

Introducción a la Lectura de Planos



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Universidad de Puerto Rico
Recinto Universitario de Mayagüez

Objetivos

- Familiarizar a los participantes con la lectura e interpretación de planos de construcción
- Exponer a los participantes a los diferentes tipos de planos típicamente utilizados.
- Orientar al participante al reconocimiento de los símbolos típicamente usados en planos

Temas Principales

- Importancia de los planos a la industria de la construcción
- Diferentes tipos de dibujos y planos
- Identificar información en los planos
- Vocabulario básico de lectura de planos
- Cálculos/Medidas
- Lectura de Planos

Los planos

- Son un medio de comunicación gráfica.
- En los planos se presentan una serie de documentos que representan una descripción ilustrada del proyecto de construcción.
- Estos se utilizan para transmitir a los constructores las instrucciones y descripciones necesarias sobre la forma y el tamaño de la estructuras a construir.

Introducción a Lectura de Planos: Importancia de los planos a la industria

- Lenguaje básico de lectura de planos
- Visualización e Interpretación

Escritura a mano

Letra Técnica o Gótica



ESTO ES UN
EJEMPLO
DE TEXTO
EN
AUTOCAD

Introducción a Lectura de Planos: Diferentes tipos de Dibujos y Planos

- Arquitectónicos (Construcción)
- Civiles
- Esquemáticos Eléctricos/Electrónicos
- HVAC (Heating, Ventilation, Air Conditioning)
- Mecánicos
- Estructurales
- Ilustraciones Técnicas
- Soldaduras

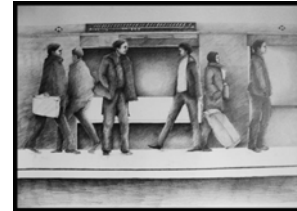
Introducción a Lectura de Planos:

Diferentes tipos de Dibujos y Planos-
Arquitectónicos

- Arquitectónicos
- Civiles
- Diseño de Interiores
- Eléctricos
- Protección de Fuego
- Representaciones
"Renderings"
- Paisaje- "Landscape"
- Mecánicos (HVAC)
- Plomería
- Estructurales
- Sistemas de
transportación

Dos ramas distintas de dibujo

Dibujo Artístico



Dibujo Técnico



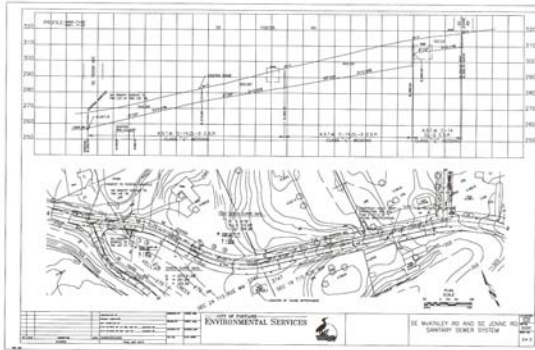
Representaciones



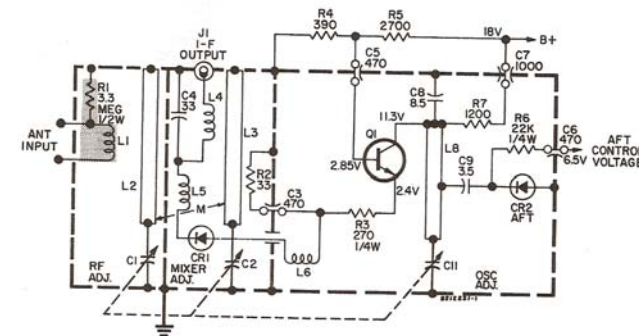
Planta



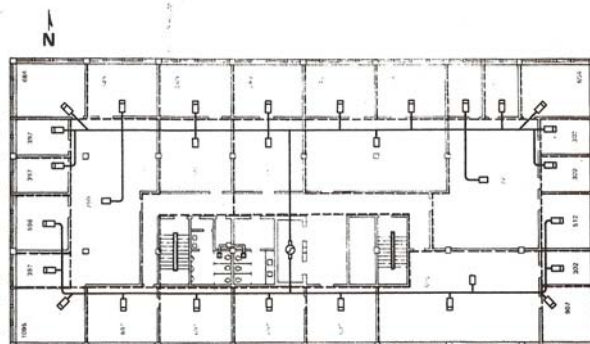
Introducción a Lectura de Planos: Diferentes tipos de Dibujos y Planos-Civiles



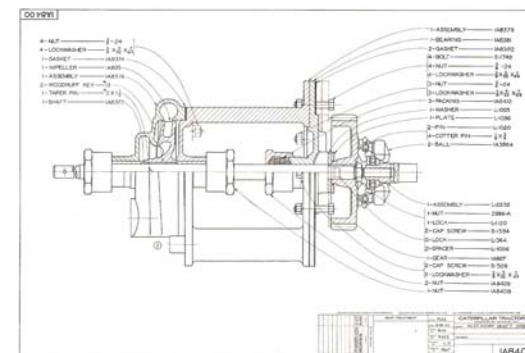
Introducción a Lectura de Planos: Diferentes tipos de Dibujos y Planos- Eléctricos/Electrónicos

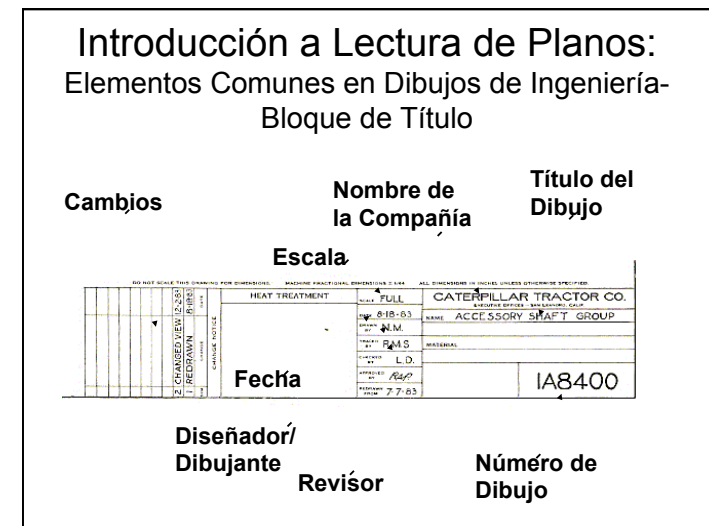
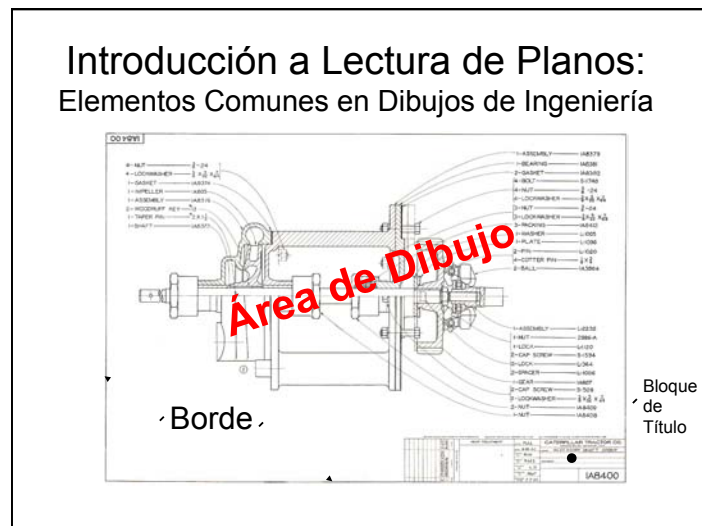
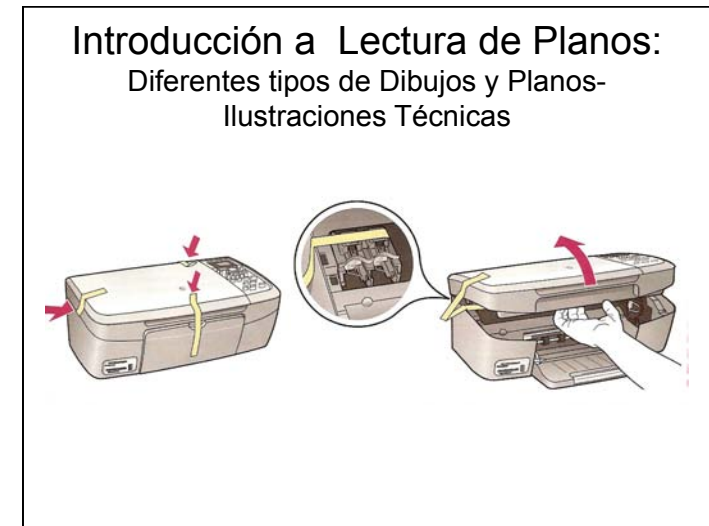
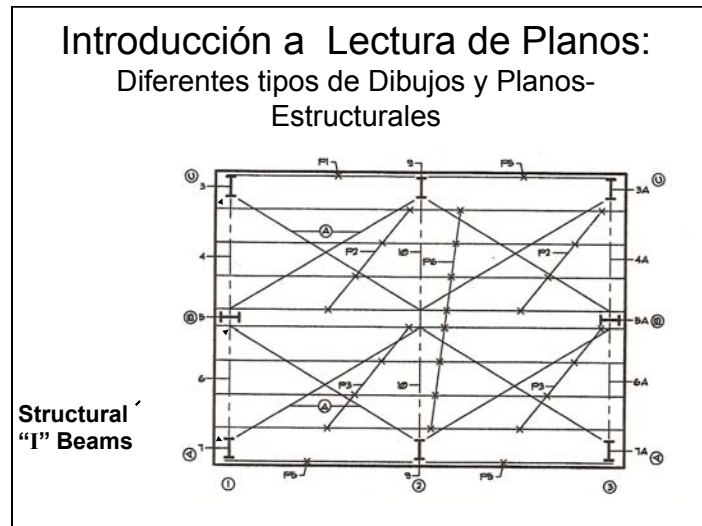


Introducción a Lectura de Planos: Diferentes tipos de Dibujos y Planos- HVAC



Introducción a Lectura de Planos: Diferentes tipos de Dibujos y Planos- Mecánicos





Bloque de Título

REVISIONS			
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Consultant	
KUBBA	
DESIGN	
CUSTOMER ARCHITECTS INTERIOR DESIGNER PROJECT MANAGEMENT	
Client	
Project	
Title	
designed DA S. KUBBA	checked
coordinated 	approved
drawing no 	revision suffix
scale 	date
drawn 	project no

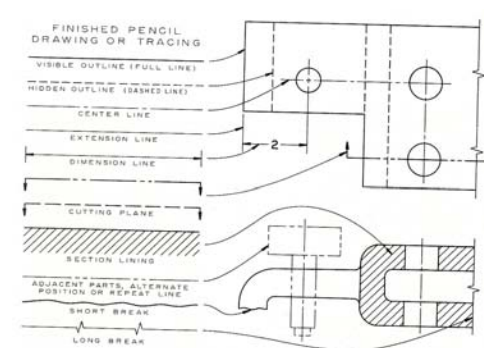
Introducción a Lectura de Planos: Elementos Comunes en Dibujos de Ingeniería- Símbolos y Líneas

- Proveen un lenguaje universal para diseñadores, ingenieros y personal de producción
- Se utilizan líneas, números, símbolos e ilustraciones
- Diferentes dibujos
 - De fabricación
 - Símbolos estándar para mecánico, soldadura, construcción, eléctrico, etc.)
 - “Sketch”
 - Ilustra una idea, principio técnico o una función

Líneas

- Consisten de formas estándar definidas
 - Todas tienen un significado específico
 - Ese significado depende de:
 - Espesor de la línea
 - Características de la línea
 - Entrecortada
 - Sólida
 - Combinación

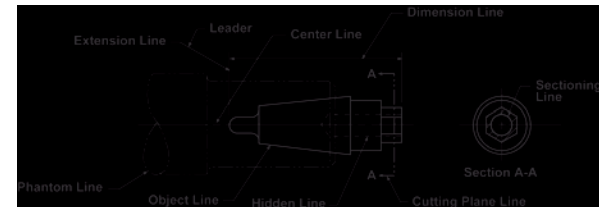
Introducción a Lectura de Planos: Elementos Comunes en Dibujos de Ingeniería- Líneas



ALFABETO DE LÍNEAS

BASIC LINES	LINE CHARACTERISTICS
① Visible (Object) Line	(THICK)
② Hidden Line	(THIN)
③ Center Line	(THIN)
④ Extension and Dimension Line	(THIN)
⑤ Cutting Plane Lines (Shows Direction of Viewing Plane)	(THICK)
⑥ Section Line	(THIN)
⑦ Break Lines	(THICK) (FOR SHORT BREAKS)
⑧ Phantom Line	(THIN)

ALFABETO DE LÍNEAS



ALFABETO DE LÍNEAS

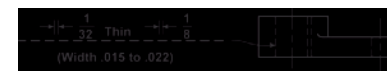
- Líneas de contorno visible
 - Líneas sólidas bastante gruesas
 - Demarcan la superficie que es visible para el ojo
 - Se usan como la base para comprar las demás líneas



ALFABETO DE LÍNEAS

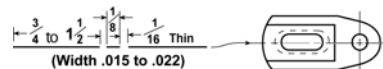
Líneas de contorno proyectado o invisible

- Líneas entrecortadas
- Se utilizan para mostrar contornos invisibles



ALFABETO DE LÍNEAS

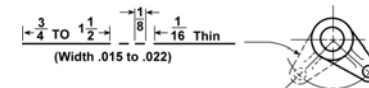
- Líneas de centro
 - Línea donde se utilizan intervalos sólidos con entrecortados
 - Se utiliza el intervalos corto donde se interseca el centro
 - Se usan para indicar el eje central de un objeto
 - Se usan para indicar el centro de círculo o hueco



ALFABETO DE LÍNEAS

Líneas Fantasma

- líneas delgadas
- Se usan para indicar la posición alterna de una parte de un objeto



ALFABETO DE LÍNEAS

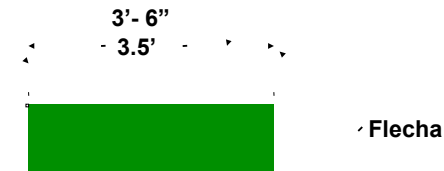
Líneas de dimensión

- Línea fina terminada en sus extremos con una flecha, un círculo o una línea diagonal pequeña
- Indica la distancia entre dos puntos
- Se le coloca un número que indica la dimensión

ALFABETO DE LÍNEAS

Línea de
Extensión

Línea de
Dimensión



ALFABETO DE LÍNEAS

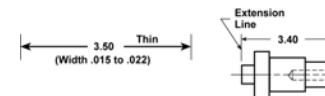
Marcado Típico de Dimensiones

-  **Flecha- Mecánico**
-  **Punto – Estructural /Civil**
-  **Diagonal– Arquitectónico**

ALFABETO DE LÍNEAS

Líneas de Extensión

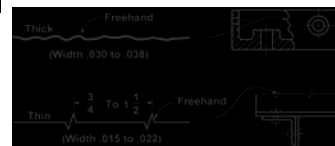
- Líneas sólidas cortas que muestran los límites de las dimensiones
- Se acercan a la superficie, pero no la tocan
- Son líneas bastantes delgadas



ALFABETO DE LÍNEAS

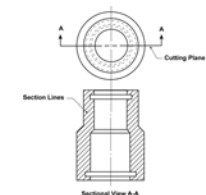
Líneas de corte

- Indican donde se hace un corte
- También se usan para reducir el tamaño de una superficie que tiene sección uniforme



ALFABETO DE LÍNEAS

- Líneas de Sección
 - Línea sólida seguida de dos líneas cortas
 - El final tiene una línea pequeña con flechas que indican hacia dónde se está mirando en el corte
 - Se identifican al final para identificar el corte
 - Al dibujo del corte se le conoce como sección

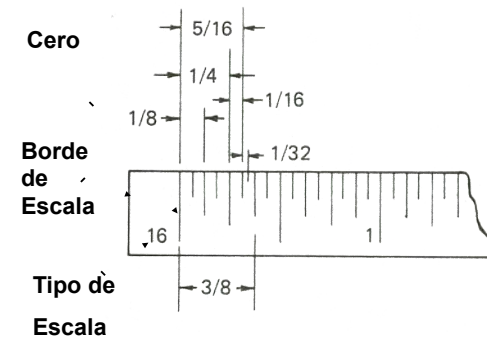


Introducción a Lectura de Planos: Elementos Comunes en Dibujos de Ingeniería- Cálculos/Medidas

- Escalas

- La escala es la proporción en la que se ha reducido el tamaño real del diseño, en el plano.
- Señala en cuanto se reducen las medidas reales para dibujarlas en el plano.
- Las medidas del plano pequeño se indican de la siguiente manera
 - **ESCALA 1/N ó 1:N**

Introducción a Lectura de Planos: Elementos Comunes en Dibujos de Ingeniería- Cálculos/Medidas



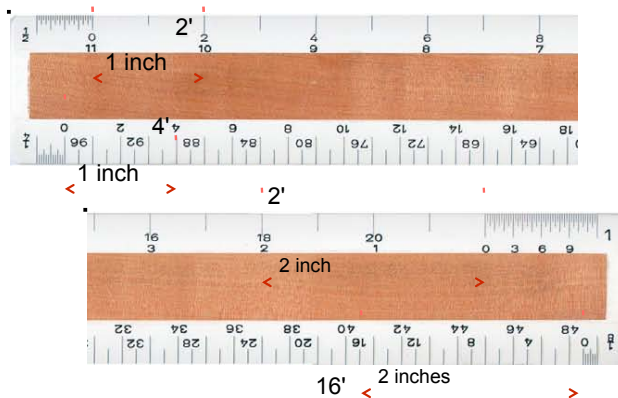
Escalas

- Escalas más comúnmente usadas
 - Escala de Arquitecto
 - $1/4" = 1'-0"$
 - $1/8" = 1'-0"$
 - Escala de Ingeniero
 - Una escala de 10 significa que cada 1" dibujada representa 10' en el proyecto real.
 - Escala Métrica
 - 1:50- cada centímetro representa 50 cm

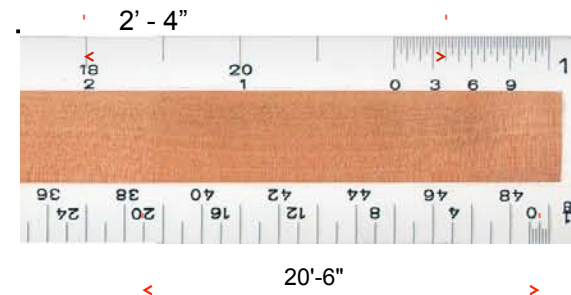
Tipos de Escalas



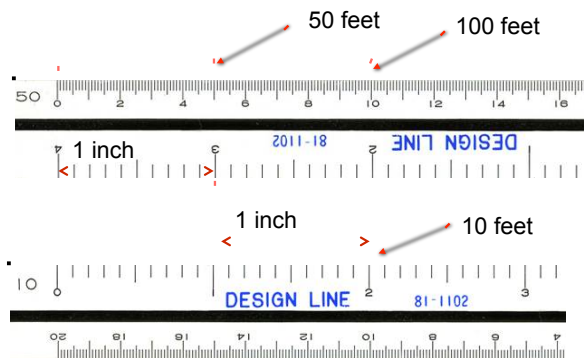
Escala de Arquitecto



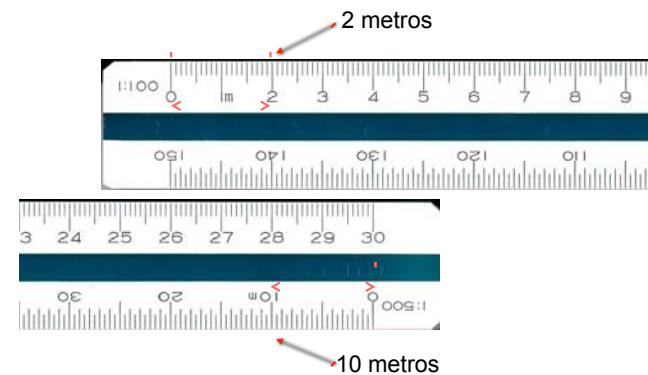
Escala de Arquitecto

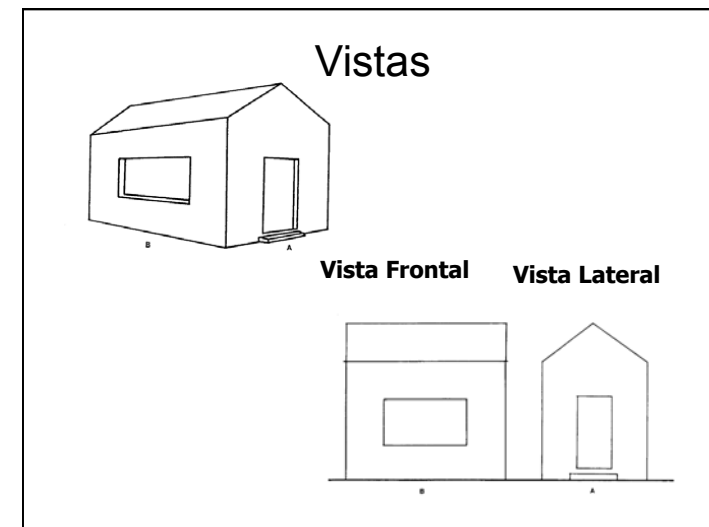
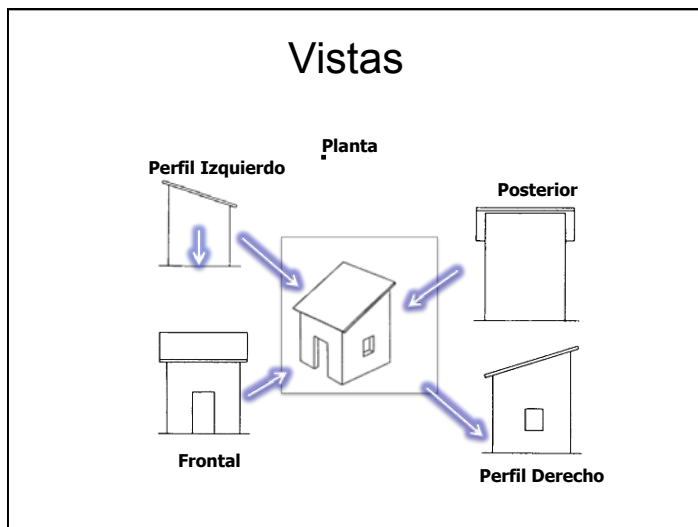
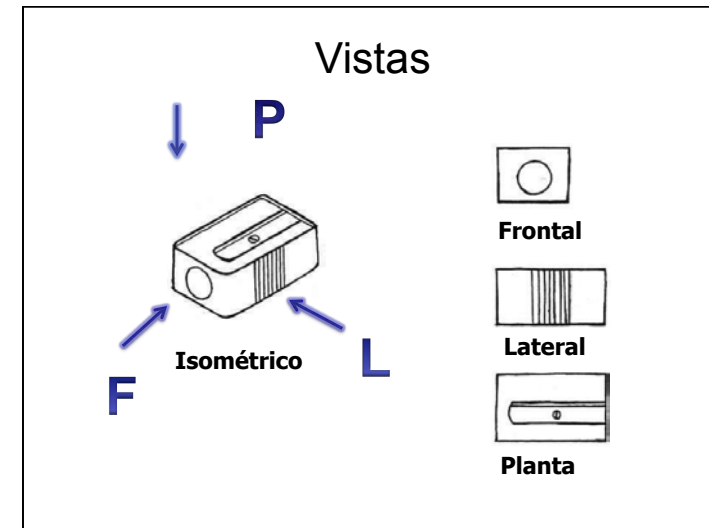
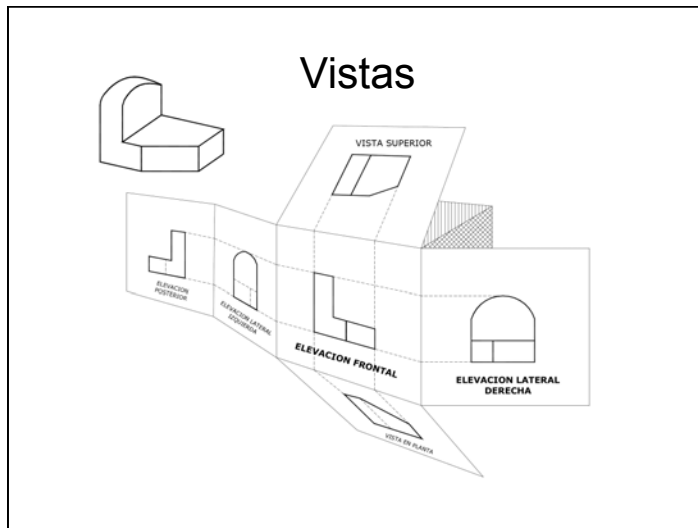


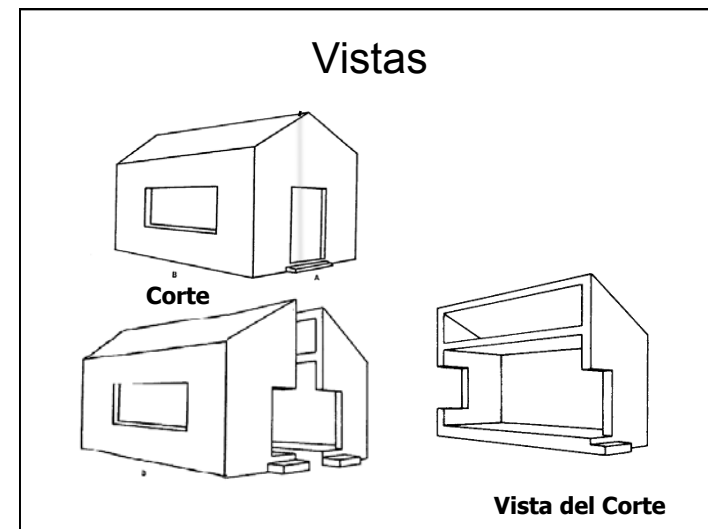
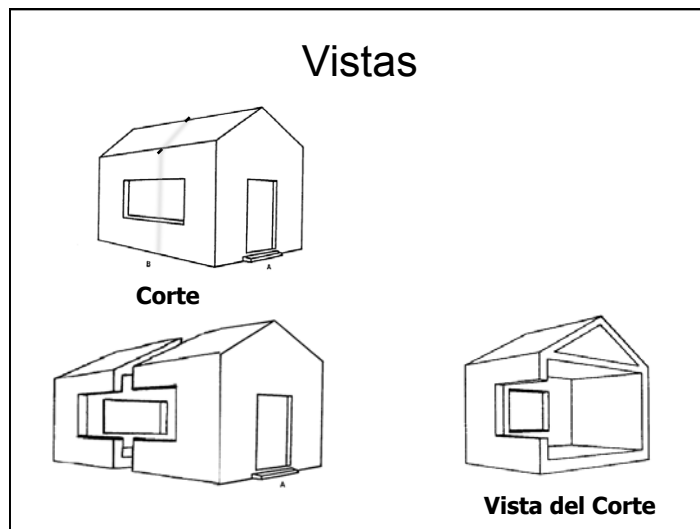
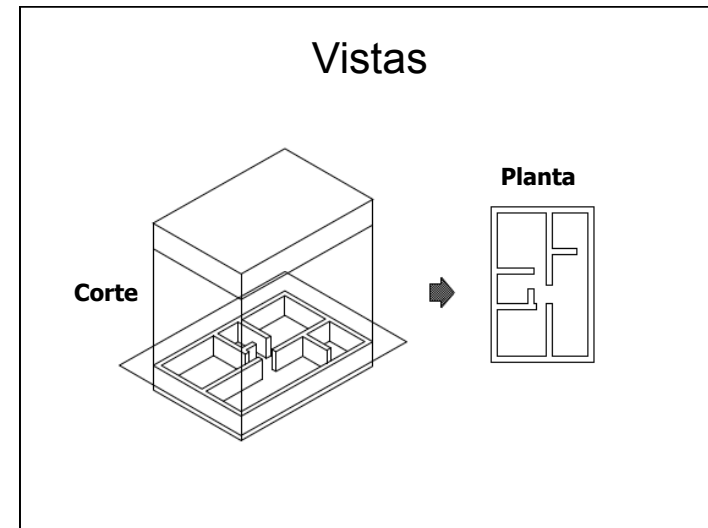
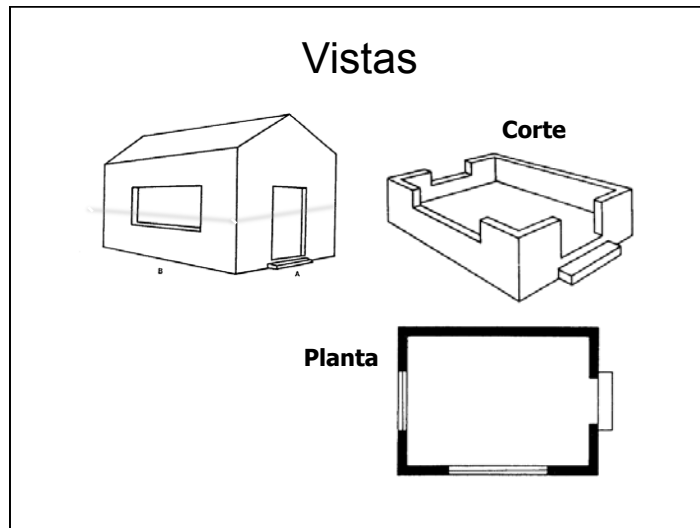
Escala de Ingeniero

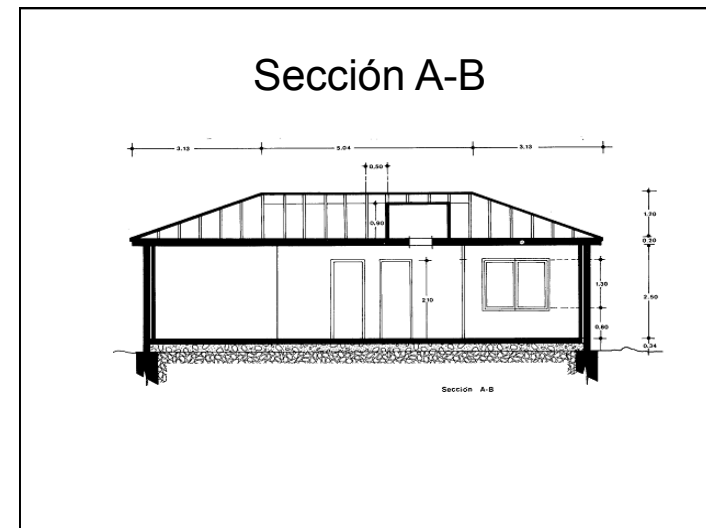
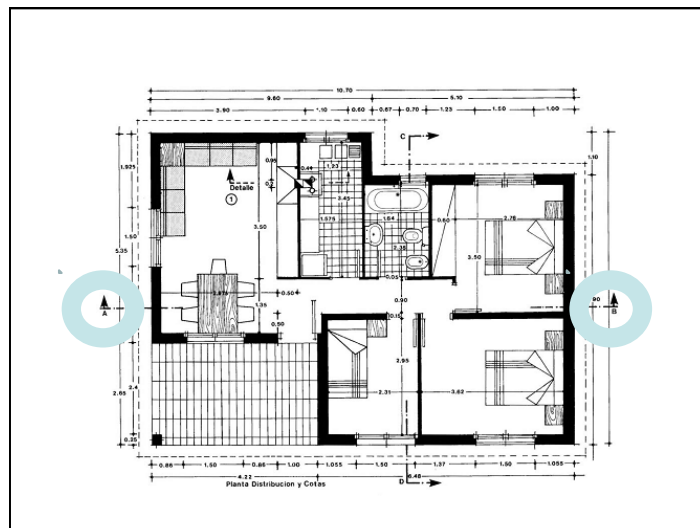
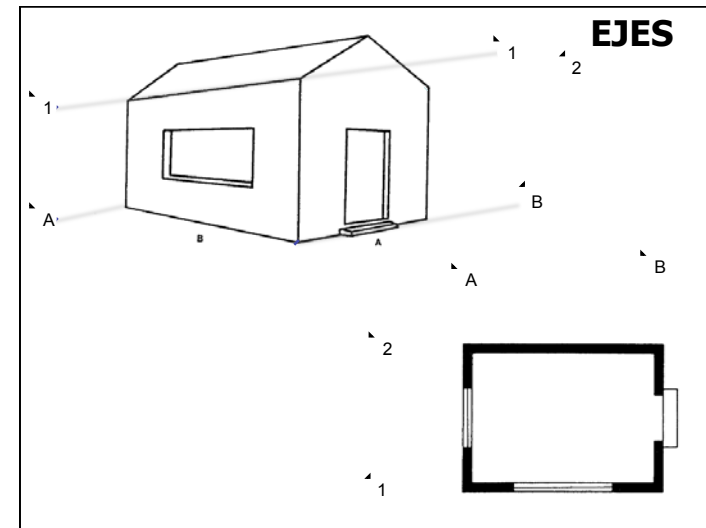
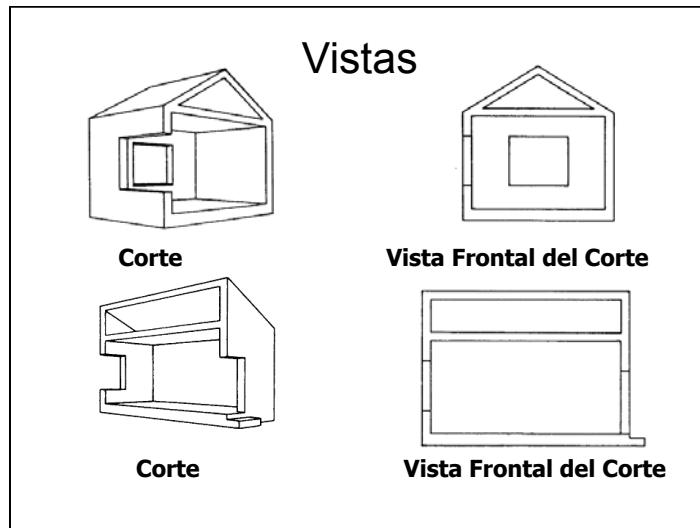


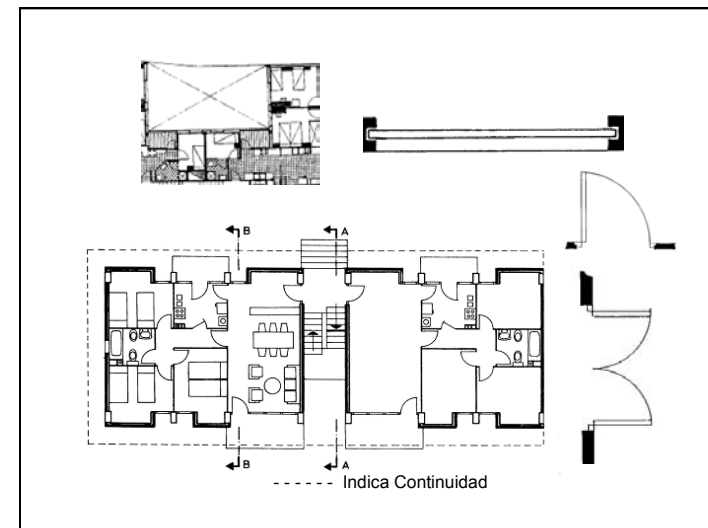
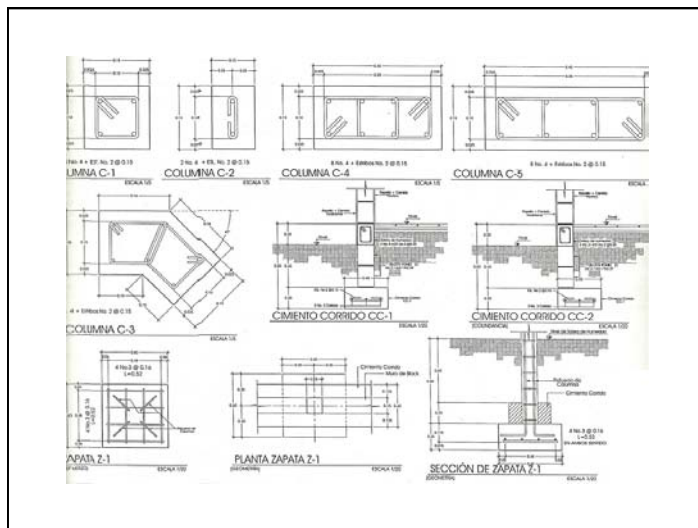
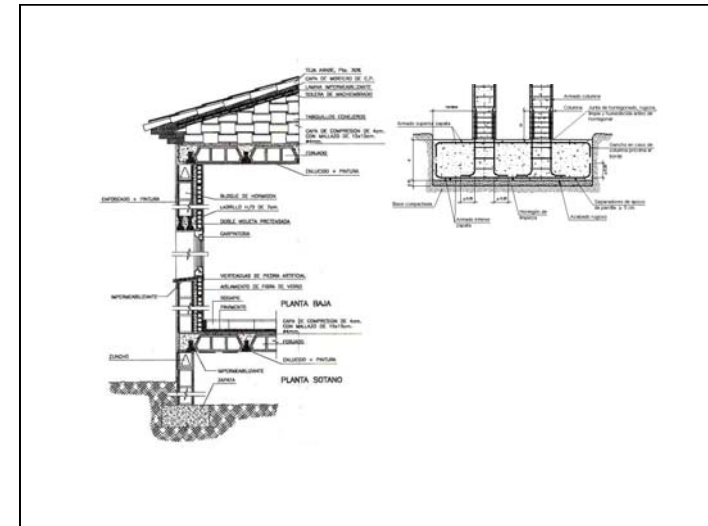
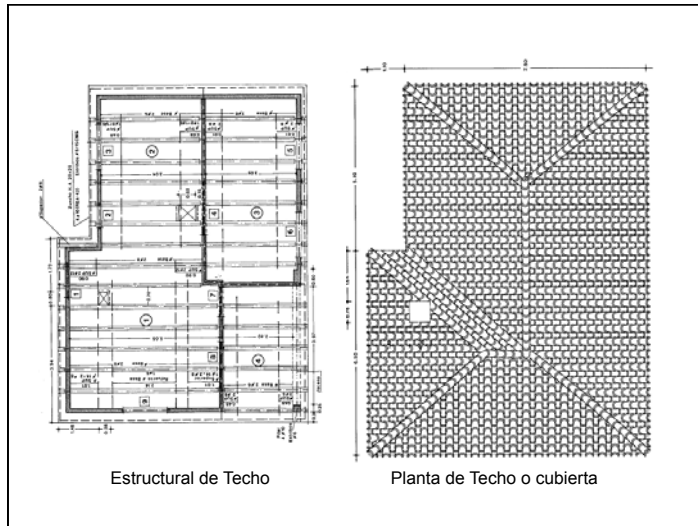
Escala Métrica











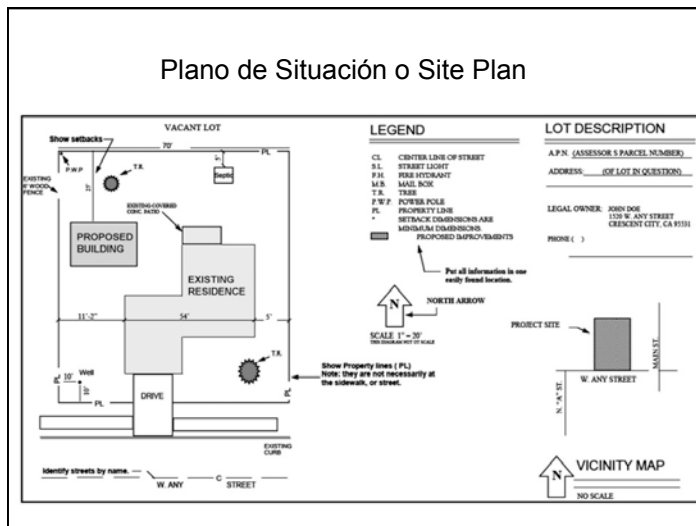
Perspectiva de 2 puntos



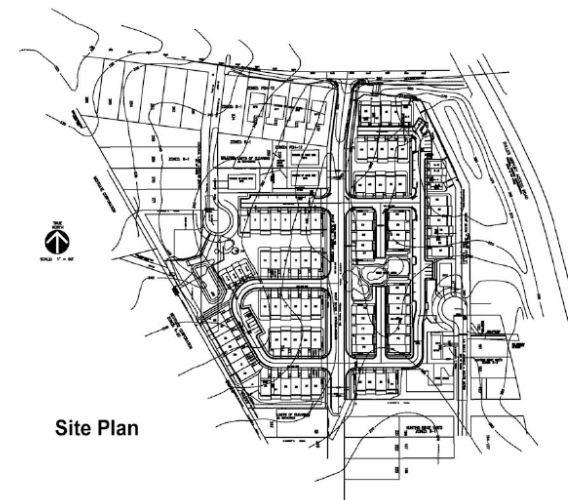
Planos Civiles
Página de Portada

POTOMAC STATION APARTMENTS LEESBURG, VIRGINIA																																																																	
DEVELOPER POTOMAC STATION, INC. 1500 OLD HAMMERSMITH WAY FALLS CHURCH, VIRGINIA 22046 TEL. 703.851.4141 FAX 703.879.9876	ARCHITECT KUBRA DESIGN 12354 MALLORY DRIVE HERNDON, VIRGINIA 20179 TEL. 703.772.2222 FAX 703.778.9888	STRUC. ENGINEER ABC ENGINEERING, INC. 7620 OLD GEORGETOWN ROAD GREAT FALLS, VIRGINIA 20814 TEL. 703.765.1232 FAX 703.878.4567																																																															
MECH. ENGINEER XYZ MECHANICAL ENGINEERS 7345 ELDEN STREET, SUITE 400 RESTON, VIRGINIA 20170 TEL. 703.547.8191 FAX 703.445.7658																																																																	
LOCATION MAP	DRAWING INDEX																																																																
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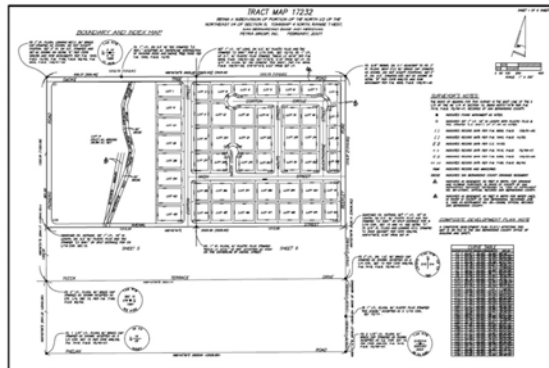
Plano de Situación o Site Plan



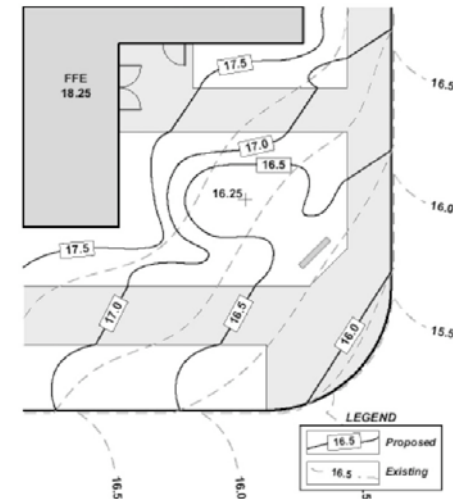
Site Plan



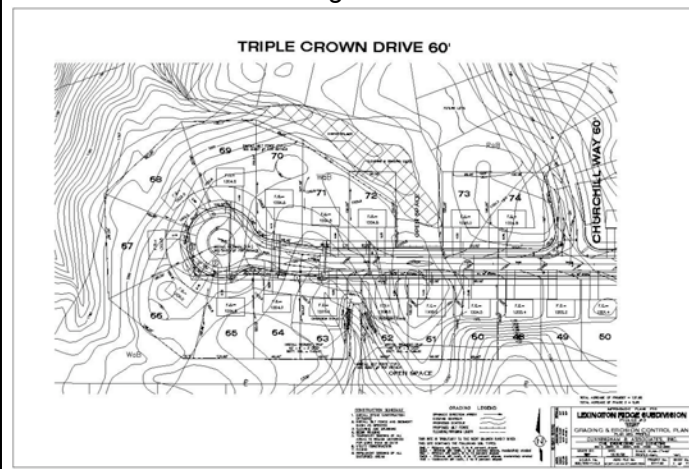
Plat Map



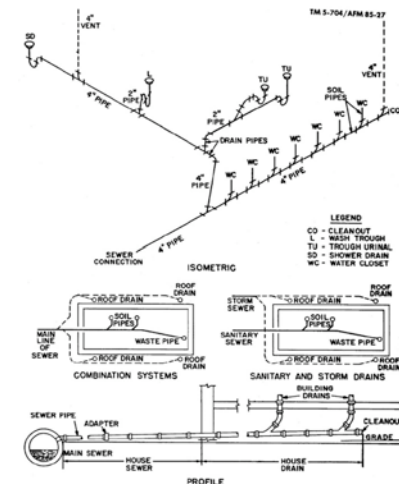
Plano Topográfico



Grading Plan



Plano Típico de Sistema Sanitario



MANHOLE STANDARD PRECAST 36" and Smaller

City of Palo Alto Standard

Approved by: *[Signature]*
Date: 5/14/07

Drawn by: *[Signature]*
Date: 3/12

Scale: NTS

[illegible]

FIRST FLOOR PLAN

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

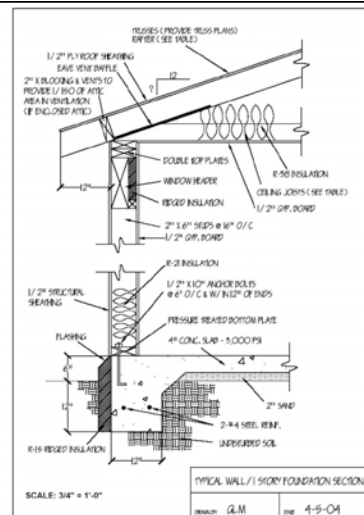
DRAWING INDEX

- FLOORING PLANS
- ELEVATIONS
- ELECTRICAL PLANS
- FOUNDATION PLAN
- FLOOR FINISH/DOOR PLANS
- GARAGE PLANS

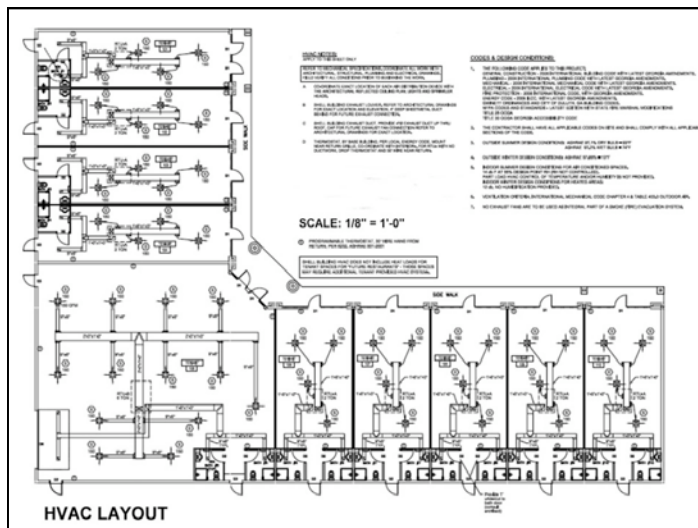
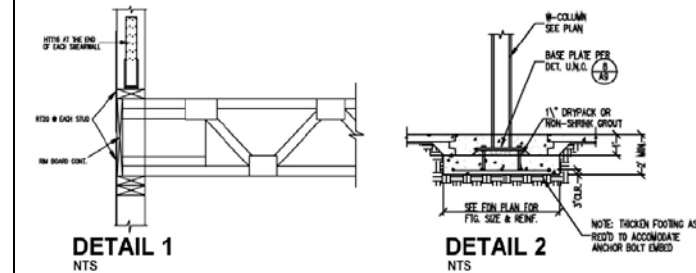
The image displays four architectural drawings of a house, arranged in a 2x2 grid. Each drawing is a detailed elevation showing the exterior of the house with dimensions and structural details.

- Elevación Frontal:** The front elevation shows a two-story house with a gabled roof. The front facade features a central entrance with a small porch, flanked by windows. The roofline is marked with dimensions.
- Elevación Posterior:** The rear elevation shows the back of the house, featuring a large window and a small porch. The roofline is marked with dimensions.
- Elevación Lado Izquierdo:** The left side elevation shows the side of the house, featuring a large window and a small porch. The roofline is marked with dimensions.
- Elevación Lado Derecho:** The right side elevation shows the side of the house, featuring a large window and a small porch. The roofline is marked with dimensions.

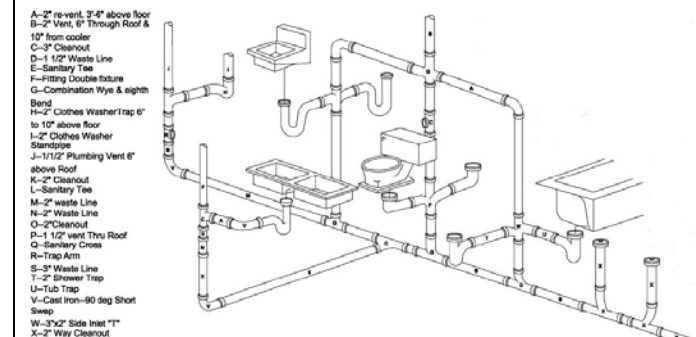
Sección Structural

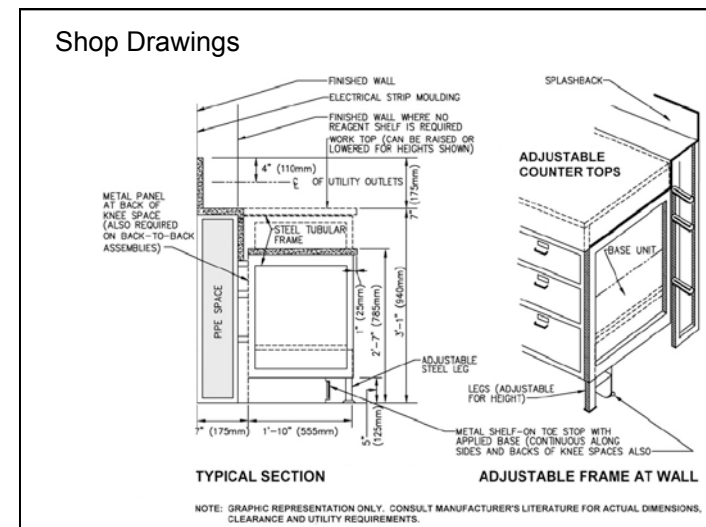
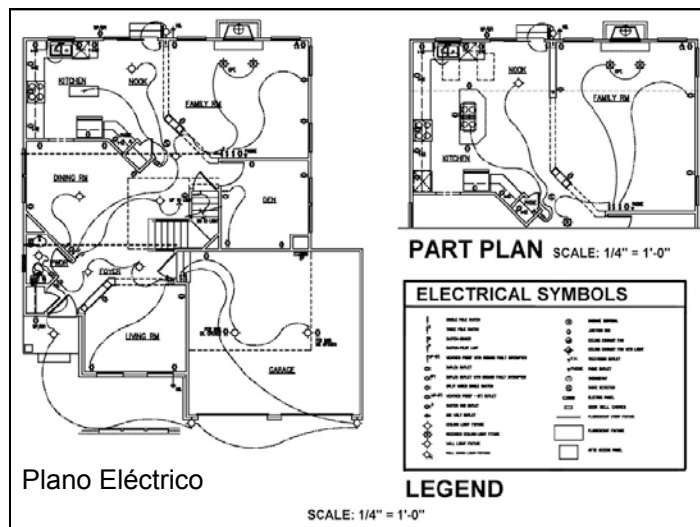
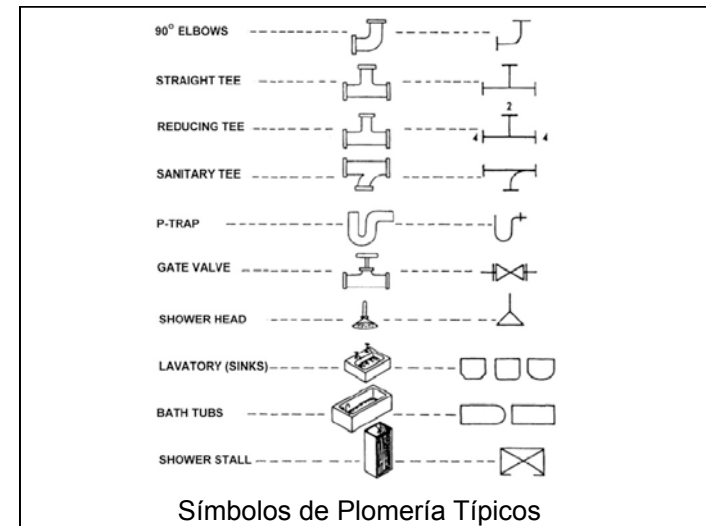
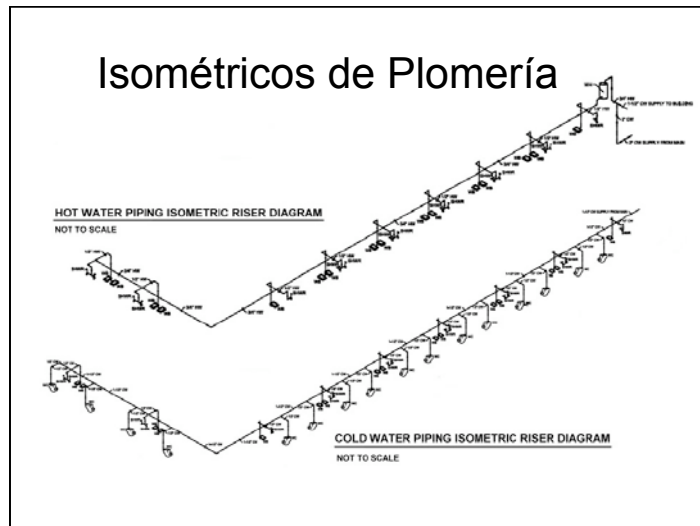


Detalles Estructurales

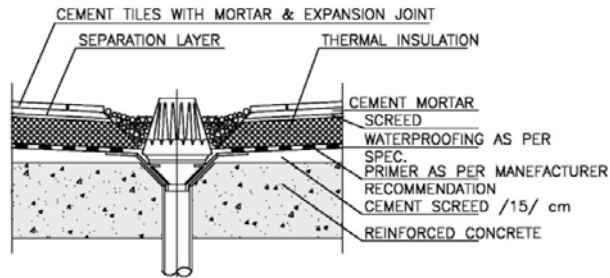


Detalles de Plomería

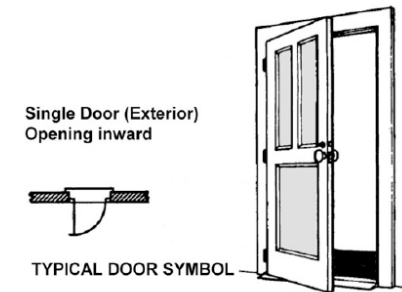




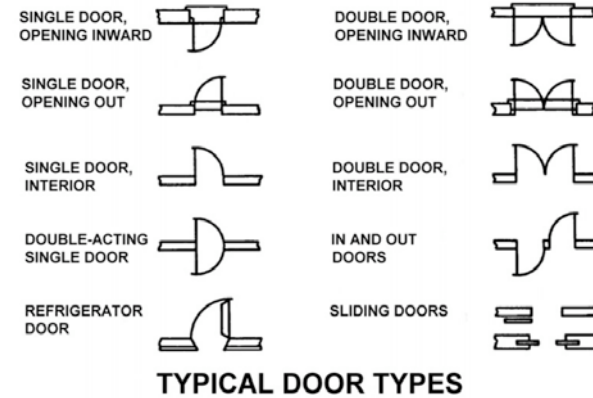
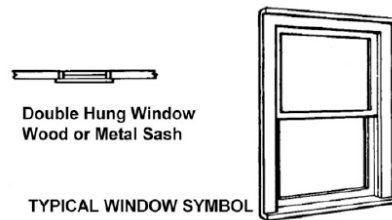
Detalles de construcción Tragante

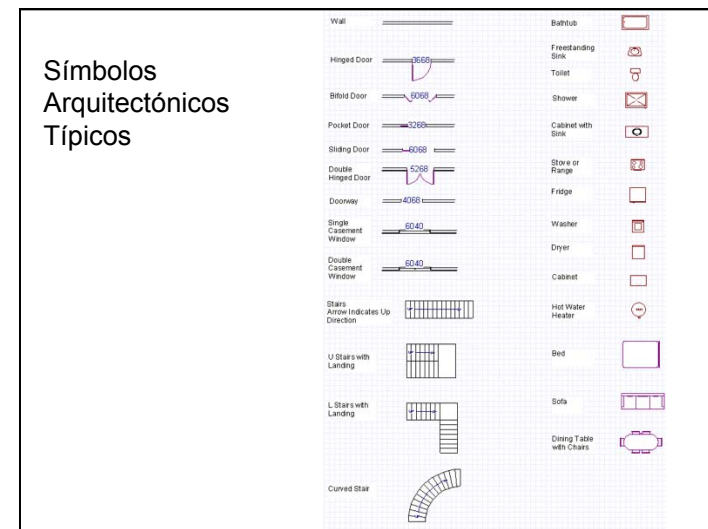
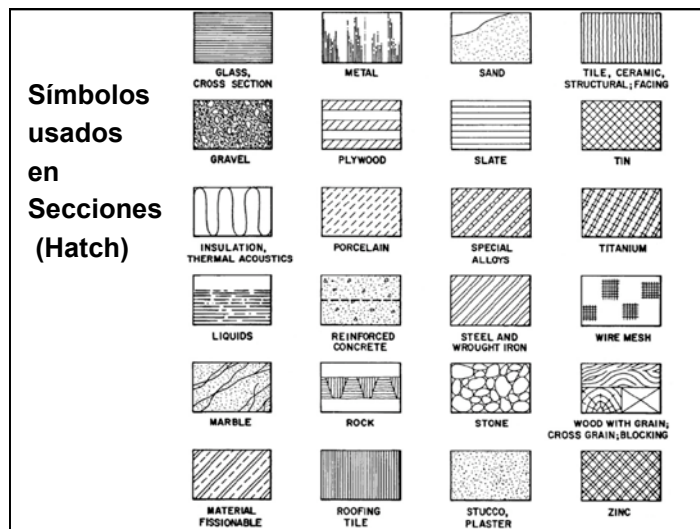
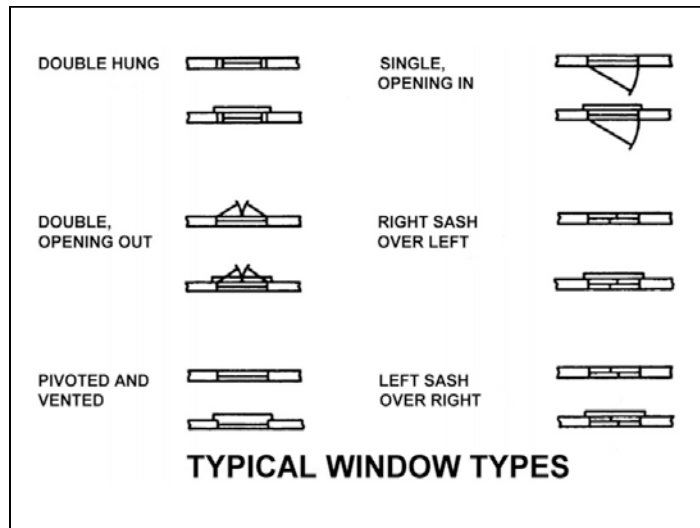


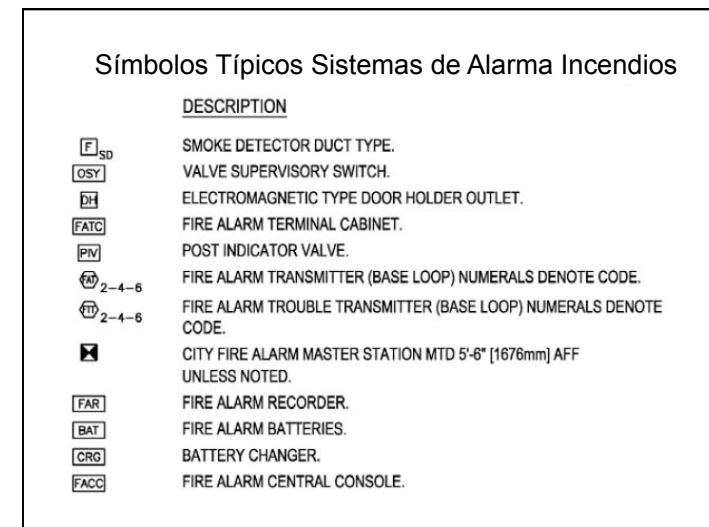
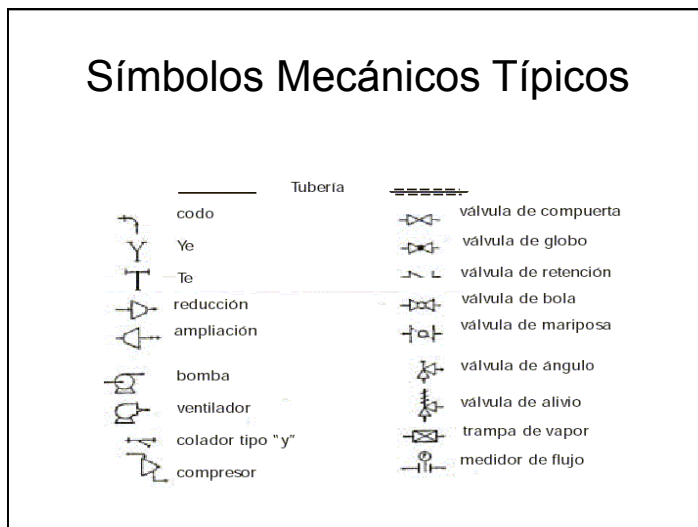
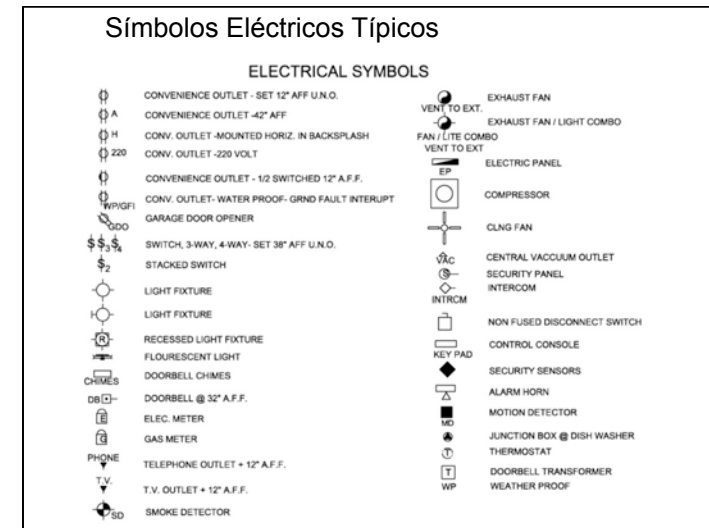
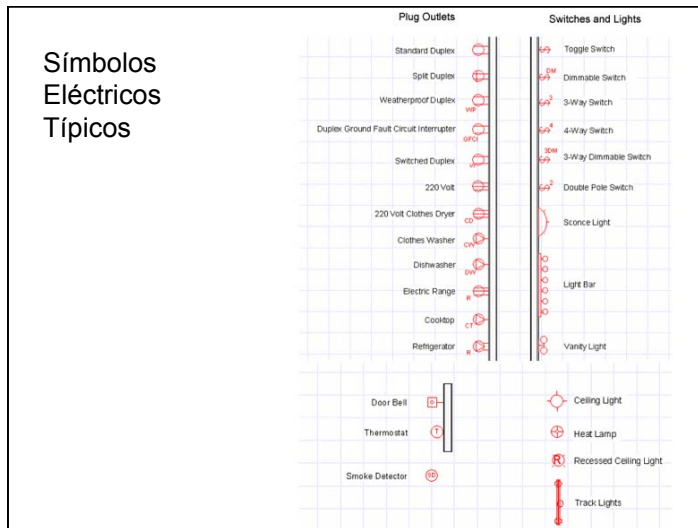
Símbolos

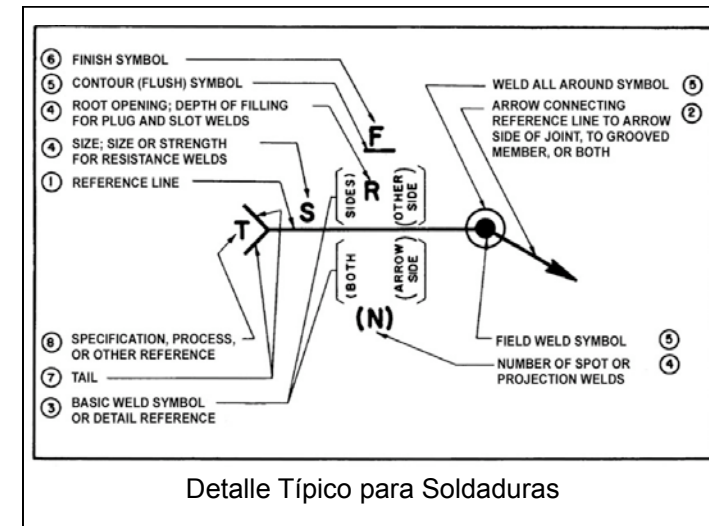
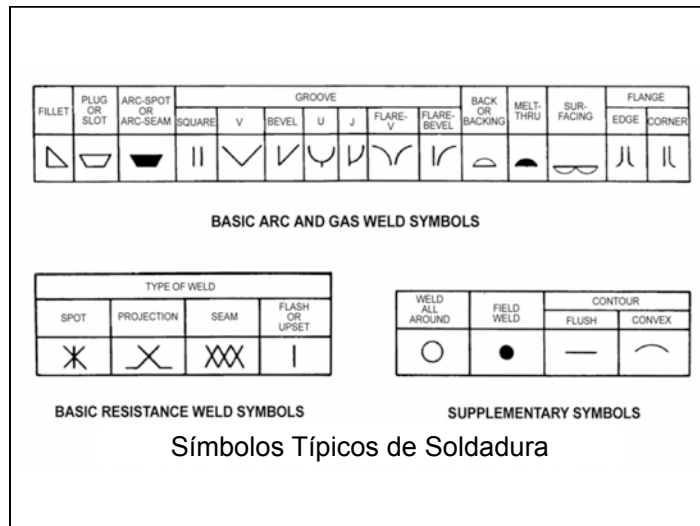


Símbolos









Referencia

Blueprint Reading: Construction Drawings
for the Building Trades
by Sam A. A. Kubba, Ph.D.

Gracias por su atención

Introducción a Lectura de Planos de Carreteras

Dr. José L. Perdomo y Dr. Francisco Maldonado
Centro de Transferencia de Tecnología en Transportación
Departamento de Ingeniería Civil y Agrimensura
Universidad de Puerto Rico
Recinto Universitario de Mayagüez

Introducción

- Familiarizar a los participantes con la lectura e interpretación de planos de construcción de carreteras
- Exponer a los participantes a los diferentes tipos de planos típicamente utilizados.
- Orientar al participante al reconocimiento de los símbolos usados en los planos

Introducción

- Presentar aspectos relacionados a
 - Plano de Localización
 - Símbolos
 - Estacionado
 - Plantas y perfiles
 - Secciones típicas
 - “Right of way”
 - Elevaciones
 - Curvas

Introducción

- Los planos de carreteras se desarrollan con la intención de proveer representaciones gráficas de las instalaciones existentes y las mejoras en las porción donde se va a construir
- Contienen información acerca del proyecto, cantidad de construcción, materiales a usarse, cantidad de espacio requerido para realizar el proyecto

Introducción

- Varias secciones son necesarias para hacer un juego de planos completo
- Las secciones a incluir dependen del tipo del proyecto
- La mayoría de los planos de construcción de carreteras tienen secciones relacionadas a:
 - Aspectos de la carretera
 - Control de erosión
 - Drenajes
 - Pavimentos
 - Mantenimiento de tráfico
 - Control de tráfico
 - Alumbrados
 - *Landscaping*
 - *Right of way*

Introducción

- Los planos de construcción forman la base para la obra que se quiere construir
- Los mismos son preparados por diferentes tipos de ingenieros
- Los planos proveen a los usuarios información técnica acerca del trabajo a realizar en un proyecto en particular.

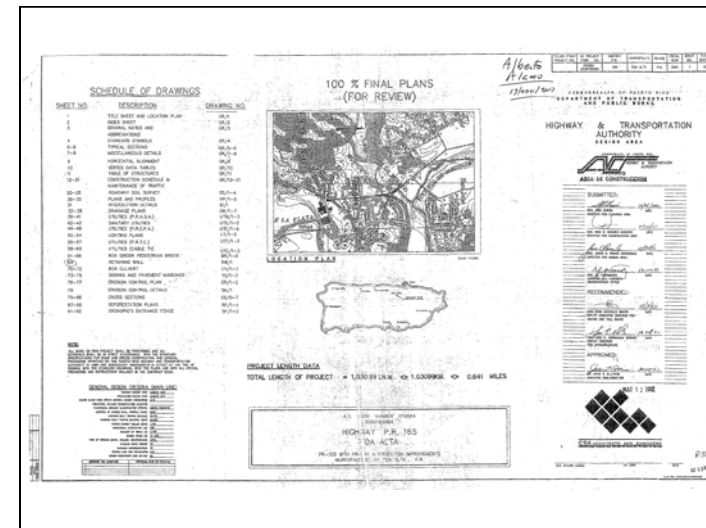
Introducción

Contenido de los planos:

- Hoja de título
- Plano esquemático
- Secciones típicas
- Notas generales
- Mantenimiento de tráfico
- Cantidades estimadas
- Hojas de perfiles y plantas
- Secciones transversales
- Control de tráfico
- Drenajes
- *Landscaping*
- *Right of way*

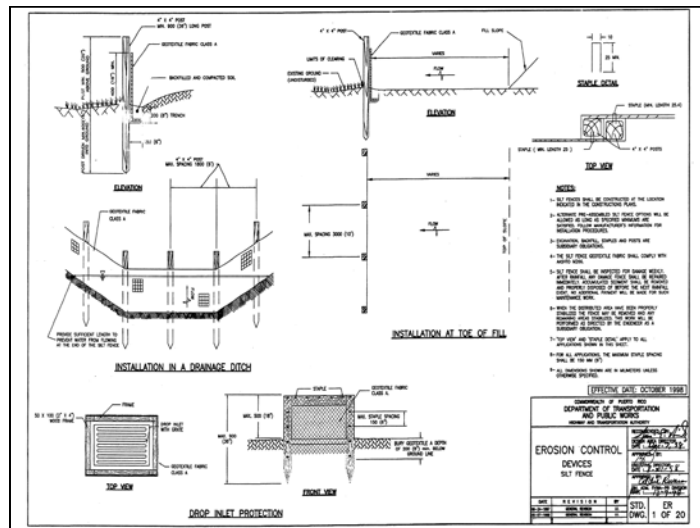
Hoja de Título

- Es la primera hoja en el set de planos
- Da una breve descripción del proyecto e indica
 - Indica la longitud del proyecto
 - Muestra la localización general del proyecto
 - Establece las especificaciones mediante las cuales se va a construir el proyecto
 - Indica si el tráfico se va a controlar o se va a desviar
 - Muestra el índice de todas las hojas
 - Listado de dibujos estándar y especificaciones suplementarias
 - Contiene la firma de aprobación de los oficiales a cargo

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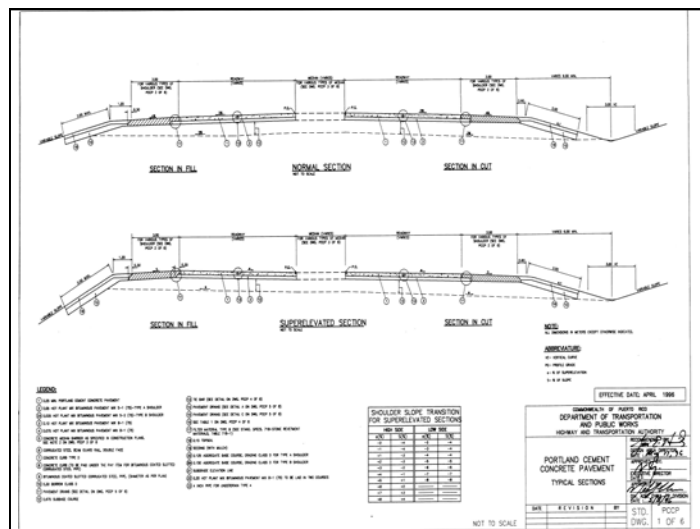
- Muestra el área general donde está localizado el proyecto
- Muestra el comienzo y la terminación del proyecto
- Muestra donde van a estar las mejoras con respecto a otras carreteras, áreas urbanas, cuerpos de agua
- La escala que se usa típicamente es 1:10,000

FORM NO. 101-101 (Rev. 10-1-79)		PAGE 1 OF 2	
FEDERAL BUREAU OF INVESTIGATION		U.S. DEPARTMENT OF JUSTICE	
TO: DIRECTOR, FBI (100-442100) FROM: SAC, NEW YORK (100-100000) SUBJECT: [REDACTED]		DATE: 10/1/79 TIME: 10:00 AM	
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ABBREVIATIONS

ABUT.	Abutment	E.H.W.	Extreme High Water
AGG.	Aggregate	F. TO F.	Face To Face
AH.	Ahead	FA	Federal Aid
AL.	Aluminum	FAP	Federal Aid Primary
ASB.	Asbestos	FAS	Federal Aid Secondary
ASPH.	Asphalt	F.	Fill
BK.	Back	F.L.	Flow Line
B.L.	Base Line	FWD.	Forward
B.W.F.	Barbed Wire Fence	G.I.	Galvanized Iron
B.V.	Beating Value	G.	Gas
B & S	Beil and Spigot	G.V.	Gas Valve
B.M.	Bench Mark	GRAV.	Gravel
B.T. CONC.	Bituminous Concrete	GRD.	Ground
B.C.C.M.P.	Bituminous Coated Corrugated Metal Pipe	H.W.	High Water
B.L.D.G.	Building	HOR.	Horizontal
C.I.	Cast Iron	HYD.	Hydrant
C.I.P.	Cast Iron Pipe	INV.	Invert
C.B.	Catch Basin	I.E.	Invert Elevation
C.L.	Center Line	J.B.	Junction Box
C. TO C.	Center To Center	L.T.	Left
CTD.	Coated	L.	Length of Curve
CUL.	Culvert	L.F.	Light Pole
CUM.	Communications	M.B.	Main Box
CORNC.	Concrete	M.L.	Main Line
C.O.A.	Control Of Access	M.H.	Manhole
COORD.	Coordinates	MAX.	Maximum
C.M.	Corrugated Metal	M.H.W.	Mean High Water
C.M.P.	Corrugated Metal Pipe	M.S.L.	Mean Sea Level
CUL.M.	Culvert	MIN.	Minimum
CULV.	Culvert	MON.	Monument
CS	Curve to Spiral	O.C.	Gas Centers
C.	Curve	O.D.	Outside Diameter
DEG.	Degree	O. TO O.	Outside To Outside
DIA.	Diameter	P.V.M.T.	Pavement
DM.	Dimension	PCC	Point of Compound Curvature
DRG.	Drawing	PC	Point of Curvature
DRY.	Driveway	PI	Point of Intersection
ELEV.	Elevation	PRC	Point of Reverse Curve
E. TO E.	End To End	P.T.	Point of Tangency
ENGR.	Engineer	P.C.C.	Portland Cement Concrete
EST.	Estimate	P.W.	Power
EX.	Excavation	P.P.	Power Pole
EXIST.	Existing	P.L.	Property Line
E.G.	Existing Ground	PROP.	Proposed
EXP.	Expansion	P.G.	Proposed Grade
EXT.	External	P.V.I.	Point of Vertical Intersection
E	External Distance	R.	Radius of Curvature
		R.R.	Railroad
		R.C.P.	Reinforced Concrete Pipe



SUMMARY OF QUANTITIES		
DESCRIPTION	UNIT	QTY
1. ALL EROSION CONTROL DEVICES SHALL BE INSTALLED AT THE LOCATION INDICATED ON THE CONSTRUCTION PLANS.	SQ. YD.	1.00
2. EROSION CONTROL DEVICES SHALL BE INSTALLED AT THE TOE OF FILL OR AT THE TOE OF EXCAVATION.	SQ. YD.	1.00
3. EROSION CONTROL DEVICES SHALL BE INSTALLED AT THE TOE OF EXCAVATION.	SQ. YD.	1.00
4. THE SLOPE SHALL BE MAINTAINED AT THE DESIGN SLOPE.	SQ. YD.	1.00
5. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED.	SQ. YD.	1.00
6. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED.	SQ. YD.	1.00
7. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED.	SQ. YD.	1.00
8. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED.	SQ. YD.	1.00
9. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED.	SQ. YD.	1.00
10. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED.	SQ. YD.	1.00
11. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED.	SQ. YD.	1.00
12. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED.	SQ. YD.	1.00

“Right of Way”

- Los planos preliminares de *Right of Way* proveen información valiosa para
 - Estudios de impacto ambiental
 - Vistas públicas
- Se preparan incluyendo la trayectoria del proyecto

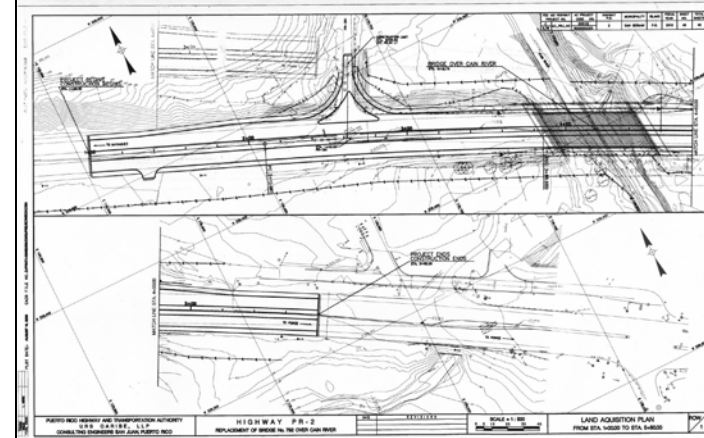
“Right of Way”

- Contienen información acerca de:
 - Estaciones
 - Límites de construcción
 - Carreteras existentes
 - Edificios
 - Estructuras y topografía existente en la vecindad del proyecto
 - Límites existentes y propuestos de ROW
 - Controles de acceso
 - Límites de corte y relleno
 - Números de parcelas
 - Dueños de propiedades vecinas

“Right of Way”

- Hay que mostrar las propiedades que van a ser expropiadas
- Tiene que haber una tabla que incluya
 - Número de parcela afectada
 - Dueño
 - Estimado del área de la parcela
 - Estimado del área a expropiar

“Right of Way”



"Right of Way"

"Right of Way"

PARCEL NAME: 001-01				OWNER: ANIBAL BAEZ IRIZARRY		
SURVEY DATA						
LINE	BEARING	DISTANCE	POINT	COORDINATES		DESCRIPTION
				NORTH (Y)	EAST (X)	
1-2	S 14°16'34" W	17.83	1	40681.0655	120638.6206	TO BE ESTABLISHED
2-3	S 27°29'6" W	25.06	2	40663.7868	120634.2240	TO BE ESTABLISHED
3-4	S 27°29'6" W	25.06	3	40641.5560	120622.6587	TO BE ESTABLISHED
4-5	S 30°54'13" W	39.51	4	40619.3252	120611.0934	TO BE ESTABLISHED
5-6	S 45°53'48" W	26.82	5	40585.4257	120590.8021	TO BE ESTABLISHED
6-7	N 73°7'21" W	87.18	6	40566.7605	120571.5435	TO BE ESTABLISHED
7-8	N 10°11'4" E	75.19	7	40592.0711	120488.1188	TO BE ESTABLISHED
8-9	N 46°51'51" W	31.95	8	40666.0734	120501.4130	TO BE ESTABLISHED
9-10	N 29°24'46" W	11.49	9	40687.9170	120478.0996	TO BE ESTABLISHED
10-11	N 0°35'10" W	57.18	10	40697.9260	120472.4569	TO BE ESTABLISHED
11-12	S 71°23'14" E	108.87	11	40755.0997	120471.8719	TO BE ESTABLISHED
12-13	S 62°17'21" E	66.51	12	40720.3518	120575.0464	TO BE ESTABLISHED
13-1	S 29°18'32" E	9.59	13	40689.4239	120633.9283	TO BE ESTABLISHED
AREA = 19628.7141				SQ.MTS.		4.9941 CUERDAS

"Right of Way"

STRUCTURES TO BE ACQUIRED			
MK'D.	OWNER	DESCRIPTION	CONDITION
1	SUCN. ANTONIO IRIZARRY	CONC. & WOOD & GALV. STRUCT.	
2	ILUMINADA RIVERA VELEZ	WOOD & GALV. STRUCT.	
3	SUCN. ANTONIO IRIZARRY	CONC. & WOOD & GALV. STRUCT.	
4	ANDERSON SANTOS	WOOD & GALV. STRUCT.	
5	LUIS CESAR IRIZARRY	CONC. & WOOD & GALV. STRUCT.	
6	RUBEN BAEZ HERNANDEZ	SHACK	
7	RUBEN BAEZ HERNANDEZ	SHACK	
8	RUBEN BAEZ HERNANDEZ	SHACK	
9	MANUEL ACEVEDO TORRES	CONC. BOX	
10	PEDRO ACEVEDO COLON	ABANDONED WATER BOX	
11	AMID F. GONZALEZ BATIZ	CONC. & WOOD & GALV. STRUCT.	
12	AMID F. GONZALEZ BATIZ	SHACK	
13	AMID F. GONZALEZ BATIZ	SHACK	

"Right of Way"

PARCEL OWNER			AREA TO BE ACQUIRED			REMAINING AREA TO BE ACQUIRED		REMAINING AREA		
NO.	N A M E	MTS.	CDAS.	PARCEL NO.	MTS.	CDAS.	MTS.	CDAS.	MTS.	CDAS.
001-00	ANIBAL BAEZ IRIZARRY			001-01	19628.7141	4.9941	---	---	---	---
002-00	GERONIMO HERNANDEZ			002-01	14223.6556	3.6189	14223.6556	3.6189	---	---
				002-02	---	---	21363.5534	5.4355	---	---
003-00	FRANCISCO BAEZ IRIZARRY			003-01	25522.1244	6.4935	---	---	---	---
				003-02	---	---	10156.1286	2.5840	---	---
004-00	P.R.E.P.A.			004-01	21757.5289	5.5357	---	---	---	---
				004-02	---	---	1608.2618	0.4092	---	---
005-00	GERONIMO HERNANDEZ VARGAS			005-01	10172.0867	2.5881	---	---	---	---
				005-02	---	---	5049.5529	1.4120	---	---
006-00	AMID F. GONZALEZ BATIZ			006-01	20198.6980	5.1391	---	---	---	---
				006-02	---	---	---	---	---	---
				006-03	---	---	---	---	---	---
007-00	AMID F. GONZALEZ BATIZ			007-01	749.8756	0.1908	---	---	---	---
				007-02	---	---	7577.6615	1.9280	---	---
008-00	AMID F. GONZALEZ BATIZ			008-01	8065.7217	1.5433	---	---	---	---
				008-02	---	---	13980.4962	3.5570	---	---
009-00	RUBEN BAEZ HERNANDEZ			009-01	28953.9798	7.3667	---	---	---	---
				009-02	---	---	---	---	25236.2770	6.4213

Gracias



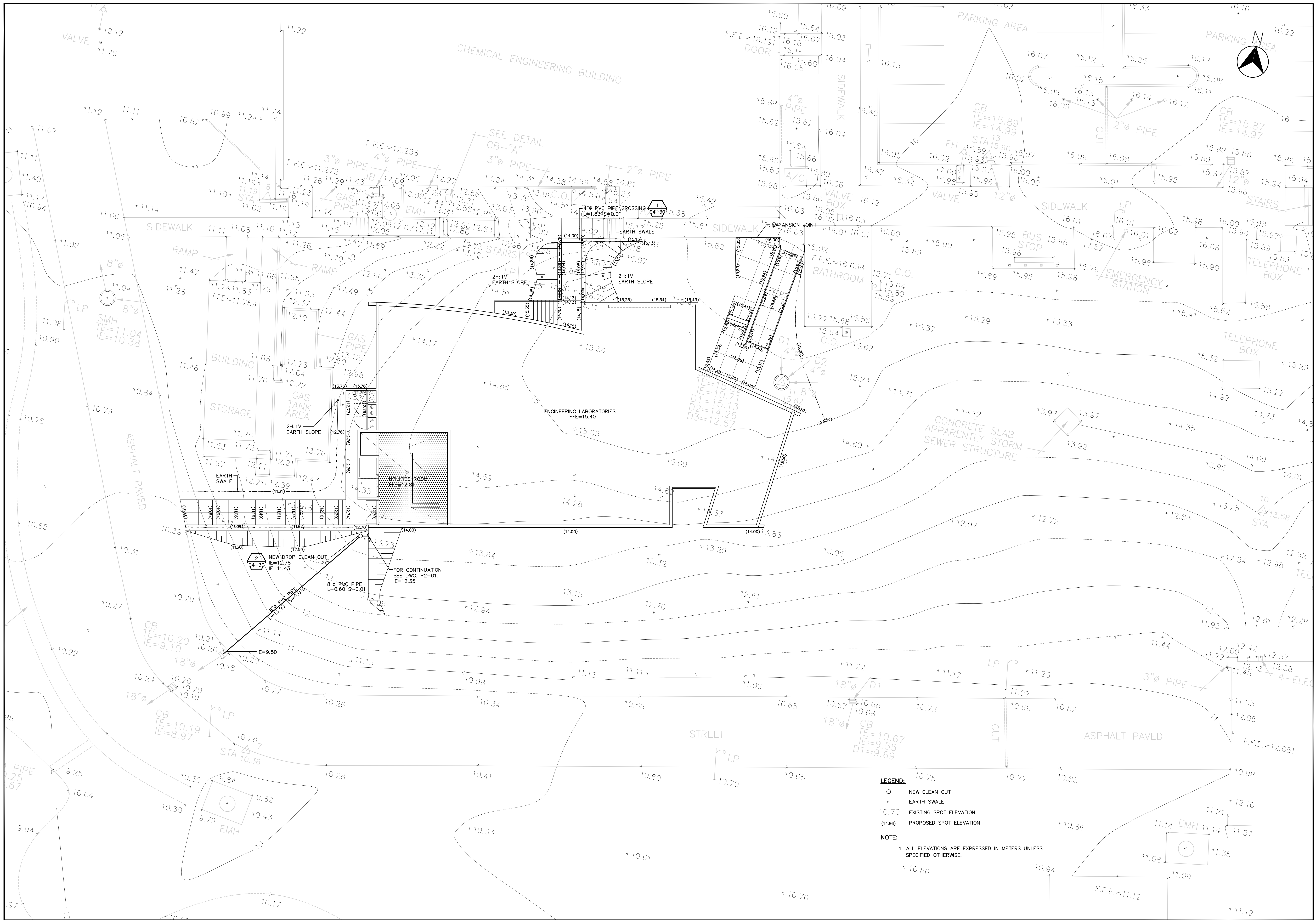
Seminario- Introducción a Lectura de Planos de Construcción

Dr. José L. Perdomo y Dr. Francisco Maldonado

Sesión de Laboratorio

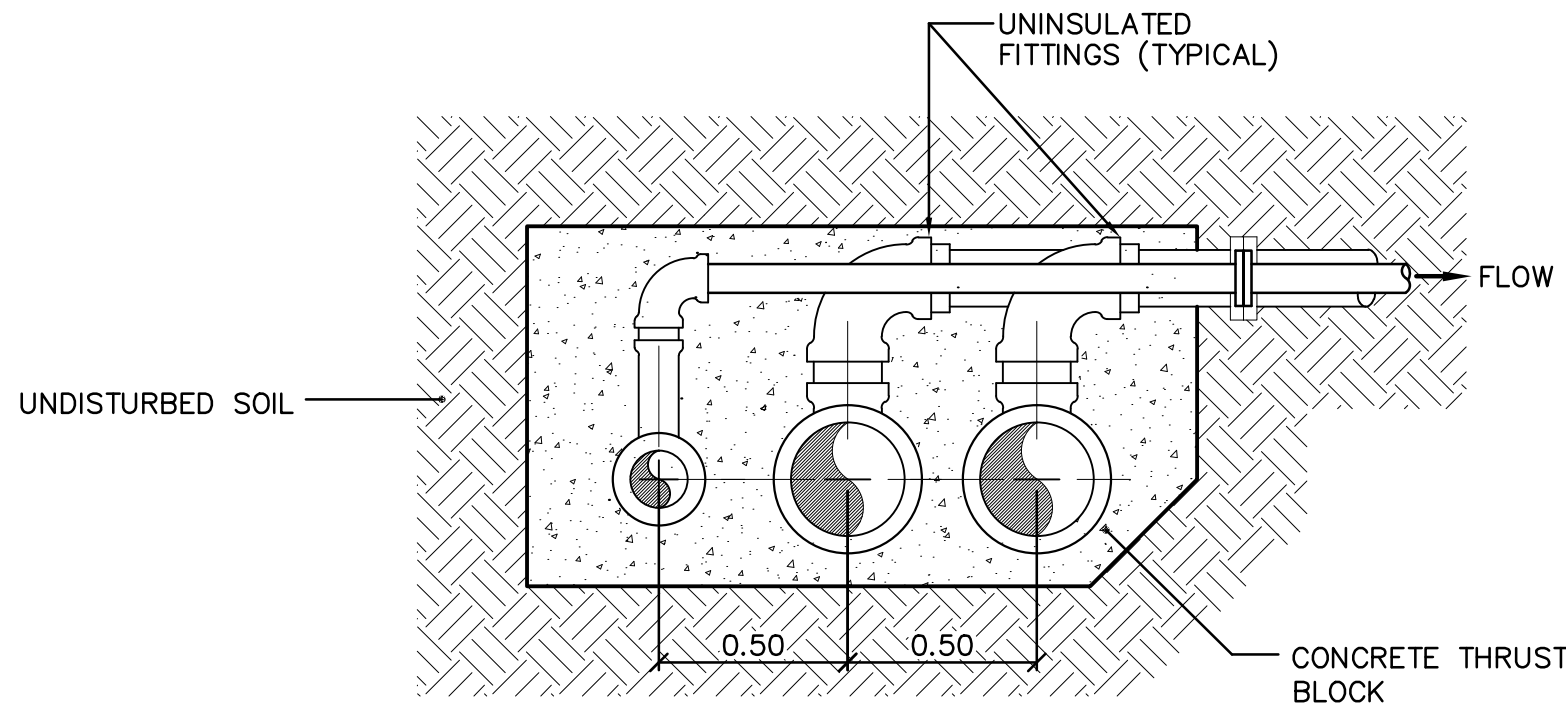
Estudie los planos provistos y conteste las siguientes preguntas.

1. Verificando la localización del edificio, que se puede decir en cuanto a la elevación del terreno y al movimiento de agua superficial en el lote?
2. ¿Cuáles son los requerimientos de compactación del material del *site* y cuándo se deben hacer pruebas de compactación?
3. ¿Esto es un edificio en acero o en hormigón? Explique como es el edificio.
4. ¿Dónde se muestra la conexión de las columnas interiores a la fundación?
5. ¿Describa los detalles de la conexión de las columnas interiores a la fundación?
6. ¿Cuál es la elevación del edificio?
7. ¿Cuál es resistencia del hormigón que se requiere para los diferentes componentes?
8. Indique la elevación interior del laboratorio desde la terminación de piso hasta el plafón.

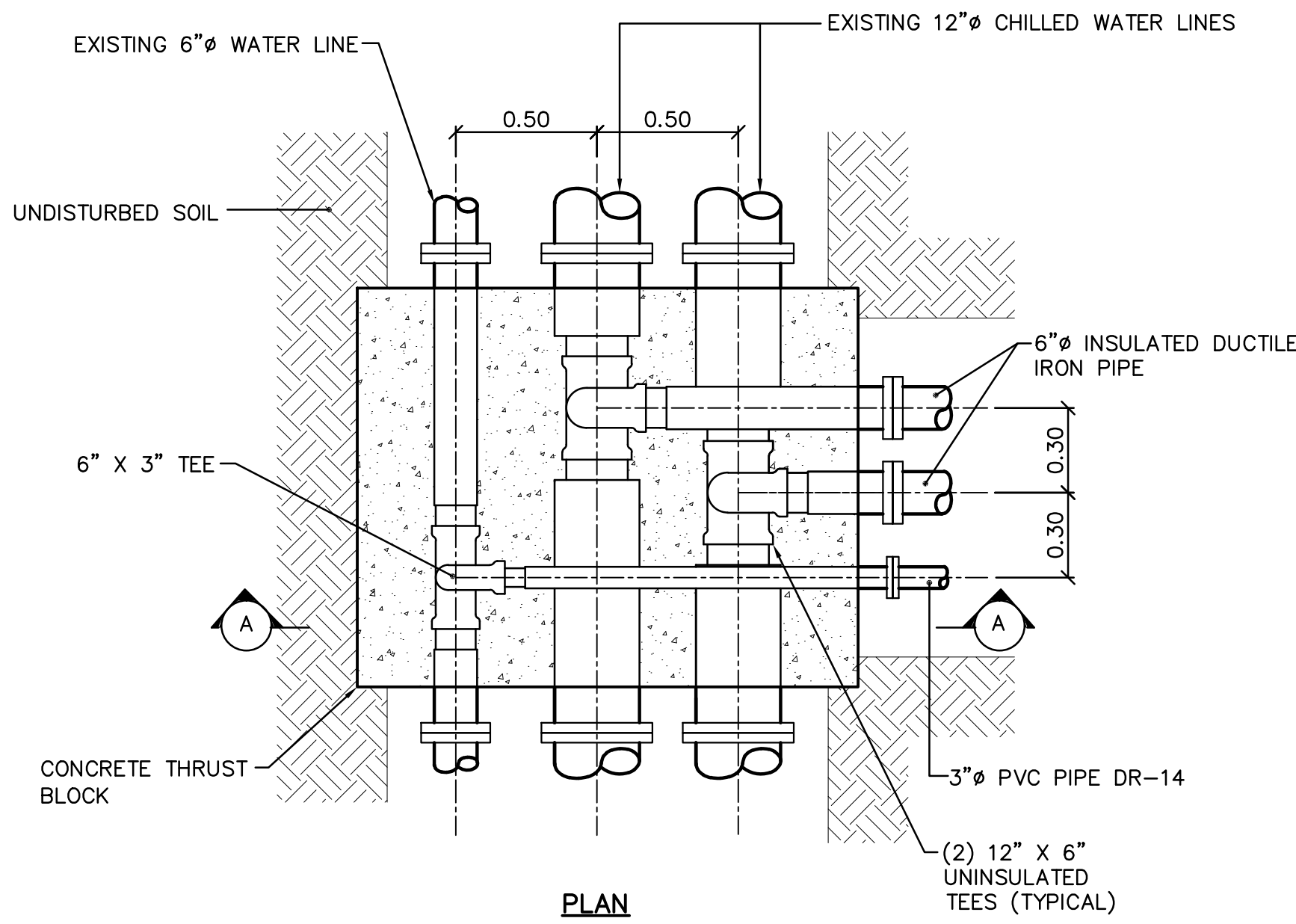


LEGEND:
○ NEW CLEAN OUT
— EARTH SWALE
+ 10.70 EXISTING SPOT ELEVATION
(14.86) PROPOSED SPOT ELEVATION

NOTE:
1. ALL ELEVATIONS ARE EXPRESSED IN METERS UNLESS SPECIFIED OTHERWISE.



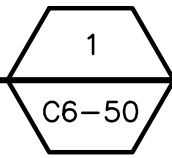
ELEVATION A-A



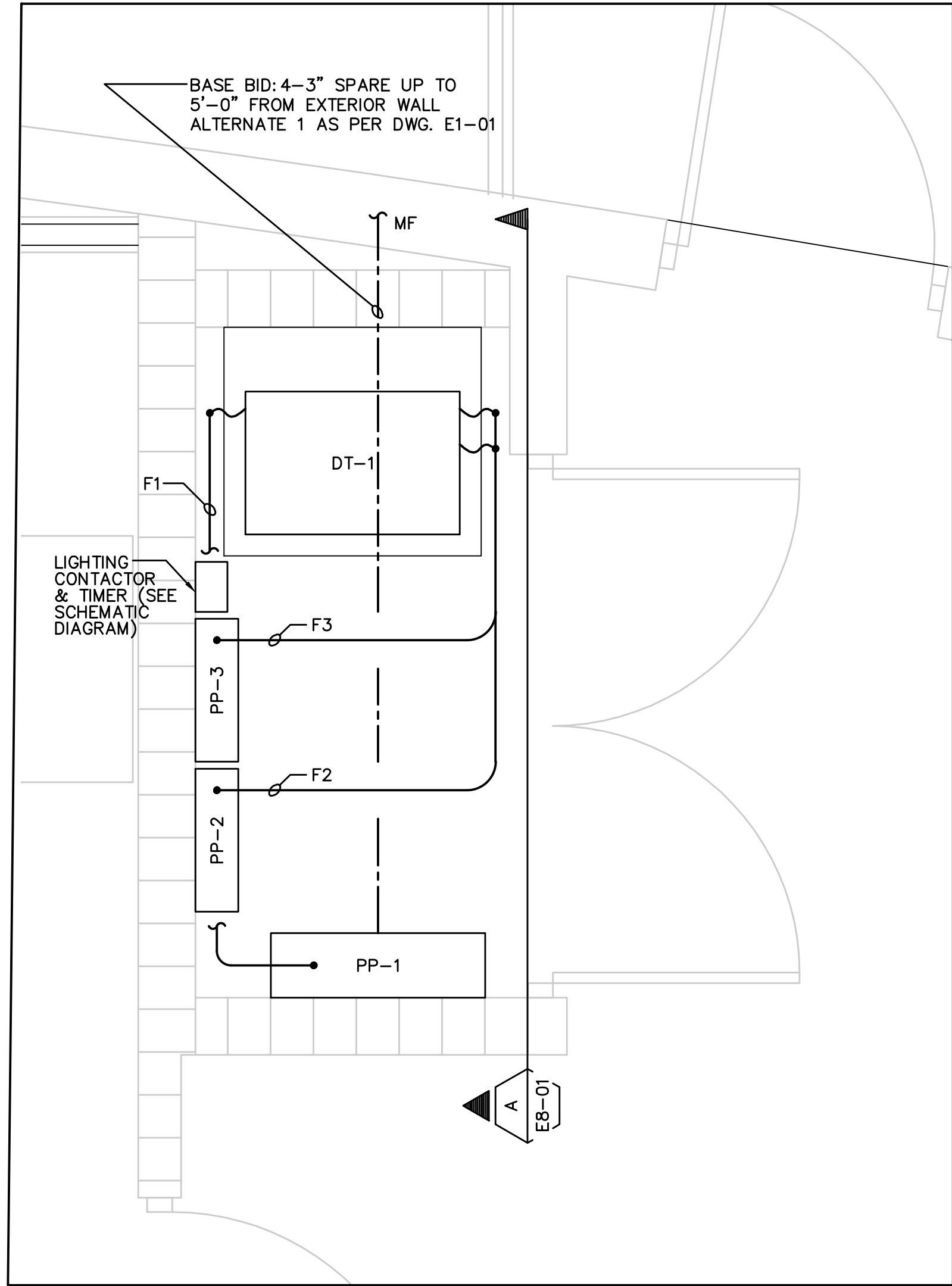
PLAN

TYPICAL THRUST
BLOCK AT TEES

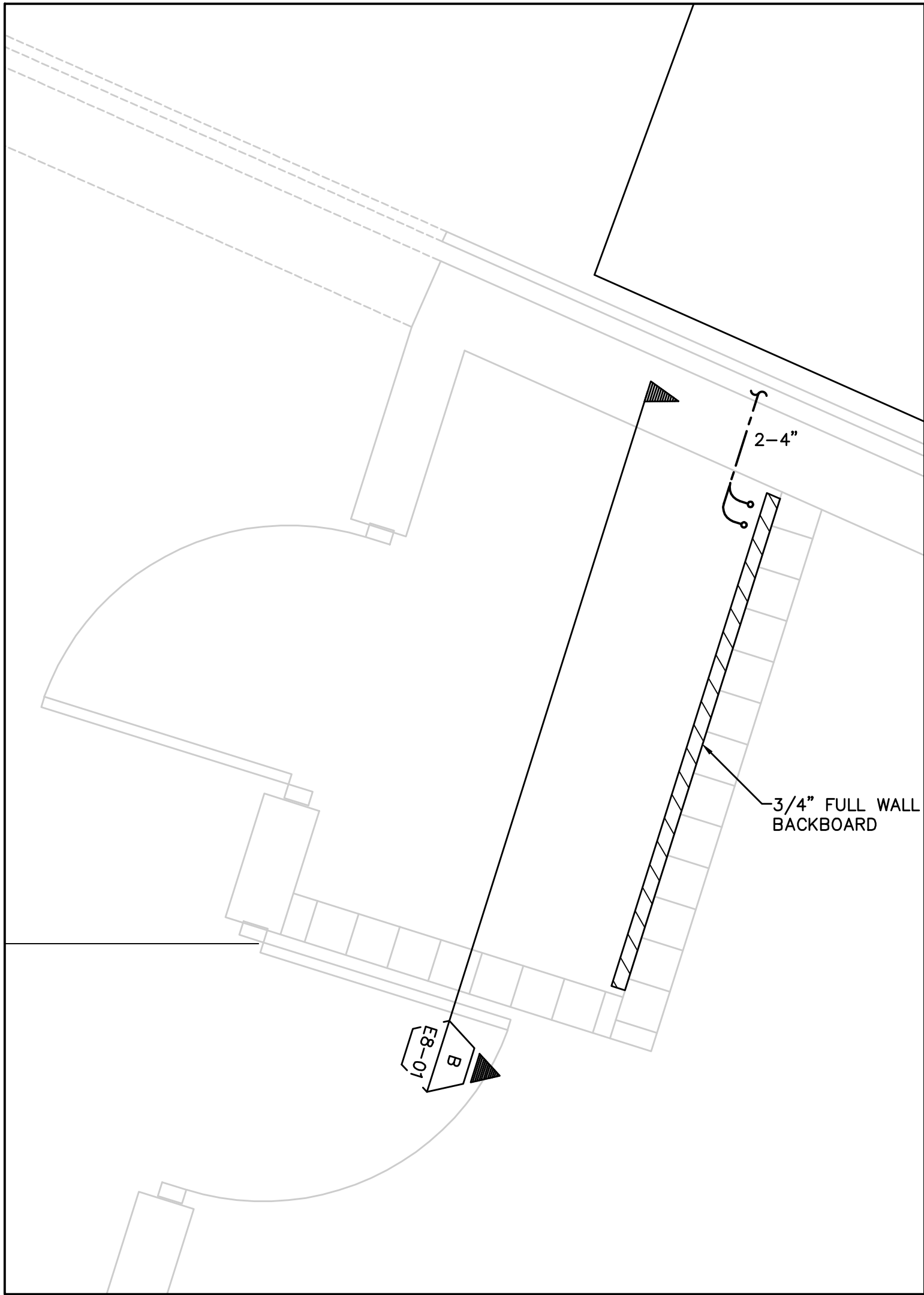
SCALE: 1:20



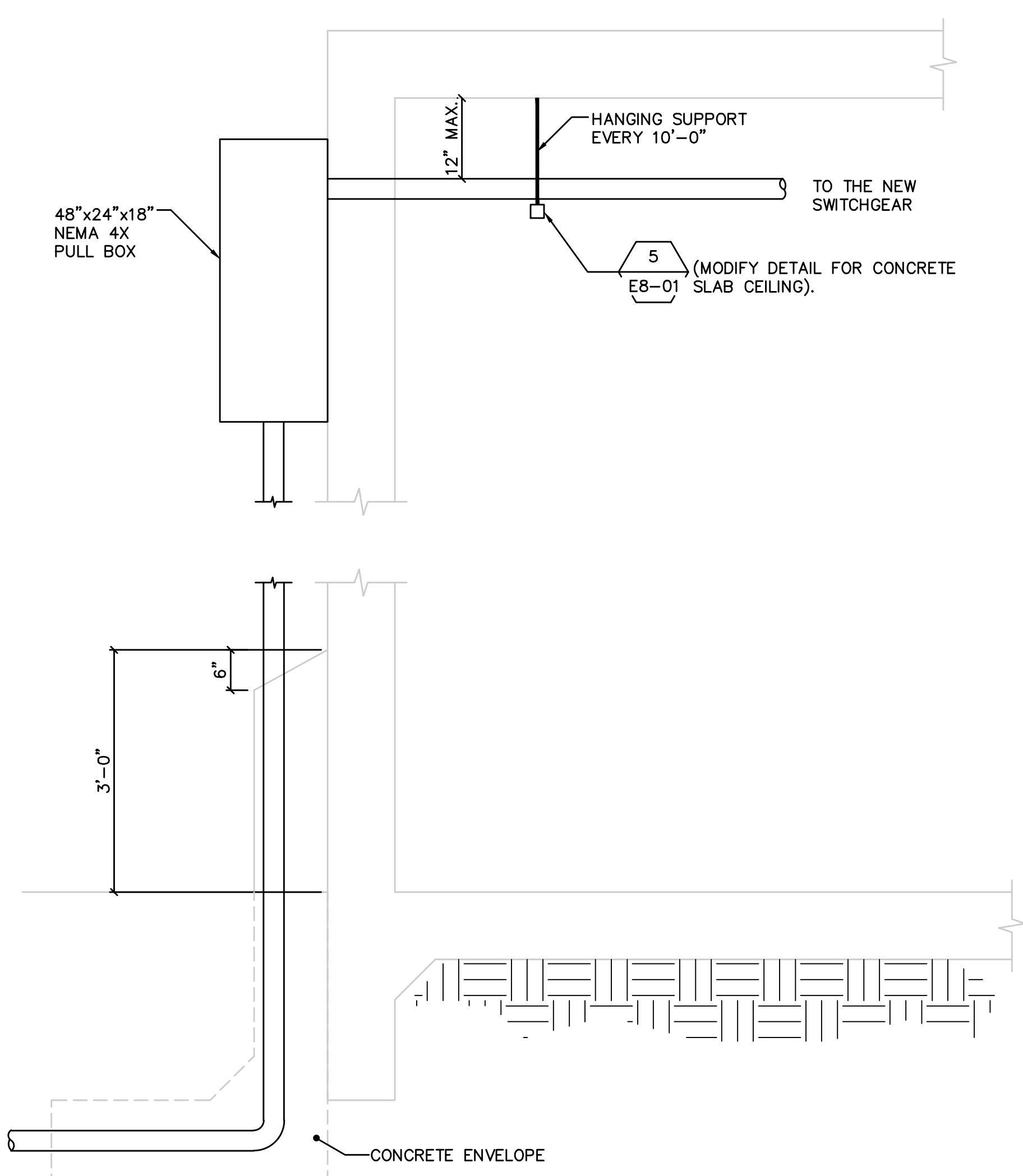
									Job No. 09009	POTABLE WATER AND FIRE PROTECTION DETAILS	C6-50			
									SCALE AS SHOWN					
									DATE 10/12/09					
01/25/10			A ISSUED FOR BID			D. BERNAL			DRAWN BY J.VAZQUEZ					
DATE	REVISIONS		BY	DATE	REVISIONS		BY	DATE	REVISIONS		BY	CHECKED BYD. BERNAL	TITLE	REVISION No. A



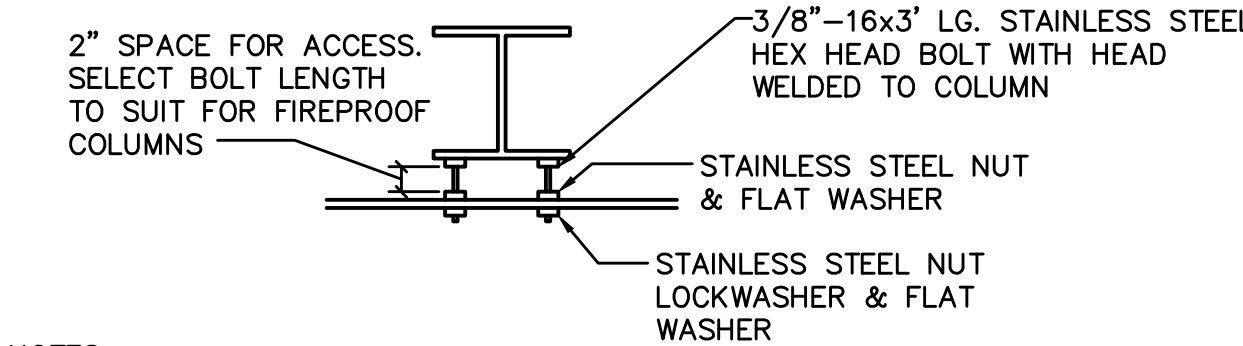
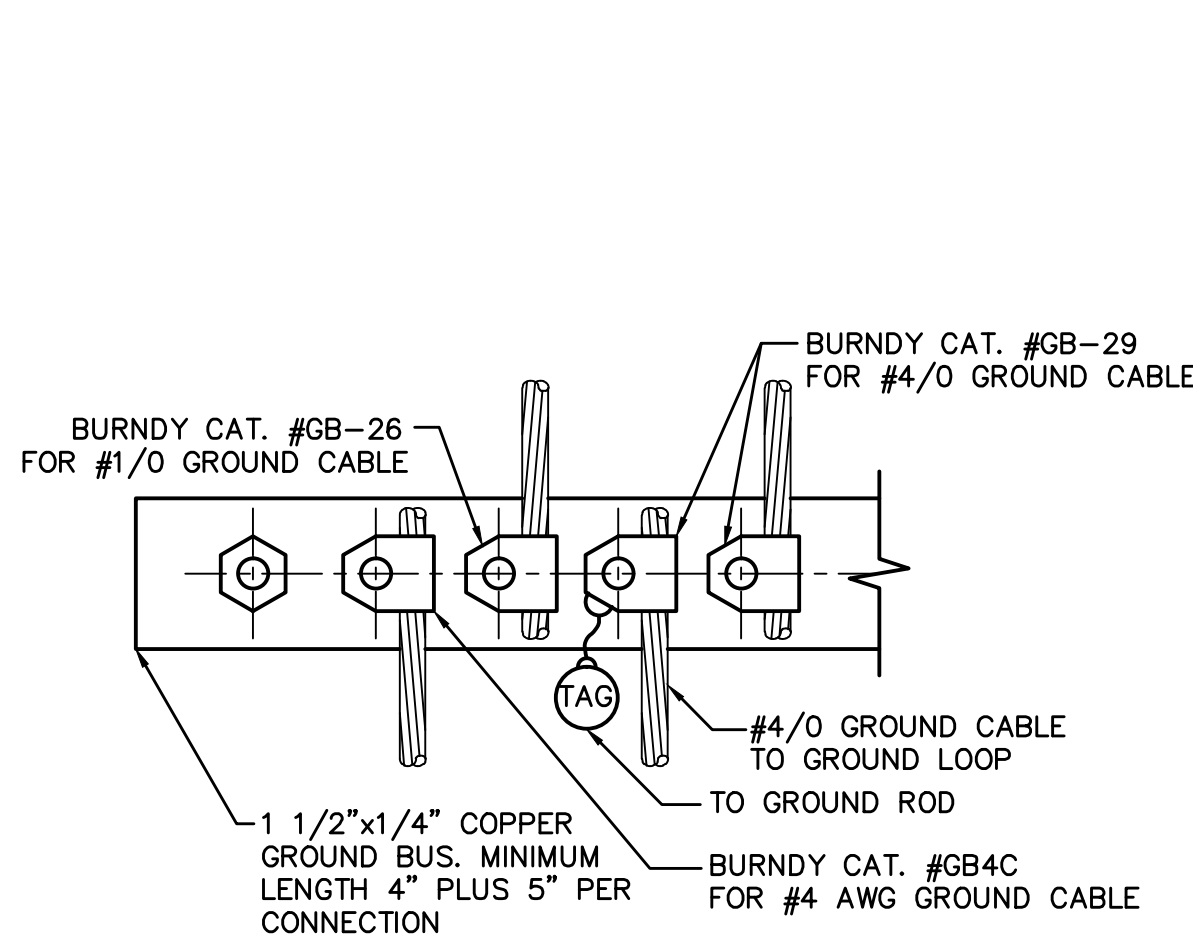
ENLARGED ELECTRICAL ROOM
SCALE: 3/4"=1'-0"



ENLARGED TELECOMMUNICATION ROOM
SCALE: 3/4"=1'-0"

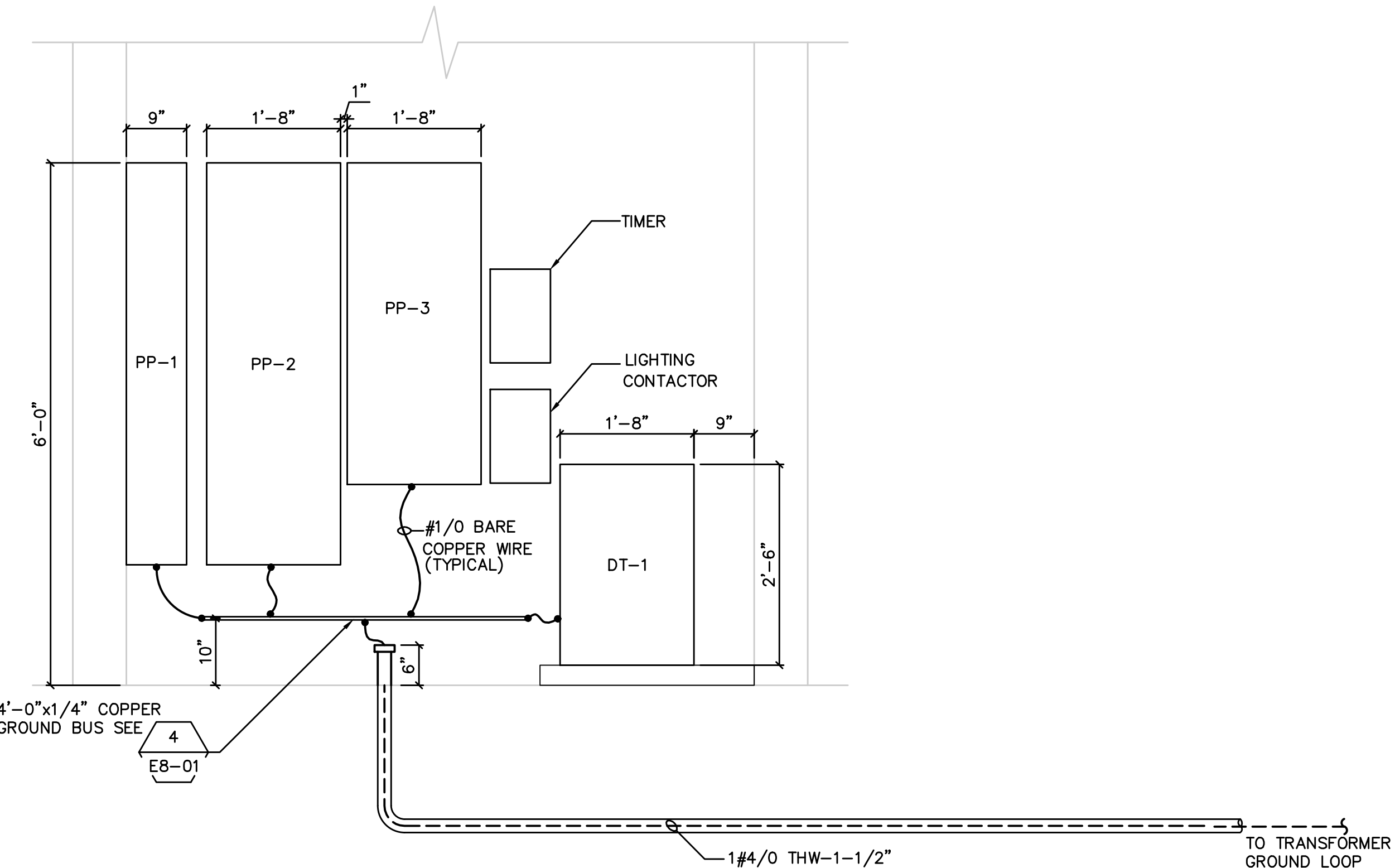


DETAIL 3
SCALE: N.T.S.

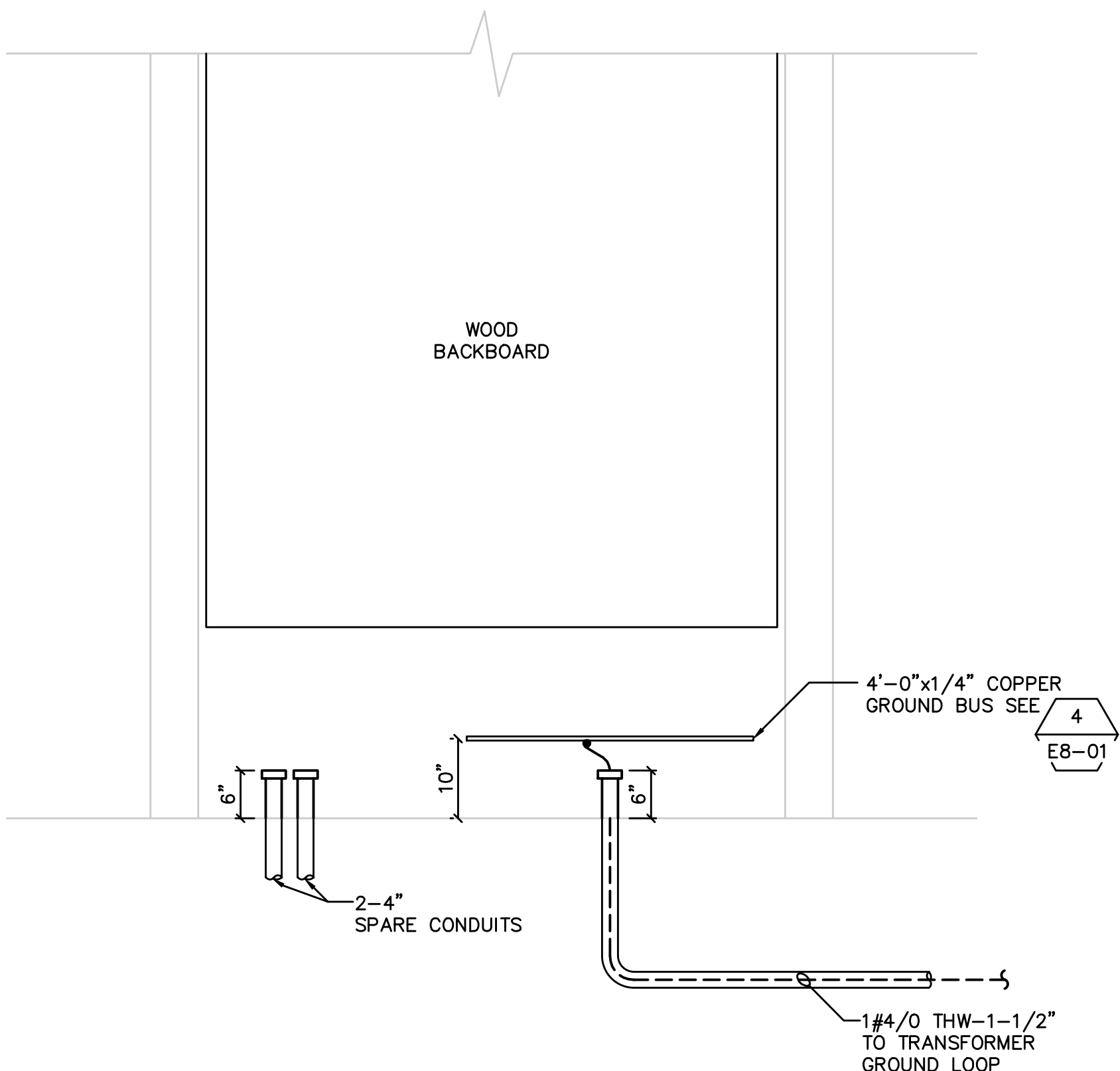


- NOTES:
- FOR ATTACHING GROUND BUS TO CONCRETE USE 3/8"-16 "RED HEAD" MULTI-SET 11 EXPANSION ANCHORS CAT. #RM-38 WITH 3/8"-16 x 3" LG. STAINLESS STEEL HEX HEAD BOLT, FLAT WASHER AND NUT.
 - GROUND BUS TO BE MOUNTED 1'-6" ABOVE FLOOR, GRADE OR PLATFORM UNLESS NOTED OTHERWISE ON JOB DRAWINGS

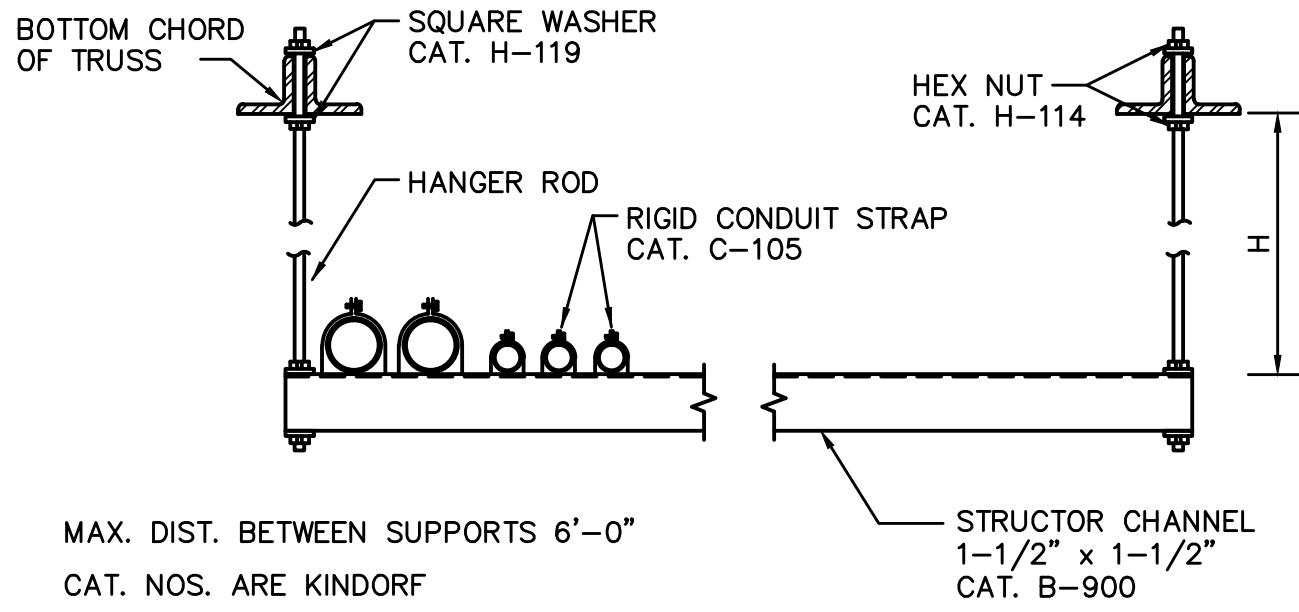
DETAIL 4
SCALE: N.T.S.



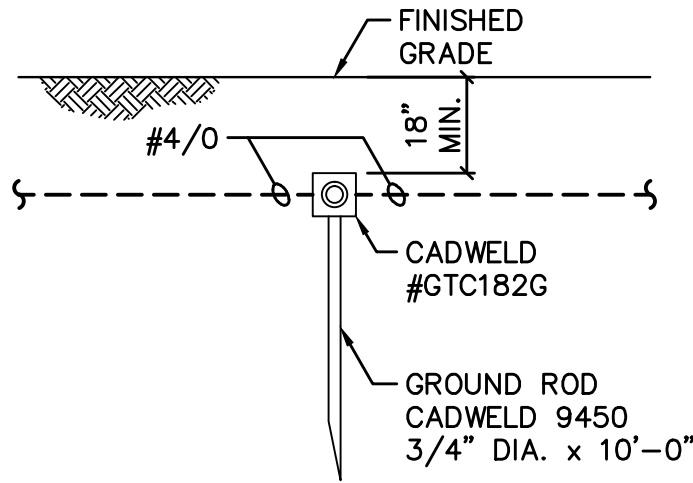
SECTION A
SCALE: 3/4"=1'-0"



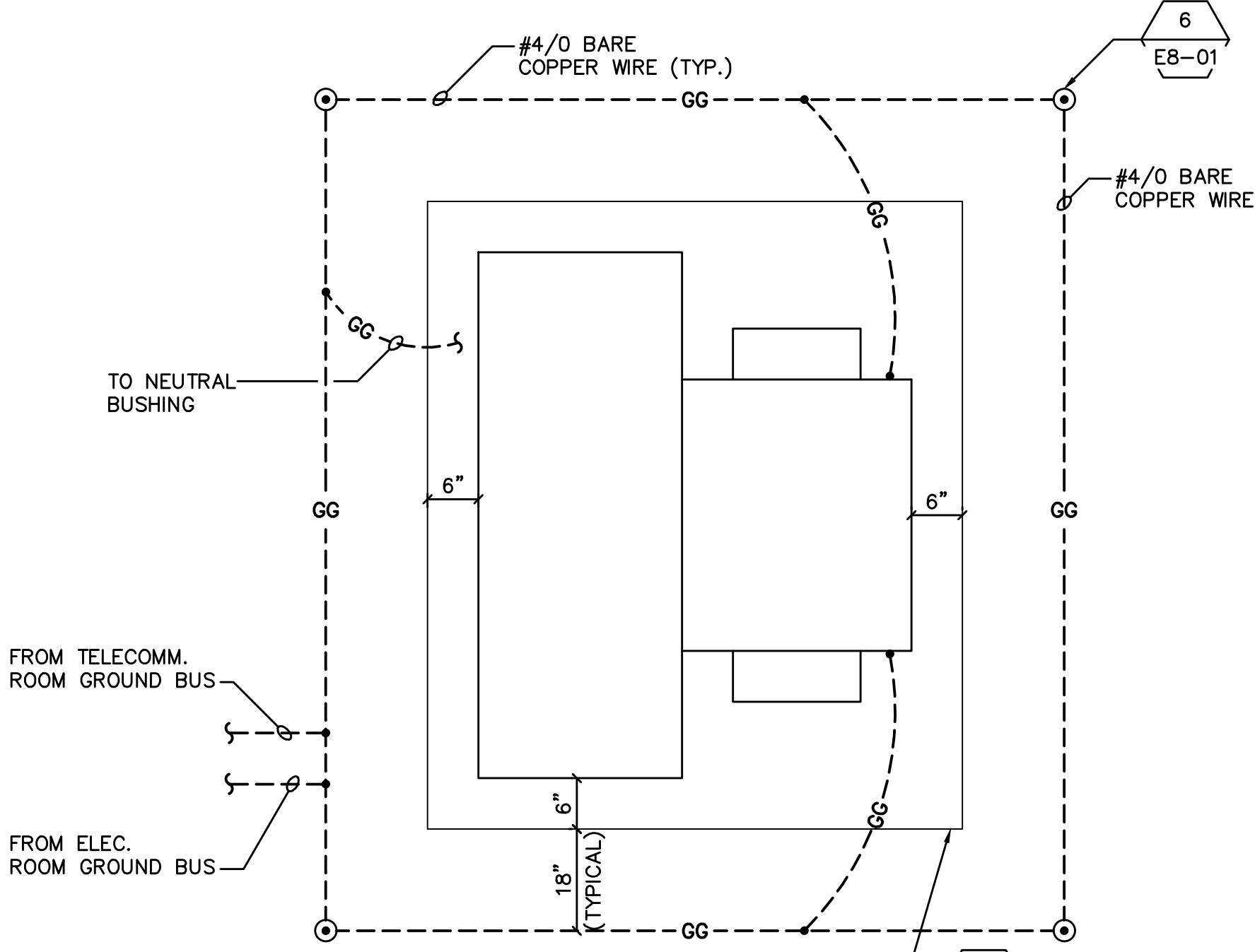
SECTION B
SCALE: 3/4"=1'-0"



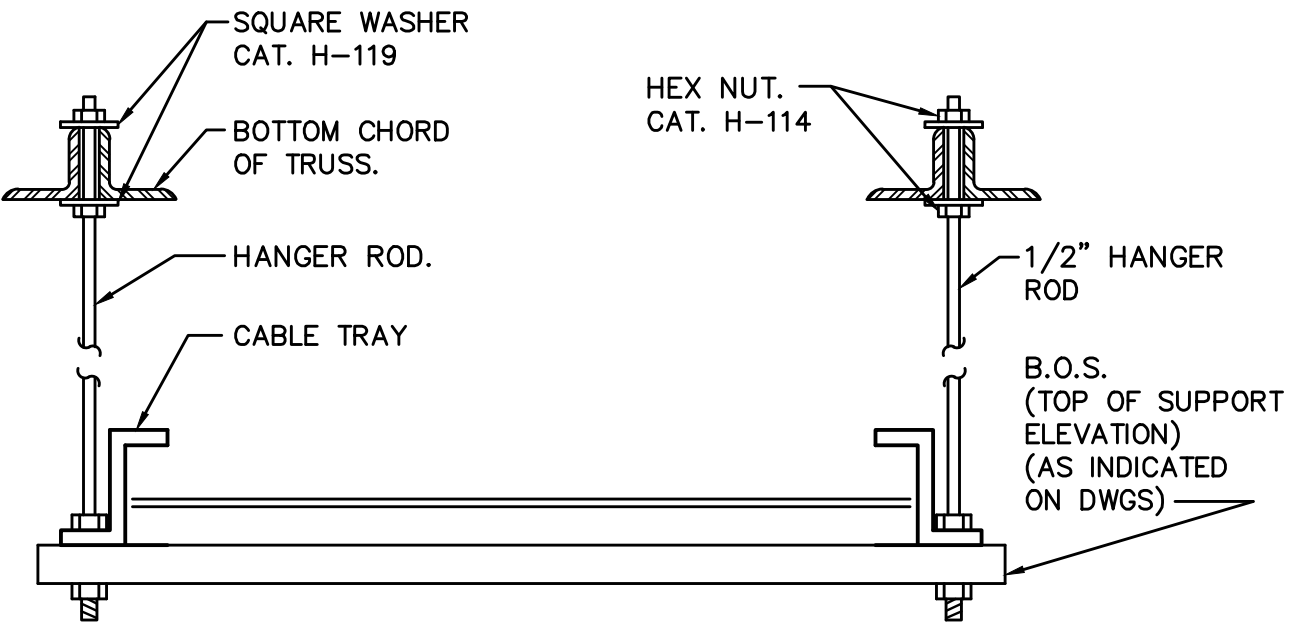
DETAIL 5
SCALE: N.T.S.



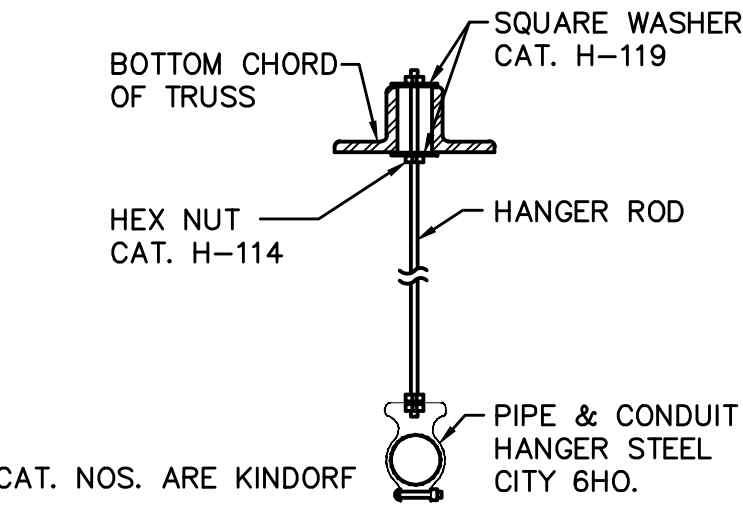
DETAIL 6
SCALE: N.T.S.



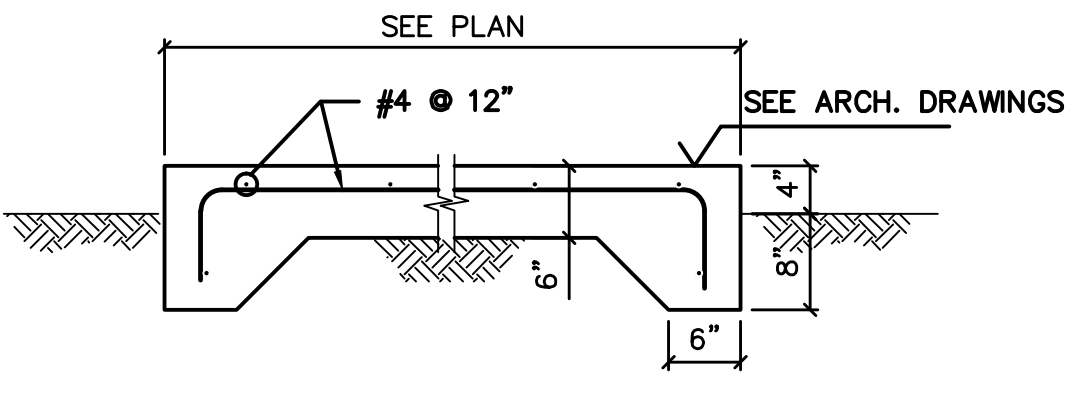
DETAIL 7
SCALE: N.T.S.



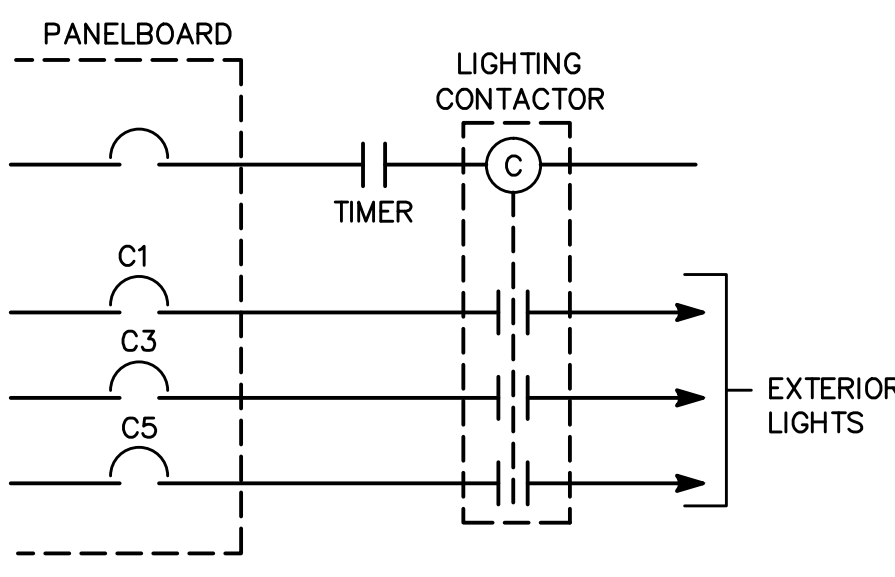
DETAIL 8
SCALE: N.T.S.



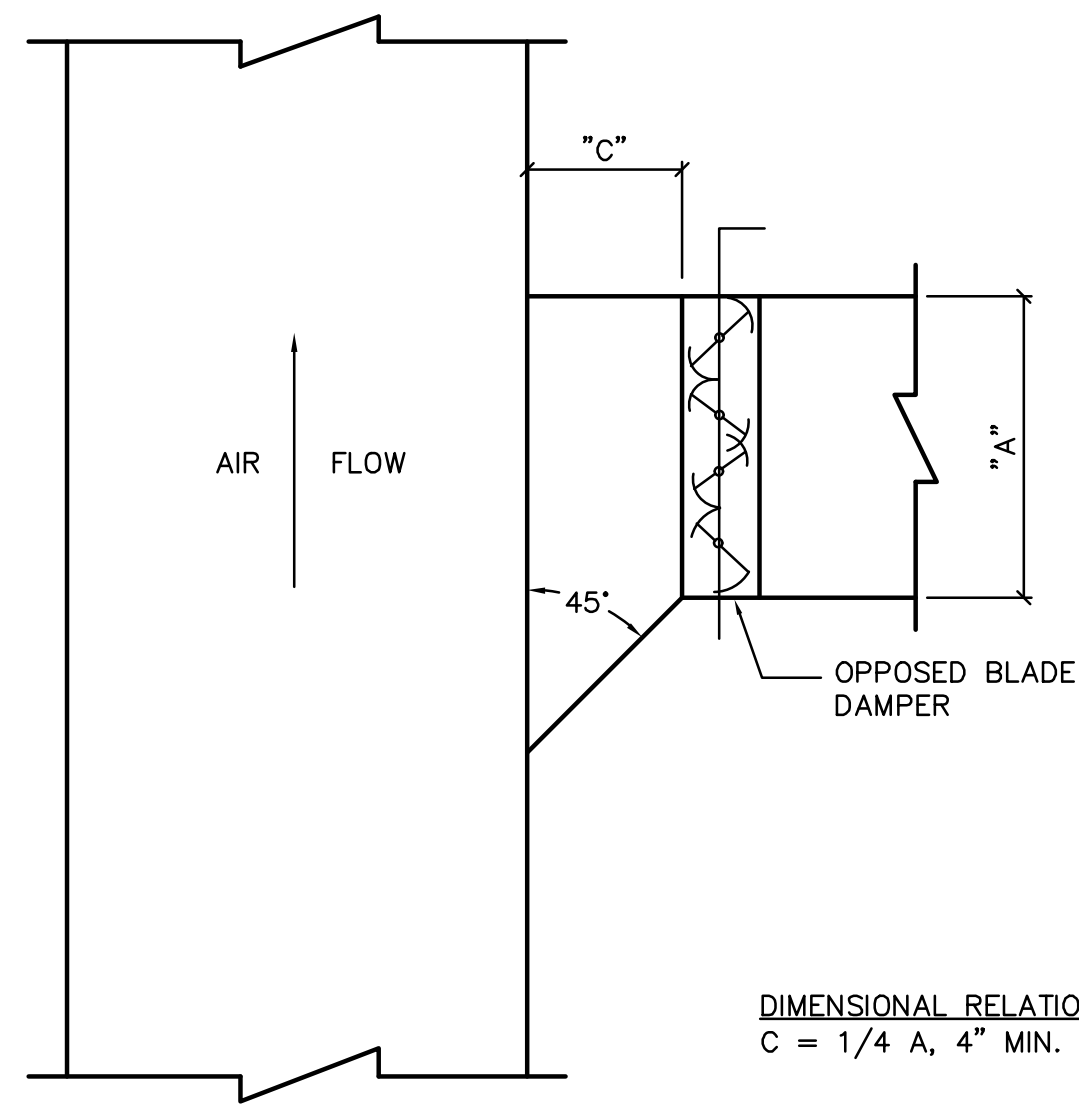
DETAIL 9
SCALE: N.T.S.



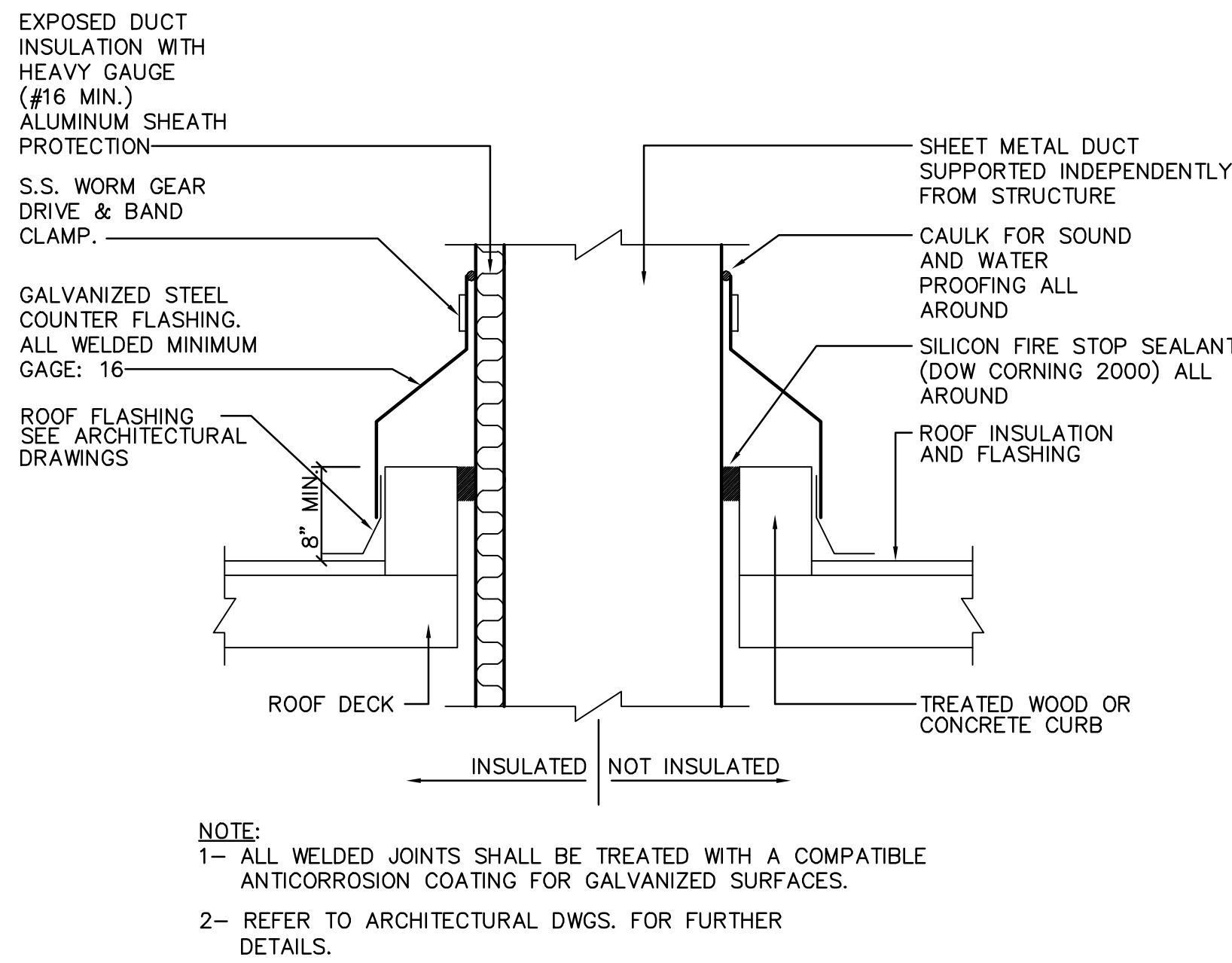
TYPICAL CONCRETE PAD DETAIL 10
SCALE: 3/4"=1'-0"



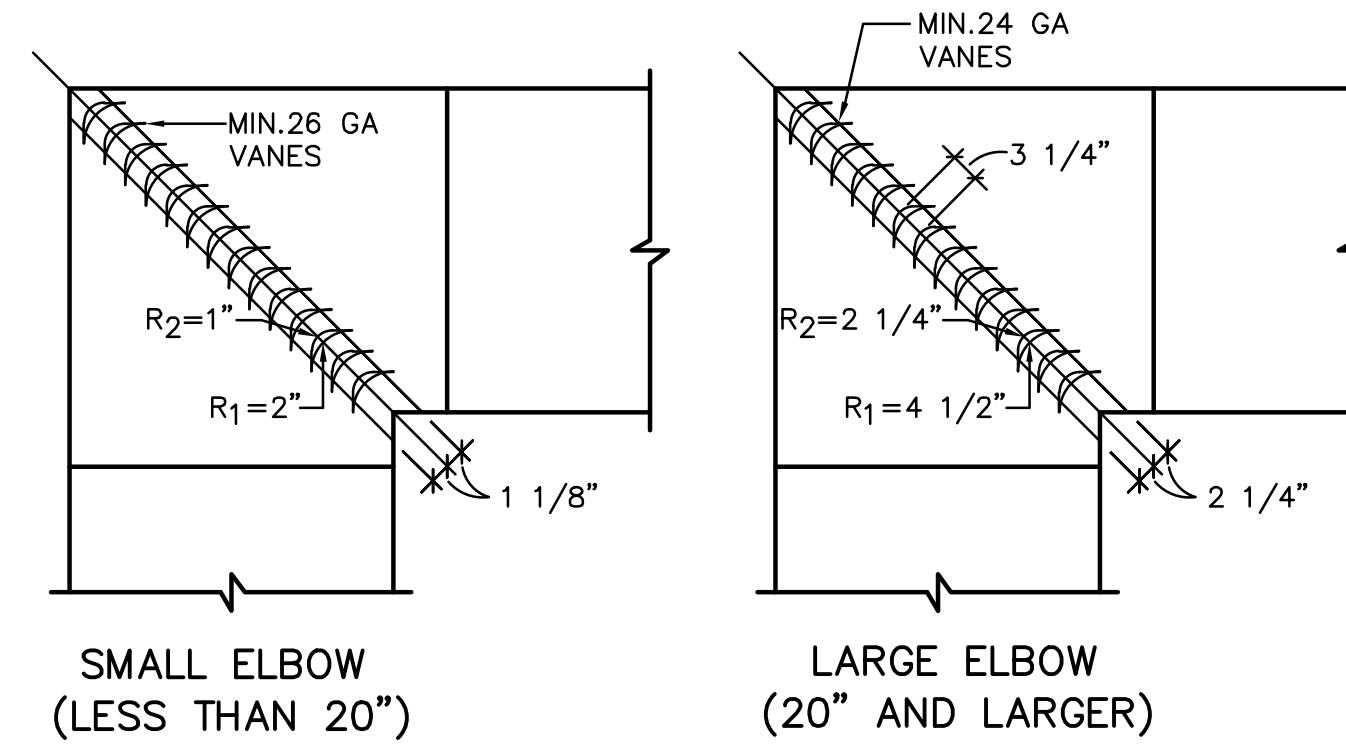
SCHEMATIC DIAGRAM
SCALE: N.T.S.



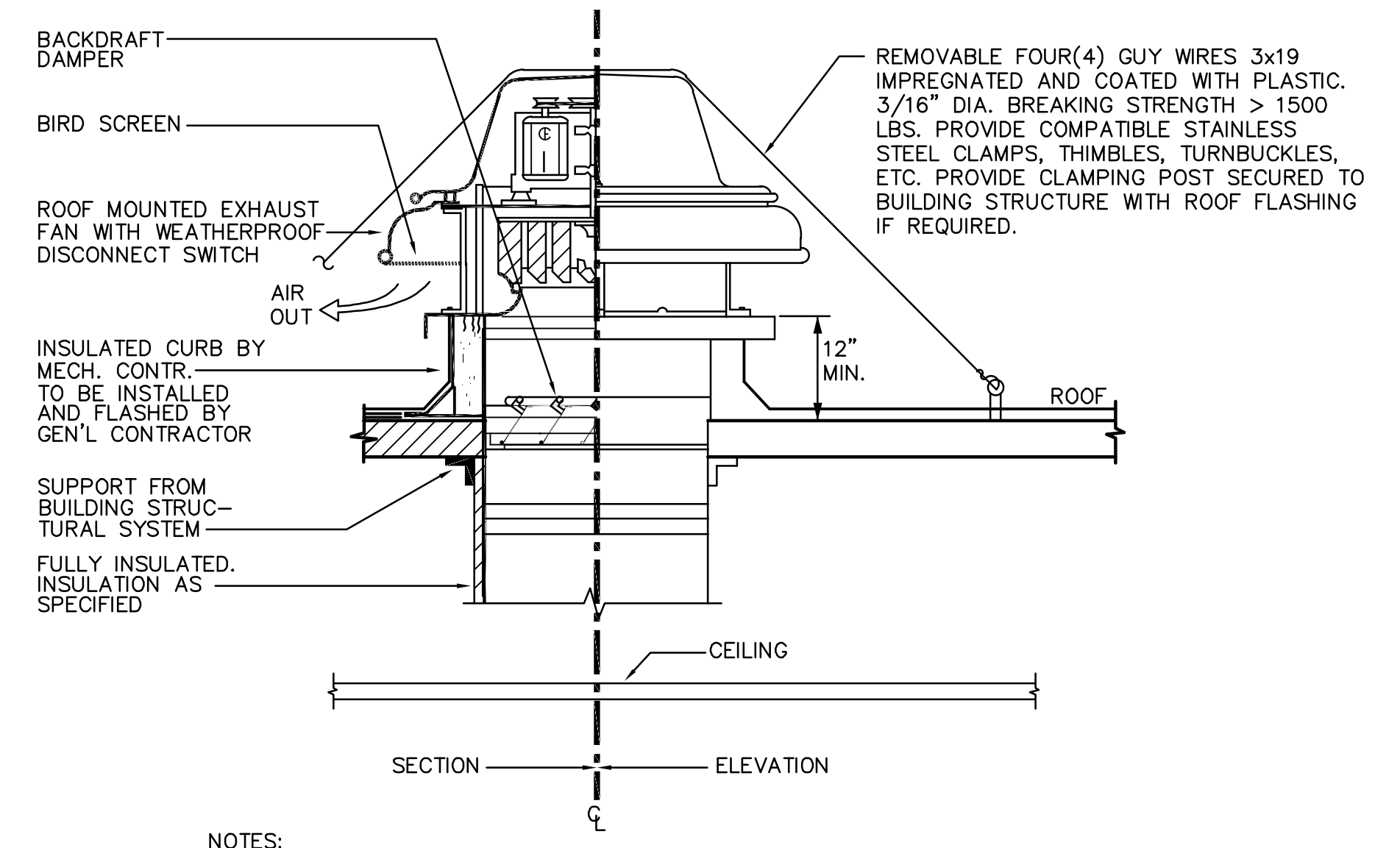
**BRANCH DUCT
DETAIL, RECTANGULAR**
N.T.S.



DUCT ACROSS ROOF DECK
N.T.S.

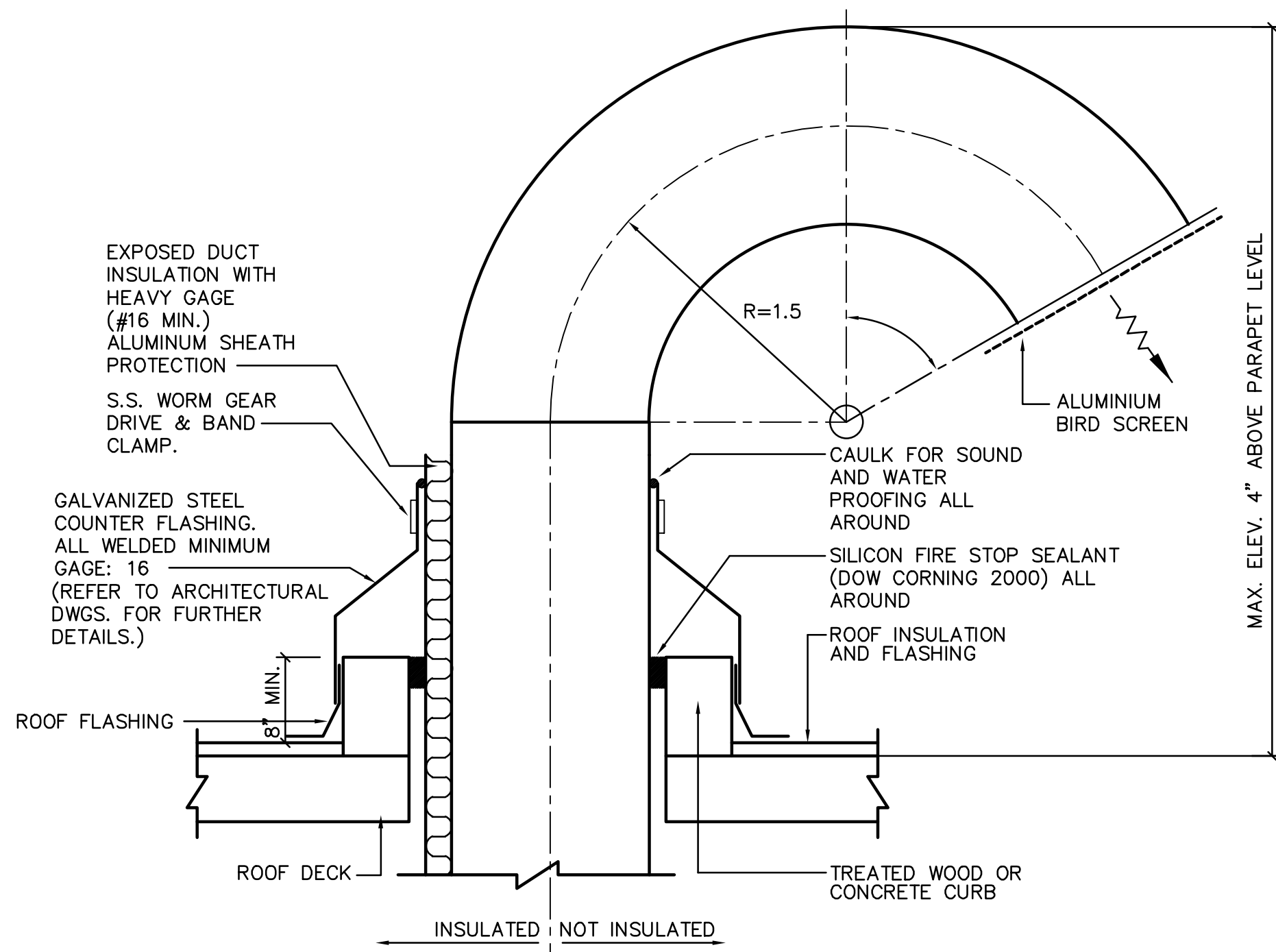


**TYPICAL
RECTANGULAR ELBOW**
N.T.S.



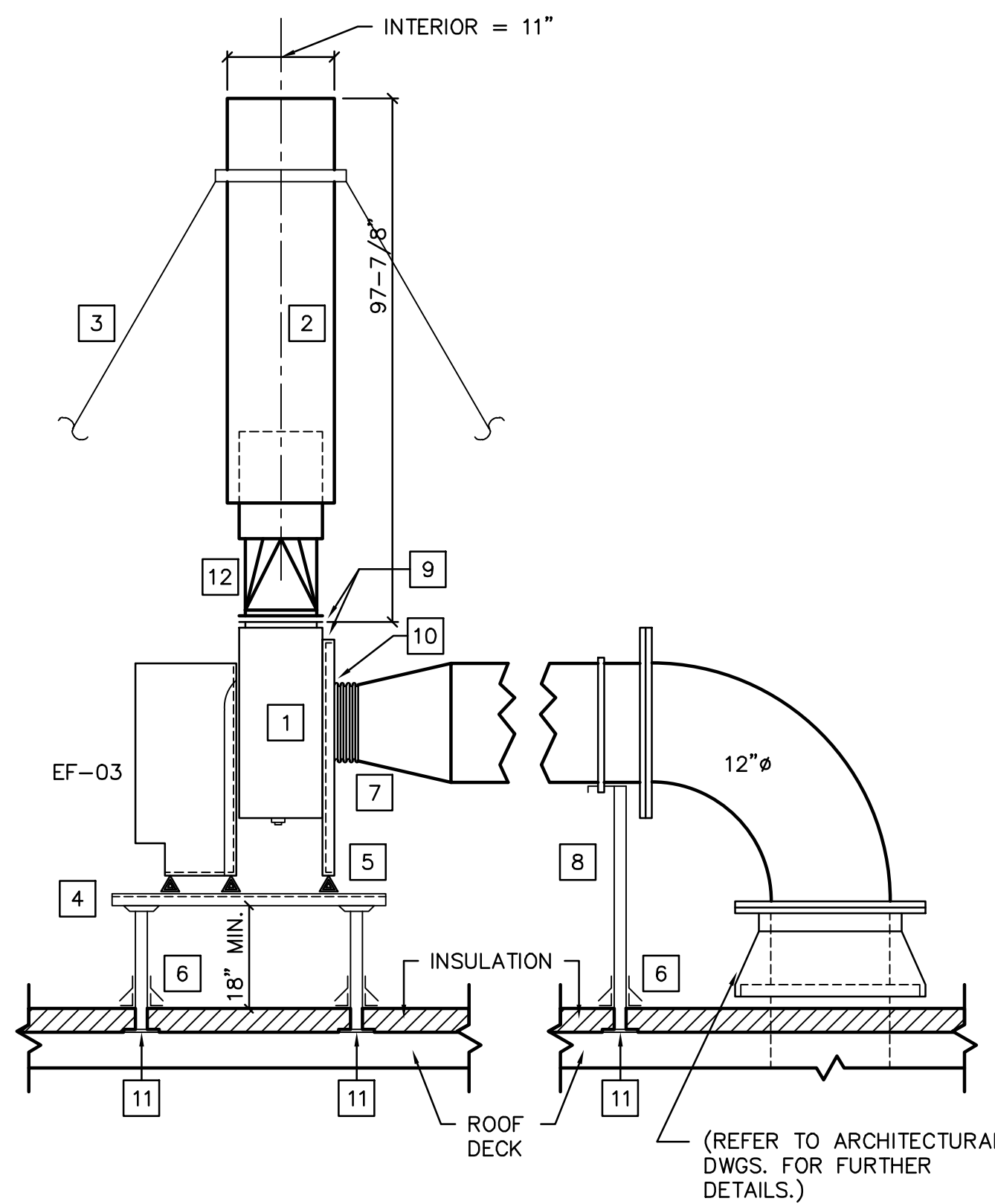
- NOTES:
1. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR ROOF CONSTRUCTION DETAILS.
 2. FOR ROOF OPENING SIZES, SEE MECHANICAL PLANS. IF SIZES ARE NOT INDICATED, OPENING IS TO BE NO SMALLER THAN CURB INSIDE DIMENSIONS.
 3. SEE MECHANICAL PLANS FOR DUCT, FAN AND GRILL SIZES

**DUCTED EXHAUST FAN,
ROOF MOUNTED**
N.T.S.



- NOTES:
- 1- ALL WELDED JOINTS SHALL BE TREATED WITH A COMPATIBLE ANTICORROSION COATING FOR GALVANIZED SURFACES.
 - 2- SHEET METAL DUCT SUPPORTED INDEPENDENTLY FROM STRUCTURE.

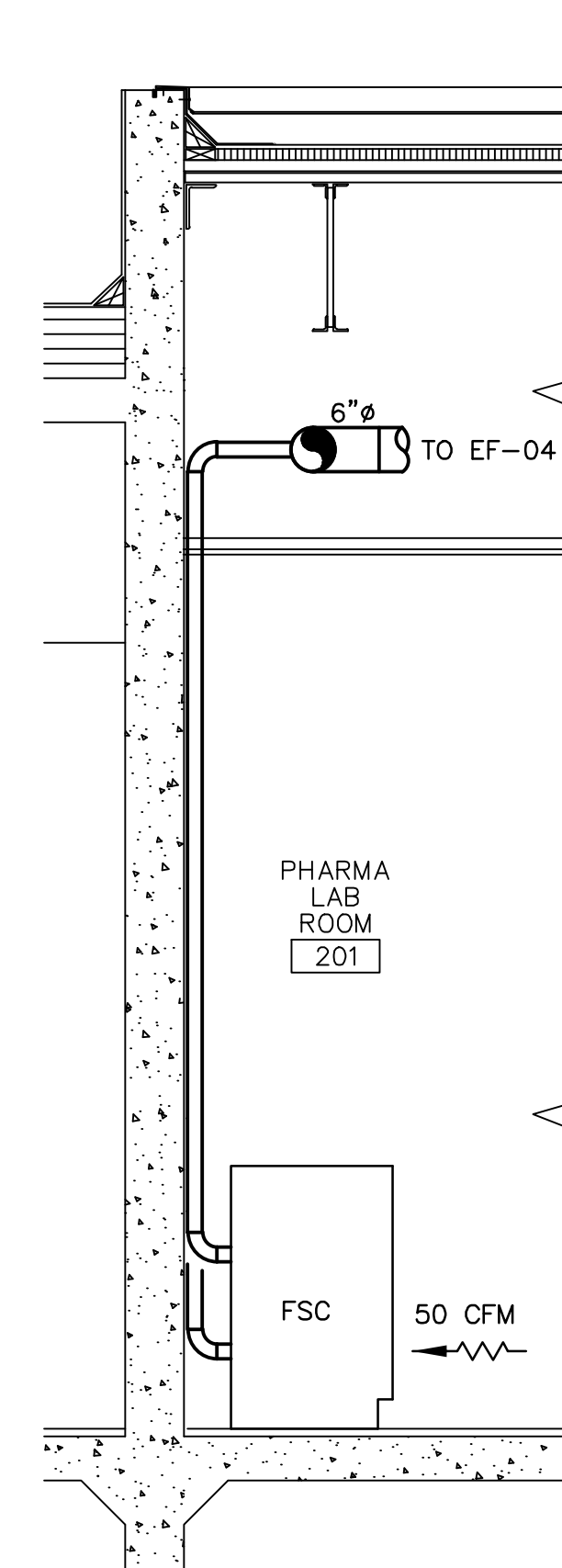
**DUCT ACROSS ROOF DECK
AND GOOSENECK DETAIL**
N.T.S.



**EXHAUST FAN
MOUNTING DETAIL**
N.T.S.

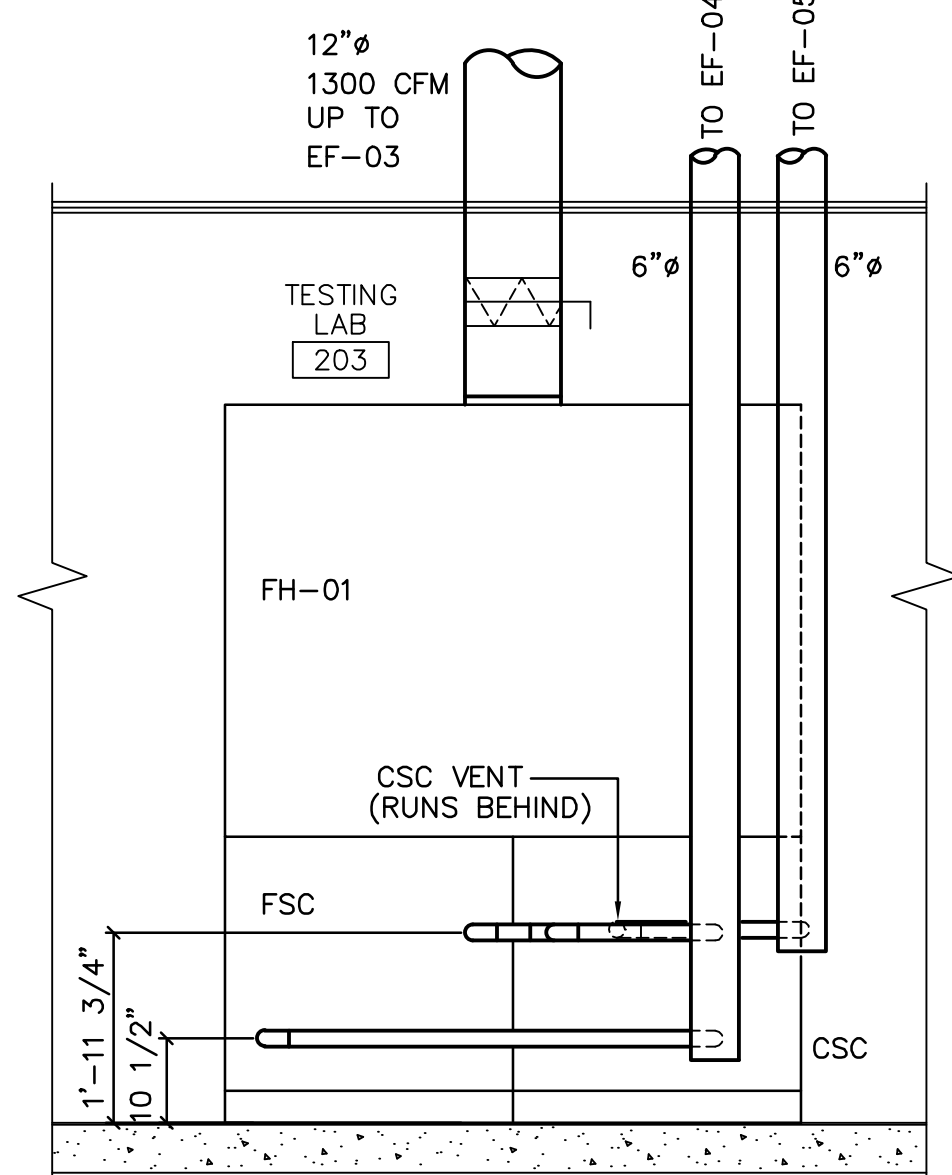
- LEGEND**
- 1 EXHAUST FAN EF-03. (SEE SCHEDULE)
 - 2 STACKHEAD DISCHARGE. COLD ROLLED STEEL WELDED CONSTRUCTION. PROVIDE BRACKETS BETWEEN UPPER STACK AND DISCHARGE DUCT (CHECK FOR STRUCTURAL STRENGTH). WELDED RING WITH CLAMPS FOR GUY WIRES. SIMILAR TO KEWAUNEE HES-1011-00 VERTICAL EXHAUST DUCT STACK HEAD ASSEMBLY.
 - 3 FOUR(4) GUY WIRES. 3 x 19 IMPREGNATED AND COATED WITH PLASTIC. 3/16 DIA. BREAKING STRENGTH > 1500 lbs. PROVIDE COMPATIBLE STAINLESS STEEL CLAMPS, THIMBLES, TURN BUCKLES, ETC. PROVIDE CLAMPING POSTS SECURED TO BUILDING STRUCTURE WITH ROOF FLASHING IF REQUIRED.
 - 4 GALVANIZED STEEL FRAMING AND LEGS.
 - 5 VIBRATION ISOLATION.
 - 6 ROOF FLASHING. SEE ARCHITECTURAL DWGS. USE TYPICAL DETAILS FROM THE NATIONAL ROOFING CONTRACTOR ASSOCIATION.
 - 7 INLET ADAPTER. SIMILAR TO KEWAUNEE HIA-1210-00 INLET ADAPTER.
 - 8 GALVANIZED STEEL DUCT SUPPORT WITH BANDING AROUND DUCT. PROVIDE ONE AS A MINIMUM. ONE EXTRA FOR EVERY FIVE FEET OF HORIZONTAL DUCT RUN.
 - 9 FAN INLET AND OUTLET FLANGES.
 - 10 CANVAS CONNECTIONS.
 - 11 LEG FLANGES SECURED TO CONCRETE DECK OR TO STRUCTURAL ROOF FRAMING.
 - 12 OUTLET ADAPTER. SIMILAR TO KEWAUNEE HOA-1012 OUTLET ADAPTER.

- NOTE**
- 1- ALL WELDED JOINTS FOR THE GALVANIZED STEEL SHALL BE TREATED WITH A COMPATIBLE ANTI-CORROSION COATING FOR GALVANIZED SURFACES.

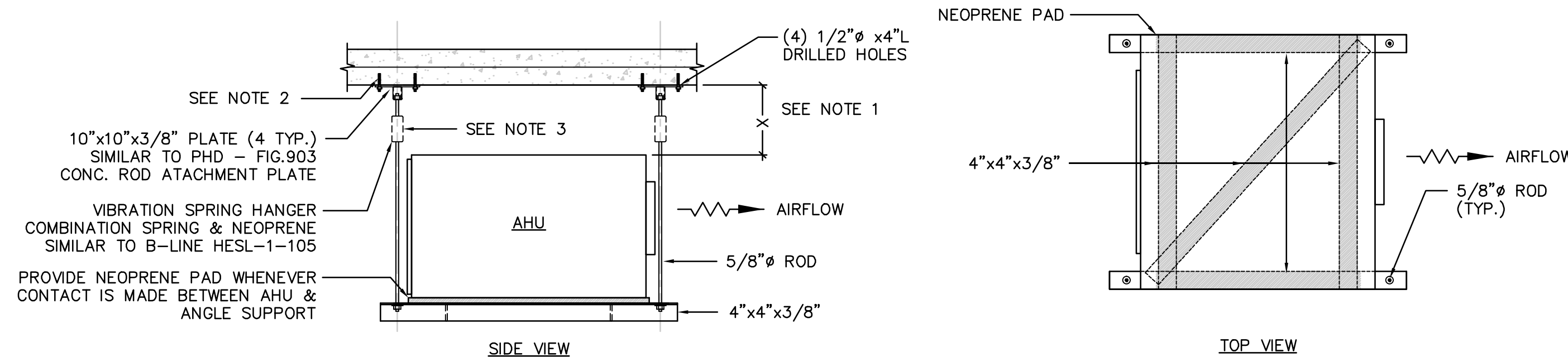


NOTE: CONNECTION DETAIL APPLIES ALSO TO CSC.

**FSC VENT
CONNECTION DETAIL**
N.T.S.

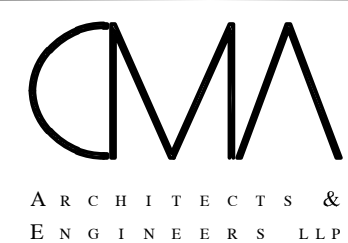
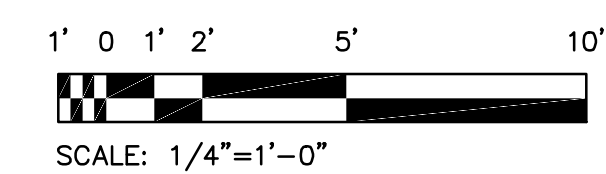
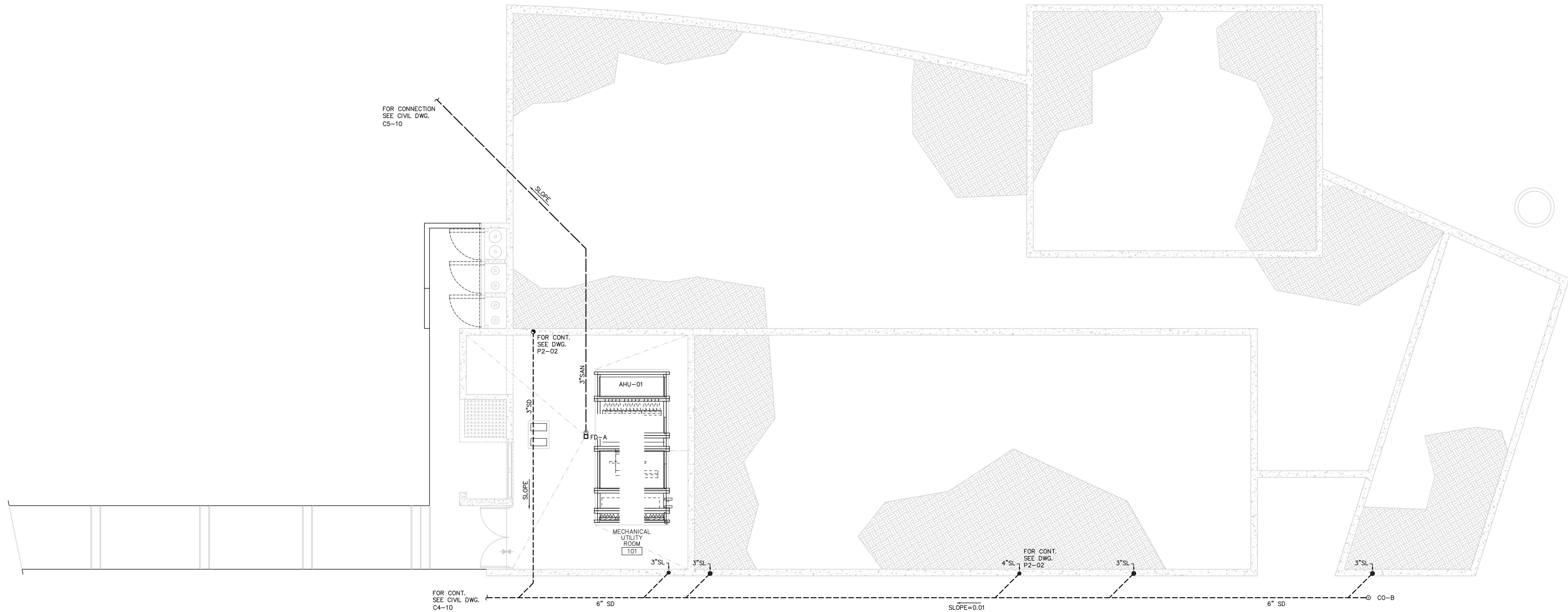
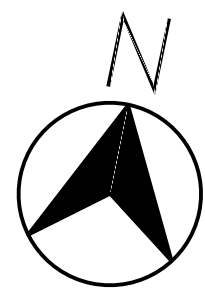


**FH-01, FSC AND CSC
VENT AND EXHAUST
CONNECTION DETAIL**
N.T.S.



- NOTE:**
1. DISTANCE BETWEEN EQUIPMENT AND ROOF SLAB SHALL BE FIELD VERIFIED.
 2. USE THE FOLLOWING ADHESIVE: HIT RE 500 ADHESIVE ANCHOR.
 3. VIBRATION SPRING HANGERS SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.

AHU'S SUPPORT DETAIL
SCALE: NTS



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www.cma-sjpr.com

UPR – MAYAGÜEZ CAMPUS
ENGINEERING LAB
MAYAGÜEZ
PUERTO RICO

									Job No. 09009			PLUMBING BASEMENT FLOOR PLAN		P2-01	
									SCALE 1/4"=1'-0"						
									DATE 10/12/09						
									DRAWN BY CAD						
01/25/10			ISSUED FOR BID			L.F.M.									
DATE	REVISIONS		BY	DATE	REVISIONS		BY	DATE	REVISIONS		BY	CHECKED BY	L.F.M.	TITLE	REVISION No. A

1. THE CONTRACTOR SHALL EXAMINE THE STRUCTURAL DRAWINGS AND SHALL NOTIFY THE STRUCTURAL ENGINEER OF ANY DISCREPANCIES HE MAY FIND BEFORE PROCEEDING WITH THE WORK.
2. THE CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS AT THE SITE AND SHALL NOTIFY THE STRUCTURAL ENGINEER OF DISCREPANCIES BETWEEN THE ACTUAL CONDITIONS AND INFORMATION SHOWN ON THE DRAWINGS BEFORE PROCEEDING WITH THE WORK.
3. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE STRUCTURAL ENGINEER OF ANY CONDITION WHICH, IN HIS OPINION, MIGHT ENDANGER THE STABILITY OF THE STRUCTURE OR CAUSE DISTRESS TO THE STRUCTURE.
4. THE FOLLOWING REFERENCE DOCUMENTS, THEIR COMMENTARIES AND THE STANDARDS REFERENCED THEREIN, SHALL APPLY TO DESIGN, FABRICATION AND CONSTRUCTION PRACTICES TO BE ADHERED TO REGARD TO THE WORK SHOWN ON THE DRAWINGS:

- FOUNDATIONS:

- CONCRETE:

- ALL PEDESTAL AND WALLS BELOW GRADE SHALL BE FORMED CONCRETE.

1. MASONRY WALLS SHALL BE CONSTRUCTED OF NORMAL WEIGHT UNITS CONFORMING TO ASTM C90, TYPE 1.
2. CMU UNITS SHALL BE SUFFICIENTLY MOIST AT TIME OF LAYING TO PREVENT DEHYDRATION OF MORTAR AND GROUT AND SHALL BE FREE OF ALL SUBSTANCES WHICH MIGHT IMPAIR THE BOND OF THE CMU TO MORTAR AND GROUT.
3. MORTAR SHALL BE MACHINE MIXED TYPE "S" CONSISTING OF, BY VOLUME, 1 PART CEMENT, 1/2 PART LIME PUTTY AND DAMP LOOSE AGGREGATE NOT LESS THAN 2 1/4 TIMES NOR MORE THAN 3 TIMES THE SUM OF THESE PARTS.
4. GROUT SHALL BE MACHINE MIXED BY VOLUME AND CONSIST OF 1 PART CEMENT, 1/10 PART LIME PUTTY AND 2 TO 3 PARTS SAND. GROUT SPACES MORE THAN 4 IN. IN WIDTH MAY HAVE NOT MORE THAN 2 PARTS PEA GRAVEL ADDED TO COMPONENTS DESCRIBED ABOVE.
5. CEMENT FOR MORTAR AND GROUT SHALL BE LOW ALKALI TYPE CONFORMING TO ASTM C150.
6. MORTAR AND GROUT SHALL HAVE THE FOLLOWING 28 DAYS STRENGTHS:

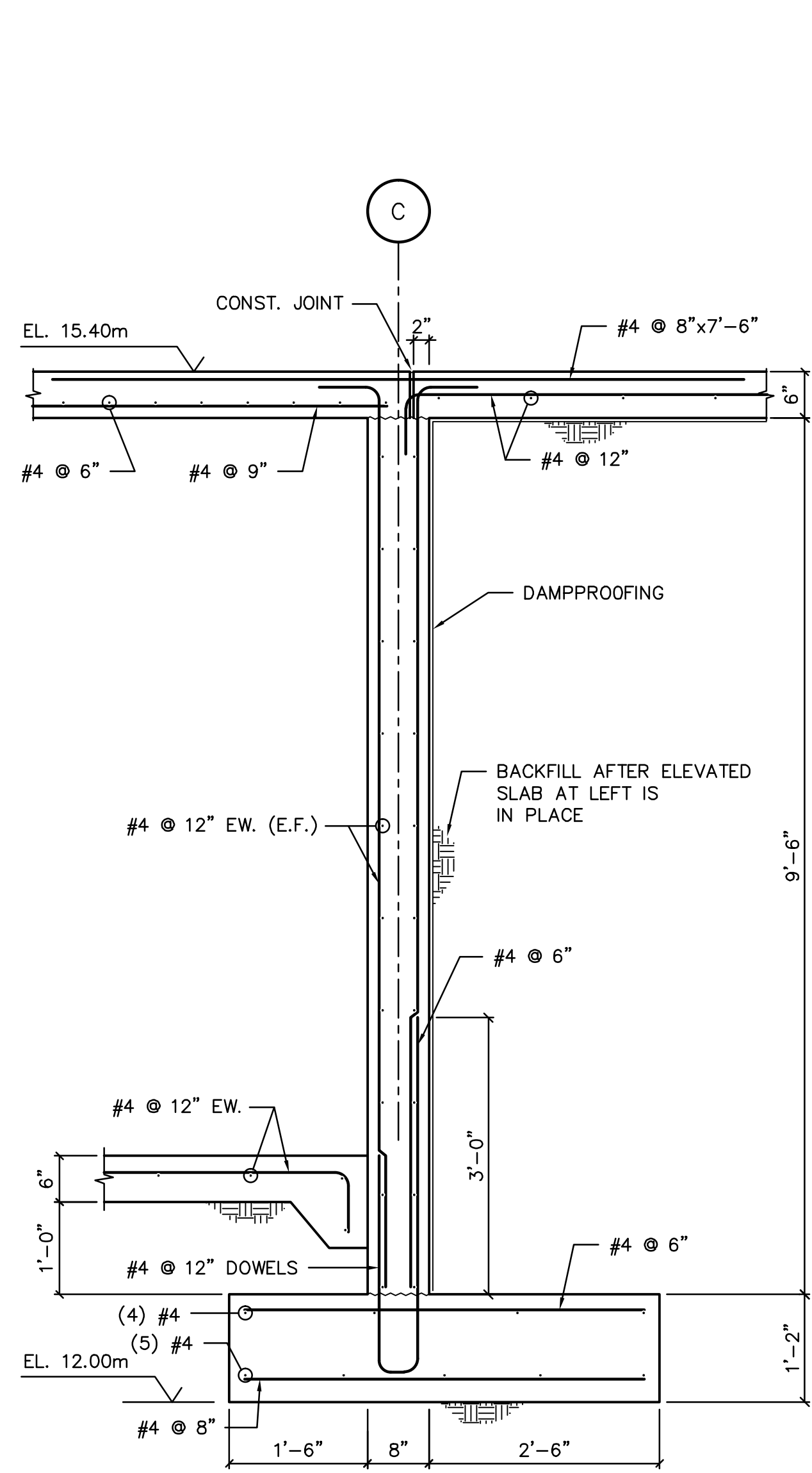
<u>1m</u>	<u>MORTAR</u>	<u>GROUT</u>
1,500 PSI	1,800 PSI	2,000 PSI
7. CONCRETE MASONRY UNIT COMPRESSIVE STRENGTH TO BE 2,000 P.S.I. ON THE NET AREA.
8. THE SPECIFIED MASONRY STRENGTH F'M MAY BE VERIFIED BY THE UNIT STRENGTH METHOD OR BY MASONRY PRISM TESTING (SPECIAL INSPECTION)
9. ALL WALLS SHALL BE GROUTED AT CELLS W/REBARS, U.N.O. MAXIMUM GROUT LIFT SHALL NOT EXCEED 4'.
10. SEE ARCHITECTURAL DRAWINGS FOR CMU SIZE, COLOR, TEXTURE, BONDING PATTERN & JOINTING.
11. HORIZONTAL REINFORCEMENT SHALL BE DUR-O-WAL, AS FOLLOWS:

A) 6" CMU	STANDARD WEIGHT TRUSS @ 16"
B) 8" CMU	EXTRA HEAVY WEIGHT TRUSS @ 8"
12. PROVIDE TEMPORARY BRACING FOR MASONRY WALLS DURING ENTIRE ERECTION OF WALLS AND UNTIL THE MORTAR HAS DEVELOPED ADEQUATE STRENGTH. TEMPORARY BRACES SHALL NOT BE REMOVED UNTIL AT LEAST 7 DAYS HAVE ELAPSED SINCE THE WALL WAS COMPLETELY ERECTED.
13. PROVIDE CONTINUOUS BOND BEAMS AT THE FOLLOWING LOCATIONS:
 - WHERE INDICATED IN SECTIONS AND DETAILS ON THE DRAWINGS.
 - AT THE TOP OF ALL MASONRY WALLS (WITHIN TOP 2 COURSES)
 - AT EVERY 10'-0" O.C. OF MASONRY WALL HEIGHT.
 - AT THE TOP OF PARAPETS
 - AT THE TOP OF ALL MASONRY WALLS BELOW STRIP WINDOW SILLS.REINFORCE BOND BEAMS AS INDICATED, OR WITH (4) #5 CONTINUOUS MINIMUM.
14. FOR ADDITIONAL REQUIREMENTS SEE TYPICAL DETAILS AND THE SPECIFICATIONS.

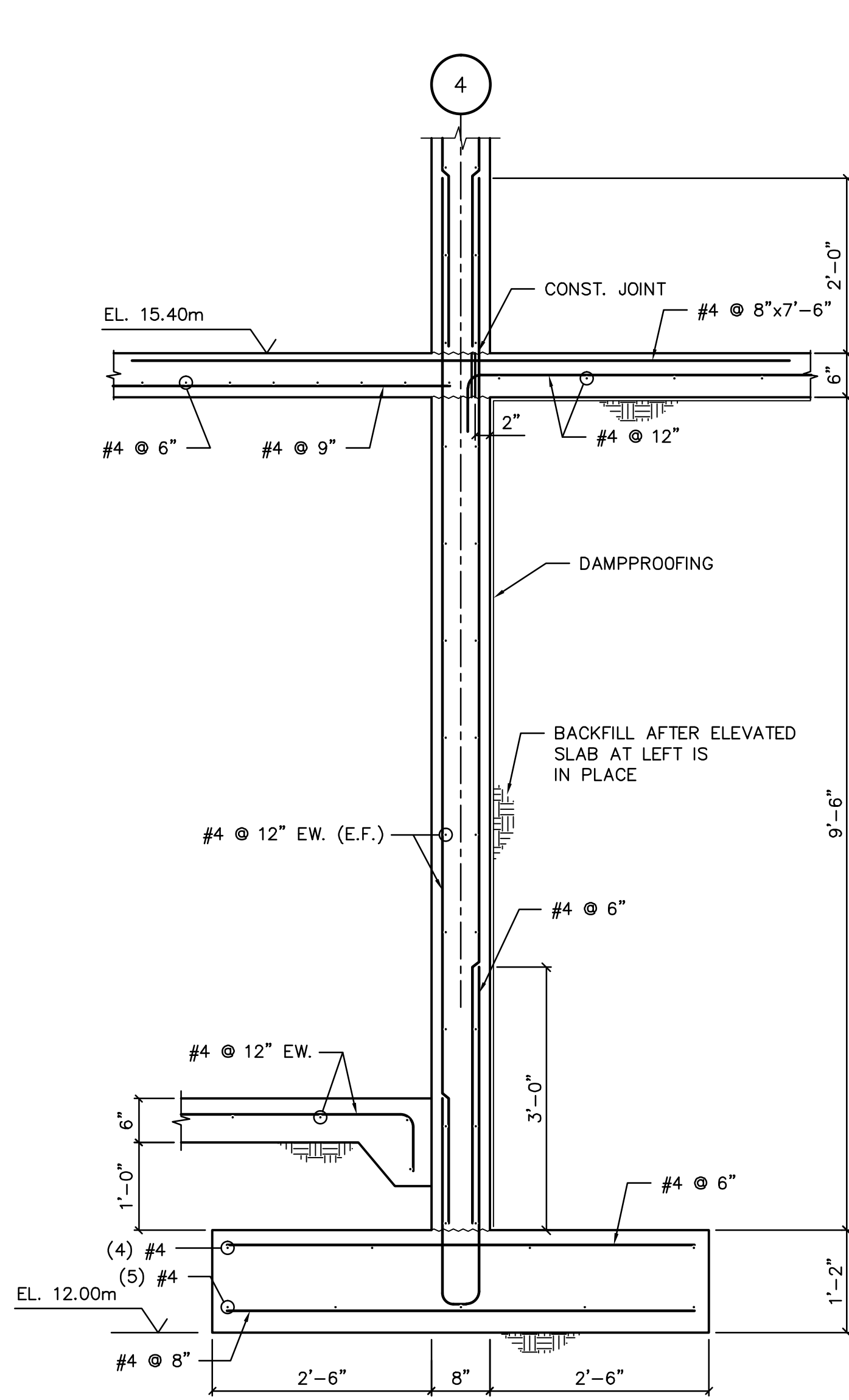
1. FIELD WELDING OF REINFORCING STEEL SHALL BE PERFORMED BY WELDERS SPECIFICALLY CERTIFIED FOR REINFORCING STEEL.
2. PRIOR TO WELDING THE "CARBON EQUIVALENT" (CE) OF STEEL SHALL BE DETERMINED. REINFORCING STEEL WHOSE "CE" CANNOT BE IDENTIFIED OR WHOSE "CE" EXCEEDS 0.75% SHALL NOT BE WELDED, EXCEPT FOR REINFORCING STEEL CONFORMING TO ASTM A706.
3. WELDING OF REINFORCING STEEL SHALL BE IN ACCORDANCE WITH A PROCEDURE ESTABLISHED BY A CERTIFIED TESTING LABORATORY FOR THE MATERIAL BEING WELDED. PROCEDURE SHALL BE BASED ON THE CARBON CONTENT OF THE REINFORCING AND SHALL ESTABLISH PREHEATING REQUIREMENTS TO SATISFACTORILY COMPLETE THE WORK.

1. ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND ALL OTHER DRAWINGS RELATED TO THE WORK
2. ALL CONSTRUCTION JOINTS MADE IN EXTERIOR WALLS OR ROOF SLABS AND CISTERN WALLS SHALL CONTAIN WATERSTOPS AND SHALL HAVE REINFORCEMENT CONTINUOUS ACROSS THE JOINTS
3. PROVIDE DAMMPROOFING MEMBRANE AGAINST ALL UNDERGROUND WALLS AND WALLS EXPOSED TO EARTH BACKFILL
4. ALL WATERSTOPS SHALL BE INSTALLED SECURELY IN ACCORDANCE WITH THE SPECIFICATIONS. THE WATERSTOPS SHALL BE PLACED CONTINUOUSLY THROUGHOUT THE LENGTH OF THE CONSTRUCTION JOINT
5. TRANSVERSE REINFORCEMENT ALONG A CURVED MEMBER SHALL BE RADIAL ABOUT THE CENTER LINE OF THE CURVE.
6. CONCRETE SURFACES LEADING TO DRAINS SHALL BE SLOPED TOWARD DRAIN AND THE ADJACENT SURFACES WARPED AS REQUIRED TO SATISFY AN ADEQUATE DRAINAGE FLOW, AS REQUIRED.
7. ALL EXPOSED CONCRETE EDGES AND CORNERS SHALL BE CHAMFERED TO 3/4" UNLESS NOTED OTHERWISE
8. BACKFILL BEHIND BASEMENT WALLS SHALL BE NOT PLACED UNTIL AFTER TOP OF WALL IS BRACED BY FIRST FLOOR SLAB.
9. POST-INSTALLED FASTENERS (DRILL-IN CONCRETE FASTENERS) SHALL BE HILTI HVA ADHESIVE SYSTEM, UNLESS NOTED OTHERWISE)
10. FL. FINISHES, SLAB STEPS, FLOOR AND ROOF SLOPE FOR DRAINAGE AS WELL AS FLOOR DEPRESSIONS SHALL BE PER ARCHITECTURAL DWGS.
11. ALL WATERPROOFING MEMBRANES FOR CISTERN, RET. WALLS, PONDS, PITS, ETC. SHALL BE PER ARCHITECTURAL DWGS.
12. WATER STOPS SHALL BE 3/8"x6" FLAT RIBBED PVC
13. FOR ADDITIONAL REQUIREMENTS SEE SPECIFICATIONS.

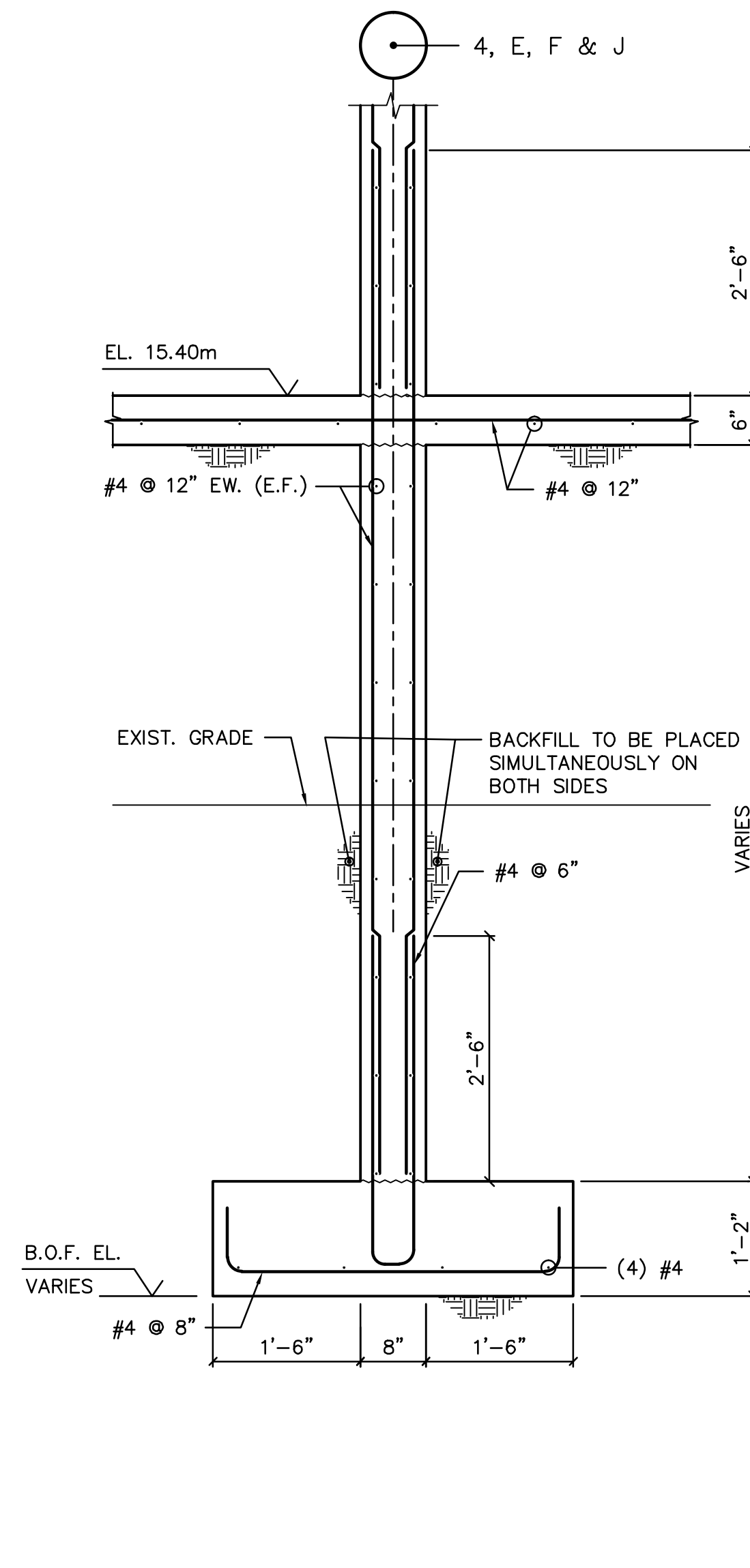
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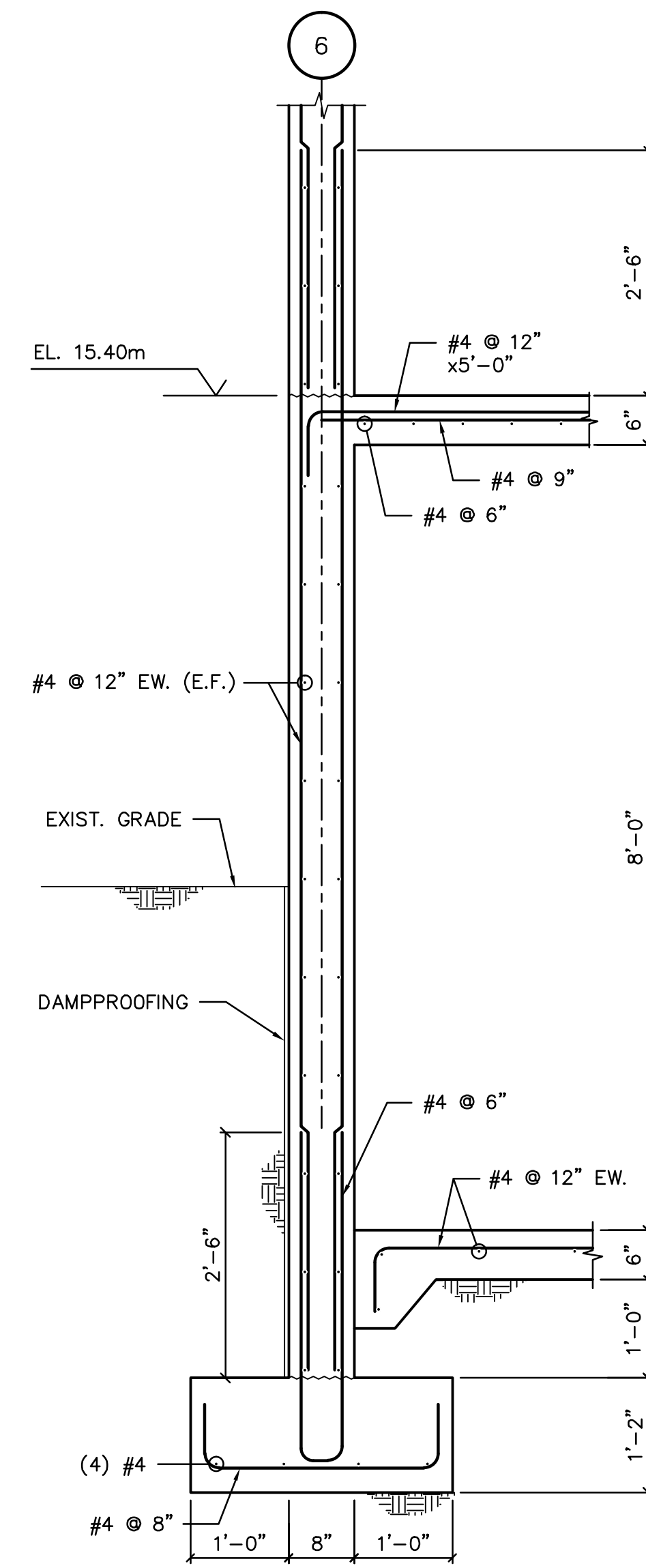
SECTION 1
SCALE: 3/4"=1'-0"



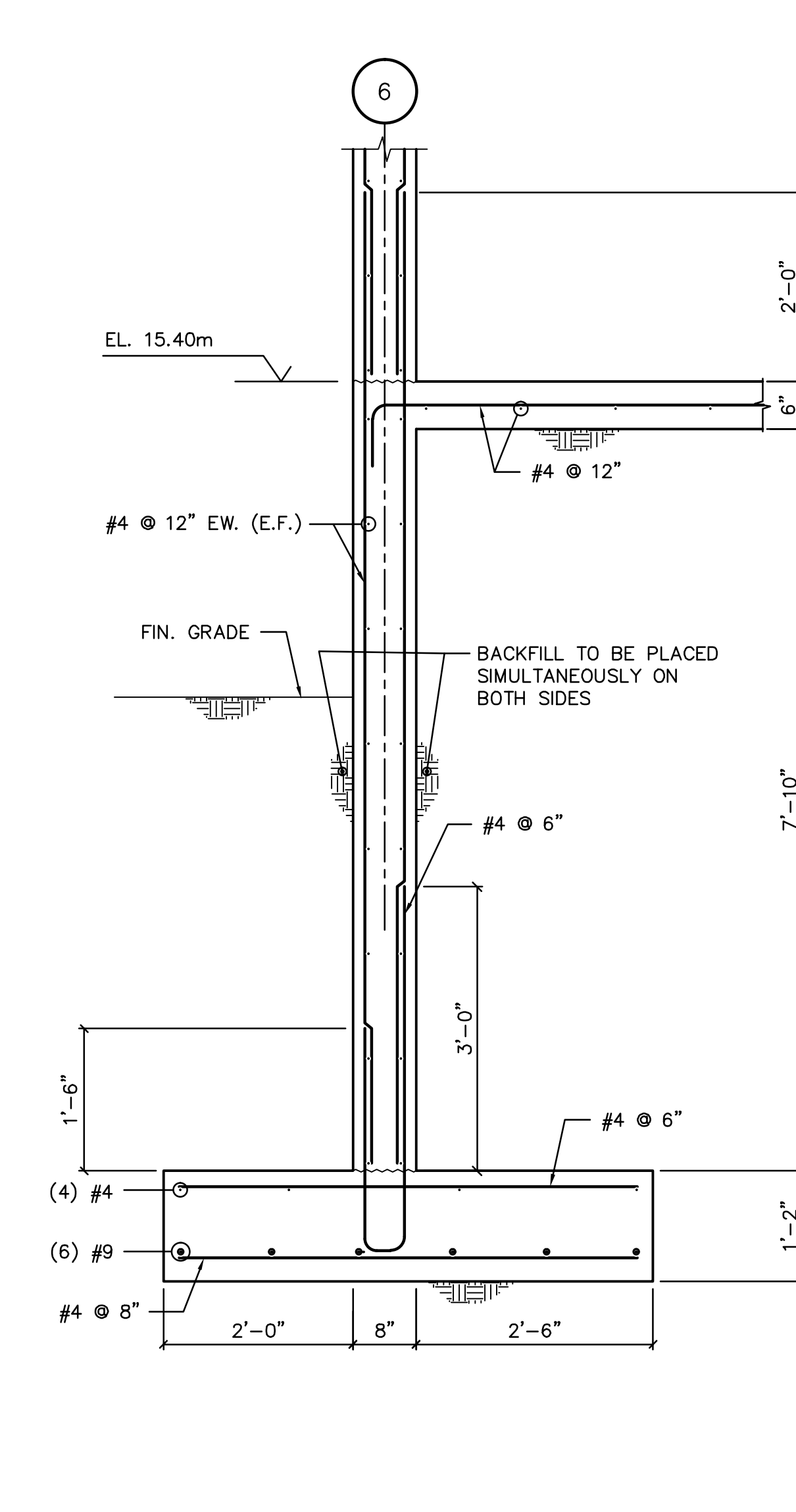
SECTION 2
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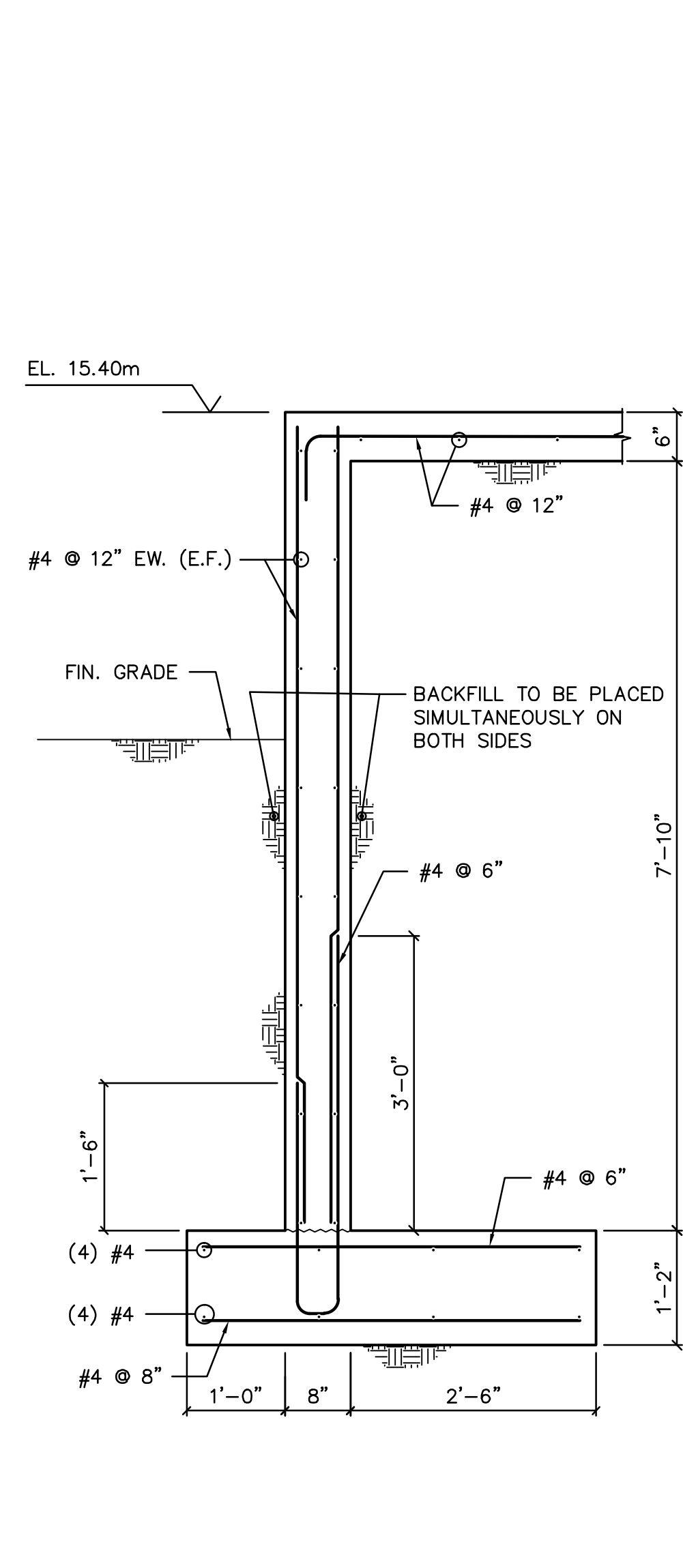
SECTION 3
SCALE: 3/4"=1'-0"



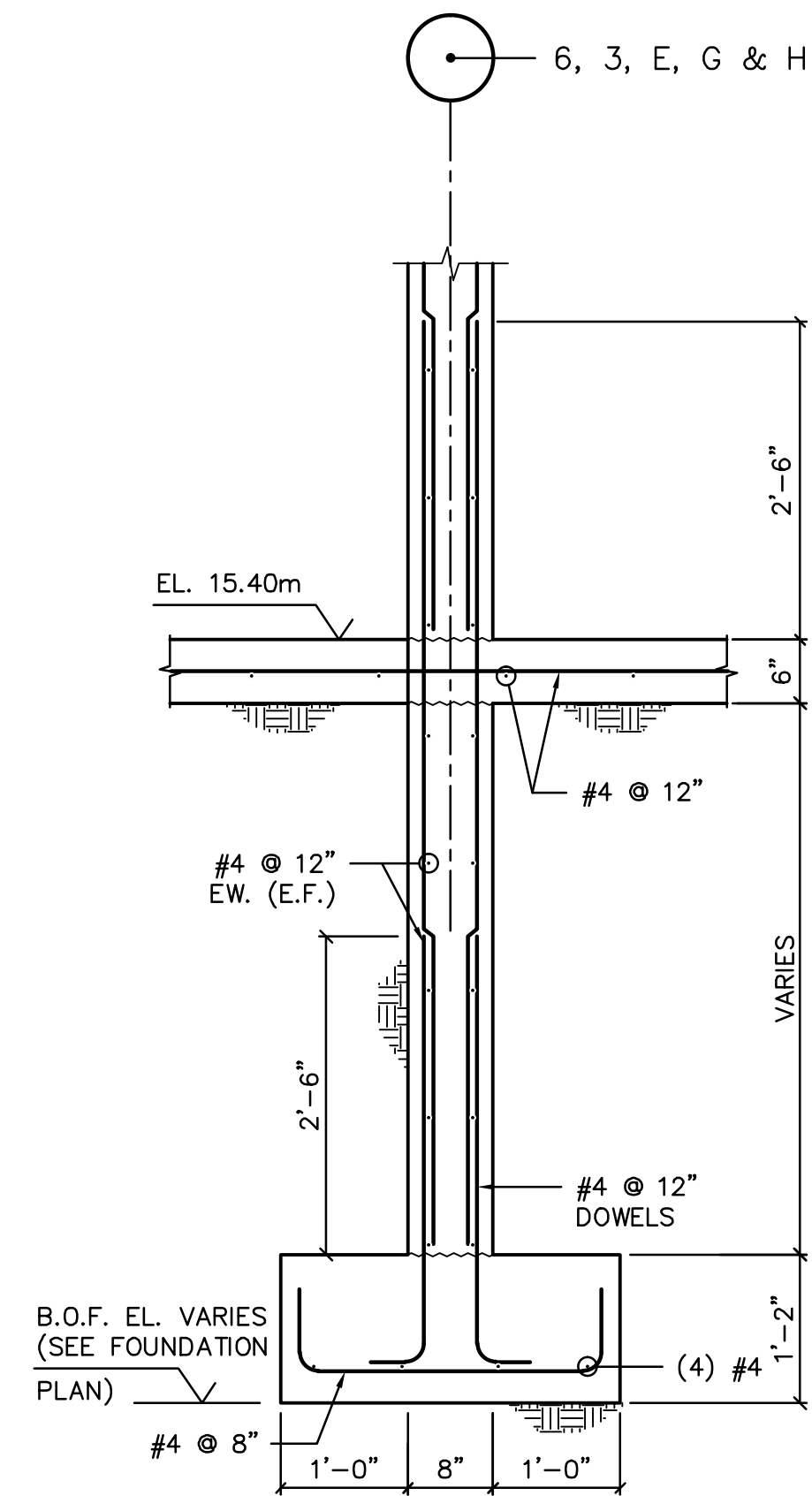
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SCALE: 3/4"=1'-0"



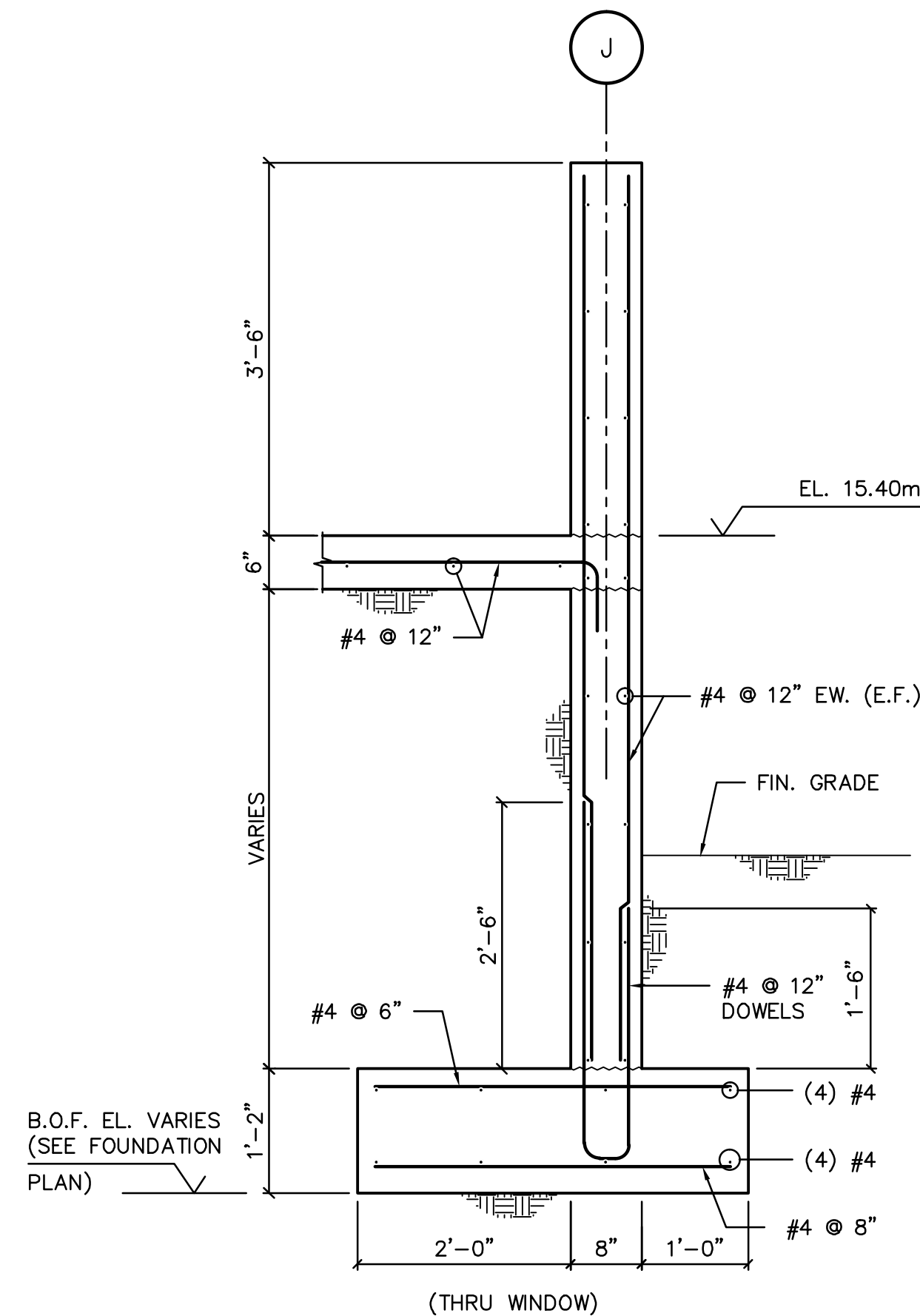
SECTION 5
SCALE: 3/4"=1'-0"



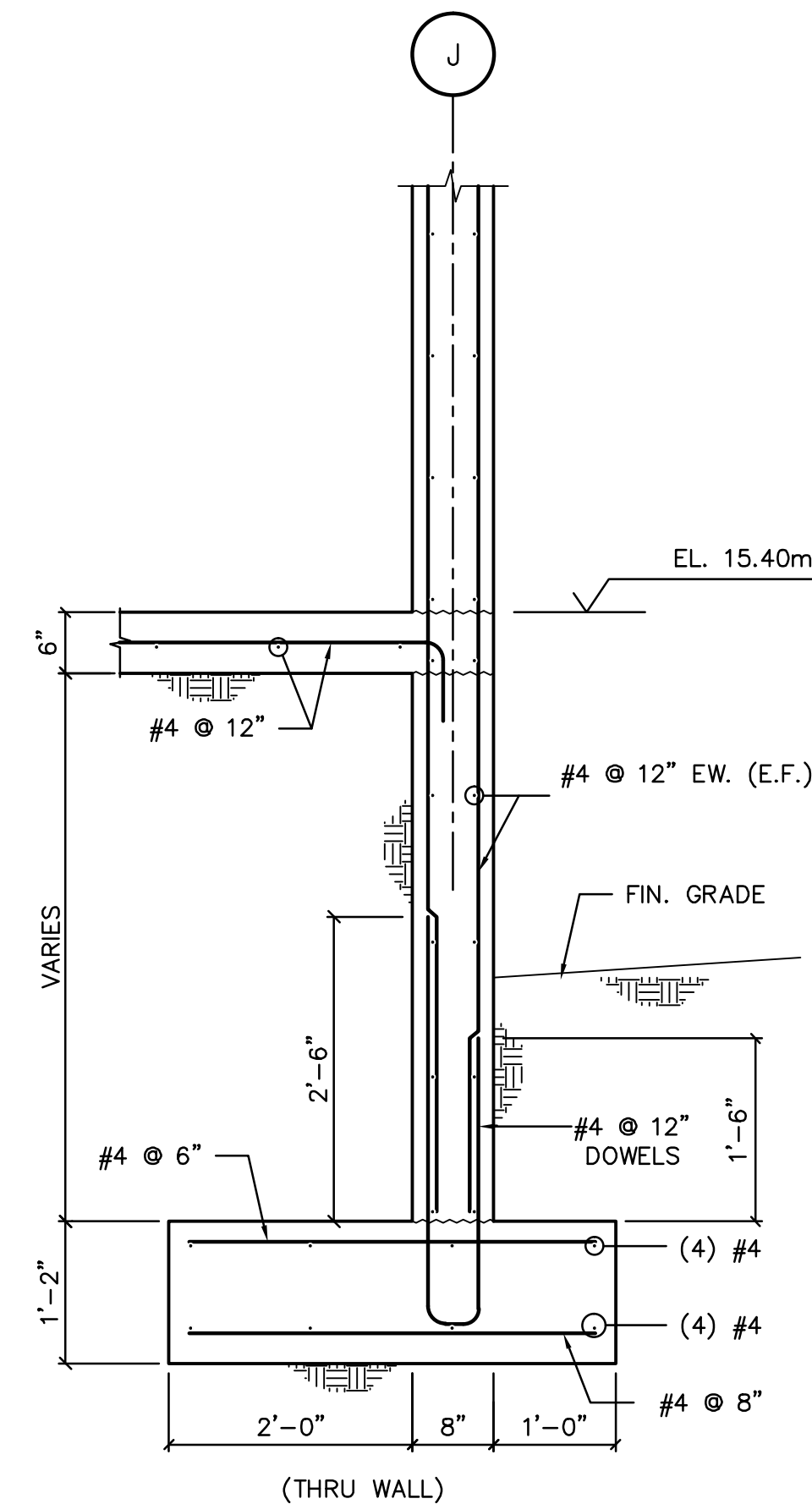
SECTION 6
SCALE: 3/4"=1'-0"



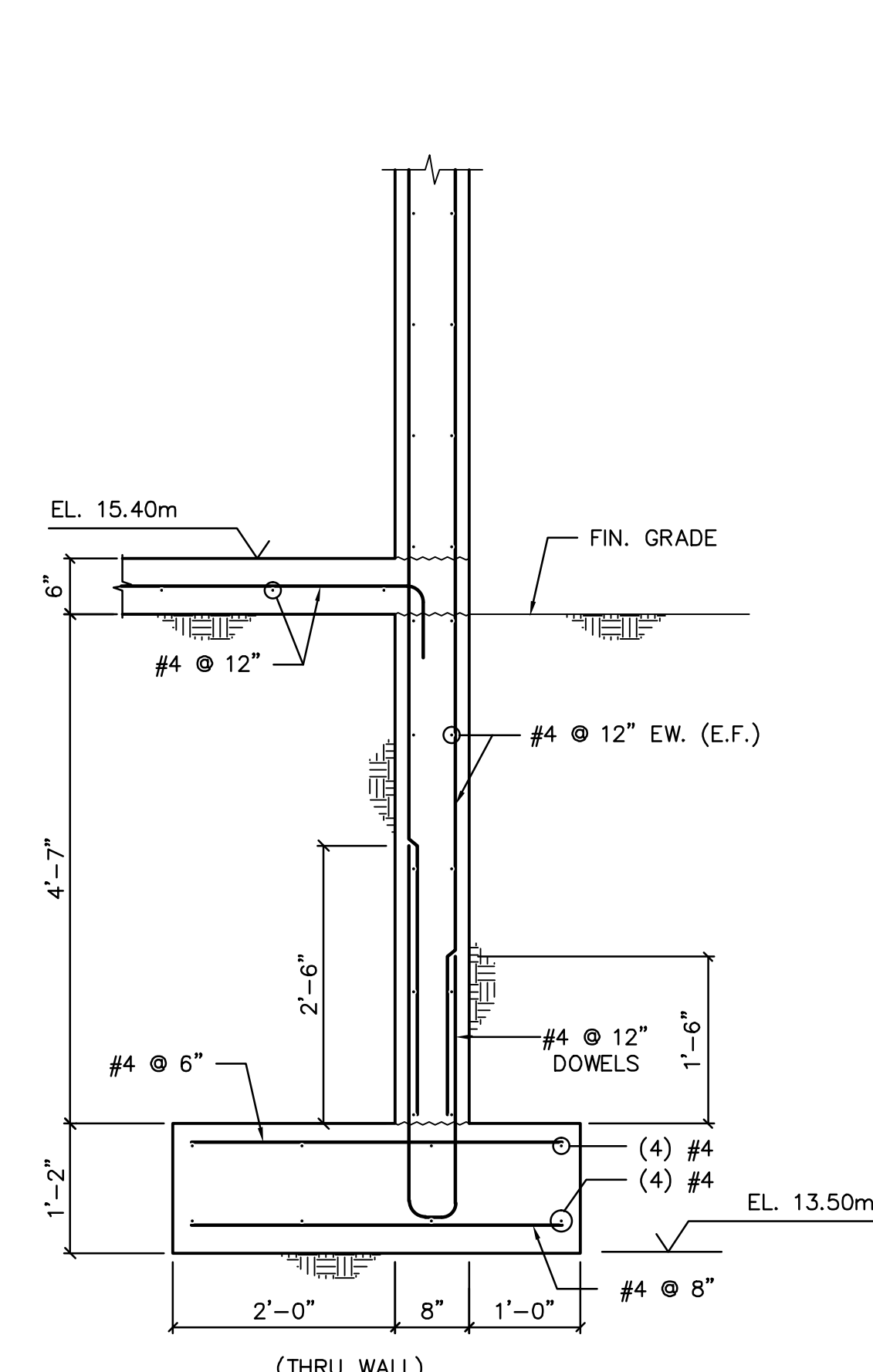
SECTION 7
SCALE: 3/4"=1'-0"



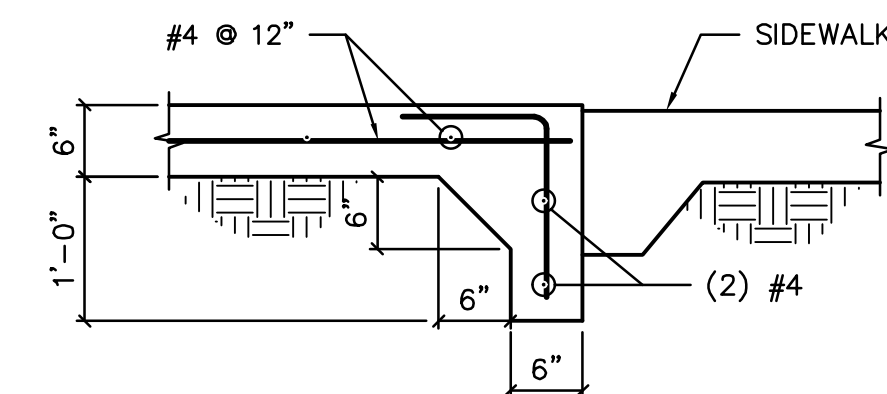
SECTION 8
SCALE: 3/4"=1'-0"



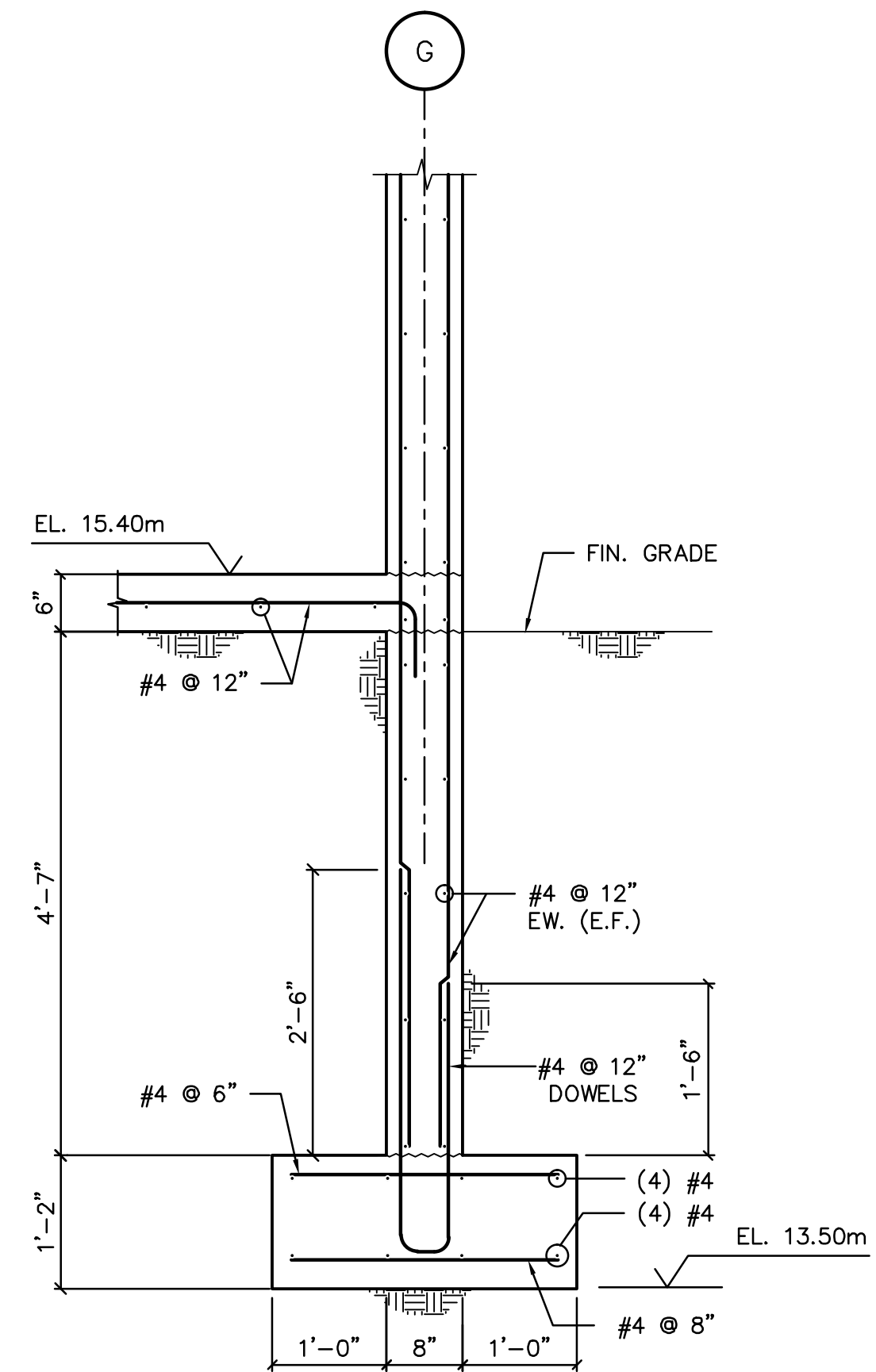
SECTION 8A
SCALE: 3/4"=1'-0"



SECTION 9
SCALE: 3/4"=1'-0"

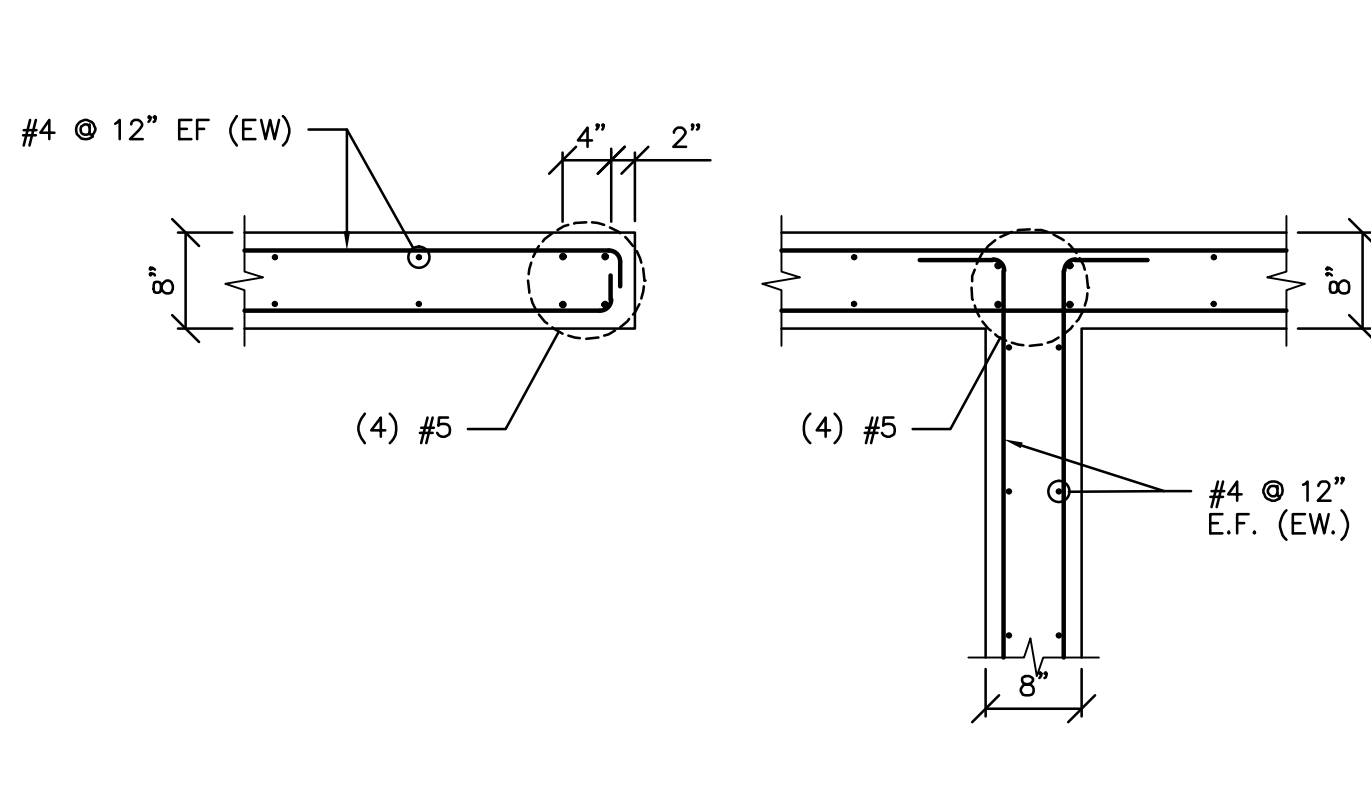


SECTION 10
SCALE: 3/4"=1'-0"



SECTION 11
SCALE: 3/4"=1'-0"

NOTES:
1. FOR GENERAL NOTES, SEE DWG. S0-01.

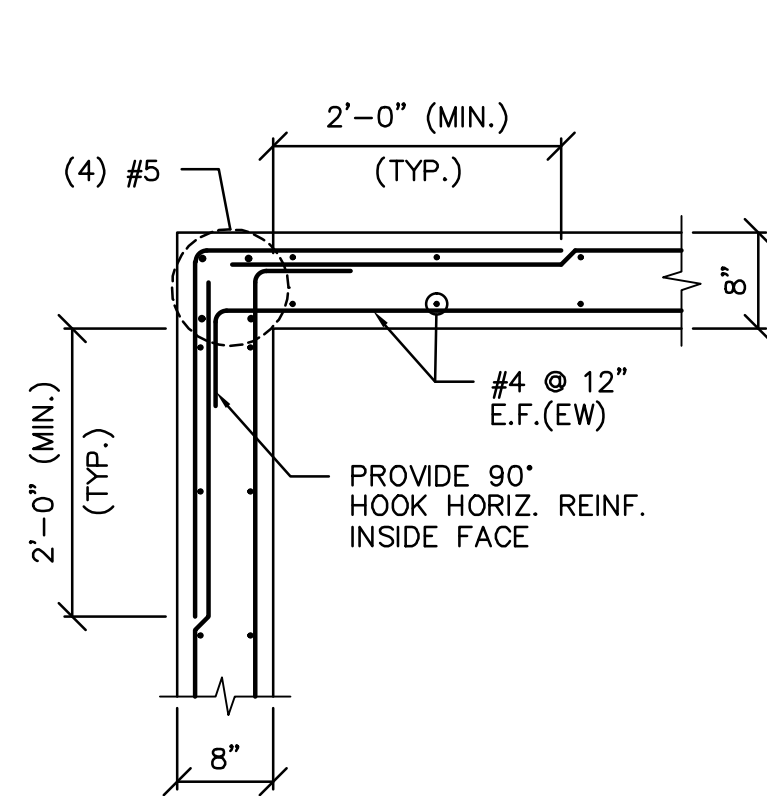


END DETAIL

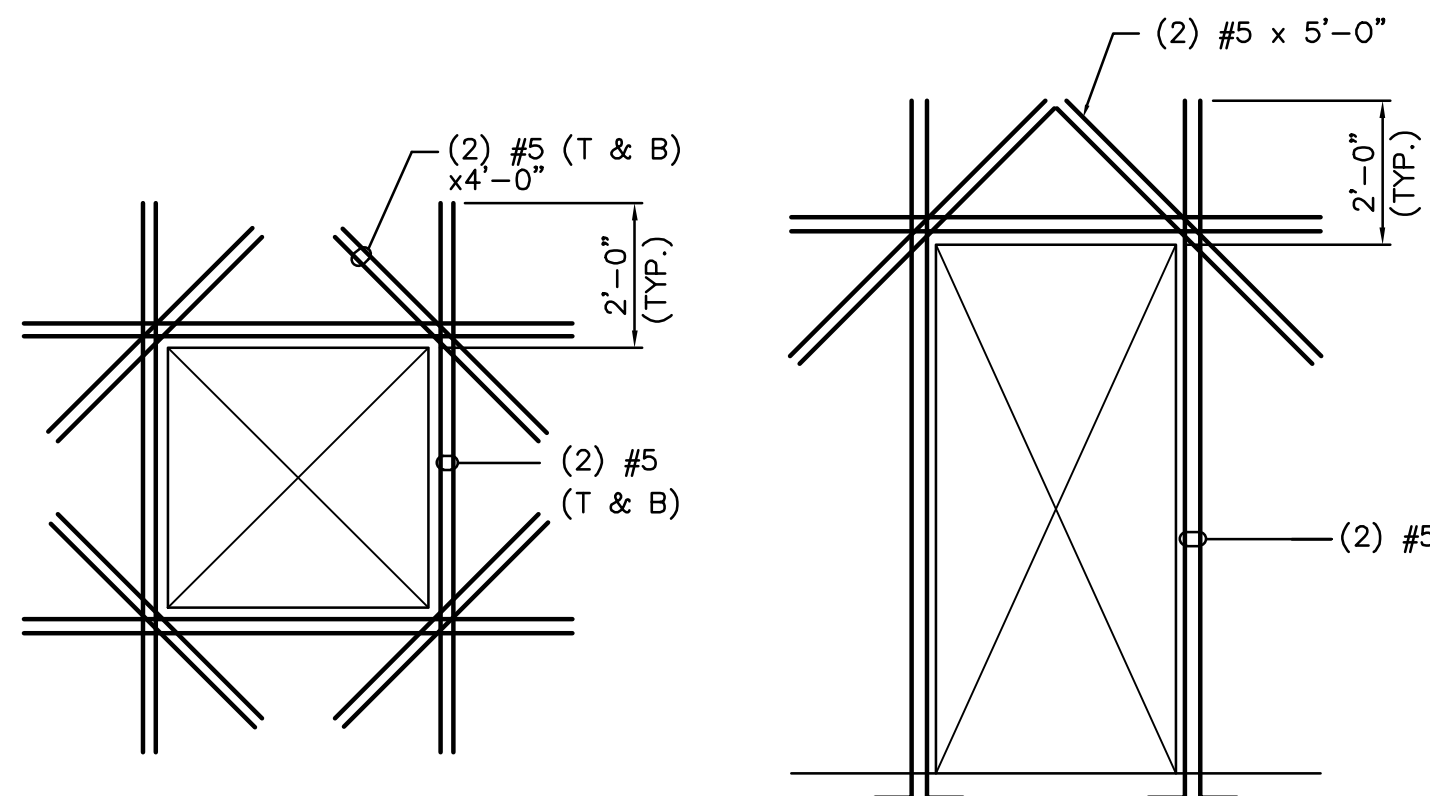
INTERSECTION DETAIL

TYPICAL WALL DETAILS

SCALE: 3/4"=1'-0"



CORNER DETAIL



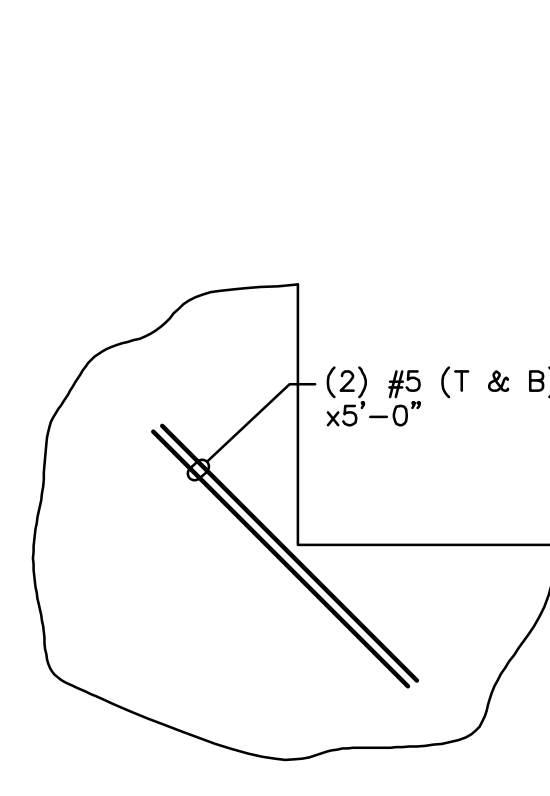
WINDOW OPENING

DOWELS W/STD HOOK OR 2'-6" INTO SLAB.

DOOR OPENING

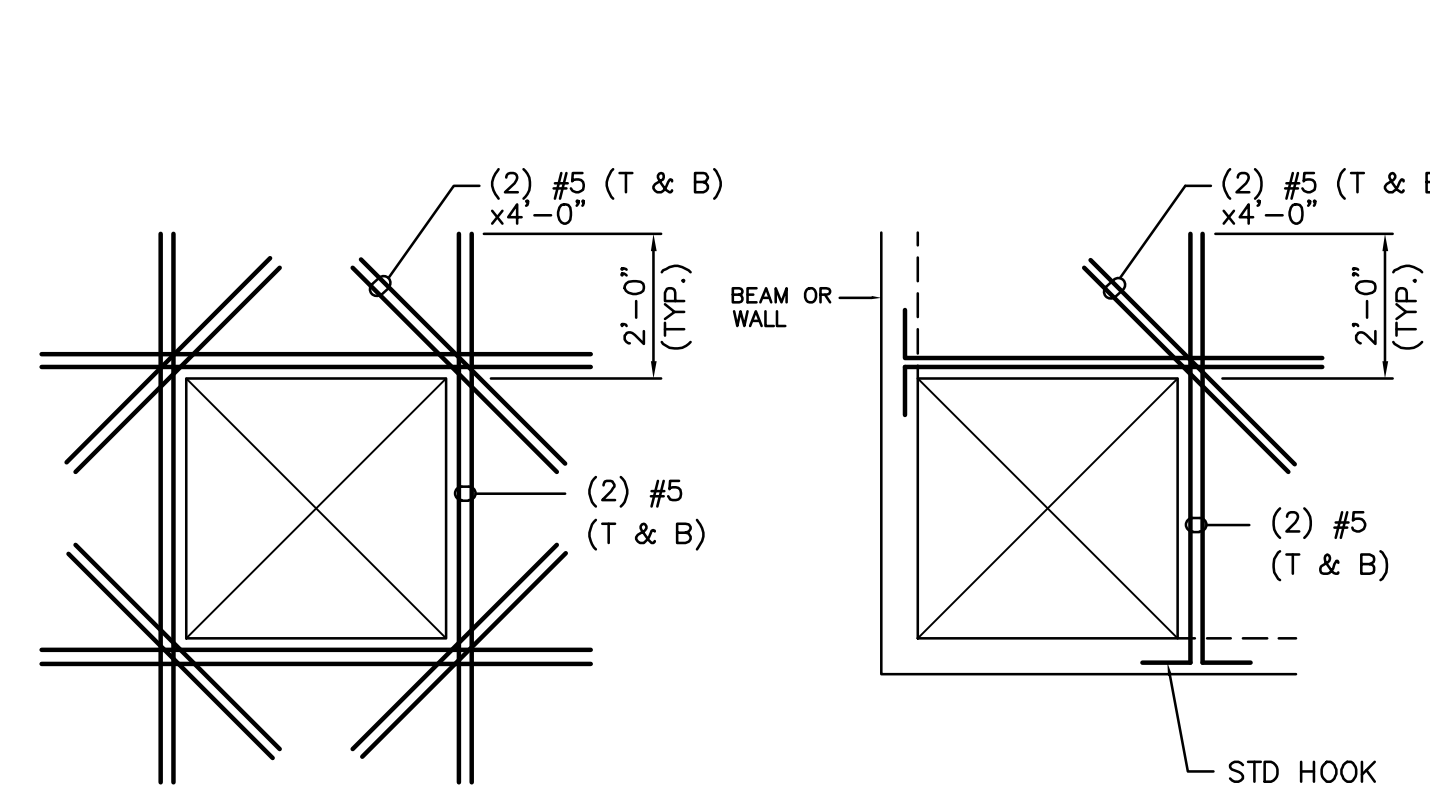
TYPICAL WALL OPENING DETAILS

N.T.S.



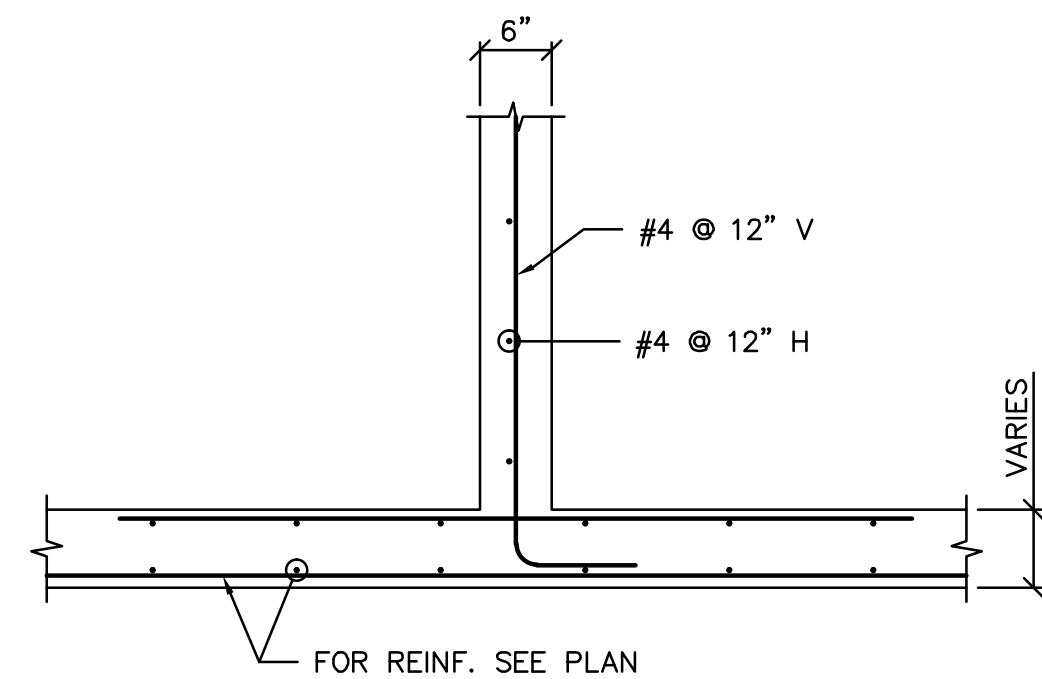
TYPICAL RE-ENTRANT SLAB DETAILS

N.T.S.



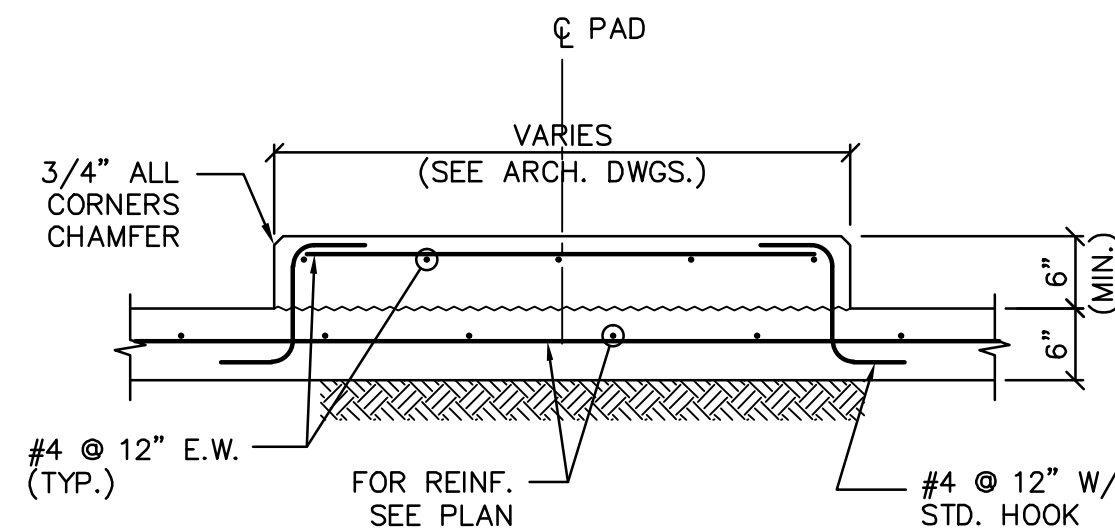
TYPICAL SLAB OPENING DETAILS

N.T.S.



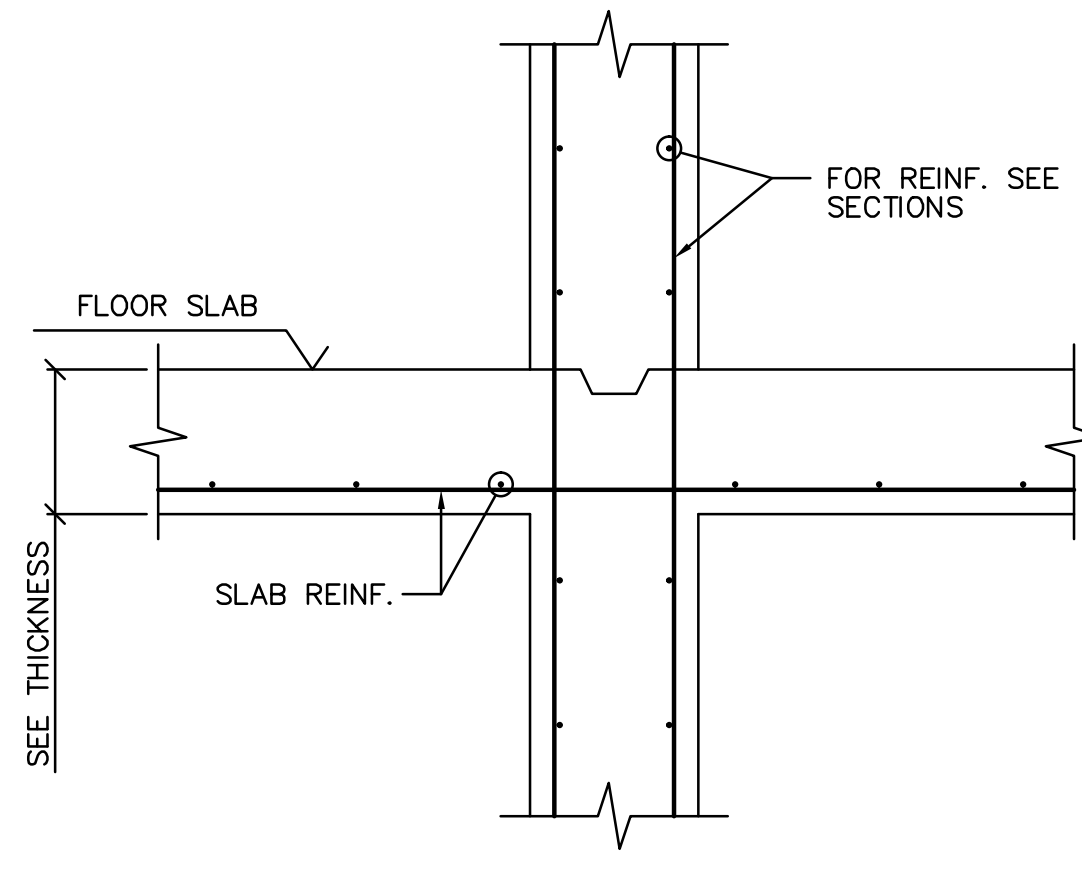
TYPICAL WALL OVER SLAB DETAIL

SCALE: 3/4"=1'-0"



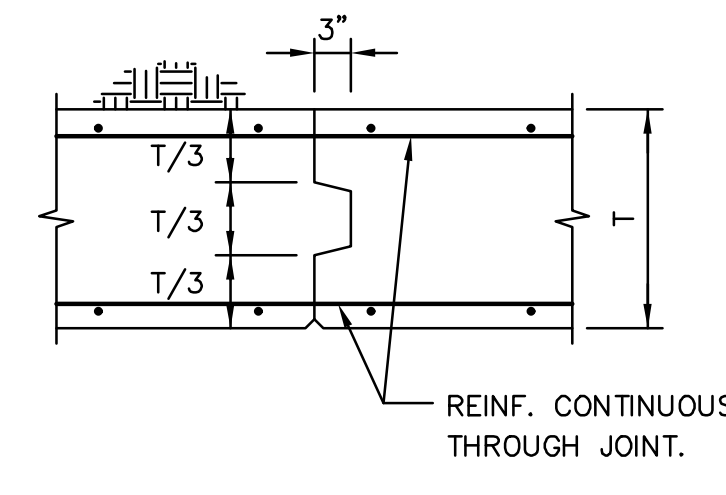
TYPICAL CONC. PAD DETAIL

SCALE: 3/4"=1'-0"



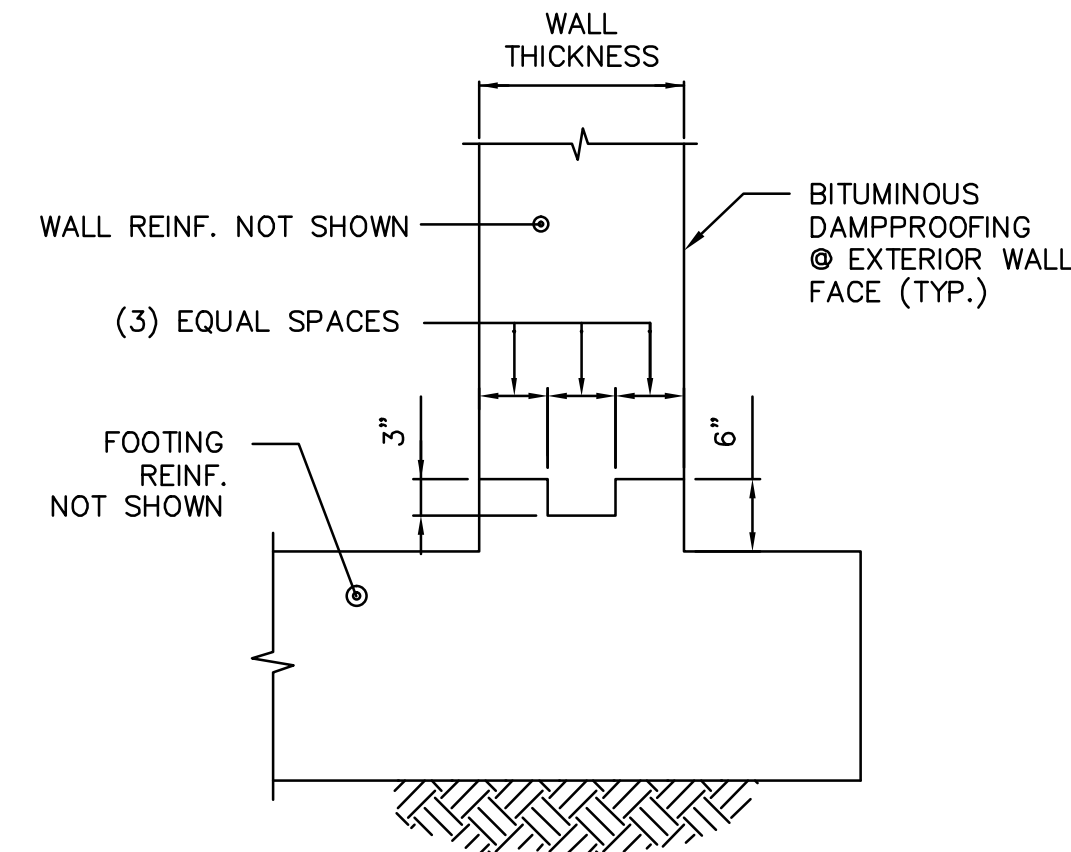
TYPICAL WALL & FLOOR SLAB INTERSECTION DETAIL

SCALE: 3/4"=1'-0"



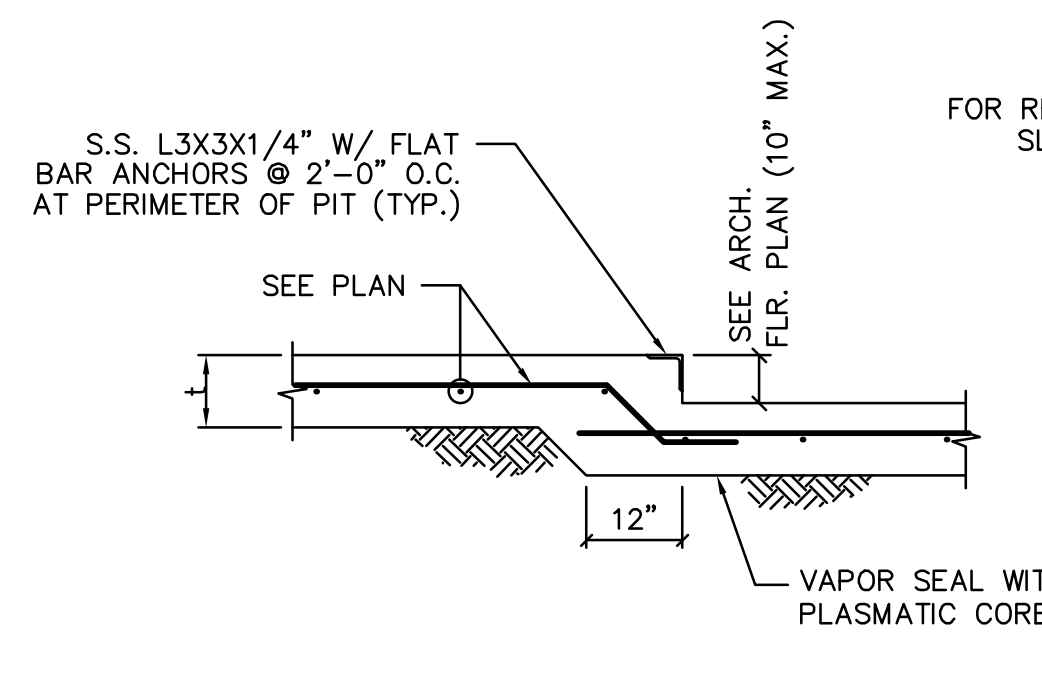
CONSTRUCTION JOINT

N.T.S.

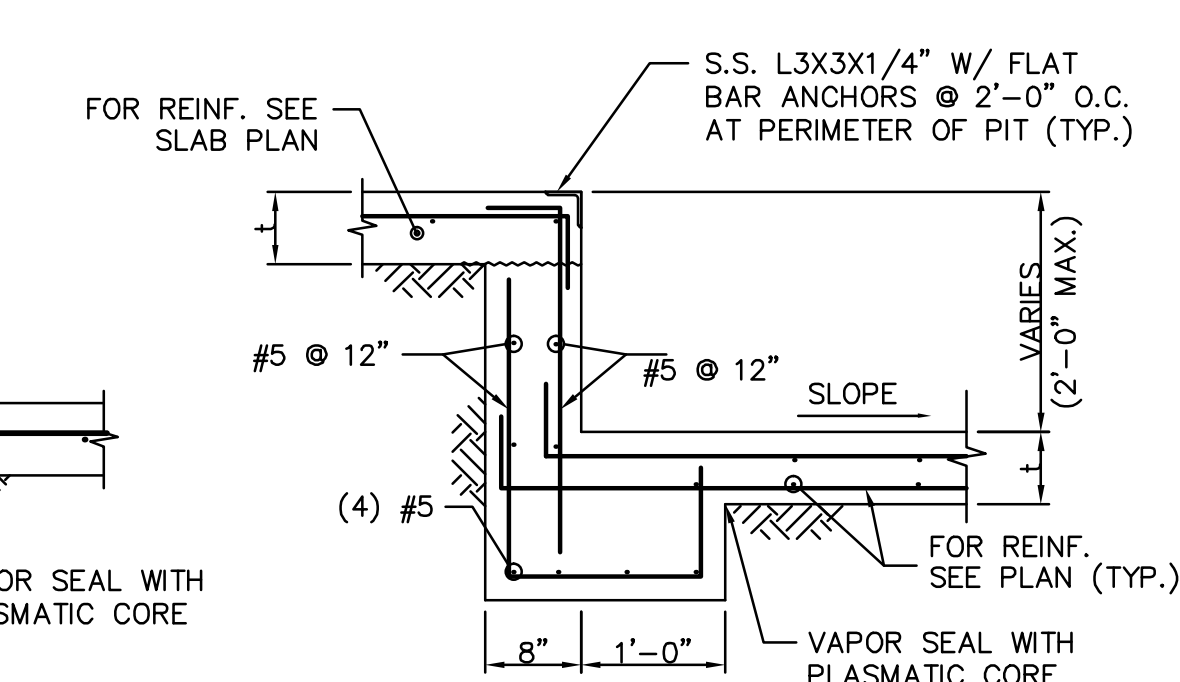


WALL TO FOOTING JUNCTION DETAIL

N.T.S.



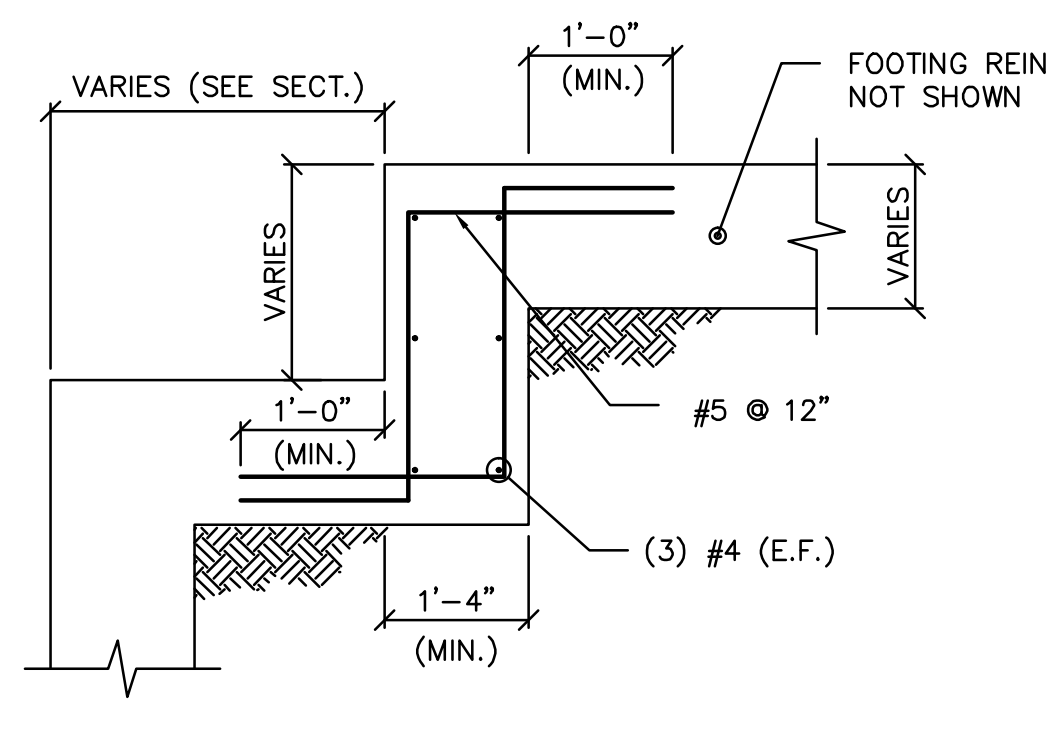
SLAB DEPRESSION ≤ 10"



SLAB DEPRESSION > 10"

SLAB DEPRESSION

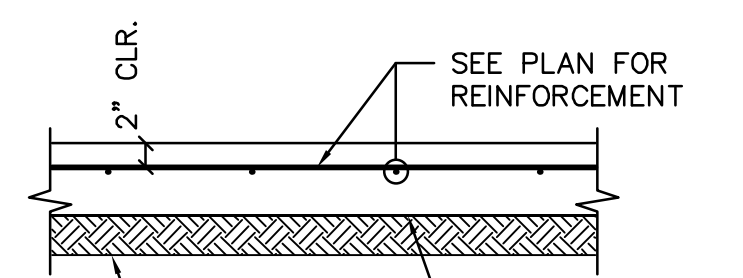
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COORDINATE STEP WITH SECTIONS

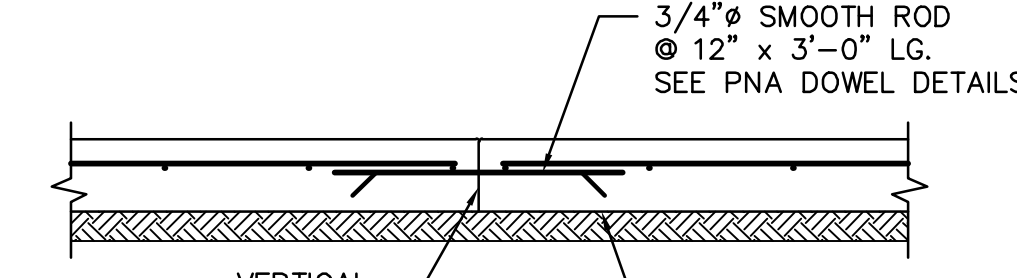
WALL FOOTING STEP DETAIL

SCALE: 3/4"=1'-0"



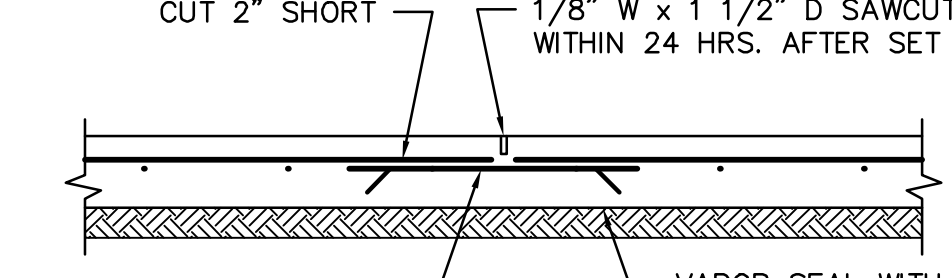
SLAB ON GRADE

SCALE: 3/4"=1'-0"



CONSTRUCTION JOINT @ 60 FT. MAX.

SCALE: 3/4"=1'-0"



CONTROL JOINT @ 20 FT. MAX

SCALE: 3/4"=1'-0"

NOTE:
1. FOR GENERAL NOTES SEE DWG. S0-01.



CONSTRUCTION DOCUMENTS

MAYAGUEZ

P U E R T O R I C O

SCALE 1 : 20,000

INDEX

CIVIL

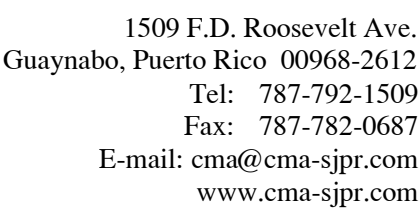
[illegible]

ARCHITECTURAL

STRUCTURAL

MECHANICAL

ELECTRICAL

[illegible]

UPR – MAYAGÜEZ CAMPUS
ENGINEERING LAB

MAYAGÜEZ

PUERTO RICO

												Job No. 09009		TITLE, INDEX AND LOCATION PLAN	TO-01			
												SCALE AS SHOWN						
												DATE 07/24/09						
1/25/10				ADG								DRAWN BY PRH						
DATE	ISSUE FOR BID			BY	DATE	REVISIONS			BY	DATE	REVISIONS			BY	A.D.G.	TITLE	REVISION No.	A