

FED.ROAD DIST.NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	99C-02-00	2001	47	51

LEGEND

NEW

EXISTING

- STANDARD TRAFFIC AND PEDESTRIAN SIGNAL HEADS MOUNTED ON TYPE I SIGNAL STANDARD, HEIGHT=10'
- PROGRAMMED VISIBILITY HEAD (PVH)
- 12" R Y ↑ TRAFFIC SIGNAL HEAD
- 12" R Y ← TRAFFIC SIGNAL HEAD
- TRAFFIC SIGNAL HEADS MOUNTED ON TYPE II SIGNAL STANDARD 40' M.A. : 12' BETWEEN HEADS
- EVP DETECTOR
- TYPE "A" PULLBOX
- TYPE "B" PULLBOX
- TYPE "C" PULLBOX
- MODEL 170 CONTROLLER ON NEW BASE
- METER PEDESTAL
- SIGN
- NEW TRAFFIC SIGNAL STANDARD
- LOOP DETECTORS

TRAFFIC SIGNAL CONDUITS

EXISTING UTILITY LINES AND SIZES AS INDICATED — W12 —

W = WATER  
S = SEWER  
D = DRAIN  
FM = FORCE MAIN  
E = ELECTRIC  
T = TELEPHONE

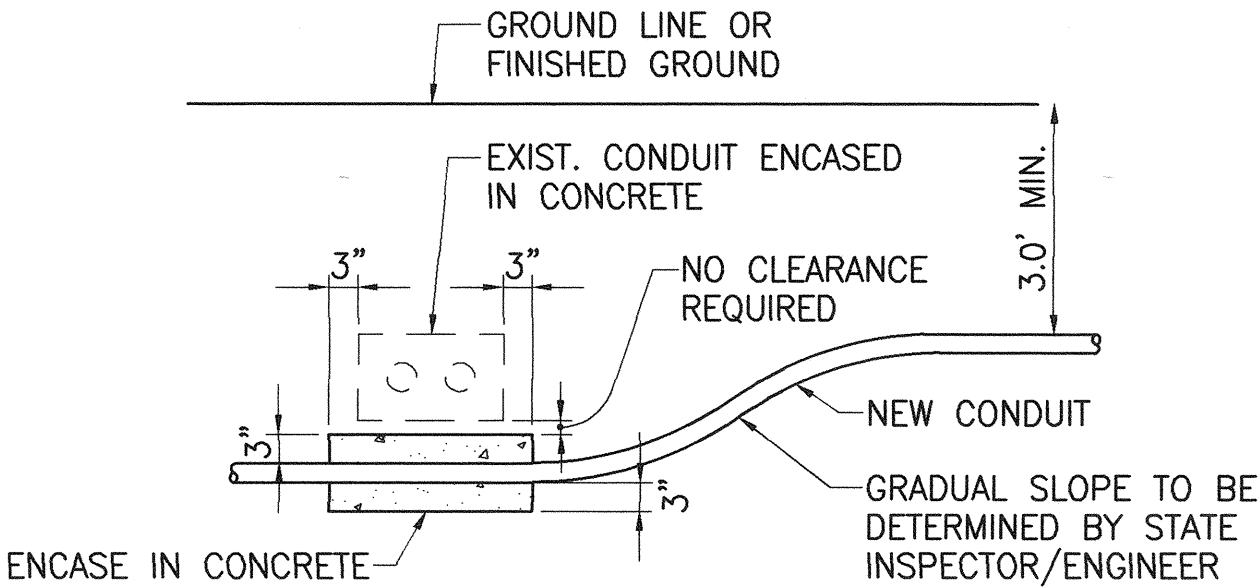
- POWER POLE PP ○
- LIGHT POLE LP ○
- GUY ANCHOR GA ○
- WATER VALVE WV ○
- TELEPHONE POLE TP ○
- WATER MANHOLE WMH ○
- SEWER MANHOLE SMH ○

TRAFFIC SIGNAL NOTES

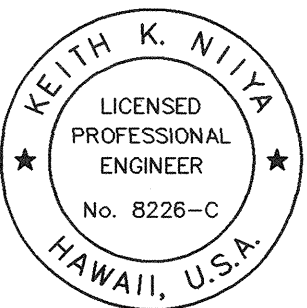
- ALL TRAFFIC SIGNAL CONTROLLER EQUIPMENT SHALL BE COMPLETELY WIRED IN THE CABINET AND SHALL CONTROL THE TRAFFIC SIGNALS AS CALLED FOR IN THE PLANS.
- SIGNAL INDICATIONS DURING CLEARANCE INTERVAL:
  - IF A SIGNAL IS G OR ←G AND WILL REMAIN G OR ←G DURING THE NEXT PHASE, IT SHALL BE G OR ←G DURING THE CLEARANCE INTERVAL.
  - IF A SIGNAL IS G OR ←G AND WILL BECOME R OR EXTINGUISHED DURING THE NEXT PHASE, IT SHALL BE Y OR ←Y DURING THE CLEARANCE INTERVAL.
  - IF A SIGNAL IS R AND WILL REMAIN R OR BECOMES G DURING THE NEXT PHASE, IT SHALL REMAIN R DURING THE CLEARANCE INTERVAL.
- 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.
- A SOLID #8 BARE COPPER WIRE SHALL BE PULLED WITH THE TRAFFIC CONTROL CABLE FOR EQUIPMENT GROUND. COST SHALL BE INCIDENTAL TO THE INSTALLATION OF THE CONTROL CABLE.
- CONDUITS AND PULLBOX LOCATIONS AS SHOWN ON THE PLANS ARE SCHEMATIC. THEY MAY BE MODIFIED BY THE CONTRACTOR WITH THE APPROVAL OF THE ENGINEER.
- THE CONTRACTOR SHALL INSTALL THE CONTROLLER AND CABINET IN THE INDICATED LOCATION.
- ALL WORK FOR THE INSTALLATION OR MODIFICATION OF THE TRAFFIC SIGNAL SYSTEM SHALL CONFORM TO THE LATEST REVISIONS OF THE "HAWAII STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 1994" AND THE "STANDARD PLANS" OF THE DEPARTMENT OF TRANSPORTATION, HIGHWAYS DIVISION AND AS SHOWN ON THESE DRAWINGS.
- ALL SPLICING SHALL BE DONE IN THE PULLBOXES.
- 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.
- THE CONCRETE JACKET FOR THE CONDUIT BY-PASS DETAIL SHOWN ON THIS SHEET SHALL NOT BE PAID FOR SEPARATELY BUT CONSIDERED INCIDENTAL TO THE VARIOUS CONTRACT ITEMS. THE ENGINEER SHALL DETERMINE IF A CONCRETE JACKET IS REQUIRED.
- ALL CABLE AND ELEMENTS FOR GROUNDING SHALL BE NEW.
- CABLES BETWEEN SIGNAL FACES, PEDESTRIAN HEADS, AND EVP DETECTORS AND THE NEAREST PULLBOX ARE NOT CALLED OUT ON THE PLAN, BUT SHALL BE FURNISHED AND INSTALLED IN SUFFICIENT NUMBERS AND LENGTHS AS REQUIRED. COST SHALL BE INCIDENTAL TO VARIOUS TRAFFIC SIGNAL CONTRACT ITEMS.
- CONDUITS BETWEEN THE TRAFFIC SIGNAL STANDARD AND THE PULLBOX SHALL BE IN SUFFICIENT NUMBER AS REQUIRED. COST SHALL BE INCIDENTAL TO THE INSTALLATION OF THE TRAFFIC SIGNAL STANDARD FOUNDATION.
- UNLESS OTHERWISE SPECIFIED, ALL CONDUITS SHALL BE PVC SCHEDULE 80.

CONSTRUCTION NOTES

- LOCATIONS OF EXISTING UNDERGROUND STRUCTURES AND UTILITIES SUCH AS PIPE-LINES, CONDUITS, CABLES, ETC., SHOWN ON PLANS ARE APPROXIMATE ONLY. IT IS NOT THE INTENT OF THESE PLANS TO SHOW THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES WITH THE RESPECTIVE OWNERS. EXISTING UTILITIES DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN COST.
- THE CONTRACTOR SHALL VERIFY AND CHECK ALL DIMENSIONS AND DETAILS SHOWN ON THE DRAWINGS PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION.
- THE CONTRACTOR SHALL NOTIFY ALL AGENCIES TO VERIFY, TONE AND LOCATE THEIR EXISTING UTILITIES WITHIN THE PROJECT AREA PRIOR TO EXCAVATING. THE CONTRACTOR SHALL COORDINATE ALL WORK.
- THE LOCATIONS OF THE NEW TRAFFIC SIGNAL STANDARDS, TRAFFIC SIGNAL STANDARDS WITH MAST-ARM, 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.
- 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.
- MAINTENANCE OF TRAFFIC THROUGH THE CONSTRUCTION AREA SHALL BE IN ACCORDANCE WITH PART VI OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", FEDERAL HIGHWAY ADMINISTRATION (1993) AS AMENDED AND AS SPECIFIED IN THE SPECIAL PROVISIONS. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ADEQUATE BARRICADES, BLINKERS, CONSTRUCTION SIGNS, ETC., FOR THE SAFETY OF THE MOTORING PUBLIC.
- AT THE END OF EACH DAY'S WORK, THE CONTRACTOR SHALL REMOVE ALL EQUIPMENT AND OTHER OBSTRUCTIONS TO PERMIT FREE AND SAFE PASSAGE OF PUBLIC TRAFFIC.



CONDUIT BY-PASS DETAIL  
NOT TO SCALE



THIS WORK WAS PREPARED BY ME  
OR UNDER MY SUPERVISION

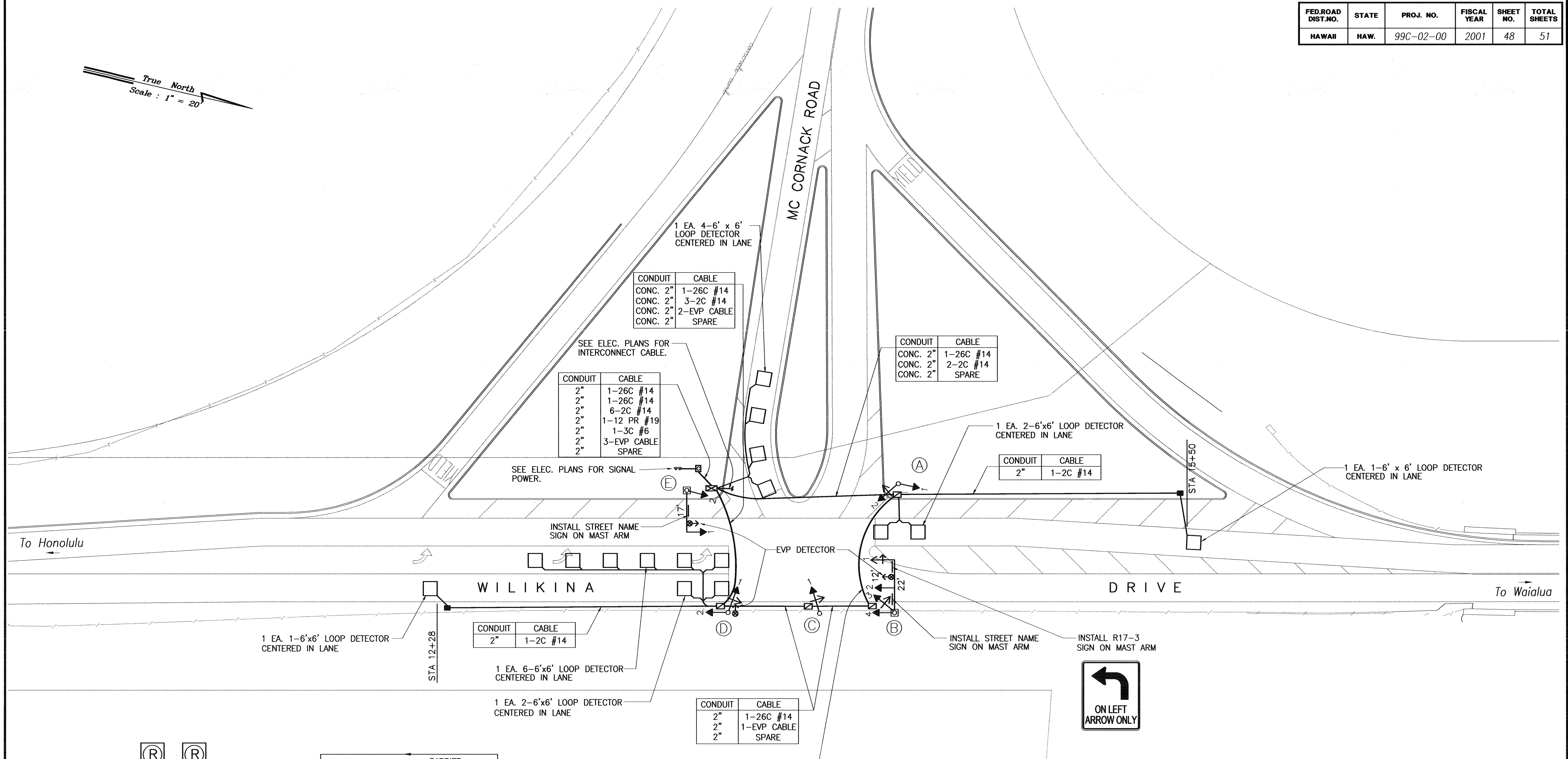
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TRAFFIC SIGNAL NOTES**  
**LEGEND AND DETAILS**  
**WILIKINA DR INTERSECTION IMPROVEMENTS**  
**AT McNAIR GATE**  
**Project No. 99C-02-00**

Scale: No Scale Date: Sep. 2000

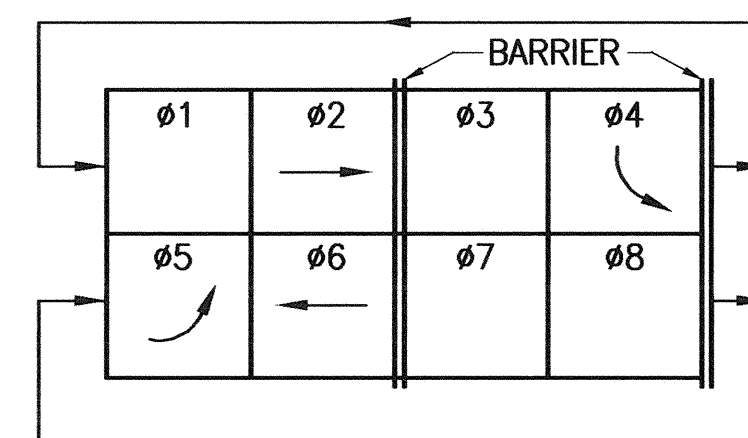
**SHEET No. 1 OF 5 SHEETS**

FED.ROAD DIST.NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	99C-02-00	2001	48	51



- |     |      |
|-----|------|
| A-1 | A-2  |
| B-2 | B-1  |
| B-4 | B-3  |
| D-2 | C-1  |
| E-1 | D-1  |
| E-2 | *PRO |

## SIGNAL INDICATIONS

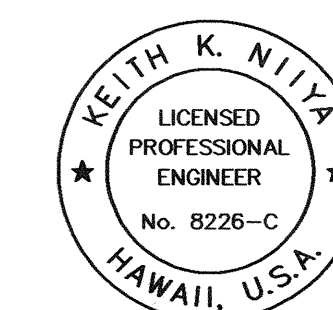


## PHASE DIAGRAM

NEW MODEL 170 CONTROLLER  
NEW MODEL 332 CABINET

## TRAFFIC SIGNAL PLAN

SCALE 1" = 20'



THIS WORK WAS PREPARED BY ME  
OR UNDER MY SUPERVISION

*John R. N.*

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

### TRAFFIC SIGNAL PLAN

### WILIKINA DR INTERSECTION IMPROVEMENTS

AT McNAIR GATE

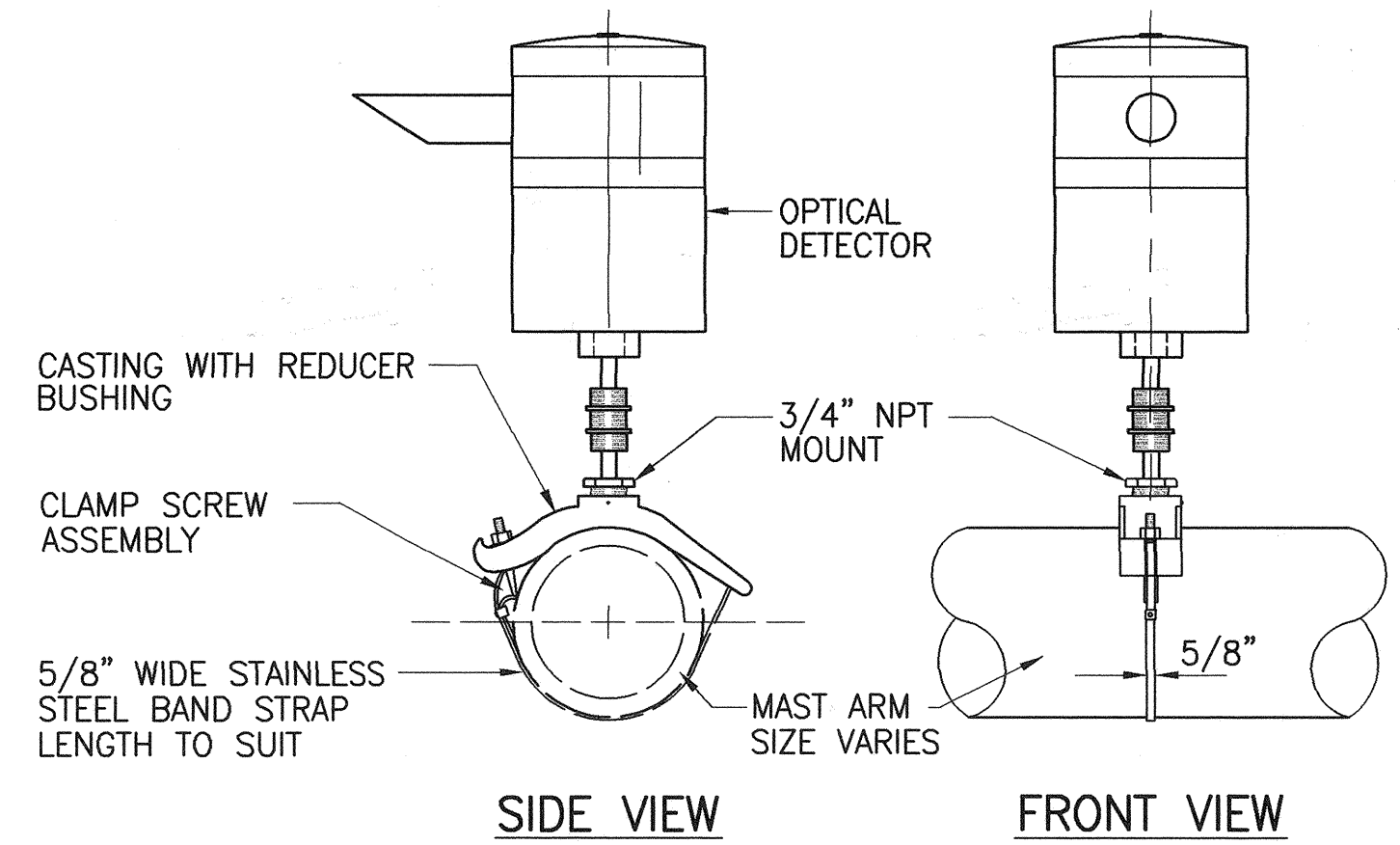
Project No. 99C-02-00

Scale:  $1'' = 20'$

Date: Sep. 2000

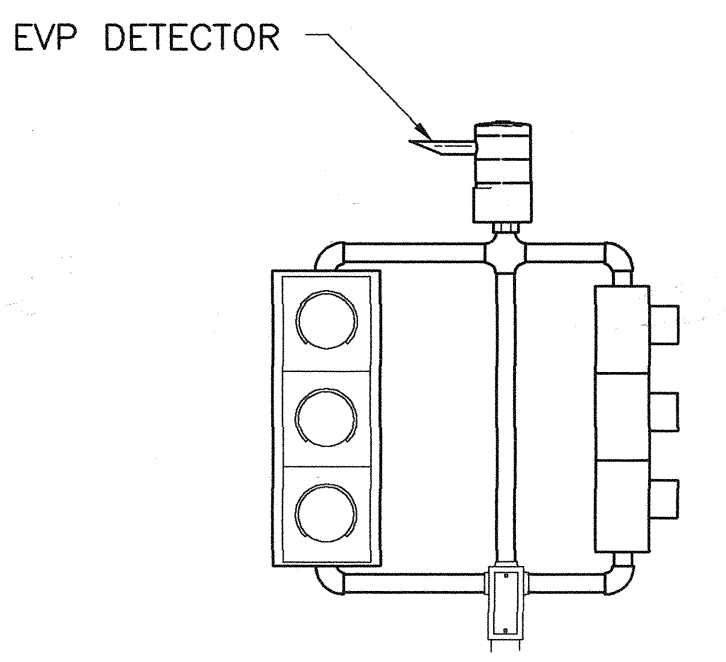


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HAWAII	HAW.	99C-02-00	2001	49	51

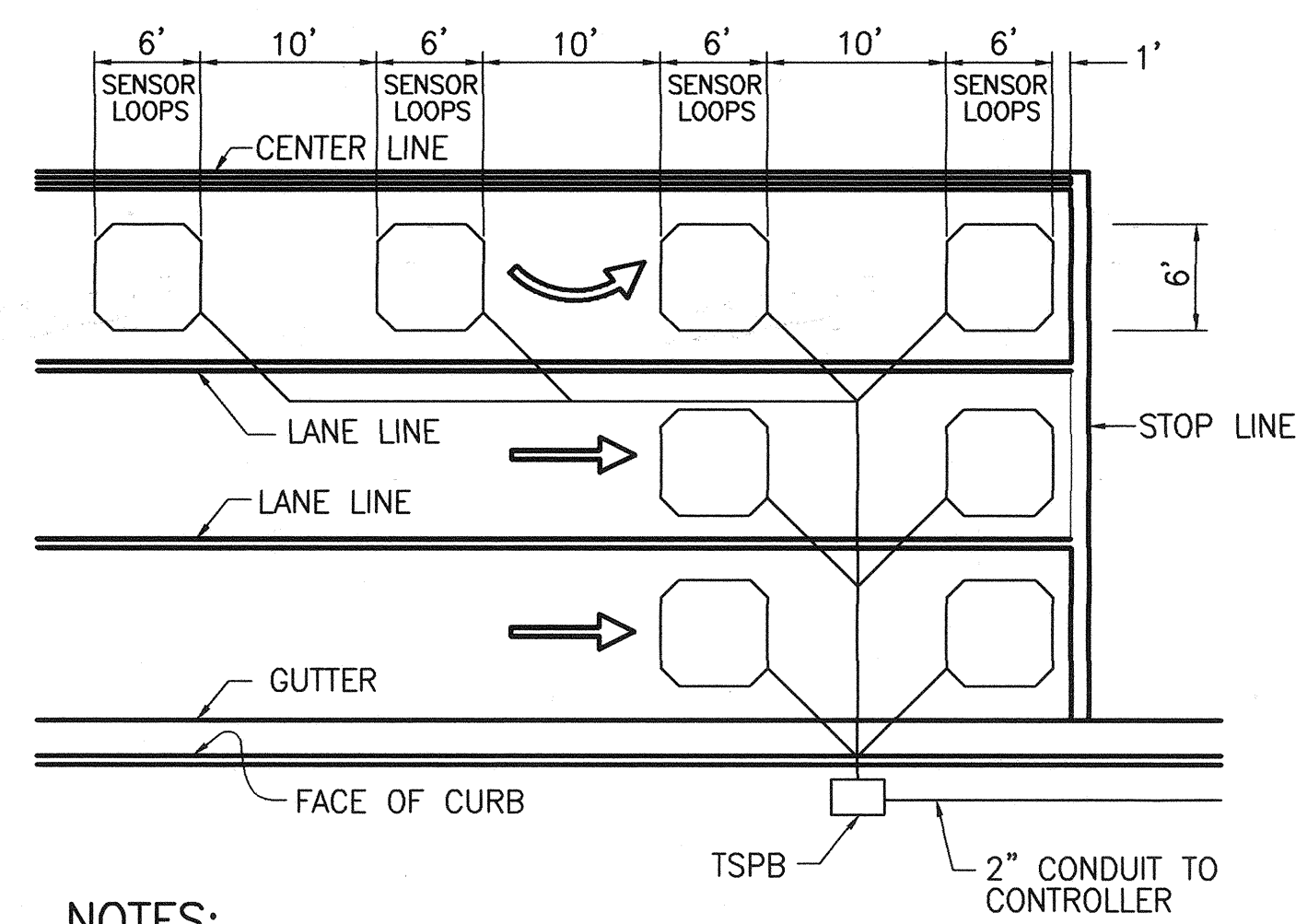


- NOTES:
1. OPTICAL DETECTOR SHALL BE "MODEL 711 PREEMPTION DETECTOR", OR APPROVED EQUAL, UNLESS NOTED OTHERWISE IN THE SPECIAL PROVISIONS.
  2. SUPPORT SADDLE ASSEMBLY SHALL BE "ASTRO MINI-BRAC, AB-0132-29", OR APPROVED EQUAL, UNLESS NOTED OTHERWISE IN THE SPECIAL PROVISIONS.

**OPTICAL DETECTOR FOR MAST ARM MOUNTING**  
NOT TO SCALE

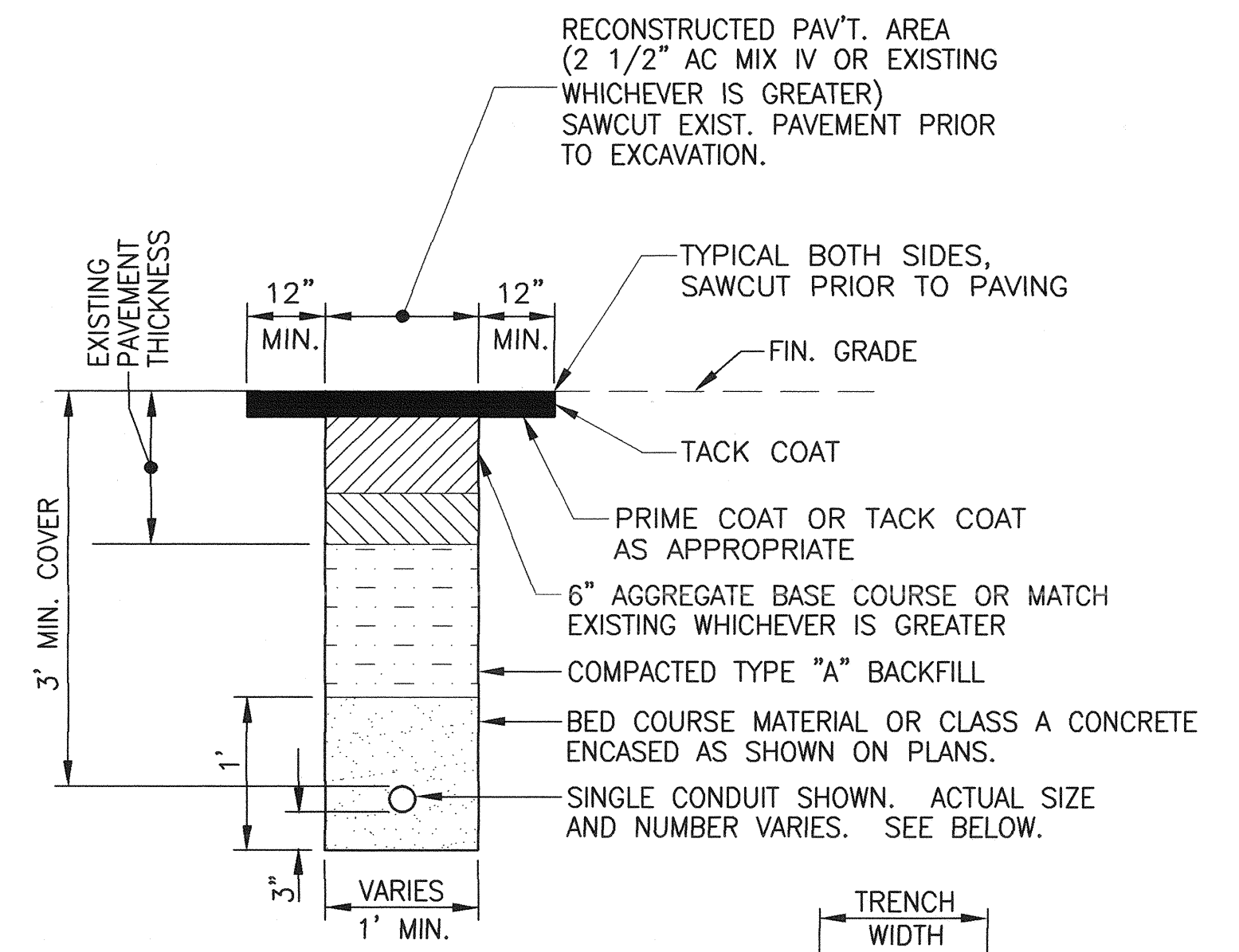


**POST TOP TP-EVP MOUNTING**  
NOT TO SCALE



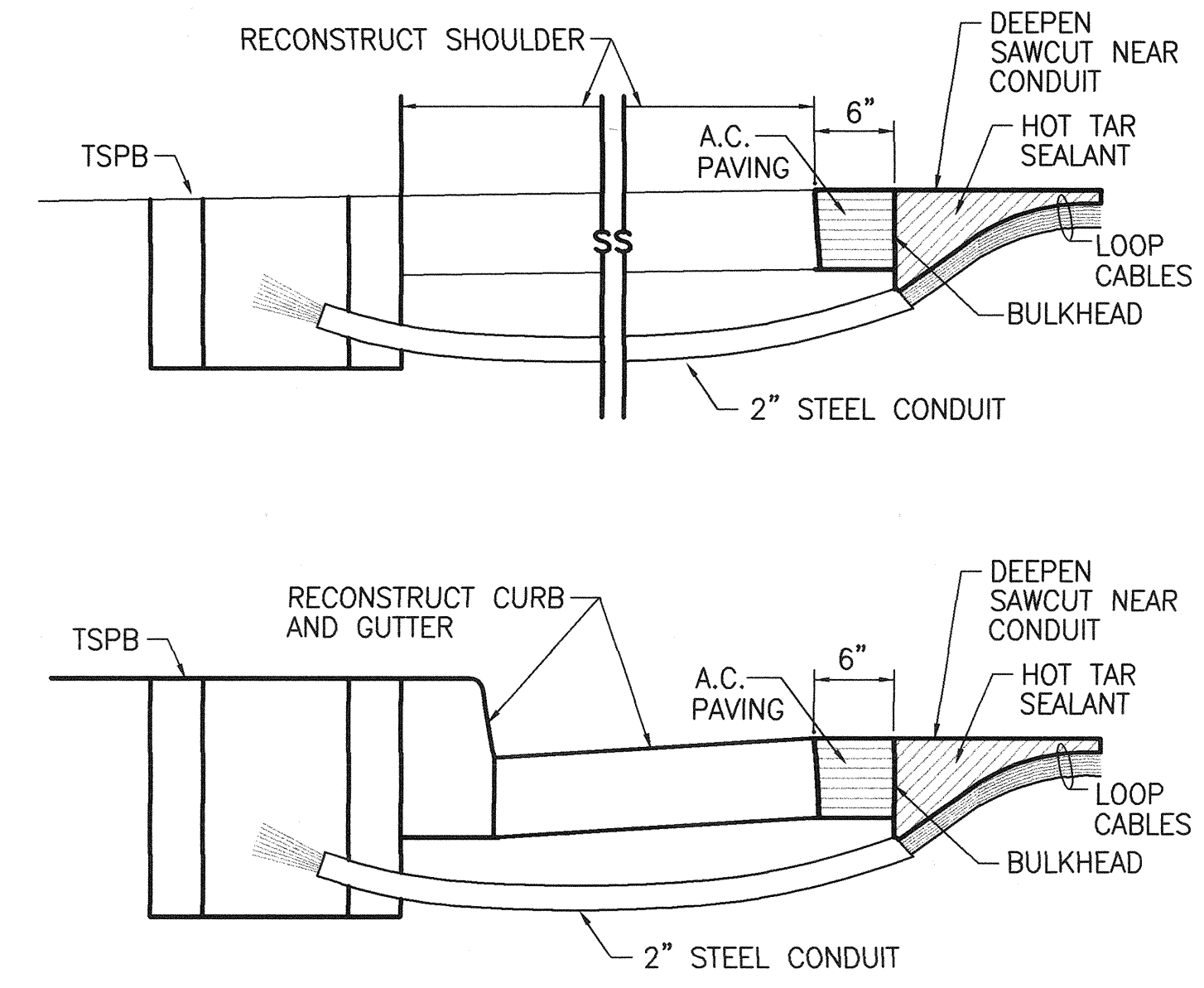
- NOTES:
1. CENTER SENSOR LOOPS IN LANES.
  2. COLLECTOR CABLES SHALL BE TWISTED 2 TURNS PER FOOT.
  3. NUMBER OF LOOPS AND LOCATIONS VARY. SEE PROJECT PLANS.
  4. NUMBER AND LOCATIONS OF COLLECTOR SAWCUTS MAY BE VARIED IN THE FIELD TO SUIT.

**TYPICAL SENSOR LOOP LAYOUT**  
NOT TO SCALE



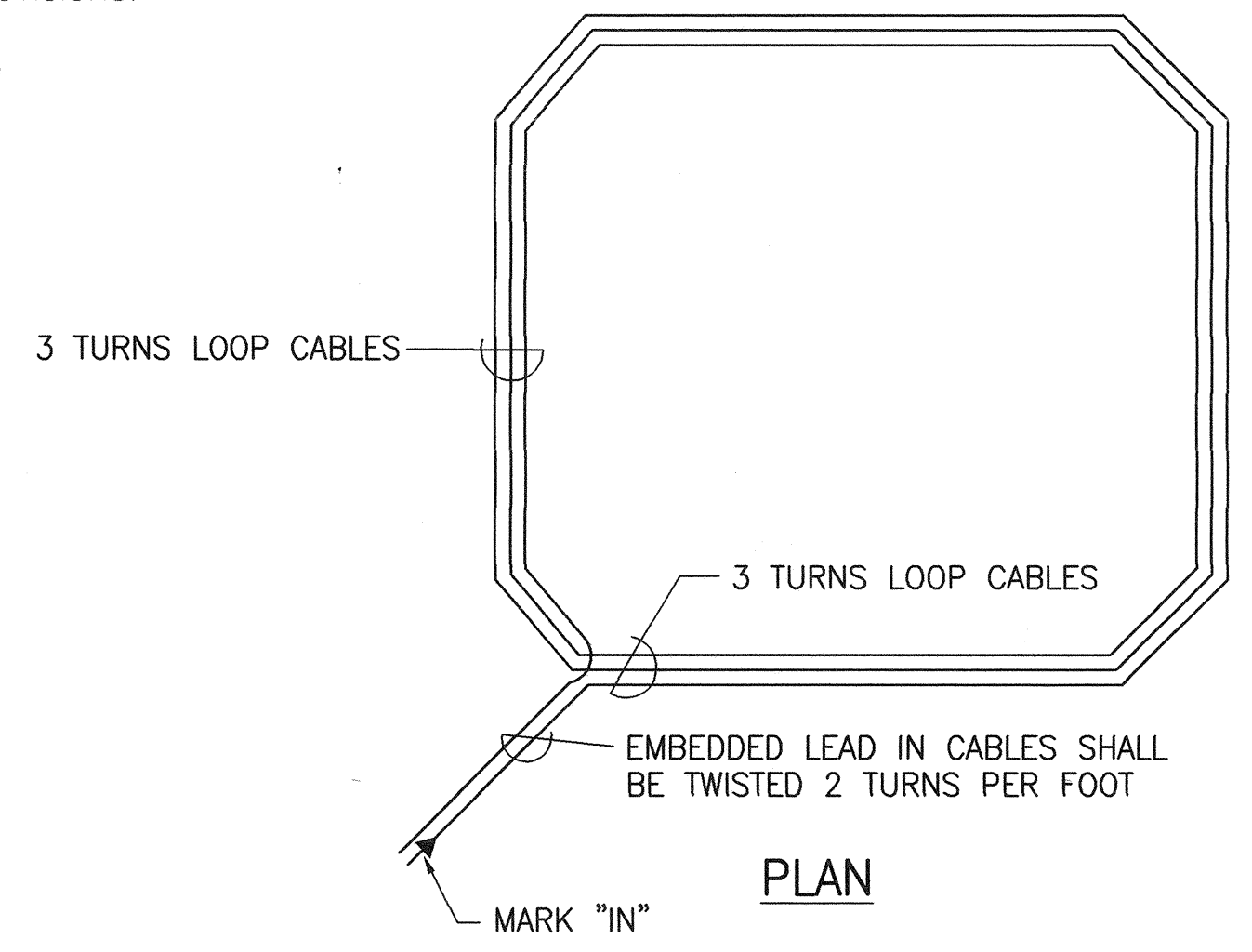
**TYPICAL TRENCH DETAIL IN PAVEMENT AREAS**  
NOT TO SCALE

- NOTES:
1. DETAIL FOR MULTIPLE CONDUIT TRENCHES SHALL BE SIMILAR. PROVIDE 3 inch MIN. CLEAR SPACING BETWEEN CONDUITS.
  2. BED COURSE MATERIAL SHALL BE BLACK SAND, BEACH SAND, CRUSHED ROCK, OR FINELY GRADED CORAL PASSING A 1/2 INCH SIEVE.

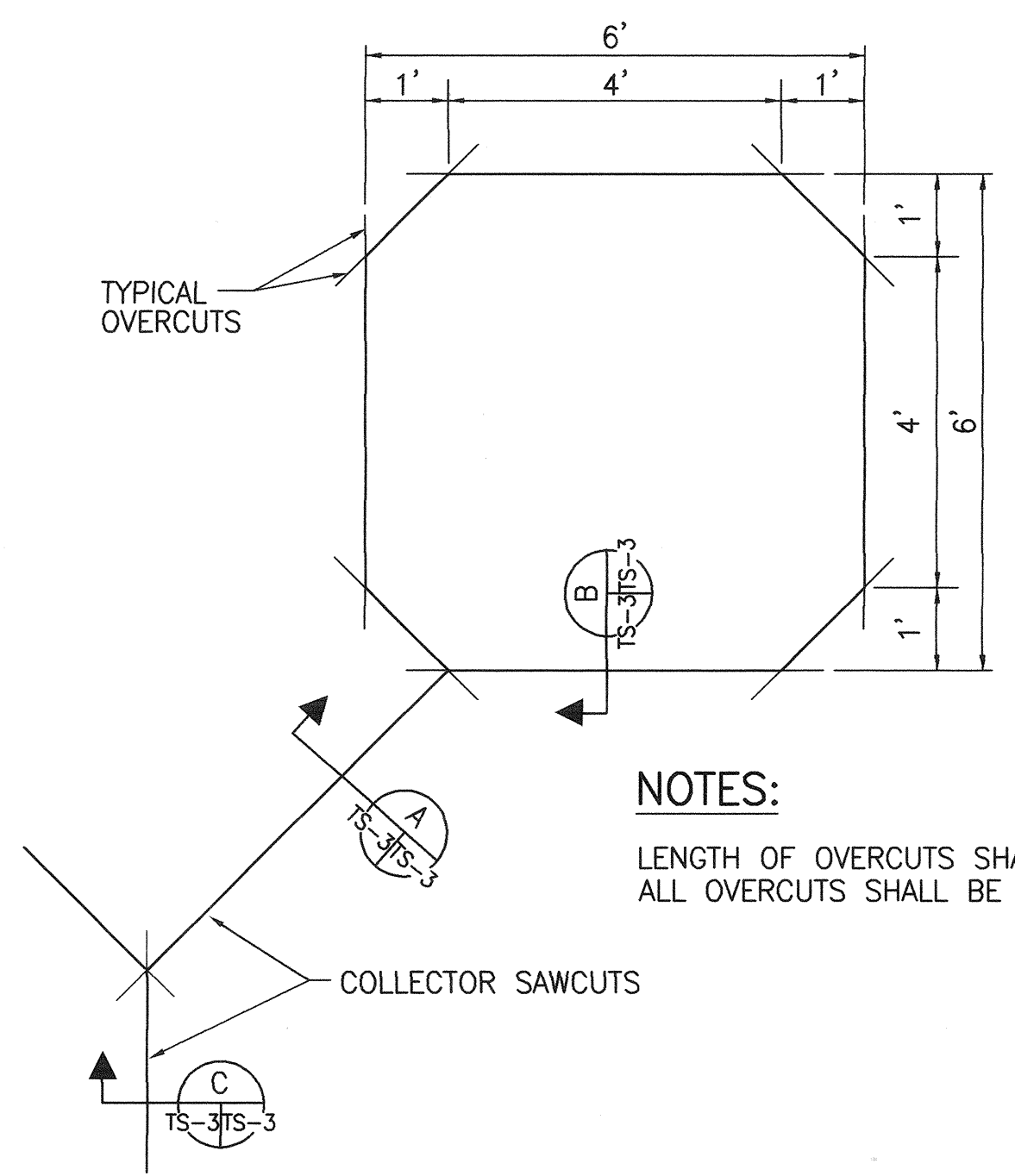
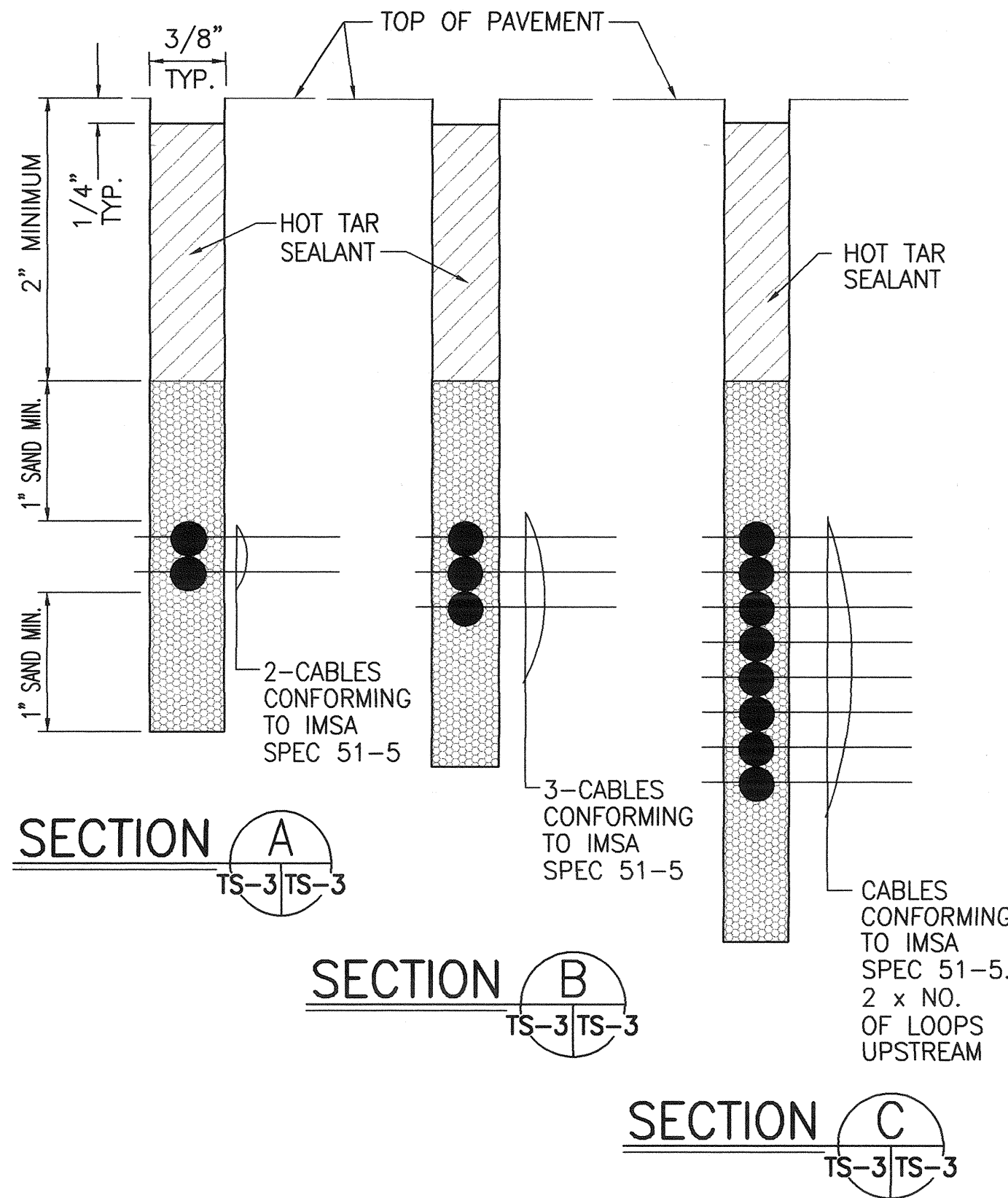


- NOTES ON CONSTRUCTION AT END OF SAWCUT
1. SEAL ROADWAY END OF CONDUIT AFTER INSTALLATION OF CONDUCTORS
  2. INSTALL BULKHEAD ACROSS CONDUIT TRENCH.
  3. PLACE HOT TAR IN SAWCUT.
  4. BACKFILL OVER CONDUIT WITH NEW A.C.
  5. RECONSTRUCT CURB AND GUTTER AS REQUIRED.

**DETAIL OF SENSOR LOOP INSTALLATION AT EDGE OF ROADWAY**  
NOT TO SCALE



**TYPICAL SENSOR LOOP WIRING DIAGRAM**  
NOT TO SCALE



**TYPICAL SENSOR LOOP SAWCUT DETAIL**  
NOT TO SCALE

- NOTES:
- LENGTH OF OVERCUTS SHALL BE KEPT TO A MINIMUM. ALL OVERCUTS SHALL BE BACKFILLED WITH HOT TAR.

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TRAFFIC SIGNAL DETAILS**

**WILIKINA DR INTERSECTION IMPROVEMENTS**  
**AT McNAIR GATE**  
**Project No. 99C-02-00**

Scale: No Scale Date: Sep. 2000

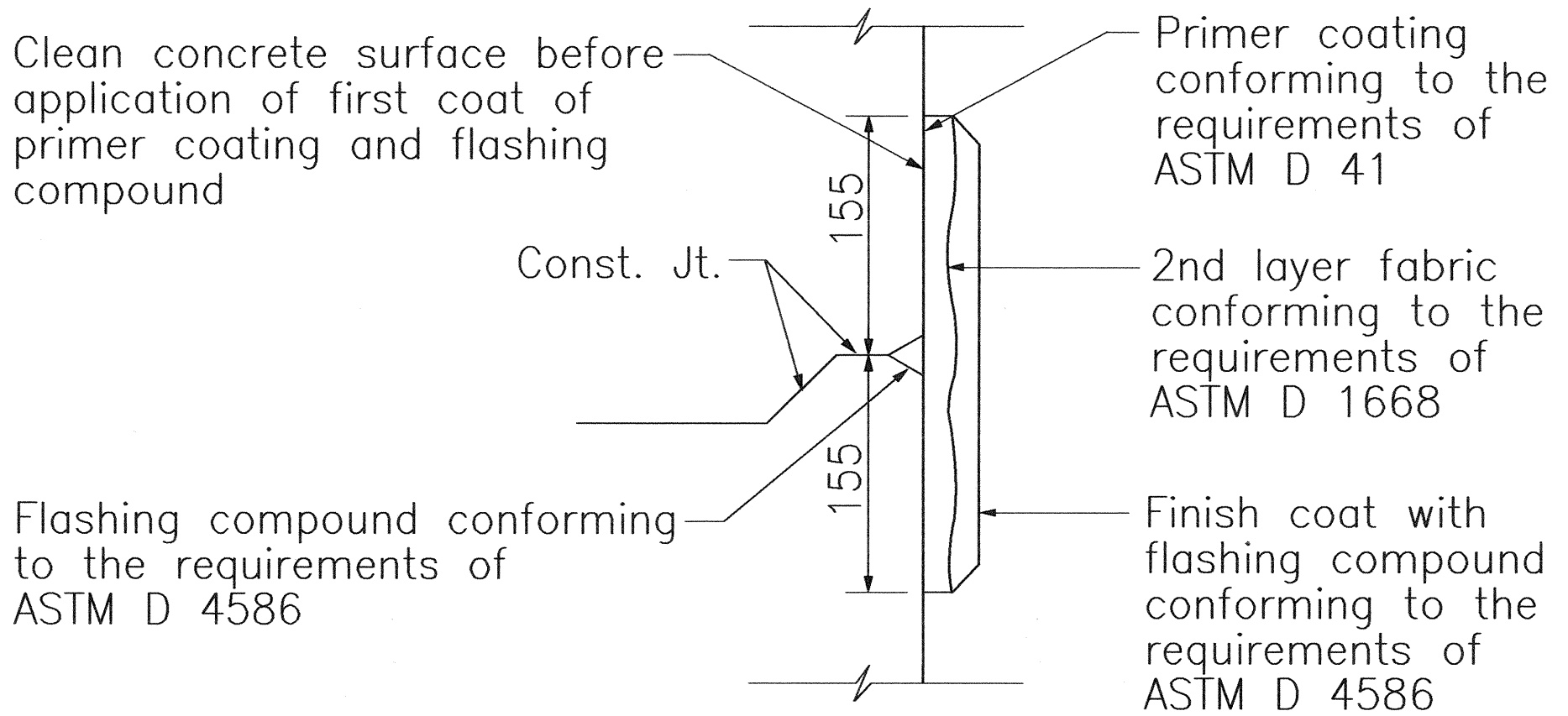
**SHEET No. 3 OF 5 SHEETS**



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GENERAL NOTES

1. Provide a minimum of one 16Ø 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 (21MPa or 3000PSI, 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

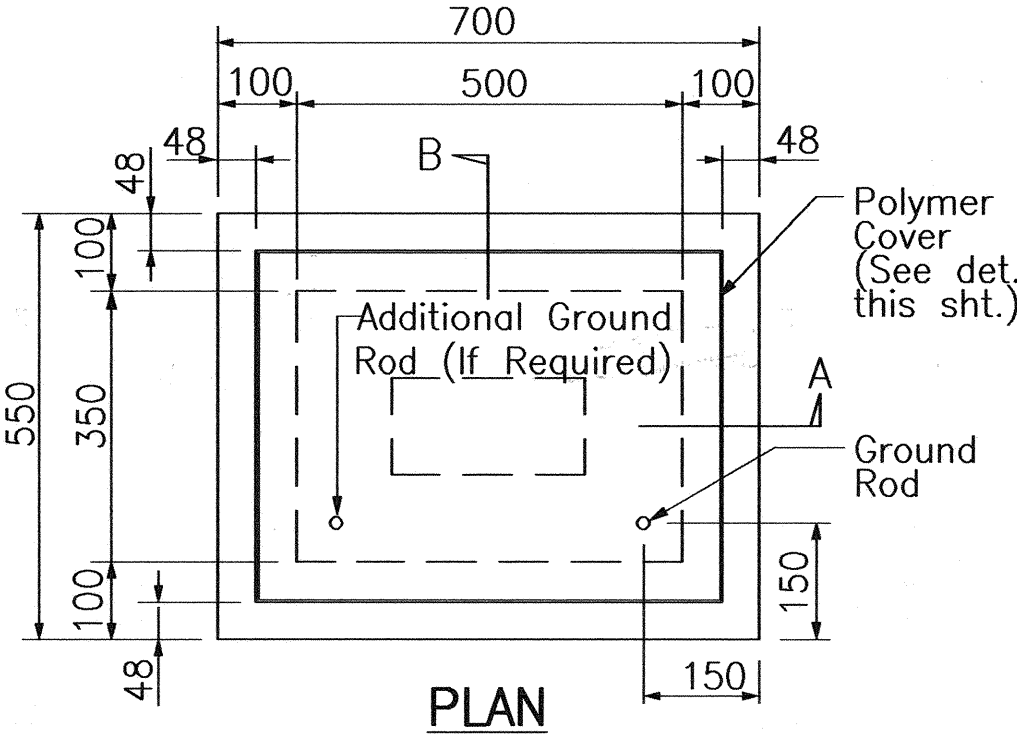
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

PULLBOX DETAIL

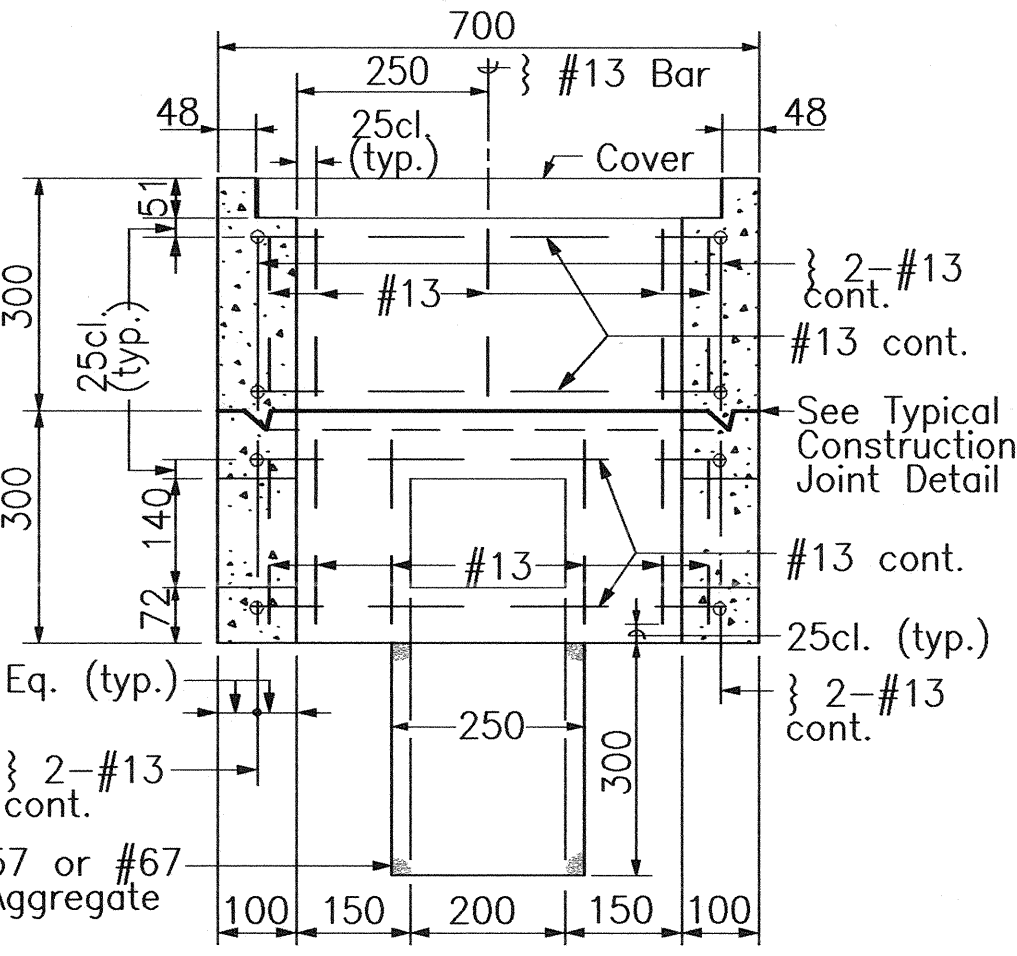
WILIKINA DR INTERSECTION IMPROVEMENTS  
AT McNAIR GATE  
Project No. 99C-02-00

Scale: No Scale      Date: Sep. 2000

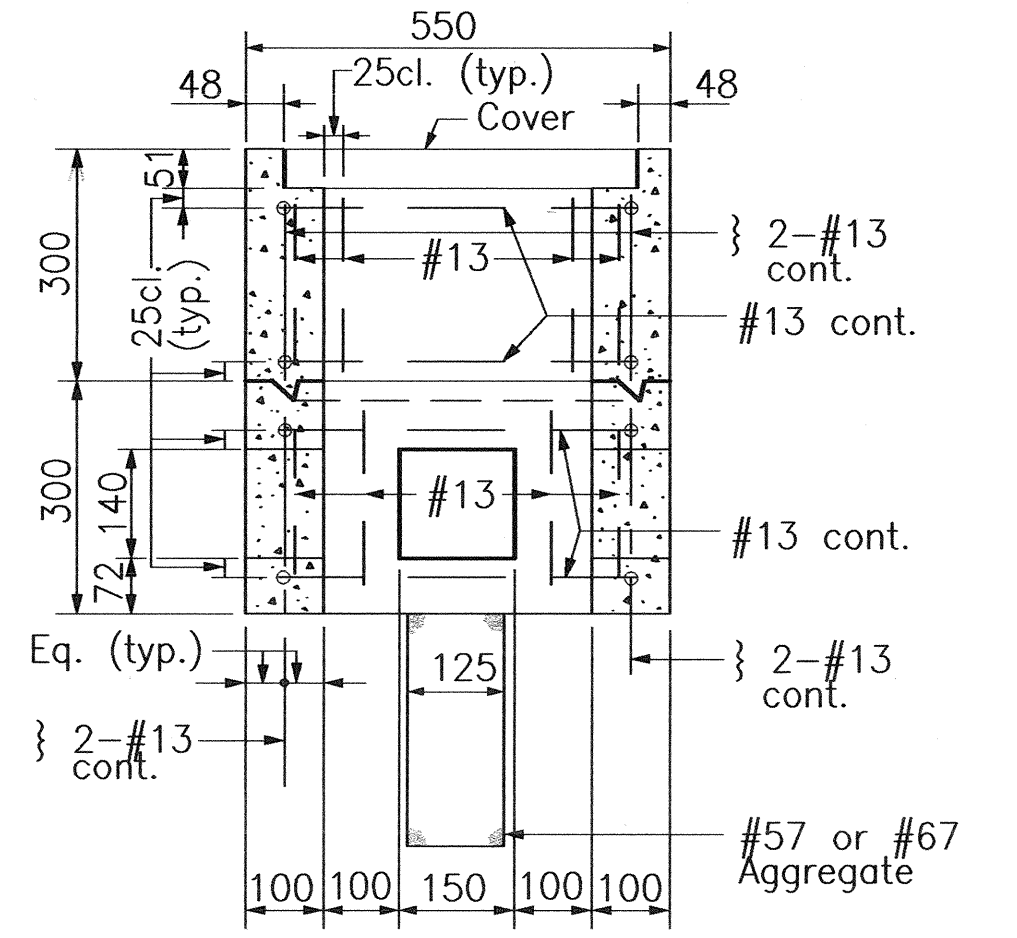
SHEET No. 4 OF 5 SHEETS



PLAN



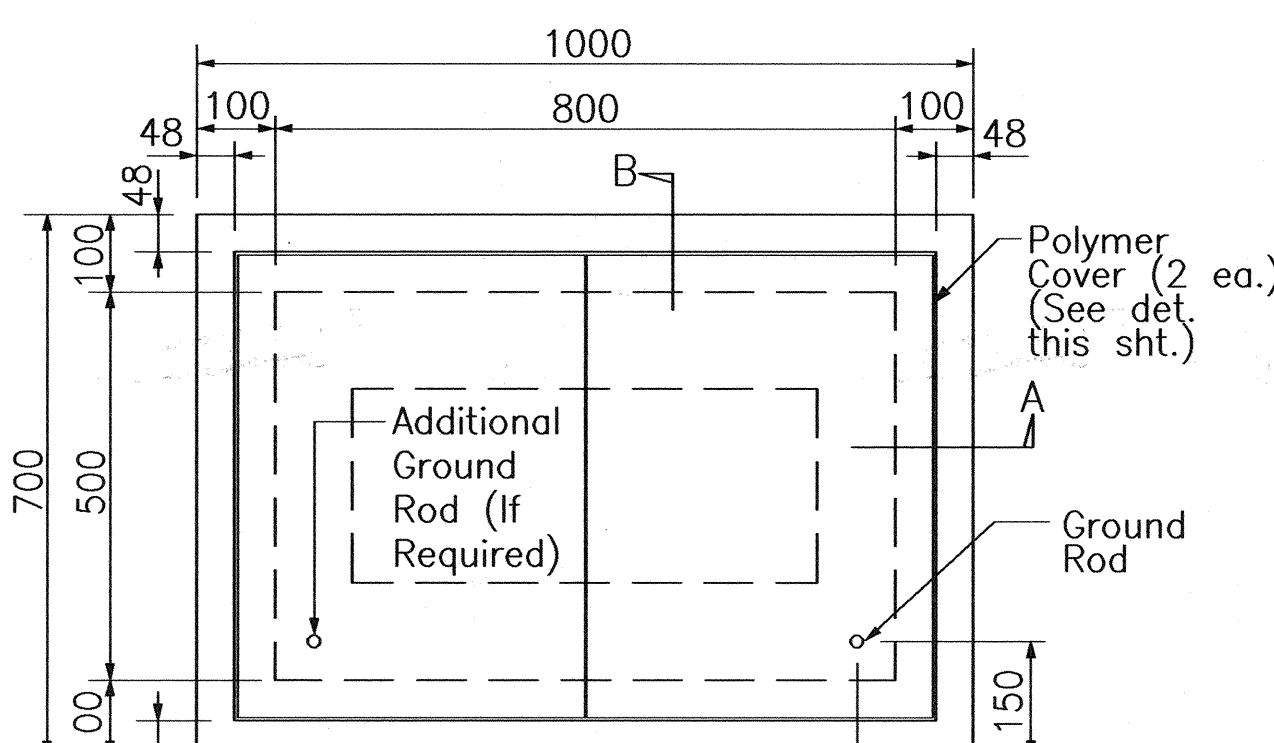
SECTION A-A



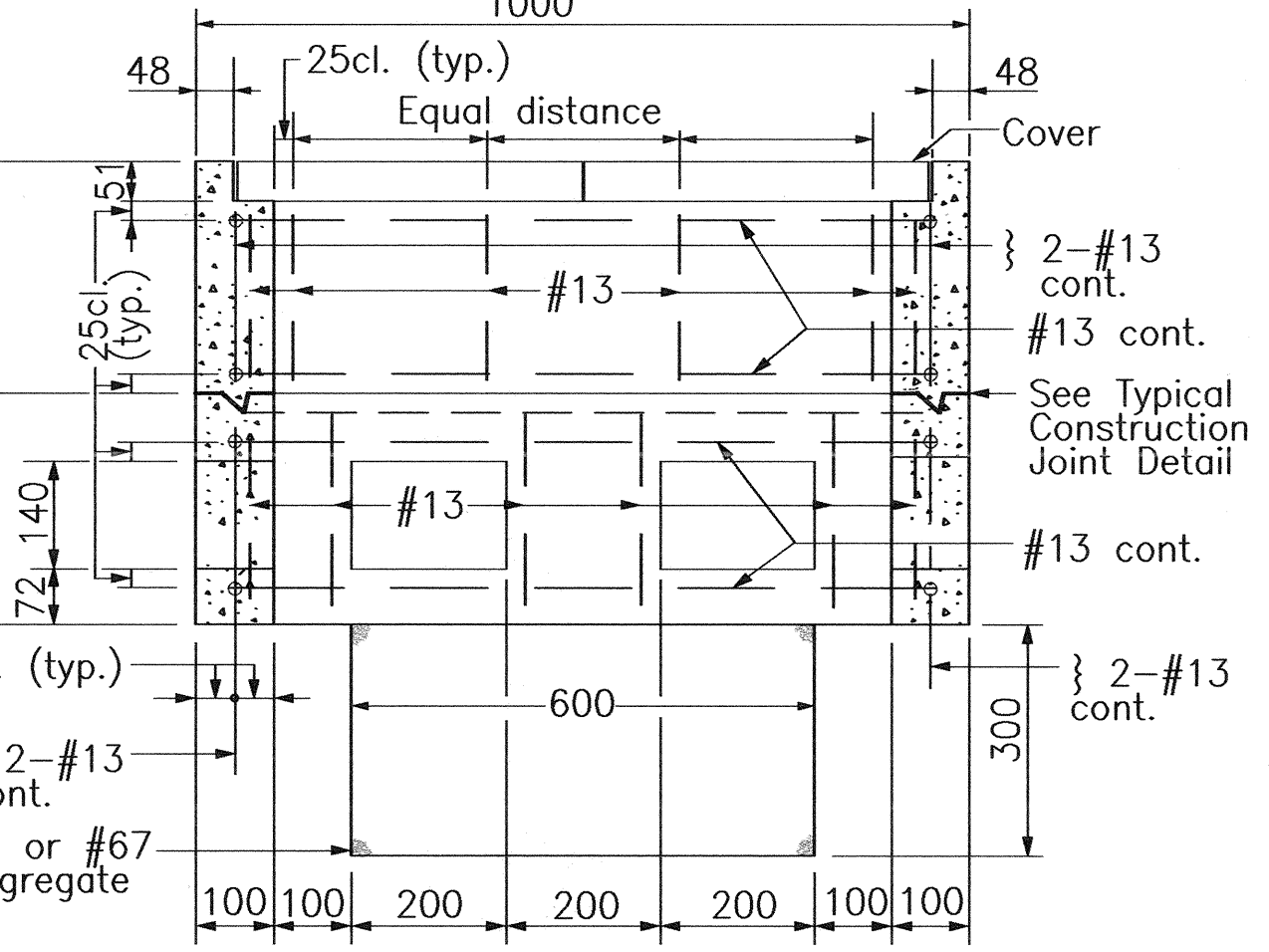
SECTION B-B

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

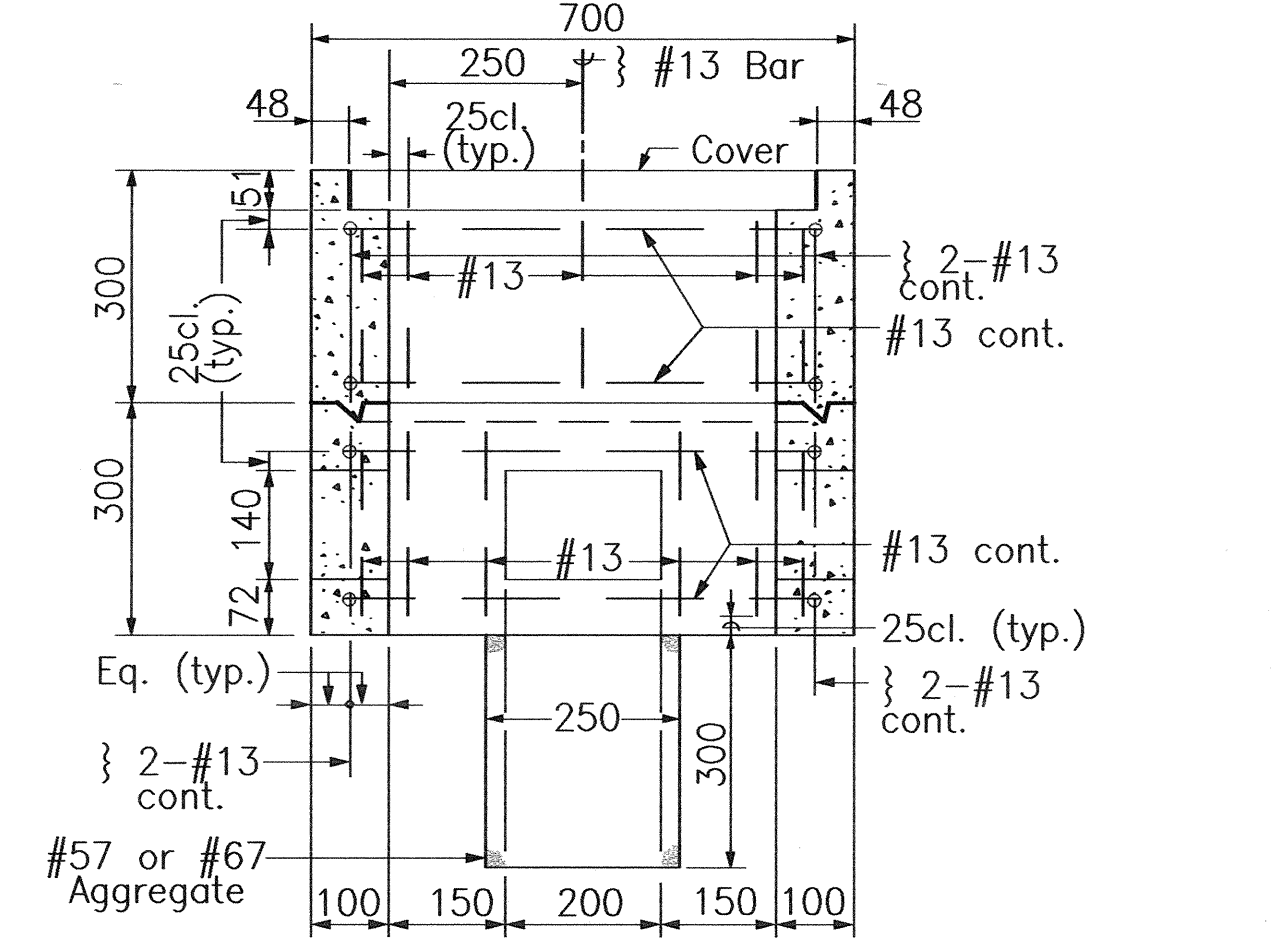
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PLAN



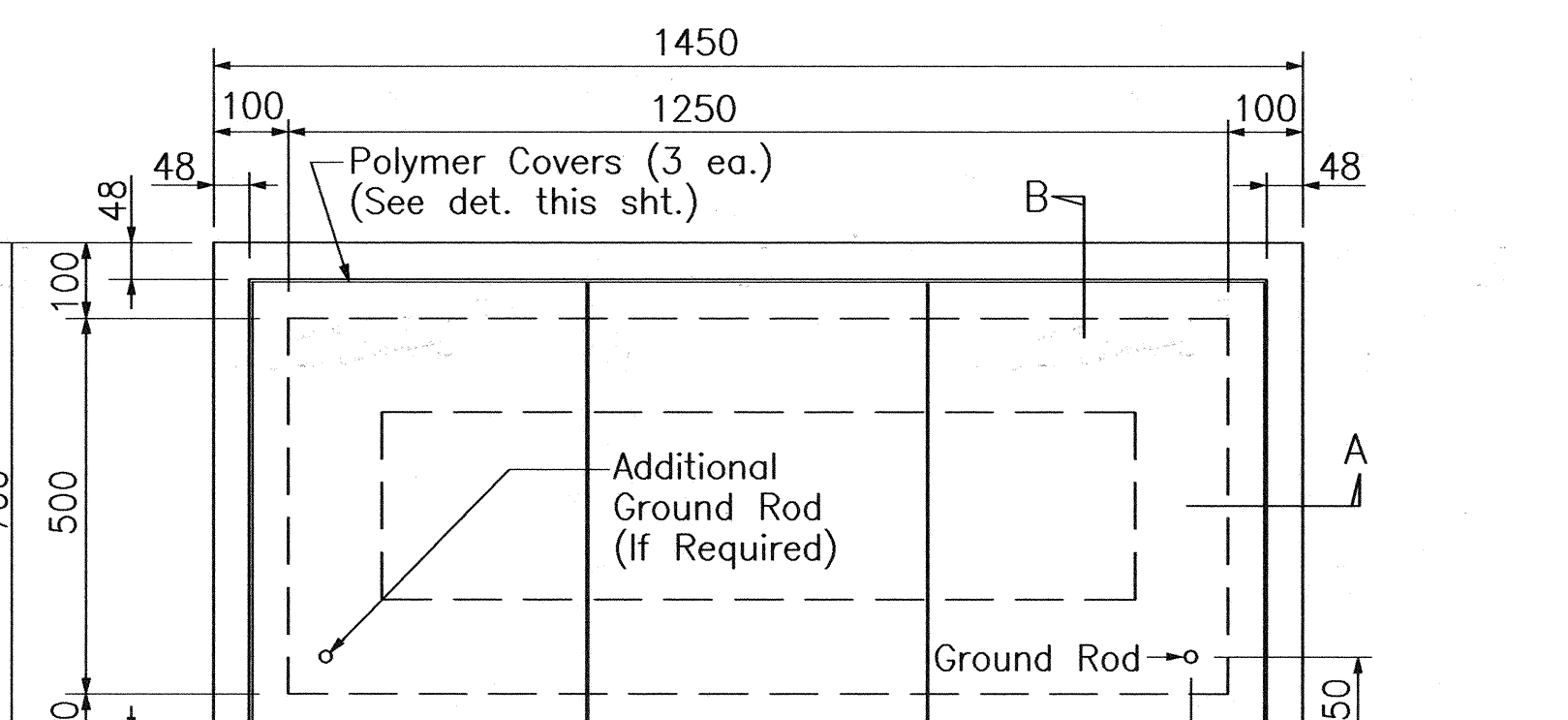
SECTION A-A



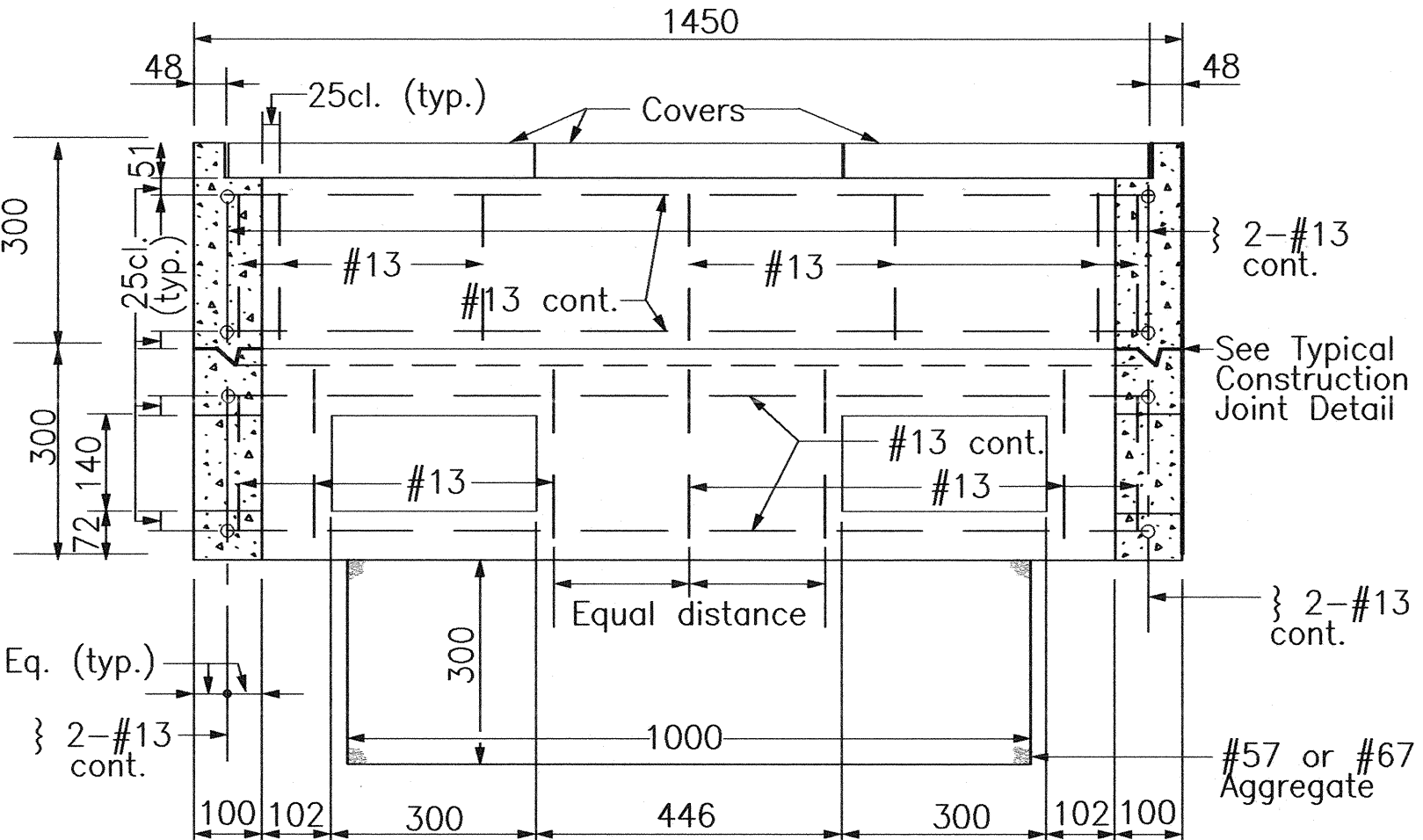
SECTION B-B

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

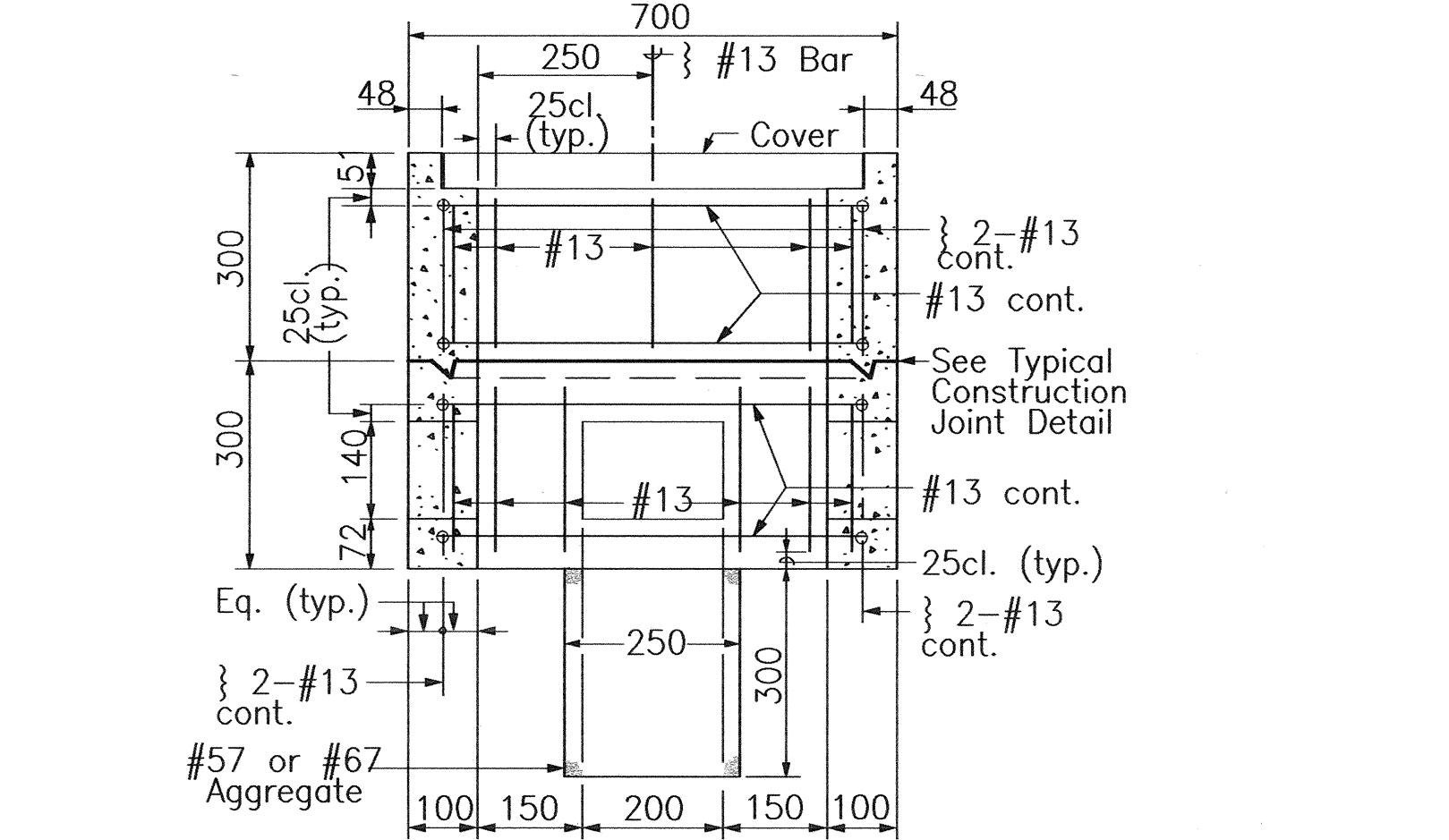
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PLAN



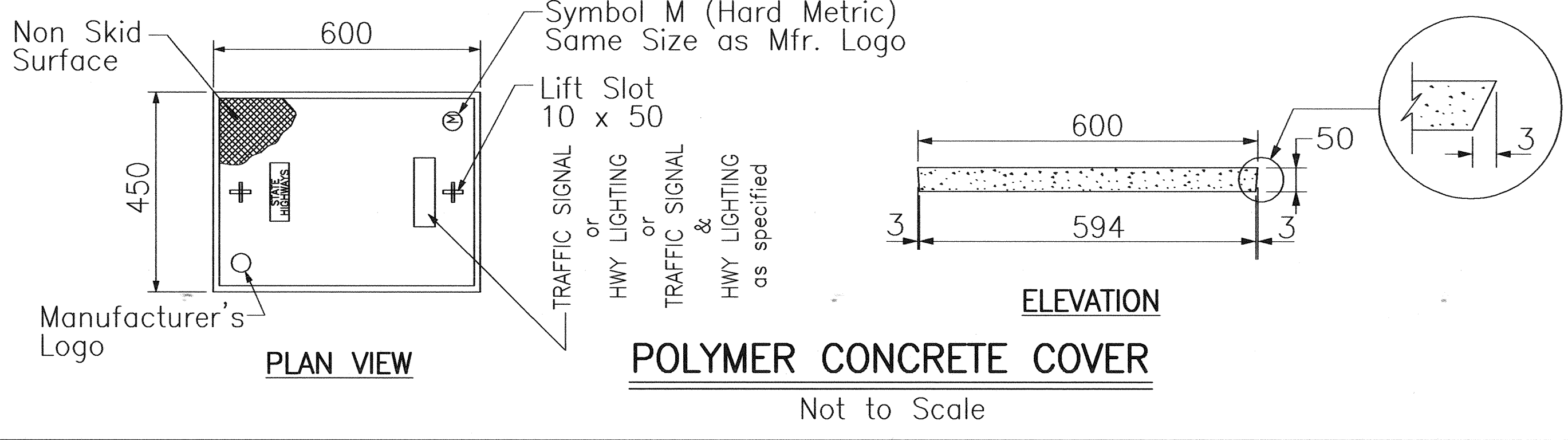
SECTION A-A



SECTION B-B

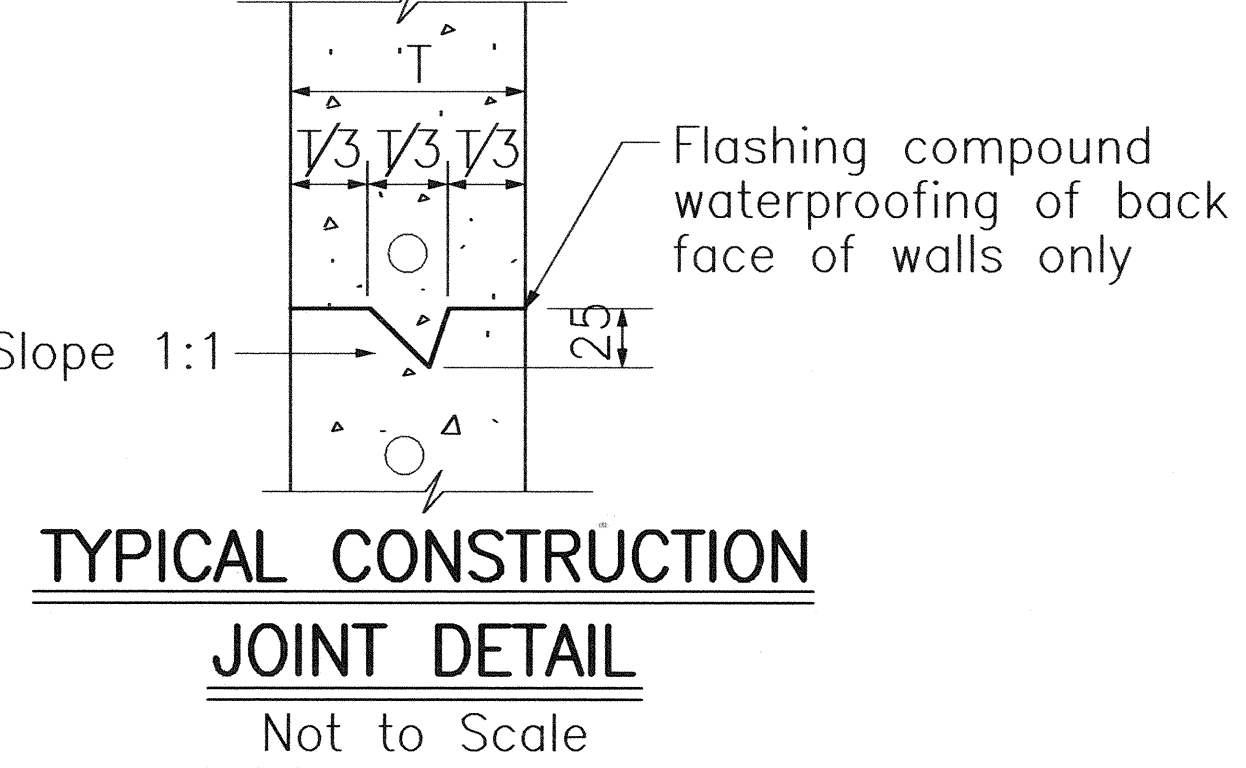
TYPE "C" PULLBOX (Old Type "D")

Scale: 1 : 100



POLYMER CONCRETE COVER

Not to Scale



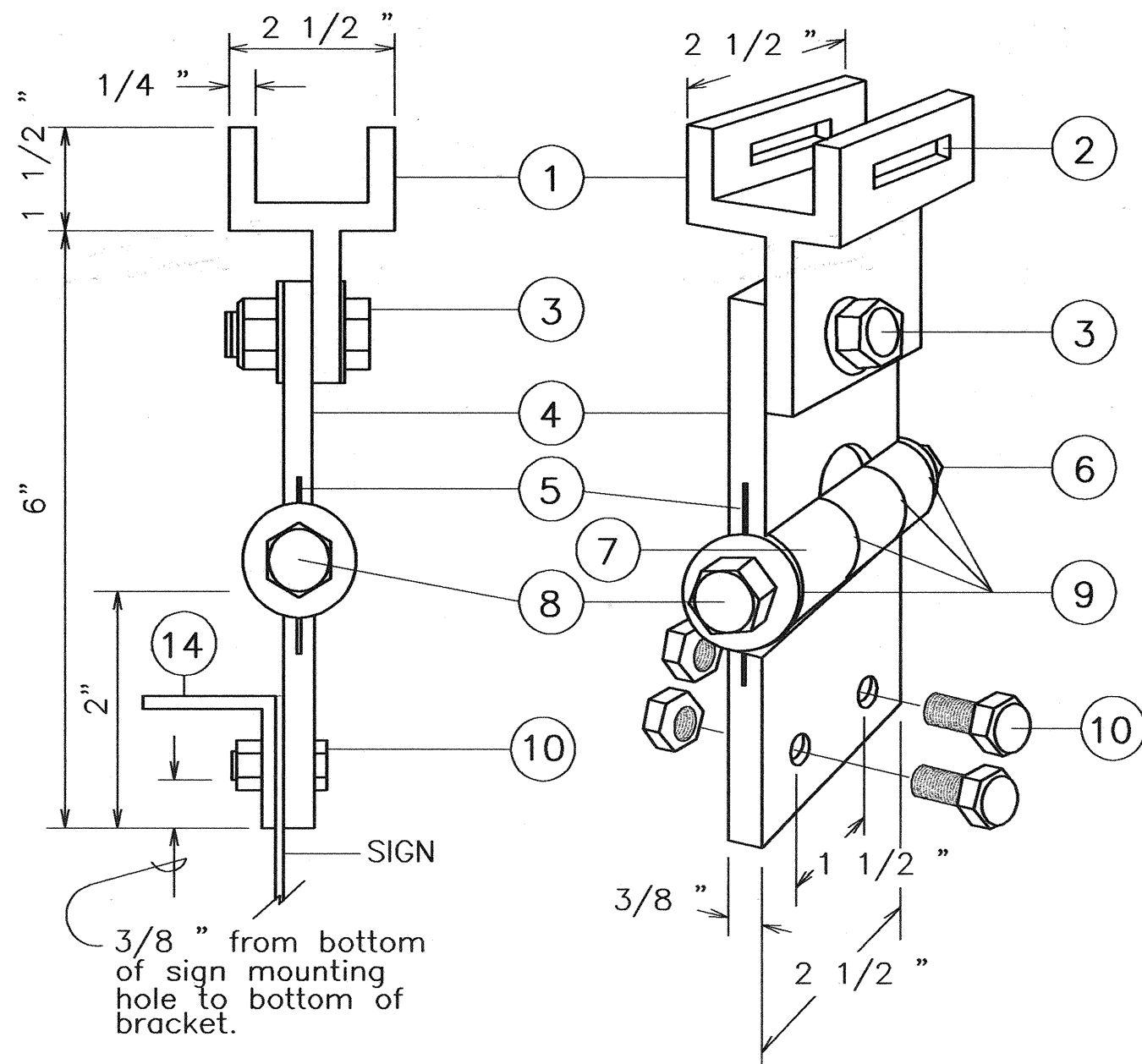
TYPICAL JOINT CONSTRUCTION

Not to Scale

ALL DIMENSIONS ARE IN MILLIMETERS  
UNLESS OTHERWISE SHOWN



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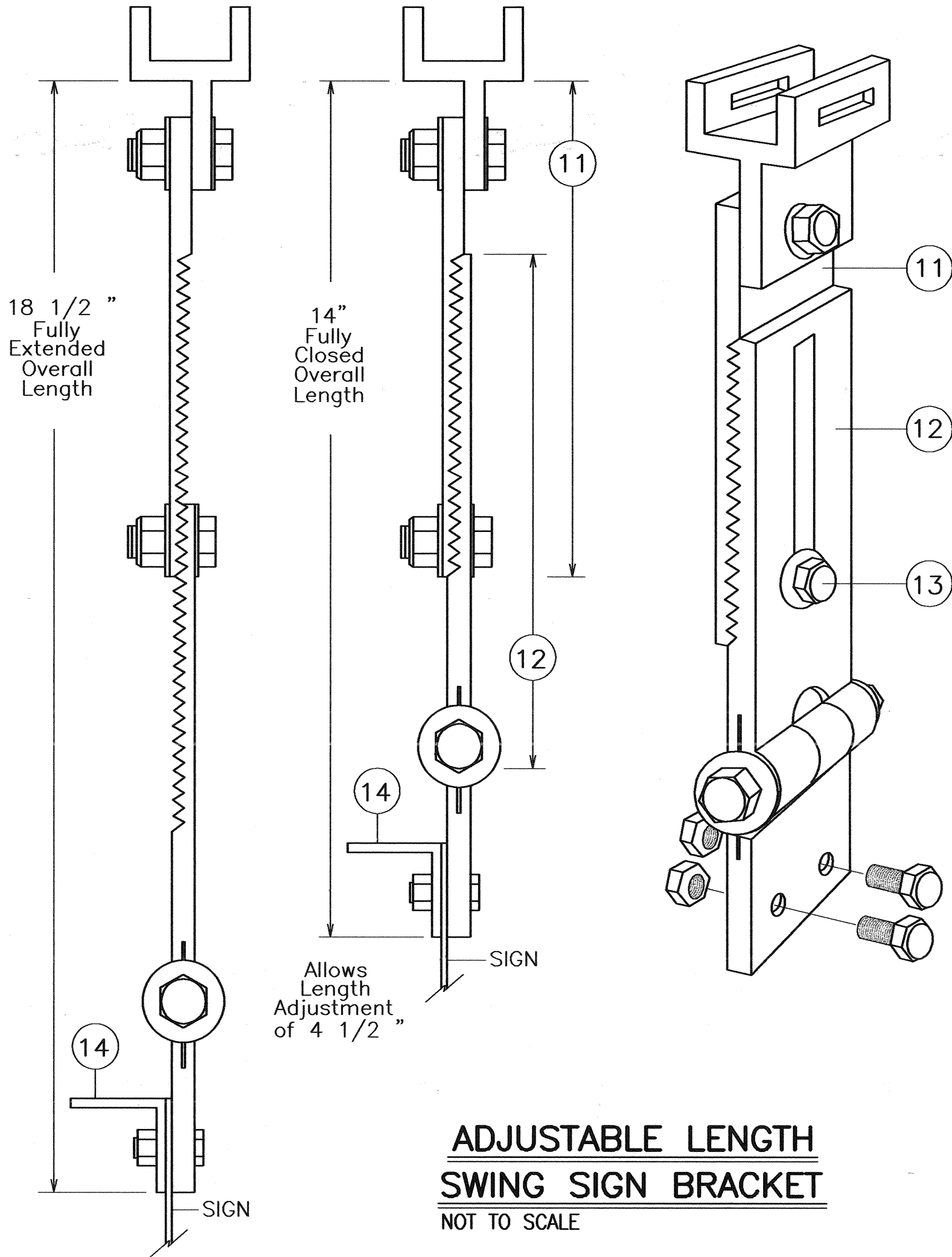


**FIXED LENGTH NON-ADJUSTABLE  
SWING SIGN BRACKET**  
NOT TO SCALE

- ① Pivotal Upper Bracket
- ② 1 5/8 " x 1/4 " Slot for double strapping to electrolier mast arm. (M2G-34S(HD) .030" x 3/4 " Heavy Duty Stainless Steel Strap with M2G-34B(HD) Buckle recommended.)
- ③ 1/2 " - 13 x 1 1/2 " Stainless Steel Hex Head Bolt with Stainless Steel Hex Lock Nut and 1/16 " Stainless Steel Washer (both sides). Allows upper bracket to pivot and align with elec-trolrier mast arm.
- ④ 6" Overall drop with Fixed Length Sign Bracket
- ⑤ Stainless Steel Dampener Spring (Removable)
- ⑥ Stainless Steel Hex Lock Nut with 1/16 " Stainless Steel Washer
- ⑦ 1" O.D. Axle Housing
- ⑧ 1/2 " - 13 x 4" Stainless Steel Hex Head Bolt with 1/16 " Stainless Steel Washer
- ⑨ Oilite Bushing
- ⑩ Sign Mounting Sets, consisting of two each 5/16 " - 18 x 1" Stainless Steel Hex Head Bolt with Stainless Steel Hex Lock Nut. Two holes on 1 1/2 " centers provide positive lock sign mounting to bracket.
- ⑪ 8 1/4 " overall length Upper Adjustable Sign Bracket section
- ⑫ 9" overall length Lower Adjustable Sign Bracket sec-tion, including Axle Housing (8" overall length to top of Axle Housing)
- ⑬ 1/2 " - 13 x 1 1/2 " Stainless Steel Hex Bolt with Stain-less Steel Hex Lock Nut and 1/16 " Stainless Steel Washers (both sides). Loosen lock nut, adjust bracket teeth to level sign.
- ⑭ 1 1/4 " x 1 1/4 " x 1/8 " Aluminum Angle

All Aluminum 6061T6 Alloy and Stainless Steel Components.

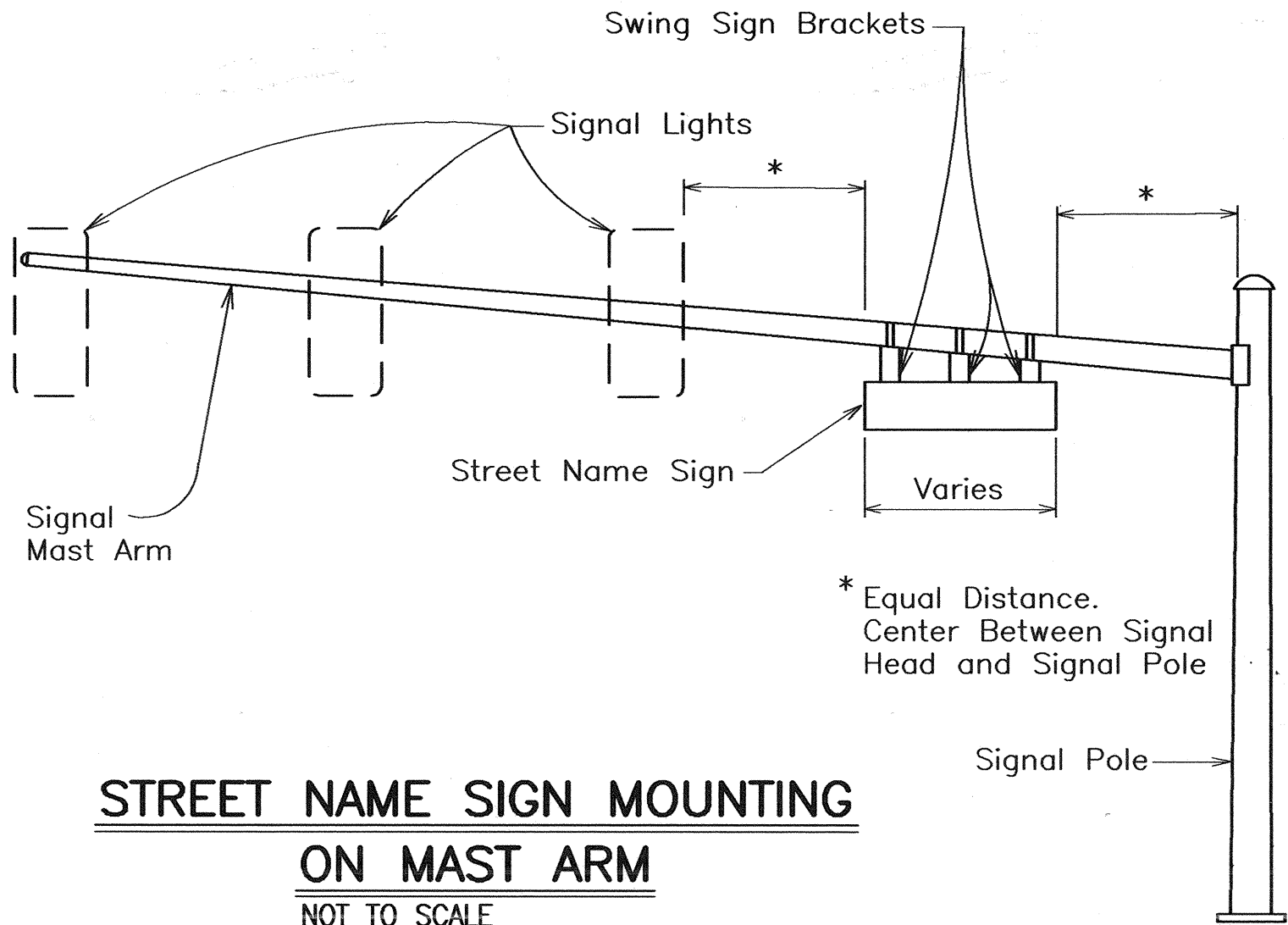
Note: Dimensions may vary slightly.



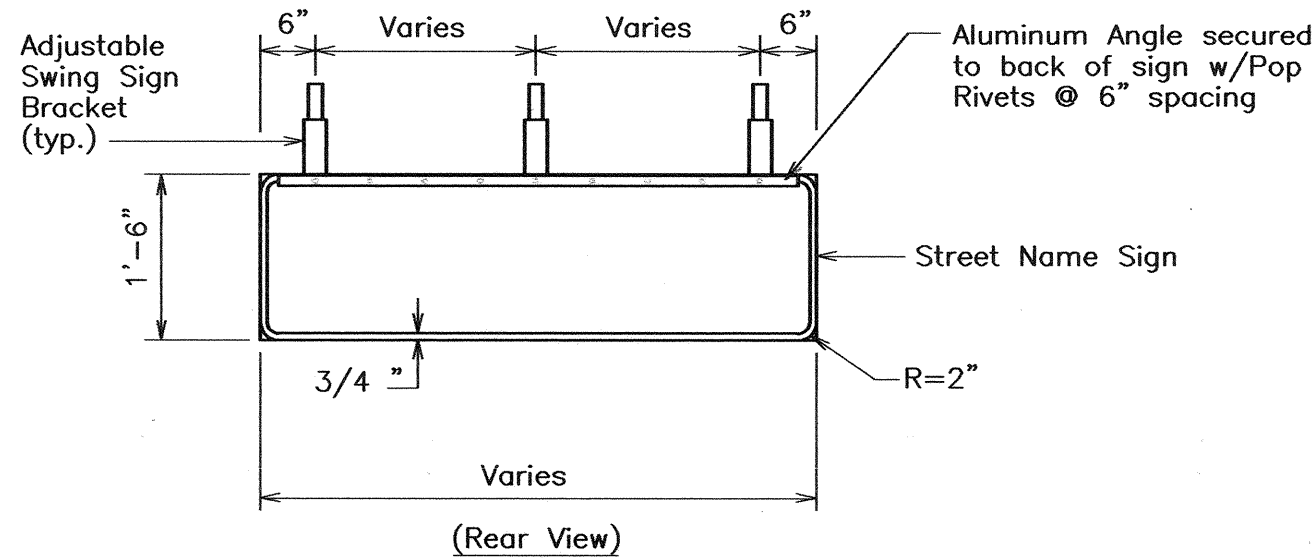
**ADJUSTABLE LENGTH  
SWING SIGN BRACKET**  
NOT TO SCALE

**NOTES:**

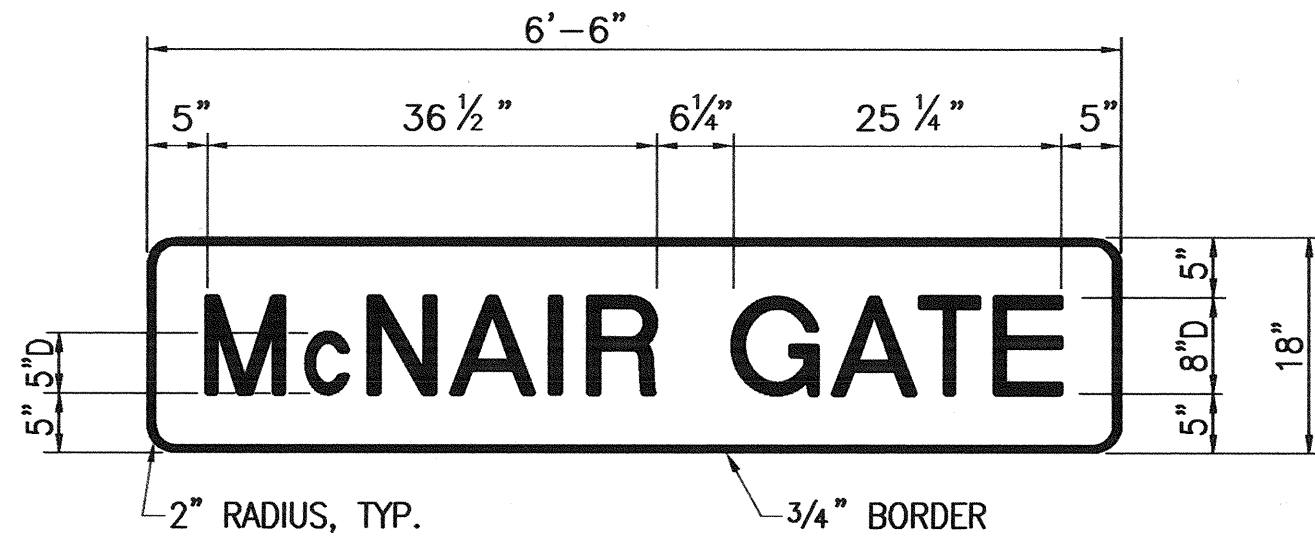
1. Street name signs shall have white message and border on green background.
2. Provide the same message on both sides of each sign.
3. All sign faces shall be completely reflectorized with Type "B" reflective sheeting.
4. The sign shall be in conformance with the requirements of Section 712.20 of the Standard Specification.
5. Colors:  
Legend - White (Reflectorized)  
Background - Green (Reflectorized)
6. All signs shall conform to section 621 of the Standard Specifications and the latest editions and amendments of the following FHWA publications:  
a. "Manual on Uniform Traffic Control Devices for Streets and Highways" (MUTCD)  
b. "Standard Highway Signs"  
c. "Standard Alphabets for Highway Signs"



**STREET NAME SIGN MOUNTING  
ON MAST ARM**  
NOT TO SCALE



**PANEL & SWING BRACKET LAYOUT  
FOR STREET NAME SIGN**  
NOT TO SCALE



**STREET NAME SIGN DETAIL**  
NOT TO SCALE



THIS WORK WAS PREPARED BY ME  
OR UNDER MY SUPERVISION  
*Keith K. Niya*

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**STREET NAME SIGN DETAILS**  
  
WILIKINA DR INTERSECTION IMPROVEMENTS  
AT McNAIR GATE  
Project No. 99C-02-00  
Scale: No Scale Date: Sep. 2000