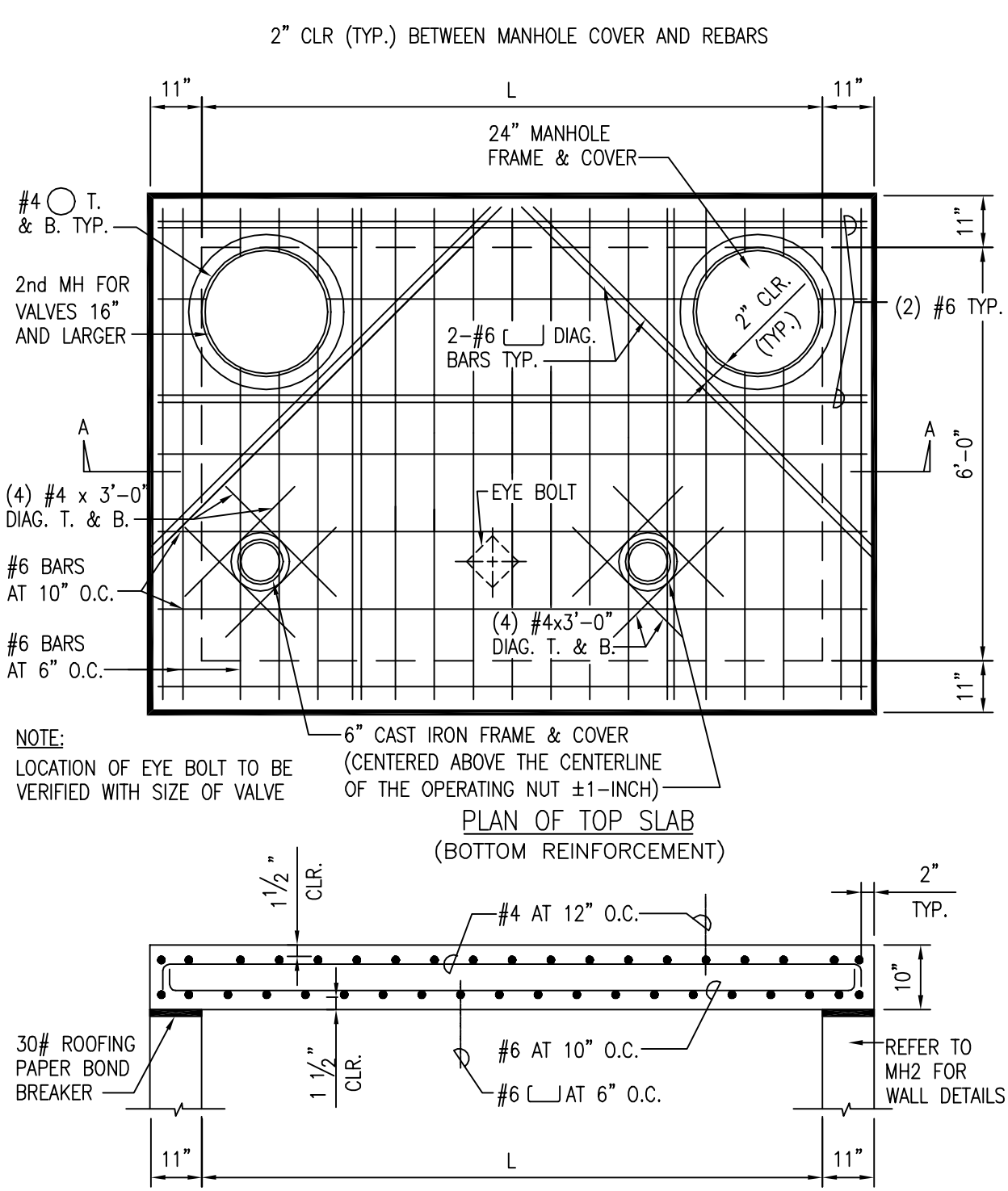
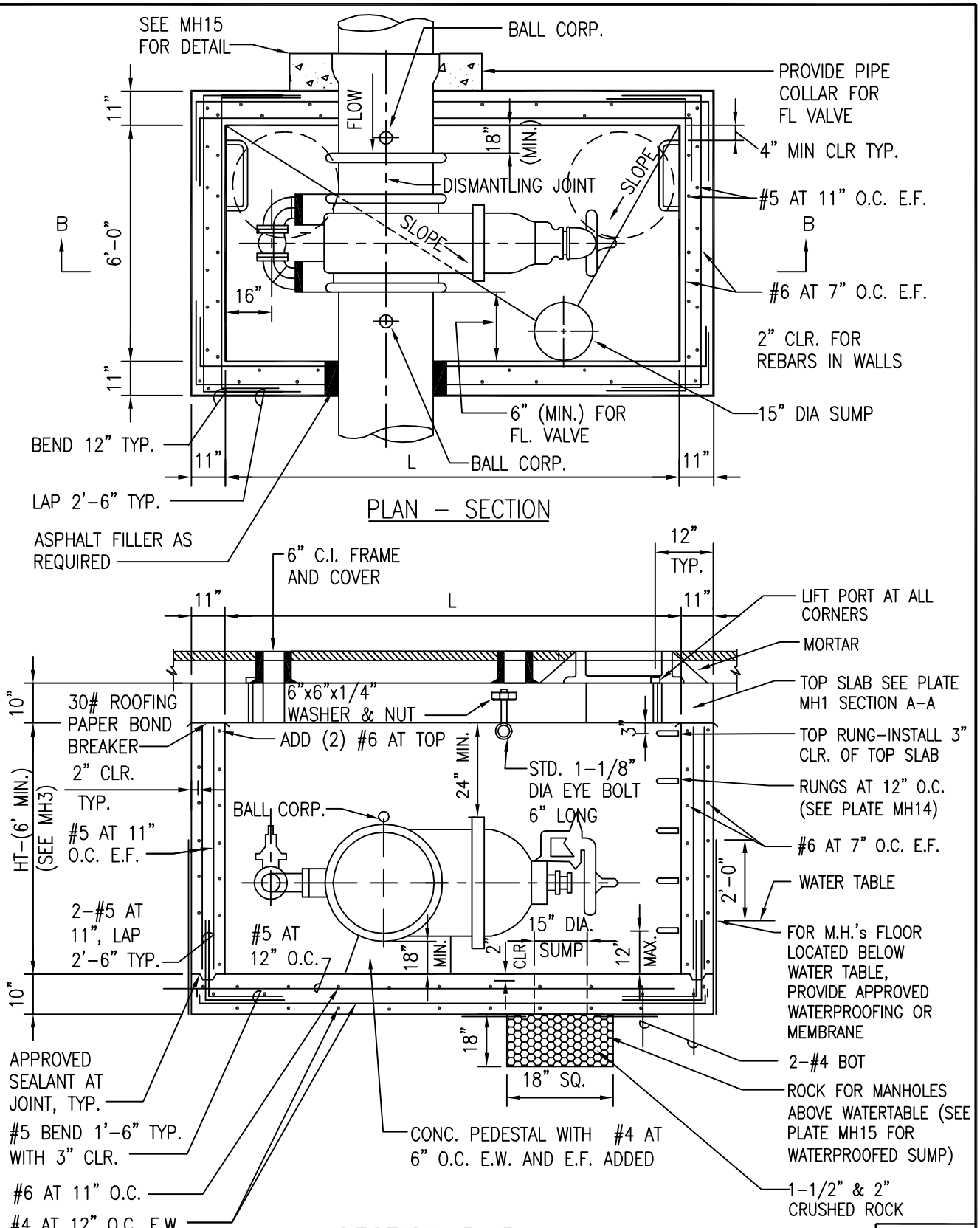


SEE PLATE MH3
FOR NOTES & TABLE

CAST-IN-PLACE TOP SLAB

	2002
	REVISION

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



2002
REVISION

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

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

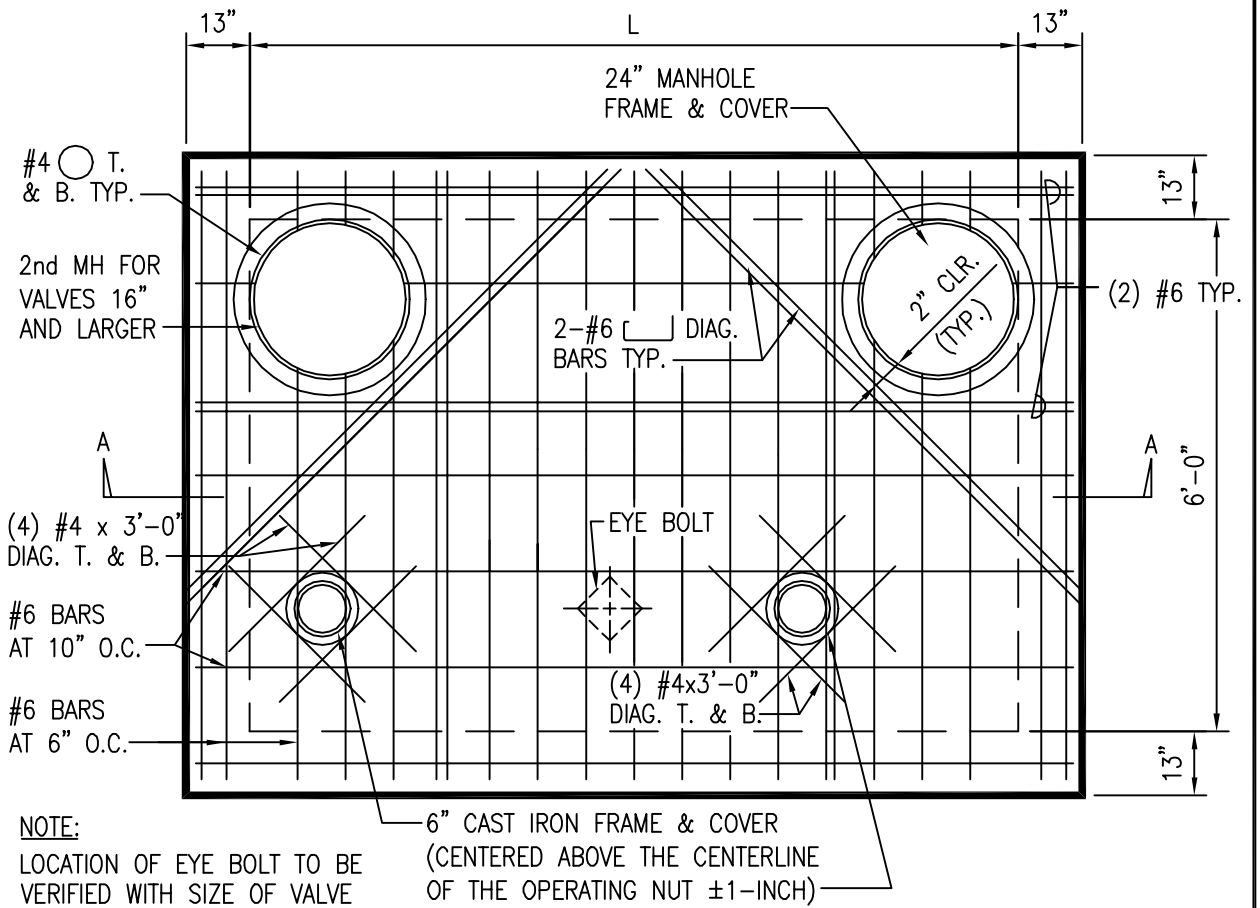
1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2. REFER TO PLATES MH12, MH13, MH14, MH15, MH16, MH17 AND V3 FOR ADDITIONAL DETAILS.
3. REFER TO SECTION 302.16 AND TABLE 300-5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.
4. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET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

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

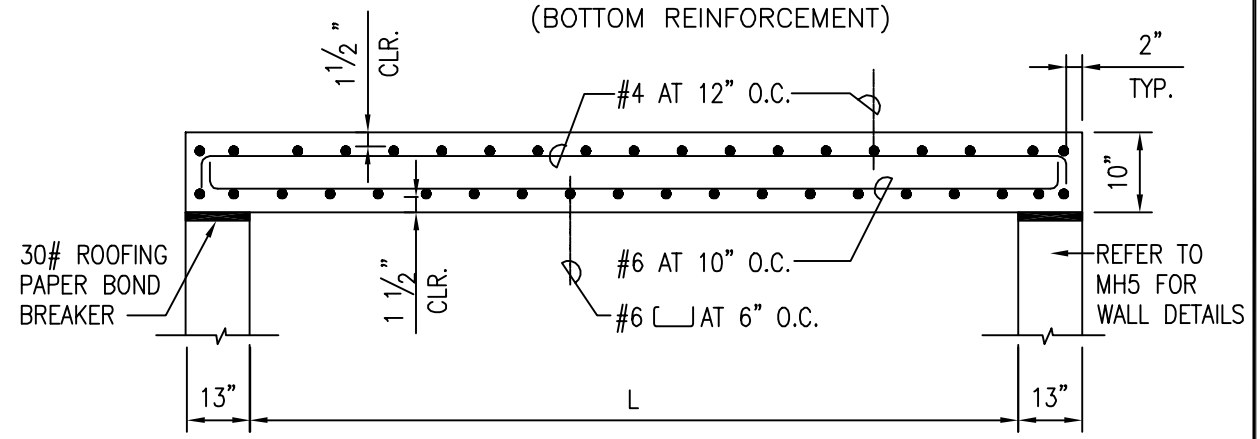
* SEE MH25 FOR OVERSIZED TOP SLAB DETAIL

	2002
	REVISION

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



PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)



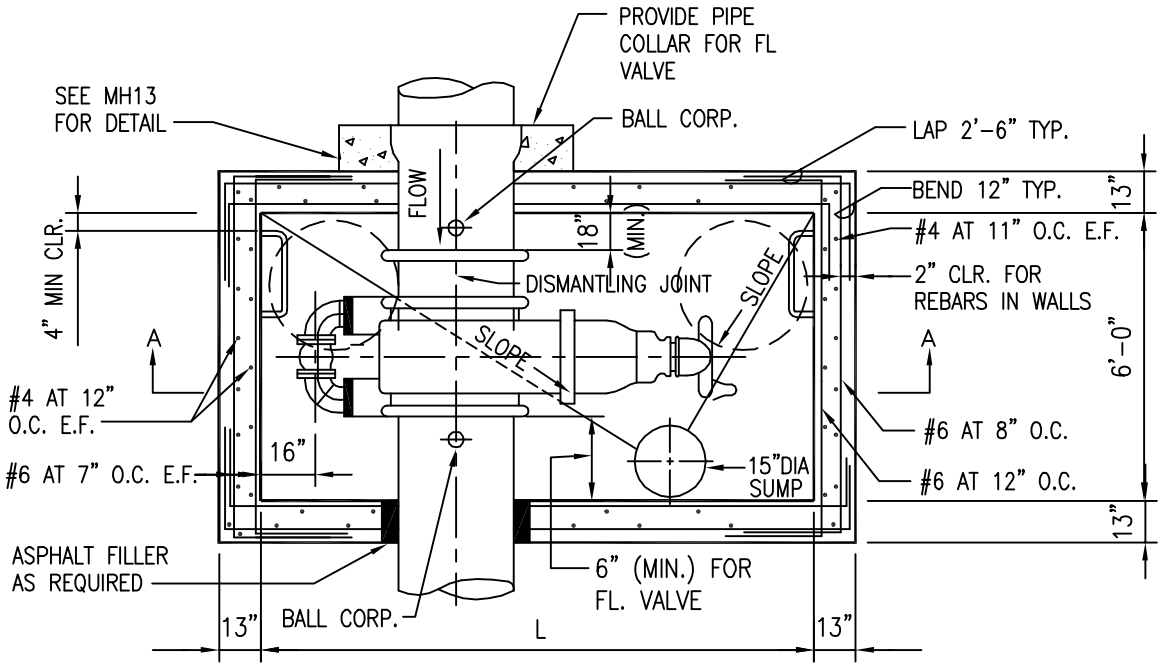
SECTION A-A

PRECAST TOP SLAB

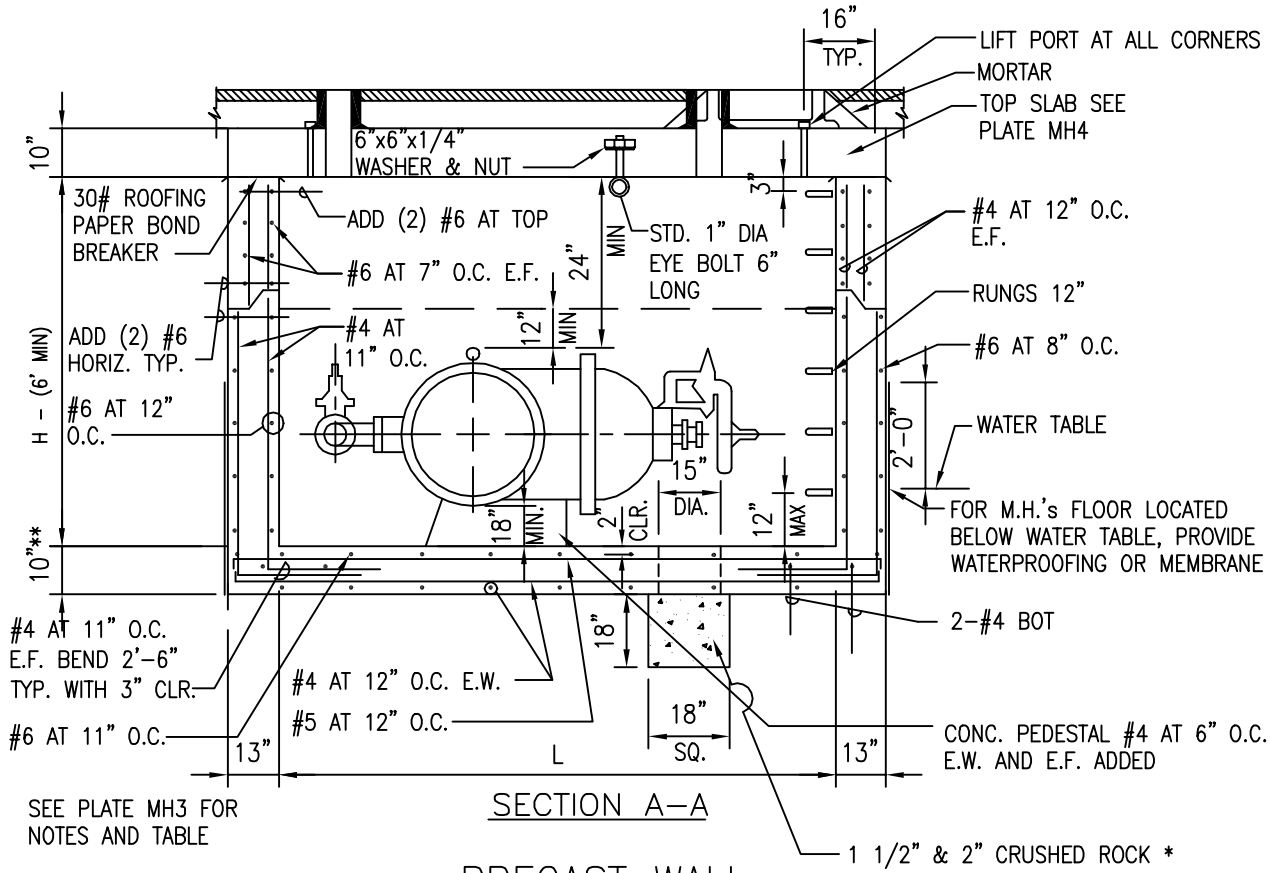
SEE PLATE MH3
FOR NOTES & TABLE

2002
REVISION

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



PLAN – SECTION



SECTION A–A

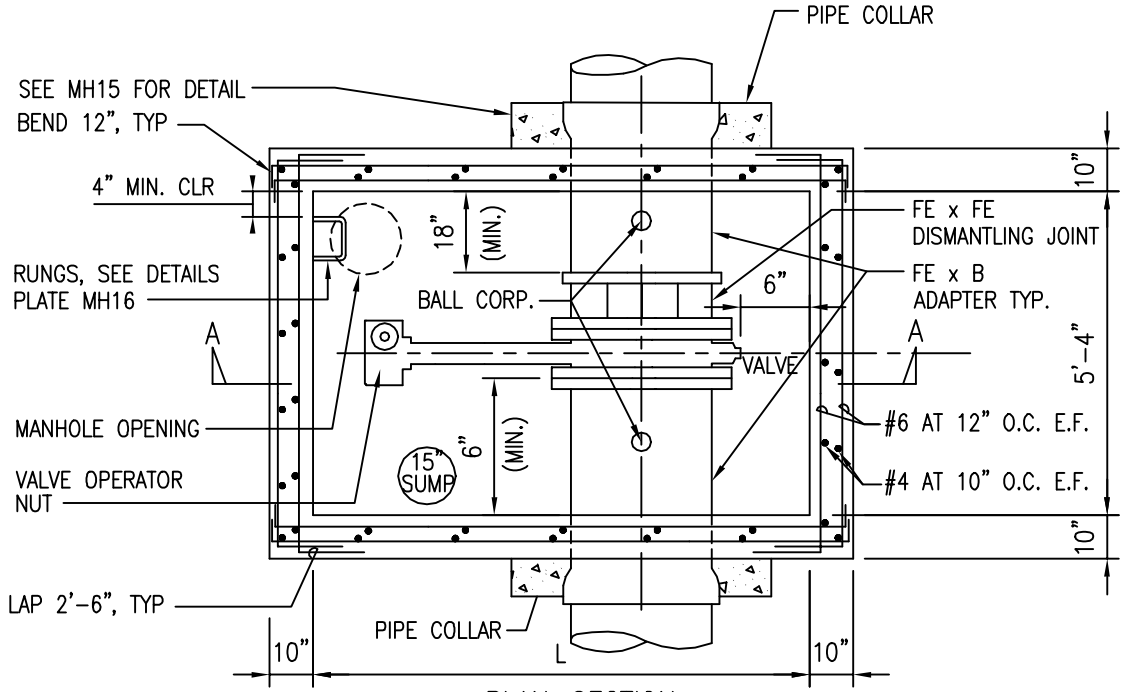
PRECAST WALL

* SEE PLATE MH12 FOR WATERPROOFED SUMP

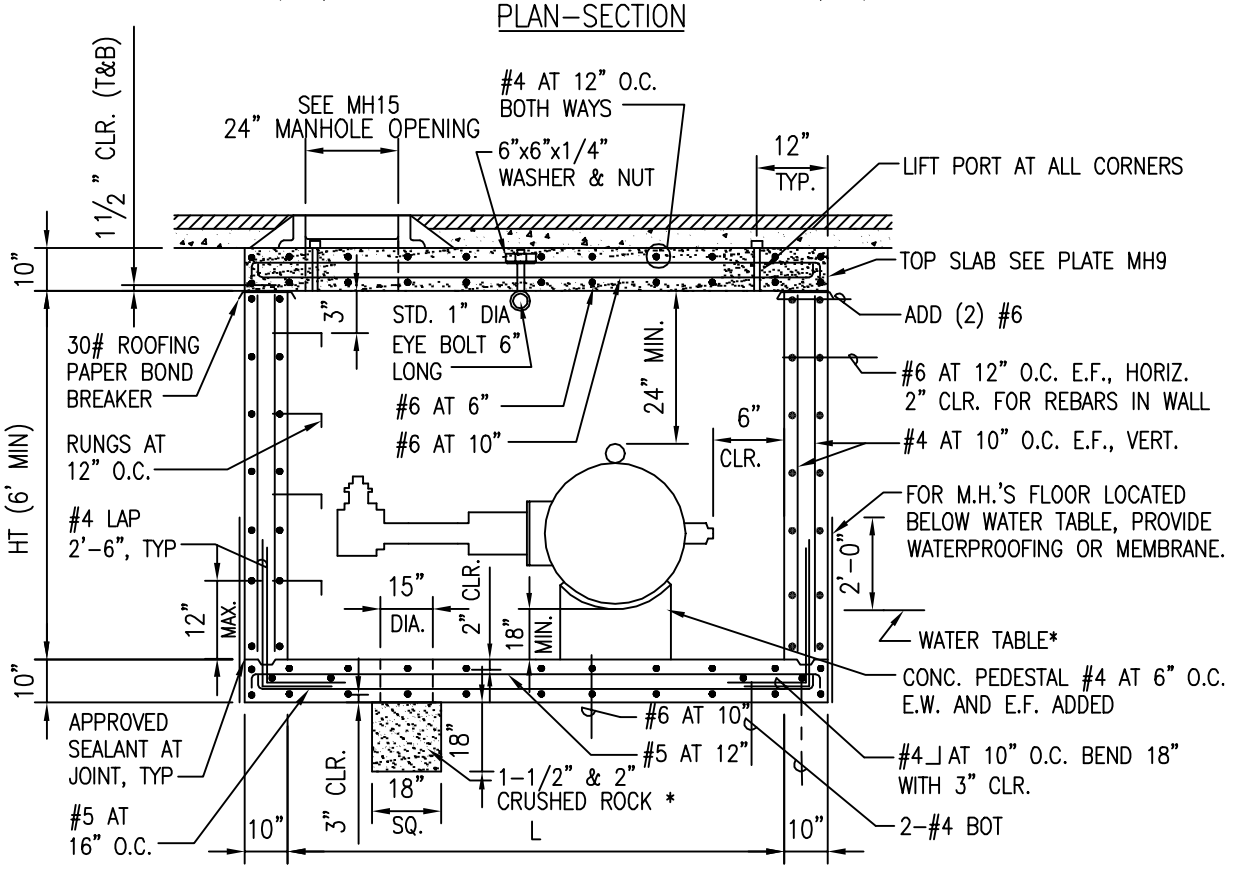
** 14" FOR WATERPROOF CONDITION

2002
REVISION

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



PLAN–SECTION



SECTION A–A

CAST–IN–PLACE WALL

* (SEE PLATE MH15 FOR WATERPROOFED SUMP)

SEE PLATE MH7 FOR NOTES AND TABLE

2002

REVISION

KAUAI
OAHU
MAUI

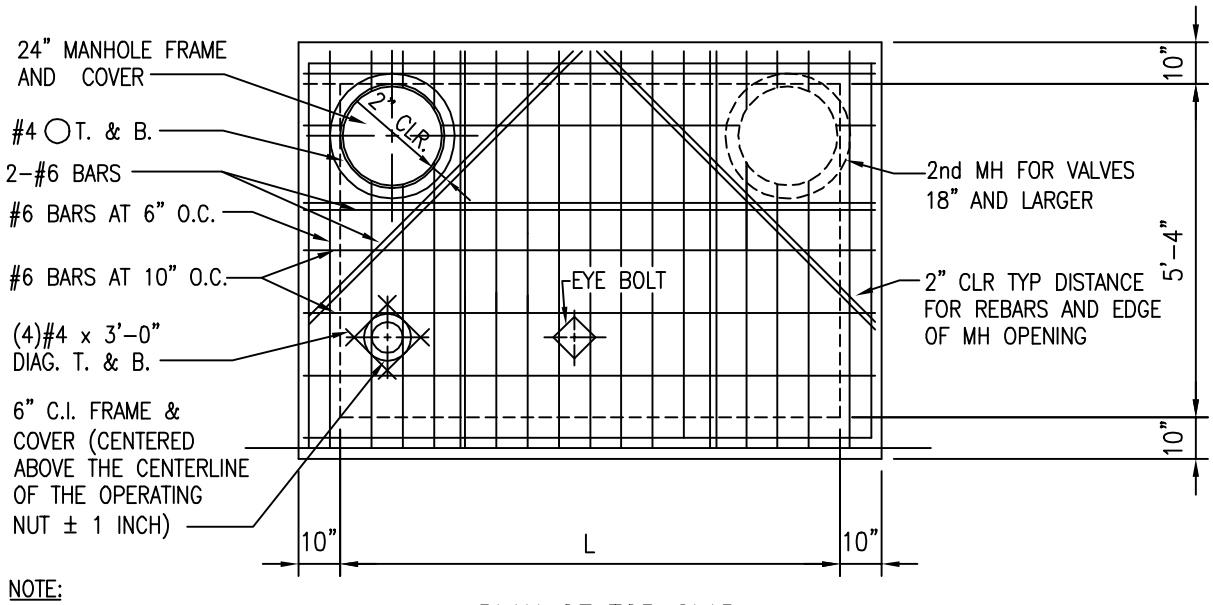
TYPE "A" MANHOLE (TRAFFIC)

FOR BUTTERFLY VALVES, CAST-IN-PLACE

SCALE: NTS

STANDARD DETAILS

MH6



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

PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

CAST-IN-PLACE TOP SLAB

NOTES: FOR CAST-IN-PLACE WALL MH

1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.

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

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

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

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

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

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

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

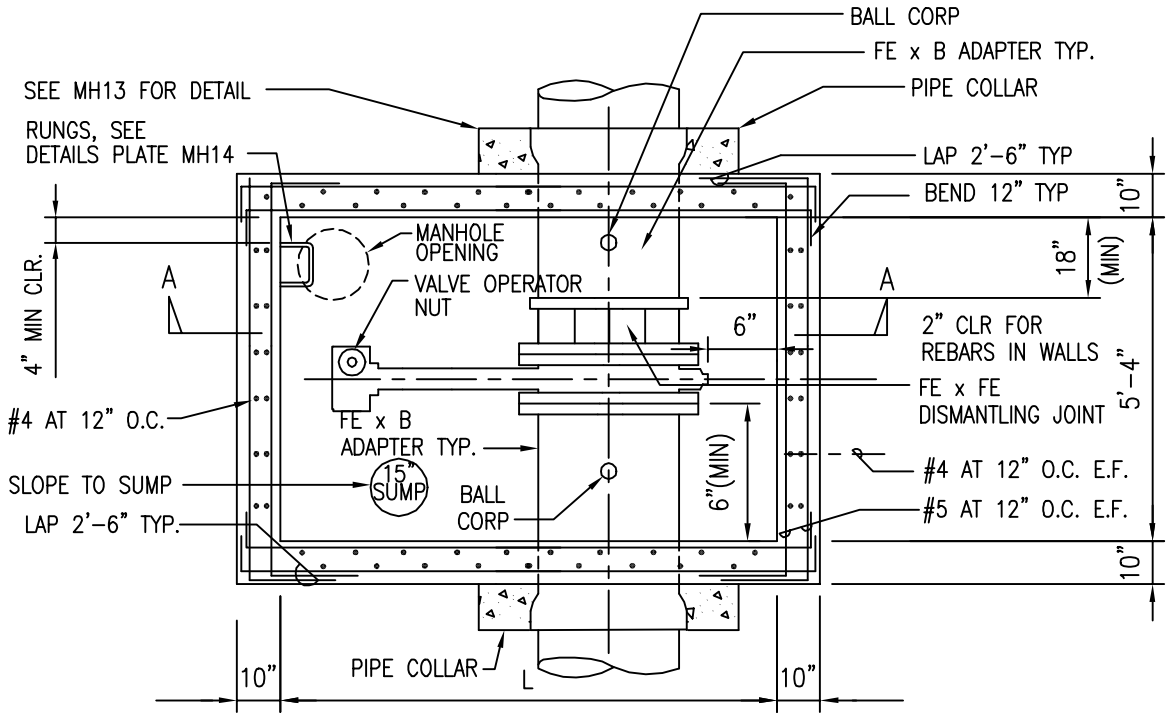
9 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED

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

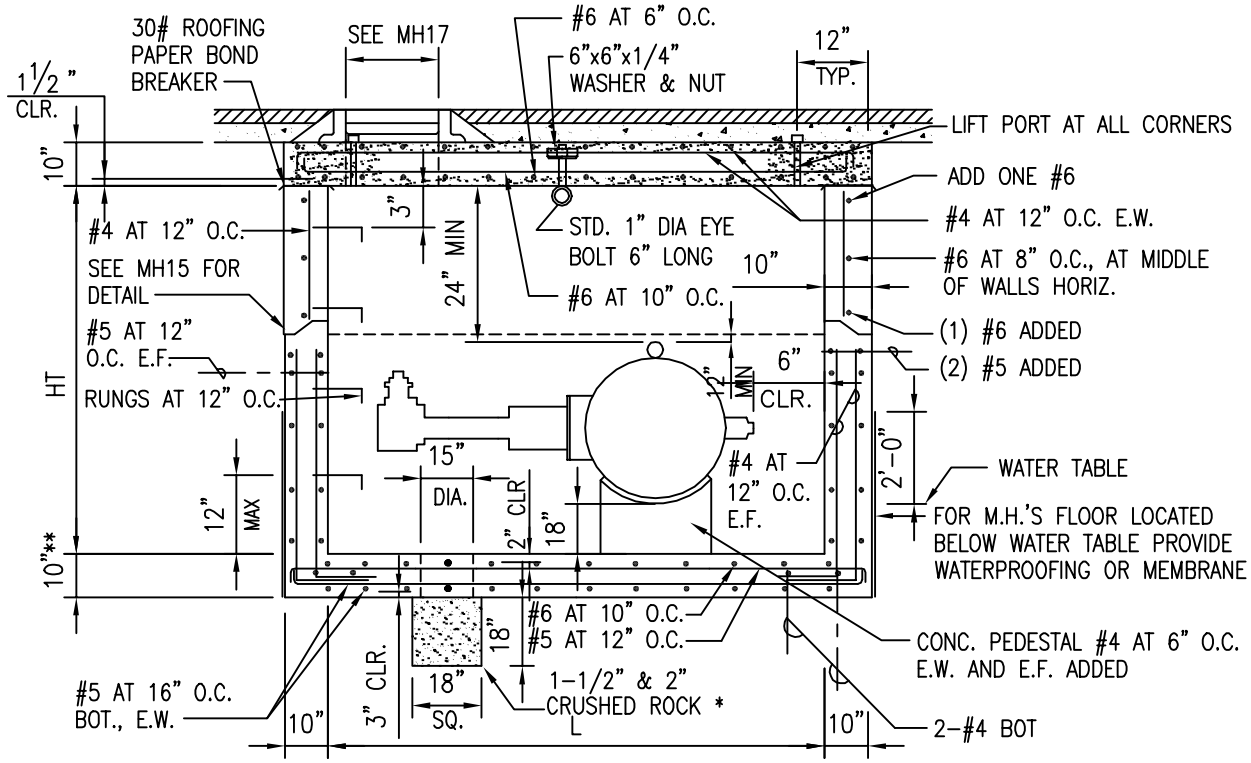
SIZE VALVE	L	HT (MIN)	HT (MAX)
12" & 16"	5'-4"	6'-0"	12'-4"
18" & 20"	6'-0"	6'-0"	12'-0"
24"	6'-8"	6'-0"	12'-0"
30"	7'-4"	6'-0"	12'-0"
36"	8'-0"	6'-0"	12'-0"
42"	8'-8"	6'-0"	12'-0"

2002
REVISION

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



PLAN–SECTION



SECTION A–A

PRECAST WALL

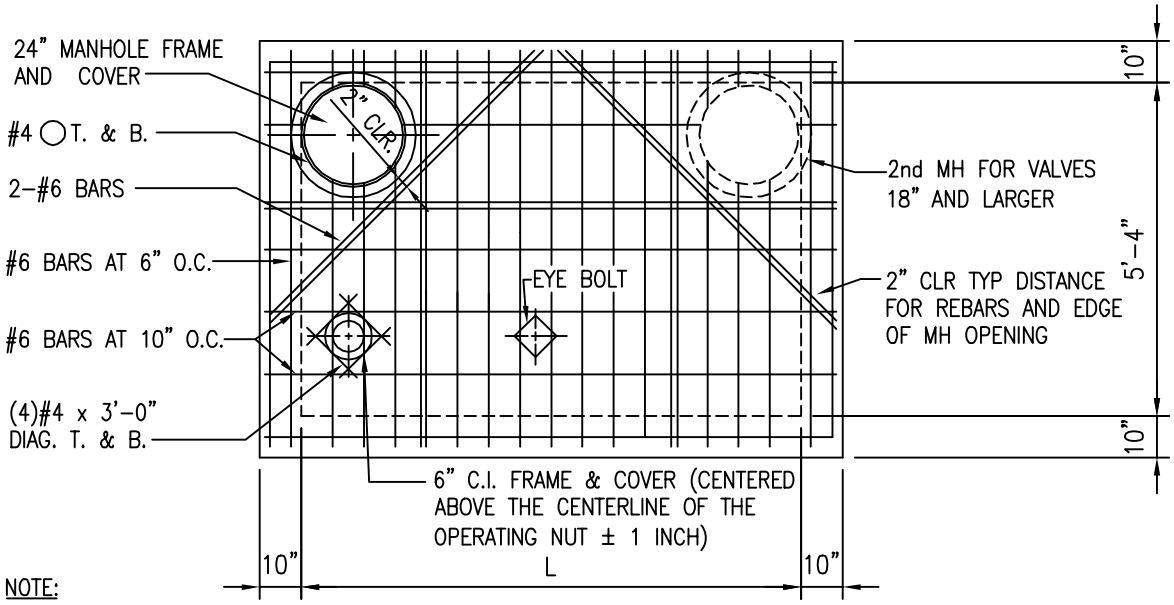
SEE PLATE MH9 FOR NOTES AND TABLE

* SEE PLATE MH12 FOR WATERPROOFED SUMP

** 14" FOR WATERPROOF CONDITION

2002
REVISION

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



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

PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

PRECAST TOP SLAB

NOTES: FOR PRECAST CONCRETE WALL MH

1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.

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

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

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

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

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

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

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

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

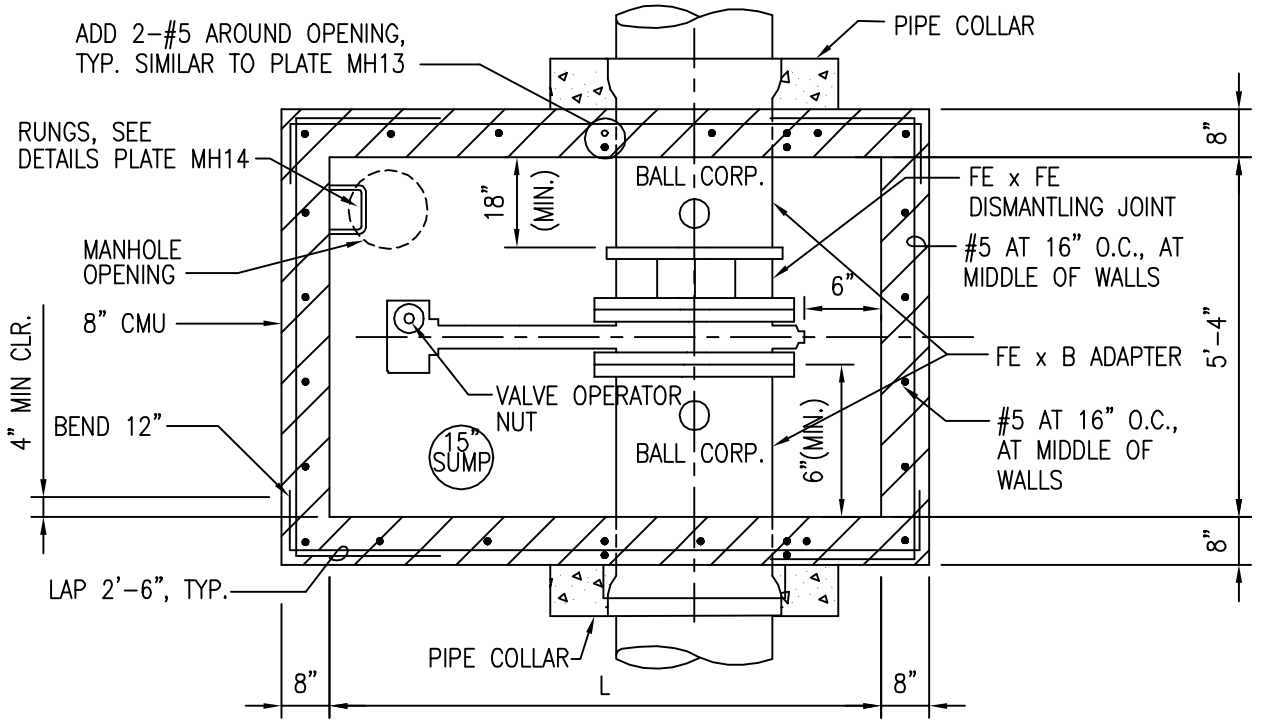
10 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED

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

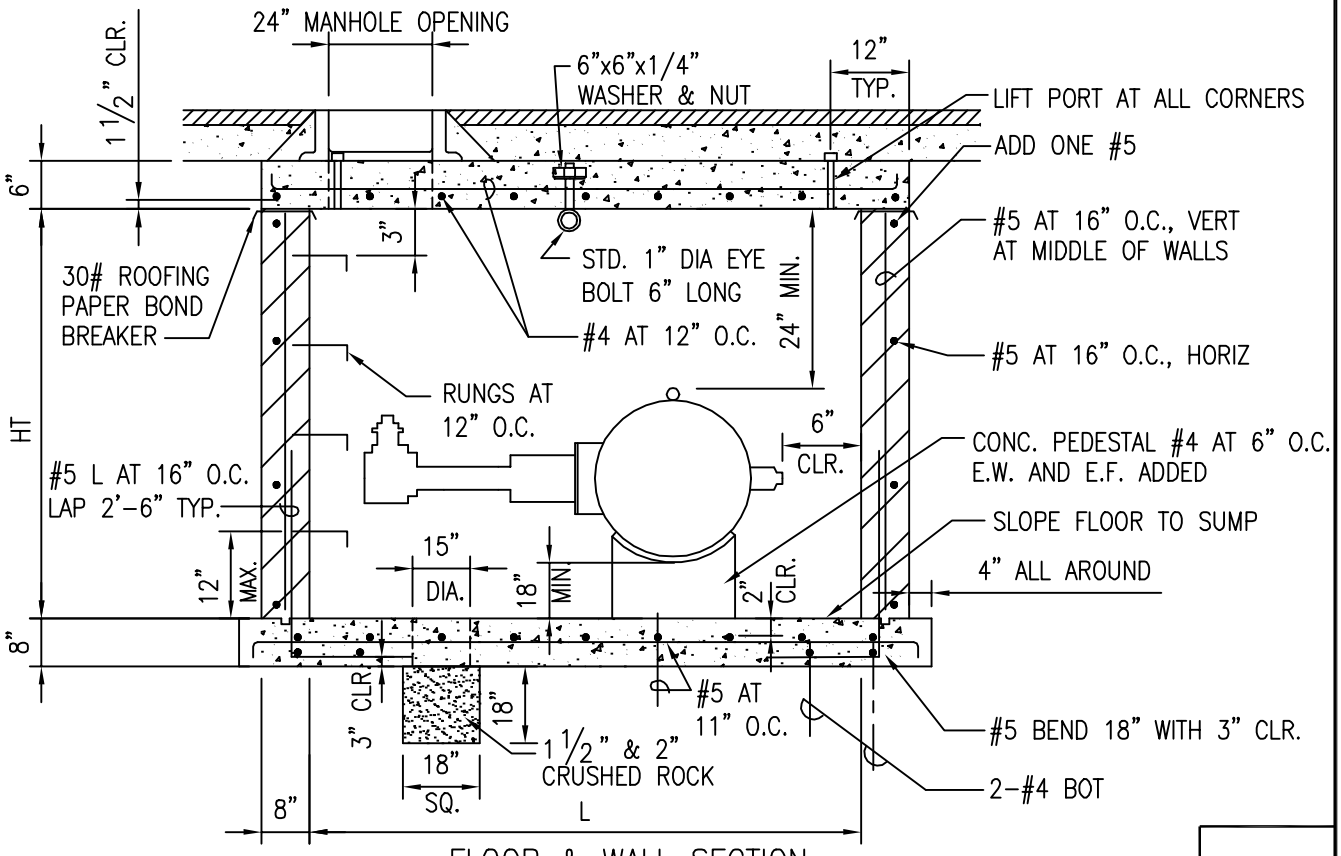
SIZE VALVE	L	HT (MIN)	HT (MAX)
12" & 16"	5'-4"	6'-0"	12'-0"
18" & 20"	6'-0"	6'-0"	12'-0"
24"	6'-8"	6'-0"	12'-0"
30"	7'-4"	6'-0"	12'-0"
36"	8'-0"	6'-0"	12'-0"
42"	8'-8"	6'-0"	12'-0"

2002	
REVISION	

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



PLAN–SECTION



FLOOR & WALL SECTION

CMU WALL

SEE PLATE MH11 FOR NOTES AND TABLE

2002
REVISION

MAUI

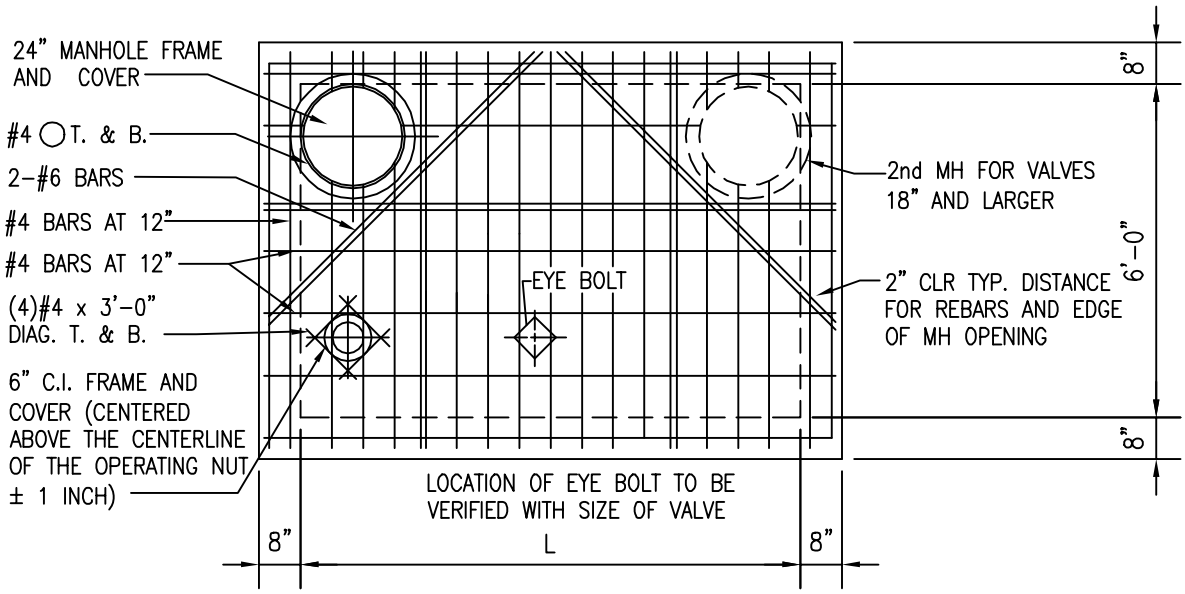
TYPE "A-1" MANHOLE (NON-TRAFFIC)

FOR BUTTERFLY VALVES, CMU

SCALE: NTS

STANDARD DETAILS

MH10



PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

PRECAST TOP SLAB FOR
CMU WALL
(NON-TRAFFIC)

NOTES: FOR CMU WALL MH

1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.

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

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

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

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

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

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

8 PAINT ALL METALS:

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

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

9 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED

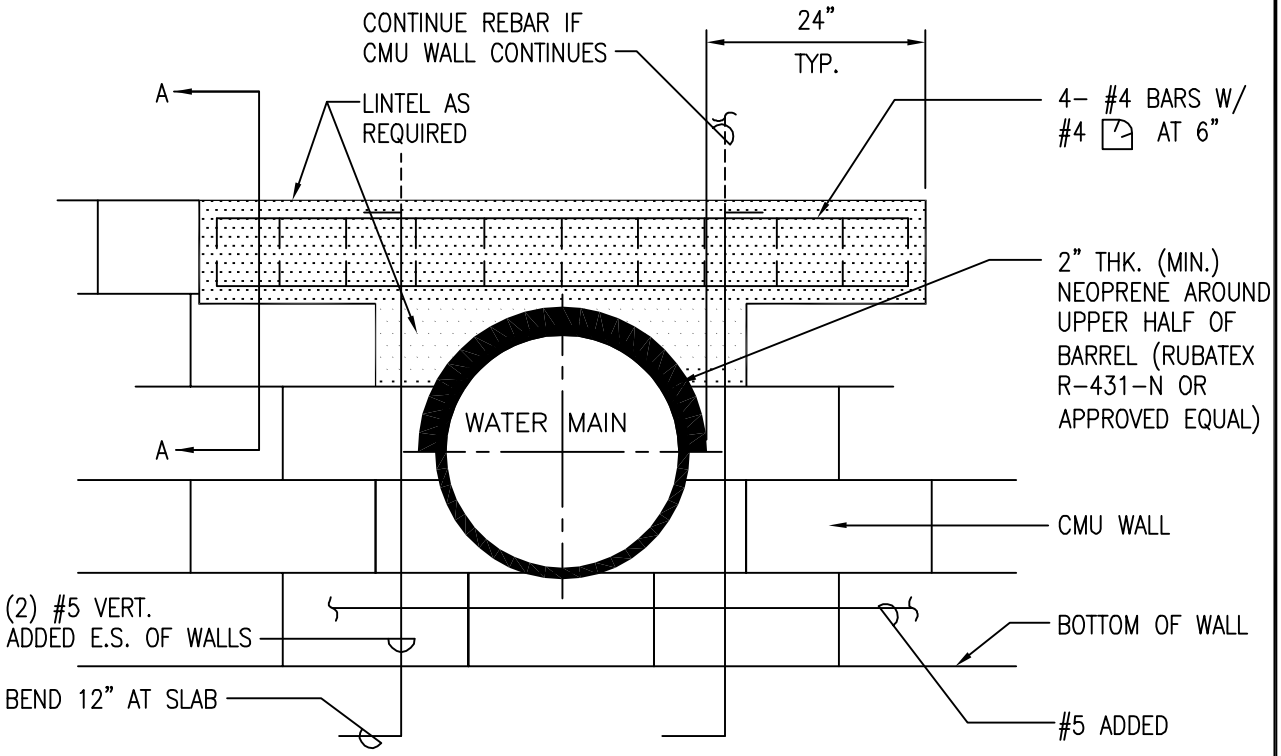
10 CMU WALL NOT ALLOWED BELOW WATERTABLE (WT)

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

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

2002
REVISION

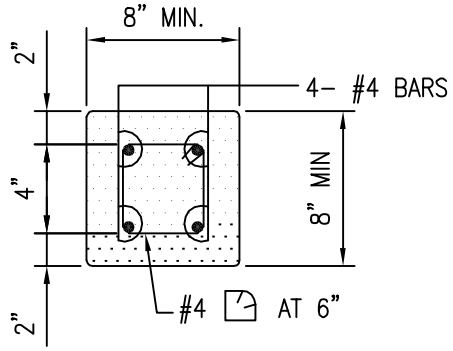
MAUI	TYPE "A-1" MANHOLE (NON-TRAFFIC) FOR BUTTERFLY VALVES, CMU SCALE: NTS	STANDARD DETAILS	MH11



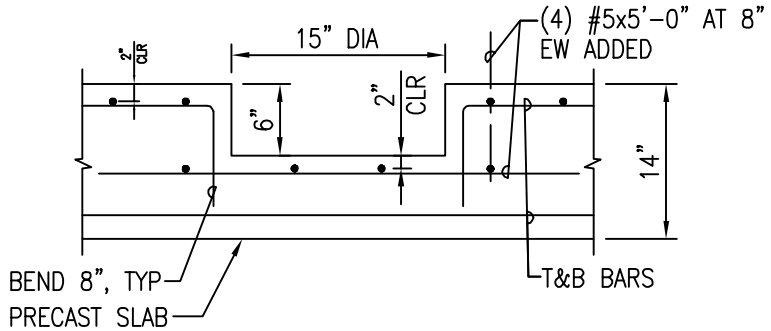
LONGITUDINAL SECTION THRU LINTEL

NOTE:

CONCRETE SHALL BE DWS 3500

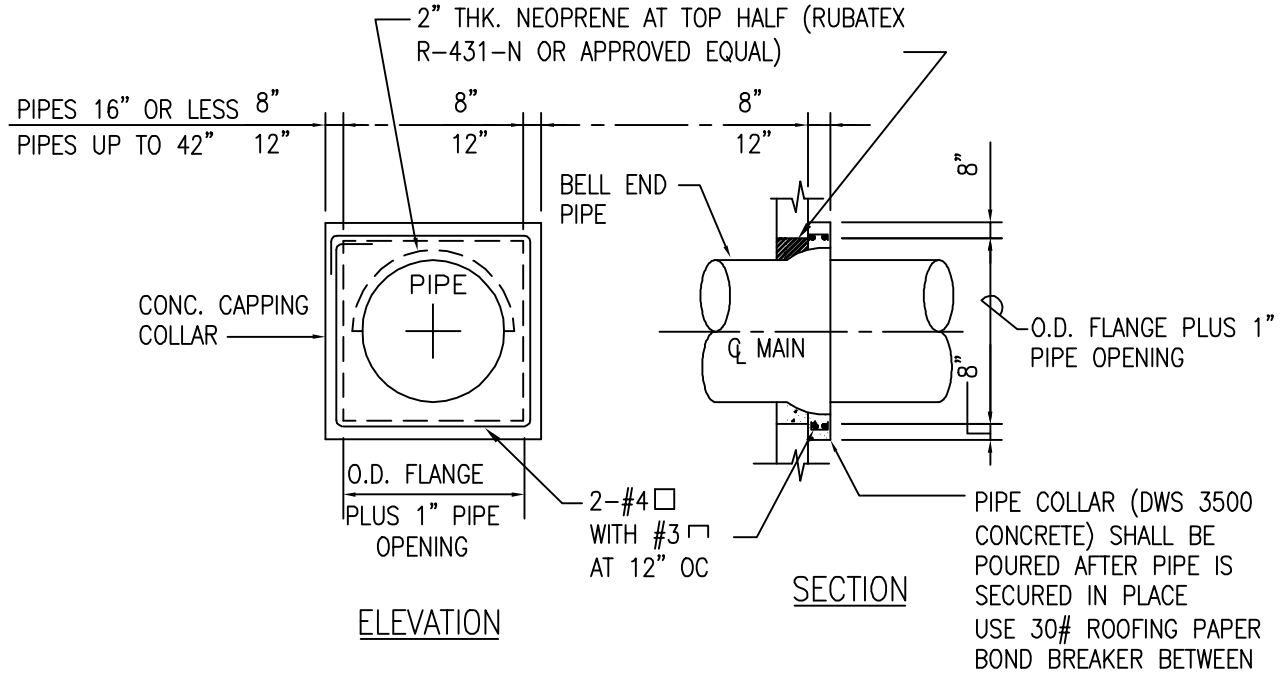


SECTION THRU LINTEL(A-A)

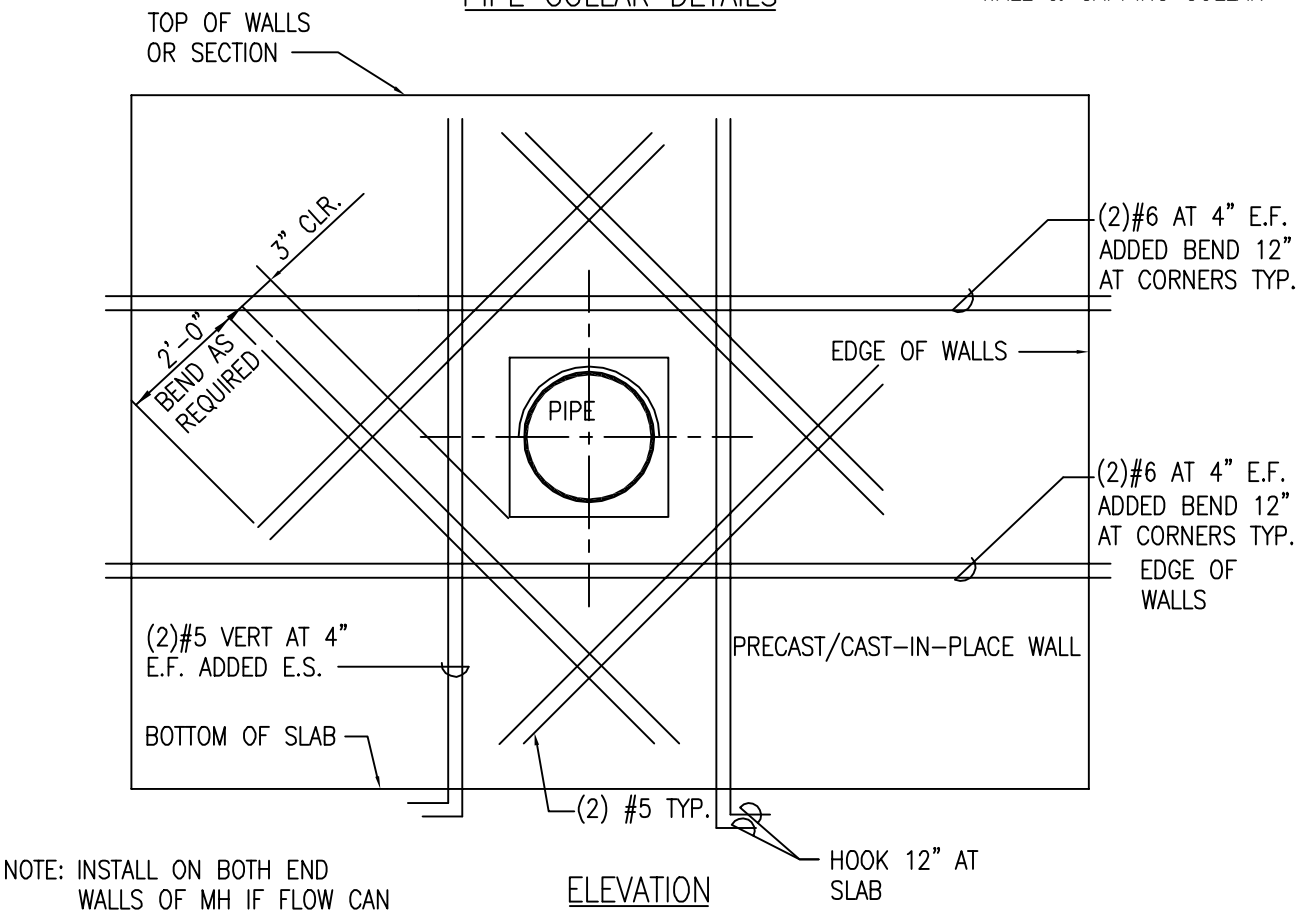


CLOSED PRECAST SUMP
FOR HIGH WATER TABLE
CONDITION

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



PIPE COLLAR DETAILS



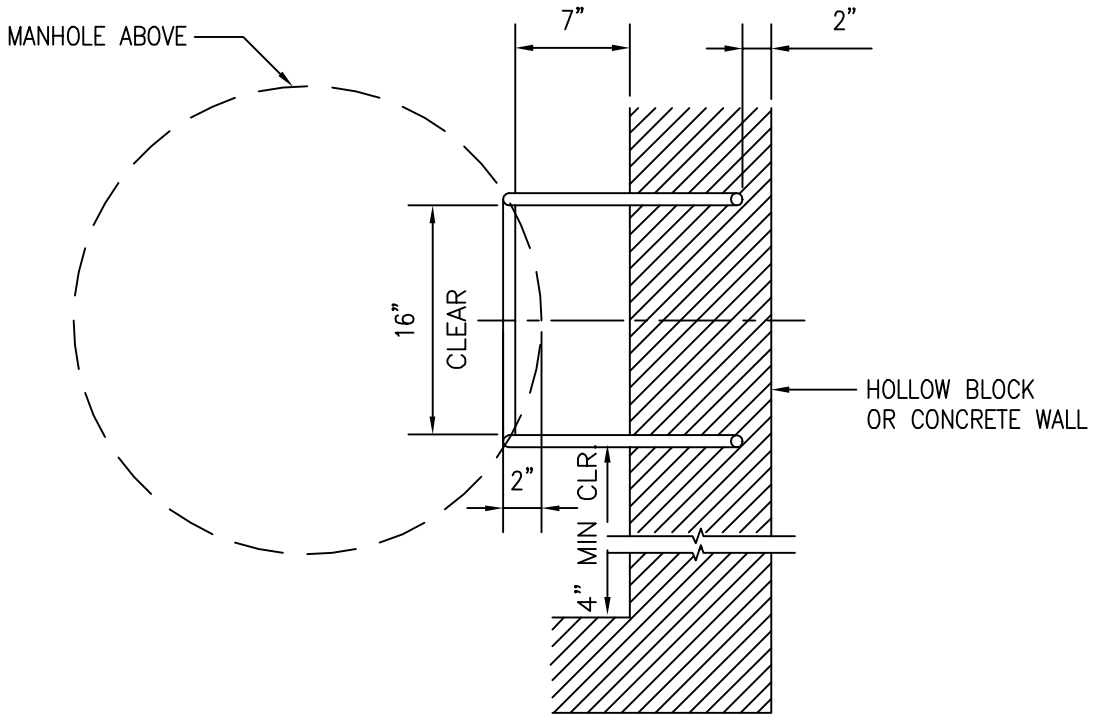
NOTE: INSTALL ON BOTH END WALLS OF MH IF FLOW CAN GO BOTH WAYS.

ELEVATION

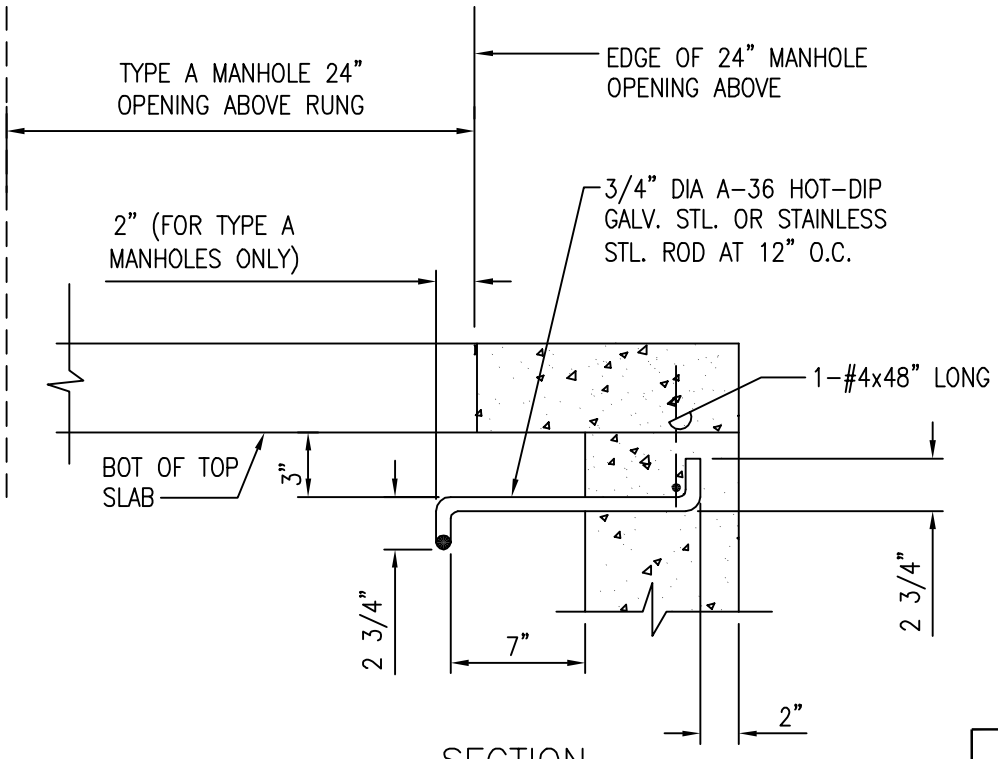
WALL PIPE OPENING
ADDED REBARS DETAIL

2002
REVISION

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



RUNG DETAIL

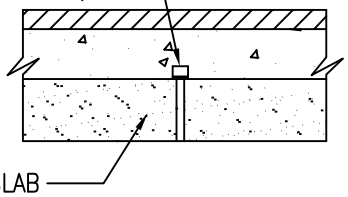


SECTION

2002
REVISION

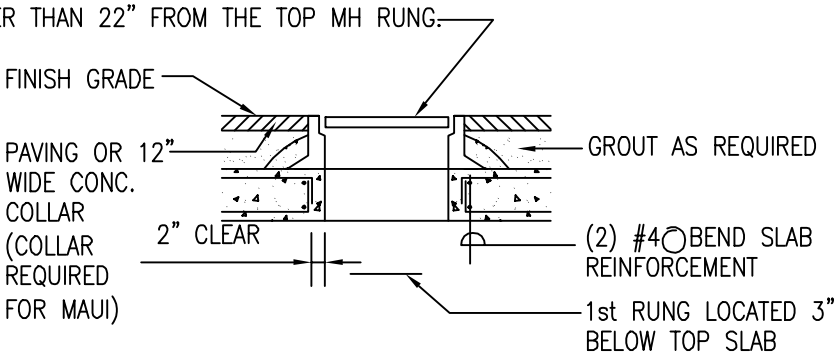
KAUAI OAHU MAUI	METAL RUNG DETAIL SCALE: NTS	STANDARD DETAILS	MH14

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

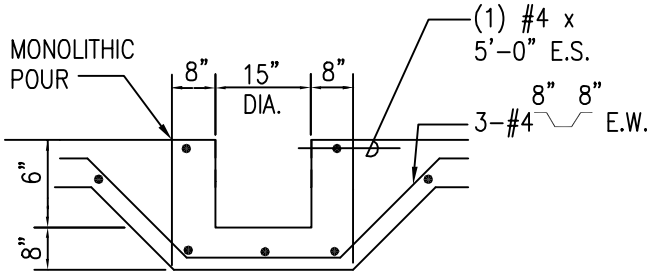


LIFT PORT DETAIL

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

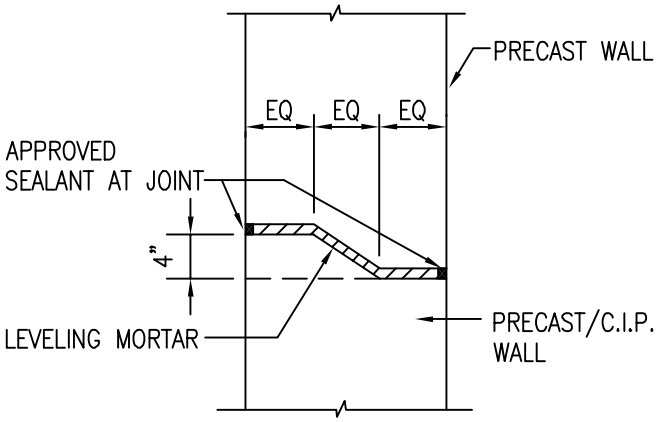


24" MANHOLE & 6" VALVEBOX SETTING DETAIL

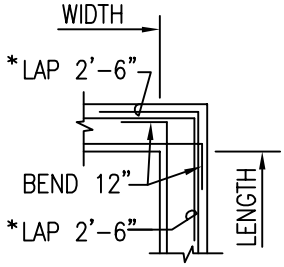


INSTALL SEALED SUMP IN LIEU OF OPEN HOLE WITH CRUSHED ROCK WHEN BOTTOM SLAB IS LOCATED BELOW ESTIMATED WATER TABLE

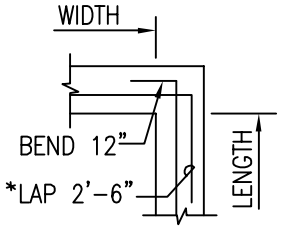
CAST-IN-PLACE SUMP DETAIL



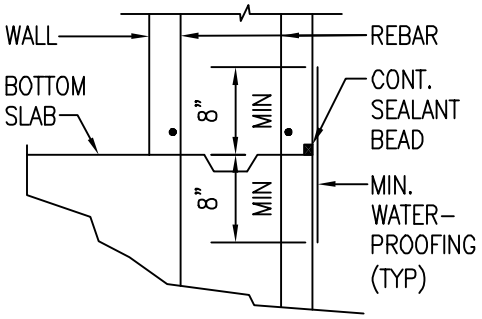
TYP. CONN DETAIL



DOUBLE LAYER TYP HORIZ REINFORCEMENT



SINGLE LAYER TYP HORIZ REINFORCEMENT

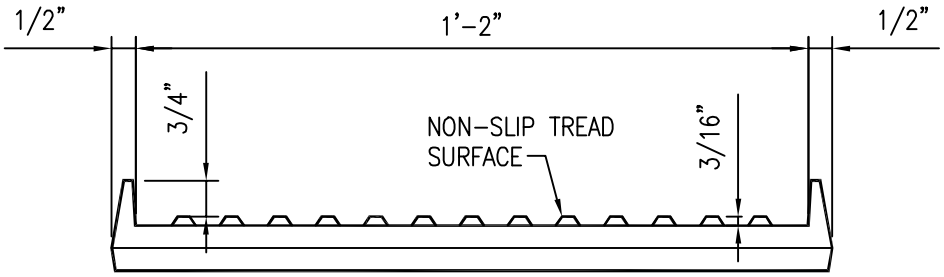


CONSTRUCTION JOINT AT BOTH SLAB AND WALL

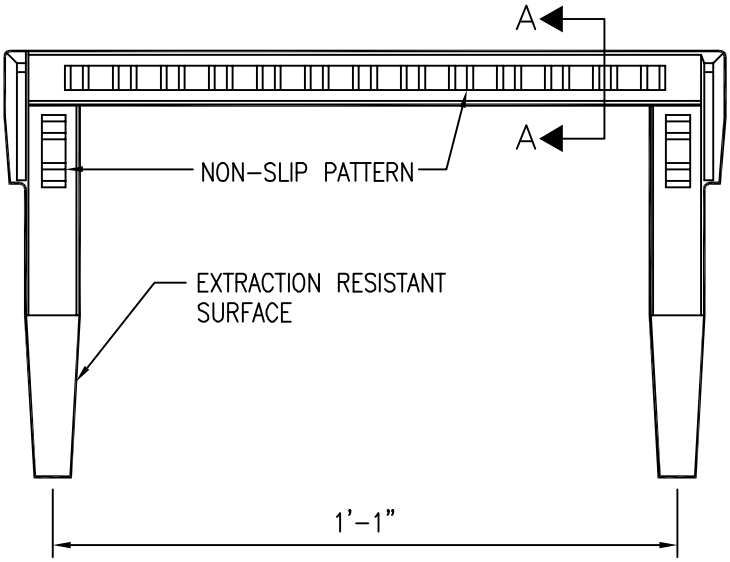
* NOTE:
UNLESS OTHERWISE NOTED ON PLANS

	2002
	REVISION

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



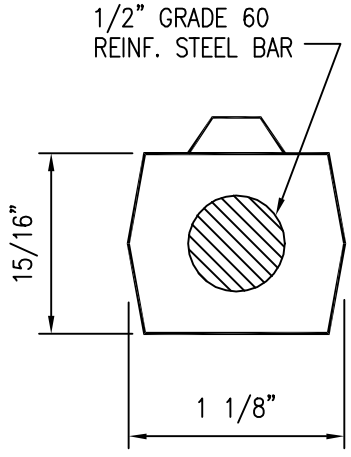
ELEVATION



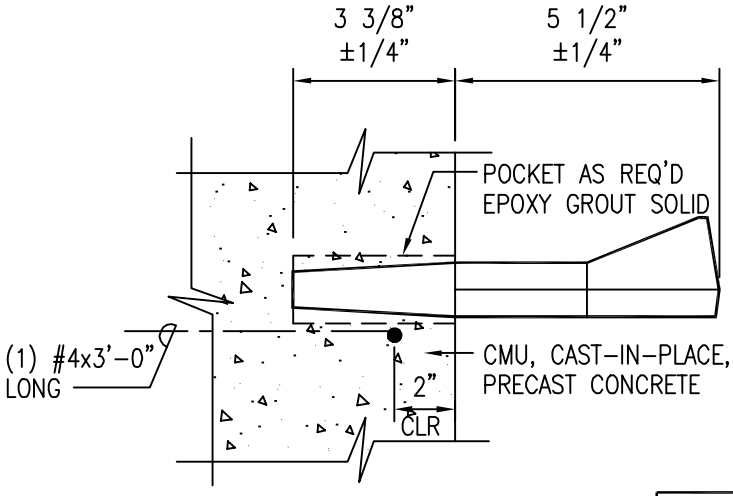
PLAN

NOTES:

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

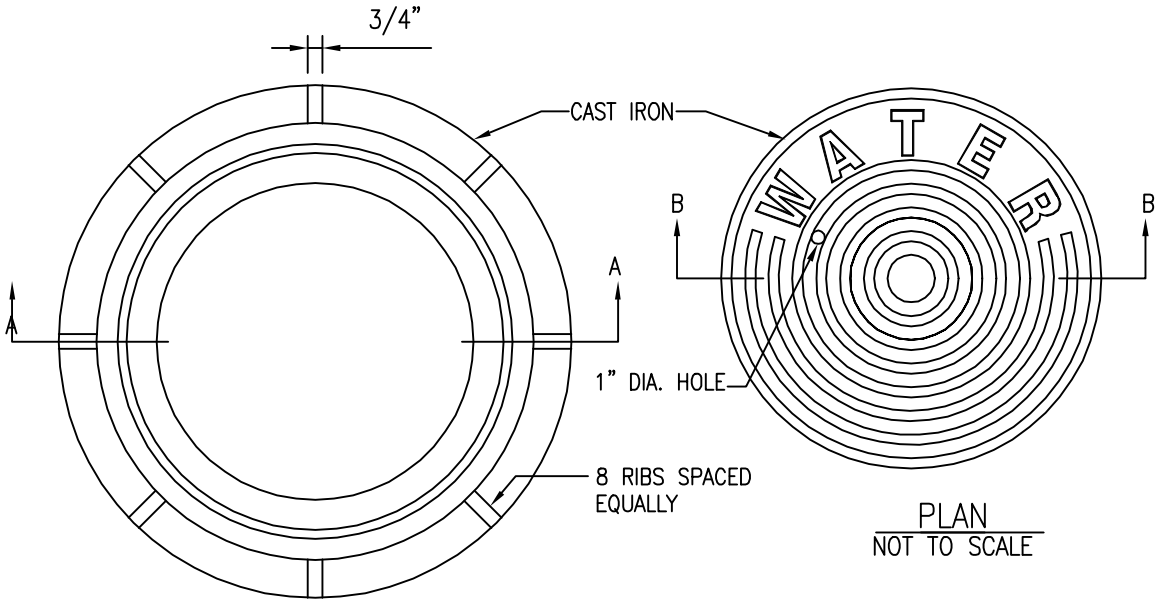


SECTION A-A



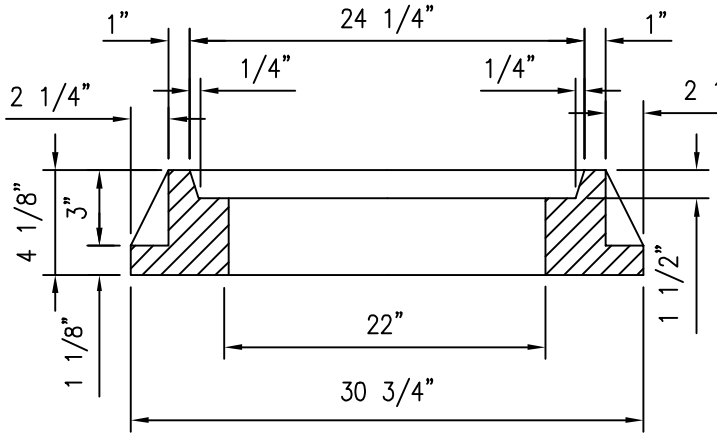
SIDE ELEVATION

			2002 REVISION
KAUAI OAHU	POLYPROPYLENE PLASTIC RUNG SCALE: NTS	STANDARD DETAILS	MH16

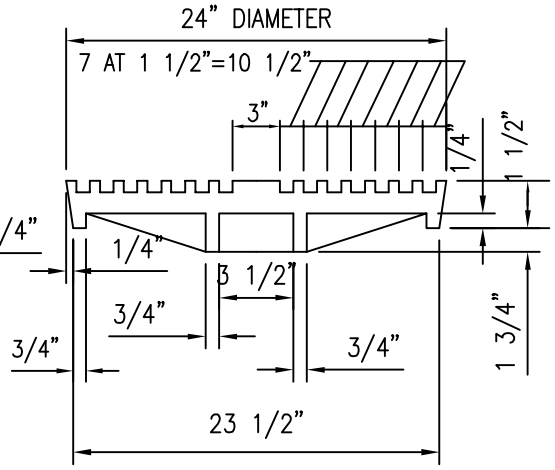


PLAN
NOT TO SCALE

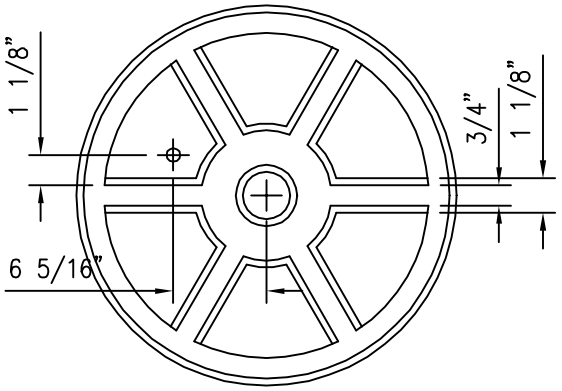
PLAN
NOT TO SCALE



SECTION A–A
NOT TO SCALE



SECTION B–B
NOT TO SCALE



PLAN
NOT TO SCALE

NOTE:

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

SEE TABLE 200–10 FOR MIN WEIGHTS.

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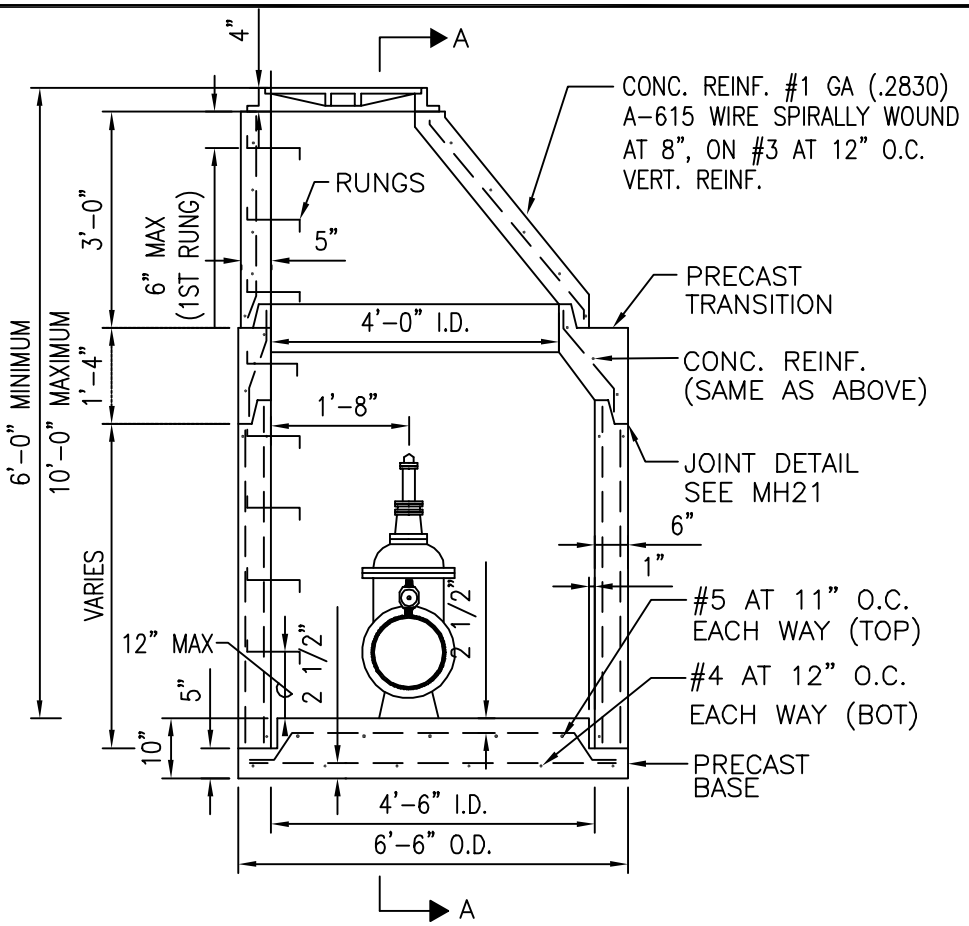
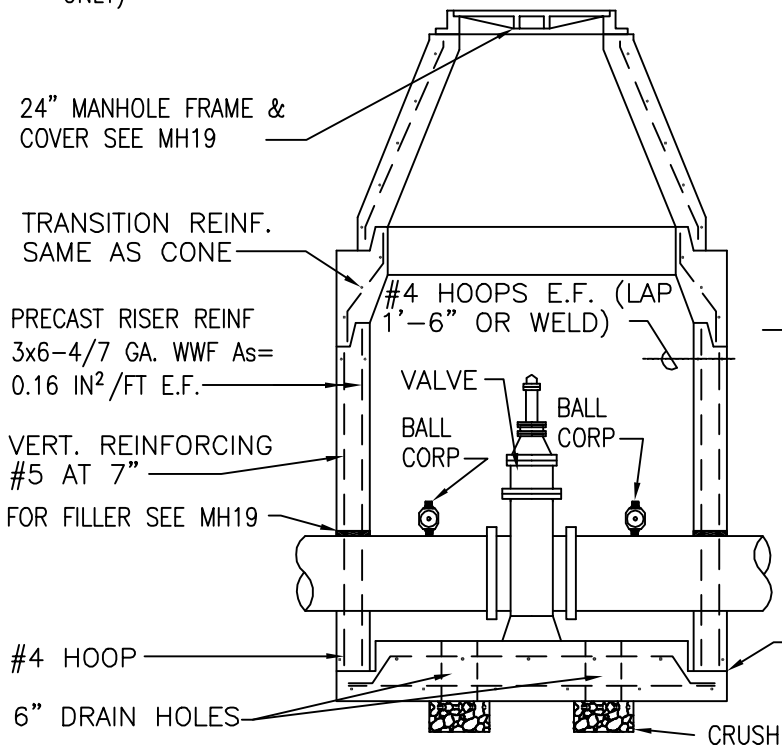
KAUAI OAHU MAUI HAWAII	**MANHOLE FRAME & COVER** **CAST IRON, 24" SIZE** **SCALE: NTS**	STANDARD DETAILS	MH17

NOTES FOR PRECAST MH

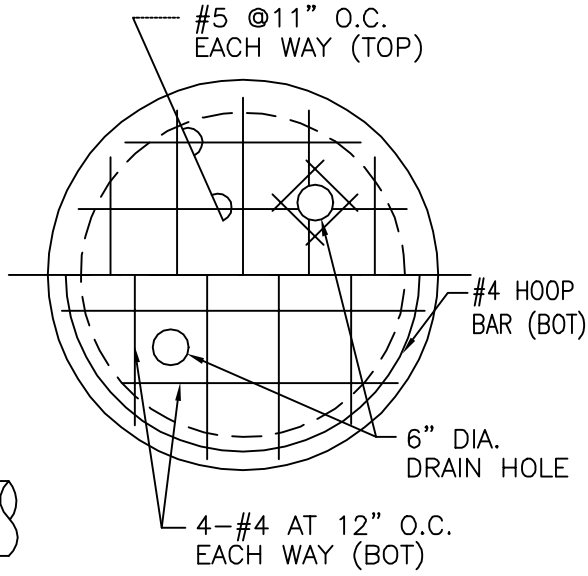
1. CONCRETE SHALL BE DWS 3500; REINFORCING STEEL SHALL BE GRADE 60
2. REFER TO MH14 FOR DETAILS OF RUNG
3. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES AND TABLE AND TABLE 200-9 OF THE WATER SYSTEM STANDARD FOR THE REQ'D BALL CORP SIZES
4. OMIT DRAIN HOLES AND CRUSHED ROCK FOR WATERPROOFED MANHOLES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



TYPE B MANHOLE



SECTION "A-A"



BASE PLAN

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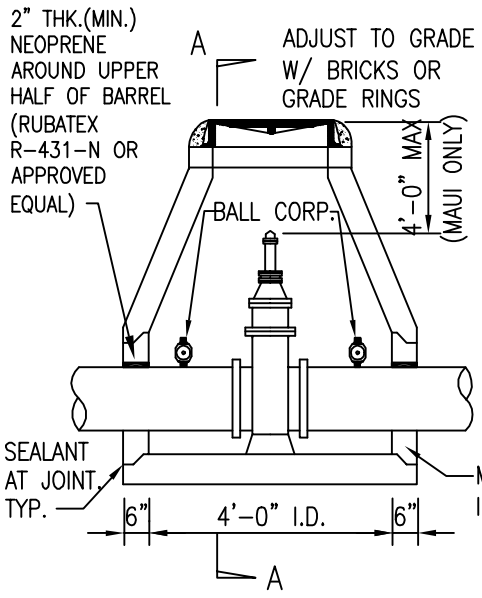
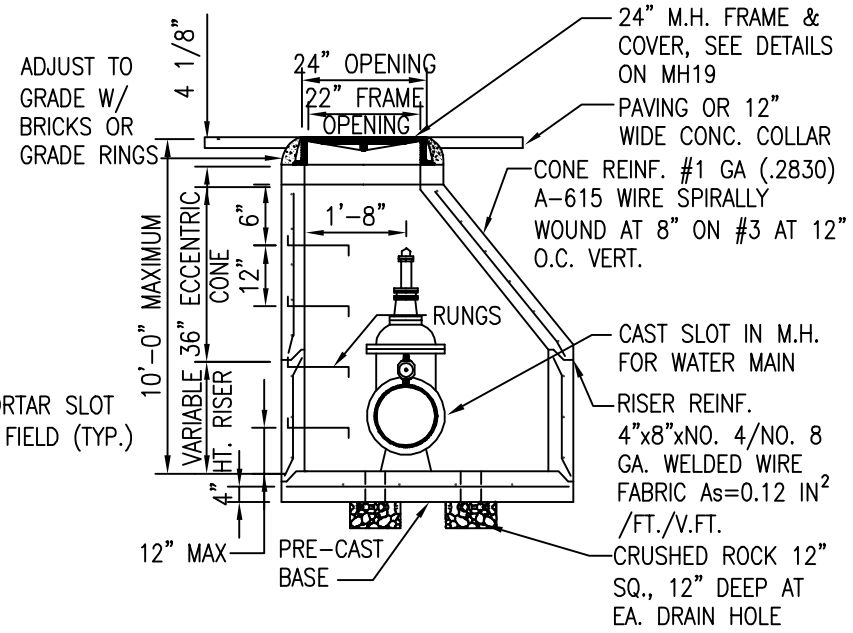
REVISION

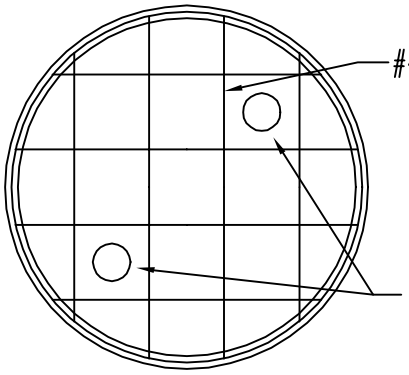
KAUAI OAHU MAUI	TYPE "B" MANHOLE GENERAL ARRANGEMENT, PRECAST WALL SCALE: NTS	STANDARD DETAILS	MH18



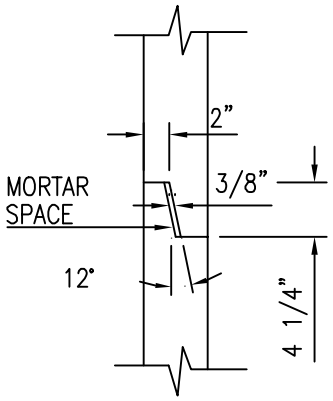
PRE-CAST TYPE C MANHOLE



SECTION A-A



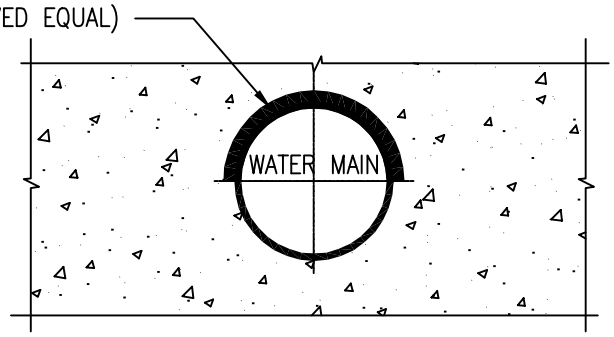
PRE-CAST MANHOLE BASE PLAN



T&G JOINT DETAIL

NOTES FOR PRE-CAST MANHOLE

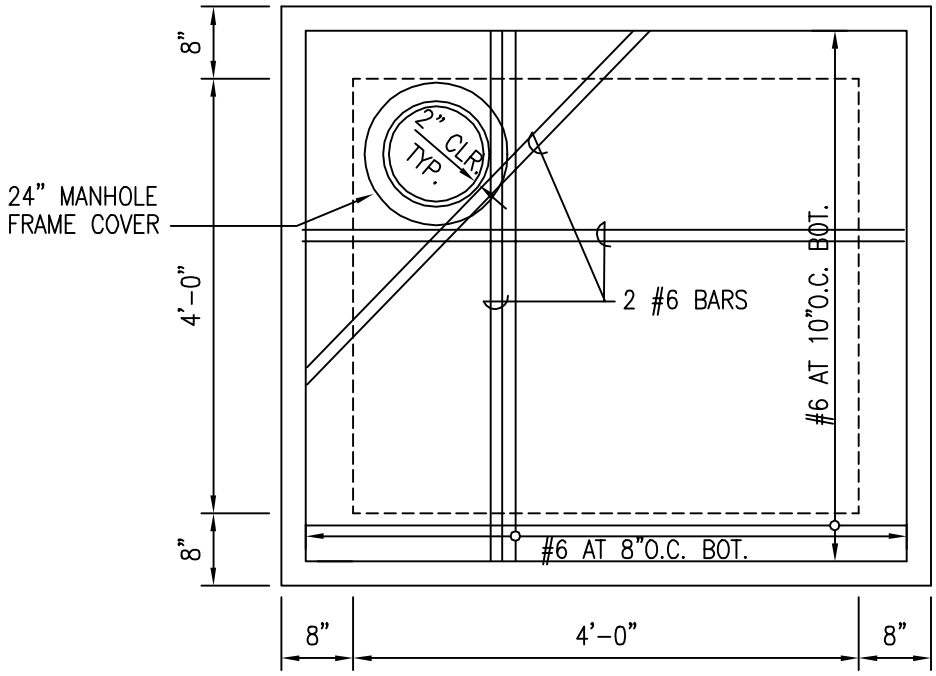
1. CONCRETE SHALL BE DWS 3500.
2. REFER TO MH14 FOR DETAILS OF RUNG.
3. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES AND TABLE 200-9 OF THE WATER STANDARD FOR THE REQUIRED BALL CORP SIZES.
4. OMIT DRAIN HOLES AND CRUSHED ROCK FOR WATERPROOFED MANHOLES.
5. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE;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



FILLER DETAIL

	2002
	REVISION

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



PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

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

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

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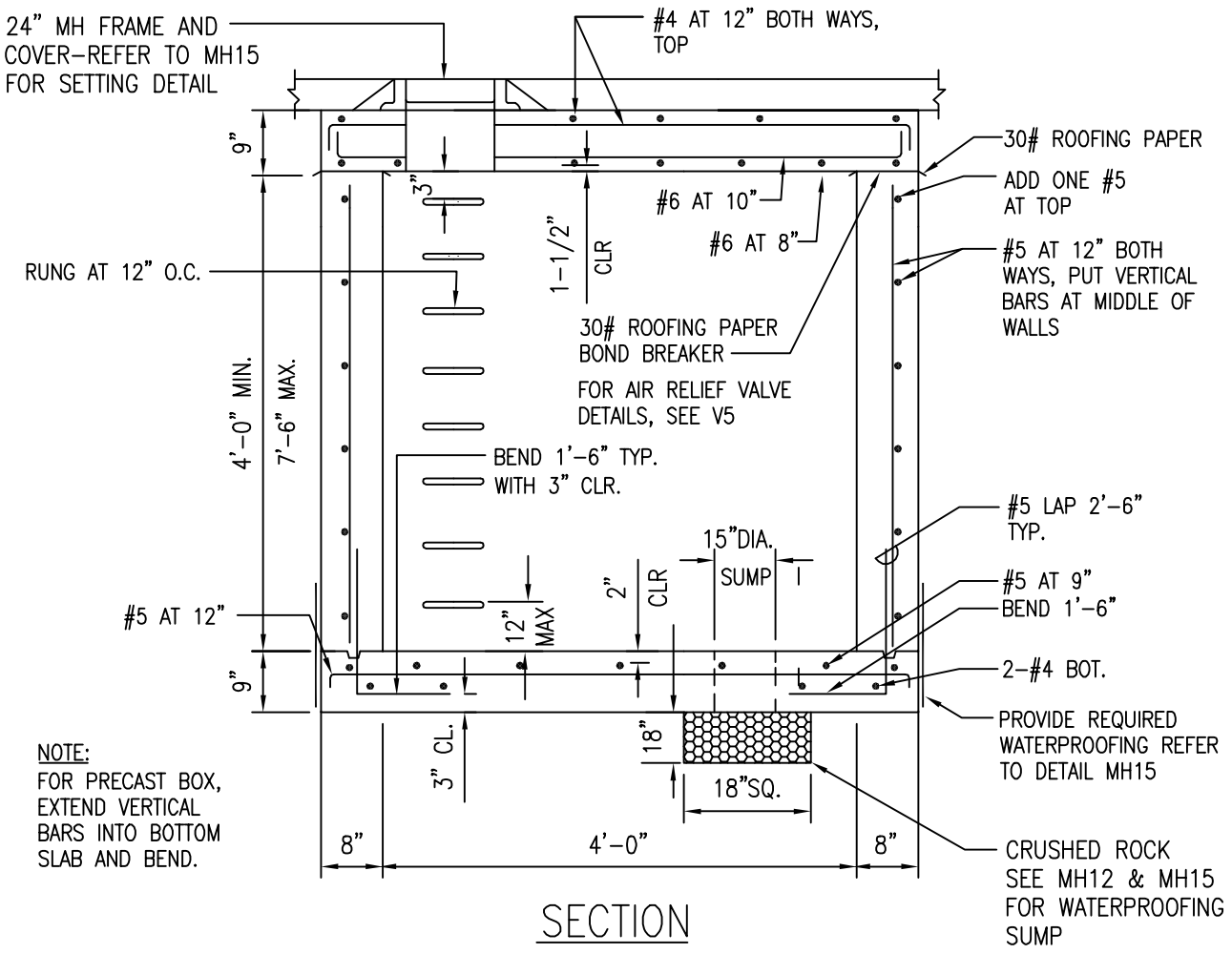
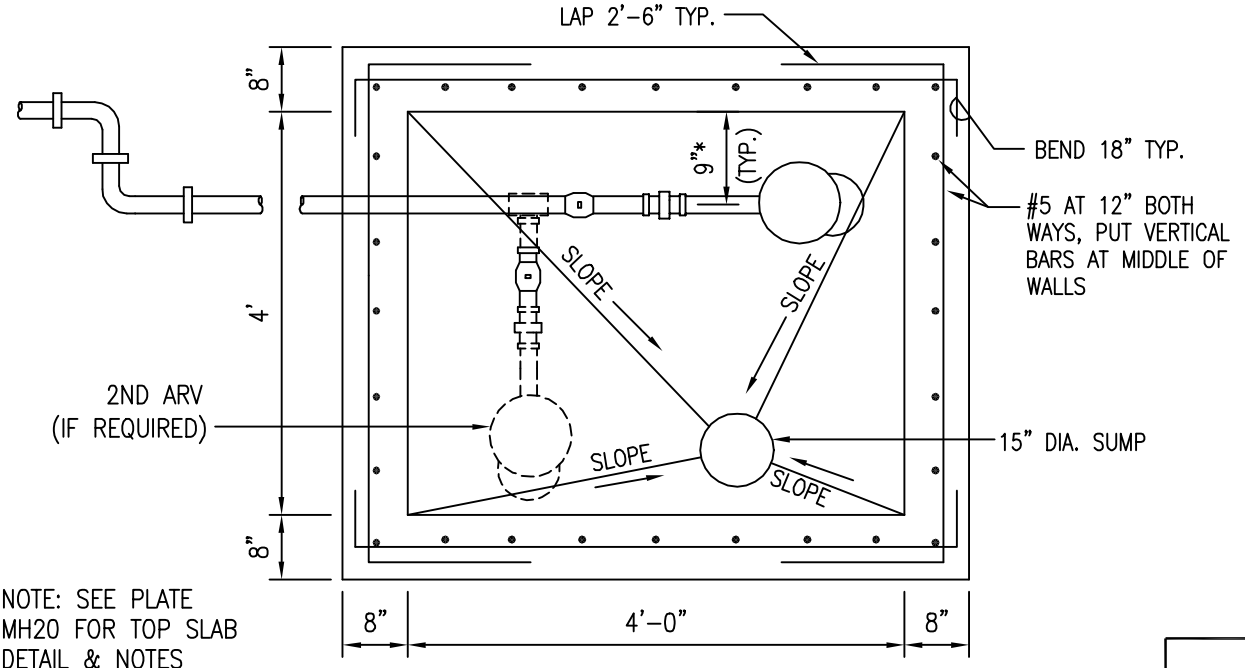
KAUAI OAHU MAUI	**TYPE "D" MANHOLE FOR 2" AIR RELIEF VALVES** SCALE: NTS	STANDARD DETAILS	MH20



SECTION



NOTE: SEE PLATE MH20 FOR TOP SLAB DETAIL & NOTES

* LATERAL CENTERED FOR SINGLE ARV

PLAN–SECTION

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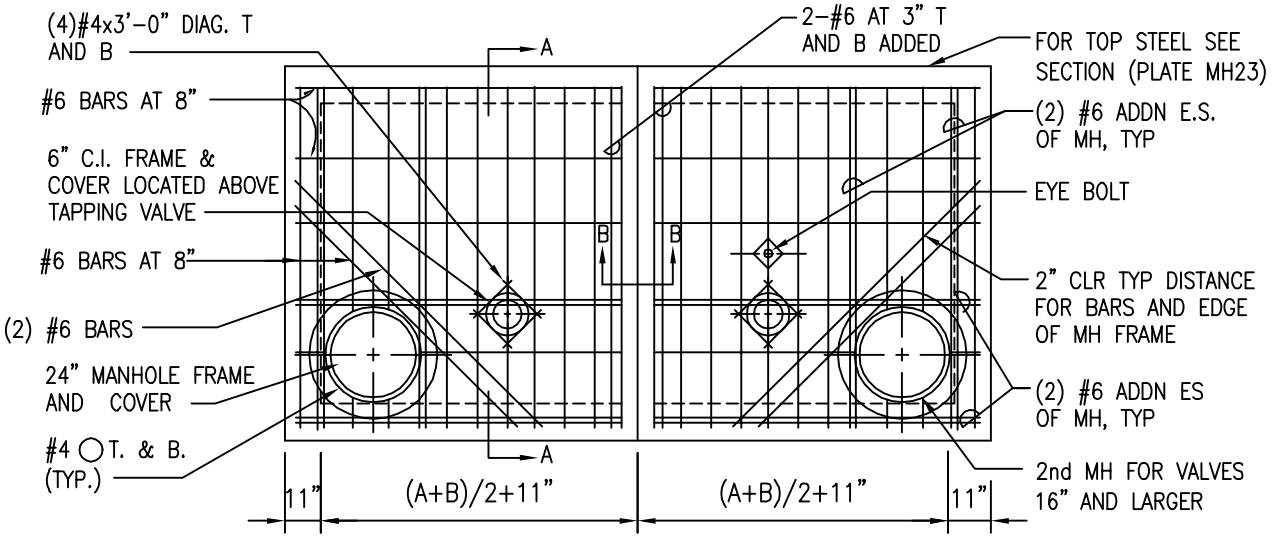
REVISION

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

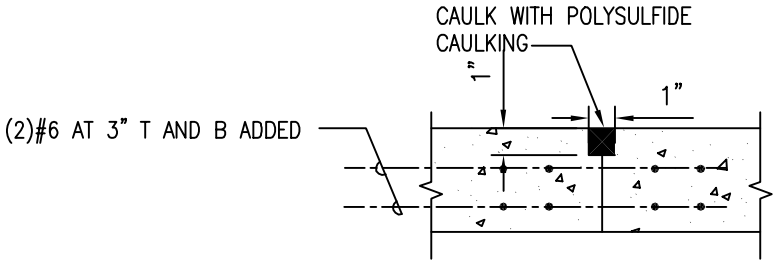


PLAN OF TOP SLAB

(BOTTOM REINFORCEMENT)

NOTE:

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



SECTION "B-B"

NOTES: FOR CAST-IN-PLACE WALL MH

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

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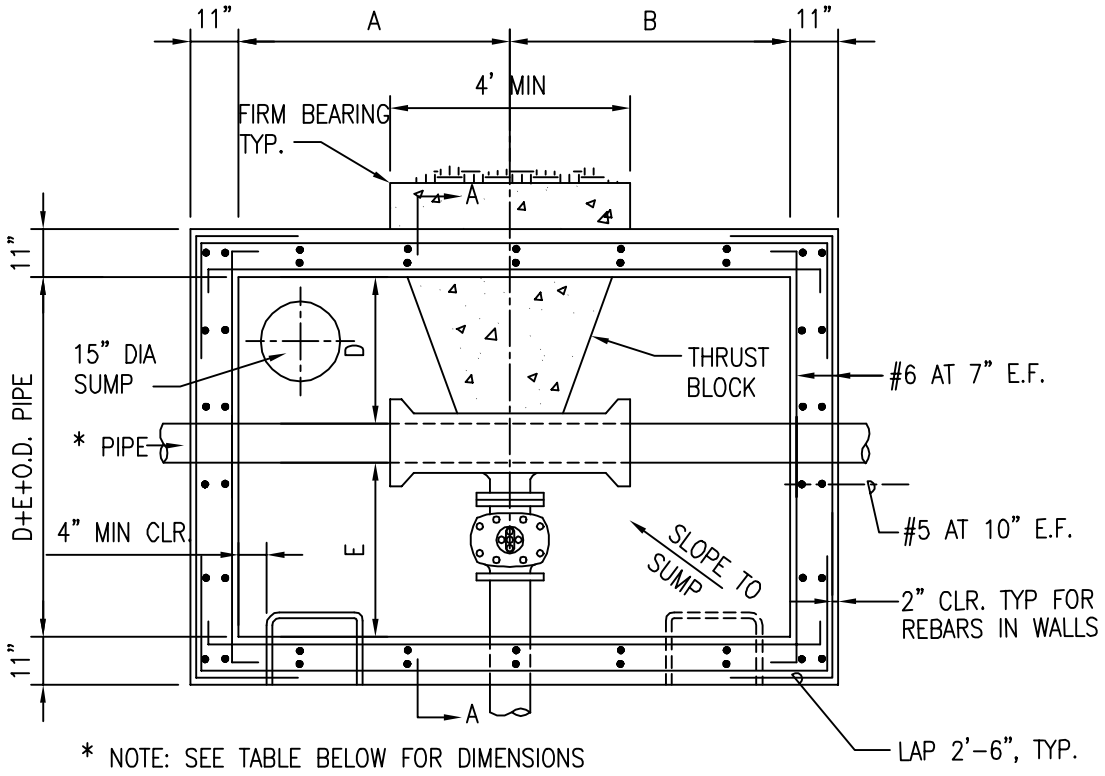
KAUAI OAHU	**TYPE "E" TAPPING TEE MANHOLE** **CAST-IN-PLACE WALL** **SCALE: NTS**	STANDARD DETAILS	MH22



PLAN–SECTION

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

NOTES:

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

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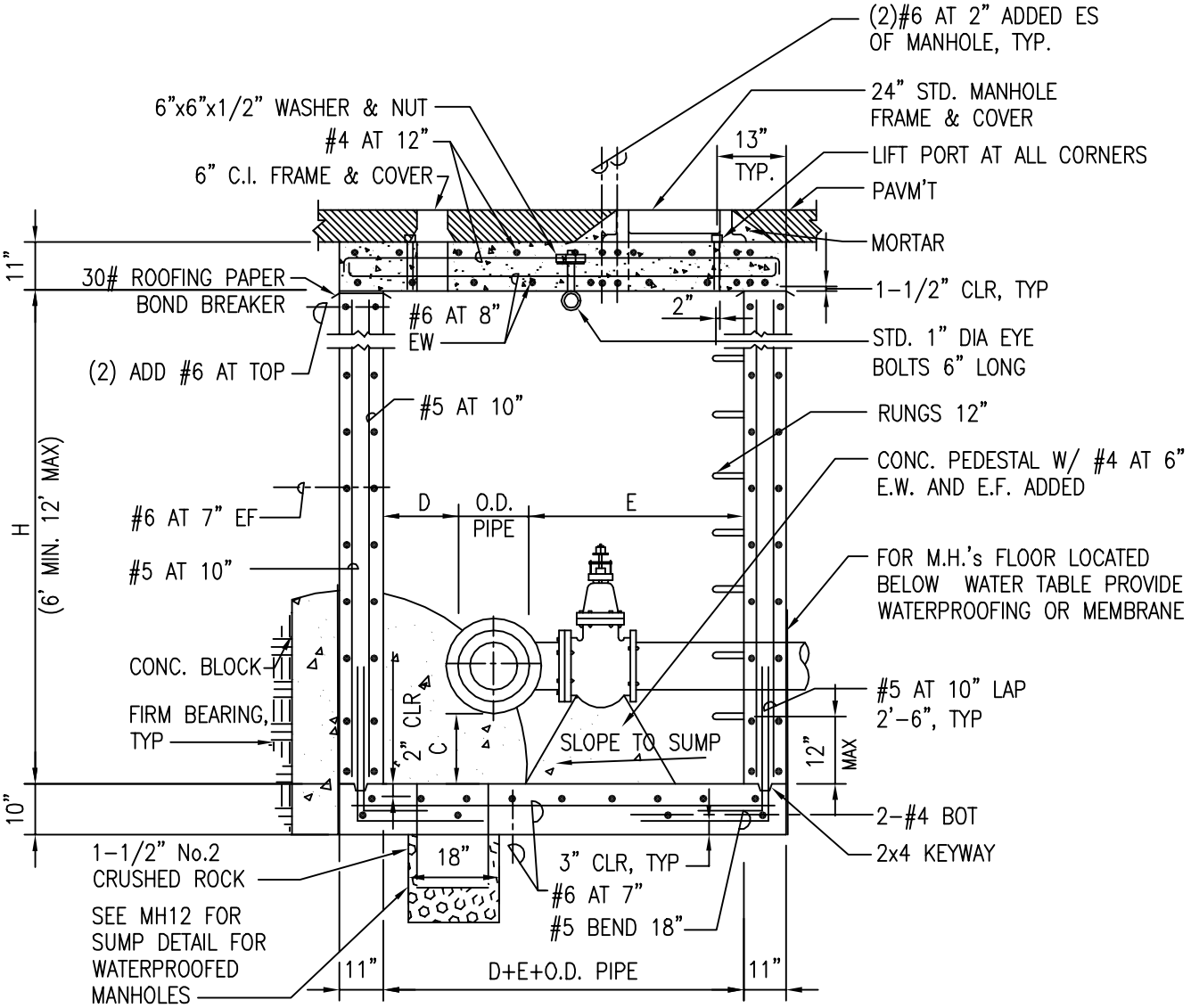
KAUAI OAHU	**TYPE "E" TAPPING TEE MANHOLE** **CAST-IN-PLACE WALL** **SCALE: NTS**	STANDARD DETAILS	MH23



SECTION A-A

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

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OAHU

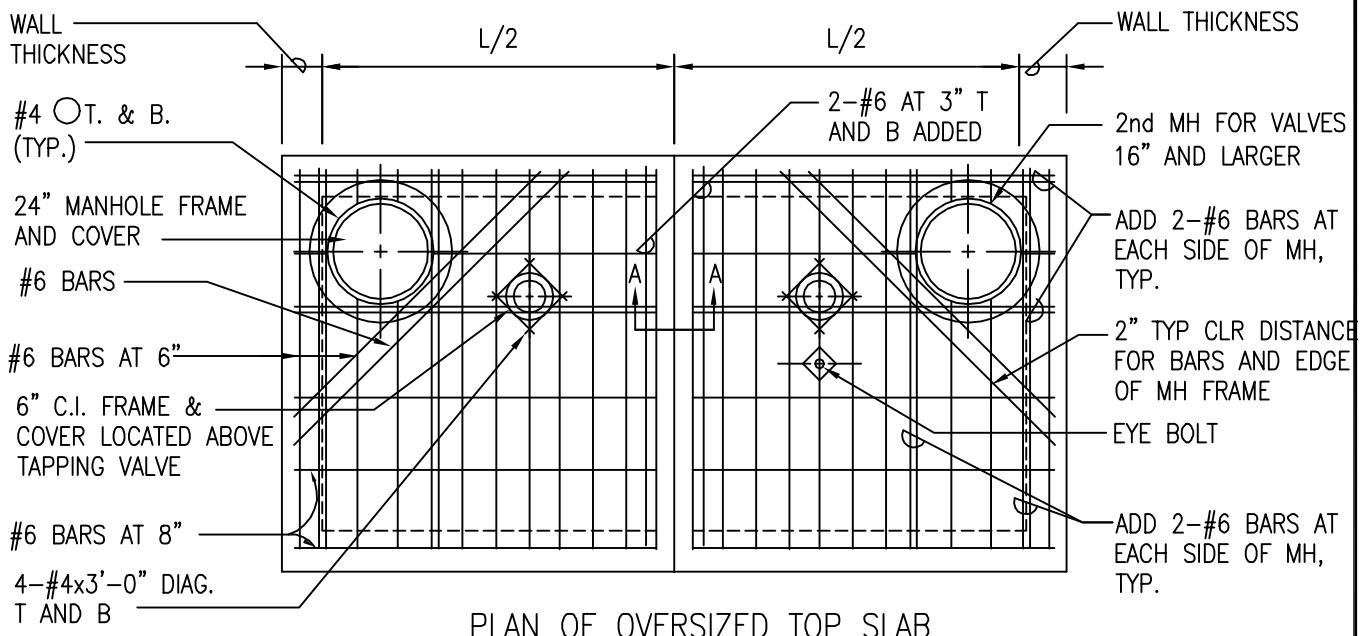
TYPE "E" TAPPING TEE MANHOLE

CAST-IN-PLACE WALL

SCALE: NTS

STANDARD DETAILS

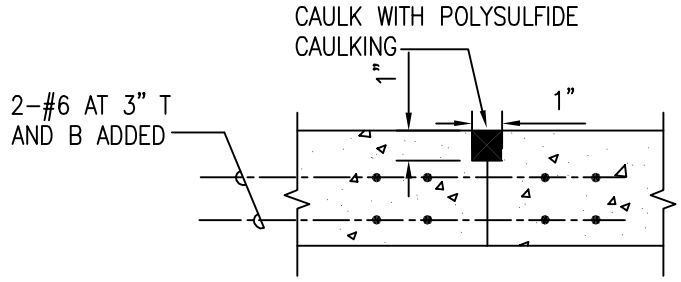
MH24



PLAN OF OVERSIZED TOP SLAB
(BOTTOM REINFORCEMENT)

NOTE:

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



SECTION "A-A"

	2002
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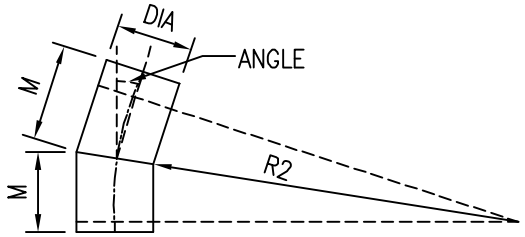
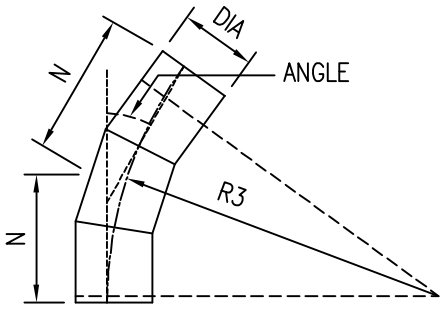
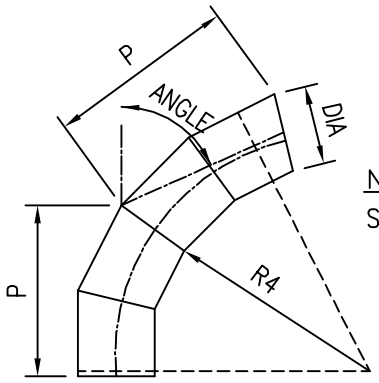
KAUAI OAHU MAUI HAWAII	OVERSIZED TOP SLAB DETAIL SCALE: NTS	STANDARD DETAILS	MH25



2 PIECE ELBOW
6° TO 22-1/2° INCLUSIVE

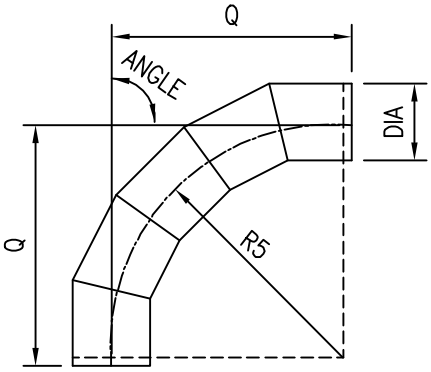


3 PIECE ELBOW
OVER 22-1/2° TO 45° INCLUSIVE

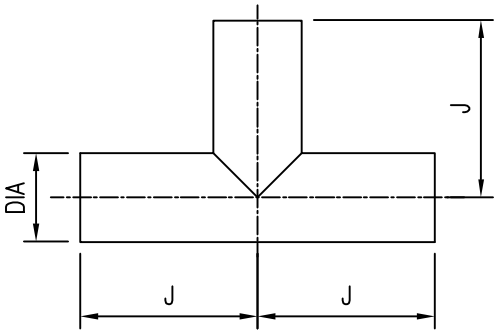


NOTE:
SEE P5

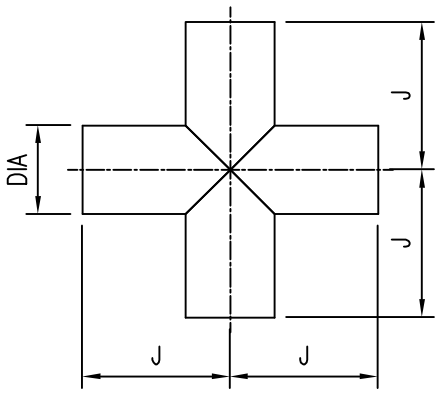
4 PIECE ELBOW
OVER 45° TO 67-1/2° INCLUSIVE



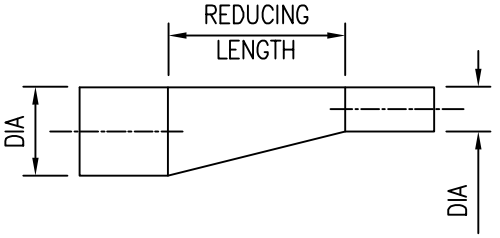
5 PIECE ELBOW
OVER 67-1/2° TO 90° INCLUSIVE



TEE

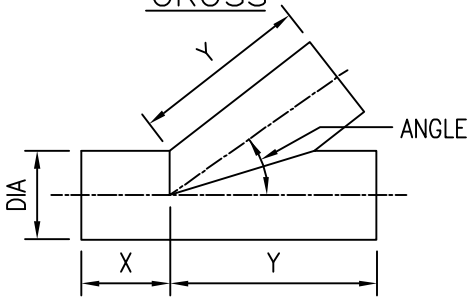


CROSS



REDUCER

SEE PLATE P2 FOR DIMENSIONS



LATERAL
30° MINIMUM – 75° MAXIMUM

2002	
REVISION	

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

STANDARD FITTING DIMENSIONS
FOR PLATE P1

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

DIMENSIONS FOR ECCENTRIC REDUCER REDUCING LENGTH

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

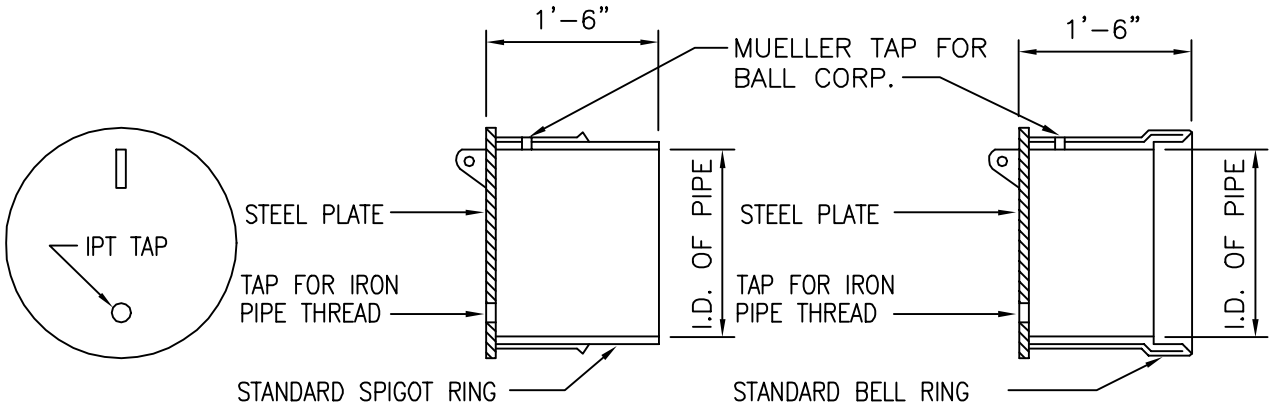
NOTE:

ALL DIMENSIONS SHOWN ARE LAYING LENGTHS.

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

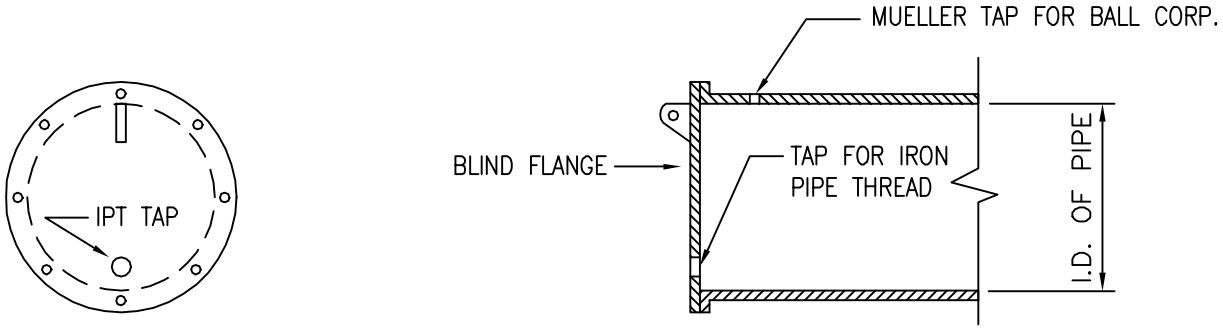
ALL FITTINGS AND SPECIALS SHALL BE ALL BELL UNLESS OTHERWISE NOTED.

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



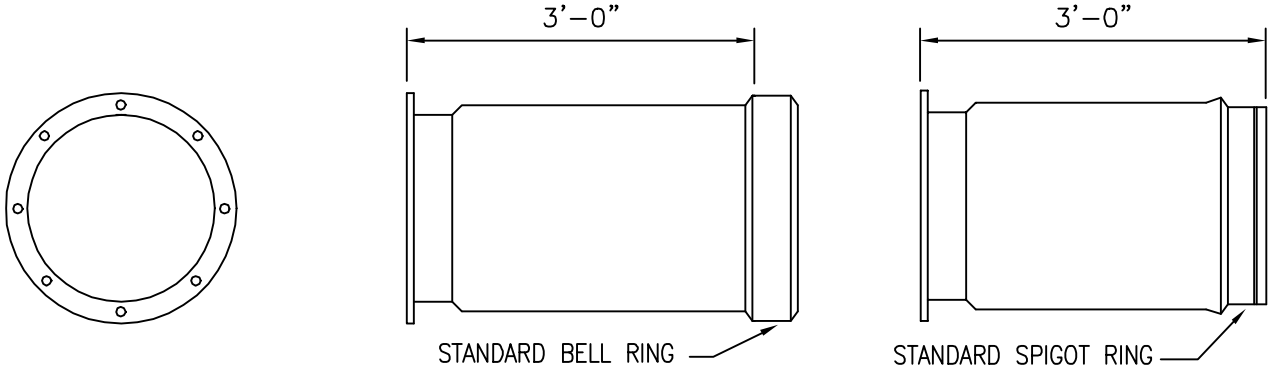
ELEV. OF STEEL PLATE SECTION OF PLUG SECTION OF CAP

DETAIL OF CAP & PLUG



ELEV. OF BLIND FLANGE SECTION

DETAIL OF BLIND FLANGE



FLANGE END ELEVATION ELEVATION

DETAIL OF ADAPTER

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

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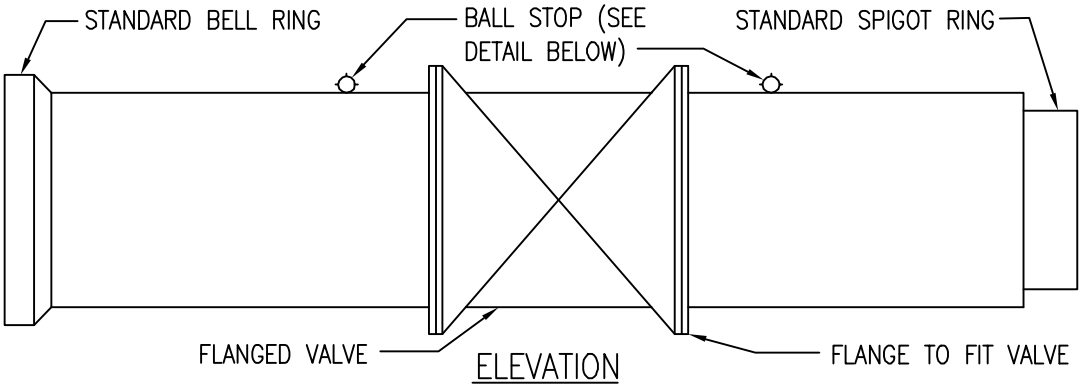
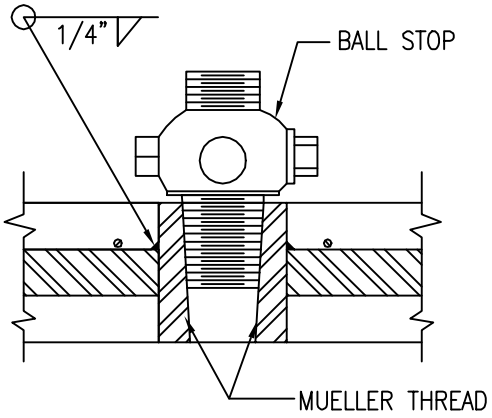
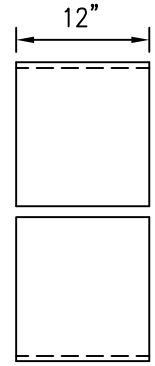
KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** **MISCELLANEOUS DETAIL** **SCALE: NTS**	STANDARD DETAILS	P3



ELEVATION



SECTION THRU CONCRETE PIPE



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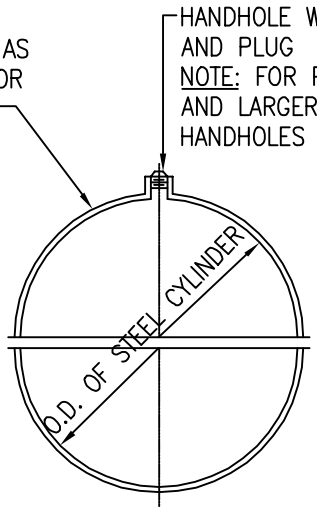
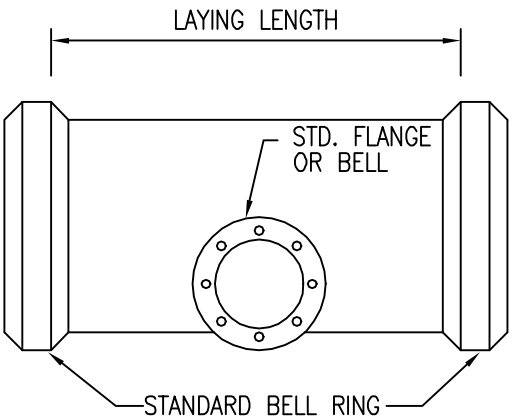


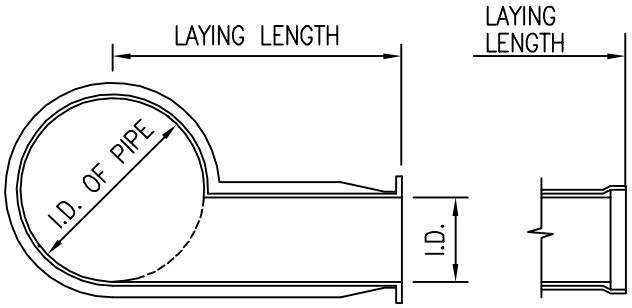
SECTION

DETAIL AT BALL STOP



ELEVATION

DETAIL OF SPLIT BUTT STRAP



SECTION AT OUTLET

BELL SECTION

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

DETAIL OF BLOW OFF TEE

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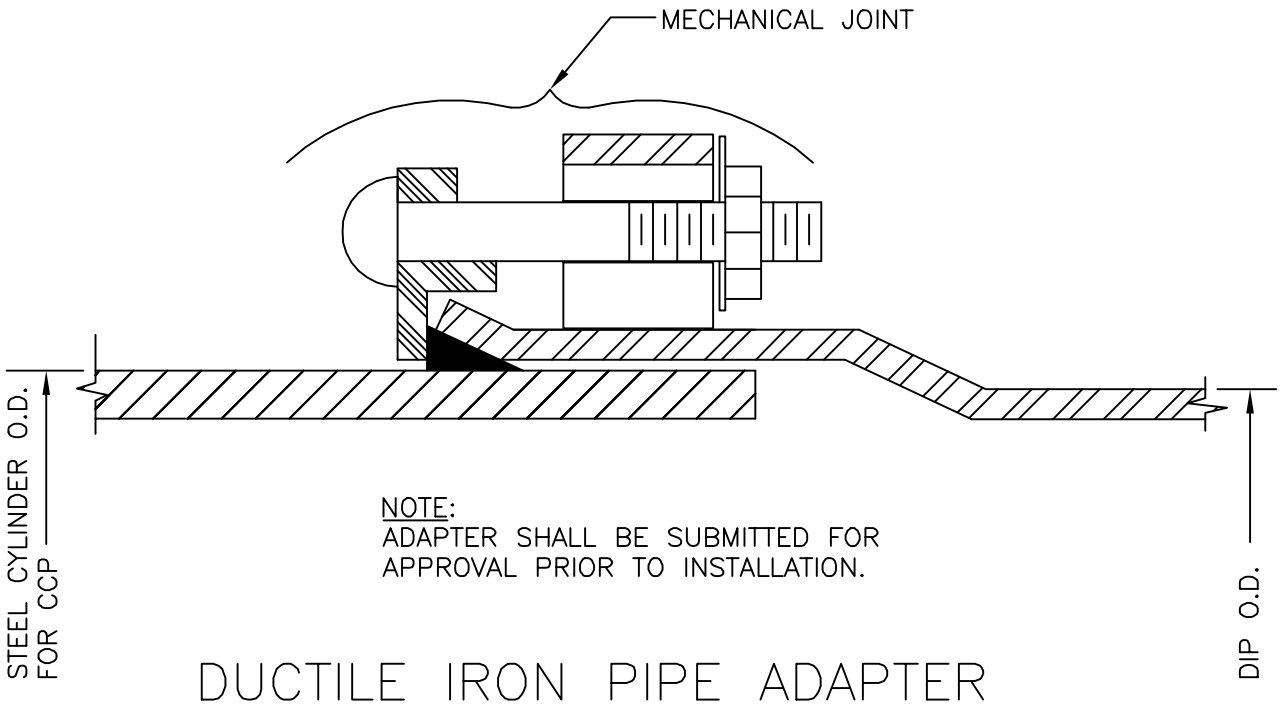
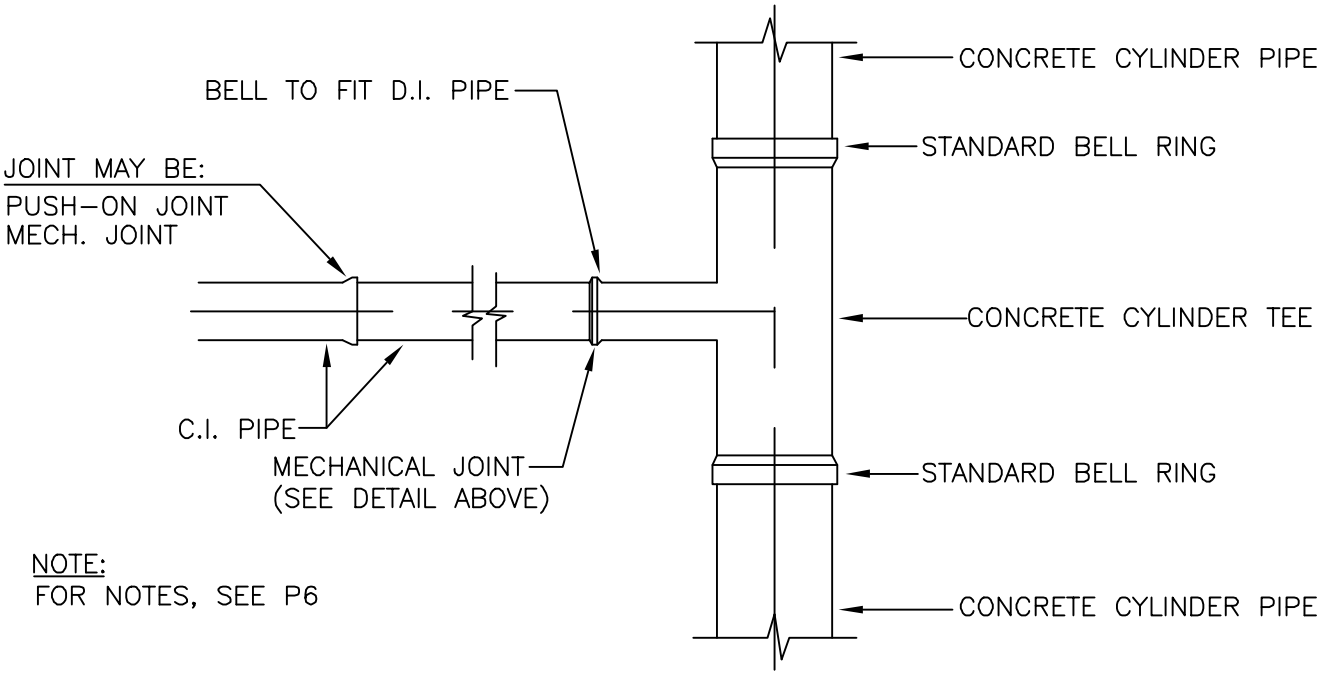
KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** **MISCELLANEOUS DETAILS** **SCALE: NTS**	STANDARD DETAILS	P4



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

DUCTILE IRON PIPE ADAPTER



NOTE:
FOR NOTES, SEE P6

TYPICAL CAST IRON PIPE CONNECTION TO CONCRETE CYLINDER PIPE

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

NOTES:

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

NOTE:

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

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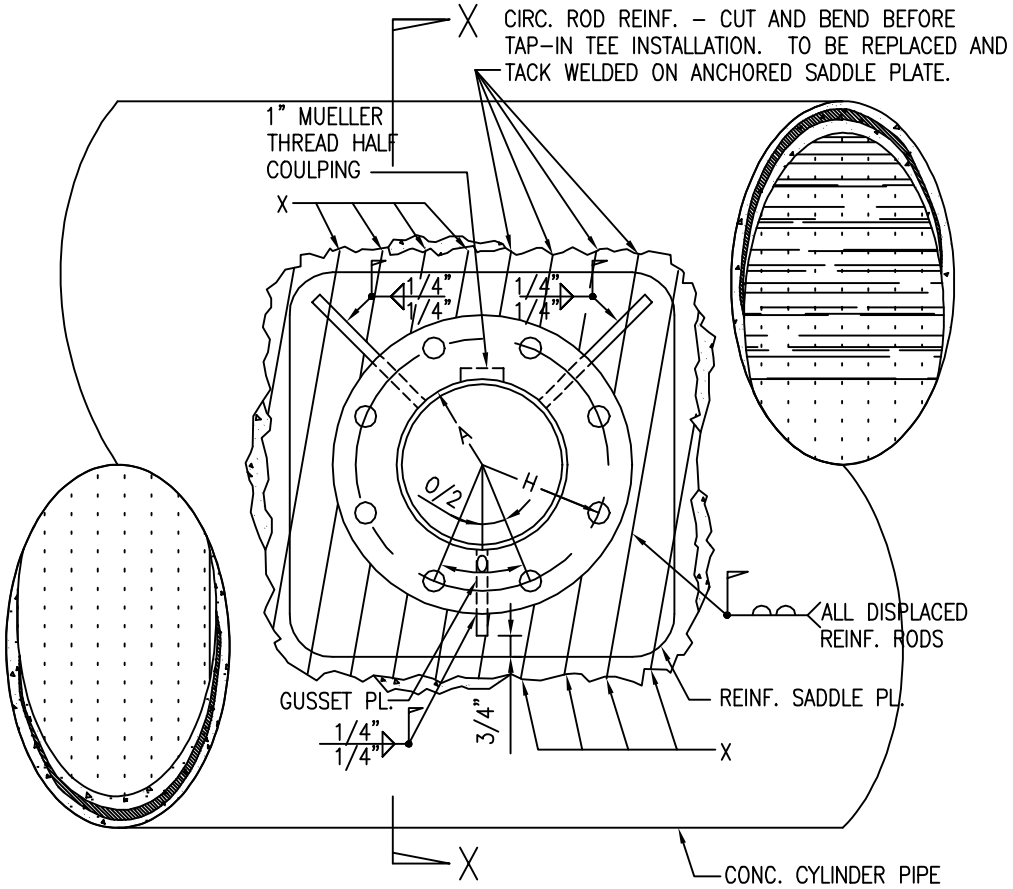
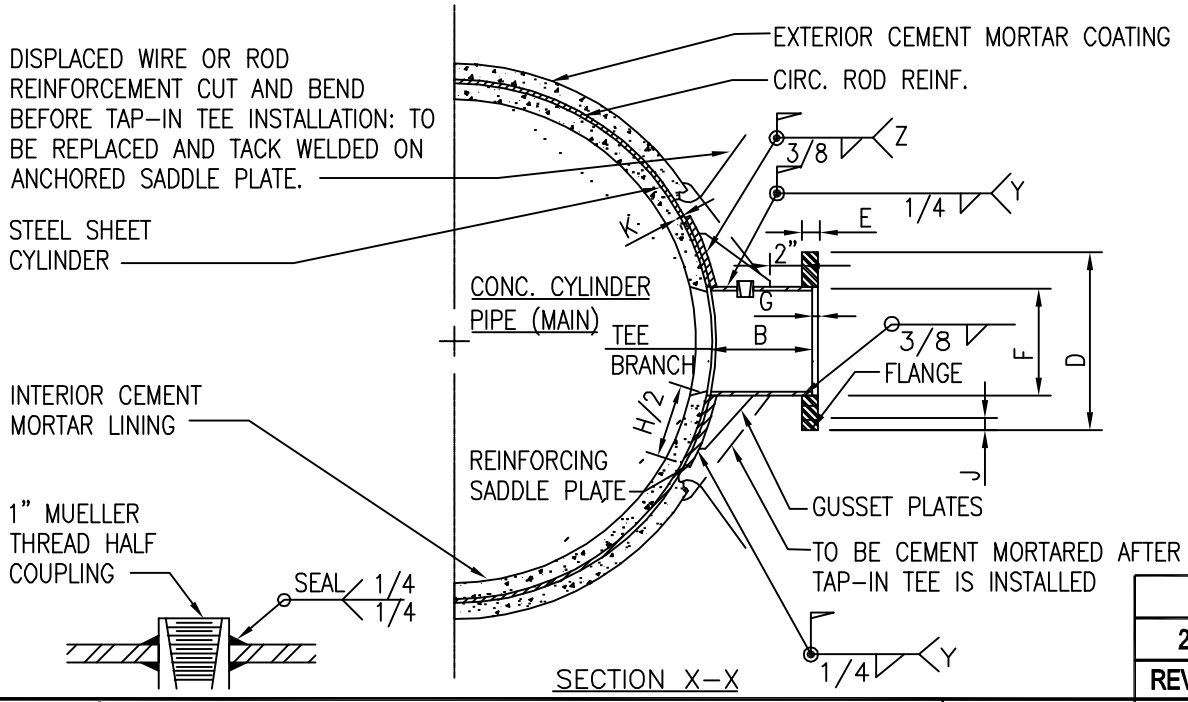
KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** **NOTES** SCALE: NTS	STANDARD DETAILS	P6



FRONT VIEW



SECTION X–X

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

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

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

FABRICATION NOTES:

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

INSTALLATION PROCEDURE

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

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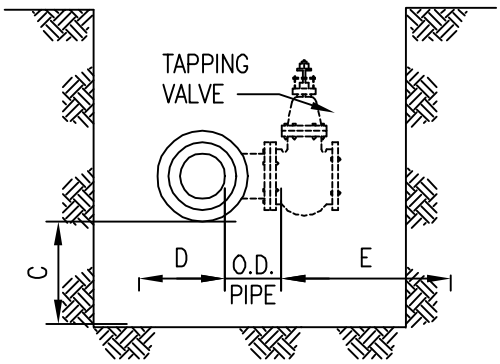
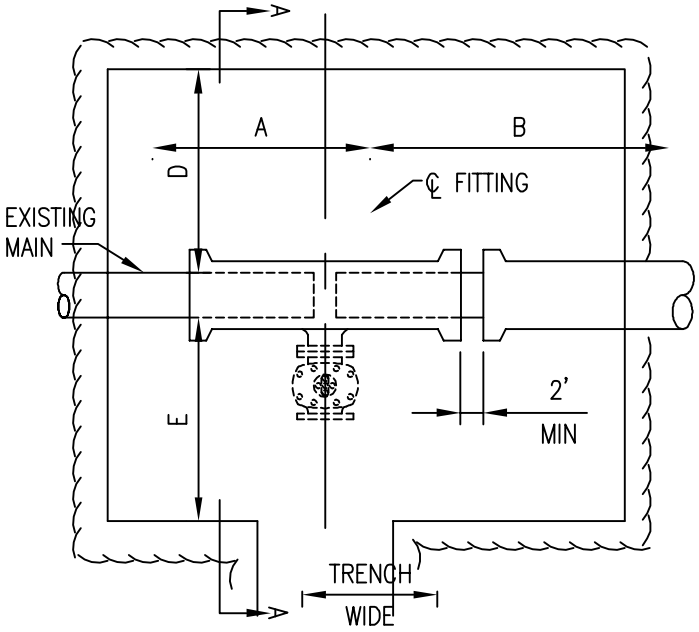
KAUAI OAHU MAUI	**CONCRETE CYLINDER PIPE** **TAP-IN TEE NOTES AND TABLES** **SCALE: NTS**	STANDARD DETAILS	P8



SECTION A–A



PLAN

TABLE "A"

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

NOTES:

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

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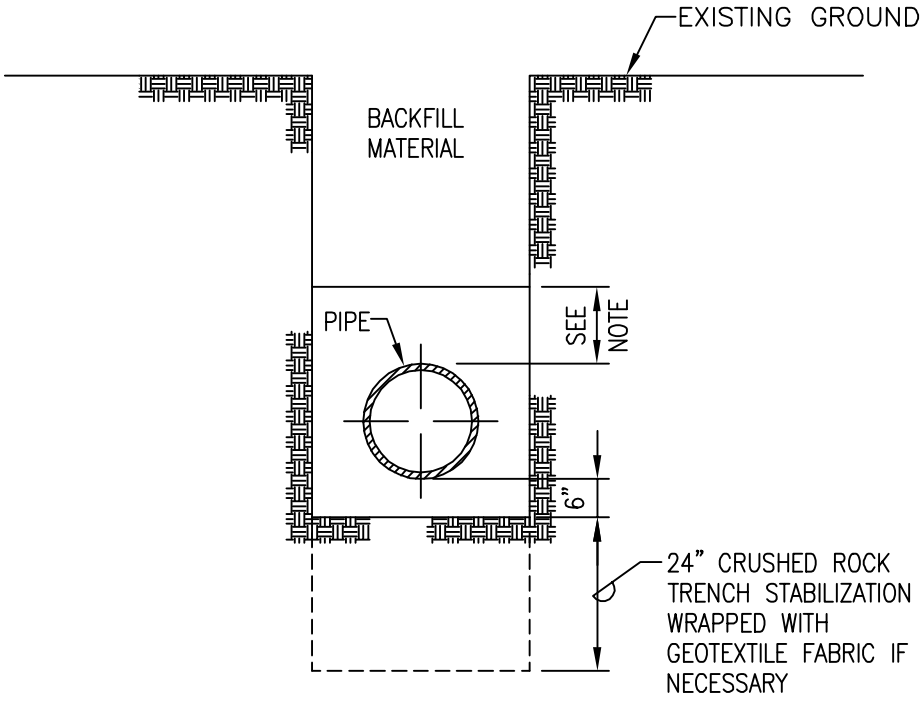
EXCAVATION PAYMENT
LIMITS AT CONNECTION
SCALE: NTS

STANDARD DETAILS

P9



NOTE:

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

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

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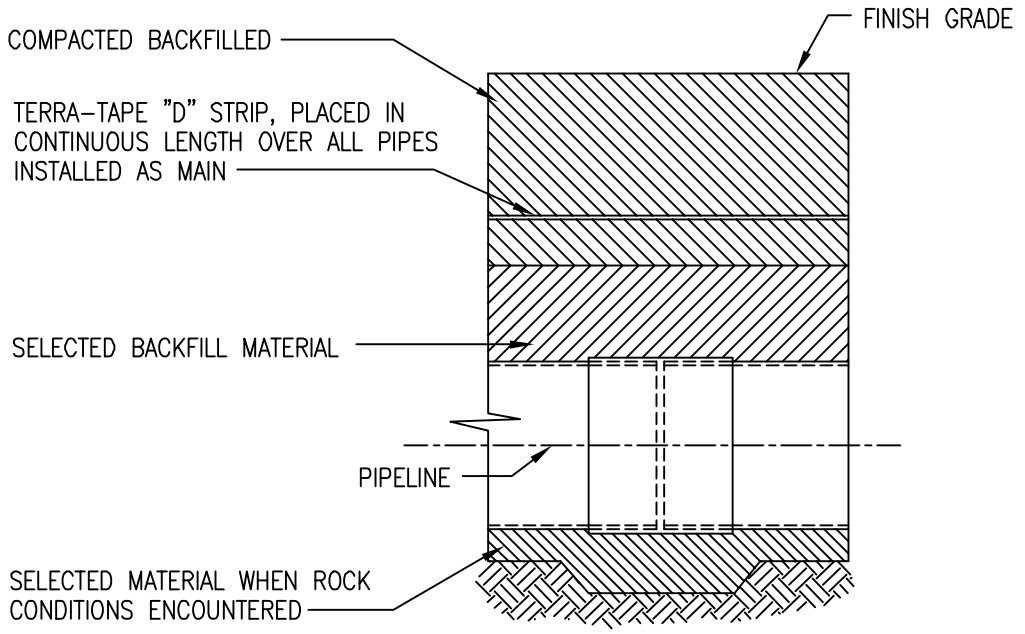
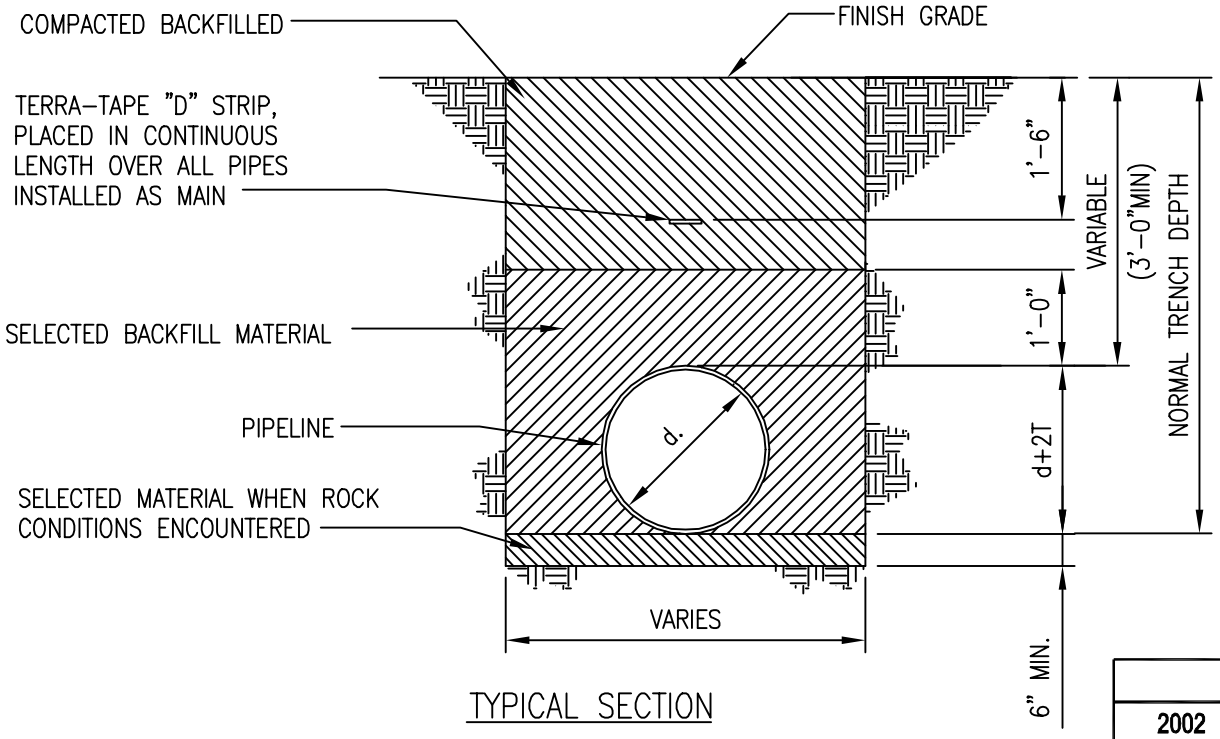
OAHU MAUI	**TRENCH BACKFILL** SCALE: NTS	STANDARD DETAILS	P10



DETAIL AT JOINT



TYPICAL SECTION

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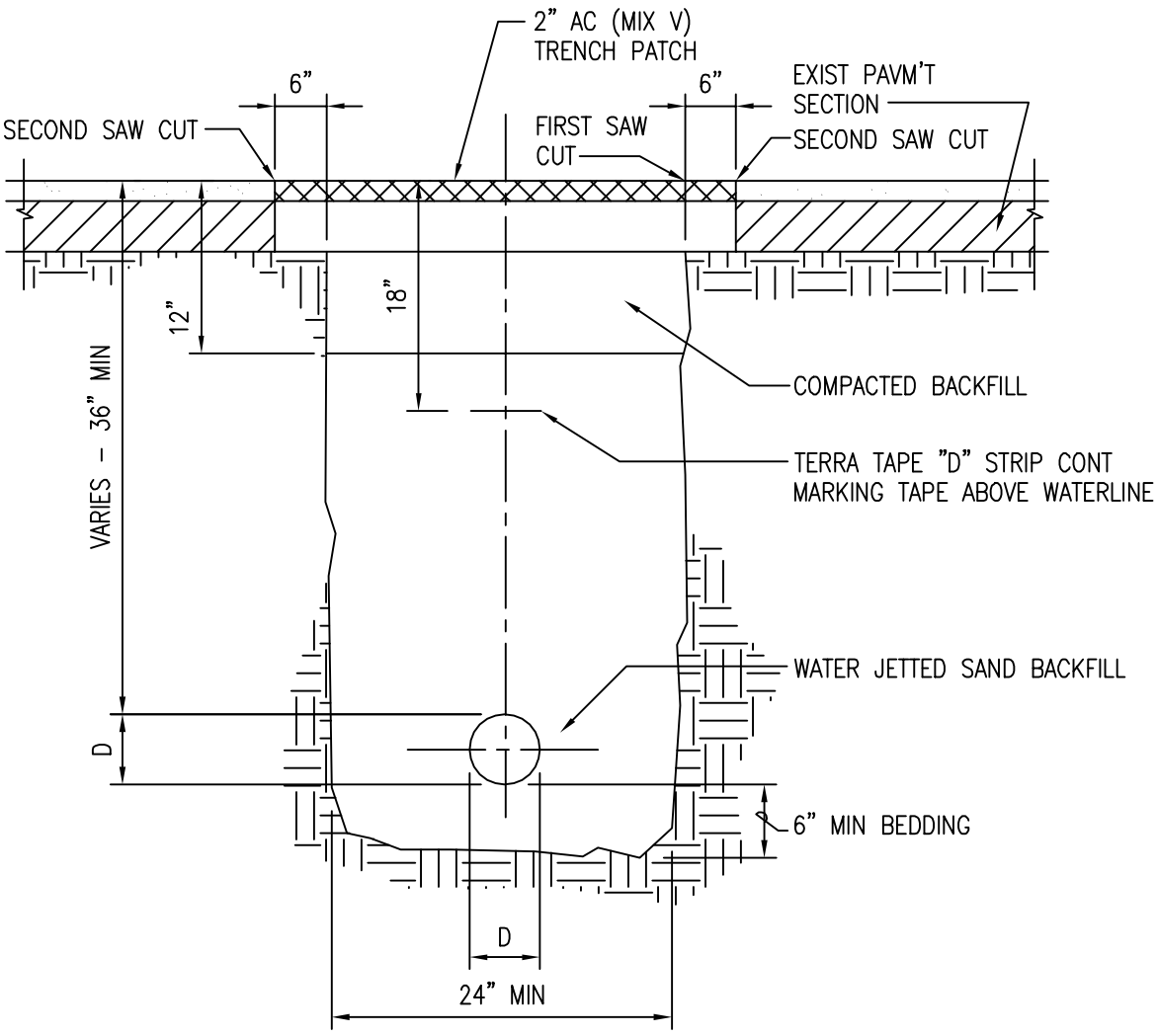
KAUAI	**WATERLINE TRENCH DETAILS** MISCELLANEOUS DETAILS SCALE: NTS	STANDARD DETAILS	P11



TYPICAL PVC WATERLINE TRENCH

NOTE FOR PVC WATER MAIN

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

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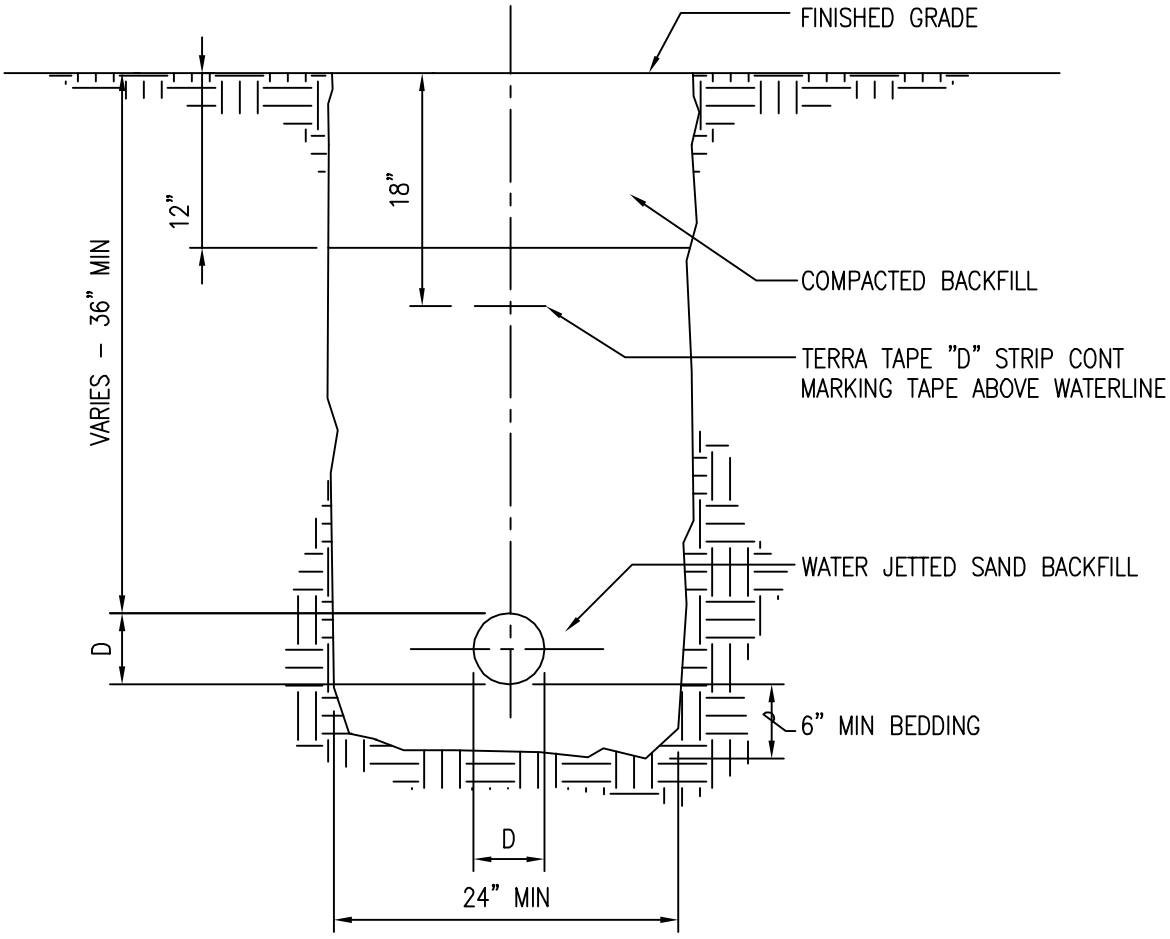
KAUAI	**TYP. PVC WATERLINE TRENCH** PAVED AREA SCALE: NTS	STANDARD DETAILS	P12



TYPICAL PVC WATERLINE TRENCH

NOTE FOR PVC WATER MAIN

1. A MIN OF 3 FEET OF COVER SHALL BE MAINTAINED AT ALL TIMES.
2. BACKFILL MATERIAL SHALL BE SAND ONLY; WATER JETTED TO WITHIN 12" OF FINISHED GRADE.
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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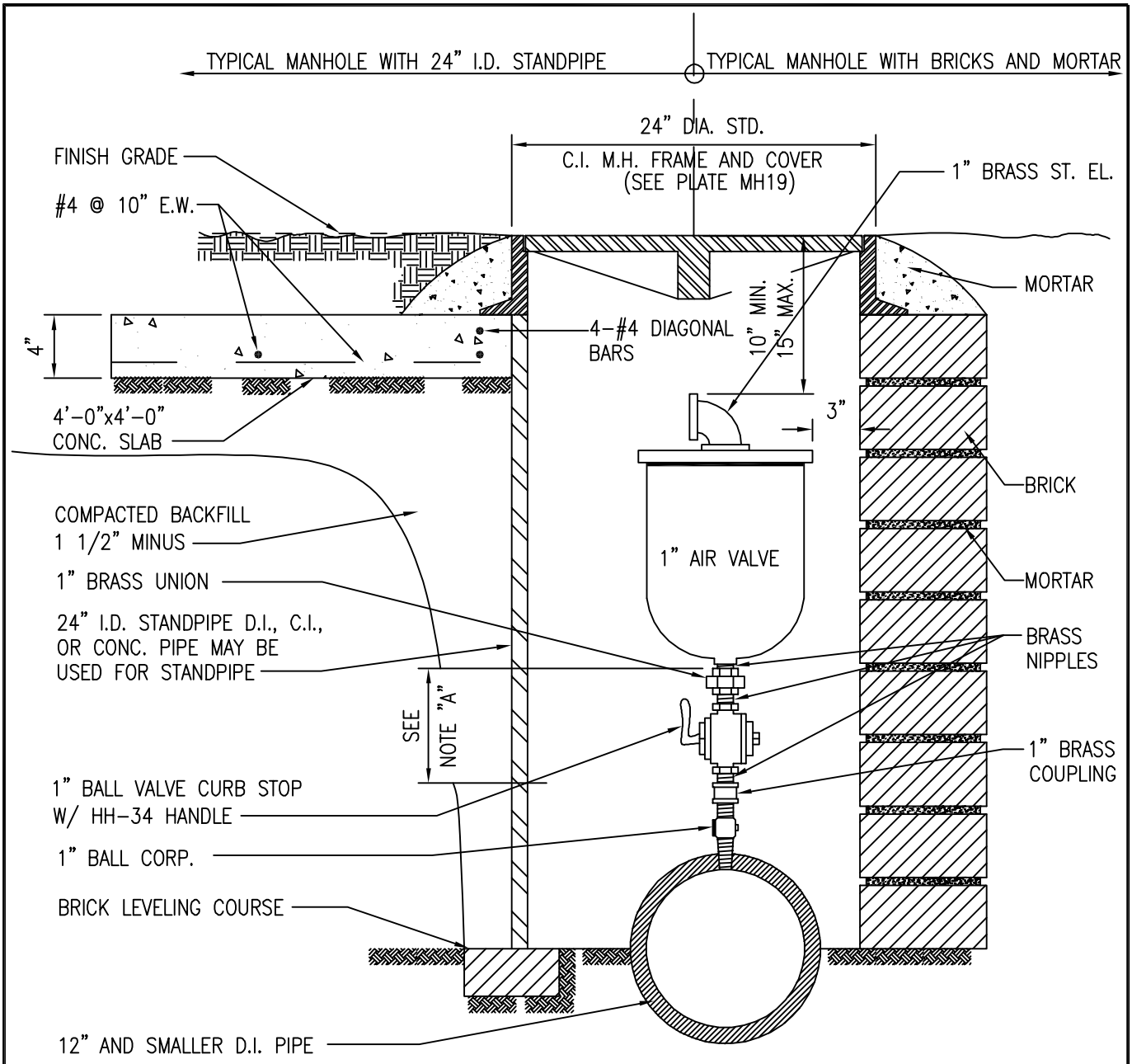
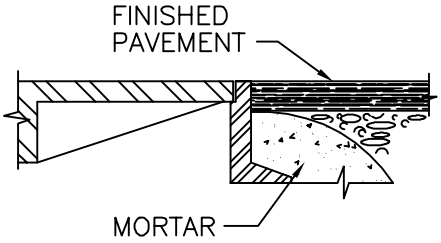
KAUAI	**TYP. PVC WATERLINE TRENCH** NON-PAVED AREA SCALE: NTS	STANDARD DETAILS	P13





MANHOLE INSTALLATION WITHIN PAVED AREAS

NOTES:

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

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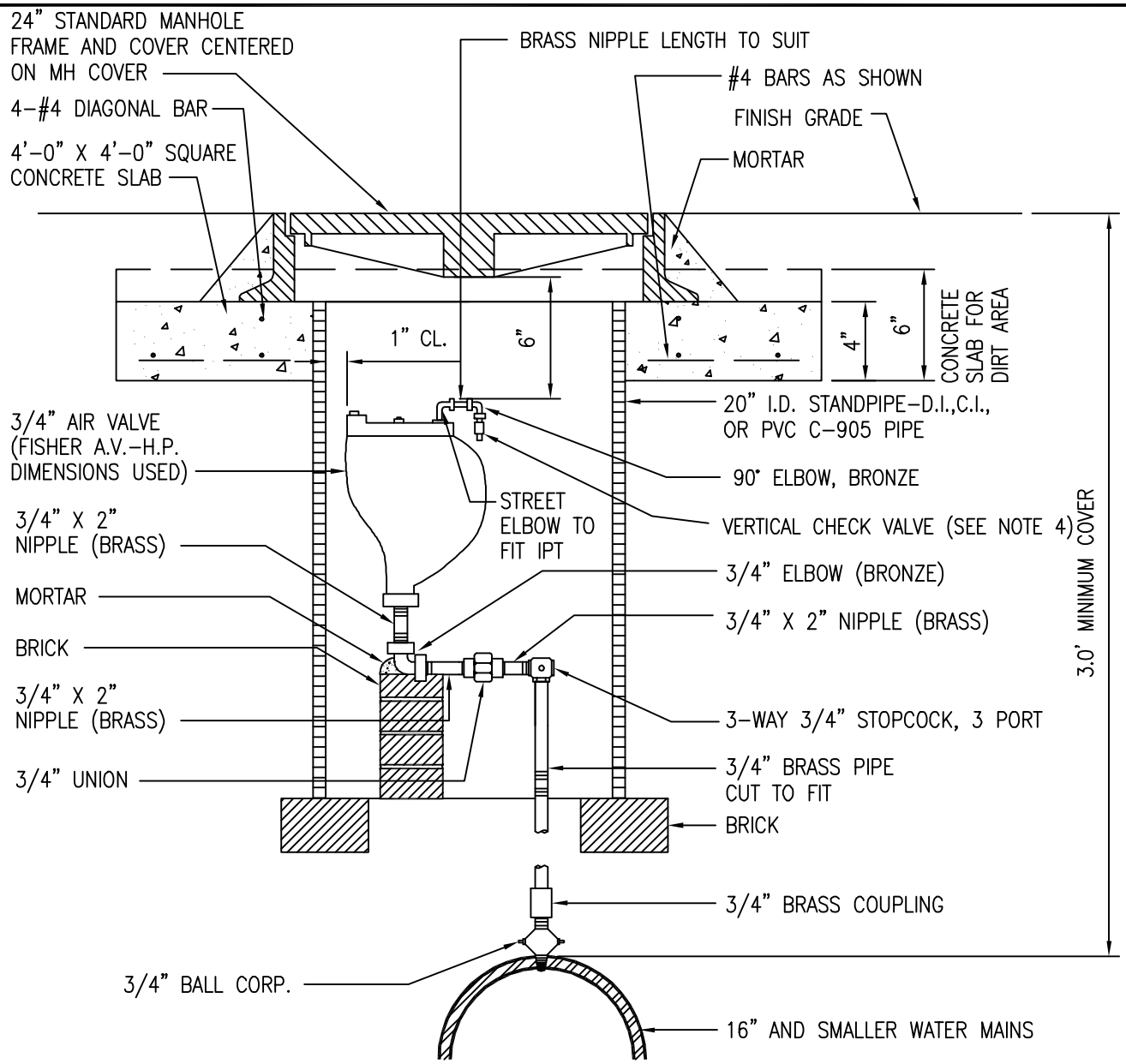
HAWAII	# 1" AIR VALVE UNIT DETAIL SCALE: NTS	STANDARD DETAILS	V1



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

NOT TO SCALE

NOTE:

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

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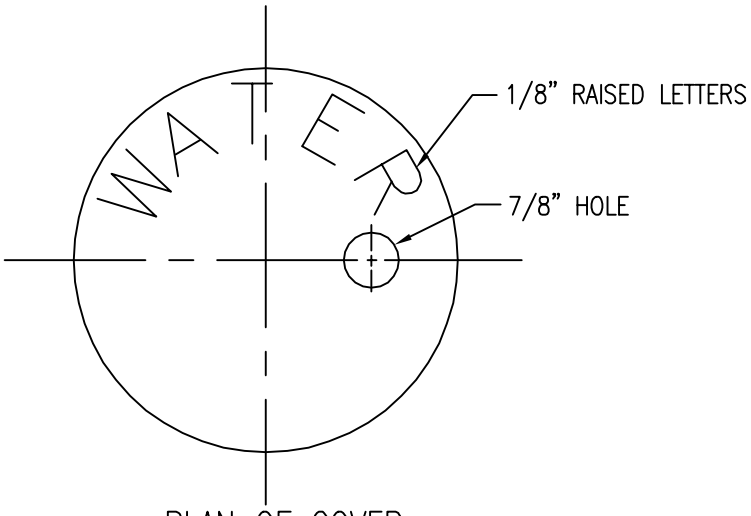
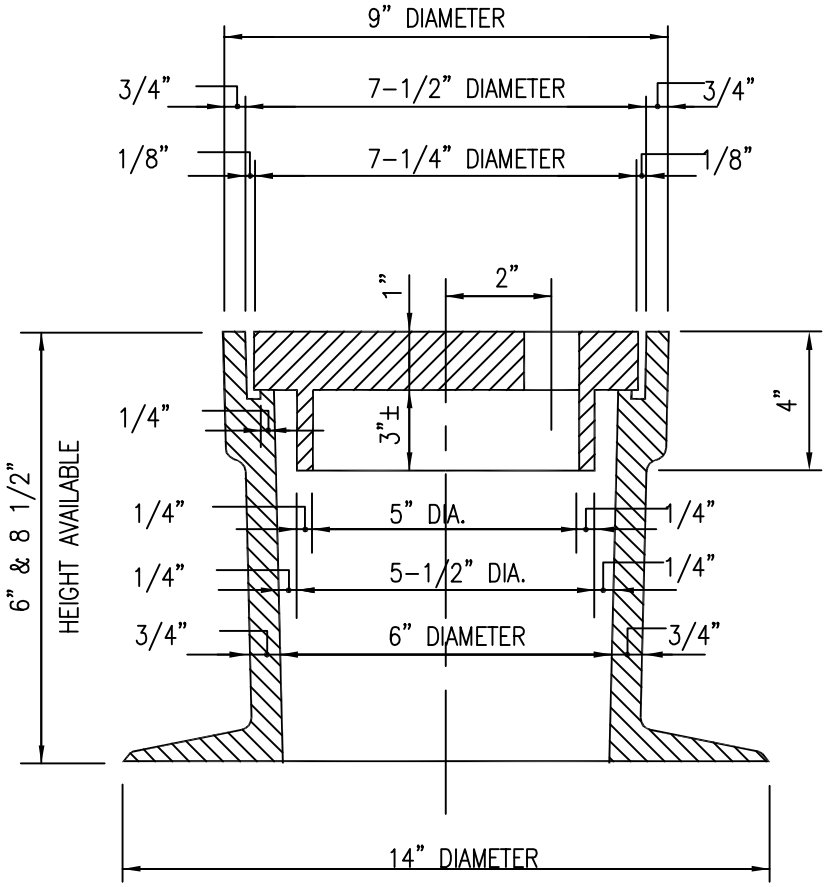
OAHU	**AIR RELIEF VALVE BOX** **FOR 3/4" AIR RELIEF VALVE** **SCALE: NTS**	STANDARD DETAILS	V2

NOTE:

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



PLAN OF COVER



SECTION

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

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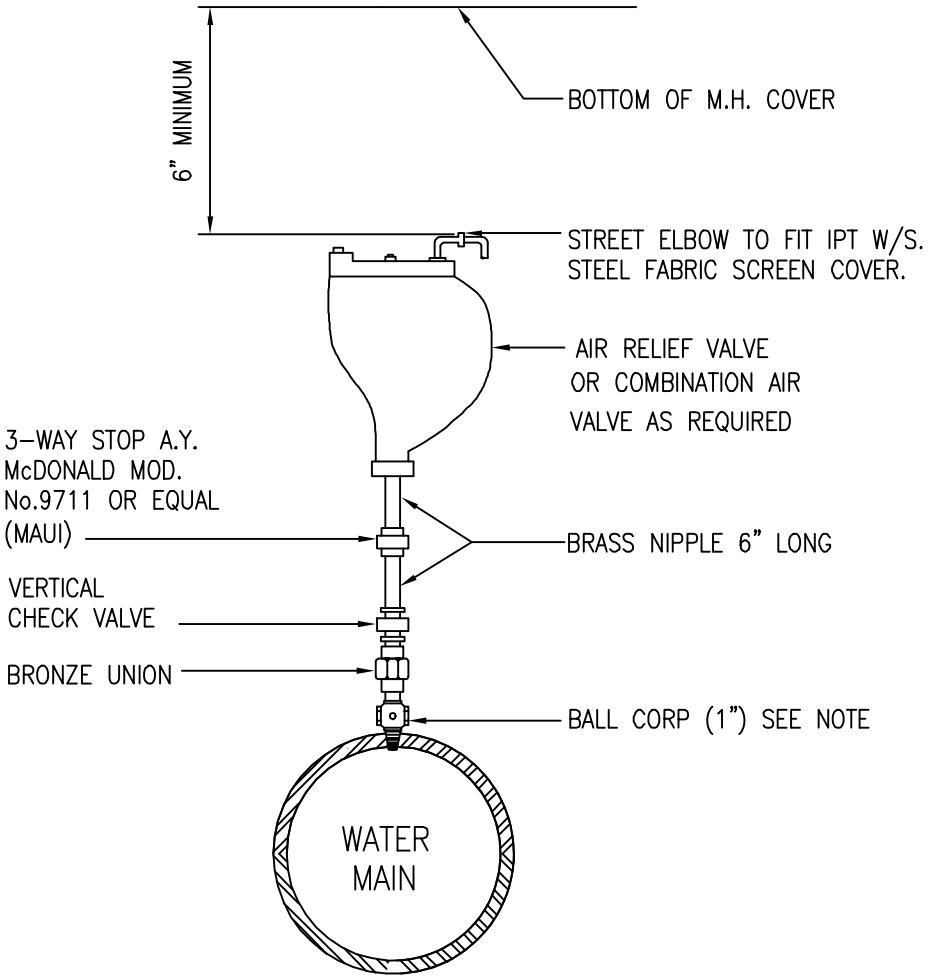

STANDARD CONNECTION FOR AIR RELIEF VALVE

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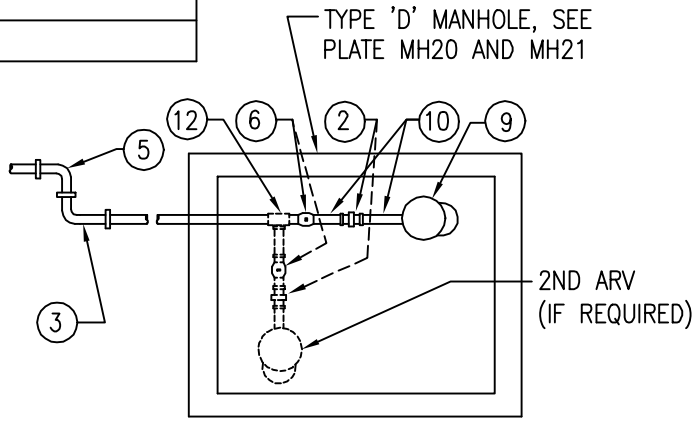
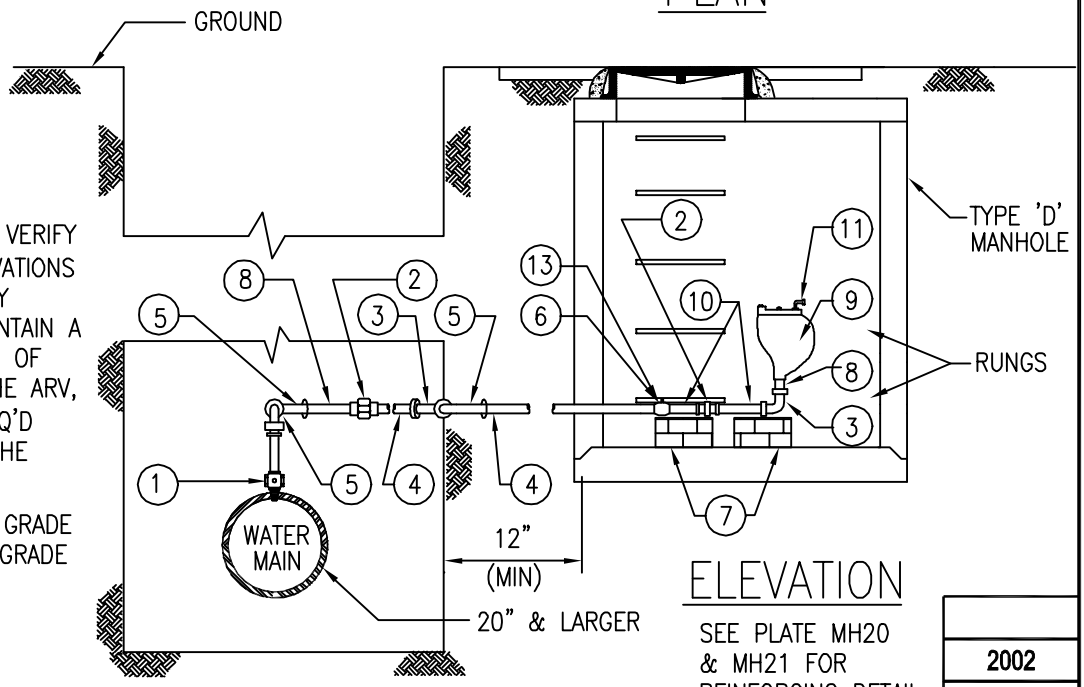
OAHU MAUI	AIR RELIEF VALVE CONNECTION IN MANHOLE SCALE: NTS	STANDARD DETAILS	V4

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

* FOR MAUI ONLY



PLAN



ELEVATION

SEE PLATE MH20 & MH21 FOR REINFORCING DETAIL

NOTE:

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

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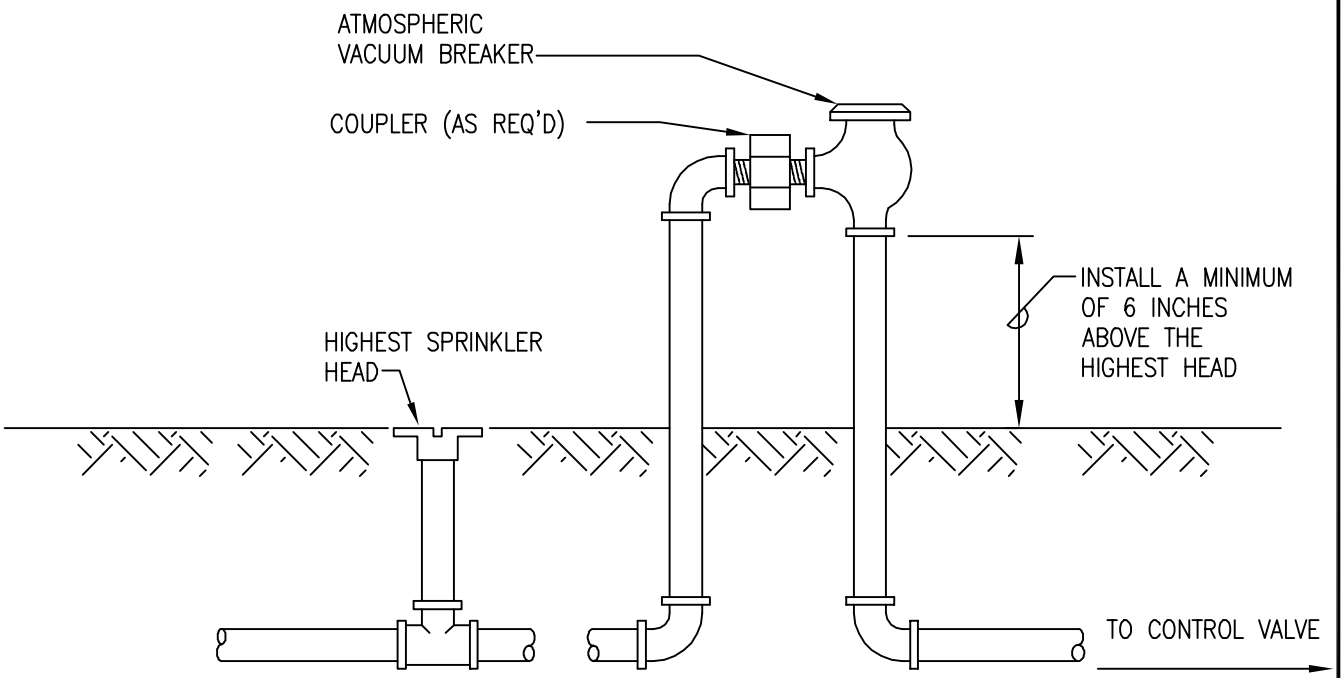
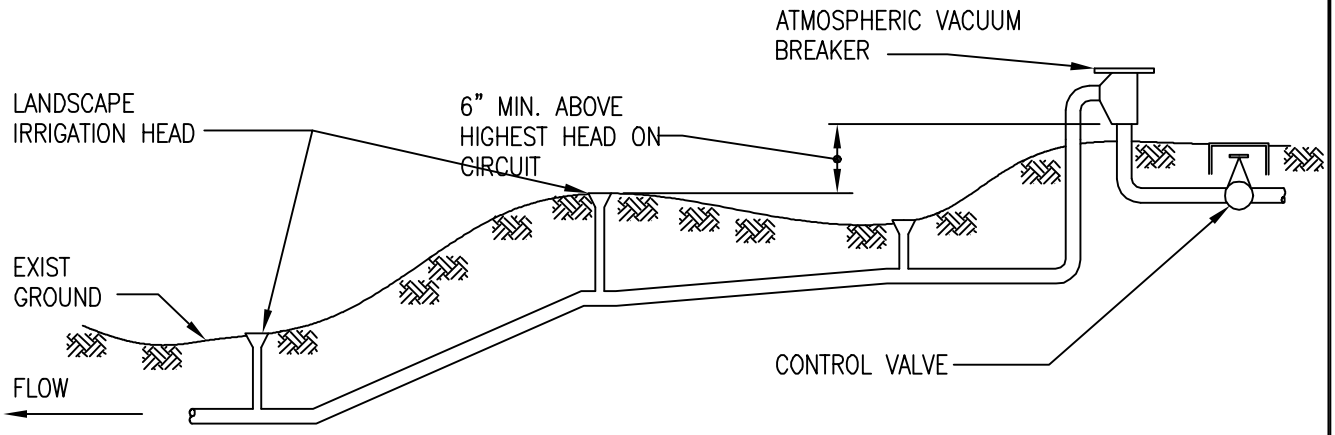
KAUAI OAHU MAUI	OFFSET AIR RELIEF VALVE FOR 20" OR LARGER MAINS SCALE: NTS	STANDARD DETAILS	V5





NOTE:

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

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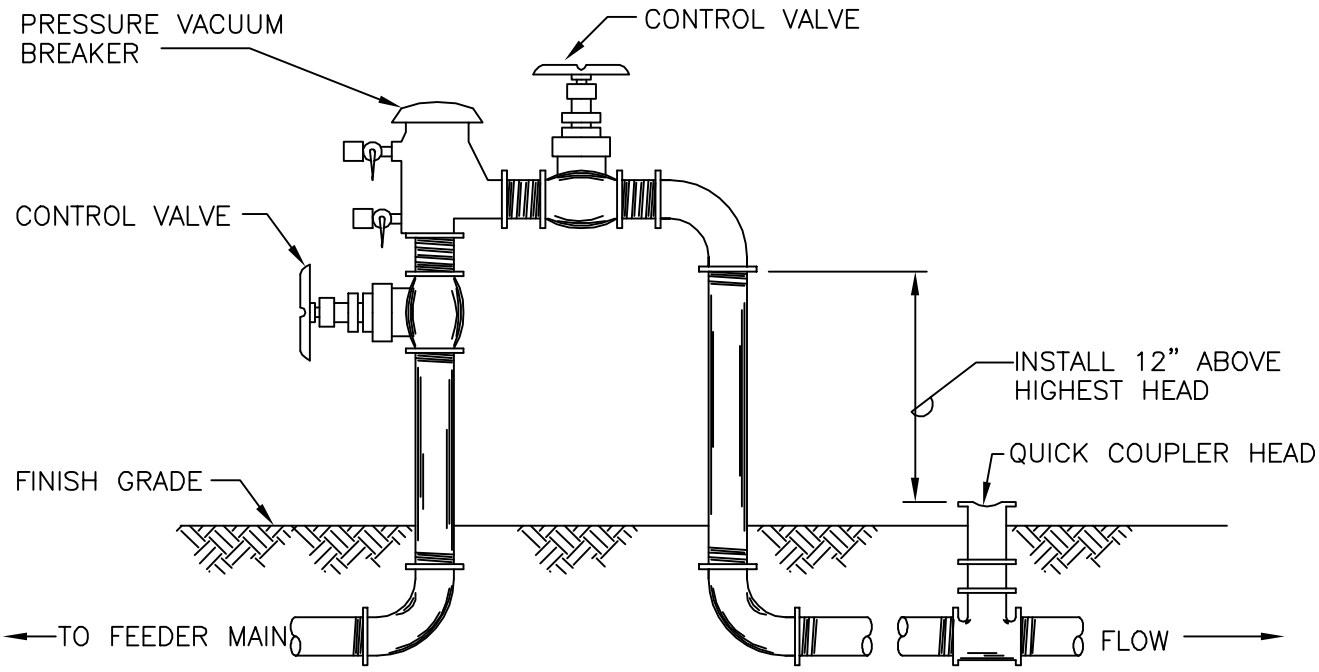
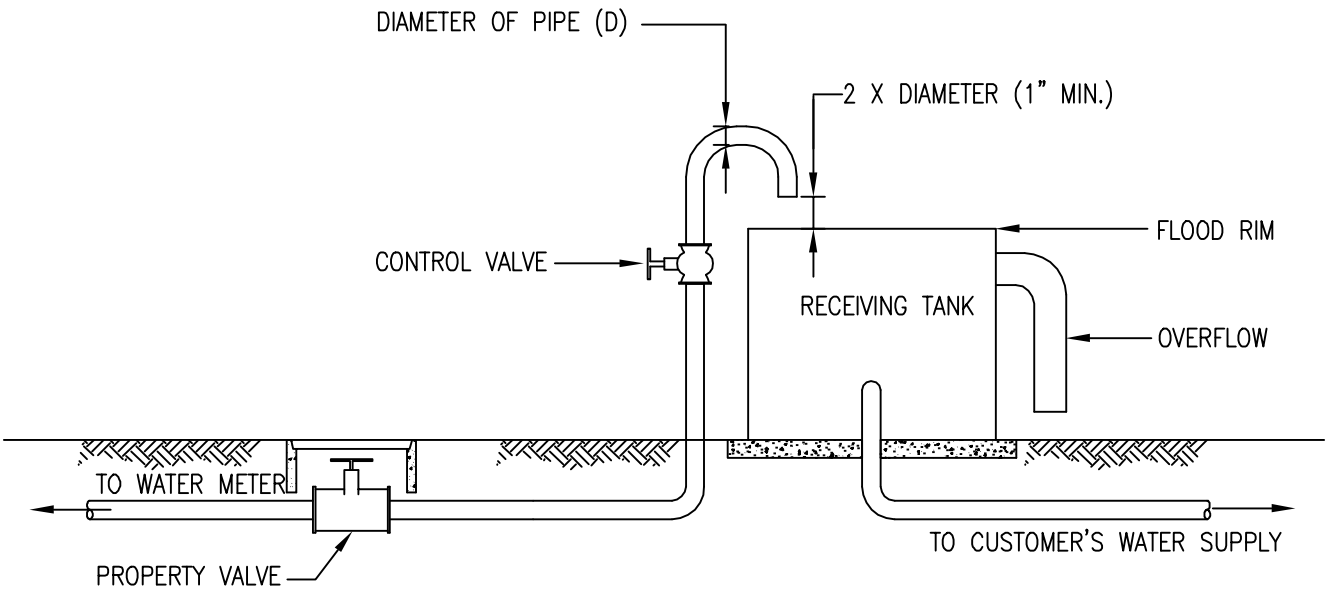
OAHU MAUI	**ATMOSPHERIC VACUUM BREAKER** **LANDSCAPE IRRIGATION DETAIL** **SCALE: NTS**	STANDARD DETAILS	V6



NOTES:

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

			2002 REVISION
OAHU MAUI	**PRESSURE VACUUM BREAKER** LANDSCAPE IRRIGATION SCALE: NTS	STANDARD DETAILS	V7



NOTE:

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

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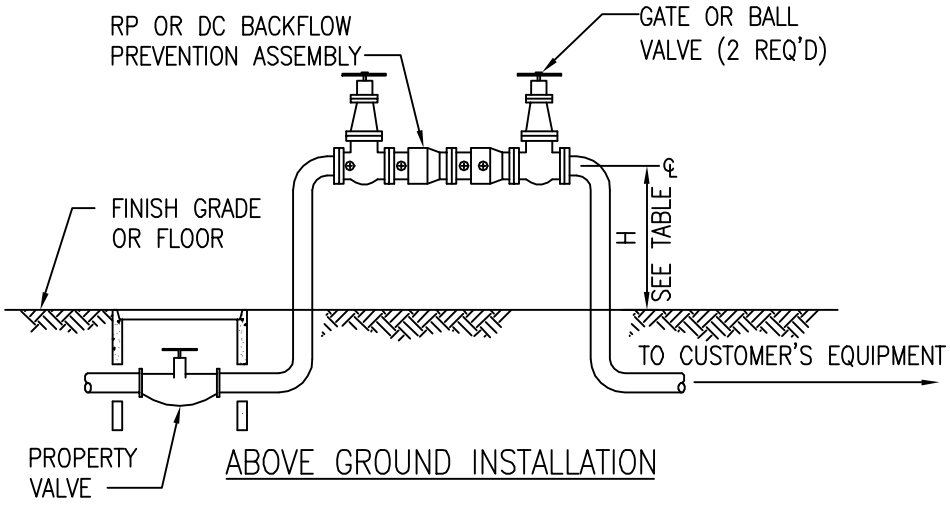
REVISION	

KAUAI OAHU MAUI HAWAII	**AIR GAP** **TYPICAL DETAIL** SCALE: NTS	STANDARD DETAILS	V8

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



ABOVE GROUND INSTALLATION

NOTES:

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

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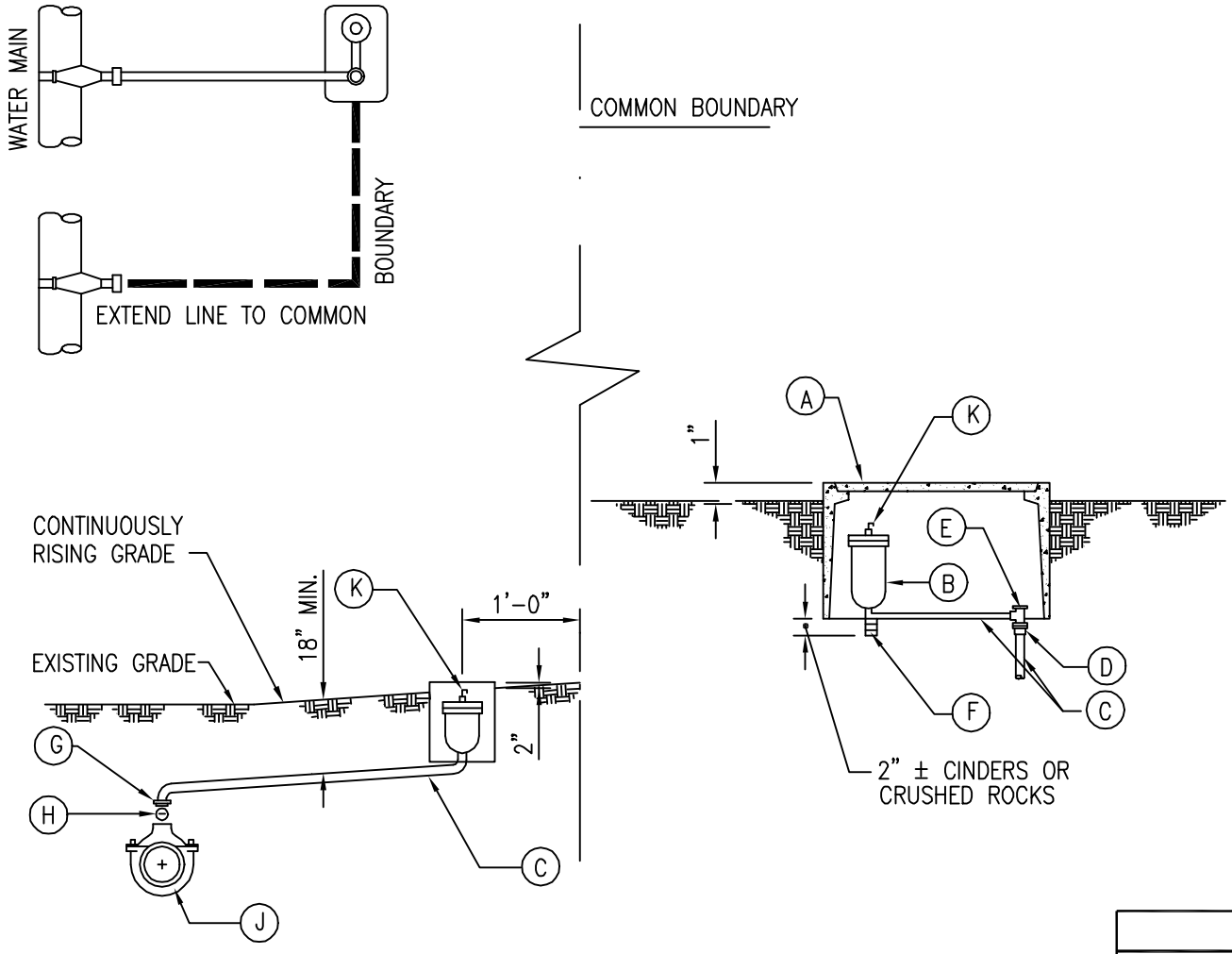
KAUAI OAHU MAUI HAWAII	**BACKFLOW PREVENTER** **TYPICAL INSTALLATION** **SCALE: NTS**	STANDARD DETAILS	V9

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



2002
REVISION

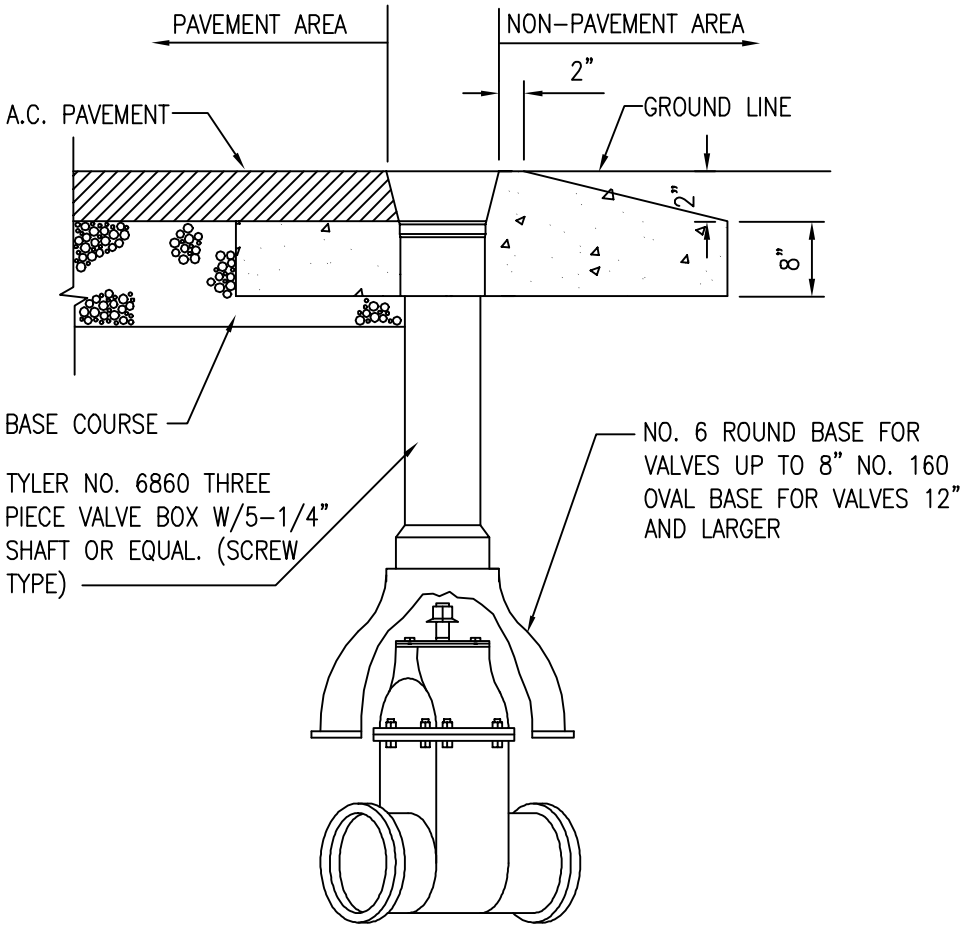
KAUAI

AUTOMATIC PRESSURE RELIEF VALVE

SCALE: NTS

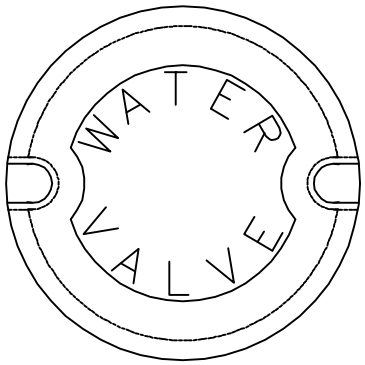
STANDARD DETAILS

V10



PROFILE

FOR GATE VALVE, BEVEL GEARED GATE VALVE AND BUTTERFLY VALVES



COVER

GENERAL NOTES:

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

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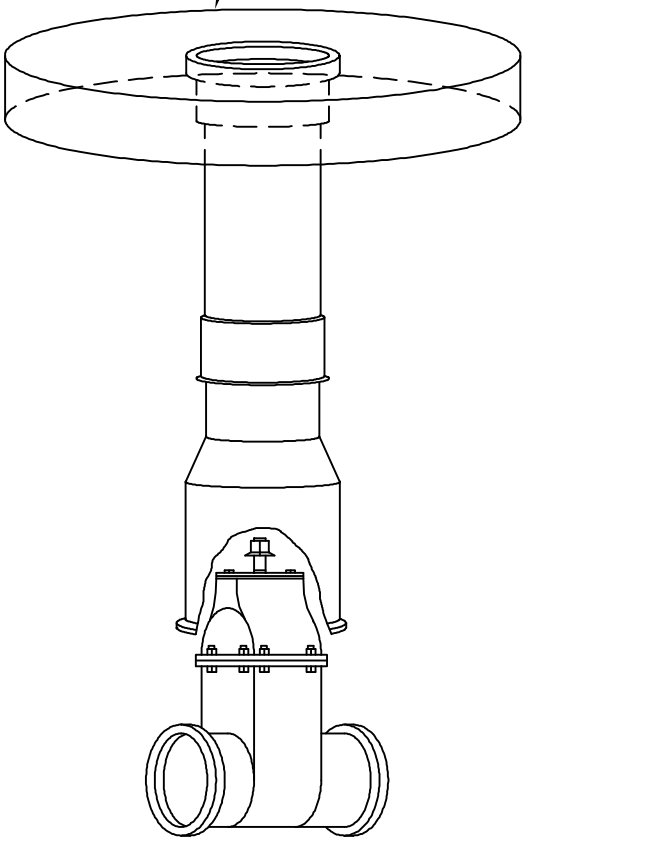
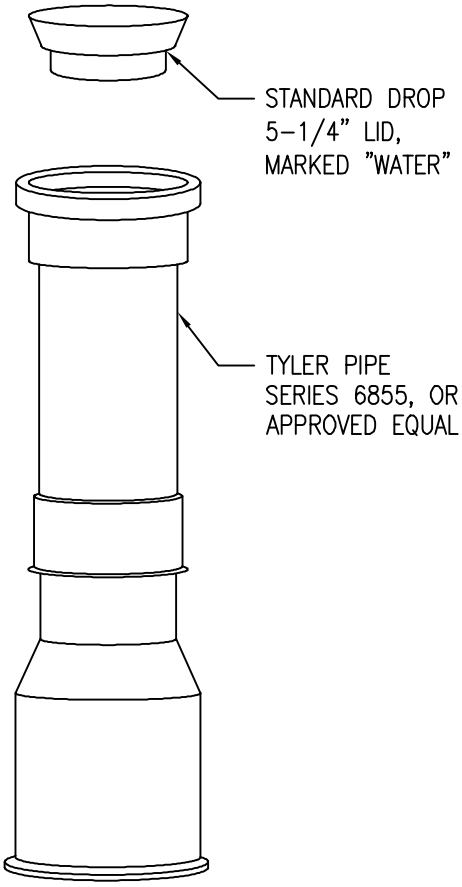
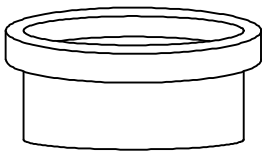
	REVISION

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

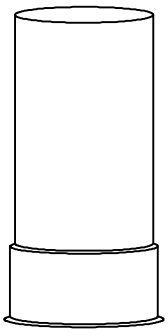




TWO-PIECE
VALVE BOX,
HEIGHT TO SUIT



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



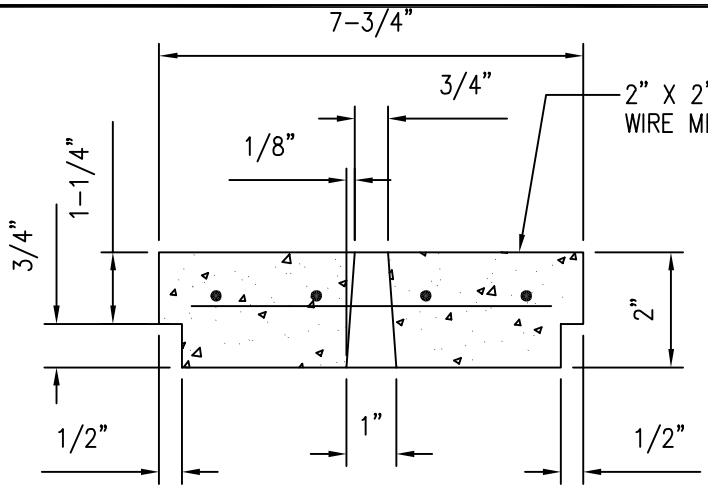
EXTENSION PIECE
60-A

NOTES:

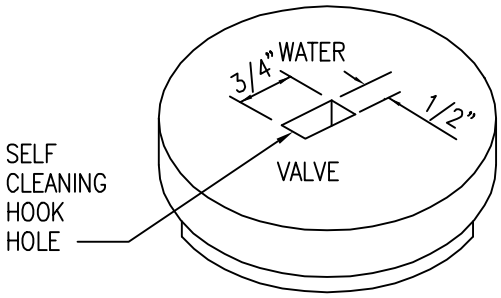
1. VALVE BOX ASSEMBLY TO BE CAST IRON.
2. MODEL NUMBERS REFER TO TYLER PIPE CATALOG.
3. MAXIMUM 4' DEPTH TO VALVE OPERATOR NUT.

	2002
	REVISION

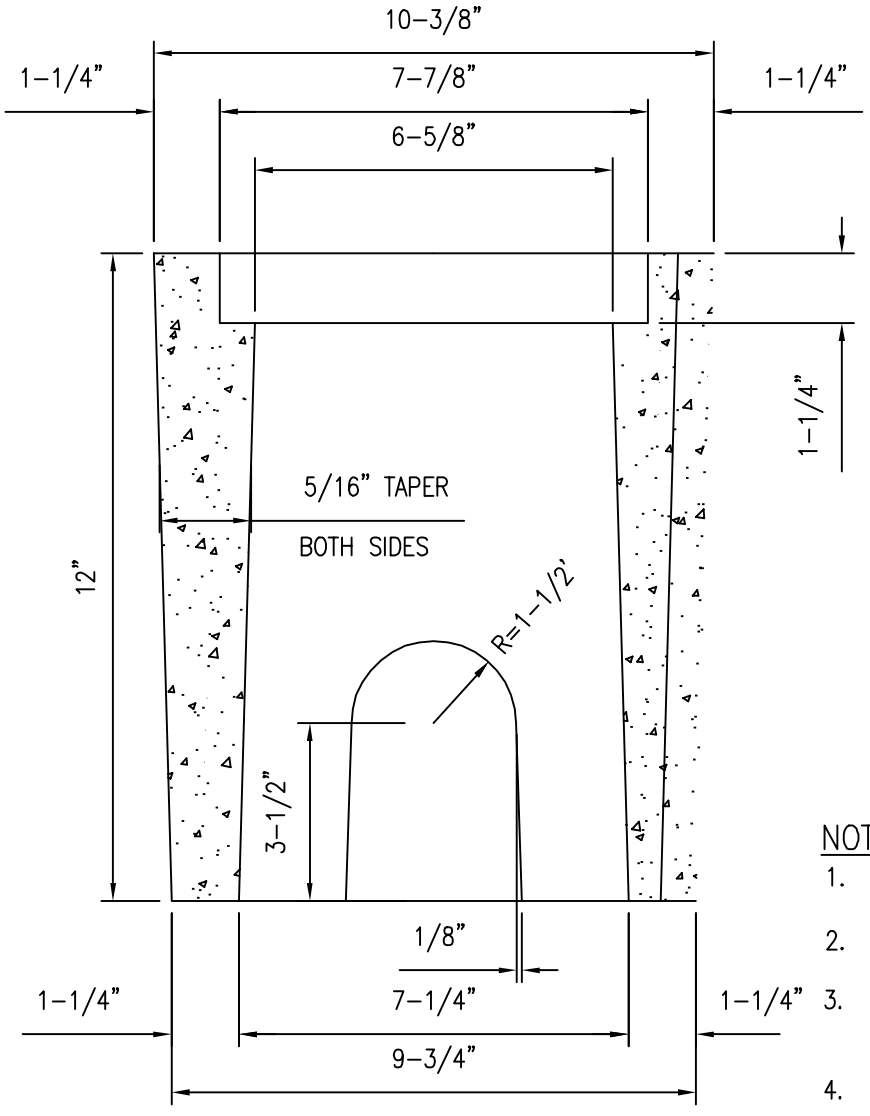
MAUI	**6" SLIDING VALVE BOX ASSEMBLY** SCALE: NTS	STANDARD DETAILS	V12



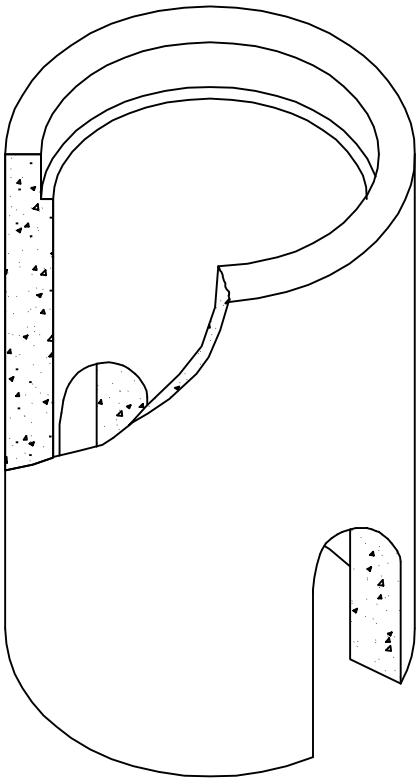
SECTION OF COVER



CONCRETE COVER



SECTION OF BOX



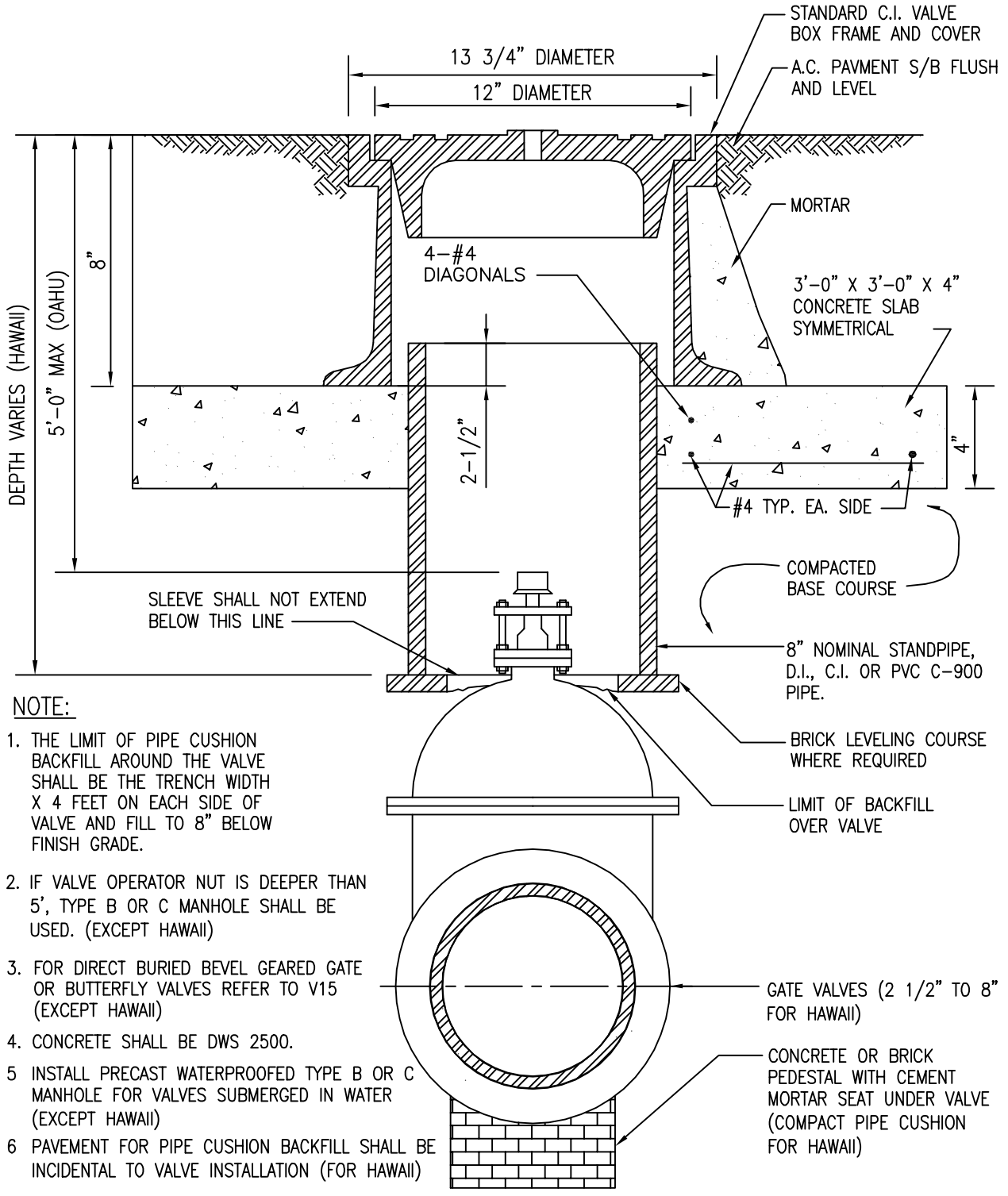
CONCRETE BOX

NOTE:

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

	2002
	REVISION

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



NOTE:

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

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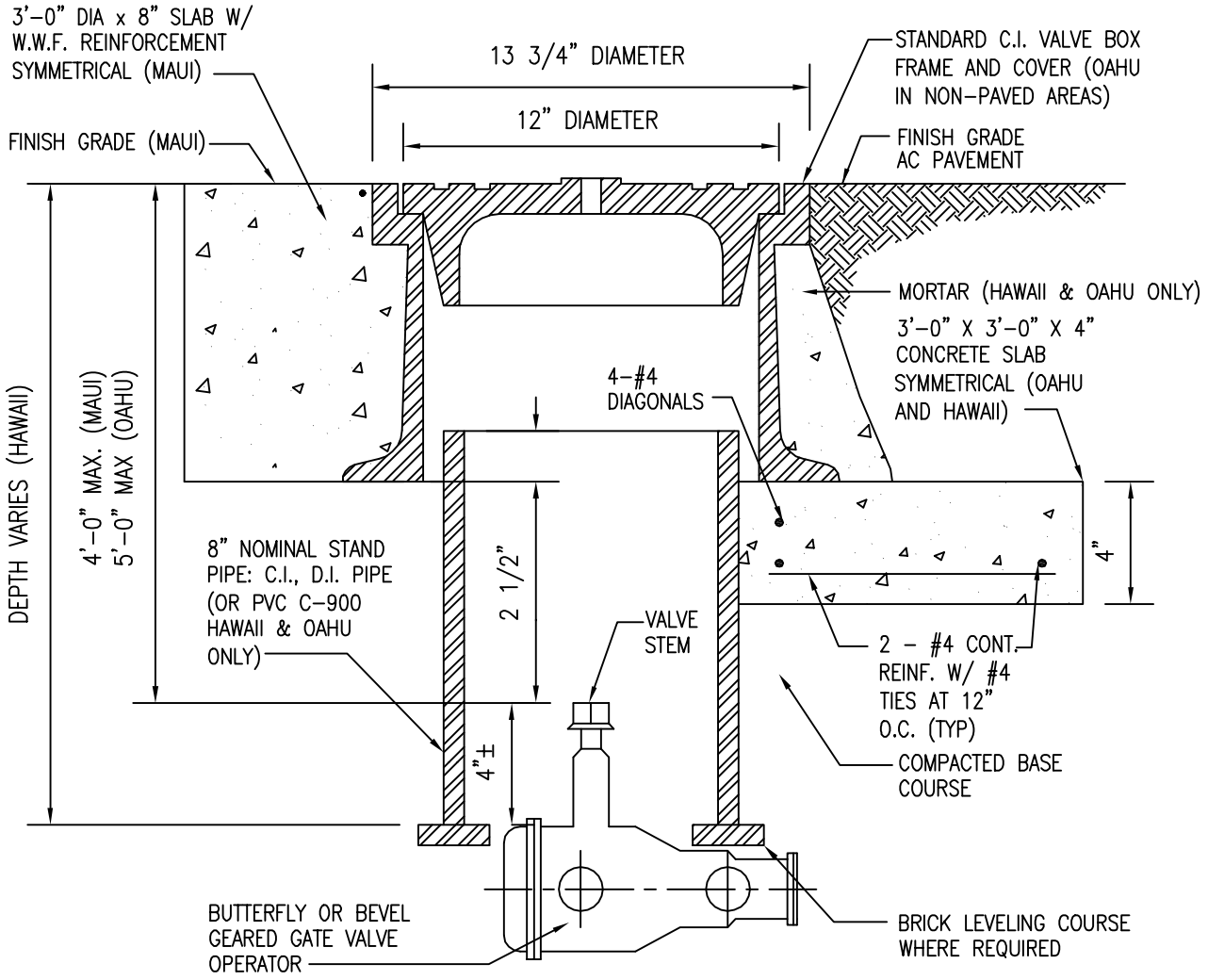
OAHU HAWAII	12" VALVE BOX INSTALLATION FOR GATE VALVE SCALE: NTS	STANDARD DETAILS	V14

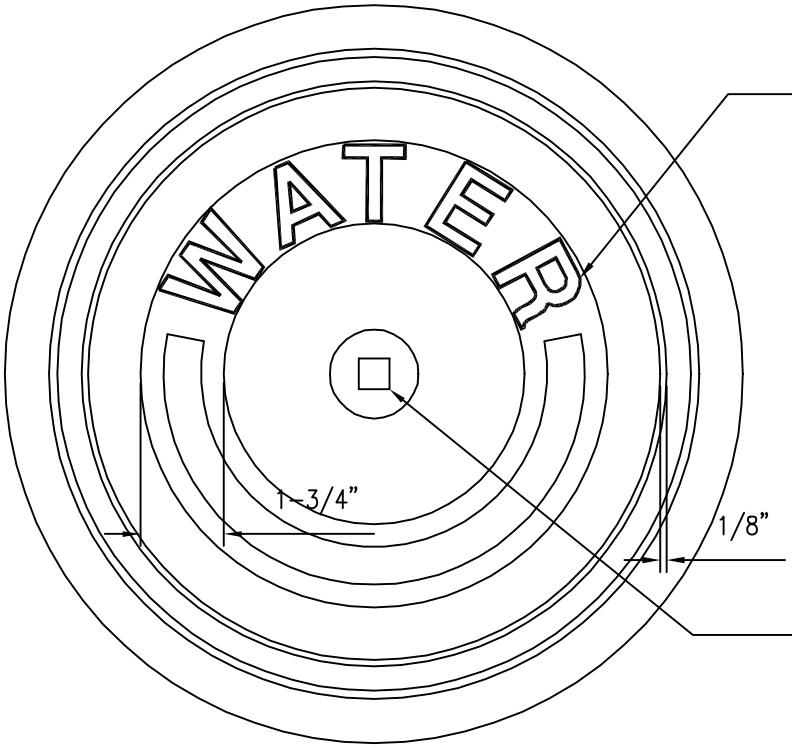


NOTE:

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

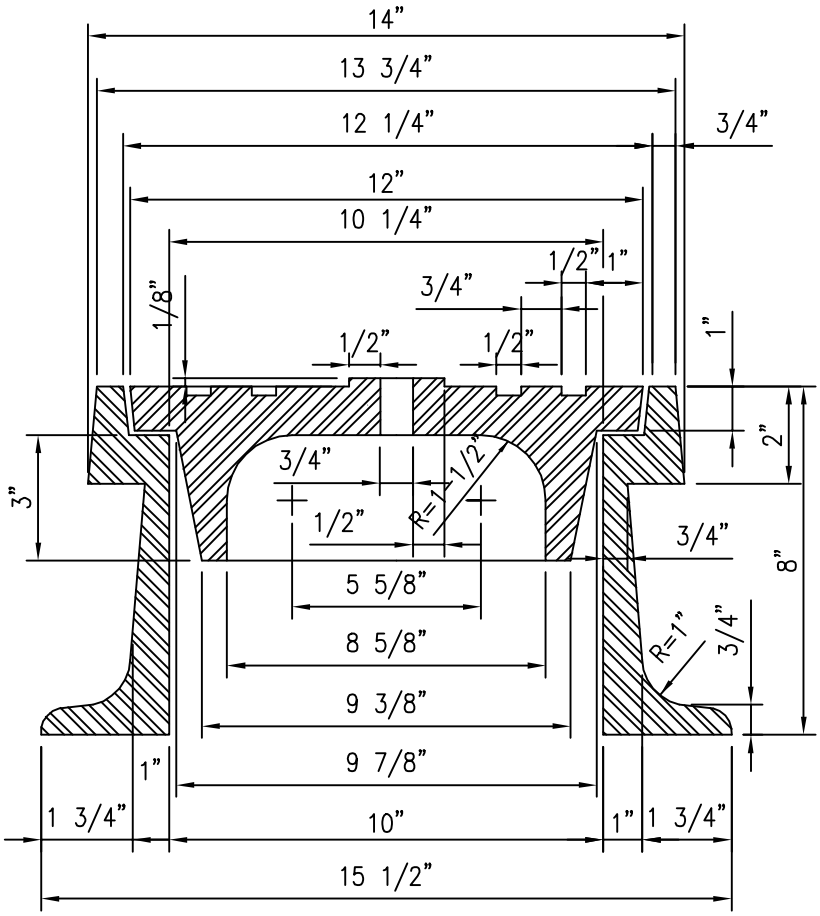
	2002
	REVISION

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



NOTE:

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



SEE TABLE 200-9 FOR MINIMUM WEIGHT REQUIREMENTS

CAST IRON FRAME & COVER

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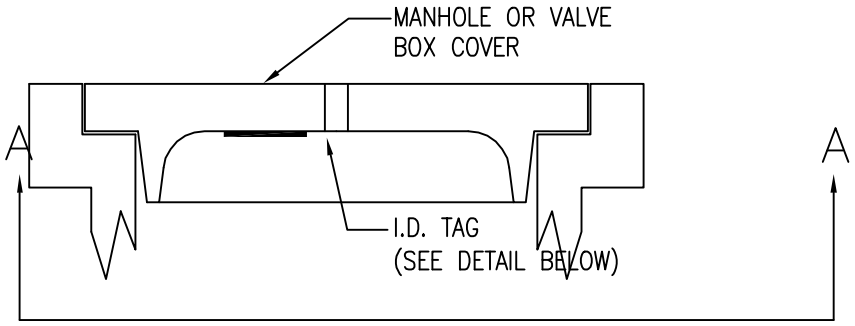
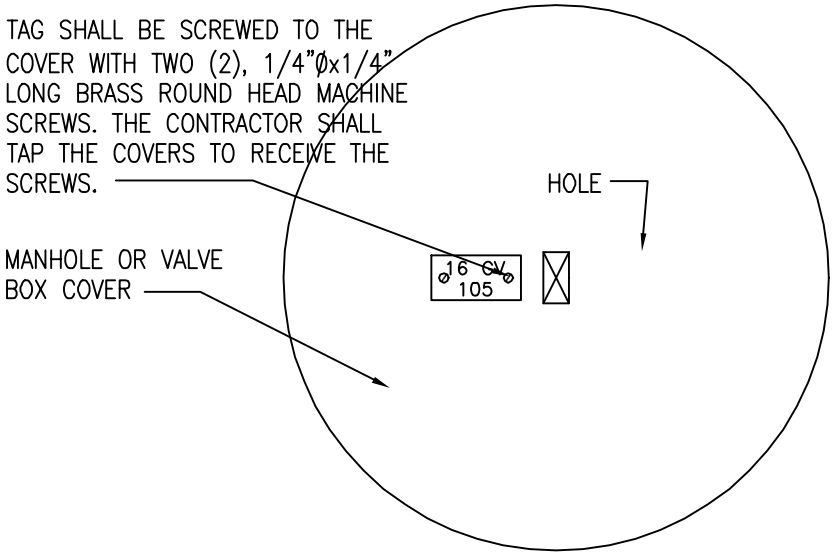
REVISION

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



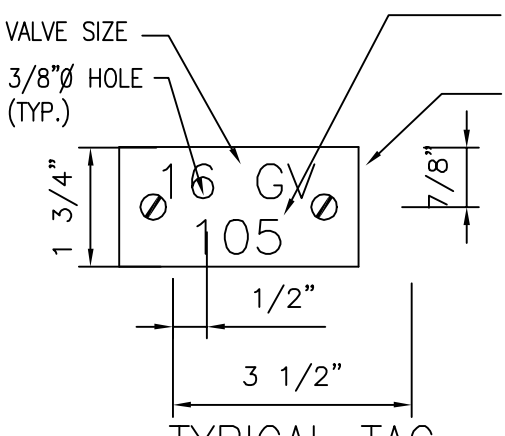
SECTION



SECTION A–A

NOTES:

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



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

TYPICAL TAG

VALVE TYPE ABBREVIATIONS

GATE VALVE	GV
BEVEL GEARED GATE VALVE	BGGV
BUTTERFLY VALVE	BV

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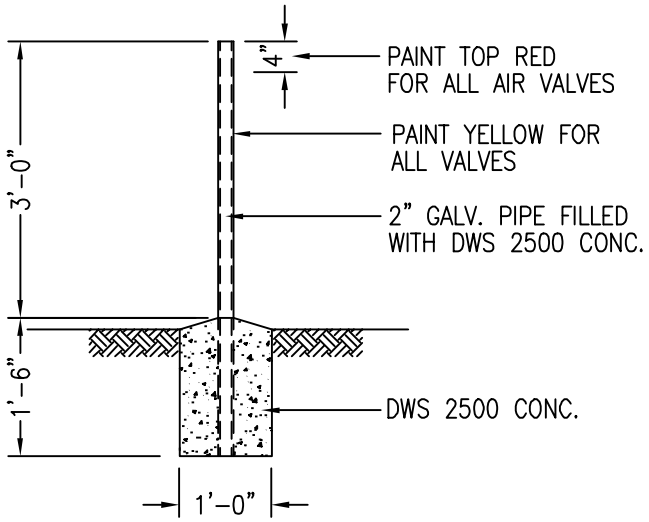
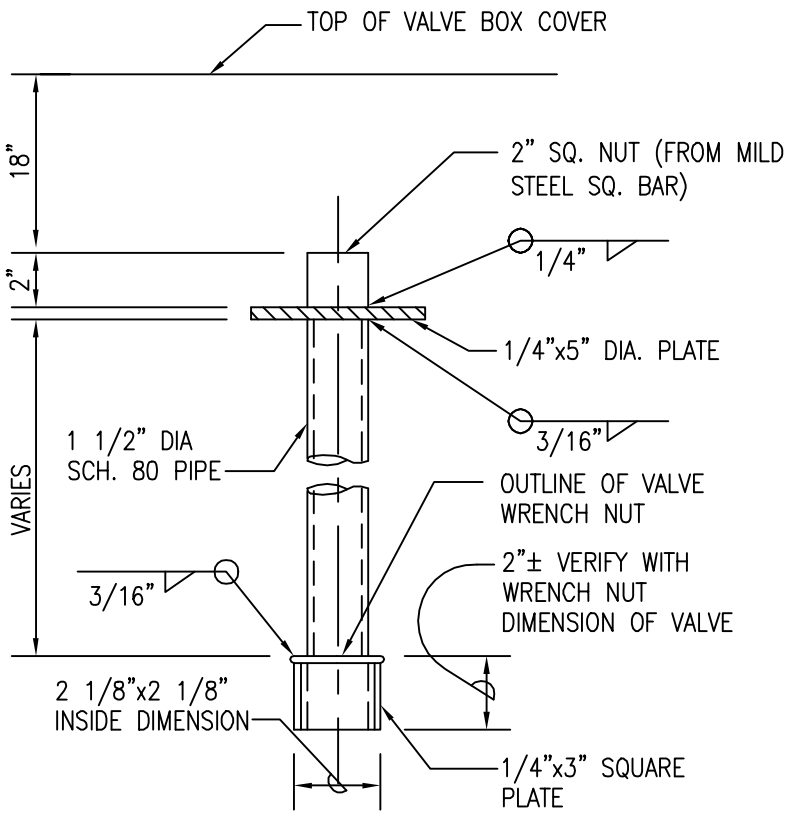
OAHU HAWAII	IDENTIFICATION TAG FOR MANHOLE OR VALVE BOX COVER SCALE: NTS	STANDARD DETAILS	V17



DETAIL OF VALVE MARKER

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



VALVE NUT EXTENSION DETAIL

NOTE:

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

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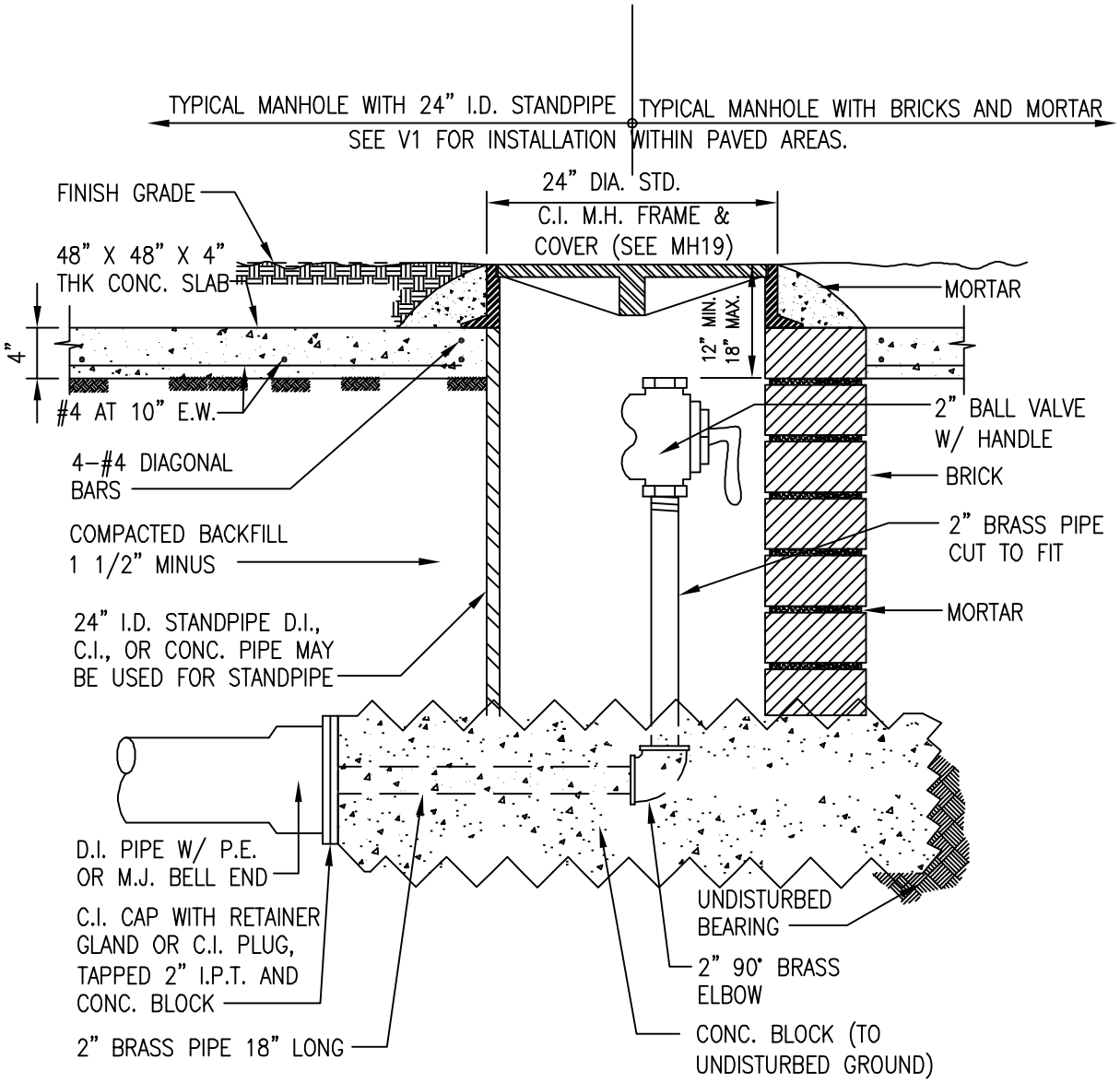
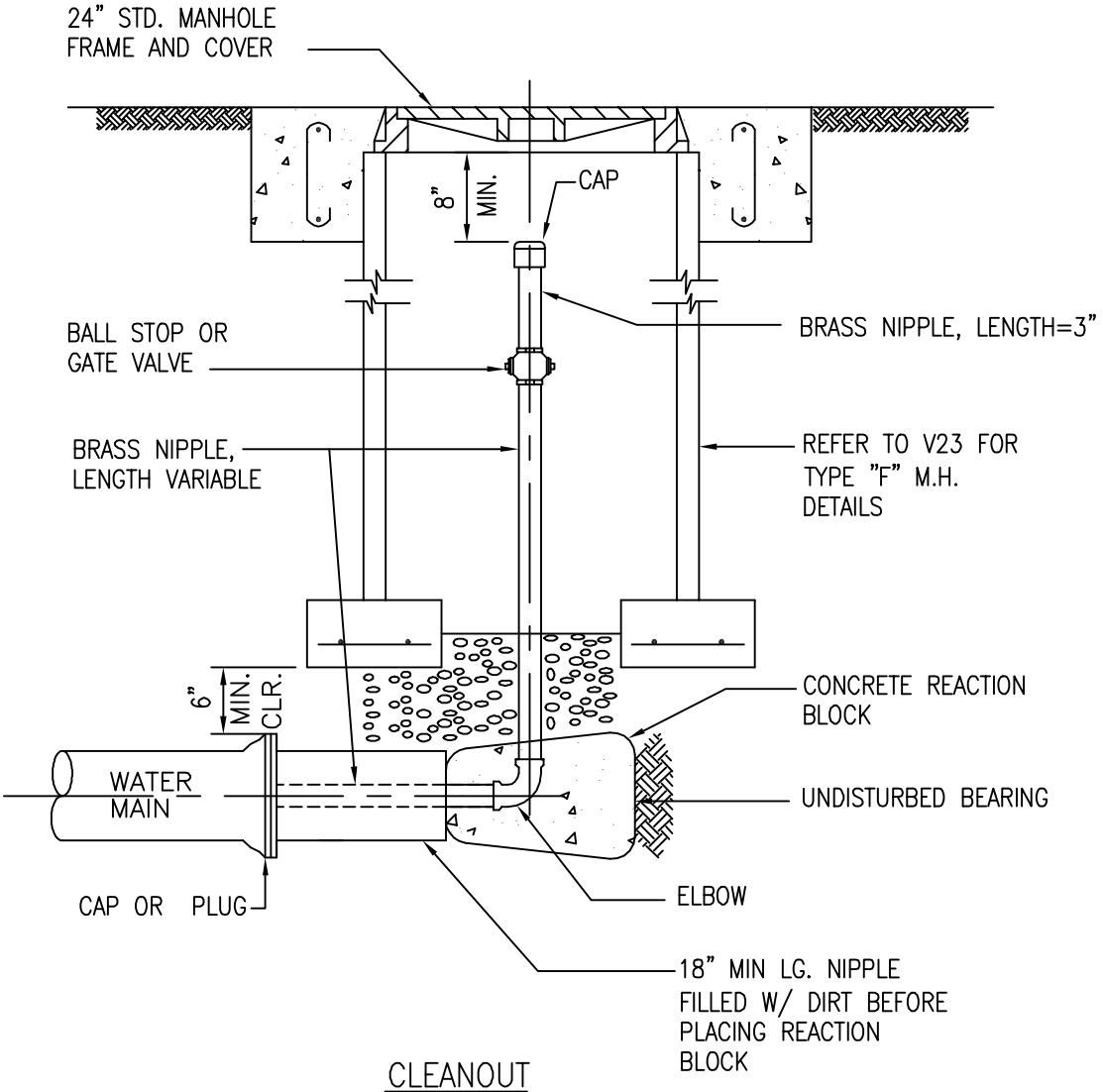
KAUAI MAUI HAWAII	**VALVE NUT EXTENSION** SCALE: NTS	STANDARD DETAILS	V19



	2002
	REVISION

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



CLEANOUT

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

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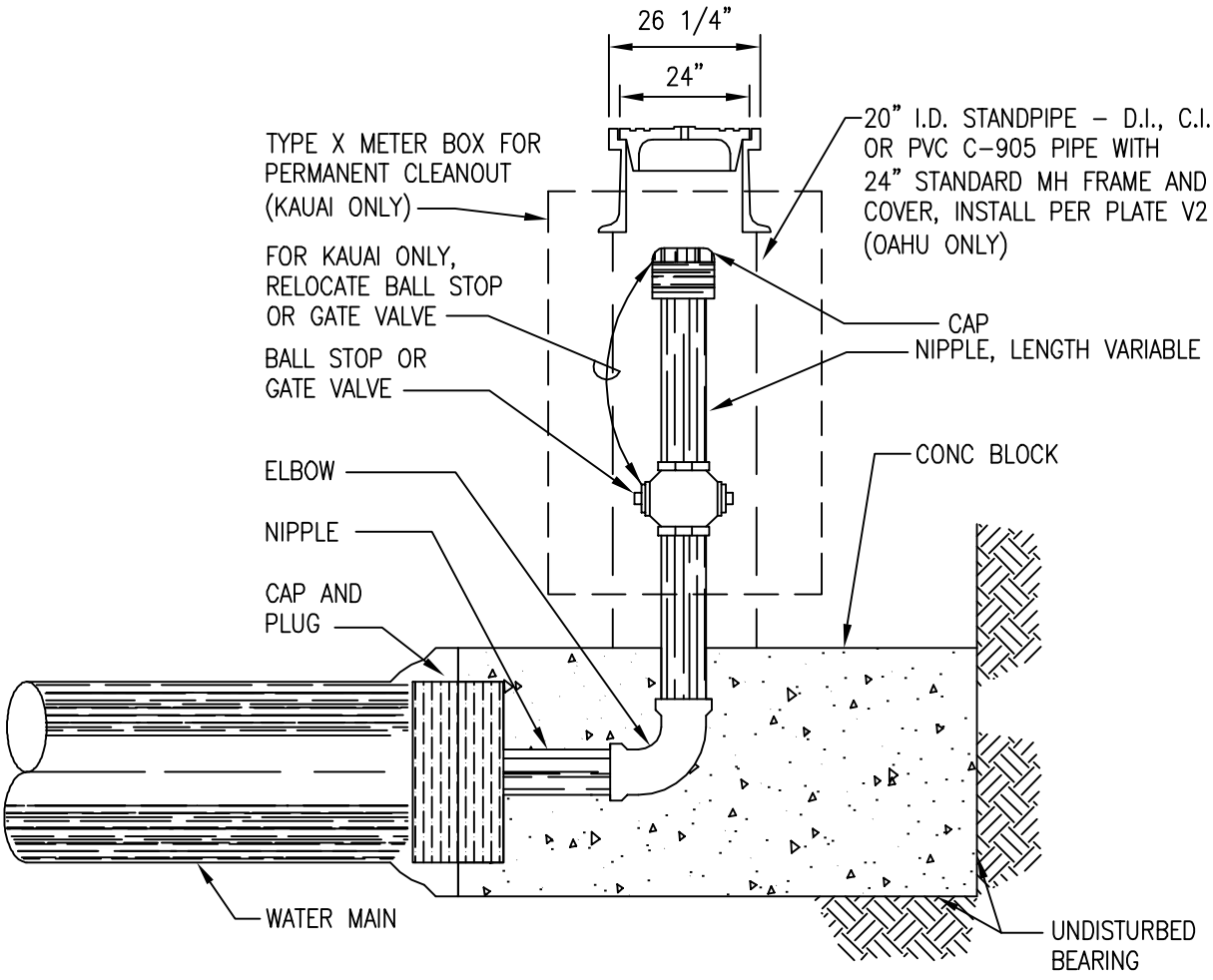
MAUI	CLEANOUT SCALE: NTS	STANDARD DETAILS	V21



TYPICAL DETAIL OF CLEANOUT

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

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

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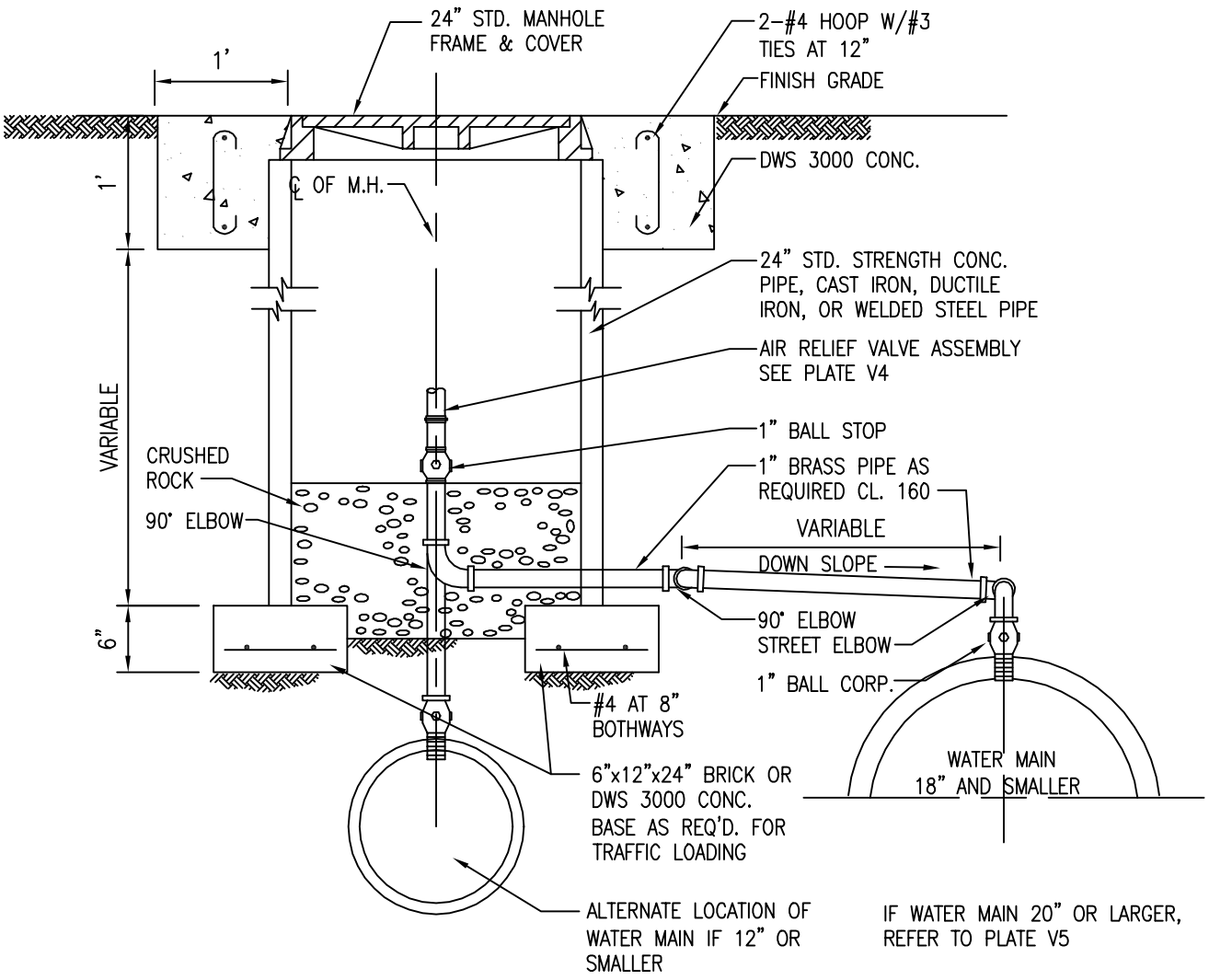
KAUAI OAHU	CLEANOUTS AND RISER SCALE: NTS	STANDARD DETAILS	V22



SECTION THROUGH MANHOLE

NOTE:

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

	2002
	REVISION

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

APPENDIX

APPENDIX A - LIST OF TABLES

APPENDIX B - INDEX

SUMMARY OF TABLES

APPENDIX A – SUMMARY OF TABLES

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