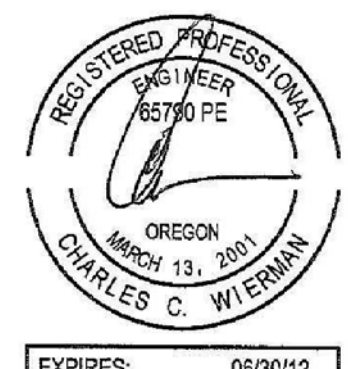
- NOTES:**
- 1) EXISTING DIFFUSER TO BE REUSED.
  - 2) USE 2-WAY THROW.
  - 3) EXISTING GRILLE TO BE REUSED.
  - 4) USE 4-WAY THROW.
  - 5) PROVIDE DIFFUSER WITH LAY-IN TYPE BORDER.
  - 6) PROVIDE DIFFUSER WITH SURFACE MOUNT BORDER.
  - 7) LINEAR SLOT DIFFUSER SHALL BE 48" LONG WITH 1" SLOT SPACINGS, 2 SLOTS, CONCEALED SURFACE MOUNT BORDER, MITERED END FLANGES, AND WHITE FINISH. PROVIDE PRICE MODEL 48"/SDS100/22"/X8/B2. PROVIDE WITH LINEAR SLOT PLENUM. PLENUM SHALL BE 48" LONG WITH 1" SLOT SPACINGS, AND 2 SLOTS. PLENUM SHALL BE FOR DRYWALL CEILING MOUNT APPLICATIONS AND BE INSULATED. PROVIDE PRICE MODEL 48"/SDS100/22/2.

**TERMINAL UNIT SCHEDULE**

TAG NO.	MANUFACTURER	MODEL	INLET SIZE (INCHES)	COOLING CFM	HEATING CFM	MINIMUM VENTILATION CFM	UNIT CFM RANGE	NOTES
TU-840	PRICE	DDS 5000-1	4	125	600	65	167-1000	1
TU-842	PRICE	DDS 5000-10	10	1055	415	50	221-800	1
TU-843	PRICE	DDS 5000-12	12	1120	415	120	313-1900	1

**NOTES:**

- 1) TERMINAL UNIT TO BE CONTROLLED BY ZONE TEMPERATURE SENSOR THROUGH DDC SYSTEM.



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PORTLAND STATE UNIVERSITY  
**MARKET CENTER BUILDING**  
MARKET CENTER BUILDING  
8TH FLOOR INTERIOR REMODEL

DATE	DWN. BY	CHK. BY
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REVISIONS

SHEET NUMBER  
**M2**  
DRAWING TYPE  
PERMIT SET  
CAD FILE  
PROJECT NO.  
10-2548-O

**15010 - BASIC MECHANICAL REQUIREMENTS**

15010.01 - DRAININGS AND SPECIFICATIONS  
THE CONTRACT DRAWINGS FOR DIVISION 15 WORK ARE IN PART SCHEMATIC, INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE THE GENERAL LAYOUT, DESIGN AND ARRANGEMENT. THE CONTRACTOR SHALL FOLLOW THESE DRAWINGS IN THE LAYOUT OF HIS WORK AND SHALL CONSULT GENERAL INTENT CONSTRUCTION DRAWINGS, STRUCTURAL DRAWINGS, ELECTRICAL DRAWINGS AND ALL OTHER DRAWINGS FOR THIS PROJECT TO DETERMINE ALL CONDITIONS AFFECTING THE DIVISION 15 WORK.

WHERE SPECIFIC DETAILS AND DIMENSIONS FOR DIVISION 15 WORK ARE NOT SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL TAKE MEASUREMENTS AND MAKE LAYOUTS AS REQUIRED FOR THE PROPER INSTALLATION OF THE WORK AND COORDINATION WITH ALL OTHER WORK ON THE PROJECT. IN CASE OF ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE SPECIFICATIONS THAT HAVE NOT BEEN CLARIFIED BY ADDENDUM PRIOR TO BIDDING, IT SHALL BE ASSUMED BY THE SIGNING OF THE CONTRACT THAT THE HIGHER COST IS INCLUDED IN THE CONTRACT PRICE.

15010.02 - WORK INCLUDED  
THIS WORK SHALL INCLUDE ALL PLANT, LABOR, MATERIAL AND EQUIPMENT AS REQUIRED TO FURNISH AND INSTALL DIVISION 15 WORK INCLUDING DEMOLITION AS SHOWN ON THE DRAWINGS AND AS HEREAFTER SPECIFIED. FURNISH AND INSTALL ALL MATERIALS, EQUIPMENT, DEVICES AND ACCESSORIES NOT SPECIFICALLY CALLED FOR BY ITEM BUT THAT ARE NECESSARY TO PROVIDE THE REQUIREMENTS IN OPERATION AND FUNCTION THAT IS ESTABLISHED BY THE DESIGN AND BY THE EQUIPMENT SPECIFIED.

WORK TO INCLUDE THE PROCUREMENT OF AND PAYMENT OF ALL LICENSES REQUIRED FOR THE PERFORMANCE OF THE WORK. PERMITS SHALL BE OBTAINED BY PSU THROUGH THE FACILITY PERMIT PROGRAM. WORK TO INCLUDE ALL FEES AND DIRECT EXPENSES INVOLVED IN ANY INSPECTIONS REQUIRED FOR THE PROJECT. ALL SCAFFOLDS, STAGING, RUNWAYS AND EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE WORK. THE REMOVAL FROM THE PREMISES, AS IT ACCUMULATES, OF ALL DIRT AND REFUSE RESULTING IN THE PERFORMANCE OF THE WORK.

15010.03 - PROTECTION AND DUST CONTROL  
THE CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION TO PREVENT DAMAGE TO ADJACENT AREAS DURING OR FOLLOWING THE WORK TO PREVENT ACCIDENTAL INJURY TO THE BUILDING OCCUPANTS AND THE PUBLIC, TO PREVENT THE SPREADING OF DUST, DIRT, DEBRIS AND MOISTURE FROM SETTING ON OR IN THE BUILDING OCCUPANTS FURNISHINGS OR EQUIPMENT.

CONTRACTOR SHALL STORE AND PROTECT FROM DAMAGE ALL EQUIPMENT AND MATERIALS AFTER DELIVERY TO THE JOB SITE. COVER WITH WATERPROOF TEAR-RESISTANT, HEAVY TAPE OR POLYETHYLENE PLASTIC AS REQUIRED TO PROTECT FROM PLASTER, DIRT, PAINT, WATER OR PHYSICAL DAMAGE. EQUIPMENT AND MATERIAL WHICH HAS BEEN DAMAGED BY CONSTRUCTION ACTIVITIES WILL BE REJECTED, AND CONTRACTOR IS OBLIGATED TO FURNISH NEW EQUIPMENT AND MATERIAL OF A LIKE KIND. KEEP PREMISES BROOM CLEAN AT ALL TIMES FROM FOREIGN MATERIAL DEPOSITED UNDER THIS CONTRACT. ALL PIPING, EQUIPMENT, ETC. SHALL HAVE A NEAT AND CLEAN APPEARANCE AT THE TERMINATION OF THE WORK.

15010.04 - EXISTING CONDITIONS  
EACH BIDDER SHALL INSPECT THE SITE AS REQUIRED FOR KNOWLEDGE OF EXISTING CONDITIONS AND FAILURE TO OBTAIN SUCH KNOWLEDGE SHALL NOT RELIEVE THE SUCCESSFUL BIDDER OF THE RESPONSIBILITY TO MEET THE EXISTING CONDITIONS IN PERFORMING THE WORK UNDER THE CONTRACT.

WHERE EXISTING DUCTWORK OR PIPING IS BROKEN BY REMOVAL OF EXISTING DEVICES, EQUIPMENT OR FITTINGS, OR BY DEMOLITION WORK, CUTTING OR REMOVAL OF EXISTING BUILDING CONSTRUCTION, AND WHERE THE EXISTING PIPING OR DUCTWORK IS REQUIRED BY REMAINING DEVICES OR EQUIPMENT TO STAY IN SERVICE, THEN THE PIPING AND DUCTWORK SHALL BE COMPLETED AS REQUIRED BY JOB CONDITIONS.

15010.05 - MATERIAL AND MANUFACTURE  
ALL MATERIAL AND EQUIPMENT SHALL BE NEW EXCEPT AS STATED OTHERWISE. SHALL BE OF THE BEST QUALITY AND DESIGN. SHALL BE FREE FROM DEFECTS AND IMPERFECTIONS AND SHALL HAVE MARKINGS OR A NAMEPLATE IDENTIFYING THE MANUFACTURER AND PROVIDING SUFFICIENT REFERENCE TO ESTABLISH QUALITY, SIZE AND CAPACITY.

15010.06 - SUBSTITUTIONS  
ALL PRODUCTS PROPOSED FOR USE, INCLUDING THOSE SPECIFIED BY REQUIRED ATTRIBUTES AND PERFORMANCE, SHALL REQUIRE APPROVAL BY THE ENGINEER BEFORE BEING INCORPORATED INTO THE WORK. THE CONTRACTOR SHALL, IF HE DESIRES TO SUBSTITUTE OTHER THAN SPECIFIED MATERIAL, SUBMIT IN ALTERNATE PROPOSAL FORM, WITH HIS BID, A LIST OF SUCH ITEMS INDICATING ITEM MANUFACTURER MODEL NUMBER AND THAT AMOUNT ADDED OR DEDUCTED FROM THE BASE BID. IF THE OWNER ELECTS TO ALLOW SUBSTITUTION, EACH SUCH MATERIAL SUBSTITUTION ITEM SHALL BE SEPARATELY LISTED IN ORDER THAT PROPER CONSIDERATION MAY BE GIVEN.

WHERE THE PHRASE "OR EQUAL" OR "APPROVED EQUAL" OCCURS IN THE CONTRACT DOCUMENTS, DO NOT ASSUME THAT MATERIALS, EQUIPMENT OR METHODS WILL BE APPROVED AS EQUAL UNLESS THE ITEM HAS BEEN SPECIFICALLY APPROVED FOR THIS WORK BY THE ENGINEER/ARCHITECT.

15010.07 - SAFETY REGULATIONS  
ALL DIVISION 15 WORK SHALL BE PERFORMED IN COMPLIANCE WITH ALL APPLICABLE AND GOVERNING SAFETY REGULATIONS OF THE OCCUPATIONAL AND SAFETY HEALTH ACT.

15010.08 - CODES, ORDINANCES, REGULATIONS AND U.L. APPROVAL  
ALL DIVISION 15 WORK SHALL CONFORM TO THE REQUIREMENTS OF ALL APPLICABLE CODES, ORDINANCES AND REGULATIONS INCLUDING THE CURRENT RULES AND REGULATIONS OF THE NATIONAL ELECTRICAL CODE, THE NATIONAL FIRE PROTECTION ASSOCIATION, UNIFORM MECHANICAL CODE, OSHA AND ALL STATE AND LOCAL LAWS, CODES AND ORDINANCES.

FIXTURES, APPLIANCES, EQUIPMENT AND MATERIALS WHICH ARE SUBJECT TO UNDERWRITERS LABORATORY TESTS SHALL BEAR SUCH APPROVAL.

15010.09 - FIRESTOPPING  
FIRESTOPPING IS DEFINED HEREIN AS THE PROCESS OF FURNISHING AND INSTALLING A MATERIAL, OR COMBINATION OF MATERIALS, IN VARIOUS CONSTRUCTIONS TO MAINTAIN EFFECTIVE BARRIER AGAINST THE SPREAD OF FLAME, SMOKE, AND GASES AND TO RETAIN THE INTEGRITY OF TIME-RATED CONSTRUCTION. IT SHALL BE USED IN SPECIFIC LOCATIONS AS SPECIFIED HEREIN.

PIPING/DUCT PENETRATIONS THROUGH TIME-RATED PARTITIONS OF FIRE WALLS SHALL BE FIRESTOPPED.

PENETRATIONS THROUGH VERTICAL PIPE SHAFTS SHALL BE FIRESTOPPED.

MATERIAL OF FIRESTOPPING SHALL BE ASBESTOS FREE AND CAPABLE OF MAINTAINING AN EFFECTIVE BARRIER AGAINST FLAME, SMOKE AND GASES IN COMPLIANCE WITH THE REQUIREMENTS ASTM E814, UL NO. 1479.

15010.10 - PENETRATIONS  
SEAL ALL MECHANICAL FLOOR, WALL AND ROOF PENETRATIONS WATER-TIGHT. CALK AROUND MECHANICAL PENETRATIONS WITH 3M CP-25 FIRE BARRIER CALK (THICKNESS AS REQUIRED AND RECOMMENDED) TO MAINTAIN FIRE RESISTANT RATING. RATING OF FIRE-RATED ASSEMBLIES. PIPING PENETRATIONS THROUGH ROOFS SHALL BE PROVIDED WITH PREFABRICATED ROOF CURBS MANUFACTURED BY CUSTOM CURB, INC., FATE CITY, MICHIGAN, OR APPROVED EQUAL.

15010.11 - EXCAVATION AND BACK FILLING  
NOT USED ON THIS PROJECT.

15010.12 - SHOP DRAWINGS AND SAMPLES  
THE CONTRACTOR SHALL SUBMIT FOR APPROVAL, THREE (3) COPIES OF MANUFACTURERS SHOP DRAWINGS FOR ALL MAJOR ITEMS OF EQUIPMENT TO BE FURNISHED UNDER THIS CONTRACT, AND ALL MAJOR ITEMS REQUIRING COORDINATION BETWEEN CONTRACTORS. BEFORE SUBMITTING SHOP DRAWINGS AND MATERIAL LISTS, THE CONTRACTOR SHALL VERIFY THAT ALL THE EQUIPMENT IS MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, AND SHALL FIT THE AVAILABLE SPACE AND ALLOW AMPLE ROOM FOR MAINTENANCE.

THE ENGINEER'S CHECKING AND SUBSEQUENT APPROVAL OF SUCH SHOP DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, QUANTITIES, OMISSIONS OF COMPONENTS OR FITTINGS, OR FOR COORDINATING SUCH WITH ALL OTHER BUILDING CONDITIONS. THE CONTRACTOR SHALL PROCEED WITH THE PROCUREMENT AND INSTALLATION OF EQUIPMENT ONLY AFTER RECEIVING APPROVED SHOP DRAWINGS RELATIVE TO EACH ITEM.

**15010 - BASIC MECHANICAL REQUIREMENTS (cont'd)**

ACCEPTANCE OF THE WORK SHALL BE SUBJECT TO THE ENGINEERS/ARCHITECTS APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. SHOP DRAWINGS SHALL INCLUDE MANUFACTURERS DETAIL DRAWINGS OF EQUIPMENT AND MATERIAL AND CONTRACTORS SHOP DETAILS FOR INSTALLATION OF MATERIAL AND EQUIPMENT. DESCRIPTIVE LITERATURE SHALL INCLUDE CATALOG DATA COVERING DESIGN, SIZE AND CAPACITY OF MATERIAL AND EQUIPMENT. SUBMITTALS SHALL INCLUDE THE MANUFACTURERS MODEL NUMBER, COLOR, FINISH, PERFORMANCE DATA, ELECTRICAL CHARACTERISTICS, ETC. ALL CLEARLY SHOWN AND MARKED FOR THE SPECIFIC ITEM OF EQUIPMENT BEING FURNISHED ON THIS PROJECT.

15010.13 - RECORD DRAWINGS  
THE CONTRACTOR SHALL KEEP DAY-TO-DAY RECORD OF ALL CHANGES OR VARIATIONS MADE FROM THE CONTRACT DOCUMENTS AND AT THE END OF THE PROJECT SHALL PROVIDE THE OWNER/ARCHITECT/ENGINEER WITH REPRODUCIBLE SETS AS REQUESTED.

15010.14 - OPERATION AND MAINTENANCE INSTRUCTIONS  
THIS CONTRACTOR SHALL, DURING THE COURSE OF CONSTRUCTION, COLLECT AND COMPIL A COMPLETE BROCHURE OF ALL EQUIPMENT FURNISHED AND INSTALLED ON THIS PROJECT. THIS BROCHURE SHALL INCLUDE OPERATIONAL AND MAINTENANCE INSTRUCTIONS, MANUFACTURERS CATALOG SHEETS, WIRING DIAGRAMS, PARTS LISTS, APPROVED SHOP DRAWINGS, AND DESCRIPTIVE LITERATURE ALL AS FURNISHED BY THE EQUIPMENT MANUFACTURER. MANUAL SHALL INCLUDE AN INSIDE COVER SHEET THAT LIST THE PROJECT NAME, DATE, OWNER, ARCHITECT, MECHANICAL CONSULTANT, GENERAL CONTRACTOR, MECHANICAL CONTRACTOR, AND AN INDEX OF CONTENTS. ALL LITERATURE SHALL BE BOUND IN APPROVED BINDERS AND THREE COPIES SUBMITTED TO THE OWNER AT THE TERMINATION OF THE WORK.

15010.15 - GUARANTEE  
GUARANTEE AGAINST DEFECTIVE WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL PAYMENT. GUARANTEE SHALL INCLUDE MATERIAL TO BE REPLACED AND ALL LABOR REQUIRED.

15010.16 - CUTTING, PATCHING AND ROUGH-IN  
THE CONTRACTOR SHALL DO ALL CUTTING OF WALLS, FLOORS, CEILING, ETC. AS SPECIFIED UNDER THIS SECTION. WORK UNDER THIS SECTION SHALL OBTAIN PERMISSION FROM THE ARCHITECT BEFORE DOING ANY CUTTING. STRUCTURAL MEMBERS SHALL NOT BE DISTURBED WITHOUT PRIOR APPROVAL FROM THE ARCHITECT. ALL HOLES SHALL BE CUT AS SMALL AS POSSIBLE. GENERAL CONTRACTOR SHALL PATCH WALLS, FLOORS, ETC. AS REQUIRED BY WORK UNDER THIS SECTION. ALL PATCHING SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION, AND ANY AREAS DISTURBED BY WORK PERFORMED UNDER THIS CONTRACT SHALL BE NEATLY REPAIRED AND REFINISHED TO THE CONDITION OF ADJOINING SURFACES IN A MANNER SATISFACTORY TO THE ARCHITECT.

15010.17 - ACCESS DOORS  
PROVIDE ACCESS DOORS IN CEILING, WALLS, ETC. WHERE INDICATED OR REQUIRED FOR ACCESS OR MAINTENANCE TO NO ACCESSIBLE VALVES AND EQUIPMENT INSTALLED UNDER THIS SECTION. DOORS SHALL HAVE CONCEALED HINGES, SCREWDRIVER-TYPE LOCK, ANCHOR STRAPS, MANUFACTURED BY MILCOR, ZURN, TITUS OR EQUAL. OBTAIN ARCHITECT APPROVAL OF TYPE AND LOCATIONS BEFORE ORDERING.

15010.18 - AIR FILTERS  
FILTERS SHALL BE FARR 30/30 THROWAWAY TYPE, OR AS OTHERWISE INDICATED ON THE DRAWINGS. ALL AIR UNITS SHALL HAVE FILTER INSTALLED ANY TIME THEY ARE OPERATED BEFORE FINAL ACCEPTANCE. PROVIDE EXTRA SET OF FILTERS AND INSTALL IN UNITS JUST BEFORE TURNING OVER BUILDING TO OWNER. EQUAL DUSTSTOP, CAMBRIDGE, OR APPROVED EQUAL.

15010.19 - ELECTRICAL WIRING  
ALL LINE VOLTAGE WIRING SHALL BE FURNISHED BY THE ELECTRICAL CONTRACTOR. ALL LINE VOLTAGE CONTROL AND INTERLOCK WIRING FOR MECHANICAL SYSTEMS SHALL ALSO BE FURNISHED BY THE ELECTRICAL CONTRACTOR. ALL LOW VOLTAGE CONTROL WIRING SHALL BE BY THE ELECTRICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL PROVIDE THE ELECTRICAL CONTRACTOR WITH WIRING DIAGRAMS AS REQUIRED FOR PROPER EQUIPMENT HOOKUP. THIS CONTRACTOR SHALL COORDINATE WITH THE ELECTRICAL CONTRACTOR THE ACTUAL WIRE SIZES AND INSTALLATIONS FOR MECHANICAL EQUIPMENT (FROM EQUIPMENT NAMEPLATE) TO ENSURE PROPER INSTALLATION.

15010.20 - REFRIGERANT AND OIL  
NOT USED ON THIS PROJECT.

15010.21 - FINAL TESTING AND ADJUSTMENTS  
CONTRACTOR SHALL PERFORM TEST READINGS ON ALL FANS, UNITS, COILS, FAN TERMINAL UNITS, DIFFUSERS, GRILLS, HOODS, ETC. AND ADJUST EQUIPMENT TO DELIVER SPECIFIED AMOUNTS OF AIR. A TESTING AND BALANCING REPORT LOG SHALL BE MADE SHOWING ALL AIR SUPPLY QUANTITIES, FAN AND UNIT TEST READINGS, ETC., AND SIX COPIES OF THE FINAL COMPLETION OF DATA SHALL BE SUBMITTED TO THE ARCHITECT FOR EVALUATION AND APPROVAL BEFORE FINAL INSPECTION OF THE PROJECT. AIR AND WATER FLOWS SHALL BE BALANCED TO WITHIN PLUS/MINUS 1% OF DESIGN REQUIREMENTS. ALL EQUIPMENT SHALL BE ADJUSTED TO OPERATE AS INTENDED BY THE SPECIFICATION. ALL BEARINGS SHALL LINE UP. BEARINGS THAT HAVE DIRT OR FOREIGN MATERIAL IN THEM SHALL BE REPLACED WITH NEW BEARINGS WITHOUT ADDITIONAL COST TO THE OWNER.

ALL THERMOSTATS AND CONTROL DEVICES SHALL BE ADJUSTED TO OPERATE AS INTENDED. ADJUST BURNERS, FANS, ETC. FOR PROPER AND EFFICIENT OPERATION. CERTIFY TO ARCHITECT THAT ALL ADJUSTMENTS HAVE BEEN MADE AND THAT SYSTEM IS OPERATING SATISFACTORILY. ADJUST ALL AIR DEVICES TO SUPPLY THE AMOUNT OF AIR SHOWN ON THE DRAWINGS. FURTHER ADJUSTMENTS SHALL BE MADE TO OBTAIN UNIFORM TEMPERATURE IN ALL SPACES. CALIBRATE, SET, AND ADJUST ALL AUTOMATIC TEMPERATURE CONTROL CHECK PROPER SEQUENCING OF ALL INTERLOCK SYSTEMS, AND OPERATION OF ALL SAFETY CONTROLS.

ALL TESTING AND BALANCING WORK SHALL BE PERFORMED BY AN INDEPENDENT TESTING AND BALANCING AGENCY CERTIFIED BY NEBS OR ASBC. THE CONTRACTOR SHALL PROVIDE PROPER CERTIFICATION TO THE ENGINEER AND THE OWNER PRIOR TO ANY TESTING AND BALANCING WORK. THE REPORT SHALL INCLUDE CERTIFICATION DOCUMENTATION. ALL BALANCING AND TEST REPORTS SHALL BE SUBMITTED ON STANDARD A486 FORMS OR EQUIVALENT FORMS BY NEBS OR SMARA.

THE TESTING AND BALANCING CONTRACTOR SHALL PROVIDE SERVICES AND MANPOWER REQUIRED TO MEET THE AIR HANDLING UNIT SEQUENCE OF OPERATION. COORDINATE WITH THE HVAC AND CONTROLS CONTRACTOR.

15010.22 - SETTINGS, ADJUSTMENT AND EQUIPMENT SUPPORTS  
WORK SHALL INCLUDE MOUNTING, ALIGNMENT AND ADJUSTMENT OF SYSTEMS AND EQUIPMENT.

SET EQUIPMENT LEVEL ON ADEQUATE FOUNDATIONS AND PROVIDE PROPER ANCHOR BOLTS AND ISOLATION AS SHOWN SPECIFIED OR REQUIRED BY THE ENGINEER/MANUFACTURERS INSTALLATION INSTRUCTIONS.

PROVIDE CONCRETE BASES FOR ALL FLOOR AND SLAB MOUNTED EQUIPMENT. REFER TO DRAWINGS FOR REQUIRED BASE TYPE AND SIZE. PROVIDE 3/4"-1/2" HIGH BASE WHERE BASE IS NOT SHOWN ON THE DRAWINGS.

15010.23 - EQUIPMENT FURNISHED BY OTHERS  
THE CONTRACTOR SHALL VERIFY AND INSTALL ALL NECESSARY EQUIPMENT AND ACCESSORIES THAT ARE NOT PROVIDED BY THE EQUIPMENT SUPPLIER OR OWNER TO COMPLETE THE INSTALLATION. EQUIPMENT AND ACCESSORIES NOT PROVIDED BY EQUIPMENT SUPPLIER MAY INCLUDE FLUES, VENTS, INTAKES ASSOCIATED ROOF JACKETS AND CAPS TO OUTDOORS, EXHAUST DRAINAGE, CONDENSATE DRAINAGE, INTERLOCKS, ETC. AS REQUIRED FOR PROPER OPERATION OF THE COMPLETE SYSTEM IN ACCORDANCE WITH THE MANUFACTURERS INSTALLATIONS.

15010.24 - MISCELLANEOUS REMODELING WORK  
PROVIDE ALL ITEMS OF HVAC SYSTEMS MODIFICATION REQUIRED BECAUSE OF BUILDING REMODELING, AS NOTED ON THE DRAWINGS OR NECESSARY FOR PROPER OPERATION. MATCH EXISTING MATERIALS AND CONSTRUCTION TECHNIQUES WHEN MODIFYING EXISTING SYSTEMS UNLESS SPECIFIED OTHERWISE. COORDINATE ADDITIONAL REQUIREMENTS WITH THE GENERAL CONTRACTOR AND THE ARCHITECT.

ALL EXISTING HVAC EQUIPMENT INTENDED FOR REUSE SHALL BE THOROUGHLY CLEANED AND REFINISHED AS REQUIRED FOR PROPER OPERATION INCLUDING REPLACEMENT OR FILTER, BELTS, MOTORS, REMOTE CONTROLS AND SAFETY INTERLOCKS.

**15200 - SUPPORTS AND ANCHORS**

15200.01 - DESCRIPTION OF WORK  
PROVIDE AND INSTALL PIPING AND EQUIPMENT HANGERS, INSERTS AND SUPPORTS, ETC., AS SPECIFIED HEREIN.

15200.02 - STANDARDS  
ALL PIPING/EQUIPMENT INSTALLATIONS SHALL MEET THE FOLLOWING STANDARDS:  
ASTM B814 - BUILDING SERVICES PIPING  
MSS 5894 - PIPE HANGERS & SUPPORTS-MATERIALS, DESIGN & MANUF.  
MSS 5864 - PIPE HANGERS & SUPPORTS-SELECTION & APPLICATION  
MSS 5884 - PIPE HANGERS & SUPPORTS-FABRICATION & INSTALLATION

15200.03 - PIPE HANGERS  
PIPE HANGERS SHALL BE CAPABLE OF SUPPORTING PIPING IN ALL CONDITIONS OF OPERATION. THEY SHALL ALLOW FREE EXPANSION AND CONTRACTION OF PIPING, AND PREVENT EXCESSIVE STRESS RESULTING FROM TRANSFERRED WEIGHT BEINGS INDUCED INTO PIPE OR CONNECTED EQUIPMENT. SUPPORT HORIZONTAL OR VERTICAL PIPES AT LOCATIONS OF LEAST VERTICAL MOVEMENT.

PROVIDE SUFFICIENT HANGERS TO ADEQUATELY SUPPORT PIPING SYSTEM AT SPECIFIED SPACING AT CHANGES IN PIPING DIRECTION AND AT CONCENTRATED LOADS. HANGERS SHALL PROVIDE FOR VERTICAL ADJUSTMENTS TO MAINTAIN PITCH REQUIRED FOR PROPER DRAINAGE AND FOR LONGITUDINAL TRAVEL DUE TO EXPANSION AND CONTRACTION OF PIPING. FASTEN HANGERS TO BUILDING STRUCTURAL MEMBERS WHEREVER PRACTICABLE. HANGERS IN DIRECT CONTACT WITH COPPER PIPE OR TUBING SHALL BE COPPER PLATED.

UNLESS INDICATED OTHERWISE ON THE DRAWINGS SUPPORT HORIZONTAL STEEL PIPE AS FOLLOWS:

PIPE SIZE - ROD DIAMETER - MAX. SPACING  
UP TO 1-1/4" - 3/8" - 8 FT.  
1-1/2" TO 2" - 3/8" - 10 FT.  
2-1/2" TO 3/4" - 1".  
4" TO 5" - 5/8" - 15 FT.  
6" - 3/4" - 11 FT.  
8" TO 12" - 1/8" - 22 FT.

UNLESS INDICATED OTHERWISE ON THE DRAWINGS SUPPORT HORIZONTAL COPPER TUBING AS FOLLOWS:

NOM. TUBING SIZE - ROD DIAMETER - MAX. SPACING  
UP TO 1" - 3/8" - 8 FT.  
1-1/4" TO 1-1/2" - 3/8" - 8 FT.  
2" - 3/8" - 8 FT.  
2-1/2" - 1/2" - 4 FT.  
3" TO 4" - 1/2" - 10 FT.

SUPPORT HORIZONTAL CAST IRON SOIL PIPING WITH ONE HANGER FOR EACH JOINT LOCATED CLOSE TO HUB.

SUPPORT PLASTIC PIPING AS RECOMMENDED BY THE PIPING MANUFACTURER.

SUPPORT VERTICAL CAST IRON SOIL PIPE AND PVC PIPE AT EVERY FLOOR AND STEEL AND COPPER TUBING AT EVERY OTHER FLOOR EXCEPT WHERE INDICATED ON THE DRAWINGS.

PROVIDE CONTINUOUS TENSILE HANGERS WHEREVER POSSIBLE. NO CHAIN, WIRE, OR PERFORATED STRAPS SHALL BE USED. HANGER RODS SHALL BE SUBJECT TO TENSILE LOADING ONLY.

PROVIDE GRINNEL PIPE HANGERS FOR VERTICAL PIPE RISERS AS FOLLOWS:  
PIPE MATERIAL - PIPE SIZE - HANGER FIGURE NO.  
COPPER - 1/2" THRU 4" - CT-121  
STEEL - 3/4" THRU 20" - 261

PROVIDE GRINNEL FIG. 194, 185, 199 STEEL WALL BRACKETS FOR PIPING SUSPENDED OR SUPPORTED FROM WALLS. BRACKETS SHALL BE PRIME COATED CARBON STEEL.

MOUNT HANGERS FOR INSULATED PIPING ON OUTSIDE OF PIPE. INSULATION SIZED TO ALLOW FOR FULL THICKNESS OF INSULATION. PROVIDE GRINNEL FIG. 161 PROTECTION SHIELDS SIZED SO THAT LINE CARRIER LOAD DOES NOT EXCEED ONE-THIRD OF INSULATION COMPRESSIVE STRENGTH. SHIELD SHALL BE GALVANIZED STEEL, SUPPORT LOWER 150 DEGREES OF FINE INSULATION. OMIT COPPER PLATING ON HANGERS MOUNTED OUTSIDE INSULATION ON COPPER TUBING.

PROVIDE FEE AND HANGER FIG. 404 VIBRATION CONTROL HANGERS AT LOCATIONS WHERE PIPING VIBRATIONS WOULD BE TRANSMITTED TO BUILDING STRUCTURE BY CONVENTIONAL HANGERS. APPLY HANGERS WITHIN THEIR LOAD SUPPORTING RANGE.

PROVIDE ELGEN FIG. 50 PIPE SADDLE WITH ADJUSTER TO SUPPORT PIPING FROM FLOOR. PROVIDE COMPLETE WITH PEDESTAL FLOOR STAND.

PROVIDE NECESSARY STRUCTURAL STEEL AND ATTACHMENT ACCESSORIES FOR INSTALLATION OF PIPE HANGERS AND SUPPORTS. WHERE HEAVY PIPING LOADS ARE TO BE ATTACHED TO THE BUILDING STRUCTURE VERIFY STRUCTURAL LOADING WITH THE ARCHITECT PRIOR TO INSTALLATION.

EQUIVALENT HANGERS AND SUPPORTS BY AUTO-GRIP, BASIC ENGINEER, ELGEN, FEE AND MAGSON OR FLORCO/CARBON COMPANY.

15200.04 - EQUIPMENT ANCHORS  
PROVIDE ANCHOR MOUNTED EQUIPMENT SUCH AS PUMPS, BOILERS, AIR HANDLING UNITS, ETC., WITH DECATRE ENGINEERING COMPANY CONCRETE ANCHORS. WHERE EQUIPMENT ANCHORS CAN NOT BE INSTALLED DURING FORMING OF FLOORS OR FOUNDATIONS ANCHOR EQUIPMENT WITH MCGOLLOUGH NAIL-BOLT CONCRETE ANCHORS. EQUAL, H.L.T.

ANCHORS SHALL BE PROPER TYPE AND SIZE RECOMMENDED BY MANUFACTURER FOR EQUIPMENT TO BE ANCHORED.

**15260 - PIPING INSULATION**

15260.01 - DESCRIPTION OF WORK  
PROVIDE PIPING INSULATION AND ACCESSORIES AS SPECIFIED ON THE DRAWINGS OR SPECIFIED HEREIN.

15260.02 - REFERENCES  
ASTM C640 - CORKBOARD AND CORK PIPE THERMAL INSULATION  
ASTM C421 - PROPERTIES OF JACKETING MATERIALS FOR THERMAL INSUL.  
ASTM D256 - FLEXIBLE CELLULAR MATERIALS  
ASTM E84 - SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS  
ASTM E86 - WATER VAPOR TRANSMISSION OF MATERIALS.  
UL T23 - SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS

15260.03 - QUALITY ASSURANCE  
MATERIALS: FLAME SPREADS/SMOKE DEVELOPED RATINGS OF 25/50 IN ACCORDANCE WITH ASTM E84, NFPA 255 AND UL T23.

15260.04 - GLASS FIBER INSULATION - TYPE A  
PIPE INSULATION INCLUDING FITTINGS AND DEVICES, UNLESS SPECIFIED OTHERWISE, SHALL BE INSULATED WITH RIGID MOLDED GLASS FIBER, WITH A K-VALUE OF 0.24 AT 75 DEGREES F (ASTM C555). INSULATION TO HAVE A MAXIMUM SERVICE TEMPERATURE OF 850 DEGREES F, MAXIMUM MOISTURE ABSORPTION OF 0.20 PERCENT BY VOLUME AND A MINIMUM SERVICE TEMPERATURE OF -20 DEGREES F.

GLASS FIBER INSULATION TO HAVE A VAPOR BARRIER JACKET MEETING ASTM C421. JACKET TO BE KRAFT PAPER REINFORCED WITH GLASS YARN AND BONDED TO ALUMINIZED FILM. THE MOISTURE VAPOR BARRIER TRANSMISSION SHALL MEET ASTM E96 AT 0.02 PERM INCH. SECURE THE JACKET WITH SELF SEALING LONGITUDINAL LAPS AND BUTT STRIPS AND FACTORY APPLIED PRESSURE SEALING LAP ADHESIVE.  
COVER FITTINGS TO THICKNESS ADJACENT COVERINGS WITH PRE-MOLDED FITTINGS COVERS.

MANUFACTURERS  
OWENS/CORNING S5L II  
CERTAIN TEED  
KNAUF  
MANVILLE

**15260 - PIPING INSULATION CONTINUED**

15260.04 - CELLULAR GLASS - TYPE B  
INSULATION TO HAVE THE FOLLOWING CHARACTERISTICS: "K" VALUE OF 0.40 AT 75 DEGREES F; MAXIMUM WATER VAPOR TRANSMISSION OF 0.1 PERM; MAXIMUM FLAME SPREAD RATING TO MEET ASTM E84-25; MAXIMUM SMOKE DEVELOPED RATING TO MEET ASTM E84-50.

APPLY PIPE COVERINGS IN A SINGLE LAYER. THIGHTLY BUTT AND BUTTER ALL JOINTS WITH VAPOR BARRIER MASTIC. FINISH WITH UL RATED VAPOR BARRIER LAMINATE OF ALUMINUM FOIL AND KRAFT REINFORCED WITH FIBERGLASS YARN. SEAL ALL LAPS AND BUTT STRIPS WITH SUITABLE ADHESIVE.

INSULATE FITTINGS WITH PREFABRICATED OR FIELD FABRICATED FITTING COVERS OF THE SAME MATERIAL, BUTTERED WITH MASTIC, SECURED IN PLACE WITH STAINLESS OR COPPER WIRE WITH TWISTED ENDS TURNED IN AND FINISHED WITH GLASS FAB OVER VINYL ACRYLIC MASTIC WITH FLOODING COAT OF MASTIC APPLIED OVER FABRIC.

MANUFACTURERS  
PITTSBURG CORNING

15260.05 - CELLULAR FOAM - TYPE E  
INSULATION TO HAVE THE FOLLOWING CHARACTERISTICS: "K" VALUE OF 0.27 AT 75 DEGREES F; MINIMUM SERVICE TEMPERATURE OF -40 DEGREES F; MAXIMUM SERVICE TEMPERATURE OF 220 DEGREES F; MAXIMUM MOISTURE ABSORPTION OF 1.0 PERCENT (PIPE) BY VOLUME, 1.0 PERCENT (SHEET) BY VOLUME; MOISTURE VAPOR TRANSMISSION OF 0.02 PERM INCHES; MAXIMUM FLAME SPREAD ASTM E84-25; MAXIMUM SMOKE DEVELOPED ASTM E84-50; CONNECTION TO BE WATERPROOF VAPOR BARRIER ADHESIVE.

PROVIDE ELASTOMERIC FOAM ADHESIVE AS RECOMMENDED BY THE INSULATION MANUFACTURER. TO BE AIR DRIED, CONTACT ADHESIVE, COMPATIBLE WITH INSULATION.

PIPE COVERINGS MAY BE SEAMLESS INSULATION SLIPPED OVER PIPING BEFORE ERECTION OR MAY BE SUT LONGITUDINALLY AND INSTALLED OVER ERECT PIPING. MAKE FITTINGS COVERS FROM SEGMENTS OF PIPE COVERING. GEMENT ALL JOINTS AND SEAMS IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.

MANUFACTURERS  
ARMSTRONG MODEL ARMAFLEX II  
HULSTED MODEL 25/50  
BALBATEX MODEL 25/50

15260.06 - JACKETS  
ALL PIPING OUTSIDE AND AS SHOWN ON THE DRAWINGS SHALL BE COVERED WITH A WEATHER PROTECTIVE JACKET CONSISTING OF 22 GAUGE ALUMINUM OR 28 GAUGE STAINLESS STEEL PROTECTIVE COVERINGS. EDGES OF EXTERIOR JACKET SHALL BE SECURELY GLOSED AROUND INSULATION TO PREVENT RAIN, SNOW, DIRT, ETC. FROM DAMAGING THE UNDERLYING INSULATION IN ANY FASHION.

15260.07 - INSTALLATION  
INSTALL INSULATION, COVERINGS, ADHESIVES, COVERING RATE OF APPLICATION, TAPE AND OTHER MATERIALS IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.

SYSTEMS SHALL BE COMPLETELY COVERED THROUGHOUT, INCLUDING VALVES, FITTINGS, AND ACCESSORIES. STRAINER COVERS AND VALVE BONNETS SHALL BE ACCESSIBLE FOR MAINTENANCE. FINISH ACCORDING TO SPECIFIED. INSULATION SHALL EXTEND CONTINUOUS THROUGH SLEEVES, WHERE PIPE COVERINGS TERMINATES AT CEILING, WALL AND EQUIPMENT, FURNISH AND INSTALL COVERING PROTECTOR CAPS FASTENED TO COVERINGS.

WHERE PIPE HANGERS ARE PRESENT, INSULATED PIPE SHALL BE FURNISHED WITH RIBBED RIBBED GALVANIZED STEEL SHELDINGS OF NOT LESS THAN 18 GAUGE, TWO-PIECE, FOLD-MOLDED, HIGH COMPRESSIVE STRENGTH, INSULATION INSERTS (860 DEGREES AROUND PIPE) AND VAPOR BARRIER JACKET COVERING THE INSULATION INSERTS. INSERTS SHALL BE CONSTRUCTED OF HIGH DENSITY, LOOSELY WATERPROOFED CALCIUM SILICATE, ENCASED IN 360 DEGREE SHEET METAL SHIELD.

15260.08 - PIPING INSULATION SCHEDULE  
NOT ALL PIPE SYSTEMS IN THE TABLE BELOW MAY NOT BE USED ON THIS PROJECT.

PIPING SYSTEM	PIPE SIZE (INCHES)	THICKNESS (INCHES)	INSULATION TYPE
DOMESTIC HWI AND HWI	2 AND LESS	1	A
CONDENSATE	1 AND LESS	1	E
LP STEAM/CONDENSATE	2-1/2 TO 4	3	A
HOT WATER SUPPLY/RETURN	1 AND LESS	1-1/2	A
HOT WATER SUPPLY/RETURN	1-1/4 TO 2	1-1/2	A
HOT WATER SUPPLY/RETURN	2-1/2 TO 4	2	A

15260.09 - QUALITY ASSURANCE  
MATERIALS: FLAME SPREADS/SMOKE DEVELOPED RATINGS OF 25/50 IN ACCORDANCE WITH ASTM E84, NFPA 255 AND UL T23.

15260.04 - GLASS FIBER FLEXIBLE - TYPE I  
WHERE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN PROVIDE AND INSTALL TYPE I INSULATION WITH THE FOLLOWING CHARACTERISTICS: SHALL MEET ASTM C555 OR C612; "K" VALUE OF 0.28 AT 75 DEGREES; MAXIMUM SERVICE TEMPERATURE OF 250 DEGREES F; MAXIMUM MOISTURE ABSORPTION OF 0.20 PERCENT BY VOLUME; DENSITY OF 3/4 LB/CU FT.

TYPE I INSULATION SHALL HAVE THE FOLLOWING VAPOR BARRIER JACKET CHARACTERISTICS: KRAFT PAPER REINFORCED WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM; MOISTURE VAPOR TRANSMISSION OF 0.04 PERM; SECURE WITH PRESSURE SENSITIVE FILM. THE VAPOR BARRIER TAPE TO BE KRAFT PAPER REINFORCED WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM WITH PRESSURE SENSITIVE RUBBER BASED ADHESIVE. 6" WIDE ON 12" CENTERS.

15260.05 - GLASS FIBER RIGID - TYPE 2  
WHERE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN PROVIDE AND INSTALL TYPE 2 INSULATION WITH THE FOLLOWING CHARACTERISTICS: SHALL MEET ASTM C612; "K" VALUE OF 0.28 AT 75 DEGREES; MAXIMUM SERVICE TEMPERATURE OF 250 DEGREES F; MAXIMUM MOISTURE ABSORPTION OF 0.20 PERCENT BY VOLUME; DENSITY OF 6 LB/CU FT.

TYPE 2 INSULATION SHALL HAVE THE FOLLOWING VAPOR BARRIER JACKET CHARACTERISTICS: KRAFT PAPER REINFORCED WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM; MOISTURE VAPOR TRANSMISSION OF 0.04 PERM; SECURE WITH WELD CLIPS AT 12" O.C. SEAL CLIPS INDENTATIONS WITH MASTIC. THE VAPOR BARRIER TAPE SHALL BE KRAFT PAPER REINFORCED WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM WITH PRESSURE SENSITIVE RUBBER BASED ADHESIVE.

15260.06 - GLASS FIBER RIGID - TYPE 3  
INSULATION TO BE THE SAME AS TYPE 3 EXCEPT FOR THE FOLLOWING: THICKNESS SHALL BE 1" THICKER THAN SPECIFIED FOR TYPE 2 INSULATION MINIMUM 1" INCH THICKER THAN HEIGHT OF REINFORCING ANGLES AND/OR CONNECTING ANGLES.

15260.06A - FIRE RATED INSULATION SYSTEMS - TYPE 4  
HIGH TEMPERATURE FIBERGLASS INSULATION WITH PSK JACKET THAT IS UL TESTED AND CERTIFIED TO PROVIDE A 2-HOUR FIRE RATING.  
A. CERTAINTeed CORP. FLAMECHOKER  
B. JONAS MANVILLE FIRETECH WRAP  
C. 3M FIRE BARRIER WRAP PRODUCTS.

**15290 - DUCTWORK INSULATION CONTINUED**

15290.01 - JACKETS  
CANVAS JACKET - TYPE A: FABRIC SHALL BE 80Z/50 YD PLAIN WEAVE COTTON TREATED WITH DILUTE FIRE RETARDANT LAGGING ADHESIVE. THE LAGGING ADHESIVE SHALL BE RECOMMENDED BY THE INSULATION MANUFACTURER AND COMPATIBLE WITH THE INSULATION.

ALUMINUM JACKET - TYPE B: JACKET TO MEET ASTM E209. JACKET TO BE 0.016 INCH THICK SHEET FOR DUCTWORK AND 30 GAUGE FOR EQUIPMENT. THE FINISH SHALL BE STUCK EMBOSSED. JOINTS SHALL BE LONGITUDINAL SLIP TYPE WITH 2" LAPS. CIRCUMFERENTIAL JOINTS SHALL BE SEALED WITH PRE-FORMED ANCHOR STRIPS (3/4" WIDE CONTAINING PLASTIC SEALANT).

15290.02 - MANUFACTURERS  
KNAUF  
OWENS/CORNING  
CERTAINTeed  
MANVILLE

15290.04 - INSTALLATION  
INSTALL IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. SYSTEMS SHALL BE COMPLETELY COVERED THROUGHOUT. ALL EXTERNAL SURFACE OF DUCTWORK SHALL BE WIPED CLEAN BEFORE INSTALLATION OF INSULATION. INSULATION SHALL BE WRAPPED ON EXTERIOR OF DUCTWORK WITH ALL JOINTS BUTTED AND ALL LONGITUDINAL SEAMS OVERLAPPED NOT LESS THAN 2". INSULATION SHALL BE ADHERED TO METAL DUCTWORK WITH NOT LESS THAN 4" STRIPS OF INSULATION ADHESIVE, APPLIED TO DUCTWORK AT NOT GREATER THAN 8' O.C. ON DUCTS WIDER THAN 18". INSULATION ON THE BOTTOM OF DUCTWORK SHALL BE ADDITIONALLY SECURED WITH HELDING PINS SECURED TO DUCTWORK AT NOT GREATER THAN 18' O.C. ALL JOINTS ON LONGITUDINAL SEAMS, ALL WELD PINS, AND ALL PENETRATIONS SHALL BE APPLIED SO THAT COMPRESSED THICKNESS AT CORNERS OF DUCTWORK IS NOT LESS THAN 1". SEAL JOINTS AND BREAKS (IN DUCTS CONVERTING AIR LESS THAN ROOM TEMPERATURE) WITH 4" WIDE STRIPS OF OPEN MESH GLASS CLOTH OR TAPE INTERSECTED BETWEEN 2 COATS OF VAPOR BARRIER SEALANT. THE COMPLETE INSTALLATION SHALL FORM A SMOOTH AND NEAT APPEARANCE.



15400 - PLUMBING

15400.04 - FINISH INSTALLATION
GENERAL: ALL PIPING SHALL BE CLEANED THOROUGHLY PRIOR TO INSTALLATION, AND ENDS OF PIPE SHALL BE REAMED AND ALL BURRS REMOVED. PIPING SHALL BE CUT ACCURATELY TO MEASUREMENTS TAKEN ON THE JOB. PIPING SHALL BE INSTALLED WITH ADEQUATE CLEARANCE FOR INSTALLATION OF COVERINGS WHERE REQUIRED, AND SHALL NOT BE SPRUNG OR BENT. ALL PIPING SHALL BE NEATLY ALIGNED, SECURELY CONNECTED, AND WELL SUPPORTED FROM THE BUILDING STRUCTURE WITH HANGERS AS REQUIRED. ALL PIPES PASSING THROUGH CEILING, FLOORS OR WALLS TO FINISHED SPACES SHALL BE PROVIDED WITH CHROMIUM PLATED ESCUTCHEONS. PIPES PASSING THROUGH FLOORS SHALL BE RUN FREE, USING PIPE SLEEVES, AND SHALL NOT BE GROUDED IN PLACE UNLESS REQUIRED FOR STRUCTURAL FIRE INTEGRITY. PIPING SHALL BE INSTALLED CONCEALED IN FINISHED SPACES WHEREVER POSSIBLE. SEE SECTION 15510 FOR ADDITIONAL REQUIREMENTS.

HANGERS: SEE SECTION 15440 FOR SUPPORTS AND ANCHORS.

SOIL AND WASTE PIPE. ALL SOIL AND WASTE PIPE SHALL BE GRADED TO A UNIFORM SLOPE OF NOT LESS THAN 1/8" PER FOOT FOR PIPES 4" AND LARGER, AND NOT LESS THAN 1/4" PER FOOT FOR PIPES 3" AND SMALLER. LAY PIPE AT UNIFORM SLOPE, FREE FROM SAGS, WITH HUB END UP STREAM. SUPPORT AT EACH JOINT. ALL CHANGES IN DIRECTION FROM HORIZONTAL TO VERTICAL, AT FIXTURE BRANCHES AND OTHER BRANCH CONNECTIONS SHALL BE MADE WITH SANITARY 'TEES' OR SHORT SWEEP 'ELLS'. ALL CHANGES IN DIRECTION FROM VERTICAL TO HORIZONTAL OR IN THE HORIZONTAL SHALL BE MADE WITH LONG RADIUS FITTINGS, LONG SWEEPING 'ELLS', COMBINATION 'Y' FITTINGS, OR 45 DEGREE 'ELLS' AND 'Y' FITTINGS. UNDERGROUND PIPE SHALL BE INSTALLED WITH THE BARREL OF THE PIPE ON FIRM SOLID EARTH FOR ITS ENTIRE LENGTH, AND HOLES SHALL BE EXCAVATED FOR PIPE BELLS. PIPING SHALL BE RAN IN STRAIGHT LINE AND GRADED UNIFORMLY TO LINE WITH BATTEN BOARDS SET NOT OVER 24" APART. OPEN ENDS OF PIPE SHALL BE CLOSED WITH A STOPPER WHEN PIPE LAYING IS NOT IN PROGRESS. SOIL AND WASTE LINES SHALL BE LOCATED IN GENERAL AS SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL FIELD VERIFY EXACT PIPE LOCATIONS TO MAINTAIN PROPER CLEARANCE AND TO INSURE DRAINAGE.

PLUMBING VENT: ALL PLUMBING VENTS SHALL BE CONNECTED AS INDICATED ON THE DRAWINGS OR AS REQUIRED BY THE INSTALLATION, AND SHALL BE EXTENDED FULL SIZE THROUGH THE ROOF LINE. VENTS PASSING THROUGH THE ROOF SHALL BE MINIMUM 3" SIZE VENT CONNECTIONS SHALL BE INSTALLED ON ALL FIXTURES AND EQUIPMENT CONNECTED TO SOIL AND WASTE PIPING, AND ALL FLOOR DRAINS SHALL BE VENTED OR CONNECTED TO A VENT LINE AS SHOWN ON THE DRAWINGS.

DOMESTIC WATER: ALL HOT AND COLD WATER SUPPLY PIPING SHALL BE ARRANGED TO DRAIN AT THE LOWEST POINT IN EACH SYSTEM. ALL SUPPLY PIPES TERMINATIONS AT VALVES OR FIXTURES SHALL BE INSTALLED WITH ENCLOSED PIPE AIR CHAMBERS, FULL SIZE OF THE SUPPLY PIPE AND MINIMUM 18" LONG, TO PREVENT WATER HAMMER. AT LEAST ONE PIPE UNION SHALL BE INSTALLED ADJACENT TO ALL VALVES, AT CONNECTION POINTS OF EACH PIECE OF EQUIPMENT, AND ELSEWHERE IN THE SYSTEM REQUIRED FOR MAINTENANCE. ALLOWANCE SHALL BE MADE FOR EXPANSION AND CONTRACTION WHERE REQUIRED BY THE INSTALLATION. WHERE PIPING OCCURS IN EXTERIOR WALLS, PIPING SHALL BE HELD AS CLOSE AS POSSIBLE TO THE INTERIOR FACE OF THE WALL. INSTALL INSULATION BATT OR OTHER INSULATION (R-8 MINIMUM) BETWEEN PIPING AND EXTERIOR WALL FACE.

15400.10 - FLOOR DRAINS
FLOOR DRAINS SHALL BE AS SCHEDULED ON THE DRAWINGS. IF NOT SCHEDULED ON THE DRAWINGS PROVIDE J.R. SMITH MODEL 2010-A OR EQUAL MADE, ZURN OR JOSAM. PROVIDE EACH DRAIN THAT DOES NOT HAVE AN INTEGRAL "P" TRAP WITH A CAST IRON "P" TRAP CONNECTING PIPING. BLOCK OUT FLOOR PRIOR TO POURING IF CONCRETE AND THEN LEVEL FLOOR DRAIN AFTER POUR IS SET, REMOVE FORMS AND GROUT HOLE LEVEL. SEE ARCHITECTURAL PLANS FOR FLOOR DRAIN TOP ELEVATIONS AND FLOOR DRAINAGE.

15400.11 - ROOF DRAINS
NOT USED ON THIS PROJECT.

15400.12 - CLEANOUTS
PROVIDE CLEANOUTS FULL SIZE OF SOIL PIPE UP TO AND INCLUDING 4" I.D. PROVIDE CLEANOUTS AS BASE OF STACKS, END OF BENCH MAIN AND AT ELBOWS OVER 45 DEGREES AND IN ANY HORIZONTAL RUN OF PIPES EXCEEDING 100 FEET IN 50 FOOT INTERVALS. BLOCK OUT FLOOR PRIOR TO POURING OF CONCRETE AND THEN LEVEL CLEANOUT AFTER POUR IS SET, REMOVE FORMS AND GROUT HOLE LEVEL. INSTALL CLEANOUTS SO THEY ARE ACCESSIBLE BY EXTENDING THEM THROUGH WALLS, FLOORS, ABOVE OR TO OUTSIDE OF BUILDING AS REQUIRED. CLEANOUTS SHALL BE AS FOLLOWS:

MALL TYPE FINISHED AREAS: J.R. SMITH 4532 CAST IRON CLEANOUT "T" WITH CLEANOUT FLUG AND STAINLESS STEEL ACCESS COVER.

MALL TYPE UNFINISHED AREAS: J.R. SMITH 4512 CAST IRON CLEANOUT TEE WITH COUNTERSUNK FLUG.

FLOOR TYPE HARD FLOORING AREAS: J.R. SMITH 4023 WITH ROUND NICKEL BRONZE SCORIATED COVER.

FLOOR TYPE CARPET AREAS: J.R. SMITH 4023-X WITH NICKEL BRONZE TOP AND CARPET GLAMP.

EQUIVALENTS: MADE, ZURN OR JOSAM

15400.15 - HYDRANTS AND HOSE BBS
NOT USED ON THIS PROJECT.

15400.14 - SHOCK ABSORBERS
PROVIDE JOSAM ABSORBATOR SHOCK ABSORBERS OR APPROVED EQUAL ON ALL PLUMBING FIXTURE BATTERIES WHERE SHOWN ON THE DRAWINGS SIZED IN ACCORDANCE WITH THE PLUMBING AND DRAINAGE INSTITUTE "STANDARD P.D.I. #1420". IF NO ARRESTORS ARE SCHEDULED OR SHOWN, PROVIDE TYPE AND SIZE A ARRESTOR WITHIN 20 FEET OF THE END OF EACH DOMESTIC HOT AND COLD WATER PIPING BRANCH. EQUIVALENT SHOCK ABSORBERS BY ZURN, WADE, SIOUX CHIEF OR J.R. SMITH.

15400.15 - PLUMBING FIXTURES
PROVIDE PLUMBING FIXTURES AS SHOWN ON THE DRAWINGS AND AS SPECIFIED COMPLETE INCLUDING PIPING AND CONNECTIONS. CHINA FIXTURES SHALL BE OF BEST GRADE VITREOUS WARE, WITHOUT FIT HOLES OR BLEMISHES AND OUTLINES SHALL BE TRUE. THE ARCHITECT RESERVES THE RIGHT TO SELECT ANY TYPE WHICH IN HIS OPINION IS FULLY FITURES FITTINGS AGAINST WALLS SHALL HAVE GROUND BACKS. EXPOSED PIPING AND FITTINGS SHALL BE CHROME PLATED.

SET FIXTURES TRUE AND LEVEL WITH ALL NECESSARY SUPPORTS FOR FIXTURES INSTALLED BEFORE PLASTERING IS DONE. NIPPLES THROUGH WALL TO FIXTURE CONNECTION SHALL BE CHROME PLATED BRASS. THE CONTRACTOR MAY USE COPPER SUBOUTS TO STOPS UNDER LAVATORIES PROVIDED DEEP ESCUTCHEONS ARE USED AND NO COPPER IS VISIBLE IN VIEW OF CHROME FINISH.

MANUFACTURERS:
FIXTURE MANUFACTURERS: AMERICAN STANDARD, ELLER, KOHLER, OR CRANE
TOILET SEATS: CHURCH OLSONITE, SPERZEL OR BENEKE
FITTINGS AND SUPPORTS: JOSAM, SMITH, ZURN OR MADE
FLUSH VALVES: SLOAN, HATCO, ZURN OF DELAWARE
TRAPS, SUPPLIES AND STOPS: DEARBORN, EASTMAN CENTRAL, D

SUPPLIES AND STOPS: DEARBORN FIGURE NO. 2100CM 1/2" COMPRESSION INLET WITH ANGLE COMPRESSION STOP AND 3/8" O.D. RISERS IN LENGTH REQUIRED. PROVIDE DEEP CHROME PLATED BRASS ESCUTCHEONS.

TRAPS: DEARBORN #5610 (1-1/2") AND/OR #5601 (1-1/4") CAST BRASS BODY WITH CLEAN-OUT "P" TRAP. PROVIDE DEEP CHROME PLATED BRASS ESCUTCHEON WITH SET SCREW.

FAUCETS AND TRIM WITH DRINKING WATER SHALL MEET OR EXCEED THE SAFE WATER DRINKING ACT (SWDA) LEAD FREE STANDARDS OF ANSI/APF STANDARD 61, SECTION 9.

LAVATORY DRAINS SHALL BE GRID TYPE CHROME PLATED 1/2 GAUGE BRASS BASKET STRAINER AND STRAINER BODY WITH 1/2"x4" LONG SEAMLESS TAILPIECE AND CAST BRASS LOCK AND COUPLING NUTS BY EBC, ELLER, KOHLER OR MCGUIRE.

SINK DRAINS SHALL BE BASKET TYPE WITH CHROME PLATED FORGED BRASS BASKET STRAINER AND STRAINER BODY WITH 1/2"x4" LONG SEAMLESS TAILPIECE AND CAST BRASS LOCK AND COUPLING NUTS BY EBC, ELLER, KOHLER OR MCGUIRE.

HANDICAP INSULATION KITS FOR LAVATORIES AND SINKS, INCLUDING OFFSET DRAIN AND CONTINUOUS WASTE COVERS WHERE REQUIRED BY BROCAR, MCGUIRE, PLUMBBEREX "PRO-2000", TRAP-WRAP OR TRU-BRO.

15400 - PLUMBING, CONTINUED

15400.16 - WATER HEATERS
PROVIDE AND INSTALL WATER HEATERS AS SPECIFIED BELOW AND AS SCHEDULED ON THE DRAWINGS. WATER HEATERS SHALL MEET ASHRAE STANDARD 401B FOR THERMAL EFFICIENCY AND SHALL BE ASME RATED. GAS WATER HEATERS SHALL BE ASA CERTIFIED AND ELECTRIC WATER HEATERS SHALL BE UL LISTED. MANUFACTURERS: A.O. SMITH STATE OR RHEIN/VAUD.

EXPANSION TANK: EXPANSION TANKS SHALL BE AMTRLO, "THERM-X-TROL", AS SCHEDULED ON THE DRAWINGS OR EQUAL ARMSTRONGS, BELL AND GOSSETT OR TAGO. ALL UNITS SHALL BE CONSTRUCTED OF WELDED CARBON STEEL, WITH FDA APPROVED BUTYL RUBBER DIAPHRAM TAPS FOR PRESSURE GAUGE, AIR CHARGING FITTINGS, AND DRAIN FITTINGS. CHARGE TANK TO A PRESSURE EQUAL TO THE STATIC WATER PRESSURE.

15400.17 - PLUMBING VALVES
REFERENCE SECTION 15515 FOR GATE VALVES, BALL VALVES, GLOBE VALVES, CHECK VALVES, STRAINERS AND UNIONS.

THERMOSTATIC MIXING VALVES: THERMOSTATIC MIXING VALVES SHALL BE BRADLEY "TMA" OR LEONARD VALVES "210" THERMOSTATIC TYPE WITH BRASS BODY. NON-CORROSIIVE INTERNAL PARTS, TAMPER RESISTANT TEMPERATURE ADJUSTMENT, UNION INLETS AND CHECK STOPS WITH STRAINERS. SET TEMPERATURE AT 110 DEGREES F FOR HAND WASHING.

15400.18 - WATER SERVICE ENTRANCE
NOT REQUIRED FOR THIS PROJECT.

15400.18 - TRAP PRIMERS
PROVIDE AND INSTALL TRAP PRIMERS WHERE REQUIRED BY LOCAL AUTHORITIES. TRAP PRIMERS SHALL BE PRECISION PLUMBING PRODUCTS "PRIME RITE" WITH BRASS BODY AND INTEGRAL VACUUM BREAKER. PROVIDE DISTRIBUTION BOX WHERE MORE THAN ONE TRAP IS INDICATED TO BE PRIMED ON THE DRAWINGS. PROVIDE ACCESS PANEL WHERE REQUIRED.

15510 - PIPING AND ACCESSORIES

15510.01 - SECTION INCLUDES PIPE AND PIPE FITTINGS FOR:
BELOW GROUND SANITARY, WASTE, SOIL, AND VENT PIPING SYSTEM
ABOVE GROUND SANITARY, WASTE, SOIL, AND VENT PIPING SYSTEM

15510.02 - PIPING MATERIALS
PIPING USED THROUGHOUT THE PROJECT SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS. PIPING SHALL BE CLEARLY MARKED WITH MANUFACTURERS NAME AND WEIGHT. ALL MATERIALS MAY NOT BE REQUIRED FOR THIS PROJECT. SEE THE PIPING MATERIAL SCHEDULE LOCATED ON THE DRAWINGS.

15510.03 - PIPING FITTINGS
PIPING FITTINGS USED THROUGHOUT PROJECT SHALL BE PROPER TYPE FOR INSTALLATION METHOD USED AND SHALL BE COMPATIBLE WITH THE PIPING SYSTEM MATERIALS. FITTINGS LISTED IN THE PIPING SCHEDULE LOCATED ON THE DRAWINGS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS.

15510.04 - INSULATING UNIONS AND FLANGES
NOT USED ON THIS PROJECT.

15510.05 - ORIFICE FLANGES
NOT USED ON THIS PROJECT.

15510.06 - UNIONS
NOT USED ON THIS PROJECT.

15510.07 - PIPE SLEEVES
PROVIDE PROPER TYPE AND SIZE PIPE SLEEVES AND INSTALL IN WALLS OR FLOORS AND WHERE OTHERWISE NOTED. SLEEVES ARE NOT REQUIRED FOR SUPPLY AND WATER LINES THROUGH WALLS SUPPORTING PLUMBING FIXTURES OR FOR CAST IRON SOIL PIPE PASSING THROUGH CONCRETE SLAB ON GRADE EXCEPT WHERE PENETRATING A MEMBRANE WATERPROOF FLOOR.

EACH SLEEVE SHALL BE CONTINUOUS THROUGH WALL, FLOOR OR ROOF AND SHALL BE CUT FLUSH ON EACH SIDE EXCEPT WHERE INDICATED OTHERWISE. SLEEVES SHALL NOT BE INSTALLED IN STRUCTURAL MEMBERS EXCEPT WHERE INDICATED OTHERWISE. SLEEVES SHALL BE REQUIRED THROUGH FLOORS SUBJECT TO FLOORING SUCH AS TOILET ROOMS, EQUIPMENT ROOMS AND KITCHENS. THE CONTRACTOR SHALL HAVE THE OPTION OF:

1. PROVIDE A CAST IRON SLEEVE WITH INTEGRAL FLANGES EXTENDING 1" ABOVE FINISHED FLOOR. SLEEVE SHALL BE CAST IN CONCRETE WHEN FLOOR IS POURED, ANNULAR SPACE BETWEEN SLEEVE AND PIPE SHALL BE FILLED WITH KANCOOL.

2. PROVIDE CORE-DRILLED OPENING IN CONCRETE WITH THUNDERLINE LINK-SEAL OR CALPICO SEALING LINX BETWEEN PIPING AND OPENING.

SLEEVES PASSING THROUGH FLOORS WITH WATERPROOF MEMBRANES SHALL BE CORE-DRILLED AND SEALED WITH THUNDERLINE LINK-SEAL OR CALPICO SEALINGS LINX.

SLEEVES PASSING THROUGH WALLS WITH WATERPROOF MEMBRANES SHALL BE SEALED WITH THUNDERLINE LINK-SEAL OR CALPICO SEALING LINX.

PIPE INSULATION SHALL BE RUN CONTINUOUSLY THROUGH PIPE SLEEVES WITH 1/4" MINIMUM CLEARANCE BETWEEN INSULATION AND PIPE SLEEVES. PROVIDE METAL JACKETS OVER INSULATED PIPES PASSING THROUGH FIRE WALLS, FLOORS AND SMOKE PARTITIONS. JACKET TO BE 0.015 STAINLESS STEEL, EXTENDING 12" ON EITHER SIDE OF BARRIER AND SECURED TO INSULATION WITH 3/8" WIDE JACKET. PROVIDE KANCOOL FIRE MASTER BULK PACKING BETWEEN SLEEVE AND METAL JACKET. PACKING THICKNESS SHALL BE SIZED PER MANUFACTURER'S RECOMMENDATIONS FOR MAINTAINING THE INTEGRITY OF THE FIRE WALL/FLOOR OR SMOKE PARTITION. FIRE PROTECTION SYSTEM SHALL BE RATED PER ASTM E14. EQUIVALENTS TO KANCOOL ARE 3M FLAME STOP OR FLAME SAFE.

WHERE PIPING PASSES THROUGH WALLS SERVING AS AIR PLUMBING OR CHASES SEAL ANNULAR SPACE BETWEEN PIPE AND SLEEVE AIR TIGHT WITH KANCOOL FIREMASTER BULK PACKING.

15510.08 - METHOD OF INSTALLATION
REAM PIPES AND TUBES. CLEAN OFF SCALE AND DIRT, INSIDE AND OUTSIDE BEFORE ASSEMBLY. REMOVE WELDING SLAG OR OTHER FOREIGN MATERIAL FROM PIPING. PROTECT OPEN ENDS OF PIPE WITH TEMPORARY PLUGS OR CAPS. RUN PIPE LINES STRAIGHT AND TRUE, PARALLEL TO BUILDING LINES WITH MINIMUM USE OF OFFSETS AND COUPLINGS. PROVIDE OFFSETS ONLY TO PROVIDE HEADROOM OR CLEARANCE AND TO PROVIDE FLEXIBILITY IN PIPE LINES. CHANGES IN DIRECTION OF PIPE LINES SHALL BE MADE WITH FITTINGS OR PIPE BENDS.

CUT PIPE TO EXACT MEASUREMENT AND INSTALL WITHOUT SPRINGING OR FORCING EXCEPT IN CASE OF EXPANSION LOOPS WHERE COLD SPRINGING IS INDICATED. TAKE PARTICULAR CARE TO AVOID CREATING, EVEN TEMPORARY, UNDE LOADS, FORCES OR STRAINS ON VALVE, EQUIPMENT OR BUILDING ELEMENTS WITH PIPING CONNECTIONS OR PIPING SUPPORTS. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE OR EQUIPMENT CONNECTED.

BRANCH CONNECTIONS AND CHANGES IN DIRECTION IN SOIL, WATER AND DOWNPOUT LINES SHALL BE MADE WITH 45 DEGREE "Y" FITTINGS OR LONG SWEEP ELBOWS, EXCEPT THAT SANITARY TEES OR SHORT SWEEP ELBOWS MAY BE USED IN VERTICAL STACKS AND CLOSET CONNECTIONS. PIPING SHALL BE GRADED TO A UNIFORM FALL OF 1/4" PER FOOT WHERE POSSIBLE. IN NO CASE SHALL PIPING BE FITTED LESS THAN 1/8" PER FOOT. CLEANOUTS SHALL BE INSTALLED WHERE SHOWN ON THE DRAWINGS, AT CHANGES IN DIRECTION OF PIPING, WHERE NECESSARY FOR EASY CLEANING OF PIPING AS REQUIRED BY CODES.

TUCKER CONNECTIONS SHALL BE INSTALLED IN VERTICAL STACKS TO ROOF TO PROVIDE FOR EXPANSION. VENT STACKS SHALL BE EXTENDED FULL SIZE OR LARGER THROUGH ROOF AND SHALL BE INSTALLED WITH SLEEVES AND WITH FLASHING/COUNTERFLASHING ASSEMBLY AS HEREIN BEFORE SPECIFIED FOR WATER/TIGHT INSTALLATION.

15510.09 - TESTING
ALL HYDRAULIC AND PNEUMATIC TESTING SHALL CONFORM TO ANSI B31.1, B31.5, B31.8 AND B31.9. THE CONTRACTOR SHALL APPLY THE SPECIFIED TEST PRESSURE FOR A MINIMUM TIME AT LEAST EQUAL TO THE APPLICABLE STANDARD'S REQUIREMENTS.

15510 - PIPING AND ACCESSORIES, CONTINUED

PERFORM TESTS ONLY AFTER THE PIPE AND CONTENTS HAVE BEEN STABILIZED AT AMBIENT TEMPERATURE AND THE SOURCE OF TEST PRESSURE IS SHUT OFF. PIPING TESTS SHALL APPLY TO PIPING ONLY WITH ALL EQUIPMENT, INSTRUMENTS BLOCKED OFF OF DISCONNECTED. NO COMPONENT OR PIPING SHALL BE SUBJECTED TO PRESSURES WHICH EXCEED THEIR RESPECTIVE PRESSURE RATINGS.

HYDROSTATIC AND PNEUMATIC TESTS SHALL APPLY TO PIPING IN THE FOLLOWING SCHEDULE. THE PRESSURE SHALL BE GRADUALLY RAISED TO THE VALUE SPECIFIED AND THE SOURCE BLOCKED OFF. LEAKAGE OR LOSS OF PRESSURE IN THE TEST DURATION PERIOD SHALL NOT BE ACCEPTABLE UNLESS OTHERWISE NOTED.

Table with 5 columns: TYPE OF SERVICE, HYDRO WORKING PRESSURE (PSIG), TEST PRESSURE (PSIG), PNEUMATIC WORKING PRESSURE (PSIG), TEST PRESSURE (PSIG), TEST PERIOD (HOURS). Rows include CHILLED WATER, HEATING WATER, CONDENSER WATER, WASTE, and POTABLE WATER.

AUDIBLE OR VISIBLE LEAKS DETECTED DURING TESTING SHALL CAUSE TO DISAPPROVE THE TEST EVEN THOUGH THE MAXIMUM ALLOWABLE PRESSURE DROP HAS NOT BEEN EXCEEDED. THE CONTRACTOR SHALL VISUALLY EXAMINE ALL JOINTS DURING THE TESTS. THE CONTRACTOR SHALL REPAIR ALL LEAKS AND SHALL REPEAT THE COMPLETE TESTING PROCEDURE AT NO ADDITIONAL COST TO THE OWNER.

1555 - VALVES AND HYDRONIC SPECIALTIES

1555.01 - SECTION INCLUDES VALVES:

- GLOBE OR ANGLE VALVES
BALL VALVES
SAFETY RELIEF VALVES

HYDRONIC SPECIALTIES
RELIEF VALVES
BALANCING VALVES
EXPANSION TANKS

1555.02 - VALVES
INSTALL NECESSARY VALVES WITHIN PIPING SYSTEMS TO PROVIDE REQUIRED FLOW CONTROL, AND TO ALLOW ISOLATION FOR INSPECTION, MAINTENANCE AND REPAIR OF EACH PIECE OF EQUIPMENT OR FIXTURE, AND ON EACH MAIN AND BRANCH SERVICE LOOP.

GLOBE VALVES:
GLOBE VALVES 2" AND UP SHALL HAVE BRONZE BODY, RISING STEM AND HANDWHEEL, INSIDE SCREEN RENEWABLE COMPOSITE DISC, SOLDER OR STERED ENDS, WITH BACK SEATING CAPACITY. VALVES OVER 2" SHALL HAVE IRON BODY, BRONZE TRIM, RISING STEM AND HANDWHEEL, OS&Y, FLUG TYPE DISC AND FLANGED ENDS.

MANUFACTURERS:
CRANE - MODEL TIF 351
HAINKORTH - MODEL WPS #W06F
ROYELL - MODEL 152A 301
NIBCO - MODEL T-325Y, F-110B

BALL VALVES:
BALL VALVES UP TO 2" SHALL BE BRONZE OR STAINLESS STEEL BODY, STAINLESS STEEL BALL, TEFLON SEATS AND STUFFING BOX RING, LEVER HANDLE, SOLDER OR THREADED ENDS. VALVES 3" AND OVER SHALL BE CAST STEEL BODY, CHROME PLATED STEEL BALL, TEFLON SEAT AND STUFFING BOX SEALS, LEVER HANDLE AND FLANGED ENDS.

MANUFACTURERS:
CRANE - MODEL 2390-TF
LINENBUEHLER - MODEL 108-16F
NIBCO - MODEL T-585-10-66, S-585-10-66

RELIEF VALVES (TEMPERATURE AND PRESSURE-POTABLE WATER SYSTEM)
VALVE SHALL HAVE BRONZE BODY, TEFLON SEAT, STEEL STEM AND SPRINGS, AUTOMATIC DIRECT PRESSURE ACTIVATED CAPACITATED ASME CERTIFIED AND LABELED.

MANUFACTURERS:
DRESSER IND. CONSOLIDATED - MODEL 1485QUIM
GLA-VAL CO. - MODEL 50-01

1555.3 - METHOD OF INSTALLATION
EACH VALVE SHALL BE INSTALLED SO THAT IT IS EASILY ACCESSIBLE FOR OPERATION, VISUAL INSPECTION AND MAINTENANCE.

VALVES INSTALLED IN PIPING SYSTEMS SHALL BE COMPATIBLE WITH SYSTEM MAXIMUM TEST PRESSURE, PIPE MATERIALS, PIPE JOINTING METHOD, AND FLUID OR GAS CONVEYED IN SYSTEM.

VALVES SHALL BE THE SAME SIZE AS PIPING SHOWN ON THE DRAWINGS. DO NOT REDUCE VALVE SIZES.

PROVIDE 3" AND LARGER MAIN AND BRANCH VALVES INSTALLED 6 FEET OR HIGHER ABOVE EQUIPMENT ROOM OR BOILER ROOM WITH CHAIN WHEEL AND CONTINUOUS CHAIN WHICH SHALL REACH WITHIN FOUR FEET OF THE FLOOR. CHAIN WHEELS ON CAST STEEL AND DUCTILE IRON VALVE SIZES 6" AND ABOVE SHALL HAVE HAMMER BLOW FEATURE.

PROVIDE RELIEF VALVES ON PRESSURE TANKS, LOW-PRESSURE SIDE OF REDUCING VALVES, HEAT EXCHANGERS, AND EXPANSION TANKS.

SELECT SYSTEM RELIEF VALVE CAPACITY SO THAT IT IS GREATER THAN MAKE-UP PRESSURE REDUCING VALVE CAPACITY. SELECT EQUIPMENT RELIEF VALVE CAPACITY TO EXCEED RATING OF CONNECTED EQUIPMENT.

INSTALL UNIONS DOWNSTREAM OF VALVES AT EQUIPMENT OR APPARATUS CONNECTIONS.

INSTALL BALL OR BUTTERFLY VALVES FOR SHUT-OFF AND TO ISOLATE EQUIPMENT, PART OF SYSTEMS OR VERTICAL RISERS.

15610 - DUCTWORK AND ACCESSORIES

15610.01 - SECTION INCLUDES DUCTWORK
ACCESS DOORS
VOLUME DAMPERS
AIR DEVICES

15610.02 - RELATED DOCUMENTS
NFA 404: AIR CONDITIONING AND VENTILATION SYSTEMS
NFA 408: STANDARD FOR INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS.
UL 181: FACTORY MADE DUCT MATERIALS AND AIR DUCT CONNECTIONS
ASHRAE
SMACNA

15610.03 - DEFINITIONS
DUCT SIZES: INSIDE CLEAR DIMENSIONS. FOR LINED DUCTS, MAINTAIN SIZES INSIDE LINING.
PRESSURE CLASS: DENOTES MAXIMUM OPERATING PRESSURE RANGE.

LOW PRESSURE CLASSIFICATIONS:
1. 1/2"MG POSITIVE OR NEGATIVE STATIC PRESSURE AND VELOCITIES LESS THAN 2000 FT/MIN.
2. 1"MG POSITIVE OR NEGATIVE STATIC PRESSURE AND VELOCITIES LESS THAN 2000 FT/MIN.
3. 2"MG POSITIVE OR NEGATIVE STATIC PRESSURE AND VELOCITIES LESS THAN 2000 FT/MIN.

MEDIUM PRESSURE CLASSIFICATIONS:
1. 3"MG POSITIVE OR NEGATIVE STATIC PRESSURE AND VELOCITIES LESS THAN 2000 FT/MIN.
2. 4"MG POSITIVE STATIC PRESSURE AND VELOCITIES GREATER THAN 2000 FT/MIN.
3. 6"MG POSITIVE STATIC PRESSURE AND VELOCITIES GREATER THAN 2000 FT/MIN.

15610.04 - RECTANGULAR SHEETMETAL DUCTWORK
FURNISH AND INSTALL ALL GALVANIZED SHEET METAL DUCTWORK AND HOUSINGS AS SHOWN ON THE DRAWINGS. ALL DUCTWORK SHALL BE IN CONFORMANCE WITH CURRENT SMACNA STANDARDS RELATIVE TO GAUGE, BRACING, JOINTS, ETC. REINFORCE ALL HOUSINGS AND DUCTWORK OVER 30" WITH 1/4" ANGLES NOT LESS THAN 5'-6" ON CENTER, AND CLOSER IF REQUIRED FOR SUFFICIENT RIGIDITY TO PREVENT VIBRATION. SUPPORT HORIZONTAL DUCTWORK FROM STRAP IRON HANGERS ON CENTERS NOT TO EXCEED 8'-0". DO NOT SUPPORT CEILING GRID, CONDUIITS, PIPES, EQUIPMENT, ETC. FROM DUCTWORK.

UNLESS OTHERWISE NOTED DUCTWORK SHALL BE ASTM 690 GALVANIZED STEEL. ASTM A525 LOCK-FORMING QUALITY, 125 OZ. ZINC COATED EACH SIDE. WHERE DUCTWORK IS LOCATED IN EXPOSED AREAS AND REQUIRED TO BE PAINTED IT SHALL BE PAINTGRIP DUCTWORK MEETING ASTM A 541, PHOSPHATE TREATED FOR PAINT ADHERENCE. PAINT GRIP TYPE DUCTWORK SHALL NOT BE USED OUTDOORS EVEN IF PAINTED.

ALL OFFSETS OF 45 DEGREES OR MORE SHALL HAVE AIRFOIL TYPE TURNING VANES OF SAME GAUGE AS DUCTWORK AND SHALL BE RIGIDLY FASTENED WITH GUIDE STRIPS. VANES IN DUCTWORK OVER 30" DEEP SHALL BE INSTALLED IN MULTIPLE SECTIONS WITH VANES NOT OVER 30" LONG AND SHALL BE RIGIDLY FASTENED.

15610.05 - ROUND/FLAT-OVAL SHEETMETAL DUCTWORK
ALL ROUND AND FLAT OVAL DUCTWORK SHALL BE MANUFACTURED BY A COMPANY WHO HAS HAD THE MANUFACTURE OF SPIRAL DUCT AS ITS PRINCIPAL BUSINESS FOR AT LEAST 10 YEARS. MANUFACTURERS: SENGCO, UNITED OR NIBCO. IF PRESSURE CLASS IS NOT INDICATED THE DUCTWORK SHALL BE CONSTRUCTED TO 2" MG. PRESSURE CLASS.

LOW PRESSURE (DUCT PRESSURE CLASS UP TO AND INCLUDING 2" MG.) FITTINGS 24" IN DIAMETER AND LESS SHALL BE PREFABRICATED, SPOT WELDED AND INTERNALLY Z SEATED. FITTINGS LARGER THAN 24" IN DIAMETER SHALL BE CONTINUOUSLY WELDED. FITTING GAUGE SHALL BE 22 GAUGE FOR 36" FITTINGS AND UNDER, 20 GAUGE FOR ALL LARGER SIZES. ALL 45 DEGREE TEES SHALL BE CONICAL TYPE. SEAL LONGITUDINAL AND TRANSVERSE DUCTWORK JOINTS AIRTIGHT WITH HEAVY LIQUID SEALANT APPLIED ACCORDING TO MANUFACTURER'S INSTRUCTIONS. PROVIDE GAUGE THICKNESS IN MEDIUM PRESSURE (DUCT PRESSURE CLASS 2 1/2" TO 6" MG.) DUCTWORK AS RECOMMENDED BY SMACNA.

15610.06 - FLEXIBLE DUCT
LOW PRESSURE (DUCT PRESSURE CLASS UP TO 2, 1/6") AND MEDIUM PRESSURE (DUCT PRESSURE CLASS 2 1/2" TO 6" MG.) FLEXIBLE DUCT SHALL BE FLEXMASTER TYPE-B, THERMAFLEX TYPE 6KM OR EQUAL. DUCT SHALL HAVE FIRE RETARDANT POLYETHYLENE PROTECTIVE VAPOR BARRIER. DUCT SHALL BE UL 181 LISTED, CLASS I, ACOUSTICAL INSULATED. INSULATION SHALL BE 1/2" (R-4.2) FIBERGLASS INSULATION. FLEXIBLE DUCTWORK SHALL HAVE CPE LINER WITH STEEL WIRE HELIX MECHANICALLY LOCKED OR PERMANENTLY BONDED TO THE LINER. FLEXIBLE DUCT RUNS SHALL NOT EXCEED 5 FEET IN LENGTH, AND SHALL BE INSTALLED STRAIGHT AS POSSIBLE AVOIDING TIGHT TURNS. FLEXIBLE DUCTS SHALL BE SUPPORTED WITH NOT LESS THAN 1" IDE. 16 GAUGE STEEL STRAPS, THE USE OF WIRE FOR SUPPORT OF FLEXIBLE DUCTS WILL NOT BE ALLOWED.

15610.07 - ACCESS DOORS IN DUCTS AND HOUSINGS
ALL DUCTS AND HOUSINGS SHALL HAVE HINGED ACCESS DOORS FOR ACCESS TO ALL AUTOMATIC DAMPERS, TEMPERATURE SENSING ELEMENTS, CONTROL DEVICES, FIRE DAMPERS, DAMPER ACTUATORS, AIR FILTERS AND ALL OTHER ITEMS WITHIN THE DUCTWORK OR HOUSING WHICH REQUIRES INSPECTION, SERVICE OR ADJUSTMENT. ALL ACCESS DOORS SHALL BE SANDWICH TYPE CONSTRUCTION WITH INSULATION BETWEEN THE OUTER AND INNER SHEET METAL PANELS. FRAME SHALL BE MINIMUM 22 GAUGE GALVANIZED STEEL WITH SEAL. DOOR SHALL BE HINGED AND MINIMUM 22 GAUGE GALVANIZED STEEL WITH 1" THICK FIBER GLASS INSULATION. ACCESS DOORS SHALL BE RATED FOR 2" MG. STATIC PRESSURE MINIMUM. DOORS SHALL BE GASKETED WITH NEOPRENE OR SPONGE RUBBER GASKETS. FOAM PLASTIC GASKET WILL NOT BE ACCEPTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ACCESS DOOR LOCATIONS REGARDLESS OF NOTATIONS ON DRAWINGS. MINIMUM ACCESS DOOR SIZE SHALL BE 12"x18" IF NOT SHOWN ON THE DRAWINGS. WHERE THE DUCTWORK WILL NOT ACCEPT THIS SIZE, THE ACCESS DOOR SHALL BE AS LARGE AND THE DUCTWORK DIMENSIONS WILL ALLOW 25 0

ALL ACCESS DOORS FOR ACCESS TO FIRE DAMPERS, MOTOR OPERATED CONTROL DAMPERS, OR COUNTERBALANCED DAMPERS SHALL HAVE VIEW PORTS OF WIRE-GLASS OR FLEXI-GLASS. THE ACCESS DOORS SHALL BE GASKETED AIRTIGHT WITH AN AREA OF NOT LESS THAN 25 SQ. INCHES FOR OBSERVATION OF DAMPERS.

HINGES SHALL BE CONTINUOUS ALUMINUM PIANO TYPE, 1 CAM LATCH FOR DOORS UNDER 14"x14". DOORS 14"x14" AND ABOVE SHALL HAVE 2 CAM LATCHES MINIMUM.

MANUFACTURERS: RUSKIN, AIR BALANCE, PREFECO

15610.08 - FIRE DAMPERS
NOT USED ON THIS PROJECT.

15610.09 - FIRE DAMPERS
NOT USED ON THIS PROJECT.

15610 - DUCTWORK AND ACCESSORIES (cont'd)

15610.04 - BALANCING DAMPERS
PROVIDE BALANCING DAMPERS WHERE SHOWN ON THE DRAWINGS AND WHEREVER NECESSARY FOR COMPLETE CONTROL OF AIRFLOW. WHERE ACCESS TO DAMPERS THROUGH A HARD CEILING IS REQUIRED, COORDINATE ACCESS DOOR LOCATION WITH ARCHITECT, OR AT CONTRACTORS OPTION, A YOUNG'S REGULATOR CONCEALED VOLUME DAMPER WITH EXTENSION ROD AND CEILING OPERATOR MAY BE USED. COORDINATE CEILING OPERATOR LOCATION WITH THE ARCHITECT. SPILTTER DAMPERS SHALL BE CONTROLLED BY LOCKING COUPLANTS PROVIDE YOUNG'S REGULATOR OR VENTLOK END BEARINGS FOR DAMPER ROD. VOLUME DAMPERS SHALL BE OPPOSED BLADE INTERLOCKING TYPE. FACTORY MADE BY RUSKIN APC, AIR BALANCE OR APPROVED EQUIVALENT. OUTSIDE AIR DAMPERS SHALL BE RUSKIN MODEL GO-50, GREENHECK, AIR BALANCE OR APPROVED EQUAL. PROVIDE FLEXMASTER MODEL 570 OR EQUAL .45 DEGREE RECTANGULAR/ROUND SIDE TAKE-OFF FITTING WITH MODEL SLEBO DOUBLE BEARING DAMPER WITH INSULATION BUILD OUT FOR ALL ROUND DUCTWORK BRANCH TAKEOFFS TO INDIVIDUAL AIR DEVICES.

15610.10 - MOTOR OPERATED RECTANGULAR DAMPERS
SEE DRAWINGS FOR REQUIREMENTS.

15610.11 - LOUVERS
NOT USED ON THIS PROJECT.

15610.12 - LOW PROFILE ROOF NEGATIVE HOODS
NOT USED ON THIS PROJECT.

15610.13 - SUPPLY DIFFUSER/RETURN GRILLES
SUPPLY DIFFUSERS/RETURN GRILLES SHALL BE SQUARE OR RECTANGULAR WITH ADJUSTABLE LOVERED FACE TYPE AS SHOWN ON THE DRAWINGS.

DIFFUSERS SHALL DELIVER AIRFLOW IN A 1-WAY, 2-WAY, 3-WAY OR 4-WAY PATTERN AS INDICATED ON THE DRAWINGS. PROVIDE THRU REDUCING VANES ONLY WHERE SPECIFICALLY CALLED FOR ON THE DRAWINGS.

PROVIDE OPPOSED BLADE DAMPER FOR FINAL TRIM BALANCING. DAMPER SHALL BE ADJUSTABLE FROM THE FACE OF THE DIFFUSER WITH SCREWDRIVER AND SHALL BE THE SAME MATERIAL AS THE DIFFUSER. DIFFUSERS SHALL BE HEAVY GAUGE STEEL CONSTRUCTION WITH REMOVABLE CORES. FINISH FOR DIFFUSERS SHALL BE OFF-WHITE BAKED ENAMEL.

MANUFACTURERS:

- A. TITUS
B. E.H.PRICE
C. CARNES CO.

15610.14 - METHOD OF INSTALLATION
COMPLY WITH ALL THE MANUFACTURER'S BEST INSTALLATION RECOMMENDATIONS AND INSTRUCTIONS FOR ALL DUCTWORK AND ACCESSORIES.

DUCTS SHALL BE CONSTRUCTED SEALED AND MADE AIR TIGHT FOR PRESSURES INDICATED ON THE DRAWINGS. IF PRESSURE CLASS IS NOT INDICATED ON THE DRAWINGS, THE DUCTS SHALL BE SEALED TO 2" MG. PRESSURE CLASS. ALL DUCTS SHALL BE SEALED IN ACCORDANCE WITH SMACNA.

PROVIDE OPENINGS IN DUCTWORK TO ACCOMMODATE THERMOMETERS, SENSORS AND CONTROLLERS. PROVIDE PILOT TUBE OPENING FOR TESTING SYSTEMS, COMPLETE WITH METAL CAN WITH SPRINGS DEVICE OR SCREW TO ENSURE AGAINST AIR LEAKAGE.

LOCATE DUCTS WITH SUFFICIENT SPACE AROUND EQUIPMENT TO ALLOW NORMAL OPERATING AND MAINTENANCE ACTIVITIES TO THE GREATEST EXTENT POSSIBLE.

THE INTERIOR OF ALL DUCTS AND BOOTS THAT CAN BE SEEN THROUGH GRILLES, REGISTERS, AND DIFFUSERS SHALL BE COATED WITH FLAT BLACK PAINT.

WHERE EXPOSED DUCTWORK PASSES THROUGH NON FIRE-RATED WALLS THE SPACE BETWEEN THE DUCT AND THE OPENING SHALL BE CLOSED WITH A COMPACTED FILL OF 3/4 LB DENSITY FIBERGLASS. PROVIDE AND INSTALL SHEET METAL COLLAR OF NOT LESS THAN 20 GAUGE PAINT-GRIP TYPE GALVANIZED SHEET METAL ON ALL SIDES OF THE DUCTWORK. OVERLAP THE OPENING AND DUCTWORK BY 1/2" ON ALL SIDES. SEAL COLLARS AROUND DUCTWORK, AND OPENING WITH SILICONE ELASTOMERIC SEALANT.

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PORTLAND STATE UNIVERSITY
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MARKET CENTER BUILDING
8TH FLOOR INTERIOR REMODEL

Table with columns: DATE, DWN. BY, CHK. BY. Row 1: 04/30/2012, DAB, CCN

Table with columns: REVISIONS, Description, Date. Row

**1500 - FIRE SPRINKLER SYSTEM**

1500.01 - DESCRIPTION OF WORK  
FURNISH ALL DESIGN, LABOR, MATERIALS, FABRICATION, EQUIPMENT AND SERVICES NECESSARY TO PROVIDE A COMPLETE AND OPERATIONAL AUTOMATIC FIRE SPRINKLER SYSTEM AS SPECIFIED HEREIN AND AS REQUIRED FOR SATISFACTORY OPERATION OF THE SYSTEM.

THE SPRINKLER SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF NFPA. THIS REQUIREMENT DOES NOT RELIEVE THE CONTRACTOR FROM MEETING THE REQUIREMENTS SET BY FACTORY MUTUAL. ALL FLOW INDICATORS, GONGS, HORNS, ETC. SHALL BE INCLUDED AS PART OF THIS CONTRACT.

FIRE PROTECTION SYSTEM SHALL BE "WET-PIPE" SYSTEM EMPLOYING AUTOMATIC SPRINKLERS ATTACHED TO A PIPING SYSTEM CONTAINING WATER AND CONNECTED TO A WATER SUPPLY SO THAT WATER DISCHARGES IMMEDIATELY FROM SPRINKLERS OPEN BY FIRE.

1500.02 - FEES AND PERMITS  
THE CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS, LICENSES AND INSPECTIONS NECESSARY IN CONJUNCTION WITH THIS WORK. IN ADDITION, THE CONTRACTOR SHALL PAY FOR ALL TAP FEES AND EQUIPMENT COSTS ASSOCIATED WITH THE FIRE SPRINKLER SYSTEM.

1500.04 - PROTECTION OF WORK  
THE SPRINKLER CONTRACTOR SHALL TAKE THE NECESSARY PRECAUTIONS REQUIRED TO PROTECT HIS WORK, AS WELL AS THE WORK OF OTHER TRADES AGAINST ANY DAMAGE.

1500.05 - SUBMITTALS AND APPROVALS  
ALL MATERIAL SUBMITTED SHALL BE CONTAINED IN BROCHURE TYPE BINDERS, CLEARLY LABELED AND IDENTIFIED. EACH SUBMITTAL SHALL BE COMPLETE WITH ALL ITEMS LISTED IN SCHEDULE FORM, SHOWING TYPE, MANUFACTURER, CATALOG NUMBER, FINISH SHOP DRAWINGS OR DESCRIPTIVE LITERATURE FOR THE PURPOSE OF IDENTIFYING THE EQUIPMENT AND ENGINEER'S REFERENCE NUMBER. FAILURE TO COMPLY WITH THESE REQUIREMENTS WILL RESULT IN RETURN OF SUBMITTAL FOR RESUBMISSION.

CONTRACTOR SHALL SUBMIT SCALED LAYOUT DRAWINGS INCLUDING, BUT NOT LIMITED TO, HEAD LOCATIONS, PIPE SIZES, LOCATIONS, ELEVATIONS, AND SLOPES OF HORIZONTAL RUNS, HALL, AND FLOOR PENETRATIONS, AND CONNECTIONS. INDICATE INTERFACE AND SPATIAL RELATIONSHIPS BETWEEN PIPING AND PROXIMATE EQUIPMENT. SHOP HANGER LOCATIONS. PLANS SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER FOR HEAD LOCATIONS APPROVAL.

AT PROJECT CLOSEOUT PROVIDE THREE (3), 1/8" PER FOOT SCALED, DIMENSIONED, RECORD DRAWINGS TO THE ARCHITECT/ENGINEER OF INSTALLED FIRE PROTECTION PIPING AND EQUIPMENT.

THE SPRINKLER SYSTEM SHALL BE A COMPLETE SYSTEM AS REQUIRED BY LOCAL AUTHORITIES. ALL WIRING REQUIRED FOR THE SYSTEM SHALL BE PROVIDED BY THE SPRINKLER CONTRACTOR AND SHALL BE INCLUDED IN THE SUBMITTAL PACKAGE. SUBMIT TO THE AGENCY HAVING JURISDICTION FOR APPROVAL. SUBMIT ONE APPROVED COPY, BEARING STAMP AND/OR SIGNATURE OF AGENCY HAVING JURISDICTION BEFORE PROCEEDING WITH THE INSTALLATION.

SUBMIT CERTIFICATION UPON COMPLETION OF FIRE PROTECTION PIPING WORK WHICH INDICATES THAT WORK HAS BEEN TESTED IN ACCORDANCE WITH NFPA 13 AND NFPA 14, AND ALSO THAT THE SYSTEM IS OPERATIONAL, COMPLETE AND HAS NO DEFECTS.

THE CONTRACTOR SHALL ALSO SUBMIT THE DRAWINGS TO THE OWNERS INSURANCE COMPANY, FOR REVIEW, COMMENT AND APPROVAL.

1500.06 - CODES AND ORDINANCES  
THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS, REGULATIONS, CODES, ORDINANCE, RULING OF FIRE UNDERWRITERS REQUIREMENTS, NFPA, AND FACTORY MUTUAL APPLICABLE TO THIS CLASS OR WORK. FURTHERMORE, THEY SHALL INCLUDE BUT SHALL NOT BE LIMITED TO, CODES LISTED IN OTHER SECTIONS OF THESE SPECIFICATIONS.

PROVIDE FIRE PROTECTION PRODUCTS IN ACCORDANCE WITH UL STANDARDS. EACH PRODUCT INSTALLED SHALL HAVE A UL LABEL.

INSTALL FIRE PROTECTION SYSTEMS IN ACCORDANCE WITH LOCAL REGULATIONS OF THE FIRE DEPARTMENT OR FIRE MARSHAL. COMPLY WITH LOCAL FIRE DEPARTMENT/MARSHAL REGULATIONS FOR SIZES, THREADING AND ARRANGEMENT OF CONNECTIONS FOR FIRE DEPARTMENT EQUIPMENT TO STANDPIPE SYSTEMS.

1500.07 - ACCEPTABLE MANUFACTURERS  
VIKING  
RELIABLE  
GRINNELL  
CENTRAL

1500.08 - QUALIFICATION OF SPRINKLER CONTRACTOR  
FIRE PROTECTION WORK SHALL BE INSTALLED BY A FIRM WITH AT LEAST 5 YEARS OF SUCCESSFUL INSTALLATION EXPERIENCE ON PROJECTS WITH THE FIRE PROTECTION WORK SIMILAR TO THAT REQUIRED FOR PROJECT BY A QUALIFIED CONTRACTOR (SPRINKLER FITTER OR PER JURISDICTIONAL DICTATES). THE SPRINKLER CONTRACTOR'S DESIGN SHALL BE STAMPED BY A REGISTERED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF THE PROJECT.

THE CONTRACTOR SHALL GUARANTEE ALL FIRE PROTECTION WORK AGAINST DEFECT DUE TO FAULTY WORKMANSHIP OR MATERIAL AND THAT ALL PIPING IS FREE FROM FOREIGN MATERIAL, OBSTRUCTIONS, HOLES OR BREAKS OF ANY NATURE. THE CONTRACTOR GUARANTEES THE PROPER CIRCULATION AND DRAINAGE OF EACH PIPING SYSTEM. UPON WRITTEN NOTICE FROM THE ARCHITECT/ENGINEER/OWNER, THE CONTRACTOR SHALL PROMPTLY REMEDY, WITHOUT COST TO THE OWNER, ANY DEFECTS OCCURRING WITHIN A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE.

1500.09 - WATER SERVICE  
EXISTING SERVICE.

1500.10 - TESTING AND FLUSHING SYSTEM  
ALL PIPING SHALL BE HYDROSTATICALLY TESTED FOR A PERIOD OF TWO (2) HOURS AT NOT LESS THAN 200PSI PRESSURE. IF LEAKS APPEAR, LINES SHALL BE DRAINED, LEAKS REPAIRED AND TEST REPEATED AT NO COST TO THE OWNER. NO PIPING SHALL BE CONCEALED IN ANY MANNER BEFORE TESTING IS APPROVED.

TESTS SHALL BE MADE IN THE PRESENCE OF AN INSPECTOR FROM THE AUTHORITY HAVING JURISDICTION. THE OWNER SHALL BE NOTIFIED OF TIME OF ALL TESTS IN ADVANCE OF THE DATE.

1500.11 - EQUIPMENT AND MATERIALS  
ALL MATERIALS AND EQUIPMENT FURNISHED AS PART OF THIS CONTRACT SHALL BE UL LISTED, FACTORY MUTUAL APPROVED AND IN COMPLIANCE WITH APPLICABLE PROVISIONS OF THE NFPA.

1500.12 - SPRINKLER HEADS  
UNLESS OTHERWISE INDICATED, SPRINKLER HEADS SHALL BE AS FOLLOWS:

1. EXPOSED AREAS WITHOUT CEILING - BRASS, UNPLATED SPRINKLERS
2. OFFICE AREAS - FLUSH MOUNT WITH ALL EXPOSED PARTS POLISHED CHROME (INCLUDE CHROME PLATED ESCUTCHEON PLATES).
3. ALL OTHER AREAS - CHROME PLATED PENDENT TYPE SPRINKLERS

TEMPERATURE RATINGS OF FUSIBLE PLUG OR LINK SPRINKLERS SHALL BE APPROPRIATE FOR THE AMBIENT CONDITIONS IN THE IMMEDIATE AREAS. PROVIDE QUICK RESPONSE SPRINKLERS.

1500.13 - SPARE HEADS  
NOT REQUIRED FOR THIS PROJECT.

**1500 - FIRE SPRINKLER SYSTEM (CONTINUED)**

1500.14 - PIPING  
PIPE AND FITTINGS SHALL BE OF NOMINAL DIAMETER AS DESIGNED WITH INNER AND OUTER SURFACES CONCENTRIC, SMOOTH INSIDE, STRAIGHT, FREE FROM WELD FLAWS, BLISTERS OR OTHER DEFECTS. EACH LENGTH OF PIPE AND EACH FITTING SHALL HAVE CAST, STAMPED OR INDELIBLY MARKED ON IT THE MAKERS MARK OR NAME AND THE WEIGHT AND QUALITY OF THE PRODUCT WHERE SUCH MARKINGS IS REQUIRED BY THE APPROVED STANDARD THAT APPLIES. NO WELDINGS OF SPRINKLER PIPING WILL BE PERMITTED, EXCEPT IN ACCORDANCE WITH NFPA 13.

PIPE ABOVE GROUND SHALL BE SCHEDULE 40 BLACK STEEL CONFORMING TO ASTM DESIGNATION A-120 OR A-53. COPPER PIPING IS ACCEPTABLE AND SHALL MATCH EXISTING.

UNLESS SPECIFIED ELSEWHERE ALL PIPING 2" AND SMALLER SHALL BE SCREWED AND ALL PIPING 2-1/2" AND LARGER SHALL BE WELDED. ALL WELDING SHALL BE IN ACCORDANCE WITH NFPA AND SHALL COMPLY WITH SECTION II, PART C, ASME BOILER AND PRESSURE VESSEL CODE.

AT THE CONTRACTOR'S OPTION AND WITH THE APPROVAL OF THE AGENCIES HAVING JURISDICTION, VIGTALUG STYLE TS, OR APPROVED EQUAL COUPLINGS WITH GROOVED END PIPE MAY BE USED.

1500.15 - PIPING ACCESSORIES  
SCREWED FITTINGS SHALL BE ITS MMPSI WORKING PRESSURE CAST IRON CONFORMING TO FEDERAL SPECIFICATION W1-F-501.

FLANGED FITTINGS SHALL BE ITS MMPSI WORKING PRESSURE CAST IRON, CONFORMING TO FEDERAL SPECIFICATION A-2110 WITH DRILLINGS TO MATCH ANSI SPECIFICATION B-16.2.

WELDING FLANGES SHALL BE FORGED STEEL, WELDING NECK TYPE CONFORMING TO ANSI SPECIFICATION B-16.1, FOR COLD WATER WORKING PRESSURE OF ITS MMPSI.

GASKETS SHALL BE FULL FACE, 1/16" THICK, GRAPHOLIT COMPOSITION UNION CARBIDE OR APPROVED EQUAL.

1500.14 - DESIGN AND CALCULATION  
CONTRACTOR SHALL PERFORM NECESSARY CALCULATIONS REQUIRED FOR PROPER DESIGN AND INSTALLATION OF THE SPRINKLER SYSTEM FOR THE RENOVATED AREA. ALL DESIGN CALCULATIONS AND LAYOUT OF THE SPRINKLER SYSTEM NETWORK SHALL BE BASED ON THE SPECIFICATIONS AND ACCOMPANYING DRAWINGS. REQUEST FOR HVAC DUCT, LIGHTING AND EQUIPMENT RELOCATIONS. NO SPRINKLER PIPE PENETRATION WILL BE ALLOWED THROUGH HVAC DUCT SYSTEM. SPRINKLERS SHALL BE LOCATED IN THE CENTER OF ACOUSTIC TILES.

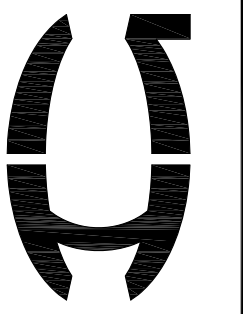
1500.15 - SIAMENSE CONNECTIONS  
NOT REQUIRED FOR THIS PROJECT.

1500.16 - MISCELLANEOUS EXECUTION  
ALL PIPING SHALL BE INSTALLED WITHIN 6" OF THE STRUCTURE. OFFSET AROUND OBSTACLES AS NECESSARY AND RETURN PIPING TO WITHIN 6" OF THE STRUCTURE AS CLOSE TO OFFSET AS POSSIBLE. BRANCH PIPING SHALL BE RUN BETWEEN CONCRETE STEM OR STEEL JOISTS IN ROOMS WITHOUT CEILINGS.

SPRINKLER HEADS SHALL BE INSTALLED IN THE CENTER OF CEILING TILES.

1500.17 - ELECTRICAL REQUIREMENTS  
NOT REQUIRED FOR THIS PROJECT.

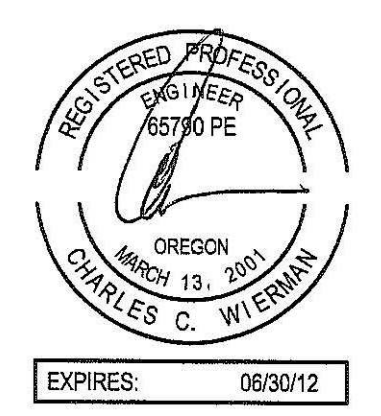
1500.18 - STANDPIPE REQUIREMENTS  
NOT REQUIRED FOR THIS PROJECT.



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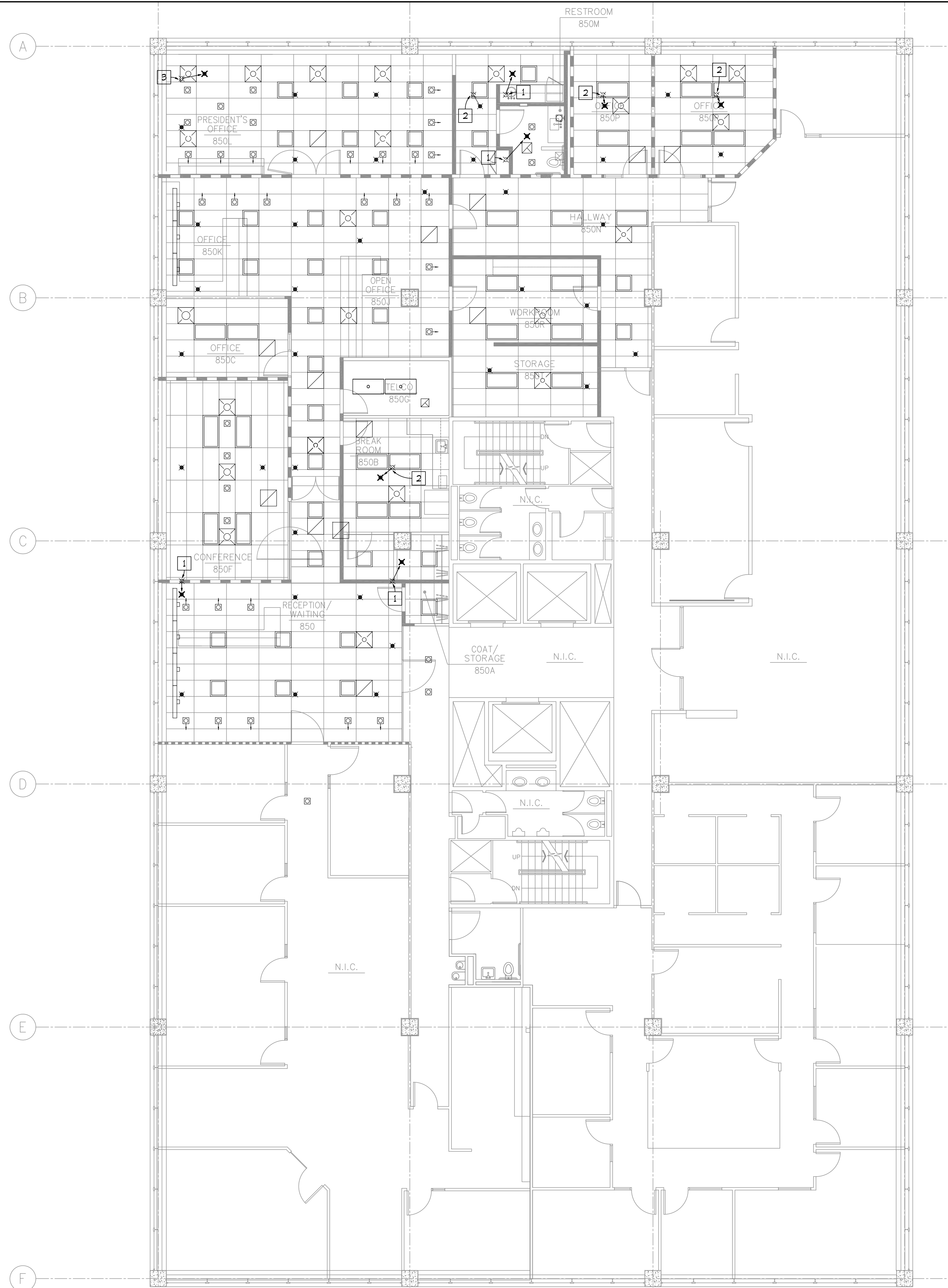
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**MARKET CENTER BUILDING**  
 MARKET CENTER BUILDING  
 8TH FLOOR INTERIOR REMODEL



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**SHEET NUMBER**  
**M5**  
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CAD FILE  
PROJECT NO.  
10-2548-0



**PLAN NOTES:**

- 1 RELOCATE EXISTING FIRE SUPPRESSION SPRINKLER HEAD TO LOCATION SHOWN TO ACCOMMODATE NEW ARCHITECTURAL WALL LAYOUT.
- 2 RELOCATE EXISTING FIRE SUPPRESSION SPRINKLER HEAD TO LOCATION SHOWN TO ACCOMMODATE NEW LIGHT FIXTURE LAYOUT.
- 3 RELOCATE EXISTING FIRE SUPPRESSION SPRINKLER HEAD TO LOCATION SHOWN TO ACCOMMODATE NEW AIR DIFFUSER LOCATION.

**GENERAL NOTES:**

1) THIS SHEET ONLY SHOWS KNOWN FIRE SUPPRESSION SPRINKLER HEAD CONFLICTS WITH NEW ARCHITECTURAL WALL LAYOUT, NEW LIGHT FIXTURE LAYOUT, NEW DIFFUSER LOCATIONS, AND NEW RETURN AIR GRILLE LOCATIONS. ADDITIONAL FIRE SUPPRESSION SPRINKLER HEADS MAY BE NECESSARY TO MEET NFPA 13. FIRE SPRINKLER SYSTEM DESIGN TO BE DEFERRED DESIGNED BY FIRE SPRINKLER CONTRACTOR. MODIFY EXISTING FIRE SPRINKLER SYSTEM TO MEET NFPA 13 AND THE AUTHORITY HAVING JURISDICTION. PROVIDE ALL NECESSARY DEMOLITION, SPRINKLER PIPING FITTINGS, SPRINKLER HEADS, DRAINS, DRAWINGS, CALCULATIONS, ETC. FOR COMPLETE FIRE PROTECTION SYSTEM. SEE ARCHITECTURAL DRAWINGS FOR ALL LOCATIONS OF WORK.

2) RELOCATE EXISTING FIRE SUPPRESSION SPRINKLER HEADS AS NECESSARY TO ACCOMMODATE NEW ARCHITECTURAL WALL LAYOUT, NEW LIGHT FIXTURE LAYOUT, NEW DIFFUSER LOCATIONS, AND NEW RETURN AIR GRILLE LOCATIONS. ADJUST AND COORDINATE ROUTING OF SPRINKLER PIPING, SUPPLY AIR DUCTWORK, AND RETURN AIR BOOTS TO AVOID CONFLICTS. PROVIDE ALL NECESSARY SPRINKLER PIPING FITTINGS, PIPE HANGERS, SPRINKLER HEADS, ETC. AREAS OF KNOWN CONFLICT SHOWN ON THIS DRAWING MAY NOT INCLUDE ALL CONFLICTS. FIELD VERIFY EXISTING CONDITIONS.

**1 8TH FLOOR - FIRE SPRINKLER NEW WORK**

SCALE: 1/8"=1'-0"



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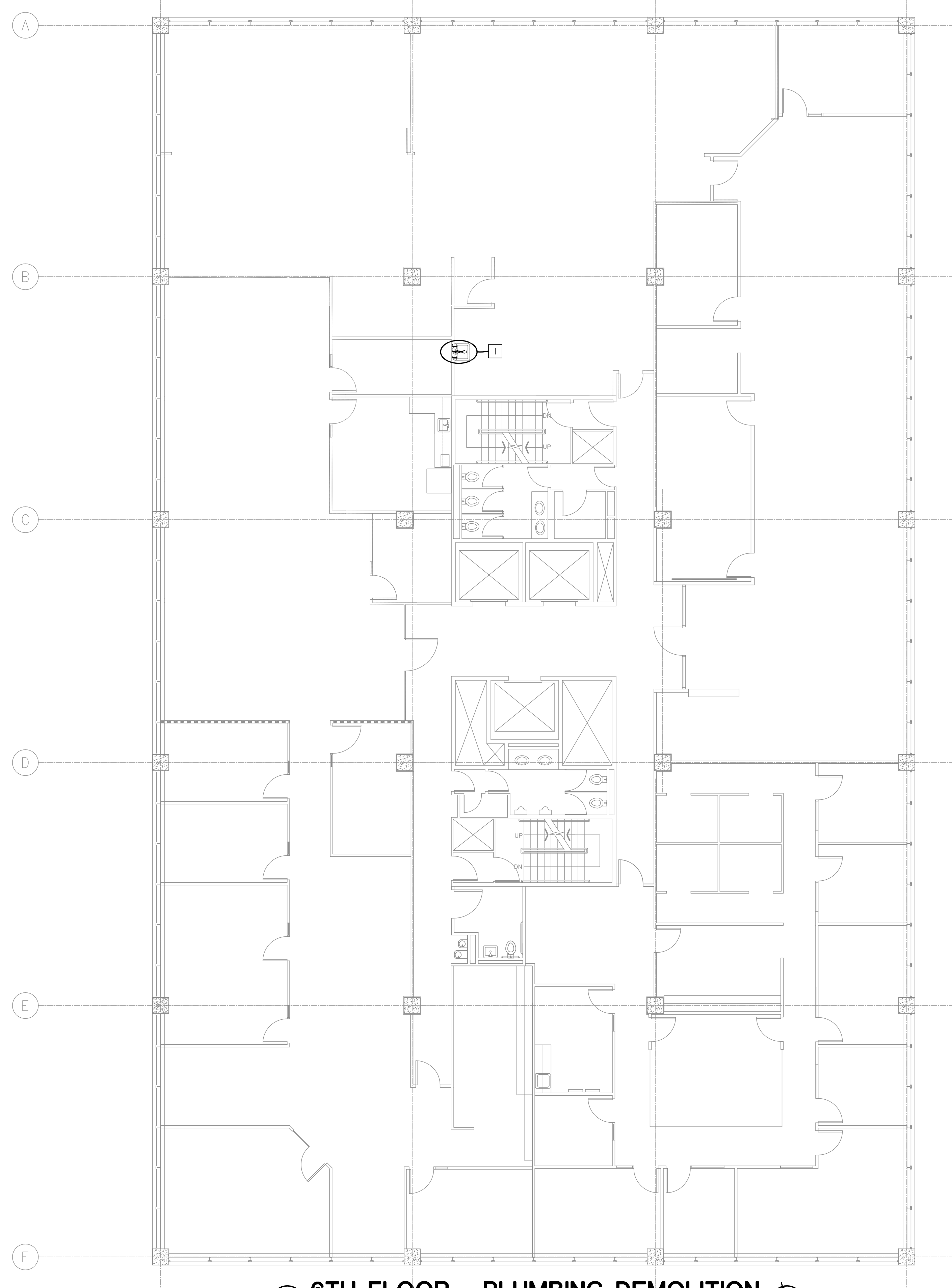
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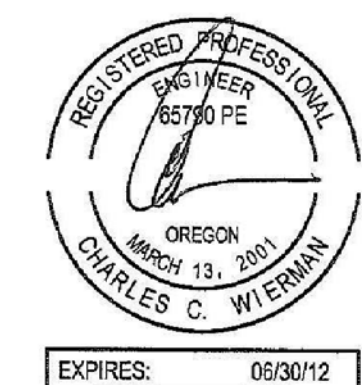
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**PLAN NOTES:**

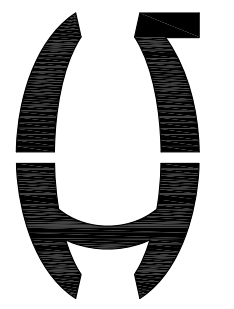
- 1 REMOVE EXISTING COLD WATER, HOT WATER, AND WASTE PIPING BACK INTO FLOOR OR CEILING AND GAP AIR AND WATER TIGHT. REMOVE ASSOCIATED STOPS, TRAPS, AND FITTINGS. PATCH AND PAINT WALL TO MATCH NEI. RE: ARCHITECTURAL.

**1 6TH FLOOR - PLUMBING DEMOLITION**  
 SCALE: 1/8"=1'-0" 



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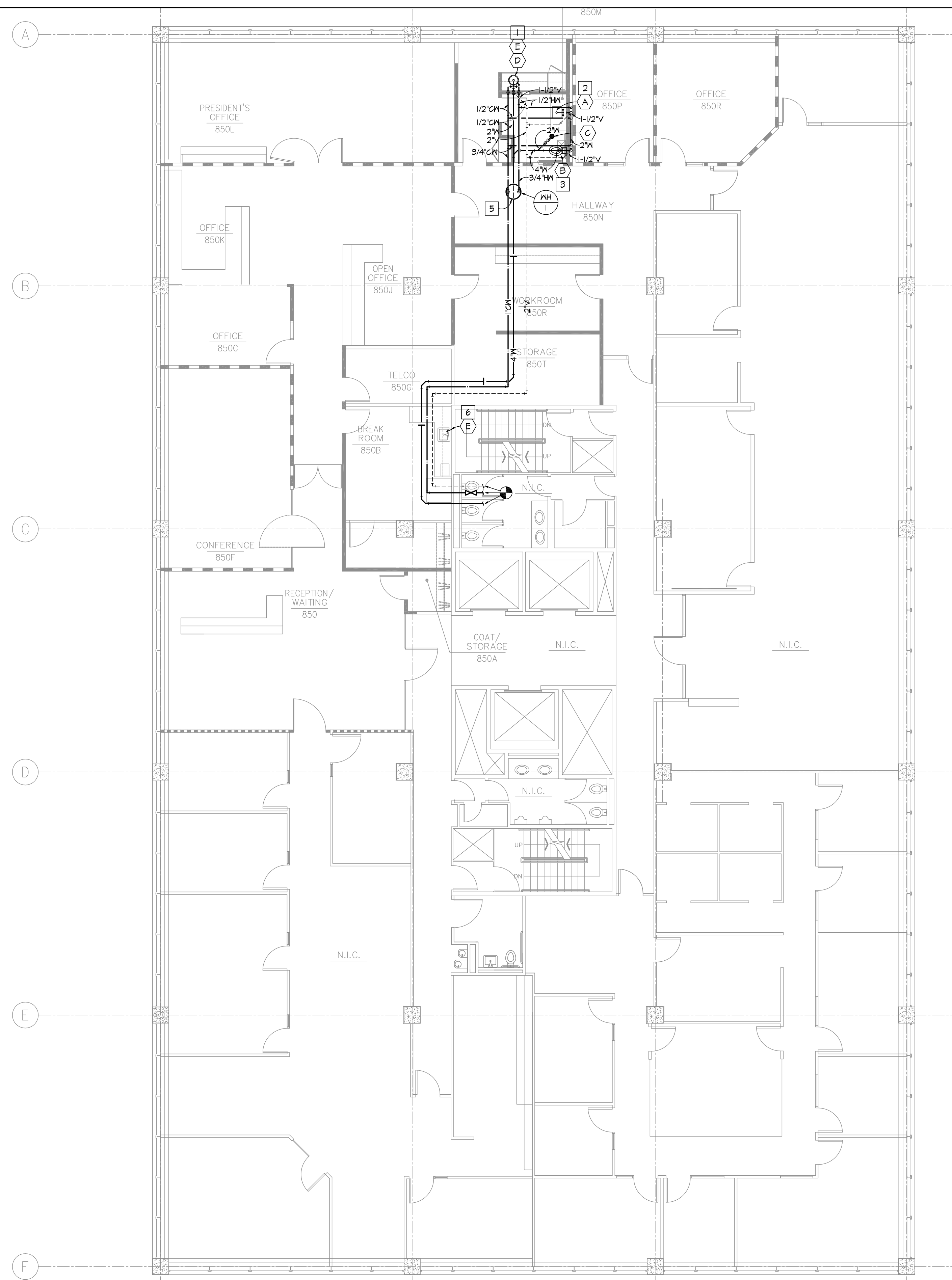
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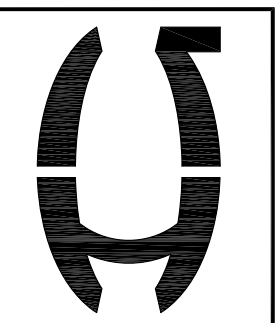
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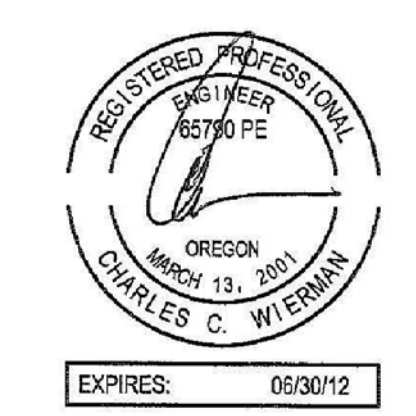
**PLAN NOTES:**

- 1 PROVIDE AND INSTALL NEW KITCHENETTE SINK WITH NEW INSTANT HOT WATER TANK UNDER SINK AND HOT WATER FAUCET.
- 2 PROVIDE AND INSTALL NEW LAVATORY
- 3 PROVIDE AND INSTALL NEW FLUSH TANK TYPE WATER CLOSET.
- 4 PROVIDE AND INSTALL NEW WATER SUPPLY AND WASTE/VENT PIPING TO SERVE NEW BREAK ROOM SINK. ROUTE NEW PIPING OVER TO RESTROOM AND TIE INTO EXISTING PIPING.
- 5 PROVIDE AND INSTALL NEW WATER HEATER TO SERVE PLUMBING FIXTURES SHOWN. INSTALL WATER HEATER ABOVE CEILING.
- 6 PROVIDE AND INSTALL NEW INSTANT HOT WATER TANK UNDER SINK AND HOT WATER FAUCET IN EXISTING SINK.



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**1 8TH FLOOR - PLUMBING NEW WORK**  
 SCALE: 1/8"=1'-0" 

<b>SHEET NUMBER</b>
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<b>DRAWING TYPE</b>
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<b>PROJECT NO.</b>
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### FIXTURE SCHEDULE:

- A RESTROOM LAVATORY.  
KOHLER GAXTON K-2210 UNDERCOUNTER LAVATORY, 17"x14" WITH OVERFLOW, WHITE VITREOUS CHINA.  
FAUCET: KOHLER PURIST K-14406-4-G WITH BRUSHED CHROME FINISH. PROVIDE SINK WITH P-TRAP. PROVIDE ADA COMPLIANT PIPE COVERS, TRIBEBO LAV-GUARD2. THERMOSTATIC MIXING VALVE: BRADLEY 554-2007.
- B ADA WATER CLOSET.  
KOHLER MODEL K3484, FLOOR MOUNTED ONE-PIECE FLUSH TANK ADA COMPLIANT WATER CLOSET, ELONGATED BOWL, 17" HIGH, 1.6 GALLONS PER FLUSH, CLASS 5 FLUSH SYSTEM, WHITE VITREOUS CHINA. SEAT AND COVER INCLUDED.
- C FLOOR DRAIN.  
JAY R. SMITH 2005-A, CAST IRON BODY WITH ADJUSTABLE 6" DIAMETER ROUND STRAINER HEAD, POLISHED NICKEL BRONZE TOP. PROVIDE WITH VANDAL PROOF SCREWS. PROVIDE WITH P-TRAP AND TRAP PRIMER CONNECTION.  
TRAP PRIMER VALVE: SIOUX CHIEF 645-01
- D KITCHENETTE SINK.  
ELKAY THE MYSTIC MODEL EGUH5FB, UNDERMOUNT SINGLE BOWL LAVATORY, TYPE 304 STAINLESS STEEL. PROVIDE WITH P-TRAP. PROVIDE CHROME PLATED SUPPLIES AND KEYED STOPS. PROVIDE ADA COMPLIANT PIPE COVERS, TRIBEBO LAV-GUARD. FAUCET: DANZE D1555656 SINGLE-HANDLE BAR SINK FAUCET, STAINLESS STEEL CONSTRUCTION. PROVIDE WITH 1.0 GPM AERATOR.
- E INSTANT HOT WATER DISPENSER.  
WASTE KING - QUICK 4 HOT, 5/8 GALLON STAINLESS STEEL TANK, 60 GUP PER HOUR CAPACITY, PROVIDE WITH CORONADO POLISHED STEEL FAUCET, HOT WATER ONLY.

### WATER HEATER SCHEDULE

TAG NO.	MANUFACTURER	MODEL NO.	TYPE	GALLON CAP.	GPH @60°F TEMP. RISE	INPUT (KW)	VOLTAGE	PHASE	NOTES
WH-1	AO SMITH	DEL-20	ELECTRIC	20	14	2.0	2TT	1	-

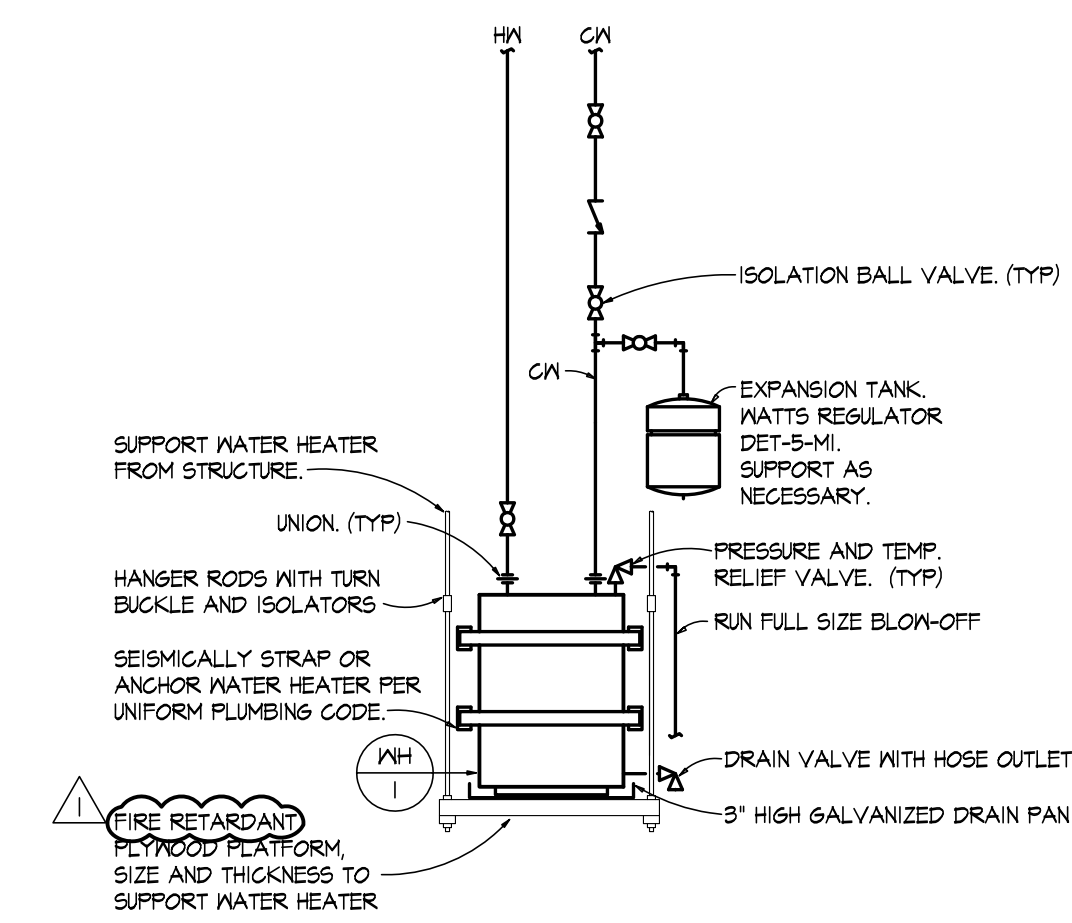
### PIPING MATERIAL SCHEDULE

SYSTEM	PIPING							FITTINGS		MAX. WORKING		FIELD TEST	
	SIZE	TYPE	SCH	GRD	ASTM	MATERIAL	MAT.	TYPE	PRESS	TEMP (°F)	PRESSURE	TIME	
DOMESTIC WATER	ALL	L	-	-	B88	CP	CP	SJ	120 PSI	40-180	150 PSI	1 HR	
WASTE & VENT	ALL	DWV	-	-	A888-45	CI	CI	NH	10 FT	50-180	10 FT	1 HR	
-	-	-	-	-	-	-	-	-	-	-	-	-	

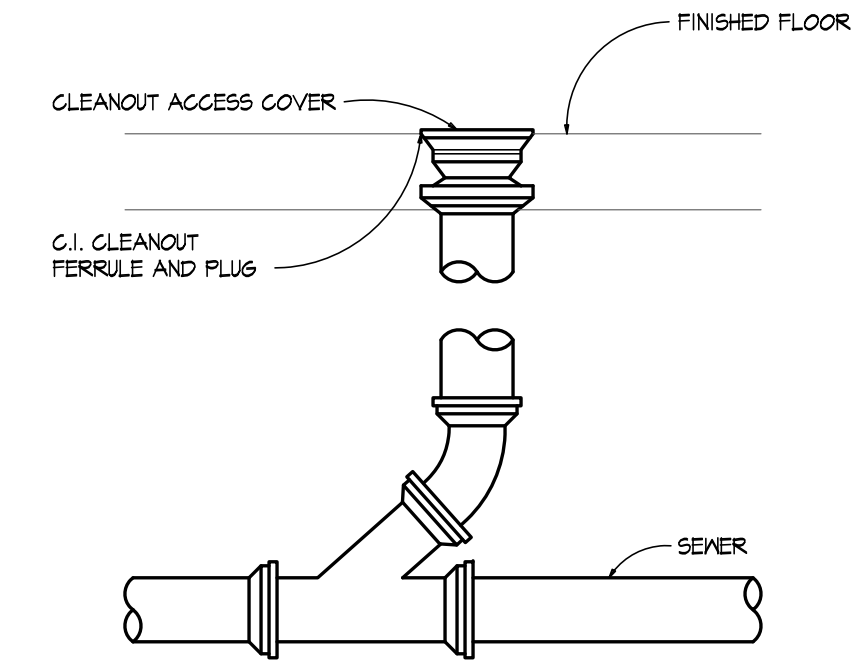
  

ATP - ARMYCO TRUSS PIPE	NS - NEOPRENE GASKET
AKS - ACID WASTE SYSTEM	NH - NO-HUB
BLK - BLACK	PE - POLYETHYLENE
BS - BELL & SPIGOT	FRPP - FIRE RESISTANT POLYPROPYLENE
CI - CAST IRON	PVC - POLYVINYL CHLORIDE
CP - COPPER	S - BRAZED JOINT - SILVER BRAZING ALLOY
CS - CARBON STEEL	SJ - SOLDER JOINT 45-5 TIN-ANTIMONY

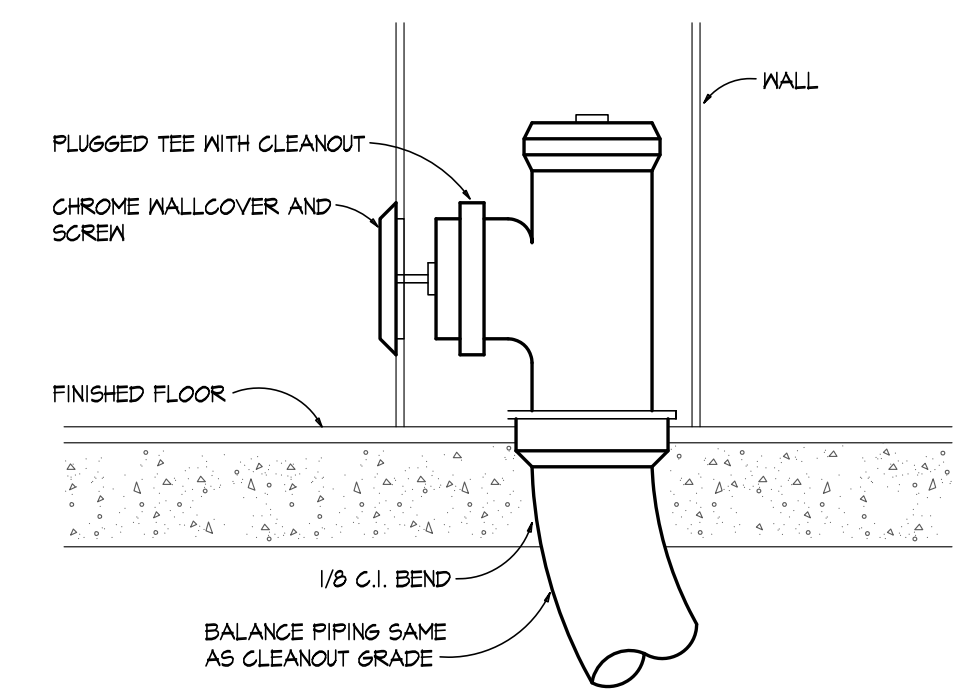
NOTE: ALL STEEL GAS PIPING IN UNVENTILATED/CONCEALED SPACES SHALL HAVE WELDED FITTINGS.



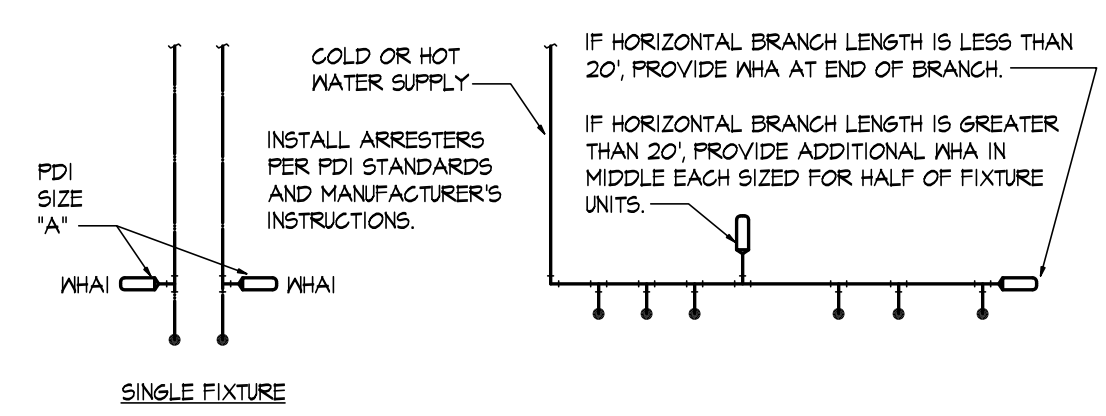
1 TYPICAL WATER HEATER DETAIL  
NOT TO SCALE



2 CLEANOUT DETAIL  
NOT TO SCALE



3 WALL CLEANOUT DETAIL  
NOT TO SCALE



ARRESTER SIZING		
PDI SIZE	PIPE SIZE	FIXTURE UNIT CAPACITY
A	1/2"	1-11
B	3/4"	12-32
C	1"	33-60

DO NOT INSTALL AIR CHAMBERS. PROVIDE WATER HAMMER ARRESTERS SUCH AS SIOUX CHIEF HYDRA-RESTER OR EQUAL BY MATT'S REGULATOR, PRECISION PLUMBING PRODUCTS OR APPROVED EQUAL HAVING PISTON AND O-RINGS CONSTRUCTION WITH PDI WH-201, ASSE 1010, AND ANSI A112.26.1M CERTIFICATION. INSTALL IN HORIZONTAL OR VERTICAL POSITION BUT NEVER UPSIDE DOWN. IF POSSIBLE, INSTALL IN LINE WITH WATER FLOW DIRECTION. SIZE THE UNITS PER THE TABLE SHOWN ABOVE AND THE FIXTURE UNIT CALCULATION TABLE.

4 WATER HAMMER ARRESTERS  
NOT TO SCALE



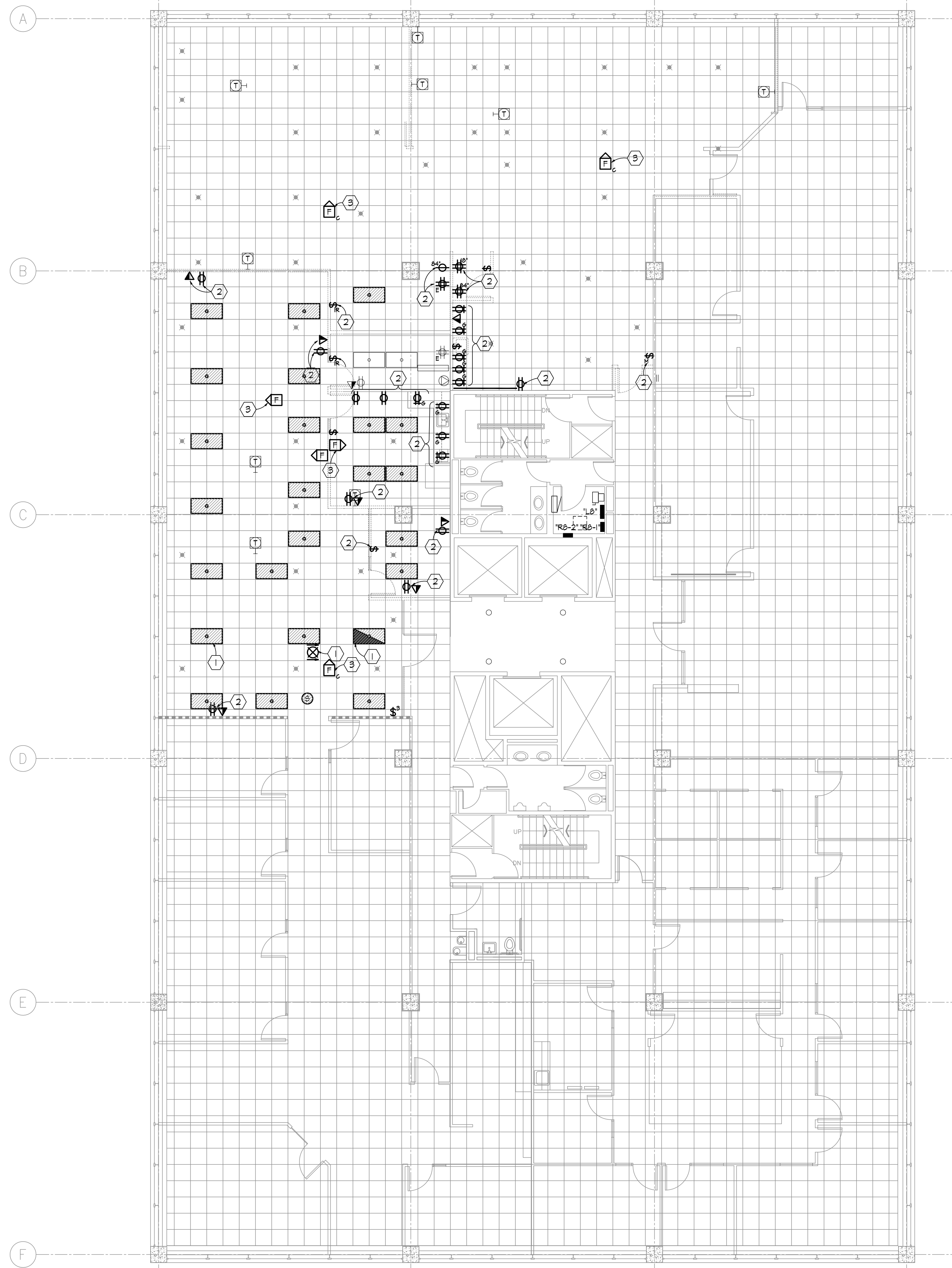
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**PLAN NOTES:**

- ① REMOVE EXISTING LIGHT FIXTURE. RETAIN 2TTV CIRCUITS FOR NEW LIGHTING. TYPICAL ALL HATCHED FIXTURES.
- ② REMOVE EXISTING ELECTRICAL DEVICE IN ITS ENTIRETY INCLUDING ALL CONDUIT, WIRE, SUPPORTS, ETC. BACK TO SOURCE OR NEAREST DEVICE TO REMAIN. PAINT AND PATCH WALL TO MATCH ADJACENT IF WALL TO REMAIN.
- ③ REMOVE EXISTING FIRE ALARM DEVICE/SPEAKER AND RETAIN FOR REINSTALLATION.

**1 8TH FLOOR - ELECTRICAL DEMOLITION**  
SCALE: 1/8"=1'-0"



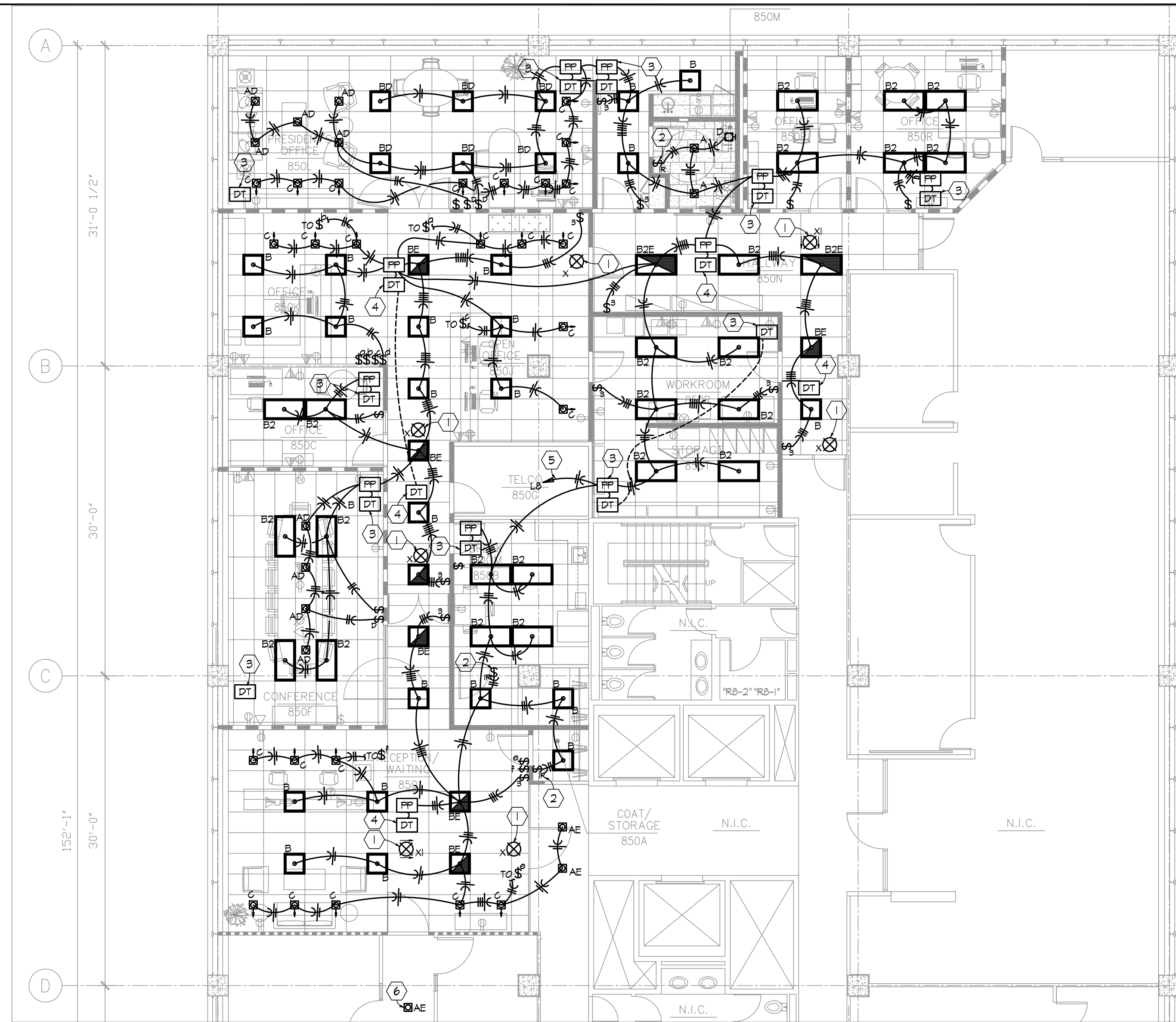
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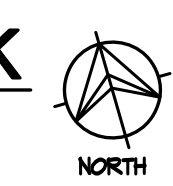


**PLAN NOTES:**

- 1 PROVIDE AND INSTALL NEW CEILING MOUNTED EXIT SIGN IN LOCATION SHOWN. ROUTE UNSWITCHED HOT CONDUCTOR, NEUTRAL AND GROUND FOR NORMAL POWER MONITORING.
- 2 PROVIDE AND INSTALL NEW INFRARED OCCUPANCY SENSOR WALL SWITCH. OCCUPANCY SENSOR SHALL BE WATTSTOPPER MODEL# MA-200 OR APPROVED EQUAL. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
- 3 PROVIDE AND INSTALL NEW DUAL TECHNOLOGY OCCUPANCY SENSOR FOR FULL ROOM COVERAGE. OCCUPANCY SENSOR SHALL BE WATTSTOPPER MODEL# DT-200 WITH B2-150 POWER PACK APPROVED EQUAL. RE: IES FOR WIRING DIAGRAM. CEILING MOUNT AND INSTALL PER MANUFACTURER'S INSTRUCTIONS.
- 4 PROVIDE AND INSTALL NEW DUAL TECHNOLOGY OCCUPANCY SENSOR FOR FULL ROOM COVERAGE. OCCUPANCY SENSOR SHALL BE WATTSTOPPER MODEL# DT-300 WITH B2-150 POWER PACK APPROVED EQUAL. RE: IES FOR WIRING DIAGRAM. CEILING MOUNT AND INSTALL PER MANUFACTURER'S INSTRUCTIONS.
- 5 ROUTE HOMERUN TO PANELBOARD "L6" LOCATED IN MAIN ELECTRICAL ROOM THIS FLOOR. PROVIDE NEW 20A/1P CIRCUIT BREAKER IN AVAILABLE SPACE FOR NEW LIGHTING CIRCUIT AND UPDATE PANELBOARD SCHEDULE.
- 6 CONNECT TO EXISTING CORRIDOR CIRCUIT.

**GENERAL NOTES:**  
 1 THE OWNER HAS SOME TYPE "B", "BE", "B2" AND "B2E" TYPE LIGHT FIXTURES. THE CONTRACTOR SHALL USE THESE FIXTURES FOR THE NEW WORK. THE CONTRACTOR SHALL COUNT THE FIXTURES IN POSSESSION BY THE OWNER AND PROVIDE ADDITIONAL NEW FIXTURES AS REQUIRED. THE EXISTING FIXTURES SHALL BE CLEANED AND NEW LAMPS ARE TO BE PROVIDED BY THE CONTRACTOR.

**1 PARTIAL 8TH FLOOR - LIGHTING NEW WORK**  
 SCALE: 1/8"=1'-0"



**LIGHTING FIXTURE SCHEDULE**

MARK	MANUFACTURER	FITTURE DESCRIPTION	MODEL NUMBER	MOUNTING	COLOR	LAMP			BALLAST (QUANTITY/TYPE)	VOLTS	WATTS	NOTES
						QTY	TYPE	BULB				
A	LITHONIA LIGHTING	6" DIAMETER OPEN REFLECTOR COMPACT FLUORESCENT DOWNLIGHT.	6HF 1/26-42TRT F601A MVOLT	CEILING	NA	1	CF	32K	(1) ELECTRONIC	2TTV	32	-
AE	LITHONIA LIGHTING	SAME AS FIXTURE "A" EXCEPT PROVIDE WITH EMERGENCY BATTERY PACK.	6HF 1/26-42TRT F601A MVOLT EL	CEILING	NA	1	CF	32K	(1) ELECTRONIC	2TTV	32	-
AD	LITHONIA LIGHTING	SAME AS FIXTURE "A" EXCEPT PROVIDE WITH ADVANCE MARK 10 ELECTRONIC DIMMING BALLAST.	6HF 1/26-42TRT F601A 211 ADEZ	CEILING	NA	1	CF	32K	(1) ELECTRONIC DIM	2TTV	32	-
B	FOCAL POINT	2x2 ARCHITECTURAL RECESSED LUMINAIRE.	FLU-22-2-2-T8-S-2TT-6-PS-WH	CEILING	WHITE	2	FL	17A	(1) ELECTRONIC	2TTV	34	-
BE	FOCAL POINT	SIMILAR TO TYPE "B" FIXTURE EXCEPT WITH EMERGENCY BALLAST.	FLU-22-2-2-T8-S-2TT-6-PS-EM-WH	CEILING	WHITE	2	FL	17A	(1) ELECTRONIC	2TTV	34	-
B2	FOCAL POINT	2x4 ARCHITECTURAL RECESSED LUMINAIRE.	FLU-24-2-2-T8-S-2TT-6-PS-WH	CEILING	WHITE	2	FL	32K	(1) ELECTRONIC	2TTV	64	-
B2E	FOCAL POINT	SIMILAR TO TYPE "B2" FIXTURE EXCEPT WITH EMERGENCY BALLAST.	FLU-24-2-2-T8-S-2TT-6-PS-EM-WH	CEILING	WHITE	2	FL	32K	(1) ELECTRONIC	2TTV	64	-
C	LITHONIA LIGHTING	6" DIAMETER OPEN REFLECTOR COMPACT FLUORESCENT WALL WASH DOWNLIGHT.	6HF-1/26-42TRT-F601AA-MVOLT	CEILING	NA	1	CF	32K	(1) ELECTRONIC	2TTV	32	-
D	VODE LIGHTING	5' LINEAR FLUORESCENT WITH BRUSHED ALUMINUM FINISH.	105-TBE-60-AL	WALL	ALUMINUM	1	FL	32K	(1) ELECTRONIC	2TTV	34	-
X	DUAL LITE	RED LED EDGE-LIT EXIT SIGN. CEILING MOUNTED, SINGLE SIDED WITH NO ARROWS. PROVIDE WITH EMERGENCY MODULE.	LEGRAND	CEILING	ALUMINUM	NA	LED	LED	NA	2TTV	9.8	-
XI	DUAL LITE	RED LED EDGE-LIT EXIT SIGN. CEILING MOUNTED, DOUBLE SIDED WITH ARROWS AS INDICATED ON THE PLANS. PROVIDE WITH EMERGENCY MODULE.	LEGRAND	CEILING	ALUMINUM	NA	LED	LED	NA	2TTV	9.4	-



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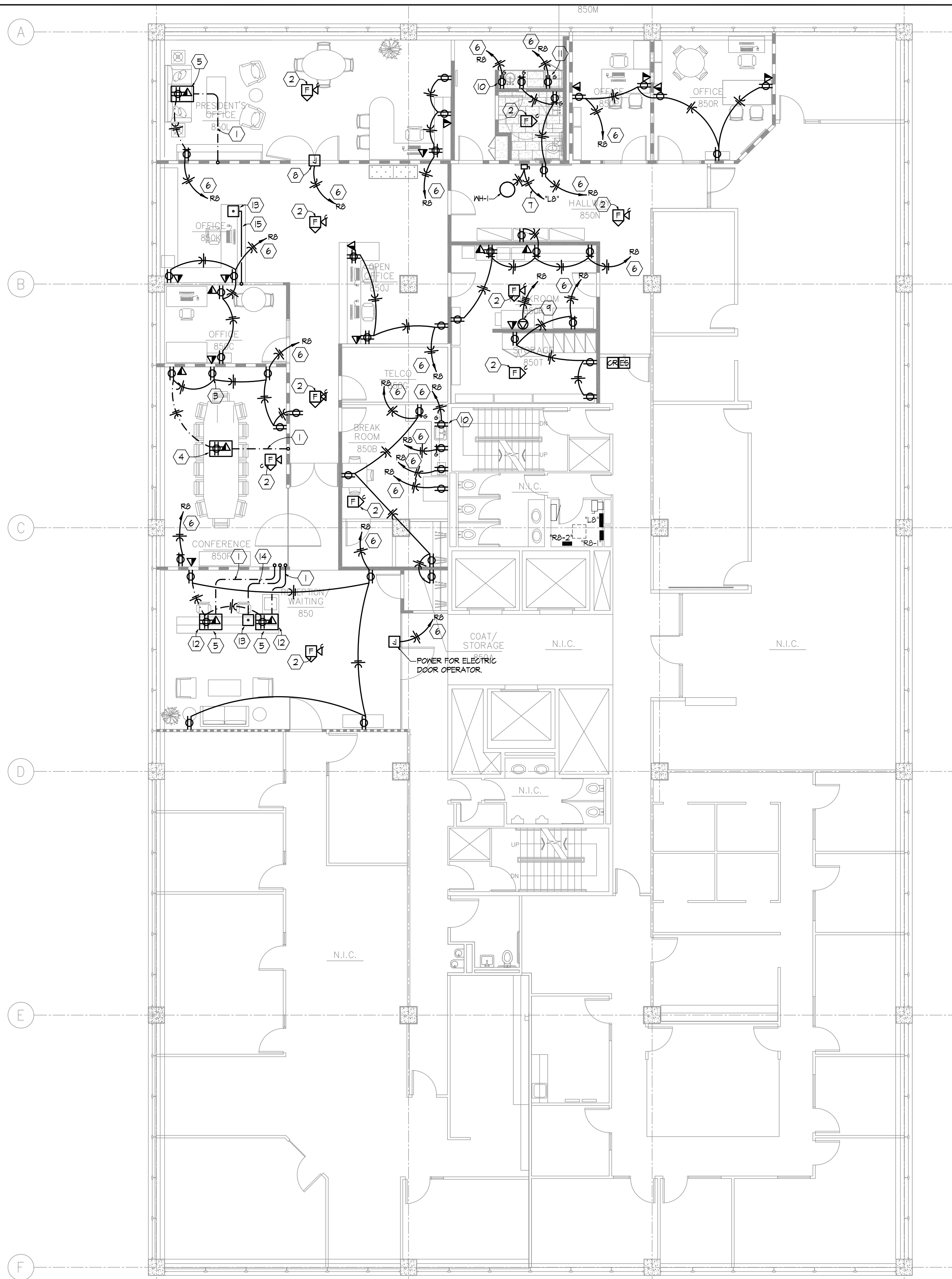
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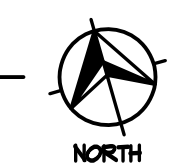


**PLAN NOTES:**

- 1) ROUTE 1" TELECOMMUNICATIONS CONDUIT FROM FLOOR BOX DOWN THROUGH FLOOR IN CEILING BELOW AND UP INTO NEAREST WALL, AS SHOWN. ROUTE TO ABOVE CEILING AND PROVIDE A 90 DEGREE SWEEP WITH BUSHING. PROVIDE WITH FULL STRING.
- 2) PROVIDE AND INSTALL NEW CEILING MOUNTED FIRE ALARM SPEAKER/STROBE OR STROBE (WHICHEVER IS SHOWN). PROVIDE NEW WAG CIRCUIT AND AMPLIFIER CIRCUIT AS REQUIRED OR CONNECT TO EXISTING CIRCUIT IF THERE IS AVAILABLE CAPACITY. PROVIDE ALL NECESSARY CALCULATIONS, ETC. FOR PERMIT.
- 3) PROVIDE POWER FOR NEW TV. COORDINATE RECEPTACLE MOUNTING HEIGHT WITH NEW TV LOCATION.
- 4) RECEPTACLE AND TELECOM OUTLET LOCATED WITHIN CONFERENCE ROOM TABLE. ROUTE CONDUIT AND WIRING UP TO TABLE.
- 5) PROVIDE AND INSTALL NEW FLUSH FLOOR BOX FOR POWER AND DATA OUTLETS. NEW FLOOR BOX SHALL BE WIREMOLD RGA4TGBK WITH (2) 20A RECEPTACLES AND (4) TELECOM JACKS.
- 6) HOMERUN TO PANELBOARD RB LOCATED IN ELECTRICAL ROOM. CONTRACTOR TO DETERMINE QUANTITY OF CIRCUITS AVAILABLE DURING DEMOLITION. PROVIDE NEW 20A, 1P CIRCUIT BREAKER AS REQUIRED.
- 7) PROVIDE AND INTALL NEW 30A DISCONNECT FOR NEW 2.0KW, 217V HOT WATER HEATER. ROUTE HOMERUN TO PANEL LB AND INSTALL NEW 15A, 1P CIRCUIT BREAKER.
- 8) PROVIDE POWER TO NEW ELECTRIC DOOR HOLD OPENS/MAGNETIC LOCK SYSTEM. RE: ARCHITECTURAL SHEET A10B FOR REQUIREMENTS.
- 9) PROVIDE NEW SPECIAL RECEPTACLE FOR COPY MACHINE. PROVIDE ALL CONDUIT, WIRING AND BREAKERS REQUIRED FOR COMPLETE SYSTEM.
- 10) PROVIDE AND INSTALL NEW DEDICATED 6FI RECEPTACLE UNDER SINK FOR NEW INSTANT HOT WATER DISPENSER.
- 11) PROVIDE AND INSTALL NEW DEDICATED 6FI RECEPTACLE UNDER COUNTER FOR NEW REFRIGERATOR.
- 12) COORDINATE FLOOR BOX LOCATION WITH ARCHITECT AND CASEWORK DESIGN TO ENSURE THAT FLOOR BOX REMAINS HIDDEN BEHIND RECEPTION DESK CASEWORK.
- 13) PANIC BUTTON LOCATION. REFER TO MILLWORK DETAILS FOR EXACT LOCATION. PROVIDE LOW VOLTAGE WIRING IN 3/4" CONDUIT FROM PANIC BUTTON TO MAGNETIC DOOR LOCK FOR OFFICE. RE: ARCHITECTURAL SHEET A10B FOR SYSTEM REQUIREMENTS.
- 14) CORE DRILL DOWN TO CEILING BELOW. ROUTE 3/4" CONDUIT FROM PANIC BUTTON THROUGH FLOOR, IN CEILING BELOW, AND UP INTO NEAREST WALL AS SHOWN. ROUTE TO ABOVE CEILING AND PROVIDE A 90 DEGREE SWEEP WITH BUSHING. PROVIDE WITH FULL STRING. COORDINATE CONDUIT AND FLOOR PENETRATION LOCATION WITH ARCHITECT AND RECEPTION DESK CASEWORK DESIGN TO ENSURE THAT CONDUIT REMAINS HIDDEN BEHIND RECEPTION DESK CASEWORK.
- 15) ROUTE 3/4" CONDUIT FROM PANIC BUTTON ALONG UNDERSIDE OF DESK AND UP INTO NEAREST WALL AS SHOWN. ROUTE TO ABOVE CEILING AND PROVIDE A 90 DEGREE SWEEP WITH BUSHING. PROVIDE WITH FULL STRING. COORDINATE CONDUIT LOCATION WITH ARCHITECT AND DESK CASEWORK DESIGN TO ENSURE THAT CONDUIT REMAINS HIDDEN BEHIND DESK CASEWORK.

**GENERAL NOTES:**  
 1) REFERENCE DRAWINGS 61 FOR ADDITIONAL GENERAL NOTES.

**1 8TH FLOOR - POWER NEW WORK**  
 SCALE: 1/8"=1'-0"



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PORTLAND STATE UNIVERSITY  
**MARKET CENTER BUILDING**  
 MARKET CENTER BUILDING  
 8TH FLOOR INTERIOR REMODEL

DATE	DWN. BY	CHK. BY
04/20/2012	DAB	CCM
REVISIONS		



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**SHEET NUMBER**  
**E3**  
 DRAWING TYPE  
 PERMIT SET  
 CAD FILE  
 PROJECT NO.  
 10-2548-O

**1610 - BASIC ELECTRICAL REQUIREMENTS**

1610.01 - DRAWINGS AND SPECIFICATIONS  
THE CONTRACT DRAWINGS FOR DIVISION 16 WORK ARE IN PART SCHEMATIC, INTENDED TO CONVEY THE SCOPE OF WORK. THEY INDICATE THE GENERAL LAYOUT, DESIGN AND ARRANGEMENT. THE CONTRACTOR SHALL FOLLOW THESE DRAWINGS IN THE LAYOUT OF HIS WORK AND SHALL CONSULT GENERAL INTENT CONSTRUCTION DRAWINGS, STRUCTURAL DRAWINGS, MECHANICAL DRAWINGS AND ALL OTHER DRAWINGS FOR THIS PROJECT TO DETERMINE ALL CONDITIONS AFFECTING THE DIVISION 16 WORK.

WHERE SPECIFIC DETAILS AND DIMENSIONS FOR DIVISION 16 WORK ARE NOT SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL TAKE MEASUREMENTS AND MAKE LAYOUTS AS REQUIRED FOR THE PROPER INSTALLATION OF THE WORK AND COORDINATION WITH ALL OTHER WORK ON THE PROJECT. IN CASE OF ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE SPECIFICATIONS THAT HAVE NOT BEEN CLARIFIED BY ADDENDUM PRIOR TO BIDDING, IT SHALL BE ASSUMED BY THE SIGNING OF THE CONTRACT THAT THE HIGHER COST IS INCLUDED IN THE CONTRACT PRICE.

1610.02 - WORK INCLUDED  
THIS WORK SHALL INCLUDE ALL PLANT, LABOR, MATERIAL, AND EQUIPMENT AS REQUIRED TO FURNISH AND INSTALL DIVISION 16 WORK INCLUDING DEMOLITION AS SHOWN ON THE DRAWINGS AND AS HEREINAFTER SPECIFIED. FURNISH AND INSTALL ALL MATERIALS, EQUIPMENT, DEVICES AND ACCESSORIES NOT SPECIFICALLY CALLED FOR BY ITEM BUT THAT ARE NECESSARY TO PROVIDE THE REQUIREMENTS IN OPERATION AND FUNCTION THAT IS ESTABLISHED BY THE DESIGN AND BY THE EQUIPMENT SPECIFIED.

WORK TO INCLUDE THE PROCUREMENT OF AND PAYMENT OF ALL PERMITS AND LICENSES NECESSARY FOR THE PERFORMANCE OF THE WORK. WORK TO INCLUDE ALL FEES AND COSTS DIRECT EXPENSES INVOLVED IN ANY INSPECTIONS REQUIRED FOR THE PROJECT. ALL SCAFFOLDS, STAGING, RUMMYS AND EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE WORK. THE REMOVAL FROM THE PREMISES AS IT ACCUMULATES OF ALL DIRT AND REFUSE RESULTING IN THE PERFORMANCE OF THE WORK.

1610.03 - PROTECTION AND DUST CONTROL  
THE CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION TO PREVENT DAMAGE TO ADJACENT AREAS, EQUIPMENT, OR FURNISHINGS TO PREVENT ACCIDENTAL INJURY TO THE BUILDING OCCUPANTS AND THE PUBLIC, TO PREVENT THE SPREADING OF DUST, DIRT, DEBRIS, AND MOISTURE FROM SETTING ON OR IN THE BUILDING OCCUPANTS FURNISHINGS OR EQUIPMENT.

1610.04 - EXISTING CONDITIONS  
EACH BIDDER SHALL INSPECT THE SITE AS REQUIRED FOR KNOWLEDGE OF EXISTING CONDITIONS AND FAILURE TO OBTAIN SUCH KNOWLEDGE SHALL NOT RELIEVE THE SUCCESSFUL BIDDER OF THE RESPONSIBILITY TO MEET THE EXISTING CONDITIONS IN PERFORMING THE WORK UNDER THE CONTRACT.

WHERE EXISTING POWER, LIGHTING OR CONTROL CIRCUITRY IS BROKEN BY REMOVAL OF EXISTING DEVICES, EQUIPMENT OR FIXTURES, OR BY DEMOLITION WORK, CUTTING OR REMOVAL OF EXISTING BUILDING CONSTRUCTION, AND WHERE THE EXISTING CIRCUITRY IS REQUIRED BY REMAINING DEVICES OR EQUIPMENT TO STAY IN SERVICE, THEN THE CIRCUITRY SHALL BE COMPLETED AS REQUIRED BY JOB CONDITIONS.

1610.05 - MATERIAL AND MANUFACTURE  
ALL MATERIAL AND EQUIPMENT SHALL BE NEW EXCEPT AS STATED OTHERWISE. SHALL BE OF THE BEST QUALITY AND BE FREE FROM DEFECTS AND IMPERFECTIONS. CONDITIONS AND SHALL HAVE MARKINGS OR A NAMEPLATE IDENTIFYING THE MANUFACTURER AND PROVIDING SUFFICIENT REFERENCE TO ESTABLISH QUALITY, SIZE AND CAPACITY.

1610.06 - SUBSTITUTIONS  
ALL PRODUCTS PROPOSED FOR USE, INCLUDING THOSE SPECIFIED BY REQUIRED ATTRIBUTES AND PERFORMANCE, SHALL REQUIRE APPROVAL BY THE ENGINEER BEFORE BEING INCORPORATED INTO THE WORK.

WHERE THE PHRASE 'OR EQUAL' OR 'APPROVED EQUAL' OCCURS IN THE CONTRACT DOCUMENTS, DO NOT ASSUME THAT MATERIALS, EQUIPMENT OR METHODS WILL BE APPROVED AS EQUAL UNLESS THE ITEM HAS BEEN SPECIFICALLY APPROVED FOR THIS WORK BY THE ENGINEER/ARCHITECT.

1610.07 - SAFETY REGULATIONS  
ALL DIVISION 16 WORK SHALL BE PERFORMED IN COMPLIANCE WITH ALL APPLICABLE AND GOVERNING SAFETY REGULATIONS OF THE OCCUPATIONAL AND SAFETY HEALTH ACT.

1610.08 - CODES, ORDINANCES, REGULATIONS AND U.L. APPROVAL  
ALL DIVISION 16 WORK SHALL CONFORM TO THE REQUIREMENTS OF ALL APPLICABLE CODES, ORDINANCES AND REGULATIONS INCLUDING THE CURRENT RULES AND REGULATIONS OF THE NATIONAL ELECTRICAL CODE, THE NATIONAL FIRE PROTECTION ASSOCIATION, OSHA AND ALL STATE AND LOCAL LAWS, CODES AND ORDINANCES.

FIXTURES, APPLIANCES, EQUIPMENT AND MATERIALS WHICH ARE SUBJECT TO UNDERWRITERS LABORATORY TESTING SHALL BEAR SUCH APPROVAL.

1610.09 - OPENINGS IN FIRE RATED ASSEMBLIES  
WHERE OPENINGS ARE MADE, OR LEFT DUE TO CONSTRUCTION THROUGH FIRE RATED ASSEMBLIES FOR CONDUIT OR NIPPLES, FOR SLEEVES CONTAINING CABLE OR WIRE, AND OPEN CONDUITS THROUGH FIRE RATED ASSEMBLIES THE AREA AROUND THE OPENINGS, SLEEVES AND CONDUITS SHALL BE FILLED WITH GELSE TECHNOLOGY CORP. ACTOPF-888 OR DOW CORNING #8-6548 RTV SILICONE OR APPROVED EQUAL, FIRE RESISTANT FOAM SEALANT AS APPROVED BY THE AUTHORITY HAVING JURISDICTION

1610.10 - ROOF PENETRATIONS  
NOT USED ON THIS PROJECT.

1610.11 - EXCAVATION AND BACK FILLING  
NOT USED ON THIS PROJECT.

1610.12 - SHOP DRAWINGS AND SAMPLES  
SUBMIT FOR APPROVAL SIX (6) SETS OF MANUFACTURER'S SHOP DRAWINGS OF ALL MAJOR ITEMS OF EQUIPMENT AND ALL ITEMS REQUIRING COORDINATION BETWEEN CONTRACTORS. ACCEPTANCE OF THE WORK SHALL BE SUBJECT TO THE ENGINEER/ARCHITECT'S APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. SHOP DRAWINGS SHALL INCLUDE MANUFACTURER'S DETAIL DRAWINGS OF EQUIPMENT AND MATERIAL AND CONTRACTORS SHOP DETAILS FOR INSTALLATION OF MATERIAL AND EQUIPMENT. DESCRIPTIVE LITERATURE SHALL INCLUDE CATALOG DATA COVERING DESIGN, SIZE AND CAPACITY OF MATERIAL AND EQUIPMENT. SUBMITTALS SHALL INCLUDE THE MANUFACTURER'S MODEL NUMBER, CAPACITY, PERFORMANCE DATA, ELECTRICAL CHARACTERISTICS, ETC., ALL CLEARLY SHOWN AND MARKED FOR THE SPECIFIC ITEM OF EQUIPMENT BEING FURNISHED ON THIS PROJECT.

1610.13 - RECORD DRAWINGS  
THE CONTRACTOR SHALL KEEP DAY-TO-DAY RECORD OF ALL CHANGES OR VARIATIONS MADE FROM THE CONTRACT DOCUMENTS AND AT THE END OF THE PROJECT SHALL PROVIDE THE OWNER/ARCHITECT/ENGINEER WITH REPRODUCIBLE SETS AS REQUESTED.

1610.14 - WIRING OF MECHANICAL EQUIPMENT  
FURNISH AND INSTALL ALL POWER WIRING, AND ALL CONTROL AND INTERLOCK WIRING OF ALL UNITS, PUMPS, FANS, WATER HEATERS, ETC. CONNECT PER MANUFACTURER'S WIRING DIAGRAMS. FURNISH AND INSTALL ALL NECESSARY DISCONNECT SWITCHES REQUIRED. AFTER INSTALLATION OF THE CONTROL INTERLOCK WIRING, THE CONTRACTOR SHALL VERIFY THAT EACH MOTOR LOAD HAS THE CORRECT PHASE ROTATION. THIS CONTRACTOR SHALL VERIFY THE ACTUAL WIRE SIZING AMPS FOR MECHANICAL EQUIPMENT FROM THE EQUIPMENT NAMEPLATE. ELECTRICAL INSTALLATION SHALL BE BASED ON ACTUAL REQUIRED AMPERAGES WHICH MAY VARY SLIGHTLY FROM THE WIRE AND EQUIPMENT SIZES SHOWN ON THE DRAWINGS. PROPERLY SIZED ELECTRICAL WIRING AND EQUIPMENT SHALL BE FURNISHED WITHOUT EXTRA COST TO THE CONTRACTOR. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ALL CHANGES TO BE MADE IN THE ELECTRICAL INSTALLATION DUE TO EQUIPMENT VARIANCES THAT THE IMPACT ON FEEDERS, PANELS, FUSE AND BREAKER SIZES CAN BE CHECKED PRIOR TO THE INSTALLATION.

1610.15 - WIRING OF THERMOSTATS AND TEMPERATURE CONTROLS  
NOT USED ON THIS PROJECT.

1610.16 - TELEPHONE SYSTEM PROVISIONS  
CONTRACTOR TO PROVIDE ALL RACEWAYS AND GANG BOXES AS SHOWN ON THE CONTRACT DOCUMENTS WITH FULL STRING. INSTALLATION OF WIRING, DEVICES, PLATES, ETC. BY PORTLAND STATE UNIVERSITY. CONTACT DAN WALSH AT (503) 725-3310 PRIOR TO INSTALLATION OF ANY RACEWAY AND TO COORDINATE WORK.

1610.17 - DATA SYSTEM PROVISIONS  
CONTRACTOR TO PROVIDE ALL RACEWAYS AND GANG BOXES AS SHOWN ON THE CONTRACT DOCUMENTS WITH FULL STRING. INSTALLATION OF WIRING, DEVICES, PLATES, ETC. BY PORTLAND STATE UNIVERSITY. CONTACT DAN WALSH AT (503) 725-3310 PRIOR TO INSTALLATION OF ANY RACEWAY AND TO COORDINATE WORK.

**1610 - BASIC ELECTRICAL REQUIREMENTS (CONTINUED)**

1610.18 - ADJUSTING ALIGNMENT AND TESTING  
ALL ELECTRICAL EQUIPMENT ON THIS PROJECT FURNISHED UNDER THIS DIVISION AND ALL ELECTRICAL EQUIPMENT FURNISHED BY OTHERS SHALL BE ADJUSTED, ALIGNED AND TESTED FOR PROPER OPERATION BY THE ELECTRICAL CONTRACTOR. COMPLETE WIRING CIRCUITS SHALL BE FREE FROM SHORT CIRCUITS. ALL MOTORS SHALL BE VERIFIED FOR PROPER PHASE ROTATION. THE CONTRACTOR SHALL PROVIDE TEST DATA READINGS AS REQUESTED OR AS NOTED. THE CONTRACTOR SHALL HAVE THE FOLLOWING READILY ACCESSIBLE AT ALL TIMES DURING THIS PROJECT: A TRUE RMS READINGS VOLTMETER, A TRUE RMS READINGS AMPMETER, AND A MEGGER INSULATION RESISTANCE METER.

1610.19 - OPERATION AND MAINTENANCE INSTRUCTIONS  
SUBMIT TO THE ARCHITECT THREE COPIES EACH OF MATERIAL FOR MAINTENANCE AND OPERATION INSTRUCTION MANUALS, APPROPRIATELY BOUND INTO MANUAL FORM INCLUDING APPROVED COPIES OF THE FOLLOWING, REVISED IF NECESSARY: TO SHOWN SYSTEM AND EQUIPMENT AS ACTUALLY INSTALLED. MANUFACTURER'S CATALOG SHEETS, WIRING DIAGRAMS, MAINTENANCE INSTRUCTIONS, OPERATING INSTRUCTIONS, PARTS LIST. CONTRACTOR SHALL ALSO PROVIDE ADEQUATE VERBAL INSTRUCTIONS OF SYSTEM OPERATION TO OWNERS REPRESENTATIVE AT THE TERMINATION OF THE WORK.

1610.20 - STARTUP OF SYSTEMS  
PRIOR TO STARTUP OF THE ELECTRICAL SYSTEMS, THE CONTRACTOR SHALL CHECK ALL COMPONENTS AND DEVICES, LUBRICATE ITEMS ACCORDINGLY, AND TIGHTEN ALL SCREWED AND BOLTED CONNECTIONS. ADJUST TAPS ON EACH TRANSFORMER FOR RATED SECONDARY VOLTAGE. CHECK SERVICE ENTRANCE VOLTAGE, GROUNDING CONDITIONS, GROUNDING RESISTANCE AND PROPER PHASING. BALANCE SINGLE PHASE LOADS AT EACH PANELBOARD, REDISTRIBUTING BRANCH CIRCUIT CONNECTIONS UNTIL BALANCE IS ACHIEVED. AFTER ALL SYSTEMS HAVE BEEN INSPECTED AND ADJUSTED, COVER ALL OPERATING FEATURES REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND MAKE FINAL ADJUSTMENTS AS NECESSARY.

1610.21 - GUARANTEE  
GUARANTEE AGAINST WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL PAYMENT. GUARANTEE SHALL INCLUDE MATERIAL TO BE REPLACED AND ALL LABOR REQUIRED.

**1610 - ELECTRICAL IDENTIFICATION**

1610.401 - DESCRIPTION OF WORK  
PROVIDE AND INSTALL REQUIRED IDENTIFICATION FOR THE SYSTEMS AND EQUIPMENT SHOWN ON THE DRAWINGS AND/OR SPECIFIED.

CABLE/CONDUIT IDENTIFICATION BANDS: MANUFACTURER'S STANDARD VINYL, SELF-ADHESIVE SELF LAMINATING CABLE/CONDUIT MARKERS, WRAP AROUND TYPE; PRE-NUMBERED PLASTIC COATED, OR WRITE-ON TYPE WITH CLEAR PLASTIC SELF-ADHESIVE COVER FLAP, LETTERING TO SHOW CIRCUIT IDENTIFICATION. SIMILAR TO PANDUIT "INSTACODE" OR ACCEPTED EQUIVALENT BY TAB OR TYTAN.

SELF-ADHESIVE PLASTIC SIGNS: MANUFACTURER'S STANDARD, SELF ADHESIVE, PRE-PRINTED, FLEXIBLE VINYL SIGNS FOR OPERATIONAL INSTRUCTIONS OR WARNINGS. THESE SHALL ALSO BE USED AT EACH RECEPTACLE STATING PANEL, NAME AND CIRCUIT NUMBER (EX. 3B-24).

DANGER SIGNS: MANUFACTURER'S STANDARD 'DANGER' SIGNS, BAKED ENAMEL FINISH ON 20 GAUGE STEEL; STANDARD RED, BLACK AND WHITE GRAPHICS.

PANELBOARD DIRECTORY CARD: FIBERBOARD NEATLY TYPED FOR NEWLY INSTALLED PANELS.

**1610 - RACEWAYS**

1610.01 - DESCRIPTION OF WORK  
INSTALLATION OF RACEWAY SYSTEMS FOR ALL WORK IN DIVISION 16 INCLUDING REQUIRED FITTINGS AND SUPPORTS.

ALL CONDUCTORS SHALL BE INSTALLED IN METALLIC CONDUIT UNLESS SPECIFIED.

1610.02 - PRODUCTS  
ALL CONDUIT SHALL BE ELECTRICAL METALLIC TUBING (EMT), EXCEPT CONDUIT LARGER THAN 4" DIAMETER. CONDUIT OUTDOORS OR IN WET OR DAMP LOCATIONS OR IN NEG CLASSIFIED HAZARDOUS LOCATIONS, CONDUIT IN EARTH, BELOW GRADE OR IN SLAB, AND EXCEPT AS OTHERWISE NOTED ON THE DRAWINGS OR SPECIFIED OTHERWISE.

ELECTRICAL METALLIC TUBING TO BE THREADESS, STEEL, TYPE CONFORMING TO ANSI STANDARD C80.3, NEG 3/8", AND U.L. 741, GALVANIZED INSIDE AND OUT.

ALL EMT FITTINGS TO BE COMPRESSION TYPE UNLESS OTHERWISE NOTED.

ALL UNDERGROUND OR IN SLAB CONDUIT SHALL BE RIGID. INCASE EACH UNDERGROUND CONDUIT IN CONCRETE AS INDICATED ON THE ARCHITECTURAL DRAWINGS.

SHORT SECTIONS OF FLEXIBLE CONDUIT (GREENFIELD) SHALL BE USED FROM JUNCTION OR OUTLET BOXES TO LIGHTING FIXTURES AS PERMITTED BY THE NATIONAL ELECTRICAL CODE. CONNECTIONS FROM OUTLET BOXES ABOVE CEILING TO FLUORESCENT FIXTURES RECESSED IN CEILING SHALL BE MADE WITH FLEXIBLE METALLIC STEEL. CONDUIT NOT TO EXCEED 6 FEET IN LENGTH. FINAL CONNECTIONS TO MOTORS, TRANSFORMERS AND TO ANY PIECE OF EQUIPMENT THAT WILL TRANSMIT MOTION, NOISE OR VIBRATION, SHALL BE FLEXIBLE METAL CONDUIT. FLEXIBLE CONDUIT SHALL NOT BE INSTALLED OUTDOORS OR IN DAMP LOCATIONS.

LIQUID TIGHT FLEXIBLE STEEL CONDUIT SHALL BE USED WHEN MAKING CONNECTIONS IN THE FOLLOWING CONDITIONS: EXPOSED TO LIQUIDS, EXPOSED TO VAPORS, EXPOSED TO SLOPHEAT.

1610.03 - INSTALLATION  
CONDUITS SHALL BE RUN PARALLEL AND PERPENDICULAR TO BUILDING LINES AND SHALL BE RUN AGAINST THE STRUCTURE IN A NEAT WORKMANLIKE MANNER.

CONDUIT SHALL BE INSTALLED CONCEALED ABOVE SUSPENDED CEILING OR CONCEALED IN WALLS OR FLOORS WHEREVER POSSIBLE. CONDUIT SHALL BE INSTALLED TO CLEAR ALL OPENINGS, DEPRESSIONS, PIPES, DUCTS, REINFORCING STEEL, ETC. ALL CONDUIT SHALL BE RUN OVERHEAD. CONDUIT SHALL BE RUN CONTINUOUS BETWEEN CONNECTIONS TO OUTLET BOXES AND CABINETS WITH MINIMUM POSSIBLE NUMBER OF BENDS. RADIUS OF BENDS SHALL BE AS LONG AS POSSIBLE AND NEVER SHORTER THAN THE CORRESPONDING TRADE ELBOW. LONG RADIUS ELBOWS SHALL BE USED WHERE NECESSARY. CONDUITS SHALL BE SECURELY FASTENED IN PLACE WITH APPROVED STRAPS, HANGERS AND STEEL SUPPORTS AS REQUIRED. SINGLE CONDUITS FOR FEEDERS SHALL BE HUNG WITH MALLEABLE SPILT RING HANGERS WITH ROP AND TURNBUCKLE SUSPENSION FROM INSERTS SPACED NOT OVER 10 FEET APART FROM CONSTRUCTION ABOVE. GROUPS OF HORIZONTAL FEEDER CONDUITS SHALL BE CLAMPED TO UNIDRIST STEEL CHANNELS AND SUSPENDED FROM INSERTS NOT SPACED OVER 10 FEET APART IN CONSTRUCTION ABOVE. HORIZONTAL FEEDER CONDUITS SHALL BE CLAMPED TO STRUCTURAL STEEL MEMBERS ATTACHED TO THE STRUCTURE. CABLE CLAMPS SHALL BE INSTALLED FOR SUPPORT OF VERTICAL FEEDERS WHERE REQUIRED. CONDUIT SUPPORTS SHALL BE ADDED WITHIN 12" AT ONE END OF ALL BENDS. CONDUIT SHALL NOT BE SUSPENDED FROM SUSPENDED CEILING COMPONENTS.

CONDUIT ENDS SHALL BE REAMED BEFORE INSTALLATION AND ALL CONDUIT SHALL BE THOROUGHLY CLEANED BEFORE INSTALLATION AND KEEP CLEAN AFTER INSTALLATION. PLUS CONDUIT AND BOXES AS REQUIRED DURING CONSTRUCTION TO KEEP CONDUIT CLEAN.

CONDUIT SHALL BE OF AMBLE SIZE TO FILL CONDUCTORS AND NOT SMALLER THAN THE CODE REQUIRED. MINIMUM SIZE CONDUIT SHALL BE 1/2" FOR THIS PROJECT.

WHERE BUILDING EXPANSION JOINTS ARE SHOWN ON THE DRAWINGS PROVIDE PROPER CONDUIT EXPANSION FITTINGS.

INSTALL A FILL WIRE IN EACH EMPTY CONDUIT WHICH IS LEFT BY THE CONTRACTOR.

ALL CONDUITS AND/OR SURFACE RACEWAYS SHALL BE PAINTED WHERE INSTALLED EXPOSED IN FINISHED SPACES. PAINTING OF SURFACE RACEWAYS SHALL BE AS DIRECTED BY THE ENGINEER/ARCHITECT.

**1610 - CONDUCTORS (LOW VOLTAGE, 600 VOLTS)**

1610.01 - DESCRIPTION OF WORK  
FURNISH AND INSTALL 600 VOLT CONDUCTORS AND ASSOCIATED SPLICES, CONNECTORS AND TERMINATIONS FOR LIGHTING, POWER AND AUXILIARY SYSTEMS AS SHOWN ON THE CONTRACT DOCUMENTS.

1610.02 - MATERIAL  
#84 CONDUCTIVITY COPPER, NEG TYPE THIN/THIN (90 C DRY/75 C WET) WITH UL LABEL. ALL CONDUCTORS TO BE IN CONDUIT.

SINGLE CONDUCTOR, STRANDED (ALL SIZES), SOFT ANNEALED COPPER CONDUCTORS WITH 600 VOLT THERMOPLASTIC INSULATION AND NYLON JACKET.

WIRE SMALLER THAN #12 GAUGE SHALL NOT BE USED UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS OR IN THESE SPECIFICATIONS.

WIRE INSULATION SHALL BE COLOR COATED AS FOLLOWS OR PER LOCAL ORDINANCES:  
120/240V - A-BLACK, B-RED, C-BLANK, NEUTRAL-WHITE, G-GREEN  
120/208V - A-BLACK, B-RED, C-BLUE, NEUTRAL-WHITE, G-GREEN  
277/480V - A-BROWN, B-ORANGE, C-YELLOW, NEUTRAL-GRAY, G-GREEN

BLACK INSULATION IS ACCEPTABLE FOR #6 WIRE AND LARGER. CONDUCTOR ENDS SHALL BE WRAPPED WITH COLORED TAPE AS INDICATED ABOVE.

IF NO WIRE SIZE IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE #12 AWG WIRE AND A 20A CIRCUIT BREAKER. CONTROL WIRING SHALL HAVE 600V INSULATION AND BE OF THE PROPER TYPE, SIZE AND NUMBER REQUIRED TO ACCOMPLISH SPECIFIED FUNCTION.

1610.03 - INSTALLATION  
ALL WIRING SHALL BE INSTALLED IN APPROVED RACEWAYS OR ENCLOSURES. WIRE IN CONDUIT SHALL RAN CONTINUOUS WITHOUT SPLICES OR TAPS. ALL SPLICES OR TAPS SHALL OCCUR IN APPROVED BOXES AND ENCLOSURES AND SHALL BE KEPT TO A MINIMUM, AND SHALL BE MADE WITH APPROVED SOLDERLESS CONNECTIONS. ALL SPLICES, TAPS AND JOINTS SHALL BE INSULATED PER THE NATIONAL ELECTRICAL CODE. ALL MATERIALS USED TO TERMINATE SPLICE OR TAP CONDUCTORS SHALL BE DESIGNED FOR PROPER SIZE FOR, AND UL LISTED FOR THE SPECIFIC APPLICATION AND CONDUCTORS INVOLVED AND SHALL BE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING THE MANUFACTURER'S RECOMMENDED TOOLS.

WHERE WIRE IS TO BE INSTALLED, BUT THE CONNECTION IS INDICATED 'FUTURE' OR 'BY OTHERS', THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 3 FEET OF 'PITAL' AT THE BOX. TAPE ALL CONDUCTOR ENDS AND COVER THE BOX.

VOLTAGE DROP IN BRANCH CIRCUITS SHALL NOT EXCEED 2%. ALL BRANCH CIRCUITS SHALL HAVE EQUIPMENT GROUNDING CONDUCTOR'S AND SHALL BE SIZED PER NEG TABLE 250-48.

**1610 - OUTLET BOXES, JUNCTION BOXES AND WIRING BODIES/SUITERS**

1610.01 - DESCRIPTION OF WORK  
FURNISH AND INSTALL OUTLET BOXES, FLOOR BOXES, FIBL BOXES, JUNCTION BOXES AND WIRING SUITERS AS SHOWN ON THE CONTRACT DOCUMENTS OR AS REQUIRED.

1610.02 - OUTLET/JUNCTION BOXES  
PROVIDE WIRING DEVICES, FIXTURES AND SPECIAL SYSTEM DEVICES WITH OUTLET BOX. USE GALVANIZED STEEL BOXES CONFORMING TO UL STANDARD 514A FOR CONCEALED AND EXPOSED DRY LOCATIONS. ALL BOXES SHALL HAVE MATCHING COVER PLATES.

USE 1/16" THICK STEEL BOXES AND COVERS OF FORM AND DIMENSION ADAPTED TO ITS SPECIFIC USE AND LOCATION. KIND OF FIXTURE OR DEVICE TO BE USED AND NUMBER, SIZE AND ARRANGEMENT OF CONNECTION CONDUITS AND NUMBER OF WIRES IN OUTLET, ALL IN ACCORDANCE WITH THE NEC. ALL BOXES SHALL BE SET IN WALLS, COLUMNS, FLOORS, OR CEILING'S SO AS TO BE FLUSH WITH THE FINISHED SURFACE AND BE ACCURATELY SET AND RIGIDLY SECURED IN POSITION. PROVIDE PLASTER RINGS, EXTENSION RINGS AND MASONRY RINGS AS REQUIRED FOR FLUSH MOUNTING.

MANUFACTURER'S: NATIONAL ELECTRICAL, APPLETON, STEEL CITY OR RAGO

1610.03 - LARGE PULL BOXES  
FURNISH FULL TAP AND CABLE SUPPORT BOXES REQUIRED BY THE NEG FOR EXCESSIVE NUMBER OF 90 DEGREE CONDUIT BENDS, CONDUIT TAPS AND CABLE SUPPORTS.

BOX CONSTRUCTION PER NEG AND CONFORMING TO UL STANDARD #50. BOX TO BE MANUFACTURED WITH MINIMUM 12 GAUGE GALVANIZED STEEL.

PROVIDE SEPARATE PULL BOX FOR EACH FEEDER.

BOXES LOCATED IN DAMP OR WET LOCATIONS SHALL BE WELDED CONSTRUCTION AND FINISHED WITH INSIDE AND GRAY OUTSIDE WITH WATERPROOF PAINT. PROVIDE GASKETED DOOR AND CORNERS. PROVIDE RAIN DRIP SHIELDS. BOXES SHALL CARRY NEMA 3R (WEATHERPROOF) OR NEMA 4 (WATERTIGHT) LABELS AS SPECIFIED.

ACCEPTABLE MANUFACTURERS: HOFFMAN, KEYSTONE, BURNS

1610.04 - CONDUIT BODIES  
CONDUIT BODIES SHALL BE INSTALLED TO PROVIDE EASE OF CONDUCTORS AND TO PROVIDE NEAT APPEARANCE TO CONDUIT INSTALLATION, AND AS SHOWN ON THE DRAWINGS. CONDUIT BODIES SHALL BE CONSTRUCTED OF MALLEABLE IRON OR COPPER FREE ALUMINUM CASTINGS. BODIES SHALL BE FINISHED WITH STANDARD DURABLE EXTERIOR COATINGS OF MANUFACTURER SPECIFIED. PROVIDE ROLLERS IN TYPE 'C' AND TYPE 'LB' BODIES, 1/4" SIZE AND LARGER. PROVIDE GASKETED PLATED STEEL OR MALLEABLE IRON COVERS.

ACCEPTABLE MANUFACTURERS: CROUSE-HINDS, KILLARK, APPLETON

1610.05 - SUITERS (WIREWAYS)  
8"x8" AND SMALLER - USE STANDARD ASSEMBLY CONSISTING OF CODE GAUGE GALVANIZED OR PAINTED STEEL AND COMBINATION HINGED/SCREWED COVERS.

ACCEPTABLE MANUFACTURERS - SQUARE-D, GENERAL ELECTRIC, WALKER ELECTRIC, B4 C STAMPING CO.

1610.06 - SURFACE METAL RACEWAYS  
COMPLY WITH STANDARD UL-9 'SURFACE METAL RACEWAYS AND FITTINGS'.

RACEWAY MATERIAL - METAL WITH MANUFACTURER'S STANDARD CORROSION RESISTANT FINISH.

WHERE INDICATED ON THE DRAWINGS, WIRING SHALL BE RUN IN EXPOSED METAL RACEWAYS, COMPLETE WITH OUTLET BOXES, FITTINGS, DIVIDERS, ETC. ALL CIRCUITS RUN IN SURFACE METAL RACEWAYS SHALL HAVE GROUND CONDUCTOR WITH GREEN INSULATION SIZED PER NEG, BUT NOT SMALLER THAN #12 AWG SCREEN CONNECTED TO EACH OUTLET BOX.

ACCEPTABLE MANUFACTURERS - WIREMOLD 640000 AND 660000, EQUAL PANDUIT

**1610 - SWITCHES AND RECEPTACLES**

1610.01 - DESCRIPTION OF WORK  
FURNISH AND INSTALL DEVICES AND ASSOCIATED DEVICE PLATES AS SHOWN ON THE DRAWINGS. ALL OUTLETS AND SWITCHES SHALL BE OF THE SAME MANUFACTURER. COLORS OF SWITCHES AND RECEPTACLES SHALL BE AS REQUESTED BY THE ARCHITECT.

1610.02 - DEVICES  
FURNISH AND INSTALL DEVICES AND ASSOCIATED DEVICE PLATES AS SHOWN ON THE DRAWINGS. ALL OUTLETS AND SWITCHES SHALL BE OF THE SAME MANUFACTURER. COLORS OF SWITCHES AND RECEPTACLES SHALL BE AS REQUESTED BY THE ARCHITECT.

STANDARD RECEPTACLES, UNLESS OTHERWISE NOTED, SHALL BE 3 WIRE GROUNDED TYPE, NEMA CONFIGURATION 5-20R, DUPLEX RECEPTACLE RATED AT 20 AMPS AT 125VAC. RECEPTACLES TO COMPLY WITH UL STANDARD 44B AND FEDERAL SPECIFICATION W-C-546. PASS AND SEYMOUR #9582.

GROUND-FAULT INTERRUPTER (GFI) RECEPTACLES: UL STANDARD 948, 'GROUND FAULT INTERRUPTERS', FEED-THROUGH TYPE, WITH INTEGRAL NEMA 5-20R DUPLEX RECEPTACLE. ARRANGE THE GFI RECEPTACLE TO PROTECT CONNECTED DOWNSTREAM RECEPTACLES ON THE SAME CIRCUIT AS SHOWN OR AS REQUIRED. PASS AND SEYMOUR #2041.

CORD AND PLUG SETS: MATCH VOLTAGE AND CURRENT RATINGS AND THE NUMBER OF CONDUCTORS TO THE REQUIREMENTS OF THE EQUIPMENT BEING CONNECTED. THE CORD SHALL BE RUBBER INSULATED, STRANDED COPPER CONDUCTORS, WITH TYPE 50M-A JACKET.

SNAP SWITCHES: QUIET TYPE A.C. SWITCHES LISTED AND LABELED TO COMPLYING WITH UL STANDARD 20 'GENERAL USE SNAP SWITCHES', AND FEDERAL SPECIFICATION W-5-546. SINGLE POLE SWITCH, PASS AND SEYMOUR #20A31. THREE WAY SWITCH, PASS AND SEYMOUR #20A23. KEY SWITCH, PASS AND SEYMOUR #20A2C-L.

1610.03 - ACCEPTABLE MANUFACTURERS  
PASS AND SEYMOUR/LEGRAND  
HEBELLL  
LEVITON  
BRYANT  
EASLE

1610.04 - DEVICE PLATES  
FURNISH AND INSTALL ALL DEVICE COVER PLATES, #16 SIERRA SATIN STAINLESS STEEL. VERIFY COLOR AND MATERIAL WITH THE ARCHITECT BEFORE INSTALLATION. SWITCH PLATES IN UNFINISHED ROOMS SHALL BE STAMPED STEEL PLATES, CADMIUM PLATED.

DEVICE PLATE SHALL BE MANUFACTURED BY THE DEVICE MANUFACTURER WHERE APPLICABLE.

FURNISH WEATHER PROOF DEVICES WITH INDIVIDUAL GASKETED ALUMINUM OR STAINLESS STEEL COVERS.

1610.01 - DESCRIPTION OF WORK  
FURNISH AND INSTALL SAFETY SWITCHES, DISCONNECTS AND SEPARATELY MOUNTED ENCLOSED CIRCUIT BREAKERS RATED TO 1200 AMPERES, 600 VOLTS AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.

1610.05 - INSTALLATION  
INSTALL DEVICES VERTICAL, 48" AFF FOR SWITCHES AND 18" AFF FOR RECEPTACLES UNLESS OTHERWISE SHOWN. DEVICES SHALL BE INSTALLED PLUMB AND SECURE ON ALL SIDES. INSTALL RECEPTACLES WITH GROUND SLOT DOWN.

**1610 - DISCONNECTS (MOTOR CIRCUIT AND SEPARATE CIRCUIT BREAKERS)**

1610.01 - DESCRIPTION OF WORK  
FURNISH AND INSTALL SAFETY SWITCHES, DISCONNECTS AND SEPARATELY MOUNTED ENCLOSED CIRCUIT BREAKERS RATED TO 1200 AMPERES, 600 VOLTS AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.

1610.02 - STANDARDS  
UL STANDARD 98  
NEMA STANDARD KSI-1883 FOR ENCLOSED SWITCHES  
NEMA A81-196 FOR MOLD CASE CIRCUIT BREAKERS AND SWITCHES

1610.03 - DISCONNECT SWITCHES  
DISCONNECT SWITCHES SHALL BE HEAVY DUTY, RATED FOR 250 OR 600 VOLTS AS REQUIRED. SWITCHES SHALL BE QUICK-MAKE QUICK-BREAK OPERATION AND HOSEPOWER RATED. THE OPERATING HANDLE SHALL BE INTERLOCKED WITH THE SWITCH DOOR TO PREVENT OPENING OF THE DOOR WITH THE SWITCH CLOSED. PROVIDE MECHANICAL OVERRIDE FOR AUTHORIZED PERSONNEL TO OPEN THE SWITCH DOOR WITHOUT OPERATING THE SWITCH HANDLE.

SWITCHES SHALL BE FUSIBLE OR NON-FUSIBLE AS SHOWN. FURNISH ONE TIME, DUAL ELEMENT, CLASS K3, REJECTION TYPE FUSES FOR EACH FUSIBLE POSITION, RATINGS AS SHOWN. FURNISH 3 SPARE FUSES FOR EACH RATING.

FUSIBLE SWITCHES LARGER THAN 600 AMPS SHALL BE SUITABLE FOR CLASS L FUSES. FUSES SERVING PREDOMINANTLY MOTOR OR TRANSFORMER LOADS SHALL BE DUAL ELEMENT, TIME DELAY TYPE OTHERWISE NON-TIME DELAY FAST ACTING TYPE IS REQUIRED. FUSES SHALL BE CURRENT LIMITING WITH 200,000A/C.

FURNISH SOLID NEUTRAL FOR EACH SWITCH BEING INSTALLED IN A CIRCUIT WHICH INCLUDES A NEUTRAL CONDUCTOR. FURNISH A GROUNDING PAD FOR CONNECTION OF CIRCUIT GROUND WIRES.

PROVIDE MECHANICAL LUGS AND POWER DISTRIBUTION CONNECTIONS FOR NUMBER, SIZE, AND MATERIAL OF CONDUCTORS AS INDICATED ON THE DRAWINGS.

ACCEPTABLE FUSE MANUFACTURERS

BUSHMAN  
LITTLEFUSE  
CHASE SHANNUT

THE DISCONNECT SWITCH SHALL BE FURNISHED WITH PROVISIONS FOR LOCKINGS WITH A PADLOCK. ENCLOSURES FOR SWITCHES TO BE NEMA 1, GENERAL PURPOSE INDOOR, OR NEMA 3R OR 4 FOR OUTDOOR LOCATIONS, MATERTIGHT.

ACCEPTABLE SWITCH MANUFACTURERS

SQUARE-D  
SIEMENS  
GENERAL ELECTRIC  
CUTLER HAMMER/VESTINGHOUSE

1610.04 - SEPARATELY MOUNTED CIRCUIT BREAKERS  
FURNISH AND INSTALL SEPARATELY MOUNTED CIRCUIT BREAKERS FOR OVERCURRENT PROTECTION OF FEEDERS AND BRANCH CIRCUITS WHERE SHOWN ON THE DRAWINGS.

CIRCUIT BREAKERS SHALL BE THERMAL-MAGNETIC, MOLDED CASE TYPE, RATED FOR 600 VOLTS. THE INTERRUPT RATINGS SHALL BE AS SHOWN OR ON THE DRAWINGS. IF NO INTERRUPT RATINGS ARE SHOWN ON THE DRAWINGS THEY SHALL BE RATED FOR 100,000A/C.

ENCLOSURES FOR INDIVIDUAL CIRCUIT BREAKERS TO BE NEMA 1, GENERAL PURPOSE INDOOR, OR NEMA 3R OR 4 FOR OUTDOOR LOCATIONS, MATERTIGHT.

ACCEPTABLE CIRCUIT BREAKER MANUFACTURERS

SQUARE-D  
SIEMENS  
GENERAL ELECTRIC  
CUTLER HAMMER/VESTINGHOUSE

**1610 - GROUNDING**

1610.01 - DESCRIPTION OF WORK  
THIS SECTION INCLUDES GROUNDING OF ELECTRICAL SYSTEMS AND EQUIPMENT AND BASIC REQUIREMENTS FOR GROUNDINGS FOR PROTECTION OF LIFE, EQUIPMENT, CIRCUITS, AND SYSTEMS.

1610.02 - STANDARDS  
NFPA 70, ARTICLE 250 - GROUNDING  
IEEE STANDARD 142 (GREEN BOOK)

1610.03 - ELECTRICAL SYSTEM AND EQUIPMENT GROUNDING  
ALL PRODUCTS SHALL BE UL LISTED AND LABELED.

BOND THE GROUND MAIN SERVICE NEUTRAL, CABINETS, EQUIPMENT, CONDUITS, ETC. PER LATEST EDITION OF THE NEG AND AS SHOWN ON THE DRAWINGS, AND SPECIFIED HEREIN.

GROUND CONDUCTORS SHALL BE #84 CONDUCTIVITY COPPER. OTHER CONDUCTOR REQUIREMENTS SHALL BE THE SAME AS DESCRIBED FOR LOW VOLTAGE, 600 VOLT, CONDUCTORS AND SPECIFIED HEREIN.

ALL CONDUIT SYSTEMS, BOXES, ELECTRICAL EQUIPMENT, ENCLOSURES, MOTOR FRAMES, ETC. SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NEG, LOCAL AUTHORITIES AND AS SPECIFIED.

A SEPARATE EQUIPMENT GROUND CONDUCTOR SHALL BE INSTALLED INSIDE OF EACH CONDUIT RUN FOR GROUNDING ALL CIRCUITS ABOVE 48 VOLTS. THE METALLIC CONDUIT SHALL NOT BE USED AS A GROUNDING CONDUCTOR.

GROUND WIRE SIZE THRU #10 SHALL BE STRANDED COPPER, GREEN TYPE THIN TS DEGREE C INSULATION. GROUND WIRES ZED #8 AND LARGER SHALL BE STRANDED COPPER, TYPE THWN OR THW WITH GREEN INSULATION OR GREEN TRACER.

GROUNDING CONDUCTORS IN CONTACT WITH EARTH SHALL BE SOLID BARE TINNED COPPER.

NO ELECTRICAL SYSTEM NEUTRAL SHALL BE USED AS A EQUIPMENT GROUND.

GROUND WIRES SHALL BE RAN CONTINUOUS FROM TERMINATION POINT TO TERMINATION POINT WITHOUT SPLICES.

ALL OUTLET BOXES AND JUNCTION BOXES, DISCONNECTS, ETC. SHALL BE GROUNDED. THE GROUND WIRE TERMINAL OF EACH DEVICE SHALL BE CONNECTED TO THE GROUND CONDUCTOR.

ALL METAL ENCLOSURES FOR ELECTRICAL DISTRIBUTION AND CONTROLS, ALL METAL EQUIPMENT SUPPORTS FOR ELECTRICAL CONTROLS AND ALL SIMILAR ITEMS SHALL BE CONNECTED TO THE GROUND SYSTEM.

FLEXIBLE CONDUIT SHALL BE BONDED AND GROUNDED IN ACCORDANCE WITH THE NEG.

ALL FLEXIBLE CONDUITS WITH CIRCUITS CONTAINING AN AMPACITY GREATER THAN 20 AMPS SHALL INCLUDE A GROUND WIRE AS WELL AS ANY FLEXIBLE CONDUIT OVER 6 FEET IN LENGTH.

**1610 - LUMINAIRES**

1

**16720 - FIRE ALARM SYSTEM (ADDRESSABLE)**

16720.01 - DESCRIPTION OF WORK  
 THE WORK COVER BY THIS SECTION OF THE SPECIFICATIONS INCLUDES THE FURNISHING OF ALL LABOR, EQUIPMENT, MATERIALS, AND PERFORMANCE OF ALL OPERATIONS ASSOCIATED WITH THE INSTALLATION OF THE FIRE ALARM SYSTEM AS SHOWN ON THE DRAWINGS AND AS HEREIN SPECIFIED.

THE COMPLETE INSTALLATION SHALL CONFORM TO THE APPLICABLE SECTIONS OF NFPA-72A, NFPA-71, LOCAL CODE REQUIREMENTS AND THE NATIONAL ELECTRICAL CODE, WITH PARTICULAR ATTENTION TO ARTICLE 760.

16720.02 - QUALITY ASSURANCE  
 EACH AND ALL ITEMS OF THE FIRE ALARM SYSTEM SHALL BE LISTED AS A PRODUCT OF A SINGLE MANUFACTURER UNDER THE APPROPRIATE CATEGORY BY UL, AND SHALL BEAR THE UL LABEL. ALL CONTROL EQUIPMENT MUST HAVE TRANSIENT PROTECTION TO COMPLY WITH UL864 REQUIREMENTS.

16720.03 - GENERAL  
 THIS IS A RENOVATION PROJECT AND REQUIRES RELOCATION OF EXISTING DETECTION AND ANNUNCIATION DEVICES WITHIN THE FACILITY.

THE SYSTEM SHALL BE WIRED, CONNECTED AND LEFT IN FIRST CLASS OPERATING CONDITION. INCLUDE SUFFICIENT CONTROL PANEL, ANNUNCIATOR, MANUAL STATIONS, AUTOMATIC FIRE DETECTORS, SMOKE DETECTORS, ALARM INDICATING APPLIANCES, WIRING, TERMINATIONS, ELECTRICAL BOXES, AND OTHER NECESSARY MATERIAL FOR A COMPLETE OPERATING SYSTEM.

THE FIRE ALARM SYSTEM SHALL ALLOW FOR LOADING AND EDITING SPECIAL INSTRUCTIONS AND OPERATING SEQUENCES AS REQUIRED. THE SYSTEM SHALL BE CAPABLE ON ON-SITE PROGRAMMING TO ACCOMMODATE SYSTEM EXPANSION AND FACILITATE CHANGES IN OPERATION. LOSS OF PRIMARY OR SECONDARY POWER SHALL NOT ERASE THE INSTRUCTIONS STORED IN MEMORY.

16720.04 - SYSTEM OPERATION  
 THE SYSTEM IS EXISTING AND THE OPERATION SHALL FOLLOW THE EXISTING SEQUENCE.

16720.05 - POWER REQUIREMENTS  
 SYSTEM SHALL OPERATE ON 120VAC POWER AND AUTOMATICALLY TRANSFER TO STAND-BY BATTERIES UPON LOSS OF POWER. BATTERIES SHALL BE SIZED TO PROVIDE COMPLETE SYSTEM OPERATION IN STAND-BY MODE FOR A MINIMUM OF TWENTY-FOUR (24) HOURS AND CAPABLE OF OPERATING THE SYSTEM IN AN ALARM CONDITION FOR A MINIMUM OF 15 MINUTES. ALL BATTERY RECHARGING SHALL BE AUTOMATIC. ALL EXTERNAL CIRCUITS SHALL OPERATE AT 24VDC AND SHALL BE FUSED INDIVIDUALLY.

16720.06 - COMMUNICATION  
 WIRING TYPE, WIRING TYPES SHALL BE APPROVED BY THE EQUIPMENT MANUFACTURER. THE SYSTEM SHALL ALLOW A LINE DISTANCE UP TO 2500 FEET TO THE FURTHEST ADDRESSABLE DEVICE ON A CLASS B CIRCUIT.

16720.07 - ADDRESSABLE DETECTOR BASES  
 UTILIZE EXISTING DEVICES.

16720.08 - SMOKE DETECTORS  
 UTILIZE EXISTING DEVICES.

16720.09 - THERMAL DETECTOR HEAD  
 UTILIZE EXISTING DEVICES.

16720.10 - PULL STATIONS  
 UTILIZE EXISTING DEVICES.

16720.11 - ZONE MODULES  
 NOT USED ON THIS PROJECT.

16720.12 - ALARM DEVICES  
 UTILIZE EXISTING DEVICES.

ALL SIGNALING DEVICES SHALL MEET AMERICANS WITH DISABILITIES ACT REQUIREMENTS.

16720.13 - INSTALLATION  
 PROVIDE AND INSTALL THE SYSTEM IN ACCORDANCE WITH THE PLANS AND THE SPECIFICATIONS, ALL APPLICABLE CODES, AND THE MANUFACTURER'S RECOMMENDATIONS. ALL WIRING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH ALL THE PROVISIONS OF NEC ARTICLE 760.

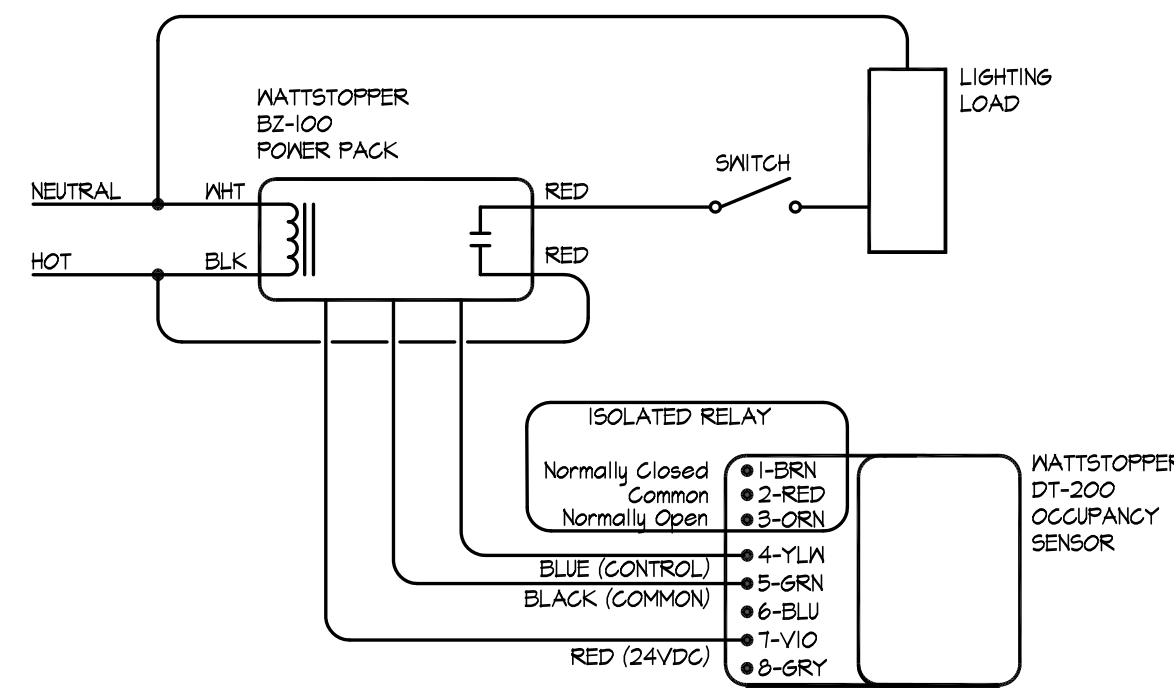
ALL WIRING SHALL BE CONTINUOUS FROM TERMINAL TO TERMINAL OR FROM TERMINAL TO DEVICE PIGTAIL LEAD. WIRING SHALL BE COLOR CODED AND COLOR CODING SCHEME SHALL BE USED CONSISTENTLY THROUGHOUT.

ALL FIRE ALARM WIRING SHALL BE INSTALLED IN SEPARATE CONDUIT SYSTEM FOR FIRE ALARM CONDUCTORS ONLY. ALL FIRE ALARM SYSTEM DEVICE BOXES, JUNCTION BOXES, PULL BOXES, ETC. SHALL BE PAINTED RED. DEVICE BOXES SHALL BE FLUSH MOUNTED IN FINISHED AREAS AND MAY BE SURFACE MOUNTED IN UNFINISHED AREAS.

16720.14 - TRAINING  
 NOT REQUIRED ON THIS PROJECT.

16720.15 - TESTING  
 THE COMPLETED FIRE ALARM SYSTEM SHALL BE FULLY TESTED IN ACCORDANCE WITH NFPA-72H BY THE CONTRACTOR IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE AND THE LOCAL FIRE MARSHAL. UPON COMPLETION OF A SUCCESSFUL TEST, THE CONTRACTOR SHALL SO CERTIFY IN WRITING TO THE OWNER AND GENERAL CONTRACTOR.

16720.16 - WARRANTY  
 NOT REQUIRED ON THIS PROJECT.

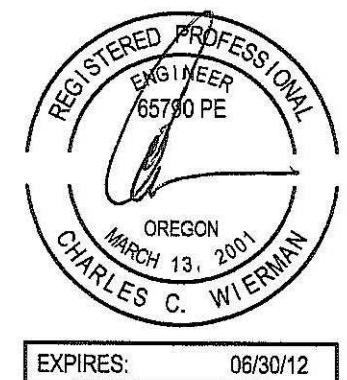


**1 TYPICAL OCCUPANCY SENSOR WIRING DIAGRAM**  
 NOT TO SCALE

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**MARKET CENTER BUILDING**  
 MARKET CENTER BUILDING  
 8TH FLOOR INTERIOR REMODEL

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**DRAWING INDEX**

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S208	8th LEVEL REFLECTED CEILING PLAN
S501	FRAMING DETAILS
S502	CEILING DETAILS

**SPECIAL INSPECTION PROGRAM**

**TABLE 1 - REQUIRED STRUCTURAL SPECIAL INSPECTIONS**

SYSTEM OR MATERIAL	IBC CODE REFERENCE	CODE OR STANDARD REFERENCE	INSPECTION		REMARKS
			FREQUENCY	PERIODIC	
POST INSTALLED CONCRETE ANCHORS					
INSTALLATION IN HARDENED CONCRETE AND COMPLETED MASONRY	1703.4.2 1704.13.3	ICC EVALUATION REPORT	X		SPECIAL INSPECTIONS APPLY TO ANCHOR PRODUCT NAME, TYPE AND DIMENSIONS, HOLE DIMENSIONS, COMPLIANCE WITH DRILL BIT REQUIREMENTS, CLEANLINESS OF THE HOLE AND ANCHOR, ADHESIVE EXPIRATION DATE, ANCHOR ADHESIVE INSTALLATION, ANCHOR EMBEDMENT, AND TIGHTENING TORQUE

**SPECIAL INSPECTION FOOTNOTES**

SPECIAL INSPECTIONS SHALL CONFORM TO CHAPTER 17 OF THE 2009 INTERNATIONAL BUILDING CODE AND OREGON AMENDMENTS. REFER TO TABLE 1 FOR SPECIAL INSPECTION AND TESTING REQUIREMENTS.

SPECIAL INSPECTIONS AND ASSOCIATED TESTING SHALL BE PERFORMED BY AN APPROVED ACCREDITED INDEPENDENT AGENCY MEETING THE REQUIREMENTS OF ASTM E29 (MATERIALS), ASTM D740 (SOILS), ASTM C917 (CONCRETE), ASTM A888 (STEEL), AND ASTM E834 (NON-DESTRUCTIVE TESTING). SPECIAL INSPECTIONS SHALL BE PERFORMED BY A LICENSED PROFESSIONAL ENGINEER. INSPECTION REPORTS SHALL BE CERTIFIED BY THE BUILDING OFFICIAL. WELDING INSPECTORS SHALL BE QUALIFIED PER SECTION 6.1.1 OF AWS D1.1. THE OWNER SHALL SECURE AND PAY FOR SERVICES OF THE INSPECTION AND TESTING AGENCY TO PERFORM ALL SPECIAL INSPECTIONS AND TESTS. THE SPECIAL INSPECTOR SHALL OBSERVE THE INDICATED WORK FOR COMPLIANCE WITH THE APPROVED CONSTRUCTION DOCUMENTS. ALL DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION, NOTED IN THE INSPECTION REPORTS, AND IF NOT CORRECTED, THEY SHALL BE BROUGHT TO THE ATTENTION OF THE STRUCTURAL ENGINEER AND THE BUILDING OFFICIAL.

THE SPECIAL INSPECTOR SHALL FURNISH INSPECTION REPORTS FOR EACH INSPECTION TO THE BUILDING OFFICIAL, STRUCTURAL ENGINEER, CONTRACTOR, AND OWNER. THE SPECIAL INSPECTION AGENCY SHALL SUBMIT A FINAL REPORT INDICATING THE WORK REQUIRING SPECIAL INSPECTION WAS INSPECTED AND IS IN COMPLIANCE WITH THE APPROVED CONSTRUCTION DOCUMENTS AND THAT ALL DISCREPANCIES NOTED IN THE INSPECTION REPORTS HAVE BEEN CORRECTED.

**GENERAL NOTES:**

- ALL CONSTRUCTION AND DESIGN SHALL CONFORM TO THE 2009 INTERNATIONAL BUILDING CODE AS AMENDED BY THE STATE OF OREGON.
- THE STRUCTURAL DRAWINGS SHALL BE UTILIZED IN CONJUNCTION WITH OTHER DESIGN CONSULTANT'S DRAWINGS (ARCHITECTURAL, MECHANICAL, ETC.). IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE REQUIREMENTS OF THE DRAWINGS INTO THEIR SHOP DRAWINGS AND CONSTRUCTION.
- THE GENERAL STRUCTURAL NOTES ARE INTENDED FOR USE IN CONJUNCTION WITH THE PROJECT SPECIFICATIONS. IN THE EVENT OF A CONFLICT BETWEEN THE TWO, THE GENERAL STRUCTURAL NOTES SHALL SUPERSEDE THE PROJECT SPECIFICATIONS. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER.
- CONSTRUCTION SEQUENCE AND METHODS:
  - THE STRUCTURAL DRAWINGS ARE INTENDED FOR THE STRUCTURE TO ACT AS A WHOLE ONCE CONSTRUCTION IS COMPLETE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE SAFETY AND STABILITY OF THE EXISTING STRUCTURE THROUGHOUT CONSTRUCTION AS A RESULT OF ANY ADDITIONAL METHODS AND SEQUENCES.
  - THE CONTRACTOR SHALL TAKE INTO ACCOUNT WEATHER CONSTRUCTION AND THE EFFECTS OF THERMAL MOVEMENT DURING THE CONSTRUCTION SCHEDULE.
- THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS. THE ARCHITECT AND/OR ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCY BETWEEN THE EXISTING CONDITIONS AND CONSTRUCTION DOCUMENTS.
- SUBMITTALS:
  - SHOP DRAWINGS FOR ALL STRUCTURAL ITEMS SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO FABRICATION AND CONSTRUCTION. SUCH ITEMS INCLUDE:
    - STEEL STUDS AND ACOUSTICAL & GYPSUM BOARD CEILING SYSTEMS.

SHOP DRAWINGS OR CONTRACTOR ENGINEERED DETAILS SHALL BEAR THE SEAL AND SIGNATURE OF A REGISTERED STRUCTURAL ENGINEER IN THE STATE OF OREGON IF IT DIFFERS FROM THE DESIGN OF THE STRUCTURAL DRAWINGS. ANY REVISION FROM THE STRUCTURAL DRAWINGS SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW AND IS SUBJECT TO THE REVIEW AND ACCEPTANCE BY THE ENGINEER.

- CALCULATIONS, DESIGN DRAWINGS AND SHOP DRAWINGS FOR THE DESIGN, FABRICATION, AND CONSTRUCTION OF BIDDER DESIGN ITEMS SHALL BEAR THE SEAL AND SIGNATURE OF A REGISTERED STRUCTURAL ENGINEER IN THE STATE OF OREGON AND SHALL BE SUBMITTED TO THE ARCHITECT PRIOR TO FABRICATION. BIDDER DESIGN ITEMS FOR THIS PROJECT INCLUDE:
  - NONE.

CALCULATIONS AND BIDDER DESIGN DRAWINGS SHALL INCLUDE THE DESIGN CONNECTION TO THE STRUCTURE AND ACCOUNTING OF ANY LOCALIZED EFFECTS THE CONNECTIONS OR SYSTEMS MAY INDUCE IN THE STRUCTURE. ALL SHOP BIDDER DESIGNED ITEMS SHALL BE BASED ON THE DESIGN REQUIREMENTS AS SPECIFIED IN THE GENERAL STRUCTURAL NOTES.

- SEISMIC BRACING AND RESTRAINT TO THE STRUCTURE OF ANY MEP EQUIPMENT, MACHINERY, AND ASSOCIATED PIPING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. CONNECTIONS NOT IN COMPLIANCE WITH SMACNA (SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION) OR THE MEP DESIGN DRAWINGS, SHALL BEAR THE SEAL OF REGISTERED ENGINEER IN THE STATE OF OREGON AND SHALL BE SUBMITTED ALONG WITH CALCULATIONS TO THE ARCHITECT FOR APPROVAL PRIOR TO FABRICATION.

**7. DESIGN CRITERIA:**

- CODE: 2009 INTERNATIONAL BUILDING CODE AS AMENDED BY THE STATE OF OREGON (2010 OSSC) AND THE CITY OF PORTLAND.
- LOADS AND DESIGN CRITERIA: THE FOLLOWING LIVE LOADS AND CRITERIA WERE USED IN ADDITION TO THE DEAD LOAD OF THE STRUCTURE.
  - INTERIOR PARTITION WALL LATERAL LOAD 5 psf MIN.

**COLD-FORMED STEEL**

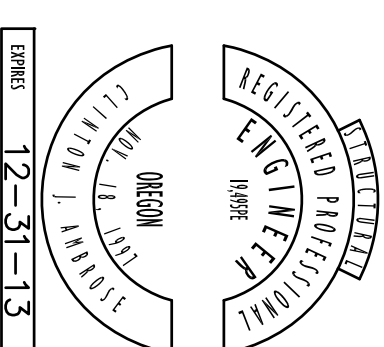
- STEEL STUDS SHALL BE OF THE SIZE, GAGE, AND SPACING SHOWN ON THE DRAWINGS. MINIMUM STUD AND TRACK SIZES ARE INDICATED BELOW USING THE INDUSTRY STANDARD STEEL STUD MANUFACTURERS ASSOCIATION (SSMA) DESIGNATION.
- PROVIDE BRIDGING IN CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS ADEQUATE FOR DEVELOPMENT OF THE FULL MOMENT CAPACITY OF THE STUDS. FOR LOAD BEARING STUDS, TRACK SHALL BE OVERSIZED TO PROVIDE FULL STUD BEARING.
- SCREWS SHALL BE ELCO DRILL-FLEX, HILTI KWIK-FLEX OR APPROVED EQUAL.

STUD DESIGNATION	STUD SIZE
3 1/2" x 20 GA	360S125-33
3 1/2" x 18 GA	360S125-43
3 1/2" x 16 GA	360S125-54

TRACK DESIGNATION	TRACK SIZE
3 1/2" x 20 GA	350T125-33
3 1/2" x 18 GA	350T125-43
(DEFLECTION HEAD)	350T125-43

**REVISED  
DRAWING SET**



Issue \_\_\_\_\_ Revision \_\_\_\_\_ Date \_\_\_\_\_  
CONSTRUCTION SET 04/30/2012

GENERAL STRUCTURAL NOTES  
SPECIAL INSPECTION PROGRAM  
AND DRAWING INDEX

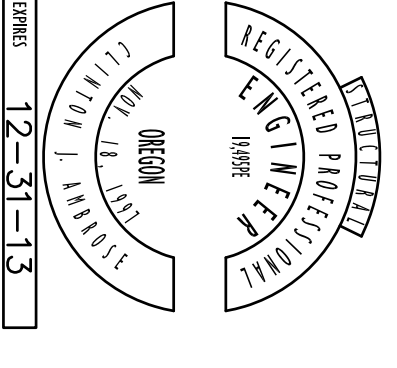
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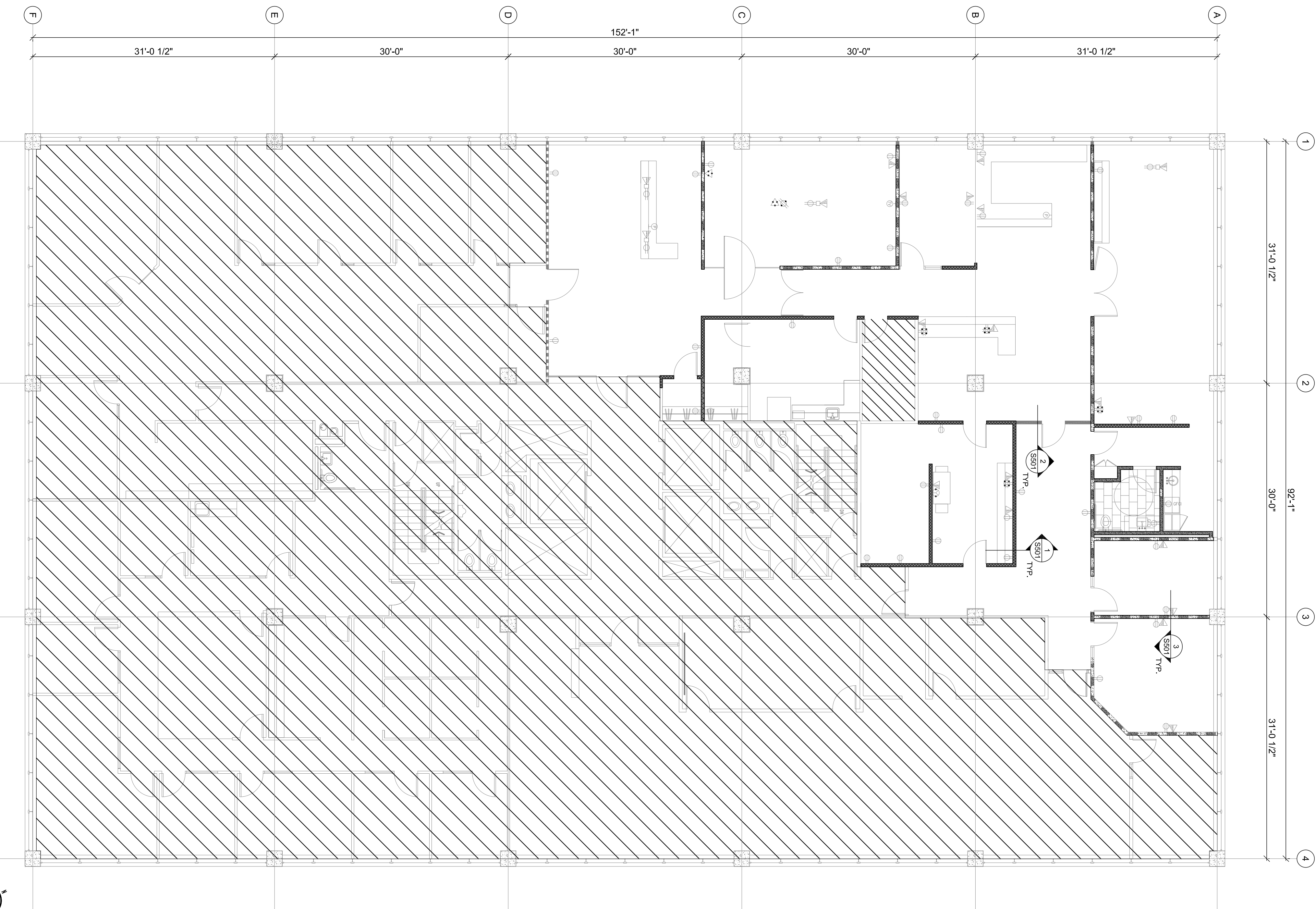
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- NOTES:
1. INDICATES GLAZING WALL, BY OTHERS, REF: S501 FOR GLAZING WALL BRACING DETAILS.
  2. INDICATES TYPICAL FULL HEIGHT METAL STUD PARTITION WALL: 3501/55-33 STUDS @ 16" o.c. REFERENCE: S5501 FOR BRACING DETAILS, TYP.
  3. INDICATES TYPICAL PARTIAL HEIGHT METAL STUD PARTITION WALL: 3501/55-33 STUDS @ 16" o.c. REFERENCE: S5501 FOR BRACING DETAILS, TYP.
  4. REFERENCE: S5201 & S5201 FOR TYPICAL NON-BEARING WALL HEADER DETAILS.
  5. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND ENGINEER OF ANY SIGNIFICANT DISCREPANCIES FROM THAT SHOWN ON THE DRAWINGS.
  6. COORDINATE ALL DIMENSIONS AND WALL LOCATIONS WITH ARCHITECTURAL DRAWINGS.
  7. REFERENCE ARCHITECTURAL, MECHANICAL BE COORDINATED WITH THE STRUCTURAL DRAWINGS.
  8. INDICATES AREA OF 8TH FLOOR NOT IN SCOPE OF WORK.



1 8TH LEVEL FLOOR PLAN  
 SCALE: 1/8"=1'-0"

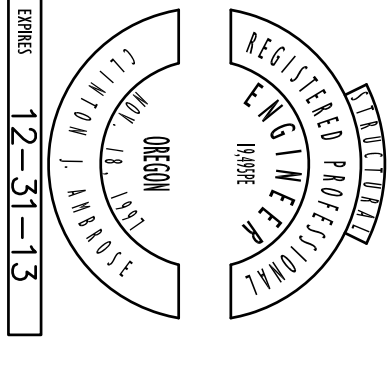
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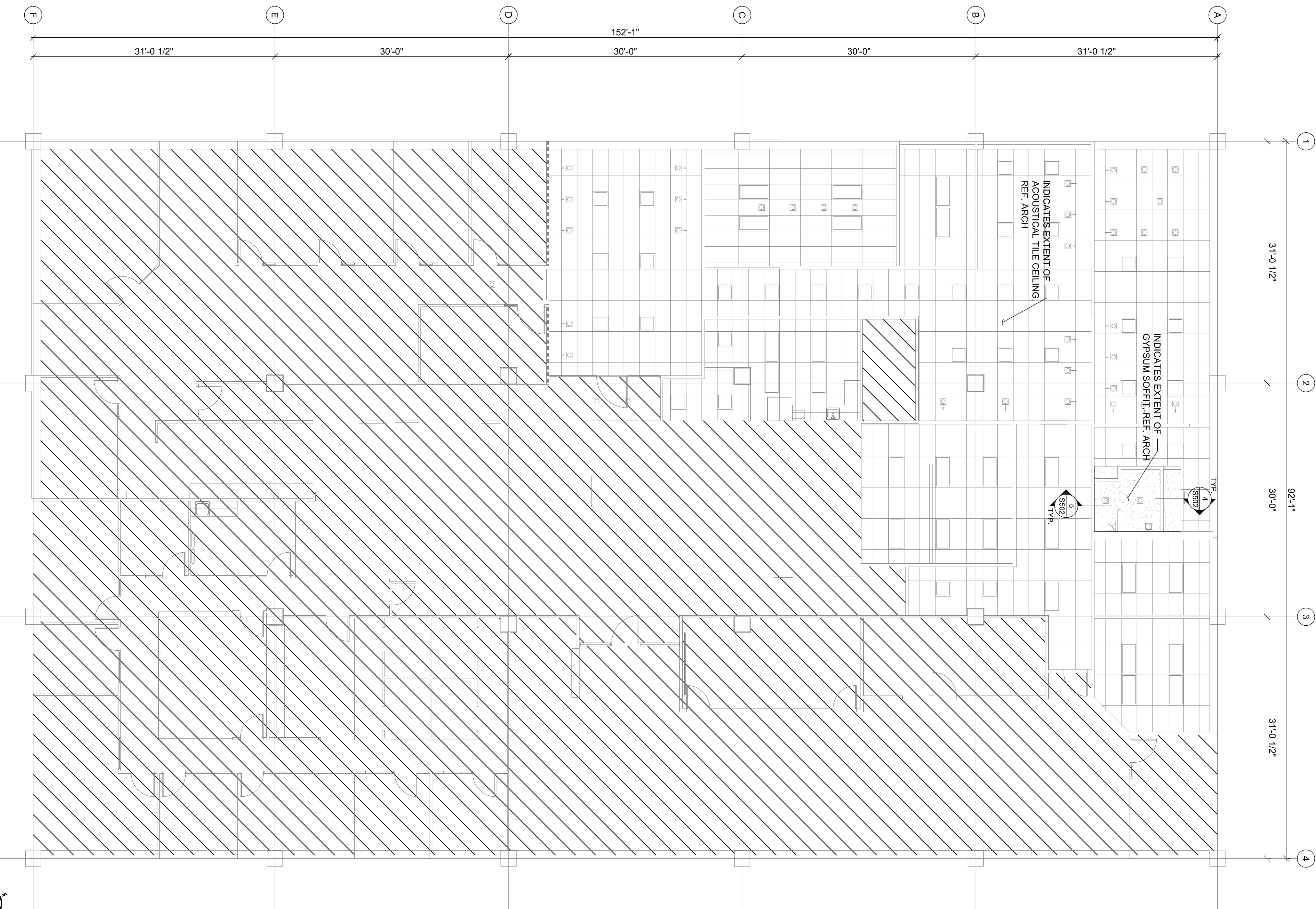
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Issue Revision Date  
CONSTRUCTION SET 04/30/2012

8th LEVEL REFLECTED CEILING PLAN  
Scale 1/8"=1'-0"  
Date APRIL 30, 2012  
Sheet No. S208



- NOTES:
1. REFERENCE PAGE S202 FOR ALL TYPICAL CEILING DETAILS.
  2. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS. ANY DISCREPANCIES OR OMISSIONS SHALL NOTIFY THE ARCHITECT AND ENGINEER OF ANY SIGNIFICANT DISCREPANCIES FROM THAT SHOWN ON THE DRAWINGS.
  3. COORDINATE ALL DIMENSIONS AND WALL LOCATIONS WITH ARCHITECTURAL DRAWINGS.
  4. REFERENCE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ITEMS TO BE REMOVED OR ADDED WITH THE STRUCTURAL DRAWINGS.
  5. INDICATES AREA OF 8th FLOOR NOT IN SCOPE OF WORK.

CONSTRUCTION OF THE SUSPENDED CEILING SYSTEM SHALL BE IN ACCORDANCE WITH THE TECHNICAL BULLETIN 401.

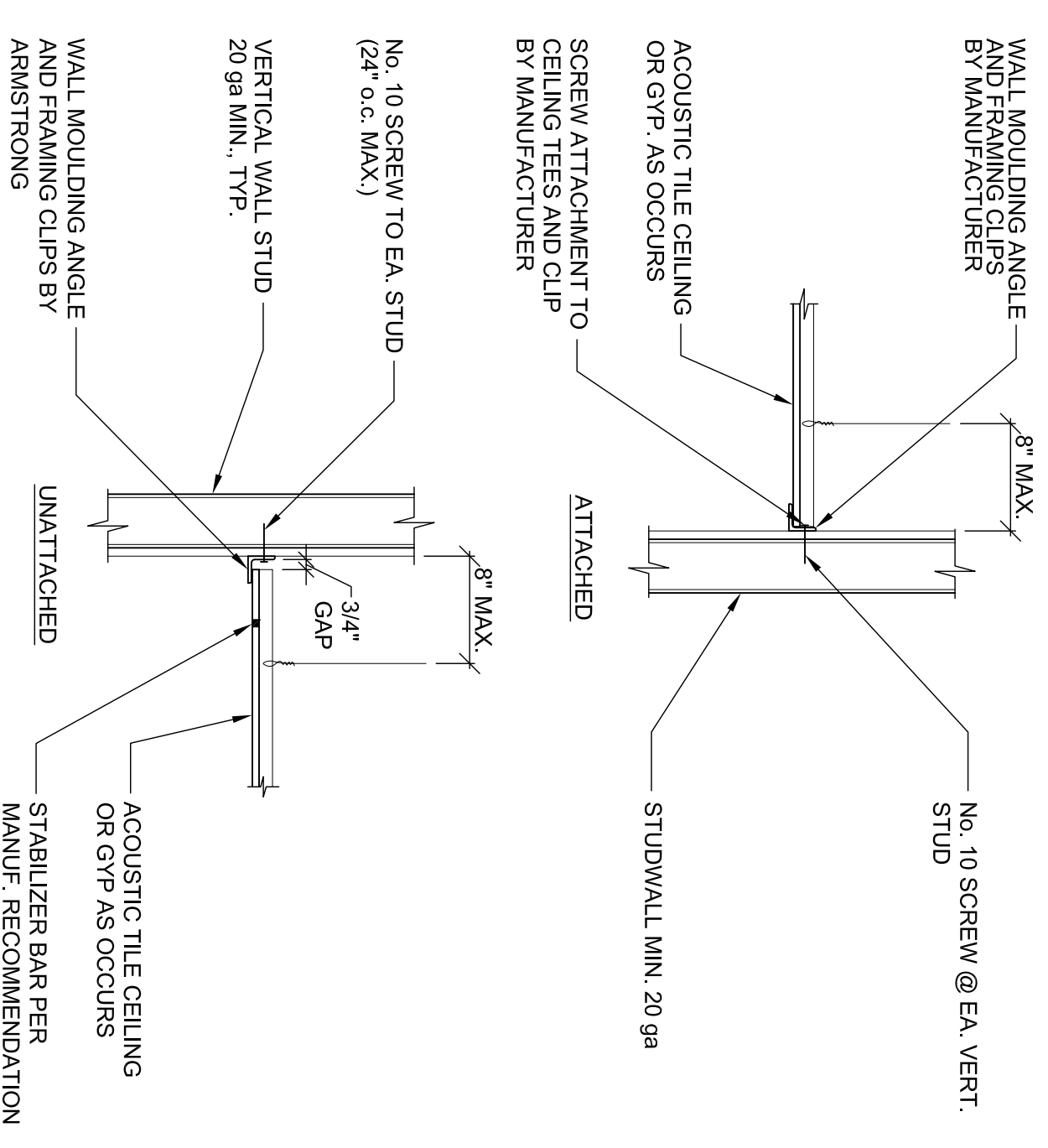
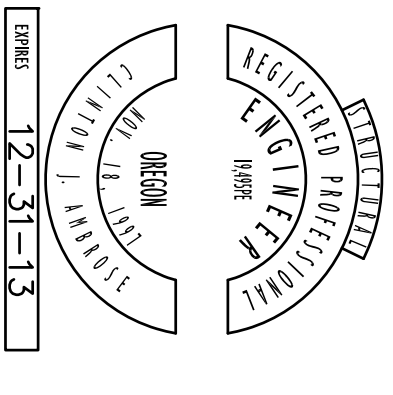




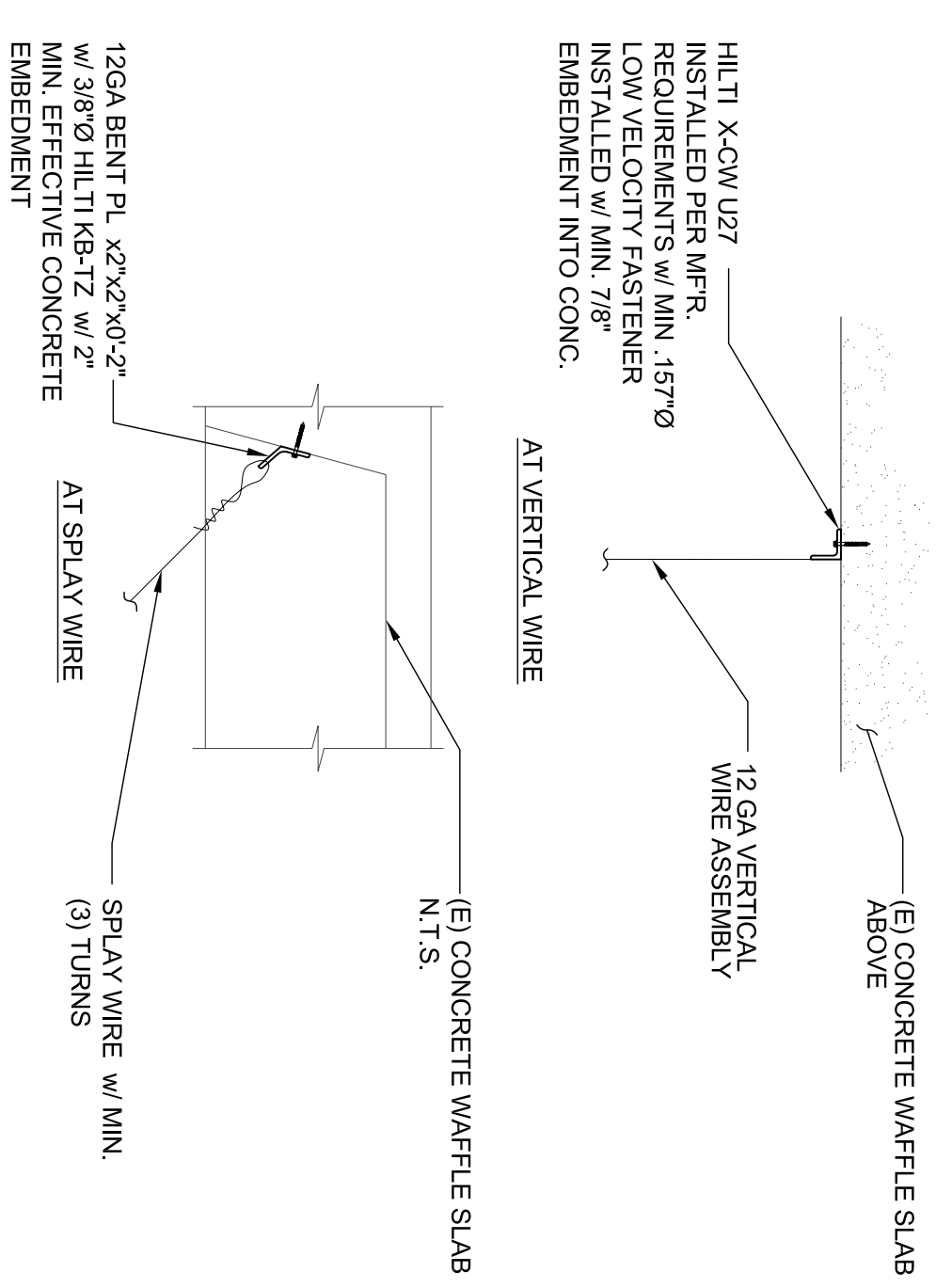
**ABHT**  
STRUCTURAL ENGINEERS  
1640 NW JOHNSON STREET  
PORTLAND, OR 97209  
Tel 503.243.6882  
Fax 503.243.6622  
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UNIVERSITY  
8TH FLOOR MARKET BLDG  
OFFICE REMODEL  
1600 SW 4th Avenue  
Portland, OR, 97201

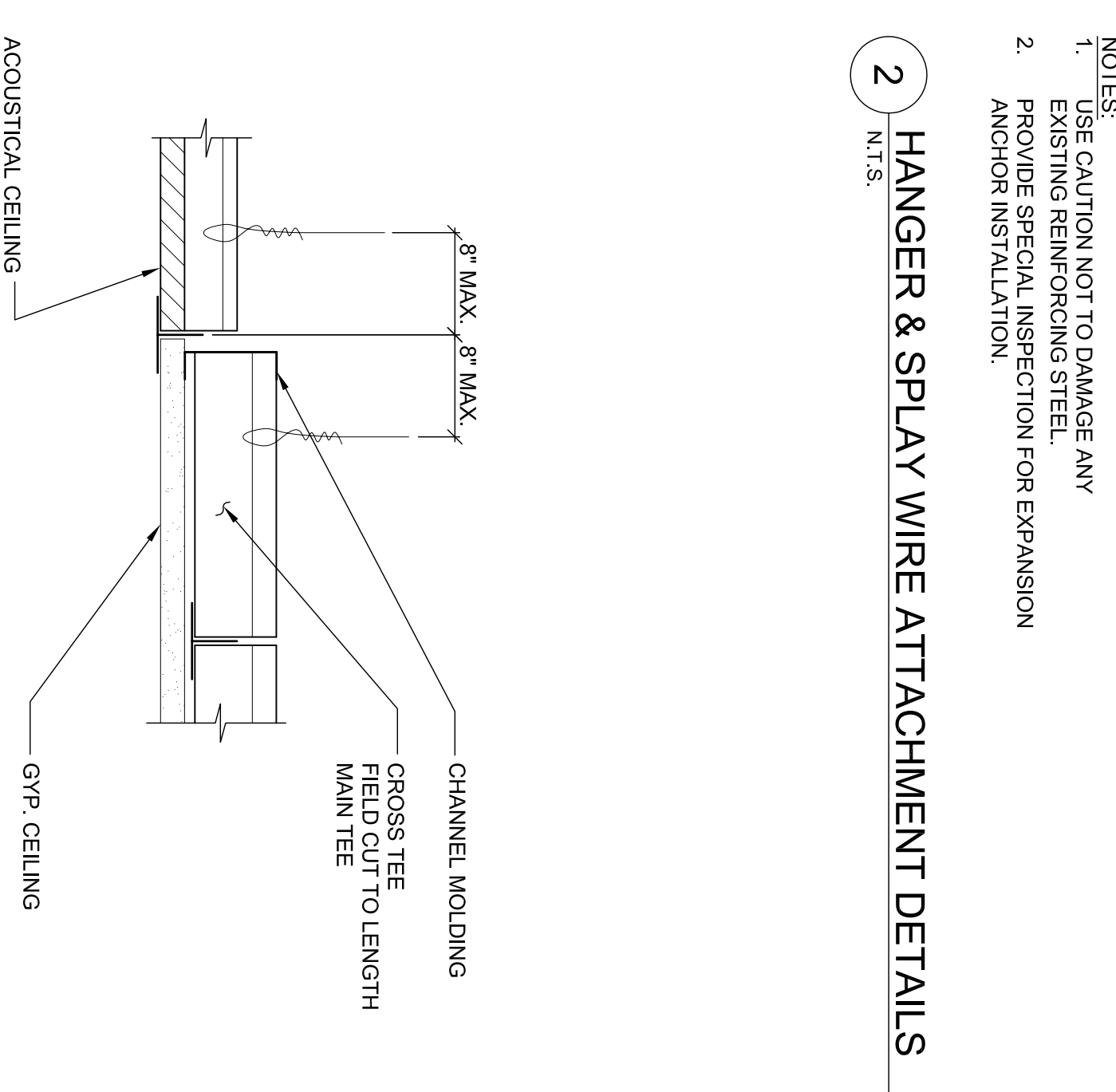
**REVISED**  
**DRAWING SET**



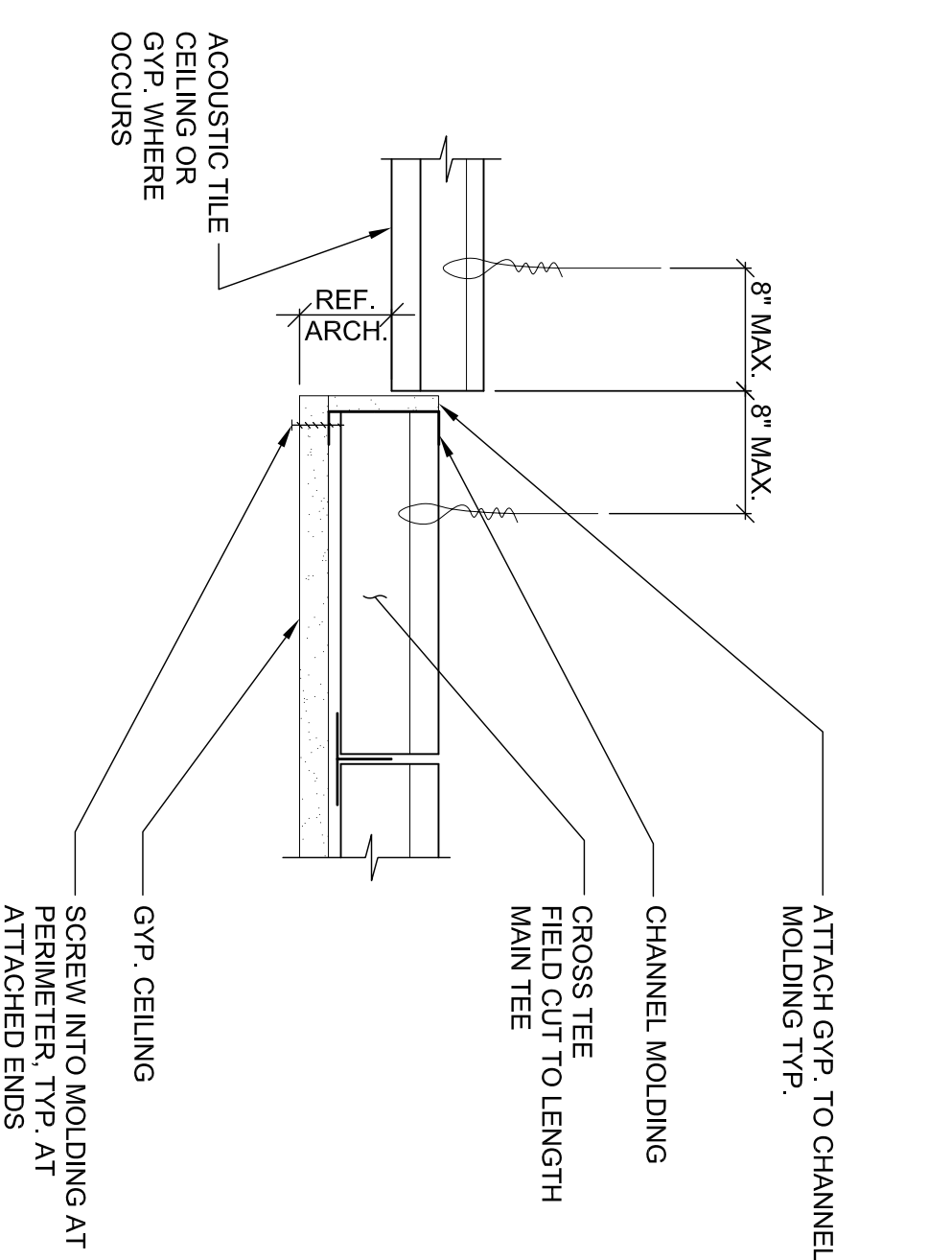
**1 ATC & GYP. END OF GRID**  
N.T.S.



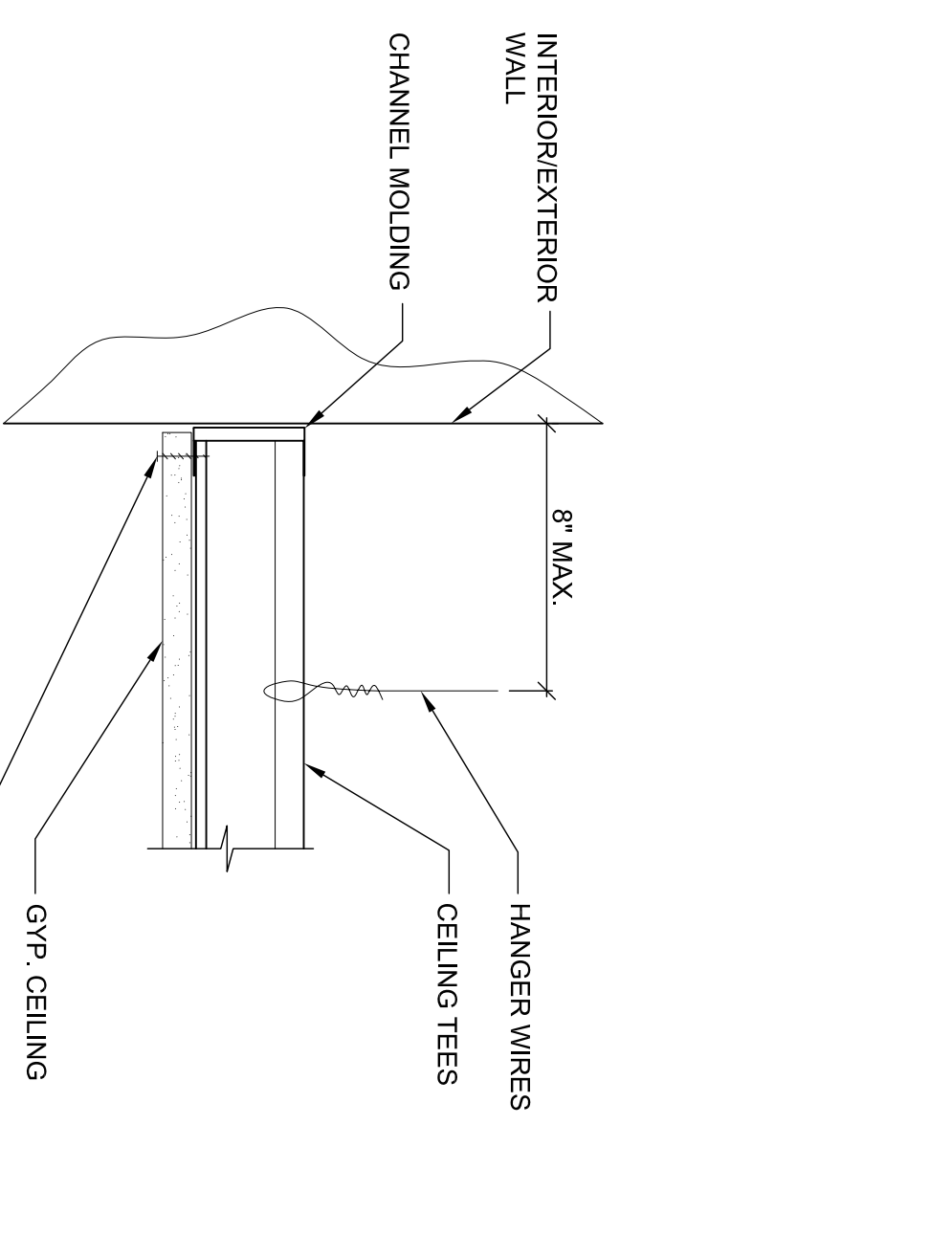
**2 HANGER & SPLAY WIRE ATTACHMENT DETAILS**  
N.T.S.



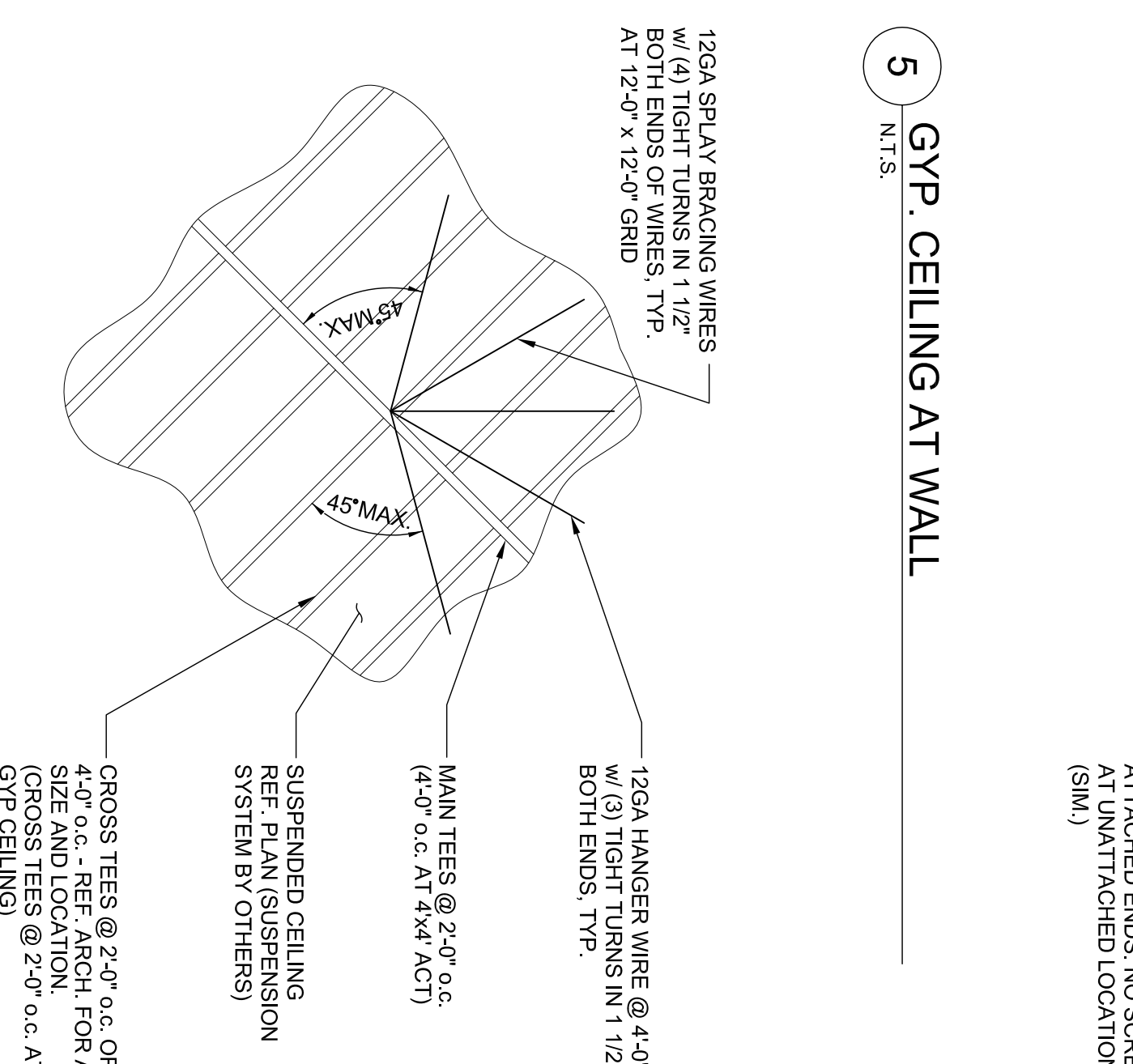
**3 ATC/GYP CEILING INTERSECTION AT SAME ELEVATION**  
N.T.S.



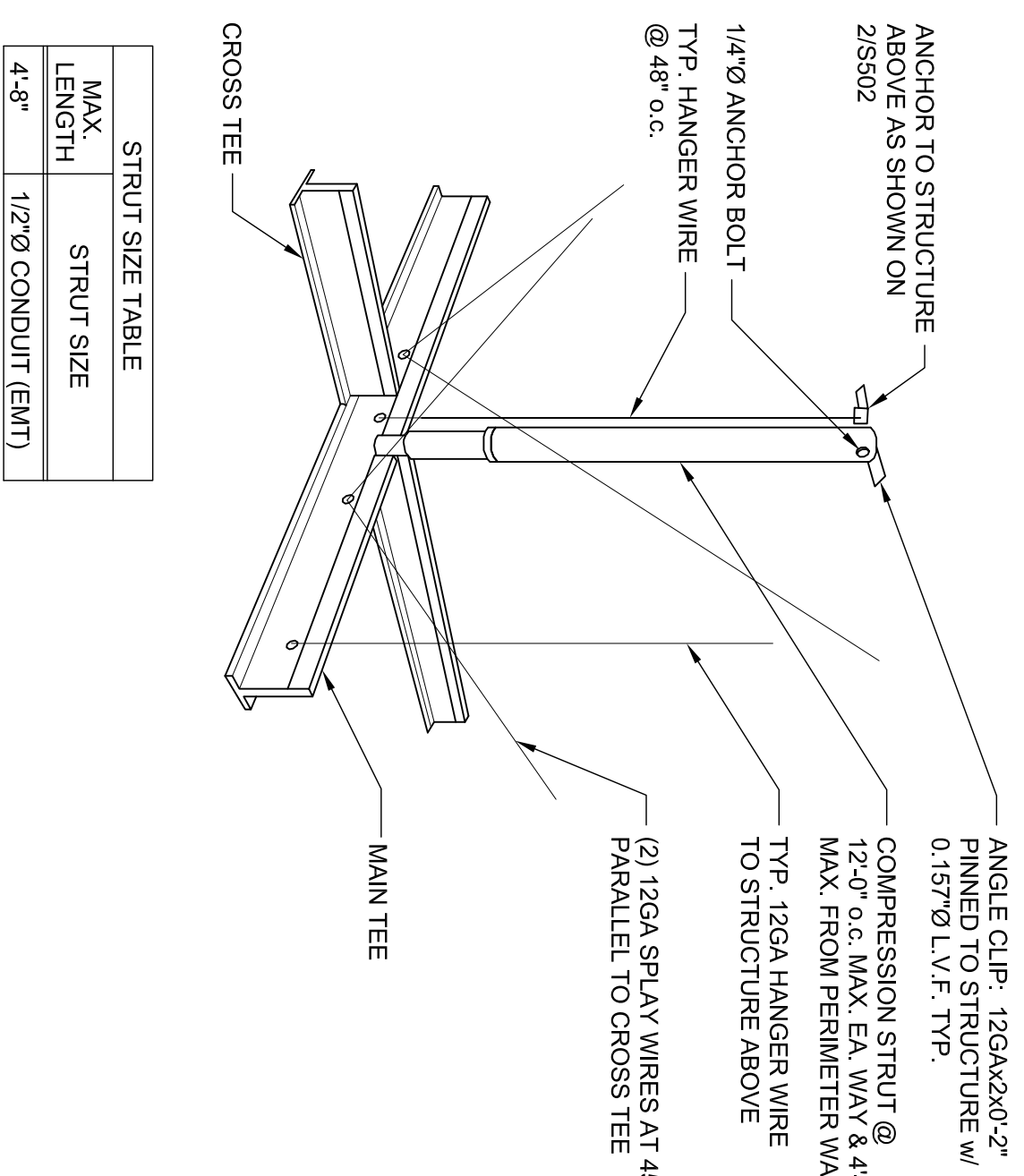
**4 ATC/GYP CEILING INTERSECTION AT DIFFERENT ELEVATIONS**  
N.T.S.



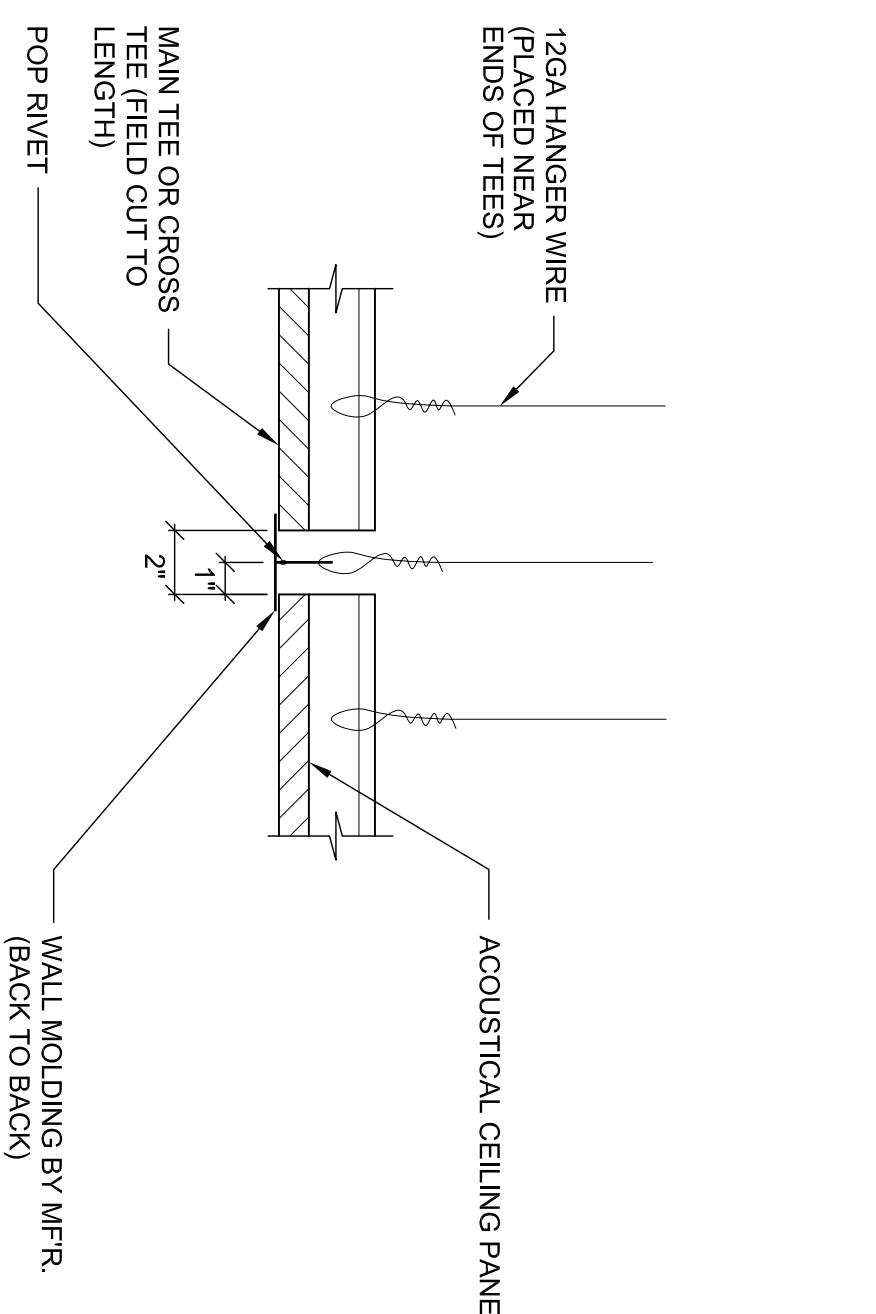
**5 GYP. CEILING AT WALL**  
N.T.S.



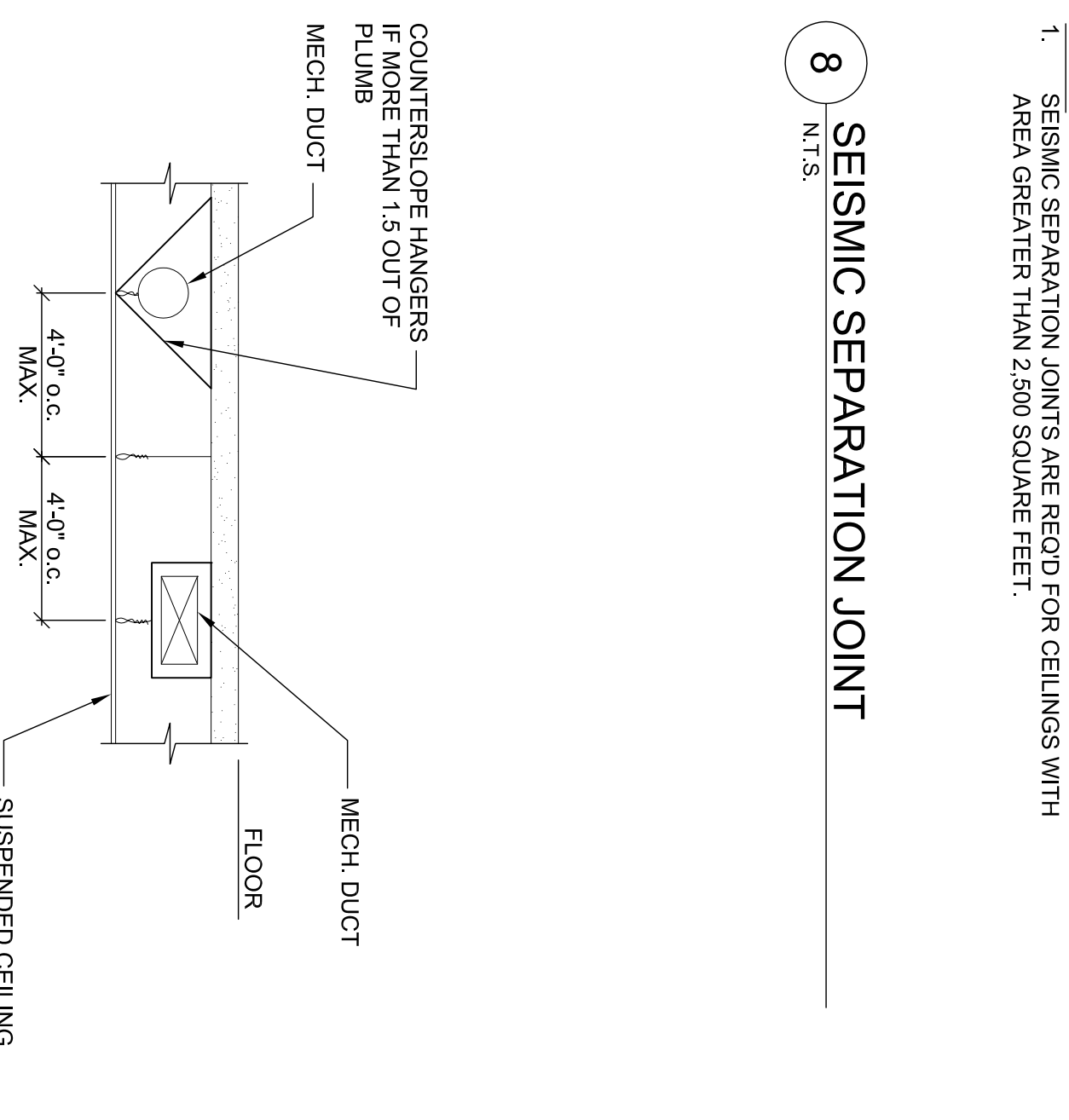
**6 SPLAY WIRES DETAIL**  
N.T.S.



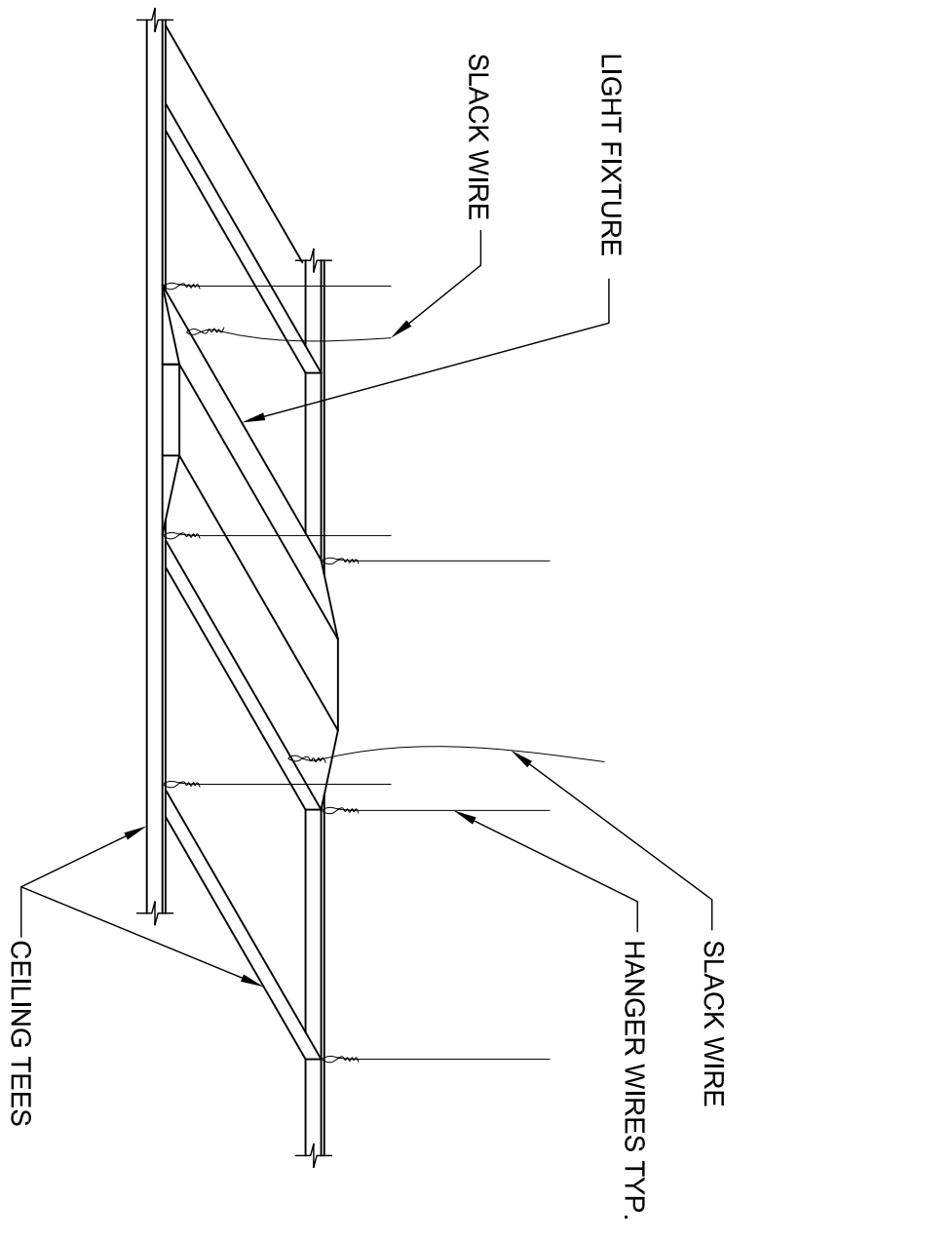
**7 COMPRESSION STRUT DETAIL**  
N.T.S.



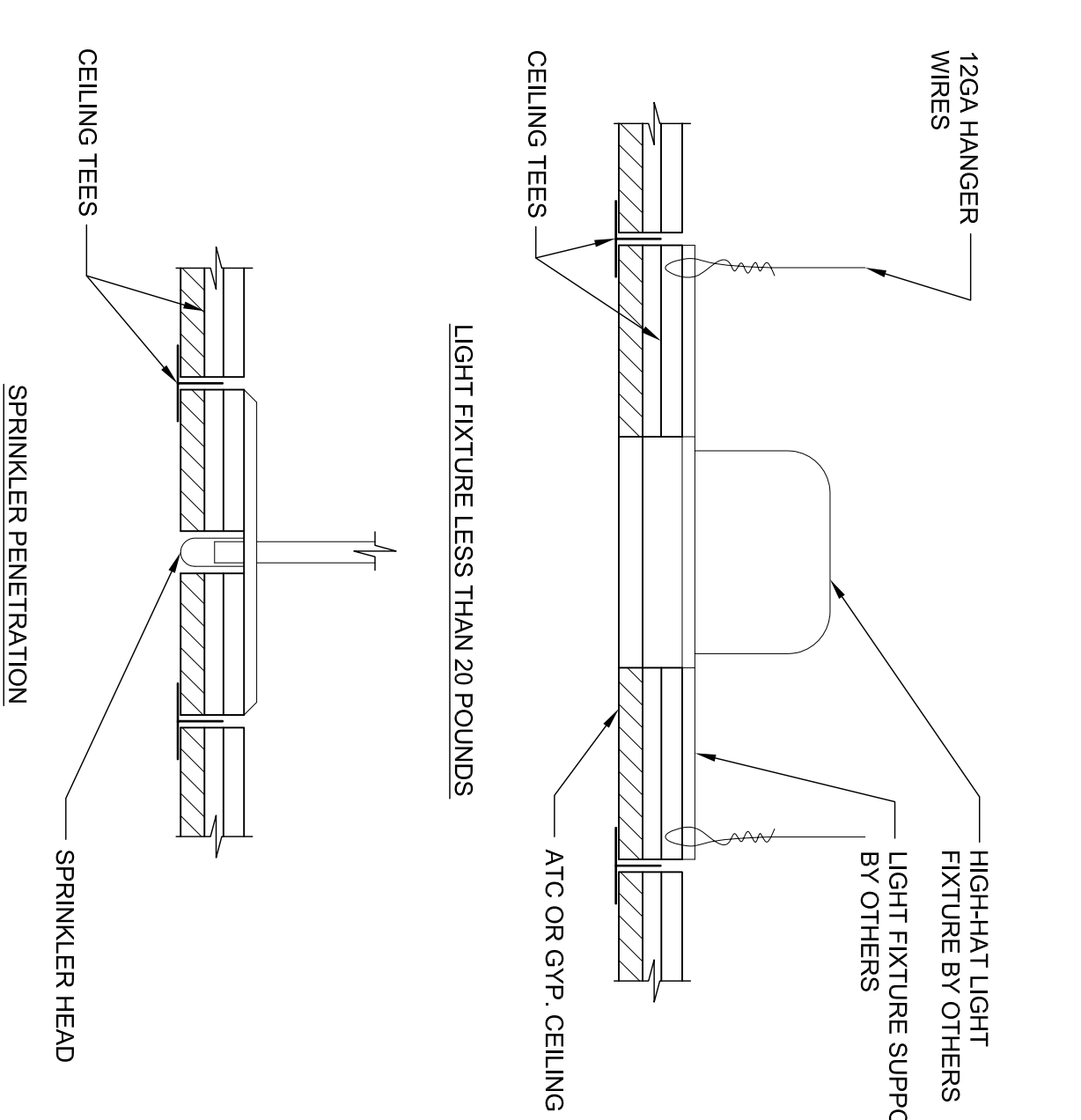
**8 SEISMIC SEPARATION JOINT**  
N.T.S.



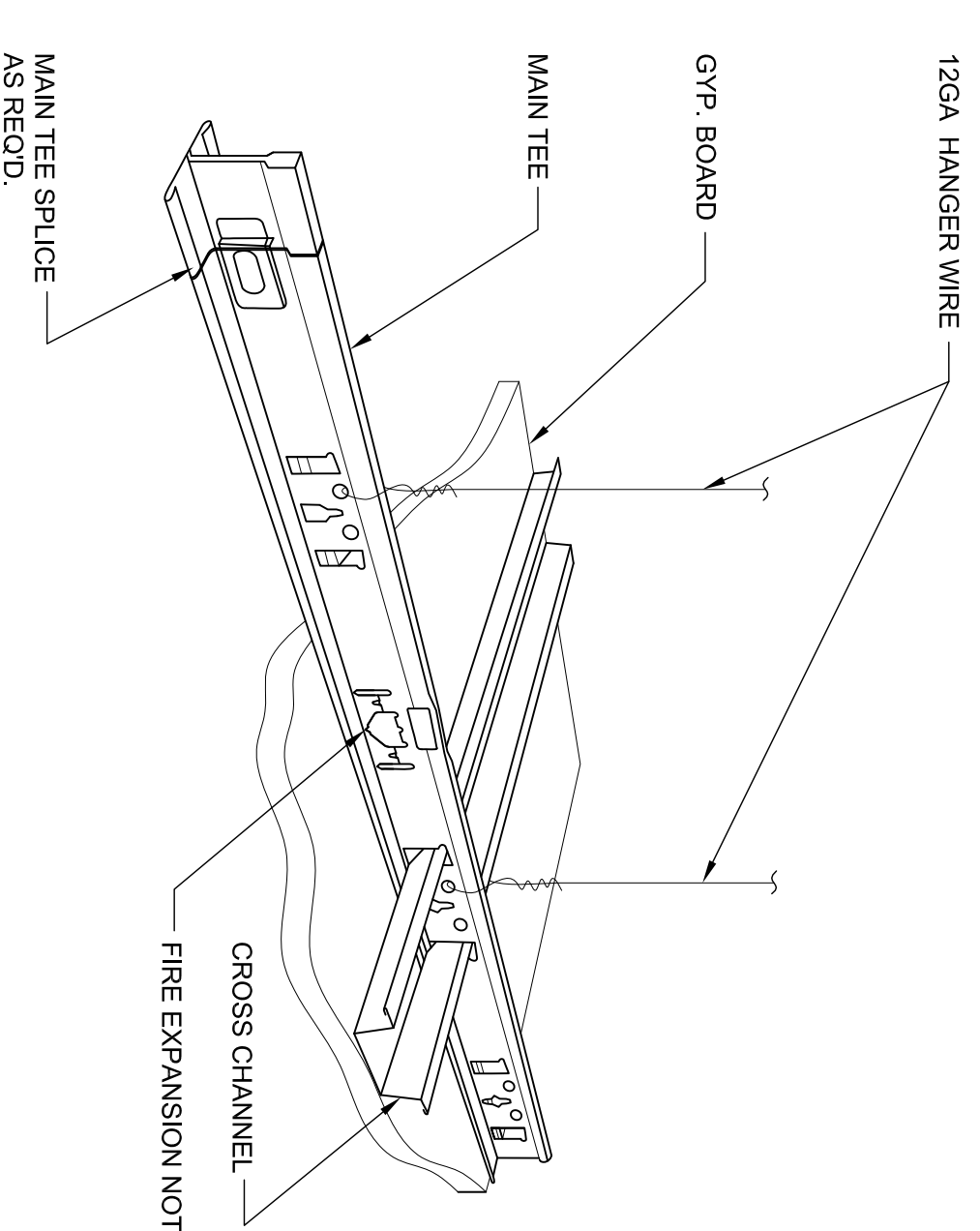
**9 CEILING SUPPORT AT MECH. EQUIPMENT**  
N.T.S.



**10 LIGHT FIXTURE SUPPORT**  
N.T.S.



**11 CEILING AT LIGHT FIXTURES & SPRINKLER**  
N.T.S.



**12 GYP. CEILING SUSPENSION SYSTEM**  
N.T.S.

Issue	Revision	Date
CONSTRUCTION SET	04/30/2012	

**CEILING DETAILS**



**ABHT**  
STRUCTURAL ENGINEERS

1640 NW Johnson Street  
Portland, OR 97209  
Tel 503.243.6682  
Fax 503.243.6622  
www.abht-structural.com

April 30, 2012

Laurel Danielson  
**DECA Architecture**  
935 SE Alder Street  
Portland, Oregon 97214

RE: PSU Market Center Building - Interior 8<sup>th</sup> Floor Office Remodel

Dear Laurel,

Attached are calculation sheets 1 through 19 dated April 30, 2012 which verify the structural adequacy of the Market Center Building - Interior 8<sup>th</sup> Floor Office Remodel project in Portland, OR as shown on sheets S001 through S502 dated April 30, 2012. The design was based on the 2010 Oregon Structural Specialty Code.

Please call us if you have any questions or require further information.

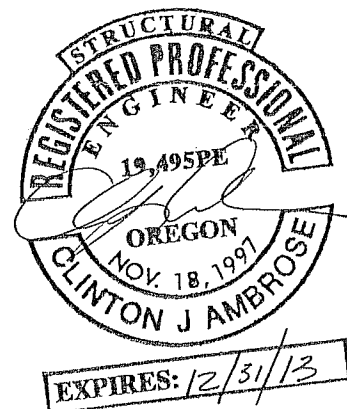
Sincerely,



Sean Clark, P.E.  
Project Engineer

Attachments – Structural Calculation Sheets 1 through 19 and Drawings S001 through S502.

:k\projects\2010\15010.03\calcletter 4-30-12.doc



Project MCB - 8th Floor T.I.

Job No.

Client

Location

1501003

Designed by DC

Date

4/20/11

Page

1

of

Sheet description

# ABHT

STRUCTURAL ENGINEERS

## Seismic Checks

Building Location: Lat. =  $45.512^\circ$

Long. =  $-122.680^\circ$

$S_{DS} = 0.727g$  (From USGS NSHM P)

$$F_p = \frac{0.4 a_p S_{DS} W_p}{(R_p / I_p)} (1 + z(\frac{z}{h}))$$

$$a_p = 1.0$$

$$R_p = 2.5$$

$$I_p = 1.0$$

$$z/h = (\frac{20'}{130'}) = 0.154$$

Calculate DL of Interior Partition walls:

Gyp. (2-sides) 6 psf

Insulation 1 psf

Studs 1 psf

Misc. m/e 2 psf

10 psf

$$\text{Per Square Foot: } F_p = \frac{0.4(1.0)(0.727g)(10\text{psf})}{(2.5/1.0)} (1 + z(0.154))$$

$$\Rightarrow F_p = 1.521\text{psf (ultimate)}$$

$$F_{pmin} = 0.3(0.727g)(1.0)(10\text{psf}) = 2.181\text{psf}$$

$$\Rightarrow 2.181\text{psf} > 1.521\text{psf} \therefore F_{pmin} \text{ controls}$$

Code minimum for Out of Plane forces = 5.0psf

$$\Rightarrow 5.0\text{psf} > 2.181\text{psf} \therefore \text{Code Min. Controls}$$

Use: 5psf for all Interior Partition Wall Out of Plane Loading

2/



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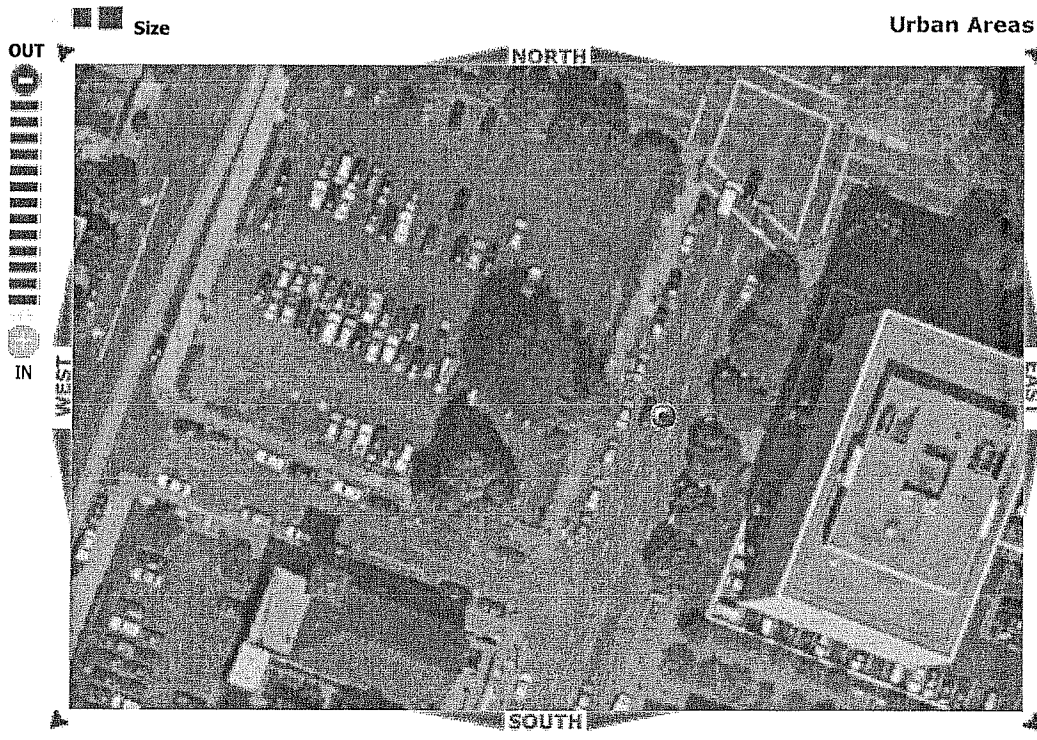
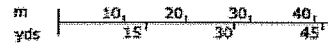


Image courtesy of the U.S. Geological Survey



**USGS Online Stream Gauging Stations:**

WILLAMETTE RIVER AT PORTLAND,, OR

Source=309954 Running Time 78.13 ms

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Server=TK2TERRAWE11

Conterminous 48 States  
 2006 International Building Code  
 Latitude = 45.51219  
 Longitude = -122.68026  
 Spectral Response Accelerations Ss and S1  
 Ss and S1 = Mapped Spectral Acceleration Values  
 Site Class B - Fa = 1.0 ,Fv = 1.0  
 Data are based on a 0.05000000074505806 deg grid spacing  
 Period Sa  
 (sec) (g)  
 0.2 0.986 (Ss, Site Class B)  
 1.0 0.346 (S1, Site Class B)

Conterminous 48 States  
 2006 International Building Code  
 Latitude = 45.51219  
 Longitude = -122.68026  
 Spectral Response Accelerations SMs and SM1  
 SMs = Fa x Ss and SM1 = Fv x S1  
 Site Class D - Fa = 1.106 ,Fv = 1.708

Period Sa  
 (sec) (g)  
 0.2 1.091 (SMs, Site Class D)  
 1.0 0.591 (SM1, Site Class D)

Conterminous 48 States  
 2006 International Building Code  
 Latitude = 45.51219  
 Longitude = -122.68026  
 Design Spectral Response Accelerations SDs and SD1  
 SDs = 2/3 x SMs and SD1 = 2/3 x SM1  
 Site Class D - Fa = 1.106 ,Fv = 1.708

Period Sa  
 (sec) (g)  
 0.2 0.727 (SDs, Site Class D)  
 1.0 0.394 (SD1, Site Class D)

Project MCB 8<sup>th</sup> Floor T.I.

Job No.

Client Location

15010.03

Designed by *se*

Date 4/28/11

Page 4

of

Sheet description



Full Height Partition Walls

Full height wall,  $h = 11'-6''$

Reaction @ Top/Bottom of full height wall:

$$W_{TOP/BOT.} = 5 \text{ psf} \left( \frac{11.5'}{2} \right) = 28.75 \text{ plf}$$

Check studs Required: space @ 16" o.c.

$$\text{Max. } \Delta = \frac{1}{240}$$

Max. height for 350S125-30 = 15'-0"

$$\Rightarrow 15'-0'' > 11'-6'' \checkmark \text{OK}$$

Size Bottom Track: Try 350T125-30

Max. spacing between bracing = 4'-0"

$$M_{ASD} = \frac{28.75 \text{ plf} (4')^2}{8} = 57.516 \text{ ft} = 0.690 \text{ k/in}$$

$$M_{allow} = 2.86 \text{ k/in} > 0.69 \text{ k/in} \checkmark \text{OK}$$

Size Top Track: Deflection Head is Required for full height walls

Try 350T200: 1" slotted hole, Vert.

$$V_{ASD} = 28.75 \text{ plf} (1.33') = 38.3 \#$$

$$M_{ASD} = 38.3 \# (1.75'') = 0.06708 \text{ k/in}$$

Find Required thickness:

$$t = \left( \frac{4(0.06708 \text{ k/in})}{0.6(32 \text{ ksi})(16'')} \right)^{1/2} = 0.0291''$$

$$\Rightarrow 0.030'' > 0.0291'' \checkmark \text{OK}$$

Minimum Thickness should be set @ 20 GA.

use: Full Height Wall: Studs = 350S125-30 Bottom Track = 350T125-30 Top Track = 350T200-43
--

# Limiting Wall Height Tables — Non-Composite

## Interior Non-Structural Non-Composite Table Notes

1. Lateral loads multiplied by 0.75 for strength determination per AISI A5.1.3.
2. Check end reactions for web crippling.
3. Limiting heights based on continuous support of each flange over the full length of the stud.
4. Heights based on steel properties only.
5. For 350S125 members use values listed for 362S125.
- ➔ 6. Calculations for 362S125 are based on 350S125 properties.

## Interior Non-Structural Non-Composite

(S) Stud Member	Spacing (in) o.c.	5 psf			7.5 psf			10 psf		
		L/120	L/240	L/360	L/120	L/240	L/360	L/120	L/240	L/360
162S125-18	12	9' 7"	7' 7"	6' 7"	8' 4"	6' 7"	5' 9"	7' 7"	6' 0"	5' 3"
162S125-18	16	8' 8"	6' 11"	6' 0"	7' 7"	6' 0"	5' 3"	6' 7" f	5' 5"	4' 9"
162S125-18	24	7' 7"	6' 0"	5' 3"	6' 2" f	5' 3"	4' 7"	5' 4" f	4' 9"	4' 2"
162S125-27	12	11' 3"	8' 11"	7' 9"	9' 10"	7' 9"	6' 10"	8' 11"	7' 1"	6' 2"
162S125-27	16	10' 3"	8' 1"	7' 1"	8' 11"	7' 1"	6' 2"	8' 1"	6' 5"	5' 7"
162S125-27	24	8' 11"	7' 1"	6' 2"	7' 9" f	6' 2"	5' 5"	6' 8" f	5' 7"	4' 11"
162S125-30	12	11' 7"	9' 2"	8' 0"	10' 1"	8' 0"	7' 0"	9' 2"	7' 3"	6' 4"
162S125-30	16	10' 6"	8' 4"	7' 3"	9' 2"	7' 3"	6' 4"	8' 4"	6' 7"	5' 9"
162S125-30	24	9' 2"	7' 3"	6' 4"	8' 0"	6' 4"	5' 7"	7' 2" f	5' 9"	5' 0"
162S125-33	12	12' 0"	9' 6"	8' 3"	10' 5"	8' 3"	7' 3"	9' 6"	7' 6"	6' 7"
162S125-33	16	10' 10"	8' 7"	7' 6"	9' 6"	7' 6"	6' 7"	8' 7"	6' 10"	6' 0"
162S125-33	24	9' 6"	7' 6"	6' 7"	8' 3"	6' 7"	5' 9"	7' 6"	6' 0"	5' 2"
250S125-18	12	13' 3"	10' 6"	9' 2"	11' 7"	9' 2"	8' 0"	10' 2" f	8' 4"	7' 3"
250S125-18	16	12' 0"	9' 6"	8' 4"	10' 2" f	8' 4"	7' 3"	8' 10" f	7' 7"	6' 7"
250S125-18	24	10' 2" f	8' 4"	7' 3"	8' 4" f	7' 3"	6' 4"	7' 2" f	6' 7"	5' 9"
250S125-27	12	15' 6"	12' 4"	10' 9"	13' 7"	10' 9"	9' 5"	12' 4"	9' 9"	8' 6"
250S125-27	16	14' 1"	11' 2"	9' 9"	12' 4"	9' 9"	8' 6"	10' 11" f	8' 10"	7' 9"
250S125-27	24	12' 4"	9' 9"	8' 6"	10' 4" f	8' 6"	7' 5"	8' 11" f	7' 9"	6' 9"
250S125-30	12	16' 1"	12' 9"	11' 1"	14' 0"	11' 1"	9' 8"	12' 9"	10' 1"	8' 10"
250S125-30	16	14' 7"	11' 7"	10' 1"	12' 9"	10' 1"	8' 10"	11' 7"	9' 2"	8' 0"
250S125-30	24	12' 9"	10' 1"	8' 10"	11' 0" f	8' 10"	7' 8"	9' 6" f	8' 0"	7' 0"
250S125-33	12	16' 7"	13' 2"	11' 6"	14' 6"	11' 6"	10' 0"	13' 2"	10' 5"	9' 1"
250S125-33	16	15' 1"	11' 11"	10' 5"	13' 2"	10' 5"	9' 1"	11' 11"	9' 6"	8' 3"
250S125-33	24	13' 2"	10' 5"	9' 1"	11' 6"	9' 1"	7' 11"	10' 3" f	8' 3"	7' 3"
250S125-43	12	18' 1"	14' 4"	12' 6"	15' 9"	12' 6"	10' 11"	14' 4"	11' 4"	9' 11"
250S125-43	16	16' 5"	13' 0"	11' 4"	14' 4"	11' 4"	9' 11"	13' 0"	10' 4"	9' 0"
250S125-43	24	14' 4"	11' 4"	9' 11"	12' 6"	9' 11"	8' 8"	11' 4"	9' 0"	7' 10"
362S125-18	12	17' 3"	13' 8"	11' 11"	14' 3" f	11' 11"	10' 5"	12' 4" f	10' 10"	9' 6"
362S125-18	16	15' 1" f	12' 5"	10' 10"	12' 4" f	10' 10"	9' 6"	10' 8" f	9' 10"	8' 7"
362S125-18	24	12' 4" f	10' 10"	9' 6"	10' 1" f	9' 6"	8' 3"	8' 9" f	8' 7"	7' 6"
362S125-27	12	20' 1"	15' 11"	13' 11"	17' 7"	13' 11"	12' 2"	15' 11"	12' 8"	11' 0"
362S125-27	16	18' 3"	14' 6"	12' 8"	15' 11"	12' 8"	11' 0"	13' 10" f	11' 6"	10' 0"
362S125-27	24	15' 11"	12' 8"	11' 0"	13' 1" f	11' 0"	9' 8"	11' 4" f	10' 0"	8' 9"
362S125-30	12	20' 10"	15' 6"	14' 5"	18' 2"	14' 5"	12' 7"	16' 8"	13' 1"	11' 5"
362S125-30	16	18' 11" f	15' 0"	13' 1"	16' 6"	13' 1"	11' 5"	14' 9" f	11' 11"	10' 5"
362S125-30	24	16' 6"	13' 1"	11' 5"	13' 11" f	11' 5"	10' 0"	12' 1" f	10' 5"	9' 1"
362S125-33	12	21' 6"	17' 1"	14' 11"	18' 9"	14' 11"	13' 0"	17' 1"	13' 6"	11' 10"
362S125-33	16	19' 6"	15' 6"	13' 6"	17' 1"	13' 6"	11' 10"	15' 6"	12' 4"	10' 9"
362S125-33	24	17' 1"	13' 6"	11' 10"	14' 11"	11' 10"	10' 4"	12' 11" f	10' 9"	9' 4"
362S125-43	12	23' 5"	18' 7"	16' 3"	20' 6"	16' 3"	14' 2"	18' 7"	14' 9"	12' 11"
362S125-43	16	21' 3"	16' 11"	14' 9"	18' 7"	14' 9"	12' 11"	16' 11"	13' 5"	11' 8"
362S125-43	24	18' 7"	14' 9"	12' 11"	16' 3"	12' 11"	11' 3"	14' 9"	11' 8"	10' 3"
362S125-54 (50 ksi)	12	25' 1"	19' 11"	17' 4"	21' 11"	17' 4"	15' 2"	19' 11"	15' 9"	13' 9"
362S125-54 (50 ksi)	16	22' 9"	18' 1"	15' 9"	19' 11"	15' 9"	13' 9"	18' 1"	14' 4"	12' 6"
362S125-54 (50 ksi)	24	19' 11"	15' 9"	13' 9"	17' 4"	13' 9"	12' 0"	15' 9"	12' 6"	10' 11"
362S125-68 (50 ksi)	12	26' 10"	21' 3"	18' 7"	23' 5"	18' 7"	16' 3"	21' 3"	16' 10"	14' 9"
362S125-68 (50 ksi)	16	24' 4"	19' 4"	16' 10"	21' 3"	16' 10"	14' 9"	19' 4"	15' 4"	13' 5"
362S125-68 (50 ksi)	24	21' 3"	16' 10"	14' 9"	18' 7"	14' 9"	12' 10"	16' 10"	13' 5"	11' 8"

f: Flexural stress controls allowable wall height



# Section Properties

## Structural (T) Track Section Properties

Section	Design Thickness (in)	Gross						Effective 33ksi					Effective 50ksi					Torsional					
		Area (in <sup>2</sup> )	Weight (lb/ft)	I <sub>xx</sub> (in <sup>4</sup> )	S <sub>xx</sub> (in <sup>3</sup> )	R <sub>x</sub> (in)	I <sub>yy</sub> (in <sup>4</sup> )	R <sub>y</sub> (in)	I <sub>xx</sub> (in <sup>4</sup> )	S <sub>xx</sub> (in <sup>3</sup> )	M <sub>a</sub> (in-k)	V <sub>a</sub> (lb)	Y <sub>cg</sub> (in)	I <sub>xx</sub> (in <sup>4</sup> )	S <sub>xx</sub> (in <sup>3</sup> )	M <sub>a</sub> (in-k)	V <sub>a</sub> (lb)	Y <sub>cg</sub> (in)	J <sup>1000</sup> (in <sup>4</sup> )	C <sub>w</sub> (in <sup>6</sup> )	X <sub>o</sub> (in)	R <sub>o</sub> (in)	β
162T125-18	0.0188	0.078	0.26	0.042	0.048	0.740	0.013	0.411	0.031	0.026	0.51	309	1.093						0.009	0.007	-0.893	1.230	0.473
162T125-27	0.0283	0.117	0.40	0.063	0.072	0.735	0.020	0.410	0.050	0.044	0.87	577	1.048						0.031	0.010	-0.886	1.221	0.474
162T125-30	0.0312	0.129	0.44	0.070	0.079	0.735	0.022	0.409	0.057	0.050	1.00	637	1.038						0.042	0.012	-0.884	1.220	0.475
162T125-33	0.0346	0.143	0.49	0.077	0.087	0.736	0.024	0.408	0.066	0.058	1.15	707	1.026						0.057	0.013	-0.882	1.219	0.476
250T125-18	0.0188	0.094	0.32	0.105	0.080	1.057	0.015	0.399	0.079	0.046	0.90	237	1.593						0.011	0.018	-0.781	1.373	0.677
250T125-27	0.0283	0.141	0.48	0.157	0.119	1.053	0.022	0.398	0.129	0.079	1.56	700	1.519						0.038	0.027	-0.774	1.366	0.679
250T125-30	0.0312	0.156	0.53	0.173	0.131	1.053	0.025	0.397	0.145	0.090	1.77	851	1.507						0.051	0.030	-0.773	1.365	0.679
250T125-33	0.0346	0.173	0.59	0.192	0.145	1.054	0.027	0.397	0.166	0.103	2.03	1046	1.492						0.069	0.033	-0.771	1.365	0.680
250T125-43	0.0451	0.225	0.77	0.250	0.188	1.055	0.035	0.395	0.231	0.147	2.91	1446	1.454						0.153	0.042	-0.766	1.362	0.683
250T125-54	0.0566	0.282	0.96	0.318	0.236	1.062	0.043	0.392	0.310	0.203	4.01	1804	1.426	0.297	0.188	5.64	2734	1.463	0.301	0.054	-0.763	1.365	0.688
250T125-68	0.0713	0.355	1.21	0.408	0.297	1.072	0.054	0.389	0.408	0.281	5.56	2252	1.404	0.402	0.262	7.85	3412	1.440	0.602	0.068	-0.758	1.369	0.694
250T150-27	0.0283	0.156	0.53	0.181	0.137	1.078	0.037	0.486	0.139	0.082	1.61	700	1.576						0.042	0.044	-0.989	1.542	0.588
250T150-30	0.0312	0.172	0.58	0.199	0.151	1.078	0.040	0.486	0.157	0.093	1.83	851	1.563						0.056	0.048	-0.988	1.541	0.589
250T150-33	0.0346	0.190	0.65	0.221	0.167	1.079	0.045	0.485	0.179	0.107	2.11	1046	1.548						0.076	0.054	-0.986	1.540	0.590
250T150-43	0.0451	0.248	0.84	0.289	0.217	1.080	0.058	0.483	0.252	0.154	3.03	1446	1.508						0.168	0.070	-0.981	1.537	0.593
250T150-54	0.0566	0.311	1.06	0.368	0.273	1.088	0.072	0.481	0.342	0.213	4.22	1804	1.477	0.325	0.197	5.89	2734	1.517	0.332	0.088	-0.977	1.539	0.597
250T150-68	0.0713	0.391	1.33	0.472	0.344	1.099	0.089	0.478	0.465	0.299	5.92	2252	1.449	0.445	0.276	8.27	3412	1.490	0.663	0.113	-0.972	1.543	0.603
250T200-33	0.0346	0.225	0.76	0.280	0.212	1.117	0.097	0.658	0.203	0.112	2.22	1046	1.647						0.090	0.118	-1.432	1.932	0.450
250T200-43	0.0451	0.293	1.00	0.366	0.275	1.118	0.128	0.657	0.288	0.183	3.21	1446	1.605						0.198	0.153	-1.427	1.928	0.452
250T200-54	0.0566	0.367	1.25	0.466	0.346	1.127	0.157	0.654	0.396	0.228	4.51	1804	1.572	0.371	0.209	6.25	2734	1.615	0.392	0.195	-1.422	1.929	0.456
250T200-68	0.0713	0.462	1.57	0.600	0.437	1.139	0.196	0.652	0.548	0.324	6.41	2252	1.538	0.517	0.296	8.86	3412	1.586	0.783	0.251	-1.417	1.932	0.462
350T125-18	0.0188	0.113	0.38	0.221	0.122	1.400	0.016	0.382	0.176	0.063	1.25	167	2.278						0.013	0.039	-0.685	1.605	0.818
350T125-27	0.0283	0.170	0.58	0.331	0.182	1.396	0.025	0.381	0.277	0.128	2.53	566	2.044						0.045	0.057	-0.680	1.599	0.819
350T125-30	0.0312	0.187	0.64	0.365	0.200	1.396	0.027	0.380	0.312	0.145	2.86	758	2.030						0.061	0.063	-0.679	1.598	0.820
350T125-33	0.0346	0.207	0.71	0.405	0.222	1.397	0.030	0.379	0.354	0.165	3.27	1033	2.014						0.083	0.070	-0.677	1.598	0.820
350T125-43	0.0451	0.270	0.92	0.528	0.288	1.397	0.038	0.377	0.490	0.233	4.61	1777	1.971						0.183	0.090	-0.673	1.596	0.822
350T125-54	0.0566	0.339	1.15	0.668	0.361	1.404	0.048	0.375	0.651	0.317	6.26	2551	1.937	0.626	0.297	8.89	3446	1.978	0.362	0.113	-0.669	1.599	0.825
350T125-68	0.0713	0.427	1.45	0.851	0.454	1.412	0.059	0.372	0.851	0.433	8.55	3193	1.908	0.839	0.407	12.18	4838	1.949	0.723	0.143	-0.665	1.605	0.828
350T150-27	0.0283	0.184	0.63	0.377	0.207	1.431	0.041	0.470	0.298	0.132	2.62	566	2.111						0.049	0.093	-0.879	1.745	0.746
350T150-30	0.0312	0.203	0.69	0.416	0.228	1.432	0.045	0.469	0.336	0.150	2.96	758	2.097						0.066	0.103	-0.878	1.744	0.747
350T150-33	0.0346	0.225	0.76	0.461	0.253	1.432	0.049	0.469	0.382	0.171	3.39	1033	2.080						0.090	0.114	-0.876	1.743	0.747
350T150-43	0.0451	0.293	1.00	0.601	0.328	1.433	0.064	0.467	0.531	0.243	4.80	1777	2.034						0.198	0.148	-0.872	1.741	0.749
350T150-54	0.0566	0.367	1.25	0.761	0.412	1.440	0.079	0.465	0.712	0.332	6.57	2551	1.996	0.679	0.310	9.28	3446	2.042	0.392	0.186	-0.868	1.744	0.752
350T150-68	0.0713	0.462	1.57	0.972	0.518	1.450	0.099	0.462	0.957	0.459	9.07	3193	1.960	0.919	0.428	12.81	4838	2.007	0.783	0.236	-0.863	1.749	0.756
350T200-33	0.0346	0.259	0.88	0.574	0.315	1.487	0.108	0.647	0.428	0.181	3.57	1033	2.199						0.103	0.248	-1.297	2.077	0.610
350T200-43	0.0451	0.338	1.15	0.749	0.409	1.489	0.140	0.645	0.600	0.257	5.09	1777	2.150						0.229	0.322	-1.292	2.074	0.612
350T200-54	0.0566	0.424	1.44	0.949	0.513	1.496	0.175	0.642	0.814	0.355	7.01	2551	2.109	0.770	0.329	9.85	3446	2.159	0.453	0.408	-1.288	2.076	0.615
350T200-68	0.0713	0.534	1.82	1.213	0.647	1.508	0.218	0.639	1.112	0.496	9.80	3193	2.066	1.054	0.458	13.71	4838	2.121	0.904	0.520	-1.283	2.080	0.620
362T125-18	0.0188	0.115	0.39	0.240	0.127	1.442	0.017	0.380	0.192	0.066	1.30	161	2.366						0.014	0.042	-0.675	1.637	0.830
362T125-27	0.0283	0.173	0.59	0.358	0.191	1.438	0.025	0.378	0.301	0.135	2.66	546	2.109						0.046	0.082	-0.670	1.631	0.831
362T125-30	0.0312	0.191	0.65	0.395	0.210	1.438	0.027	0.378	0.339	0.152	3.01	731	2.095						0.062	0.068	-0.669	1.630	0.832
362T125-33	0.0346	0.212	0.72	0.438	0.232	1.438	0.030	0.377	0.384	0.174	3.44	996	2.079						0.085	0.075	-0.667	1.630	0.832
362T125-43	0.0451	0.276	0.94	0.571	0.302	1.439	0.039	0.375	0.531	0.245	4.84	1777	2.035						0.187	0.097	-0.663	1.628	0.834
362T125-54	0.0566	0.346	1.18	0.723	0.378	1.445	0.048	0.373	0.705	0.332	6.57	2645	2.000	0.678	0.312	9.34	3446	2.042	0.369	0.122	-0.659	1.632	0.837
362T125-68	0.0713	0.436	1.48	0.921	0.475	1.454	0.060	0.370	0.921	0.453	8.95	3311	1.971	0.907	0.427	12.78	5017	2.012	0.738	0.155	-0.655	1.637	0.840
362T150-27	0.0283	0.187	0.64	0.408	0.217	1.475	0.041	0.468	0.323	0.140	2.76	546	2.177						0.050	0.101	-0.868	1.774	0.761
362T150-30	0.0312	0.207	0.70	0.449	0.239	1.475	0.045	0.467	0.364	0.158	3.12	731	2.162						0.067	0.111	-0.866	1.773	0.761
362T150-33	0.0346	0.229	0.78	0.499	0.264	1.475	0.050	0.467	0.414	0.180	3.56	996	2.146						0.091	0.123	-0.865	1.772	0.762
362T150-43	0.0451	0.298	1.02	0.650	0.343	1.476	0.064	0.465	0.574	0.255	5.04	1777	2.099						0.202	0.160	-0.860	1.771	0.764
362T150-54	0.0566	0.374	1.27	0.823	0.431	1.483	0.080	0.462	0.769	0.349	6.89	2645	2.060	0.735	0.325	9.74	3446	2.107	0.400	0.201	-0.856	1.774	0.767
362T150-68	0.0713	0.471	1.60	1.050	0.542	1.492	0.099	0.459	1.034	0.480	9.49	3311	2.024	0.993	0.449	13.43	5017	2.072	0.799	0.256	-0.852	1.779	0.771
362T200-33	0.0346	0.264	0.90	0.619	0.328	1.532	0.110	0.645	0.464	0.190	3.76	996	2.267						0.105	0.269	-1.282	2.100	0.627
362T2																							

Design Lateral Brace for Partition Wall

Max. height of partition wall = 8'-6"

Reaction @ top of partition wall:

$$W_{top/bot.} = 5 \text{ psf} \left( \frac{8.5'}{2} \right) = 21.25 \text{ plf}$$

Try diagonal brace @ 4'-0" o.c.

$$V_{brace} = 21.25 \text{ plf} (4') = 85 \#$$

$$\text{Brace Force: } T/C_{brace} = 85 \# (\sqrt{2}) = 120.2 \#$$

$$\text{Brace Length: } l_{brace} = (3') (\sqrt{2}) = 4.243'$$

Try 350S125-33 for all braces:

$$r_y = 0.415" \quad (\text{From SSMA catalog})$$

$$\frac{KL}{r_y} = \frac{(110)(4.243') (12/1)}{0.415"} = 122.7 < 200 \quad \checkmark \text{OK}$$

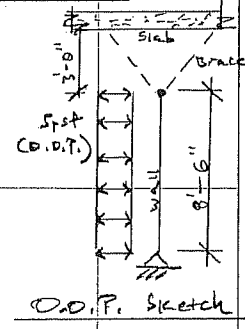
$$F_c = \frac{\pi^2 (29,000 \text{ ksi})}{(122.7)^2} = 19.02 \text{ KST}$$

$$0.44 (33 \text{ KST}) = 14.52 \text{ KST} < 19.02 \text{ KST}$$

$$F_{cr} = (0.658 \left( \frac{33}{19.02} \right)) (33 \text{ KST}) = 15.96 \text{ KST}$$

$$P_{n/\Omega} = 15.96 \text{ KST} (0.210 \text{ in}^2 \times \frac{1}{1.67}) = 2.007 \text{ kip}$$

$$\Rightarrow 2.007 \# > 120.2 \# \quad \checkmark \text{OK}$$



use: **350S125-33 for all braces**  
 $l = 4.25' \text{ max.}$



# Section Properties

## Section Properties Table Notes

1. The centerline bend radius is the greater of 2 times the design thickness or 3/32".
2. Web depth for track sections is equal to the nominal height plus 2 times the design thickness plus the bend radius.
3. Hems on non-structural track sections are ignored.
4. Effective properties incorporate the strength increase from the cold work of forming as applicable per AISI A7.2.
5. Tabulated gross properties are based on the full-unreduced cross section of the studs, away from punchouts.
6. For deflection calculations, use the effective moment of inertia.
7. For those steels that have both 33 and 50 ksi listings, if the design is based upon 50 ksi, the 50 ksi steel needs to be specified. (i.e., 362S137-54 (50 ksi))

## Non-Structural (S) Stud Section Properties

Section	Design Thickness (in)	Gross							Effective 33ksi					Effective 50ksi					Torsional				
		Area (in²)	Weight (lb/ft)	Ixx (in⁴)	Sxx (in³)	Rx (in)	Iyy (in⁴)	Ry (in)	Ixx (in⁴)	Sxx (in³)	Ma (in-k)	Va (lb)	Ycg (in)	Ixx (in⁴)	Sxx (in³)	Ma (in-k)	Va (lb)	Ycg (in)	Jx1000 (in⁴)	Cw (in³)	Xo (in)	Ro (in)	β
162S125-18	0.0188	0.080	0.27	0.038	0.046	0.686	0.016	0.447	0.034	0.033	0.66	309	0.924						0.009	0.009	-1.061	1.340	0.373
162S125-27	0.0283	0.120	0.41	0.056	0.068	0.682	0.023	0.443	0.055	0.051	1.01	526	0.909						0.032	0.013	-1.049	1.327	0.375
162S125-30	0.0312	0.131	0.45	0.061	0.075	0.681	0.026	0.441	0.060	0.059	1.16	579	0.894						0.043	0.014	-1.046	1.323	0.376
162S125-33	0.0346	0.145	0.49	0.067	0.083	0.679	0.028	0.440	0.066	0.068	1.35	641	0.877						0.058	0.015	-1.042	1.319	0.376
250S125-18	0.0188	0.097	0.33	0.099	0.079	1.014	0.019	0.439	0.089	0.059	1.17	247	1.391						0.011	0.023	-0.930	1.444	0.585
250S125-27	0.0283	0.144	0.49	0.147	0.118	1.009	0.027	0.434	0.144	0.092	1.81	700	1.372						0.039	0.033	-0.919	1.432	0.589
250S125-30	0.0312	0.159	0.54	0.161	0.129	1.008	0.030	0.433	0.159	0.104	2.06	851	1.354						0.052	0.036	-0.915	1.429	0.590
250S125-33	0.0346	0.176	0.60	0.178	0.142	1.006	0.033	0.431	0.175	0.120	2.38	1040	1.333						0.070	0.039	-0.911	1.425	0.591
250S125-43	0.0451	0.227	0.77	0.228	0.182	1.001	0.041	0.426	0.226	0.173	3.43	1350	1.275						0.154	0.049	-0.899	1.412	0.594
250S125-54	0.0566	0.280	0.95	0.277	0.222	0.994	0.049	0.419	0.277	0.218	4.98	1656	1.260	0.275	0.205	6.14	2510	1.289	0.299	0.059	-0.890	1.398	0.595
250S125-68	0.0713	0.345	1.18	0.334	0.267	0.984	0.057	0.408	0.334	0.266	6.30	2017	1.252	0.334	0.261	7.81	3057	1.262	0.585	0.069	-0.880	1.381	0.594
350S125-18	0.0188	0.115	0.39	0.215	0.123	1.366	0.021	0.423	0.197	0.087	1.72	172	1.992						0.014	0.049	-0.819	1.648	0.753
350S125-27	0.0283	0.173	0.59	0.320	0.183	1.361	0.030	0.418	0.312	0.147	2.90	589	1.892						0.046	0.071	-0.809	1.637	0.756
350S125-30	0.0312	0.190	0.65	0.351	0.201	1.359	0.033	0.417	0.346	0.167	3.29	790	1.871						0.062	0.077	-0.805	1.634	0.757
350S125-33	0.0346	0.210	0.72	0.387	0.221	1.358	0.036	0.415	0.382	0.191	3.77	1046	1.847						0.084	0.085	-0.802	1.630	0.758
350S125-43	0.0451	0.272	0.93	0.498	0.284	1.352	0.046	0.410	0.493	0.272	5.37	1777	1.780						0.184	0.106	-0.790	1.619	0.762
350S125-54	0.0566	0.337	1.15	0.608	0.348	1.344	0.055	0.402	0.608	0.342	7.82	2403	1.762	0.603	0.324	9.71	3446	1.796	0.360	0.127	-0.781	1.605	0.763
350S125-68	0.0713	0.417	1.42	0.739	0.422	1.332	0.064	0.391	0.737	0.421	9.95	2959	1.752	0.737	0.413	12.36	4483	1.765	0.706	0.151	-0.770	1.587	0.765
362S125-18	0.0188	0.118	0.40	0.234	0.129	1.409	0.021	0.421	0.215	0.090	1.78	166	2.075						0.014	0.053	-0.807	1.677	0.768
362S125-27	0.0283	0.176	0.60	0.347	0.192	1.404	0.031	0.416	0.338	0.154	3.05	568	1.957						0.047	0.077	-0.797	1.667	0.771
362S125-30	0.0312	0.194	0.66	0.381	0.210	1.402	0.033	0.415	0.375	0.175	3.46	761	1.935						0.063	0.084	-0.794	1.664	0.772
362S125-33	0.0346	0.215	0.73	0.421	0.232	1.400	0.037	0.413	0.415	0.201	3.96	1039	1.911						0.086	0.092	-0.790	1.660	0.774
362S125-43	0.0451	0.278	0.95	0.540	0.298	1.395	0.046	0.408	0.536	0.285	5.64	1777	1.843						0.188	0.115	-0.779	1.649	0.777
362S125-54	0.0566	0.344	1.17	0.661	0.365	1.386	0.055	0.400	0.661	0.358	8.21	2497	1.825	0.655	0.341	10.20	3446	1.859	0.367	0.138	-0.769	1.635	0.779
362S125-68	0.0713	0.426	1.45	0.803	0.443	1.374	0.065	0.389	0.802	0.442	10.44	3076	1.815	0.802	0.434	12.98	4661	1.827	0.721	0.164	-0.758	1.617	0.780
400S125-18 <sup>1</sup>	0.0188	0.125	0.42	0.294	0.147	1.536	0.021	0.414	0.265	0.099	1.96	150	2.325						0.015	0.066	-0.774	1.769	0.809
400S125-27	0.0283	0.187	0.64	0.438	0.219	1.531	0.031	0.410	0.426	0.178	3.52	511	2.150						0.050	0.096	-0.764	1.759	0.811
400S125-30	0.0312	0.206	0.70	0.481	0.240	1.529	0.034	0.408	0.473	0.202	3.99	686	2.127						0.067	0.105	-0.761	1.756	0.812
400S125-33	0.0346	0.228	0.77	0.531	0.265	1.527	0.038	0.407	0.523	0.231	4.56	936	2.102						0.091	0.115	-0.757	1.752	0.813
400S125-43	0.0451	0.295	1.00	0.682	0.341	1.521	0.048	0.402	0.676	0.327	6.46	1777	2.032						0.200	0.145	-0.746	1.742	0.816
400S125-54	0.0566	0.365	1.24	0.835	0.418	1.512	0.057	0.394	0.835	0.411	9.40	2777	2.013	0.828	0.391	11.71	3446	2.048	0.390	0.174	-0.737	1.728	0.818
400S125-68	0.0713	0.452	1.54	1.017	0.509	1.499	0.066	0.383	1.015	0.507	11.98	3429	2.003	1.015	0.498	14.91	5196	2.015	0.767	0.206	-0.725	1.709	0.820
550S125-18 <sup>1</sup>	0.0188	0.153	0.52	0.630	0.229	2.029	0.023	0.390	0.925	0.253	5.00	366	3.072						0.018	0.138	-0.666	2.171	0.906
550S125-27	0.0283	0.229	0.78	0.938	0.341	2.023	0.034	0.385	1.017	0.307	6.06	491	2.956						0.061	0.202	-0.657	2.162	0.908
550S125-30	0.0312	0.252	0.86	1.031	0.375	2.021	0.037	0.384	1.017	0.307	6.06	491	2.956						0.082	0.220	-0.654	2.159	0.908
550S125-33	0.0346	0.279	0.95	1.139	0.414	2.019	0.041	0.382	1.124	0.368	7.26	670	2.864						0.112	0.242	-0.651	2.156	0.909
550S125-43	0.0451	0.362	1.23	1.468	0.534	2.013	0.052	0.377	1.456	0.514	10.16	1487	2.786						0.246	0.304	-0.641	2.146	0.911
550S125-54	0.0566	0.450	1.53	1.805	0.656	2.002	0.061	0.369	1.805	0.647	14.80	2799	2.765	1.790	0.620	18.57	2967	2.804	0.481	0.366	-0.631	2.132	0.912
550S125-68	0.0713	0.559	1.90	2.209	0.803	1.987	0.072	0.358	2.205	0.801	18.94	4442	2.753	2.205	0.789	23.62	5468	2.767	0.948	0.437	-0.620	2.112	0.914
600S125-18 <sup>1</sup>	0.0188	0.162	0.55	0.778	0.259	2.189	0.024	0.382	1.145	0.274	5.42	335	3.413						0.019	0.169	-0.637	2.312	0.924
600S125-27 <sup>1</sup>	0.0283	0.243	0.83	1.160	0.387	2.183	0.035	0.377	1.259	0.331	6.54	448	3.292						0.065	0.247	-0.628	2.303	0.926
600S125-30	0.0312	0.268	0.91	1.275	0.425	2.181	0.038	0.376	1.391	0.408	8.06	612	3.154						0.087	0.270	-0.625	2.300	0.926
600S125-33	0.0346	0.297	1.01	1.409	0.470	2.179	0.042	0.374	1.529	0.470	9.44	809	3.037						0.118	0.296	-0.622	2.297	0.927
600S125-43	0.0451	0.385	1.31	1.817	0.606	2.173	0.053	0.369	1.802	0.584	11.55	1358	3.017						0.261	0.373	-0.612	2.287	0.928
600S125-54	0.0566	0.479	1.63	2.236	0.745	2.161	0.063	0.362	2.236	0.735	16.82	2708	3.015	2.218	0.706	21.14	2708	3.056	0.511	0.449	-0.603	2.273	0.930
600S125-68	0.0713	0.595	2.02	2.740	0.913	2.146	0.073	0.351	2.735	0.911	21.53	4442	3.003	2.735	0.898	26.88	5468	3.018	1.008	0.536	-0.592	2.253	0.931
800S125-33 <sup>1</sup>																							

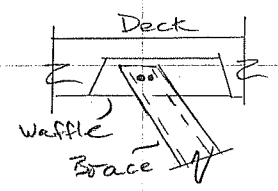
### Design Brace Connection

To avoid putting the fastener in tension, attach brace directly to side of waffle;

$$P_{brace} = 120.2 \#$$

Try (2) 0.145"  $\phi$  L.V.F. fasteners:

$$Z = 2(105 \#) = 210 \# > 120.2 \# \text{ OK}$$



use: (2) 0.145"  $\phi$  L.V.F. @ EA, diagonal brace to concrete waffle Deck connection

Brace Sketch

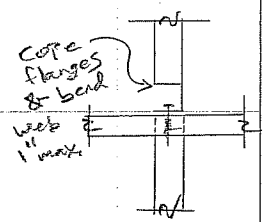
### Connection to Wall Top Track Below

Check required thickness of bracing members:

Moment for coped web: Center screw

$$M_{ASD} = 85 \#(1\frac{1}{2}) = 0.0425 \text{ k-in}$$

$$t_w = \frac{(4(0.0425 \text{ k-in}))}{(0.6(33 \text{ ksi})(4\text{"}))} = 0.0463\text{"} \leftarrow \text{diagonal measure}$$



$$18 \text{ Gage} = 0.0451\text{"}$$

$$\text{overstress} = 100(1 - \frac{0.0451\text{"}}{0.0463\text{}}) = 2.65\% \leq 5\% \text{ Say OK}$$

use: 18 Gage studs for all top braces. Cope flanges & bend web 1". Attach screws @ center of bent web.  $F_y = 33 \text{ ksi}$

Elevation View

TABLE 2—ALLOWABLE SERVICE LOADS FOR LOW-VELOCITY FASTENERS  
DRIVEN INTO NORMAL-WEIGHT CONCRETE<sup>1,2</sup>

FASTENER DESCRIPTION	FASTENER	SHANK DIAMETER (inch)	EMBEDMENT (inches)	CONCRETE COMPRESSIVE STRENGTH					
				2,000 psi		4,000 psi		6,000 psi	
				Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)
Standard Nail	X-C	0.138	3/4	45	75	60	105	—	—
			1	85	150	90	200	—	—
			1 1/4	130	210	130	290	—	—
			1 1/2	175	260	245	360	—	—
Universal Nail	X-DNI	0.145	3/4	60	105	110	120	—	—
			1	145	185	160	240	100	125
			1 1/4	160	290	180	250	200	270
			1 1/2	220	330	320	425	—	—
Drywall Track Nail	X-C22 P8 TH	0.138	3/4	55	130	90	170	—	—
High Performance Nail	X-AL-H	0.177	3/4	65	70	90	95	120	125
			1	130	190	165	195	—	—
			1 1/4	135	265	240	270	240	440
			1 1/2	240	340	240	460	—	—
High Performance Nail	X-AL-H <sup>3</sup>	0.177	1 1/2	355	470	475	565	—	—
Heavy Duty Nail	DS	0.177	3/4	50	120	125	135	—	—
			1	130	195	155	240	—	—
			1 1/4	220	385	270	425	—	—
			1 1/2	300	405	355	450	—	—
1/4-20 Threaded Stud	W6	0.145	3/4	40	55	40	55	—	—
			1	85	195	110	225	—	—
3/8-16 Threaded Stud	W10	0.205	1	85	95	100	105	—	—
			1 1/4	175	345	200	380	—	—
			1 5/8	285	380	385	395	—	—
Stainless Steel Nail	X-CR	0.145	3/4	30	40	65	40	—	—
			1	55	185	120	190	100	170
			1 1/4	110	290	125	300	120	440
			1 1/2	265	405	350	450	—	—

For SI: 1 inch = 25.4 mm, 1 psi = 6.8948 kPa, 1 pound = 4.45 N.

<sup>1</sup> The tabulated allowable load values utilize a factor of safety that is greater than one equal to 5, calculated in accordance with AC70. Wood or steel members connected to the substrate must be investigated for compliance with the applicable code in accordance with referenced design criteria.

<sup>2</sup> The concrete base material must exhibit the tabulated compressive strength when the fastener is installed.

<sup>3</sup> The X-AL-H fastener must be installed using the DX-Kwik drilled pilot hole installation procedure described in Section 4.3.

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Design Brace Connection

Check screws from 18 Gage brace to 20 Gage top track of partition wall:

Try (3) No. 8 screws per connection:

$$\phi_{shear} = 3(141\#) = 423\# > 85\# \quad \checkmark \text{OK}$$

$$\phi_{pullout} = 3(65\#) = 195\# > 85\# \quad \checkmark \text{OK}$$

USE: (3) No. 8 screws per brace/top track connection

Design Stud wall & Base Connection

Stud wall: Max height w/ 5psf O.D.P. load

$$h_{max} = 15'-0" < 8'-6" \quad \checkmark \text{OK}$$

(For 350S125-30 studs @ 16" o.c.)

Assume Base Anchorage to follow stud spacing

$$V_{ASD Anch.} = 1.33' (5\text{psf}) (11\frac{1}{2}') = 38.33\#$$

(Worst case is full height wall)

Try 0.145" L.V.F. w/ 3/4" conc. Embedment

$$\phi = 105\# > 38.33\# \quad \checkmark \text{OK}$$

Check No. 8 screw/Top Track connection:

$$\phi = 141\# > 38.33\# \quad \checkmark \text{OK}$$

use: 350S125-30 studs @ 16" o.c.  
Base Track - connect to EA. stud w/ No. 8 screw, EA. side w/ 0.145" L.V.F. in EA. stud bay w/ 3/4" min. Embed. Depth

For Bottom Track only:

use: L.V.F. may be used at every other bay i.e. @ 32" o.c.

# Fasteners (Screws and Welds)

## Screw Table Notes

1. Screw spacing and edge distance shall not be less than 3 x d. (d = Nominal screw diameter)
2. The allowable loads are based on the steel properties of the members being connected, per AISI section E4.
3. When connecting materials of different steel thicknesses or tensile strength ( $F_u$ ), the lowest applicable values should be used.
4. The nominal strength of the screw must be at least 3.75 times the allowable loads.
5. Values include a 3.0 factor of safety.
6. Applied loads may be multiplied by 0.75 for seismic or wind loading, per AISI A 5.1.3.
7. Penetration of screws through joined materials should not be less than 3 exposed threads. Screws should be installed and tightened in accordance with screw manufacturer's recommendations.

## Allowable Loads for Screw Connections (lbs/screw)

Steel Mils	Thickness Design (in)	Steel Properties		No. 12 Dia. = 0.216 (in)		No. 10 Dia. = 0.190 (in)		No. 8 Dia. = 0.164 (in)		No. 6 Dia. = 0.138 (in)	
		Fy (ksi)	Fu (ksi)	Shear	Pullout	Shear	Pullout	Shear	Pullout	Shear	Pullout
18	0.0188	33	45					66	39	60	33
27	0.0283	33	45					121	59	111	50
30	0.0312	33	45			151	76	141	65	129	55
33	0.0346	33	45			177	84	164	72	151	61
43	0.0451	33	45	280	124	263	109	244	94	224	79
54	0.0566	33	45	394	156	370	137	344	118		
68	0.0713	33	45	557	196	523	173				

## Weld Table Notes

1. Weld capacities based on AISI, section E2
2. When connecting materials of different steel thicknesses or tensile strength ( $F_u$ ), the lowest applicable values should be used.
3. Values include a 2.5 factor of safety.
4. Based on the minimum allowance load for fillet or flare groove welds, longitudinal or transverse loads.
5. Allowable loads based on E60xx electrodes.
6. For material less than or equal to .1242" thick, drawings show nominal weld size. For such material, the effective throat of the weld shall not be less than the thickness of the thinnest connected part.

## Allowable Loads for Fillet Welds and Flare Groove Welds

Steel Mils	Thickness Design (in)	Fy (ksi)	Fu (ksi)	Nominal Weld Size	Allowable Load (lb/in)
43	0.0451	33	45	1/16	609
54	0.0566	33	45	3/32	764
68	0.0713	33	45	1/8	963
97	0.1017	33	45	1/8	1373
118	0.1242	33	45	1/8	1677
54	0.0566	50	65	3/32	1104
68	0.0713	50	65	1/8	1390
97	0.1017	50	65	1/8	1983
118	0.1242	50	65	1/8	2422

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# ABHT

STRUCTURAL ENGINEERS

## Header Schedule

Max. Cripple wall above header height = 3'-0"

$$W_{DL, \text{Header}} = 8 \text{ psf} (3') = 24 \text{ plf}$$

Find max. span length for typical header:

(2) 350S125-33 (Boxed Header)

$$M_{\text{allow}} = 2(3.77 \text{ k.in}) = 7.54 \text{ k.in}$$

Assume simple span for all headers:

$$M = \frac{wL^2}{8} \Rightarrow L = \sqrt{\frac{8(7.54 \text{ k.in})(12'')}{0.024 \text{ k/ft}}} = 14.47'$$

Max. header span = 8'-6" < 14.47' ✓OK

Check deflection:  $I_{\text{Header}} = 2(0.382 \text{ in}^4) = 0.764 \text{ in}^4$

$$\Delta = \frac{5(0.024 \text{ k/ft})(8.5')^4 (1,728 \text{ in}^3/\text{ft}^3)}{384(29,000 \text{ ksi})(0.764 \text{ in}^4)} = 0.1272''$$

$$\Rightarrow \frac{8.5'(12'')}{0.1272''} = \frac{1}{802} < \frac{1}{360} \text{ ✓OK}$$

use: For all header lengths 8'-6" and less  
(2) 350S125-33 Box Stud header

Check Connection:

$$P_{\text{ASD}} = 24 \text{ plf} (8.5'/2) = 102\#$$

Typical jamb/king stud connection = (3) No. 8 screws

$$R_{\text{allow}} = 3(164\#) = 492\#$$

$$\Rightarrow 492\# > 102\# \text{ ✓OK}$$

use: (3) No. 8 screws for EA Header Stud to jamb stud connection

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**ABHT**  
 STRUCTURAL ENGINEERS

### Header Schedule

Check Axial Capacity of Jamb Stud

Typ. Stud = 350S125-33

Braced by Gyp. Straps or Blocking

$$r_x = 1.358''$$

$$\frac{KL}{r} = \frac{11.5' (12'/1)}{1.358''} = 101.62 < 200 \checkmark \text{OK}$$

$$F_e = \frac{\pi^2 (29,000 \text{ ksi})}{(101.62)^2} = 27.72 \text{ ksi}$$

$$\lambda_c = \sqrt{\frac{33 \text{ ksi}}{27.72 \text{ ksi}}} = 1.091 < 1.5$$

$$F_n = (0.658^{(1.091)^2}) (33 \text{ ksi}) = 20.05 \text{ ksi}$$

$$P_{n/2} = 0.210 \text{ in}^2 (20.05 \text{ ksi}) \left(\frac{1}{1.80}\right) = 2.34 \text{ kip}$$

$$\Rightarrow 2.34 \text{ kip} \geq 0.102 \text{ kip} \checkmark \text{OK}$$

Check Combined:

$$W_{ASD} = S_p s f (1.33') = 6.67 \text{ Plf}$$

$$M_{ASD} = \frac{6.67 \text{ Plf} (11.5')^2}{8} = 110.216 \text{ ft} = 1.32 \text{ k} \cdot \text{in}$$

$$M_{allow} = 3.77 \text{ k} \cdot \text{in} \geq 1.32 \text{ k} \cdot \text{in} \checkmark \text{OK}$$

Unity Equation:

$$\frac{0.102 \text{ k}}{2.34 \text{ k}} = \frac{0.102 \text{ k}}{2.34 \text{ k}} = 0.044 < 0.15$$

$$\Rightarrow 0.044 + \frac{1.32 \text{ k}}{3.77 \text{ k}} = 0.394 < 1.0 \checkmark \text{OK}$$

use: Typical Wall stud is adequate to be used as Jamb Stud.  
350S125-33

## Design Hanging Ceiling

DL of ceiling:

Gypsum (5/8" max) 2.75psf

Framing 1.00psf

$$\Sigma DL = 3.75psf$$

Min. Weight (from ASCE-7) = 4.0psf

$$\Rightarrow 4.0psf > 3.75psf \therefore \text{Min. Controls}$$

$$F_p = \frac{0.4(1.0)(0.726g)W_p}{(2.5/1.0)} (1 + 2(1.0)) = 0.348 W_p$$

$$F_{pmin} = 0.3(0.726g)(1.0)(W_p) = 0.21W_p$$

Use to be conservative  
- Not @ Roof !!!

$$\Rightarrow 0.21W_p < 0.348W_p \therefore F_p \text{ Controls}$$

$$\text{Service Level: } F_{pASD} = \frac{0.35W_p}{1.4} = 0.25 W_p$$

Try bracing @ 12'-0" x 12'-0" grid

use Wires for tension &amp; compression struts

$$W_p = 4psf (12')^2 = 576 \#$$

$$F_p = 0.25 (576 \#) = 144 \#$$

Keep all bracing @ 45° angles!

$$T/C_{ASD} = 144 \# (\sqrt{2}) = 203.6 \#$$

Try 12 gage wire for tension:

$$A_{req} = (\pi/4)(0.1046")^2 = 0.00859 in^2$$

$$P_{t/\Omega} = \frac{50ksi(0.00859 in^2)}{1.67} = 0.257 kip$$

$$\Rightarrow 257 \# > 204 \# \checkmark OK$$

Use: 12 gage wire for Tension  
diagonal bracing @ 45°



### Design Compression strut

Drop height = 11'-6" - 8'-1 1/2" = 3.375'

Max Compression length = 3.375' (√2) (12"/1')

$l_c = 57.27"$

Try 1/2" ∅ conduit w/  $t_{wall} = 0.042"$

O.D. = 0.706"

I.D. = 0.622"

$A = (\pi/4) [(0.706")^2 - (0.622")^2] = 0.088 in^2$

$r = \frac{\sqrt{(0.706")^2 + (0.622")^2}}{4} = 0.235"$

$\frac{kl}{r} = \frac{(11.0)(57.27")}{0.235"} = 243.5$

$F_c = \frac{\pi^2 (29,000 ksi)}{(243.5)^2} = 4.83 ksi$

$F_{cr} = 0.877 (4.83 ksi) = 4.23 ksi$

$P_{n/a} = 4.23 ksi (0.088 in^2) (1.67) = 0.222 kip$

$\Rightarrow 222 \# \approx 204 \# \checkmark OK$

use: 1/2" ∅ EMT Compression strut

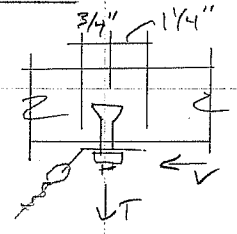
### Design Brace to Concrete Conn.

Size bent  $\#$ : Try 12 gauge x 2" long

$M_{\#} = 144 \# (1") = 0.144 kin$

$t_{\#} = \left( \frac{4(0.144 in^2)}{0.6(50 ksi)(2")} \right)^{1/2} = 0.098"$

$\Rightarrow 0.1046" > 0.098" \checkmark OK$



Hanger sketch

Check 3/8" ∅ Hi-ti KB-TZ 2" embed.

$T_a = 1009 \# \left( \frac{0.65(0.75)}{1.1} \right) = 447 \# > 144 \# \checkmark OK$

$V_a = 999 \# \left( \frac{0.65(0.75)}{1.1} \right) = 443 \# > 144 \# \checkmark OK$

Interaction:  $\frac{144 \#}{447 \#} + \frac{144 \#}{443 \#} = 0.647 < 1.2 \checkmark OK$

use: # 12 GA x 2" long w/ 3/8" ∅ Hi-ti KB-TZ wedge anchor w/ 2" embed. depth

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TABLE 9—KB-TZ CARBON AND STAINLESS STEEL ALLOWABLE SEISMIC TENSION (ASD), NORMAL-WEIGHT CRACKED CONCRETE, CONDITION B (pounds)<sup>1,2,3</sup>

Nominal Anchor Diameter	Embedment Depth $h_{ef}$ (in.)	Concrete Compressive Strength <sup>2</sup>							
		$f_c = 2,500$ psi		$f_c = 3,000$ psi		$f_c = 4,000$ psi		$f_c = 6,000$ psi	
		Carbon steel	Stainless steel	Carbon steel	Stainless steel	Carbon steel	Stainless steel	Carbon steel	Stainless steel
3/8	2	1,006	1,037	1,102	1,136	1,273	1,312	1,559	1,607
	1/2	1,065	1,212	1,167	1,328	1,348	1,533	1,651	1,878
1/2	3 1/4	2,178	2,207	2,386	2,418	2,755	2,792	3,375	3,419
	5/8	2,081	2,081	2,280	2,280	2,632	2,632	3,224	3,224
5/8	4	3,014	2,588	3,301	2,835	3,812	3,274	4,669	4,010
	3/4	2,736	3,594	2,997	3,937	3,460	4,546	4,238	5,568
3/4	4 3/4	3,900	3,900	4,272	4,272	4,933	4,933	6,042	6,042

For SI: 1 lbf = 4.45 N, 1 psi = 0.00689 MPa For pound-inch units: 1 mm = 0.03937 inches

<sup>1</sup>Values are for single anchors with no edge distance or spacing reduction. For other cases, calculation of  $R_d$  as per ACI 318-05 and conversion to ASD in accordance with Section 4.2.1 Eq. (5) is required.

<sup>2</sup>Values are for normal weight concrete. For sand-lightweight concrete, multiply values by 0.60.

<sup>3</sup>Condition B applies where supplementary reinforcement in conformance with ACI 318-05 Section D.4.4 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the strength reduction factors associated with Condition A may be used.

TABLE 10—KB-TZ CARBON AND STAINLESS STEEL ALLOWABLE SEISMIC SHEAR LOAD (ASD), (pounds)<sup>1</sup>

Nominal Anchor Diameter	Allowable Steel Capacity, Seismic Shear	
	Carbon Steel	Stainless Steel
3/8	999	1,252
1/2	2,839	3,049
5/8	4,678	5,245
3/4	6,313	6,477

For SI: 1 lbf = 4.45 N

<sup>1</sup>Values are for single anchors with no edge distance or spacing reduction due to concrete failure.

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Check Ceiling Gravity

use 4'-0" x 4'-0" grid for gravity

$$P_{ASD} = 4 \text{ psf} (4')^2 = 64\#$$

$$12 \text{ GA. wire: } P_{1/2} = 257\# > 64\# \text{ OK}$$

$$\text{Tension in Anchor} = 64\#$$

$$T_{min} = 100\# \text{ (Tech. bulletin NWCB)}$$

Try Hilti X-CW X-U27 ceiling wire assembly:

$$T_a = 170\# > 100\# \text{ OK}$$

use: 12 gage wire @ 4'-0" sq grid  
w/ Hilti X-CW X-U27 w/  
0.157" anchor w/ 7/8" min.  
embed. depth

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TABLE 1—X-CW CEILING WIRE ASSEMBLY TYPES

CEILING WIRE ASSEMBLY TYPE	FASTENER DIAMETER (inch)	FASTENER SHANK LENGTH (inches)	RELEVANT BASE MATERIAL	MINIMUM EMBEDMENT OF FASTENER (inches)
X-CW X-C 27	0.138	1.063	Normal-weight concrete, structural sand-lightweight concrete over steel deck panel	$\frac{7}{8}$
X-CW X-C 32	0.138	1.260		$1\frac{1}{8}$
X-CW X-U 22	0.157	0.866		$\frac{3}{4}$
X-CW X-U 27	0.157	1.063		$\frac{7}{8}$

For SI: 1 inch = 25.4 mm.

TABLE 2—ALLOWABLE LOADS FOR HILTI X-CW CEILING WIRE ASSEMBLIES INSTALLED IN NORMAL-WEIGHT CONCRETE (pounds)<sup>1,2</sup>

CEILING WIRE ASSEMBLY TYPE	MINIMUM EMBEDMENT (inches)	CONCRETE COMPRESSIVE STRENGTH			
		4000 psi		6000 psi	
		Tension	45-Degree	Tension	45-Degree
X-CW X-C 27	$\frac{7}{8}$	210	210	---	---
X-CW X-C 32	$1\frac{1}{8}$	210	210	---	---
X-CW X-U 22	$\frac{3}{4}$	---	---	100	90
X-CW X-U 27	$\frac{7}{8}$	210	210	130	150

For SI: 1 inch = 25.4 mm, 1 lbf = 4.4 N, 1 psi = 6895 Pa.

<sup>1</sup>Allowable values are for ceiling wire assemblies installed in concrete having the designated compressive strength at the time of installation.  
<sup>2</sup>Concrete thickness at the point of penetration must be a minimum of three times the fastener embedment depth.

TABLE 3—ALLOWABLE LOADS FOR HILTI X-CW CEILING WIRE ASSEMBLIES INSTALLED IN STRUCTURAL SAND-LIGHTWEIGHT CONCRETE FILLED COMPOSITE STEEL DECK PANEL (pounds)<sup>1,2</sup>

CEILING WIRE ASSEMBLY TYPE	MINIMUM EMBEDMENT (inches)	3000 psi CONCRETE COMPRESSIVE STRENGTH			
		Upper Flute		Lower Flute	
		Tension	45-Degree	Tension	45-Degree
X-CW X-C 27	$\frac{7}{8}$	110	210	100	145
X-CW X-C 32	$1\frac{1}{8}$	150	210	100	145
X-CW X-U 27	$\frac{7}{8}$	170	210	150	160

For SI: 1 inch = 25.4 mm, 1 lbf = 4.4 N, 1 psi = 6895 Pa.

<sup>1</sup>Allowable values are for ceiling wire assemblies installed in concrete having the designated compressive strength at the time of installation.  
<sup>2</sup>The composite floor deck panel must have a minimum base-metal thickness of 0.0358 inch and conform to the applicable material standard, with a minimum yield strength ( $F_y$ ) of 38 ksi. Figure 3 shows nominal flute dimensions, ceiling wire assembly locations and load orientations for the deck panel profile. Structural sand-lightweight concrete fill above top of steel deck panel must be a minimum of  $3\frac{1}{4}$  inches thick.

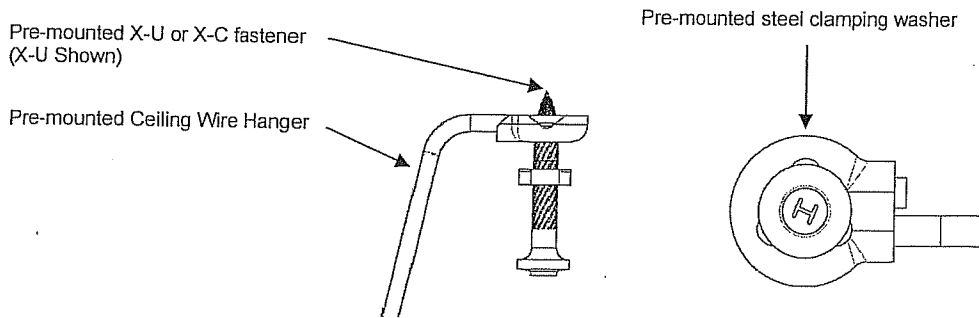


FIGURE 1—X-CW CEILING WIRE ASSEMBLY IDENTIFICATION