
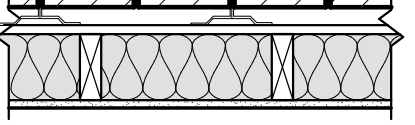
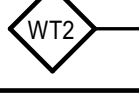
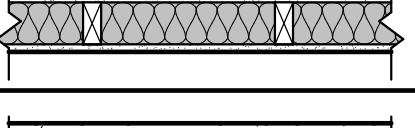



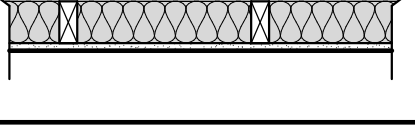

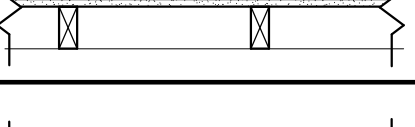

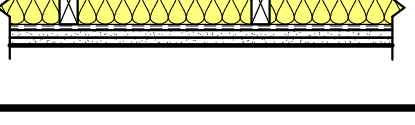
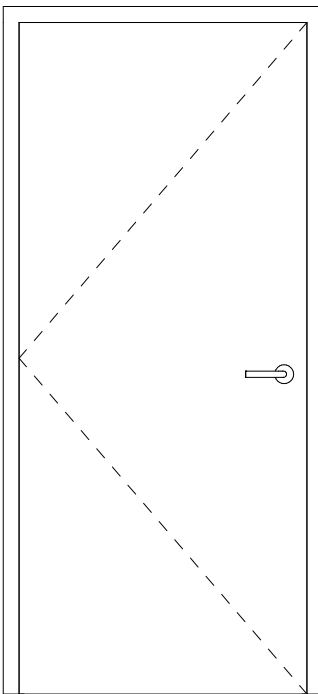






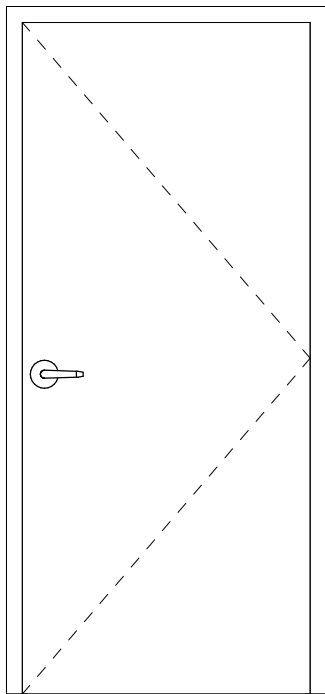
| WALL TYPE LEGEND  |   |   |
|---|---|---|
| SYMBOL  | PLAN DETAIL   | DESCRIPTION   |
|  |  | <b>EXTERIOR WALL</b><br>3-5/8" BRICK<br>1 1/2" AIR SPACE<br>3/4" EXTERIOR SHEATHING<br>2 X 6 STUDS @ 16" O.C. W/ 5 1/2" BATT INSULATION (R-21)<br>5/8" GYPSUM BD. INSIDE  |
|  |  | <b>TYPICAL INTERIOR WALL - (3 1/2" STUD)</b><br>2 X 4 STUDS @ 16" O.C. W/ 5/8" GYPSUM BD. EACH SIDE (BATT INSULATION FOR SOUND CONTROL)   |
|  |  | <b>TYPICAL INTERIOR WALL - (6 1/2" STUD)</b><br>2 X 6 STUDS @ 16" O.C. W/ 5/8" GYPSUM BD. EACH SIDE (BATT INSULATION FOR SOUND CONTROL)   |
|  |  | <b>U341- 1-HOUR, 9 1/4", STC 57</b><br>5/8" TYPE 'X' GYP. BD.<br>2 X 4 STUDS (STAGGER) @ 16" O.C. W/ 3 1/2" INSULATION<br>1" AIR SPACE<br>2 X 4 STUDS (STAGGER) @ 16" O.C. W/ 3 1/2" INSULATION<br>5/8" TYPE 'X' GYP. BD.   |
|  |  | <b>TYPICAL FURRING WALL</b><br>2 X 4 STUDS @ 16" O.C. W/ 5/8" GYPSUM BD. ONE ONE SIDE.  |
|  |  | <b>U334 - 2-HOUR, 6 1/2", STC 58 (USG 8102190)</b><br>TWO LAYERS OF 5/8" THICK GYPSUM BD. APPLIED HORIZ. OR VERTICALLY.<br>25 GA FURRING CHANNELS INSTALLED HORIZONTALLY SPACED 24" O.C.<br>2 X 4 STUDS @ 16" O.C. MAX. W/ 3" INSULATION<br>TWO LAYERS OF 5/8" THICK GYPSUM BD. APPLIED HORIZ. OR VERTICALLY. |

DOOR TYPE SCHEDULE



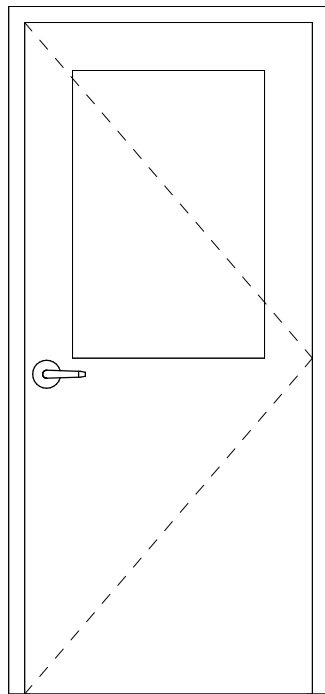
A

DOOR PANEL: FLUSH - SOLID CORE WOOD DOORS  
INTERIOR DOORS - (1,2,3,4,8,9, & 10)



B

DOOR PANEL: FLUSH - INSULATED METAL DOOR  
EXTERIOR - (5 & 11)

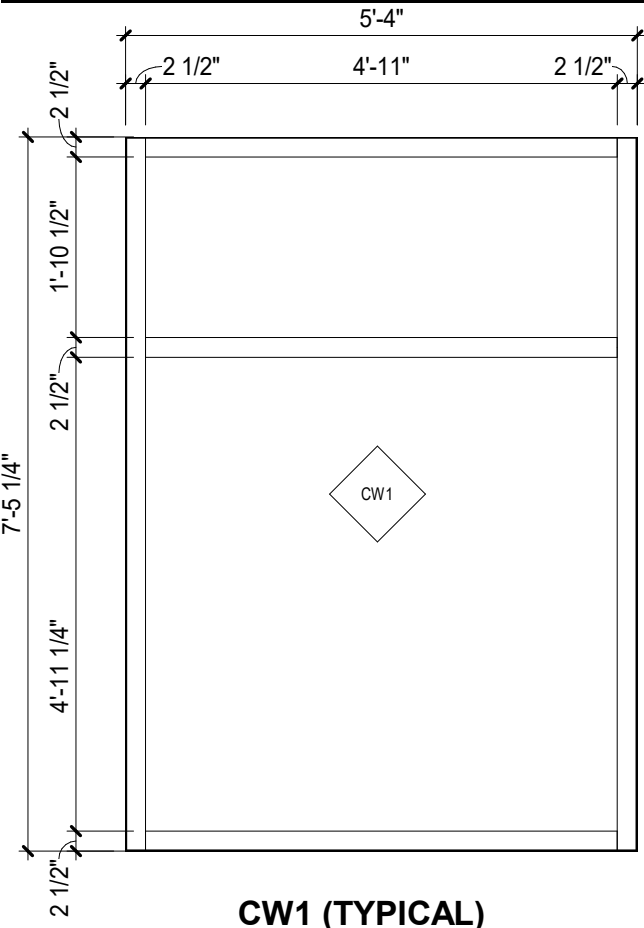


C

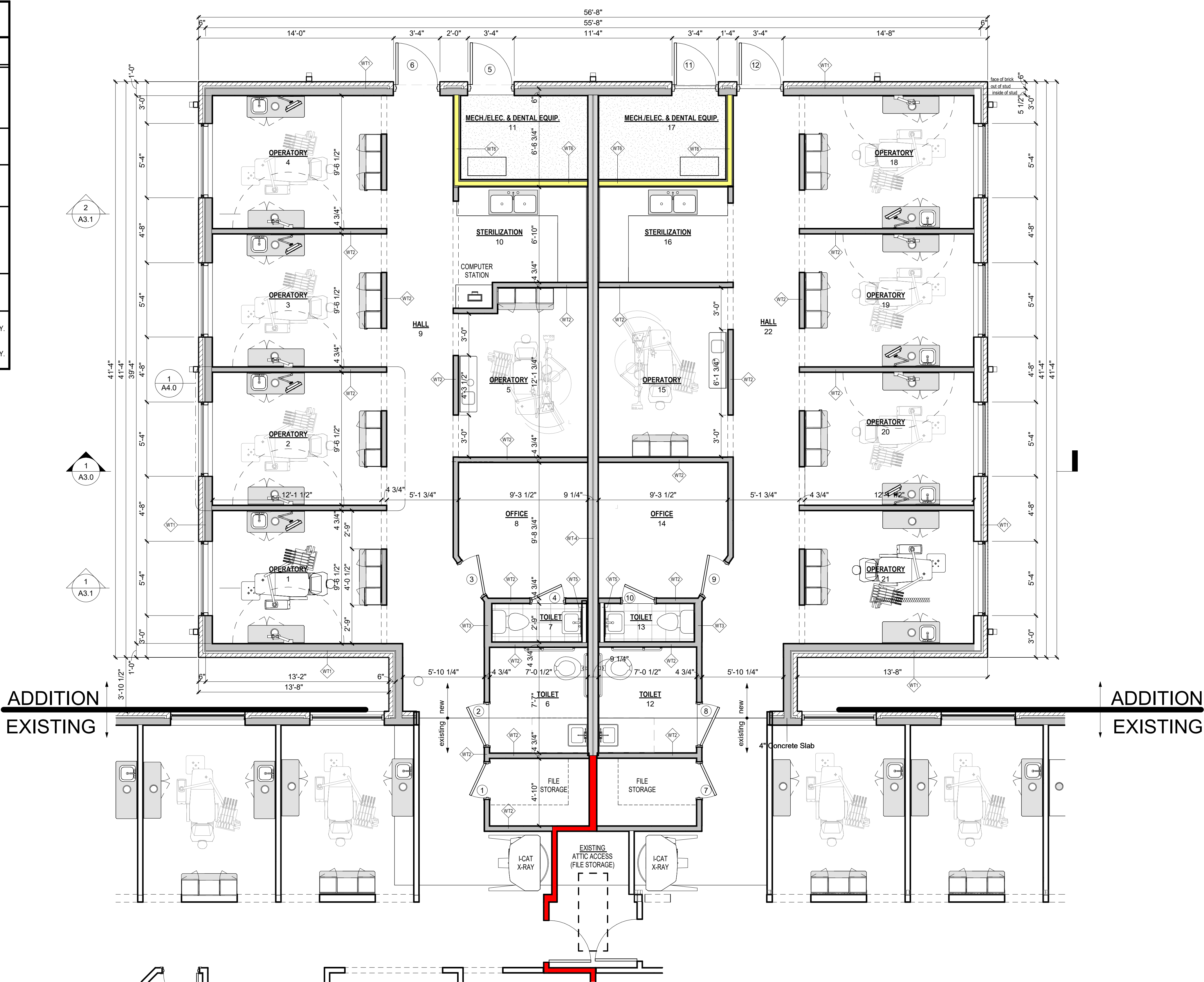
DOOR PANEL: FLUSH - INSULATED METAL DOOR  
EXTERIOR - (6 & 12)

| Door No. | Door Panel | Type Mark | Frame Type | Width  | Height | Thickness | Hardware Set | Remarks |
|----------|------------|-----------|------------|--------|--------|-----------|--------------|---------|
| 1        | SCW        | A         | METAL      | 2'-6"  | 7'-0"  | 1 3/4"    | HW-1         |         |
| 2        | SCW        | A         | METAL      | 3'-0"  | 7'-0"  | 1 3/4"    | HW-2         |         |
| 3        | SCW        | A         | METAL      | 2'-10" | 7'-0"  | 1 3/4"    | HW-1         |         |
| 4        | SCW        | A         | METAL      | 2'-4"  | 7'-0"  | 1 3/4"    | HW-2         |         |
| 5        | HM         | B         | METAL      | 3'-0"  | 7'-0"  | 2"        | HW-4         |         |
| 6        | HM         | C         | METAL      | 3'-0"  | 7'-0"  | 2"        | HW-3         |         |
| 7        | SCW        | A         | METAL      | 2'-6"  | 7'-0"  | 1 3/4"    | HW-1         |         |
| 8        | SCW        | A         | METAL      | 3'-0"  | 7'-0"  | 1 3/4"    | HW-2         |         |
| 9        | SCW        | A         | METAL      | 2'-10" | 7'-0"  | 1 3/4"    | HW-1         |         |
| 10       | SCW        | A         | METAL      | 2'-4"  | 7'-0"  | 1 3/4"    | HW-2         |         |
| 11       | HM         | B         | METAL      | 3'-0"  | 7'-0"  | 2"        | HW-4         |         |
| 12       | HM         | C         | METAL      | 3'-0"  | 7'-0"  | 2"        | HW-3         |         |

CURTAINWALL TYPE LEGEND



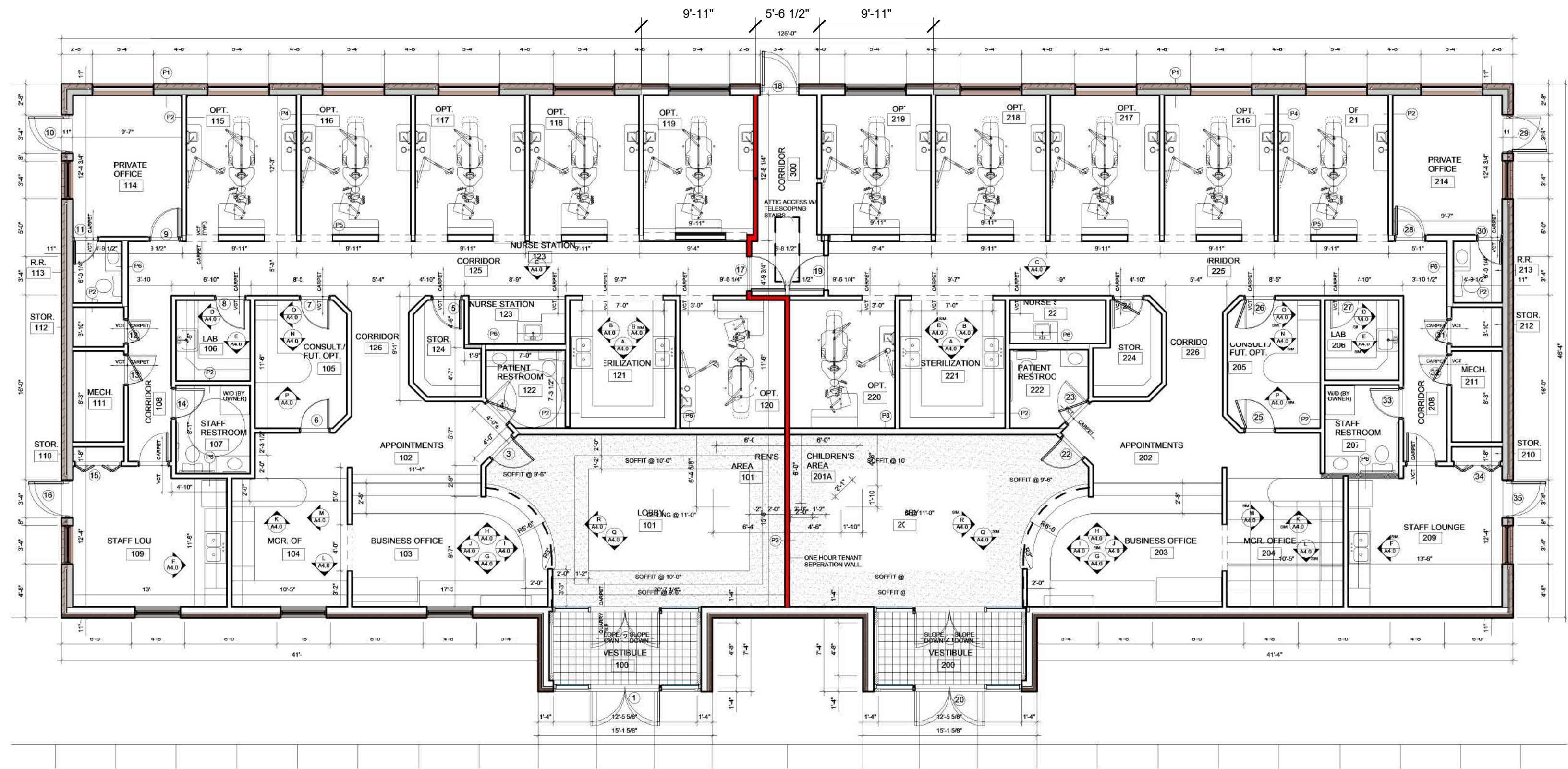
CW1 (TYPICAL)



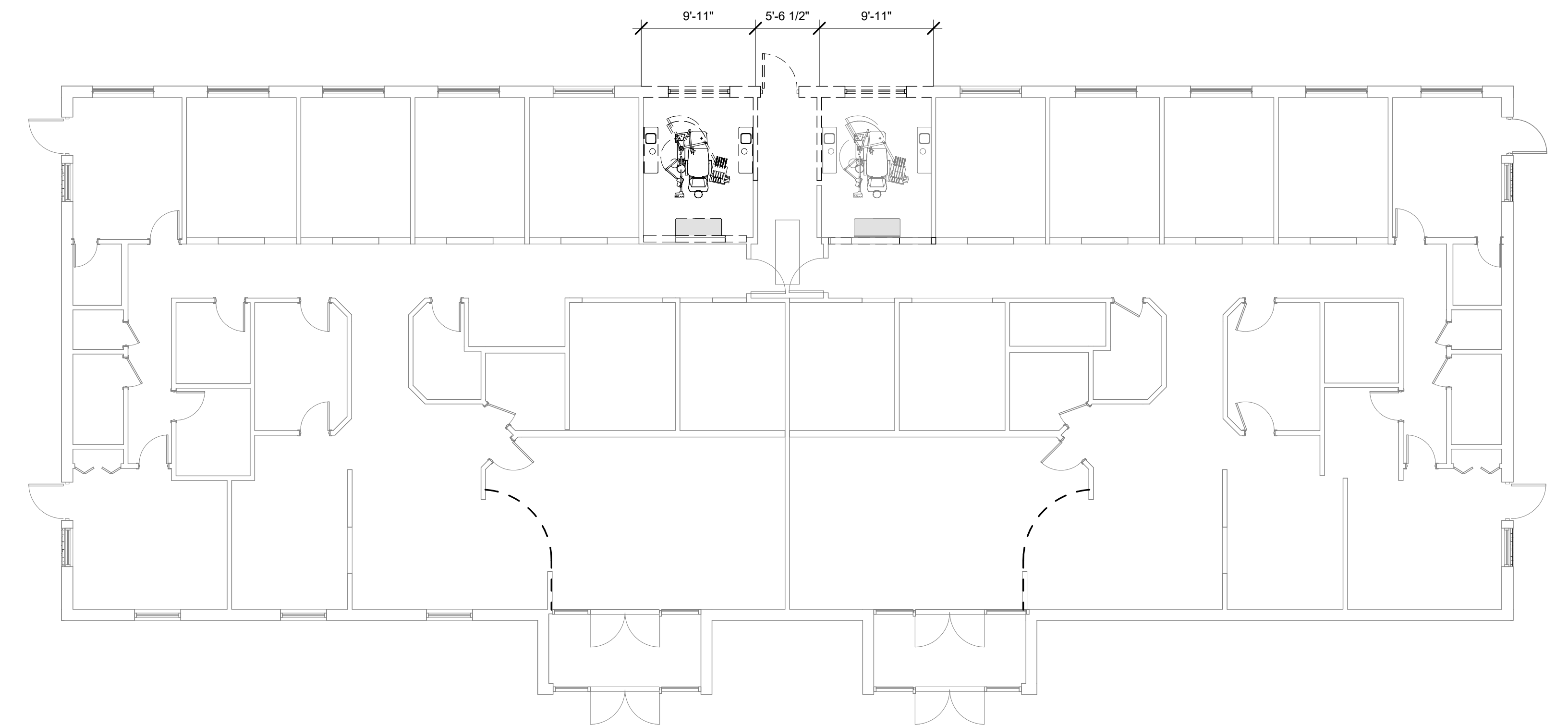
1 Dimension Floor Plan

1/4" = 1'-0"





1 Existing Floor Plan  
1/8" = 1'-0"



2 Demolition Plan  
1/8" = 1'-0"



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Existing &  
Demolition Floor  
Plans

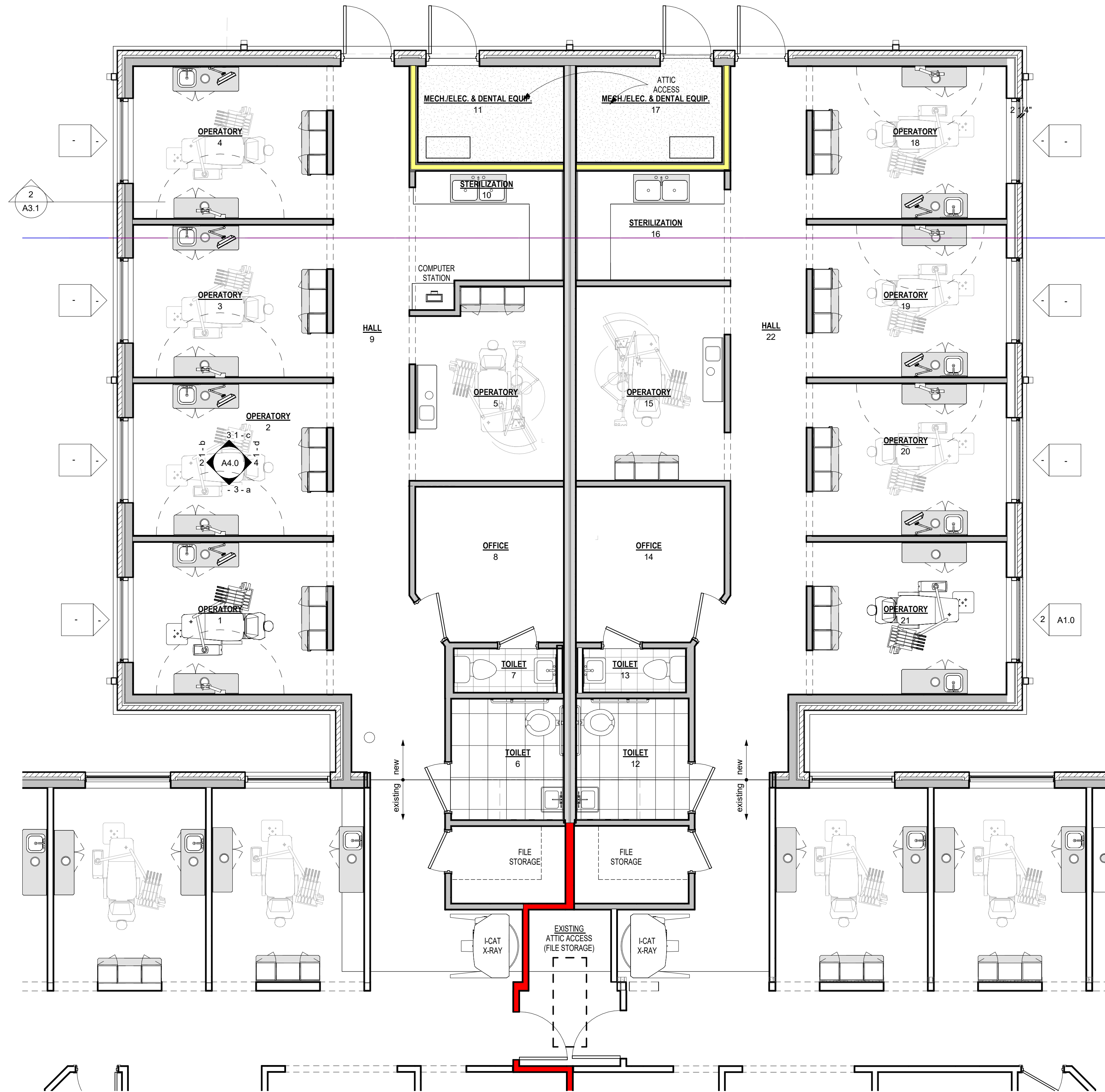
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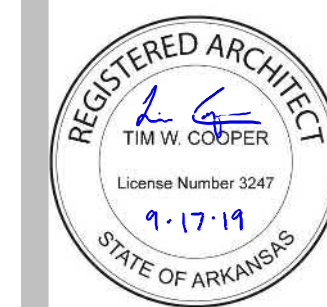
Tim W Cooper Architect  
P.O. Box 16888 Jonesboro, AR 72403  
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① EQUIPMENT PLAN  
1/4" = 1'-0"



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Equipment Plan

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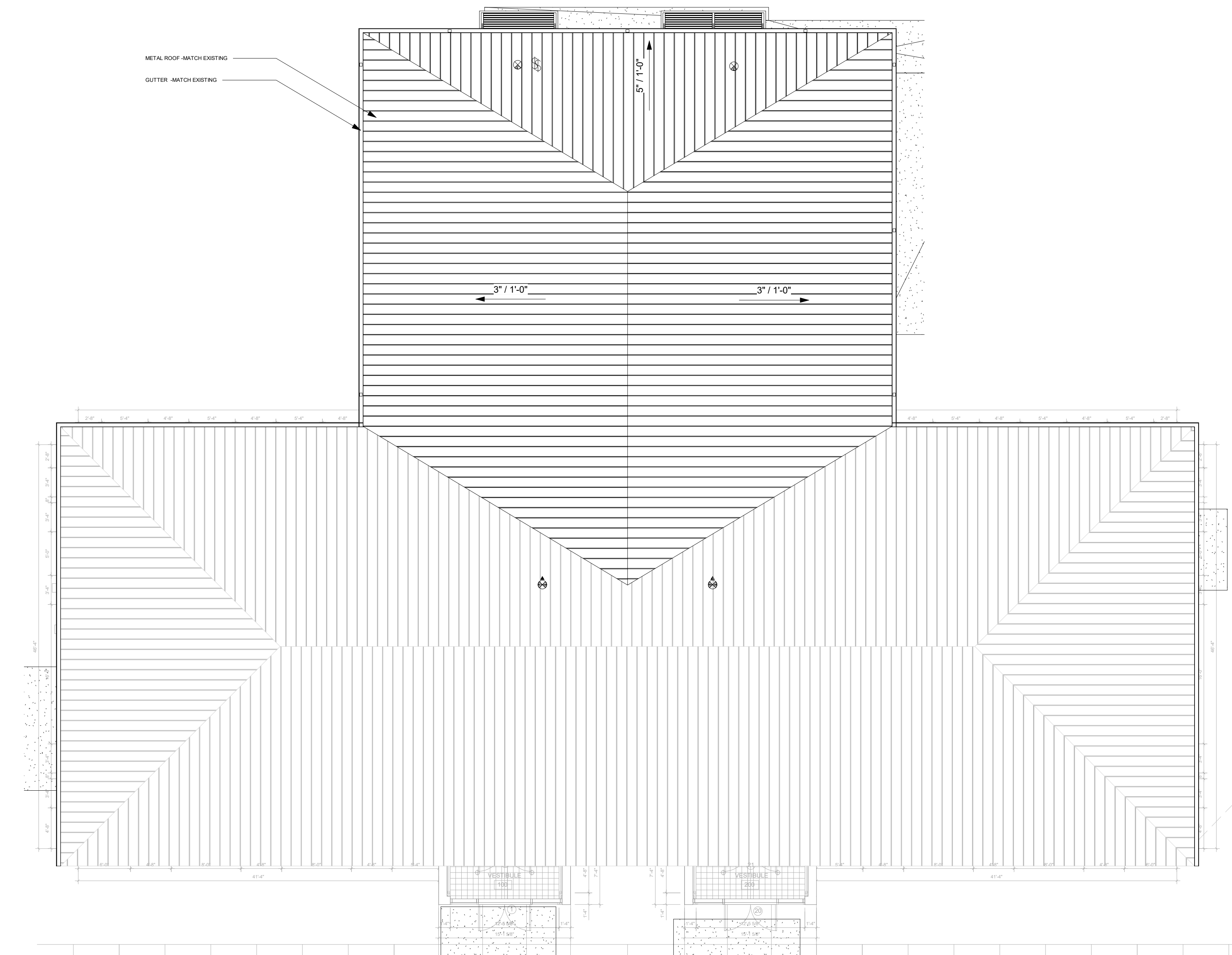
A1.3

Tim W Cooper Architect

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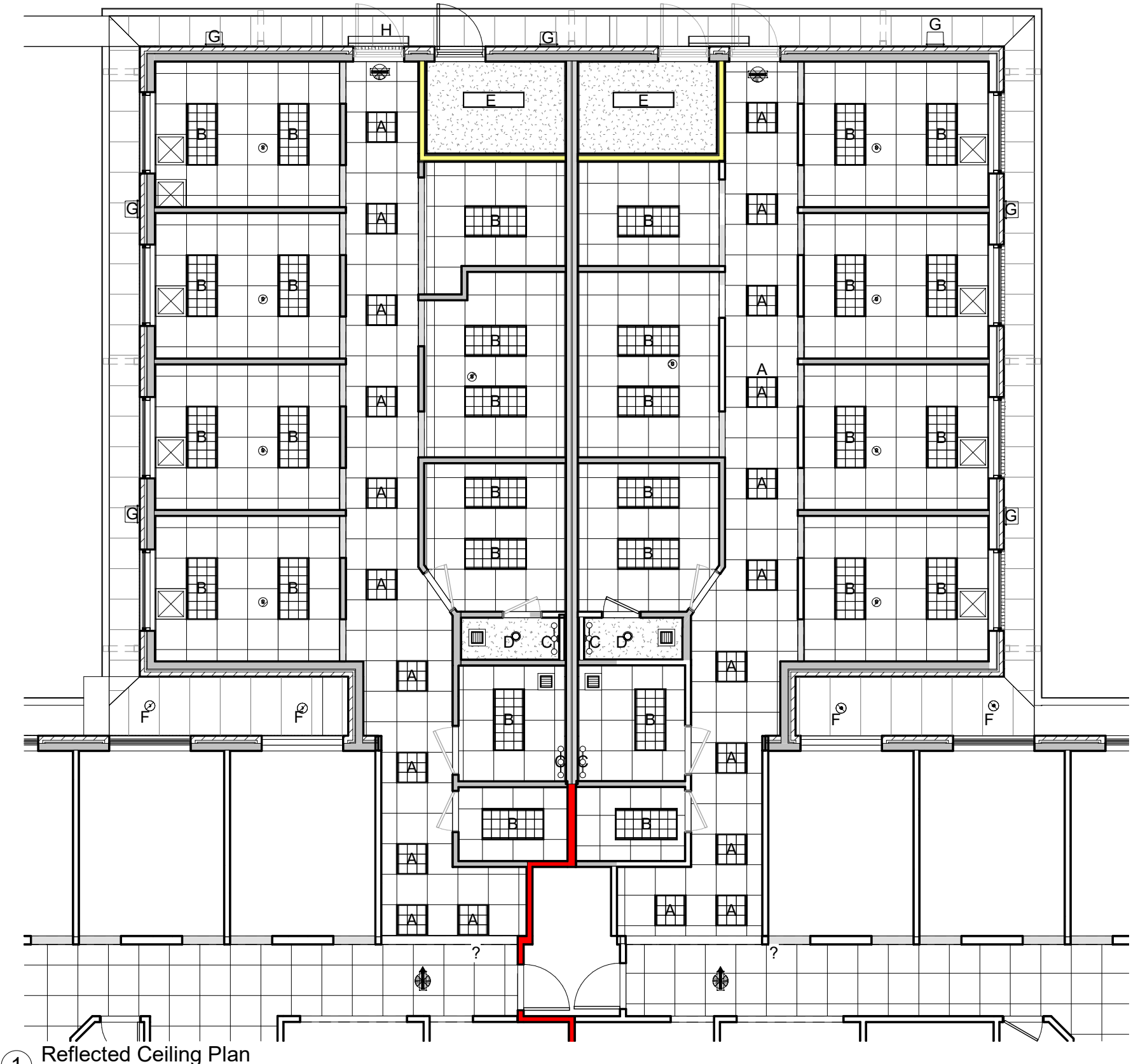
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② ROOF PLAN  
1/8" = 1'-0"

| LIGHT FIXTURE SCHEDULE |        |  |
|------------------------|--------|--|
| MARK                   | SYMBOL | DESCRIPTION  |
| A                      |        | 2' X 4' FLURESECNT RECESSED PARABOLIC                    |
| B                      |        | 2' X 2' FLURESECNT RECESSED PARABOLIC                    |
| C                      |        | VANITY LIGHT   |
| D                      |        | INTERIOR 6" RECESSED CAN                                 |
| E                      |        | 2' X 4' FLURESECNT SURFACED MOUNTED                      |
| F                      |        | EXTERIOR 6" RECESSED CAN                                 |
| G                      |        | WALL PACK  |
| H                      |        | EXTERNAL LIGHT @ BOTH EXITS<br>(BATTERY BACKUP REQUIRED) |



① Reflected Ceiling Plan  
1/8" = 1'-0"



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CONTENTS

RCP & ROOF  
PLAN

SHEET NUMBER

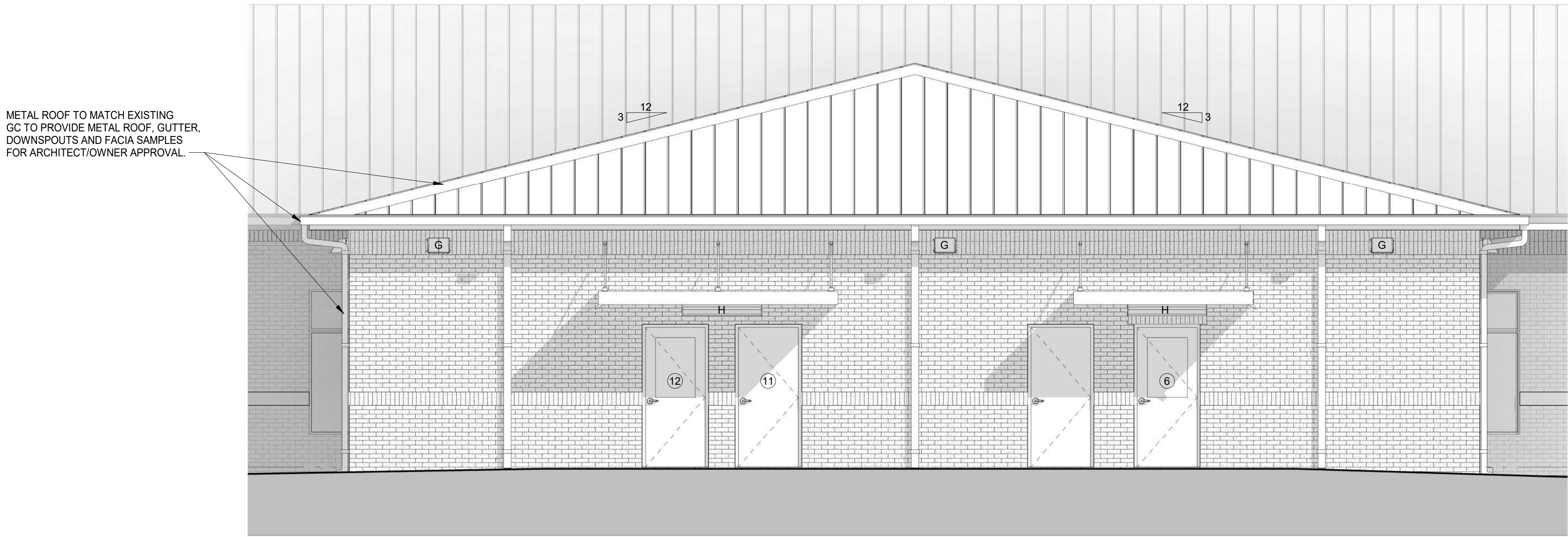
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Tim W Cooper Architect  
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Email: twcarci@mac.com Phone: 479.236.6629

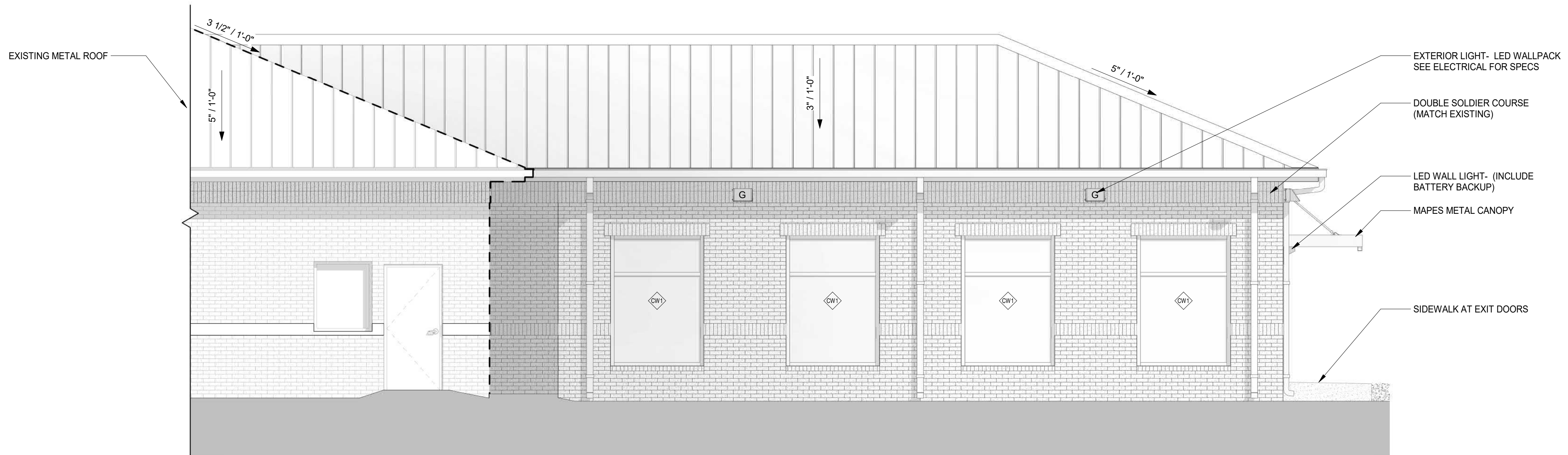
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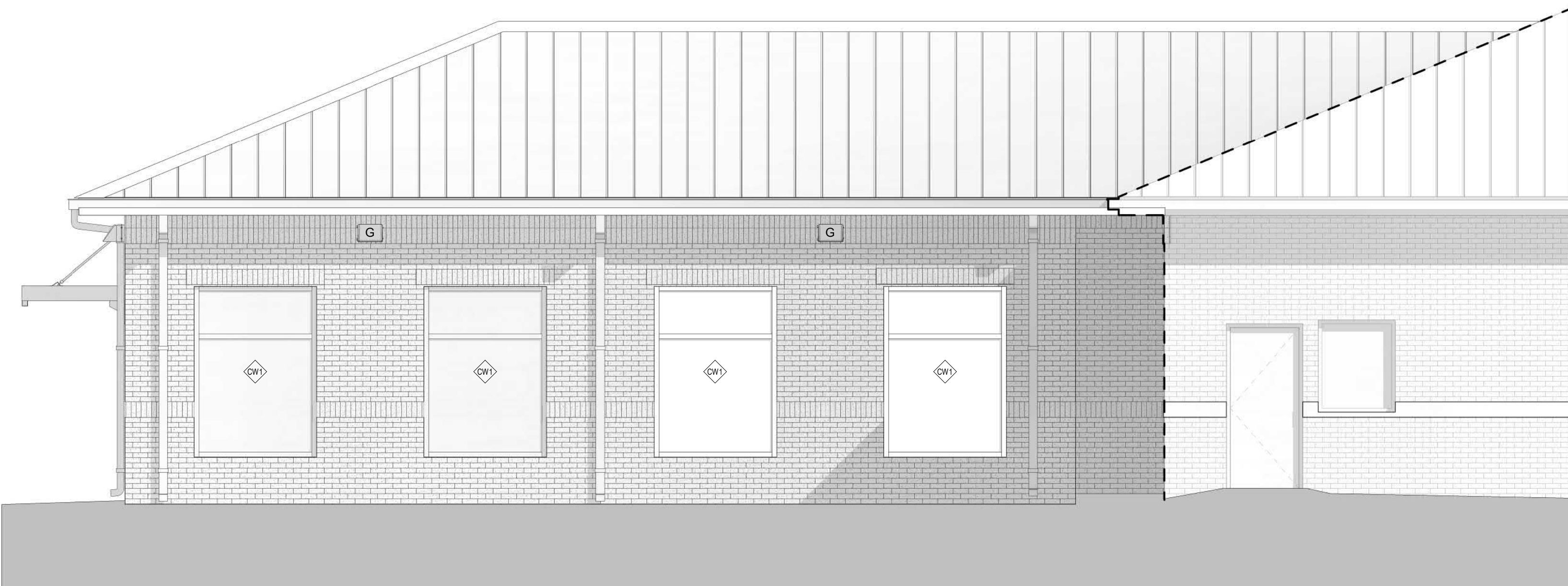




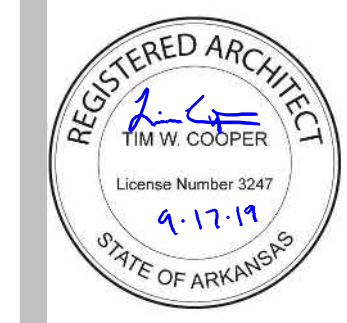
① North Elevation  
1/4" = 1'-0"



② East Elevation  
1/4" = 1'-0"



③ West Elevation  
1/4" = 1'-0"



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CONTENTS  
Exterior Elevations

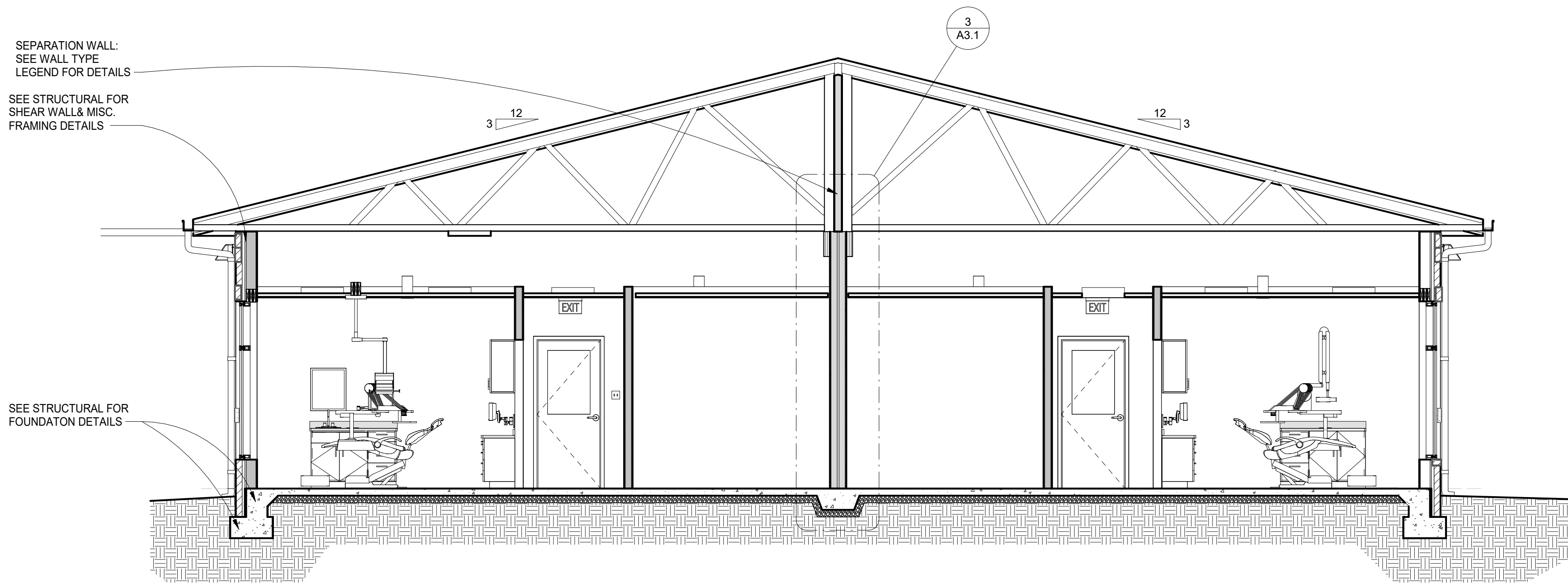
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**A2.0**

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1 BUILDING SECTION  
1/4" = 1'-0"



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CONTENTS

Building Sections

SHEET NUMBER

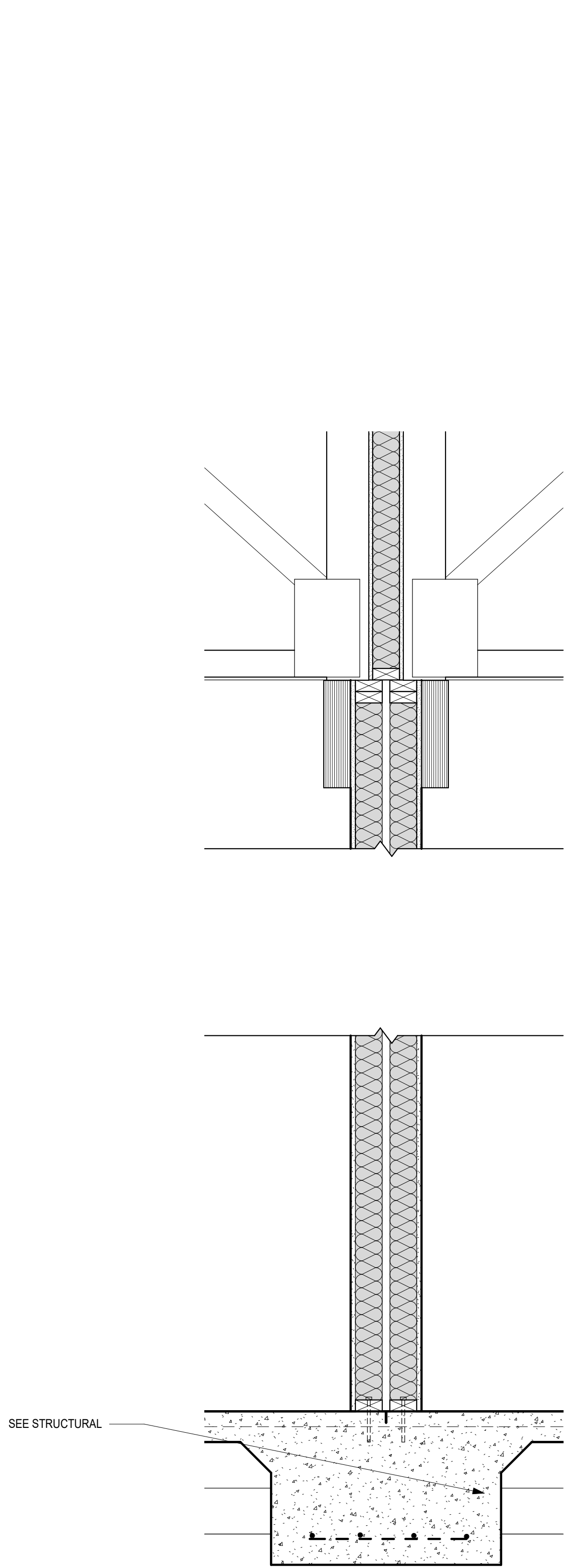
A3.0

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Email: [twcarcl@mac.com](mailto:twcarcl@mac.com) Phone: 479.236.6629

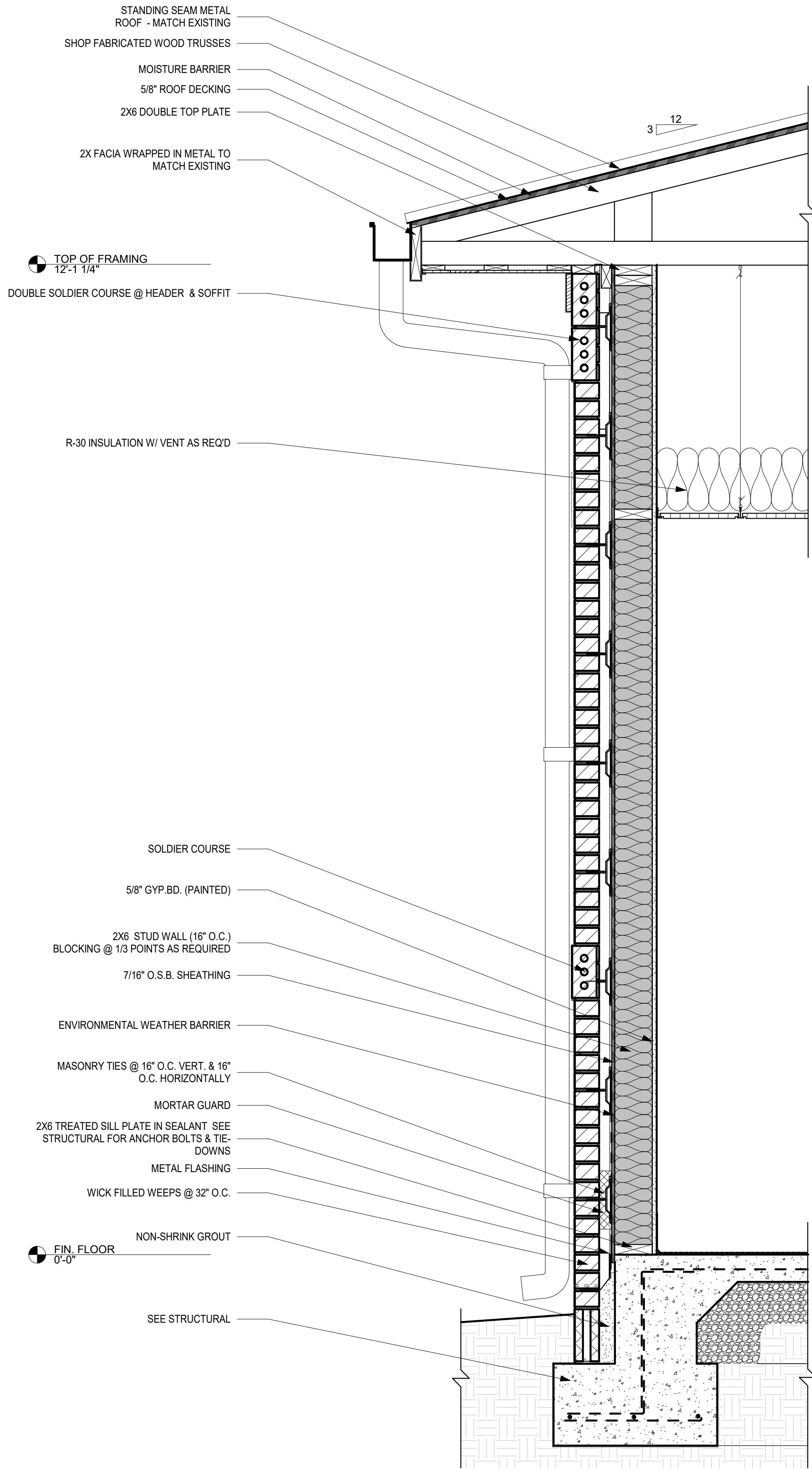
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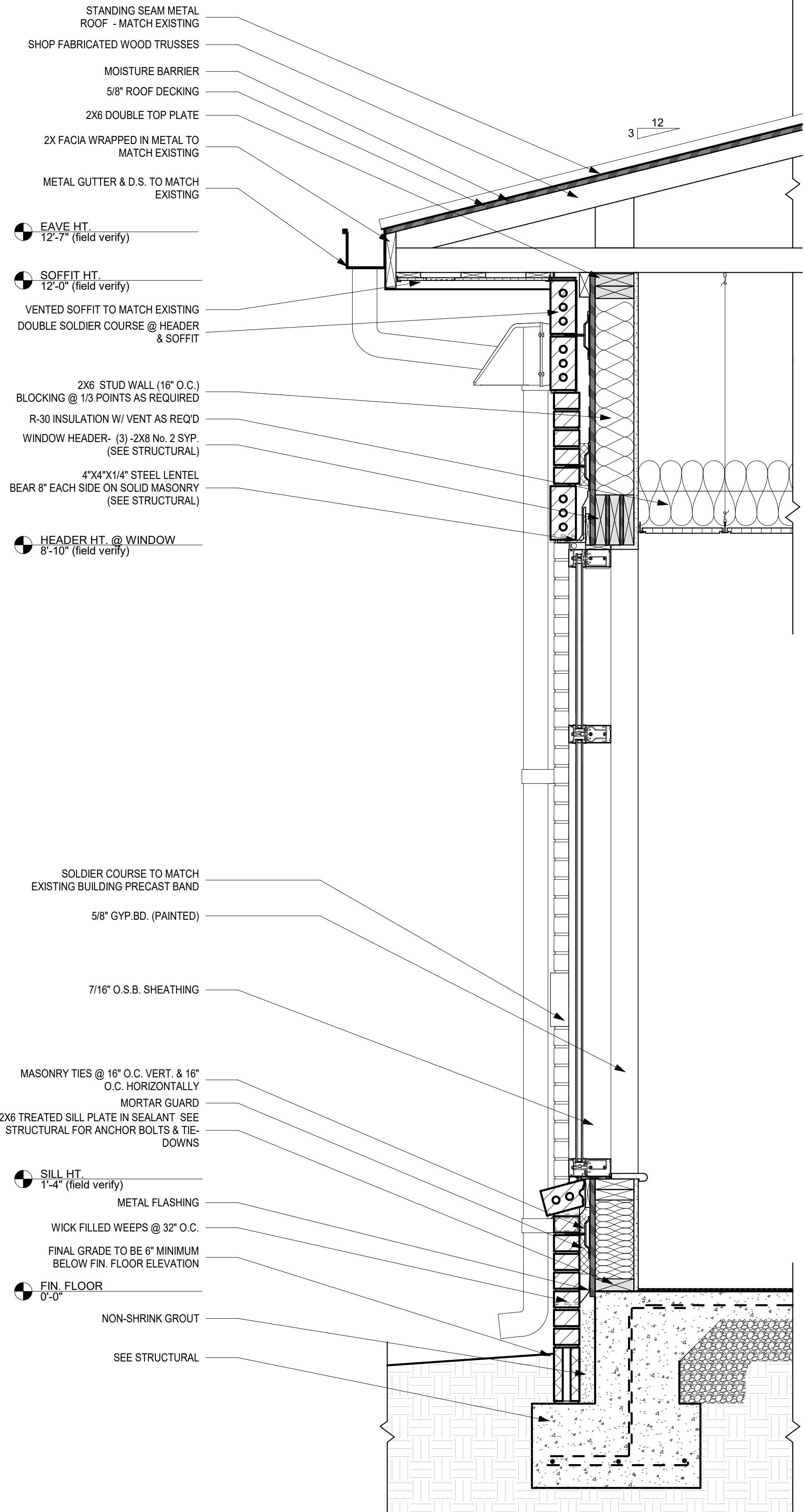




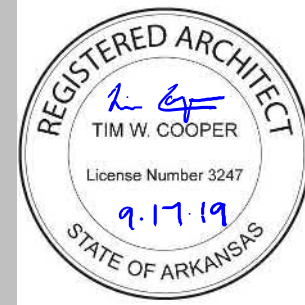
**3** BUILDING SECTION - Callout 1(1)  
1" = 1'-0"



**2** Section @ EXTERIOR WALL (TYPICAL)  
1" = 1'-0"



**1** Section @ WINDOWS (TYPICAL)  
1" = 1'-0"



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CONTENTS

Wall Sections &  
Details

SHEET NUMBER

**A3.1**

**Tim W Cooper Architect**

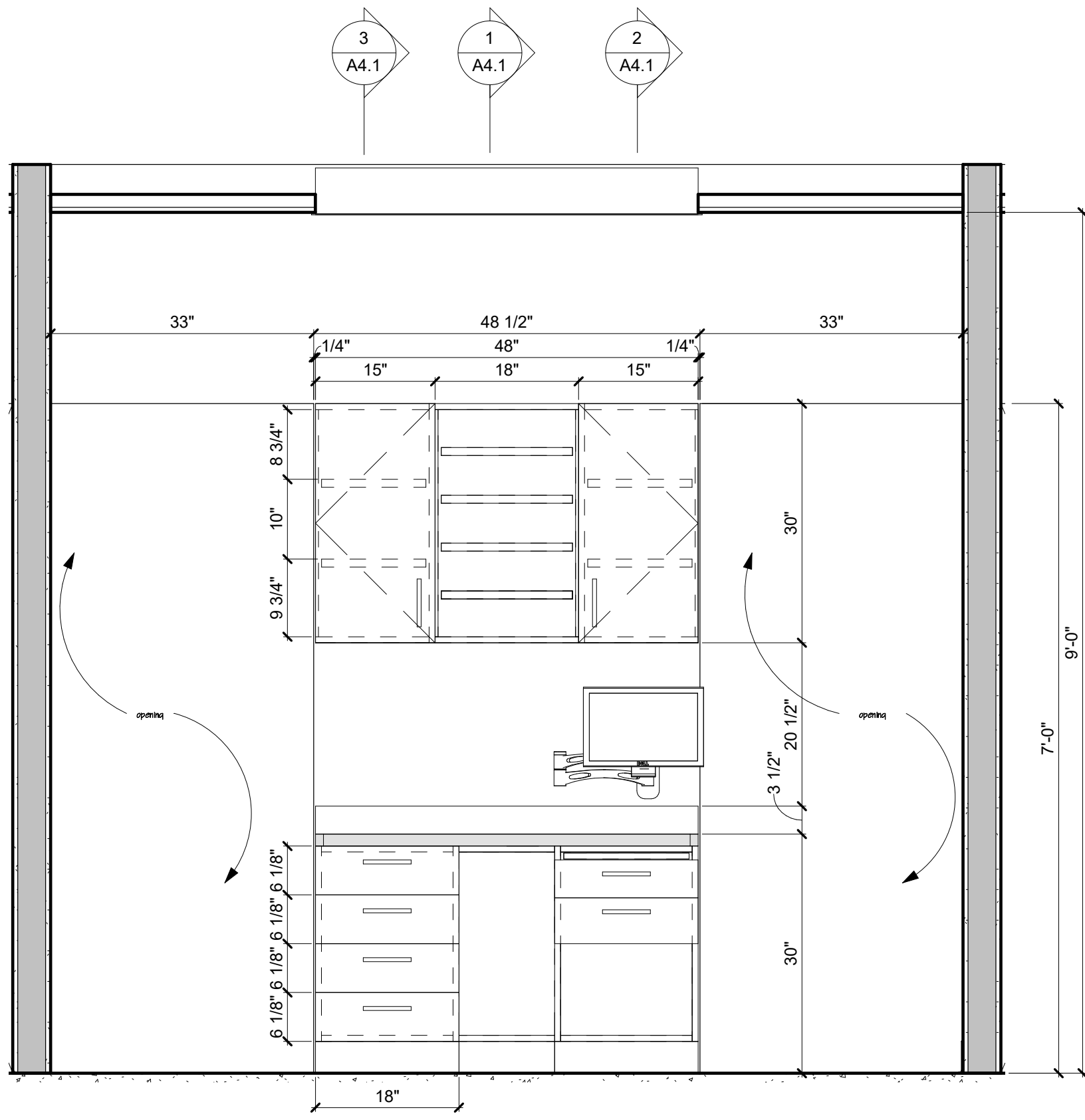
P.O. Box 16888 Jonesboro, AR 72403  
Email: [twcarch@mac.com](mailto:twcarch@mac.com) Phone: 479.236.6629

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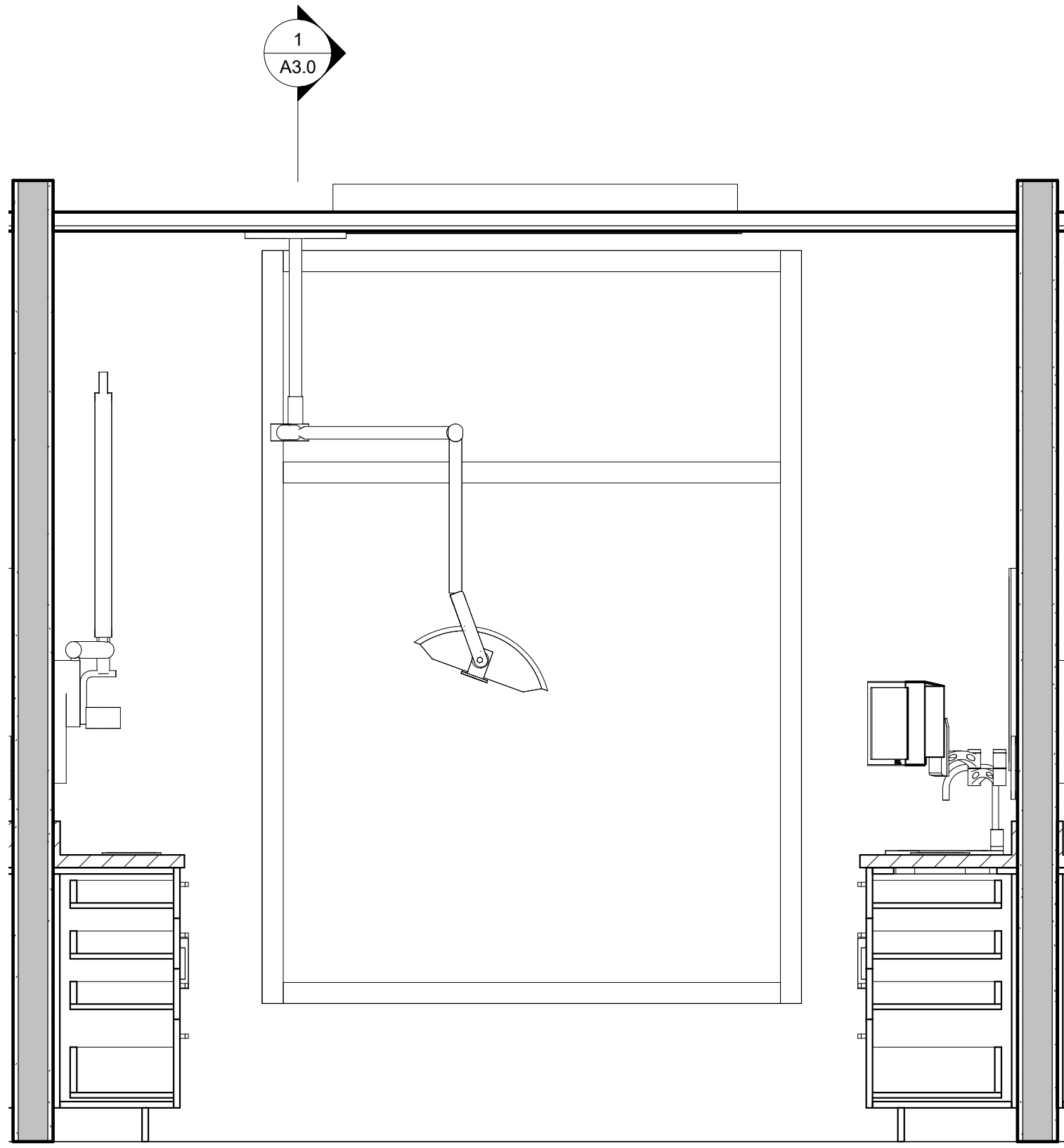
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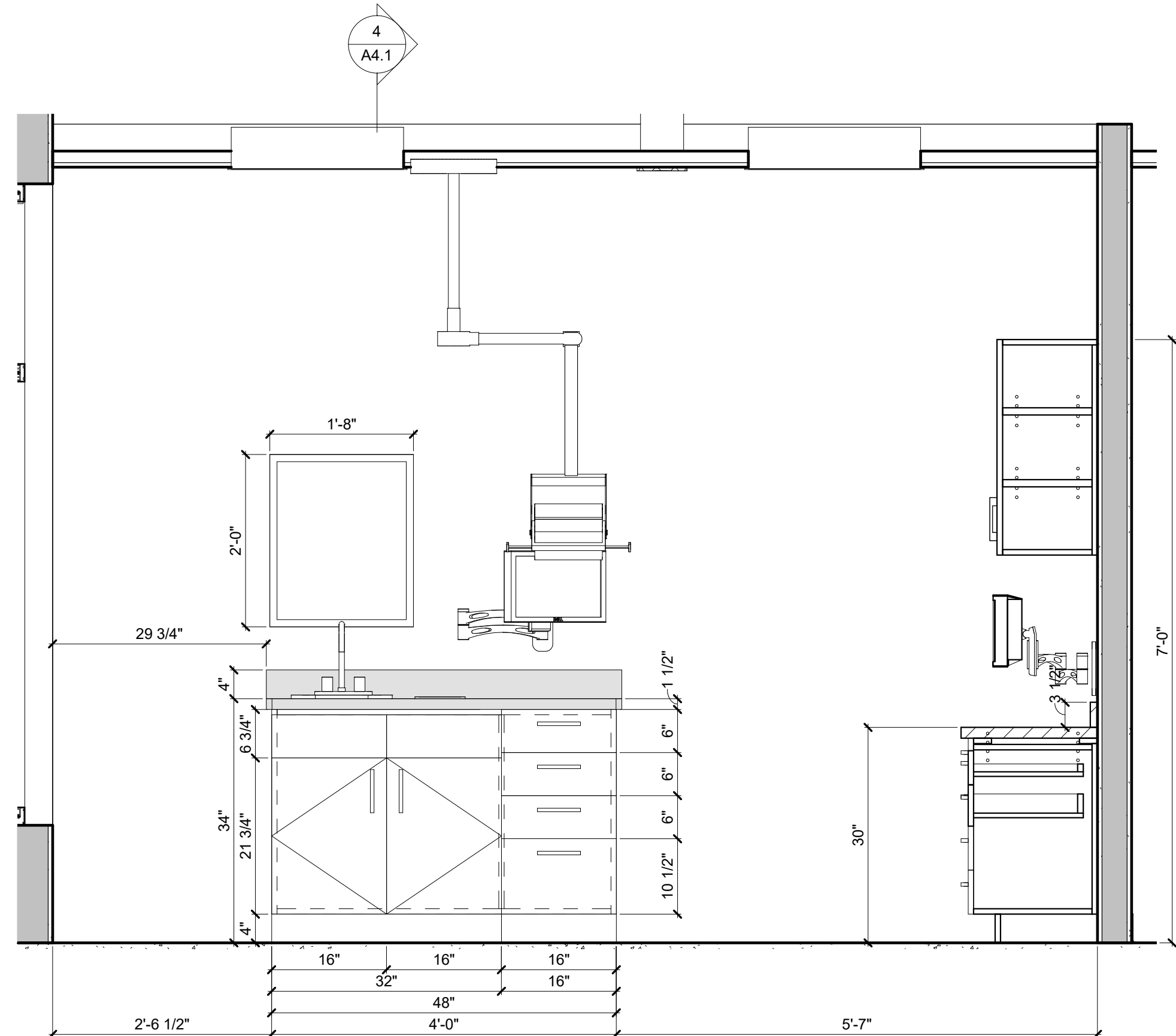




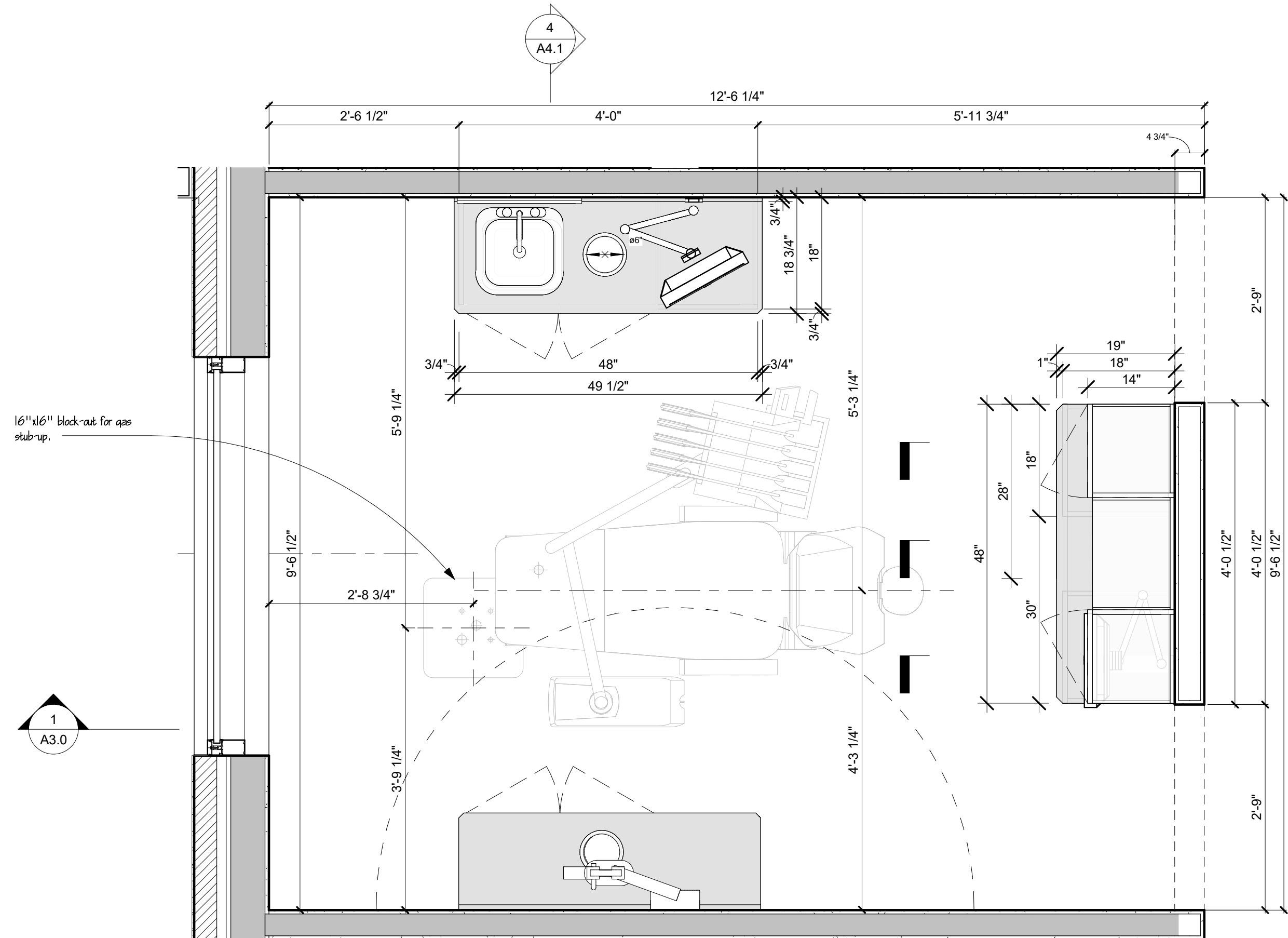
**4 1 - d**  
3/4" = 1'-0"



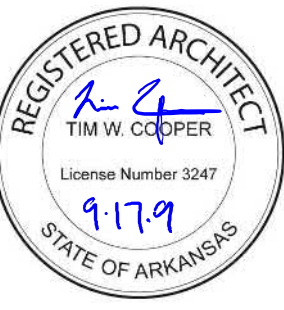
**2 1 - b**  
3/4" = 1'-0"



**3 1 - c**  
3/4" = 1'-0"



**1 Enlarged Plan - Typical Operatory**  
3/4" = 1'-0"



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Enlarged Plan &  
Interior Elevations  
(Typical Operatory)

SHEET NUMBER

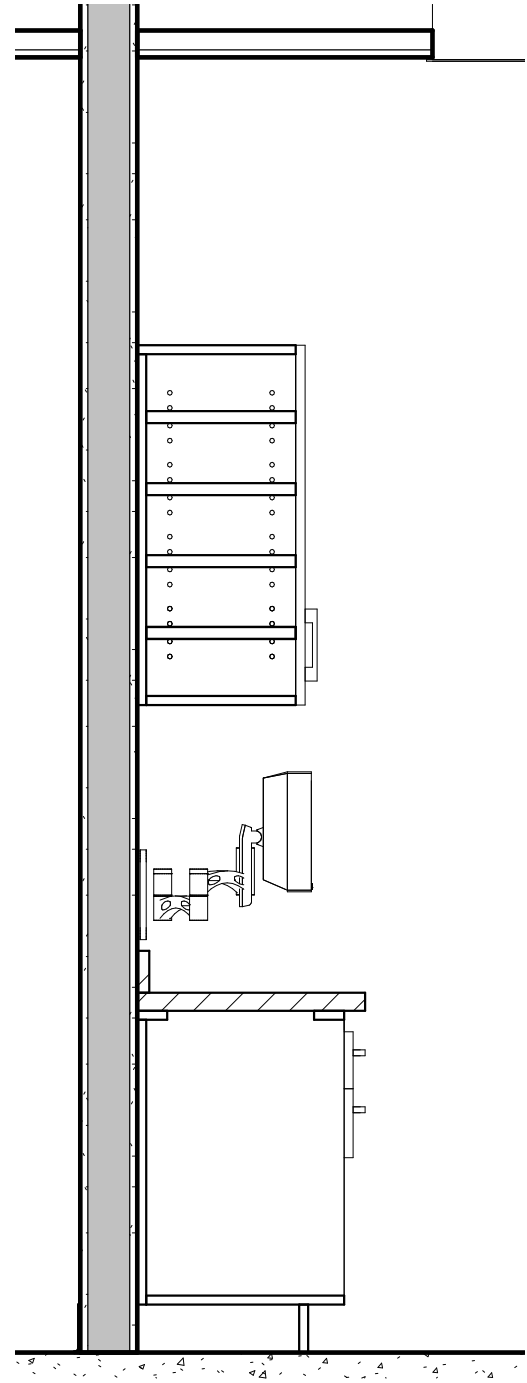
**A4.0**

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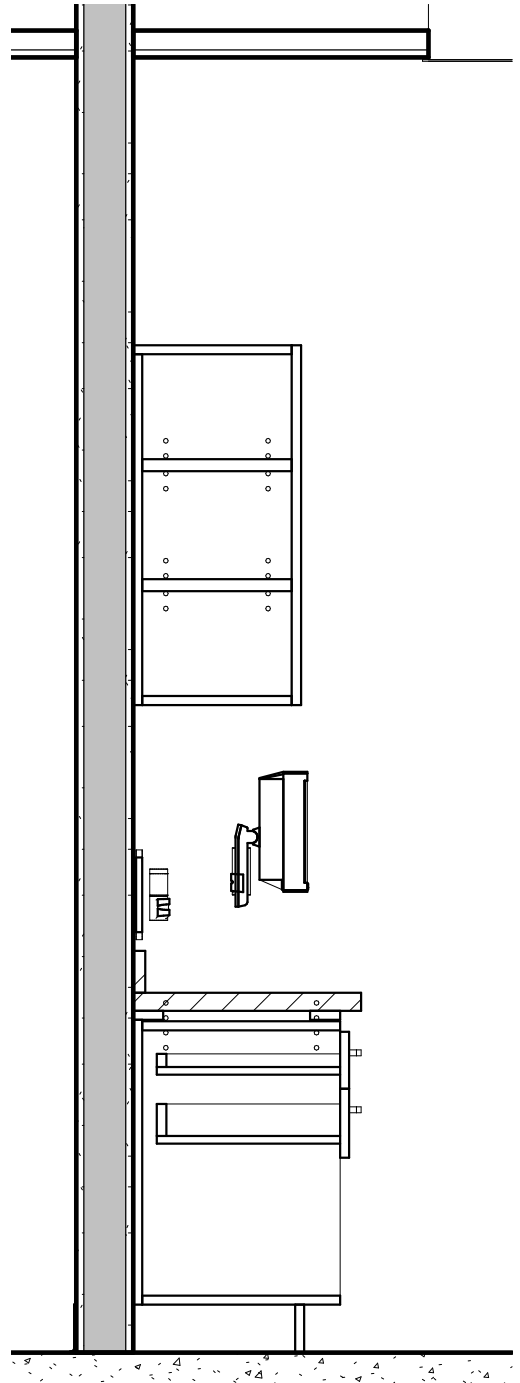
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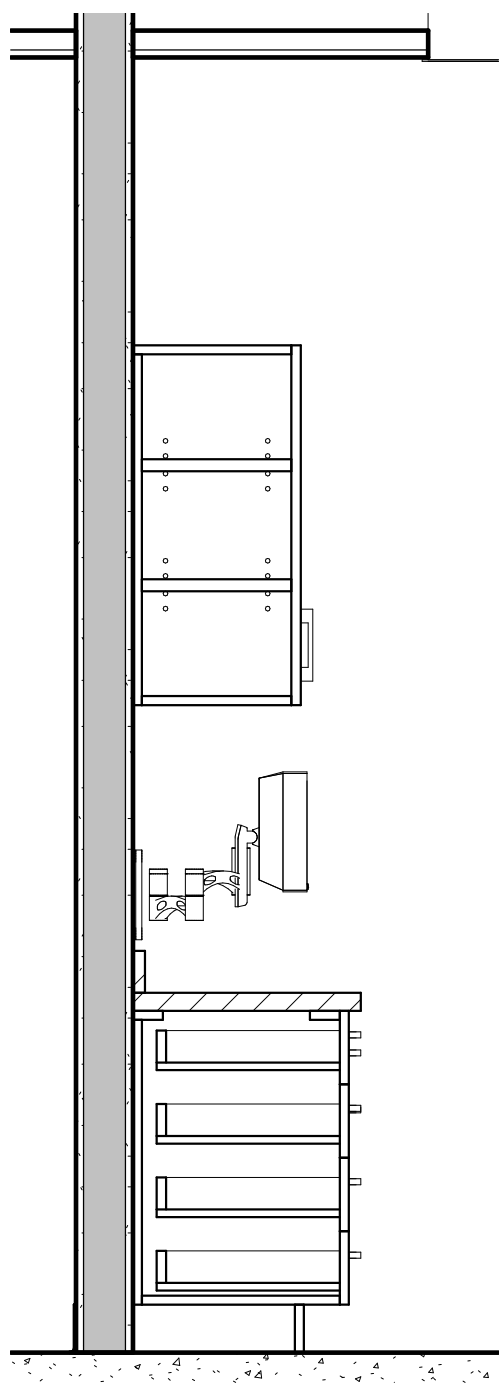




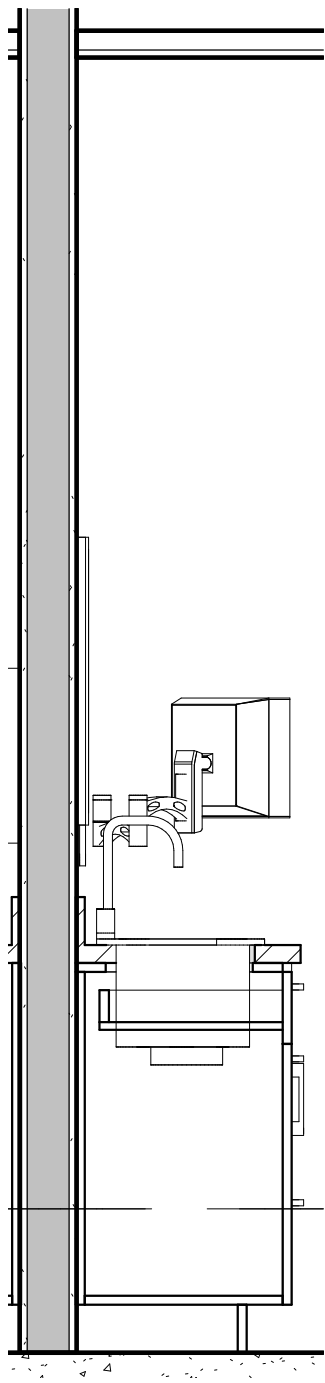
1 Section A  
3/4" = 1'-0"



2 Section B  
3/4" = 1'-0"



3 Section C  
3/4" = 1'-0"



4 Section D  
3/4" = 1'-0"



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Millwork Sections

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A4.1

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SHEET NOTES

- 1

ROUTE TO A ROOF JACK AND MAKE ALL CONNECTIONS. PAINT TO MATCH THE COLOR OF THE ROOF
- 2

PLACE BEHIND LOCKABLE, PLASTIC THERMOSTAT PROTECTOR
- 3

PAINT GRIP PREP SPIRAL DUCT. VERIFY DUCT PAINT COLOR WITH THE OWNER
- 4

EXPOSED REFRIGERANT PIPING INSULATION SHALL BE PAINTED. VERIFY THE PAINT COLOR WITH THE OWNER
- 5

ROUTE INSULATED CONDENSATE TO NEAREST VENT STACK
- 6

AIR CURTAIN, MARS OR EQUAL TO BE ENERGIZED WHEN DOOR(S) IS OPENED. MARS MODEL LPN236-1UA-OB, 120V, BLACK, UNHEATED
- 7

MUA TO BE LOCATED DIRECTLY ABOVE THE HOOD ON THE ROOF
- 8

AIR CURTAIN, MARS OR EQUAL TO BE ENERGIZED WHEN OPERABLE WINDOW IS OPENED. MARS MODEL LPN242-1UA-OB, 120V, BLACK, UNHEATED
- 9

EXHAUST FAN SHALL BE LOCATED MIN. 10'-0" FROM THE EDGE OF THE ROOF AND ANY AIR INTAKE
- 10

REMOTE SENSOR SHALL BE LOCATED IN THE RETURN DUCT
- 11

CIRCULATING FAN, **SFAN-100**. THE "ON-OFF" AND SPEED (AIRFLOW) IS CONTROLLED BY THE CIRCULATION FAN VFD. THE VFD SPEED SHALL BE INITIALLY SET TO PROVIDE 10,000 CFM. THE SPEED SHALL THEN BE FIELD ADJUSTED SO THAT THE EFFECTS OF THE FAN CAN BE FELT BY AN OCCUPANT LOCATED DIRECTLY BENEATH THE FAN. FANIMATION CEILING FANS, MODEL MAD797, VARIABLE SPEED DRIVE WITH REVERSE, 72" BLADES, TR206 WALL CONTROL, 120V. BOTTOM OF FAN SHALL BE MOUNTED AT 12'-0" A.F.F.
- 12

FAN CONTROLLER MOUNTED BEHIND LOCKABLE PROTECTIVE COVER

MECHANICAL GENERAL NOTES

1. THE PLANS ARE DIAGRAMMATIC AND NOT TO BE SCALED. REFER TO THE ARCHITECTURAL DRAWINGS AND FIELD MEASUREMENTS FOR FINAL DIMENSIONS.
2. THESE DRAWINGS REPRESENT THE APPROXIMATE LOCATION OF THE DUCT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FINAL ROUTING OF THE DUCT. THIS RESPONSIBILITY INCLUDES AVOIDING INTERFERENCES WITH THE BUILDING STRUCTURE, PIPING SYSTEMS AND ELECTRICAL WORK.
3. DUCT DIMENSIONS NEAR THE EQUIPMENT ARE APPROXIMATED. THE CONTRACTOR MUST FABRICATE THE DUCT TO FIT THE EQUIPMENT SUPPLIED.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FINAL LOCATION OF THE EQUIPMENT BASED ON THE APPROXIMATE LOCATIONS AS INDICATED ON THE DRAWINGS. THIS RESPONSIBILITY INCLUDES AVOIDING INTERFERENCES WITH THE BUILDING STRUCTURE, PIPING SYSTEMS AND ELECTRICAL WORK.
5. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST MECHANICAL CODE AND ALL OF THE LOCAL ADOPTED ORDINANCES.
6. ALL THERMOSTATS SHALL BE SUPPLIED BY THE MECHANICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL THE NECESSARY CONDUIT, WIRE, BOXES, ETC. FOR THE INSTALLATION OF THERMOSTATS. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR TERMINATING THE WIRING AT THE CONTROLS AND EQUIPMENT.
7. COORDINATE THE AIR TERMINAL DEVICE LOCATIONS WITH THE CEILING GRID.

SYSTEM DESIGN NOTES

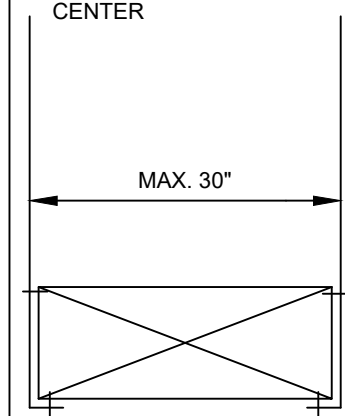
1. LOW PRESSURE DUCT SHALL BE SIZED AT A PRESSURE DROP OF 0.08" W.C. PER 100 FT.
2. EACH SUPPLY AND RETURN TERMINAL DEVICE SHALL HAVE A MEANS TO BALANCE THE AIRFLOW AS INDICATED ON THE PLANS. BALANCE DAMPERS SHALL BE LOCATED EITHER IMMEDIATELY DOWNSTREAM OF A BRANCH TAKE-OFF, AT THE TERMINAL DEVICE OR WHERE LOCATED ON THE PLANS.

DUCT CONSTRUCTION SPECIFICATIONS

| RECTANGULAR DUCT CONSTRUCTION MINIMUM METAL GAUGES |                  |                |               |
|--|------------------|----------------|---------------|
| MAXIMUM SIZE                                       | GALVANIZED STEEL | PERIMETER HALF | HANGER STRAP  |
| THROUGH 12"  | 26 GAUGE         | P/2 = 30"      | 1"x22 GAUGE   |
| 13" THROUGH 30"                                    | 24 GAUGE         | P/2 = 72"      | 1"x18 GAUGE   |
| 31" THROUGH 54"                                    | 22 GAUGE         | P/2 = 96"      | 1"x16 GAUGE   |
| 55" THROUGH 84"                                    | 20 GAUGE         | P/2 = 120"     | 1.5"x16 GAUGE |
| OVER 84"   | 18 GAUGE         | P/2 = 168"     | 1.5"x16 GAUGE |

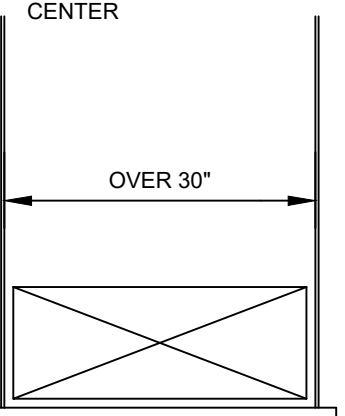
| ROUND DUCT CONSTRUCTION MINIMUM METAL GAUGES |                   |             |          |               |
|--|-------------------|-------------|----------|---------------|
| DIAMETER                                     | LONGITUDINAL SEAM | SPIRAL SEAM | FITTINGS | HANGER STRAP  |
| THROUGH 12"                                  | 26 GAUGE          | 28 GAUGE    | 26 GAUGE | 1"x22 GAUGE   |
| 13" THROUGH 30"                              | 24 GAUGE          | 26 GAUGE    | 24 GAUGE | 1"x18 GAUGE   |
| 31" THROUGH 54"                              | 22 GAUGE          | 24 GAUGE    | 22 GAUGE | 1"x16 GAUGE   |
| 55" THROUGH 84"                              | 20 GAUGE          | 22 GAUGE    | 20 GAUGE | 1.5"x16 GAUGE |
| OVER 84"                                     | 18 GAUGE          | 20 GAUGE    | 18 GAUGE | 1.5"x16 GAUGE |

HANGER STRAPS FASTEN TO STRUCTURE. MAXIMUM 8'-0" ON CENTER



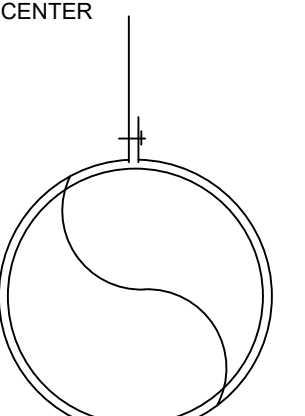
MAX. 30"

HANGER ROD FASTEN TO STRUCTURE. MAXIMUM 8'-0" ON CENTER



OVER 30"

HANGER TO ROD FASTEN TO STRUCTURE. MAXIMUM 8'-0" ON CENTER



SHEET METAL SCREWS TO BOTTOM OF DUCT.

ANGLE - REFER TO TABLE FOR SIZE. NUT AND WASHER AT END OF ROD.

| DUCT HANGER SCHEDULE |                |                      |            |                |                         |
|----------------------|----------------|----------------------|------------|----------------|-------------------------|
| DUCT SIZE - IN.      | TYPE OF HANGER | HANGER SPACING - FT. | STRAP SIZE | ROD SIZE (IN.) | ANGLE FOR BRACING       |
| UP TO 12"            | STRAP          | 8'-0"                | 1" x 16 GA | N.A.           | N.A.                    |
| 13" TO 18"           | STRAP          | 8'-0"                | 1" x 16 GA | N.A.           | N.A.                    |
| 19" TO 30"           | STRAP/ANGLE    | 8'-0"                | 1" x 16 GA | 1/4"           | 1-1/2" x 1-1/2" x 1/8"  |
| 31" TO 42"           | ANGLE          | 8'-0"                | N.A.       | 1/4"           | 1-1/2" x 1-1/2" x 1/8"  |
| 43" TO 54"           | ANGLE          | 8'-0"                | N.A.       | 1/4"           | 1-1/2" x 1-1/2" x 1/8"  |
| 55" TO 60"           | ANGLE          | 8'-0"                | N.A.       | 1/4"           | 1-1/2" x 1-1/2" x 1/8"  |
| 61" TO 84"           | ANGLE          | 8'-0"                | N.A.       | 1/4"           | 1-1/2" x 1-1/2" x 3/16" |
| 85" TO 90"           | ANGLE          | 8'-0"                | N.A.       | 1/4"           | 1-1/2" x 1-1/2" x 3/16" |
| OVER 96"             | ANGLE          | 8'-0"                | N.A.       | 3/8"           | 2" x 2" x 1/4"          |

1. FOR SEVERAL DUCTS ON ONE HANGER, ANGLE HANGERS MAY BE USED. SIZE OF THE HANGER SHALL BE SELECTED ON THE SUM OF DUCT WIDTHS EQUAL TO MAXIMUM WIDTH OF DUCT SCHEDULE
2. FOR STRAP HANGERS, PROVIDE THREE, (3), HANGERS AT EACH TAKE-OFF OR BRANCH.
3. GALVANIZED OR ALUMINUM HANGERS ARE ACCEPTABLE.
4. SECURE HANGERS TO STRUCTURE AS RECOMMENDED BY SMACNA.

NOTES:

1. DUCT DIMENSIONS SHOWN ON THE DRAWINGS ARE THE FINISHED INTERNAL DIMENSIONS.
2. ALL DUCT SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH SMACNA GUIDELINES.

DUCT MATERIALS SHALL BE AS FOLLOWS:

- ROUND SUPPLY AND RETURN AIR DUCT**

GALVANIZED "SNAPLOCK" PIPE WITH JOINTS AND SEAMS TAPED WITH ALUMINUM FOIL TAPE. INSULATE THE DUCT WITH 2" THICK, 1.0 LB DENSITY FIBERGLASS DUCT WRAP (INSTALLED R-VALUE OF 6) WITH AN ALUMINUM FOIL BACKING. OVERLAP THE INSULATION SEAMS AND TAPE WITH ALUMINUM FOIL TAPE. THE INSTALLED INSULATION SHALL FORM A CONTINUOUS VAPOR BARRIER AROUND THE DUCT. THE INSULATION SHALL BE EQUAL TO OWENS CORNING TYPE 100 FIBERGLASS ALL SERVICE DUCT WRAP.
- RECTANGULAR SUPPLY AND RETURN AIR DUCT**

GALVANIZED STEEL WITH JOINTS AND SEAMS TAPED WITH ALUMINUM FOIL TAPE. INSULATED DUCT WITH 1 1/2" THICK, 1.0 LB DENSITY DUCT LINER (INSTALLED R-VALUE OF 6) WITH AN ANTI-MICROBIAL COATING. INSTALL INSULATION PER THE MANUFACTURER'S RECOMMENDATIONS. THE INSULATION SHALL BE OWENS CORNING SOFTR AEROFLEX DUCT LINER.
- EXPOSED DUCTWORK**

REQUIREMENTS ARE THE SAME AS ABOVE EXCEPT THE DUCT SHALL NOT BE INSULATED AND ALL JOINTS SHALL BE SEALED WITH MASTIC IN LIEU OF TAPE. ALL DUCT SHALL BE CLEANED WITH A SOLVENT BEFORE PAINT IS APPLIED WHERE INDICATED ON THE PLANS. ALL EXPOSED DUCTWORK SHALL BE SPIRAL DUCT.
- EXHAUST DUCT**

UNINSULATED SNAPLOCK PIPE OR GALVANIZED STEEL DUCT.
- FLEXIBLE DUCTWORK**

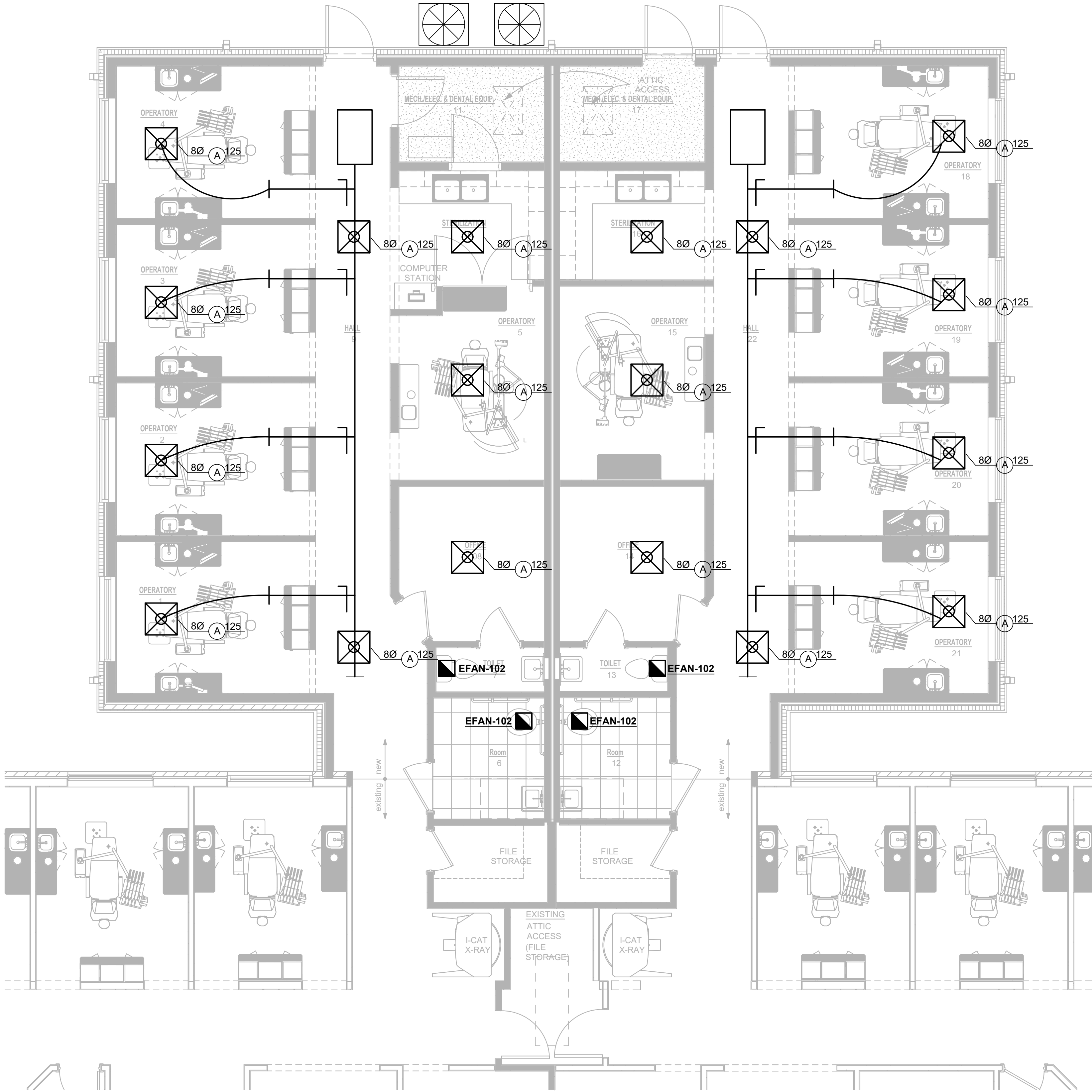
UL LISTED CLASS 1 PRE-INSULATED FLEX DUCT WITH AN R-VALUE OF 6.

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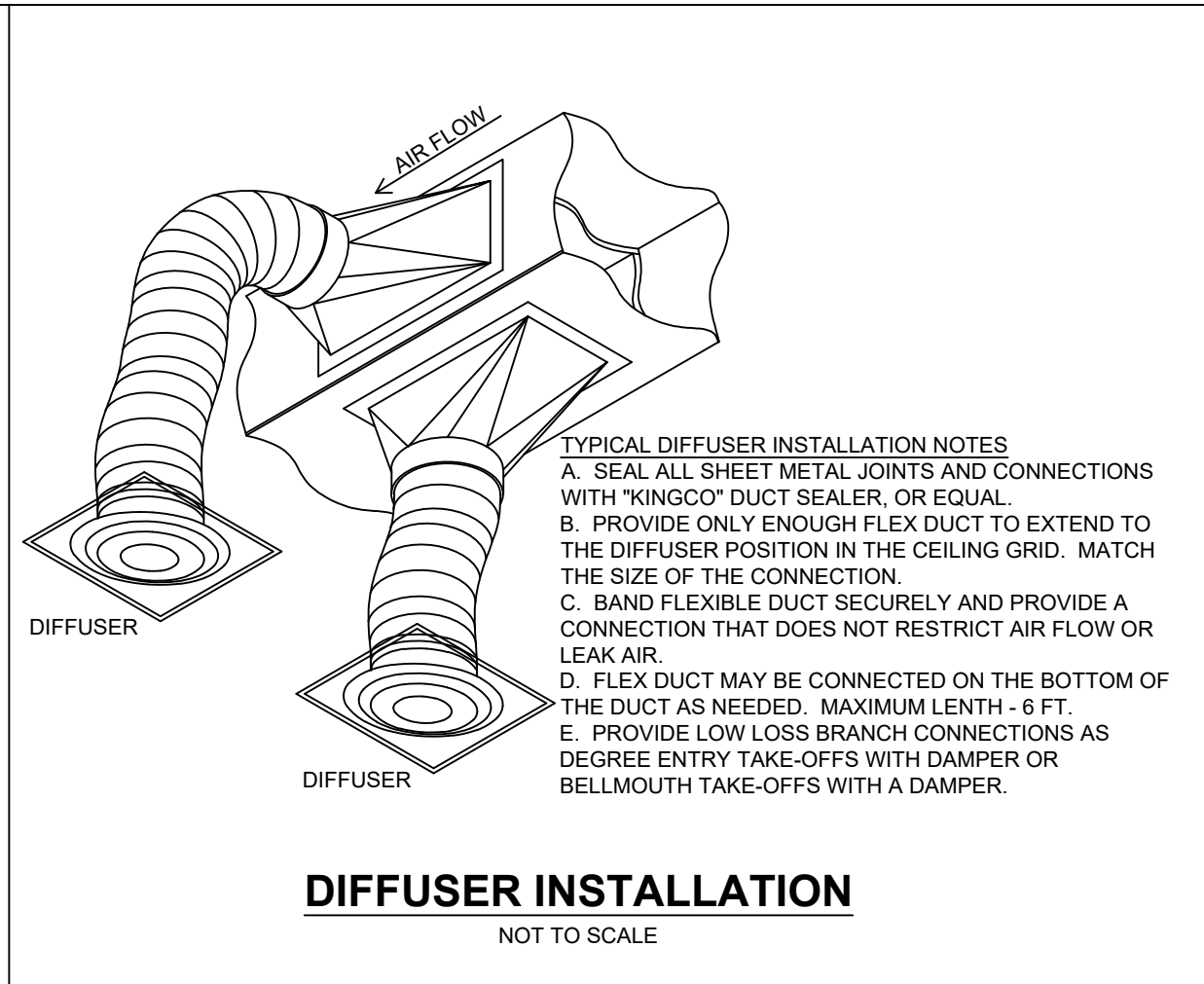
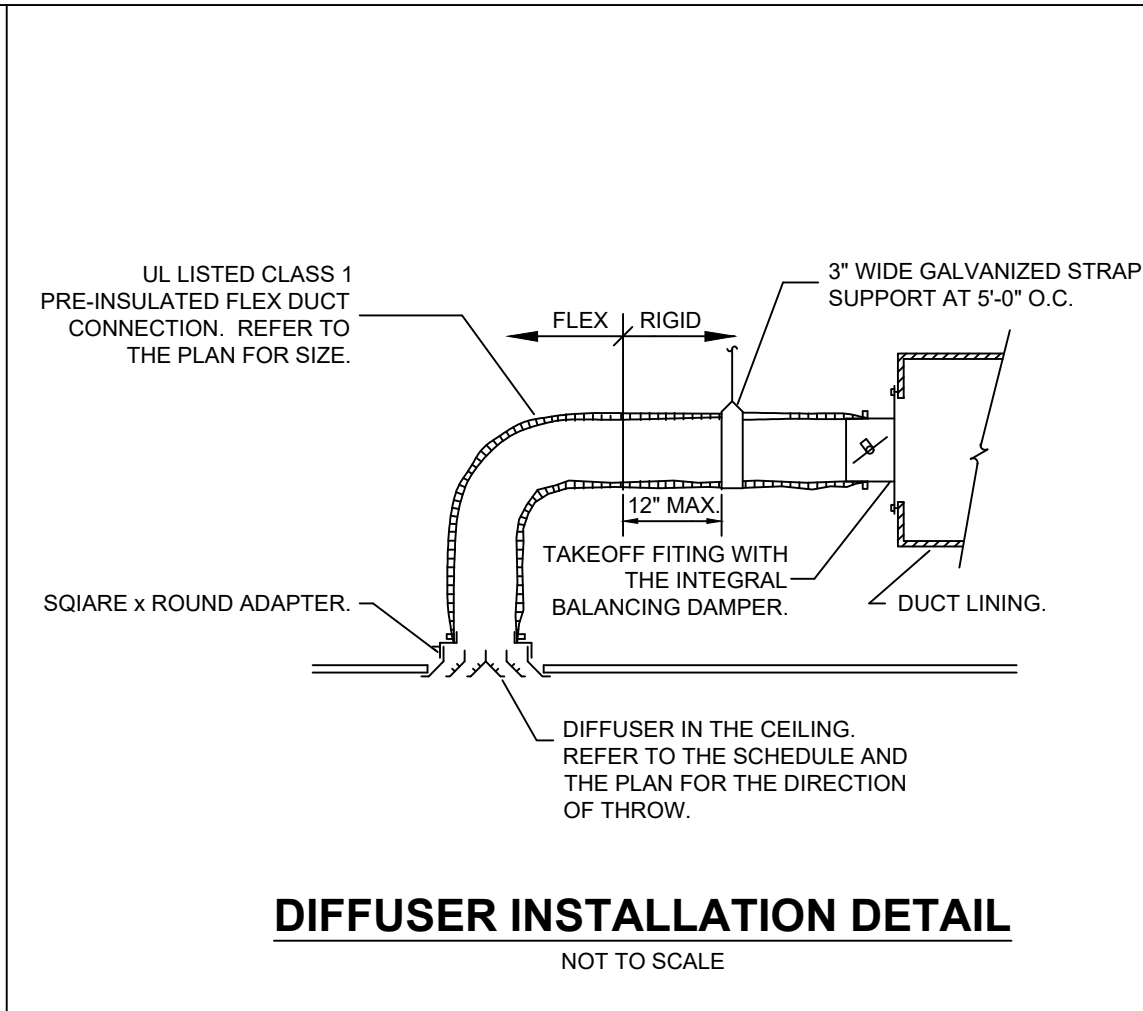
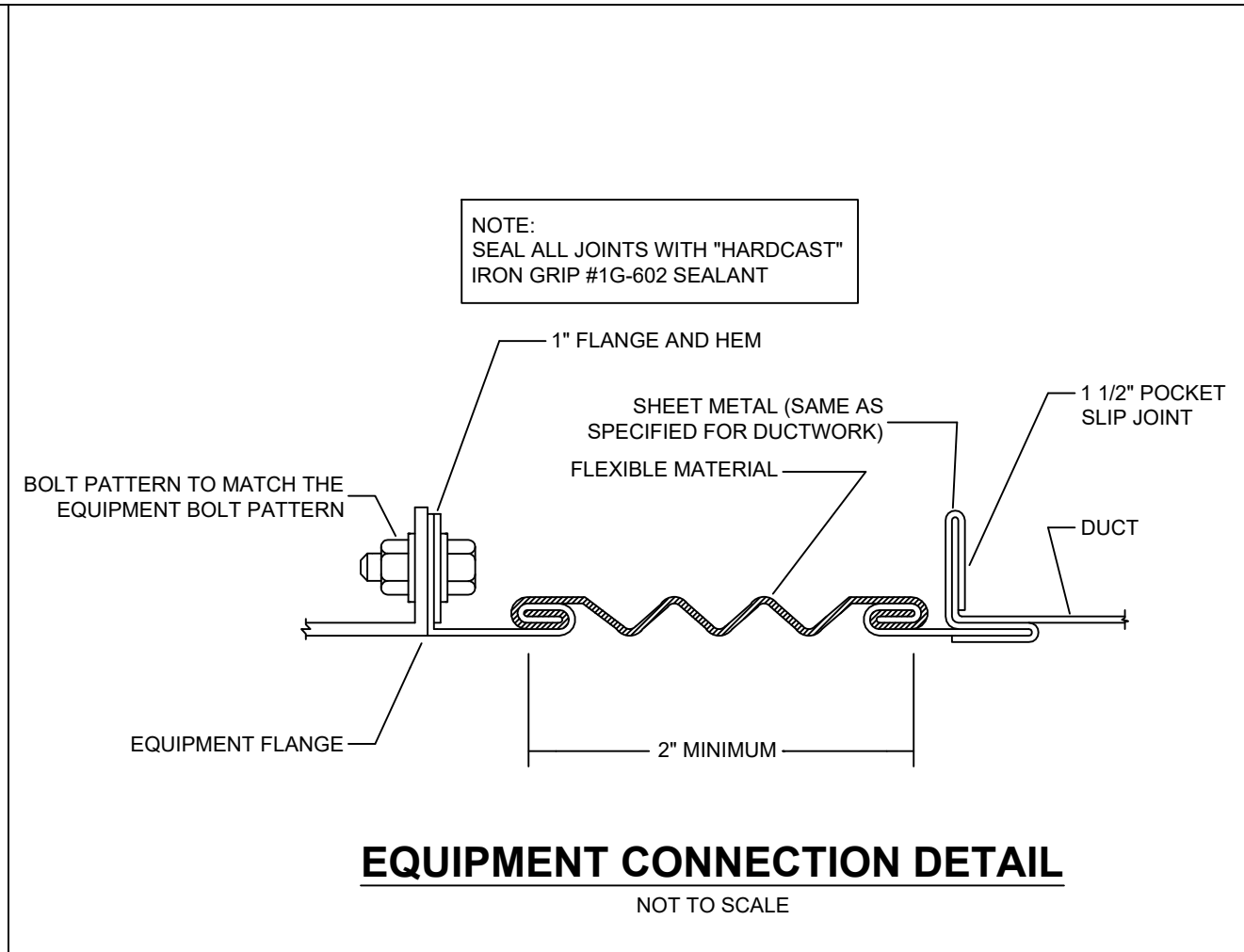
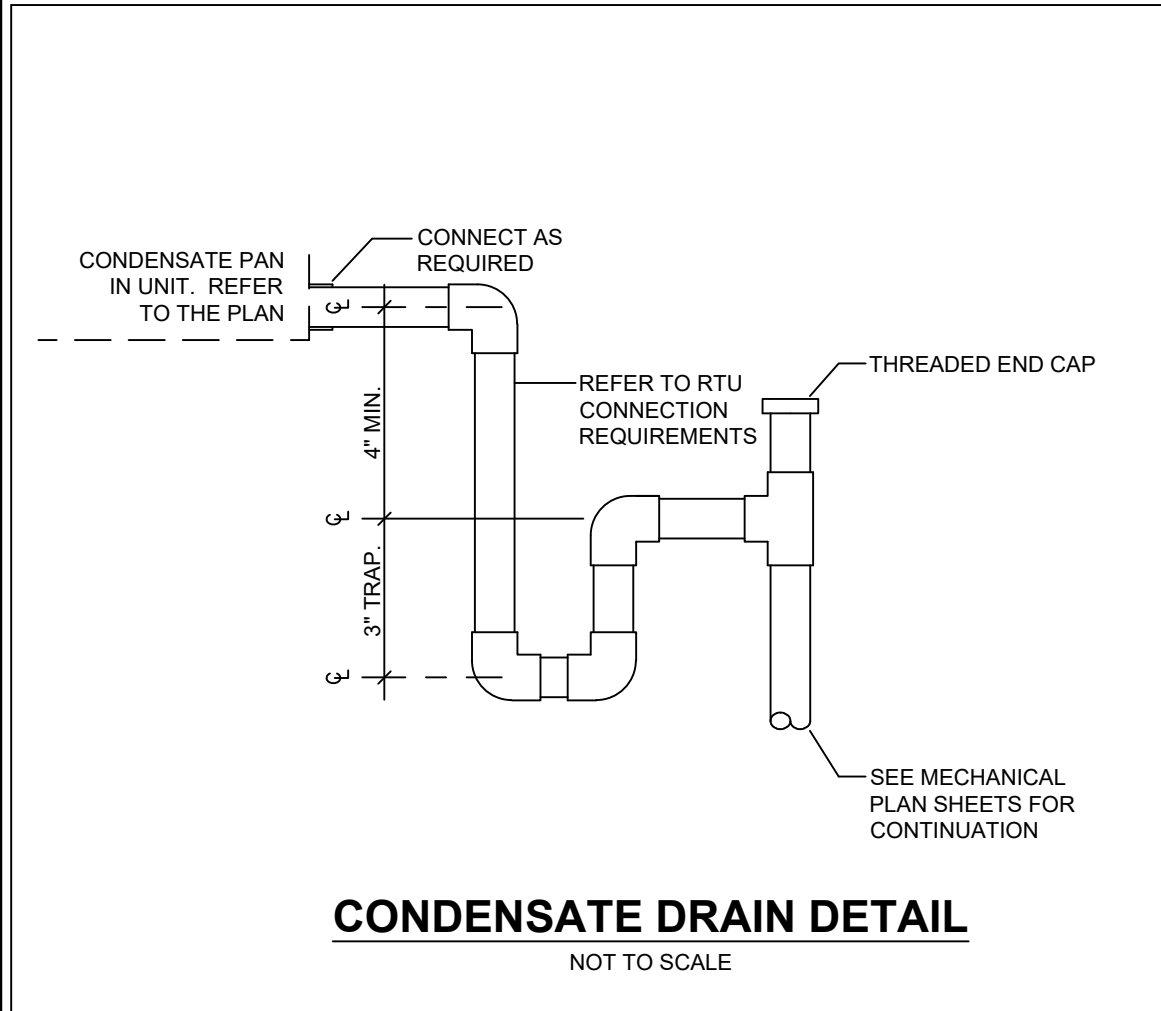
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① Dimension Floor Plan  
1/4" = 1'-0"

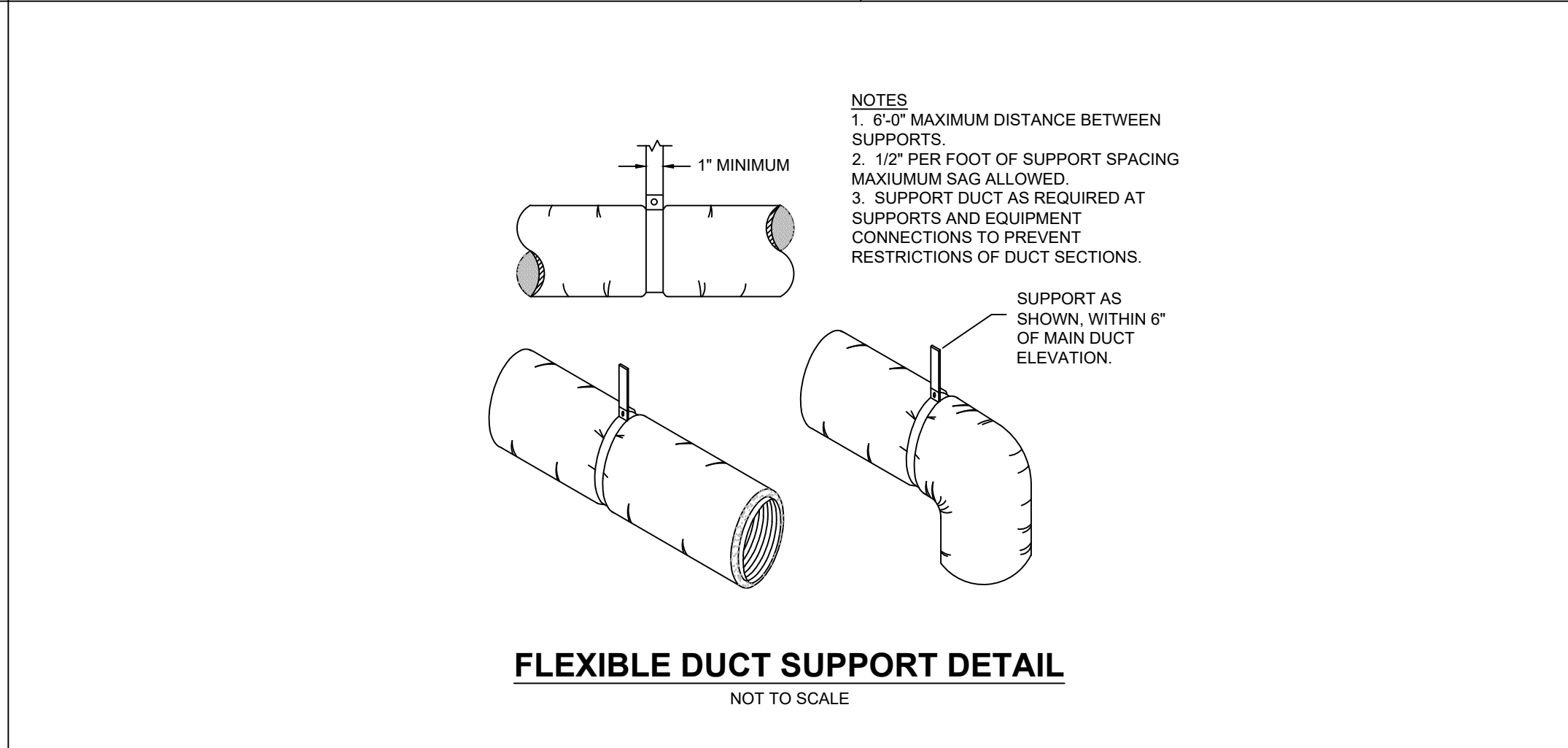
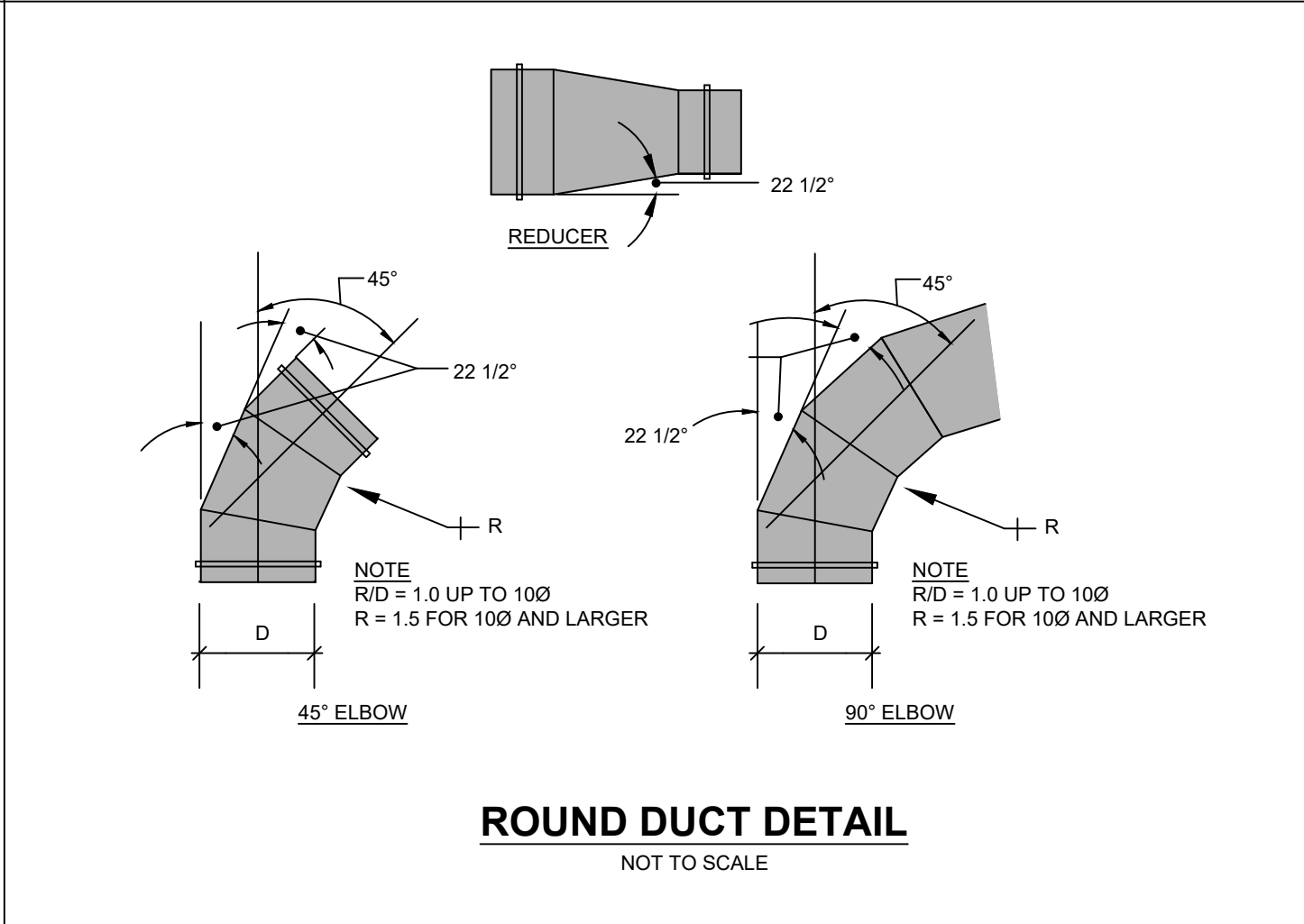
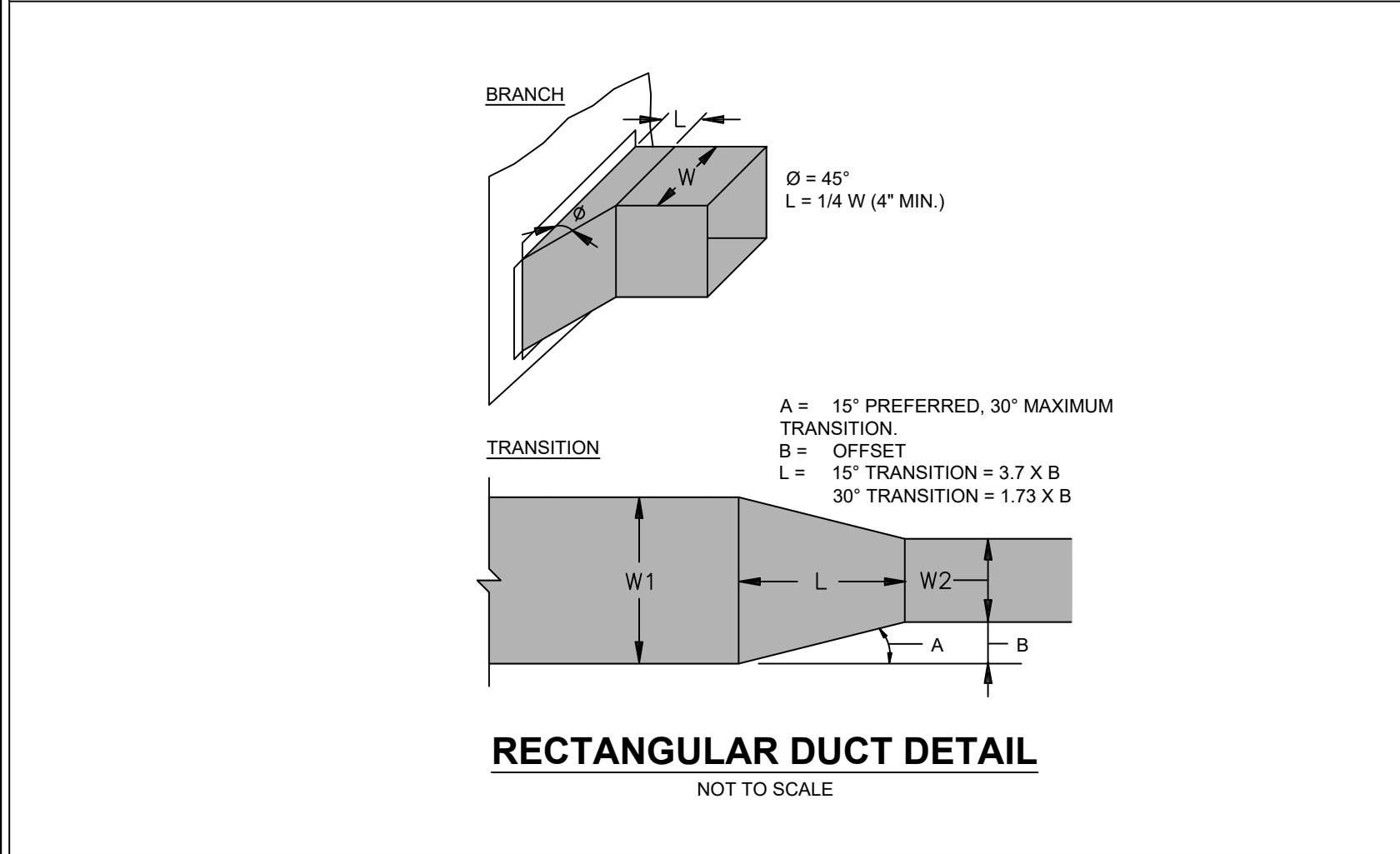
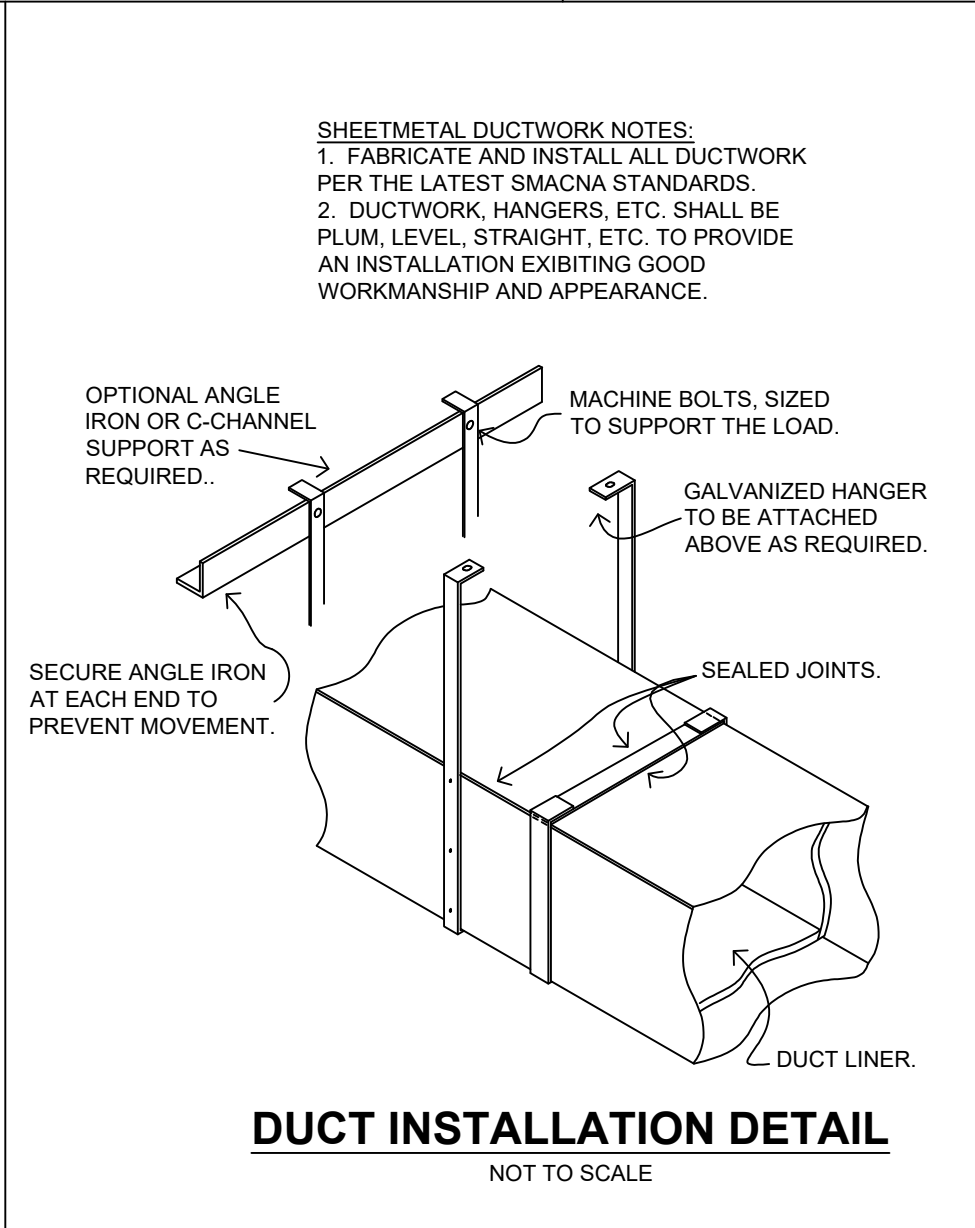
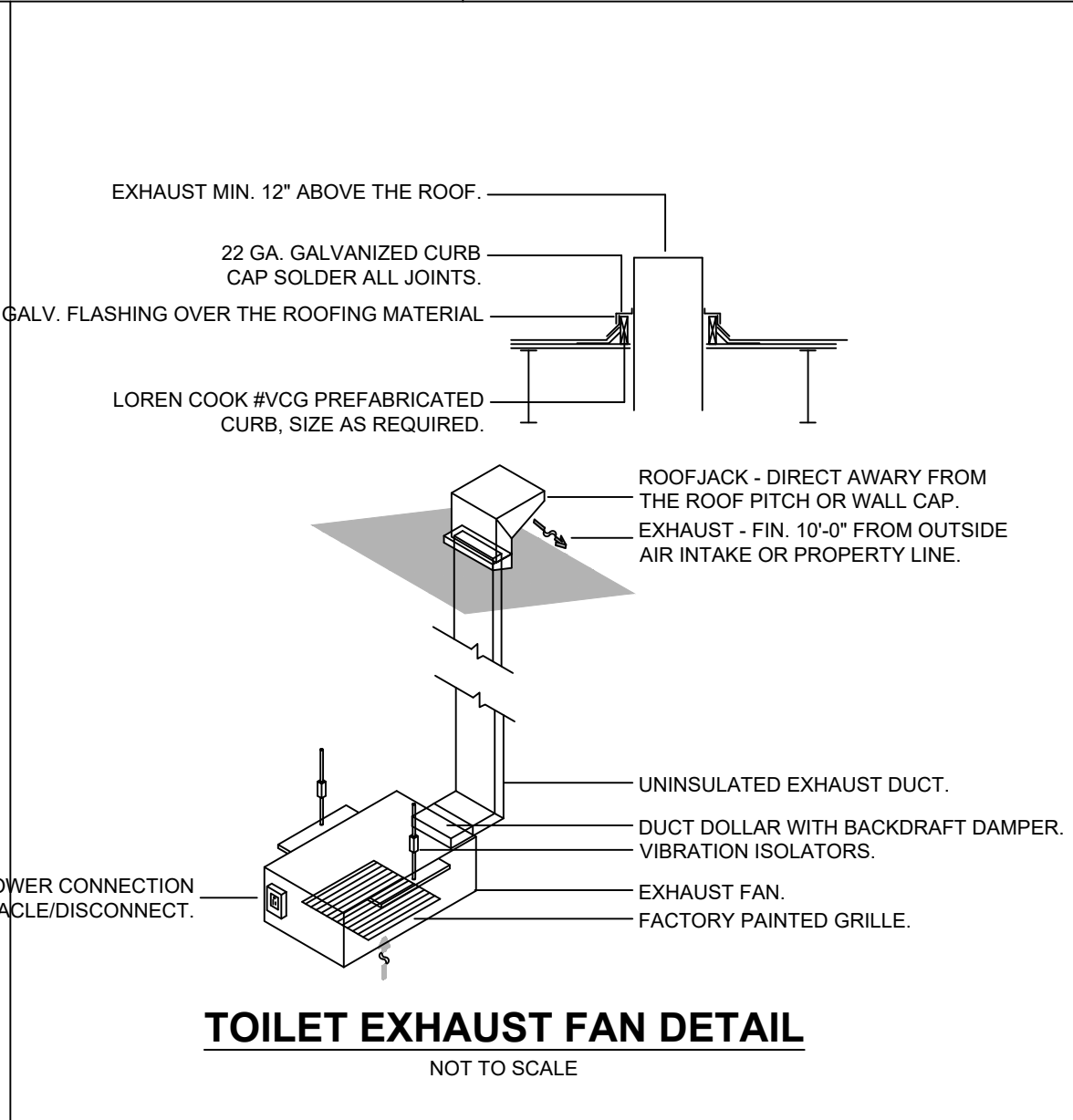
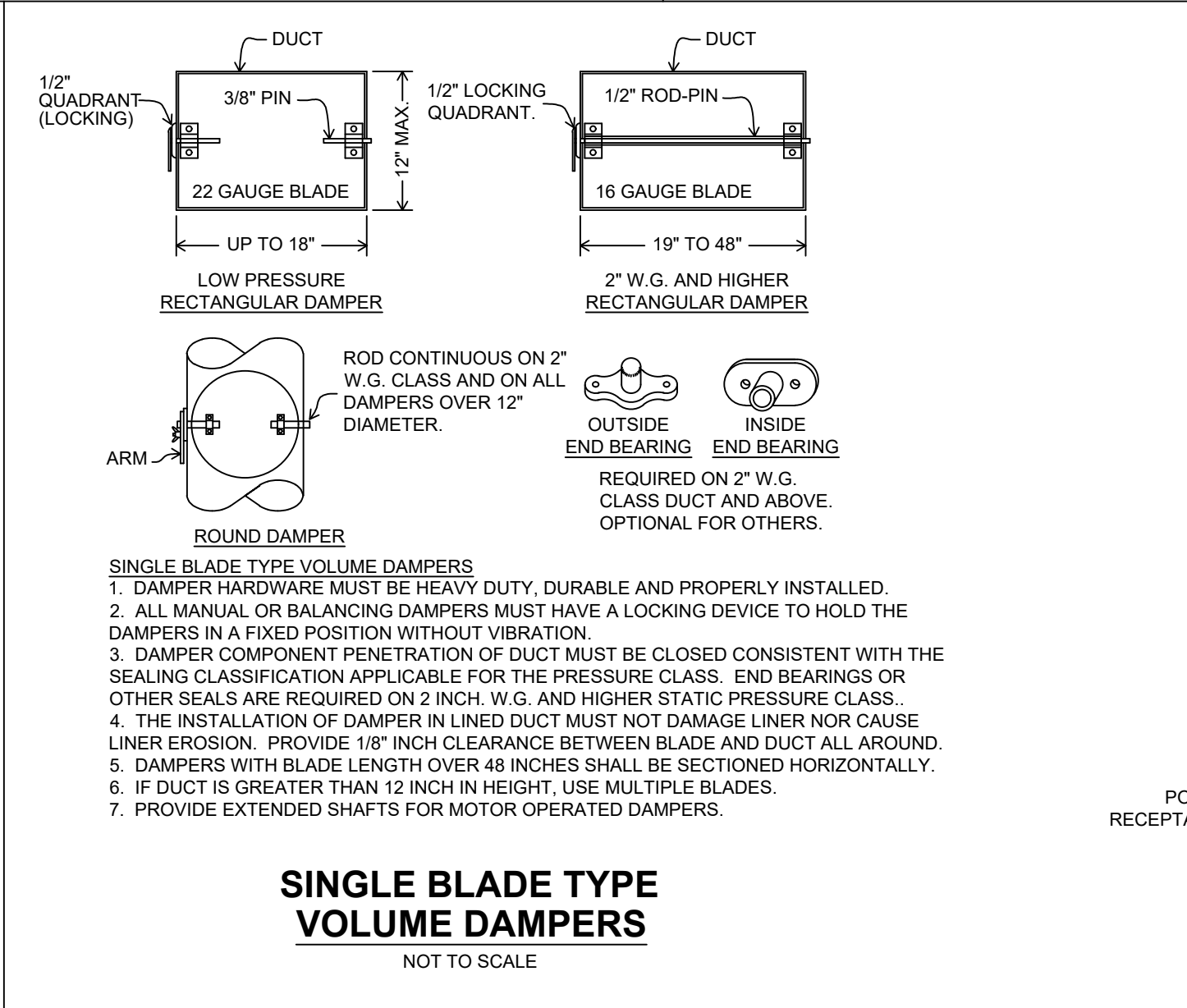
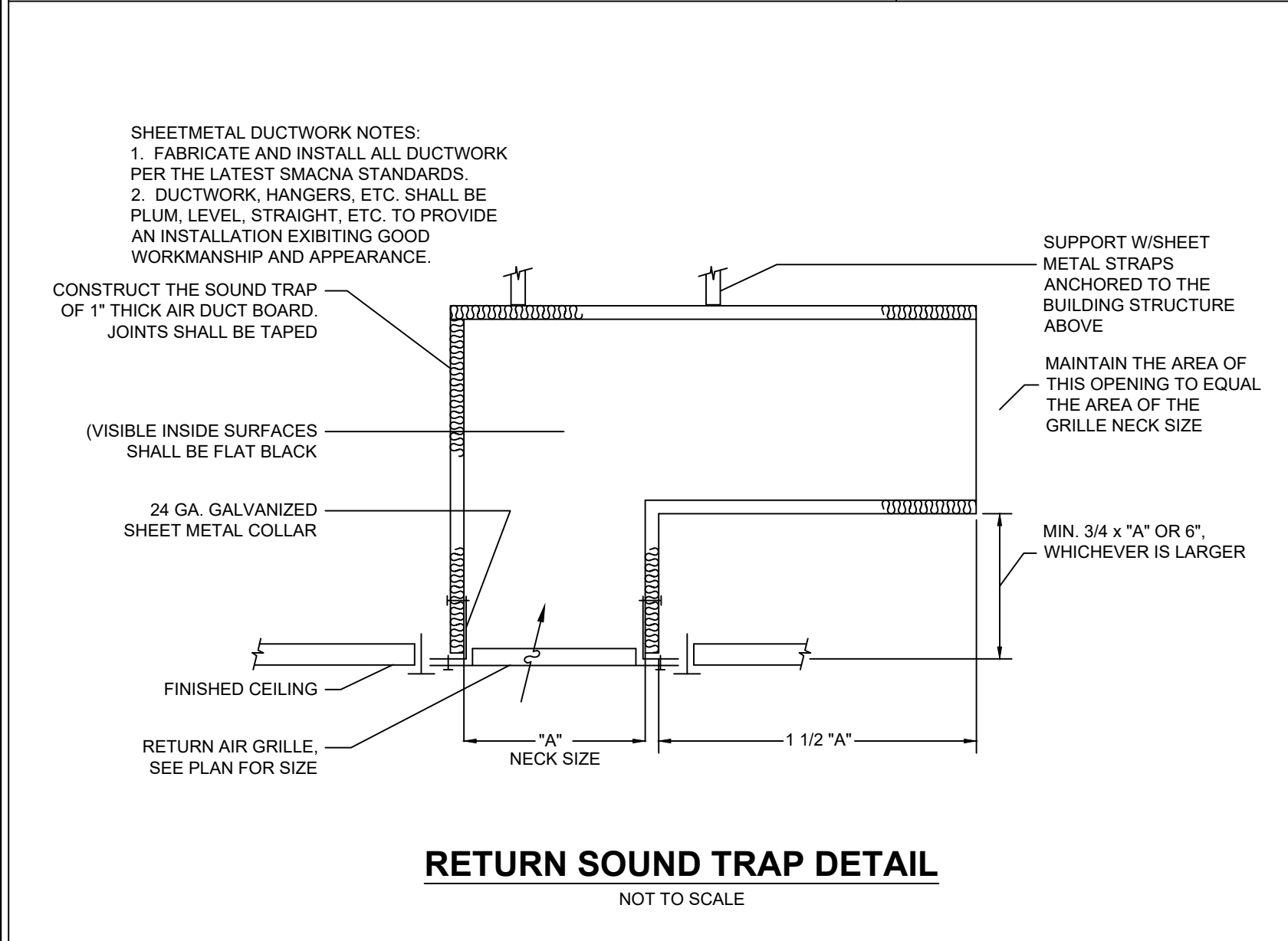




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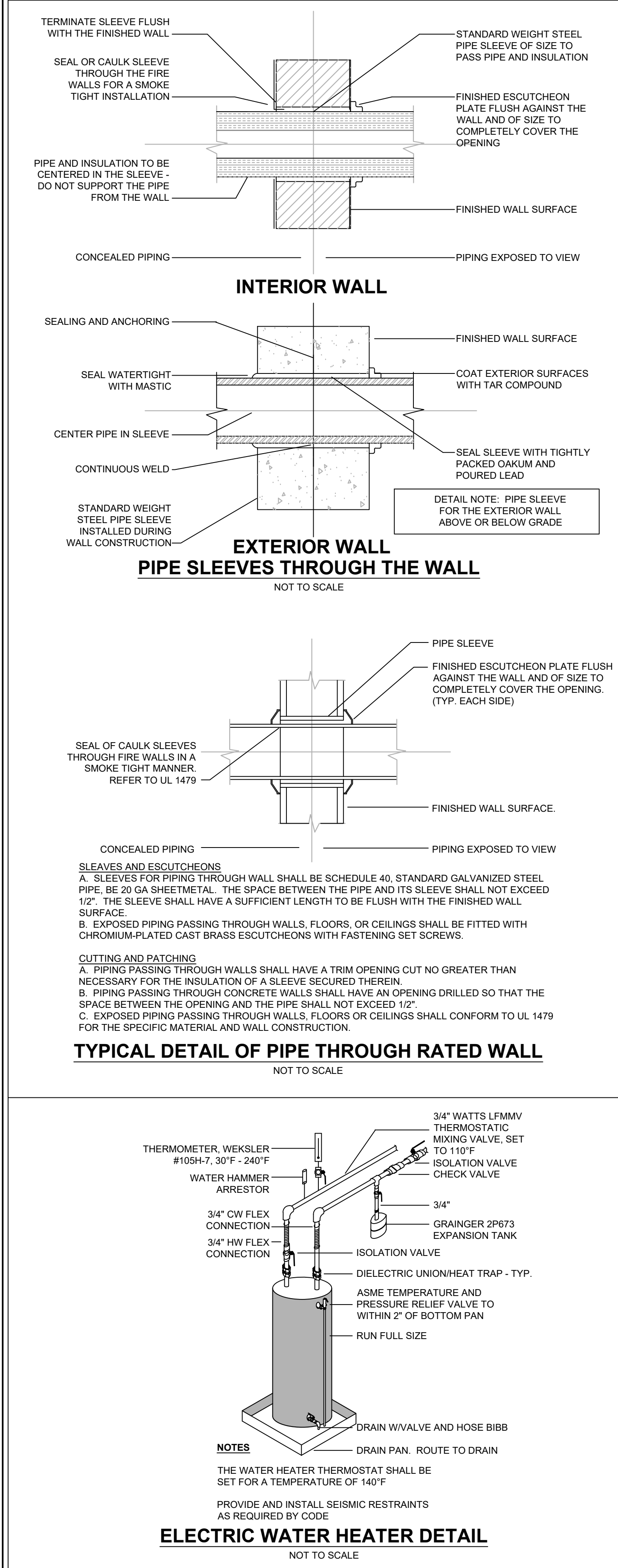
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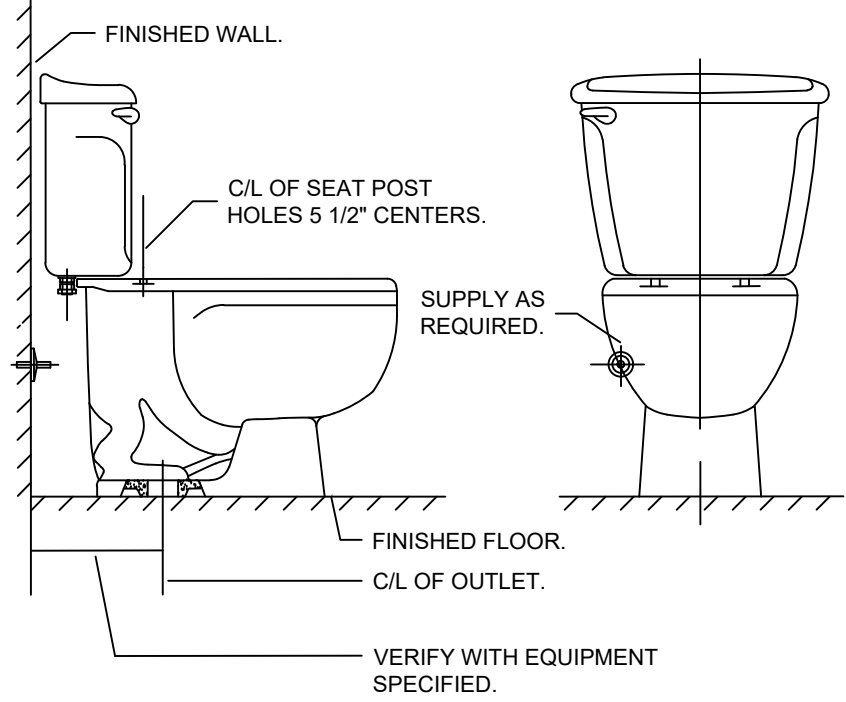






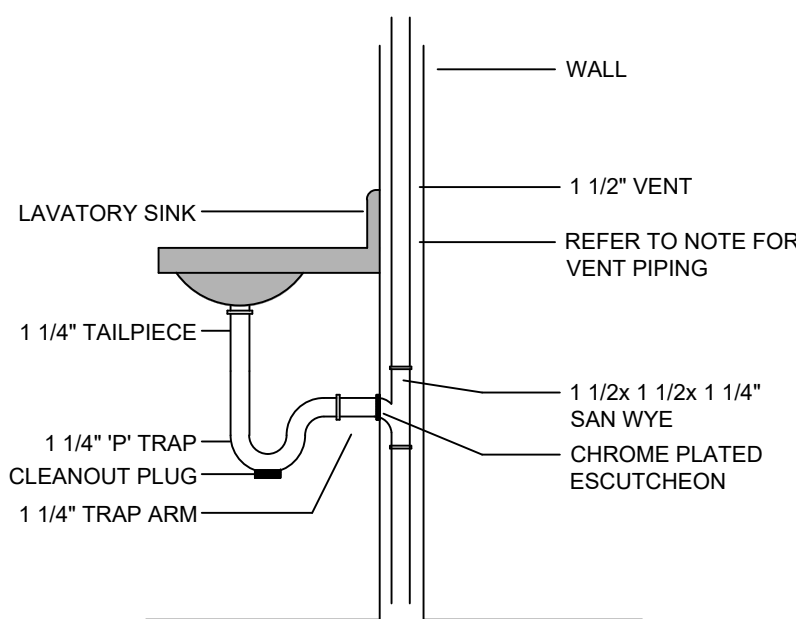


- NOTE:**
1. TOILET DESIGNED TO MEET ADA DISABILITY REQUIREMENTS WHEN TOP OF SEAT IS INSTALLED 17" TO 19" ABOVE THE FINISHED FLOOR
  2. THIS COMBINATION IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 12" FROM THE FINISHED WALL TO CL OF OUTLET
  3. DIMENSIONS SHOWN FOR THE LOCATION OF SUPPLIES ARE SUGGESTED
  4. FLEX SUPPLIES NOT INCLUDED WITH FIXTURES AND MUST BE ORDERED SEPARATELY



**TYPICAL WATER CLOSET DETAIL**

NOT TO SCALE



**NOTE:** CONTRACTOR SHALL MODIFY THE VENT PIPING PROVIDED ALL INSTALLATIONS PER THE APPLICABLE CODES

**LAVATORY WASTE PLUMBING DETAIL**

NOT TO SCALE

**SHEET NOTES**

- 1 REFER TO THE SITE UTILITIES PLAN FOR CONTINUATION
- 2 LOCATE THE VTR TOWARDS THE BACK OF THE BUILDING AS POSSIBLE
- 3 GREASE LINE - REFER TO THE SITE UTILITIES PLAN FOR ADDITIONAL INFORMATION

**PLUMBING PLAN GENERAL NOTES**

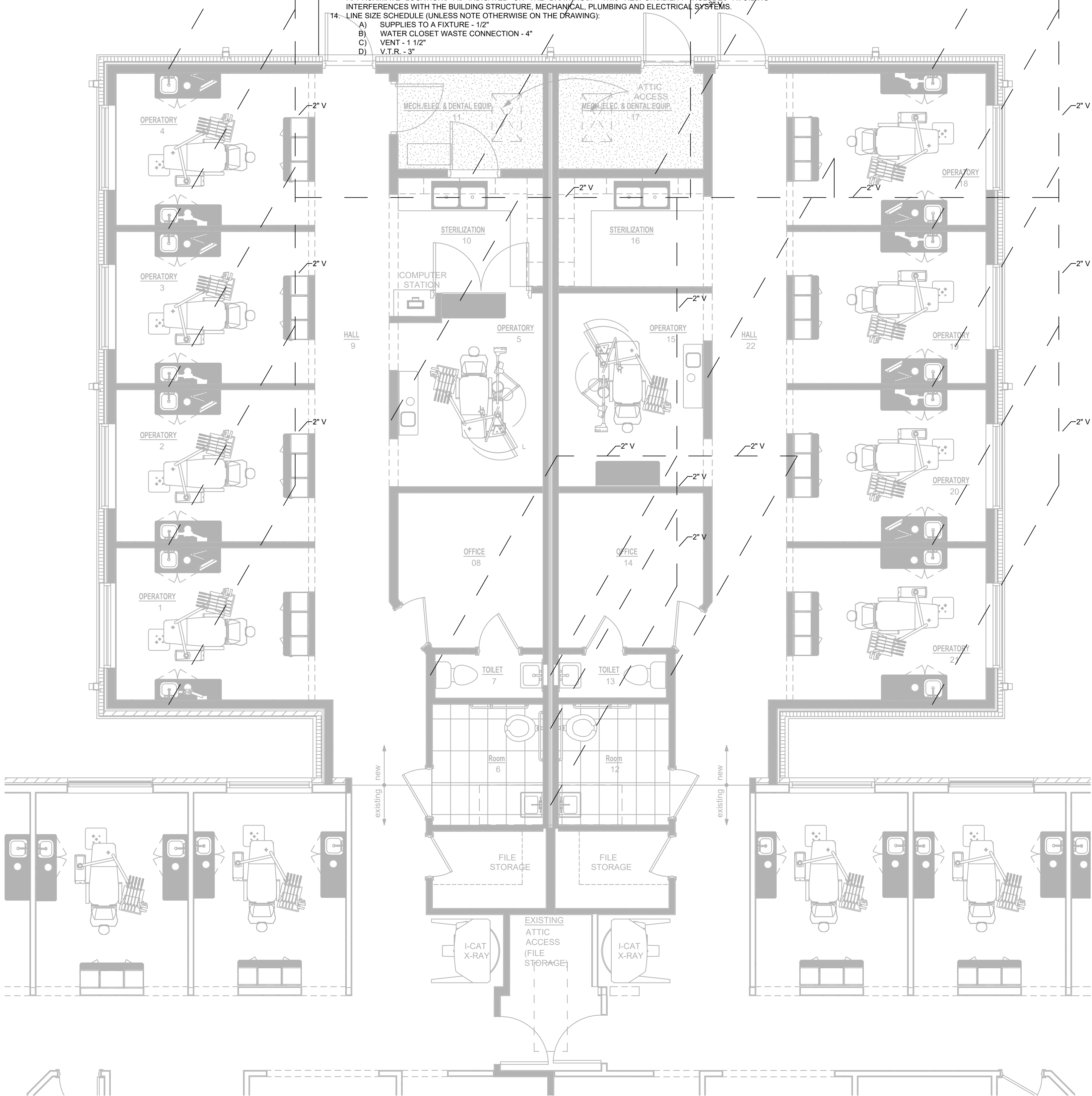
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2. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST ADOPTED PLUMBING CODE AND ALL OF THE CURRENT ADOPTED ORDINANCES IN EFFECT FOR THE LOCATION WHERE THE PLUMBING IS TO BE INSTALLED. ALL MATERIALS IN DIRECT CONTACT WITH POTABLE WATER SYSTEMS SHALL BE LEAD FREE AS REQUIRED BY CODE.
3. PLANS ARE DIAGRAMMATIC AND ARE NOT TO BE SCALED.
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5. ALL FIXTURES SHALL BE INSTALLED WITH WATER STOPS, TRAPS AND ALL OTHER HARDWARE REQUIRED FOR A COMPLETE AND OPERABLE INSTALLATION.
6. REFER TO THE ARCHITECTURAL DRAWINGS FOR THE EXACT LOCATION OF THE PLUMBING FIXTURES AND MOUNTING HEIGHTS.
7. THE CONTRACTOR SHALL INSULATE THE HOT AND COLD WATER PIPING SYSTEMS AND PROVIDE METAL SHIELDS UNDER THE PIPE HANGERS.
8. THE CONTRACTOR SHALL ISOLATE THE PIPE HANGERS FROM THE HOT AND COLD WATER PIPING SYSTEMS WITH NEOPRENE PADS.
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10. THE HOT AND COLD WATER PIPING SYSTEMS SHALL NOT MAKE DIRECT CONTACT WITH THE BUILDING STRUCTURE OR WALLS.
11. ALL P-TRAPS ON THE LAVATORIES, BAR SINKS AND SERVICE SINKS SHALL HAVE CLEANOUT PLUGS.
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  - D) V.T.R. - 3"

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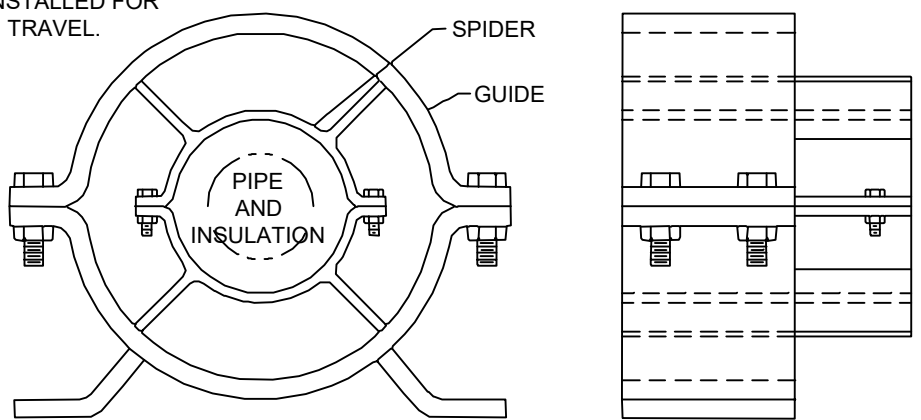
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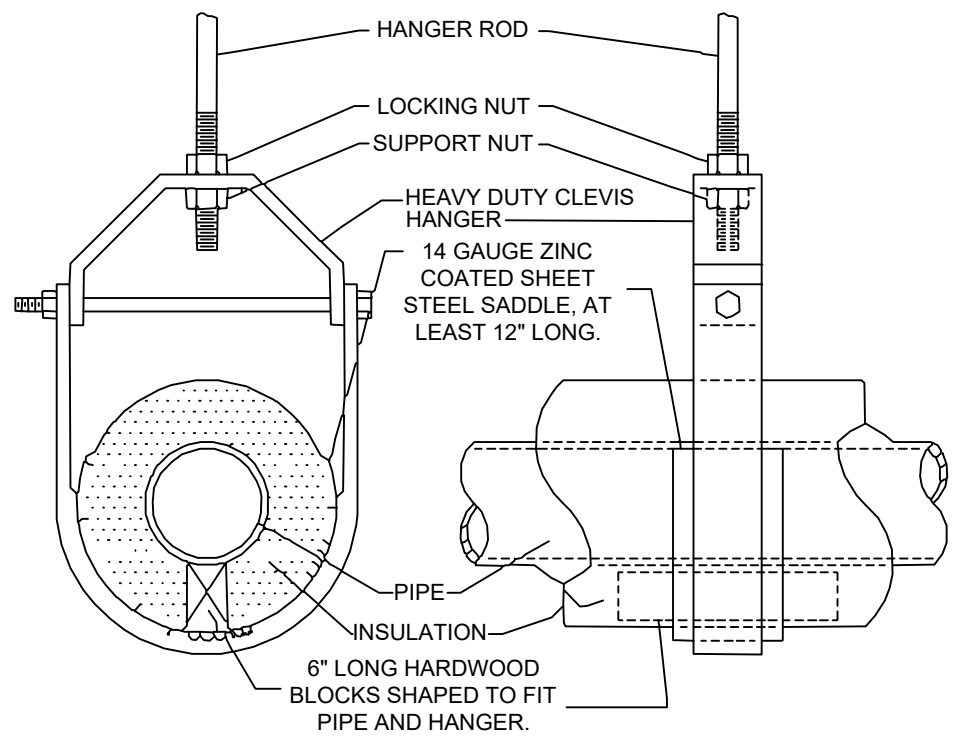
**1 WASTE / VENT PLUMBING PLAN**

1/4" = 1'-0"

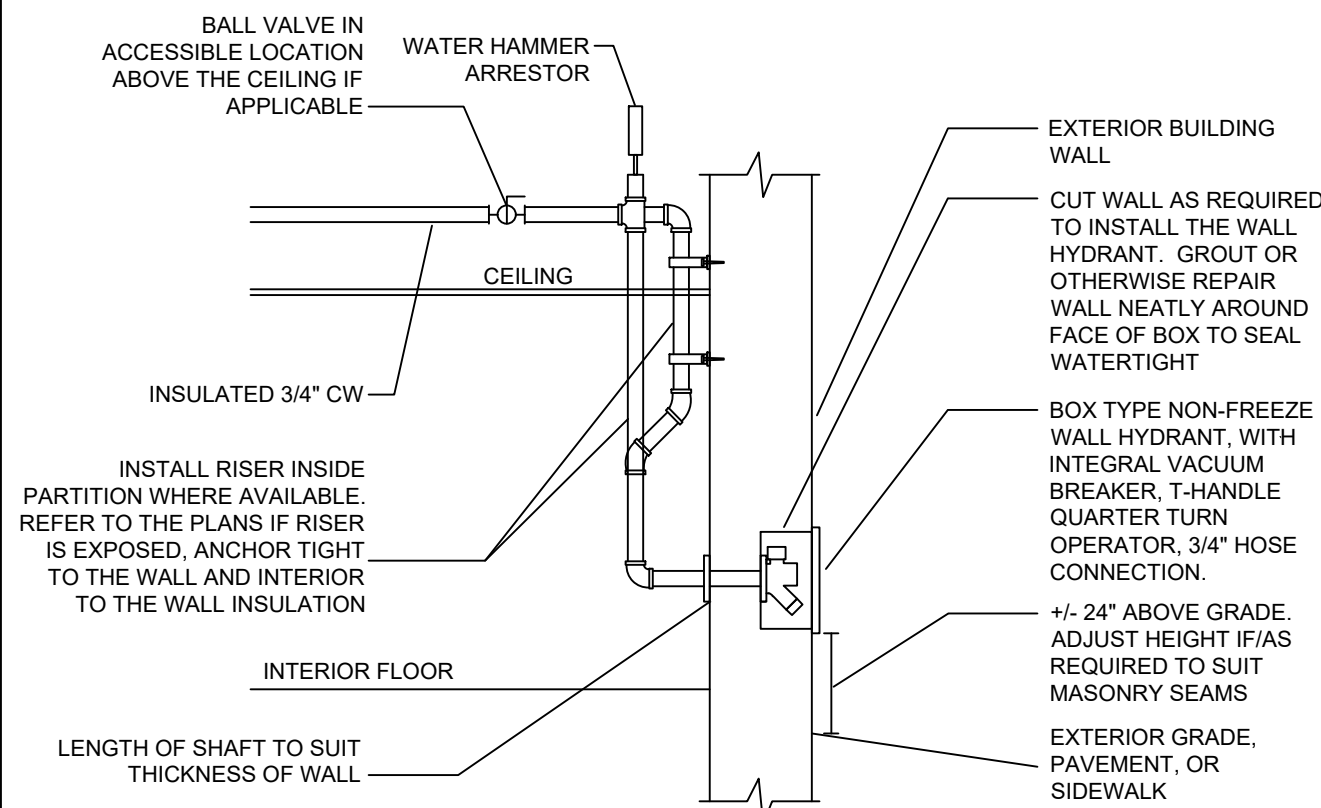




PIPE ALIGNMENT GUIDE DETAIL  
NOT TO SCALE



PIPE HANGERS (6" AND SMALLER) DETAIL  
NOT TO SCALE



FREEZEPROOF WALL  
HYDRANT DETAIL  
NOT TO SCALE

SHEET NOTES

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PLUMBING PLAN GENERAL NOTES

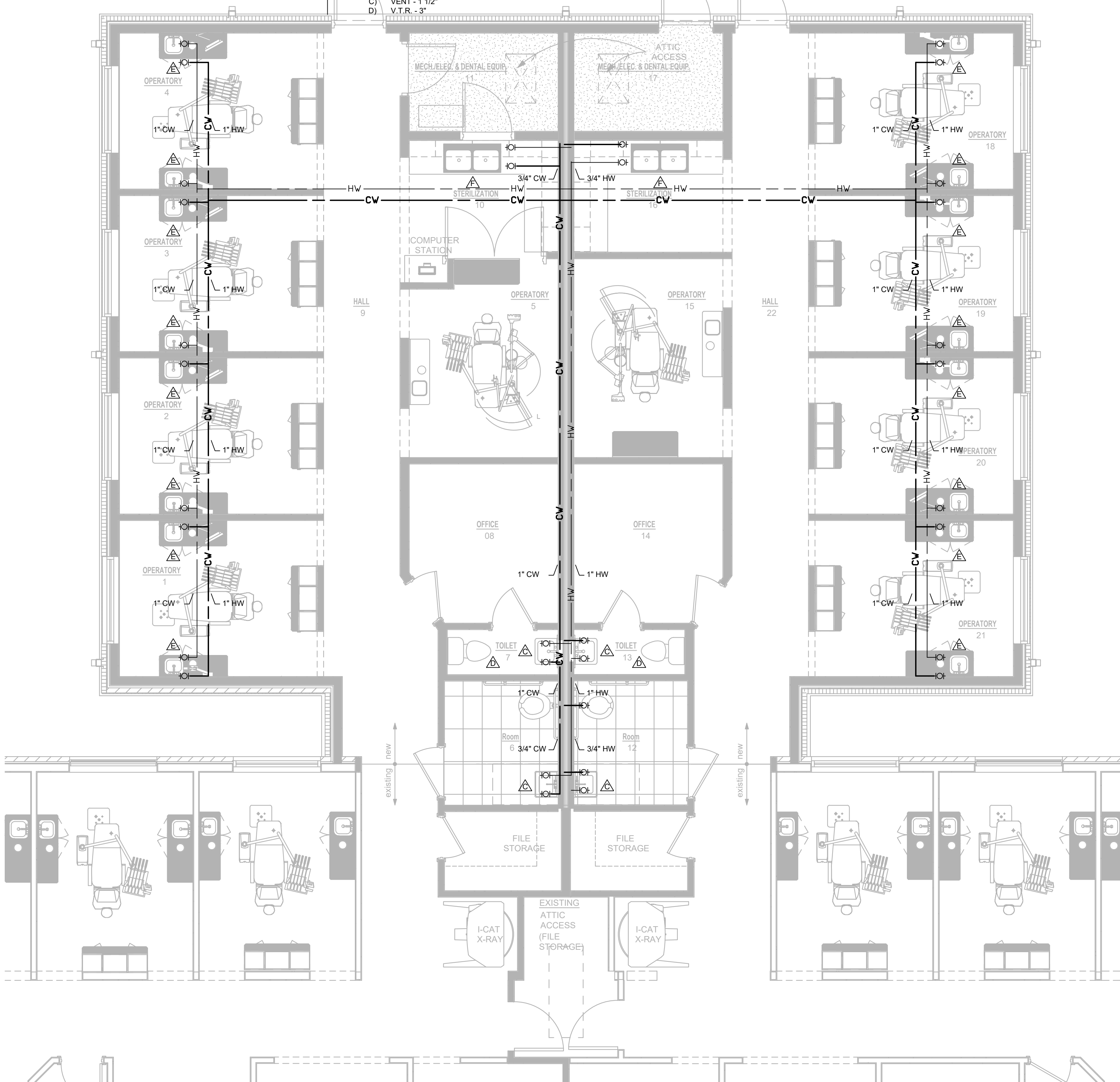
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1 SUPPLY PLUMBING PLAN  
1/4" = 1'-0"

Tim W Cooper Architect

P.O. Box 16888 Jonesboro, AR 72403  
Email: twcarch@mac.com Phone: 479.236.6629

Bartels Family Dentistry - Addition  
811 WINDOVER ROAD  
JONESBORO, AR 72401

Charles G Tharp



PROJECT NUMBER

17-012

DATE

3/27/2018  
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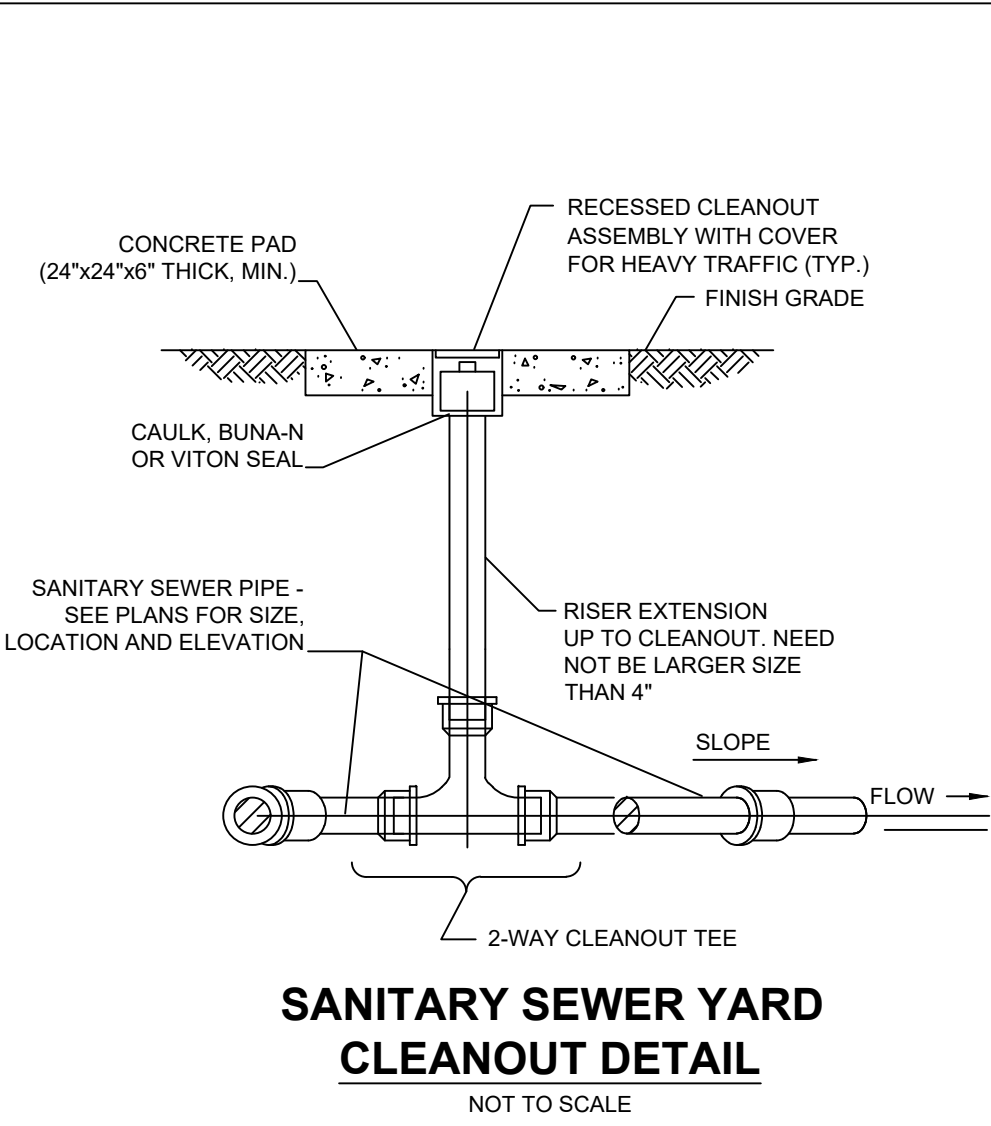
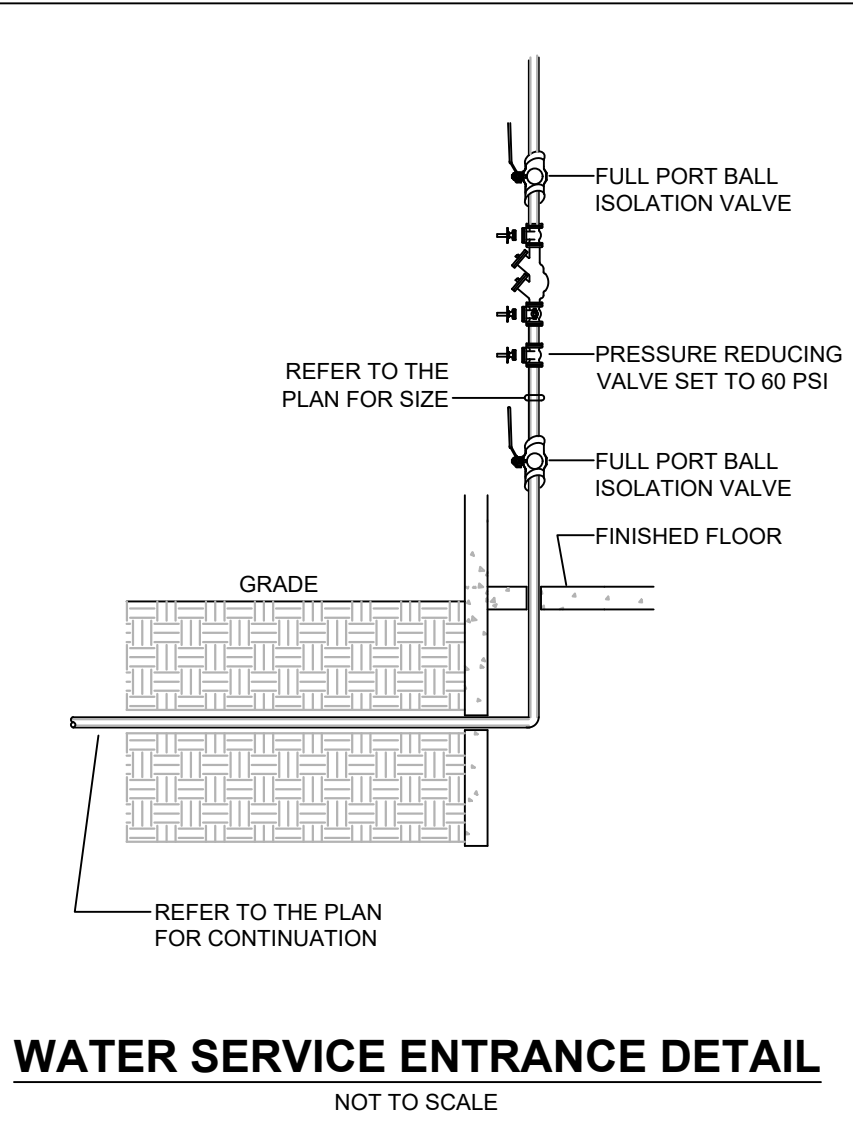
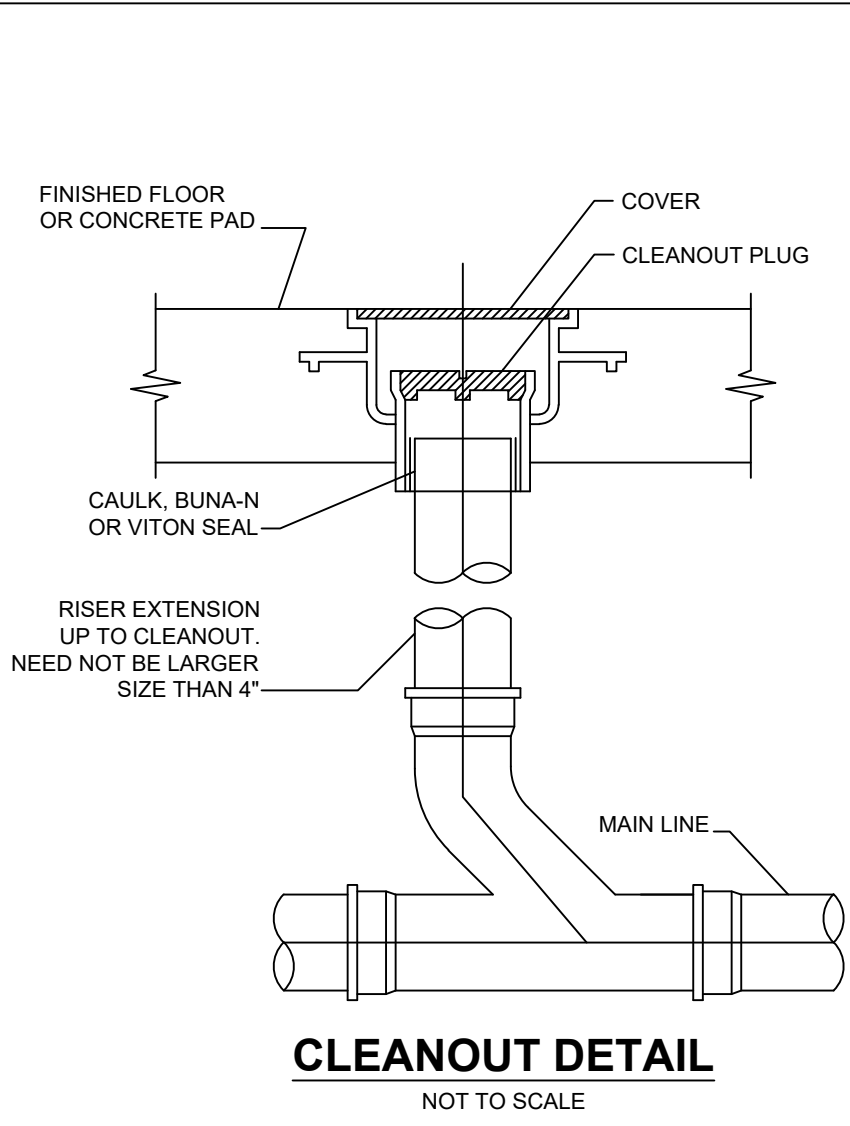
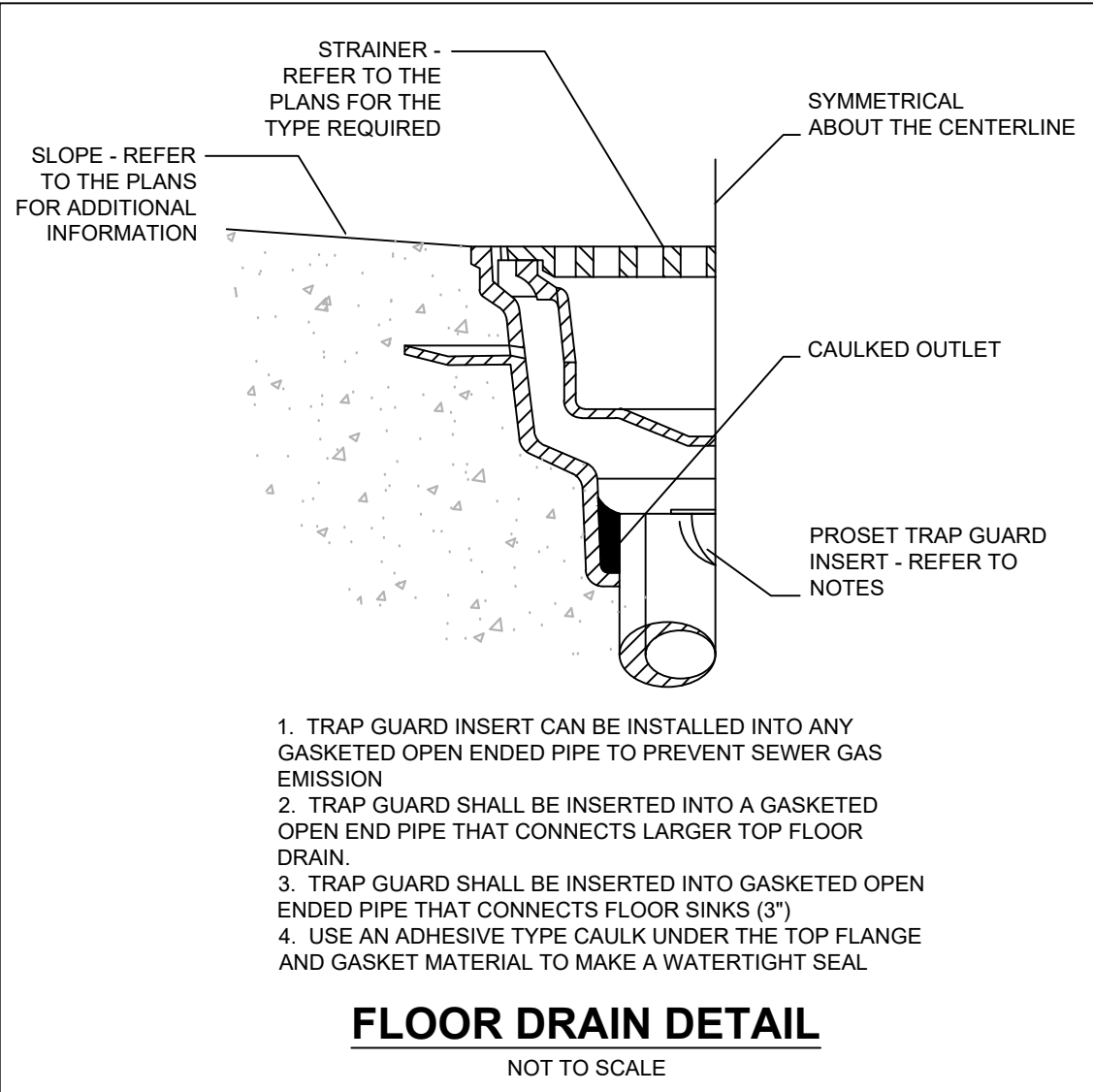
CONTENTS

SUPPLY  
PLUMBING  
PLAN

SHEET NUMBER

P1.1



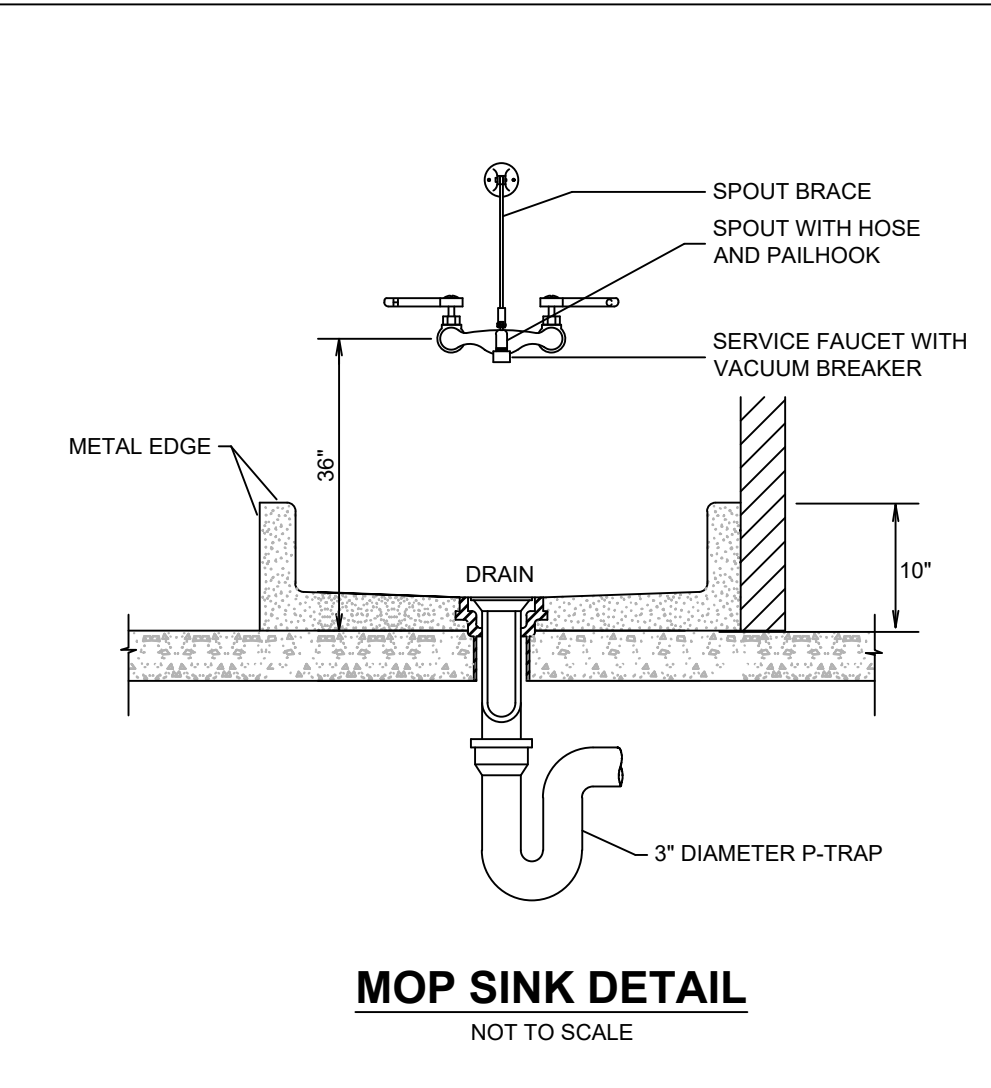
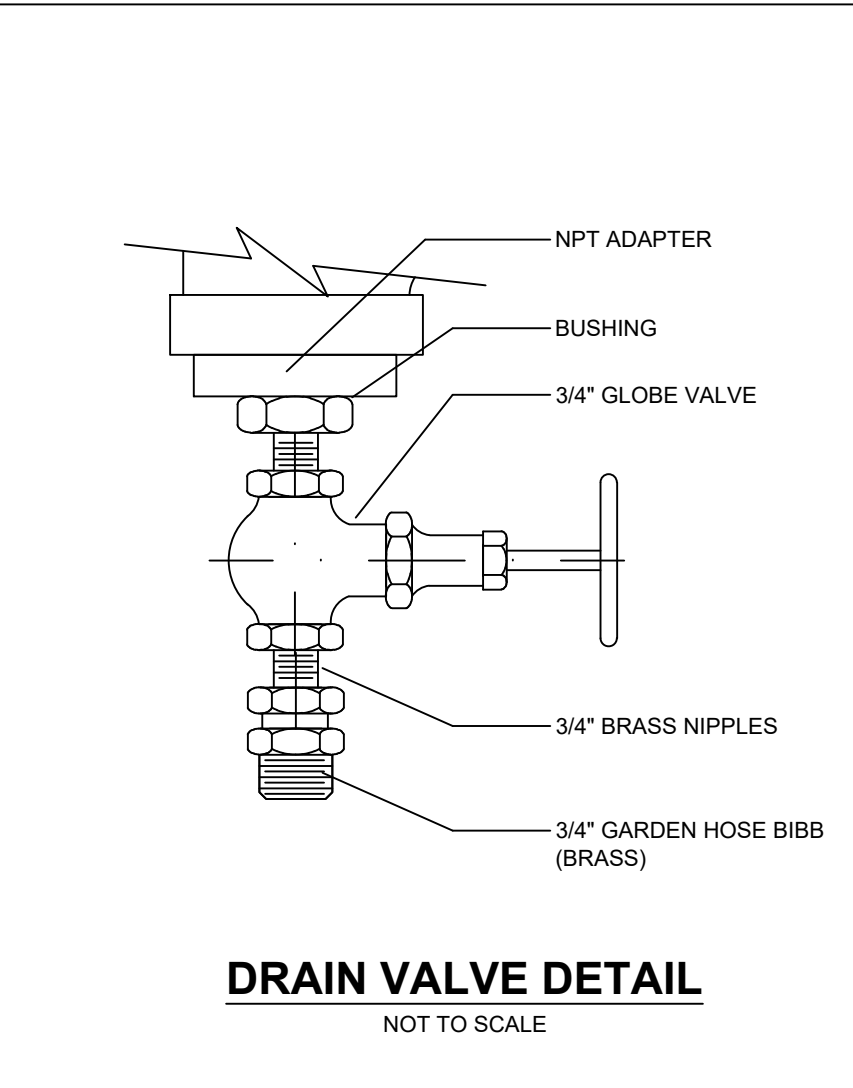
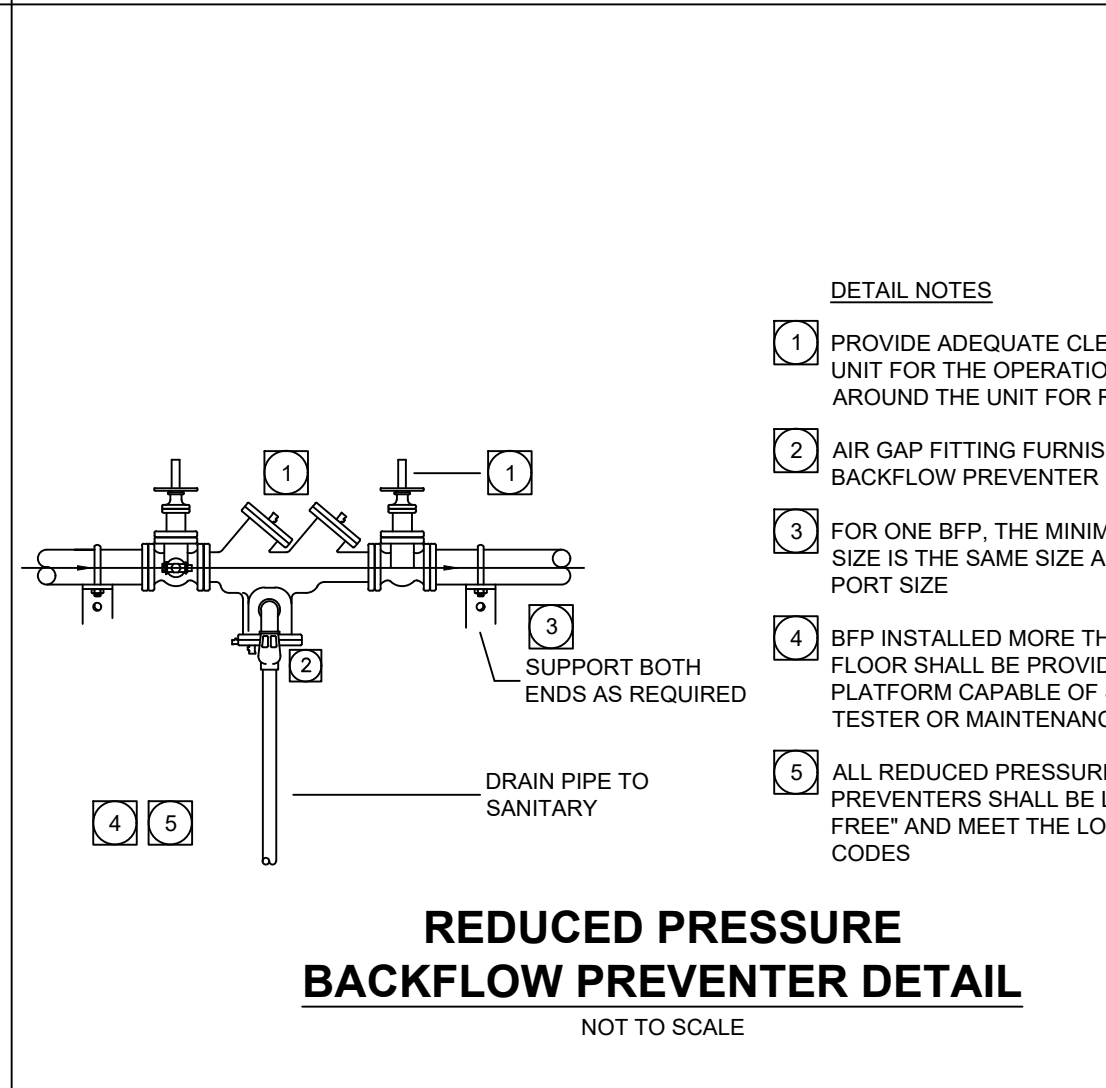
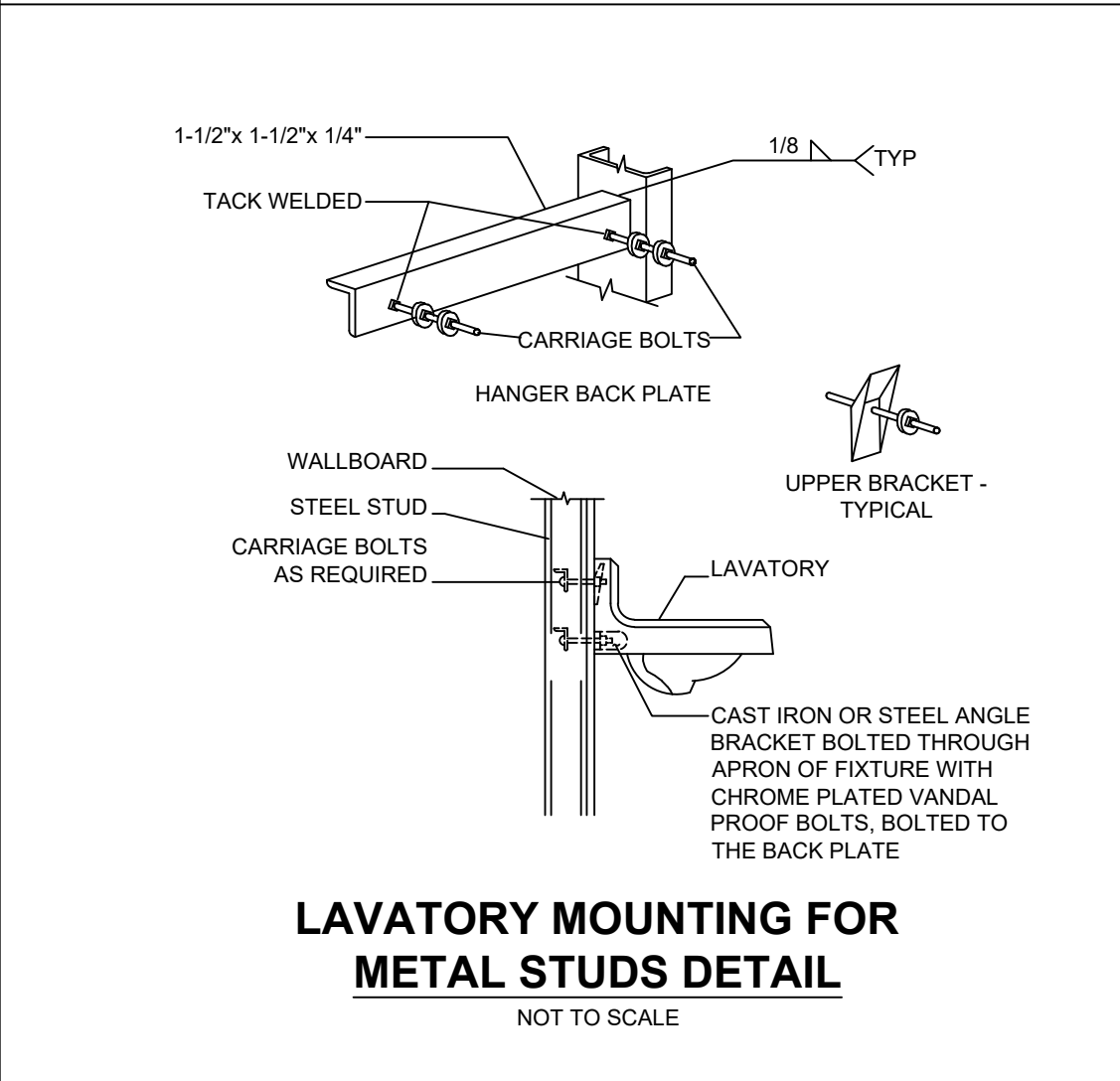
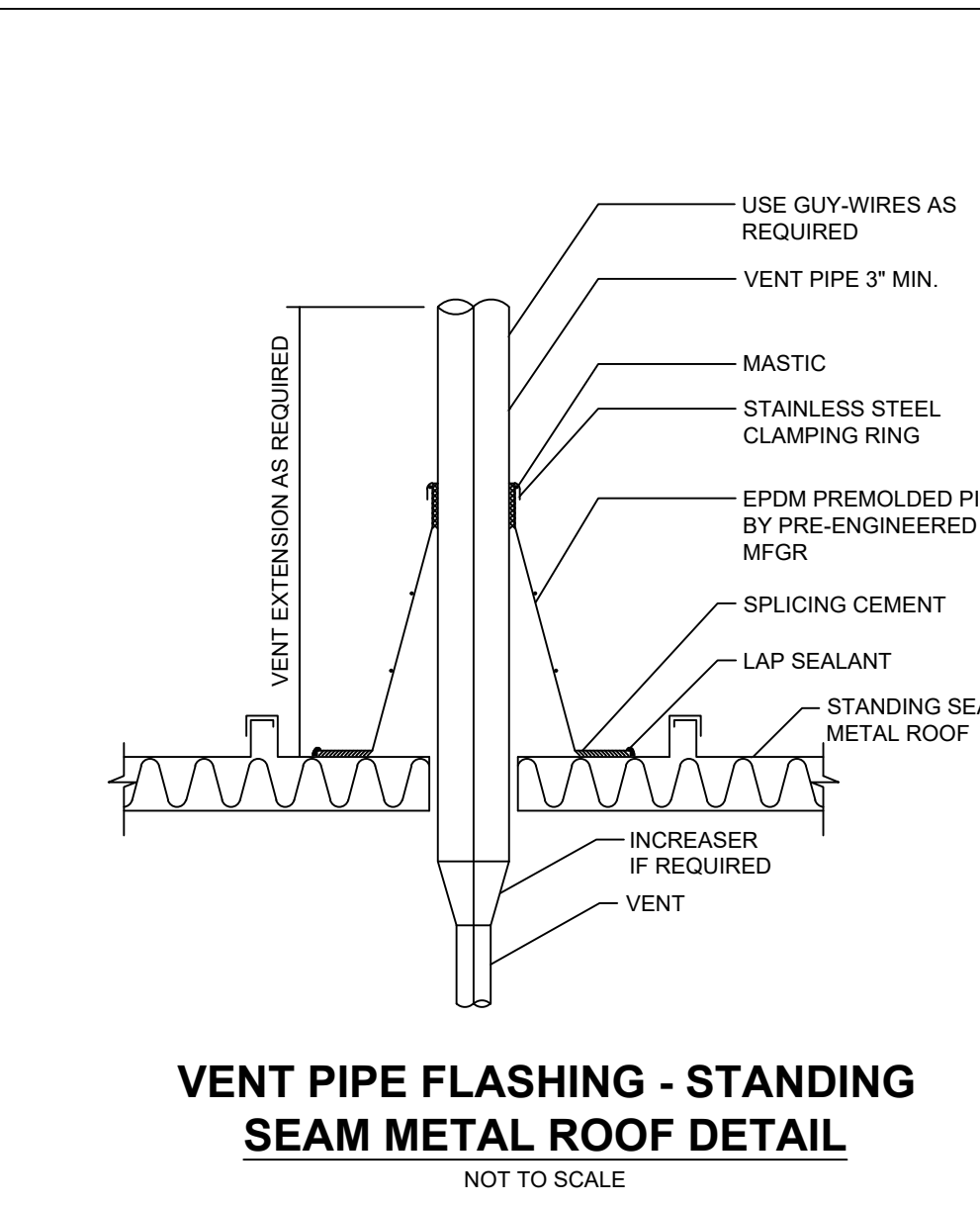
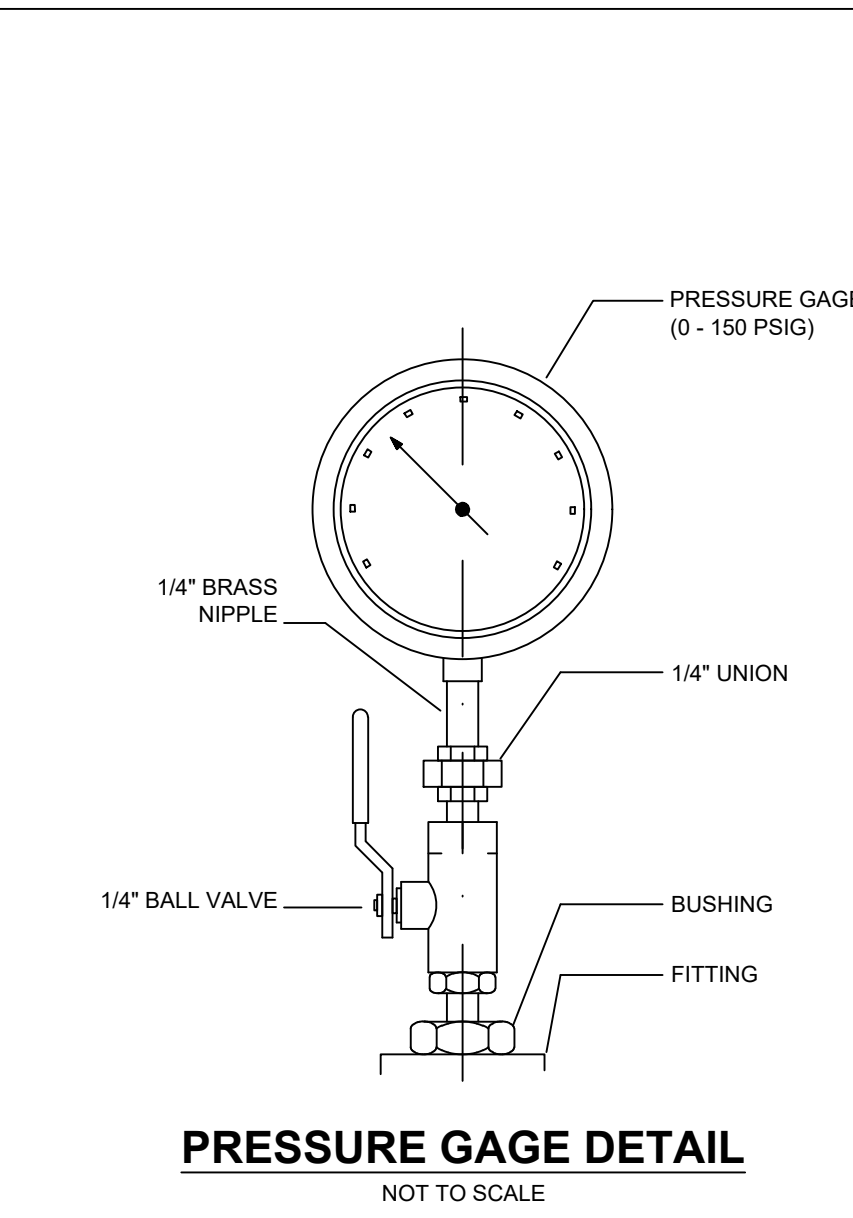
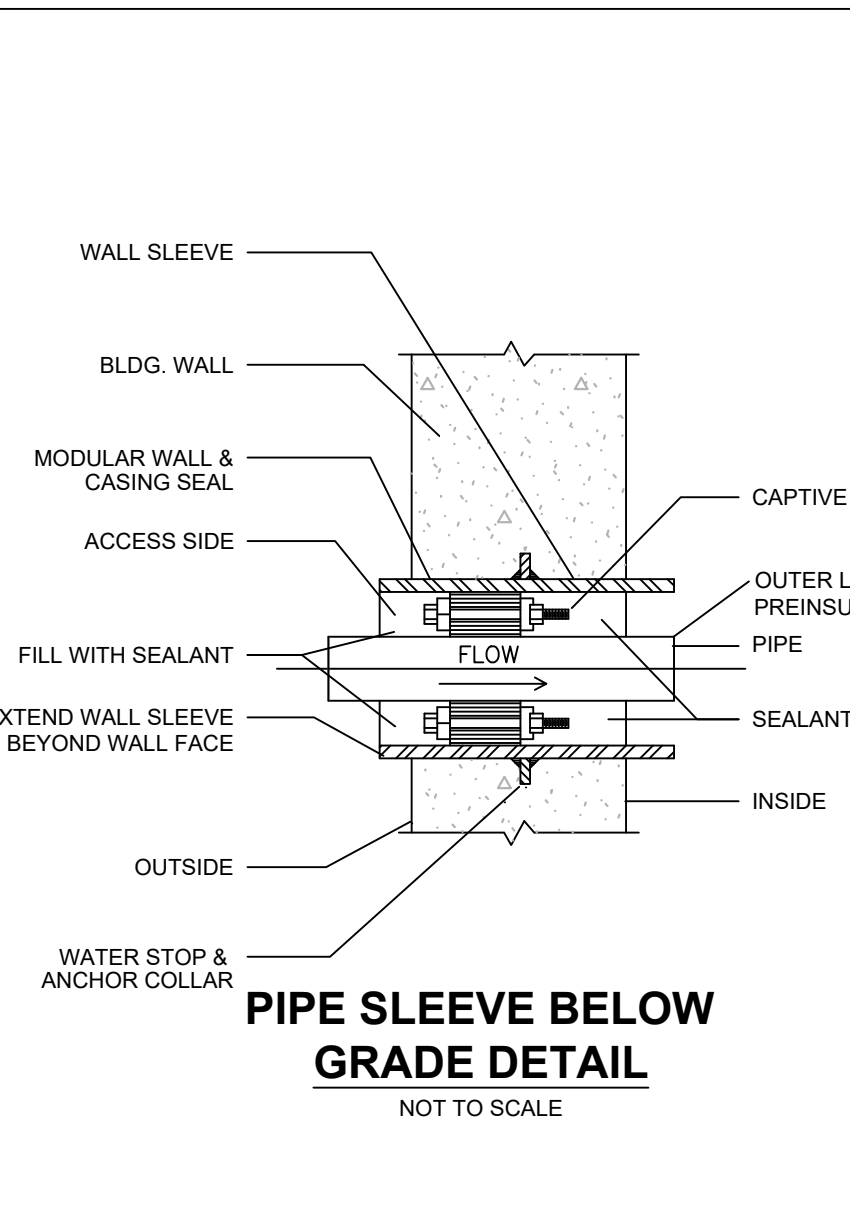
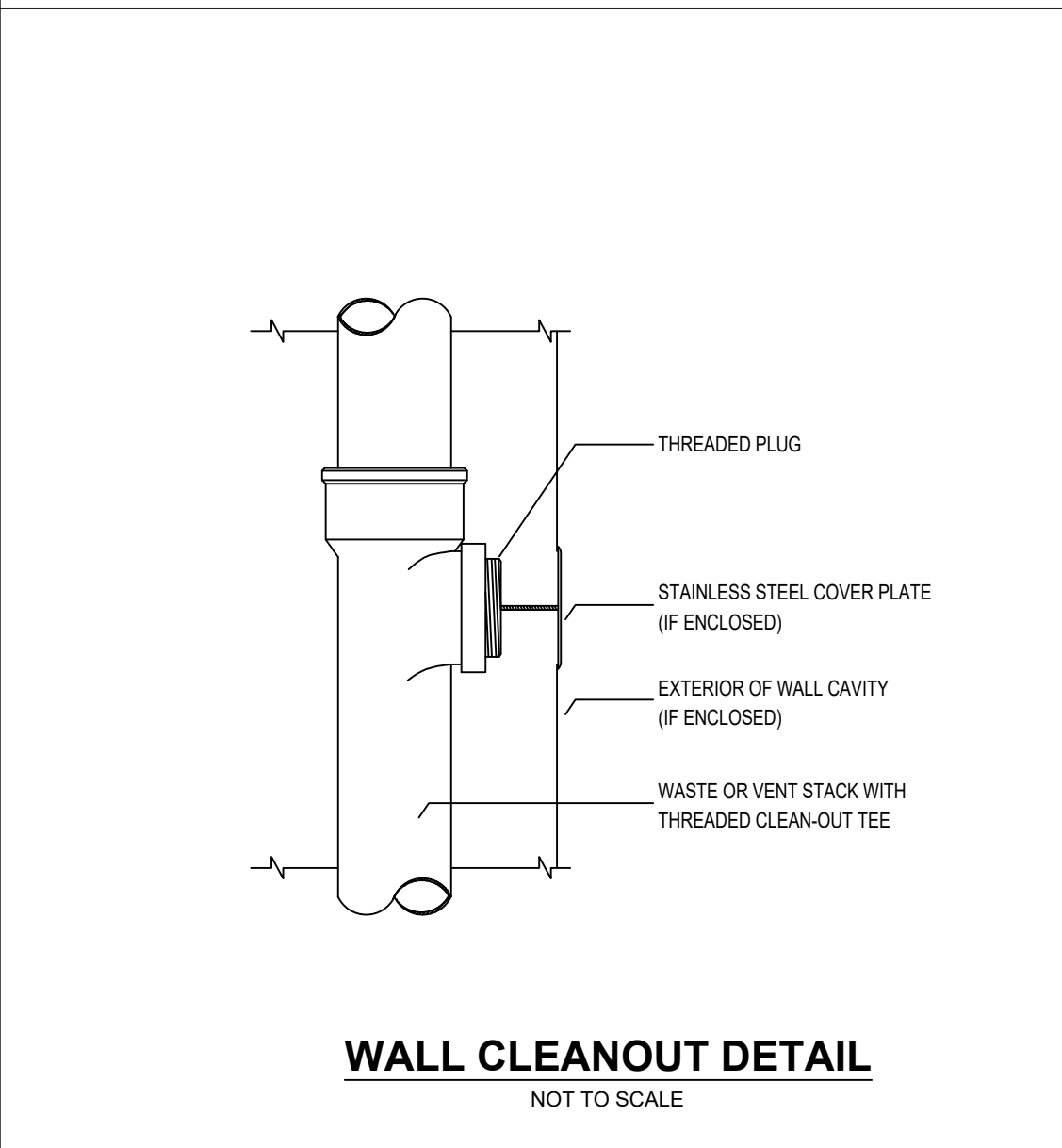


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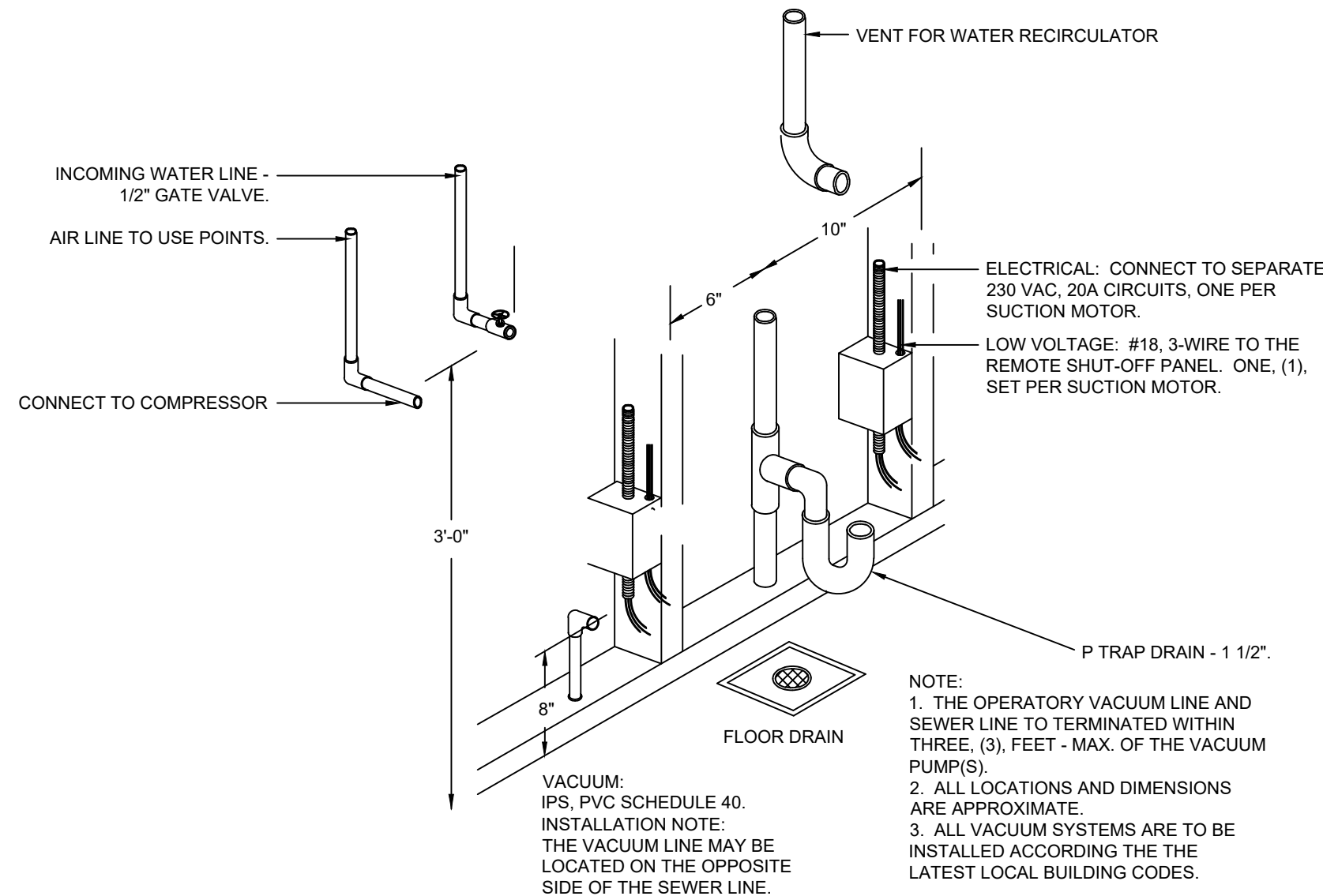
**Bartels Family Dentistry - Addition**  
811 WINDOVER ROAD  
JONESBORO, AR 72401

Charles G Tharp  
Digitally signed by Charles G Tharp  
Date: 2019.08.31 09:06:24 -05'00'  
REGISTERED PROFESSIONAL ENGINEER  
No. 12104  
STATE OF ARKANSAS  
GREGORY

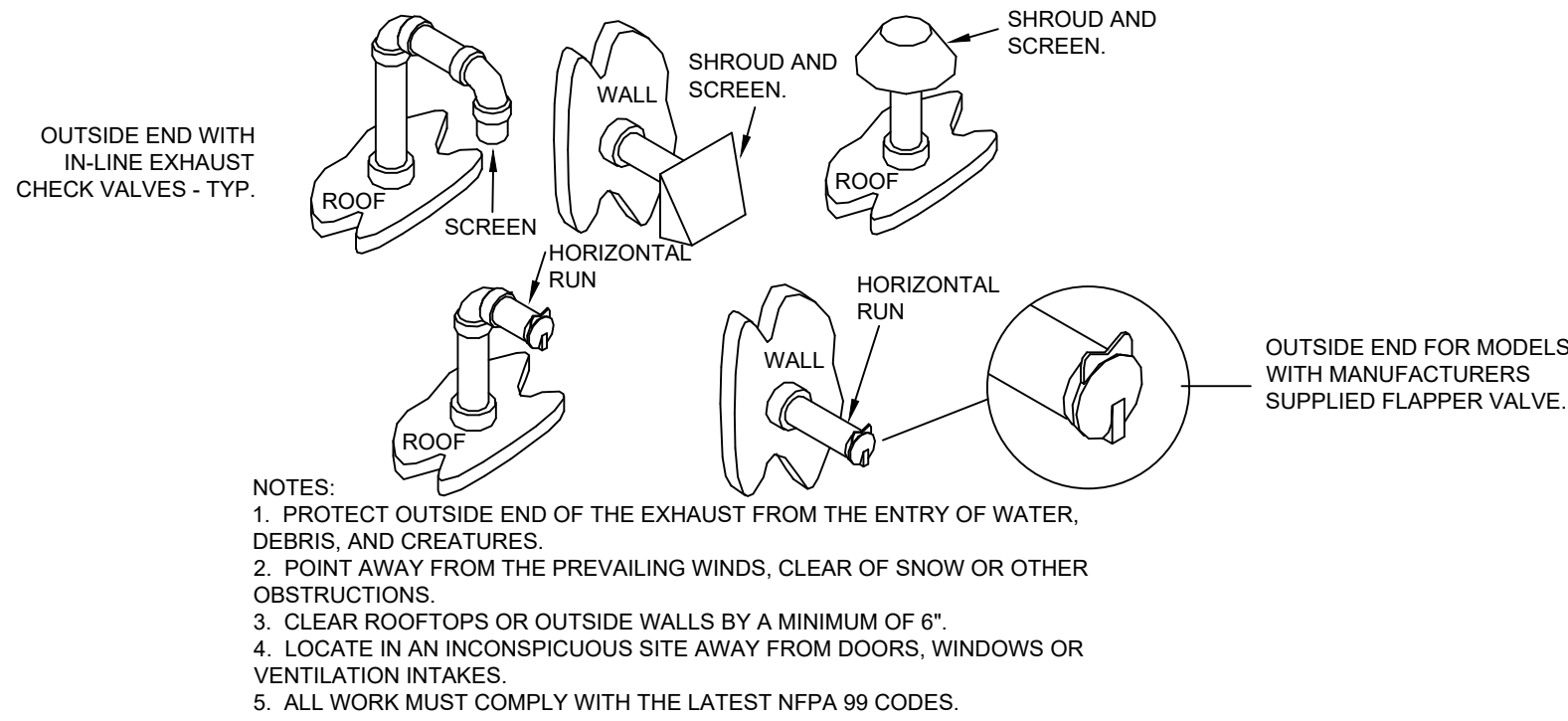
PROJECT NUMBER  
**17-012**  
DATE  
3/27/2018  
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PLUMBING  
DETAILS  
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**P2.0**

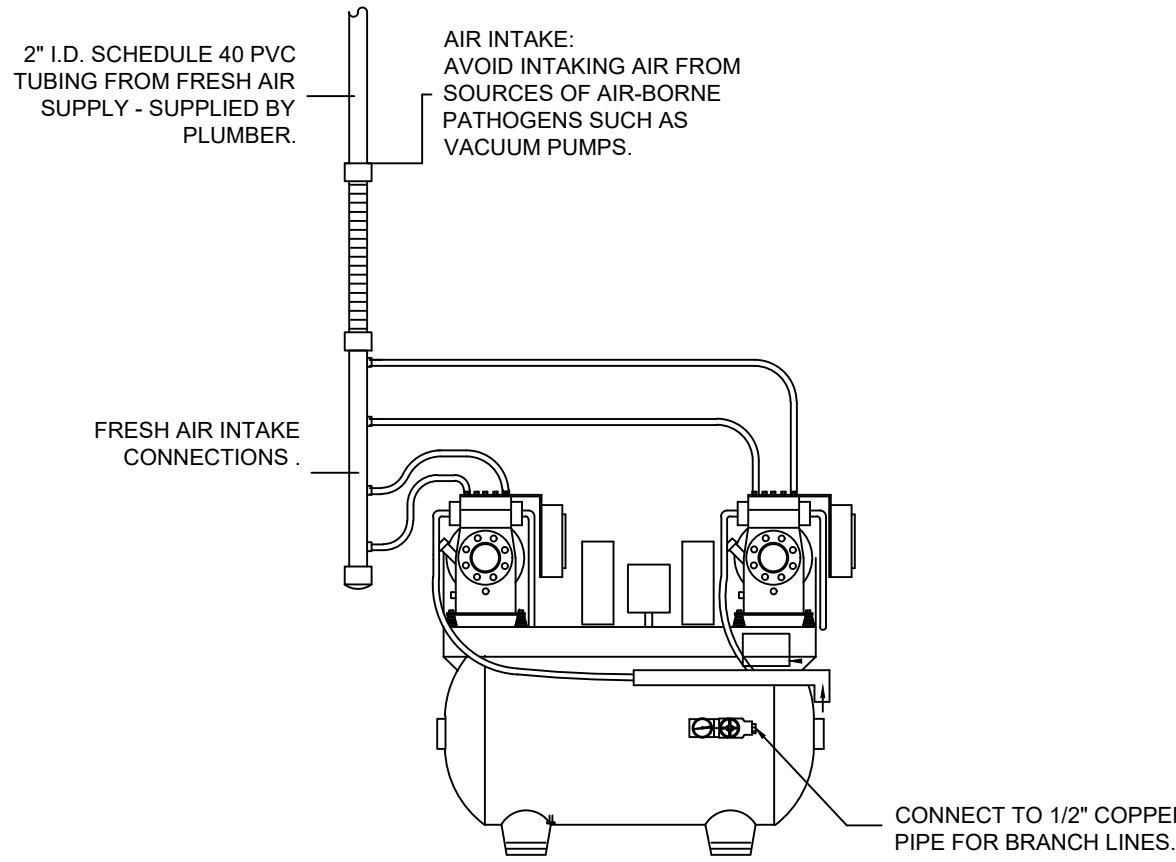




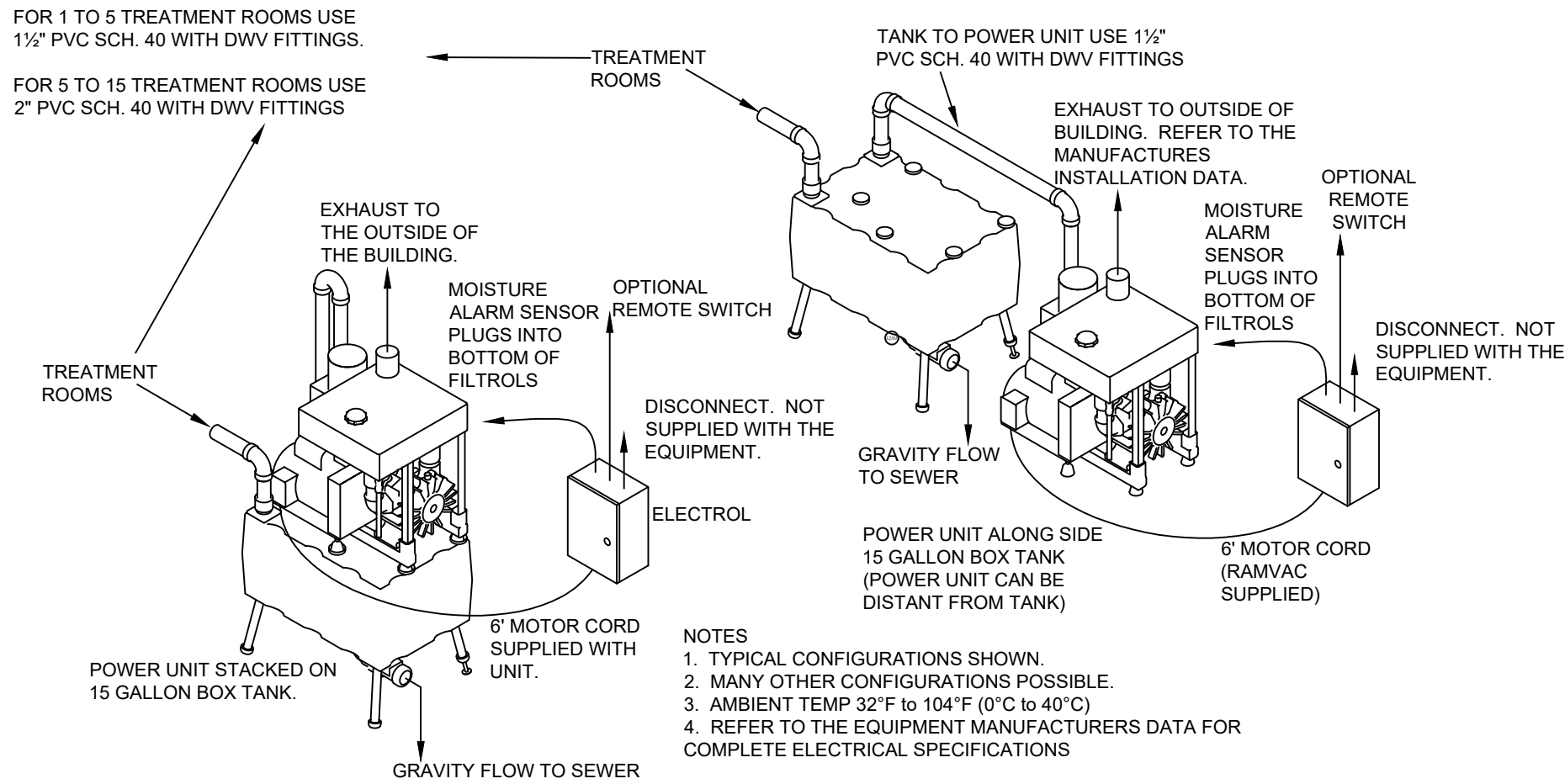
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NOT TO SCALE



**EXHAUST PIPING - TERMINATION FITTINGS**  
NOT TO SCALE



**MEDICAL AIR - AIR COMPRESSOR DETAIL**  
NOT TO SCALE



**VACUUM LINE DETAIL**  
NOT TO SCALE

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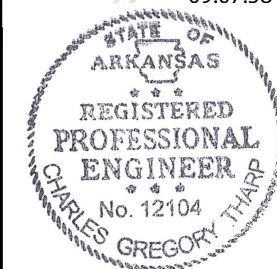
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Date: 2019.08.31 09:07:58 -0500



PROJECT NUMBER

17-012

DATE

3/27/2018  
2:32:28 PM

CONTENTS

PLUMBING  
DETAILS

SHEET NUMBER

P2.1



[illegible]

- |   |   |
|---|---|
| 1 | Coordinate the rough-in of all of the plumbing fixtures with the Architectural Drawings.  |
| 2 | Sinks and lavatories for handicapped access shall be installed with offset tailpieces.  |
| 3 | All exposed sink and lavatory drain and supply lines shall be insulated with protective devices equal to "McGuire" #PW 2150 W.C., white molded closed cell vinyl. |
| 4 | Furnish and install the flush handle on the wide side of the restroom or stall for handicapped-accessible water closets.  |
| 5 | Furnish and install a water hammer arrestor at each flush valve.  |

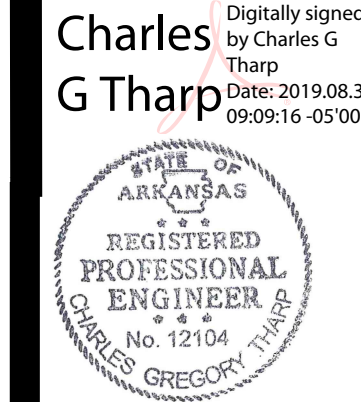
| PIPE HANGER SCHEDULE - EXCLUDING FIRE PROTECTION PIPING  |  |                                  |                                |
|--|--|----------------------------------|--------------------------------|
| PIPING MATERIAL  |  | MAXIMUM HORIZONTAL SPACING - FT. | MAXIMUM VERTICAL SPACING - FT. |
| ABS PIPE   |  | 4                                | 10 <sup>b</sup>                |
| ALUMINUM PIPING AND TUBING   |  | 10                               | 15                             |
| BRASS PIPE   |  | 10                               | 10                             |
| CAST IRON PIPE (REFER TO NOTE a)   |  | 5 <sup>b</sup>                   | 15                             |
| COPPER OR COPPER-ALLOY PIPE  |  | 12                               | 10                             |
| COPPER OR COPPER-ALLOY PIPE, 1 1/4" DIAMETER AND SMALLER   |  | 6                                | 10                             |
| COPPER OR COPPER-ALLOY PIPE, 1 1/2" DIAMETER AND LARGER  |  | 2.67 (32 IN.)                    | 10                             |
| CROSSED LINKED POLYETHYLENE PIPE (PEX)   |  | 2.67 (32 IN.)                    | 10 <sup>b</sup>                |
| CROSSED LINKED POLYETHYLENE/ALUMINUM/CROSS-LINKED POLYETHYLENE PIPE (PEX-AL-PEX)   |  | 3                                | 4 <sup>b</sup>                 |
| CPVC PIPE OR TUBING, 1 1/4" OR SMALLER   |  | CONTINUOUS                       | 10 <sup>b</sup>                |
| CPVC PIPE OR TUBING, 1" OR LARGER  |  | 12                               | 10 <sup>b</sup>                |
| STEEL PIPE   |  | 2.67 (32 IN.)                    | 15                             |
| LEAD PIPE  |  | CONTINUOUS                       | 4                              |
| PB PIPE OR TUBING  |  | 2.67 (32 IN.)                    | 4                              |
| POLYETHYLENE/ALUMINUM/CROSS-LINKED POLYETHYLENE PIPE (PEX-AL-PEX)  |  | 2.67 (32 IN.)                    | 4 <sup>b</sup>                 |
| PVC PIPE   |  | 4                                | 10 <sup>b</sup>                |
| STAINLESS STEEL DRAINAGE SYSTEMS   |  | 10                               | 10 <sup>b</sup>                |
| <p>Schedule Notes - for S1: 1 Inch=25.4 mm, 1 Foot=304.8 mm.</p> <p>a. THE MAXIMUM HORIZONTAL SPACING OF CAST-IRON PIPE HANGERS SHALL BE INCREASE TO 10 FEET WHERE 10-FOOT LENGTHS OF PIPE ARE INSTALLED.</p> <p>b. MID-STORY GUIDE.</p> |  |                                  |                                |

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Charles G Tharp



PROJECT NUMBER

17-012

DATE \_\_\_\_\_

3/27/2018  
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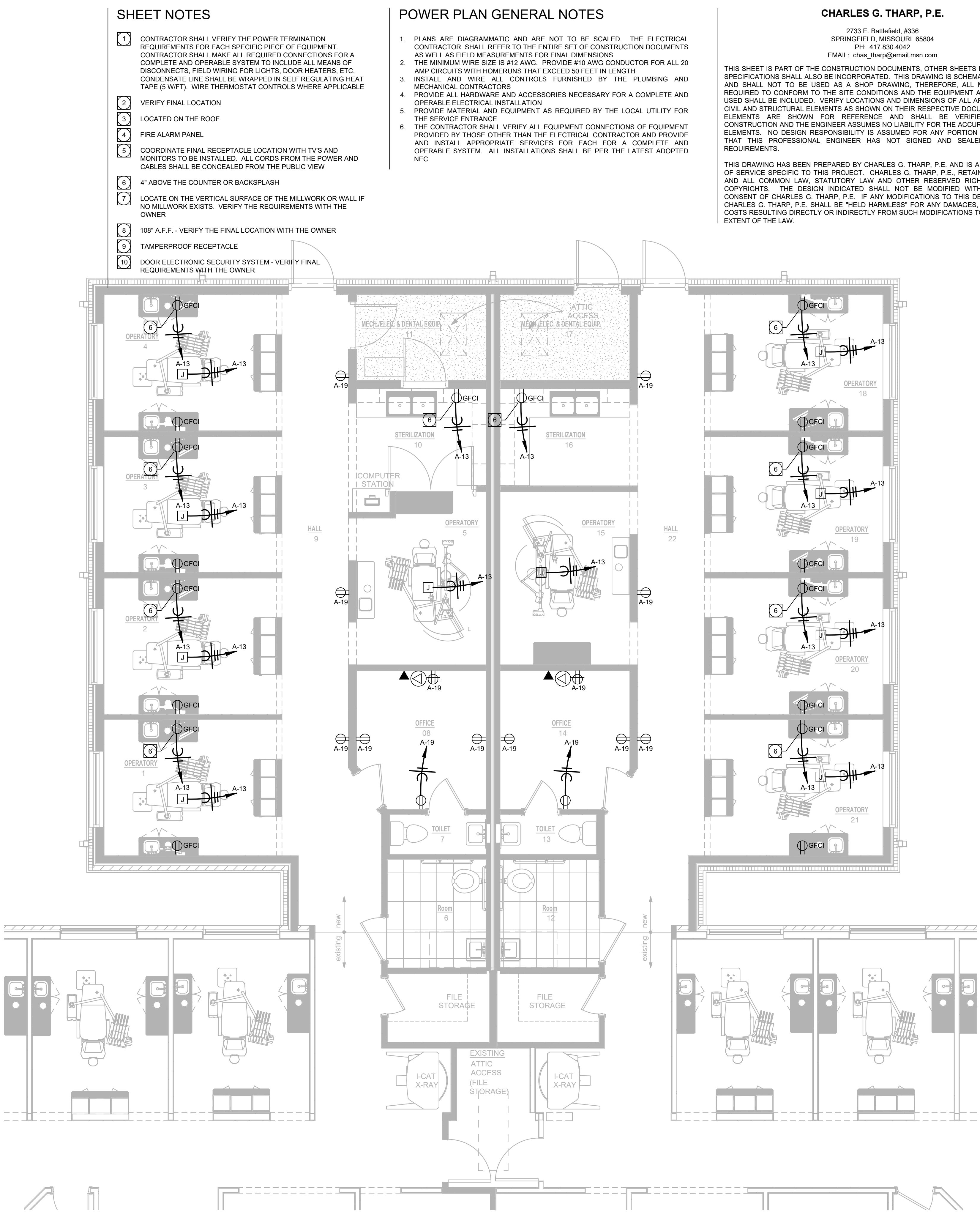
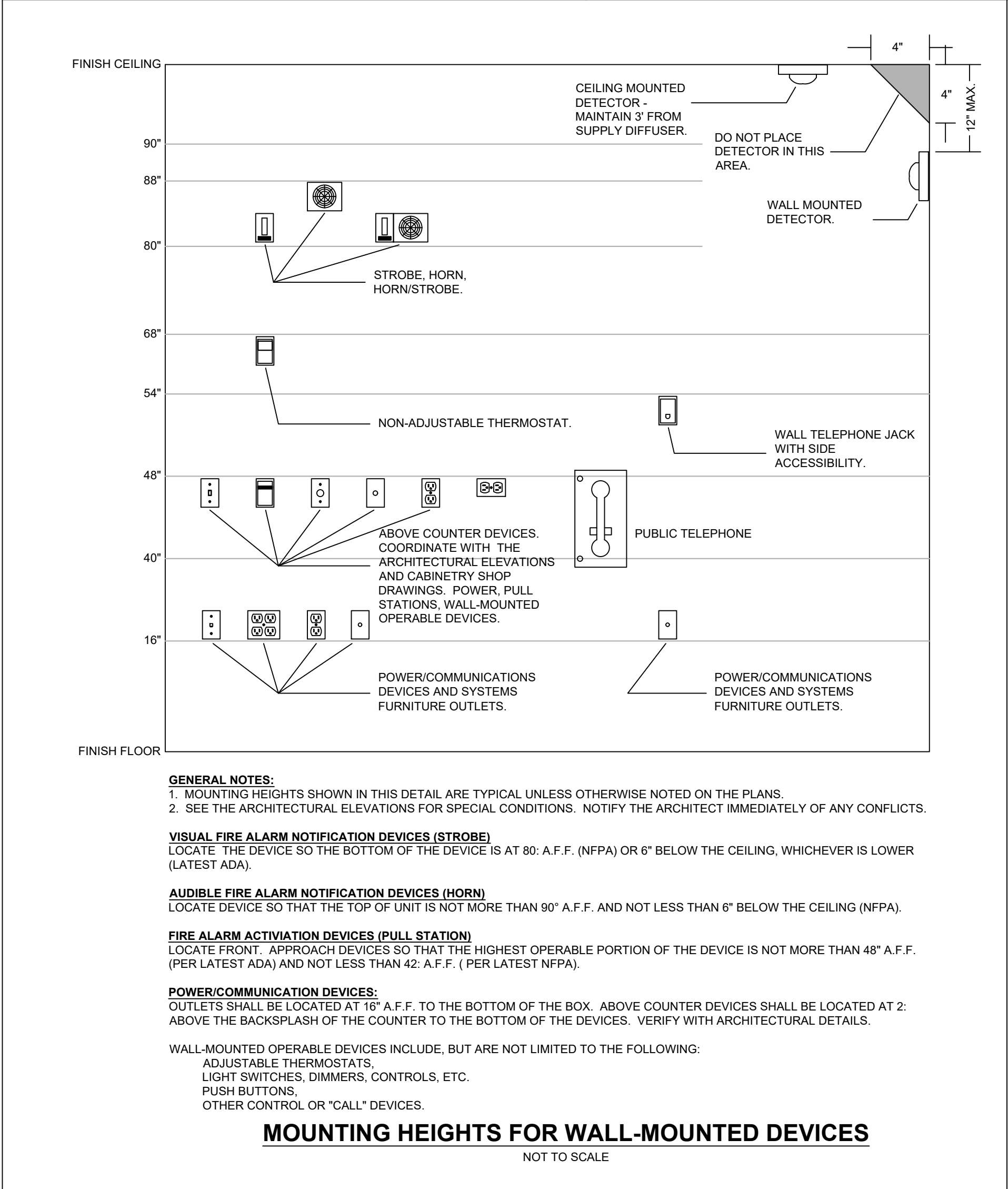
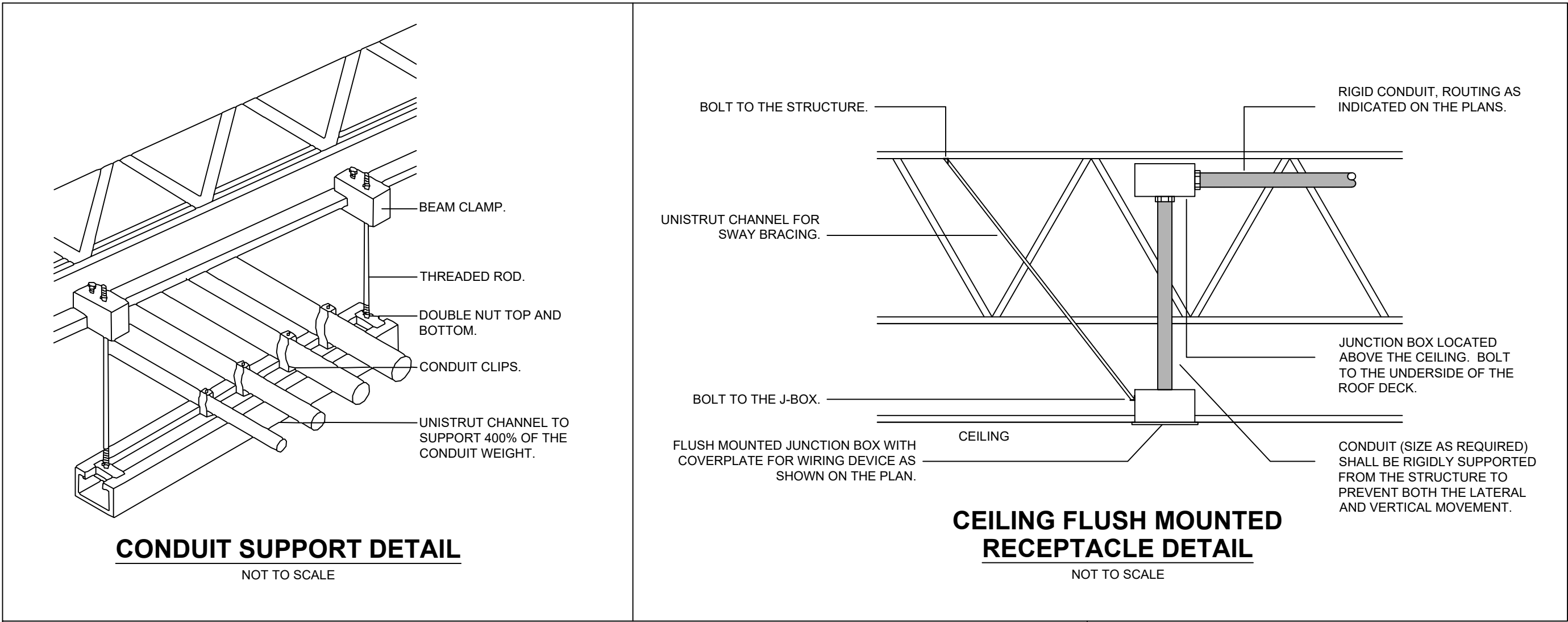
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## PLUMBING SCHEDULES

SHEET NUMBER

P3.0





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Charles G Tharp

Digitally signed by Charles G Tharp  
Date: 2019.08.31 09:05:19 -0500

REGISTERED PROFESSIONAL ENGINEER  
No. 12104  
Charles G. Tharp, P.E.

PROJECT NUMBER

17-012

DATE

3/27/2018  
2:32:28 PM

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POWER  
PLAN

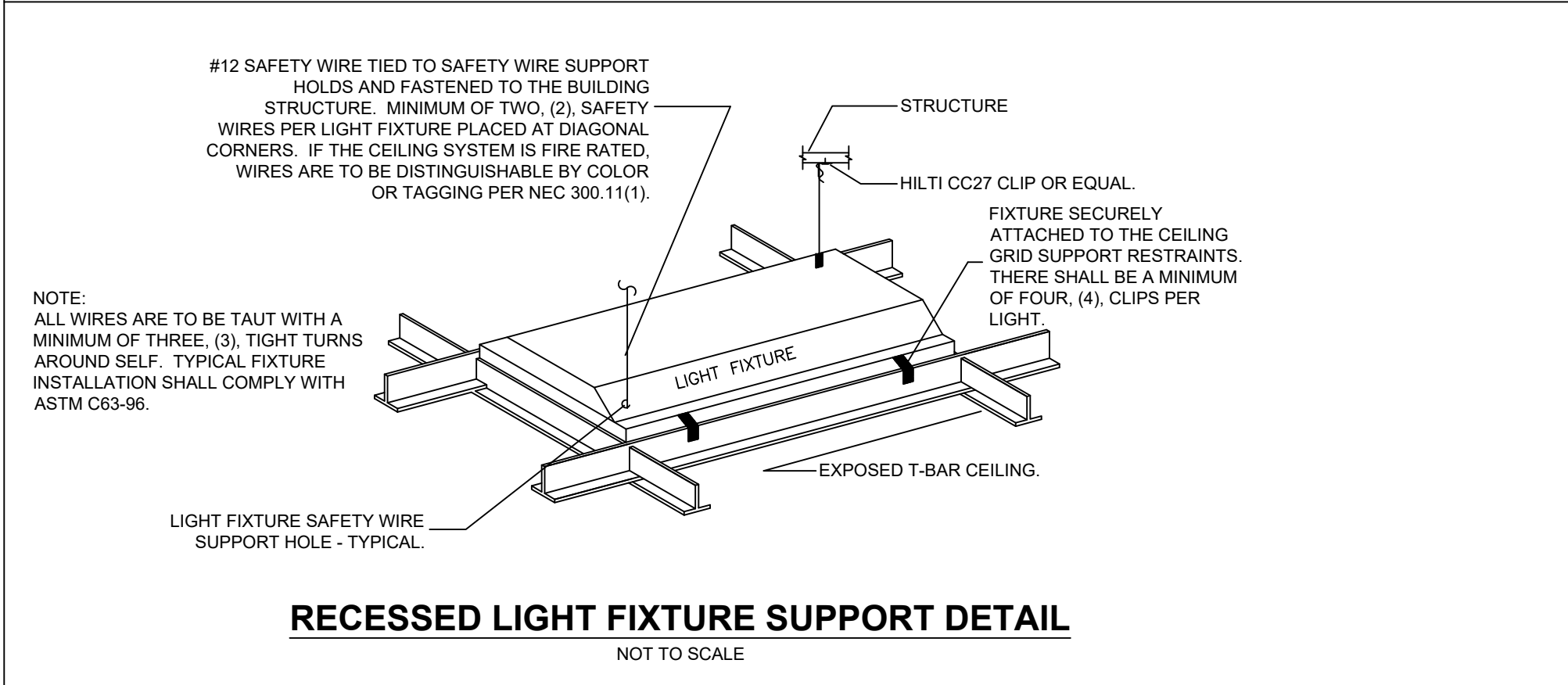
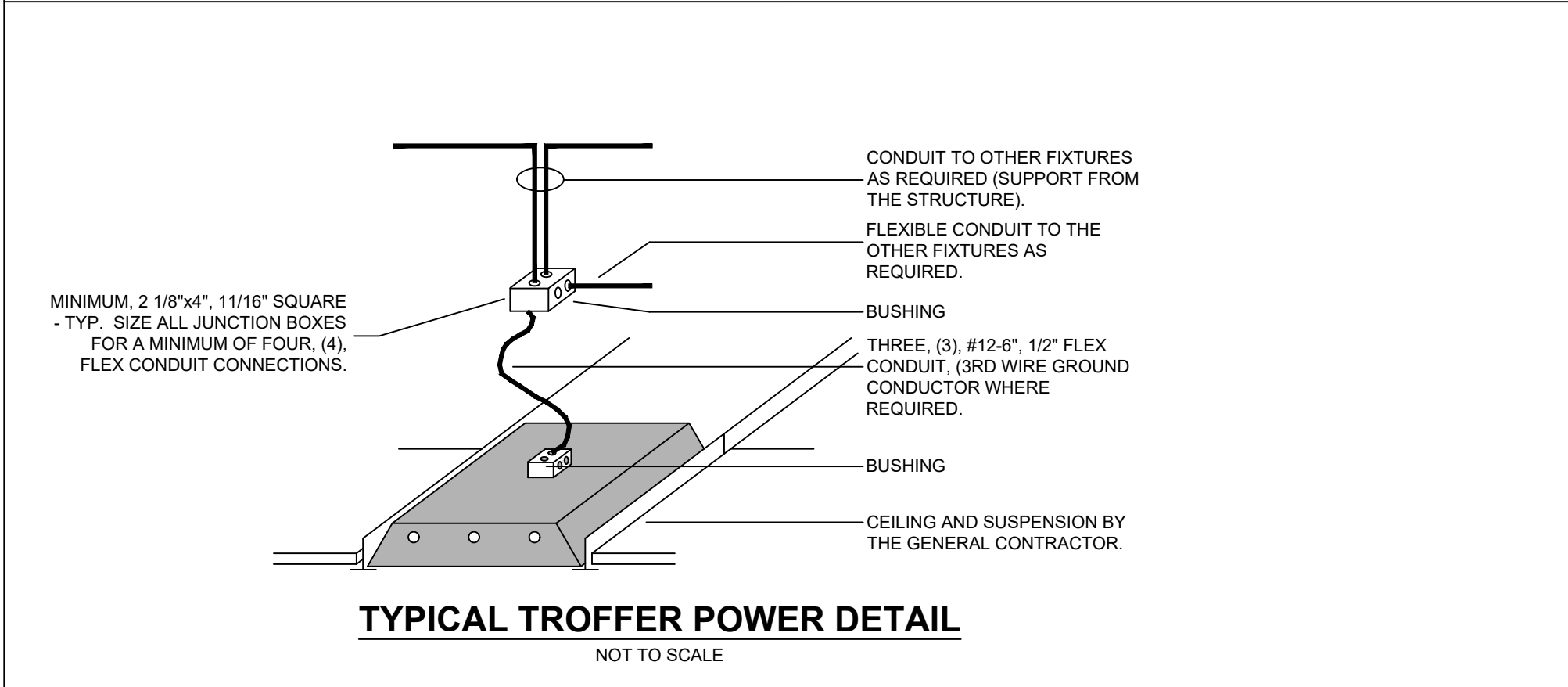
SHEET NUMBER

E1.0



| LIGHT FIXTURE SCHEDULE |             |  |          |         |      |        |      |       |              |             |        |              |           |        |              |                 |                |   |   |   |   |
|------------------------|-------------|--|----------|---------|------|--------|------|-------|--------------|-------------|--------|--------------|-----------|--------|--------------|-----------------|----------------|---|---|---|---|
| MARK                   | MANFR.      | MODEL NUMBER                                 | MOUNTING |         |      |        |      | LAMP  |              |             |        |              | LAMP CODE |        | POWER REQ'TS |                 | REMARKS        |   |   |   |   |
|                        |             |  | Recess   | Surface | Wall | Ground | Pole | Other | Incandescent | Fluorescent | H.I.D. | Metal Halide | LED       | Number |              | Fixture Wattage | Supply Voltage |   |   |   |   |
| A                      | LITHONIA    | 2BLT4 40L ADP EZ1 LP840                      | ●        |         |      |        |      |       |              |             |        |              | ●         | -      | 4000K        | 34              | 120            | 4 | 1 | 1 | 1 |
| B                      | LUMARK      | XTOR6B-W-BK-CBP                              |          | ●       |      |        |      |       |              |             |        |              | ●         | -      | 4000K        | 58              | 120            | 2 | 1 | 1 | 1 |
| C                      | LITHONIA    | ZL1F L24 SMR 3000 LM MDD MVOLT 40K 80CRI MB  |          |         |      |        |      | ●     |              |             |        |              | ●         | -      | 4000K        | 30              | 120            | 3 | 1 | 1 | 1 |
| D                      | LITHONIA    | ECBR LED M6                                  |          | ●       |      |        |      |       |              |             |        |              | ●         | -      | -            | -               | 120            | 1 | 1 | 1 | 1 |
| E                      | LITHONIA    | OLLWU LED P1 40K MVOLT DDB                   |          | ●       |      |        |      |       |              |             |        |              | ●         | -      | 4000K        | 14              | 120            | 1 | 1 | 1 | 1 |
| F                      | E-CONOLIGHT | E-TFP05A-24R40N                              | ●        |         |      |        |      |       |              |             |        |              | ●         | -      | 2200K        | 50.4            | 120            | 3 | 4 | 1 | 1 |
| G                      | LITHONIA    | ZL1F L96 SMR 12000 LM MDD MVOLT 40K 80CRI MB |          |         |      |        |      | ●     |              |             |        |              | ●         | -      | 4000K        | 114             | 120            | 1 | 1 | 1 | 1 |
| H                      | LITHONIA    | CMNS L46 1LL MVOLT 840                       |          |         | ●    |        |      |       |              |             |        |              | ●         | -      | 4000K        | 25              | 120            | 1 | 1 | 1 | 1 |
| I                      | HALO        | HU3DADV36 P                                  |          | ●       |      |        |      |       |              |             |        |              | ●         | -      | VARIABLE K   | 14.2            | 120            | 5 | 1 | 1 | 1 |
| J                      | LITHONIA    | ELM2 LED SD                                  |          | ●       |      |        |      |       |              |             |        |              | ●         | -      | -            | -               | 120            | 1 | 1 | 1 | 1 |
| K                      | LITHONIA    | CSXW 30C 700 40K T3M MVOLT DBLXD             |          | ●       |      |        |      |       |              |             |        |              | ●         | -      | 4000K        | 69              | 120            | 1 | 1 | 1 | 1 |

|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| ADDITIONAL SCHEDULE REQUIREMENTS DESCRIPTION - REFER TO THE REMARKS COLUMN.                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 INDOOR EMERGENCY FIXTURE  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 OUTDOOR EMERGENCY FIXTURE   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 PROVIDE FIXTURE WITH OCCUPANCY/DAYLIGHT SENSOR  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 PROVIDE FIXTURE TRIM REQUIRED FOR RECESSED FIXTURES IN GYP. CEILINGS                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 CONTRACT MAY CHOOSE TO DAISY CHAIN CERTAIN FIXTURES THAT ARE IN CLOSE PROXIMITY WITH EACH OTHER |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



SHEET NOTES

- 1 MOUNT ON WALL BELOW CABINET. CONTRACTOR SHALL FIELD VERIFY LOCATION
- 2 PLACE PROTECTIVE GUARD OVER APPLIANCE
- 3 POWER AND CONTROL WIRING TO EXHAUST FAN FROM GENERAL LIGHT CIRCUITS. EXHAUST FAN SHALL BE ENERGIZED WHEN THE LIGHT CIRCUIT IS ENERGIZED
- 4 COMBINATION SMOKE AND CARBON MONOXIDE DETECTOR

LIGHTING PLAN GENERAL NOTES

1. THE PLANS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED. THE ELECTRICAL CONTRACTOR SHALL REFER TO THE ENTIRE SET OF PLANS AS WELL AS FIELD MEASUREMENTS FOR FINAL DIMENSIONS
2. INSTALL AND WIRE ALL CONTROLS FURNISHED BY THE PLUMBING AND HVAC CONTRACTORS
3. PROVIDE ALL HARDWARE AND ACCESSORIES NECESSARY FOR A COMPLETE ELECTRICAL INSTALLATION
4. WIRING TO THE EMERGENCY LIGHTS AND EXIT LIGHT FIXTURES ARE NOT SHOWN FOR CLARITY

| LIGHTING LEGEND                                  |            |  |
|--|------------|--|
| REFER TO LEGEND SHEET FOR ADDITIONAL INFORMATION |            |  |
| DESCRIPTION                                      | RATED AMPS | SWITCHPLATE SPECIFICATIONS/ REQUIREMENTS |
| \$ LEVITON MODEL IPSD6-1LZ, WHITE                | 20         | PER ARCHITECT                            |
| \$3 LEVITON MODEL IPSD6-1LZ, 3-WAY, WHITE        | 20         | PER ARCHITECT                            |
| \$S LEVITON MODEL IPS06-1LW, WHITE               | 20         | PER ARCHITECT                            |

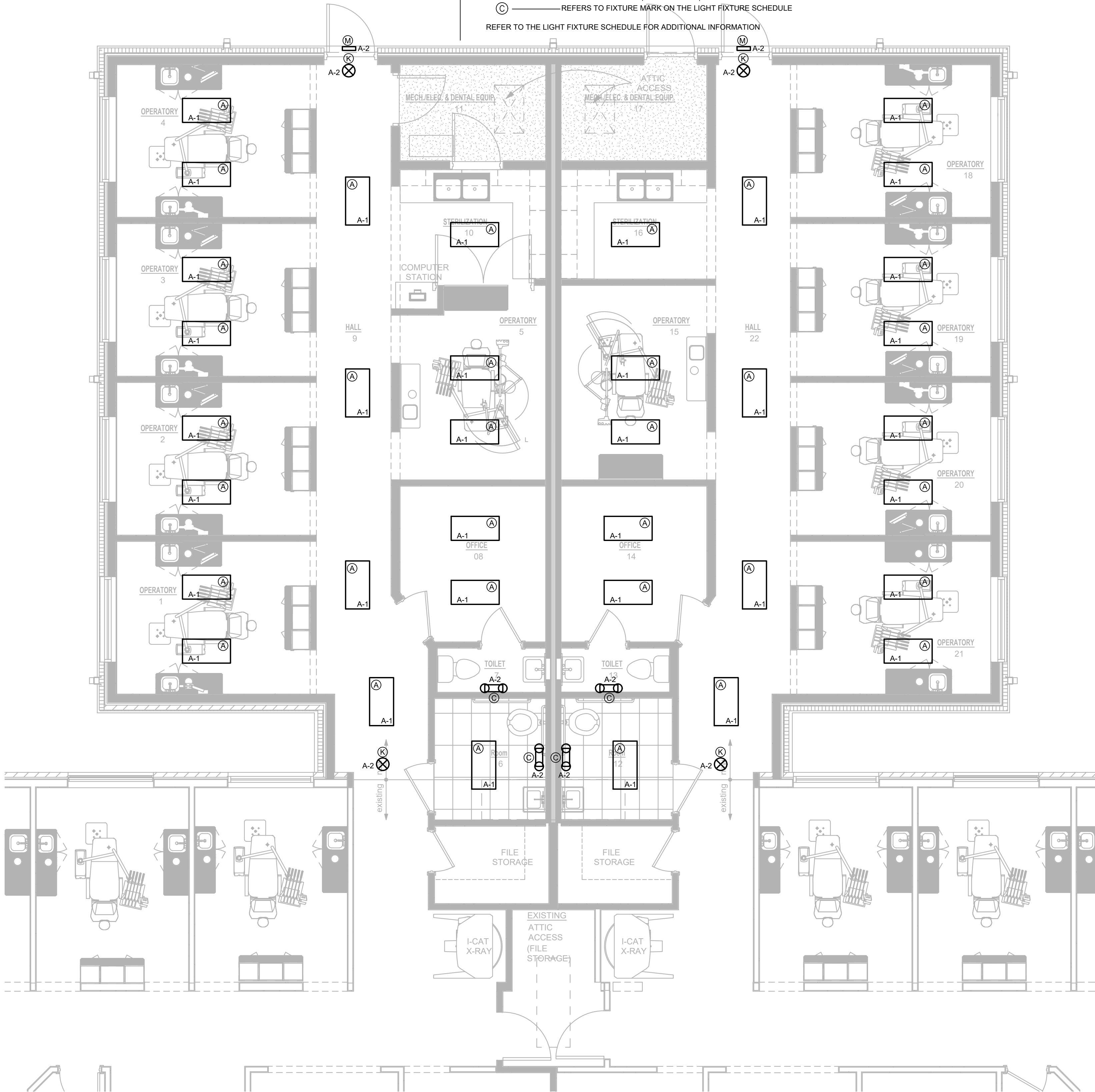
Ⓢ — REFERS TO FIXTURE MARK ON THE LIGHT FIXTURE SCHEDULE  
REFER TO THE LIGHT FIXTURE SCHEDULE FOR ADDITIONAL INFORMATION

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1 Dimension Floor Plan  
1/4" = 1'-0"

**Bartels Family Dentistry - Addition**  
JONESBORO, AR 72401  
811 WINDOVER ROAD

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DATE

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LIGHTING  
PLAN

SHEET NUMBER

E1.1

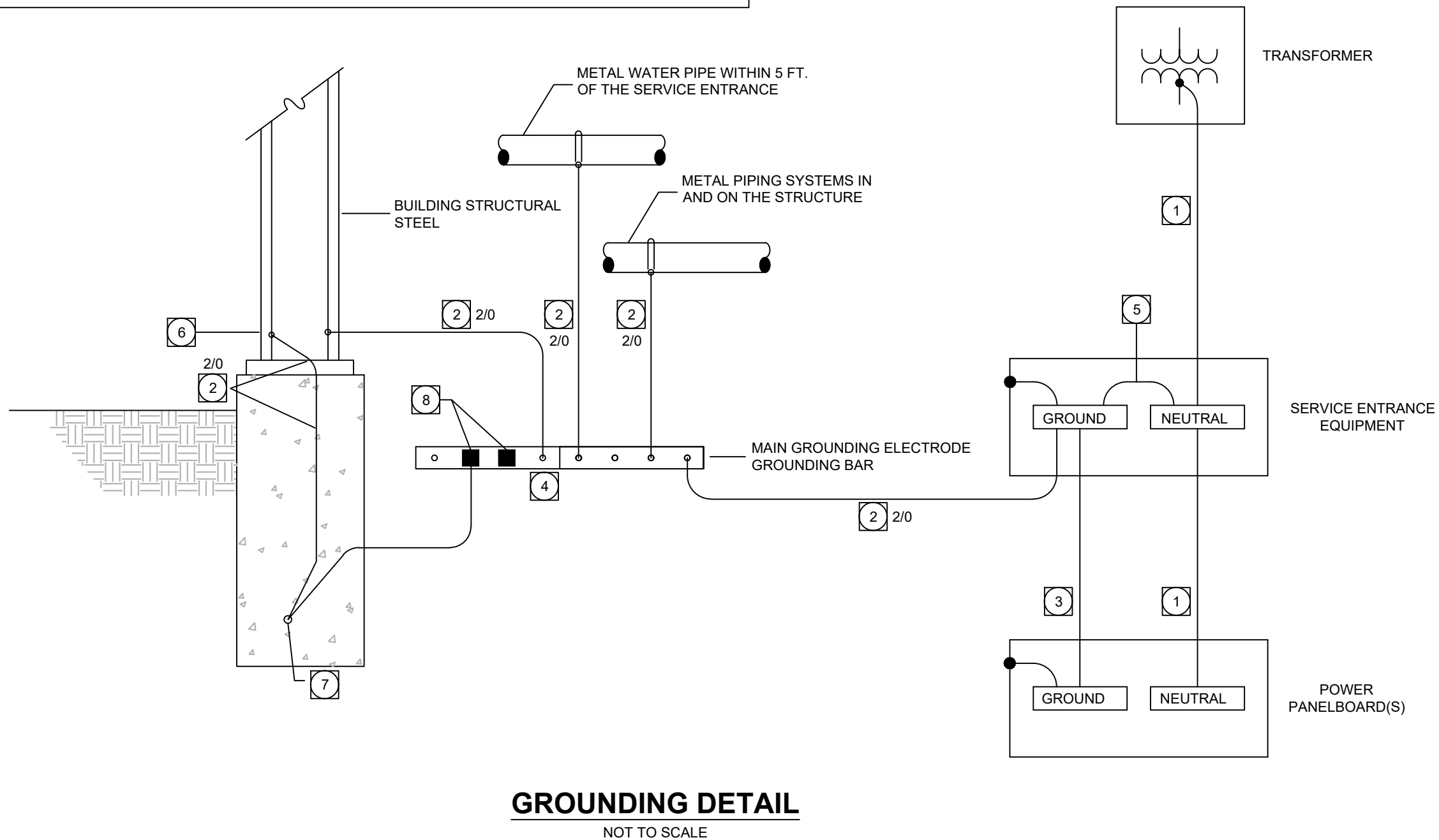


| LIGHT FIXTURE SCHEDULE  |              |   |          |         |      |        |      |       |              |             |           |              |     |         |     |
|---|--------------|---|----------|---------|------|--------|------|-------|--------------|-------------|-----------|--------------|-----|---------|-----|
| MARK  | MANFR.       | MODEL NUMBER                                    | MOUNTING |         |      |        | LAMP |       |              |             | LAMP CODE | POWER REQ'TS |     | REMARKS |     |
|   |              |   | Recess   | Surface | Wall | Ground | Pole | Other | Incandescent | Fluorescent | H.I.D.    | Metal Halide | LED | Number  |     |
| A   | LITHONIA     | 2BLT4 40L ADP EZ1 LP840                         | ●        |         |      |        |      |       |              |             |           | ●            | -   | 4000K   | 34  |
| B   | LUMARK       | XTOR6B-W-BK-CBP                                 |          | ●       |      |        |      |       |              |             |           | ●            | -   | 4000K   | 58  |
| C   | LITHONIA     | ZL1F L24 SMR 3000 LM MDD MVOLT 40K 80CRI MB     |          |         |      |        |      | ●     |              |             |           | ●            | -   | 4000K   | 30  |
| D   | LITHONIA     | ECBR LED M6                                     |          | ●       |      |        |      |       |              |             |           | ●            | -   | -       | 120 |
| E   | LITHONIA     | OLLWU LED P1 40K MVOLT DDB                      |          | ●       |      |        |      |       |              |             |           | ●            | -   | 4000K   | 14  |
| F   | ALVA PENDANT | 700 SYSTEM TD M BLACK CORD, BLACK FINISH, LEDWD |          |         |      |        |      | ●     |              |             |           | ●            | -   | 2200K   | 20  |
| G   | LITHONIA     | ZL1F L36 SMR 12000 LM MDD MVOLT 40K 80CRI MB    |          |         |      |        |      | ●     |              |             |           | ●            | -   | 4000K   | 114 |
| H   | LITHONIA     | CMNS L46 1LL MVOLT 840                          |          |         |      |        |      | ●     |              |             |           | ●            | -   | 4000K   | 25  |
| I   | WARELIGHT    | HBLED 275W 6000K WG                             |          |         |      |        |      | ●     |              |             |           | ●            | -   | 5000K   | 275 |
| J   | LITHONIA     | ELM2 LED SD                                     |          | ●       |      |        |      |       |              |             |           | ●            | -   | -       | 120 |
| K   | LITHONIA     | CSXW 30C 700 40K T3M MVOLT DBLXD                |          | ●       |      |        |      |       |              |             |           | ●            | -   | 4000K   | 69  |
| ADDITIONAL SCHEDULE REQUIREMENTS DESCRIPTION - REFER TO THE REMARKS COLUMN. |              |   |          |         |      |        |      |       |              |             |           |              |     |         |     |
| 1. INDOOR EMERGENCY FIXTURE   |              |   |          |         |      |        |      |       |              |             |           |              |     |         |     |
| 2. OUTDOOR EMERGENCY FIXTURE  |              |   |          |         |      |        |      |       |              |             |           |              |     |         |     |
| 3. PROVIDE FIXTURE NEAREST DOOR WITH LSXR OCCUPANCY SENSOR                  |              |   |          |         |      |        |      |       |              |             |           |              |     |         |     |
| 4. PROVIDE FIXTURE TRIM REQUIRED FOR RECESSED FIXTURES IN GYP. CEILINGS     |              |   |          |         |      |        |      |       |              |             |           |              |     |         |     |

| CONDUCTOR AND CONDUIT SIZE SCHEDULE                                     |           |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              |     |     |        |             |        |        |        |  |
|---|-----------|------------------------------|-----|---|---|---|---|---|---|-----|-----|-----|-----|-----|-----|--------------|-----|-----|--------|-------------|--------|--------|--------|--|
| Mark  | Amps      | Copper Conductor Size — THWN |     |   |   |   |   |   |   |     |     |     |     |     |     | Conduit Size |     |     | Ground | No. of Sets |        |        |        |  |
|   |           | #12                          | #10 | 8 | 6 | 4 | 3 | 2 | 1 | 1/0 | 2/0 | 3/0 | 4/0 | 250 | 300 | 350          | 400 | 500 |        |             | 3—Wire | 4—Wire | 5—Wire |  |
| ①   | 0 — 16    | ●                            |     |   |   |   |   |   |   |     |     |     |     |     |     |              |     |     | 3/4"   | 3/4"        | 3/4"   | #12    | 1      |  |
| ②   | 17 — 30   |                              | ●   |   |   |   |   |   |   |     |     |     |     |     |     |              |     |     | 3/4"   | 3/4"        | 3/4"   | #10    | 1      |  |
| ③   | 31 — 43   |                              |     | ● |   |   |   |   |   |     |     |     |     |     |     |              |     |     | 3/4"   | 3/4"        | 3/4"   | #10    | 1      |  |
| ④   | 44 — 58   |                              |     |   | ● |   |   |   |   |     |     |     |     |     |     |              |     |     | 3/4"   | 3/4"        | 1"     | #10    | 1      |  |
| ⑤   | 59 — 79   |                              |     |   |   | ● |   |   |   |     |     |     |     |     |     |              |     |     | 1"     | 1"          | 1 1/4" | #8     | 1      |  |
| ⑥   | 80 — 90   |                              |     |   |   |   | ● |   |   |     |     |     |     |     |     |              |     |     | 1"     | 1 1/4"      | 1 1/4" | #8     | 1      |  |
| ⑦   | 91 — 105  |                              |     |   |   |   |   | ● |   |     |     |     |     |     |     |              |     |     | 1"     | 1 1/4"      | 1 1/4" | #8     | 1      |  |
| ⑧   | 106 — 121 |                              |     |   |   |   |   |   | ● |     |     |     |     |     |     |              |     |     | 1 1/4" | 1 1/4"      | 1 1/2" | #6     | 1      |  |
| ⑨   | 122 — 145 |                              |     |   |   |   |   |   |   | ●   |     |     |     |     |     |              |     |     | 1 1/4" | 1 1/2"      | 2"     | #6     | 1      |  |
| ⑩   | 146 — 166 |                              |     |   |   |   |   |   |   |     | ●   |     |     |     |     |              |     |     | 1 1/2" | 2"          | 2"     | #4     | 1      |  |
| ⑪   | 167 — 189 |                              |     |   |   |   |   |   |   |     |     | ●   |     |     |     |              |     |     | 1 1/2" | 2"          | 2"     | #4     | 1      |  |
| ⑫   | 190 — 223 |                              |     |   |   |   |   |   |   |     |     |     | ●   |     |     |              |     |     | 2"     | 2 1/2"      | 2 1/2" | #2     | 1      |  |
| ⑬   | 224 — 245 |                              |     |   |   |   |   |   |   |     |     |     |     | ●   |     |              |     |     | 2"     | 2 1/2"      | 2 1/2" | #2     | 1      |  |
| ⑭   | 246 — 281 |                              |     |   |   |   |   |   |   |     |     |     |     |     | ●   |              |     |     | 2"     | 2 1/2"      | 2 1/2" | #2     | 1      |  |
| ⑮   | 282 — 305 |                              |     |   |   |   |   |   |   |     |     |     |     |     |     | ●            |     |     | 2 1/2" | 3"          | 3"     | #2     | 1      |  |
| ⑯   | 306 — 328 |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 1      |  |
| ⑰   | 329 — 378 |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 1      |  |
| ⑱   | 600 A     |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 2      |  |
| ⑲   | 800 A     |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 2      |  |
| ⑳   | 1000 A    |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 2      |  |
| \u2117  | 1200 A    |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 3      |  |
| \u2118  | 1400 A    |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 4      |  |
| \u2119  | 1600 A    |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 4      |  |
| \u211a  | 2000 A    |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              | ●   |     | 2 1/2" | 3"          | 3"     | 1/0    | 5      |  |
| Schedule Notes:   |           |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              |     |     |        |             |        |        |        |  |
| 1. The contractor shall comply with the latest NEC Codes and Appendices |           |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              |     |     |        |             |        |        |        |  |
| 2. A ground shall not be included as a part of the service entrance     |           |                              |     |   |   |   |   |   |   |     |     |     |     |     |     |              |     |     |        |             |        |        |        |  |

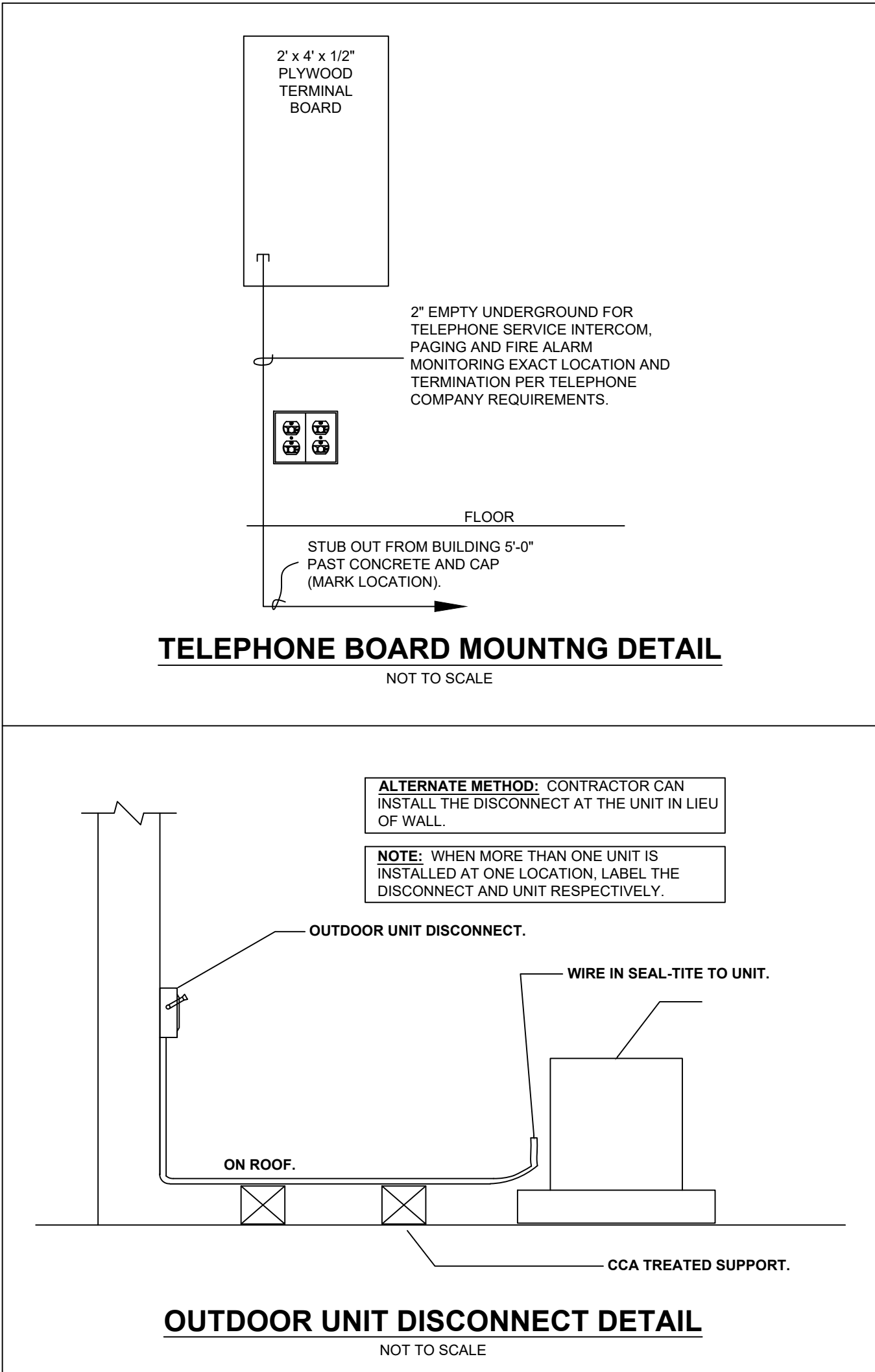
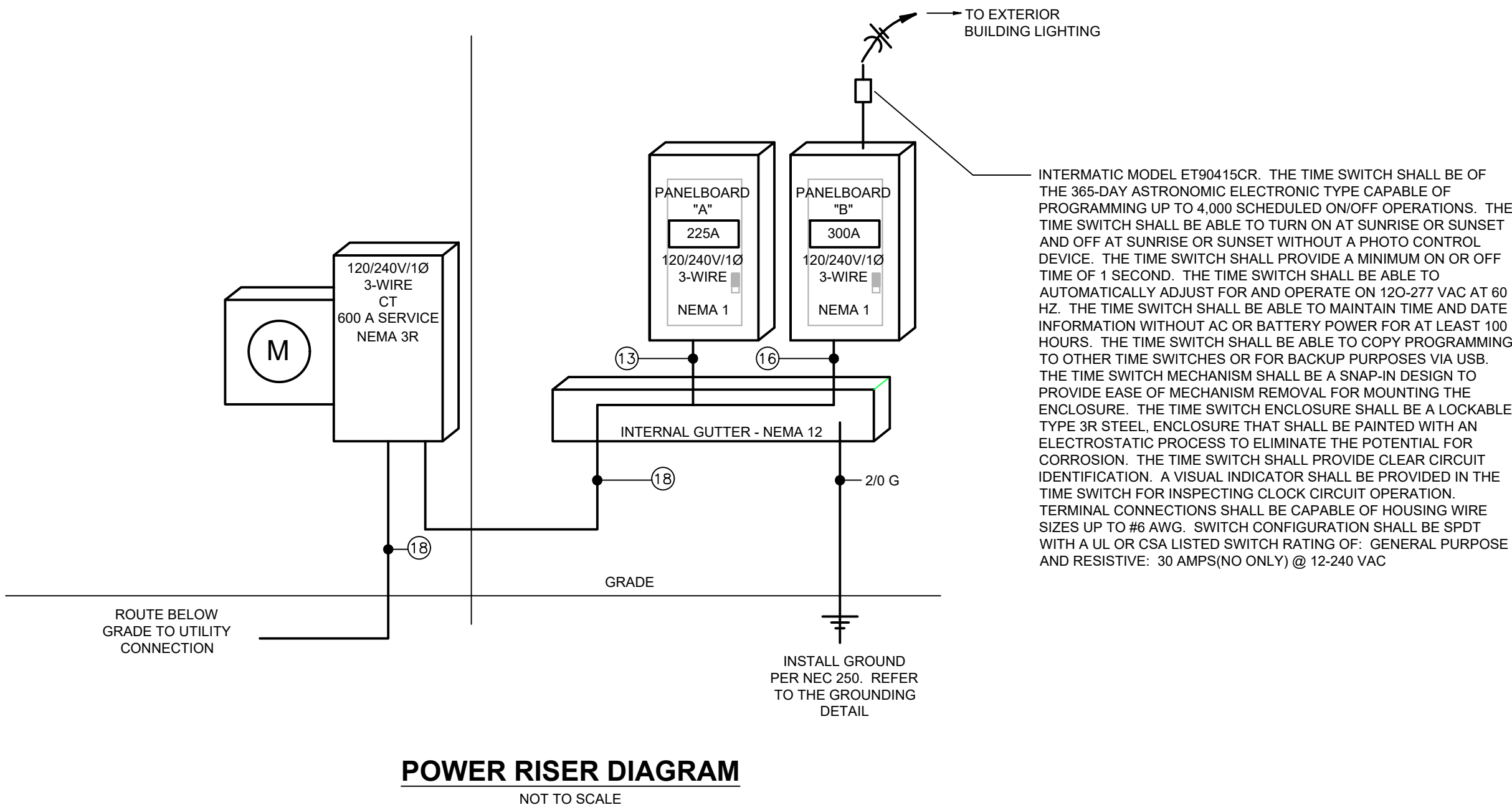
GENERAL NOTES

- CONDUCTOR SIZES SHOWN ARE MINIMUM AND MAY BE LARGER THAT THE MINIMUM SIZES REQUIRED BY THE NEC.
- INSTALL GROUNDING CONNECTIONS TO THE BUILDING STRUCTURE AND WATER PIPES AT LOCATIONS THAT ARE VISIBLE AND ACCESSIBLE FOR INSPECTION, MAINTENANCE AND TESTING.
- INSTALL AN INSULATED, THROAT GROUNDING BUSHING ON EACH METALLIC SERVICE ENTRANCE CONDUIT. BOND TO THE GROUND BUS USING CONDUCTORS THAT ARE SIZED BASED ON NEC TABLE 250-66 USING THE SERVICE PHASE CONDUCTOR SIZE.
- INSTALL AN INSULATED THROAT GRONDING BUSHING ON EACH METALLIC FEED CONDUIT. BOND TO THE GROUND BUS USING CONDUCTORS THAT ARE SIZED BASED ON NEC TABLE 250-122 USING THE FEEDER CIRCUIT OVERCURRENT DEVICE SIZE.
- BOND HOT AND COLD WATER PIPING SYSTEMS.



DETAIL NOTES

- INSTALL GROUNDED (NEUTRAL) CONDUCTOR THE SAME SIZE AS THE LARGEST PHASE CONDUCTOR IF THE LINE-TO-NEUTRAL LOAD EXCEEDS 5% OF THE CONNECTED LOAD. IF THE NEUTRAL LOAD IS SMALLER, INSTALL THE NEC MINIMUM GROUNDED CONDUCTOR.
- INSTALL GROUNDING ELECTRODE CONDUCTOR, SIZED BASED ON THE NEC TABLE 250-66 USING THE SERVICE PHASE CONDUCTOR SIZE, BUT NOT SMALLER THAN NO. 4.
- INSTALL EQUIPMENT GROUNDING CONDUCTOR SIZED BASED ON NEC TABLE 250-122 USING THE FEEDER OVERCURRENT DEVICE SIZE.
- INSTALL A "MAIN GROUND ELECTRODE GROUND BAR" FOR SINGLE POINT GROUNDING. LOCATED AT AN ACCESSIBLE POINT NEAR THE SERVICE ENTRANCE EQUIPMENT. MAKE CONNECTIONS TO THE GROUND ELECTRODE CONDUCTOR USING IRREVERSIBLE CONNECTORS OR EXOTHERMIC WELDS. MAKE OTHER CONNECTIONS TO THE GROUND BAR USING TWO-HOLE COMPRESSION SPADE LUGS THAT MEET IEEE 637 REQUIREMENTS. LABEL EACH CONNECTION TO THE GROUND BAR.
- INSTALL A BONDING JUMPER WIRE THAT IS SIZED BASED ON NEC TABLE 250-66 USING THE SERVICE OR SEPARATELY DERIVED SYSTEM PHASE CONDUCTOR SIZE.
- BOND TO A STRUCTURAL STEEL COLUMN TO THE CONCRETE ENCASED MAIN GROUNDING ELECTRODE. USE COMPRESSION CONNECTORS THAT MEET IEEE 637 REQUIREMENTS OR USE EXOTHERMIC WELDS.
- INSTALL GROUNDING ELECTRODE CONDUCTOR THAT IS SIZED BASED ON NEC TABLE 250-66 USING THE SEPARATELY DERIVED SYSTEM PHASE CONDUCTOR SIZE.
- INSTALL IRREVERSIBLE COMPRESSION CONNECTOR WITH TAMPERPROOF HARDWARE OR INSTALL EXOTHERMIC WELD.



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Charles G Tharp  
REGISTERED PROFESSIONAL ENGINEER  
No. 12104  
EXPIRATION DATE 12/31/2018

PROJECT NUMBER

17-012

DATE

3/27/2018  
2:32:28 PM

CONTENTS

ELECTRICAL  
DETAILS

SHEET NUMBER

E2.0



PANELBOARD SCHEDULE

Panelboard Accessories

Panel Designation: A

Manufacturer: Square D

Catalog No: NQOD

Voltage: 120/208V/3Ø

System: 3-Phase, 4-Wire

KAIC Amps (RMS): 22

Mounting: Surface

Enclosure: NEMA 1 - Indoor

Fed From: NEMA 1 - Indoor Gutter

Poles: 42

Main Breaker / MLO: 225 MCB

Panelboard Accessories

☐

Transient Voltage Surge Suppression

☐

Service Entrance Rating

☐

Tin Plated Aluminum Bus Bars

☐

Prepared Circuit Breaker Space

☐

Split Bus

☐

200% Rated Neutral Bus Bar

☐

Tin Plated Copper Bus Bar

☐

Neutral Bonding Kit

☐

Ground Bar Insulator Kit

☐

Equipment Ground Bar Kit

☐

Feed-Thru Lugs

☐

Compression Lugs

Breaker Accessories Designations:

AC: Auxiliary Contracts

EO: Electrical Operator

GFI: Ground-Fault Interrupting

HR: HACR Rating

HLOFF: Handle Lock-Off

HLON: Handle Lock-On

SR: Switch Rating

AFCI: Air-Fault Circuit Interrupters

ST: Shunt Trip

☐

Sub-Feed Circuit Breaker

☐

Sub-Feed Lugs

PANELBOARD SCHEDULE

Panelboard Accessories

Panel Designation: A

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☐

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☐

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☐

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☐

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AC: Auxiliary Contracts

EO: Electrical Operator

GFI: Ground-Fault Interrupting

HR: HACR Rating

HLOFF: Handle Lock-Off

HLON: Handle Lock-On

SR: Switch Rating

AFCI: Air-Fault Circuit Interrupters

ST: Shunt Trip

☐

Sub-Feed Circuit Breaker

☐

Sub-Feed Lugs

| Phase Loads (VA)           |       |       |       |
|----------------------------|-------|-------|-------|
| 1                          | A     | B     | 2     |
| 3                          | 2400  | 2400  | 4     |
| 5                          | 1400  |       | 6     |
| 7                          |       | 5700  | 8     |
| 9                          | 6060  |       | 10    |
| 11                         |       | 3780  | 12    |
| 13                         | 4080  |       | 14    |
| 15                         |       | 2000  | 16    |
| 17                         | 2250  |       | 18    |
| 19                         |       | 1772  | 20    |
| 21                         | 1750  |       | 22    |
| 23                         |       | 1710  | 24    |
| 25                         | 2940  |       | 26    |
| 27                         |       | 1860  | 28    |
| 29                         | 1500  |       | 30    |
| 31                         |       |       | 32    |
| 33                         |       |       | 34    |
| 35                         |       |       | 36    |
| 37                         |       |       | 38    |
| 39                         |       |       | 40    |
| 41                         |       |       | 42    |
| Connected Phase Loads (VA) |       |       |       |
| Phase A:                   | 22380 |       |       |
| Phase B:                   |       | 19222 |       |
| Phase C:                   |       |       | 19222 |
| Total                      | 41602 |       |       |

| Diversified Load Calculations                |                |                 |                |
|--|----------------|-----------------|----------------|
| Load Description                             | Connected (VA) | Demand Factor   | Code Min. (VA) |
| Lights                                       | 6902           | 1.25            | 8627.5         |
| Receptacles                                  | 8640           | Note 1          | 8640           |
| Motors                                       | 4880           | Note 2          | 1220           |
| Air Conditioning                             | —              | 1.0             | 0              |
| Space Heating                                | 15360          | 1.0             | 15360          |
| Continuous                                   | —              | 1.25            | 0              |
| Non-Continuous                               | 3500           | 1.0             | 3500           |
| Kitchen Equipment                            | —              | 1.0 ( 1 Unit)   | 0              |
| Kitchen Equipment                            | —              | 1.0 ( 2 Unit)   | 0              |
| Kitchen Equipment                            | —              | 0.8 ( 3 Unit)   | 0              |
| Kitchen Equipment                            | —              | 0.8 ( 4 Unit)   | 0              |
| Kitchen Equipment                            | 7200           | 0.7 ( 5 Unit)   | 5040           |
| Kitchen Equipment                            | —              | 0.65 ( +6 Unit) | 0              |
| Load (VA):                                   |                |                 | 42387.5        |
| Future Factor                                | —              | 1.0             | 0              |
| Sizing Load (VA):                            |                |                 | 42387.5        |
| Sizing Load (Amps):                          |                |                 | 190            |
| Note 1. 1.0 x First 10 kVA + 0.5 x Remaining |                |                 |                |
| Note 2. 1.25 x Largest + Sum of Remaining    |                |                 |                |

| Phase Loads (VA)           |       |       |       |
|----------------------------|-------|-------|-------|
| 1                          | A     | B     | 2     |
| 3                          | 2400  | 2400  | 4     |
| 5                          | 1400  |       | 6     |
| 7                          |       | 5700  | 8     |
| 9                          | 6060  |       | 10    |
| 11                         |       | 3780  | 12    |
| 13                         | 4080  |       | 14    |
| 15                         |       | 2000  | 16    |
| 17                         | 2250  |       | 18    |
| 19                         |       | 1772  | 20    |
| 21                         | 1750  |       | 22    |
| 23                         |       | 1710  | 24    |
| 25                         | 2940  |       | 26    |
| 27                         |       | 1860  | 28    |
| 29                         | 1500  |       | 30    |
| 31                         |       |       | 32    |
| 33                         |       |       | 34    |
| 35                         |       |       | 36    |
| 37                         |       |       | 38    |
| 39                         |       |       | 40    |
| 41                         |       |       | 42    |
| Connected Phase Loads (VA) |       |       |       |
| Phase A:                   | 22380 |       |       |
| Phase B:                   |       | 19222 |       |
| Phase C:                   |       |       | 19222 |
| Total                      | 41602 |       |       |

| Diversified Load Calculations                |                |                 |                |
|--|----------------|-----------------|----------------|
| Load Description                             | Connected (VA) | Demand Factor   | Code Min. (VA) |
| Lights                                       | 6902           | 1.25            | 8627.5         |
| Receptacles                                  | 8640           | Note 1          | 8640           |
| Motors                                       | 4880           | Note 2          | 1220           |
| Air Conditioning                             | —              | 1.0             | 0              |
| Space Heating                                | 15360          | 1.0             | 15360          |
| Continuous                                   | —              | 1.25            | 0              |
| Non-Continuous                               | 3500           | 1.0             | 3500           |
| Kitchen Equipment                            | —              | 1.0 ( 1 Unit)   | 0              |
| Kitchen Equipment                            | —              | 1.0 ( 2 Unit)   | 0              |
| Kitchen Equipment                            | —              | 0.8 ( 3 Unit)   | 0              |
| Kitchen Equipment                            | —              | 0.8 ( 4 Unit)   | 0              |
| Kitchen Equipment                            | 7200           | 0.7 ( 5 Unit)   | 5040           |
| Kitchen Equipment                            | —              | 0.65 ( +6 Unit) | 0              |
| Load (VA):                                   |                |                 | 42387.5        |
| Future Factor                                | —              | 1.0             | 0              |
| Sizing Load (VA):                            |                |                 | 42387.5        |
| Sizing Load (Amps):                          |                |                 | 190            |
| Note 1. 1.0 x First 10 kVA + 0.5 x Remaining |                |                 |                |
| Note 2. 1.25 x Largest + Sum of Remaining    |                |                 |                |

| Panelboard Schedule |                  |      |   |      |                  |    |  |  |             |
|---------------------|------------------|------|---|------|------------------|----|--|--|-------------|
| Circuit No.         | Load Description |      |   |      | Load Description |    |  |  | Circuit No. |
| 1                   | 20               | 900  | A | 1000 | 20               | 2  |  |  |             |
| 3                   | 20               | 1620 | B | 2880 | 2P               | 4  |  |  |             |
| 5                   | 20               | 1620 | C | 2880 | 20               | 6  |  |  |             |
| 7                   | 20               | 1260 | A | 2880 | 50               | 8  |  |  |             |
| 9                   | 20               | 1260 | B | 900  | 20               | 10 |  |  |             |
| 11                  | 20               | 1800 | C | 900  | 20               | 12 |  |  |             |
| 13                  | 20               | 1260 | A | 900  | 20               | 14 |  |  |             |
| 15                  | 20               | 1440 | B | 1080 | 20               | 16 |  |  |             |
| 17                  | 20               | 1440 | C | 720  | 20               | 18 |  |  |             |
| 19                  | 20               | 1080 | A | 720  | 20               | 20 |  |  |             |
| 21                  | 20               | 1080 | B | 720  | 20               | 22 |  |  |             |
| 23                  | 20               | 1080 | C | 1500 | 20               | 24 |  |  |             |
| 25                  | 20               | 1080 | A | 1500 | 20               | 26 |  |  |             |
| 27                  | 20               | 900  | B | 1500 | 20               | 28 |  |  |             |
| 29                  | 20               | 900  | C | 1500 | 20               | 30 |  |  |             |
| 31                  | 20               | 900  | A | —    | 20               | 32 |  |  |             |
| 33                  | 20               | 1250 | B | —    | 20               | 34 |  |  |             |
| 35                  | 20               | 1500 | C | —    | 20               | 36 |  |  |             |
| 37                  | 20               | 540  | A | —    | 20               | 38 |  |  |             |
| 39                  | 20               | 1500 | B | —    | 20               | 40 |  |  |             |
| 41                  | 20               | 1500 | C | —    | 20               | 42 |  |  |             |

| Panelboard Schedule |                              |  |             |
|---------------------|------------------------------|--|-------------|
| Circuit No.         | Load Description             |  | Circuit No. |
| 1                   | LIGHTS                       |  | 2           |
| 3                   | RECEPTACLES                  |  | 4           |
| 5                   | RECEPTACLES                  |  | 6           |
| 7                   | RECEPTACLES                  |  | 8           |
| 9                   | RECEPTACLES                  |  | 10          |
| 11                  | RECEPTACLES                  |  | 12          |
| 13                  | RECEPTACLES                  |  | 14          |
| 15                  | RECEPTACLES                  |  | 16          |
| 17                  | RECEPTACLES                  |  | 18          |
| 19                  | RECEPTACLES                  |  | 20          |
| 21                  | RECEPTACLES                  |  | 22          |
| 23                  | RECEPTACLES                  |  | 24          |
| 25                  | RECEPTACLES                  |  | 26          |
| 27                  | RECEPTACLES                  |  | 28          |
| 29                  | RECEPTACLES                  |  | 30          |
| 31                  | RECEPTACLES                  |  | 32          |
| 33                  | COPIER                       |  | 34          |
| 35                  | RECEPTACLES                  |  | 36          |
| 37                  | RECEPTACLES                  |  | 38          |
| 39                  | COFFEE AREA COUNTER — RECEPT |  | 40          |
| 41                  | GARBAGE DISPOSAL UNIT        |  | 42          |

| Panelboard Schedule |                  |      |   |      |                  |    |  |  |             |
|---------------------|------------------|------|---|------|------------------|----|--|--|-------------|
| Circuit No.         | Load Description |      |   |      | Load Description |    |  |  | Circuit No. |
| 1                   | 20               | 900  | A | 1000 | 20               | 2  |  |  |             |
| 3                   | 20               | 1620 | B | 2880 | 2P               | 4  |  |  |             |
| 5                   | 20               | 1620 | C | 2880 | 20               | 6  |  |  |             |
| 7                   | 20               | 1260 | A | 2880 | 50               | 8  |  |  |             |
| 9                   | 20               | 1260 | B | 900  | 20               | 10 |  |  |             |
| 11                  | 20               | 1800 | C | 900  | 20               | 12 |  |  |             |
| 13                  | 20               | 1260 | A | 900  | 20               | 14 |  |  |             |
| 15                  | 20               | 1440 | B | 1080 | 20               | 16 |  |  |             |
| 17                  | 20               | 1440 | C | 720  | 20               | 18 |  |  |             |
| 19                  | 20               | 1080 | A | 720  | 20               | 20 |  |  |             |
| 21                  | 20               | 1080 | B | 720  | 20               | 22 |  |  |             |
| 23                  | 20               | 1080 | C | 1500 | 20               | 24 |  |  |             |
| 25                  | 20               | 1080 | A | 1500 | 20               | 26 |  |  |             |
| 27                  | 20               | 900  | B | 1500 | 20               | 28 |  |  |             |
| 29                  | 20               | 900  | C | 1500 | 20               | 30 |  |  |             |
| 31                  | 20               | 900  | A | —    | 20               | 32 |  |  |             |
| 33                  | 20               | 1250 | B | —    | 20               | 34 |  |  |             |
| 35                  | 20               | 1500 | C | —    | 20               | 36 |  |  |             |
| 37                  | 20               | 540  | A | —    | 20               | 38 |  |  |             |
| 39                  | 20               | 1500 | B | —    | 20               | 40 |  |  |             |
| 41                  | 20               | 1500 | C | —    | 20               | 42 |  |  |             |

| Panelboard Schedule |                              |  |             |
|---------------------|------------------------------|--|-------------|
| Circuit No.         | Load Description             |  | Circuit No. |
| 1                   | LIGHTS                       |  | 2           |
| 3                   | RECEPTACLES                  |  | 4           |
| 5                   | RECEPTACLES                  |  | 6           |
| 7                   | RECEPTACLES                  |  | 8           |
| 9                   | RECEPTACLES                  |  | 10          |
| 11                  | RECEPTACLES                  |  | 12          |
| 13                  | RECEPTACLES                  |  | 14          |
| 15                  | RECEPTACLES                  |  | 16          |
| 17                  | RECEPTACLES                  |  | 18          |
| 19                  | RECEPTACLES                  |  | 20          |
| 21                  | RECEPTACLES                  |  | 22          |
| 23                  | RECEPTACLES                  |  | 24          |
| 25                  | RECEPTACLES                  |  | 26          |
| 27                  | RECEPTACLES                  |  | 28          |
| 29                  | RECEPTACLES                  |  | 30          |
| 31                  | RECEPTACLES                  |  | 32          |
| 33                  | COPIER                       |  | 34          |
| 35                  | RECEPTACLES                  |  | 36          |
| 37                  | RECEPTACLES                  |  | 38          |
| 39                  | COFFEE AREA COUNTER — RECEPT |  | 40          |
| 41                  | GARBAGE DISPOSAL UNIT        |  | 42          |



|             |                            |
|-------------|----------------------------|
| PIPE LABELS |                            |
|             | DOMESTIC COLD WATER        |
|             | DOMESTIC HOT WATER (110°F) |
|             | DOMESTIC HOT WATER RETURN  |
|             | SOIL PIPE                  |
|             | VENT PIPE                  |
|             | CONDENSATE DRAIN           |
|             | NATURAL GAS                |

ABBREVIATIONS

|     |                      |
|-----|----------------------|
| AD  | ACCESS DOOR          |
| VTR | VENT THROUGH ROOF    |
| W   | WASTE                |
| V   | VENT                 |
| CW  | DOMESTIC COLD WATER  |
| HW  | DOMESTIC HOT WATER   |
| FD  | FLOOR DRAIN          |
| DN  | DOWN                 |
| AFF | ABOVE FINISHED FLOOR |
| FCU | FAN COIL UNIT        |
| AHU | AIR HANDLING UNIT    |
| UV  | UNIT VENTILATOR      |
| CU  | CONDENSING UNIT      |
| CUH | CABINET UNIT HEATER  |
| UH  | UNIT HEATER          |
| EF  | EXHAUST FAN          |
| BBH | BASEBOARD HEATER     |
| VAV | VARIABLE AIR VOLUME  |

CONTROL SYSTEMS

|  |                                 |
|--|---------------------------------|
|  | TEMPERATURE SENSOR (THERMOSTAT) |
|  | PRESSURE GAUGE                  |
|  | THERMOMETER                     |
|  | TEST PLUG (PETE'S PLUG)         |

VALVES & FITTINGS

|                                     |                              |
|-------------------------------------|------------------------------|
|                                     | GATE VALVE                   |
|                                     | GLOBE VALVE                  |
|                                     | BALL VALVE                   |
|                                     | BUTTERFLY VALVE              |
|                                     | ANGLE GATE VALVE             |
|                                     | ANGLE GLOBE VALVE            |
| TYPES OF ACTUATORS FOR ABOVE VALVES |                              |
|                                     | NONRISING STEM               |
|                                     | OUTSIDE STEM & YOKE          |
|                                     | LEVER                        |
|                                     | GEAR                         |
|                                     | ELECTRIC MOTOR               |
|                                     | SOLENOID                     |
|                                     | PNEUMATIC                    |
|                                     | DIAPHRAGM                    |
|                                     | STANDARD AUTOMATIC           |
|                                     | PRESSURE RELIEF VALVE        |
|                                     | SWING CHECK VALVE            |
|                                     | Y TYPE STRAINER              |
|                                     | SCREWED UNION                |
|                                     | FLANGED UNION                |
|                                     | PRESSURE REDUCING VALVE      |
|                                     | HEAT TRACE                   |
|                                     | VACUUM BREAKER               |
|                                     | BACKFLOW PREVENTER           |
|                                     | PIPE UP                      |
|                                     | PIPE DOWN                    |
|                                     | TEE UP                       |
|                                     | TEE DOWN                     |
|                                     | PIPE UP - TEE INTERSECTION   |
|                                     | PIPE DOWN - TEE INTERSECTION |
|                                     | TEE                          |
|                                     | ELBOW                        |
|                                     | PIPE CAP                     |
|                                     | TAKE-OFF VERTICAL PIPE       |

ELECTRICAL

|  |   |
|--|---|
|  | CONDUIT ABOVE GRADE   |
|  | CONDUIT BELOW GRADE   |
|  | CIRCUIT NUMBER(S)<br>ARROWS INDICATE NUMBER OF CIRCUIT HOMERUNS<br>DESIGNATES PANELBOARD<br>GROUND<br>NEUTRAL<br>HOT OR SWITCH LEG  |
|  | 20 AMP DUPLEX, 125V, 2P, 3W, GROUNDING TYPE, WHITE PLUG.  |
|  | SPECIAL RECEPTACLE, SEE PLAN NOTES.   |
|  | 20 AMP FOURPLEX, 125V, 2P, 3W, GROUNDING TYPE, WHITE PLUG.  |
|  | 20 AMP DUPLEX RECEPTACLE, TOP RECEPTACLE CONTROLLED BY SWITCH   |
|  | 20 AMP DUPLEX, GROUND FAULT INTERRUPTOR   |
|  | EQUIPMENT SPECIFIC RECEPTACLE - REFER TO MANUFACTURER FOR ADDITIONAL INFORMATION AND EXACT REQUIREMENTS.  |
|  | TELEVISION 120V/20A DUPLEX OUTLET AND CABLE CONNECTION PORT. VERIFY FINAL LOCATION PER THE ARCHITECTURAL DRAWINGS. OUTLETS AND PORTS SHALL BE LOCATED TO MINIMIZE VISUAL IMPACT OF CORDS. |
|  | DISCONNECT SWITCH   |
|  | COMBINATION MAGNETIC MOTOR CONTROLLER   |
|  | MAGNETIC MOTOR CONTROLLER   |
|  | LIGHTING CONTACTOR  |
|  | WALL TELEPHONE OUTLET   |
|  | FLOOR MOUNTED TELEPHONE OUTLET  |
|  | INTERCOM OUTLET   |
|  | COMPUTER TERMINAL OUTLET  |
|  | JUNCTION BOX  |
|  | MOTOR   |
|  | PLUGMOLD  |
|  | 20 AMP SINGLE POLE 120V/277V SWITCH   |
|  | 20 AMP THREE-WAY 120V/277V SWITCH   |
|  | 20 AMP FOUR-WAY 120V/277V SWITCH  |
|  | 120V DIMMER SWITCH  |
|  | GROUND FAULT INTERRUPT SWITCH   |
|  | 120V SWITCH WITH INTEGRAL OCCUPANCY SENSOR  |
|  | WATERPROOF SWITCH   |
|  | PILOT LIGHTED SWITCH  |
|  | PILOT LIGHTED 3-WAY SWITCH  |
|  | PILOT LIGHTED TIMER SWITCH  |
|  | JUNCTION BOX  |
|  | SURFACE MOUNT DOWNLIGHT   |
|  | RECESSED DOWNLIGHT  |
|  | WALL MOUNTED FIXTURE  |
|  | CEILING MOUNT EXIT LIGHT  |
|  | WALL MOUNT EXIT LIGHT   |
|  | FLOURESCENT LIGHT FIXTURE   |
|  | EMERGENCY FLOURESCENT FIXTURE   |
|  | TRACK LIGHTING  |
|  | LIGHTING PANELBOARD   |
|  | DISTRIBUTION FEEDER OR POWER PANELBOARD   |

HVAC DUCTWORK

|  |  |
|--|--|
|  | BRANCH DUCT W/ EXTRACTOR & MANUAL VOLUME DAMPER                                      |
|  | BRANCH DUCT W/ SPIN-IN W/ SCOOP AND VOLUME DAMPER                                    |
|  | ELBOW W/ TURNING VANES   |
|  | EQUIPMENT W/ FLEXIBLE DUCT CONNECTION  |
|  | SUPPLY AIR DIFFUSER  |
|  | RETURN AIR DIFFUSER  |
|  | DIFFUSER TAG - GIVES NECK SIZE, MARK, & CFM  |
|  | LINEAR SLOT DIFFUSER W/ FLEX DUCT  |
|  | ROUND DIFFUSER   |
|  | SIDEWALL SUPPLY/RETURN GRILLE OR REGISTER  |
|  | SUPPLY AIR DUCT UP   |
|  | SUPPLY AIR DUCT DOWN   |
|  | RETURN, EXHAUST, OR FRESH AIR DUCT UP  |
|  | RETURN, EXHAUST, OR FRESH AIR DUCT DOWN  |
|  | RECTANGULAR TO ROUND TRANSITION  |
|  | INSULATED FLEXIBLE DUCT  |
|  | DOOR UNDERCUT  |
|  | DOOR LOUVER  |
|  | VOLUME DAMPER<br>FIRE DAMPER<br>SMOKE DAMPER<br>MOTORIZED DAMPER<br>BACKDRAFT DAMPER |
|  | DUCT SIZE, FIRST DIMENSION IS THE DIMENSION WHICH YOU CAN SEE                        |

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PROJECT NUMBER

17-012

DATE

3/27/2018  
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CONTENTS

SYMBOLS  
AND  
ABBREVIATIONS

SHEET NUMBER

MEP1.0



GENERAL MECHANICAL REQUIREMENTS

- PART 1 - GENERAL**
- 1.01 WORK INCLUDED
- A. PROVIDE MECHANICAL AND PLUMBING SYSTEMS INCLUDING, BUT NOT LIMITED TO:
1. PLUMBING EQUIPMENT, PIPING AND DRAINAGE SYSTEMS INCLUDING DISTRIBUTION WATER SYSTEMS, PLUMBING EQUIPMENT, WASTEWATER PUMPS AND ACCESSORIES.
  2. INSTALLATION OF PIPING SYSTEMS AND EQUIPMENT.
  3. SYSTEM COMMISSIONING, TESTING, ADJUSTING, BALANCING, AND DOCUMENTATION.
  4. PROBER LABELING FOR ALL SYSTEMS, PIPING, AND OTHER COMPONENTS.
  5. PAINTING RELATED TO THIS SECTION OF WORK, INCLUDING REPAIR OF DAMAGED FINISHES AND TOUCH-UP OF INSTALLED EQUIPMENT FINISHES.
  6. SITE CLEAN-UP AND LEGAL DISPOSAL OF ALL CONSTRUCTION DEBRIS. ALL EXCESS EQUIPMENT, MATERIALS, OR OTHER ITEMS SHALL BE REMOVED FROM THE SITE.
  7. COORDINATION WITH THE OWNER AND THE OTHER TRADES WORKING IN THE AREA.
- 1.02 RELATED SECTIONS AND DOCUMENTS
- B. PROJECT SPECIFICATIONS, DOCUMENTS, CONTRACTS, WRITTEN INSTRUCTIONS, BIDDING ADDENDUMS, WRITTEN PRE-BID INSTRUCTIONS AND AGREEMENTS, AND ANY OTHER ITEMS AS DOCUMENTED IN OTHER PORTIONS OF THIS DOCUMENT.
- C. PROJECT DRAWINGS THAT RELATE TO THIS WORK AND THE FURNISHING, METHODS, INSTALLATION, PROCEDURES, LIMITATIONS, RESTRICTIONS, AND INSTRUCTIONS AS SPECIFIED IN THE SPECIFICATION DOCUMENTS AS A WHOLE.
- D. ALL OTHER SPECIFICATIONS, WHETHER ITEMIZED ABOVE OR NOT. DRAWINGS AND WORK AS REPRESENTED ON THE DRAWINGS, INCLUDING THE MANUFACTURER'S INSTRUCTIONS AND DETAILS REQUIRED FOR THE CORRECT INSTALLATION OF THE EQUIPMENT AS SPECIFIED AND COMMON TO THE TRADES, LABOR, MATERIALS, AND METHODS FOR THE COMPLETION OF THE SPECIFIED WORK.
- 1.03 REFERENCES (LATEST ISSUE SHALL APPLY UNLESS OTHERWISE NOTED)
- A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARDS REFERENCED HEREIN:
1. B1.20.1 - PIPE THREADS, GENERAL PURPOSE.
  2. B16.3 - MALLEABLE IRON THREADED FITTINGS.
  3. B16.5 - PIPE FLANGES AND FLANGED FITTINGS.
  4. B16.11 - FORGED STEEL FITTINGS, SOCKET WELDING AND THREADED.
  5. B16.21 - NONMETALLIC FLAT GASKETS FOR PIPE FLANGES.
  6. B16.39 - MALLEABLE IRON THREADED PIPE UNIONS.
  7. B18.2.1 - SQUARE AND HEX BOLTS AND SCREWS, INCLUDING HEX CAP SCREWS AND LAG SCREWS.
  8. B18.2.2 - SQUARE AND HEX NUTS.
  9. B36.10 - WELDED AND SEAMLESS WROUGHT STEEL PIPE.
- B. AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM) STANDARDS REFERENCED HEREIN:
1. A53 - TYPE B PIPE, STEEL, BLACK AND HOT-DIPPED, ZINC-COATED WELDED AND SEAMLESS.
  2. A105 - FORGINGS, CARBON STEEL, FOR PIPING COMPONENTS.
  3. A194 - CARBON AND ALLOY STEEL NUTS FOR BOLTS FOR HIGH-PRESSURE AND HIGH TEMPERATURE SERVICE.
  4. A234 - PIPING FITTINGS OF WROUGHT CARBON STEEL AND ALLOY STEEL FOR MODERATE AND ELEVATED TEMPERATURES.
  5. A283 - LOW AND INTERMEDIATE STRENGTH CARBON STEEL PLATES, SHAPES AND BARS.
  6. A307 - CARBON STEEL EXTERNALLY THREADED STANDARD FASTENERS.
  7. A563 - CARBON AND ALLOY STEEL NUTS.
  8. A663 - STEEL BARS, CARBON, MERCHANT QUALITY, MECHANICAL PROPERTIES.
  9. C564 - RUBBER GASKETS FOR CAST IRON SOIL PIPE AND FITTINGS.
  10. D1784 - RIGID PVC AND CPVC COMPOUNDS.
  11. D1785 - PVC PLASTIC PIPE, SCHEDULE 40, 80 AND 120.
  12. D2466 - PVC PLASTIC PIPE FITTINGS, SCHEDULE 40.
  13. D2564 - SOLVENT CEMENTS FOR PVC PLASTIC PIPE AND FITTINGS.
  14. D2665 - PVC PLASTIC DRAIN, WASTE AND VENT PIPE AND FITTINGS.
  15. D4101 - POLYPROPYLENE PLASTIC INJECTION AND EXTRUSION MATERIALS.
- C. MANUFACTURER'S STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS) STANDARDS REFERENCED HEREIN:
1. SP-58 - PIPE HANGERS AND SUPPORTS: MATERIALS, DESIGN AND MANUFACTURE.
  2. SP-49 - PIPE HANGERS AND SUPPORTS: SELECTION AND APPLICATION.
  3. SP-83 - CARBON STEEL PIPE UNIONS, SOCKET WELDING AND THREADED.
  4. SP-89 - PIPE HANGERS AND SUPPORTS: FABRICATION AND INSTALLATION PRACTICES.
- D. MISCELLANEOUS STANDARDS REFERENCED HEREIN:
1. ASSE 1011 - HOSE CONNECTION VACUUM BREAKERS.
  2. P1453 - FABRICATING TOLERANCES.
- E. BUILDING OFFICIALS AND CODE ADMINISTRATORS (BOCA) STANDARDS REFERENCED HEREIN:
1. NMC - NATIONAL MECHANICAL CODE.
  2. NPC - NATIONAL PLUMBING CODE.
- F. INTERNATIONAL BUILDING CODES REFERENCED HEREIN:
1. IMC - INTERNATIONAL MECHANICAL CODE.
  2. IPC - INTERNATIONAL PLUMBING CODE.
- 1.04 SUBMITTALS FOR REVIEW
- A. PRIOR TO ORDERING EQUIPMENT OR STARTING ANY INSTALLATION WORK, SUBMIT SEVEN (7) COPIES OF ITEMS PROPOSED FOR THIS WORK WITH NECESSARY ILLUSTRATIONS, DRAWINGS, AND ENGINEERING DATA FOR REVIEW BY THE OWNER AND/OR ENGINEER. SUBMIT IN TIME TO ALLOW NO LESS THAN SEVEN (7) WORKING DAYS FOR REVIEW, CHECKING, COMMENTING AND TRANSMITTAL WITHOUT DELAYING THE CONSTRUCTION SCHEDULE. SUBMIT ALL ITEMS AT ONE TIME NO LESS THAN TWENTY (20) DAYS AFTER AWARD OF THE CONTRACT.
- B. SUBMITTALS SHALL BE CLEARLY MARKED TO SHOW THE INTENDED ITEM, WITH IDENTIFICATION AS TO THE EQUIPMENT NUMBER OR OTHER MARKING TO SHOW LOCATION, SERVICE, AND FUNCTION. ALL OTHER EXTRANEOUS AND INAPPLICABLE INFORMATION SHALL BE MARKED OUT BEFORE SUBMITTAL. SUBMITTALS NOT CLEARLY MARKED TO PROPERLY IDENTIFY THE EQUIPMENT AND APPLICATION WILL BE REJECTED AND RETURNED FOR IMMEDIATE RE-SUBMITTAL BY THE CONTRACTOR.
- C. THE CONTRACTOR AGREES THAT SUBMITTALS REVIEWED AND APPROVED BY THE OWNER AND/OR ENGINEER ARE NOT CHANGE ORDERS; THE PURPOSE OF SUBMITTALS BY THE CONTRACTOR IS TO DEMONSTRATE TO THE OWNER AND/OR ENGINEER THAT THE CONTRACTOR UNDERSTANDS THE PROJECT DESIGN, AND THAT THIS UNDERSTANDING IS DEMONSTRATED BY INDICATING THE EQUIPMENT AND MATERIALS HE OR SHE INTENDS TO FURNISH AND INSTALL AND/OR BY THE FABRICATION AND INSTALLATION METHODS HE OR SHE INTENDS TO USE.
- D. THE CONTRACTOR FURTHER AGREES THAT IF DEVIATIONS, DISCREPANCIES, OR CONFLICTS BETWEEN SUBMITTALS AND CONTRACT DOCUMENTS ARE DISCOVERED, EITHER PRIOR TO OR AFTER, SUBMITTALS ARE TO BE PROCESSED BY THE OWNER AND THE CONTRACT DOCUMENTS SHALL CONTROL AND SHALL BE FOLLOWED. SUBMITTALS ARE REQUIRED OF ALL EQUIPMENT AND MATERIALS FURNISHED ON THE PROJECT AND SHALL INCLUDE AND BE CLEARLY MARKED AS FOLLOWS:
1. THE NAME OF THE PROJECT.
  2. SUBMITTAL DATE.
  3. NAMES OF CONTRACTORS, SUBCONTRACTORS, SUPPLIERS, AND MANUFACTURERS OF MATERIALS AND SUPPLIES.
  4. ALL PERFORMANCE DATA OR INFORMATION, INCLUDING DIMENSIONAL INFORMATION, WEIGHTS, PERFORMANCE, AND OTHER INFORMATION PERTAINING TO SPECIFIC EQUIPMENT.
  5. IF APPLICABLE, VOLTAGE, PHASE, OPERATING AND NAMEPLATE AMPERAGE OF EACH ELECTRICAL ITEM SUCH AS MOTORS, HEATERS, OR OTHER ITEMS. FOR MOTORS, PROVIDE THE MANUFACTURERS NAMEPLATE INFORMATION FOR REVIEW AND APPROVAL.
  6. IF APPLICABLE, ALL AUXILIARY EQUIPMENT, INCLUDING VARIOUS DETAILS TO ASSURE THE INTENT OF THE WORK WILL BE MET.
  7. INCLUDE MANUFACTURER'S INFORMATION, INCLUDING MANUFACTURER'S INSTRUCTIONS, DRAWINGS, CUT SHEETS, DATA SHEETS, AND OTHER DESCRIPTIVE INFORMATION.
  8. FULL DESCRIPTION OF CAPABILITIES AND CAPACITIES OF EQUIPMENT, INCLUDING BUT NOT LIMITED TO THE MANUFACTURER'S DRAWINGS, CUT SHEETS, DATA SHEETS, AND OTHER DESCRIPTIVE INFORMATION.
  9. MSDS INFORMATION FOR ALL POTENTIALLY HAZARDOUS CHEMICALS AND MATERIALS. ALSO, POST A COPY OF THE MSDS AT THE JOBSITE AS REQUIRED INDICATING THE REQUIRED PROPER HANDLING TECHNIQUES AND SAFETY PROCEDURES FOR THE MATERIALS.
  10. DOCUMENTATION PROVING COMPLIANCE WITH THE COMING YEAR 2000 CALENDAR DATE INPUT EVENT.
- E. USE WELDERS, FITTERS, LABORERS, TECHNICIANS, ETC. QUALIFIED FOR THE WORK TO BE DONE. WRITTEN CERTIFICATION AND DOCUMENTATION IS REQUIRED.
- 1.05 SITE CONDITIONS
- A. THE CONTRACTOR MUST INSPECT THE WORK AREAS, DRAWINGS AND SPECIFICATIONS AND BECOME THOROUGHLY ACQUAINTED WITH THE CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE INSTALLATION OF THE WORK. NO EXTRA COMPENSATION OR INVOICING WILL BE ALLOWED TO COVER THE WORK WHICH HAS NOT BEEN INCLUDED IN THE BID DUE TO FAILURE OF THE CONTRACTOR TO THOROUGHLY EXAMINE THE PREMISES.
- B. THE CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR PROPER NOTIFICATION OF ARKANSAS ONE CALL SYSTEM, DIG RITE, AT LEAST TWO (2) WORKING DAYS PRIOR TO THE NEED TO DO ANY EXPLORATORY OR OTHER PROJECT EXCAVATION WORK AS IT PERTAINS TO THIS WORK. THE CONTRACTOR SHALL NOT EXCAVATE UNTIL THE ARKANSAS ONE CALL SYSTEM HAS PROPERLY SURVEYED THE SITE CONDITIONS AND HAS RESPONDED ACCORDINGLY. IF THE WORK PROCEEDS BEFORE THE ONE CALL SYSTEM REVIEW IS COMPLETED, THE CONTRACTOR SHALL PAY FOR THE COST TO REPAIR OR REPLACE ANY DAMAGES.
- C. ARRANGEMENT OF SYSTEMS INDICATED ON THE DRAWINGS IS DIAGRAMMATIC, AND INDICATES THE MINIMUM REQUIREMENTS FOR THE WORK. SITE CONDITIONS MAY DETERMINE THE ACTUAL ARRANGEMENT OF SYSTEMS. FIELD MEASUREMENTS SHALL BE TAKEN AND CONFIRMED. THE CONTRACTOR SHALL CONFIRM ACCURACY OF DIMENSIONS BEFORE FABRICATION AND SHALL BE RESPONSIBLE FOR ALL EQUIPMENT AND COMPONENT LAYOUTS. OVERHEAD WORK SHALL BE LAID OUT TO OBTAIN THE MAXIMUM HEAD ROOM. COORDINATE THE LOCATION OF ALL MECHANICAL SYSTEMS TO AVOID INTERFERENCE WITH THE LOCATION OF OTHER SYSTEMS OR WITH TRAFFIC FLOW WITHIN THE BUILDING. COORDINATE LOCATIONS WITH THE OWNER PRIOR TO INSTALLATION.
- D. THE CONTRACTOR IS RESPONSIBLE FOR THE DAILY INSPECTION OF THE PROJECT WORK SITE FOR THE PRESENCE OF ASBESTOS MATERIALS OR FOR MATERIALS THAT MAY BE ASBESTOS CONTAMINATED. IT IS BELIEVED THAT THERE ARE NO KNOWN ASBESTOS MATERIALS ON THE WORK SITE. THE OWNER KNOWS OF NO OTHER POTENTIALLY CONTAMINATED AREAS, PIPING SYSTEM, DUCT SYSTEM, ETC. THAT MIGHT CONTAIN SUCH MATERIALS. THE CONTRACTOR SHALL NOT ALLOW EMPLOYEES OR OWNER'S PERSONNEL TO BE EXPOSED IN ANY FASHION TO ANY UNKNOWN MATERIALS THAT MAY CONTAIN ASBESTOS MATERIALS. EXPOSURE TO MATERIALS IN QUESTION SHALL BE COMPLETELY AVOIDED IMMEDIATELY. THE CONTRACTOR SHALL CORDON OFF THE AREA WITH "SAFETY TAPE" TO IDENTIFY THE POTENTIAL RISK AND THEREFORE LIMIT EXPOSURE FOR OTHERS. THE OWNER SHALL BE CONTACTED IMMEDIATELY. THE OWNER WILL MAKE IMMEDIATE ARRANGEMENTS FOR THE INSPECTION OF MATERIALS IN QUESTION AND, IF NECESSARY, FOR REMOVAL OF SAME MATERIALS BY AN OUTSIDE CONSULTING FIRM. THE ENGINEER HAS NOT BEEN RETAINED BY THE OWNER TO INSPECT THE SITE FOR THE PRESENCE OF ASBESTOS MATERIALS AND THEREFORE HAS NO SPECIFIC KNOWLEDGE OF THE PRESENCE OF SUCH MATERIALS.
- E. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THE TEMPERATURE IN THE WORK AREAS AND OTHER ENVIRONMENTAL CONDITIONS ARE FAVORABLE DURING THE PROGRESS OF THE WORK.
- 1.06 QUALITY ASSURANCE
- A. COMPLY WITH ALL GOVERNING CODES AND REGULATIONS. PROVIDE PRODUCTS OF ACCEPTABLE MANUFACTURERS WHICH HAVE BEEN IN SATISFACTORY USE IN SIMILAR SERVICE FOR TEN (10) YEARS. USE EXPERIENCED INSTALLERS. DELIVER, HANDLE, AND STORE MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
- B. THE CONTRACT DRAWINGS FOR THIS 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 ALL OTHER DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT TO DETERMINE ALL CONDITIONS AFFECTING THE WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE EQUIPMENT INSTALLATION LAYOUTS, ORIENTATION, CLEARANCES FOR ACCESS AND MAINTENANCE, INSPECTION, TESTING, FINISHING, SAFETY, AND OTHER ITEMS FOR ANY EQUIPMENT FURNISHED.
- C. THE CONTRACTOR SHALL BARE ALL ADDITIONAL COSTS PERTAINING TO ANY CONTRACTOR REQUESTED ALTERNATE/CHANGES AND SHALL NOT ASK FOR ADDITIONS MONIES, OR CAUSE OTHER CONTRACTORS OR TRADES TO REQUEST ADDITIONAL MONIES FROM THE OWNER AS A DIRECT OR INDIRECT RESULT OF THE USE OF THE ALTERNATE/CHANGES RESULTING FROM AN ALTERNATE ACCEPTED BY THE OWNER OR ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACCURACY OF DIMENSIONS AND LAYOUT.
- D. A REPRESENTATIVE MAY BE APPOINTED BY THE OWNER AS THE OWNER'S PROJECT INSPECTOR AND MAY INSPECT THE WORK AS IT PROGRESSES. ANY WORK OR MATERIAL REJECTED BY THE INSPECTOR SHALL BE REMOVED AND REPLACED WITH WORK OR MATERIALS AS SPECIFIED OR AS SHOWN ON THE DRAWINGS OR AS REQUIRED BY CODES OR INDUSTRY STANDARDS AT NO ADDITIONAL COST TO THE OWNER.
- E. SUBMIT DOCUMENTATION OF ALL WELDER CERTIFICATIONS AND WELDING PROCEDURES TO THE OWNER PRIOR TO THE START OF ANY WORK. PERFORM WELDING OF METALLIC PIPING SYSTEMS WITH QUALIFIED WELDERS AND WELDING OPERATORS. QUALIFY WELDS AND WELDING OPERATORS IN ACCORDANCE WITH THE APPLICABLE CODE.
- F. PERFORM ALL BONDING OF NON-METALLIC PIPING SYSTEMS WITH QUALIFIED BONDERS OR BONDING OPERATORS. QUALIFY BONDERS AND BONDING OPERATORS IN ACCORDANCE WITH THE APPLICABLE CODE. MAINTAIN QUALIFICATION RECORDS IN ACCORDANCE WITH THE APPLICABLE CODE. GIVE THE OWNER A COPY OF THE QUALIFICATION RECORDS. KEEP RECORDS CURRENT AT ALL TIMES.
- 1.07 REGULATORY REQUIREMENTS
- A. SPECIAL PART OF WORK: THE CONTRACTOR SHALL STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE WORK. THE CONTRACTOR SHALL ALSO STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED METHODS OF EXCAVATION, TRENCHING, AND SHORING METHODS AS DESCRIBED IN OSHA 29 CFR SUBPART P, EXCAVATIONS. ALL EQUIPMENT USED IN THE ACTIVITIES OF THE WORK SHALL BE CURRENTLY APPROVED BY OSHA FOR THE USES SPECIFICALLY DESIGNED FOR BY THE EQUIPMENT MANUFACTURER. THE CONTRACTOR SHALL MAINTAIN AND CLOSELY SUPERVISE SAFETY PRACTICES AND CODES. PROVIDE AND USE PERSONAL RESTRAINT DEVICES. EXTREME CARE SHALL BE TAKEN TO SAFEGUARD THE SAFETY OF THE PUBLIC, THE OWNER'S EMPLOYEES, AND THE CONTRACTOR'S EMPLOYEES.
- B. FALL PROTECTION ON THE JOB SITE MUST COMPLY WITH PROVISIONS OF OSHA STANDARDS FOUND IN 29 CFR 1926 SUBPART M; AND AS SPECIFICALLY DEFINED BY 1926.501(B), SUBSECTIONS (1) THROUGH (15).
- C. REMOVE MATERIALS AS SPECIFIED OR AS REQUIRED DURING THE COURSE OF THE WORK. COMMUNICATE WITH THE OWNER AND VERIFY THE DISPOSITION PLAN WITH THE OWNER. DISPOSE OF ALL MATERIALS IN A LEGAL, ACCEPTABLE, AND PROPER FASHION.
- D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR BECOMING FAMILIAR WITH LOCAL GOVERNING AUTHORITIES HAVING JURISDICTION, CODES, AND STATUTES AND, IF REQUIRED, SHALL OBTAIN THE REQUIRED PERMITS, PAY ALL RELATED FEES INCLUDING INSPECTION FEES, AND OBTAIN INSPECTIONS AS REQUIRED TO COMPLETE AND FINISH HIS WORK. THE FOLLOWING CODES SHALL BE STRICTLY BE ADHERED TO:
1. ALL OSHA REQUIREMENTS AND GUIDELINES INCLUDING OSHA 29 CFR 1926 AND 1910.
  2. INTERNATIONAL STATE AND LOCAL BUILDING CODES.
  3. INTERNATIONAL STATE AND LOCAL MECHANICAL CODES.
  4. NFPA STANDARDS.
  5. LIFE SAFETY CODES AND STANDARDS.
  6. ADA REQUIREMENTS.

- 1.08 MATERIAL DELIVERY, HANDLING, STORAGE AND PROTECTION
- A. DELIVER, STORE, PROTECT AND HANDLE PRODUCTS TO THE SITE. OBTAIN MSDS SHEETS ON CHEMICALS AND OTHER MATERIALS UPON DELIVERY AND PROVIDE TRAINING AND DOCUMENTATION FOR ALL WORKERS ON CONSTRUCTION SITE.
- B. ALL MATERIALS AND EQUIPMENT SHALL BE INSPECTED UPON RECEIPT FOR DAMAGE AND MANUFACTURING FLAWS. ANY DAMAGE OR FLAWS SHALL BE DULY NOTED AND ITEMS RETURNED TO THE SUPPLYING VENDOR OR MANUFACTURER OR REPAIRED SATISFACTORILY. SHIPMENT OF THE EQUIPMENT SHALL BE SCHEDULED TO AVOID ANY DELAY AS THE CONSTRUCTION SCHEDULE SHALL NOT BE CHANGED, AS REQUIRED. ACCEPT THE MATERIALS ON SITE IN SHIPPING CONTAINERS WITH THE LABELING IN PLACE. DOCUMENT THE CONDITION OF MATERIALS UPON RECEIPT.
- C. STORE ALL MATERIALS ON PALLETS, SHORING, OR TIMBERS AS REQUIRED TO PREVENT THE MATERIALS FROM RESTING ON THE GROUND OR FINISHED SURFACES WHERE DAMAGE TO THE MATERIALS OR FINISHED SURFACES MAY OCCUR. MATERIALS SUCH THAT NO SPILL MAY OCCUR THAT CAN DAMAGE THE ENVIRONMENT IN ANY FASHION. STORE MATERIALS SUCH THAT NO DANGER EXISTS FROM THE POTENTIAL OF STACKED MATERIALS FALLING ON PERSONNEL OR OTHER MATERIALS. PROVIDE TEMPORARY PROTECTIVE COVERING OR COATINGS FOR FERROUS MATERIALS SUCH AS CAST IRON, STEEL VALVES, AND OTHER SURFACES. PROTECT MATERIALS THAT MAY BE DAMAGED FROM FREEZING BY STORING IN HEATED AREAS.
- D. PROVIDE TEMPORARY END CAPS OR CLOSURES ON PIPING, FITTINGS AND EQUIPMENT OPENINGS. MAINTAIN THE CAPS IN PLACE UNTIL INSTALLATION. DURING HANDLING AND INSTALLATION OF THE MATERIALS, PROTECT THE PIPING SYSTEMS FROM ENTRY OF FOREIGN MATERIALS BY UTILIZING TEMPORARY COVERS, COMPLETING AND CLOSING SECTIONS OF THE WORK, AND ISOLATING PARTS OF THE COMPLETED SYSTEM.
- E. DAMAGED, LOST OR STOLEN MATERIALS SHALL BE REPLACED BY THE CONTRACTOR AT THE EXPENSE OF THE CONTRACTOR.
- F. THE CONTRACTOR SHALL PROTECT THE EQUIPMENT FROM DAMAGE AND KEEP THE EQUIPMENT IN AN "AS NEW" CONDITION FOR ALL THE FURNISHED MATERIALS AND EQUIPMENT UNTIL FINAL ACCEPTANCE BY THE OWNER.
- 1.09 BIDDING AND SCOPE OF WORK COORDINATION
- A. THE CONTRACTORS SHALL BE RESPONSIBLE FOR INCLUDING THE FOLLOWING IN THEIR BIDDING ACTIVITIES AND WORK ACTIVITIES:
1. LABOR AND MATERIAL FOR THE INSTALLATION OF ALL MECHANICAL AND PLUMBING SYSTEMS.
- 1.10 COORDINATION
- A. CONTRACTORS AND SUB-CONTRACTORS OBTAIN CONFIRMATION OF PROJECT WORK SCHEDULE PRIOR TO BIDDING WORK.
- B. COORDINATE WORK AND ACTIVITIES AT THE SITE WITH THE OWNER DURING ALL WORK TO PROVIDE ADEQUATE AND TIMELY ACCESS TO ALL CONTRACT WORK AREAS WITH A MINIMAL DISRUPTION OF THE OWNER'S ACTIVITIES AND BUSINESS NEEDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR A SCHEDULED SEQUENCE IN PERFORMING THE WORK SO THAT IT WILL NOT INTERFERE WITH THE OWNER'S OPERATION. BEFORE ANY WORK IS STARTED, THE CONTRACTOR SHALL CONSULT WITH THE OWNER AND ARRANGE A SATISFACTORY WORK SCHEDULE. THE CONTRACTOR SHALL MAKE TEMPORARY ALTERATIONS AS REQUIRED TO EXECUTE THE WORK SO THAT ALL OPERATIONS AND SERVICES IN THE FACILITY ARE MAINTAINED WITH THE MINIMUM POSSIBLE INTERRUPTION. TEMPORARY SHUT-DOWNS SHALL BE MINIMIZED AND SHALL BE OF THE SHORTEST POSSIBLE DURATION. ALL FACILITIES SHALL BE KEPT IN CONTINUOUS OPERATION UNLESS SPECIFIC PERMISSION TO THE CONTRARY IS GRANTED IN WRITING BY THE OWNER. DAILY SCHEDULING AND WORK LOCATION IS A PART OF THE CONTRACTOR'S WORK INCLUDED HEREIN.
- C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE OTHER TRADES SO THAT THE INSTALLATION IS PERFORMED WITH MINIMUM OF INTERFERENCE AND CONFLICT. PARTICULAR ATTENTION MUST BE PAID TO COMMUNICATION WITH THE VARIOUS TRADES REGARDING THE PLANNED INSTALLATION OF THIS WORK.
- D. THE CONTRACTOR SHALL BE PREPARED TO START, PROGRESS WITH, AND COMPLETE THE WORK AS PER THE OWNER'S PROJECT SCHEDULE AND COORDINATING THE ACTIVITY OF OTHERS PERFORMING PROJECT WORK.
- E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TIMELY PROCUREMENT OF MATERIALS AS SPECIFIED IN THIS SPECIFICATION. THE CONTRACTOR SHALL SCHEDULE PROCUREMENT OF ALL MATERIALS SO THAT THEY MAY BE DELIVERED AND INSTALLED WITHIN THE TERMS OF THE PROJECT SCHEDULE. ANY DIFFICULTIES IN PROCUREMENT AFFECTING THE INTENDED SCHEDULE SHOULD BE PROMPTLY REPORTED TO THE OWNER IN WRITING.
- 1.11 WARRANTY
- A. ALL MATERIALS, LABOR AND SYSTEM COMPONENTS SHALL BE GUARANTEED FOR A MINIMUM PERIOD OF TWO (2) YEARS FROM DATE OF ACCEPTANCE OF WORK BY THE OWNER, UNLESS SPECIFIED OTHERWISE. ALL EQUIPMENT SHALL BE COVERED BY A SEPARATE WARRANTY. CONFLICTS IN STATED WARRANTY PERIODS SHALL AUTOMATICALLY DEFAULT TO THE LONGEST STATED PERIOD. SHOULD ANY MECHANICAL OR OTHER RELATED PROBLEM DUE TO FAULTY MATERIALS OR WORKMANSHIP OCCUR, THE PROBLEM SHALL BE CORRECTED TO THE SATISFACTION OF THE OWNER AT NO COST TO THE OWNER. ANY DEFECTIVE MATERIALS OR INFERIOR WORKMANSHIP DISCOVERED AT THE TIME OF INSTALLATION AND/OR DURING THE GUARANTEE PERIOD SHALL BE CORRECTED IMMEDIATELY TO THE COMPLETE SATISFACTION OF THE OWNER.
- 1.12 PROJECT CLOSEOUT
- A. ADEQUATELY INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF EACH SYSTEM AND EQUIPMENT ITEM.
- B. PROVIDE THE OWNER WITH THREE (3) SETS OF OPERATION AND MAINTENANCE MANUALS WITH APPROPRIATELY DIVIDED SECTIONS FOR EACH SYSTEM OR EQUIPMENT ITEM. FOR ALL ITEMS FURNISHED BY THE RESPECTIVE TRADES, SUBCONTRACTORS AND CONTRACTORS, PROVIDE SETS OF MANUFACTURER'S OPERATING, MAINTENANCE, INSTRUCTIONS AND SPARE PARTS MANUALS IN A SINGLE COMB BOUND MANUAL OR HEAVY DUTY THREE RING BINDER FORMAT FOR THE OWNER'S USE. WORK OF ALL TRADES, SUBCONTRACTORS AND CONTRACTORS SHALL BE IN THIS ONE BINDER WITH DIVIDERS FOR THE RESPECTIVE SECTIONS OF WORK.
- C. PROVIDE FOR THE REUSE BY THE OWNER OR PROPER AND LEGAL DISPOSAL OF EXCESS MATERIALS AS REQUIRED TO APPROVED LOCATIONS ON THE SITE OR FOR LEGAL DISPOSAL AS REQUIRED IF NO ACCEPTABLE PLACE FOR DISPOSAL EXISTS ON THE SITE. THE HAULING, HANDLING, CONFIRMATION, COORDINATION, AND MANAGEMENT OF THIS ACTIVITY IS WHOLLY THE RESPONSIBILITY OF THE CONTRACTOR.
- D. FURNISH RECORD DRAWINGS OF THE FINAL INSTALLATION NOTING IMPORTANT DATA, SUCH AS COVERED OR ENCLOSED PIPE OR OTHER MATERIALS ETC. DURING AND AFTER THE FINAL INSTALLATION IS COMPLETE AND SYSTEMS ARE OPERATIONAL. RECORD DRAWINGS SHALL BE THOROUGH WITH ATTENTION TO DETAILS. THE OWNER RETAINS THE RIGHT TO REQUEST MORE INFORMATION TO BE ADDED TO DRAWINGS AS NEEDED. RECORD DRAWINGS SHALL BE CLEARLY MARKED WITH AN ERASABLE RED LEAD PENCIL.
- E. COPIES OF ALL PROJECT CLOSE-OUT DOCUMENTS SHALL BE FORWARDED TO THE OWNER FOR REVIEW, APPROVAL, AND USE.
- PART 2 - PRODUCTS AND MATERIALS**
- 2.01 MATERIAL STANDARDS
- A. ALL PRODUCTS SHALL BE FIRST-LINE QUALITY, NEW AND UNUSED OF THE GRADE AND TYPE AS SHOWN ON THE DRAWINGS AND AS SPECIFIED, OR THE EQUIVALENTS AS APPROVED BY THE OWNER IN WRITING.
- B. ALL PRODUCTS SHALL BE IN CURRENT PRODUCTION WITH NO NOTICE HAVING BEEN GIVEN THAT THIS PRODUCT IS TO BE DRASITICALLY CHANGED, MODIFIED, OR DISCONTINUED FROM PRODUCTION.
- C. WHEN ANY MATERIAL OR EQUIPMENT IS IDENTIFIED ON THE PLANS OR IN THE SPECIFICATIONS BY REFERENCE TO ONE MANUFACTURER'S NAME OR MODEL NUMBER, IT IS INTENDED TO ESTABLISH THE REQUIRED STANDARD OF DESIGN AND QUALITY, AND IT IS NOT INTENDED TO LIMIT COMPETITION. IT IS UNDERSTOOD THAT, WHETHER PRESENT OR NOT, THE PHRASE "OR EQUAL" OR "OR AN APPROVED EQUAL" APPLIES TO ALL FURNISHED MATERIALS AND IS MEANT TO MEAN AN "ACCEPTED" EQUIVALENT IF APPROVED BY THE OWNER AND ENGINEER PRIOR TO BIDDING PROJECT.
- 2.02 MATERIAL ALTERNATIVES
- A. IF THE CONTRACTOR DESIRES TO SUGGEST CHANGES, MODIFICATIONS OR ALTERNATIVES, THE CONTRACTOR SHALL SUBMIT, IN WRITING, A DESCRIPTION OF THE PROPOSED CHANGES OR MODIFICATIONS FOR REVIEW BY THE OWNER AND ENGINEER.
- B. THE CONTRACTOR SHALL SUBMIT TO THE OWNER FOR APPROVAL THREE (3) COPIES OF DESCRIPTIVE INFORMATION FOR ANY MATERIALS PROPOSED BY THE CONTRACTOR WHICH ARE NOT EXACTLY AS SPECIFIED AND ARE INTENDED TO BE EQUAL OR BETTER IN QUALITY OR PERFORMANCE. THE INFORMATION SHALL INCLUDE, AS A MINIMUM, CATALOG DATA SHEETS AND SHOP DRAWINGS, SAMPLES AND OTHER SUPPORTIVE INFORMATION AS NECESSARY FOR THE OWNER TO EVALUATE THE PROPOSED MATERIALS OR EQUIPMENT.
- C. THE OWNER SHALL REVIEW ALTERNATIVE MATERIAL AND EQUIPMENT RECOMMENDATIONS AND SHALL BE THE SOLE JUDGE IN DETERMINING WHETHER THE PROPOSED MATERIAL, ACCESSORY, OR ITEM MEETS THE STATED CRITERIA FOR THE SERVICE AND CONDITIONS IMPOSED. THE OWNER MAY REQUEST THE ENGINEER TO PROVIDE AN OPINION REGARDING SUCH ISSUES.
- D. THE CONTRACTOR SHALL NOT PROCEED WITH ANY PROPOSED CHANGES OR MODIFICATIONS UNTIL AUTHORIZED TO DO SO BY THE OWNER IN WRITING. THE COST OF ANY WORK PERFORMED ON PROPOSED CHANGES OR MODIFICATIONS WITHOUT THE OWNER'S EXPENSE, AS WELL AS ANY COST FOR UNDOING SUCH UNAUTHORIZED WORK.
- E. ACCEPTED ALTERNATIVES OR CHANGES BY THE CONTRACTOR SHALL NOT INCUR OTHER TRADE COSTS OR EXPENSES TO THE OWNER AND ANY RESULTANT COSTS ARISING OUT OF THE ACCEPTANCE OF ANY REQUESTED CHANGE SHALL BE PAID FOR BY THE CONTRACTOR.
- F. ACCEPTANCE OF REQUESTS FOR SUBSTITUTIONS OF EQUIPMENT, MATERIALS OR PROCESSES SPECIFIED WILL BE CONTINGENT UPON SUBMISSION OF PROOF, SATISFACTORY TO THE OWNER AND ENGINEER THAT:
1. THEY ARE SATISFACTORY IN TERMS OF QUALITY AND SERVICEABILITY.
  2. THEIR USE WILL NOT ENTAIL CHANGES IN DETAILS AND CONSTRUCTION OF RELATED WORK.
  3. THE SUBSTITUTION IS IN CONSIDERATION OF THE REQUIRED DESIGN. THE BURDEN OF PROOF SHALL BE UPON THE PARTY PROPOSING THE SUBSTITUTION. NO CONSIDERATION WILL BE GIVEN TO INCOMPLETE SUBMITTALS.
- G. THE CONTRACTOR IS ENCOURAGED TO SUGGEST ALTERNATES COVERING EACH OF THE FOLLOWING SUBJECTS:
1. ALTERNATIVE MATERIALS AND EQUIPMENT TO IMPROVE QUALITY, SCHEDULE OR TO REDUCE PRICING.
  2. EXECUTIONS TO THE SPECIFICATIONS COVERING MATERIALS AND EQUIPMENT, MANNER OF APPLICATION, OR OTHER DETAILS.

PART 3 - EXECUTION OF WORK

- 3.01 EXAMINATION AND INSPECTION
- A. PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL VISIT THE SITE AND BECOME FULLY FAMILIAR WITH ALL CONDITIONS SUCH AS OVERHEAD OBSTRUCTIONS, STRUCTURES, EQUIPMENT, AND OTHER ITEMS THAT PERTAIN TO THE WORK DESCRIBED HEREIN. FAILURE TO UNDERSTAND OR HAVE KNOWLEDGE OF ISSUES THAT COULD HAVE BEEN DETERMINED PRIOR TO BIDDING WILL NOT CONSTITUTE GROUNDS FOR ASKING FOR WORK CHANGE ORDERS OR EXTRA WORK.
- B. VERIFY FIELD DIMENSIONS, ROUTING, CLEARANCES, ACCESS, HEIGHTS, SCHEDULES, AND OTHER TIMES BY FIELD INSPECTION AND SITE ASSESSMENT PRIOR TO BEGINNING THE WORK.
- C. ARRANGEMENT OF SYSTEMS INDICATED ON THE DRAWINGS IS DIAGRAMMATIC, AND INDICATES THE MINIMUM REQUIREMENTS FOR MECHANICAL WORK. SITE CONDITIONS MAY DETERMINE THE ACTUAL ARRANGEMENT OF SYSTEMS. FIELD MEASUREMENTS SHALL BE TAKEN BEFORE FABRICATION. CONTRACTOR SHALL BE RESPONSIBLE FOR ACCURACY OF DIMENSIONS AND LAYOUT. OVERHEAD WORK SHALL BE LAID OUT IN A JOINT COORDINATION AND COOPERATION WITH THE OTHER TRADES. FINISHED WORK SHALL BE CLEARLY MARKED TO AVOID INTERFERENCE WITH THE LOCATION OF OTHER SYSTEMS OR WITH TRAFFIC FLOW WITHIN THE BUILDING. COORDINATE THE LOCATION OF ALL SYSTEMS TO AVOID INTERFERENCE WITH THE LOCATION OF OTHER SYSTEMS, WORK OF OTHER TRADES OR WITH TRAFFIC FLOW WITHIN THE AREAS.
- D. WHERE SPECIFIC DETAILS AND DIMENSIONS FOR THE 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 SHALL PROVIDE 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 (IF THERE IS ANY DIFFERENCE IN COSTS) IS INCLUDED IN THE CONTRACT PRICE, AND THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH THE DRAWINGS AND WITH THE SPECIFICATIONS, AS DETERMINED AND APPROVED BY THE OWNER, AND NO ADDITIONAL COSTS SHALL BE ADDED TO THE CONTRACT PRICE.
- E. THE CONTRACTOR SHALL EXAMINE THE AREAS AND CONDITIONS UNDER WHICH THIS WORK IS TO BE INSTALLED. DO NOT PROCEED WITH THE WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. THE STARTING OF WORK IS ACCEPTANCE OF THE CONDITIONS WITHIN ANY PARTICULAR AREA.
- 3.02 INSTALLATION
- A. COMPLY WITH ALL APPLICABLE REGULATIONS AND BUILDING CODE REQUIREMENTS.
- B. WORK UNDER THIS DIVISION OF THE SPECIFICATIONS SHALL CONSIST OF THE FURNISHING OF ALL LABOR AND MATERIALS NECESSARY FOR THE COMPLETE INSTALLATION OF ALL MECHANICAL AND PLUMBING SYSTEMS AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED HEREIN. THE CONTRACTOR SHALL FURNISH AND BE RESPONSIBLE FOR THE COMPLETELY AND PROPERLY AND PROBABLY NECESSARY FOR THE WORK. SUCH ITEMS ARE ANCHORS, BOLTS, SLEEVES, BRACKETS, VENTS, OFFSETS, AND OTHER COMPONENTS TO PROVIDE AN OPERATING SYSTEM. THE CONTRACTOR SHALL DRILL, CUT, OR OTHERWISE ATTACH COMPONENTS FOR INSTALLATION OF THE WORK WITH THE FULL UNDERSTANDING THAT THE CONTRACTOR IS RESPONSIBLE FOR LEAVING THE FINISHED AREAS IN AN "AS ORIGINAL" CONDITION. CAULKING, FILLING, TOUCH-UP PAINTING, AND OTHER SURFACE FINISH AROUND THE CONTRACTOR'S WORK AND WORK AREA IS THEREFORE WITHIN THE SCOPE OF WORK OF THIS SPECIFICATION. ALL WORK SHALL BE COMPLETED AND READY FOR FULL OPERATION.
- C. INSTALL ALL MATERIALS AND SYSTEMS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND AS PER THE APPROVED SUBMITTALS. INSTALL MATERIALS IN PROPER RELATIONSHIP WITH ADJACENT CONSTRUCTION AND WITH A UNIFORM APPEARANCE FOR EXPOSED WORK. COORDINATION OF THE INSTALLATION WITH THE WORK OF OTHER TRADES AND SECTIONS IS A SIGNIFICANT AND IMPORTANT PORTION OF THE WORK FOR THE PROJECT.
- D. PROPERLY SUPPORT ALL PIPING. PITCH THE PIPING TO THE DRAIN POINTS. INSTALL PIPING WITH PROPER EXPANSION LOOPS, FLEXIBLE CONNECTORS, MECHANICAL EXPANSION JOINTS, HANGER SYSTEMS, VIBRATION ISOLATION SYSTEMS, AND ANCHORS.
- E. CLEARLY LABEL AND TAG ALL COMPONENTS, EQUIPMENT, ACCESS DOORS, SYSTEM MAIN VALVES, FILTER LOCATIONS, INCLUDING WATER SERVICE VALVES, AND ALL OTHER COMPONENTS ACCORDING TO THE DRAWINGS AND SPECIFICATIONS.
- F. CLEAN, WASH, LUBRICATE, TEST AND BALANCE, AS REQUIRED, ALL SYSTEMS AS PER THE MANUFACTURER'S INSTRUCTIONS FOR PROPER OPERATION PRIOR TO PLACING THE SYSTEMS INTO SERVICE.
- G. RESTORE DAMAGED FINISHES. CLEAN AND PROTECT THE WORK FROM DAMAGE DURING CONSTRUCTION AND CLEAN THE FINAL WORK AT PROJECT COMPLETION. ANY DAMAGED, SCRATCHED, MARRED, OR OTHERWISE DEFACED PAINTED SURFACES, WALLS, CEILINGS, ROOFS, FLOORS, DOORS, INSULATED SURFACES OR INSULATION COVERINGS OR FINISHES, OR OTHER ITEMS SHALL BE SO REPAIRED TO RESTORE THE FINISH TO ORIGINAL CONDITION BY PERSONNEL WORKING IN THE REQUIRED RESPECTIVE TRADE.
- H. IF REQUIRED, INSTALL APPROVED FIRE STOP MATERIALS AROUND ALL PIPE AND DUCT MATERIAL PENETRATION THROUGH FIRE RATED WALLS AND FLOORS.
- I. IT IS THE INTENT THAT ALL MATERIALS AND MATERIAL SURFACES HAVE A PROTECTIVE FINISH WHEN IN PLACE. ALL NON-GALVANIZED FERROUS METAL ITEMS INSIDE THE BUILDING, EXPOSED TO WEATHER OR OTHER AREA SUBJECT TO RUSTING SHALL BE GIVEN ONE HEAVY COAT OF RUST PREVENTIVE PRIMER AT THE TIME OF INITIAL INSTALLATION TO PREVENT RUSTING OR CORROSION PRIOR TO FINAL PAINTING.
- J. INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF ALL SYSTEMS.
- 3.03 PENETRATIONS, CUTTING AND PATCHING
- A. FOR ALL MECHANICAL AND PLUMBING WORK, THIS SPECIFICATION GOVERNS THE MINIMUM REQUIREMENTS FOR THE MATERIAL PROCUREMENT, LABOR, SUPERVISION, TOOLS, AND EQUIPMENT NECESSARY FOR PENETRATION OF THE BUILDING ELEMENTS. WORK TO BE PERFORMED SHALL INCLUDE THE COMPLETE AND PROPER PENETRATION OF BUILDING ELEMENTS AS SHOWN ON THE DRAWINGS AND AS NECESSARY TO PROPERLY INSTALL AN OPERATING SYSTEM.
- B. PIPE SLEEVES AND OPENINGS SHALL BE PROVIDED WHERE DUCTS, PIPES, HANGERS, AND VALVE OPERATOR STEMS PASS THROUGH FLOORS, ROOFS, WALLS, PARTITIONS, OR OTHER BUILDING ELEMENTS.
- D. PENETRATIONS THROUGH THE EXTERIOR WALL SHALL BE GASKET SEALED AND WATER TIGHT, AND ALLOW FOR THE NORMAL DUCT OR PIPE MOVEMENTS. PACK AROUND BOTH PIPE AND DUCT SLEEVES WITH GROUT TO CREATE A WATER TIGHT SEAL.

E. IF POSSIBLE, SLEEVES SHALL BE EMBEDDED IN THE STRUCTURAL SLAB CONCRETE.

F. HOLES IN REINFORCED CAST IN PLACE CONCRETE PANELS OR PRECAST PANELS SHALL NOT CUT ANY REINFORCING STEEL WITHIN THE PANEL. IN GENERAL, THE PENETRATIONS HOLES SHALL BE AT THE PANEL EDGE AWAY FROM THE REINFORCING STEEL. MASONRY SHALL BE DRILLED WITH A SUITABLE DIAMOND CORE BIT ROTARY DRILL.

G. HOLES IN MASONRY SHALL BE DRILLED WITH A SUITABLE DIAMOND CORE BIT ROTARY DRILL. WALL SLEEVES THROUGH CONCRETE SHALL BE GROUTED AND INSTALLED WITH FOUR (4) 1 1/2 INCH ANCHORING LUGS. AIR HAMMERS SHALL NOT BE USED. OPENINGS SHALL BE MADE BY CORING, SAWING, OR OTHER METHODS AS APPROVED BY THE OWNER.

H. PERMISSION TO PATCH ANY AREAS OR ITEMS OF WORK SHALL NOT CONSTITUTE A WAIVER OF THE OWNER'S RIGHT TO REQUIRE COMPLETE REMOVAL AND REPLACEMENT OF SAID AREAS OR ITEMS OF WORK, IF IN THE OWNER'S OPINION, SAID PATCHING DOES NOT SATISFACTORILY RESTORE THE QUALITY AND APPEARANCE OF SAME.

3.04 CLEANING AND TREATING OF SYSTEMS

A. ALL SYSTEMS SHALL BE CAREFULLY FLUSHED DURING INSTALLATION WITH AIR OR WATER TO REMOVE DIRT, SCALE, FOREIGN MATTER AND OTHER CONTAMINANTS. IF ANY SYSTEM FAILS TO FUNCTION OR SYSTEM SEALS FAIL DUE TO IT IN THE SYSTEM, THE NECESSARY REPAIRS AND ADJUSTMENTS SHALL BE MADE AT THE CONTRACTOR'S EXPENSE.

B. ALL PIPING AND EQUIPMENT SHALL BE FLUSHED AND CLEANED AS REQUIRED.

C. PROVIDE ALL NECESSARY PUMPS, HIGH PRESSURE SPRAYERS, TEMPORARY PIPING CONNECTIONS, SPOOL PIECES, VALVES, HOSES, CHEMICALS, DETERGENTS, SPONGES, PIGS, BRUSH BALLS, AND OTHER ITEMS AS REQUIRED. DISCONNECTION OF THE ITEMS FOR TESTING IS PART OF THE WORK UNDER THIS SECTION. COMPLETE AND SUBMIT TO THE OWNER A COPY OF THE PIPING CLEANING REPORT FOR EACH SYSTEM CLEANED UNDER THIS SECTION.

D. PROVIDE POSITIVE ISOLATION OF SYSTEMS BEING CLEANED OR DISINFECTED TO PREVENT THE BACKFLOW OF CHEMICALS OR DETERGENTS INTO OTHER SYSTEMS OR PIPING LOOPS.

E. FLUSH ALL NEW PIPING AND EQUIPMENT OF EACH SYSTEM WITH WATER. HYDROSTATICALLY TESTED PIPING SYSTEMS SHALL BE FLUSHED WITH WATER. ALL SYSTEMS SHALL BE FLUSHED BEFORE PRESSURE TESTING.

F. DO NOT EXCEED THE WORKING PRESSURE OF ANY SYSTEM WHILE PERFORMING WORK UNDER THIS SECTION. THE WORKING PRESSURE FOR PIPING IS DETERMINED BY USING TWO THIRDS OF THE HYDROSTATIC TEST PRESSURE. REFER TO THE SPECIFICATIONS FOR EACH PIPING SYSTEM FOR SPECIFICS OF PIPING SYSTEM TESTING, INCLUDING TEST PRESSURES.

G. AFTER VISUALLY INSPECTING AND VERIFYING ALL SYSTEM COMPONENTS, VESSELS AND OTHER ITEMS ARE CLEAN, POTABLE WATER AT AMBIENT TEMPERATURE SHALL BE USED FOR ALL FLUSHING. MAINTAIN A HIGH FLUID VELOCITY TO ENSURE COMPLETE REMOVAL OF ALL SCALE, WELD SPLATTER AND OTHER DEBRIS. DRAIN THE WATER TO THE SEWER OR OTHER APPROVED LOCATION. THE OWNER SHALL OBSERVE THE INITIAL DISCHARGE AND INTERMITTENTLY OBSERVE THE FLUSHING PROCESS.

H. ALL RESIDUAL MATTER DEPOSITED ON FLOORS, ROOFS, WALLS AND OTHER SURFACES AS A RESULT OF THE SYSTEM INSTALLATION SHALL BE COMPLETELY REMOVED. IF NECESSARY, THE FINISH SHALL BE RESTORED TO THE SATISFACTION OF THE OWNER.

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THIS SHEET IS PART OF THE CONSTRUCTION DOCUMENTS. OTHER SHEETS INCLUDING THE SPECIFICATIONS SHALL ALSO BE INCORPORATED. THIS DRAWING IS SCHEMATIC IN NATURE AND SHALL NOT TO BE USED AS A SHOP DRAWING. THEREFORE, ALL MODIFICATIONS REQUIRED TO CONFORM TO THE SITE CONDITIONS AND THE EQUIPMENT AND MATERIALS USED SHALL BE INCLUDED. VERIFY LOCATIONS AND DIMENSIONS OF ALL ARCHITECTURAL, CIVIL AND STRUCTURAL ELEMENTS AS SHOWN ON THEIR RESPECTIVE DOCUMENTS. THESE ELEMENTS ARE SHOWN FOR REFERENCE AND SHALL BE VERIFIED PRIOR TO CONSTRUCTION AND THE ENGINEER ASSUMES NO LIABILITY FOR THE ACCURACY OF THESE ELEMENTS. NO DESIGN RESPONSIBILITY IS ASSUMED FOR ANY PORTION OF THE WORK THAT THIS PROFESSIONAL ENGINEER HAS NOT SIGNED AND SEALED PER STATE REQUIREMENTS.

THIS DRAWING HAS BEEN PREPARED BY CHARLES G. THARP, P.E. AND IS AN INSTRUMENT OF SERVICE SPECIFIC TO THIS PROJECT. CHARLES G. THARP, P.E., RETAINS OWNERSHIP AND ALL COMMON LAW, STATUTORY LAW AND OTHER RESERVED RIGHTS INCLUDING COPYRIGHTS. THE DESIGN INDICATED SHALL NOT BE MODIFIED WITHOUT WRITTEN CONSENT OF CHARLES G. THARP, P.E. IF ANY MODIFICATIONS TO THIS DESIGN IS MADE, CHARLES G. THARP, P.E. SHALL BE "HELD HARMLESS" FOR ANY DAMAGES, LIABILITIES OR COSTS RESULTING DIRECTLY OR INDIRECTLY FROM SUCH MODIFICATIONS TO THE FULLEST EXTENT OF THE LAW.

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Date: 2019.08.31 08:57:05 -0500



PROJECT NUMBER

17-012

DATE

3/27/2018  
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CONTENTS

SPECIFICATIONS

SHEET NUMBER

MEP2.0



GENERAL ELECTRICAL REQUIREMENTS

- PART 1 - GENERAL**  
**WORK INCLUDED**
- THE FURNISHING OF ALL ADMINISTRATION, LABOR, EQUIPMENT, AND MATERIALS REQUIRED FOR THE INSTALLATION OF COMPLETE ELECTRICAL SYSTEMS.
  - REFERENCES (LATEST ISSUE SHALL APPLY UNLESS OTHERWISE NOTED)
  - COMPLY WITH THE FOLLOWING STANDARDS:
    - ANSI AMERICAN NATIONAL STANDARDS INSTITUTE.
    - FS FEDERAL SPECIFICATION.
    - CEIA INDUSTRIAL CABLE ENGINEERS ASSOCIATION.
    - IEEE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS.
    - IES ILLUMINATING ENGINEERING SOCIETY.
    - FISA INSTRUMENT SOCIETY OF AMERICA.
    - NEC NATIONAL ELECTRICAL CODE.
    - NEMA NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION.
    - NESCC NATIONAL ELECTRICAL SAFETY CODE.
    - NFPA NATIONAL FIRE PROTECTION ASSOCIATION.
    - OSHA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION.
    - UBC UNIFORM BUILDING CODE.
    - UL UNDERWRITER'S LABORATORIES, INC.
    - FEDERAL, STATE AND LOCAL CODES.

- SUBMITTALS FOR REVIEW**
- PRIOR TO ORDERING EQUIPMENT OR STARTING ANY INSTALLATION WORK, SUBMIT THREE (3) COPIES OF ITEMS PROPOSED FOR THIS WORK WITH NECESSARY ILLUSTRATIONS, DRAWINGS, AND ENGINEERING DATA FOR REVIEW BY THE OWNER AND/OR ENGINEER. SUBMIT IN TIME TO ALLOW NO LESS THAN SEVEN (7) WORKING DAYS FOR REVIEW, CHECKING, COMMENTING AND TRANSMITTAL WITHOUT DELAYING THE CONSTRUCTION SCHEDULE. SUBMIT ALL ITEMS AT ONE TIME NO LESS THAN TWENTY (20) DAYS AFTER AWARD OF THE CONTRACT.
  - SUBMITTALS SHALL BE CLEARLY MARKED TO SHOW THE INTENDED ITEM, WITH IDENTIFICATION AS TO THE EQUIPMENT NUMBER OR OTHER MARKING TO SHOW LOCATION, SERVICE, AND FUNCTION. ALL OTHER EXTRANEOUS AND INAPPLICABLE INFORMATION SHALL BE MARKED OUT BEFORE SUBMITTAL. SUBMITTALS NOT CLEARLY MARKED TO PROPERLY IDENTIFY THE EQUIPMENT AND APPLICATION WILL BE REJECTED AND RETURNED FOR IMMEDIATE RE-SUBMITTAL BY THE CONTRACTOR.
  - THE CONTRACTOR AGREES THAT SUBMITTALS REVIEWED AND APPROVED BY THE OWNER AND/OR ENGINEER ARE NOT CHANGE ORDERS; THE PURPOSE OF SUBMITTALS BY THE CONTRACTOR IS TO DEMONSTRATE TO THE OWNER AND/OR ENGINEER THAT THE CONTRACTOR UNDERSTANDS THE PROJECT DESIGN, AND THAT THIS UNDERSTANDING IS DEMONSTRATED BY INDICATING THE EQUIPMENT AND MATERIALS HE OR SHE INTENDS TO FURNISH AND INSTALL AND/OR BY THE FABRICATION AND INSTALLATION METHODS HE OR SHE INTENDS TO USE.
  - CONTRACTOR FURTHER AGREES THAT IF DEVIATIONS, DISCREPANCIES, OR CONFLICTS BETWEEN SUBMITTALS AND CONTRACT DOCUMENTS ARE DISCOVERED, EITHER PRIOR TO OR AFTER, SUBMITTALS ARE TO BE PROCESSED BY THE OWNER AND THE CONTRACTOR'S CONTROL, AND SHALL BE FOLLOWED. SUBMITTALS ARE REQUIRED OF ALL EQUIPMENT AND MATERIALS FURNISHED ON THE PROJECT AND SHALL INCLUDE AND BE CLEARLY MARKED AS FOLLOWS:
    - SUBMITTAL DATE.
    - NAMES OF CONTRACTORS, SUBCONTRACTORS, SUPPLIERS, AND MANUFACTURERS OF MATERIALS AND SUPPLIES.
    - ALL PERFORMANCE DATA FOR ELECTRICAL EQUIPMENT, INCLUDING DIMENSIONAL INFORMATION AND VOLTAGE, PHASE, OPERATING AND NAMEPLATE AMPERAGE OF EACH ELECTRICAL ITEM SUCH AS MOTORS, HEATERS, OR OTHER ITEMS. FOR MOTORS, PROVIDE THE MANUFACTURER'S NAMEPLATE INFORMATION FOR REVIEW AND APPROVAL. IF APPLICABLE, ALL AUXILIARY EQUIPMENT, INCLUDING VARIOUS DETAILS TO ASSURE THE INTENT OF THE WORK WILL BE MET.
    - FULL DESCRIPTION OF CAPABILITIES OF EQUIPMENT, INCLUDING BUT NOT LIMITED TO THE MANUFACTURER'S DRAWINGS, CUT SHEETS, DATA SHEETS, AND OTHER DESCRIPTIVE INFORMATION.
    - MSDS INFORMATION FOR ALL POTENTIALLY HAZARDOUS CHEMICALS AND MATERIALS. ALSO, POST A COPY OF THE MSDS AT THE JOBSITE AS REQUIRED INDICATING THE REQUIRED PROPER HANDLING TECHNIQUES AND SAFETY PROCEDURES FOR THE MATERIALS.

- SITE CONDITIONS**
- THE CONTRACTOR MUST INSPECT THE WORK AREAS, DRAWINGS AND SPECIFICATIONS AND BECOME THOROUGHLY ACQUAINTED WITH THE CONDITIONS WHICH MAY BE ENCOUNTERED DURING THE INSTALLATION OF THE WORK. NO EXTRA COMPENSATION OR INVOICING WILL BE ALLOWED TO COVER THE WORK WHICH HAS NOT BEEN INCLUDED IN THE BID DUE TO FAILURE OF THE CONTRACTOR TO THOROUGHLY EXAMINE THE PREMISES.
  - ARRANGEMENT OF SYSTEMS INDICATED ON THE DRAWINGS IS DIAGRAMMATIC, AND INDICATES THE MINIMUM REQUIREMENTS FOR ELECTRICAL WORK. SITE CONDITIONS MAY DETERMINE THE ACTUAL ARRANGEMENT OF SYSTEMS. FIELD MEASUREMENTS SHALL BE TAKEN AND CONFIRMED. THE CONTRACTOR SHALL CONFIRM ACCURACY OF DIMENSIONS BEFORE FABRICATION AND SHALL BE RESPONSIBLE FOR ALL EQUIPMENT AND COMPONENT LAYOUTS. OVERHEAD WORK SHALL BE LAID OUT TO OBTAIN THE MAXIMUM HEAD ROOM. COORDINATE THE LOCATION OF ALL ELECTRICAL SYSTEMS TO AVOID INTERFERENCE WITH THE LOCATION OF OTHER SYSTEMS OR WITH TRAFFIC FLOW WITHIN THE BUILDING. CONFIRM LOCATIONS WITH THE OWNER PRIOR TO INSTALLATION.
  - THE CONTRACTOR IS RESPONSIBLE FOR THE DAILY INSPECTION OF THE PROJECT WORK SITE FOR THE PRESENCE OF ASBESTOS MATERIALS OR FOR MATERIALS THAT MAY BE ASBESTOS CONTAMINATED. IT IS BELIEVED THAT THERE ARE NO UNKNOWN ASBESTOS MATERIALS ON THE WORK SITE. ALL KNOWN MATERIALS ARE MARKED INDICATING THE PRESENCE OF ASBESTOS MATERIALS. THE OWNER KNOWS OF NO POTENTIALLY CONTAMINATED AREAS, PIPING SYSTEM, DUCT SYSTEM, ETC. THAT MIGHT CONTAIN SUCH MATERIALS. CONTRACTOR SHALL NOT ALLOW EMPLOYEES OR OWNERS PERSONNEL TO BE EXPOSED IN ANY FASHION TO ANY UNKNOWN MATERIALS THAT MAY CONTAIN ASBESTOS MATERIALS. EXPOSURE TO MATERIALS IN QUESTION SHALL BE COMPLETELY AVOIDED IMMEDIATELY. CONTRACTOR SHALL CORDON OFF THE AREA WITH "SAFETY TAPE" TO IDENTIFY THE POTENTIAL RISK AND THEREFORE LIMIT EXPOSURE FOR OTHERS. THE OWNER SHALL BE CONTACTED IMMEDIATELY. THE OWNER WILL MAKE IMMEDIATE ARRANGEMENTS FOR THE INSPECTION OF MATERIALS IN QUESTION AND, IF NECESSARY, FOR REMOVAL OF SAME MATERIALS BY AN OUTSIDE CONSULTING FIRM. THE ENGINEER HAS NOT BEEN RETAINED BY THE OWNER TO INSPECT THE SITE FOR THE PRESENCE OF ASBESTOS MATERIALS AND THEREFORE HAS NO SPECIFIC KNOWLEDGE OF THE PRESENCE OF SUCH MATERIALS.

- QUALITY ASSURANCE**
- COMPLY WITH ALL GOVERNING CODES AND REGULATIONS. PROVIDE PRODUCTS OF ACCEPTABLE MANUFACTURERS WHICH HAVE BEEN IN SATISFACTORY USE IN SIMILAR SERVICE FOR TEN (10) YEARS. USE EXPERIENCED INSTALLERS. DELIVER, HANDLE, AND STORE MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
  - THE CONTRACT DRAWINGS FOR THIS 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 CONSTRUCTION DRAWINGS, MECHANICAL DRAWINGS AND ALL OTHERS AND SPECIFICATIONS FOR THIS PROJECT TO DETERMINE ALL CONDITIONS AFFECTING THE ELECTRICAL WORK.
  - THE CONTRACT DRAWINGS ARE NOT NECESSARILY SCALED AND THE CONTRACTOR SHALL VERIFY ADEQUACY AND SUITABILITY OF SPACES IN WHICH THE ELECTRICAL WORK IS TO BE INSTALLED. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE EQUIPMENT INSTALLATION LAYOUTS, ORIENTATION, CLEARANCES FOR ACCESS AND MAINTENANCE, INSPECTION, TESTING, FINISHING, SAFETY, AND OTHER ITEMS FOR ANY EQUIPMENT FURNISHED.
  - CONTRACTOR SHALL ALSO BARE ANY ADDITIONAL COSTS PERTAINING TO THE CONTRACTOR REQUESTED ALTERNATIVE/CHANGE AND SHALL NOT ASK FOR ADDITIONS MONIES, OR CAUSE OTHER CONTRACTORS OR TRADES TO REQUEST ADDITIONAL MONIES FROM THE OWNER AS A DIRECT OR INDIRECT RESULT OF THE USE OF THE ALTERNATE/CHANGES RESULTING FROM AN ALTERNATE ACCEPTED BY THE OWNER OR ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACCURACY OF DIMENSIONS AND LAYOUT.
  - A REPRESENTATIVE MAY BE APPOINTED BY THE ENGINEER AS THE ENGINEER'S PROJECT INSPECTOR AND MAY INSPECT THE WORK AS IT PROGRESSES. ANY WORK OR MATERIAL REJECTED BY THE INSPECTOR SHALL BE REMOVED AND REPLACED WITH WORK OR MATERIALS AS SPECIFIED OR AS SHOWN ON THE DRAWINGS OR AS REQUIRED BY CODES OR INDUSTRY STANDARDS AT NO ADDITIONAL COSTS TO THE OWNER.

- REGULATORY REQUIREMENTS**
- SPECIAL PART OF WORK: THE CONTRACTOR SHALL STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED HOISTS, SCAFFOLDS, STAGING, RUNWAYS, AND EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE WORK. SAFE MOVEABLE SCAFFOLDS WITH CORRECT HANDRAILS, TOE-PLATES, AND OTHER FEATURES SHALL BE PROVIDED AND USED FOR OVERHEAD WORK. THE CONTRACTOR SHALL ALSO STRICTLY COMPLY WITH ALL OSHA SAFETY RULES AND REGULATIONS AND USE ONLY APPROVED METHODS OF EXCAVATION, TRENCHING, AND SHORING METHODS AS DESCRIBED IN OSHA 29 CFR SUBPART F, EXCAVATIONS. ALL EQUIPMENT USED IN THE ACTIVITIES OF THE WORK SHALL BE CURRENTLY APPRAISED BY OSHA FOR THE USES SPECIFICALLY DESIGNED FOR BY THE EQUIPMENT MANUFACTURER. THE CONTRACTOR SHALL MAINTAIN AND CLOSELY SUPERVISE SAFETY PRACTICES AND CODES. EXTREME CARE SHALL BE TAKEN TO SAFEGUARD THE SAFETY OF THE PUBLIC, THE OWNER'S EMPLOYEES, AND THE CONTRACTOR'S EMPLOYEES.
  - FALL PROTECTION ON THE JOB SITE MUST COMPLY WITH PROVISIONS OF OSHA STANDARDS FOUND IN 29 CFR 1926 SUBPART M: AND AS SPECIFICALLY DEFINED BY 1926.501(B), SUBSECTIONS (1) THROUGH (15).
  - REMOVE MATERIALS AS SPECIFIED OR AS REQUIRED DURING THE COURSE OF THE WORK. COMMUNICATE WITH THE OWNER AND VERIFY THE DISPOSITION PLAN WITH OWNER. DISPOSE OF ALL MATERIALS IN A LEGAL, ACCEPTABLE, AND PROPER FASHION.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR BECOMING FAMILIAR WITH LOCAL GOVERNING AUTHORITIES HAVING JURISDICTION, CODES, AND STATUTES AND, IF REQUIRED, SHALL OBTAIN THE REQUIRED PERMITS, PAY ALL RELATED FEES INCLUDING INSPECTION FEES, AND OBTAIN INSPECTIONS AS REQUIRED TO COMPLETE AND FINISH HIS WORK. THE FOLLOWING CODES SHALL BE STRICTLY BE ADHERED TO:
    - ALL OSHA REQUIREMENTS AND GUIDELINES INCLUDING OSHA 29 CFR 1926 AND 1910.
    - STATE AND LOCAL BUILDING CODES.
    - STATE AND LOCAL MECHANICAL CODES.
    - STATE AND LOCAL ELECTRICAL CODES.
    - NFPA STANDARDS.
    - LIFE SAFETY CODES AND STANDARDS.
    - ADA REQUIREMENTS.

- MATERIAL DELIVERY, HANDLING, STORAGE AND PROTECTION**
- DELIVER, STORE, PROTECT AND HANDLE PRODUCTS TO THE SITE. OBTAIN MSDS SHEETS ON CHEMICALS AND OTHER MATERIALS UPON DELIVERY AND PROVIDE TRAINING AND DOCUMENTATION FOR ALL WORKERS ON CONSTRUCTION SITE.
  - ALL ELECTRICAL MATERIALS AND RELATED ELECTRICAL EQUIPMENT SHALL BE INSPECTED UPON RECEIPT FOR DAMAGE AND MANUFACTURING FLAWS. ANY DAMAGE OR FLAWS SHALL BE DULY NOTED AND ITEMS RETURNED TO THE SUPPLYING VENDOR OR MANUFACTURER OR REPAIRED SATISFACTORILY. SHIPMENT OF THE EQUIPMENT SHALL BE SCHEDULED TO AVOID ANY DELAY IN THE CONSTRUCTION SCHEDULE AS THE CONSTRUCTION SCHEDULE SHALL NOT BE CHANGED. AS REQUIRED, ACCEPT THE MATERIALS ON SITE IN SHIPPING CONTAINERS WITH THE LABELING IN PLACE. DOCUMENT THE CONDITION OF MATERIALS UPON RECEIPT.
  - STORE MATERIALS SUCH THAT NO DANGER EXISTS FROM THE POTENTIAL OF STACKED MATERIALS FALLING ON PERSONNEL OR OTHER MATERIALS.
  - STORE ALL MATERIALS ON PALETTES, SHORING, OR TIMBERS AS REQUIRED TO PREVENT THE MATERIALS FROM RESTING ON THE GROUND OR FINISHED SURFACES WHERE DAMAGE TO THE MATERIALS OR FINISHED SURFACES MAY OCCUR. PROTECT, STORE, AND HANDLE ALL MATERIALS SUCH THAT NO SPILL MAY OCCUR THAT CAN DAMAGE THE ENVIRONMENT IN ANY FASHION. PROVIDE TEMPORARY PROTECTIVE COVERING OR COATINGS FOR FERROUS MATERIALS SUCH AS CAST IRON, STEEL VALVES, AND OTHER SURFACES. PROTECT MATERIALS THAT MAY BE DAMAGED FROM FREEZING BY STORING IN HEATED AREAS.
  - PROVIDE TEMPORARY END CAPS OR CLOSURES ON CONDUIT, FITTINGS AND EQUIPMENT OPENINGS. MAINTAIN THE CAPS IN PLACE UNTIL INSTALLATION. DURING HANDLING AND INSTALLATION OF THE MATERIALS, PROTECT ELECTRICAL SYSTEMS FROM ENTRY OF FOREIGN MATERIALS BY UTILIZING TEMPORARY COVERS, COMPLETING AND CLOSING SECTIONS OF THE WORK, AND ISOLATING PARTS OF THE COMPLETED SYSTEM.
  - DAMAGED, LOST OR STOLEN MATERIALS SHALL BE REPLACED BY THE CONTRACTOR AT THE EXPENSE OF THE CONTRACTOR.

- COORDINATION**
- COORDINATE WORK AND ACTIVITIES AT THE SITE WITH THE OWNER DURING ALL WORK TO PROVIDE ADEQUATE AND TIMELY ACCESS TO ALL CONTRACT WORK AREAS WITH A MINIMAL DISRUPTION OF THE OWNER'S ACTIVITIES AND BUSINESS NEEDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR A SCHEDULED SEQUENCE IN PERFORMING THE WORK SO THAT IT WILL NOT INTERFERE WITH THE OWNER'S OPERATION. BEFORE ANY WORK IS STARTED, THE CONTRACTOR SHALL CONSULT WITH THE OWNER AND ARRANGE A SATISFACTORY WORK SCHEDULE. THE CONTRACTOR SHALL MAKE TEMPORARY ALTERATIONS AS REQUIRED TO EXECUTE THE WORK SO THAT ALL OPERATIONS AND SERVICES IN THE FACILITY ARE MAINTAINED WITH THE MINIMUM POSSIBLE INTERRUPTION. TEMPORARY SHUT-DOWNS SHALL BE MINIMIZED AND SHALL BE OF THE SHORTEST POSSIBLE DURATION. ALL FACILITIES SHALL BE KEPT IN CONTINUOUS OPERATION UNLESS SPECIFIC PERMISSION TO THE CONTRARY IS GRANTED IN WRITING BY THE OWNER. DAILY SCHEDULING AND WORK LOCATION IS A PART OF THE CONTRACTOR'S WORK INCLUDED HEREIN.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION AND COOPERATION WITH THE OWNER AND OTHER TRADES SO THAT THE INSTALLATION IS PERFORMED WITH MINIMUM OF INTERFERENCE AND CONFLICT. PARTICULAR ATTENTION MUST BE PAID TO COMMUNICATION WITH THE VARIOUS TRADES REGARDING THE PLANNED INSTALLATION OF THIS WORK.
  - THE CONTRACTOR SHALL BE PREPARED TO START, PROGRESS WITH, AND COMPLETE THE WORK AS PER THE OWNER'S PROJECT SCHEDULE AND COORDINATING THE ACTIVITY OF OTHERS PERFORMING PROJECT WORK.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TIMELY PROCUREMENT OF MATERIALS AS SPECIFIED IN THIS SPECIFICATION. THE CONTRACTOR SHALL SCHEDULE PROCUREMENT OF ALL MATERIALS SO THAT THEY MAY BE DELIVERED AND INSTALLED WITHIN THE TERMS OF THE PROJECT SCHEDULE. ANY DIFFICULTIES IN PROCUREMENT AFFECTING THE INTENDED SCHEDULE SHOULD BE PROMPTLY REPORTED TO THE OWNER IN WRITING.

- WARRANTY**
- ALL MATERIALS, LABOR AND SYSTEM COMPONENTS SHALL BE GUARANTEED FOR A MINIMUM PERIOD OF ONE (1) YEAR FROM DATE OF FINAL ACCEPTANCE OF WORK BY THE OWNER, UNLESS SPECIFIED OTHERWISE IN OTHER SPECIFICATION. ALL EQUIPMENT SHALL BE COVERED BY A SEPARATE WARRANTY. CONFLICTS IN STATED WARRANTY PERIODS SHALL AUTOMATICALLY DEFAULT TO THE LONGEST STATED PERIOD. SHOULD ANY MECHANICAL OR OTHER RELATED PROBLEM DUE TO FAULTY MATERIALS OR WORKMANSHIP OCCUR, THE PROBLEM SHALL BE CORRECTED TO THE SATISFACTION OF THE OWNER. IF THE OWNER, ANY DEFECTIVE MATERIALS OR INFERIOR WORKMANSHIP DISCOVERED AT THE TIME OF INSTALLATION AND/OR DURING THE GUARANTEE PERIOD SHALL BE CORRECTED IMMEDIATELY TO THE COMPLETE SATISFACTION OF THE OWNER.
  - THE CONTRACTOR SHALL FURTHER AGREE TO REPAIR OR RENEW, FREE OF CHARGE TO THE OWNER ANY PART OF THE EQUIPMENT WHICH SHALL PROVE TO BE DEFECTIVE WITHIN TWO (2) YEARS AFTER THE DATE OF ACCEPTANCE BY THE OWNER.
  - ELECTRICAL EQUIPMENT SUCH AS TRANSFORMERS AND PANELBOARDS SHALL HAVE A MINIMUM EXTENDED WARRANTY PERIOD OF FIVE (5) YEARS FROM DATE OF FINAL ACCEPTANCE BY THE OWNER.
  - THE CONTRACTOR SHALL PROTECT THE EQUIPMENT FROM DAMAGE AND KEEP THE EQUIPMENT IN AN 'AS NEW' CONDITION FOR ALL THE FURNISHED MATERIALS AND EQUIPMENT UNTIL FINAL ACCEPTANCE BY THE OWNER.
- TEST AND REPORTS**
- INSTRUCT THE OWNER IN THE OPERATION AND MAINTENANCE OF THE ELECTRICAL SYSTEM.
  - PERFORM OPERATIONAL TESTS ON ALL LIGHTING AND 120 VOLT RECEPTACLE CIRCUITS AND AS REQUIRED IN THE SPECIFICATIONS.
  - INSPECT ALL GROUND CONNECTIONS FOR CONTINUITY AND TIGHT CONNECTIONS. TEST RESISTANCE AT VARIOUS POINTS ON THE GROUNDING ELECTRODE SYSTEM USING A BIDDLE METER. REPORT ANY READING GREATER THAN 5 OHMS TO THE OWNER.
  - CHECK ALL CONTROL AND INTERLOCKING WIRING FOR PROPER OPERATION. PERFORM OPERATIONAL TESTS WITH THE OWNER TO ASSURE THAT CONTROL WIRING HAS BEEN PROPERLY INSTALLED.
  - SUBMIT A LIST OF MOTORS THAT REQUIRE AN OVERLOAD HEATER WITH THE FOLLOWING DATA:
    - MOTOR DESIGNATION.
    - HORSEPOWER, VOLTAGE, PHASE, AND SERVICE FACTOR.
    - NAMEPLATE FULL LOAD AMPERES.
    - MANUFACTURER'S CATALOG NUMBER OF HEATER SELECTED.
  - DURING THIS WORK, VERIFY THAT OVERLOAD RELAYS ARE SET ON 'MANUAL' RESET.
  - BEFORE ENERGIZING ANY PANELBOARD OR SWITCHBOARD.
  - REMOVE ALL CONSTRUCTION DIRT AND DEBRIS.
  - CHECK THAT WIRING IS NOT RESTING AGAINST SHARP EDGES OF THE ENCLOSURE.
  - CONDUCT INSULATION TESTS BETWEEN BUSES AND BETWEEN BUS AND GROUND.
  - VERIFY THAT OVERCURRENT DEVICES HAVE PROPER RATINGS AND SETTINGS.
  - CONDUCT INSULATION TESTS ON ALL WIRING AND EQUIPMENT. RECORD DRAWINGS SHALL BE THOROUGH WITH ATTENTION TO DETAILS. THE OWNER RETAINS THE RIGHT TO REQUEST MORE INFORMATION TO BE ADDED TO DRAWINGS AS NEEDED. RECORD DRAWINGS SHALL BE CLEARLY MARKED WITH AN ERASABLE RED LEAD PENCIL.
  - SUBMIT GROUND FAULT PROTECTION SYSTEM TESTING AS REQUIRED BY NEC 230-95C.
  - CHECK ROTATION ON ALL MOTORS AND REVERSE ROTATION IF NECESSARY.
  - CHECK ROTATION OF ALL UTILITY SERVICES AND BUILDING GENERATOR SOURCES TO ASSURE PROPER PHASE ROTATION.

- PROJECT CLOSE-OUT**
- ADEQUATELY INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF EACH SYSTEM AND EQUIPMENT ITEM.
  - PROVIDE THE OWNER THREE (3) SETS OF OPERATION AND MAINTENANCE MANUALS FOR EACH SYSTEM OR EQUIPMENT ITEM. THE VARIOUS ITEMS FOR EACH MANUAL SHALL BE BOUND TOGETHER IN ONE PLASTIC COMB BOUND BOOKLET OR HEAVY DUTY THREE (3) RING BINDER.
  - PROVIDE FOR THE REUSE BY THE OWNER OR PROPER DISPOSAL OF EXCESS MATERIALS AS REQUIRED TO APPROVED LOCATIONS ON THE SITE OR FOR DISPOSAL AS REQUIRED IF NO ACCEPTABLE PLACE FOR DISPOSAL EXISTS ON THE SITE. THE HAULING, HANDLING, CONFIRMATION, COORDINATION, AND MANAGEMENT OF THIS ACTIVITY ARE WHOLLY THE RESPONSIBILITY OF THE CONTRACTOR.
  - FURNISH RECORD DRAWINGS OF THE FINAL INSTALLATION NOTING IMPORTANT DATA DURING AND AFTER THE FINAL INSTALLATION IS COMPLETE AND SYSTEMS ARE OPERATIONAL. RECORD DRAWINGS SHALL BE THOROUGH WITH ATTENTION TO DETAILS. THE OWNER RETAINS THE RIGHT TO REQUEST MORE INFORMATION TO BE ADDED TO DRAWINGS AS NEEDED. RECORD DRAWINGS SHALL BE CLEARLY MARKED WITH AN ERASABLE RED LEAD PENCIL.
  - COPIES OF ALL PROJECT CLOSE-OUT DOCUMENTS SHALL BE FORWARDED TO THE OWNER FOR REVIEW, APPROVAL, AND USE.

PART 2 - PRODUCTS AND MATERIALS

- MATERIAL STANDARDS**
- ALL PRODUCTS SHALL BE FIRST-LINE QUALITY, NEW AND UNUSED OF THE GRADE AND TYPE AS SHOWN ON THE DRAWINGS AND AS SPECIFIED, OR THE EQUIVALENTS AS APPROVED BY THE OWNER IN WRITING.
  - ALL PRODUCTS SHALL BE IN CURRENT PRODUCTION WITH NO NOTICE HAVING BEEN GIVEN THAT THIS PRODUCT IS TO BE DRASTICALLY CHANGED, MODIFIED, OR DISCONTINUED FROM PRODUCTION.
  - WHEN ANY MATERIAL OR EQUIPMENT IS IDENTIFIED ON THE PLANS OR IN THE SPECIFICATIONS BY REFERENCE TO ONE MANUFACTURER'S NAME OR MODEL NUMBER, IT IS INTENDED TO ESTABLISH THE REQUIRED STANDARD OF DESIGN AND QUALITY, AND IT IS NOT INTENDED TO LIMIT COMPETITION. IT IS UNDERSTOOD THAT, WHETHER PRESENT OR NOT, THE PHRASE "OR EQUAL" OR "OR AN APPROVED EQUIVALENT" APPLIES TO ALL FURNISHED MATERIALS AND IS MEANT TO MEAN AN "ACCEPTED" ITEM IF APPROVED BY THE OWNER AND ENGINEER PRIOR TO BIDDING PROJECT.

- MATERIAL ALTERNATIVES**
- IF THE CONTRACTOR DESIRES TO SUGGEST CHANGES, MODIFICATIONS OR ALTERNATIVES, THE CONTRACTOR SHALL SUBMIT, IN WRITING, A DESCRIPTION OF THE PROPOSED CHANGES OR MODIFICATIONS FOR REVIEW BY THE OWNER AND/OR ENGINEER.
  - THE CONTRACTOR OR SHALL SUBMIT TO THE OWNER FOR APPROVAL THREE (3) COPIES OF DESCRIPTIVE INFORMATION FOR ANY MATERIALS PROPOSED BY THE CONTRACTOR WHICH ARE NOT EXACTLY AS SPECIFIED AND ARE INTENDED TO BE EQUAL OR BETTER IN QUALITY OR PERFORMANCE. THE INFORMATION SHALL INCLUDE, AS A MINIMUM, CATALOG DATA SHEETS AND SHOP DRAWINGS, SAMPLES AND OTHER SUPPORTIVE INFORMATION AS NECESSARY FOR THE OWNER TO EVALUATE THE PROPOSED MATERIALS AND EQUIPMENT.
  - THE OWNER SHALL REVIEW ALTERNATIVE MATERIAL AND EQUIPMENT RECOMMENDATIONS AND SHALL BE THE SOLE JUDGE IN DETERMINING WHETHER THE PROPOSED MATERIAL, ACCESSORY, OR ITEM MEETS THE STATED CRITERIA FOR THE SERVICE AND CONDITIONS IMPOSED. THE OWNER MAY REQUEST THE ENGINEER TO PROVIDE AN OPINION REGARDING SUCH ISSUES.
  - THE CONTRACTOR SHALL NOT PROCEED WITH ANY PROPOSED CHANGES OR MODIFICATIONS UNTIL AUTHORIZED TO DO SO BY THE OWNER IN WRITING. THE COST OF ANY WORK PERFORMED ON PROPOSED CHANGES OR MODIFICATIONS WITHOUT THE OWNER'S WRITTEN APPROVAL WILL BE AT THE CONTRACTOR'S EXPENSE, AS WELL AS ANY COST FOR UNDOING SUCH UNAUTHORIZED WORK.
  - ACCEPTANCE OF DETAILS FOR SUBSTITUTION OF EQUIPMENT, MATERIALS OR PROCESSES WILL BE CONTINGENT UPON SUBMISSION OF PROOF, SATISFACTORY TO THE OWNER THAT (1) THEY ARE SATISFACTORY IN TERMS OF QUALITY AND SERVICEABILITY; (2) THEIR USE WILL NOT ENTAIL CHANGES IN DETAILS AND CONSTRUCTION OF RELATED WORK AND (3) THEY ARE ACCEPTABLE IN CONSIDERATION OF THE REQUIRED DESIGN. THE BURDEN OF PROOF SHALL BE UPON THE PARTY PROPOSING THE SUBSTITUTION. NO CONSIDERATION WILL BE GIVEN TO INCOMPLETE SUBMITTALS.
  - THE CONTRACTOR IS ENCOURAGED TO SUGGEST ALTERNATES COVERING EACH OF THE FOLLOWING SUBJECTS:
    - ALTERNATIVE MATERIALS AND EQUIPMENT TO IMPROVE QUALITY, SCHEDULE OR REDUCE PRICING.
    - EXCEPTIONS TO THE SPECIFICATIONS COVERING MATERIALS AND EQUIPMENT, MANNER OF APPLICATION, OR OTHER DETAILS.

PART 3 - EXECUTION OF WORK

- 3.01 EXAMINATION AND INSPECTION**
- PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL VISIT THE SITE AND BECOME FULLY FAMILIAR WITH ALL CONDITIONS SUCH AS OVERHEAD OBSTRUCTIONS, STRUCTURES, EQUIPMENT, AND OTHER ITEMS THAT PERTAIN TO THE WORK DESCRIBED HEREIN. FAILURE TO UNDERSTAND OR HAVE KNOWLEDGE OF ISSUES THAT COULD HAVE BEEN DETERMINED PRIOR TO BIDDING WILL NOT CONSTITUTE GROUNDS FOR ASKING FOR WORK CHANGE ORDERS OR EXTRA WORK.
- VERIFY FIELD DIMENSIONS, ROUTING, CLEARANCES, ACCESS, HEIGHTS, SCHEDULES, AND OTHER TIMES BY FIELD INSPECTION AND SITE ASSESSMENT PRIOR TO BEGINNING THE WORK.
  - ARRANGEMENT OF SYSTEMS INDICATED ON THE DRAWINGS IS DIAGRAMMATIC, AND INDICATES THE MINIMUM REQUIREMENTS FOR THE ELECTRICAL WORK. SITE CONDITIONS MAY DETERMINE THE ACTUAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL BE RESPONSIBLE FOR ACCURACY OF DIMENSIONS AND LAYOUT. OVERHEAD WORK SHALL BE LAID OUT TO OBTAIN MAXIMUM HEAD ROOM. COORDINATE THE LOCATION OF ALL SYSTEMS TO AVOID INTERFERENCE WITH THE LOCATION OF OTHER SYSTEMS, WORK OF OTHER TRADES OR WITH TRAFFIC FLOW WITHIN THE AREAS.
  - WHERE SPECIFIC DETAILS AND DIMENSIONS FOR THE 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 SHALL PROVIDE 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 (IF THERE IS ANY DIFFERENCE IN COSTS) IS INCLUDED IN THE CONTRACT PRICE, AND THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH THE DRAWINGS AND WITH THE SPECIFICATIONS, AS DETERMINED AND APPROVED BY THE OWNER/ENGINEER, AND NO ADDITIONAL COSTS SHALL BE ADDED TO THE CONTRACT PRICE.
  - THE CONTRACTOR SHALL EXAMINE THE AREAS AND CONDITIONS UNDER WHICH THIS WORK IS TO BE INSTALLED. DO NOT PROCEED WITH THE WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. THE STARTING OF WORK IS ACCEPTANCE OF THE CONDITIONS WITHIN ANY PARTICULAR AREA.
  - THE CONTRACTOR SHALL TAKE EXTRA PRECAUTIONS TO PROTECT THE FLOORS, ROOFS, AND GROUND FROM OIL SPILLAGE AND DRIPPING. ANY OPERATION, SUCH AS CUTTING AND THREADING OF PIPE, THAT CAN RESULT IN DRIPPING OF OIL AND THREAD CUTTINGS SHALL BE DONE OVER A DRAIN PAN THAT WILL COLLECT ALL DRIPPINGS. TARPAILINS, PLYWOOD OR DROP CLOTHS SHALL BE USED AROUND SUCH PIPING TO PREVENT WORKERS FROM TRACKING OIL OVER THE AREA. WORKERS SHALL BE CAUTIONED ABOUT CLEANING THEIR SHOES. ANY LIQUIDS, SUCH AS OIL, THAT WILL BE USED IN THIS WORK SHALL BE KEPT IN TIGHTLY STOPPERED CONTAINERS, AND EXTREME CARE SHALL BE USED WHEN CHARGING EQUIPMENT WITH THESE MATERIALS SO AS TO AVOID ANY SPILLS.

- 3.02 INSTALLATION**
- WORK UNDER THIS DIVISION OF THE SPECIFICATIONS SHALL CONSIST OF THE FURNISHING OF ALL LABOR AND MATERIALS NECESSARY FOR THE COMPLETE INSTALLATION OF ALL ELECTRICAL AND CONTROLS SYSTEMS AS SHOWN ON THE DRAWINGS AND/OR AS SPECIFIED HEREIN. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL MINOR ITEMS WHICH ARE OBVIOUSLY REQUIRED AND REASONABLY NECESSARY FOR THE WORK. THE CONTRACTOR SHALL DRILL, CUT, OR OTHERWISE ATTACH COMPONENTS FOR INSTALLATION OF THE WORK WITH THE FULL UNDERSTANDING THAT THE CONTRACTOR IS RESPONSIBLE FOR LEAVING THE FINISHED AREAS IN AN "AS ORIGINAL" CONDITION. CAULKING, FILLING, TOUCH-UP PAINTING, AND OTHER SURFACE FINISH AROUND THE CONTRACTOR'S WORK AND WORK AREA IS THEREFORE WITHIN THE SCOPE OF WORK OF THIS SPECIFICATION. ALL WORK SHALL BE COMPLETED AND READY FOR FULL OPERATION.
  - INSTALL ALL MATERIALS AND SYSTEMS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND AS PER THE APPROVED SUBMITTALS. INSTALL MATERIALS IN PROPER RELATIONSHIP WITH ADJACENT CONSTRUCTION AND WITH A UNIFORM APPEARANCE FOR EXPOSED WORK. COORDINATE THE INSTALLATION WITH THE WORK OF OTHER SECTIONS. COMPLY WITH ALL APPLICABLE REGULATIONS AND BUILDING CODE REQUIREMENTS.
  - RESTORE DAMAGED FINISHES. CLEAN AND PROTECT THE WORK FROM DAMAGE DURING CONSTRUCTION AND CLEAN THE FINAL WORK AT PROJECT COMPLETION. ANY DAMAGED, SCRATCHED, MARRED, OR OTHERWISE DEFACED PAINTED SURFACES, WALLS, CEILINGS, ROOFS, FLOORS, DOORS, INSULATED SURFACES OR INSULATION COVERINGS OR FINISHES, OR OTHER ITEMS SHALL BE SO REPAIRED TO RESTORE THE FINISH TO ORIGINAL CONDITION BY PERSONNEL WORKING IN THE REQUIRED RESPECTIVE TRADE.
  - IF REQUIRED, INSTALL APPROVED FIRE STOP MATERIALS AROUND ALL PIPE AND DUCT MATERIAL PENETRATIONS THROUGH FIRE RATED WALLS AND FLOORS.
  - IT IS THE INTENT THAT ALL MATERIALS AND MATERIAL SURFACES HAVE A PROTECTIVE FINISH WHEN IN PLACE. ALL NON-GALVANIZED FERROUS METAL ITEMS INSIDE THE BUILDING EXPOSED TO WEATHER OR OTHER AREA SUBJECT TO RUSTING SHALL BE GIVEN ONE HEAVY COAT OF RUST PREVENTIVE PRIMER AT THE TIME OF INITIAL INSTALLATION TO PREVENT RUSTING OR CORROSION PRIOR TO FINAL PAINTING.

- 3.03 PENETRATIONS, CUTTING AND PATCHING**
- FOR ALL WORK, THIS SPECIFICATION GOVERNS THE MINIMUM REQUIREMENTS FOR THE MATERIAL PROCUREMENT, LABOR, SUPERVISION, TOOLS, AND EQUIPMENT NECESSARY FOR PENETRATION OF THE BUILDING ELEMENTS. WORK TO BE PERFORMED SHALL INCLUDE THE COMPLETE AND PROPER PENETRATION OF BUILDING ELEMENTS AS SHOWN ON THE DRAWINGS AND AS NECESSARY TO PROPERLY INSTALL AN OPERATING SYSTEM.
  - PENETRATIONS THROUGH THE EXTERIOR WALL SHALL BE FLASHED AND WATER TIGHT, AND ALLOW FOR THE NORMAL CONDUIT MOVEMENT. FOR NON-FIRE RATED WALLS, PACK AROUND BOTH CONDUIT WITH FIBERGLASS AND CAULK WITH A COMPOUND TO CREATE WATER TIGHT SEAL. FOR FIRE RATED WALLS, SEAL AS REQUIRED TO PROVIDE THE FULL FIRE RATING CAPACITY OF THE FIRE RATED ASSEMBLY. IF APPLICABLE, THE LOCATION OF FIRE RATED WALLS AND FLOORS WILL BE PROVIDED BY THE OWNER.
  - ALL PENETRATIONS OF INSULATION PANELS ARE TO BE PROPERLY INSULATED TO PREVENT FORMATION OF CONDENSATION ON THE WARM SIDE. WHERE CONDUITS PASS THROUGH INSULATED PANELS, THE PANELS SHALL BE NEATLY CUT TO FIT AROUND THE PIPE, WITH OPENINGS FILLED TIGHTLY WITH INSULATION. OPENINGS FILLED WITH POLYURETHANE FOAM SHALL BE COVERED WITH THE FINISH SIMILAR TO ADJACENT PANELS.
  - STAINLESS STEEL ESCUTCHEON PLATES SHALL BE PLACED AROUND PIPE SLEEVES IN WALLS, PARTITIONS, AND CEILINGS TO ENCLOSE AND SEAL-OFF THE OPENING.
  - HOLES IN MASONRY SHALL BE DRILLED WITH A SUITABLE DIAMOND-CORE-BIT ROTARY DRILL. WALL SLEEVES THROUGH CONCRETE SHALL BE GROUTED AND INSTALLED WITH FOUR 1 1/2 INCH ANCHORING LUGS. AIR HAMMERS SHALL NOT BE USED. OPENINGS SHALL BE MADE BY CORING, SAWING, OR OTHER METHODS AS APPROVED BY THE OWNER.
  - PERMISSION TO PATCH ANY AREAS OR ITEMS OF WORK SHALL NOT CONSTITUTE A WAIVER OF THE OWNER'S RIGHT TO REQUIRE COMPLETE REMOVAL AND REPLACEMENT OF SAID AREAS OR ITEMS OF WORK, IF, IN THE OWNER'S OPINION, SAID PATCHING DOES NOT SATISFACTORILY RESTORE THE QUALITY AND APPEARANCE OF SAME.

- 3.04 GROUNDING**
- ALL EQUIPMENT SHALL BE GROUNDED BY CONNECTING THE EQUIPMENT GROUND OR HOUSING TO THE BUILDING GROUNDING SYSTEM WITH A PROPERLY SIZED CONDUCTOR.
  - ALL CURRENT CARRYING EQUIPMENT SHALL BE CONNECTED TO THE GROUND SYSTEM. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, TRANSFORMERS, PANELS, MOTOR FRAMES, MOTOR CONTROL CENTERS, MOTOR CONTROLLERS, AND STARTERS.
  - EVERY CONDUIT CARRYING POWER CIRCUITS SHALL HAVE SEPARATE GROUND WIRE(S) RUN WITH THE POWER WIRES REGARDLESS OF CONDUIT MATERIAL.
  - UNLESS OTHERWISE SHOWN, A SEPARATE GROUNDING WIRE SHALL NOT BE REQUIRED IN CONTROL CIRCUIT RACEWAYS.

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THIS DRAWING HAS BEEN PREPARED BY CHARLES G. THARP, P.E. AND IS AN INSTRUMENT OF SERVICE SPECIFIC TO THIS PROJECT. CHARLES G. THARP, P.E., RETAINS OWNERSHIP AND ALL COMMON LAW, STATUTORY LAW AND OTHER RESERVED RIGHTS INCLUDING COPYRIGHTS. THE DESIGN INDICATED SHALL NOT BE MODIFIED WITHOUT WRITTEN CONSENT OF CHARLES G. THARP, P.E. IF ANY MODIFICATIONS TO THIS DESIGN IS MADE, CHARLES G. THARP, P.E. SHALL BE "HOLD HARMLESS" FOR ANY DAMAGES, LIABILITIES OR COSTS RESULTING DIRECTLY OR INDIRECTLY FROM SUCH MODIFICATIONS TO THE FULLEST EXTENT OF THE LAW.



PANELBOARDS

PART 1 - GENERAL

- 1.1 SUMMARY  
A. SECTION INCLUDES DISTRIBUTION PANELBOARDS AND LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS.
- 1.2 ACTION SUBMITTALS  
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.  
B. SHOP DRAWINGS: FOR EACH PANELBOARD AND RELATED EQUIPMENT.  
1. INCLUDE DIMENSIONED PLANS, ELEVATIONS, SECTIONS, AND DETAILS. SHOW TABULATIONS OF INSTALLED DEVICES, EQUIPMENT FEATURES, AND RATINGS.  
2. DETAIL ENCLOSURE TYPES AND DETAILS FOR TYPES OTHER THAN NEMA 250, TYPE 1.  
3. DETAIL BUS CONFIGURATION, CURRENT, AND VOLTAGE RATINGS.  
4. SHORT-CIRCUIT CURRENT RATING OF PANELBOARDS AND OVERCURRENT PROTECTIVE DEVICES.  
5. INCLUDE EVIDENCE OF NRTL LISTING OR SERIES RATING OF INSTALLED DEVICES.  
6. DETAIL FEATURES, CHARACTERISTICS, RATINGS, AND FACTORY SETTINGS OF INDIVIDUAL OVERCURRENT PROTECTIVE DEVICES AND AUXILIARY COMPONENTS.  
7. INCLUDE WIRING DIAGRAMS FOR POWER, SIGNAL, AND CONTROL WIRING.  
8. INCLUDE TIME-CURRENT COORDINATION CURVES FOR EACH TYPE AND RATING OF OVERCURRENT PROTECTIVE DEVICE INCLUDED IN PANELBOARDS.
- 1.3 INFORMATIONAL SUBMITTALS  
A. FIELD QUALITY-CONTROL REPORTS.  
B. PANELBOARD SCHEDULES FOR INSTALLATION IN PANELBOARDS.
- 1.4 CLOSEOUT SUBMITTALS  
A. OPERATION AND MAINTENANCE DATA.
- 1.5 QUALITY ASSURANCE  
A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.  
B. COMPLY WITH NEMA PB 1.  
C. COMPLY WITH NFPA 70.
- 1.6 WARRANTY  
A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE TRANSIENT VOLTAGE SUPPRESSION DEVICES THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.  
1. WARRANTY PERIOD: [FIVE] <INSERT NUMBER> YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

PART 2 - PRODUCTS

- 2.1 GENERAL REQUIREMENTS FOR PANELBOARDS  
A. FABRICATE AND TEST PANELBOARDS ACCORDING TO IEEE 344 TO WITHSTAND SEISMIC FORCES DEFINED IN SECTION 260548 "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."  
B. ENCLOSURES: [FLUSH] [SURFACE] [FLUSH- AND SURFACE]-MOUNTED CABINETS.  
1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.  
a. INDOOR DRY AND CLEAN LOCATIONS: NEMA 250, [TYPE 1] <INSERT TYPE>.  
b. OUTDOOR LOCATIONS: NEMA 250, [TYPE 3R] <INSERT TYPE>.  
c. [KITCHEN] [WASH-DOWN] AREAS: NEMA 250, [TYPE 4X] <INSERT TYPE>, [STAINLESS STEEL] <INSERT MATERIAL>.  
d. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, [TYPE 4] <INSERT TYPE>.  
2. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.  
3. HINGED FRONT COVER: ENTIRE FRONT TRIM HINGED TO BOX AND WITH STANDARD DOOR WITHIN HINGED TRIM COVER.  
4. DIRECTORY CARD: INSIDE PANELBOARD DOOR, MOUNTED IN TRANSPARENT CARD HOLDER.  
5. <INSERT OPTIONAL FEATURES>  
C. INCOMING MAINS LOCATION: [TOP] [BOTTOM] [TOP AND BOTTOM].  
D. PHASE, NEUTRAL, AND GROUND BUSES: [TIN-PLATED ALUMINUM] [HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY].  
E. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL AND SIZES.  
1. MATERIAL: [TIN-PLATED ALUMINUM] [HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY].  
2. MAIN AND NEUTRAL LUGS: [COMPRESSION] [MECHANICAL] TYPE.  
3. GROUND LUGS AND BUS CONFIGURED TERMINATORS: [COMPRESSION] [MECHANICAL] TYPE.  
4. FEED-THROUGH LUGS: [COMPRESSION] [MECHANICAL] TYPE, SUITABLE FOR USE WITH CONDUCTOR MATERIAL. LOCATE AT OPPOSITE END OF BUS FROM INCOMING LUGS OR MAIN DEVICE.  
5. SUBFEED (DOUBLE) LUGS: [COMPRESSION] [MECHANICAL] TYPE SUITABLE FOR USE WITH CONDUCTOR MATERIAL. LOCATE AT SAME END OF BUS AS INCOMING LUGS OR MAIN DEVICE.  
6. <INSERT OPTIONAL FEATURES>  
F. SERVICE EQUIPMENT LABEL: NRTL LABELED FOR USE AS SERVICE EQUIPMENT FOR PANELBOARDS WITH ONE OR MORE MAIN SERVICE DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES.  
G. FUTURE DEVICES: MOUNTING BRACKETS, BUS CONNECTIONS, FILLER PLATES, AND NECESSARY APPURTENANCES REQUIRED FOR FUTURE INSTALLATION OF DEVICES.  
H. PANELBOARD SHORT-CIRCUIT CURRENT RATING: RATED FOR SERIES-CONNECTED SYSTEM WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES AND LABELED BY AN NRTL. INCLUDE SIZE AND TYPE OF ALLOWABLE UPSTREAM AND BRANCH DEVICES, AND LISTED AND LABELED FOR SERIES-CONNECTED SHORT-CIRCUIT RATING BY AN NRTL.  
I. PANELBOARD SHORT-CIRCUIT CURRENT RATING: FULLY RATED TO INTERRUPT SYMMETRICAL SHORT-CIRCUIT CURRENT AVAILABLE AT TERMINALS.
- 2.2 PERFORMANCE REQUIREMENTS  
A. SURGE SUPPRESSION: FACTORY INSTALLED AS AN INTEGRAL PART OF INDICATED PANELBOARDS, COMPLYING WITH UL 1449 SPD TYPE 1.
- 2.3 DISTRIBUTION PANELBOARDS  
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, [PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:  
B. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:  
1. EATON ELECTRICAL INC., CUTLER-HAMMER BUSINESS UNIT.  
2. GENERAL ELECTRIC COMPANY; GE CONSUMER & INDUSTRIAL - ELECTRICAL DISTRIBUTION.  
3. SIEMENS ENERGY & AUTOMATION, INC.  
4. SQUARE D, A BRAND OF SCHNEIDER ELECTRIC.  
C. PANELBOARDS: NEMA PB 1, POWER AND FEEDER DISTRIBUTION TYPE.  
D. DOORS: SECURED WITH VAULT-TYPE LATCH WITH TUMBLER LOCK; KEYED ALIKE.  
E. MAINS: CIRCUIT BREAKER OR LUGS ONLY.  
F. BRANCH OVERCURRENT PROTECTIVE DEVICES: FOR CIRCUIT-BREAKER FRAME SIZES 125 A AND SMALLER: [PLUG-IN CIRCUIT BREAKERS.  
G. BRANCH OVERCURRENT PROTECTIVE DEVICES: FOR CIRCUIT-BREAKER FRAME SIZES LARGER THAN 125 A: BOLT-ON CIRCUIT BREAKERS; PLUG-IN CIRCUIT BREAKERS WHERE INDIVIDUAL POSITIVE-LOCKING DEVICE REQUIRES MECHANICAL RELEASE FOR REMOVAL.  
H. BRANCH OVERCURRENT PROTECTIVE DEVICES: FUSED SWITCHES.
- 2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS  
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:  
B. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:  
1. EATON ELECTRICAL INC., CUTLER-HAMMER BUSINESS UNIT.  
2. GENERAL ELECTRIC COMPANY; GE CONSUMER & INDUSTRIAL - ELECTRICAL DISTRIBUTION.  
3. SIEMENS ENERGY & AUTOMATION, INC.  
4. SQUARE D, A BRAND OF SCHNEIDER ELECTRIC.  
C. PANELBOARDS: NEMA PB 1, LIGHTING AND APPLIANCE BRANCH-CIRCUIT TYPE.  
D. MAINS: CIRCUIT BREAKER.  
E. BRANCH OVERCURRENT PROTECTIVE DEVICES: PLUG-IN CIRCUIT BREAKERS, REPLACEABLE WITHOUT DISTURBING ADJACENT UNITS.  
F. CONTACTORS IN MAIN BUS: NEMA ICS 2, CLASS A, ELECTRICALLY HELD, GENERAL-PURPOSE CONTROLLER, WITH SAME SHORT-CIRCUIT INTERRUPTING RATING AS PANELBOARD.  
1. EXTERNAL CONTROL-POWER SOURCE: 120-V BRANCH CIRCUIT.  
G. DOORS: CONCEALED HINGES; SECURED WITH FLUSH LATCH WITH TUMBLER LOCK; KEYED ALIKE.  
H. COLUMN-TYPE PANELBOARDS: NARROW GUTTER EXTENSION, WITH COVER, TO OVERHEAD JUNCTION BOX EQUIPPED WITH GROUND AND NEUTRAL TERMINAL BUSES.
- 2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES  
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING.  
B. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCT BY ONE OF THE FOLLOWING:  
1. EATON ELECTRICAL INC., CUTLER-HAMMER BUSINESS UNIT.  
2. GENERAL ELECTRIC COMPANY; GE CONSUMER & INDUSTRIAL - ELECTRICAL DISTRIBUTION.  
3. SIEMENS ENERGY & AUTOMATION, INC.  
4. SQUARE D, A BRAND OF SCHNEIDER ELECTRIC.  
C. MOLDED-CASE CIRCUIT BREAKER (MCCB): COMPLY WITH UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS.  
1. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER.  
2. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.  
3. ELECTRONIC TRIP CIRCUIT BREAKERS WITH RMS SENSING; FIELD-REPLACEABLE RATING PLUG OR FIELD-REPLICABLE ELECTRONIC TRIP; AND THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:  
a. INSTANTANEOUS TRIP.  
b. LONG- AND SHORT-TIME PICKUP LEVELS.  
c. LONG- AND SHORT-TIME TIME ADJUSTMENTS.  
d. GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2T RESPONSE.  
4. CURRENT-LIMITING CIRCUIT BREAKERS: FRAME SIZES 400 A AND SMALLER; LET-THROUGH RATINGS LESS THAN NEMA FU 1, RK-5.  
5. GFCI CIRCUIT BREAKERS: SINGLE- AND TWO-POLE CONFIGURATIONS WITH CLASS A GROUND-FAULT PROTECTION (6-MA TRIP).  
6. GROUND-FAULT EQUIPMENT PROTECTION (GFEP) CIRCUIT BREAKERS: CLASS B GROUND-FAULT PROTECTION (30-MA TRIP).  
7. ARC-FAULT CIRCUIT INTERRUPTER (AFCI) CIRCUIT BREAKERS: COMPLY WITH UL 1699; 120/240-V, SINGLE-POLE CONFIGURATION.  
8. MOLDED-CASE CIRCUIT-BREAKER (MCCB) FEATURES AND ACCESSORIES:  
a. STANDARD FRAME SIZES, TRIP RATINGS, AND NUMBER OF POLES.  
b. LUGS: MECHANICAL STYLE, SUITABLE FOR NUMBER, SIZE, TRIP RATINGS, AND CONDUCTOR MATERIALS.  
c. APPLICATION LISTING: APPROPRIATE FOR APPLICATION; TYPE SWD FOR SWITCHING FLUORESCENT LIGHTING LOADS; TYPE HID FOR FEEDING FLUORESCENT AND HIGH-INTENSITY DISCHARGE (HID) LIGHTING CIRCUITS.  
d. GROUND-FAULT PROTECTION: INTEGRALLY MOUNTED RELAY AND TRIP UNIT WITH ADJUSTABLE PICKUP AND TIME-DELAY SETTINGS; PUSH-TO-TEST FEATURE; AND GROUND-FAULT INDICATOR.  
e. COMMUNICATION CAPABILITY: CIRCUIT-BREAKER-MOUNTED COMMUNICATION MODULE WITH FUNCTIONS AND FEATURES COMPATIBLE WITH POWER MONITORING AND CONTROL SYSTEM SPECIFIED IN SECTION 260913 "ELECTRICAL POWER MONITORING AND CONTROL."  
f. SHUNT TRIP: 120-V TRIP COIL ENERGIZED FROM SEPARATE CIRCUIT, SET TO TRIP AT 55 PERCENT OF RATED VOLTAGE.  
g. HANDLE PADLOCKING DEVICE: FIXED ATTACHMENT, FOR LOCKING CIRCUIT-BREAKER HANDLE IN ON OR OFF POSITION.  
h. HANDLE CLAMP: LOOSE ATTACHMENT, FOR HOLDING CIRCUIT-BREAKER HANDLE IN ON POSITION.
- 2.6 ACCESSORY COMPONENTS AND FEATURES  
A. PORTABLE TEST SET: FOR TESTING FUNCTIONS OF SOLID-STATE TRIP DEVICES WITHOUT REMOVING FROM PANELBOARD. INCLUDE RELAY AND METER TEST PLUGS SUITABLE FOR TESTING PANELBOARD METERS AND SWITCHBOARD CLASS RELAYS.

PART 3 - EXECUTION

- 3.1 INSTALLATION  
A. RECEIVE, INSPECT, HANDLE, STORE AND INSTALL PANELBOARDS AND ACCESSORIES ACCORDING TO NEMA PB 1.1.  
B. COMPLY WITH MOUNTING AND ANCHORING REQUIREMENTS SPECIFIED IN SECTION 260548 "VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS."  
C. MOUNT TOP OF TRIM [90 INCHES (2286 MM)] ABOVE FINISHED FLOOR UNLESS OTHERWISE INDICATED.  
D. MOUNT PANELBOARD CABINET PLUMB AND RIGID WITHOUT DISTORTION OF BOX. MOUNT RECESSED PANELBOARDS WITH FRONTS UNIFORMLY FLUSH WITH WALL FINISH AND MATING WITH BACK BOX.  
E. INSTALL OVERCURRENT PROTECTIVE DEVICES AND CONTROLLERS NOT ALREADY FACTORY INSTALLED.  
1. SET FIELD-ADJUSTABLE, CIRCUIT-BREAKER TRIP RANGES.  
F. INSTALL FILLER PLATES IN UNUSED SPACES.  
G. STUB FOUR 1-INCH (27-GRC) EMPTY CONDUITS FROM PANELBOARD INTO ACCESSIBLE CEILING SPACE OR SPACE DESIGNATED TO BE CEILING SPACE IN THE FUTURE. STUB FOUR 1-INCH (27-GRC) EMPTY CONDUITS INTO RAISED FLOOR SPACE OR BELOW SLAB NOT ON GRADE.  
H. ARRANGE CONDUCTORS IN GUTTERS INTO GROUPS AND BUNDLE AND WRAP WITH WIRE TIES.  
I. COMPLY WITH NECA 1.

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PROJECT NUMBER

17-012

DATE

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SPECIFICATIONS

SHEET NUMBER

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