

**DIVISION 400 - APPROVED  
MATERIAL LIST AND STANDARD  
DETAILS**

## Section 403 - STANDARD DETAILS

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SECTION

DETAIL NOS.

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**APPLICATION TABLE**

Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
	<b>CONCRETE THRUST BLOCKS, VALVE ANCHOR BLOCKS, BEAMS, AND JACKETS (B)</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

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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
<b>CHAIN LINK FENCE AND GATE (F)</b>					
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	
<b>FIRE HYDRANTS AND APPURTENANCES (FH)</b>					
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
<b>SERVICE LATERALS (L)</b>					
L1	Single Service Lateral Plan, Profile & Material List	0			
L2	Double Service Lateral Plan, Profile & Material List	0			

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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

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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
	<b>METER BOXES, AND 3-INCH AND LARGER METERS (M)</b>				
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		

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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	

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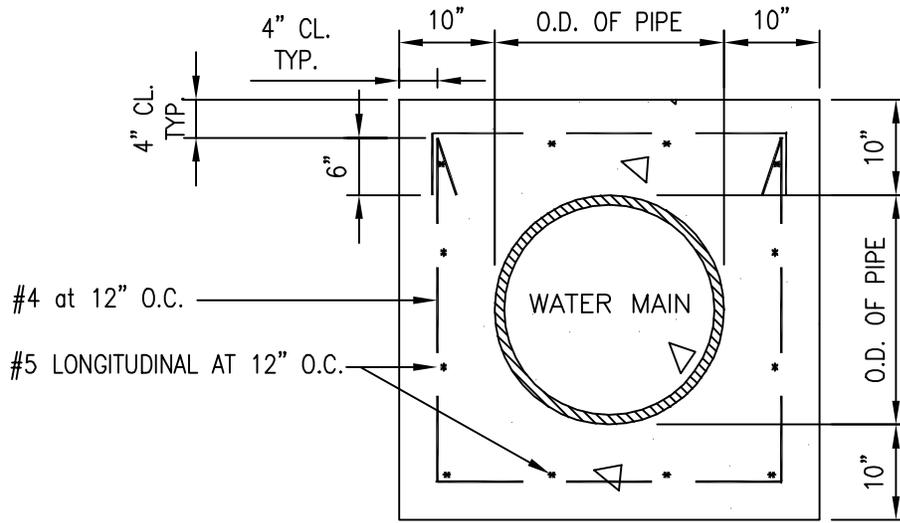
Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
M39	8" x 2" FM Meter & Box, Box Details - Precast/Cast-In-Place Walls			0	
M40	8" x 2" FM Meter & Box Cover Plate & Support Details			0	
M41	8" x 2" FM Meter & Box Identification Inserts and Clip Details			0	
M42	8" x 2" FM Meter & Box Reading Lid & Frame Details			0	
M43	Water Meter Box for Non-Sidewalk Areas			0	
	<b>MANHOLES (MH)</b>				
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

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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
	<b>TRENCH DETAILS, AND CONCRETE CYLINDER PIPE AND APPURTENANCES (P)</b>				
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			

DIVISION 400, SECTION 403 - STANDARD DETAILS

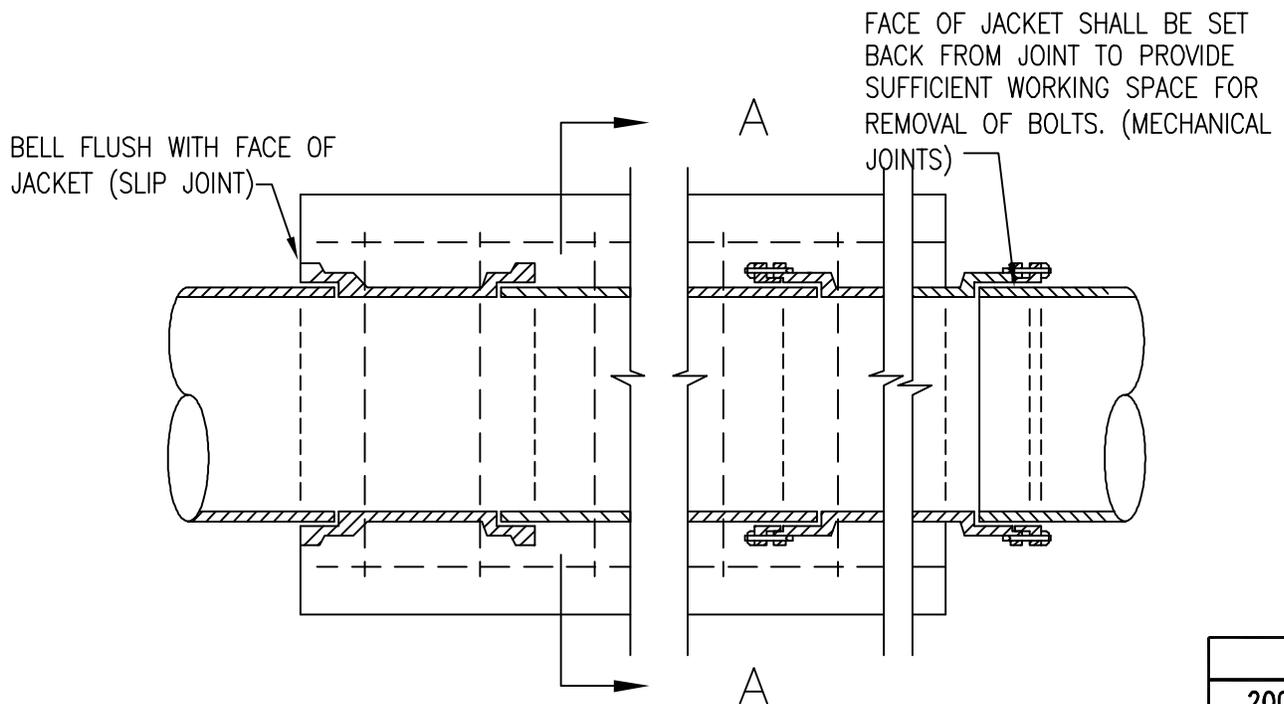
Detail No.	Contents	Applicable To			
		Kauai	Hawaii	Oahu	Maui
	<b>VALVES AND APPURTENANCES (V)</b>				
V1	1" Air Valve Unit Detail		0		
V2	Air Relief Valve Box for 3/4" Air Relief Valve			0	
V3	Valve Frame & Cover Cast Iron, 6" Size	0		0	0
V4	Air Relief Valve Connection in Manhole			0	0
V5	Offset Air 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



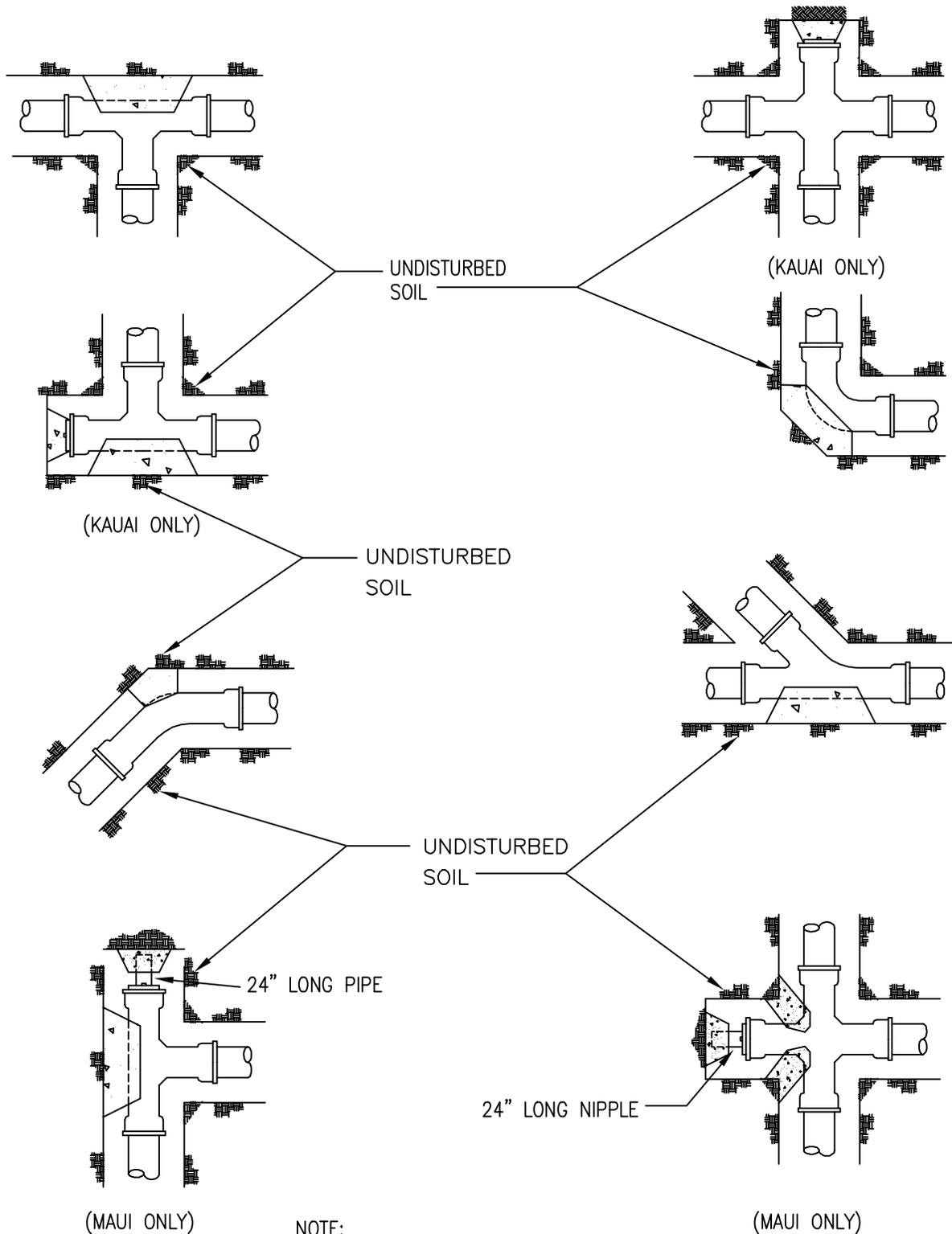
SECTION A-A

**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.



KAUAI OAHU MAUI HAWAII	<b>REINFORCED CONCRETE JACKET</b> TYPICAL DETAIL SCALE: NTS	STANDARD DETAILS	2002
			REVISION
			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	<b>HORIZONTAL REACTION BLOCK FOR WATER MAINS</b> SCALE: NTS	STANDARD DETAILS	B2
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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														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	A	B	C	D	E	F	G														
4"	TEES, CAPS	6.5	3.5	2.0	1.5	1.0	1.0	1.0	<b>USE FIGURES UNDER 250 PSI</b>																																		
	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																																			
6"	TEES, CAPS	14.0	7.0	5.0	3.5	2.5	2.0	1.5	<b>USE FIGURES UNDER 250 PSI</b>																																		
	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																																			
8"	TEES, CAPS	25.0	12.5	8.5	6.5	4.0	3.0	2.5	<b>USE FIGURES UNDER 250 PSI</b>																																		
	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																																			
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	<b>USE FIGURES UNDER 250 PSI</b>																				
	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																						

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

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B4

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																				
		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
18"	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
	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
20"	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
	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
24"	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
	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
24"	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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
	36	42																																																																																																																																																																																																																																																																																																																										

TYPE OF SOIL CONDITION

LATERAL BEARING PRESSURE

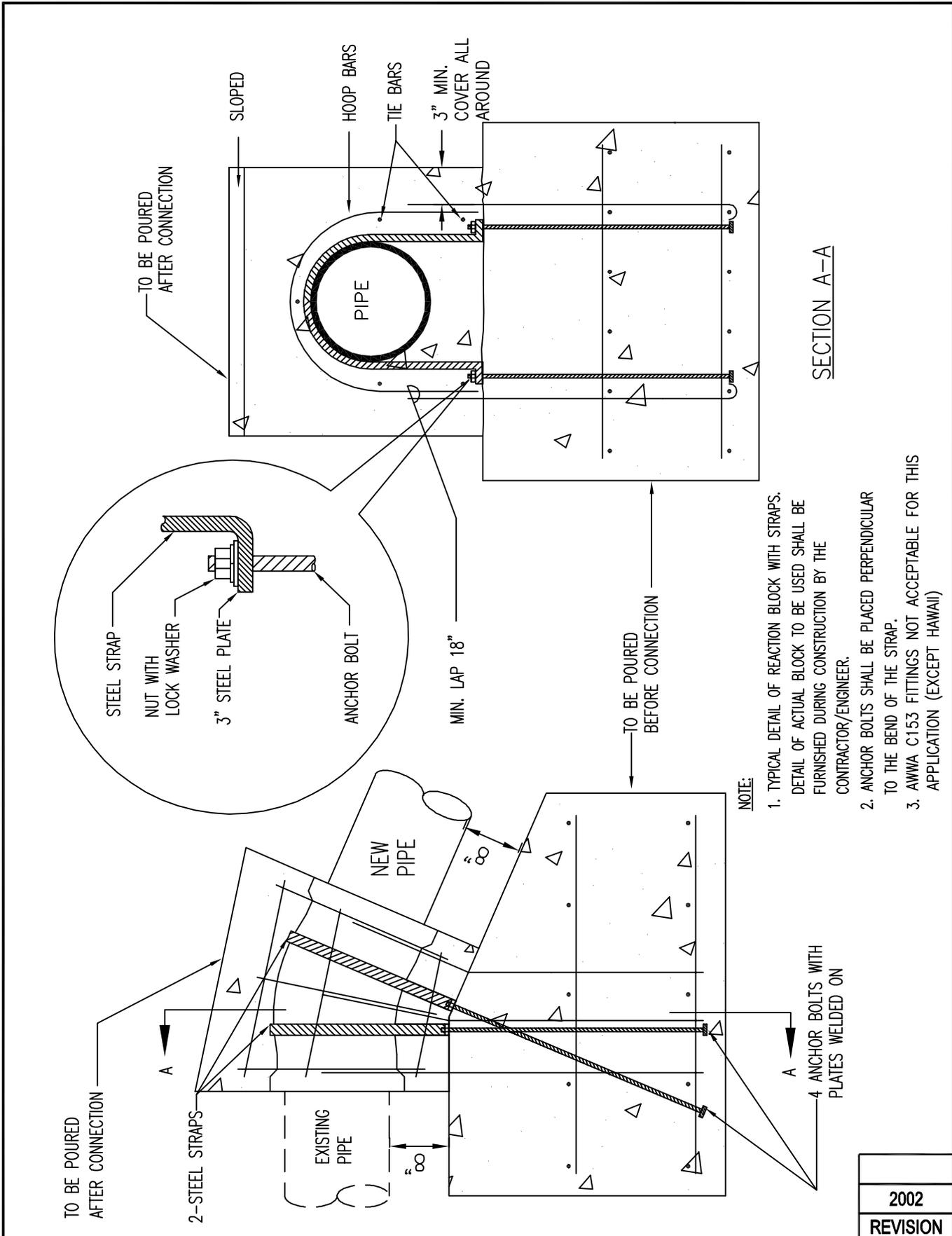
- A. SOFT CLAY; FINE LOOSE SAND.....500 LBS. PER SQ. FT.
- B. SAND & CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND.....1000 LBS. PER SQ. FT.
- C. HARD DRY CLAY.....1500 LBS. PER SQ. FT.
- D. COARSE SAND.....2000 LBS. PER SQ. FT.
- E. GRAVEL.....3000 LBS. PER SQ. FT.
- F. SOFT ROCK.....4000 LBS. PER SQ. 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.







- 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)

SECTION A-A

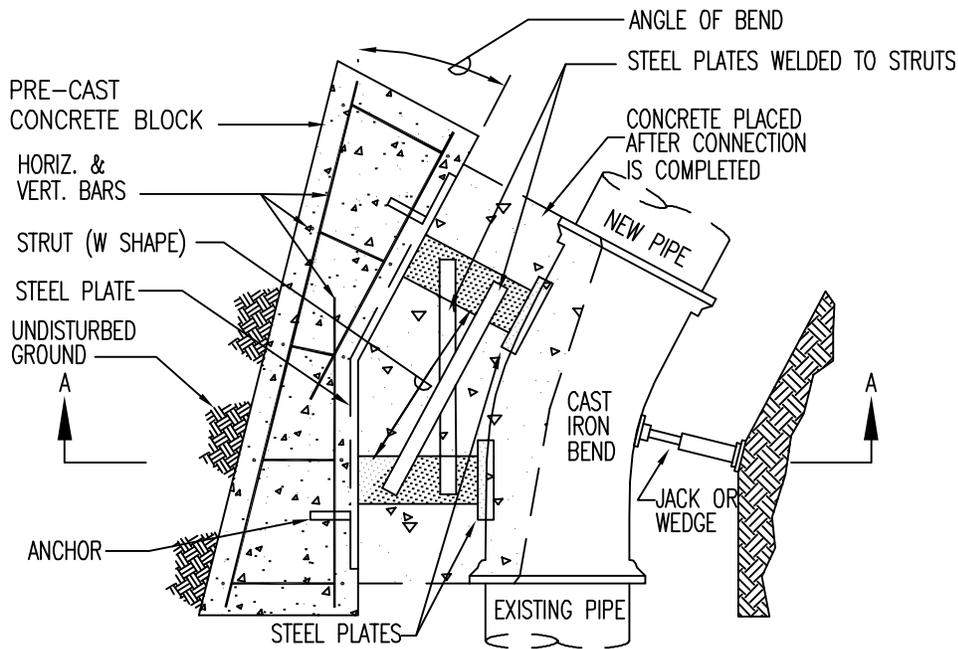
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KAUAI  
OAHU  
MAUI  
HAWAII

TYPICAL THRUST BLOCK W/ STRAPS  
FOR CONNECTIONS AT VERTICAL BEND  
SCALE: NTS

STANDARD  
DETAILS

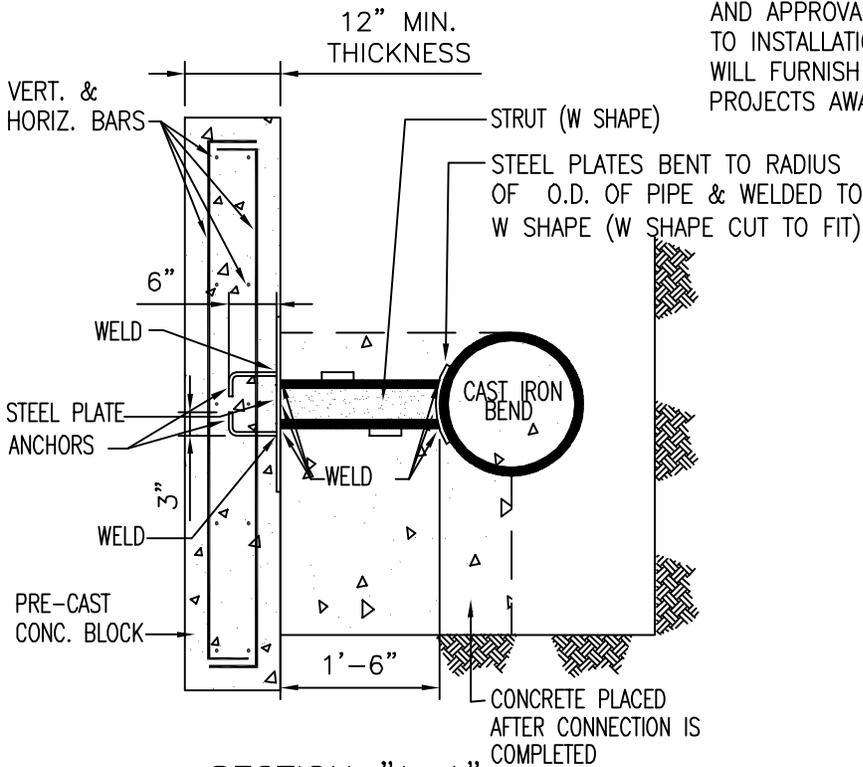
B8



PLAN

NOTE:

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SECTION "A-A"

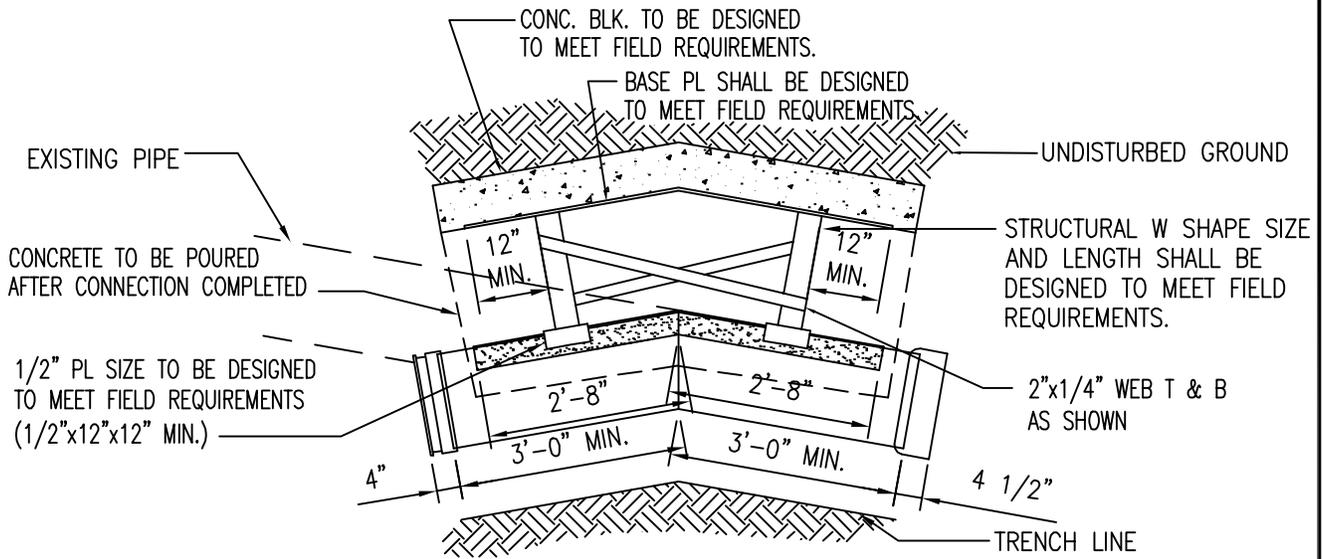
2002
REVISION

KAUAI  
OAHU  
MAUI  
HAWAII

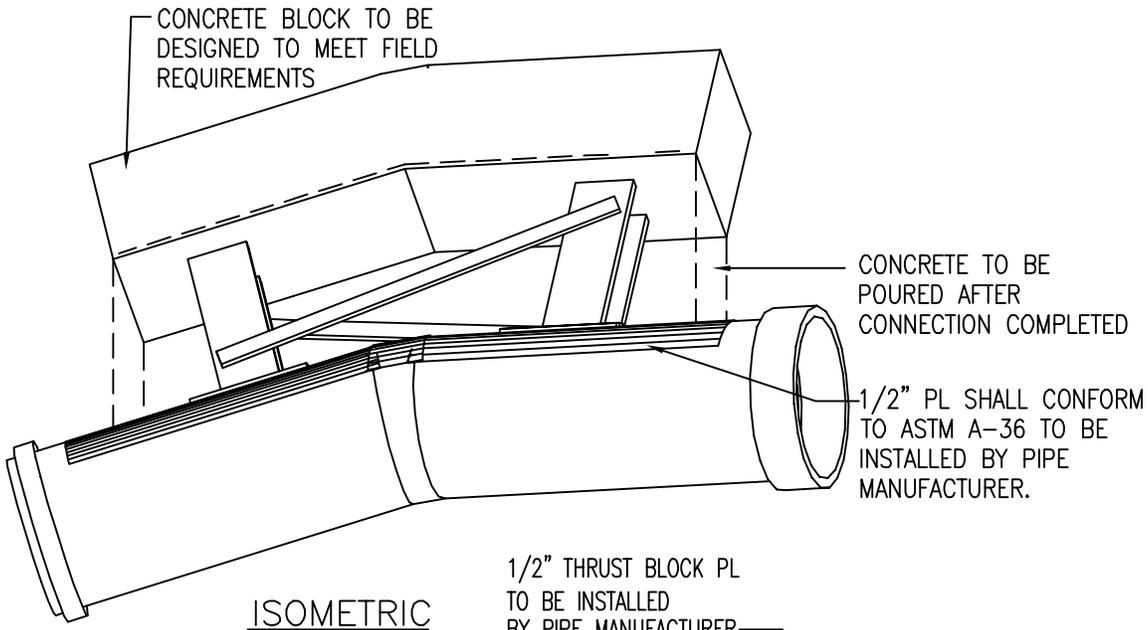
**TYPICAL THRUST BLOCK**  
WITH STRUCTURAL STRUT FOR CONNECTIONS  
SCALE: NTS

STANDARD  
DETAILS

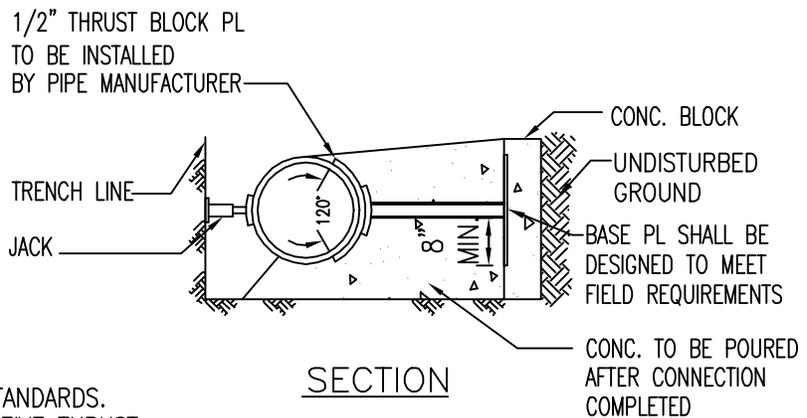
**B9**



PLAN



ISOMETRIC



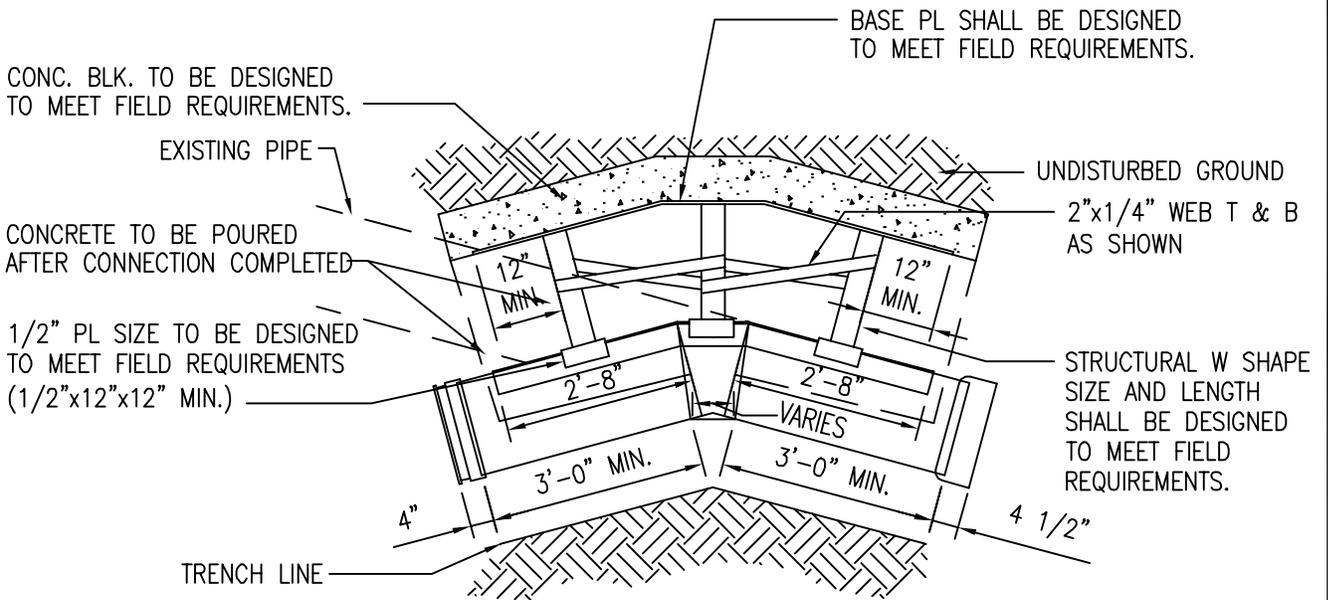
SECTION

NOTES:

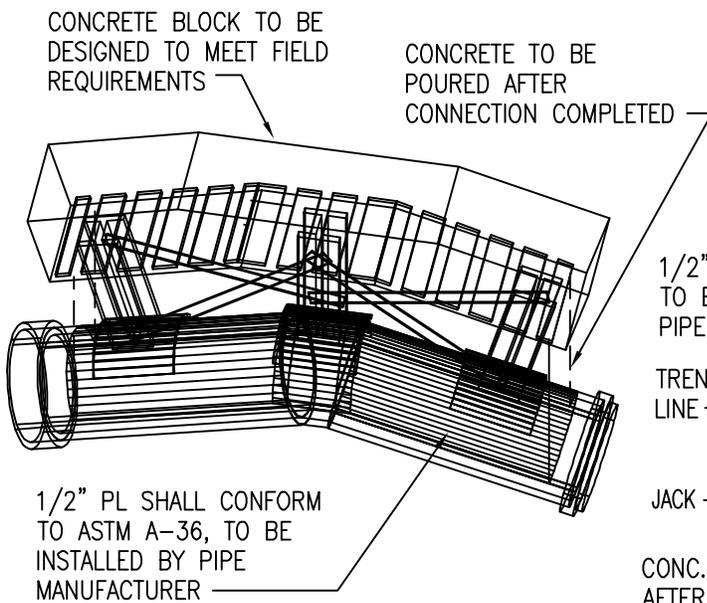
1. ALL WELDS SHALL CONFORM TO AWS STANDARDS.
2. PL SHALL BE UNCOATED READY TO RECEIVE THRUST STRUTS AND APPURTENANCES.
3. DELIVER AT REQUEST.
4. NUMBER OF STRUTS TO BE USED MAY VARY ACCORDING TO THE WORKING PRESSURE.

2002
REVISION

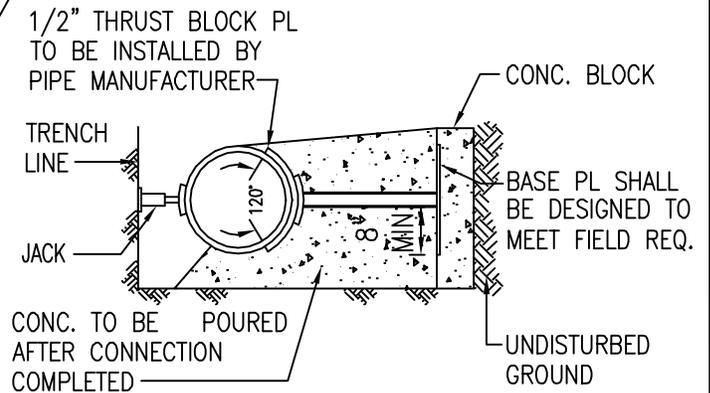
KAUAI OAHU MAUI	<b>TYPICAL THRUST BLOCK</b> <b>6° TO 22 1/2° CONCRETE CYLINDER BEND</b> <b>FOR 16" TO 42" CONNECTIONS ONLY</b> SCALE: NTS	STANDARD DETAILS	B10
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PLAN



ISOMETRIC



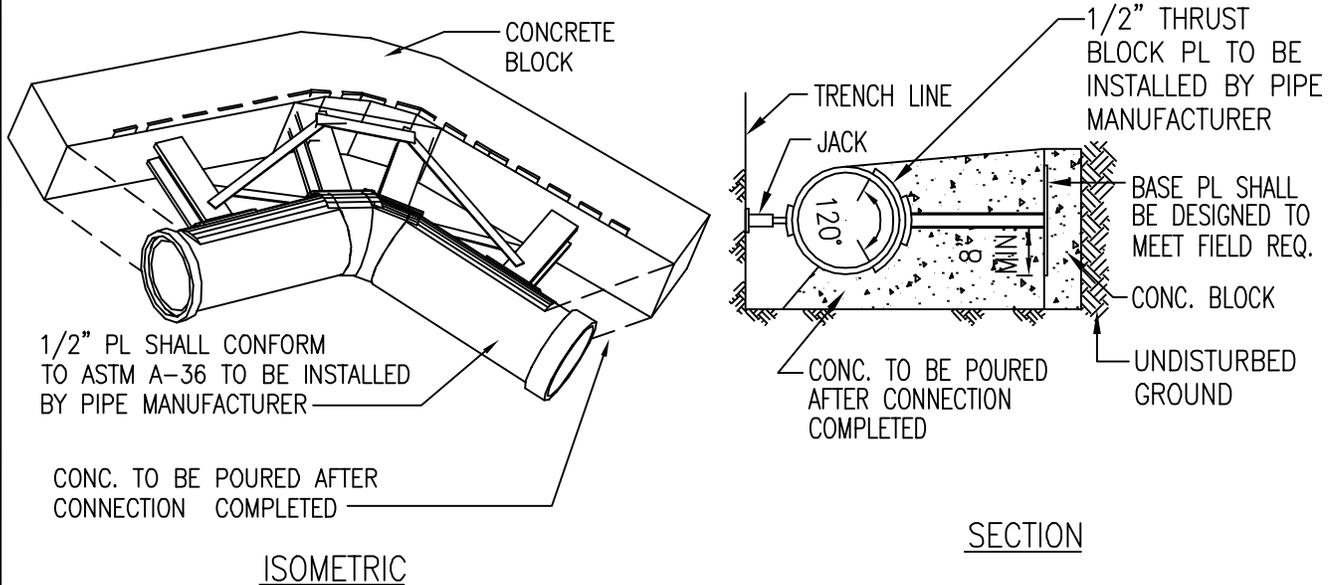
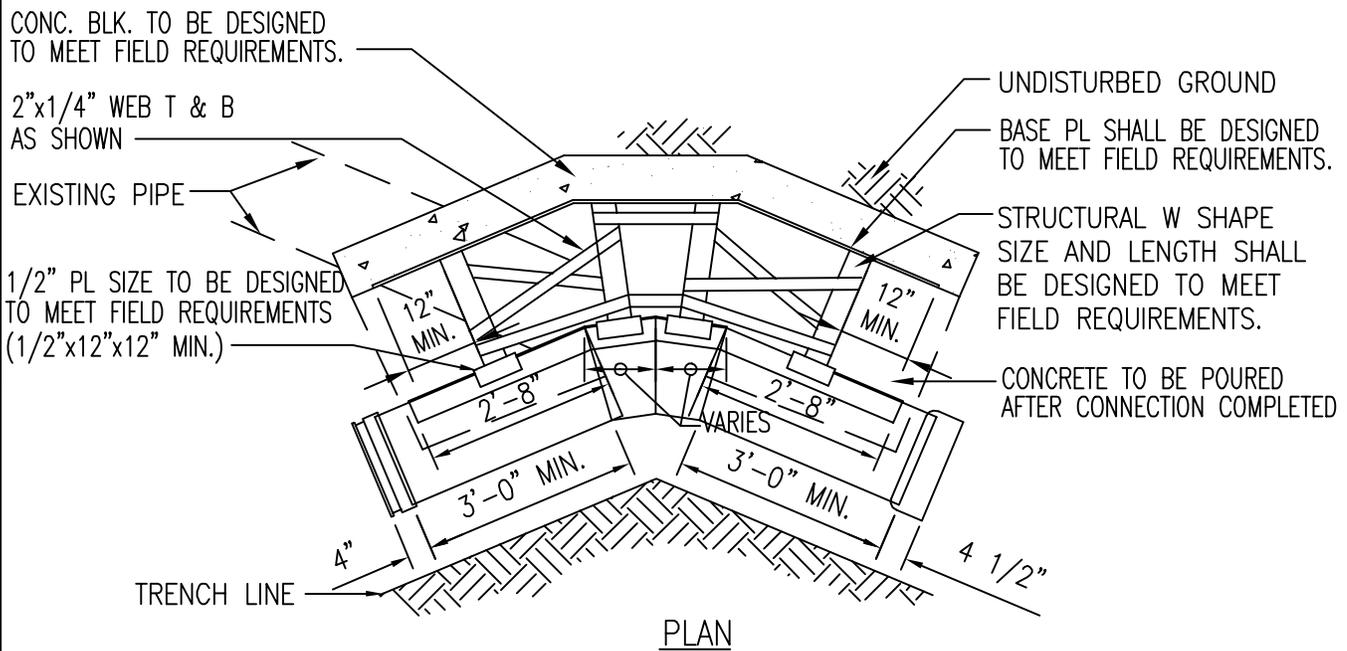
SECTION

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.

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REVISION

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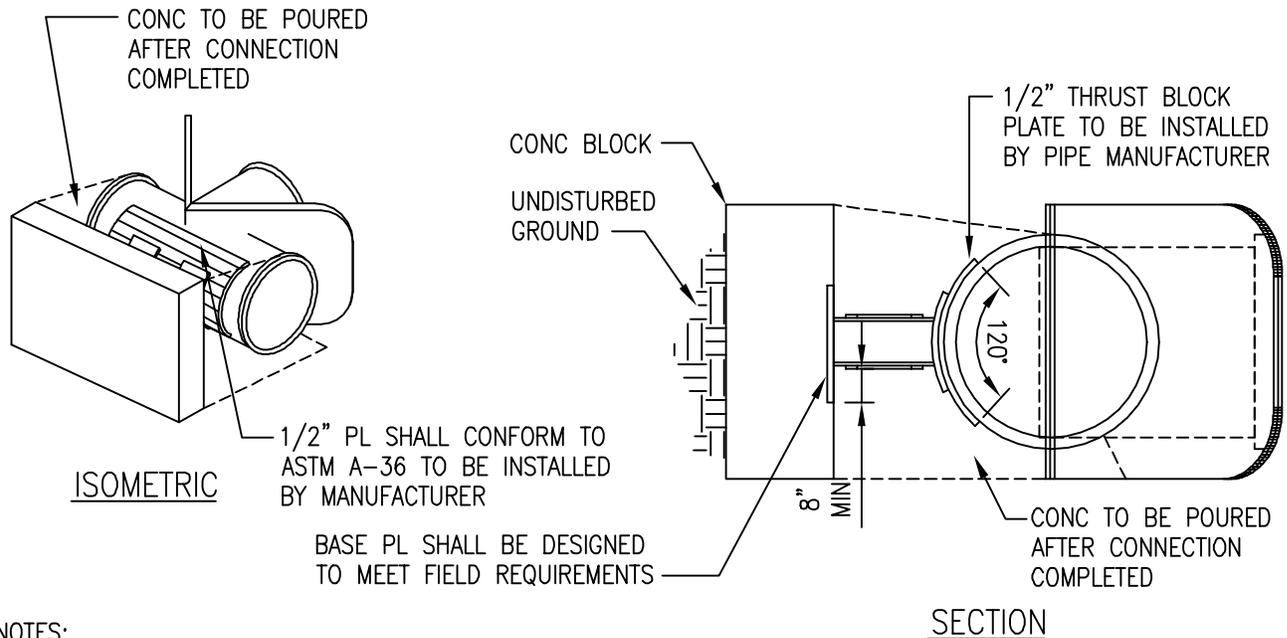
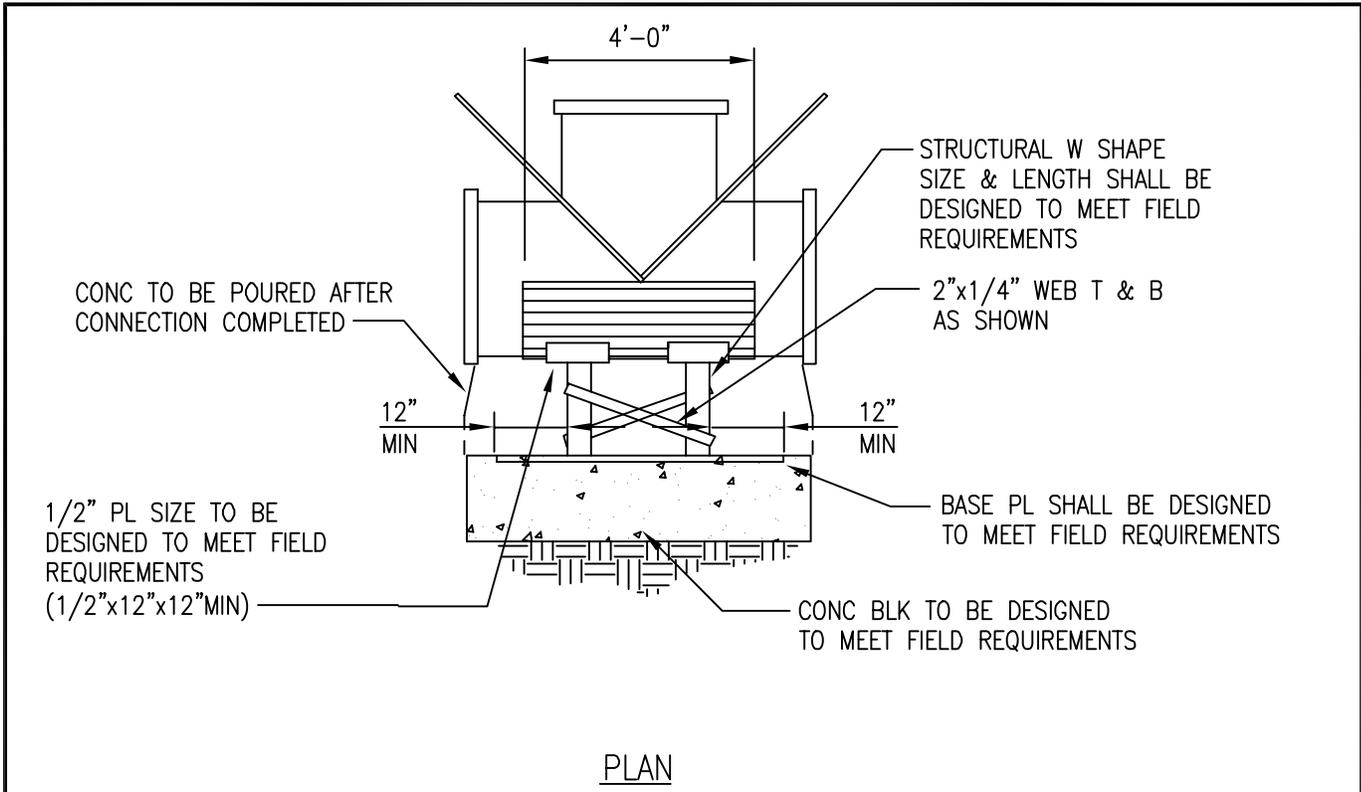


**NOTES:**

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.

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REVISION

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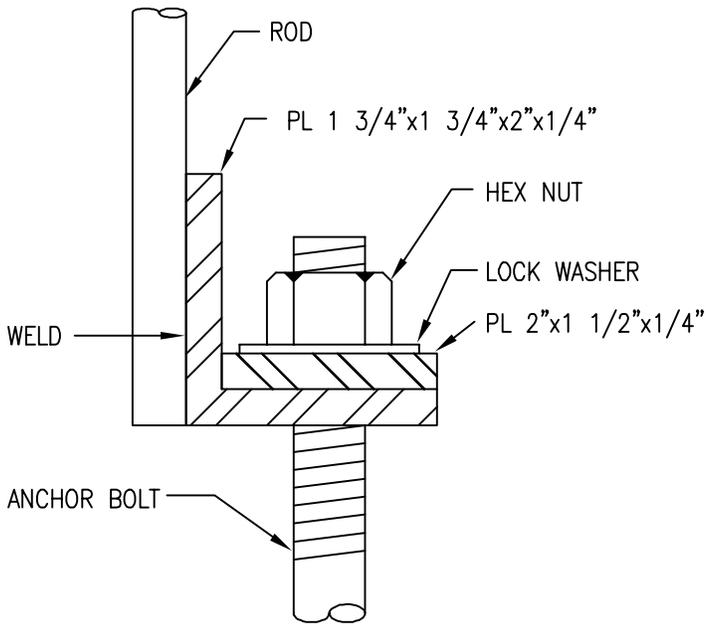


**NOTES:**

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.

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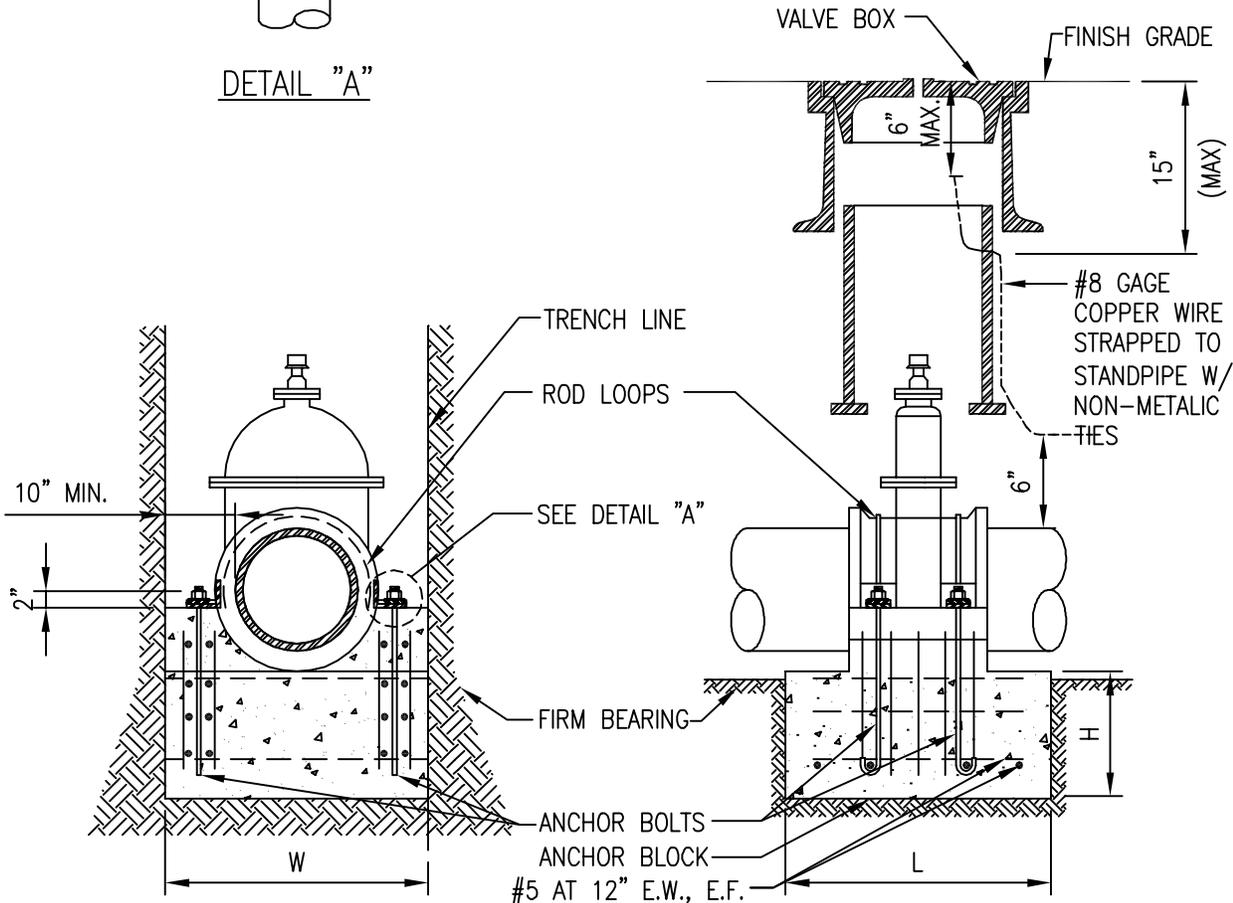
KAUAI OAHU MAUI	<b>TYPICAL THRUST BLOCK</b> CONCRETE CYLINDER TEE CONNECTION (16" - 42") SCALE: NTS	STANDARD DETAILS	<b>B13</b>
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DETAIL "A"

**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.



TYPICAL DETAIL

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REVISION

OAHU MAUI	<b>GATE VALVE ANCHOR BLOCK</b> NON-METALLIC PIPES SCALE: NTS	STANDARD DETAILS	<b>B14</b>
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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

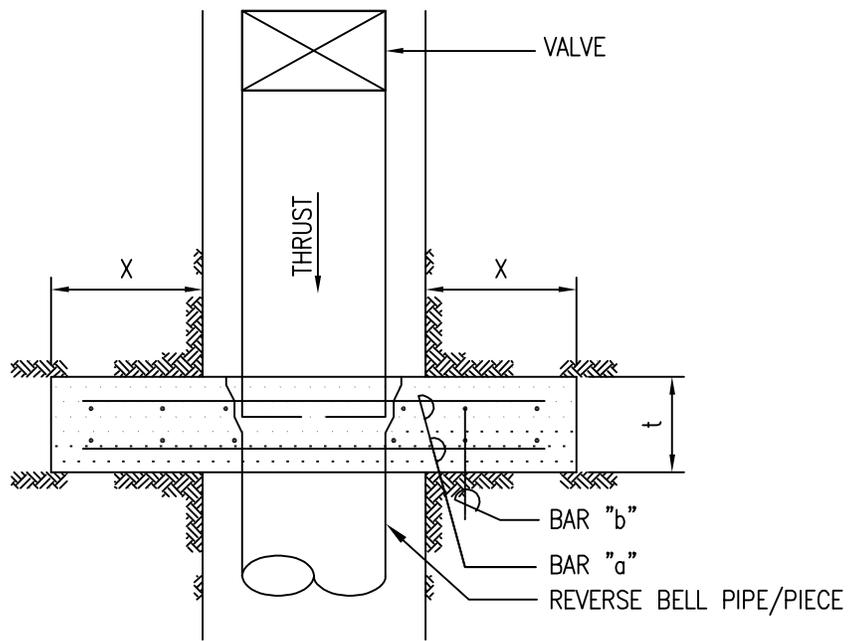
TYPE OF SOIL CONDITION	LATERAL BEARING PRESSURE
A. SOFT CLAY: FINE LOOSE SAND.....	500 LBS. PER SQ. FT.
B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND.....	1000 LBS. PER SQ. FT.
C. HARD DRY CLAY.....	1500 LBS. PER SQ. FT.
D. COARSE SAND.....	2000 LBS. PER SQ. FT.
E. GRAVEL.....	3000 LBS. PER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

NOTE:

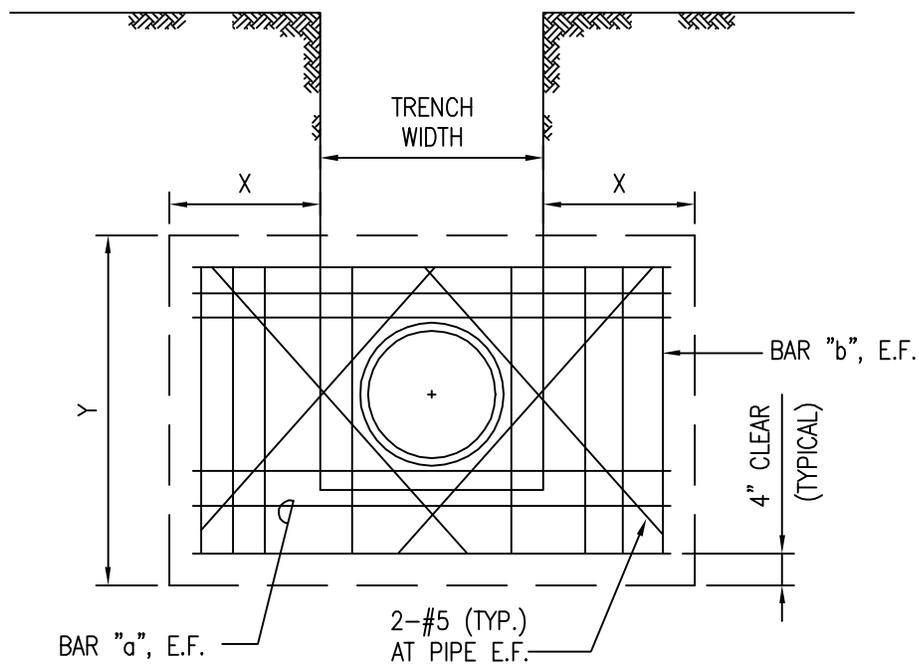
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2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE

2002
REVISION

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



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.

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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

2002  
REVISION

B17

WATER PRESSURE 250 PSI  
TYPE OF SOIL CONDITION

PIPE SIZE (in)	A		B		C		D		E		F		G		Bar "a" Min.	Bar "b" Min.
	Y (ft)	X (ft)														
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"
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"
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"
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"
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"
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	#5@6"
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"
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"
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"
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"
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"

WATER PRESSURE 200 PSI  
TYPE OF SOIL CONDITION

PIPE SIZE (in)	A		B		C		D		E		F		G		Bar "a" Min.	Bar "b" Min.
	Y (ft)	X (ft)														
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"
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"
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"
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"
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"
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"
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"
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"
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"
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"
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"

NOTE:  
REFER TO DETAIL B18 FOR ADDITIONAL INFORMATION

**CONCRETE THRUST BEAM**  
SCHEDULE  
SCALE: NTS

STANDARD  
DETAILS

**B18**

REVISION

2002

WATER PRESSURE 150 PSI  
TYPE OF SOIL CONDITION

PIPE SIZE (in)	A		B		C		D		E		F		G		Bar "a" Min.	Bar "b" Min.
	Y (ft)	X (ft)														
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@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@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@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	#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"
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"
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"
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"
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"
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"
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"

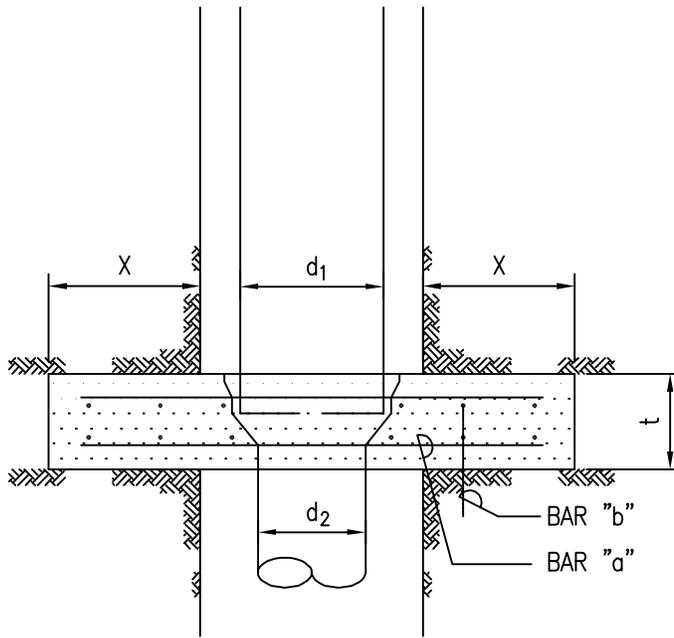
TYPE OF SOIL CONDITION

- 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.

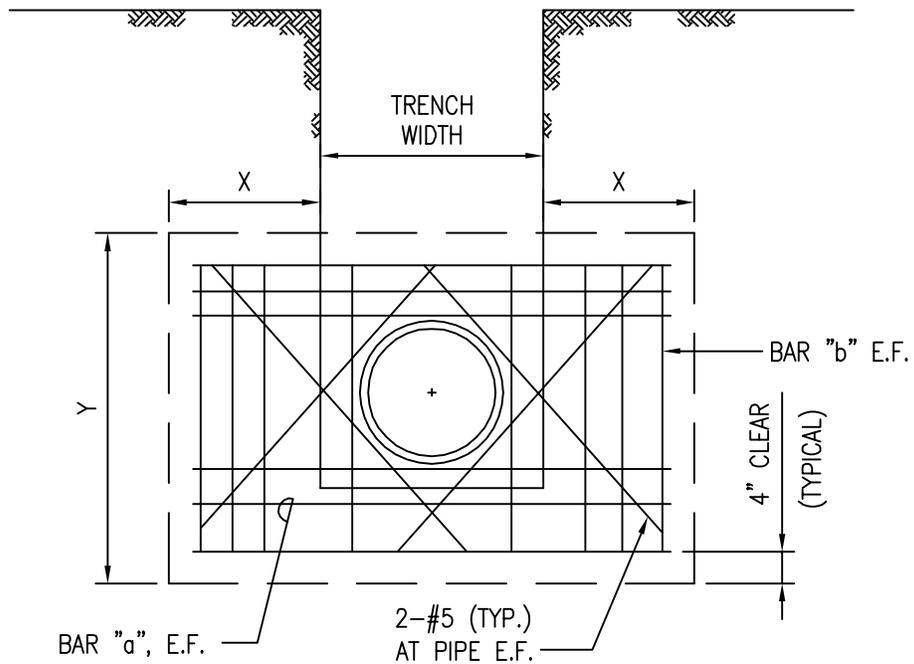
LATERAL BEARING PRESSURE

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	<b>CONCRETE THRUST BEAM</b> <b>FOR REDUCER - TYPICAL DETAIL</b> SCALE: NTS	STANDARD DETAILS	<b>B19</b>
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WATER PRESSURE 250 PSI  
TYPE OF SOIL CONDITION

D1 PIPE SIZE (in)	D2 PIPE SIZE (in)	A		B		C		D		E		F		G		Bar "a" Min.	Bar "b" Min.
		Y (ft)	X (ft)														
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"
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"
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@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@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@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@12"
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@12"
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@12"
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@12"
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@12"
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@12"

WATER PRESSURE 200 PSI  
TYPE OF SOIL CONDITION

D1 PIPE SIZE (in)	D2 PIPE SIZE (in)	A		B		C		D		E		F		G		Bar "a" Min.	Bar "b" Min.
		Y (ft)	X (ft)														
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"
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"
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"
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@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@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@12"
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@12"
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@12"
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@12"
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@12"
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@12"

NOTE:  
REFER TO PLATE B21 FOR ADDITIONAL INFORMATION

2002
REVISION

KAUAI  
OAHU  
MAUI  
HAWAII

**CONCRETE THRUST BEAM**  
REDUCER - SCHEDULE  
SCALE: NTS

STANDARD  
DETAILS

**B20**

# CONCRETE THRUST BEAM

## FOR REDUCER - SCHEDULE

SCALE: NTS

STANDARD  
DETAILS

B21

REVISION

2002

### WATER PRESSURE 150 PSI TYPE OF SOIL CONDITION

D1 PIPE SIZE (in)	D2 PIPE SIZE (in)	A		B		C		D		E		F		G		Bar "a"	Bar "b"	
		Y (ft)	X (ft)	Min.	Min.													
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"

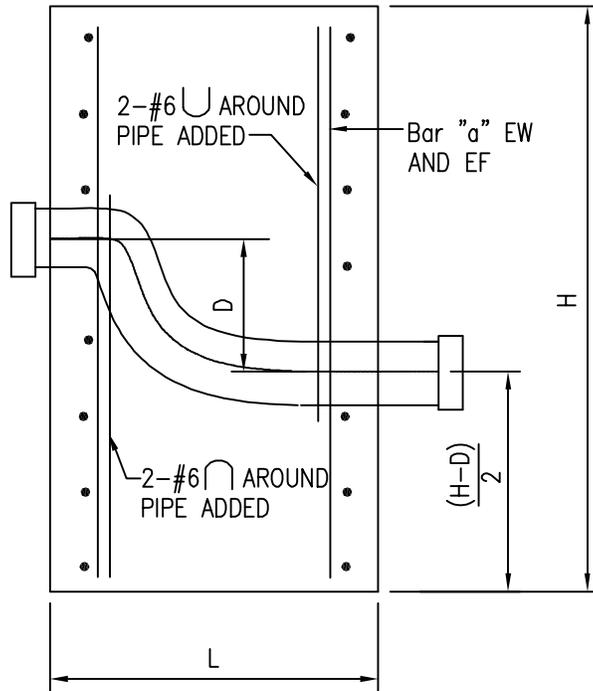
#### TYPE OF SOIL CONDITION

- 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.

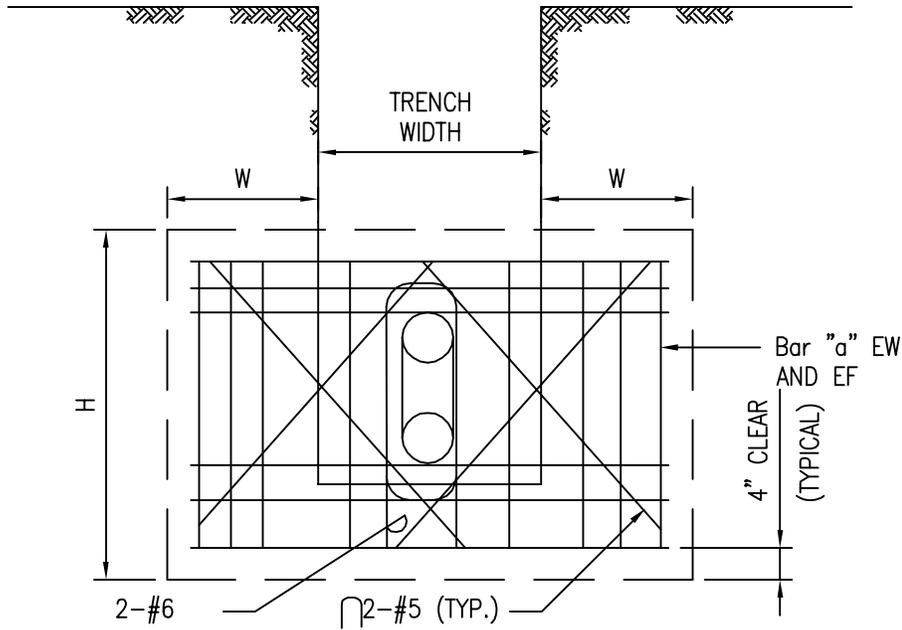
#### LATERAL BEARING PRESSURE

**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.
- 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)						
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

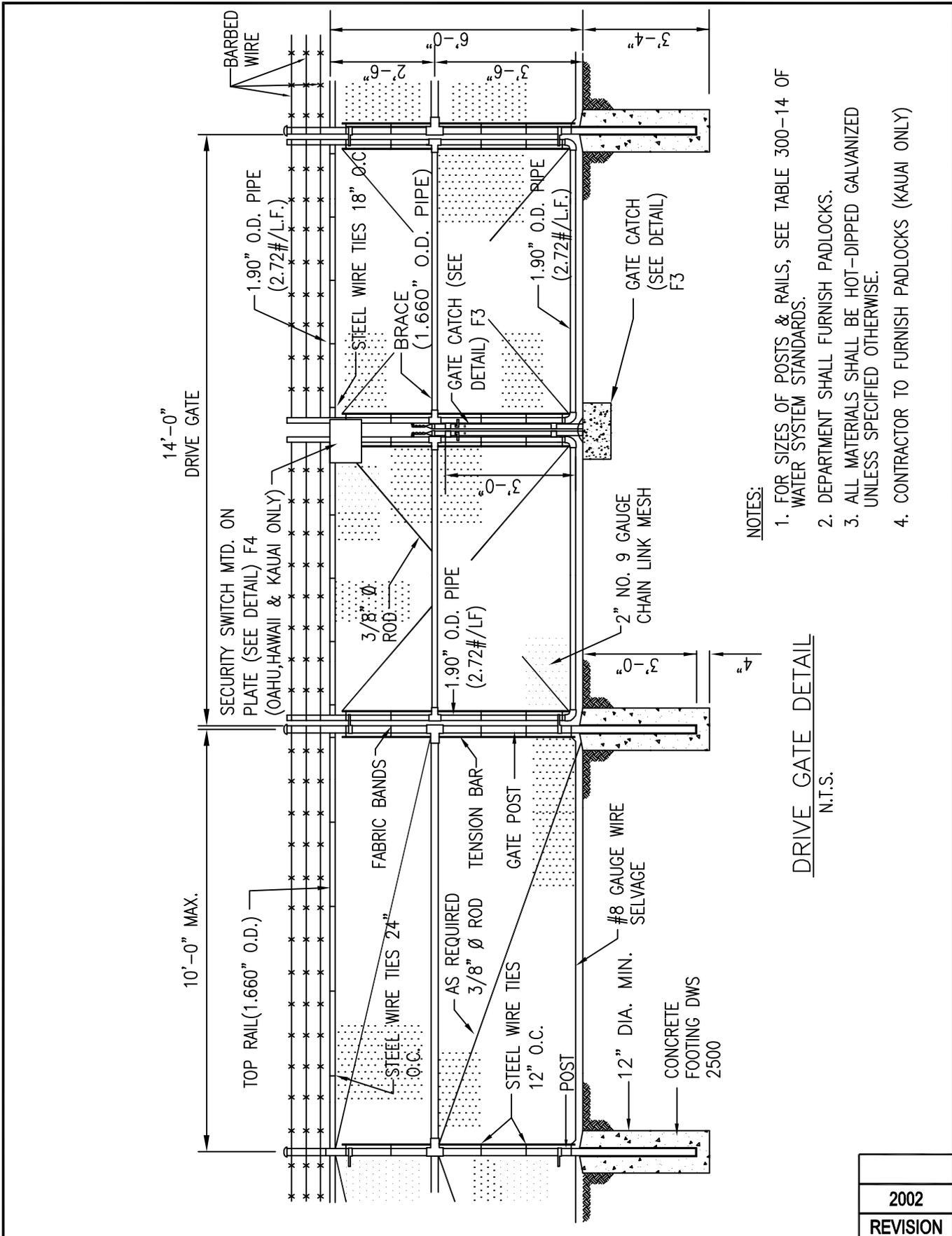
- A. SOFT CLAY; FINE LOOSE SAND.....500 LBS. PER SQ. FT.
- B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND.....1000 LBS. PER SQ. FT.
- C. HARD DRY CLAY.....1500 LBS. PER SQ. FT.
- D. COARSE SAND.....2000 LBS. PER SQ. FT.
- E. GRAVEL.....3000 LBS. PER SQ. FT.
- F. SOFT ROCK.....4000 LBS. PER 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.

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KAUAI OAHU MAUI HAWAII	<b>CONCRETE THRUST BEAM</b> FOR OFFSET - SCHEDULE SCALE: NTS	STANDARD DETAILS	<b>B23</b>
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**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)

**DRIVE GATE DETAIL**  
N.T.S.

OAHU  
MAUI  
HAWAII  
KAUAI

**CHAIN LINK FENCE**

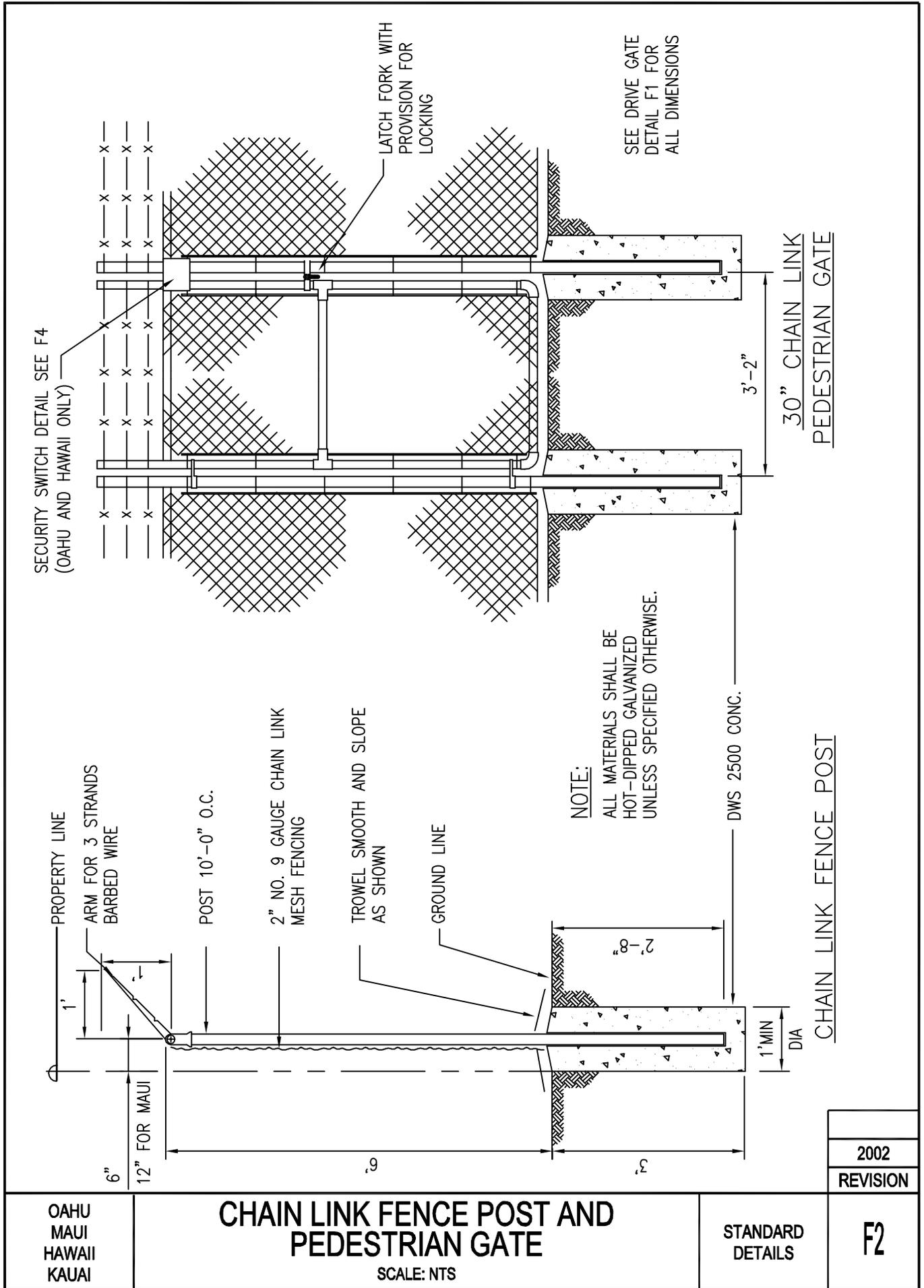
SCALE: NTS

STANDARD  
DETAILS

2002

REVISION

F1



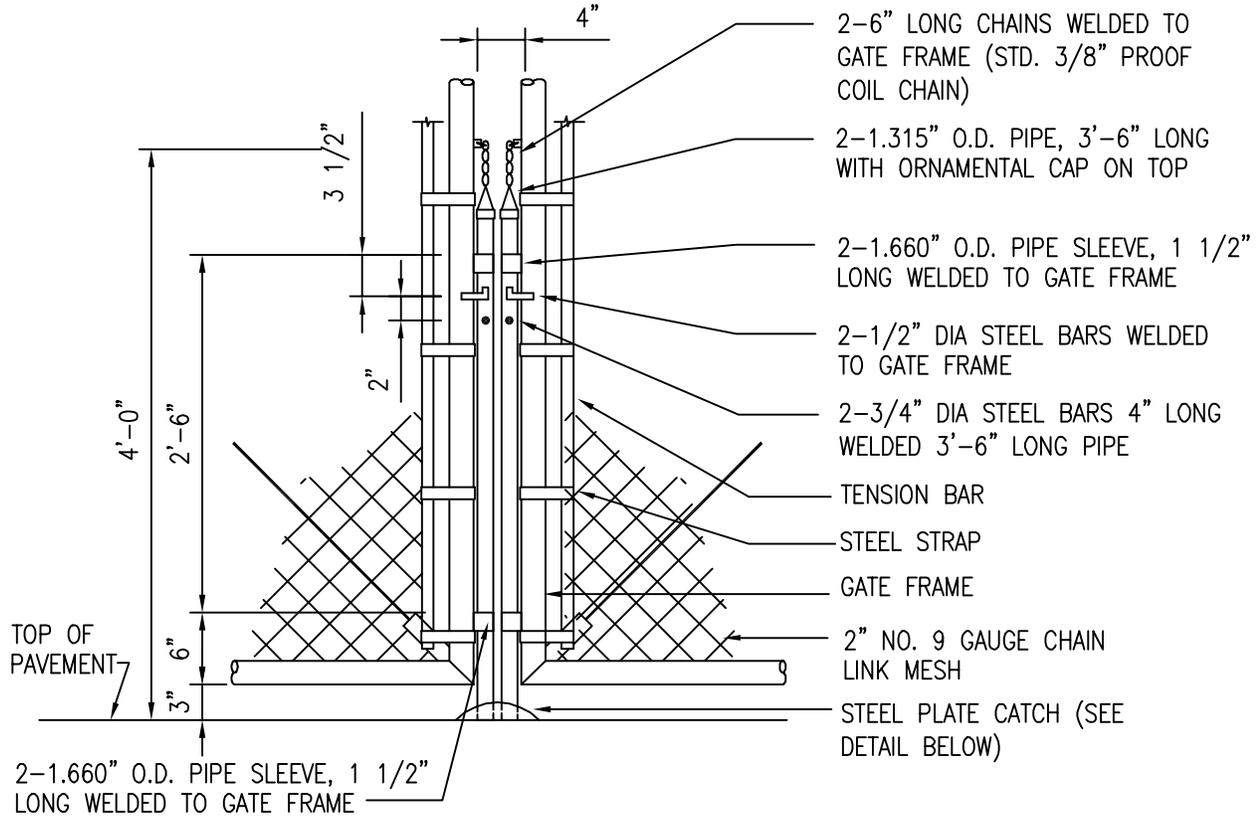
OAHU  
MAUI  
HAWAII  
KAUAI

# CHAIN LINK FENCE POST AND PEDESTRIAN GATE

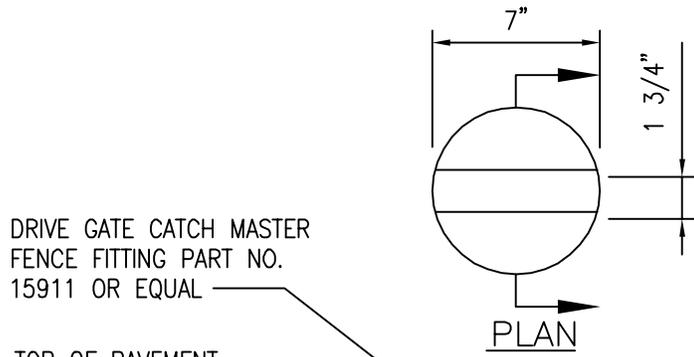
SCALE: NTS

STANDARD  
DETAILS

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F2



DETAIL AT CATCH GATE



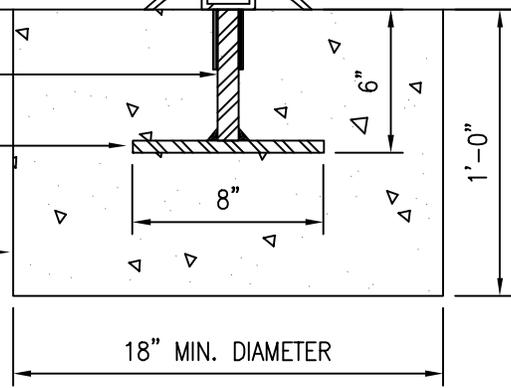
DRIVE GATE CATCH MASTER FENCE FITTING PART NO. 15911 OR EQUAL

TOP OF PAVEMENT

#7 BAR WELDED TO CATCH

#4 BAR WELDED TO #7 BAR

DWS 2500 CONC. BASE



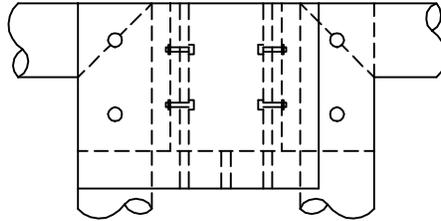
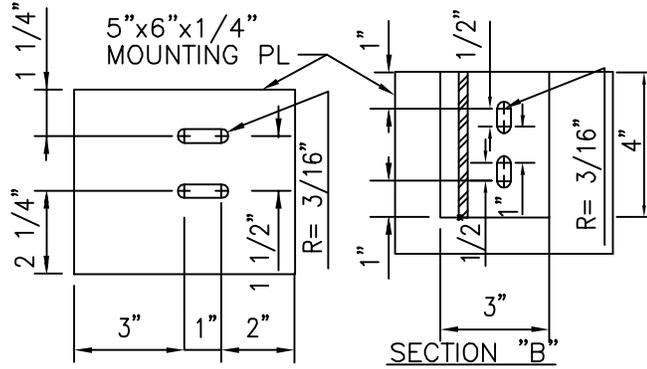
SECTION

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.

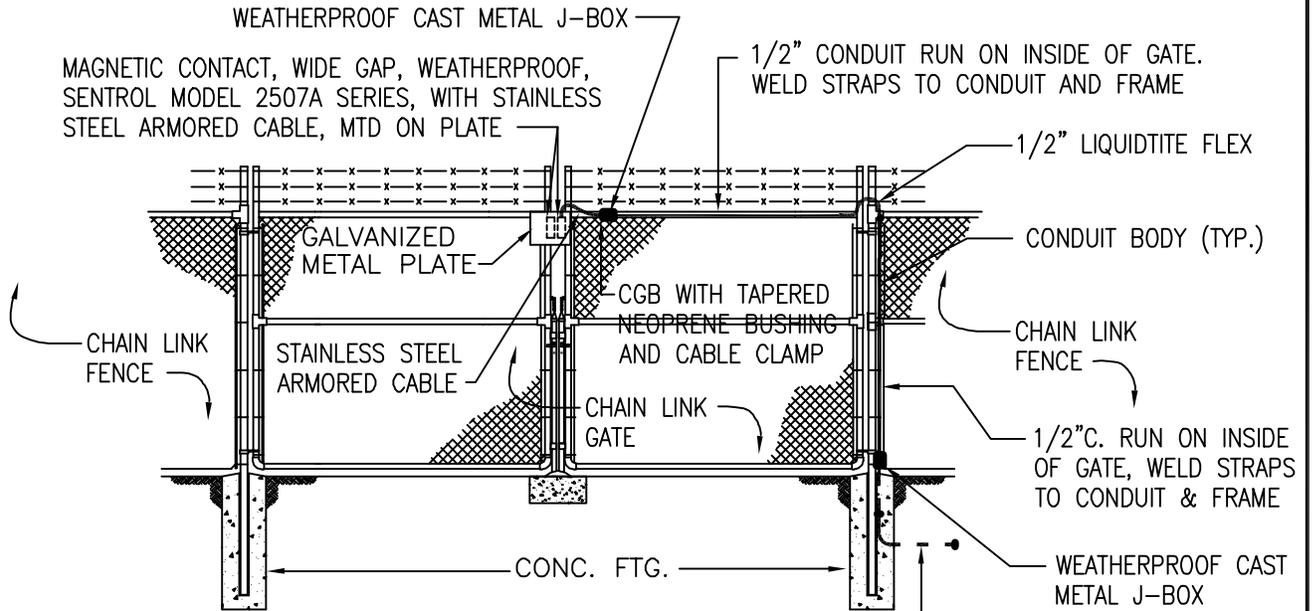
2002
REVISION

OAHU MAUI HAWAII KAUAI	CHAIN LINK FENCE MISCELLANEOUS DETAILS SCALE: NTS	STANDARD DETAILS	2002
			REVISION
			F3



ELEVATION

**A**  
**F4** SECURITY SWITCH DETAIL  
FOR INSWINGING DOUBLE  
LEAF CHAIN LINK FENCE  
(OPPOSITE HAND FOR OUTSWINGING)  
N.T.S.



ELEVATION

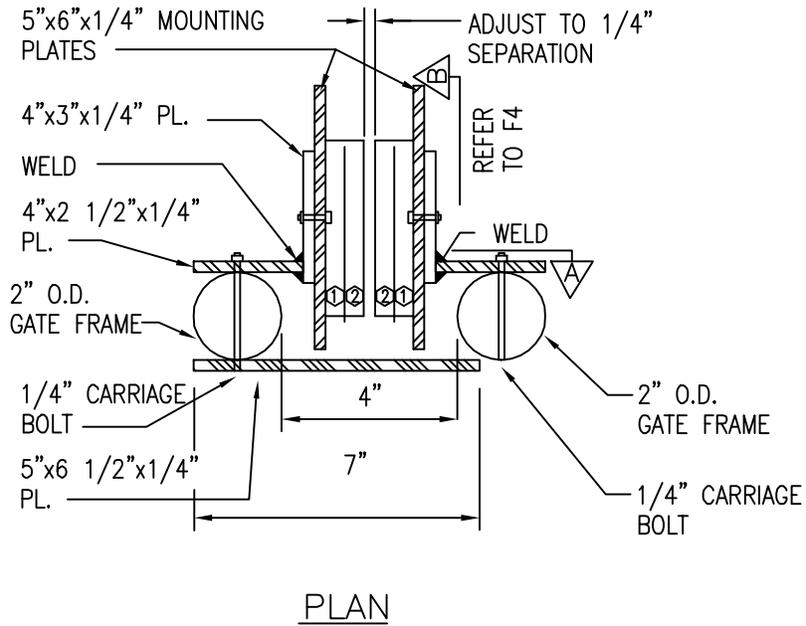
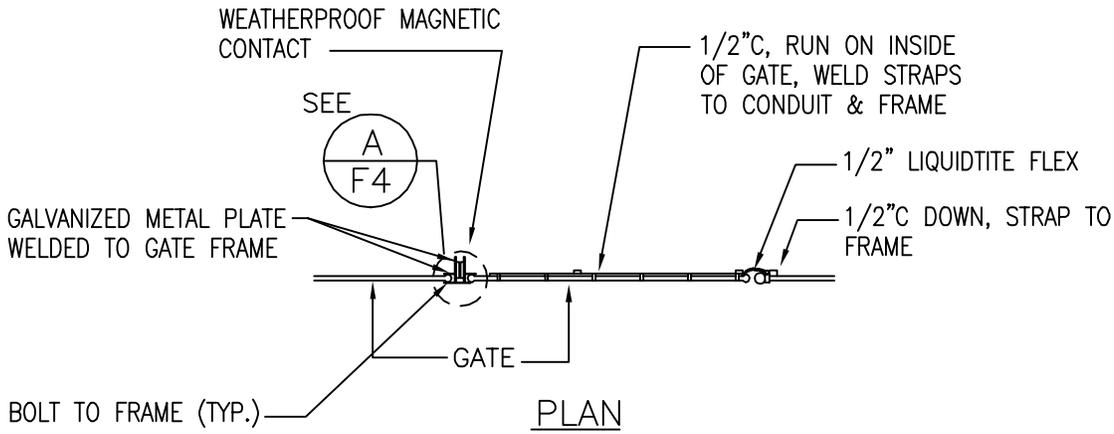
DETAIL OF GATE SWITCH

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

SEE OTHER PLATES FOR DETAILS NOT SHOWN.

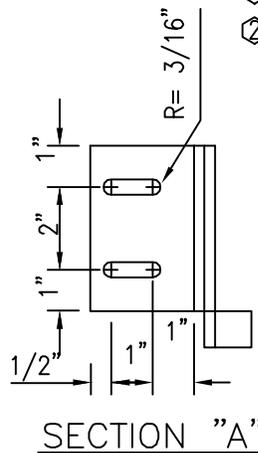
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REVISION

OAHU HAWAII KAUAI	<b>CHAIN LINK FENCE</b> SECURITY SWITCH DETAIL SCALE: NTS	STANDARD DETAILS	<b>F4</b>
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SWITCH ASSEMBLY DESCRIPTION

- ① SPACER—SENTROL #1913 OR EQUAL
- ② MAGNETIC SWITCH—SENTROL #2507 AH BIASED MAGNETIC SWITCH OR APPROVED EQUAL



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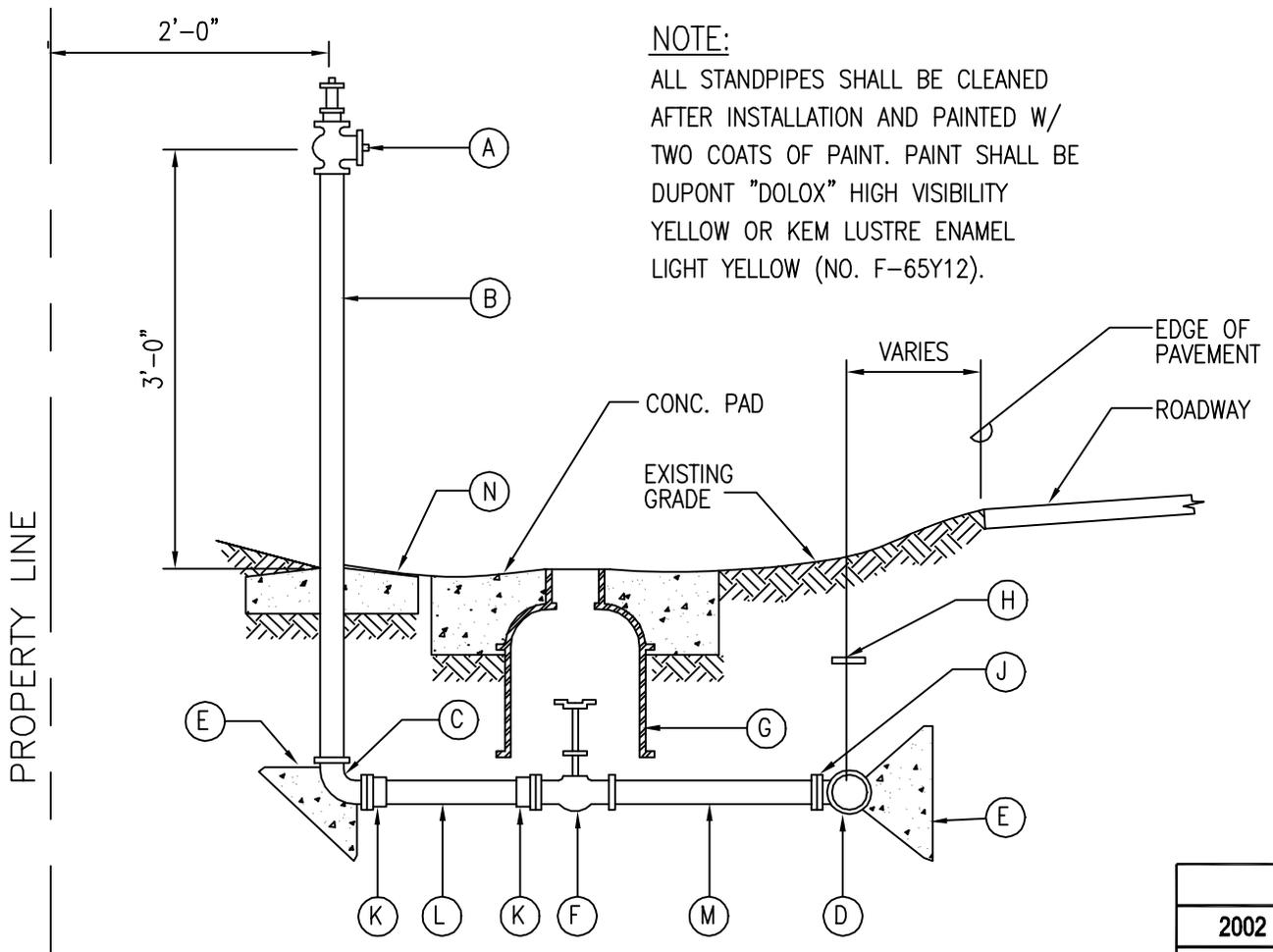
OAHU  
HAWAII  
KAUAI

**CHAIN LINK FENCE**  
**SECURITY SWITCH DETAIL**  
SCALE: NTS

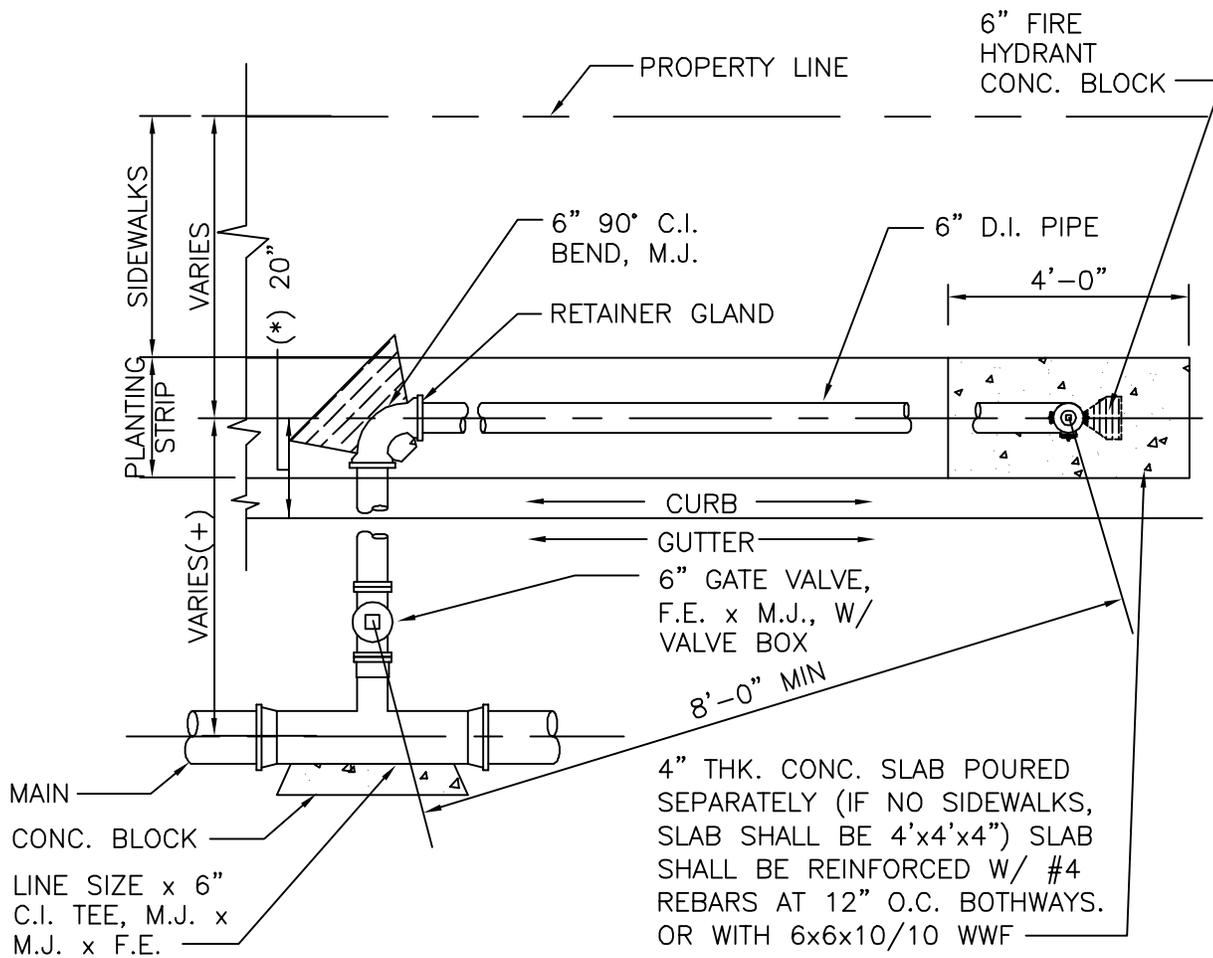
STANDARD  
DETAILS

**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



KAUAI	<b>2 1/2" STANDPIPE DETAIL</b>	STANDARD DETAILS	2002
			REVISION
	SCALE: NTS		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.

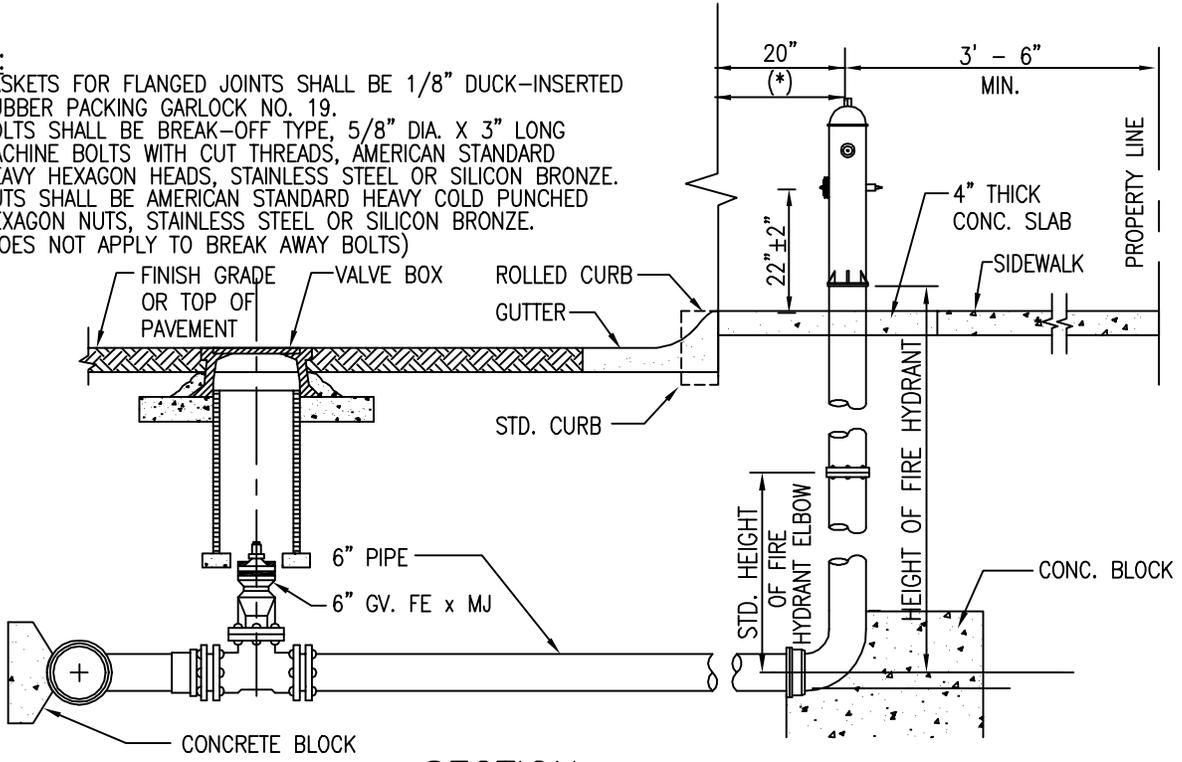
\* FOR AREAS WITH ROLLED CURB THE FIRE HYDRANT CENTERLINE SHALL BE 24" FROM THE EDGE OF THE ROLLED CURB.

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HAWAII	<b>HYDRANT CONNECTION LAYOUT "A"</b> (WITH ELBOW) SCALE: NTS	STANDARD DETAILS	FH2
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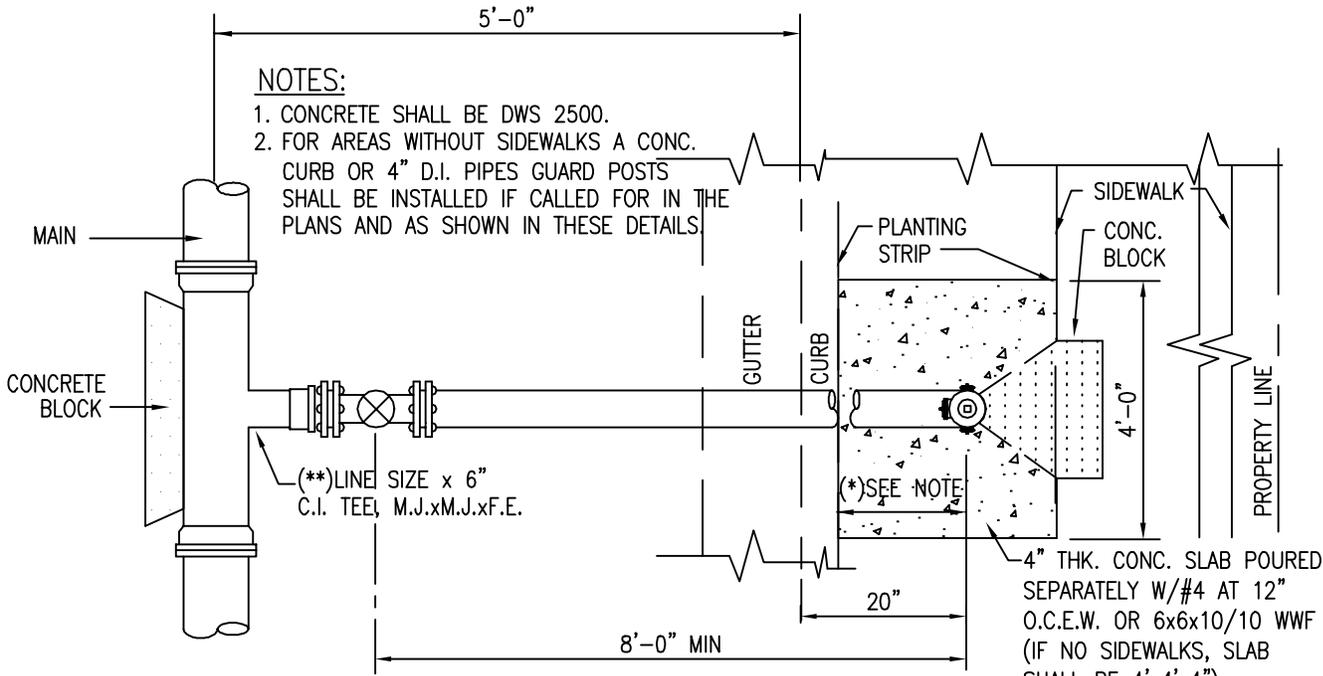
**NOTE:**

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.



**NOTES:**

1. CONCRETE SHALL BE DWS 2500.
2. FOR AREAS WITHOUT SIDEWALKS A CONC. CURB OR 4" D.I. PIPES GUARD POSTS SHALL BE INSTALLED IF CALLED FOR IN THE PLANS AND AS SHOWN IN THESE DETAILS

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

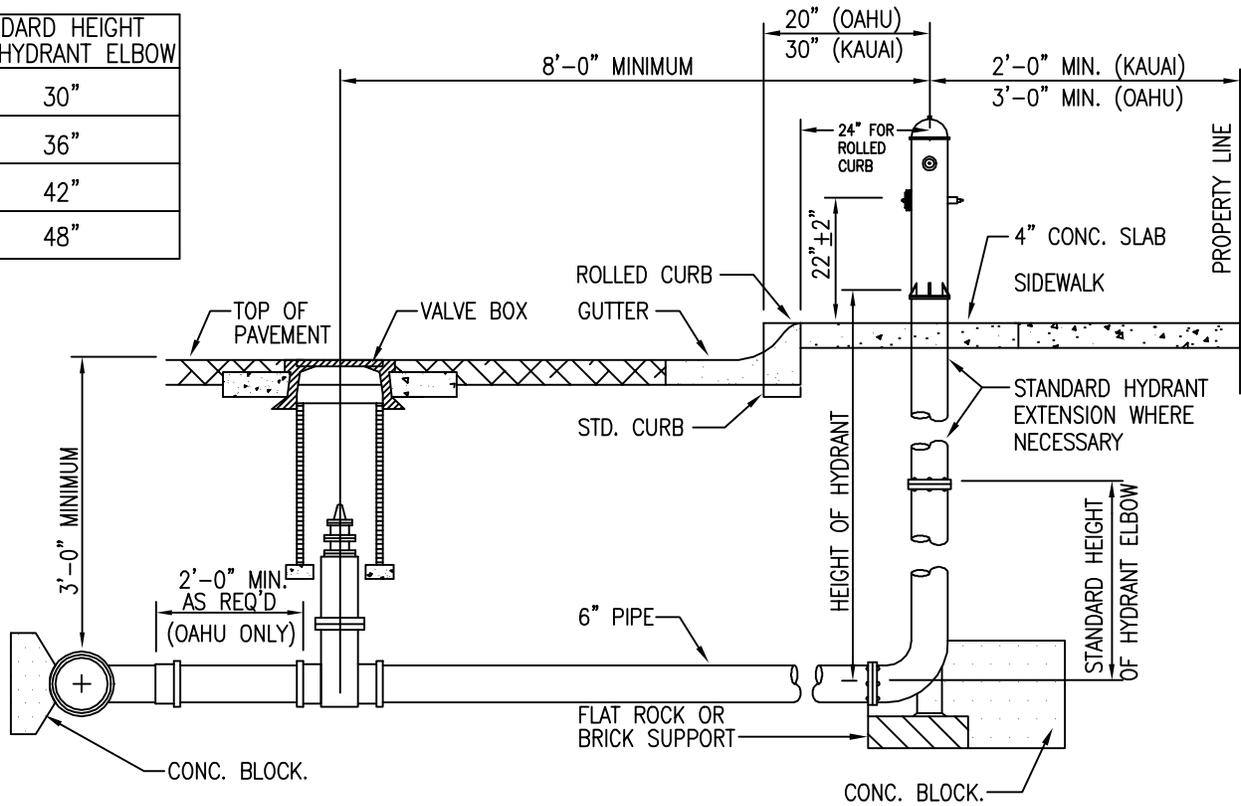
\*\* TAPPING SLEEVE/TAPPING VALVE ASSEMBLY MAY BE USED WHEN APPROVED BY MANAGER.

**PLAN**

2002  
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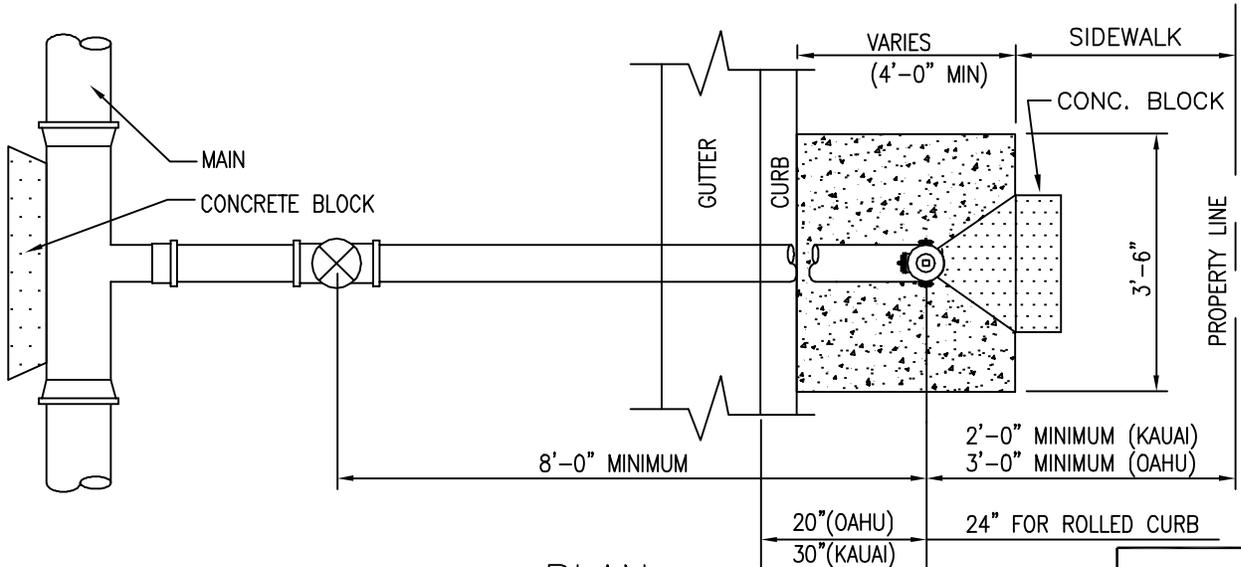
HAWAII	<b>HYDRANT CONNECTION LAYOUT "B"</b> (STRAIGHT RUN) SCALE: NTS	STANDARD DETAILS	FH3
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STANDARD HEIGHT FOR HYDRANT ELBOW	
30"	
36"	
42"	
48"	



SECTION

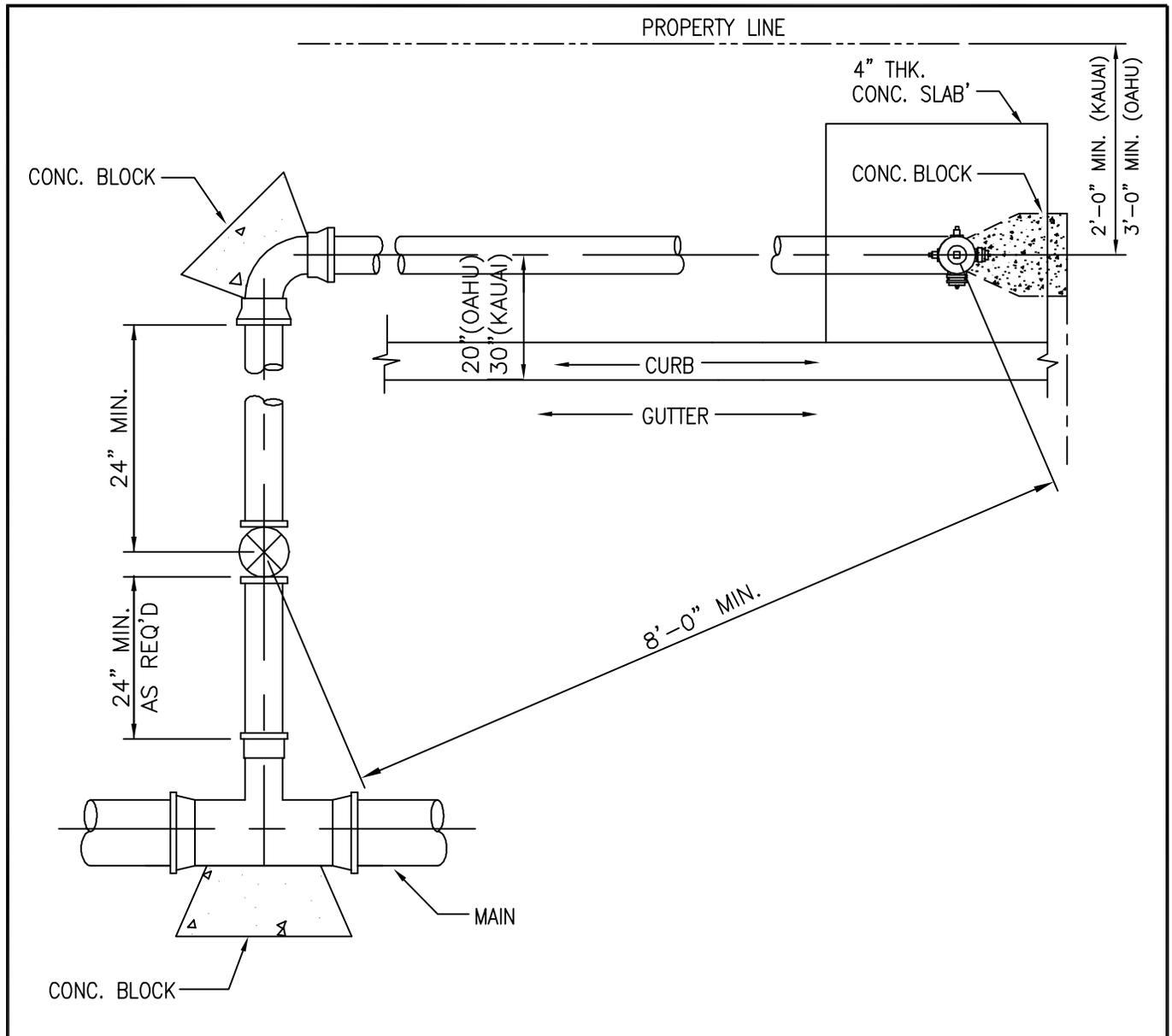
STANDARD HYDRANT EXTENSIONS ARE AVAILABLE IN THE FOLLOWING LENGTHS: 6 TO 30 INCHES LONG IN INCREMENTS OF 6 INCHES.



\* SEE NOTES ON PLATE FH8

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KAUAI OAHU	<b>HYDRANT CONNECTION</b> STRAIGHT RUN SCALE: NTS	STANDARD DETAILS	<b>FH4</b>
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**NOTES:**

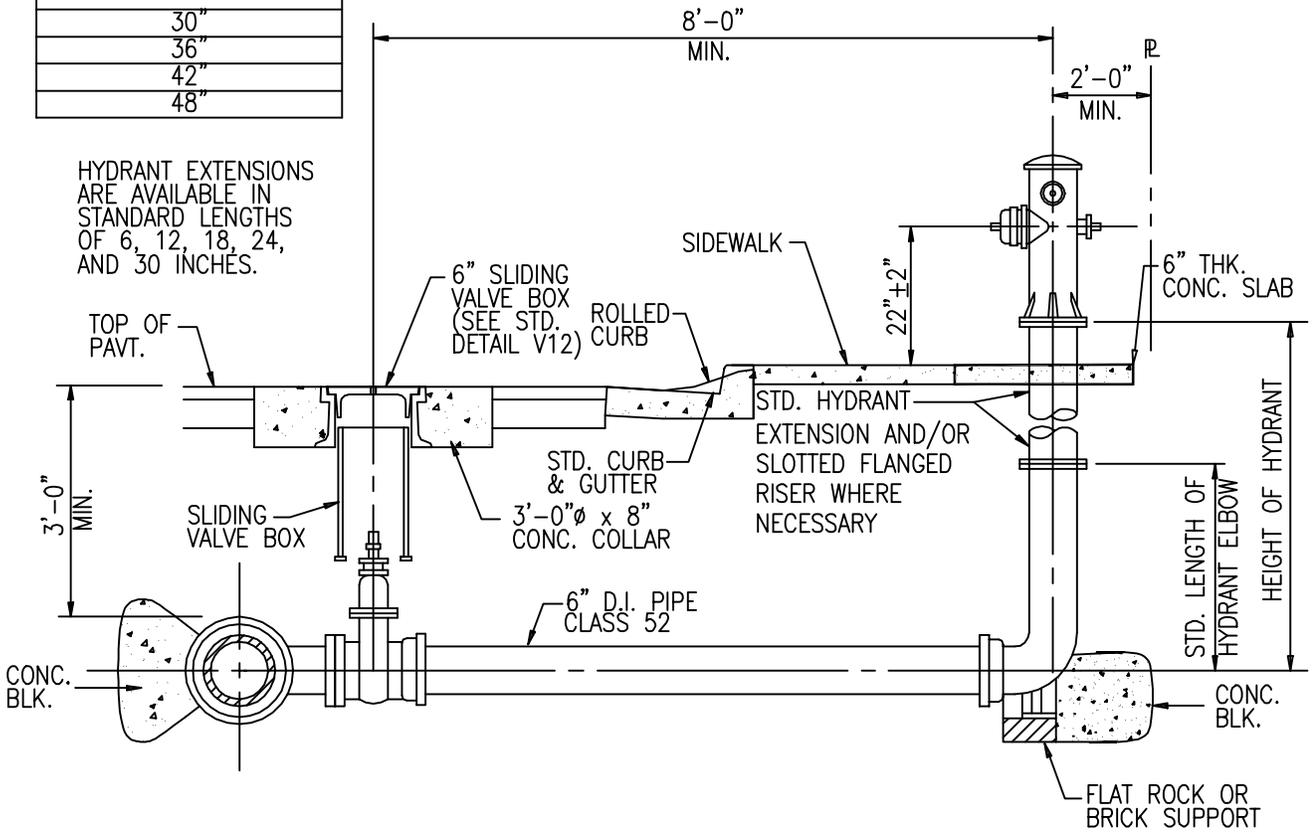
1. MINIMUM DIRECT DISTANCE FROM FIRE HYDRANT TO GATE VALVE SHALL BE 8'-0".
2. CONCRETE SHALL BE DWS 2500.
3. FLANGED OUTLET FOR THE TEE IS OPTIONAL FOR OAHU; MANDATORY FOR KAUAI.
4. REFER TO PLATE FH4 FOR DIMENSIONS OF 4" CONCRETE SLAB AROUND FIRE HYDRANT.
5. TAPPING SLEEVE WITH VALVE MAY BE USED. (SEE 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.

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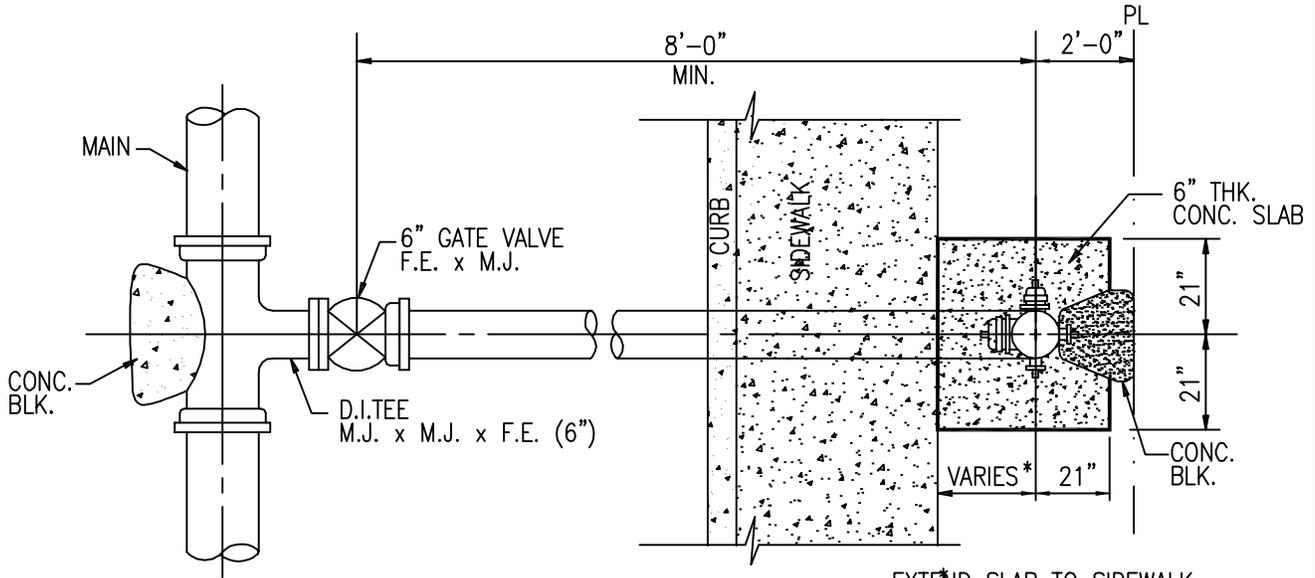
KAUAI OAHU	<b>HYDRANT CONNECTION WITH ELBOW</b> SCALE: NTS	STANDARD DETAILS	<b>FH5</b>
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STANDARD LENGTHS FOR HYDRANT ELBOWS	
30"	
36"	
42"	
48"	

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



SECTION

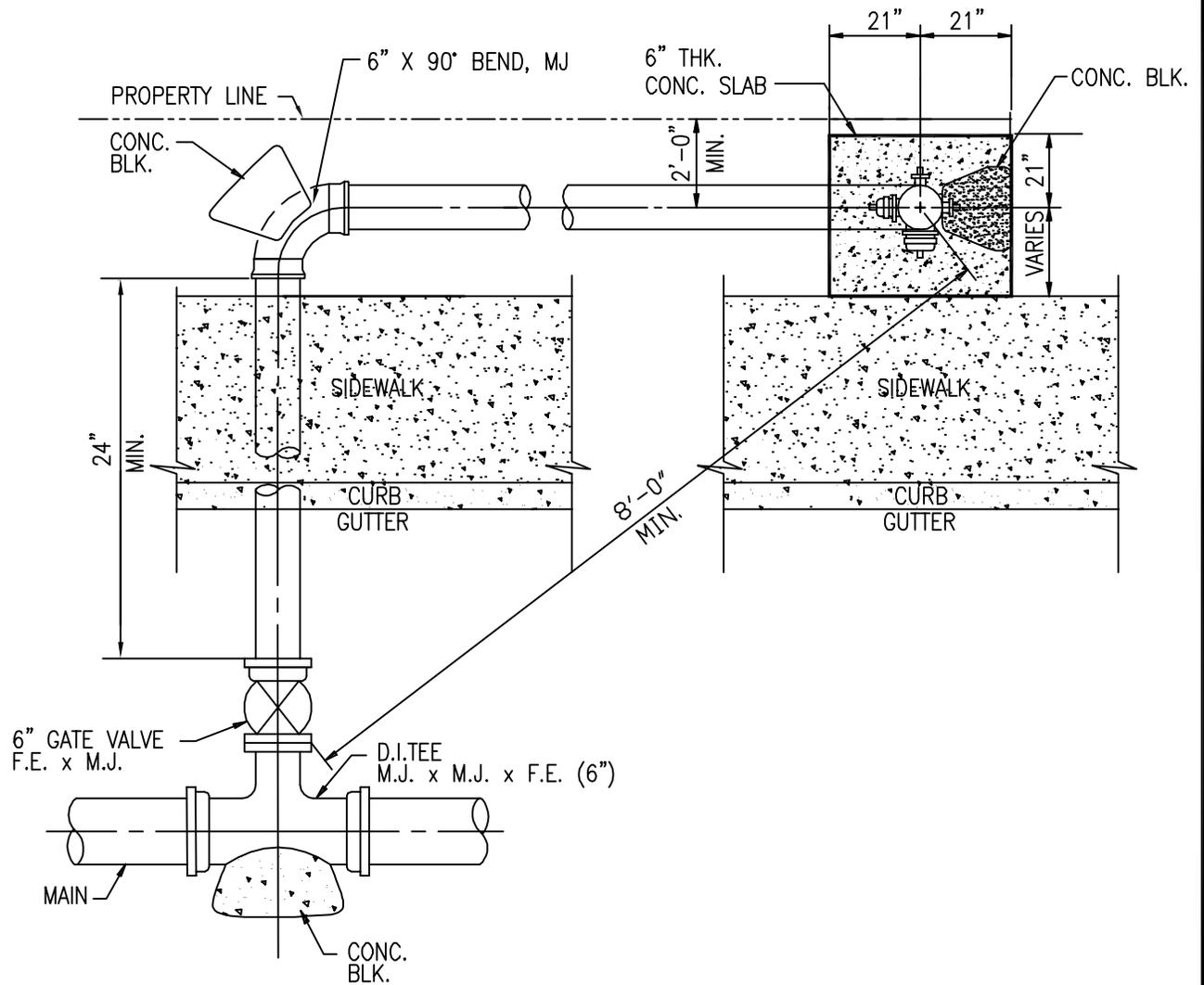


PLAN

REFER TO STANDARD DETAIL FH8 FOR NOTES.

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MAUI	<b>HYDRANT CONNECTION</b> STRAIGHT RUN SCALE: NTS	STANDARD DETAILS	<b>FH6</b>
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PLAN

REFER TO STANDARD DETAIL FH8 FOR NOTES.  
 REFER TO STANDARD DETAIL FH6 FOR ADDITIONAL  
 INFORMATION FOR FIRE HYDRANT INSTALLATION.

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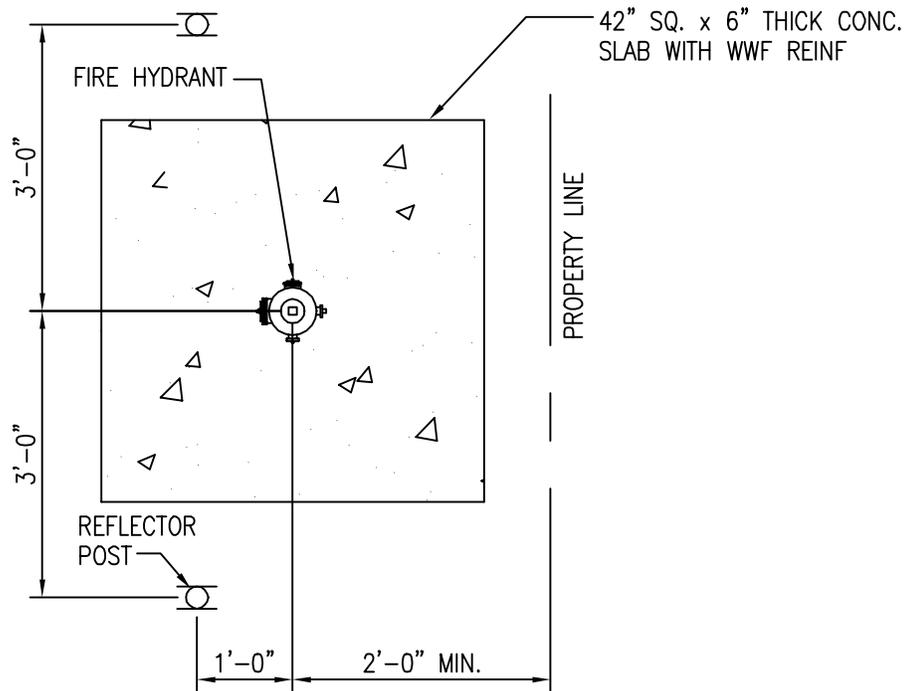
MAUI	<b>HYDRANT CONNECTION WITH ELBOW</b> SCALE: NTS	STANDARD DETAILS	<b>FH7</b>
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NOTE:

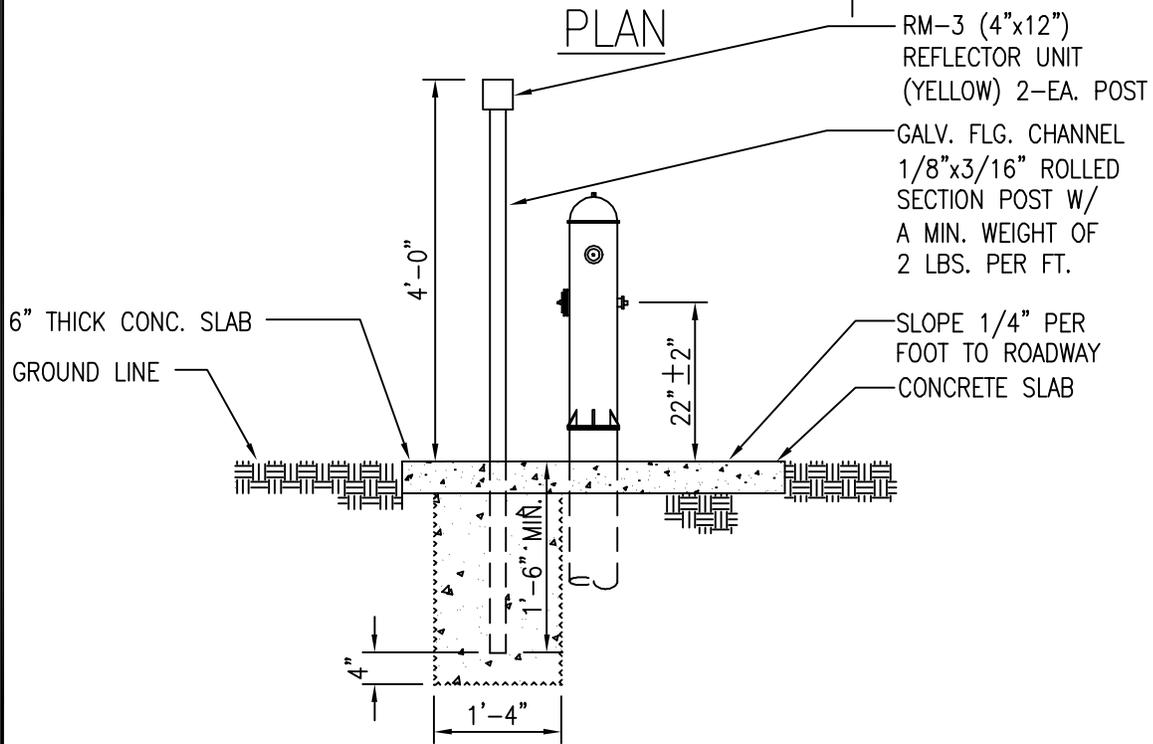
1. GASKETS FOR FLANGED JOINTS SHALL BE 1/8" DUCK-INSERTED RUBBER PACKING GARLOCK NO. 19.
2. BOLTS SHALL BE BREAK-OFF TYPE, 5/8" DIA. x 3" LONG MACHINE BOLTS WITH CUT THREADS, AMERICAN STANDARD COARSE HEXAGON HEADS, STAINLESS STEEL OR SILICON BRONZE. INSTALL BOLT WITH THREADS FACING DOWN.
3. NUTS SHALL 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)

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KAUAI OAHU MAUI	<b>HYDRANT CONNECTION</b> NOTES SCALE: NTS	STANDARD DETAILS	<b>FH8</b>
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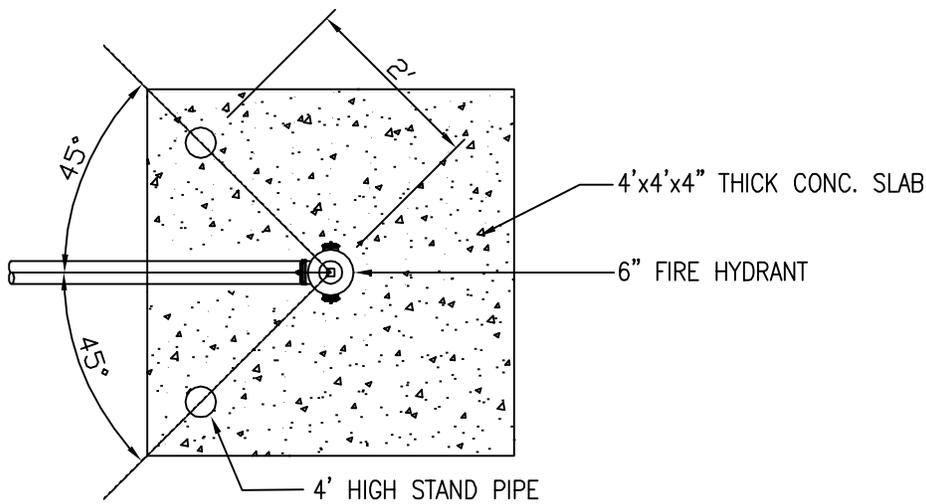
PLAN



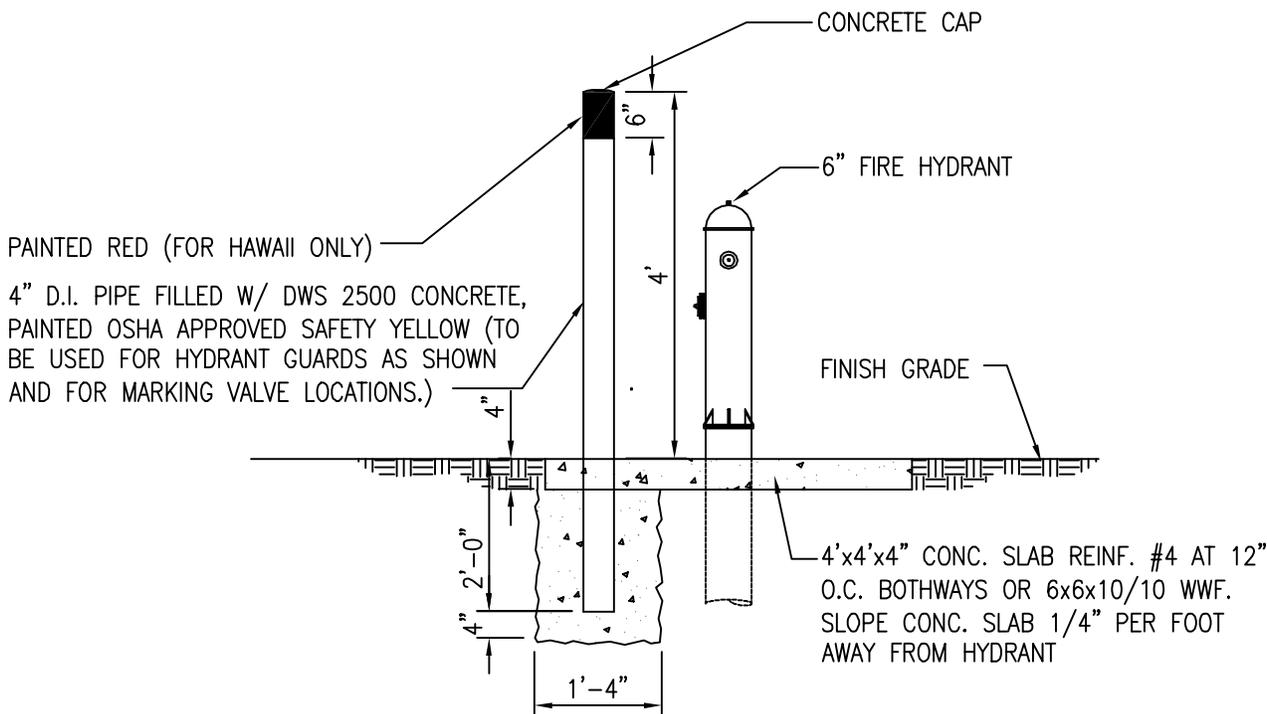
ELEVATION  
 (REFLECTOR POST DETAIL  
 FOR MARKING HYDRANTS  
 WITHOUT STREET CURBING)

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MAUI	<b>HYDRANT CONCRETE SLAB &amp; REFLECTOR POST</b> SCALE: NTS	STANDARD DETAILS	<b>FH9</b>
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PLAN

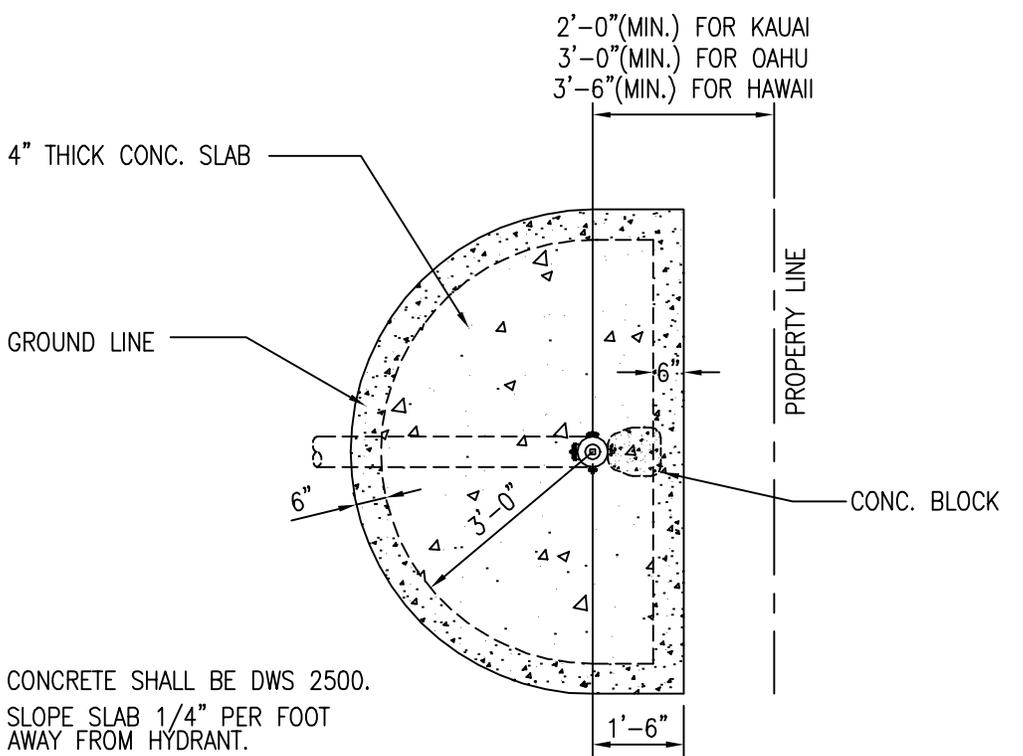


PAINTED RED (FOR HAWAII ONLY)  
 4" D.I. PIPE FILLED W/ DWS 2500 CONCRETE,  
 PAINTED OSHA APPROVED SAFETY YELLOW (TO  
 BE USED FOR HYDRANT GUARDS AS SHOWN  
 AND FOR MARKING VALVE LOCATIONS.)

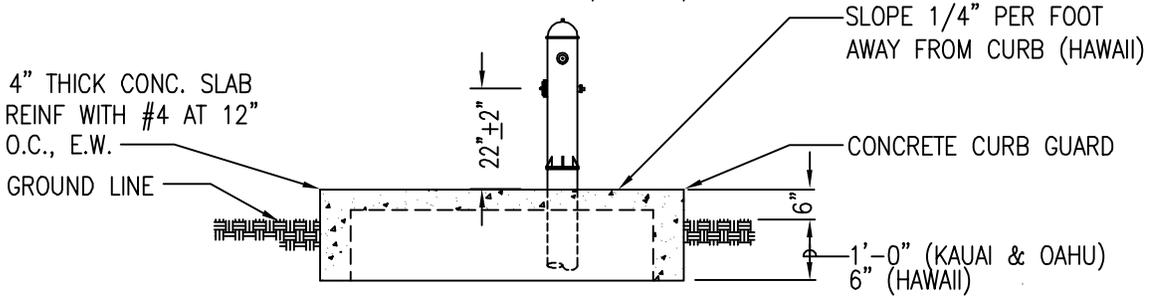
4'x4'x4" CONC. SLAB REINF. #4 AT 12"  
 O.C. BOTHWAYS OR 6x6x10/10 WWF.  
 SLOPE CONC. SLAB 1/4" PER FOOT  
 AWAY FROM HYDRANT

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<p>OAHU HAWAII</p>	<p><b>HYDRANT CONCRETE SLAB AND GUARD POSTS</b> SCALE: NTS</p>	<p>STANDARD DETAILS</p>	<p>FH10</p>
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1. CONCRETE SHALL BE DWS 2500.
2. SLOPE SLAB 1/4" PER FOOT AWAY FROM HYDRANT.



DETAIL OF CURB GUARD  
AT HYDRANT WHERE REQUIRED

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KAUAI OAHU HAWAII	<b>HYDRANT CURB GUARD</b>  SCALE: NTS	STANDARD DETAILS	<b>FH11</b>
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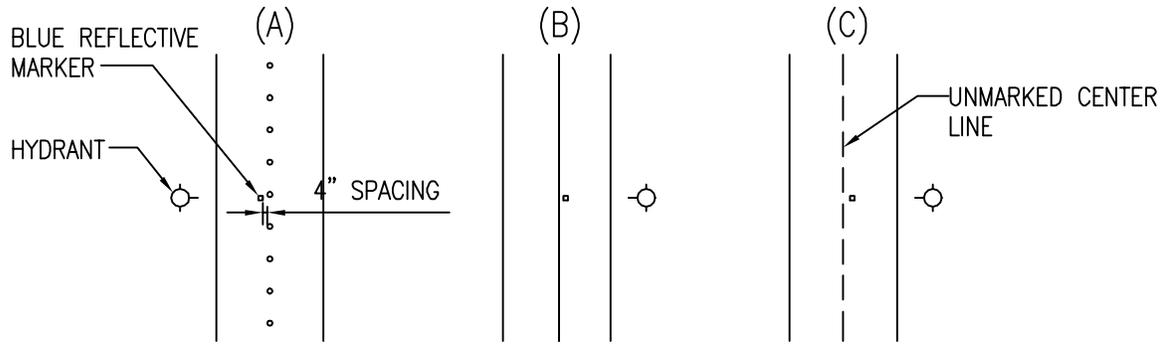


FIGURE 1  
TWO LANE STREET

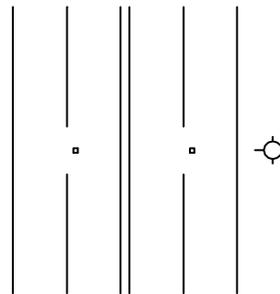


FIGURE 2  
DIVIDED STREET

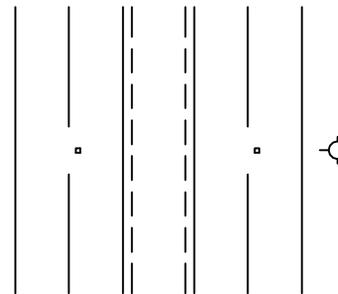


FIGURE 3  
MULTI-LANE STREET W/  
TURN LANE

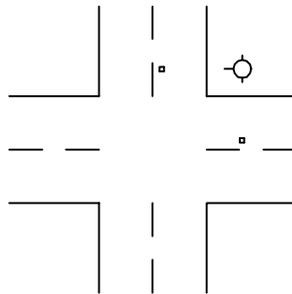


FIGURE 4  
TWO LANE STREET  
@ INTERSECTION

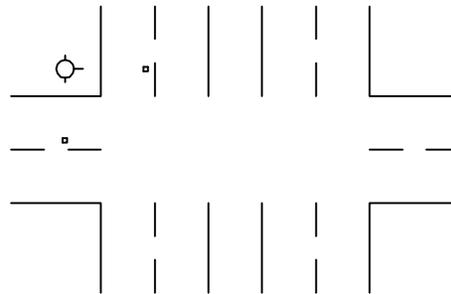


FIGURE 5  
FOUR LANE STREET W/ TURN  
LANE @ INTERSECTION

HYDRANT MARKER LOCATION

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KAUAI OAHU MAUI	<b>HYDRANT MARKER</b> LOCATION FOR STREETS SCALE: NTS	STANDARD DETAILS	<b>FH12</b>
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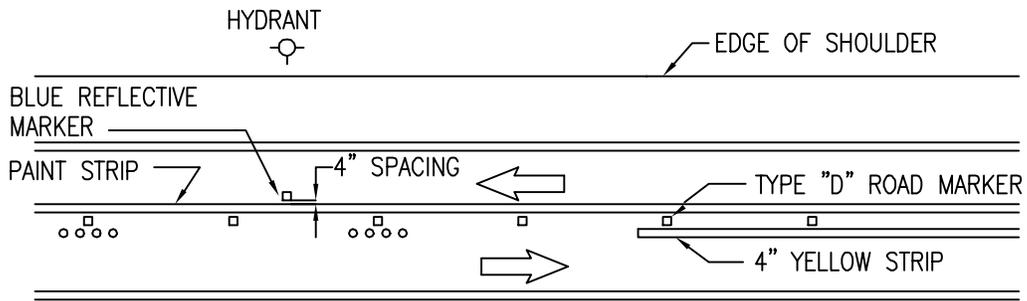


DIAGRAM A: TWO LANE HIGHWAY

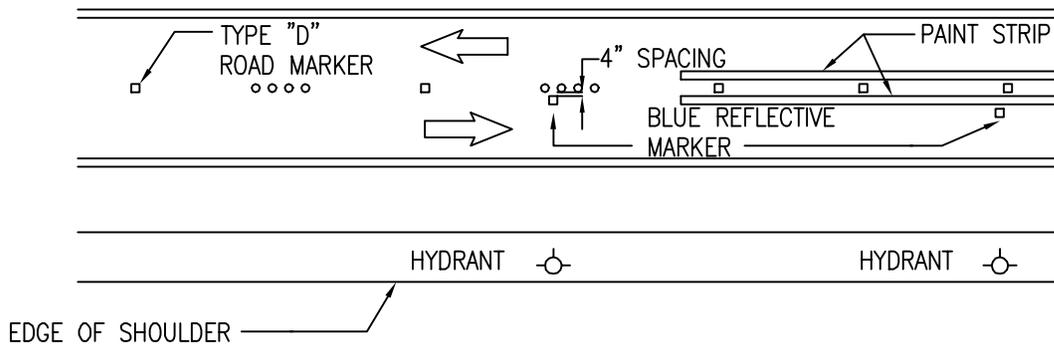


DIAGRAM B: TWO LANE HIGHWAY

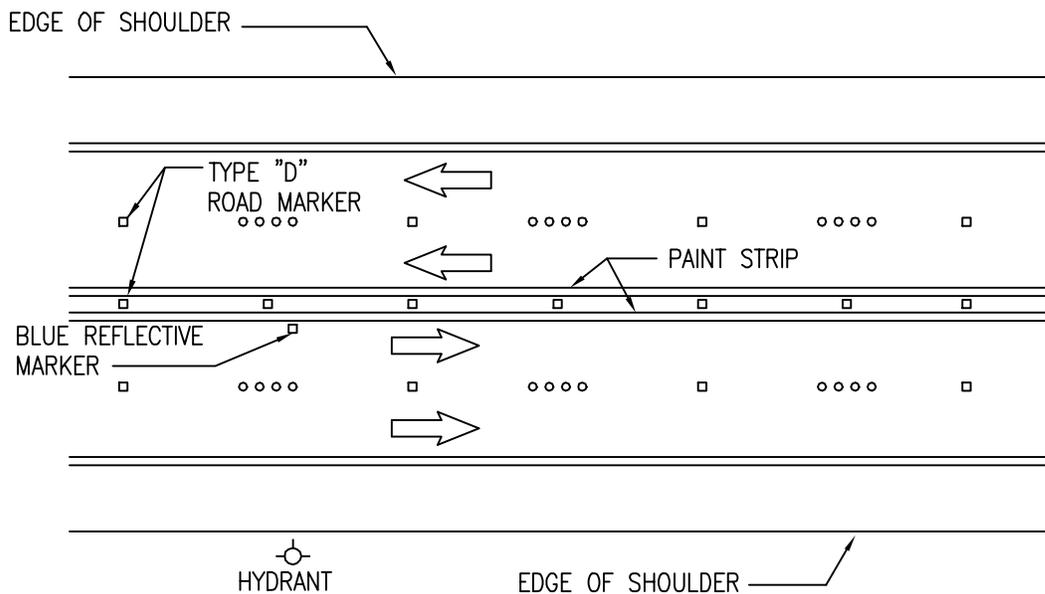


DIAGRAM C: MULTI-LANE HIGHWAY

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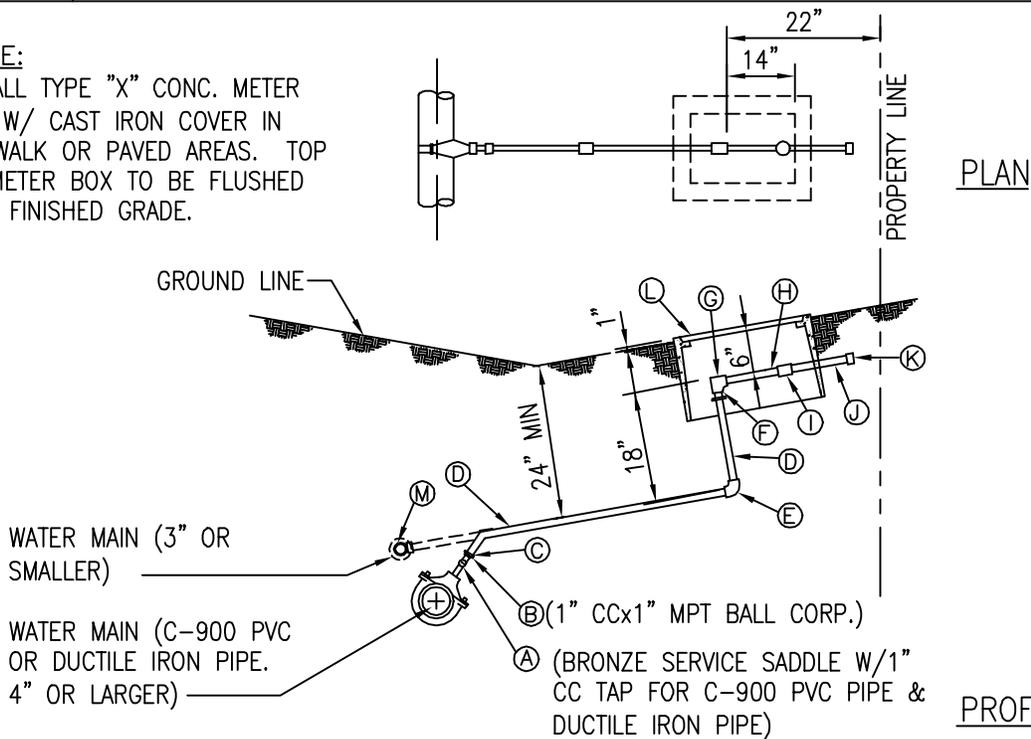
KAUAI OAHU MAUI	<b>HYDRANT MARKER</b> LOCATION FOR HIGHWAYS SCALE: NTS	STANDARD DETAILS	FH13
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# SCHEDULE OF FITTINGS

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.

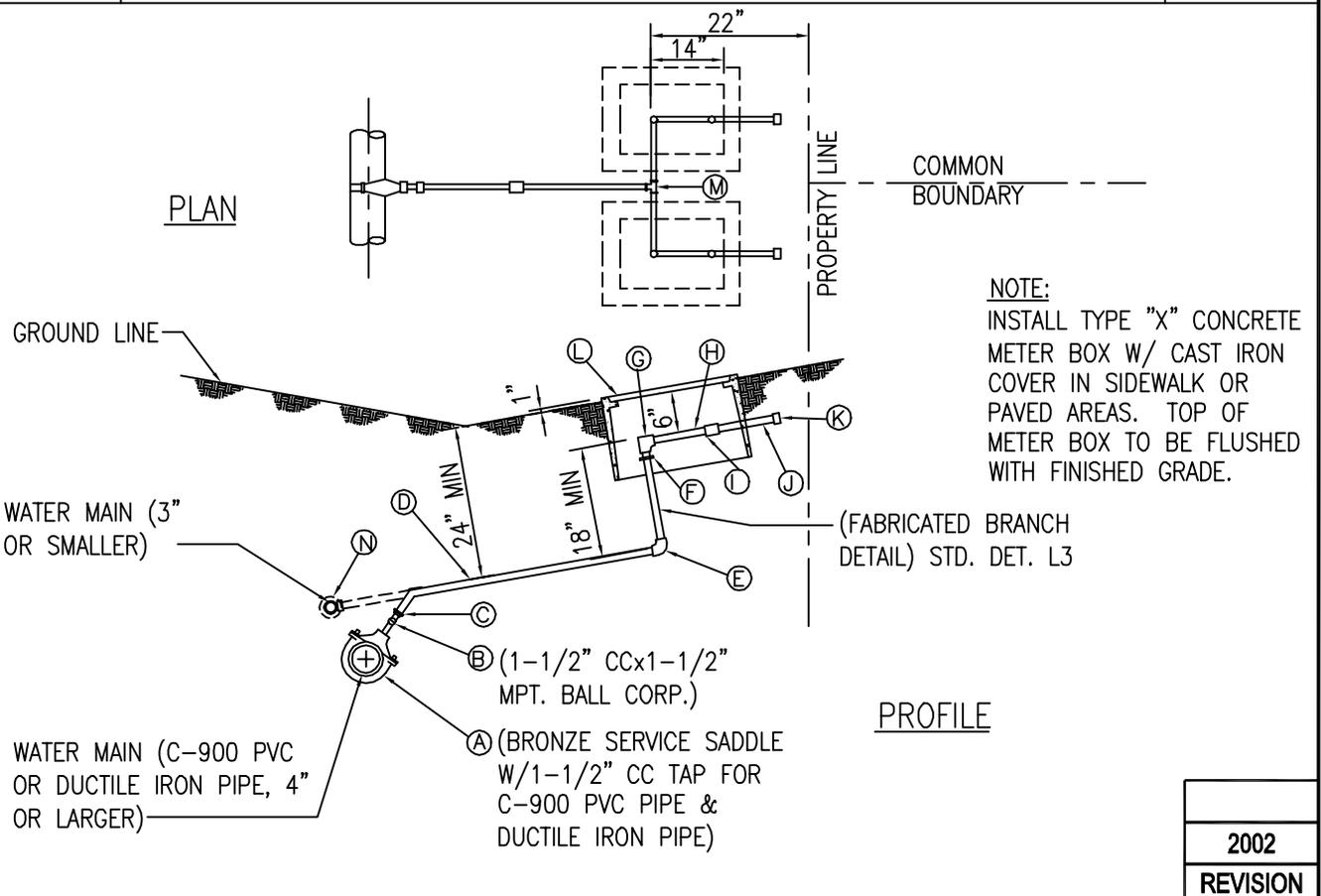


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KAUAI	<h2 style="margin: 0;">SINGLE SERVICE LATERAL</h2> <p style="margin: 0;">PLAN, PROFILE &amp; MATERIAL LIST</p> <p style="margin: 0;">SCALE: NTS</p>	STANDARD DETAILS	L1
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# SCHEDULE OF FITTINGS

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

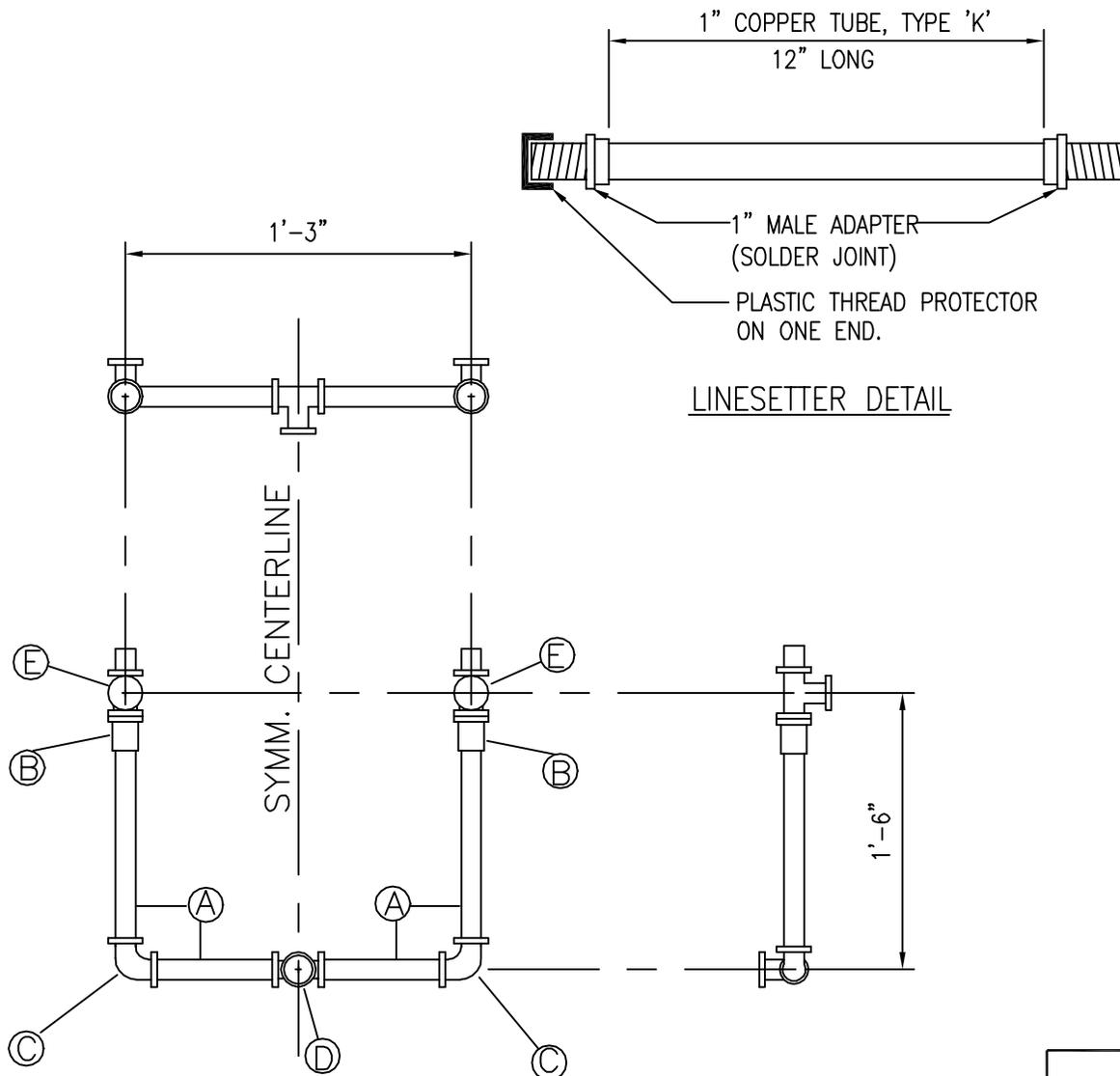


2002
REVISION

KAUAI	<h2 style="margin: 0;">DOUBLE SERVICE LATERAL</h2> <p style="margin: 0;">PLAN, PROFILE &amp; MATERIAL LIST</p> <p style="margin: 0;">SCALE: NTS</p>	STANDARD DETAILS	L2
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# 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

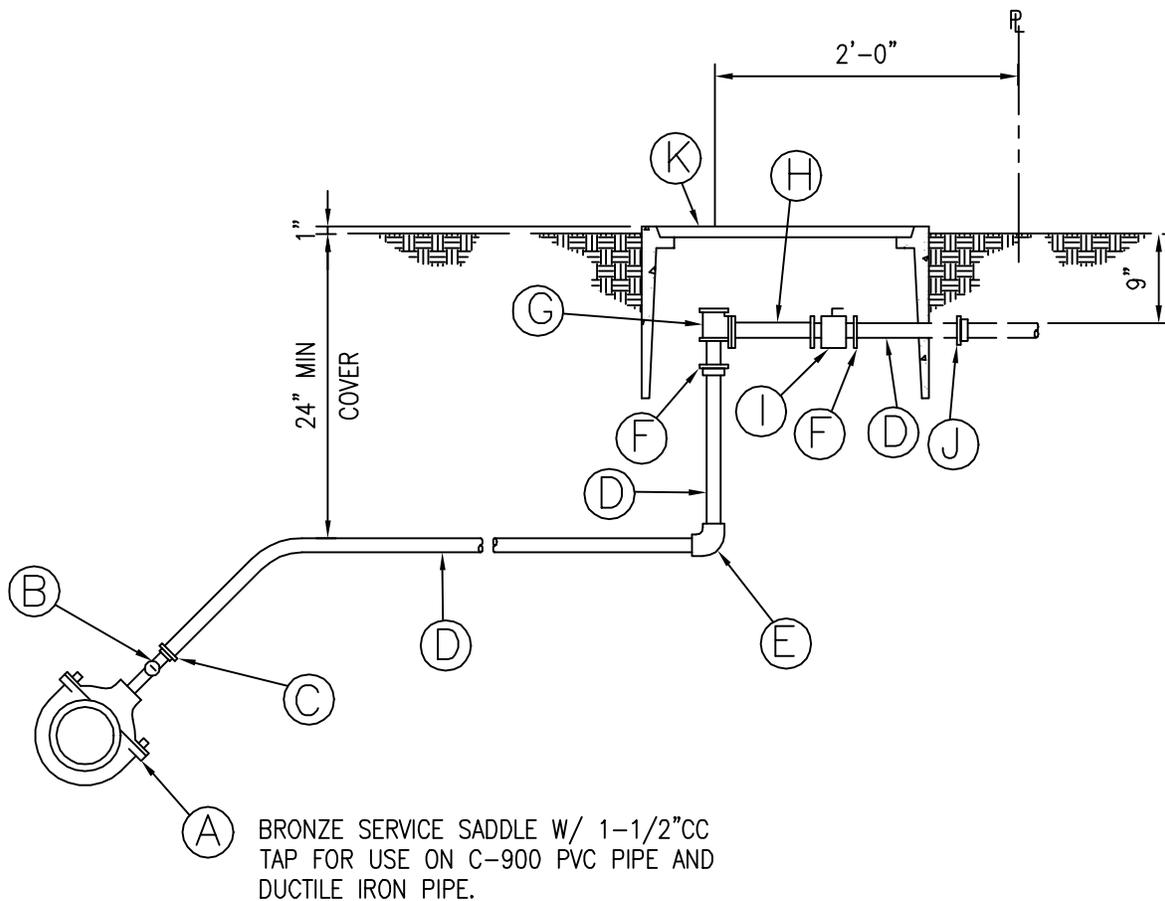


2002
REVISION

KAUAI	<b>FABRICATED BRANCH PIPE AND LINESETTER DETAIL</b> SCALE: NTS	STANDARD DETAILS	L3
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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



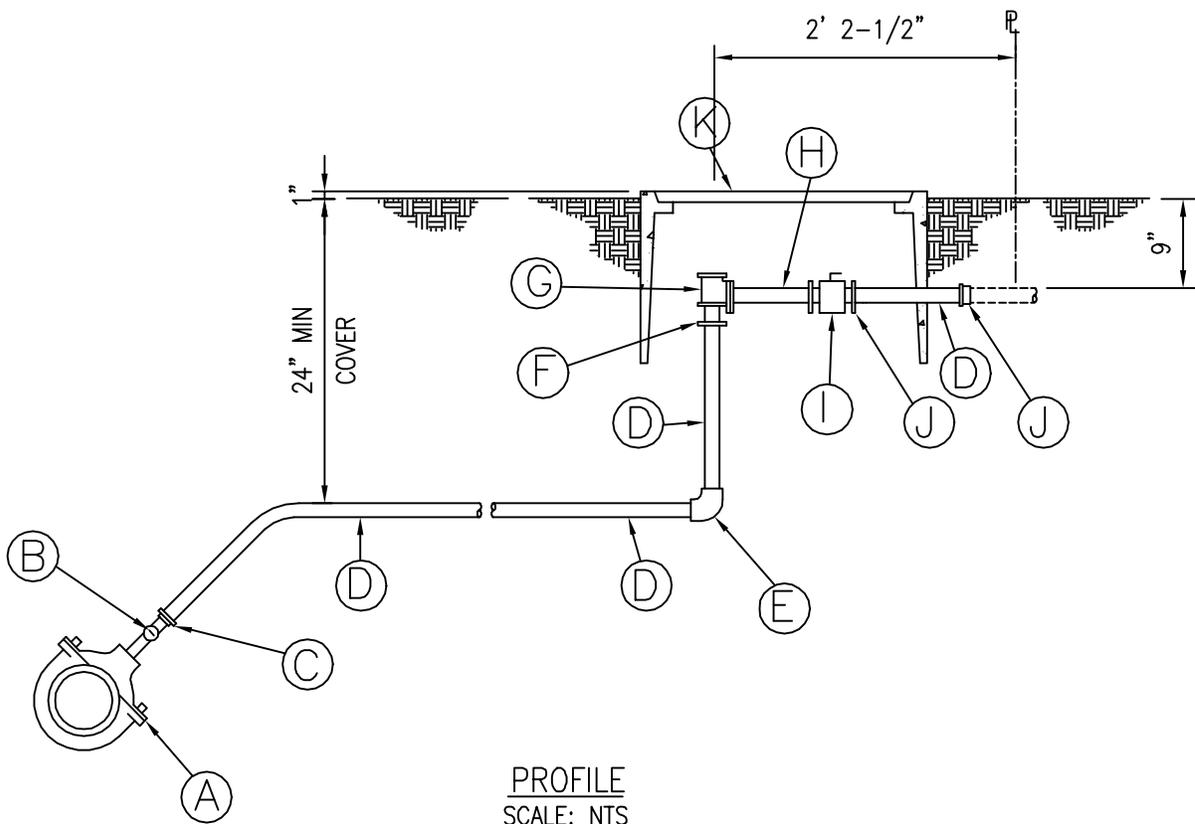
PROFILE

2002
REVISION

KAUAI	<b>ONE INCH METER PROFILE &amp; MATERIAL LIST</b> SCALE: NTS	STANDARD DETAILS	<b>L4</b>
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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

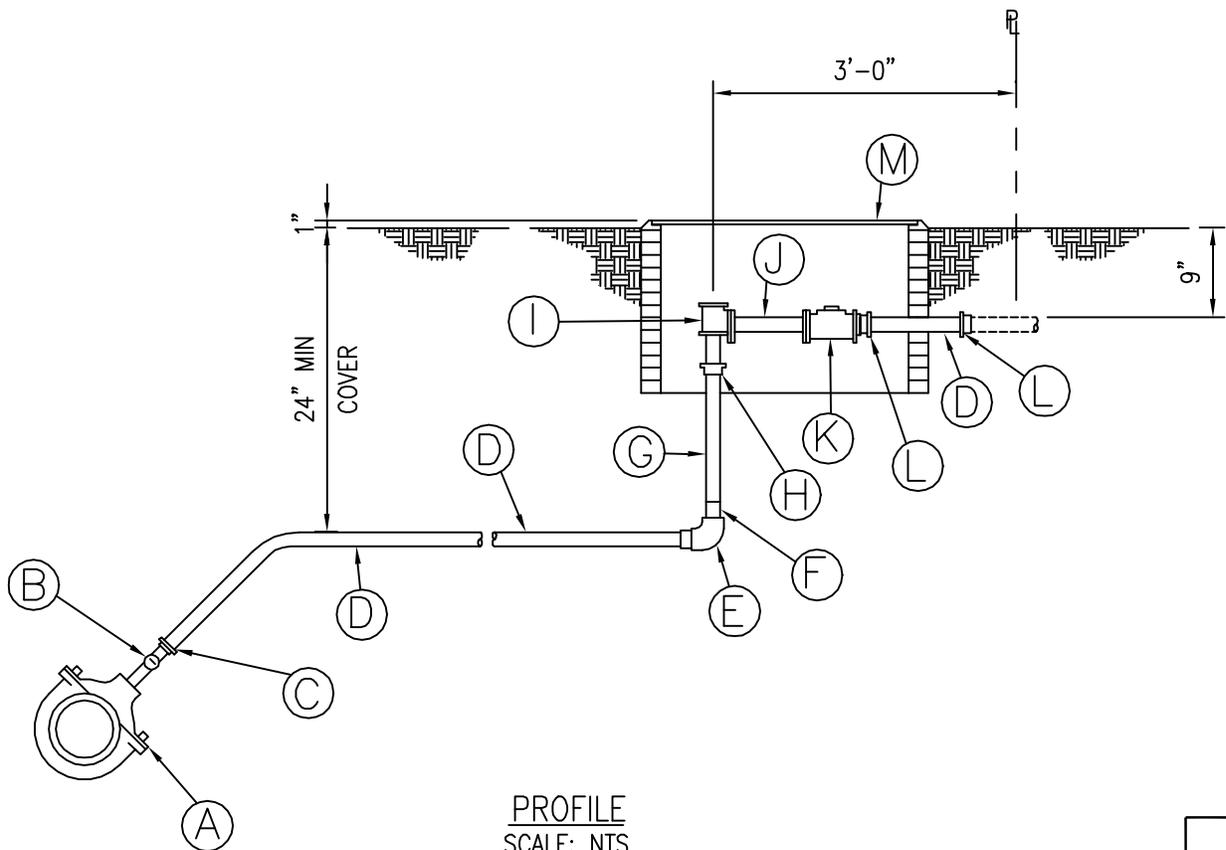
BRONZE SERVICE SADDLE W/ 2" CC TAP FOR USE  
ON C-900 PVC PIPE AND DUCTILE IRON PIPE

2002
REVISION

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

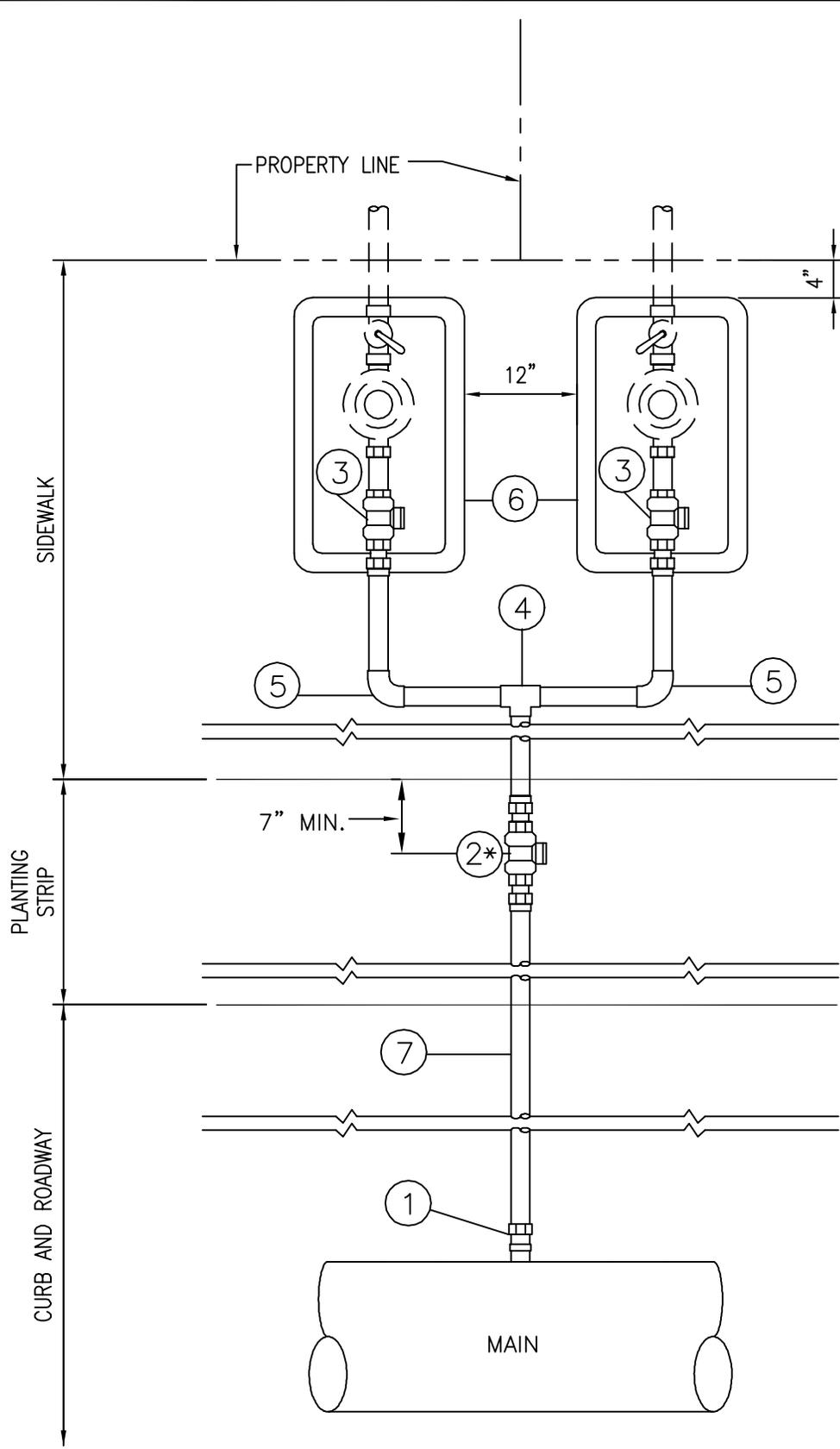


PROFILE  
SCALE: NTS

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

2002
REVISION

KAUAI	<b>TWO-INCH METER</b> PROFILE & MATERIAL LIST SCALE: NTS	STANDARD DETAILS	<b>L6</b>
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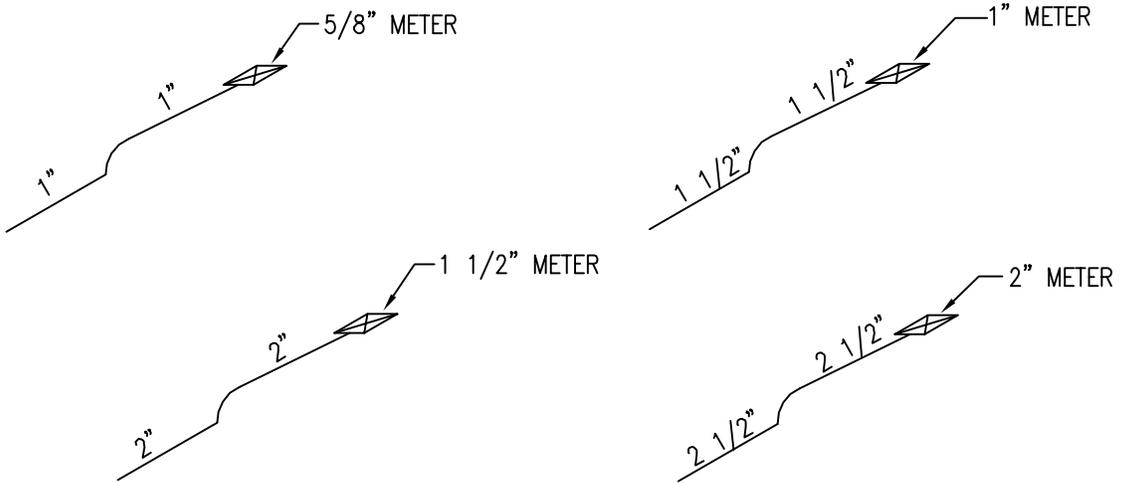


METER BOX EXCEPTION - FOR 1 1/2" TYPE "B", 1 1/2" TYPE "C", AND 1 1/2" TYPE "D" SERVICE LATERALS, INSTALL TYPE "X" METER BOXES IN A.C. AND CONCRETE PAVED AREAS. INSTALL TYPE "B" METER BOXES IN UNPAVED AREAS. CURB STOP TO BE LOCATED BELOW PLANTING STRIP. FOR CONC. SIDEWALKS W/O PLANTING STRIP, CURB STOP 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".

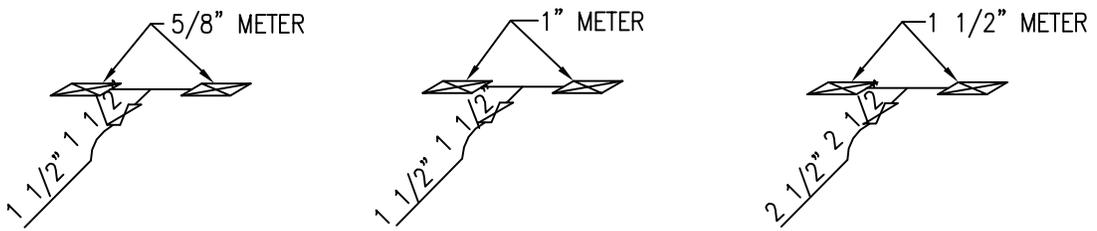
NOTE:  
REFER TO L10 FOR SCHEDULE OF  
COPPER FITTINGS.

2002
REVISION

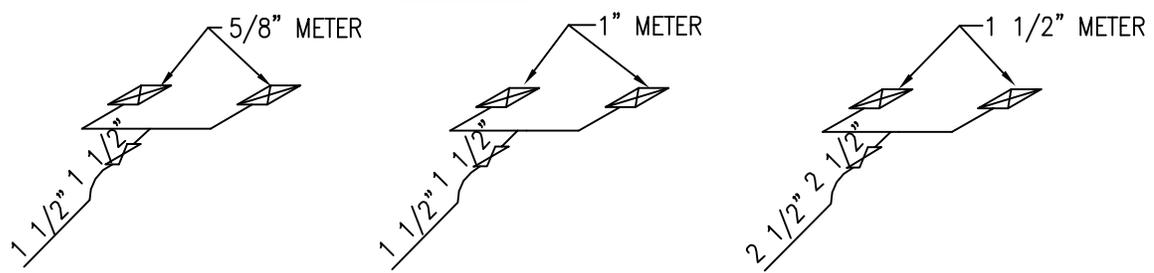
HAWAII	<b>COPPER SERVICE LATERAL FOR MULTIPLE METERS</b> SCALE: NTS	STANDARD DETAILS	L7
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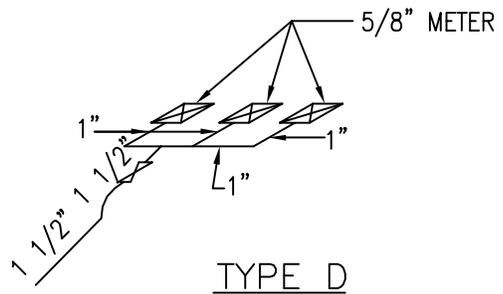
TYPE A



TYPE B



TYPE C

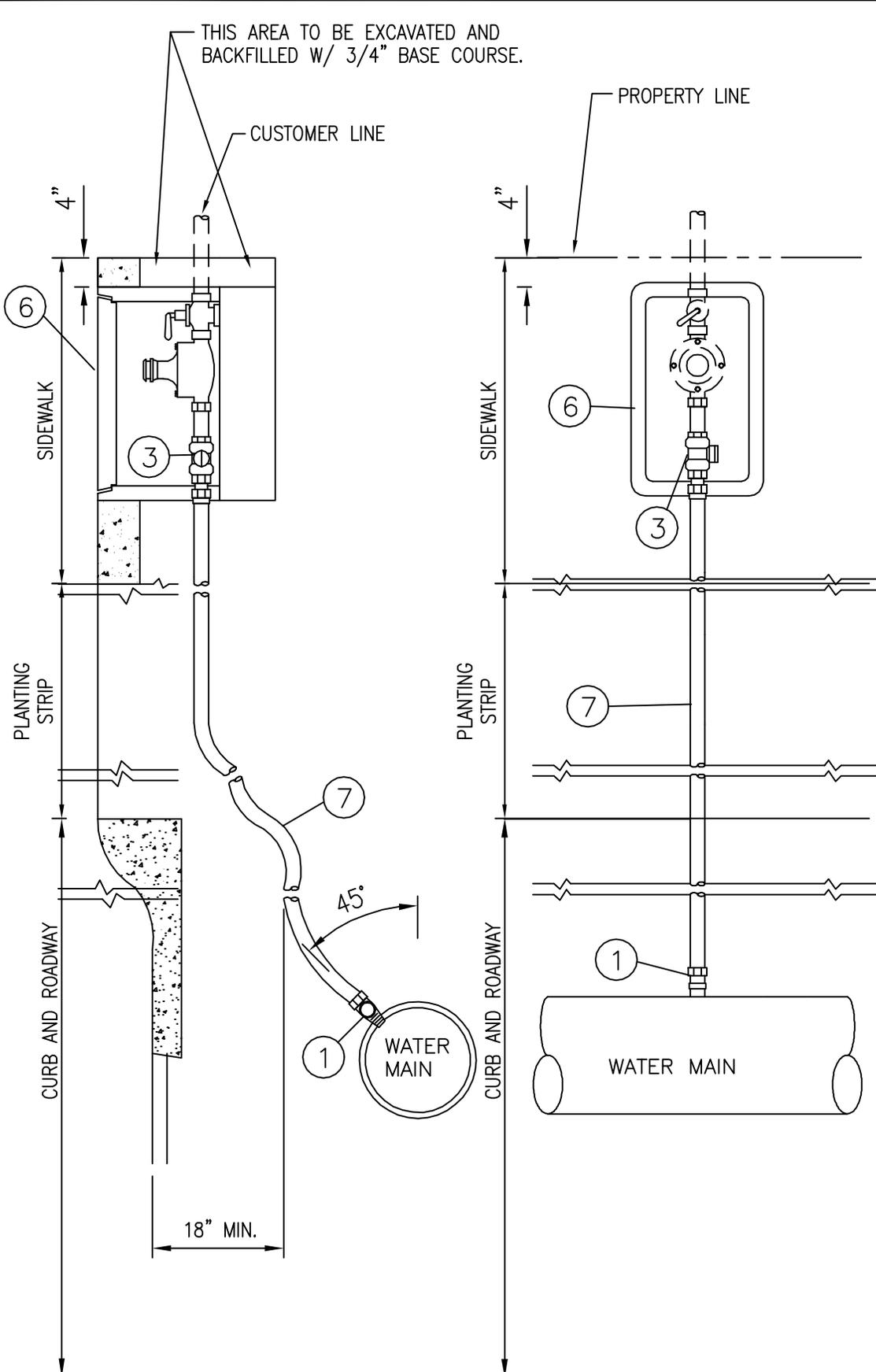


TYPE D

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 ABOVE MAY BE INSTALLED ONLY WITH THE APPROVAL OF THE MANAGER.

2002
REVISION

HAWAII	<b>SERVICE LATERALS AND CONNECTIONS</b>	STANDARD DETAILS	L8
	SCALE: NTS		



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.

2002
REVISION

HAWAII	<b>COPPER SERVICE LATERAL</b> FOR 5/8" & 1" METERS SCALE: NTS	STANDARD DETAILS	L9
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**SERVICE LATERAL AND CONNECTION MATERIAL SCHEDULE**

SERVICE CONNECTION MATERIAL																		
SERVICE LATERAL MATERIAL																		
TYPE	BRONZE BALL CORP. (a)		BRONZE CURB STOP (b)		BRONZE CURB STOP (c)		TEE CxXC STYLE		90° ELBOW CxX STYLE		METER BOX		COPPER TUBING TYPE K		METER		CUSTOMER VALVE (d)	
	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.	SIZE	QNT.
A	1	1	1X1	1	1*	1						1	1	5/8	1	3/4	1	
	1- 1/2	1	1-1/2X1-1/2	1	1-1/2	1						1	1	1- 1/2	1	1	1	1
	2	1	2X2	1	2	1						1	1	2	1- 1/2	1	1-1/2	1
B	2- 1/2	1	2X2	1	2	1						1	1	2- 1/2	1	2	1	2
	1- 1/2	1	1-1/2X1-1/2	1	1-1/2	1	1 x 1 x 1-1/2	1				2	2	1- 1/2	2	3/4	2	2
	1- 1/2	1	1-1/2X1-1/2	1	1-1/2	2	1-1/2X1-1/2X1-1/2	1				2	2	1- 1/2	1	1	2	2
C	2- 1/2	1	2X2	1	2	2	2 X 2 X 2- 1/2	1				2	2	2- 1/2	2	1-1/2	2	2
	1- 1/2	1	1-1/2X1-1/2	1	1-1/2	1	1 X 1 X 1- 1/2	1				2	2	1- 1/2	2	3/4	2	2
	1- 1/2	1	1-1/2X1-1/2	1	1-1/2	2	1-1/2X1-1/2X1-1/2	1				2	2	1- 1/2	1	1	2	2
D	2- 1/2	1	2X2	1	2	2	2 X 2 X 2- 1/2	1				2	2	2- 1/2	2	1-1/2	2	2
	1- 1/2	1	1-1/2X1-1/2	1	1-1/2	1	1-1/2X1x1-1/2	1				1	1	1- 1/2	3	3/4	3	3
	1- 1/2	1	1-1/2X1-1/2	1	1-1/2	1	1- 1/2 X 1 X 1	1				1	1	5/8	3	3/4	3	3
ITEM NO.	①		②		③		④		⑤		⑥		⑦		⑧		⑨	

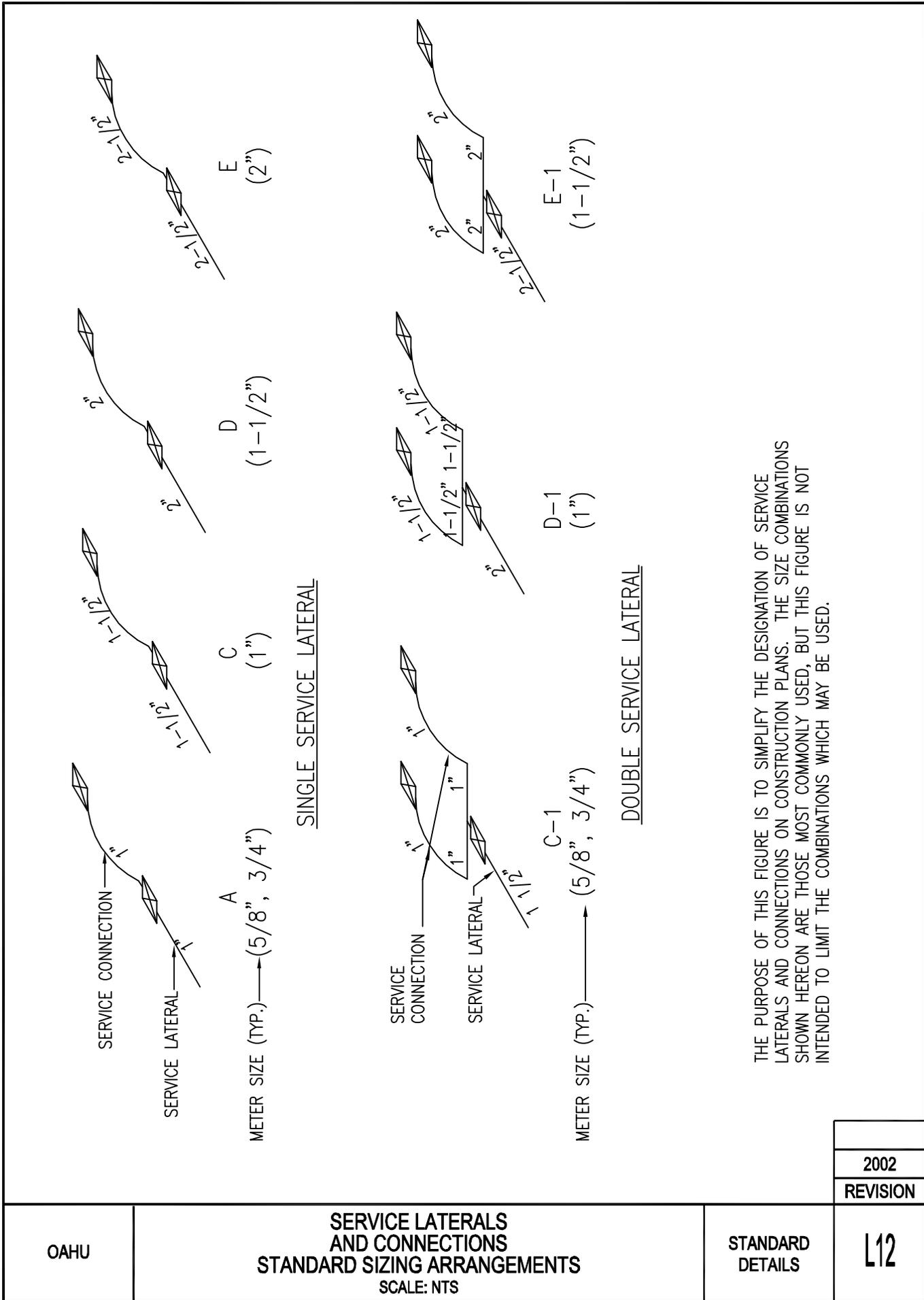
(a) BRONZE BALL CORP.  
 INLET: AWWA TAPER  
 OUTLET: PACK JOINT, "M.P.T. W/ADAPTER (F.P.T. x PACK JOINT)" OR M.P.T. W/ BRASS UNION (FPT X C)

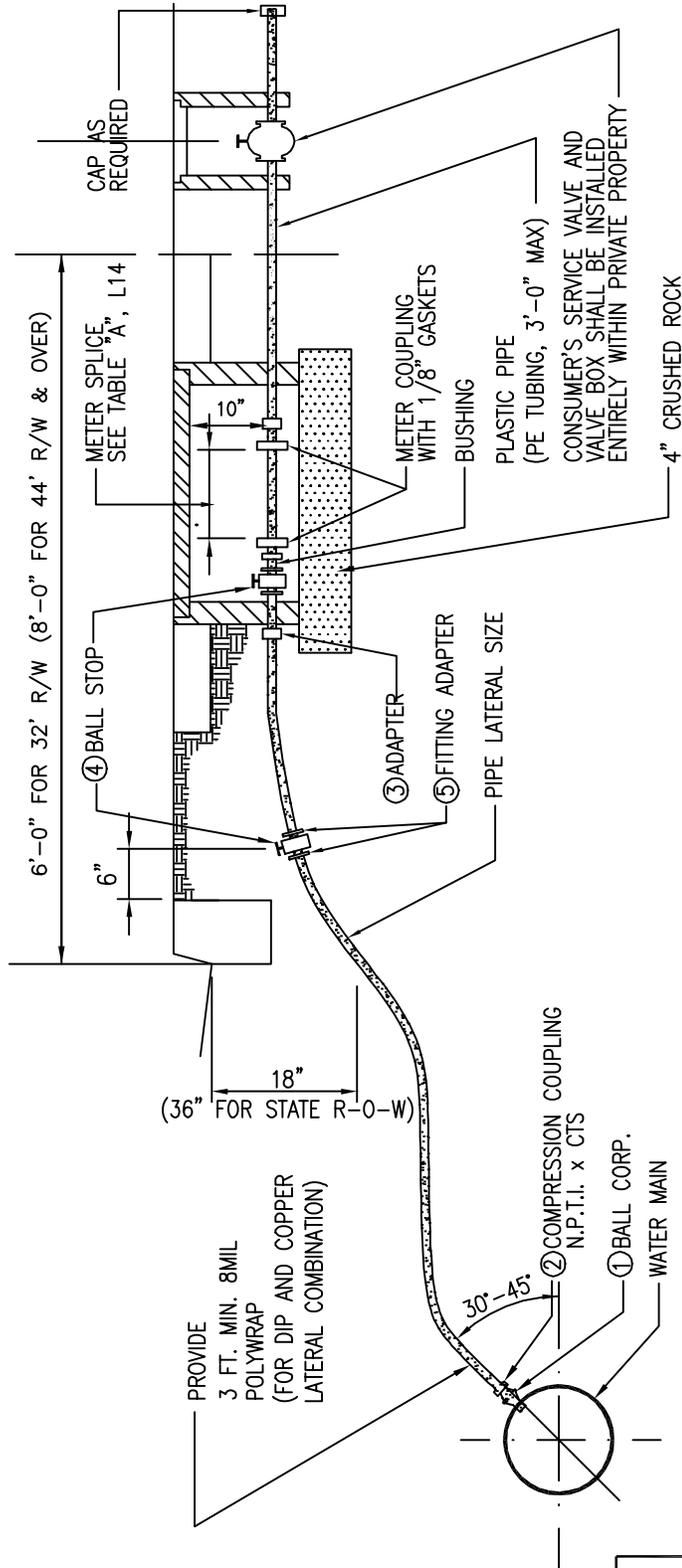
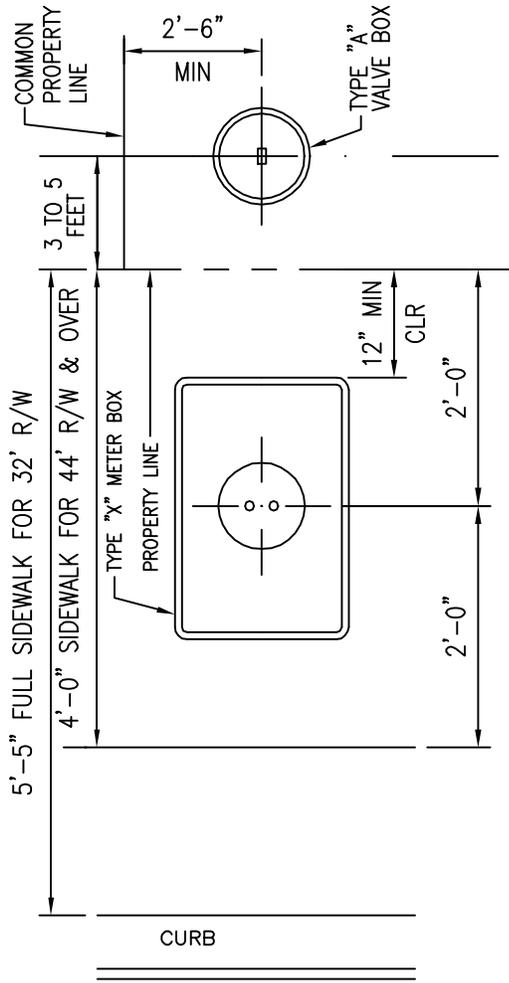
(b) BRONZE BALL CURB STOP  
 INLET-OUTLET: PACK JOINTS OR  
 FPT W/ ADAPTER (C X MPT)

(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

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







OAHU

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

STANDARD  
DETAILS

2002  
REVISION

L13

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.

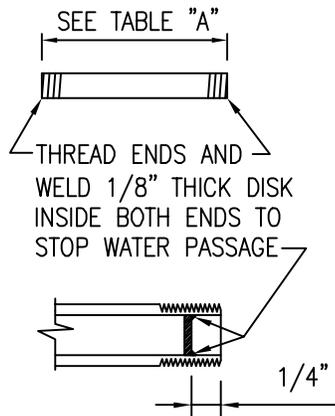
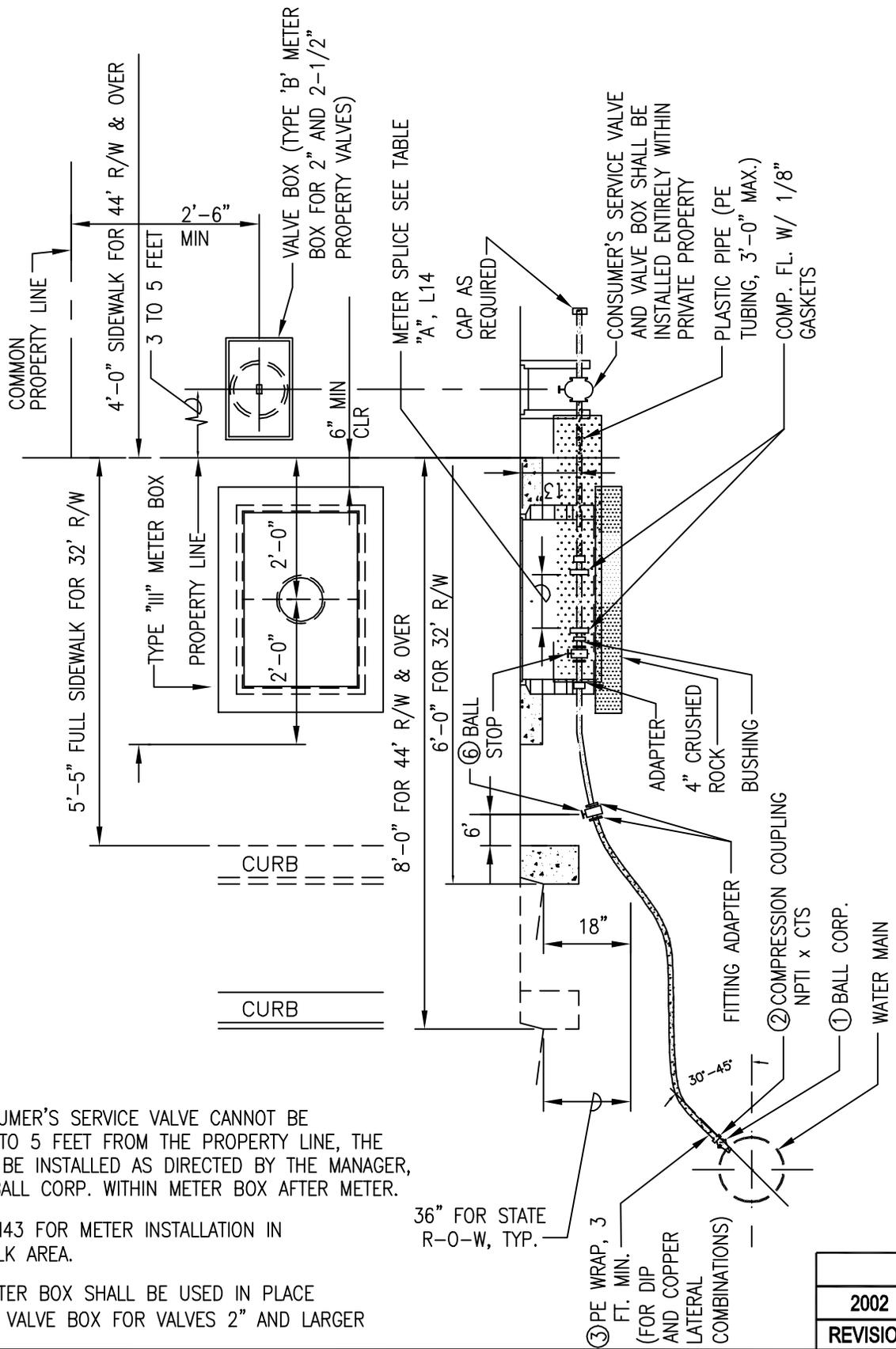


TABLE "A"		
METER SIZE	SPLICE SIZE	SPLICE LENGTH
5/8"	1" DIA.	7 1/2"
3/4"	1" DIA.	9"
1"	1 1/4" DIA.	10 3/4"

METER SPLICE DETAIL

2002
REVISION

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

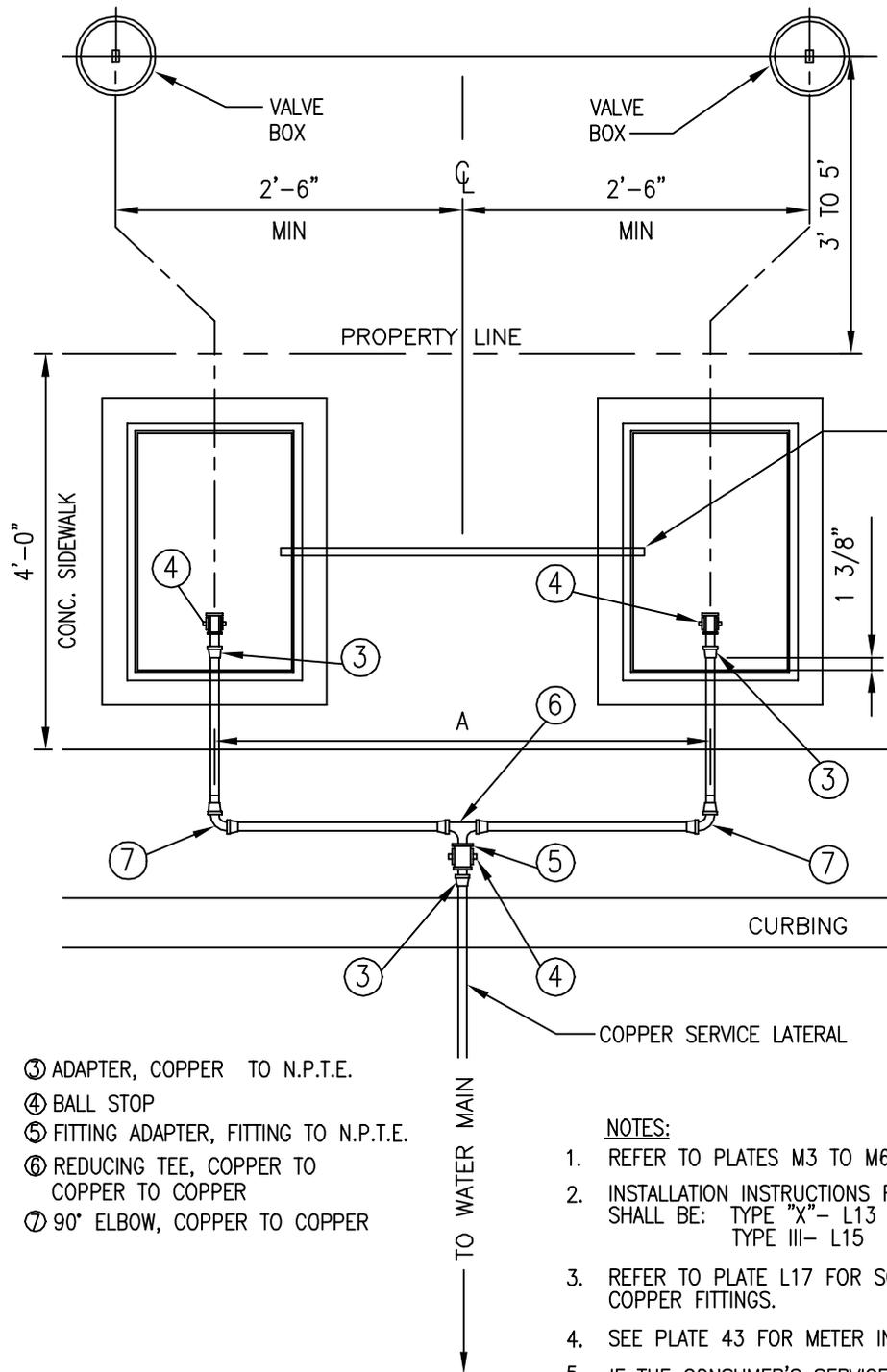
**COPPER SERVICE LATERAL  
FOR CONNECTION TYPE III METER BOX  
1 1/2" AND 2" METERS  
SCALE: NTS**

OAHU

STANDARD  
DETAILS

2002  
REVISION

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

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

2002
REVISION

OAHU	<b>SPECIAL LATERAL AND CONNECTION FITTING SCHEDULE</b> SCALE: NTS	STANDARD DETAILS	L17
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OAHU

**MATERIAL LIST  
FOR COPPER LATERALS**  
SCALE: NTS

STANDARD  
DETAILS

L18

TABLE A (COPPER)

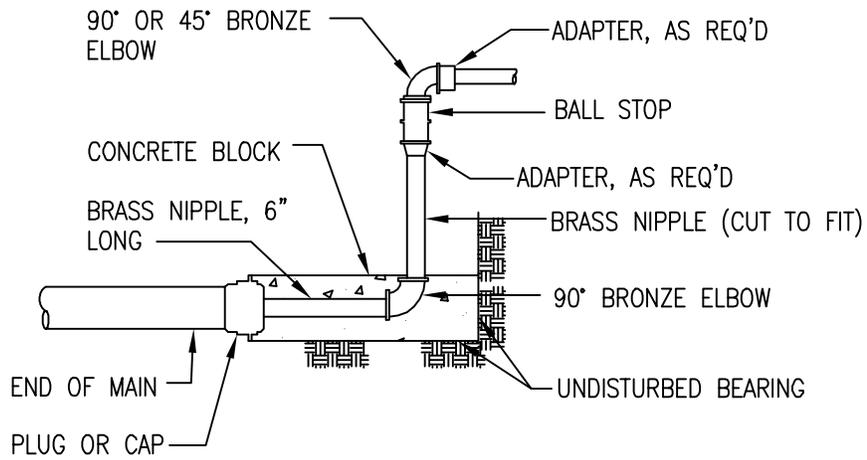
METER CODE SIZE	LOW RANGE FOR METER SIZING (GPM)	LATERAL TYPE	LATERAL SIZE	SPLICE SIZE	SPLICE LENGTH	METER COUPL'G	BRASS REDUC.	SERVICE VALVE	BRASS PIPE	CAP	METER BOX
02 5/8"	20	"A"	1"	1" DIA.	7 1/2"	3/4"	1"x3/4"	1"	1"x10"	1"	TYPE X
03 3/4"	30	"A"	1"	1" DIA.	9"	3/4"	1"x3/4"	1"	1"x10"	1"	TYPE X
04 1"	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	"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	"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" x 2 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"

2002
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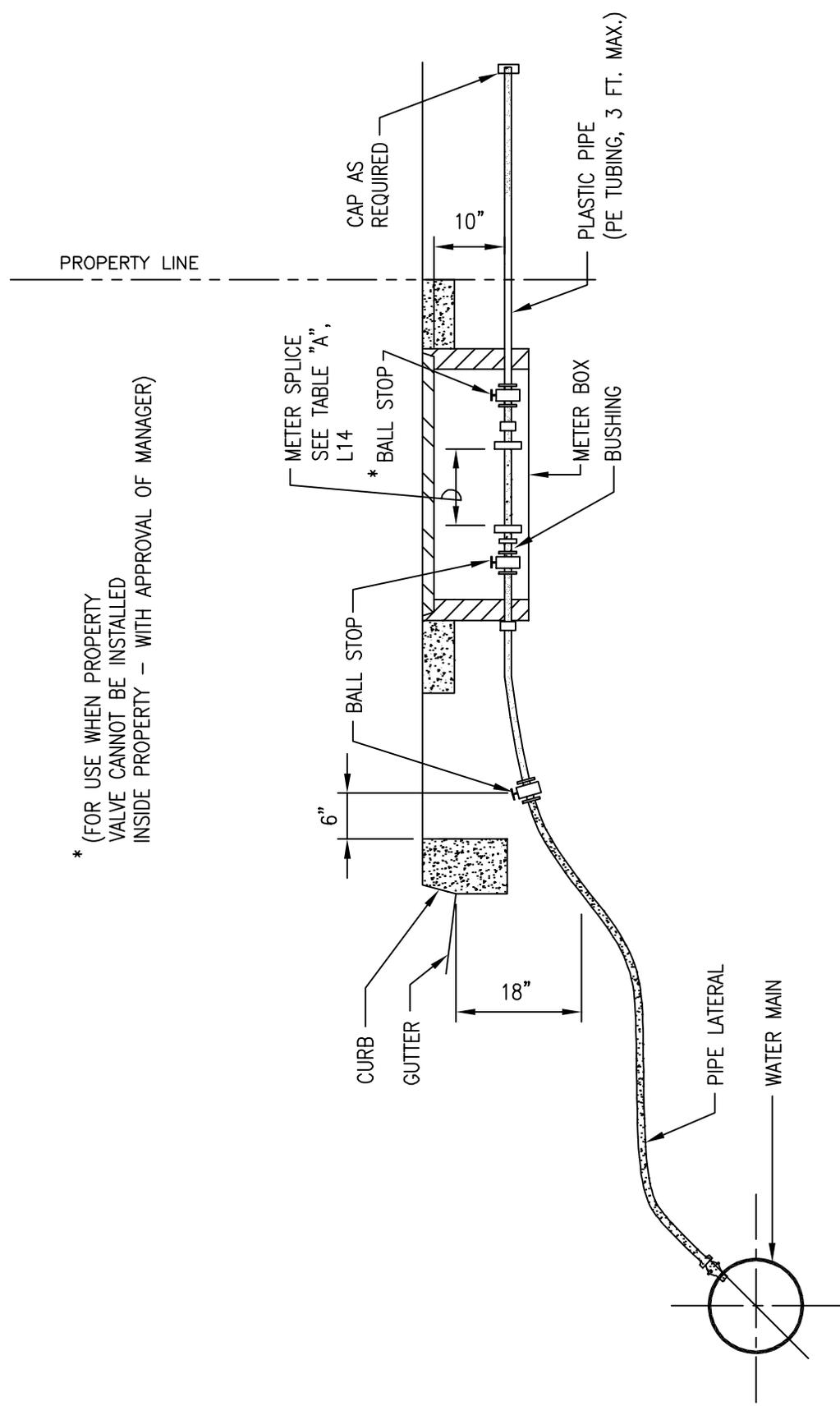


SERVICE LATERAL CONNECTION AT END OF LINE

2002
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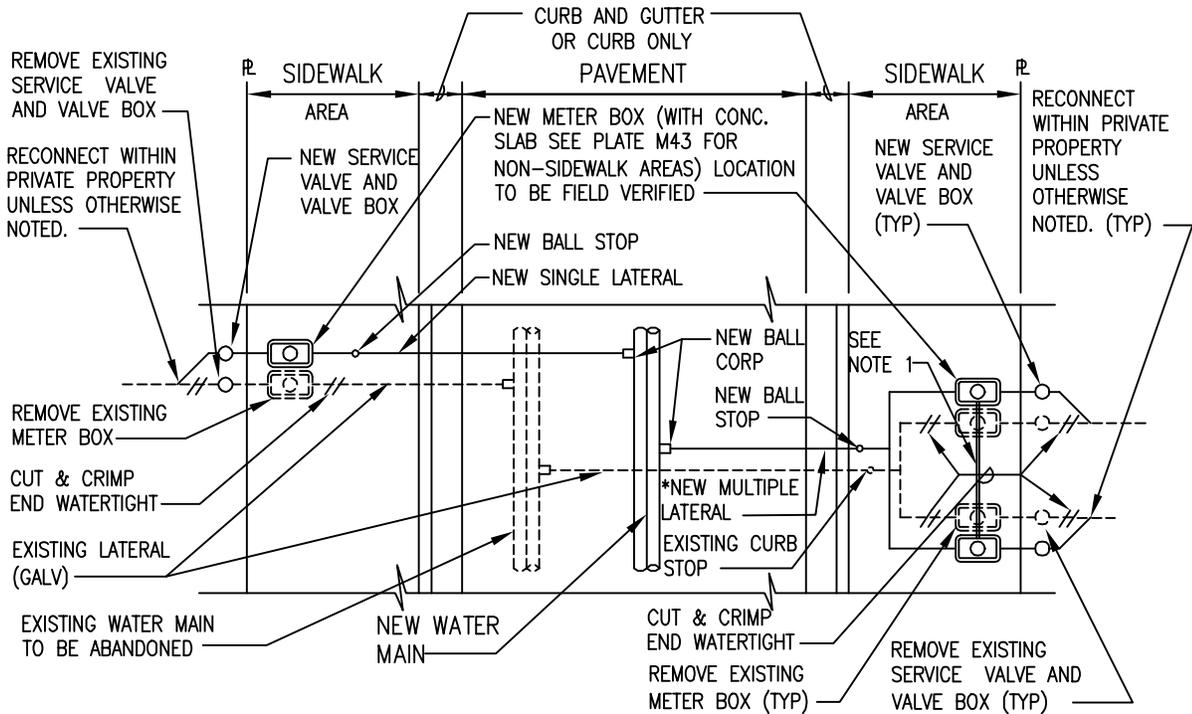
OAHU	<p style="text-align: center;"><b>END OF LINE CONNECTION</b></p> <p style="text-align: center;">SCALE: NTS</p>	STANDARD DETAILS	L19
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\* (FOR USE WHEN PROPERTY VALVE CANNOT BE INSTALLED INSIDE PROPERTY - WITH APPROVAL OF MANAGER)

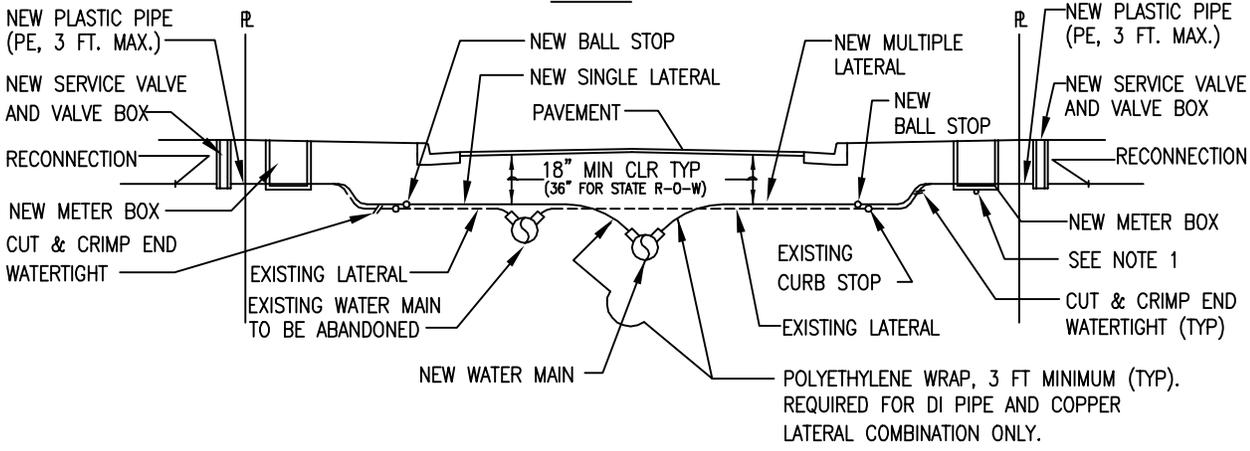


TYPICAL DETAIL FOR INSTALLATION OF BALL STOP AFTER METER

OAHU	<p><b>TYPICAL DETAIL FOR INSTALLATION OF BALL STOP AFTER METER</b></p> <p>SCALE: NTS</p>	STANDARD DETAILS	<table border="1"> <tr> <td data-bbox="1388 1869 1534 1921">L20</td> </tr> <tr> <td data-bbox="1388 1921 1534 1974">REVISION</td> </tr> <tr> <td data-bbox="1388 1974 1534 2016">2002</td> </tr> </table>	L20	REVISION	2002
L20						
REVISION						
2002						



**PLAN**



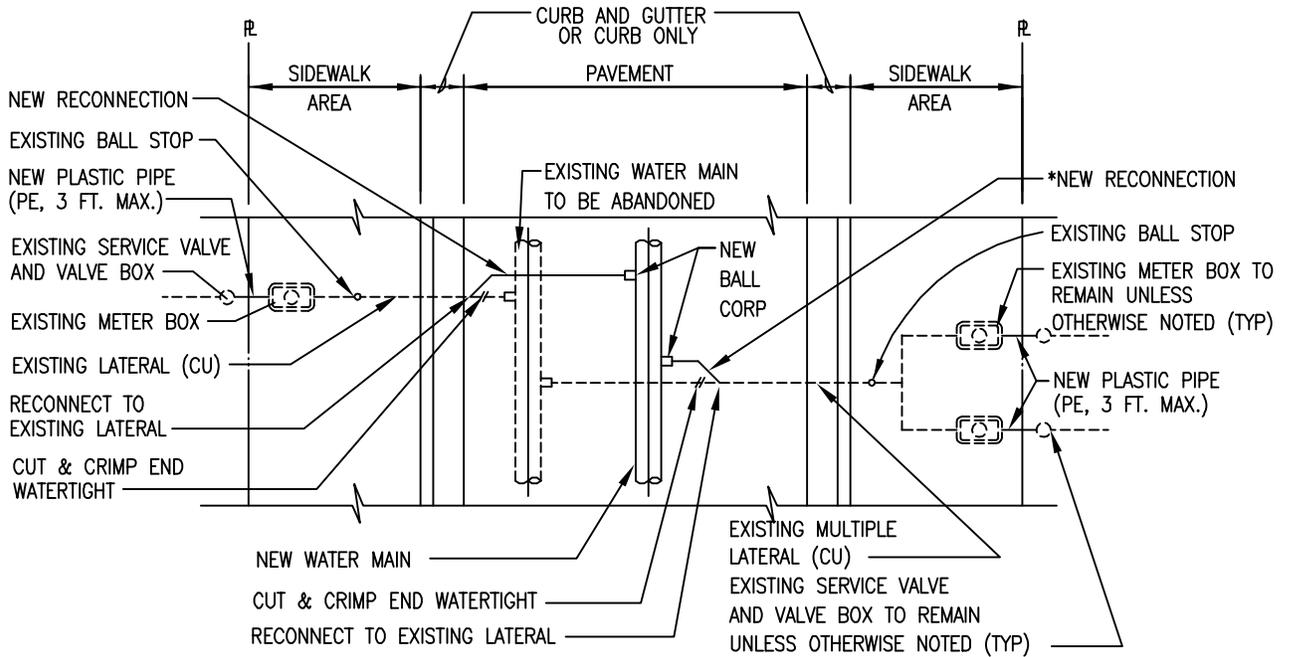
**PROFILE**

**NOTES:**

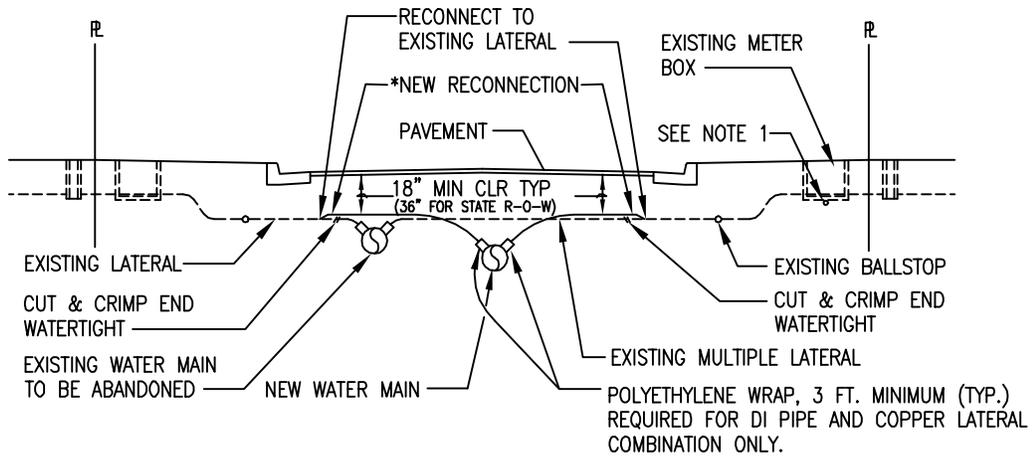
1. CONTRACTOR SHALL INSTALL A 3/4" PVC SCHEDULE 80 CONDUIT WITH STRING WHENEVER THE DISTANCE BETWEEN METER BOXES (2 TO 12 MULTIPLE METER BOXES) IS 4'-0" OR LESS (EDGE TO EDGE). CONDUIT SHALL EXTEND 2" WITHIN METER BOX, KEEP BOTH ENDS EXPOSED, PLUG OR TAPE TO PREVENT SOIL INTRUSION, AS REQUIRED. SAW CUT 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.

2002
REVISION

OAHU	<b>NEW LATERAL INSTALLATION</b> SCHEMATIC DETAIL SCALE: NTS	STANDARD DETAILS	L21
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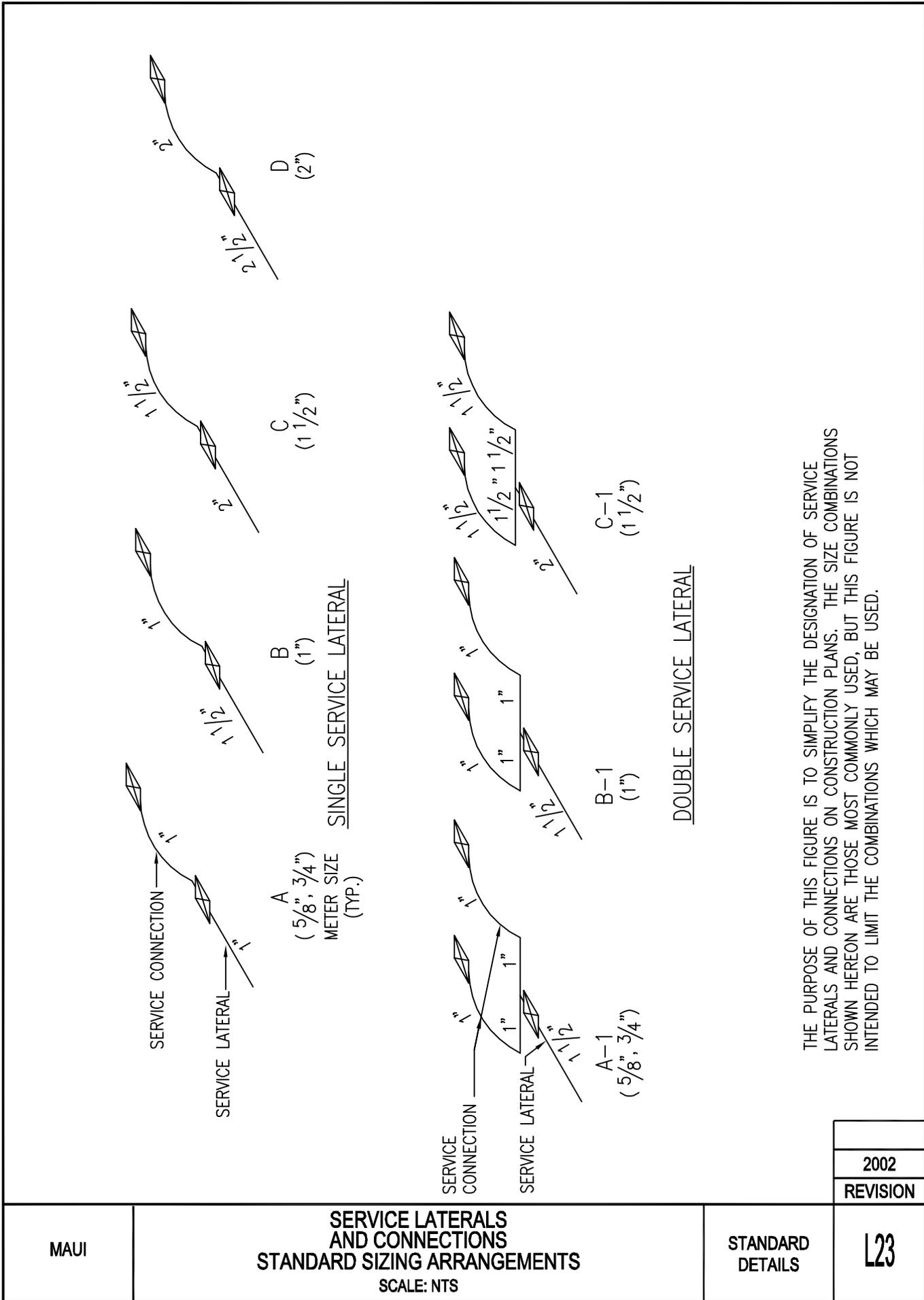
PLAN



PROFILE

2002
REVISION

OAHU	<b>LATERAL RECONNECTION SCHEMATIC DETAIL</b> SCALE: NTS	STANDARD DETAILS	L22
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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.

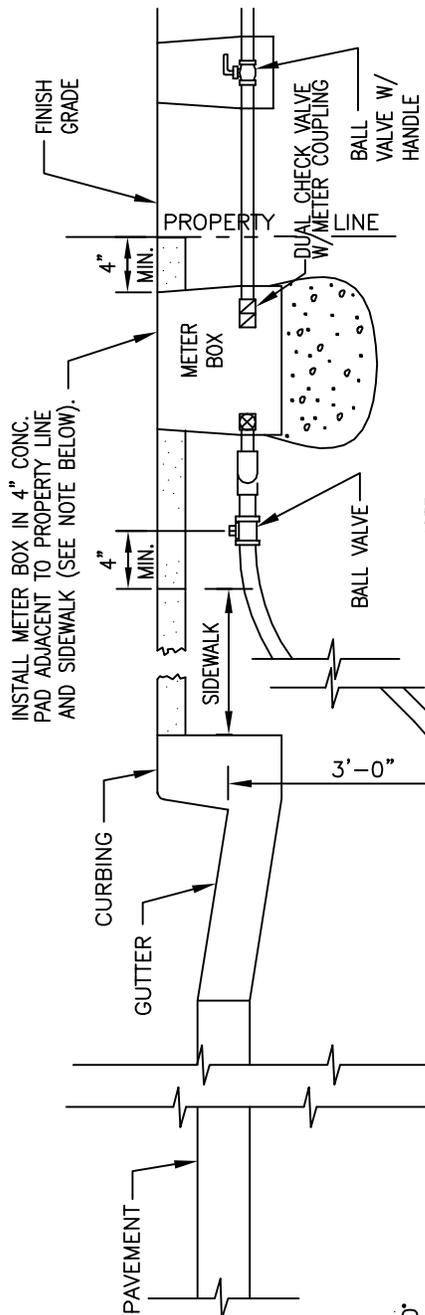
MAUI

**SERVICE LATERALS AND CONNECTIONS**  
**STANDARD SIZING ARRANGEMENTS**  
SCALE: NTS

STANDARD DETAILS

2002
REVISION

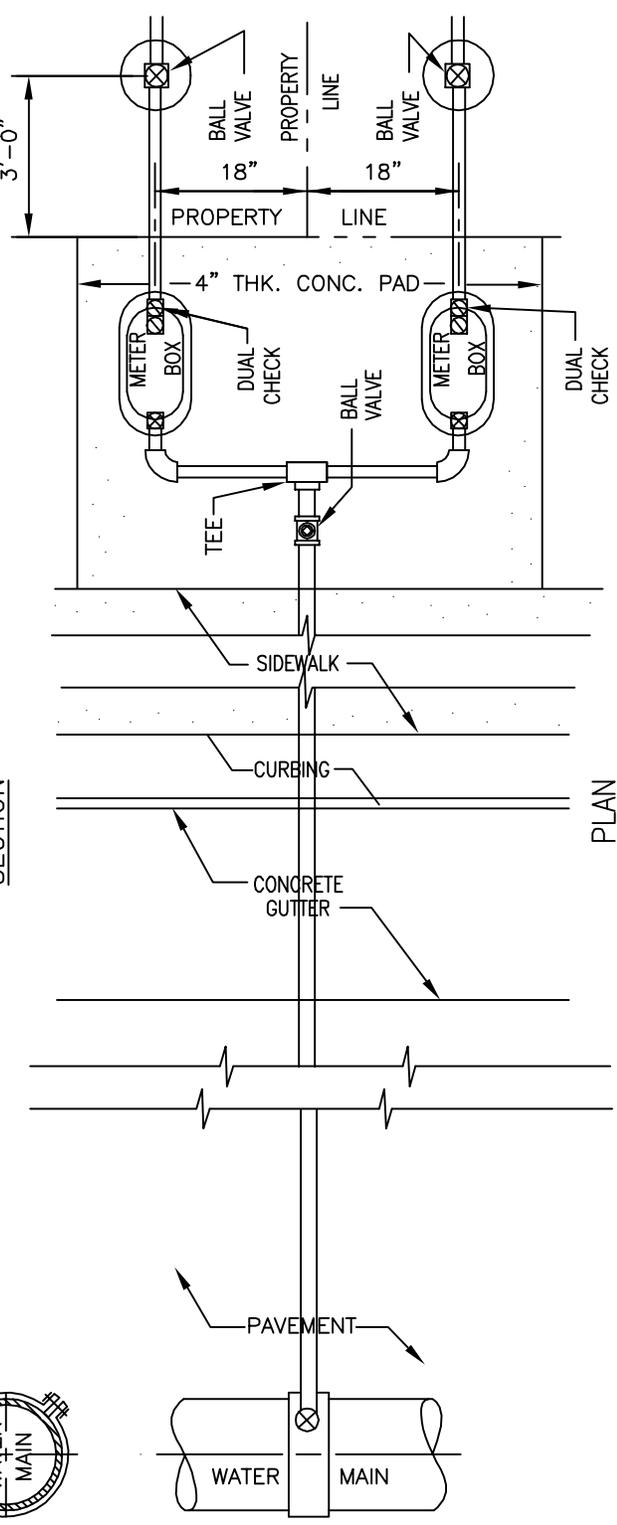
L23



INSTALL METER BOX IN 4" CONC. PAD ADJACENT TO PROPERTY LINE AND SIDEWALK (SEE NOTE BELOW).

NOTE: REMOVE EXISTING BEDDING MATERIAL UNDER METER BOX AND REPLACE W/ 2 CU.FT. OF CRUSHED ROCK, 3/4" TO 1-1/2" SIZE, UNLESS TRENCH IS 100% CLEAN SAND.

SECTION



PLAN

MAUI

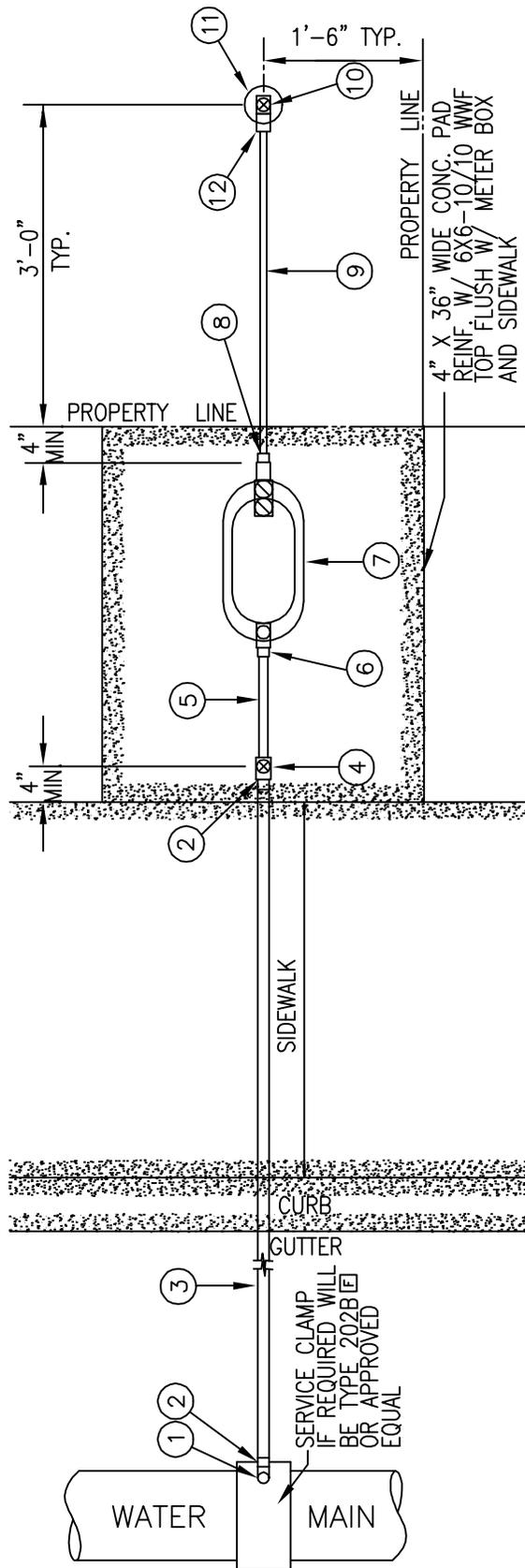
TYPICAL SERVICE LATERAL

SCALE: NTS

STANDARD DETAILS

2002  
REVISION

L24



NOTE: SEE L26 FOR MATERIALS AND NOTES

2002
REVISION

MAUI

**SINGLE SERVICE LATERAL  
TYPE "A", 5/8" & 3/4" METERS)**  
SCALE: NTS

STANDARD  
DETAILS

**L25**

TYPE	METER SIZE	①		②		③		④		⑤		⑥	
		CORP. STOP	COPPER ADAPTER	COPPER SERVICE TUBING	BRONZE BALL VALVE	BRASS NIPPLE	BRASS FITTING						
A	5/8" x 3/4"	1" AWMA THREAD x FEMALE I.P.T. FB 1600-4	1" MALE I.P.T. x COPPER	1"	1" FEMALE I.P.T. B 11-444	1" x 4"	N/A						
A	3/4" x 3/4"	1" AWMA THREAD x FEMALE I.P.T. FB 1600-4	1" MALE I.P.T. x COPPER	1"	1" FEMALE I.P.T. B 11-444	1" x 4"	1" x 45° ELBOW W/ CLOSE NIPPLE OR 45° STREET ELBOW						
TYPE	METER SIZE	⑦		⑧		⑨		⑩		⑪		⑫	
		CAST IRON METER BOX		COPPER ADAPTER		COPPER SERVICE TUBING		BRONZE BALL VALVE		PLASTIC VALVE BOX		DIELECTRIC COUPLING	
A	5/8" x 3/4"	1" FEMALE I.P.T. INLET 3/4" FEMALE I.P.T. OUTLET LYLB 111-243-IP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED)		3/4" MALE I.P.T. x COPPER		3/4"		3/4" FEMALE I.P.T. B 11-333 HB-34S		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-IP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED)		3/4" MALE I.P.T. x COPPER		3/4"		3/4" FEMALE I.P.T. B 11-333 HB-34S		10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015		3/4 BRASS W/ CLOSE NIPPLE	

☐ DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.

**NOTES**

- 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.
- SEE L25 FOR PLAN VIEW
- 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.
- REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.

MAUI

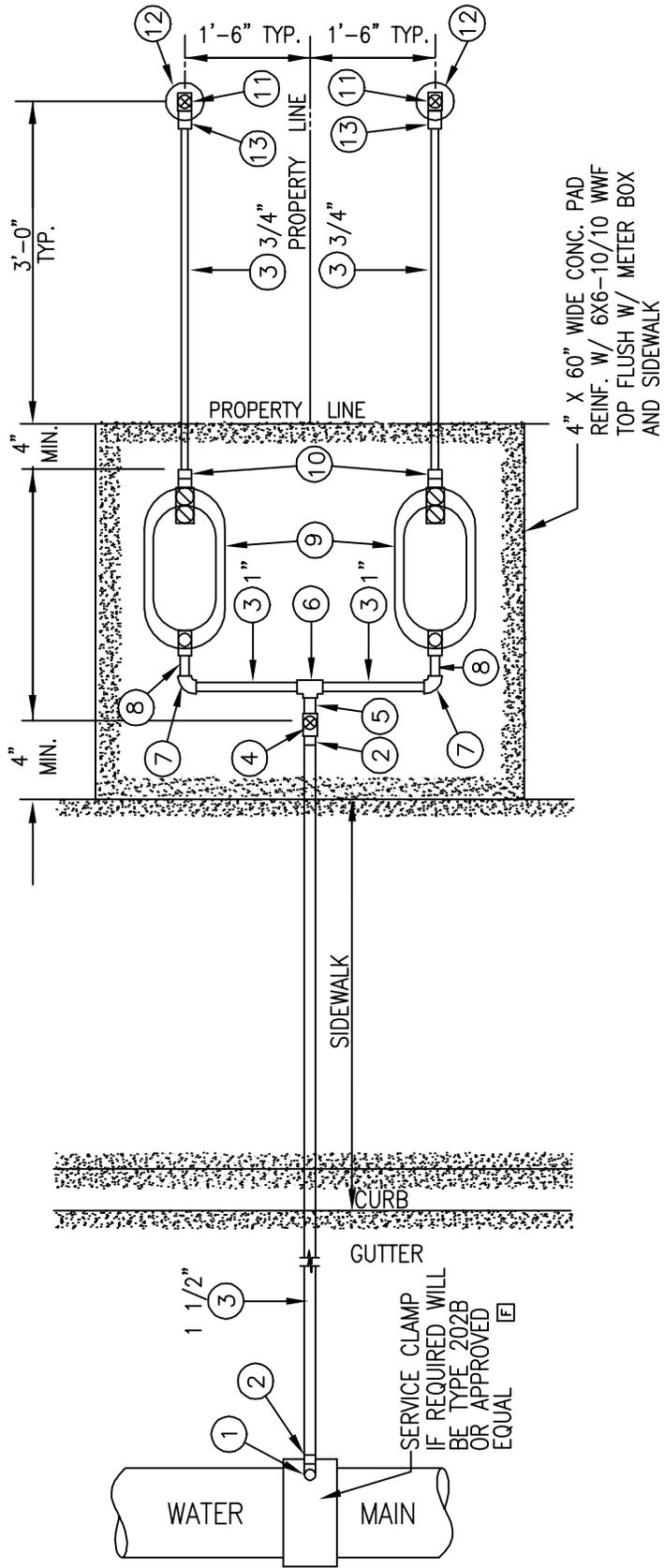
**SINGLE SERVICE LATERAL  
(TYPE "A", 5/8" & 3/4" METERS)**

SCALE: NTS

STANDARD  
DETAILS

2002  
REVISION

L26



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

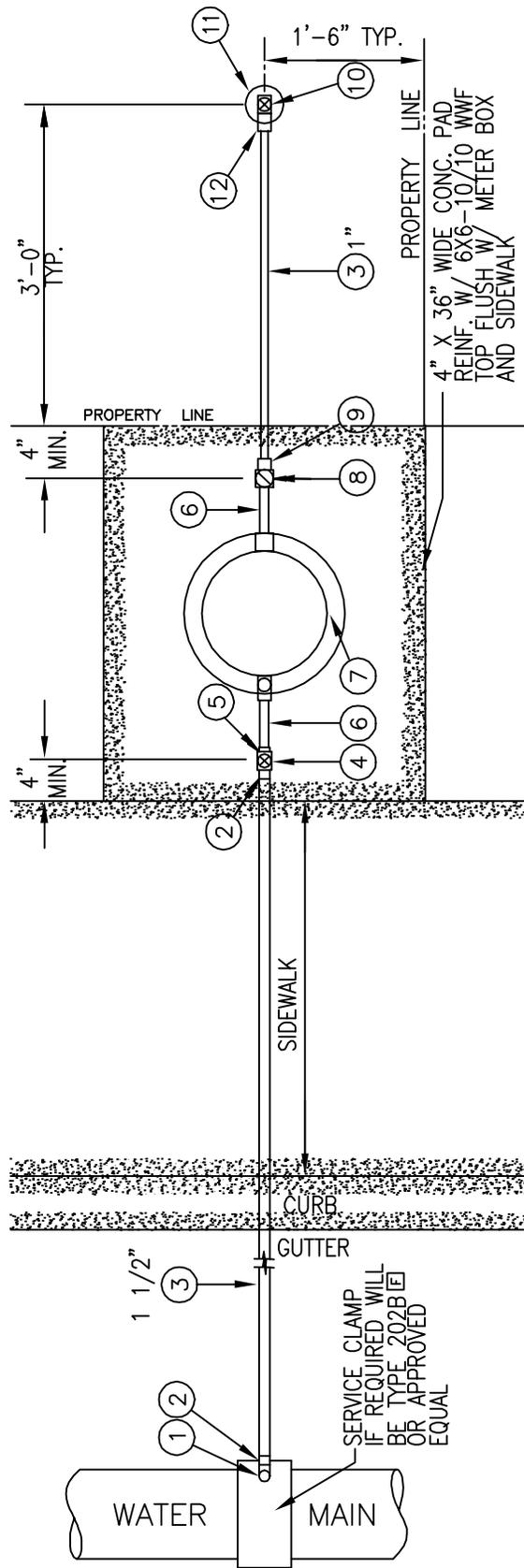
**L27**

MAUI		DOUBLE SERVICE LATERAL (TYPE "A-1", 5/8" & 3/4" METERS)		STANDARD DETAILS		L28		
		SCALE: NTS				2002 REVISION		
METER SIZE	TYPE	①	②	③	④	⑤	⑥	
5/8" x 3/4"	A-1	BALL STOP CORP.  1 1/2" AWWA THREAD x FEMALE I.P.T. FB 1600-6 [E]	COPPER ADAPTER  1 1/2" MALE I.P.T. x COPPER	COPPER SERVICE TUBING  SIZES AS NOTED ON L27	BRONZE BALL VALVE  1 1/2" FEMALE I.P.T. B 11-666 [E]	COPPER ADAPTER  1 1/2" MALE I.P.T. x COPPER (SPIGOT)	COPPER TEE  1" x 1" x 1 1/2" C x C x C	
3/4" x 3/4"	A-1	1 1/2" AWWA THREAD x FEMALE I.P.T. FB 1600-6 [E]	1 1/2" MALE I.P.T. x COPPER	SIZES AS NOTED ON L27	1 1/2" FEMALE I.P.T. B 11-666 [E]	1 1/2" MALE I.P.T. x COPPER (SPIGOT)	1" x 1" x 1 1/2" C x C x C	
METER SIZE	TYPE	⑦	⑧	⑨	⑩	⑪	⑫	⑬
5/8" x 3/4"	A-1	COPPER 90° ELLS  1" C x C	COPPER ADAPTER  1" MALE I.P.T. x COPPER (SPIGOT)	CAST IRON METER BOX  1" FEMALE I.P.T.; INLET 3/4" FEMALE I.P.T. OUTLET LY/B 111-243-TP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED) [E]	COPPER ADAPTER  3/4" MALE I.P.T. x COPPER	BRONZE BALL VALVE  3/4" FEMALE I.P.T. B 11-333 HB-34S [E]	PLASTIC VALVE BOX  10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	DIELECTRIC COUPLING  3/4 BRASS WITH CLOSE NIPPLE
3/4" x 3/4"	A-1	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 LY/B 211-343-TP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED) [E]	3/4" MALE I.P.T. x COPPER	3/4" FEMALE I.P.T. B 11-333 HB-34S [E]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	3/4 BRASS WITH CLOSE NIPPLE

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

**NOTES**

- 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.
- SEE L27 FOR PLAN VIEW
- 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.
- REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.



NOTE: SEE L30 FOR MATERIALS AND NOTES

2002
REVISION

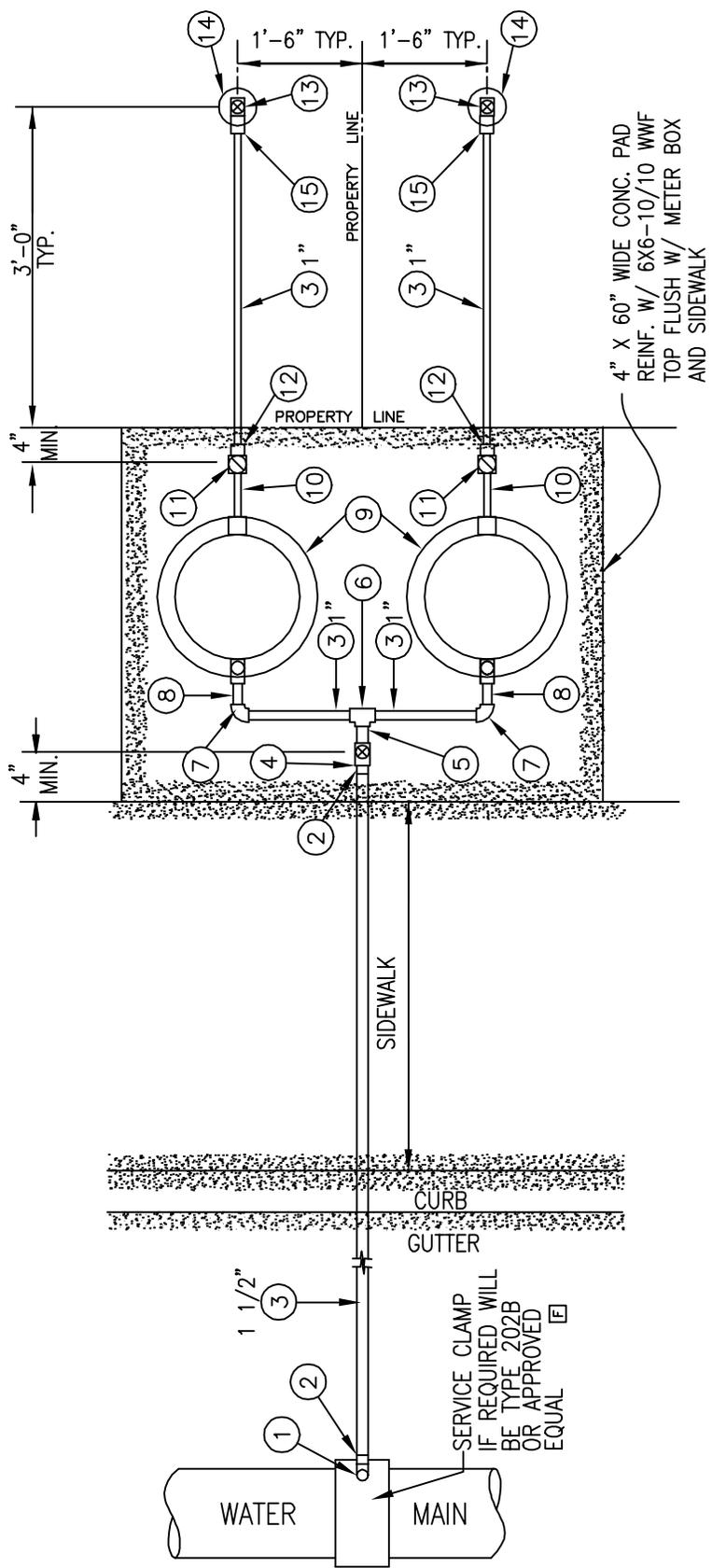
MAUI

**SINGLE SERVICE LATERAL  
(TYPE "B", 1" METER)**  
SCALE: NTS

STANDARD  
DETAILS

**L29**





NOTE: SEE L32 FOR MATERIALS AND NOTES.

MAUI

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

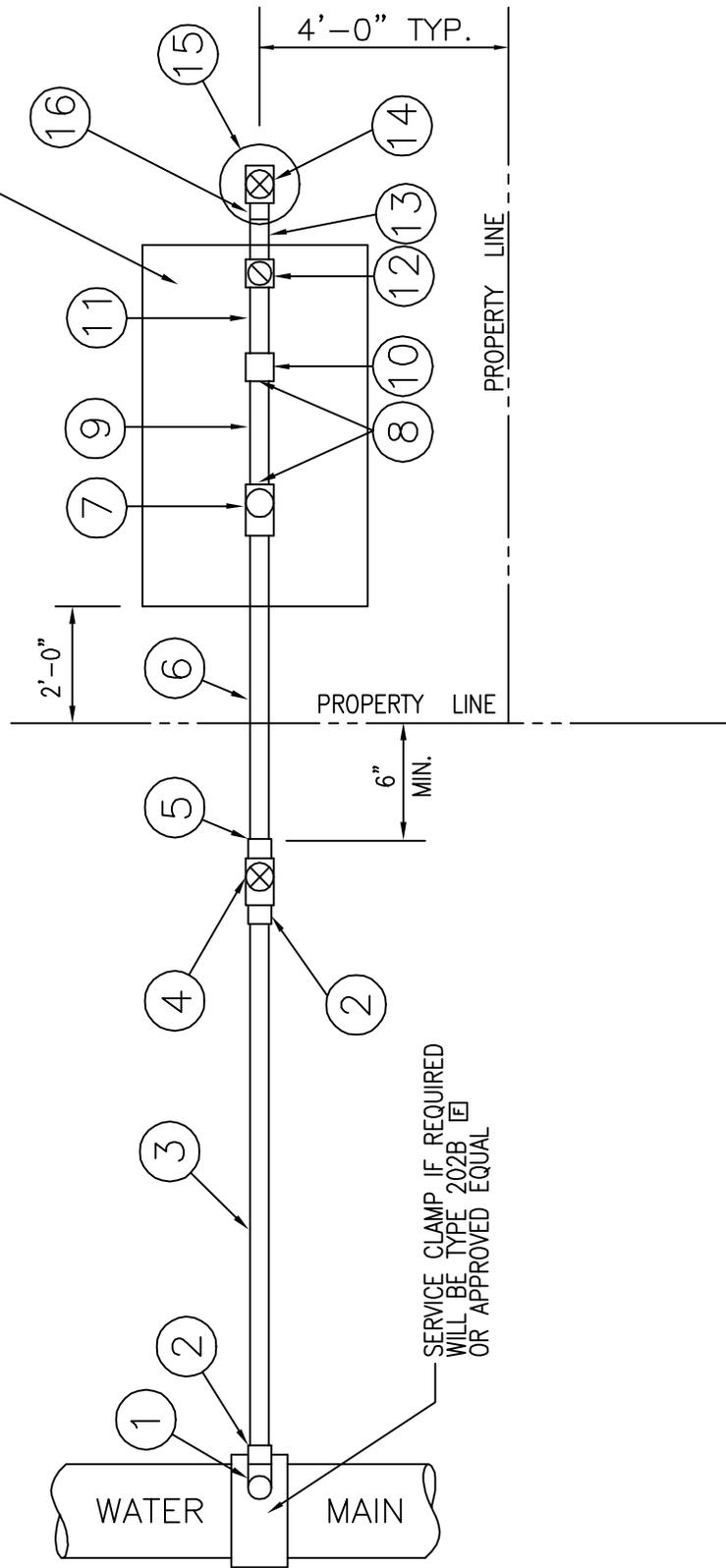
STANDARD  
 DETAILS

2002
REVISION

L31

MAUI	<b>DOUBLE SERVICE LATERAL</b> (TYPE "B-1", 1" METER) SCALE: NTS		STANDARD DETAILS	L32	2002				
					REVISION				
METER SIZE	TYPE	①	②	③	④	⑤	⑥	⑦	
1"	B-1	CORP. STOP 1 1/2" AWWA THREAD x FEMALE I.P.T. FB 1600-6 E	COPPER ADAPTER 1 1/2" MALE I.P.T. x COPPER	SIZES AS NOTED ON L31	BRONZE BALL VALVE 1 1/2" FEMALE I.P.T. B 11-666 E	COPPER ADAPTER 1 1/2" MALE I.P.T. x COPPER (SPIGOT)	COPPER TEE 1" x 1" x 1 1/2" C x C x C	COPPER 90° ELLS	
METER SIZE	TYPE	⑧	⑨	⑩	⑪	⑫	⑬	⑭	
1"	B-1	COPPER ADAPTER 1" MALE I.P.T. x COPPER (SPIGOT)	CAST IRON METER BOX INLET-OUTLET 1" FEMALE I.P.T. (METER SHUT-OFF INCLUDED) YLB 111-444-TP	BRASS NIPPLE 1" x 4"	BRASS CHECK VALVE 1" IN-LINE SPRING HS 11-444 E	COPPER ADAPTER 1" MALE I.P.T. x COPPER	BRONZE BALL VALVE 1" FEMALE I.P.T. B 11-444 HB-34S	PLASTIC VALVE BOX 10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	
<p><b>NOTES</b></p> <ol style="list-style-type: none"> <li>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.</li> <li>SEE L31 FOR PLAN VIEW</li> <li>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.</li> <li>REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME &amp; COVER IF SUBJECT TO TRAFFIC.</li> </ol> <p>E DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.</p>									

SEE PLATE M12 FOR  
1 1/2" METER BOX



NOTE: SEE L34 FOR MATERIALS AND NOTES

2002
REVISION

MAUI

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

STANDARD  
DETAILS

L33

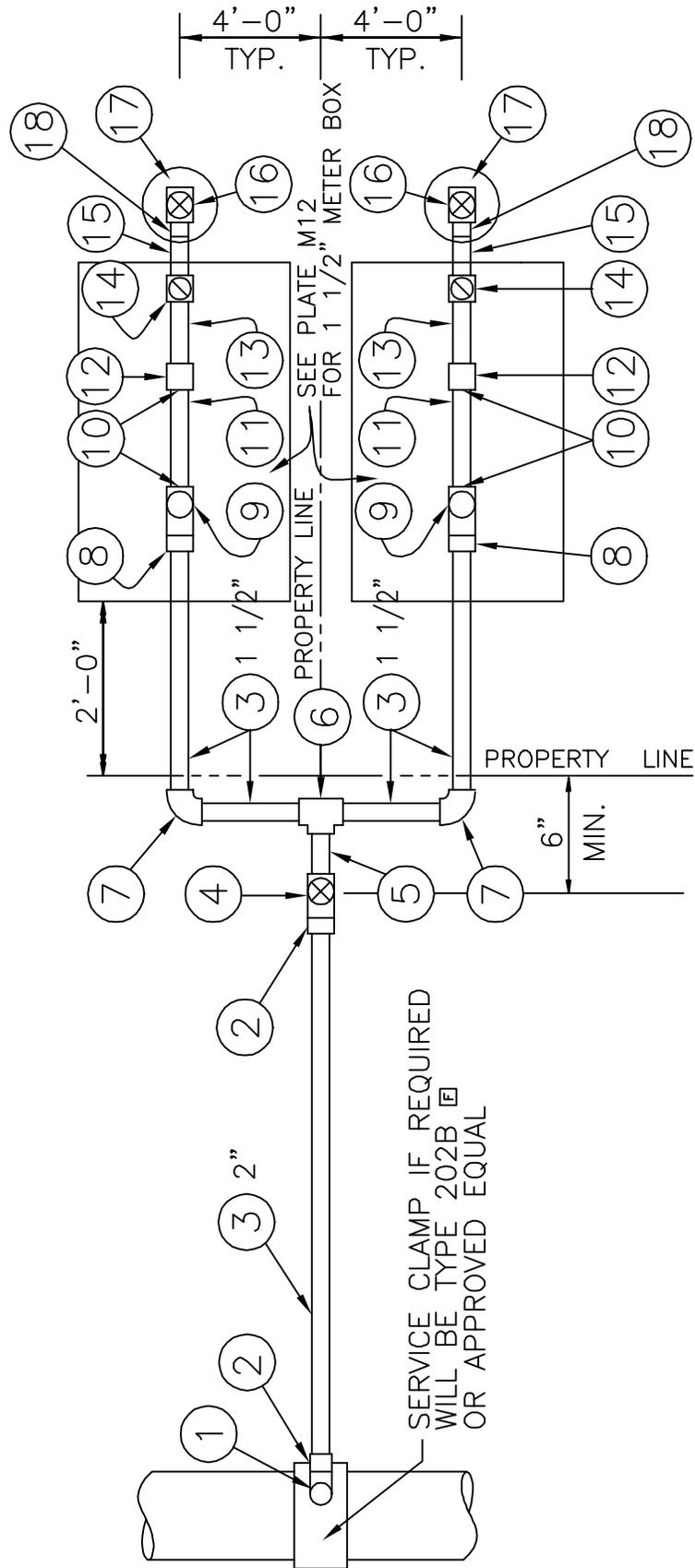
MAUI	<p align="center"><b>SINGLE SERVICE LATERAL</b> (TYPE "C", 1 1/2" METER) SCALE: NTS</p>		STANDARD DETAILS	<p align="center">L34</p>													
TYPE	METER SIZE	1	CORP. STOP	2	COPPER ADAPTER	3	COPPER SERVICE TUBING	4	BRONZE BALL VALVE	5	BRASS BUSHING	6	BRASS NIPPLE	7	METER VALVE	8	STAINLESS STL. BOLTS/NUTS
C	1 1/2"	2" AWWA THREAD FEMALE I.P.T. FB 1600-7 [E]	2" MALE I.P.T. x COPPER	2"	2" FEMALE I.P.T. B 11-777 [E]	2"	1 1/2" FEMALE I.P.T. x 2" MALE I.P.T. C 18-67 [E]	1 1/2" x 48" (OR LENGTH TO FIT)	1 1/2" FEMALE I.P.T. x FLANGE BF 13-666 [E]	1 1/2"	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 48" FEMALE I.P.T. B 11-666 HB-67S [E]	10" AMETEK 10-181-014 W/ GREEN COVER 10-181-015	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 [E]	1 1/2" FLG. x LOK-PAK [E]	1 1/2" x 6"	1 1/2" IN-LINE SPRING HS 11-666 [E]	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 14" FEMALE I.P.T. B 11-666 HB-67S [E]	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 14"	1 1/2" x 14"

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

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

2002  
REVISION



NOTE: SEE L36 FOR MATERIALS AND NOTES

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REVISION

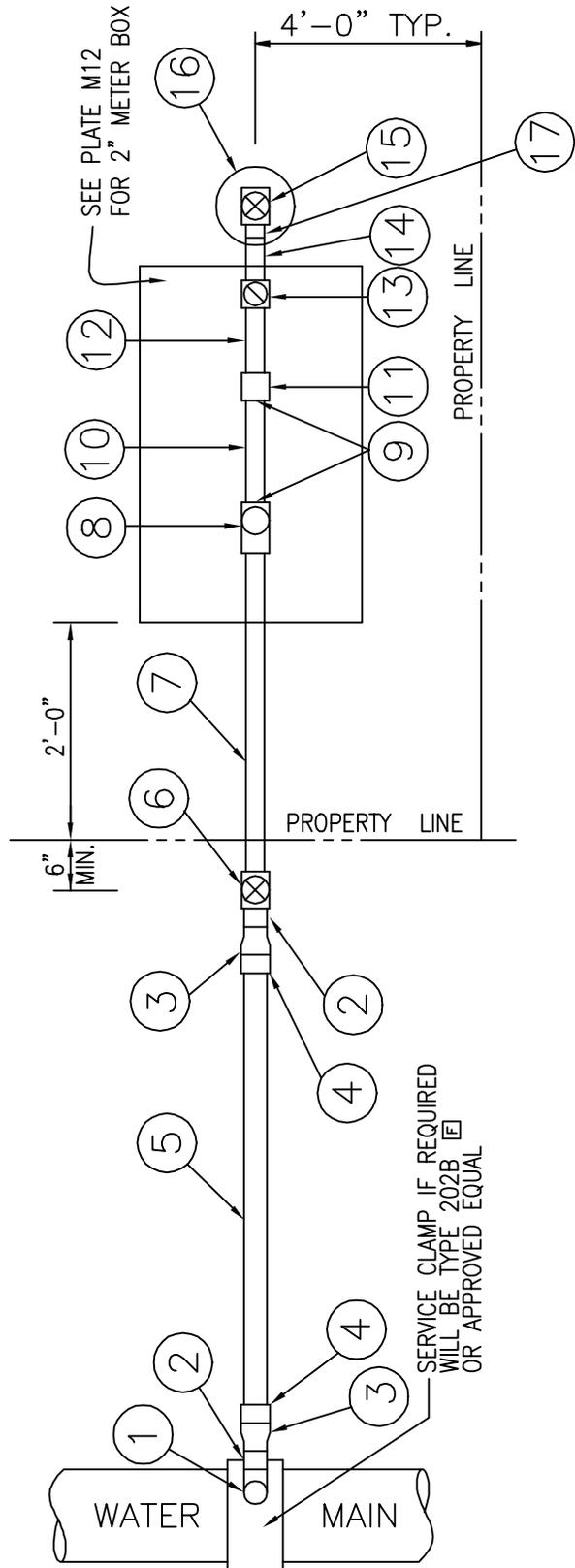
MAUI

**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		
METER SIZE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)						
TYPE	CORP. STOP	COPPER ADAPTER	COPPER SERVICE TUBING	BRONZE BALL VALVE	COPPER ADAPTER	COPPER TEE	COPPER 90° ELLS	COPPER ADAPTER						
C-1 1 1/2"	2" AWWA THREAD x FEMALE I.P.T. FB 1600-7	2" MALE I.P.T. x COPPER	SIZES AS NOTED ON L35	2" FEMALE I.P.T. B 11-777	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)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)					
METER VALVE	STAINLESS STL. BOLTS/NUTS	METER IDLER	METER COUPLING	BRASS NIPPLE	BRASS CHECK VALVE	BRASS NIPPLE	BRONZE BALL VALVE	PLASTIC VALVE BOX	DIELECTRIC COUPLING					
1 1/2" FEMALE I.P.T. x FLANGE BF 13-666	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	1 1/2" x 6"	1 1/2" IN-LINE SPRING HS 11-666	1 1/2" x 14"	1 1/2" FEMALE I.P.T. B 11-666 HB-67S	10" AMETEK 10-181-014 W/GREEN COVER 10-181-015	1 1/2" BRASS WITH ADAPTER AND CLOSE NIPPLE					
<p>NOTES:</p> <p>ALL FITTINGS AND MATERIALS LISTED BY BRAND NAMES OR APPROVED EQUAL.</p> <p>SEE PLATE M23 FOR TRANSPONDER BRACKET INSTALLATION.</p> <p>SEE L35 FOR PLAN VIEW</p>														
<p>☐ DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.</p>														
											2002			
											REVISION			



NOTE: SEE L38 FOR MATERIALS AND NOTES

2002
REVISION

MAUI

**SINGLE SERVICE LATERAL**  
 (TYPE "D", 2" METER)  
 SCALE: NTS

STANDARD  
 DETAILS

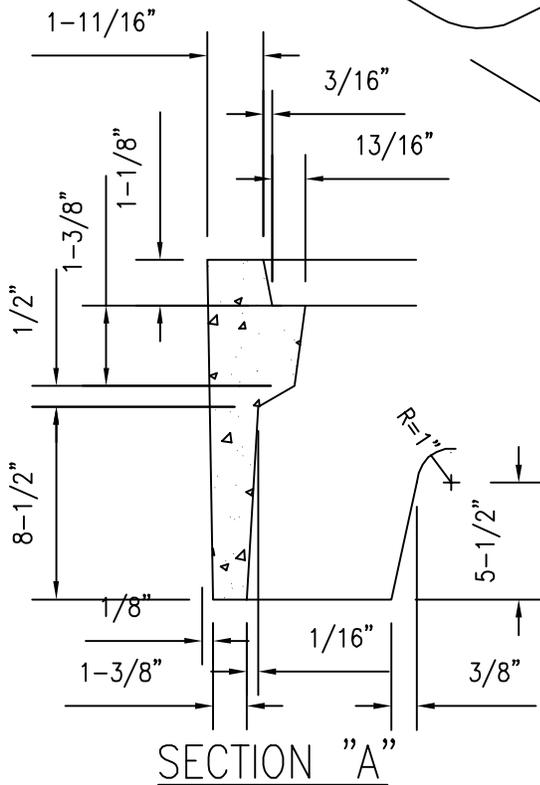
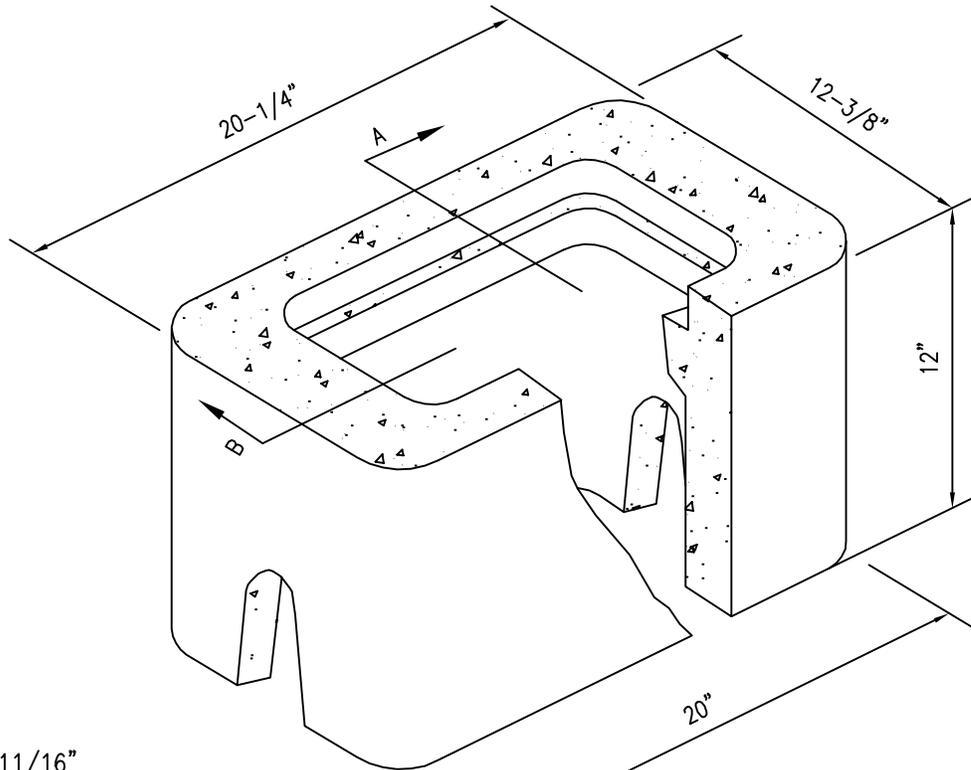
L37

MAUI	<b>SINGLE SERVICE LATERAL</b> (TYPE "D", 2" METER) SCALE: NTS		STANDARD DETAILS	L38  REVISION 2002		
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 <span style="float: right;">F</span>	2" x 4"	2 1/2" x 2" C 11-87 <span style="float: right;">F</span>	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 <span style="float: right;">F</span>	2" x 48" (OR LENGTH TO FIT) <span style="float: right;">F</span>	2" FEMALE I.P.T. x FLANGE BF 13-777 <span style="float: right;">F</span>	5/8" x 3" TYPE 304	2" x 17" FLG. x FLG. ONE END PLUGED	2" FLG. x LOK PAK <span style="float: right;">F</span>	
⑫	⑬	⑭	⑮	⑯	⑰	
BRASS NIPPLE	BRASS CHECK VALVE	BRASS NIPPLE	BRONZE BALL VALVE	PLASTIC VALVE BOX	DIELECTRIC COUPLING	
2" x 6" <span style="float: right;">F</span>	2" IN-LINE SPRING HS 11-777 <span style="float: right;">F</span>	2" x 14" <span style="float: right;">F</span>	2" FEMALE I.P.T. B 11-777 HB-67 S <span style="float: right;">F</span>	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 TRANSDUCER 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

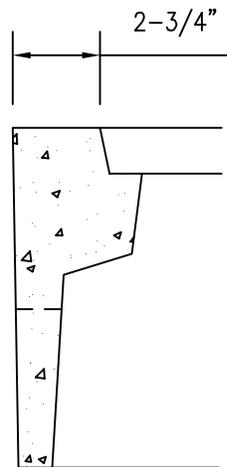
F DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.



**CONCRETE BOX**

**NOTES:**

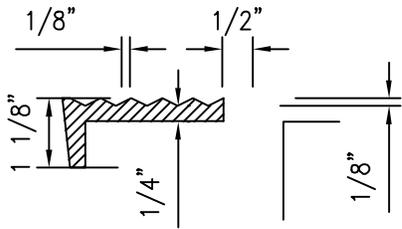
1. ACCOMMODATES 5/8" OR 3/4" METERS. (KAUAI AND HAWAII ONLY) AND 2" AND 2-1/2" PROPERTY VALVES (FOR OAHU)
2. ACCOMMODATES 2" & 2-1/2" VALVES.
3. SEE PLATE M2 FOR C.I. COVER DETAILS.
4. FOR OAHU AND HAWAII, FIBER REINFORCED CONC. IS ALLOWED.
5. INSTALL 6" WIDE X 4" THICK CONCRETE COLLAR WITH WIRE MESH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



**SECTION "B"**

2002
REVISION

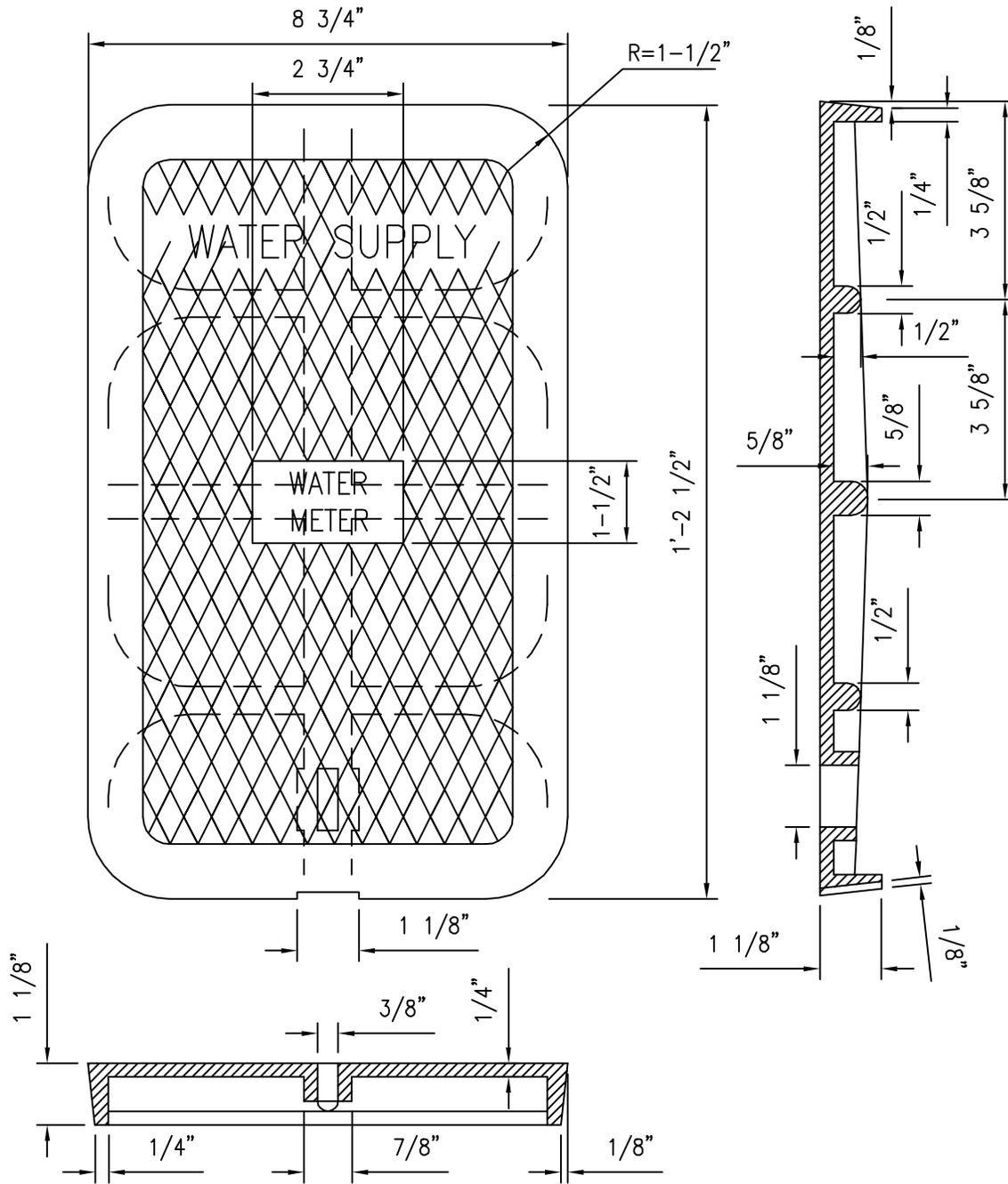
KAUAI OAHU HAWAII	<b>METER BOX</b> TYPE "B" SCALE: NTS	STANDARD DETAILS	<b>M1</b>
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**CHECKERED PATTERN**

**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.



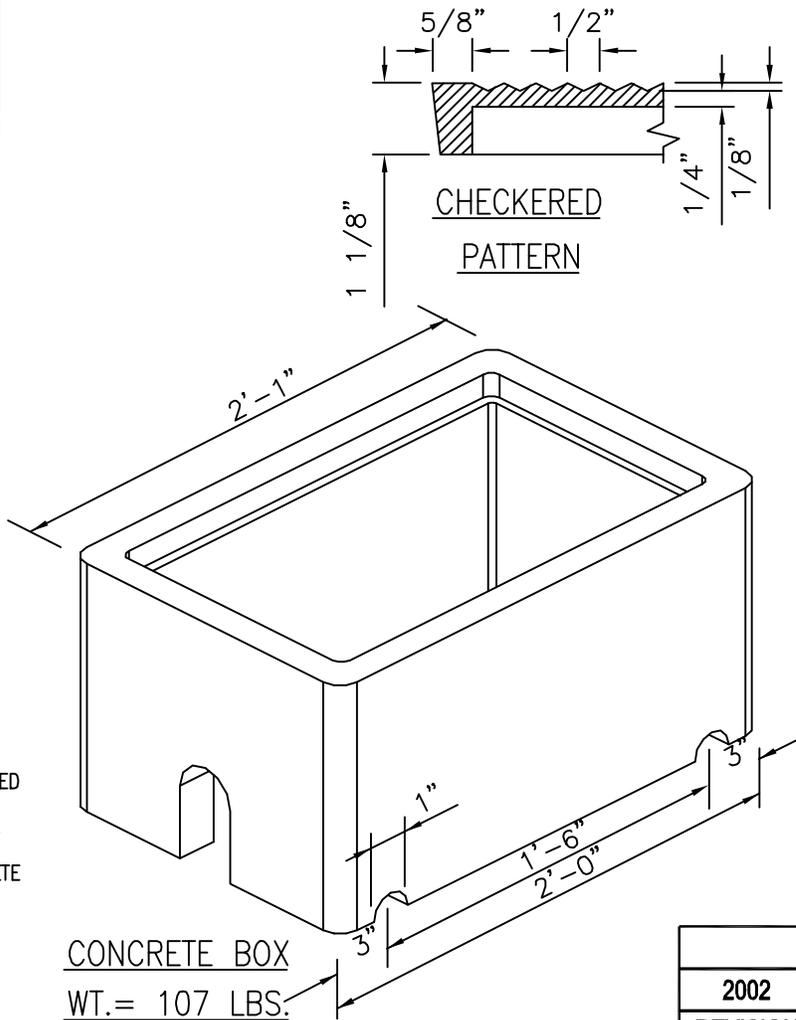
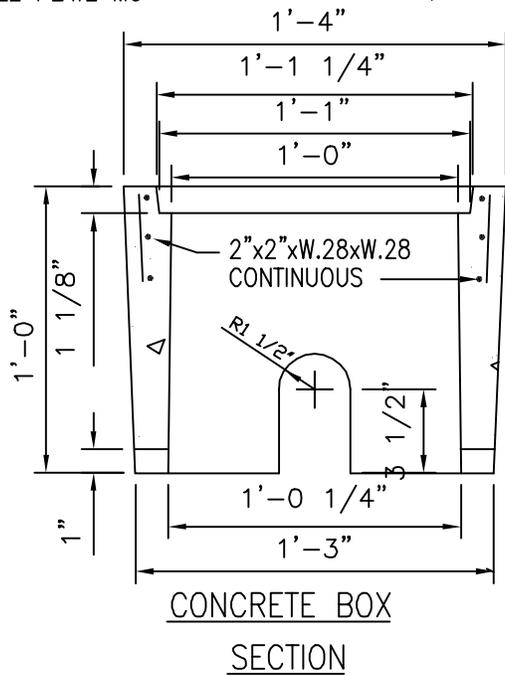
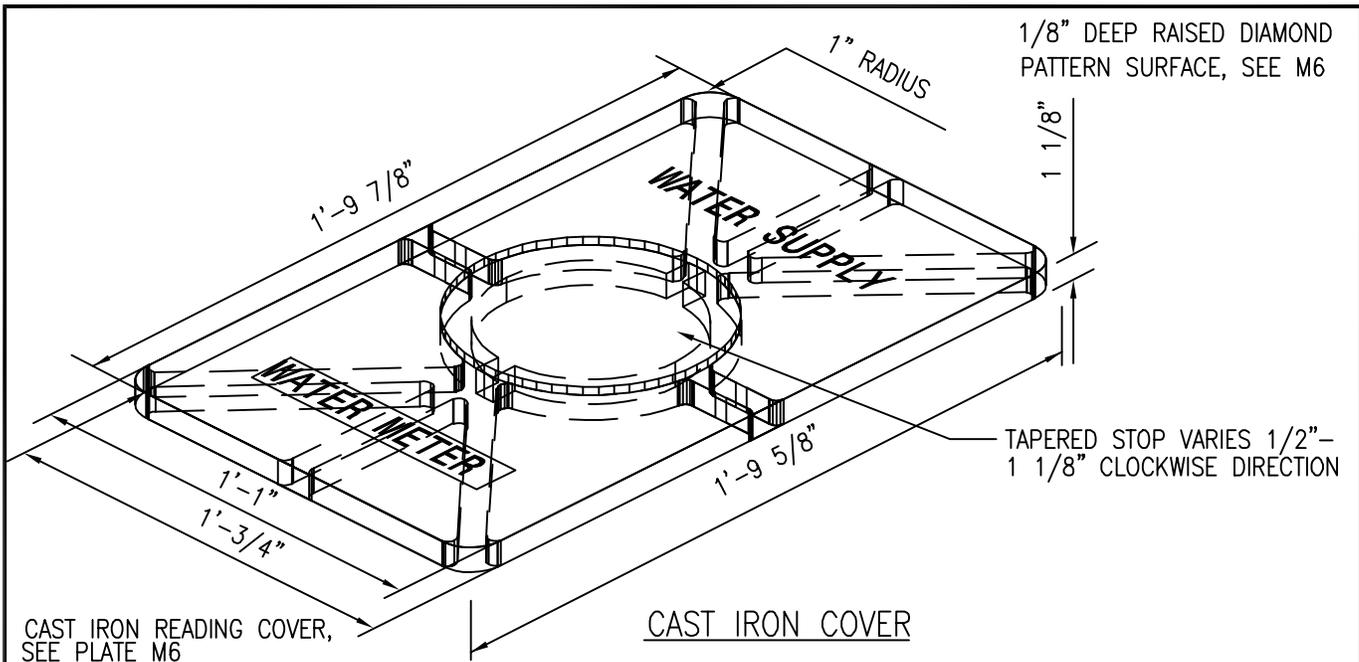
2001
REVISION

KAUAI  
 OAHU  
 HAWAII

**CAST IRON COVER  
 FOR TYPE "B" METER BOX  
 SCALE: NTS**

STANDARD  
 DETAILS

**M2**

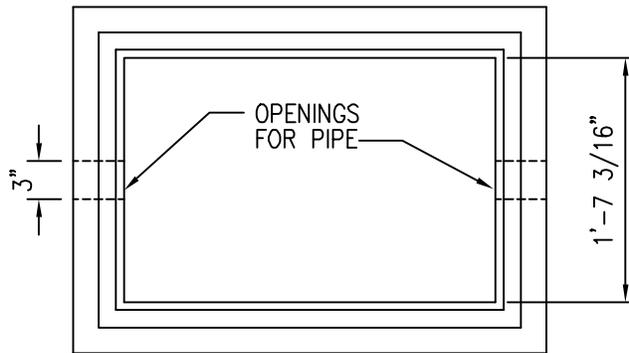


**NOTES:**

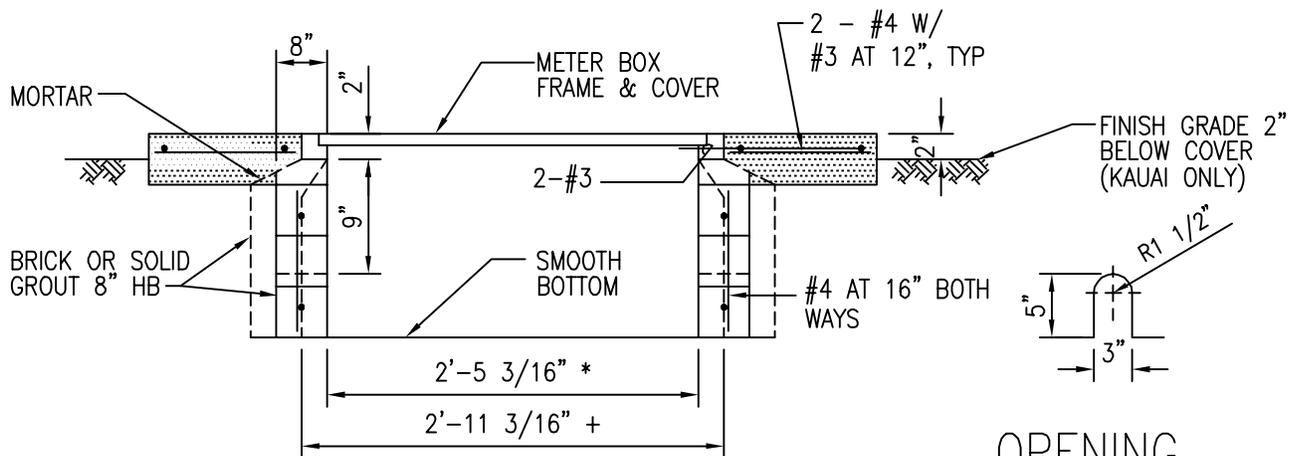
1. THICKNESS DIMENSIONS ARE NET. ADD 1/8" FOR RAISED SURFACE. RAISED SURFACE. USE 3/4" HIGH LETTERS
2. TYPE "X" METER BOX FOR 5/8", 3/4", & 1" METERS.
3. FOR "HAWAII", TYPE "X" METER BOX IS FOR 1" METER AND FOR 5/8" METERS INSTALLED IN A.C. OR CONCRETE PAVED AREA.
4. FOR OAHU AND HAWAII, FIBER REINFORCED 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	<b>METER BOX &amp; COVER</b> TYPE "X" SCALE: NTS	STANDARD DETAILS	M3
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PLAN VIEW



ELEVATION

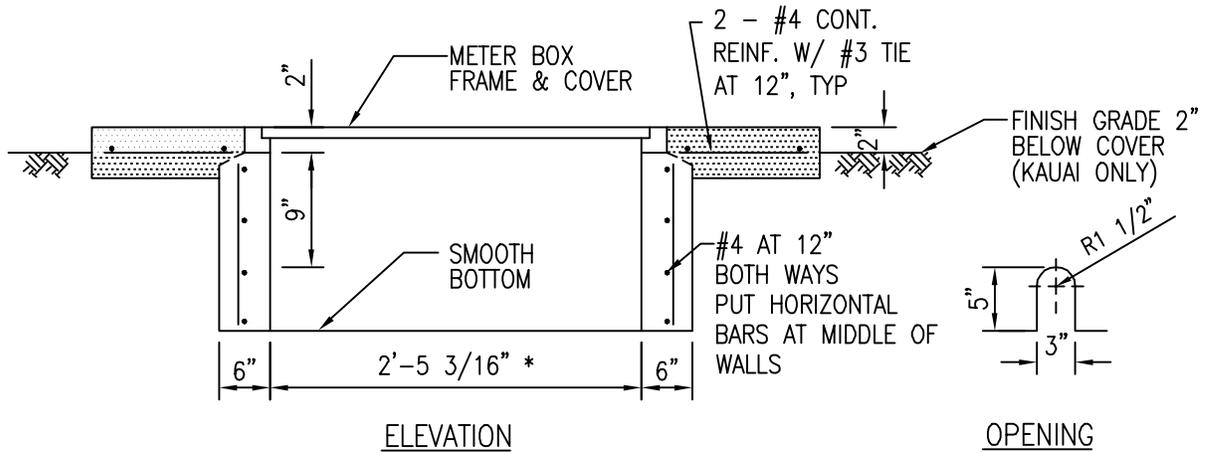
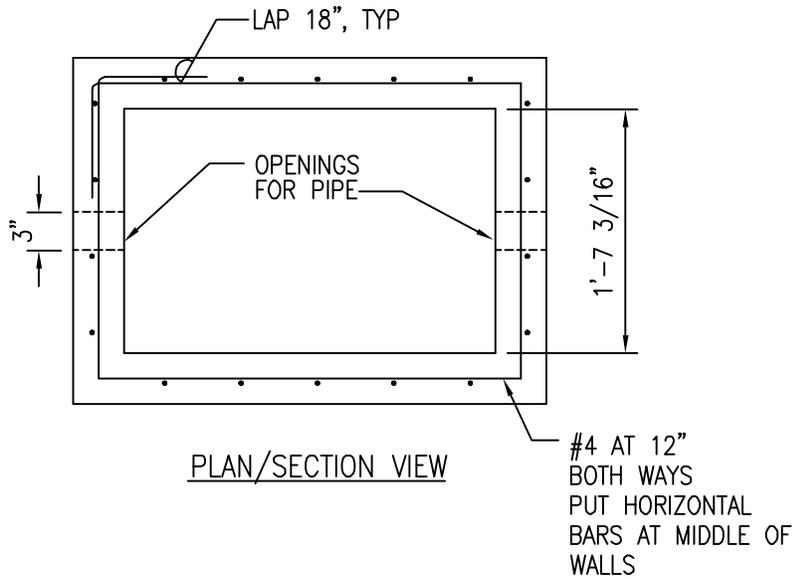
NOTE:

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 1 1/2" AND 2" METERS ON OAHU, 2" METERS ON KAUAI

2002
REVISION

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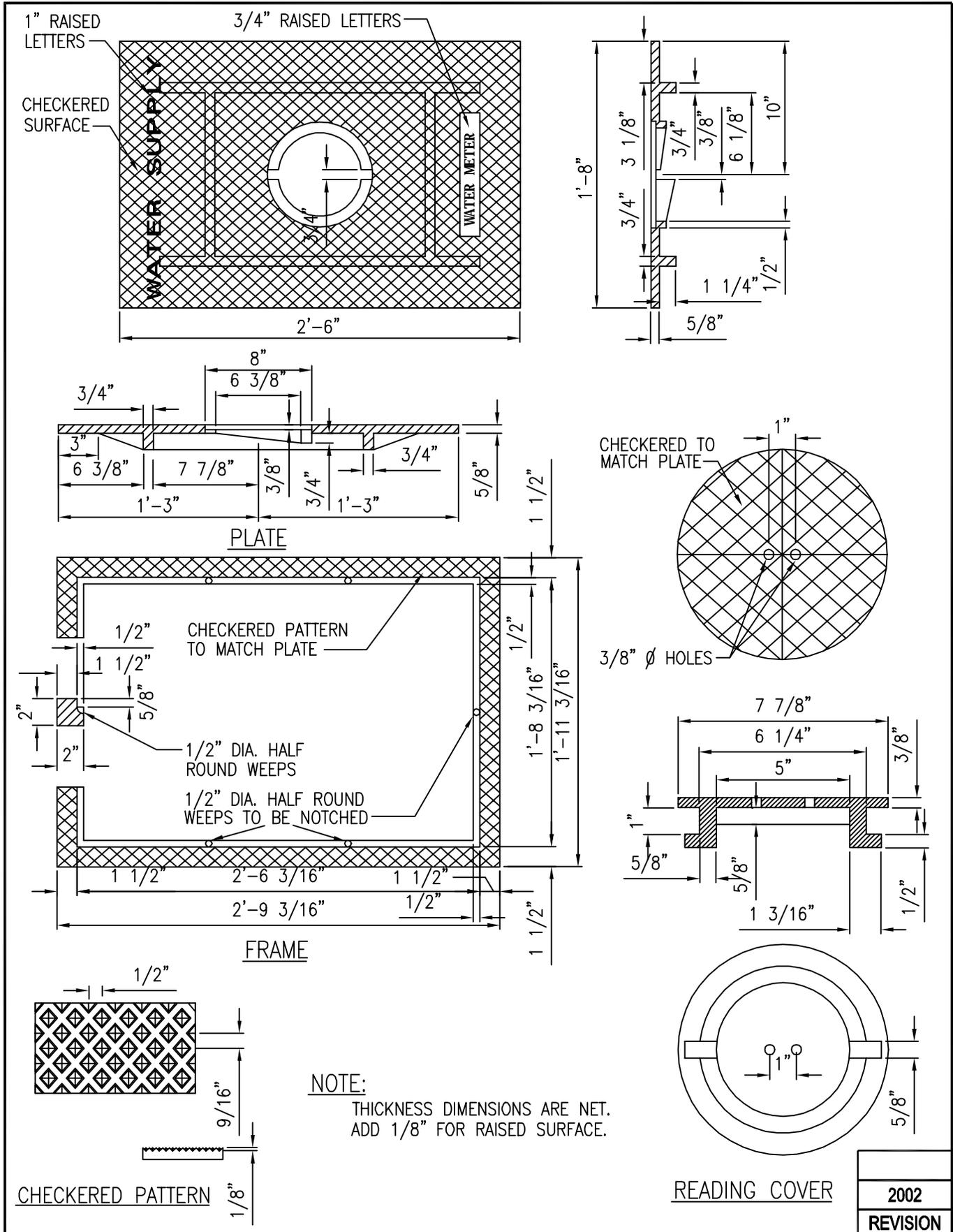
**NOTE:**

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

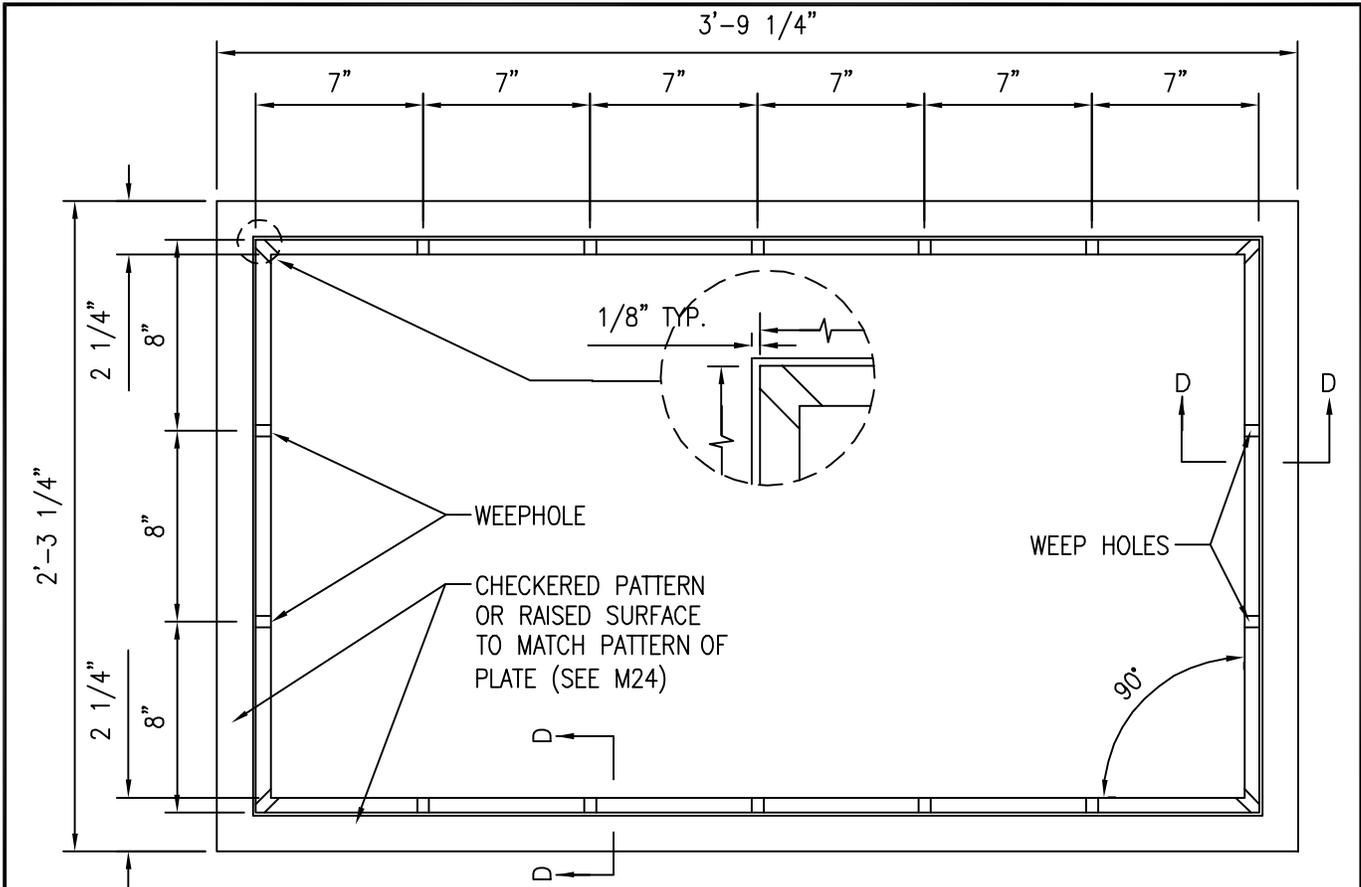
\* FOR 1 1/2" AND 2" METERS ON OAHU, 2" METERS ON KAUAI

2002
REVISION

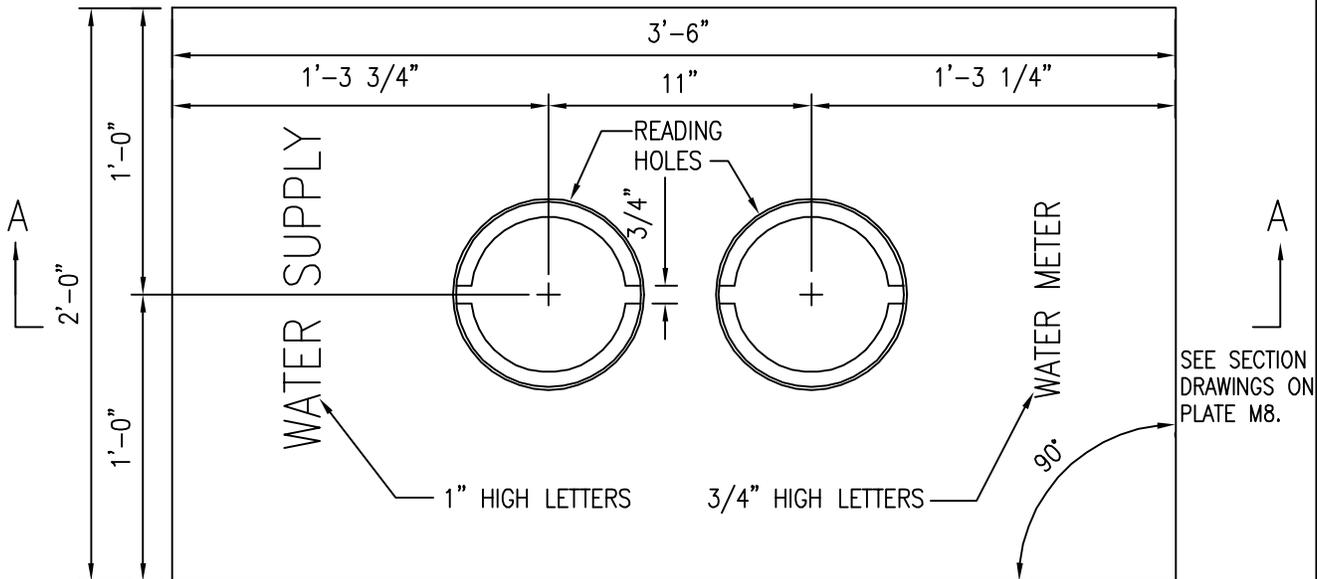
KAUAI OAHU	<b>METER BOX TYPE III</b> FOR 1 1/2" & 2" METERS SCALE: NTS	STANDARD DETAILS	<b>M5</b>
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KAUAI OAHU	<b>METER BOX FRAME &amp; COVER</b> CAST IRON, TYPE III SCALE: NTS	STANDARD DETAILS	2002
			REVISION
			M6



PLAN VIEW OF CAST IRON FRAME  
FOR 24"X42"X3/4" PLATE

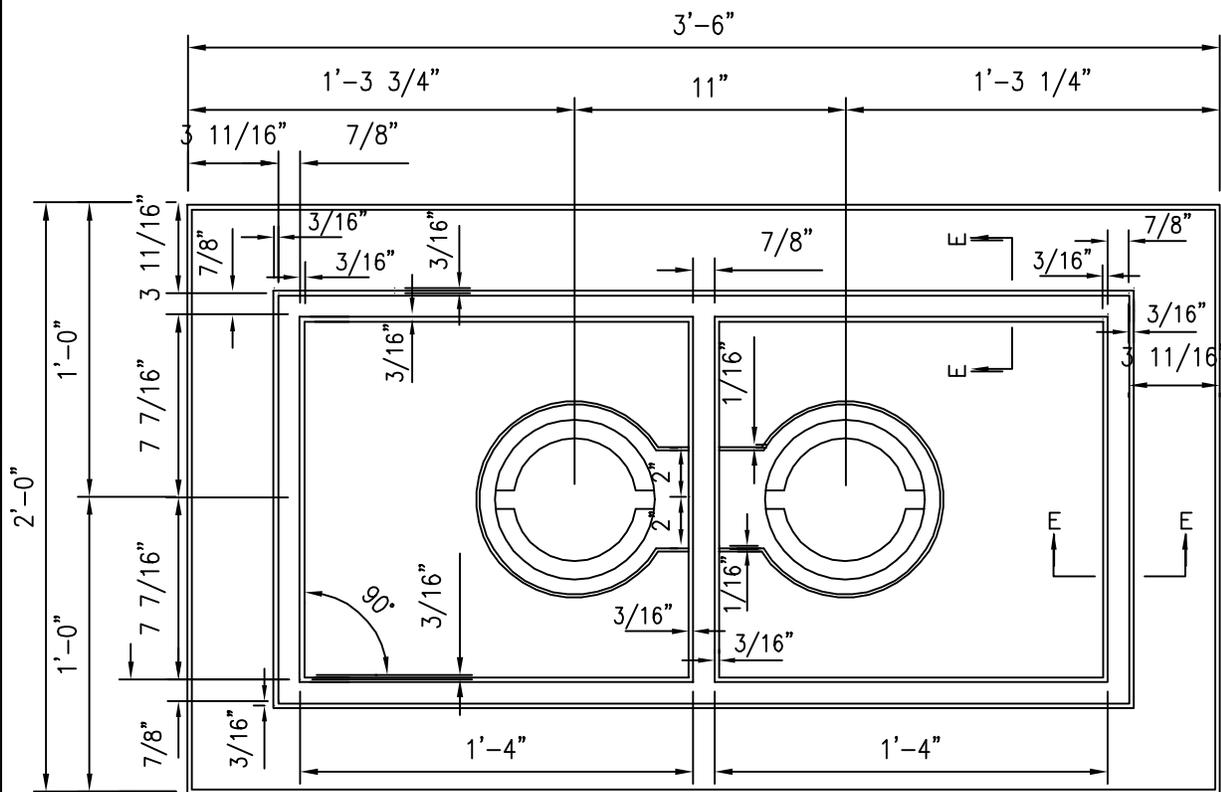


PLAN VIEW OF 24"X42"X3/4"  
CAST IRON PLATE

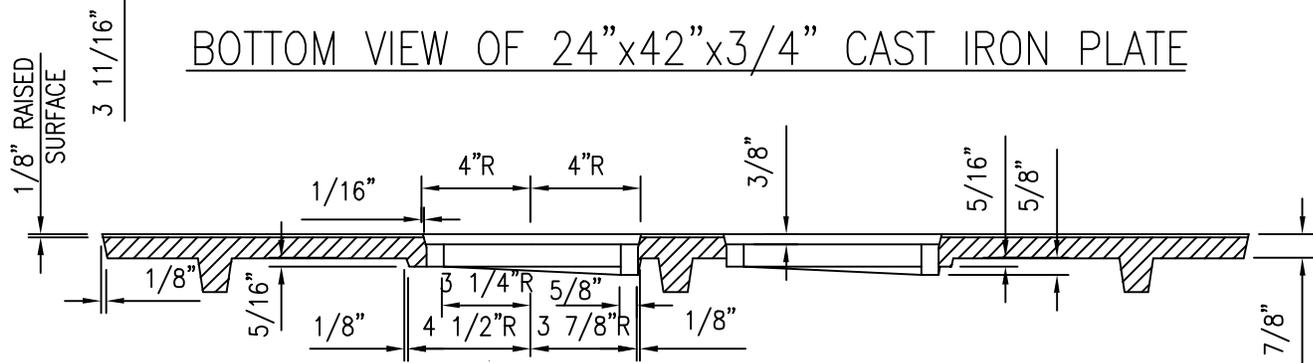
SEE PLATE M24 FOR  
READING HOLE COVER AND  
DETAILS OF RAISED SURFACE.

2002
REVISION

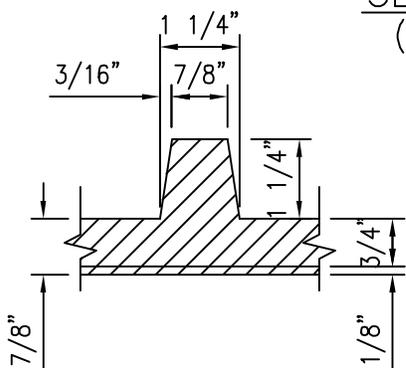
KAUAI OAHU	<b>METER BOX FRAME &amp; COVER</b> CAST IRON, TYPE IV FOR 3" & 4" METERS SCALE: NTS	STANDARD DETAILS	<b>M7</b>
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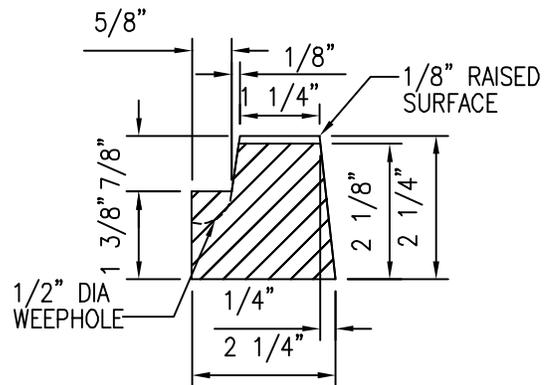
BOTTOM VIEW OF 24"x42"x3/4" CAST IRON PLATE



SECTION "A-A"  
(SEE M7)



SECTION "E-E"



SECTION "D-D"  
(SEE M7)

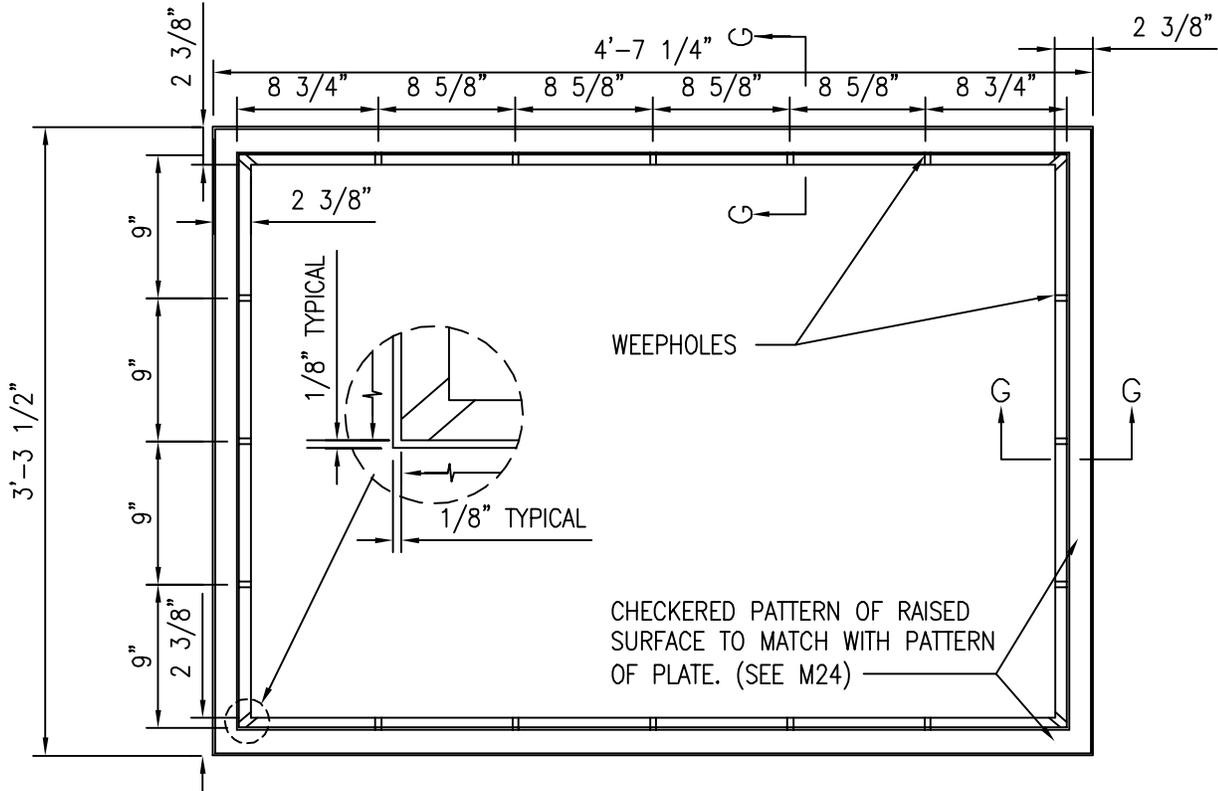
2002
REVISION

KAUAI  
OAHU

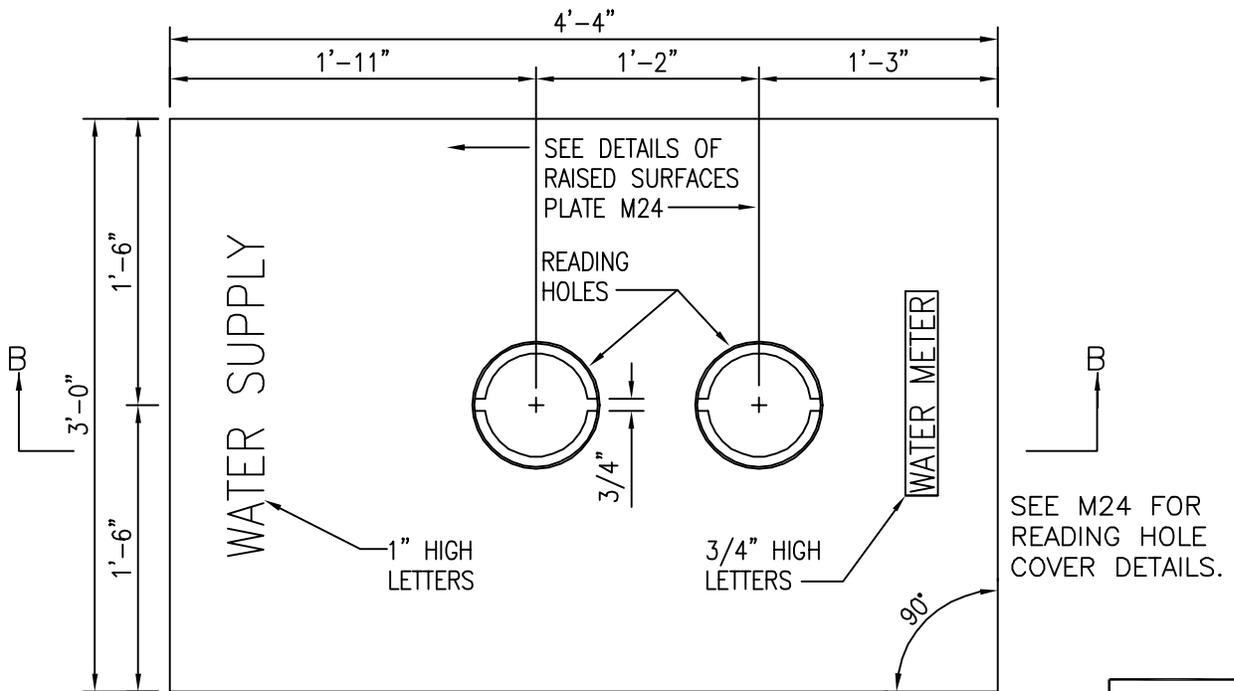
**METER BOX COVER**  
CAST IRON, TYPE IV  
SCALE: NTS

STANDARD  
DETAILS

M8



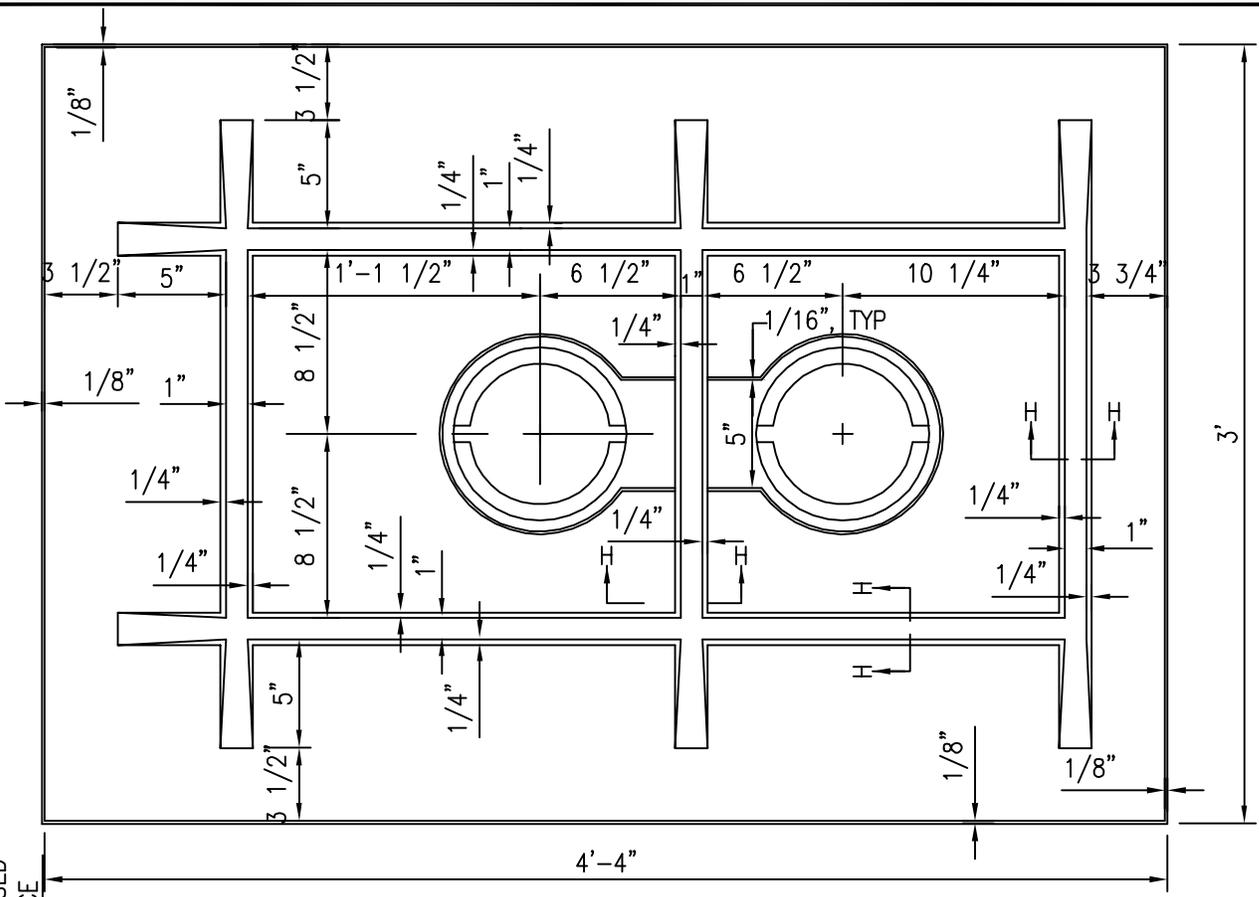
PLAN VIEW OF CAST IRON FRAME FOR 36"x52"x3/4" PLATE



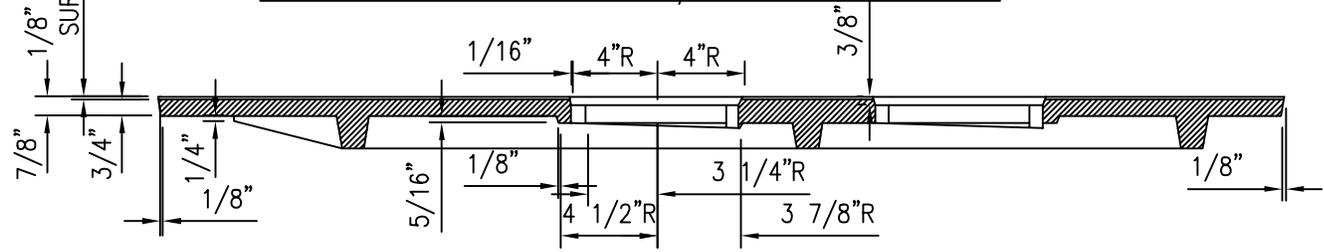
PLAN VIEW OF 36"x52"x3/4" CAST IRON PLATE

2002
REVISION

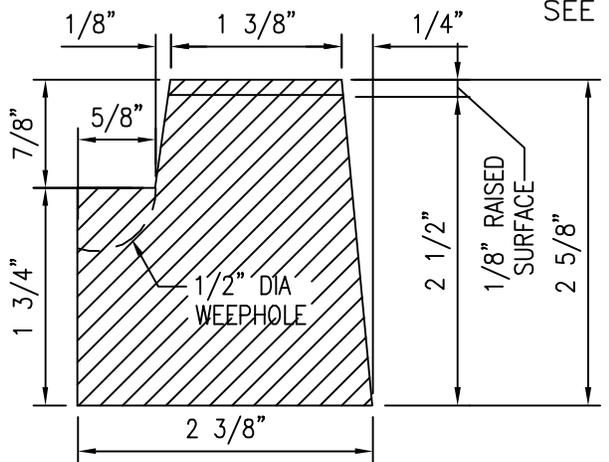
KAUAI OAHU	<b>METER BOX FRAME &amp; COVER</b> CAST IRON, TYPE V FOR 6" & 8" METERS SCALE: NTS	STANDARD DETAILS	M9
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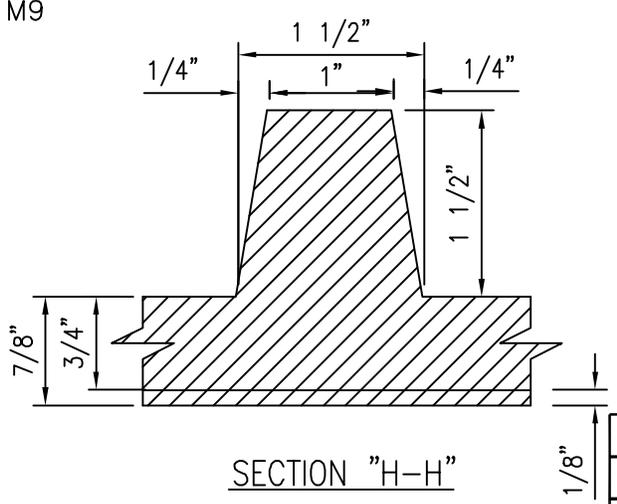
BOTTOM VIEW OF 36"x52"x3/4" CAST IRON PLATE



SECTION "B-B"  
SEE M9



SECTION "G-G"  
SEE M9



SECTION "H-H"

KAUAI OAHU	<b>METER BOX COVER</b> CAST IRON, TYPE V SCALE: NTS	STANDARD DETAILS	2002
			REVISION
			M10

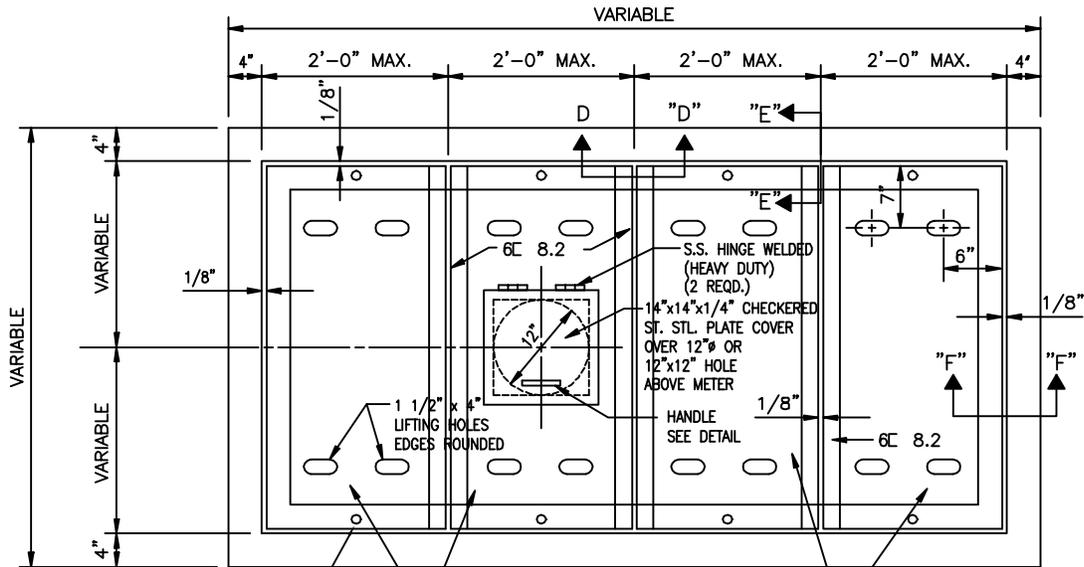
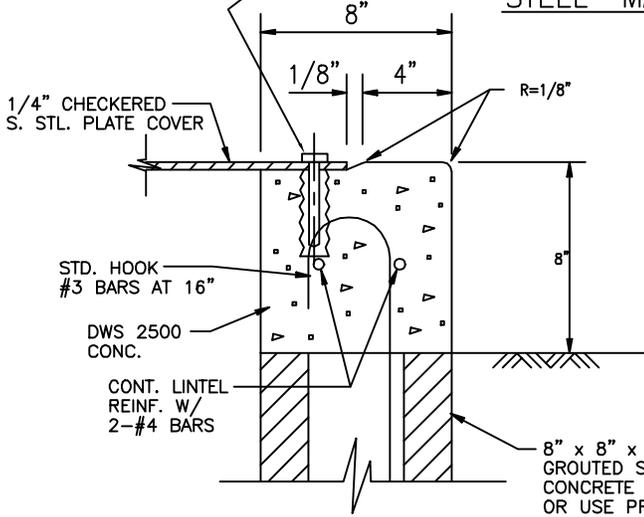
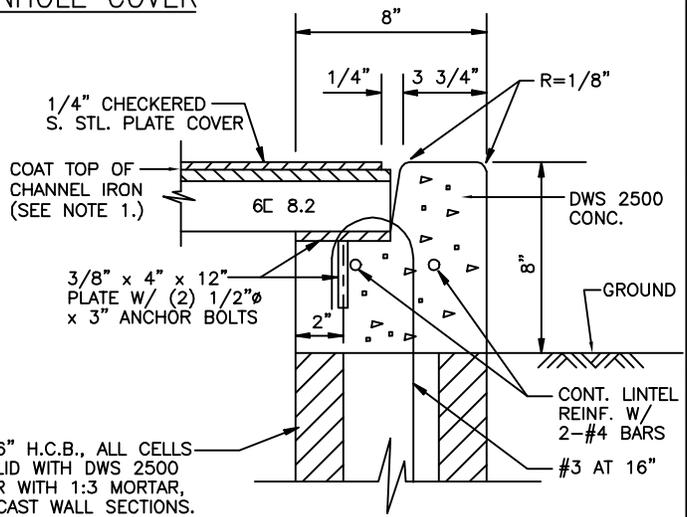


PLATE HOLD-DOWN ANCHOR  
2 EACH PLATE COVER.  
1/2" S.S. BOLT W/ PENTA HEAD \*\*  
INTO EMBEDDED INSERT.

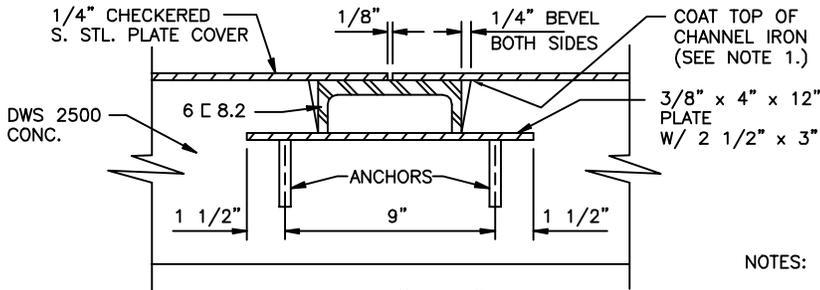
PLAN OF STAINLESS (316)  
STEEL\* MANHOLE COVER



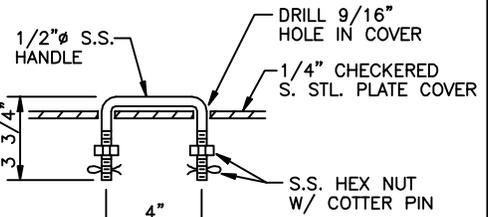
SECTION "F-F"



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	<b>METAL MANHOLE COVER</b> (NON-TRAFFIC LOADING) SCALE: NTS	STANDARD DETAILS	M11
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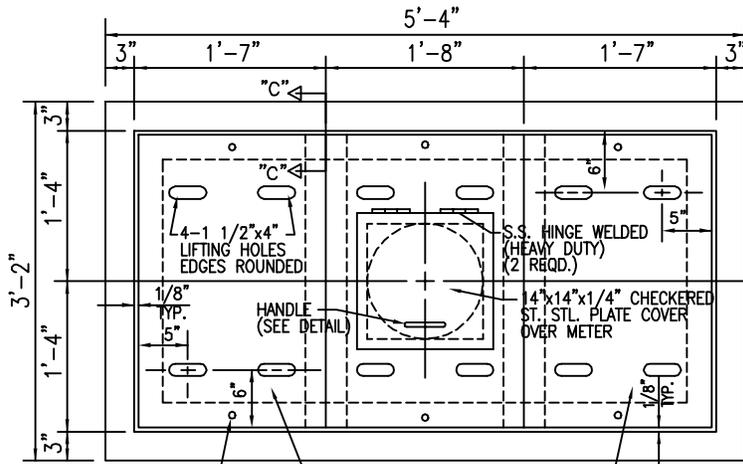
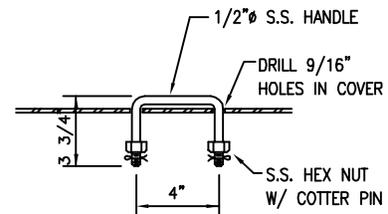


PLATE HOLD-DOWN ANCHOR  
2 EACH PLATE COVER.  
1/2" S.S. BOLT W/ PENTA  
HEAD INTO EMBEDDED INSERT.  
(SEE PLATE M11)

PLAN OF STAINLESS (316)  
STEEL\* MANHOLE COVER

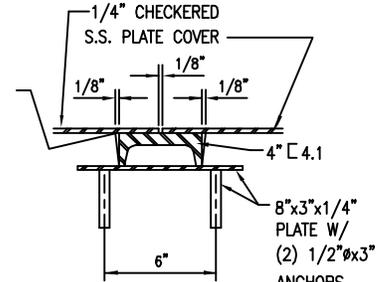


HANDLE DETAIL

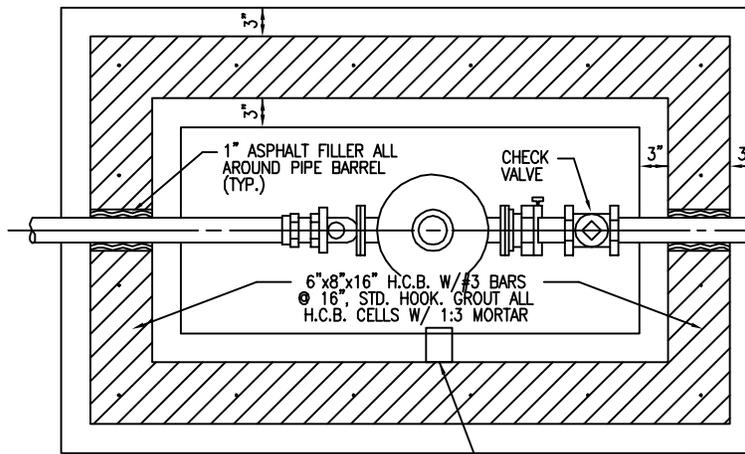
NOTE:

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

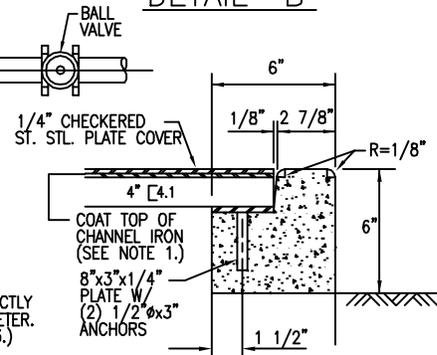
COAT TOP OF  
CHANNEL IRON  
(SEE NOTE 1.)



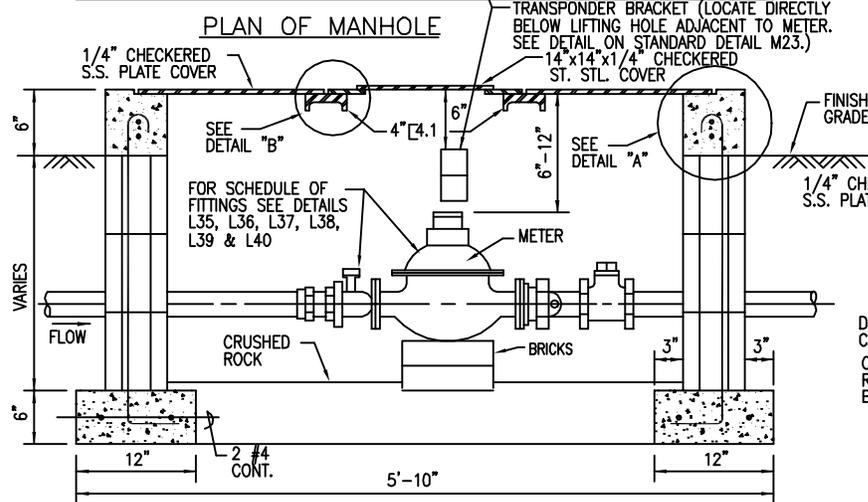
DETAIL "B"



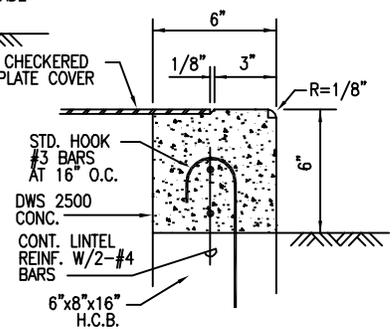
PLAN OF MANHOLE



SECTION "C-C"



SECTION



DETAIL "A"

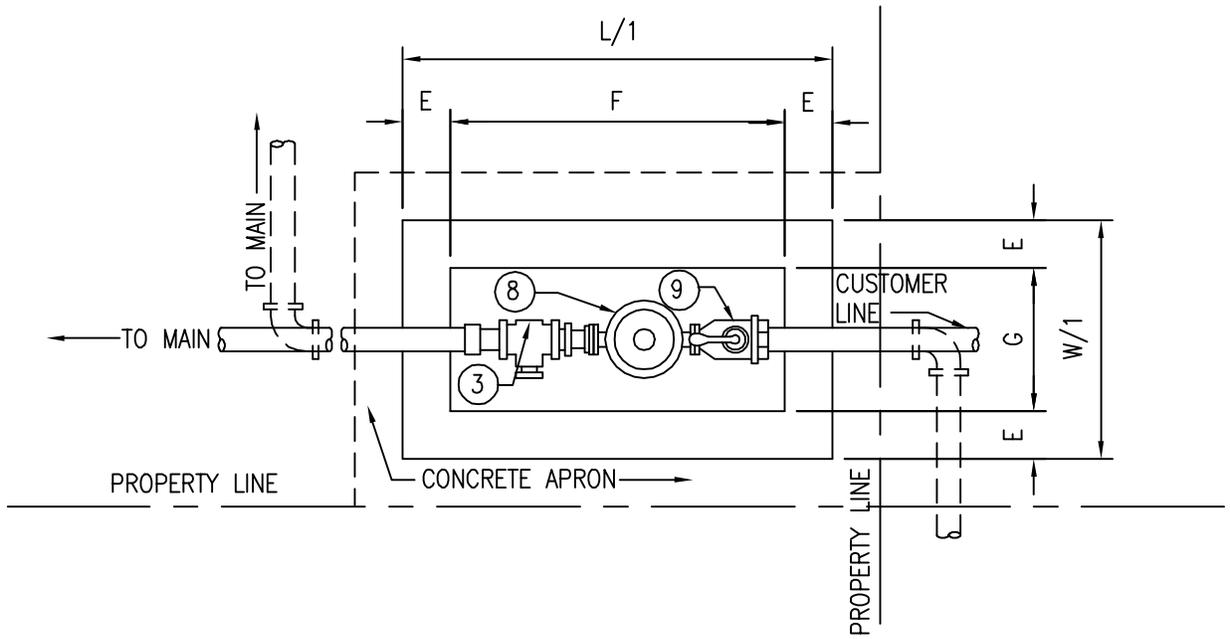
NOTES:

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

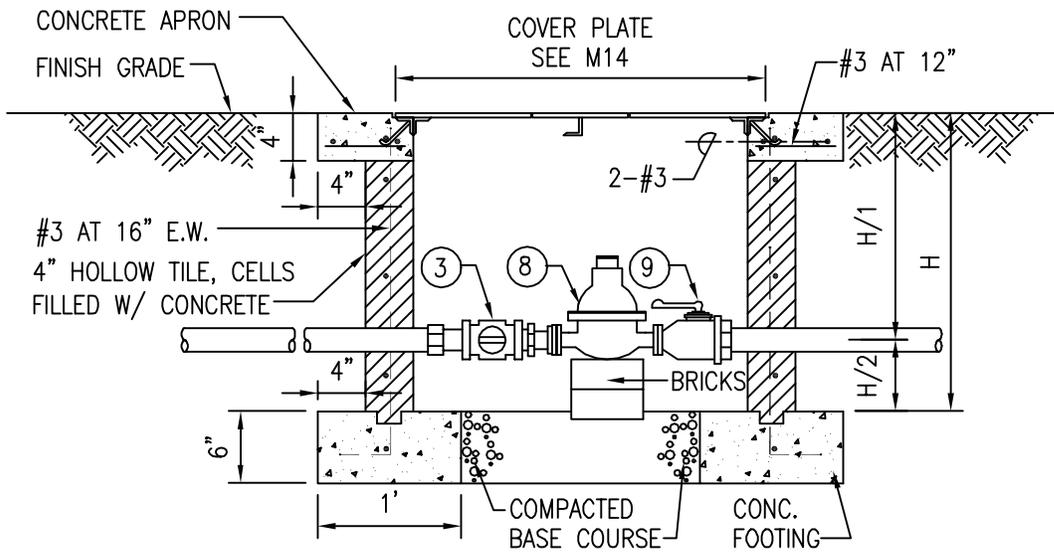
\* ALTERNATE = PROVIDE DESIGN WITH ANODIZED ALUMINUM COVER.

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REVISION

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



ELEVATION

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.

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

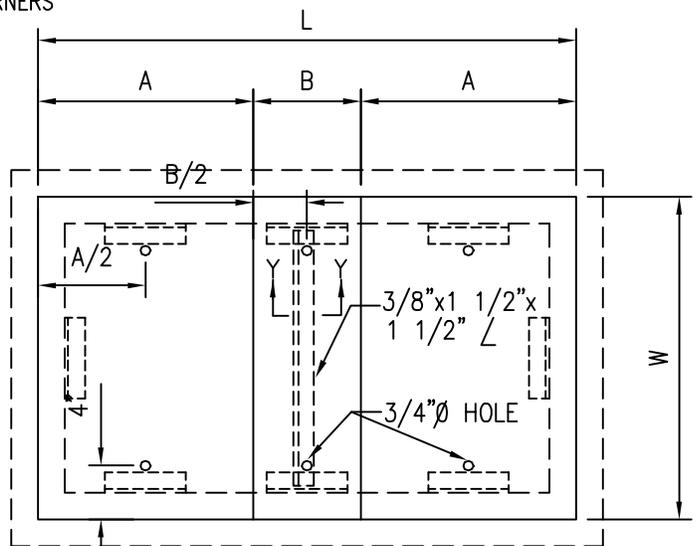
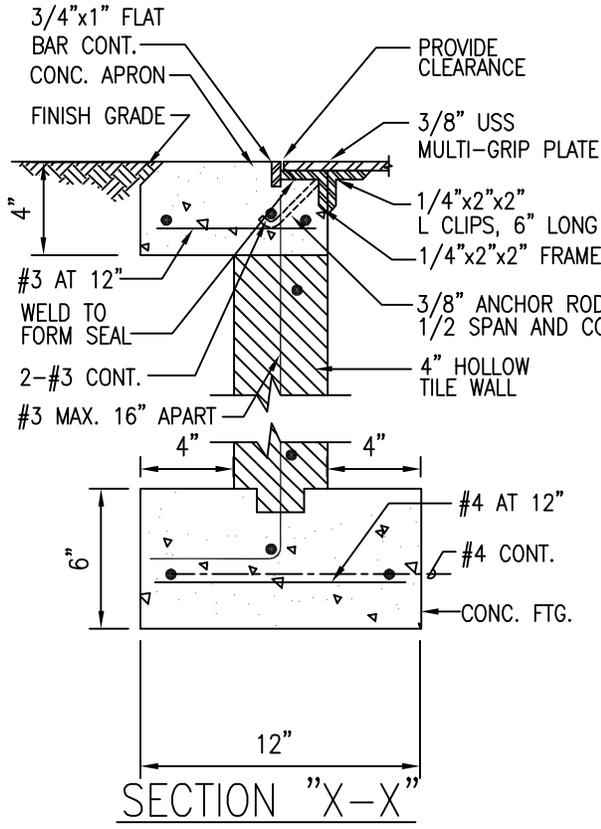
2002
REVISION

COVER PLATE DIMENSIONS (IN INCHES)

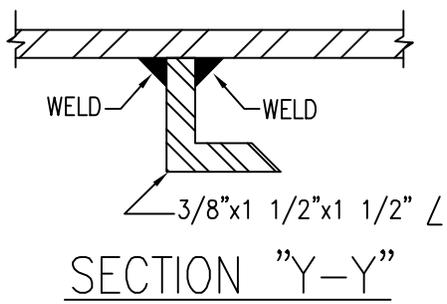
METER SIZE	L	W	L/3	A	B
1*	32	16			
1 1/2	40	24		16	8
2	48	24	16		

ALL PLATES USS MULTI-GRIP OR CHECKER STEEL, 3/8" THICK

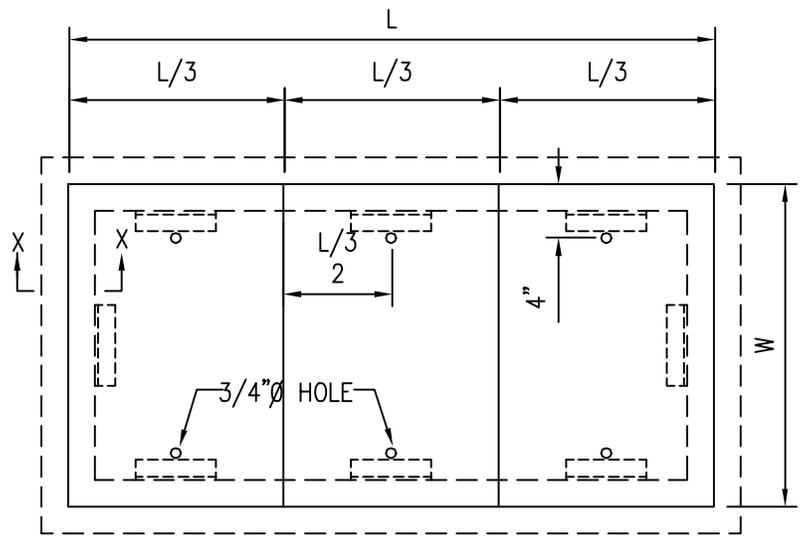
\* COVER PLATE DETAILS FOR 1" METER SHALL BE SIMILAR TO SHOWN BELOW EXCEPT 2-16"x16"x3/8" PLATES REQUIRED



1 1/2" METER BOX COVER



SECTION "Y-Y"

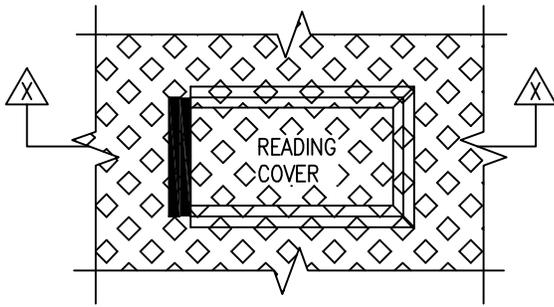


2" METER BOX COVER

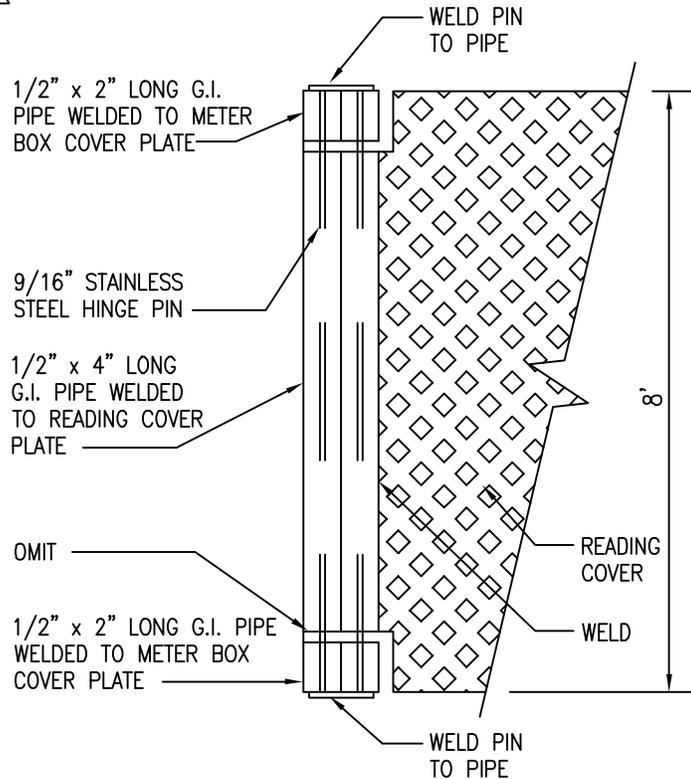
NOTE:  
ALL L IRONS AND PLATES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

2002
REVISION

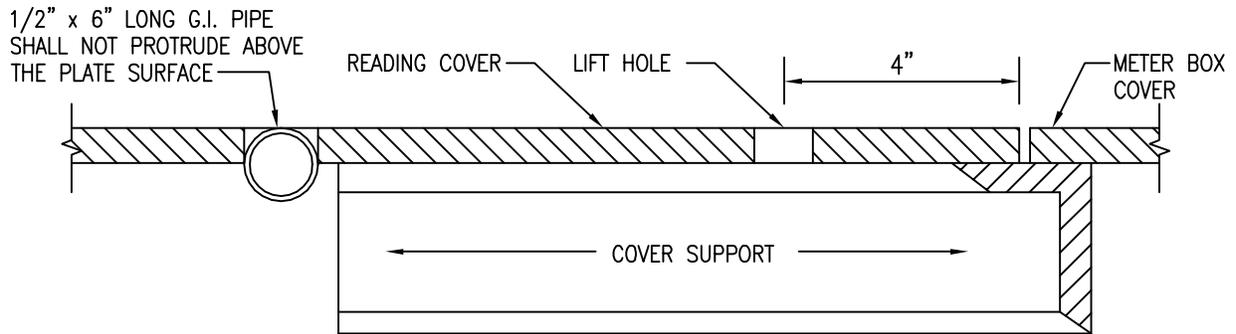
HAWAII	<b>STANDARD METER COVERS</b>	STANDARD DETAILS	M14
SCALE: NTS			



PLAN



HINGE DETAIL



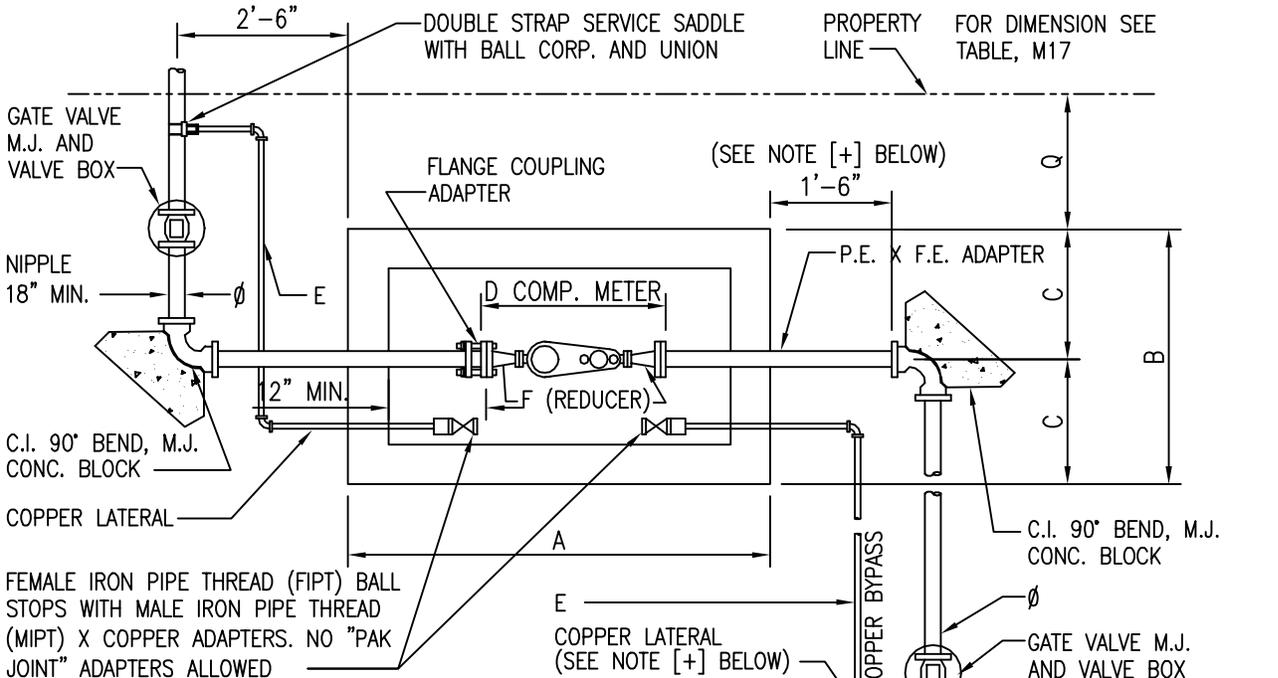
SECTION X-X

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

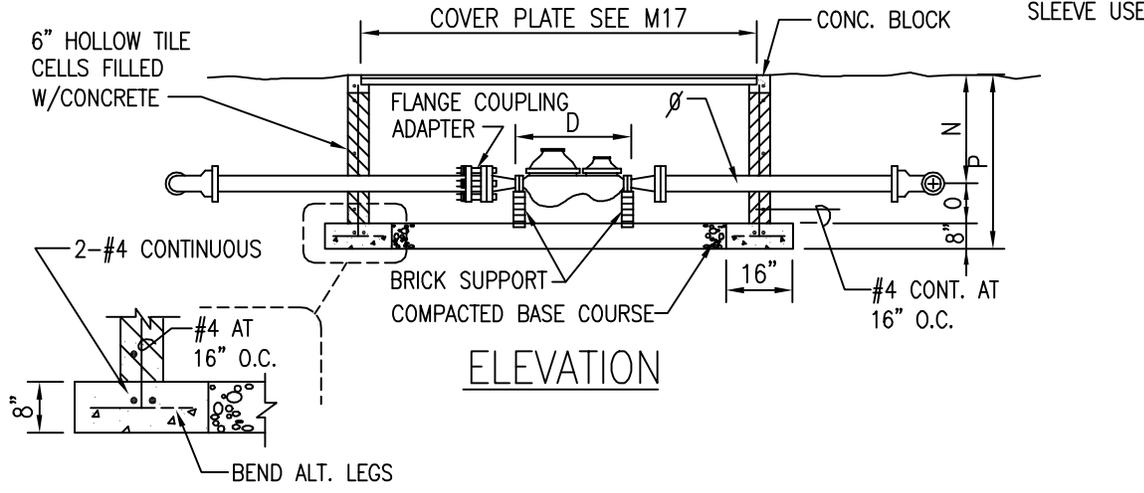
2002
REVISION

HAWAII	<b>READING COVER DETAIL</b>	STANDARD DETAILS	<b>M15</b>
SCALE: NTS			



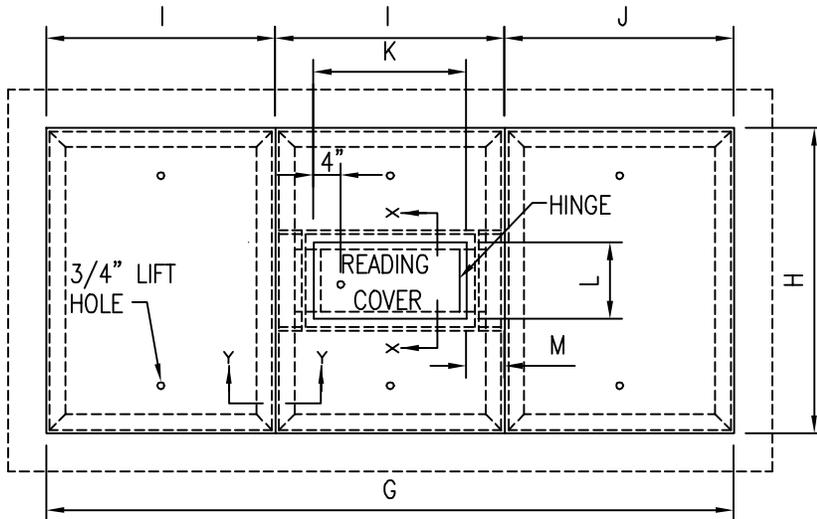
PLAN

- \* IF TAPPING SLEEVE AND TAPPING VALVE USED COPPER LATERAL SHALL BE TAPPED TO WATER MAIN.
- + IF METER UNIT IS INSTALLED ON THE OPPOSITE SIDE OF THE ROAD, AS THE WATERLINE, AN ADDITIONAL GATE VALVE AND VALVE BOX IS REQUIRED BETWEEN THE BOX AND THE 90° BEND. CENTER OF VALVE SHALL BE 2'-6" FROM EDGE OF BOX. ALSO RELOCATE COPPER LATERAL JUST UPSTREAM OF VALVE (BETWEEN VALVE & 90° BEND.)



ELEVATION

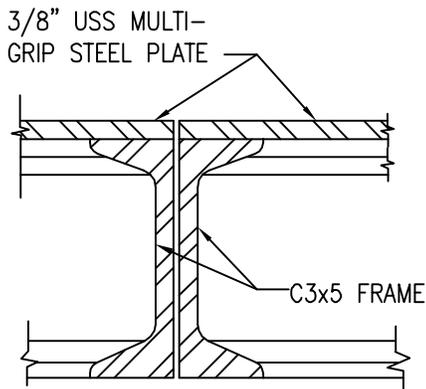
HAWAII	<b>COMPOUND METER AND BOX INSTALLATION</b> SCALE: NTS	STANDARD DETAILS	2002
			REVISION
			<b>M16</b>



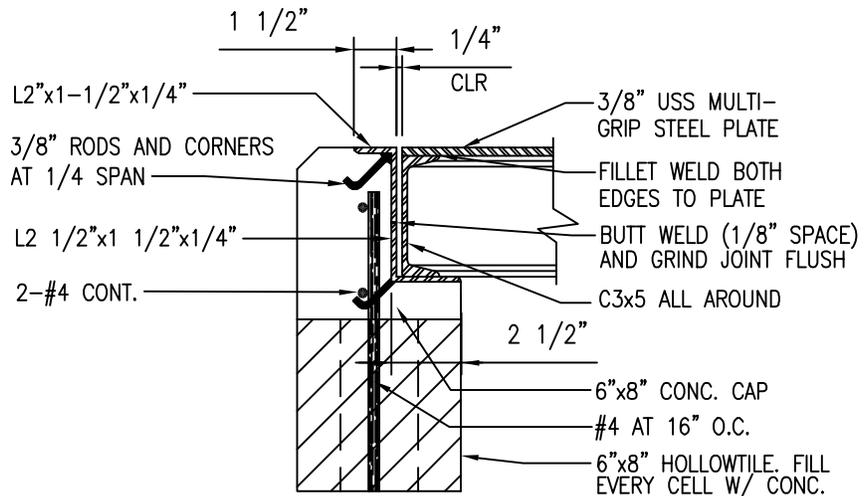
FOR 3", 4", & 6" COMPOUND METERS

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
∅	4	6	8

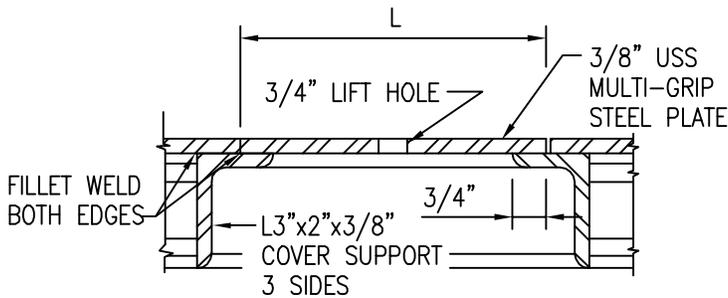
\*= MIN.



SECTION "Y-Y"



CONCRETE CAP AND FRAME  
DETAILS



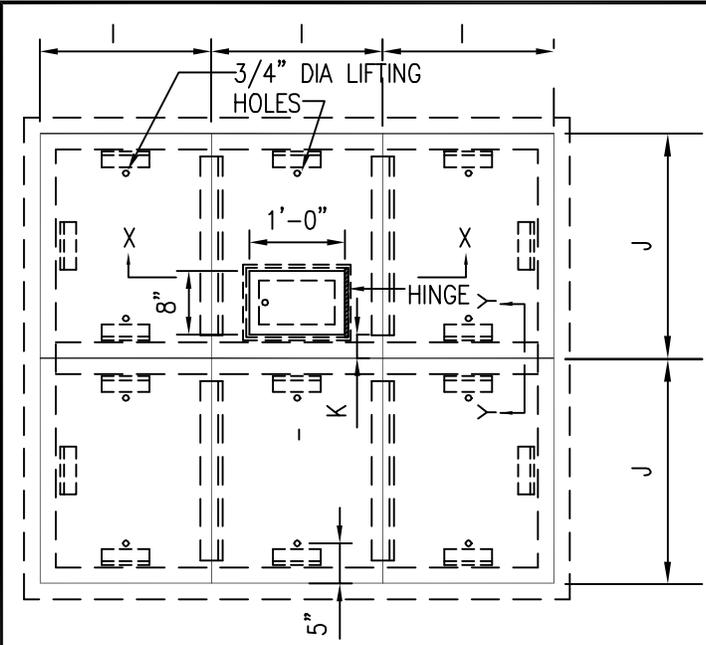
SECTION "X-X"

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.

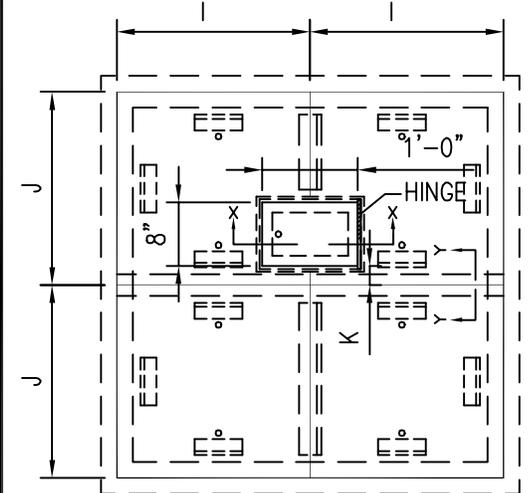
2002
REVISION

HAWAII	<b>COMPOUND METER COVER DETAILS</b> SCALE: NTS	STANDARD DETAILS	<b>M17</b>
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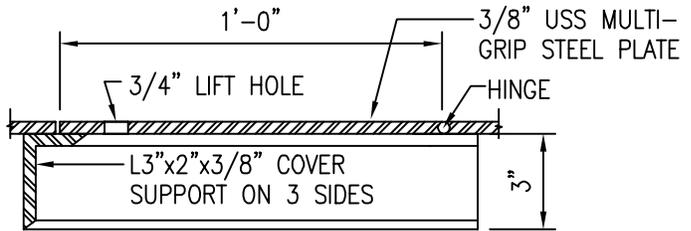


COVER PLATES 10" DC METER

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

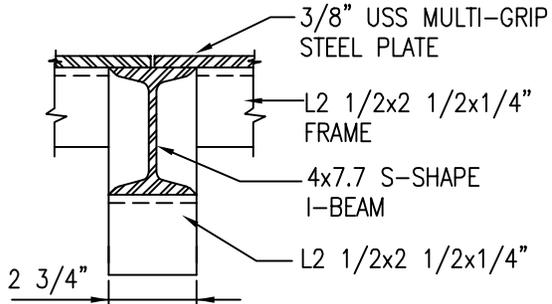


COVER PLATES 3", 4", 6" AND 8" DC METERS

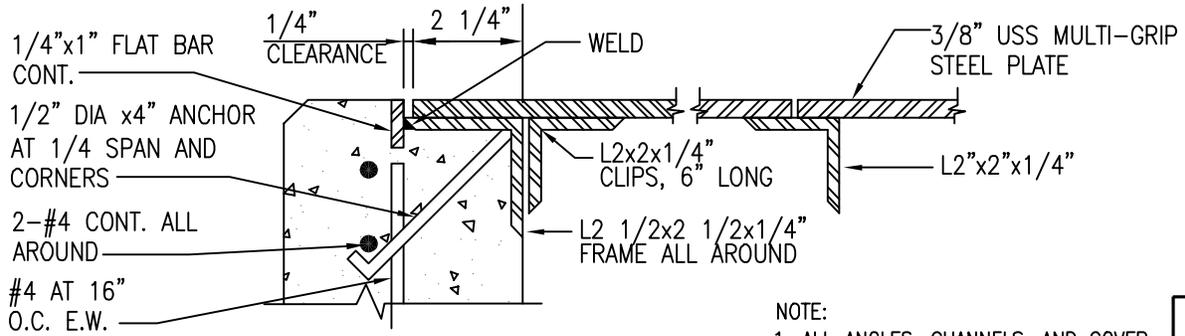


READING COVER SECTION "X-X"

SEE PLATE M15 FOR DETAILS



CROSS BEAM SECTION "Y-Y"



FRAME AND COVER DETAILS

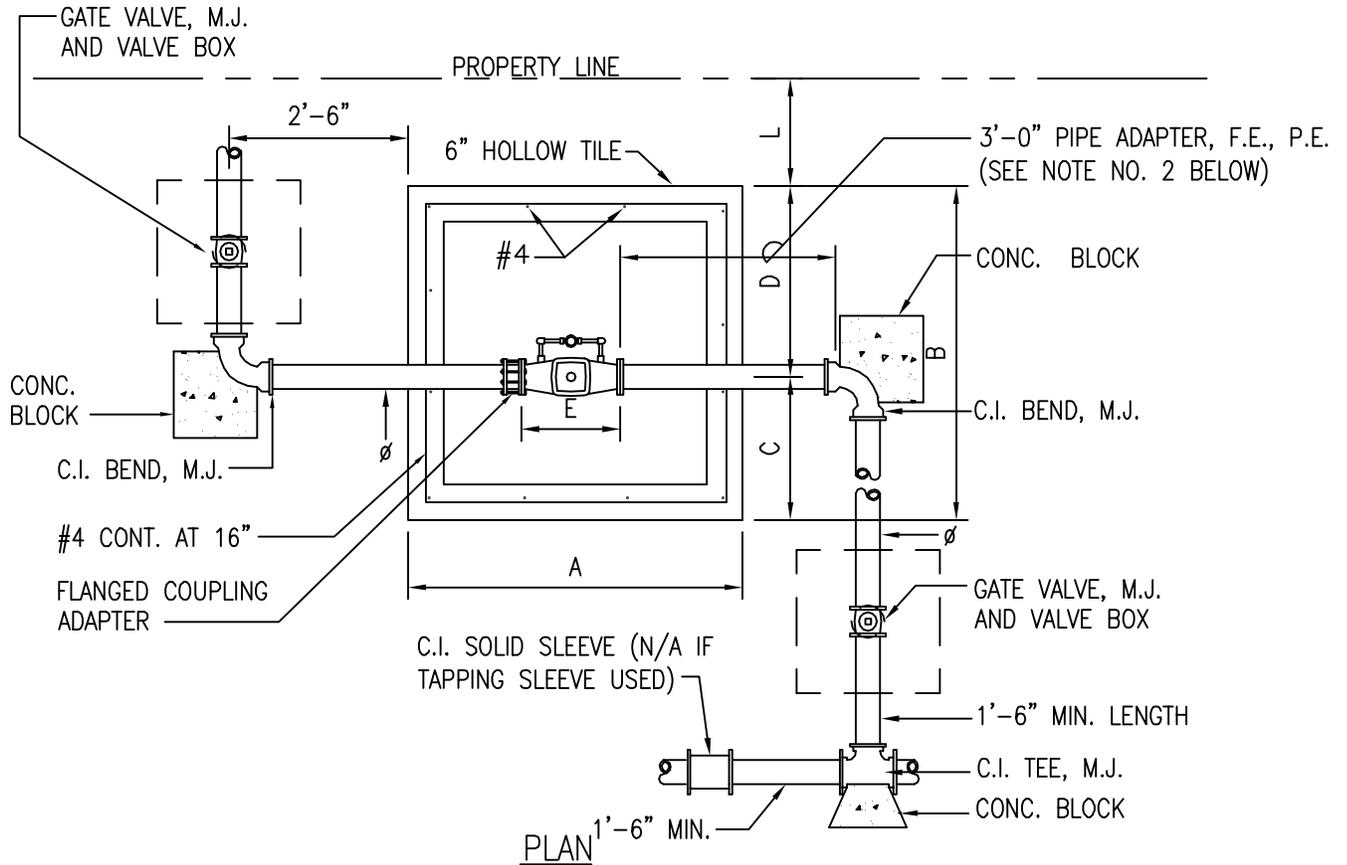
NOTE:  
1. ALL ANGLES, CHANNELS, AND COVER PLATES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

2002
REVISION

HAWAII	<b>DETECTOR CHECK COVER</b> DETAILS SCALE: NTS	STANDARD DETAILS	M18
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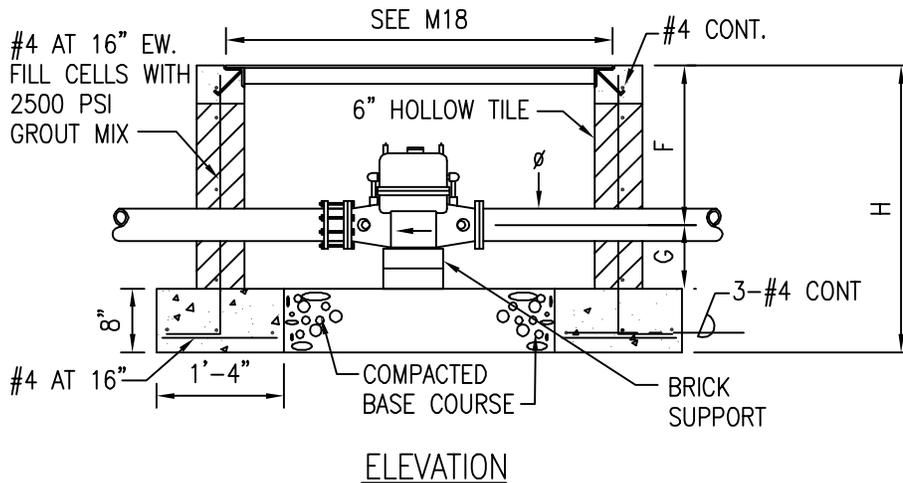


FOR DIMENSIONS, SEE TABLE, M18



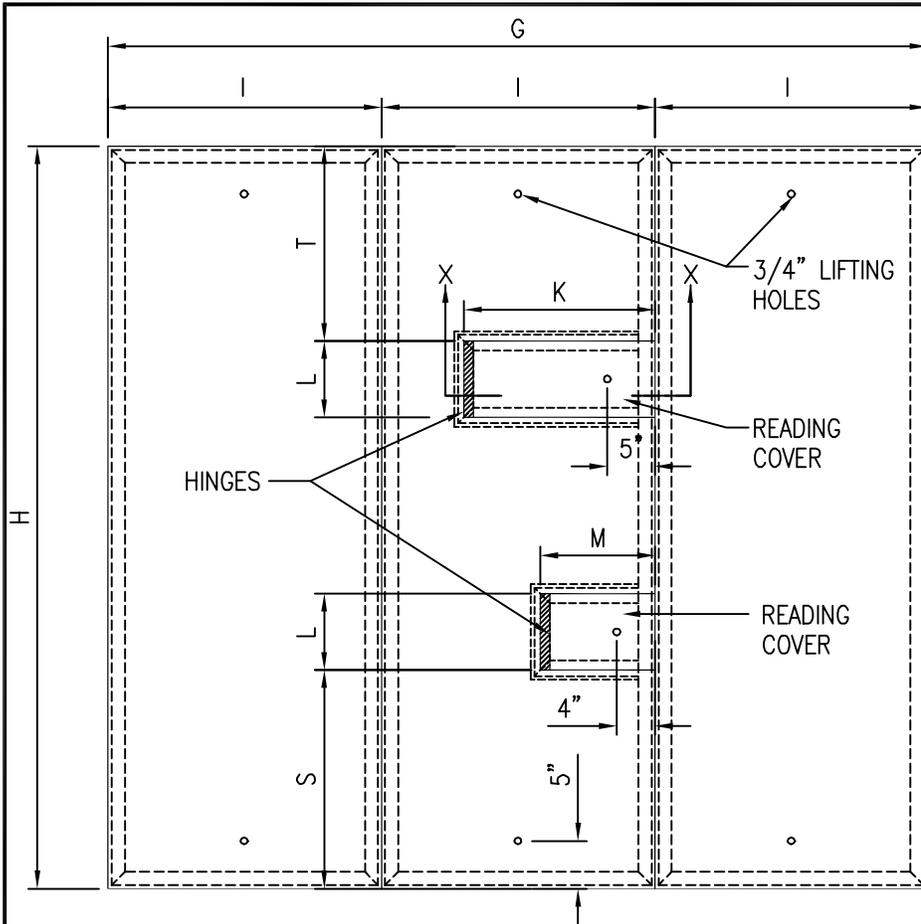
**NOTES:**

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.



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HAWAII	<b>MODEL DC DETECTOR CHECK INSTALLATION</b> SCALE: NTS	STANDARD DETAILS	M20
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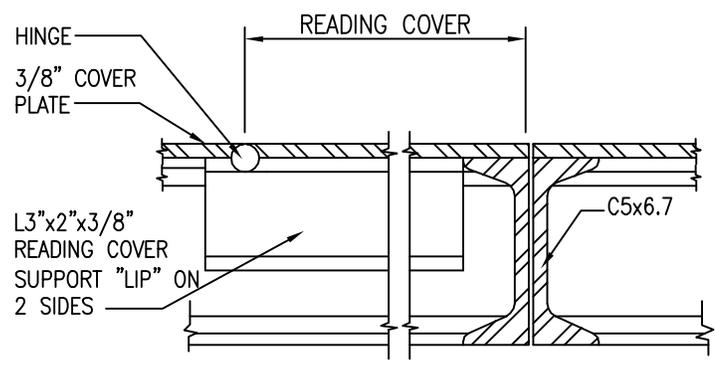


**NOTES:**

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.

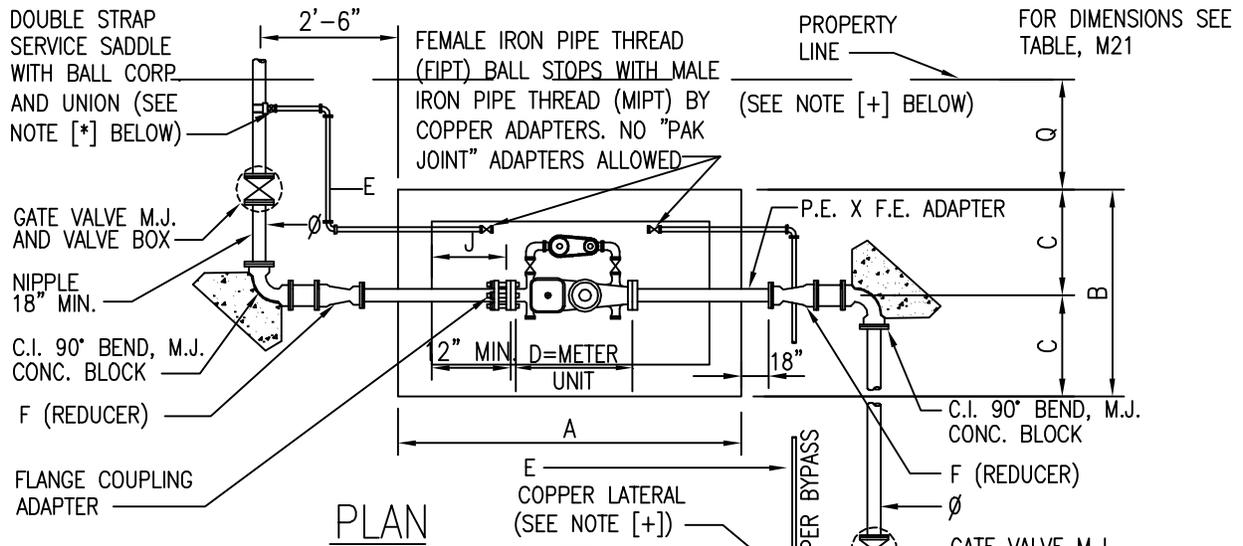
PLAN

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



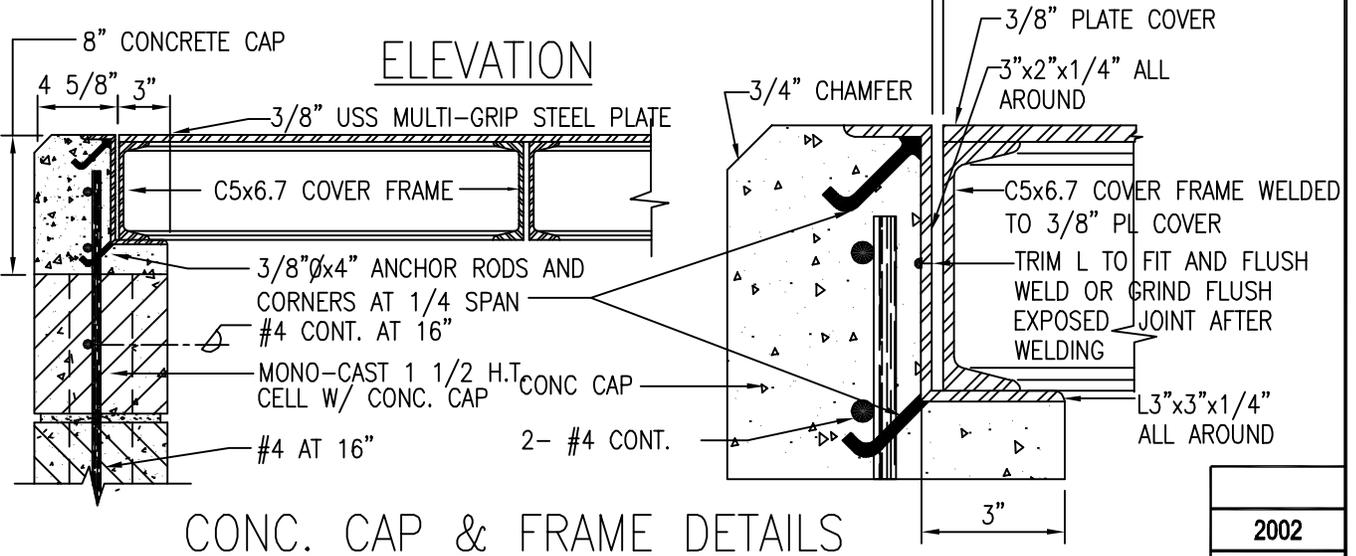
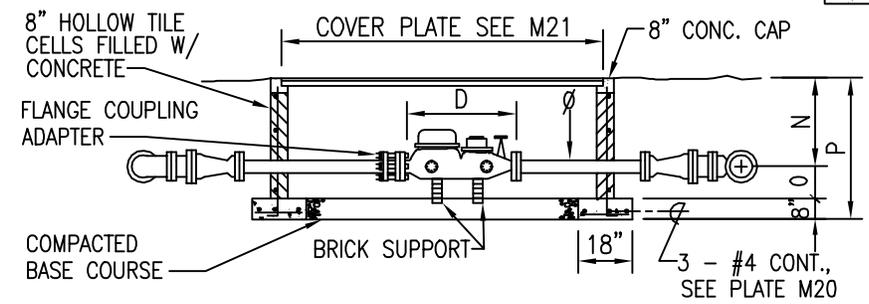
SECTION X-X

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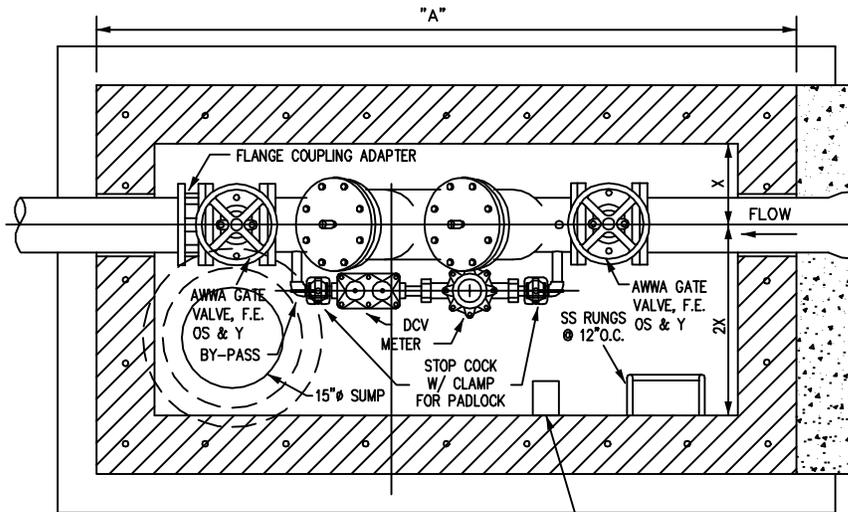


**NOTES:**

- \* IF TAPPING SLEEVE AND TAPPING VALVE USED COPPER LATERAL SHALL BE TAPPED TO WATER MAIN.
- + IF METER UNIT IS INSTALLED ON THE OPPOSITE SIDE OF THE ROAD, AS THE WATERLINE, AN ADDITIONAL GATE VALVE AND VALVE BOX IS REQUIRED BETWEEN THE BOX AND THE REDUCER. CENTER OF VALVE SHALL BE 2'-6" FROM EDGE OF BOX. ALSO RELOCATE COPPER LATERAL JUST UPSTREAM OF VALVE (BETWEEN VALVE & REDUCER.)



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**NOTES:**

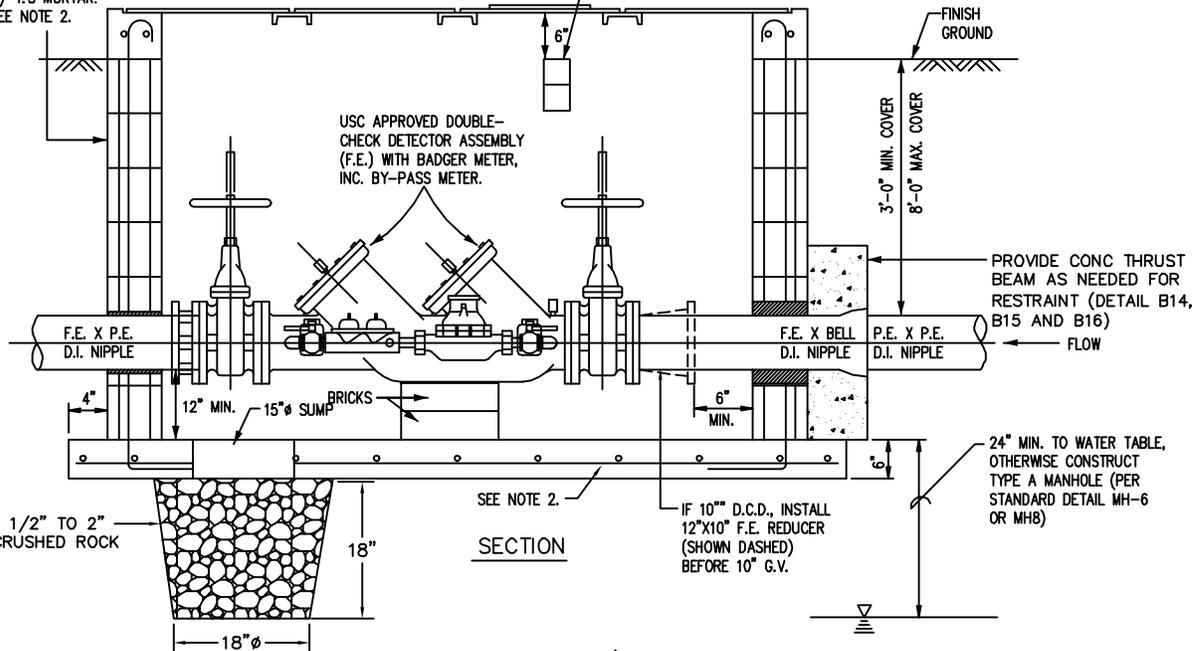
1. MANHOLE MAY BE PRECAST, CAST-IN-PLACE, OR BLOCK.
2. FOR CMU MANHOLE REINFORCEMENT, SEE STANDARD DETAIL MH12.
3. FOR BOND BEAM AND METAL MANHOLE COVER DETAILS, SEE STANDARD PLATE M11.
4. BYPASS METER SHALL BE RADIO READ TYPE MANUFACTURED BY BADGER METER INC., OR OTHER AS REQUIRED BY DWS.

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

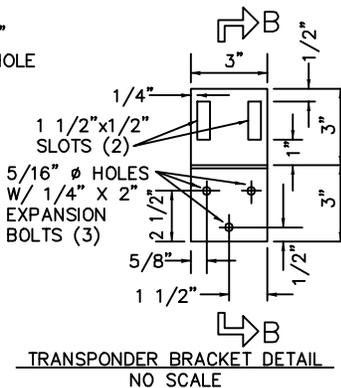
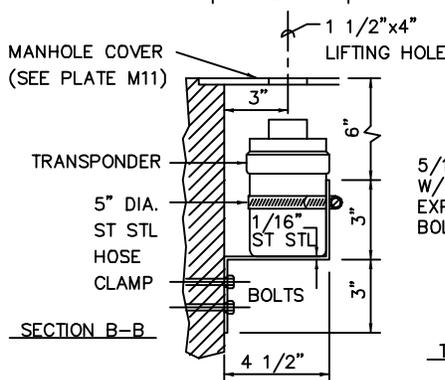
8"x8"x16" HCB.  
ALL CELLS GROUTED  
W/ 1:3 MORTAR.  
SEE NOTE 2.

**PLAN SECTION**

TRANSDUCER BRACKET (LOCATE DIRECTLY BELOW LIFTING HOLE ADJACENT TO METER. SEE DETAIL BELOW.)



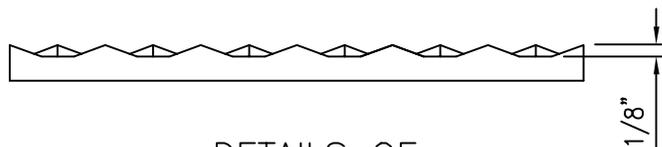
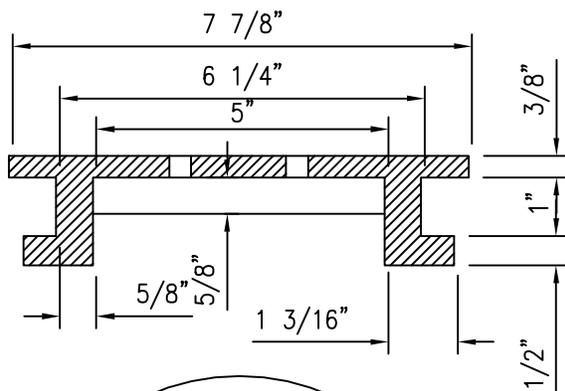
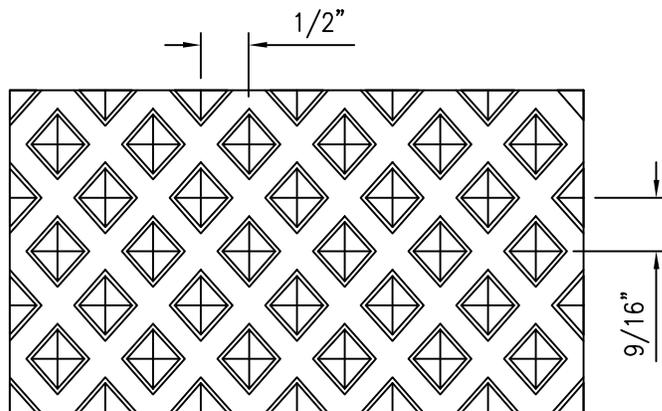
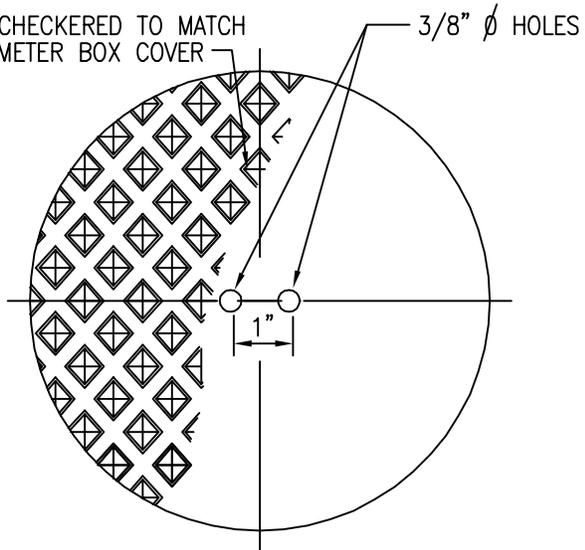
**SECTION**



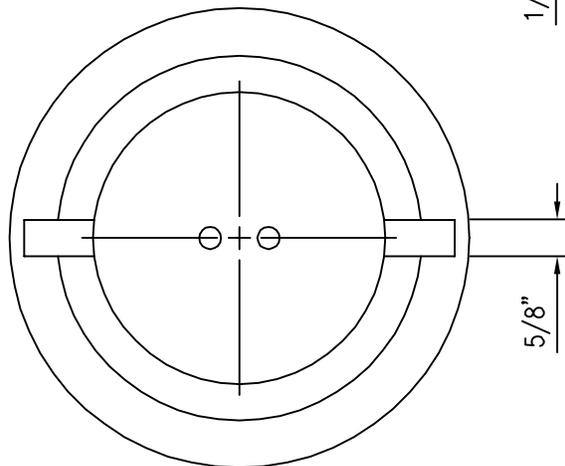
D.C.D. SIZE	MANHOLE SIZE	
	A	B
10"	12'-0"	6'-8"
8"	9'-4"	6'-0"
6"	8'-0"	5'-4"
4"	6'-8"	4'-8"
& SMALLER	6'-8"	4'-8"

**2002**  
**REVISION**

CHECKERED TO MATCH  
METER BOX COVER



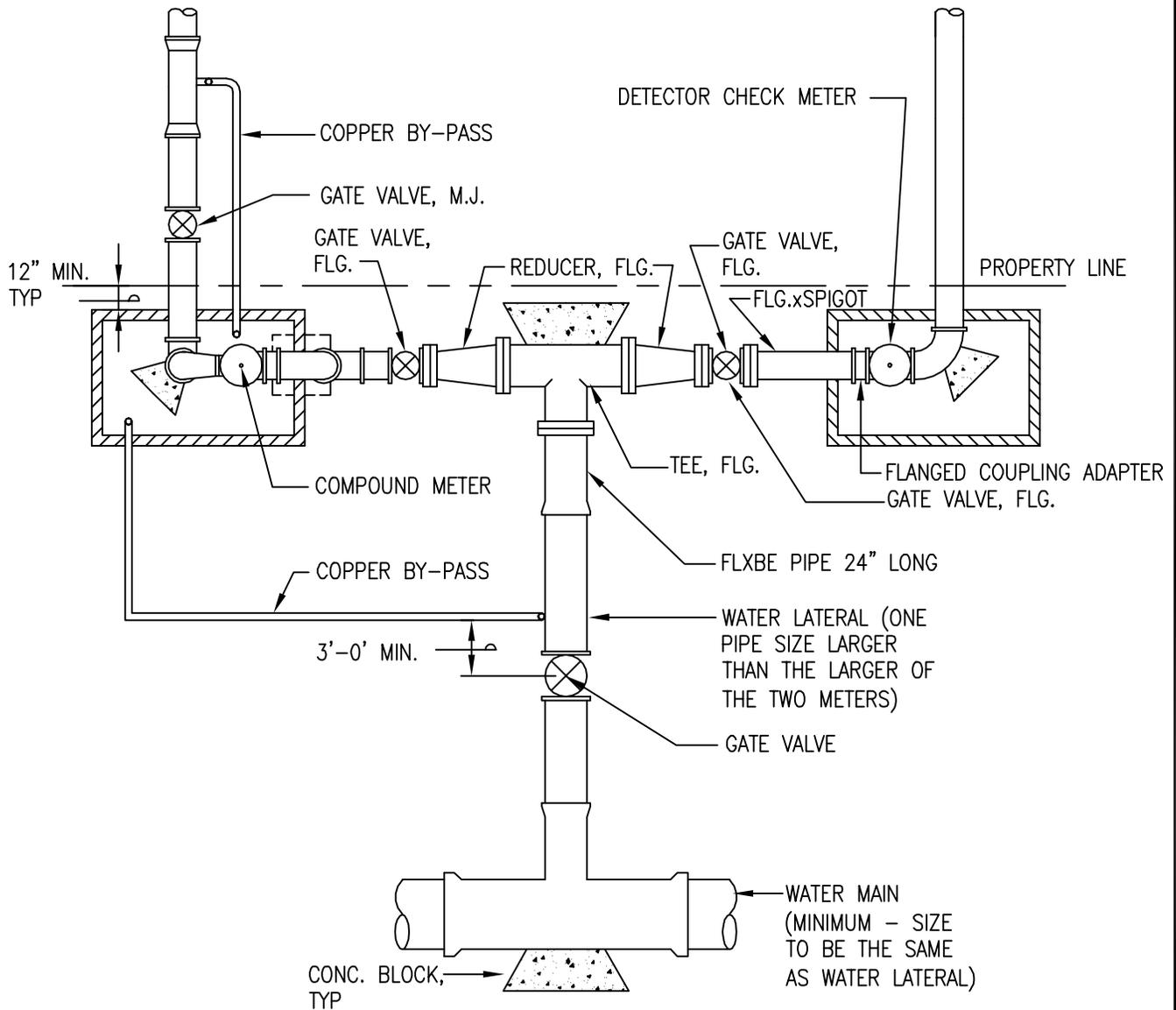
DETAILS OF  
RAISED  
SURFACE



CAST IRON READING-HOLE COVER

2002
REVISION

KAUAI OAHU	<p><b>READING HOLE COVER</b>          RAISED SURFACE DETAIL          SCALE: NTS</p>	STANDARD DETAILS	M24
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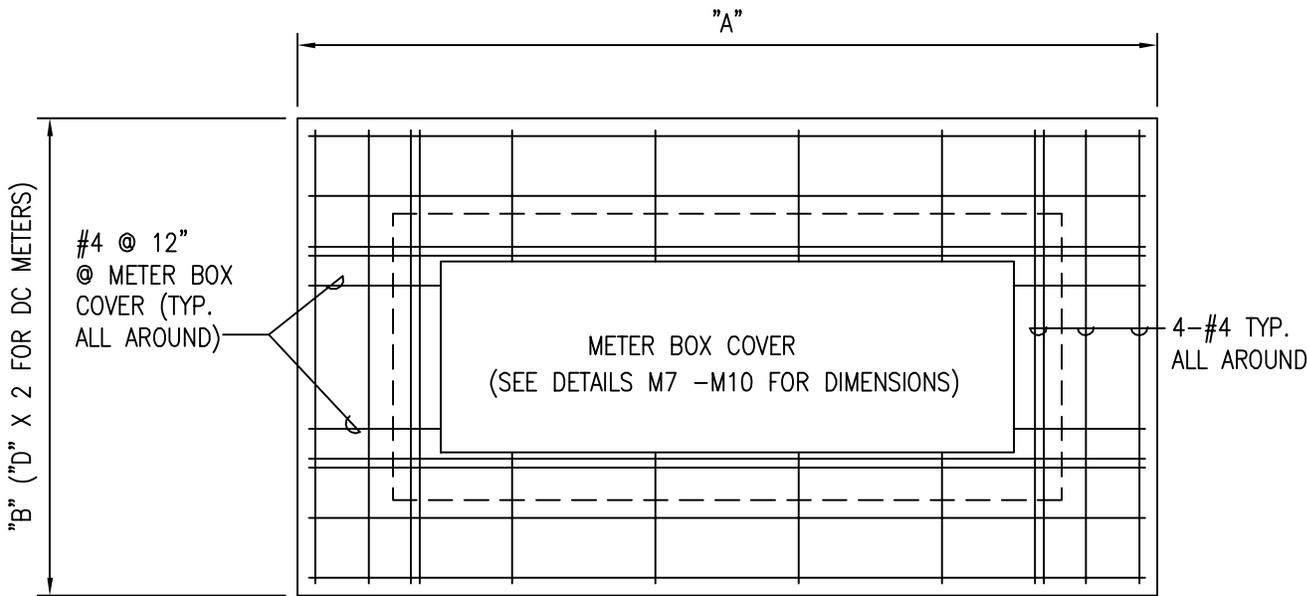
COMBINATION OF SINGLE COMPOUND  
AND SINGLE DETECTOR CHECK METERS

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
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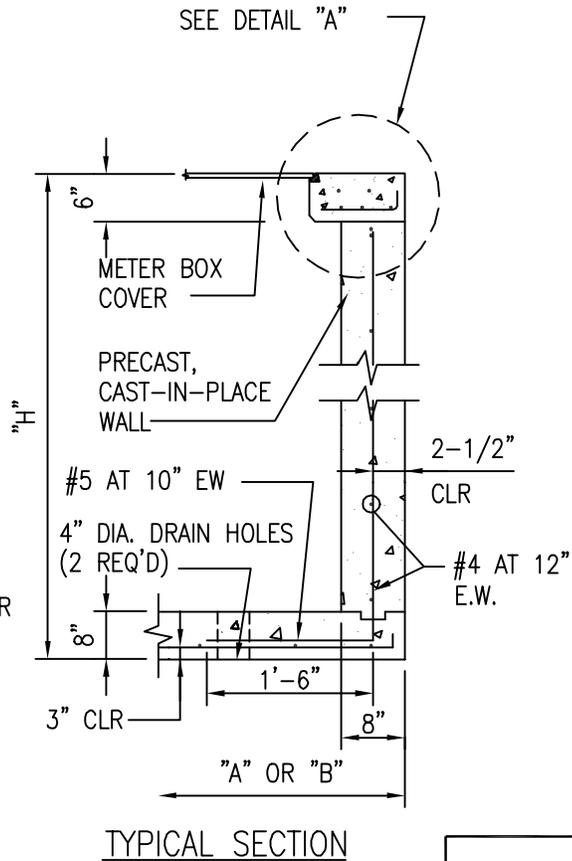
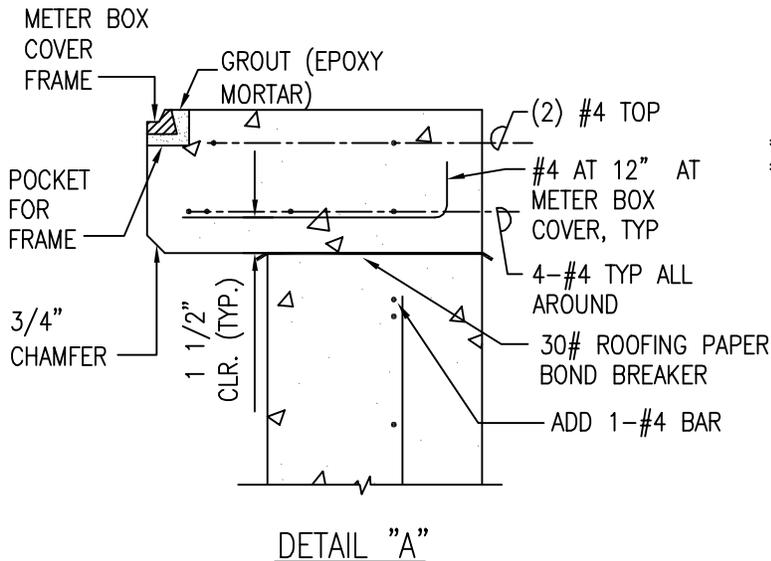
OAHU	<b>COMBINATION OF SINGLE COMPOUND AND SINGLE DETECTOR CHECK METERS</b> SCALE: NTS	STANDARD DETAILS	<b>M25</b>
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PLAN

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.

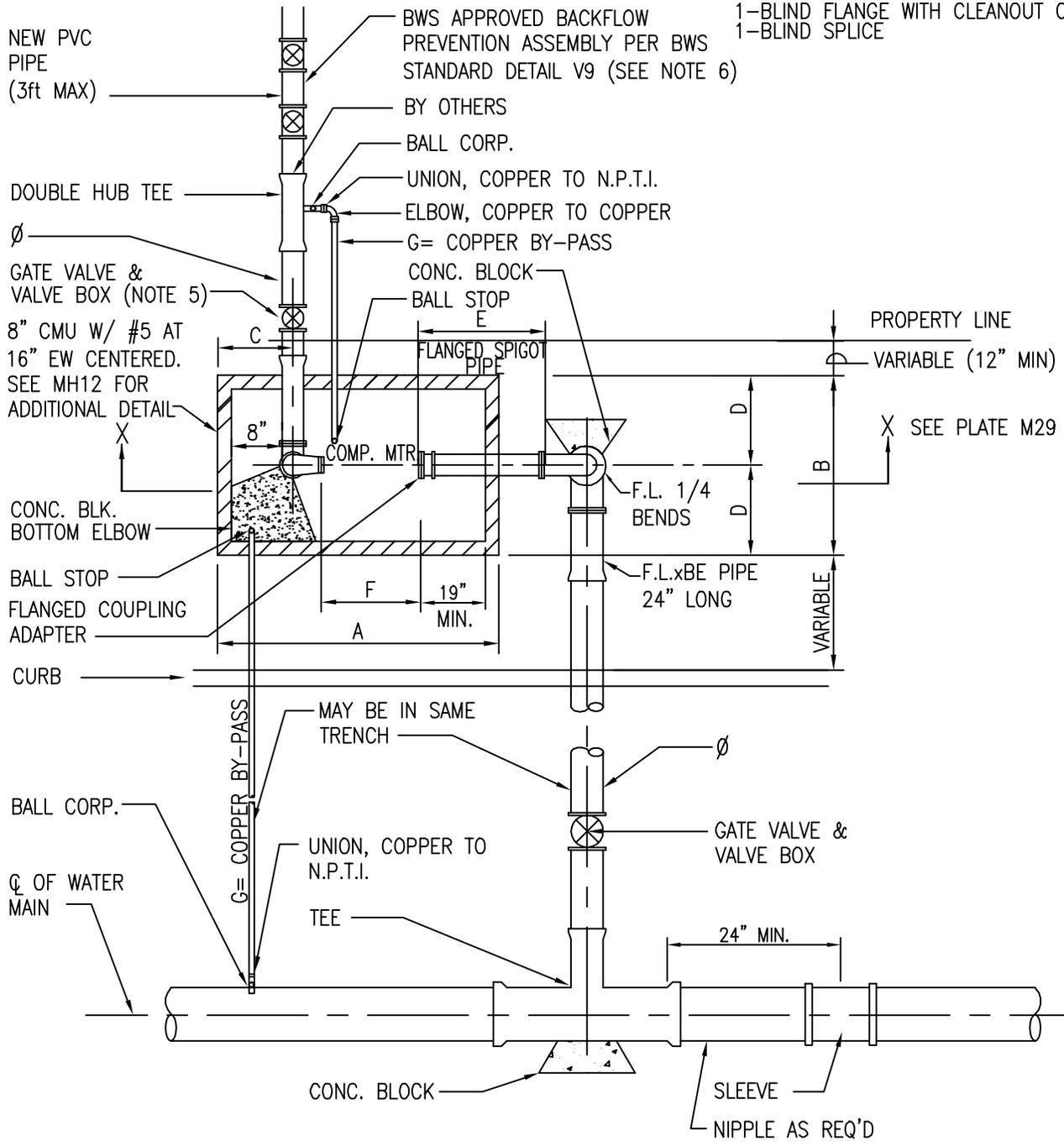


2002
REVISION

OAHU	<b>METER BOX DETAIL</b> FOR COMPOUND, DC AND TURBINE METERS SCALE: NTS	STANDARD DETAILS	<b>M26</b>
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MATERIALS FOR TESTING AS REQ'D

- 1-BLIND FLANGE WITH CLEANOUT OR
- 1-BLIND SPLICE



MATERIALS FOR TESTING AS REQ'D

- 1-SLEEVE
- 1-CAP WITH CLEANOUT
- 8-L.F. CONNECTING PIPE

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
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OAHU	<b>SINGLE COMPOUND METER INSTALLATION PLAN</b> SCALE: NTS	STANDARD DETAILS	<b>M27</b>
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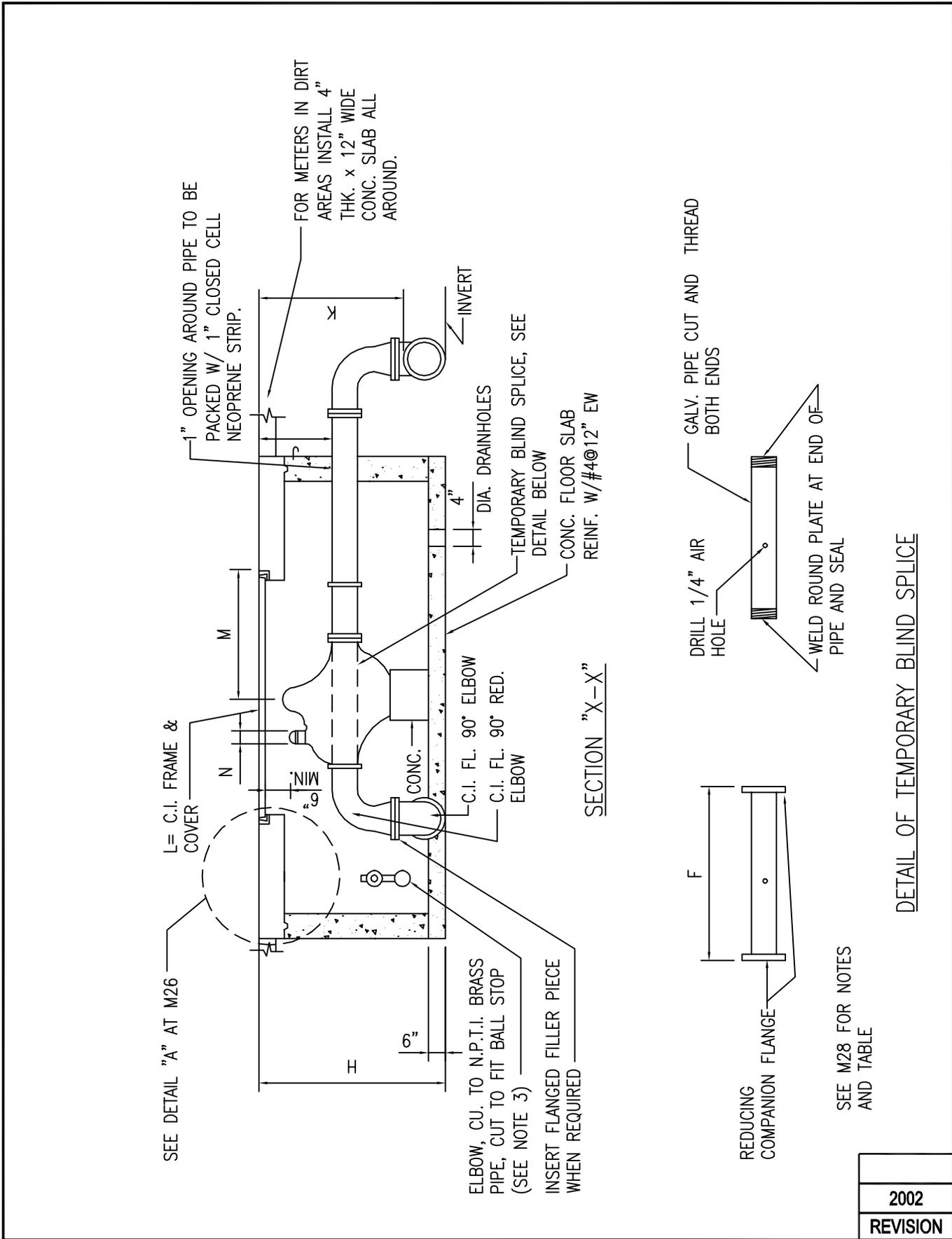
**NOTES:**

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"

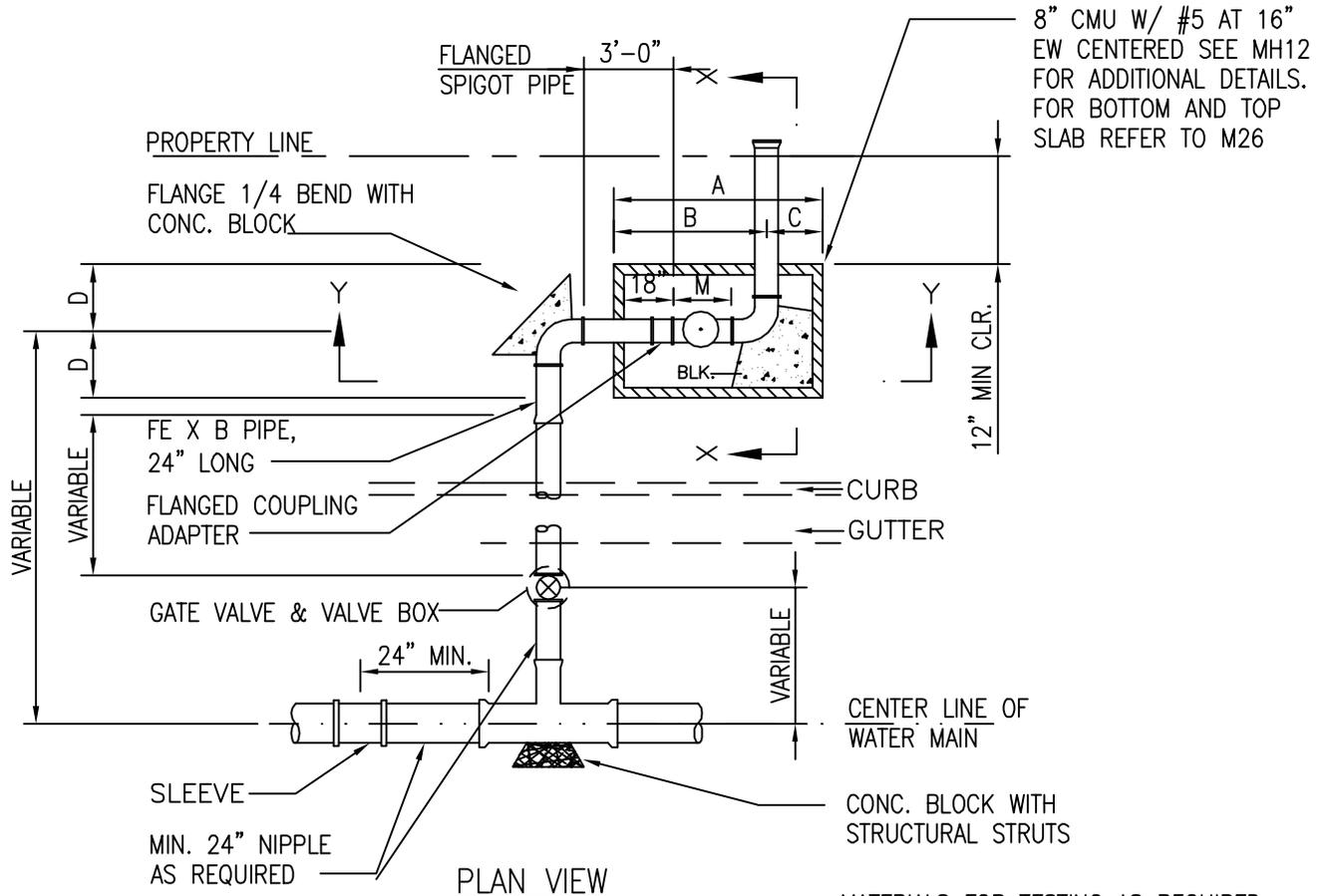
2002
REVISION

OAHU	<b>SINGLE COMPOUND METER</b> <b>INSTALLATION-NOTES AND TABLES</b> SCALE: NTS	STANDARD DETAILS	<b>M28</b>
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OAHU	<b>SINGLE COMPOUND METER</b> <b>INSTALLATION-SECTION</b> SCALE: NTS	STANDARD DETAILS	2002
			REVISION
			M29

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



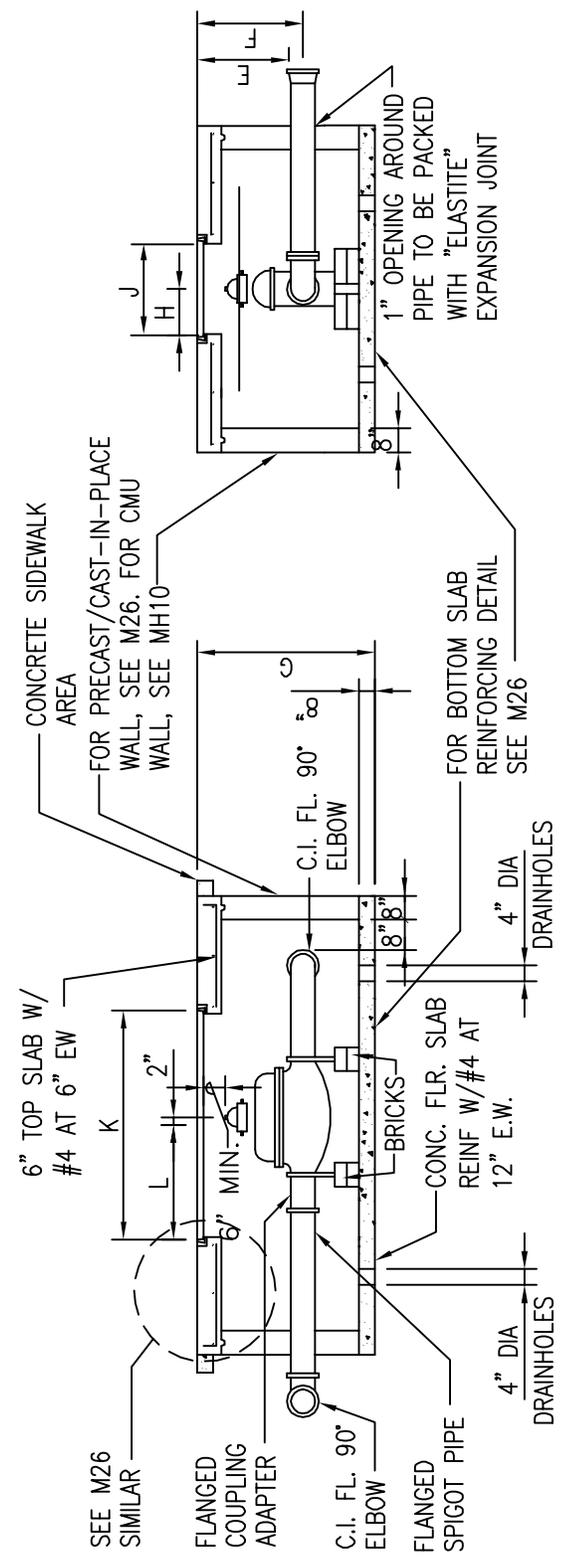
MATERIALS FOR TESTING AS REQUIRED:  
 1- SLEEVE  
 1- CAP WITH CLEANOUT  
 8 L.F. CONNECTING PIPE

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	<b>SINGLE DETECTOR CHECK METER INSTALLATION</b> SCALE: NTS	STANDARD DETAILS	<b>M30</b>
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SECTION "X-X"

SECTION "Y-Y"

METER	A SIZE	B	C	D	E (MIN.)	F (MIN.)	G (MIN.)	H	CI F & C		L	M
									J	K		
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" x 5/8"	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.

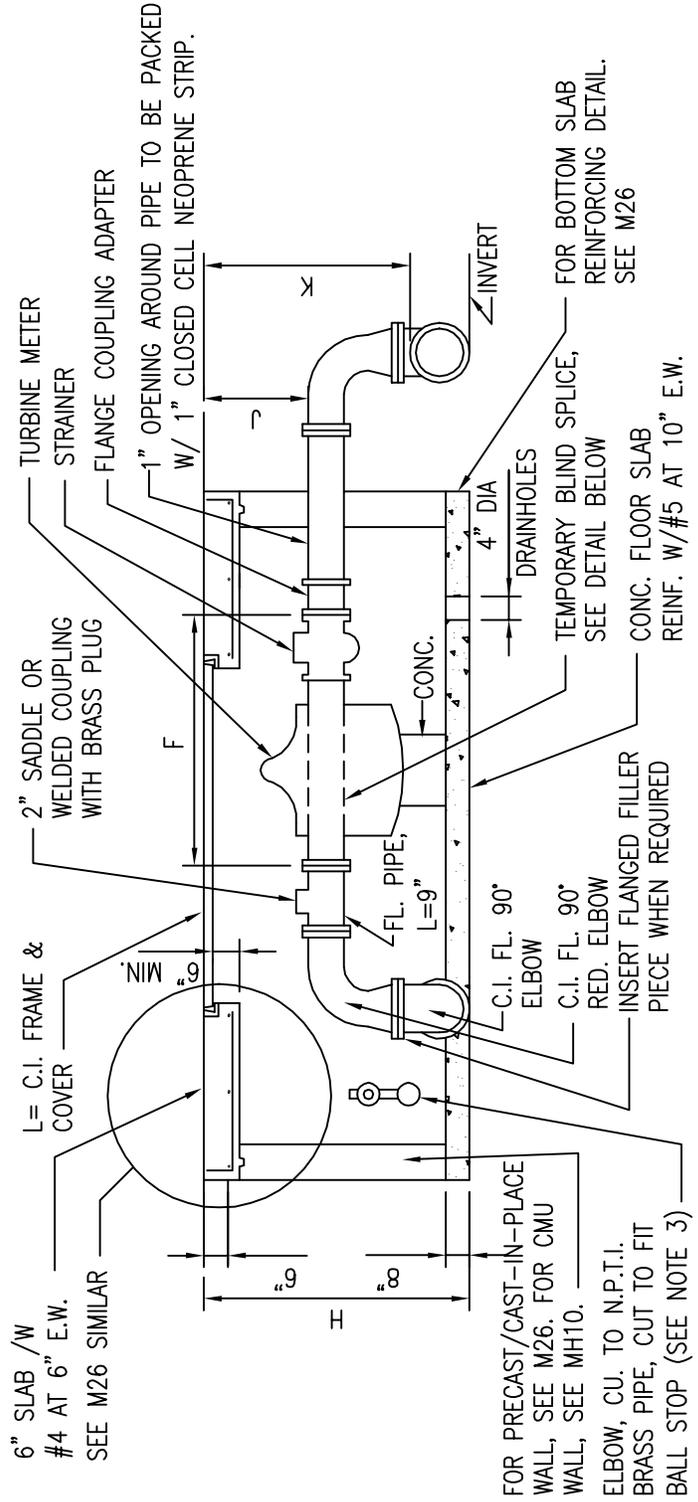
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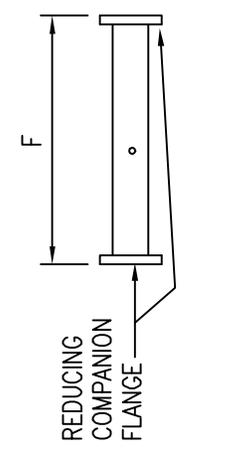
**SINGLE DETECTOR  
CHECK METER INSTALLATION**  
SCALE: NTS

STANDARD  
DETAILS

M31



SECTION "X-X"



SEE PLATE M33 FOR NOTES AND TABLE

DETAIL OF TEMPORARY BLIND SPLICE

OAHU

**TURBINE METER  
INSTALLATION-SECTION**  
SCALE: NTS

STANDARD  
DETAILS

2002
REVISION
M32

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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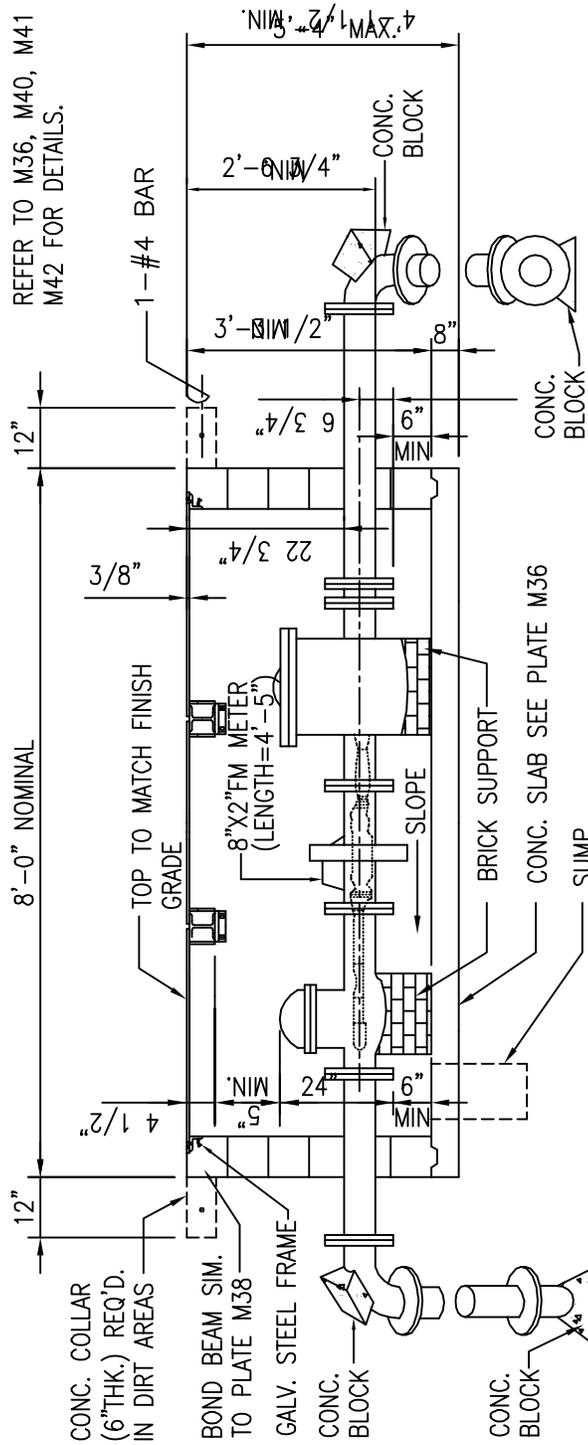
OAHU	<b>TURBINE METER</b> <b>INSTALLATION-NOTES AND TABLES</b> SCALE: NTS	STANDARD DETAILS	M33
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NOTES FOR CMU WALL MANHOLE

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.

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



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

SECTION "A1-A1"

CMU WALLS

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OAHU

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

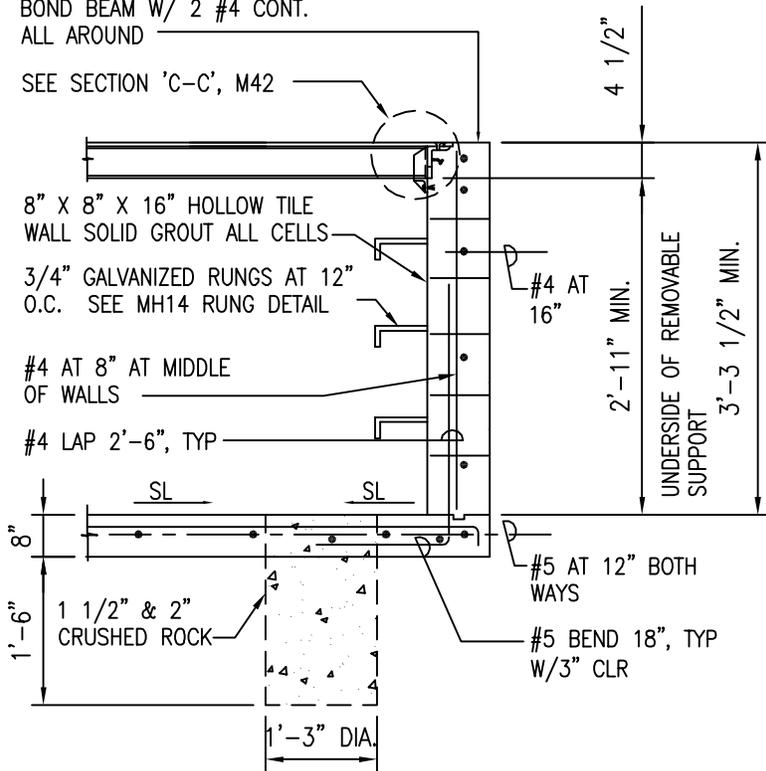
SCALE: NTS

STANDARD  
DETAILS

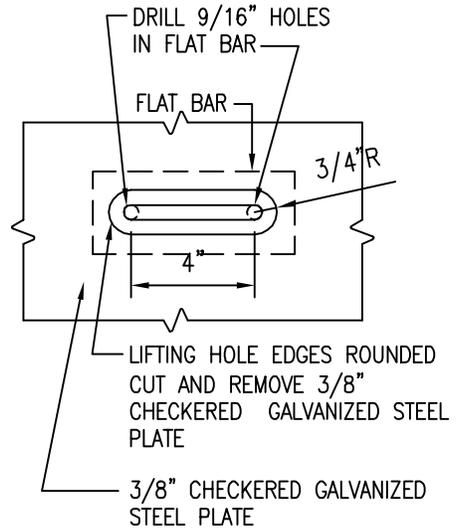
M35

BOND BEAM W/ 2 #4 CONT.  
ALL AROUND

SEE SECTION 'C-C', M42

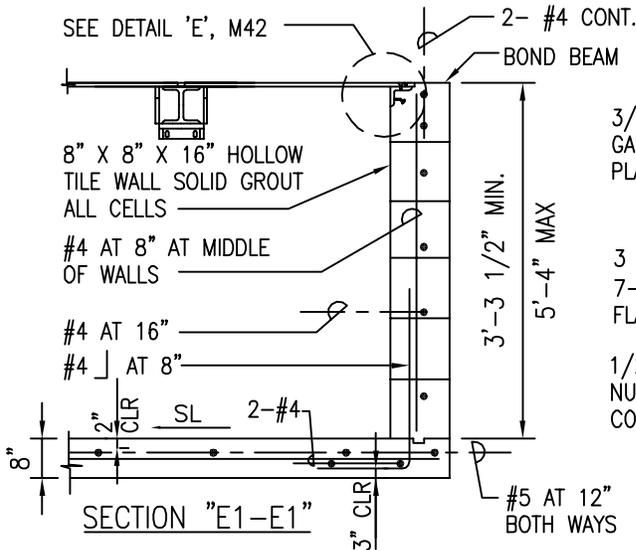


SECTION "B1-B1"



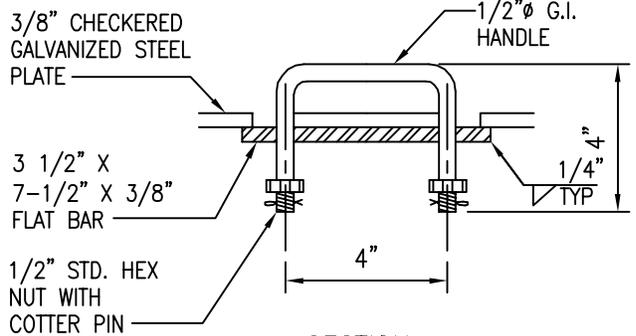
PLAN

SEE DETAIL 'E', M42



SECTION "E1-E1"

CMU WALLS



SECTION

HANDLE DETAIL

2002  
REVISION

OAHU

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

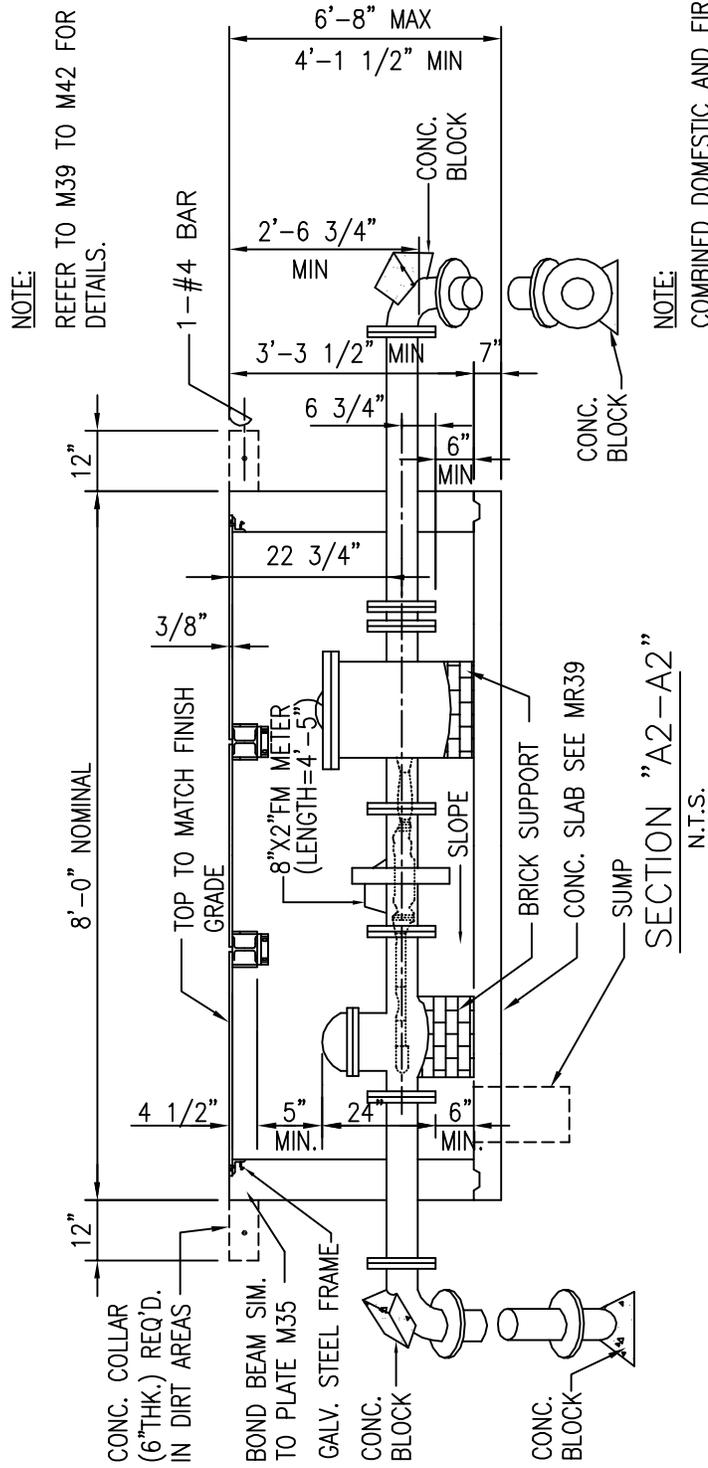
STANDARD  
DETAILS

M36



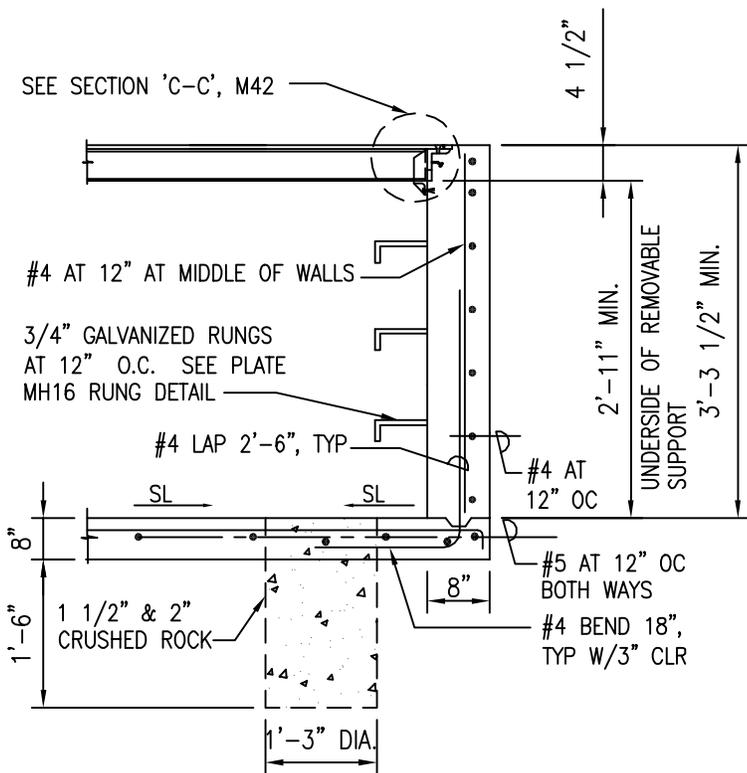
NOTES FOR PRECAST/CAST-IN-PLACE WALL MANHOLE

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.

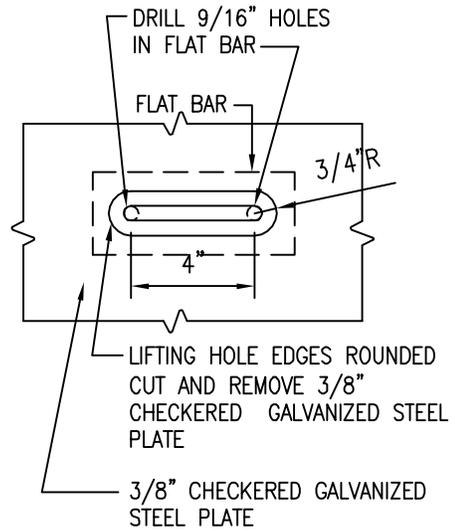


PRECAST/CAST IN PLACE WALLS

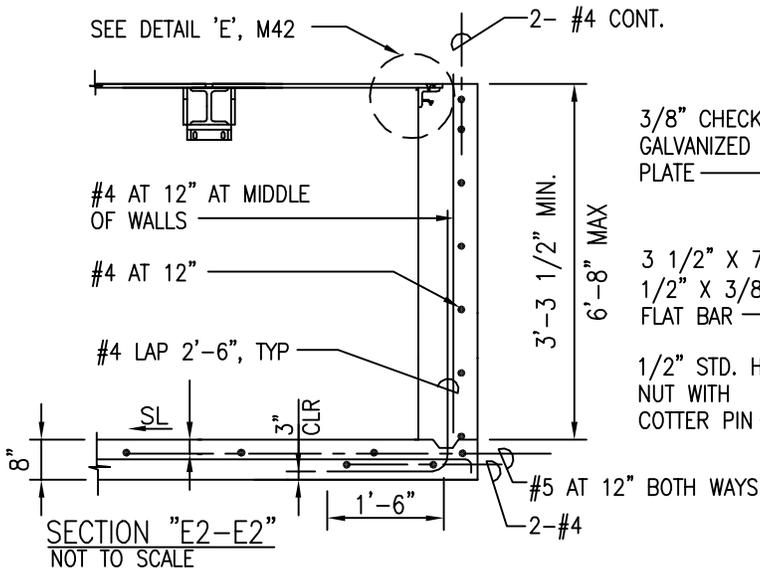
OAHU	8" X 2" FM METER & BOX LAYOUT FIRE AND DOMESTIC USES - PRECAST / CAST-IN-PLACE WALLS	STANDARD DETAILS	2002
			REVISION
	SCALE: NTS		M38



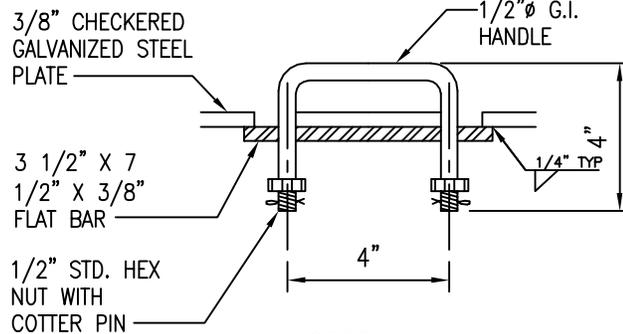
SECTION "B2-B2"  
NOT TO SCALE



PLAN  
NOT TO SCALE



SECTION "E2-E2"  
NOT TO SCALE



SECTION

HANDLE DETAIL  
NOT TO SCALE

2002
REVISION

OAHU	<b>8" X 2" FM METER &amp; BOX</b> BOX DETAILS-PRECAST / CAST-IN-PLACE WALLS SCALE: NTS	STANDARD DETAILS	<b>M39</b>
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3/4" RAISED SHARP-FACED LETTERS ON CAST IRON INSERT

FLAME CUT OPENING IN 3/8" CHECKERED PLATE FOR INSERTS BELOW

3/8" Ø X 3/4" S.S. CAP SCREWS, 8 REQUIRED PER ASSEMBLY-DRILL & TAP CAST IRON INSERT AND FLAT PLATE (PER INSERT)

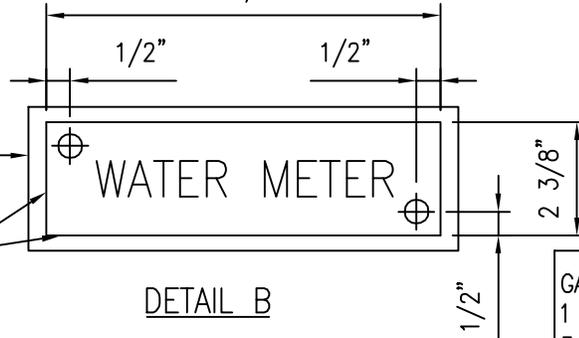
1/8" @ 4 TYP

3" X 9" X 3/8" FLAT BAR

8 1/4"

3" X 9" X 3/8" FLAT BAR

CUT OUT IN PLATE COVER



DETAIL B

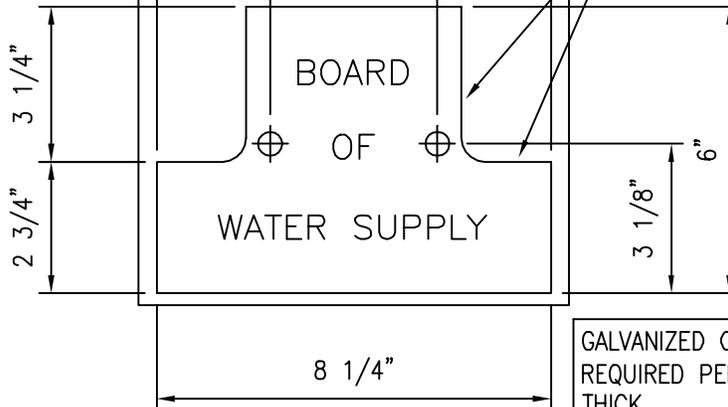
GALVANIZED CAST IRON, 1 REQUIRED PER UNIT, 3/8" THICK

6 1/2" X 9" X 3/8" STEEL PLATE WELDED TO BOTTOM OF COVER

1 7/8" 4 1/2" 1 7/8"

1/2"

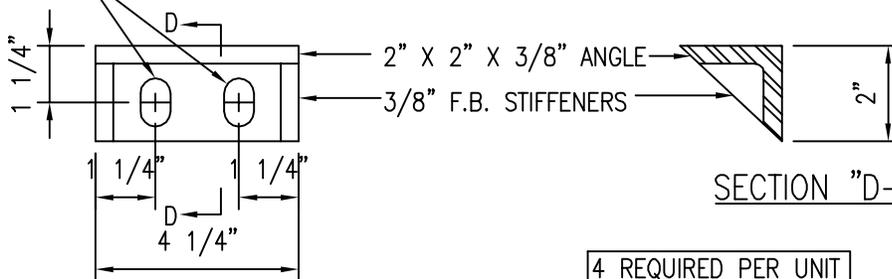
CUT OUT IN PLATE COVER



DETAIL C

GALVANIZED CAST IRON, 3 REQUIRED PER UNIT, 3/8" THICK

(2) 5/8" X 1" SLOTTED HOLES FOR 1/2" EXPANSION ANCHORS WITH GALVANIZED HEXAGON HEAD BOLTS



SECTION "D-D"

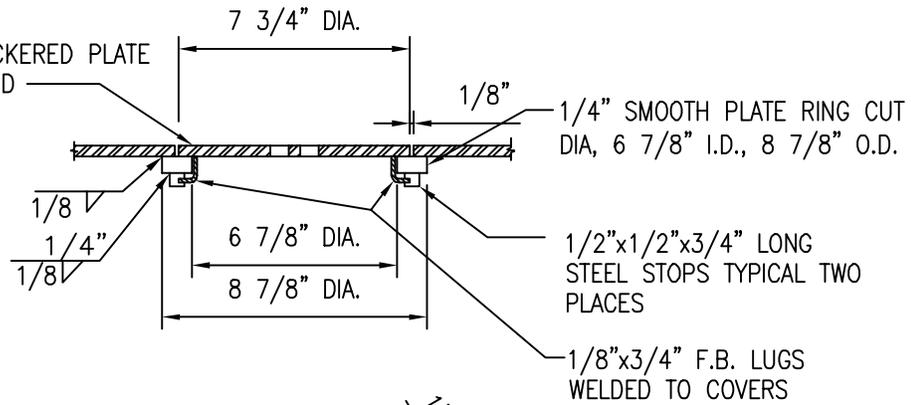
4 REQUIRED PER UNIT

CLIP DETAIL

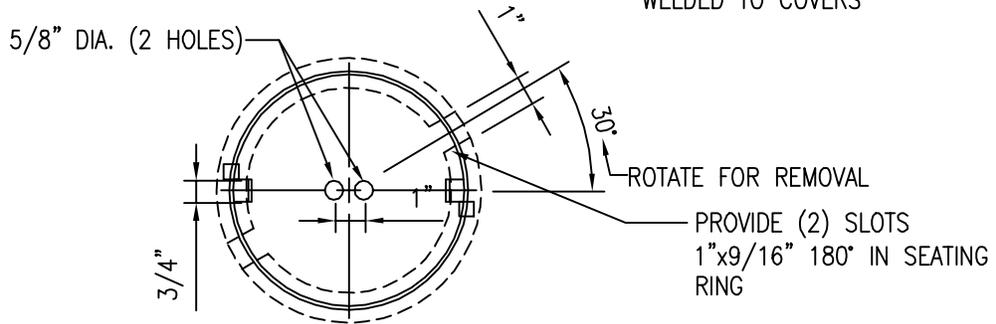
2002
REVISION

OAHU	<p><b>8" X 2" FM METER &amp; BOX</b></p> <p>IDENTIFICATION INSERTS AND CLIP DETAILS</p> <p>SCALE: NTS</p>	STANDARD DETAILS	M41
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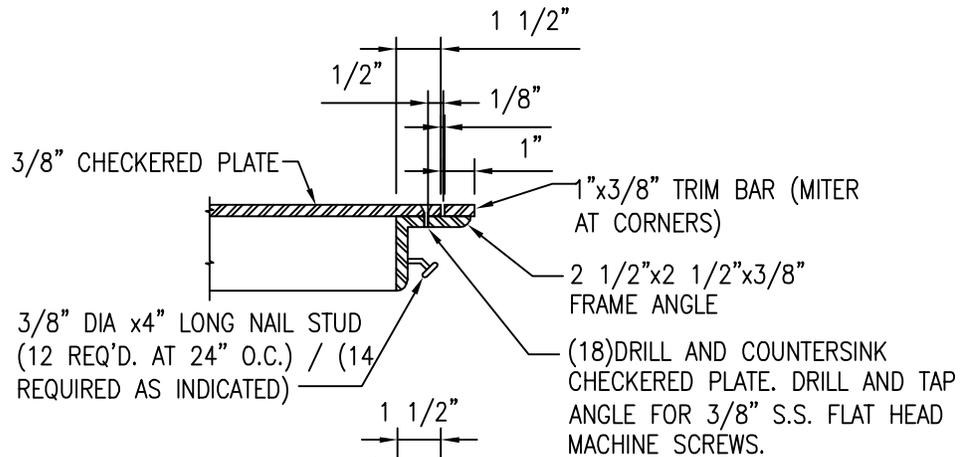
SECTION OF  
DETAIL A



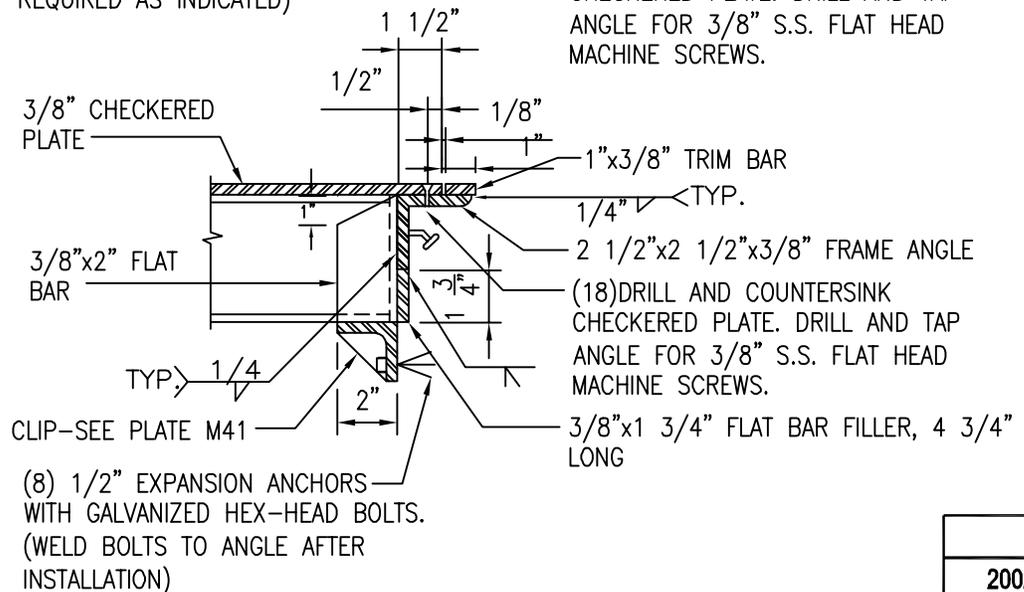
DETAIL A  
PLAN



DETAIL E

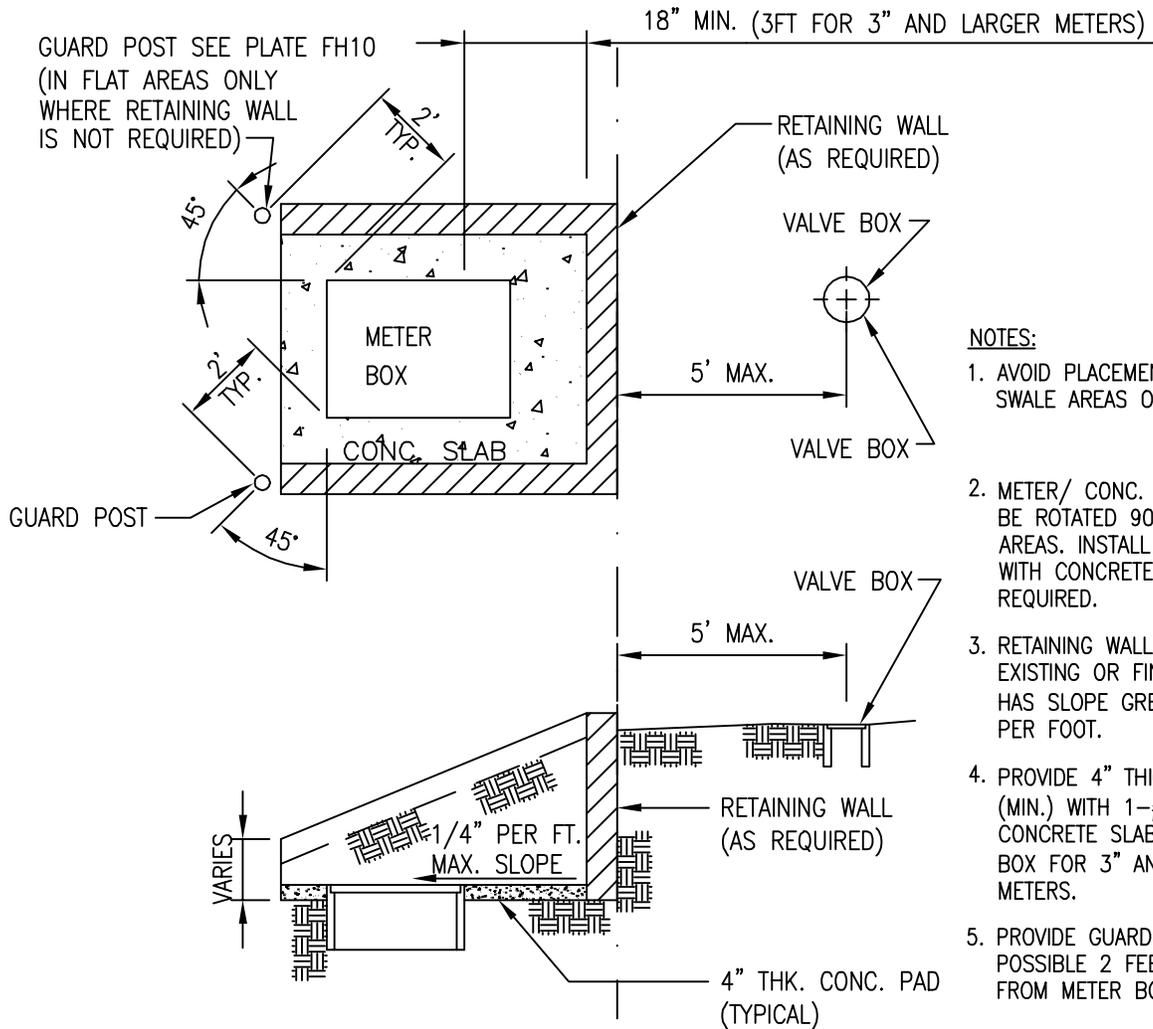


SECTION "C-C"



2002
REVISION

OAHU	<b>8" X 2" FM METER &amp; BOX</b> READING LID & FRAME DETAILS SCALE: NTS	STANDARD DETAILS	<b>M42</b>
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**NOTES:**

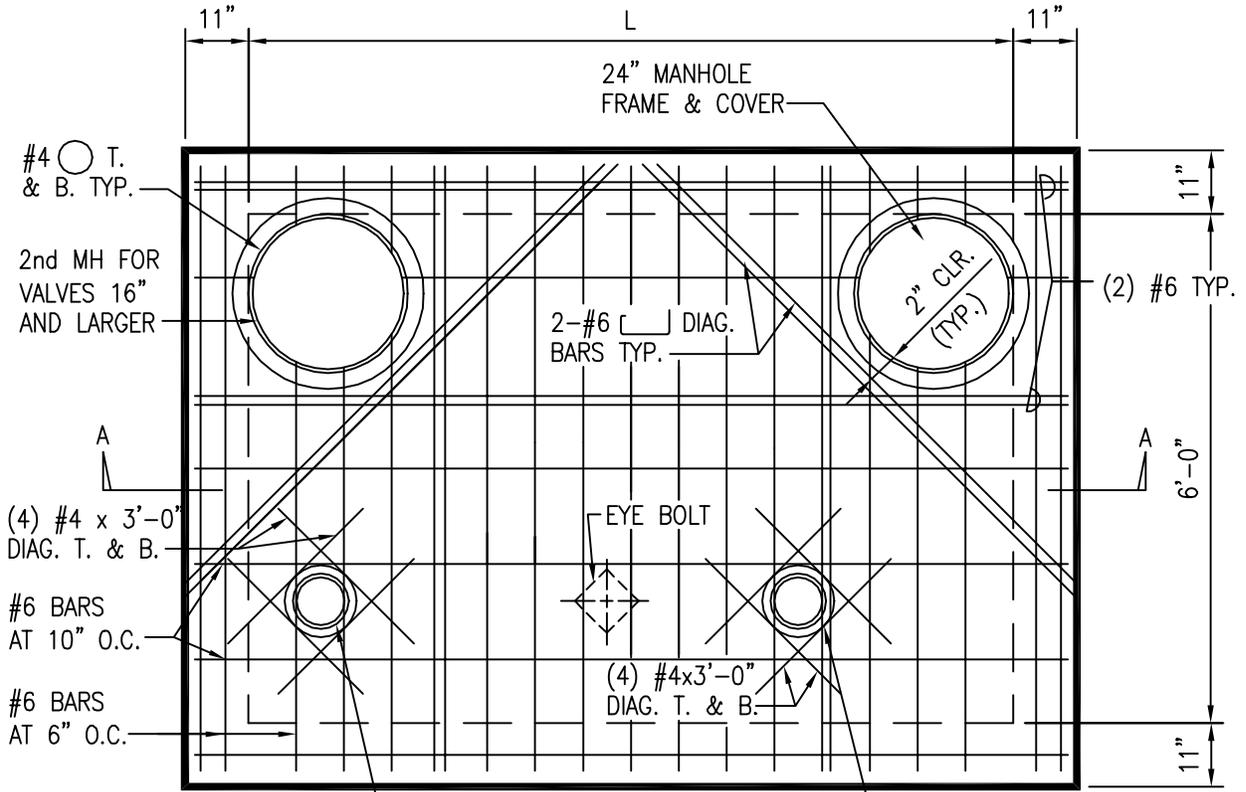
1. AVOID PLACEMENT OF METERS IN SWALE AREAS OR LOW POINTS.
2. METER/ CONC. SLAB DETAIL MAY BE ROTATED 90° TO FIT IN TIGHT AREAS. INSTALL FL x BELL PIECE WITH CONCRETE BEAM, AS REQUIRED.
3. RETAINING WALL REQUIRED IF EXISTING OR FINISH GROUND HAS SLOPE GREATER THAN 1/4" PER FOOT.
4. PROVIDE 4" THICK BY 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

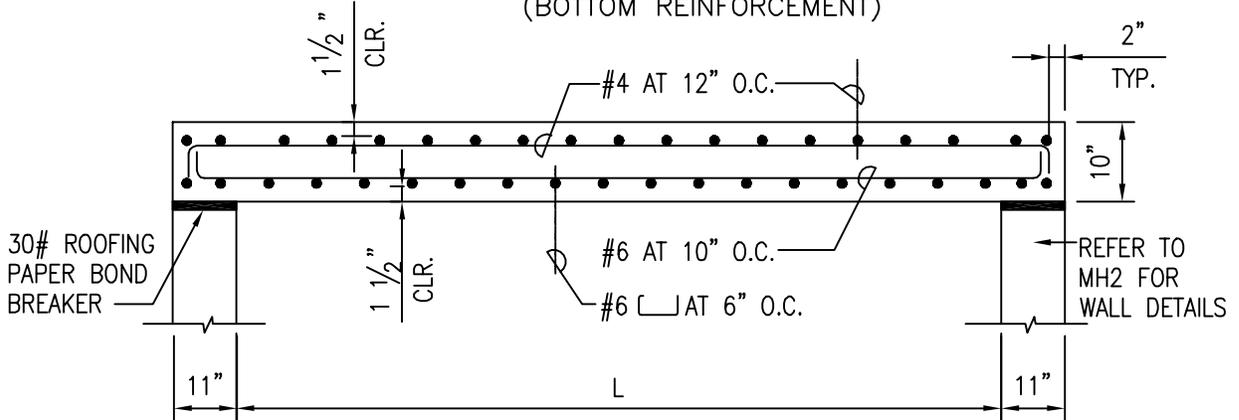
OAHU	<b>WATER METER BOX FOR NON-SIDEWALK AREAS</b> SCALE: NTS	STANDARD DETAILS	<b>M43</b>
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2" CLR (TYP.) BETWEEN MANHOLE COVER AND REBARS



**NOTE:**  
 LOCATION OF EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE  
 (CENTERED ABOVE THE CENTERLINE OF THE OPERATING NUT ±1-INCH)

PLAN OF TOP SLAB  
 (BOTTOM REINFORCEMENT)



SECTION A-A

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	STANDARD DETAILS	MH1
SCALE: NTS			



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

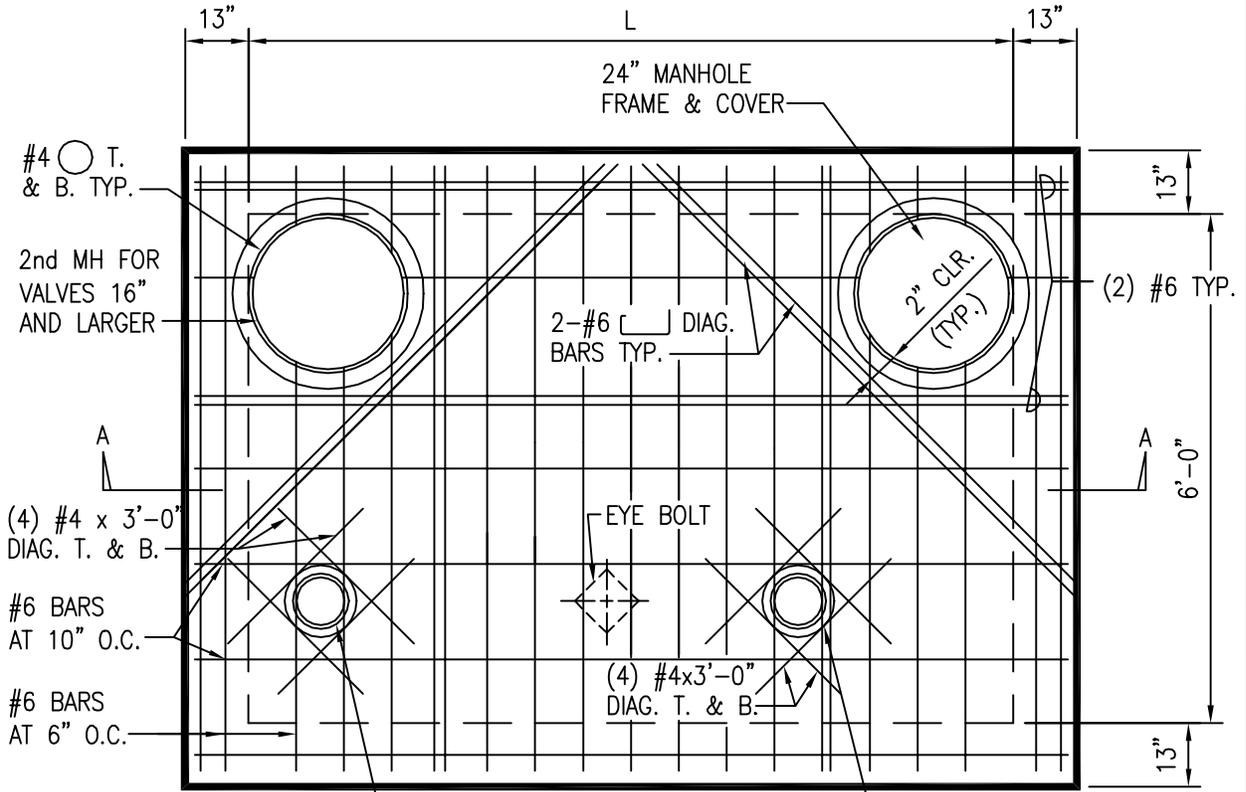
1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2. REFER TO PLATES MH12, MH13, MH14, MH15, MH16, MH17 AND V3 FOR ADDITIONAL DETAILS.
3. REFER TO SECTION 302.16 AND TABLE 300-5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.
4. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET 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

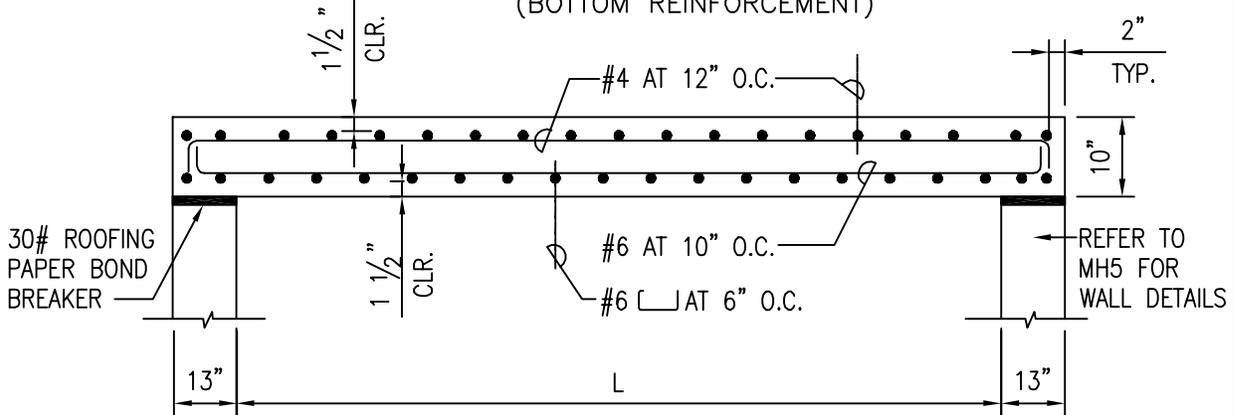
			2002
			REVISION
KAUAI OAHU	TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, CAST-IN-PLACE AND PRECAST WALL NOTES  SCALE: NTS	STANDARD DETAILS	MH3

2" CLR (TYP.) BETWEEN MANHOLE COVER AND REBARS



**NOTE:**  
 LOCATION OF EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE  
 (CENTERED ABOVE THE CENTERLINE OF THE OPERATING NUT ±1-INCH)

**PLAN OF TOP SLAB  
 (BOTTOM REINFORCEMENT)**



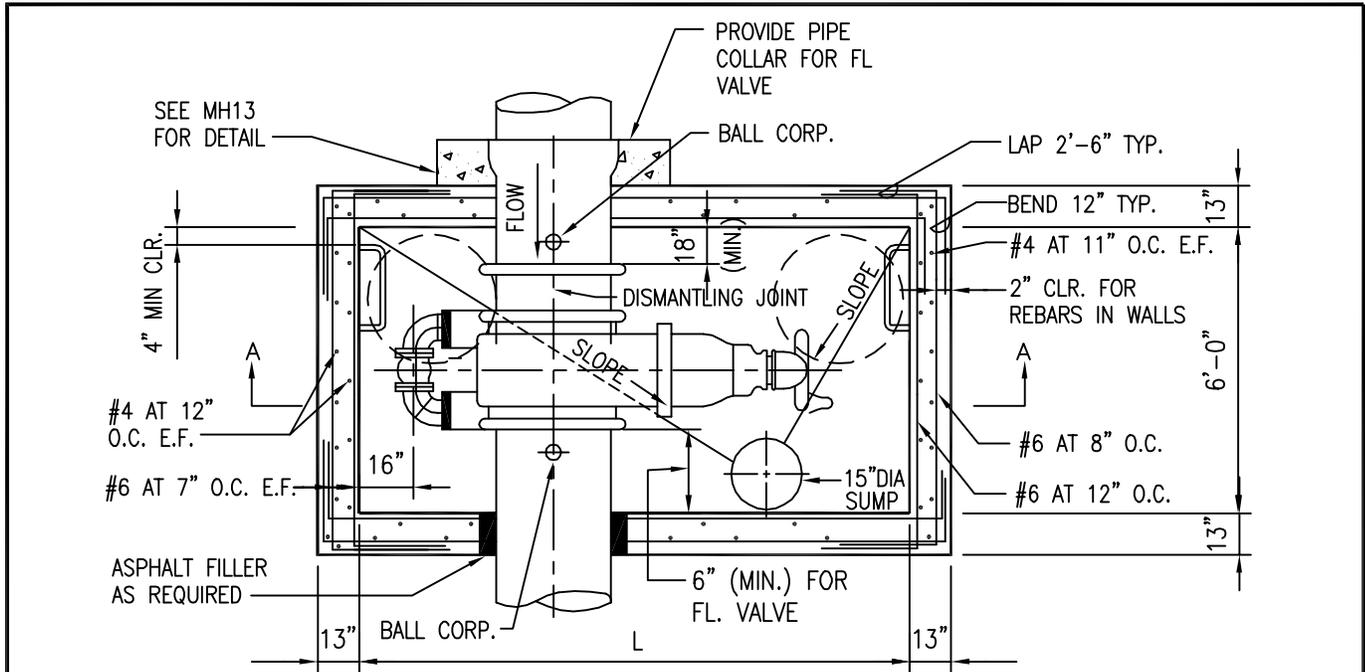
**SECTION A-A**

**PRECAST TOP SLAB**

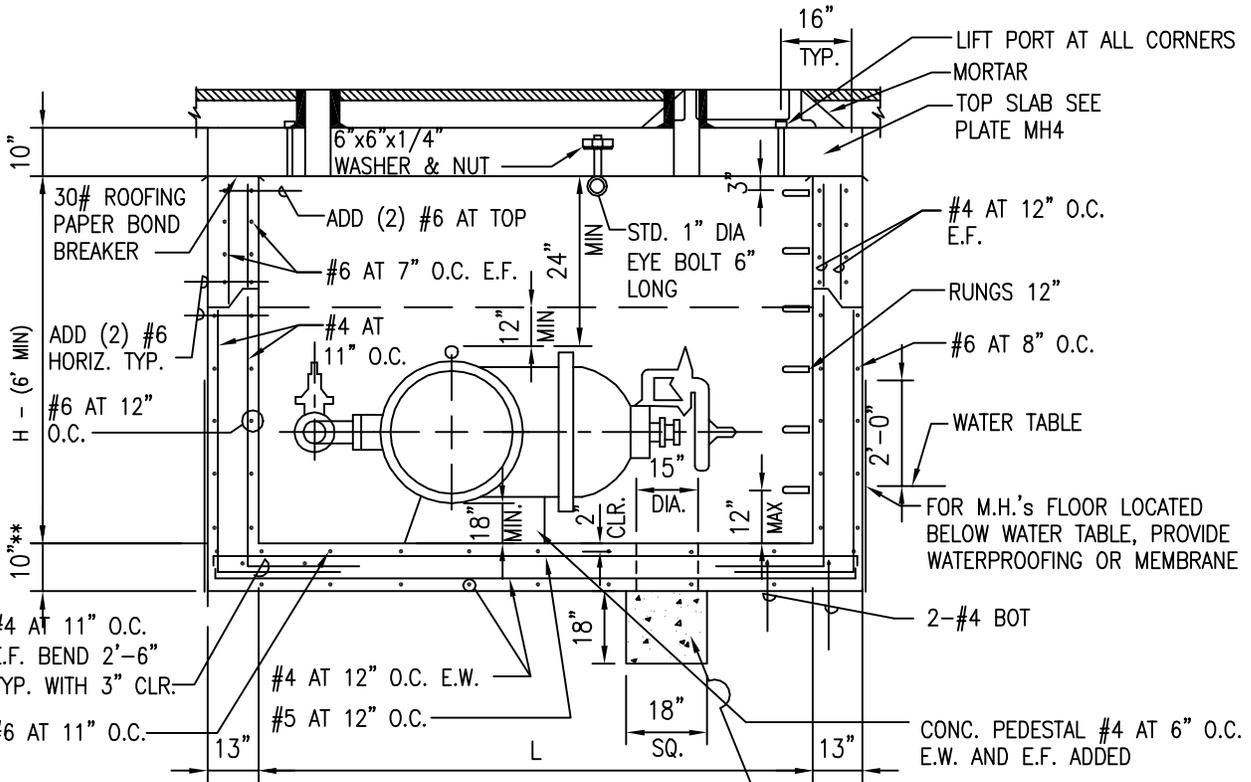
SEE PLATE MH3  
 FOR NOTES & TABLE

2002
REVISION

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



PLAN - SECTION



SECTION A-A

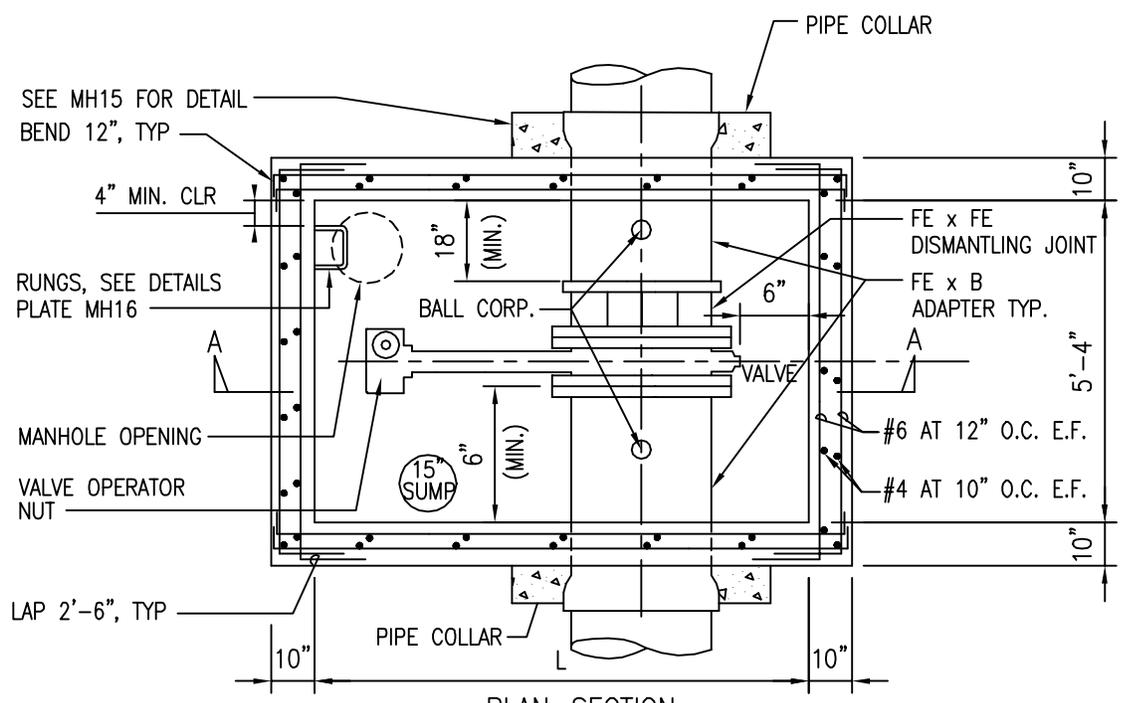
PRECAST WALL

\* SEE PLATE MH12 FOR WATERPROOFED SUMP

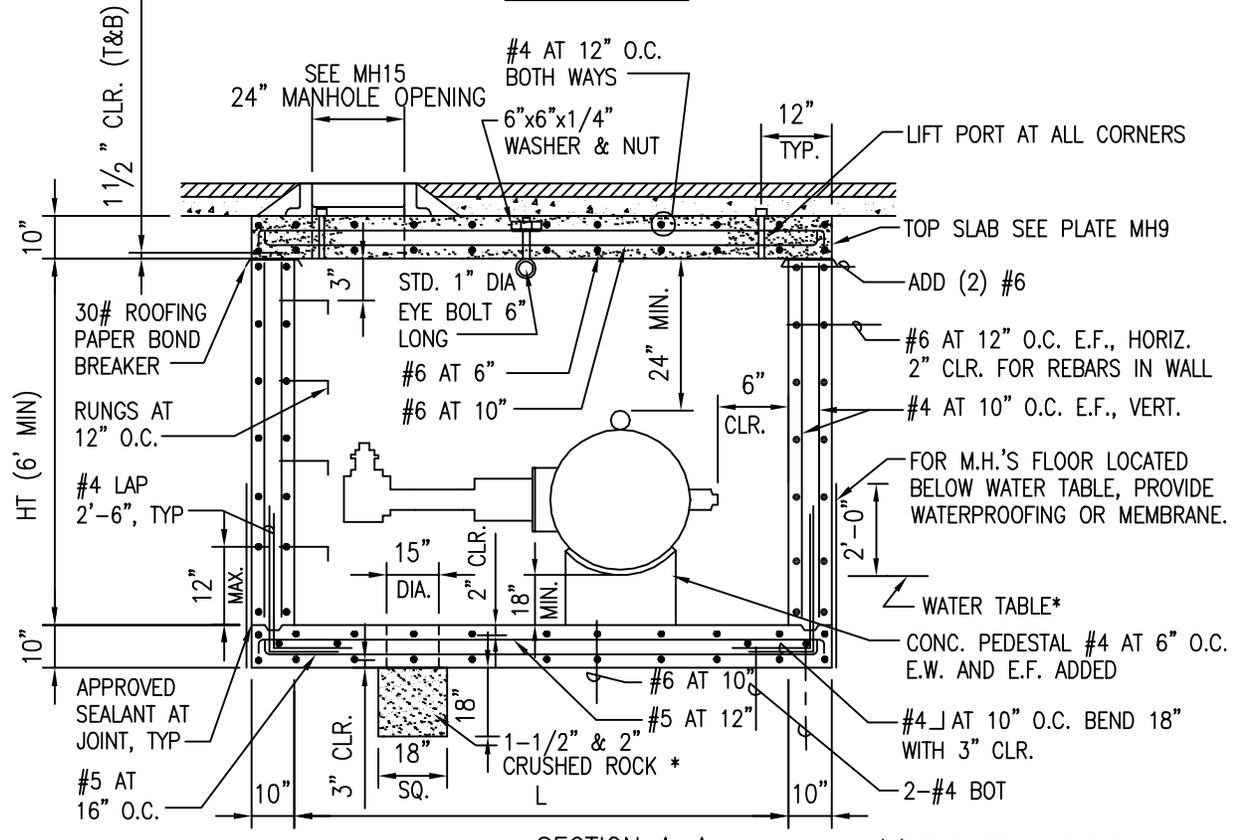
\*\* 14" FOR WATERPROOF CONDITION

2002
REVISION

KAUAI OAHU	<b>TYPE "A" MANHOLE (TRAFFIC)</b> FOR BEVEL GEARED GATE VALVES, PRECAST SCALE: NTS	STANDARD DETAILS	<b>MH5</b>
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PLAN-SECTION



SECTION A-A  
CAST-IN-PLACE WALL

\*(SEE PLATE MH15 FOR WATERPROOFED SUMP)

SEE PLATE MH7 FOR NOTES AND TABLE

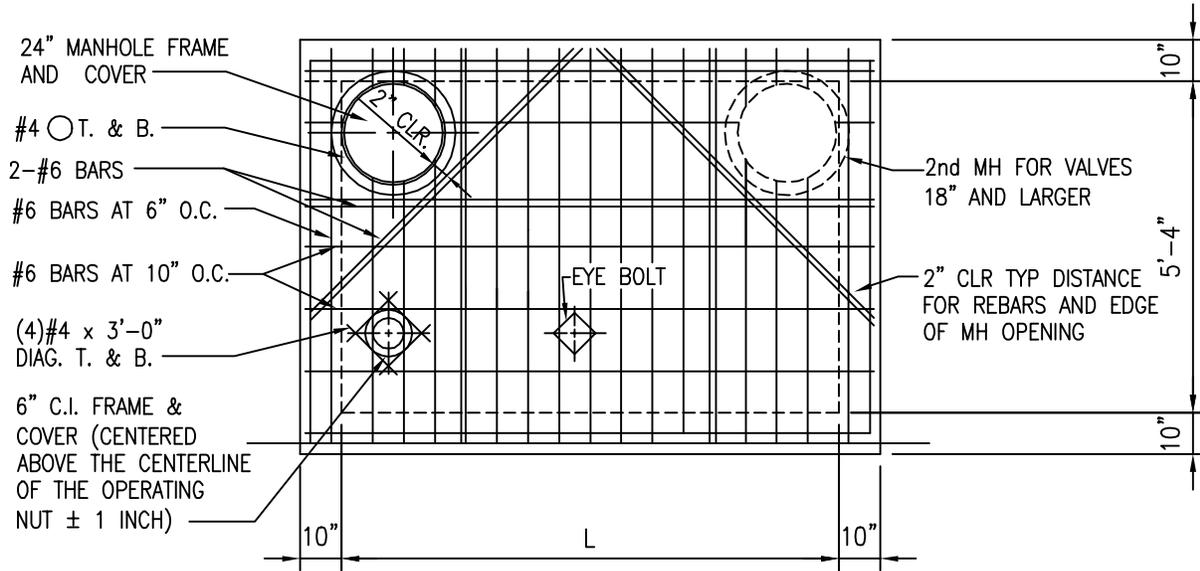
2002
REVISION

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**

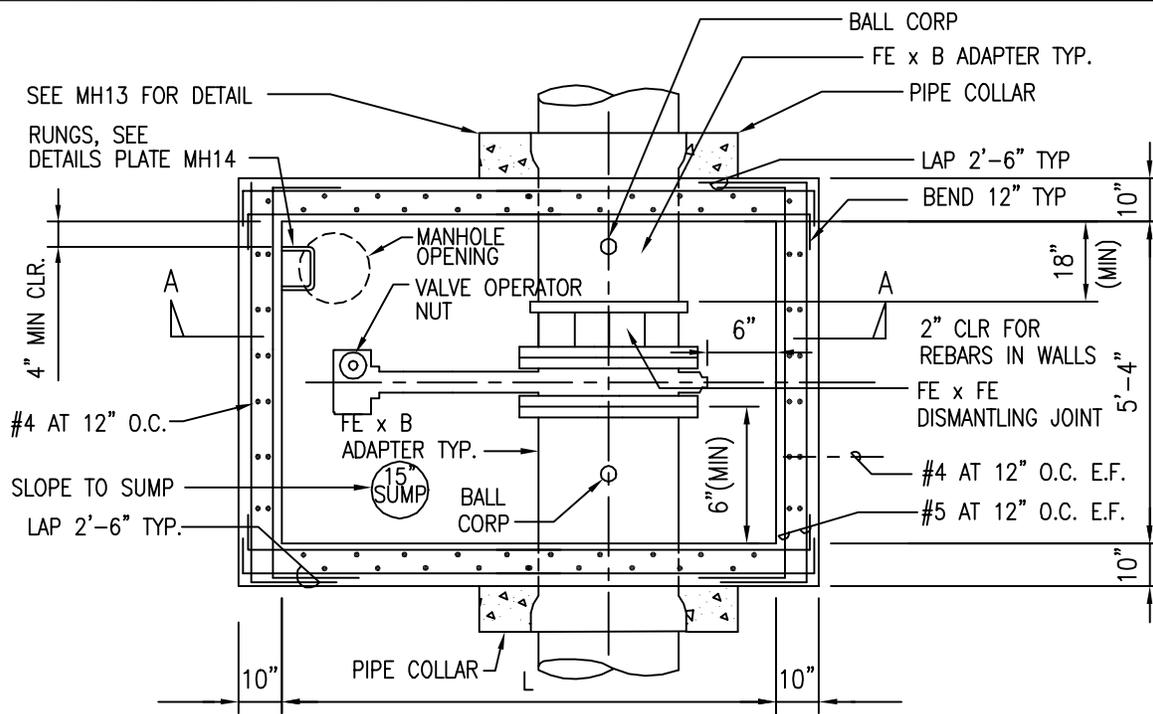
**NOTES: FOR CAST-IN-PLACE WALL MH**

- 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.

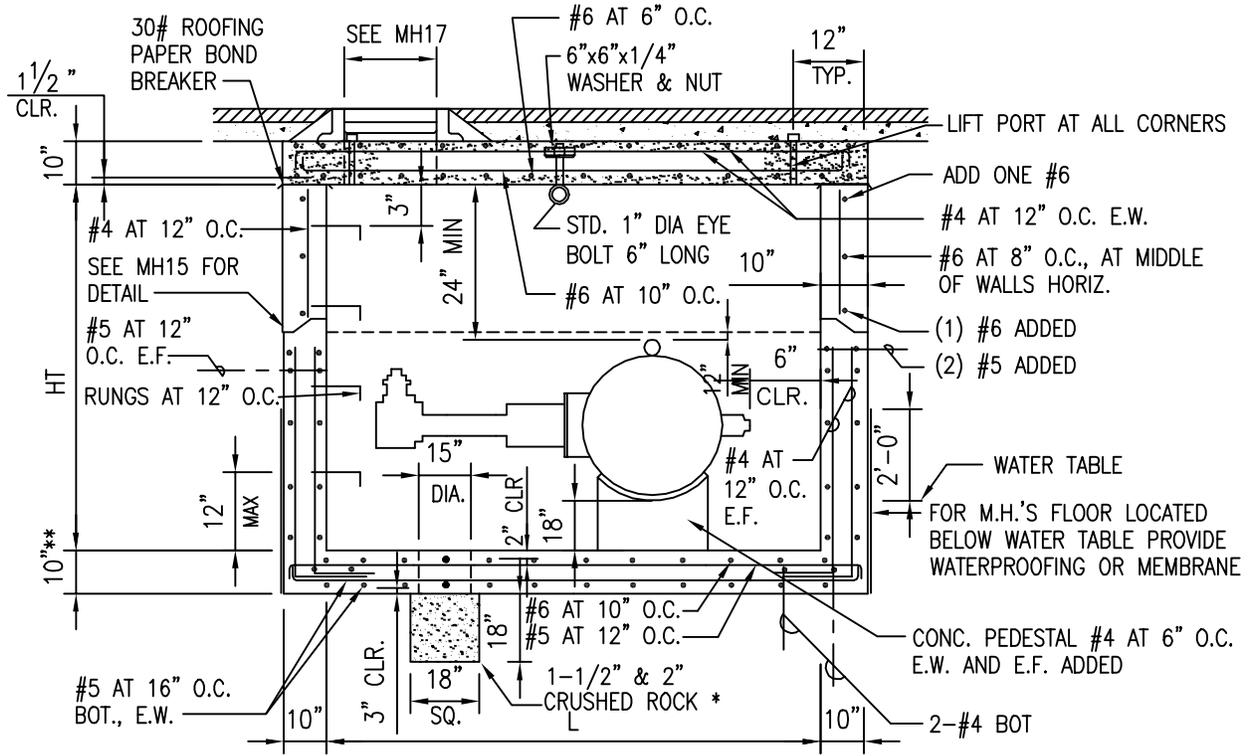
SIZE VALVE	L	HT (MIN)	HT (MAX)
12" & 16"	5'-4"	6'-0"	12'-4"
18" & 20"	6'-0"	6'-0"	12'-0"
24"	6'-8"	6'-0"	12'-0"
30"	7'-4"	6'-0"	12'-0"
36"	8'-0"	6'-0"	12'-0"
42"	8'-8"	6'-0"	12'-0"

2002
REVISION

KAUAI OAHU MAUI	<b>TYPE "A" MANHOLE (TRAFFIC)</b> FOR BUTTERFLY VALVES, CAST-IN-PLACE SCALE: NTS	STANDARD DETAILS	<b>MH7</b>
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PLAN-SECTION

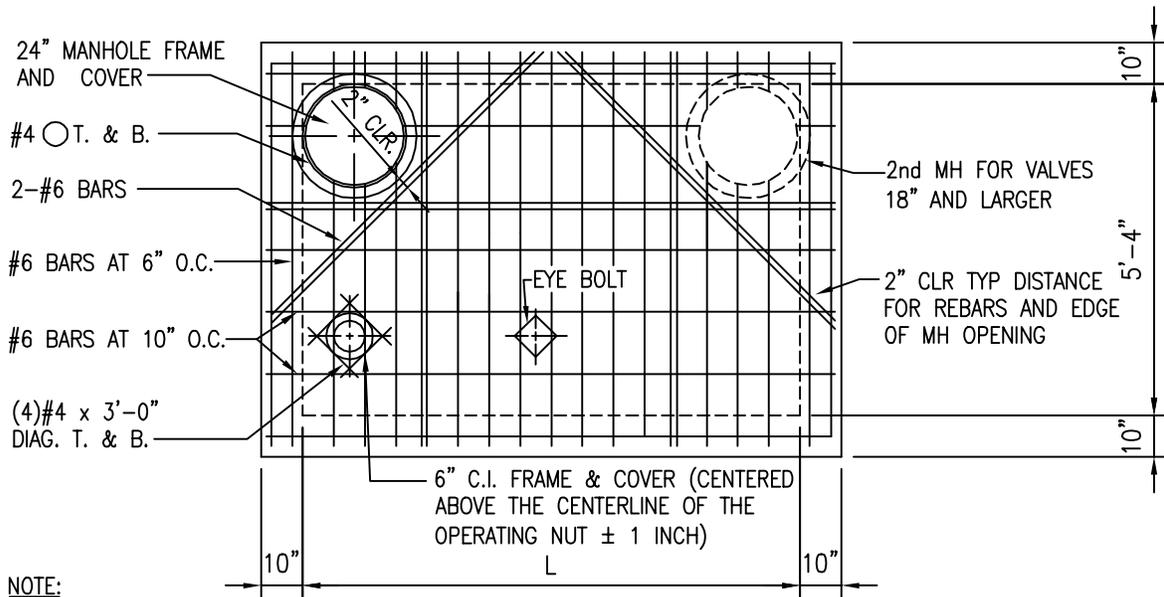


SECTION A-A  
PRECAST WALL

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

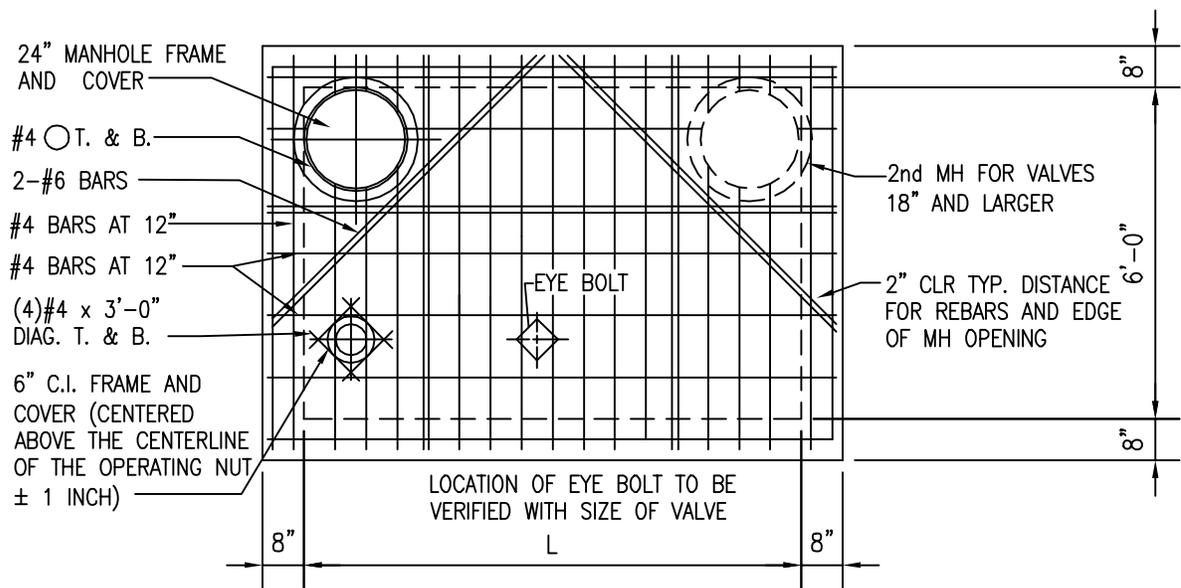
- 1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
- 2 REFER TO SECTION 302.16 AND TABLE 300-5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.
- 3 REFER TO PLATES MH12, MH13, MH14, MH15, MH17 AND V3 FOR ADDITIONAL DETAILS.
- 4 FOR OAHU AND KAUAI, PLASTIC RUNGS MAY BE USED. 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	<b>TYPE "A" MANHOLE (TRAFFIC)</b> <b>FOR BUTTERFLY VALVES, PRECAST</b> SCALE: NTS	STANDARD DETAILS	MH9
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PLAN OF TOP SLAB  
 (BOTTOM REINFORCEMENT)  
PRECAST TOP SLAB FOR  
CMU WALL  
 (NON-TRAFFIC)

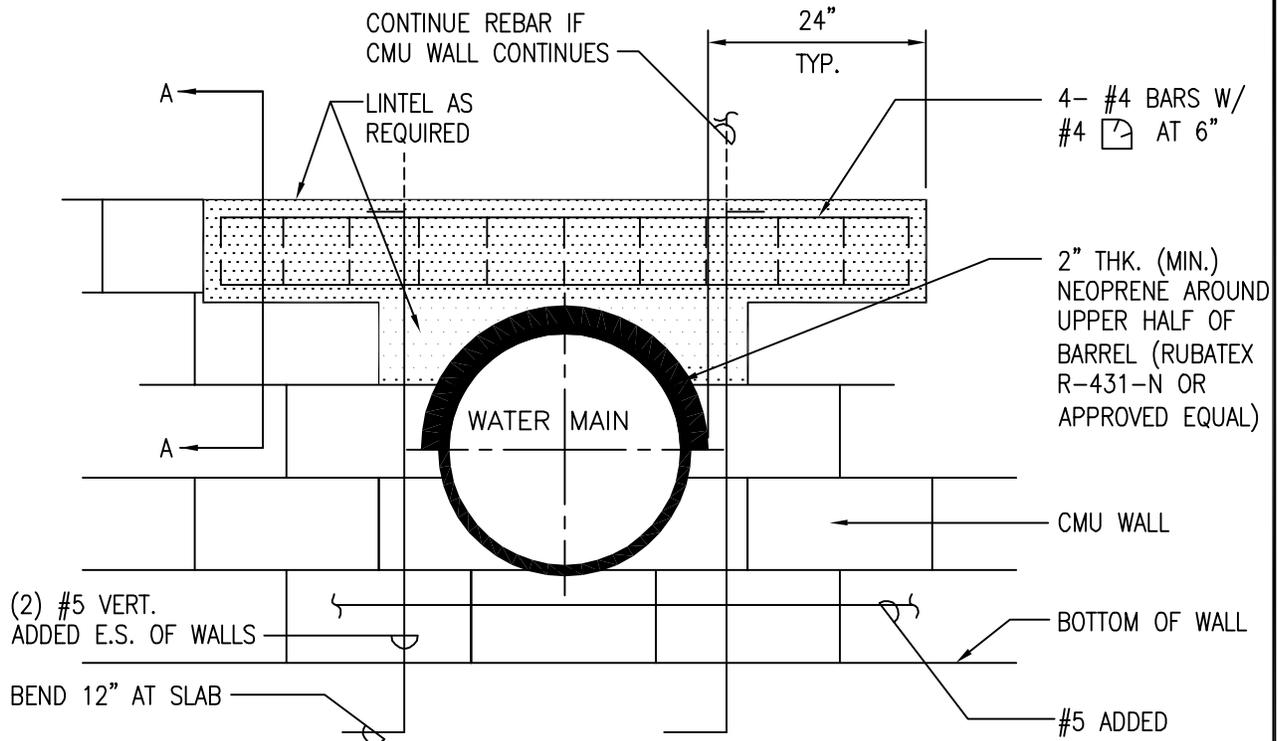
NOTES: FOR CMU WALL MH

- 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-TRAFFIC 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.

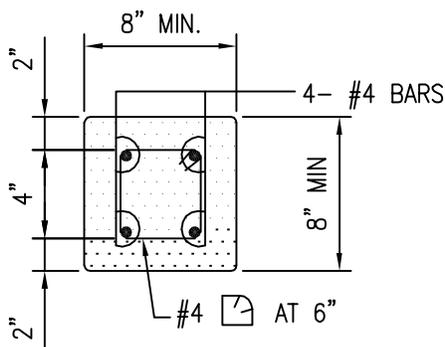
2002
REVISION

MAUI	<b>TYPE "A-1" MANHOLE (NON-TRAFFIC)</b> <b>FOR BUTTERFLY VALVES, CMU</b> SCALE: NTS	STANDARD DETAILS	<b>MH11</b>
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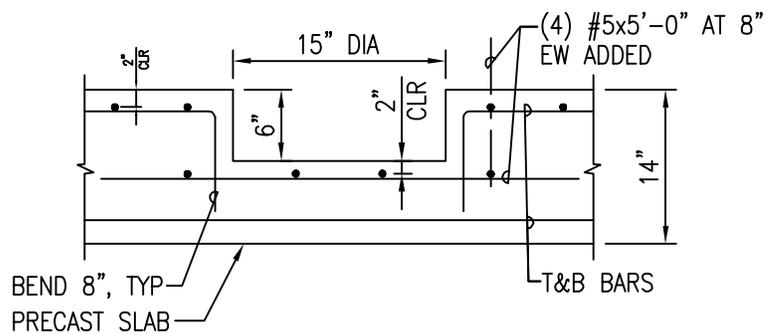


LONGITUDINAL SECTION THRU LINTEL

NOTE:  
CONCRETE SHALL BE DWS 3500



SECTION THRU LINTEL(A-A)



CLOSED PRECAST SUMP  
FOR HIGH WATER TABLE  
CONDITION

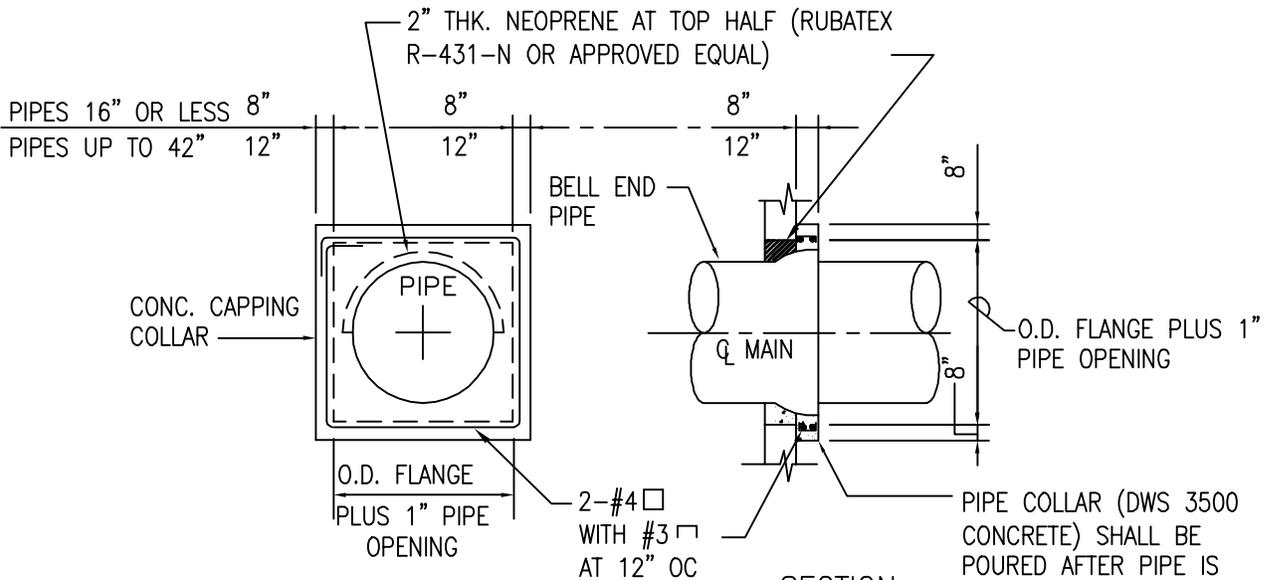
2002
REVISION

KAUAI  
MAUI  
OAHU

**MANHOLE DETAIL OF LINTEL AND FILLER**  
TYPICAL DETAIL  
SCALE: NTS

STANDARD  
DETAILS

**MH12**

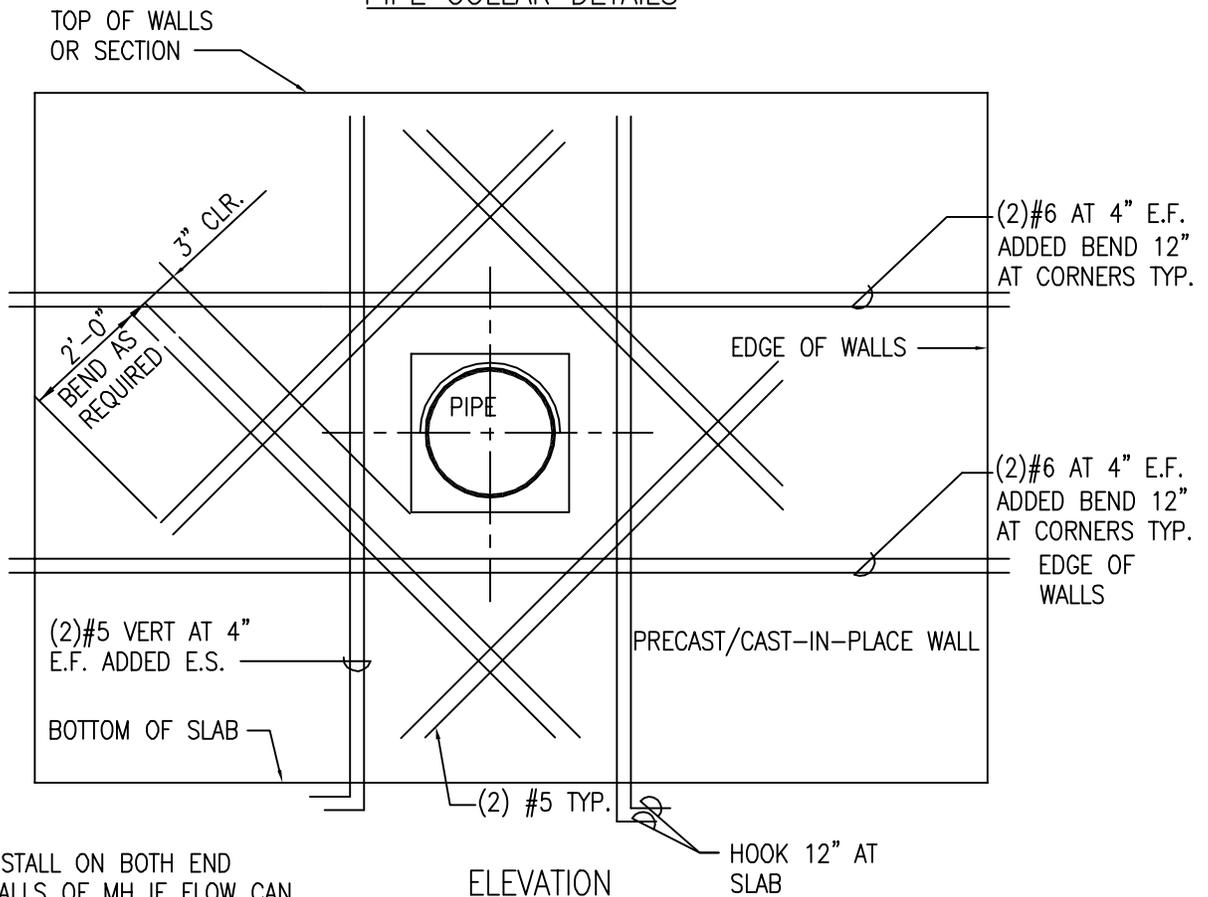


ELEVATION

SECTION

PIPE COLLAR DETAILS

PIPE COLLAR (DWS 3500 CONCRETE) SHALL BE POURED AFTER PIPE IS SECURED IN PLACE USE 30# ROOFING PAPER BOND BREAKER BETWEEN WALL & CAPPING COLLAR



ELEVATION

WALL PIPE OPENING  
ADDED REBARS DETAIL

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

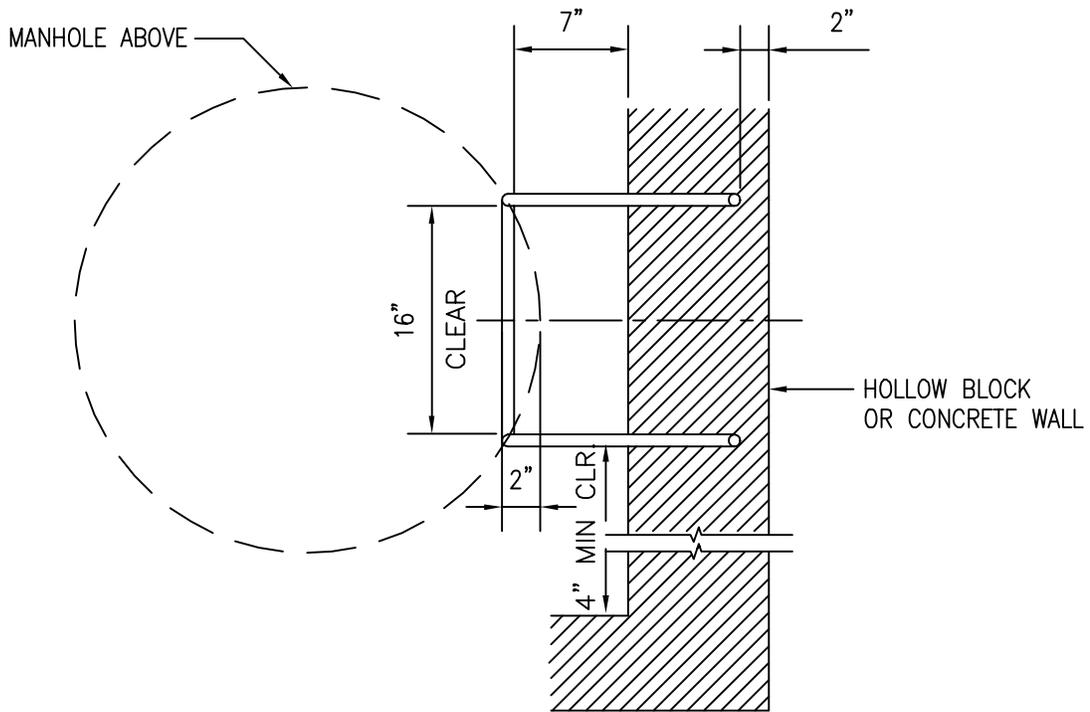
2002  
REVISION

KAUAI  
OAHU  
MAUI

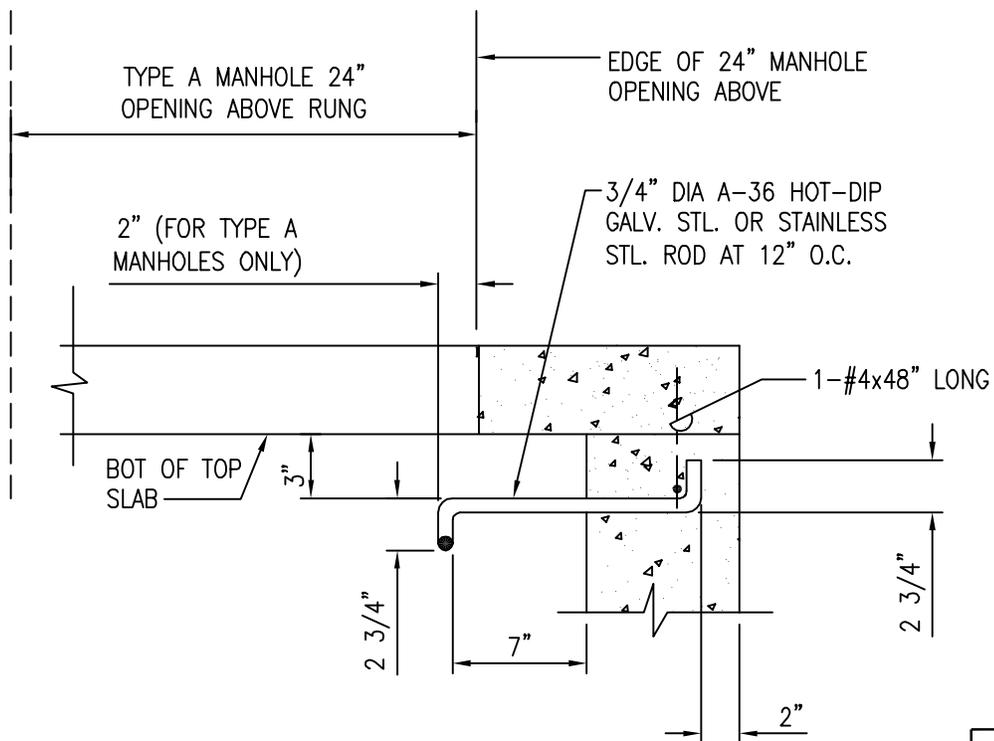
**MANHOLE**  
PIPE COLLAR DETAIL  
SCALE: NTS

STANDARD  
DETAILS

**MH13**



RUNG DETAIL



SECTION

2002
REVISION

KAUAI  
OAHU  
MAUI

**METAL RUNG DETAIL**

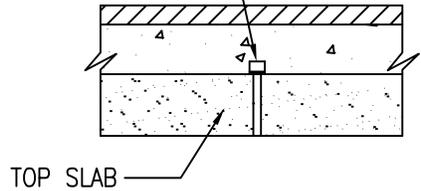
SCALE: NTS

STANDARD  
DETAILS

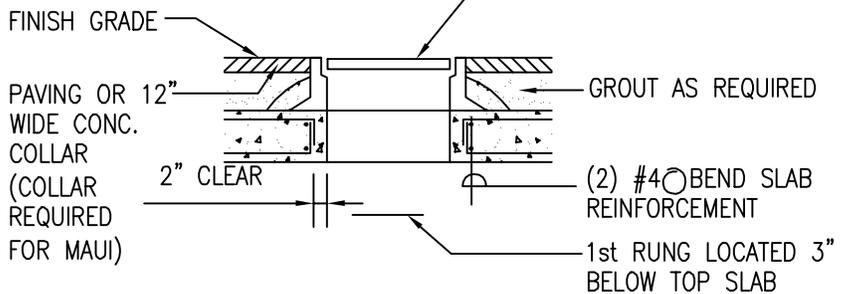
**MH14**

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.

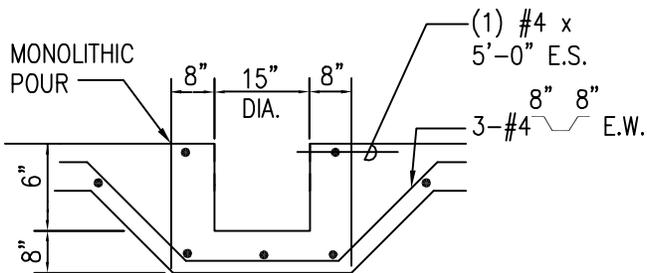
2" DIAMETER PIPE CHASE  
 THREADED TO RECEIVE 2"  
 CAP. FLOOD COAT CAP &  
 PIPE (EXPOSED SURFACE)  
 WITH GILSOMASTIC OR  
 APPROVED EQUAL.



LIFT PORT DETAIL

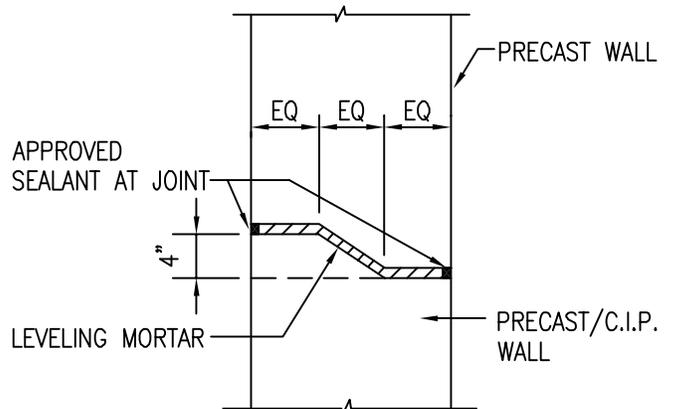


24" MANHOLE & 6" VALVEBOX SETTING DETAIL

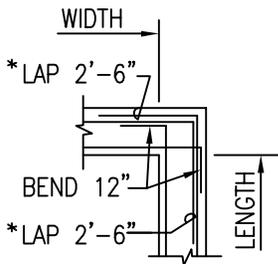


INSTALL SEALED SUMP IN LIEU OF OPEN HOLE WITH  
 CRUSHED ROCK WHEN BOTTOM SLAB IS LOCATED  
 BELOW ESTIMATED WATER TABLE

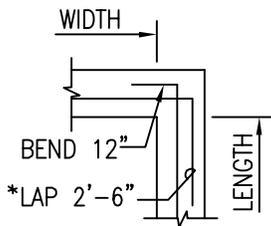
CAST-IN-PLACE SUMP DETAIL



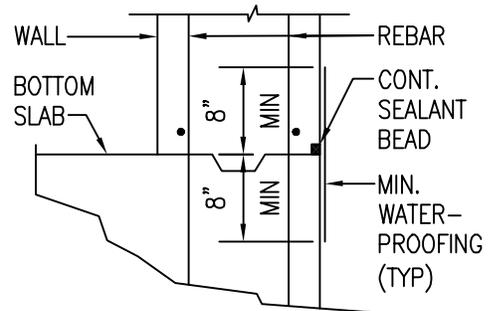
TYP. CONN DETAIL



DOUBLE LAYER  
 TYP HORIZ REINFORCEMENT



SINGLE LAYER  
 TYP HORIZ REINFORCEMENT

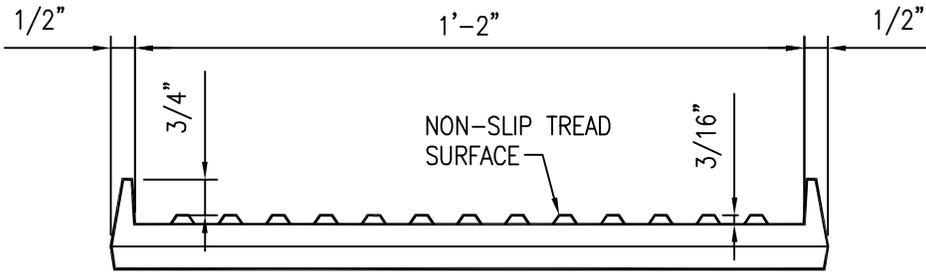


CONSTRUCTION JOINT AT  
 BOTH SLAB AND WALL

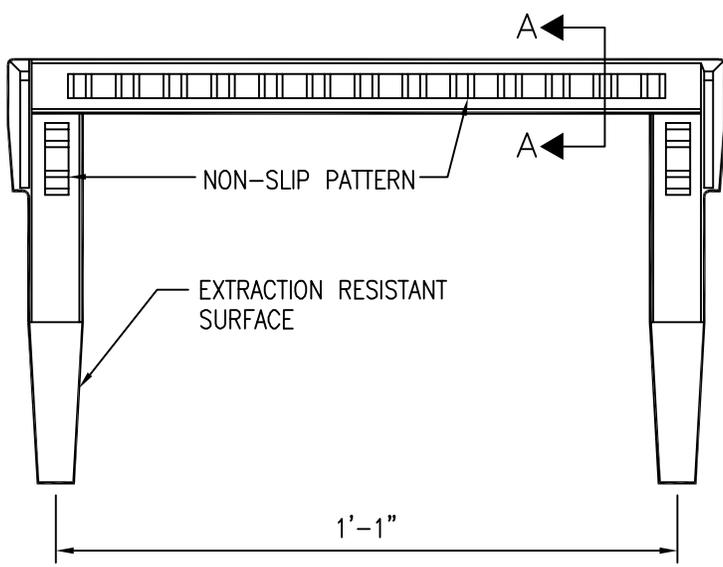
\* NOTE:  
 UNLESS OTHERWISE NOTED ON PLANS

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KAUAI OAHU MAUI	<b>MANHOLE</b> MISCELLANEOUS DETAILS SCALE: NTS	STANDARD DETAILS	<b>MH15</b>
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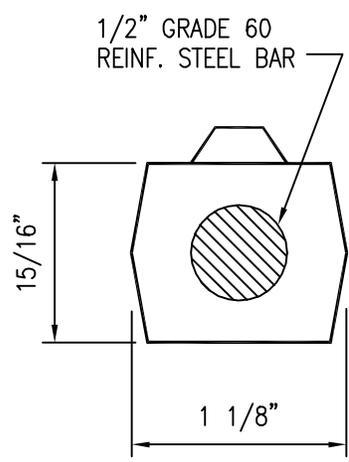
ELEVATION



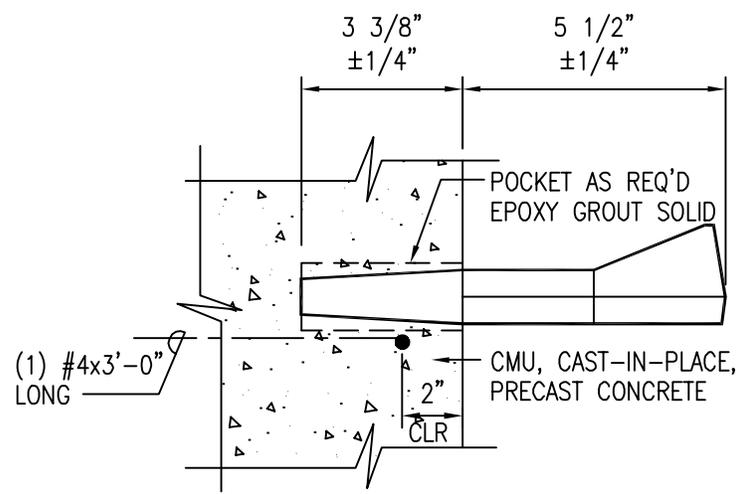
PLAN

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.



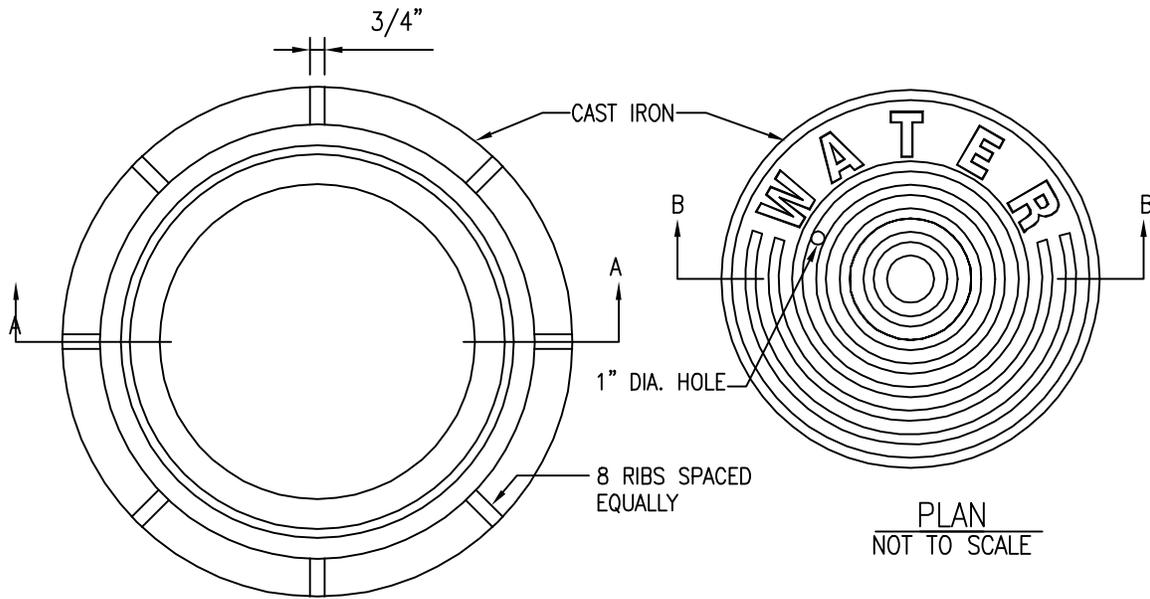
SECTION A-A



SIDE ELEVATION

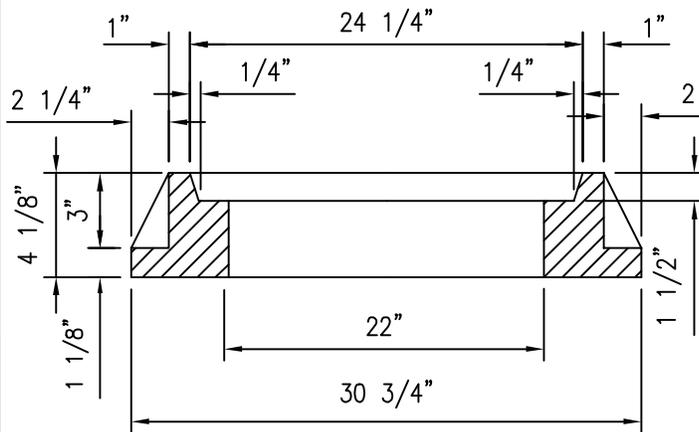
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KAUAI OAHU	<b>POLYPROPYLENE PLASTIC RUNG</b>	STANDARD DETAILS	<b>MH16</b>
SCALE: NTS			

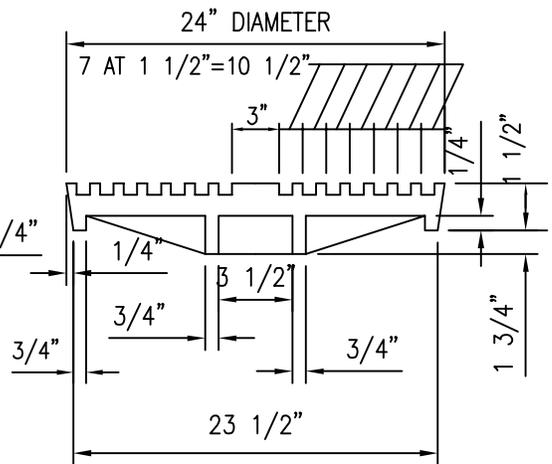


PLAN  
NOT TO SCALE

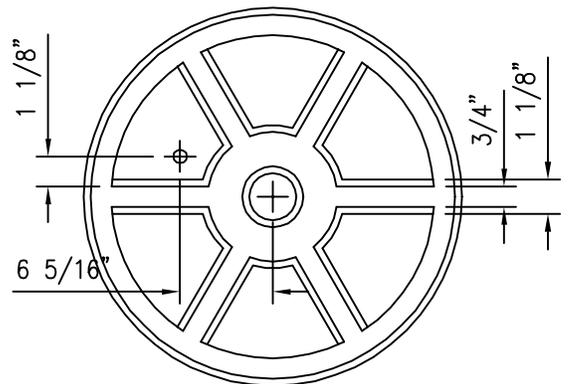
PLAN  
NOT TO SCALE



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.

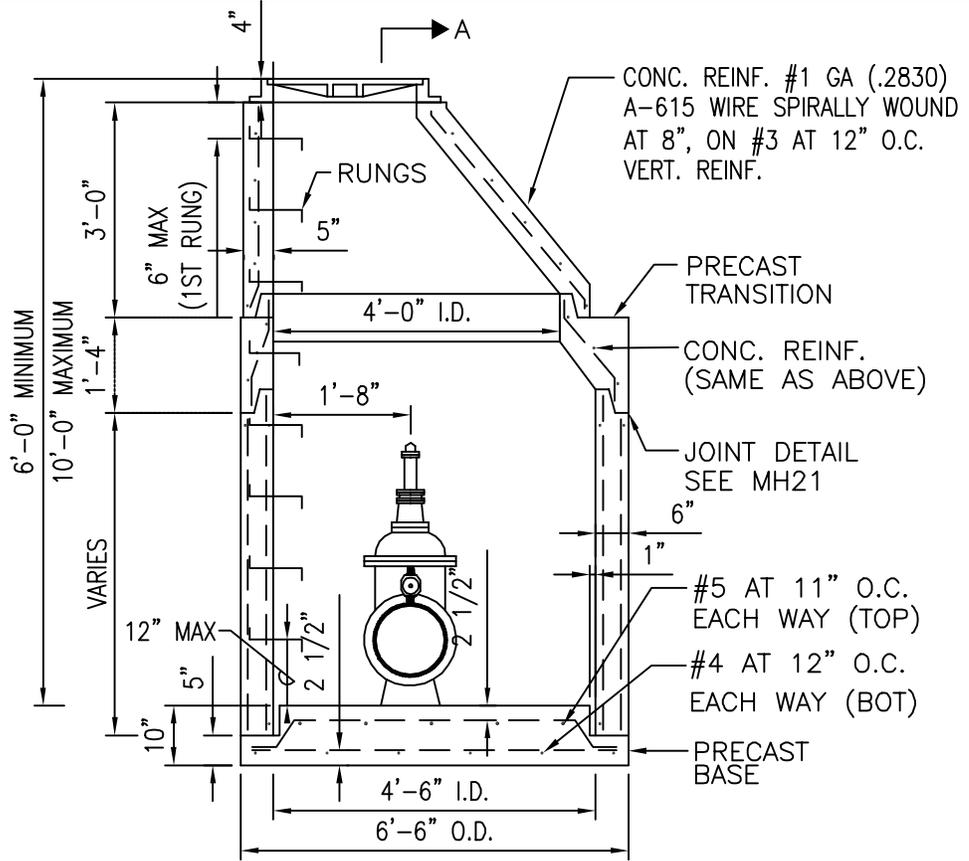
SEE TABLE 200-10 FOR MIN WEIGHTS.

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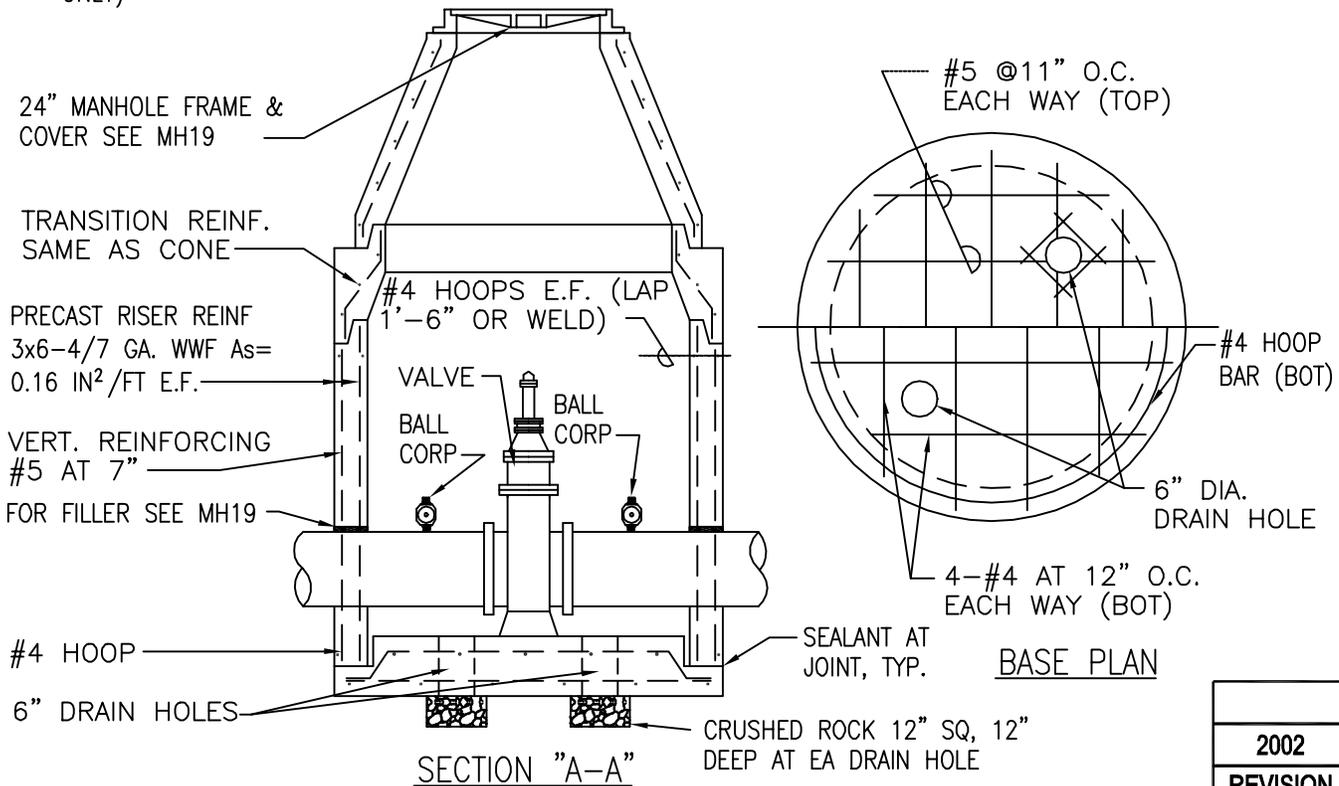
KAUAI OAHU MAUI HAWAII	<b>MANHOLE FRAME &amp; COVER</b> CAST IRON, 24" SIZE SCALE: NTS	STANDARD DETAILS	<b>MH17</b>
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**NOTES FOR PRECAST MH**

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**

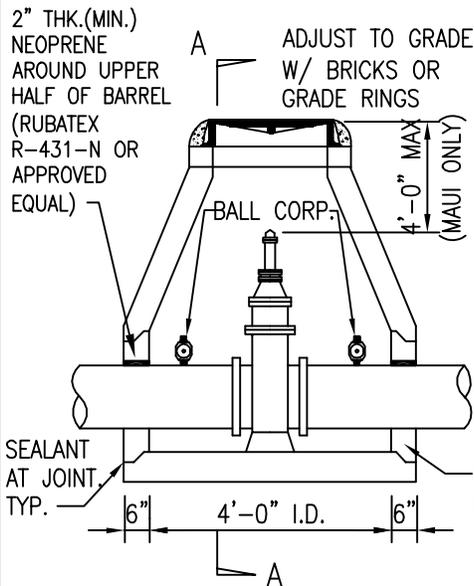


**SECTION "A-A"**

**BASE PLAN**

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REVISION

KAUAI OAHU MAUI	<b>TYPE "B" MANHOLE</b> GENERAL ARRANGEMENT, PRECAST WALL SCALE: NTS	STANDARD DETAILS	<b>MH18</b>
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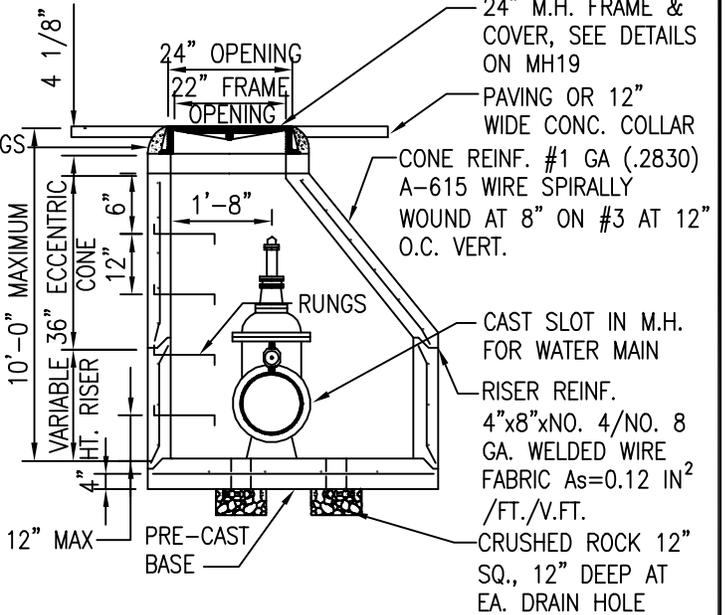


**PRE-CAST TYPE C  
MANHOLE**

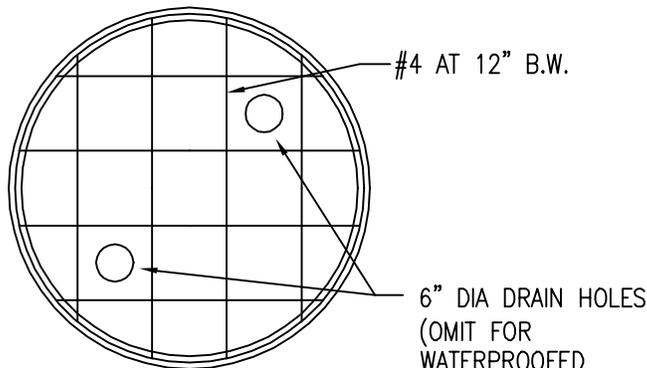
ADJUST TO GRADE W/ BRICKS OR GRADE RINGS

ADJUST TO GRADE W/ BRICKS OR GRADE RINGS

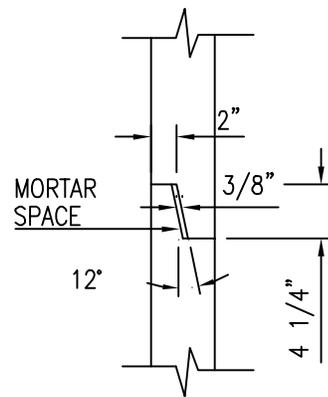
MORTAR SLOT IN FIELD (TYP.)



**SECTION A-A**



**PRE-CAST MANHOLE  
BASE PLAN**

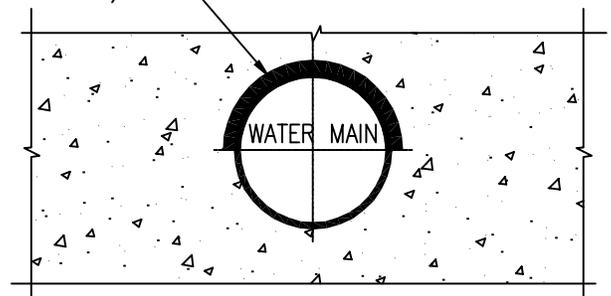


**T&G JOINT  
DETAIL**

**NOTES FOR PRE-CAST MANHOLE**

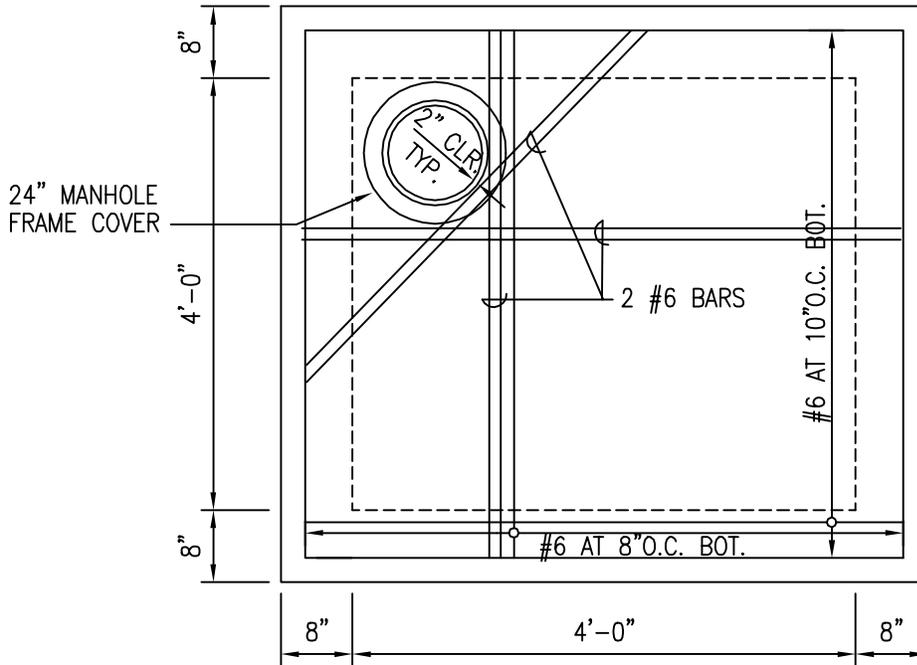
1. CONCRETE SHALL BE DWS 3500.
2. REFER TO MH14 FOR DETAILS OF RUNG.
3. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES AND TABLE 200-9 OF THE WATER STANDARD FOR THE REQUIRED BALL CORP SIZES.
4. OMIT DRAIN HOLES AND CRUSHED ROCK FOR WATERPROOFED MANHOLES.
5. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 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)

2" THK. (MIN.) NEOPRENE AROUND UPPER HALF OF BARREL (RUBATEX R-431-N OR APPROVED EQUAL)



**FILLER DETAIL**

KAUAI OAHU MAUI	<b>TYPE "C" MANHOLE</b> GENERAL ARRANGEMENT, PRECAST WALL SCALE: NTS	STANDARD DETAILS	2002
			REVISION
			<b>MH19</b>



PLAN OF TOP SLAB  
(BOTTOM REINFORCEMENT)

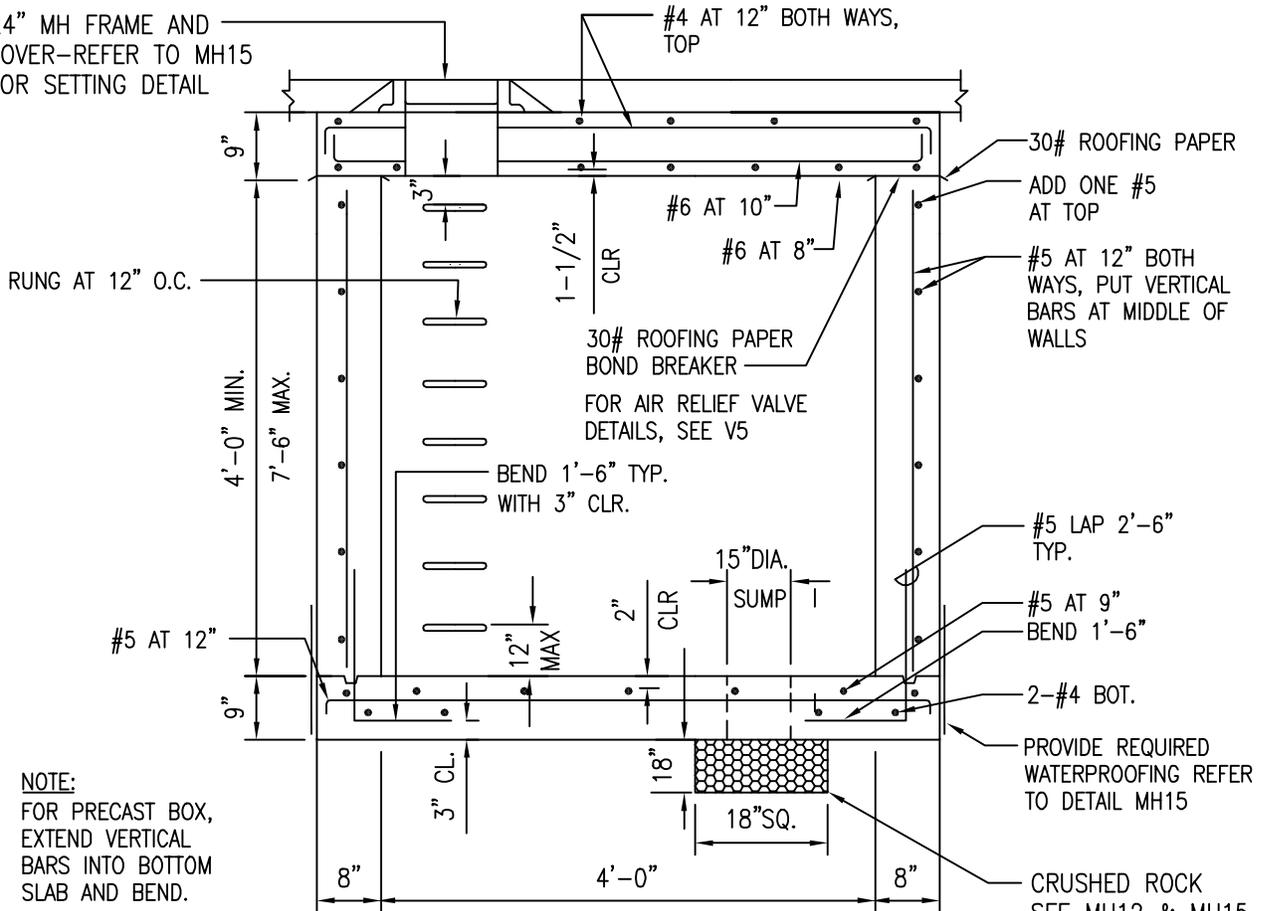
NOTES FOR CAST-IN-PLACE AND PRECAST WALL MH:

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.

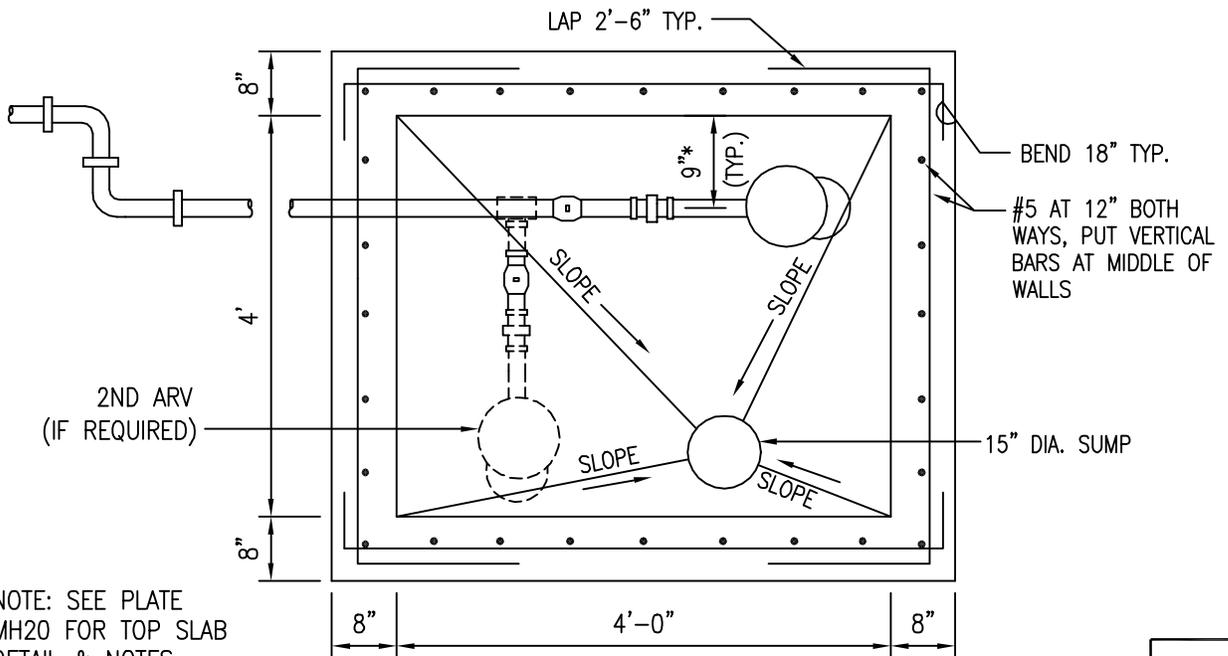
2002
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KAUAI OAHU MAUI	<b>TYPE "D" MANHOLE FOR 2" AIR RELIEF VALVES</b> SCALE: NTS	STANDARD DETAILS	<b>MH20</b>
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24" MH FRAME AND COVER—REFER TO MH15 FOR SETTING DETAIL



SECTION



PLAN-SECTION

NOTE: SEE PLATE MH20 FOR TOP SLAB DETAIL & NOTES

\* LATERAL CENTERED FOR SINGLE ARV

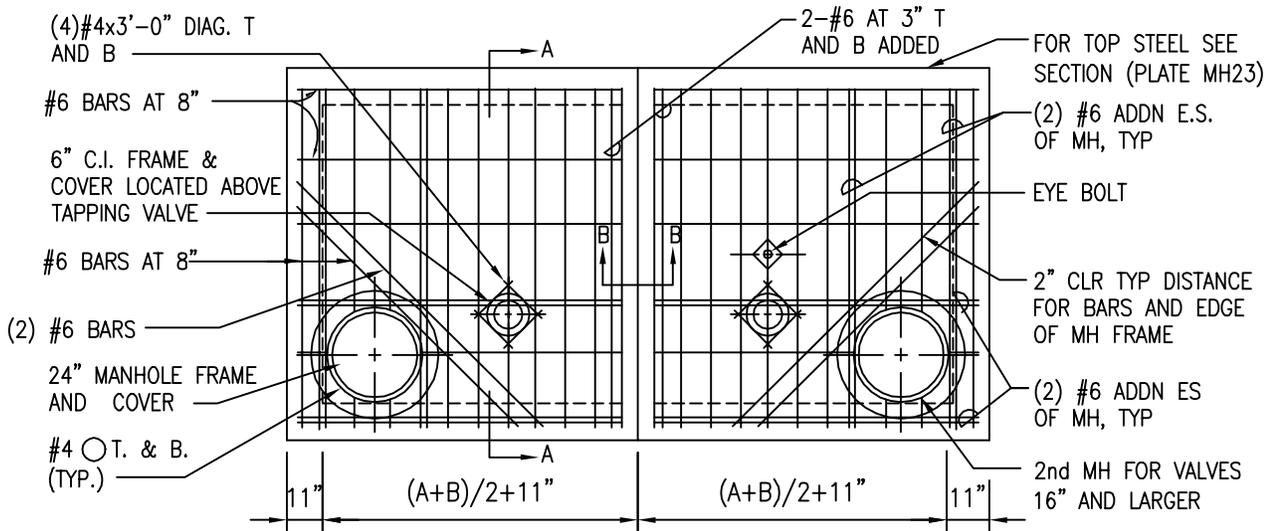
2002  
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KAUAI  
OAHU  
MAUI

**TYPE "D" MANHOLE FOR 2" AIR RELIEF VALVES**  
**CAST-IN-PLACE AND PRECAST WALLS**  
 SCALE: NTS

STANDARD  
DETAILS

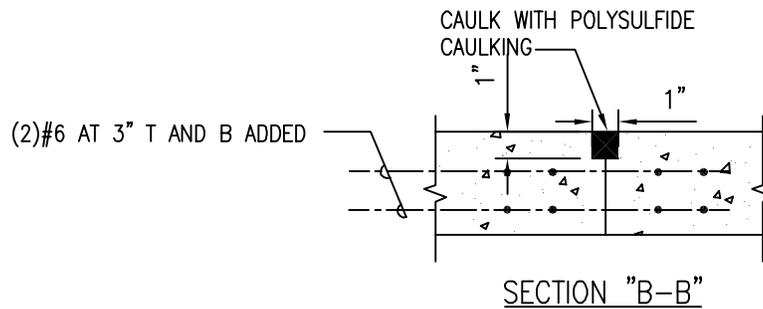
**MH21**



**PLAN OF TOP SLAB**  
(BOTTOM REINFORCEMENT)

**NOTE:**

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

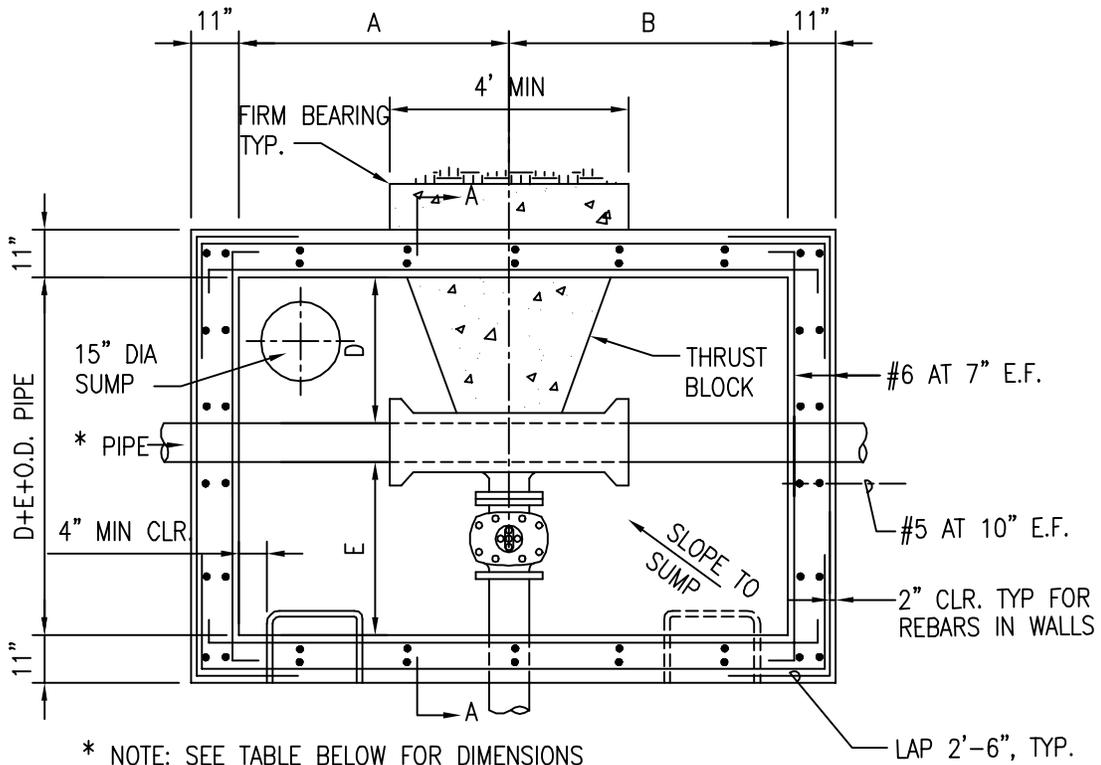


**NOTES: FOR CAST-IN-PLACE WALL MH**

1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES AND 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.

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REVISION

KAUAI OAHU	<b>TYPE "E" TAPPING TEE MANHOLE</b> CAST-IN-PLACE WALL SCALE: NTS	STANDARD DETAILS	<b>MH22</b>
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PLAN-SECTION

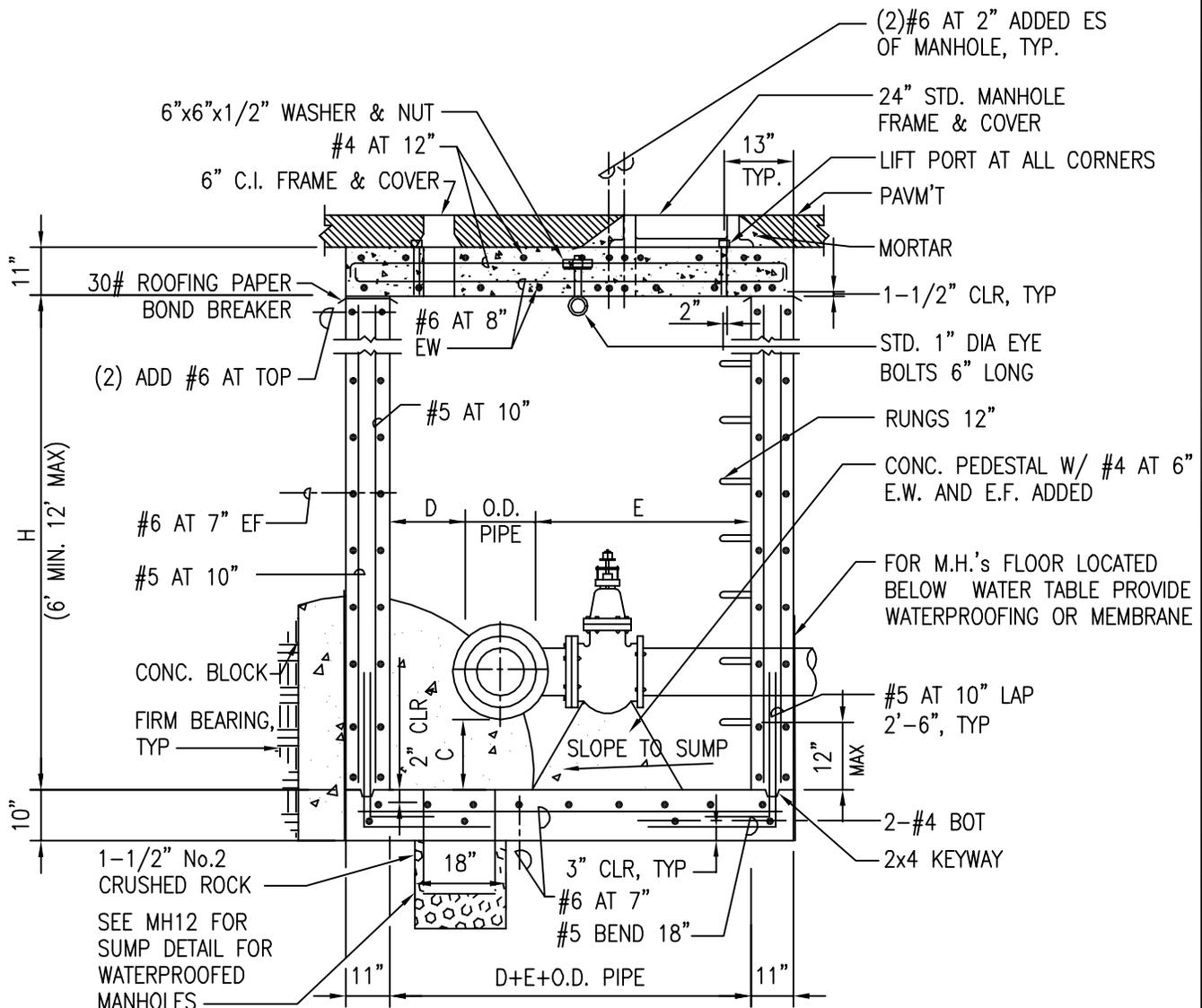
TAPPING TEE MANHOLE DIMENSION						
PIPE DIAMETER	MATERIAL	A	B	C	D	E
4"-12"	CI AND DI	3'-0"	5'-0"	1'-0"	1'-6"	5'-0"
16"-20"	CI AND DI	3'-0"	5'-6"	1'-6"	1'-6"	6'-0"
24"-42"	CI AND DI	3'-6"	6'-0"	1'-6"	1'-6"	6'-0"

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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REVISION

KAUAI OAHU	<b>TYPE "E" TAPPING TEE MANHOLE</b> CAST-IN-PLACE WALL SCALE: NTS	STANDARD DETAILS	MH23
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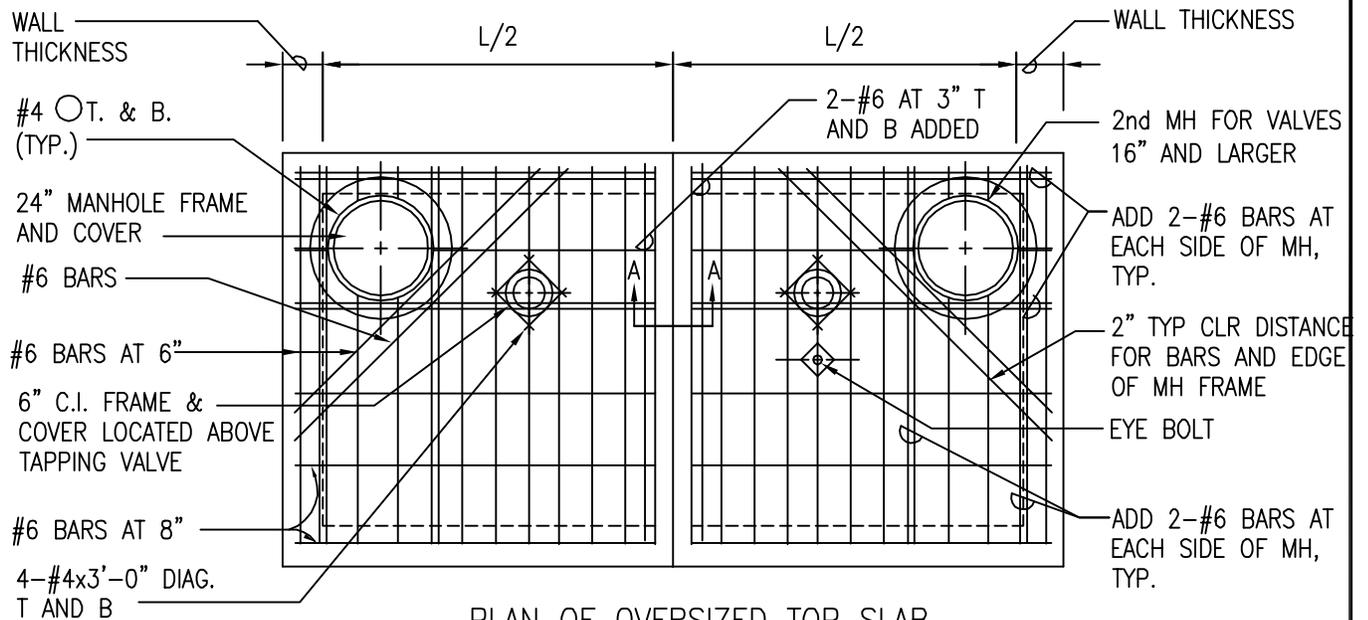


SECTION A-A

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

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REVISION

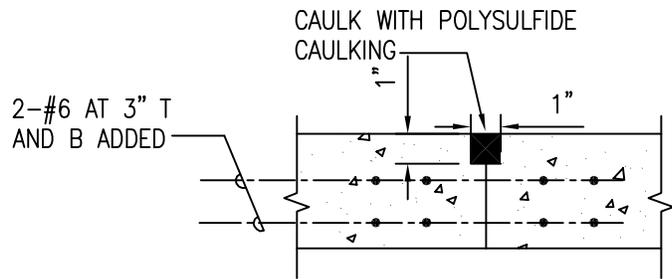
KAUAI OAHU	<b>TYPE "E" TAPPING TEE MANHOLE</b> CAST-IN-PLACE WALL SCALE: NTS	STANDARD DETAILS	MH24
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**PLAN OF OVERSIZED TOP SLAB**  
(BOTTOM REINFORCEMENT)

**NOTE:**

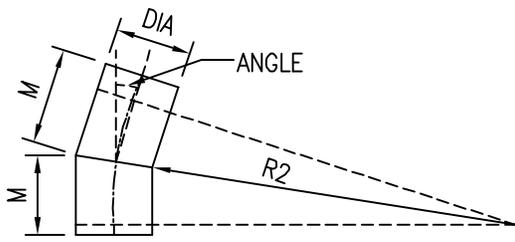
1. LOCATION OF THE EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE. REFER TO MH1, MH2, MH3, MH4 AND MH5 FOR DETAILS.
2. PROVIDE LIFT PORTS FOR SLAB AT FOUR CORNERS MINIMUM 2" AWAY FROM THE WALL.
3. PROVIDE TWO SECTIONS OF SLAB WHEN TOTAL WEIGHT OF THE SINGLE PIECE OF SLAB EXCEEDS 10 KIPS.
4. SEE PLATE MH1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



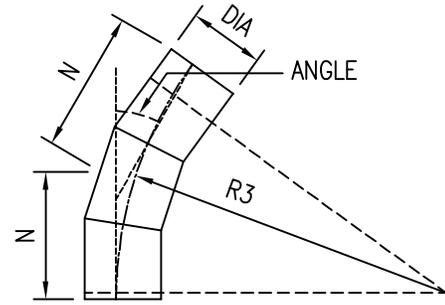
**SECTION "A-A"**

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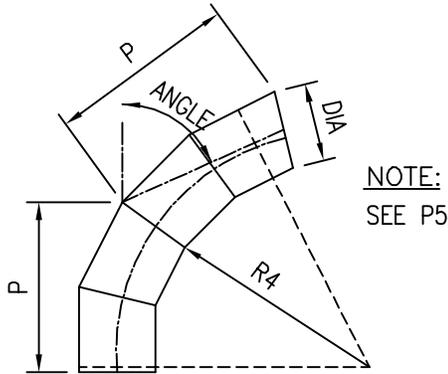
KAUAI OAHU MAUI HAWAII	<b>OVERSIZED TOP SLAB DETAIL</b> SCALE: NTS	STANDARD DETAILS	<b>MH25</b>
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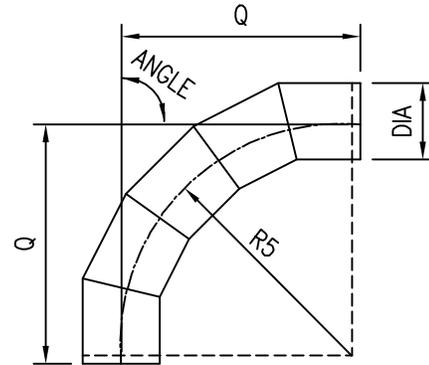
2 PIECE ELBOW  
6° TO 22-1/2° INCLUSIVE



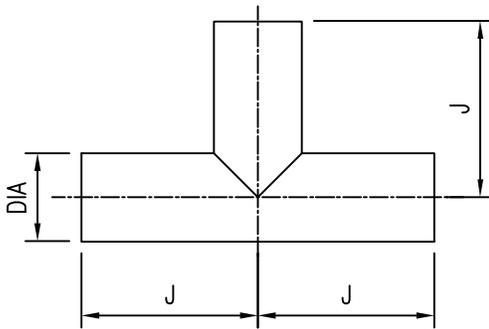
3 PIECE ELBOW  
OVER 22-1/2° TO 45° INCLUSIVE



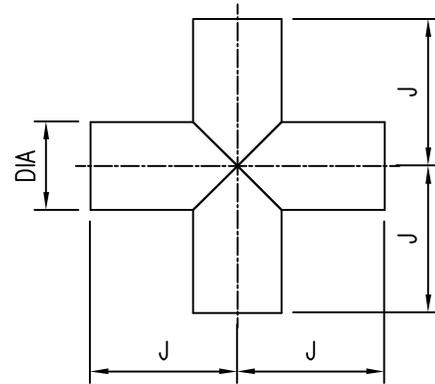
4 PIECE ELBOW  
OVER 45° TO 67-1/2° INCLUSIVE



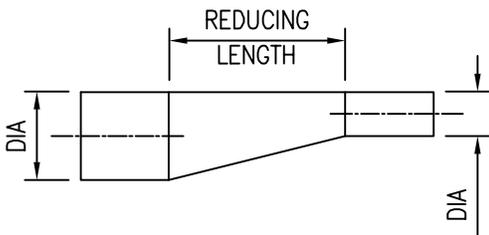
5 PIECE ELBOW  
OVER 67-1/2° TO 90° INCLUSIVE



TEE

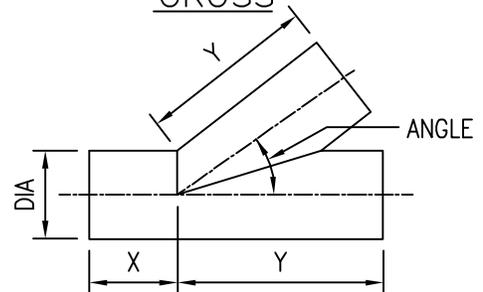


CROSS



REDUCER

SEE PLATE P2 FOR DIMENSIONS



LATERAL

30° MINIMUM - 75° MAXIMUM

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KAUAI OAHU MAUI	<b>CONCRETE CYLINDER PIPE</b> MISCELLANEOUS DETAIL SCALE: NTS	STANDARD DETAILS	<b>P1</b>
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**STANDARD FITTING DIMENSIONS  
FOR PLATE P1**

DIAMETER	TEE		CROSS (BOTH WAYS)	LATERAL (30° TO 75°)		ELBOWS (CENTER TO END)							
	RUN J + J	OUTLET J		RUN X + Y	OUTLET Y	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°)	
			M			R2	N	R3	P	R4	Q	R5	
	16"	34"	17"	34"	62"	52"	12"	60"	18"	44"	26"	39"	44"
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.

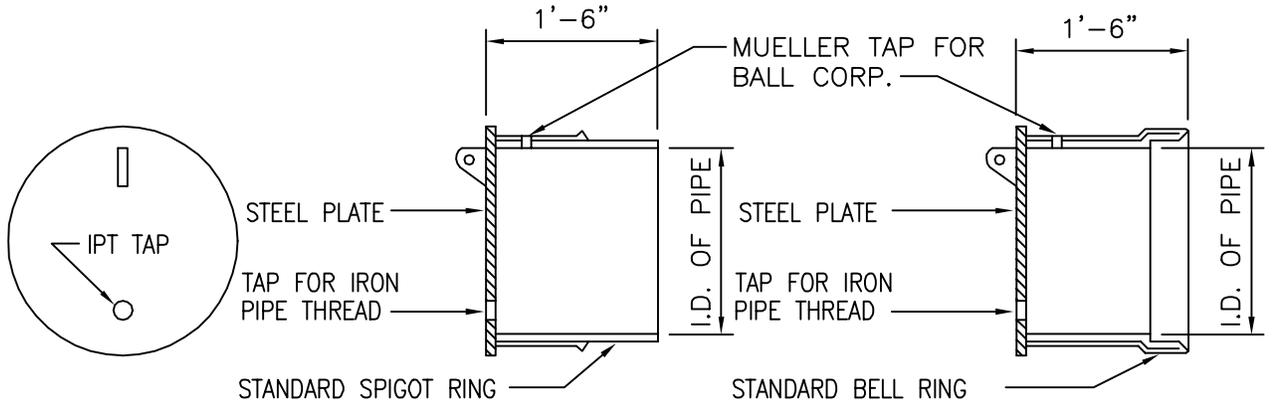
ALL FITTINGS AND SPECIALS SHALL BE FABRICATED INDEPENDENT FROM PIPE SECTIONS AND IN ACCORDANCE WITH THE DIMENSIONS SHOWN.

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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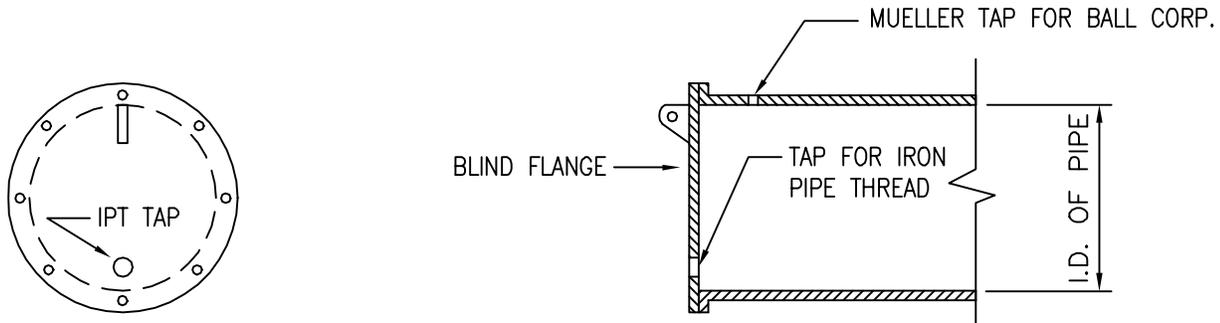
KAUAI OAHU MAUI	<b>CONCRETE CYLINDER PIPE</b> NOTES AND TABLES SCALE: NTS	STANDARD DETAILS	<b>P2</b>
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ELEV. OF STEEL PLATE    SECTION OF PLUG

SECTION OF CAP

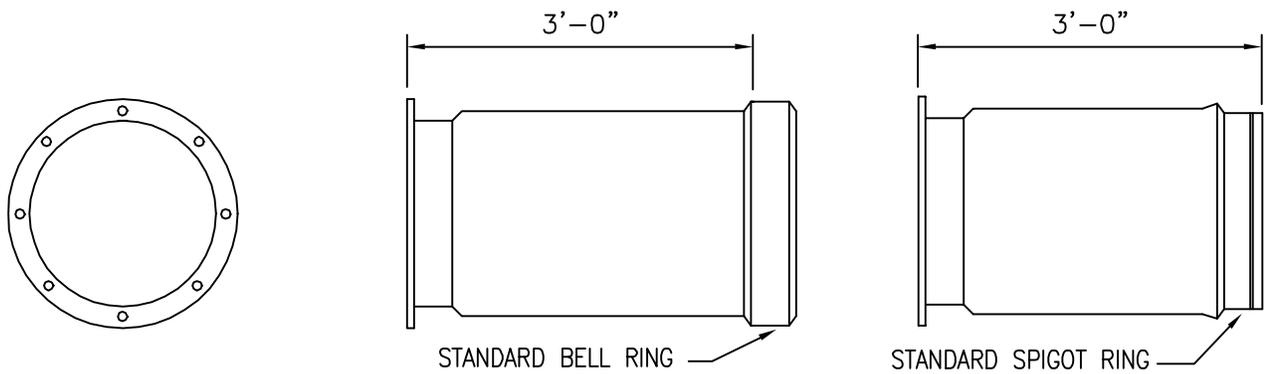
DETAIL OF CAP & PLUG



ELEV. OF BLIND FLANGE

SECTION

DETAIL OF BLIND FLANGE



FLANGE END

ELEVATION

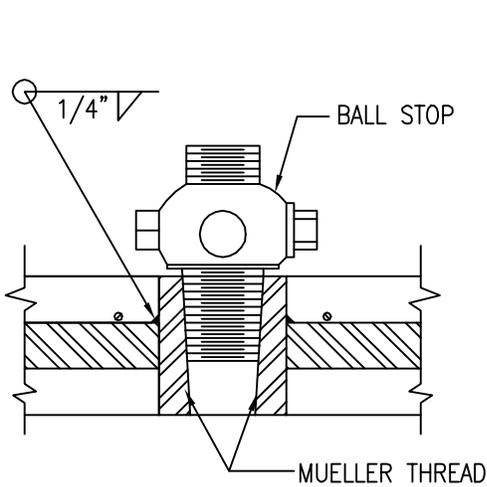
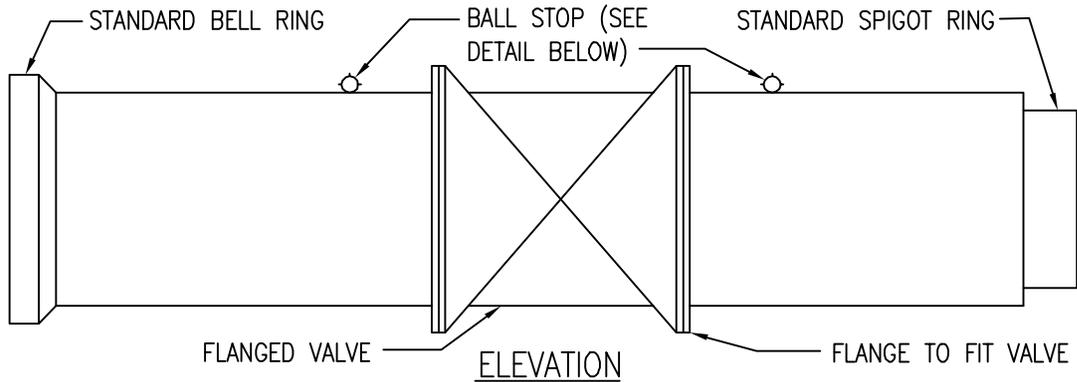
ELEVATION

DETAIL OF ADAPTER

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

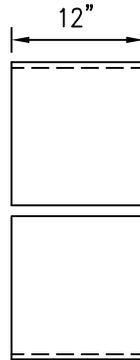
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KAUAI OAHU MAUI	<b>CONCRETE CYLINDER PIPE</b> MISCELLANEOUS DETAIL SCALE: NTS	STANDARD DETAILS	<b>P3</b>
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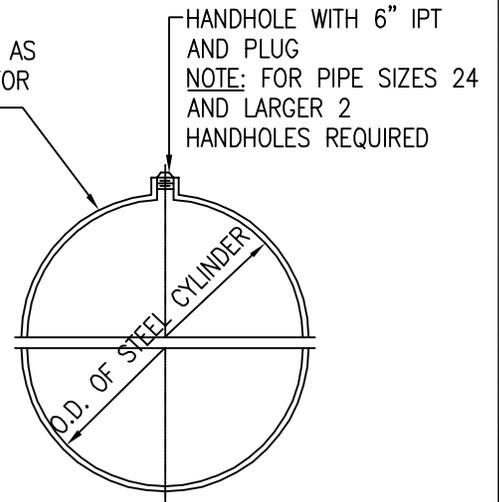


SECTION THRU  
CONCRETE PIPE

PLATE THICKNESS SHALL BE AS  
SHOWN IN SPECIFICATIONS FOR  
CONCRETE CYLINDER PIPE.



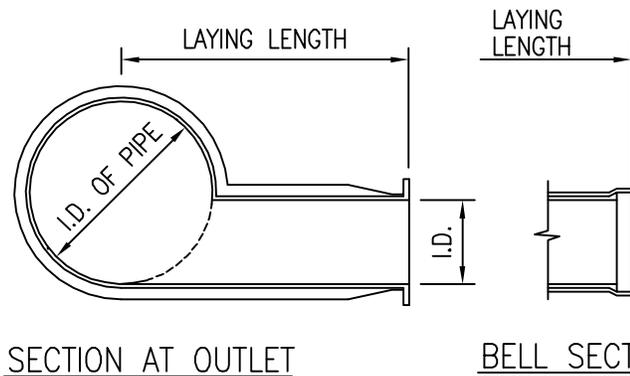
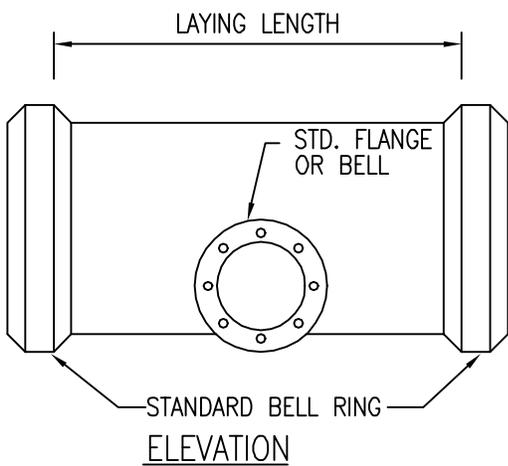
ELEVATION



SECTION

DETAIL AT  
BALL STOP

DETAIL OF  
SPLIT BUTT STRAP



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

DETAIL OF BLOW OFF TEE

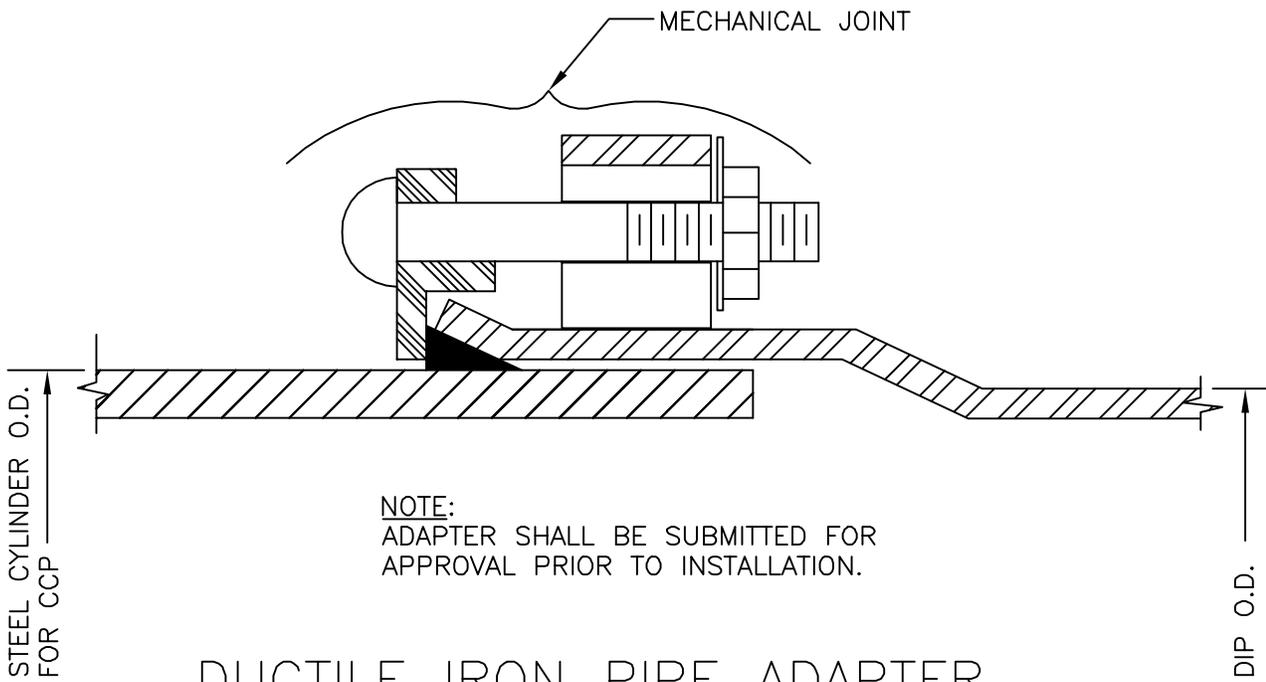
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KAUAI  
OAHU  
MAUI

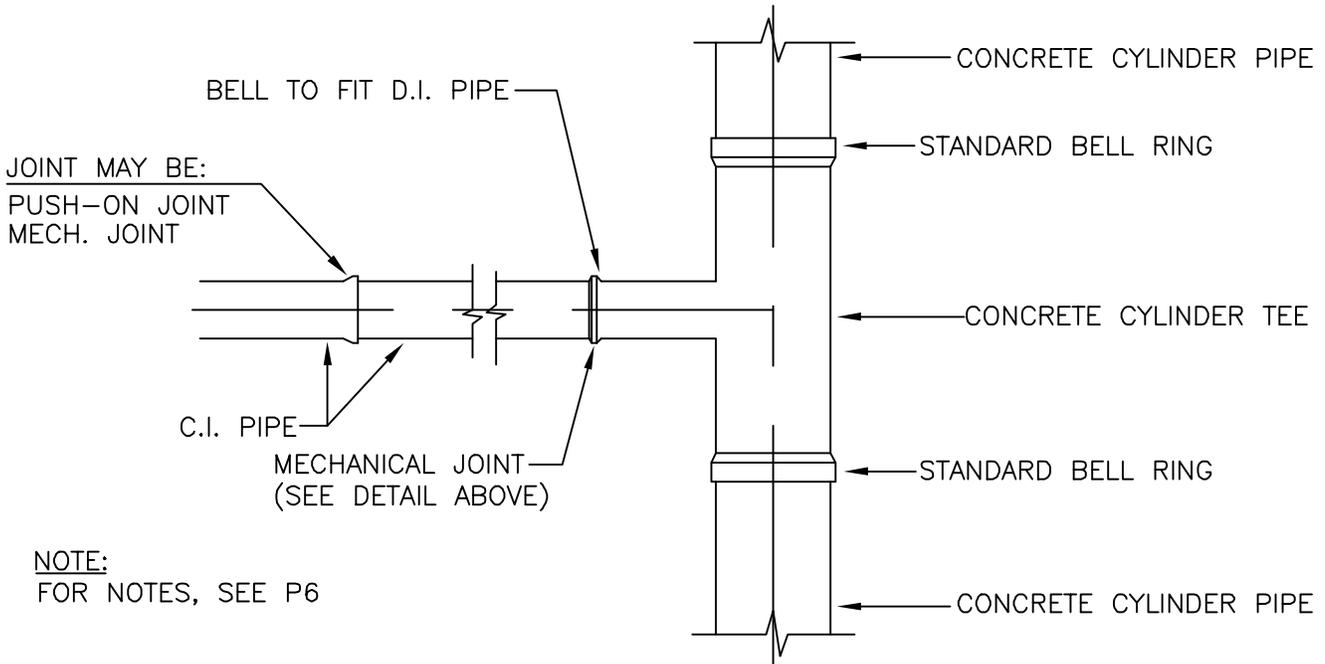
CONCRETE CYLINDER PIPE  
MISCELLANEOUS DETAILS  
SCALE: NTS

STANDARD  
DETAILS

P4



DUCTILE IRON PIPE ADAPTER



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

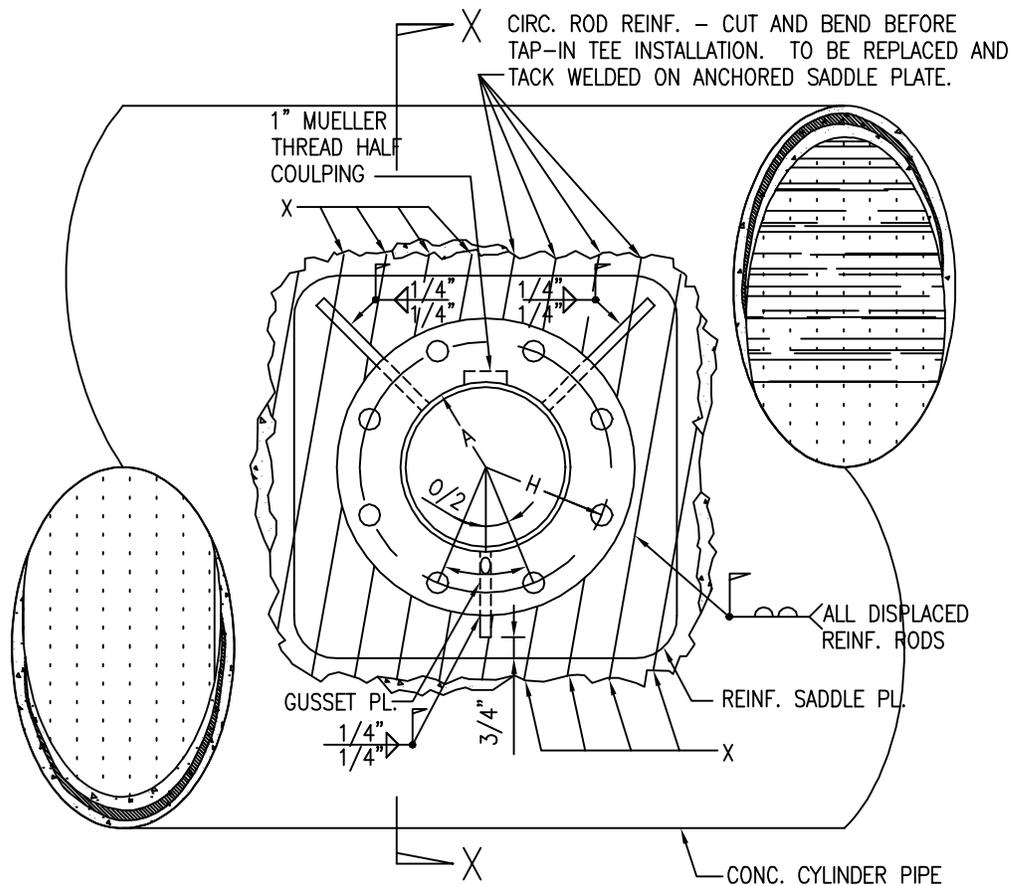
NOTES:

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.

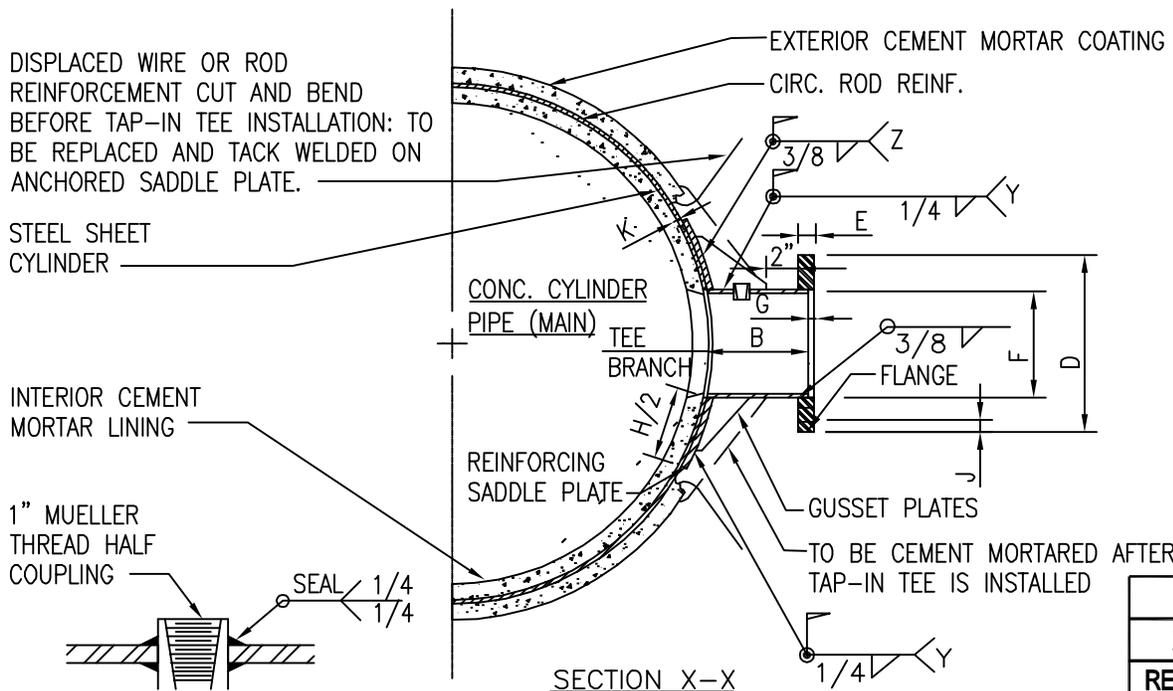
NOTE:

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

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			REVISION
KAUAI OAHU MAUI	<b>CONCRETE CYLINDER PIPE</b> NOTES SCALE: NTS	STANDARD DETAILS	<b>P6</b>



FRONT VIEW



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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	<b>CONCRETE CYLINDER PIPE</b> <b>TAP-IN TEE NOTES AND TABLES</b> SCALE: NTS	STANDARD DETAILS	P8
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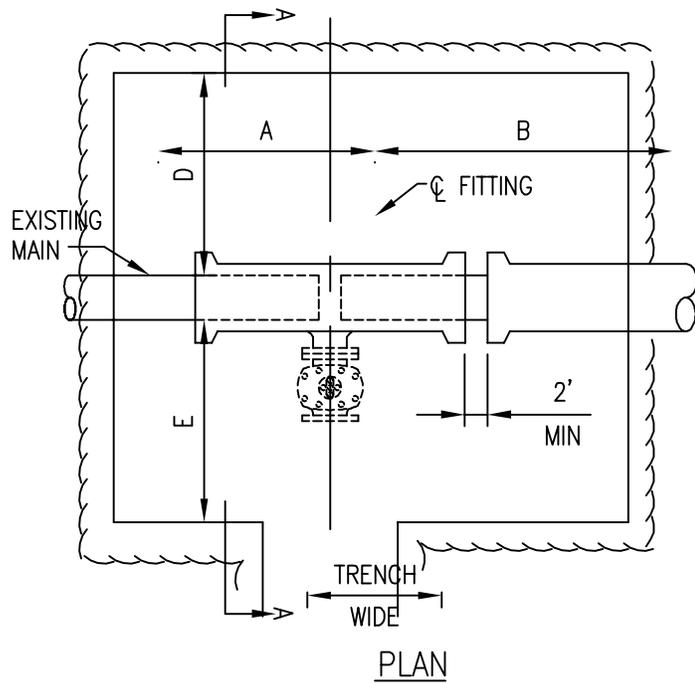
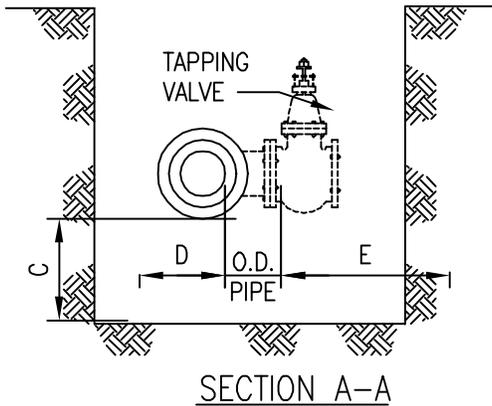


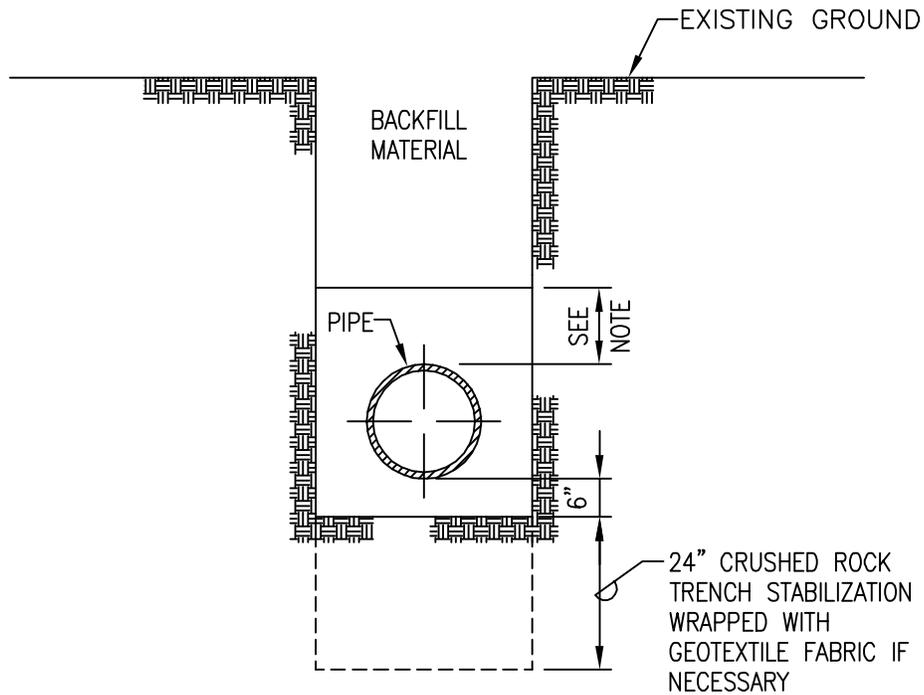
TABLE "A"

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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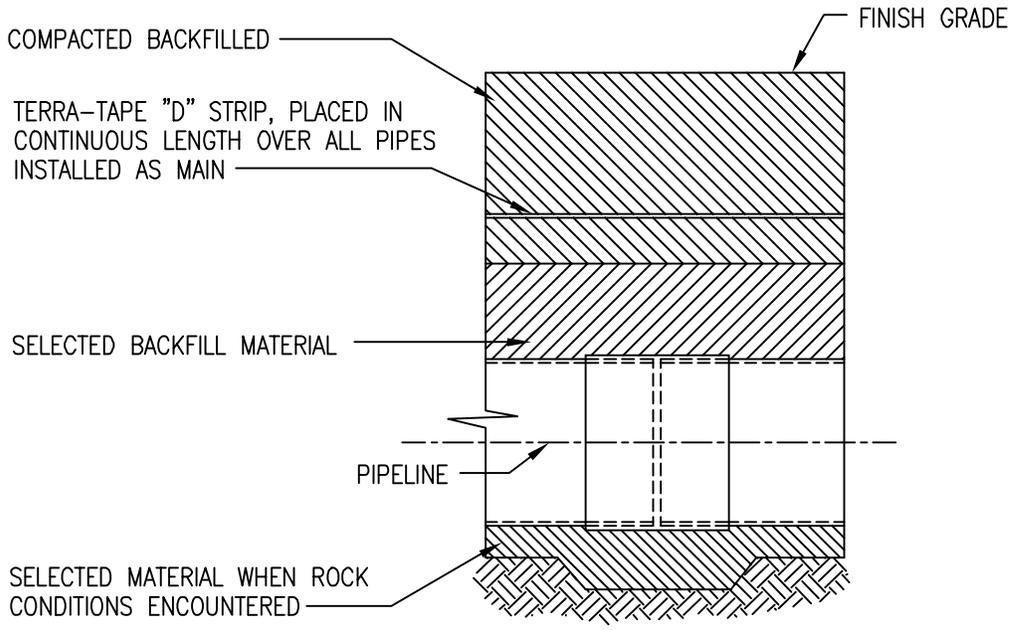


NOTE:

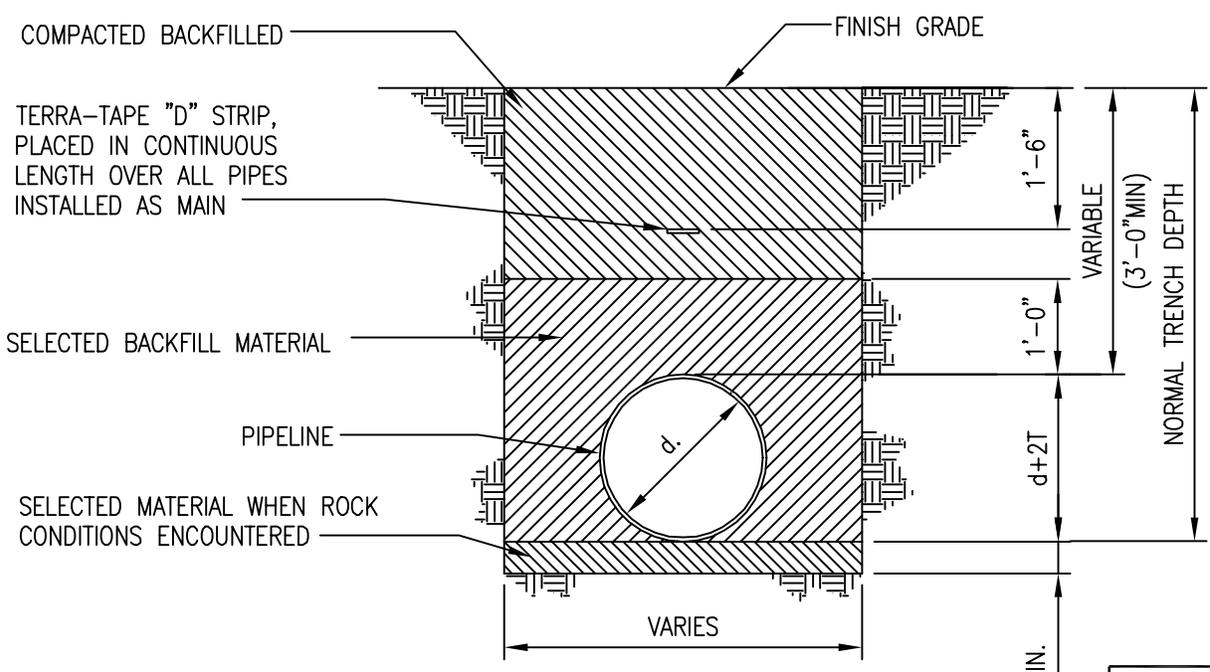
1. 12" OF CUSHION MATERIAL FOR PIPES 16" OR LARGER. 6" CUSHION MATERIAL FOR PIPES 12" OR SMALLER AT LOCATIONS WHERE INVERT IS ABOVE 4-FOOT ELEVATION.
2. 12" OF CUSHION MATERIAL FOR ALL PIPE SIZES AT LOCATIONS WHERE THE INVERT IS AT OR BELOW THE 4-FOOT ELEVATION.

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OAHU MAUI	<b>TRENCH BACKFILL</b> SCALE: NTS	STANDARD DETAILS	P10
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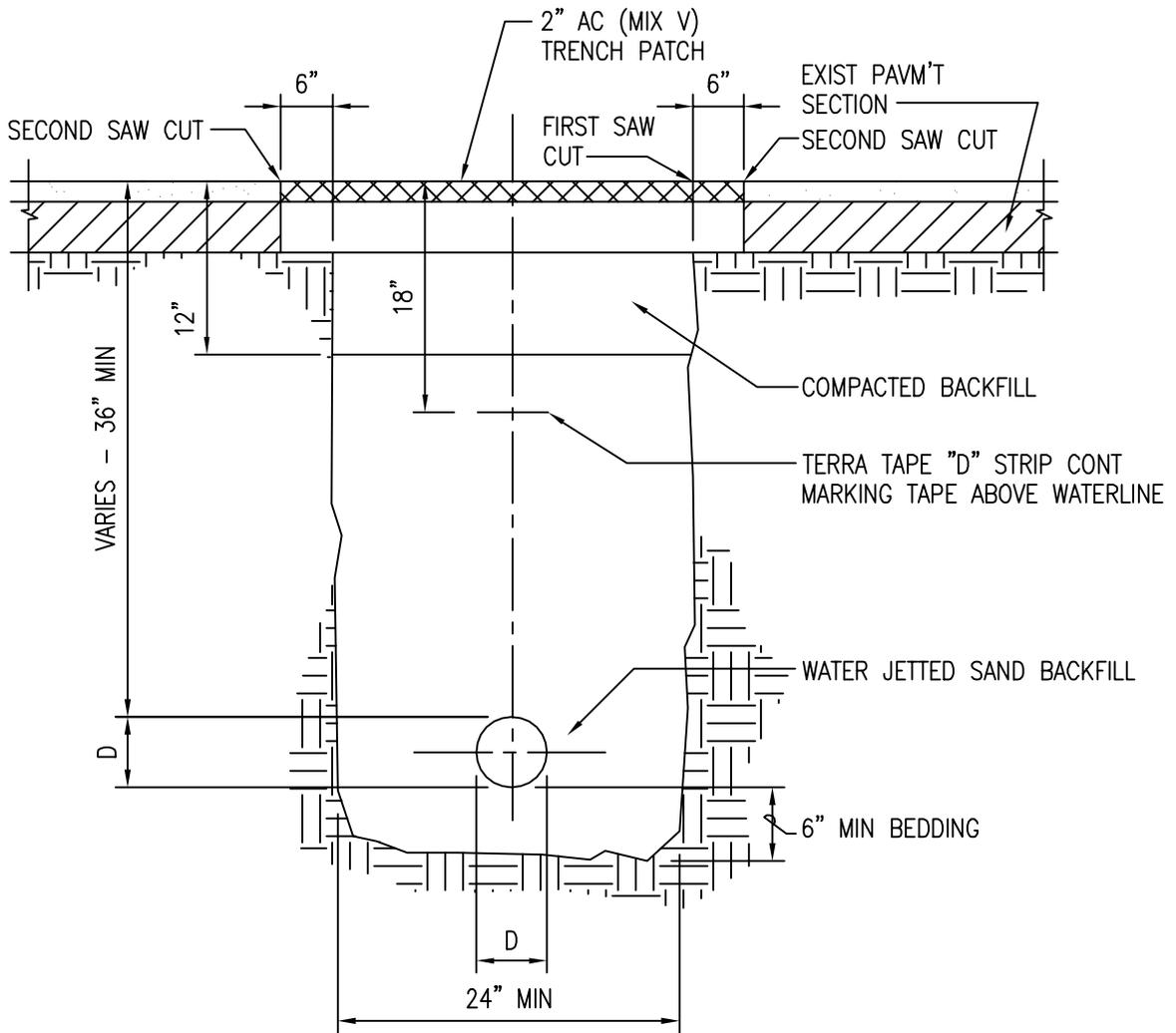
DETAIL AT JOINT



TYPICAL SECTION

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KAUAI	<p align="center"><b>WATERLINE TRENCH DETAILS</b>  <b>MISCELLANEOUS DETAILS</b>          SCALE: NTS</p>	STANDARD DETAILS	P11
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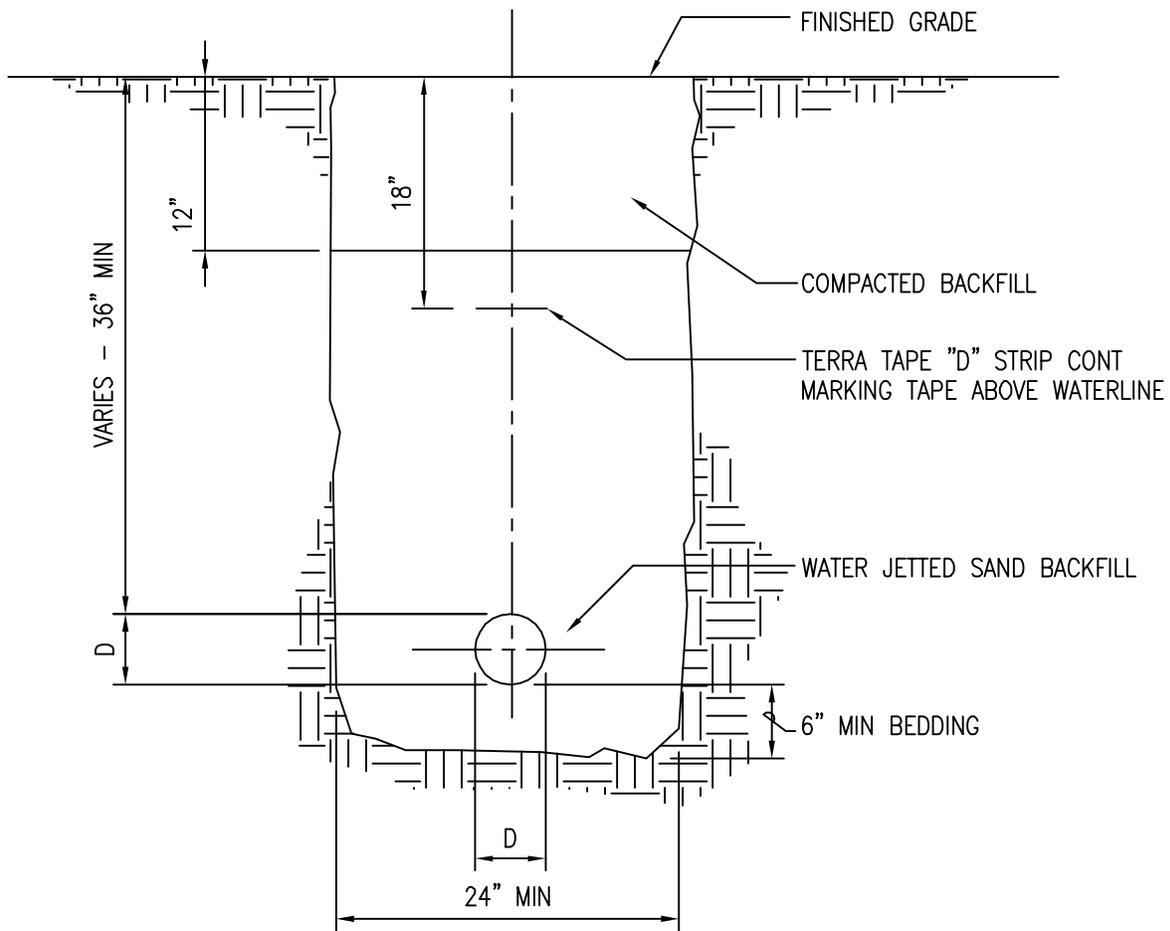
TYPICAL PVC WATERLINE TRENCH

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.

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KAUAI	<b>TYP. PVC WATERLINE TRENCH</b> PAVED AREA SCALE: NTS	STANDARD DETAILS	<b>P12</b>
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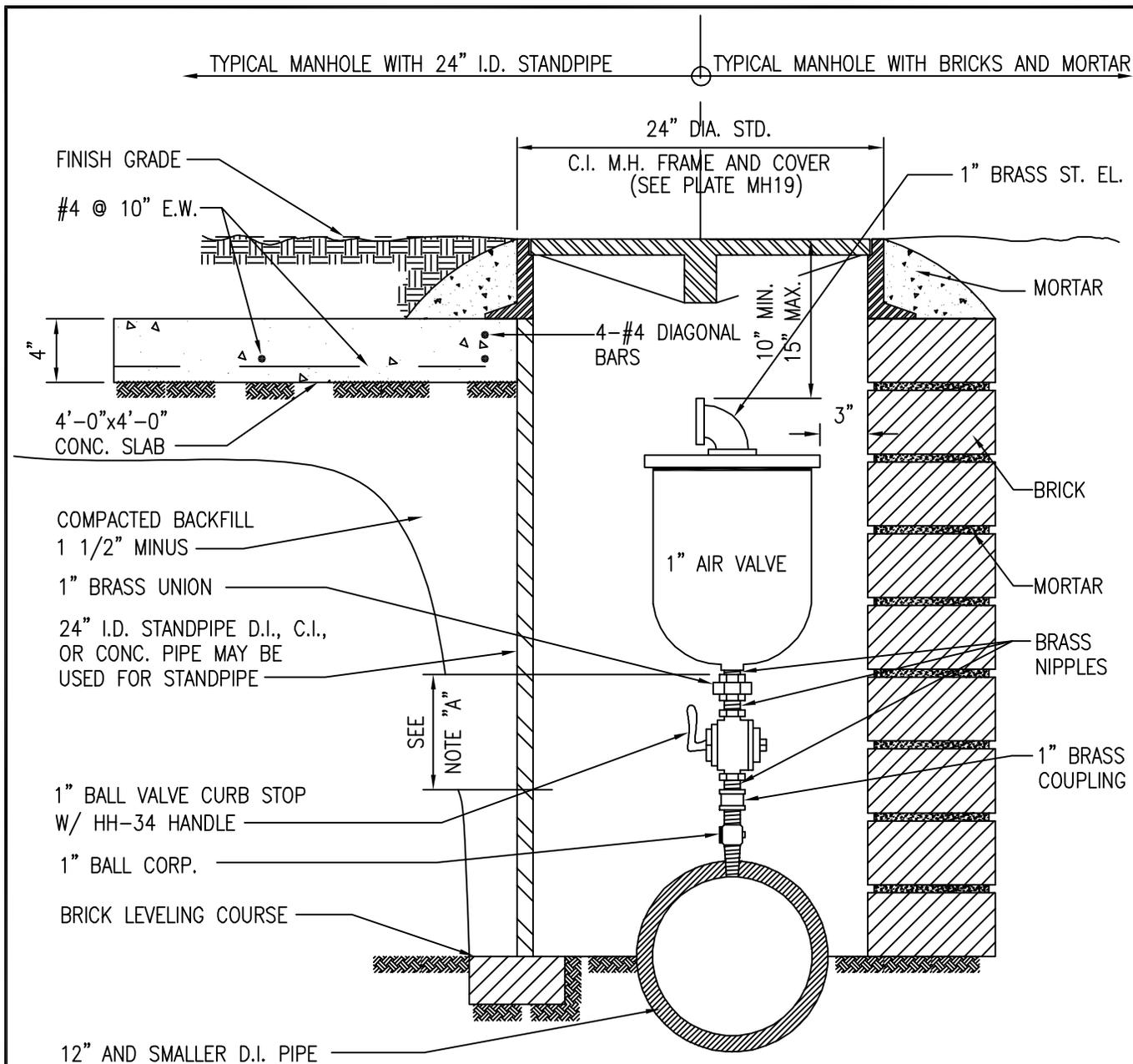
TYPICAL PVC WATERLINE TRENCH

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.

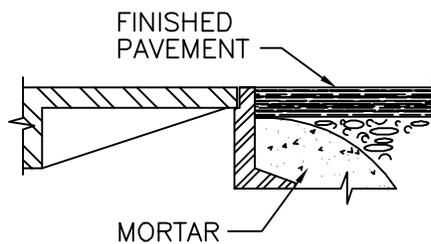
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KAUAI	<b>TYP. PVC WATERLINE TRENCH</b> NON-PAVED AREA SCALE: NTS	STANDARD DETAILS	P13
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**NOTES:**

- 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.



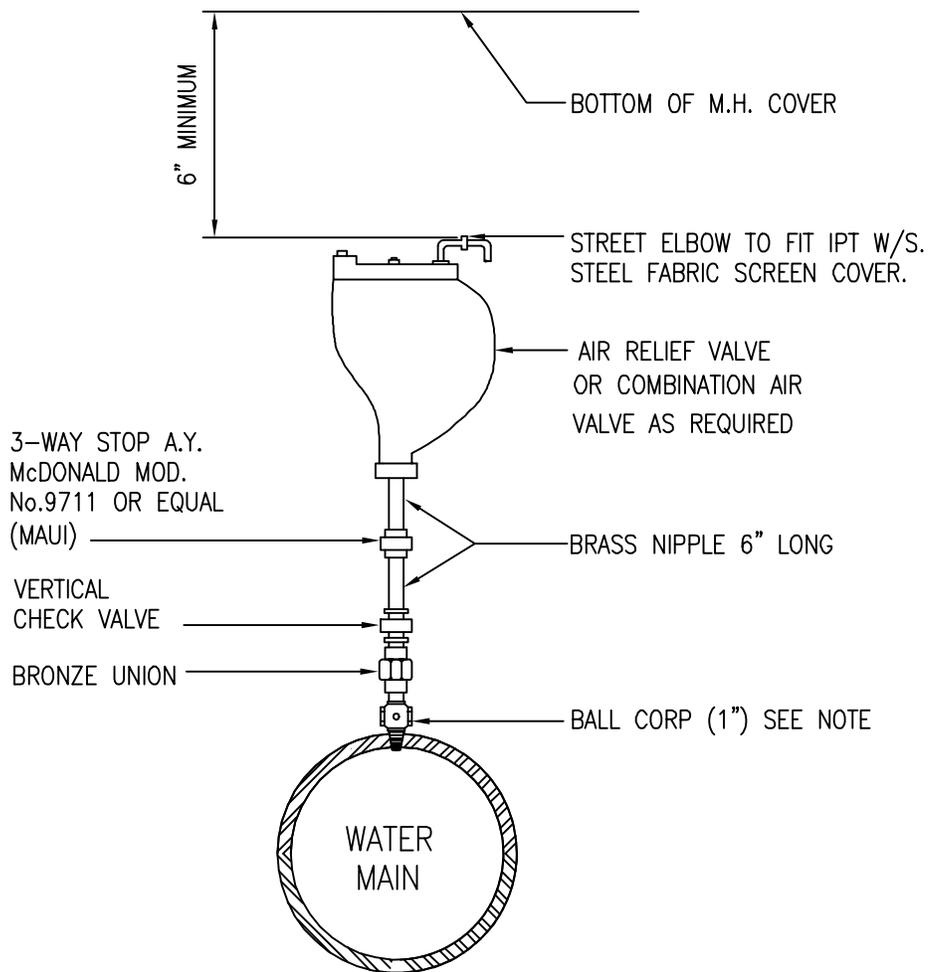
**MANHOLE INSTALLATION  
WITHIN PAVED AREAS**

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HAWAII	<b>1" AIR VALVE UNIT DETAIL</b>	STANDARD DETAILS	V1
SCALE: NTS			







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.

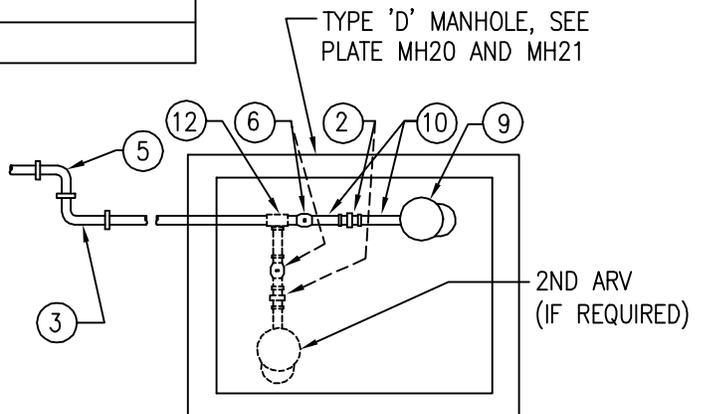
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OAHU MAUI	<b>AIR RELIEF VALVE CONNECTION</b> IN MANHOLE SCALE: NTS	STANDARD DETAILS	<b>V4</b>
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### LIST OF MATERIALS

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

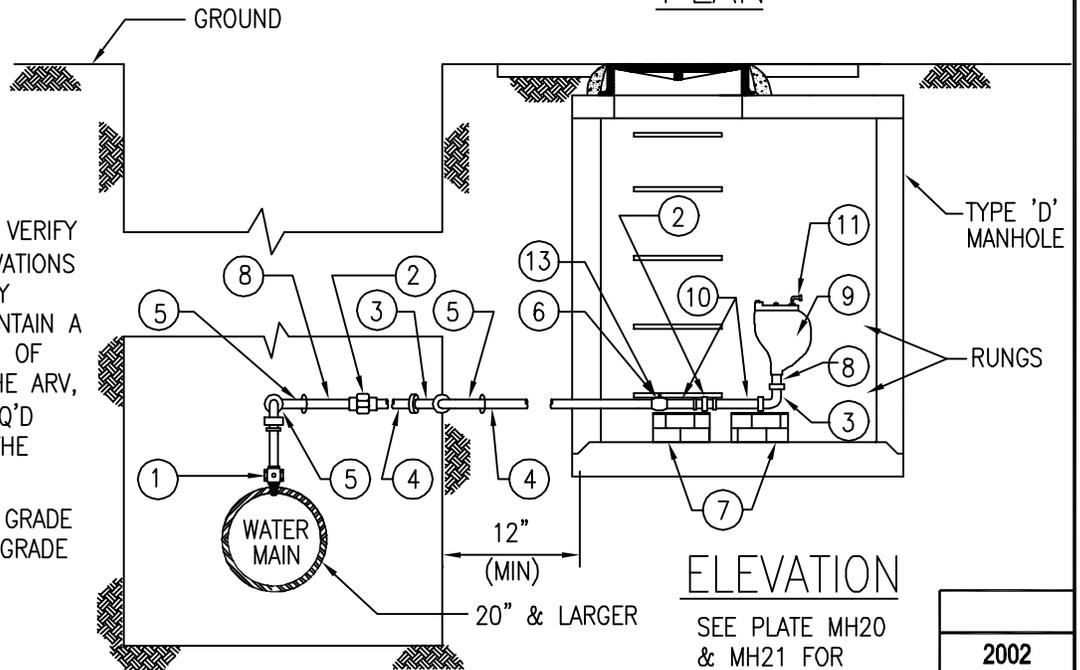
\* FOR MAUI ONLY



PLAN

**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.

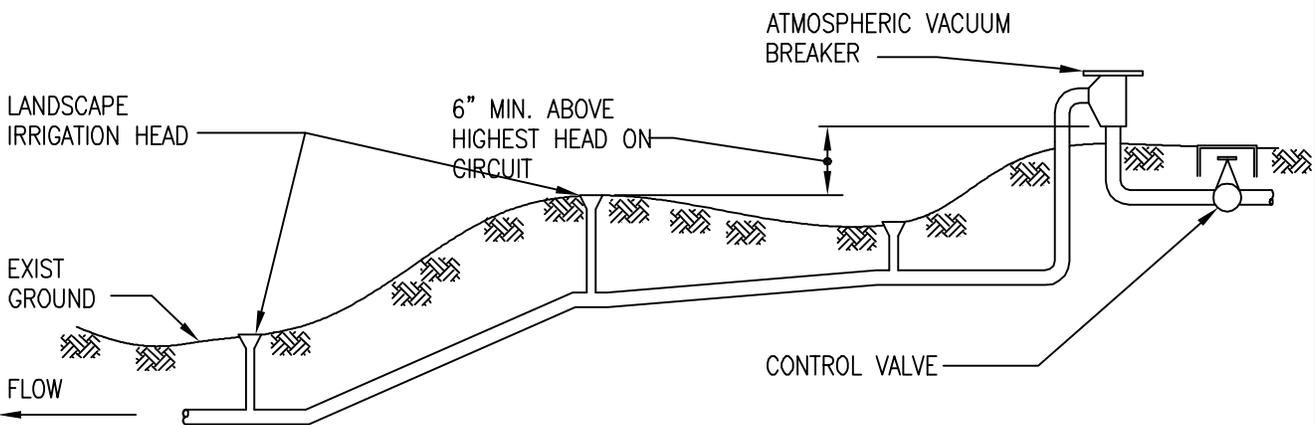
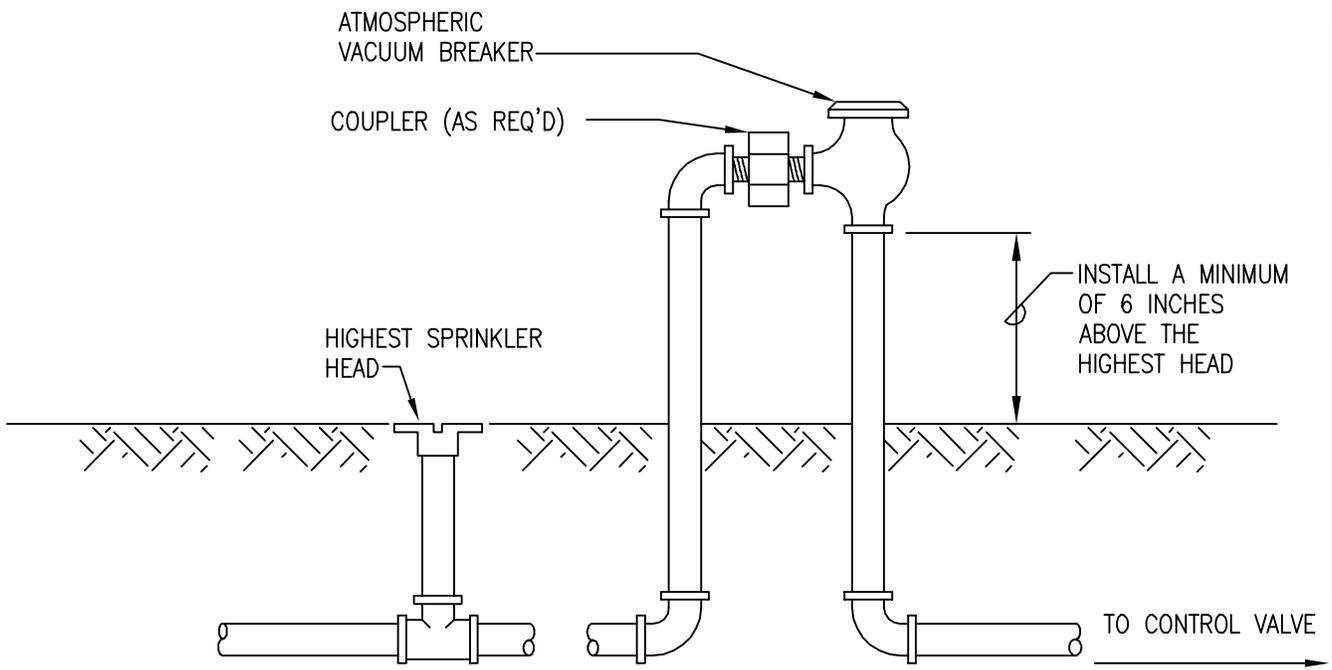


ELEVATION

SEE PLATE MH20  
& MH21 FOR  
REINFORCING DETAIL

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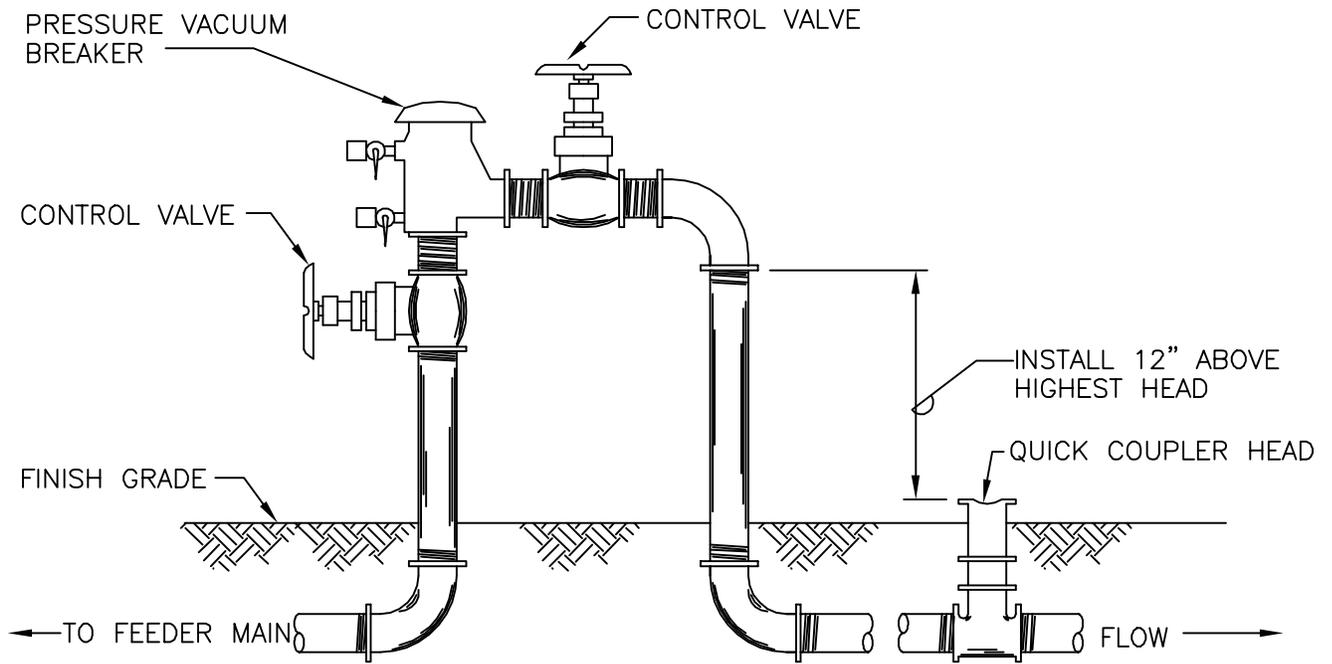


**NOTE:**

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.

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OAHU MAUI	<b>ATMOSPHERIC VACUUM BREAKER</b> LANDSCAPE IRRIGATION DETAIL SCALE: NTS	STANDARD DETAILS	V6
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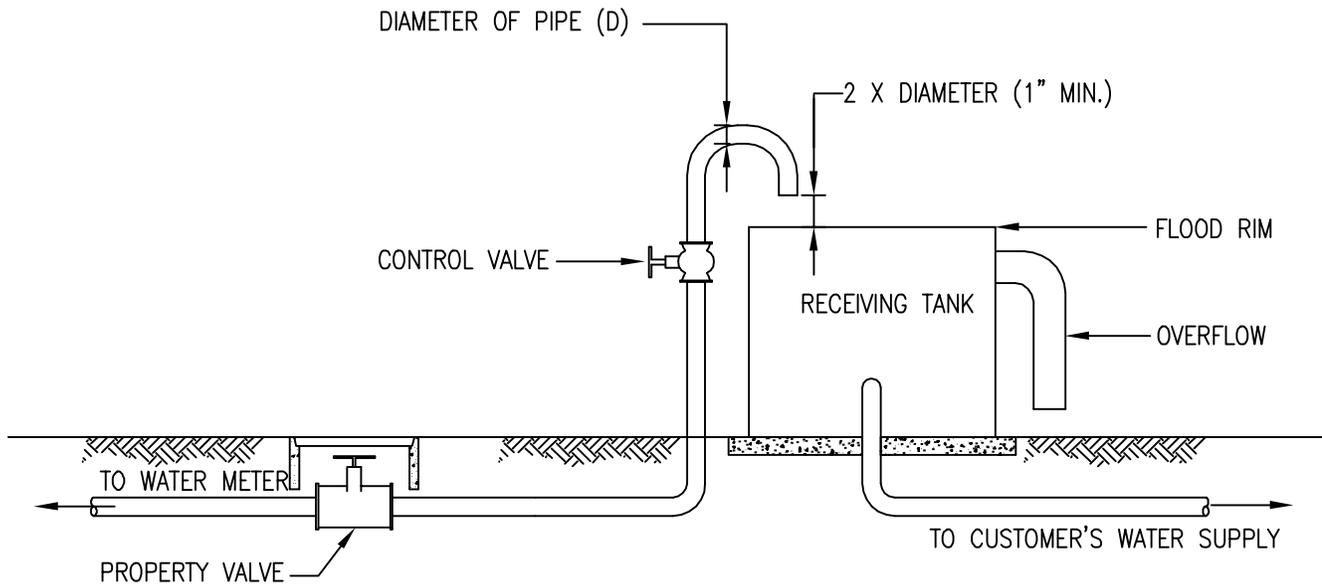


NOTES:

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.

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OAHU MAUI	<b>PRESSURE VACUUM BREAKER</b> LANDSCAPE IRRIGATION SCALE: NTS	STANDARD DETAILS	V7
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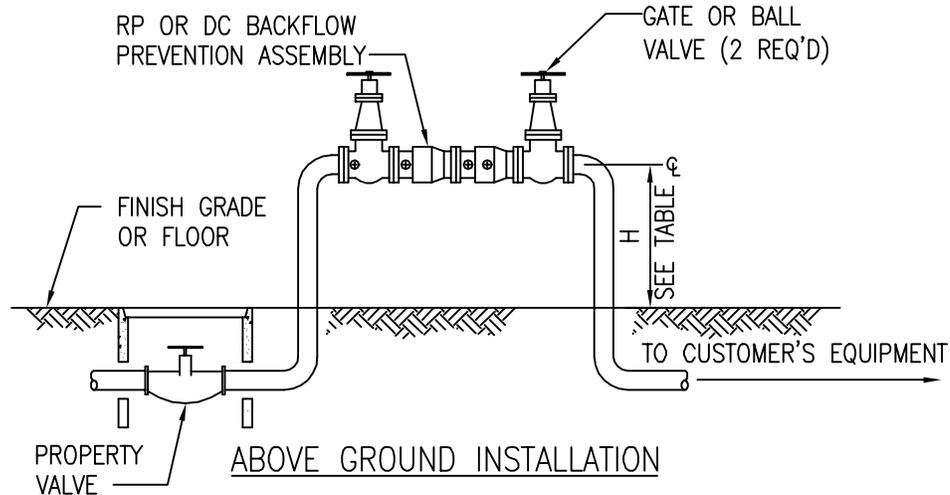
NOTE:

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

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KAUAI OAHU MAUI HAWAII	<b>AIR GAP</b> <b>TYPICAL DETAIL</b> SCALE: NTS	STANDARD DETAILS	<b>V8</b>
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SIZE (INCHES)	H (INCHES)
3/4 TO 1-1/2	18
2 TO 3	24
4 TO 6	30
8 TO 10	36



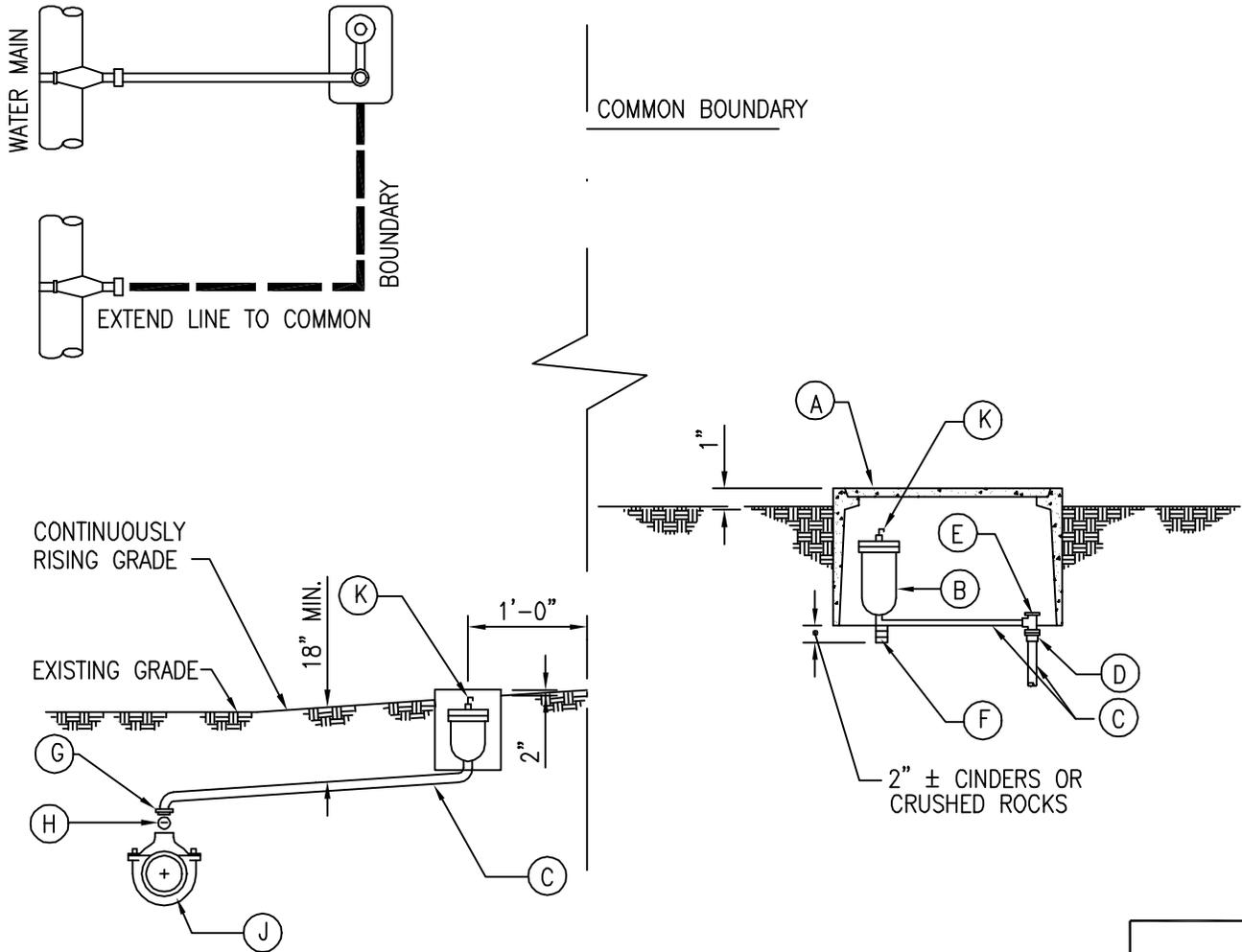
NOTES:

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.

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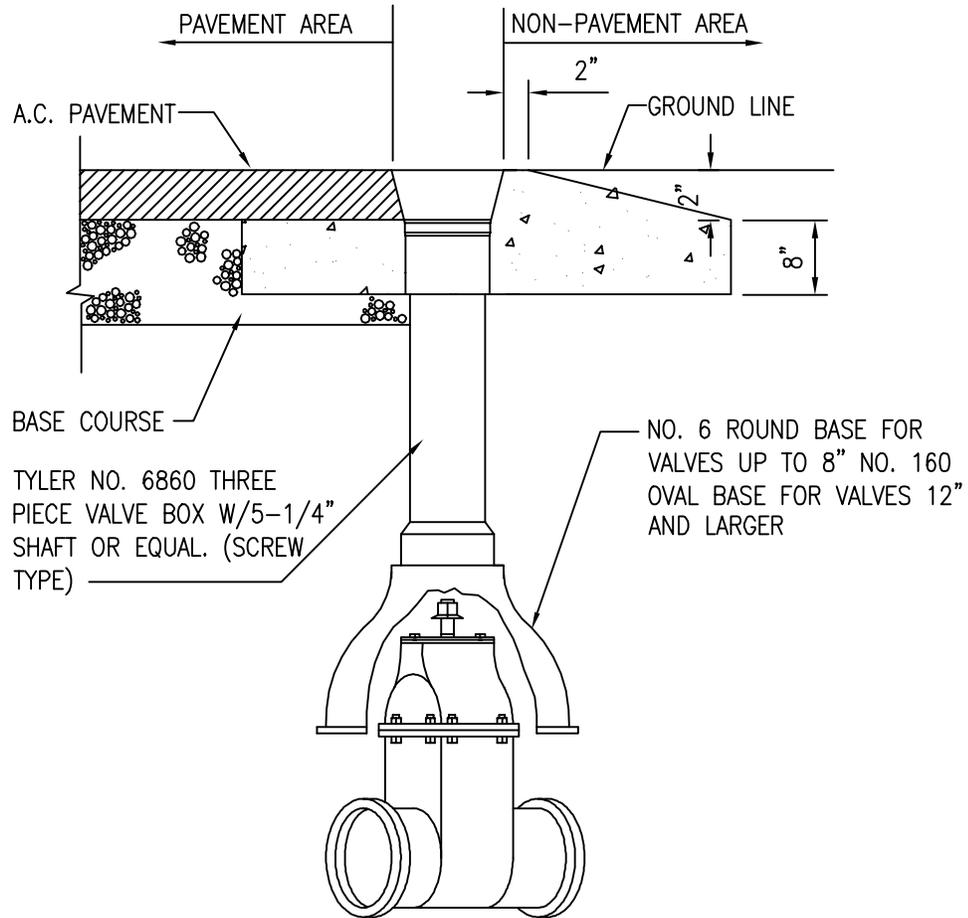
KAUAI OAHU MAUI HAWAII	<b>BACKFLOW PREVENTER</b> TYPICAL INSTALLATION SCALE: NTS	STANDARD DETAILS	V9
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ITEM	MATERIALS LIST
A	TYPE "X" METER BOX W/ CAST IRON COVER
B	1" PRESSURE AIR RELIEF VALVE
C	1" COPPER (TYPE "K", SOFT)
D	1" COPPER MALE ADAPTER
E	ANGLE BALL VALVE (FORD BAI1-344W 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



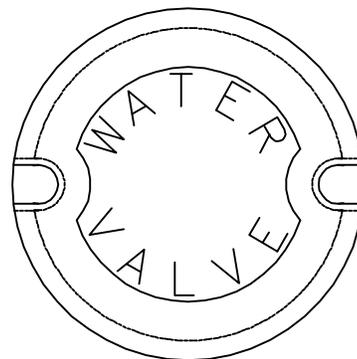
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REVISION

KAUAI	<b>AUTOMATIC PRESSURE RELIEF VALVE</b> SCALE: NTS	STANDARD DETAILS	V10
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PROFILE

FOR GATE VALVE, BEVEL  
GEARED GATE VALVE AND  
BUTTERFLY VALVES



COVER

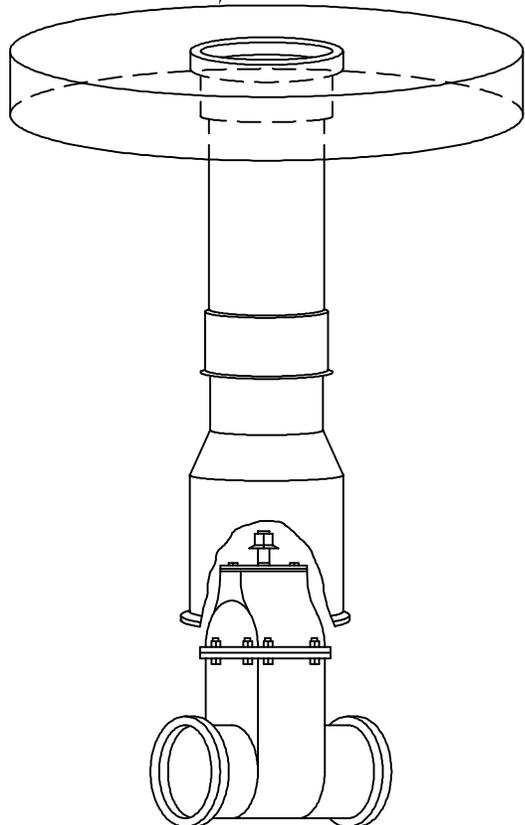
GENERAL NOTES:

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 X 4" THICK CONC. SETTLEMENT SLAB.
3. COVER TO BE DROP LID COVER.

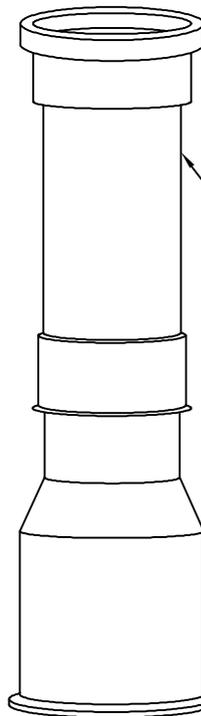
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KAUAI	<b>CAST IRON VALVE BOX DETAILS</b>	STANDARD DETAILS	V11
SCALE: NTS			

36" DIA x8" CONC. COLLAR  
IN ROADWAY 48"x48"x8" SLAB  
W/ W.W.F. REINFORCEMENT IN  
NON-ROAD AREA

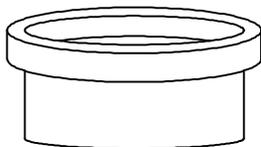


STANDARD DROP  
5-1/4" LID,  
MARKED "WATER"

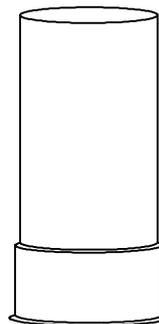


TYLER PIPE  
SERIES 6855, OR  
APPROVED EQUAL

TWO-PIECE  
VALVE BOX,  
HEIGHT TO SUIT



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



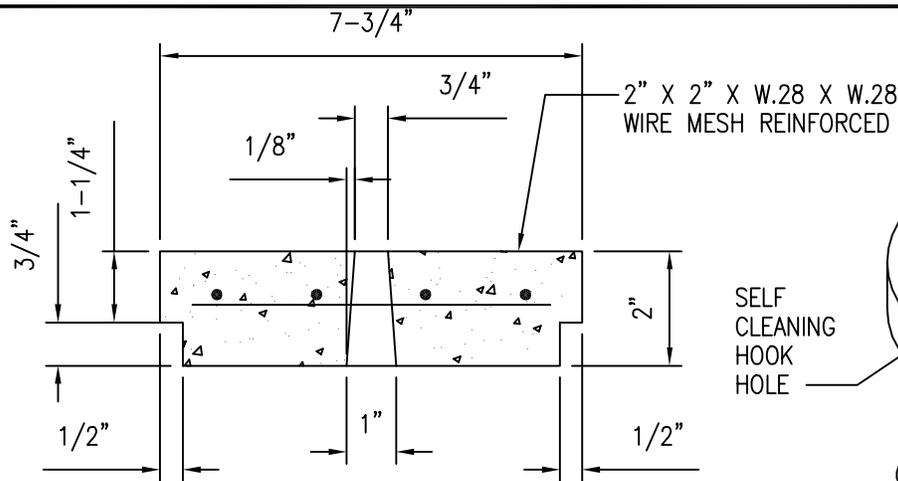
EXTENSION PIECE  
60-A

NOTES:

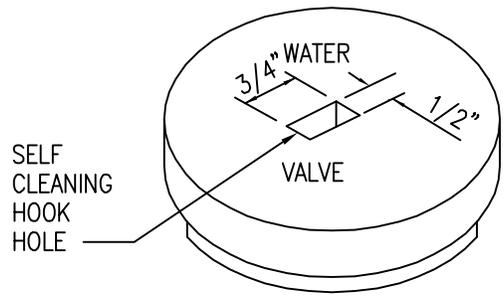
1. VALVE BOX ASSEMBLY TO BE CAST IRON.
2. MODEL NUMBERS REFER TO TYLER PIPE CATALOG.
3. MAXIMUM 4' DEPTH TO VALVE OPERATOR NUT.

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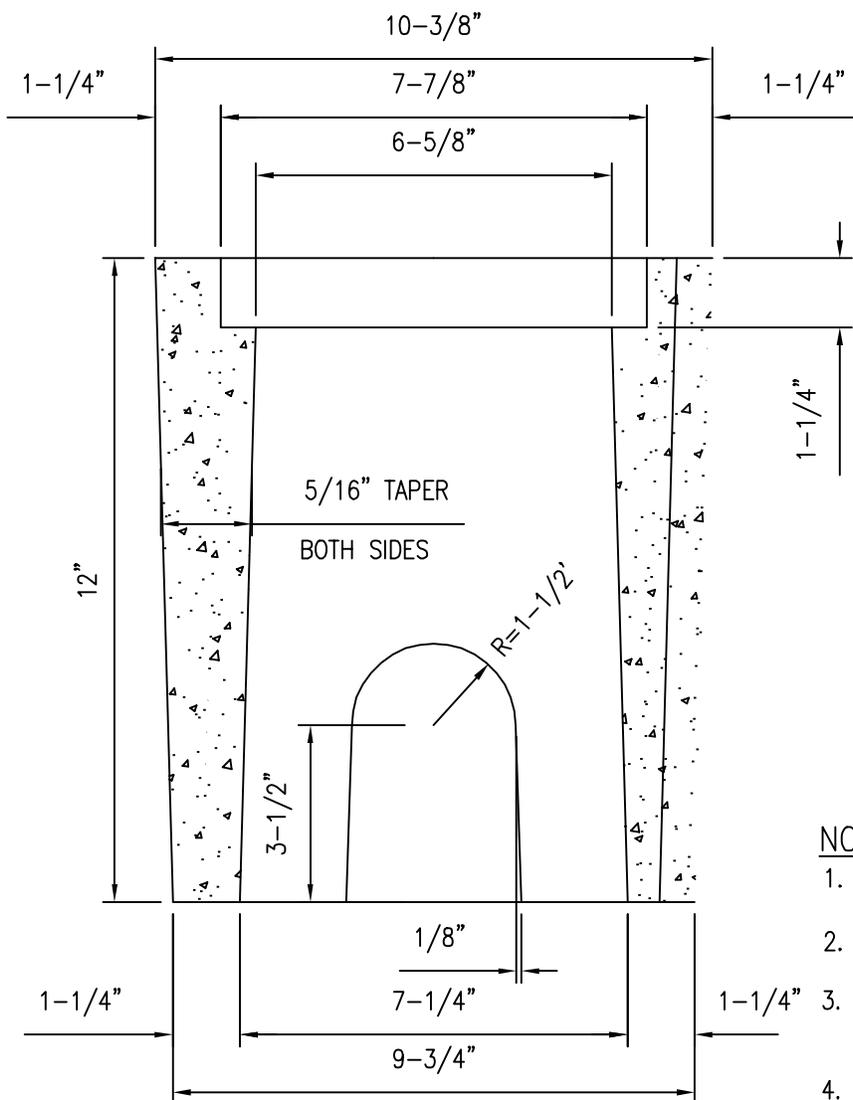
MAUI	<b>6" SLIDING VALVE BOX ASSEMBLY</b>	STANDARD DETAILS	V12
SCALE: NTS			



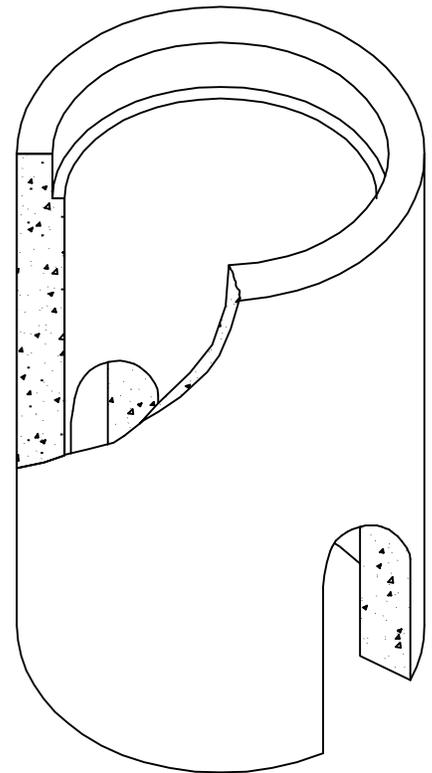
SECTION OF COVER



CONCRETE COVER



SECTION OF BOX

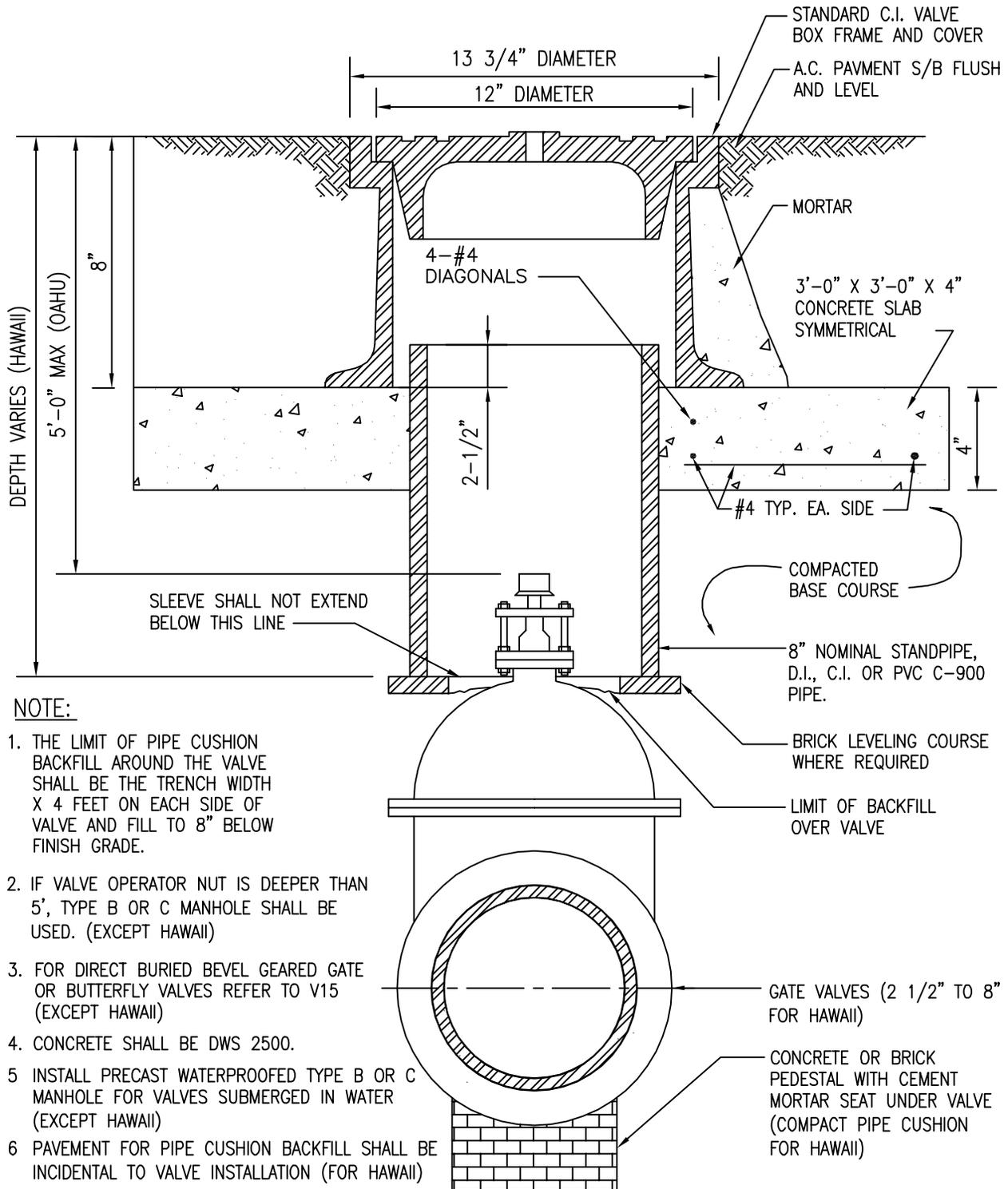


CONCRETE BOX

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)

KAUAI OAHU HAWAII	<b>TYPE "A" VALVE BOX</b>	STANDARD DETAILS	2002
			REVISION
SCALE: NTS			<b>V13</b>

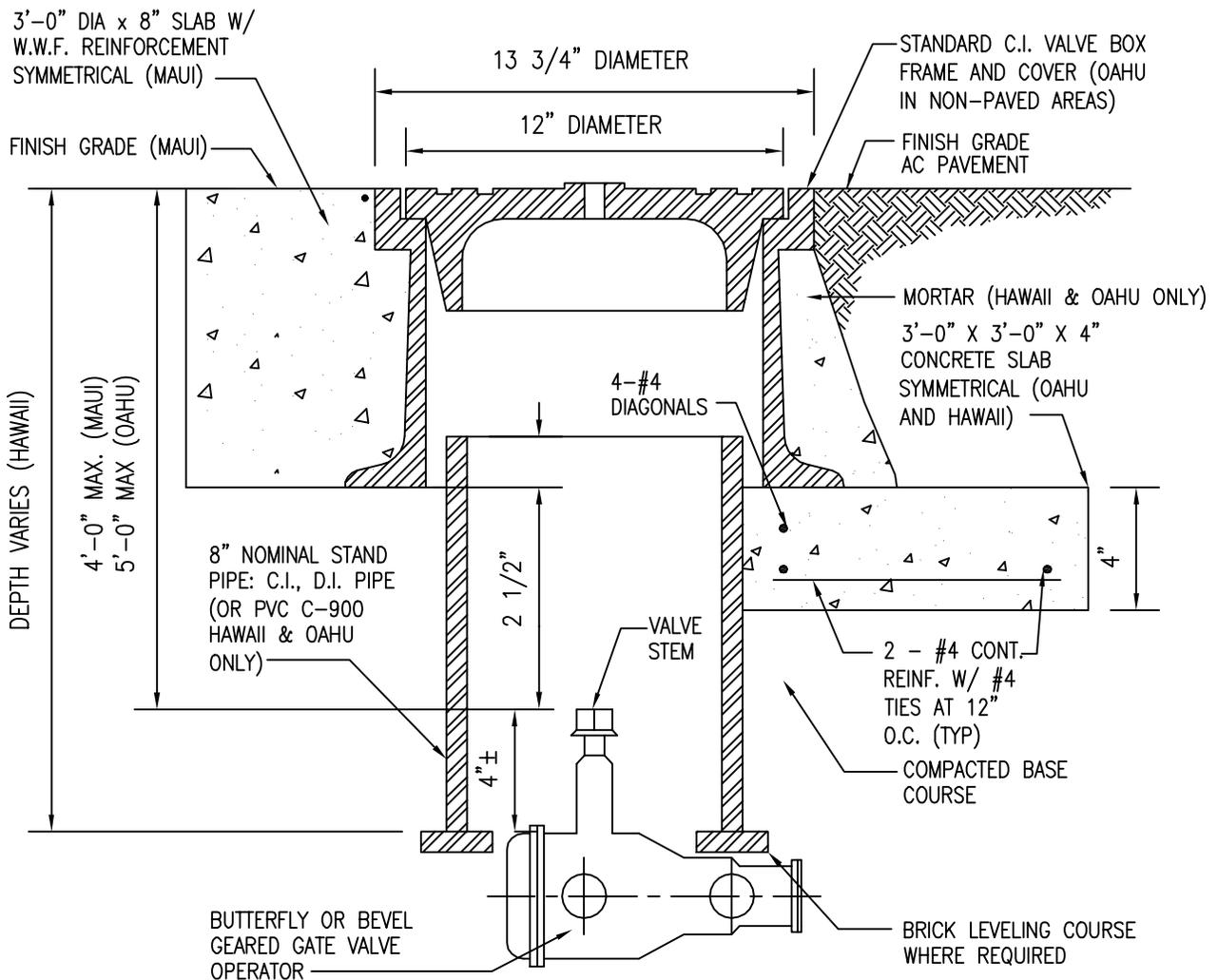


**NOTE:**

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)

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OAHU HAWAII	<b>12" VALVE BOX INSTALLATION</b> FOR GATE VALVE SCALE: NTS	STANDARD DETAILS	V14
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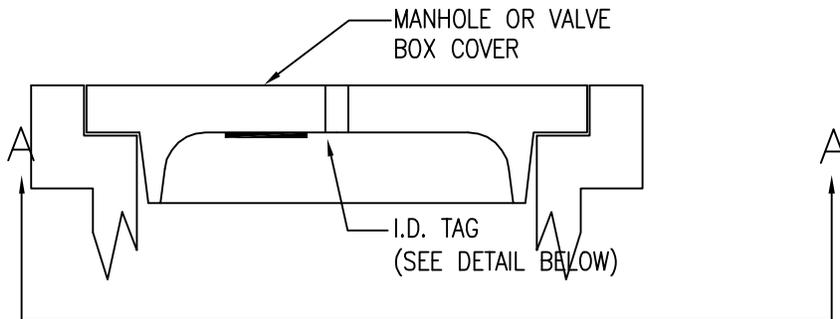


**NOTE:**

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	<b>12" VALVE BOX INSTALLATION</b> FOR VALVE OPERATORS SCALE: NTS	STANDARD DETAILS	V15

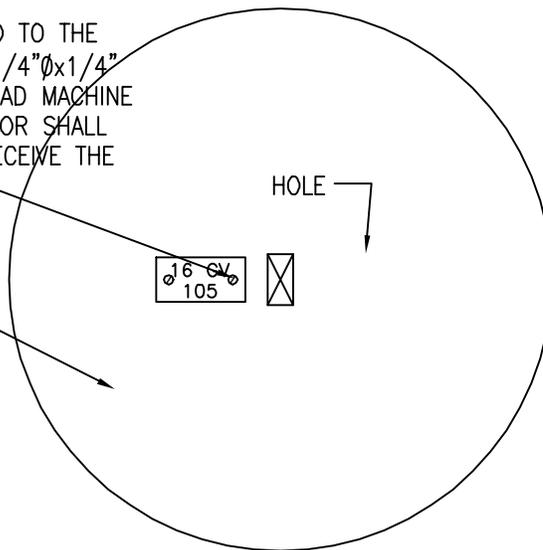




SECTION

TAG SHALL BE SCREWED TO THE COVER WITH TWO (2), 1/4"Øx1/4" LONG BRASS ROUND HEAD MACHINE SCREWS. THE CONTRACTOR SHALL TAP THE COVERS TO RECEIVE THE SCREWS.

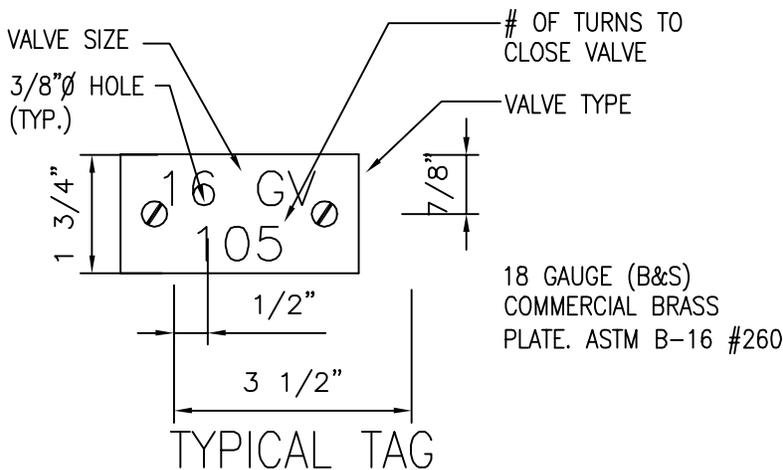
MANHOLE OR VALVE BOX COVER



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.

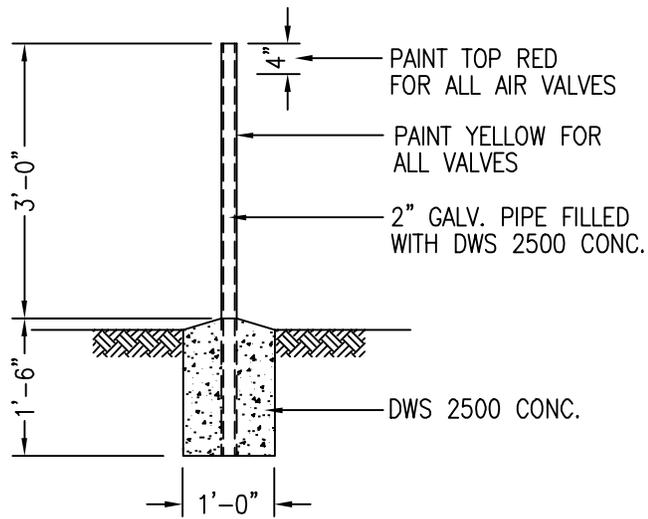


VALVE TYPE ABBREVIATIONS

GATE VALVE	GV
BEVEL GEARED GATE VALVE	BGGV
BUTTERFLY VALVE	BV

2002
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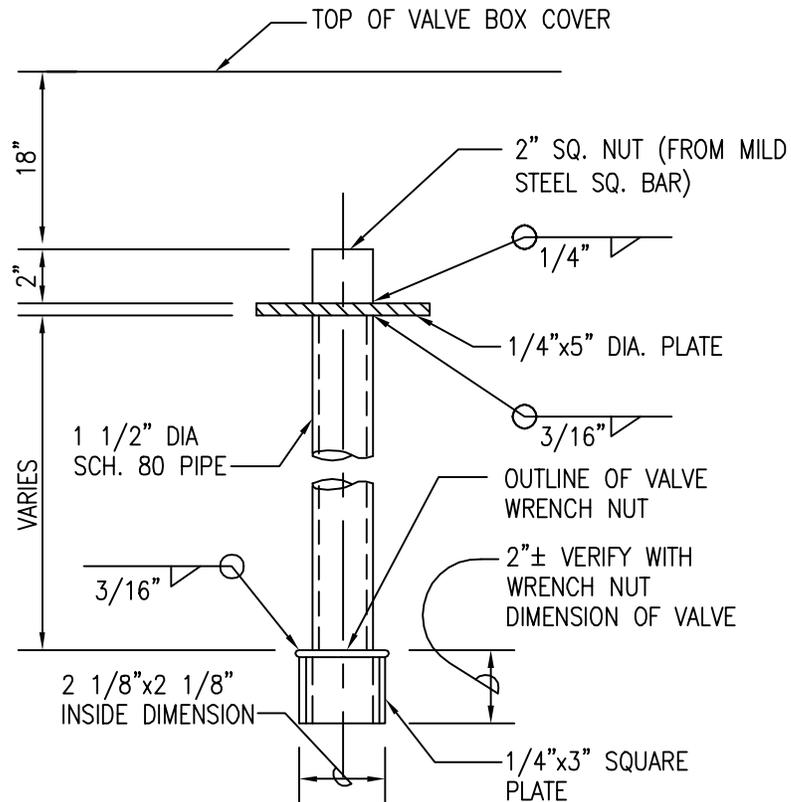
OAHU HAWAII	<b>IDENTIFICATION TAG FOR MANHOLE OR VALVE BOX COVER</b> SCALE: NTS	STANDARD DETAILS	V17
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DETAIL OF VALVE MARKER

2002
REVISION

KAUAI OAHU MAUI	<b>VALVE MARKER</b> SCALE: NTS	STANDARD DETAILS	<b>V18</b>
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VALVE NUT EXTENSION DETAIL

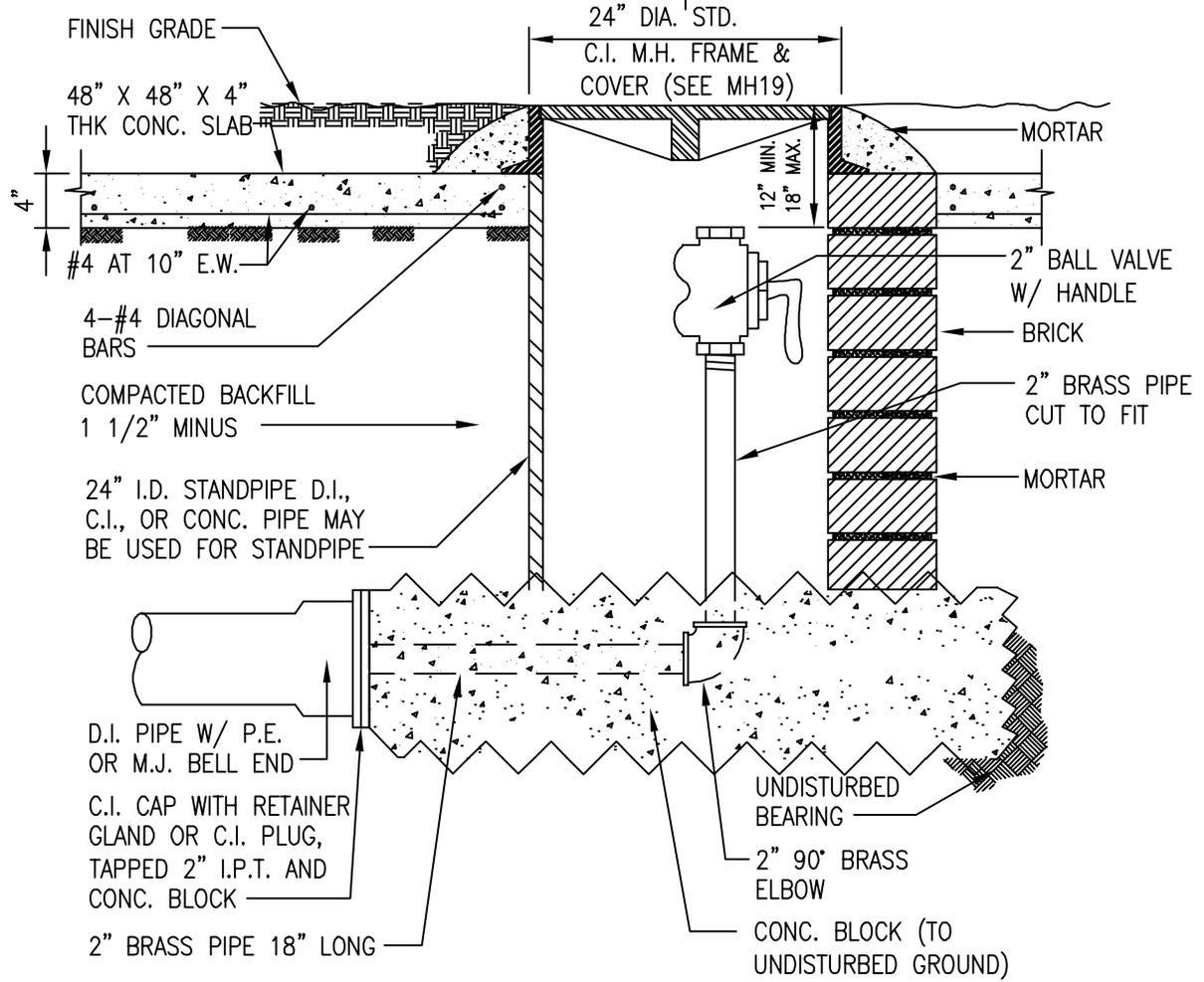
NOTE:

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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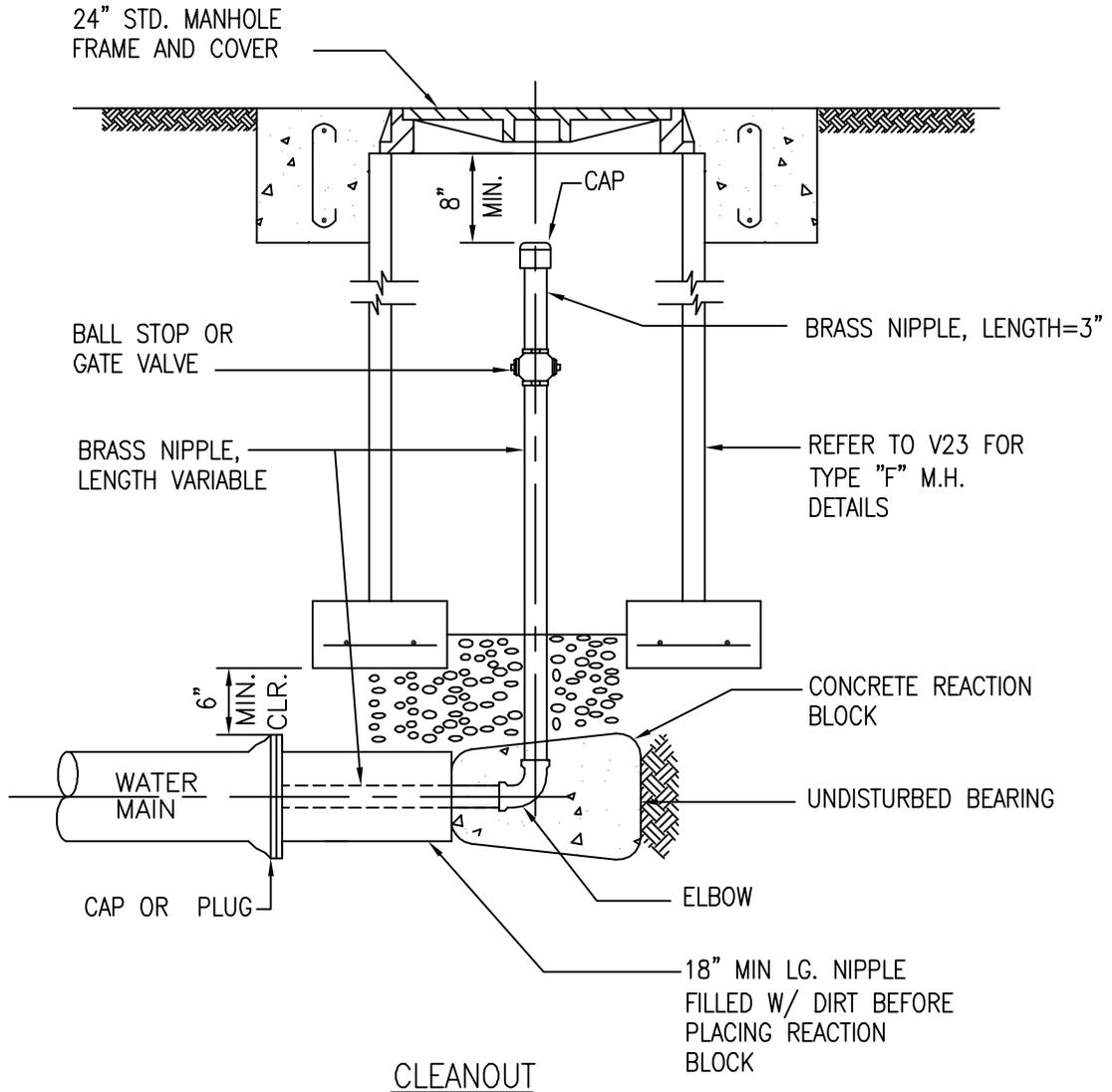
KAUAI MAUI HAWAII	<b>VALVE NUT EXTENSION</b>  SCALE: NTS	STANDARD DETAILS	V19
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TYPICAL MANHOLE WITH 24" I.D. STANDPIPE    TYPICAL MANHOLE WITH BRICKS AND MORTAR  
 SEE V1 FOR INSTALLATION WITHIN PAVED AREAS.



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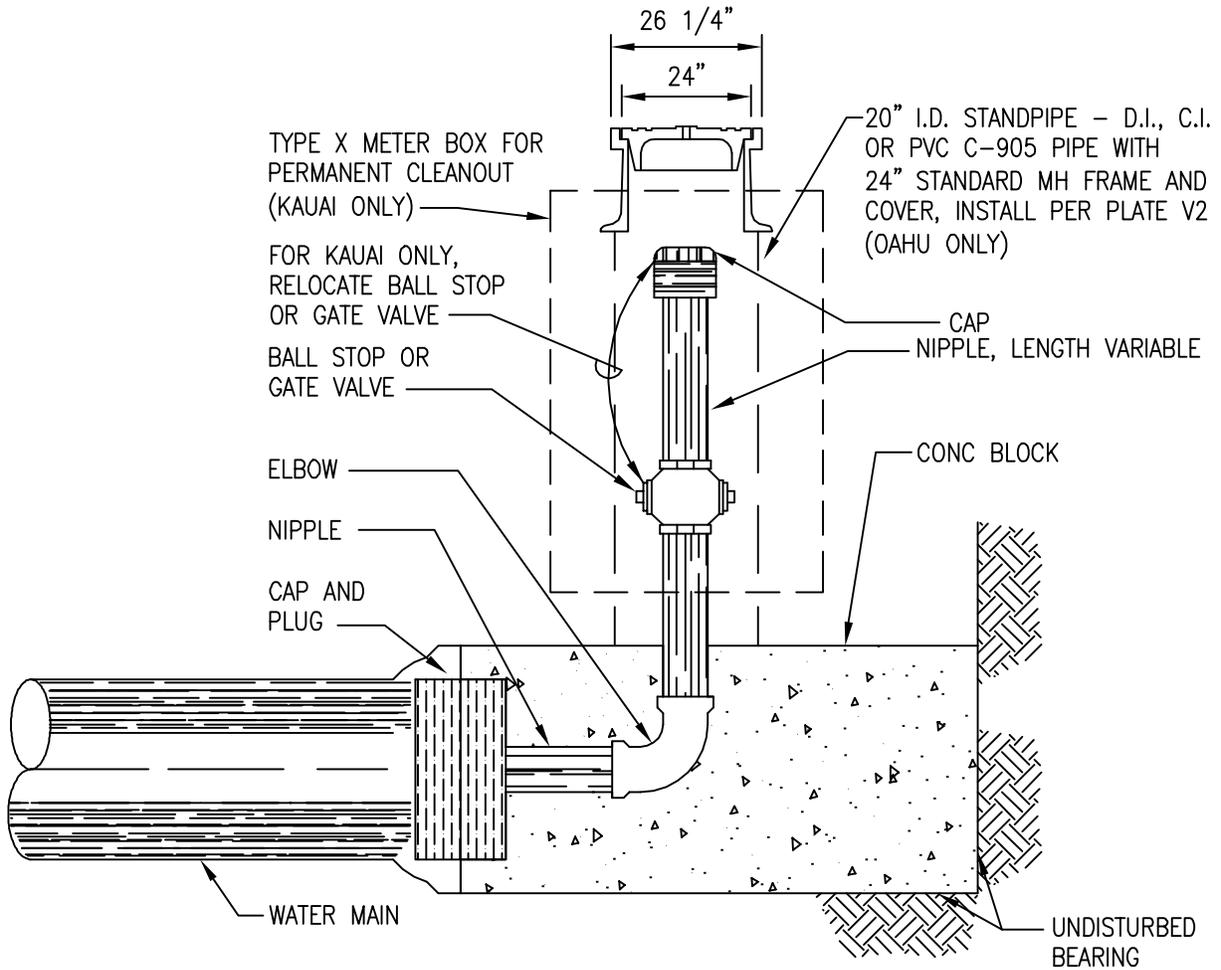
HAWAII	<b>2" CLEANOUT AT DEAD ENDS</b>	STANDARD DETAILS	V20
SCALE: NTS			



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	<b>CLEANOUT</b> SCALE: NTS	STANDARD DETAILS	V21
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TYPICAL DETAIL OF CLEANOUT

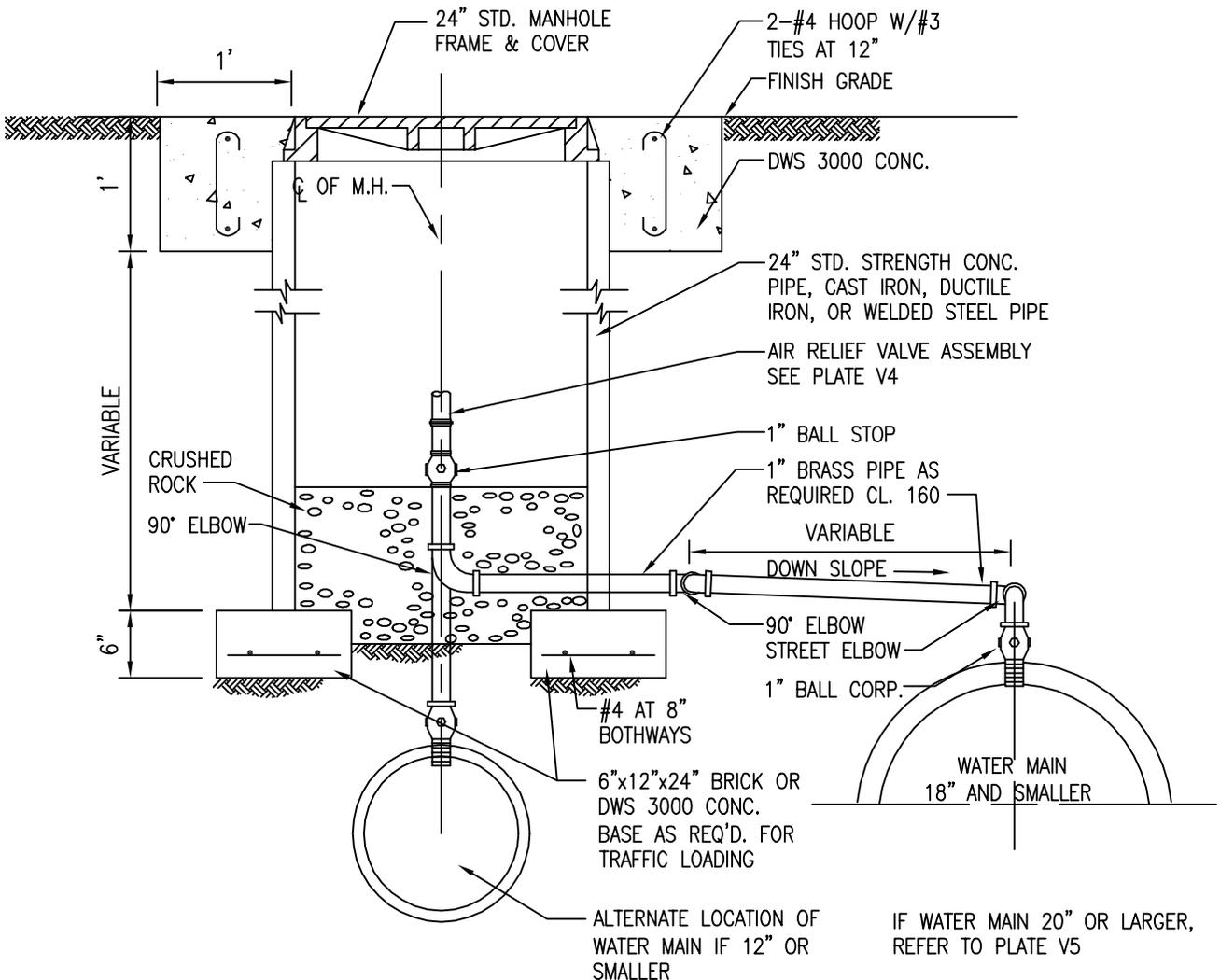
SCHEDULE OF CLEANOUTS		MATERIAL
PIPE SIZE	CLEANOUT SIZE	TYPE OF PIPE
8" & SMALLER	2 1/2"	BRASS
12" TO 20"	4"	GALV.
24" & LARGER	6"	GALV.

**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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KAUAI OAHU	<b>CLEANOUTS AND RISER</b>  SCALE: NTS	STANDARD DETAILS	V22
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SECTION THROUGH MANHOLE

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

2002
REVISION

MAUI	<b>ARV INSTALLATION TYPE "F" MANHOLE</b>	STANDARD DETAILS	V23
SCALE: NTS			