

SURVEY PLOTTED BY
DATE
DRAWN BY
TRACED BY
DESIGNED BY
CHECKED BY

ORIGINAL
PLAN
NOTE BOOK
No.

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 30 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 (DOSH).

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.

ELECTRICAL UTILITY NOTE:

THE ELECTRICAL SERVICE INSTALLATION SHALL COMPLY WITH HELCO'S REQUIREMENTS, AS INDICATED ON HELCO'S CONSTRUCTION PROJECT DRAWINGS. WHERE HELCO'S DRAWINGS DIFFER FROM THE ELECTRICAL CONSULTANT'S PLANS, ANY DISCREPANCIES MUST BE RESOLVED PRIOR TO THE START OF ANY ELECTRICAL SERVICE WORK. IN NO EVENT SHALL HELCO'S REVIEW OF OR FAILURE TO REVIEW THE ELECTRICAL CONSULTANT'S PLAN CONSTITUTE AN ENDORSEMENT OR WARRANTY OF SUCH PLANS, NOR AS A WAIVER OF ANY RIGHT BY HELCO, AND CONTRACTOR AND CONSULTANT SHALL BE RESPONSIBLE IN ALL RESPECTS FOR SUCH PLANS AND FOR ANY LIABILITY INCURRED IN RELATION TO THE ELECTRICAL SERVICE INSTALLATION PERFORMED PURSUANT TO SUCH PLANS.

NOTES FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS

STRUCTURAL SUPPORT FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS AND AS MODIFIED IN THE FOLLOWING:

1. BASIC WIND SPEED [ARTICLE 3.8.2] TO DETERMINE THE DESIGN WIND PRESSURE SHALL BE 105 MPH. FOR UNUSUAL OR DIFFERING EXPOSURE CONDITIONS, THE BASIC WIND SPEED SHOULD BE INCREASED USING RATIONAL PROCEDURES AND SOUND ENGINEERING JUDGEMENT. ALTERNATIVELY, THE DESIGN WIND PRESSURE MAY BE INCREASED BY USING A HIGHER WIND IMPORTANCE FACTOR [TABLE 3-2] CORRESPONDING TO A RECURRENCE INTERVAL OF AT LEAST ONE LEVEL GREATER THAN RECOMMENDED.

2. WIND IMPORTANCE FACTOR [ARTICLE 3.8.3] NOTED IN TABLE 3-2 USED TO DETERMINE THE DESIGN WIND PRESSURE FOR OVERHEAD CANTILEVERED SIGN SUPPORT STRUCTURES OVER:

A. FREEWAYS SHALL BE BASED ON A RECURRENCE INTERVAL OF 100 YEARS.
B. RAMPS AND OTHER HIGHWAYS WITH "HIGH" ADT SHALL BE BASED ON A RECURRENCE INTERVAL OF 100 YEARS UNLESS OTHERWISE DIRECTED.

3. HEIGHT AND EXPOSURE FACTOR [ARTICLE 3.8.4]. FOR SIGN AND LUMINAIRE SUPPORT STRUCTURES ON BRIDGES, THE HEIGHT AND EXPOSURE FACTOR SHALL BE DETERMINED BASED ON THE MAXIMUM HEIGHT THEY ARE ABOVE THE SURROUNDING GROUND. FOR SEVERE EXPOSURE CONDITIONS SUCH AS ALONG THE COASTLINE, THE FACTOR SHALL BE INCREASED BASED ON THE LATEST ASCE STANDARD NO. 7, MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.

4. FATIGUE IMPORTANCE FACTORS [ARTICLE 11.6] NOTED IN TABLE 11-1 FOR OVERHEAD CANTILEVERED SIGN, TRAFFIC SIGNAL AND LUMINAIRE SUPPORT STRUCTURES SHALL BE BASED ON THE FOLLOWING:

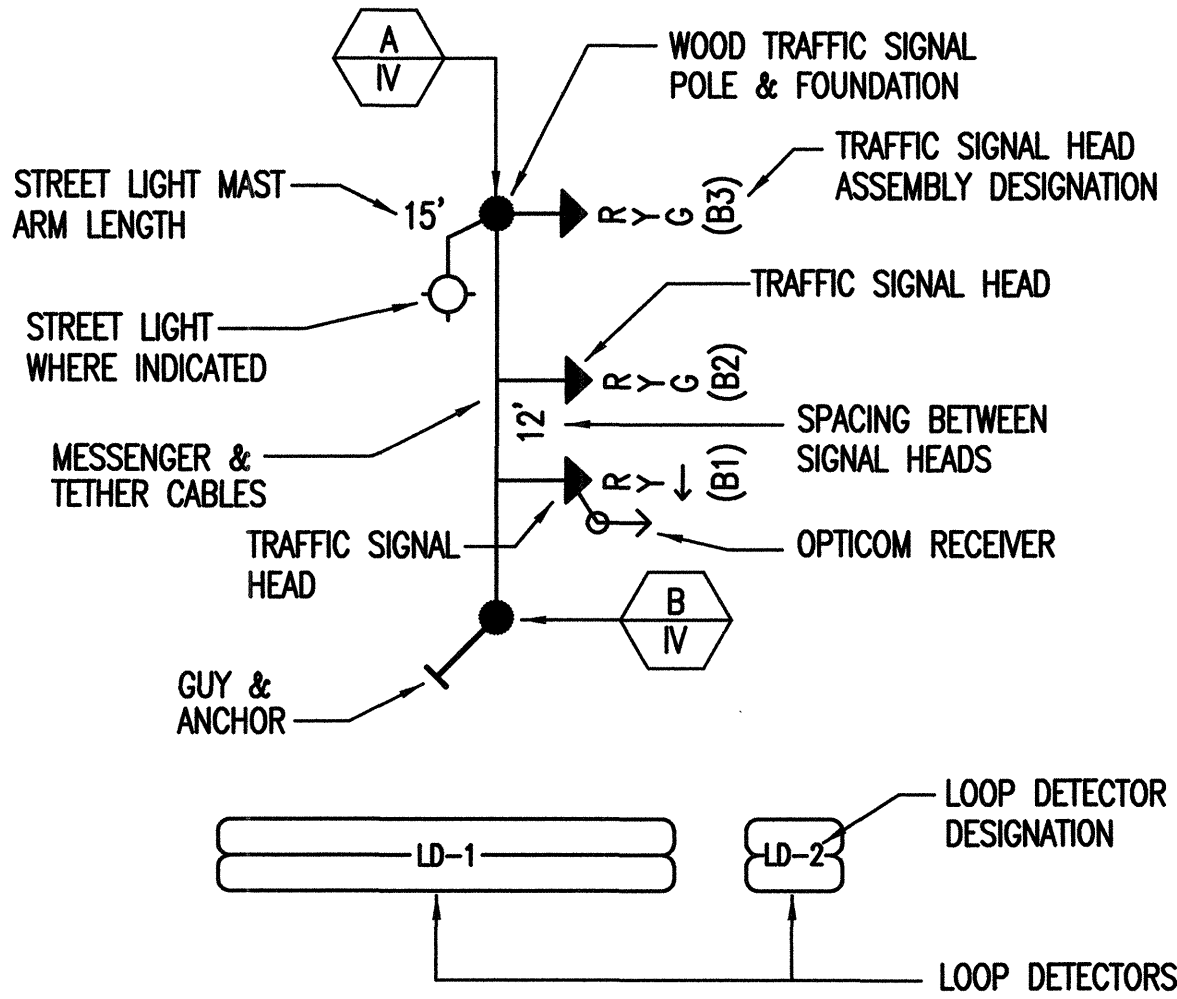
A. FATIGUE CATEGORY I – FOR ALL STRUCTURES WHERE FAILURE WOULD RESULT IN THE STRUCTURE FALLING ONTO THE TRAVEL WAY.
B. FATIGUE CATEGORY II – FOR ALL OTHERS.

5. GALLOPING [ARTICLE 11.7.1]. OVERHEAD CANTILEVERED SIGN AND TRAFFIC SIGNAL SUPPORT STRUCTURES SHALL BE DESIGNED FOR GALLOPING-INDUCED CYCLIC LOADS UNLESS APPROVED VIBRATION MITIGATION DEVICES ARE INSTALLED. AS ALONG THE COASTLINE, THE FACTOR SHALL BE INCREASED BASED ON THE LATEST ASCE STANDARD NO. 7, MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.

6. VORTEX SHEDDING [ARTICLE 11.7.2]. NONTAPERED LIGHTING STRUCTURES SHALL BE DESIGNED TO RESIST VORTEX SHEDDING-INDUCED LOADS INCLUDING CANTILEVERED MAST ARMS AND LIGHTING STRUCTURES THAT HAVE TAPERS LESS THAN 0.14 IN/FT.

7. NATURAL WIND GUST [ARTICLE 11.7.3]. OVERHEAD CANTILEVERED SIGN, TRAFFIC SIGNAL, AND HIGH-LEVELLIGHTING SUPPORT STRUCTURES SHALL BE DESIGNED TO RESIST AN EQUIVALENT STATIC NATURAL WIND GUST PRESSURE. FOR UNUSUAL OR DIFFERING EXPOSURE CONDITIONS, THE EQUIVALENT STATIC NATURAL WIND GUST PRESSURE SHOULD BE INCREASED USING REFERENCES NOTED IN THE SPECIFICATIONS.

8. TRUCK-INDUCED GUST [ARTICLE 11.7.4]. OVERHEAD CANTILEVERED SIGN AND TRAFFIC SIGNAL SUPPORT STRUCTURES SHALL BE DESIGNED TO RESIST AN EQUIVALENT STATIC TRUCK GUST PRESSURE RANGE BASED ON A TRUCK SPEED OF 65 MPH. AT THE OPTION OF THE STATE DOT, A LOWER TRUCK SPEED MAY BE USED IN AREAS WITH DESIGN SPEEDS NOT EXCEEDING 45 MPH.



LEGEND

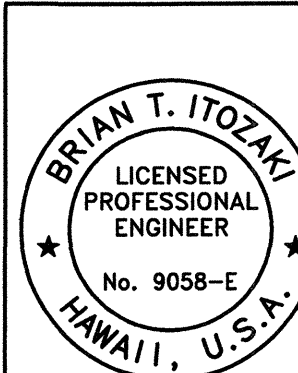
ABBREVIATIONS:

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.	11A-01-02	2003	20	30

ELECTRICAL SYMBOL LIST

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



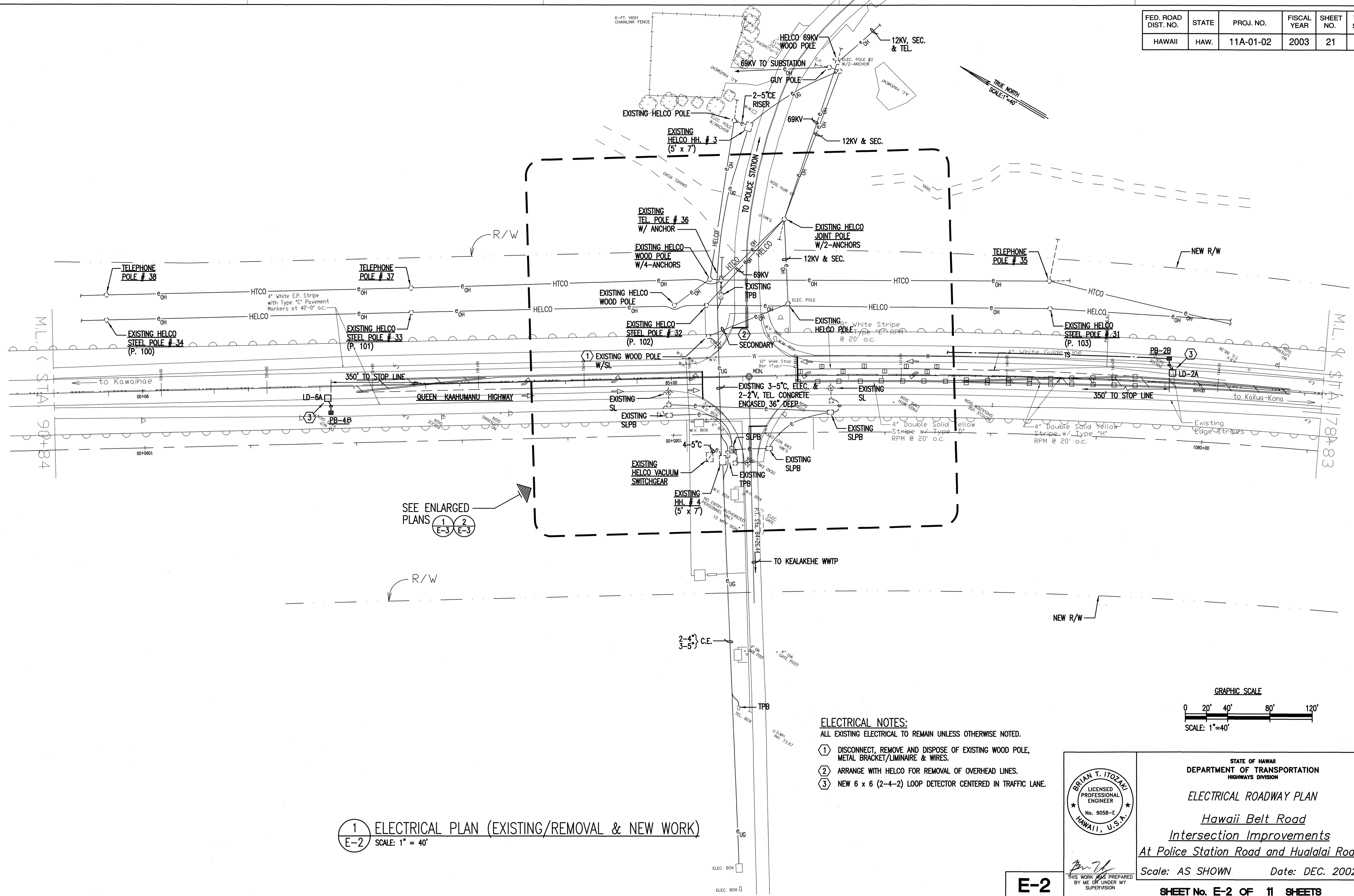
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GENERAL NOTES, TRAFFIC SIGNAL AND STREET LIGHTING NOTES, AND ELECTRICAL SYMBOL LIST
Hawaii Belt Road
Intersection Improvements
At Police Station Road and Hualalai Road
Scale: AS SHOWN Date: DEC. 2002

E-1

SHEET No. E-1 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	11A-01-02	2003	21	30



SEE ENLARGED PLANS
1 E-3 2 E-3

- ELECTRICAL NOTES:**
ALL EXISTING ELECTRICAL TO REMAIN UNLESS OTHERWISE NOTED.
- 1 DISCONNECT, REMOVE AND DISPOSE OF EXISTING WOOD POLE, METAL BRACKET/LIMINAIRE & WIRES.
 - 2 ARRANGE WITH HELCO FOR REMOVAL OF OVERHEAD LINES.
 - 3 NEW 6 x 6 (2-4-2) LOOP DETECTOR CENTERED IN TRAFFIC LANE.

1 ELECTRICAL PLAN (EXISTING/REMOVAL & NEW WORK)
E-2 SCALE: 1" = 40'

BRIAN T. ITOZAKI
LICENSED PROFESSIONAL ENGINEER
No. 9058-E
HAWAII, U.S.A.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL ROADWAY PLAN

Hawaii Belt Road
Intersection Improvements
At Police Station Road and Hualalai Road

Scale: AS SHOWN Date: DEC. 2002

E-2

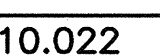
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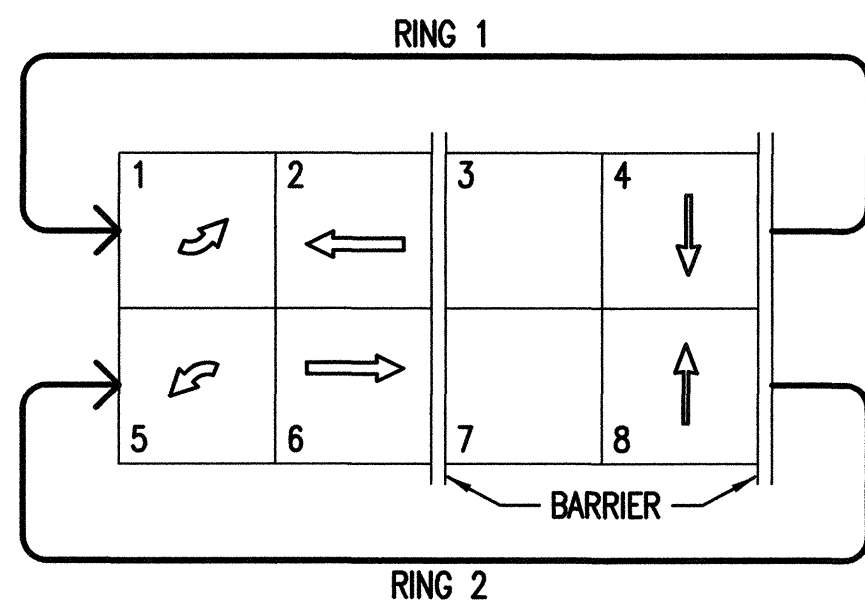
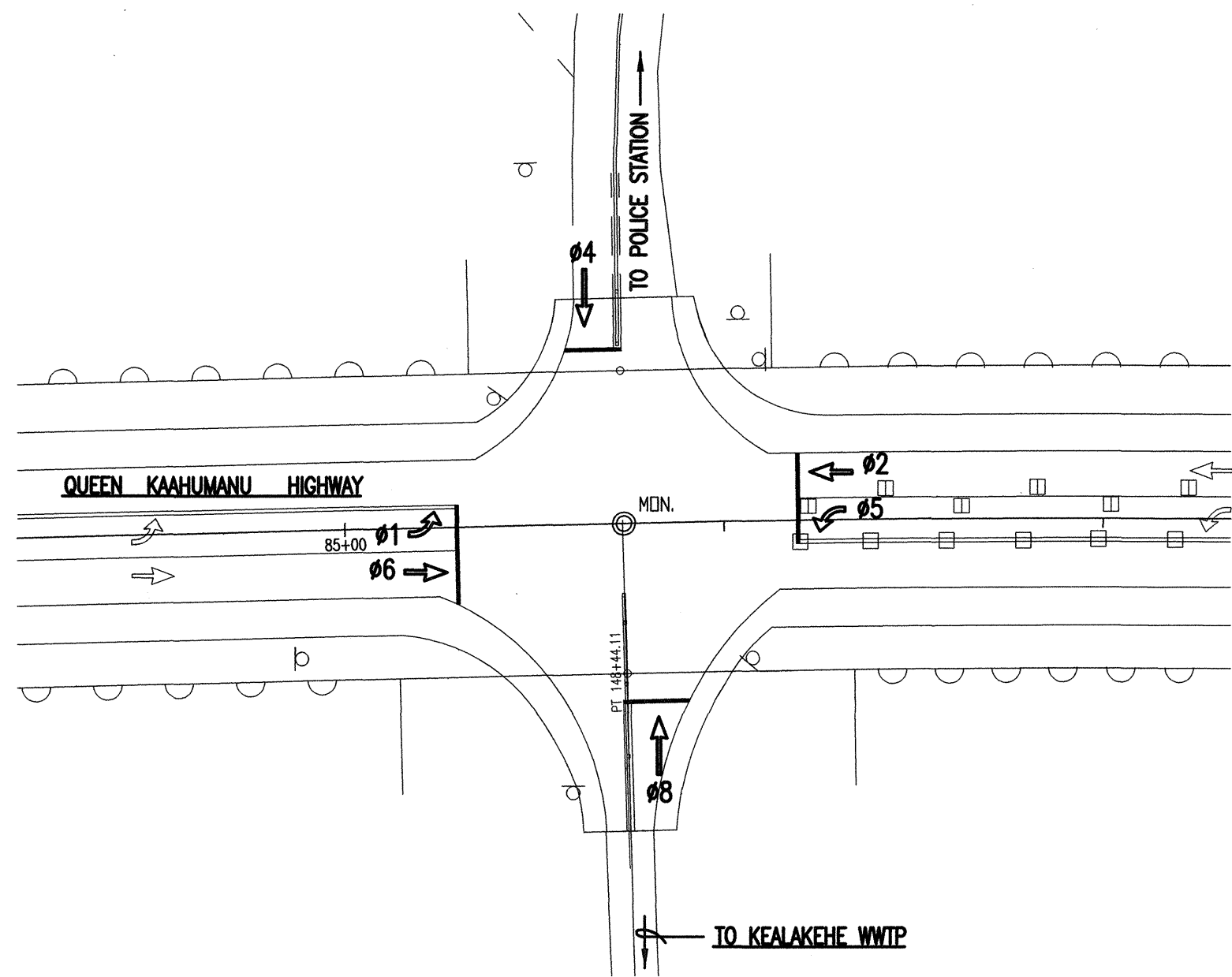
SHEET No. E-2 OF 11 SHEETS

21

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
DESIGNED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

ORIGINAL PLAN	SURVEY PLOTTED BY _____	DATE _____
NOTE BOOK	DRAWN BY _____	_____
	TRACED BY _____	_____
	DESIGNED BY _____	_____
	QUANTITIES BY _____	_____
No. _____	CHECKED BY _____	_____





PHASE DIAGRAM

LOOP DETECTOR ASSIGNMENTS

LD-#	AMPLIFIER UNIT	CHANNEL	PHASE-NOTES
1 & 2	A	1	Ø2
3	A	1	Ø1
4	B	3	Ø4
5 & 6	B	2	Ø6
7	A	2	Ø5
8	C	1	Ø8
2A	C	1	PROGRAMMABLE EXTEND
6A	D	1	PROGRAMMABLE EXTEND

1 PHASE ASSIGNMENTS
E-4

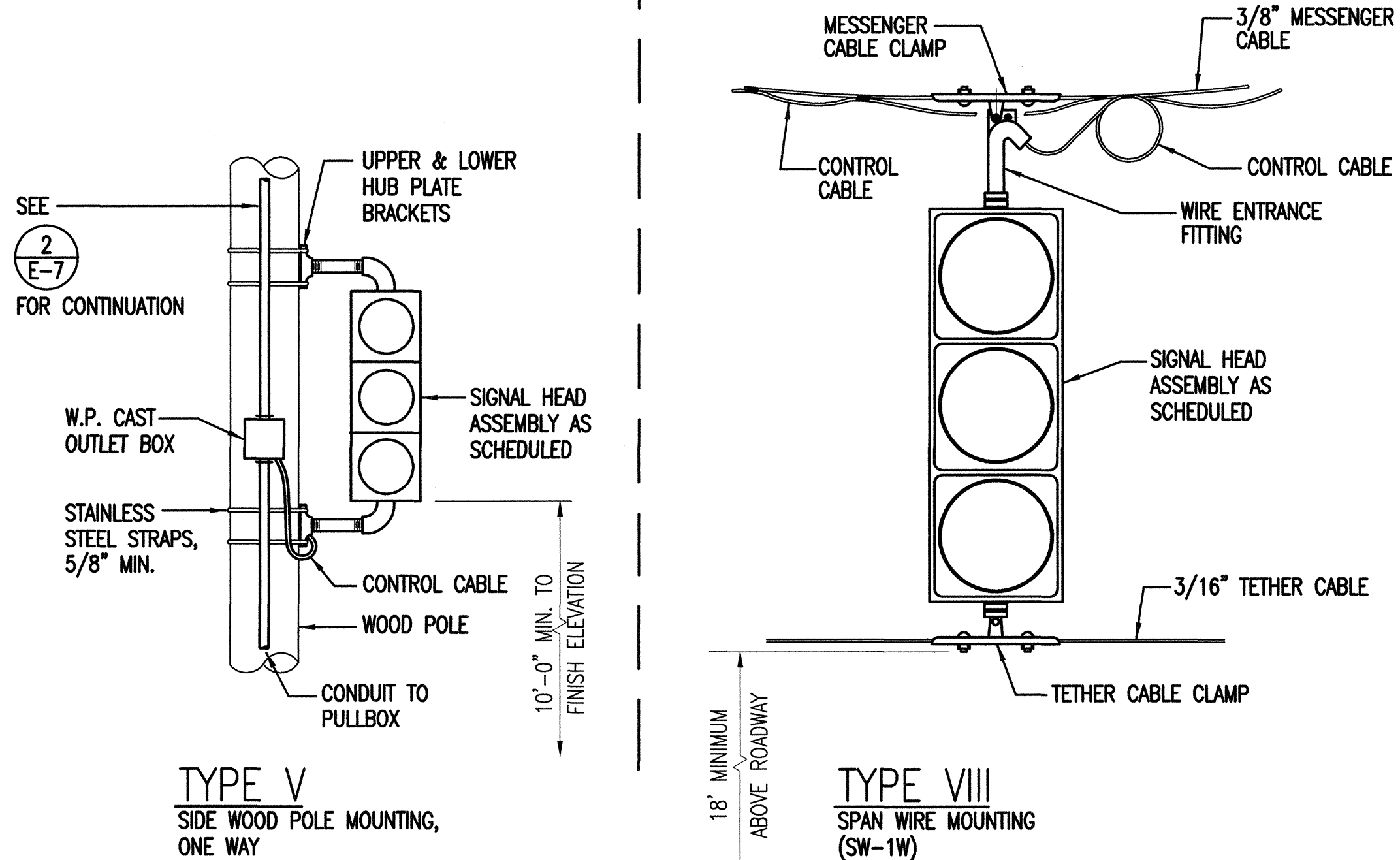
LEGEND:
R = RED
Y = YELLOW
G = GREEN
← = ARROW
A - 2 - III
POLE NO. SIGNAL HEAD LOCATION
SIGNAL HEAD MOUNTING TYPE

				SIGNAL HEAD TYPE
12" RYG TRAFFIC SIGNAL HEAD (L.E.D. SIGNAL ASSEMBLY)		12" RY ^G TRAFFIC SIGNAL HEAD (L.E.D. SIGNAL ASSEMBLY)	12" RY ^G TRAFFIC SIGNAL HEAD (L.E.D. SIGNAL ASSEMBLY)	DESCRIPTION
A-2- VIII (a) A-3- VIII (a) A-4- V B-1- VIII (a) B-2- VIII (a) C-2- VIII (a) C-3- VIII (a) C-4- V D-1- VIII (a) D-2- VIII (a)		B-3- V D-3- V	A-1- VIII (a) * C-1- VIII (a) *	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 POLES A, B, C, & D. INSTALL TWO (2) MARKERS PER POLE.
ALL SIGNAL HEADS SHALL BE L.E.D. TYPE.

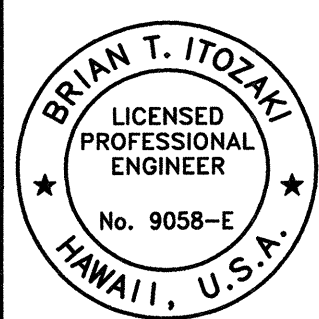
2 TRAFFIC SIGNAL TYPE, LOCATION AND MOUNTING SCHEDULE
E-4



3 SIGNAL ASSEMBLY MOUNTING
E-4 NOT TO SCALE

CONDUIT/CABLE SCHEDULE

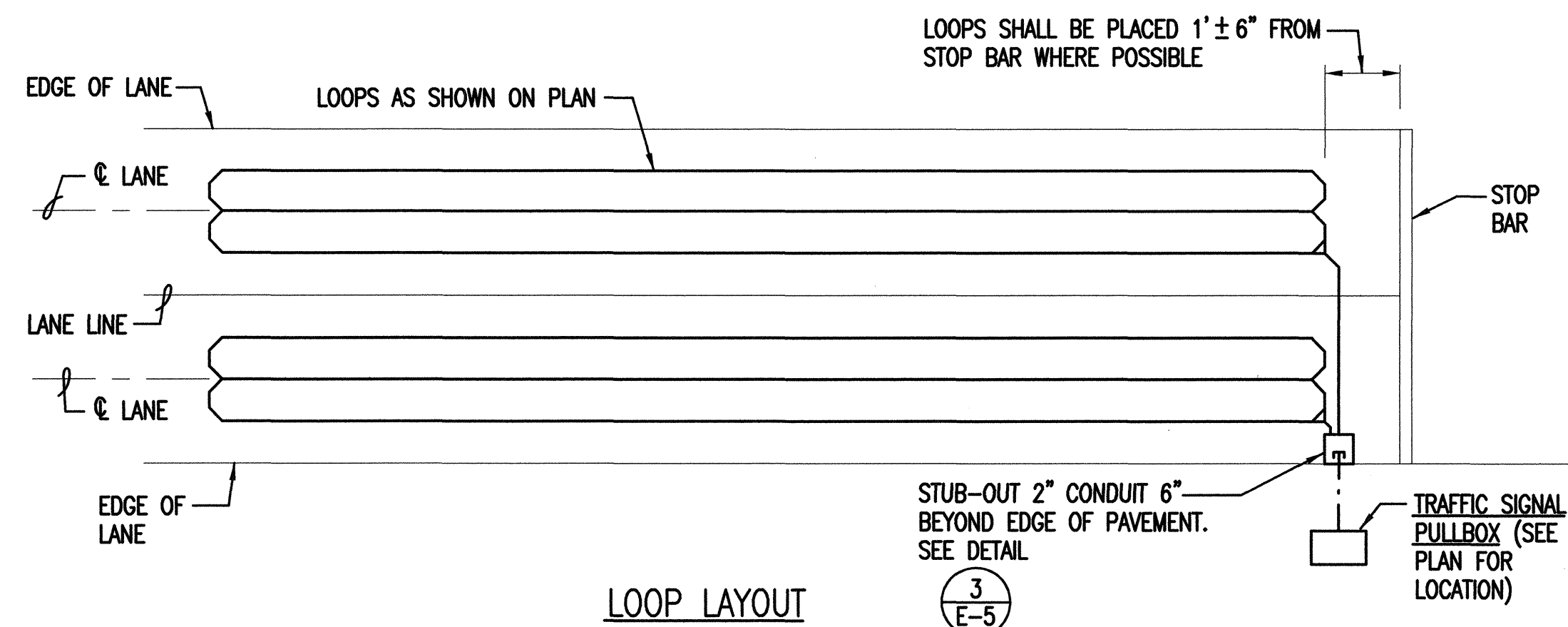
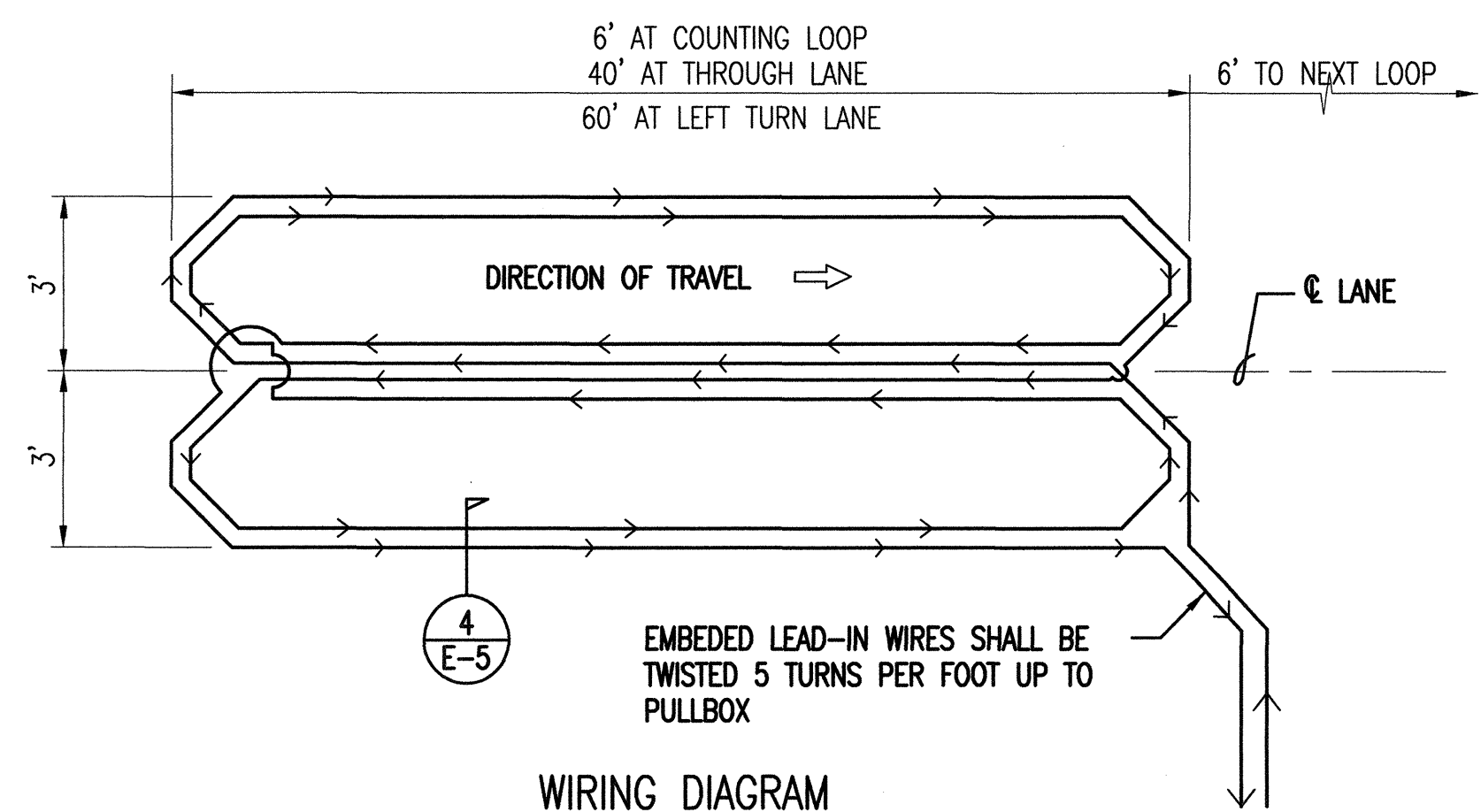
FROM	TO	MAIN CONTROL		SIGNAL CONTROL		DETECTORS (VEH)		OPTICOM		STREET LIGHTS		SPARE	REMARKS
		CONDUIT 2"	CABLE 26/C #14	CONDUIT 2"	CABLE 4/C #14	CONDUIT 2"	CABLE 2/C #16	CONDUIT 2"	CABLE 3/C #20	CONDUIT 2"	CABLE 3/C #6		
POLE	METER	--	--	--	--	--	--	--	--	--	--	1	CE, 2"C, 3-# 2
METER	UPS	--	--	--	--	--	--	--	--	--	--	1	CE, 2"C, 3-#6, 1-#8 GRD.
CONT.	PB1	1	2	--	--	1	8	1	3	--	--	1	CE
PB1	PB2	1	2	--	--	1	8	1	3	1	1	1	CE
PB2	POLE A	--	--	1	14	1	5	1	3	1	1	--	DB
PB2	PB2A	--	--	--	--	1	2	--	--	--	--	--	DB
PB2A	PB2B	--	--	--	--	1	1	--	--	--	--	--	DB
POLE A	POLE B	--	--	--	7	--	1	--	2	--	--	--	AERIAL
POLE B	PB3	--	--	--	--	1	1	--	--	--	--	--	DB
PB3	PB3A	--	--	--	--	1	1	--	--	--	--	--	DB
POLE B	POLE C	--	--	--	3	--	3	--	1	--	--	--	AERIAL
POLE C	PB4	--	--	--	--	1	3	--	--	--	--	--	DB
PB4	PB4A	--	--	--	--	1	2	--	--	--	--	--	DB
PB4A	PB4B	--	--	--	--	1	1	--	--	--	--	--	DB
POLE C	POLE D	--	--	--	--	--	--	--	1	--	--	--	AERIAL
POLE D	PB5	--	--	--	--	1	1	--	--	--	--	--	DB
PB5	PB5A	--	--	--	--	1	1	--	--	--	--	--	DB
POLE D	POLE A	--	--	--	6	--	1	--	1	--	1	--	AERIAL
METER	PB1	--	--	--	--	--	--	--	--	1	1	1	DB



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
PHASE ASSIGNMENT
Hawaii Belt Road
Intersection Improvements
At Police Station Road and Hualalai Road
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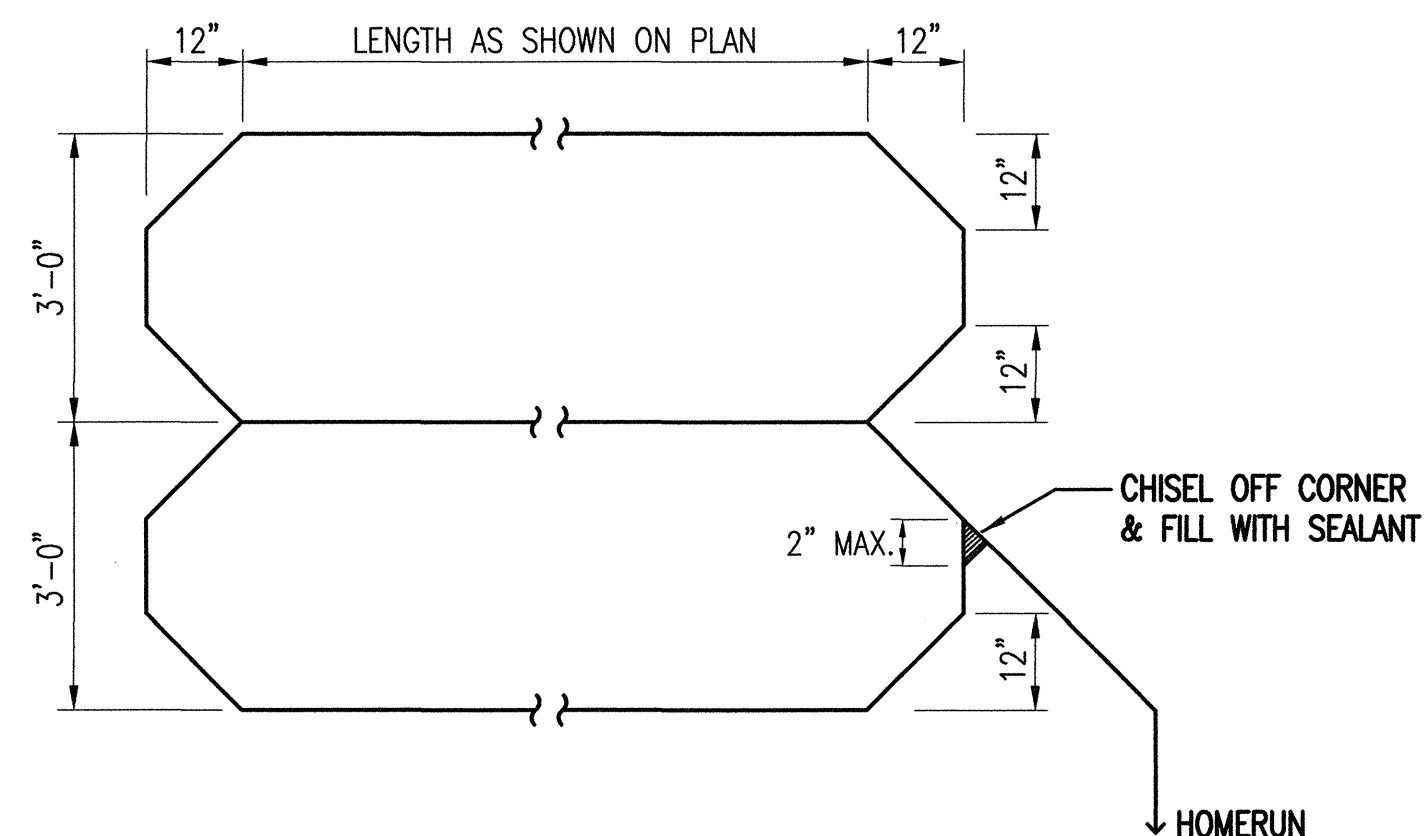
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FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	11A-01-02	2003	24	30

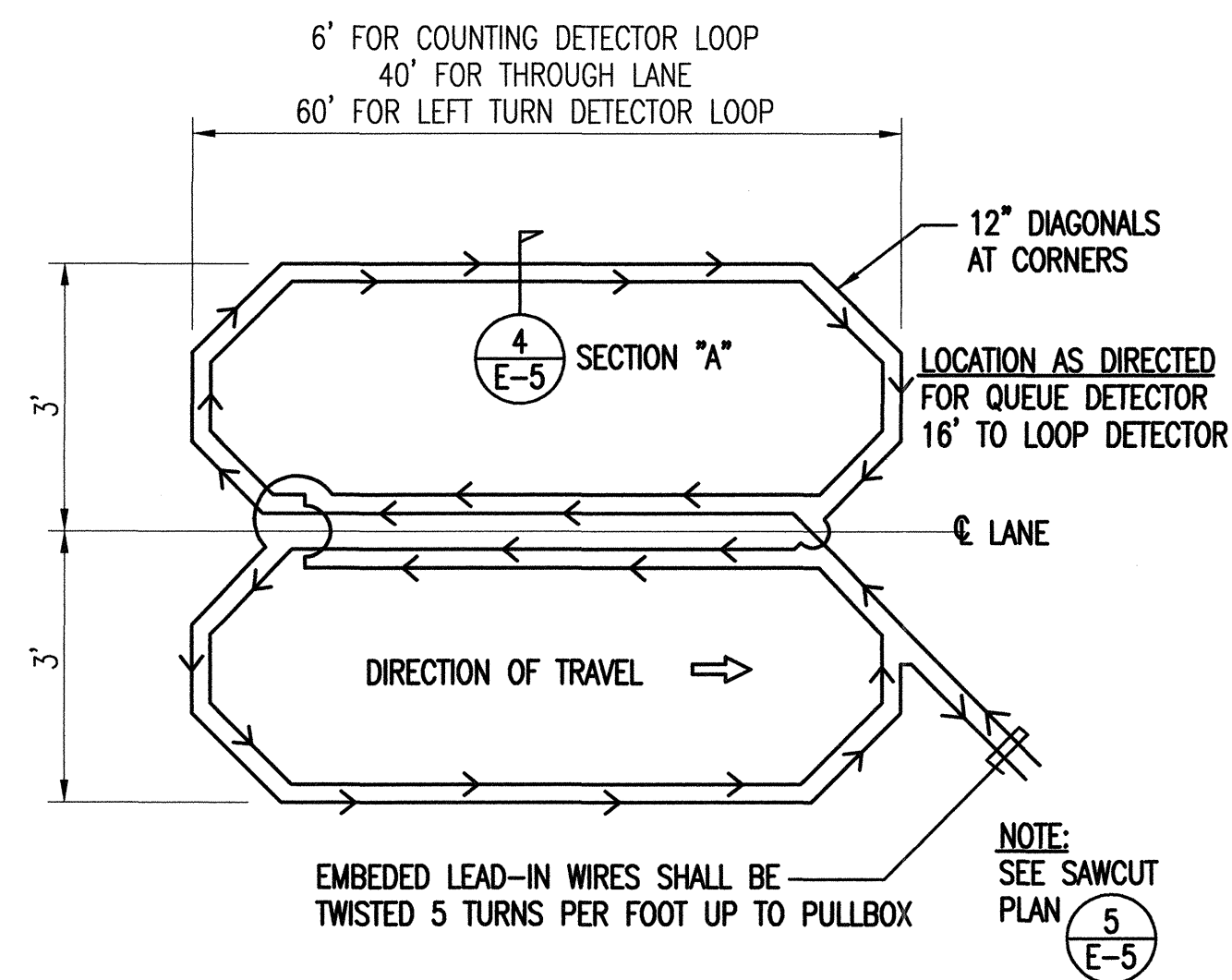


- NOTES:**
1. EACH PRE-FORMED LOOP DETECTOR LEAD-IN CABLES SHALL BE IDENTIFIED IN THE CABINET WITH IT'S APPROPRIATE LOOP DETECTOR ASSIGNMENT NUMBER PER PLANS.
 2. WHEN HOT SEALANTS ARE USED. ONLY POLYESTER INSULATION WITH A MINIMUM 400° MELTING POINT WILL BE PERMITTED.
 3. ALL LOOPS SHALL BE PRE-FORMED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

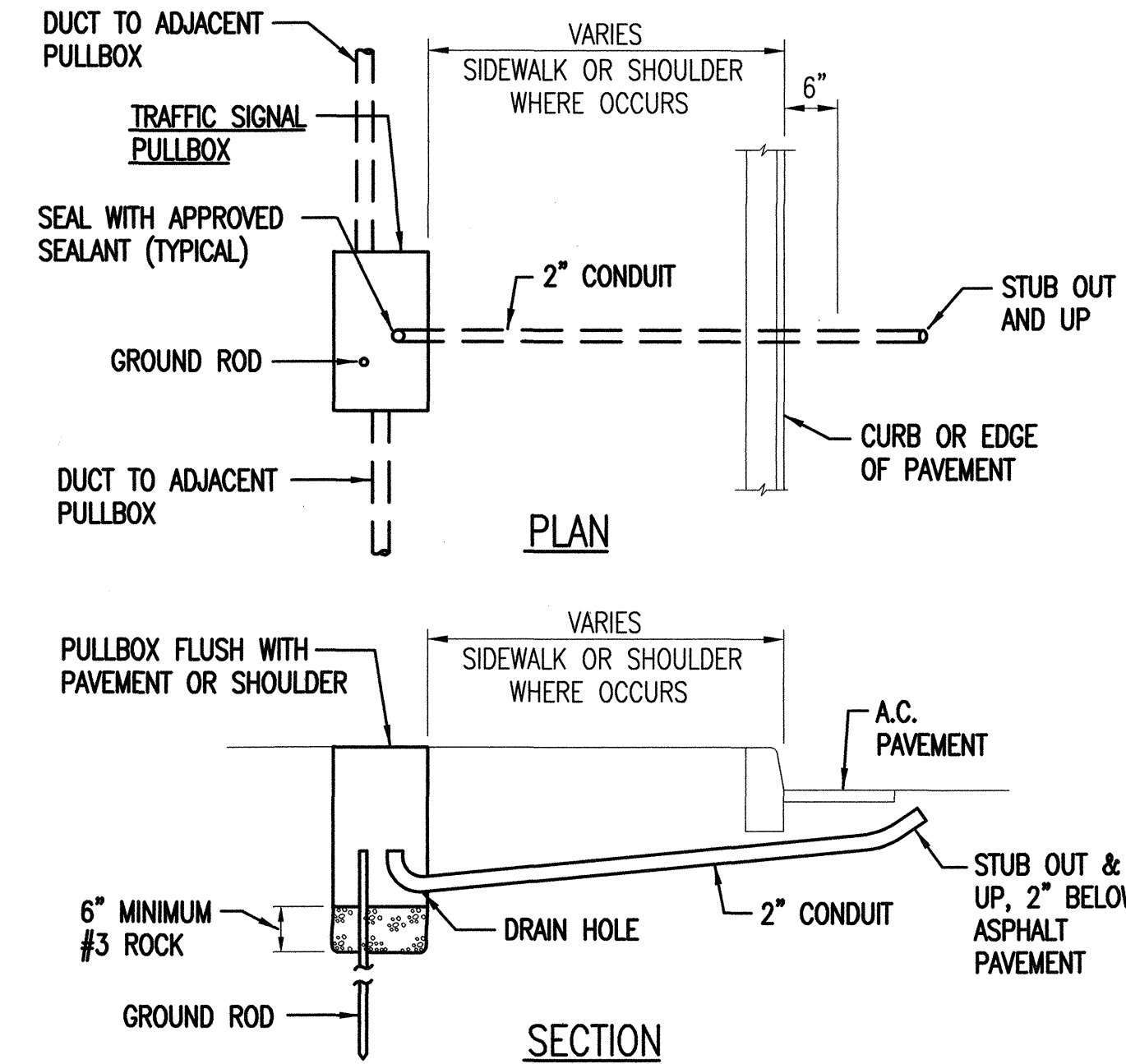
1 PLAN - LOOP DETECTOR (TYPICAL)
E-5 NOT TO SCALE



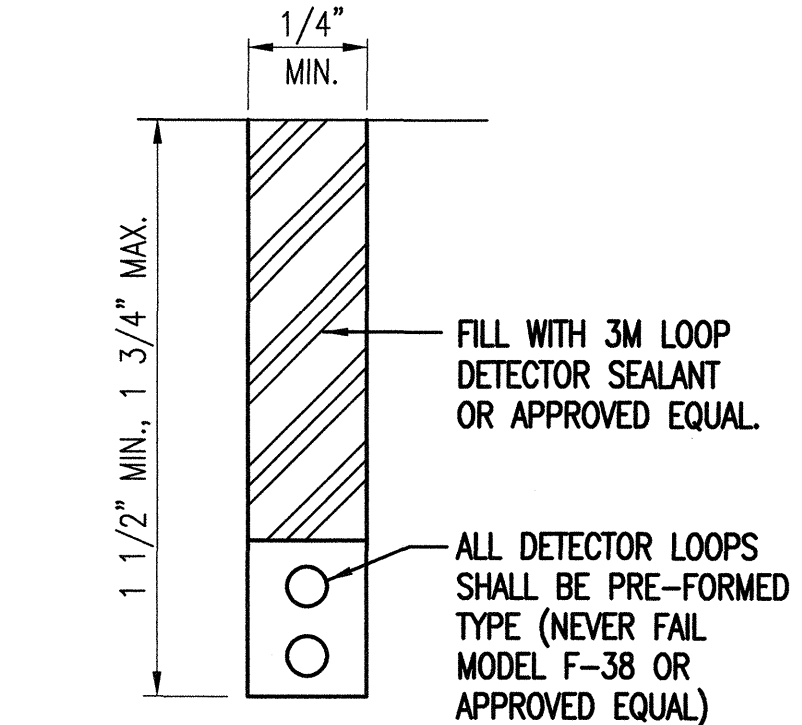
5 PLAN - LOOP DETECTOR SAWCUT
E-5 NOT TO SCALE



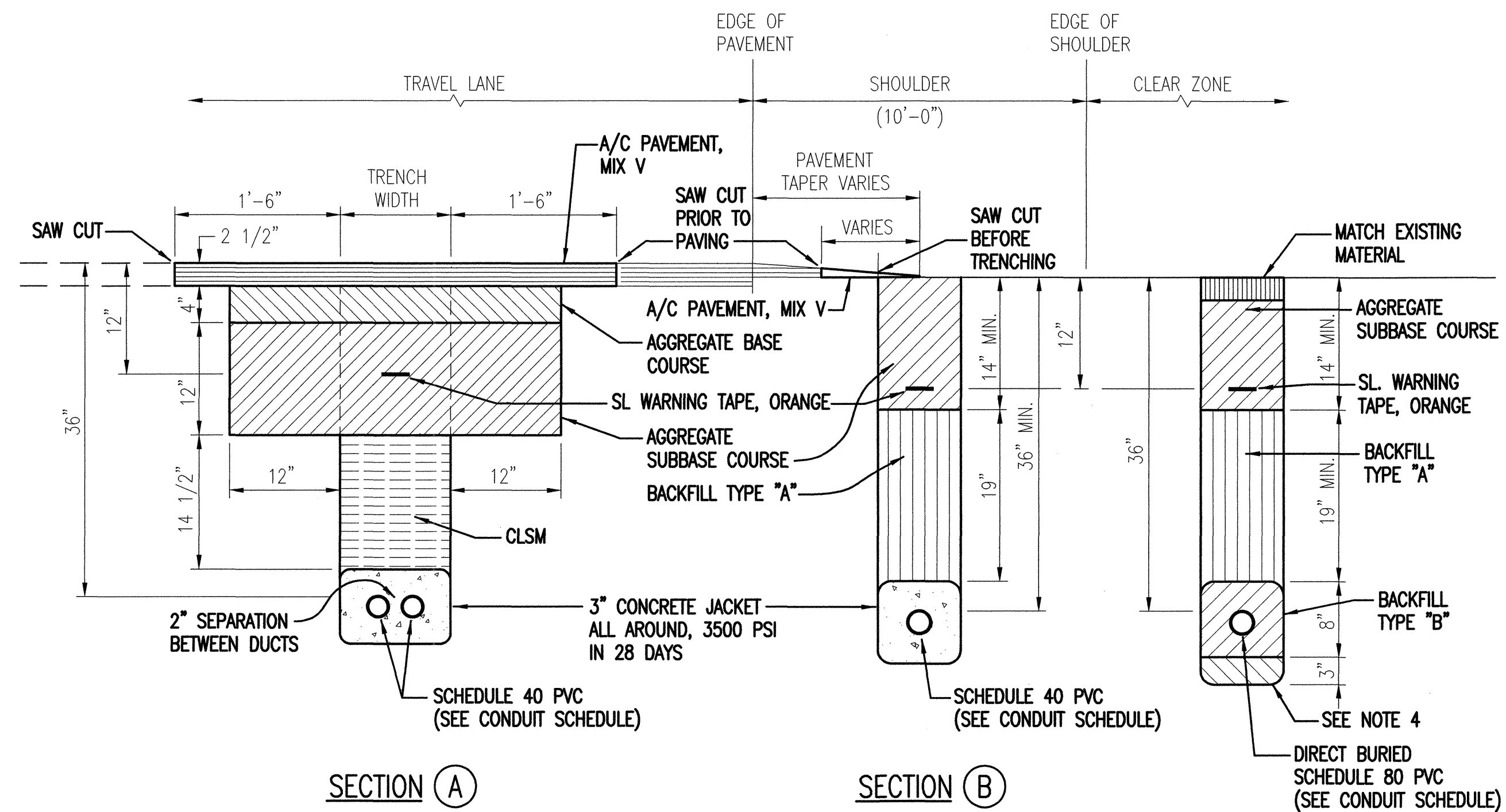
2 WIRING DIAGRAM - QUEUE/COUNTING LOOP DETECTOR
E-5 NOT TO SCALE



3 LOOP DETECTOR STUBOUT
E-5 NOT TO SCALE



4 SECTION "A"
E-5 NOT TO SCALE



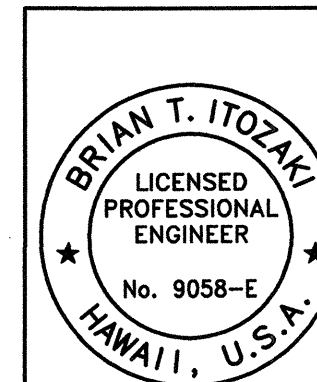
6 TYPICAL DUCT SECTION DETAILS
E-5 NOT TO SCALE (TRAFFIC SIGNAL SYSTEM)

NOTES:

1. ALL CONDUIT SHALL BE "PVC" SCHEDULE 80 FOR DIRECT BURIED AND SCHEDULE 40 WITH CONCRETE ENCASUREMENT, UNLESS OTHERWISE NOTED.
2. BACKFILL OVER CONCRETE DUCT SECTIONS SHALL BE TYPE "A".
3. BACKFILL OVER DIRECT BURIED SECTIONS SHALL BE TYPE "B".
4. 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.
5. CONCRETE FOR DUCTS SHALL BE 3500 P.S.I. IN 28 DAYS.
6. 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 SCREEN AND CONTAIN NOT MORE THAN 20% BY VOLUME OF ROCK PARTICLES.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION


LOOP DETECTOR DETAILS

*Hawaii Belt Road
Intersection Improvements
At Police Station Road and Hualalai Road*

Scale: AS SHOWN Date: DEC. 2002

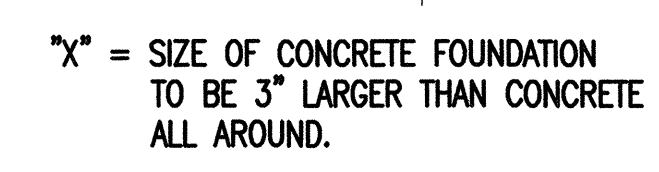
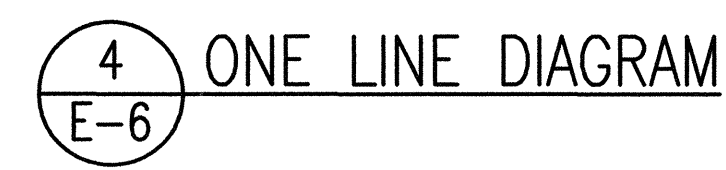
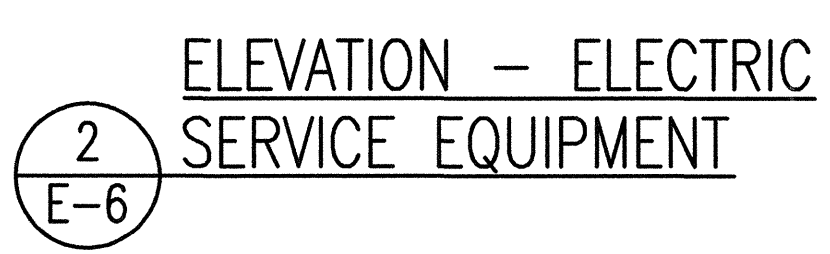
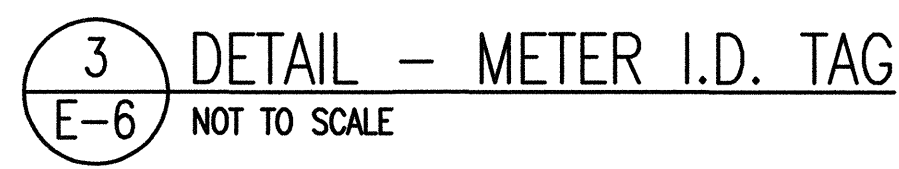
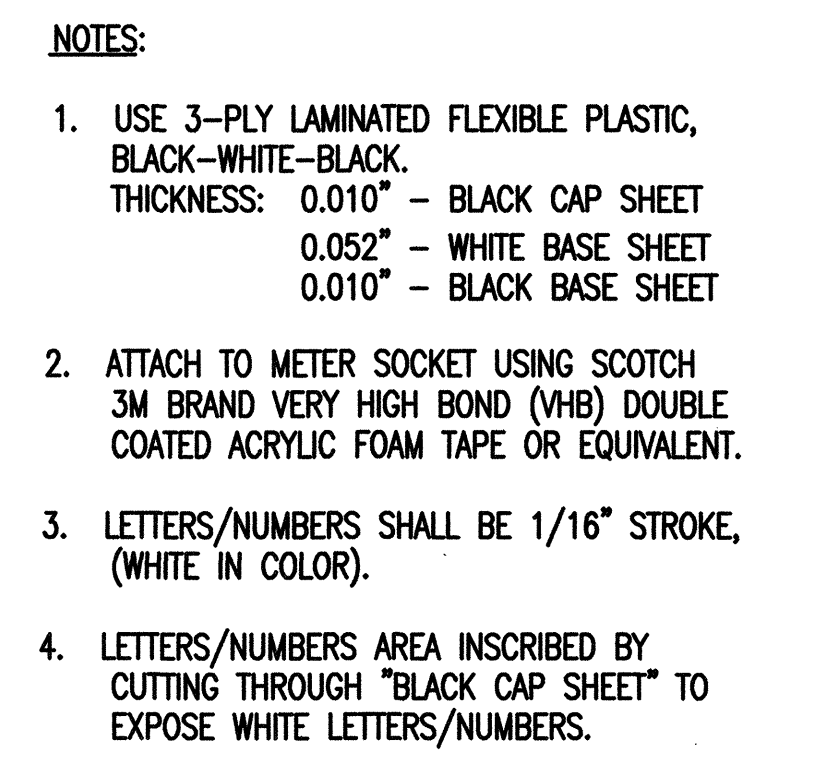
E-5

SHEET No. E-5 OF 11 SHEETS



THIS WORK WAS PREPARED
BY ME OR UNDER MY
SUPERVISION

25 210.022

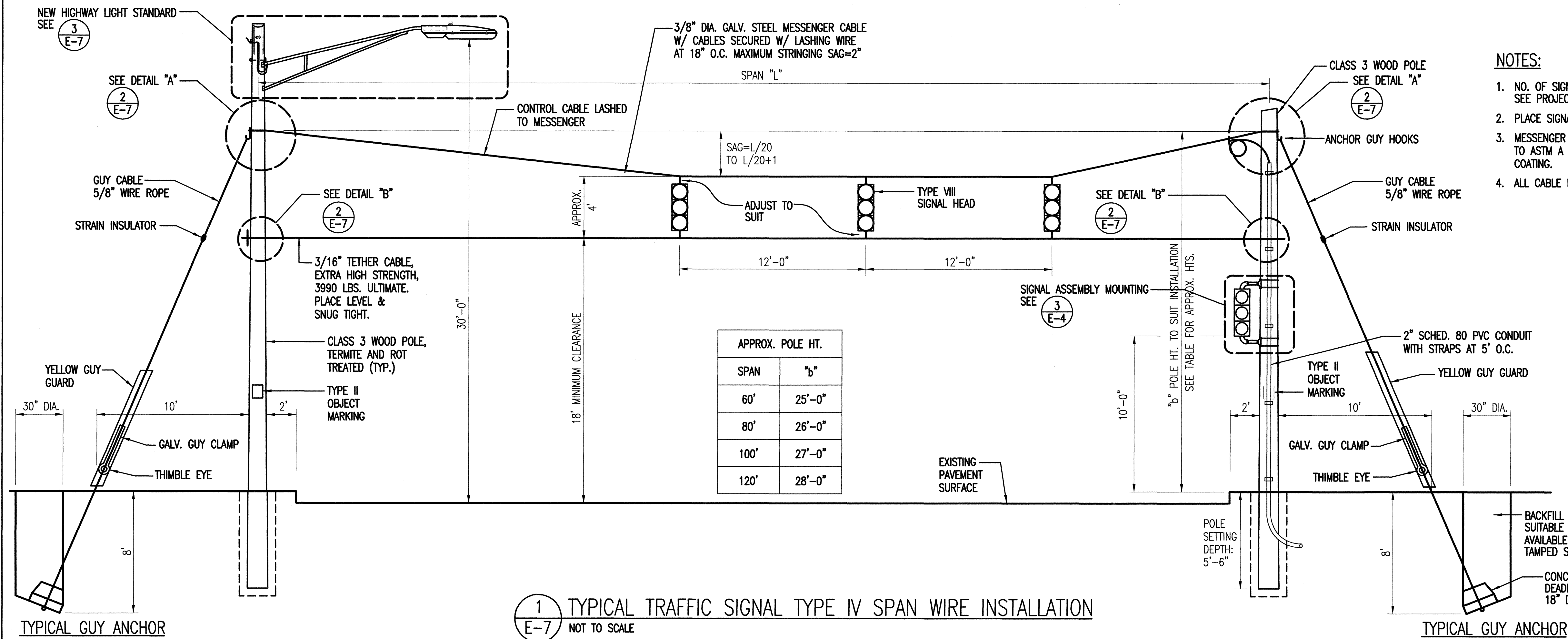


FOUNDATION PLAN

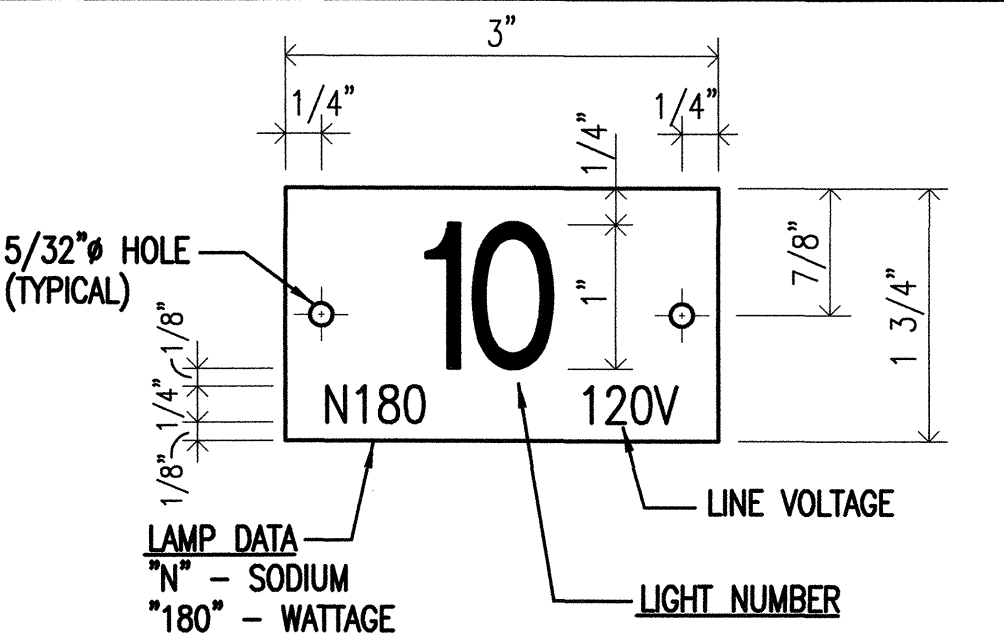
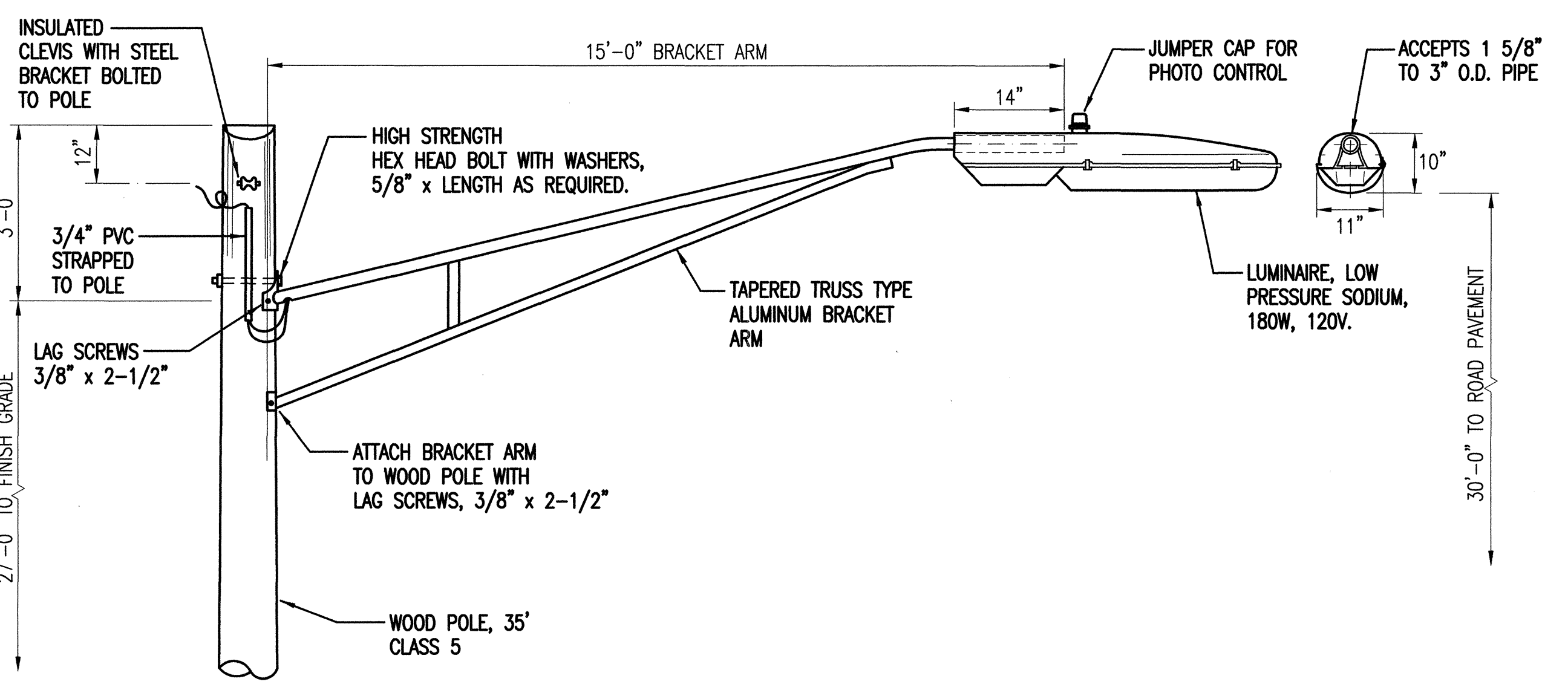
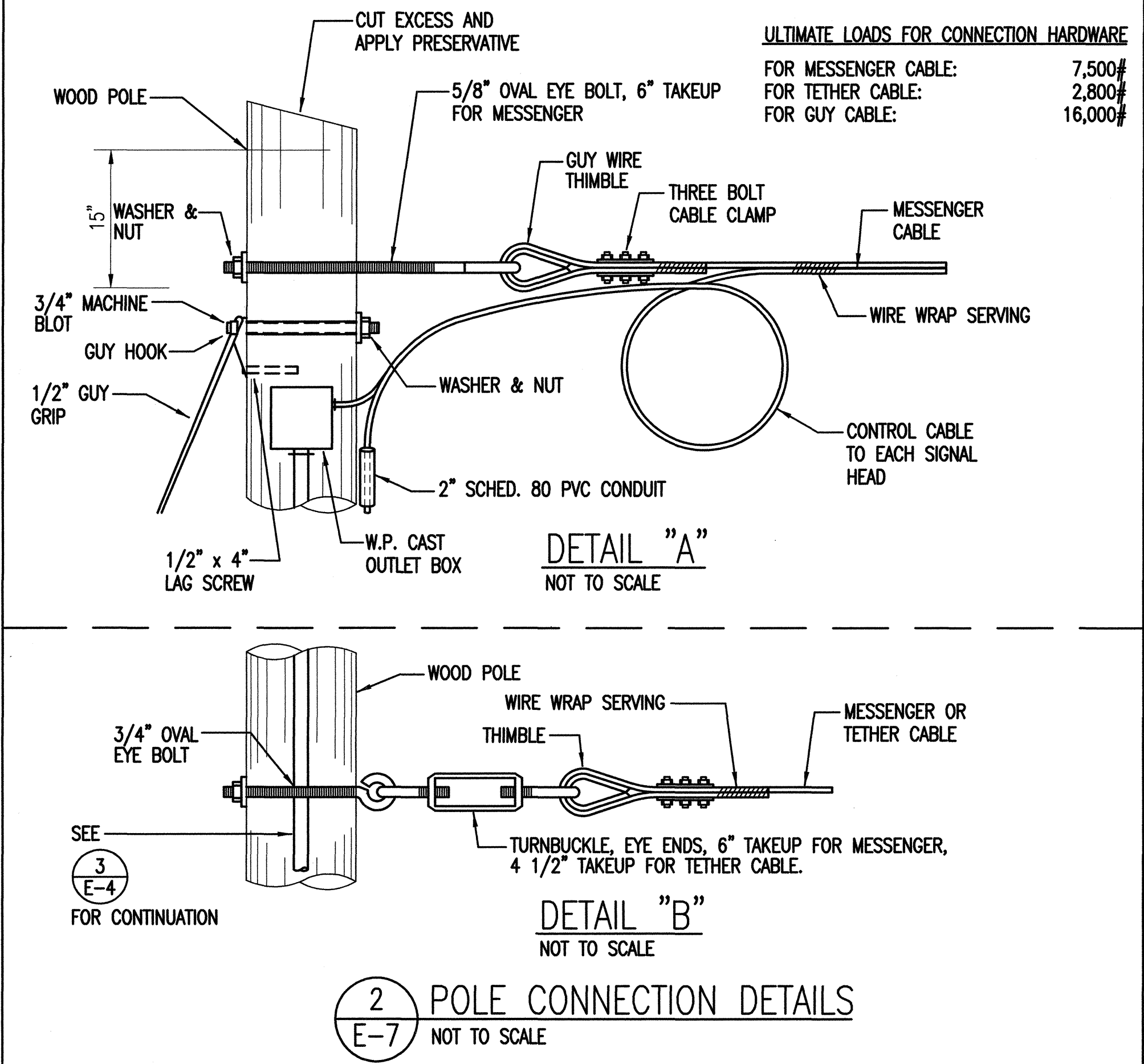
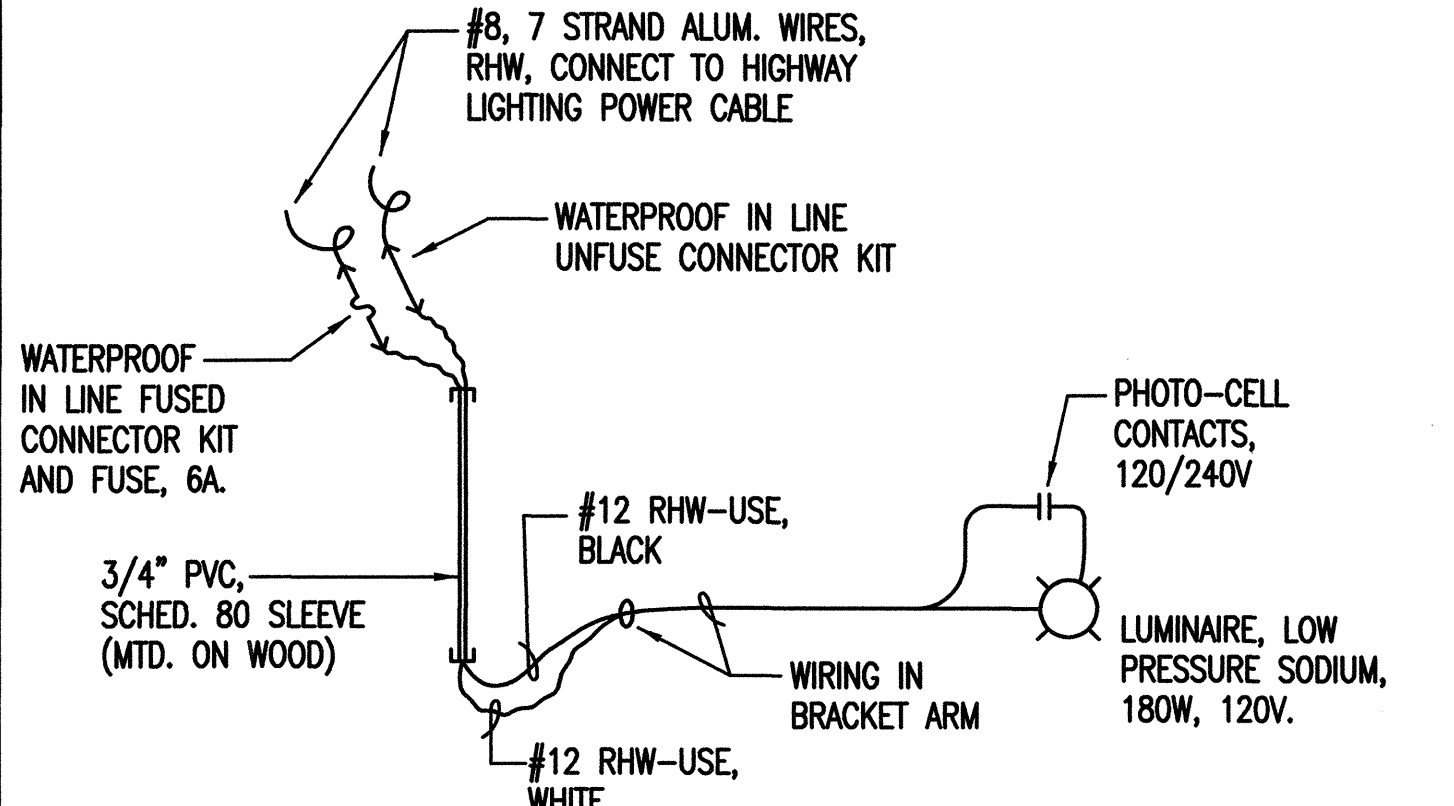
- 1) 2" LOOP DETECTOR (NUMBER, AS SCHEDULED).
- 2) NOT USED.
- 3) 1" CONDUIT FOR DRAIN.
- 4) 2" OPTICALPREEMPTION DETECTOR.
- 5) 2" CONTROL (NUMBER, AS SCHEDULED).
- 6) 2" SPARE (NUMBER AS SCHEDULED).
- 7) 2" POWER FROM UPS.
- 8) 5/8"Ø x 10'-0" GROUND ROD.
- 9) 2" POWER TO CONTROLLER.
- 10) 2" POWER TO FROM METER.



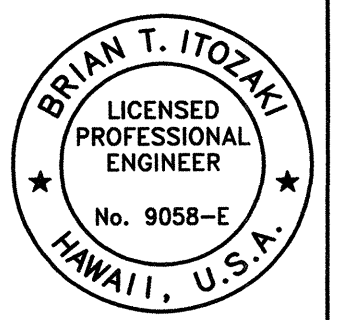
ORIGINAL PLAN	SURVEY PLOTTED BY _____ DATE _____
NOTE BOOK	DRAWN BY _____
	TRACED BY _____
	DESIGNED BY _____
	QUANTITIES BY _____
No. _____	CHECKED BY _____



- NOTES:
- NO. OF SIGNAL FACES VARIES, MAX. = 3. SEE PROJECT PLAN.
 - PLACE SIGNAL FACES OVER LANE LINES.
 - MESSENGER AND TETHER CABLES SHALL CONFORM TO ASTM A 475, EXTRA HIGH STRENGTH, CLASS "C" COATING.
 - ALL CABLE FITTINGS SHALL BE GALVANIZED.
 - WOOD POLES SHALL MEET THE REQUIREMENT OF THE AMERICAN NATIONAL STANDARDS INSTITUTE, INC. AND THE AMERICAN WOOD PRESERVERS ASSOCIATION.
 - CONTRACTOR SHALL FURNISH TWO (2) ADDITIONAL SETS OF SPAN WIRE SIGNAL HEAD MOUNTING HARDWARE (WIRE ENTRANCE FITTING WITH MESSENGER CABLE CLAMP AND BOTTOM TETHER CABLE CLAMP WITH SIGNAL HEAD MOUNTING). THE MOUNTING HAWAII DISTRICT OFFICE 50 MAKAALA STREET, HILO, HAWAII.



- 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 STEEL POLES WITH NO. 7 CADMIUM PLATED DRIVE SCREWS. (a) ATTACHED TO ALUMINUM POLES WITH NO. 7 ALUM. DRIVE SCREWS.
 - USE "N" FOR SODIUM LAMPS.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SPAN WIRE DETAILS

Hawaii Belt Road

Intersection Improvements

At Police Station Road and Hualalai Road

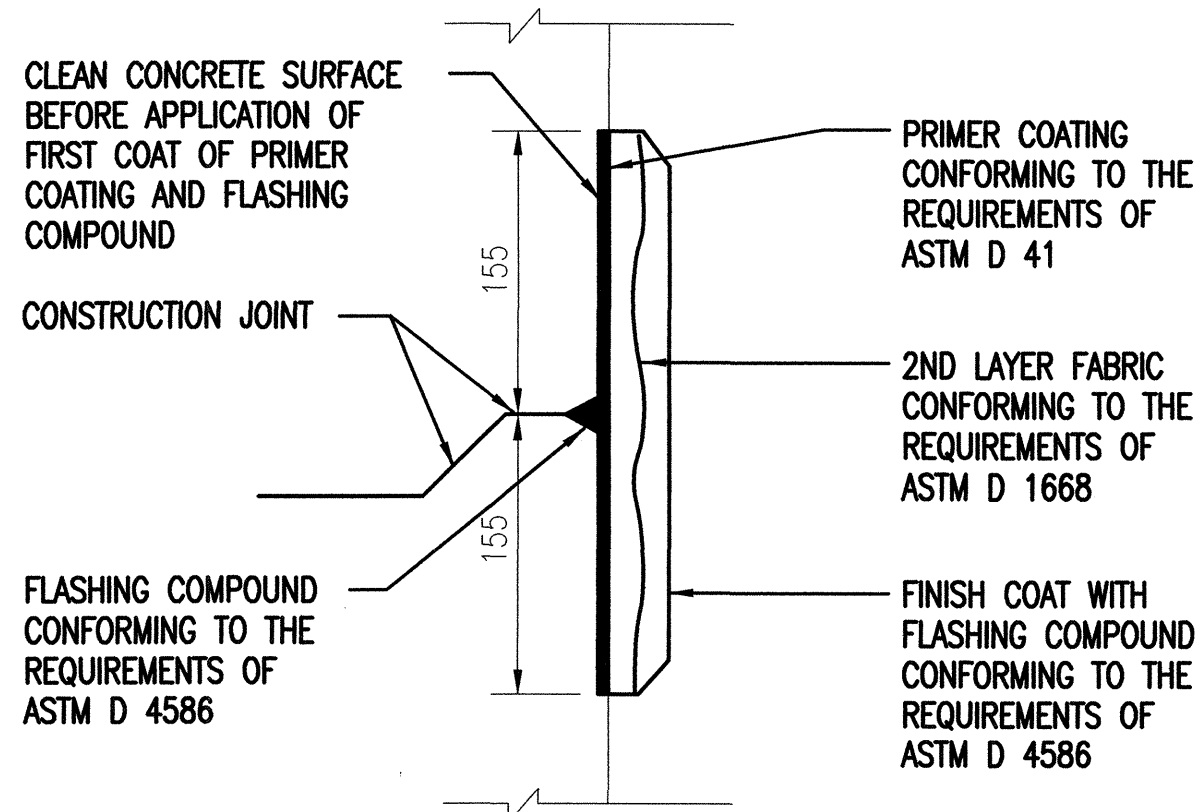
Scale: AS SHOWN Date: DEC. 2002

E-7

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	11A-01-02	2003	27	30

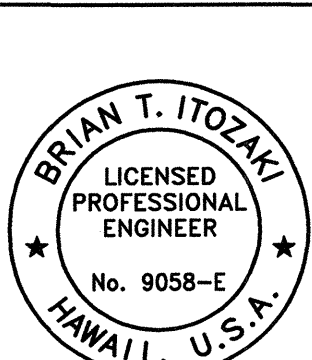
GENERAL NOTES:

1. PROVIDE A MINIMUM OF ONE 5/8"Ø x 10'-0" 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.
7. 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 "A", "B" AND "C" PULLBOXES SHALL BE INSTALLED IN LOCATIONS PROTECTED FROM VEHICULAR TRAFFIC (I.E. RAISED SIDEWALK, BEHIND A.C. CURBS, TRAFFIC SIGNAL STANDARD OR PIPE GUARDS).



6 DETAIL - TYPICAL FLASHING COMPOUND WATERPROOFING
E-8 NOT TO SCALE

NOTE:
ALL DIMENSIONS ARE IN MILLIMETERS
UNLESS OTHERWISE SHOWN.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

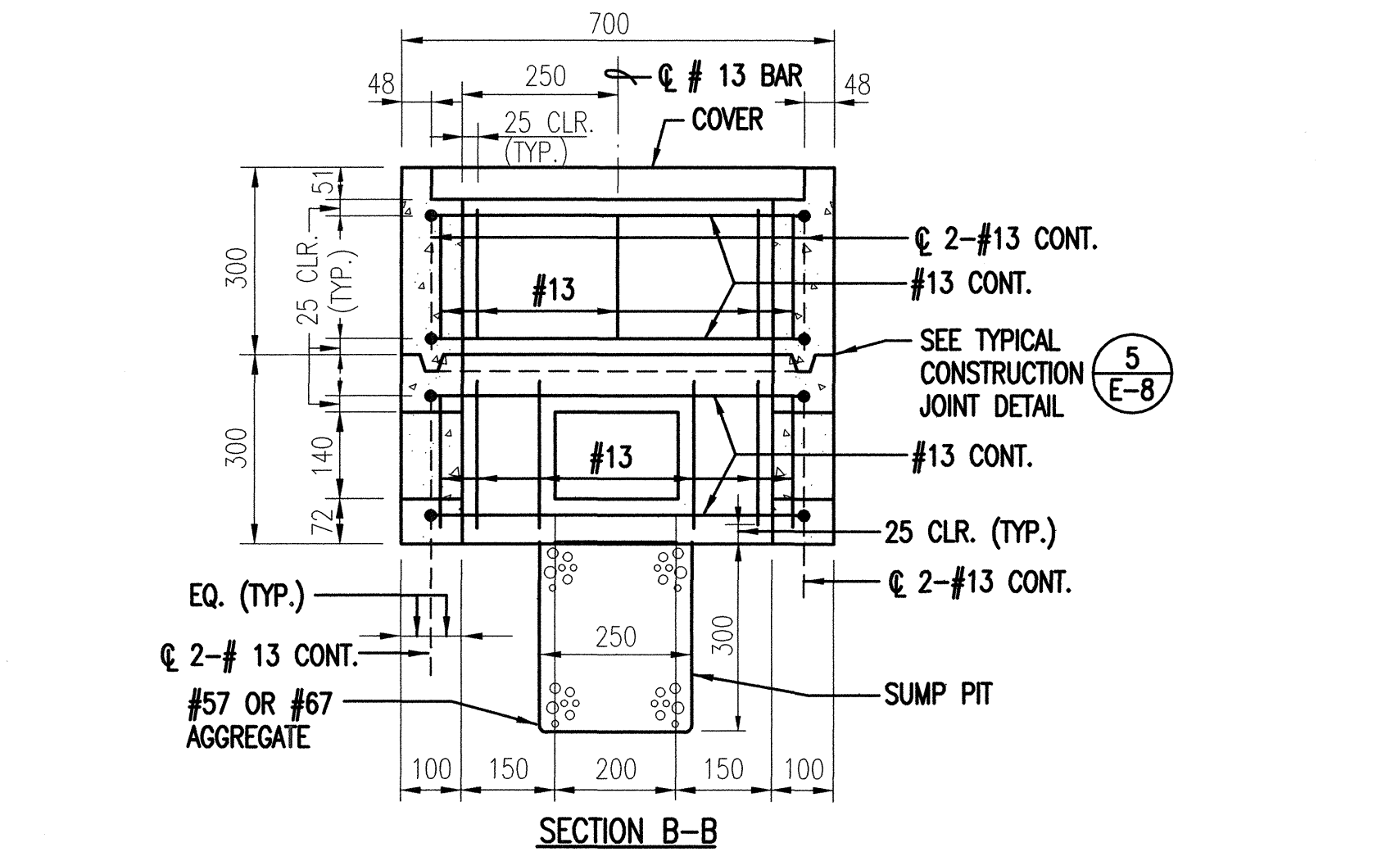
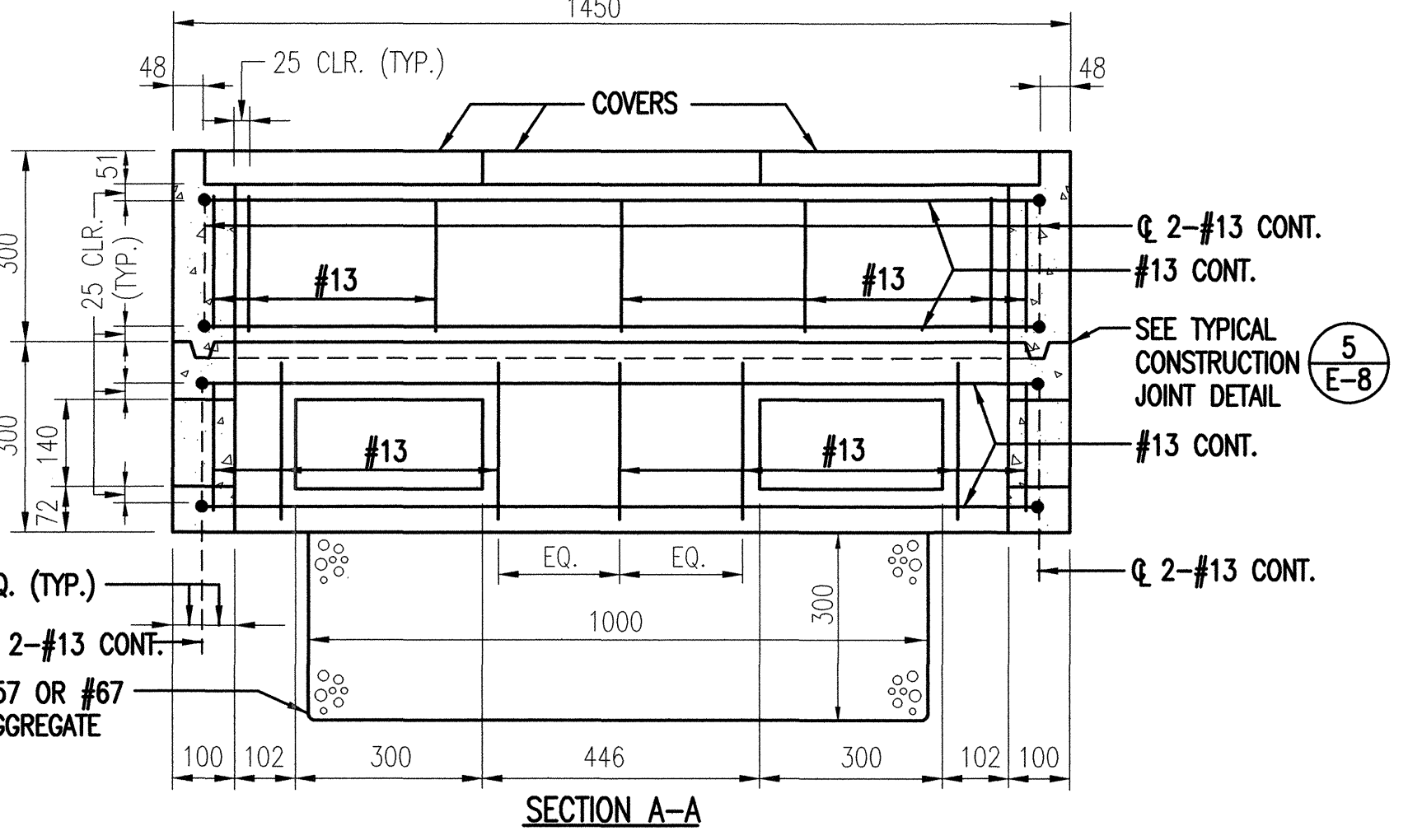
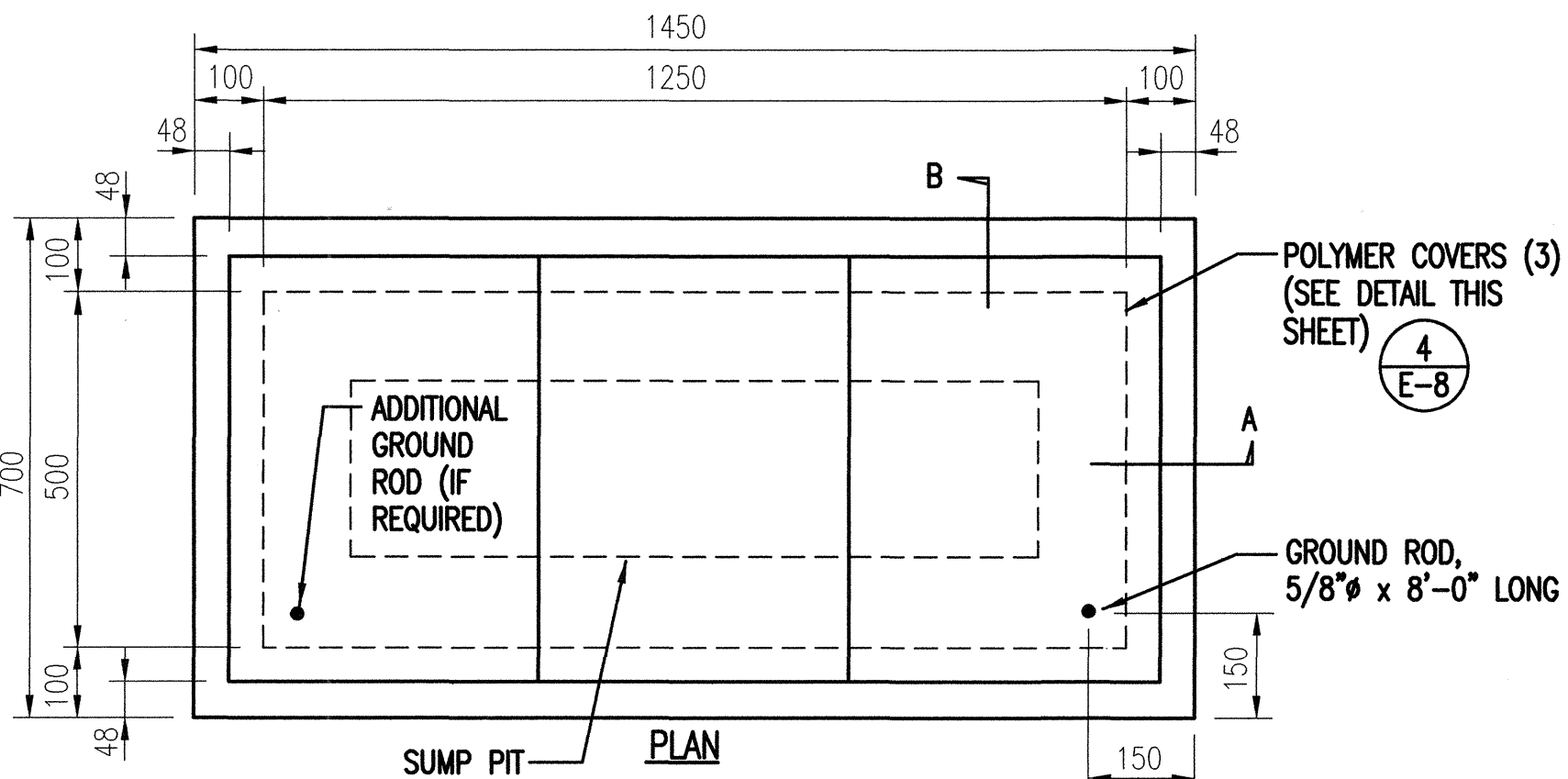
PULLBOX DETAILS

*Hawaii Belt Road
Intersection Improvements
At Police Station Road and Hualalai Road*

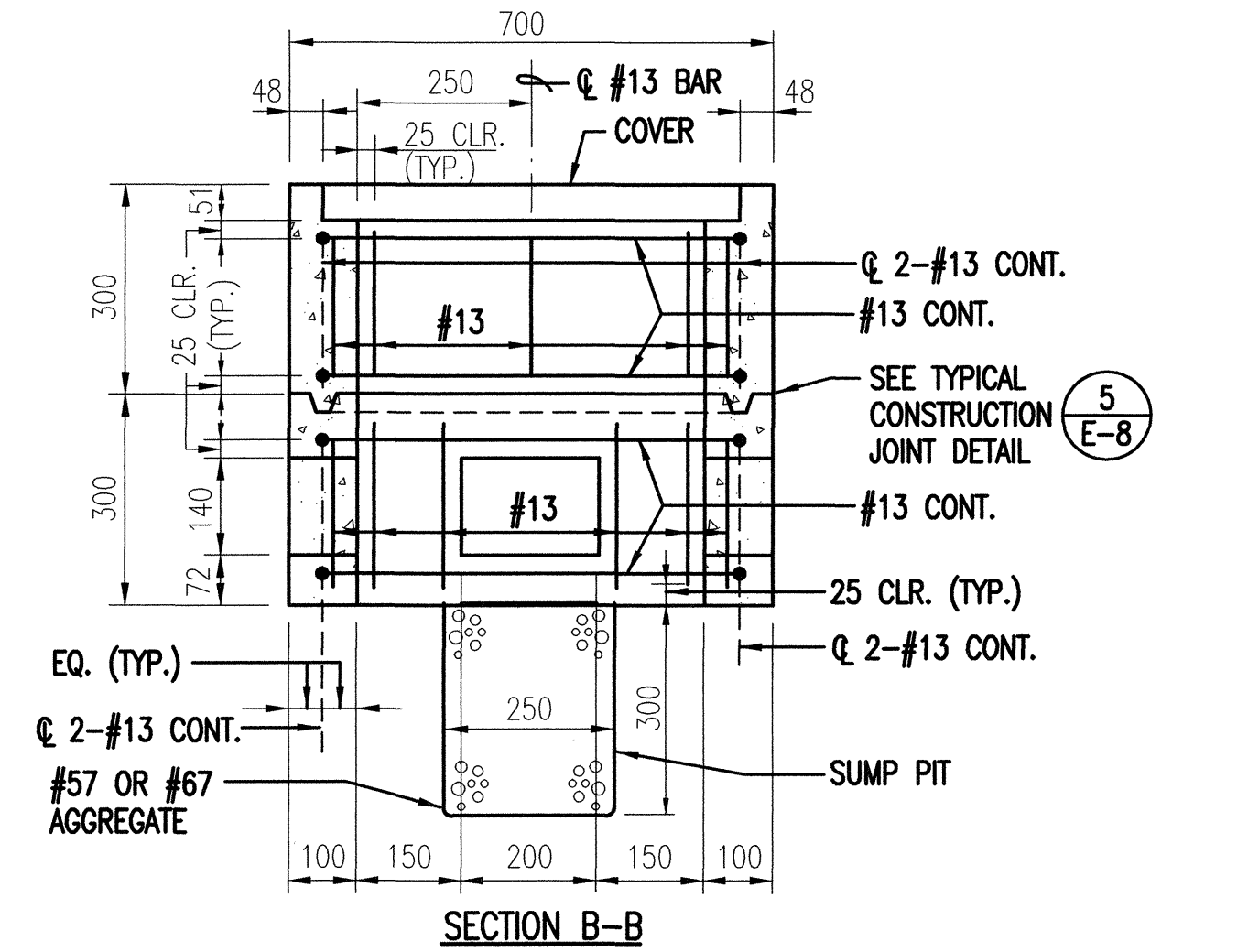
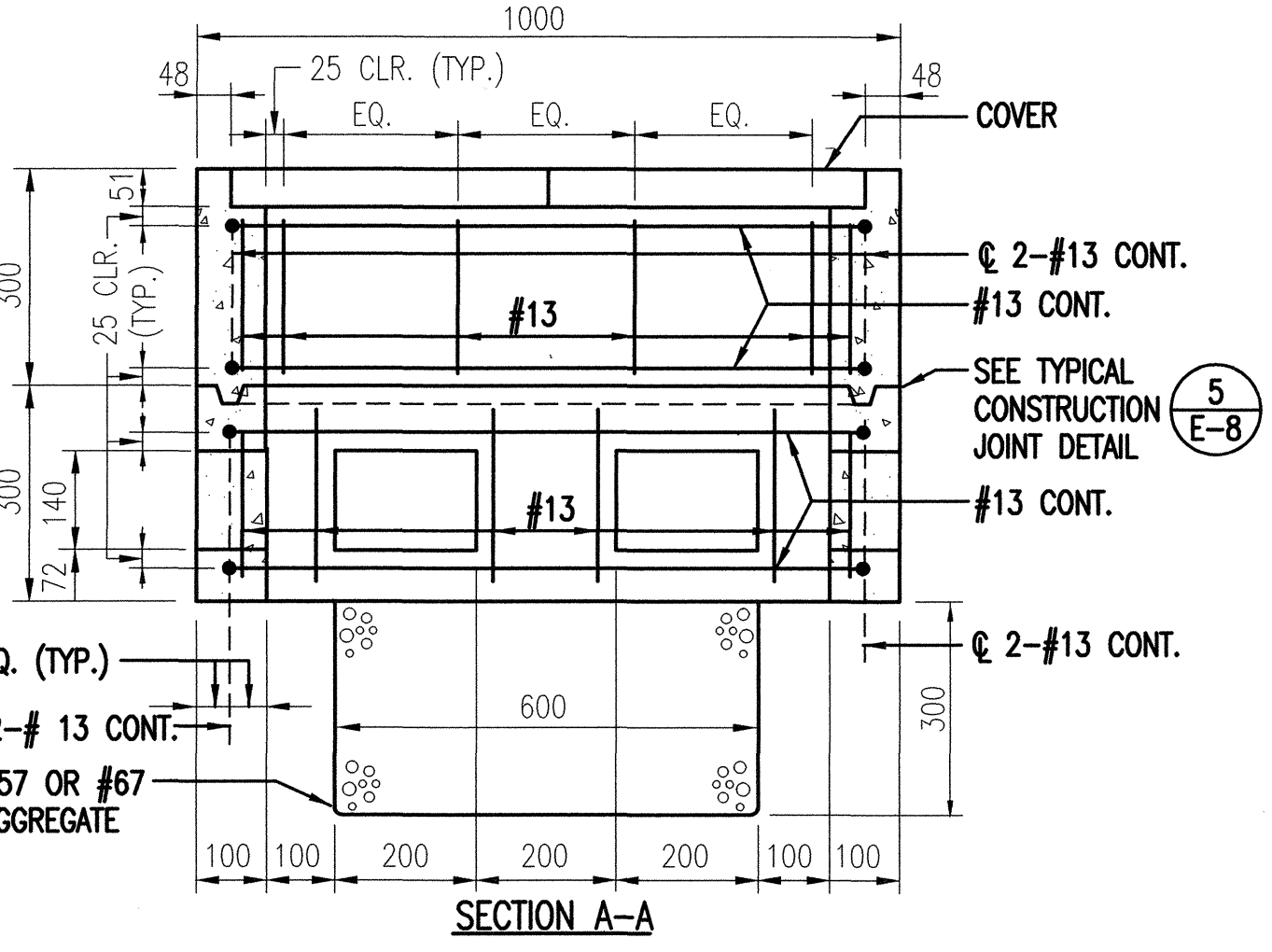
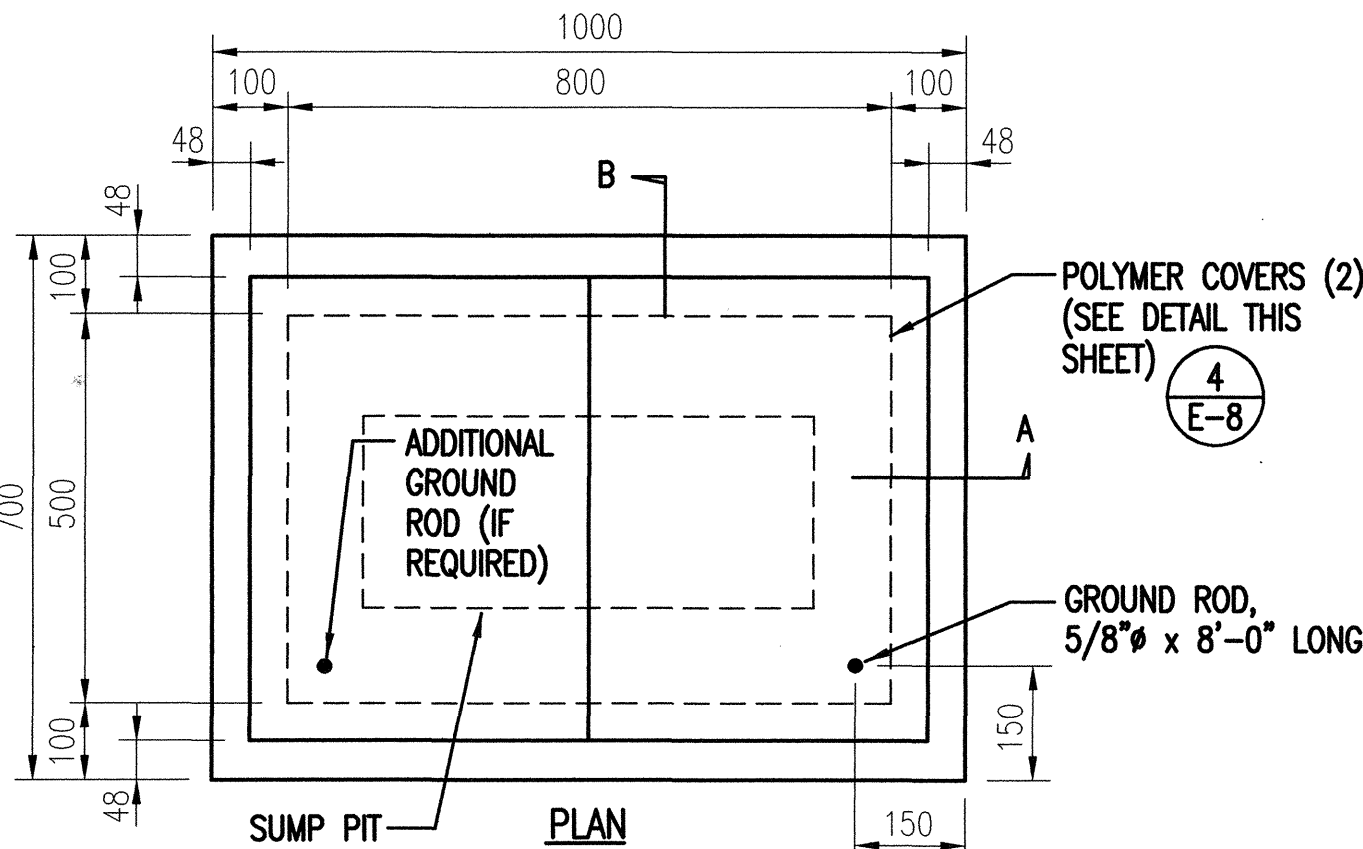
Scale: AS SHOWN Date: DEC. 2002

E-8

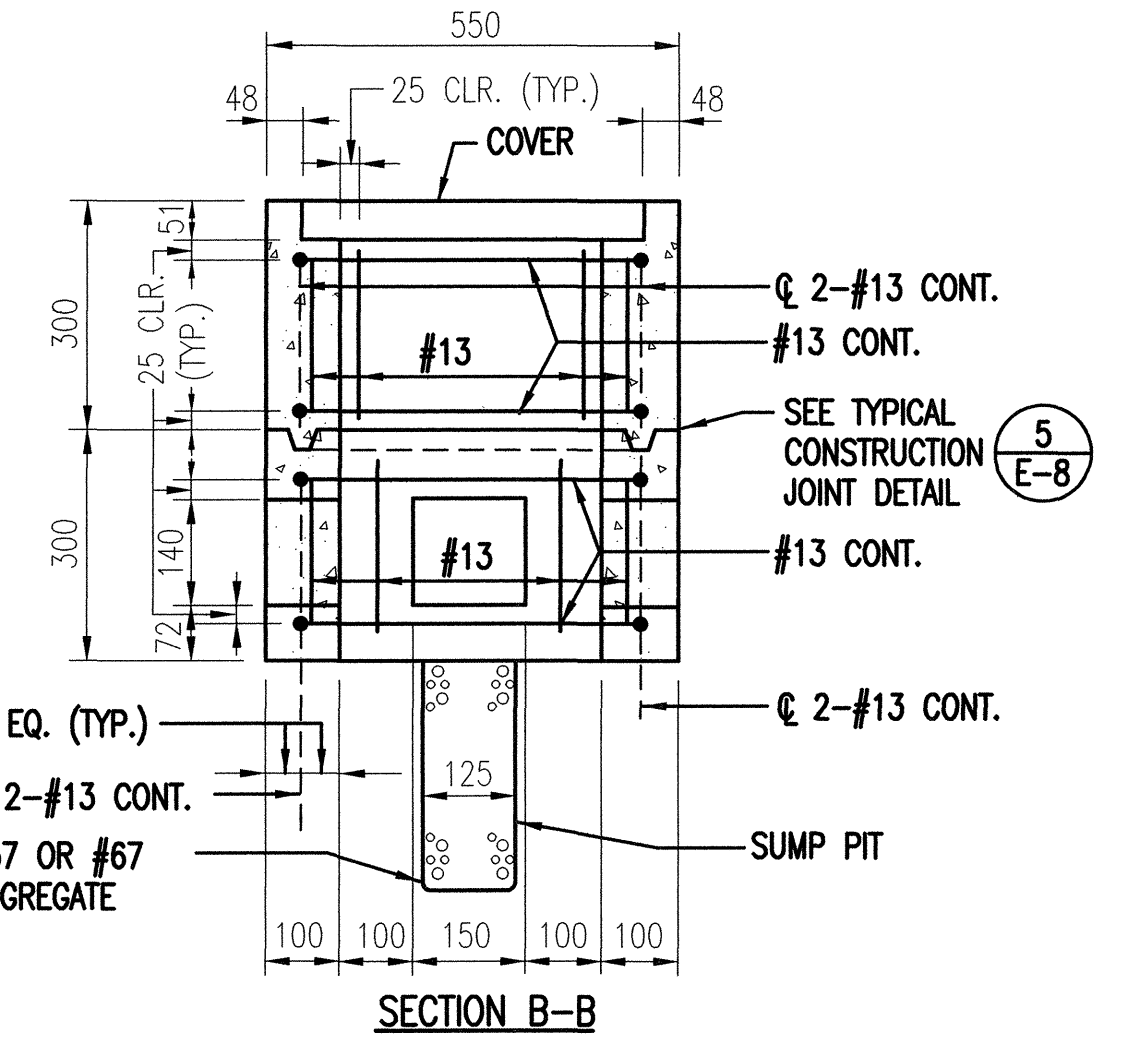
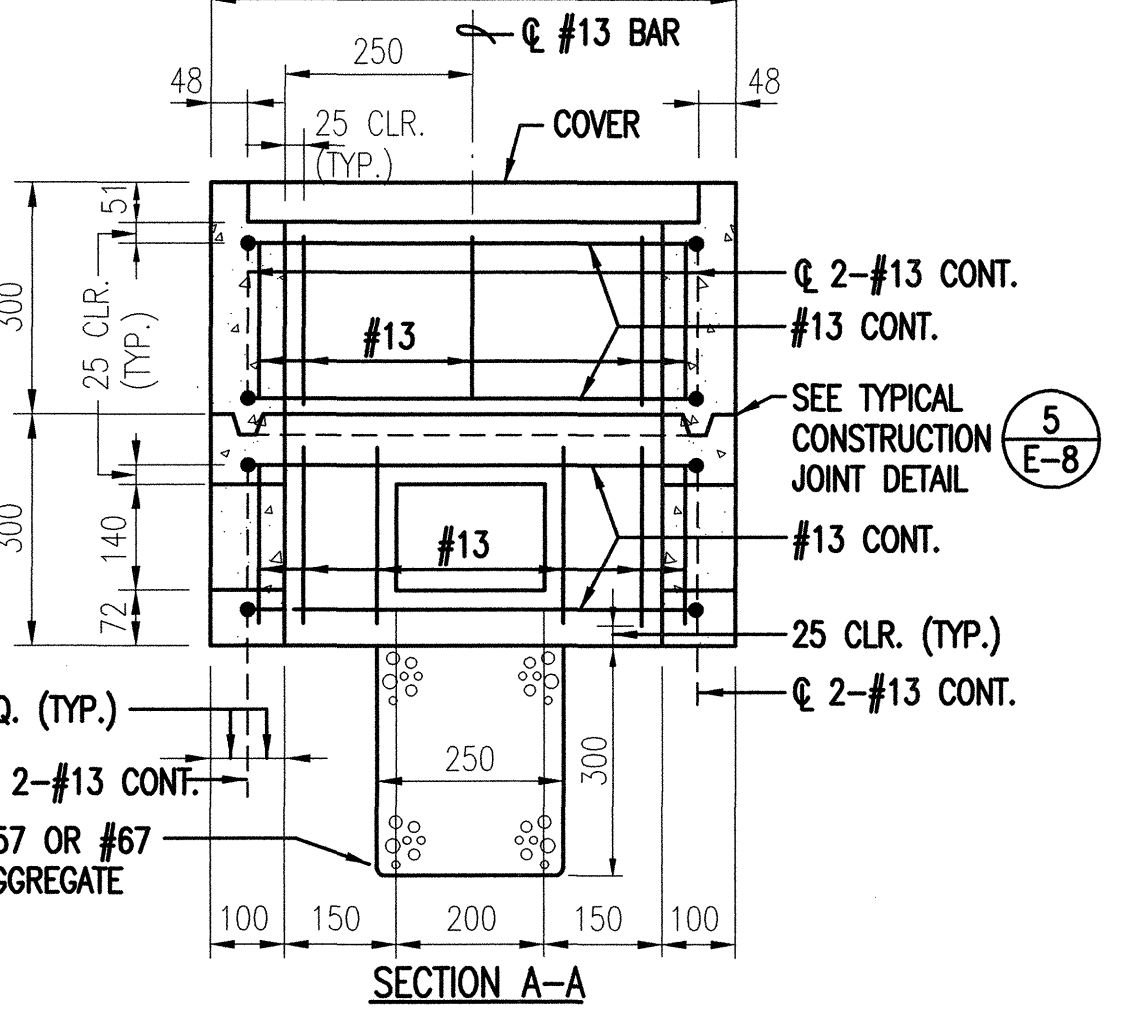
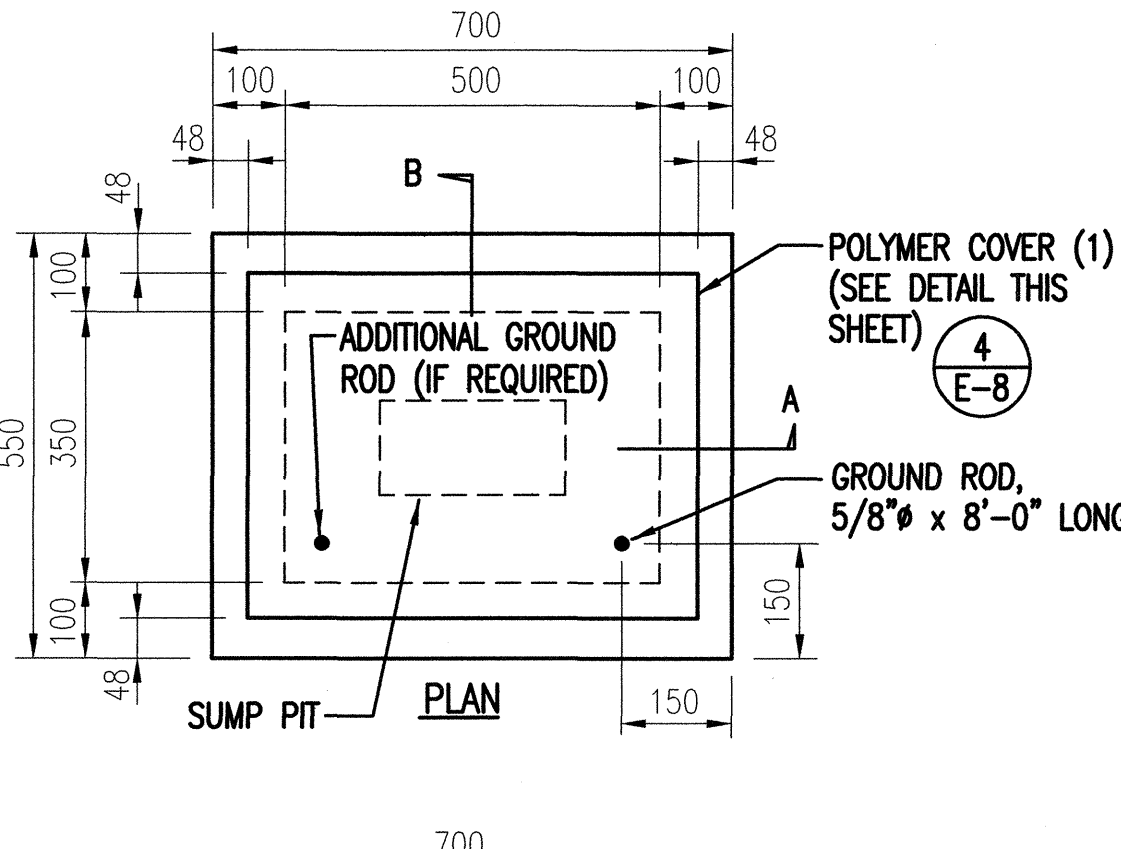
SHEET No. E-8 OF 11 SHEETS



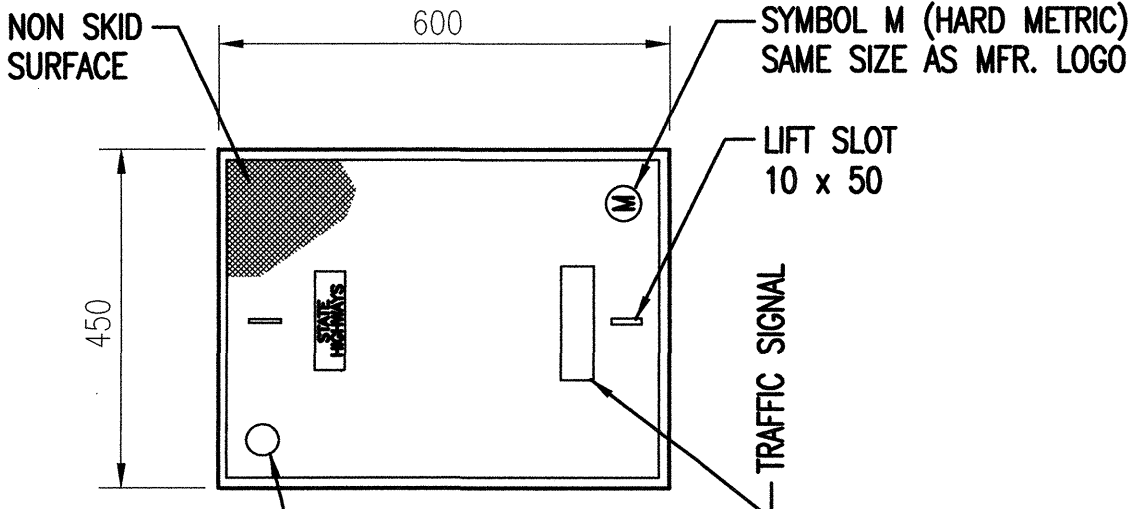
3 TYPE "C" PULLBOX
E-8 (OLD TYPE "D")
SCALE: 1:100



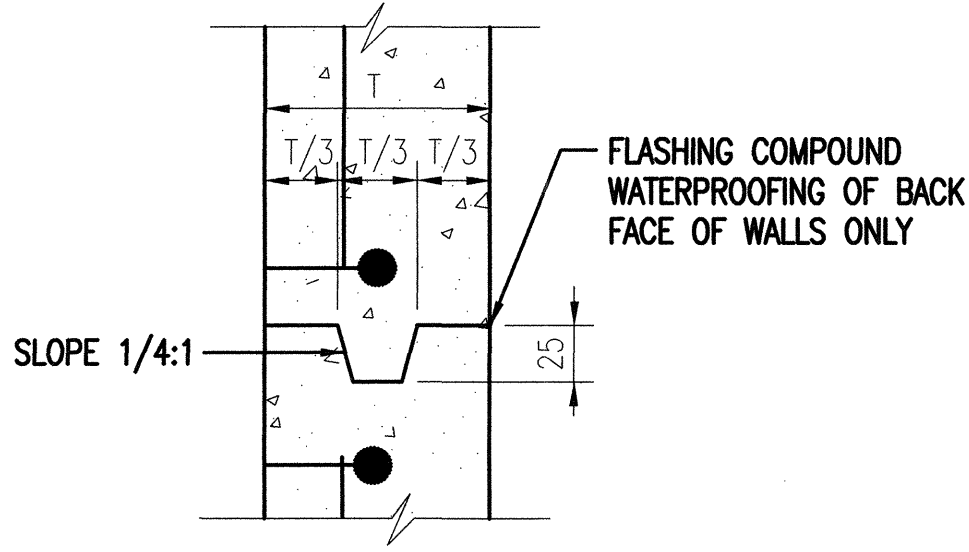
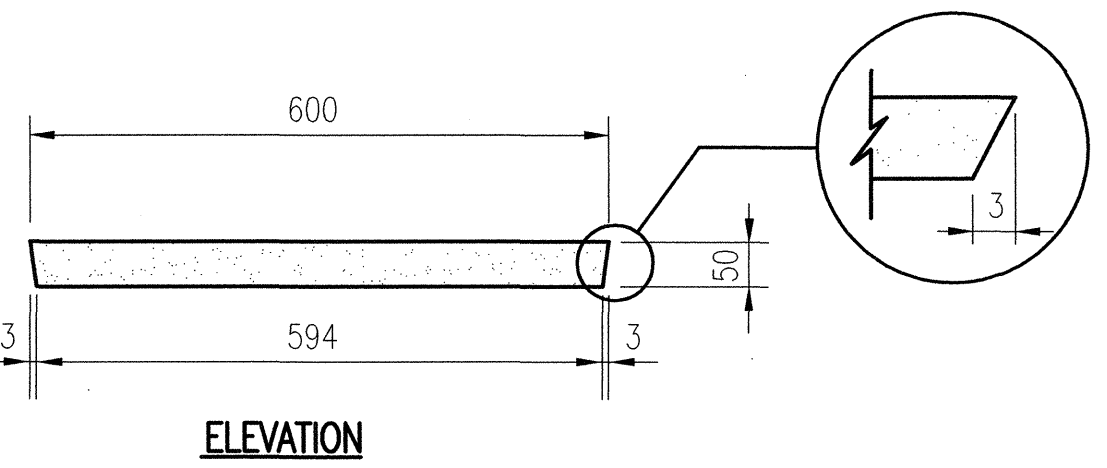
2 TYPE "B" PULLBOX
E-8 (OLD TYPE "C")
SCALE: 1:100



1 TYPE "A" PULLBOX
E-8 (OLD TYPE "B")
SCALE: 1:100



4 DETAIL - POLYMER CONCRETE COVER
E-8 NOT TO SCALE



5 DETAIL - TYPICAL CONSTRUCTION JOINT
E-8 NOT TO SCALE

SURVEY PLOTTED BY _____ DATE _____
DRAWN BY _____
DESIGNED BY _____
NOTED BY _____
CHECKED BY _____
ORIGINAL PLAN _____
NOTE BOOK _____
No. _____

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	11A-01-02	2003	28	30

ELECTRICAL SYMBOL LIST

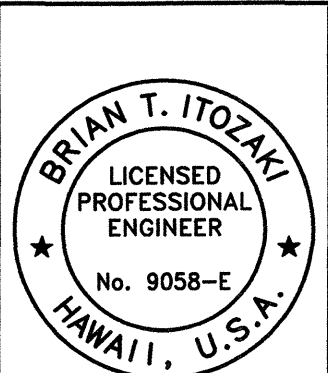
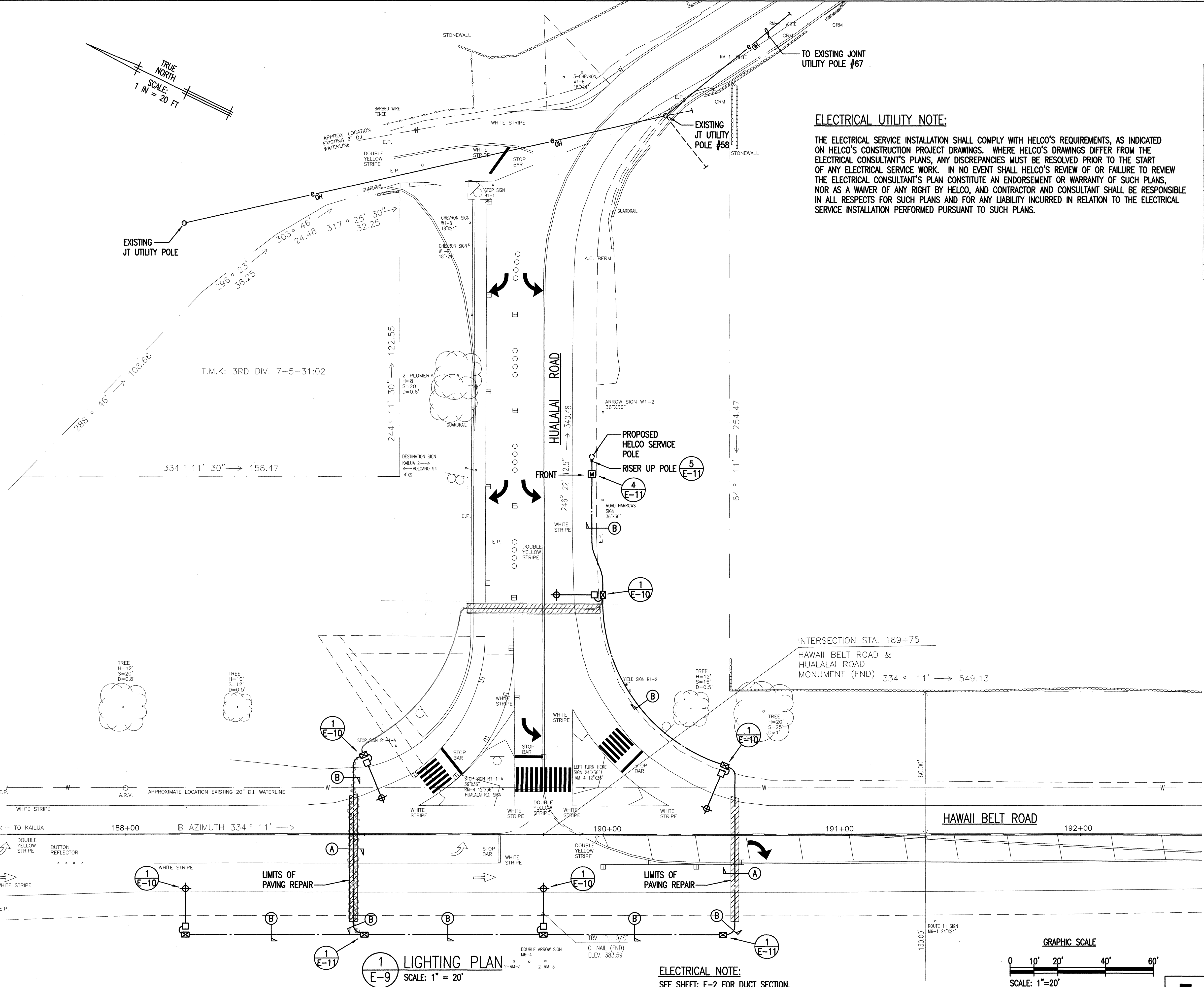
EXISTING	NEW	DESCRIPTION
		HIGHWAY LIGHT STANDARD WITH POLE, LUMINAIRE, AND CONCRETE FOUNDATION.
		RACEWAY, CONCEALED BELOW FINISH GRADE, NUMBER OF HOOKMARKS INDICATE NUMBER OF WIRES WITHIN.
		OVERHEAD ELECTRIC LINES.
		METERING EQUIPMENT.
		HIGHWAY LIGHTING PULLBOX, TYPE "A".
		DETAIL INDICATOR UPPER HALF: DETAIL NUMBER. LOWER HALF: SHEET NUMBER, DETAIL LOCATION.
		DUCT SECTION INDICATOR.
		NOTE INDICATOR.

GENERAL NOTES - ELECTRICAL:

- THE SCOPE OF WORK FOR THIS PROJECT SHALL CONSIST OF INSTALLING NEW HIGHWAY LIGHTING SYSTEM INCLUDING METAL POLES, BRACKET ARM, LUMINAIRE, CONCRETE FOUNDATION, UNDERGROUND WIRING, AND PULLBOXES.
- 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 30 PERCENT OF THE TOTAL CONTRACT COST LESS DEDUCTIBLE ITEMS. NON-COMPLIANCE WITH THIS SUBSECTION MAY BE GROUNDS FOR REJECTION OF BID.
- 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.
- ALL NECESSARY PERMITS SHALL BE OBTAINED BY THE CONTRACTOR AT HIS OWN COST.
- THE CONTRACTOR SHALL COMPLY WITH THE STATE OF HAWAII'S OCCUPATIONAL SAFETY AND HEALTH LAW (DOSH).
- 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.

ELECTRICAL UTILITY NOTE:

THE ELECTRICAL SERVICE INSTALLATION SHALL COMPLY WITH HELCO'S REQUIREMENTS, AS INDICATED ON HELCO'S CONSTRUCTION PROJECT DRAWINGS. WHERE HELCO'S DRAWINGS DIFFER FROM THE ELECTRICAL CONSULTANT'S PLANS, ANY DISCREPANCIES MUST BE RESOLVED PRIOR TO THE START OF ANY ELECTRICAL SERVICE WORK. IN NO EVENT SHALL HELCO'S REVIEW OF OR FAILURE TO REVIEW THE ELECTRICAL CONSULTANT'S PLAN CONSTITUTE AN ENDORSEMENT OR WARRANTY OF SUCH PLANS, NOR AS A WAIVER OF ANY RIGHT BY HELCO, AND CONTRACTOR AND CONSULTANT SHALL BE RESPONSIBLE IN ALL RESPECTS FOR SUCH PLANS AND FOR ANY LIABILITY INCURRED IN RELATION TO THE ELECTRICAL SERVICE INSTALLATION PERFORMED PURSUANT TO SUCH PLANS.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
LIGHTING PLAN
Hawaii Belt Road
Intersection Improvements
At Police Station Road and Hualalai Road
Scale: AS SHOWN Date: DEC. 2002

E-9


SHEET No. E-9 OF 11 SHEETS

"AS-BUILT"

28

210.022

A circular professional engineer seal. The outer ring contains the text "BRYAN T. ITOZAKI" at the top and "HAWAII, U.S.A." at the bottom, separated by two stars. The inner circle contains the text "LICENSED PROFESSIONAL ENGINEER" and "No. 9058-E".


THIS WORK WAS PREPARED
BY ME OR UNDER MY
SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

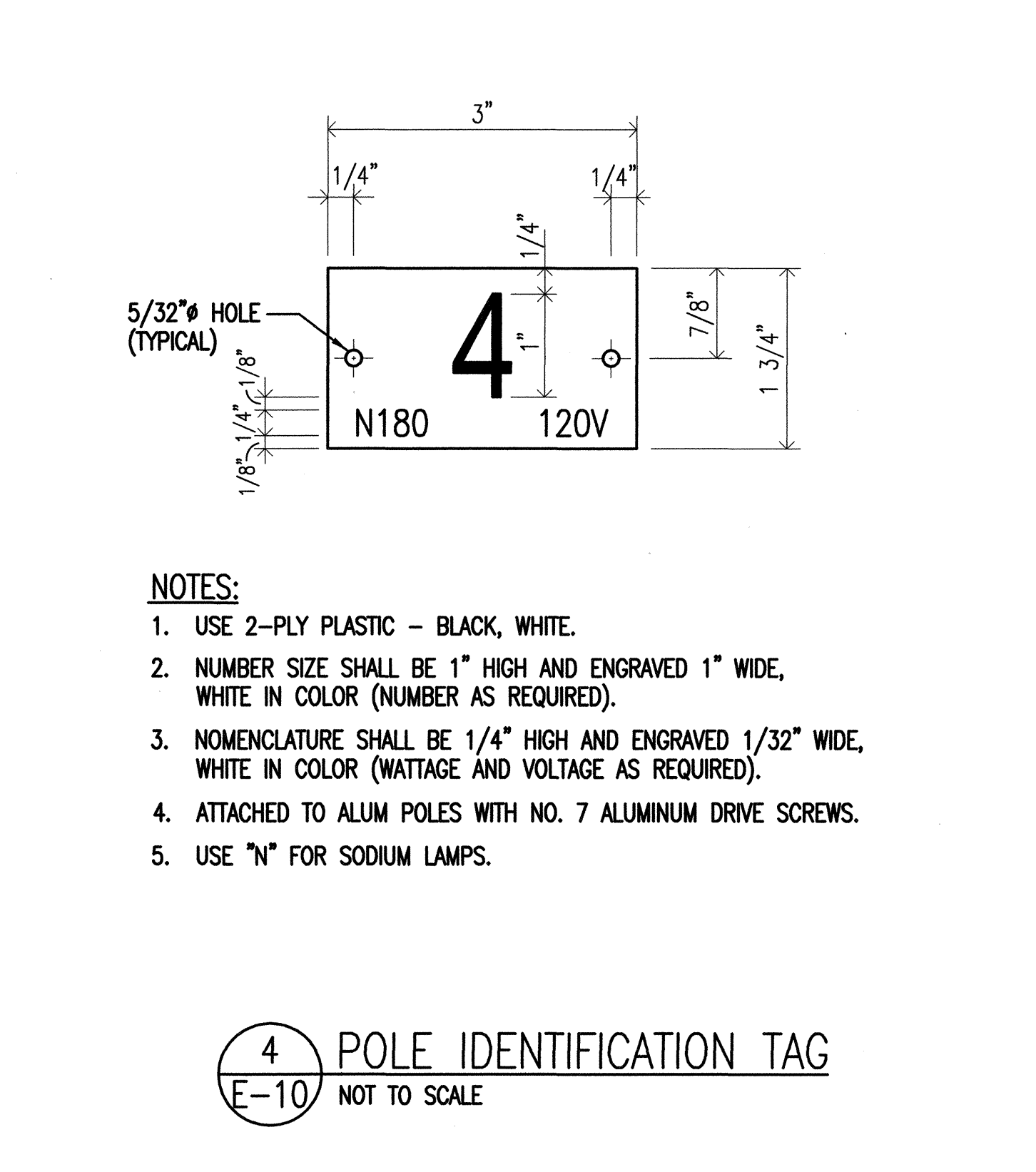
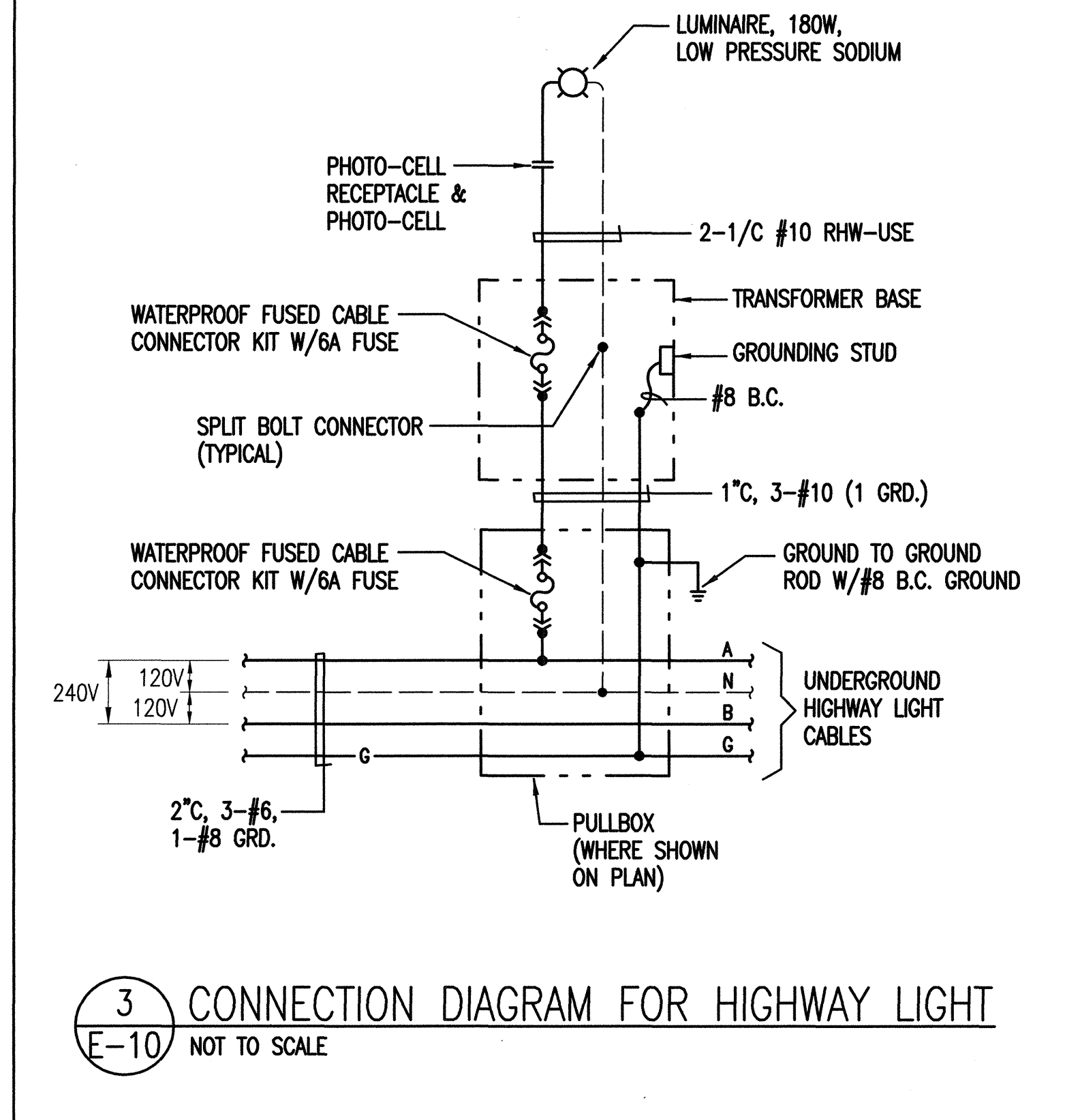
TYPICAL HIGHWAY LIGHT STANDARD DETAILS

Hawaii Belt Road
Intersection Improvements
At Police Station Road and Hualalai Road

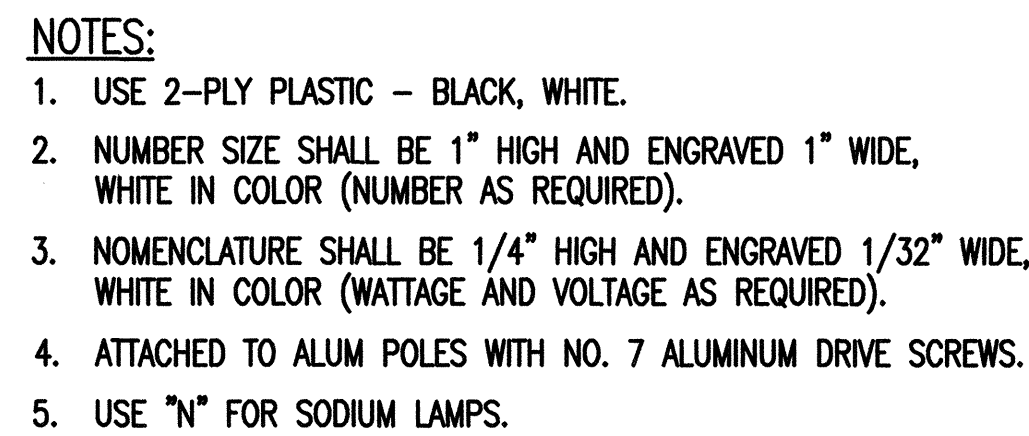
Scale: AS SHOWN

Date: DEC. 2002

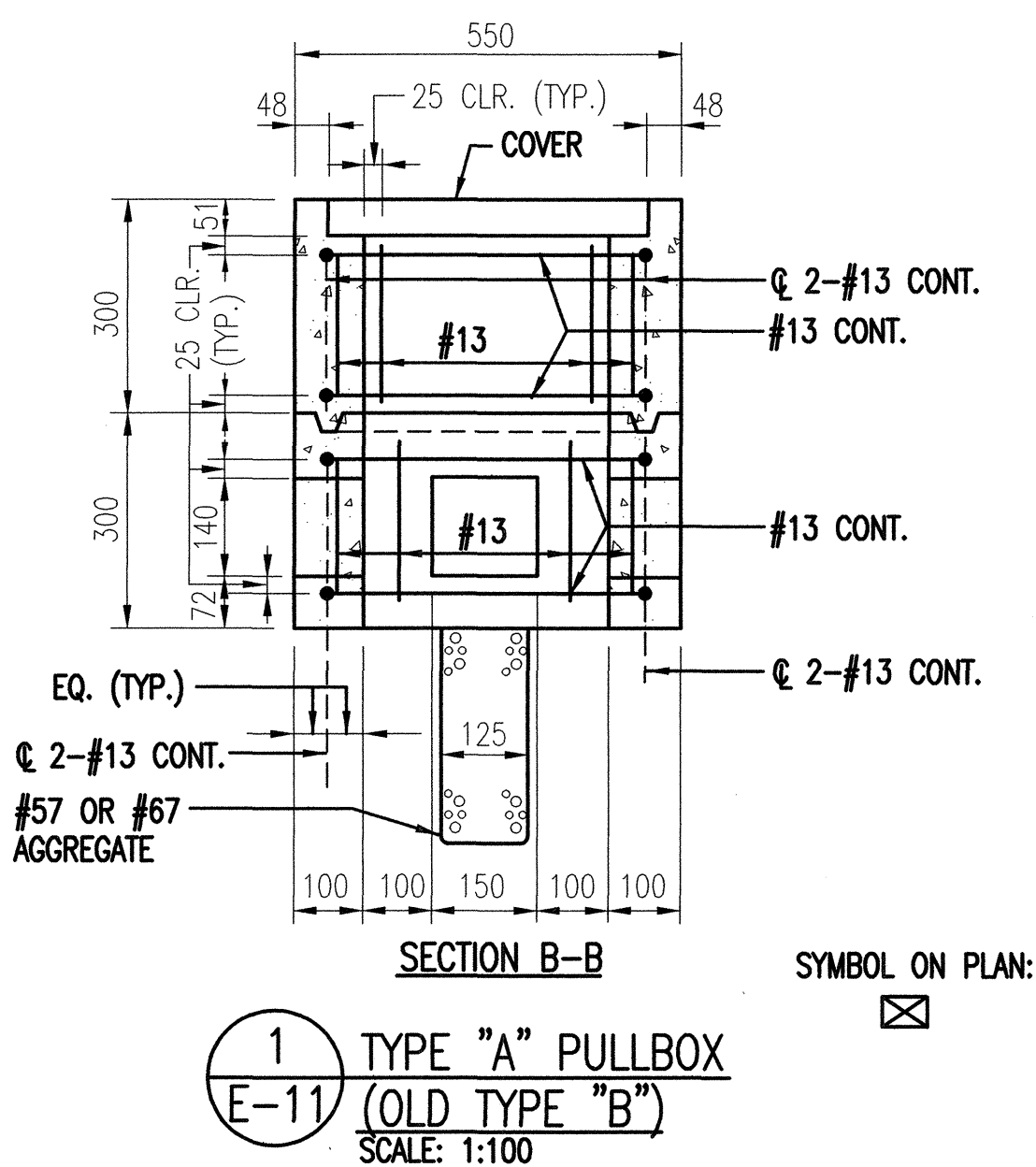
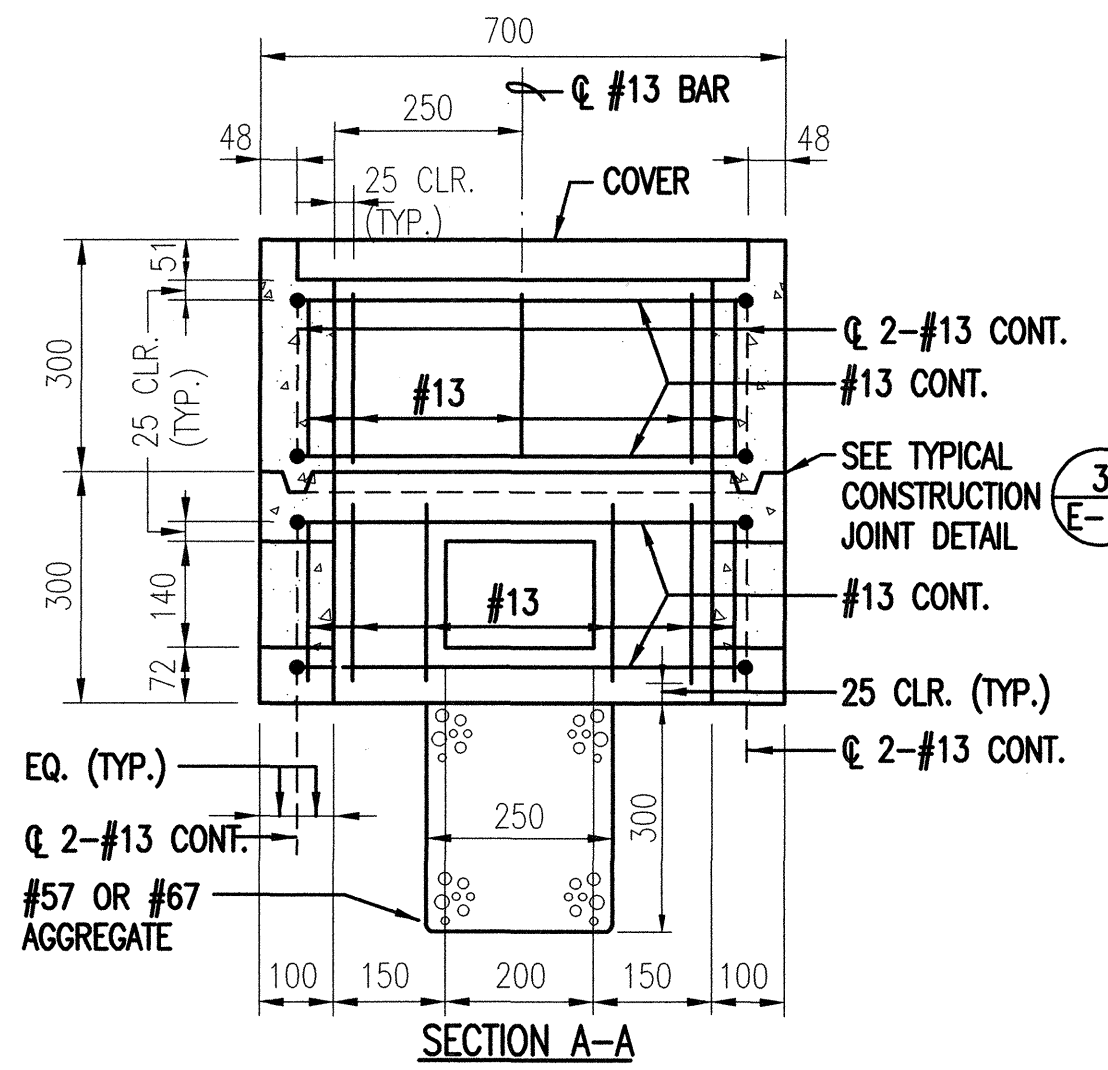
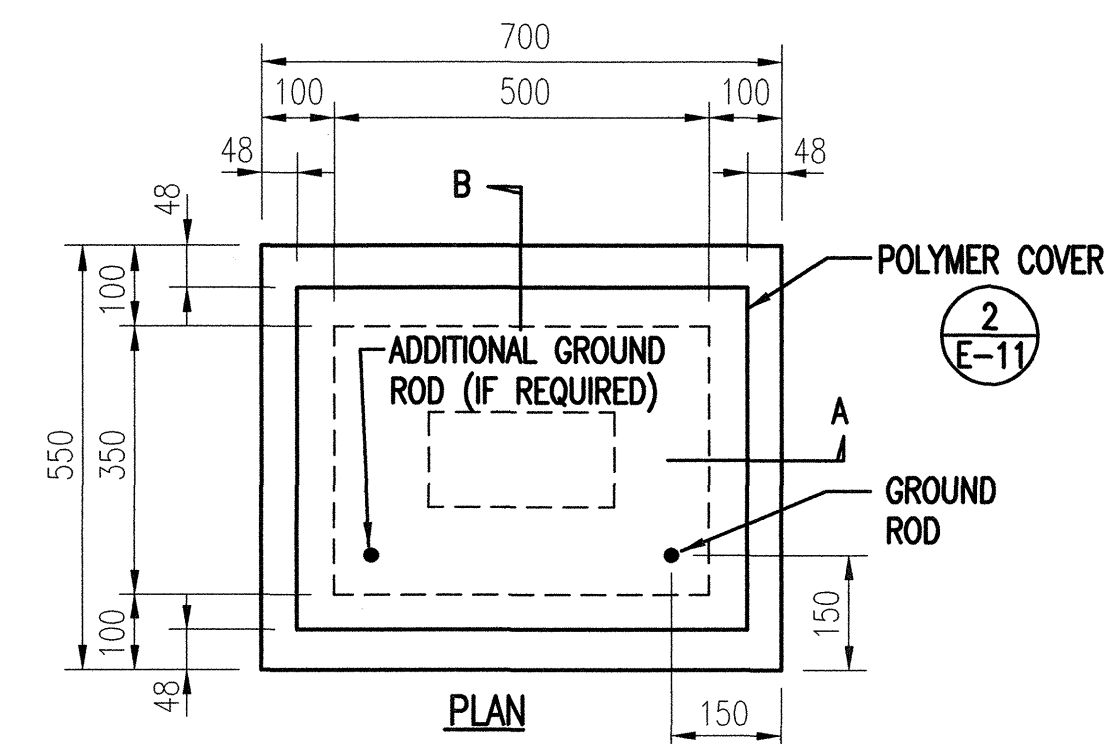
SHEET No. E-10 OF 11 SHEETS



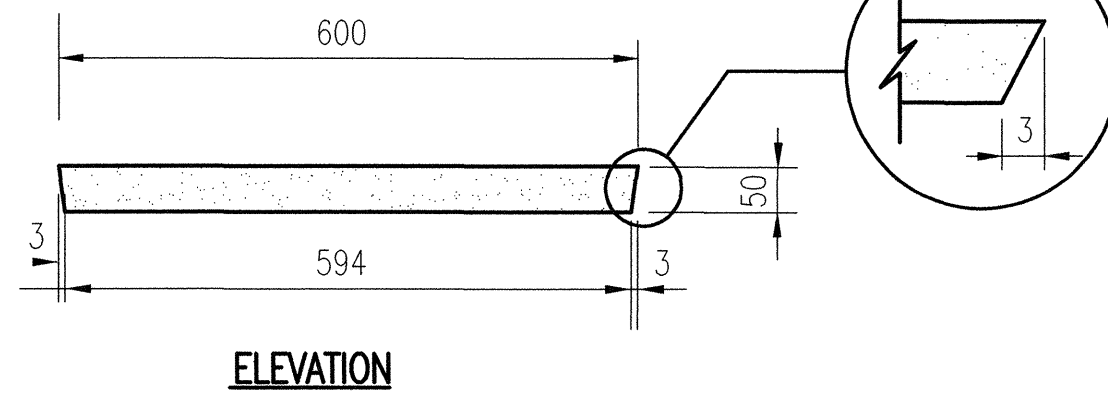
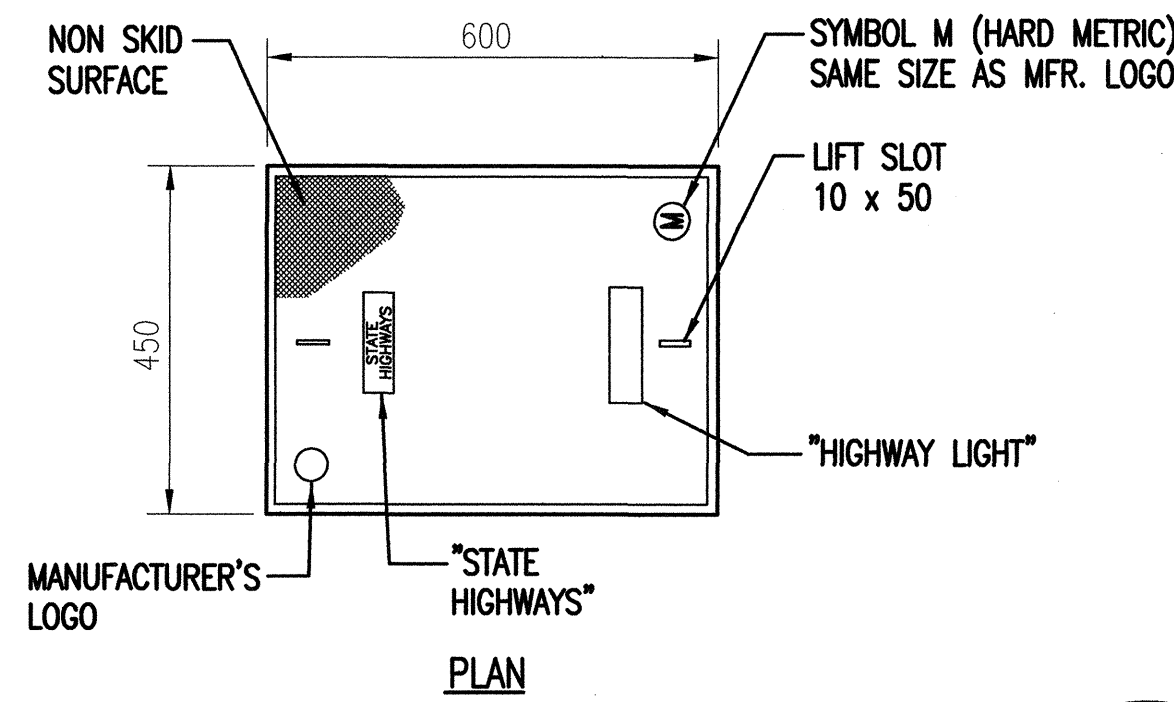
- ## BACKFILL TYPES ARE:
- | | |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TYPE "A": | BEACH SAND, EARTH OR EARTH AND GRAVEL.
IF EARTH AND 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 SCREEN AND CONTAIN
NOT MORE THAN 20% BY VOLUME OF ROCK
PARTICLES. |



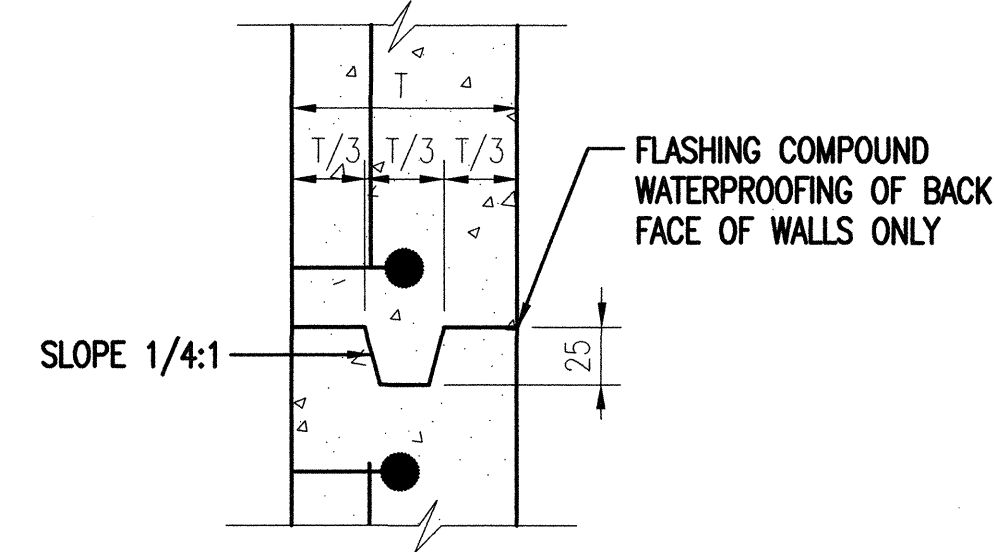
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	11A-01-02	2003	30	30



SYMBOL ON PLAN:



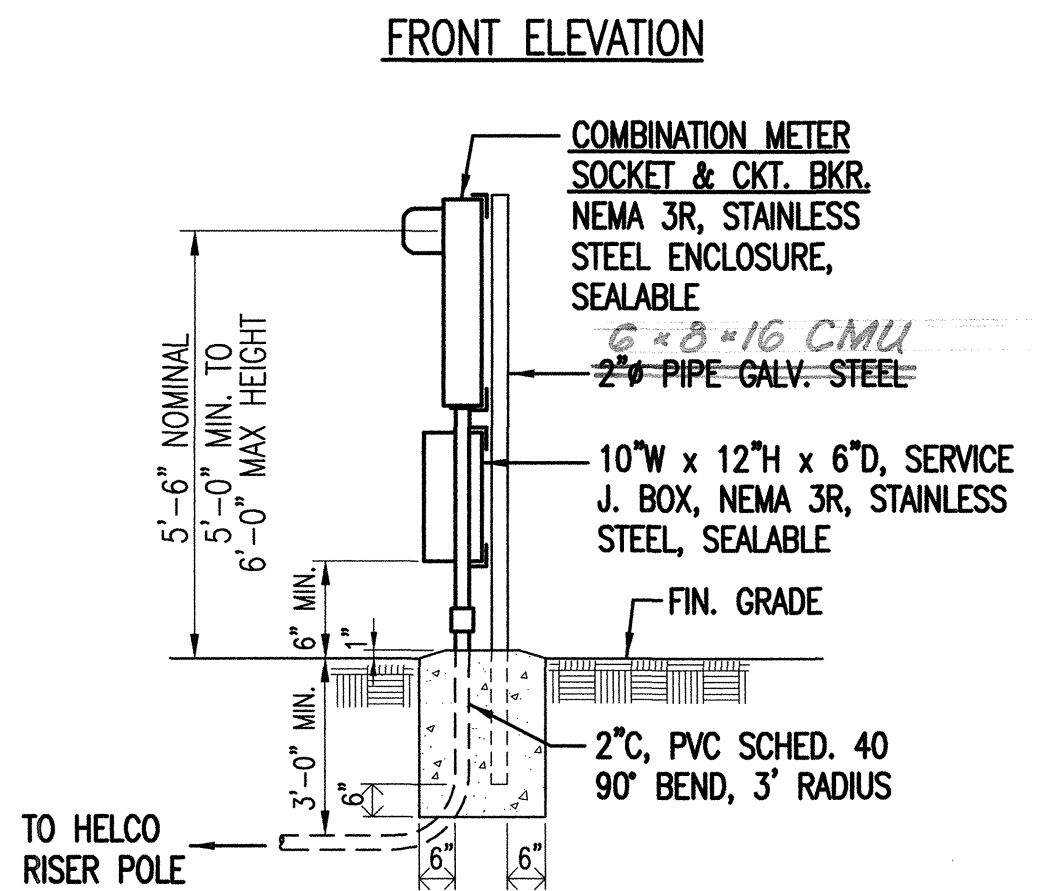
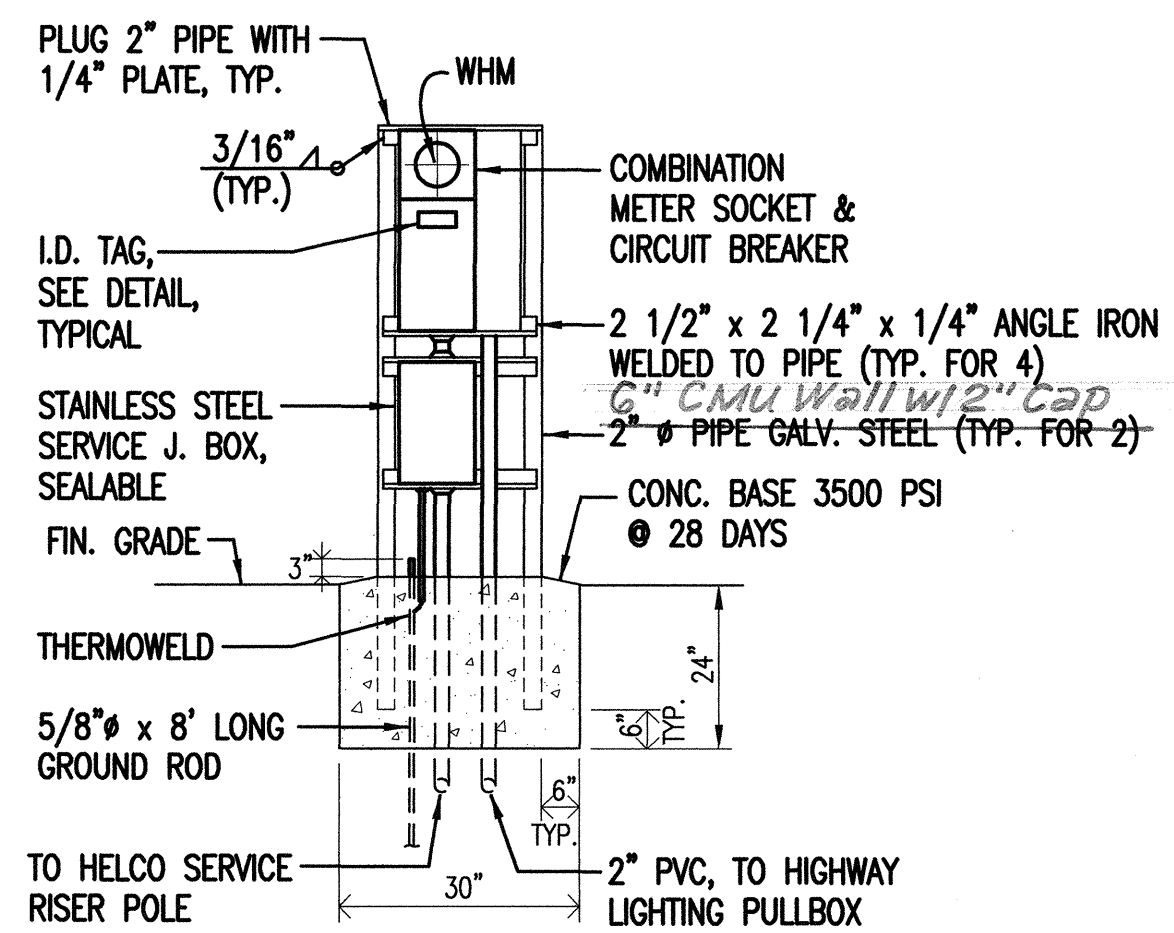
2
E-3
POLYMER CONCRETE COVER
NOT TO SCALE



3
E-11
TYPICAL CONSTRUCTION JOINT DETAIL
NOT TO SCALE

GENERAL NOTES:

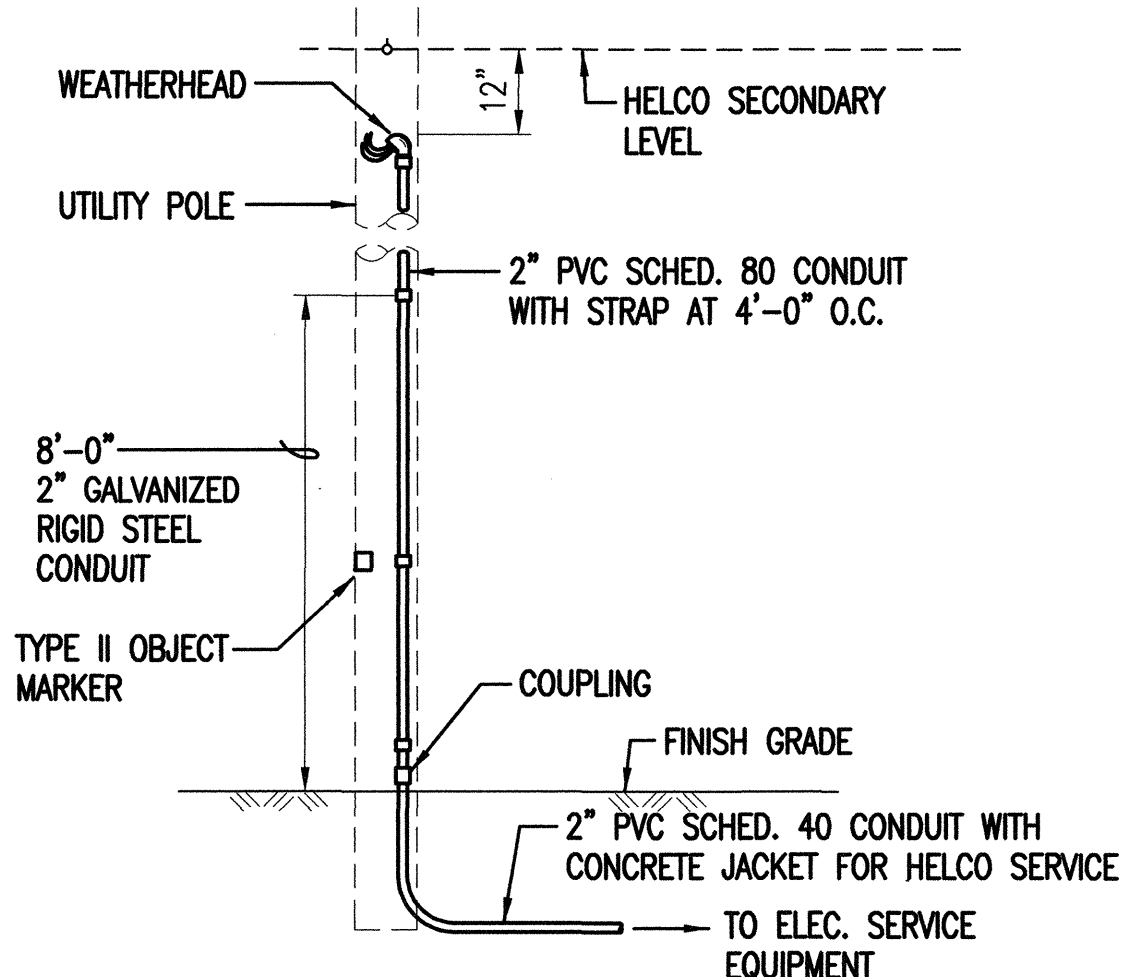
1. PROVIDE A MINIMUM OF ONE 16# x 2.5M COPPERWELD GROUND ROD IN EACH PULLBOX. WHEN DIRECTED BY THE STATE INSPECTOR/ENGINEER, INSTALL ADDITIONAL GROUND RODS. COST OF GROUND RODS SHALL BE INCIDENTAL TO THE PULLBOXES.
2. ALL PRE-CAST CONCRETE PULLBOXES SHALL BE MANUFACTURED IN TWO PIECES.
3. THE PULLBOX 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).



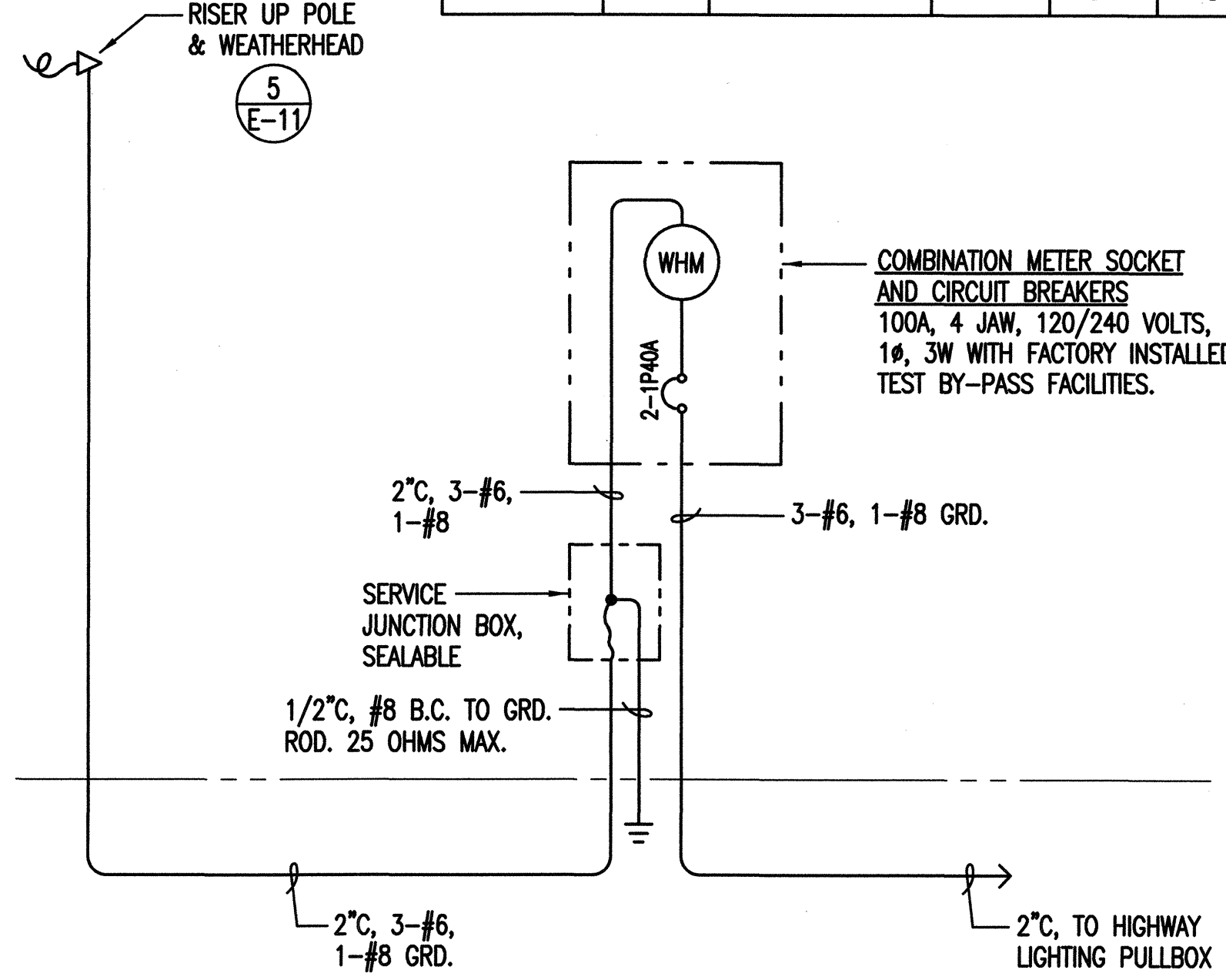
NOTES:

1. CONTRACTOR SHALL MAKE ALL ELECTRICAL CONNECTIONS. PROVIDE 2-1P40A BREAKERS.
2. ALL CONDUITS TO CONTAIN A POLYLEFIN PULL LINE. (JET LINE CAT #232 OR EQUIV.).
3. FRAMING SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
4. ALL FASTENING BOLTS, NUTS AND WASHERS SHALL BE STAINLESS STEEL.
5. PROVIDE 4 FEET CLEARANCE IN FRONT OF METER.

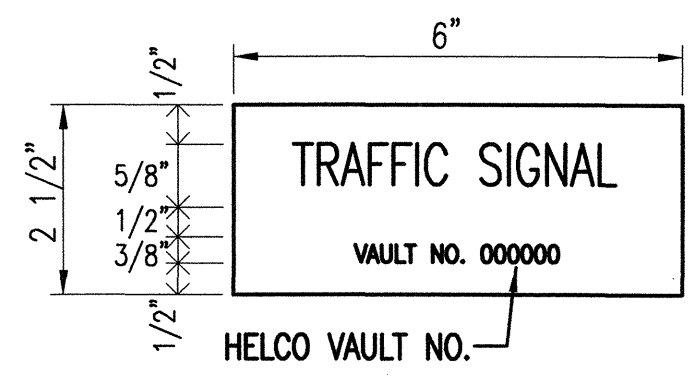
4
E-11
DETAIL - ELECTRICAL SERVICE EQUIPMENT
NOT TO SCALE



5
E-11
DETAIL - SERVICE RISER AT POLE
NOT TO SCALE



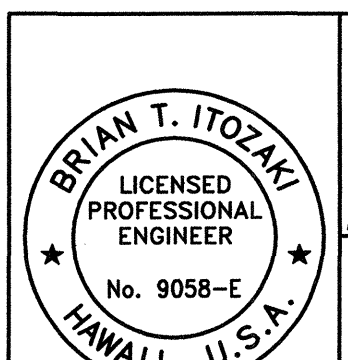
6
E-11
DETAIL - ELECTRIC SERVICE EQUIPMENT
NOT TO SCALE



NOTES:

1. USE 3-PLY LAMINATED FLEXIBLE PLASTIC, BLACK-WHITE-BLACK THICKNESS: BLACK CAP SHEET-0.010", WHITE BASE SHEET-0.052", BLACK BASE SHEET-0.010".
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 EXPOSED WHITE LETTERS/NUMBERS.

7
E-11
DETAIL - STATE METER SOCKET ID. TAG
NOT TO SCALE



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
PULLBOX & ELECTRIC SERVICE EQUIP. DETAILS
Hawaii Belt Road
Intersection Improvements
At Police Station Road and Hualalai Road
Scale: AS SHOWN Date: DEC. 2002

E-11

SHEET No. E-11 OF 11 SHEETS

30

210.022

ORIGINAL PLAN
DATE
DESIGNED BY
CHECKED BY
NO.