

GENERAL NOTES – ELECTRICAL:

1.

THE SCOPE OF WORK FOR THIS PROJECT SHALL CONSIST OF INSTALLING NEW HIGHWAY LIGHTING, AND NEW TRAFFIC SIGNAL SYSTEMS WITH APPURTENANCES, AND EMERGENCY OPTICAL PREEMPTION SYSTEM.
2.

THE CONTRACTOR IS REMINDED OF THE REQUIREMENTS OF SUBSECTION 108.01 – SUBLETTING OF CONTRACT, WHICH REQUIRES HIM TO PERFORM WORK ACCOUNTING TO NOT LESS THAN 50 PERCENT OF THE TOTAL CONTRACT COST LESS DEDUCTIBLE ITEMS. NON-COMPLIANCE WITH THIS SUBSECTION MAY BE GROUNDS FOR REJECTION OF BID.
3.

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE FOLLOWING SECTIONS OF THE SPECIAL PROVISIONS:
SUBSECTION 107.13 – PUBLIC CONVENIENCE AND SAFETY
SUBSECTION 107.21 – CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICES
SECTION 645 – TRAFFIC CONTROL
4.

ALL NECESSARY PERMITS SHALL BE OBTAINED BY THE CONTRACTOR AT HIS OWN COST.
5.

THE CONTRACTOR SHALL COMPLY WITH THE STATE OF HAWAII'S OCCUPATIONAL SAFETY AND HEALTH LAW (DOSHS).
6.

LOCATIONS OF EXISTING UNDERGROUND STRUCTURES AND UTILITIES SUCH AS PIPELINES, CONDUITS, CABLES, MANHOLES, MONUMENTS, AND STRUCTURES SHOWN ON THE 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 EXISTING UTILITIES WITH THE RESPECTIVE OWNERS. EXISTING UTILITIES DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN COST.
7.

ALL WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING CONSTRUCTION STANDARDS AND SPECIFICATIONS:

a.

GENERAL ORDER NO. 6 AND NO. 10 PUBLIC UTILITIES COMMISSION, STATE OF HAWAII, CURRENT EDITION.

b.

CONSTRUCTION STANDARDS OF DEPARTMENT OF TRANSPORTATION, STATE OF HAWAII.

c.

CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, STATE OF HAWAII.

d.

STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION, DEPARTMENT OF PUBLIC WORKS, COUNTY OF HAWAII.

e.

CONSTRUCTION STANDARD AND SPECIFICATIONS OF GTE. HAWAIIAN TELEPHONE COMPANY, INC. (VERIZON).

f.

CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THE HAWAII ELECTRIC LIGHT COMPANY.
8.

IT IS NOT THE INTENT OF THESE PLANS AND SPECIFICATIONS TO INDICATE THAT ALL EXISTING UTILITIES ARE SHOWN ON THE PLANS. THE INFORMATION ON THE EXISTING UTILITIES ARE BASED ON AVAILABLE PLANS. THE LOCATIONS ARE APPROXIMATE ONLY AND THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THIS AREA. ALL EXISTING UTILITIES WHETHER OR NOT SHOW ON THE PLANS SHALL BE PROTECTED AT ALL TIMES BY THE CONTRACTOR UNLESS SPECIFIED ON THE PLANS TO BE ABANDONED OR DEMOLISHED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES TO THE FACILITIES WHETHER SHOWN OR NOT SHOWN ON PLANS. ANY REPAIR WORK SHALL BE PROVIDED AT NO ADDITIONAL COST TO THIS PROJECT.
9.

THE CONTRACTOR SHALL EXERCISE PROPER CARE WHEN EXCAVATING IN AREAS WITH EXISTING UNDERGROUND FACILITIES, DAMAGES TO THE EXISTING FACILITIES SHALL BE IMMEDIATELY REPORTED TO THE RESPECTIVE UTILITY COMPANIES, COUNTY OR STATE AGENCY. THE REPAIR WORK SHALL BE PROVIDED AT NO ADDITIONAL COST TO THIS PROJECT.
10.

CONTRACTOR SHALL INSTALL 3/16" POLYPROPYLENE FISH TAPE IN ALL DUCTS. PLUG ALL DUCTS WITH NON-CORRODIBLE PLUGS MANUFACTURED FOR THIS PURPOSE.
11.

ALL STRUCTURAL SUPPORTS FOR TRAFFIC SIGNALS, HIGHWAY LIGHTING AND SIGNS SHALL BE DESIGNED IN ACCORDANCE WITH THE "STANDARDS SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS", 4TH. EDITION, 2001.

TRAFFIC SIGNAL NOTES:

1.

ALL TRAFFIC SIGNAL EQUIPMENT SHALL BE COMPLETELY WIRED IN THE CABINET AND SHALL CONTROL THE TRAFFIC SIGNALS AS CALLED FOR IN THE PLANS.
2.

THE LOOP DETECTOR AMPLIFIER UNITS SUPPLIED FOR THIS PROJECT SHALL BE CAPABLE OF OPERATING THE LOOP DETECTOR CONFIGURATIONS SHOWN ON THE PLANS.
3.

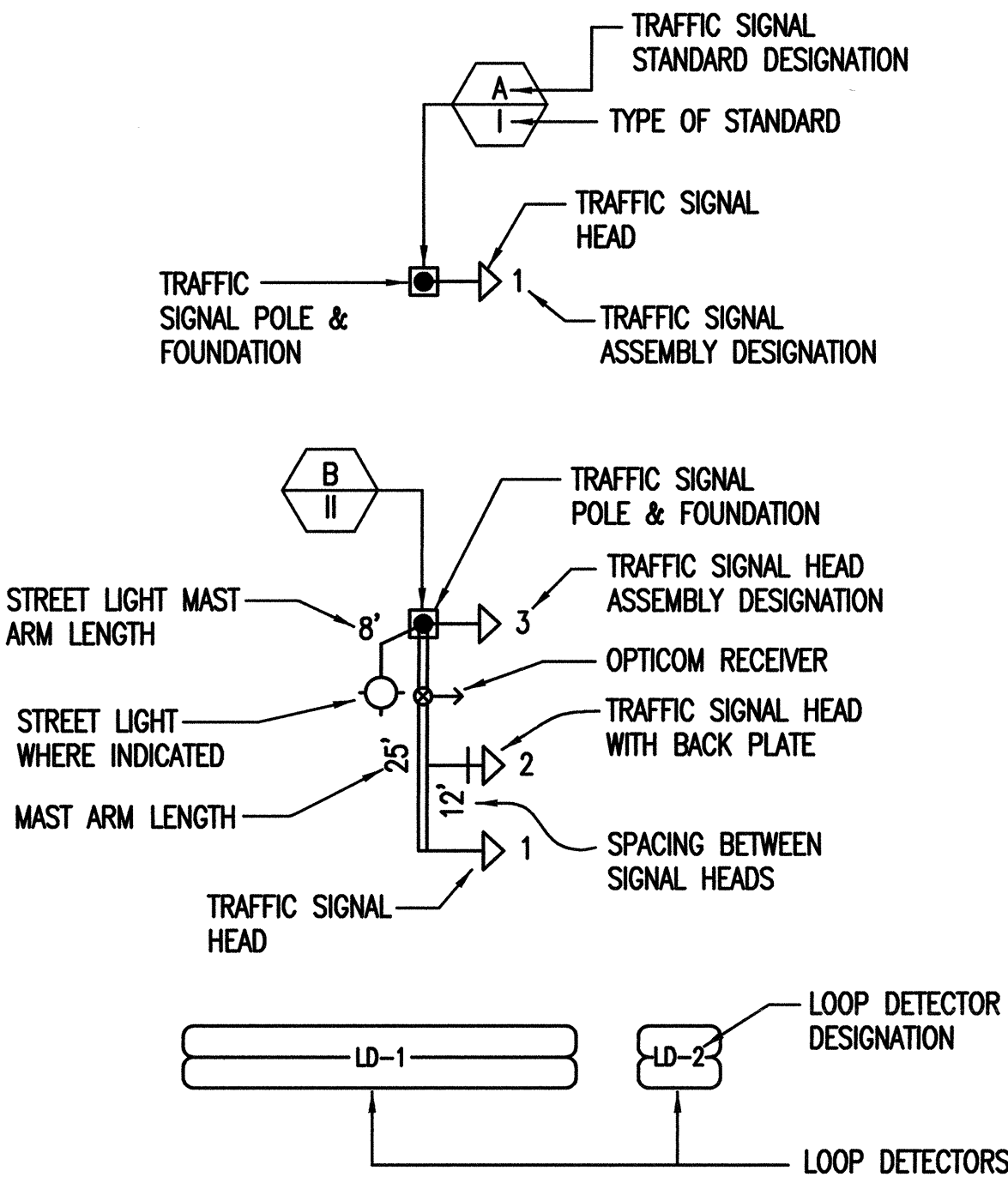
RESTORATION OF EXISTING PAVEMENTS AND IMPROVEMENTS UNAVOIDABLY DAMAGED SHALL BE INCIDENTAL TO THE VARIOUS CONTRACT ITEMS. RESTORATION SHALL BE EQUAL TO ORIGINAL OR BETTER THAN ORIGINAL CONDITION.
4.

ALL TRAFFIC SIGNAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHTWAYS," FEDERAL HIGHWAY ADMINISTRATION (2000) AND AMENDMENTS.
5.

MAINTENANCE OF TRAFFIC THROUGH THE CONSTRUCTION AREA SHALL BE IN ACCORDANCE WITH PART VI OF THE "MANUAL ON THE UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS," FEDERAL HIGHWAY ADMINISTRATION (2000) 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.
6.

THE CONTRACTOR SHALL PROVIDE OFF-DUTY POLICE OFFICER(S) TO CONTROL THE FLOW OF TRAFFIC AS REQUIRED BY THE ENGINEER.
7.

SHOULD ANY DEFECT BE ENCOUNTERED DURING THE WARRANTY PERIOD, THE CONTRACTOR WILL BE NOTIFIED AND SHALL PROMPTLY CORRECT SUCH DEFECT. SERVICE CALL (BY FACTORY QUALIFIED REPRESENTATIVE) DURING THE WARRANTY PERIOD FOR REPAIRS OR OTHER MAINTENANCE SHALL BE ANSWERED IMMEDIATELY AND SHALL BE DONE AT NO EXPENSE WHATSOEVER TO THE STATE.



LEGEND

ABBREVIATIONS:

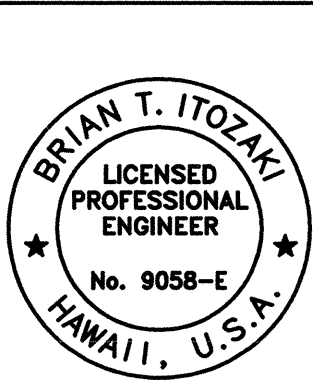
A	AMPERE
AC	ALTERNATING CURRENT
AIC	AMPERE INTERRUPTING CAPACITY
C	CONDUIT
CAB	CABINET
CL	CENTERLINE
CMU	CONCRETE MASONRY UNIT
DWG	DRAWING
ELEC	ELECTRIC, ELECTRICAL
ENCL	ENCLOSURE
EP	ELECTRICAL PRIMARY
EQPT	EQUIPMENT
ES	ELECTRICAL SECONDARY
EX, EXIST	EXISTING
CMU	CONCRETE MASONRY UNIT
DWG	DRAWING
ELEC	ELECTRIC, ELECTRICAL
GND	GROUND
HELCO	HAWAII ELECTRIC LIGHT COMPANY
HH	HANDHOLE
HTCO	HAWAIIAN TELEPHONE COMPANY (VERIZON HAWAII)
JB	JUNCTION BOX
KVA	KILO-VOLT AMPERE
KWH	KILO-WATT HOUR
MIN	MINIMUM
MISC	MISCELLANEOUS
MH	MANHOLE
N	NEUTRAL
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OH	OVERHEAD
P	POLE
PB	PULLBOX
PFB	PROVISIONS FOR FUTURE BREAKER
PH	PHASE
PB	PANELBOARD
PL	PROPERTY LINE
RSC	RIGID METAL CONDUIT (STEEL)
PVC	RIGID NON-METALLIC CONDUIT (SCH. 40 PVC UNLESS OTHERWISE INDICATED)
R/W	RIGHT OF WAY
SLPB	STREET LIGHT PULLBOX
T, TEL	TELEPHONE
TSPB	TRAFFIC SIGNAL PULLBOX
TYP	TYPICAL
UG	UNDERGROUND
V	VOLTS
W	WIRE(S)
WHM	WATT-HOUR METER
WP	WEATHERPROOF

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	22	34

ELECTRICAL SYMBOL LIST

EXISTING	NEW	DESCRIPTION
		TRAFFIC SIGNAL CONTROLLER AND CABINET.
		ELECTRIC POWER SUPPLY.
		TRAFFIC SIGNAL HEAD WITH 12" LENS.
		TYPE I TRAFFIC SIGNAL STANDARD (HEAD SIGNAL ASSEMBLY AS SPECIFIED).
		TYPE II TRAFFIC SIGNAL STANDARD WITH MAST ARM (MAST ARM LENGTH, SIGNAL HEAD SPACING, AND HEAD AS SPECIFIED).
		TYPE III TRAFFIC SIGNAL STANDARD WITH MAST ARM (MAST ARM LENGTH, SIGNAL HEAD SPACING AND HEAD AS SPECIFIED) AND STREET LIGHTING STANDARD.
		TRAFFIC SIGNAL PULLBOX, TYPE "A".
		TRAFFIC SIGNAL PULLBOX, TYPE "B".
		TRAFFIC SIGNAL PULL BOX, TYPE "C".
		LOOP DETECTOR.
		OPTICOM RECEIVER.
		TRAFFIC SIGNAL HEAD WITH BACK PLATE.
		STREET LIGHT STANDARD WITH POLE, LUMINAIRE, AND CONCRETE BASE.
		STREET LIGHT STANDARD WITH BRACKET ARM AND LUMINAIRE MOUNTED ON TRAFFIC SIGNAL POLE.
		WOOD POLE OR STEEL POLE AS DESIGNATED.
		RACEWAY, CONCEALED BELOW FINISH GRADE, NUMBER OF HASHMARKS INDICATE NUMBER OF WIRES WITHIN.
		OVERHEAD ELECTRIC LINES.
		TRAFFIC SIGNAL RACEWAY.
		STREET LIGHT RACEWAY.
		TELEPHONE RACEWAY.
		DETAIL INDICATOR UPPER HALF: DETAIL NUMBER, LOWER HALF: SHEET NUMBER, DETAIL LOCATION.
		DUCT SECTION INDICATOR.
		NOTE INDICATOR.
		2 x 4 ELECTRIC HANDHOLE.
		METERING EQUIPMENT.
		UNINTERRUPTIBLE POWER SUPPLY UNIT.

E-1



THIS WORK WAS PREPARED BY ME, OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

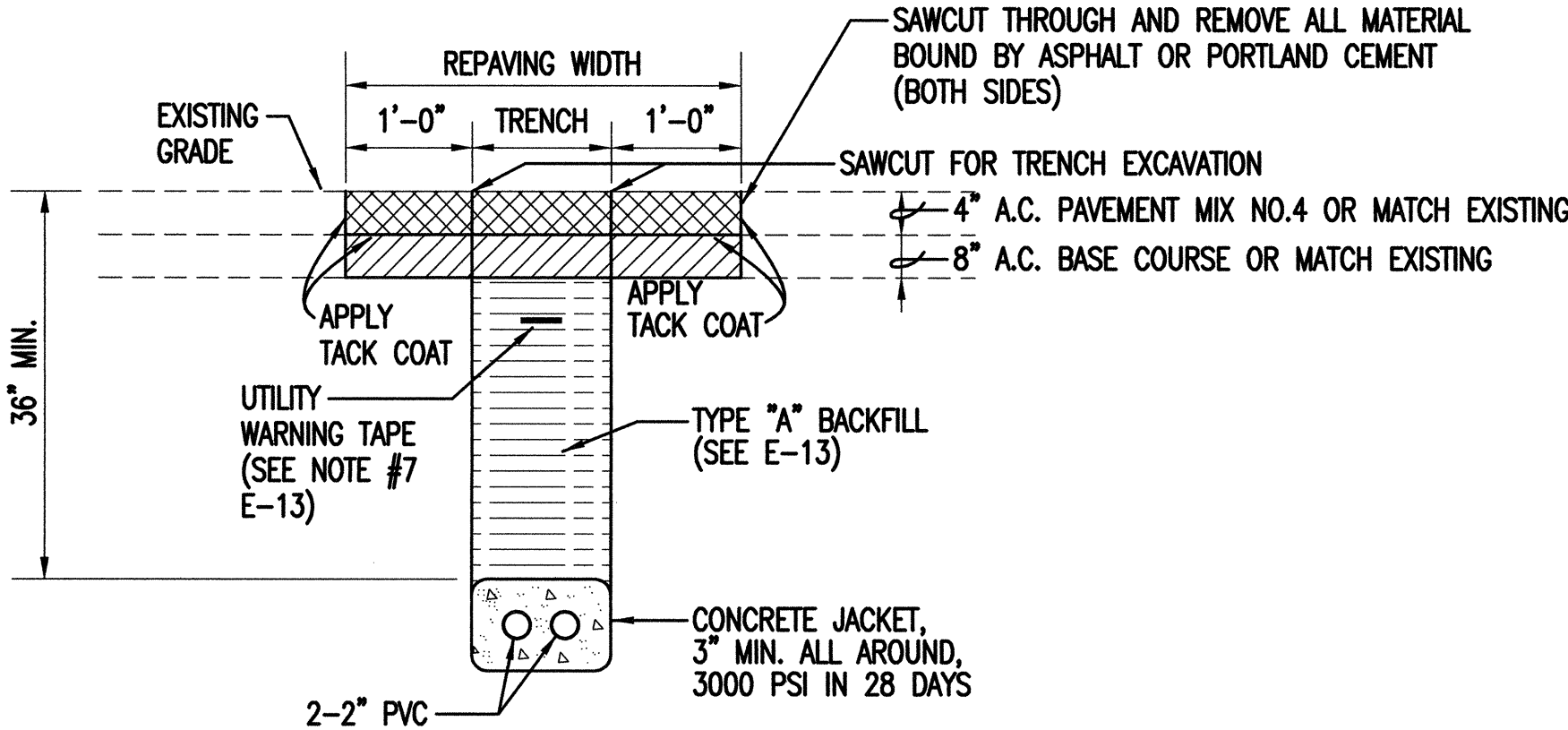
GENERAL NOTES, TRAFFIC SIGNAL AND STREET LIGHTING NOTES, AND ELECTRICAL SYMBOL LIST.

Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

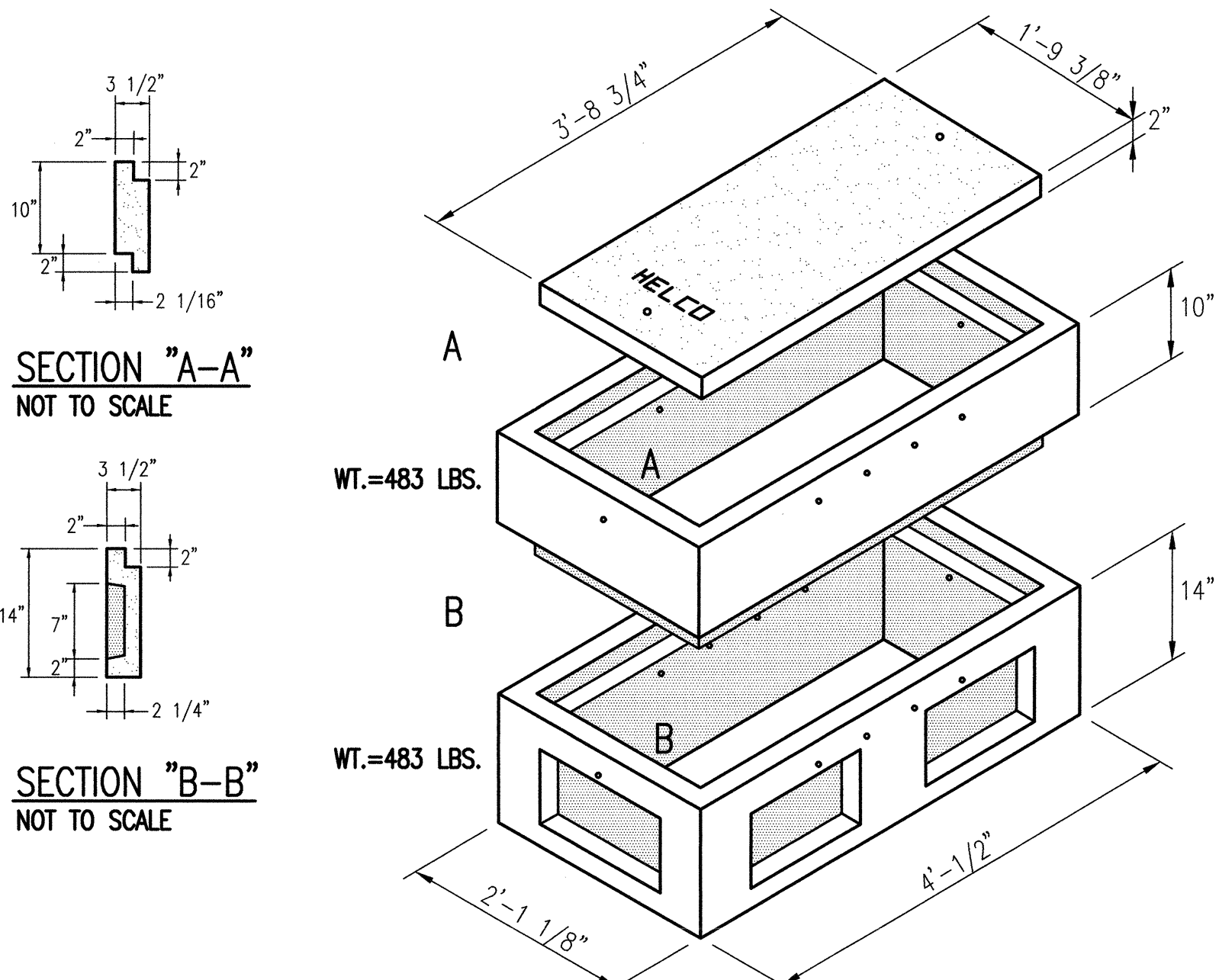
SCALE: AS SHOWN DATE: MAY 2002

SHEET No. E-1 OF 13 SHEETS

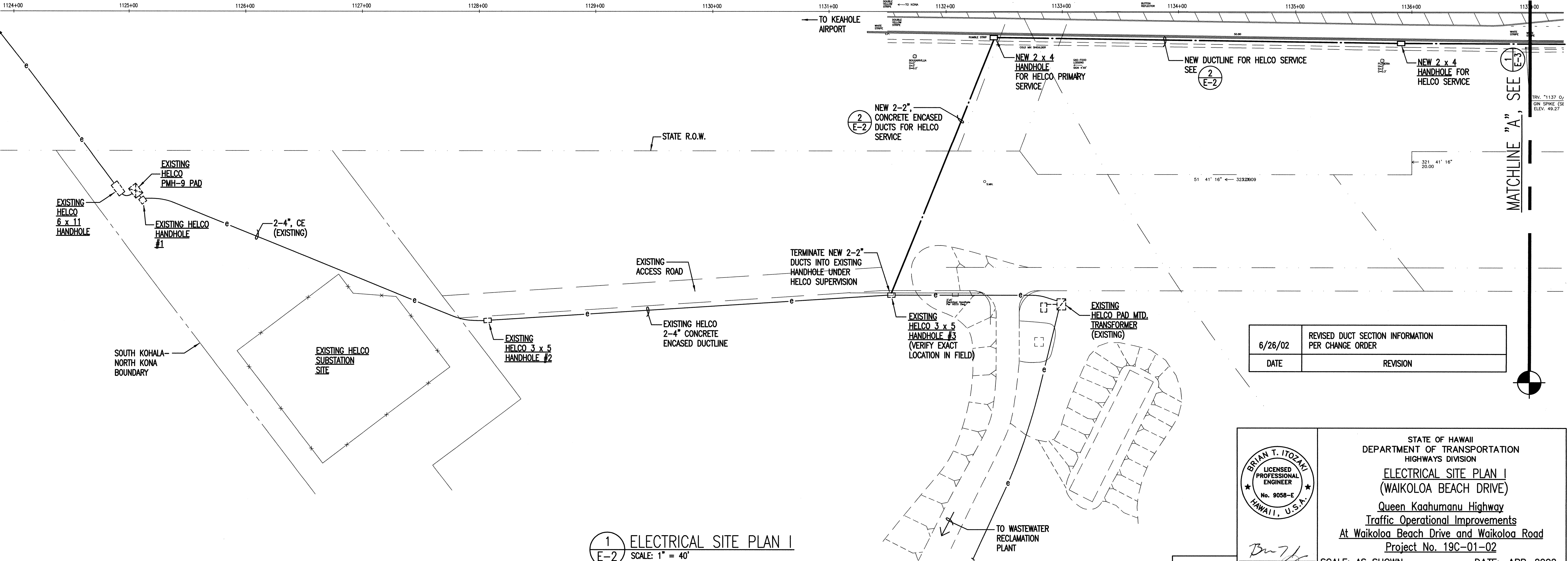
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	C.O. 23	34



2 DUCT SECTION-"A"
E-2



3 2' x 4' ELECTRIC PULLBOX ASSEMBLY
E-2 (FOR HELCO SERVICE)



1 ELECTRICAL SITE PLAN I
E-2 SCALE: 1" = 40'

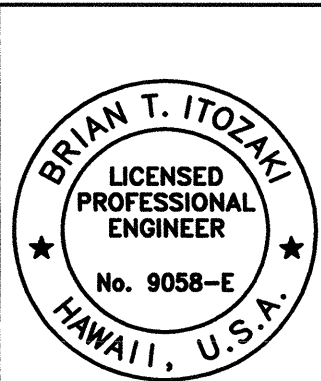
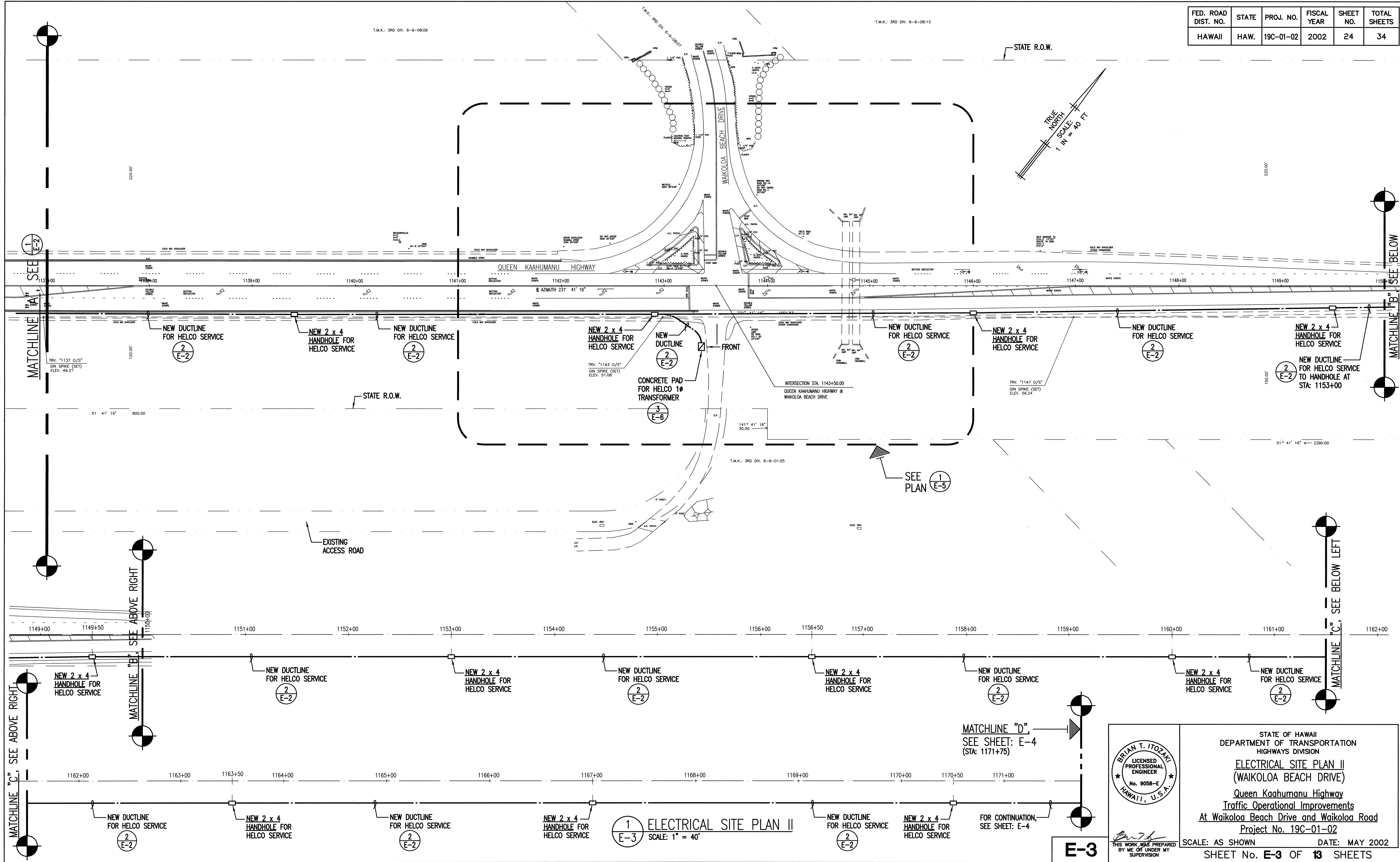
6/26/02	REVISED DUCT SECTION INFORMATION PER CHANGE ORDER
DATE	REVISION

Brian T. Itozaki
LICENSED PROFESSIONAL ENGINEER
No. 9058-E
HAWAII, U.S.A.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
ELECTRICAL SITE PLAN I
(WAIKOLOA BEACH DRIVE)
Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02
SCALE: AS SHOWN DATE: APR. 2002
SHEET No. E-2 OF 13 SHEETS

E-2

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	24	34

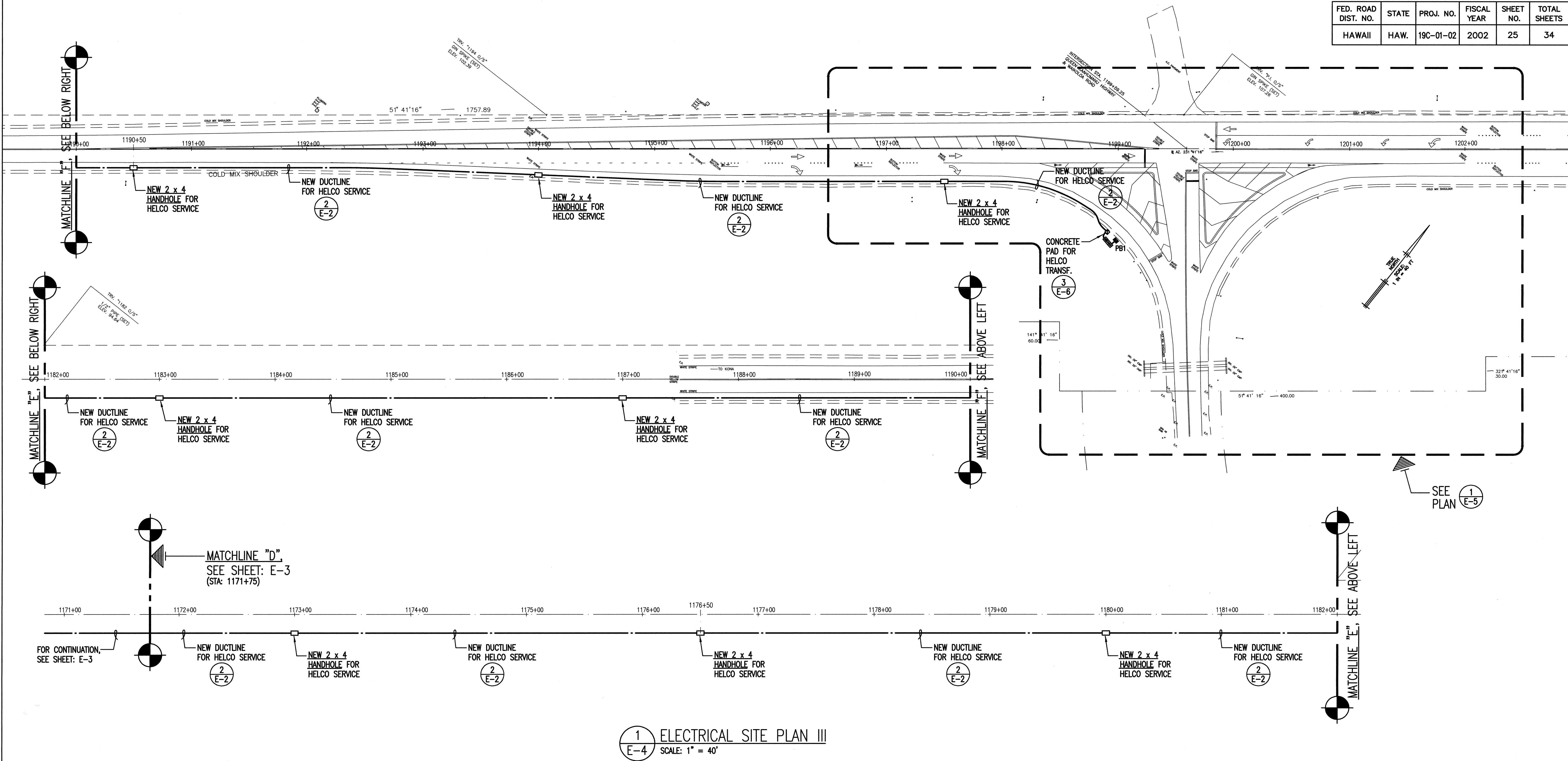


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
ELECTRICAL SITE PLAN II
(WAIKOLOA BEACH DRIVE)
Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

SCALE: AS SHOWN DATE: MAY 2002
SHEET No. **E-3** OF **13** SHEETS

E-3

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	25	34



1
E-4 ELECTRICAL SITE PLAN III
SCALE: 1" = 40'

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HIGHWAYS DIVISION

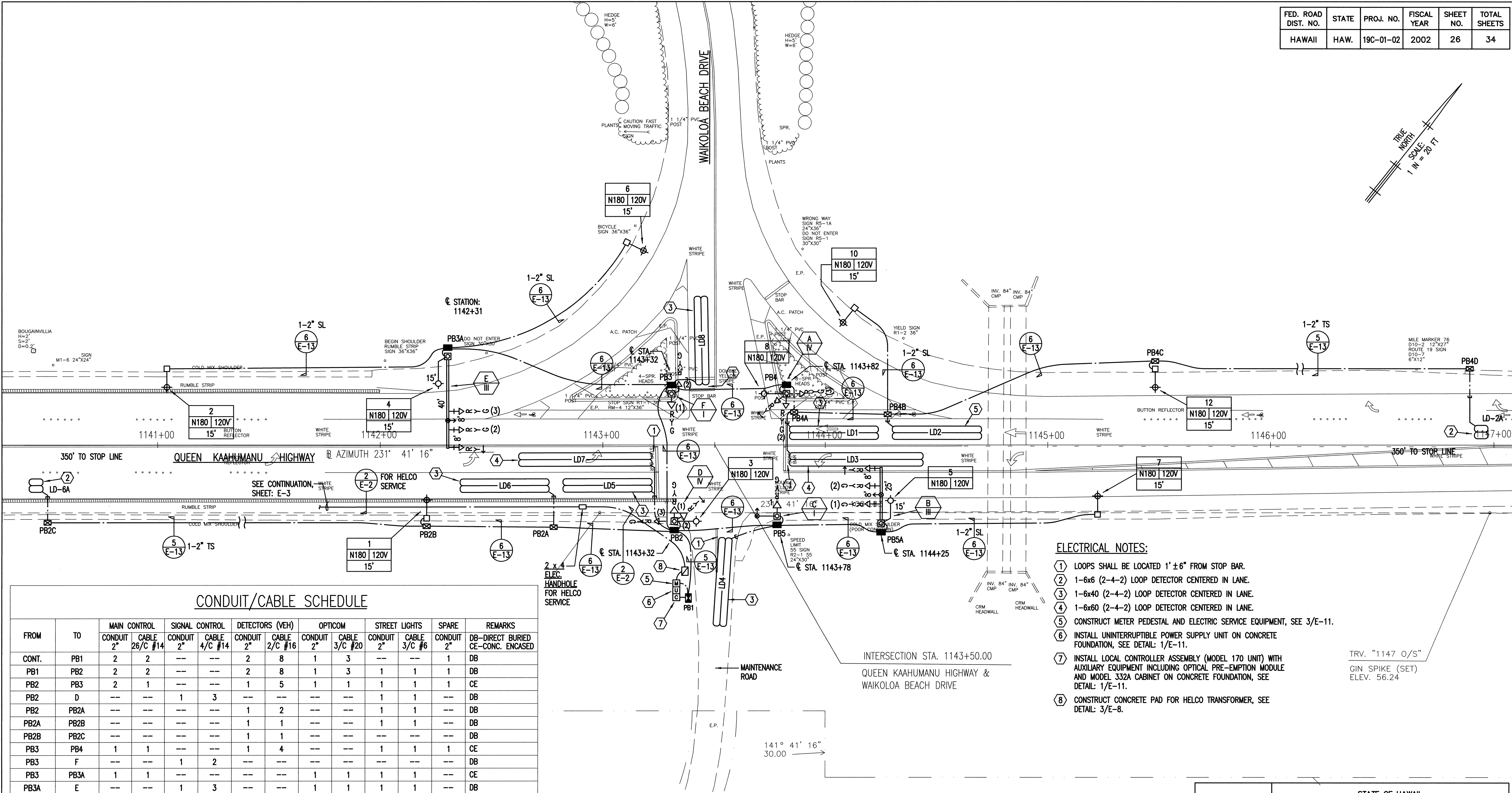
ELECTRICAL SITE PLAN III

Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

SCALE: AS SHOWN DATE: MAY 2002
SHEET No. E-4 OF 13 SHEETS

E-4

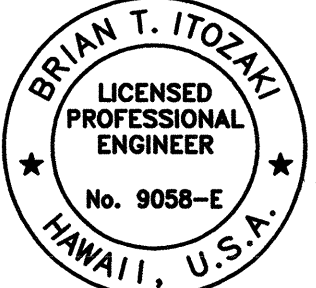
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	26	34



CONDUIT/CABLE SCHEDULE											
FROM	TO	MAIN CONTROL CONDUIT 2" 26/C #14	SIGNAL CONTROL CONDUIT 2" 4/C #14	DETECTORS (VEH) CONDUIT 2" 2/C #16	OPTICOM CONDUIT 2" 3/C #20	STREET LIGHTS CONDUIT 2" 3/C #6	SPARE CONDUIT 2"	REMARKS			
CONT.	PB1	2	2	2	8	1	3	1	DB	DB-DIRECT BURIED	
PB1	PB2	2	2	2	8	1	3	1	1	1	DB
PB2	PB3	2	1	1	5	1	1	1	1	1	CE
PB2	D	---	---	1	3	---	---	1	1	---	DB
PB2	PB2A	---	---	---	---	1	1	1	1	---	DB
PB2A	PB2B	---	---	---	---	1	1	1	1	---	DB
PB2B	PB2C	---	---	---	---	1	1	1	1	---	DB
PB3	PB4	1	1	1	4	---	---	1	1	1	CE
PB3	F	---	---	1	2	---	---	---	---	---	DB
PB3	PB3A	1	1	---	---	1	1	1	1	---	CE
PB3A	E	---	---	1	3	---	---	1	1	---	DB
PB3A	SL	---	---	---	---	---	---	1	1	---	DB
PB4	A	---	---	1	3	---	---	1	1	---	DB
PB4	PB4A	---	---	---	---	1	1	1	1	---	DB
PB4A	PB4B	---	---	---	---	1	1	1	1	---	CE
PB4B	PB4C	---	---	---	---	1	1	1	1	---	CE
PB4C	PB4D	---	---	---	---	1	1	1	1	---	DB
PB5	C	---	---	1	1	---	---	1	1	---	DB
PB5	PB5A	1	1	---	---	1	1	1	1	---	DB
PB5A	B	---	---	1	3	---	---	1	1	---	DB
PB5	PB2	1	1	---	---	1	1	1	1	1	CE

- ELECTRICAL NOTES:**
- (1) LOOPS SHALL BE LOCATED 1' ± 6" FROM STOP BAR.
 - (2) 1-6x6 (2-4-2) LOOP DETECTOR CENTERED IN LANE.
 - (3) 1-6x40 (2-4-2) LOOP DETECTOR CENTERED IN LANE.
 - (4) 1-6x60 (2-4-2) LOOP DETECTOR CENTERED IN LANE.
 - (5) CONSTRUCT METER PEDESTAL AND ELECTRIC SERVICE EQUIPMENT, SEE 3/E-11.
 - (6) INSTALL UNINTERRUPTIBLE POWER SUPPLY UNIT ON CONCRETE FOUNDATION, SEE DETAIL: 1/E-11.
 - (7) INSTALL LOCAL CONTROLLER ASSEMBLY (MODEL 170 UNIT) WITH AUXILIARY EQUIPMENT INCLUDING OPTICAL PRE-EMPTION MODULE AND MODEL 332A CABINET ON CONCRETE FOUNDATION, SEE DETAIL: 1/E-11.
 - (8) CONSTRUCT CONCRETE PAD FOR HELCO TRANSFORMER, SEE DETAIL: 3/E-8.

1 PLAN - EQUIPMENT/DUCTLINE
E-5 SCALE: 1" = 20'



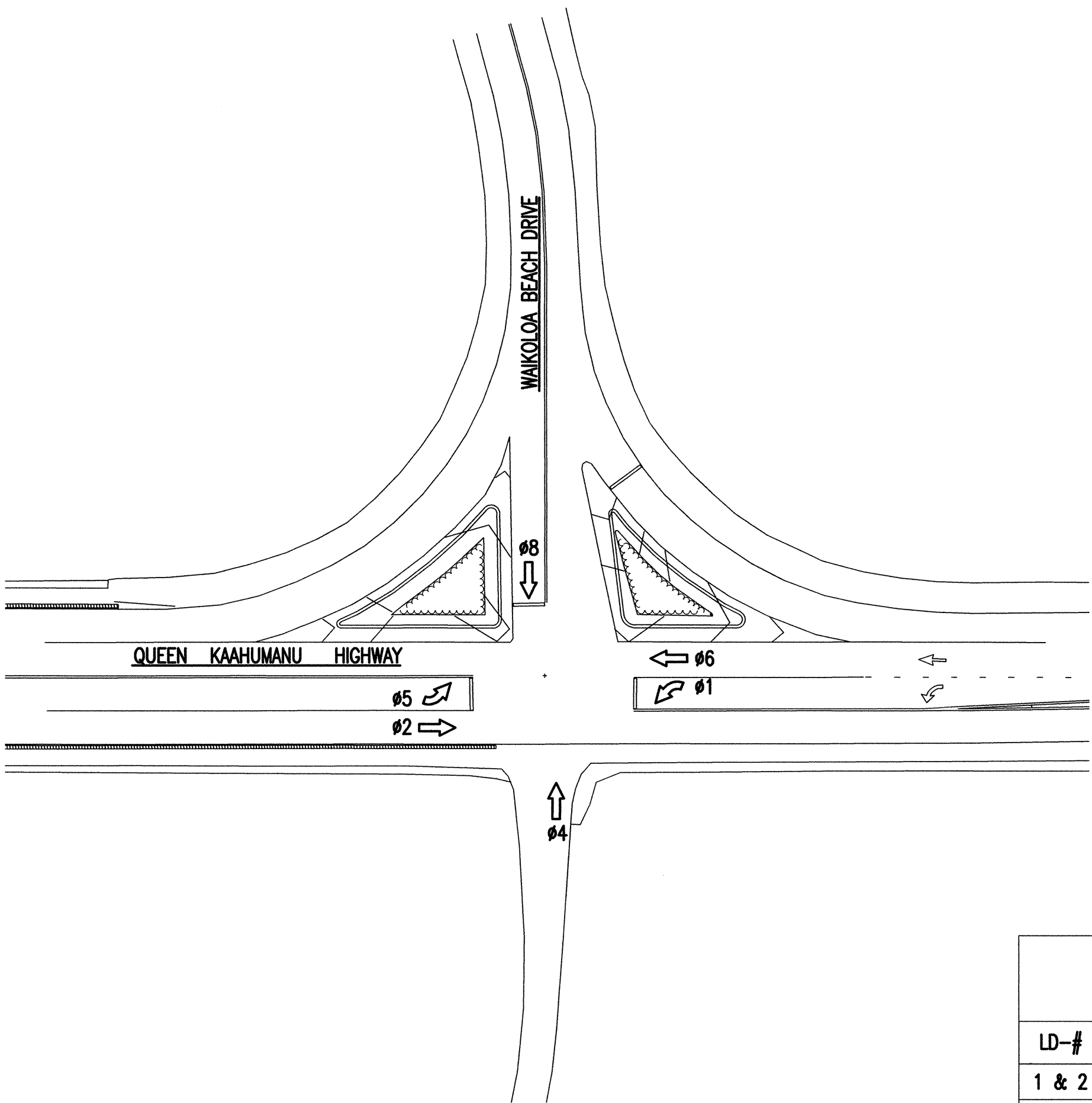
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PLAN - EQUIPMENT/DUCTLINE
(WAIKOLOA BEACH DRIVE)

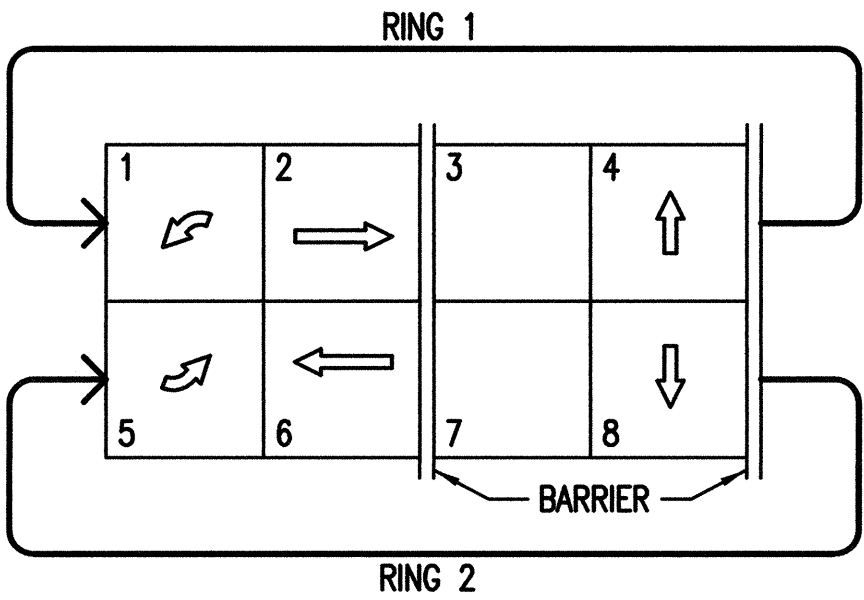
Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

SCALE: AS SHOWN DATE: MAY 2002
SHEET No. E-5 OF 13 SHEETS

E-5



1 PHASE ASSIGNMENTS
E-6



PHASE DIAGRAM

LOOP DETECTOR ASSIGNMENTS

LD-#	AMPLIFIER UNIT	CHANNEL	PHASE-NOTES
1 & 2	A	1	#6 OR #2 (HAND WIRED TOGETHER)
3	A	1	#1 & #6 (INTERNALLY SWITCHED)
4	B	3	#4
5 & 6	B	2	#2 & #6 (HAND WIRED TOGETHER)
7	A	2	#5 OR #2 (INTERNALLY SWITCHED)
8	C	1	#8
2A	C	1	PROGRAMMABLE EXTEND
6A	D	1	PROGRAMMABLE EXTEND

LEGEND:
R = RED
Y = YELLOW
G = GREEN

← = ARROW

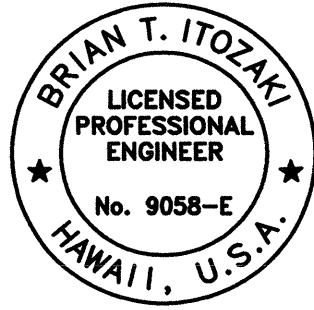
POLE NO. A - 2 - III
SIGNAL HEAD LOCATION
SIGNAL HEAD MOUNTING TYPE

<div><div>R</div><div>Y</div><div>G</div></div>			<div><div>R</div><div>Y</div><div>←</div></div>		SIGNAL HEAD TYPE
12" RYG TRAFFIC SIGNAL HEAD (L.E.D. SIGNAL ASSEMBLY)			12" RYG TRAFFIC SIGNAL HEAD (L.E.D. SIGNAL ASSEMBLY)		DESCRIPTION
A-2-Ⅴ A-3-Ⅴ B-1-Ⅵ B-2-Ⅵ C-1-Ⅰ D-1-Ⅴ D-3-Ⅴ E-2-Ⅴ E-3-Ⅵ F-1-Ⅱ F-2-Ⅱ			A-1-Ⅴ B-3-Ⅵ * D-2-Ⅴ E-1-Ⅵ *		POLE LETTER - SIGNAL HEAD NUMBER-MOUNTING TYPE

(a) PROVIDE BACK PLATE FOR SIGNAL HEAD.
* WITH R10-5 SIGN

NOTE: PROVIDE ADHESIVE TYPE II OBJECT MARKERS ON STANDARDS A, B, C, D, & E. INSTALL TWO (2) MARKERS PER STANDARD.
ALL SIGNAL HEADS SHALL BE L.E.D. TYPE.

2 TRAFFIC SIGNAL TYPE, LOCATION AND MOUNTING SCHEDULE
E-6

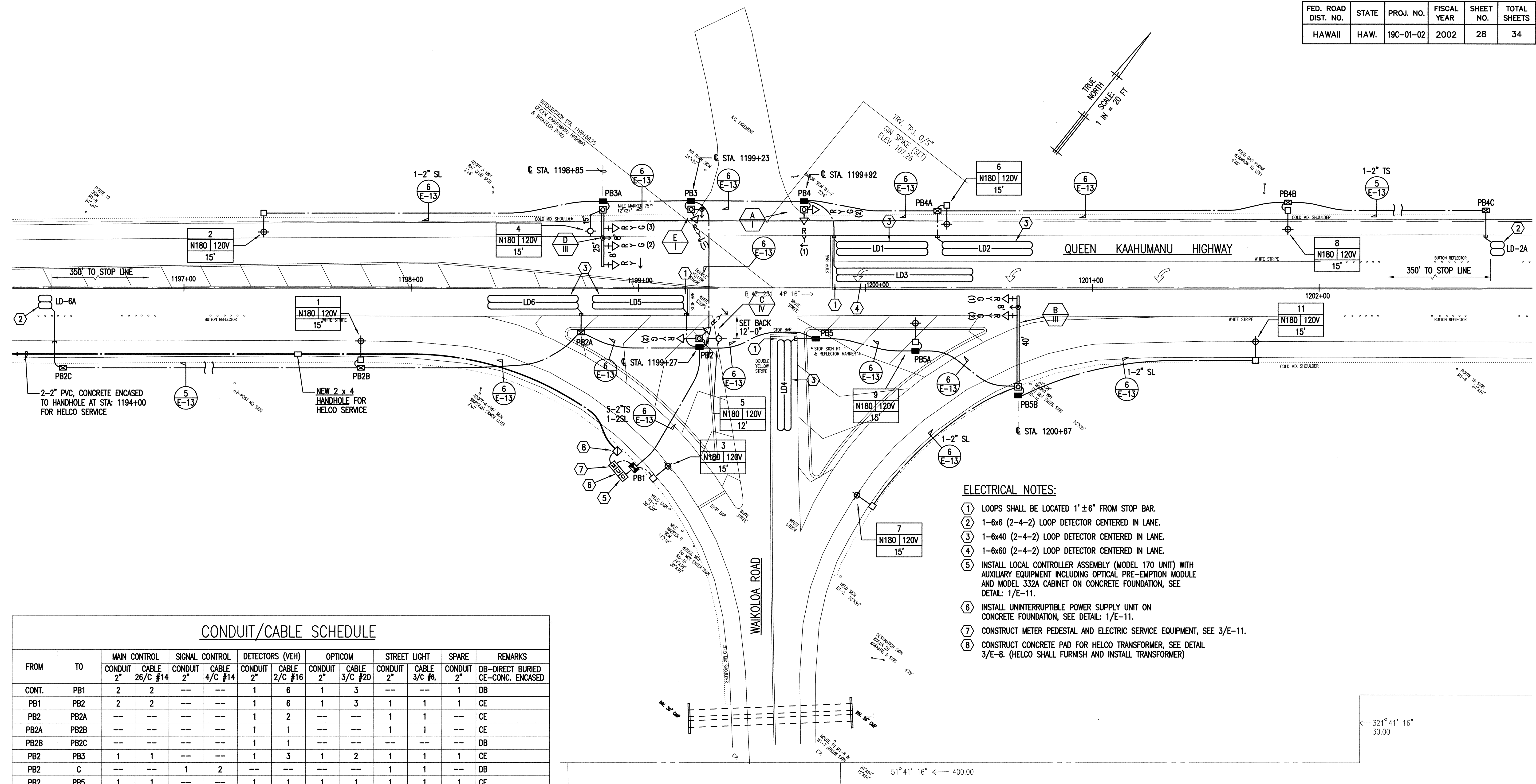


THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

E-6

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
PHASE ASSIGNMENT
(WAIKOLOA BEACH DRIVE)
Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02
SCALE: AS SHOWN
DATE: MAY 2002
SHEET No. E-6 OF 13 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	28	34

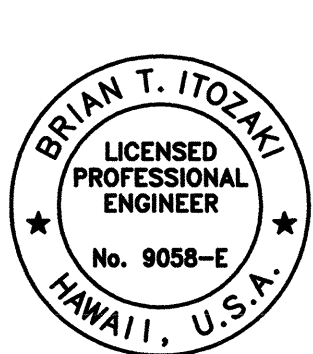


- ELECTRICAL NOTES:**
- ① LOOPS SHALL BE LOCATED 1'±6" FROM STOP BAR.
 - ② 1-6x6 (2-4-2) LOOP DETECTOR CENTERED IN LANE.
 - ③ 1-6x40 (2-4-2) LOOP DETECTOR CENTERED IN LANE.
 - ④ 1-6x60 (2-4-2) LOOP DETECTOR CENTERED IN LANE.
 - ⑤ INSTALL LOCAL CONTROLLER ASSEMBLY (MODEL 170 UNIT) WITH AUXILIARY EQUIPMENT INCLUDING OPTICAL PRE-EMPTION MODULE AND MODEL 332A CABINET ON CONCRETE FOUNDATION, SEE DETAIL: 1/E-11.
 - ⑥ INSTALL UNINTERRUPTIBLE POWER SUPPLY UNIT ON CONCRETE FOUNDATION, SEE DETAIL: 1/E-11.
 - ⑦ CONSTRUCT METER PEDESTAL AND ELECTRIC SERVICE EQUIPMENT, SEE 3/E-11.
 - ⑧ CONSTRUCT CONCRETE PAD FOR HELCO TRANSFORMER, SEE DETAIL 3/E-8. (HELCO SHALL FURNISH AND INSTALL TRANSFORMER)

CONDUIT/CABLE SCHEDULE

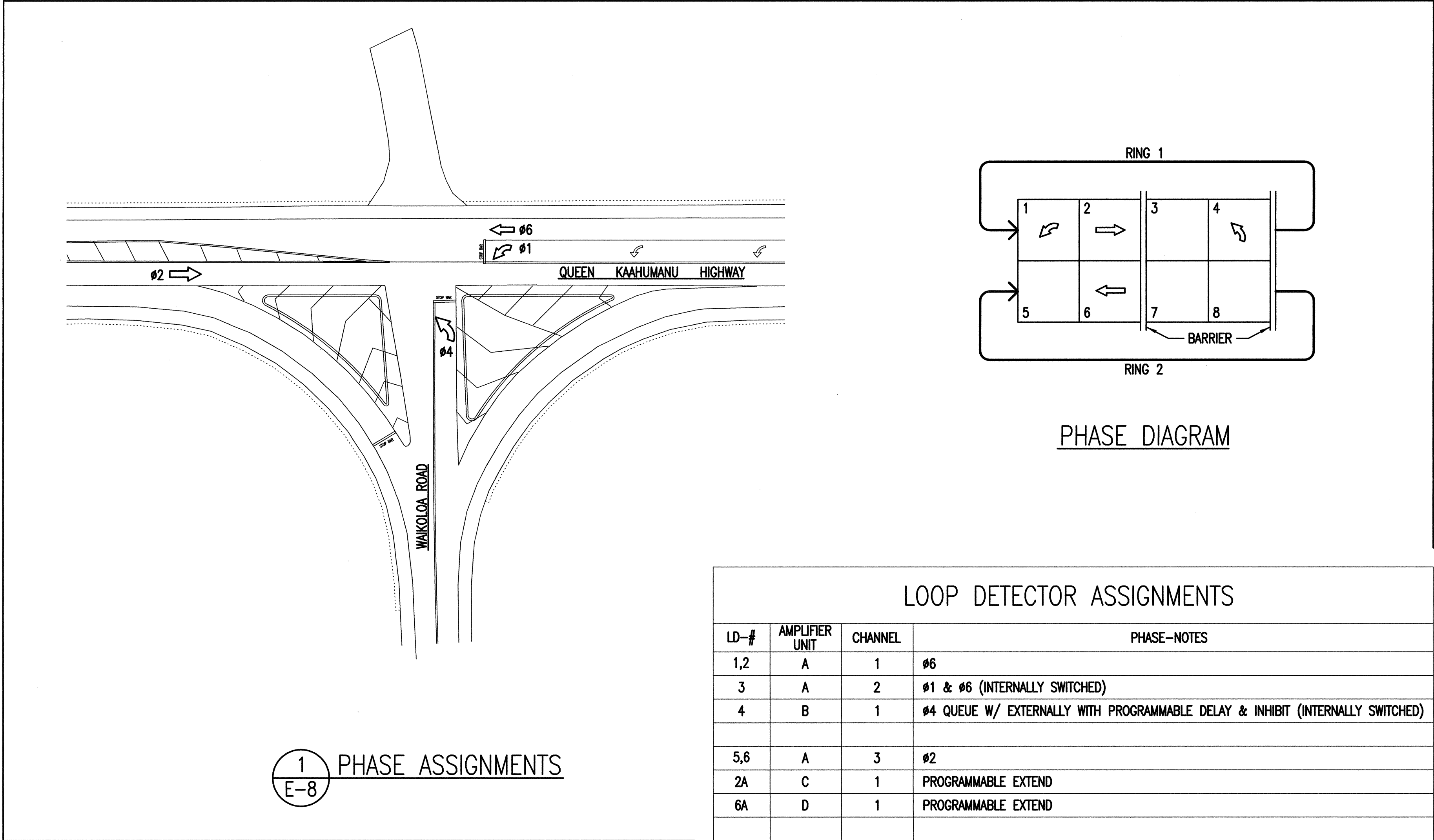
FROM	TO	MAIN CONTROL		SIGNAL CONTROL		DETECTORS (VEH)		OPTICOM		STREET LIGHT		SPARE	REMARKS
		CONDUIT 2"	CABLE 26/C #14	CONDUIT 2"	CABLE 4/C #14	CONDUIT 2"	CABLE 2/C #16	CONDUIT 2"	CABLE 3/C #20	CONDUIT 2"	CABLE 3/C #6	CONDUIT 2"	
CONT.	PB1	2	2	--	--	1	6	1	3	1	1	1	CE
PB1	PB2	2	2	--	--	1	6	1	3	1	1	1	CE
PB2	PB2A	--	--	--	--	1	2	--	--	1	1	--	CE
PB2A	PB2B	--	--	--	--	1	1	--	--	1	1	--	CE
PB2B	PB2C	--	--	--	--	1	1	--	--	--	--	--	DB
PB2	PB3	1	1	--	--	1	3	1	2	1	1	1	CE
PB2	C	--	--	1	2	--	--	--	--	1	1	--	DB
PB2	PB5	1	1	--	--	1	1	1	1	1	1	1	CE
PB3	E	--	--	1	1	--	--	1	1	--	--	--	DB
PB3	PB3A	1	1	--	--	--	--	1	1	1	1	1	DB
PB3A	D	--	--	1	4	--	--	1	1	1	1	--	DB
PB3	PB4	1	1	--	--	1	3	--	--	1	1	1	CE
PB4	A	--	--	1	2	--	--	--	--	--	--	--	DB
PB4	PB4A	--	--	--	--	1	2	--	--	1	1	--	DB
PB4A	PB4B	--	--	--	--	1	1	--	--	1	1	--	DB
PB4B	PB4C	--	--	--	--	1	1	--	--	--	--	--	DB
PB5	PB5A	1	1	--	--	--	--	1	1	1	1	--	CE
PB5A	PB5B	1	1	--	--	--	--	1	1	1	1	--	DB
PB5A	B	--	--	1	2	--	--	1	1	1	1	--	DB

1 PLAN - EQUIPMENT/DUCTLINE
E-7 SCALE: 1" = 20'

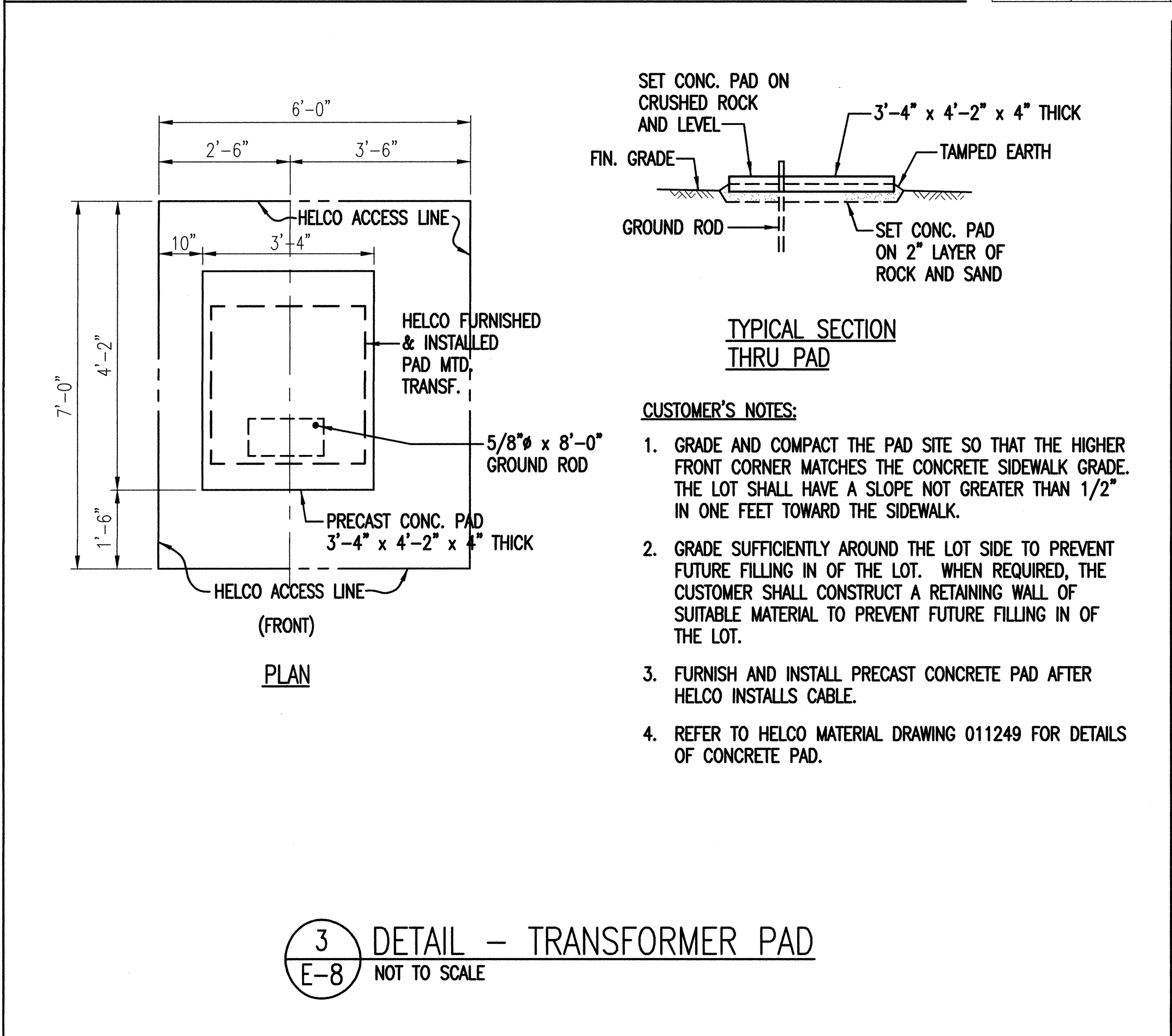


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
PLAN - EQUIPMENT/DUCTLINE
(WAIKOLOA ROAD)
Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02
SCALE: AS SHOWN DATE: MAY 2002
SHEET No. **E-7** OF **13** SHEETS

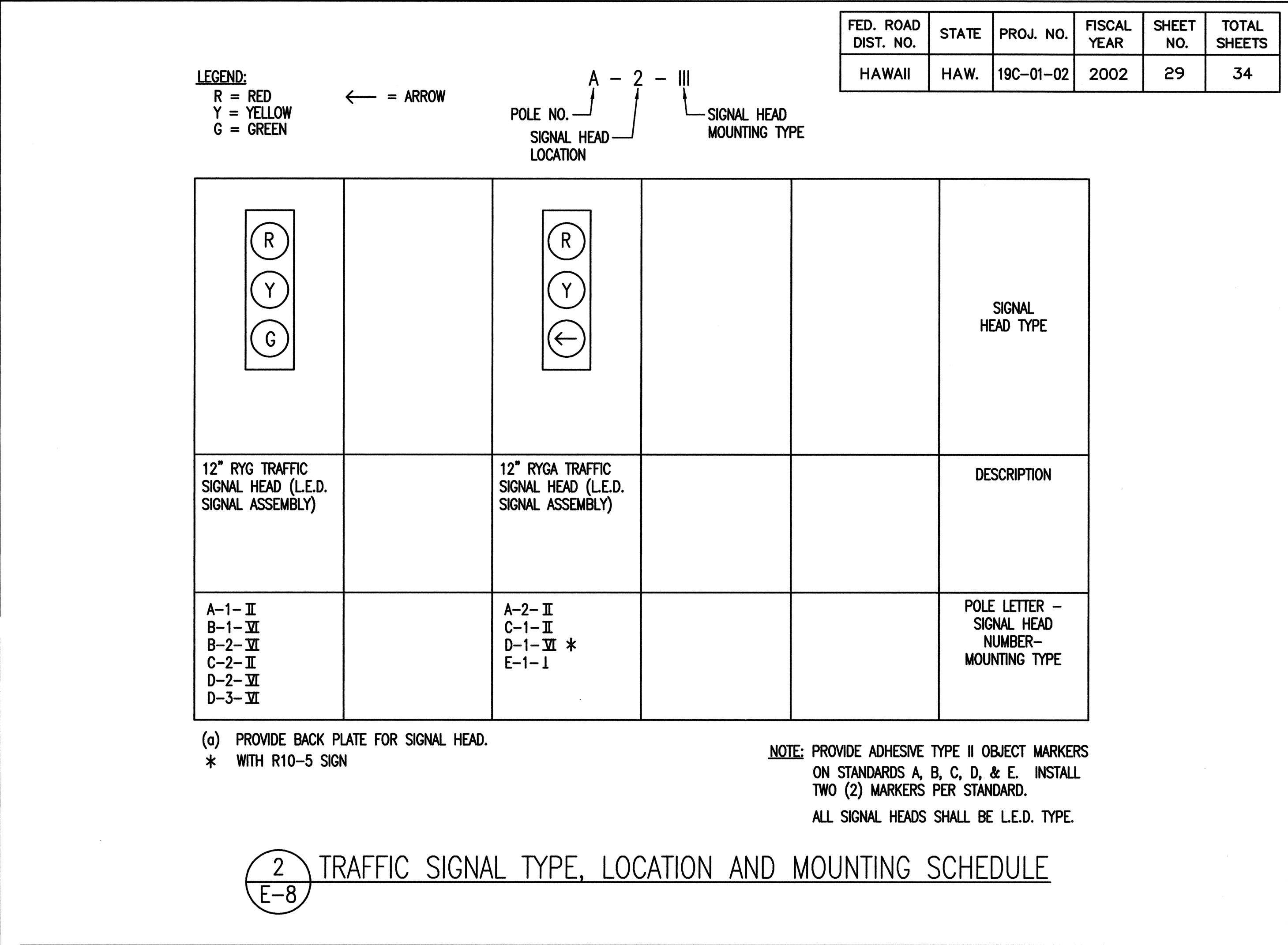
E-7



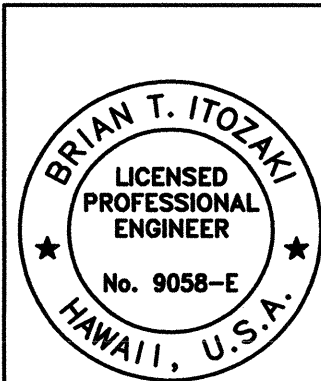
1 PHASE ASSIGNMENTS
E-8



3 DETAIL - TRANSFORMER PAD
E-8 NOT TO SCALE



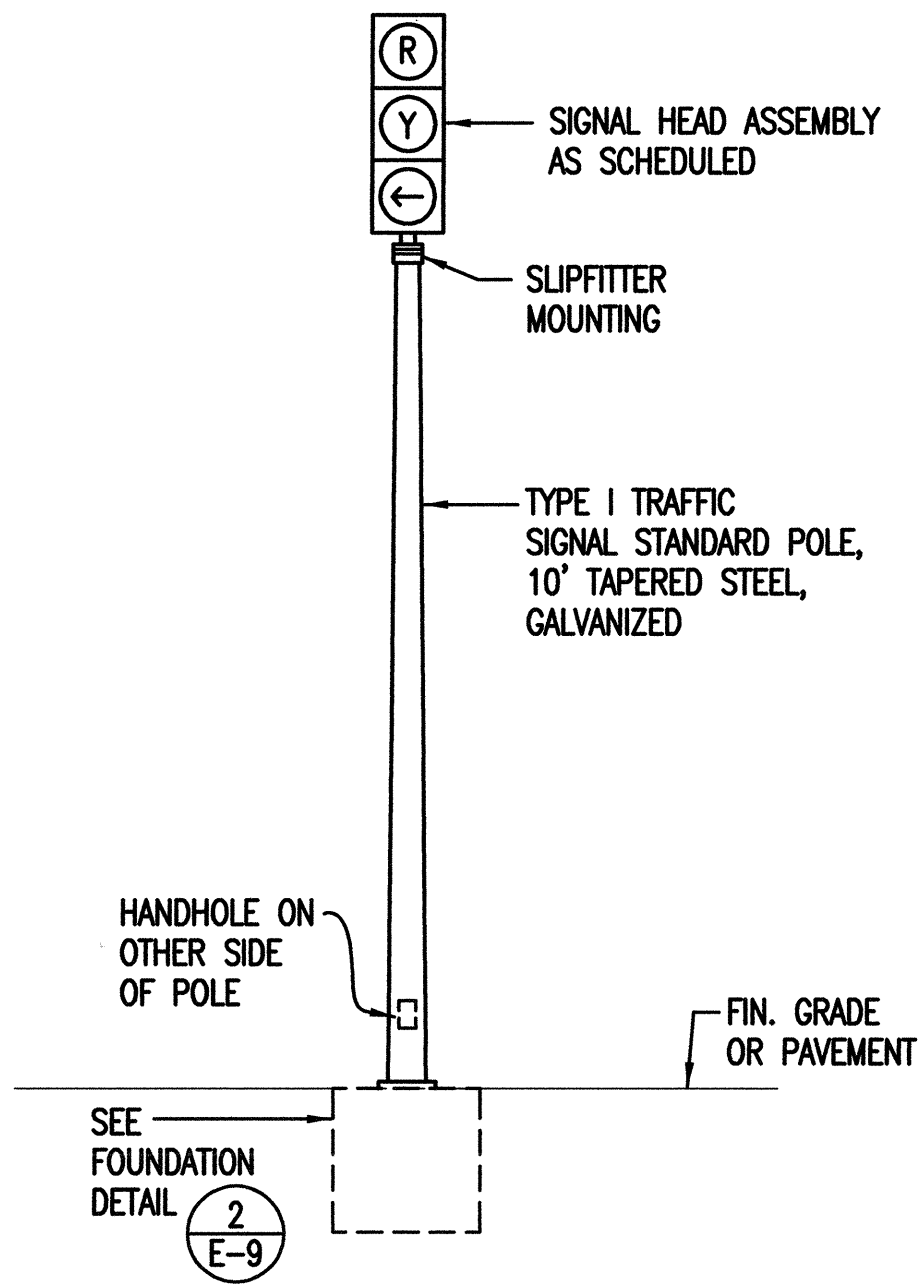
E-8



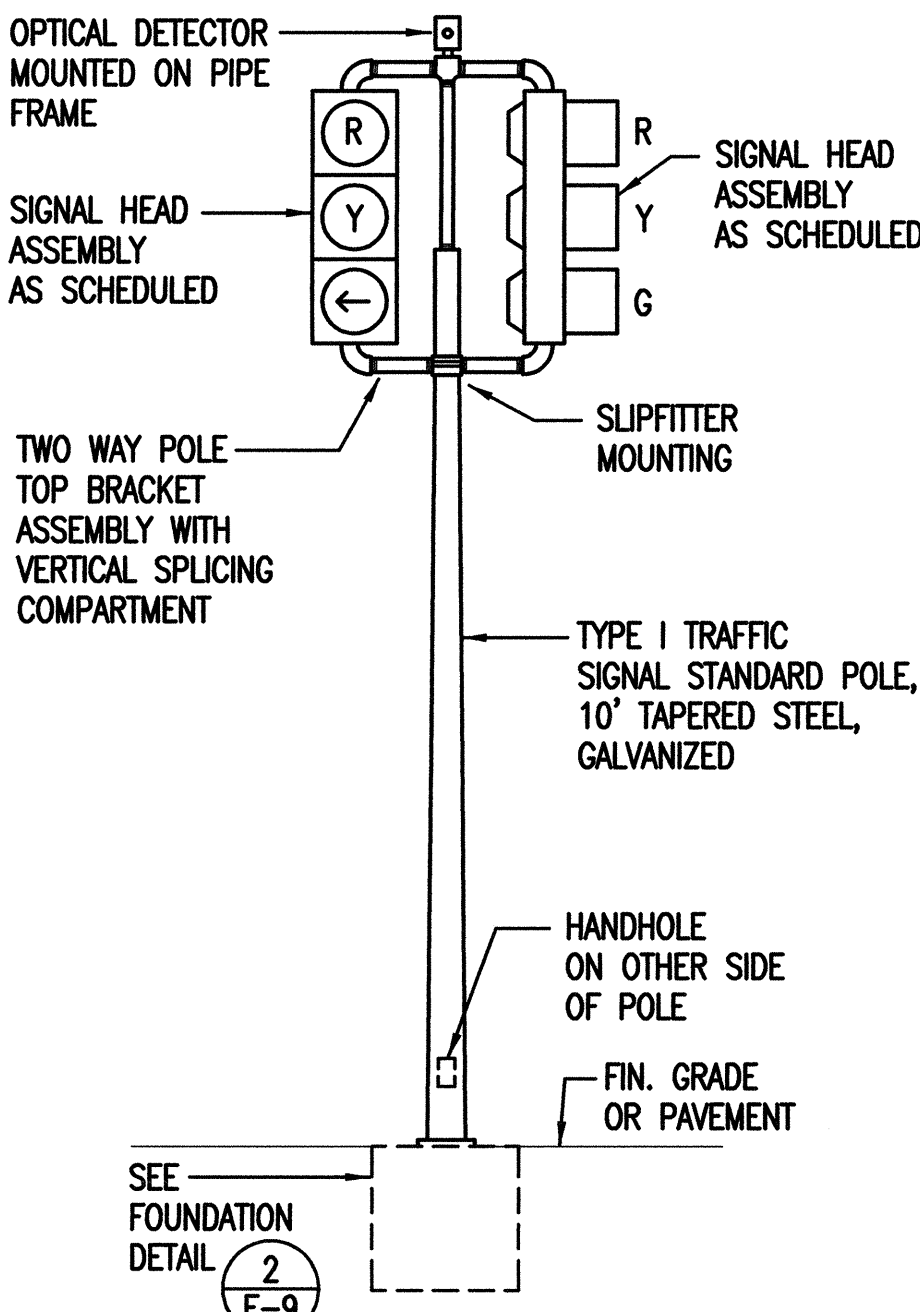
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
PHASE ASSIGNMENT
(WAIKOLOA ROAD)
Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02
SCALE: AS SHOWN
DATE: MAY 2002
SHEET No. E-8 OF 13 SHEETS

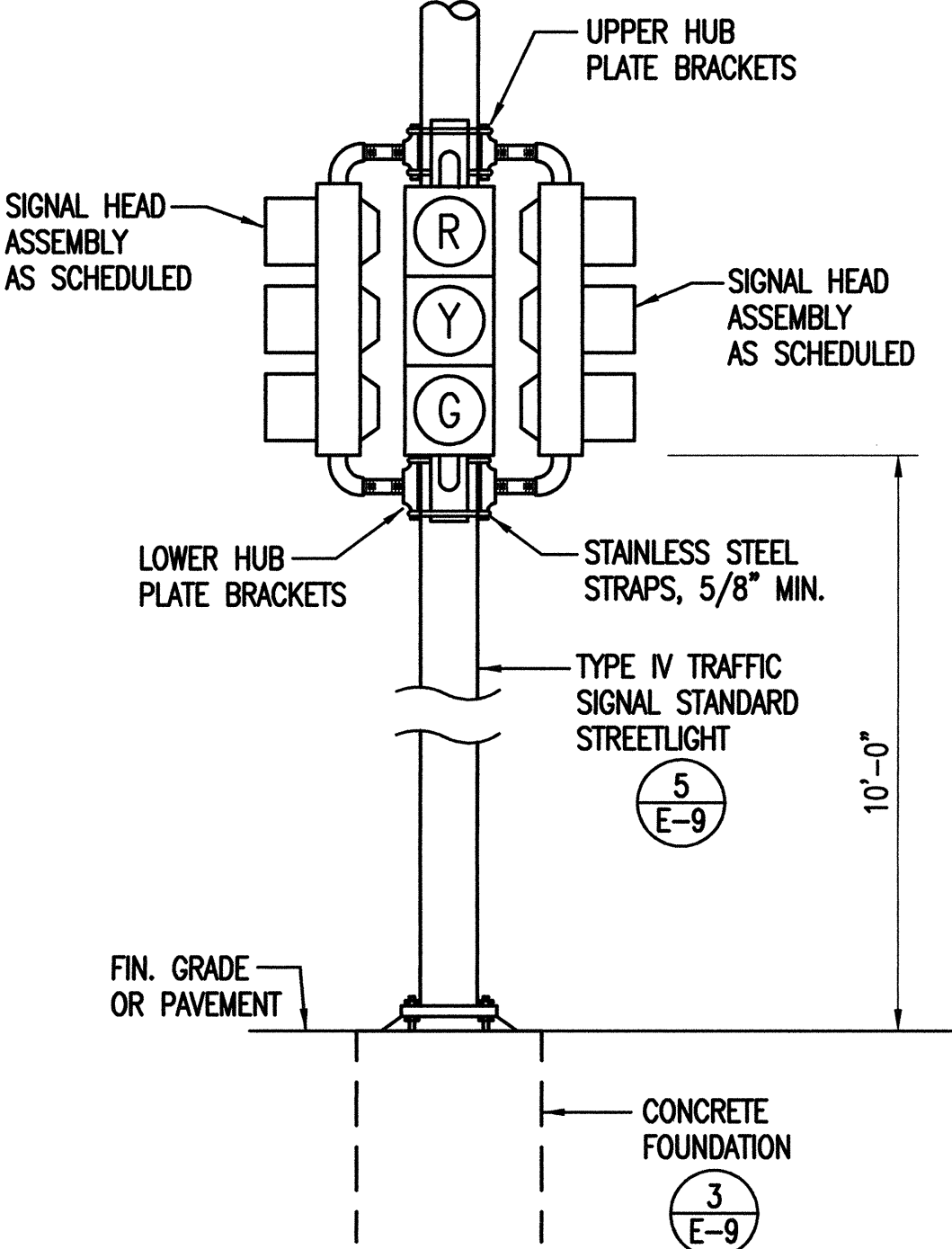
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	30	34



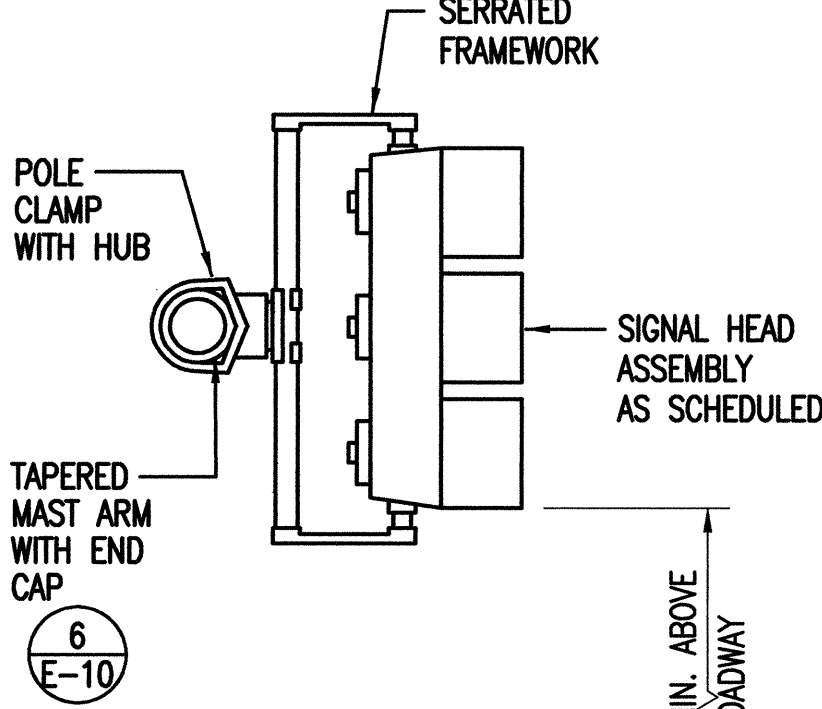
TYPE I (POST TOP MOUNTING - ONE WAY)
NOT TO SCALE



TYPE II (POST TOP MOUNTING - TWO WAY)
NOT TO SCALE

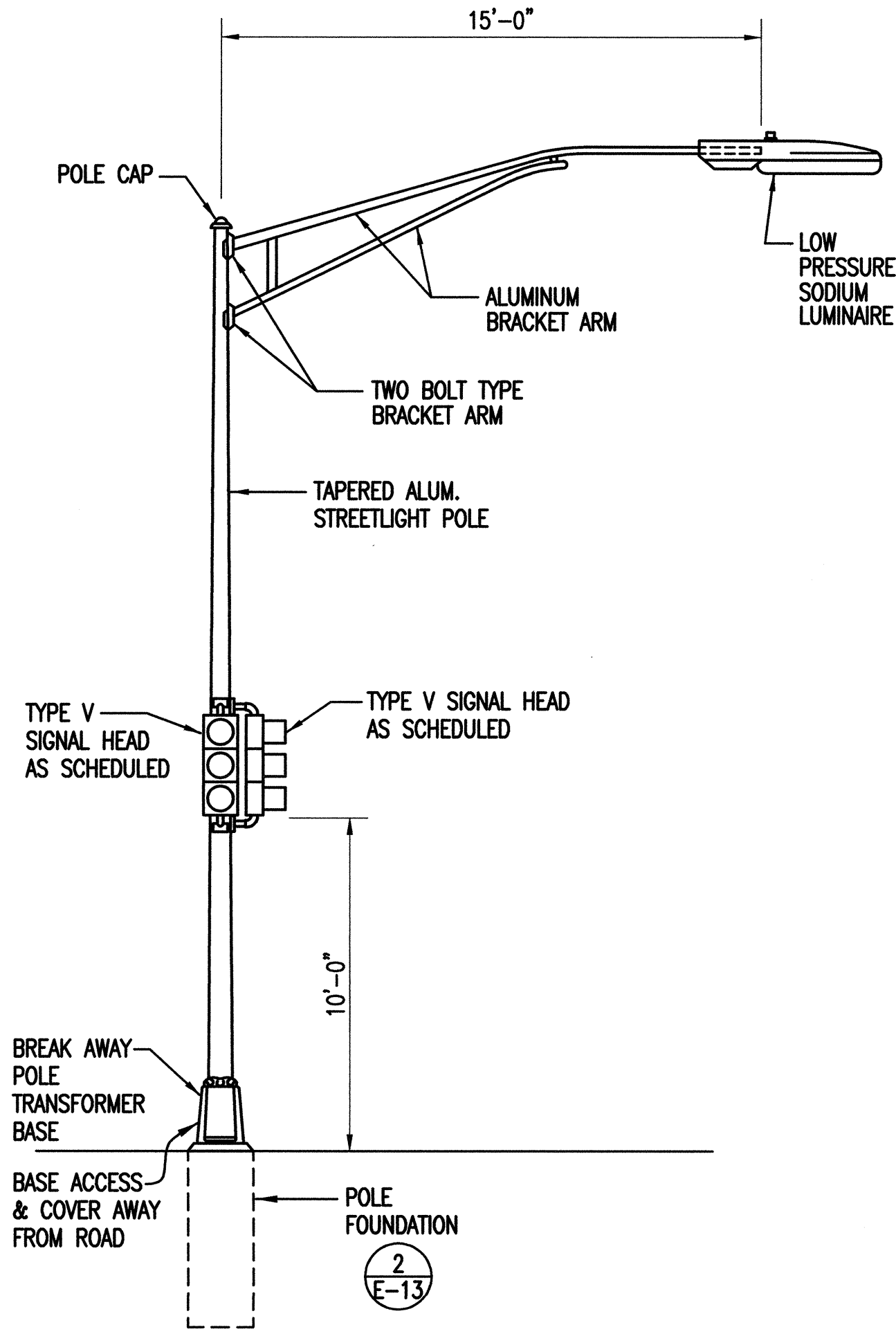


TYPE V
(SIDE POLE MOUNTING, TWO OR THREE WAY AS SHOWN ON PLAN)
NOT TO SCALE

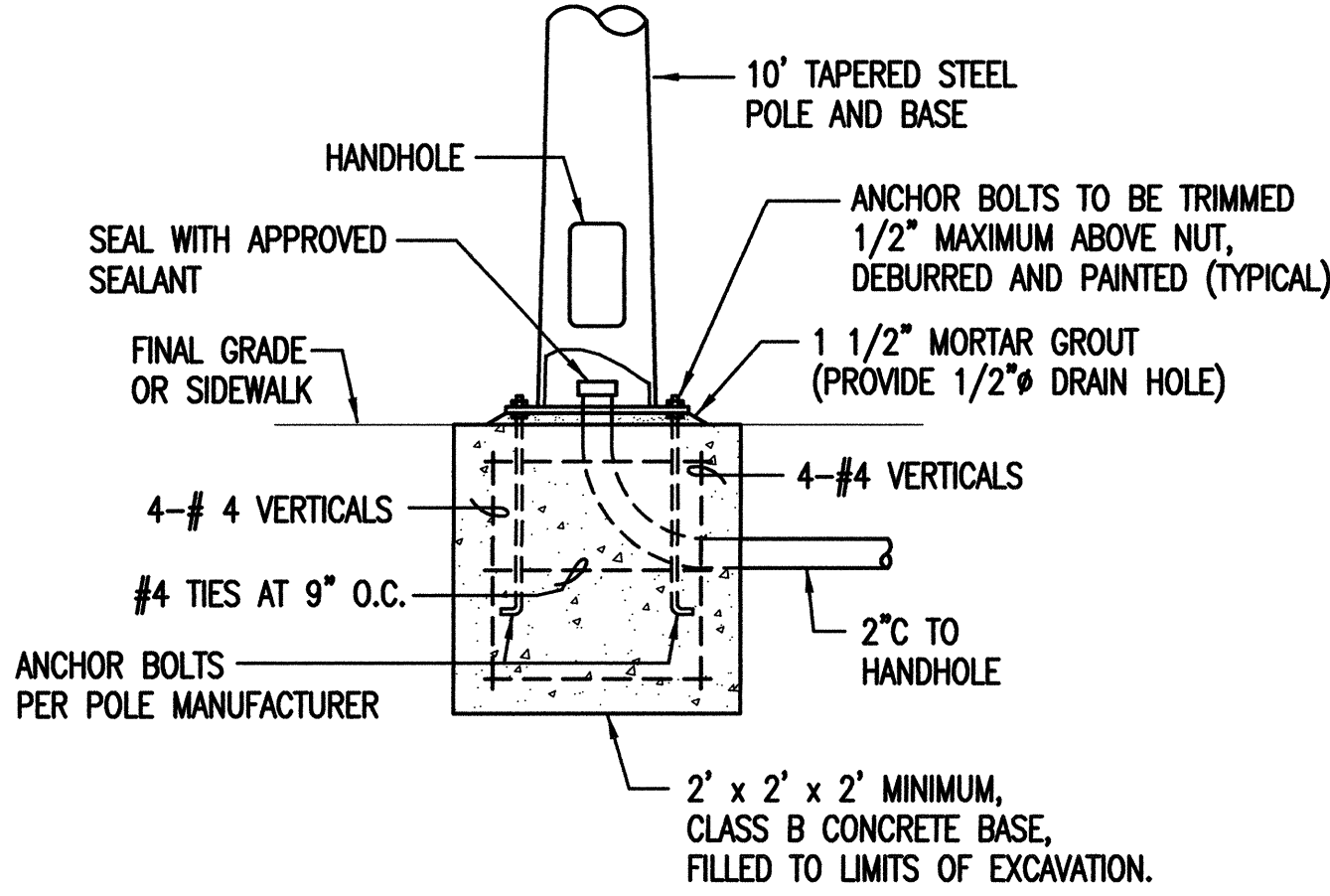


TYPE VI
(MAST ARM MOUNTING)
NOT TO SCALE

- NOTES:
- ALL THREADED ITEMS, I.E. BOLTS, FITTINGS, SCREWS, ETC., SHALL BE COATED WITH AN APPROVED ANTI-SEIZE COMPOUND PRIOR TO ASSEMBLY OR INSTALLATION.
 - ALL CIRCULAR SIGNAL HEADS (EXCEPT FIBEROPTIC AND PROGRAMMABLE) SHALL HAVE APPROVED GLASS LENSES.



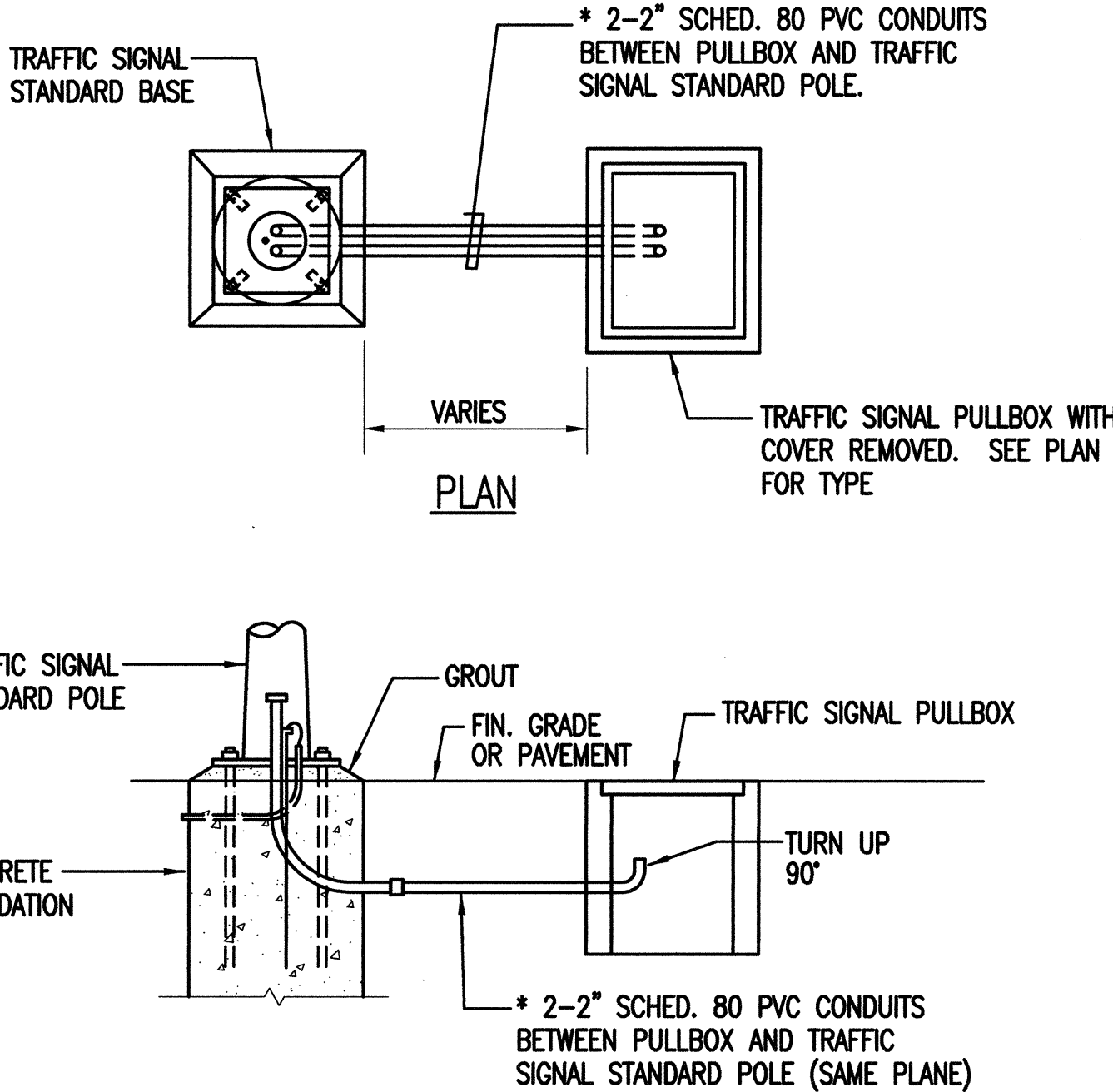
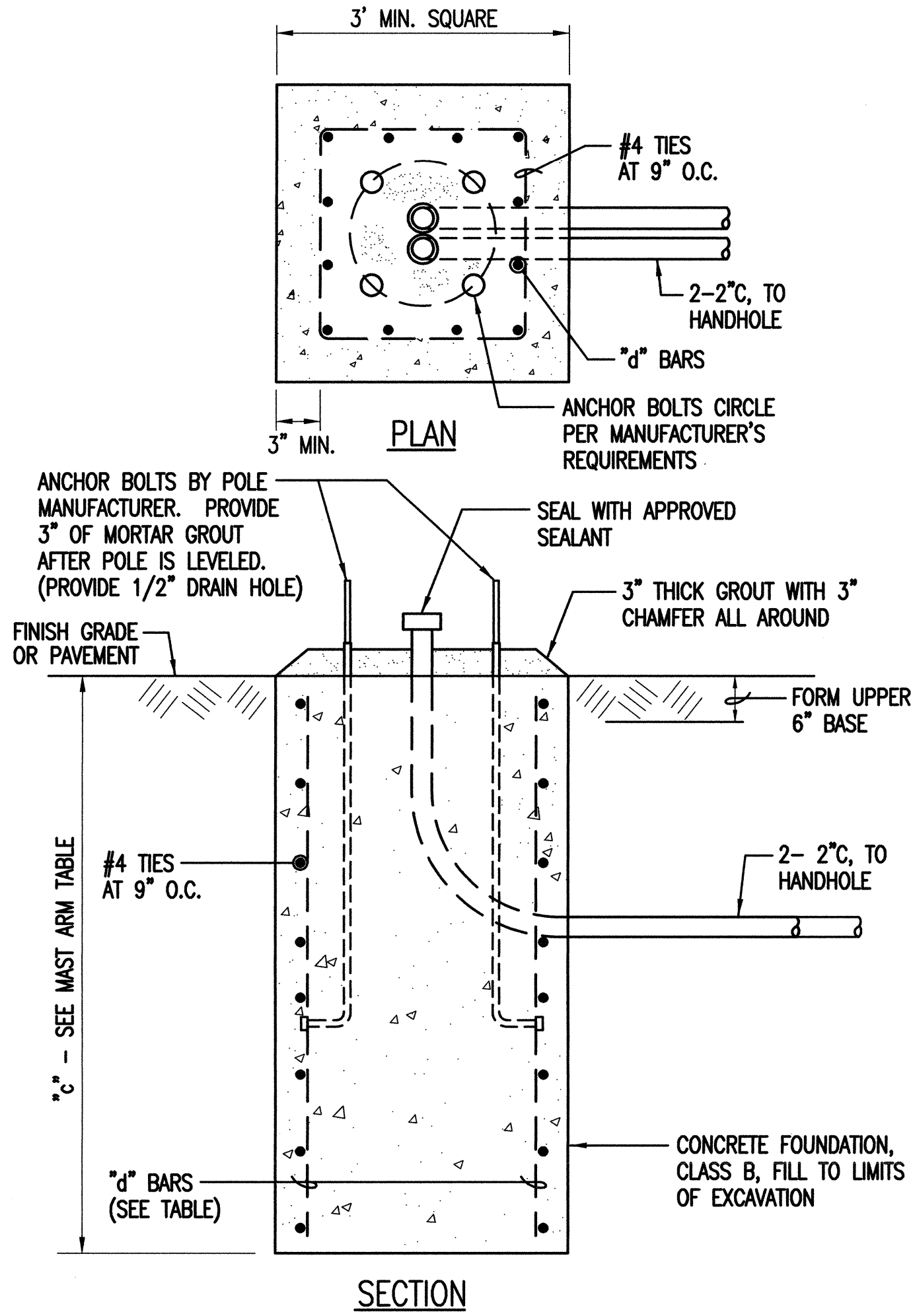
TYPE IV - TRAFFIC SIGNAL STANDARD ON STREETLIGHT POLE
NOT TO SCALE



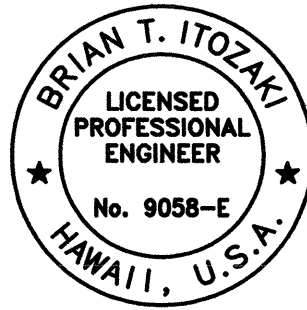
FOUNDATION DETAIL - TYPE I POLE
NOT TO SCALE
NOTE: FOUNDATIONS IN OR ADJOINING PAVEMENT SHALL BE FLUSH WITH PAVEMENT.

LENGTH	"c"	"d" BARS
16'-18'	5'-0"	12-#6
20'	5'-6"	12-#6
25'	6'-0"	12-#6
30'	6'-6"	12-#6
35'-40'	6'-6"	12-#6

FOUNDATION DETAIL - TYPE III POLE
NOT TO SCALE
NOTE: FOUNDATIONS IN PAVEMENT AREA SHALL BE FLUSH WITH PAVEMENT.



DETAIL - CONDUIT FOR TRAFFIC SIGNAL STANDARD
NOT TO SCALE



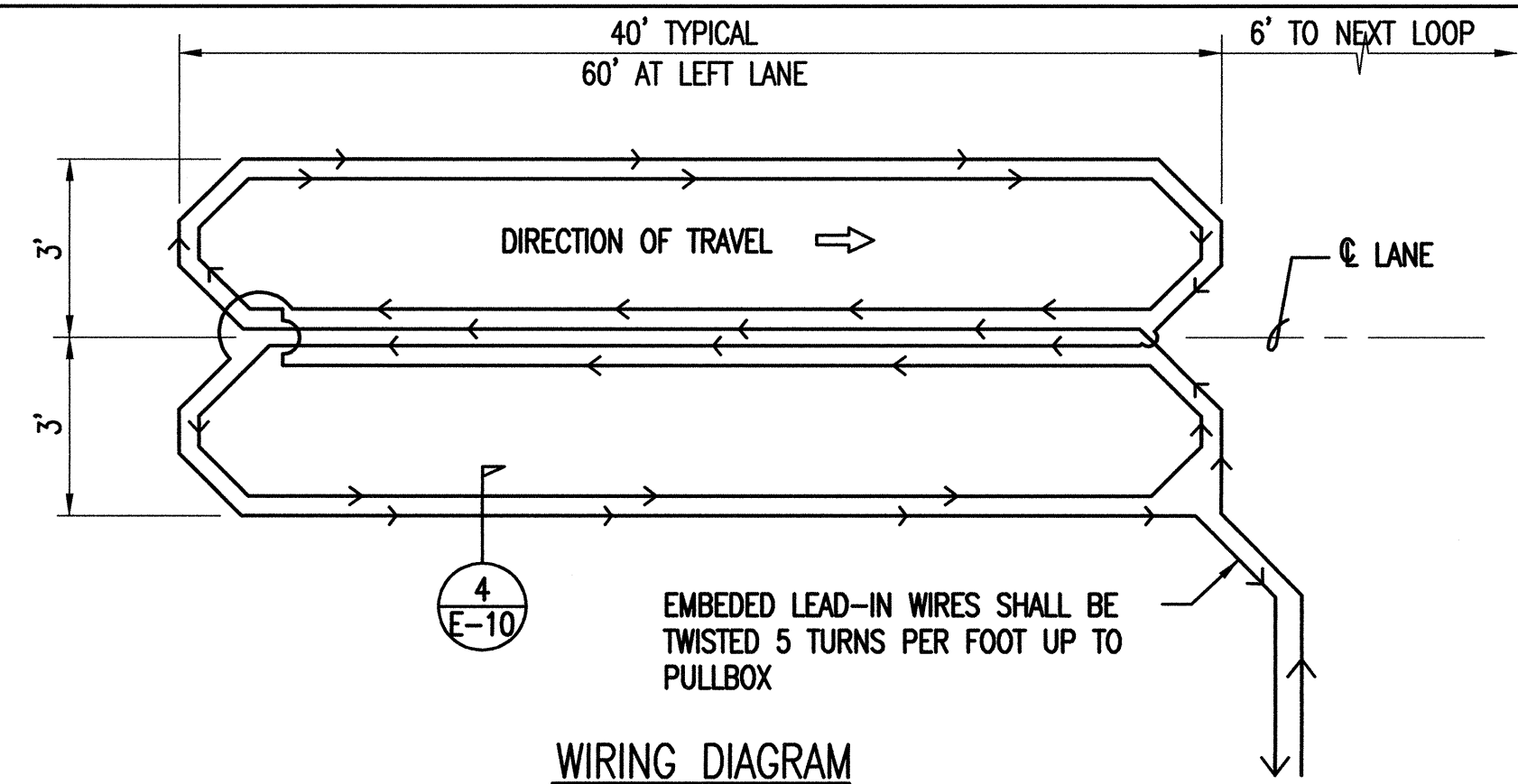
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL MOUNTING
AND FOUNDATION DETAILS
Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

THIS WORK WAS PREPARED
BY ME OR UNDER MY
SUPERVISION

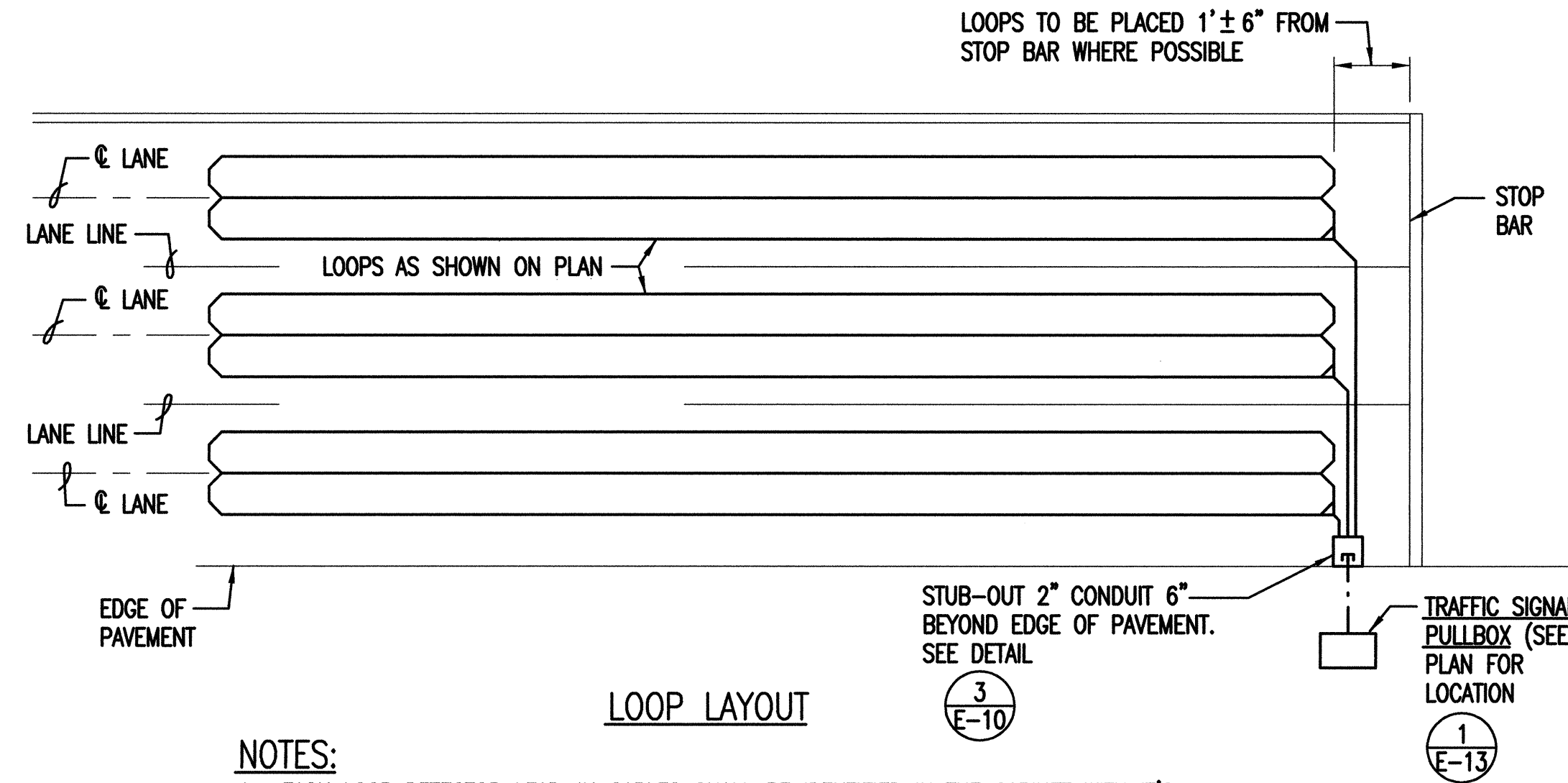
SCALE: AS SHOWN
DATE: MAY 2002
SHEET No. E-9 OF 13 SHEETS

E-9

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	31	34



WIRING DIAGRAM



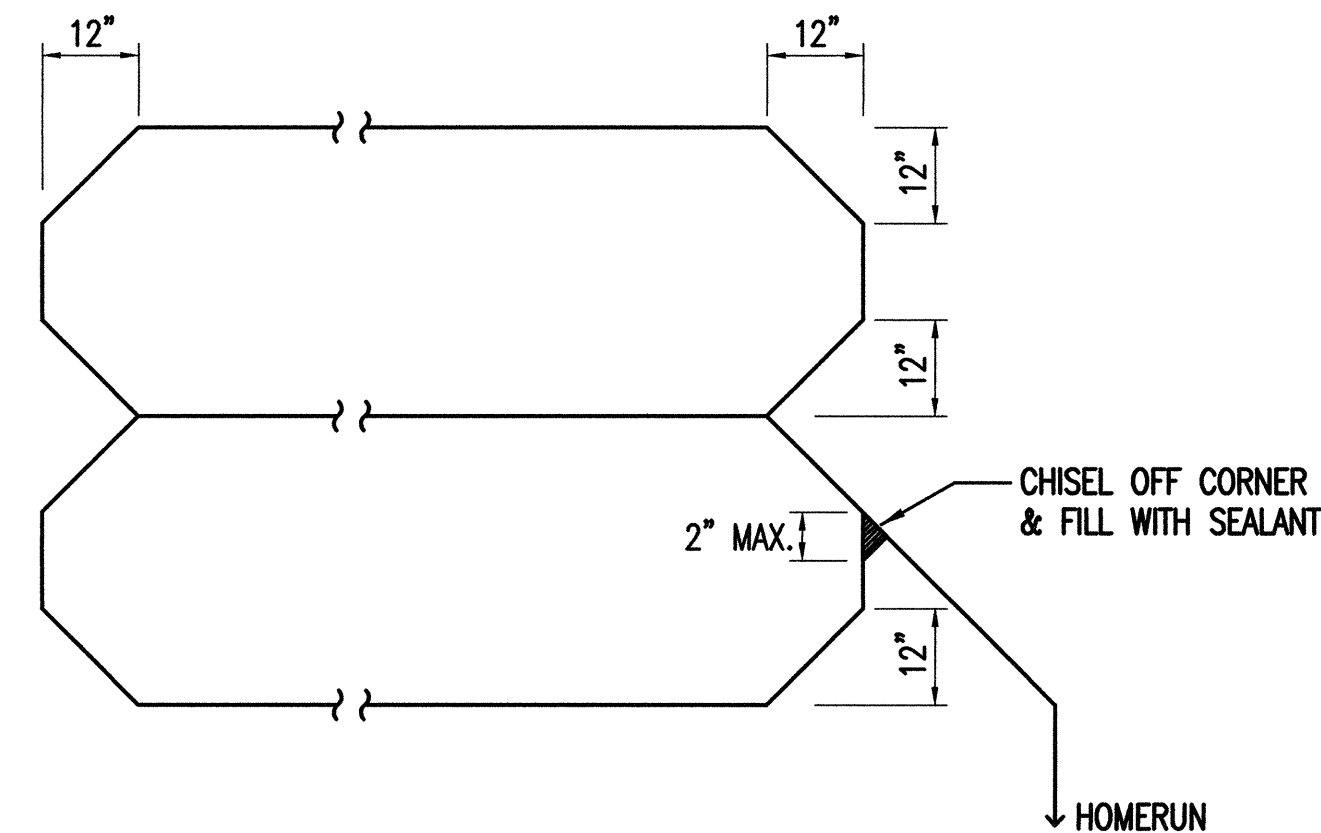
LOOP LAYOUT

NOTES:

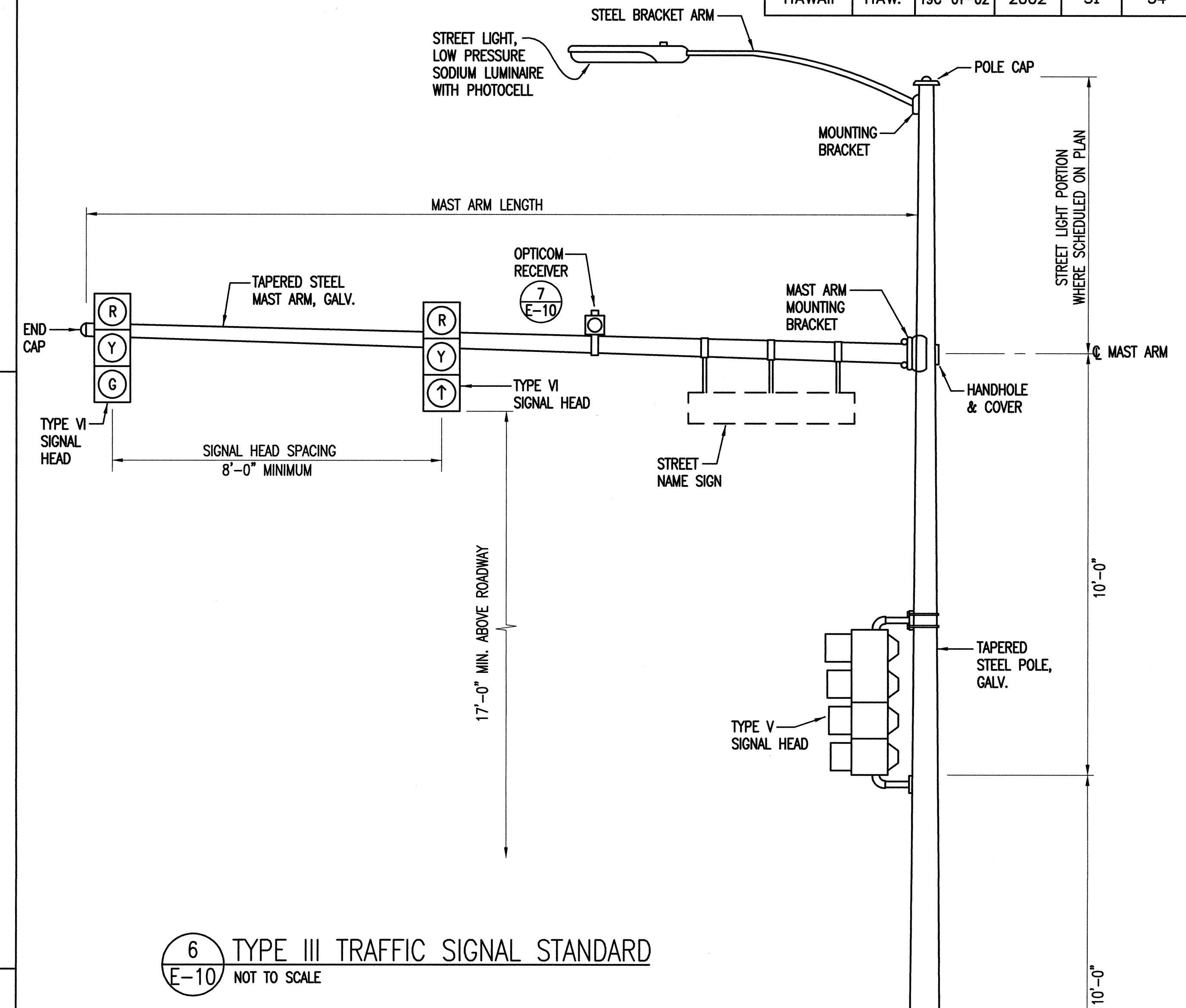
1. EACH LOOP DETECTOR LEAD-IN CABLES SHALL BE IDENTIFIED IN THE CABINET WITH IT'S APPROPRIATE LOOP DETECTOR ASSIGNMENT NUMBER PER PLANS.
2. WHEN HOT SEALANTS ARE USED. ONLY POLYESTER INSULATION WITH A MINIMUM 400° MELTING POINT WILL BE PERMITTED.

1 LOOP DETECTOR (TYPICAL)
E-10 NOT TO SCALE

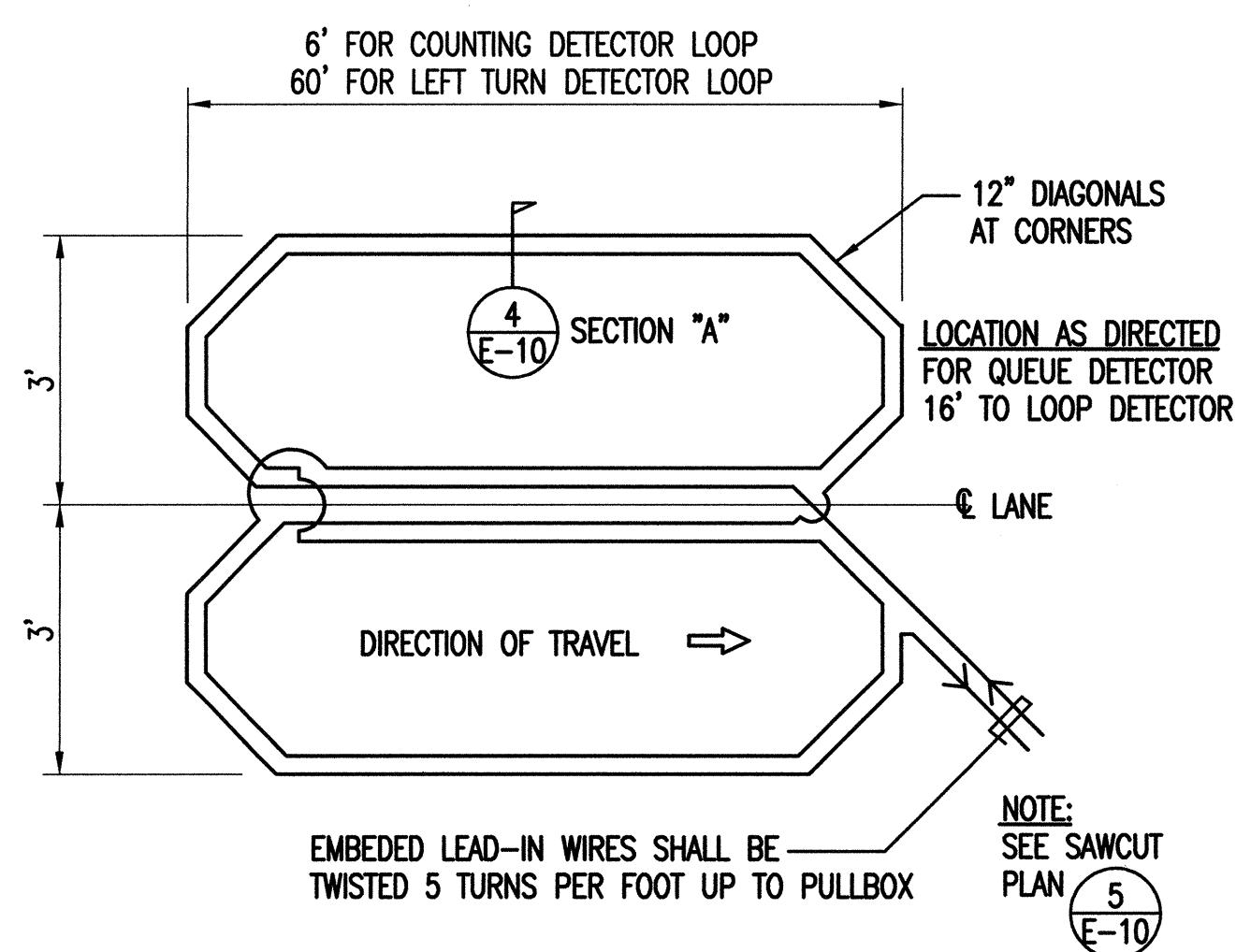
4 SECTION "A"
E-10 NOT TO SCALE



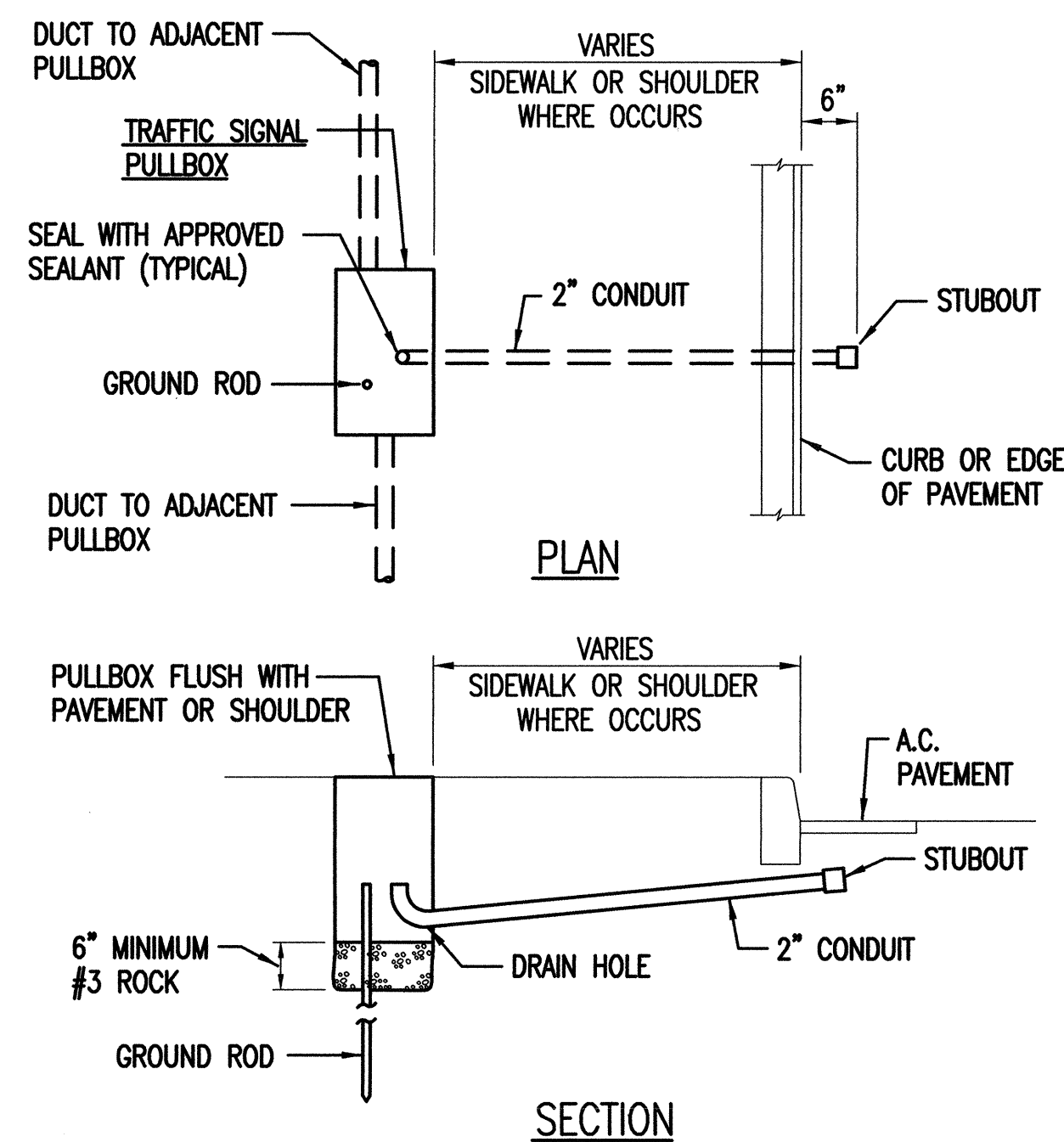
5 TYPICAL LOOP DETECTOR SAWCUT PLAN
E-10 NOT TO SCALE



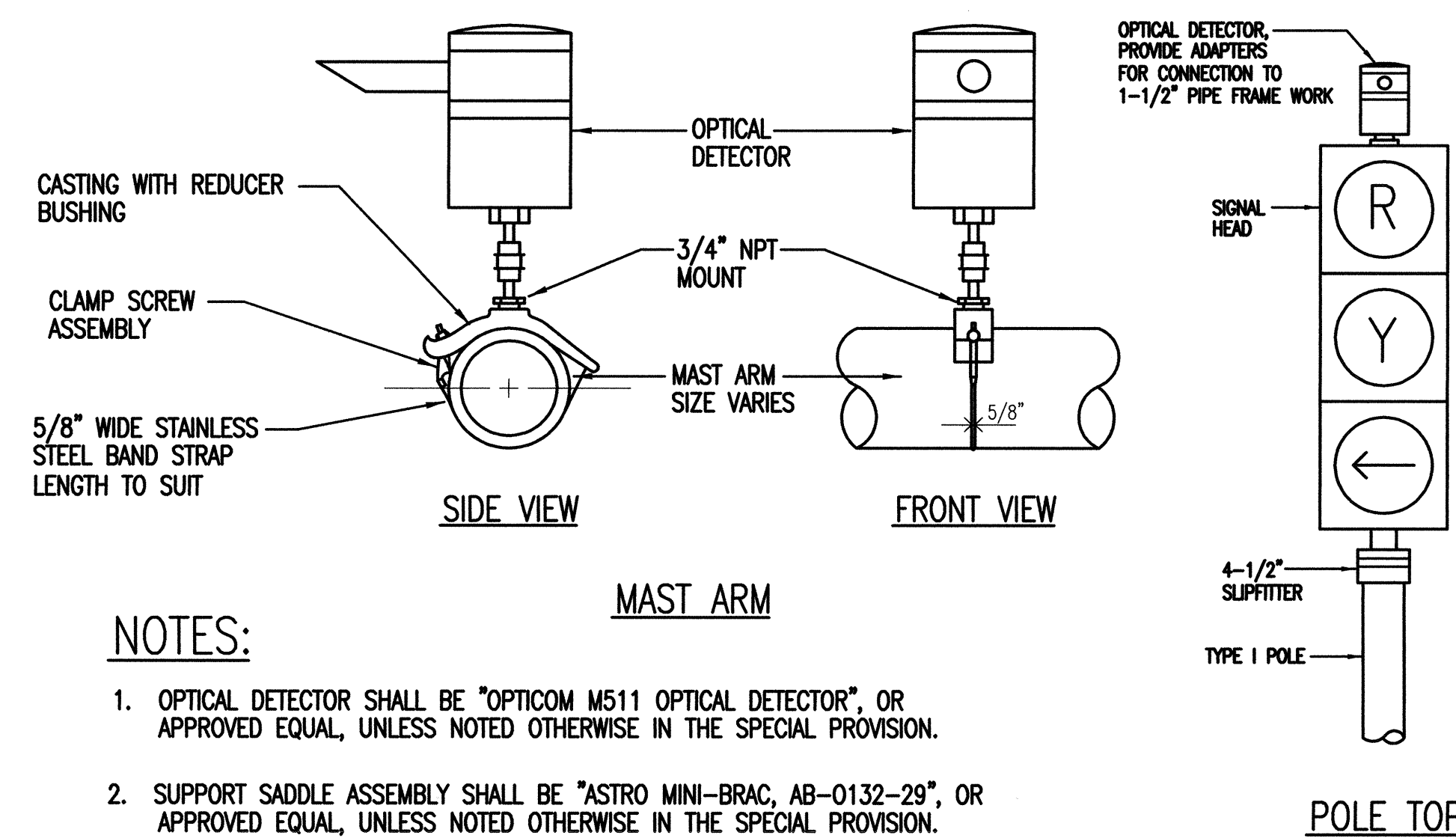
6 TYPE III TRAFFIC SIGNAL STANDARD
E-10 NOT TO SCALE



2 WIRING DIAGRAM - QUEUE/COUNTING DETECTOR
E-10 NOT TO SCALE



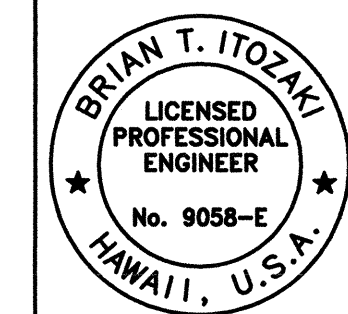
3 LOOP DETECTOR STUBOUT
E-10 NOT TO SCALE



NOTES:

1. OPTICAL DETECTOR SHALL BE "OPTICOM M511 OPTICAL DETECTOR", OR APPROVED EQUAL, UNLESS NOTED OTHERWISE IN THE SPECIAL PROVISION.
2. SUPPORT SADDLE ASSEMBLY SHALL BE "ASTRO MINI-BRAC, AB-0132-29", OR APPROVED EQUAL, UNLESS NOTED OTHERWISE IN THE SPECIAL PROVISION.

7 DETAIL - OPTICAL DETECTOR MOUNTING
E-10 NOT TO SCALE



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**TRAFFIC SIGNAL STANDARD
AND LOOP DETECTOR DETAILS**
Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

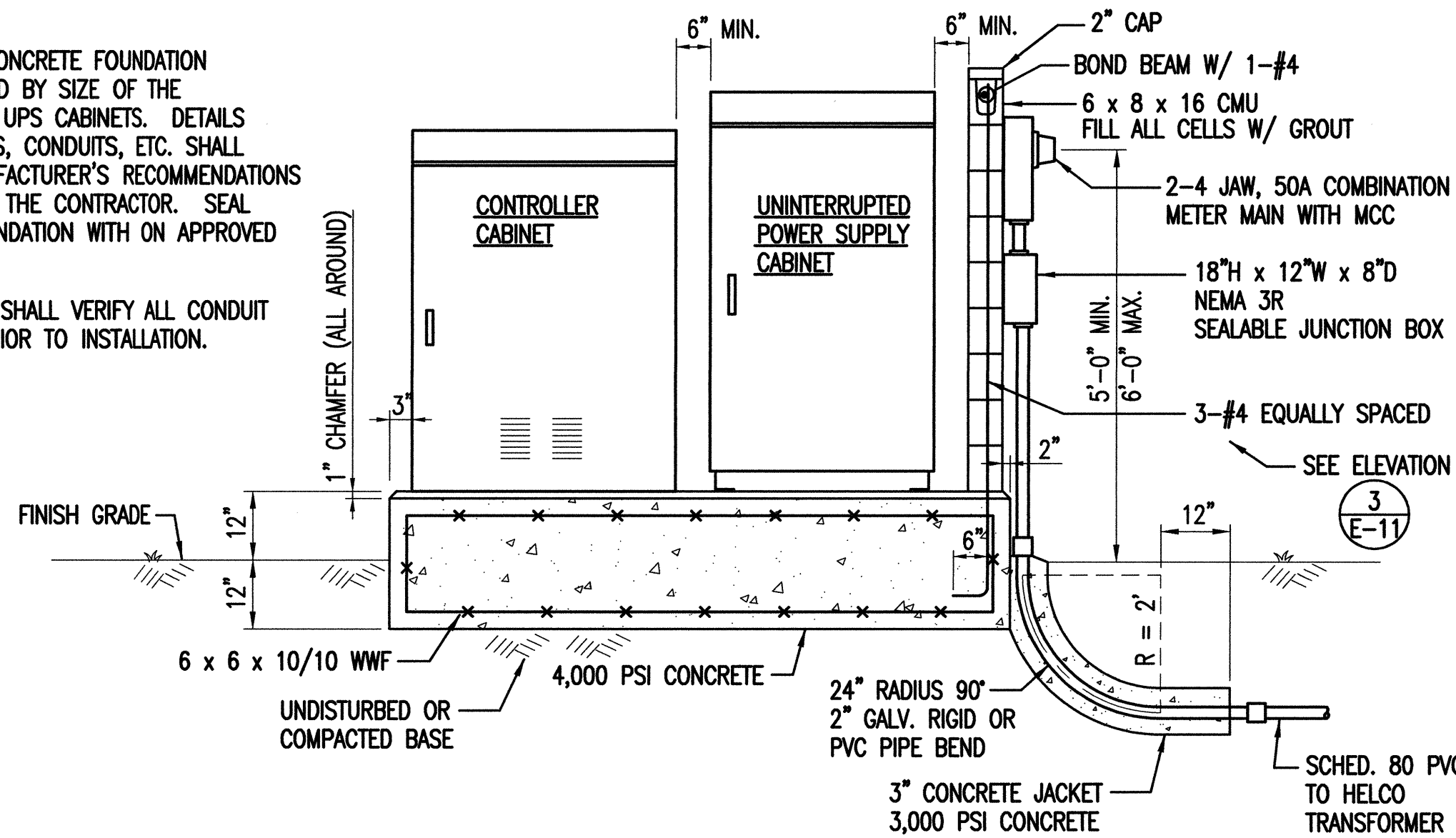
SCALE: AS SHOWN DATE: MAY 2002
SHEET No. E-10 OF 13 SHEETS

E-10

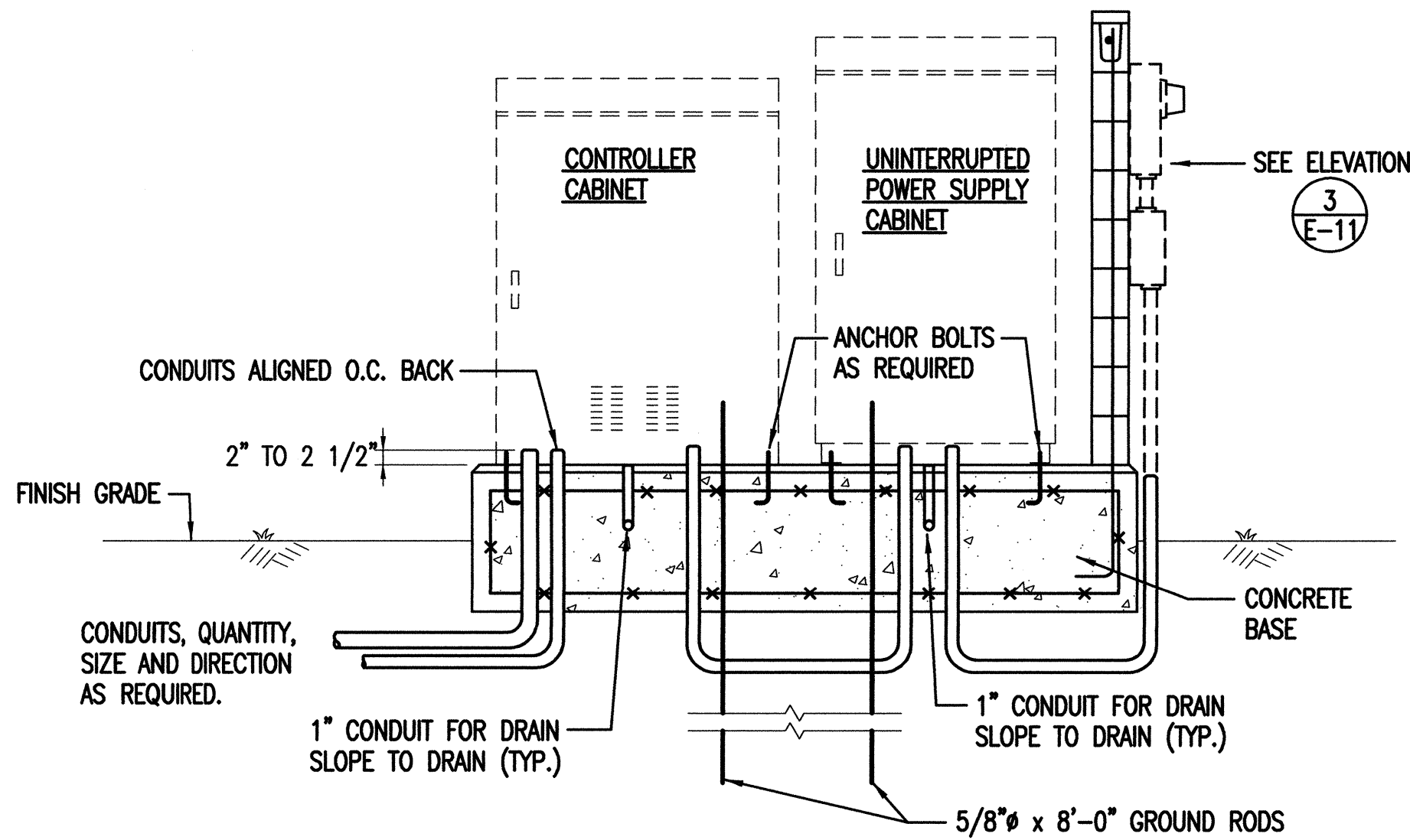
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	32	34

NOTES:

- DIMENSIONS OF CONCRETE FOUNDATION TO BE DETERMINED BY SIZE OF THE CONTROLLER AND UPS CABINETS. DETAILS OF ANCHOR BOLTS, CONDUITS, ETC. SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS AND SECURED BY THE CONTRACTOR. SEAL CABINETS TO FOUNDATION WITH ON APPROVED SEALANT.
- THE CONTRACTOR SHALL VERIFY ALL CONDUIT REQUIREMENTS PRIOR TO INSTALLATION.

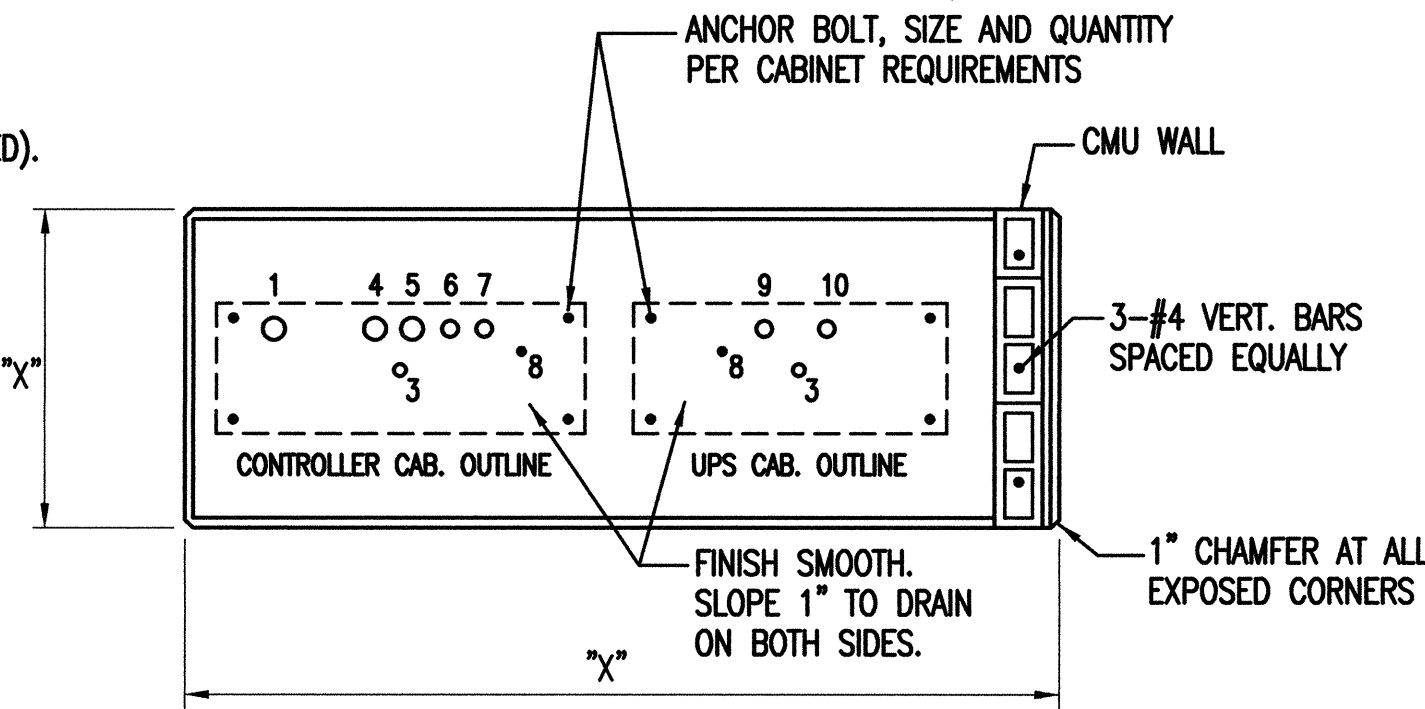


ELEVATION



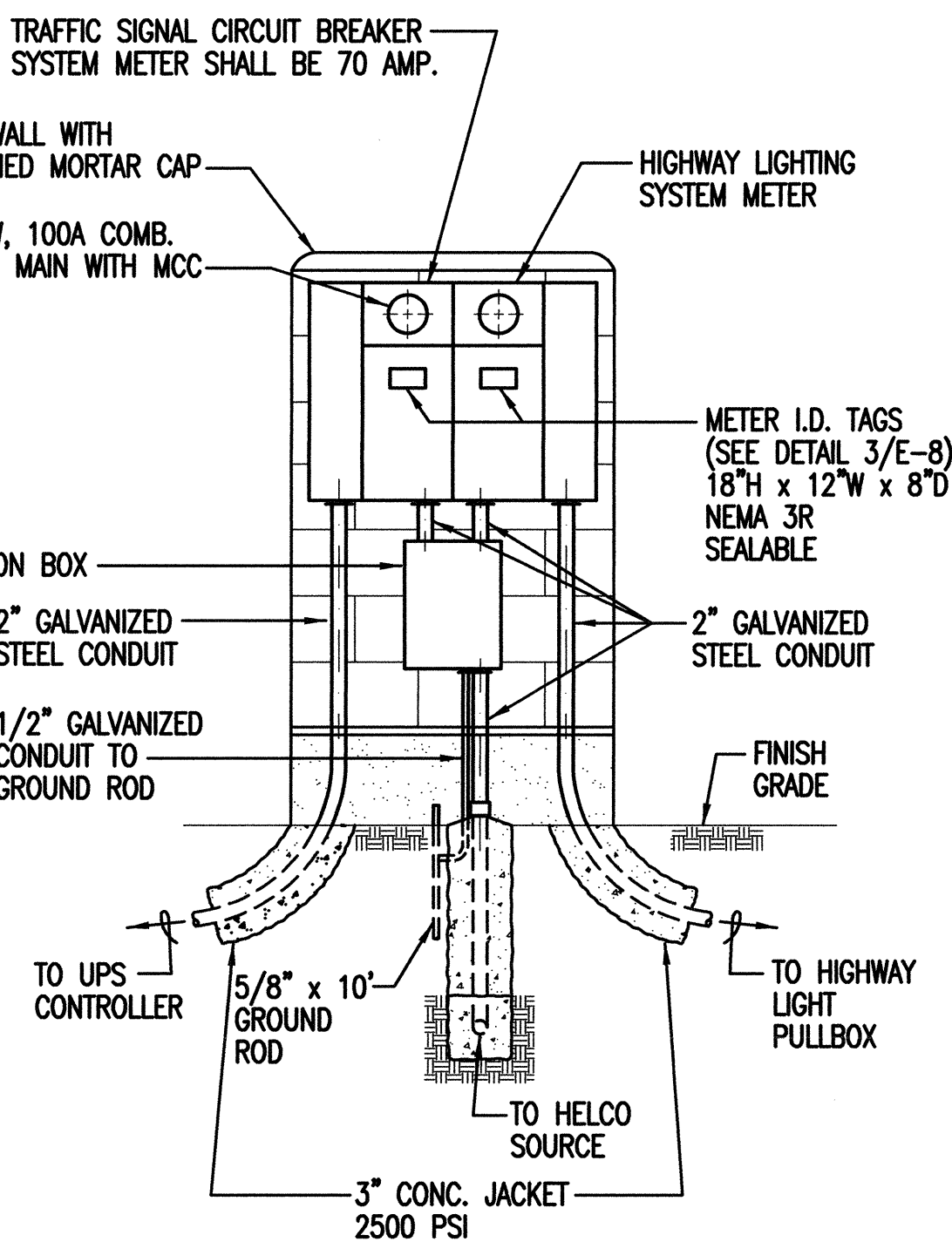
SECTION

- 2" LOOP DETECTOR (NUMBER, AS SCHEDULED).
- NOT USED.
- 1" CONDUIT FOR DRAIN.
- 2" OPTICALPREEMPTION DETECTOR.
- 2" CONTROL (NUMBER, AS SCHEDULED).
- 2" SPARE (NUMBER AS SCHEDULED).
- 2" POWER FROM UPS.
- 5/8" x 8'-0" GROUND ROD.
- 2" POWER TO CONTROLLER.
- 2" POWER TO FROM METER.



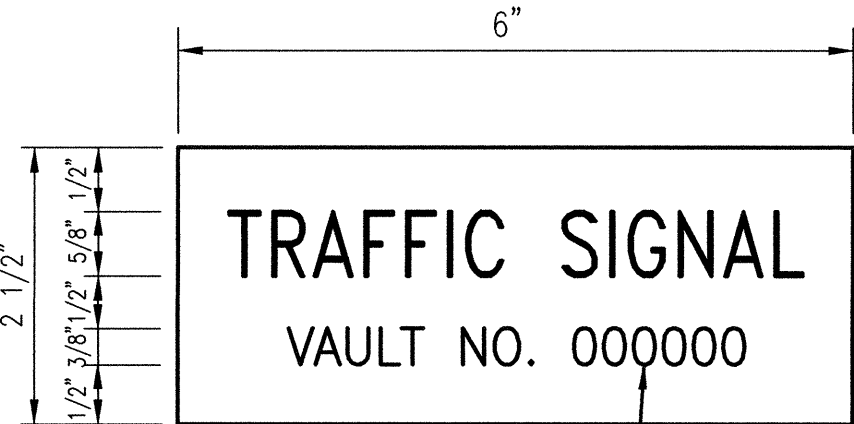
FOUNDATION PLAN

1 DETAIL - CONTROLLER CABINET & UPS CABINET
E-11 SCALE: 1/2" = 1'-0"



ELEVATION - ELECTRICAL SERVICE EQUIPMENT

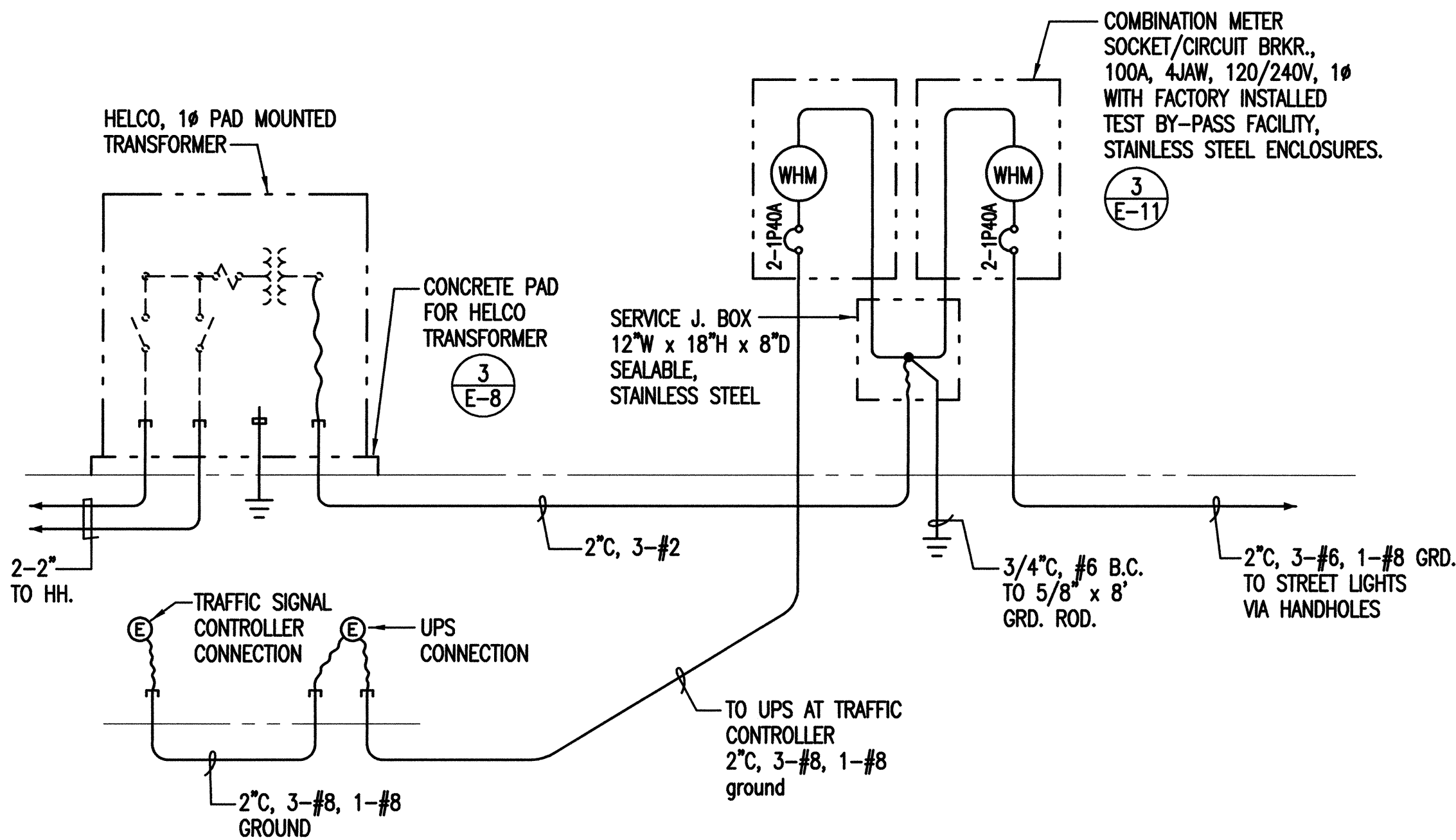
3
E-11



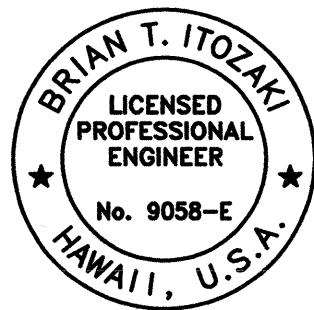
NOTES:

- 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
- ATTACH TO METER SOCKET USING SCOTCH 3M BRAND VERY HIGH BOND (VHB) DOUBLE COATED ACRYLIC FOAM TAPE OR EQUIVALENT.
- LETTERS/NUMBERS SHALL BE 1/16" STROKE, (WHITE IN COLOR).
- LETTERS/NUMBERS AREA INSCRIBED BY CUTTING THROUGH "BLACK CAP SHEET" TO EXPOSE WHITE LETTERS/NUMBERS.

4 DETAIL - METER I.D. TAG
E-11 NOT TO SCALE



5 ONE LINE DIAGRAM
E-11



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL CONTROLLER CABINET
AND UPS DETAILS

Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

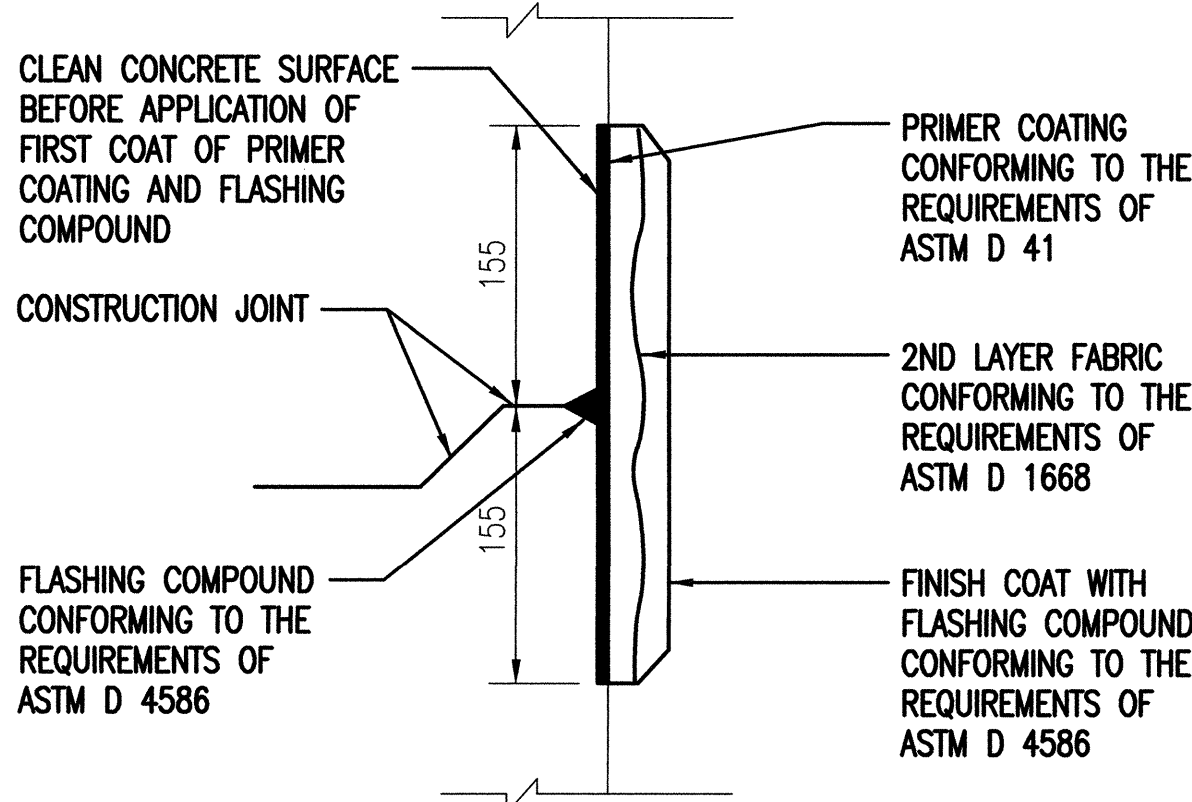
SCALE: AS SHOWN DATE: MAY 2002
SHEET No. E-11 OF 13 SHEETS

E-11

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	33	34

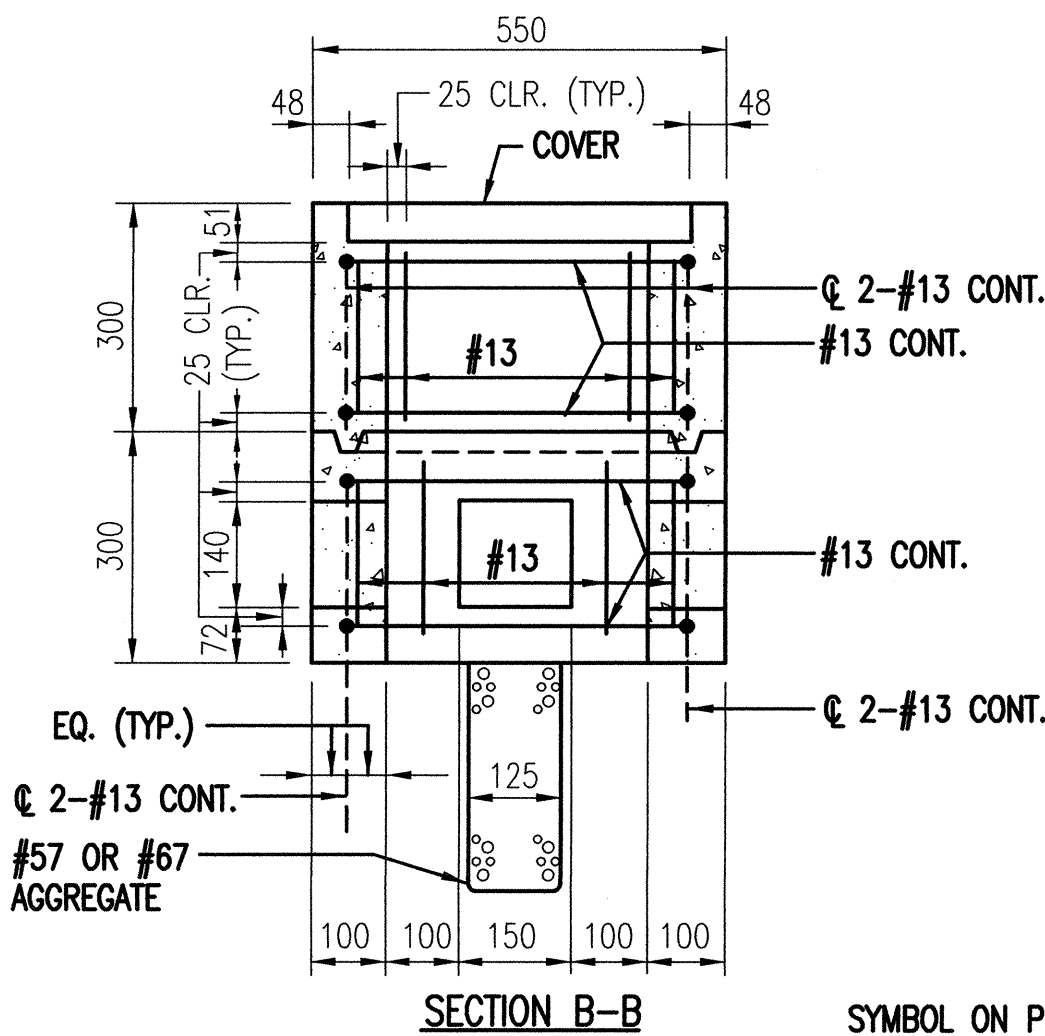
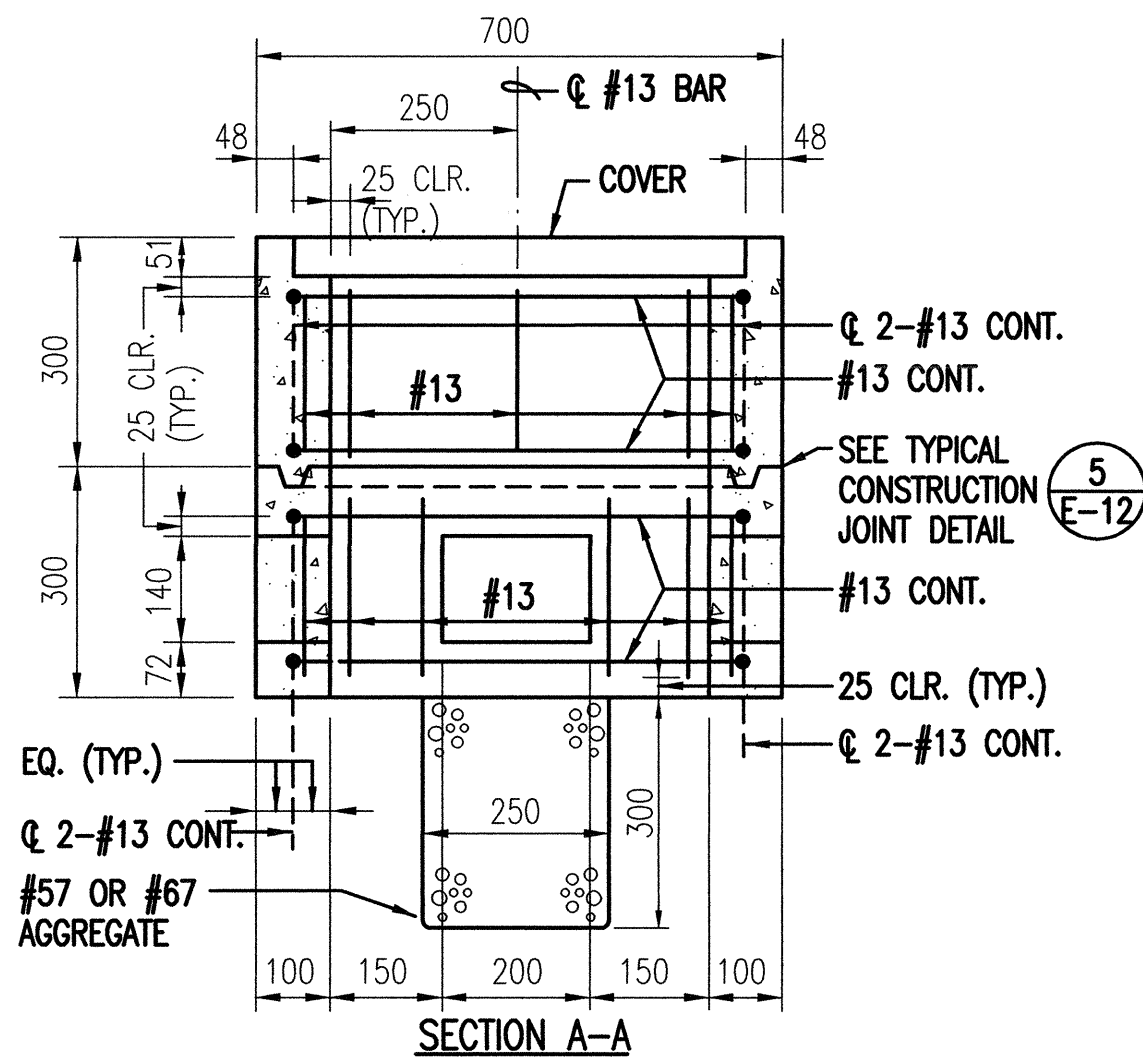
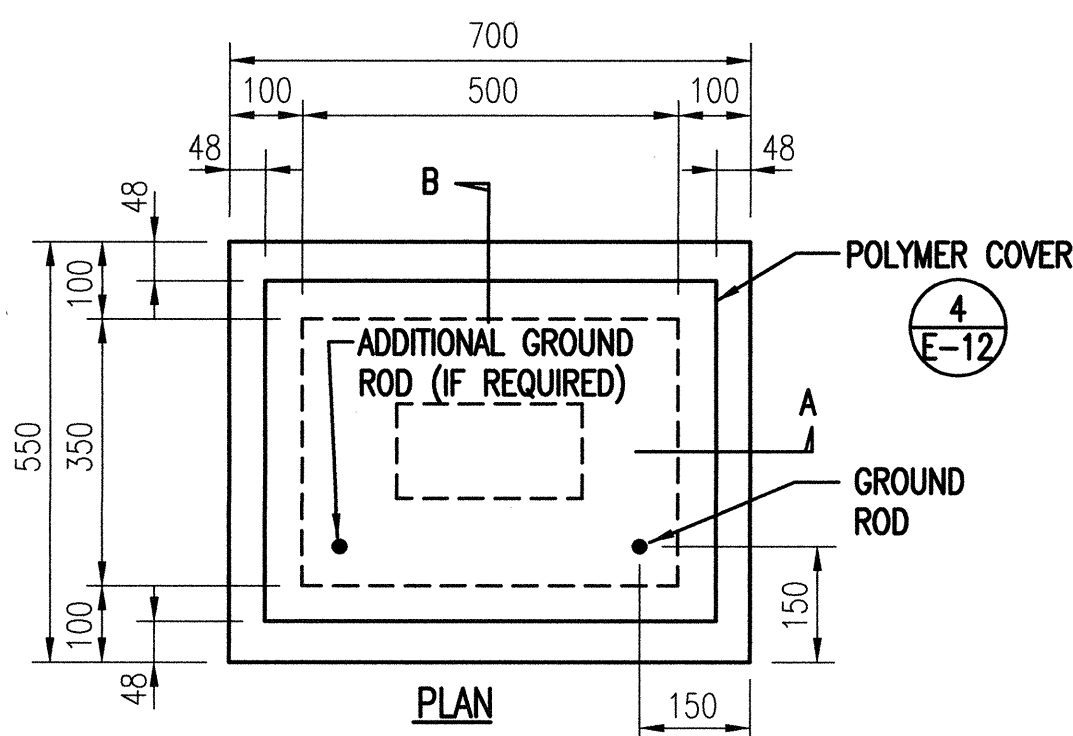
GENERAL NOTES:

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 CONDUIT 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 (25MPA, 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).



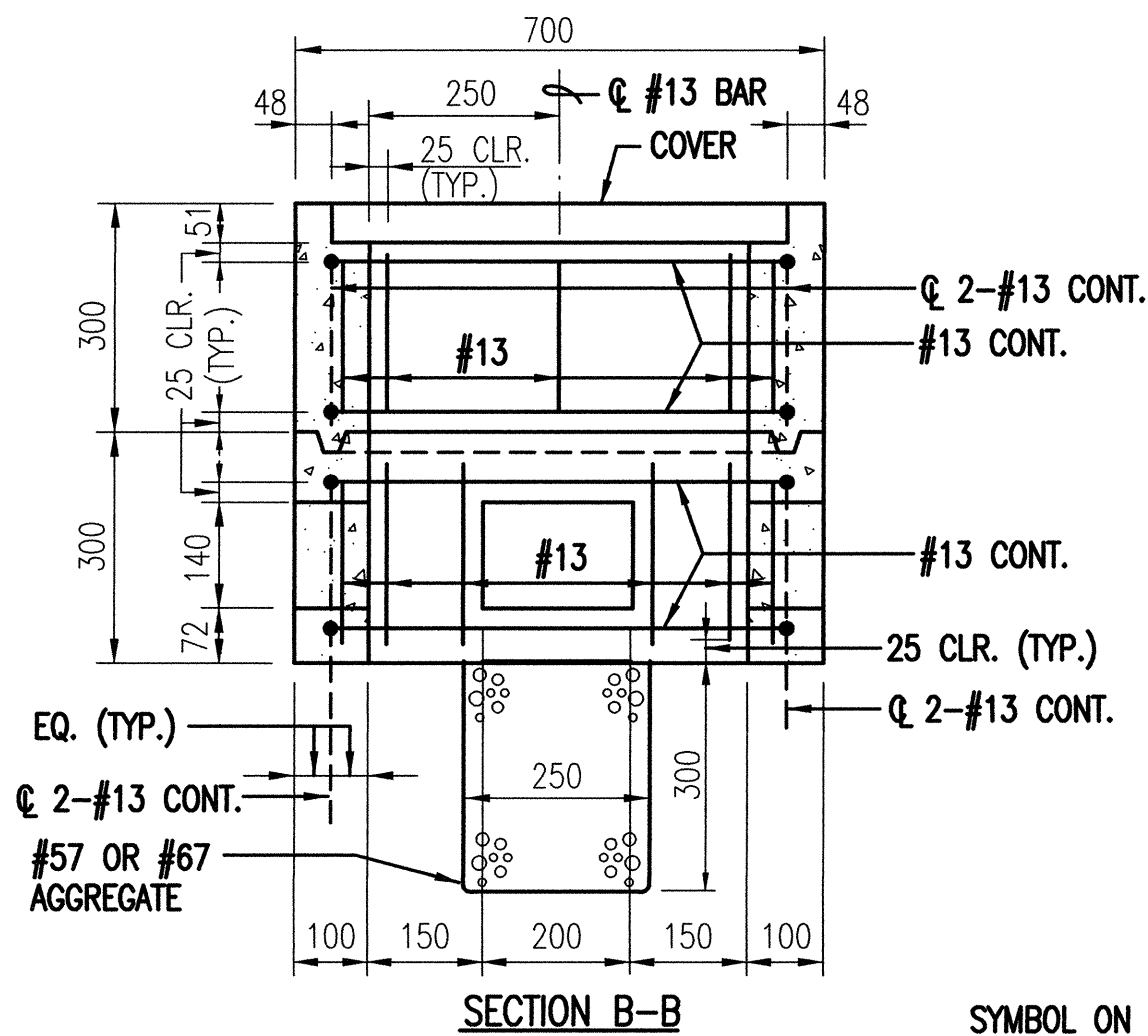
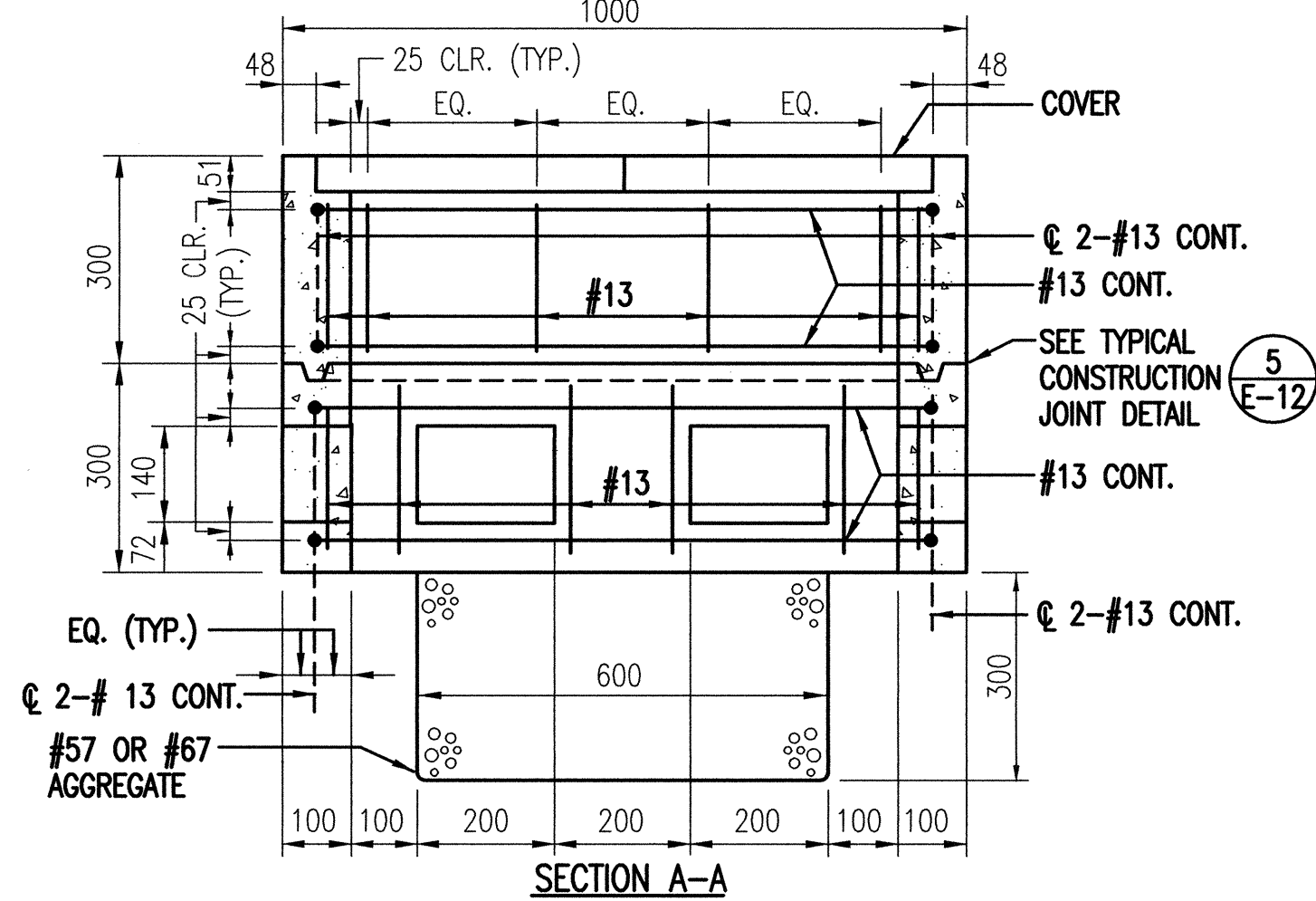
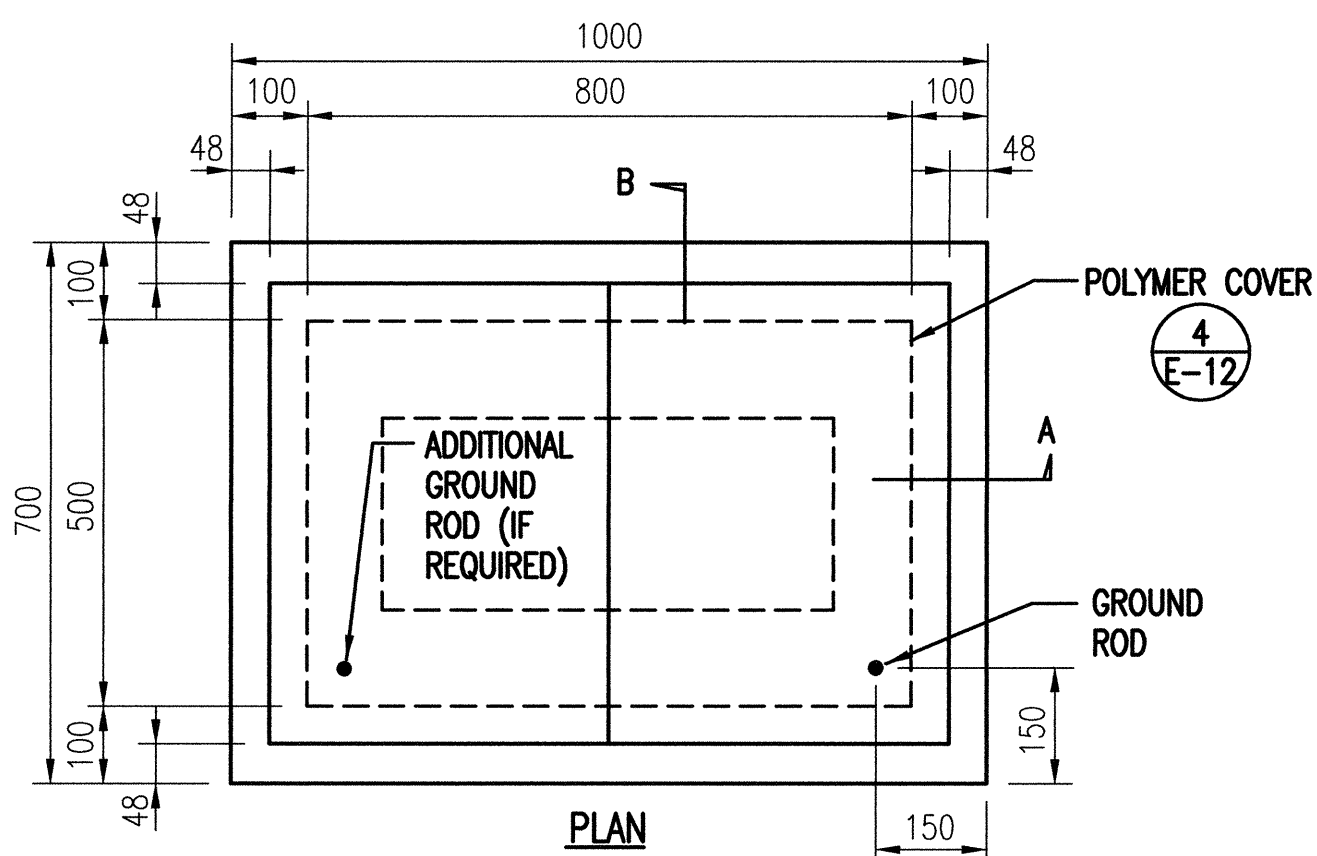
6 TYPICAL FLASHING COMPOUND WATERPROOFING DETAILS NOT TO SCALE

NOTE:
ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE SHOWN.



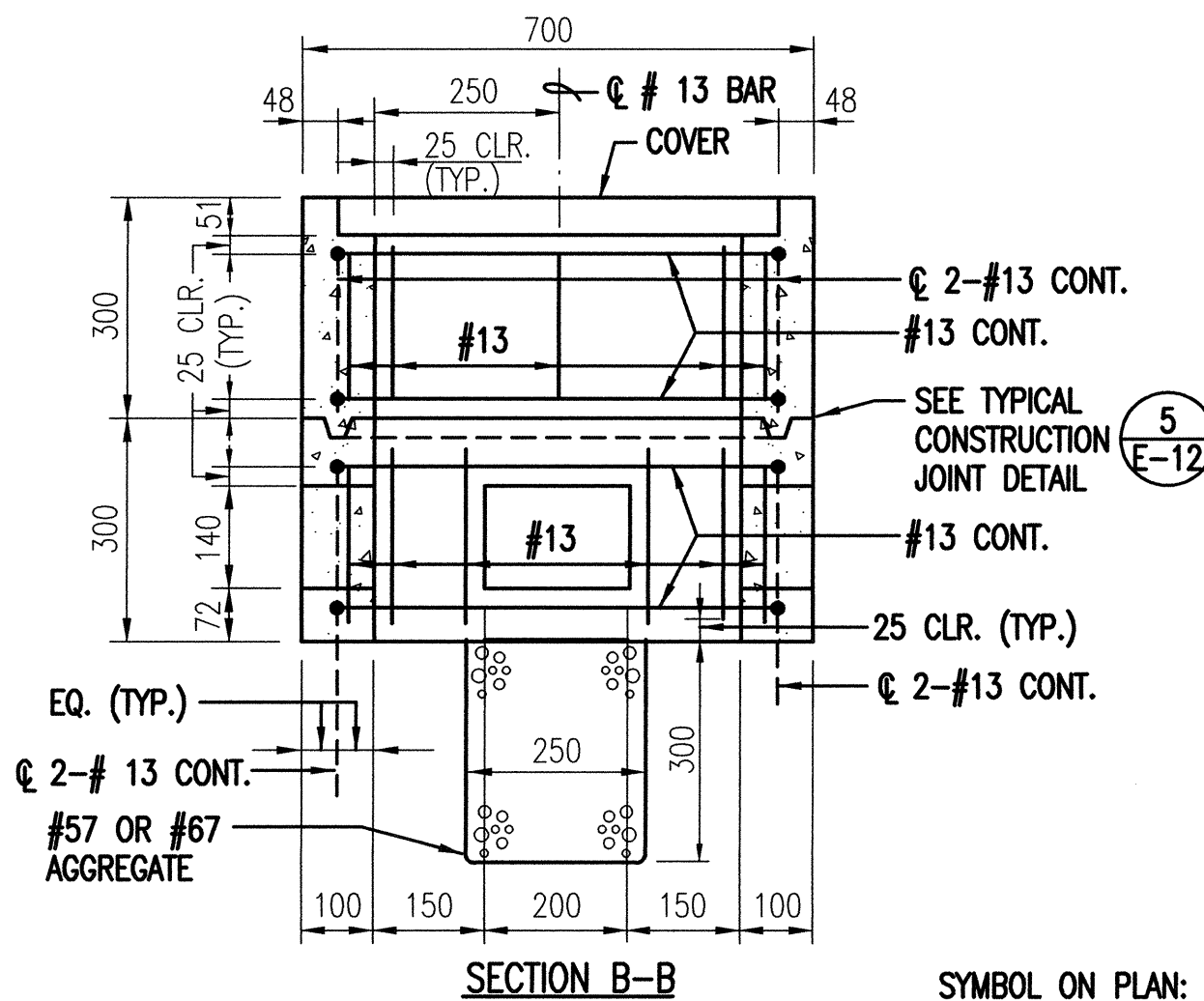
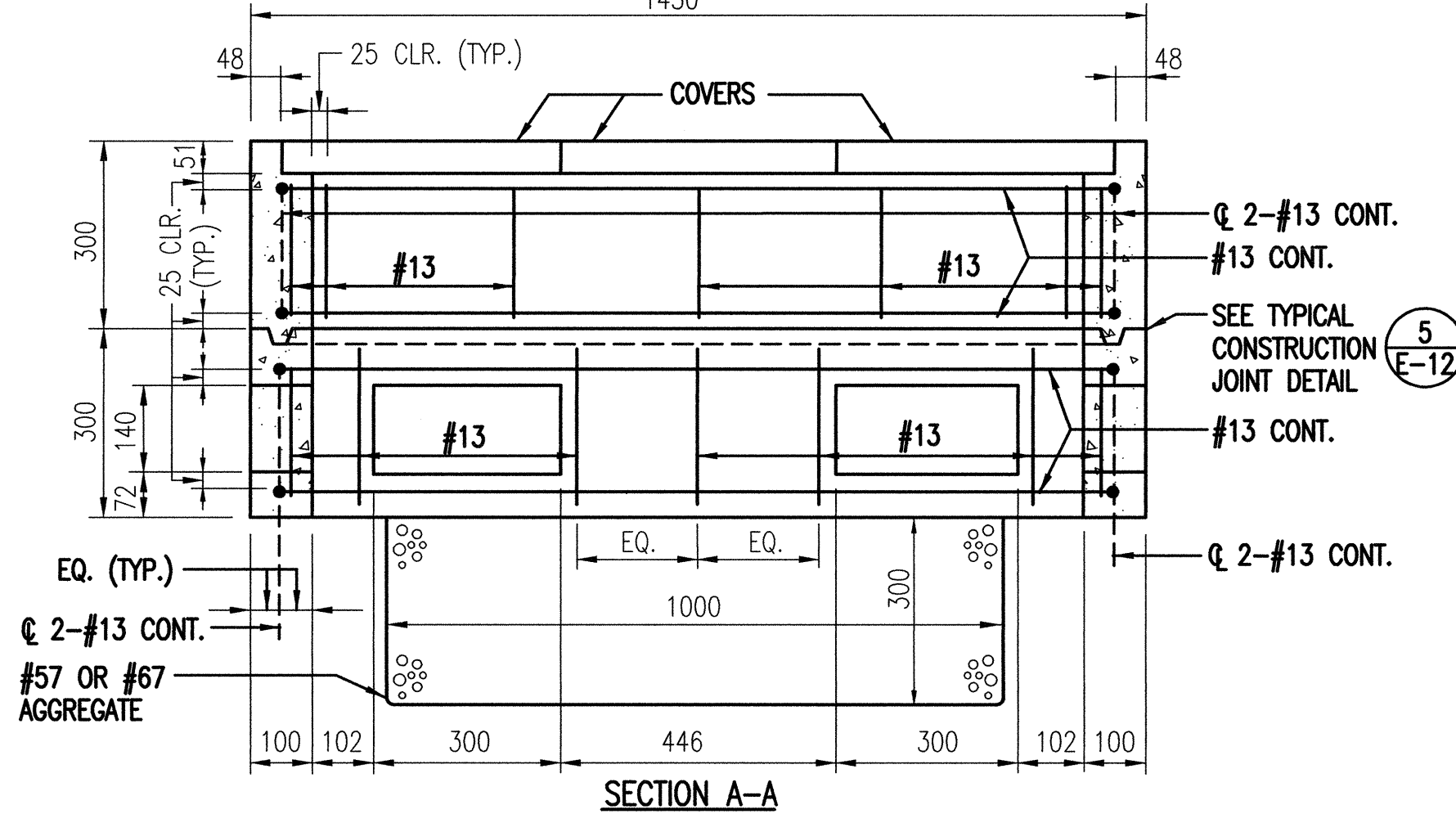
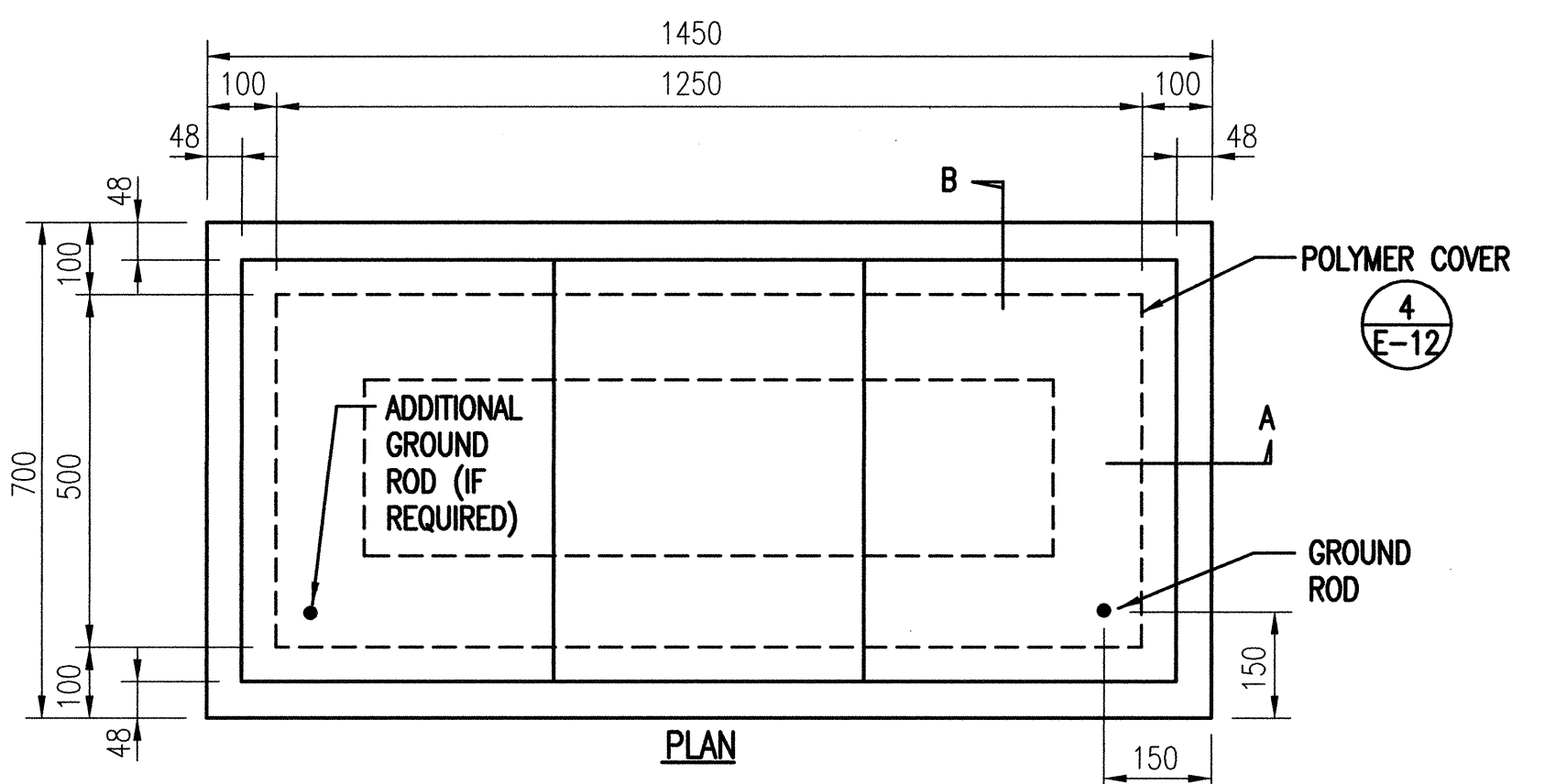
1 TYPE "A" PULLBOX (OLD TYPE "B") SCALE: 1:100

SYMBOL ON PLAN:



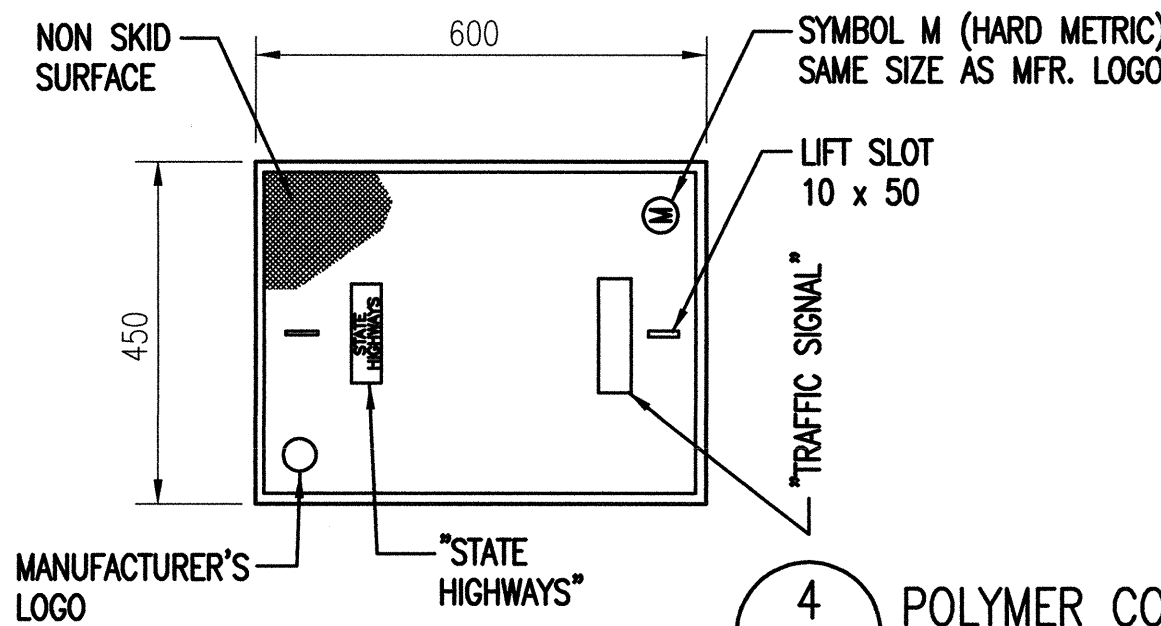
2 TYPE "B" PULLBOX (OLD TYPE "C") SCALE: 1:100

SYMBOL ON PLAN:

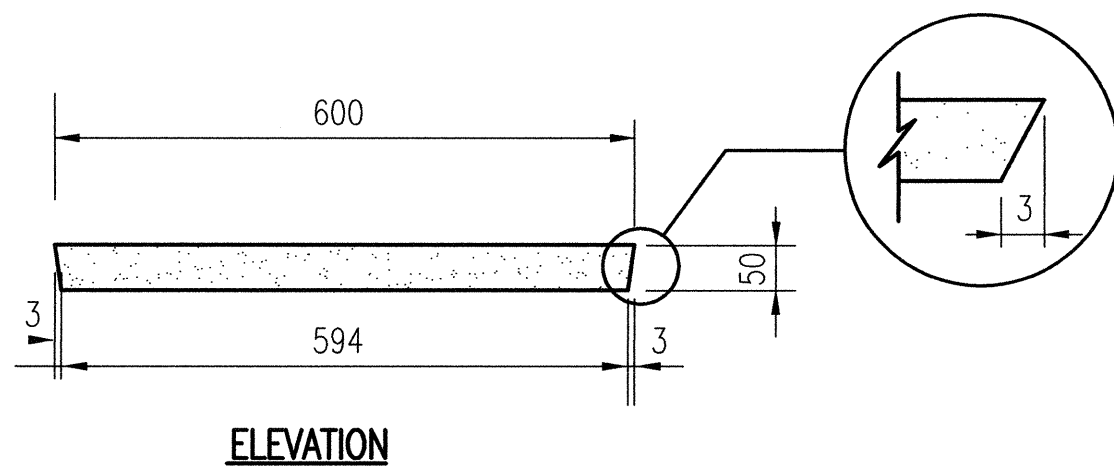


3 TYPE "C" PULLBOX (OLD TYPE "D") SCALE: 1:100

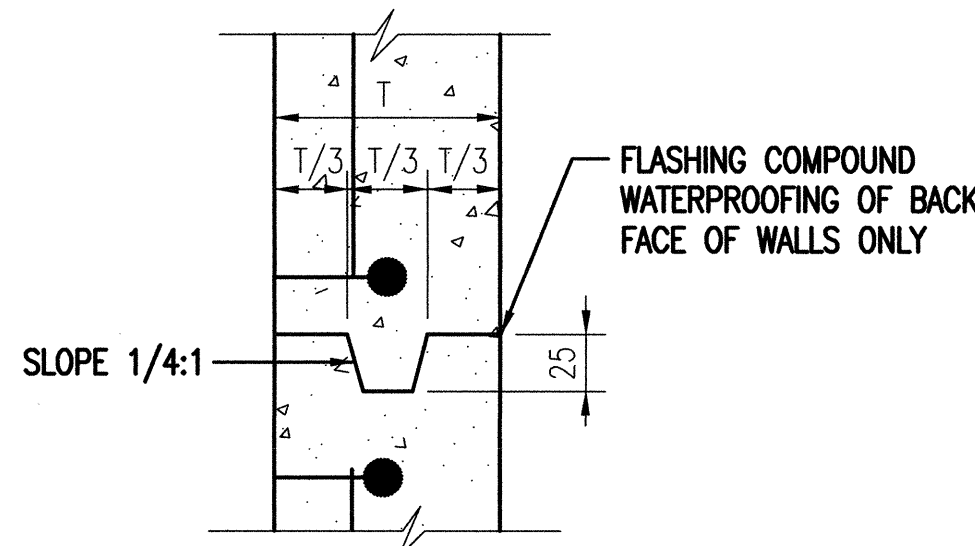
SYMBOL ON PLAN:



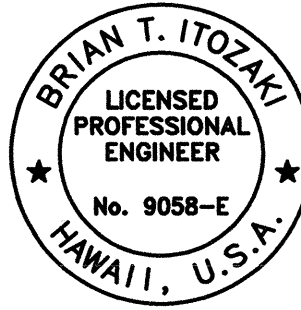
4 POLYMER CONCRETE COVER NOT TO SCALE



ELEVATION



5 TYPICAL CONSTRUCTION JOINT DETAIL NOT TO SCALE



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PULLBOX AND COVER DETAILS

Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

SCALE: AS SHOWN DATE: MAY 2002
SHEET No. E-12 OF 13 SHEETS

E-12

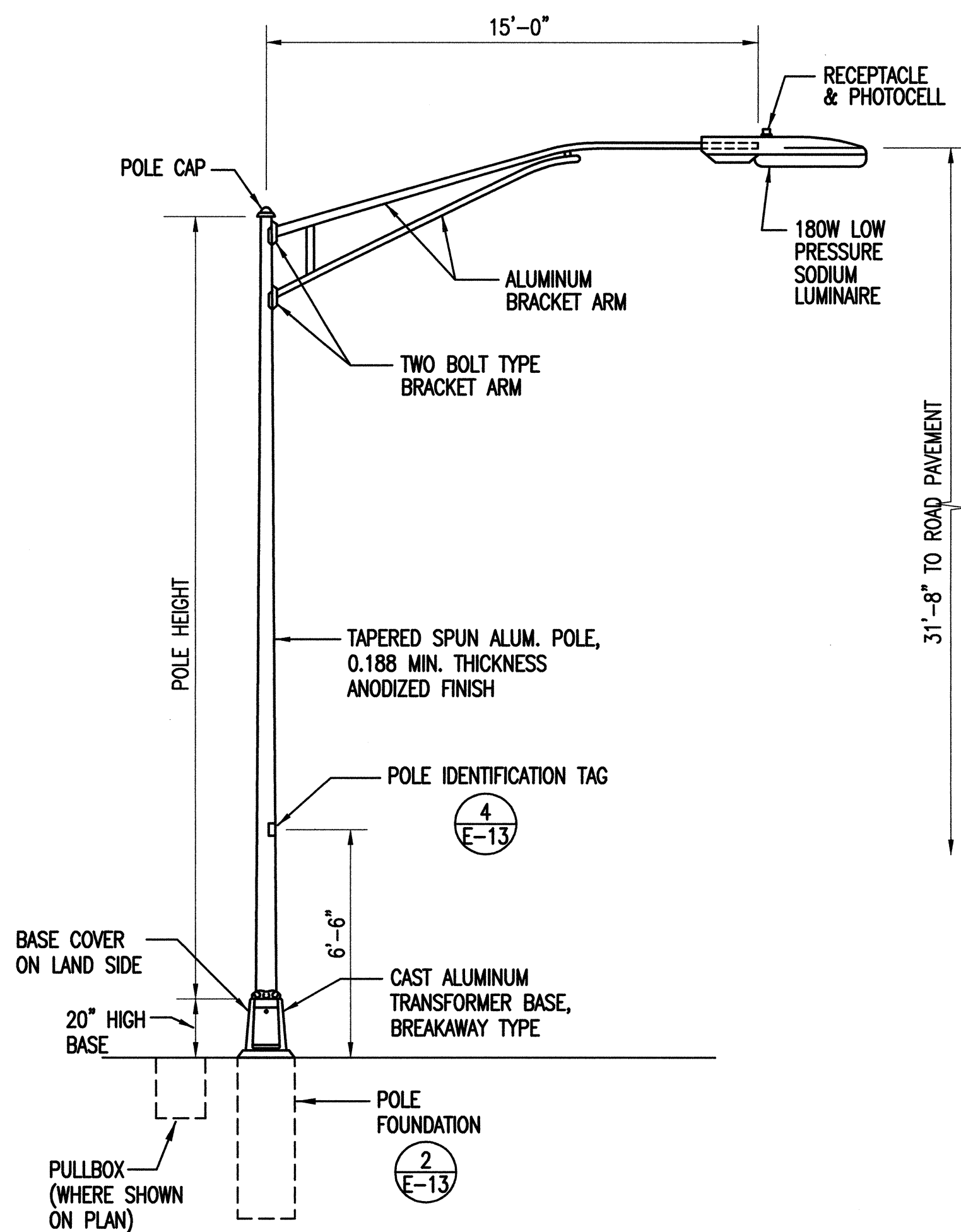
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	19C-01-02	2002	C.O. 34	34

NOTES:

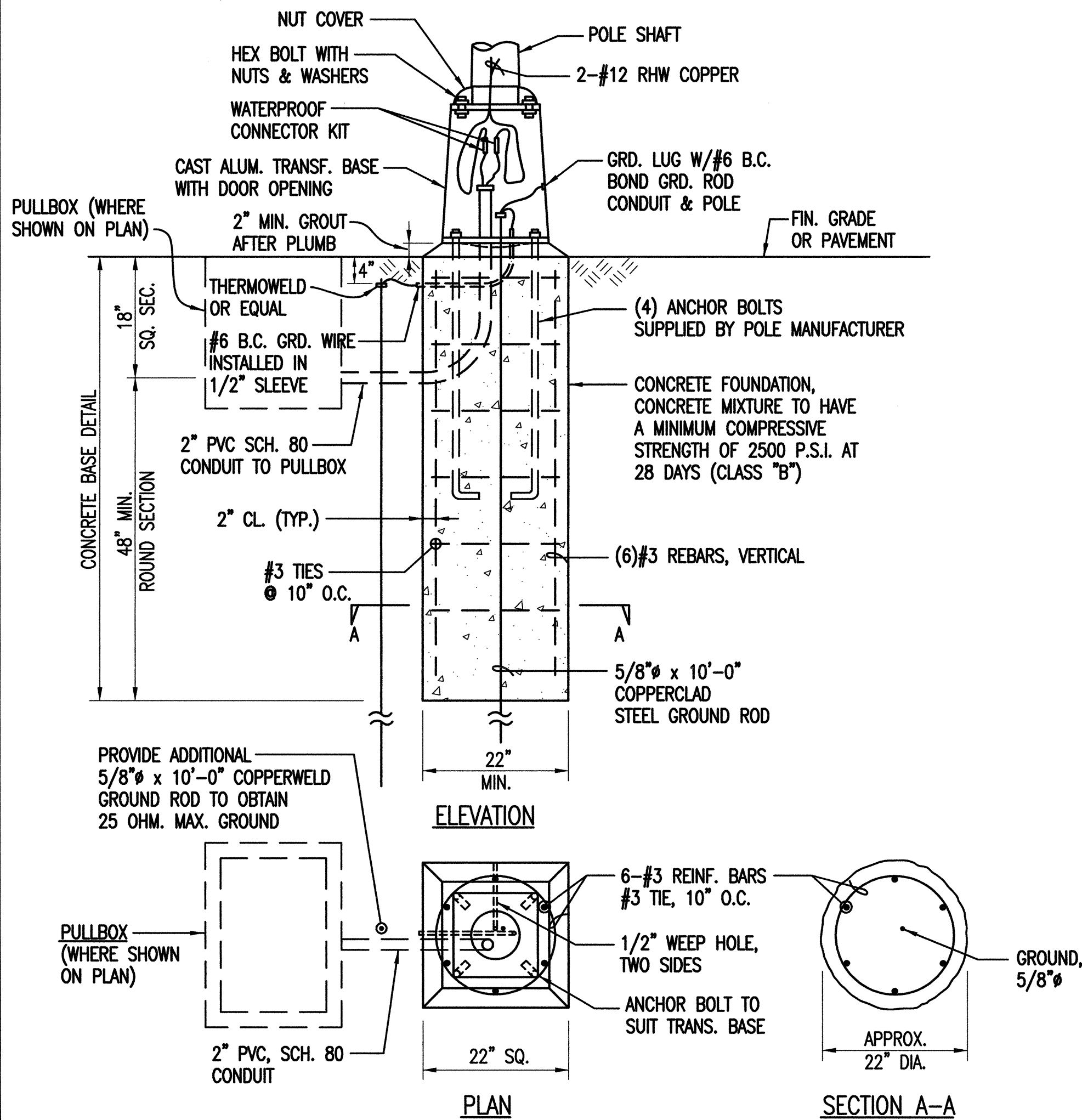
- ALL CONDUIT SHALL BE "PVC" SCHEDULE 80 FOR DIRECT BURIED OR CONCRETE ENCASEMENT.
- BACKFILL OVER CONCRETE DUCT SECTIONS SHALL BE TYPE "A".
- BACKFILL OVER DIRECT BURIED CONDUITS SHALL BE TYPE "B" & TYPE "A".
- IF THE NORMAL MATERIAL IN THE BOTTOM OF A TRENCH CONTAINING A DIRECT BURIAL CONDUIT IS NOT TYPE "B" AN ADDITIONAL 3" SHALL BE EXCAVATED AND TYPE "B" BACKFILL PROVIDED.
- CONCRETE FOR DUCTS TO BE 3000 P.S.I. IN 28 DAYS.
- PROVIDE 2" SEPARATION BETWEEN DUCTS OF SAME SYSTEM. PROVIDE 3" SEPARATION BETWEEN DUCTS OF DIFFERENT SYSTEMS.
- 8 MIL THICK RED COLORED PLASTIC WARNING TAPE 3" WIDE, ENTIRE LENGTH OF DUCT. TAPE TO HAVE CONTINUOUS METALLIC BACKING AND CORROSION RESISTANT FOIL CORE. WARNING AND IDENTIFICATION TO BE IMPRINTED ON TAPE AND SHALL READ "CAUTION BURIED ELECTRIC CABLE BELOW". MESSAGE SHALL BE REPEATED APPROXIMATELY EVERY TEN FEET.

BACKFILL TYPES ARE:

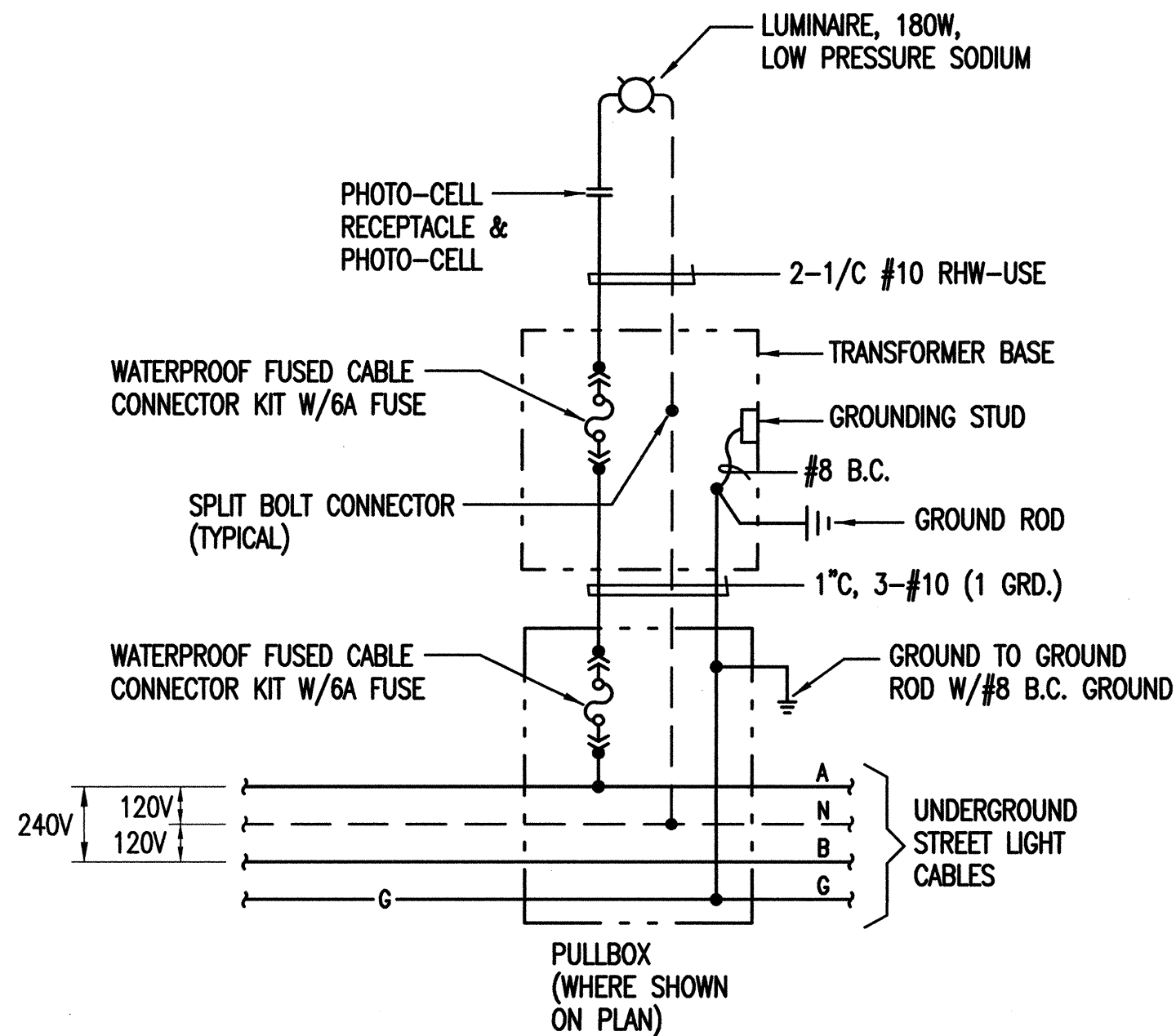
- TYPE "A": BEACH SAND, EARTH OR EARTH AND GRAVEL IF EARTH AND GRAVEL USED, THE MAXIMUM ROCK SIZE SHALL BE 1" AND THE MIXTURE SHALL CONTAIN NOT MORE THAN 50% BY VOLUME OF ROCK PARTICLES.
- TYPE "B": BEACH SAND, EARTH OR EARTH AND GRAVEL IF EARTH AND GRAVEL USED, MIXTURE MUST PASS A 1/2" MESH SREEN AND CONTAIN NOT MORE THAN 20% BY VOLUME OF ROCK PARTICLES.



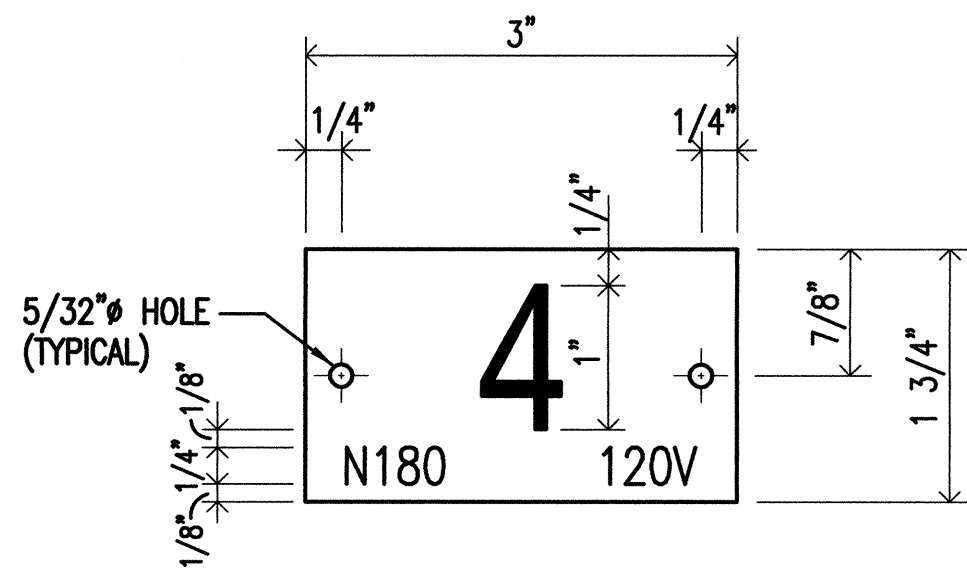
1 TYPICAL STREET LIGHT STANDARD
E-13 NOT TO SCALE



2 DETAIL - CONCRETE FOUNDATION
E-13 NOT TO SCALE



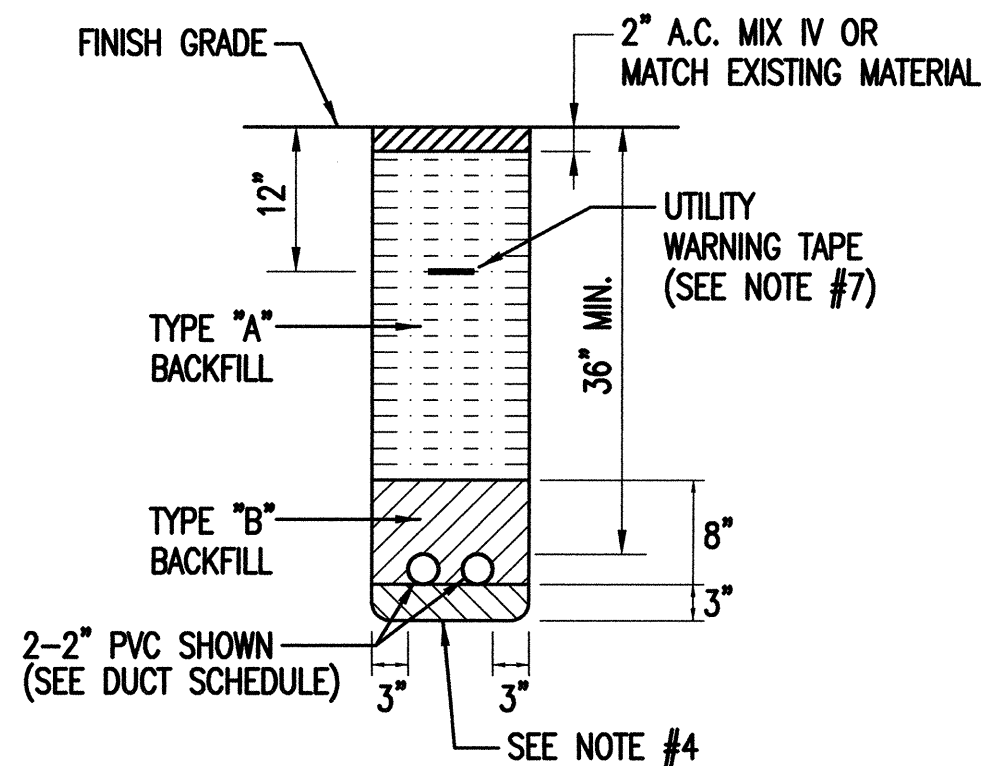
3 CONNECTION DIAGRAM FOR STREET LIGHT
E-13 NOT TO SCALE



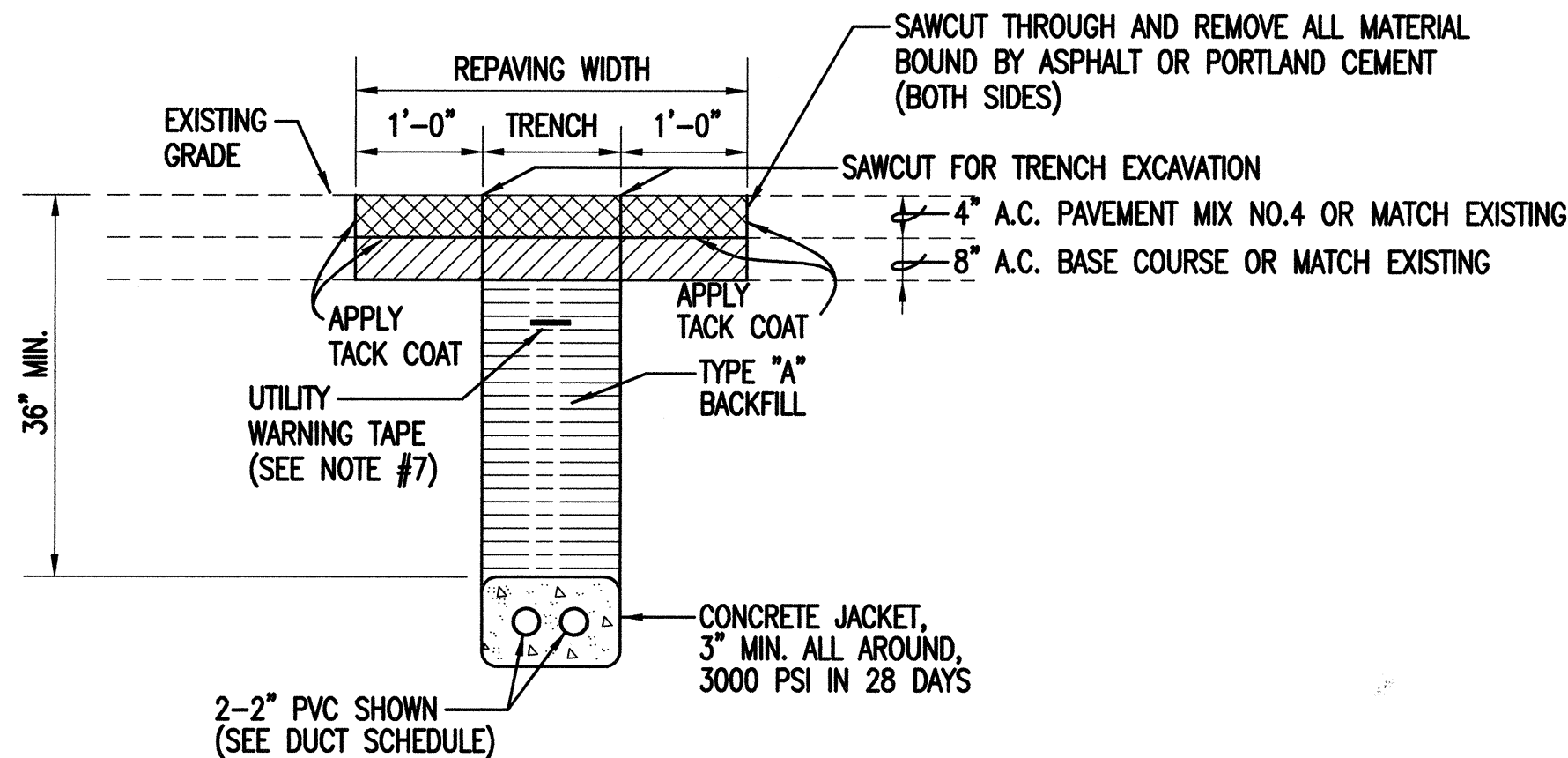
NOTES:

- USE 2-PLY PLASTIC - BLACK, WHITE.
- NUMBER SIZE SHALL BE 1" HIGH AND ENGRAVED 1" WIDE, WHITE IN COLOR (NUMBER AS REQUIRED).
- NOMENCLATURE SHALL BE 1/4" HIGH AND ENGRAVED 1/32" WIDE, WHITE IN COLOR (WATTAGE AND VOLTAGE AS REQUIRED).
- ATTACHED TO ALUM POLES WITH NO. 7 ALUMINUM DRIVE SCREWS.
- USE "N" FOR SODIUM LAMPS.

4 POLE IDENTIFICATION TAG
E-13 NOT TO SCALE



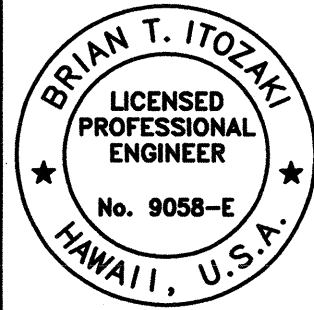
5 TYPICAL DUCT SECTION - "A"
E-13 NON ROADWAY AREA



6 TYPICAL DUCT SECTION - "B"
E-13 IN ROADWAY

6/26/02	REVISED DUCT SECTION INFORMATION PER CHANGE ORDER
DATE	REVISION

E-13



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL STREET LIGHT STANDARD DETAILS

Queen Kaahumanu Highway
Traffic Operational Improvements
At Waikoloa Beach Drive and Waikoloa Road
Project No. 19C-01-02

SCALE: AS SHOWN DATE: APR. 2002
SHEET No. E-13 OF 13 SHEETS