Section 403 - STANDARD DETAILS

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DIVISION 400, Section 403 - STANDARD DETAILS

SECTION DETAIL NOS.

APPLICATION TABLE

Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
	CONCRETE THRUST BLOCKS, VALVE ANCHOR BLOCKS, BEAMS, AND JACKETS (B)				
B1	Reinforced Concrete Jacket Typical Detail	0	0	0	0
B2	Horizontal Reaction Block for Water Mains	0			0
B3	Horizontal Thrust Block Minimum Bearing Areas	0	0	0	0
B4	Horizontal Thrust Block Minimum Bearing Areas	0	0	0	0
B5	Horizontal Thrust Block Minimum Bearing Areas	0	0	0	0
B6	Top Vertical Thrust Block Schedule	0	0	0	0
B7	Typical Thrust Block at Vertical Bends	0	0	0	0
B8	Typical Thrust Block w/ Straps for Connections at Vertical Bend	0	0	0	0
B9	Typical Thrust Block with Structural Strut for Connections	0	0	0	0
B10	Typical Thrust Block 6 to 22 1/2 Degree Conc. Cyl. Bend for 16" to 42" Connections Only	0		0	0
B11	Typical Thrust Block 22 1/2 to 45 Degree Conc. Cyl. Bend for 16" to 42" Connections Only	0		0	0
B12	Typical Thrust Block 45 to 67 1/2 Degree Conc. Cyl. Bend for 16" to 42" Connections Only	0		0	0
B13	Typical Thrust Block Conc. Cyl. Tee Connection (16" to 42")	0		0	0
B14	Gate Valve Anchor Block Non-Metallic Pipes			0	0
B15	Gate Valve Anchor Block Schedule	0		0	0
B16	Concrete Thrust Beam Typical Detail	0	0	0	0
B17	Concrete Thrust Beam Schedule	0	0	0	0
B18	Concrete Thrust Beam Schedule	0	0	0	0
B19	Concrete Thrust Beam for Reducer - Typical Detail	0	0	0	
B20	Concrete Thrust Beam for Reducer - Schedule	0	0	0	0

Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
B21	Concrete Thrust Beam for Reducer - Schedule	0	0	0	0
B22	Concrete Thrust Beam for Offset - Typical Detail	0	0	0	0
B23	Concrete Thrust Beam for Offset - Schedule	0	0	0	0
	CHAIN LINK FENCE AND GATE (F)				
F1	Chain Link Fence	0	0	0	0
F2	Chain Link Fence Post and Pedestrian Gate	0	0	0	0
F3	Chain Link Fence Miscellaneous Details	0	0	0	0
F4	Chain Link Fence Security Switch Detail	0	0	0	
F5	Chain Link Fence Security Switch Detail	0	0	0	
	FIRE HYDRANTS AND APPURTENANCES (FH)				
FH1	2 1/2" Standpipe Detail	0			
FH2	Hydrant Connection Layout “A” (with Elbow)		0		
FH3	Hydrant Connection Layout “B” (Straight Run)		0		
FH4	Hydrant Connection Straight Run	0		0	
FH5	Hydrant Connection with Elbow	0		0	
FH6	Hydrant Connection Straight Run				0
FH7	Hydrant Connection with Elbow				0
FH8	Hydrant Connection Notes	0		0	0
FH9	Hydrant Conc. Slab & Reflector Post				0
FH10	Hydrant Concrete Slab and Guard Posts		0	0	
FH11	Hydrant Curb Guard	0	0	0	
FH12	Hydrant Marker Location for Streets	0		0	0
FH13	Hydrant Marker Location for Highways	0		0	0
	SERVICE LATERALS (L)				
L1	Single Service Lateral Plan, Profile & Material List	0			
L2	Double Service Lateral Plan, Profile & Material List	0			

Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
L3	Fabricated Branch Pipe and Linesetter Detail	0			
L4	One Inch Meter Profile & Material List	0			
L5	1 1/2" Inch Meter Profile & Material List	0			
L6	Two-Inch Meter Profile & Material List	0			
L7	Copper Service Lateral for Multiple Meters		0		
L8	Service Laterals and Connections		0		
L9	Copper Service Lateral for 5/8" & 1" Meters		0		
L10	Service Lateral / Connection Material Schedule		0		
L11	Stabilization of 5/8-Inch Meter Easements		0		
L12	Service Laterals and Connections Standard Sizing Arrangements			0	
L13	Copper Service Lateral for Connection Type "X" Meter Box 5/8", 3/4", & 1" Meters			0	
L14	Copper Service Lateral for Connection Type "X" Meter Box 5/8", 3/4", & 1" Meters			0	
L15	Copper Service Lateral for Connection Type III Meter Box 1 1/2" and 2" Meters			0	
L16	Copper Service Lateral for Connection (Multiple Service)			0	
L17	Special Lateral and Connection Fitting Schedule			0	
L18	Material List for Copper Laterals			0	
L19	End Of Line Connection			0	
L20	Typical Detail for Installation of Ball Stop After Meter			0	
L21	New Lateral Installation Schematic Detail			0	
L22	Lateral Reconnection Schematic Detail			0	
L23	Service Laterals and Connections Standard Sizing Arrangements				0
L24	Typical Service Lateral				0
L25	Single Service Lateral (Type “A”, 5/8" & 3/4" Meters)				0
L26	Single Service Lateral (Type “A”, 5/8” & 3/4” Meters)				0
L27	Double Service Lateral (Type “A-1”, 5/8" & 3/4" Meters)				0

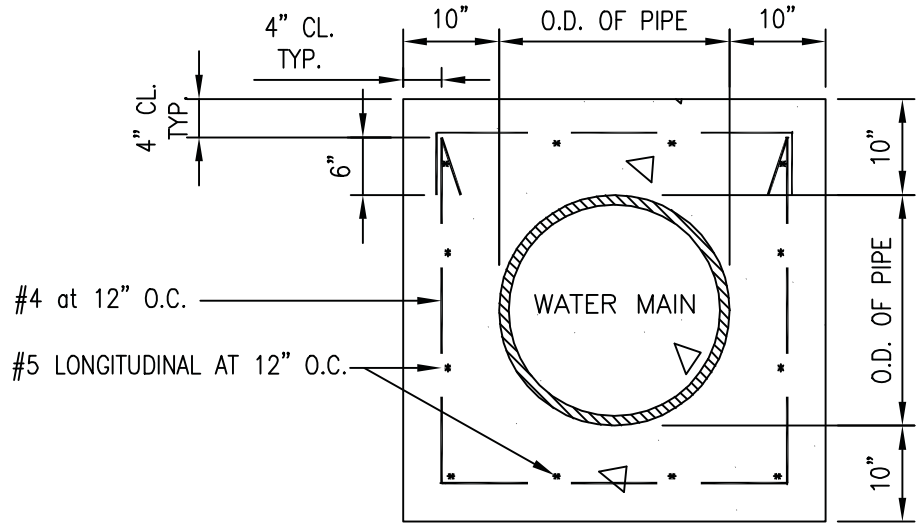
Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
L28	Double Service Lateral (Type “A-1”, 5/8” & 3/4” Meters)				0
L29	Single Service Lateral (Type “B”, 1" Meter)				0
L30	Single Service Lateral (Type “B”, 1” Meter)				0
L31	Double Service Lateral (Type “B-1”, 1" Meter)				0
L32	Double Service Lateral (Type “B-1”, 1” Meter)				0
L33	Single Service Lateral (Type “C”, 1 1/2" Meter)				0
L34	Single Service Lateral (Type “C”, 1 1/2” Meter)				0
L35	Double Service Lateral (Type “C-1”, 1 1/2" Meter)				0
L36	Double Service Lateral (Type “C-1”, 1 1/2” Meter)				0
L37	Single Service Lateral (Type “D”, 2" Meter)				0
L38	Single Service Lateral (Type “D”, 2” Meter)				0
	METER BOXES, AND 3-INCH AND LARGER METERS (M)				
M1	Meter Box Type “B”	0	0	0	
M2	Cast Iron Cover for Type “B” Meter Box	0	0	0	
M3	Meter Box & Cover Type “X”	0	0	0	
M4	Meter Box Type III for 1 1/2" & 2" Meters	0		0	
M5	Meter Box Type III for 1 1/2" & 2" Meters	0		0	
M6	Meter Box Frame & Cover Cast Iron, Type III	0		0	
M7	Meter Box Frame & Cover Cast Iron Type IV for 3" & 4" Meters	0		0	
M8	Meter Box Cover Cast Iron, Type IV	0		0	
M9	Meter Box Frame & Cover Cast Iron Type V for 6" & 8" Meters	0		0	
M10	Meter Box Cover Cast Iron, Type V	0		0	
M11	Metal Manhole Cover (Non-Traffic Loading)				0
M12	1 1/2" & 2" Meter Manhole Standard Non-Traffic				0
M13	Standard 1", 1 1/2", & 2" Meter and Box Installation		0		

Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
M14	Standard Meter Box Covers		0		
M15	Reading Cover Detail		0		
M16	Compound Meter and Box Installation		0		
M17	Compound Meter Cover Details		0		
M18	Detector Check Cover Details		0		
M19	Detector Check Meter Details		0	0	
M20	Model DC Detector Check Installation		0		
M21	MFM-MCT Meter and Box Installation		0		
M22	MFM-MCT Meter and Box Installation		0		
M23	Double-Check Detector Assembly Non-Traffic Manhole				0
M24	Reading Hole Cover Raised Surface Detail	0		0	
M25	Combination of Single Compound and Single Detector Check Meters			0	
M26	Meter Box Detail for Compound, DC and Turbine Meters			0	
M27	Single Compound Meter Installation Plan			0	
M28	Single Compound Meter Installation - Notes and Tables			0	
M29	Single Compound Meter Installation - Section			0	
M30	Single Detector Check Meter Installation			0	
M31	Single Detector Check Meter Installation			0	
M32	Turbine Meter Installation - Section			0	
M33	Turbine Meter Installation - Notes and Tables			0	
M34	8" x 2" FM Meter & Box Layout Fire and Domestic Uses - CMU Walls			0	
M35	8" x 2" FM Meter & Box Layout Fire and Domestic Uses - CMU Walls			0	
M36	8" x 2" FM Meter & Box, Box Details - CMU Walls			0	
M37	8" x 2" FM Meter & Box Layout Fire and Domestic Uses - Precast/Cast-In-Place Walls			0	
M38	8" x 2" FM Meter & Box Layout Fire and Domestic Uses - Precast/Cast-In-Place Walls			0	

Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
M39	8" x 2" FM Meter & Box, Box Details - Precast/Cast-In-Place Walls			0	
M40	8" x 2" FM Meter & Box Cover Plate & Support Details			0	
M41	8" x 2" FM Meter & Box Identification Inserts and Clip Details			0	
M42	8" x 2" FM Meter & Box Reading Lid & Frame Details			0	
M43	Water Meter Box for Non-Sidewalk Areas			0	
	MANHOLES (MH)				
MH1	Type “A” Manhole (Traffic) for Bevel Geared Gate Valves, Cast-In-Place	0		0	
MH2	Type “A” Manhole (Traffic) for Bevel Geared Gate Valves, Cast-In-Place	0		0	
MH3	Type “A” Manhole (Traffic) for Bevel Geared Gate Valves, Cast-In-Place and Precast Wall Notes	0		0	
MH4	Type “A” Manhole (Traffic) for Bevel Geared Gate Valves, Precast	0		0	
MH5	Type “A” Manhole (Traffic) for Bevel Geared Gate Valves, Precast	0		0	
MH6	Type “A” Manhole (Traffic) for Butterfly Valves, Cast-In-Place	0		0	0
MH7	Type “A” Manhole (Traffic) for Butterfly Valves, Cast-In-Place	0		0	0
MH8	Type “A” Manhole (Traffic) for Butterfly Valves, Precast	0		0	0
MH9	Type “A” Manhole (Traffic) for Butterfly Valves, Precast	0		0	0
MH10	Type “A-1” Manhole (Non-Traffic) for Butterfly Valves, CMU				0
MH11	Type “A-1” Manhole (Non-Traffic) for Butterfly Valves, CMU				0
MH12	Manhole Detail of Lintel and Filler Typical Detail	0		0	0
MH13	Manhole Pipe Collar Detail	0		0	0

Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
MH14	Metal Rung Details	0		0	0
MH15	Manhole Miscellaneous Details	0		0	0
MH16	Polypropylene Plastic Rung	0		0	
MH17	Manhole Frame & Cover Cast Iron, 24" Size	0	0	0	0
MH18	Type “B” Manhole General Arrangement, Precast Wall	0		0	0
MH19	Type “C” Manhole General Arrangement, Precast Wall	0		0	0
MH20	Type “D” Manhole for 2” Air Relief Valves, Cast-In-Place and Precast Walls	0		0	0
MH21	Type “D” Manhole for 2” Air Relief Valves, Cast-In-Place and Precast Walls	0		0	0
MH22	Type “E” Tapping Tee Manhole, Cast-In-Place Wall	0		0	
MH23	Type “E” Tapping Tee Manhole, Cast-In-Place Wall	0		0	
MH24	Type “E” Tapping Tee Manhole, Cast-In-Place Wall	0		0	
MH25	Oversize Top Slab Detail	0	0	0	0
	TRENCH DETAILS, AND CONCRETE CYLINDER PIPE AND APPURTENANCES (P)				
P1	Concrete Cylinder Pipe Miscellaneous Detail	0		0	0
P2	Concrete Cylinder Pipe Notes and Tables	0		0	0
P3	Concrete Cylinder Pipe Miscellaneous Detail	0		0	0
P4	Concrete Cylinder Pipe Miscellaneous Details	0		0	0
P5	Concrete Cylinder Pipe Miscellaneous Details	0		0	0
P6	Concrete Cylinder Pipe Notes	0		0	0
P7	Concrete Cylinder Pipe Tap-In Tee Details	0		0	0
P8	Concrete Cylinder Pipe Tap-In Tee Notes and Tables	0		0	0
P9	Excavation Payment Limits at Connection	0		0	
P10	Trench Backfill			0	0
P11	Waterline Trench Details Miscellaneous Details	0			
P12	Typical PVC Waterline Trench - Paved Area	0			
P13	Typical PVC Waterline Trench - Non-Paved Area	0			

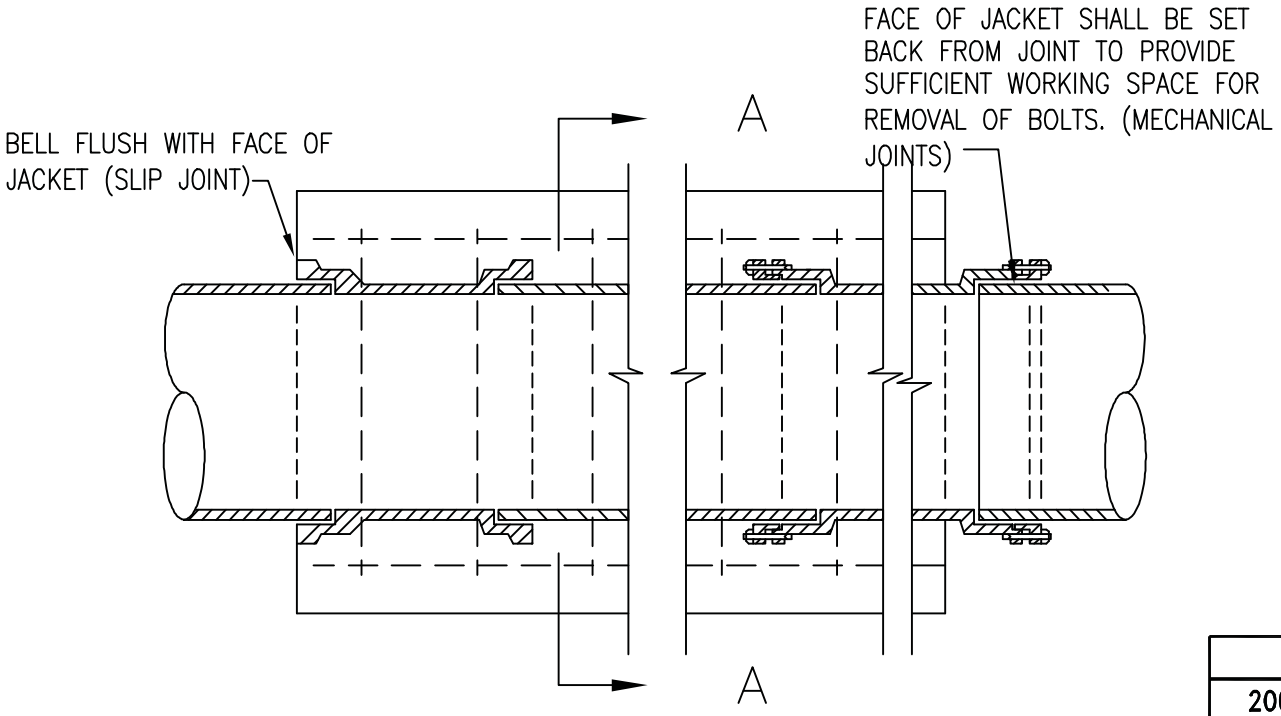
Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
	VALVES AND APPURTENANCES (V)				
V1	1" Air Valve Unit Detail		0		
V2	Air Relief Valve Box for 3/4" Air Relief Valve			0	
V3	Valve Frame & Cover Cast Iron, 6" Size	0		0	0
V4	Air Relief Valve Connection in Manhole			0	0
V5	Offset Air Relief Valve for 20” or Larger Mains	0		0	0
V6	Atmospheric Vacuum Breaker, Landscape Irrigation Detail			0	0
V7	Pressure Vacuum Breaker, Landscape Irrigation			0	0
V8	Air Gap Typical Detail	0	0	0	0
V9	Backflow Preventer Typical Installation	0	0	0	0
V10	Automatic Pressure Relief Valve	0			
V11	Cast Iron Valve Box Details	0			
V12	6" Sliding Valve Box Assembly				0
V13	Type "A" Valve Box	0	0	0	
V14	12" Valve Box Installation for Gate Valve		0	0	
V15	12" Valve Box Installation for Valve Operators		0	0	0
V16	12” Valve Box Frame & Cover		0	0	0
V17	Identification Tag for Manhole or Valve Box Cover	0	0	0	
V18	Valve Marker	0		0	0
V19	Valve Nut Extension	0	0		0
V20	2" Cleanout at Dead Ends		0		
V21	Cleanout				0
V22	Cleanouts and Riser	0		0	
V23	ARV Installation Type F Manhole				0



SECTION A–A

NOTE:

1. WHEREVER CONSTRUCTION JOINTS ARE REQUIRED, DWS APPROVED 6" RUBBER OR NEOPRENE WATERSTOPS OR CONCRETE BONDING AGENT APPROVED BY THE MANAGER SHALL BE INSTALLED.
2. NO CONCRETE JACKETING OF PVC PIPE OR EXISTING AC PIPE WILL BE ALLOWED.
3. CONCRETE SHALL BE DWS 2500 EXCEPT UNDER RESERVOIR FLOOR SLABS WHERE IT SHALL BE DWS 3500.
4. REINFORCING DESIGN APPLICABLE FOR STRAIGHT PIPE JACKETED SEGMENT. FOR SIPHON OR OFFSET, SUBMIT SHOP DRAWINGS.
5. PRECAST JACKETED WATERLINE SEGMENT SHALL BE DESIGNED AND STAMPED BY A LICENSED STRUCTURAL ENGINEER AND APPROVED BY MANAGER.



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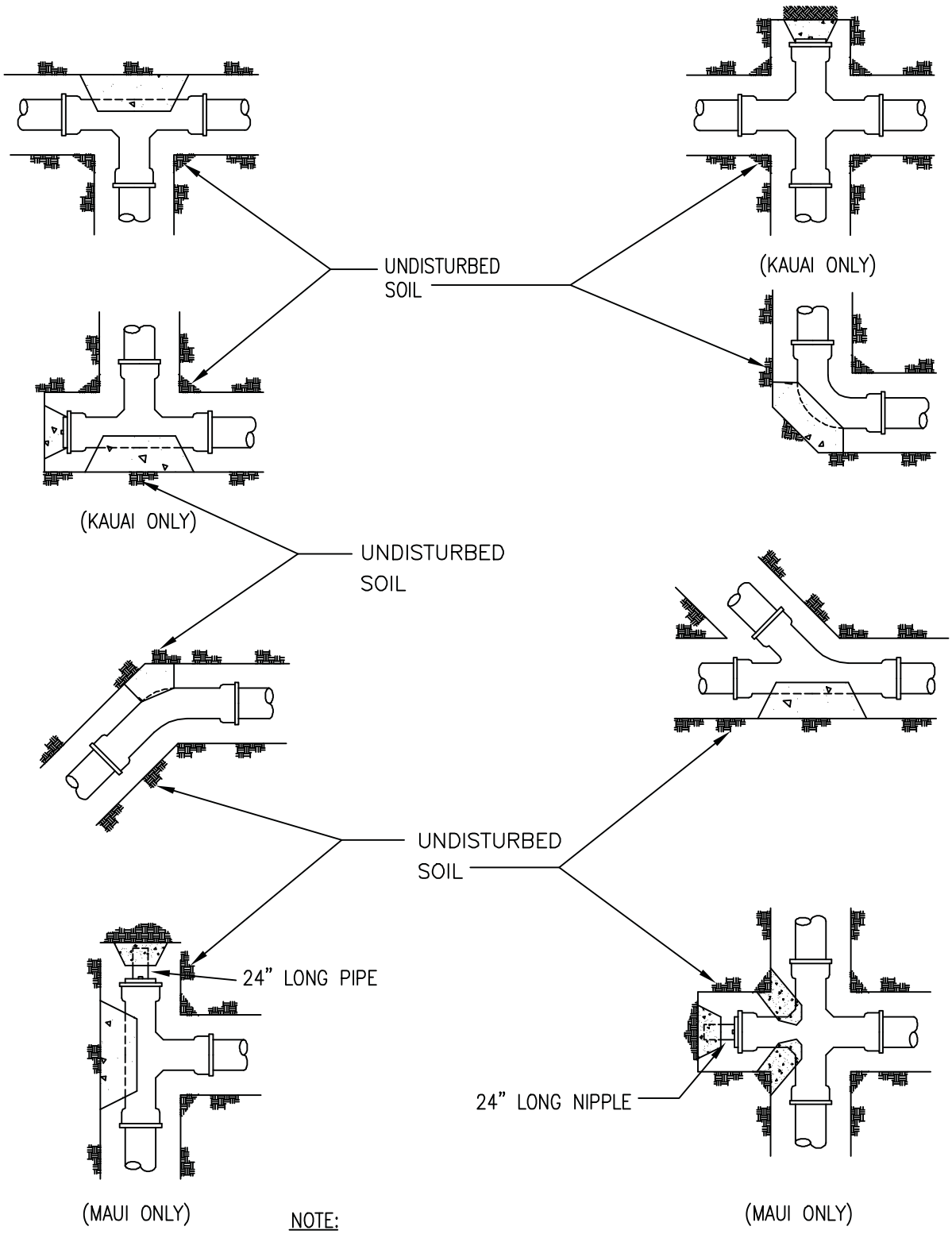
KAUAI OAHU MAUI HAWAII	REINFORCED CONCRETE JACKET TYPICAL DETAIL SCALE: NTS	STANDARD DETAILS	B1



NOTE:

REFER TO DETAILS B3, B4 & B5 FOR THE SIZE OF REACTION BLOCKS. REACTION BLOCKS SHALL BEAR AGAINST UNDISTURBED SOIL. CONCRETE SHALL BE DWS 2500.

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KAUAI MAUI	HORIZONTAL REACTION BLOCK FOR WATER MAINS SCALE: NTS	STANDARD DETAILS	B2

KAUAI
OAHU
MAUI
HAWAII

HORIZONTAL THRUST BLOCK

MINIMUM BEARING AREAS

SCALE: NTS

STANDARD DETAILS

B3

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MINIMUM BEARING AREAS (SQ. FT.) FOR HORIZONTAL THRUST BLOCKS

PIPE SIZE	BEND	PRESSURE 250 PSI — TYPE OF SOIL CONDITION							PRESSURE 200 PSI — TYPE OF SOIL CONDITION							PRESSURE 150 PSI — TYPE OF SOIL CONDITION						
		A	B	C	D	E	F	G	A	B	C	D	E	F	G	A	B	C	D	E	F	G
4"	TEES, CAPS	6.5	3.5	2.0	1.5	1.0	1.0	1.0														
	1/4	9.0	4.5	3.0	2.5	1.5	1.0	1.0														
	1/8	5.0	2.5	1.5	1.5	1.0	1.0	1.0														
	1/16	2.5	1.5	1.0	1.0	1.0	1.0	1.0														
	1/32	1.5	1.0	1.0	1.0	1.0	1.0	1.0														
6"	TEES, CAPS	14.0	7.0	5.0	3.5	2.5	2.0	1.5														
	1/4	20.0	10.0	7.0	5.0	3.5	2.5	2.0														
	1/8	11.0	5.5	3.5	3.0	2.0	1.5	1.0														
	1/16	5.5	3.0	2.0	1.5	1.0	1.0	1.0														
	1/32	3.0	1.5	1.0	1.0	1.0	1.0	1.0														
8"	TEES, CAPS	25.0	12.5	8.5	6.5	4.0	3.0	2.5														
	1/4	35.0	18.0	12.0	9.0	6.0	4.5	3.5														
	1/8	20.0	9.5	6.5	5.0	3.0	2.5	2.0														
	1/16	10.0	5.0	3.5	2.5	1.5	1.0	1.0														
	1/32	5.0	2.5	1.5	1.5	1.0	1.0	1.0														
12"	TEES, CAPS	56.5	28.5	19.0	14.0	9.5	7.0	5.5	45.5	22.5	15.0	11.5	7.5	5.5	4.5	34.0	17.0	11.5	8.5	5.5	4.5	3.5
	1/4	80.0	40.0	26.5	20.0	13.5	10.0	8.0	64.0	32.0	21.5	16.0	11.0	8.0	6.5	48.0	24.0	16.0	12.0	8.0	6.0	5.0
	1/8	43.5	21.5	14.5	11.0	7.0	5.5	4.5	35.0	17.5	11.5	9.0	6.0	4.5	3.5	26.0	13.0	8.5	6.5	4.5	3.5	2.5
	1/16	22.0	11.0	7.5	5.5	3.5	3.0	2.5	17.5	9.0	6.0	4.5	3.0	2.5	2.0	13.0	6.5	4.5	3.5	2.0	1.5	1.5
	1/32	11.5	5.5	4.0	3.0	2.0	1.5	1.0	9.0	4.5	3.0	2.5	1.5	1.0	1.0	7.0	3.5	2.5	2.0	1.0	1.0	1.0

USE FIGURES UNDER 250 PSI

TYPE OF SOIL CONDITION	LATERAL BEARING PRESSURE
A. SOFT CLAY; FINE LOOSE SAND	500 LBS. PER SQ. FT.
B. SAND & CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND	1000 LBS. PER SQ. FT.
C. HARD DRY CLAY	1500 LBS. PER SQ. FT.
D. COARSE SAND	2000 LBS. PER SQ. FT.
E. GRAVEL	3000 LBS. PER SQ. FT.
F. SOFT ROCK	4000 LBS. PER SQ. FT.
G. HARDPAN	5000 LBS. PER SQ. FT.

NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.
2. FOR KAUAI AND MAUI, SEE PLATE B2 FOR ADDITIONAL NOTES.

KAUAI
OAHU
MAUI
HAWAII

HORIZONTAL THRUST BLOCK

MINIMUM BEARING AREAS

SCALE: NTS

STANDARD DETAILS

B4

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MINIMUM BEARING AREAS (SQ. FT.) FOR HORIZONTAL THRUST BLOCKS

PIPE SIZE	BEND	PRESSURE 250 PSI							PRESSURE 200 PSI							PRESSURE 150 PSI						
		TYPE OF SOIL CONDITION							TYPE OF SOIL CONDITION							TYPE OF SOIL CONDITION						
		A	B	C	D	E	F	G	A	B	C	D	E	F	G	A	B	C	D	E	F	G
16"	TEES, CAPS	101.0	50.5	34.0	25.5	17.0	13.0	10.5	80.5	40.5	27.0	20.5	13.5	10.5	8.5	60.5	30.5	20.5	15.5	10.5	8.0	6.5
	1/4	142.5	71.5	47.5	35.5	24.0	18.0	14.5	114.0	57.0	38.0	28.5	19.0	14.5	11.5	85.5	43.0	28.4	21.5	14.5	11.0	8.5
	1/8	77.0	38.5	26.0	19.5	13.0	10.0	8.0	62.0	31.0	20.5	15.5	10.5	8.0	6.5	46.5	23.5	15.5	11.5	8.0	6.0	5.0
	1/16	39.5	20.0	13.5	10.0	6.5	5.0	4.0	31.5	16.0	10.5	8.0	5.5	4.0	3.5	23.5	12.0	8.0	6.0	4.0	3.0	2.5
	1/32	20.0	10.0	7.0	5.0	3.5	2.5	2.0	16.0	8.0	5.5	4.0	3.0	2.0	2.0	12.0	6.0	4.0	3.0	2.0	1.5	1.5
18"	TEES, CAPS	127.5	64.0	42.5	32.0	21.5	16.0	13.0	102.0	51.0	34.0	25.5	17.0	13.0	10.5	76.5	38.5	25.5	19.5	13.0	10.0	8.0
	1/4	180.0	90.0	60.0	45.0	30.0	22.5	18.0	144.0	72.0	48.0	36.0	24.0	18.0	14.5	108.0	54.0	36.0	27.0	18.0	13.5	11.0
	1/8	97.5	49.0	32.5	24.5	16.5	12.5	10.0	78.0	39.0	26.0	19.5	13.0	10.0	8.0	58.5	29.5	19.5	15.0	10.0	7.5	6.0
	1/16	50.0	25.0	16.5	12.5	8.5	6.5	5.0	40.0	20.0	13.5	10.0	7.0	5.0	4.0	30.0	15.0	10.0	7.5	5.0	4.0	3.0
	1/32	25.0	12.5	8.5	6.5	4.5	3.5	2.5	20.0	10.0	7.0	5.0	3.5	2.5	2.0	15.0	7.5	5.0	4.0	2.5	2.0	2.0
20"	TEES, CAPS	157.5	79.0	52.5	39.5	26.5	20.0	16.0	126.0	63.0	42.0	31.5	21.0	16.0	13.0	94.5	47.5	31.5	24.0	16.0	12.0	9.5
	1/4	222.5	111.5	74.0	55.5	37.0	28.0	22.5	178.0	89.0	59.5	44.5	30.0	22.5	18.0	133.5	67.0	44.5	33.5	22.5	17.0	13.5
	1/8	120.5	60.5	40.5	30.5	20.0	15.0	12.0	96.5	48.5	32.5	24.0	16.0	12.0	10.0	72.5	36.5	24.0	18.0	12.0	9.0	7.5
	1/16	61.5	31.0	20.5	15.5	10.5	8.0	6.5	49.0	24.5	16.5	12.5	8.5	6.5	5.0	37.0	18.5	12.5	9.5	6.5	5.0	4.0
	1/32	31.0	15.5	10.5	8.0	5.5	4.0	3.5	25.0	12.5	8.5	6.5	4.5	3.5	2.5	18.5	9.5	6.5	4.5	3.5	2.5	2.0
24"	TEES, CAPS	226.5	113.5	75.5	57.0	38.0	28.5	23.0	181.0	90.5	60.5	45.5	30.5	23.0	18.5	136.0	68.0	45.5	34.0	23.0	17.0	14.0
	1/4	320.0	160.0	107.0	80.0	53.5	40.0	32.0	256.0	128.0	85.5	64.0	43.0	32.0	26.0	192.0	96.0	64.0	48.0	32.0	24.0	19.5
	1/8	173.5	87.0	58.0	43.5	29.0.	22.0	17.5	138.5	69.5	46.5	35.0	23.5	17.5	14.0	104.0	52.0	35.0	26.0	17.5	13.0	10.5
	1/16	88.5	44.5	29.5	22.5	15.0	11.0	9.0	71.0	35.5	24.0	18.0	12.0	9.0	7.5	53.0	26.5	18.0	13.5	15.0	7.0	5.5
	1/32	44.5	22.5	15.0	11.5	7.5	5.5	4.5	35.5	18.0	12.0	9.0	6.0	4.5	3.5	27.0	13.5	9.0	7.0	4.5	3.5	3.0

TYPE OF SOIL CONDITION	LATERAL BEARING PRESSURE
A. SOFT CLAY; FINE LOOSE SAND	500 LBS. PER SQ. FT.
B. SAND & CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND	1000 LBS. PER SQ. FT.
C. HARD DRY CLAY	1500 LBS. PER SQ. FT.
D. COARSE SAND	2000 LBS. PER SQ. FT.
E. GRAVEL	3000 LBS. PER SQ. FT.
F. SOFT ROCK	4000 LBS. PER SQ. FT.
G. HARDPAN	5000 LBS. PER SQ. FT.

NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.
2. FOR KAUAI AND MAUI, SEE PLATE B2 FOR ADDITIONAL NOTES.

KAUAI
OAHU
MAUI
HAWAII

HORIZONTAL THRUST BLOCK

MINIMUM BEARING AREAS

SCALE: NTS

STANDARD DETAILS

B5

REVISION 2002

MINIMUM BEARING AREAS (SQ. FT.) FOR HORIZONTAL THRUST BLOCKS

PIPE SIZE	BEND	PRESSURE 250 PSI							PRESSURE 200 PSI							PRESSURE 150 PSI						
		TYPE OF SOIL CONDITION							TYPE OF SOIL CONDITION							TYPE OF SOIL CONDITION						
		A	B	C	D	E	F	G	A	B	C	D	E	F	G	A	B	C	D	E	F	G
30"	TEES, CAPS	353.5	177.0	118.0	88.5	59.0	44.5	35.5	283.0	141.5	94.5	71.0	47.5	35.5	28.5	212.5	106.5	71.0	53.5	35.5	27.0	21.5
	1/4	500.0	250.0	167.0	125.0	83.5	62.5	50.0	400.0	200.0	133.5	100.0	67.0	50.0	40.0	300.0	150.0	100.0	75.0	50.0	37.5	30.0
	1/8	270.5	135.5	90.5	68.0	45.5	34.0	27.5	216.5	108.5	72.5	54.5	36.5	27.5	22.0	162.5	81.5	54.5	41.0	27.5	20.5	16.5
	1/16	138.0	69.0	46.0	34.5	23.0	17.5	14.0	110.5	55.5	37.0	28.0	18.5	14.0	11.0	83.0	41.5	28.0	21.0	14.0	10.5	8.5
	1/32	69.5	35.0	23.5	17.5	11.5	9.0	7.0	55.5	28.0	18.5	14.0	9.5	7.0	5.5	42.0	21.0	14.0	10.5	7.0	5.5	4.5
36"	TEES, CAPS	509.0	254.5	170.0	127.5	85.0	64.0	51.0	407.5	204.0	136.0	102.0	68.0	51.0	41.0	305.5	153.0	102.0	76.5	51.0	38.5	31.0
	1/4	720.0	360.0	240.0	180.0	120.0	90.0	72.0	576.0	288.0	192.0	144.0	96.0	72.0	58.0	432.0	216.0	144.0	108.0	72.0	54.0	43.5
	1/8	390.0	195.0	130.0	97.5	65.0	49.0	39.0	312.0	156.0	104.0	78.0	52.0	39.0	31.5	234.0	117.0	78.0	58.4	39.0	29.5	23.5
	1/16	199.0	99.5	66.5	50.0	33.5	25.0	20.0	159.0	79.5	53.0	40.0	26.5	20.0	16.0	119.5	60.0	40.0	30.0	20.0	15.0	12.0
	1/32	100.0	50.0	33.5	25.0	17.0	12.5	10.0	80.0	40.0	27.0	20.0	13.5	10.0	8.0	60.0	30.0	20.0	15.0	10.0	7.5	6.0
42"	TEES, CAPS	693.0	346.5	231.0	173.5	115.5	87.0	69.5	554.5	277.5	185.0	139.0	92.5	69.5	55.5	416.0	208.0	139.0	104.0	69.5	52.0	42.0
	1/4	980.0	490.0	327.0	245.0	163.5	122.5	98.0	784.0	392.0	261.5	196.0	131.0	98.0	78.5	588.0	294.0	196.0	147.0	98.0	74.0	59.0
	1/8	530.5	265.5	177.0	132.5	88.5	66.5	53.0	424.5	212.5	141.5	106.0	71.0	53.0	42.5	319.5	159.5	106.0	79.5	53.0	40.0	32.0
	1/16	270.5	135.5	90.5	68.0	45.0	34.0	27.0	216.5	108.5	72.5	54.5	36.0	27.0	22.0	162.5	81.5	54.1	40.5	27.0	20.5	16.5
	1/32	136.0	68.0	45.5	34.0	23.0	17.0	14.0	109.0	54.5	36.5	27.5	18.5	14.0	11.0	81.5	41.0	27.5	20.5	14.0	10.5	8.5

TYPE OF SOIL CONDITION	LATERAL BEARING PRESSURE
A. SOFT CLAY; FINE LOOSE SAND	500 LBS. PER SQ. FT.
B. SAND & CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND	1000 LBS. PER SQ. FT.
C. HARD DRY CLAY	1500 LBS. PER SQ. FT.
D. COARSE SAND	2000 LBS. PER SQ. FT.
E. GRAVEL	3000 LBS. PER SQ. FT.
F. SOFT ROCK	4000 LBS. PER SQ. FT.
G. HARDPAN	5000 LBS. PER SQ. FT.

NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.
2. FOR KAUAI AND MAUI, SEE PLATE B2 FOR ADDITIONAL NOTES.

KAUAI
OAHU
MAUI
HAWAII

TOP VERTICAL
THRUST BLOCK SCHEDULE

SCALE: NTS

STANDARD DETAILS

B6

REVISION	2002	

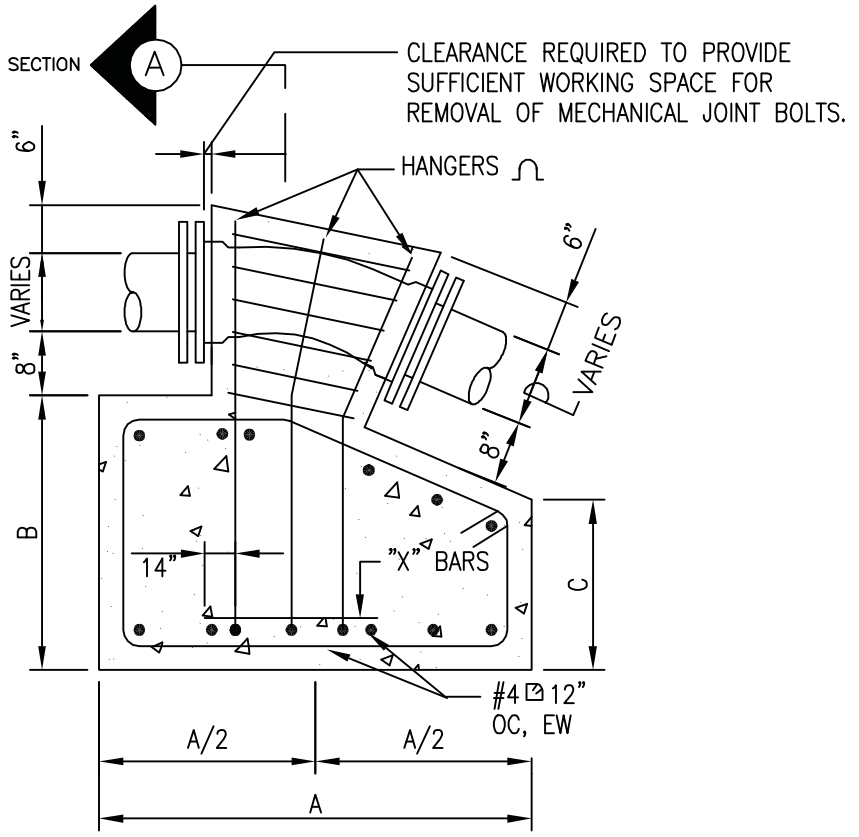
TOP VERTICAL THRUST BLOCK SCHEDULE

PIPE SIZE	BEND	PRESSURE 250 PSI						PRESSURE 200 PSI						PRESSURE 150 PSI					
		CONCRETE BLOCK				HANGER	"X" BAR	CONCRETE BLOCK				HANGER	"X" BAR	CONCRETE BLOCK				HANGER	"X" BAR
		A	B	C	D			A	B	C	D			A	B	C	D		
4"	1/4	4'-6"	4'-0"	4'-0"	2'-6"	(2)#4	(2)#4												
	1/8	3'-9"	3'-0"	1'-6"	2'-6"	(2)#3	(2)#3												
	1/16	2'-6"	2'-3"	1'-9"	2'-6"	(2)#3	(2)#3												
	1/32	2'-3"	1'-6"	1'-3"	2'-6"	(2)#3	(2)#3												
6"	1/4	4'-6"	4'-3"	4'-3"	4'-6"	(2)#5	(2)#5												
	1/8	5'-0"	3'-9"	1'-6"	3'-0"	(2)#4	(2)#4												
	1/16	3'-9"	3'-3"	2'-6"	2'-6"	(2)#3	(2)#3												
	1/32	3'-0"	2'-3"	2'-0"	2'-6"	(2)#3	(2)#3												
8"	1/4	5'-3"	5'-0"	5'-0"	5'-3"	(2)#6	(2)#6												
	1/8	5'-3"	4'-9"	2'-3"	4'-0"	(2)#5	(2)#5												
	1/16	5'-9"	3'-6"	2'-6"	2'-6"	(2)#4	(2)#4												
	1/32	3'-6"	2'-9"	2'-6"	2'-6"	(2)#3	(2)#3												
12"	1/4	6'-6"	7'-0"	7'-0"	6'-6"	(3)#7	(2)#7	6'-3"	6'-3"	6'-3"	5'-6"	(3)#7	(2)#7	6'-0"	6'-0"	6'-0"	4'-6"	(2)#7	(2)#7
	1/8	6'-3"	5'-9"	2'-9"	5'-6"	(2)#7	(2)#7	5'-6"	5'-6"	2'-9"	4'-6"	(2)#6	(2)#6	5'-0"	5'-3"	2'-9"	3'-9"	(2)#6	(2)#6
	1/16	5'-6"	4'-6"	3'-6"	4'-0"	(2)#5	(2)#5	5'-8"	4'-6"	3'-4"	2'-6"	(3)#4	(2)#4	6'-0"	4'-0"	2'-9"	2'-0"	(2)#4	(2)#4
	1/32	5'-3"	4'-3"	3'-9"	2'-6"	(2)#4	(2)#4	4'-3"	3'-9"	3'-3"	2'-0"	(2)#3	(2)#3	4'-0"	3'-0"	2'-6"	2'-0"	(2)#3	(2)#3

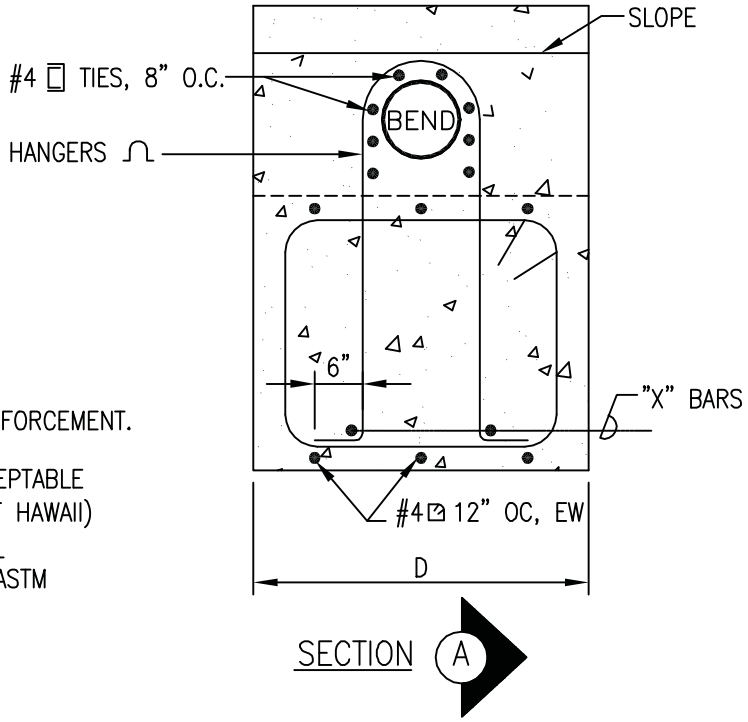
USE FIGURES UNDER 250 PSI

NOTE:

1. ACTUAL FIELD CONDITIONS SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.
2. DIMENSIONS IN SCHEDULE REFER TO B7.
3. SCHEDULE IS NOT APPLICABLE TO BLOCKS FULLY OR PARTLY SUBMERGED IN WATER.
4. SAFETY FACTOR 1.5 BASED ON PIPE LOCATION MINIMUM 2' BELOW GROUND.



ELEVATION



SECTION A

NOTES:

1. DWS 2500 CONCRETE.
2. MIN. 2" COVER OVER ALL REINFORCEMENT.
3. SEE B6 FOR SCHEDULE.
4. AWWA C153 FITTINGS NOT ACCEPTABLE FOR THIS APPLICATION (EXCEPT HAWAII)
5. UNLESS OTHERWISE NOTED, ALL REINFORCING BARS SHALL BE ASTM A615, GRADE 60

			2002 REVISION
KAUAI OAHU MAUI HAWAII	**TYPICAL THRUST BLOCK** AT VERTICAL BENDS SCALE: NTS	STANDARD DETAILS	B7

KAUAI
OAHU
MAUI
HAWAII

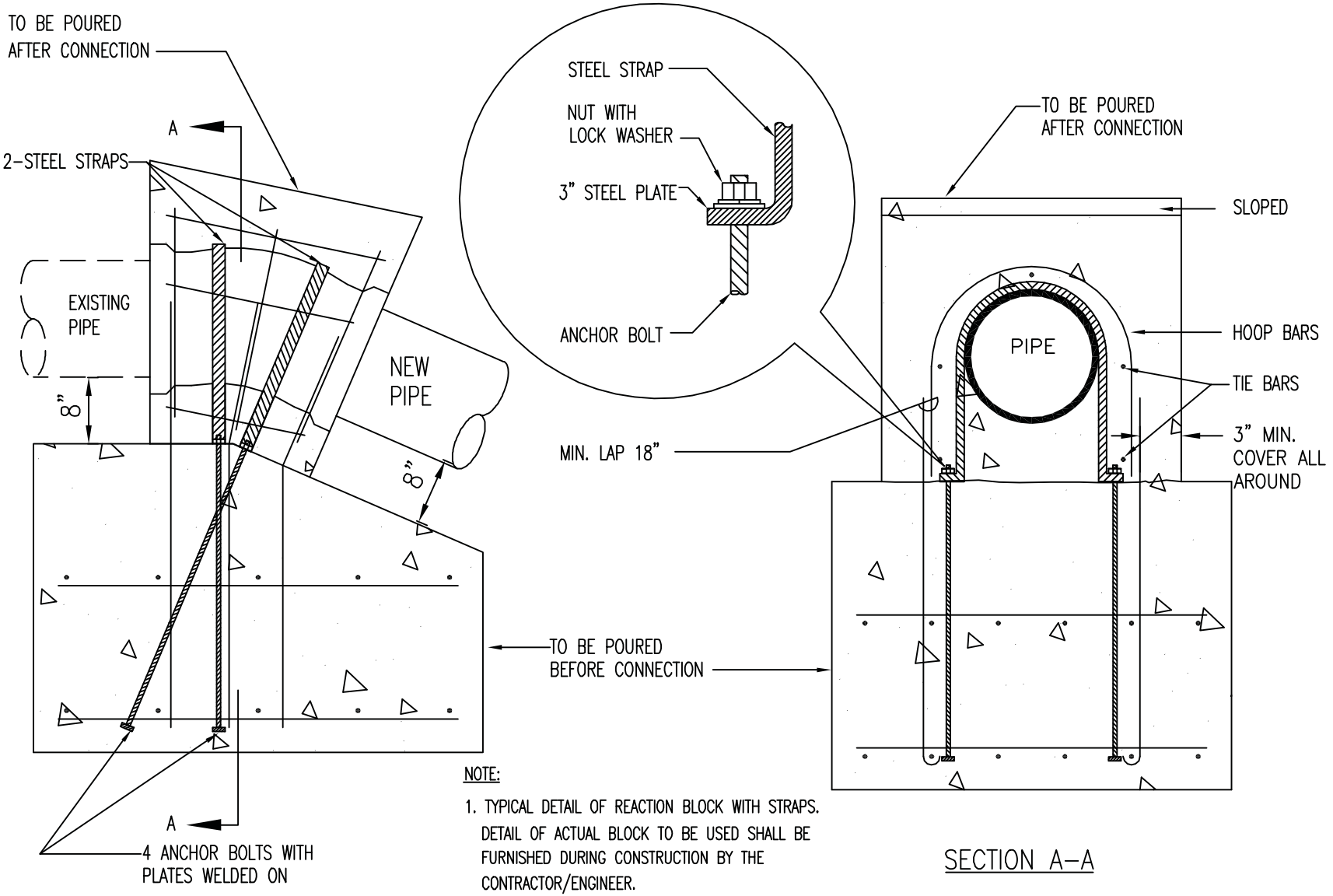
TYPICAL THRUST BLOCK W/ STRAPS FOR CONNECTIONS AT VERTICAL BEND

SCALE: NTS

STANDARD DETAILS

B8

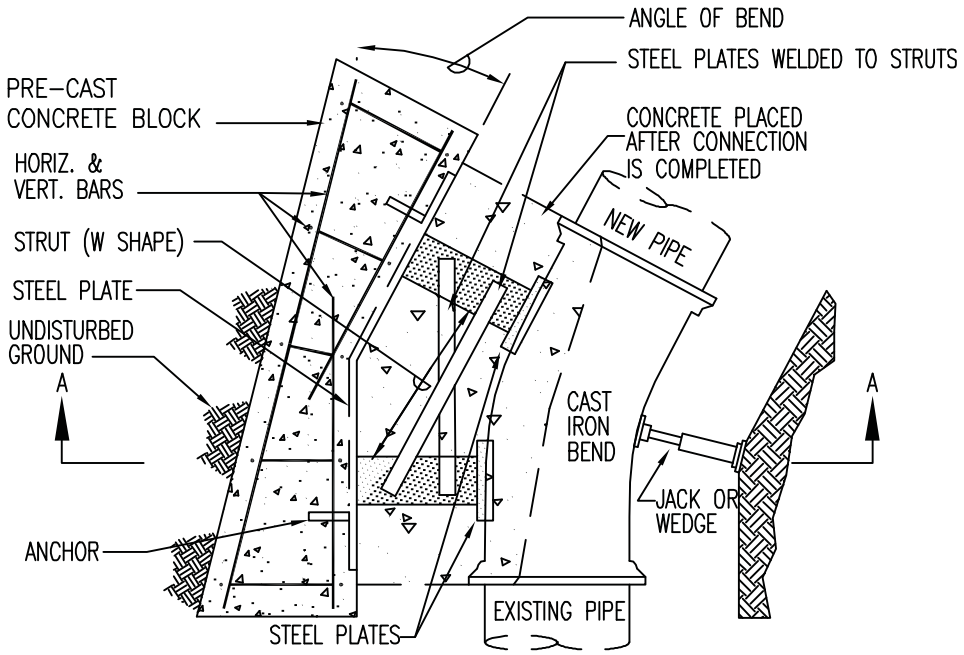
REVISION	2002	



SECTION A–A

NOTE:

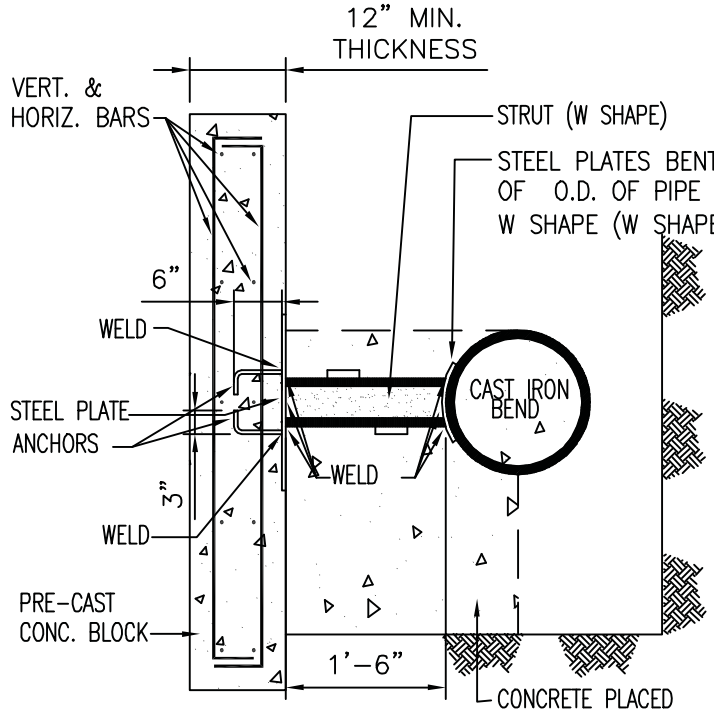
1. TYPICAL DETAIL OF REACTION BLOCK WITH STRAPS. DETAIL OF ACTUAL BLOCK TO BE USED SHALL BE FURNISHED DURING CONSTRUCTION BY THE CONTRACTOR/ENGINEER.
2. ANCHOR BOLTS SHALL BE PLACED PERPENDICULAR TO THE BEND OF THE STRAP.
3. AWWA C153 FITTINGS NOT ACCEPTABLE FOR THIS APPLICATION (EXCEPT HAWAII)



PLAN

NOTE:

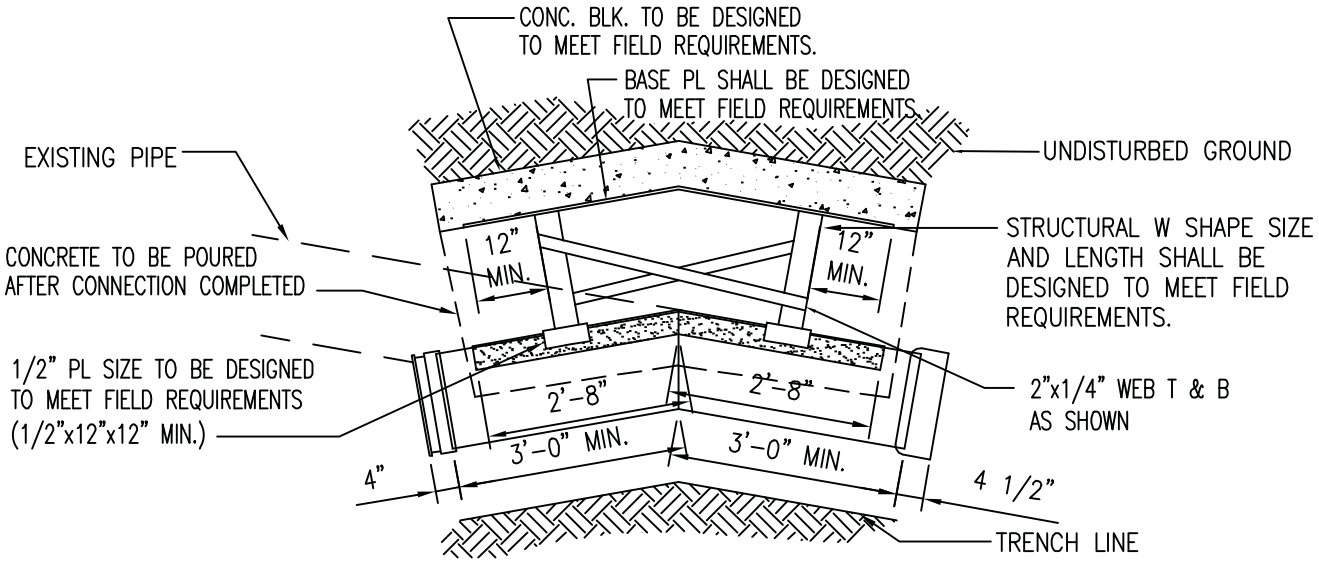
ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.



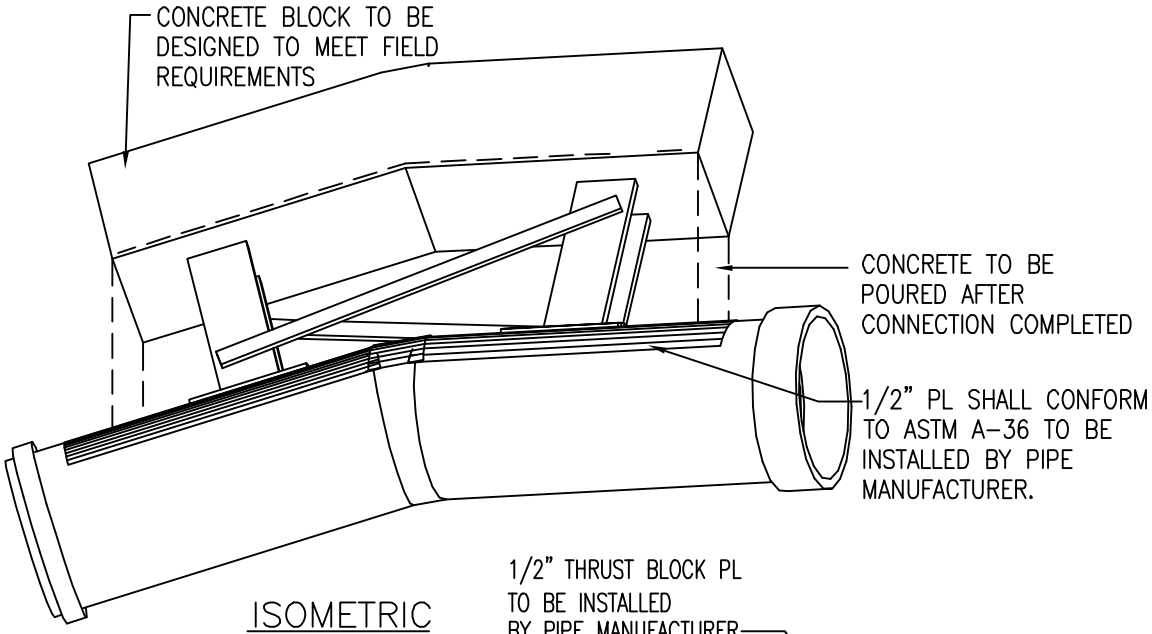
SECTION "A-A"

2002	
REVISION	

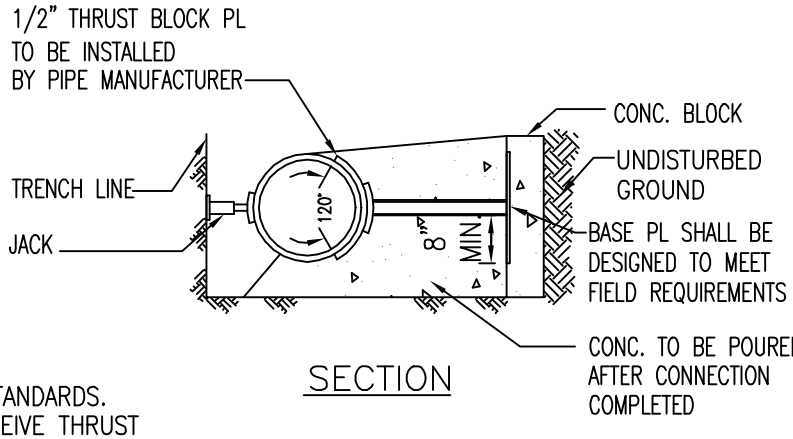
KAUAI OAHU MAUI HAWAII	**TYPICAL THRUST BLOCK** **WITH STRUCTURAL STRUT FOR CONNECTIONS** SCALE: NTS	STANDARD DETAILS	B9



PLAN



ISOMETRIC

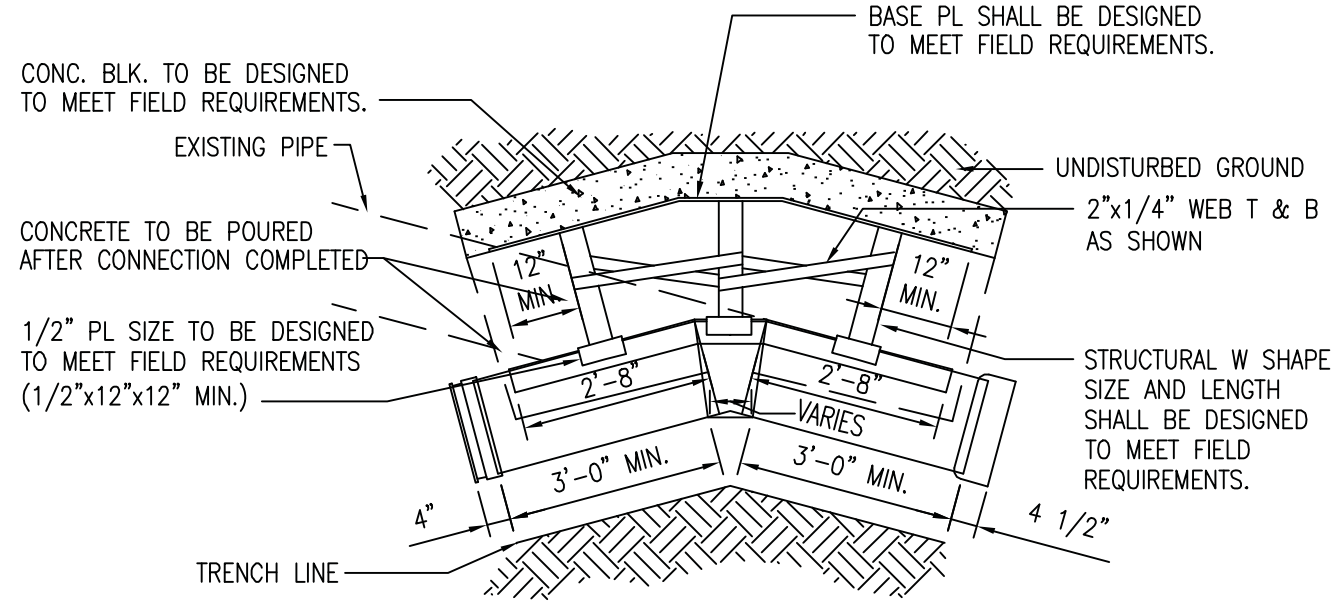


SECTION

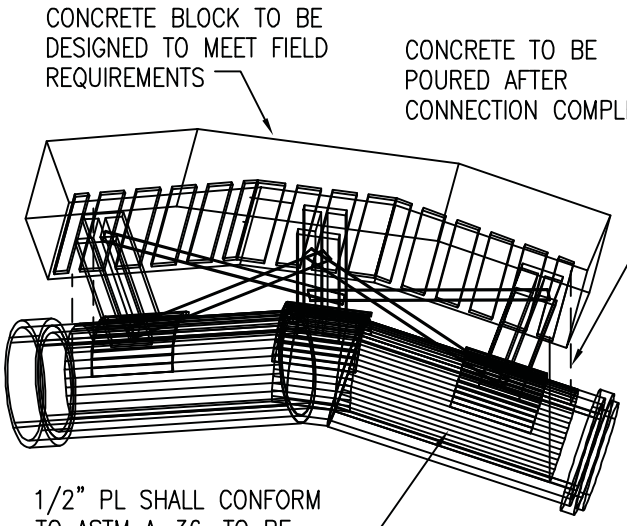
NOTES:
1. ALL WELDS SHALL CONFORM TO AWS STANDARDS.
2. PL SHALL BE UNCOATED READY TO RECEIVE THRUST STRUTS AND APPURTENANCES.
3. DELIVER AT REQUEST.
4. NUMBER OF STRUTS TO BE USED MAY VARY ACCORDING TO THE WORKING PRESSURE.

2002	
REVISION	

KAUAI OAHU MAUI	**TYPICAL THRUST BLOCK** **6° TO 22 1/2° CONCRETE CYLINDER BEND** **FOR 16" TO 42" CONNECTIONS ONLY** **SCALE: NTS**	STANDARD DETAILS	B10



PLAN



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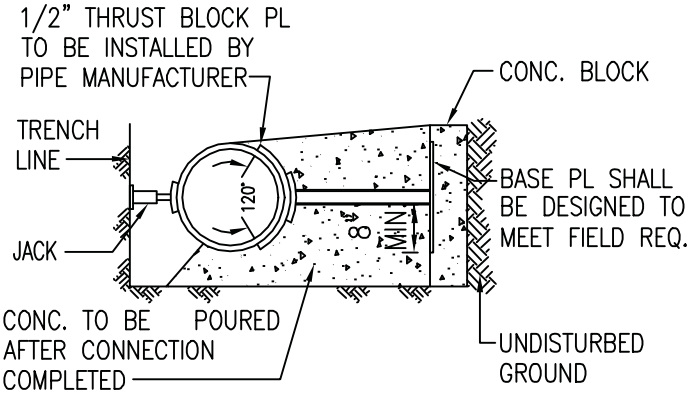


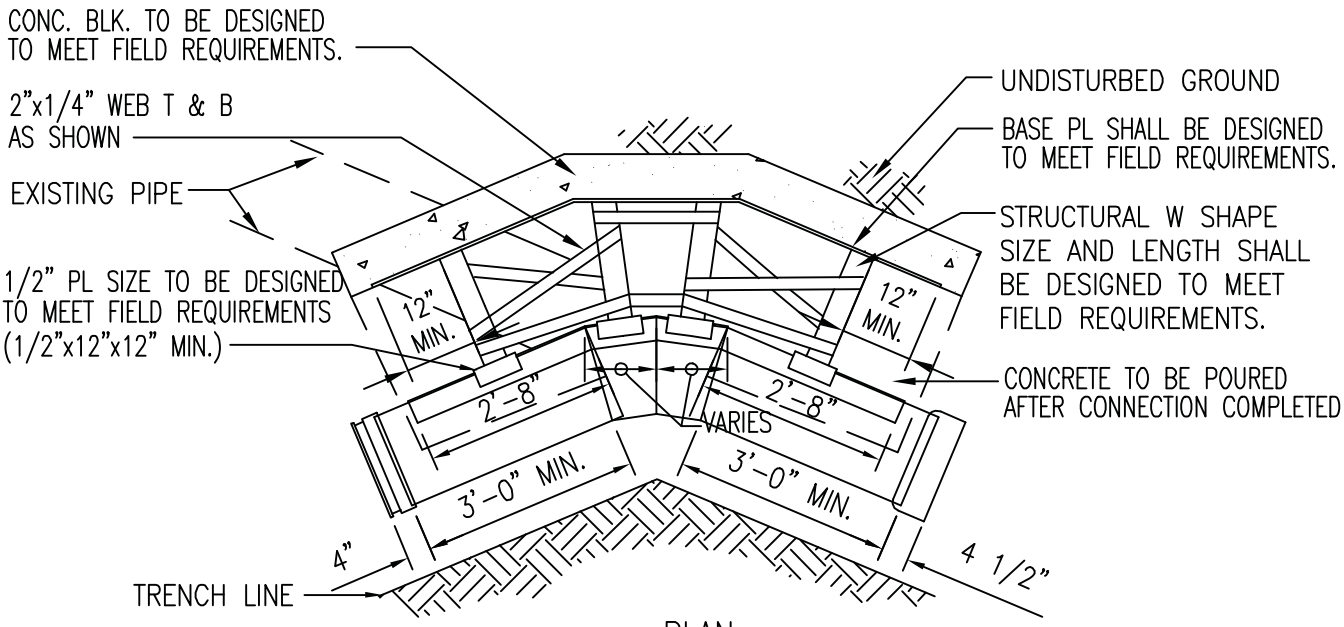
SECTION

NOTES:

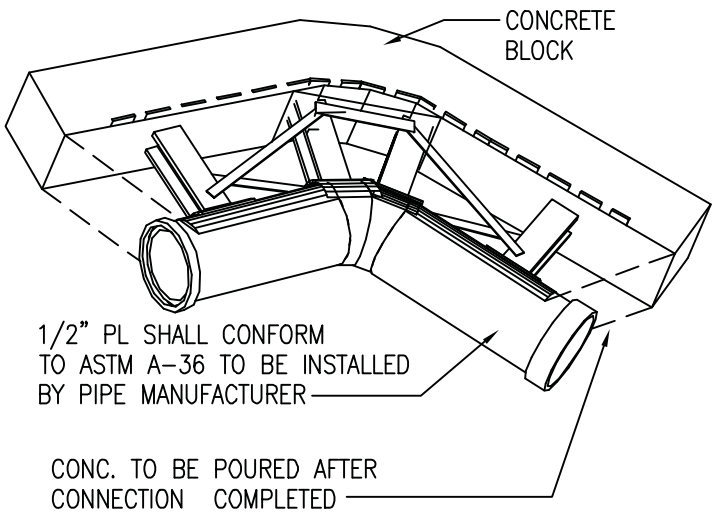
1. ALL WELDS SHALL CONFORM TO AWS STANDARDS.
2. PL SHALL BE UNCOATED READY TO RECEIVE THRUST STRUTS AND APPURTENANCES.
3. DELIVER AT REQUEST.
4. NUMBER OF STRUTS TO BE USED MAY VARY ACCORDING TO THE WORKING PRESSURE.

	2002
	REVISION

KAUAI OAHU MAUI	**TYPICAL THRUST BLOCK 22 1/2° TO 45° CONCRETE CYLINDER BEND FOR 16" TO 42" CONNECTIONS ONLY** SCALE: NTS	STANDARD DETAILS	B11



PLAN



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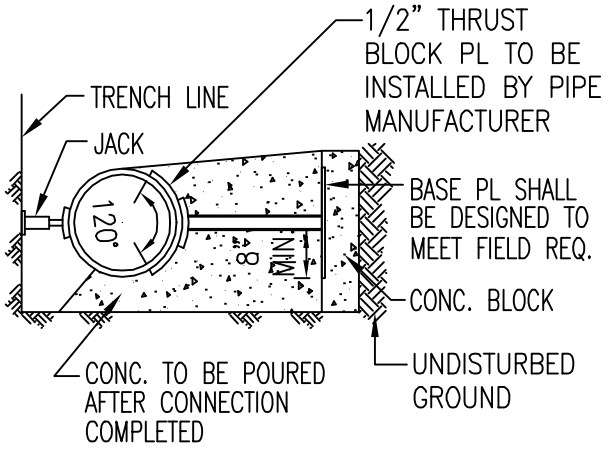
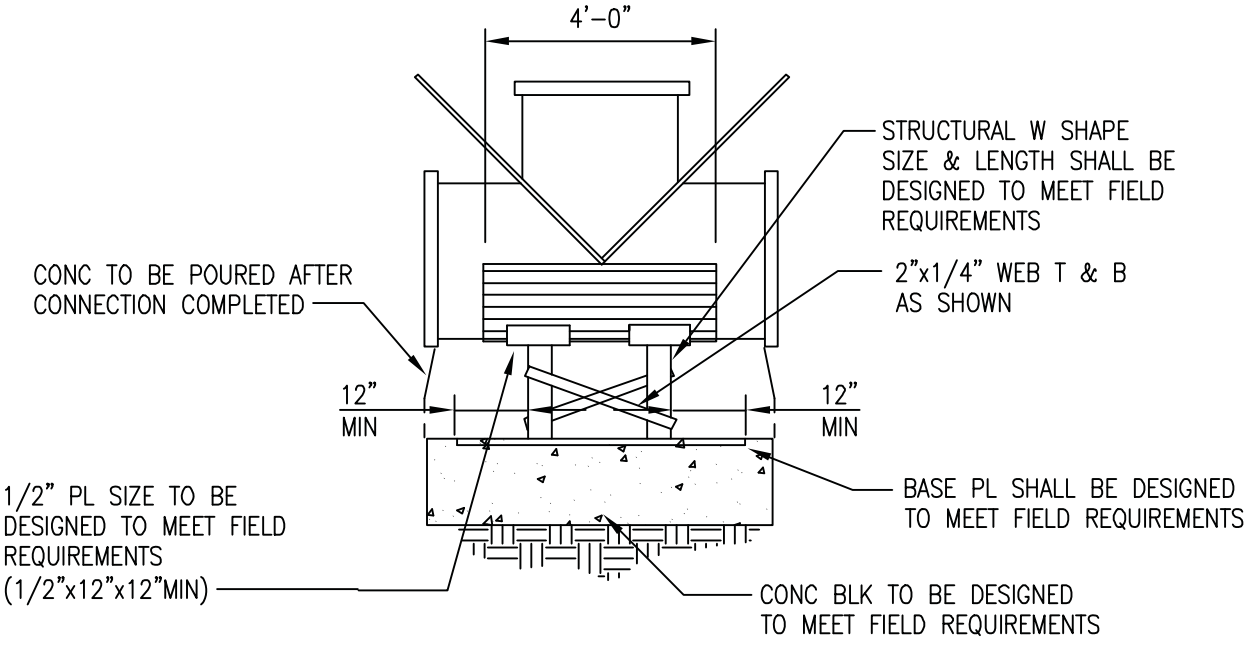


SECTION

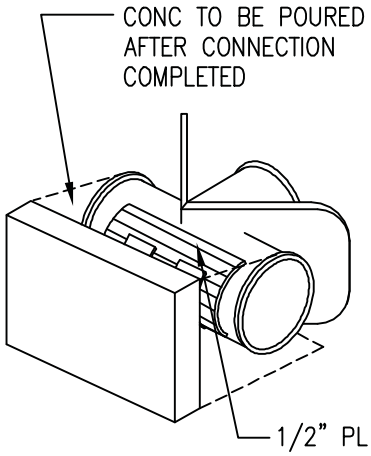
NOTES:
1. ALL WELDS SHALL CONFORM TO AWS STANDARDS.
2. PL SHALL BE UNCOATED READY TO RECEIVE THRUST STRUTS AND APPURTENANCES.
3. DELIVER AT REQUEST.
4. NUMBER OF STRUTS TO BE USED MAY VARY ACCORDING TO THE WORKING PRESSURE.

2002	
REVISION	

KAUAI OAHU MAUI	**TYPICAL THRUST BLOCK** **45° TO 67 1/2° CONCRETE CYLINDER BEND** **FOR 16" TO 42" CONNECTIONS ONLY** **SCALE: NTS**	STANDARD DETAILS	B12



PLAN



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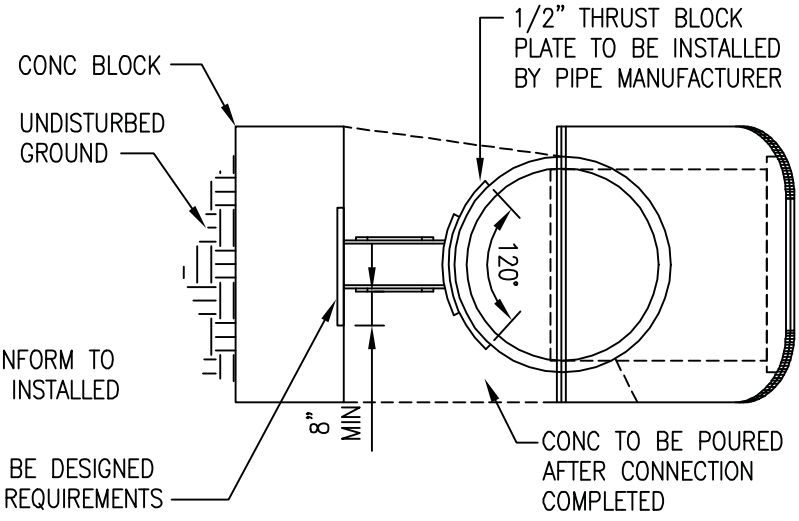

SECTION

NOTES:

1. ALL WELDS SHALL CONFORM TO AWS STANDARDS.
2. PL SHALL BE UNCOATED READY TO RECEIVE THRUST STRUTS AND APPURTENANCES.
3. DELIVER AT REQUEST.
4. NUMBER OF STRUTS TO BE USED MAY VARY ACCORDING TO THE WORKING PRESSURE.

2002	
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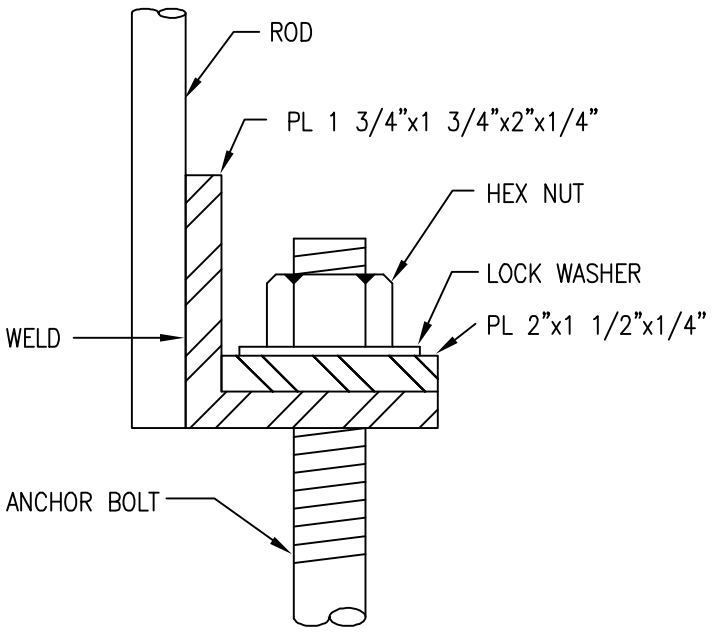
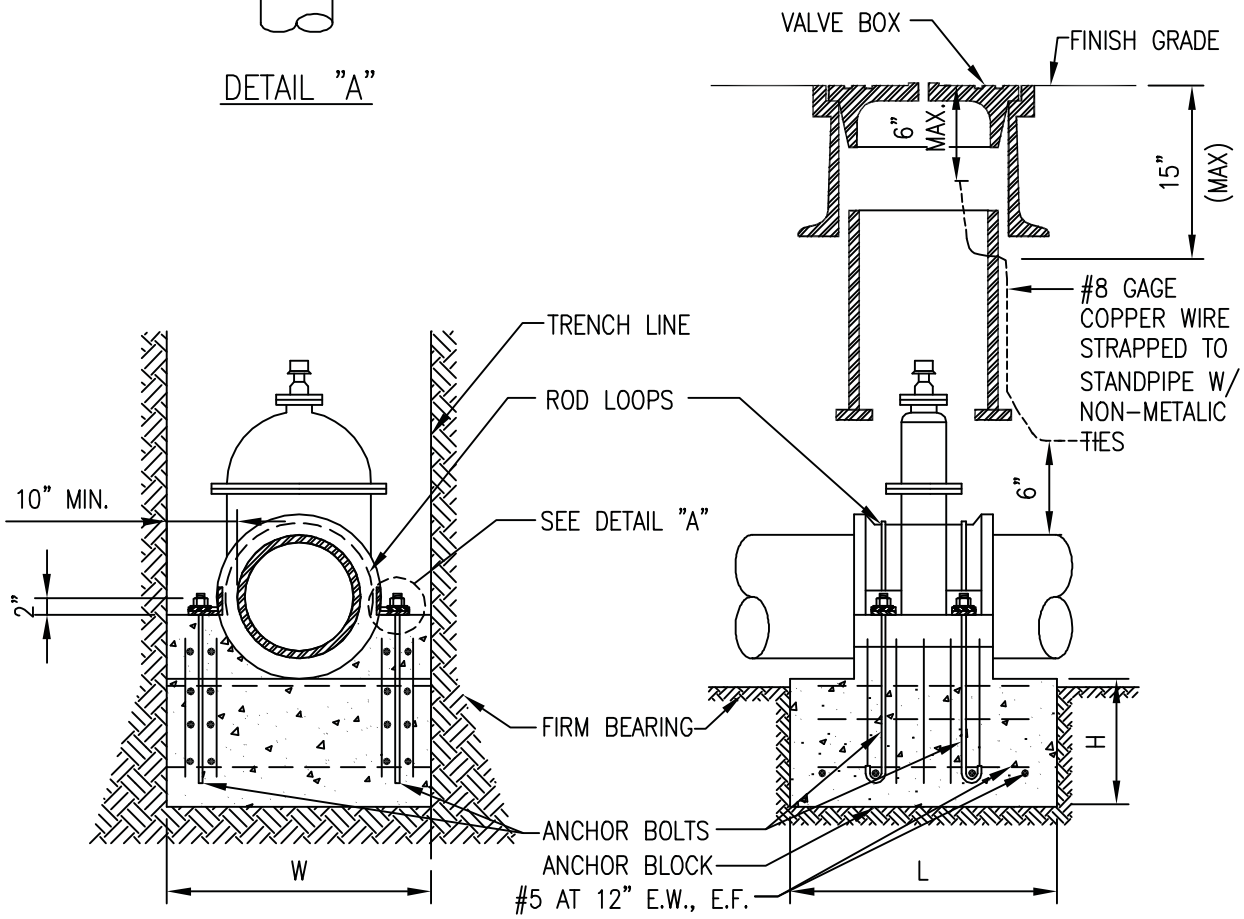
KAUAI OAHU MAUI	**TYPICAL THRUST BLOCK** **CONCRETE CYLINDER TEE CONNECTION (16" - 42")** **SCALE: NTS**	STANDARD DETAILS	B13

NOTES:

1. APPLY BOND BREAKER BETWEEN GATE VALVE AND CONCRETE.
2. ALL ANCHOR MATERIALS SHALL BE HOT DIPPED GALVANIZED STEEL, AND COATED WITH ASPHALTIC MATERIAL AFTER INSTALLATION.
3. 3" CLEARANCE FOR ALL REINFORCING STEEL.
4. FOR MANHOLES, ANCHOR BLOCKS CAN BE MADE AS PART OF FLOOR SLAB. SUBMIT STRUCTURAL DESIGN FOR MANAGER'S APPROVAL.
5. (ADDITIONAL FOR MAUI) A SEGMENT OF AC PIPE SHALL BE REMOVED AND THE VALVE INSTALLED WITH D.I.P. NIPPLES.
6. ANCHOR BLOCK DESIGNED FOR VERTICAL LOAD ONLY. FOR BLOCK SCHEDULE, SEE DETAIL B15.
7. STANDPIPE SHALL BE PVC C-900.



DETAIL "A"



TYPICAL DETAIL

	2002
	REVISION

OAHU MAUI	**GATE VALVE ANCHOR BLOCK** **NON-METALIC PIPES** SCALE: NTS	STANDARD DETAILS	B14

TYPE OF SOIL CONDITION			A	B	C	D	E	F	G
PIPE SIZE (in)	WIDTH, W (in)	HEIGHT, H (in)	LENGTH OF ANCHOR BLOCK, L (in)						
4	24	12	24	24	24	24	24	24	24
6	26	12	26	26	26	26	26	26	26
8	28	15	28	28	28	28	28	28	28
12	32	15	32	32	32	32	32	32	32
16	36	18	36	36	36	36	36	36	36
18	38	18	38	38	38	38	38	38	38
20	40	18	40	40	40	40	40	40	40
24	44	18	44	44	44	44	44	44	44
30	50	18	50	50	50	50	50	50	50

TYPE OF SOIL CONDITION	LATERAL BEARING PRESSURE
A. SOFT CLAY: FINE LOOSE SAND	500 LBS. PER SQ. FT.
B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND	1000 LBS. PER SQ FT.
C. HARD DRY CLAY	1500 LBS. PER SQ. FT.
D. COARSE SAND	2000 LBS. PER SQ FT.
E. GRAVEL	3000 LBS. PER SQ. FT.
F. SOFT ROCK	4000 LBS. PER SQ FT.
G. HARDPAN	5000 LBS. PER SQ. FT.

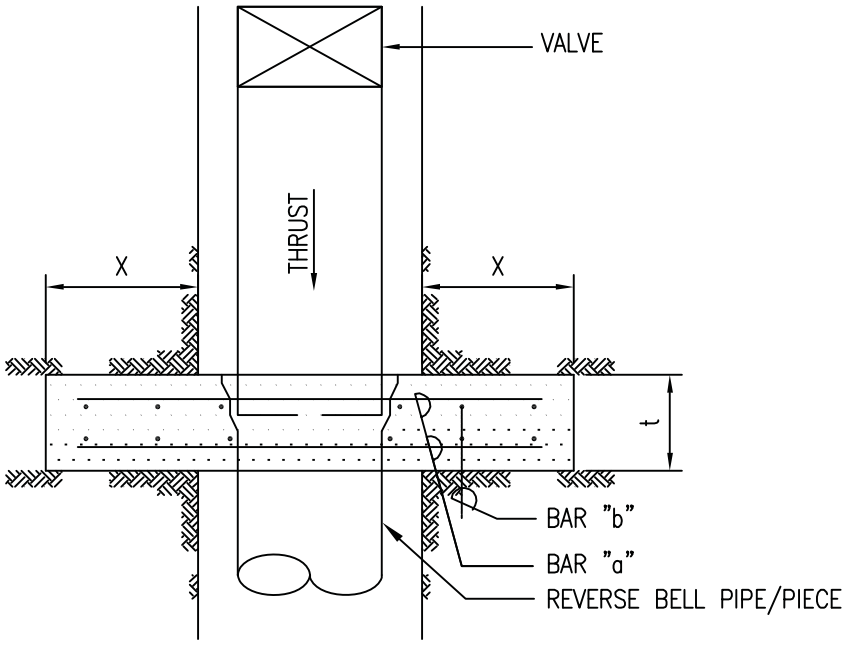
NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

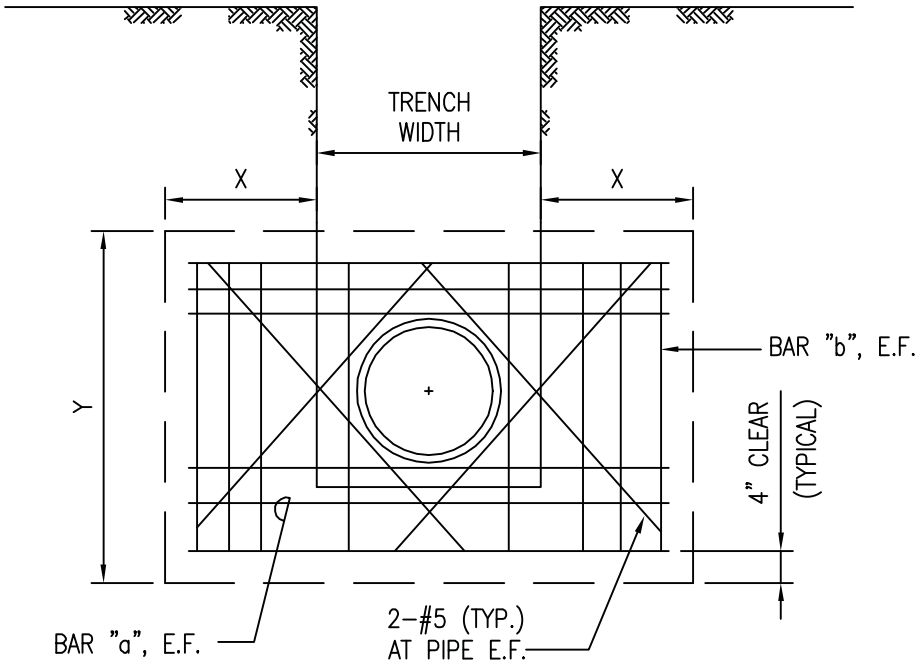
2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE

	2002
	REVISION

KAUAI OAHU MAUI	# GATE VALVE ANCHOR BLOCK SCHEDULE SCALE: NTS	STANDARD DETAILS	B15



PLAN



ELEVATION

SEE TABLE ON PLATES B17 AND B18 FOR DIMENSION. FOR TRENCH WIDTH REFER TO TABLE 300-1 IN DIVISION 300 OF THE WATER SYSTEM STANDARDS.

FOR MAUI: SEE TABLE ON PLATES B20 AND B21 WHEN BEAM IS REQUIRED FOR RESTRAINT OF A REDUCER.

2002	
REVISION	

KAUAI OAHU MAUI HAWAII	**CONCRETE THRUST BEAM** **TYPICAL DETAIL** **SCALE: NTS**	STANDARD DETAILS	B16

KAUAI
OAHU
MAUI
HAWAII

CONCRETE THRUST BEAM SCHEDULE

SCALE: NTS

STANDARD DETAILS

B17

REVISION 2002

WATER PRESSURE 250 PSI
TYPE OF SOIL CONDITION

PIPE	A		B		C		D		E		F		G			Bar "a"	Bar "b"
SIZE (in)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	t (in)	Min.	Min.
4	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	12.00	#4@12"	#4@12"
6	3.00	4.00	3.00	3.75	3.00	3.75	3.00	3.75	3.00	3.75	3.00	4.00	3.00	4.00	12.00	#4@12"	#4@12"
8	3.50	4.75	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	12.00	#4@6"	#4@12"
12	5.00	6.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	18.00	#4@6"	#5@12"
16	6.75	8.75	4.75	6.00	4.00	5.25	3.75	4.75	3.75	4.75	3.75	5.00	3.75	4.75	18.00	#5@6"	#5@12"
18	7.50	9.75	5.25	6.75	4.50	5.75	4.00	5.25	4.00	5.25	4.00	5.25	4.25	5.50	18.00	#6@6"	#5@12"
20	8.25	10.75	5.75	7.25	4.75	6.00	4.25	5.50	4.25	5.50	4.50	5.75	4.50	5.75	24.00	#6@6"	#6@12"
24	10.00	12.75	6.75	8.50	5.75	7.25	5.00	6.25	4.50	5.75	4.75	6.00	4.75	6.00	24.00	#6@6"	#6@12"
30	12.25	15.75	8.75	11.00	7.25	9.25	6.25	8.00	6.00	7.50	6.00	7.50	6.00	7.50	24.00	#8@6"	#6@12"
36	14.75	18.75	10.50	13.25	8.50	10.75	7.50	9.50	7.00	9.00	7.00	9.00	7.00	9.00	30.00	#9@6"	#6@8"
42	17.00	21.75	12.00	15.25	10.00	12.75	8.75	11.25	7.75	9.75	7.75	9.75	7.75	9.75	36.00	#10@6"	#6@6"

WATER PRESSURE 200 PSI
TYPE OF SOIL CONDITION

PIPE	A		B		C		D		E		F		G			Bar "a"	Bar "b"
SIZE (in)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	t (in)	Min.	Min.
4	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	12.00	#4@12"	#4@10"
6	3.00	4.00	3.00	3.75	3.00	3.75	3.00	3.75	3.00	3.75	3.00	3.75	3.00	3.75	12.00	#4@12"	#4@10"
8	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	12.00	#4@12"	#4@10"
12	4.50	5.75	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	18.00	#4@12"	#5@10"
16	6.00	7.75	4.50	5.75	3.75	4.75	3.75	4.75	3.75	4.75	3.75	4.75	3.75	4.75	18.00	#4@6"	#5@10"
18	6.75	8.75	5.00	6.50	4.00	5.25	4.00	5.25	4.25	5.50	4.00	5.25	4.25	5.50	18.00	#5@6"	#5@10"
20	7.50	9.75	5.25	6.75	4.25	5.50	4.25	5.50	4.50	5.75	4.50	5.75	4.50	5.75	24.00	#5@6"	#6@10"
24	8.75	11.50	6.25	8.00	5.25	6.75	4.50	5.75	4.75	6.00	4.75	6.00	4.75	6.00	24.00	#6@6"	#6@10"
30	11.00	14.25	7.75	10.00	6.50	8.50	5.75	7.50	5.25	6.75	5.25	6.75	5.25	6.75	24.00	#7@6"	#6@10"
36	13.25	17.00	9.50	12.00	7.75	10.00	6.75	8.75	6.00	7.50	6.00	7.50	6.00	7.50	30.00	#8@6"	#6@8"
42	15.50	19.50	11.00	14.25	9.00	11.25	8.00	10.25	7.00	8.75	7.00	8.75	7.00	8.75	36.00	#9@6"	#6@6"

NOTE:

REFER TO DETAIL B18 FOR ADDITIONAL INFORMATION

KAUAI
OAHU
MAUI
HAWAII

CONCRETE THRUST BEAM SCHEDULE

SCALE: NTS

STANDARD DETAILS

B18

REVISION | 2002

WATER PRESSURE 150 PSI
TYPE OF SOIL CONDITION

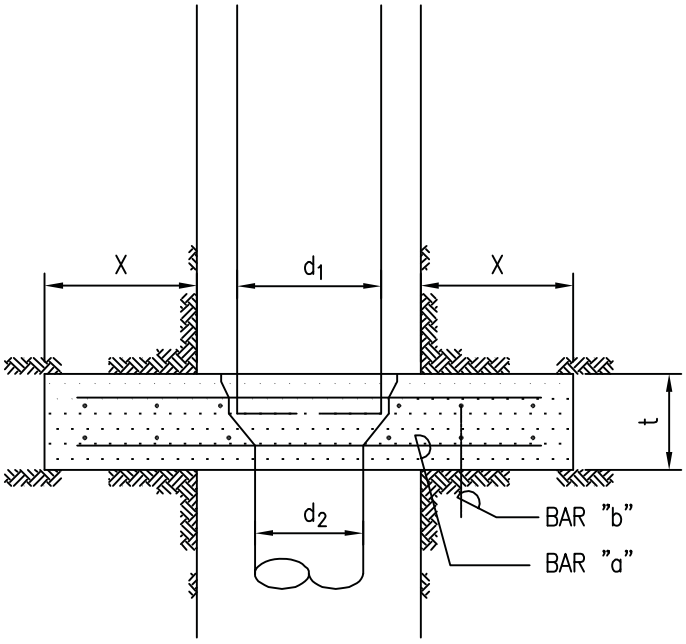
PIPE	A		B		C		D		E		F		G			Bar "a"	Bar "b"
SIZE (in)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	t (in)	Min.	Min.
4	2.75	3.25	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	12.00	#4@12"	#4@10"
6	3.00	3.25	3.00	3.75	3.00	3.75	3.00	3.75	3.00	3.75	3.00	3.75	3.00	3.75	12.00	#4@12"	#4@10"
8	3.50	3.75	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	12.00	#4@12"	#4@10"
12	4.00	5.25	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	18.00	#4@12"	#5@10"
16	5.25	6.75	3.75	4.75	3.75	4.75	3.75	4.75	3.75	4.75	3.75	4.75	3.75	4.75	18.00	#4@6"	#5@10"
18	6.00	7.75	4.25	5.50	4.00	5.50	4.00	5.25	4.25	5.50	4.25	5.50	4.25	5.50	18.00	#5@6"	#5@10"
20	6.50	8.25	4.50	5.75	4.25	5.75	4.50	5.75	4.50	5.75	4.50	5.75	4.50	5.75	24.00	#5@6"	#6@10"
24	7.75	10.00	5.50	7.00	4.75	6.00	4.75	6.00	4.75	6.00	4.75	6.00	4.75	6.00	24.00	#5@6"	#6@10"
30	9.50	12.25	6.75	8.50	5.75	7.25	5.25	6.75	5.25	6.75	5.25	6.75	5.25	6.75	24.00	#6@6"	#6@10"
36	11.25	14.25	8.00	10.25	6.75	8.50	5.75	7.25	5.75	7.25	5.75	7.25	5.75	7.25	30.00	#7@6"	#6@8"
42	13.25	16.75	9.50	12.25	7.75	9.75	6.75	8.50	6.25	8.00	6.25	8.00	6.25	8.00	36.00	#8@6"	#6@6"

TYPE OF SOIL CONDITION	LATERAL BEARING PRESSURE
A. SOFT CLAY: FINE LOOSE SAND	500 LBS. PER SQ. FT.
B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND	1000 LBS. PER SQ. FT.
C. HARD DRY CLAY	1500 LBS. PER SQ. FT.
D. COARSE SAND	2000 LBS. PER SQ FT.
E. GRAVEL	3000 LBS. PER SQ. FT.
F. SOFT ROCK	4000 LBS. PER SQ FT.
G. HARDPAN	5000 LBS. PER SQ. FT.

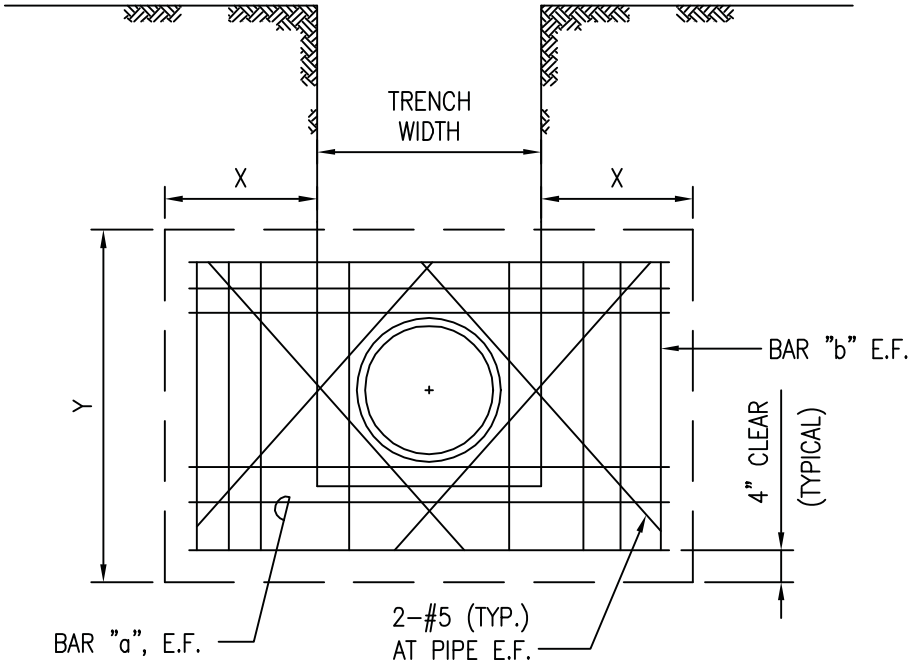
NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE



PLAN



ELEVATION

SEE TABLE ON PLATES B20 AND B21 FOR DIMENSION. FOR TRENCH WIDTH REFER TO TABLE 300-1 IN DIVISION 300 OF THE WATER SYSTEM STANDARDS.

	2002
	REVISION

KAUAI OAHU HAWAII	**CONCRETE THRUST BEAM** **FOR REDUCER - TYPICAL DETAIL** **SCALE: NTS**	STANDARD DETAILS	B19

KAUAI
OAHU
MAUI
HAWAII

CONCRETE THRUST BEAM

REDUCER - SCHEDULE

SCALE: NTS

STANDARD DETAILS

B20

WATER PRESSURE 250 PSI
TYPE OF SOIL CONDITION

D1	D2	A		B		C		D		E		F		G			Bar "a"	Bar "b"
PIPE	PIPE	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	t (in)	Min.	Min.
SIZE (in)	SIZE (in)																	
4	3	2.00	2.50	2.00	2.50	2.00	2.50	2.00	2.50	2.00	2.50	2.00	2.50	2.00	2.50	5.00	#4@6"	#4@12"
6	4	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	7.00	#4@6"	#4@12"
8	6	2.75	3.50	2.50	3.50	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	9.00	#4@6"	#4@12"
12	10	4.75	6.25	3.50	4.00	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	12.00	#4@6"	#5@12"
16	12	6.00	7.75	4.25	5.25	3.50	4.50	3.00	3.75	2.75	3.50	3.00	3.75	3.00	3.75	16.00	#5@6"	#5@12"
18	16	6.50	8.25	4.75	5.75	3.75	4.75	3.25	4.25	2.75	3.50	3.25	4.25	3.25	4.25	17.00	#5@6"	#5@8"
20	18	7.00	8.75	5.00	6.25	4.00	5.25	3.50	4.50	3.00	3.75	3.25	4.25	3.25	4.25	18.00	#5@6"	#5@8"
24	20	8.50	10.75	6.00	7.75	5.00	6.50	4.25	5.50	3.50	4.50	3.75	4.75	3.75	4.75	22.00	#6@6"	#5@8"
30	24	9.75	12.25	7.00	9.50	5.75	7.25	5.00	6.25	4.00	5.25	4.25	5.50	4.25	5.50	24.00	#7@6"	#5@8"
36	30	12.00	15.00	8.50	11.75	7.00	8.75	6.00	7.75	5.00	6.25	4.75	6.00	4.75	6.00	30.00	#8@6"	#5@6"
42	30	14.75	18.50	10.50	13.50	8.50	10.75	7.50	9.50	6.00	7.50	5.25	6.75	5.25	6.75	36.00	#9@6"	#6@6"

WATER PRESSURE 200 PSI
TYPE OF SOIL CONDITION

D1	D2	A		B		C		D		E		F		G			Bar "a"	Bar "b"
PIPE	PIPE	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	t (in)	Min.	Min.
SIZE (in)	SIZE (in)																	
4	3	2.00	2.50	2.00	2.50	2.00	2.50	2.00	2.50	2.00	2.50	2.00	2.50	2.00	2.50	5.00	#4@12"	#4@12"
6	4	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	7.00	#4@12"	#4@12"
8	6	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	9.00	#4@12"	#4@12"
12	10	4.25	5.50	3.00	3.75	2.75	3.75	2.75	3.75	2.75	3.50	2.75	3.50	2.75	3.50	12.00	#4@6"	#5@12"
16	12	5.25	6.75	3.75	4.75	3.25	4.25	3.00	4.00	3.00	3.75	3.00	3.75	3.00	3.75	16.00	#4@6"	#5@12"
18	16	5.75	7.25	4.25	5.50	3.50	4.50	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	17.00	#5@6"	#5@8"
20	18	6.25	8.00	4.50	5.75	3.75	4.75	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	18.00	#5@6"	#5@8"
24	20	7.50	9.50	5.25	6.75	4.25	5.50	3.75	4.75	3.75	4.75	3.75	4.75	3.75	4.75	22.00	#5@6"	#5@8"
30	24	8.50	10.75	6.00	7.75	5.00	6.25	4.50	5.75	4.25	5.75	4.25	5.75	4.25	5.75	24.00	#6@6"	#5@8"
36	30	10.75	13.50	7.75	9.75	6.25	8.00	5.50	7.00	4.75	6.00	4.75	6.00	4.75	6.00	30.00	#7@6"	#5@6"
42	30	13.25	16.75	9.25	11.75	7.75	9.75	6.75	8.50	5.50	7.00	5.25	7.00	5.25	7.00	36.00	#8@6"	#6@6"

REVISION	2002	

NOTE:

REFER TO PLATE B21 FOR ADDITIONAL INFORMATION

KAUAI
OAHU
MAUI
HAWAII

CONCRETE THRUST BEAM
FOR REDUCER - SCHEDULE

SCALE: NTS

STANDARD DETAILS

B21

REVISION 2002

WATER PRESSURE 150 PSI
TYPE OF SOIL CONDITION

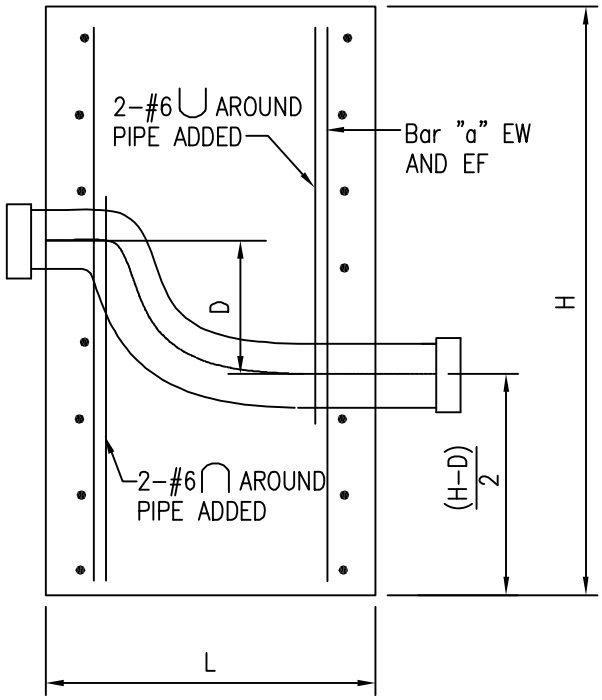
D1	D2	A		B		C		D		E		F		G			Bar "a"	Bar "b"
PIPE	PIPE	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	t (in)	Min.	Min.
SIZE (in)	SIZE (in)																	
4	3	2.00	2.50	2.00	2.75	2.00	2.75	2.00	2.75	2.00	2.75	2.00	2.75	2.00	2.75	5.00	#4@12"	#4@12"
6	4	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	2.25	3.00	7.00	#4@12"	#4@12"
8	6	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	2.50	3.25	9.00	#4@12"	#4@12"
12	10	3.50	4.75	2.75	3.25	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	2.75	3.50	12.00	#4@12"	#5@12"
16	12	4.75	6.00	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	16.00	#4@6"	#5@12"
18	16	5.00	6.25	3.50	4.50	3.50	4.50	3.25	4.25	3.25	4.25	3.25	4.25	3.25	4.25	17.00	#4@6"	#5@8"
20	18	5.50	7.00	3.75	4.75	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	18.00	#4@6"	#5@8"
24	20	6.50	8.25	4.50	5.75	3.75	4.75	3.75	4.75	3.75	4.75	3.75	4.75	3.75	4.75	22.00	#5@6"	#5@8"
30	24	7.50	9.50	5.25	6.75	4.50	5.75	4.25	5.75	4.25	5.75	4.25	5.75	4.25	5.75	24.00	#5@6"	#5@8"
36	30	9.25	11.75	6.50	8.25	5.50	7.00	4.75	6.00	4.75	6.00	4.75	6.00	4.75	6.00	30.00	#6@6"	#5@6"
42	30	11.50	14.25	8.00	10.25	6.75	8.50	5.25	6.75	5.25	6.75	5.25	6.75	5.25	6.75	36.00	#7@6"	#6@6"

TYPE OF SOIL CONDITION	LATERAL BEARING PRESSURE
A. SOFT CLAY: FINE LOOSE SAND	500 LBS. PER SQ. FT.
B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND	1000 LBS. PER SQ. FT.
C. HARD DRY CLAY	1500 LBS. PER SQ. FT.
D. COARSE SAND	2000 LBS. PER SQ FT.
E. GRAVEL	3000 LBS. PER SQ. FT.
F. SOFT ROCK	4000 LBS. PER SQ FT.
G. HARDPAN	5000 LBS. PER SQ. FT.

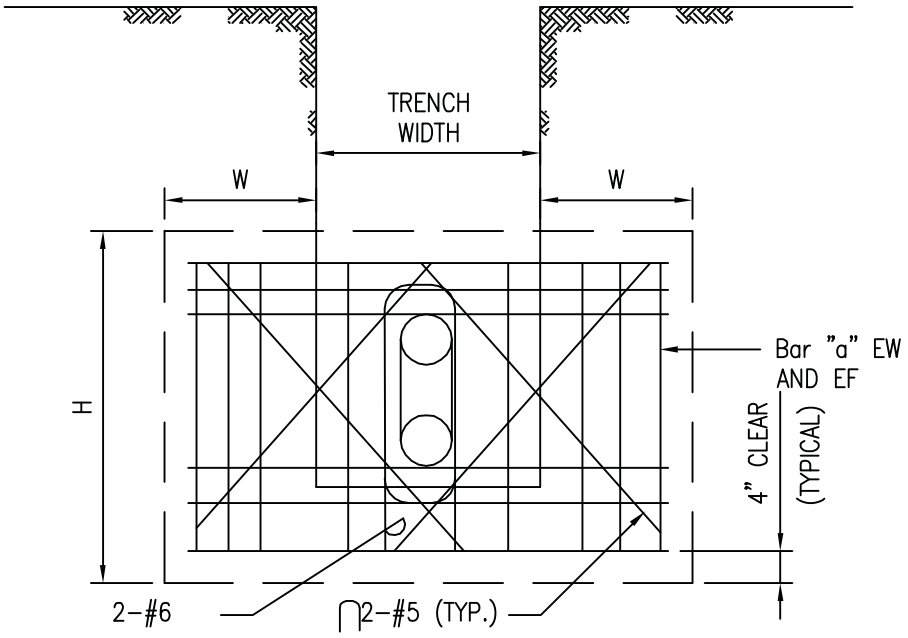
NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE BEFORE USING TABLES ABOVE



SECTION



ELEVATION

SEE PLATE B23 FOR TABLE. FOR TRENCH WIDTH REFER TO TABLE 300–1 IN WATER DIVISION 300 OF THE SYSTEM STANDARDS.

2002
REVISION

KAUAI
OAHU
MAUI
HAWAII

CONCRETE THRUST BEAM
FOR OFFSET - TYPICAL DETAIL
SCALE: NTS

STANDARD DETAILS

B22

TYPE OF SOIL CONDITION					A	B	C	D	E	F	Bar "a" Min.
SIZE (in)	D (in)	PRESSURE (psi)	L (in)	H (ft)	W (ft)	W (ft)	W (ft)	W (ft)	W (ft)	W (ft)	
3	6	250	15	3.25	1.50	1.50	1.50	1.50	1.50	1.50	#4@6"
3	12	250	18	3.25	1.50	1.50	1.50	1.50	1.50	1.50	#4@6"
3	18	250	27	3.75	1.50	1.50	1.50	1.50	1.50	1.50	#5@6"
4	6	250	15	3.25	1.50	1.50	1.50	1.50	1.50	1.50	#4@6"
4	12	250	18	3.25	1.50	1.50	1.50	1.50	1.50	1.50	#4@6"
4	18	250	27	3.75	2.00	1.50	1.50	1.50	1.50	1.50	#5@6"
6	6	250	18	3.25	1.75	1.50	1.50	1.50	1.50	1.50	#4@6"
6	12	250	21	3.50	2.25	1.50	1.50	1.50	1.50	1.50	#4@6"
6	18	250	30	4.00	2.50	2.00	1.50	1.50	1.50	1.50	#5@6"
8	6	250	18	3.50	2.00	1.50	1.50	1.50	1.50	1.50	#4@6"
8	12	250	24	3.75	4.00	2.00	1.50	1.50	1.50	1.50	#5@6"
8	18	250	30	4.25	4.00	2.00	2.00	1.50	1.50	1.50	#5@6"
12	6	250	21	3.75	3.75	2.00	1.50	1.50	1.50	1.50	#4@6"
12	12	250	33	4.75	4.75	2.50	1.75	2.00	1.50	1.50	#6@8"
12	18	250	45	5.25	5.75	5.00	2.00	3.00	2.00	1.50	#7@8"
16	6	150	24	4.25	3.75	2.00	1.50	1.50	1.50	1.50	#5@8"
16	6	250	24	4.50	4.75	3.00	2.00	1.50	1.50	1.50	#5@8"
16	12	150	36	5.00	5.00	3.75	2.50	2.00	1.50	1.50	#6@6"
16	12	250	36	5.25	7.00	4.75	4.00	3.00	2.00	1.50	#6@6"
16	18	150	45	5.50	5.75	3.75	3.75	2.75	2.00	1.50	#7@8"
16	18	250	45	6.25	7.25	5.75	4.75	4.50	3.00	2.00	#7@8"

NOTE:

FOR 12–INCH AND SMALLER OFFSETS WITH TEST PRESSURE OF 150 OR 200 PSI, USE SCHEDULE FOR 250 PSI TEST PRESSURE.

TYPE OF SOIL CONDITION	LATERAL BEARING PRESSURE
A. SOFT CLAY: FINE LOOSE SAND	500 LBS. PER SQ. FT.
B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND	1000 LBS. PER SQ. FT.
C. HARD DRY CLAY	1500 LBS. PER SQ. FT.
D. COARSE SAND	2000 LBS. PER SQ FT.
E. GRAVEL	3000 LBS. PER SQ. FT.
F. SOFT ROCK	4000 LBS. PER SQ FT.
G. HARDPAN	5000 LBS. PER SQ. FT.

NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE.

2002
REVISION

KAUAI
OAHU
MAUI
HAWAII

CONCRETE THRUST BEAM
FOR OFFSET - SCHEDULE
SCALE: NTS

STANDARD DETAILS

B23

OAHU
MAUI
HAWAII
KAUAI

CHAIN LINK FENCE

SCALE: NTS

STANDARD DETAILS

F1

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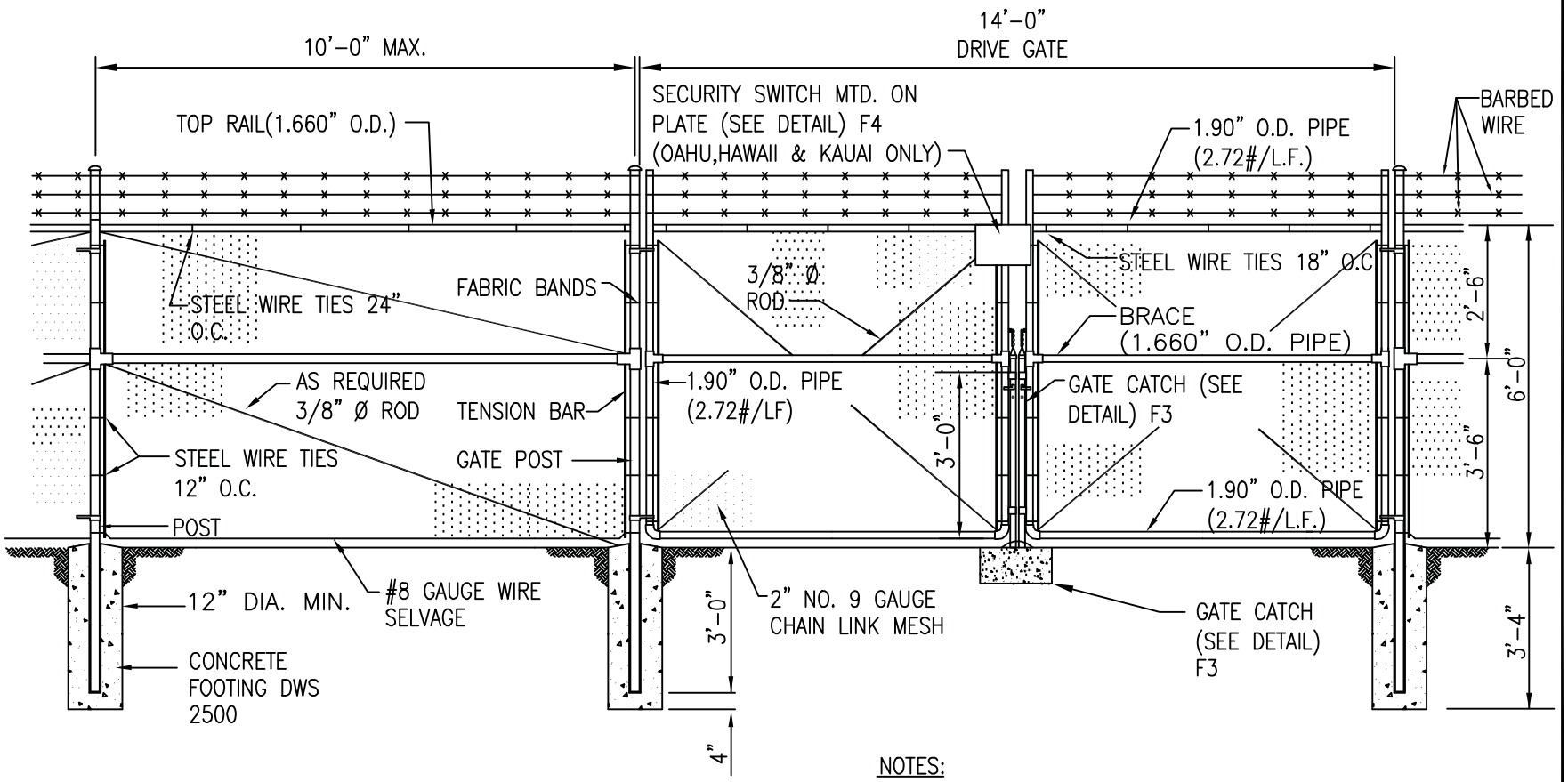


DRIVE GATE DETAIL
N.T.S.

NOTES:

1. FOR SIZES OF POSTS & RAILS, SEE TABLE 300-14 OF WATER SYSTEM STANDARDS.
2. DEPARTMENT SHALL FURNISH PADLOCKS.
3. ALL MATERIALS SHALL BE HOT-DIPPED GALVANIZED UNLESS SPECIFIED OTHERWISE.
4. CONTRACTOR TO FURNISH PADLOCKS (KAUAI ONLY)

OAHU
MAUI
HAWAII
KAUAI

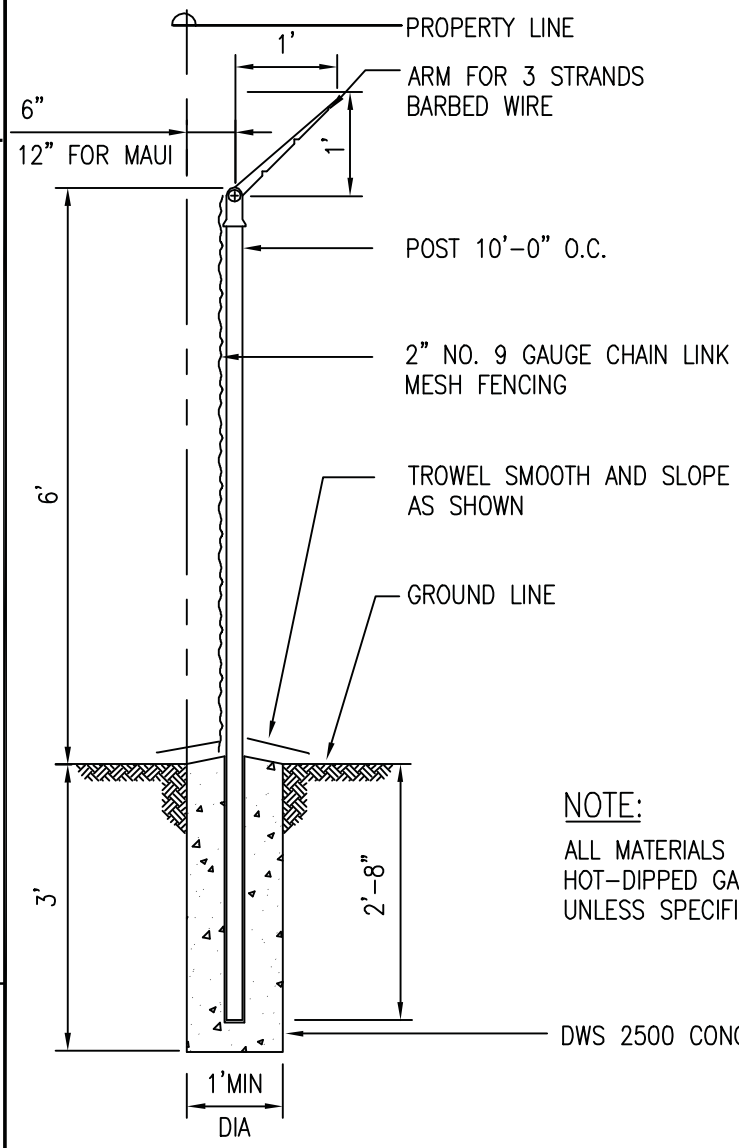
CHAIN LINK FENCE POST AND PEDESTRIAN GATE

SCALE: NTS

STANDARD DETAILS

F2

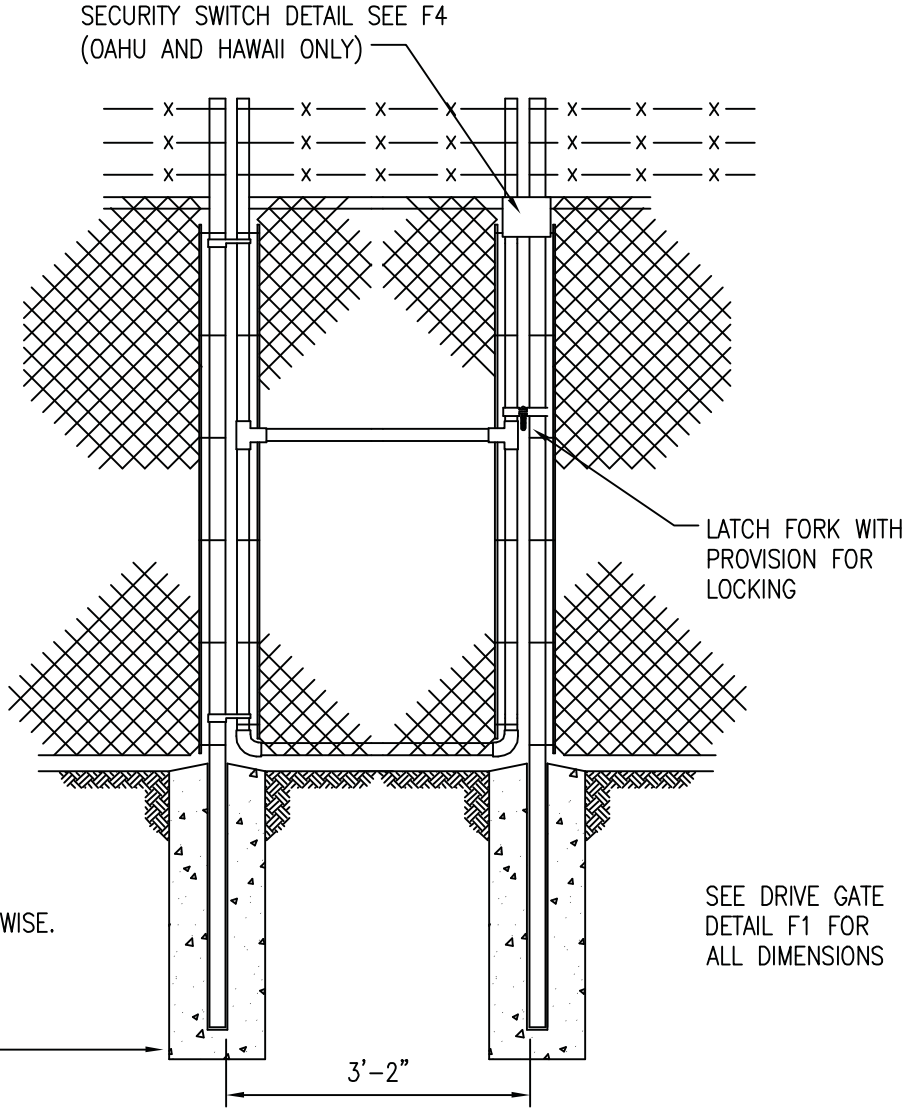
REVISION 2002



CHAIN LINK FENCE POST

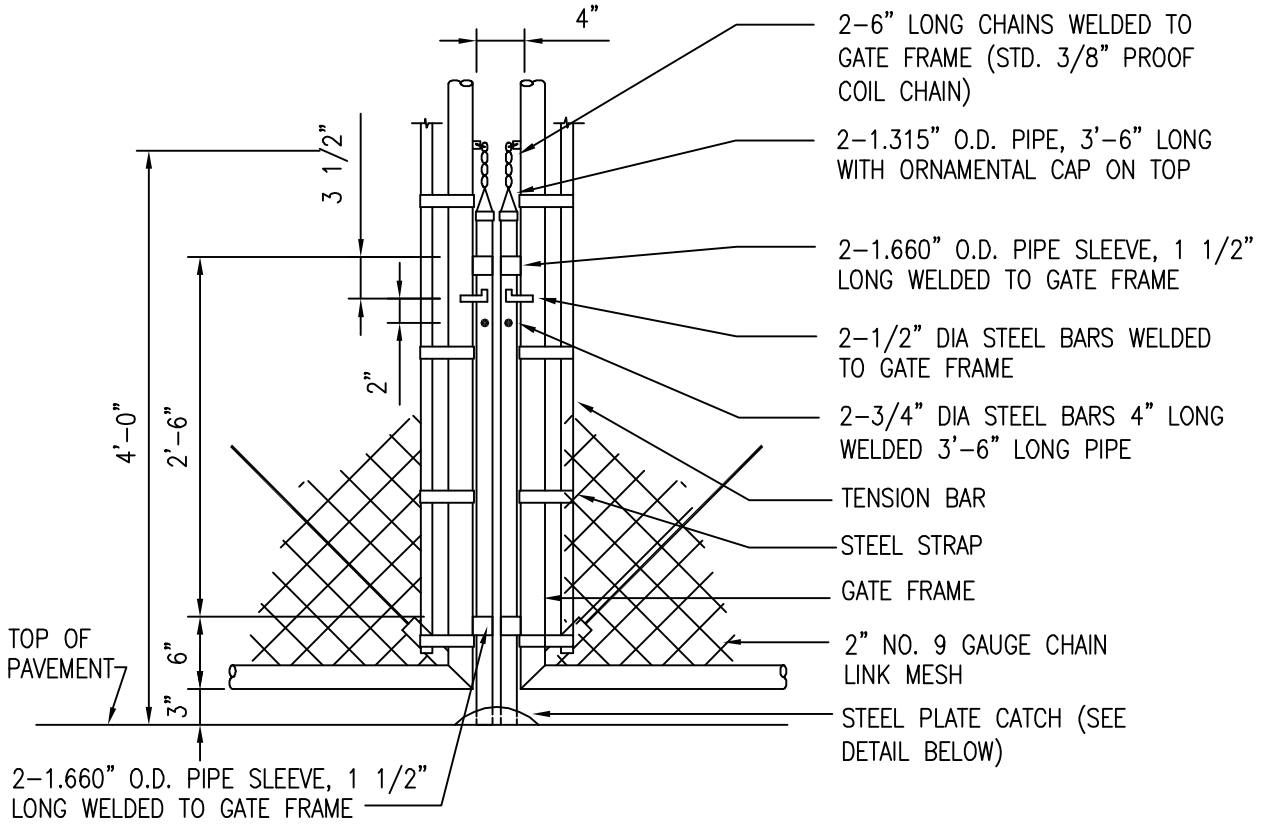
NOTE:

ALL MATERIALS SHALL BE HOT-DIPPED GALVANIZED UNLESS SPECIFIED OTHERWISE.

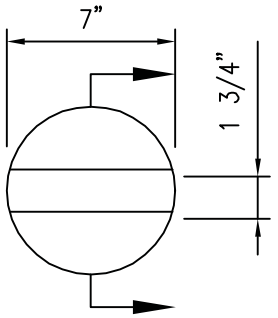


SEE DRIVE GATE DETAIL F1 FOR ALL DIMENSIONS

30" CHAIN LINK PEDESTRIAN GATE



DETAIL AT CATCH GATE

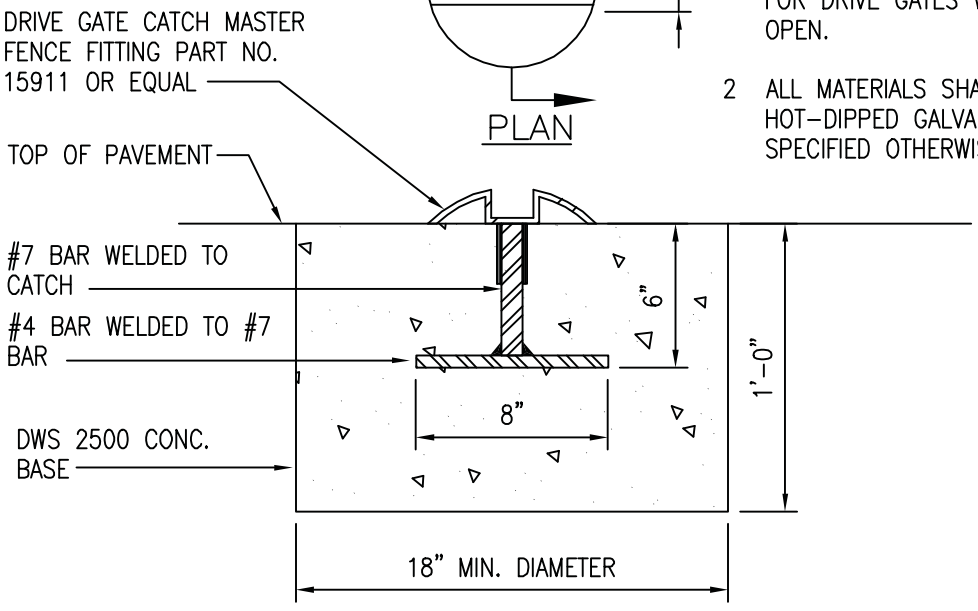


PLAN

NOTES:

1 PROVIDE 2 GATE STOPS, SIMILAR IN CONSTRUCTION AS GATE CATCH FOR DRIVE GATES WHEN FULLY OPEN.

2 ALL MATERIALS SHALL BE HOT-DIPPED GALVANIZED UNLESS SPECIFIED OTHERWISE.



SECTION

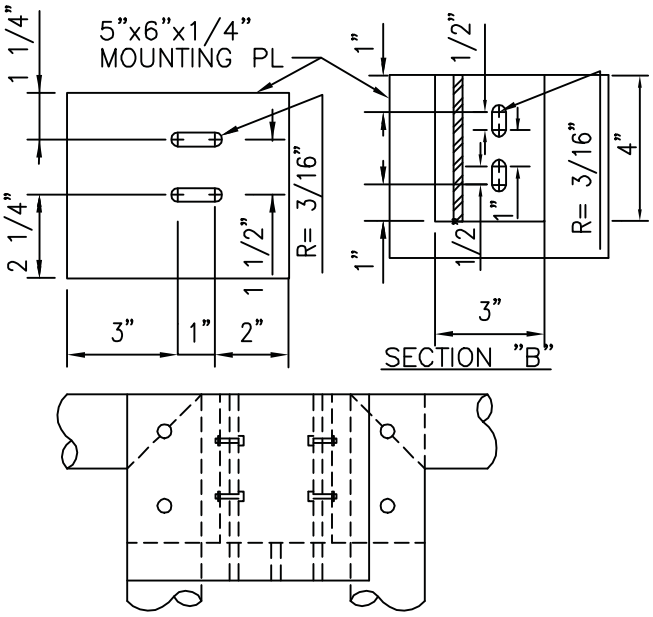
2002
REVISION

OAHU
MAUI
HAWAII
KAUAI

CHAIN LINK FENCE
MISCELLANEOUS DETAILS
SCALE: NTS

STANDARD DETAILS

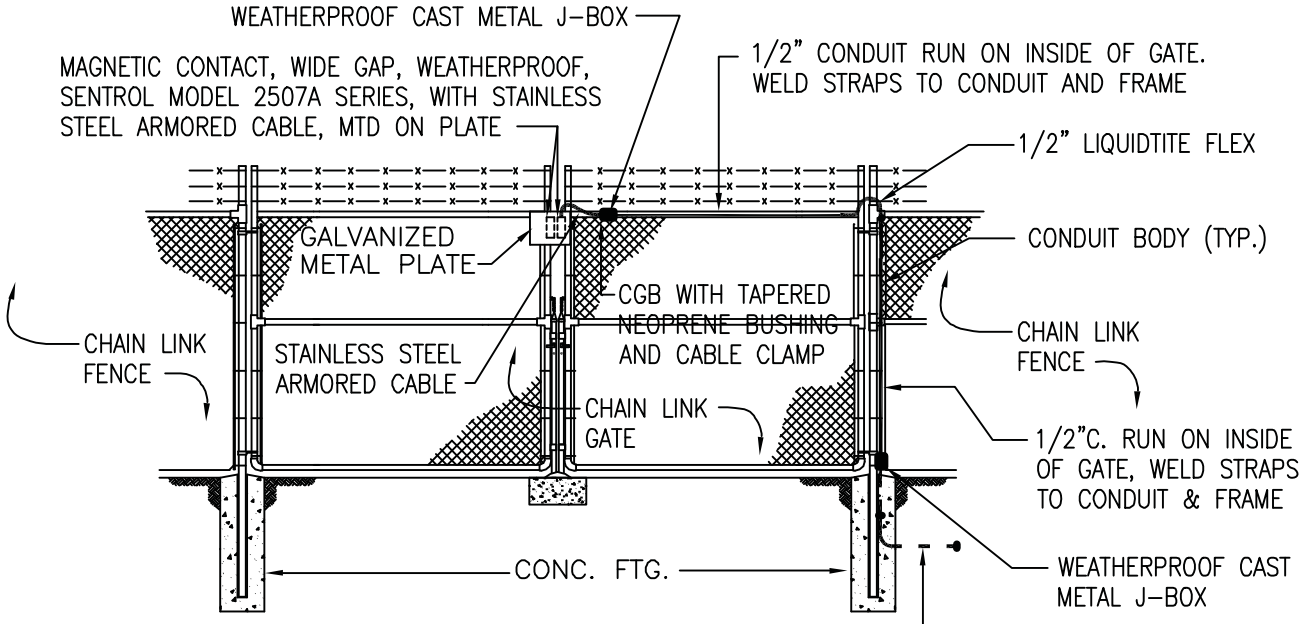
F3



A / F4 SECURITY SWITCH DETAIL FOR INSWINGING DOUBLE LEAF CHAIN LINK FENCE

(OPPOSITE HAND FOR OUTSWINGING)

N.T.S.



ELEVATION

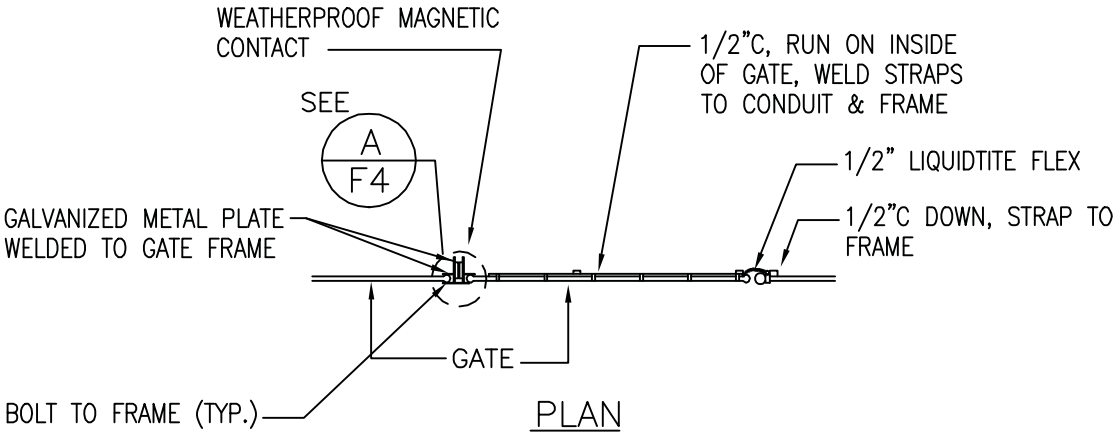
DETAIL OF GATE SWITCH

NOTE: ALL MATERIALS SHALL BE HOT-DIP GALVANIZED UNLESS SPECIFIED OTHERWISE.

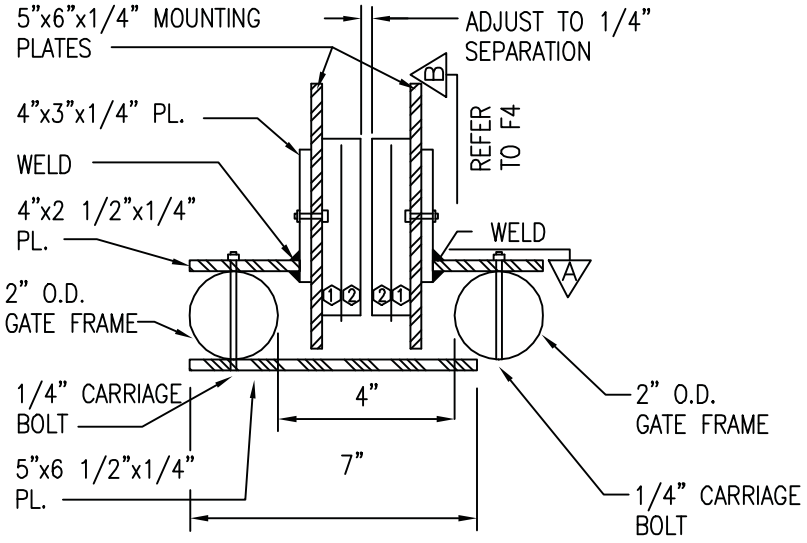
SEE OTHER PLATES FOR DETAILS NOT SHOWN.

	2002
	REVISION

OAHU HAWAII KAUAI	**CHAIN LINK FENCE** **SECURITY SWITCH DETAIL** **SCALE: NTS**	STANDARD DETAILS	F4



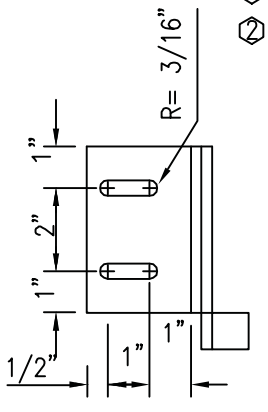
PLAN



PLAN

SWITCH ASSEMBLY DESCRIPTION

1. SPACER–SENTROL #1913 OR EQUAL
2. MAGNETIC SWITCH–SENTROL #2507 AH BIASED MAGNETIC SWITCH OR APPROVED EQUAL



SECTION "A"

2002
REVISION

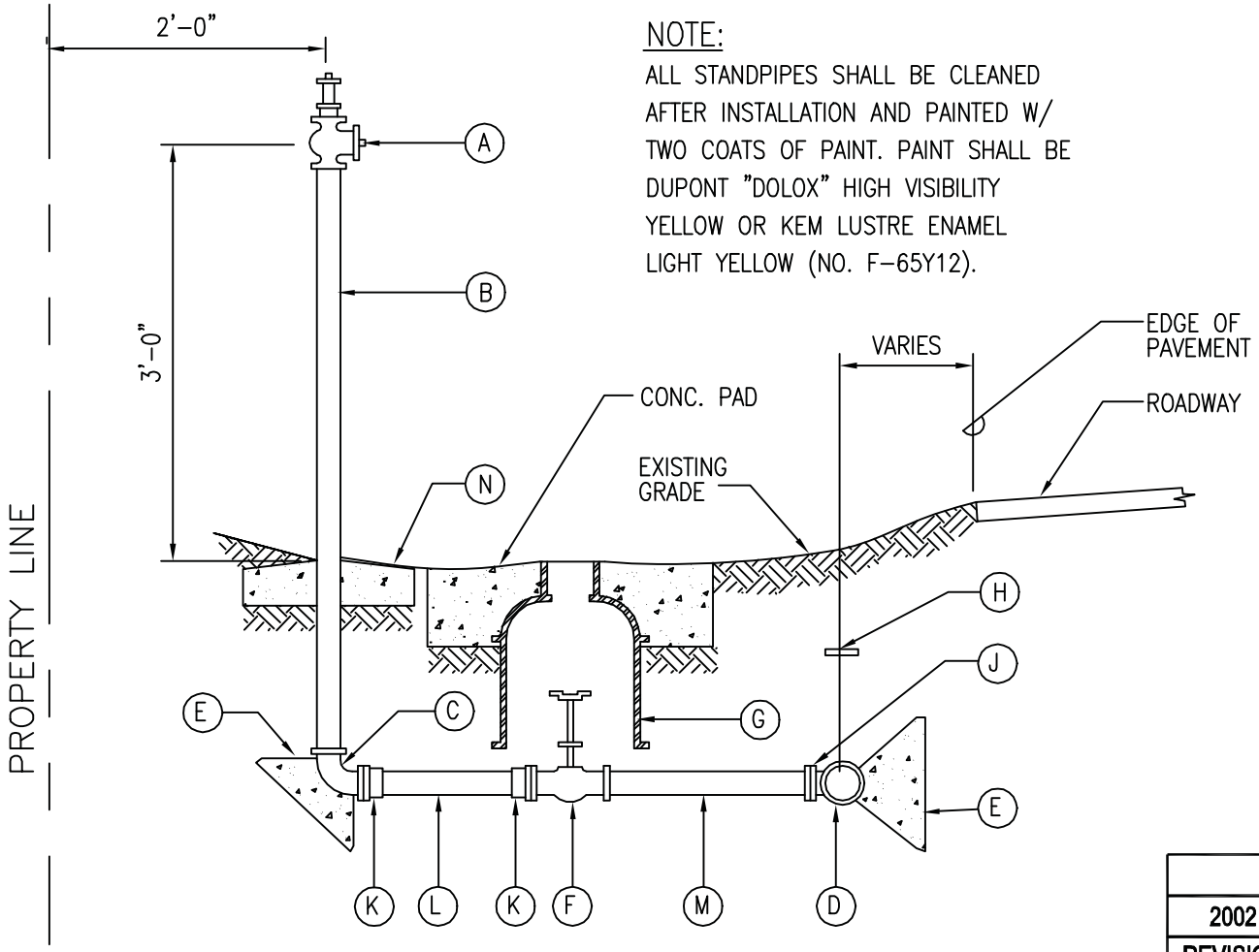
OAHU
HAWAII
KAUAI

CHAIN LINK FENCE
SECURITY SWITCH DETAIL
SCALE: NTS

STANDARD DETAILS

F5

	LIST OF MATERIALS
A	ANGLE FIRE HYDRANT VALVE, 2 1/2" IPT x 2 1/2" NATIONAL STANDARD FIRE HOSE COUPLING SCREW THREADS "JONES J-334" W/ CAP & CHAIN OR EQUAL.
B	2 1/2" GALV. STEEL PIPE, SCHEDULE 40 (CUT TO FIT)
C	2 1/2" GALV. STEEL 90° ELBOW
D	TEE
E	CONCRETE REACTION BLOCK
F	2 1/2" GATE VALVE, S.E.
G	CAST IRON VALVE BOX AND COVER
H	TERRA – TAPE "D"
J	2 1/2" BUSHING (S. x T.)
K	2 1/2" PVC MALE ADAPTER
L	2 1/2" PVC NIPPLE, SCHEDULE 40
M	2 1/2" BRASS NIPPLE (12" LONG)
N	6" x 2'-0" DIA. OR 2'-0" x 2'-0" SQ. SETTLEMENT SLAB



NOTE:

ALL STANDPIPES SHALL BE CLEANED AFTER INSTALLATION AND PAINTED W/ TWO COATS OF PAINT. PAINT SHALL BE DUPONT "DOLOX" HIGH VISIBILITY YELLOW OR KEM LUSTRE ENAMEL LIGHT YELLOW (NO. F-65Y12).

2002
REVISION

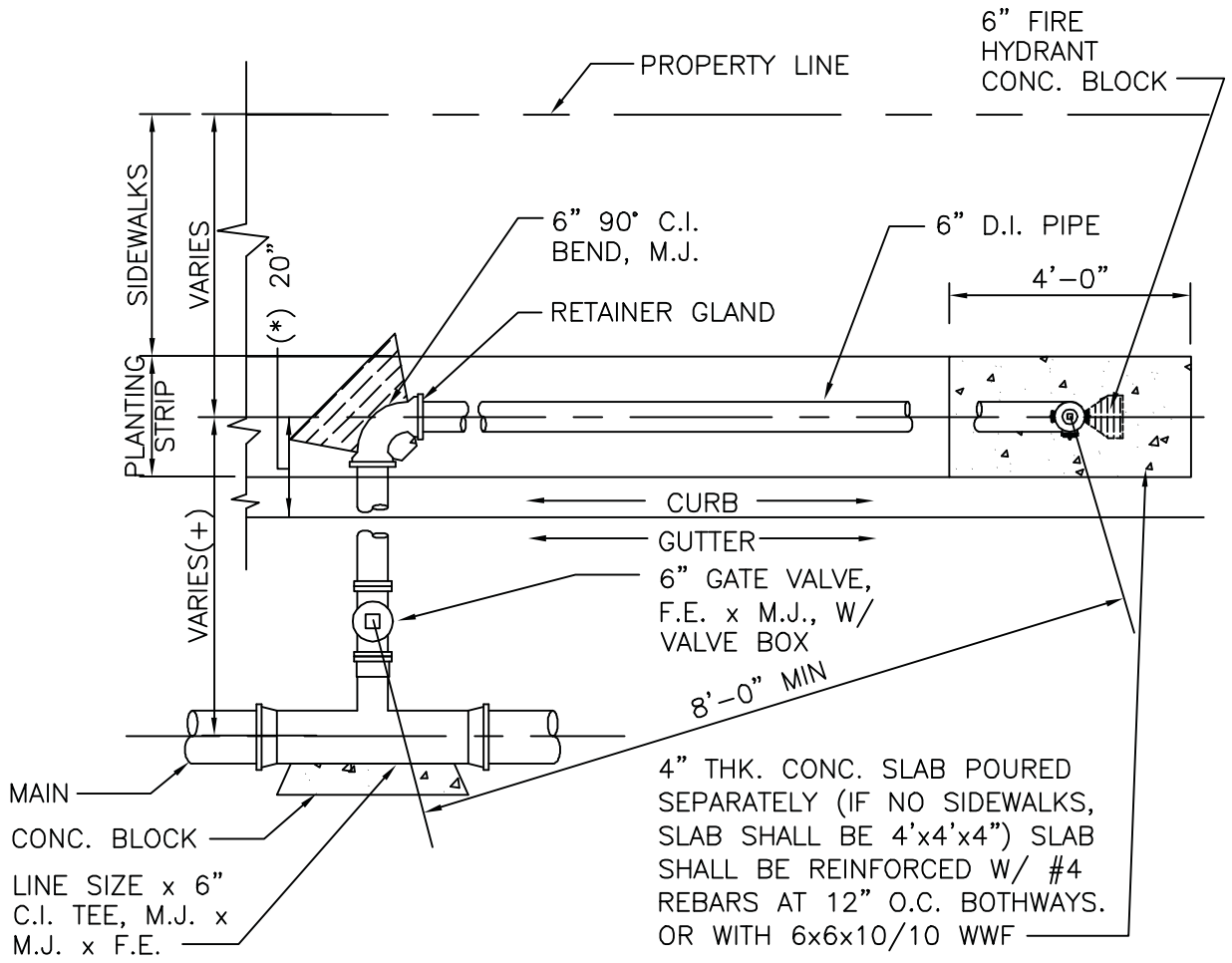
KAUAI

2 1/2" STANDPIPE DETAIL

SCALE: NTS

STANDARD DETAILS

FH1



NOTES:

1. GASKETS FOR FLANGED JOINTS SHALL BE 1/8" DUCK-INSERTED RUBBER PACKING GARLOCK NO. 19.
2. BOLTS SHALL BE BREAK-OFF TYPE, 5/8" DIA. X 3" LONG MACHINE BOLTS WITH CUT THREADS, AMERICAN STANDARD HEAVY HEXAGON HEADS, STAINLESS STEEL OR SILICON BRONZE.
3. NUTS SHALL BE AMERICAN STANDARD HEAVY COLD PUNCHED HEXAGON NUTS, STAINLESS STEEL OR SILICON BRONZE. (DOES NOT APPLY TO BREAK AWAY BOLTS)
4. CONCRETE SHALL BE DWS 2500.
5. FOR AREAS WITHOUT SIDEWALKS A CONCRETE CURB OR 4" D.I. PIPE SHALL BE INSTALLED IF CALLED FOR IN THE PLANS AND AS SHOWN IN THESE DETAILS.
6. REFER TO DETAIL FH3 FOR ADDITIONAL DETAILS.

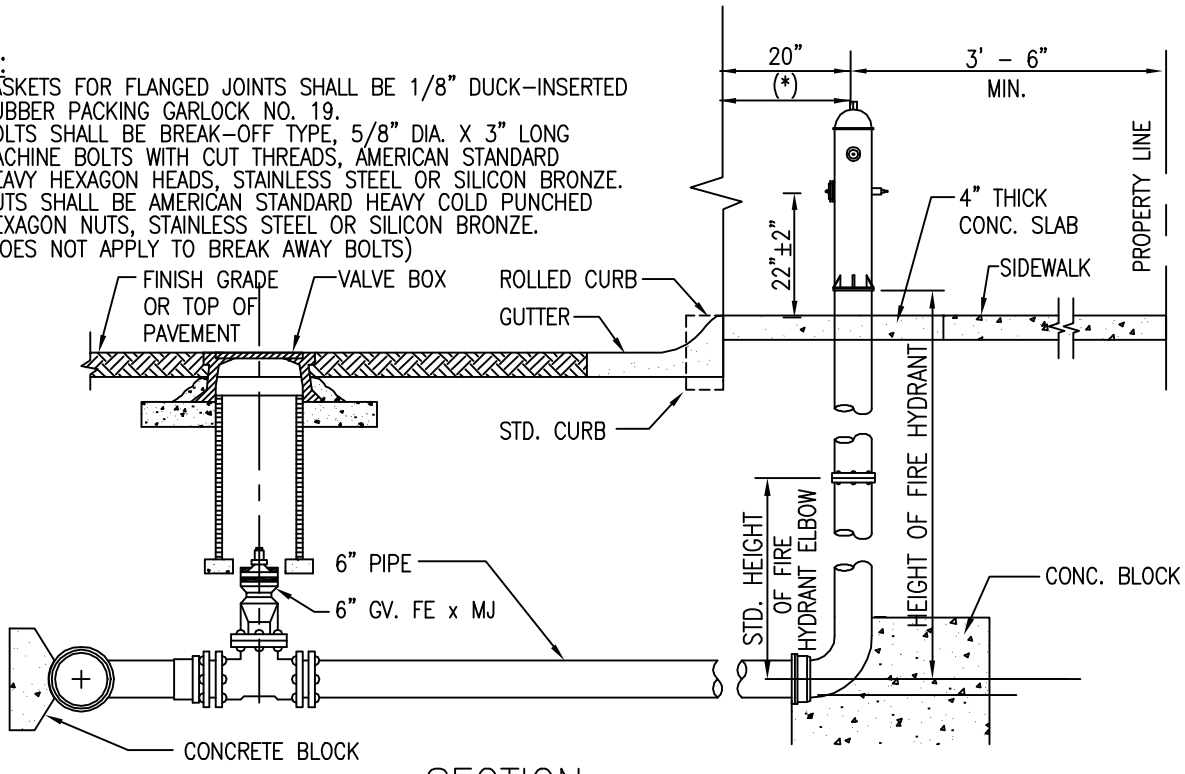
+ IF SPACE IS AVAILABLE, TAPPING VALVE/ TAPPING SLEEVE ASSEMBLY MAY BE USED WHEN APPROVED BY MANAGER.

* FOR AREAS WITH ROLLED CURB THE FIRE HYDRANT CENTERLINE SHALL BE 24" FROM THE EDGE OF THE ROLLED CURB.

	2002
	REVISION

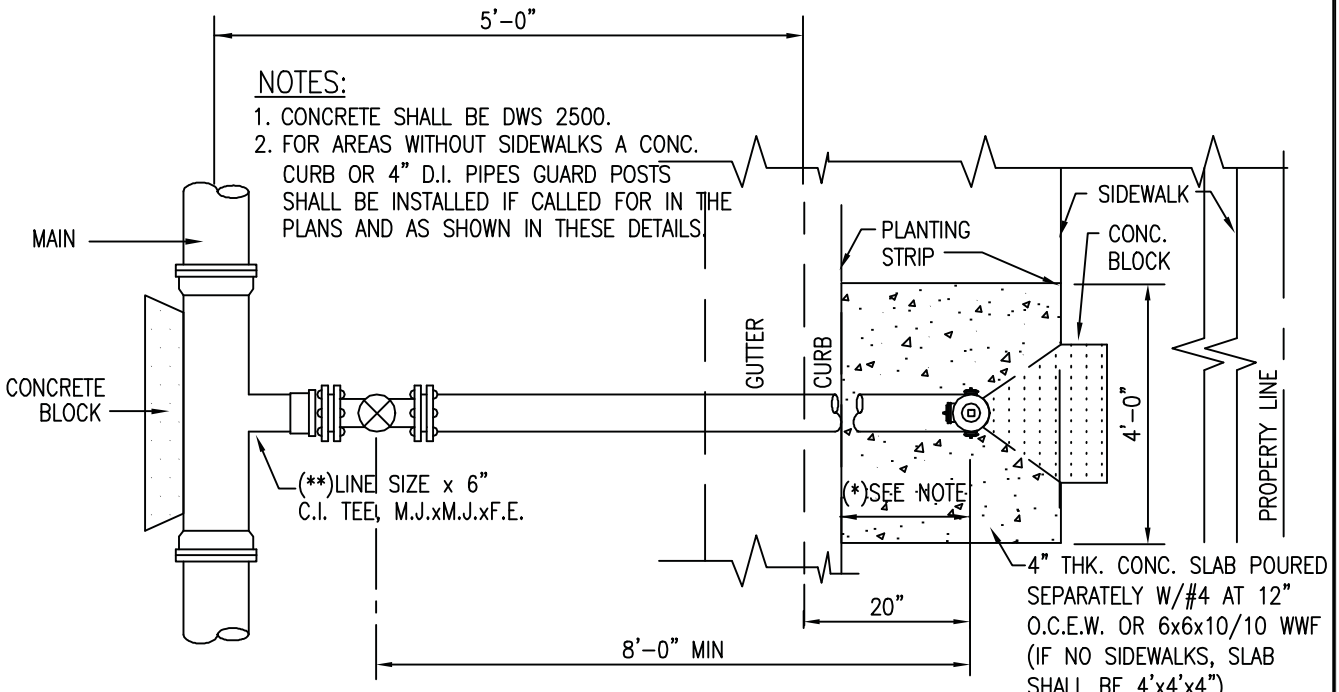
HAWAII	**HYDRANT CONNECTION LAYOUT "A"** (WITH ELBOW) SCALE: NTS	STANDARD DETAILS	FH2

NOTE:
1. GASKETS FOR FLANGED JOINTS SHALL BE 1/8" DUCK-INSERTED RUBBER PACKING GARLOCK NO. 19.
2. BOLTS SHALL BE BREAK-OFF TYPE, 5/8" DIA. X 3" LONG MACHINE BOLTS WITH CUT THREADS, AMERICAN STANDARD HEAVY HEXAGON HEADS, STAINLESS STEEL OR SILICON BRONZE.
3. NUTS SHALL BE AMERICAN STANDARD HEAVY COLD PUNCHED HEXAGON NUTS, STAINLESS STEEL OR SILICON BRONZE. (DOES NOT APPLY TO BREAK AWAY BOLTS)



SECTION

STANDARD HYDRANT EXTENSIONS ARE AVAILABLE IN THE FOLLOWING LENGTHS: 6 TO 30 INCHES LONG IN INCREMENTS OF 6 INCHES.



* FOR AREAS W/ ROLLED CURBS THE F.H. CENTER LINE SHALL BE 24" FROM THE EDGE OF THE ROLLED CURB.

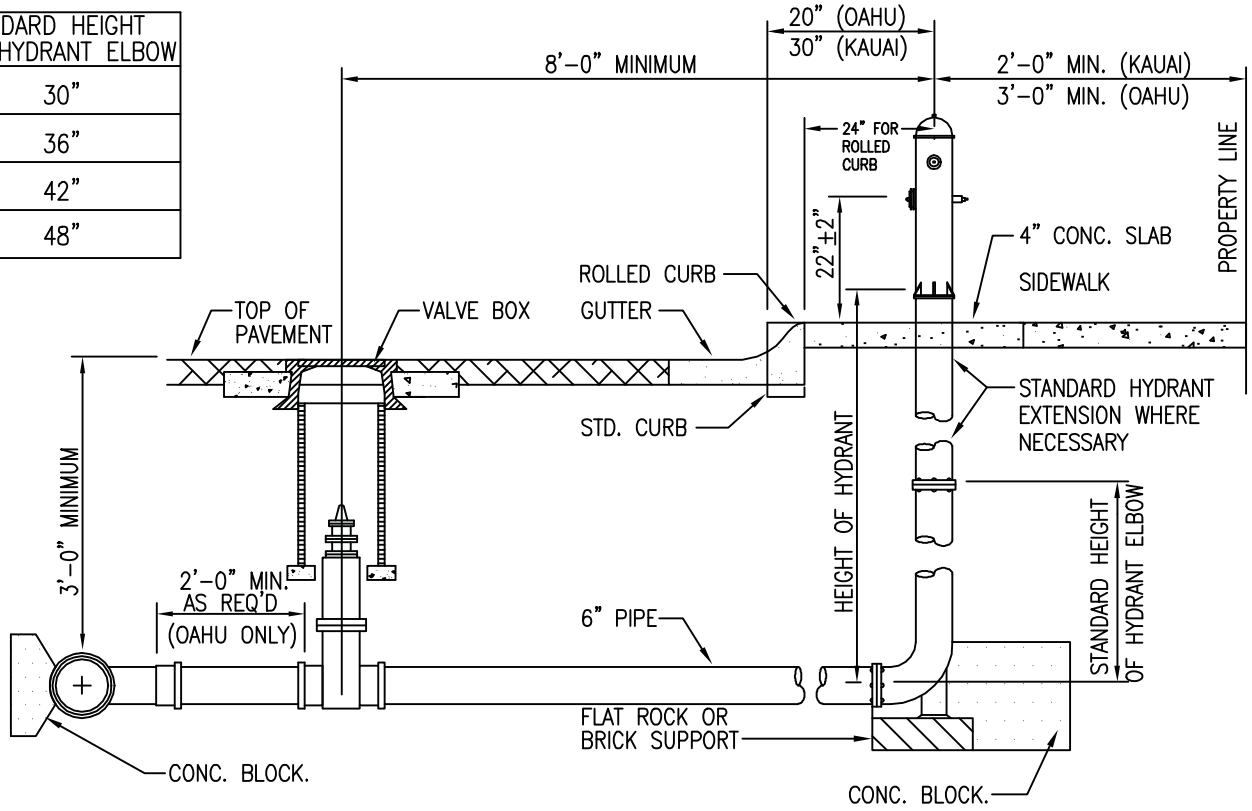
PLAN

** TAPPING SLEEVE/TAPPING VALVE ASSEMBLY MAY BE USED WHEN APPROVED BY MANAGER.

	2002
	REVISION

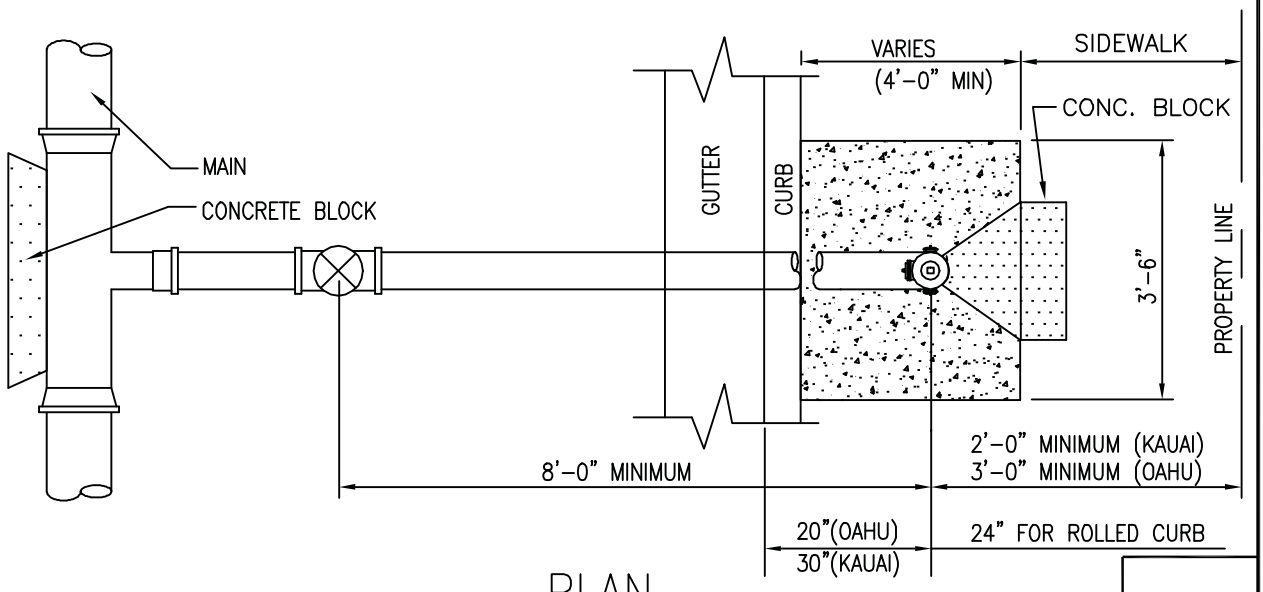
HAWAII	**HYDRANT CONNECTION LAYOUT "B"** (STRAIGHT RUN) SCALE: NTS	STANDARD DETAILS	FH3

STANDARD HEIGHT FOR HYDRANT ELBOW
30"
36"
42"
48"



SECTION

STANDARD HYDRANT EXTENSIONS ARE AVAILABLE IN THE FOLLOWING LENGTHS: 6 TO 30 INCHES LONG IN INCREMENTS OF 6 INCHES.



PLAN

* SEE NOTES ON PLATE FH8

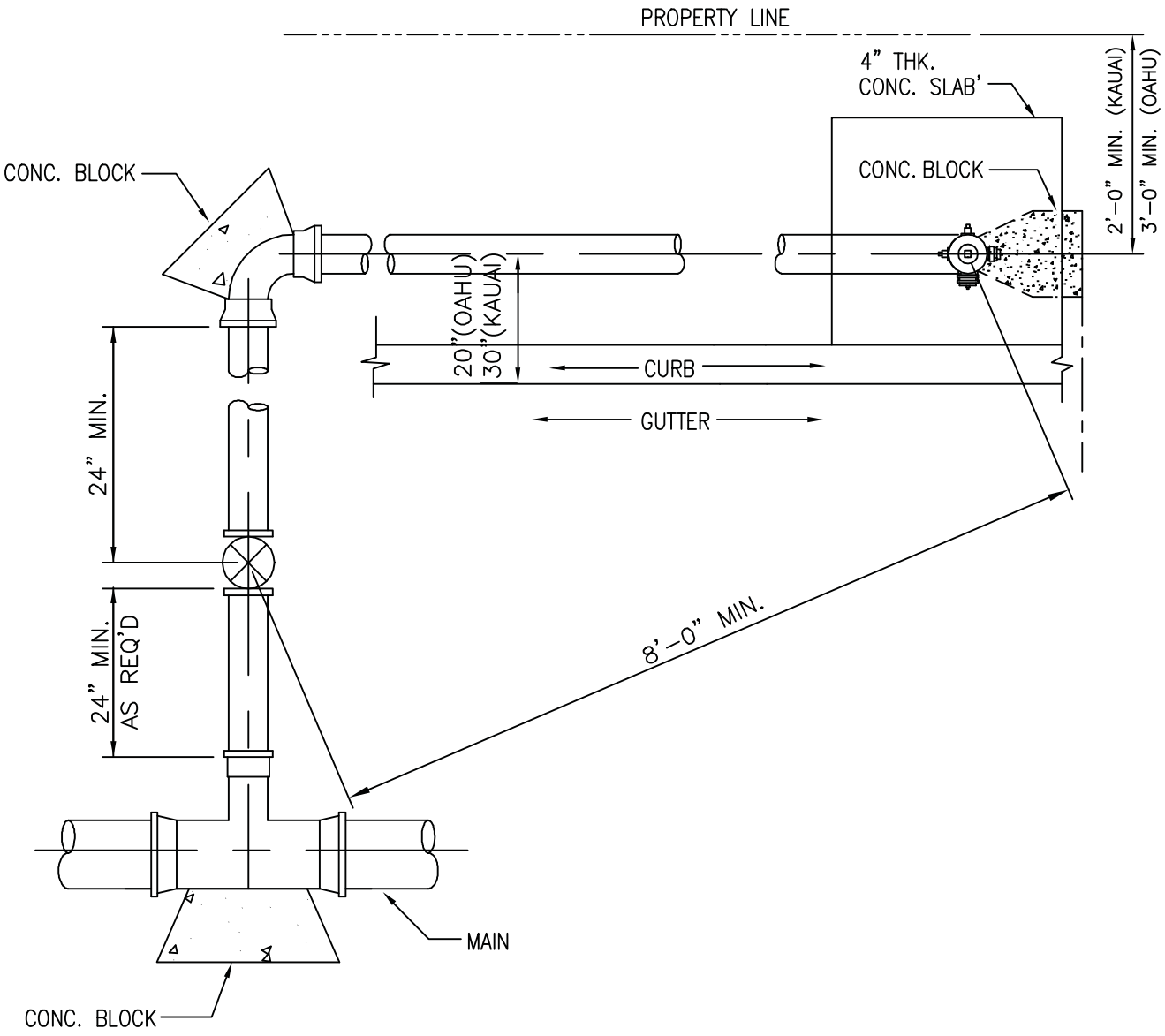
2002
REVISION

KAUAI
OAHU

HYDRANT CONNECTION
STRAIGHT RUN
SCALE: NTS

STANDARD DETAILS

FH4



NOTES:

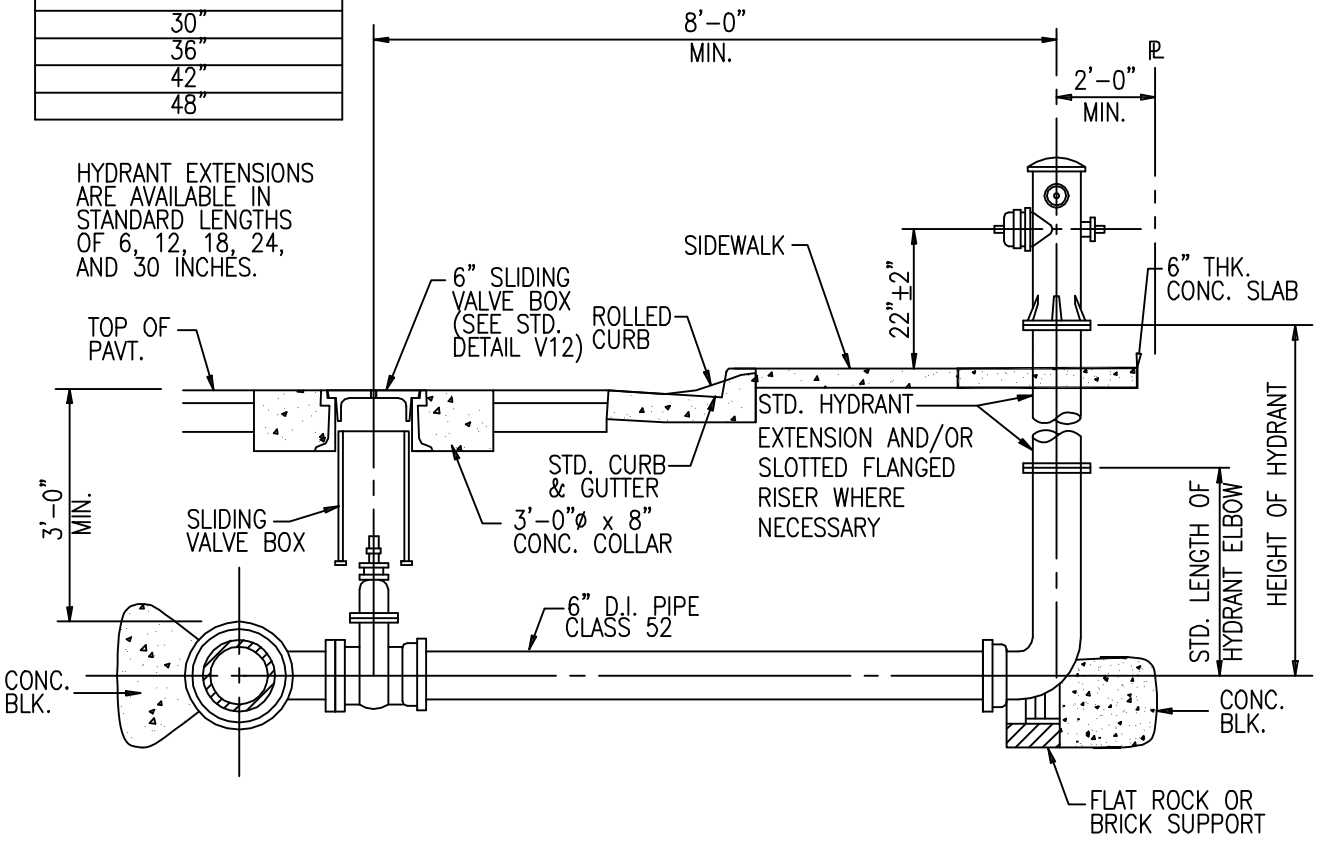
1. MINIMUM DIRECT DISTANCE FROM FIRE HYDRANT TO GATE VALVE SHALL BE 8'-0".
2. CONCRETE SHALL BE DWS 2500.
3. FLANGED OUTLET FOR THE TEE IS OPTIONAL FOR OAHU; MANDATORY FOR KAUAI.
4. REFER TO PLATE FH4 FOR DIMENSIONS OF 4" CONCRETE SLAB AROUND FIRE HYDRANT.
5. TAPPING SLEEVE WITH VALVE MAY BE USED. (SEE NOTE ON PLATE FH8)
6. LUBRICATE HYDRANT NOZZLE THREADS WITH NON-TOXIC GREASE.
7. INSTALL FH MARKERS (SEE PLATES FH12 AND FH13)
8. THE 4-1/2" NOZZLE SHOULD FACE PERPENDICULAR TO THE CURB/ROAD.

	2002
	REVISION

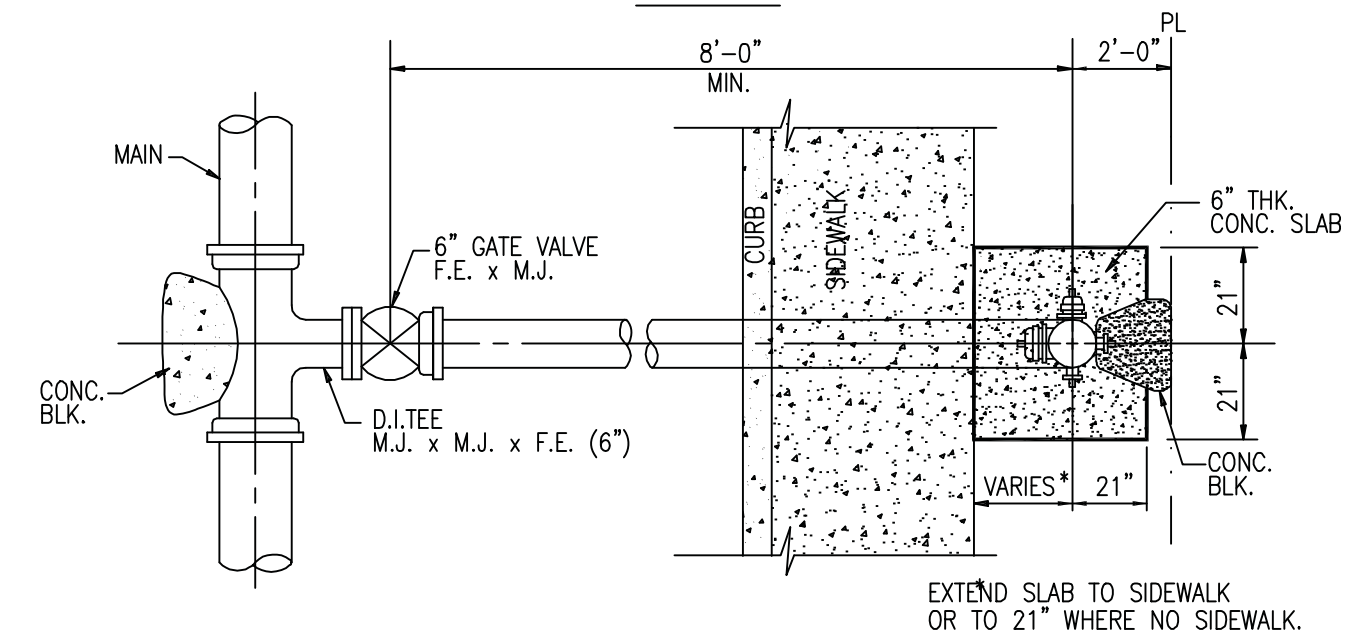
KAUAI OAHU	**HYDRANT CONNECTION** **WITH ELBOW** SCALE: NTS	STANDARD DETAILS	FH5

STANDARD LENGTHS FOR HYDRANT ELBOWS
30"
36"
42"
48"

HYDRANT EXTENSIONS ARE AVAILABLE IN STANDARD LENGTHS OF 6, 12, 18, 24, AND 30 INCHES.



SECTION



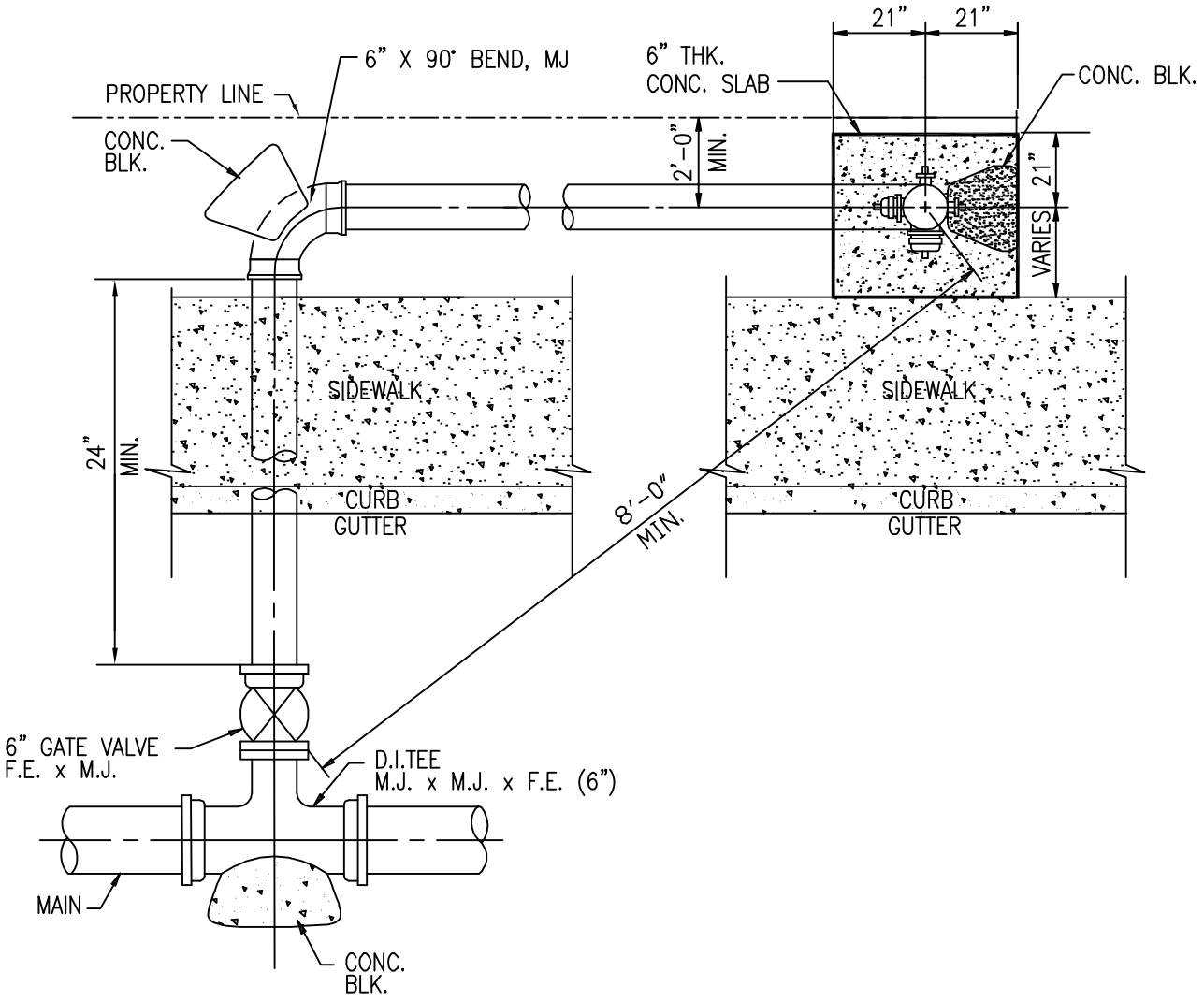
*EXTEND SLAB TO SIDEWALK OR TO 21" WHERE NO SIDEWALK.

PLAN

REFER TO STANDARD DETAIL FH8 FOR NOTES.

2002
REVISION

MAUI	HYDRANT CONNECTION STRAIGHT RUN SCALE: NTS	STANDARD DETAILS	FH6



PLAN

REFER TO STANDARD DETAIL FH8 FOR NOTES.

REFER TO STANDARD DETAIL FH6 FOR ADDITIONAL INFORMATION FOR FIRE HYDRANT INSTALLATION.

	2002
	REVISION

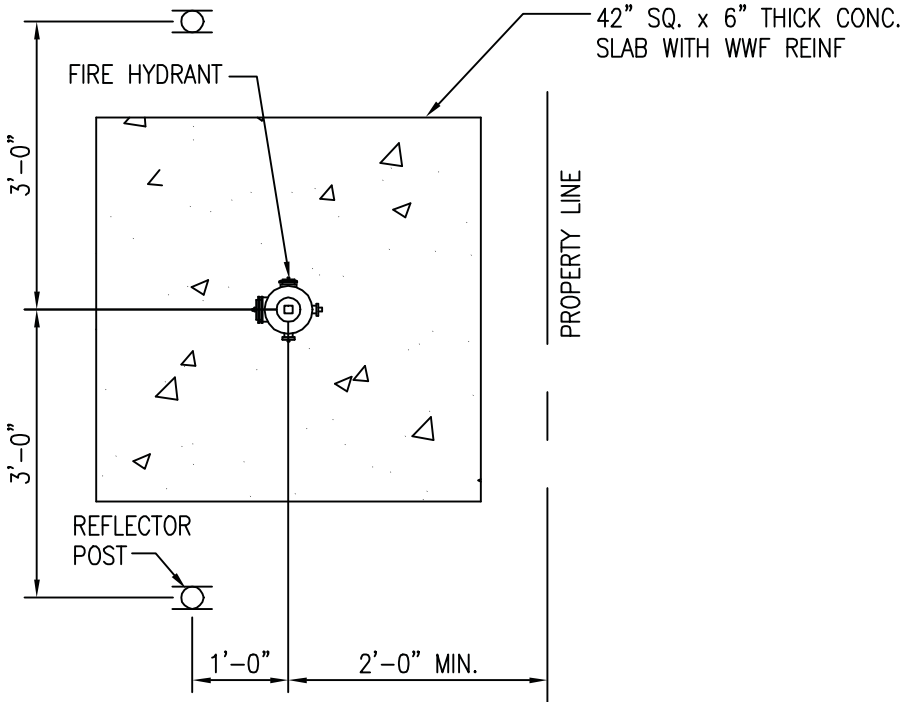
MAUI	**HYDRANT CONNECTION** **WITH ELBOW** SCALE: NTS	STANDARD DETAILS	FH7

NOTE:

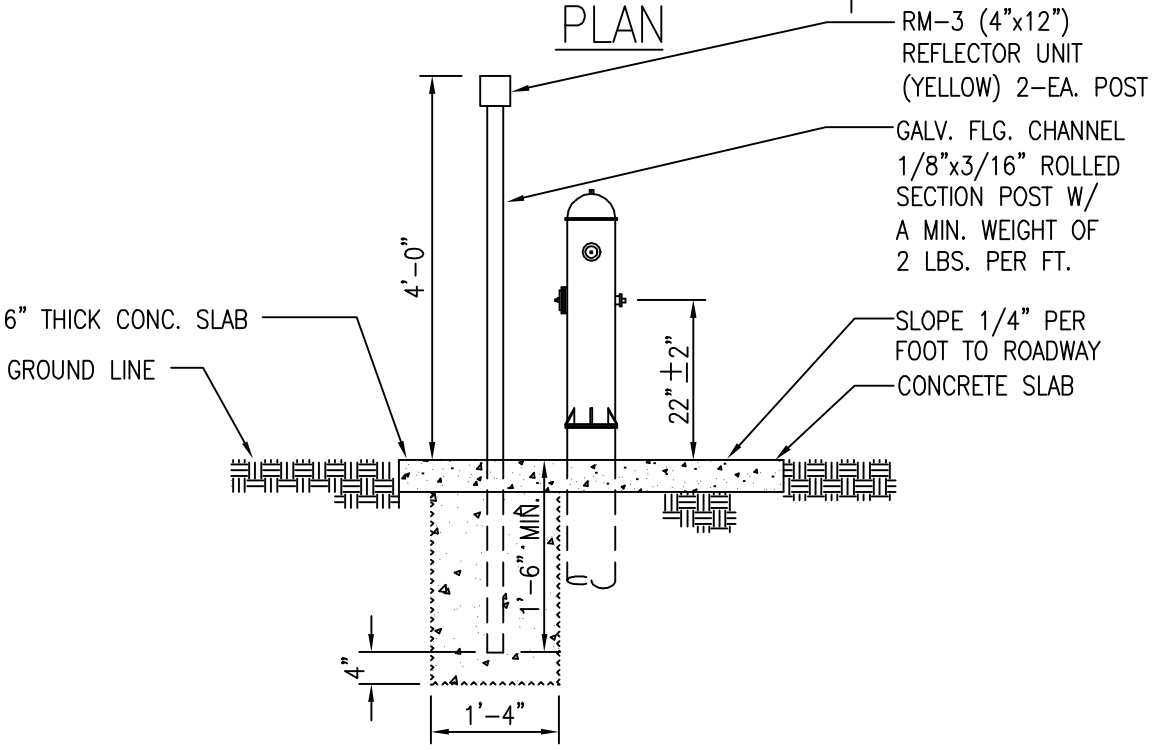
1. GASKETS FOR FLANGED JOINTS SHALL BE 1/8" DUCK–INSERTED RUBBER PACKING GARLOCK NO. 19.
2. BOLTS SHALL BE BREAK–OFF TYPE, 5/8" DIA. x 3" LONG MACHINE BOLTS WITH CUT THREADS, AMERICAN STANDARD COARSE HEXAGON HEADS, STAINLESS STEEL OR SILICON BRONZE. INSTALL BOLT WITH THREADS FACING DOWN.
3. NUTS SHALL BE AMERICAN STANDARD HEAVY COLD PUNCHED HEXAGON NUTS, STAINLESS STEEL OR SILICON BRONZE.
4. CONCRETE SHALL BE DWS 2500.
5. REFER TO PLATE FH11 FOR FIRE HYDRANT INSTALLATION WITH CURB GUARD. (OAHU & KAUAI ONLY). FOR MAUI, REFER TO PLATE FH9 WHERE NO STREET CURBING.
6. FLANGED OUTLET FOR THE TEE IS OPTIONAL FOR OAHU; MANDATORY FOR KAUAI AND MAUI.
7. TAPPING SLEEVE WITH TAPPING VALVE ASSEMBLY MAY BE USED FOR CONNECTION TO EXIST MAIN.
8. LUBRICATE HYDRANT NOZZLE THREADS WITH NON–TOXIC GREASE.
9. PROVIDE SLOTTED FLANGED RISER FOR HYDRANT AS NEEDED TO ALIGN 4–1/2" NOZZLE PERPENDICULAR TO CURB. (FOR MAUI ONLY)
10. INSTALL HYDRANT MARKERS. (SEE PLATES FH12 AND FH13)

	2002
	REVISION

KAUAI OAHU MAUI	**HYDRANT CONNECTION** **NOTES** SCALE: NTS	STANDARD DETAILS	FH8



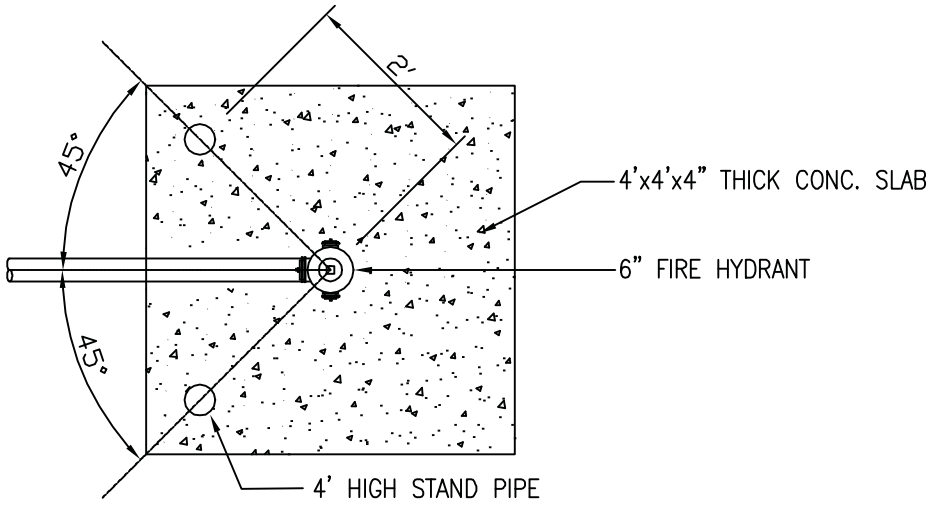
PLAN



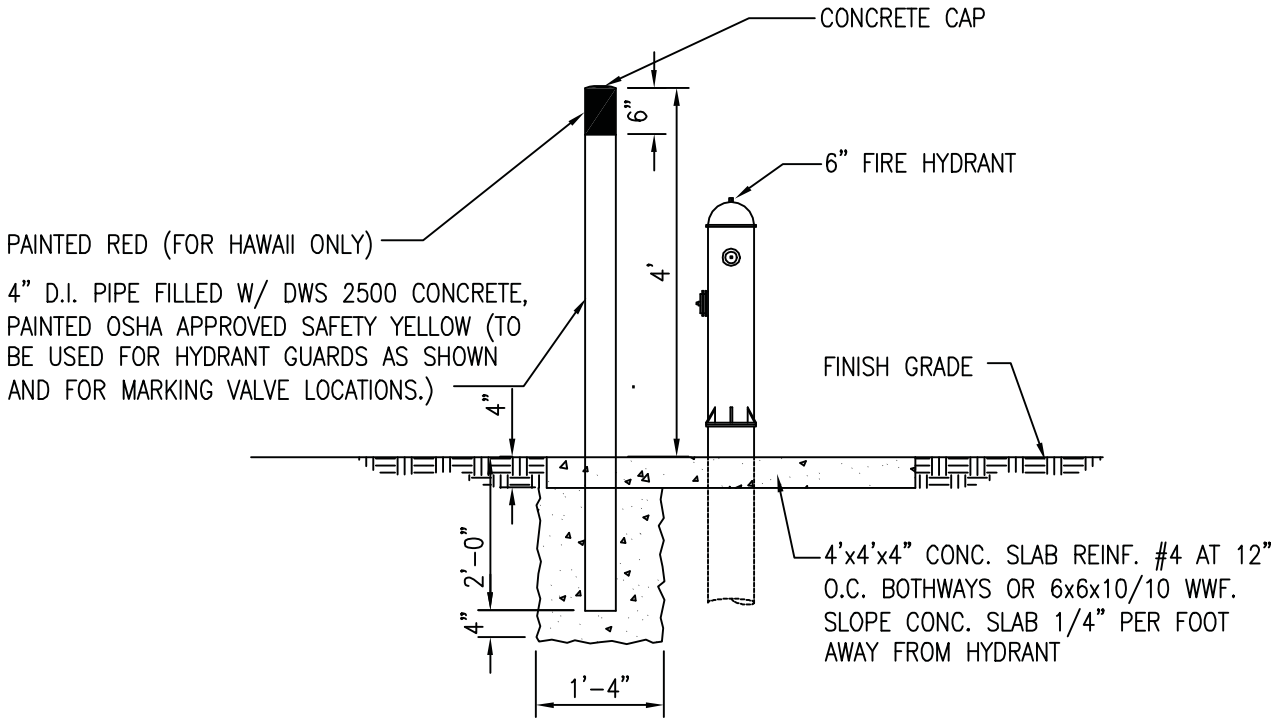
ELEVATION
(REFLECTOR POST DETAIL
FOR MARKING HYDRANTS
WITHOUT STREET CURBING)

	2002
	REVISION

MAUI	**HYDRANT CONCRETE SLAB & REFLECTOR POST** SCALE: NTS	STANDARD DETAILS	FH9



PLAN



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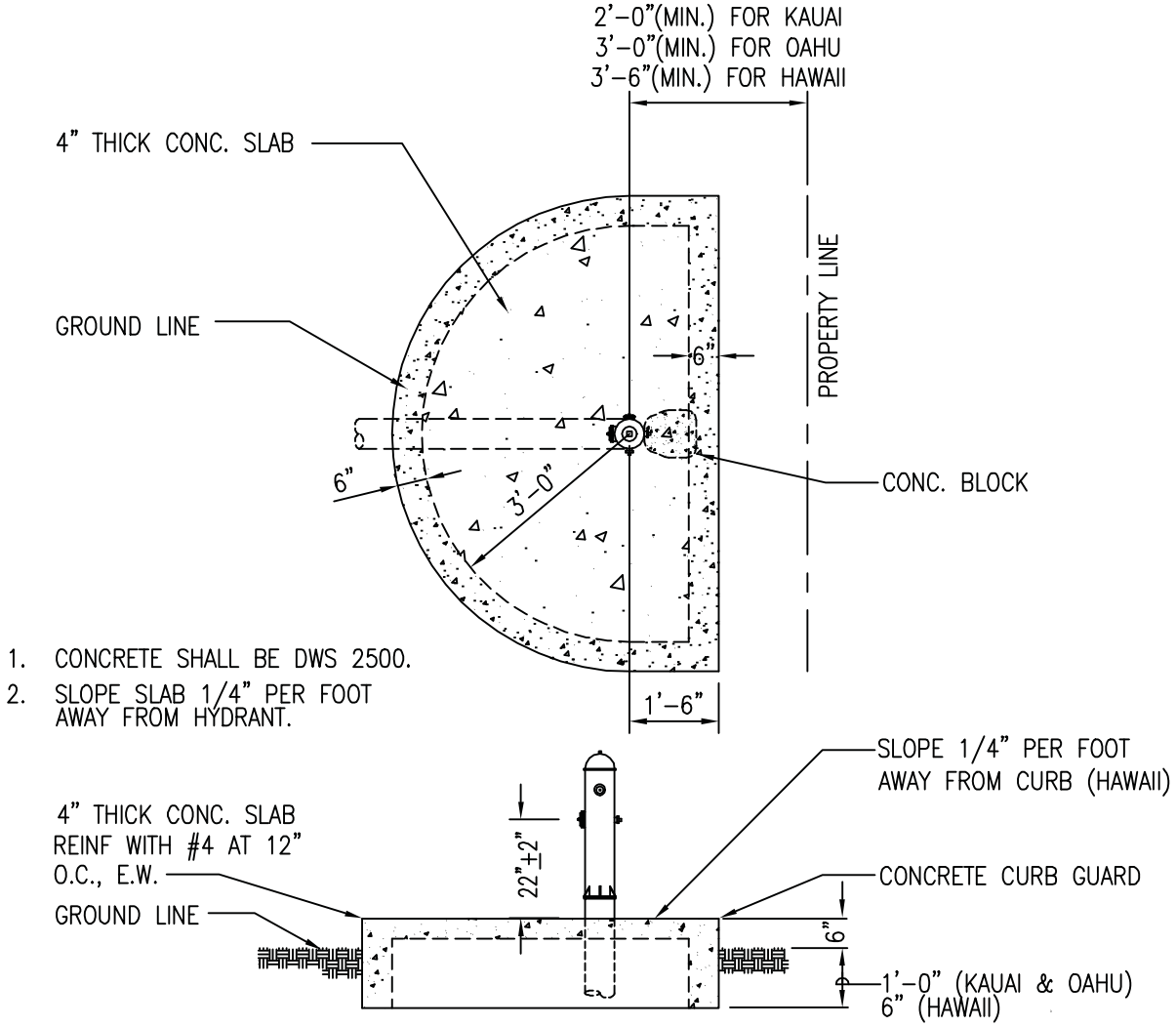
OAHU HAWAII	HYDRANT CONCRETE SLAB AND GUARD POSTS SCALE: NTS	STANDARD DETAILS	FH10



DETAIL OF CURB GUARD AT HYDRANT WHERE REQUIRED

	2002
	REVISION

KAUAI OAHU HAWAII	**HYDRANT CURB GUARD** SCALE: NTS	STANDARD DETAILS	FH11

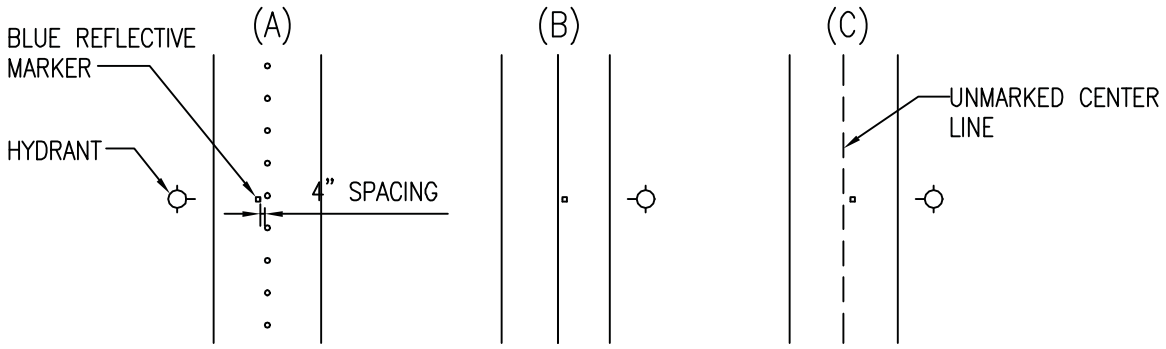


FIGURE 1
TWO LANE STREET

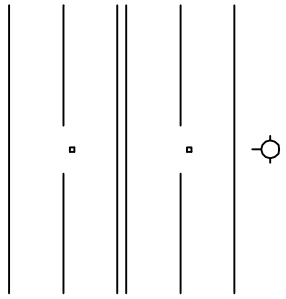


FIGURE 2
DIVIDED STREET

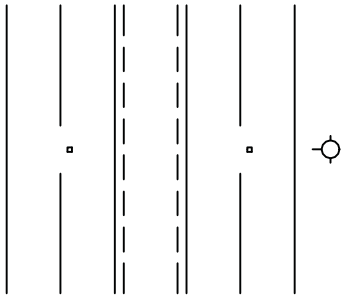


FIGURE 3
MULTI-LANE STREET W/ TURN LANE

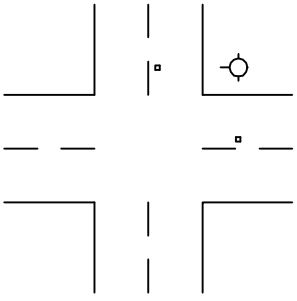


FIGURE 4
TWO LANE STREET @ INTERSECTION

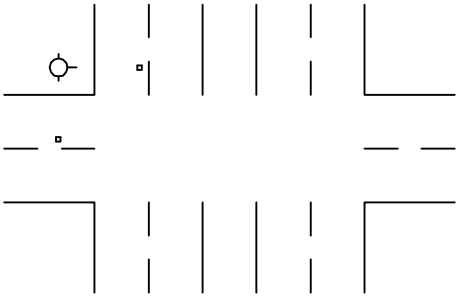


FIGURE 5
FOUR LANE STREET W/ TURN LANE @ INTERSECTION

HYDRANT MARKER LOCATION

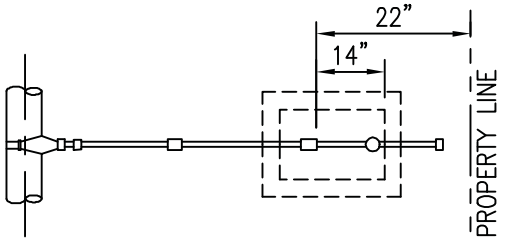
2002	
REVISION	

KAUAI OAHU MAUI	**HYDRANT MARKER** **LOCATION FOR STREETS** **SCALE: NTS**	STANDARD DETAILS	FH12

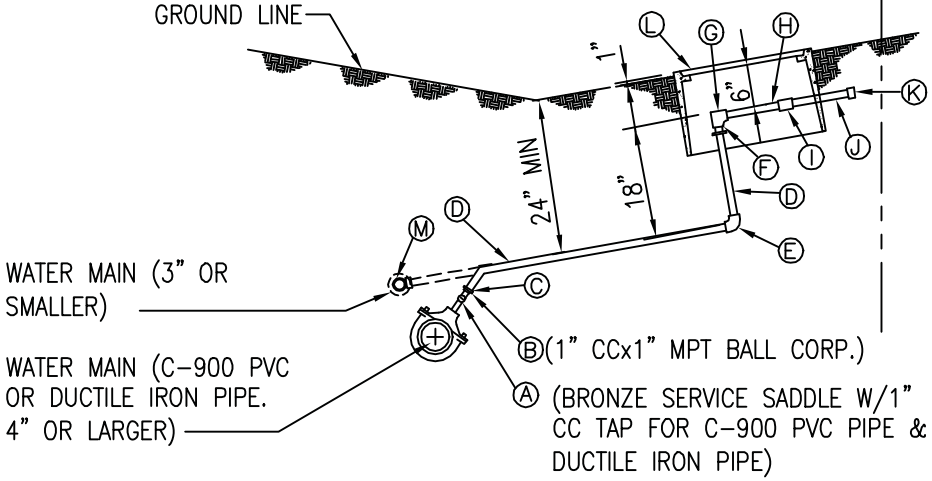
SCHEDULE OF FITTINGS

ITEM	DESCRIPTION	SINGLE SERVICE
A	BRONZE SERVICE SADDLE W/ 1" CC TAP FOR C-900 PVC PIPE & D.I. PIPE	1
B	1" CC x 1" MPT BALL CORPORATION	1
C	PACK JOINT COUPLINGS (FORD C14-44 OR APPROVED EQUAL)	1
D	1" COPPER TUBE, TYPE "K" SOFT	1
E	1" 90° COPPER ELBOW, S x S	1
F	1" COPPER MALE ADAPTER, SXT	1
G	ANGLE BALL VALVE, 1" FEMALE IPT INLET x 3/4" METER COUPLING NUT OUTLET (FORD BA13-342W OR APPROVED EQUAL)	1
H	METER SPACER, SUPPLIED BY DEPT. OF WATER & INSTALLED BY CONTRACTOR	1
I	BALL VALVE W/ HANDLE, 3/4" METER COUPLING NUT INLET x 1" FEMALE IPT OUTLET (FORD B13-342 W/ HT-34 HANDLE OR APPROVED EQUAL)	1
J	LINESETTER, 1" COPPER TUBE, TYPE "K" SOFT, 12" LONG (SEE STD. DET. L3)	1
K	1" PLASTIC THREAD PROTECTOR	1
L	TYPE "B" CONCRETE METER BOX W/ CAST IRON COVER	1
M	TEE W/ 1" BUSHING (WHEN CONNECTING TO 3" OR SMALLER PIPE)	1

NOTE:
INSTALL TYPE "X" CONC. METER BOX W/ CAST IRON COVER IN SIDEWALK OR PAVED AREAS. TOP OF METER BOX TO BE FLUSHED WITH FINISHED GRADE.



PLAN



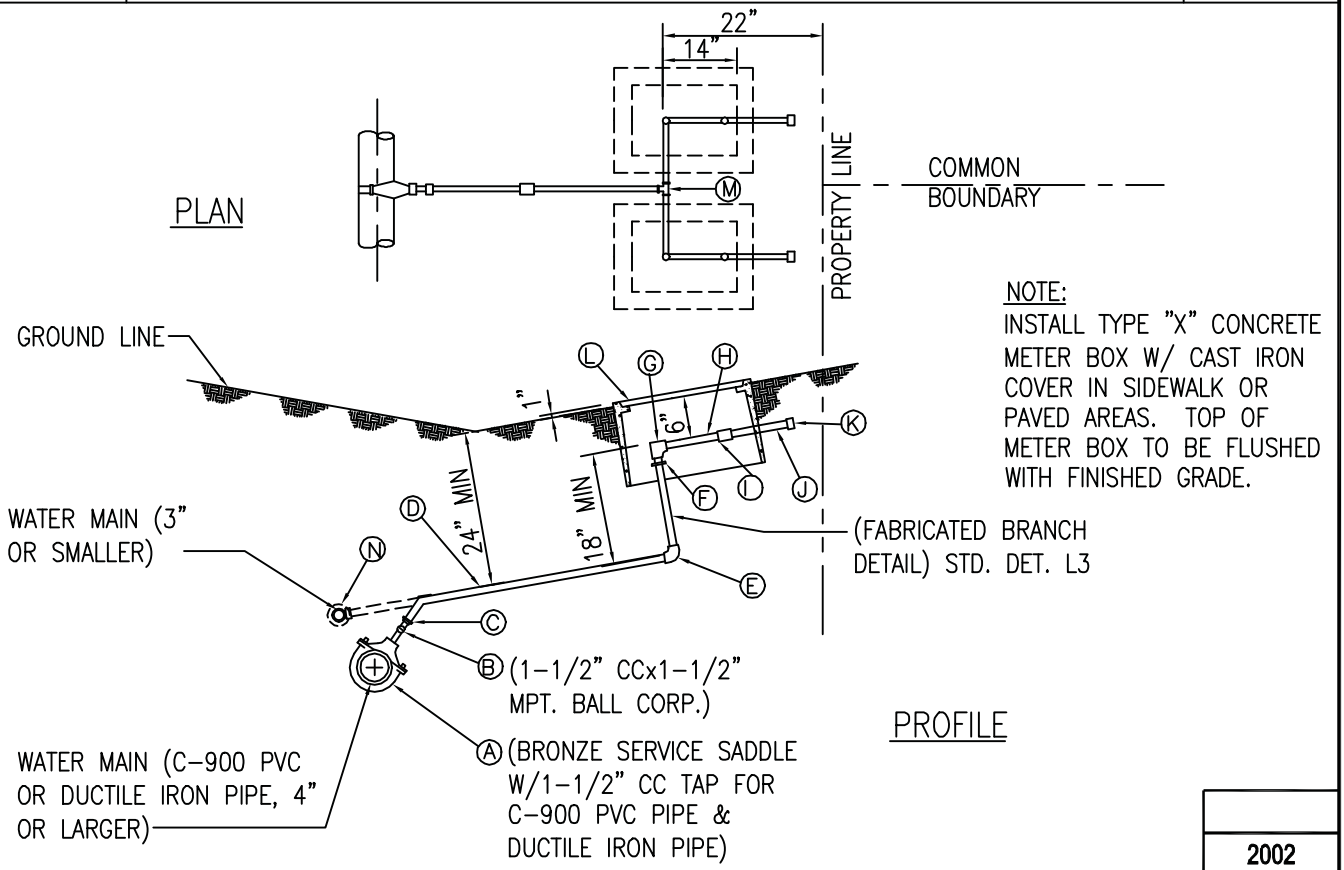
PROFILE

2002
REVISION

KAUAI	SINGLE SERVICE LATERAL PLAN, PROFILE & MATERIAL LIST SCALE: NTS	STANDARD DETAILS	L1

SCHEDULE OF FITTINGS

ITEM	DESCRIPTION	DOUBLE SERVICE
A	BRONZE SERVICE SADDLE W/ 1-1/2" CC TAP FOR C-900 PVC PIPE AND DUCTILE IRON PIPE	1
B	1-1/2" CC x 1-1/2" MPT BALL CORPORATION	1
C	PACK JOINT COUPLING (FORD C14-66 OR APPROVED EQUAL)	1
D	1-1/2" COPPER TUBE, TYPE "K" SOFT	2
E	1" 90° COPPER ELBOW, S x S	2
F	1" COPPER MALE ADAPTER, S x T	2
G	ANGLE BALL VALVE, 1" FEMALE IPT INLET x 3/4" METER COUPLING NUT OUTLET (FORD BA13-342W OR APPROVED EQUAL)	2
H	METER SPACER, SUPPLIED BY DEPT. OF WATER & INSTALLED BY CONTRACTOR	2
I	BALL VALVE W/ HANDLE, 3/4" METER COUPLING NUT INLET x 1" FEMALE IPT OUTLET (FORD B13-342 W/ HT-34 HANDLE OR APPROVED EQUAL)	2
J	LINESETTER, 1" COPPER TUBE, TYPE "K" SOFT, 12" LONG (SEE STD. DET. L3)	2
K	1" PLASTIC THREAD PROTECTOR	2
L	TYPE "B" CONCRETE METER BOX WITH CAST IRON COVER	2
M	1" x 1" x 1-1/2" COPPER TEE, S x S x S	1
N	TEE W/ 1-1/2" BUSHING (WHEN CONNECTING TO 3" OR SMALLER PIPE)	1



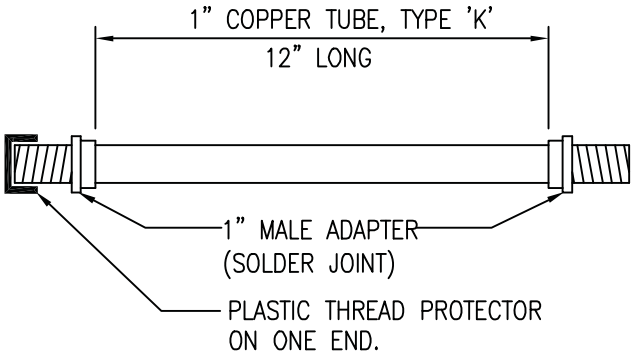
NOTE:
INSTALL TYPE "X" CONCRETE METER BOX W/ CAST IRON COVER IN SIDEWALK OR PAVED AREAS. TOP OF METER BOX TO BE FLUSHED WITH FINISHED GRADE.

2002
REVISION

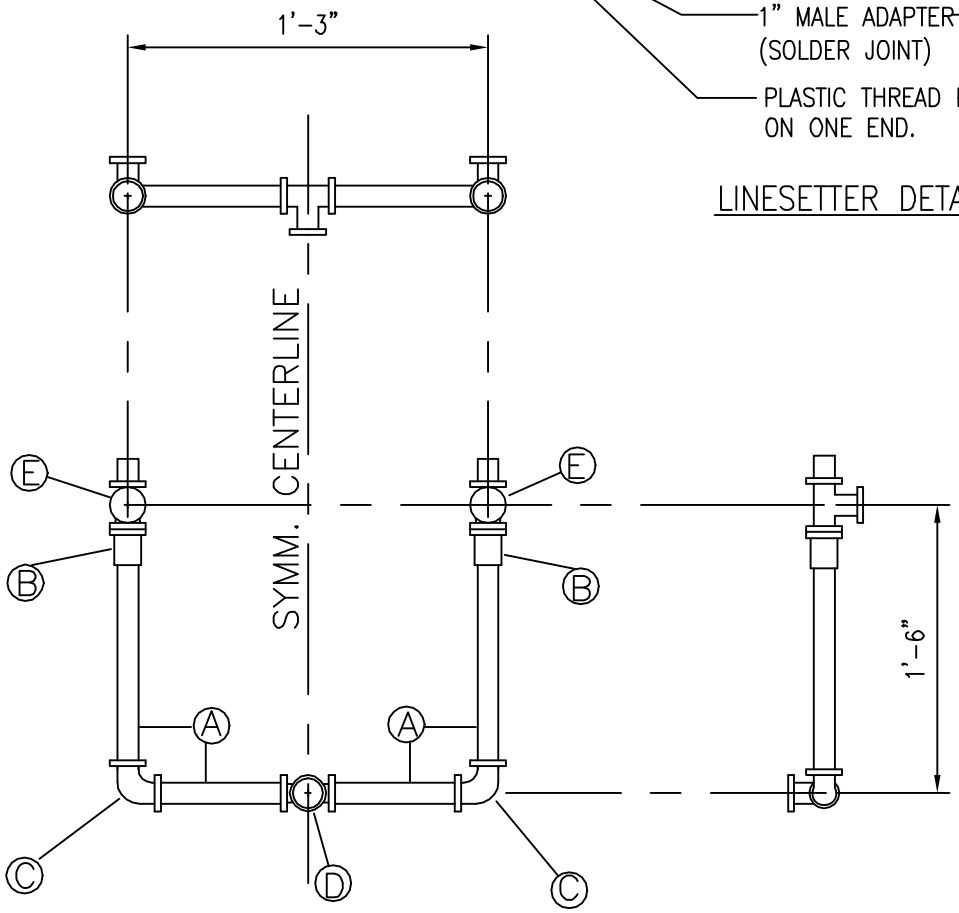
KAUAI	DOUBLE SERVICE LATERAL PLAN, PROFILE & MATERIAL LIST SCALE: NTS	STANDARD DETAILS	L2

SCHEDULE OF COPPER FITTINGS

NO.	DESCRIPTION	SINGLE SERVICE	DOUBLE SERVICE
A	1" COPPER TUBE, TYPE 'K'	1	1
B	1" COPPER MALE ADAPTER	1	2
C	1" X 90° ELBOW (CAST SOLDER)	1	2
D	1" X 1" X 1 1/2" TEE, (CAST SOLDER)		1
E	ANGLE VALVE, 1" FEMALE IPT, INLET 3/4" METER COUPLING NUT OUTLET (FORD KV13-342W OR APPROVED EQUAL)	1	2



LINESETTER DETAIL



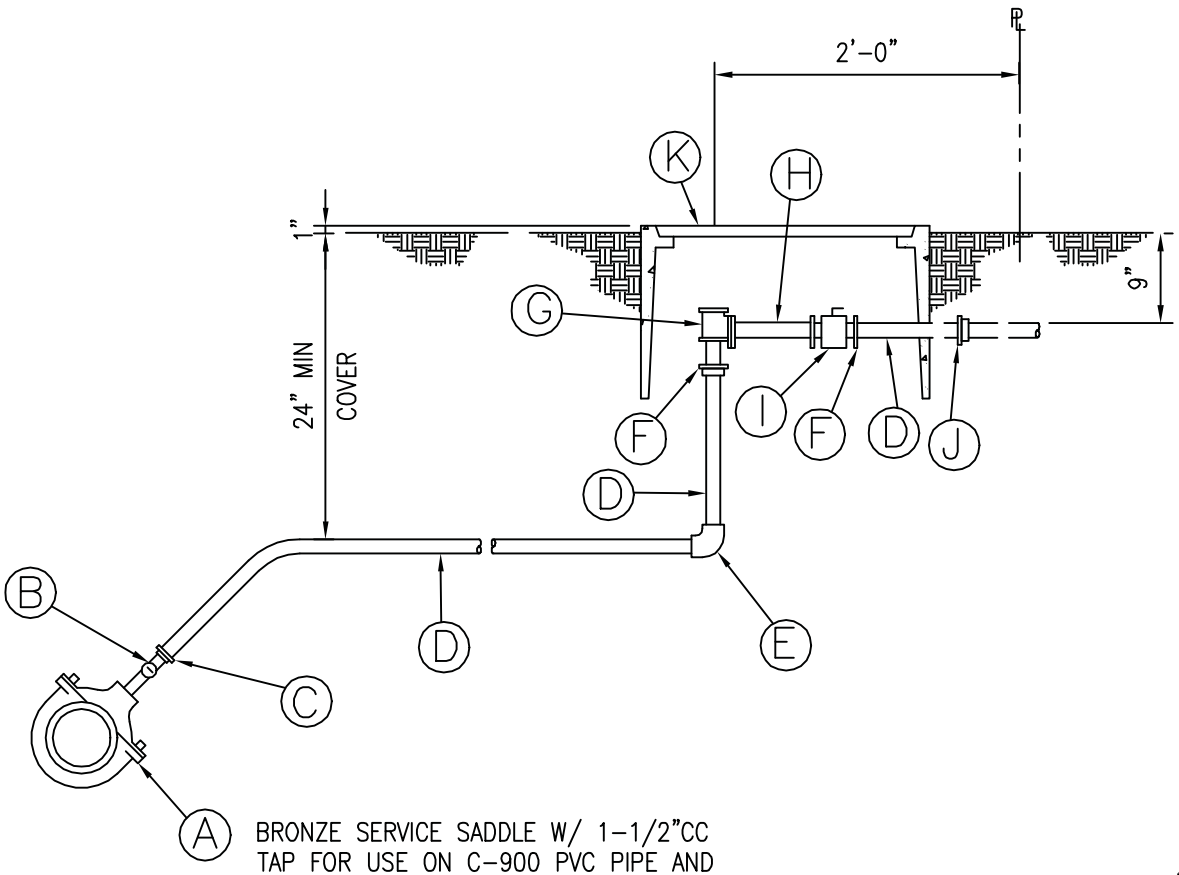
FABRICATED BRANCH PIPE DETAIL

2002
REVISION

KAUAI	FABRICATED BRANCH PIPE AND LINESETTER DETAIL SCALE: NTS	STANDARD DETAILS	L3

ITEM	DESCRIPTION	SIZE
A	SERVICE SADDLE (SIZE DEPENDS UPON MAIN)	1 1/2" CC TAP
B	BALL CORPORATION (FORD FB 400 OR APPROVED EQUAL)	1 1/2" CC X 1 1/2" MPT
C	PACK JOINT COUPLING (FORD C14-66 OR APPROVED EQUAL)	1 1/2"
D	COPPER TUBE TYPE "K" SOFT	1 1/2"
E	90° COPPER ELBOW	1 1/2"
F	COPPER MALE ADAPTER	1 1/2" X 1"
G	ANGLE BALL VALVE (FORD BA13-444W OR APPROVED EQUAL)	1"
H	METER SPACER (TO BE SUPPLIED BY THE DEPT. OF WATER & INSTALLED BY CONTRACTOR)	1"
I	BALL VALVE(FORD B13-444W W/HT 34 OR APPROVED EQUAL)	1"
J	COPPER MALE ADAPTER	1 1/2"
K	TYPE "X" CONC. METER BOX W/ C.I. COVER	---

SCHEDULE OF FITTINGS



BRONZE SERVICE SADDLE W/ 1-1/2"CC TAP FOR USE ON C-900 PVC PIPE AND DUCTILE IRON PIPE.

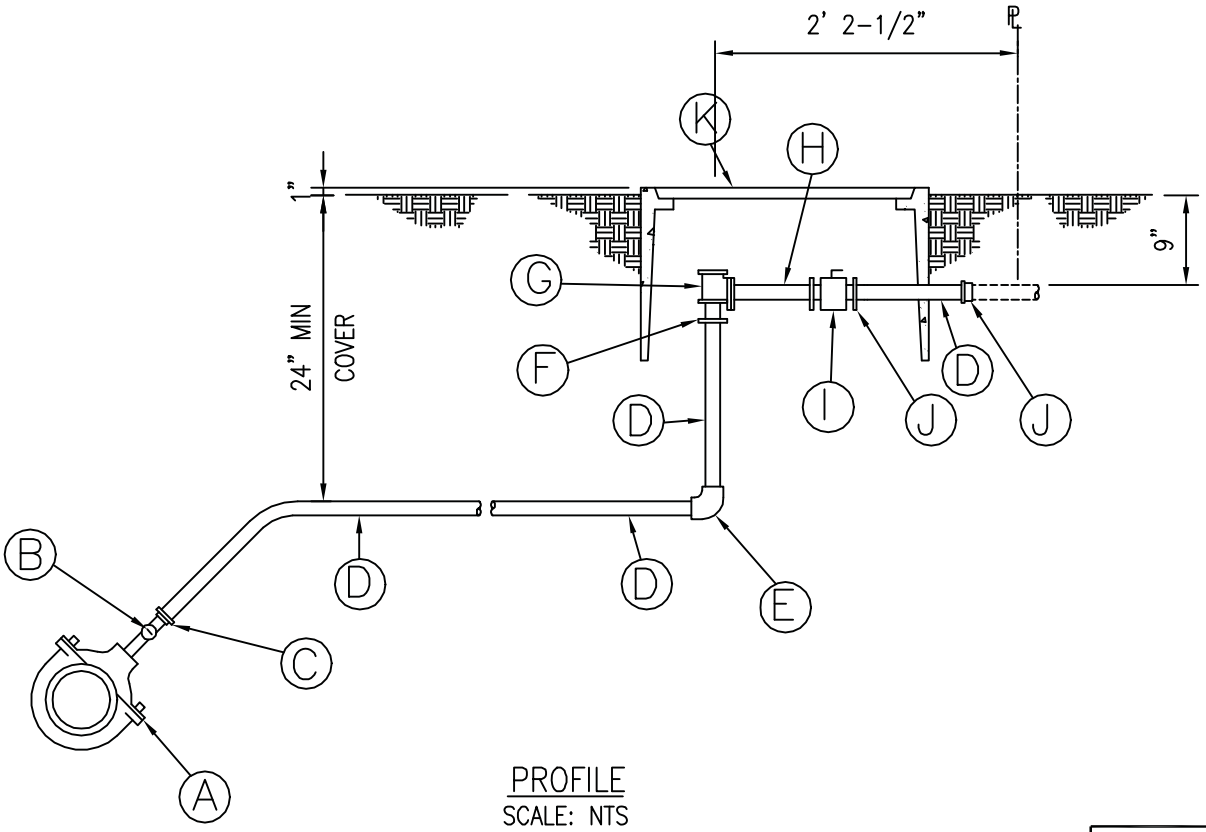
PROFILE

2002
REVISION

KAUAI	ONE INCH METER PROFILE & MATERIAL LIST SCALE: NTS	STANDARD DETAILS	L4

ITEM	DESCRIPTION	SIZE
A	SERVICE SADDLE (SIZE DEPENDS UPON MAIN)	2" CC TAP
B	BALL CORPORATION (FORD FB 400 OR APPROVED EQUAL)	2" CC X MPT
C	PACK JOINT COUPLING (FORD C14-77 OR APPROVED EQUAL)	2"
D	COPPER TUBE TYPE "K" SOFT	2"
E	90° COPPER ELBOW	2"
F	COPPER MALE ADAPTER	2" X 1 1/2"
G	ANGLE BALL VALVE (FORD BFA13-666W OR APPROVED EQUAL)	1 1/2"
H	METER SPACER (TO BE SUPPLIED BY THE DEPT OF WATER & INSTALLED BY CONTRACTOR)	1 1/2"
I	BALL VALVE (FORD BF13-676W W/ HB67S OR APPROVED EQUAL)	1 1/2"
J	COPPER MALE ADAPTER	2"
K	TYPE "X" CONC. METER BOX W/ C.I. COVER	———

SCHEDULE OF FITTINGS



PROFILE
SCALE: NTS

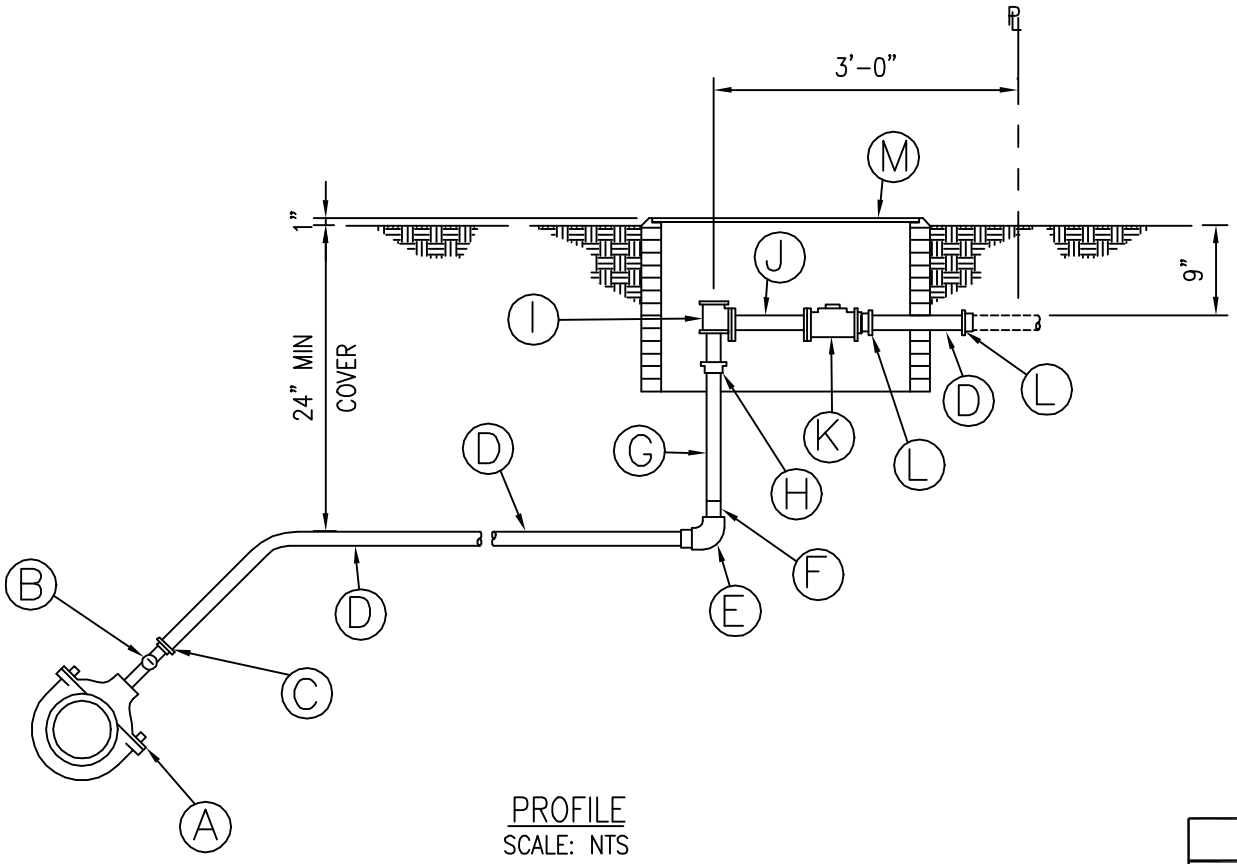
BRONZE SERVICE SADDLE W/ 2" CC TAP FOR USE ON C-900 PVC PIPE AND DUCTILE IRON PIPE

2002
REVISION

KAUAI	1 1/2" INCH METER PROFILE & MATERIAL LIST SCALE: NTS	STANDARD DETAILS	L5

ITEM	DESCRIPTION	SIZE
A	SERVICE SADDLE (SIZE DEPENDS UPON MAIN)	2" CC TAP
B	BALL CORPORATION (FORD FB 800 OR APPROVED EQUAL)	2" CC X 2 1/2" MPT
C	PACK JOINT COUPLING (FORD C14-88 OR APPROVED EQUAL)	2 1/2"
D	COPPER TUBE TYPE "K" SOFT	2 1/2"
E	90° COPPER ELBOW	2 1/2"
F	COPPER FLUSH BUSHING	2 1/2" C X 2" FTG.
G	COPPER TUBE TYPE "K" SOFT	2"
H	COPPER MALE ADAPTER	2"
I	ANGLE BALL VALVE (FORD BFA13-777W OR APPROVED EQUAL)	2"
J	METER SPACER (TO BE SUPPLIED BY THE DEPT. OF WATER & INSTALLED BY CONTRACTOR)	2"
K	BALL VALVE (FORD BF13-787W W/ HB 67S OR APPROVED EQUAL)	2"
L	COPPER MALE ADAPTER	2 1/2"
M	TYPE III METER BOX FRAME AND COVER	———

SCHEDULE OF FITTINGS



PROFILE
SCALE: NTS

BRONZE SERVICE SADDLE W/ 2" CC TAP FOR
USE C-900 PVC PIPE AND DUCTILE IRON PIPE

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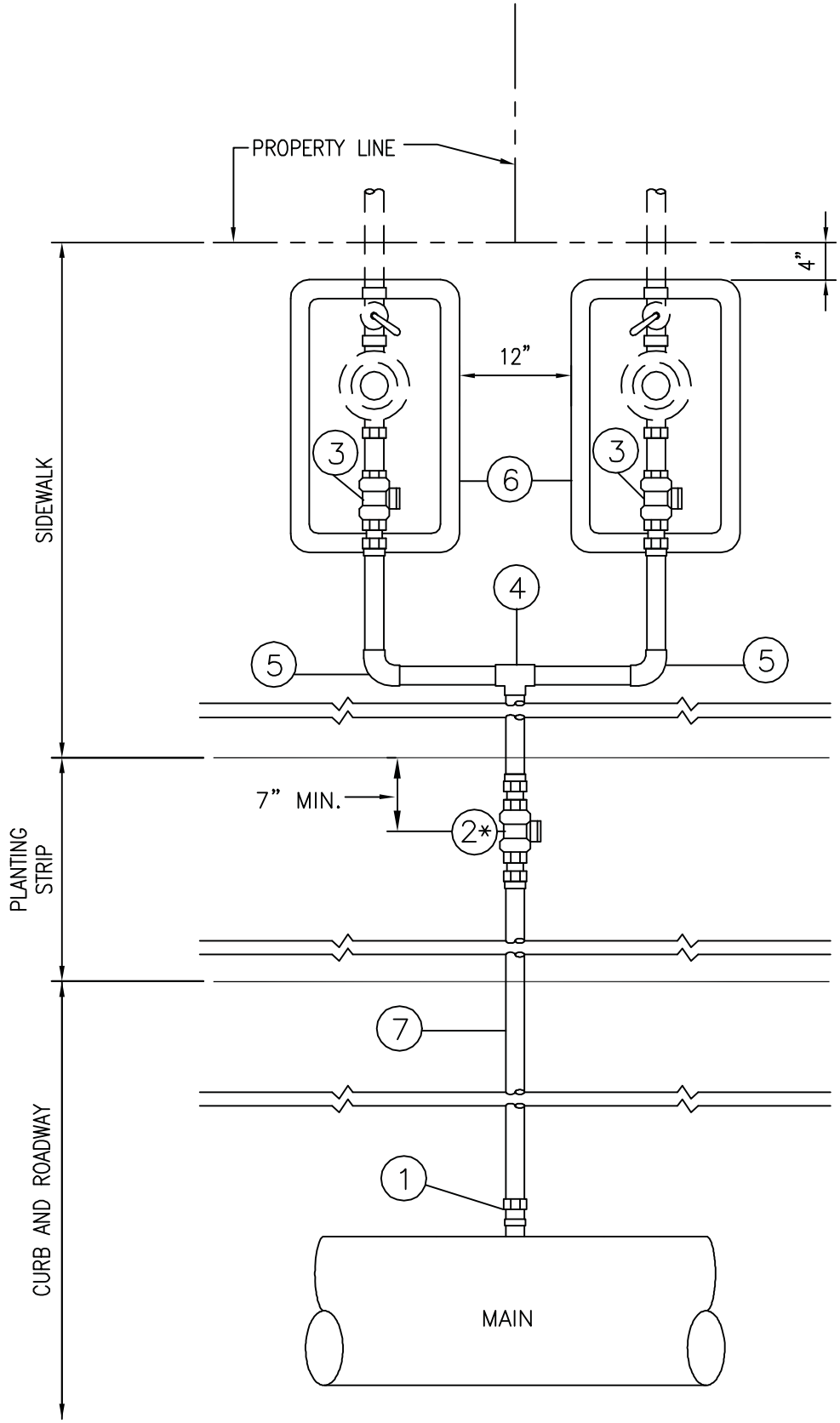
KAUAI	TWO-INCH METER PROFILE & MATERIAL LIST SCALE: NTS	STANDARD DETAILS	L6



METER BOX EXCEPTION – FOR 1 1/2" TYPE "B", 1 1/2" TYPE "C", AND 1 1/2" TYPE "D" SERVICE LATERALS, INSTALL TYPE "X" METER BOXES IN A.C. AND CONCRETE PAVED AREAS. INSTALL TYPE "B" METER BOXES IN UNPAVED AREAS. CURB STOP TO BE LOCATED BELOW PLANTING STRIP. FOR CONC. SIDEWALKS W/O PLANTING STRIP, CURB STOP SHALL BE LOCATED 12" ON CENTERLINE SIDE OF CURB FACE. FOR A.C. PAVED AND STABILIZED SHOULDERS, CURB STOP SHALL BE LOCATED NEXT TO COPPER TEE, MIN. 7".

NOTE:
REFER TO L10 FOR SCHEDULE OF COPPER FITTINGS.

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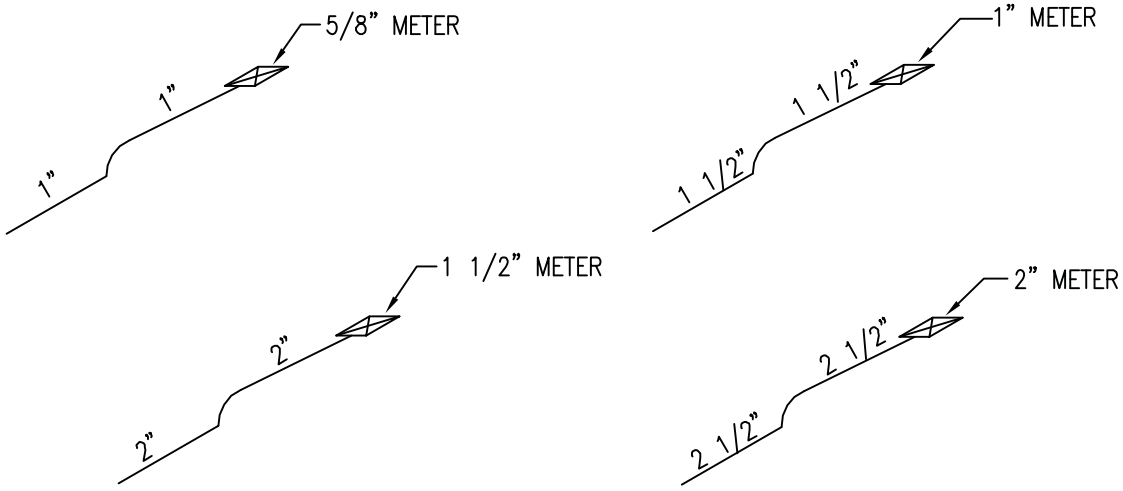
HAWAII

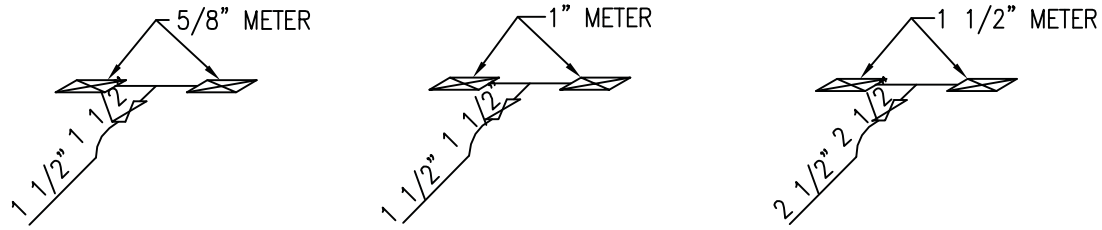
COPPER SERVICE LATERAL
FOR MULTIPLE METERS
SCALE: NTS

STANDARD DETAILS

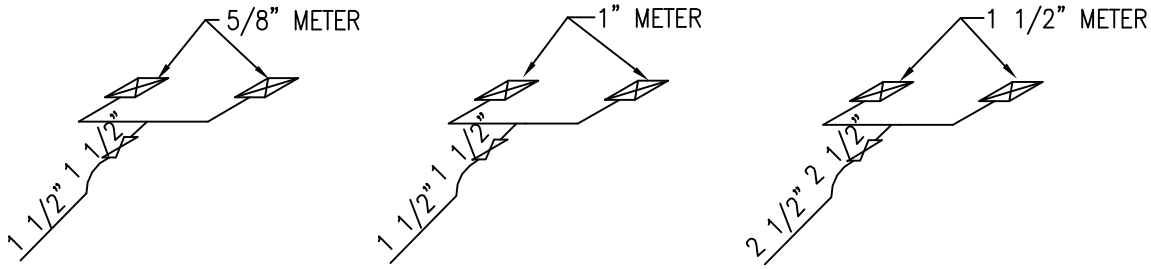
L7



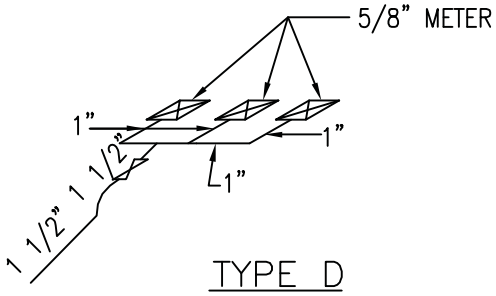
TYPE A



TYPE B



TYPE C



TYPE D

NOTE:

THE SIZE COMBINATIONS SHOWN ARE THOSE MOST COMMONLY USED, BUT THIS FIGURE IS NOT INTENDED TO LIMIT THE COMBINATIONS WHICH MAY BE USED. HOWEVER, COMBINATIONS OTHER THAN THESE SHOWN ABOVE MAY BE INSTALLED ONLY WITH THE APPROVAL OF THE MANAGER.

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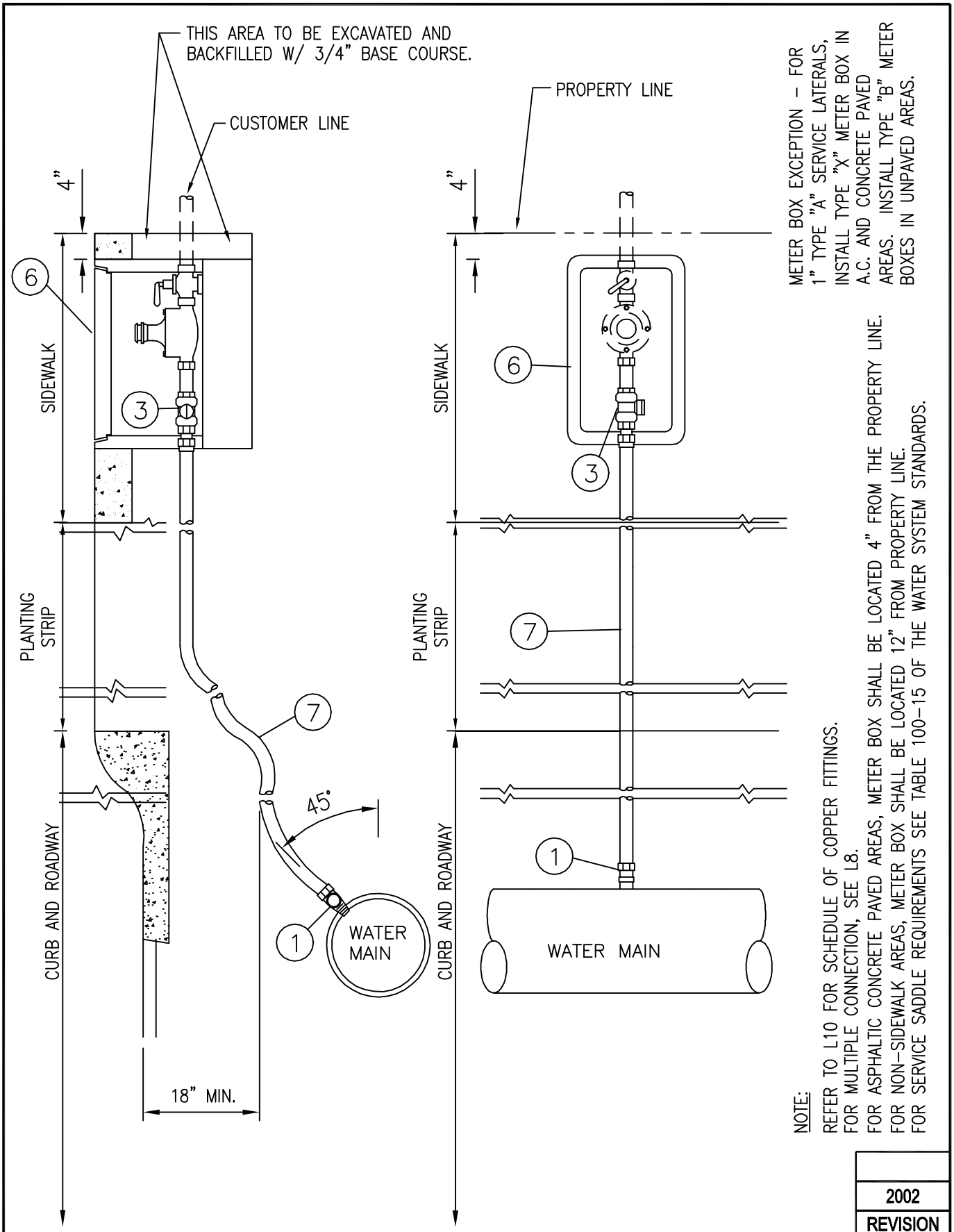
HAWAII	**SERVICE LATERALS AND CONNECTIONS** SCALE: NTS	STANDARD DETAILS	L8



METER BOX EXCEPTION – FOR 1" TYPE "A" SERVICE LATERALS, INSTALL TYPE "X" METER BOX IN A.C. AND CONCRETE PAVED AREAS. INSTALL TYPE "B" METER BOXES IN UNPAVED AREAS.

NOTE:
REFER TO L10 FOR SCHEDULE OF COPPER FITTINGS.
FOR MULTIPLE CONNECTION, SEE L8.
FOR ASPHALTIC CONCRETE PAVED AREAS, METER BOX SHALL BE LOCATED 4" FROM THE PROPERTY LINE.
FOR NON-SIDEWALK AREAS, METER BOX SHALL BE LOCATED 12" FROM PROPERTY LINE.
FOR SERVICE SADDLE REQUIREMENTS SEE TABLE 100-15 OF THE WATER SYSTEM STANDARDS.

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HAWAII	**COPPER SERVICE LATERAL** **FOR 5/8" & 1" METERS** SCALE: NTS	STANDARD DETAILS	L9

HAWAII

SERVICE LATERAL/CONNECTION

MATERIAL SCHEDULE

SCALE: NTS

STANDARD DETAILS

L10

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SERVICE LATERAL AND CONNECTION MATERIAL SCHEDULE

		SERVICE CONNECTION MATERIAL / SERVICE LATERAL MATERIAL															
		BRONZE BALL CORP. (a)		BRONZE CURB STOP (b)		BRONZE CURB STOP (c)		TEE CxCxC STYLE		90° ELBOW CxC STYLE		METER BOX	COPPER TUBING TYPE K	METER		CUSTOMER VALVE (d)	
TYPE	SIZE	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	QNT.	SIZE	SIZE	QNT.	SIZE	QNT.
A	1	1X1	1			1*	1					1	1	5/8	1	3/4	1
	1- 1/2	1-1/2X1-1/2	1			1-1/2	1					1	1- 1/2	1	1	1	1
	2	2X2	1			2	1					1	2	1- 1/2	1	1-1/2	1
	2- 1/2	2X2	1			2	1					1	2- 1/2	2	1	2	1
B	1- 1/2	1-1/2X1-1/2	1	1-1/2	1	1*	2	1 x 1 x 1-1/2	1			2	1- 1/2	5/8	2	3/4	2
	1- 1/2	1-1/2x1-1/2	1	1-1/2	1	1-1/2"	2	1-1/2X1-1/2X1-1/2	1			2	1- 1/2	1	2	1	2
	2- 1/2	2X2	1	2-1/2	1	2	2	2 X 2 X 2- 1/2	1			2	2- 1/2	1- 1/2	2	1-1/2	2
C	1- 1/2	1-1/2X1-1/2	1	1-1/2	1	1*	2	1 X 1 X 1- 1/2	1	1	2	2	1- 1/2	5/8	2	3/4	2
	1- 1/2	1-1/2x1-1/2	1	1-1/2	1	1-1/2"	2	1-1/2X1-1/2X1-1/2	1	1- 1/2	2	2	1- 1/2	1	2	1	2
	2- 1/2	2X2	1	2-1/2	1	2	2	2 X 2 X 2- 1/2	1	2	2	2	2- 1/2	1-1/2	2	1-1/2	2
D	1- 1/2	1-1/2x1-1/2	1	1-1/2	1	1*	3	1-1/2x1x1-1/2	1	1	2	3	1- 1/2	5/8	3	3/4	3
ITEM NO.		①		②		③		1- 1/2 X 1 X 1	1	⑤		⑥	⑦	⑧		⑨	
								④									

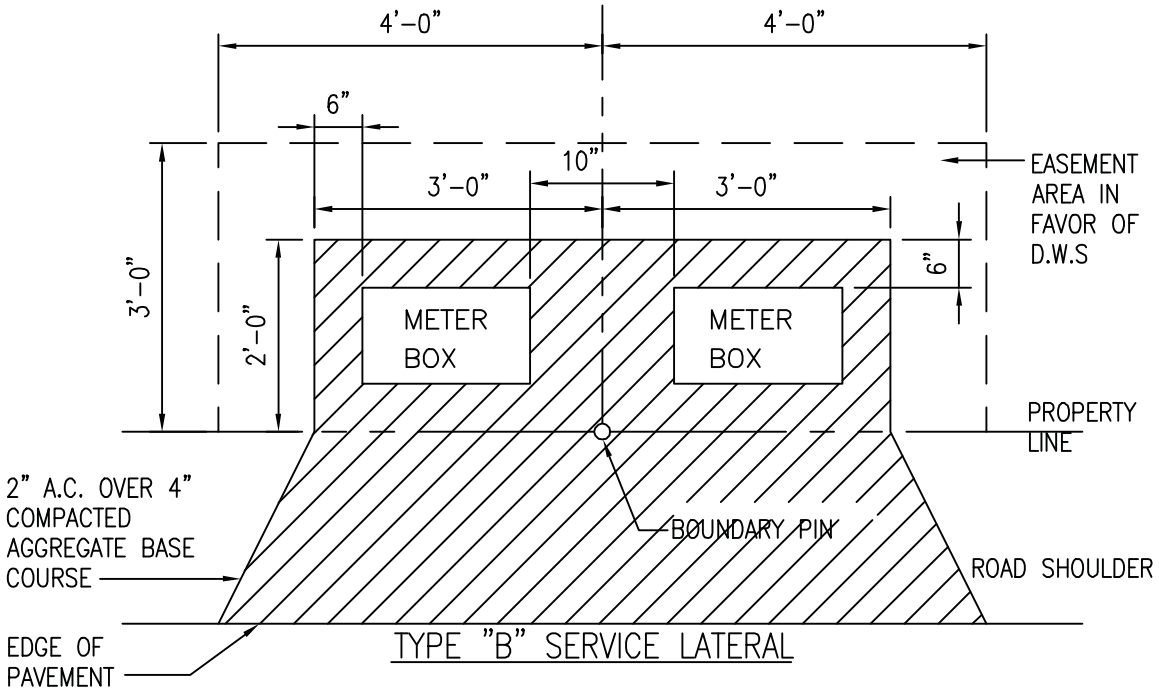
(a) BRONZE BALL CORP.
INLET: AWWA TAPER
OUTLET: PACK JOINT, "M.P.T. W/ADAPTER (F.P.T. x PACK JOINT)" OR
M.P.T. W/ BRASS UNION (FPT X C)

(b) BRONZE BALL CURB STOP
INLET–OUTLET: PACK JOINTS OR
FPT W/ ADAPTER (C X MPT)

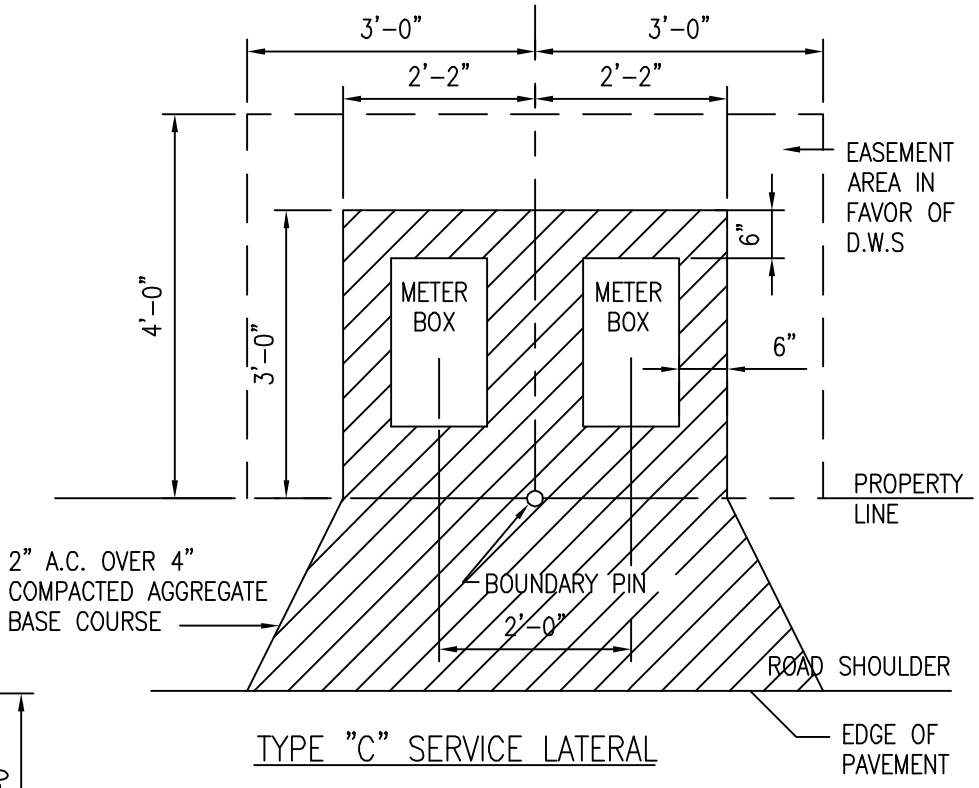
(*) 1" SERVICE CONNECTION
INLET: (TO FIT 1" COPPER PIPE)
OUTLET: METER COUPLING FOR
5/8" x 3/4" METER

(c) BRONZE BALL CURB STOP
INLET: PACK JOINT
OUTLET: METER COUPLING OR FPT W/BRASS BUSHING
OR
INLET: FPT W/ ADAPTER (C X MPT)
OUTLET: FPT W/BRASS BUSHING
OR
INLET: FPT W/ ADAPTER (C X MPT)
OUTLET: FPT W/ BRASS BUSHING AND METER COUPLING.

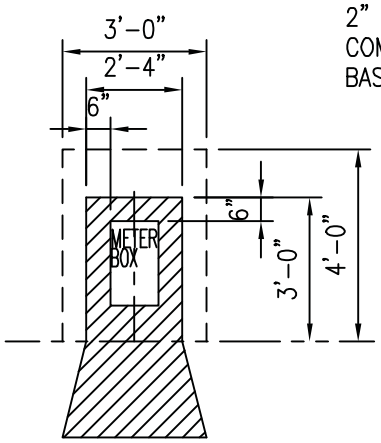
(d) CUSTOMER VALVE: BALL VALVE WITH HAND LEVER
INLET: METER COUPLING OR FLANGE, PACK JOINT, OR FPT.
OUTLET: FPT OR PACK JOINT.



TYPE "B" SERVICE LATERAL



TYPE "C" SERVICE LATERAL



TYPE "A" SERVICE LATERAL

TYPE "X" METER BOXES SHALL BE INSTALLED

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HAWAII	**STABILIZATION OF 5/8 INCH METER EASEMENTS** SCALE: NTS	STANDARD DETAILS	L11

OAHU

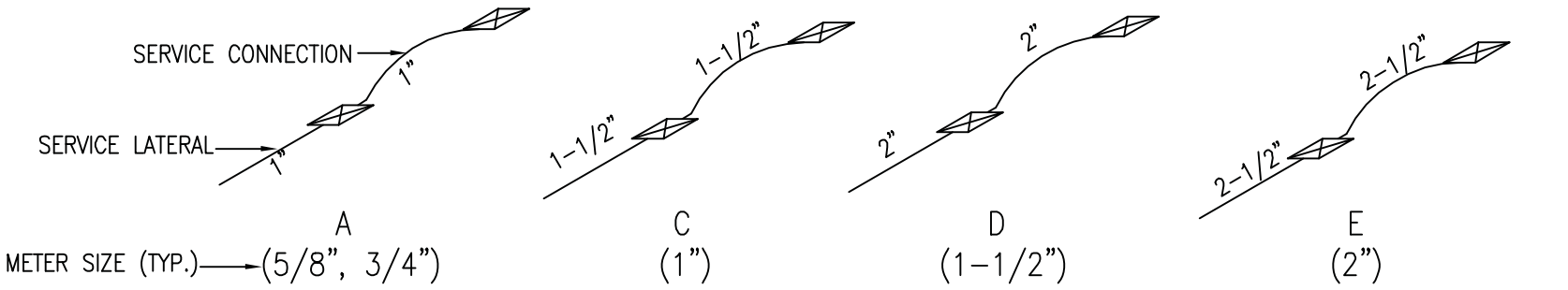
SERVICE LATERALS AND CONNECTIONS STANDARD SIZING ARRANGEMENTS

SCALE: NTS

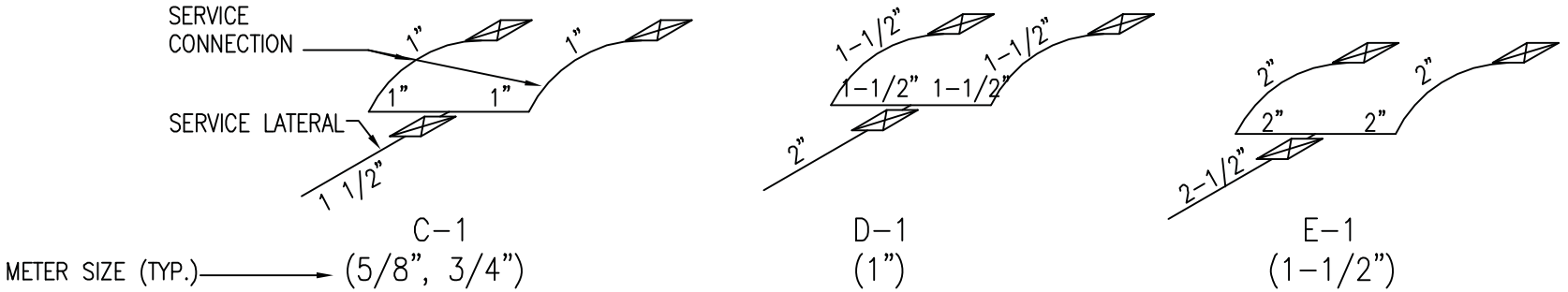
STANDARD DETAILS

L12

REVISION 2002

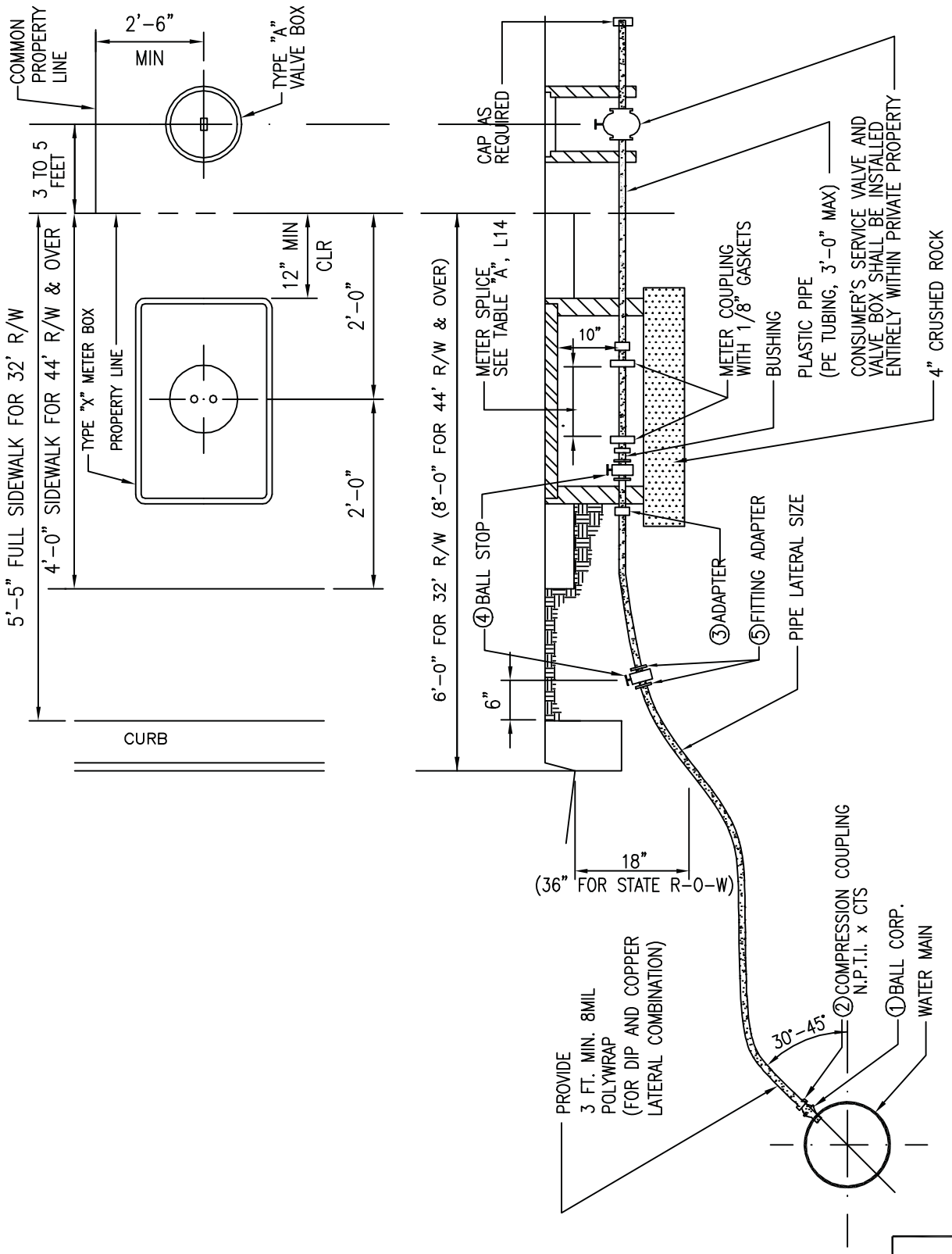


SINGLE SERVICE LATERAL



DOUBLE SERVICE LATERAL

THE PURPOSE OF THIS FIGURE IS TO SIMPLIFY THE DESIGNATION OF SERVICE LATERALS AND CONNECTIONS ON CONSTRUCTION PLANS. THE SIZE COMBINATIONS SHOWN HEREON ARE THOSE MOST COMMONLY USED, BUT THIS FIGURE IS NOT INTENDED TO LIMIT THE COMBINATIONS WHICH MAY BE USED.



OAHU	COPPER SERVICE LATERAL FOR CONNECTION TYPE "X" METER BOX 5/8", 3/4", & 1" METERS SCALE: NTS	STANDARD DETAILS	L13

2002
REVISION

NOTES:

1. SEE M3 FOR DETAILS OF TYPE "X" METER BOX.

2. IF THE CONSUMER'S SERVICE VALVE CANNOT BE INSTALLED 3–5 FEET FROM THE PROPERTY LINE, THE VALVE SHALL BE INSTALLED AS DIRECTED BY THE MANAGER, OR INSTALL BALL CORP. WITHIN METER BOX AFTER METER.

3. SEE PLATE M43 FOR METER INSTALLATION IN NON–SIDEWALK AREA.

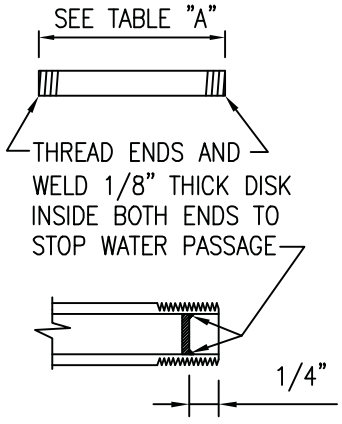


TABLE "A"		
METER SIZE	SPLICE SIZE	SPLICE LENGTH
5/8"	1" DIA.	7 1/2"
3/4"	1" DIA.	9"
1"	1 1/4" DIA.	10 3/4"

METER SPLICE DETAIL

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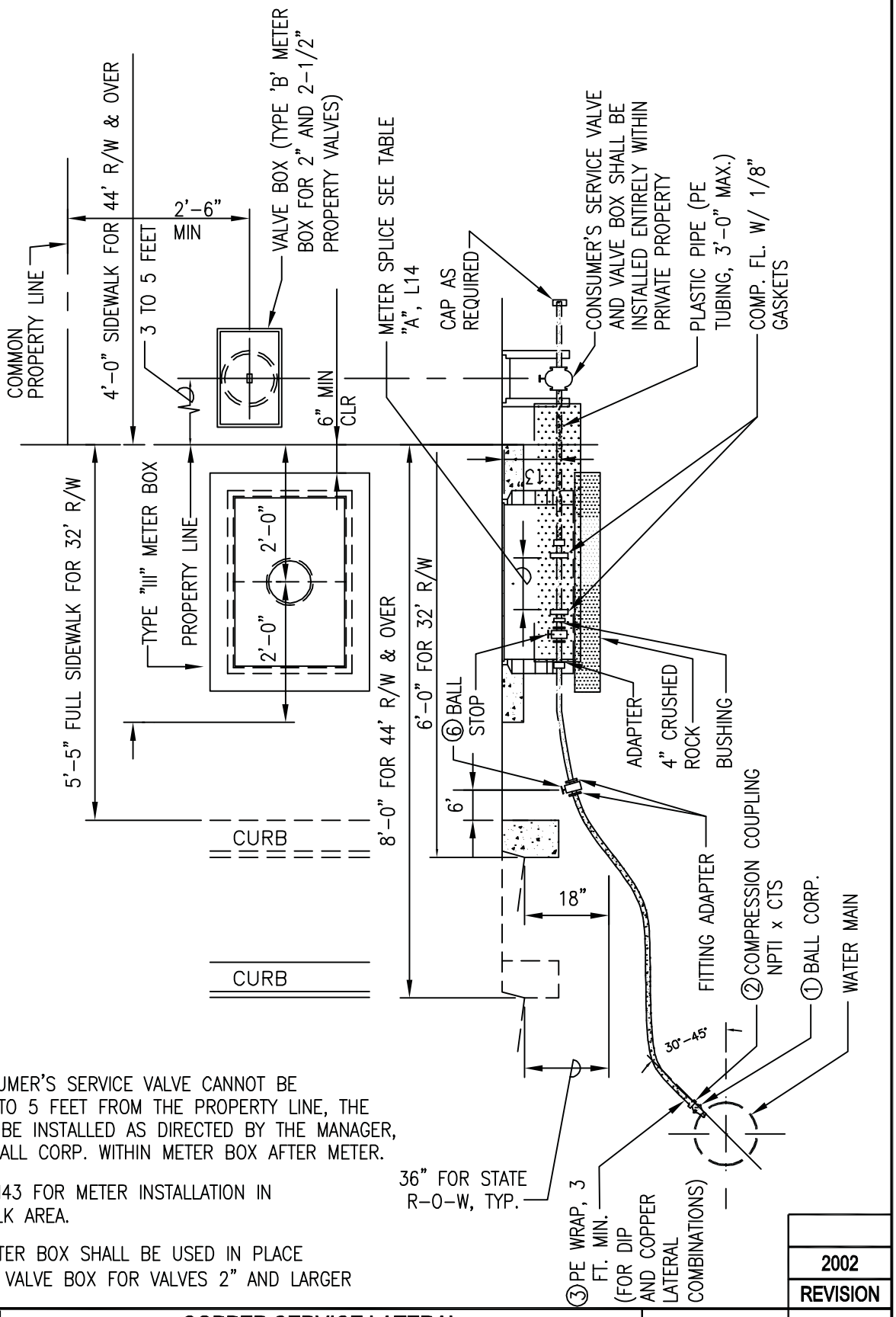
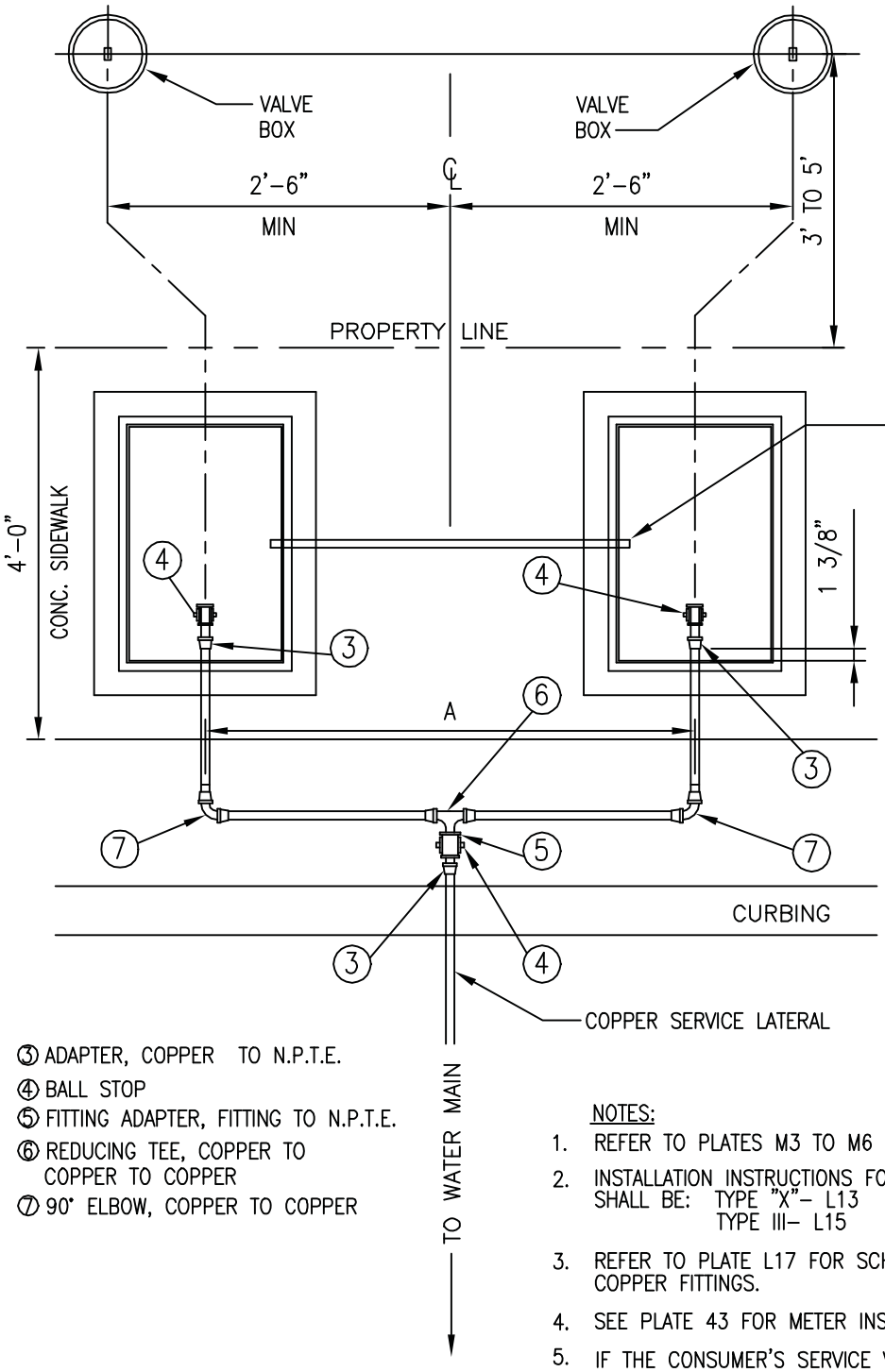
OAHU	COPPER SERVICE LATERAL FOR CONNECTION TYPE "X" METER BOX 5/8", 3/4", & 1" METERS SCALE: NTS	STANDARD DETAILS	L14



NOTES:

1. IF THE CONSUMER'S SERVICE VALVE CANNOT BE INSTALLED 3 TO 5 FEET FROM THE PROPERTY LINE, THE VALVE SHALL BE INSTALLED AS DIRECTED BY THE MANAGER, OR INSTALL BALL CORP. WITHIN METER BOX AFTER METER.
2. SEE PLATE M43 FOR METER INSTALLATION IN NON-SIDEWALK AREA.
3. TYPE "B" METER BOX SHALL BE USED IN PLACE OF TYPE "A" VALVE BOX FOR VALVES 2" AND LARGER

			2002
			REVISION
OAHU	**COPPER SERVICE LATERAL FOR CONNECTION TYPE III METER BOX 1 1/2" AND 2" METERS** SCALE: NTS	STANDARD DETAILS	L15



INSTALL 3/4" PVC SCHEDULE 80 CONDUIT WITH STRING UNDER THE METER BOXES, WHENEVER THE DISTANCE BETWEEN METER BOXES (2 TO 12 MULTIPLE METER BOXES) IS 4'-0" OR LESS (EDGE TO EDGE). CONDUIT SHALL EXTEND 2" WITHIN METER BOX, KEEP BOTH ENDS EXPOSED, PLUG OR TAPE TO PREVENT SOIL INTRUSION, AS REQUIRED. FOR INSTALLATION IN EXISTING SLAB, SAW CUT TRENCH, REPAIR CONCRETE WITH EPOXY MORTAR, LEVEL AND FINISH TO MATCH EXISTING.

③ ADAPTER, COPPER TO N.P.T.E.
④ BALL STOP
⑤ FITTING ADAPTER, FITTING TO N.P.T.E.
⑥ REDUCING TEE, COPPER TO COPPER TO COPPER
⑦ 90° ELBOW, COPPER TO COPPER

NOTES:

1. REFER TO PLATES M3 TO M6 FOR DETAILS OF METER BOXES.
2. INSTALLATION INSTRUCTIONS FOR METER BOXES IN SIDEWALK AREA SHALL BE: TYPE "X"– L13
   TYPE III– L15
3. REFER TO PLATE L17 FOR SCHEDULE OF COPPER FITTINGS.
4. SEE PLATE 43 FOR METER INSTALLATION IN NON–SIDEWALK AREAS.
5. IF THE CONSUMER'S SERVICE VALVE CANNOT BE INSTALLED 3 TO 5 FEET FROM THE PROPERTY LINE, THE VALVE SHALL BE INSTALLED AS DIRECTED BY THE MANAGER.

TYPE OF METER BOX	MIN. DIMENSION "A"
TYPE "X"	25"
TYPE III	29"

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REVISION

OAHU

COPPER SERVICE LATERAL
FOR CONNECTION (MULTIPLE SERVICE)
SCALE: NTS

STANDARD DETAILS

L16

ITEM NO.	DESCRIPTION	SINGLE SERVICE CONN.	CONNECTION FOR TWO SERVICES
1	BALL CORPORATION, BRONZE	1	1
2	GROUND JOINT UNION, COPPER TO N.P.T.I.	1	1
3	ADAPTER, COPPER TO N.P.T.E.	1	3
4	BALL STOP	2	3
5	FITTING ADAPTER, FITTING TO N.P.T.E	2	1
6	REDUCING TEE, COPPER TO COPPER TO COPPER	–	1
7	90° ELBOW, COPPER TO COPPER	–	2

NPTI= NATIONAL PIPE THREAD, INTERNAL
NPTE= NATIONAL PIPE THREAD, EXTERNAL
CTS= COPPER TUBING SIZE

SCHEDULE OF COPPER FITTINGS

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REVISION

OAHU

SPECIAL LATERAL AND CONNECTION
FITTING SCHEDULE
SCALE: NTS

STANDARD DETAILS

L17

OAHU

MATERIAL LIST
FOR COPPER LATERALS

SCALE: NTS

STANDARD DETAILS

L18

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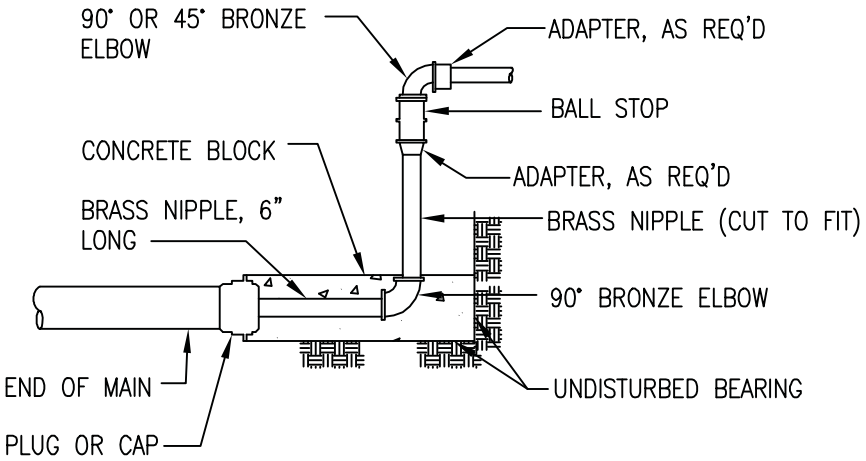
TABLE A (COPPER)													
METER			LOW RANGE FOR METER SIZING (GPM)	LATERAL TYPE	LATERAL SIZE	SPLICE SIZE	SPLICE LENGTH	METER COUPL'G	BRASS REDUC.	SERVICE VALVE	BRASS PIPE	CAP	METER BOX
CODE	SIZE	FLOW GPM											
02	5/8"	20	0–20	"A"	1"	1" DIA.	7 1/2"	3/4"	1"x3/4"	1"	1"x10"	1"	TYPE X
03	3/4"	30	21–30	"A"	1"	1" DIA.	9"	3/4"	1"x3/4"	1"	1"x10"	1"	TYPE X
04	1"	50	31–50	"C"	1–1/2"	1" DIA.*	10 3/4"	1"	1 1/2"x1"	1 1/2"	1 1/2"x10"	1 1/2"	TYPE X
06	1 1/2"	100	51–100	"D"	2"	1 1/2" DIA.	13" R.E.	1 1/2 FL.	NONE	1 1/2"	1 1/2"x10"	1 1/2"	TYPE III
07	2"	160	101–160	"E"	2–1/2"	2" DIA.**	17" R.E.	2" FL.	NONE	2"	2"x10"	2"	TYPE III

* INCLUDES 2–1 1/4"x 1" BUSHINGS

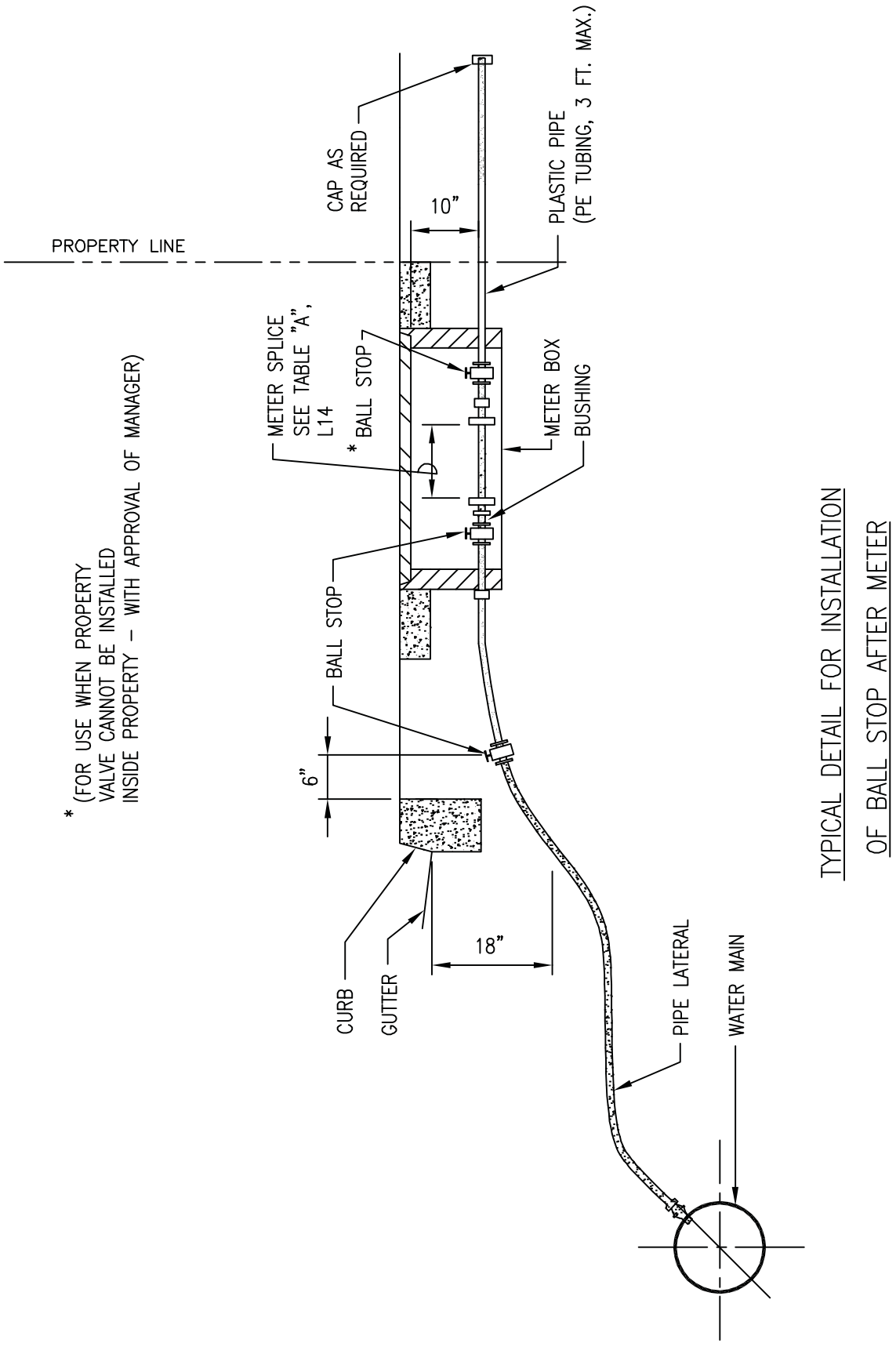
* * INCLUDES 2–2"x2 1/2" BUSHINGS

MAXIMUM METER SIZES FOR DOMESTIC SERVICE LATERALS		
LATERAL TYPE	MAXIMUM METER SIZE FOR SINGLE SERVICE LATERAL	MAXIMUM METER SIZES FOR COMMON SERVICE LATERAL
"A"	3/4"	NA
"C"	1"	3/4" & 3/4"
"D"	1–1/2"	1" & 1"
"E"	2"	1–1/2" & 1"



SERVICE LATERAL CONNECTION AT END OF LINE

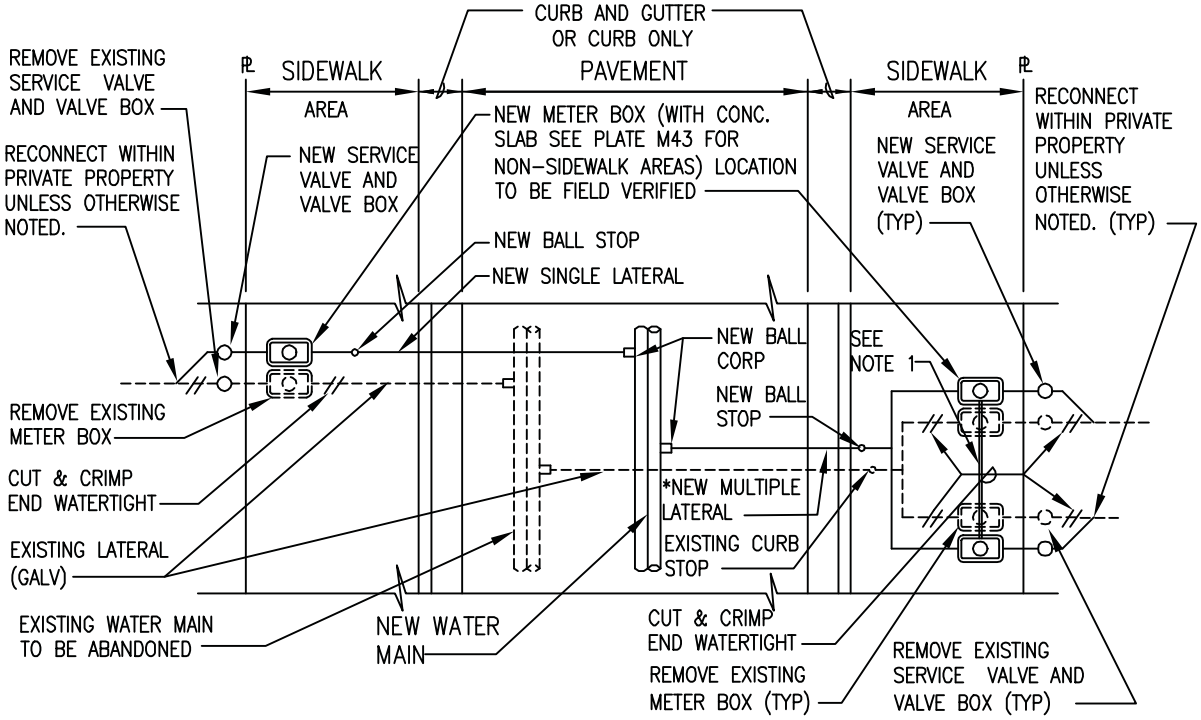
			2002 REVISION
OAHU	END OF LINE CONNECTION SCALE: NTS	STANDARD DETAILS	L19



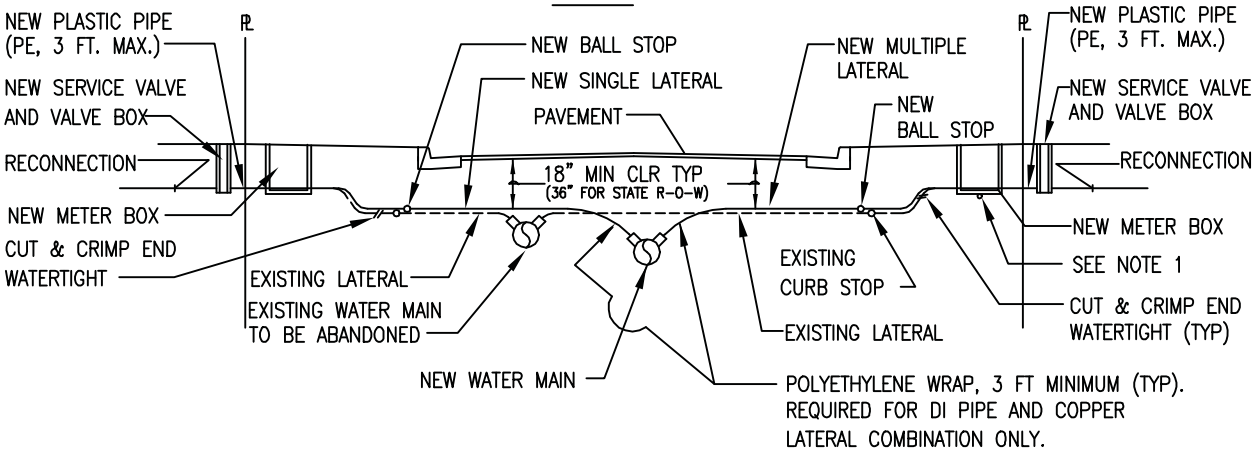
TYPICAL DETAIL FOR INSTALLATION
OF BALL STOP AFTER METER

OAHU	**TYPICAL DETAIL FOR INSTALLATION** OF BALL STOP AFTER METER SCALE: NTS	STANDARD DETAILS	L20

2002
REVISION



PLAN



PROFILE

NOTES:

1. CONTRACTOR SHALL INSTALL A 3/4" PVC SCHEDULE 80 CONDUIT WITH STRING WHENEVER THE DISTANCE BETWEEN METER BOXES (2 TO 12 MULTIPLE METER BOXES) IS 4'-0" OR LESS (EDGE TO EDGE). CONDUIT SHALL EXTEND 2" WITHIN METER BOX, KEEP BOTH ENDS EXPOSED, PLUG OR TAPE TO PREVENT SOIL INTRUSION, AS REQUIRED. SAW CUT TRENCH AS REQUIRED AND REPAIR TO MATCH EXISTING CONDITIONS. FOR CONCRETE SLAB, REPAIR TRENCH WITH EPOXY MORTAR, LEVEL AND FINISH TO MATCH EXISTING.
2. INSTALL ELBOWS AND PIPE EXTENSIONS BEFORE METERS TO PROVIDE 18-INCH MINIMUM COVER FOR SERVICE LATERALS, AS REQUIRED.

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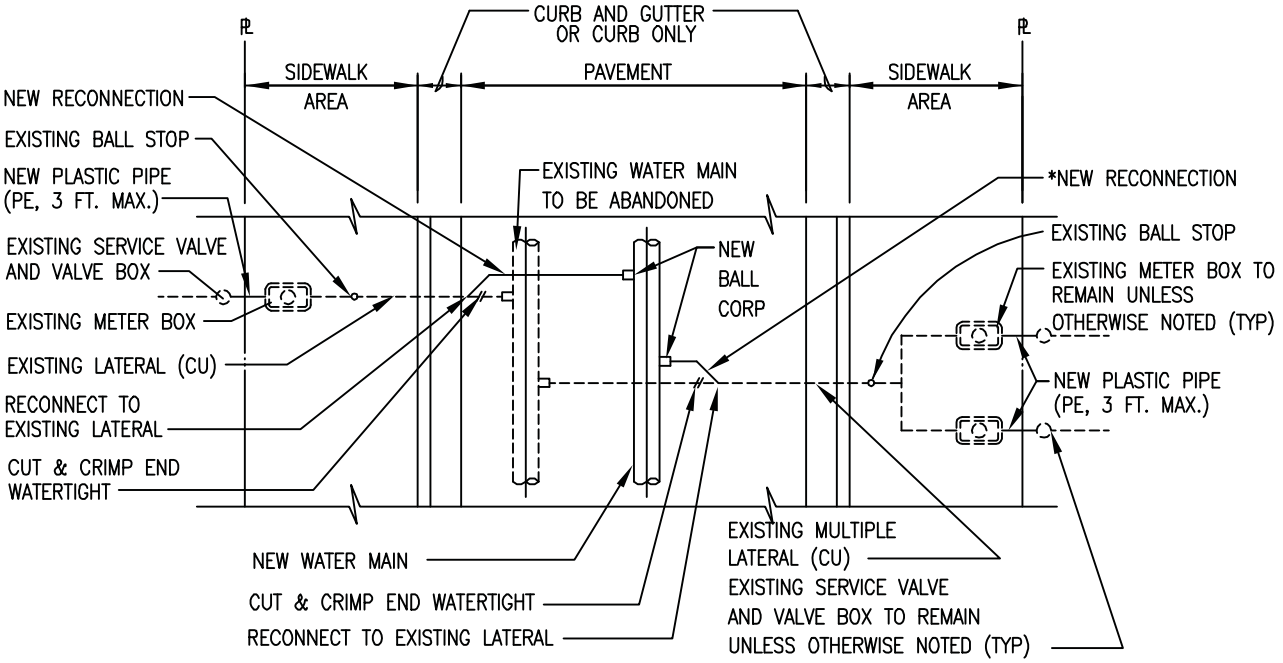
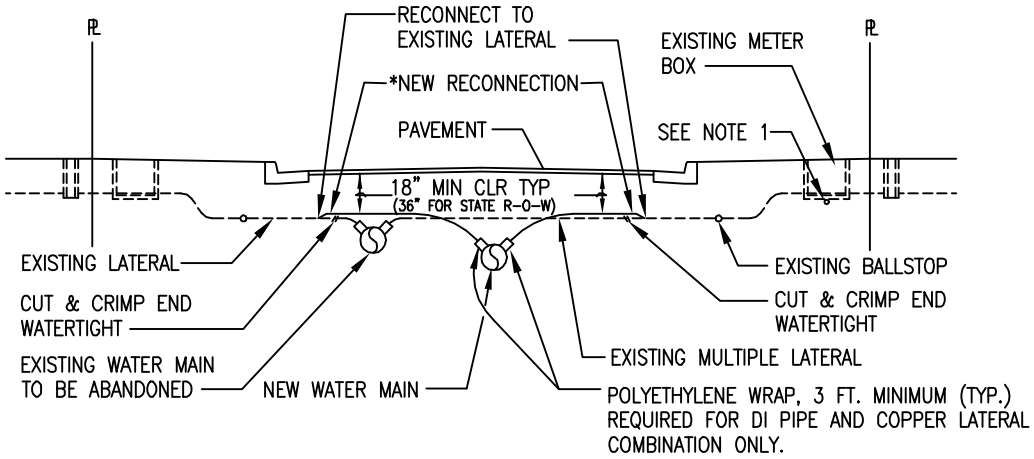
REVISION

OAHU	**NEW LATERAL INSTALLATION** SCHEMATIC DETAIL SCALE: NTS	STANDARD DETAILS	L21



PLAN



PROFILE

			2002 REVISION
OAHU	LATERAL RECONNECTION SCHEMATIC DETAIL SCALE: NTS	STANDARD DETAILS	L22

MAUI

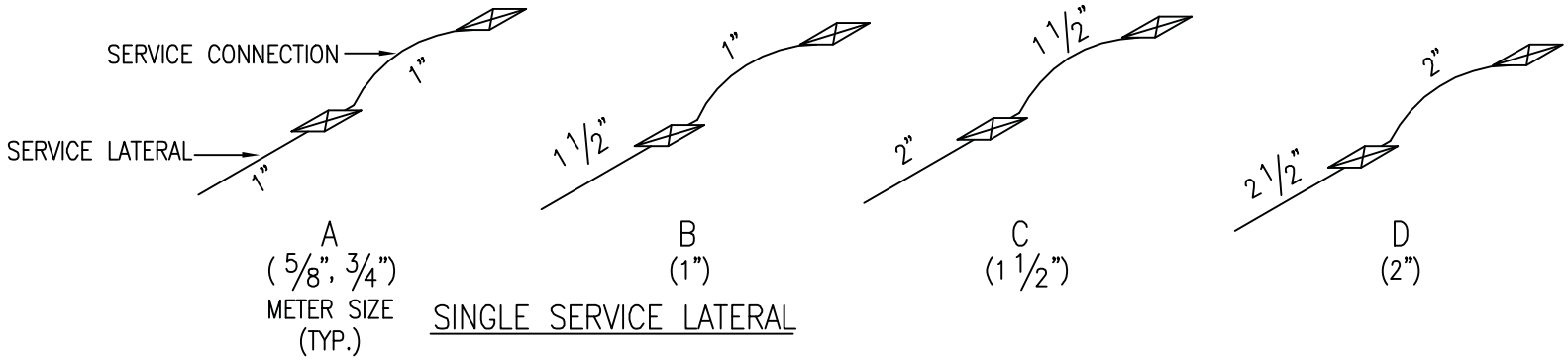
SERVICE LATERALS AND CONNECTIONS STANDARD SIZING ARRANGEMENTS

SCALE: NTS

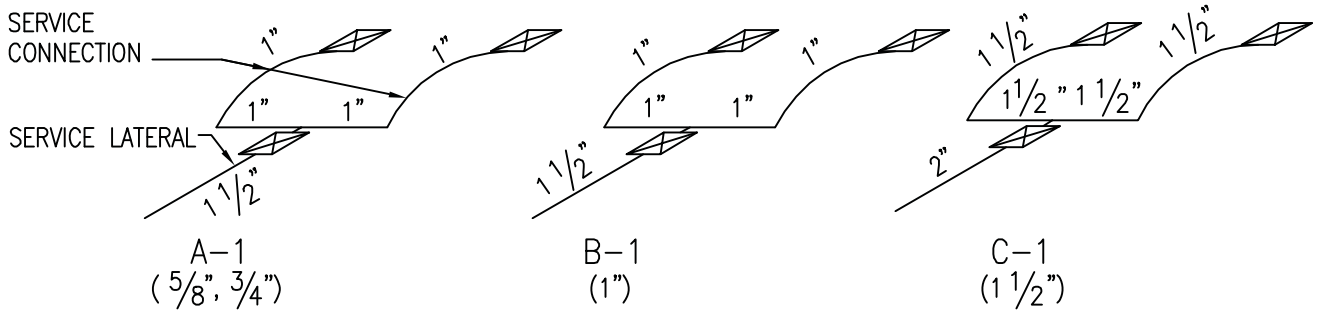
STANDARD DETAILS

L23

REVISION 2002

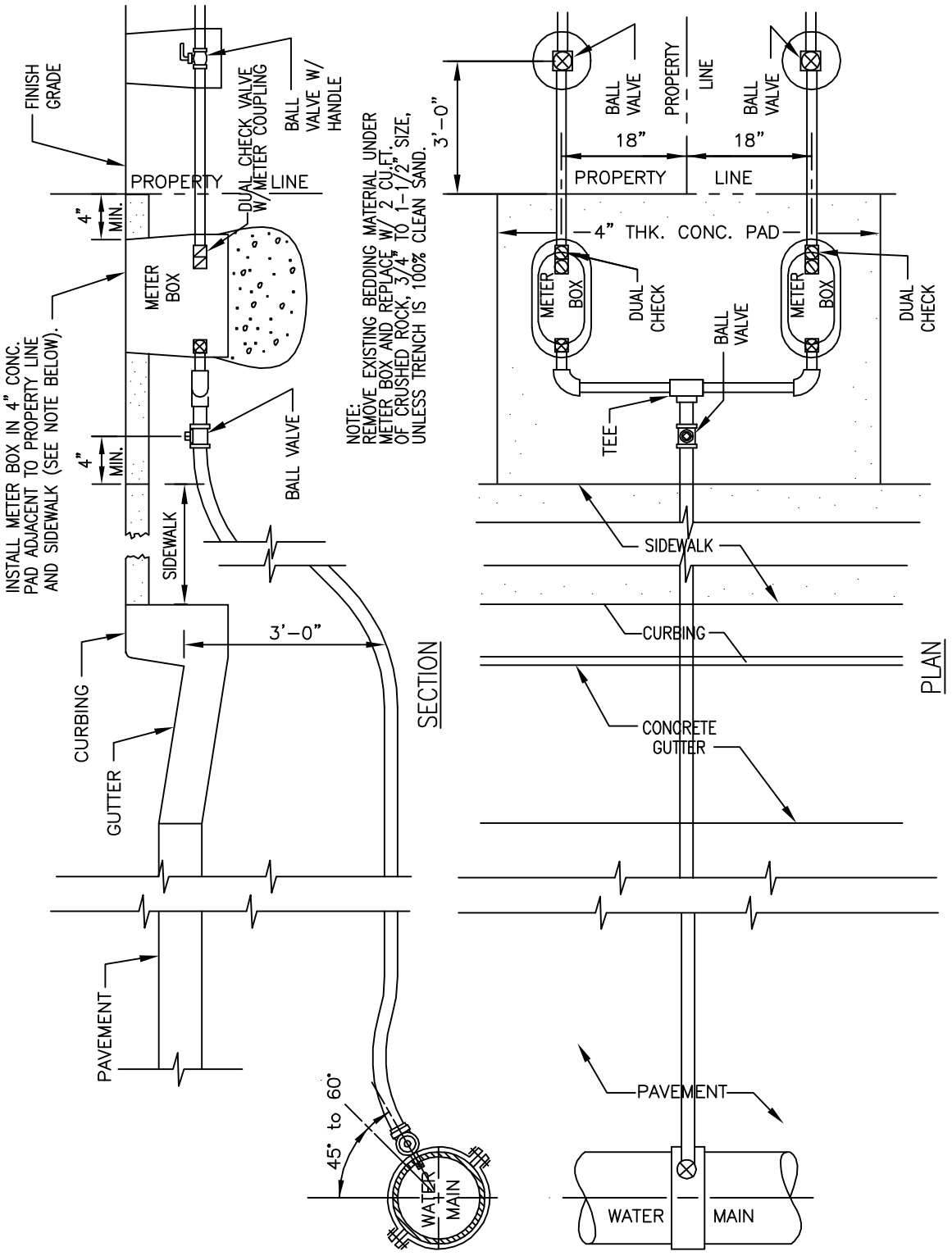


SINGLE SERVICE LATERAL



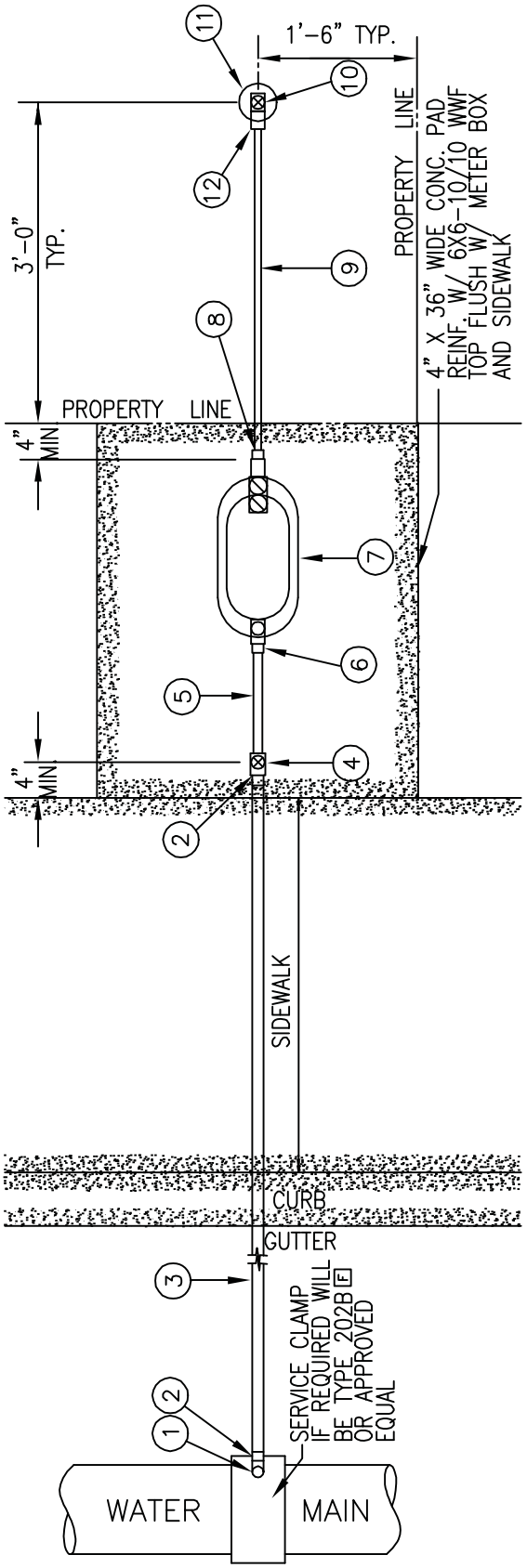
DOUBLE SERVICE LATERAL

THE PURPOSE OF THIS FIGURE IS TO SIMPLIFY THE DESIGNATION OF SERVICE LATERALS AND CONNECTIONS ON CONSTRUCTION PLANS. THE SIZE COMBINATIONS SHOWN HEREON ARE THOSE MOST COMMONLY USED, BUT THIS FIGURE IS NOT INTENDED TO LIMIT THE COMBINATIONS WHICH MAY BE USED.



MAUI	TYPICAL SERVICE LATERAL SCALE: NTS	STANDARD DETAILS	L24

2002
REVISION



NOTE: SEE L26 FOR MATERIALS AND NOTES

MAUI	SINGLE SERVICE LATERAL TYPE "A", 5/8" & 3/4" METERS) SCALE: NTS	STANDARD DETAILS	L25

2002
REVISION

MAUI

SINGLE SERVICE LATERAL (TYPE "A", 5/8" & 3/4" METERS)

SCALE: NTS

STANDARD DETAILS

L26

TYPE	METER SIZE	(1) CORP. STOP	(2) COPPER ADAPTER	(3) COPPER SERVICE TUBING	(4) BRONZE BALL VALVE	(5) BRASS NIPPLE	(6) BRASS FITTING
A	5/8" x 3/4"	1" AWWA THREAD x FEMALE I.P.T. FB 1600-4 [F]	1" MALE I.P.T. x COPPER	1"	1" FEMALE I.P.T. B 11-444 [F]	1" x 4"	N/A
A	3/4" x 3/4"	1" AWWA THREAD x FEMALE I.P.T. FB 1600-4 [F]	1" MALE I.P.T. x COPPER	1"	1" FEMALE I.P.T. B 11-444 [F]	1" x 4"	1" x 45° ELBOW W/ CLOSE NIPPLE OR 45° STREET ELBOW

TYPE	METER SIZE	(7) CAST IRON METER BOX	(8) COPPER ADAPTER	(9) COPPER SERVICE TUBING	(10) BRONZE BALL VALVE	(11) PLASTIC VALVE BOX	(12) DIELECTRIC COUPLING
A	5/8" x 3/4"	1" FEMALE I.P.T. INLET 3/4" FEMALE I.P.T. OUTLET LYLB 111-243-TP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED) [F]	3/4" MALE I.P.T. x COPPER	3/4"	3/4" FEMALE I.P.T. B 11-333 HB-34S [F]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	3/4 BRASS W/ CLOSE NIPPLE
A	3/4" x 3/4"	1" FEMALE I.P.T. INLET 3/4" FEMALE I.P.T. OUTLET LYLB 211-343-TP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED) [F]	3/4" MALE I.P.T. x COPPER	3/4"	3/4" FEMALE I.P.T. B 11-333 HB-34S [F]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	3/4 BRASS W/ CLOSE NIPPLE

[F] DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.

NOTES

1. ALL FITTINGS AND MATERIALS SHALL BE AS LISTED BY BRAND NAME OR APPROVED EQUAL.
   FOR CONDITION OTHER THAN STANDARD CONDITION SHOWN, ENGINEER SHALL SUBMIT MODIFIED DETAIL FOR APPROVAL.
2. SEE L25 FOR PLAN VIEW
3. WHERE THERE IS NO SIDEWALK, THE 4" CONCRETE PAD SHALL MEASURE 42" FRONT-TO-BACK AND 36" ALONG THE PROPERTY LINE, WITH TOP ELEVATION 2" ABOVE THE GRADED SHOULDER.
4. REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.

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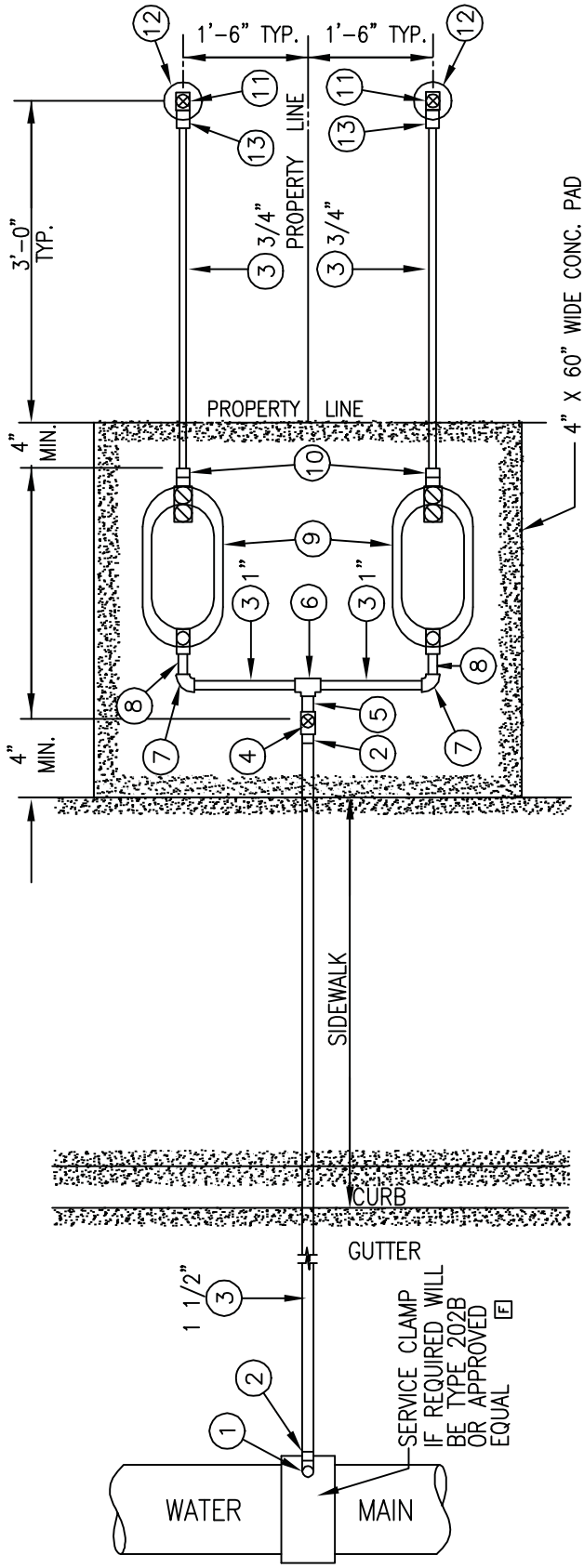


NOTE: SEE L28 FOR MATERIALS AND NOTES

			2002
			REVISION
MAUI	DOUBLE SERVICE LATERAL (TYPE "A-1", 5/8" & 3/4" METERS) SCALE: NTS	STANDARD DETAILS	L27

MAUI

DOUBLE SERVICE LATERAL (TYPE "A-1", 5/8" & 3/4" METERS)

SCALE: NTS

STANDARD DETAILS

L28

REVISION	2002	

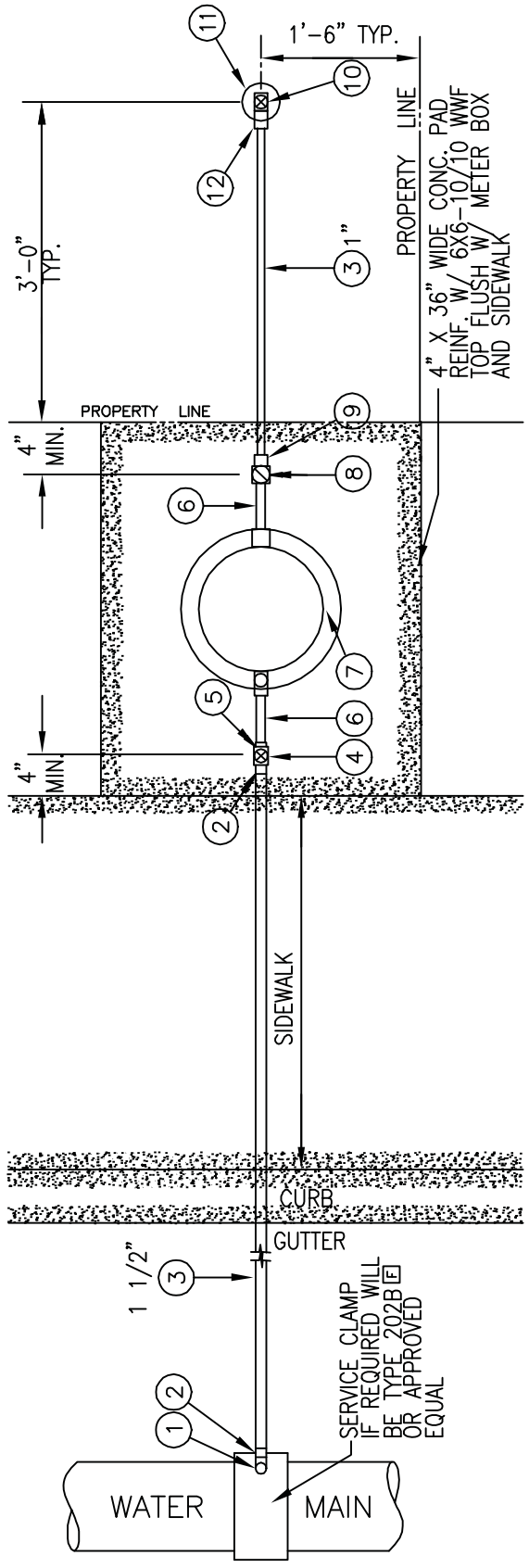
TYPE	METER SIZE	(1) BALL STOP CORP.	(2) COPPER ADAPTER	(3) COPPER SERVICE TUBING	(4) BRONZE BALL VALVE	(5) COPPER ADAPTER	(6) COPPER TEE
A-1	5/8" x 3/4"	1 1/2" AWWA THREAD x FEMALE I.P.T. FB 1600-6 [F]	1 1/2" MALE I.P.T. x COPPER	SIZES AS NOTED ON L27	1 1/2" FEMALE I.P.T. B 11-666 [F]	1 1/2" MALE I.P.T. x COPPER (SPIGOT)	1" x 1" x 1 1/2" C x C x C
A-1	3/4" x 3/4"	1 1/2" AWWA THREAD x FEMALE I.P.T. FB 1600-6 [F]	1 1/2" MALE I.P.T. x COPPER	SIZES AS NOTED ON L27	1 1/2" FEMALE I.P.T. B 11-666 [F]	1 1/2" MALE I.P.T. x COPPER (SPIGOT)	1" x 1" x 1 1/2" C x C x C

TYPE	METER SIZE	(7) COPPER 90° ELLS	(8) COPPER ADAPTER	(9) CAST IRON METER BOX	(10) COPPER ADAPTER	(11) BRONZE BALL VALVE	(12) PLASTIC VALVE BOX	(13) DIELECTRIC COUPLING
A-1	5/8" x 3/4"	1" C x C	1" MALE I.P.T. x COPPER (SPIGOT)	1" FEMALE I,P,T, INLET 3/4" FEMALE I.P.T. OUTLET LYLB 111-243-TP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED) [F]	3/4" MALE I.P.T. x COPPER	3/4" FEMALE I.P.T. B 11-333 HB-34S [F]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	3/4 BRASS WITH CLOSE NIPPLE
A-1	3/4" x 3/4"	1" C x C (ROTATED 45°)	1" MALE I.P.T. x COPPER (SPIGOT)	1" FEMALE I,P,T, INLET 3/4" FEMALE I.P.T. OUTLET LYLB 211-343-TP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED) [F]	3/4" MALE I.P.T. x COPPER	3/4" FEMALE I.P.T. B 11-333 HB-34S [F]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	3/4 BRASS WITH CLOSE NIPPLE

[F] DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.

NOTES

1. ALL FITTINGS AND MATERIALS SHALL BE AS LISTED BY BRAND NAME OR APPROVED EQUAL. FOR CONDITION OTHER THAN STANDARD CONDITION SHOWN, ENGINEER SHALL SUBMIT MODIFIED DETAIL FOR APPROVAL.
2. SEE L27 FOR PLAN VIEW
3. WHERE THERE IS NO SIDEWALK, THE 4" CONCRETE PAD SHALL MEASURE 42" FRONT-TO-BACK AND 60" ALONG THE PROPERTY LINE, WITH TOP ELEVATION 2" ABOVE THE GRADED SHOULDER.
4. REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.



NOTE: SEE L30 FOR MATERIALS AND NOTES

MAUI	**SINGLE SERVICE LATERAL (TYPE "B", 1" METER)** SCALE: NTS	STANDARD DETAILS	L29

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REVISION

MAUI

SINGLE SERVICE LATERAL (TYPE "B", 1" METER)

SCALE: NTS

STANDARD DETAILS

L30

TYPE	METER SIZE	(1) CORP. STOP	(2) COPPER ADAPTER	(3) COPPER SERVICE TUBING	(4) BRONZE BALL VALVE	(5) BRASS BUSHING	(6) BRASS NIPPLE	(7) CAST IRON METER BOX
B	1"	1 1/2" AWWA THREAD x FEMALE I.P.T. FB 1600-6 [F]	1 1/2" MALE I.P.T. x COPPER	SIZES AS NOTED ON L29	1 1/2" FEMALE I.P.T. B 11-666 [F]	1" FEMALE I.P.T. x 1 1/2" MALE I.P.T. C 18-46 [F]	1" x 4"	INLET-OUTLET 1" FEMALE I.P.T. (METER SHUTOFF INCLUDED) YLB 111-444-TP [F]

TYPE	METER SIZE	(8) BRASS CHECK VALVE	(9) COPPER ADAPTER	(10) BRONZE BALL VALVE	(11) PLASTIC VALVE BOX	(12) DIELECTRIC COUPLING
B	1"	1" IN-LINE SPRING HS 11-444 [F]	1" MALE I.P.T. x COPPER	1" FEMALE I.P.T. B 11-444 HB-34S [F]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	1" BRASS WITH CLOSE NIPPLE

[F] DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.

NOTES

1. ALL FITTINGS AND MATERIALS SHALL BE AS LISTED BY BRAND NAME OR APPROVED EQUAL. FOR CONDITION OTHER THAN STANDARD CONDITION SHOWN, ENGINEER SHALL SUBMIT MODIFIED DETAIL FOR APPROVAL.
2. SEE L29 FOR PLAN VIEW
3. WHERE THERE IS NO SIDEWALK, THE 4" CONCRETE PAD SHALL MEASURE 42" FRONT-TO-BACK AND 36" ALONG THE PROPERTY LINE, WITH TOP ELEVATION 2" ABOVE THE GRADED SHOULDER.
4. REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.

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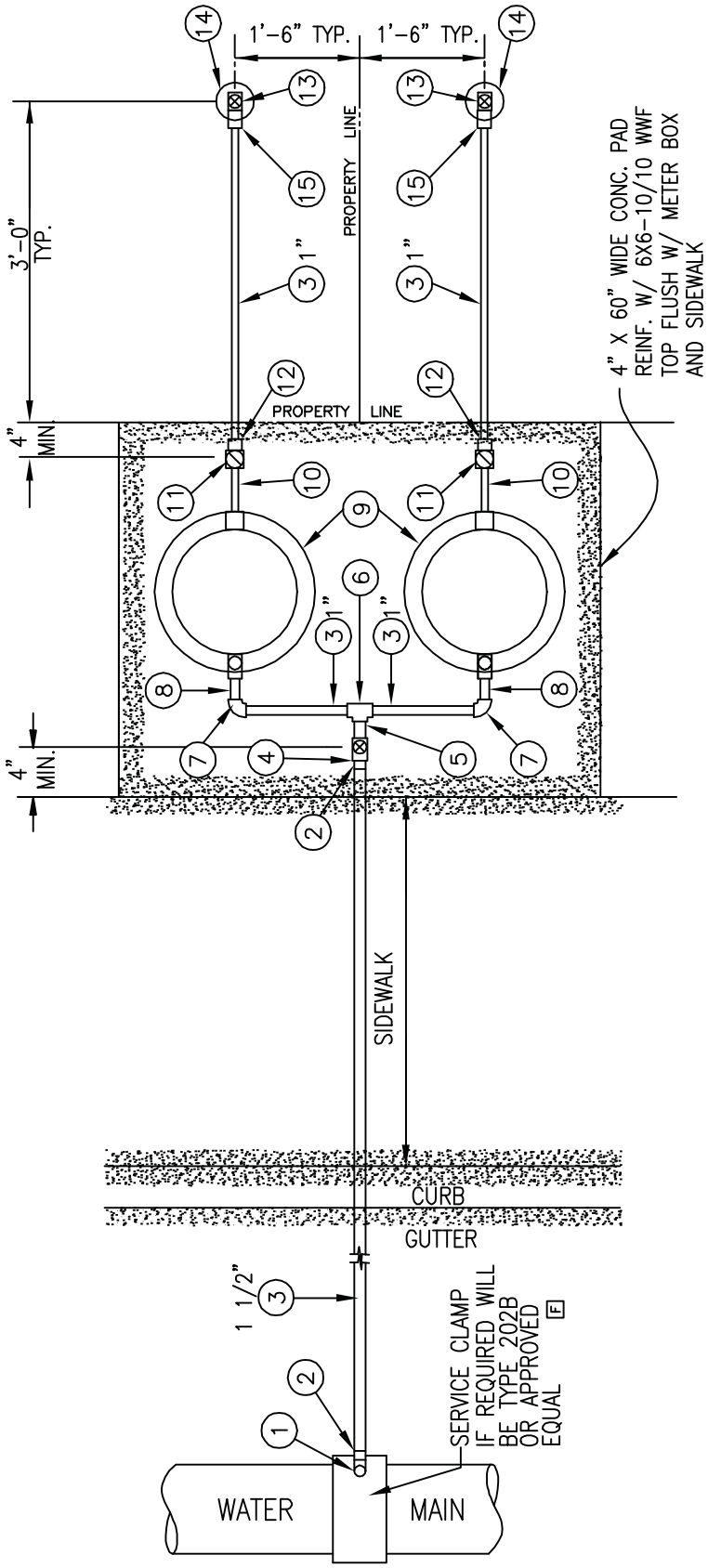


NOTE: SEE L32 FOR MATERIALS AND NOTES.

MAUI	**DOUBLE SERVICE LATERAL** **(TYPE "B-1", 1" METER)** SCALE: NTS	STANDARD DETAILS	L31

2002
REVISION

MAUI

DOUBLE SERVICE LATERAL

(TYPE "B-1", 1" METER)

SCALE: NTS

STANDARD DETAILS

L32

TYPE	METER SIZE	① CORP. STOP	② COPPER ADAPTER	③ COPPER SERVICE TUBING	④ BRONZE BALL VALVE	⑤ COPPER ADAPTER	⑥ COPPER TEE	⑦ COPPER 90° ELLS
B-1	1"	1 1/2" AWWA THREAD x FEMALE I.P.T. FB 1600-6 [F]	1 1/2" MALE I.P.T. x COPPER	SIZES AS NOTED ON L31	1 1/2" FEMALE I.P.T. B 11-666 [F]	1 1/2" MALE I.P.T. x COPPER (SPIGOT)	1" x 1" x 1 1/2" C x C x C	1" C x C

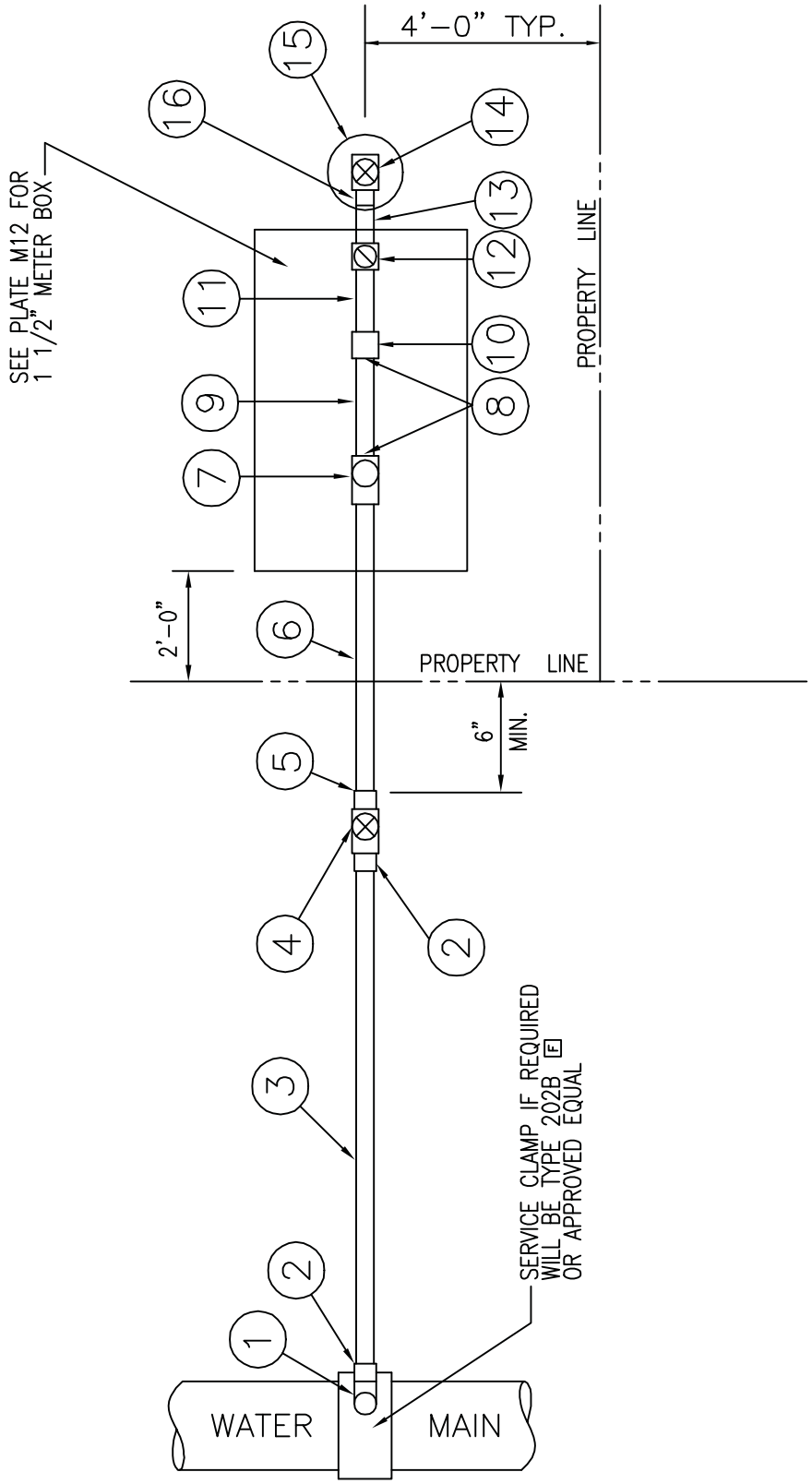
TYPE	METER SIZE	⑧ COPPER ADAPTER	⑨ CAST IRON METER BOX	⑩ BRASS NIPPLE	⑪ BRASS CHECK VALVE	⑫ COPPER ADAPTER	⑬ BRONZE BALL VALVE	⑭ PLASTIC VALVE BOX	⑮ DIELECTRIC COUPLING
B-1	1"	1" MALE I.P.T. x COPPER (SPIGOT)	INLET-OUTLET 1" FEMALE I.P.T. (METER SHUT-OFF INCLUDED) YLB 111-444-TP	1" x 4"	1" IN-LINE SPRING HS 11-444 [F]	1" MALE I.P.T. x COPPER	1" FEMALE I.P.T B 11-444 HB-34S	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	1" BRASS WITH CLOSE NIPPLE

NOTES

1. ALL FITTINGS AND MATERIALS SHALL BE AS LISTED BY BRAND NAME OR APPROVED EQUAL. FOR CONDITION OTHER THAN STANDARD CONDITION SHOWN, ENGINEER SHALL SUBMIT MODIFIED DETAIL FOR APPROVAL.
2. SEE L31 FOR PLAN VIEW
3. WHERE THERE IS NO SIDEWALK, THE 4" CONCRETE PAD SHALL MEASURE 42" FRONT-TO-BACK AND 60" ALONG THE PROPERTY LINE, WITH TOP ELEVATION 2" ABOVE THE GRADED SHOULDER.
4. REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.

[F] DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.

REVISION 2002



NOTE: SEE L34 FOR MATERIALS AND NOTES

	2002
	REVISION

MAUI	**SINGLE SERVICE LATERAL** (TYPE "C", 1 1/2" METER) SCALE: NTS	STANDARD DETAILS	L33

MAUI

SINGLE SERVICE LATERAL

(TYPE "C", 1 1/2" METER)

SCALE: NTS

STANDARD DETAILS

L34

TYPE	METER SIZE	(1) CORP. STOP	(2) COPPER ADAPTER	(3) COPPER SERVICE TUBING	(4) BRONZE BALL VALVE	(5) BRASS BUSHING	(6) BRASS NIPPLE	(7) METER VALVE	(8) STAINLESS STL. BOLTS/NUTS
C	1 1/2"	2" AWWA THREAD x FEMALE I.P.T. FB 1600-7 [F]	2" MALE I.P.T. x COPPER	2"	2" FEMALE I.P.T. B 11-777 [F]	1 1/2" FEMALE I.P.T. x 2" MALE I.P.T. C 18-67 [F]	1 1/2" x 48" (OR LENGTH TO FIT)	1 1/2" FEMALE I.P.T. x FLANGE BF 13-666 [F]	5/8" x 2 1/2" TYPE 304

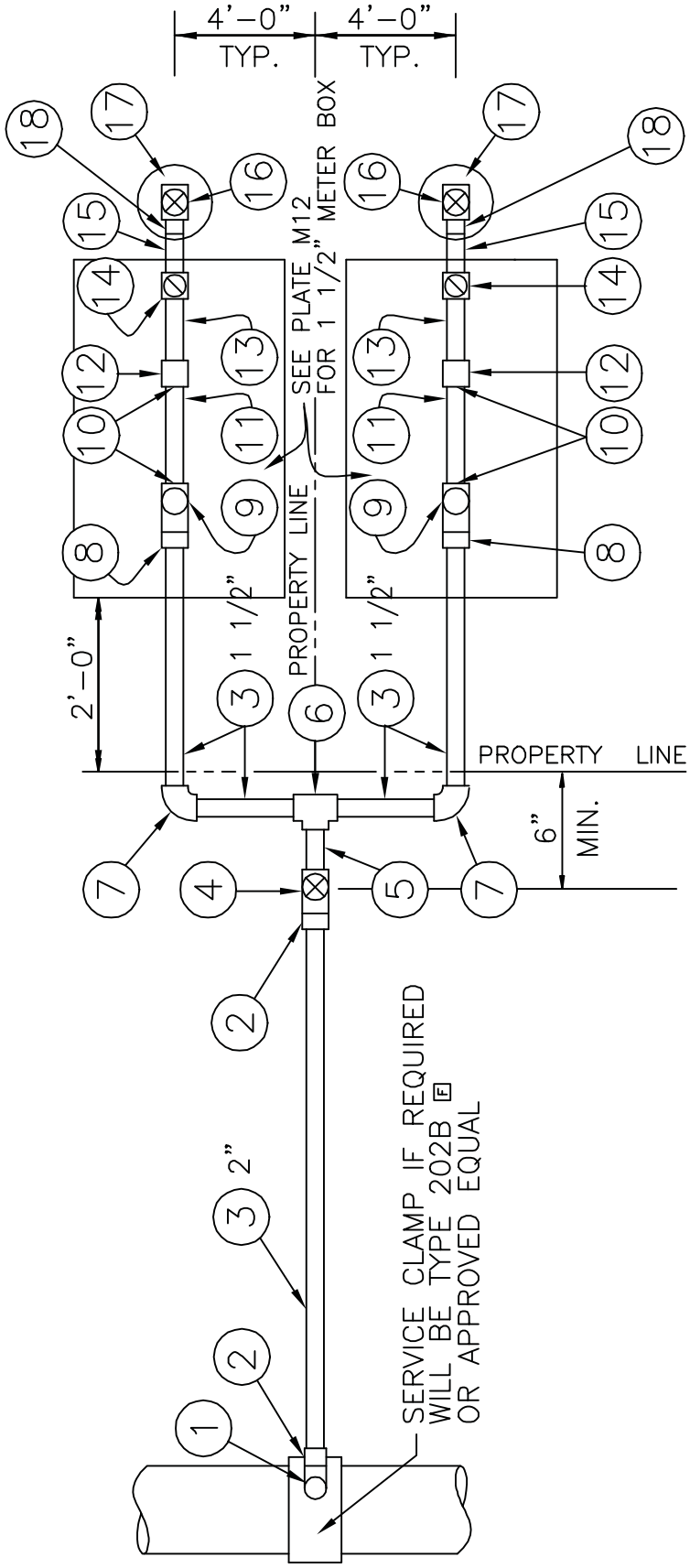
TYPE	METER SIZE	(9) METER IDLER	(10) METER COUPLING	(11) BRASS NIPPLE	(12) BRASS CHECK VALVE	(13) BRASS NIPPLE	(14) BRONZE BALL VALVE	(15) PLASTIC VALVE BOX	(16) DIELECTRIC COUPLING
C	1 1/2"	1 1/2" x 13" FLG. x FLG. ONE END PLUGGED	1 1/2" FLG. x LOK-PAK [F]	1 1/2" x 6"	1 1/2" IN-LINE SPRING HS 11-666 [F]	1 1/2" x 14"	1 1/2" FEMALE I.P.T. B 11-666 HB-67S [F]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	1 1/2" BRASS WITH ADAPTER AND CLOSE NIPPLE

NOTES:

1. ALL FITTINGS AND MATERIALS LISTED BY BRAND NAMES OR APPROVED EQUAL.
2. SEE PLATE M23 FOR TRANSPONDER BRACKET INSTALLATION.
3. SEE L33 FOR PLAN VIEW

[F] DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.

REVISION 2002



NOTE: SEE L36 FOR MATERIALS AND NOTES

	2002
	REVISION

MAUI	**DOUBLE SERVICE LATERAL** (TYPE "C-1", 1 1/2" METER) SCALE: NTS	STANDARD DETAILS	L35

MAUI

DOUBLE SERVICE LATERAL

(TYPE "C-1", 1 1/2" METER)

SCALE: NTS

STANDARD DETAILS

L36

TYPE	METER SIZE	① CORP. STOP	② COPPER ADAPTER	③ COPPER SERVICE TUBING	④ BRONZE BALL VALVE	⑤ COPPER ADAPTER	⑥ COPPER TEE	⑦ COPPER 90° ELLS	⑧ COPPER ADAPTER
C-1	1 1/2"	2" AWWA THREAD x FEMALE I.P.T. FB 1600-7 [F]	2" MALE I.P.T. x COPPER	SIZES AS NOTED ON L35	2" FEMALE I.P.T. B 11-777 [F]	2" MALE I.P.T. x C (SPIGOT)	1 1/2" x 1 1/2"x 2" C x C x C	1 1/2" C x C	1 1/2" MALE I.P.T. x COPPER

⑨ METER VALVE	⑩ STAINLESS STL. BOLTS/NUTS	⑪ METER IDLER	⑫ METER COUPLING	⑬ BRASS NIPPLE	⑭ BRASS CHECK VALVE	⑮ BRASS NIPPLE	⑯ BRONZE BALL VALVE	⑰ PLASTIC VALVE BOX	⑱ DIELECTRIC COUPLING
1 1/2" FEMALE I.P.T. x FLANGE BF 13-666 [F]	5/8" x 2 1/2" TYPE 304	1 1/2" x 13" FLG. x FLG. ONE END PLUGGED	1 1/2" FLG. x LOK-PAK [F]	1 1/2" x 6"	1 1/2" IN-LINE SPRING HS 11-666 [F]	1 1/2" x 14"	1 1/2" FEMALE I.P.T. B 11-666 HB-67S [F]	10" AMETEK 10-181-014 W/GREEN COVER 10-181-015	1 1/2" BRASS WITH ADAPTER AND CLOSE NIPPLE

NOTES:

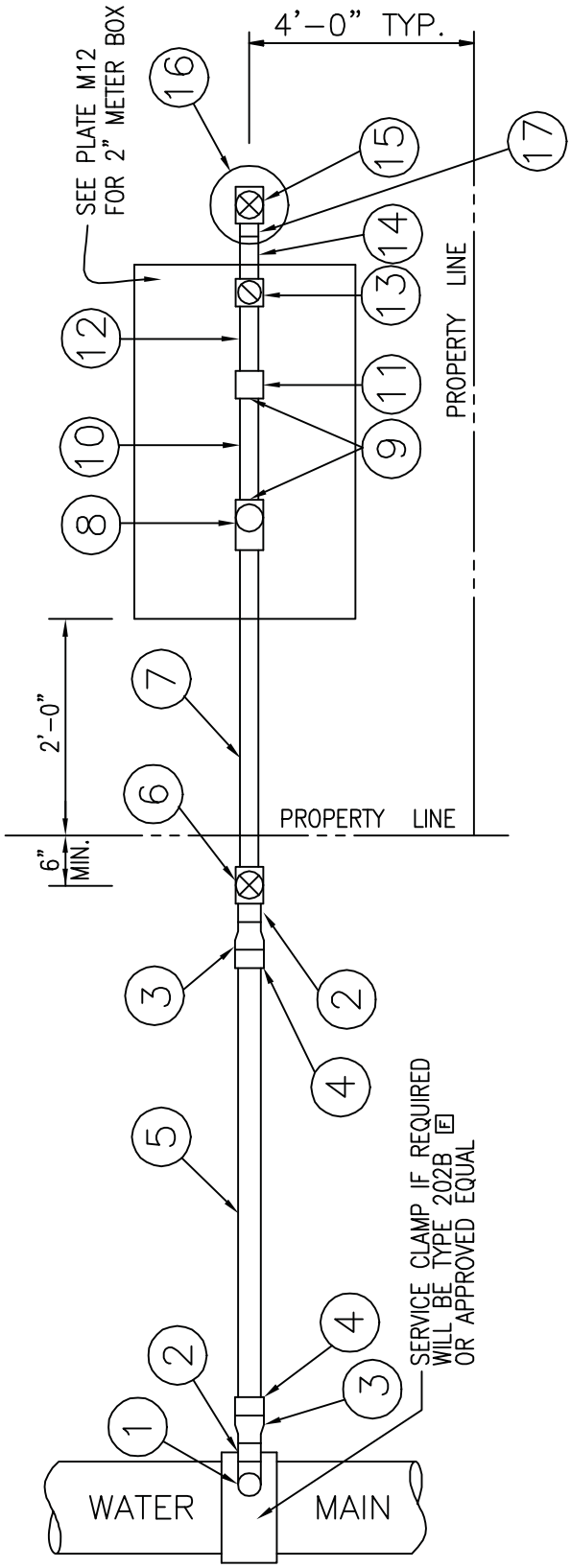
ALL FITTINGS AND MATERIALS LISTED BY BRAND NAMES OR APPROVED EQUAL.

SEE PLATE M23 FOR TRANSPONDER BRACKET INSTALLATION.

SEE L35 FOR PLAN VIEW

[F] DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.

REVISION 2002



NOTE: SEE L38 FOR MATERIALS AND NOTES

MAUI	**SINGLE SERVICE LATERAL** (TYPE "D", 2" METER) SCALE: NTS	STANDARD DETAILS	L37

2002
REVISION

MAUI

SINGLE SERVICE LATERAL

(TYPE "D", 2" METER)

SCALE: NTS

STANDARD DETAILS

L38

TYPE	METER SIZE	①	② *	③ *	④ *	⑤ *
		STOP CORP.	BRASS NIPPLE	BRASS REDUCING COUPLING	COPPER ADAPTER	COPPER SERVICE TUBING
D	2"	2" AWWA THREAD x FEMALE I.P.T. FB 1600-7 [F]	2" x 4"	2 1/2" x 2" C 11-87 [F]	2 1/2" * (OR 2") MALE I.P.T. x COPPER	2 1/2" * (OR 2")

⑥	⑦	⑧	⑨	⑩	⑪
BRONZE BALL VALVE	BRASS NIPPLE	VALVE METER	STAINLESS STL. BOLTS/NUTS	METER IDLER	METER COUPLING
2" FEMALE I.P.T. B 11-777 [F]	2" x 48" (OR LENGTH TO FIT)	2" FEMALE I.P.T. x FLANGE BF 13-777 [F]	5/8" x 3" TYPE 304	2" x 17" FLG. x FLG. ONE END PLUGED	2" FLG. x LOK PAK [F]

⑫	⑬	⑭	⑮	⑯	⑰
BRASS NIPPLE	BRASS CHECK VALVE	BRASS NIPPLE	BRONZE BALL VALVE	PLASTIC VALVE BOX	DIELECTRIC COUPLING
2" x 6"	2" IN-LINE SPRING HS 11-777 [F]	2" x 14"	2" FEMALE I.P.T. B 11-777 HB-67 S [F]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	2" BRASS WITH ADAPTER AND CLOSE NIPPLE

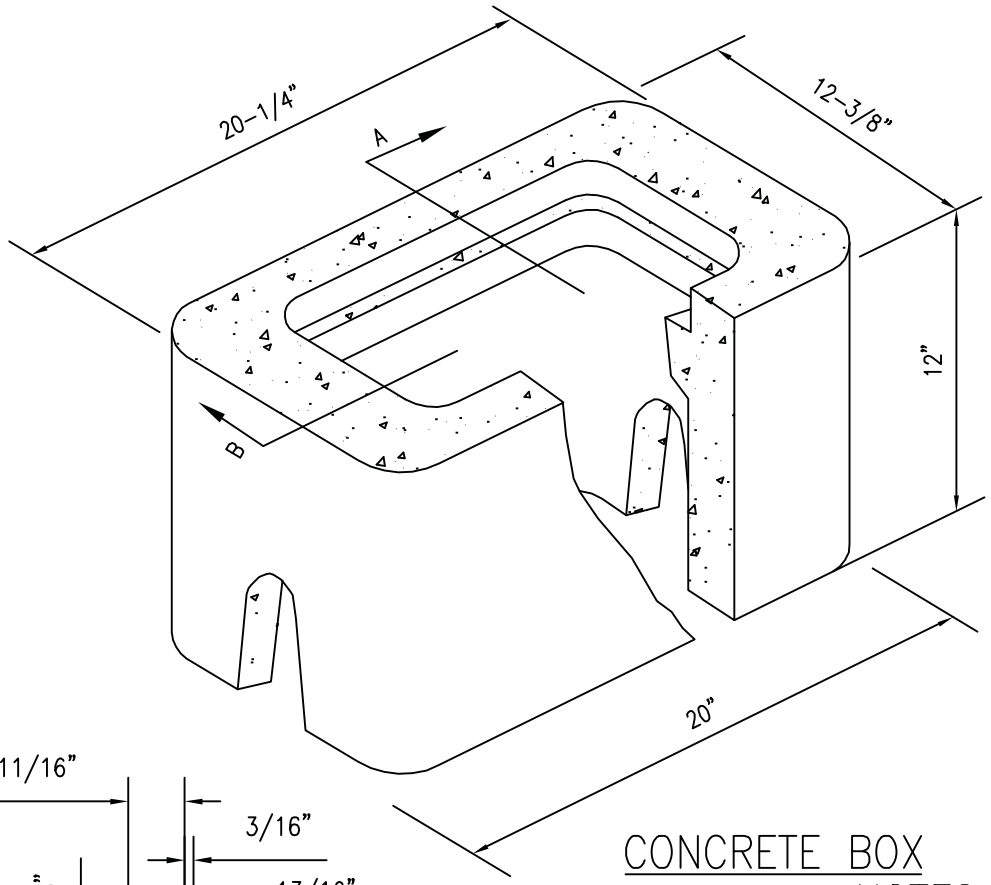
NOTES:

1. ALL FITTINGS AND MATERIALS LISTED BY BRAND NAMES OR APPROVED EQUAL.
2. SEE PLATE M23 FOR TRANSPONDER BRACKET INSTALLATION.

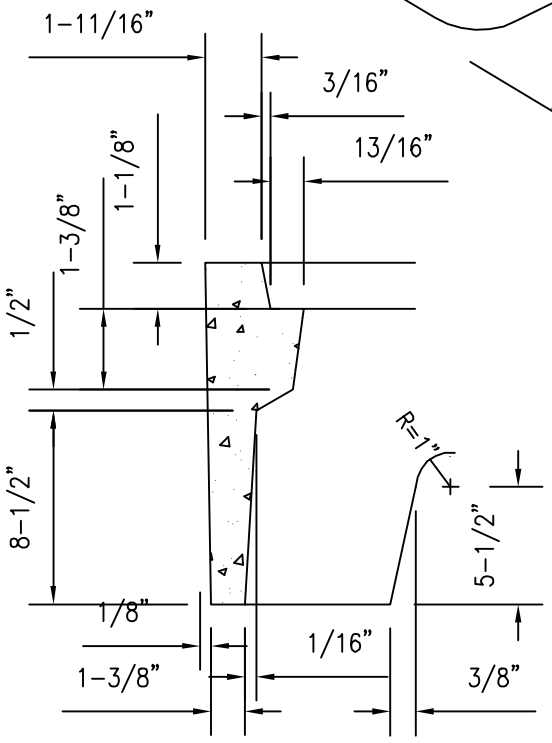
* IF LENGTH OF SERVICE LATERAL IS LESS THAN 15 FEET, DELETE ITEMS ② AND ③ AND USE 2" SIZE FOR ITEMS ④ AND ⑤. SEE L37 FOR PLAN VIEW

[F] DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.

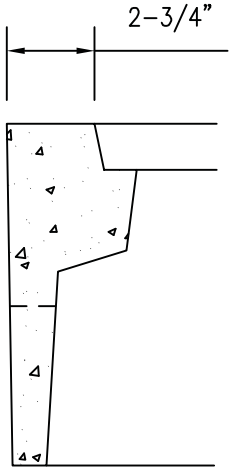
REVISION 2002



CONCRETE BOX



SECTION "A"



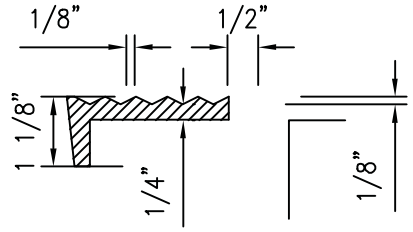
SECTION "B"

NOTES:

1. ACCOMMODATES 5/8" OR 3/4" METERS. (KAUAI AND HAWAII ONLY) AND 2" AND 2-1/2" PROPERTY VALVES (FOR OAHU)
2. ACCOMMODATES 2" & 2-1/2" VALVES.
3. SEE PLATE M2 FOR C.I. COVER DETAILS.
4. FOR OAHU AND HAWAII, FIBER REINFORCED CONC. IS ALLOWED.
5. INSTALL 6" WIDE X 4" THICK CONCRETE COLLAR WITH WIRE MESH IN NON-CONCRETE/SIDEWALK AREA WHERE APPLICABLE

	2002
	REVISION

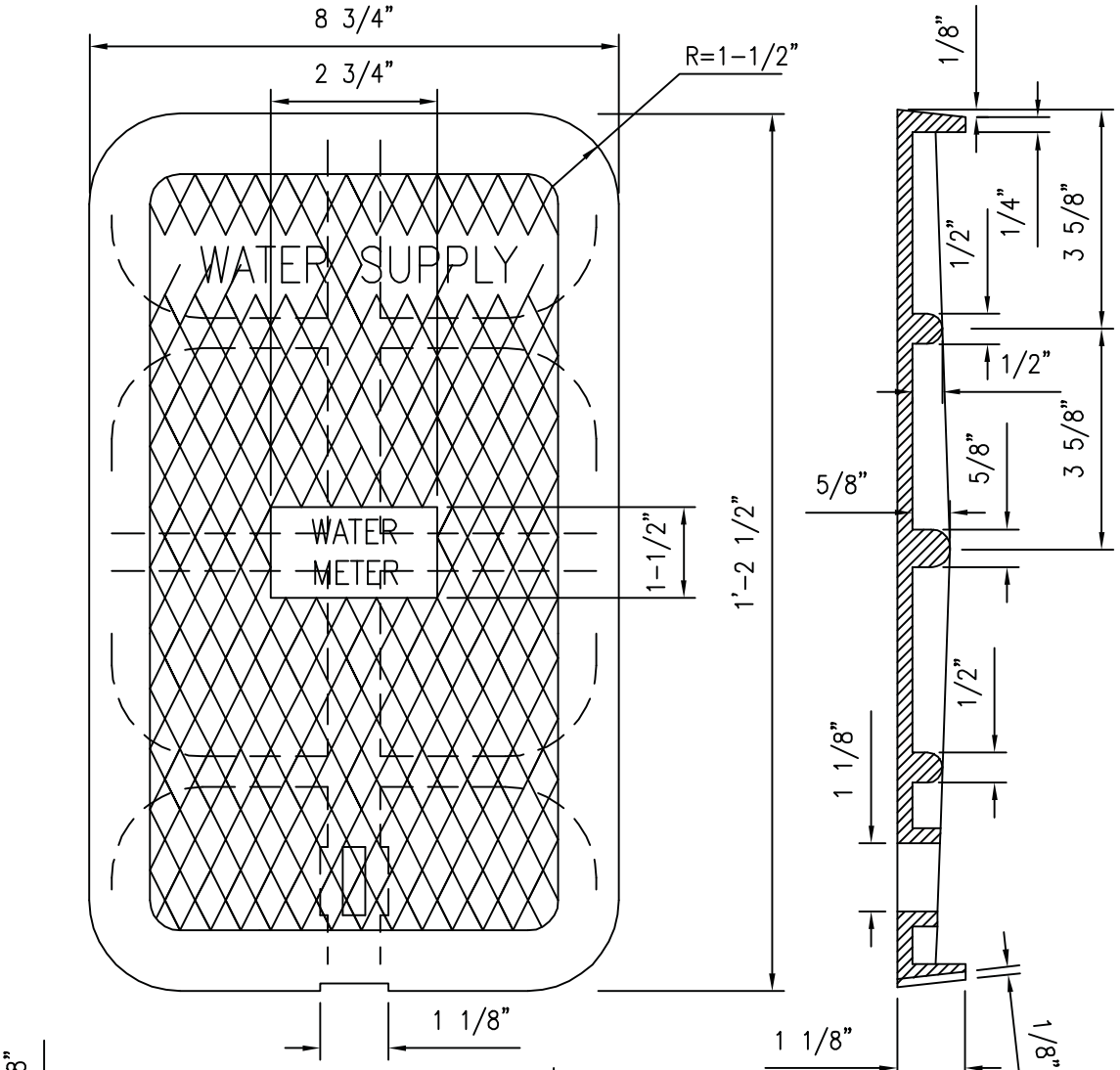
KAUAI OAHU HAWAII	**METER BOX** **TYPE "B"** **SCALE: NTS**	STANDARD DETAILS	M1

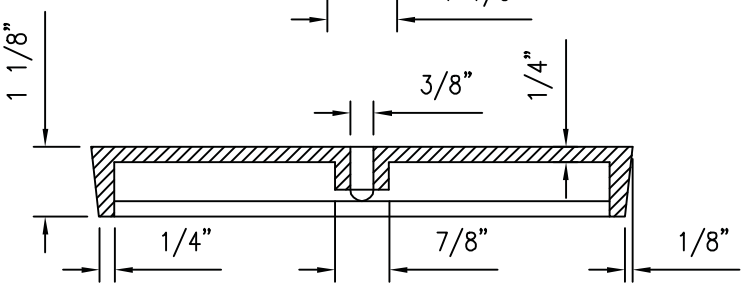


CHECKERED PATTERN

NOTE:

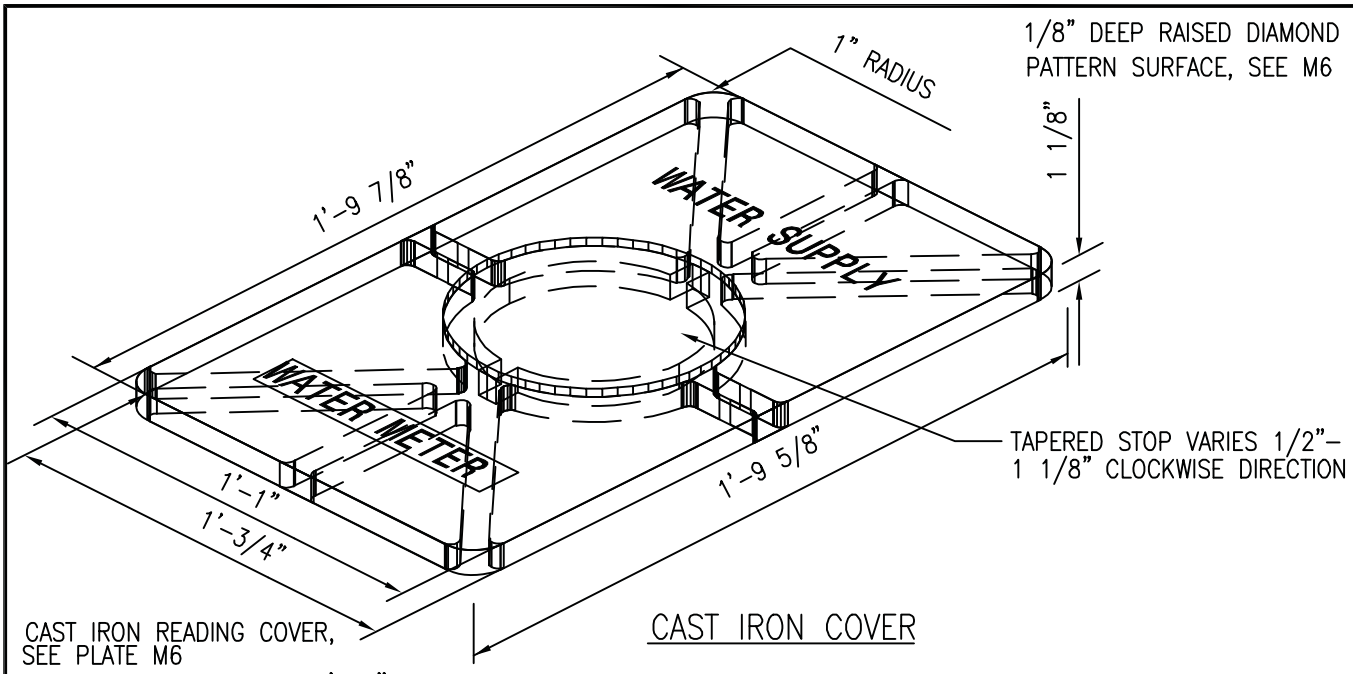
METAL THICKNESS DIMENSIONS ARE NET.
USE 1/2" HIGH VERTICAL LETTERS.
METER COVER SHALL BE GRAY CAST IRON, FREE OF BLISTER, BLOWHOLES, WARPAGE AND COLD SHUTS.

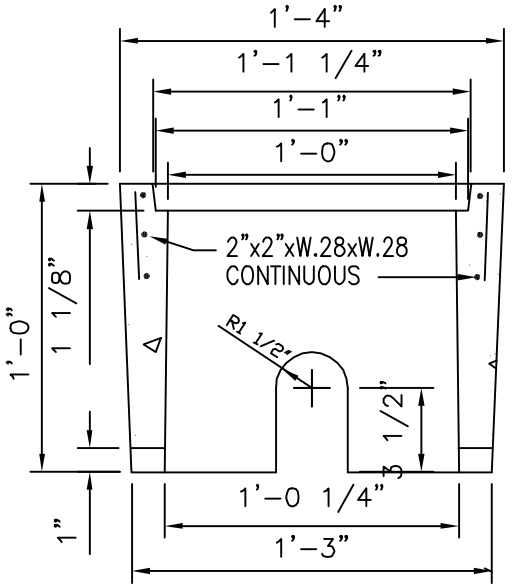


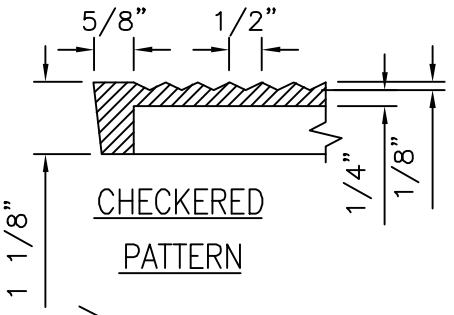


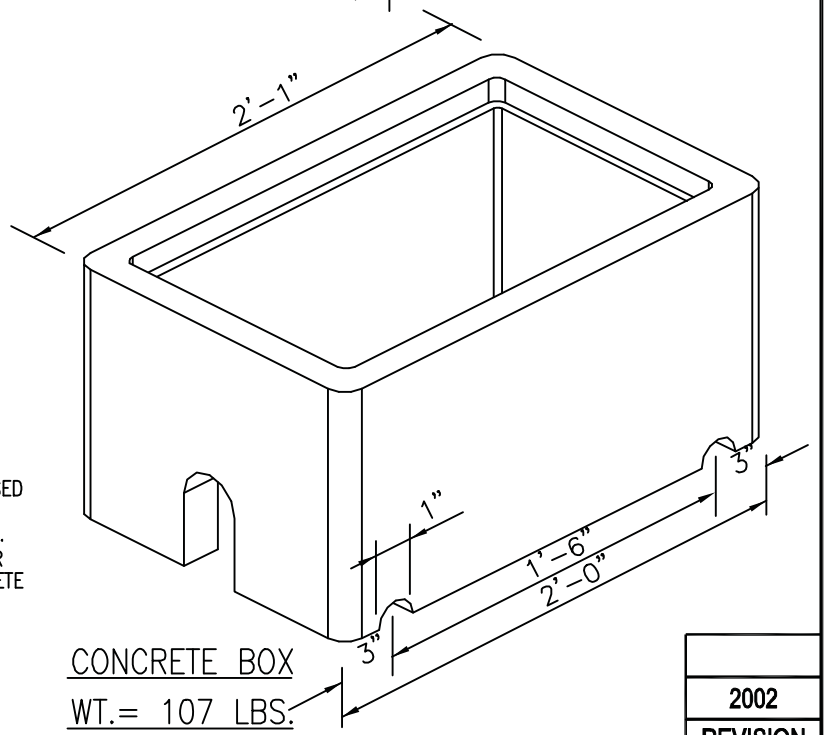
	2001
	REVISION

KAUAI OAHU HAWAII	**CAST IRON COVER** FOR TYPE "B" METER BOX SCALE: NTS	STANDARD DETAILS	M2







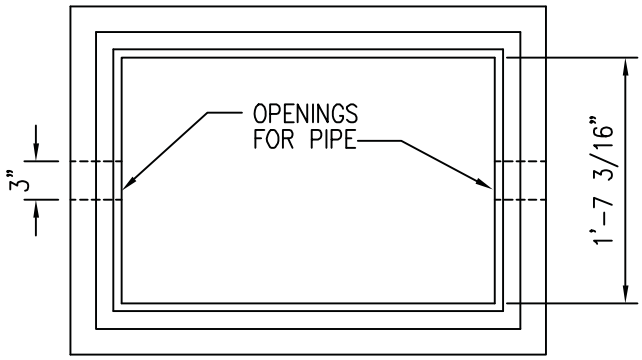


NOTES:

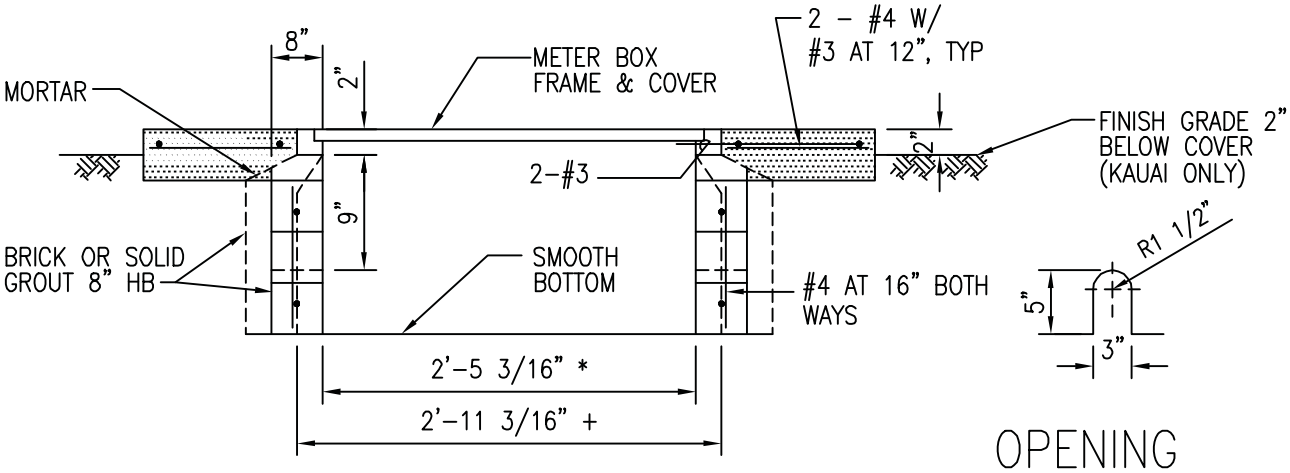
1. THICKNESS DIMENSIONS ARE NET. ADD 1/8" FOR RAISED SURFACE. RAISED SURFACE. USE 3/4" HIGH LETTERS
2. TYPE "X" METER BOX FOR 5/8", 3/4", & 1" METERS.
3. FOR "HAWAII", TYPE "X" METER BOX IS FOR 1" METER AND FOR 5/8" METERS INSTALLED IN A.C. OR CONCRETE PAVED AREA.
4. FOR OAHU AND HAWAII, FIBER REINFORCED CONCRETE IS ALLOWED.
5. SEE PLATE M24 FOR READING HOLE COVER DETAIL.
6. INSTALL 6" WIDE x 4" THICK CONC COLLAR IN NON-CONCRETE/SIDEWALK AREAS WHERE APPLICABLE.

2002
REVISION

KAUAI OAHU HAWAII	METER BOX & COVER TYPE "X" SCALE: NTS	STANDARD DETAILS	M3



PLAN VIEW



ELEVATION

OPENING

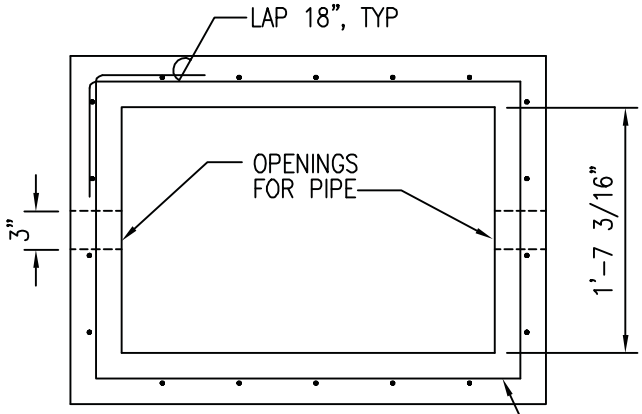
NOTE:

1. INSTALL 12" WIDE x 4" THICK CONCRETE COLLAR (REINFORCING AS SHOWN) IN NON-CONCRETE/SIDEWALK AREAS
2. DWS 3500 CONCRETE, 1500 PSI CMU AND GRADE 60 REINFORCEMENT STEELS
3. DESIGN IS BASED ON: 250 PSF LIVE LOAD, 0 FEET SURCHARGE: 60 PCF/FT AT REST PRESSURE AND WATER TABLE BELOW BOTTOM OF METER BOX PER ASSHTO LRFD BRIDGE SPECIFICATION (1998). NON TRAFFIC TYPE
4. ALL CELLS SHALL BE GROUTED SOLID WITH 2500 PSI GROUT, TYPE M MORTAR

* FOR 1½" AND 2" METERS ON OAHU, 2" METERS ON KAUAI

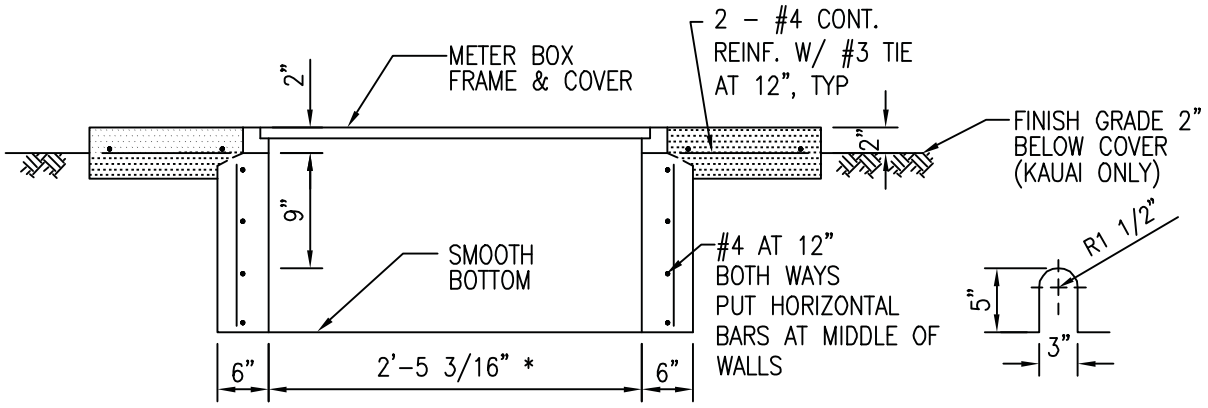
	2002
	REVISION

KAUAI OAHU	**METER BOX TYPE III** **FOR 1 1/2" & 2" METERS** SCALE: NTS	STANDARD DETAILS	M4



PLAN/SECTION VIEW

#4 AT 12"
BOTH WAYS
PUT HORIZONTAL
BARS AT MIDDLE OF
WALLS



ELEVATION

OPENING

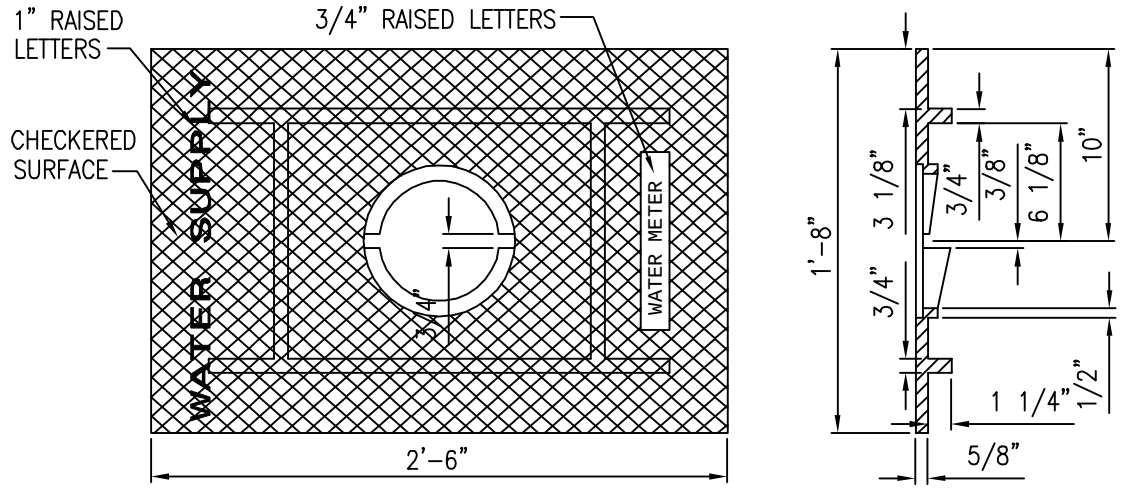
NOTE:

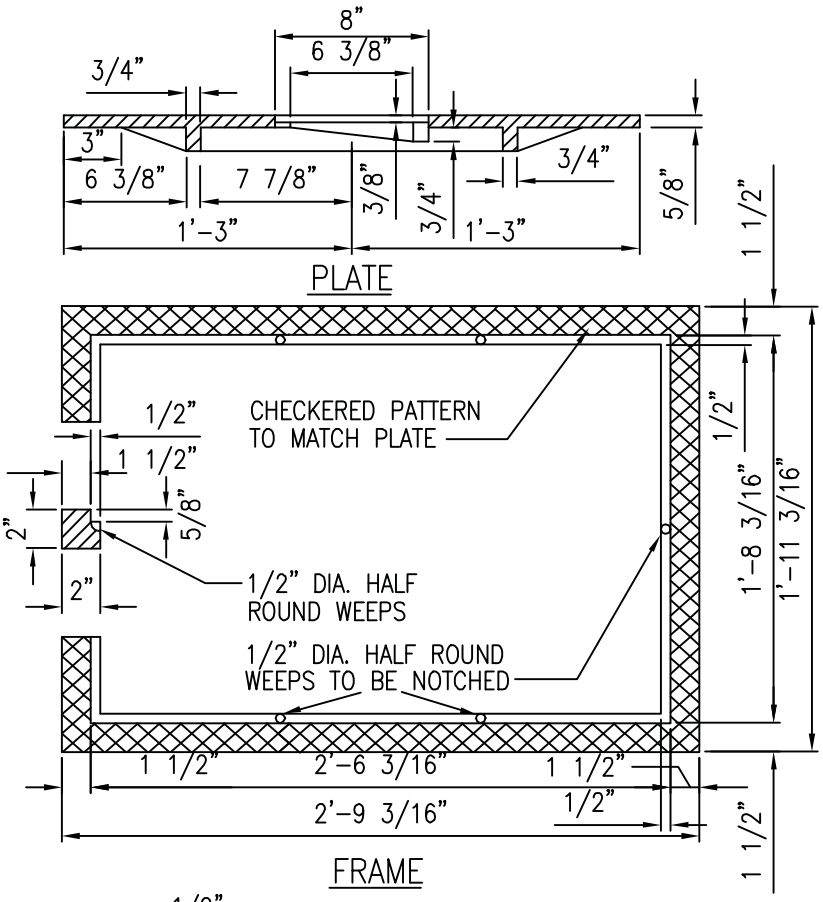
1. INSTALL 12" WIDE x 4" THICK CONCRETE COLLAR (REINFORCING AS SHOWN) IN NON-CONCRETE/SIDEWALK AREAS
2. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL
3. DESIGN IS BASED ON: 250 PSF LIVE LOAD. 0 FEET SURCHARGE: 60 PCF/FT AT REST PRESSURE AND WATER TABLE BELOW BOTTOM OF METER BOX PER ASSHTO LRFD BRIDGE SPECIFICATION (1998) NON TRAFFIC TYPE

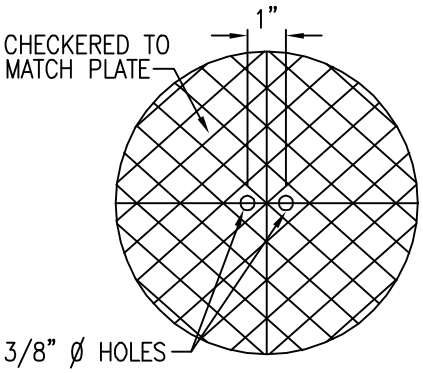
* FOR 1½" AND 2" METERS ON OAHU, 2" METERS ON KAUAI

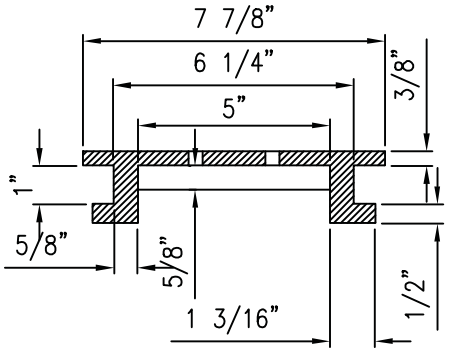
2002	
REVISION	

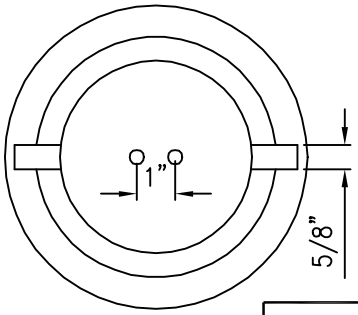
KAUAI OAHU	**METER BOX TYPE III** **FOR 1 1/2" & 2" METERS** **SCALE: NTS**	STANDARD DETAILS	M5



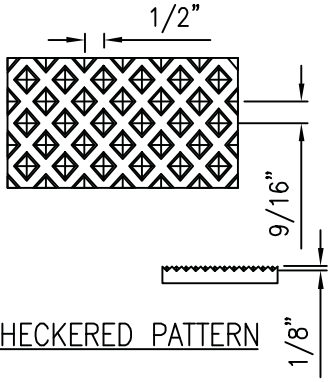








READING COVER



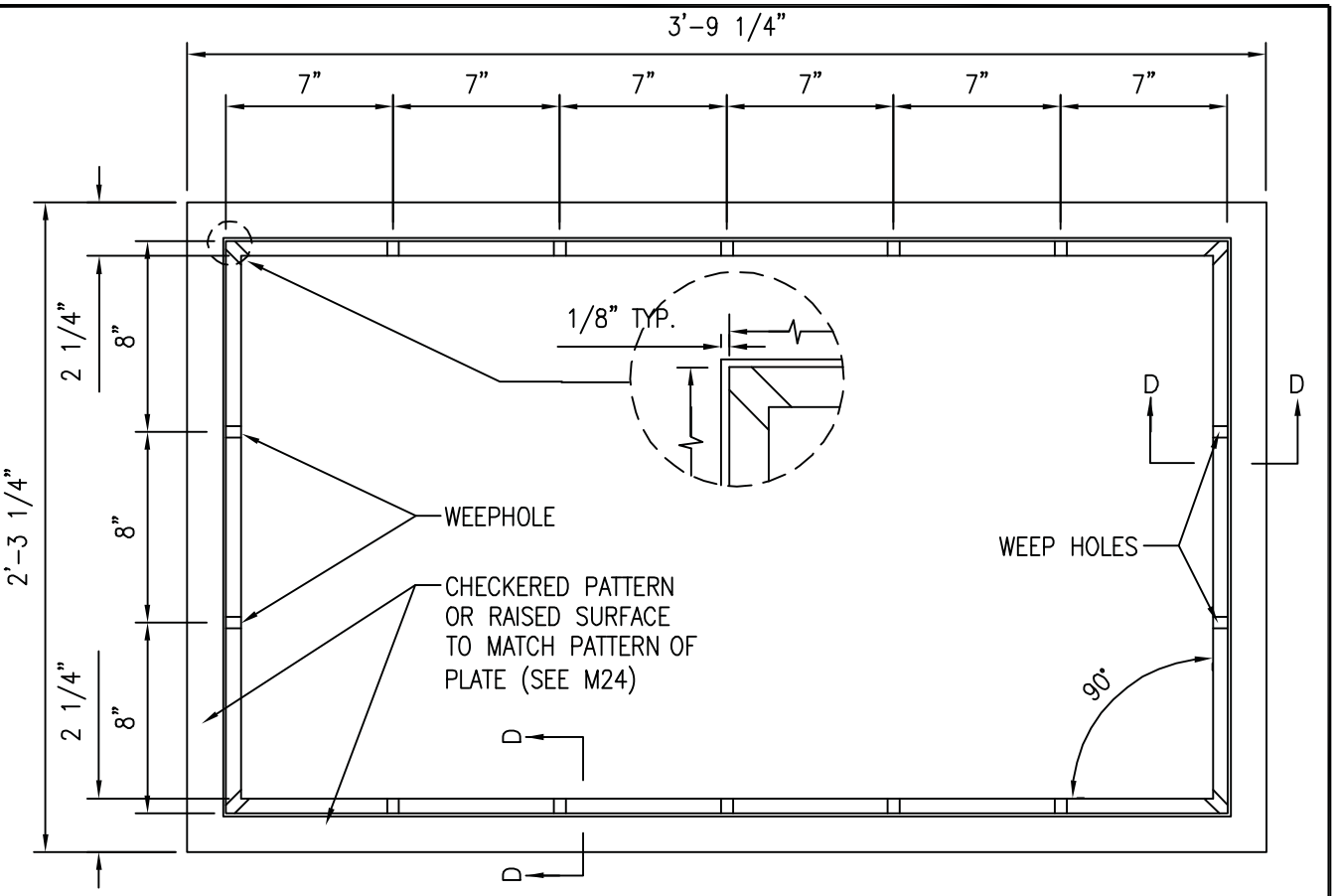
CHECKERED PATTERN

NOTE:

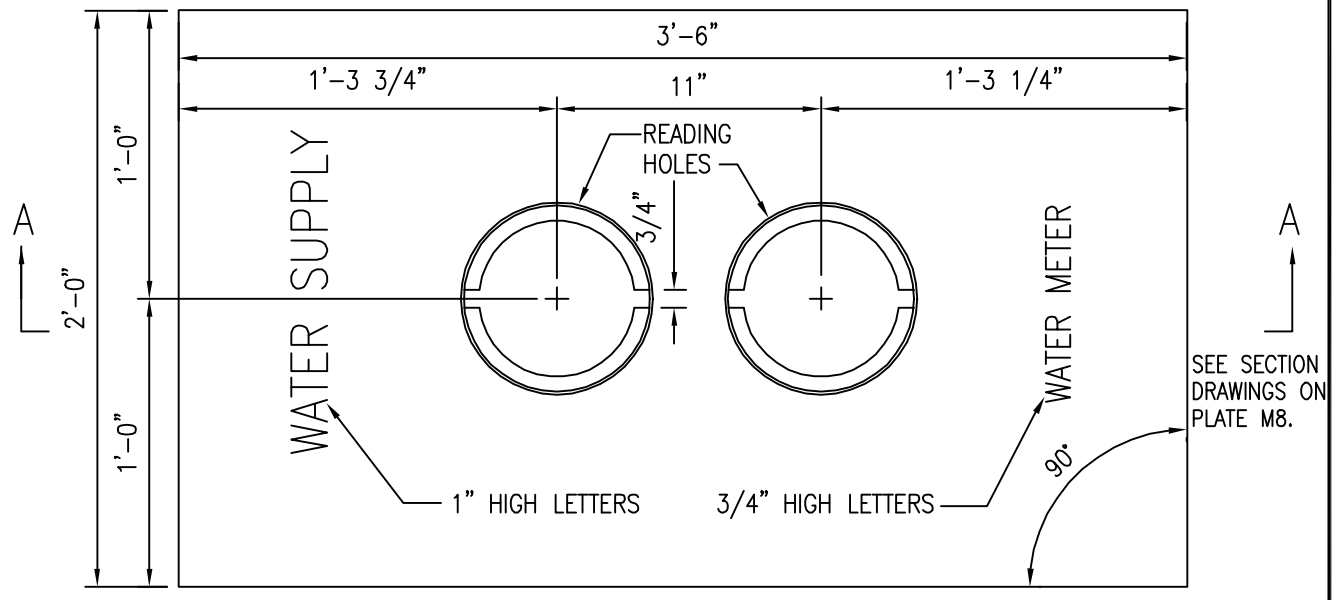
THICKNESS DIMENSIONS ARE NET.
ADD 1/8" FOR RAISED SURFACE.

2002
REVISION

KAUAI OAHU	METER BOX FRAME & COVER CAST IRON, TYPE III SCALE: NTS	STANDARD DETAILS	M6



PLAN VIEW OF CAST IRON FRAME
FOR 24"x42"x3/4" PLATE

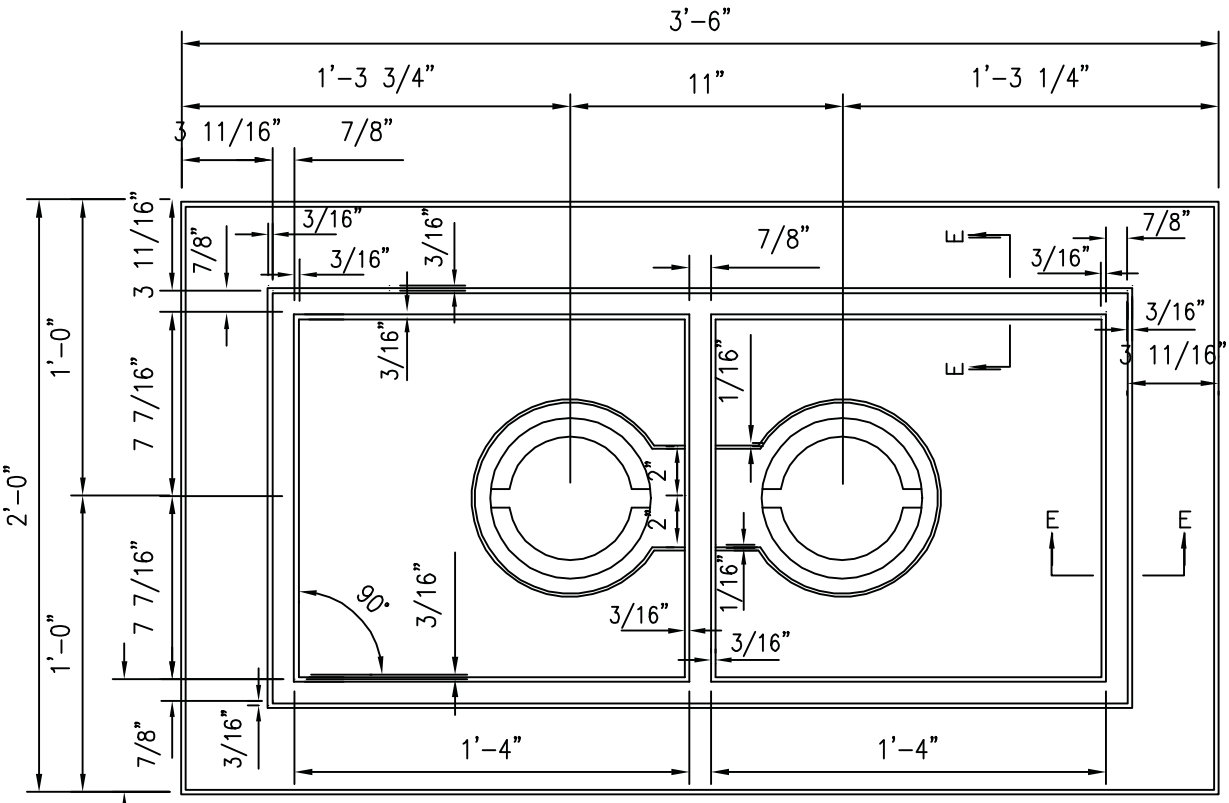


SEE PLATE M24 FOR READING HOLE COVER AND DETAILS OF RAISED SURFACE.

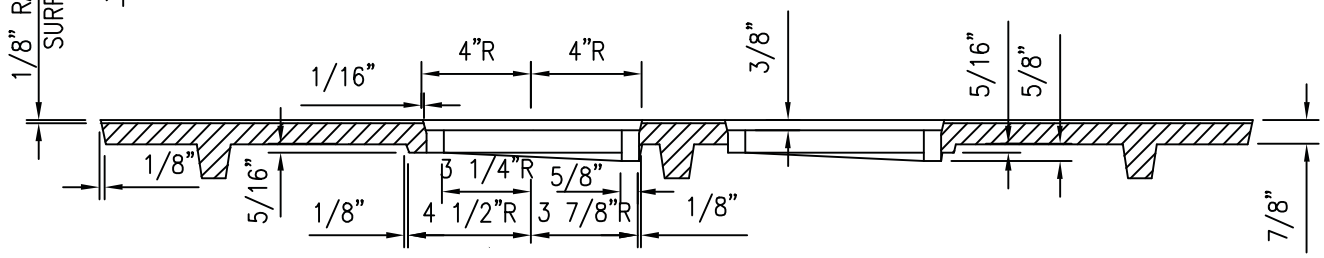
PLAN VIEW OF 24"x42"x3/4"
CAST IRON PLATE

2002
REVISION

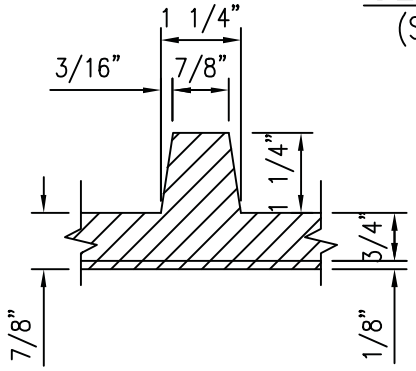
KAUAI OAHU	**METER BOX FRAME & COVER** CAST IRON, TYPE IV FOR 3" & 4" METERS SCALE: NTS	STANDARD DETAILS	M7



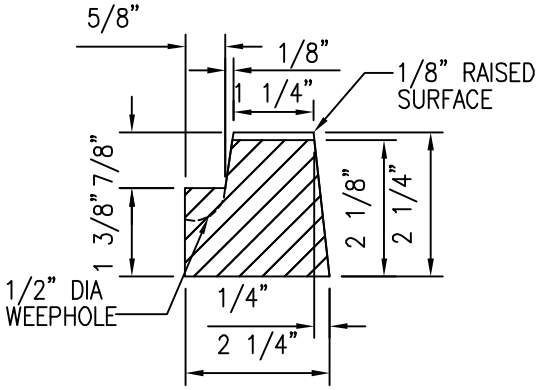
BOTTOM VIEW OF 24"x42"x3/4" CAST IRON PLATE



SECTION "A-A"
(SEE M7)



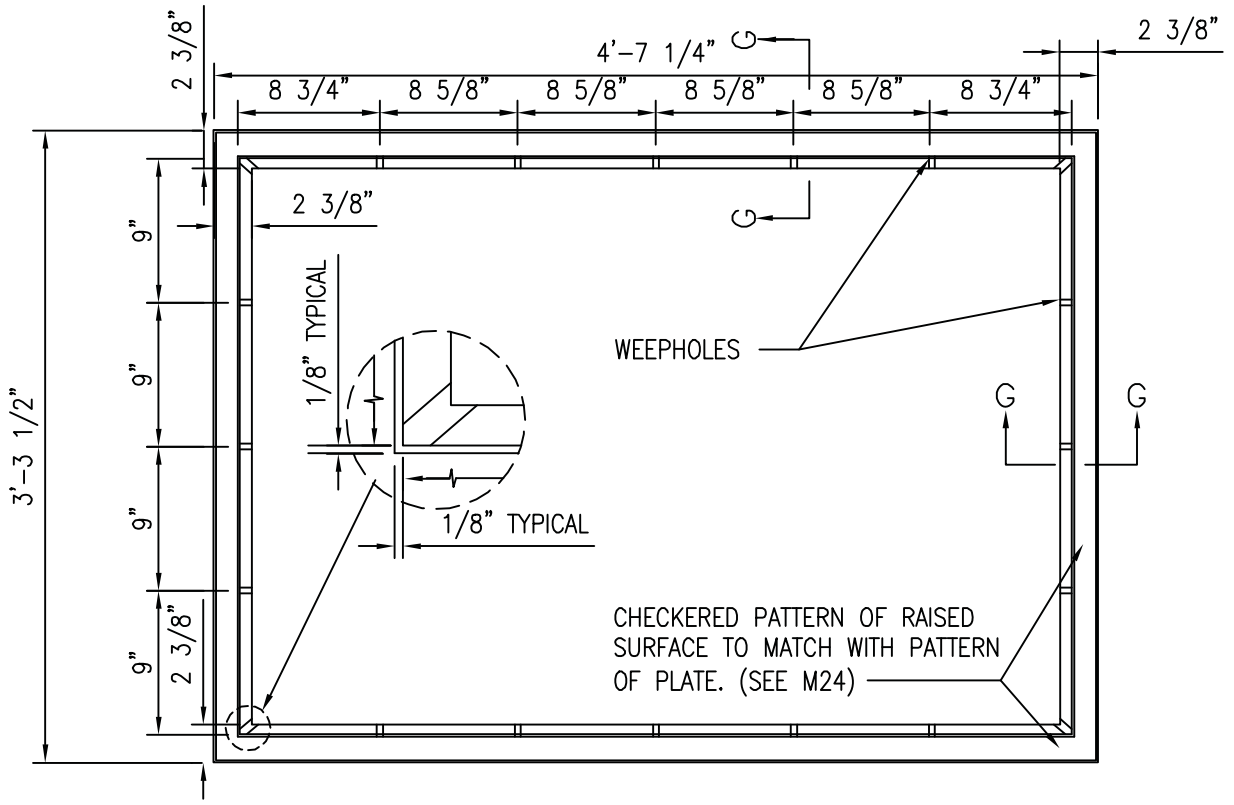
SECTION "E-E"



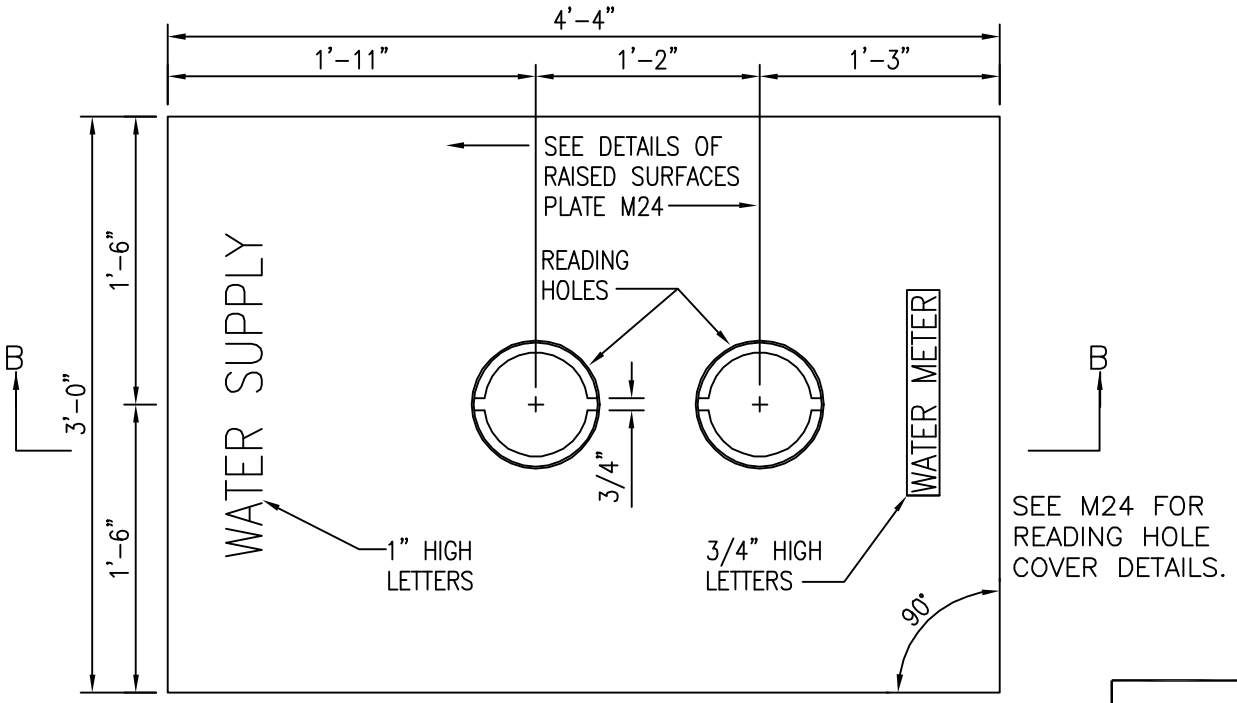
SECTION "D-D"
(SEE M7)

2002
REVISION

KAUAI OAHU	METER BOX COVER CAST IRON, TYPE IV SCALE: NTS	STANDARD DETAILS	M8



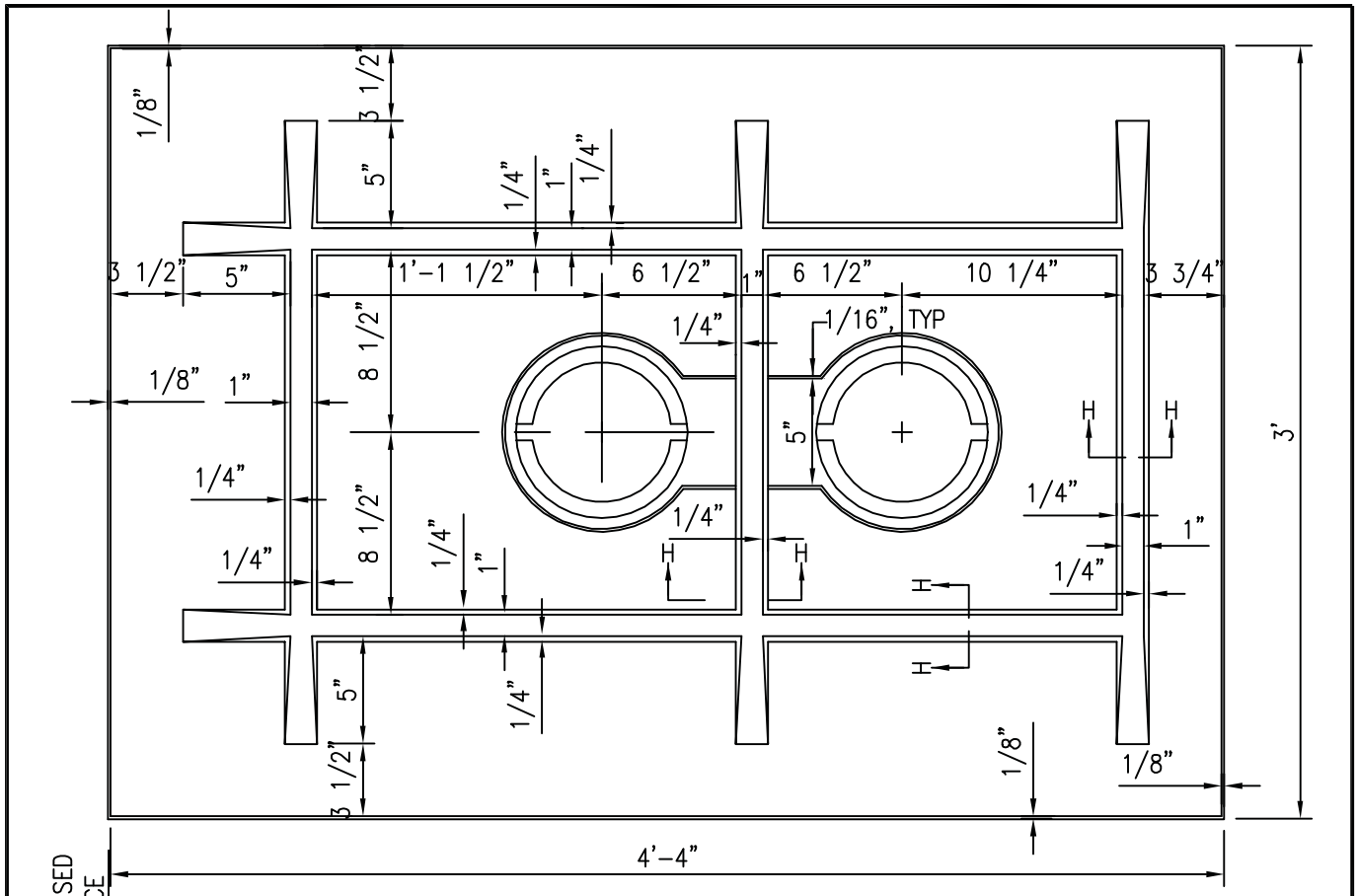
PLAN VIEW OF CAST IRON FRAME FOR 36"x52"x3/4" PLATE



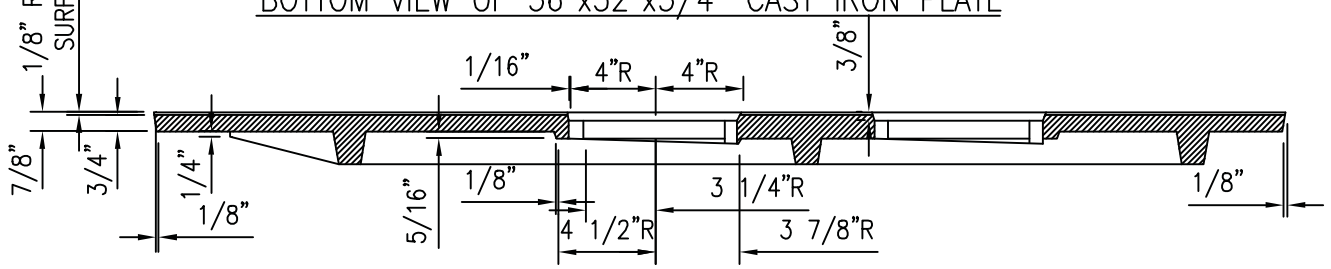
PLAN VIEW OF 36"x52"x3/4" CAST IRON PLATE

KAUAI OAHU	**METER BOX FRAME & COVER** CAST IRON, TYPE V FOR 6" & 8" METERS SCALE: NTS	STANDARD DETAILS	M9

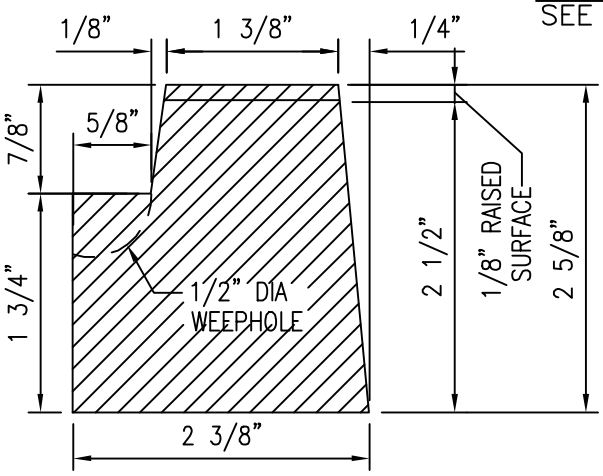
2002
REVISION



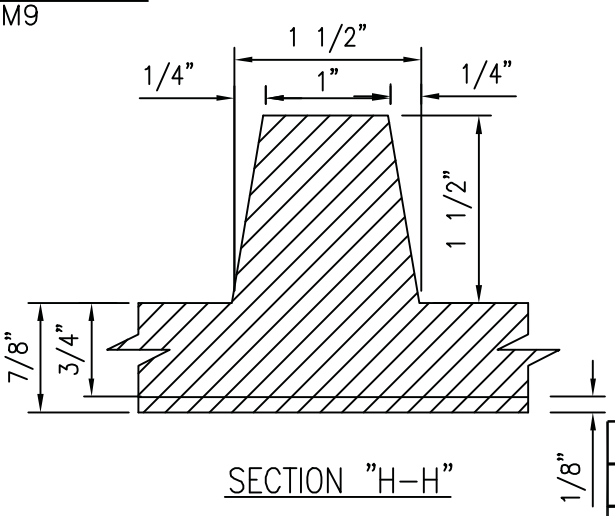
BOTTOM VIEW OF 36"x52"x3/4" CAST IRON PLATE



SECTION "B-B"
SEE M9



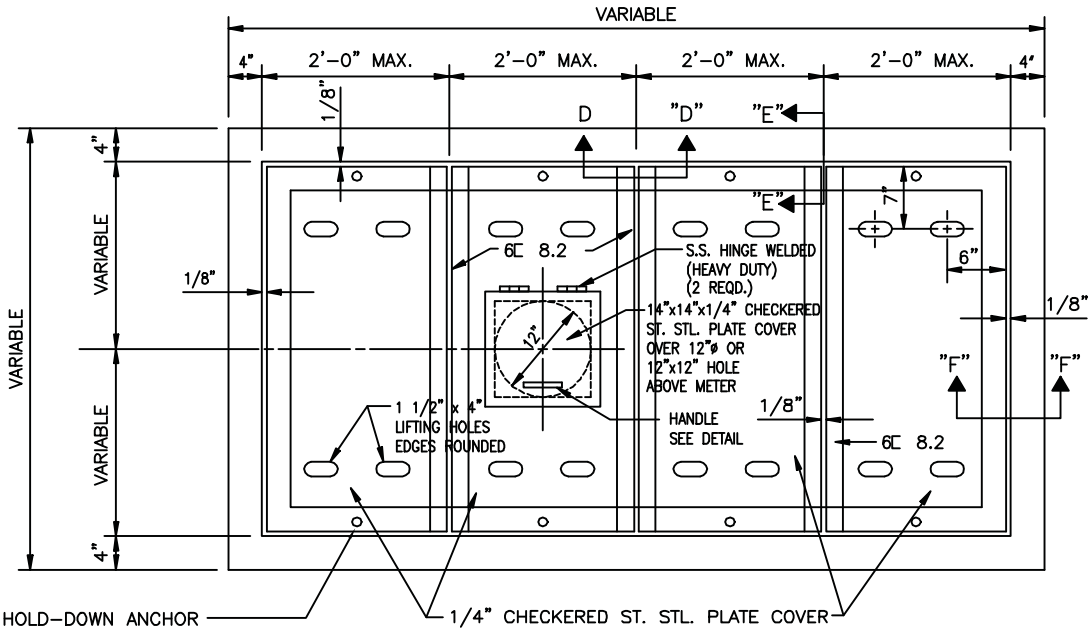
SECTION "G-G"
SEE M9



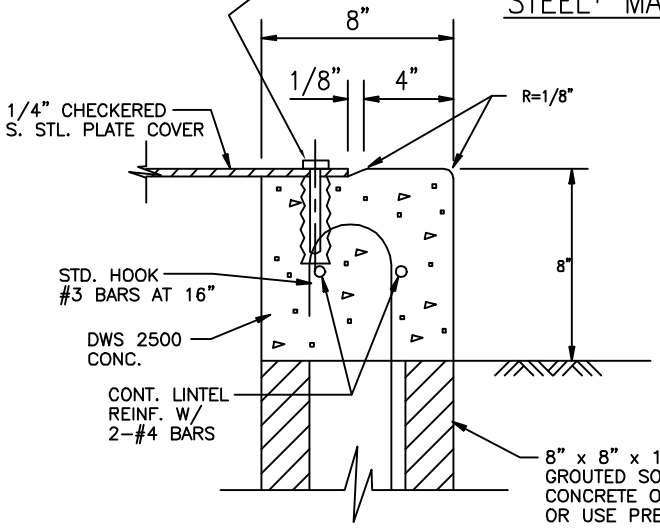
SECTION "H-H"

	2002
	REVISION

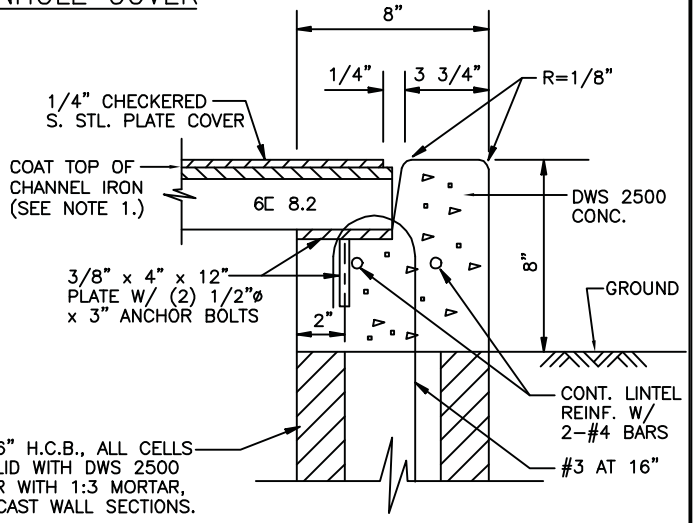
KAUAI OAHU	**METER BOX COVER** CAST IRON, TYPE V SCALE: NTS	STANDARD DETAILS	M10



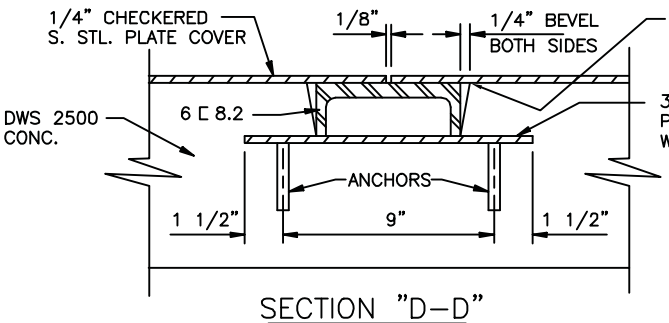
PLAN OF STAINLESS (316) STEEL* MANHOLE COVER



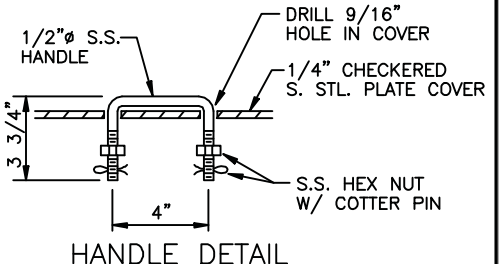
SECTION "F-F"



SECTION "E-E"



SECTION "D-D"



HANDLE DETAIL

NOTES:

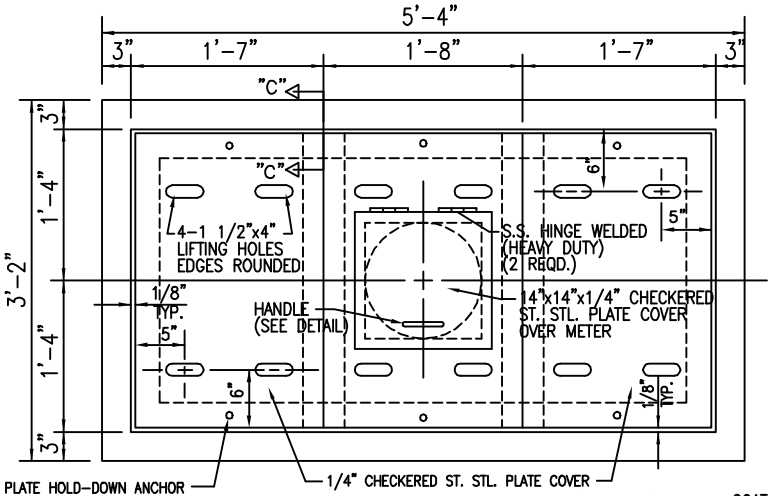
1. COAT CONTACT POINT OF DISSIMILAR METALS W/ CHEVRON INDUSTRIAL MEMBRANE (ELASTOMERIC MEMBRANE) OR EQUAL.
2. ALL MILD STEEL SHALL BE HOT-DIPPED GALVANIZED.

* ALTERNATE = PROVIDE DESIGN WITH ANODIZED ALUMINUM COVER.

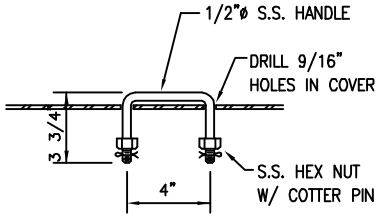
** USE HEX HEAD FOR DETECTOR CHECK MANHOLES.

	2002
	REVISION

MAUI	**METAL MANHOLE COVER** (NON-TRAFFIC LOADING) SCALE: NTS	STANDARD DETAILS	M11

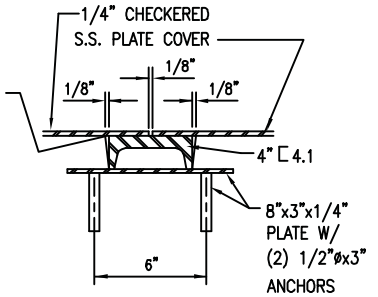


PLAN OF STAINLESS (316) STEEL* MANHOLE COVER

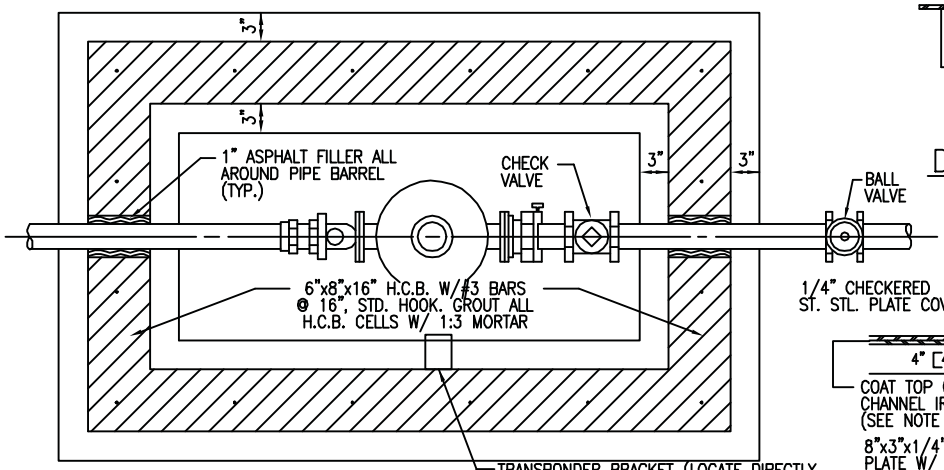


HANDLE DETAIL

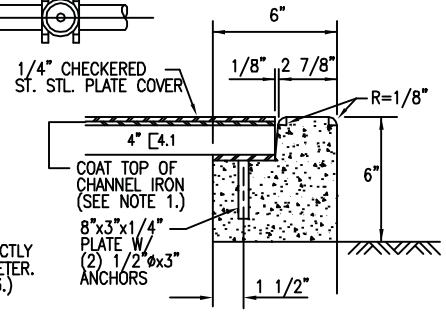
NOTE:
EACH PANEL WIDTH OF METER BOX COVER MAY VARY SLIGHTLY ACCORDING TO METER LOCATION.



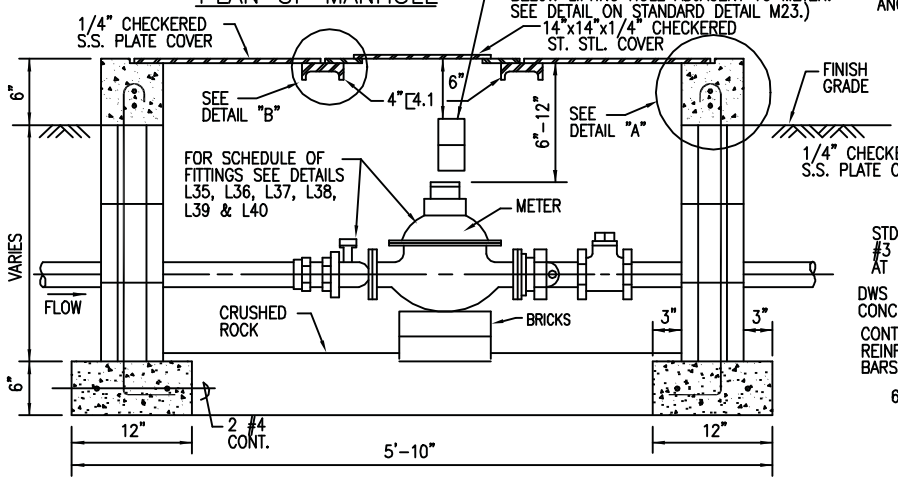
DETAIL "B"



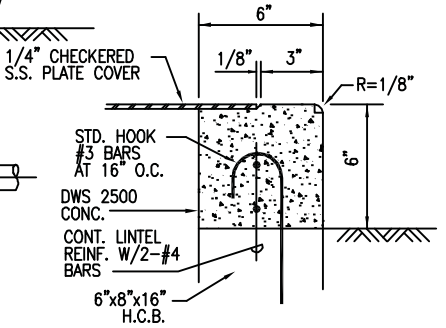
PLAN OF MANHOLE



SECTION "C-C"



SECTION



DETAIL "A"

NOTES:
1. COAT CONTACT POINT OF DISSIMILAR METALS W/ CHEVRON INDUSTRIAL MEMBRANE (ELASTOMERIC MEMBRANE) OR EQUAL.
2. ALL MILD STEEL SHALL BE HOT-DIPPED GALVANIZED.

* ALTERNATE = PROVIDE DESIGN WITH ANODIZED ALUMINUM COVER.

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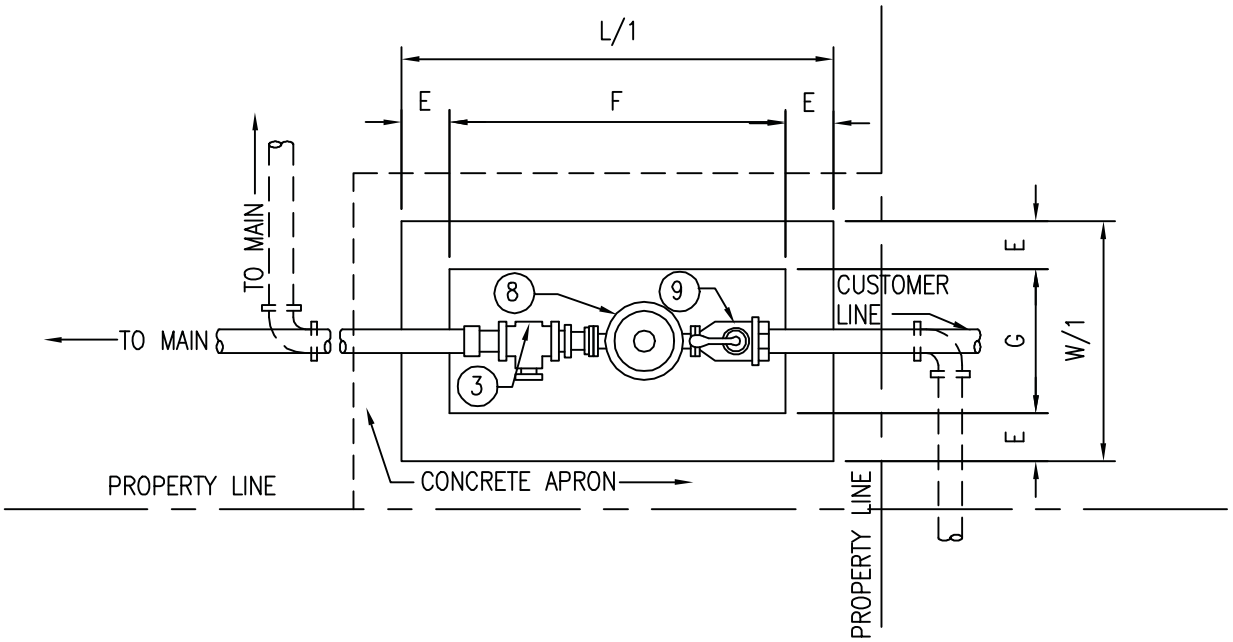
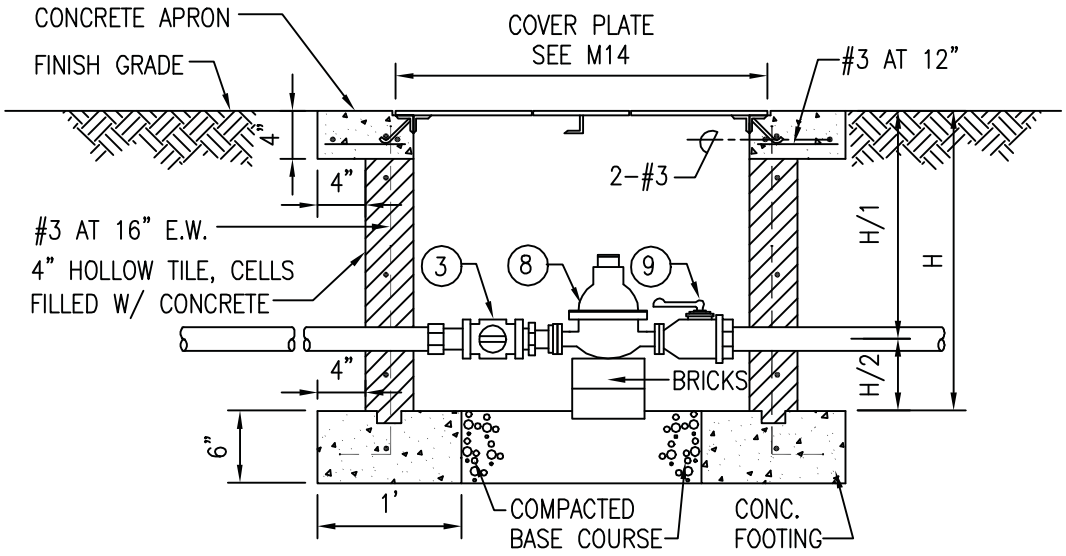
MAUI	**1 1/2" & 2" METER MANHOLE** STANDARD NON-TRAFFIC SCALE: NTS	STANDARD DETAILS	M12



PLAN



ELEVATION

METER BOX DIMENSIONS(IN INCHES)								
METER SIZES	L/1	E	F	W/1	G	H	H/1	H/2
1	36	4	28	20	12	25	19	6
1 1/2	44	4	36	28	20	25	19	6
2	52	4	44	28	20	27	21	6

NOTE:

REFER TO PLATE L10 FOR SCHEDULE OF COPPER FITTINGS. FOR SERVICE SADDLE REQUIREMENT, SEE DIVISION 100, SECTION 104.02, OF THE WATER SYSTEM STANDARDS. FOR 1-1/2" AND 2" METERS, INSTALL FORD "LOK-PAK" METER COUPLING AND NECESSARY ADAPTERS.

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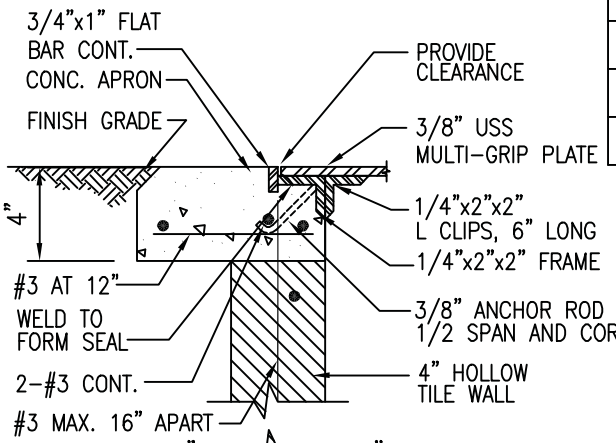
STANDARD 1", 1 1/2", & 2"
METER AND BOX INSTALLATION
SCALE: NTS

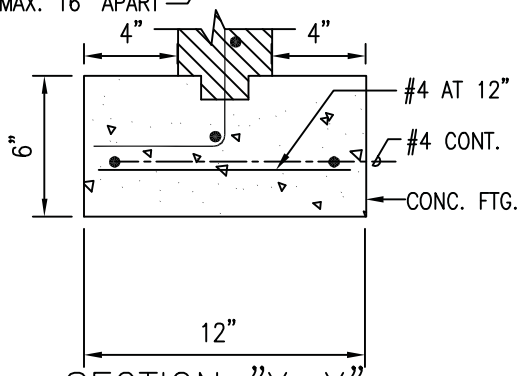
STANDARD DETAILS

M13

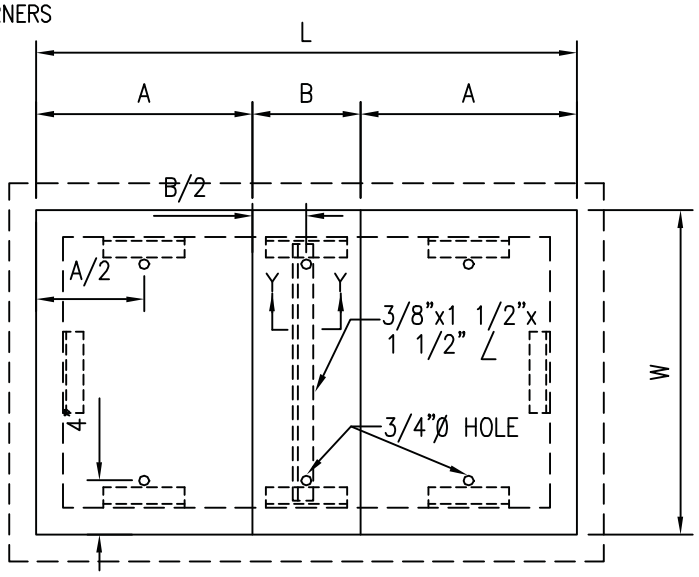
COVER PLATE DIMENSIONS (IN INCHES)					
METER SIZE	L	W	L/3	A	B
1*	32	16			
1 1/2	40	24		16	8
2	48	24	16		
ALL PLATES USS MULTI-GRIP OR CHECKER STEEL, 3/8" THICK					

* COVER PLATE DETAILS FOR 1" METER SHALL BE SIMILAR TO SHOWN BELOW EXCEPT 2-16"x16"x3/8" PLATES REQUIRED

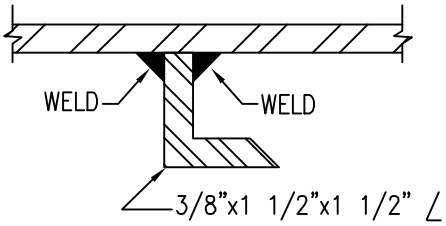




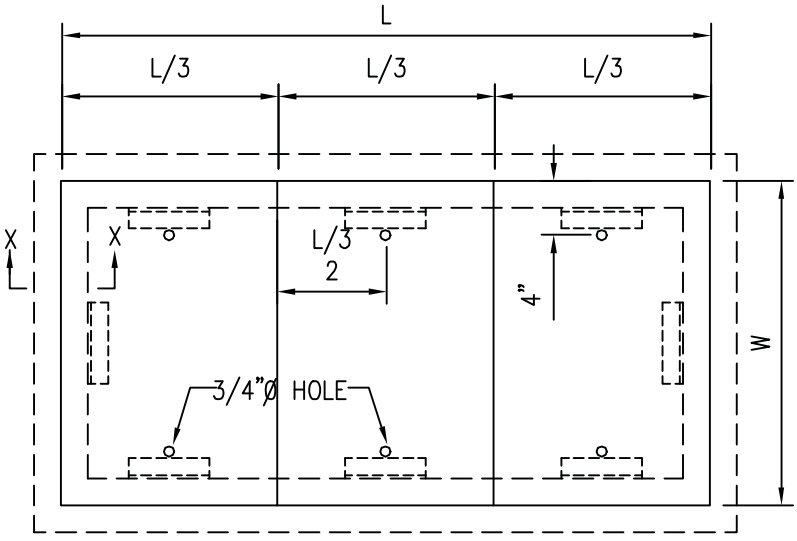
SECTION "X-X"



1 1/2" METER BOX COVER



SECTION "Y-Y"



2" METER BOX COVER

NOTE:
ALL ∠ IRONS AND PLATES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

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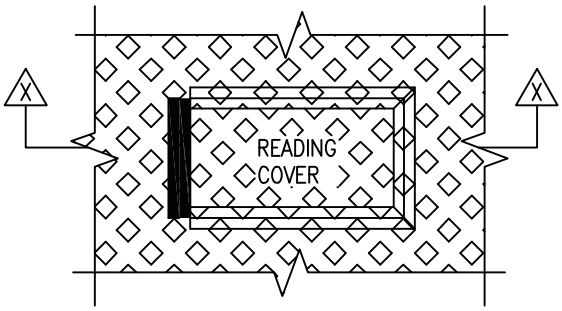
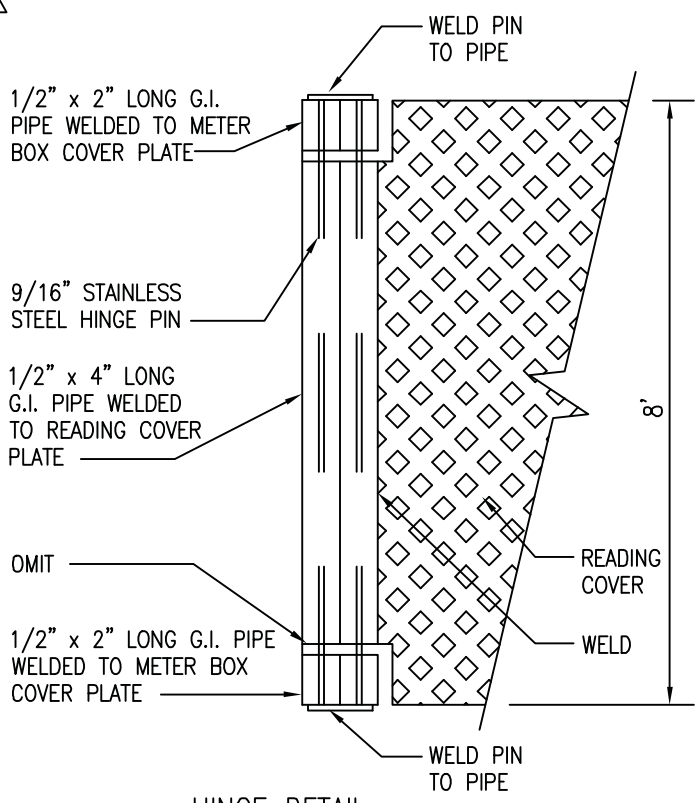
REVISION

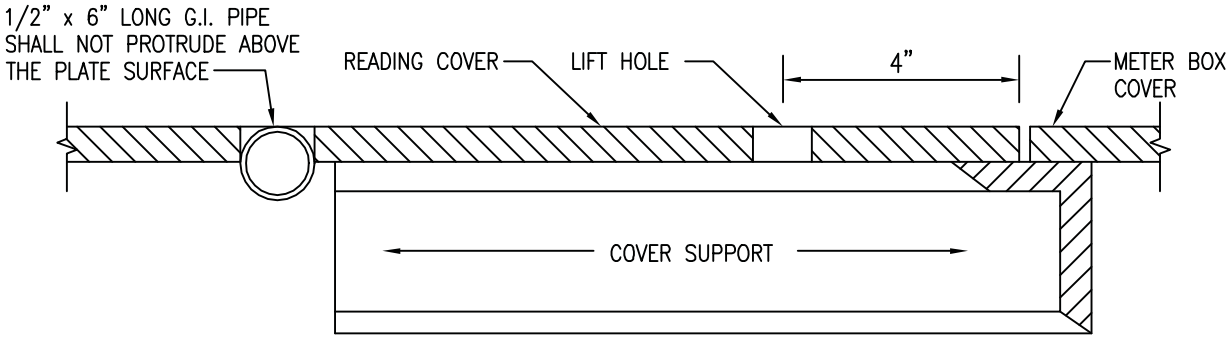
HAWAII	STANDARD METER COVERS SCALE: NTS	STANDARD DETAILS	M14



PLAN



HINGE DETAIL



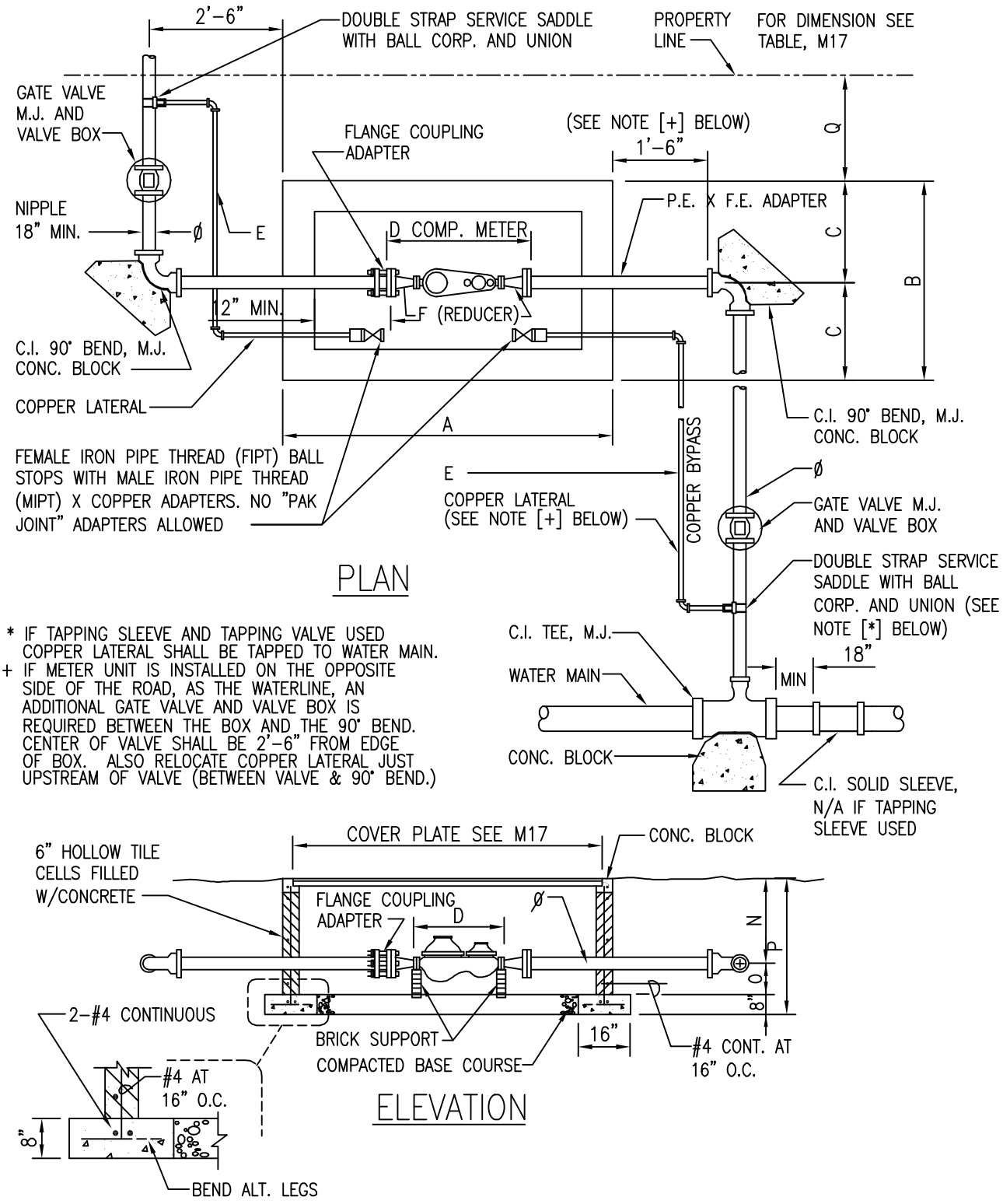
SECTION X–X

READING COVER FOR:

COMPOUND METER BOX COVER SEE PLATES M16 & M17
MFM–MCT METER BOX COVER SEE PLATES M21 & M22 DETECTOR
CHECK METER BOX COVER SEE PLATES M18 & M20

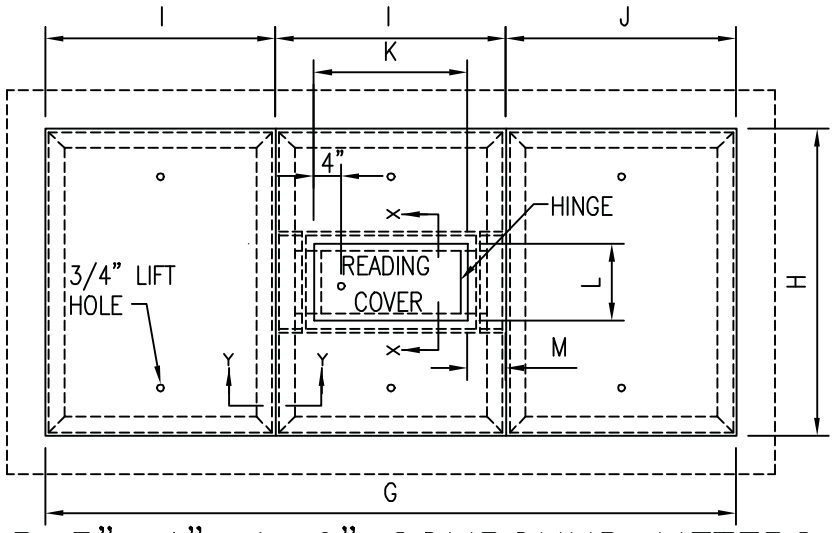
	2002
	REVISION

HAWAII	READING COVER DETAIL SCALE: NTS	STANDARD DETAILS	M15



	2002
	REVISION

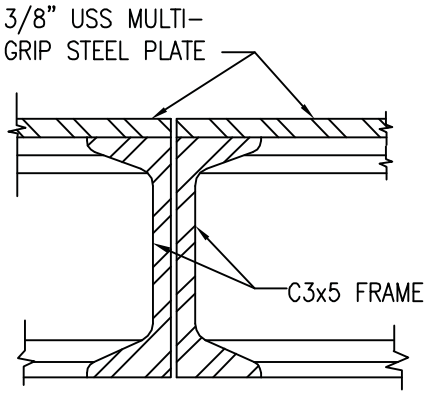
HAWAII	**COMPOUND METER AND BOX** **INSTALLATION** **SCALE: NTS**	STANDARD DETAILS	M16



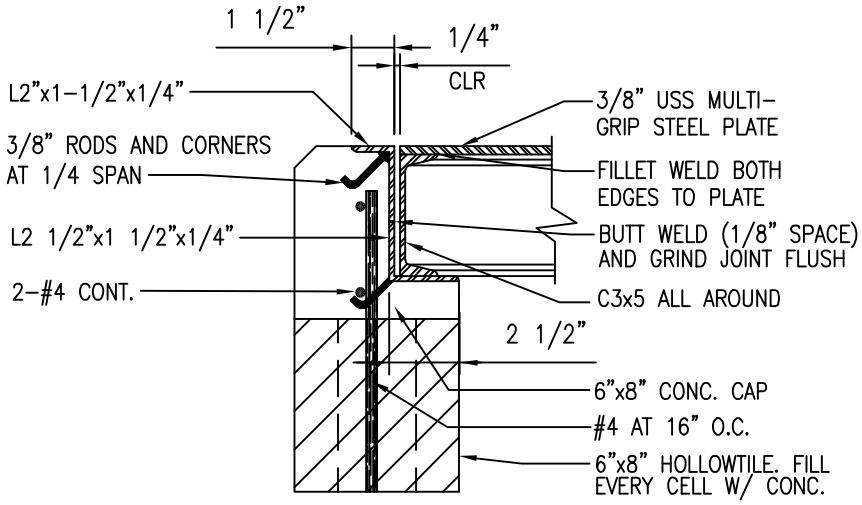
FOR 3", 4", & 6" COMPOUND METERS

DIMENSION TABLE			
METER SIZE (IN INCHES)			
	3	4	6
A	96	96	96
B	48	48	48
C	24	24	24
D	24	29	36 1/2
E	2	2	2 1/2
F	4 x 3	6 x 4	8 x 6
G	88	88	88
H	40	40	40
I	29	29	29
J	30	30	30
K	18	18	18
L	8	8	8
M	4	4	4
N	26	27	28
O	12	12	12
P	46	47	48
Q*	30	30	36
Ø	4	6	8

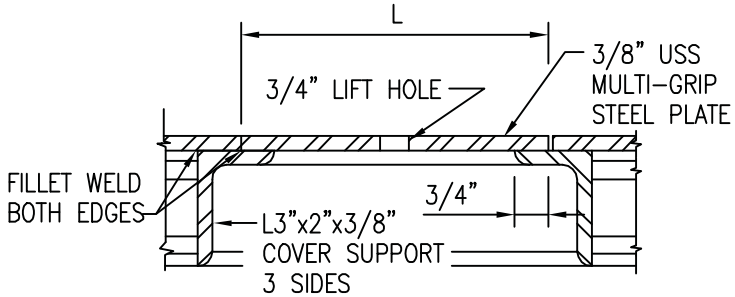
*= MIN.



SECTION "Y-Y"



CONCRETE CAP AND FRAME DETAILS



SECTION "X-X"

NOTES:

1. ALL ANGLES, CHANNELS, AND COVER PLATES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.
2. FOR DIMENSIONS, SEE TABLE ABOVE.
3. FOR METER INSTALLATIONS LARGER THAN 6", SUBMIT DRAWINGS TO MANAGER FOR APPROVAL.
4. SEE M15 FOR READING COVER DETAIL.

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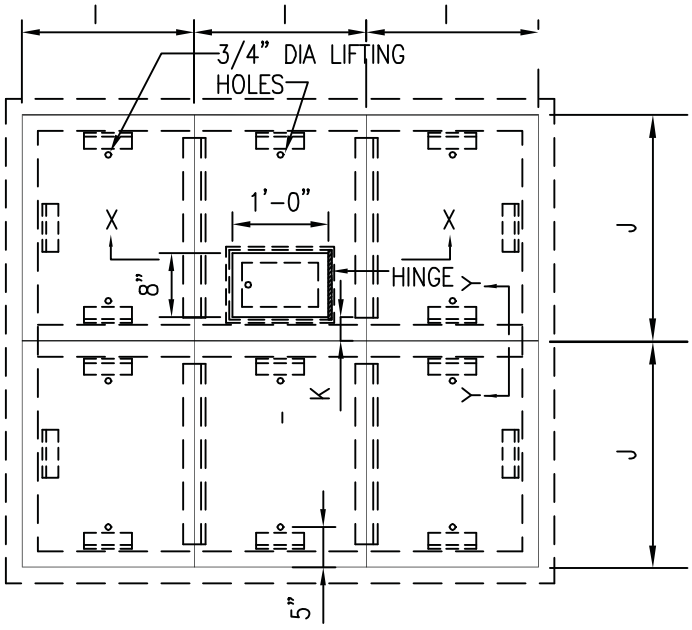
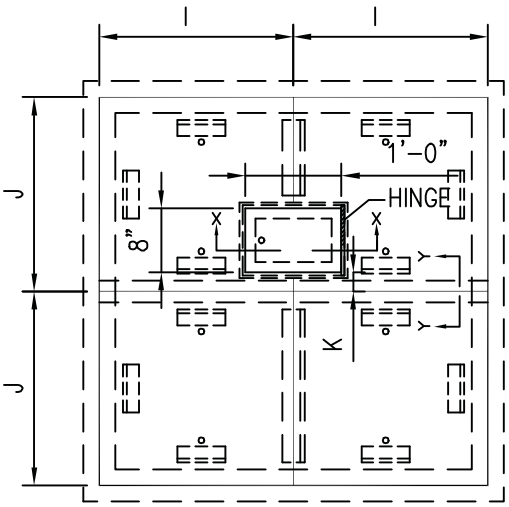
HAWAII	**COMPOUND METER** **COVER DETAILS** SCALE: NTS	STANDARD DETAILS	M17

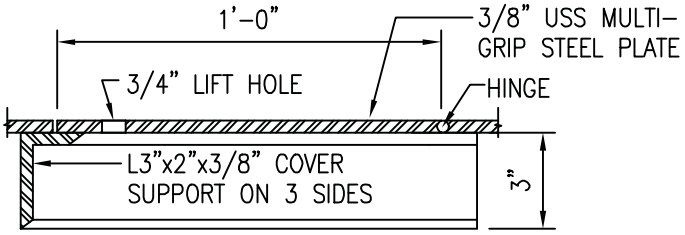


COVER PLATES 10" DC METER

DETECTOR CHECK AND DC VALVE TABLE (IN INCHES)					
	3	4	6	8	10
A	56	56	56	64	72
B	56	56	56	64	64
C	24	24	24	27	27
D	32	32	32	37	37
E	16.5	16.5	22.5	25.0	28.0
F	26	26	27	28	36
G	8	8	12	12	12
H	42	42	47	48	56
I	24.25	24.25	24.25	28.25	21.5
J	24.25	24.25	24.25	28.25	28.25
K	3	3	3	3	3
$L_{(MIN.)}$	18	18	18	18	18
Ø	4	4	6	8	10

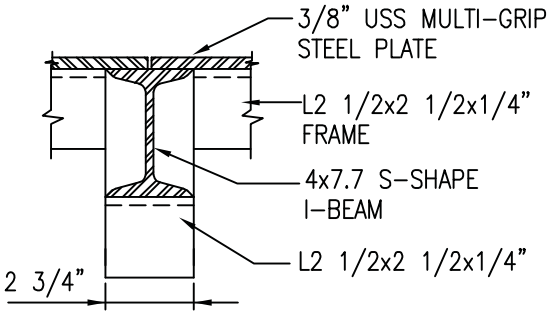


COVER PLATES 3", 4", 6", AND 8" DC METERS

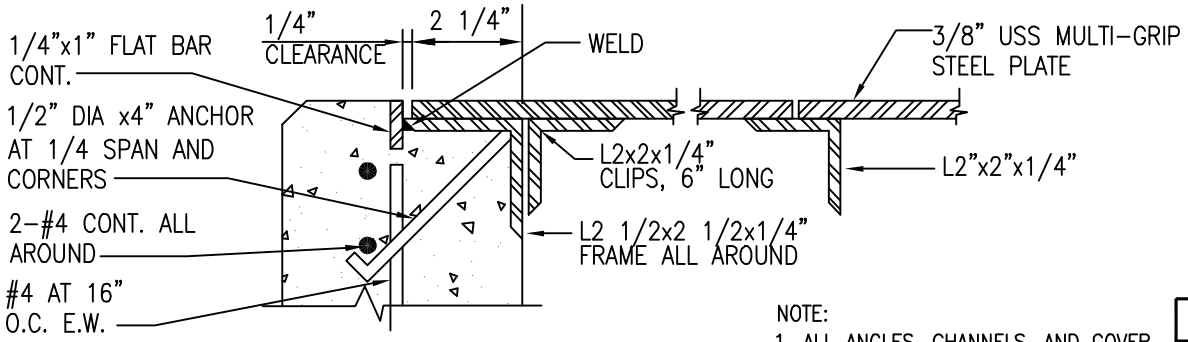


READING COVER SECTION "X-X"

SEE PLATE M15 FOR DETAILS



CROSS BEAM SECTION "Y-Y"



FRAME AND COVER DETAILS

NOTE:
1. ALL ANGLES, CHANNELS, AND COVER PLATES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

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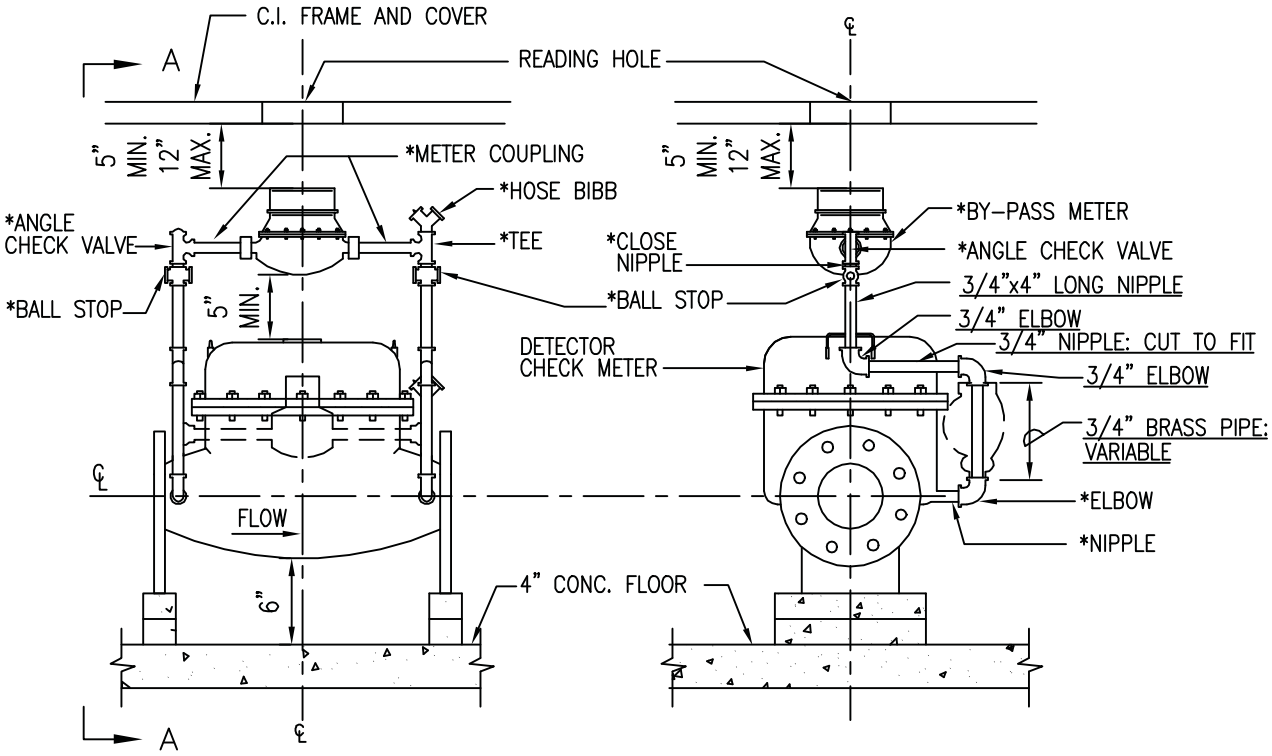
HAWAII

DETECTOR CHECK COVER
DETAILS
SCALE: NTS

STANDARD DETAILS

M18



DETECTOR CHECK METER DETAIL

DETAIL OF WORK TO BE DONE BY CONTRACTOR IN ORDER TO RAISE AND CENTER BY-PASS METER

NOTES:

1. ITEMS UNDERLINED TO BE FURNISHED BY CONTRACTOR
2. ALL ITEMS TO BE RED BRASS OR BRONZE.
3. ALL WORK TO BE DONE BY THE CONTRACTOR.
4. (*) THESE ITEMS ARE PART OF DETECTOR CHECK ASSEMBLY.
5. DASHED LINE INDICATES BY-PASS METER LOCATION AS FURNISHED BY MANUFACTURER.
6. BY-PASS PIPING ASSEMBLY SHALL BE CONFIGURED TO CENTER THE BY-PASS METER UNDER THE READING COVERS.

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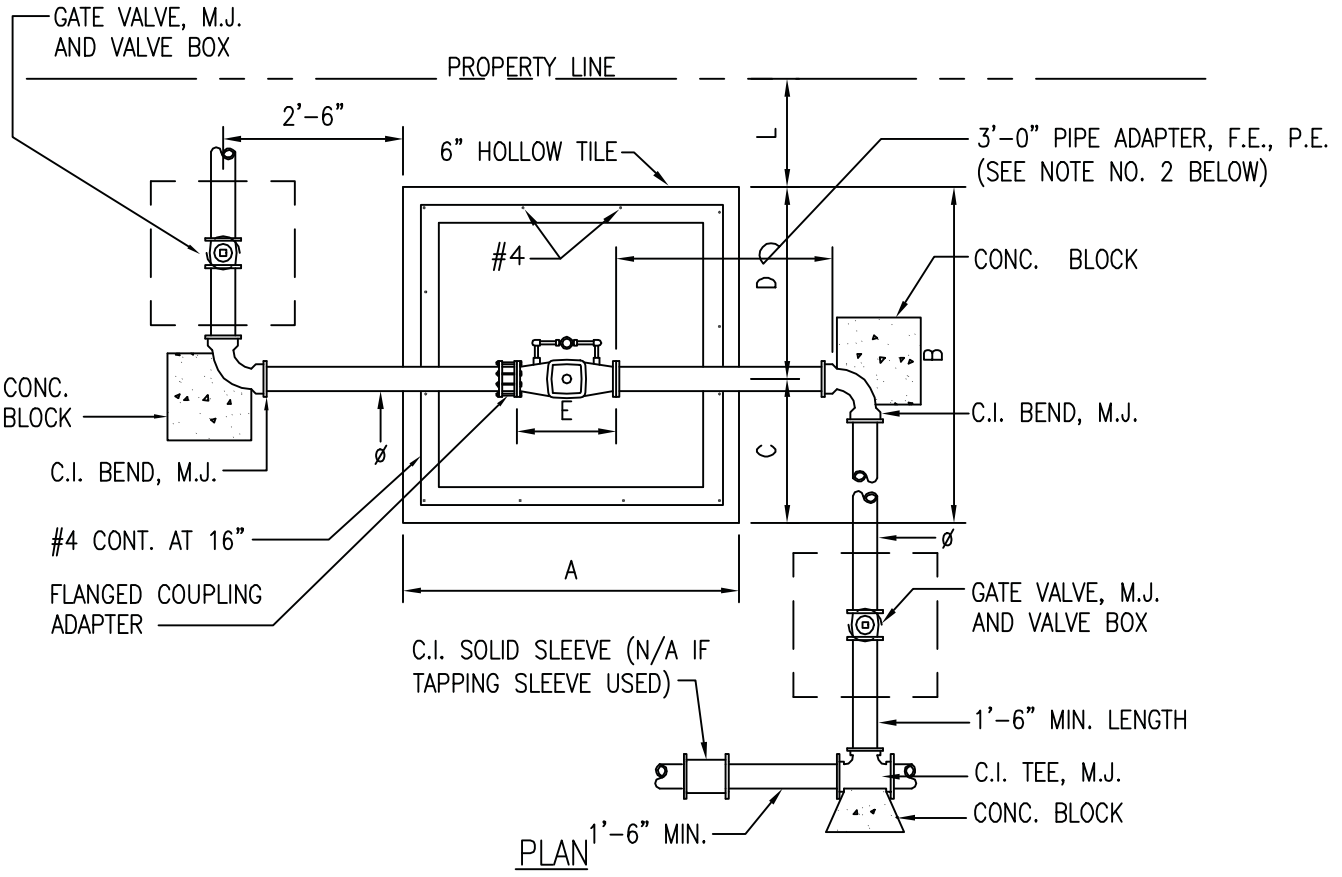
OAHU HAWAII	**DETECTOR CHECK METER** DETAILS SCALE: NTS	STANDARD DETAILS	M19

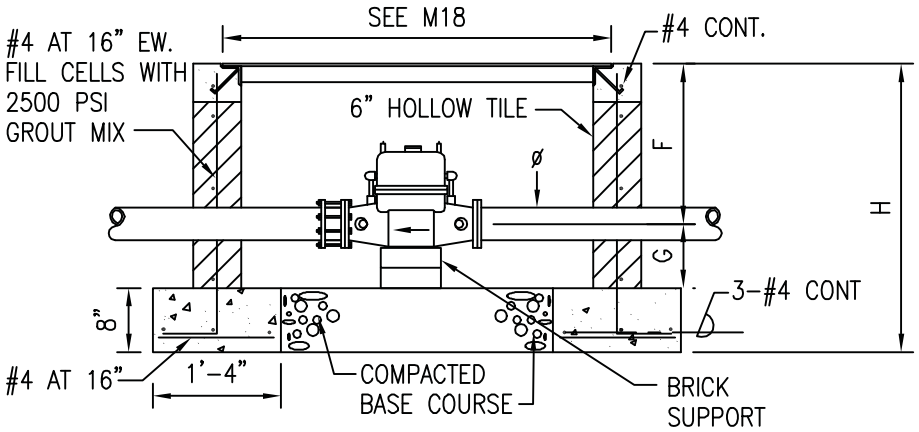
FOR DIMENSIONS, SEE TABLE, M18



PLAN

NOTES:

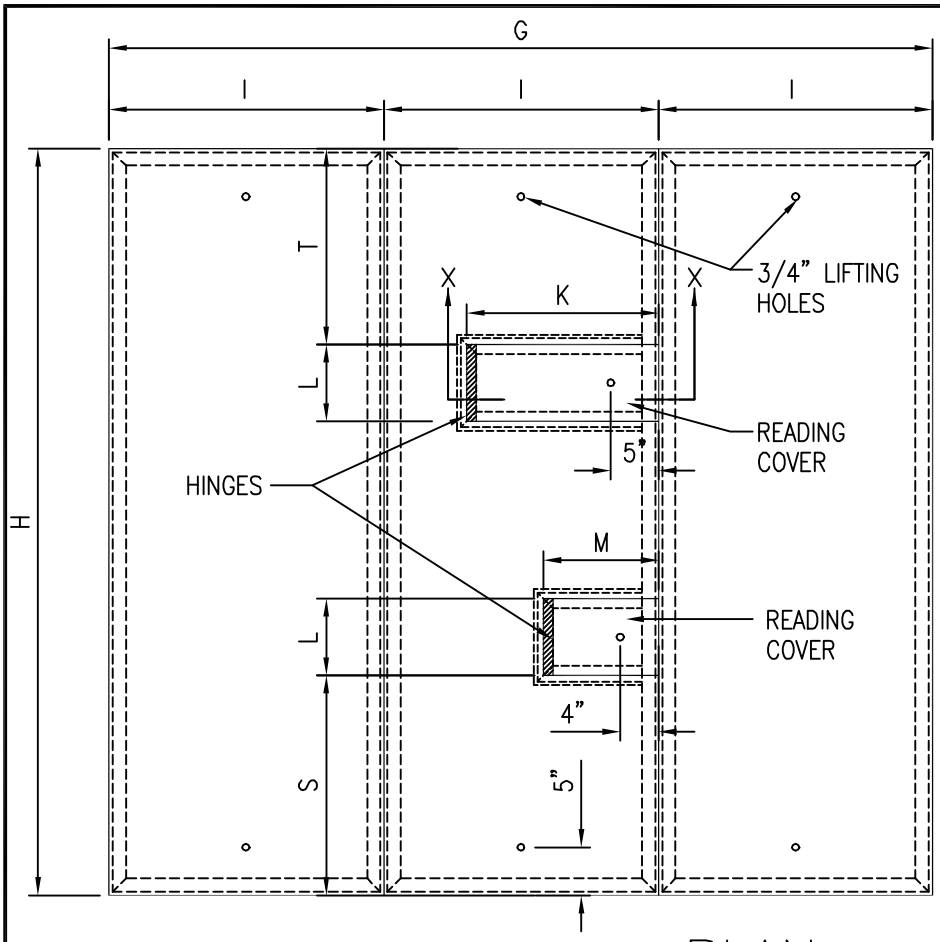
1. TAPPING SLEEVE AND TAPPING VALVE MAY BE USED WITH THE APPROVAL OF THE MANAGER.
2. FOR 3" DC METER INSTALLATIONS A 3" X 4" F.E. REDUCER SHALL BE INSTALLED AT BOTH ENDS OF DC METER.



ELEVATION

	2002
	REVISION

HAWAII	MODEL DC DETECTOR CHECK INSTALLATION SCALE: NTS	STANDARD DETAILS	M20

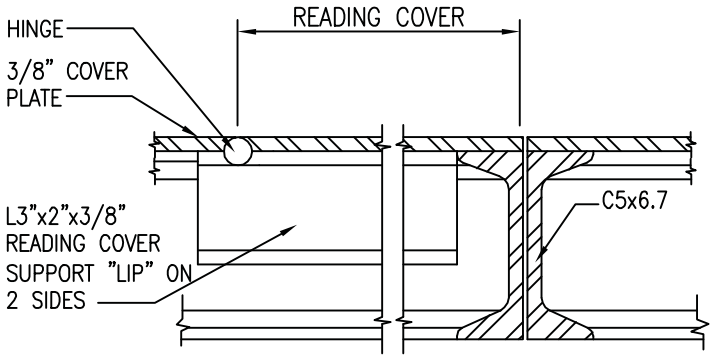


PLAN

NOTES:

1. READING COVERS SHALL BE LOCATED DIRECTLY OVER THE METER REGISTERS. LOCATIONS WILL VARY W/ THE TYPE OF METER TO BE INSTALLED.
2. SEE M15 FOR READING COVER DETAILS.
3. ALL ANGLES, CHANNELS, & COVER PLATES SHALL BE HOT DIPPED GALV. AFTER FABRICATION.
4. FOR 2-1/2" COPPER BYPASS LINES, INSTALL 2" BALL CORP. WITH APPROPRIATE 2"x2-1/2" FITTINGS.

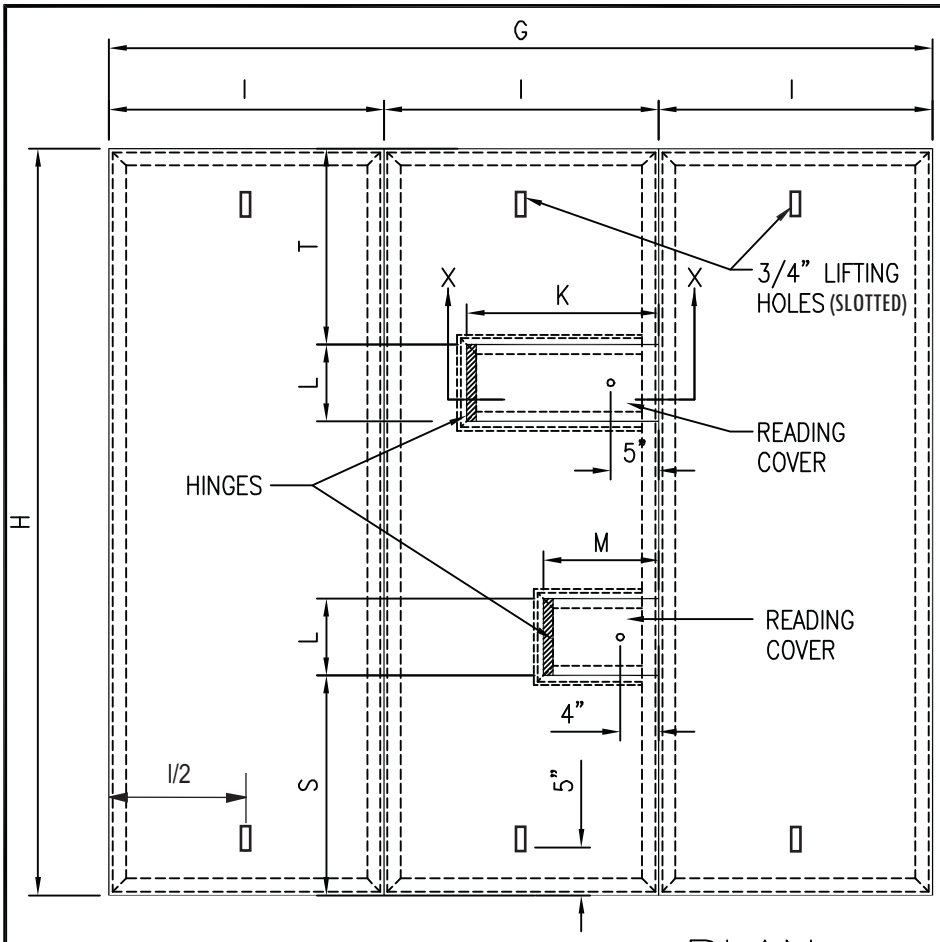
DIMENSION TABLE				
	METER SIZE (IN INCHES)			
	3	4	6	8
A	80	80	96	96
B	72	72	80	88
C	28	28	28	32
C	44	44	52	56
D	33	33	45	53
E	2	2	2 1/2	2 1/2
F	4 x 3	6 x 4	8 x 6	12 x 8
G	69 3/4	69 3/4	85 3/4	85 3/4
H	61 3/4	61 3/4	69 3/4	77 3/4
I	23 1/4	23 1/4	28 5/8	28 5/8
J	18	18	20	16
K	15	15	15	20
L	8	8	8	8
M	12	12	12	12
N	26	27	28	36
O	16	17	18	19 1/2
P	50	52	54	63 1/2
Q	30	30	30	30
R	2	2	2	2
S	18 7/8	18 7/8	18 7/8	22 7/8
T	18 1/8	17 1/8	21 1/4	20 3/8
Ø	4	6	8	12



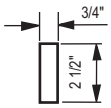
SECTION X-X

2002
REVISION

HAWAII	MFM-MCT METER AND BOX INSTALLATION SCALE: NTS	STANDARD DETAILS	M21



PLAN

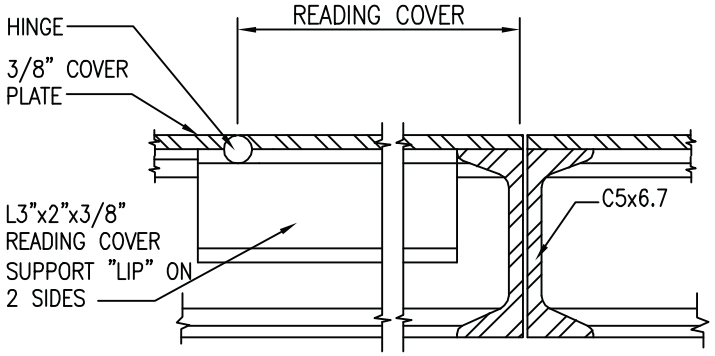


LIFTING HOLE DETAIL

NOTES:

1. READING COVERS SHALL BE LOCATED DIRECTLY OVER THE METER REGISTERS. LOCATIONS WILL VARY W/ THE TYPE OF METER TO BE INSTALLED.
2. SEE M15 FOR READING COVER DETAILS.
3. ALL ANGLES, CHANNELS, & COVER PLATES SHALL BE HOT DIPPED GALV. AFTER FABRICATION.
4. FOR 2-1/2" COPPER BYPASS LINES, INSTALL 2" BALL CORP. WITH APPROPRIATE 2"x2-1/2" FITTINGS.

DIMENSION TABLE				
	METER SIZE (IN INCHES)			
	3	4	6	8
A	80	80	96	96
B	72	72	80	88
C	28	28	28	32
C	44	44	52	56
D	33	33	45	53
E	2	2	2 1/2	2 1/2
F	4 x 3	6 x 4	8 x 6	12 x 8
G	69 3/4	69 3/4	85 3/4	85 3/4
H	61 3/4	61 3/4	69 3/4	77 3/4
I	23 1/4	23 1/4	28 5/8	28 5/8
J	18	18	20	16
K	15	15	15	20
L	8	8	8	8
M	12	12	12	12
N	26	27	28	36
O	16	17	18	19 1/2
P	50	52	54	63 1/2
Q	30	30	30	30
R	2	2	2	2
S	18 7/8	18 7/8	18 7/8	22 7/8
T	18 1/8	17 1/8	21 1/4	20 3/8
Ø	4	6	8	12



SECTION X-X

2002
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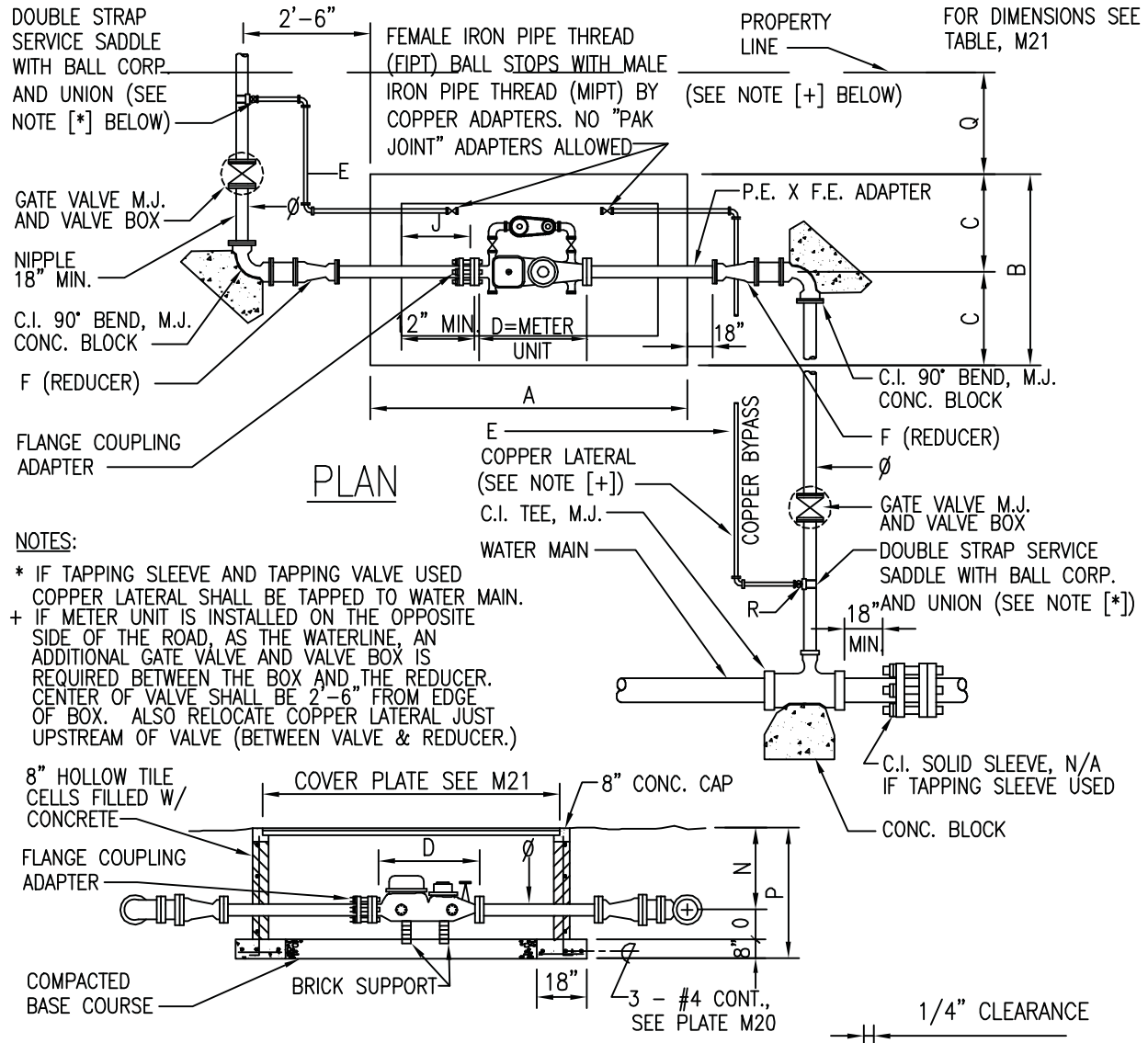
HAWAII

MFM-MCT METER AND BOX
INSTALLATION
SCALE: NTS

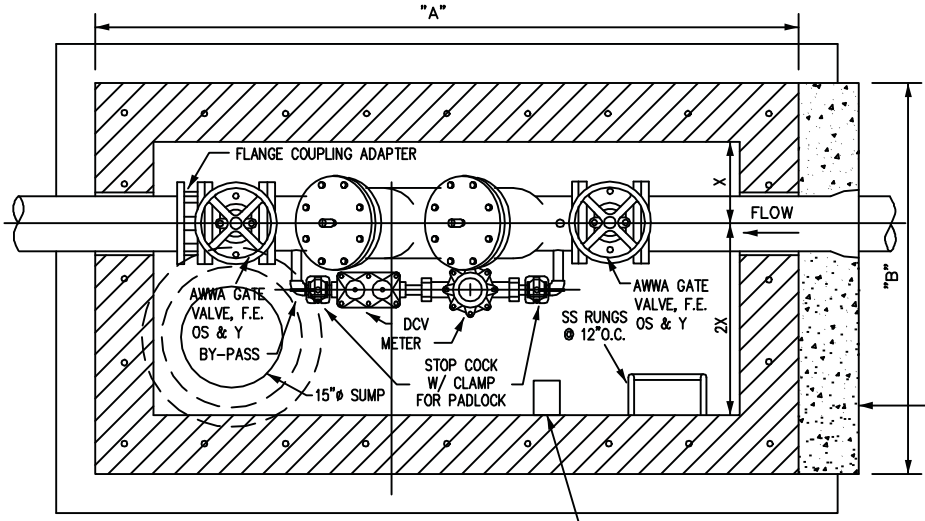
STANDARD DETAILS

M21R



	2002
	REVISION

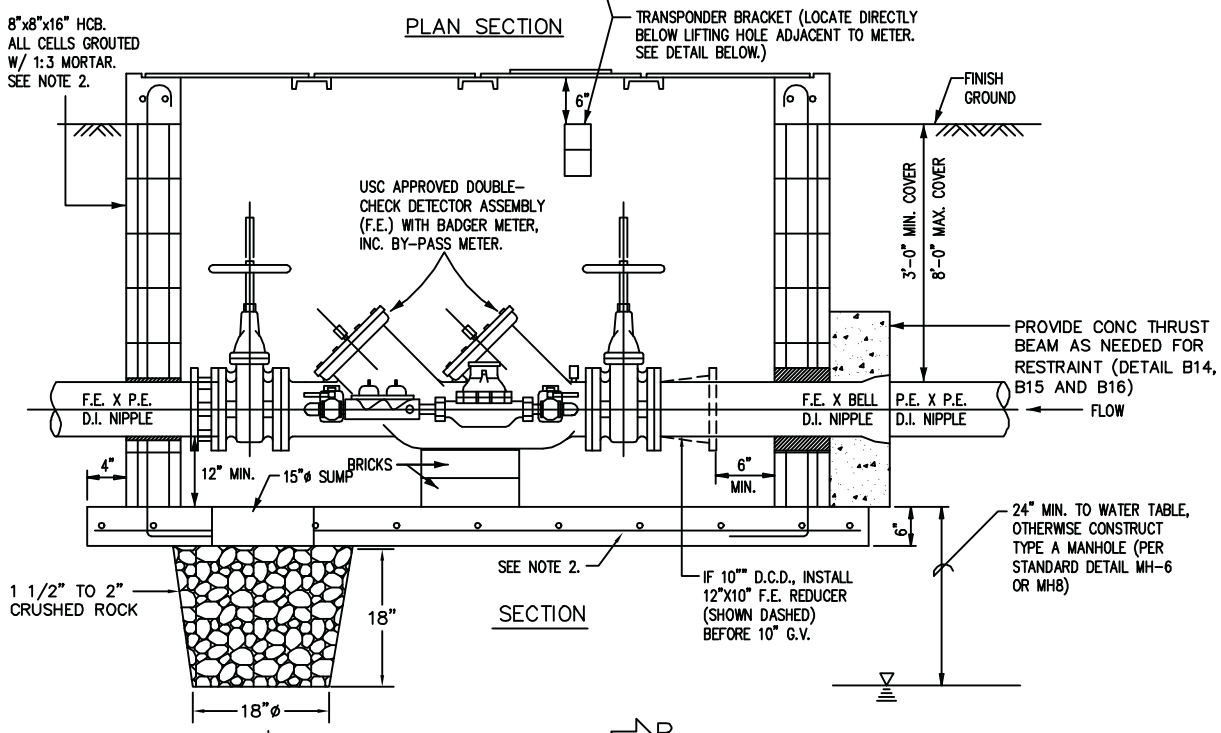
HAWAII	**MFM-MCT METER AND BOX** **INSTALLATION** SCALE: NTS	STANDARD DETAILS	M22

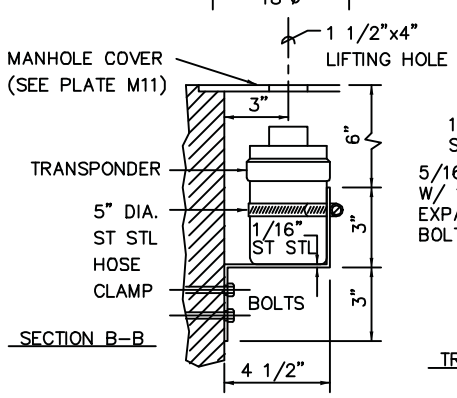


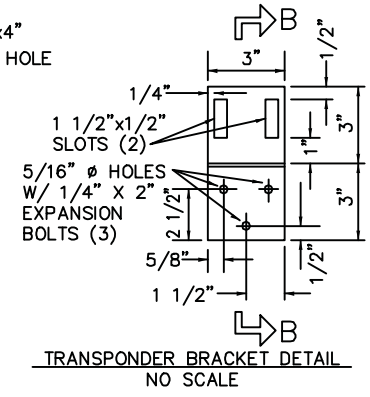
NOTES:

1. MANHOLE MAY BE PRECAST, CAST-IN-PLACE, OR BLOCK.
2. FOR CMU MANHOLE REINFORCEMENT, SEE STANDARD DETAIL MH12.
3. FOR BOND BEAM AND METAL MANHOLE COVER DETAILS, SEE STANDARD PLATE M11.
4. BYPASS METER SHALL BE RADIO READ TYPE MANU-FACTURED BY BADGER METER INC., OR OTHER AS REQUIRED BY DWS.

PROVIDE CONC THRUST BEAM AS NEEDED FOR RESTRAINT (DETAIL B14, B15 AND B16)







D.C.D. SIZE	MANHOLE SIZE	
	A	B
10"	12'-0"	6'-8"
8"	9'-4"	6'-0"
6"	8'-0"	5'-4"
4"	6'-8"	4'-8"
& SMALLER	6'-8"	4'-8"

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REVISION

MAUI

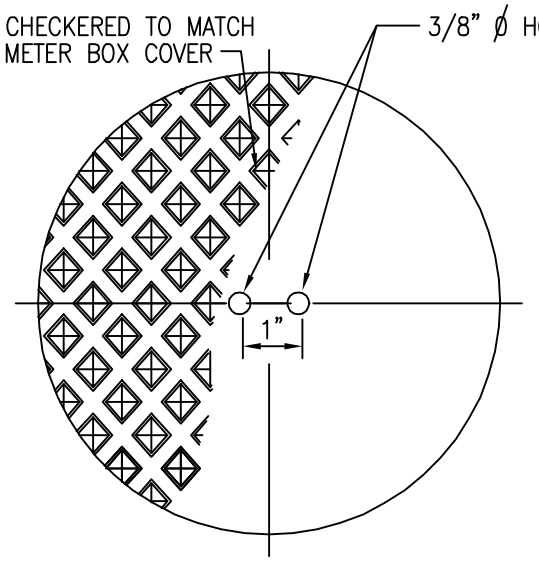
DOUBLE-CHECK DETECTOR ASSEMBLY

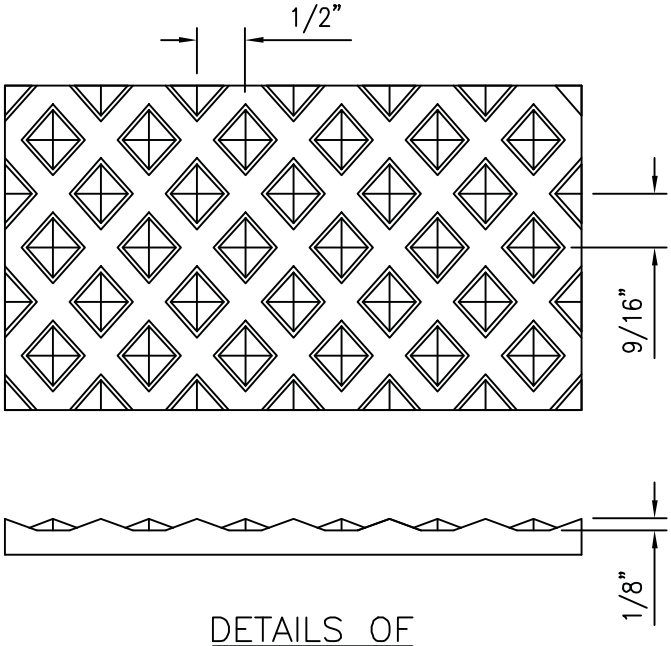
NON-TRAFFIC MANHOLE

SCALE: NTS

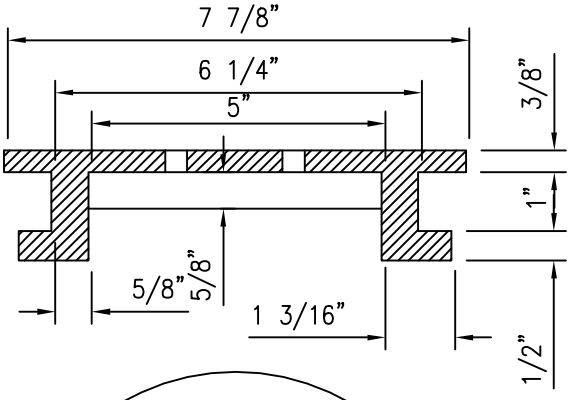
STANDARD DETAILS

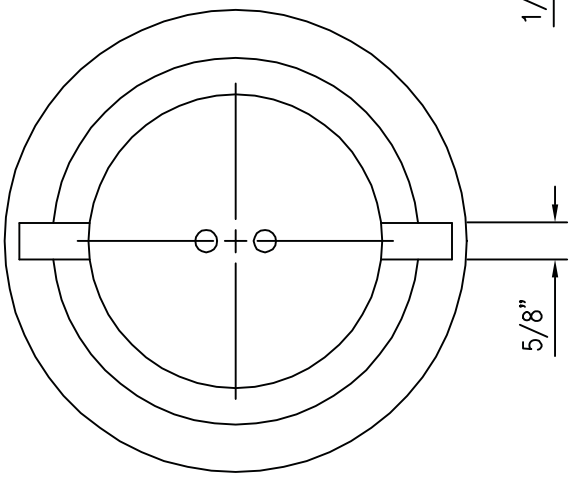
M23





DETAILS OF
RAISED
SURFACE

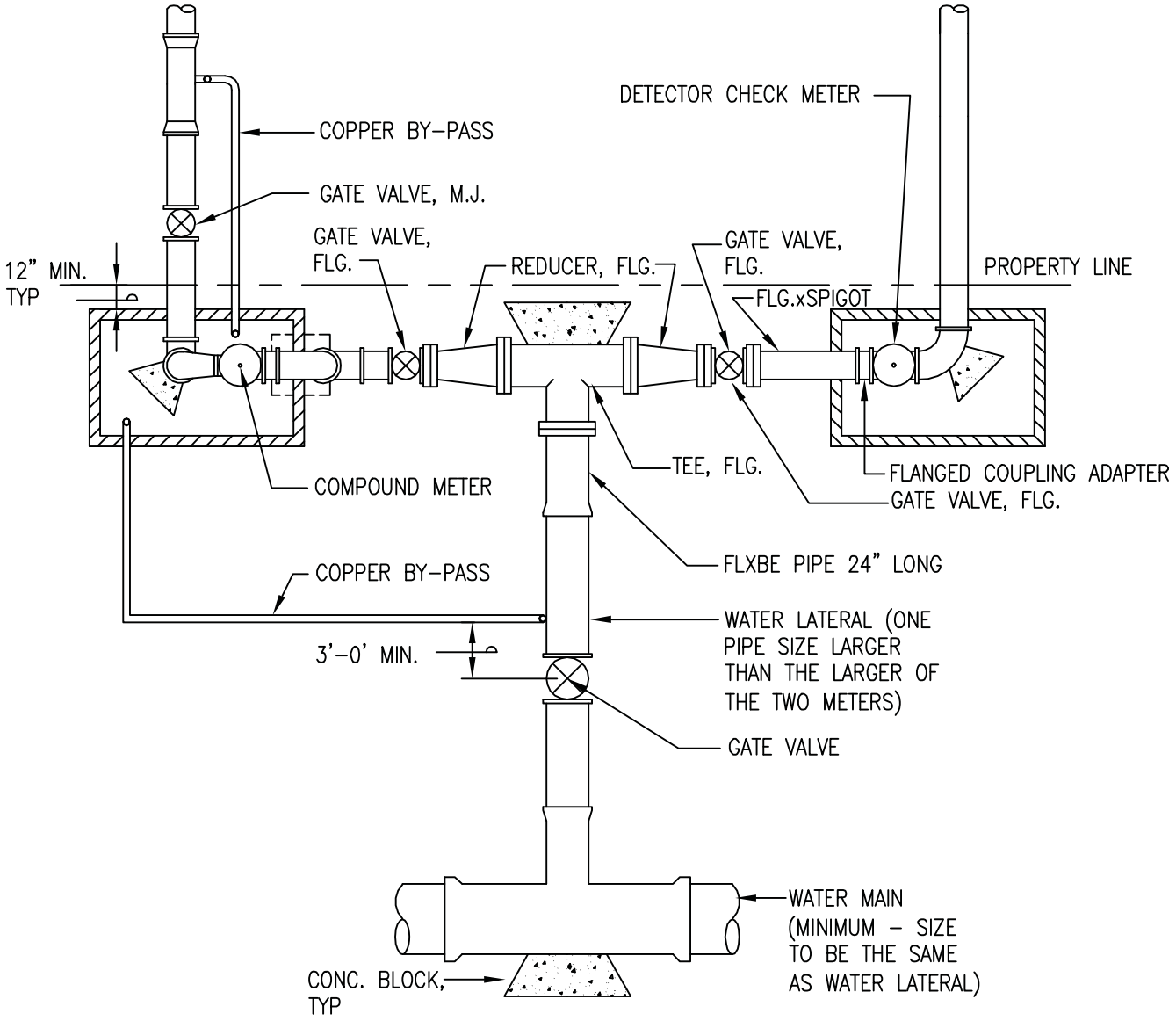




CAST IRON READING–HOLE COVER

	2002
	REVISION

KAUAI OAHU	**READING HOLE COVER** RAISED SURFACE DETAIL SCALE: NTS	STANDARD DETAILS	M24



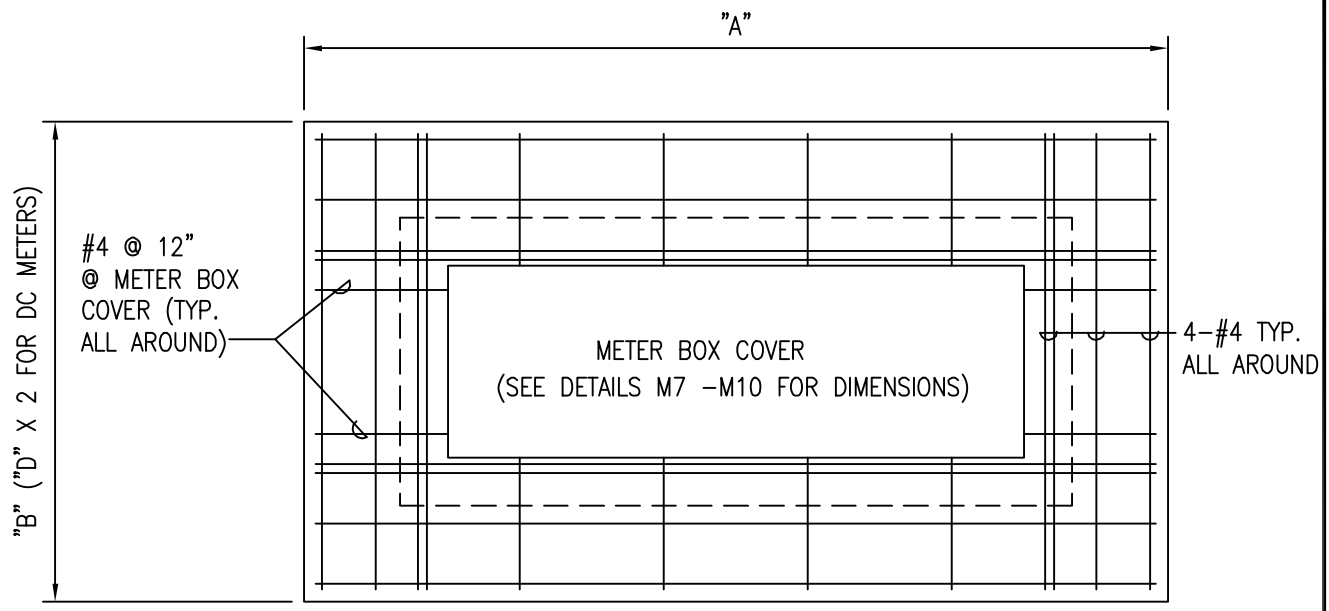
COMBINATION OF SINGLE COMPOUND AND SINGLE DETECTOR CHECK METERS

NOTE:

1. REFER TO M19, M30 AND M31 FOR DETECTOR CHECK METER INSTALLATION DETAILS.
2. REFER TO M27 – M29 FOR COMPOUND METER INSTALLATION DETAILS.
3. INSTALL ADDITIONAL FLANGED SPOOLS, AS REQUIRED.

2002	
REVISION	

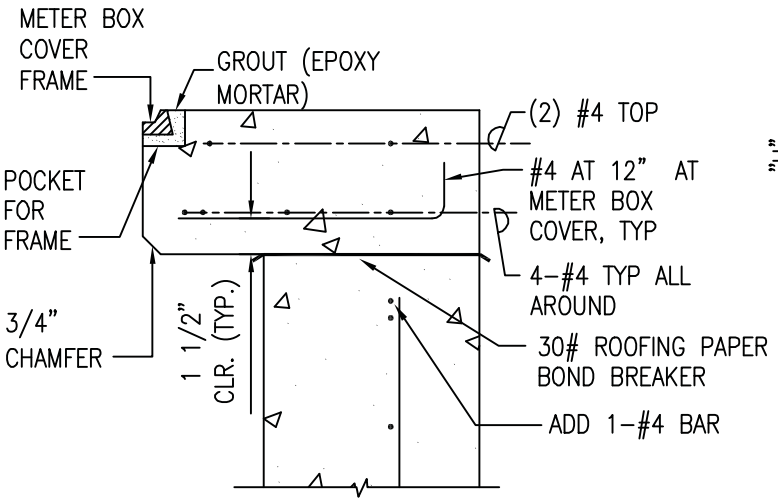
OAHU	**COMBINATION OF SINGLE COMPOUND AND SINGLE DETECTOR CHECK METERS** SCALE: NTS	STANDARD DETAILS	M25



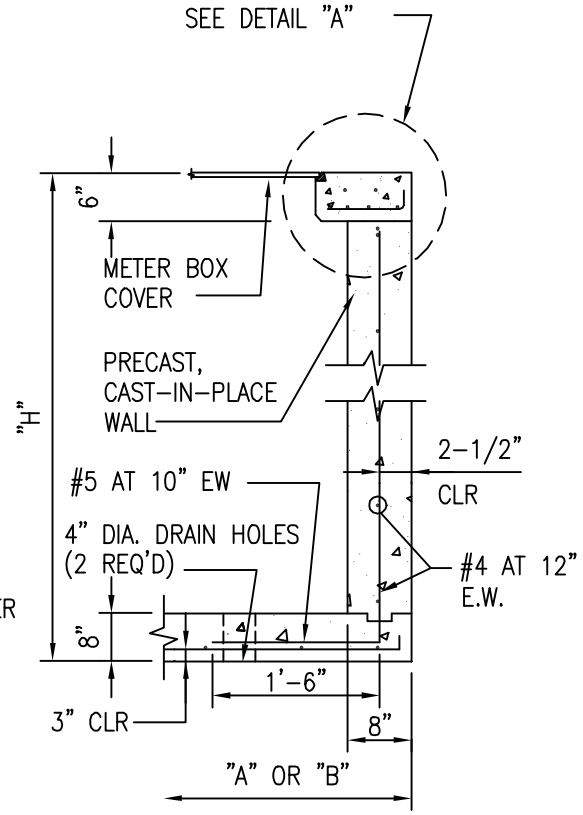
PLAN

NOTES:

1. REFER TO THE FOLLOWING DETAILS FOR BOX DIMENSIONS: M27–M29 FOR COMPOUND METERS, M19, M30 & M31 FOR DC METERS, M32 & M33 FOR TURBINE METERS.
2. CONCRETE SHALL BE DWS 3500.
3. REINFORCING STEEL SHALL BE ASTM A615 GRADE 60.
4. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). NON–TRAFFIC TYPE.
5. FOR CMU WALL: INSTALL 8" CMU W/ #5 @ 16" E.W. CENTERED. SEE MH12 FOR ADDITIONAL DETAIL.



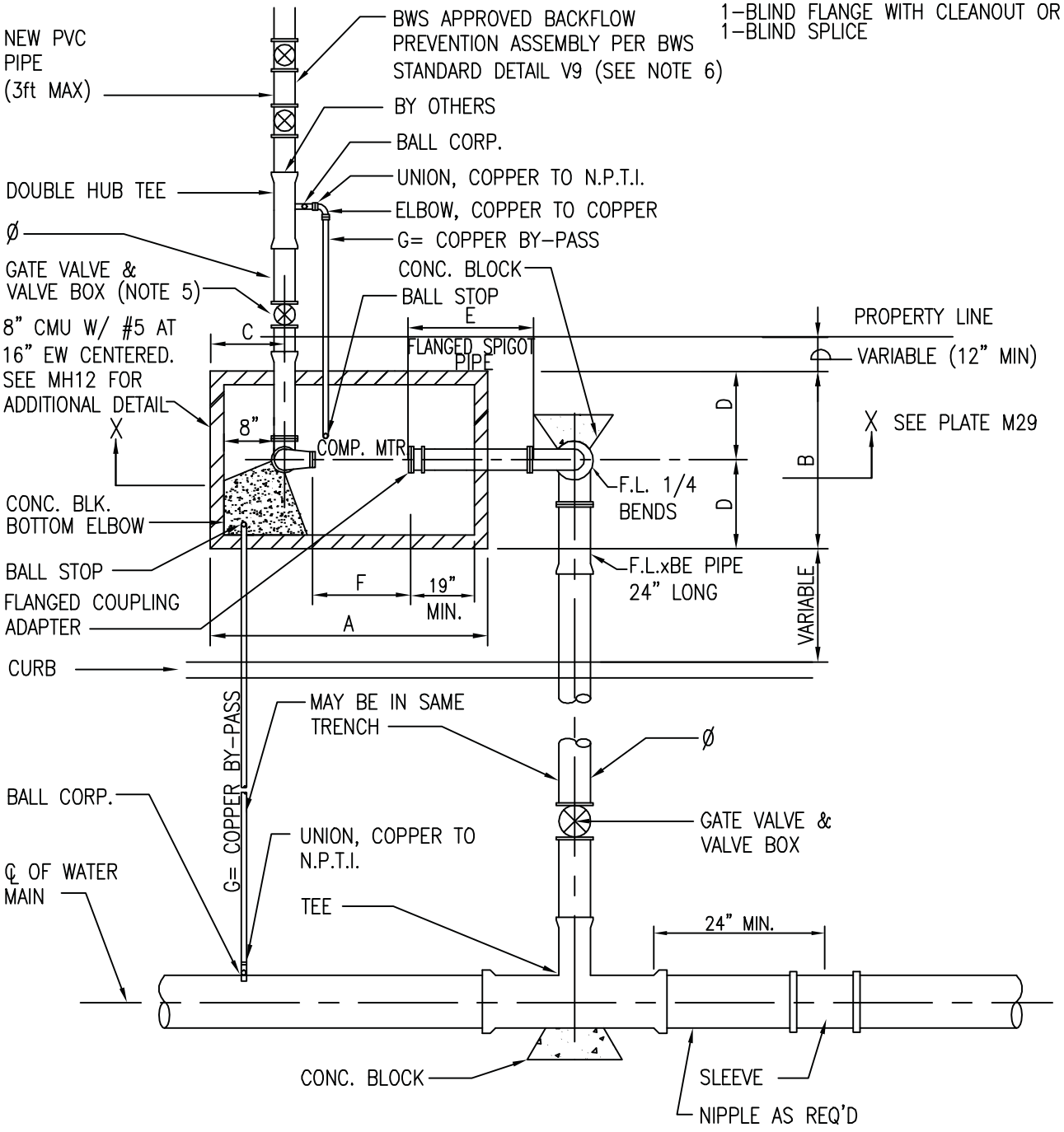
DETAIL "A"



TYPICAL SECTION

2002
REVISION

OAHU	METER BOX DETAIL FOR COMPOUND, DC AND TURBINE METERS SCALE: NTS	STANDARD DETAILS	M26



NOTE:

1. SEE TABLE ON M28 FOR DIMENSIONS BASED ON METER SIZE.
2. TAPPING SLEEVE/ TAPPING VALVE ASSEMBLY MAY BE USED.
3. ALL PIPING SHALL BE DUCTILE IRON PIPE UNLESS OTHERWISE NOTED.
4. MIN. DISTANCE OF TAP FOR BY–PASS TO TEE SHALL BE 36" CENTER TO CENTER.
5. OUTLET GATE VALVE MUST REMAIN
6. BACKFLOW PREVENTION ASSEMBLY TYPE TO BE DETERMINE BY BWS, IF REQUIRED.

	2002
	REVISION

OAHU	**SINGLE COMPOUND METER** **INSTALLATION PLAN** SCALE: NTS	STANDARD DETAILS	M27

NOTES:

1. SEE M7, M8, M9 AND M10 FOR METER BOX FRAME AND COVER DETAILS. SEE M26 FOR METER BOX DETAIL.
2. THE PROJECT SHALL PAY THE APPLICABLE WATER SYSTEM FACILITIES CHARGE AND FOR THE METER WHICH WILL BE FURNISHED BY BWS AND INSTALLED BY THE CONTRACTOR WHEN THE LATERAL IS INSTALLED.
3. LOCATE BY–PASS BALL STOPS IN METER BOX WITH ENOUGH SPACE BETWEEN METER AND WALL FOR TEMPORARY BY–PASS STANDPIPE TO BE HOOKED UP.
4. ELIMINATE 4" DRAINHOLES FOR WATERPROOFED MANHOLES.
5. CONTRACTOR SHALL NOTIFY CUSTOMER SERVICE DIVISION IN WRITING AFTER THE PLAN IS APPROVED, NO LATER THAN 120 DAYS, PRIOR TO WITHDRAWING METER FROM THE BWS STOREYARD. SUCH NOTICE SHALL INDICATE NUMBER, SIZE, AND TYPE OF METER AND APPROXIMATE MONTH AND YEAR METER IS ANTICIPATED TO BE DRAWN OUT. IF THE APPROVED PLAN IS ALLOWED TO LAPSE, THE 120–DAY NOTICE WILL BE VOIDED.
6. ALL METERS SHALL BE INSTALLED IN THE CONCRETE OR DIRT SIDEWALK AREA WITH CONCRETE SLAB (SEE PLATE M43).

	COMPOUND METERS		
METER CODE	09	12	15
FLOW RATE (GPM)	320	500	1000
METER SIZE	3"	4"	6"
A	7'–2"	7'–5"	7'–11"
B	4'–0"	4'–6"	4'–6"
C	1'–8 1/2"	1'–9 1/2"	1'–10 3/4"
D	2'–0"	2'–3"	2'–3"
E	3'–6"	3'–6"	3'–0"
F	2'–0"	2'–5"	3'–0 1/2"
G	2"	2 1/2"	2 1/2"
H	2'–9 1/4"	3'–1"	3'–6"
J	1'–6 1/4"	1'–8 1/2"	1'–11 1/2"
K	2'–6 3/4"	2'–11 1/2"	3'–4 1/2"
L	24" X 42"	24" X 42"	36" X 52"
M	15 1/4"	15 1/4"	15"
N	1"	7/8"	1/2"
Ø	4"	4" OR 6"	6" OR 8"

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OAHU

SINGLE COMPOUND METER
INSTALLATION-NOTES AND TABLES
SCALE: NTS

STANDARD DETAILS

M28

OAHU

SINGLE COMPOUND METER

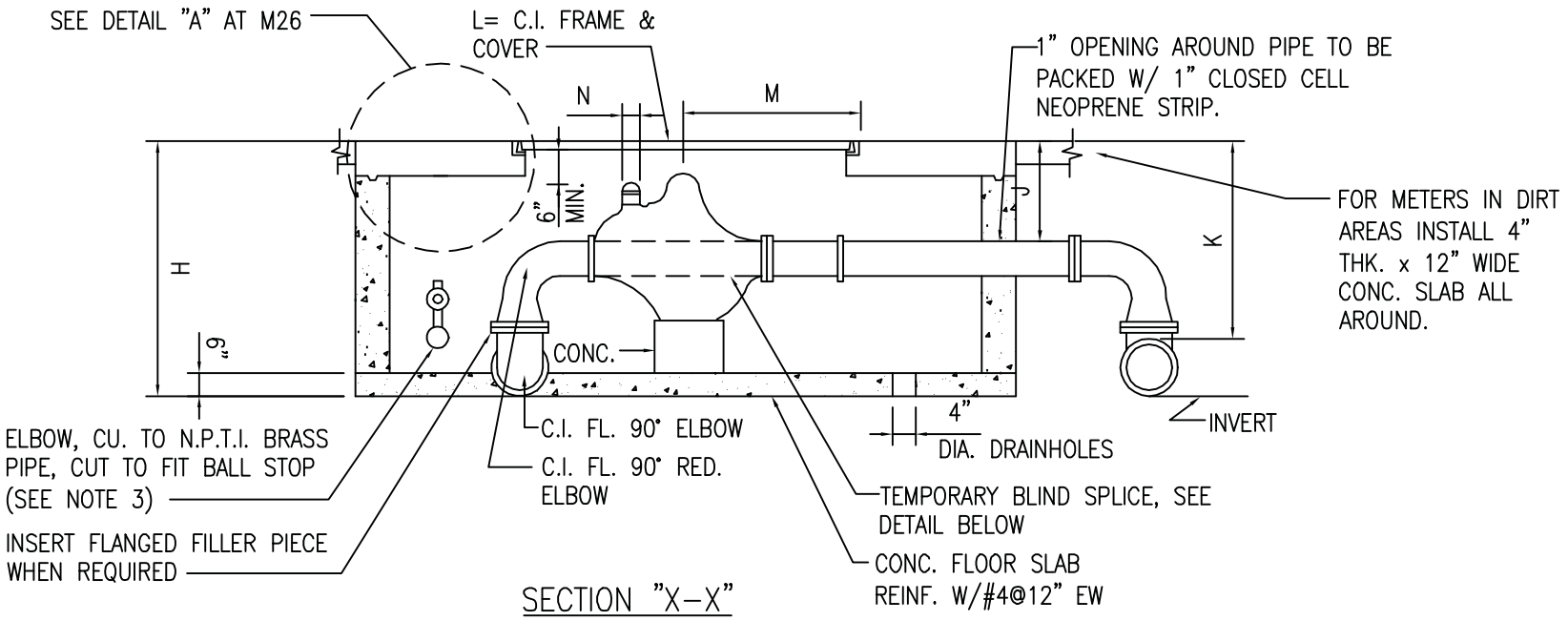
INSTALLATION-SECTION

SCALE: NTS

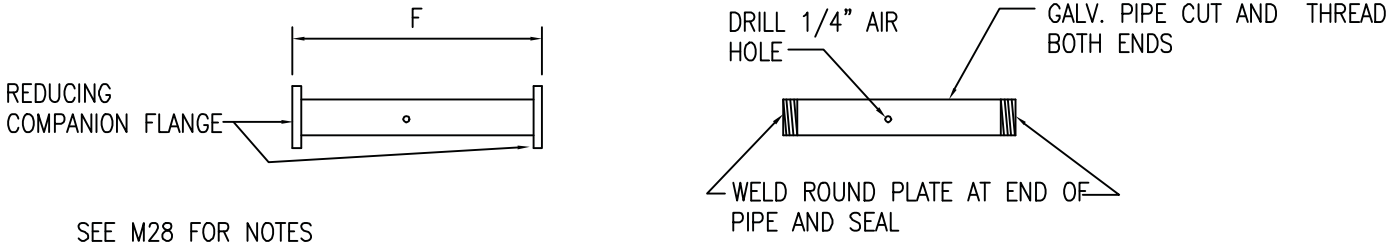
STANDARD DETAILS

M29

REVISION 2002



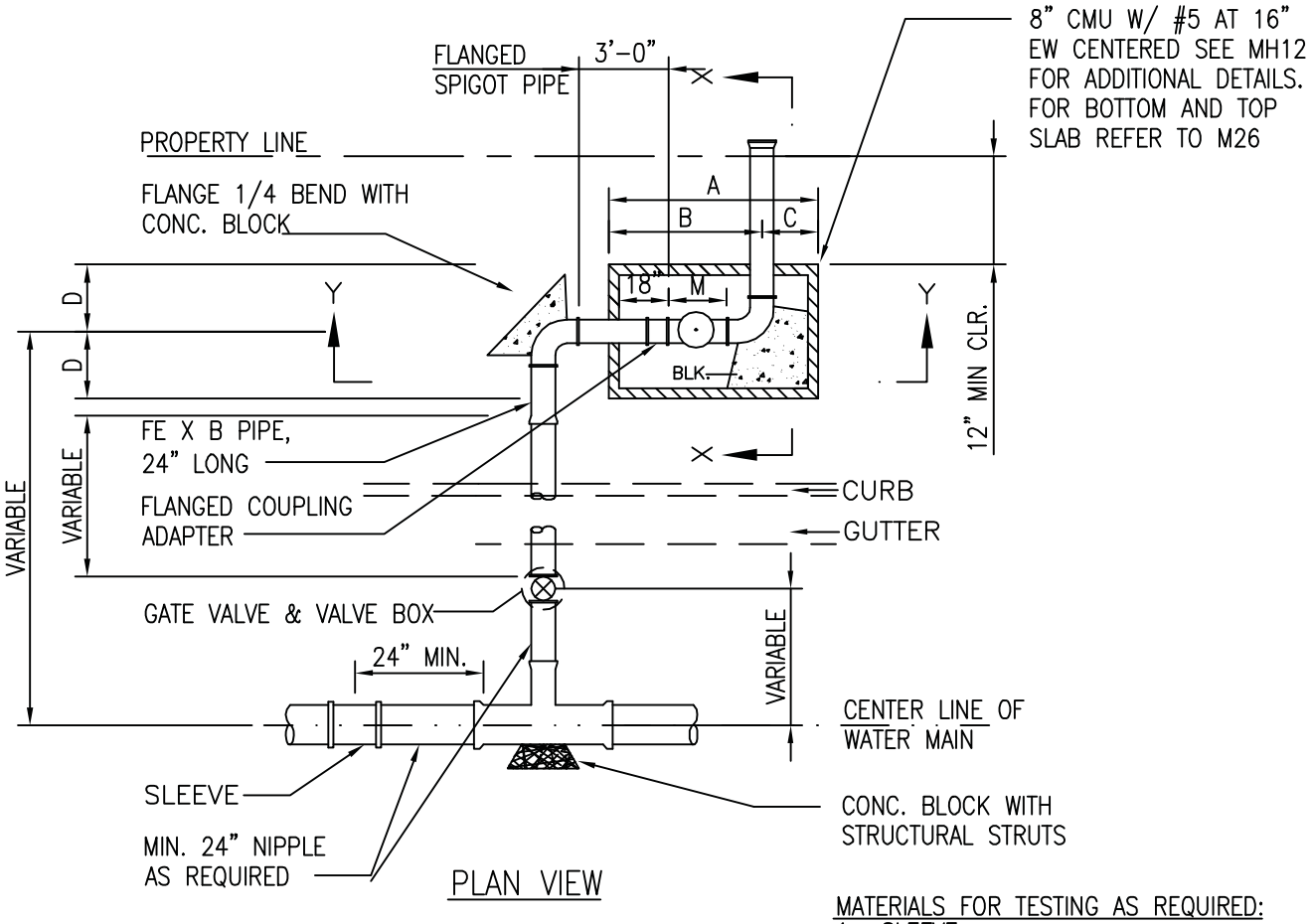
SECTION "X–X"



SEE M28 FOR NOTES AND TABLE

DETAIL OF TEMPORARY BLIND SPLICE

MATERIALS FOR TESTING AS REQUIRED:
1– BLIND FLANGE WITH CLEANOUT OR,
1– BLIND SPLICE



MATERIALS FOR TESTING AS REQUIRED:
1– SLEEVE
1– CAP WITH CLEANOUT
8 L.F. CONNECTING PIPE

NOTES:

1. ALL METERS SHALL BE INSTALLED IN THE CONCRETE OR DIRT SIDEWALK AREA WITH CONCRETE SLAB (SEE PLATE M43).
2. CONTRACTOR SHALL NOTIFY CUSTOMER SERVICE DIVISION IN WRITING AFTER PLAN IS APPROVED, NO LATER THAN 120 DAYS, PRIOR TO WITHDRAWING METER THE FROM THE BWS STOREYARD. SUCH NOTICE SHALL INDICATE NUMBER, SIZE, AND TYPE OF METER AND APPROXIMATE MONTH AND YEAR METER IS ANTICIPATED TO BE DRAWN OUT. IF THE APPROVED PLAN IS ALLOWED TO LAPSE, THE 120–DAY NOTICE WILL BE VOIDED.
3. THE PROJECT SHALL PAY THE APPLICABLE ONE–TIME SERVICE CHARGE AND FOR THE METER WHICH WILL BE FURNISHED BY BWS AND INSTALLED BY THE CONTRACTOR WHEN THE LATERAL IS INSTALLED.
4. TAPPING SLEEVE/ TAPPING VALVE ASSEMBLY MAY BE USED.
5. FOR DETAILS, SECTIONS AND TABLE SEE PLATES M19 AND M31.
6. CONCRETE SHALL BE DWS 3500.
7. REINFORCING STEEL SHALL BE ASTM A615 GRADE 60.
8. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). NON–TRAFFIC TYPE.
9. SEE DETAIL M26 FOR METER BOX DETAIL.

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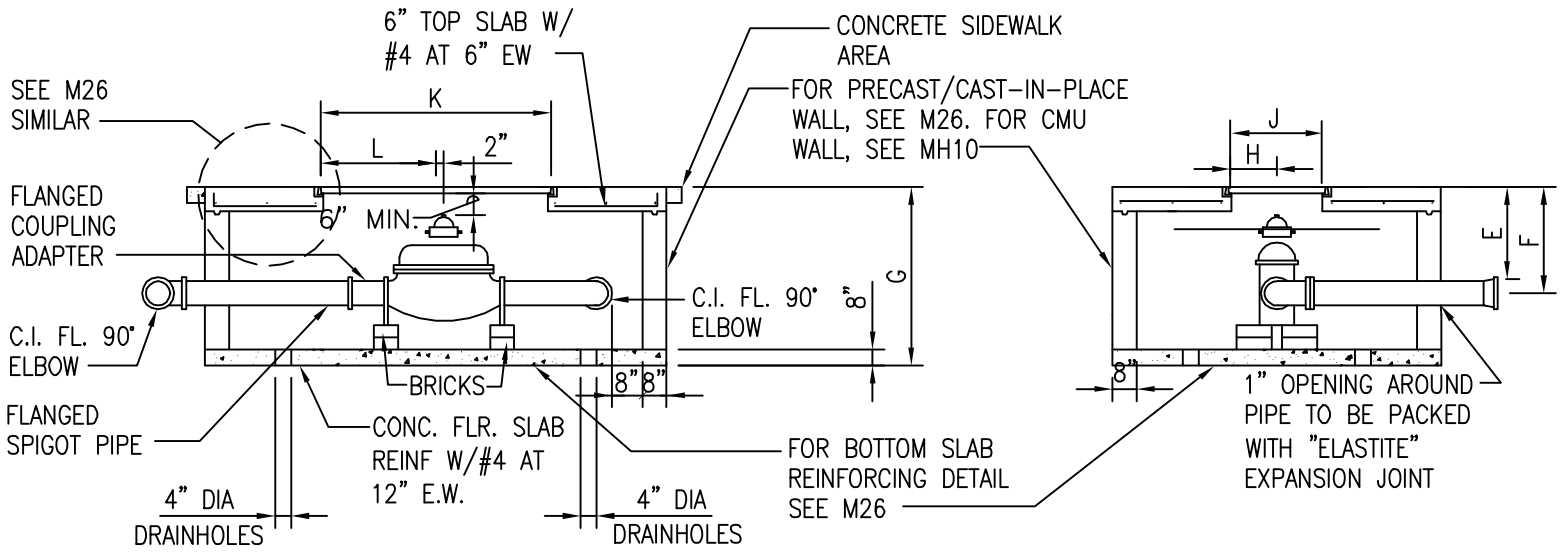
OAHU	**SINGLE DETECTOR** **CHECK METER INSTALLATION** SCALE: NTS	STANDARD DETAILS	M30

OAHU

SINGLE DETECTOR
CHECK METER INSTALLATION
SCALE: NTS

STANDARD DETAILS

M31



SECTION "Y-Y"

SECTION "X-X"

METER	A SIZE	B	C	D	E (MIN.)	F (MIN.)	G (MIN.)	H	CI F & C J	CI F & C K	L	M
4"x 5/8"	5'-9 1/2"	4'-1"	1'-8 1/2"	2'-0"	2'-0"	2'-2 1/2"	3'-4 1/2"	1'-0"	24"	42"	15 3/4"	1'-4 1/2"
6"x 5/8"	6'-6"	4'-8 1/2"	1'-9 1/2"	2'-3"	2'-3"	2'-6 1/2"	3'-9 1/2"	1'-0"	36"	52"	15 3/4"	1'-10 1/2"
8"x5/8"	7'-1/4"	5'-1 1/2"	1'-10 3/4"	2'-8"	2'-9"	3'-1 1/2"	4'-6"	1'-6"	36"	52"	23"	2'-2 1/2"

NOTES:

1. MAX. DEPTH FOR "E", "F", & "G" SHALL BE 1'-0" MORE THAN SHOWN IN TABLE.

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OAHU

TURBINE METER
INSTALLATION-SECTION
SCALE: NTS

STANDARD DETAILS

M32

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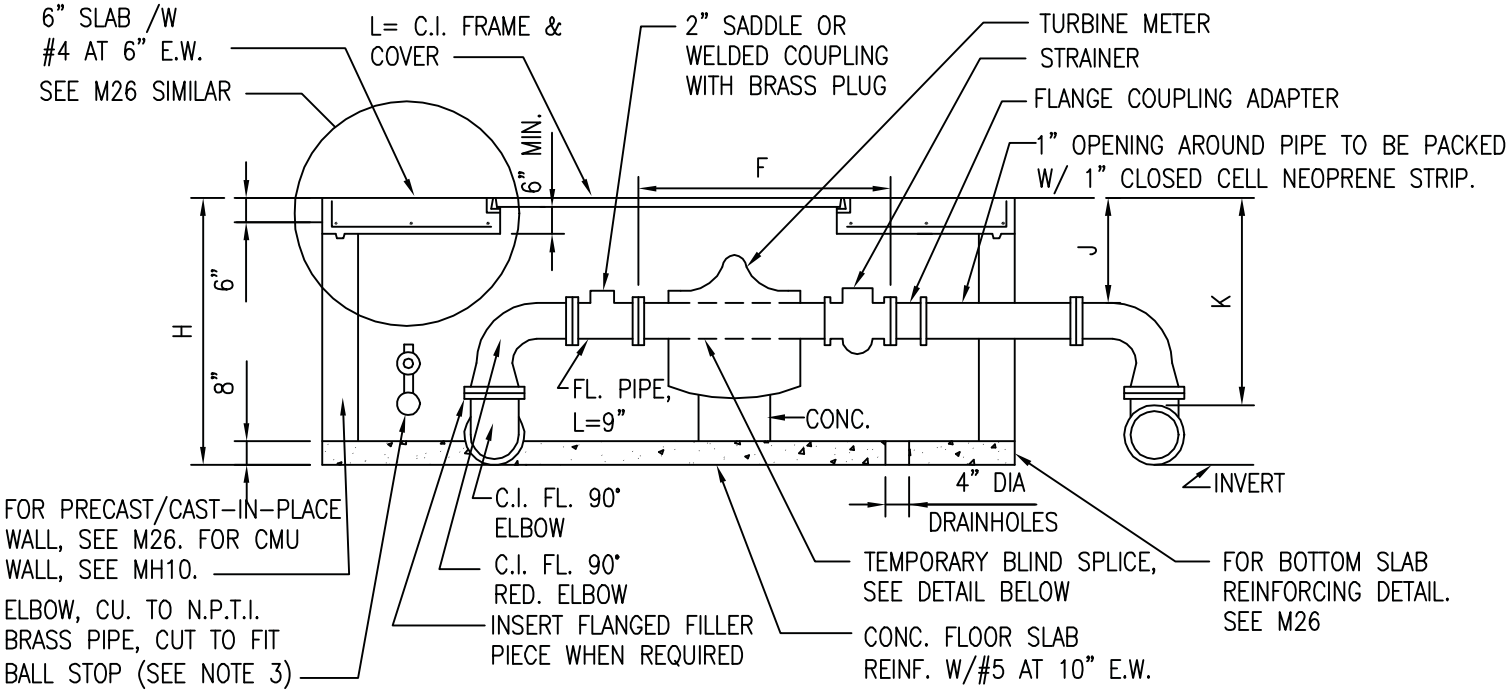
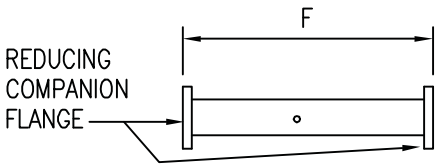
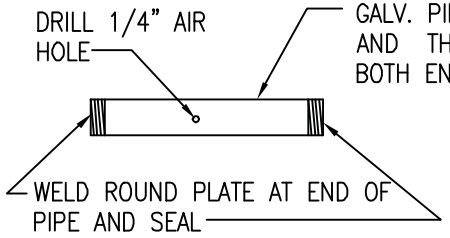


SECTION "X-X"





SEE PLATE M33 FOR
NOTES AND TABLE

DETAIL OF TEMPORARY BLIND SPLICE

NOTES:

1. SEE M7, M8, M9 AND M10 FOR METER BOX FRAME AND COVER DETAILS. SEE DETAIL M26 FOR METER BOX DETAIL.
2. THE PROJECT SHALL PAY THE APPLICABLE WATER SYSTEM FACILITIES CHARGE AND FOR THE METER WHICH WILL BE FURNISHED BY BWS AND INSTALLED BY THE CONTRACTOR WHEN THE LATERAL IS INSTALLED.
3. LOCATE BY–PASS BALL STOP IN METER BOX WITH ENOUGH SPACE BETWEEN METER AND WALL FOR TEMPORARY BY–PASS STANDPIPE TO BE HOOKED UP.
4. ELIMINATE 4" DRAINHOLES FOR WATERPROOFED MANHOLES.
5. CENTER DIAL UNDER READING COVER.
6. CONTRACTOR SHALL NOTIFY CUSTOMER SERVICE DIVISION IN WRITING AFTER THE PLAN IS APPROVED, NO LATER THAN 120 DAYS, PRIOR TO WITHDRAWING METER FROM THE BWS STOREYARD. SUCH NOTICE SHALL INDICATE NUMBER, SIZE, AND TYPE OF METER AND APPROXIMATE MONTH AND YEAR METER IS ANTICIPATED TO BE DRAWN OUT. IF THE APPROVED PLAN IS ALLOWED TO LAPSE, THE 120–DAY NOTICE WILL BE VOIDED.
7. ALL METERS SHALL BE INSTALLED IN THE CONCRETE OR DIRT SIDEWALK AREA WITH CONCRETE SLAB. (SEE PLATE M43)
8. CONCRETE SHALL BE DWS 3500.
9. REINFORCING STEEL SHALL BE ASTM A615 GRADE 60.
10. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). NON–TRAFFIC TYPE.
11. SPECIAL INSPECTION SHALL BE PROVIDED DURING CONSTRUCTION FOR CMU WALL.
12. STRUCTURAL STEEL SHAPES SHALL BE ASTM A–36. HOT DIP GALVANIZED AFTER FABRICATION.

	TURBINE METERS			
	3"	4"	6"	8"
A	7'–2"	7'–5"	7'–11"	8'–7"
B	4'–0"	4'–6"	4'–6"	4'–6"
C	1'–8 1/2"	1'–9 1/2"	1'–10 3/4"	1'–11"
D	2'–0"	2'–3"	2'–3"	2'–3"
E	3'–6"	3'–6"	3'–0"	3'–0"
F	1'–6"	1'–9 1/2"	2'–3"	2'–6"
G	2"	2 1/2"	2 1/2"	2 1/2"
H	2'–9 1/4"	3'–1"	3'–6"	3'–7"
J	1'–6 1/4"	1'–8 1/2"	1'–11 1/2"	1'–3"
K	2'–6 3/4"	2'–11 1/2"	3'–4 1/2"	2'–10 1/2"
L	24" X 42"	24" X 42"	36" X 52"	36" X 52"
Ø	4"	4" OR 6"	6" OR 8"	8" OR 12"

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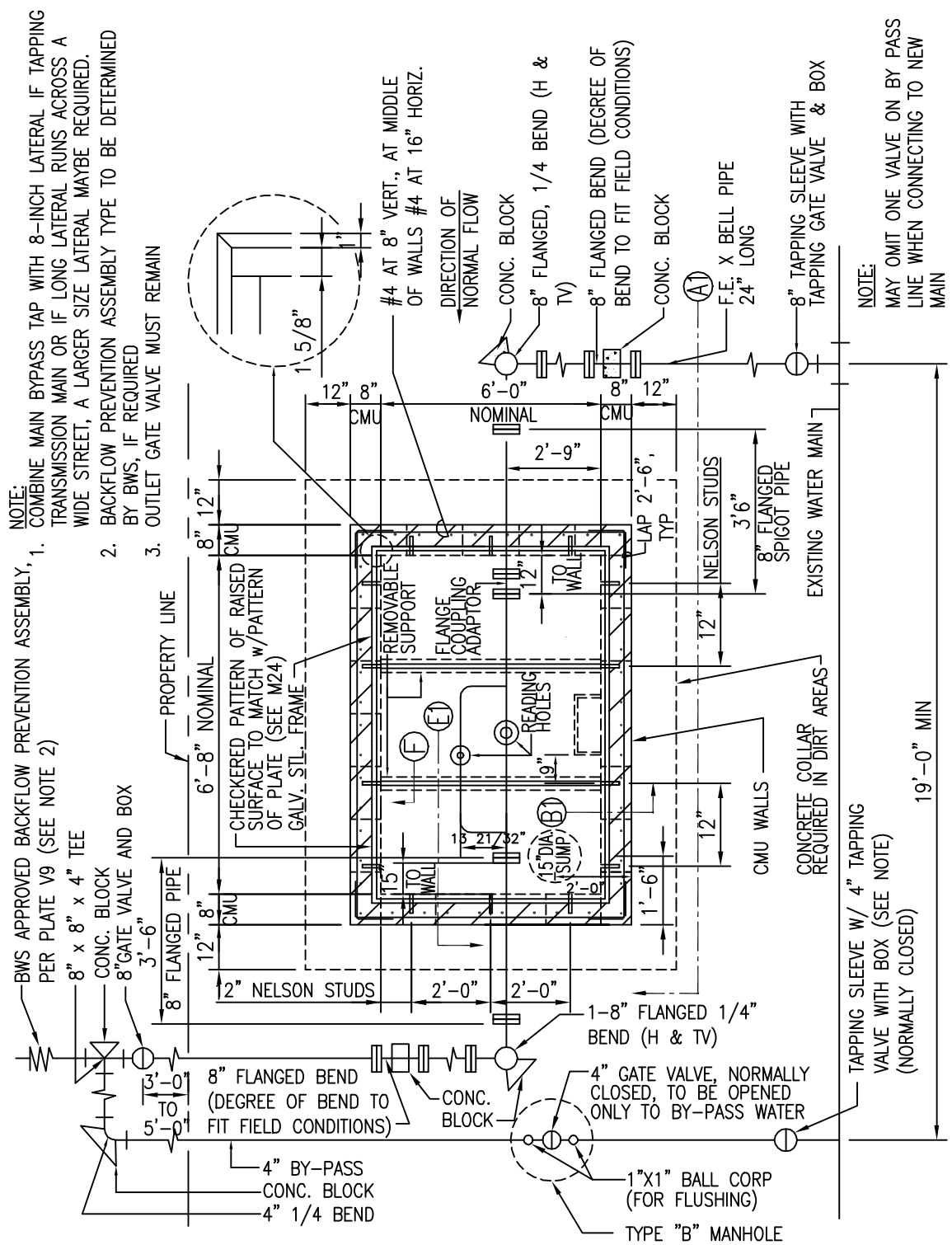
OAHU

TURBINE METER
INSTALLATION-NOTES AND TABLES
SCALE: NTS

STANDARD DETAILS

M33



	2002
	REVISION

OAHU	**8" X 2" FM METER & BOX LAYOUT FIRE AND DOMESTIC USES - CMU WALLS** SCALE: NTS	STANDARD DETAILS	M34

OAHU

8" X 2" FM METER & BOX LAYOUT FIRE AND DOMESTIC USES - CMU WALLS

SCALE: NTS

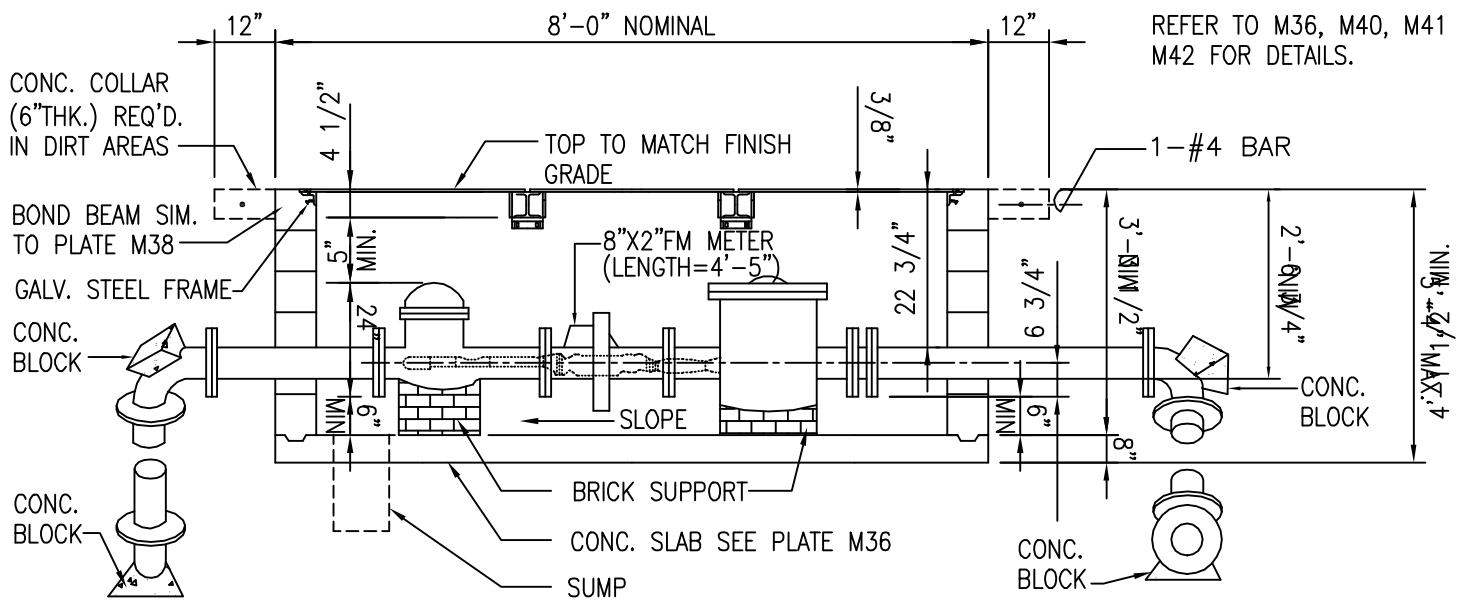
STANDARD DETAILS

M35

REVISION 2002

NOTES FOR CMU WALL MANHOLE

1. BWS 3500 CONCRETE, 1500 PSI CMU AND GRADE 60 REINFORCING STEEL
2. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB; PER AASHTO LRFD BRIDGE DESIGN SPECIFICATION (1998) NON-TRAFFIC TYPE.
3. ALL CELLS SHALL BE GROUTED SOLID WITH 2500 PSI GROUT. TYPE M MORTAR
4. SPECIAL INSPECTION SHALL BE PROVIDED DURING CONSTRUCTION FOR CMU WALL.



SECTION "A1-A1"

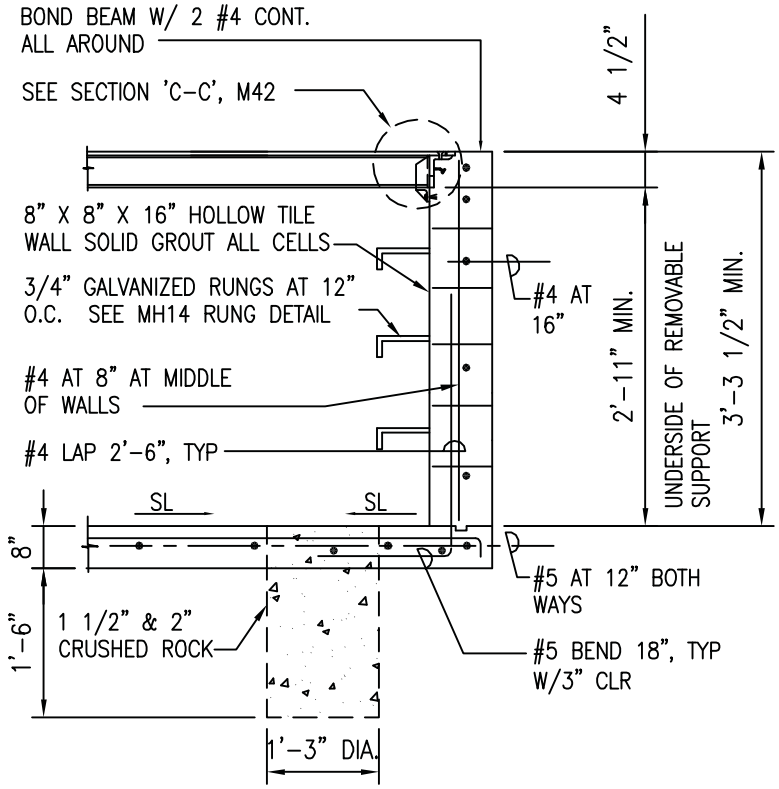
NOTE:

REFER TO M36, M40, M41 AND M42 FOR DETAILS.

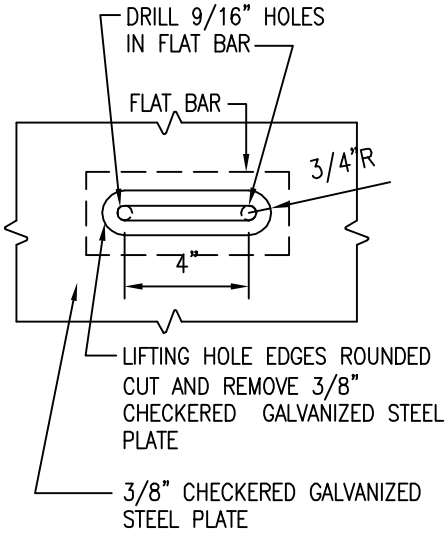
NOTE:

COMBINED DOMESTIC AND FIRE FLOW REQUIREMENT = NOT TO EXCEED 3,500 GPM

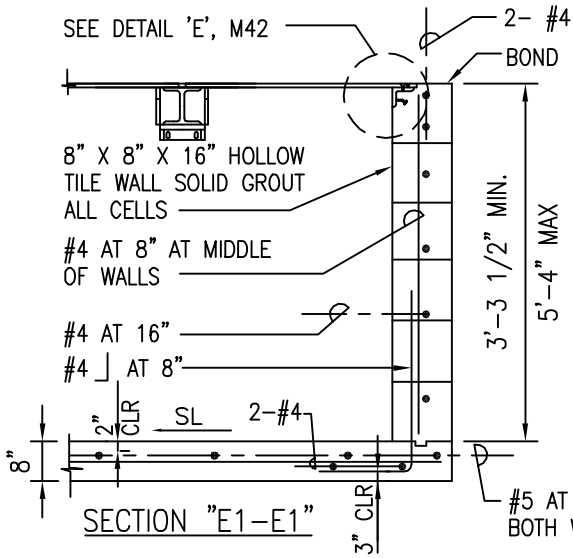
CMU WALLS



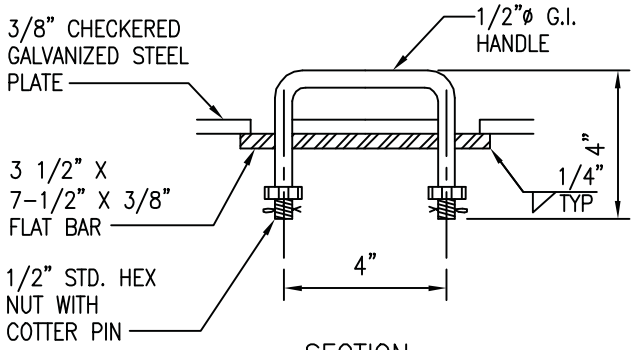
SECTION "B1-B1"



PLAN



SECTION "E1-E1"



SECTION

HANDLE DETAIL

CMU WALLS

	2002
	REVISION

OAHU	**8" X 2" FM METER & BOX** **BOX DETAILS - CMU WALLS** SCALE: NTS	STANDARD DETAILS	M36

OAHU

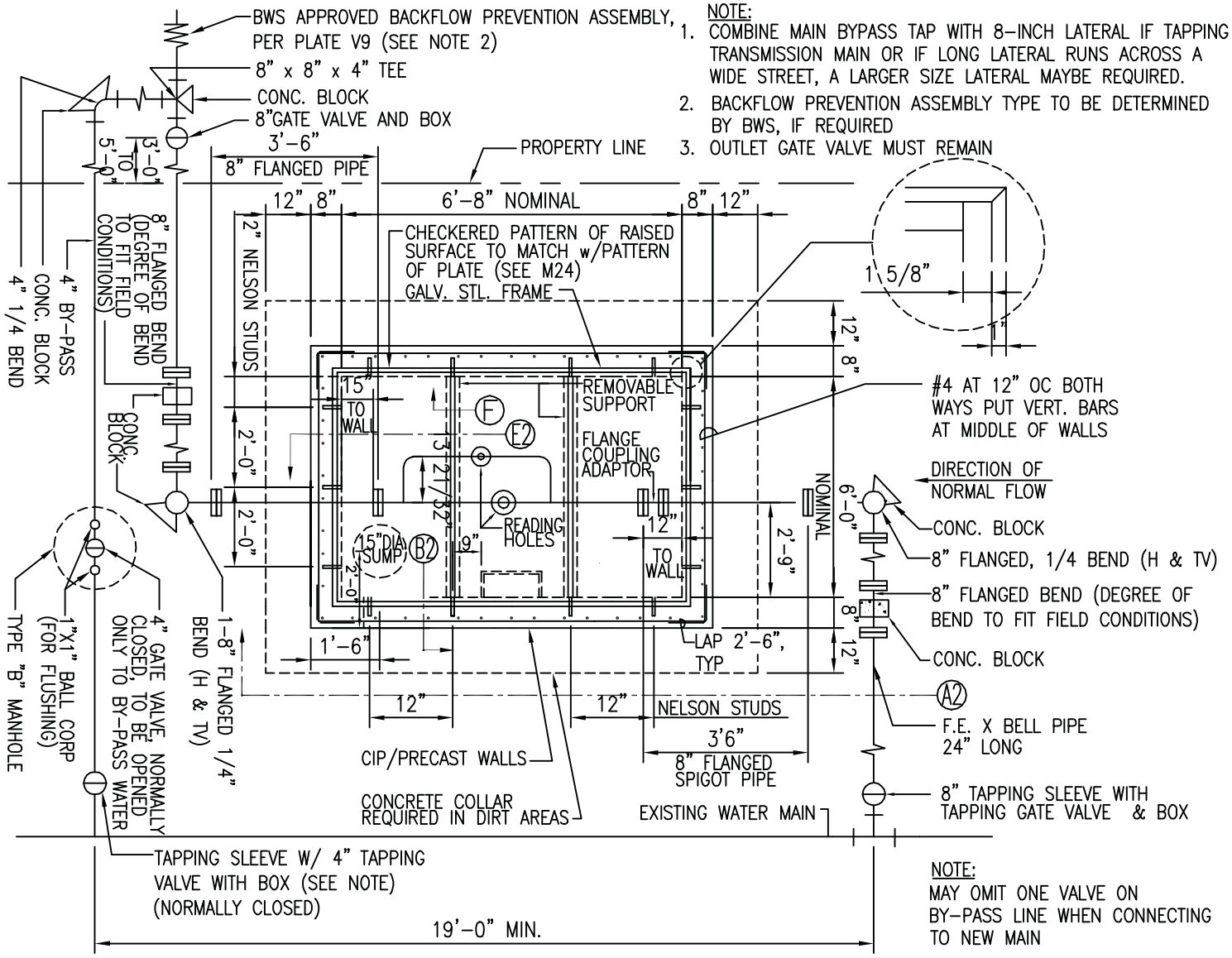
8" X 2" FM METER & BOX LAYOUT FIRE AND DOMESTIC USES - PRECAST / CAST-IN-PLACE WALLS

SCALE: NTS

STANDARD DETAILS

M37

REVISION 2002



NOTE:

1. COMBINE MAIN BYPASS TAP WITH 8-INCH LATERAL IF TAPPING TRANSMISSION MAIN OR IF LONG LATERAL RUNS ACROSS A WIDE STREET, A LARGER SIZE LATERAL MAYBE REQUIRED.
2. BACKFLOW PREVENTION ASSEMBLY TYPE TO BE DETERMINED BY BWS, IF REQUIRED
3. OUTLET GATE VALVE MUST REMAIN

PLAN VIEW OF GALV. STEEL FRAME AND REMOVABLE SUPPORT

FOR SECTIONS SEE M38, M39 AND M40

PRECAST/CAST IN PLACE WALLS

OAHU

8" X 2" FM METER & BOX LAYOUT FIRE AND DOMESTIC USES - PRECAST / CAST-IN-PLACE WALLS

SCALE: NTS

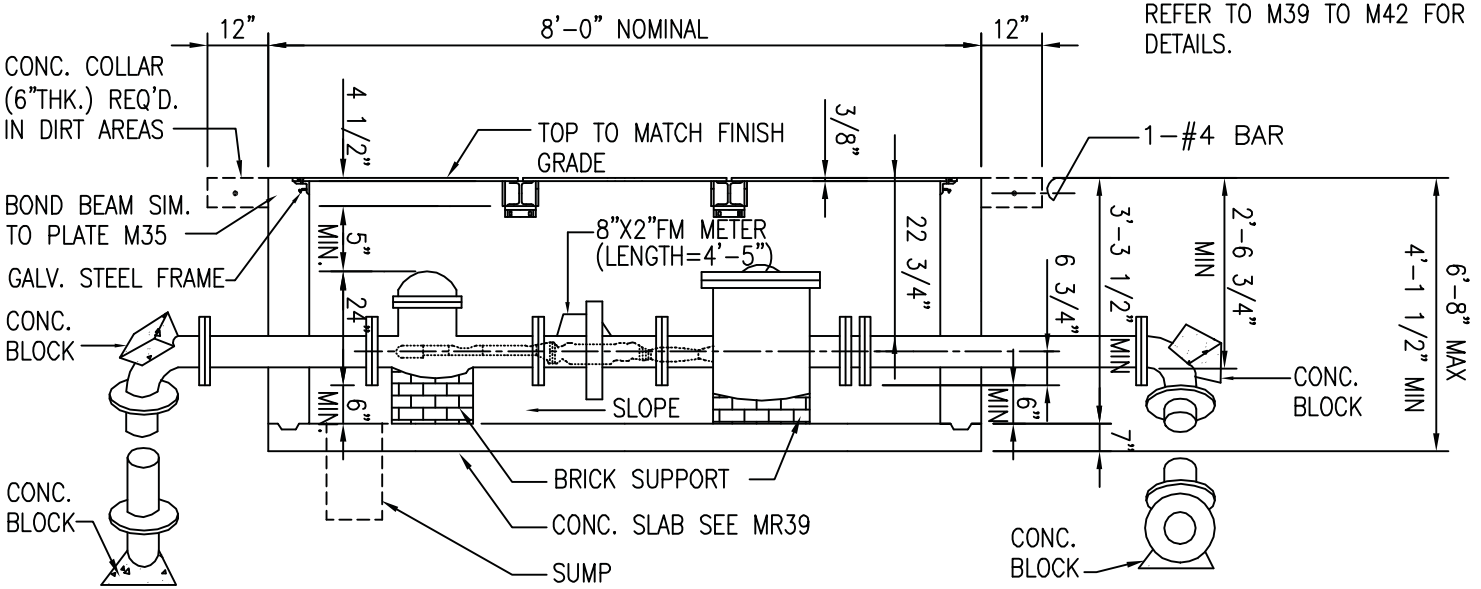
STANDARD DETAILS

M38

REVISION 2002

NOTES FOR PRECAST/CAST-IN-PLACE WALL MANHOLE

1. BWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL
2. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATION (1998). NON-TRAFFIC TYPE.



SECTION "A2-A2"

N.T.S.

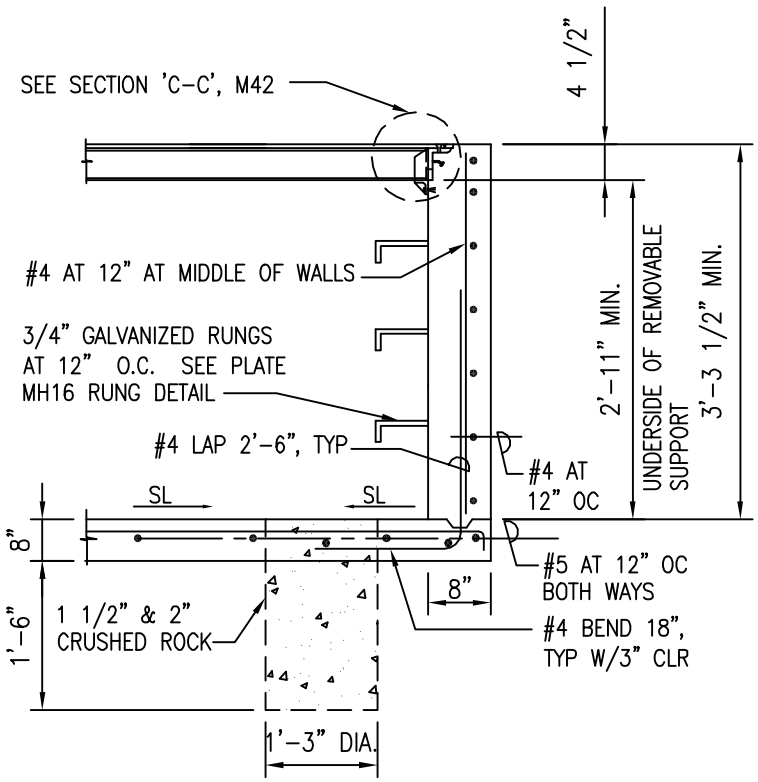
NOTE:

REFER TO M39 TO M42 FOR DETAILS.

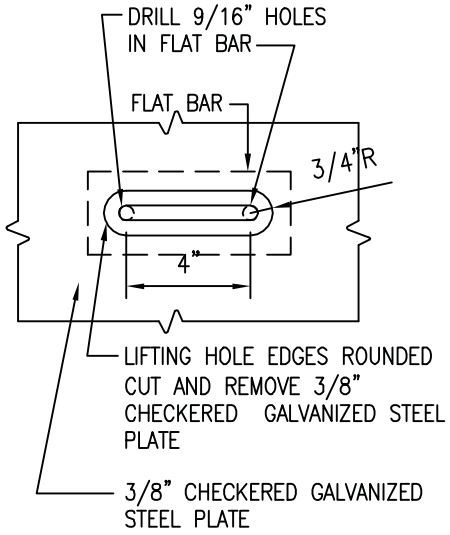
NOTE:

COMBINED DOMESTIC AND FIRE FLOW REQUIREMENT = NOT TO EXCEED 3,500 GPM

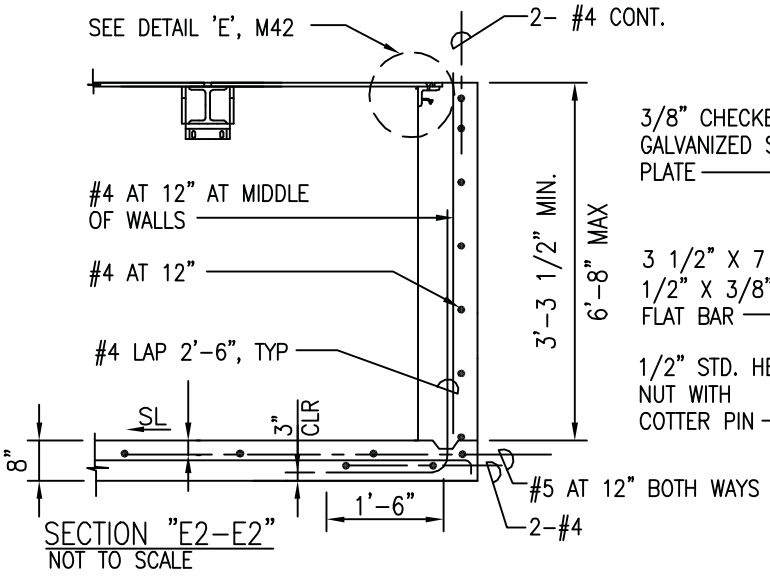
PRECAST/CAST IN PLACE WALLS



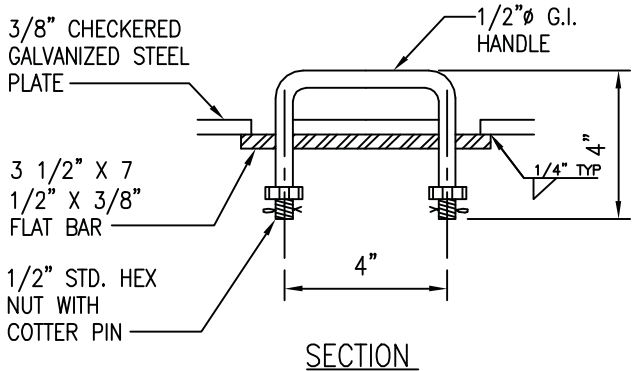
SECTION "B2-B2"
NOT TO SCALE



PLAN
NOT TO SCALE



SECTION "E2-E2"
NOT TO SCALE

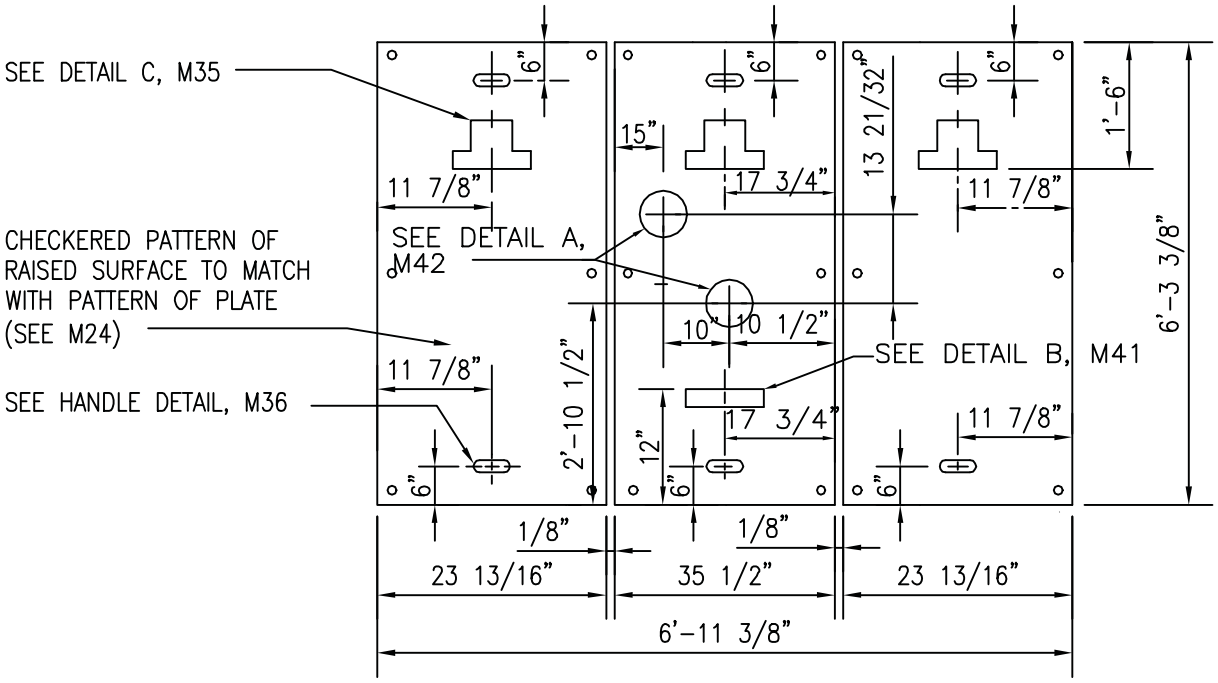


SECTION

HANDLE DETAIL
NOT TO SCALE

	2002
	REVISION

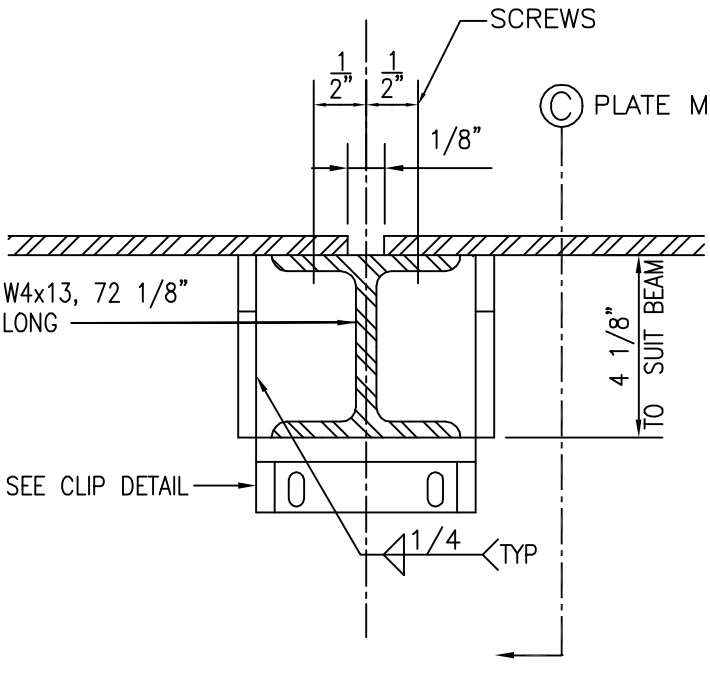
OAHU	**8" X 2" FM METER & BOX** **BOX DETAILS-PRECAST / CAST-IN-PLACE WALLS** **SCALE: NTS**	STANDARD DETAILS	M39



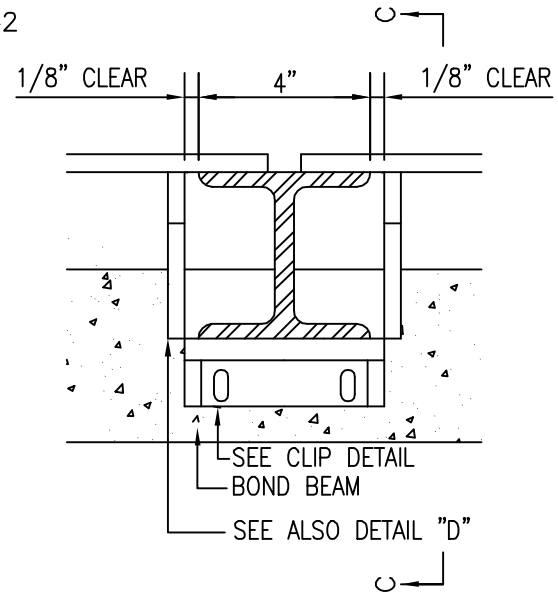
NOTES:

1. CONTRACTOR TO VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
2. LOCATION OF READING LID SHALL BE VERIFIED BY CONTRACTOR.

PLAN – FM METER COVER
NOT TO SCALE



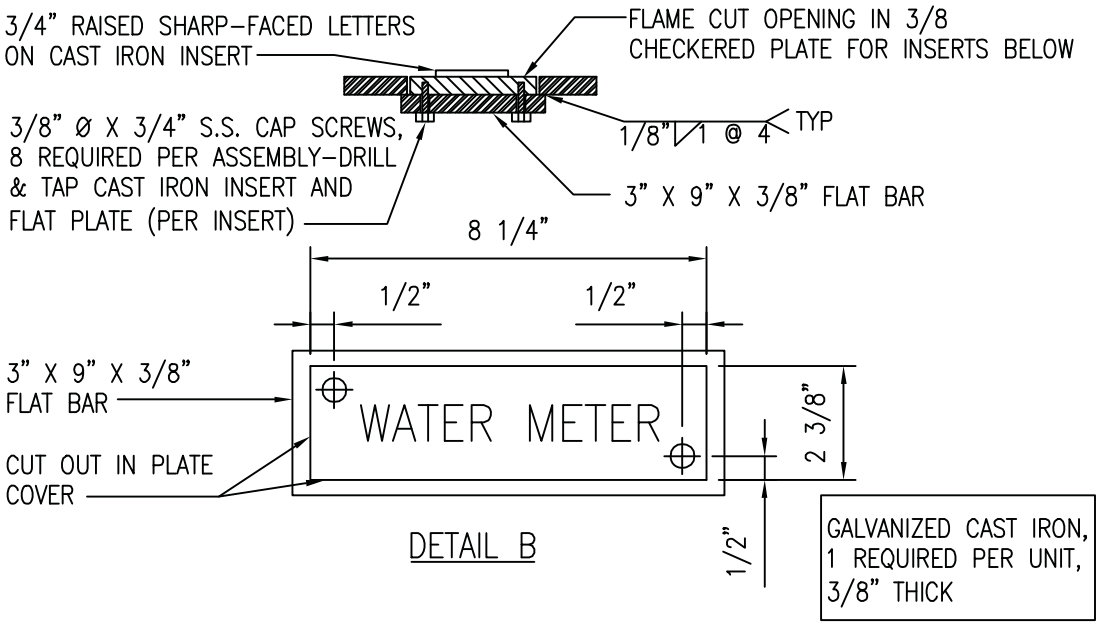
DETAIL "D"
REMOVABLE SUPPORT
NOT TO SCALE

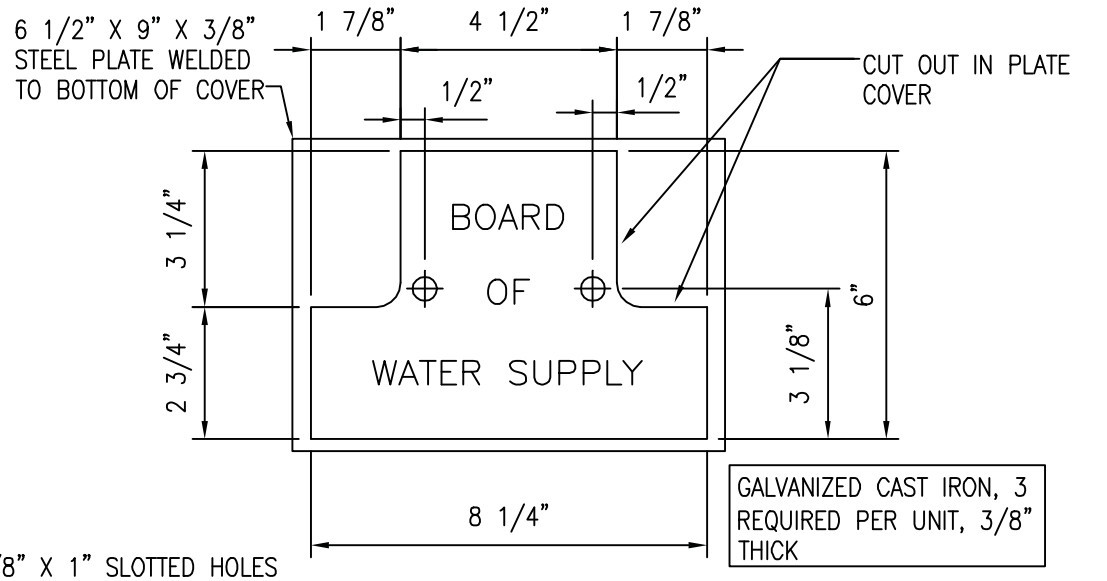


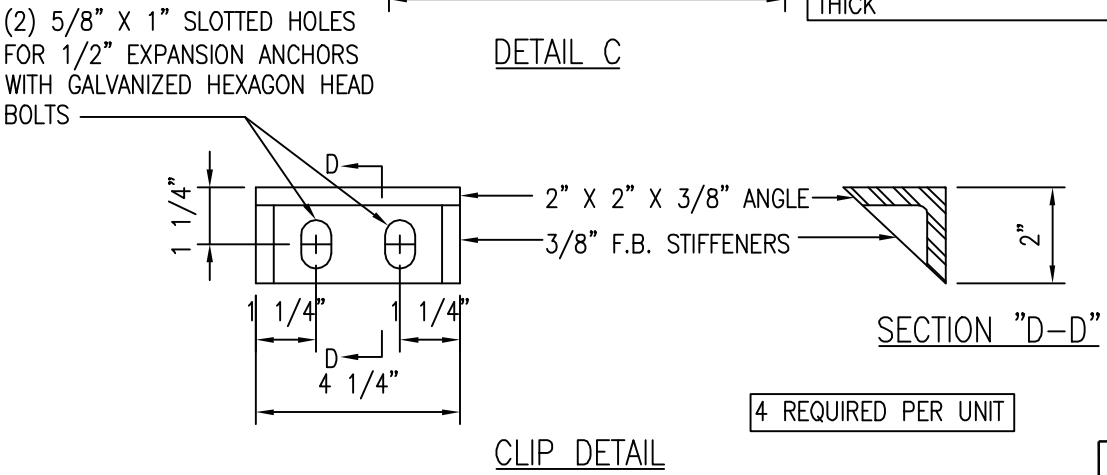
SECTION "F–F"
NOT TO SCALE

	2002
	REVISION

OAHU	**8" X 2" FM METER & BOX** **COVER PLATE & SUPPORT DETAILS** **SCALE: NTS**	STANDARD DETAILS	M40



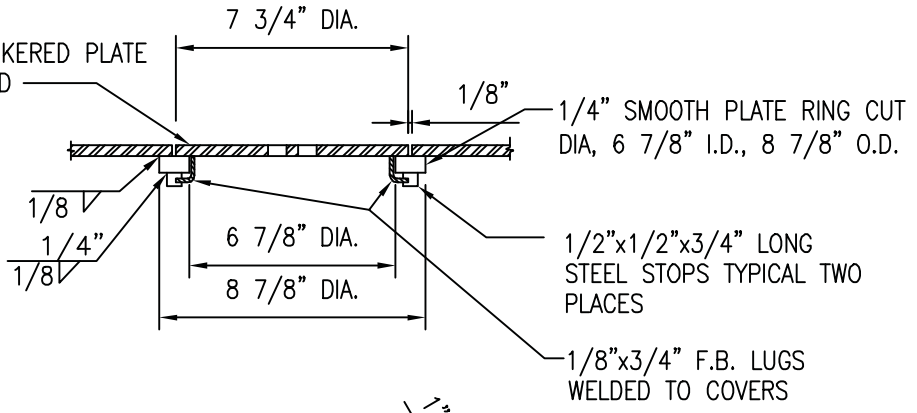




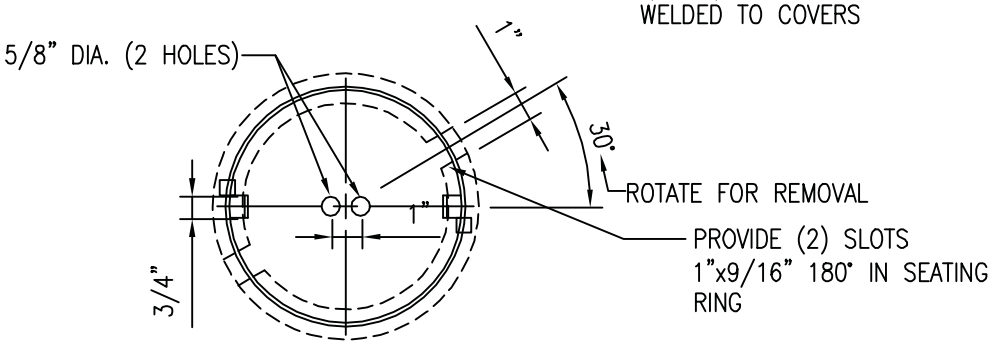
2002
REVISION

OAHU	8" X 2" FM METER & BOX IDENTIFICATION INSERTS AND CLIP DETAILS SCALE: NTS	STANDARD DETAILS	M41

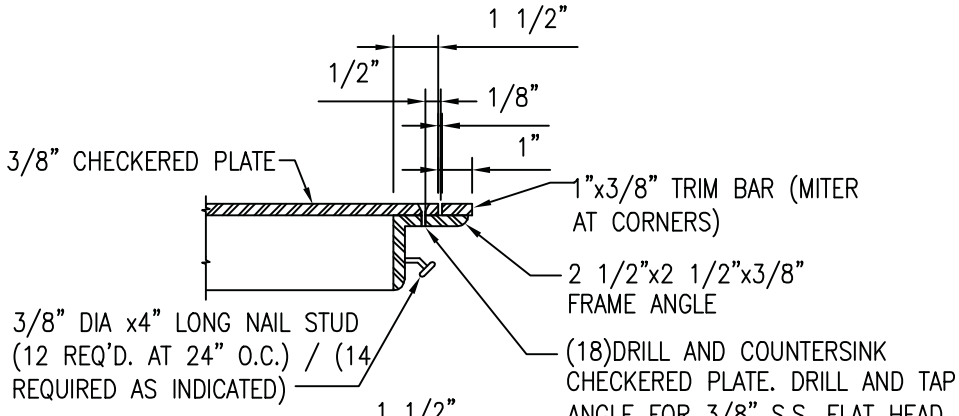
SECTION OF DETAIL A



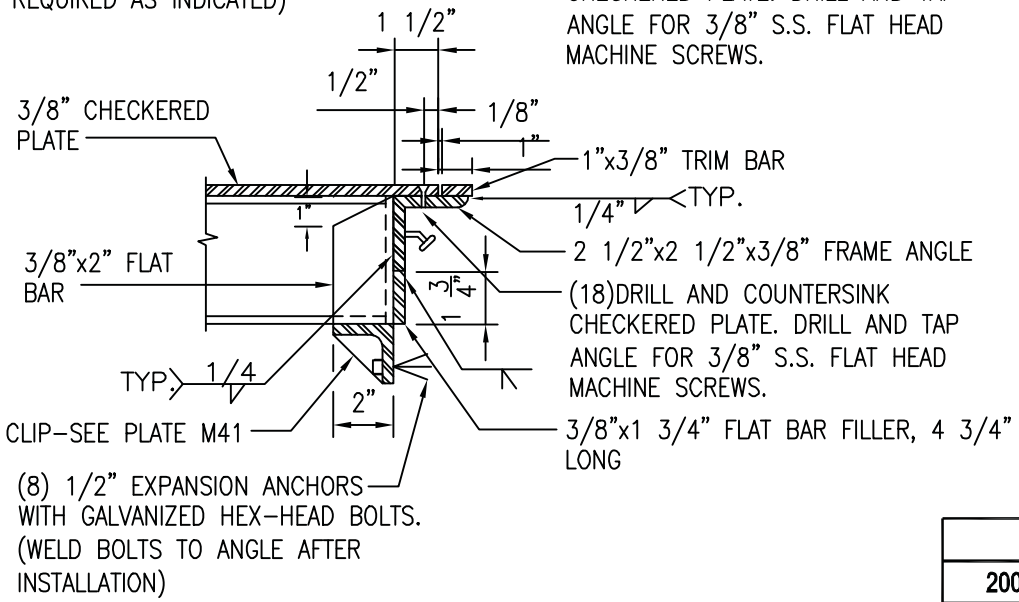
DETAIL A PLAN



DETAIL E

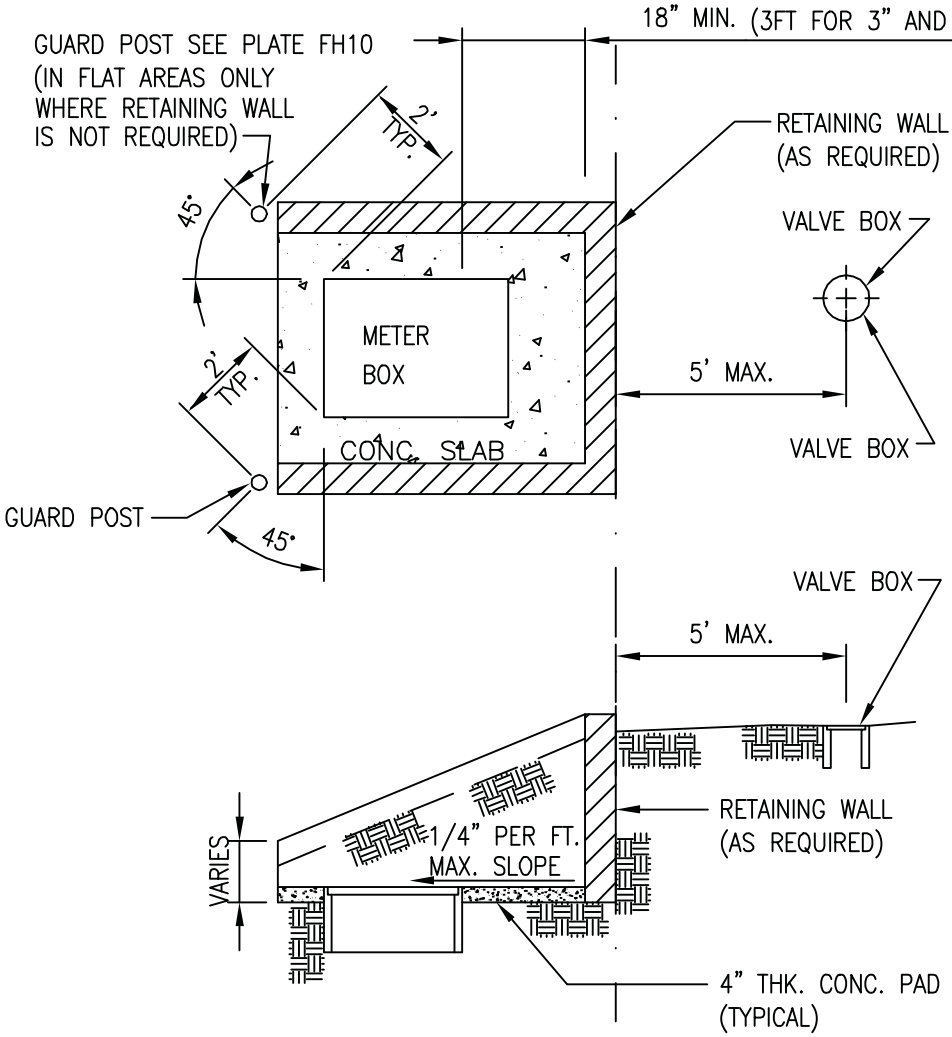


SECTION "C-C"



2002
REVISION

OAHU	**8" X 2" FM METER & BOX** **READING LID & FRAME DETAILS** SCALE: NTS	STANDARD DETAILS	M42



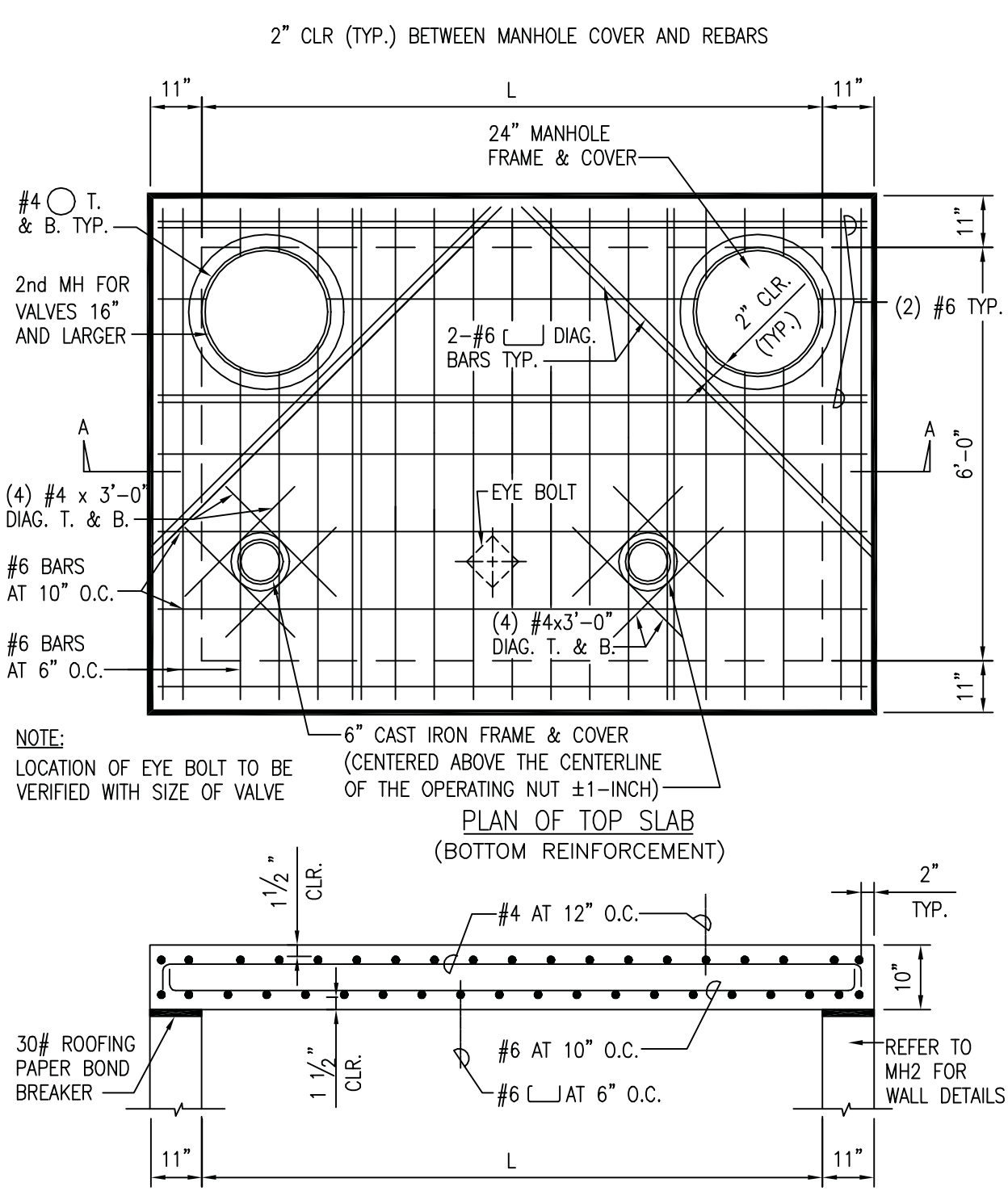
NOTES:

1. AVOID PLACEMENT OF METERS IN SWALE AREAS OR LOW POINTS.
2. METER/ CONC. SLAB DETAIL MAY BE ROTATED 90° TO FIT IN TIGHT AREAS. INSTALL FL x BELL PIECE WITH CONCRETE BEAM, AS REQUIRED.
3. RETAINING WALL REQUIRED IF EXISTING OR FINISH GROUND HAS SLOPE GREATER THAN 1/4" PER FOOT.
4. PROVIDE 4" THICK BY 12" WIDE (MIN.) WITH 1–#4 REBAR, CONCRETE SLAB AROUND METER BOX FOR 3" AND LARGER METERS.
5. PROVIDE GUARD POSTS WHEREVER POSSIBLE 2 FEET MINIMUM CLEAR FROM METER BOX.

WATER METER BOX DETAIL FOR NON–SIDEWALK AREAS

	2002
	REVISION

OAHU	**WATER METER BOX FOR NON-SIDEWALK AREAS** SCALE: NTS	STANDARD DETAILS	M43

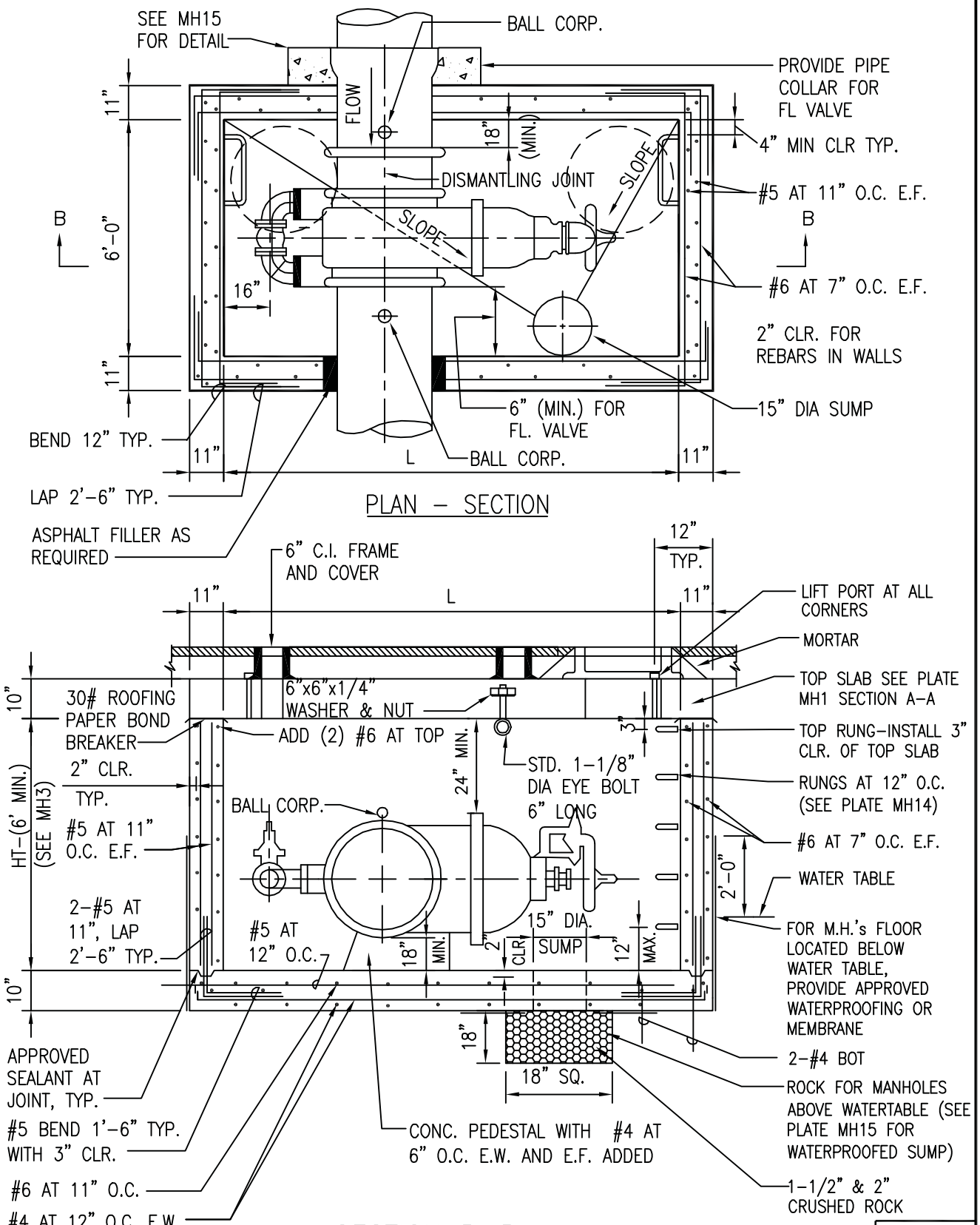


SEE PLATE MH3
FOR NOTES & TABLE

CAST-IN-PLACE TOP SLAB

2002	
REVISION	

KAUAI OAHU	**TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, CAST-IN-PLACE** SCALE: NTS	STANDARD DETAILS	MH1



2002
REVISION

KAUAI OAHU	TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, CAST-IN-PLACE SCALE: NTS	STANDARD DETAILS	MH2

NOTES FOR CAST-IN-PLACE AND PRECAST WALL MH FOR BGGV's:

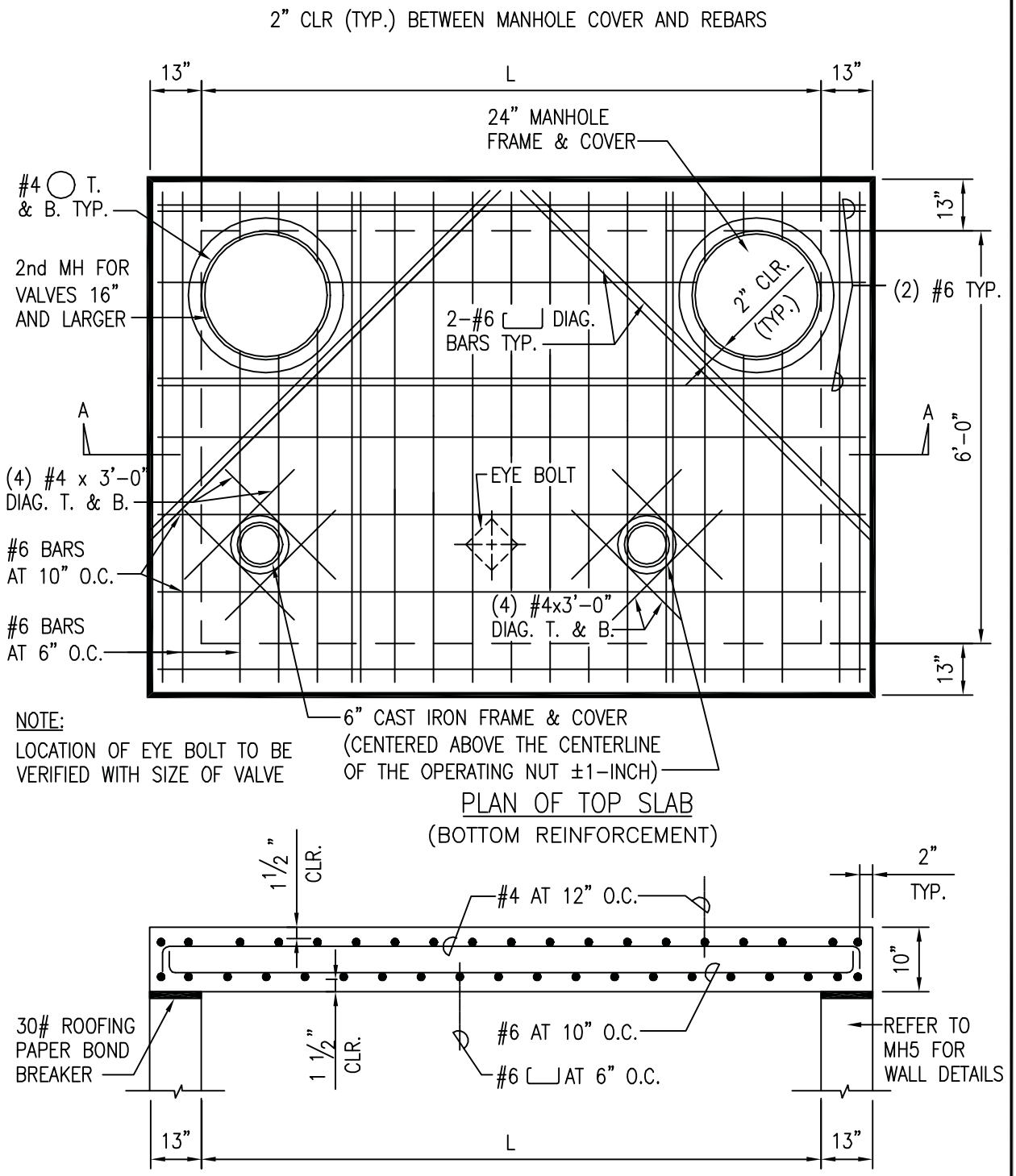
1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2. REFER TO PLATES MH12, MH13, MH14, MH15, MH16, MH17 AND V3 FOR ADDITIONAL DETAILS.
3. REFER TO SECTION 302.16 AND TABLE 300-5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.
4. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). ENGINEER TO MODIFY DESIGN IF WATER TABLE IS MORE THAN 4 FEET ABOVE BOTTOM SLAB.
5. STRUCTURAL BASE COURSE FOR MANHOLE BOTTOM SLAB NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.
6. PAINT ALL METALS:
   A. MANHOLE FRAME AND COVER SHALL BE PAINTED WITH ASPHALTUM.
   B. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
7. PROVIDE HOISTING SYSTEM FOR TRANSPORTATION AND INSTALLATION OF PRECAST WALL AND SLAB MEMBERS.
8. SPECIAL DESIGN FOR ROAD GRADES >5% IS REQUIRED
9. FOR OAHU, INSTALL FLXFL DISMANTLING JOINT ON ONE SIDE OF FLANGED END VALVES.
10. FOR FLANGED END VALVES, INSTALL FE x B ADAPTERS (LENGTH TO SUIT), DISMANTLING JOINT AND CAPPING COLLARS.
11. FOR OAHU ONLY, PLASTIC RUNGS MAY BE USED. SEE MH16.

C.I.P. AND PRECAST WALL MH			
VALVE SIZE (IN.)	L	HT. (MIN.)	HT. (MAX.)
12	6'-8"	6'-0"	12'-0"
16	8'-0"	6'-0"	12'-0"
18	8'-8"	6'-0"	12'-0"
20	8'-8"	6'-0"	12'-0"
24	10'-0"	6'-0"	12'-0"
30	11'-4"*	6'-6"	12'-0"
36	12'-8"*	7'-0"	12'-0"
42	14'-8"*	7'-6"	12'-0"

* SEE MH25 FOR OVERSIZED TOP SLAB DETAIL

	2002
	REVISION

KAUAI OAHU	TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, CAST-IN-PLACE AND PRECAST WALL NOTES SCALE: NTS	STANDARD DETAILS	MH3

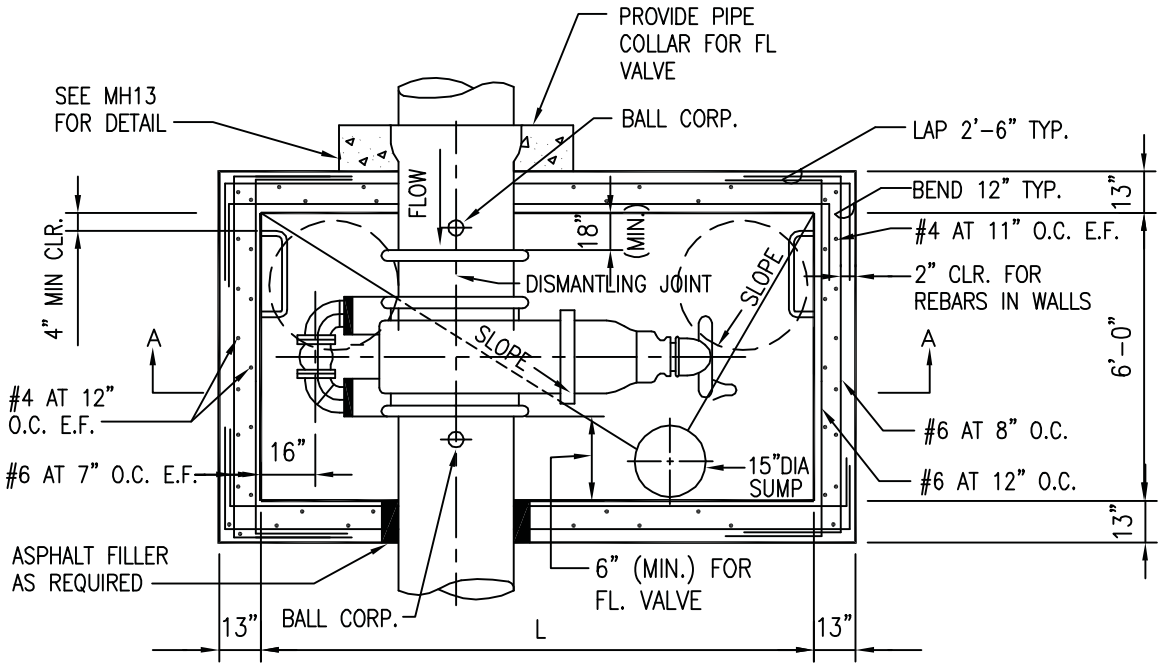


PRECAST TOP SLAB

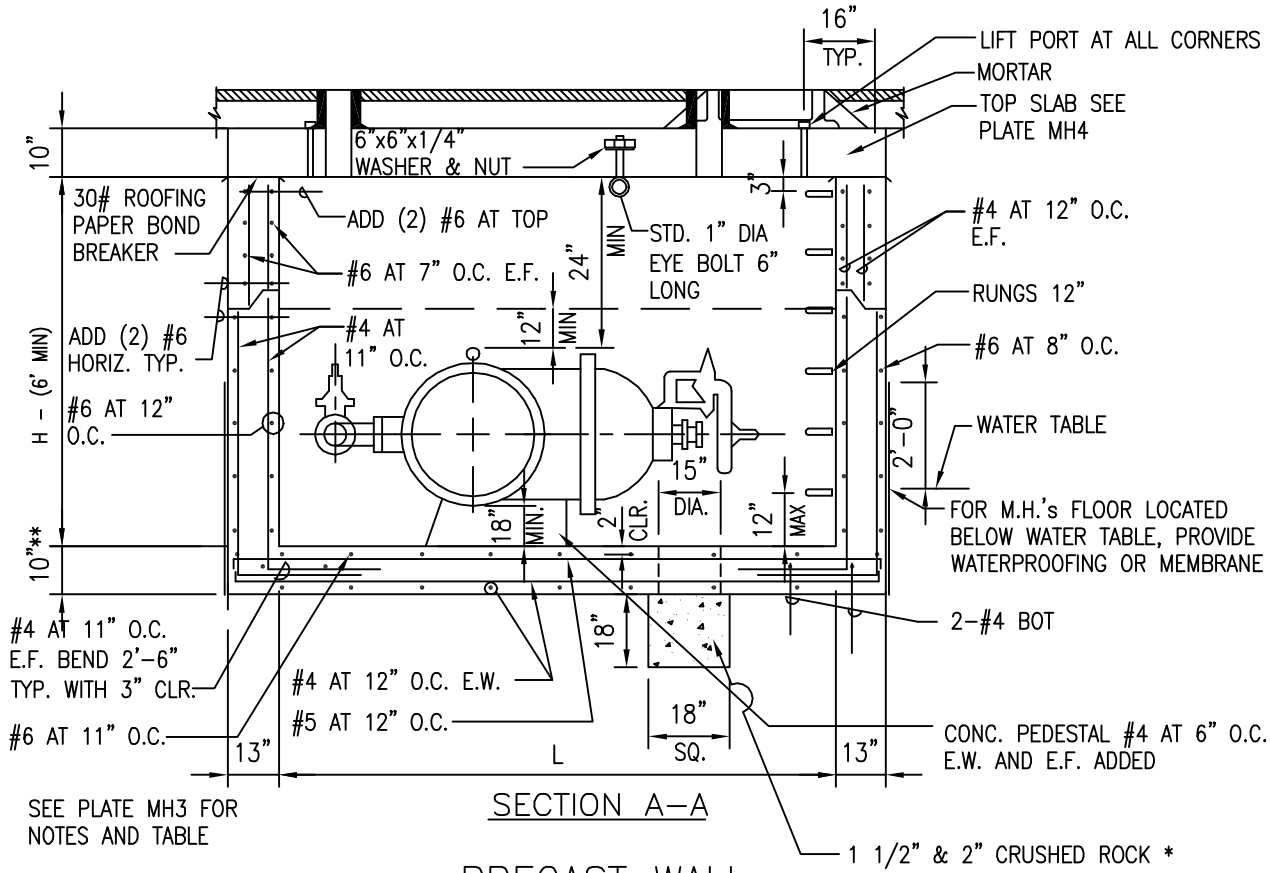
SEE PLATE MH3
FOR NOTES & TABLE

2002
REVISION

KAUAI OAHU	TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, PRECAST SCALE: NTS	STANDARD DETAILS	MH4



PLAN – SECTION



SECTION A–A

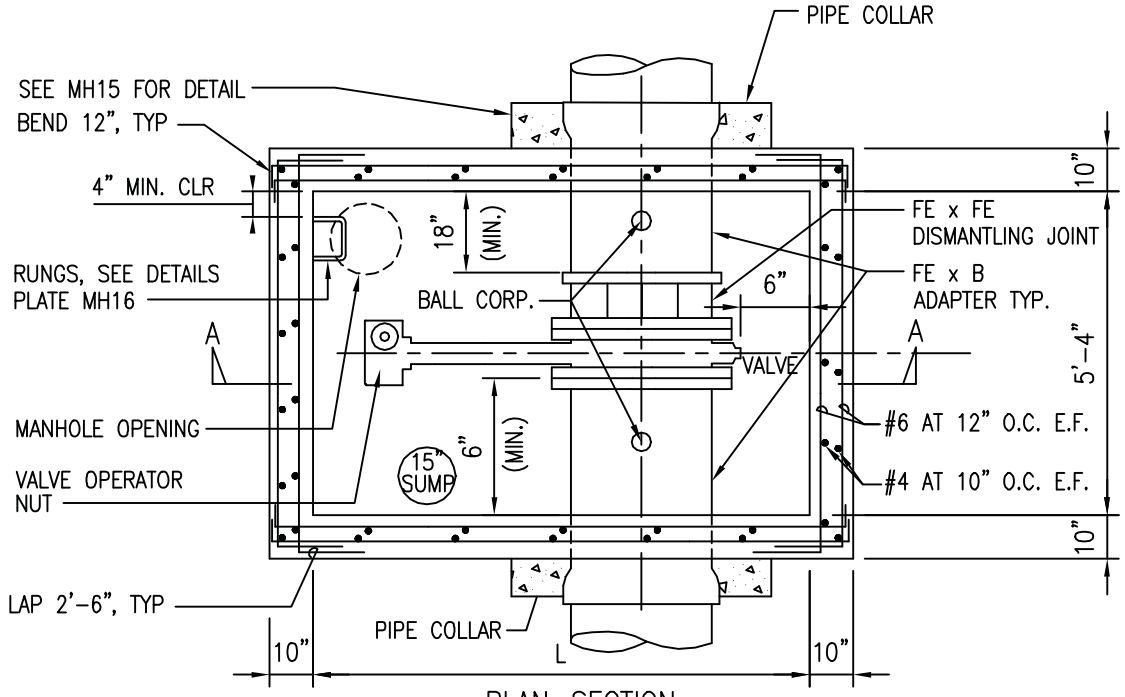
PRECAST WALL

* SEE PLATE MH12 FOR WATERPROOFED SUMP

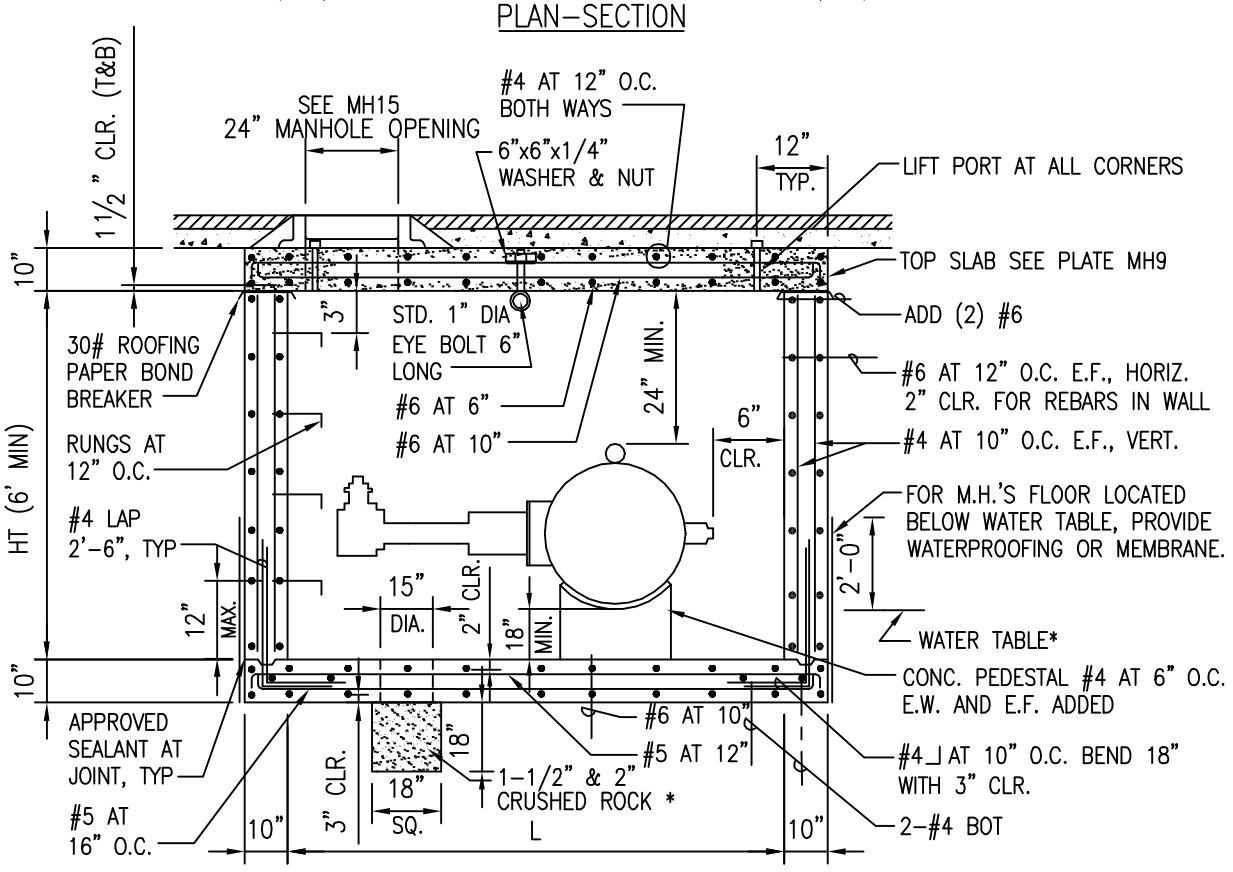
** 14" FOR WATERPROOF CONDITION

	2002
	REVISION

KAUAI OAHU	**TYPE "A" MANHOLE (TRAFFIC)** FOR BEVEL GEARED GATE VALVES, PRECAST SCALE: NTS	STANDARD DETAILS	MH5



PLAN–SECTION



SECTION A–A

CAST–IN–PLACE WALL

* (SEE PLATE MH15 FOR WATERPROOFED SUMP)

SEE PLATE MH7 FOR NOTES AND TABLE

2002

REVISION

KAUAI
OAHU
MAUI

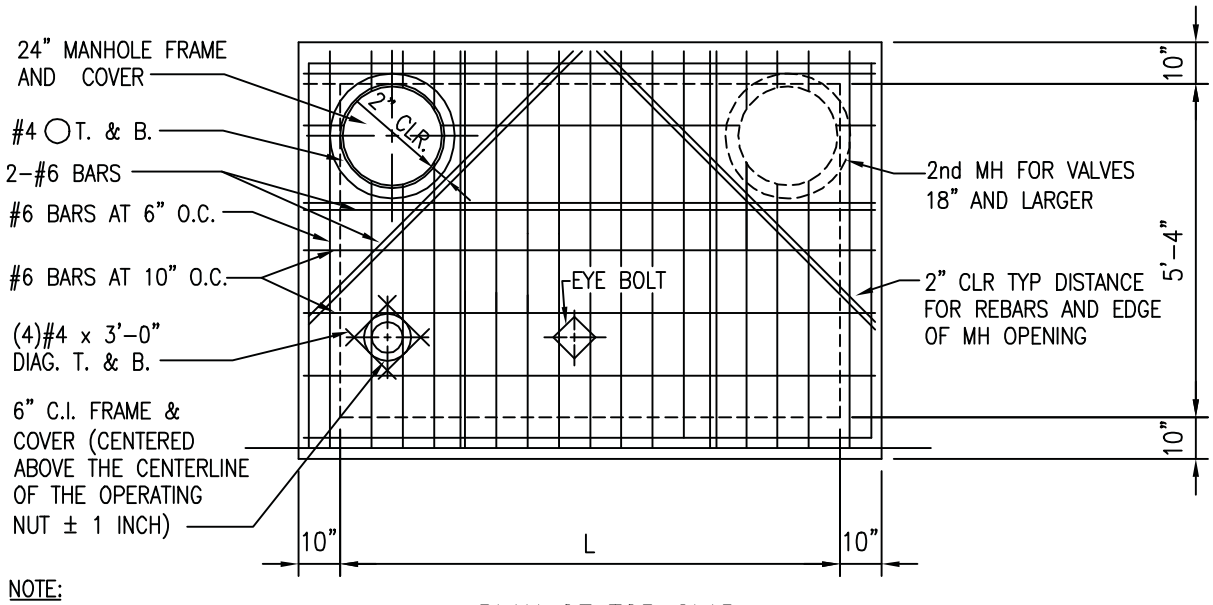
TYPE "A" MANHOLE (TRAFFIC)

FOR BUTTERFLY VALVES, CAST-IN-PLACE

SCALE: NTS

STANDARD DETAILS

MH6



NOTE:
LOCATION OF EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE

PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

CAST-IN-PLACE TOP SLAB

NOTES: FOR CAST-IN-PLACE WALL MH

1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.

2 REFER TO SECTION 302.16 AND TABLE 300-5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.

3 REFER TO PLATES MH13, MH14, MH15, MH17, AND V3 FOR ADDITIONAL DETAILS.

4 FOR OAHU AND KAUAI, PLASTIC RUNGS MAY BE USED. REFER TO PLATE MH16.

5 FOR MAUI ONLY, IN NON-TRAFFIC LOADING AREAS. SEE PLATE M23 FOR COVER DETAILS AND MANHOLE MODIFICATIONS.

6 DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998).

7 STRUCTURAL BASE COURSE FOR MANHOLE BOTTOM SLAB NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.

8 PAINT ALL METALS:
A. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
B. MANHOLE FRAME AND COVER, SHALL BE PAINTED WITH ASPHALTUM.

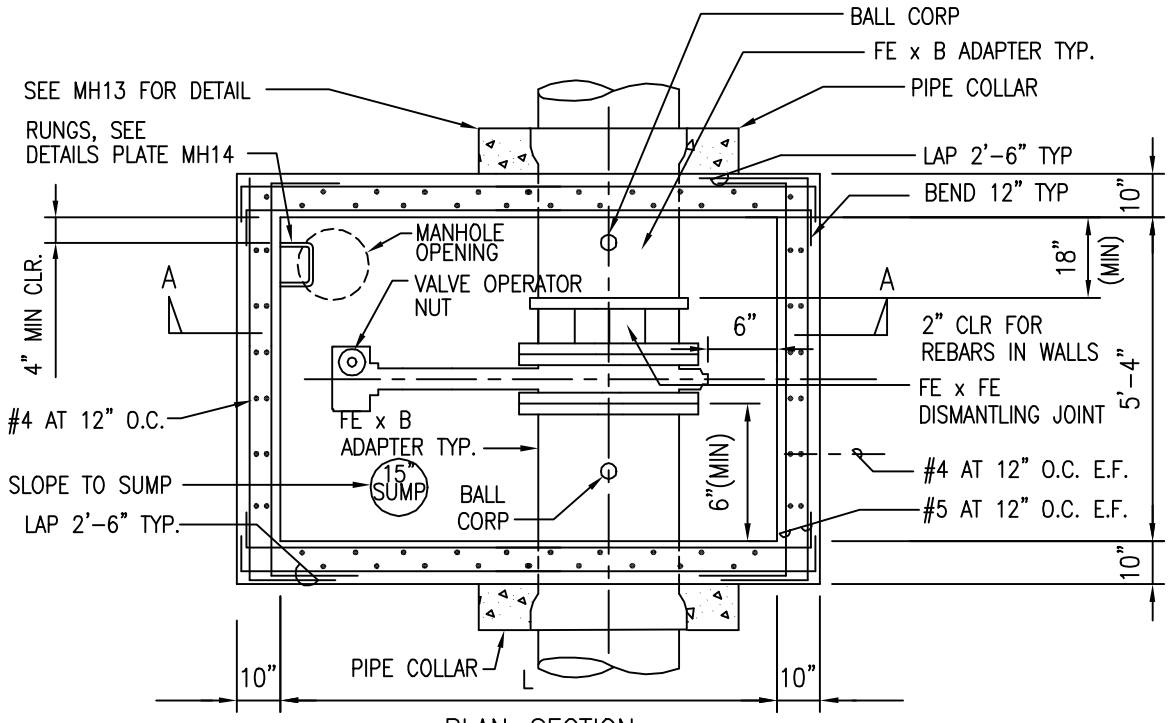
9 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED

10 FOR FLANGED END VALVES, INSTALL FE x B ADAPTERS (LENGTH TO SUIT), FE X FE DISMANTLING JOINT ON ONE SIDE OF VALVE, AND CAPPING COLLARS.

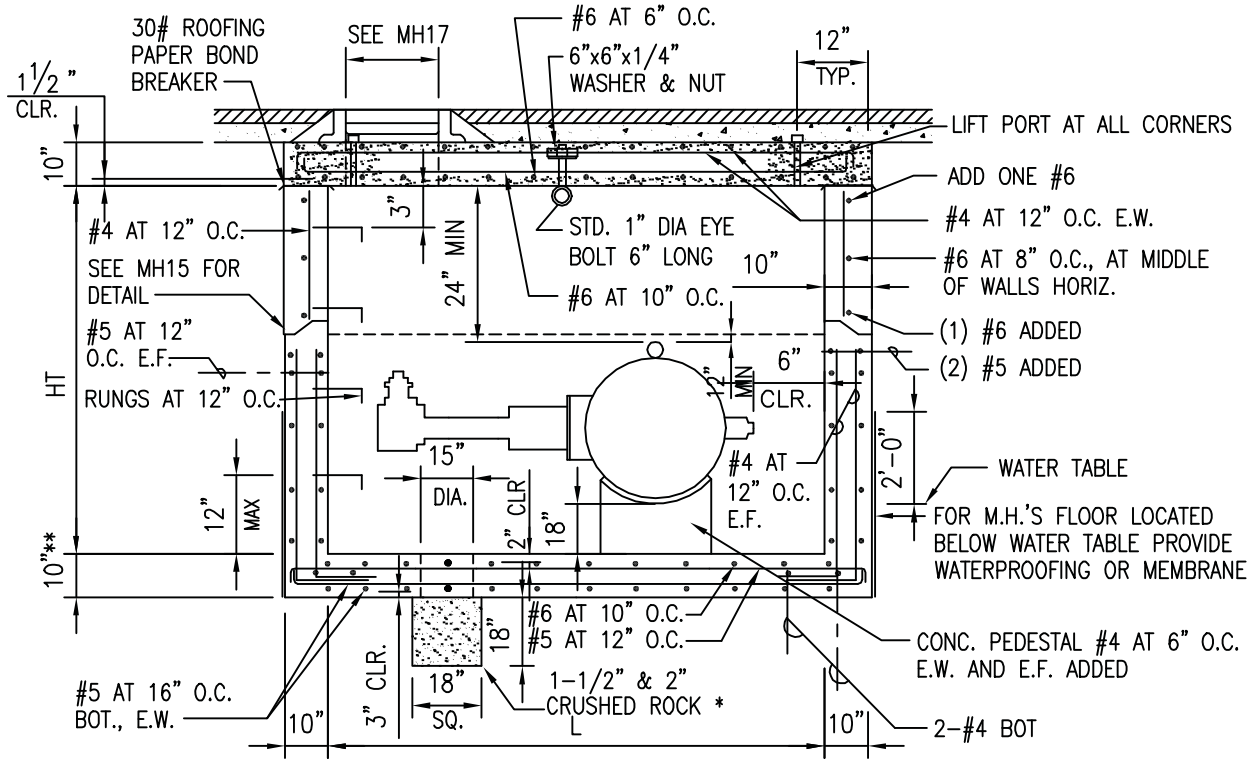
SIZE VALVE	L	HT (MIN)	HT (MAX)
12" & 16"	5'-4"	6'-0"	12'-4"
18" & 20"	6'-0"	6'-0"	12'-0"
24"	6'-8"	6'-0"	12'-0"
30"	7'-4"	6'-0"	12'-0"
36"	8'-0"	6'-0"	12'-0"
42"	8'-8"	6'-0"	12'-0"

2002
REVISION

KAUAI OAHU MAUI	**TYPE "A" MANHOLE (TRAFFIC)** **FOR BUTTERFLY VALVES, CAST-IN-PLACE** **SCALE: NTS**	STANDARD DETAILS	MH7



PLAN–SECTION



SECTION A–A

PRECAST WALL

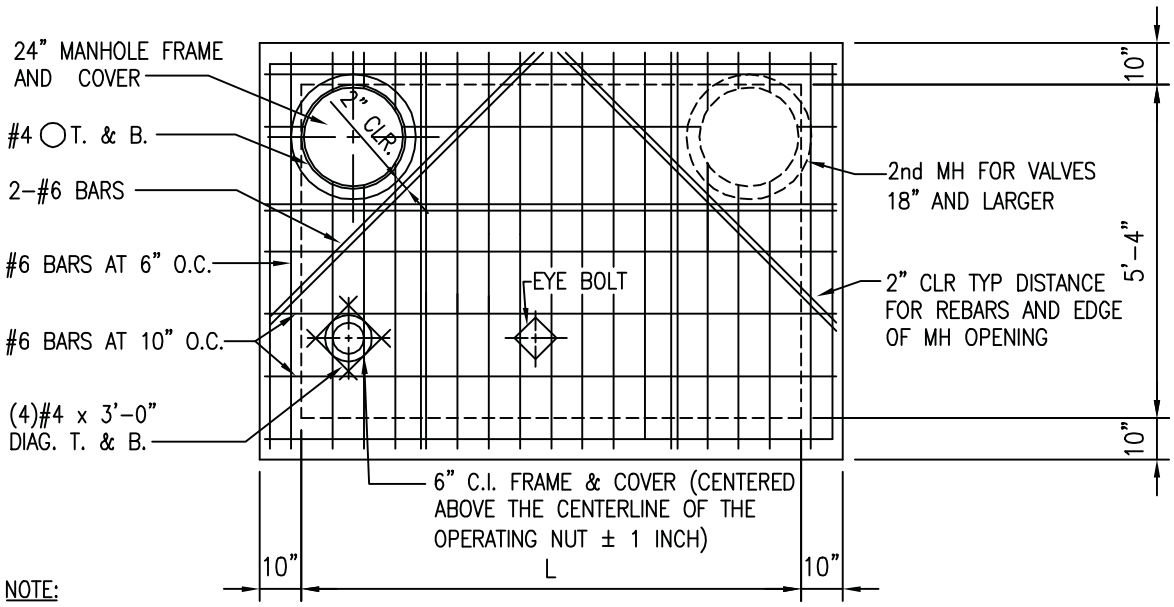
SEE PLATE MH9 FOR NOTES AND TABLE

* SEE PLATE MH12 FOR WATERPROOFED SUMP

** 14" FOR WATERPROOF CONDITION

2002
REVISION

KAUAI OAHU MAUI	TYPE "A" MANHOLE (TRAFFIC) FOR BUTTERFLY VALVES, PRECAST SCALE: NTS	STANDARD DETAILS	MH8



NOTE:
LOCATION OF EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE

PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

PRECAST TOP SLAB

NOTES: FOR PRECAST CONCRETE WALL MH

1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.

2 REFER TO SECTION 302.16 AND TABLE 300-5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.

3 REFER TO PLATES MH12, MH13, MH14, MH15, MH17 AND V3 FOR ADDITIONAL DETAILS.

4 FOR OAHU AND KAUAI, PLASTIC RUNGS MAY BE USED. REFER TO PLATE MH16.

5 FOR MAUI ONLY, IN NON-TRAFFIC LOADING AREAS, SEE PLATE M23 FOR COVER DETAILS AND MANHOLE MODIFICATIONS.

6 DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998).

7 STRUCTURAL BASE COURSE FOR MANHOLE NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.

8 PAINT ALL METALS:
A. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
B. MANHOLE FRAME AND COVER, SHALL BE PAINTED WITH ASPHALTUM.

9 PROVIDE HOISTING SYSTEM FOR TRANSPORTATION AND INSTALLATION OF PRECAST WALL MEMBERS.

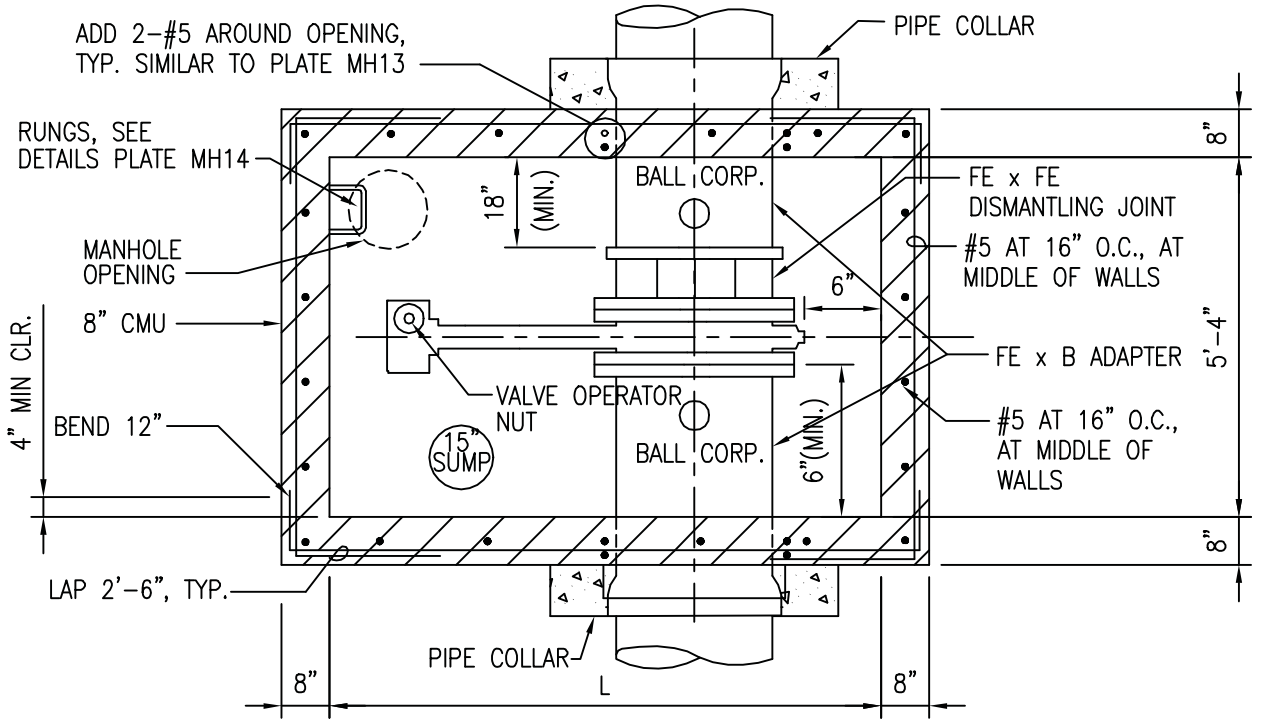
10 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED

11 FOR FLANGED END VALVES, INSTALL FE x B ADAPTERS (LENGTH TO SUIT), FE X FE DISMANTLING JOINT ON ONE SIDE OF VALVE, AND CAPPING COLLARS.

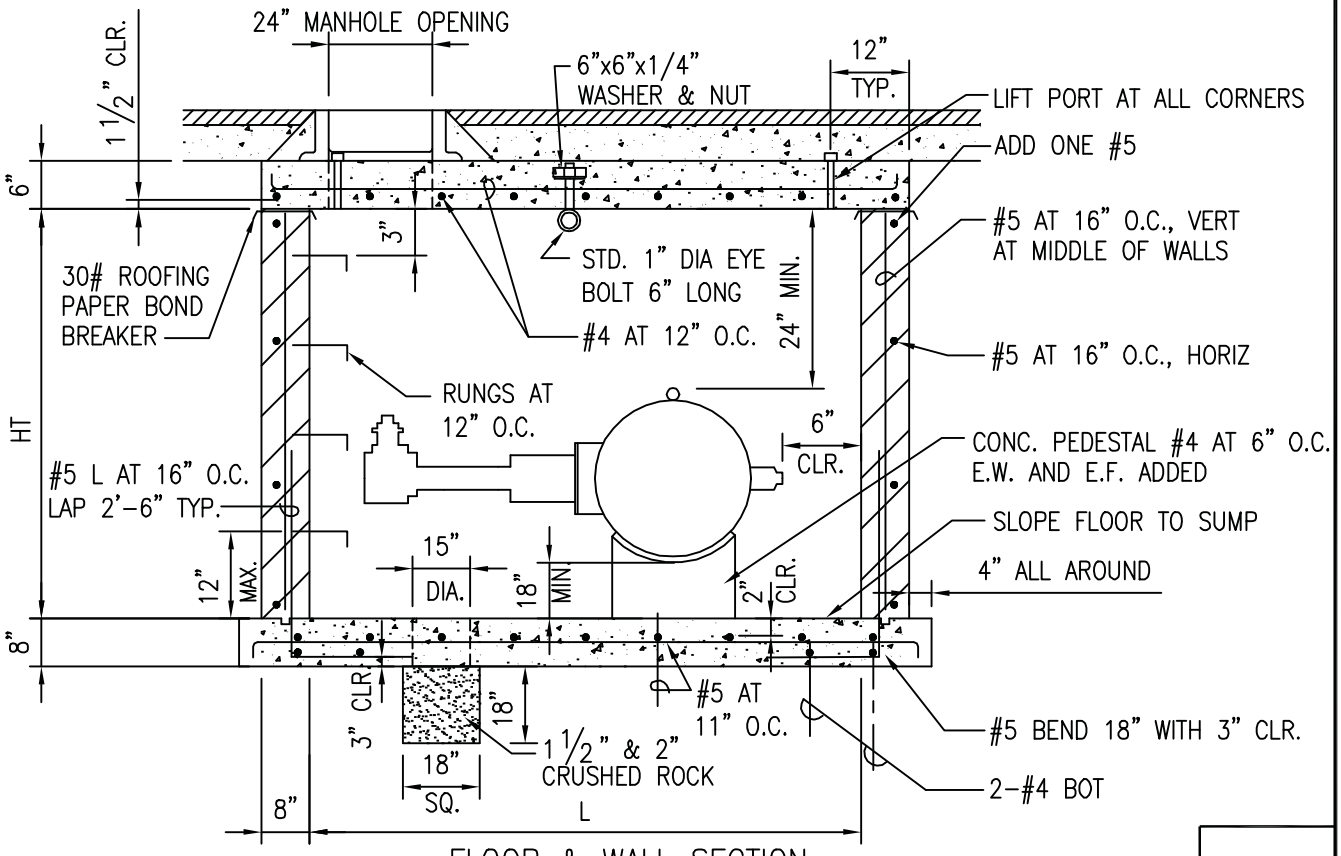
SIZE VALVE	L	HT (MIN)	HT (MAX)
12" & 16"	5'-4"	6'-0"	12'-0"
18" & 20"	6'-0"	6'-0"	12'-0"
24"	6'-8"	6'-0"	12'-0"
30"	7'-4"	6'-0"	12'-0"
36"	8'-0"	6'-0"	12'-0"
42"	8'-8"	6'-0"	12'-0"

2002	
REVISION	

KAUAI OAHU MAUI	**TYPE "A" MANHOLE (TRAFFIC)** **FOR BUTTERFLY VALVES, PRECAST** SCALE: NTS	STANDARD DETAILS	MH9



PLAN–SECTION



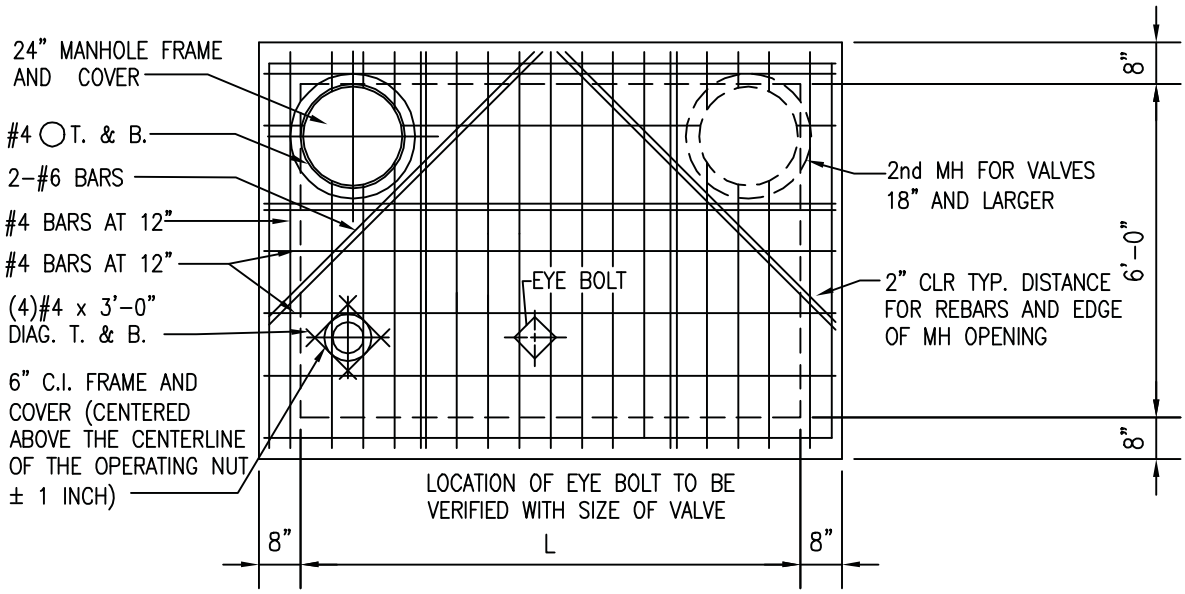
FLOOR & WALL SECTION

CMU WALL

SEE PLATE MH11 FOR NOTES AND TABLE

2002
REVISION

MAUI	TYPE "A-1" MANHOLE (NON-TRAFFIC) FOR BUTTERFLY VALVES, CMU SCALE: NTS	STANDARD DETAILS	MH10



PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

PRECAST TOP SLAB FOR
CMU WALL
(NON-TRAFFIC)

NOTES: FOR CMU WALL MH

1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.

2 REFER TO SECTION 302.16 AND TABLE 300-5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.

3 REFER TO PLATES MH12, MH13, MH14, MH15, MH17 AND V3 FOR ADDITIONAL DETAILS.

4 IN NON-TRAFFIC AREAS, METAL MH COVERS MAY BE USED. SEE PLATE M23.

5 DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). NON-TRAFIC TYPE.

6 ALL CELLS SHALL BE GROUTED SOLID WITH 2500 PSI GROUT. TYPE M MORTAR.

7 STRUCTURAL BASE COURSE FOR MANHOLE BOTTOM SLAB NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.

8 PAINT ALL METALS:

A. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.

B. MANHOLE FRAME AND COVER SHALL BE PAINTED WITH ASPHALTUM.

9 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED

10 CMU WALL NOT ALLOWED BELOW WATERTABLE (WT)

11 FOR FLANGED END VALVES INSTALL FE x B ADAPTERS (LENGTH TO SUIT), FE X FE DISMANTLING JOINT ON ONE SIDE OF VALVE, AND CAPPING COLLARS.

SIZE VALVE	L	HT
12" & 16"	5'-4"	6'-0"
18" & 20"	6'-0"	6'-0"
24"	6'-8"	6'-0"
>24"	N.A.	N.A.

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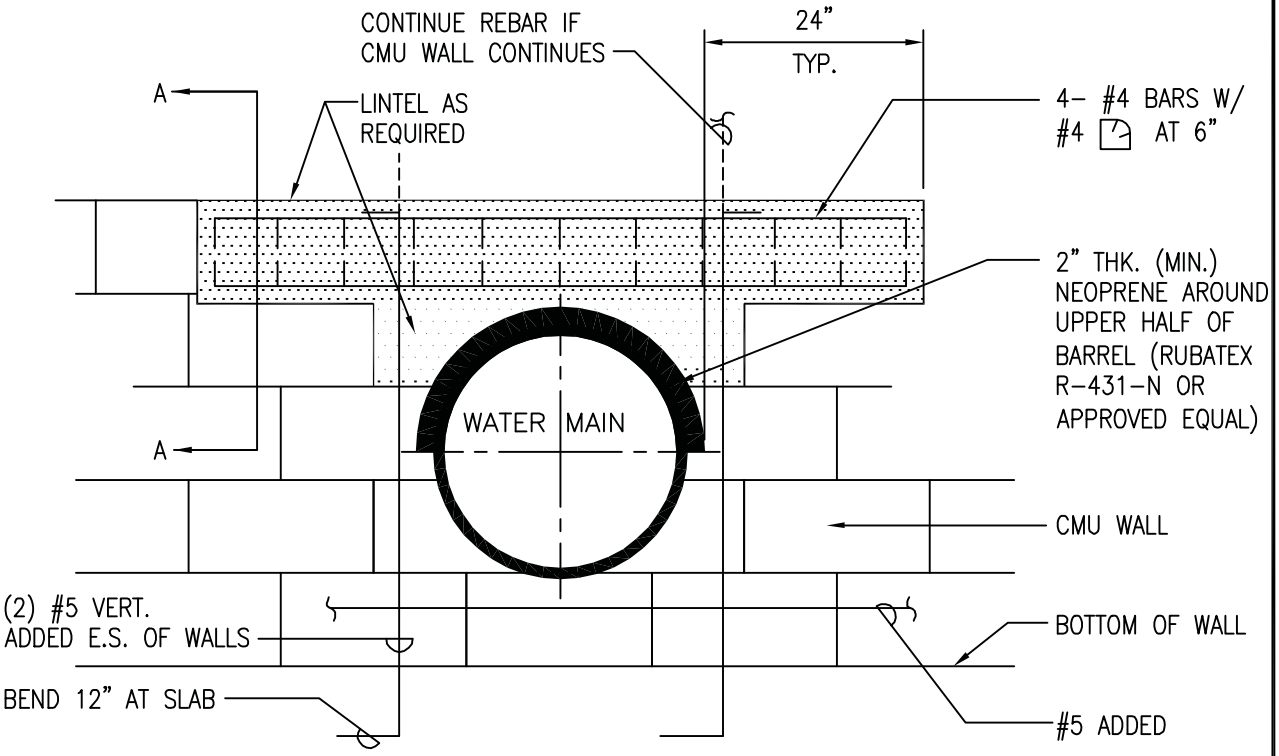
MAUI

TYPE "A-1" MANHOLE (NON-TRAFFIC)
FOR BUTTERFLY VALVES, CMU
SCALE: NTS

STANDARD DETAILS

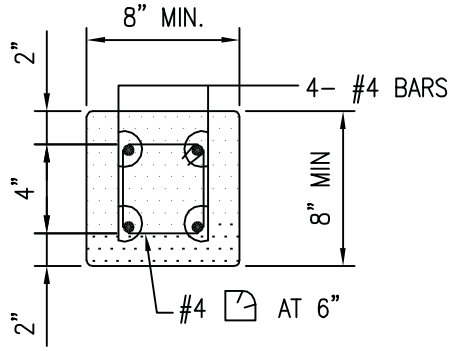
MH11



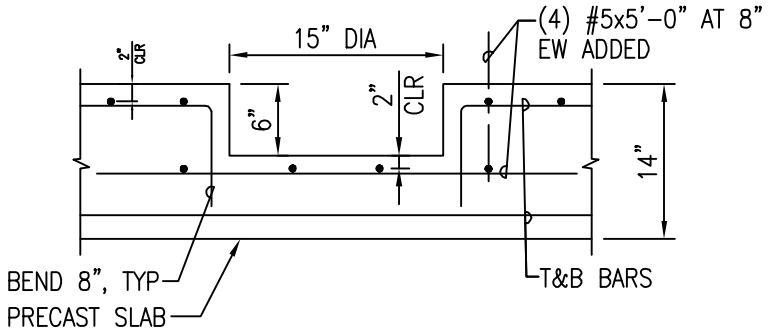
LONGITUDINAL SECTION THRU LINTEL

NOTE:

CONCRETE SHALL BE DWS 3500

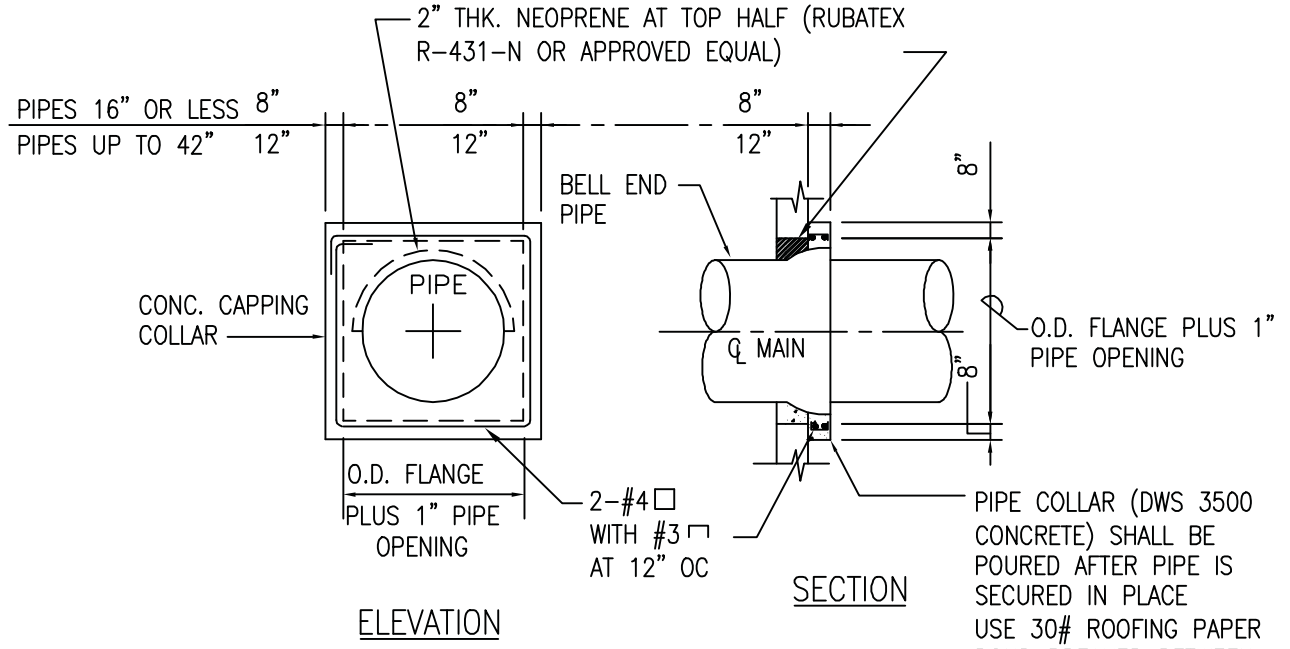


SECTION THRU LINTEL(A-A)

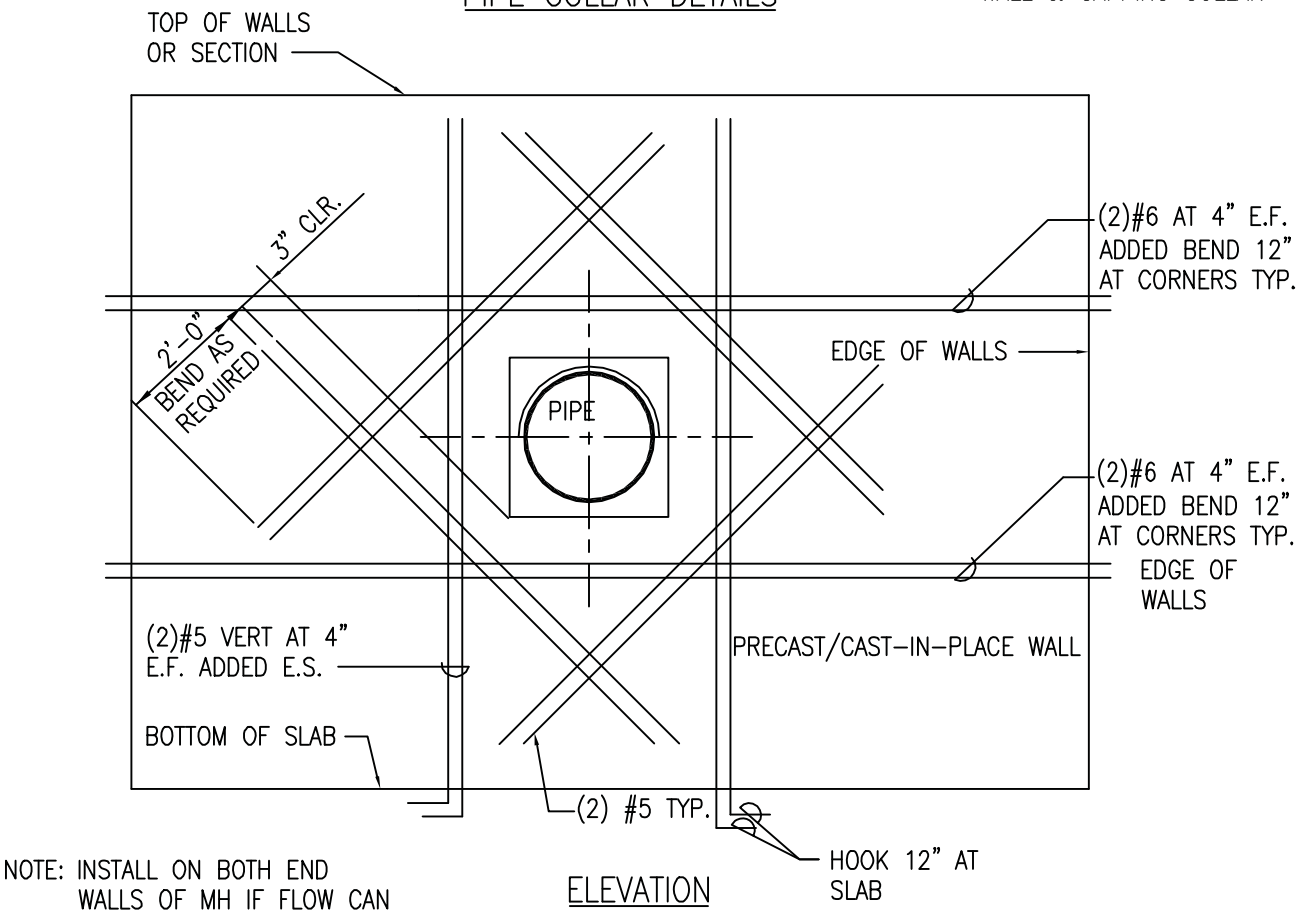


CLOSED PRECAST SUMP
FOR HIGH WATER TABLE
CONDITION

			2002 REVISION
KAUAI MAUI OAHU	**MANHOLE DETAIL OF LINTEL AND FILLER** TYPICAL DETAIL SCALE: NTS	STANDARD DETAILS	MH12



PIPE COLLAR DETAILS



NOTE: INSTALL ON BOTH END WALLS OF MH IF FLOW CAN GO BOTH WAYS.

ELEVATION

WALL PIPE OPENING ADDED REBARS DETAIL

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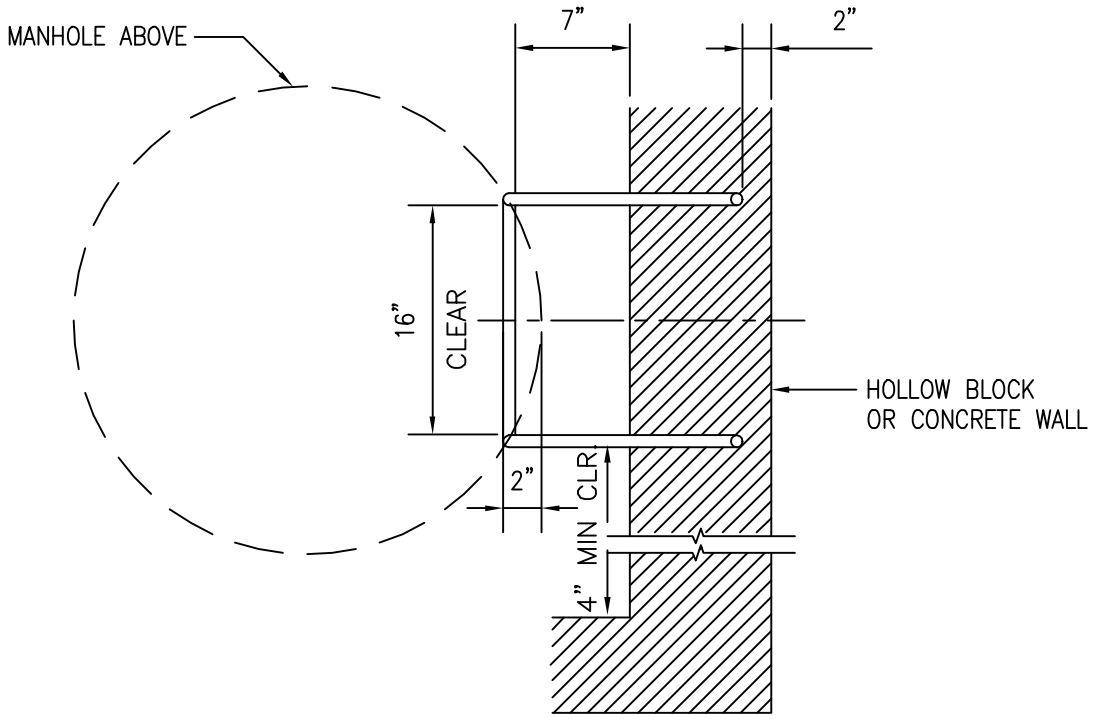
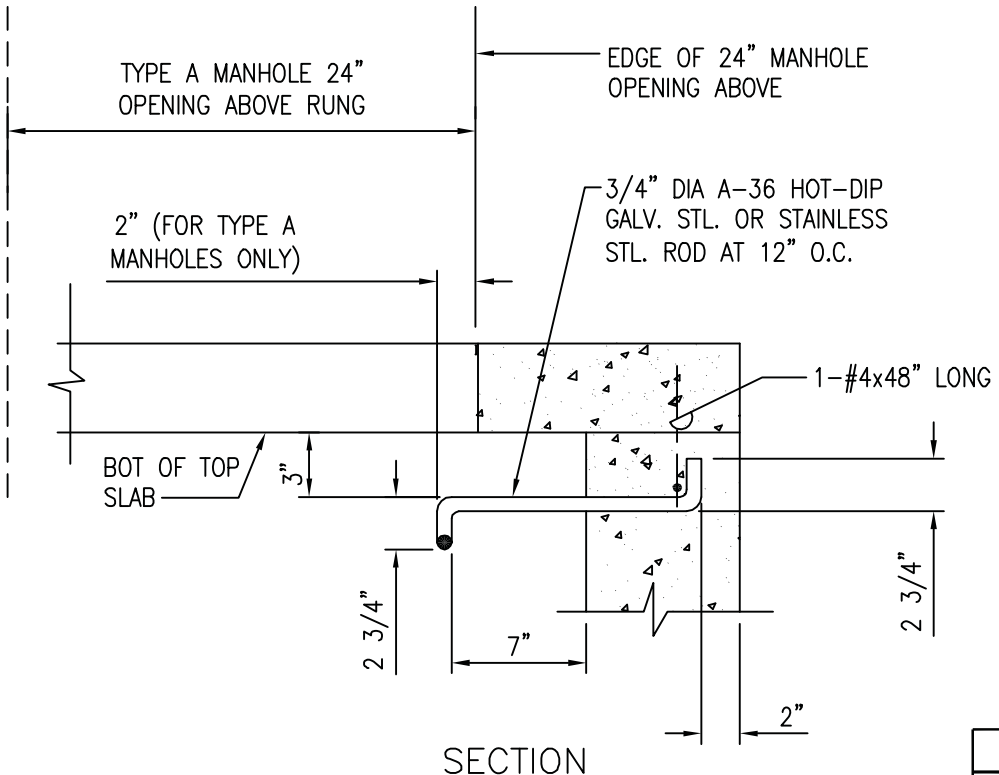
KAUAI OAHU MAUI	**MANHOLE** **PIPE COLLAR DETAIL** SCALE: NTS	STANDARD DETAILS	MH13



RUNG DETAIL

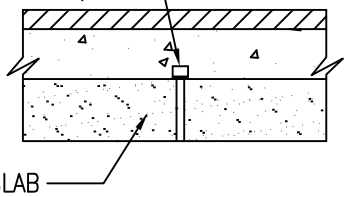


SECTION

2002
REVISION

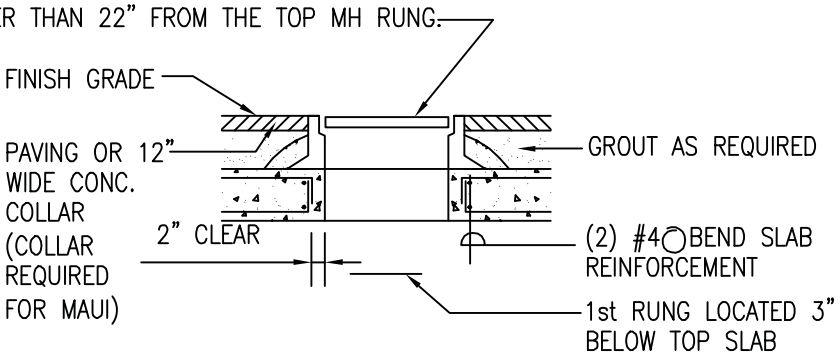
KAUAI OAHU MAUI	METAL RUNG DETAIL SCALE: NTS	STANDARD DETAILS	MH14

2" DIAMETER PIPE CHASE THREADED TO RECEIVE 2" CAP. FLOOD COAT CAP & PIPE (EXPOSED SURFACE) WITH GILSOMASTIC OR APPROVED EQUAL.

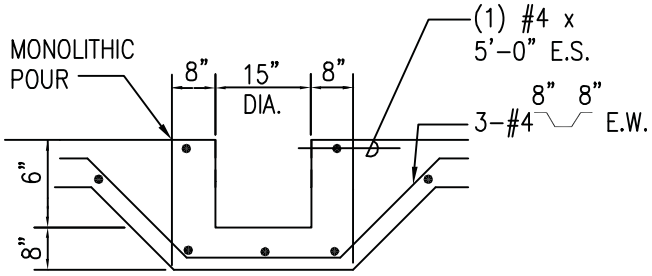


LIFT PORT DETAIL

STANDARD 24" MANHOLE & 6" FRAME & COVER. SET COVER FLUSH WITH GROUND, SHIM WITH GROUT OR BRICK AS REQUIRED. MANAGER'S APPROVAL IS REQUIRED IF TOP OF MH FRAME & COVER IS SET GREATER THAN 22" FROM THE TOP MH RUNG.

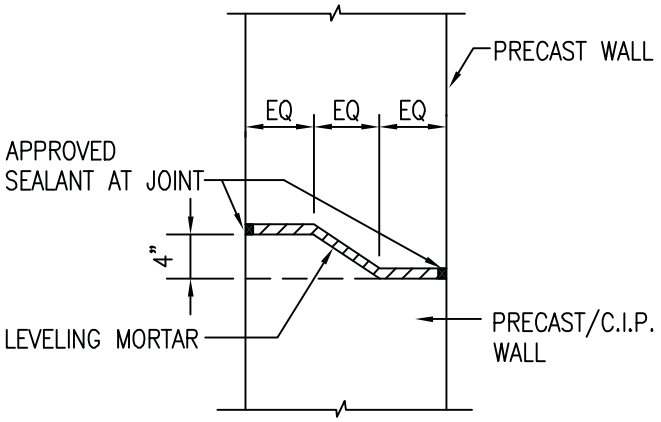


24" MANHOLE & 6" VALVEBOX SETTING DETAIL

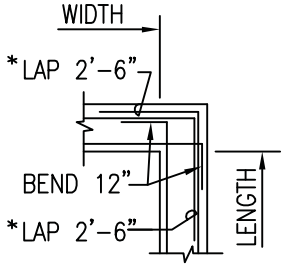


INSTALL SEALED SUMP IN LIEU OF OPEN HOLE WITH CRUSHED ROCK WHEN BOTTOM SLAB IS LOCATED BELOW ESTIMATED WATER TABLE

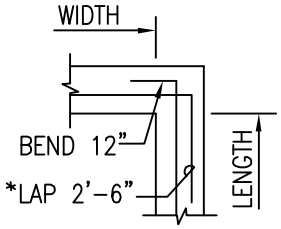
CAST-IN-PLACE SUMP DETAIL



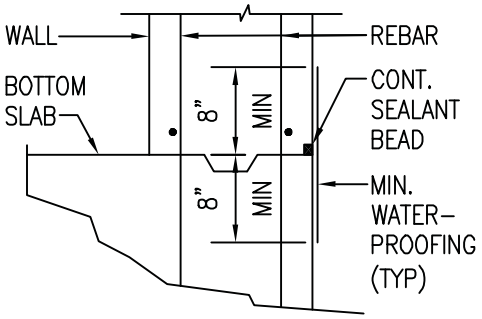
TYP. CONN DETAIL



DOUBLE LAYER TYP HORIZ REINFORCEMENT



SINGLE LAYER TYP HORIZ REINFORCEMENT



CONSTRUCTION JOINT AT BOTH SLAB AND WALL

* NOTE:
UNLESS OTHERWISE NOTED ON PLANS

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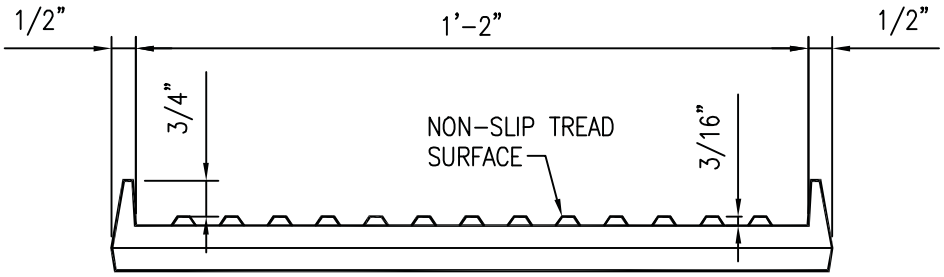
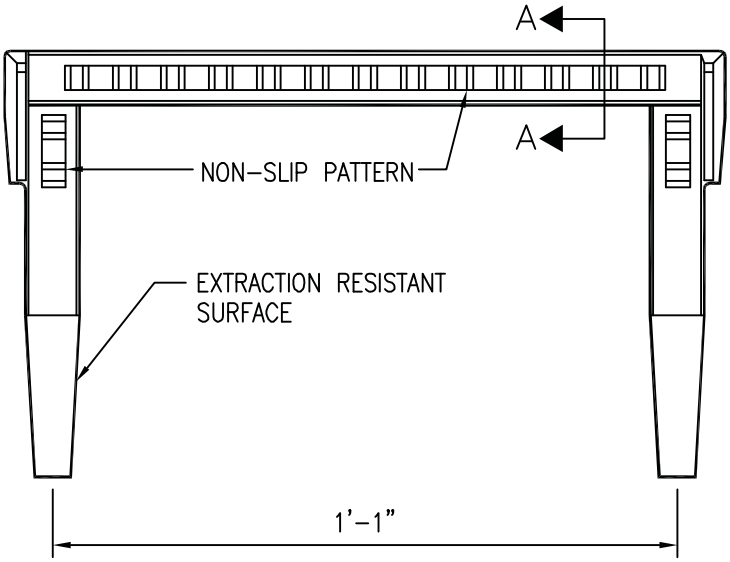
KAUAI OAHU MAUI	**MANHOLE** **MISCELLANEOUS DETAILS** SCALE: NTS	STANDARD DETAILS	MH15



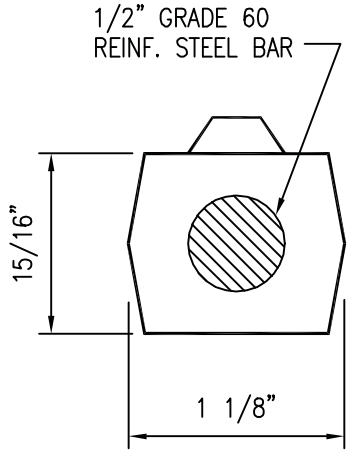
ELEVATION



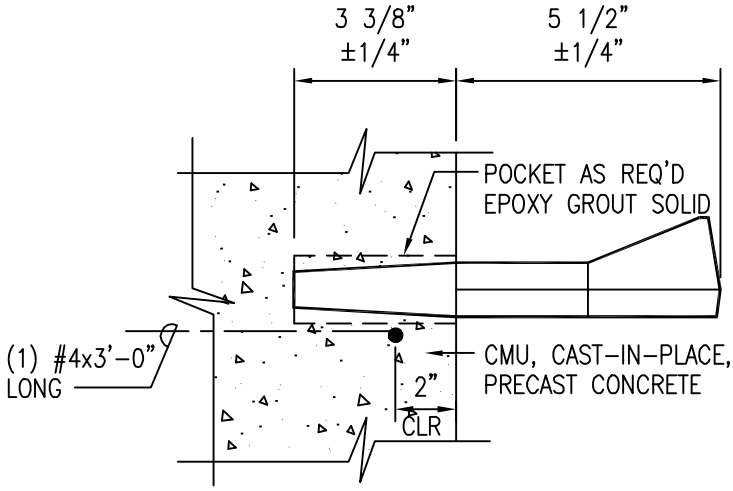
PLAN

NOTES:

1. ALL FABRICATION DIMENSIONS INDICATED ARE MINIMUM.
2. SEE PLATE MH14 FOR MANHOLE LOCATION OVER RUNG CENTERLINE.
3. STEP TO BE INSTALLED DURING CONSTRUCTION OF THE WALL. NO INSTALLATION INTO EXISTING WALL.



SECTION A-A



SIDE ELEVATION

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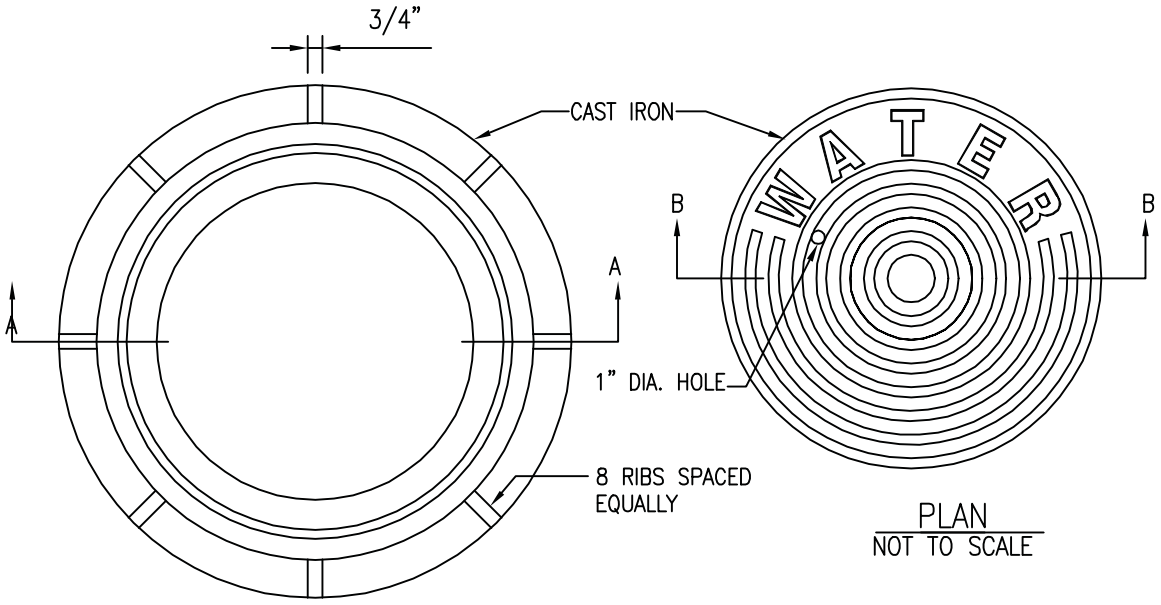
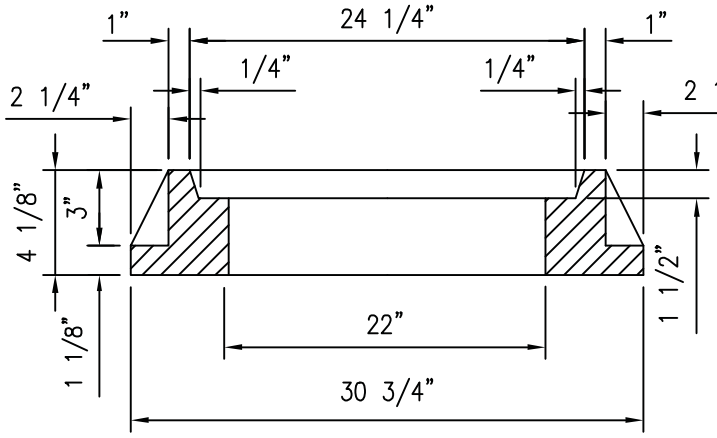
REVISION

KAUAI OAHU	POLYPROPYLENE PLASTIC RUNG	STANDARD DETAILS	MH16
	SCALE: NTS		

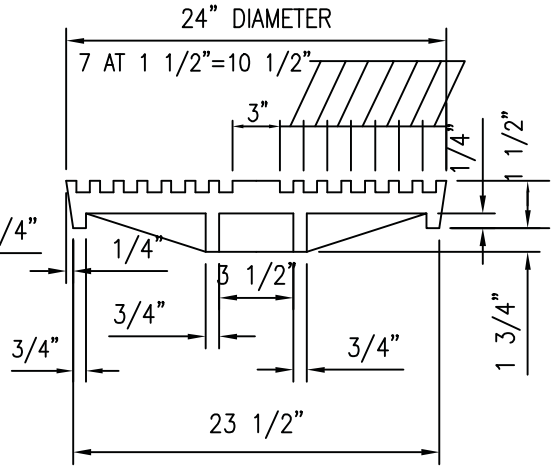


PLAN
NOT TO SCALE

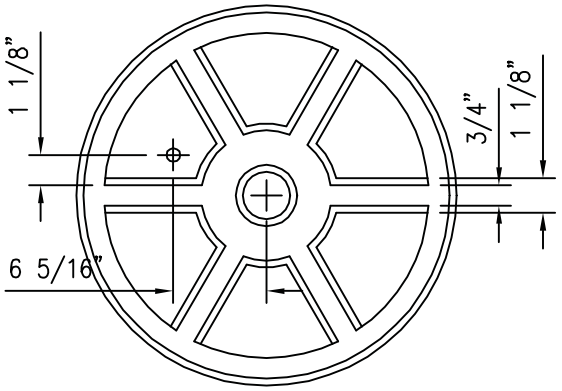
PLAN
NOT TO SCALE



SECTION A–A
NOT TO SCALE



SECTION B–B
NOT TO SCALE



PLAN
NOT TO SCALE

NOTE:

ALL CASTINGS SHALL BE MADE ACCURATELY TO THE DIMENSIONS SHOWN. SEAT AND COVER SHALL BE MACHINED, NOT GROUND TO SECURE FLAT AND TRUE SURFACES. THE COVER SHALL NOT RATTLE IN ANY POSITION.

SEE TABLE 200–10 FOR MIN WEIGHTS.

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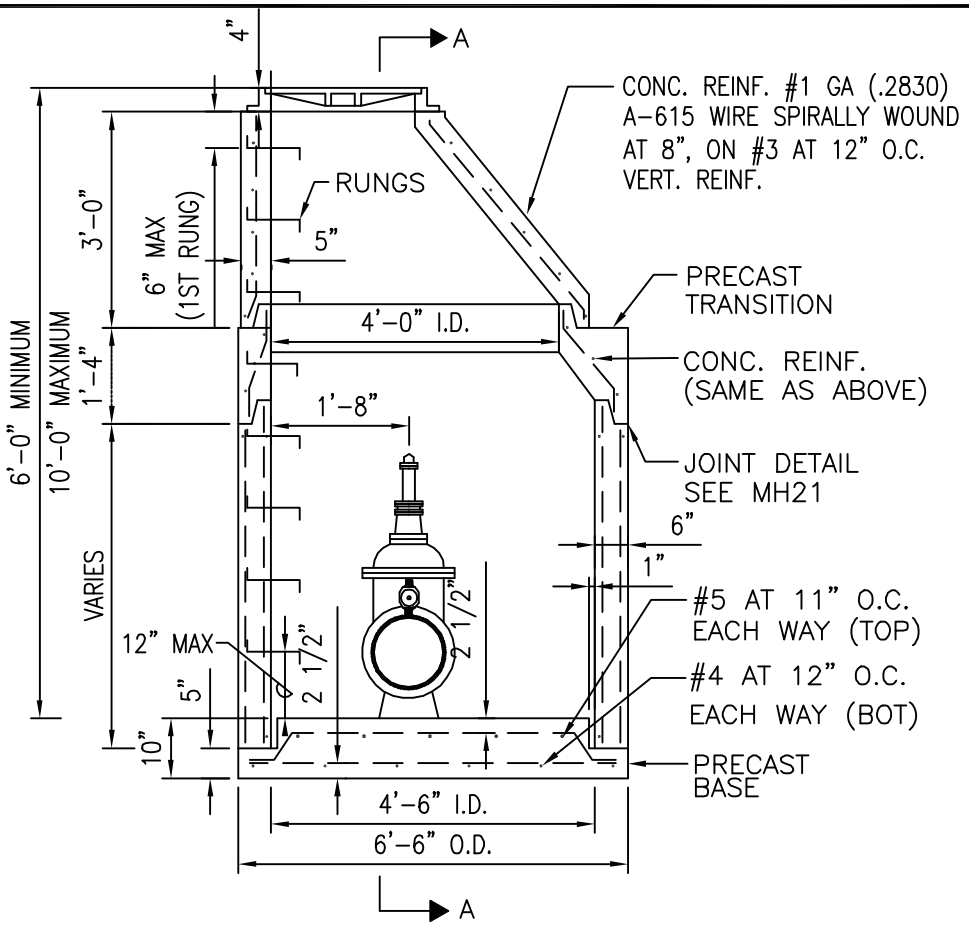
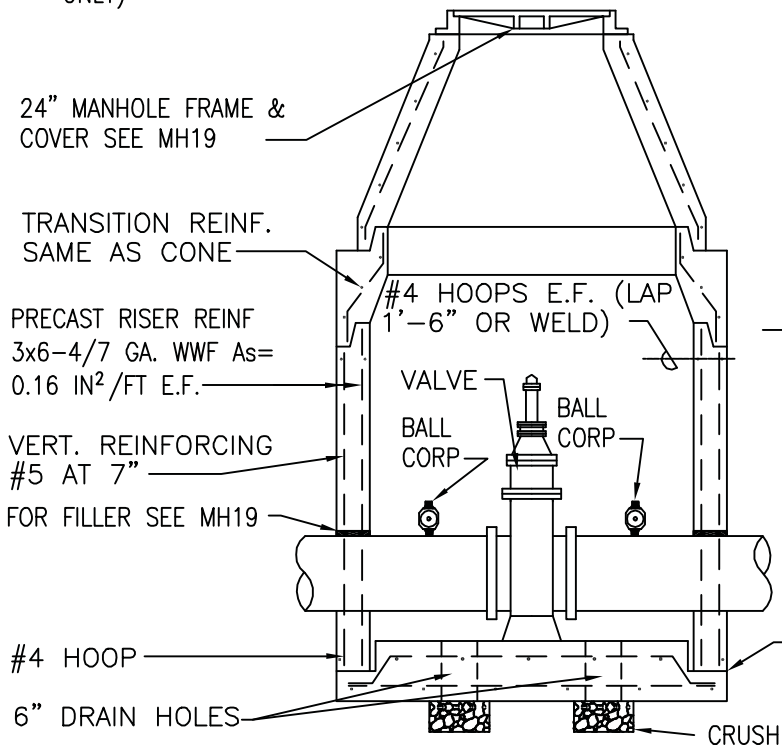
KAUAI OAHU MAUI HAWAII	**MANHOLE FRAME & COVER** **CAST IRON, 24" SIZE** **SCALE: NTS**	STANDARD DETAILS	MH17

NOTES FOR PRECAST MH

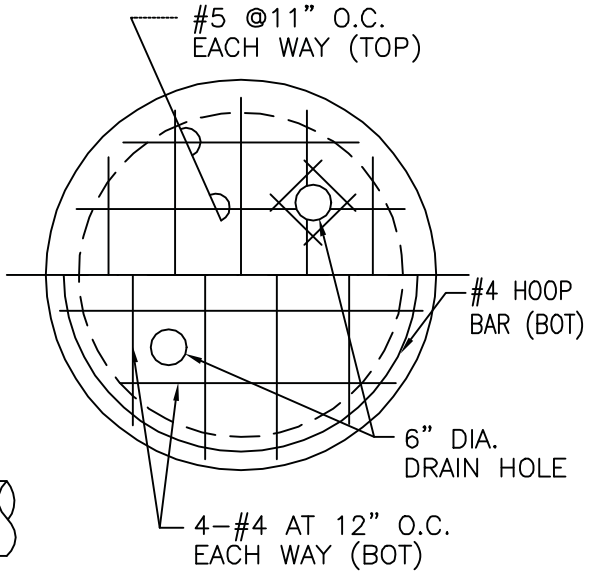
1. CONCRETE SHALL BE DWS 3500; REINFORCING STEEL SHALL BE GRADE 60
2. REFER TO MH14 FOR DETAILS OF RUNG
3. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES AND TABLE AND TABLE 200-9 OF THE WATER SYSTEM STANDARD FOR THE REQ'D BALL CORP SIZES
4. OMIT DRAIN HOLES AND CRUSHED ROCK FOR WATERPROOFED MANHOLES
5. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998)
6. INSTALL BALL CORP W/ APPROVED SERVICE SADDLE ON PVC PIPES (FOR OAHU ONLY)



TYPE B MANHOLE



SECTION "A-A"



BASE PLAN

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REVISION

KAUAI
OAHU
MAUI

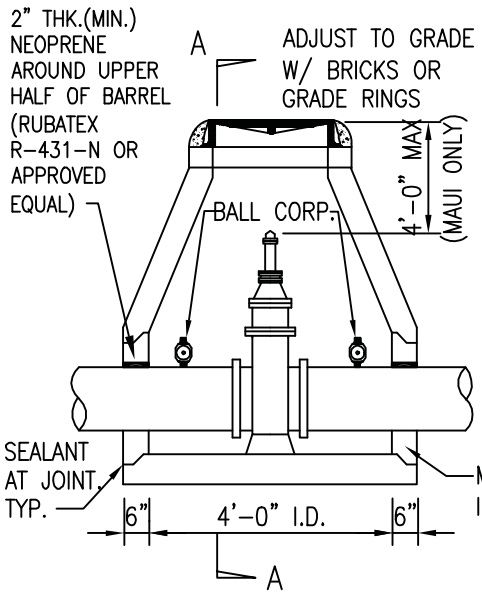
TYPE "B" MANHOLE

GENERAL ARRANGEMENT, PRECAST WALL

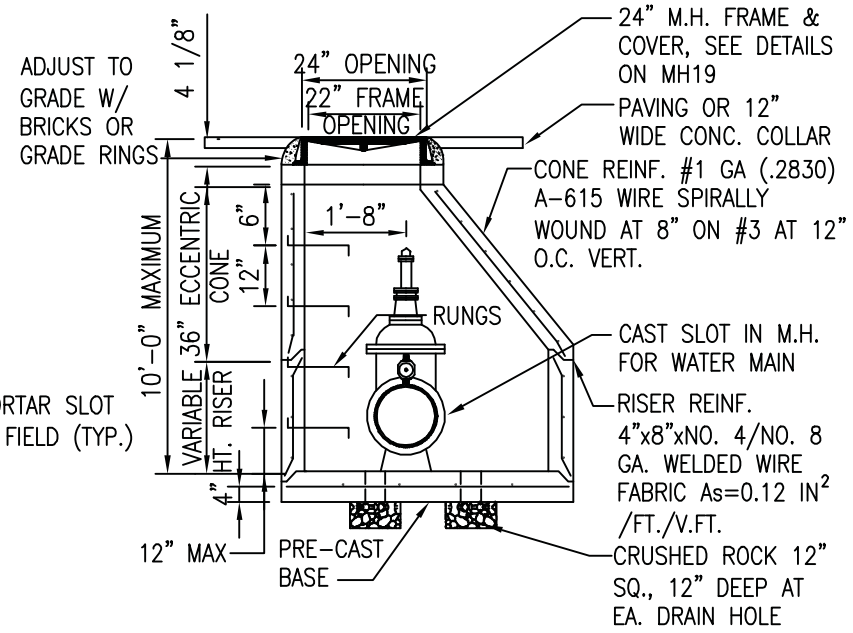
SCALE: NTS

STANDARD DETAILS

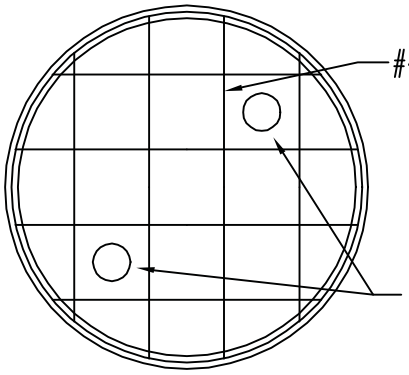
MH18



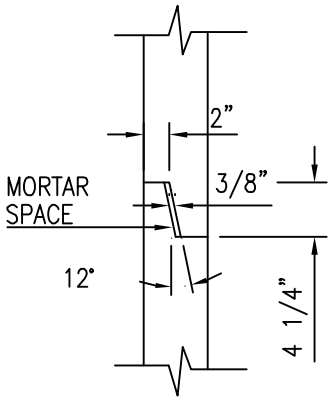
PRE-CAST TYPE C MANHOLE



SECTION A-A



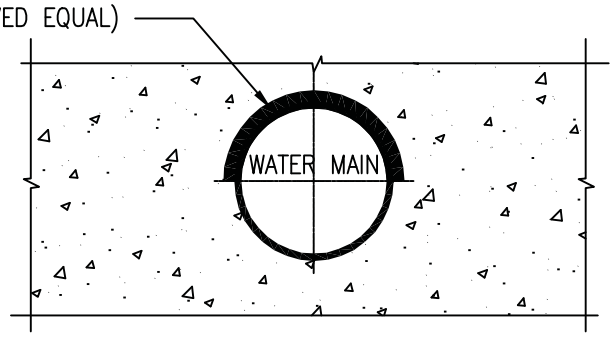
PRE-CAST MANHOLE BASE PLAN



T&G JOINT DETAIL

NOTES FOR PRE-CAST MANHOLE

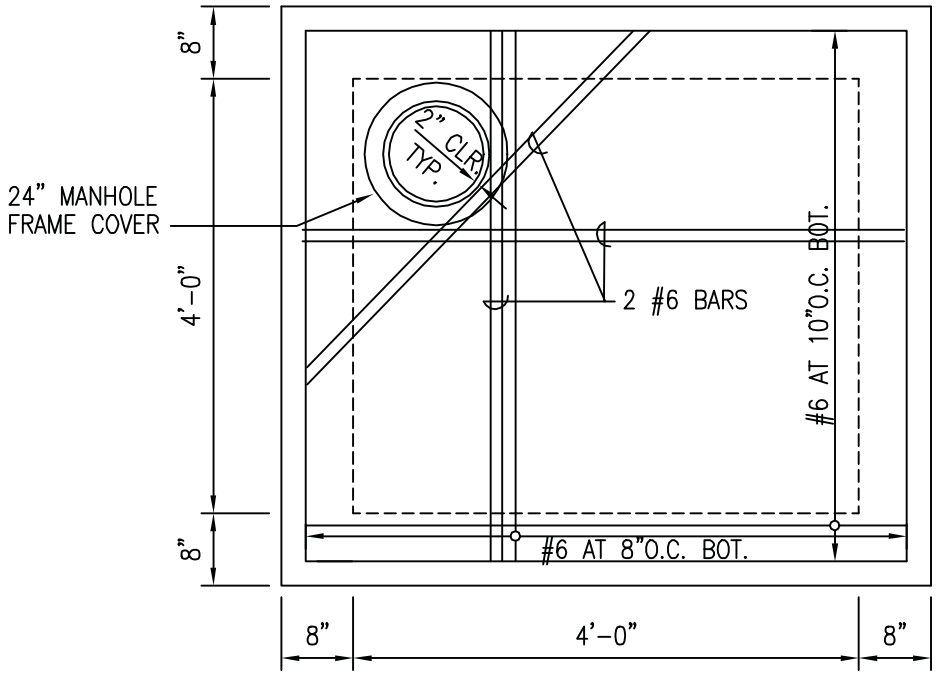
1. CONCRETE SHALL BE DWS 3500.
2. REFER TO MH14 FOR DETAILS OF RUNG.
3. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES AND TABLE 200-9 OF THE WATER STANDARD FOR THE REQUIRED BALL CORP SIZES.
4. OMIT DRAIN HOLES AND CRUSHED ROCK FOR WATERPROOFED MANHOLES.
5. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998)
6. INSTALL BALL CORP W/ APPROVED SERVICE SADDLE ON PVC PIPES (FOR OAHU ONLY)



FILLER DETAIL

	2002
	REVISION

KAUAI OAHU MAUI	**TYPE "C" MANHOLE** **GENERAL ARRANGEMENT, PRECAST WALL** SCALE: NTS	STANDARD DETAILS	MH19

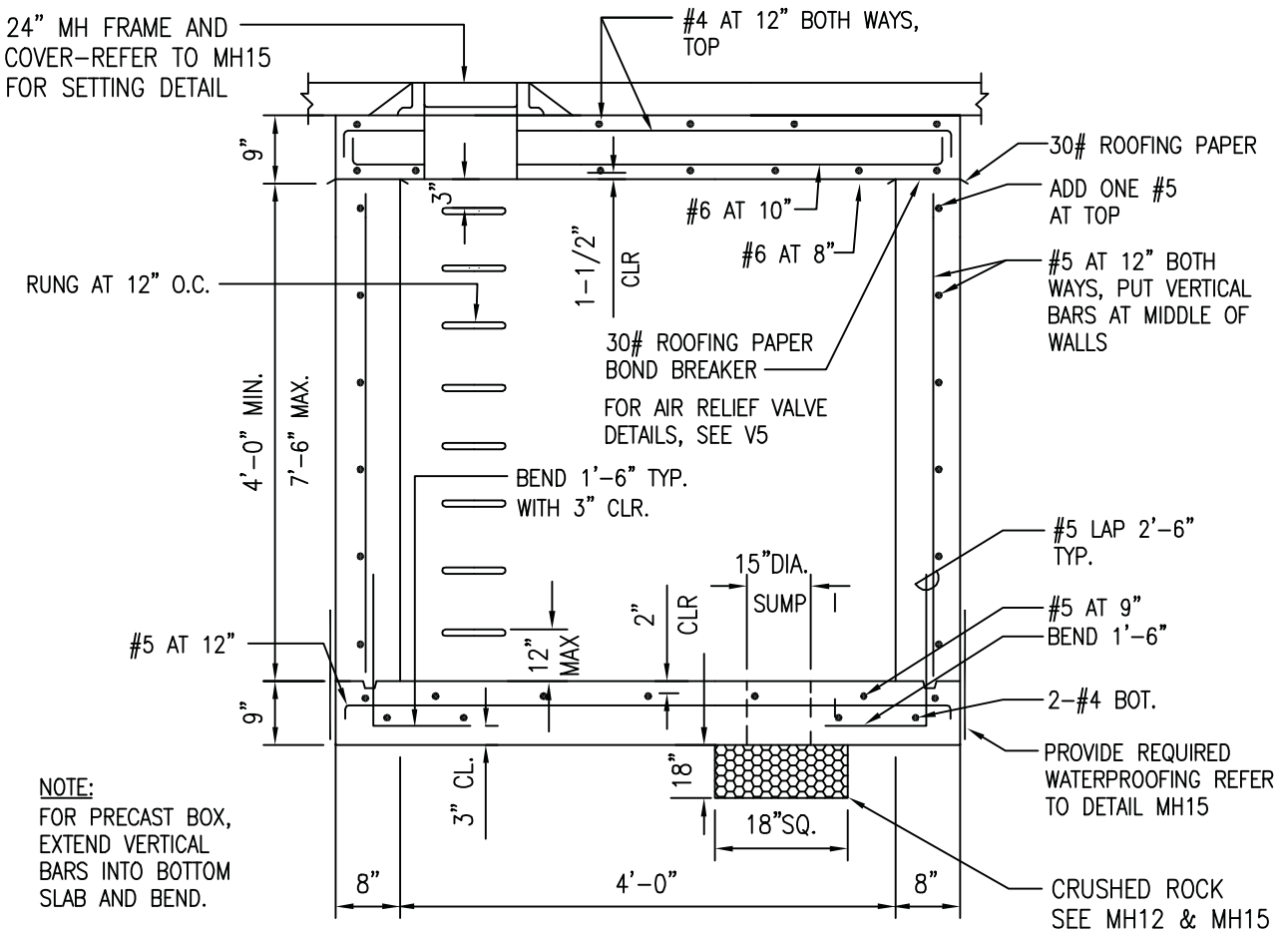


PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

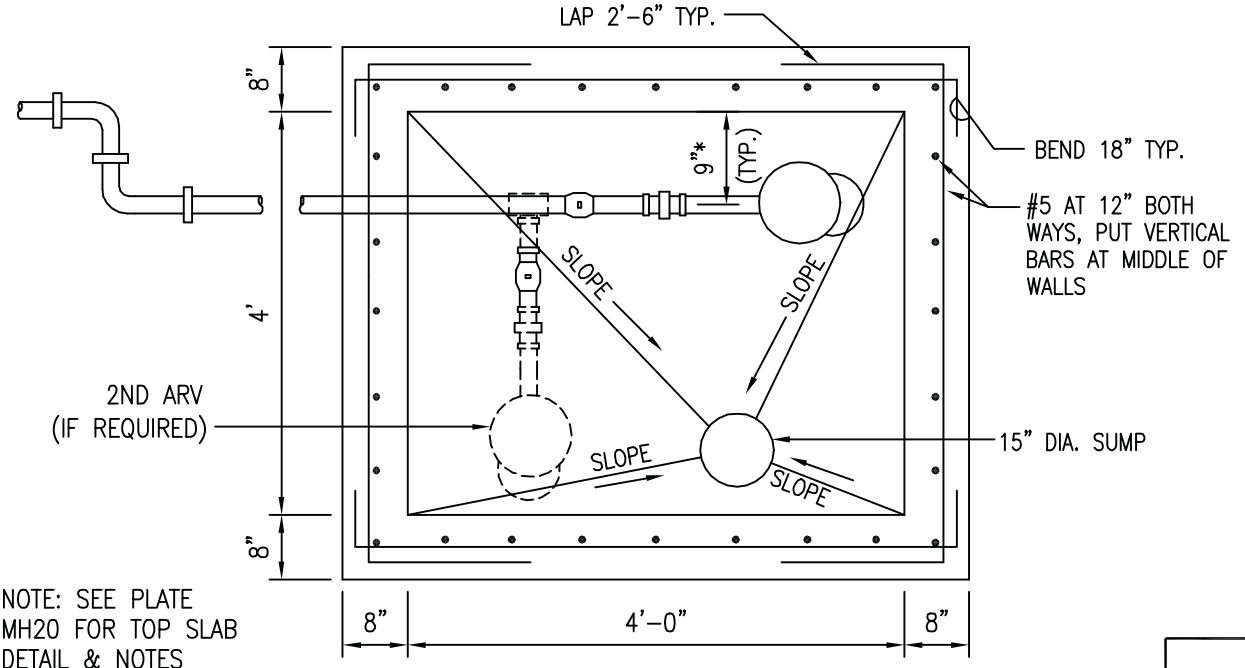
NOTES FOR CAST-IN-PLACE AND PRECAST WALL MH:

1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2. REFER TO MH12, MH14, MH15, MH17 AND MH18 FOR ADDITIONAL DETAILS.
3. REFER TO SECTION 205.08 BALL CORPS FOR VALVES AND TABLE 200-9 OF THE WATER SYSTEM STANDARDS FOR THE REQUIRED BALL CORP. SIZES.
4. PLASTIC RUNGS MAY BE USED. REFER TO MH18 (EXCEPT MAUI).
5. FOR PRECAST WALL MANHOLE, BOTTOM HALF OF MANHOLE MAY BE PRECASTED IF BOTTOM SLAB ELEVATION IS +2' ABOVE ESTIMATED WATER TABLE.
6. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998).
7. PAINT ALL METALS:
   A. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
   B. MANHOLE FRAME AND COVER, VALVE SHALL BE PAINTED WITH ASPHALTUM.
8. PROVIDE HOISTING SYSTEM FOR TRANSPORTATION AND INSTALLATION OF PRECAST WALL.
9. FOR MAUI, IN NON-TRAFFIC AREAS, METAL MH COVERS MAY BE USED. REFER TO M23.

			2002 REVISION
KAUAI OAHU MAUI	TYPE "D" MANHOLE FOR 2" AIR RELIEF VALVES SCALE: NTS	STANDARD DETAILS	MH20



SECTION



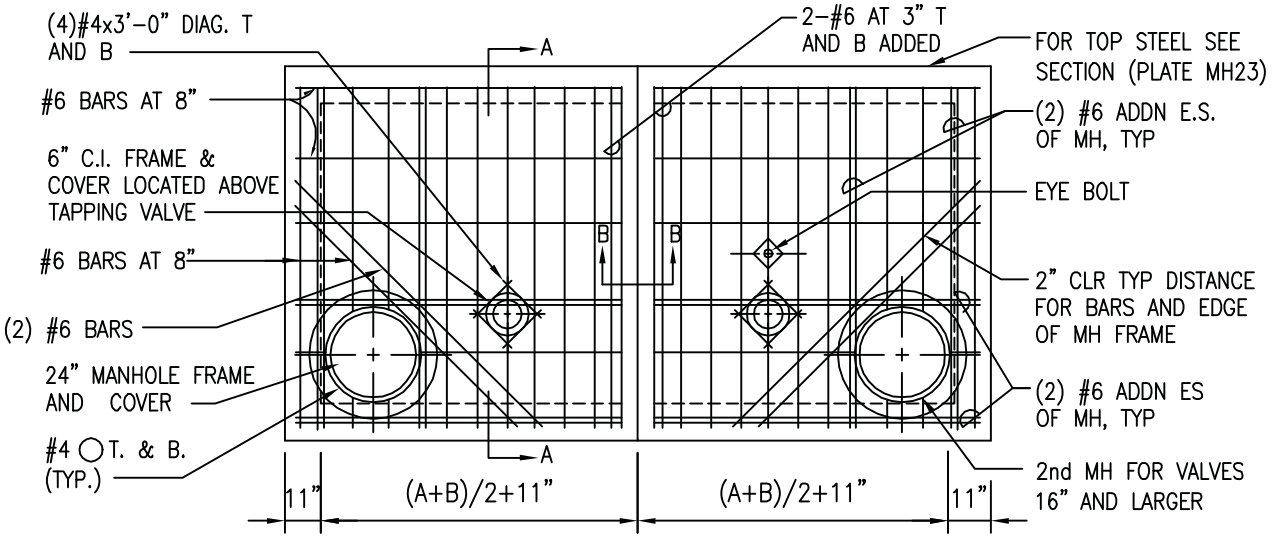
NOTE: SEE PLATE MH20 FOR TOP SLAB DETAIL & NOTES

* LATERAL CENTERED FOR SINGLE ARV

PLAN–SECTION

2002
REVISION

KAUAI OAHU MAUI	TYPE "D" MANHOLE FOR 2" AIR RELIEF VALVES CAST-IN-PLACE AND PRECAST WALLS SCALE: NTS	STANDARD DETAILS	MH21

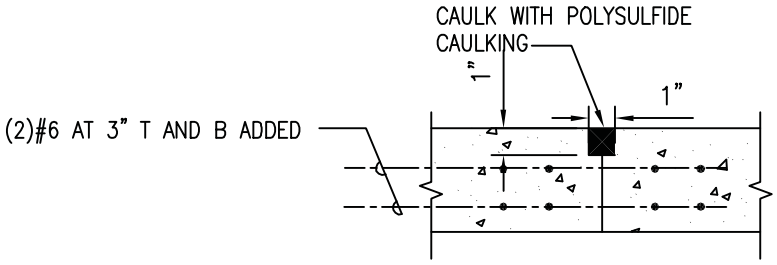


PLAN OF TOP SLAB

(BOTTOM REINFORCEMENT)

NOTE:

LOCATION OF THE EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE



SECTION "B-B"

NOTES: FOR CAST-IN-PLACE WALL MH

1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES ABD TABLE 200-9 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES.
3. REFER TO MH12, MH13, MH14, MH15 AND MH17 FOR ADDITIONAL DETAILS.
4. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF AT REST PRESSURE; AND 4 FEET MAX OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998).
5. STRUCTURAL BASE FOR MANHOLE NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.
6. PAINT ALL METALS:
   A. MANHOLE FRAME AND COVER, VALVE SHALL BE PAINTED WITH ASPHALTUM.
   B. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
7. SEE PLATES MH23 AND MH24 FOR SECTIONS.

2002
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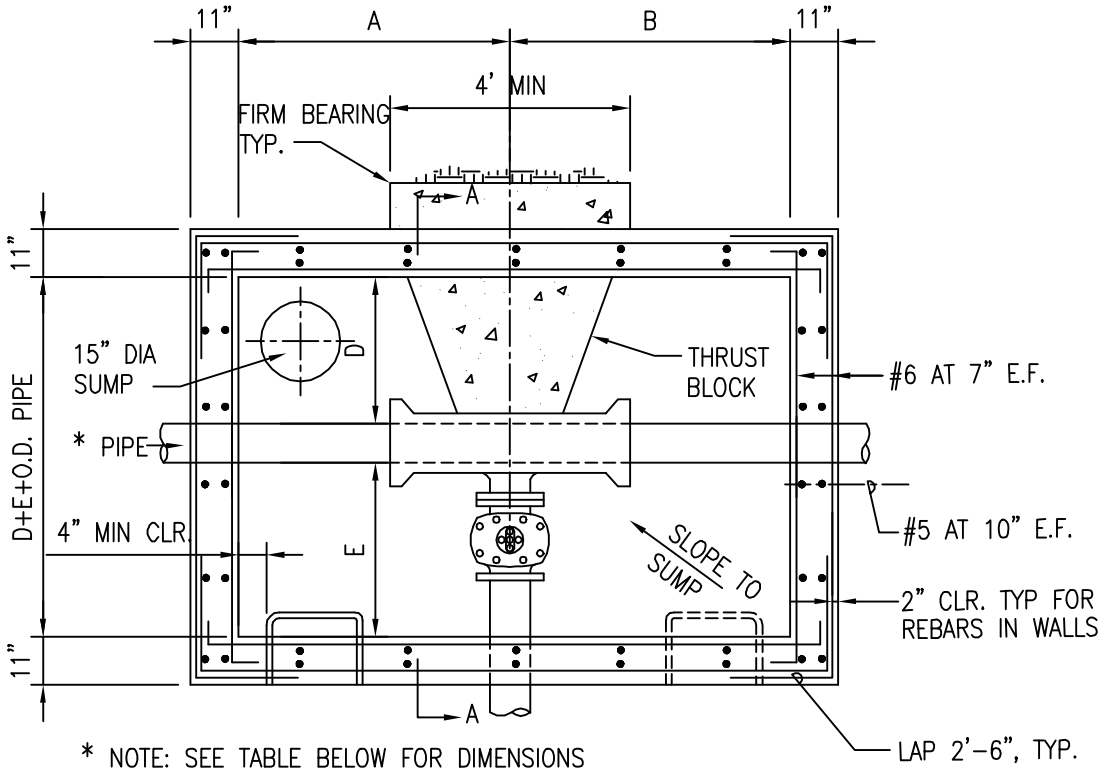
KAUAI OAHU	**TYPE "E" TAPPING TEE MANHOLE** **CAST-IN-PLACE WALL** **SCALE: NTS**	STANDARD DETAILS	MH22



PLAN–SECTION

TAPPING TEE MANHOLE DIMENSION						
PIPE DIAMETER	MATERIAL	A	B	C	D	E
4"–12"	CI AND DI	3'–0"	5'–0"	1'–0"	1'–6"	5'–0"
16"–20"	CI AND DI	3'–0"	5'–6"	1'–6"	1'–6"	6'–0"
24"–42"	CI AND DI	3'–6"	6'–0"	1'–6"	1'–6"	6'–0"

NOTES:

1. DIMENSIONS SHALL BE VERIFIED IN FIELD
2. SEE PLATE MH24 FOR SECTION
3. TAPPING VALVE SHALL BE OPENED ONLY AFTER THRUST BLOCK IS POURED AND CURED IN PLACE. FOR THRUST BLOCK WITH STRUCTURAL STEEL STRUTS, IF NEEDED FOR LARGER SIZED PIPES, THE MANHOLE WALL SHALL BE BUILT AROUND THE BLOCK OR STRUCTURAL STRUTS.

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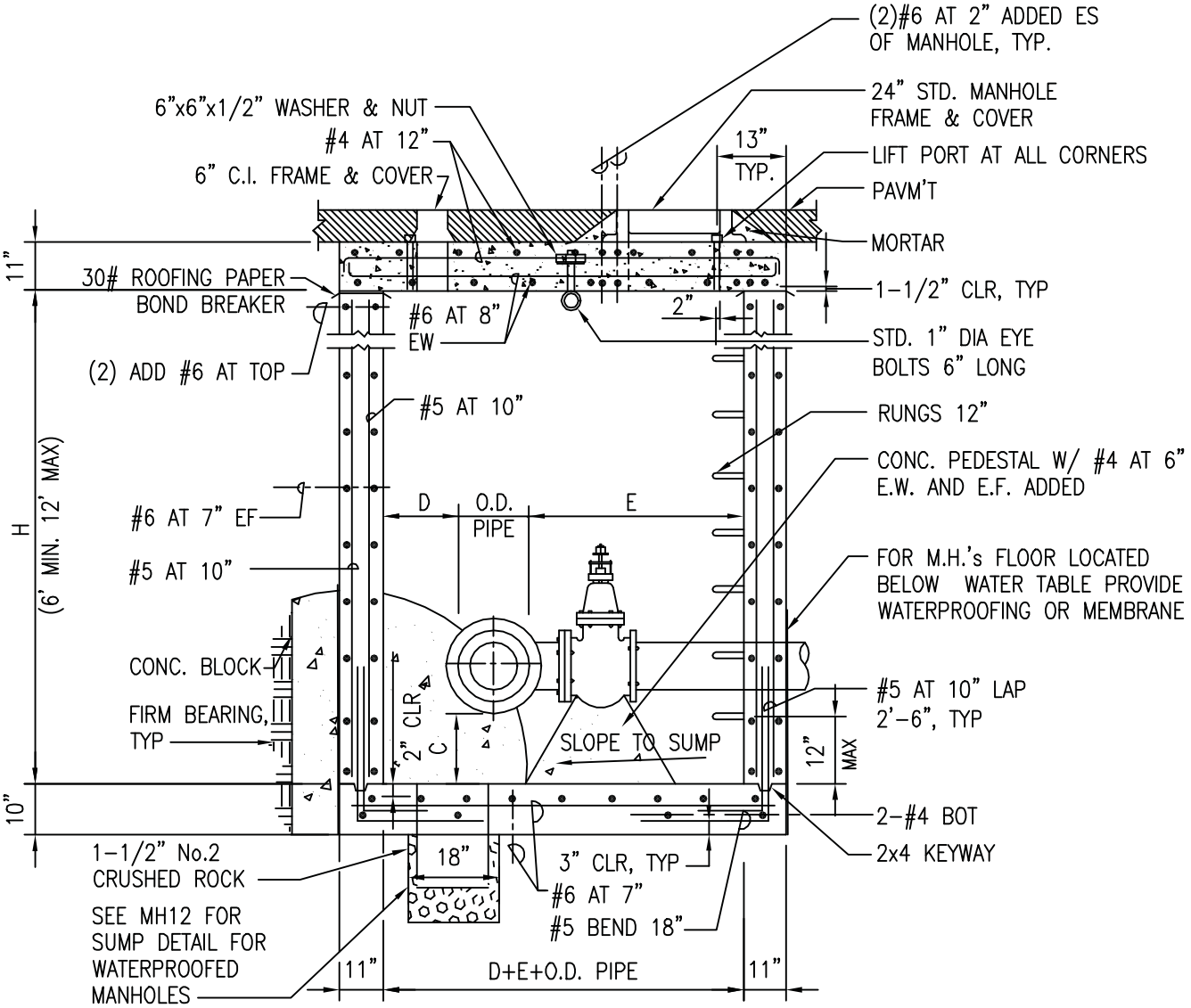
KAUAI OAHU	**TYPE "E" TAPPING TEE MANHOLE** CAST-IN-PLACE WALL SCALE: NTS	STANDARD DETAILS	MH23



SECTION A-A

SEE PLATE MH22 FOR TOP SLAB REINF.
SEE PLATE MH23 FOR TOP WALL REINF.

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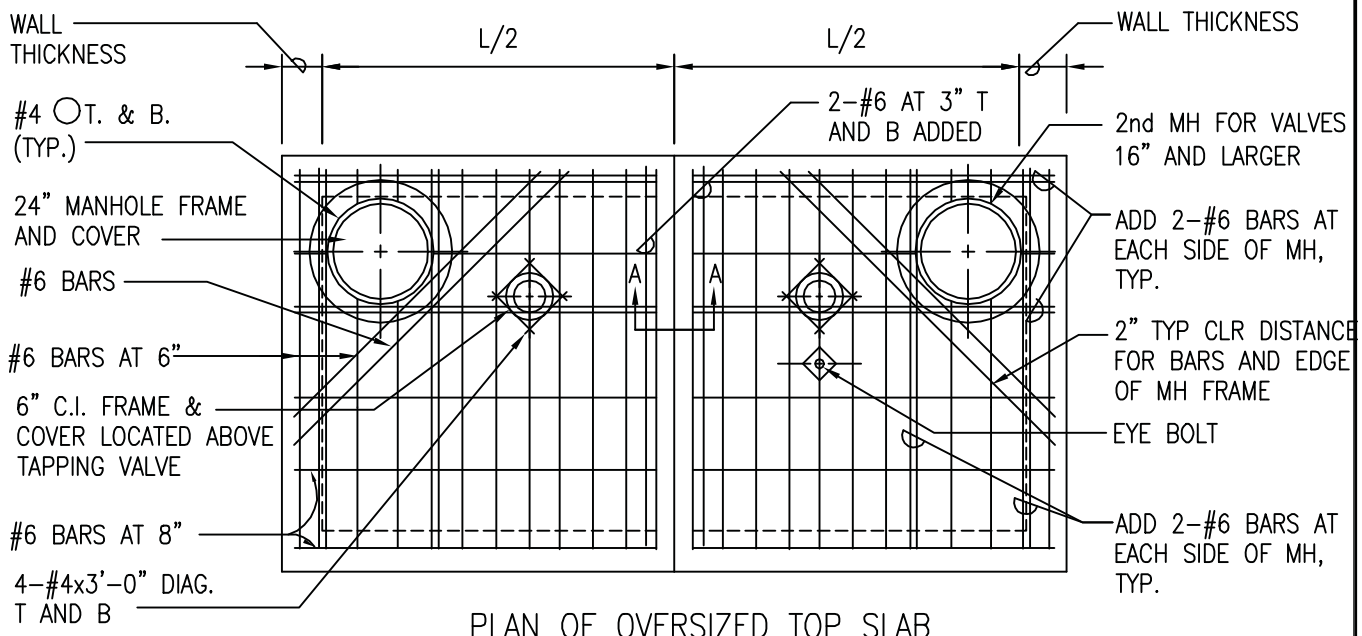
TYPE "E" TAPPING TEE MANHOLE

CAST-IN-PLACE WALL

SCALE: NTS

STANDARD DETAILS

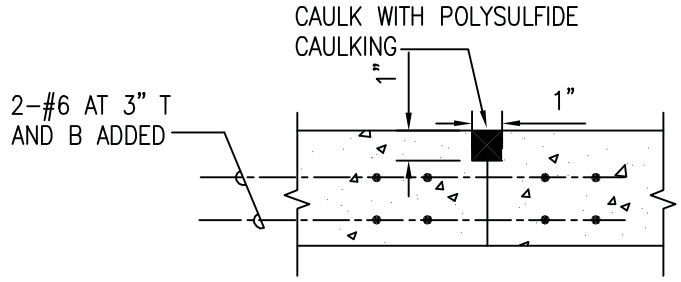
MH24



PLAN OF OVERSIZED TOP SLAB
(BOTTOM REINFORCEMENT)

NOTE:

1. LOCATION OF THE EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE. REFER TO MH1, MH2, MH3, MH4 AND MH5 FOR DETAILS.
2. PROVIDE LIFT PORTS FOR SLAB AT FOUR CORNERS MINIMUM 2" AWAY FROM THE WALL.
3. PROVIDE TWO SECTIONS OF SLAB WHEN TOTAL WEIGHT OF THE SINGLE PIECE OF SLAB EXCEEDS 10 KIPS.
4. SEE PLATE MH1 FOR DETAILS NOT SHOWN.



SECTION "A–A"

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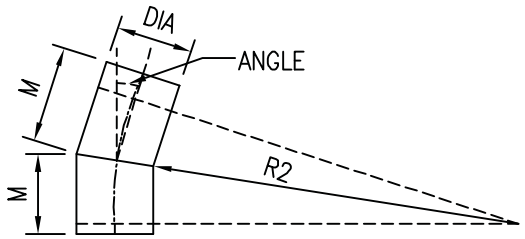
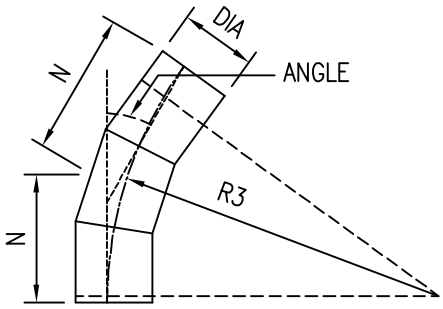
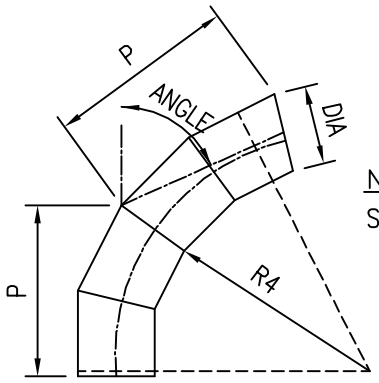
KAUAI OAHU MAUI HAWAII	OVERSIZED TOP SLAB DETAIL SCALE: NTS	STANDARD DETAILS	MH25



2 PIECE ELBOW
6° TO 22-1/2° INCLUSIVE

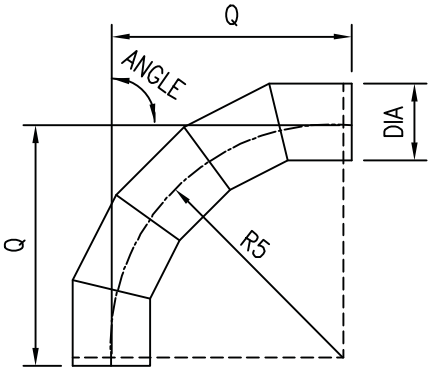


3 PIECE ELBOW
OVER 22-1/2° TO 45° INCLUSIVE

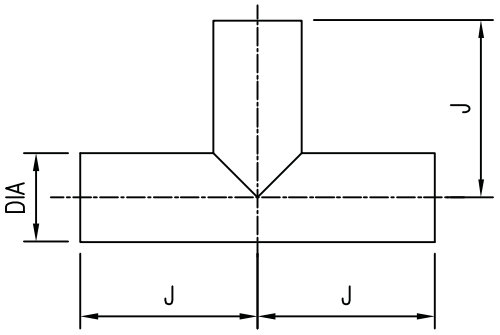


NOTE:
SEE P5

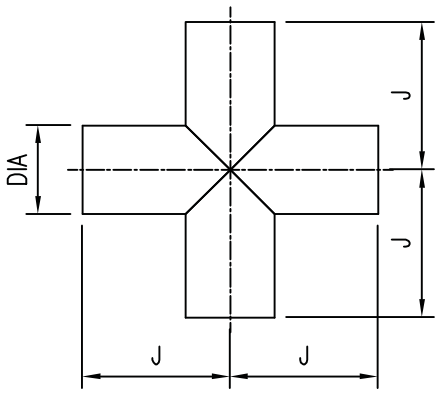
4 PIECE ELBOW
OVER 45° TO 67-1/2° INCLUSIVE



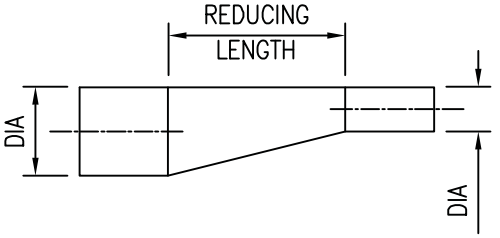
5 PIECE ELBOW
OVER 67-1/2° TO 90° INCLUSIVE



TEE

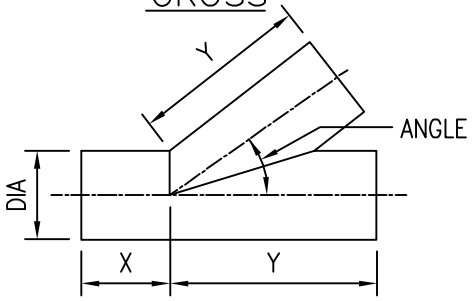


CROSS



REDUCER

SEE PLATE P2 FOR DIMENSIONS



LATERAL
30° MINIMUM – 75° MAXIMUM

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KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** **MISCELLANEOUS DETAIL** **SCALE: NTS**	STANDARD DETAILS	P1

STANDARD FITTING DIMENSIONS
FOR PLATE P1

DIAMETER	TEE		CROSS (BOTH WAYS)	LATERAL (30° TO 75°)		ELBOWS (CENTER TO END)							
						2 PIECE (UP TO 22 1/2°)		3 PIECE (22 1/2° TO 45°)		4 PIECE (45° TO 67 1/2°)		5 PIECE (67 1/2° TO 90°)	
	RUN J + J	OUTLET J	J + J	RUN X + Y	OUTLET Y	M	R2	N	R3	P	R4	Q	R5
16"	34"	17"	34"	62"	52"	12"	60"	18"	44"	26"	39"	44"	40"
18"	36"	18"	36"	66"	56"	12"	60"	19"	47"	27"	41"	36"	32"
20"	38"	19"	38"	72"	60"	13"	65"	20"	49"	28"	42"	54"	50"
22"	40"	20"	40"	78"	66"	13"	65"	21"	51"	30"	45"	41"	37"
24"	42"	21"	42"	84"	72"	14"	70"	22"	54"	32"	48"	64"	60"
30"	60"	30"	60"	96"	84"	15"	75"	25"	61"	37"	51"	79"	75"
36"	66"	33"	66"	110"	96"	16"	80"	27"	66"	40"	60"	94"	90"
42"	72"	36"	72"	124"	108"	17"	85"	30"	71"	49"	69"	109"	105"

DIMENSIONS FOR ECCENTRIC REDUCER REDUCING LENGTH

36" X 30" ECCENTRIC REDUCER – LENGTH 66"
30" X 24" ECCENTRIC REDUCER – LENGTH 66"
24" X 20" ECCENTRIC REDUCER – LENGTH 26"
20" X 16" ECCENTRIC REDUCER – LENGTH 26"
42" X 36" ECCENTRIC REDUCER – LENGTH 66"
42" X 30" ECCENTRIC REDUCER – LENGTH 66"

NOTE:

ALL DIMENSIONS SHOWN ARE LAYING LENGTHS.

ALL FITTINGS AND SPECIALS SHALL BE FABRICATED INDEPENDENT FROM PIPE SECTIONS AND IN ACCORDANCE WITH THE DIMENSIONS SHOWN.

ALL FITTINGS AND SPECIALS SHALL BE ALL BELL UNLESS OTHERWISE NOTED.

ALL TEES, WYES, CROSSES AND REDUCERS 16–INCH IN DIAMETER AND LARGER SHALL BE REINFORCED WITH STEEL RIBS OR STEEL CROTCH PLATES WELDED CONTINUOUSLY TO THE CYLINDER OR BY OTHER METHODS TO WITHSTAND THE LONGITUDINAL CRUSHING EFFECT CAUSED BY THE TEST PRESSURE AS CALLED FOR IN THE PLANS.

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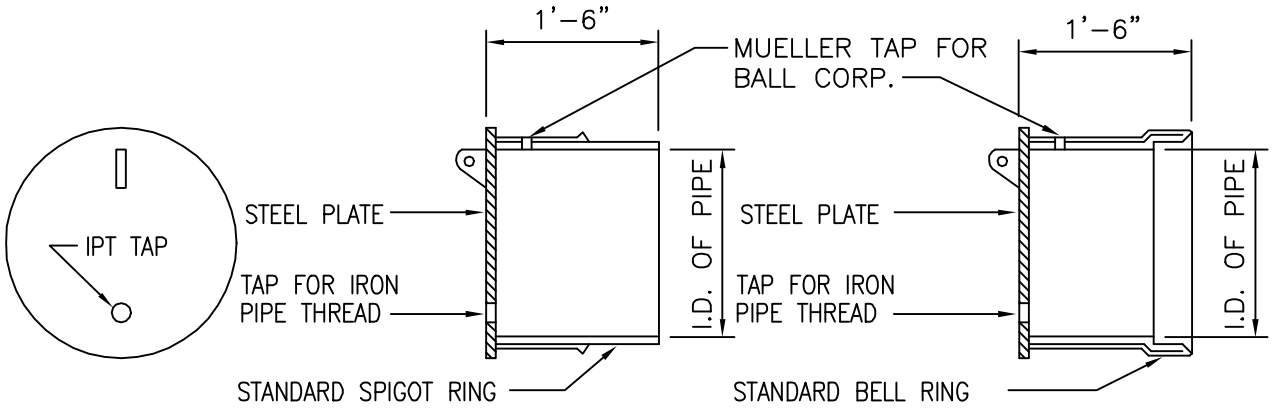
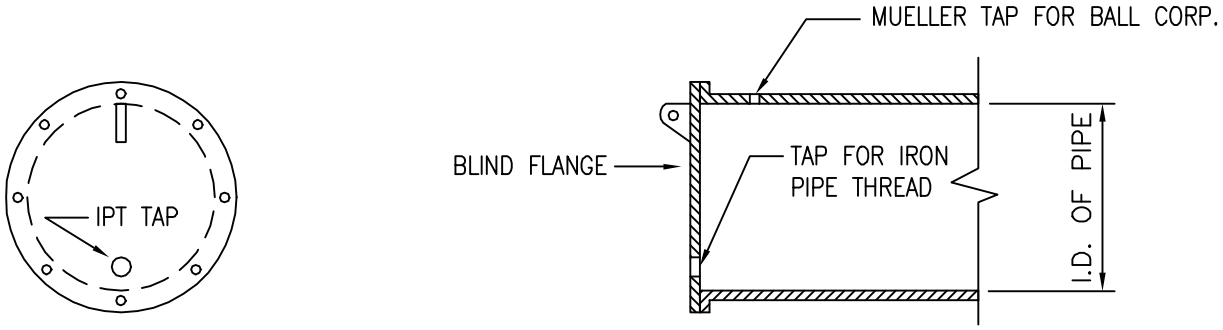
KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** **NOTES AND TABLES** **SCALE: NTS**	STANDARD DETAILS	P2



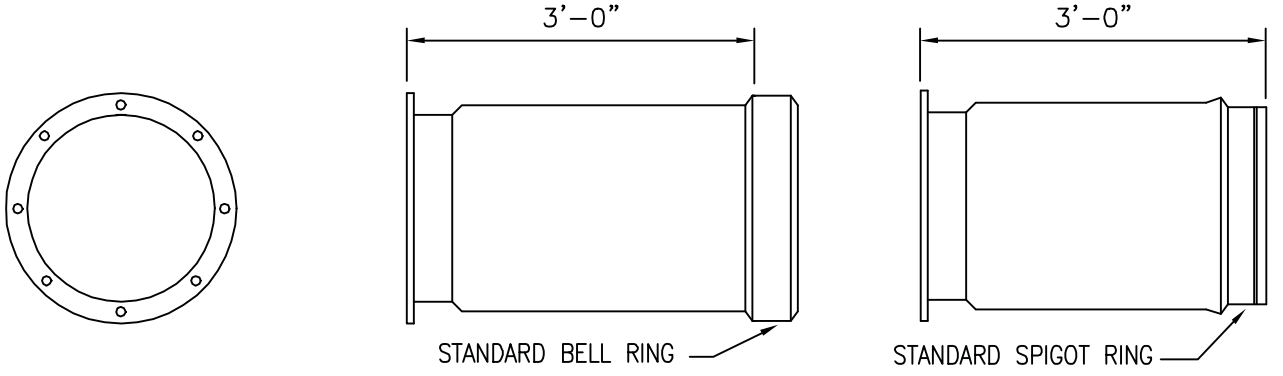
ELEV. OF STEEL PLATE SECTION OF PLUG SECTION OF CAP

DETAIL OF CAP & PLUG



ELEV. OF BLIND FLANGE SECTION

DETAIL OF BLIND FLANGE



FLANGE END ELEVATION ELEVATION

DETAIL OF ADAPTER

NOTE:
FLANGE CLASS SHALL BE
AS SPECIFIED IN THE PLANS.

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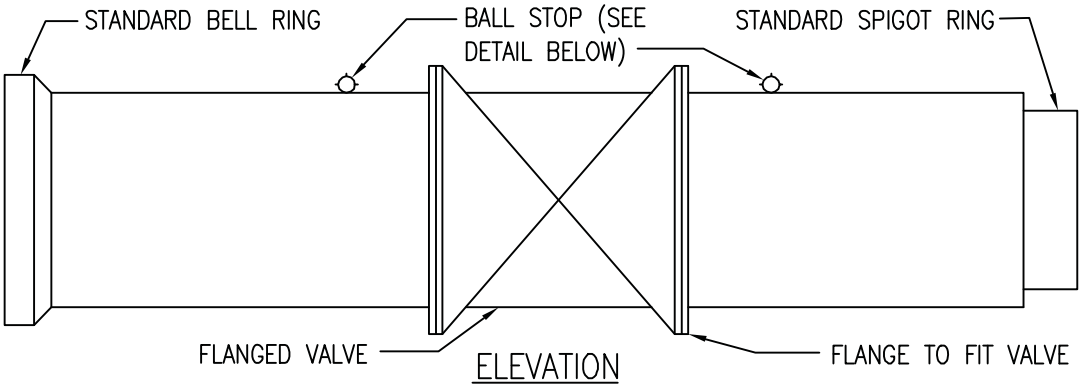
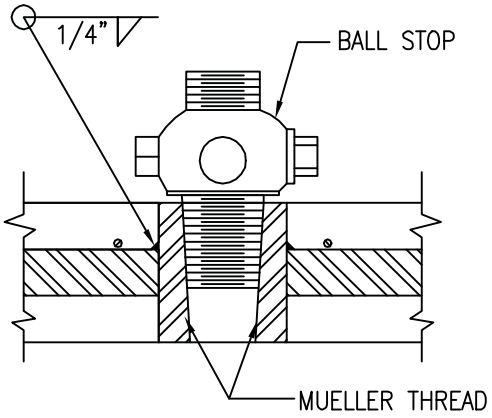
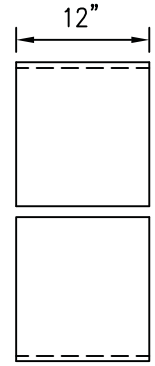
KAUAI OAHU MAUI	CONCRETE CYLINDER PIPE MISCELLANEOUS DETAIL SCALE: NTS	STANDARD DETAILS	P3



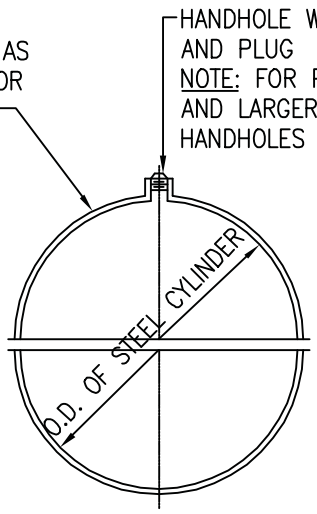
ELEVATION



SECTION THRU CONCRETE PIPE

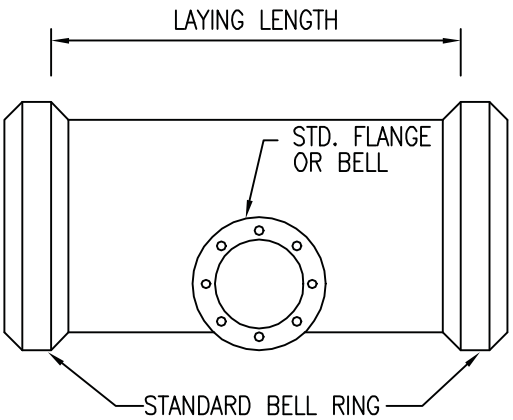


ELEVATION



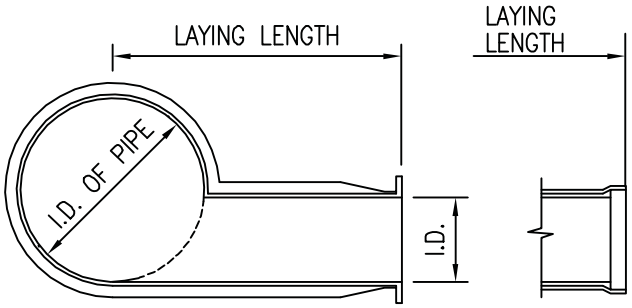
SECTION

DETAIL AT BALL STOP



ELEVATION

DETAIL OF SPLIT BUTT STRAP



SECTION AT OUTLET

BELL SECTION

NOTE:
FLANGE CLASS SHALL BE AS SPECIFIED IN THE PLANS.

DETAIL OF BLOW OFF TEE

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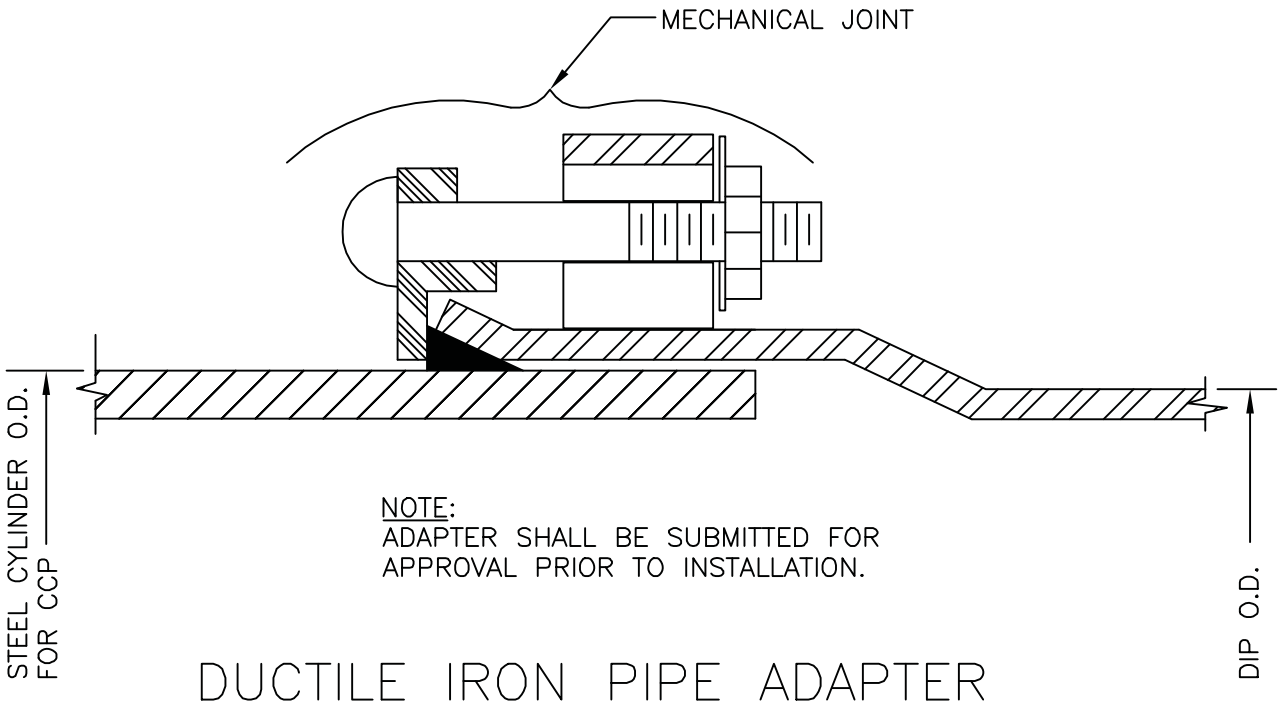
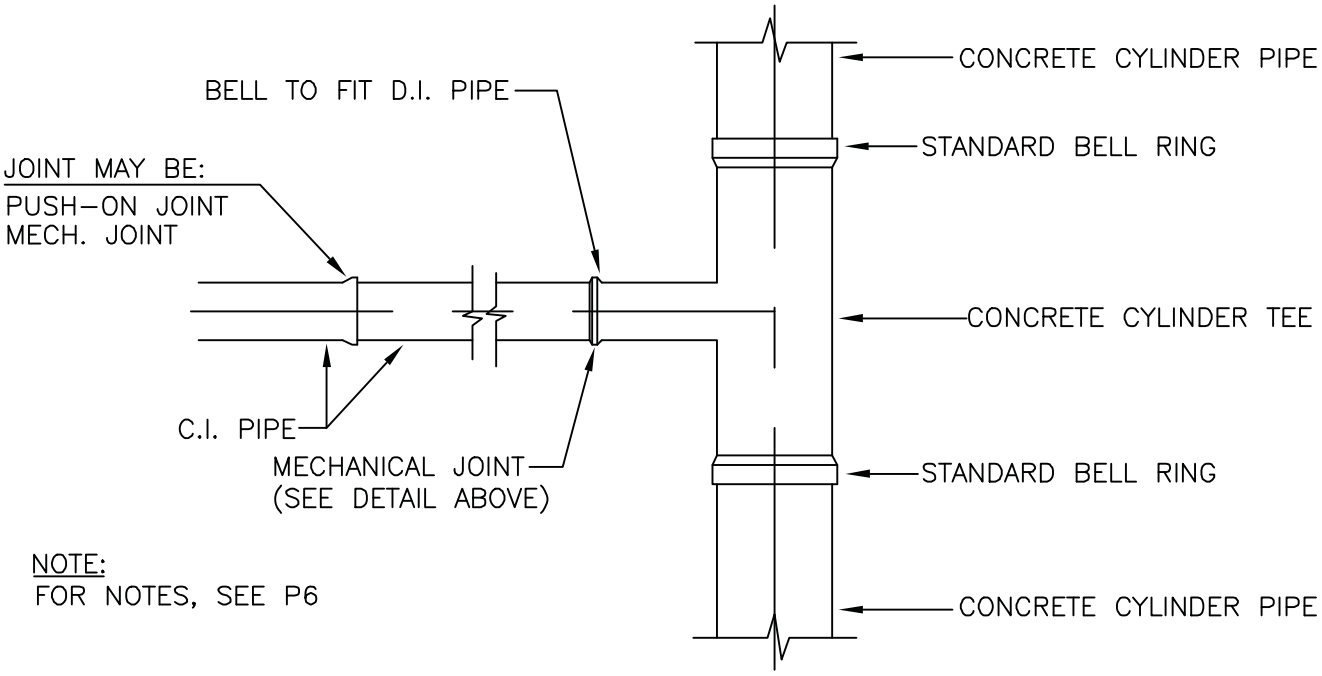
KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** **MISCELLANEOUS DETAILS** **SCALE: NTS**	STANDARD DETAILS	P4



NOTE:
ADAPTER SHALL BE SUBMITTED FOR APPROVAL PRIOR TO INSTALLATION.

DUCTILE IRON PIPE ADAPTER



NOTE:
FOR NOTES, SEE P6

TYPICAL CAST IRON PIPE CONNECTION TO CONCRETE CYLINDER PIPE

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KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** MISCELLANEOUS DETAILS SCALE: NTS	STANDARD DETAILS	P5

NOTES:

1. BOLTS – 1/2" STICKING OUT BEYOND TIGHTENED NUT IS ACCEPTABLE.
2. ADD STEP DOWN (SIMILAR TO A BELL END) OR STOP TO PREVENT INSIDE MORTAR FROM CRACKING WHEN PIPE IS PUSHED IN TOO FAR DURING INSTALLATION.
3. INTERIOR JOINT TO BE FILLED WITH MORTAR GROUT.
4. BOLTS AND NUTS FOR FOLLOWING RING TO BE TYPE 316 STAINLESS STEEL.
5. ONLY C.I. FITTING EPOXY COATING (NSF APPROVED) SHALL BE FACTORY–INSTALLED DURING THE MANUFACTURING OF THE ADAPTER.
6. APPLY BITUMAST COATING TO ALL EXPOSED STEEL, BOLTS, NUTS, FOLLOWING RING AFTER INSTALLATION.
7. INSTALL DOUBLE POLYETHYLENE WRAP (16 MILS MINIMUM) AND 15 LB. ROOFING FELT OVER POLY–WRAP TO PREVENT DAMAGE/PUNCTURES TO POLY–WRAP DURING BACKFILL WORK ON DUCTLINE IRON PIPE ADAPTER.

NOTE:

SEE PLATE P5 FOR DETAIL OF EXIST DUCTILE IRON AND CONCRETE CYLINDER PIPE CONNECTION.

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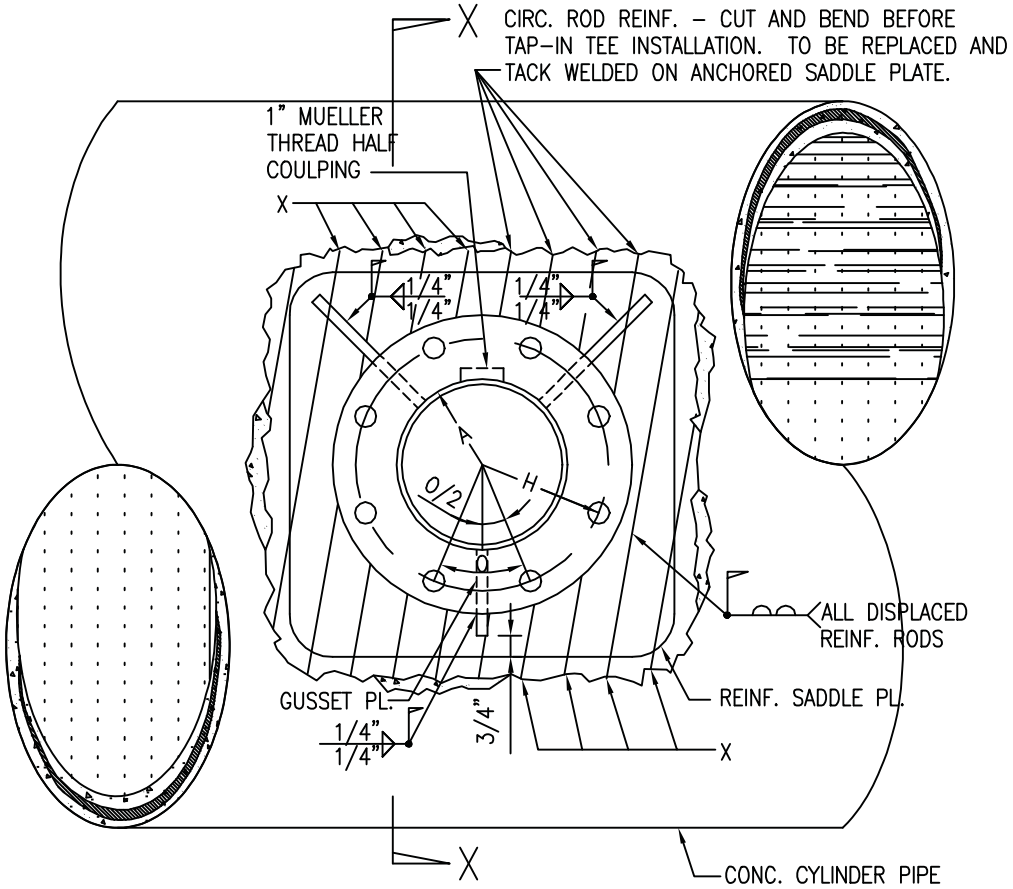
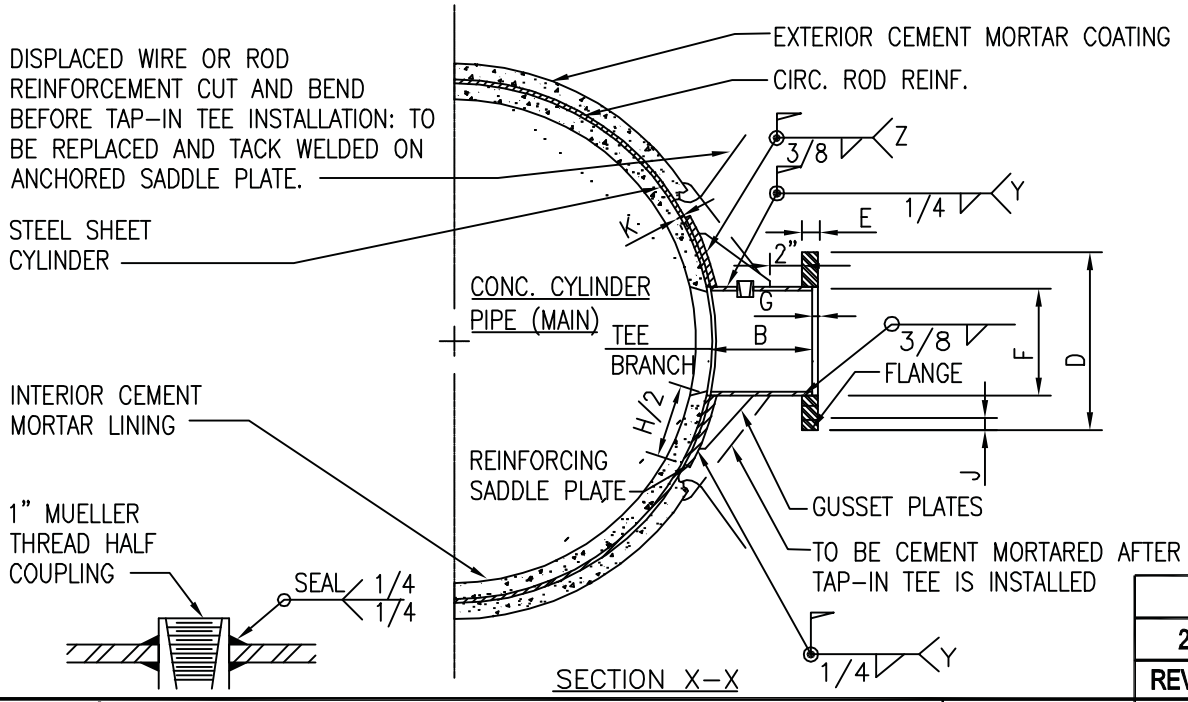
KAUAI OAHU MAUI	CONCRETE CYLINDER PIPE NOTES SCALE: NTS	STANDARD DETAILS	P6



FRONT VIEW



SECTION X–X

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KAUAI OAHU MAUI	CONCRETE CYLINDER PIPE TAP-IN TEE DETAILS SCALE: NTS	STANDARD DETAILS	P7

DIMENSIONS (INCH)		TEE BRANCH				
	NOMINAL BRANCH SIZE (DIA.)	4	6	8	12	16*
A	ACTUAL BRANCH DIAMETER (I.D.)	4.25	6.25	8.375	12.375	
B	LENGTH OF TEE BRANCH	6.00	6.00	6.25	6.25	
C	MIN. THICKNESS OF TEE NIPPLE	0.237	0.280	0.280	0.330	
D	DIAMETER OF MACHINED FLANGE	9.125	11.125	13.656	19.00	
E	FLANGED THICKNESS	0.94	1.00	1.125	1.25	
F	FLANGE OFFSET DIAMETER	4.724	6.81	8.935	13.035	
G	DEPTH OF FLANGE OFFSET	.375	0.375	0.375	0.375	
H	BOLT CIRCLE DIAMETER	7.50	9.50	11.75	17.00	
J	(AMOUNT) & DIA. OF BOLT HOLES	(8)0.750	(8)0.875	(8)0.875	(12)1.00	
K	THICKNESS OF REINF. SADDLE PLATE	0.250	0.250	0.250	0.375	
O	DEGREES BETWEEN BOLT CENTER	45°	45°	45°	30°	

* FOR 16" AND LARGER BRANCH THE CONTRACTOR SHALL SUBMIT 6 SETS OF SHOP DRAWINGS FOR APPROVAL BY THE WATER DEPARTMENT.

FABRICATION NOTES:

1. ALL TAP-IN TEE COMPONENTS SHALL BE MADE FROM NEW AND SOUND MATERIALS AS SPECIFIED.
2. STEEL PRODUCTS FOR COMPONENTS SHALL BE HOT ROLLED M-1020 OR BETTER.
3. WELDING ELECTRODES SHALL MEET ASTM A-223, AWS A-5.1 SPECIFICATIONS.
4. THE TOP TWO BOLT HOLES ON THE FLANGE SHALL BE EQUIDISTANT FROM THE PLUMB CENTER LINE.
5. THE BUTT END ON THE BRANCH AND THE ARCH ON THE REINFORCING SADDLE PLATE SHALL CONFORM TO THE O.D. OF THE STEEL SHEET CYLINDER SO THAT A TIGHT AND CLOSE FIT JOINT WILL BE ATTAINED ON THE STEEL SHEET CYLINDER. DIAMETER OF BRANCH HOLE ON THE SADDLE PLATE IS 0.50" LARGER THAN THE O.D. OF THE BRANCH.
6. THREE 0.375" THICK GUSSET PLATES SHALL BE PROVIDED AND INSTALLED IN THE FIELD.

INSTALLATION PROCEDURE

1. REMOVE SUFFICIENT EXTERIOR MORTAR COATING FROM CONCRETE CYLINDER PIPE TO CONTAIN REINFORCING SADDLE PLATE.
2. POSITION AND MARK OUT EXACT OUTLINE OF REINFORCING SADDLE PLATE ON EXPOSED STEEL SHEET CYLINDER.
3. TACK WELD CIRCUMFERENTIAL WIRE OR ROD REINFORCEMENT ONTO STEEL SHEET CYLINDER – 1" AWAY FROM PERIMETER OF SADDLE PLATE.
4. CUT AND BEND REINFORCING WIRES OR RODS AWAY FROM THE WORK AREA.
5. POSITION AND DRAW REINFORCED SADDLE PLATE TIGHTLY AGAINST THE STEEL SHEET CYLINDER BEFORE WELDING THE SADDLE PLATE ON THE CYLINDER, AS INDICATED BY "Y".
6. TEE BRANCH INSTALLATION:
   - A. POSITION THE PRESHAPED END OF THE TEE BRANCH ON THE STEEL SHEET CYLINDER THROUGH THE BRANCH HOLE ON THE SADDLE PLATE.
   - B. WELD THE BRANCH TO THE STEEL SHEET CYLINDER BEFORE JOINING AND TYING THE BRANCH TO THE SADDLE PLATE, AS INDICATED BY "Z" ON SECTION X-X.
   - C. FIT AND INSTALL THE GUSSET PLATES, AS ABOVE.
   - D. TEST WELDED JOINTS ON NEW INSTALLATION FOR LEAKS.
   - E. BEND AND REPLACE THE DISPLACED CIRCUMFERENTIAL WIRE OR ROD REINFORCEMENT OVER THE SADDLE PLATE AND TACK WELD THE WIRES OR RODS TO THE PLATE.
   - F. APPLY A HEAVY COAT OF CEMENT MORTAR ON EXPOSED METAL SURFACE, AS SHOWN BY DOTTED LINES ON SECTION X-X.

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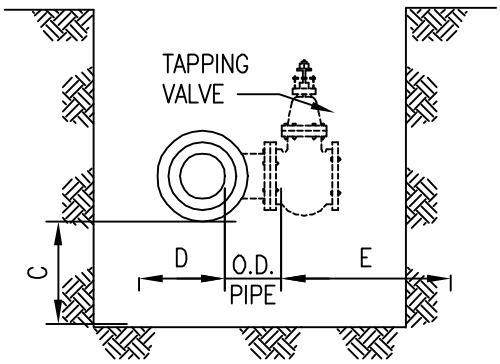
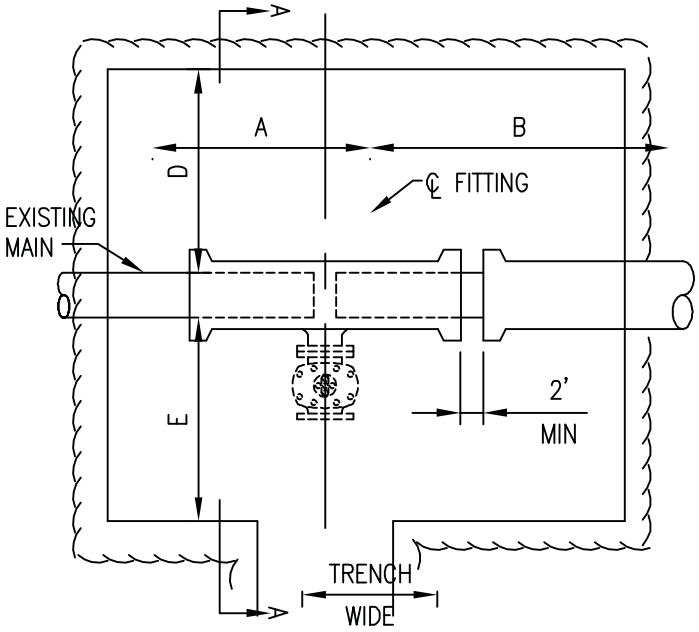
KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** **TAP-IN TEE NOTES AND TABLES** **SCALE: NTS**	STANDARD DETAILS	P8



SECTION A–A



PLAN

TABLE "A"

PIPE DIAMETER	MATERIAL	FITTING	A	B	C	D	E
4"–12"	AC	COUPLING	3'–0"	5'–0"	1'–0"	1'–6"	1'–6"
	CI & DI	SLEEVE OR BEND	3'–0"	5'–0"	1'–0"	1'–6"	1'–6"
	CI & DI	TAPPING TEE	3'–0"	5'–0"	1'–0"	1'–6"	5'–0"
	CI & DI	TEE	6'–6"	5'–0"	1'–0"	1'–6"	5'–0"
16"–20"	AC	COUPLING	3'–0"	5'–0"	1'–6"	2'–0"	2'–0"
	CC	BUTT STRAP	3'–6"	5'–6"	3'–0"	2'–0"	2'–0"
	CI & DI	SLEEVE OR BEND	3'–0"	5'–0"	1'–6"	2'–0"	2'–0"
	CI & DI	TAPPING TEE	3'–0"	5'–6"	1'–6"	1'–6"	6'–0"
	CI & DI	TEE	7'–0"	5'–6"	1'–6"	2'–0"	6'–0"
24"–42"	CC	BUTT STRAP	3'–6"	5'–6"	3'–0"	3'–0"	3'–0"
	CI & DI	SLEEVE OR BEND	3'–0"	5'–0"	1'–6"	3'–0"	3'–0"
	CI & DI	TAPPING TEE	3'–6"	6'–0"	1'–6"	1'–6"	6'–0"
	CI & DI	TEE	8'–6"	7'–0"	1'–6"	3'–0"	6'–0"

NOTES:

1. LIMIT OF PAYMENT FOR EXCAVATION SHALL BE AS SHOWN ON TABLE "A" ABOVE.
2. FOR BGGV, DIMENSIONS SHALL BE DETERMINED IN THE FIELD.
3. REACTION BLOCKS AS REQUIRED. NOT SHOWN FOR CLARITY.

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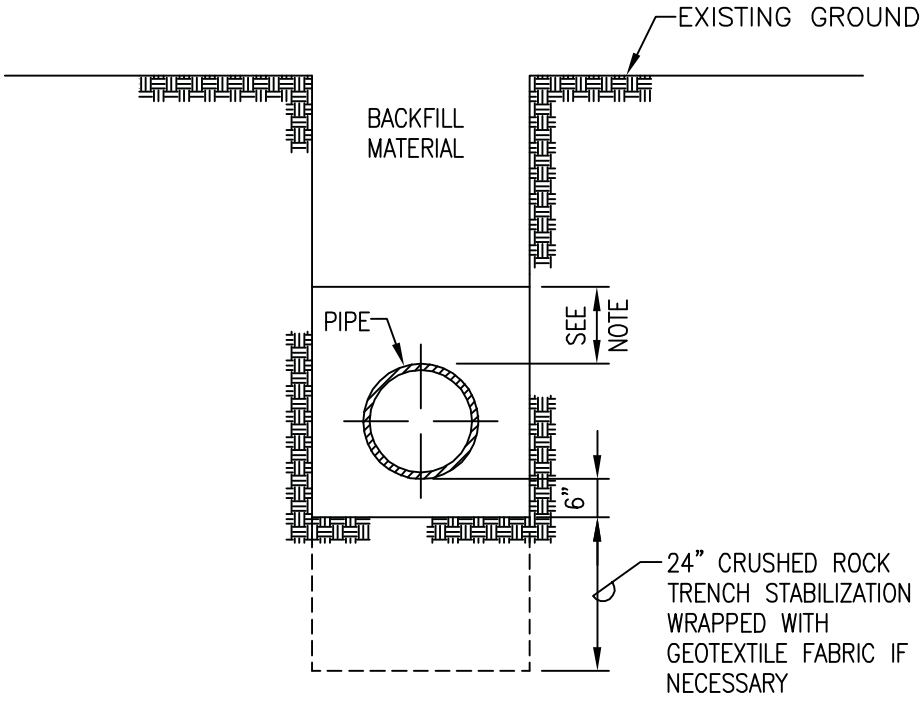
EXCAVATION PAYMENT
LIMITS AT CONNECTION
SCALE: NTS

STANDARD DETAILS

P9

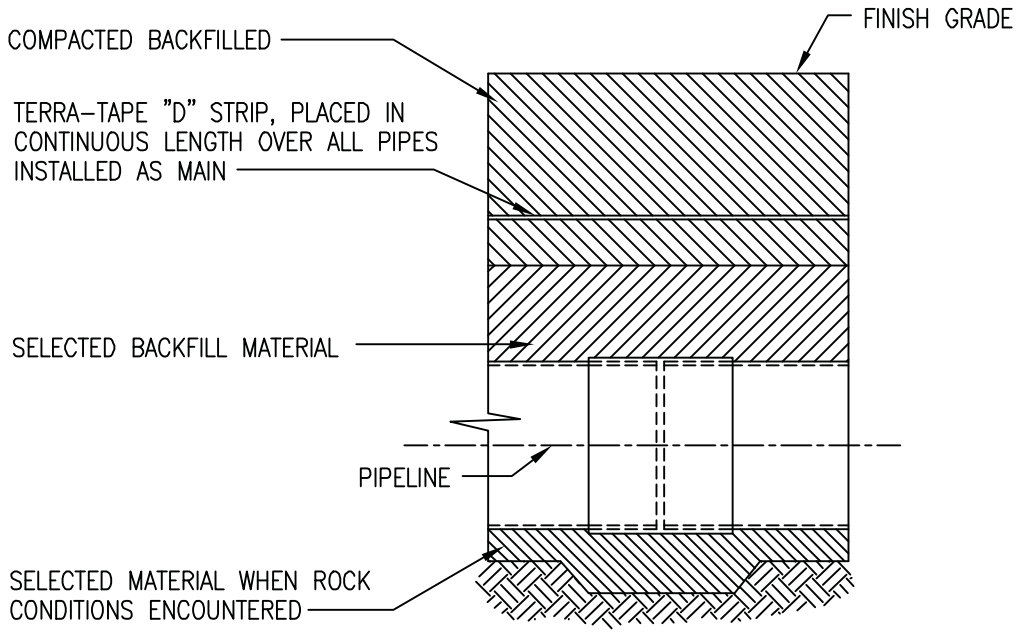


NOTE:

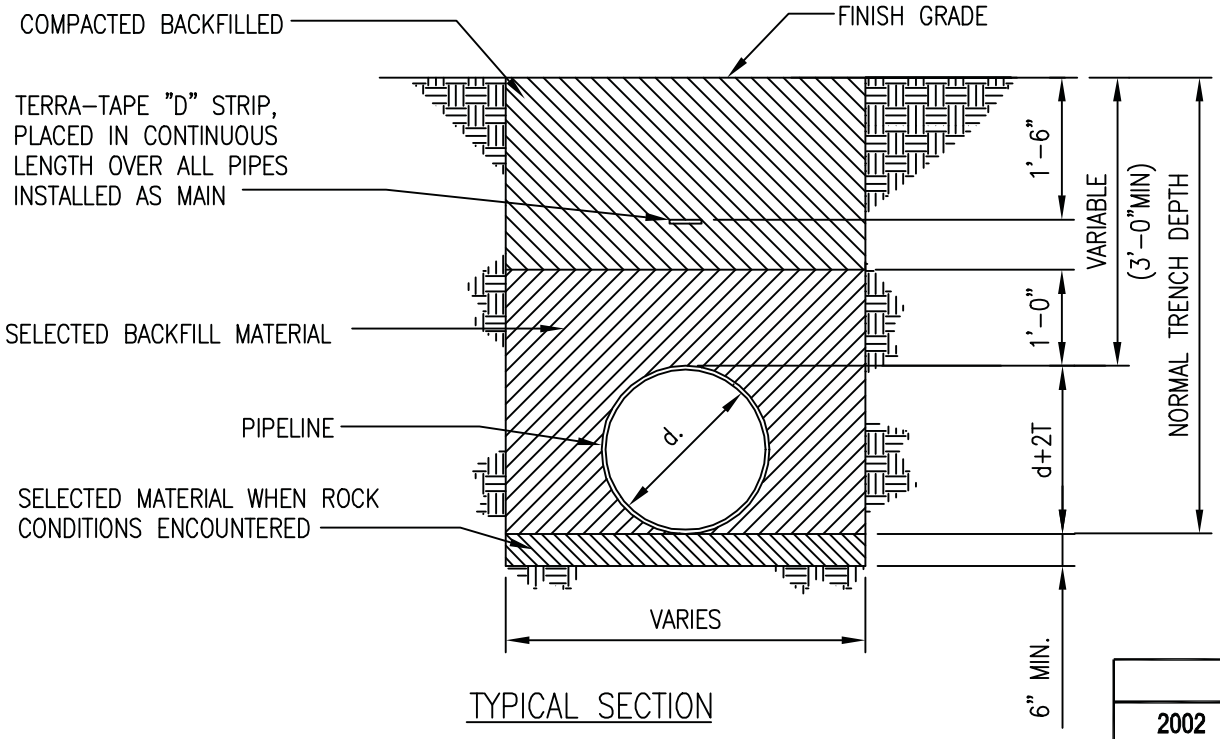
1. 12" OF CUSHION MATERIAL FOR PIPES 16" OR LARGER. 6" CUSHION MATERIAL FOR PIPES 12" OR SMALLER AT LOCATIONS WHERE INVERT IS ABOVE 4–FOOT ELEVATION.

2. 12" OF CUSHION MATERIAL FOR ALL PIPE SIZES AT LOCATIONS WHERE THE INVERT IS AT OR BELOW THE 4–FOOT ELEVATION.

			2002 REVISION
OAHU MAUI	**TRENCH BACKFILL** SCALE: NTS	STANDARD DETAILS	P10



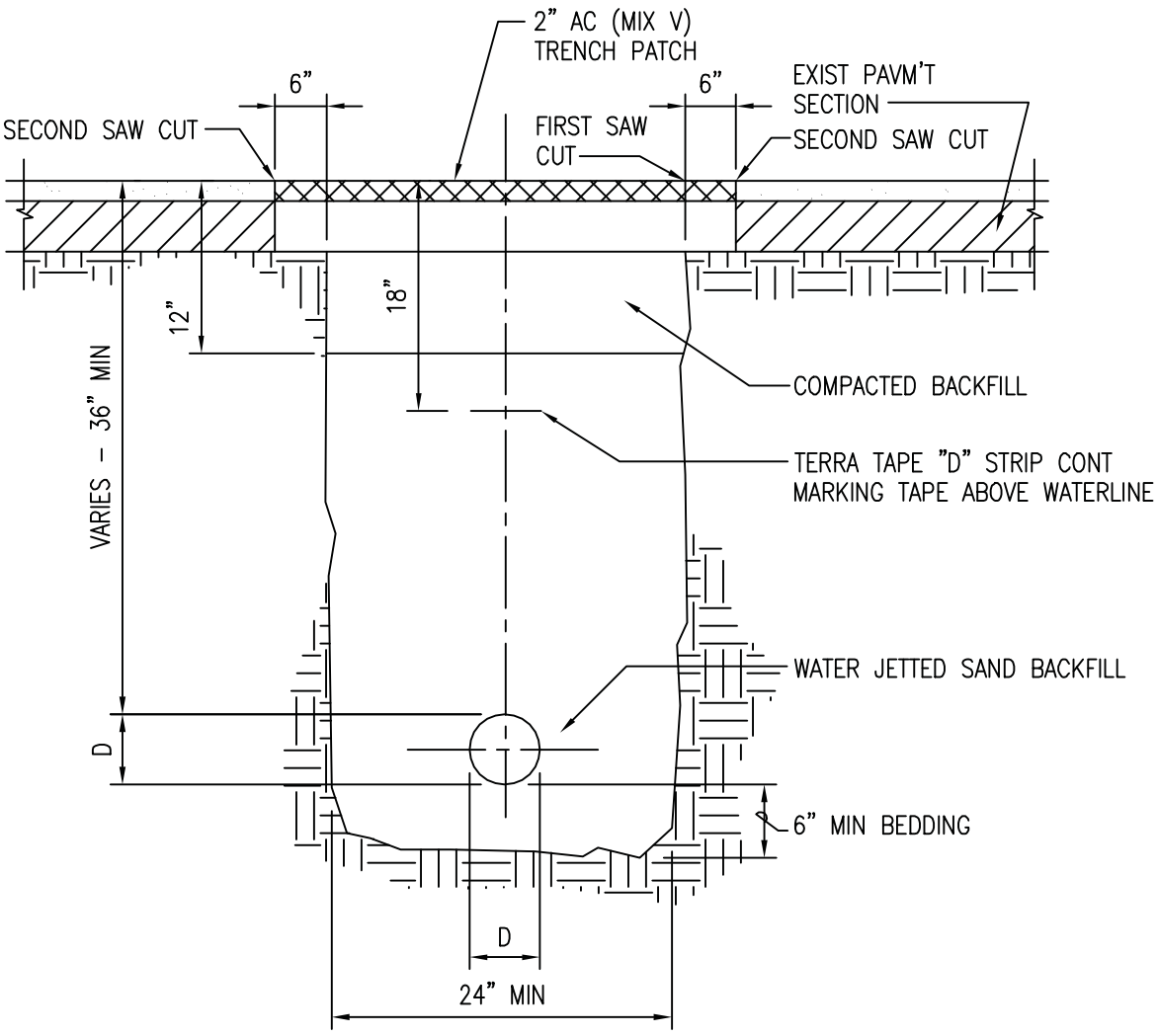
DETAIL AT JOINT



TYPICAL SECTION

	2002
	REVISION

KAUAI	**WATERLINE TRENCH DETAILS** MISCELLANEOUS DETAILS SCALE: NTS	STANDARD DETAILS	P11



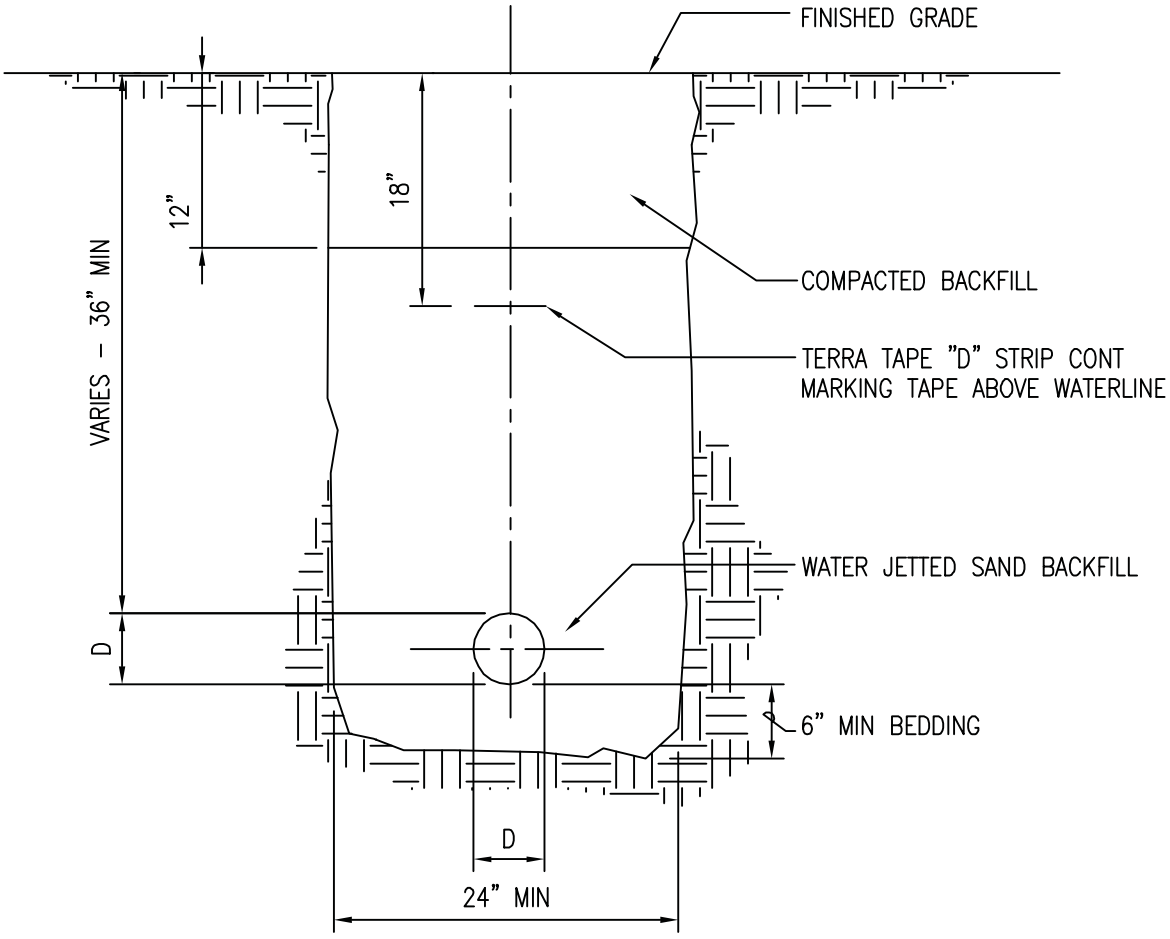
TYPICAL PVC WATERLINE TRENCH

NOTE FOR PVC WATER MAIN

1. A MIN OF 3 FEET OF COVER SHALL BE MAINTAINED AT ALL TIMES.
2. BACKFILL MATERIAL SHALL BE SAND ONLY; WATER JETTED TO WITHIN 12" OF FINISHED GRADE.
3. NO DIRECT TAPS SHALL BE PERMITTED. ALL TAPS SHALL BE WITH THE USE OF BRONZE, DOUBLE STRAP SERVICE SADDLES.
4. ALL OTHER CONDITIONS FOR PIPELINE INSTALLATIONS REMAIN AS SPECIFIED.
5. ONLY C.I. FITTINGS SHALL BE USED FOR ALL BENDS, REDUCERS, ETC. WITH PVC ENDS OR MJ ENDS.

	2002
	REVISION

KAUAI	**TYP. PVC WATERLINE TRENCH** **PAVED AREA** **SCALE: NTS**	STANDARD DETAILS	P12



TYPICAL PVC WATERLINE TRENCH

NOTE FOR PVC WATER MAIN

1. A MIN OF 3 FEET OF COVER SHALL BE MAINTAINED AT ALL TIMES.
2. BACKFILL MATERIAL SHALL BE SAND ONLY; WATER JETTED TO WITHIN 12" OF FINISHED GRADE.
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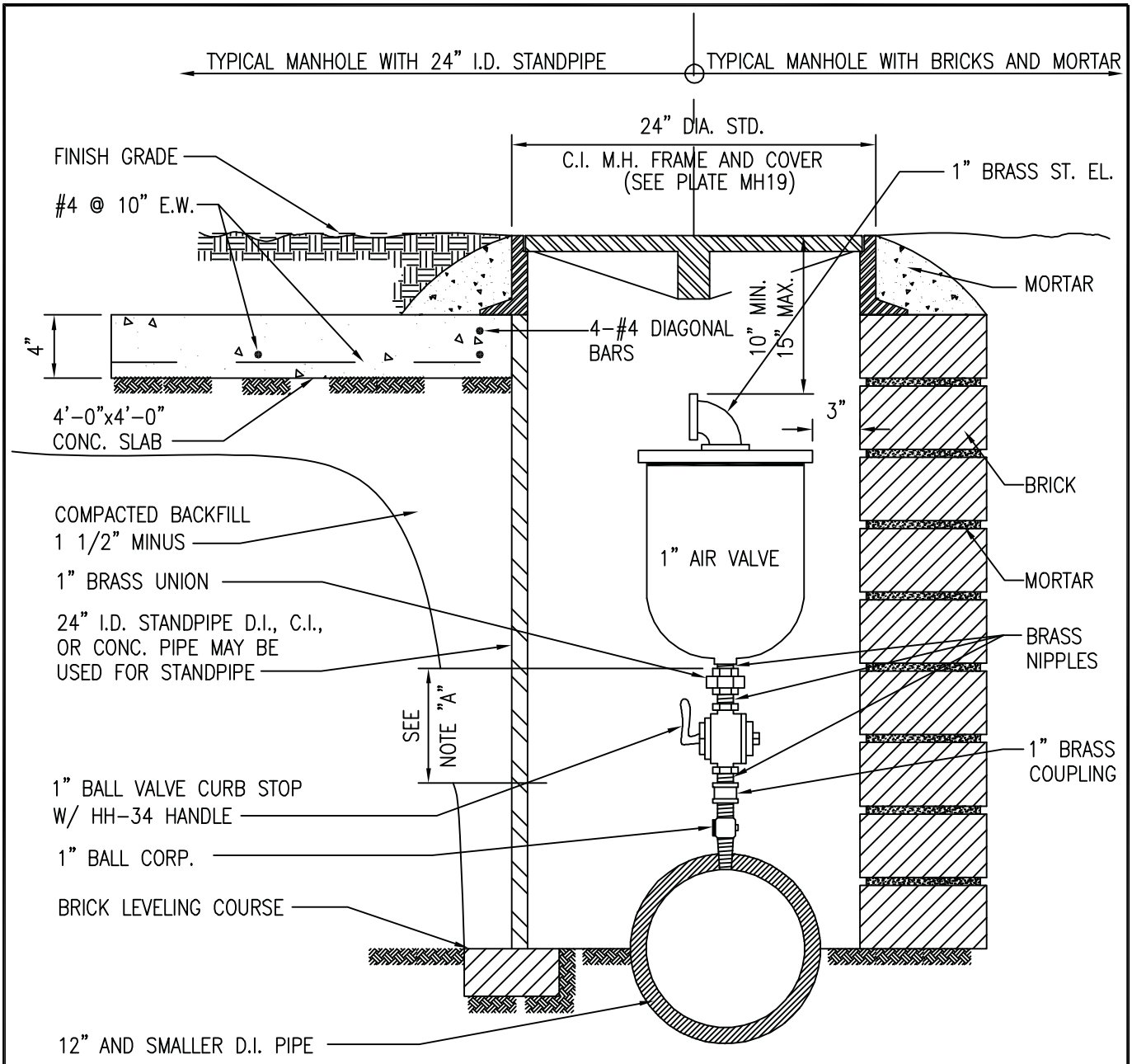
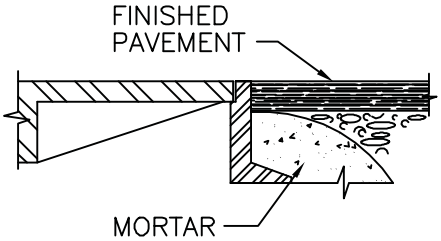
4. ALL OTHER CONDITIONS FOR PIPELINE INSTALLATIONS REMAIN AS SPECIFIED.
5. ONLY C.I. FITTINGS SHALL BE USED FOR ALL BENDS, REDUCERS, ETC. WITH PVC ENDS OR MJ ENDS.

2002	
REVISION	

KAUAI	**TYP. PVC WATERLINE TRENCH** NON-PAVED AREA SCALE: NTS	STANDARD DETAILS	P13





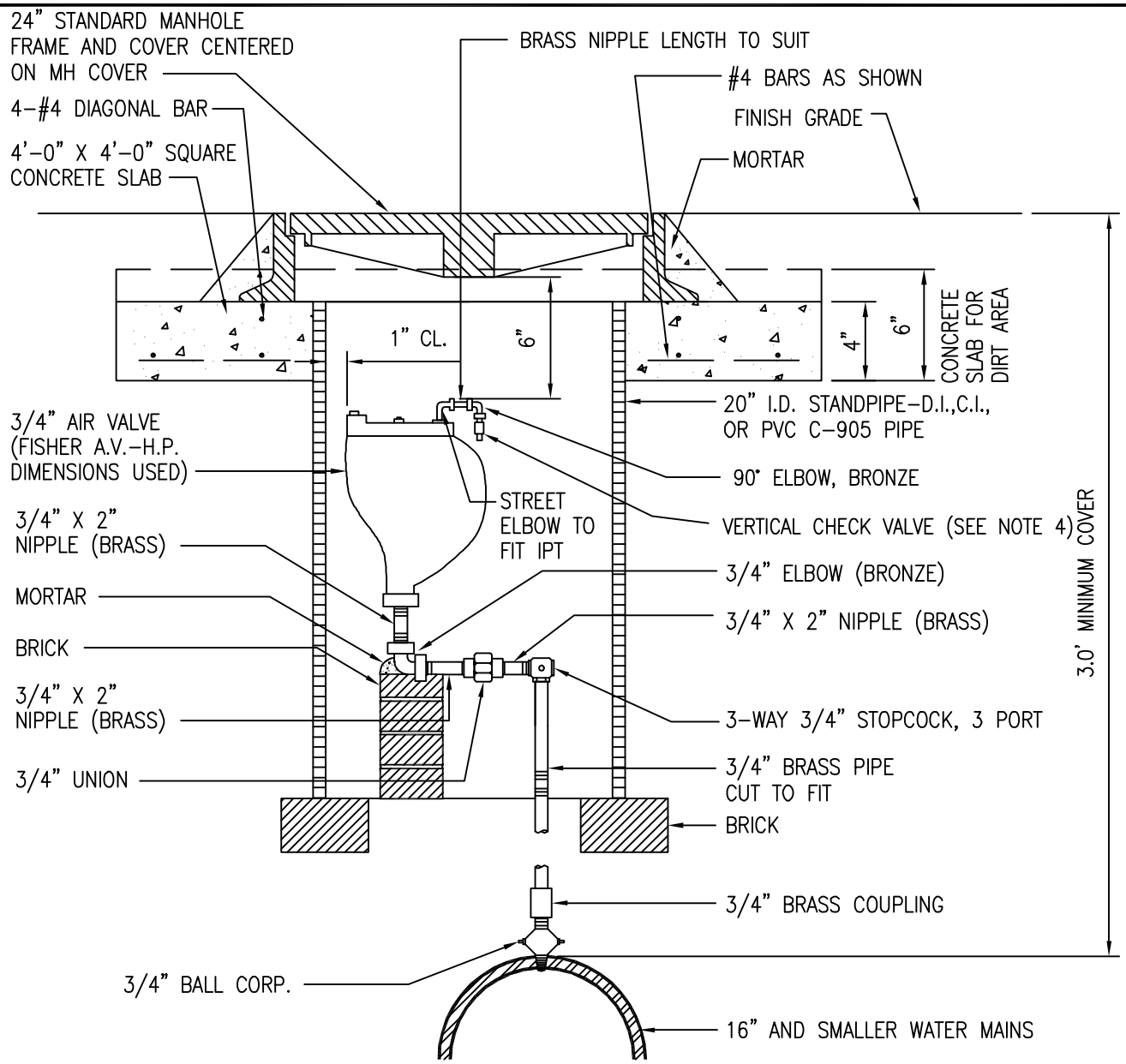
MANHOLE INSTALLATION WITHIN PAVED AREAS

NOTES:

A. ELIMINATE CURB STOP AND COUPLING WHERE PIPE BURY (TOP OF PIPE TO FINISH GRADE) IS LESS THAN 30 INCHES. CONNECT UNION TO BALL CORP. AND ADJUST OVERALL HEIGHT ACCORDINGLY W/ BRASS NIPPLE (CUT TO FIT).
B. FOR INSTALLATIONS WITHIN PAVED AREAS, SEE DETAIL AT RIGHT.

	2002
	REVISION

HAWAII	# 1" AIR VALVE UNIT DETAIL SCALE: NTS	STANDARD DETAILS	V1



STANDARD CONNECTION FOR 3/4" AIR RELIEF VALVE AT VALVE BOX

NOT TO SCALE

NOTE:

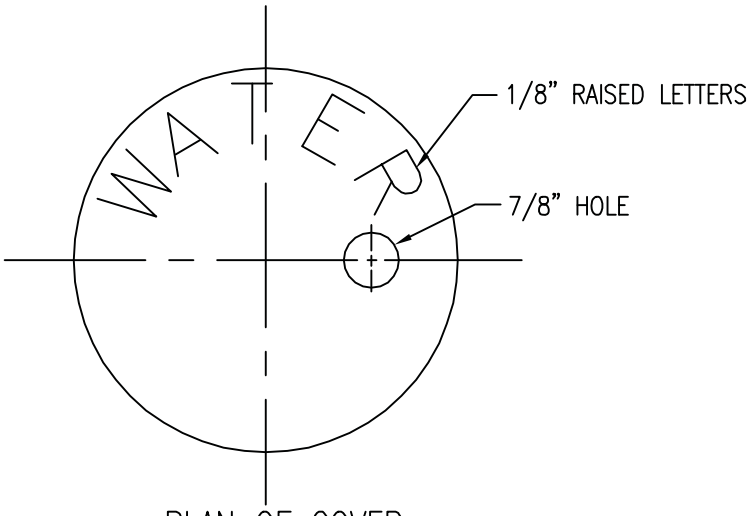
1. SEE V4 FOR INSTALLATION IN MANHOLES.
2. CONCRETE SHALL BE DWS 2500. REINFORCING STEEL SHALL BE GRADE 60.
3. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 2 FEET OF WATER ABOVE BOTTOM OF STANDPIPE PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998)
4. VERTICAL CHECK VALVE IS REQUIRED WHEN AIR VALVE IS IMMERSED IN WATER.
5. PROVIDE S.S. FABRIC SCREEN COVER FOR OUTLET PIPE.

	2002
	REVISION

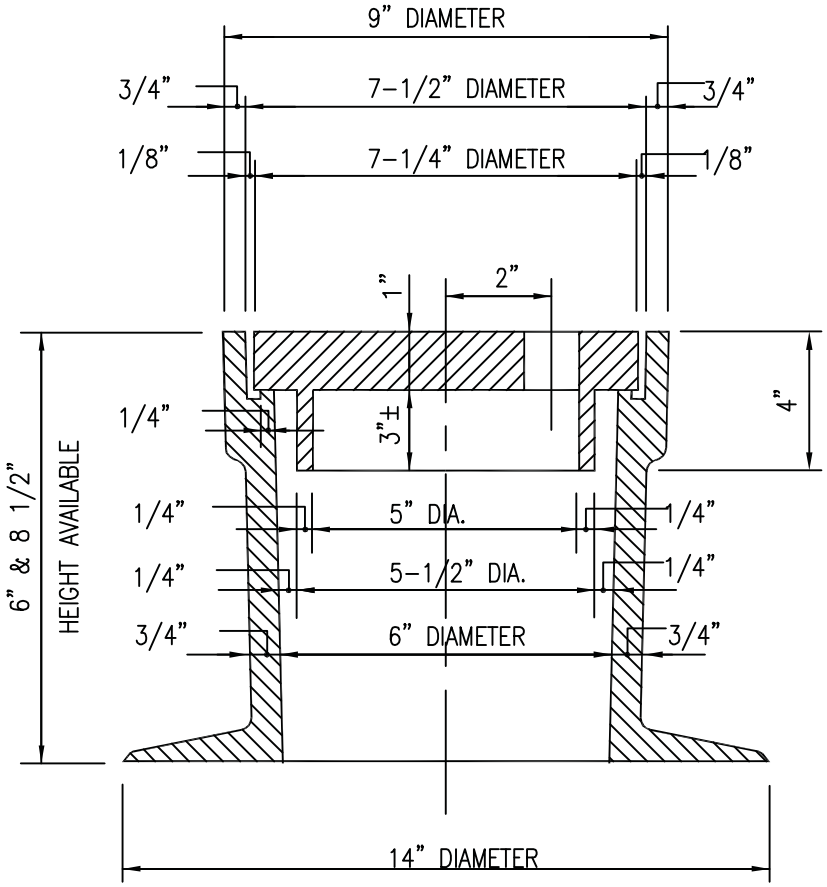
OAHU	**AIR RELIEF VALVE BOX** **FOR 3/4" AIR RELIEF VALVE** **SCALE: NTS**	STANDARD DETAILS	V2

NOTE:

ALL CASTINGS SHALL BE MADE ACCURATELY TO THE DIMENSIONS SHOWN. SEAT ANC COVER SHALL BE MACHINED, NOT GROUND TO SECURE FLAT AND TRUE SURFACES. THE COVER SHALL NOT RATTLE IN ANY POSITION.



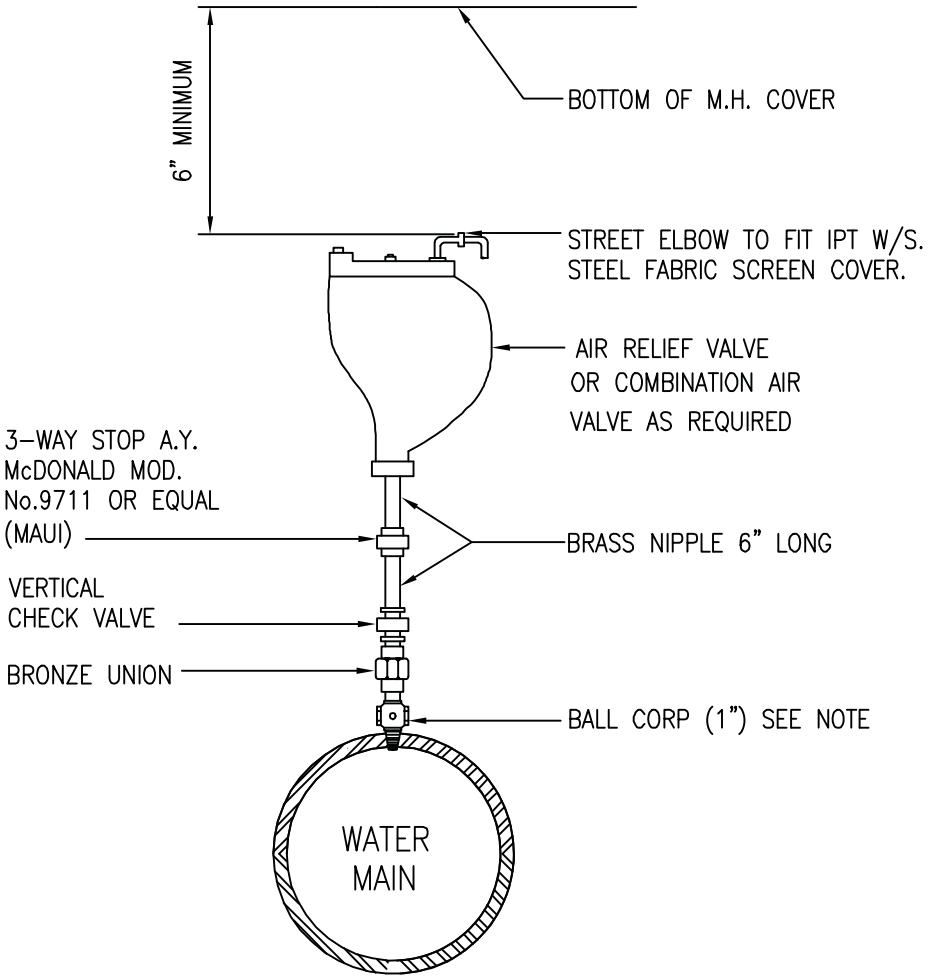
PLAN OF COVER



SECTION

2002
REVISION

KAUAI OAHU MAUI	VALVE FRAME & COVER CAST IRON, 6" SIZE SCALE: NTS	STANDARD DETAILS	V3



STANDARD CONNECTION FOR AIR RELIEF VALVE

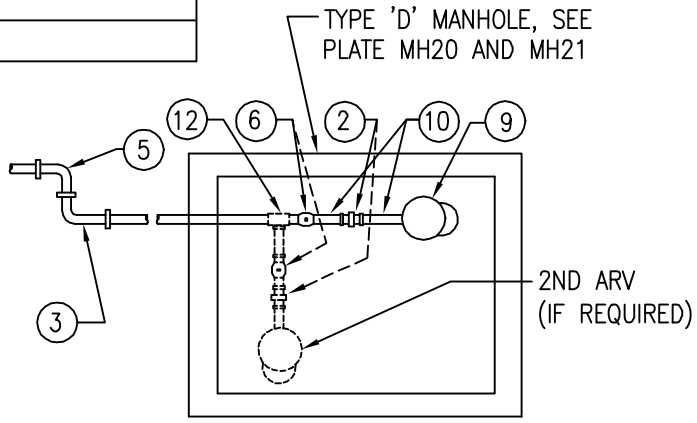
NOTE:

1. FOR 2" AIR RELIEF VALVE, SIZE OF BALL CORP., UNION, VERTICAL CHECK VALVE AND NIPPLE SHALL BE 2".
2. PROVIDE TYPE "F" MANHOLE V23 FOR BURIED INSTALLATION. (MAUI ONLY)
3. INSTALL PRECAST TYPE B OR TYPE C MANHOLE FOR VALVES (OAHU ONLY)
4. FOR COMBINATION AIR VALVE, IMMERSED INSTALLATION NOT PERMITTED.

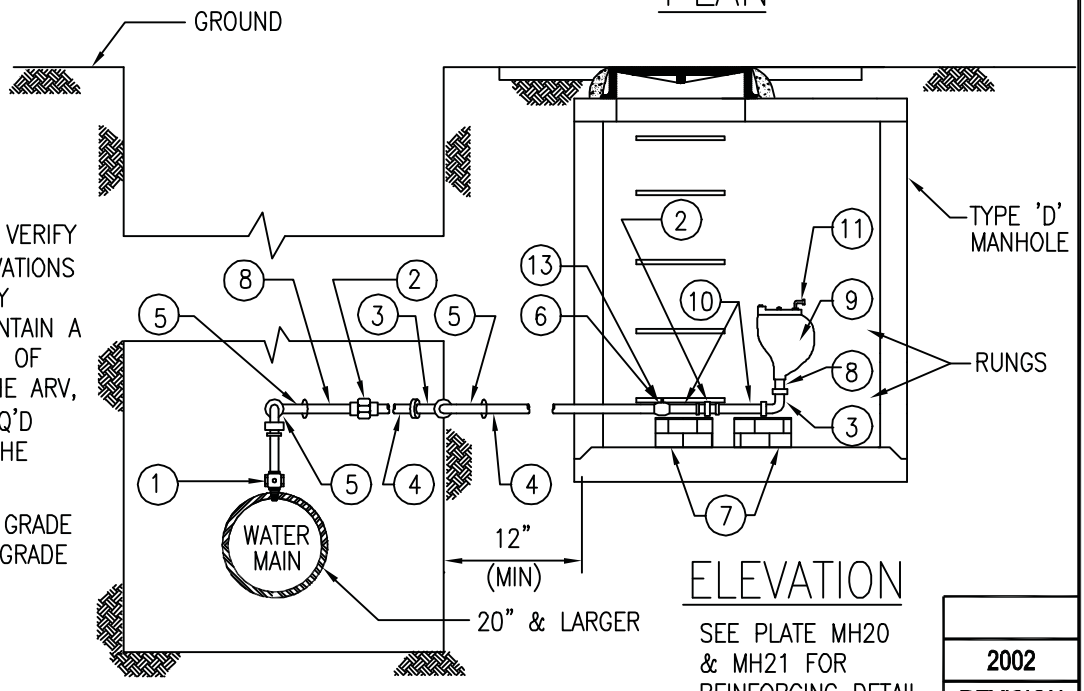
			2002 REVISION
OAHU MAUI	AIR RELIEF VALVE CONNECTION IN MANHOLE SCALE: NTS	STANDARD DETAILS	V4

LIST OF MATERIALS			
ITEM	NO. REQ. FOR 1 ARV	NO. REQ. FOR 2 ARVS	DESCRIPTION
1	1	1	2" BALL CORPORATION
2	2	3	2" UNION, BRONZE
3	2	4	2" 90° ELBOW, BRONZE
4	2	5	2" BRASS PIPE, CUT TO FIT
5	3	3	2" STREET ELBOW
6	1	2	2" BALL STOP
7	2	4	BRICK SUPPORT
8	1	2	2" DIA. x 4" NIPPLE, BRASS
9	1	2	2" AIR RELIEF VALVE
10	4	8	2" DIA. x 4" NIPPLE, BRASS
11	1	2	STREET ELBOW TO FIT IPT **
12	0	1	2" x 2" TEE, BRASS
*13	1	2	3-WAY STOP

* FOR MAUI ONLY



PLAN



ELEVATION

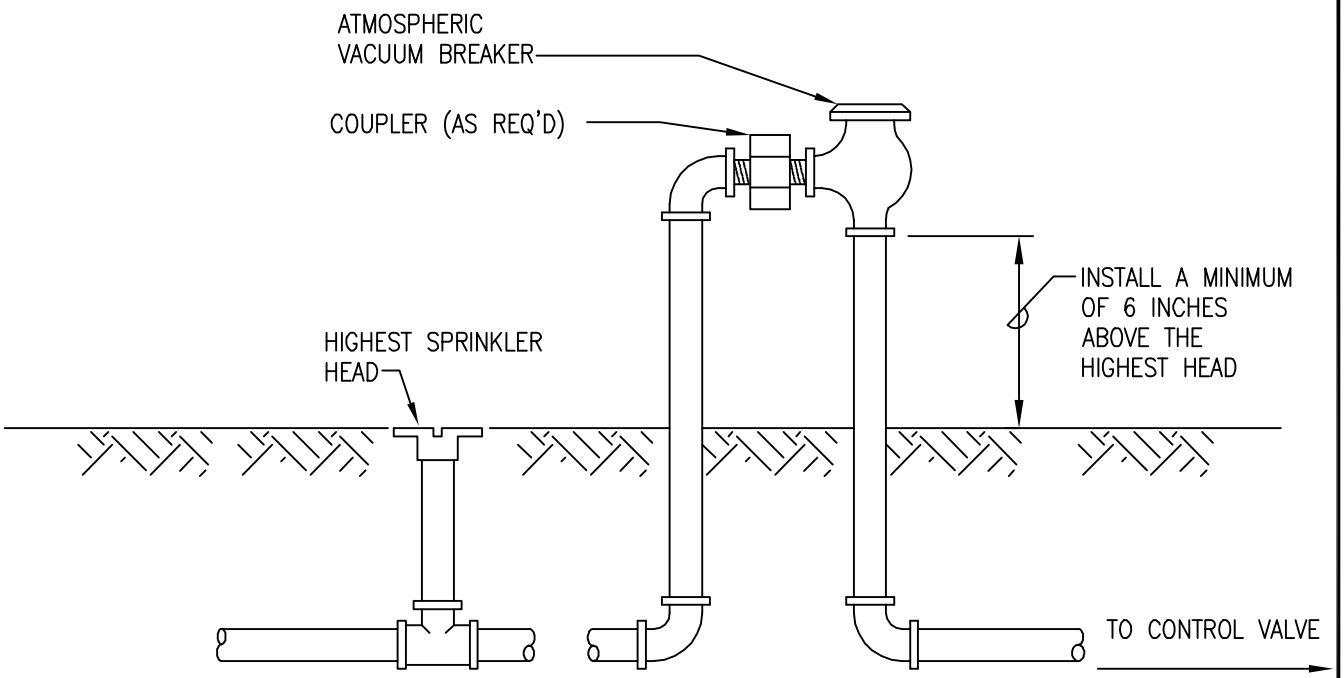
SEE PLATE MH20 & MH21 FOR REINFORCING DETAIL

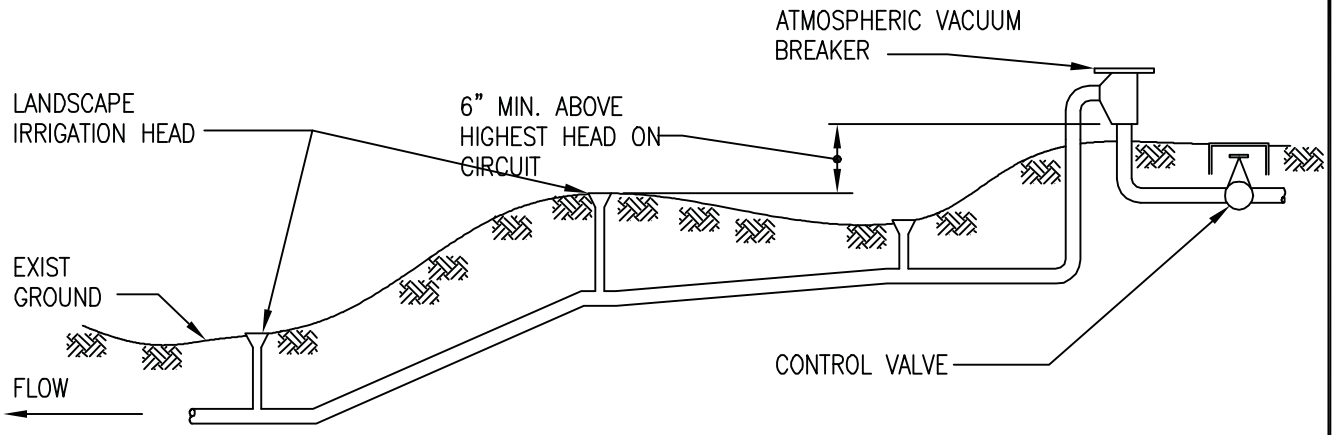
NOTE:

1. DESIGN ENGINEER TO VERIFY ALL DIMENSIONS/ELEVATIONS AND MAKE NECESSARY ADJUSTMENTS TO MAINTAIN A 0 TO POSITIVE SLOPE OF LATERAL GOING TO THE ARV, AND PROVIDE ALL REQ'D CLEARANCES INSIDE THE MANHOLE.
2. INSTALL MANHOLE AT GRADE HIGHER THAN FINISH GRADE ALONG MAIN.

2002
REVISION

KAUAI OAHU MAUI	OFFSET AIR RELIEF VALVE FOR 20" OR LARGER MAINS SCALE: NTS	STANDARD DETAILS	V5



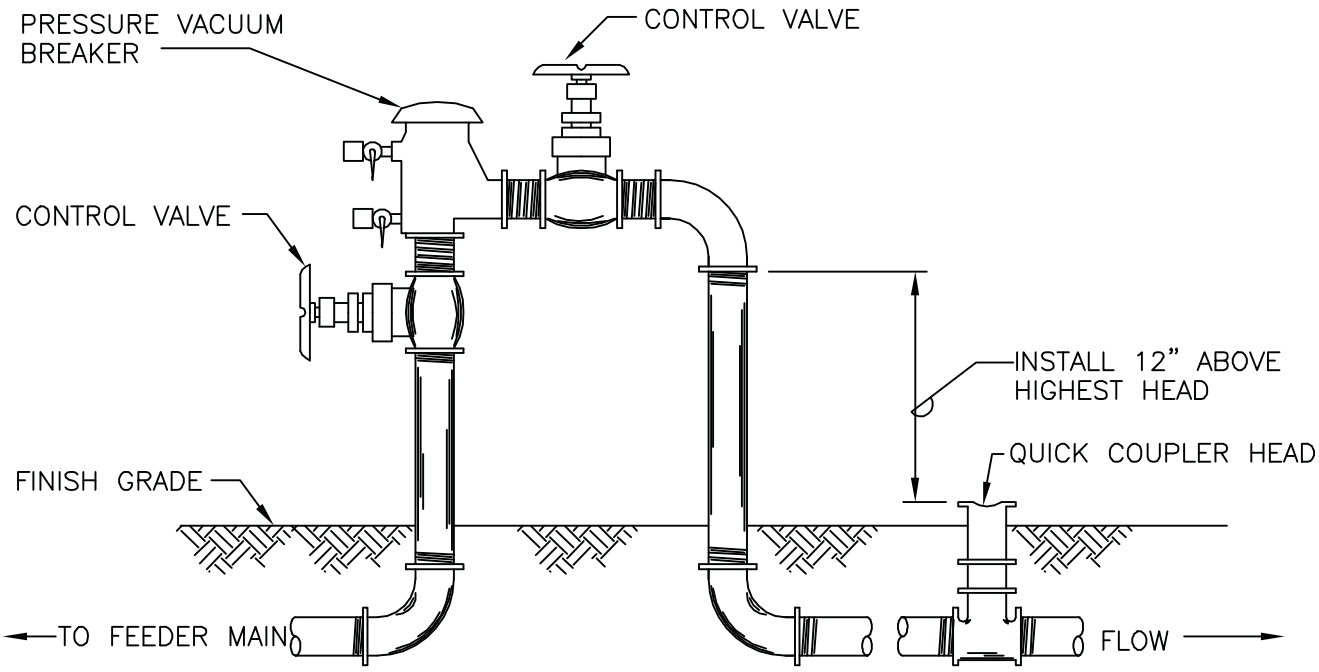


NOTE:

1. AN ATMOSPHERIC VACUUM BREAKER SHALL BE INSTALLED ON THE DISCHARGE SIDE OF THE LAST CIRCUIT CONTROL VALVE.
2. NO CHEMICAL ADDITION, EITHER BY INJECTION OR SIPHONING, WILL BE PERMITTED.
3. FOR USE ONLY ON THOSE CIRCUITS, WITH UNDERGROUND SPRAY, SHRUBBERY SPRAY, BUBBLE HEADS, OR OTHER SIMILARLY CONSTRUCTED IRRIGATION HEADS.
4. NOT FOR USE ON CIRCUITS WITH QUICK COUPLING VALVES OR SUBSURFACE IRRIGATION SYSTEMS.

2002	
REVISION	

OAHU MAUI	**ATMOSPHERIC VACUUM BREAKER** **LANDSCAPE IRRIGATION DETAIL** **SCALE: NTS**	STANDARD DETAILS	V6

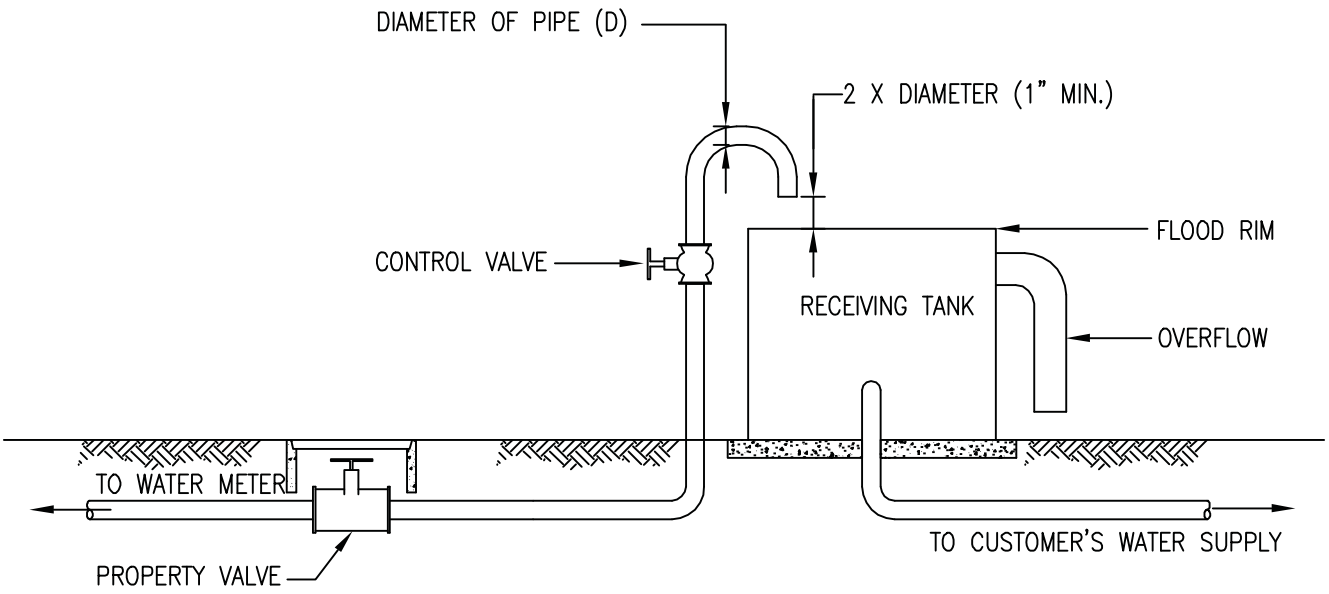


NOTES:

1. PRESSURE VACUUM BREAKER SHALL BE INSTALLED AT THE BEGINNING OF EACH CIRCUIT.
2. INJECTION OR SIPHONING OF CHEMICALS AND OTHER TOXIC OR OBJECTIONABLE SUBSTANCES INTO THE IRRIGATION SYSTEM WILL NOT BE PERMITTED.
3. FOR USE ON CIRCUITS WITH QUICK COUPLING VALVES, SUBSURFACE IRRIGATION SYSTEMS, OR SWIMMING POOLS.

	2002
	REVISION

OAHU MAUI	**PRESSURE VACUUM BREAKER** LANDSCAPE IRRIGATION SCALE: NTS	STANDARD DETAILS	V7



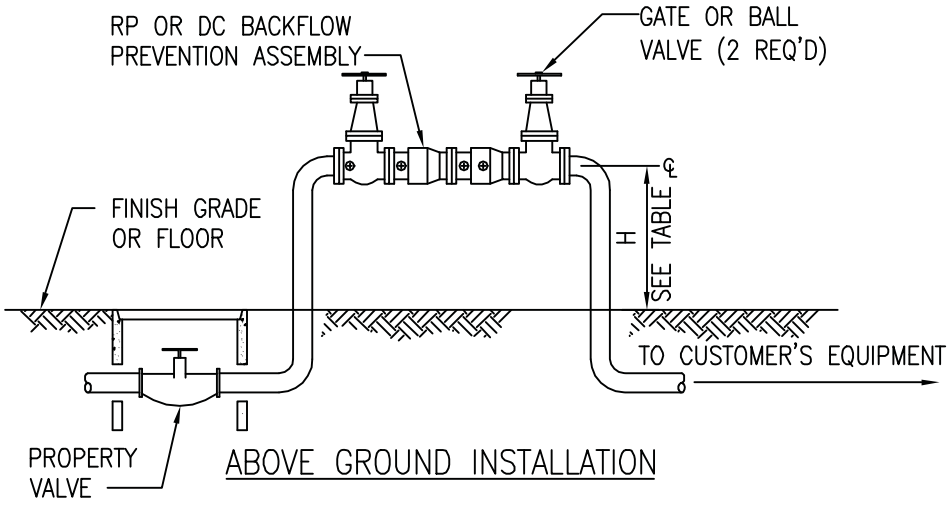
NOTE:

1. MAY BE USED AS AN ALTERNATIVE FOR THE REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION DEVICE.
2. NO CONNECTIONS OR TEES BETWEEN METER AND TANK IS ALLOWED.
3. THE AIR GAP SHALL BE LOCATED ON PRIVATE PROPERTY AS CLOSE TO THE METER AS PHYSICALLY POSSIBLE

2002	
REVISION	

KAUAI OAHU MAUI HAWAII	**AIR GAP** **TYPICAL DETAIL** SCALE: NTS	STANDARD DETAILS	W8

SIZE (INCHES)	H (INCHES)
3/4 TO 1-1/2	18
2 TO 3	24
4 TO 6	30
8 TO 10	36



ABOVE GROUND INSTALLATION

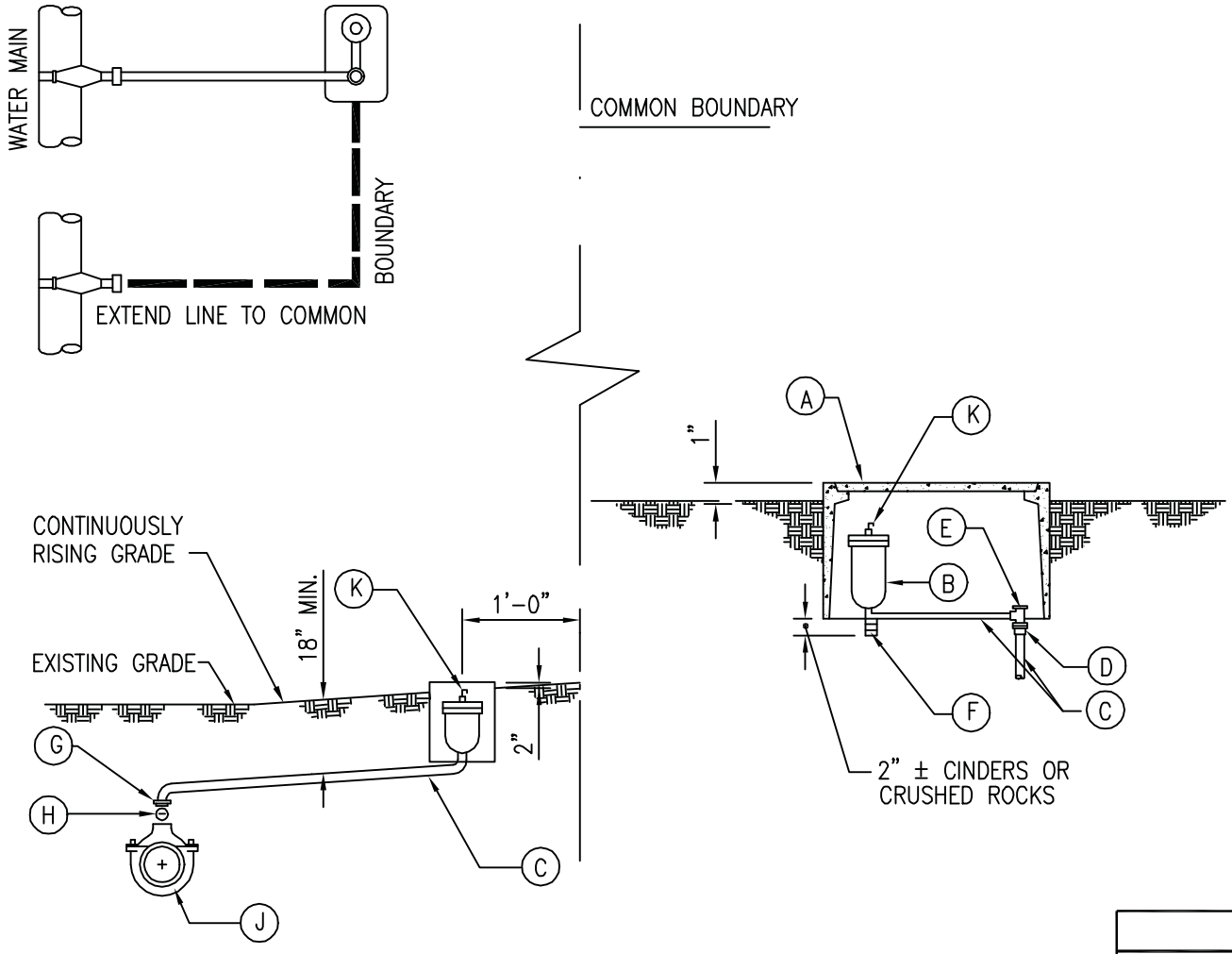
NOTES:

1. ANY CONNECTIONS OR TEES BETWEEN METER AND BACKFLOW PREVENTION ASSEMBLY MUST HAVE WRITTEN APPROVAL BY THE MANAGER.
2. A RP OR DC BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED WHENEVER THE MANAGER DEEMS NECESSARY TO PREVENT POTENTIAL CONTAMINATION TO THE PUBLIC WATER SYSTEM. THE TYPE OF BACKFLOW PREVENTION ASSEMBLY SHALL BE DETERMINED BY THE MANAGER.
3. AT NO TIME SHALL THE BOTTOM OF THE BACKFLOW PREVENTION ASSEMBLY BE LESS THAN 12" ABOVE GROUND, FLOOR, OR FLOOD LEVEL NOR MORE THAN 48" ABOVE AFOREMENTIONED GRADES.
4. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED AFTER THE WATER METER PRIOR TO ANY TEES AND BRANCHES.
5. WHENEVER BACKFLOW PREVENTION ASSEMBLY IS LOCATED 5' OR MORE FROM THE WATER METER, INSTALL CONCRETE JACKET BETWEEN WATER METER AND BACKFLOW PREVENTION ASSEMBLY TO AVOID POTENTIAL CROSS CONNECTION.
6. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED PRIOR TO ISSUANCE OF WATER METER OR ACTIVATION OF WATER SERVICE.
7. REFER TO DIVISION 100, SECTION 107.1 FOR ADDITIONAL REQUIREMENTS AND TYPE OF BACKFLOW PREVENTER NEEDED.

2002
REVISION

KAUAI OAHU MAUI HAWAII	**BACKFLOW PREVENTER** **TYPICAL INSTALLATION** **SCALE: NTS**	STANDARD DETAILS	V9

ITEM	MATERIALS LIST
A	TYPE "X" METER BOX W/ CAST IRON COVER
B	1" PRESSURE AIR RELIEF VALVE
C	1" COPPER (TYPE "K", SOFT)
D	1" COPPER MALE ADAPTER
E	ANGLE BALL VALVE (FORD BAII-344W OR APPROVED EQUAL)
F	2" X 4" X 8" BRICK SADDLE
G	PACK JOINT COUPLING (FORD C14-44 OR APPROVED EQUAL)
H	1" CC X 1" MPT BALL CORPORATION
J	BRONZE SERVICE SADDLE W/ 1" CC TAP FOR USE ON C-900 PVC PIPE AND DUCTILE IRON PIPE OR PVC TEE W/ 1" PVC BUSING FOR USE ON 3" AND 4" PVC PIPE. SMITH-BLAIR TYPE 342 PLASTIC SERVICE SADDLE W/ 1" CC TAP FOR 3" AND 4" PVC PIPE.
K	ELBOWS AND SCREEN



2002
REVISION

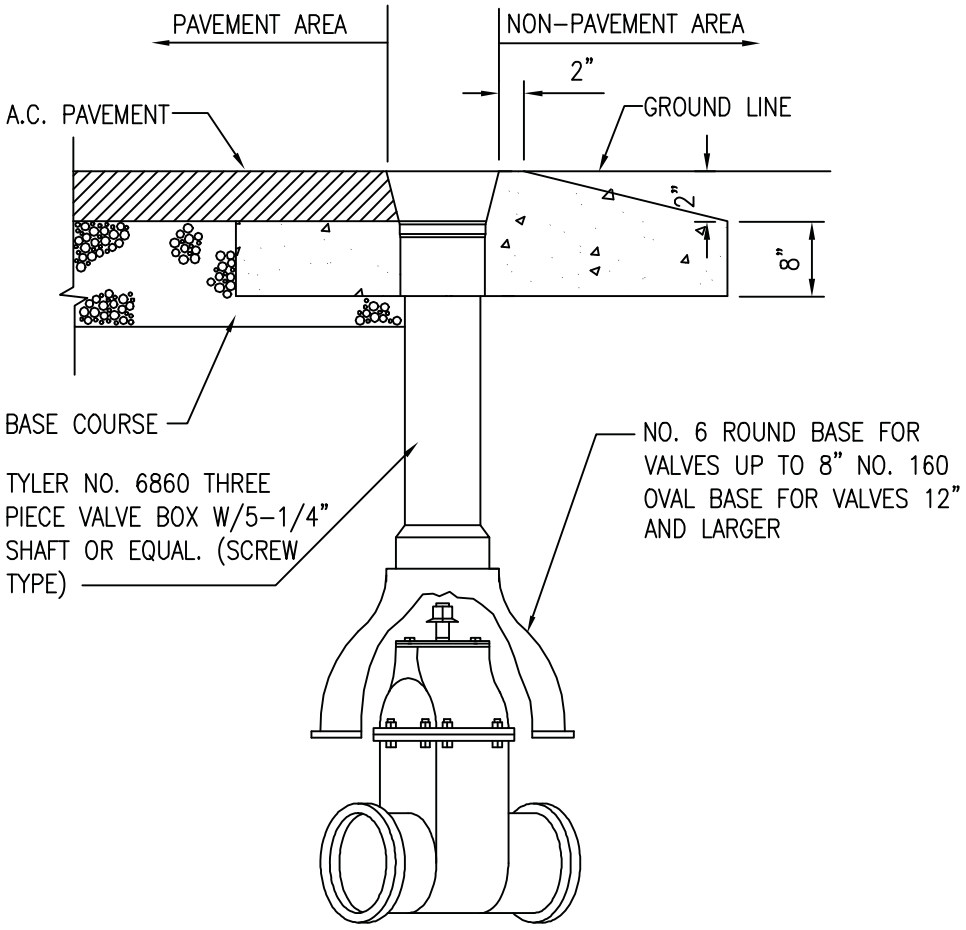
KAUAI

AUTOMATIC PRESSURE RELIEF VALVE

SCALE: NTS

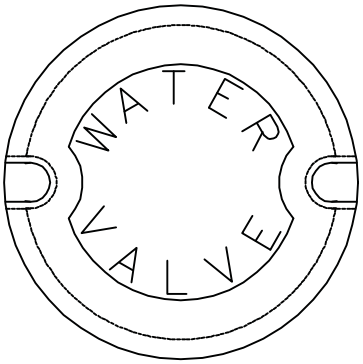
STANDARD DETAILS

V10



PROFILE

FOR GATE VALVE, BEVEL GEARED GATE VALVE AND BUTTERFLY VALVES



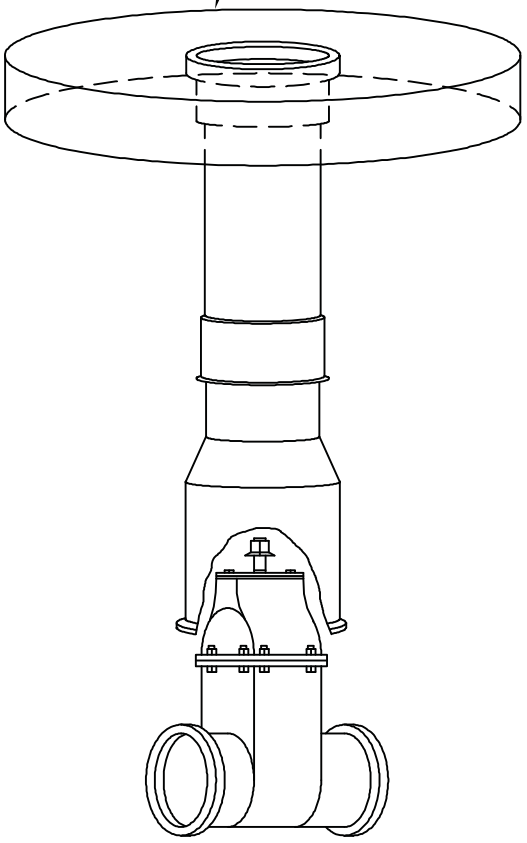
COVER

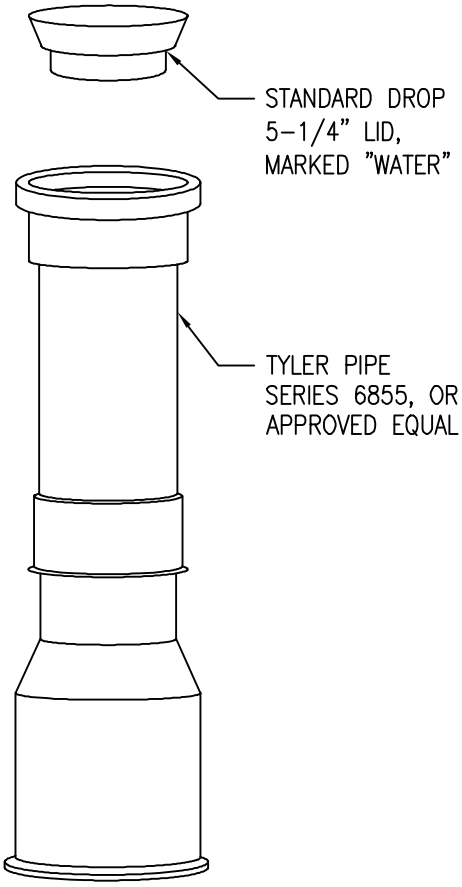
GENERAL NOTES:

1. PAVEMENT AREA: 2'-0" DIA. OR 2'-0" X 2'-0" SQUARE X 4" THICK CONC. SETTLEMENT SLAB.
2. NON-PAVEMENT AREA: 3'-0" DIA. OR 3'-0" X 3'-0" SQUARE X4" THICK CONC. SETTLEMENT SLAB.
3. COVER TO BE DROP LID COVER.

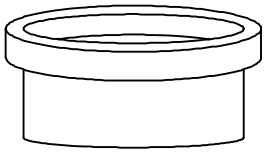
	2002
	REVISION

KAUAI	CAST IRON VALVE BOX DETAILS SCALE: NTS	STANDARD DETAILS	V11

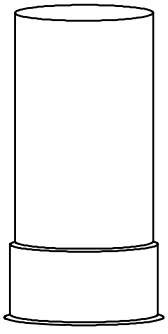




TWO-PIECE
VALVE BOX,
HEIGHT TO SUIT



1 1/2" / 2 1/4"
VALVE BOX RISER



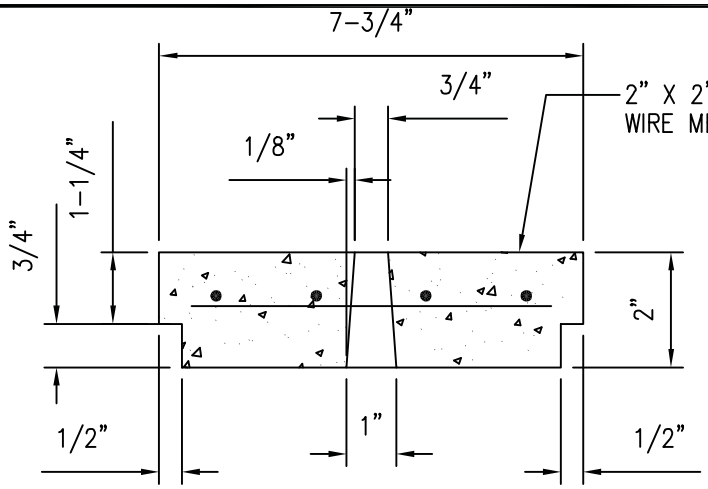
EXTENSION PIECE
60-A

NOTES:

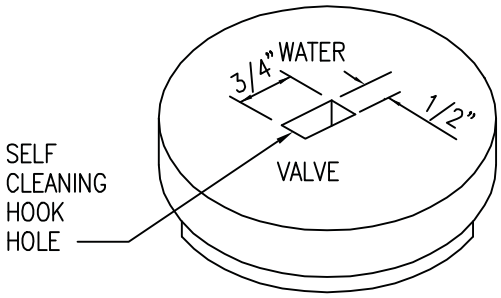
1. VALVE BOX ASSEMBLY TO BE CAST IRON.
2. MODEL NUMBERS REFER TO TYLER PIPE CATALOG.
3. MAXIMUM 4' DEPTH TO VALVE OPERATOR NUT.

	2002
	REVISION

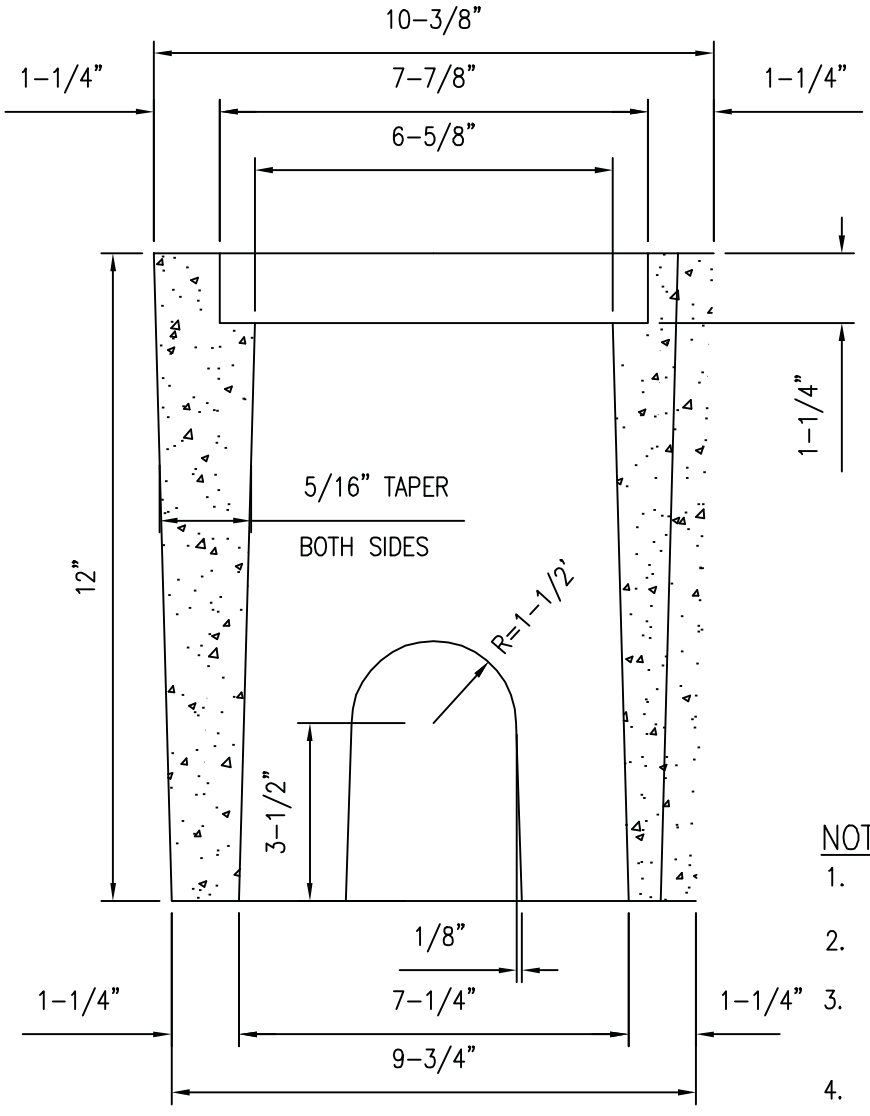
MAUI	**6" SLIDING VALVE BOX ASSEMBLY** SCALE: NTS	STANDARD DETAILS	V12



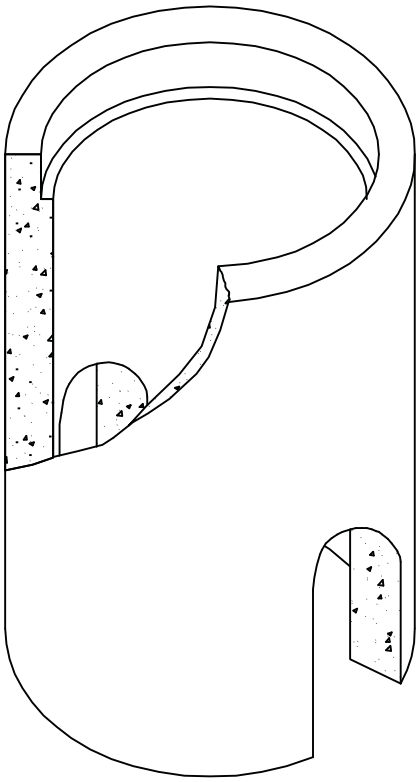
SECTION OF COVER



CONCRETE COVER



SECTION OF BOX



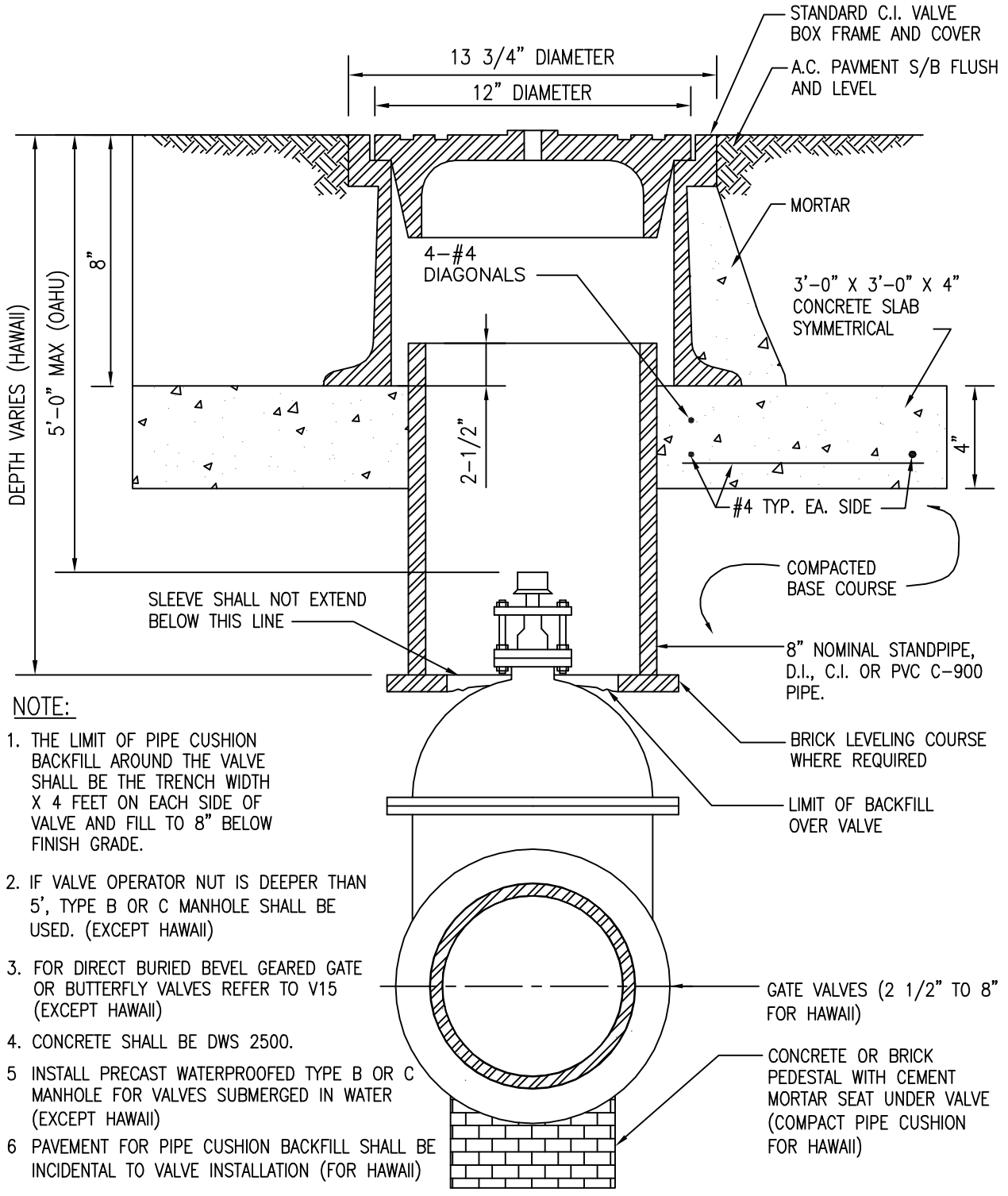
CONCRETE BOX

NOTE:

1. ACCOMMODATES 1" & 1-1/2" VALVES.
2. FOR 2" & 2-1/2" VALVES, USE TYPE "B" METER BOX.
3. FOR OAHU AND HAWAII, FIBER REINFORCED CONCRETE IS ALLOWED.
4. FOR VALVES INSTALLED IN ROADWAYS, INSTALL VALVE BOXES, SEE DETAIL V14 (FOR OAHU)

2002
REVISION

KAUAI OAHU HAWAII	TYPE "A" VALVE BOX SCALE: NTS	STANDARD DETAILS	V13

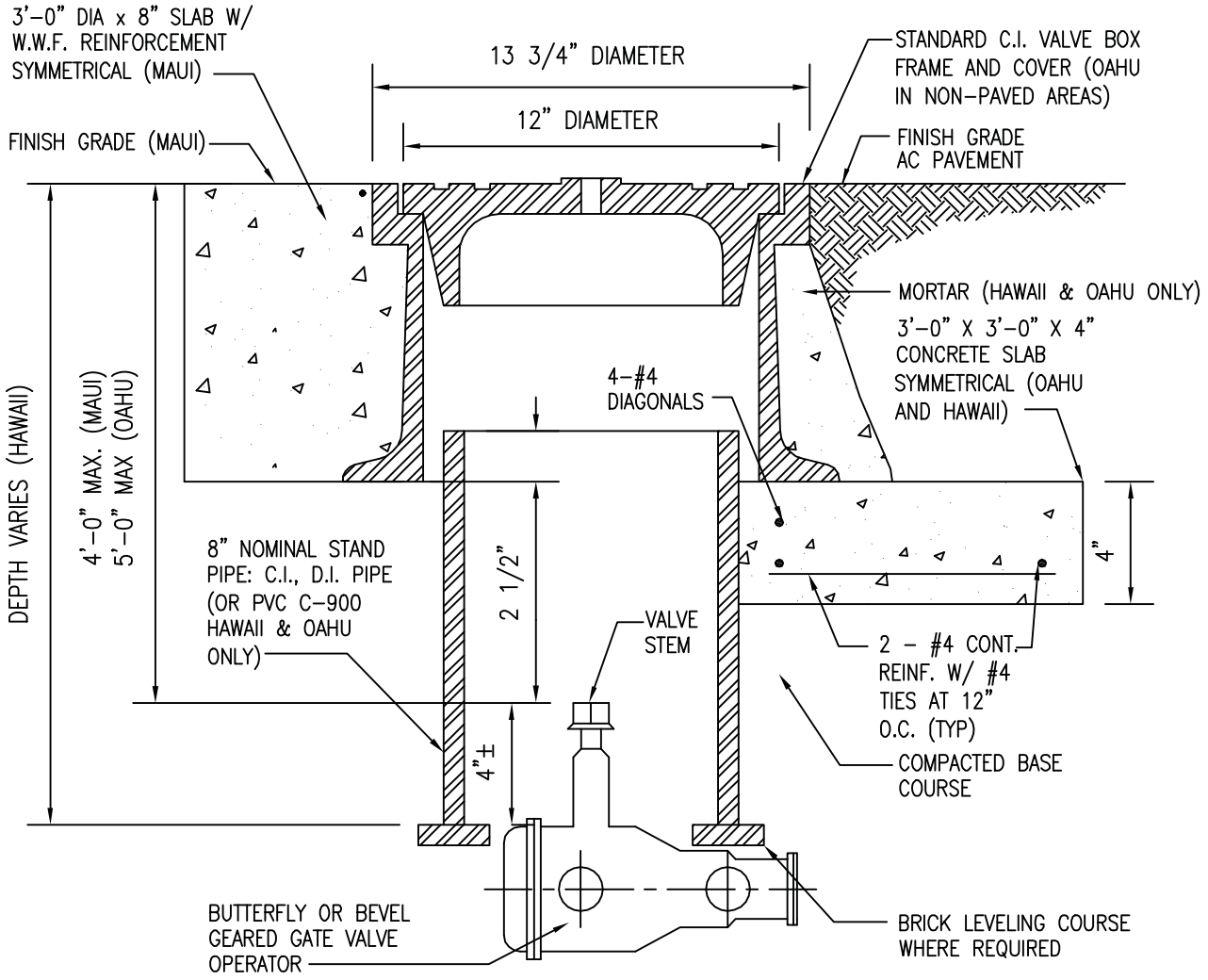


NOTE:

1. THE LIMIT OF PIPE CUSHION BACKFILL AROUND THE VALVE SHALL BE THE TRENCH WIDTH X 4 FEET ON EACH SIDE OF VALVE AND FILL TO 8" BELOW FINISH GRADE.
2. IF VALVE OPERATOR NUT IS DEEPER THAN 5', TYPE B OR C MANHOLE SHALL BE USED. (EXCEPT HAWAII)
3. FOR DIRECT BURIED BEVEL GEARED GATE OR BUTTERFLY VALVES REFER TO V15 (EXCEPT HAWAII)
4. CONCRETE SHALL BE DWS 2500.
5. INSTALL PRECAST WATERPROOFED TYPE B OR C MANHOLE FOR VALVES SUBMERGED IN WATER (EXCEPT HAWAII)
6. PAVEMENT FOR PIPE CUSHION BACKFILL SHALL BE INCIDENTAL TO VALVE INSTALLATION (FOR HAWAII)

2002
REVISION

OAHU HAWAII	12" VALVE BOX INSTALLATION FOR GATE VALVE SCALE: NTS	STANDARD DETAILS	V14

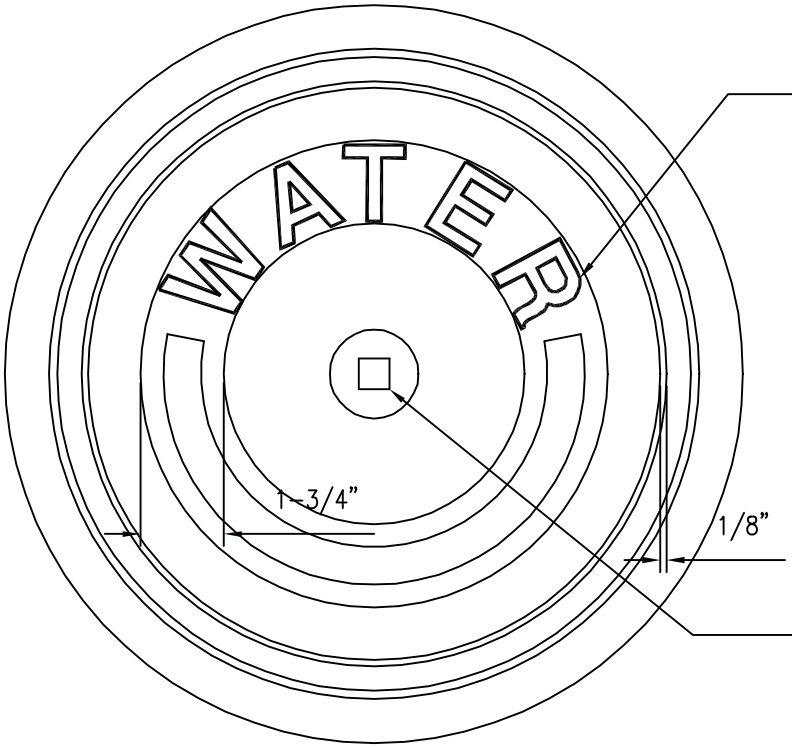


NOTE:

1. THE LIMIT OF PIPE CUSHION BACKFILL AROUND THE VALVE SHALL BE THE TRENCH WIDTH X 4 FEET ON EACH SIDE OF VALVE AND FILL TO 8" BELOW FINISH GRADE.
2. CONCRETE SHALL BE DWS 2500.
3. TWO VALVE BOXES REQUIRED PER BEVEL GEARED GATE VALVE WITH BY-PASS VALVE. APPLICABLE FOR DIRECT-BURIED BGGVS IN PAVED ROADWAYS AS APPROVED BY MANAGER. (OAHU ONLY)

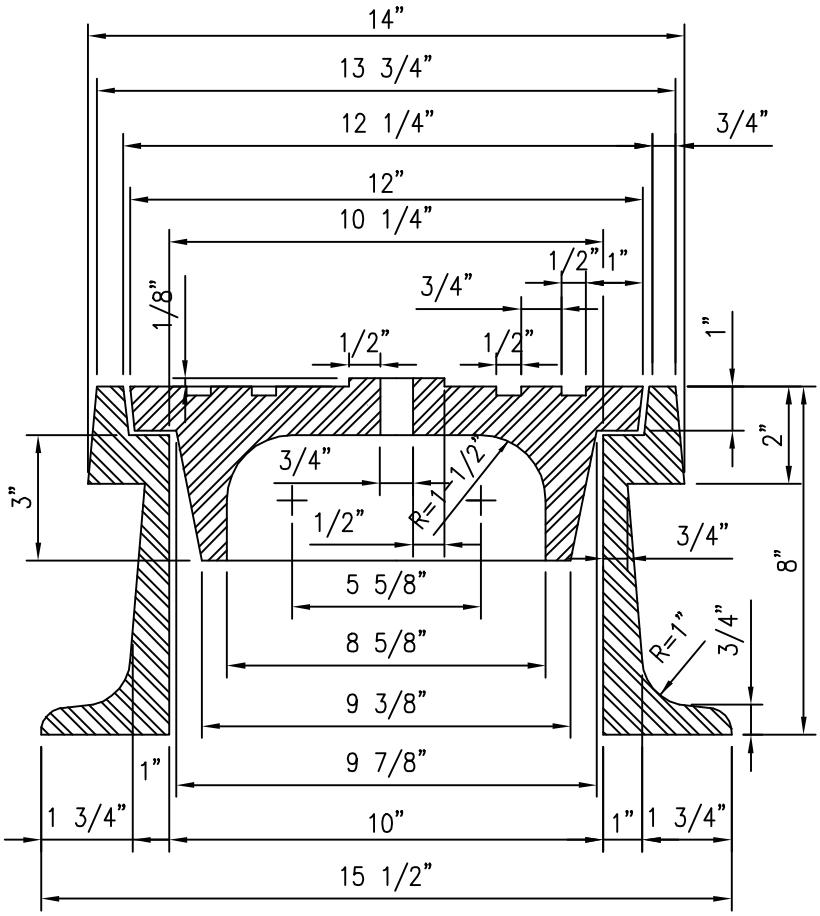
	2002
	REVISION

OAHU MAUI HAWAII	**12" VALVE BOX INSTALLATION** FOR VALVE OPERATORS SCALE: NTS	STANDARD DETAILS	V15



NOTE:

ALL CASTINGS SHALL BE MADE ACCURATELY TO THE DIMENSIONS SHOWN. SEAT AND COVER SHALL BE MACHINED, NOT GROUND TO SECURE FLAT AND TRUE SURFACES. THE COVER SHALL NOT RATTLE IN ANY POSITION.



SEE TABLE 200-9 FOR MINIMUM WEIGHT REQUIREMENTS

CAST IRON FRAME & COVER

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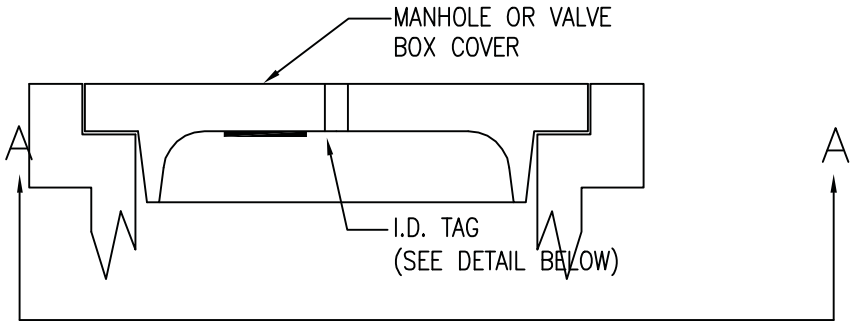
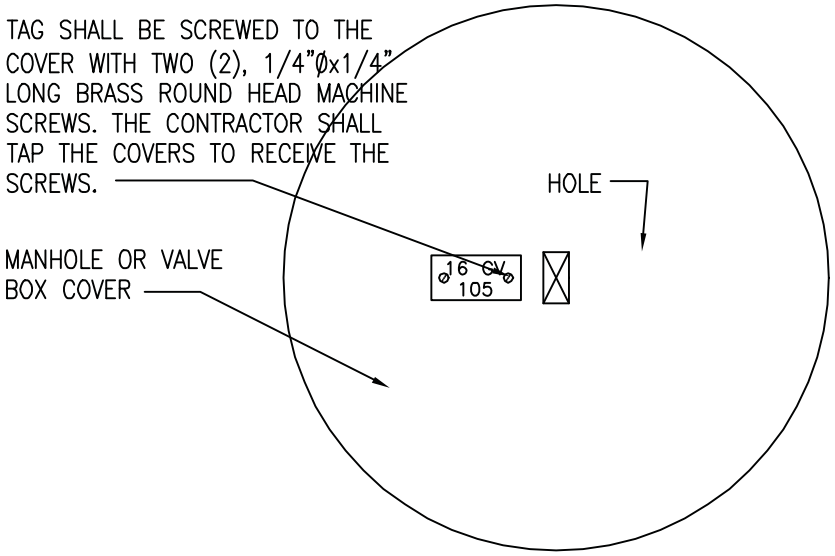
OAHU MAUI HAWAII	12" VALVE BOX FRAME & COVER SCALE: NTS	STANDARD DETAILS	V16



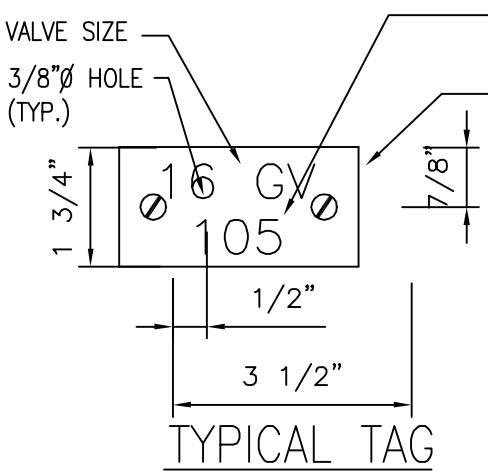
SECTION



SECTION A–A

NOTES:

1. THE CONTRACTOR SHALL VERIFY VALVE DATA WITH THE VALVE MANUFACTURER PRIOR TO STAMPING I.D. TAG.
2. I.D. TAG SHALL BE INSTALLED ON UNDERSIDE OF ALL NEW MANHOLE OR VALVE BOX COVER.
3. PAYMENT FOR THE FURNISHING AND INSTALLATION OF I.D. TAGS WILL NOT BE MADE DIRECTLY BUT SHALL BE INCLUDED IN THE UNIT PRICE BIDS FOR VALVES.



18 GAUGE (B&S) COMMERCIAL BRASS PLATE. ASTM B–16 #260

TYPICAL TAG

VALVE TYPE ABBREVIATIONS

GATE VALVE	GV
BEVEL GEARED GATE VALVE	BGGV
BUTTERFLY VALVE	BV

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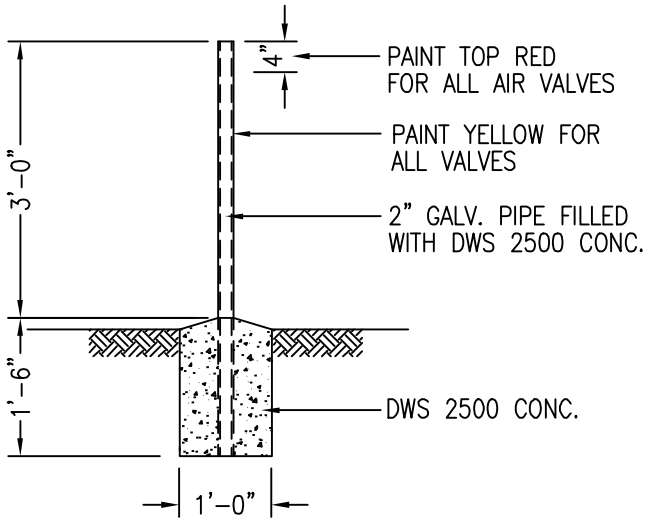
OAHU HAWAII	IDENTIFICATION TAG FOR MANHOLE OR VALVE BOX COVER SCALE: NTS	STANDARD DETAILS	V17



DETAIL OF VALVE MARKER

	2002
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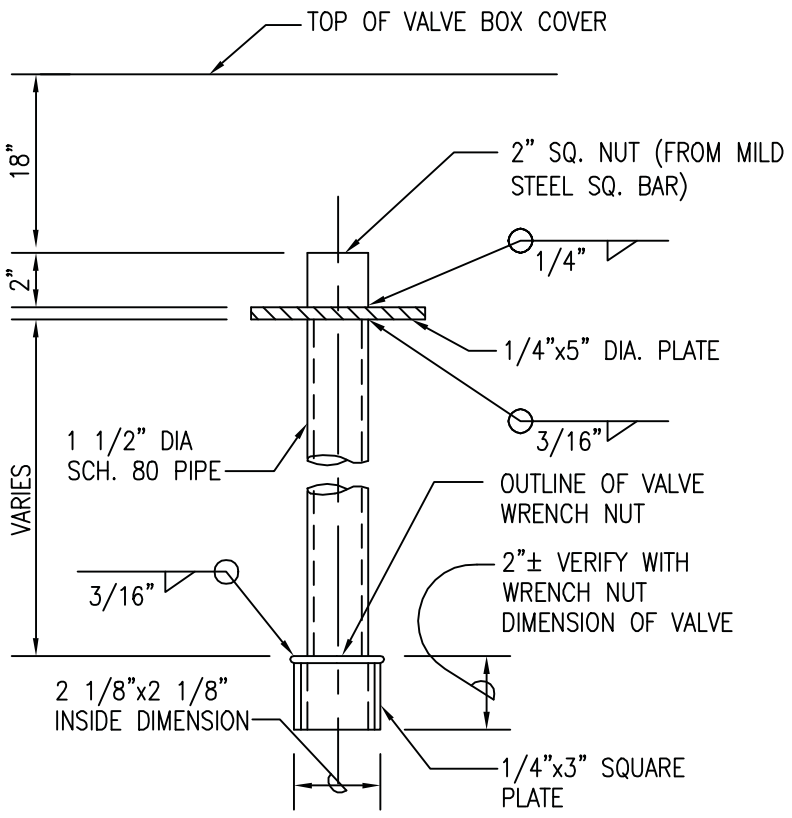
KAUAI OAHU MAUI	VALVE MARKER SCALE: NTS	STANDARD DETAILS	V18



VALVE NUT EXTENSION DETAIL

NOTE:

1. FURNISH AND INSTALL VALVE EXTENSION TO 18" FROM TOP OF VALVE BOX COVER.
2. VALVE EXTENSION SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
3. FOR VALVE OPERATORS DEEPER THAN 3.5' TO FINISH GRADE.

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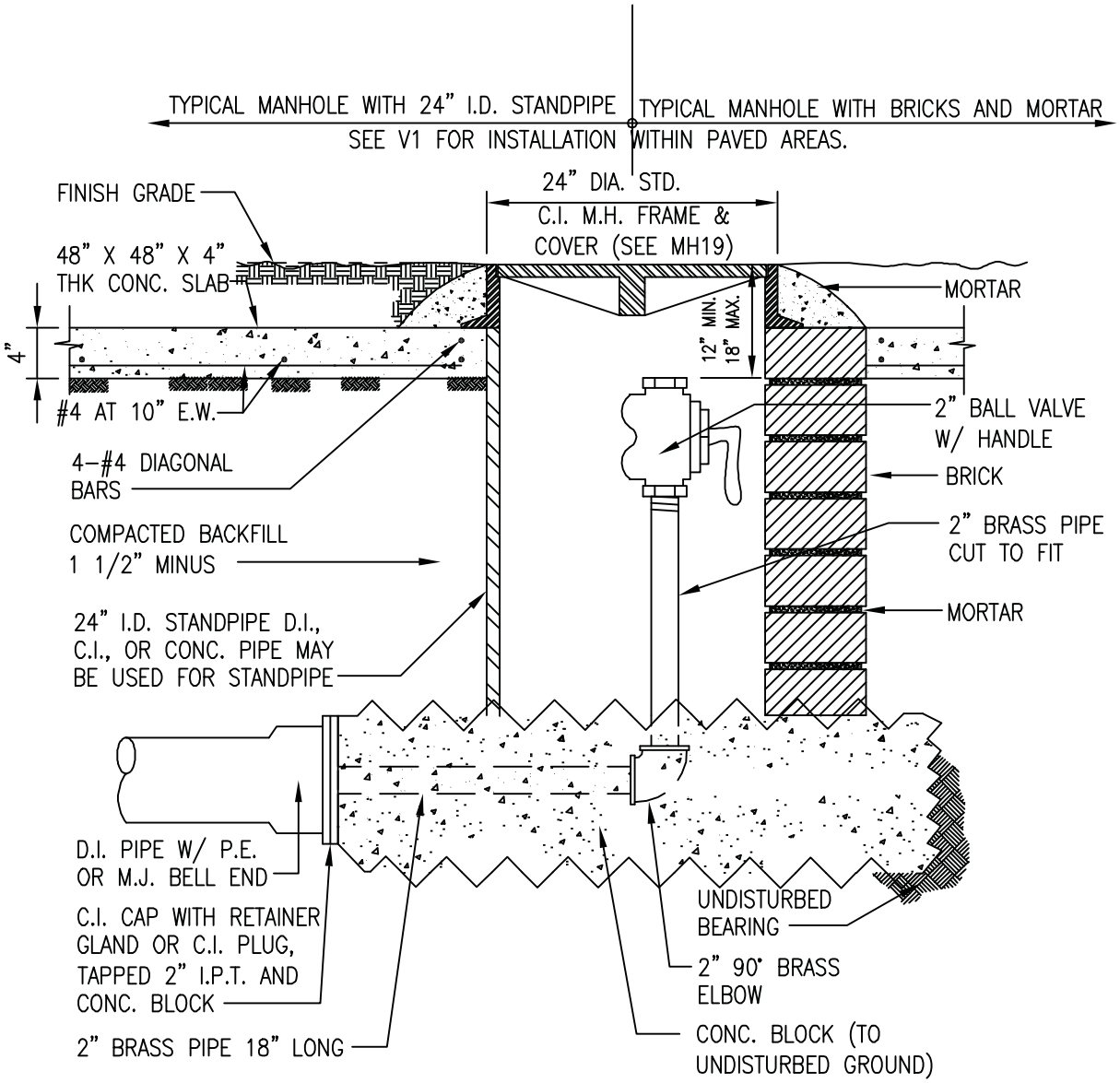
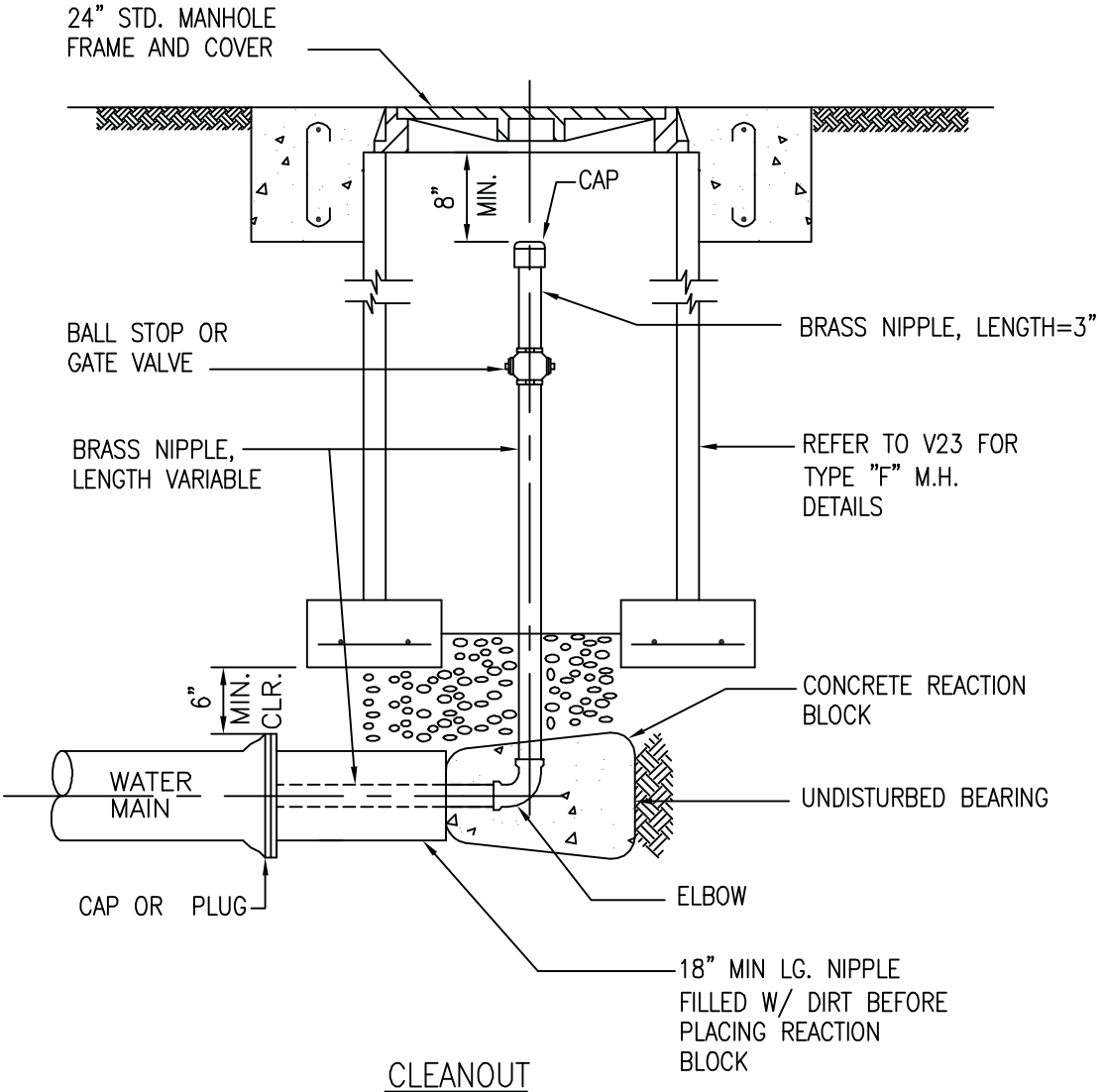
KAUAI MAUI HAWAII	**VALVE NUT EXTENSION** SCALE: NTS	STANDARD DETAILS	V19



	2002
	REVISION

HAWAII	# 2" CLEANOUT AT DEAD ENDS SCALE: NTS	STANDARD DETAILS	V20

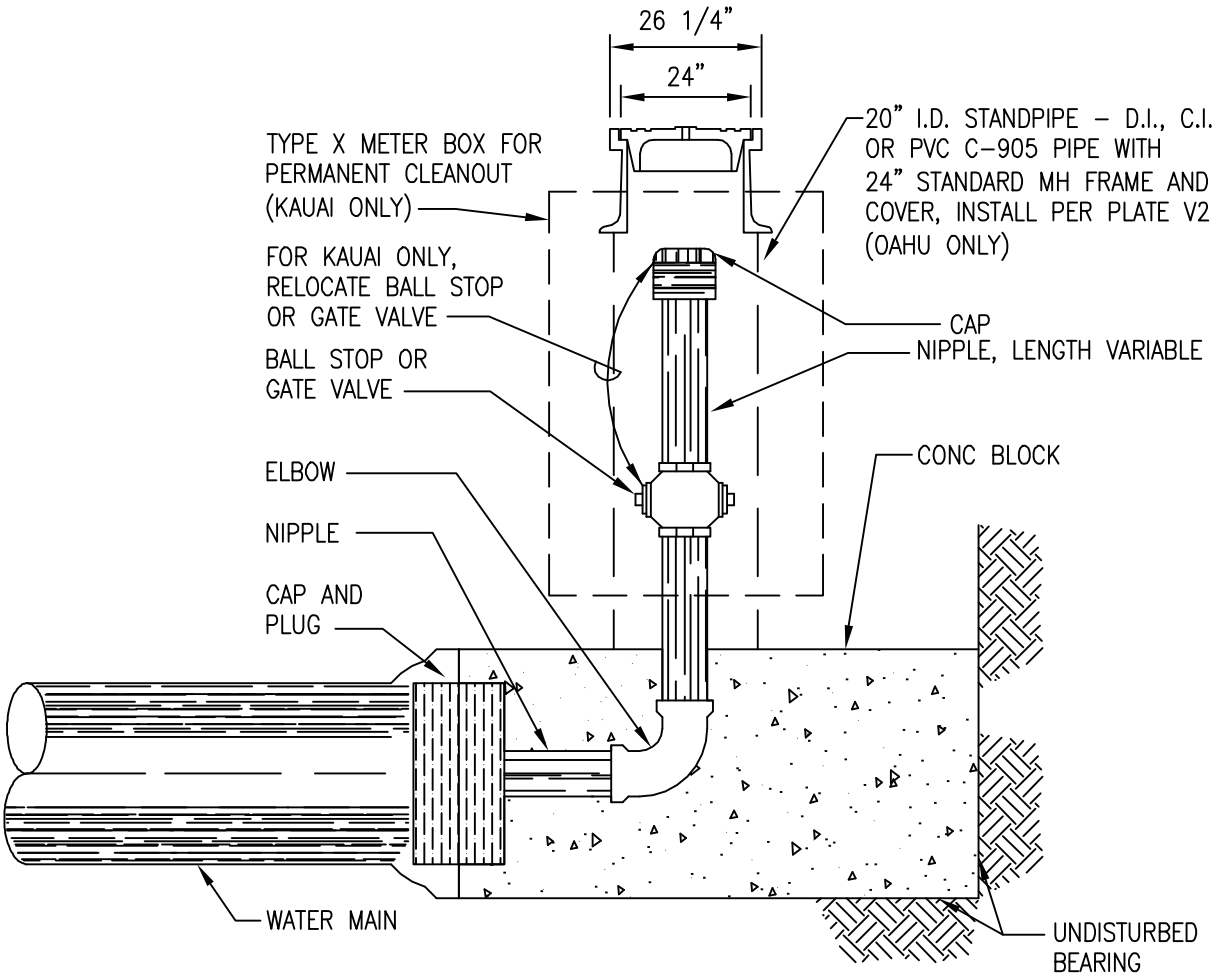


CLEANOUT

SCHEDULE OF CLEANOUTS		
MAIN SIZE	CLEANOUT SIZE	MANHOLE ENCLOSURE
6" & SMALLER	2"	TYPE "F"
8" & 12"	2 1/2"	TYPE "F"
LARGER THAN 12"	FURNISH SPECIAL DESIGN FOR DISCHARGE NOZZLE OR HYDRANT ASSEMBLY	

2002	
REVISION	

MAUI	**CLEANOUT** SCALE: NTS	STANDARD DETAILS	V21



TYPICAL DETAIL OF CLEANOUT

SCHEDULE OF CLEANOUTS		MATERIAL
PIPE SIZE	CLEANOUT SIZE	TYPE OF PIPE
8" & SMALLER	2 1/2"	BRASS
12" TO 20"	4"	GALV.
24" & LARGER	6"	GALV.

NOTES:
1. CLEANOUT SHALL INCLUDE THE CAP, PLUG, AND ALL APPURTENANCES AS SHOWN.
2. FOR OAHU ONLY: FOR PIPES 8" & SMALLER:
   a) ALL TEMPORARY PIPES SHALL BE OF GALVANIZED MATERIALS.
   b) FOR PERMANENT CLEANOUT INSTALLATION, ONLY BRASS OR COPPER FITTINGS SHALL BE USED.
3. FOR KAUAI ONLY: ALL CLEANOUTS INSTALLATION SHALL BE BRASS OR COPPER PIPE FITTINGS.

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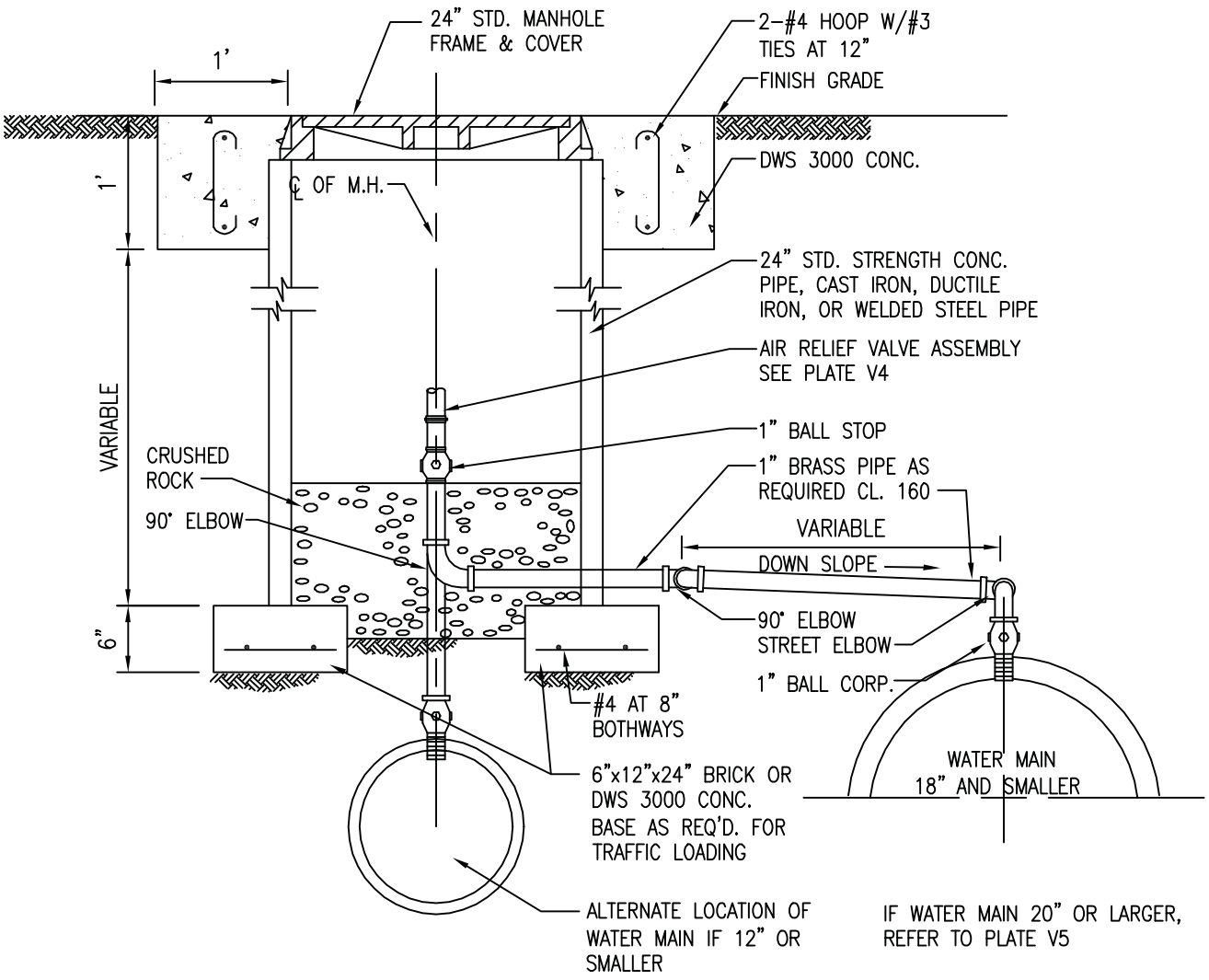
REVISION	

KAUAI OAHU	CLEANOUTS AND RISER SCALE: NTS	STANDARD DETAILS	V22



SECTION THROUGH MANHOLE

NOTE:

POSITION AIR VALVE BODY 4" FRONT OR BACK FROM INSIDE WALL OF MANHOLE.

	2002
	REVISION

MAUI	ARV INSTALLATION TYPE "F" MANHOLE SCALE: NTS	STANDARD DETAILS	V23

APPENDIX

APPENDIX A - LIST OF TABLES

APPENDIX B - INDEX

SUMMARY OF TABLES

APPENDIX A – SUMMARY OF TABLES

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