FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	7101A-01-00	2001	13	19

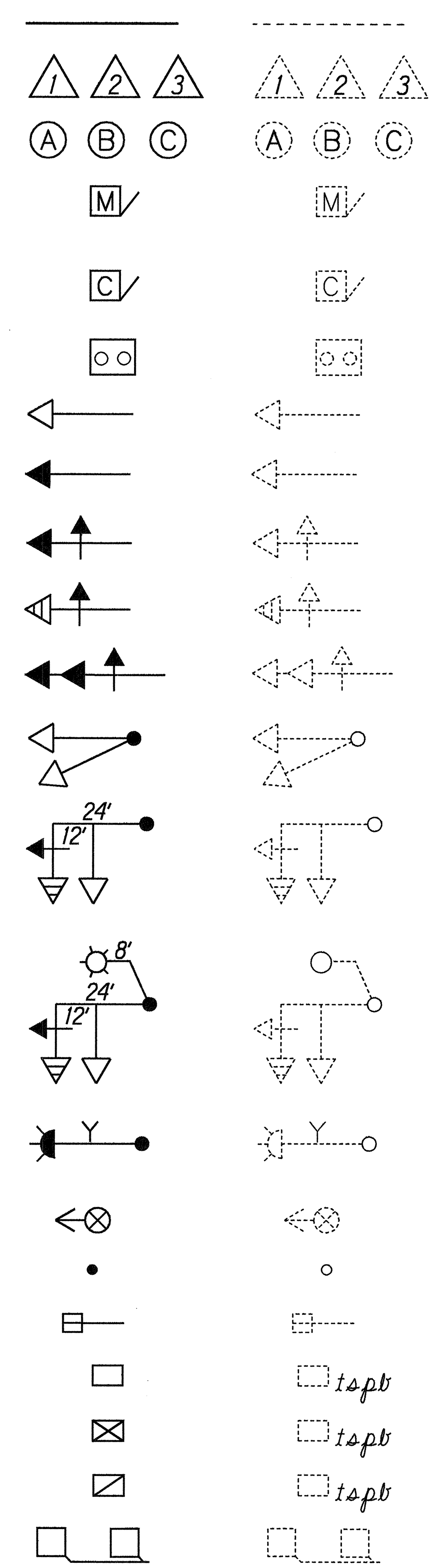
TRAFFIC SIGNAL NOTES

1. The locations of the Traffic Signal Standards, Traffic Signal Standards w/Mast Arms, Pedestrian Push Buttons, Traffic Controller, Pullboxes, Conduits and Loop Detectors shall be staked out in the field by the Contractor and approval of the locations shall be obtained from the Engineer prior to construction and installation.
2. All splicing shall be done in the pullboxes.
3. Furnishing and installing the conduit stubouts (pullboxes to edge of pavement) will not be paid for separately but shall be considered incidental to the various contract items.
4. A solid #8 bare copper wire shall be pulled with the traffic signal control cable for equipment ground. Cost shall be incidental to the installation of the control cable.
5. All Traffic signal controller equipment shall be completely wired in the cabinet and shall control the traffic signals as called for in the plans.
6. The loop amplifier units furnished for this project shall be capable of operating the loop detector configurations shown on the plans. Cost for the loop amplifier shall be incidental to the installation of the loop detector.
7. Should any defect be encountered during the warranty period, the manufacturer will be notified and he shall promptly correct such defect. Service call (by factory qualified representative) during the warranty period for repairs or other maintenance shall be answered within 24 hours and shall be done at no expense to the State. All repairs shall be done as soon as possible.
8. All traffic signal work shall conform to the requirements of the "Manual On Uniform Traffic Control Devices For Streets And Highways", Federal Highway Administration (1988) and Amendments.
9. Locations of traffic markings and markers (lane lines, Stop lines, crosswalk, etc.) shown on the plans shall be verified with the Engineer prior to the installation of the traffic signal system.
10. All Conduits between pullboxes and Traffic Signal/Highway Lighting Standards shall not be paid for separately but shall be considered incidental to the various contract items.
11. All Signal-Drop Cables (Type 5 Cables) from the various Types of Traffic Signal Head on the traffic signal standards and mast arms to the pullboxes shall not be paid for separately but considered incidental to the Traffic Signal Head.
12. After installing all the traffic signal cables, the Contractor shall duct seal all conduits in the pullboxes, traffic signal standards and traffic signal controller cabinet concrete base. The duct seal material shall be approved by the Traffic Signal Inspector/Engineer and shall not be paid for separately but considered incidental to the direct buried and/or concrete encased conduits.
13. After installing the Traffic Signal System, the Contractor shall apply grease to all parts of the Traffic Signal System (i.e. fittings, brackets, nipples, elbows, screws, signal head assemblies, bolts, hinges, etc.) as directed by the Traffic Signal Inspector, to prevent rust and corrosion. The grease material shall be approved by the Signal Inspector.
14. Connecting into existing traffic signal system and making all necessary adjustments shall not be paid for separately, but considered incidental to the various traffic signal contract items.
15. The Contractor shall notify the Traffic Signal Branch, Department of Transportation Services, City & County of Honolulu, (phone no. 527-5007) two weeks prior to commencing any work on the traffic signal system.

TRAFFIC SIGNAL NOTES (CONTINUED)

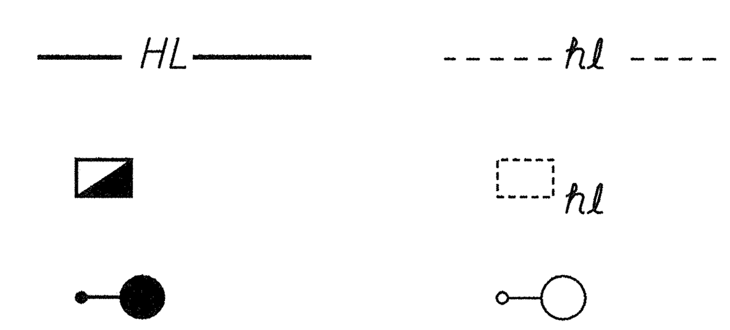
16. The Department of Transportation Services, City & County of Honolulu, will assist the Engineer in construction inspection for the traffic signal system. The Contractor shall notify the Electrical and Maintenence Services Division, Department of Transportation Services, ten (10) working days prior to commencing work on the traffic signal system (phone no. 527-5007).

TRAFFIC SIGNAL LEGEND



NEW	EXISTING	
		Traffic Signal Conduit
1 2 3	1 2 3	Conduit Run Numbers
A B C	A B C	Equipment description, installation or item no.
M	M	Traffic Signal Master Controller Door Indicates Front of Cabinet
C	C	Traffic Signal Controller Door Indicates Front of Cabinet
		Meter Pedestal
		12" RYG Traffic Signal Head
		12" RY↑ Traffic Signal Head
		12" RY← Traffic Signal Head
		12" RY← Traffic Signal Head (Programmed Visibility)
		12" RYG ←G/Y Fiber Optic Traffic Signal Head
		Type I Standard and Attached Signals
24' 12'		Type II Standard with Signal Mast Arm and Attached Signals (Nos. indicates mast arm length & distance between signal heads as specified on plans)
8' 24' 12'		Type III Standard with Luminaire and Signal Mast Arm and Attached Signals (Nos. indicates mast arm lengths & distance between signal heads as specified on plans)
Y	Y	Flashing Beacon, One Signal Section, "Y" indicates 12" Yellow Lens
		Opticom Receiver (Arrow indicates direction detector faces)
		Pipe Guard
		Pedestrain Signal Head
	t.s.p.b.	Type A Pullbox
	t.s.p.b.	Type B Pullbox
	t.s.p.b.	Type C Pullbox

HIGHWAY LIGHTING LEGEND



NEW	EXISTING	
HL	hl	Highway Lighting Conduit
	hl	Type A Pullbox (Hwy. Ltg.)
		Highway Lighting Standard

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL LEGEND AND NOTES

FARRINGTON HIGHWAY IMPROVEMENT
Waikele Road to Aniani Place
Project No. 7101A-01-00

Date: Sept., 2000

SHEET No. T5 OF 11 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	
NOTE BOOK	DRAWN BY M. Takatsuji	
	TRACED BY	
	DESIGNED BY Richard Akana	
	QUANTITIES BY	
	CHECKED BY	

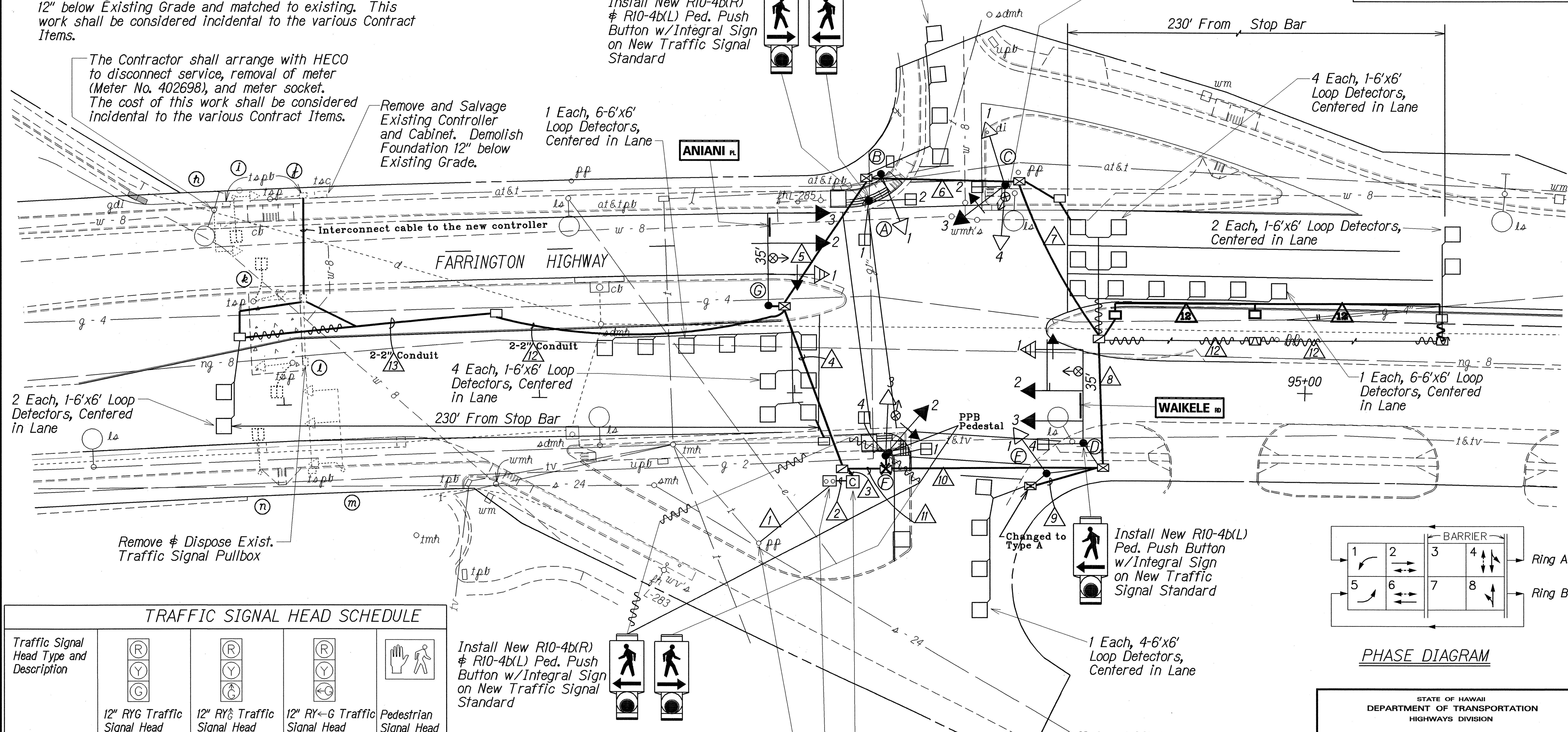
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	7101A-01-00	2001	14	19

ADDITIONAL TRAFFIC SIGNAL NOTES:

1. Existing Traffic Signal Pullboxes and Conduits shall remain in place unless noted on the Plans.
2. All Existing Traffic Signal Cables not part of the new Traffic Signal System shall be removed and disposed of.
3. All Removal, Disposal, and/or Salvaging of Existing Traffic Signal Controller, Cabinet, Standards, Mast Arms, Signal & Pedestrian Heads, Pullboxes, Conduits, and Cables shall not be paid for separately but shall be considered incidental to the various Contracts Items.
4. All Existing Foundations to be removed shall be demolished 12" below Existing Grade and matched to existing. This work shall be considered incidental to the various Contract Items.
5. Contractor shall deliver all salvagable Traffic Signal materials/equipment to the City and County of Honolulu Baseyard as directed by the Engineer.
6. See Sheet T7 for List of Materials to install, remove, dispose and/or salvage.
7. Removal of Existing Traffic Signal System and Median Concrete Slab at Sta. 91+00 to be done after the New Traffic Signal System is operational.
8. Contractor shall coordinate with HECO for connection between Power source and Meter. The cost of this work shall be considered incidental to the various Contract Items.

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting



TRAFFIC SIGNAL HEAD SCHEDULE

Traffic Signal Head Type and Description	12" RYG Traffic Signal Head	12" RY↑G Traffic Signal Head	12" RY←G Traffic Signal Head	Pedestrian Signal Head
Pole Letter Signal Head Number	B-1 C-1 C-4 E-1 F-3	D-2 D-3 G-2 G-3	C-3 *D-1 F-2 *G-1	A-1 A-2 C-2 D-4 F-1 F-4

* With Programmed Visibility

PHASE DIAGRAM

Note: Additional Type "A" PB's per City & County DTS request.

DATE	REVISION
9/24/01	Revise pole D & G and Add pole E. Revise schedule and note title.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL PLAN

Farrington Highway Improvements
Waikele Road to Aniani Place
Project No. 7101A-01-00

Scale: 1"=20' Date: Sept., 2001

SHEET No. T6 OF 11 SHEETS

AS-BUILT

ADD. 14

SURVEY PLOTTED BY / DRAWN BY M. Takafuji / TRACED BY / DESIGNED BY Gary Kaiehi / QUANTITIES BY / CHECKED BY
ORIGINAL PLAN / NOTE BOOK 102.dgn / N. ffarttsp

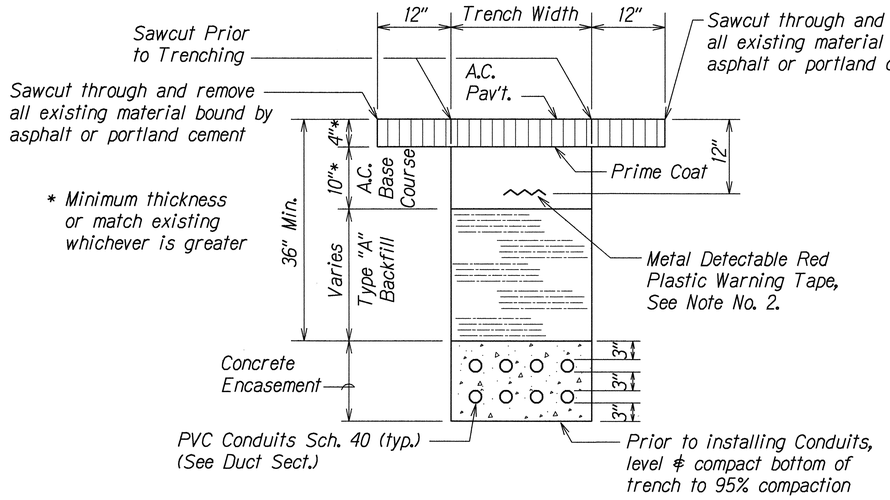
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	7101A-01-00	2001	15	19

STATE RIGHT-OF-WAY BACKFILL NOTES

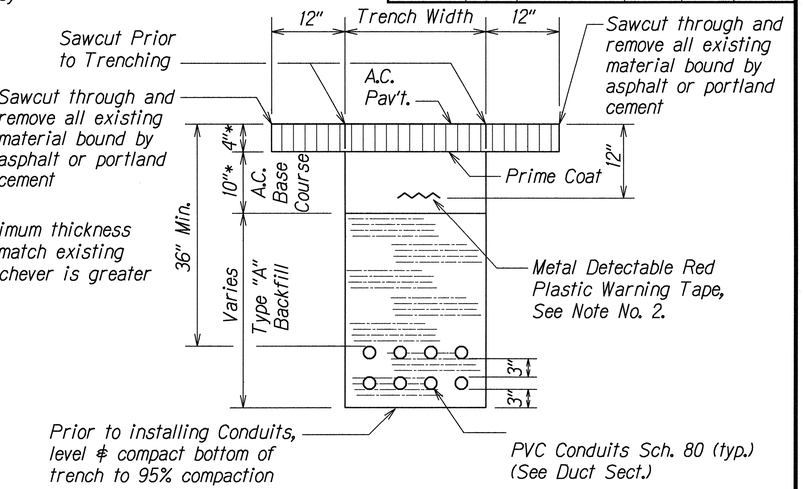
Trench Backfill Material "A"
Beach Sand, Earth, or Earth and Gravel. If Earth and Gravel used, the maximum shall contain not more than 50% by volume of rock particles. Maximum 8" loose fill per lift. Obtain 95% compaction for each lift.

Concrete
3000 psi compressive strength @ 3 days.

NOTE: Base Course & Sub-Base Course per 1994 State Standard Specifications for Highway Construction.



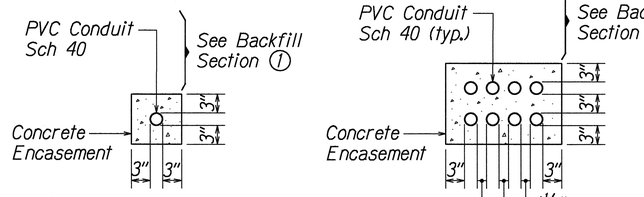
① TYPICAL BACKFILL SECTION WITH CONCRETE ENCASED DUCTS



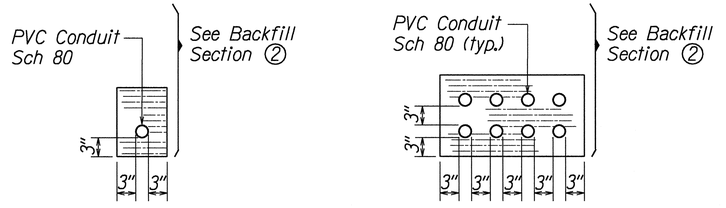
② TYPICAL BACKFILL SECTION DIRECT BURIED DUCTS

GENERAL NOTES

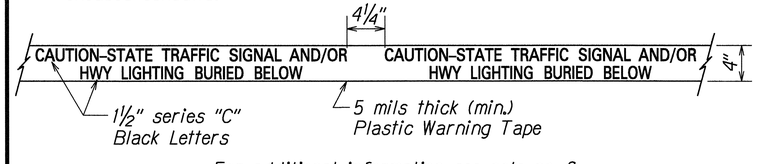
1. If trench is located on unpaved area, the Contractor shall replace 10" A.C. Base Course and 4" A.C. Pavement with Type "A" backfill material.
2. The Metal Detectable Red Plastic Warning Tape shall be a minimum 5 mils thick and 4" wide with a continuous metallic backing and corrosion resistant 1± mil thick foil core. The message on the tape shall read, "CAUTION - STATE TRAFFIC SIGNAL AND/OR HWY LIGHTING BURIED BELOW," utilizing 1½ inches series "C" black lettering. The message will be repeated with a 4¼" spacing between top line of message and start of next repeat.
3. The Contractor may begin backfilling the conduit trench when the concrete reaches 3000 psi compressive strength after 3 days.
4. Maximum four (4) Conduits per row for multiple conduit duct section.
5. For direct buried duct sections, the concrete jacket required at the conduit by-pass for various utilities, shall not be paid for separately but considered incidental to the direct buried conduits.
6. After installing all the traffic signal cables, the Contractor shall duct seal all conduits in the pullboxes, traffic signal standards and traffic signal controller cabinet concrete base. The duct seal material shall be approved by the Traffic Signal Inspector/Engineer and shall not be paid for separately but considered incidental to the direct buried and/or concrete encased conduits.



DUCT SECTIONS - CONC. ENCASED

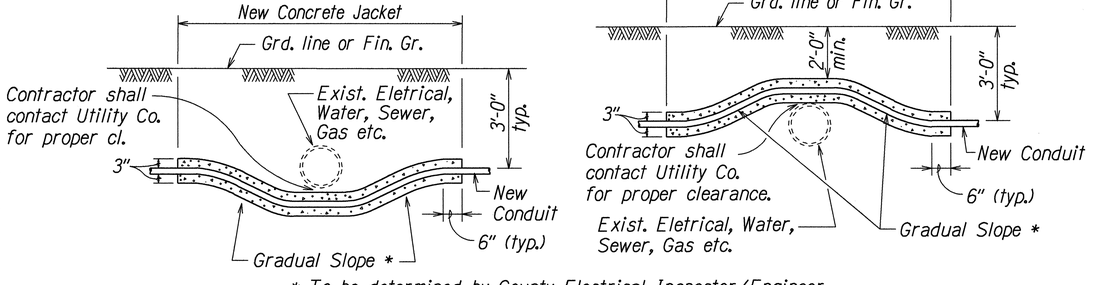


DUCT SECTIONS - DIRECT BURIED



For additional information see note no. 2.

METAL DETECTABLE RED PLASTIC WARNING TAPE



* To be determined by County Electrical Inspector/Engineer

CONDUIT BY-PASS DETAIL AT VARIOUS UTILITIES

Not to Scale

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY M. Takeuchi	
	TRACED BY	
	DESIGNED BY Gary Kakehi	
NOTE BOOK	QUANTITIES BY	
No. nfarfsdi	CHECKED BY	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS

FARRINGTON HIGHWAY IMPROVEMENTS
Waikele Road to Aniani Place
Project No. 7101A-01-00

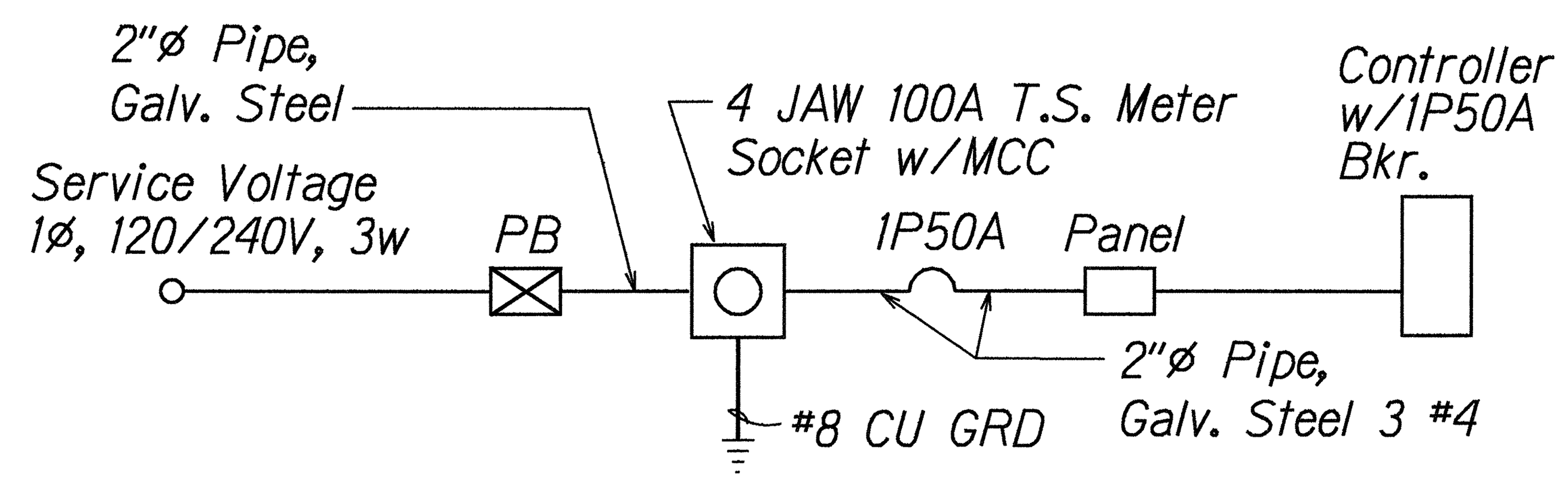
Not to Scale Date: Sept., 2000

SHEET No. T9 OF 11 SHEETS

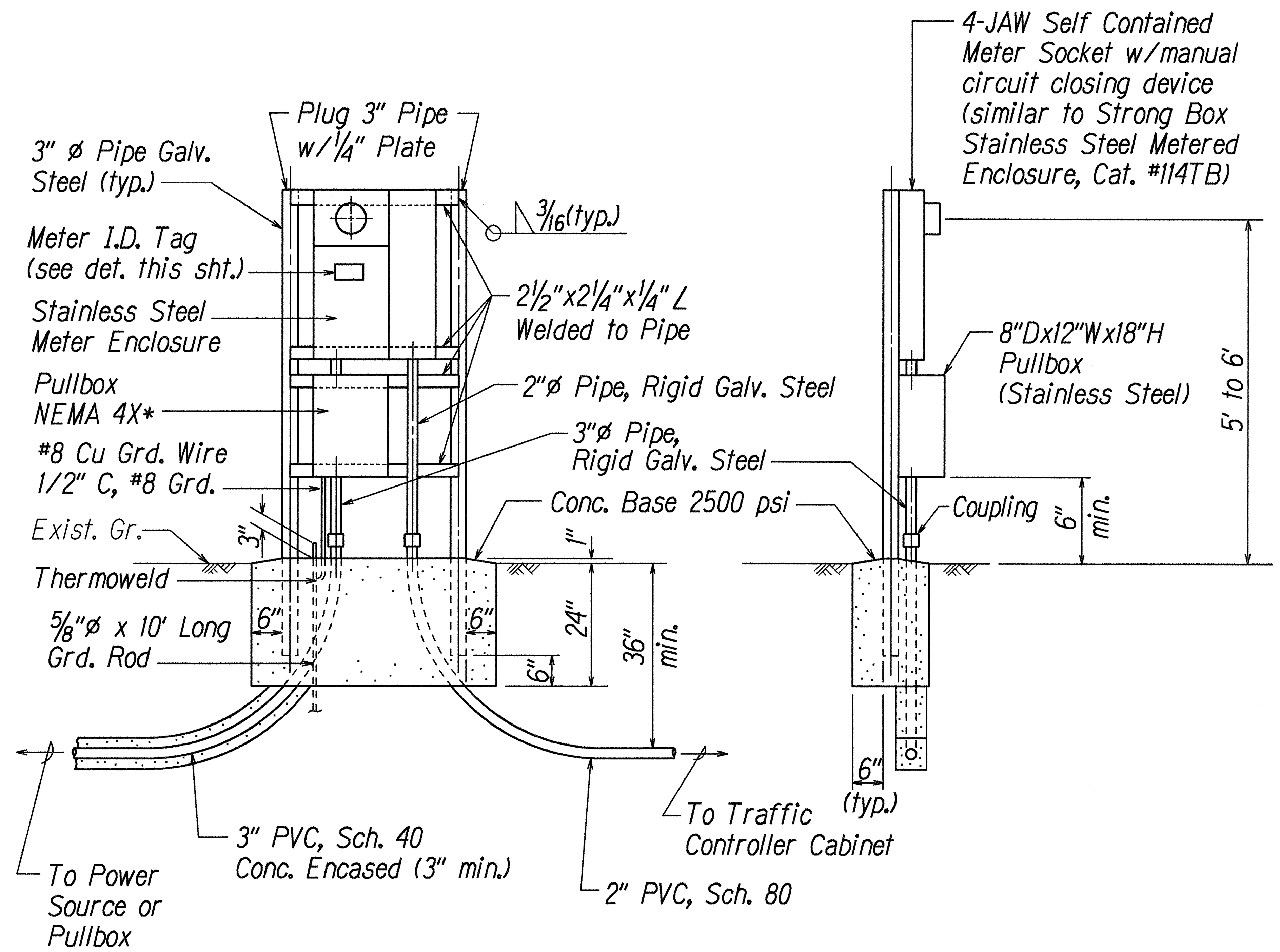
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	7101A-01-00	2001	16	0

Notes:

1. Pedestal shall be hot-dipped galvanized after fabrication.
2. All fastening bolts, nuts & washer shall be stainless steel.
3. Provide 4 ft. cl. in front of meter.
4. * Sealable Stainless Steel enclosure 6"D x 10"W x 12"H.
5. Size & Type of Power Cables from Elec. Company's Power Source to Pullbox on Meter Pedestal shall be determined by the Electric Company.



ONE LINE DIAGRAM

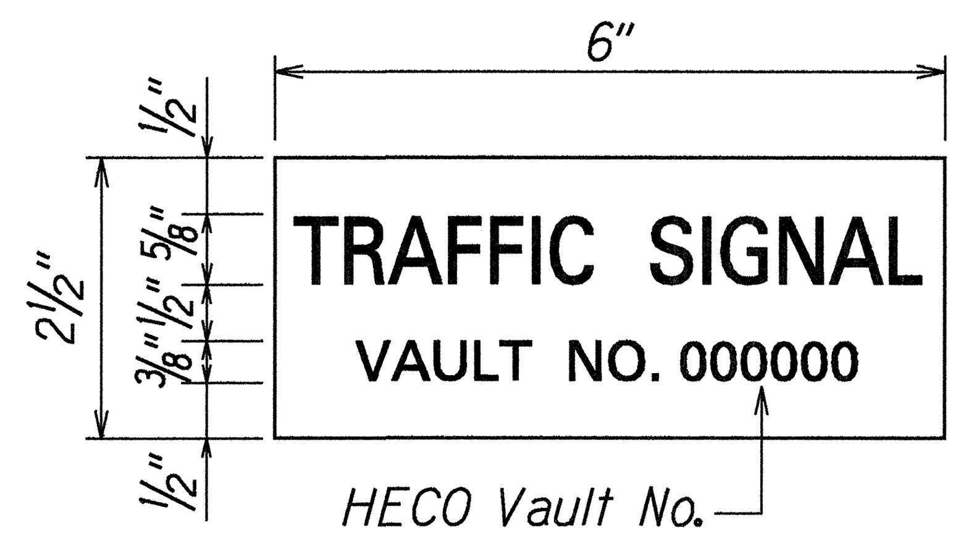


FRONT ELEVATION

SIDE ELEVATION

METER PEDESTAL FOR UNDERGROUND SERVICE

N.T.S.



NOTES:

1. Use 3-ply laminated flexible plastic, black-white-black.
   Thickness: 0.010" - black cap sheet
   0.052" - white base sheet
   0.010" - black base sheet
2. Attach to Meter Socket using Scotch 3M Brand very high bond (VHB) double coated acrylic foam tape or equivalent.
3. Letters/Numbers shall be 1/16" stroke, (white in color).
4. Letters/Numbers area inscribed by cutting through "black cap sheet" to expose white letters/numbers.

METER ID TAG DETAIL

N.T.S

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

METER PEDESTAL DETAIL

FARRINGTON HIGHWAY IMPROVEMENTS
Waikele Road to Aniani Place
Project No. 7101A-01-00

Date: Sept., 2000

SHEET No. T8 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	7101A-01-00	2000	17	19

LIST OF MATERIALS

POLE NO.	STANDARD TYPE	COMMENTS	MOUNTING TYPE	SIGNAL FACES & OPTICOM RECEIVERS		PPB ASSEMBLY	
				NEW	EXISTING	NEW	EXISTING
A	I - 8	NEW	TOP OF POLE - TWO WAY	H-M, H-M		2 (L & R)	
B	I - 10	NEW	TOP OF POLE - ONE WAY	R-Y-G			
C	I - 10	NEW	TOP OF POLE - THREE WAY CANTILEVER - ONE WAY TOP OF POLE - ONE WAY	R-Y-G, R-Y-G←, R-Y-G H-M OPTICOM		1 (L)	
D	II - 35	NEW	MAST ARM - ONE WAY MAST ARM - HOR MAST ARM - ONE WAY MAST ARM - ONE WAY BRACKET - ONE WAY	R-Y-G← (PV) OPTICOM R-Y-G↑ R-Y-G↑ H-M		1 (L)	
E	I - 10	NEW	TOP OF POLE - ONE WAY	R-Y-G			
F	I - 10	NEW	TOP OF POLE - TWO WAY CANTILEVER - TWO WAY TOP OF POLE - ONE WAY	R-Y-G←, R-Y-G H-M, H-M OPTICOM		2 (L & R)	
G	II - 35	NEW	MAST ARM - ONE WAY MAST ARM - HOR MAST ARM - ONE WAY MAST ARM - ONE WAY	R-Y-G← (PV) OPTICOM R-Y-G↑ R-Y-G↑			
h	WOOD POLE	EXISTING	BRACKET ARM (DISPOSE)		R-Y-G (SALVAGE)		
i	I - 10 (SALVAGE)	EXISTING	TOP OF POLE		R-Y-G (SALVAGE) H-M (SALVAGE)		
j	PEDESTAL (SALVAGE)	EXISTING	BRACKET - ONE WAY				1 (SALVAGE)
k	I - 10 (SALVAGE)	EXISTING	TOP OF POLE CANTILEVER		R-Y-G (SALVAGE) H-M (SALVAGE)		1 (SALVAGE)
l	I - 10 (SALVAGE)	EXISTING	TOP OF POLE CANTILEVER		R-Y-G (SALVAGE) H-M (SALVAGE)		1 (SALVAGE)
m	II-30 (SALVAGE)	EXISTING	MAST ARM MAST ARM BRACKET		R-Y-G, (SALVAGE) R-Y-G, (SALVAGE) R-Y-G, (SALVAGE)		
n	I-10 (SALVAGE)	EXISTING	TOP OF POLE		H-M (SALVAGE)		1 (SALVAGE)

1	CONDUIT (Conc. encased)	CABLE
	3"	1-3c#6

2	CONDUIT	CABLE
	2"	1-3c#6

3	CONDUIT	CABLE
	2"	1-26c#14
	2"	1-26c#14
	2"	1-26c#14
	2"	1-26c#14
	2"	4-2c#14
	2"	4-2c#14
	2"	3-2c#14
	2"	4-3c#20
	2"	Spare

4	CONDUIT (Conc. encased)	CABLE
	2"	1-26c#14
	2"	1-26c#14
	2"	4-2c#14
	2"	2-2c#14
	2"	2-3c#20
	2"	Spare

5	CONDUIT (Conc. encased)	CABLE
	2"	1-26c#14
	2"	1-26c#14
	2"	3-2c#14
	2"	1-3c#20
	2"	Spare

6	CONDUIT (Conc. encased)	CABLE
	2"	1-26c#14
	2"	1-26c#14
	2"	1-2c#14
	2"	1-3c#20
	2"	Spare

7	CONDUIT (Conc. encased)	CABLE
	2"	1-26c#14
	2"	1-26c#14
	2"	Spare
	2" Added per C&C	

8	CONDUIT (Conc. encased)	CABLE
	2"	1-26c#14
	2"	1-26c#14
	2"	3-2c#14
	2"	Spare

9	CONDUIT	CABLE
	2"	1-2c#14 1-4c#14*

10	CONDUIT (Conc. encased)	CABLE
	2"	1-26c#14
	2"	1-26c#14
	2"	4-2c#14
	2"	1-2c#14
	2"	1-3c#20
	2"	Spare

11	CONDUIT	CABLE
	2"	1-26c#14
	2"	1-26c#14
	2"	4-2c#14
	2"	2-2c#14
	2"	2-3c#20
	2"	Spare

12	CONDUIT (Conc. encased)	CABLE
	2"	1-2c#14

13	CONDUIT	CABLE
	2"	1-2c#14

*Note
4-c#14 (Type 5 Cable) Signal-Drop Cable shall not be paid for separately but considered incidental to Traffic Signal Heads (See Note 11 on Sheet T5)

LEGEND FOR AS-BUILT POSTINGS

~~	Squiggly line for as-built deletion
~~100.00~~	Double line for as-built deletion
Roadway	Text for as-built posting

DATE	REVISION
9/24/01	Revise pole D&G and Add pole E.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS

FARRINGTON HIGHWAY IMPROVEMENT
Waikele Road to Aniani Place
Project No. 7101A-01-00
Date: Sept., 2001

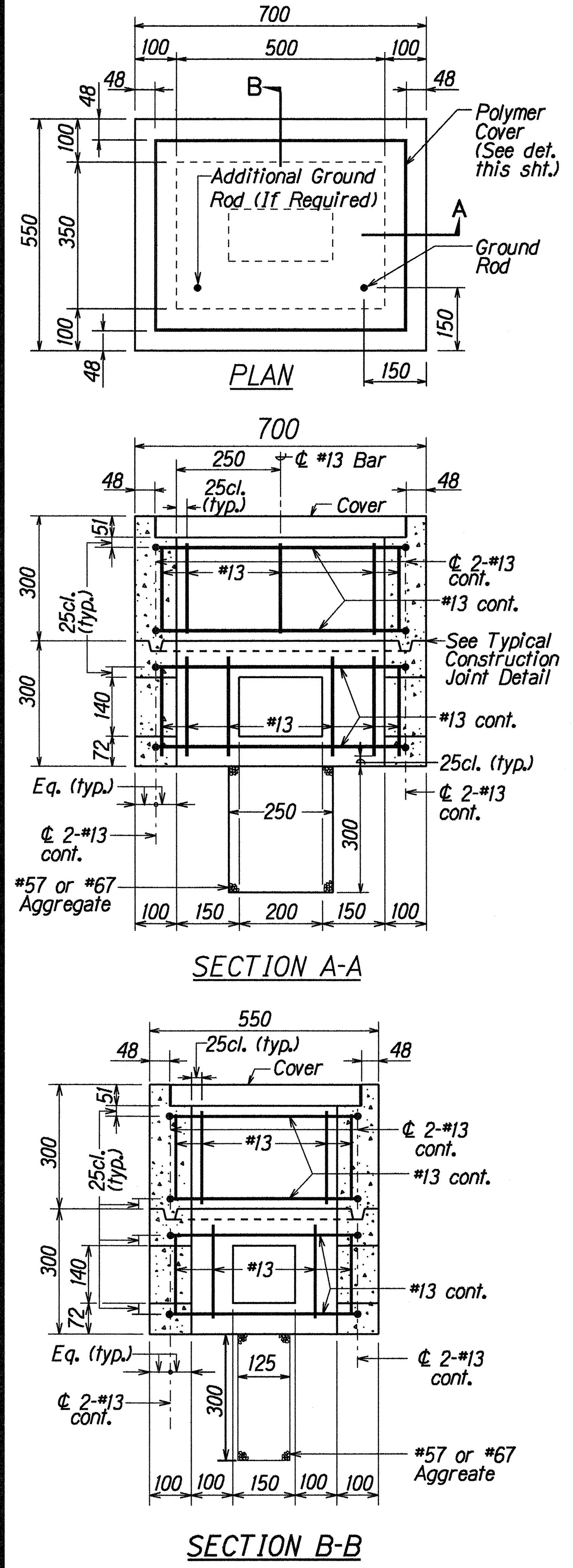
SHEET No. T7 OF 11 SHEETS

AS-BUILT

ADD. 17

ORIGINAL PLAN
NOTE BOOK td2.may
No. nfartsd2
SURVEY PLOTTED BY ____ DATE ____ X
DRAWN BY M. Takafuji
TRACED BY
DESIGNED BY Gary Kakehi
QUANTITIES BY
CHECKED BY

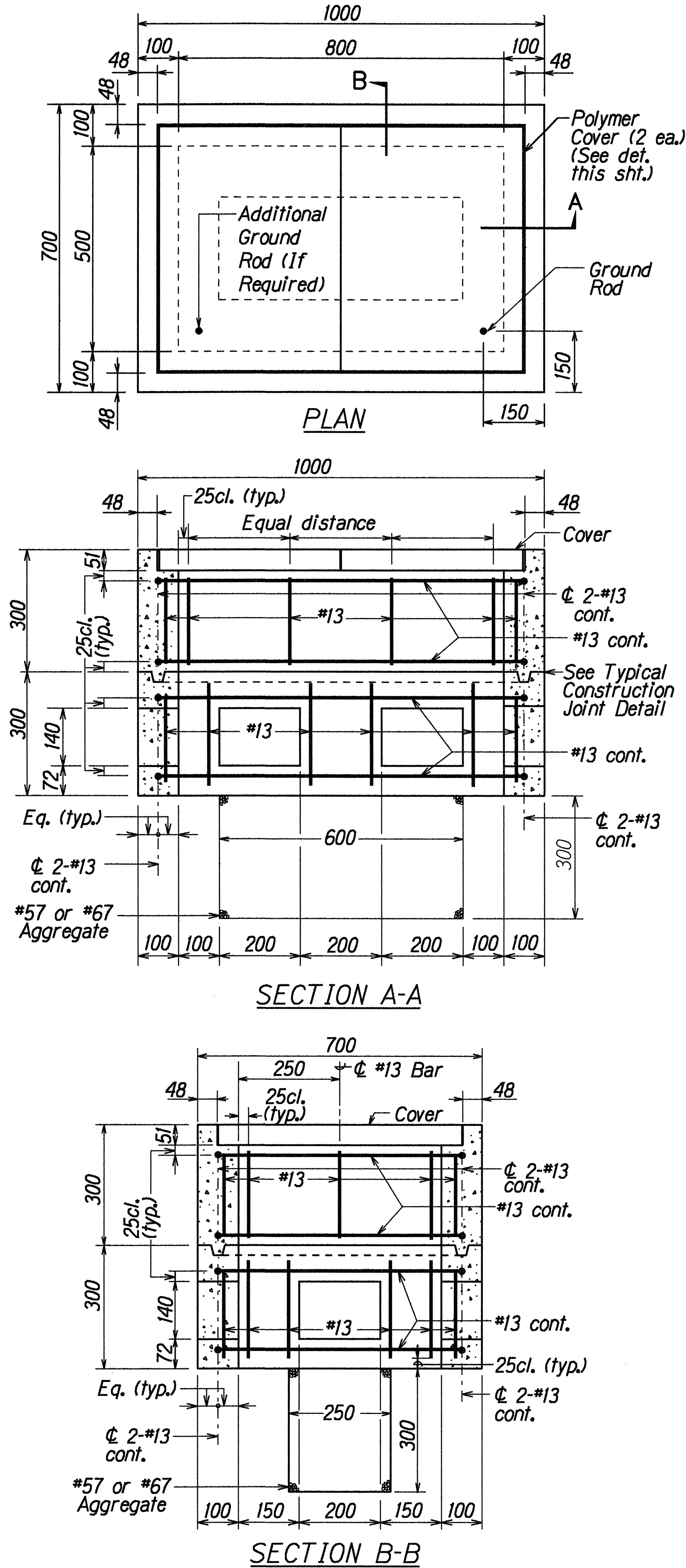
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	7101A-01-00	2001	18	19



TYPE "A" PULLBOX

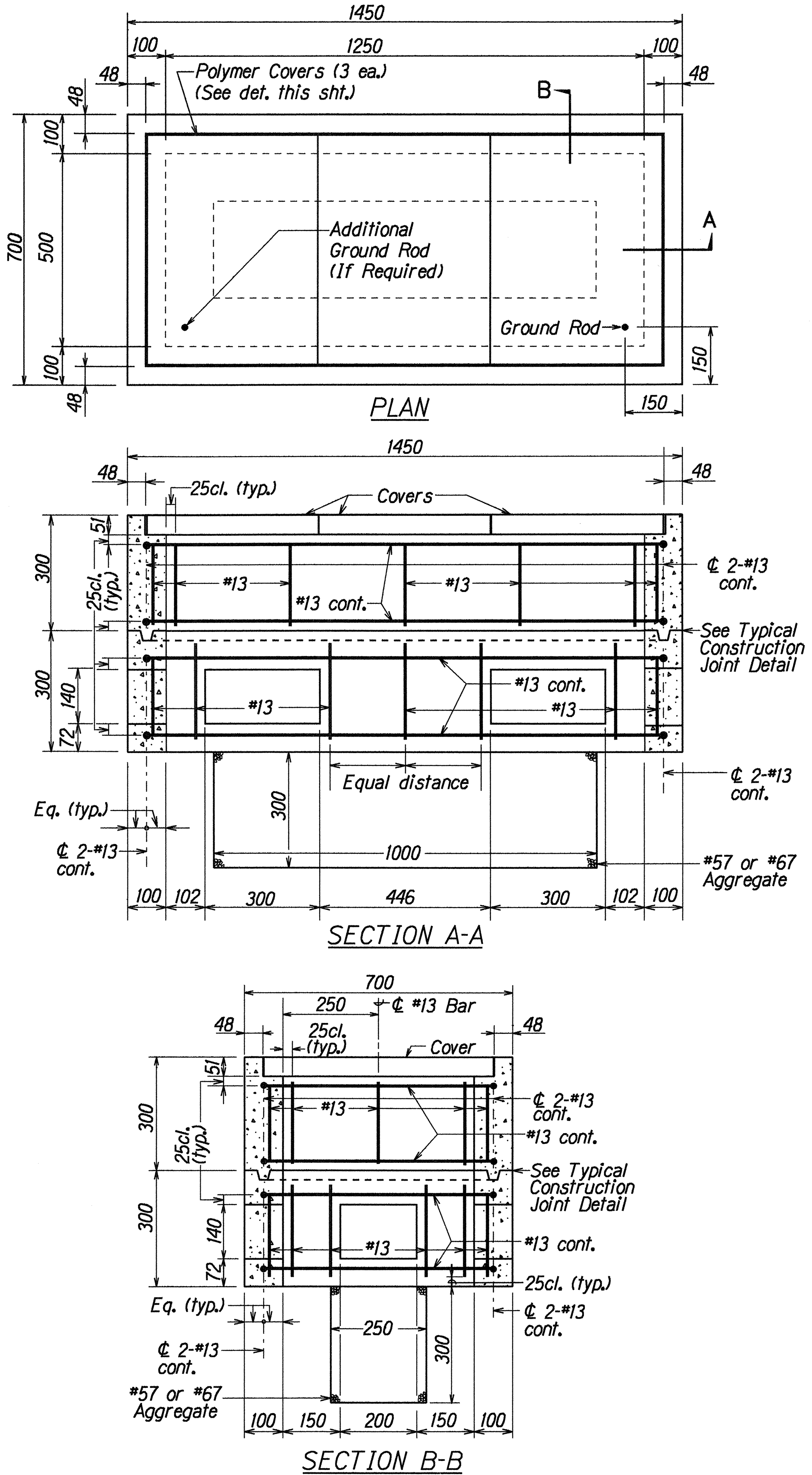
(Old Type "B")

Scale: 1:10



TYPE "B" PULLBOX (Old Type "C")

Scale: 1:10

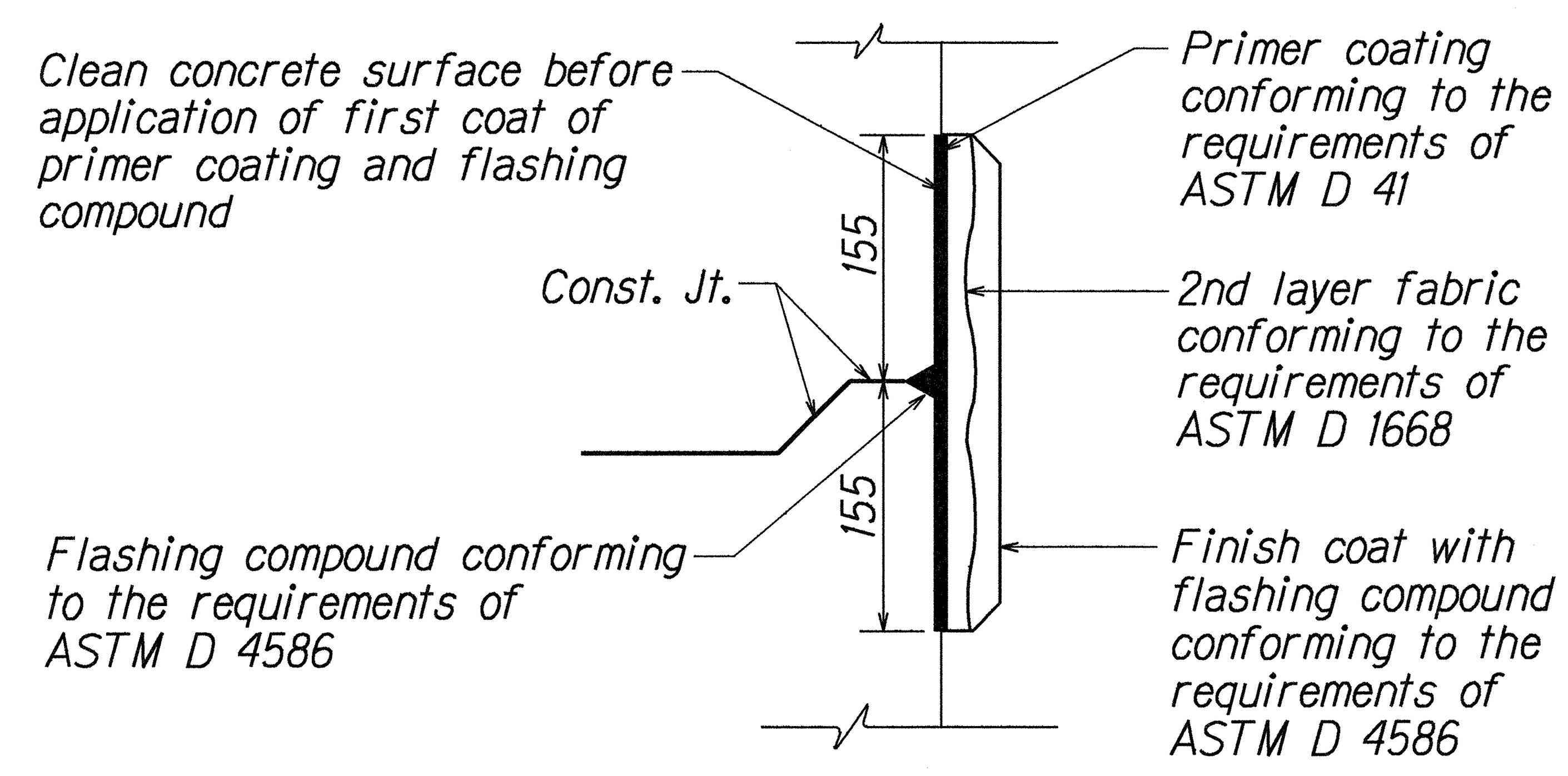


TYPE "C" PULLBOX (Old Type "D")

Scale: 1:10

GENERAL NOTES

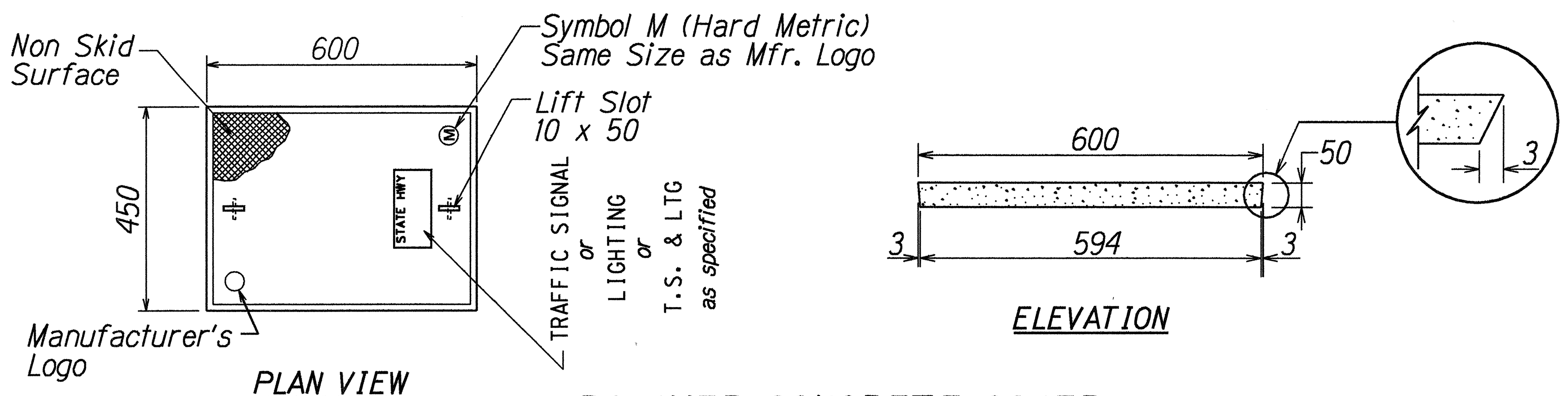
1. Provide a minimum of one 16 ⌀ x 2.5m Copperweld Ground Rod in each pullbox. When directed by the Traffic Signal Inspector/Engineer, install additional Ground Rods. Cost of Ground Rods shall be incidental to the pullboxes.
2. All pre-cast concrete pullboxes shall be manufactured in two pieces.
3. The pullbox with cover shall be capable of supporting an MS 18 Loading.
4. The maximum weight of the pullbox cover shall not exceed 27 kilograms.
5. The openings for the conduits on all pullboxes shall be pre-cast concrete knockouts.
6. After installing the conduits in the openings of the pullboxes, the Contractor shall fill the excess opening in the pre-cast knockouts with concrete mortar.
7. Prior to installing the pullboxes, the Contractor shall level the bottom of the trench and achieve a minimum of 95% relative compaction of the bottom of the trench.
8. All concrete shall be Class A (21 MPa (3,000 psi), min.)
9. Rebars shall be Grade 300 and all lapped splices shall be 360mm minimum.
10. The #57 or #67 size aggregate shall conform to latest version of AASHTO M43 (ASTM D 448).
11. Type "C" Pullbox shall be installed in a location protected from vehicular traffic (i.e. raised sidewalk, behind A.C. curbs, traffic signal standard or pipe guards).



TYPICAL FLASHING COMPOUND WATERPROOFING DETAILS

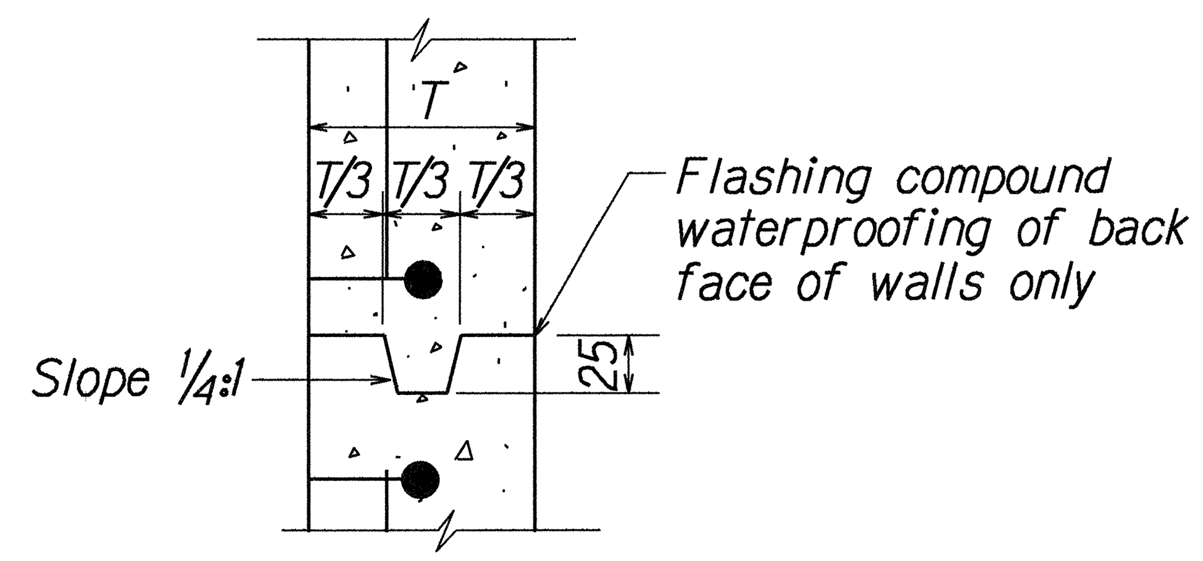
Not to Scale

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



POLYMER CONCRETE COVER

Not to Scale



TYPICAL CONSTRUCTION JOINT DETAIL

Not to Scale

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

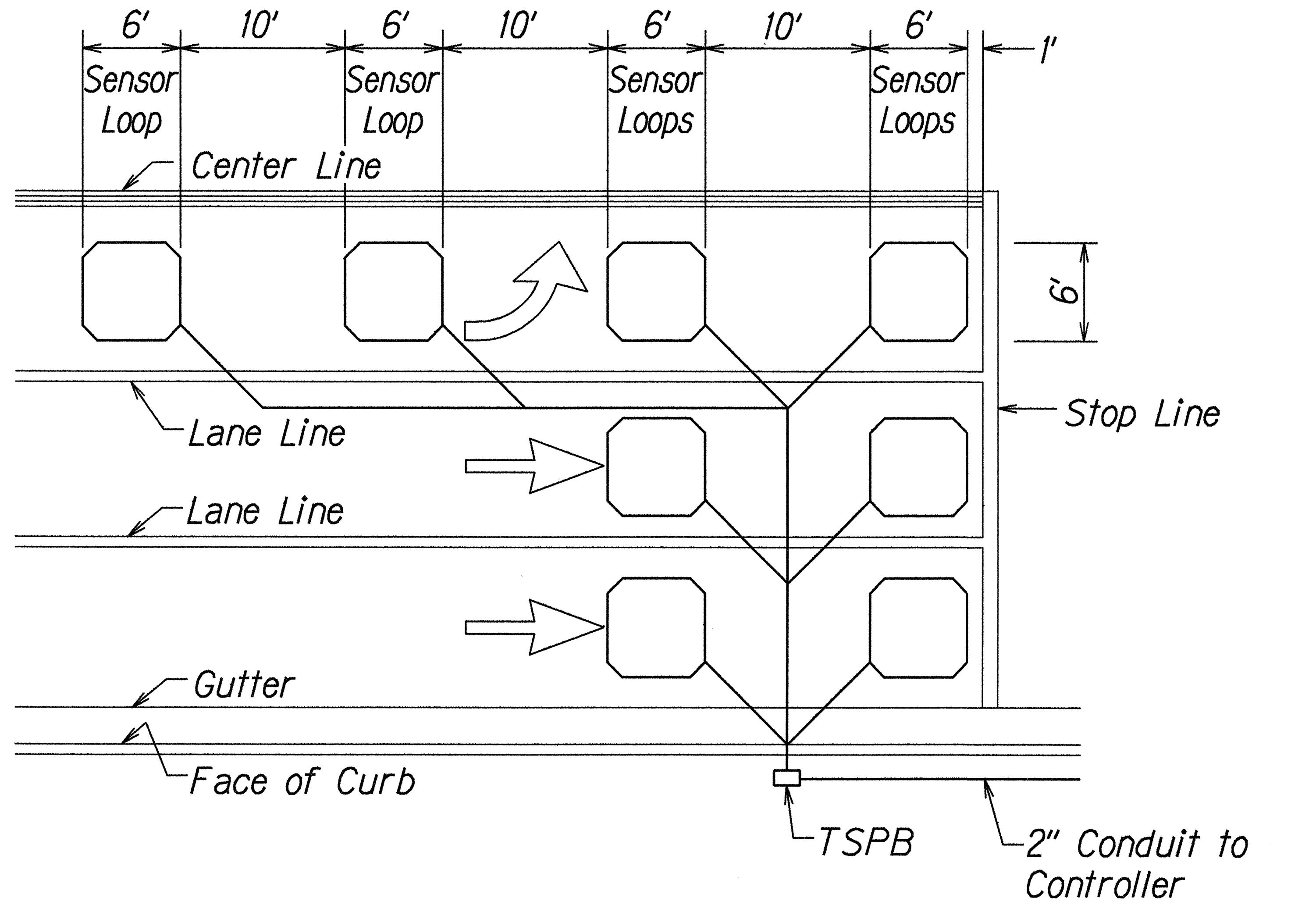
PULLBOX & COVER DETAILS

FARRINGTON HIGHWAY IMPROVEMENTS
Waikele Road to Aniani Place
Project No. 7101A-01-00

Scale: As Shown Date: Sept., 2000

SHEET No. T10 OF 11 SHEETS

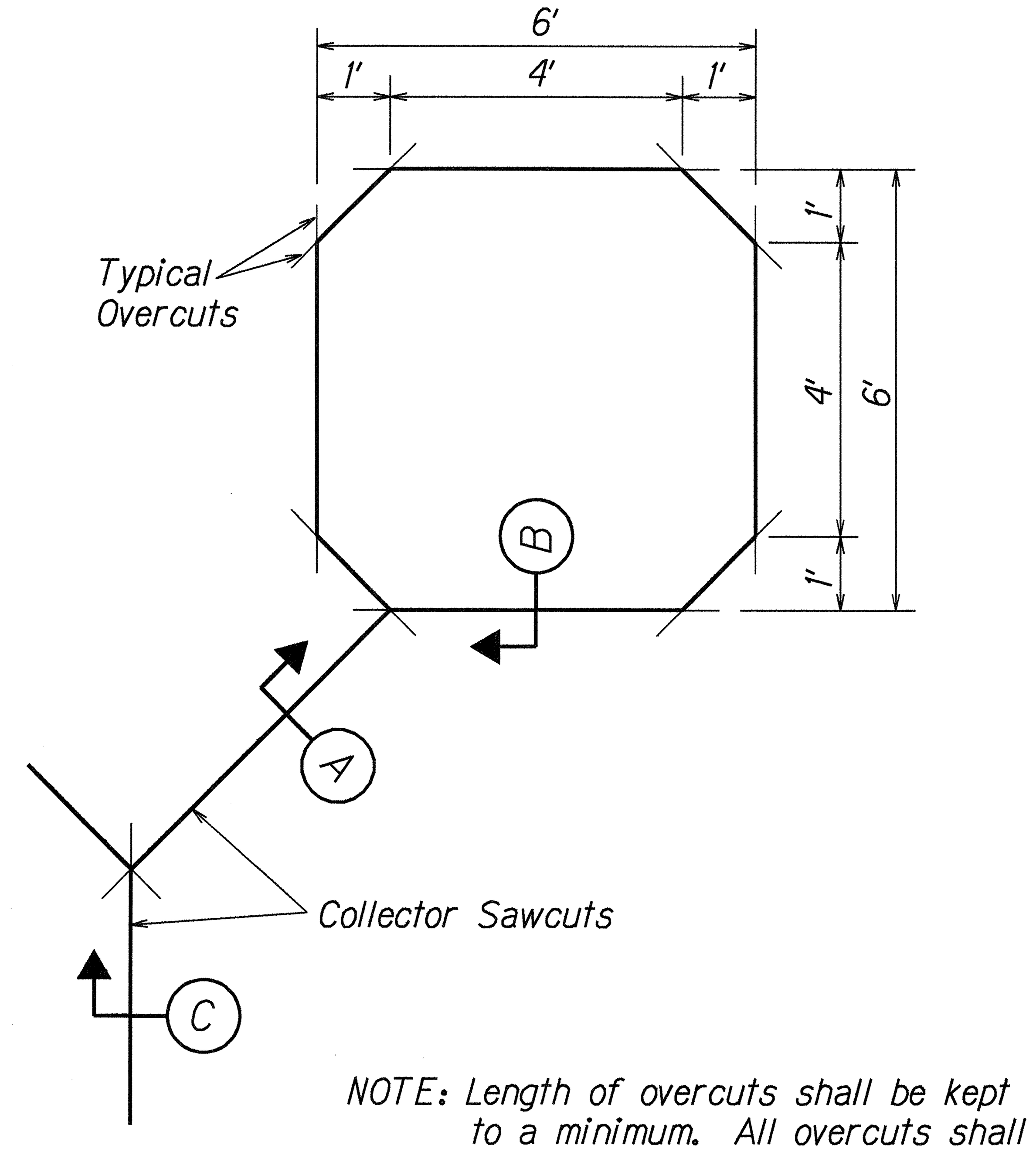
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	7101A-01-00	2001	19	19



NOTES:

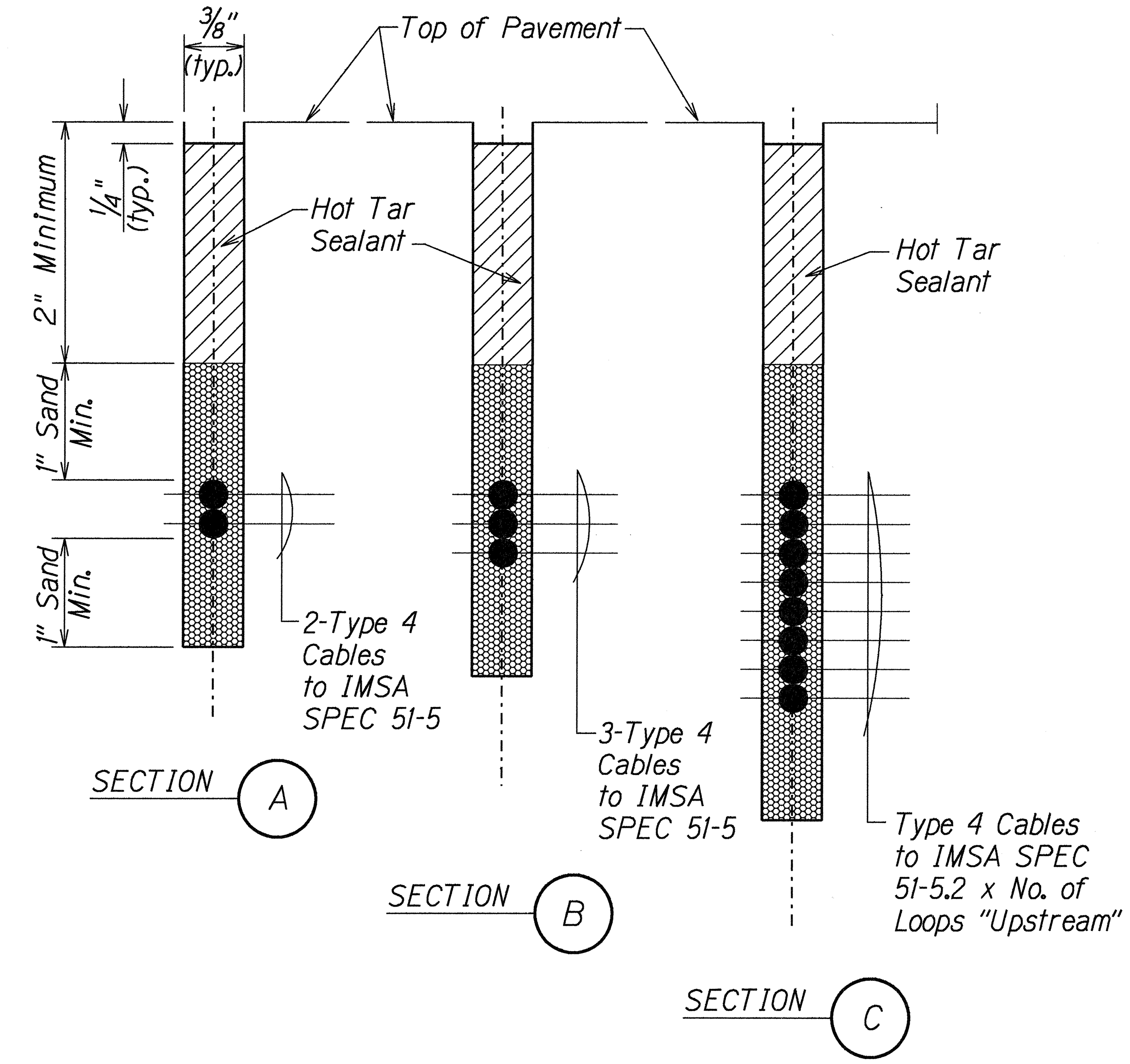
1. Center sensor loops in lanes.
2. Collector cables shall be twisted 2 turns per foot.
3. Number of loops and locations vary. See project plans.
4. Number and locations of collector sawcuts may be varied in the field to suit.

TYPICAL SENSOR LOOP LAYOUT

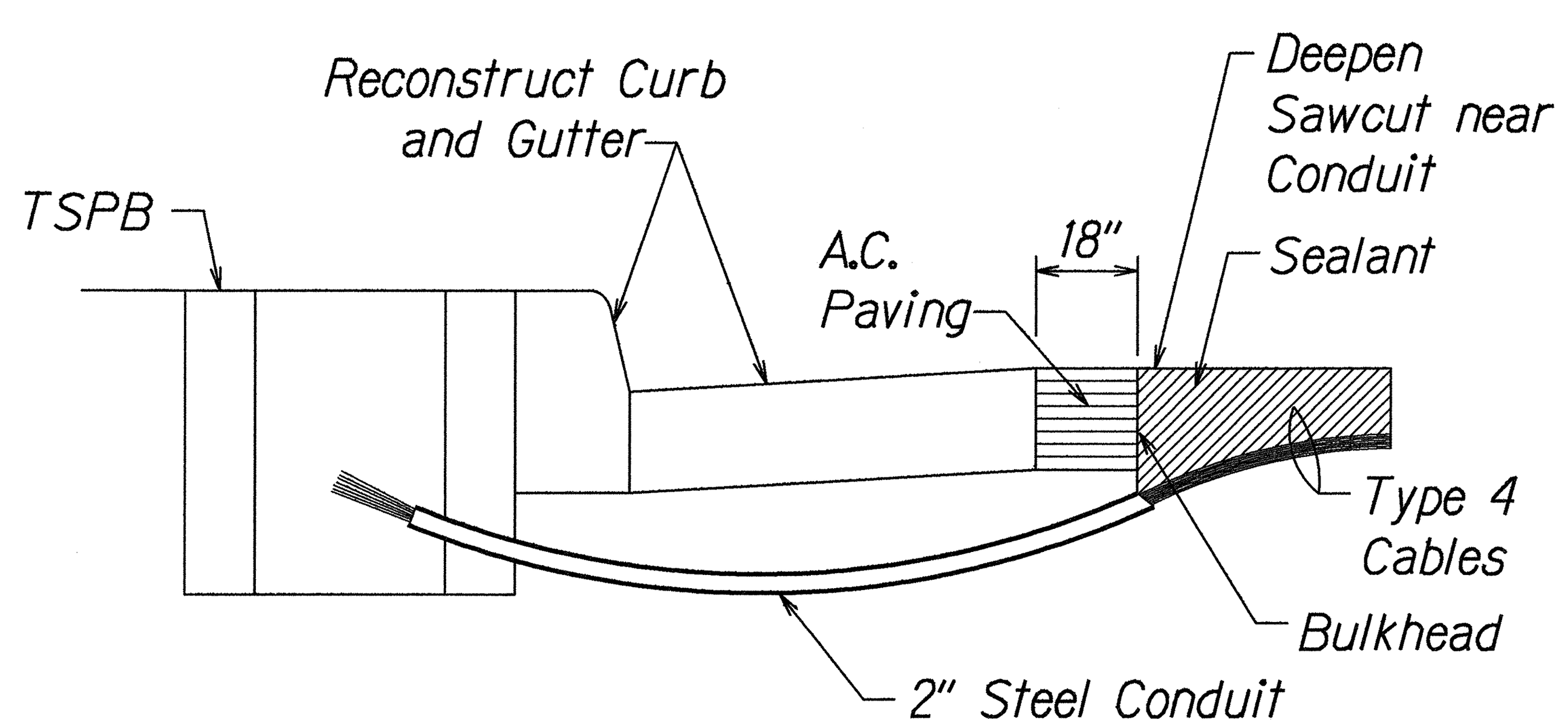


NOTE: Length of overcuts shall be kept to a minimum. All overcuts shall be back filled with hot tar.

TYPICAL SENSOR LOOP SAWCUT DETAIL



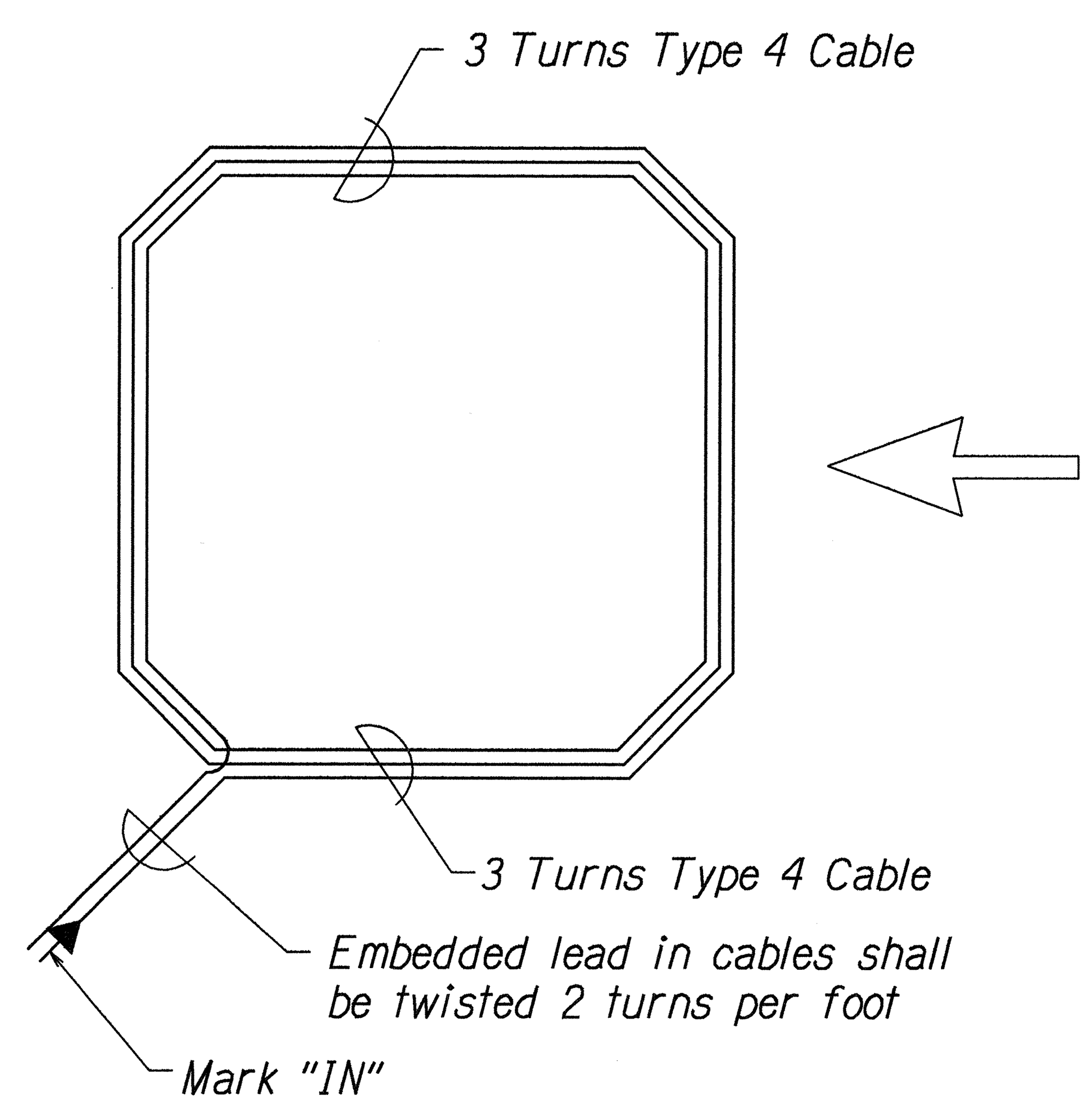
TYPICAL SECTION THROUGH SENSOR LOOP



NOTES ON CONSTRUCTION AT END OF SAWCUT

1. Seal roadway end of conduit after installation of conductors.
2. Install bulkhead across conduit trench.
3. Place hot tar in sawcut.
4. Backfill over conduit with new A.C.
5. Reconstruct curb and gutter as required.

DETAIL OF SENSOR LOOP INSTALLATION AT EDGE OF ROADWAY



TYPICAL SENSOR LOOP WIRING DIAGRAM

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

LOOP DETECTOR DETAILS

FARRINGTON HIGHWAY IMPROVEMENTS
Waikele Road to Aniani Place
Project No. 7101A-01-00

Not to Scale   Date: Sept., 2000

SHEET No. T11 OF 11 SHEETS