Introducción a la Lectura de Planos



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

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

Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura 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

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

ESTO ES UN EJEMPLO DE TEXTO EN AUTOCAD

Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

Escritura a mano Letra Técnica o Gótica THE ANDERSON MAN LETTER THE

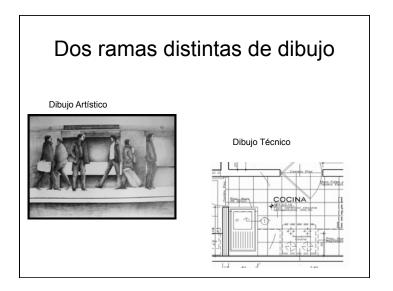
Introducción a Lectura de Planos: Diferentes tipos de Dibujos y Planos

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

Introducción a Lectura de Planos:

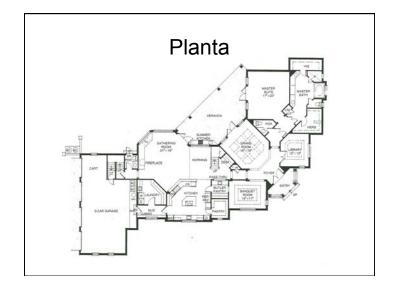
Diferentes tipos de Dibujos y Planos-Arquitectónicos

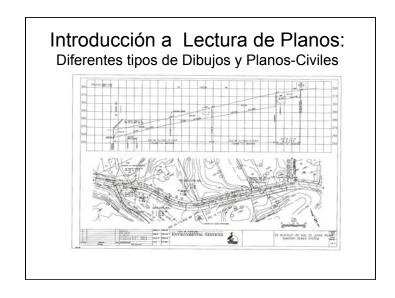
- Arquitectónicos
- Civiles
- Diseño de Interiores
- Eléctricos
- Protección de Fuego Sistemas de
- Representaciones "Renderings"
- Paisaje- "Landscape"
- Mecánicos (HVAC)
- Plomería
- Estructurales
- transportación

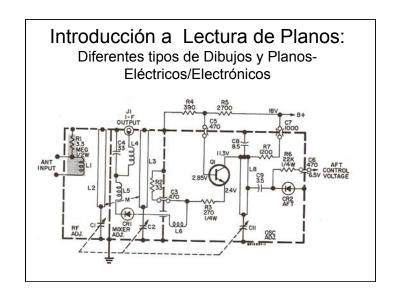


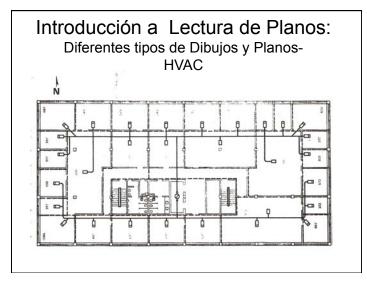
Representaciones

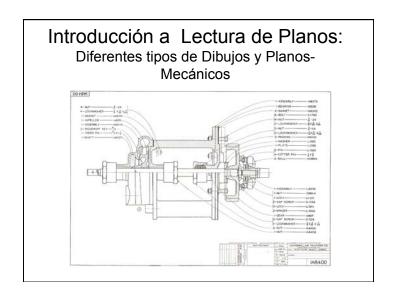


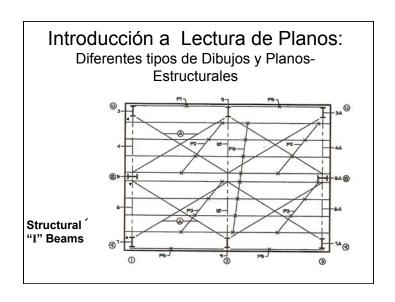


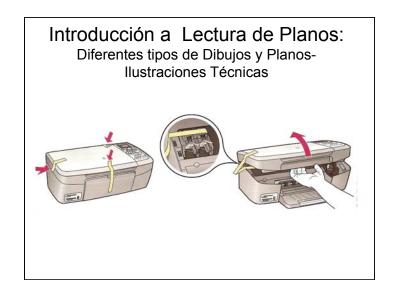


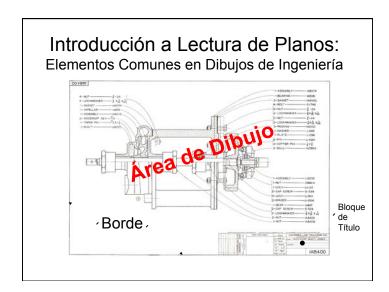


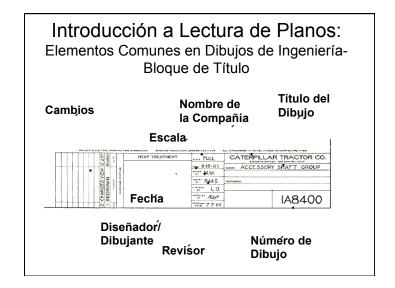












Bloque de Título



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

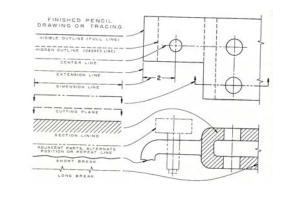
Introducción a Lectura de Planos:

Elementos Comunes en Dibujos de Ingeniería-Símbolos y Líneas

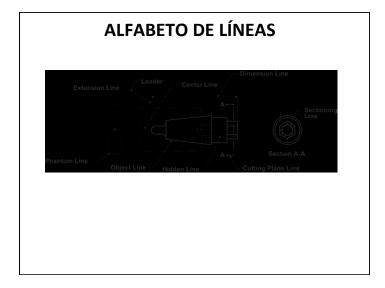
- Proveen un lenguaje universal para diseñadores, ingenieros y personal de producción
- Se utilizan líneas, números, símbolos e ilustraciones
- Diferentes dibujos
 - De fabricación
 - Símbolos estándar para mecánico, soldadura, construcción, eléctrico, etc.)
 - "Sketch"
 - Ilustra una idea, principio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

Introducción a Lectura de Planos:

Elementos Comunes en Dibujos de Ingeniería-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



Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

ALFABETO DE LÍNEAS

Líneas de contorno proyectado o invisible

- · Líneas entrecortadas
- Se utilizan para mostrar contornos invisibles



ALFABETO DE LÍNEAS

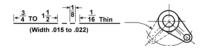
- · Líneas de centro
 - Línea donde se utilizan intervalos sólidos con entrecortados
 - Se utiliza el intervalos corto donde se interseca el centro
 - Se usan para indicar el eje central de un objeto
 - Se usan para indicar el centro de círculo o hueco



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

3'- 6"
- 3.5'

Flecha

ALFABETO DE LÍNEAS

Marcado Típico de Dimensiones

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

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



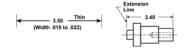


Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

ALFABETO DE LÍNEAS

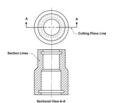
Líneas de Extensión

- 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

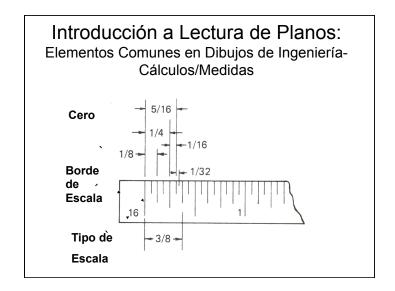
- · Líneas de Sección
 - · Línea sólida seguida de dos líneas cortas
 - El final tiene una línea pequeña con flechas que indican hacia dónde se está mirando en el corte
 - Se identifican al final para identificar el corte
 - · Al dibujo del corte se le conoce como sección



Introducción a Lectura de Planos:

Elementos Comunes en Dibujos de Ingeniería-Cálculos/Medidas

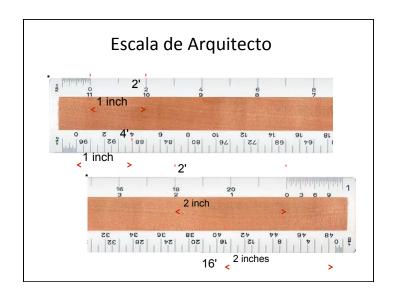
- Escalas
 - La escala es la proporción en la que se ha reducido el tamaño real del diseño, en el plano.
 - Señala en cuanto se reducen las medidas reales para dibujarlas en el plano.
 - Las medidas del plano pequeño se indican de la siguiente manera
 - ESCALA 1/N ó 1:N

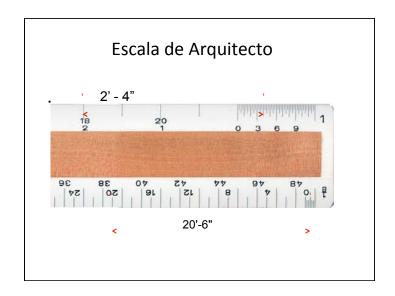


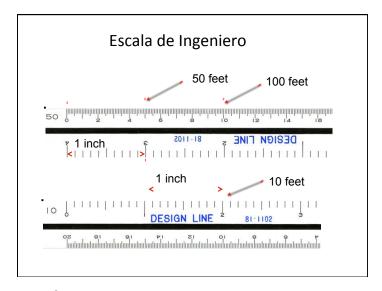
Escalas

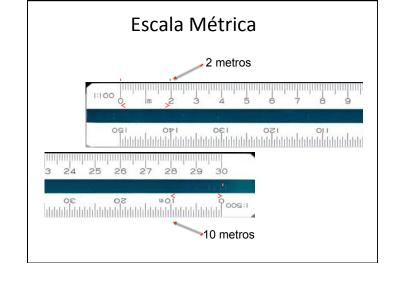
- Escalas más comúnmente usadas
 - Escala de Arquitecto
 - 1/4" = 1'-0"
 - 1/8" = 1'-0"
 - Escala de Ingeniero
 - Una escala de 10 significa que cada 1" dibujada representa 10' en el proyecto real.
 - Escala Métrica
 - 1:50- cada centímetro representa 50 cm



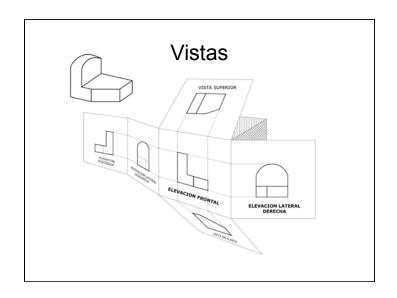


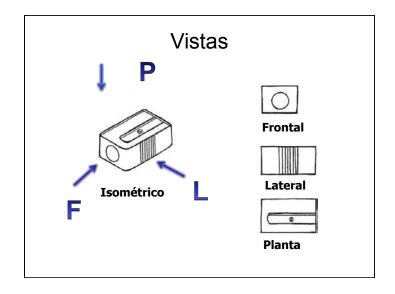


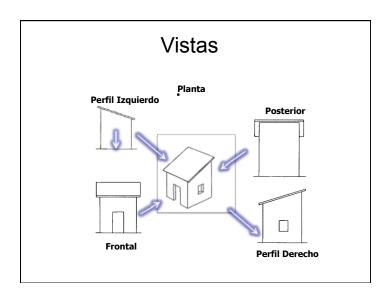


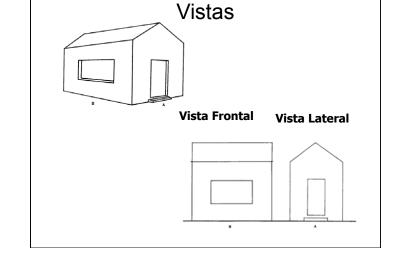


Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

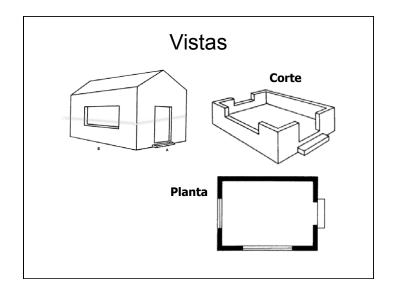


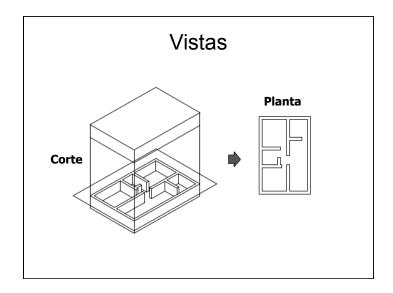


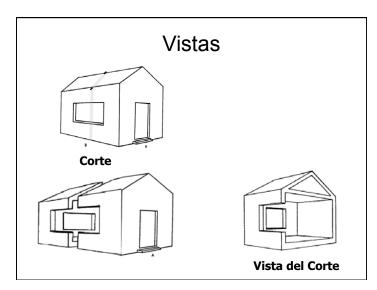


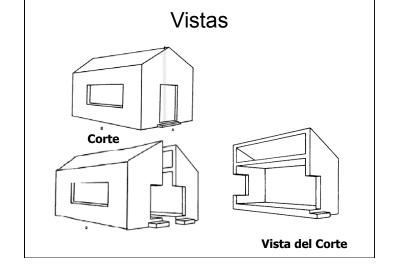


Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

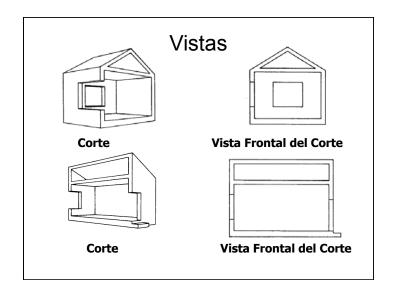


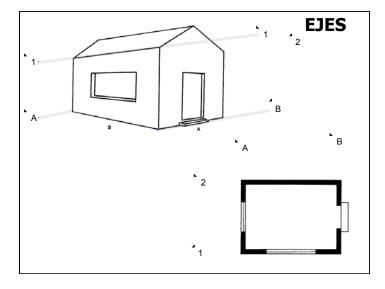


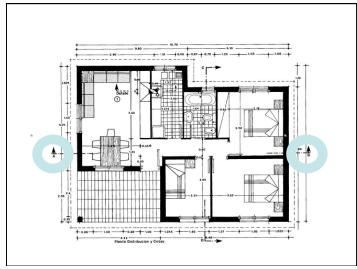


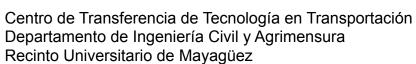


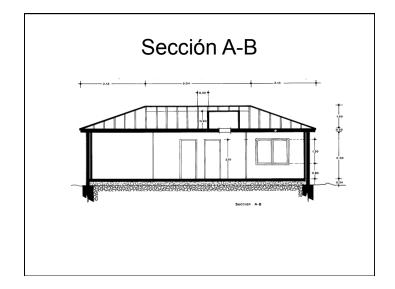
Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

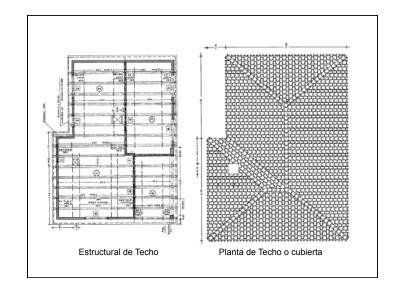


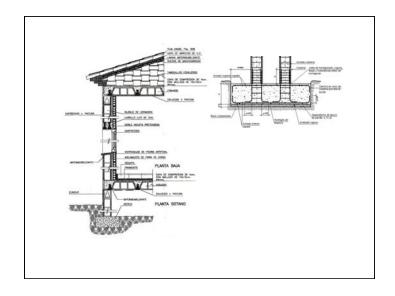


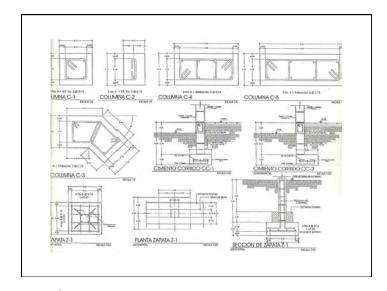


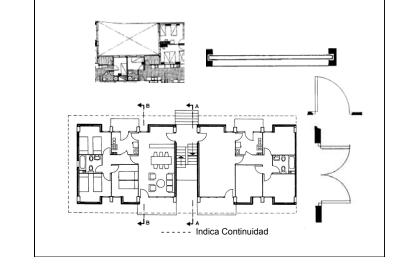




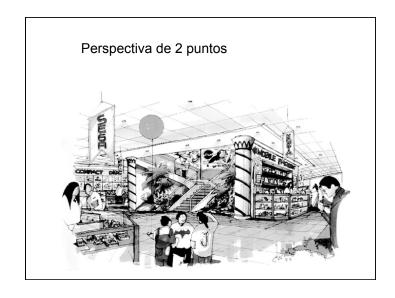


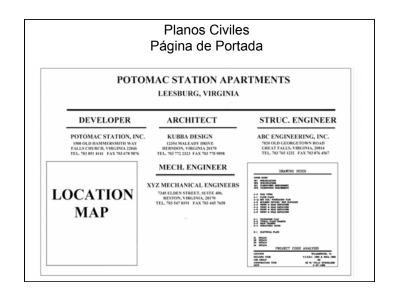


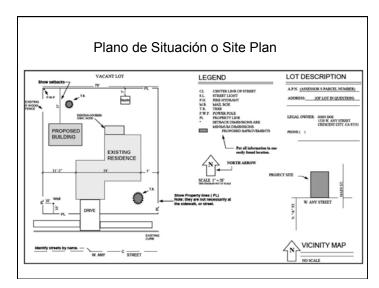




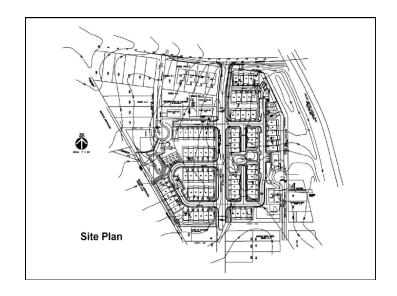
Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

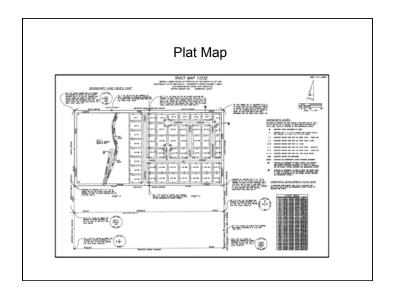


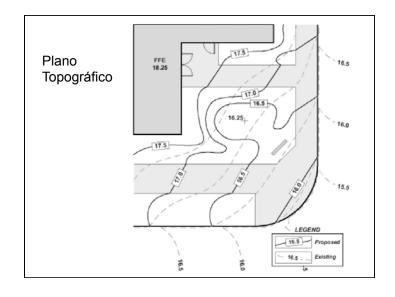


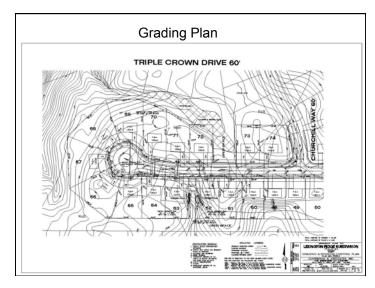




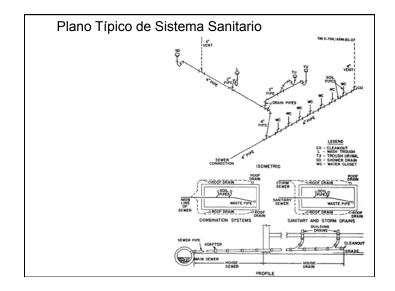


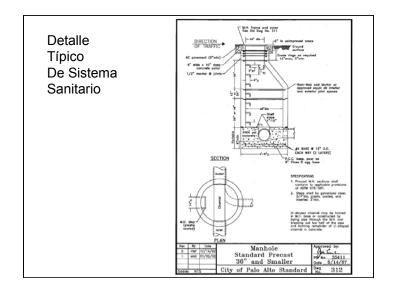


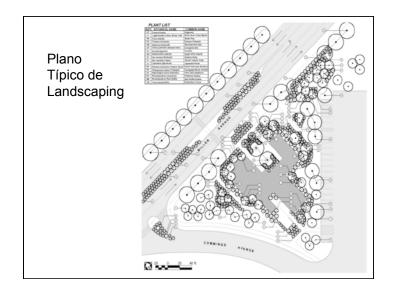


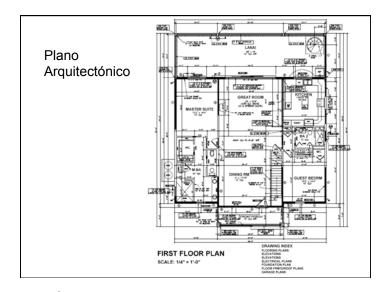


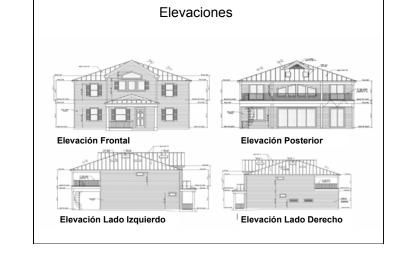
Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez



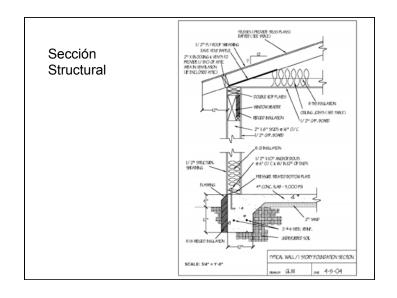


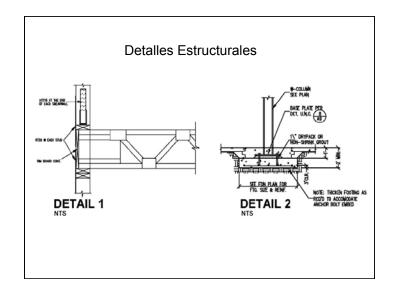


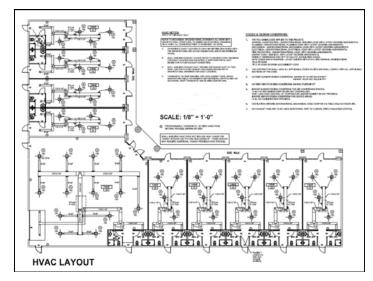




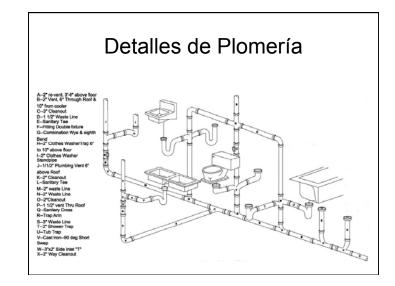
Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

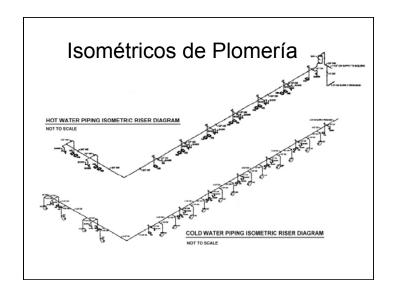


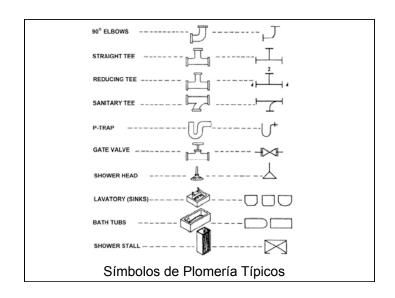


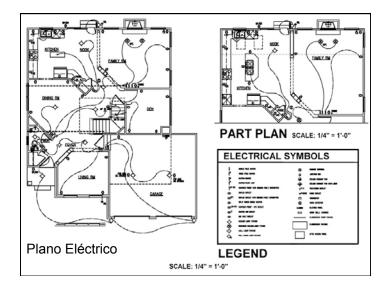


Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez









Shop Drawings

FINSHED WALL

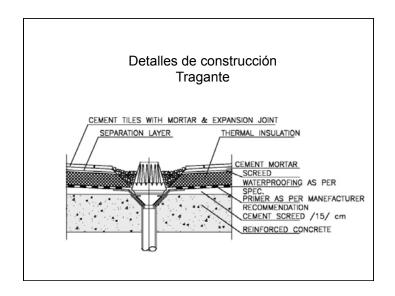
FINSHED WALL WHERE NO

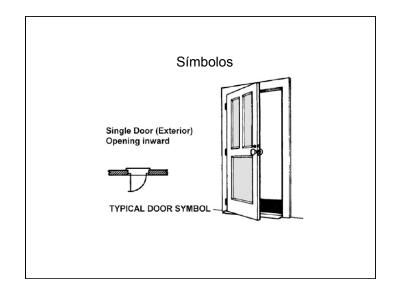
FINSHED WALL WHER NO

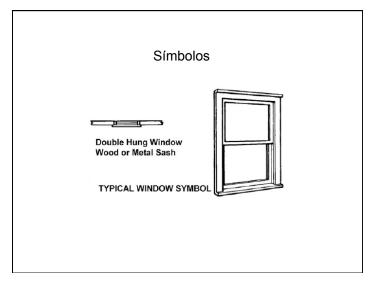
FINSHED WALL WHERE NO

FINSHED WALL WHER

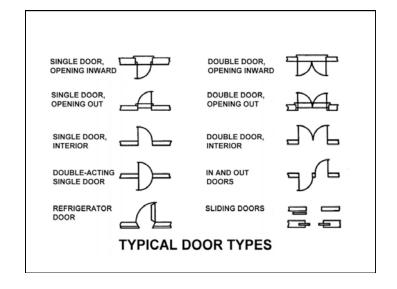
Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

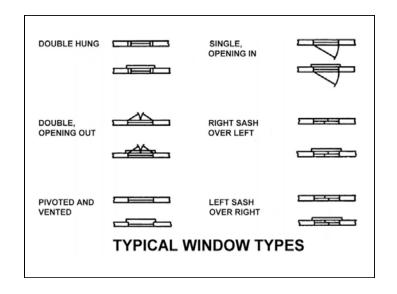




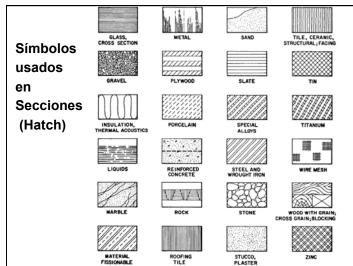




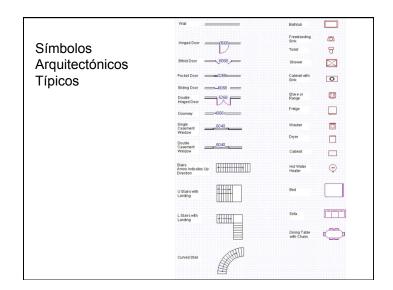


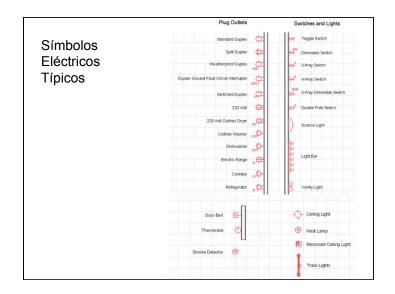


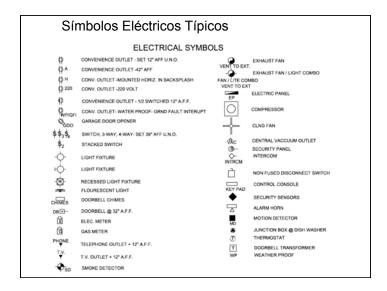


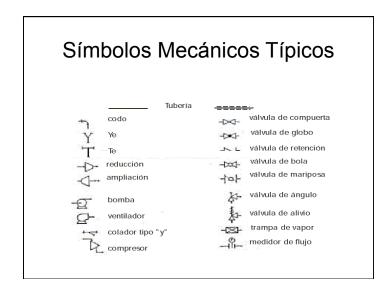


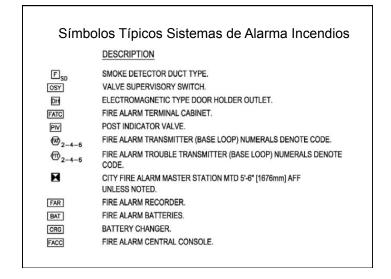


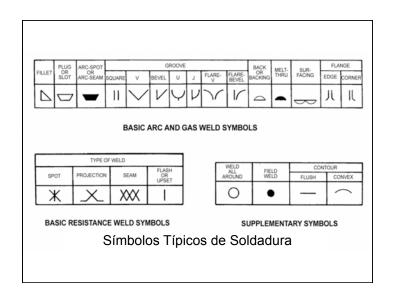


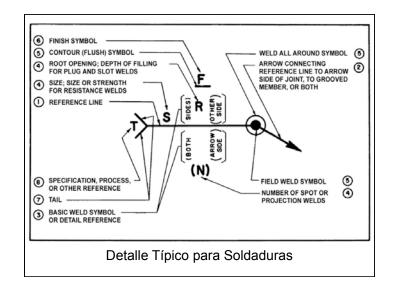












Referencia

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

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

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

- 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.

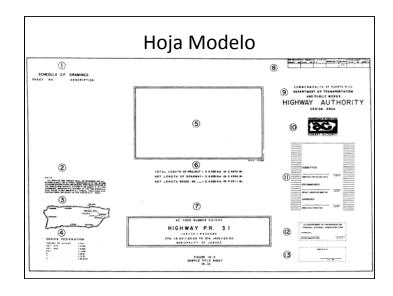
Introducción

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

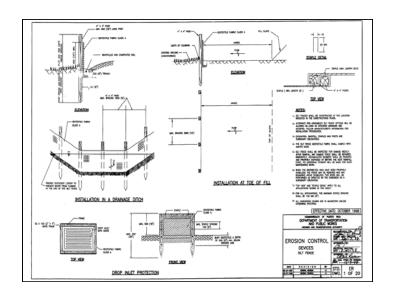
- Es la primera hoja en el set de planos
- Da una breve descripción del proyecto e indica
 - Indica la longitud del proyecto
 - Muestra la localización general del proyecto
 - Establece las especificaciones mediante las cuales se va a construir el proyecto
 - Indica si el tráfico se va a controlar o 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



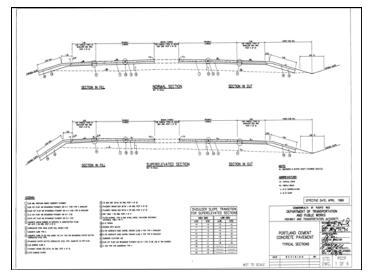


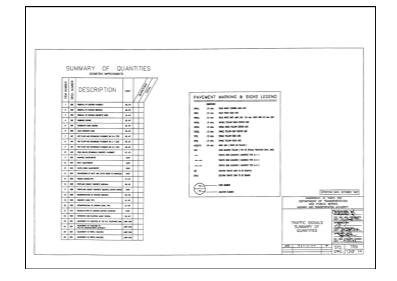
Plano de Localización

- 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

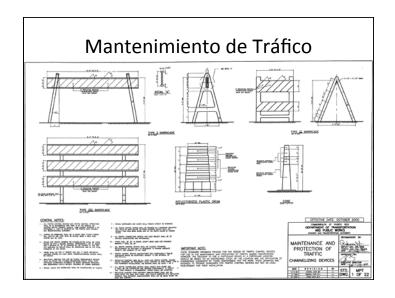


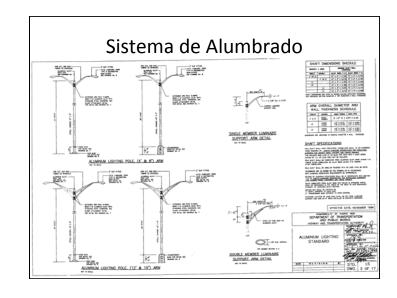
	ABBREV	IATIONS	
ABUT.	Abutment	E.H.W.	Extreme High Water
AGG.	Aggregate	F. To F.	Face To Face
AH.	Ahead	FA	Federal Aid
AL.	Aluminum	FAP	Federal Aid Primary
ASB.	Asbestos	FAS	Federal Aid Secondary
ASPH.	Asphalt	F.	Pill
BK.	Back	F.L.	Flow Line
B.L.	Base Line	FWD.	Forward
B.W.F.	Barbed Wire Fence	G.I.	Galvanized Iron
B.V.	Bearing Value	G.	Gas
B 4 S	Bell and Spigot	G.V.	Gas Valve
B.M.	Bench Mark	GRAV.	Gravel
BIT. CONC.	Bituminous Concrete	GRD.	Ground
B.C.C.M.P.	Bituminous Coated Corrugated	H.W.	High Water
	Metal Pipe	HOR.	Horizontal
HLDG.	Building	HYD.	Hydrant
CI	Cast Iron	INV.	Invert
CIP	Cast Iron Pipe	LE.	Invert Elevation
C.B.	Catch Basin	J.B.	Junction Box
C.L.	Center Line	LT.	Left
C. TO C.	Center To Center	L	Length of Curve
CTD.	Coated	L.P.	Light Pole
COL	Column	M.B.	Mail Box
COM.	Communications	M.L.	Main Line
CONC	Concrete	M.H.	Manhole
C.O.A.	Control Of Access	MAX.	Maximun
COORD.	Coordinates	M.H.W.	Mean High Water
C.M.	Corrugated Metal	M.S.L.	Mean Sea Level
CMP.	Corrugated Metal Pipe	MIN.	Mean Sea Level Minimun
CU.M.	Cubic Meter		Monument
CULV.	Culvert	MON.	On Centers
COLV.	Curve to Spiral	O.C.	On Centers Outside Dismeter
CS C.	Cut Cut	O.D. O. TO O.	Outside To Outside
	Degree		
DEG.		PVMT.	Pavement
DIA.	Diameter	PCC	Point of Compound Curvature
DIM.	Dimension	PC	Point of Curvature
DWG.	Drawing	PI	Point of Intersection
DWY.	Driveway	PRC	Point of Reverse Curve
ELEV.	Elevation	PT	Point of Tangency
E. TO E.	End To End	P.C.C.	Portland Cement Concrete
		PWR.	Power
ENGR.	Engineer	P.P.	Power Pole
EST.	Estimate	P.L.	Property Line
Exc.	Excavation	PROP.	Proposed
EXIST.	Existing	P.G.	Proposed Grade
E.G.	Existing Ground	P.V.I.	Point of Vertical Intersection
EXP.	Expansion	R	Radius of Curvature
EXT.	External	RR.	Railroad
E	External Distance	R.C.P.	Reinforced Concrete Pipe

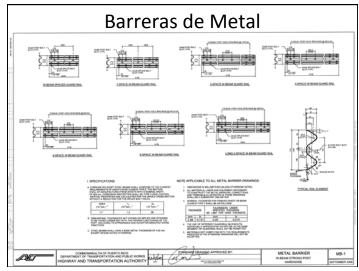


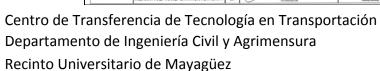


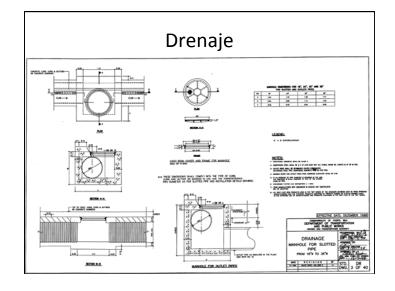
Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez











"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

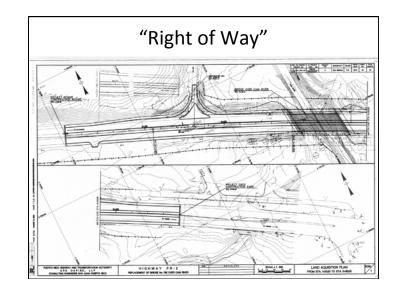
"Right of Way"

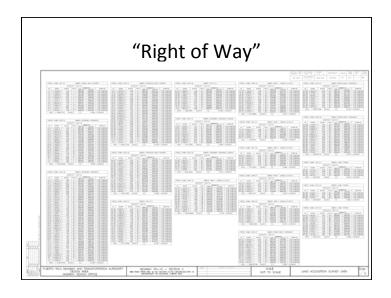
- Hay que mostrar las propiedades que van a ser expropiadas
- Tiene que haber una tabla que incluya
 - Número de parcela afectada
 - Dueño
 - Estimado del área de la parcela
 - Estimado del área a expropiar

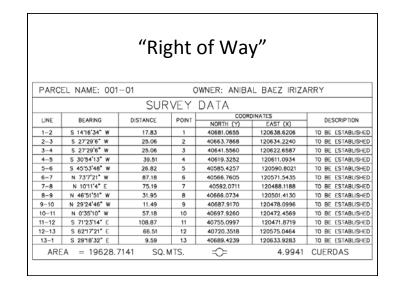
Centro de Transferencia de Tecnología en Transportación Departamento de Ingeniería Civil y Agrimensura Recinto Universitario de Mayagüez

"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		
	STRUCTURES TO		
MK'D.	OWNER	DESCRIPTION	CONDITION
1	SUCN. ANTONIO IRIZARRY	& 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	& 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	& GALV. STRUCT.	
12	AMID F. GONZALEZ BATIZ	SHACK	ĺ
13	AMID F. GONZALEZ BATIZ	SHACK	

		"	Rig	tht c	of W	/ay	יני,			
	PARCEL OWN	E R		AREA	TO BE ACQU	IRED	REMAINING TO BE AC		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			00301	25522.1244	6.4935				
				003-02			10156.1286	2.5840		
004-00	P.R.E.P.A.			00401	21757.5289	5.5357				
				004-02			1608.2618	0.4092		
005-00	GERONIMO HERNANDEZ VARGAS			005-01	10172.0867	2.5881				
				005-02			5549.5529	1.4120		
006-00	AMID F. GONZALEZ BATIZ			006-01	20198.6960	5.1391				
				006-02						
				006-03						
007-00	AMID F. GONZALEZ BATTZ			00701	749.8756	0.1908				
				007-02			7577.6815	1.9280		
008-00	AMID F. GONZALEZ BATIZ			008-01	6065.7217	1.5433				
				008-02			13980.4962	3.5570		
009-00	RUBEN BAEZ HERNANDEZ			009-01	28953.9798	7.3667	-			-
	1			009-02					25238,2770	6.4213



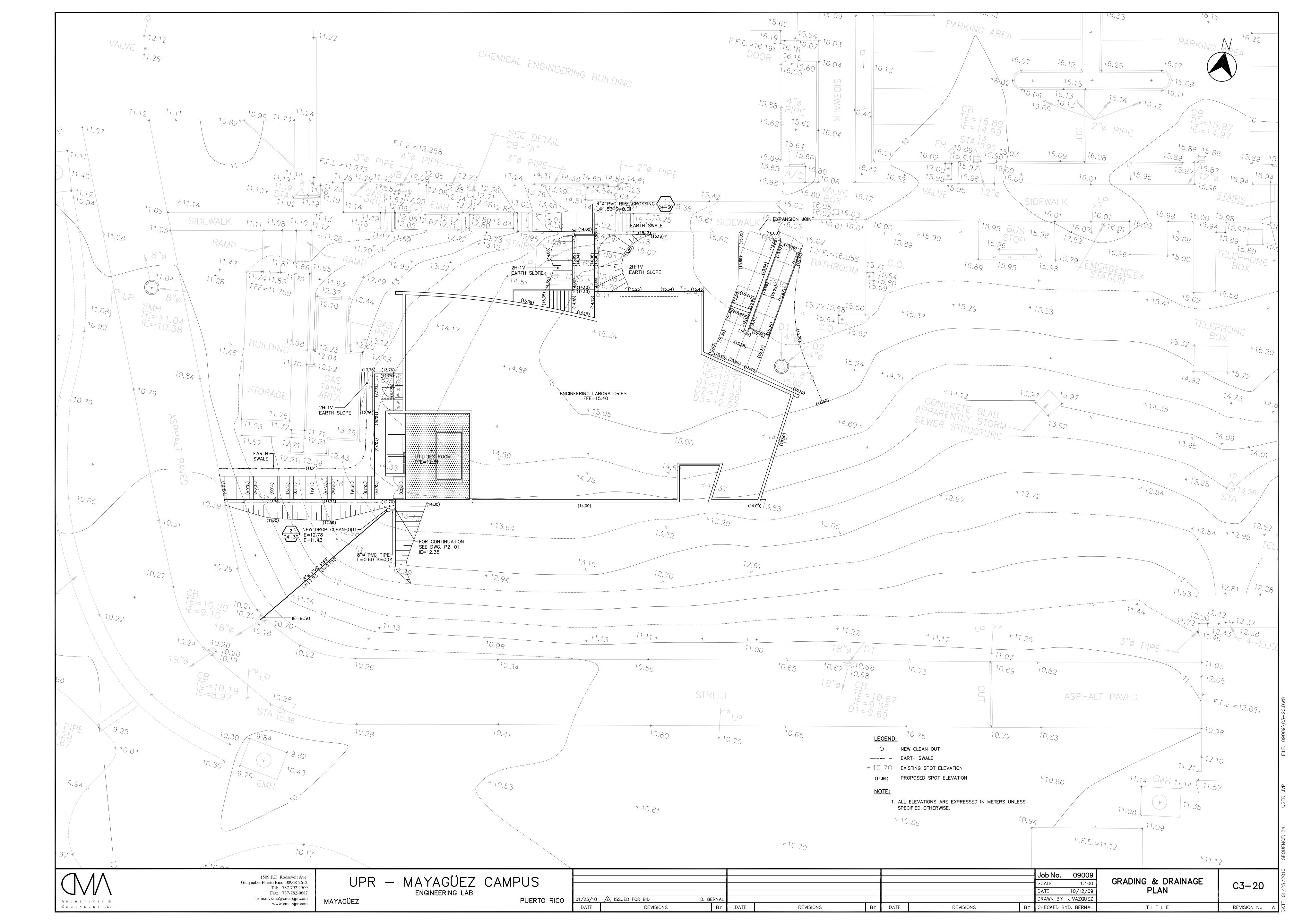
Seminario- Introducción a Lectura de Planos de Construcción

Dr. José L. Perdomo y Dr. Francisco Maldonado

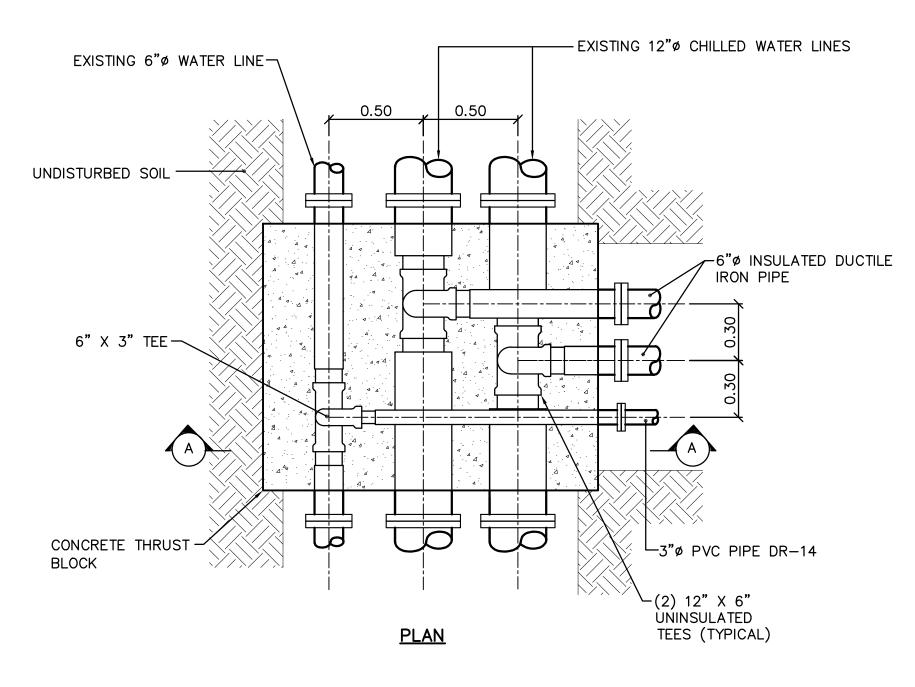
Sesión de Laboratorio

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.



ELEVATION A-A



TYPICAL THRUST BLOCK AT TEES SCALE: 1:20

A R C H I T E C T S & E N G I N E E R S LLP

1509 F.D. Roosevelt Ave. Guaynabo, Puerto Rico 00968-2612 Tel: 787-792-1509 Fax: 787-782-0687 E-mail: cma@cma-sjpr.com www.cma-sjpr.com

MAYAGÜEZ

UPR - MAYAGÜEZ CAMPUS
ENGINEERING LAB

D. BERNAL
BY DATE PUERTO RICO

O1/25/10 A ISSUED FOR BID

DATE REVIS BY DATE REVISIONS REVISIONS REVISIONS

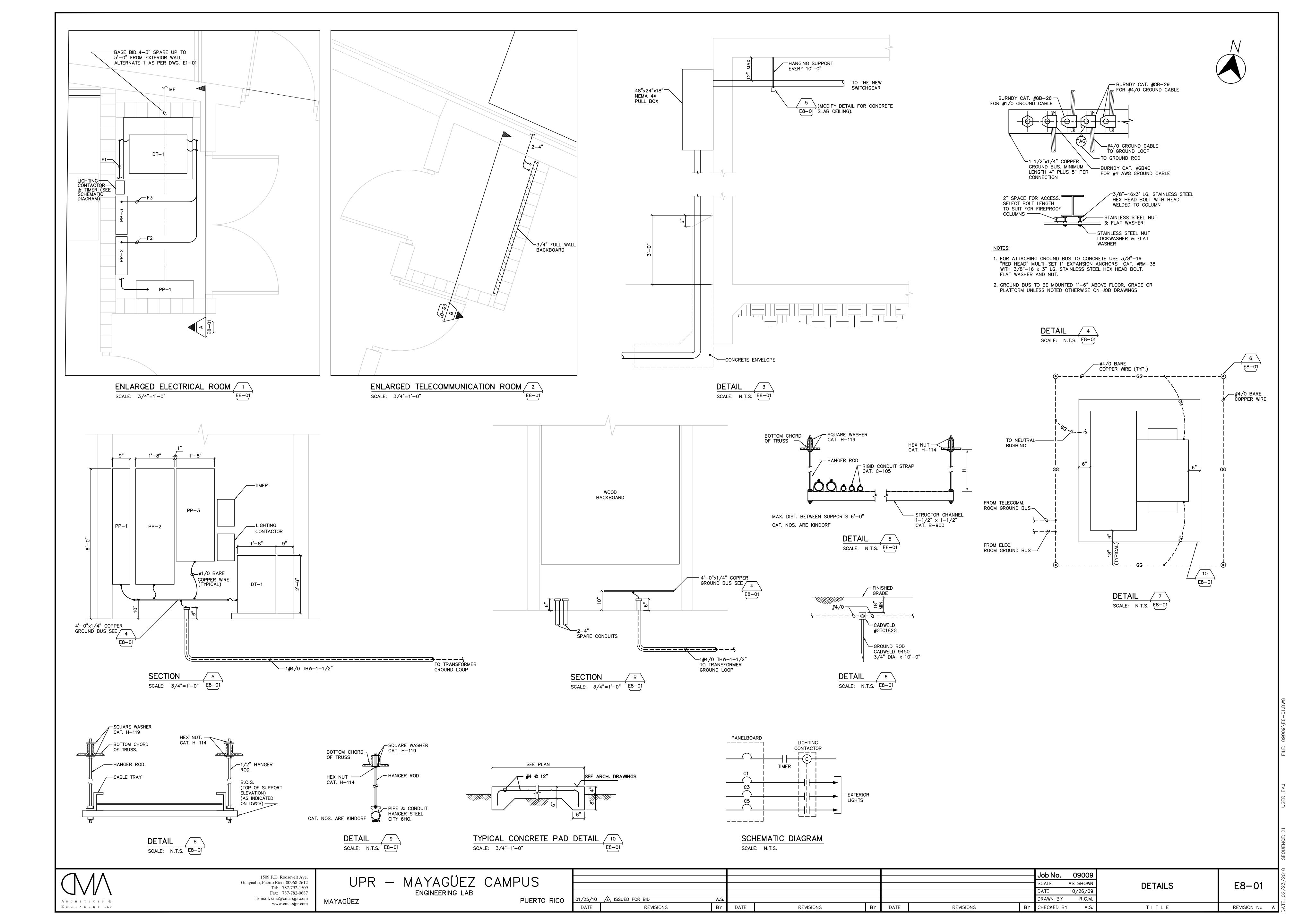
Job No. 09009

SCALE AS SHOWN

DATE 10/12/09

DRAWN BY J.VAZQUEZ BY CHECKED BYD. BERNAL

POTABLE WATER AND FIRE PROTECTION DETAILS C6-50 REVISION No. A TITLE



THE MECHANICAL CONTRACTOR SHALL PERFORM ALL WIRING AND CONNECTION (POWER AND CONTROL) NOT INDICATED IN THE ELECTRICAL DRAWINGS AND NECESSARY FOR THE PROPER OPERATION OF THE MECHANICAL EQUIPMENT IN STRICT ACCORDANCE WITH THE NATIONAL ELECTRIC CODE.

THE CONTRACTOR SHALL TAKE EVERY PRECAUTION IN ORDER TO MINIMIZE OR ELIMINATE THE TRANSMISSION OF NOISE OR VIBRATION FROM THE EQUIPMENT, PIPING SYSTEM OR DUCT SYSTEM TO THE CONDITIONED SPACE.

ALL EQUIPMENT, MATERIALS AND ACCESSORIES SHALL BE AS PER THE INDICATED SPECIFICATION AND/OR MANUFACTURER MODEL OR CATALOG NUMBER.

SUBSTITUTION OF SPECIFIED EQUIPMENT, MATERIALS AND ACCESSORIES REQUIRES PRIOR APPROVAL BY THE ENGINEER OF RECORD AND/OR THE OWNER'S REPRESENTATIVE.

UNLESS OTHERWISE NOTED IN DRAWINGS AND/OR SPECIFICATIONS ALL EQUIPMENT AND ACCESSORIES SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.

UNLESS OTHERWISE NOTED FOR ALL EQUIPMENT INSIDE BUILDING AND ON LARGER CONCRETE SLABS OUTSIDE BUILDING, A 4-INCH THICK CONCRETE HOUSEKEEPING PAD SHALL BE PROVIDED.

ALL PENETRATIONS THROUGH ROOF DECK WITH INSULATION AND BUILT UP FOR DUCTS AND/OR PIPES ROW SHALL BE PROVIDED WITH FLASHING AS PER DETAIL "M" OF THE NATIONAL ROOFING CONTRACTOR ASSOCIATION. MATERIALS SHALL BE COMPATIBLE WITH ROOF BUILT UP AND WITH PIPING OR DUCT SYSTEM.

EQUIPMENT SUPPORT LEGS INSTALLED ON ROOF DECK WITH INSULATION AND BUILT UP SHALL BE PROVIDED WITH FLASHING AS PER DETAILS OF THE NATIONAL ROOFING CONTRACTOR ASSOCIATION. MATERIALS SHALL BE COMPATIBLE WITH ROOF BUILT UP. USE DETAIL N-2 IN METAL DECKS AND DETAIL M-3 IN CONCRETE DECKS.

ALL DIMENSIONS SHALL BE FIELD CHECKED BY CONTRACTOR PRIOR TO COMMENCING

IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROCURE ALL NECESSARY INFORMATION DURING THE BIDDING PERIOD IN ORDER TO FURNISH ALL MISCELLANEOUS MATERIAL, ACCESSORIES AND LABOR, EITHER SHOWN OR NOT SHOWN ON THE DRAWINGS AND REQUIRED TO PERFORM THE SET-UP, INSTALLATION, TESTING AND START-UP OF OWNER - SUPPLIED EQUIPMENT; ALL IN ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S REQUIREMENTS.

VENTILATION AND AIR CONDITIONING

ALL DUCTWORK FOR THE HVAC SYSTEMS SHALL BE MANUFACTURED AND INSTALLED IN ACCORDANCE WITH THE HVAC DUCT CONSTRUCTION STANDARDS OF THE SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC., SMACNA (LATEST EDITION).

DUCTS SHALL BE RECTANGULAR OR ROUND AS INDICATED IN THE DRAWINGS IN ACCORDANCE WITH THE DUCTWORK SCHEDULE.

ALL INDICATED SECTIONS OF DUCT SHALL BE TESTED FOR LEAKAGE AT THE

INDICATED PRESSURE CLASS PRIOR TO INSULATION INSTALLATION. PRESSURIZATION, LEAKAGE AND INFILTRATION TESTS SHALL BE PERFORMED PER SMACNA STANDARDS.

UNLESS OTHERWISE SPECIFIED, DUCT MATERIAL SHALL BE: G.S. LOW CARBON, GALVANIZED STEEL OF LOCK-FORMING QUALITY ASTM A525.

IN ORDER TO OBTAIN THE REQUIRED DUCT SEAL CONNECTIONS BETWEEN DUCT SECTIONS AND BETWEEN DUCT AND FITTINGS THE DUCT SYSTEM CAN BE SEALED WITH HEAT TAPE, RAYCHEM THERMO FIT DUCT BANDS AS MANUFACTURED BY RAYCHEM CORP., 300 CONSTITUTION DRIVE, MENLO PARK, CALIFORNIA 94025, OR APPROVED EQUAL.

MANUAL AND AUTOMATIC CONTROL DAMPERS SHALL BE OPPOSED BLADES (O.B.D.) TYPE EXTRUDED ALUMINUM CONSTRUCTION. RUSKIN MFG. CO. TYPE CD-50 OR APPROVED EQUAL.

DUCT WORK SUPPORTS SHALL COMPLY WITH SMACNA RECOMMENDATIONS FOR TYPE OF DUCT CONSTRUCTION. SUBMIT SHOP DRAWING FOR APPROVAL.

CANVAS CONNECTIONS SHALL BE NEOPRENE-COATED GLASS FABRIC AS MANUFACTURED BY VENT FABRIC (VENT GLASS), DURO DYNE CORP.. OR EQUAL: MOUNTED ON ANGLE FRAMES SECURELY FASTENED TO DUCTS AND EQUIPMENT WITH ACCESSORIES TO PREVENT COL-LAPSING AT 10 IWG OF NEGATIVE PRESSURE. CANVAS CONNECTIONS SHALL BE AIR TIGHT (NO LEAKAGE OR INFILTRATION) AT INDICATED

NO ELBOW SHALL BE MADE WITH AN INSIDE RADIUS OF LESS THAN THE WIDTH OF THE DUCT. SHOULD ANY TURN BE NECESSARY WITH INSIDE RADIUS LESS THAN 3/4 DEPTH OF THE DUCT, THEY MUST BE FITTED WITH DOUBLE THICKNESS MULTIPLE VANES.

FOR MULTIPLE OUTLET VAV BOXES PROVIDE A BALANCING DAMPER AT EACH OUTLET OR AT THE TERMINAL DIFFUSER.

DUCT COLLARS BEHIND GRILLES, REGISTERS AND CEILING OUTLETS SHALL BE PAINTED INSIDE WITH TWO COATS OF FLAT BACK PAINT.

SEISMIC RESTRAINT

DUCTWORK

ADEQUATE SIZING AND TYPE.

PRESSURE CLASS.

CONTRACTOR SHALL PROVIDE SEISMIC RESTRAINTS TO (BUT NOT BE LIMITED TO) THE FOLLOWING MECHANICAL ELEMENTS: AC UNITS

ALL EQUIPMENT, PIPING AND DUCTWORK SHALL BE RESTRAINED TO RESIST SEISMIC FORCES. RESTRAINTS SHALL MAINTAIN MECHANICAL EQUIPMENT. PIPING OR DUCT WORK IN A CAPTIVE POSITION. RESTRAINT DEVICES SHALL BE DESIGNED AND SELECTED TO MEET SEISMIC REQUIREMENTS AS DEFINED IN THE LATEST ISSUE OF UNIFORM BUILDING CODE. THIS SITE IS CLASSI-FIED AS SEISMIC ZONE 3. HOWEVER, THE MINIMUM HORIZONTAL RESTRAINT CAPABILITY SHALL BE 0.5q HORIZONTAL AND 0.33 VERTICAL. LIFE SAFETY EQUIPMENT SUCH AS SPRINKLER PIPING SHALL BE DESIGNED TO RESIST A MINIMUM 1.0g HORIZONTAL LOAD AND 0.67g VERTICAL LOAD. CONTRACTOR MUST PROVIDE SUBMITTALS FOR SEISMIC RESTRAINT. A SEISMIC DESIGN ERRORS AND OMISSIONS INSURANCE CERTIFICATE MUST ACCOMPANY SUBMITTALS FROM THE SEISMIC ENGINEER. MANUFACTURERS PRODUCT LIABILITY INSURANCE CERTIFI-CATES ARE NOT ACCEPTABLE. CONTRACTOR MUST PROVIDE SEISMIC CALCULA-TIONS, SIGNED BY A QUALIFIED LICENSED PROFESSIONAL ENGINEER SHOWING

HVAC DRAWING SYMBOLS **J**AD 10''×12'' 10''×12''

ACCESS DOOR OR ACCESS PANEL

GOOSENECK HOOD

RECTANGULAR OR SQUARE DUCT. FIRST NUMBER INDICATES DIMENSION OF SIDE SHOWN.SECOND NUMBER INDICATES SIDE NOT SHOWN.

INTERNALLY - LINED DUCT (NUMBERS INDICATE INSIDE DIMENSIONS)

SUPPLY DUCT SECTION-FIRST NUMBER INDICATES HORIZONTAL DIMENSION INVIEW, SECOND NUMBER INDICATES

VERTICAL DIMENSION IN VIEW. EXHAUST OR RETURN DUCT SECTION-FIRST NUMBER INDICATES HORIZONTAL DIMENSION IN VIEW, SECOND NUMBER

INDICATES VERTICAL DIMENSION IN VIEW.

SUPPLY DUCT TURNING TOWARD VIEWER

RETURN OR EXHAUST DUCT TURNING TOWARD VIEWER

SUPPLY DUCT TURNING AWAY FROM VIEWER

RETURN OR EXHAUST DUCT TURNING AWAY FROM VIEWER

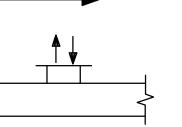
MOTOR OPERATED DAMPER (Pneumatic or Electric)

BALANCING (VOLUME) DAMPER

→

STANDARD BRANCH FOR SUPPLY

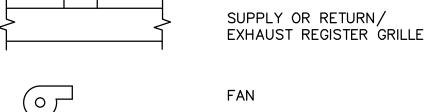
AIR FLOW (UNDUCTED)



DAMPER. SIZE AS INDICATED.

SUPPLY OR RETURN/

AIR FLOW (DUCTED)



FAN

FIRE DAMPER:

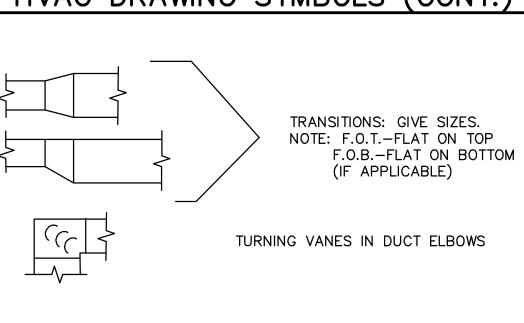
─ VERTICAL POSITION

→ HORIZONTAL POSITION

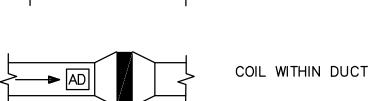
AND RETURN (NO SPLITTER)

AIR GRILLE, REGISTER & DIFFUSER SCHEDULE LEGEND SIMILAR TO DESCRIPTION THERMALLY POWERED VAV DIFFUSER WITH THUMBWHEEL ACUTHERM AND TEMPERATURE SCALE TO ADJUST THE COOLING THERMAFUSER SET POINT. SIZE AS INDICATED. SQUARE LOUVER FACE CEILING DIFFUSER. EXTRUDED METALAIRE ALUMINUM CONSTRUCTION. SIZE OF NECK AND THROW SERIES 5000 SIZE OF NECK AND THROW INDICATED ON PLANS. METALAIRE LAMINAR AIRFLOW DIFFUSER. ONE PIECE PERFORATED MODEL FACE AND CORE ASSEMBLY CONSTRUCTION. FACE HPL-CL-AL-6 SHALL BE FLUSH WITH THE CEILING SURFACE. METALAIRE SD-ASIDEWALL SUPPLY GRILLE VERTICAL BLADES, ALUMINUM SERIES V1 CONSTRUCTION, SINGLE DIFLECTION, ONE PIECE FORMED BORDER. METALAIRE EXHAUST REGISTER. EXTRUDED ALUMINUM EG-A/ SERIES RH CONSTRUCTION, ALUMINUM OPPOSED BLADE





DOWN INCLINED DROP IN RESPECT TO AIR FLOW INCLINED RISE IN RESPECT TO AIR FLOW UP_



FLEXIBLE DUCT CONNECTION

BACKDRAFT DAMPER

OPPOSED BLADE DAMPERS

SUPPLY DIFFUSER

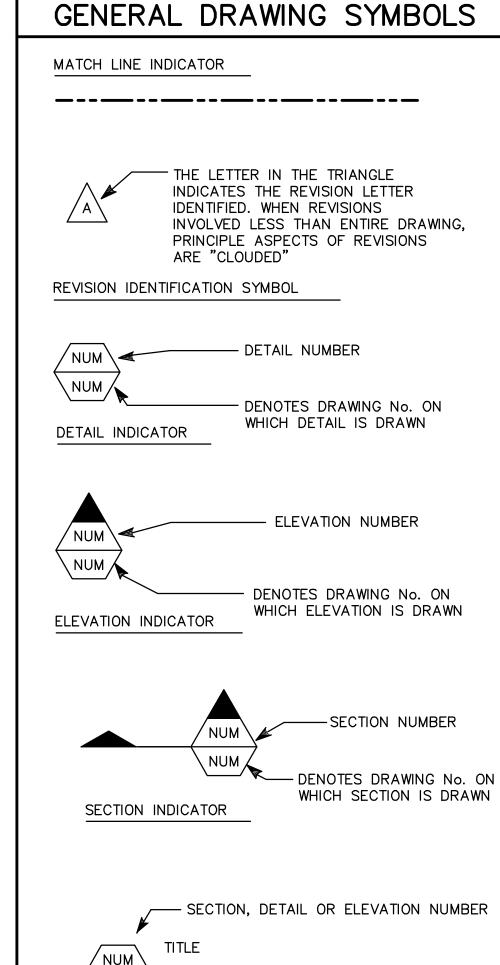
XX" X XX" ◀ INDICATES NECK SIZE XXX CFM ◀ INDICATES AIR FLOW

RETURN DIFFUSER

XX" X XX" ◀ INDICATES NECK SIZE SUPPLY REGISTER

XX" X XX" ◀ INDICATES NECK SIZE

RETURN DIFFUSER XX" X XX" ◀ INDICATES NECK SIZE XXX CFM ◀ INDICATES AIR FLOW



SCALE:

ELEVATION TITLE INDICATOR

∖ NUM ∕

-DRAWING NUMBER WHERE SECTION. DETAIL OR ELEVATION IS IDENTIFIED

AMPERES INSIDE DIAMETER ACCESS DOOR INCH(ES) ABOVE FINISHED FLOOR INSUL INSULATION ACCESS PANEL KILOWATT ΚW ASHRAE AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-LAB LABORATORY CONDITIONING ENGINEERS LAT LEAVING AIR TEMPERATURE ATTENUATOR LBS/HR POUNDS PER HOUR LOUVER BACKDRAFT DAMPER LWT LEAVING WATER TEMPERATURE BUTTERFLY DAMPER BLAST GATE MAXIMUM BRAKE HORSEPOWER MBH UNITS OF THOUSANDS BTU/HR BLDG BUILDING MECHANICAL BOD BOTTOM OF DUCT MEZZ **MEZZANINE** BOS BOTTOM OF STEEL **MANUFACTURER** BTU BRITISH THERMAL UNIT MINIMUM BRITISH THERMAL UNIT PER HOUR MATERIAL MTR MOTOR CELSIUS (DEGREES) CAC CLEAN AIR CENTER NORMALLY CLOSED CONSTANT EXHAUST (MANUAL OPERATION) CUBIC FEET PER MINUTE CFM NATIONAL ELECTRIC CODE CENTER LINE NOT IN CONTRACT COLUMN NECK DIAMETER CONCRETE NORMALLY OPEN CONN CONNECTION (MANUAL OPERATION) CONT CONTINUATION NUMBER CONTR CONTRACT(OR) NOT TO SCALE CSC CORROSIVE STORAGE CABINET CVR CONSTANT VOLUME REGULATOR OUTSIDE AIR OUTDOOR AIR DAMPER OUTDOOR AIR INTAKE/INLET DRY BULB TEMPERATURE OPPOSED BLADE DOOR GRILLE ON CENTER DIAMETER OUTSIDE DIAMETER DIFF DIFFUSER OPENING OUNCE DIFFERENTIAL PRESSURE GAUGE DAMPER PRESSURE DROP DPT DEW POINT TEMPERATURE PRE-FILTER DRAWING PHASE PARTS PER MILLION EXHAUST AIR PRESSURE ENTERING AIR TEMPERATURE POUNDS PER SQUARE INCH EQUIVALENT DIRECT RADIATION POUNDS PER SQUARE INCH ABSOLUTE **ELEVATION** POUNDS PER SQUARE INCH GAUGE ELECTRIC (ELECTRICAL) **EQUIPMENT** RETURN AIR ESP EXTERNAL STATIC PRESSURE RELATIVE HUMIDITY EWT ENTERING WATER TEMPERATURE REVOLUTIONS PER MINUTE EXH **EXHAUST EXISTING EXIST** SUPPLY AIR SCFH STANDARD CUBIC FEET PER HOUR FAHRENHEIT (DEGREES) SCFM STANDARD CUBIC FEET PER MINUTE FACE AREA SQUARE FEET FAIL CLOSED STATIC PRESSURE FINISHED FLOOR **SPECIFICATIONS** FINISHED FLOOR ELEVATION **SQUARE** FLOOR STAINLESS STEEL FLEXIBLE STANDARD TEMPERATURE FLXC FLEXIBLE CONNECTOR FMD FLOW MEASURING DEVICE TOD TOP OF DUCT TOS TOP OF STEEL FO FAIL OPEN FOB FLAT ON BOTTOM TOTAL PRESSURE FOT TOTAL STATIC PRESSURE FLAT ON TOP FPM FEET PER MINUTE TURNING VANE FLAMMABLE STORAGE CABINET FSC TYP TYPICAL FOOT (FEET) FUT FUTURE VARIABLE AIR VOLUME FACE VELOCITY F۷ VOLUME DAMPER (MANUAL) VELOCITY GAUGE VERTICAL GALV GALVANIZED VARIABLE FREQUENCY DRIVE HIGH EFFICIENCY PARTICULATE VELOCITY PRESSURE AIR FILTER WET BULB TEMPERATURE HGR HANGER WATER GAUGE (COLUMN) HOR HORIZONTAL WORKING POINT HORSEPOWER

HEATING AND VENTILATING

HEATING, VENTILATING AND AIR CONDITIONING

HVAC

REVISIONS

HVAC ABBREVIATIONS

																		112	1151	12				
											Al	R H	IAN	DLING	UNIT	SCH	EDUL	E						
		AIR FLO	DW SCFM	SP ((IWG)		FAN			DR	IVE			MOTOR				VIB.			SIMILAR TO			FURNISHED
DESIGNATION	SERVING	TOTAL	OUTSIDE	EXT.	тот.	TYPE	CLASS	DIA.	. DISCH	TYPE	RPM	внР	HP	V/PH/HZ	TYPE	COILS	FILTERS	ISOL.	ACC.	MANUFACTURER	MODEL	SIZE	REMARKS	BY
AHU-01	RMS. 201/202/ 203/204/205	8,400	2,310	3.5	7.0	CENT	-	-	TF	BELT	_	14.5	15.0	460/3/60	TEFC	SEE CC SCH.	30/65/ HEPA	SPRING	_	McQUAY	VISION	CAH021	1	MECHANICAL CONTRACTOR
AHU-02	RM. 210	1,530	350	1.5	2.51	FC	1	9	FR	BELT	1901	1.59	2.0	460/3/60	TEFC	SEE CC SCH.	30%	RUBBER	_	McQUAY	LAH	004A	1	MECHANICAL CONTRACTOR
AHU-03	RMS. 211/212	1,250	50	1.5	2.56	FC	1	9	FR	BELT	1903	1.28	2.0	460/3/60	TEFC	SEE CC SCH.	30%	RUBBER	_	McQUAY	LAH	003A	1	MECHANICAL CONTRACTOR
NOTE: 1. PREMIUI	M EFFICIENCY, VFD	RATED FAI	N MOTOR.																					

											FAN	SCHE	EDULE	-							
				PERFORMANO	CE			BLO	WER				MOTOR &	ELECT. S	ERVICE			MANUFACTURER			FURNICUED
DESIGNATION	AREA SERVED	LOCATION	CFM	(SP INH ₂ 0)	O.V.(FPM)	RPM	FAN DIA.	DRIVE	WHEEL TYPE	DISCH	ARR'G	ВНР	MOTOR HP	VOLTS	PHASE	HZ	SIMILAR TO	MODEL	SIZE	REMARKS	FURNISHED BY
EF-01	TOILETS & JANITOR	ROOF	240	0.5		1534	6"	BELT	BI	DN.	-	0.09	1/6	115	1	60	GREENHECK	GB	071-6	3, 4, 5	MECHANICAL CONTRACTOR
EF-02	RM. 210	CEILING	250	0.8	190	1935	4"	BELT	BI	INLINE	_	0.24	1/4	115	1	60	GREENHECK	BSQ	070-4	5	MECHANICAL CONTRACTOR
EF-03	FUME HOOD AT RM. 203	ROOF	1340	0.7	-	1017	10"	BELT	FI	UP	_	_	3/4	115	1	60	KEWAUNEE	HF5	1007-T1	1, 5	MECHANICAL CONTRACTOR
EF-04	FSC AT RM. 201/203	ROOF	100	1.0	-	1725	10"	DIRECT	ВІ	DN.	_	0.19	1/6	115	1	60	TWIN CITY	FA	10FA2	2, 3, 5	MECHANICAL CONTRACTOR
EF-05	CSC AT RM. 201/203	ROOF	100	1.0	-	1725	10"	DIRECT	ВІ	DN.	-	0.19	1/6	115	1	60	TWIN CITY	FA	10FA2	2, 3, 5	MECHANICAL CONTRACTOR
EF-06	RM. 202	CEILING	200	0.5	-	1537	4"	BELT	ВІ	INLINE	-	0.12	1/4	115	1	60	GREENHECK	BSQ	070-4	5	MECHANICAL CONTRACTOR

1. PART OF FUME HOOD 2. PLASTIC FAN

3. PROVIDE ROOF CURB 4. BACKDRAFT DAMPER 5. VIBRATION ISOLATORS.

ARCHITECTS &

1509 F.D. Roosevelt Ave. Guaynabo, Puerto Rico 00968-2612 Tel: 787-792-1509 Fax: 787-782-0687 E-mail: cma@cma-sjpr.com www.cma-sjpr.com

RG-A/

UPR - MAYAGÜEZ CAMPUS ENGINEERING LAB

PUERTO RICO

01/25/10 A ISSUED FOR BID BY DATE BY DATE DATE REVISIONS **REVISIONS**

Job No. 09009 AS SHOWN SCALE 0/0/0 DRAWN BY CAD BY CHECKED BY

HVAC NOTES, SYMBOLS ABBREVIATIONS & **SCHEDULES**

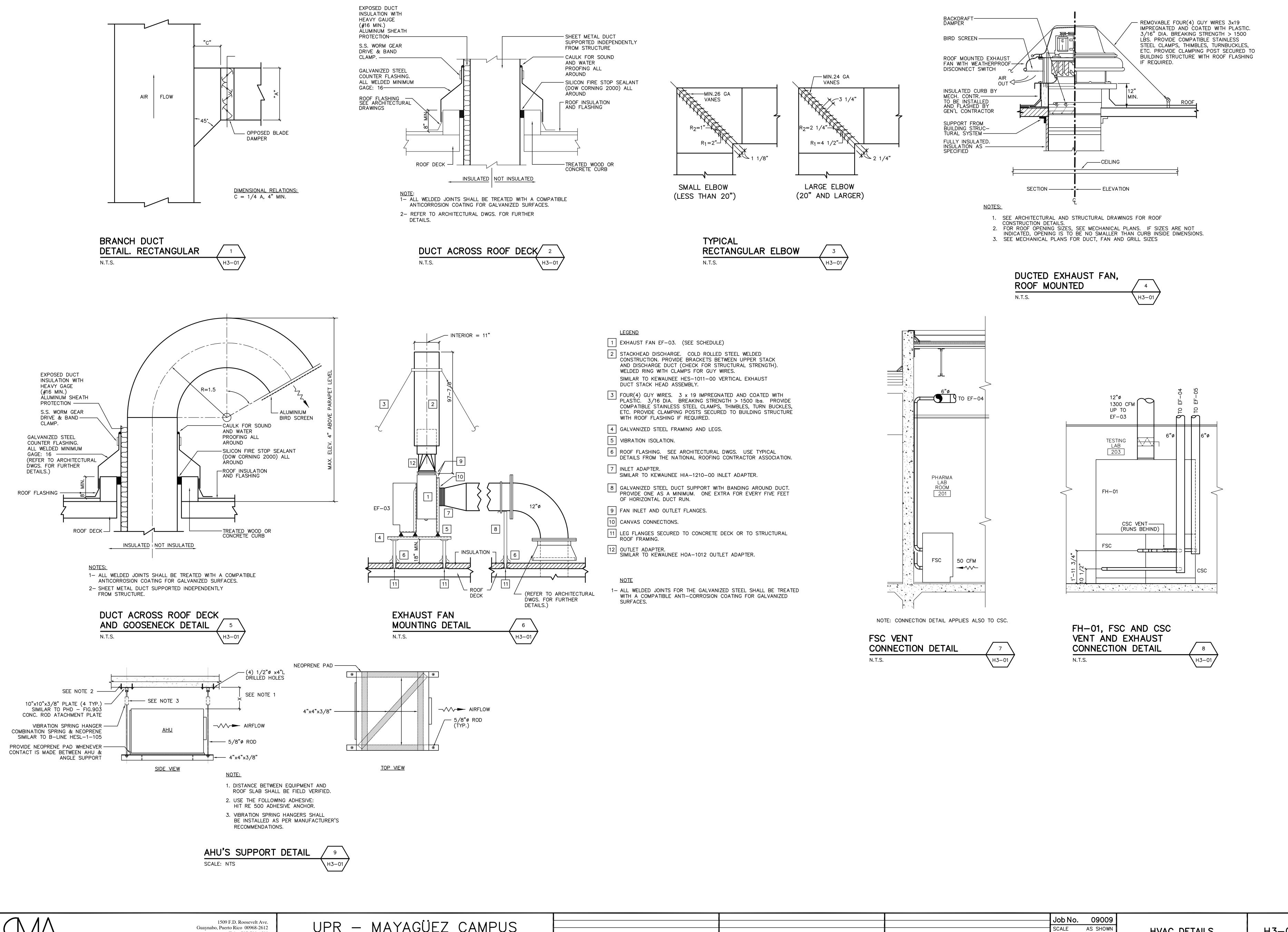
TITLE

WATER PRESSURE DROP

WEIGHT

H1 - 01REVISION No. A

E N G I N E E R S LLP



HVAC DETAILS H3 - 01REVISION No. A

E-mail: cma@cma-sjpr.com www.cma-sjpr.com

MAYAGÜEZ

UPR - MAYAGÜEZ CAMPUS ENGINEERING LAB

01/25/10 A ISSUED FOR BID REVISIONS

REVISIONS

TITLE

A R C H I T E C T S & E N G I N E E R S LLP

Tel: 787-792-1509 Fax: 787-782-0687

PUERTO RICO

DATE

BY DATE

REVISIONS

BY DATE

10/20/09 DRAWN BY L.F.M. BY CHECKED BY

NOTES

PLUMBING/PIPING

CONTRACTOR SHALL DETERMINE EXACT LOCATION OF SERVICE LINES AND CHANGE PLUMBING/PIPING ACCORDINGLY AFTER APPROVAL OF THE ARCHITECT-ENGINEER.

THE WATER SERVICE LINE MUST BE INSTALLED AT LEAST 12" ABOVE THE TOP LEVEL OF THE SEWER LINE AND IN A SIDE LEDGE.

WATER METERS IN ACCORDANCE WITH PUERTO RICO AUTHORITY AND SEWER AUTHORITY STANDARDS.

ALL PIPING CONNECTIONS TO EQUIPMENT SHALL BE DONE WITH SUITABLE FLEXIBLE CONNECTIONS. ALL PIPING SHALL BE SUPPORTED IMMEDIATELY AFTER THE FLEXIBLE CONNECTOR.

ALL PIPE SUPPORTS SHALL BE PROVIDED WITH SUITABLE VIBRATION ISOLATORS.

MINIMUM SLOPE FOR DRAINAGE PIPES SIZE 3" AND SMALLER SHALL BE 1/4" PER

MINIMUM SLOPE FOR DRAINAGE PIPES SIZE 4" AND LARGER SHALL BE 1/8" PER

MAXIMUM SPACING FOR CLEANOUTS IN LINES 4" AND SMALLER SHALL BE 50 FEET AND FOR LARGER LINES SHALL BE 100 FEET.

ALL JOINTS BETWEEN STEEL AND COPPER PIPE MUST BE DONE WITH EPCO DIELECTRIC UNIONS, MODEL FX FOR SIZES UP TO AND INCLUDING 2" AND MODEL GX FOR SIZES 2-1/2" AND 3".

ALL PIPES ABOVE GRADE EXPOSED MUST BE COLOR CODED IN ACCORDANCE WITH ANSI A13.1 1981. USE SETON SET MARK PIPE MARKING SYSTEM WITH LEGEND AND DIRECTIONAL ARROWS OR APPROVED EQUAL EVERY 20 FEET.

WASTE STACKS AND WASTE HORIZONTAL BRANCHES RECEIVING AIR CONDITIONERS CONDENSATE MUST BE INSULATED WITH J.M. AEROTUBE FOAMED PLASTIC PIPE INSULATION 1/2" THICK WITH ALL JOINTS SEALED WITH J.M.-57 ADHESIVE.

SIZE FOR WATER LINES SHALL BE 1/2" OR AS INDICATED.

SIZE OF COMPRESSED AIR LINES SHALL BE 1/2" OR AS INDICATED.

SIZE OF DRAINAGE LINES SHALL BE 3" OR AS INDICATED.

SIZE OF VENT LINES SHALL BE 2" OR AS INDICATED.

WHEN A PIPING SYSTEM IS SPECIFIED FROM A SPECIFIC MANUFACTURER, ALL RECOMMENDATIONS FROM HIM ON INSTALLATION AND MATERIAL HANDLING SHALL BE FOLLOW.

SEISMIC RESTRAINT

CONTRACTOR SHALL PROVIDE SEISMIC RESTRAINTS TO (BUT NOT BE LIMITED TO) THE FOLLOWING MECHANICAL ELEMENTS:

WATER HEATERS PUMPS

ALL EQUIPMENT, PIPING AND DUCTWORK SHALL BE RESTRAINED TO RESIST SEISMIC FORCES. RESTRAINTS SHALL MAINTAIN MECHANICAL EQUIPMENT. PIPING OR DUCT WORK IN A CAPTIVE POSITION. RESTRAINT DEVICES SHALL BE DESIGNED AND SELECTED TO MEET SEISMIC REQUIREMENTS AS DEFINED IN THE LATEST ISSUE OF UNIFORM BUILDING CODE. THIS SITE IS CLASSI-FIED AS SEISMIC ZONE 3. HOWEVER, THE MINIMUM HORIZONTAL RESTRAINT CAPABILITY SHALL BE 0.5g HORIZONTAL AND 0.33 VERTICAL. LIFE SAFETY EQUIPMENT SUCH AS SPRINKLER PIPING SHALL BE DESIGNED TO RESIST A MINIMUM 1.0g HORIZONTAL LOAD AND 0.67g VERTICAL LOAD. CONTRACTOR MUST PROVIDE SUBMITTALS FOR SEISMIC RESTRAINT. A SEISMIC DESIGN ERRORS AND OMISSIONS INSURANCE CERTIFICATE MUST ACCOMPANY SUBMITTALS FROM THE SEISMIC ENGINEER. MANUFACTURERS PRODUCT LIABILITY INSURANCE CERTIFI-CATES ARE NOT ACCEPTABLE. CONTRACTOR MUST PROVIDE SEISMIC CALCULA-TIONS, SIGNED BY A QUALIFIED LICENSED PROFESSIONAL ENGINEER SHOWING ADEQUATE SIZING AND TYPE.

	LEG	END	
	DRAIN ABOVE GRADE	>	FIXTURE STOP VALVE
	SEWER & DRAIN BELOW SLAB OR GRADE	O C.O.	CLEAN OUT FLUSH WITH FLOOR
	VENT	ı⊢—— c.o.	CLEAN OUT VERTICAL
	COLD WATER	0.0.	FACE
	HOT WATER	W.H.	WATER HEATER
	HOT WATER RECIRCULATION	⊚ SL	STORM LEADER
CA	COMPRESSED AIR	SS, WS	SOIL STACK, WASTE STACK
F	FIRE PROTECTION	O VS	VENT STACK
CHWS	CHILLED WATER SUPPLY	Ф	BALL VALVE
CHWR	CHILLED WATER RETURN		UNION
		───	GATE VALVE
		───	GLOBE VALVE
			BUTTERFLY VALVE
		N	CHECK VALVE
		-+	HOSE BIBB
			WATER HAMMER ARRESTER
		T PP	PETE'S PLUG
			CONNECT TO EXISTING
		(E)	EXISTING
		(R)	RELOCATED
		(N)	NEW

	FLOOR DRAIN SCHEDULE	
LEGEND	DESCRIPTION	SIMILAR TO
FD-A	FLOOR DRAINS IN FINISHED AREAS SHALL BE CAST IRON BODY AND NICKEL BRONZE ADJUSTABLE (TYPE B) STRAINER.	ZURN ZN-415

	HOSE BIBB SCHEDULE	
LEGEND	DESCRIPTION	SIMILAR TO
HB-A	ALL HOSE BIBBS WITH WHEEL HANDLE SHALL BE BRONZE GATE VALVE 3/4" SIZE.	WATTS SC-4

	PLUMBING AND	PIPING	ABBREVIATIONS
Α	AMPERES	JAN	JANITOR
AAV	AUTOMATIC AIR VENT	LAD	LADODATODY
AFF	ABOVE FINISHED FLOOR	LAB	LABORATORY
AV	AIR VENT	LDR LWT	LEADER (STORM DRAIN RISER) LEAVING WATER TEMPERATURE
BAV	BALL VALVE	∟ ۷ ۷ I	LEAVING WATER TEMPERATURE
BFV	BUTTERFLY VALVE	MAX	MAXIMUM
BHP	BRAKE HORSEPOWER	MBH	UNITS OF THOUSANDS BTU/HR
BLDG BOP	BUILDING BOTTOM OF PIPE	MECH MFG	MECHANICAL MANUFACTURER
BTU	BRITISH THERMAL UNIT	MIN	MINIMUM
втин	BRITISH THERMAL UNIT PER HOUR	MTL	MATERIAL
		MTR	MOTOR
CBV	CIRCUIT BALANCING VALVE		
CFS CI	CUBIC FEET PER SECOND CAST IRON	NC	NORMALLY CLOSED (MANUAL OPERATION)
CLG	CEILING	NO	NORMALLY OPEN (MANUAL OPERATION)
CONC	CONCRETE	No. NPT	NUMBER NATIONAL PIPE THREAD
CONN	CONNECTION	NTS	NOT TO SCALE
CONT CONTR	CONTRACT(OR)		
CS	CONTRACT(OR) CARBON STEEL	ОС	ON CENTER
CV	CHECK VALVE	OD	OUTSIDE DIAMETER
		OF	OVERFLOW PIPE
D	DRAIN	DA	DIDE ANOLIOD
DI DIA	DUCTILE IRON DIAMETER	PA PD	PIPE ANCHOR PRESSURE DROP
DN	DOWN	PG	PIPE GUIDE
DS	DOWNSPOUT	Ph	PHASE
DV	DRAIN VALVE	PH	PIPE HANGER
DVL DWG	DIAPHRAGM VALVE DRAWING	PPH PPL	POUNDS PER HOUR POLYPROPYLENE
DWG	DRAWING	PRESS	
- 4	F.A.O.U.	PSH	HIGH PRESSURE SWITCH
EA EL	EACH ELEVATION	PSI	
EQUIP	EQUIPMENT	PSIA	•
EWT	ENTERING WATER TEMPERATURE	PSIG	
EXP VL		PVC	POLYVINYL CHLORIDE
EXIST	EXISTING		
_		RED RPM	REDUCER(ING) REVOLUTION PER MINUTE
F	FAHRENHEIT (DEGREES)	RT RT	RUNNING TRAP WITH CLEANOUT
FF FFE	FINISHED FLOOR FINISHED FLOOR ELEVATION		
FIN	FINISH	SF	SQUARE FEET
FL	FLOOR	SPEC	
FLEX	FLEXIBLE	SS	STAINLESS STEEL
FLG FPM	FLANGE FEET PER MINUTE	STD	STANDARD
FPS	FEET PER SECOND	STR SV	STRAINER SOLENOID VALVE
FT	FOOT (FEET)	SW	SOCKET WELD
FTG	FOOTING		
FT HD FU	FEET OF HEAD (WATER) FIXTURE UNIT	TDH	TOTAL DYNAMIC HEAD
FUT	FUTURE	TEMP	TEMPERATURE
		TOP	TOP OF PIPE
GAL	GALLON (S)	TP	TOTAL PRESSURE
GALV	GALVANIZED	TSP TYP	TOTAL STATIC PRESSURE TYPICAL
GLV	GLOBE VALVE	116	THICAL
GPH	GALLONS PER HOUR	UG	UNDERGROUND
GPM GV	GALLONS PER MINUTE GATE VALVE		55E665NB
		V	VENT
HOR	HORIZONTAL	V	VOLTS
HP	HORSEPOWER	VB VEL	VACUUM BREAKER VELOCITY
HVAC	HEATING, VENTILATING	VERT	VERTICAL
	AND AIR CONDITIONING	VFD	VARIABLE FREQUENCY DRIVE
		VL	VALVE
ID	INSIDE DIAMETER	VP VS	VELOCITY PRESSURE VENT STACK
IE IN	INVERT ELEVATION INCH(ES)	VS VTR	VENT THRU ROOF
INSUL	INSULATION		
IPS	IRON PIPE SIZE	WG	WATER GAUGE (COLUMN)
		WPD	WATER PRESSURE DROP

										PUMI	P SCHEDU	JLE								
				PERF	ORMANCE			MOTOR CH	IARACTE	RISTICS			SIMIL	AR TO						
DES	IGNATION	LOCATION	GPM	HEAD	NPSH	% EFF.	RPM	TYPE	BHP	VOLTS/PHASE/CY	MANUFACTURER	MODEL	CURVE	S	IZE	IMP	MATERIAL	SEAL	REMARKS	FURNISHED BY
			GFM	(FT H ₂ O)	(FT H ₂ O)	/ ₀ EFF.	KEM	TIPE	Dilif	VOL13/11/1A3E/O1	MANOI ACTOILLI	WODEL	CONVE	IN	OUT	DIA				
Cł	HWP-01	MECHANICAL ROOM	95	70	_	61.6	1800	END SUCTION	2.76	460/3/60	PEERLESS	F1020A	_			8.875	CS	месн	1,2,4	MECHANICAL CONTRACTOR
Cł		MECHANICAL ROOM	95	70	_	61.6	1800	END SUCTION	2.76	460/3/60	PEERLESS	F1020A	_			8.875	CS	месн	1,2,3,4	MECHANICAL CONTRACTOR
NOT	1. MOTO	OR SHALL BE A MG1 PARTS							NSS		PROTECTED FOR F				-					

3. SPARE

4. 184R MOTOR FRAME.

				CLASS OR		COATING	G OR LINING		JOINT & FITTINGS		Γ.,
ESIGNATION	SERVICE	MATERIAL	SCHEDULE	TYPE	SPECIFICATION	TYPE	SPECIFICATION	TYPE	JT. MAT.	SPECIFICATION	N
PS-1	WATER SERVICE & DISTRIBUTION 3" OR SMALLER/BELOW GRADE	COPPER	-	K	ASTM B88	_	-	LEAD FREE SOLDER	95–5	ASTM B32 FTGS ANSI B16.22	
PS-2	WATER DISTRIBUTION 3" OR SMALLER/ABOVE GRADE	COPPER	_	L	ASTM B88	-	-	LEAD FREE SOLDER	95–5	ASTM B32 FTGS ANSI B16.22	
PS-4	AIR CONDITIONING CONDENSATE	PLASTIC PVC 1120	40	I	ASTM D 1785 CS 207	-	-	SOCKET FTGS PVC SCH 40	SOLVENT CEMENT	-	
PS-5	VENTING, WASTE AND SOIL PIPING / BELOW AND EXPOSE TO OUTDOOR/ AC CONDENSATE	CAST IRON	_	STANDARD WEIGHT	ASTM A-74 CS 188	COAL TAR	AWWA 7A.6	B & S	RUBBER GASKET	ANSI A 21.11 CS 188	1
PS-6	VENTING	PLASTIC PVC 1120	40	I	ASTM D 1785 CS 207	-	-	SOCKET FTGS PVC SCH 40	SOLVENT CEMENT	-	
PS-7	CHILLED WATER 2" AND SMALLER	CARBON STEEL	40	_	ASTM A-53	-	-	SCREWED, NPT MI FITTINGS	PIPE JOINING COMPOUND	FTGS: ANSI B 16.3	
PS-8	CHILLED WATER 2-1/2" AND LARGER	CARBON STEEL	40	_	ASTM A-53	-		BUTT WELD CS FITTINGS	_	FTGS: ANSI B 16.9	
PS-9	CHILLED WATER UNDERGROUND	CARBON STEEL	40	_	ASTM A-53	-	_	MECH. JOINT W./ RUBBER GASKET	_	-	
PS-10	COMPRESSED AIR	COPPER	-	L	ASTM B88	_	_	LEAD FREE SOLDER	95-5	ASTM B32 FTGS ANSI B16.22	
PS-11	OXYGEN	COPPER	-	L	ASTM B88	-	_	LEAD FREE SOLDER	95-5	ASTM B32 FTGS ANSI B16.22	
PS-12	NITROGEN	COPPER	1	L	ASTM B88	_	-	LEAD FREE SOLDER	95-5	ASTM B32 FTGS ANSI B16.22	

1. PROVIDE CONCRETE PROTECTION WHEN LOCATED UNDER PAVEMENT.

2. WHEN LOCATED ON SPACES SERVING AS AIR PLENUM. 3. NO PVC PIPES ARE ALLOWED ON SPACES SERVING AS AIR PLENUM NOR A/C MECHANICAL ROOMS.

F INSULATION, 105°C MAX. RISE CAPABLE OF WITHSTANDING REPEATED PEAKS

DESIGNED FOR PWM FORM.

OFF 2000 VOLTS AT 0.1 MICROSECOND RISE TIME, WITH OVERTURN SHIELD WIRING

4. PROVIDE THRUST BLOCK WHENEVER A CHANGE OF DIRECTION OCCURS.

					W	ATER	HEAT	ER SCH	HEDULE				
				ı	1								
, D	ESIGNATION	SERVING	CAPACITY	MATERIAL	DIM.	FIN	IISH	HEATING ELEMENTS	INSULATION	V/PH/HZ	KW	SIMILAR TO	REMARKS
			OAI AOITT	W// TENIAL	Diwi.	INT.	EXT.	ELEMENTS					
	WH-01	LAB.	50 GAL.	GLASS LINED STEEL	47 1/2" H 22ø	GLASS LINED	BAKED ENAMEL	2	2" NON CFC FOAM	208/1/60	7.0	BRADFORD WHITE LD-50S3-5	PROVIDE TWO HEATING ELEMENTS FOR SIMULTANEOUS OPERATION
	WH-02	WOMEN'S/MEN'S TOILET AND JANITOR RM.	_	ABS COVER & GLASS REINF. HEATER	10 3/4"Hx 5 1/4"Wx 2 7/8"D	GLASS REINF.	ABS COVER	-	-	240/1/60	5.5	BRADFORD WHITE ES-5500-4-S-10	_

	TRAP PRIMER SCHEDULE	
LEGEND	DESCRIPTION	SIMILAR TO
TP-A	TRAP PRIMER SHALL BE POLISHED CHROME PLATED CAST WITH 1/2" PRIMER TUBE WITH COMPRESSION FITTING CONNECTION AT WALL.	SMITH 2698

	ROOF DRAIN SCHEDULE	
LEGEND	DESCRIPTION	SIMILAR TO
R.D.—A	12" DIAMETER ROOF DRAIN, LOW SILHOUETTE DOME. DURA—COATED CAST IRON BODY WITH ALUMINUM DOME.	ZURN ZA-121

	INSULATION	SCHEDULE	(SEE SPE	C. 15180	AND 15840)
	SERVICE	MATERIAL	THICKNESS INCHES	JACKET	REMARKS
B. Pl	PING INSULATION				
HOT WATER	ABOVE GROUND	FIBERGLASS	1"	ASJ PAPER/PVC	USE 30 MIL PVC JACKET WHEN EXPOSED
CONDENSATE	_	ARMAFLEX	1/2"	NONE	
CHILLED WATER	ABOVEGROUND	FOAMGLASS	2½"	ASJ PAPER/PVC	USE 30 MIL PVC JACKET WHEN EXPOSED
CHILLED WATER	UNDERGROUND	POLYURETHANE FOAM	1½"	ASJ PAPER/PVC	30 MIL PVC JACKET

WATER PRESSURE DROP

	CLEANOUT SCHEDULE	
LEGEND	DESCRIPTION	SIMILAR TO
CO-A	CLEANOUTS IN FINISHED FLOOR AREAS SHALL BE CAST IRON CADMIUM PLATED COUNTERSUNK PLUG, CAST IRON BODY WITH SERRATIONS PROVIDING CUT—OFF ADJUSTMENT, POLISHED NICKEL BRONZE ACCESS COVER AND FRAME WITH INTEGRAL LUGS FOR 1"ADJUSTMENT TO PLANE OF FINISHED FLOOR, ROUND SCORIATED TOP.	ZURN Z-1400
CO-B	CLEANOUTS FOR FLOORS WITHOUT FINISH AND AT GRADE SHALL BE FLUSH SLOTTED HEAD CLEAN OUTS WITH CAST IRON FERRULE AND BRONZE PLUG. PROVIDE ADAPTER FOR PVC PIPE PROVIDED A 12" X 12" X 6" CONCRETE BLOCK FOR CLEANOUT AT GRADE.	ZURN Z-1440
co-c	CLEANOUTS IN FINISHED WALLS SHALL BE FLUSH SLOTTED HEAD CLEAN OUTS WITH CAST IRON CADMIUM PLATED COUNTERSUNK PLUG, CAST IRON FERRULE AND POLISHED NICKEL BRONZE ROUND ACCESS COVER WITH SECURING SCREW.	ZURN Z-1441

	UMBING FIXTU							
LEGEND	DESCRIPTION				URE	TRAP SIZE	VENT SIZE	REMARKS
P-1FH	FLUSH WATER CLOSET	1"	_	1"	_	3"	2"	_
P-2	LAVATORY	1/2"	1/2"	3/8"	3/8"	1-1/2"	1-1/4"	_
P-5F	FLUSH URINAL	3/4"	_	3/4"	-	2"	1-1/2"	_
P-8	FLOOR SERVICE SINK	1/2"	1/2"	1/2"	1/2"	1-1/2"	1-1/4"	_
НВ	HOSE BIBB	_	_	3/4"	_	_	_	_
FD	FLOOR DRAIN	_	_	_	_	2"	_	_

E	EMER	GENCY SHOWER & EYE WASH	SCHEDULE
	LEGEND	DESCRIPTION	SIMILAR TO
E	ESEW-A	COMBINATION EYEWASH AND SAFETY SHOWER STATION. ABS PLASTIC 10" SHOWER HEAD. 11 1/2" ROUND S.S. EYEWASH BOWL. 1 1/4" NPT FEMALE SIDE WATER INLET 1 1/4"NPT FEMALE DRAIN OUTLET.	GUARDIAN G1902

				٧	VATE	R CONTE	ROL VAL	VE SCHI	EDULE			
DESIGNATION	SERVING	GPM	DP	CV No	POSITION			MANUFACTURER			REMARKS	FURNISHED BY
DESIGNATION	SERVING	GPM	PSI	CV NO.	POSITION	SIMILAR TO	VALVE No.	SIZE (IN)	TYPE	CONNECTIONS	REMARKS	FURNISHED BY
CTV-01	AHU-01	74.1	5.0	40.0	N.O	SIEMENS 599 SERIES	274-03170	2"	FXF	NPT	0-10V/4-20MA	MECHANICAL CONTRACTOR
CTV-02	AHU-02	15.0	5.0	10.0	N.O.	SIEMENS 599 SERIES	274-03167	1"	FXF	NPT	0-10V/4-20MA	MECHANICAL CONTRACTOR
CTV-03	AHU-03	5.5	5.0	2.5	N.O.	SIEMENS 599 SERIES	274-03164	3/4"	FXF	NPT	0-10V/4-20MA	MECHANICAL CONTRACTOR

	С	IRCUIT	BALAN	ICING V	ALVE		
DESIGNATION	SERVING	SIZE (INCHES)	FLOW RATE (GPM)	PRESS. DROP (PSID)	MANUF.	MODEL	FURNISHED BY
CBV-01	AHU-01	2 1/2"	74.1	1.3	TACO	ACUF-250-AF	MECHANICAL CONTRACTOR
CBV-02	AHU-02	1 1/4"	15.0	1.3	TACO	ACUF-125-AT	MECHANICAL CONTRACTOR
CBV-03	AHU-03	3/4"	5.5	2.3	TACO	ACUF-100-AT	MECHANICAL CONTRACTOR
CBV-04	CHW LOOP	1/2"	2.0	1.6	TACO	ACUF-050-AT	MECHANICAL CONTRACTOR
CBV-05	CHW LOOP	1/2"	2.0	1.6	TACO	ACUF-050-AT	MECHANICAL CONTRACTOR

PROVIDE ONE DIFFERENTIAL PRESSURE GAUGE.

A R C H I T E C T S &

E N G I N E E R S LLP

1509 F.D. Roosevelt Ave. Guaynabo, Puerto Rico 00968-2612 Tel: 787-792-1509 Fax: 787-782-0687 E-mail: cma@cma-sjpr.com www.cma-sjpr.com

MAYAGÜEZ

UPR - MAYAGÜEZ CAMPLENGINEERING LAB

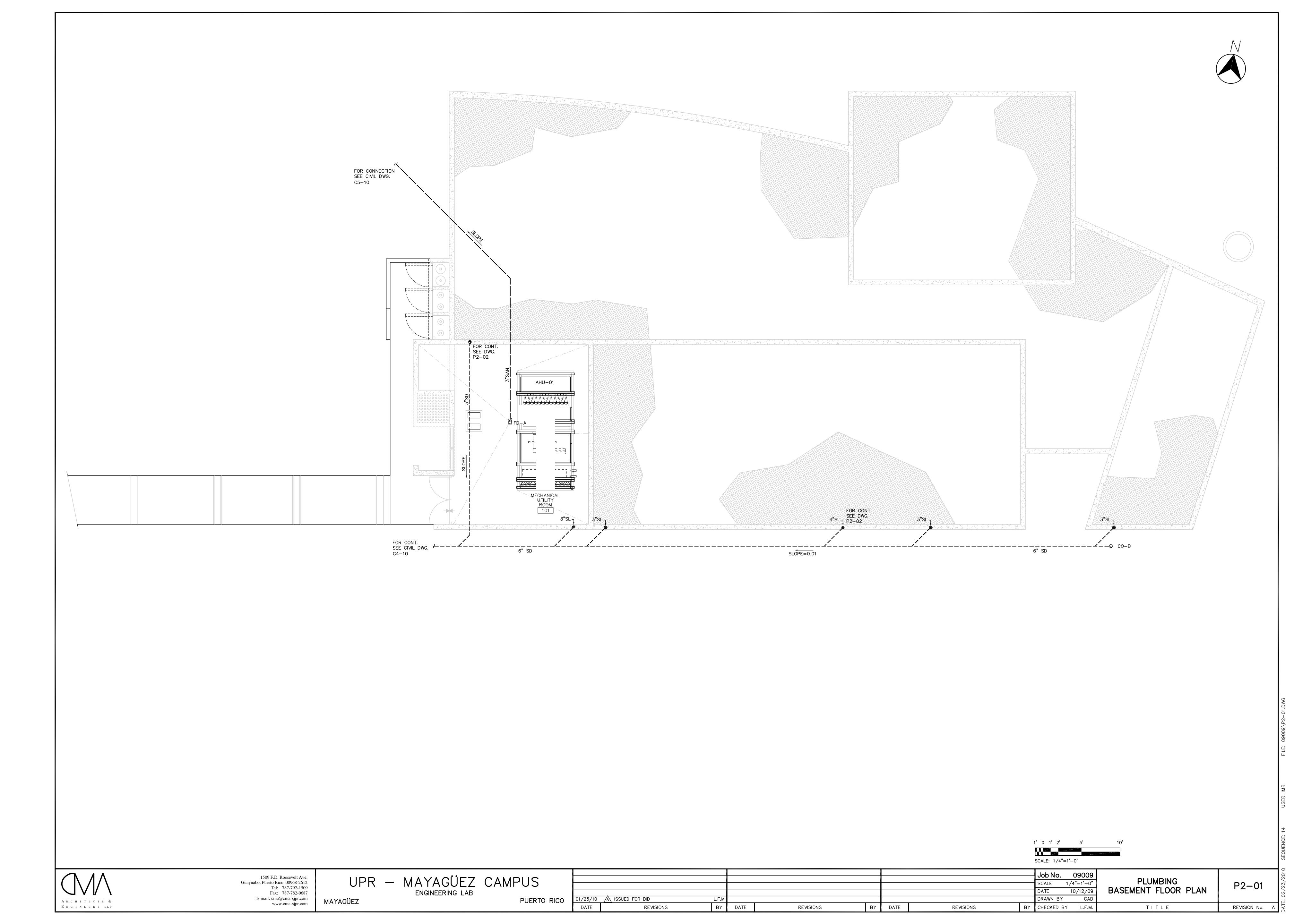
US	
PUERTO RICO	01/25/10
. • • • • • • • • • • • • • • • • • • •	DATE

							_
							_
)	A ISSUED FOR BID	L.F.M					
	REVISIONS	BY	DATE	REVISIONS	BY	DATE	-

	Job No.	09009	PIPING & PLUMBING NOTES,
	SCALE	AS SHOWN	LEGEND, ABBREVIATIONS
	DATE	0/0/0	& SCHEDULES
	DRAWN BY	CAD	& SCHEDULES
BY	CHECKED B	Y	TITLE

REVISIONS

REVISION No. A



GENERAL:

- 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, APPLY TO DESIGN, FABRICATION AND CONSTRUCTION PRACTICES TO BE ADHERED TO REGARD
- TO THE WORK SHOWN ON THE DRAWINGS: A) PUERTO RICO BUILDING REGULATION & UNIFORM BUILDING CODE (UBC 1997)
- B) ACI MANUAL OF CONCRETE PRACTICE (LATEST).
- C) ACI BLDG. CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318-05). E) AWS STRUCTURAL WELDING CODE.
- 5. ALL ASTM DESIGNATIONS SHALL BE AS AMENDED TO DATE.
- 6. SPECIFIC NOTES & DETAILS SHALL TAKE PRECEDENCE OVER GENERAL NOTES & TYPICAL DETAILS.
- 7. THE CONTRACTOR SHALL REFER TO THE SPECIFICATIONS FOR INFORMATION NOT COVERED BY THESE GENERAL NOTES OR THE STRUCTURAL DRAWINGS.
- 8. THE CONTRACTOR SHALL PROVIDE TEMPORARY ERECTION BRACING & SHORING FOR ALL STRUCTURAL MEMBERS OR AS REQUIRED FOR STRUCTURAL STABILITY OF THE STRUCTURE DURING ALL PHASES OF
- 9. THE CONTRACTOR SHALL TAKE ALL STEPS NECESSARY TO ENSURE THE PROPER ALIGNMENT OF THE STRUCTURE AFTER THE INSTALLATION OF ALL STRUCTURAL AND FINISH MATERIALS.

FOUNDATIONS:

- 1. SOIL CONSULTANT SHALL INSPECT FOOTING EXCAVATIONS TO VERIFY FOUNDATION DEPTHS PRIOR TO PLACEMENT OF FORMS AND/OR REINFORCING STEEL
- 2. ALL BACKFILL SHALL BE RECOMPACTED TO 95 PERCENT OF MAXIMUM DENSITY AS PER SOIL REPORT (ASTM D1557 MODIFIED PROCTOR).
- 3. THE TEST BORINGS FOR THIS PROJECT WERE PERFORMED BY: SUELOS INC. CONSULTANTS. A COPY OF THE INVESTIGATION REPORT IS INCLUDED IN THE SPECIFICATION IT IS TITLED SUBSOIL.
- 4. THE FOUNDATION DESIGN IS BASED ON 2,000psi SOIL BEARING VALUE AND 150KCF COEFFICIENT OF SUBGRADE REACTION
- 5. ALL EXCAVATION WORK SHALL BE PERFORMED WITHOUT AFFECTING THE STABILITY AND INTEGRITY OF EXISTING NEIGHBORING STRUCTURES.
- 6. THE CONTRACTOR SHALL PROVIDE ALL DEWATERING AS REQUIRED DURING THE EXCAVATION AND CONSTRUCTION OF THE FOUNDATION WORK.
- 7. ALL COLUMN FOOTINGS SHALL BE CENTERED ON THE COLUMN CENTERLINES, UNLESS OTHERWISE NOTED.
- 8. ALL EXISTING UNDERGROUND UTILITIES IN THE AREA OF THE NEW CONSTRUCTION SHALL BE RELOCATED UNLESS OTHERWISE NOTED ON THE DRAWINGS BEFORE ANY NEW FOUNDATION WORK IS STARTED. EXISTING SITE ELEMENTS AND UTILITIES, MANHOLES, CATCH BASINS, ETC. ADJACENT TO NEW CONSTRUCTION EXCAVATIONS SHALL BE PROTECTED BY SHEETING AND/OR SHORING. THIS PROTECTION SHALL BE PROVIDED AND DESIGNED BY THE CONTRACTOR AND HIS PROFESSIONAL ENGINEER WHO SHALL BE TOTALLY RESPONSIBLE FOR ITS DESIGN AND INSTALLATION.
- 9. THE CONTRACTOR SHALL COORDINATE ALL FOUNDATION WORK WITH ALL UNDERGROUND UTILITIES. ALL NEW UNDERGROUND UTILITIES OR PIPES SHALL NOT BE PLACED BELOW THE FOOTINGS. IF ANY SUCH CONDITION OCCURS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND DROP THE BOTTOM OF FOOTING TO CLEAR THE PIPE.
- 10. BACKFILL AGAINST WALLS SHALL FOLLOW THE CRITERIA NOTED. AS A MINIMUM, WALLS MUST HAVE REACHED THEIR 28 DAY DESIGN STRENGTH OR BE IN PLACE 14 DAYS, WHICHEVER IS LONGER. FOR EXTERIOR AND INTERIOR BASEMENT AND/OR RETAINING WALLS, BACKFILL SHALL BE PLACED EVENLY ON BOTH SIDES TO THE FLOOR SUBGRADE LEVEL. EQUIPMENT USED TO COMPACT THE BACKFILL WILL BE SUCH AS TO LIMIT PRESSURES ON THE WALLS TO THE DESIGN VALUES AND TO BE REVIEWED AND ACCEPTED BY THE OWNER'S GEOTECHNICAL ENGINEER.
- 11. PROVIDE STANDARD STEEL PIPE SLEEVES FOR ALL PIPES PASSING THROUGH NEW CONCRETE WALLS AND NEATLY CORED HOLES A MINIMUM OF ONE PIPE SIZE LARGER THAN NEW PIPE THROUGH EXISTING CONCRETE WALLS WHERE SHOWN ON THE DRAWINGS. COORDINATE CORED HOLES WITH SEALANT, ETC., REQUIREMENTS WITH RELATED SPECIFICATIONS. SEE TYPICAL DETAIL ON DRAWING
- 12. THE CONTRACTOR SHALL PROVIDE ADEQUATE SUPPORT FOR THE EXCAVATION ALLOWED BY THE EXISTING CONDITIONS AND SOIL STABILITY.
- 13. FOR ADDITIONAL REQUIREMENTS SEE TYPICAL DETAILS AND THE SPECIFICATIONS.
- 14. PROVIDE A MEMBRANE UNDERNEATH FOUNDATION SLAB AS PER SPECIFICATIONS.

CONCRETE:

G. WALLS

- 1. ALL CONCRETE SHALL BE STONE CONCRETE UTILIZING AGGREGATE CONFORMING TO ASTM C33. CEMENT SHALL BE TYPE I CONFORMING TO ASTM C150.
- 2. CONCRETE STRENGTH SHALL BE AS FOLLOWS:

3,000 p.s.i. 3.000 p.s.i. TOPPING ON STEEL DECK 3,500 p.s.i. SLAB RESTING ON GROUND ELEVATED SLABS 4,000 p.s.i.

(*) MIN STRENGTH OR AS PER INDICATED W/C RATIO LIMITS, WHICHEVER IS LARGER

4. CONCRETE COVER OVER REINFORCING STEEL SHALL BE AS FOLLOWS,

A. FOUNDATION MAT: 2" BOTTOM . 1" TOP B. CONCRETE AGAINST EARTH (FORMED) CONCRETE PEDESTALS D. COLUMNS & BEAMS E. ELEVATED SLABS F. ROOF SLABS

- 1 1/2" UP TO #5 - 2" #6 & ABOVE - 1 1/2" -3/4" BOTT, 1 1/2" TOP

- ALL PEDESTAL AND WALLS BELOW GRADE SHALL BE FORMED CONCRETE.
- 5. BEFORE CONCRETE IS PLACED THE CONTRACTOR SHALL COORDINATE AND CHECK WITH ALL TRADES TO ENSURE THE PROPER PLACEMENT OF ALL OPENINGS, SLEEVES, INSERTS, CURBS, DEPRESSIONS, ETC. RELATING TO THE WORK, AS SHOWN IN THE DRAWINGS. ANY CHANGE OR DISCREPANCY SHALL BE APPROVED BY THE STRUCTURAL ENGINEER.
- 6. NO JOINT, OPENING, SLOT OR GROOVE OTHER THAN THAT SHOWN ON PLANS SHALL BE PERMITTED WITHOUT PREVIOUS APPROVAL BY THE ENGINEER. ALL CONSTRUCTION JOINT SURFACES SHALL BE CLEANED AND ROUGHENED TO 1/4" AMPLITUDE (U.N.O.) AND TREATED AS INSTRUCTED IN THE ACI MANUAL OF CONCRETE PRACTICE.
- 7. ALL CONCRETE WORK SHALL BE CURED FOR A MINIMUM OF 7 CONSECUTIVE DAYS IN ACCORDANCE WITH ACI STANDARDS.
- 8. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR CONCRETE EQUIPMENT PADS AND FOUNDATIONS REQUIRED.
- 9. ALL CONCRETE USED TO PATCH EXISTING FLOOR SLABS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. THE CONCRETE TYPE SHALL BE THE SAME AS THE EXISTING

MASONRY:

- 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>MORTAR</u> <u>f'm</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 5 FEET.
- 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.

REINFORCING STEEL:

- 1. ALL REINFORCING STEEL SHALL BE NEW STOCK DEFORMED BARS CONFORMING TO ASTM A615 GRADE 60 OR ASTM A 706. SEE DWG. S5-04 FOR LOCATIONS WHERE A 706 MUST BE USED.
- 2. ALL BAR BENDS SHALL BE MADE COLD.
- 3. BAR LAPS SHALL BE MADE AWAY FROM POINTS OF MAXIMUM STRESS OR AT LOCATIONS SHOWN ON THE DRAWINGS. LAP SPLICES SHALL BE CLASS "B" AS PER ACI 318-05.

WELDING OF REINFORCING STEEL:

- 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. REIN-FORCING 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.

MISCELLANEOUS:

- 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 ADEQUATED 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.

METAL DECK:

- 1. ALL METAL DECK SHALL CONFORM TO THE REQUIREMENTS OF THE STEEL DECK INSTITUTE (SDI).
- 2. METAL DECK REQUIRED IS 1.5C CONFORM BY VULCRAFT GAGE 22, THREE SPAN CONDITION MINIMUM LENGTH OF SHEETS. 3. ROOF DECK ATTACHMENT SHALL BE:
- A) #12 SCREWS ON 36/4 PATTERN.
- B) SIDE LAPS 3 STITCH CONNECTIONS PER DECK SPAN
- 4. THE STEEL DECK SHALL BE PLACED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION WITH THE NARROW RIB DOWN.

DATE

- 5. PROVIDE 3" MIN. LAP AND END BEARING FOR ALL DECKING.
- 6. UNFRAMED OPENINGS LARGER THAN 6" TRANSVERSE TO DECK SPAN SHALL BE REINFORCED. 7. FOR ADDITIONAL REQUIREMENTS SEE TYPICAL DETAILS AND SPECIFICATIONS.

DESIGN LOADS

STRUCTURAL SYSTEM

OOF LIVE LOADS	UBC 1997
TYPICAL ROOF LOAD GROUND FLOOR	40 PSF 125 PSF
GROUND I LOOK	125 737
ATERAL LOADS - WIND	ASCE 7-95
ND LOAD DESIGN PARAMETERS	
BASIC WIND SPEED, V (3 SEC. GUST CRITERIA) WIND LOAD IMPORTANCE FACTOR WIND EXPOSURE	125 MPH 1.00 C
IND LOAD ON STRUCTURAL FRAME	
VERTICAL SURFACES 0 FEET - 15 FEET	41 PSF
15 FEET — 20 FEET	41 PSF
HORIZONTAL SURFACES	45 PSF
ND LOADS ON COMPONENTS AND CLADDING	
VERTICAL SURFACES TYPICAL WALL (W/O DISCONTINUITY)	
TIFICAL WALL (W/O DISCONTINUITI)	51 PSF
WALL CORNERS AND EDGES (W/ DISCONTINUITY)	51 PSF 68 PSF
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES	
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES ROOF FIELD (W/O DISCONTINUITY)	68 PSF 56 PSF
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES	68 PSF
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES ROOF FIELD (W/O DISCONTINUITY) ROOF EDGES (W/O DISCONTINUITY) ROOF CORNERS (W/O DISCONTINUITY)	68 PSF 56 PSF 94 PSF 141 PSF
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES ROOF FIELD (W/O DISCONTINUITY) ROOF EDGES (W/O DISCONTINUITY) ROOF CORNERS (W/O DISCONTINUITY) ATERAL LOADS — SEISMIC SEISMIC OCCUPANCY CATEGORY	56 PSF 94 PSF 141 PSF UBC 199
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES ROOF FIELD (W/O DISCONTINUITY) ROOF EDGES (W/O DISCONTINUITY) ROOF CORNERS (W/O DISCONTINUITY) ATERAL LOADS — SEISMIC SEISMIC OCCUPANCY CATEGORY SEISMIC IMPORTANCE FACTOR, I	56 PSF 94 PSF 141 PSF UBC 199
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES ROOF FIELD (W/O DISCONTINUITY) ROOF EDGES (W/O DISCONTINUITY) ROOF CORNERS (W/O DISCONTINUITY) ATERAL LOADS — SEISMIC SEISMIC OCCUPANCY CATEGORY	68 PSF 56 PSF 94 PSF 141 PSF UBC 199 1.00 1.50
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES ROOF FIELD (W/O DISCONTINUITY) ROOF EDGES (W/O DISCONTINUITY) ROOF CORNERS (W/O DISCONTINUITY) ATERAL LOADS — SEISMIC SEISMIC OCCUPANCY CATEGORY SEISMIC IMPORTANCE FACTOR, I SEISMIC IMPORTANCE FACTOR, IP (EQUIPMENT) SOIL PROFILE TYPE SEISMIC ZONE	56 PSF 94 PSF 141 PSF UBC 199 3 1.00 1.50 SD
WALL CORNERS AND EDGES (W/ DISCONTINUITY) HORIZONTAL SURFACES ROOF FIELD (W/O DISCONTINUITY) ROOF EDGES (W/O DISCONTINUITY) ROOF CORNERS (W/O DISCONTINUITY) ATERAL LOADS — SEISMIC SEISMIC OCCUPANCY CATEGORY SEISMIC IMPORTANCE FACTOR, I SEISMIC IMPORTANCE FACTOR, IP (EQUIPMENT) SOIL PROFILE TYPE	56 PSF 94 PSF 141 PSF UBC 199 1.00 1.50 SE

BEARING WALL SYSTEM - SHEAR WALLS

STRUCTURAL DRAWING LIST

SO-01 GENERAL NOTES S1-01 FOUNDATION PLAN S1-02 FIRST FLOOR SLAB PLAN S1-03 ROOF SLAB PLAN S2-01 ROOF FRAMING PLAN S3-01 STRUCTURAL WALL ELEVATIONS S3-02 STRUCTURAL WALL ELEVATIONS S3-03 STRUCTURAL WALL SECTIONS & DETAILS S4-01 FOUNDATION SECTIONS & DETAILS S4-02 FOUNDATION SECTIONS & DETAILS S5-01 ROOF SECTIONS & DETAILS S5-02 ROOF SECTIONS & DETAILS

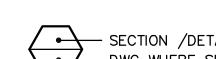
LEGEND FOR SECTION /DETAIL:

S8-01 STAIR PLANS SECTIONS & DETAILS

S6-01 TYPICAL CONCRETE DETAILS

S7-01 TYPICAL CMU DETAILS

1. LEGEND FOR SECTION/DETAIL CROSS REFERENCING



• \ SECTION /DETAIL DESIGNATION • / DWG WHERE SECTION /DETAIL IS DRAWN



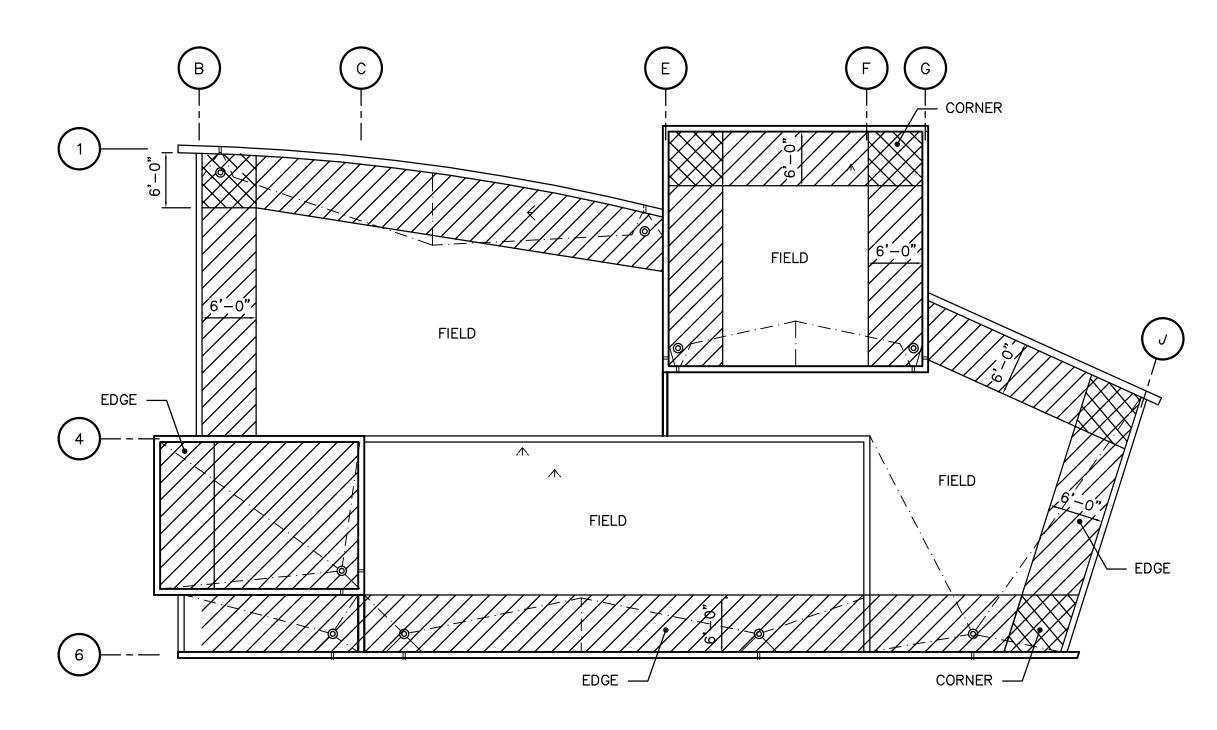
SECTION /DETAIL DESIGNATION ● → DWG WHERE SECTION /DETAIL IS SHOWN

2. SLAB REINFORCING: TOP BARS ——— BOTT BARS

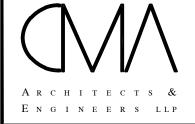
3. WALLS/COLUMNS: □□□□ WALL/COL BELOW WALL/COL ABOVE

ABBREVIATIONS:

F.F. EL.	FINISHED FLOOR ELEVATION
T.O.S.	TOP OF SLAB
ADD	ADDITIONAL
T&B	TOP & BOTTOM
EF	EACH FACE
REINF.	REINFORCEMENT, REINFORCING
TYP	TYPICAL
TEMP	TEMPORARY
CONC	CONCRETE
ELEV.	ELEVATION
CONN	CONNECTION
PH	PENTHOUSE
ВМ	BEAM
OPNG	OPENING



WIND UPLIFT LOADING PLAN



1509 F.D. Roosevelt Ave. Guaynabo, Puerto Rico 00968-2612 Tel: 787-792-1509 Fax: 787-782-0687 E-mail: cma@cma-sjpr.com www.cma-sjpr.com

MAYAGÜEZ

UPR - MAYAGÜEZ CAMPUS ENGINEERING LAB

PUERTO RICO

01/25/10 A ISSUE FOR BID **REVISIONS**

BY DATE

REVISIONS

BY DATE

REVISIONS

SCALE AS SHOWN 0/0/0 DRAWN BY BY CHECKED BY

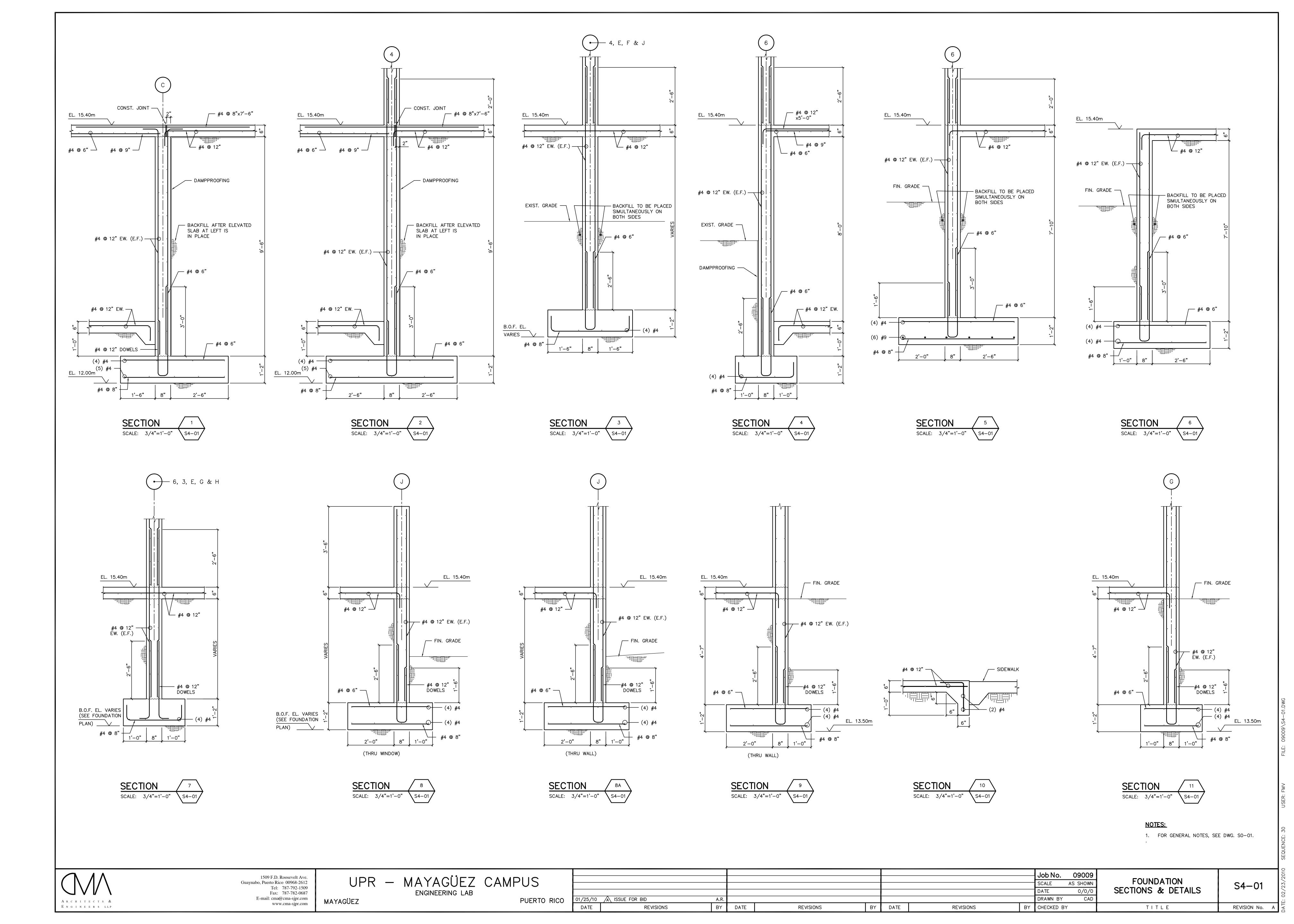
Job No. 09009

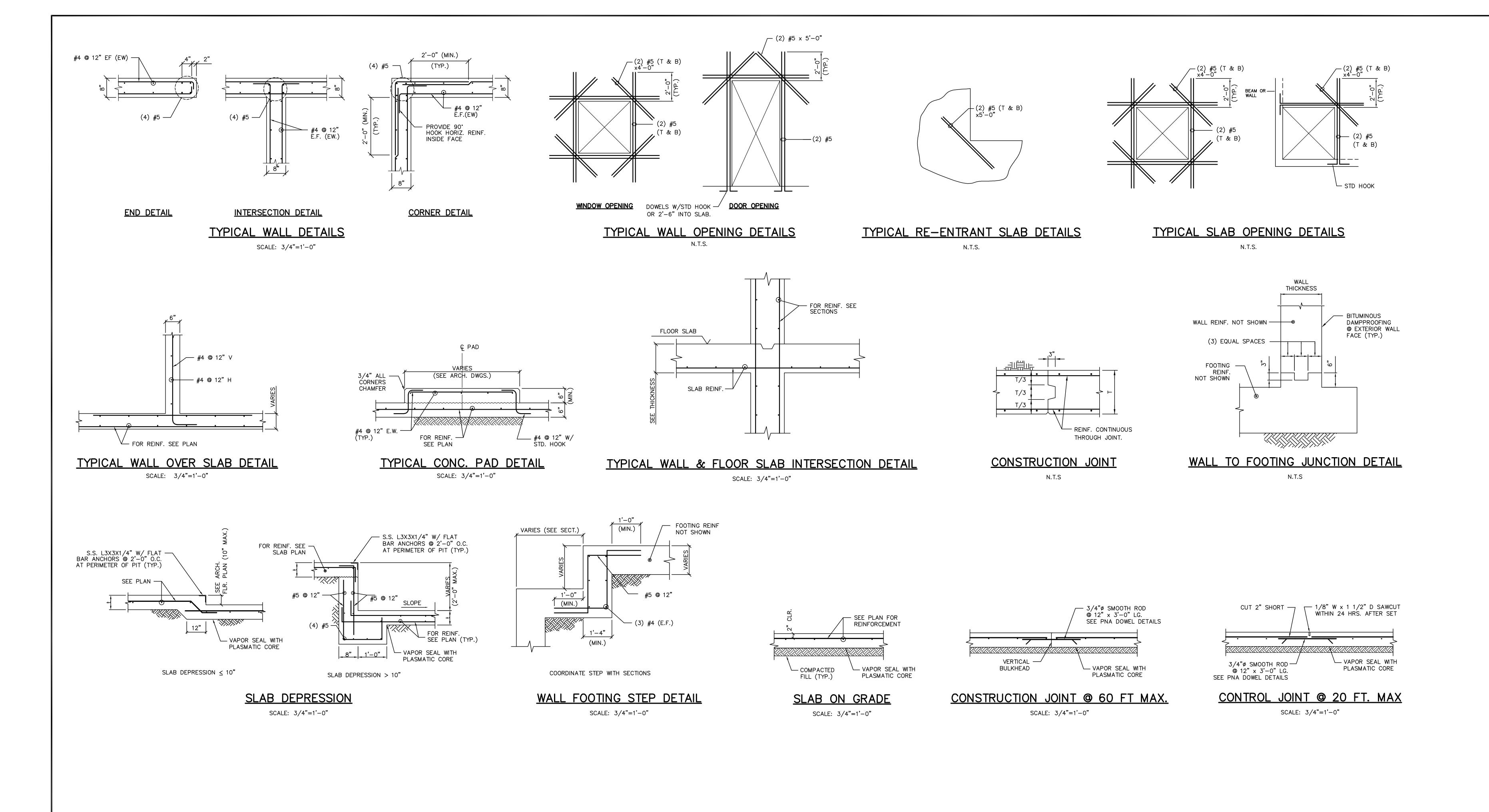
GENERAL NOTES

TITLE

50 - 01

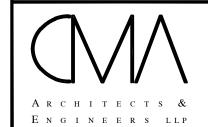
REVISION No. A





NOTE:

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



1509 F.D. Roosevelt Ave. Guaynabo, Puerto Rico 00968-2612 Tel: 787-792-1509 Fax: 787-782-0687 E-mail: cma@cma-sjpr.com www.cma-sjpr.com

MAYAGÜEZ

UPR - MAYAGÜEZ CAMPUS ENGINEERING LAB

PUERTO RICO

O1/25/10

DATE

REV REVISIONS

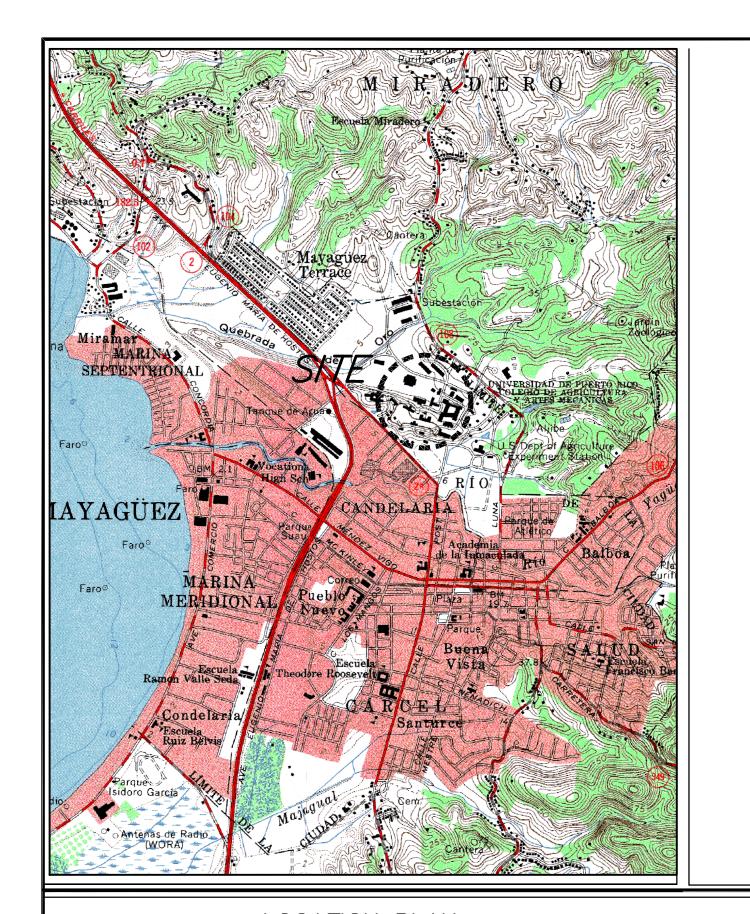
BY DATE REVISIONS BY DATE REVISIONS

Job No. 09009

SCALE AS SHOWN

DATE 0/0/0 DRAWN BY TITLE BY CHECKED BY

TYPICAL CONCRETE DETAILS S6 - 01



UPR MAYAGUEZ CAMPUS PHARMACEUTICAL ENGINEERING LAB

CONSTRUCTION DOCUMENTS

MAYAGUEZ

PUERTO RICO

LOCATION PLAN SCALE 1 : 20,000

INDEX

NUM.	TITLE	REV.	DATE
T0-01	TITLE, INDEX AND LOCATION PLAN	Α	1/25/10
A0-00	SYMBOLS, ABBREVIATIONS & GENERAL NOTES	Α	1/25/10

CIVIL

NUM.	TITLE	REV.	DATE
C1-10	EXISTING CONDITION & TOPOGRAPHIC SURVEY	Α	1/25/10
C1-50	DEMOLITION PLAN	Α	1/25/10
C2-10	LAYOUT PLAN	Α	1/25/10
C2-20	COORDINATE VERTEX DATA	Α	1/25/10
C3-20	GRADING & DRAINAGE PLAN	Α	1/25/10
C4-30	STORM SEWER DETAILS	Α	1/25/10
C4-80	CES PLAN	Α	1/25/10
C4-90	CES PLAN DETAILS	Α	1/25/10
C5-10	SANITARY SEWER SYSTEM PLAN	Α	1/25/10
C5-30	SANITARY SEWER SYSTEM DETAILS	Α	1/25/10
C6-10	POTABLE WATER SYSTEM	Α	1/25/10
C6-50	POTABLE WATER FIRE PROTECTION DETAILS	Α	1/25/10
C7-10	TYPICAL SECTIONS AND DETAILS	Α	1/25/10

ARCHITECTURAL

NUM.	TITLE	REV.	DATE
A0-01	GENERAL SITE PLAN	Α	1/25/10
A1-01	BASEMENT FLOOR PLAN	Α	1/25/10
A1-02	GENERAL FLOOR PLAN	Α	1/25/10
A2-01	BUILDING ELEVATIONS	Α	1/25/10
A2-02	BUILDING ELEVATION & SECTIONS	Α	1/25/10
A2-03	WALL SECTIONS	Α	1/25/10
A2-04	WALL SECTIONS	Α	1/25/10
A2-05	WALL SECTIONS & WALL TYPES	Α	1/25/10
A3-01	GENERAL ROOF PLAN	Α	1/25/10
A3-02	ROOF DETAILS	Α	1/25/10
A4-01	DOOR & ROOM FINISH SCHEDULE	Α	1/25/10
A4-02	WINDOW SCHEDULE	Α	1/25/10
A5-01	REFLECTED CEILING PLAN	Α	1/25/10
A5-02	REFLECTED CEILING DETAILS	Α	1/25/10
A6-01	ENLARGED TOILET PLANS, ELEVATIONS & DETAILS	Α	1/25/10
A7-01	FURNITURE PLAN	Α	1/25/10
A9-01	ENLARGED STAIR PLANS, ELEVATIONS, SECTIONS & DETAILS	Α	1/25/10

STRUCRURAL

Ε
/10
/10
/10
/10
/10
/10
/10
/10
/10
/10
/10
/10
/10
/10
/10
_

MECHANICAL

NUM.	TITLE	REV.	DATE
FP2-01	FIRE PROTECTION NOTES, SCHEDULES & FLOOR PLAN	Α	1/25/10
H1-01	HVAC NOTES, SYMBOLS ABBREVIATION & SCHEDULE	Α	1/25/10
H1-02	HVAC SCHEDULES	Α	1/25/10
H2-01	HVAC BASEMENT FLOOR PLAN	Α	1/25/10
H2-02	HVAC FIRST FLOOR PLAN	Α	1/25/10
H2-03	HVAC ROOF PLAN	Α	1/25/10
H3-01	HVAC DETAILS	Α	1/25/10
H4-01	HVAC FLOW DIAGRAM	Α	1/25/10
H4-02	HVAC FLOW DIAGRAM	Α	1/25/10
H4-03	PRESSURIZATION FLOOR PLAN	Α	1/25/10
M1-01	PIPING & PLUMBING NOTES, LEGEND, ABBREVIATIONS & SCHEDULE	Α	1/25/10
M2-01	PIPING BASEMENT FLOOR PLAN	Α	1/25/10
M2-02	PIPING FIRST FLOOR PLAN	Α	1/25/10
M3-01	PIPIPNG & PLUMBING DETAILS, ISOMETRIC & CHILLED WATER DIA.	Α	1/25/10
M3-02	PIPIPNG & PLUMBING DETAILS	Α	1/25/10
M4-01	CHILLED WATER FLOW DIAGRAM	Α	1/25/10
P2-01	PLUMBING BASEMENT FLOOR PLAN	Α	1/25/10
P2-02	PLUMBING FIRST FLOOR PLAN	Α	1/25/10
P2-03	PLUMBING ROOF PLAN	Α	1/25/10
-			

ELECTRICAL

NUM.	TITLE	REV.	DATE
E0-01	ELECTRICAL SITE PLAN	Α	1/25/10
E1-01	ONE LINE DIAGRAM	Α	1/25/10
E4-01	SCHEDULES	Α	1/25/10
E4-02	PANEL BOARD SCHEDULES	Α	1/25/10
E5-01	LIGHTING BASEMENT FLOOR PLAN	Α	1/25/10
E5-02	LIGHTING FIRST FLOOR PLAN	Α	1/25/10
E6-01	POWER BASEMENT FLOOR PLAN	Α	1/25/10
E6-02	POWER FIRST FLOOR PLAN	Α	1/25/10
E7-01	FIRE ALARM BASEMENT FLOOR PLAN	Α	1/25/10
E7-02	FIRE ALARM FIRST FLOOR PLAN	Α	1/25/10
E7-03	COMMUNICATIONS FIRST FLOOR PLAN	Α	1/25/10
E8-01	DETAILS	Α	1/25/10

1/25/10	A ISSUE FOR BID ADG					
DATE	REVISIONS	BY	DATE	REVISIONS	BY	

REVISIONS

TITLE