

DEMOLITION NOTES

1. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE ENGINEER IN THE FIELD DURING THE ACTUAL DEMOLITION WORK TO RESOLVE ALL QUESTIONS WHERE APPLICABLE.
2. DISCONNECT AND REMOVE THE EXISTING ELECTRICAL ITEMS AND THEIR ASSOCIATED WIRING AS INDICATED.
3. ALL UN-USED EXISTING WIRING SHALL BE REMOVED IN ITS ENTIRETY.
4. ALL REMOVED ITEMS SHALL REMAIN THE PROPERTY OF THE OWNER. CONTRACTOR SHALL CONSULT THE OWNER FOR STORAGE AND/OR DISPOSAL INSTRUCTIONS.
5. CONTRACTOR SHALL ARRANGE FOR UTILITY SERVICE DISCONNECTIONS AND REMOVALS AS APPLICABLE.
6. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL EXISTING CONDITIONS. THE EXISTING CONDITIONS SHOWN ARE INTENDED TO BE AS COMPLETE AND ACCURATE AS POSSIBLE. HOWEVER, ALL ITEMS NOT SHOWN SHALL BE DEMOLISHED WHERE REQUIRED AT NO ADDITIONAL COST TO THE OWNER.

DEFINITIONS

WIRING - ALL CONDUITS, RACEWAYS, CONDUCTORS, FITTINGS, PULLBOXES, JUNCTION BOXES, OUTLET BOXES, DEVICES, AND OTHER MATERIALS OR ITEMS AS NECESSARY FOR A COMPLETED AND OPERATIONAL ELECTRICAL CIRCUIT OR SYSTEM; OR THAT WHICH COMPRISES AN ELECTRICAL CIRCUIT OR SYSTEM.

OUTLET - IN ADDITION TO DEFINITION IN THE NEC, OUTLET SHALL MEAN THE REQUIRED OUTLET BOXES, CONDUCTORS, TERMINATIONS, WIRING DEVICES, AND COVER PLATES, TO PROVIDE FOR THE INTENDED USE, APPLICATION, OR UTILIZATION EQUIPMENT.

CONDUCTOR COLOR CODE:

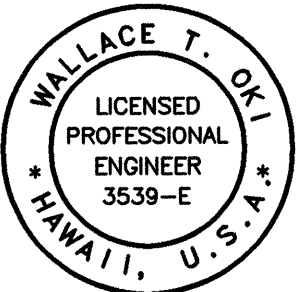
BK	BLACK	Y	YELLOW
W	WHITE	BR	BROWN
R	RED	PK	PINK
G	GREEN	GY	GRAY
O	ORANGE	PU	PURPLE
BL	BLUE	BK1	BLACK-ONE

ABBREVIATIONS

A	AMPERE	L	LIGHTS, LIGHTING, LONG, LENGTH
AC	ALTERNATING CURRENT	MIN	MINIMUM
AF	AMPERE FRAME	MISC	MISCELLANEOUS
AIC	AMPERE INTERRUPTING CAPACITY	N	NEUTRAL
AT	AMPERE TRIP	NIC	NOT IN CONTRACT
C	CONDUIT	NTS	NOT TO SCALE
CAB	CABINET	NP	NAMEPLATE
CB	CIRCUIT BREAKER	OC	ON CENTER
CL	CENTERLINE	OH	OVERHEAD
CO	CONDUIT ONLY	P	POLE
CMU	CONCRETE MASONRY UNIT	PBX	PULLBOX
D	DEEP	PFFB	PROVISIONS FOR FUTURE BREAKER
DWG	DRAWING	PH	PHASE
E, ELEC	ELECTRIC, ELECTRICAL	PNLBD	PANELBOARD
EA	EACH	PL	PROPERTY LINE
EL	ELEVATION	REF	REFERENCE
ENCL	ENCLOSURE	RMC	RIGID METAL CONDUIT (STEEL)
EP	ELECTRICAL PRIMARY	RNMC	RIGID NON-METALLIC CONDUIT (SCH 40 PVC UNLESS OTHERWISE INDICATED)
EQPT	EQUIPMENT	R/W	RIGHT OF WAY
ES	ELECTRICAL SECONDARY	SD	SERVICE DROP
EXIST	EXISTING	T	TEL TELEPHONE
FBO	FURNISHED BY OWNER OR OTHERS	(TYP)	TYPICAL
G, GND	GROUND	UG	UNDERGROUND
GFIC	GROUND FAULT INTERRUPTING CAPABILITY	V	VOLTS, VERTICAL
H	HORIZONTAL OR HIGH	VTU	VEHICLE TRACKING UNIT
HELCO	HAWAII ELECTRIC LIGHT COMPANY	W	WIRE(S), WIDE, WATTS
HH	HANDHOLE	WHM	WATT-HOUR METER
H.T.CO.	HAWAIIAN TELEPHONE COMPANY	WP	WEATHERPROOF
HDGAF	HOT DIPPED GALVANIZED AFTER FABRICATION	WWF	WELDED WIRE FABRIC
IBC	INSTALLED BY CONTRACTOR	W.x_H.x_L.	W.=WIDE, H.=HIGH, L.=LONG OR LENGTH
IBO	INSTALLED BY OWNER OR OTHERS		
JBX	JUNCTION BOX		
KVA	KILO-VOLT AMPERE		
KWH	KILO-WATT HOUR		

ELECTRICAL PLAN SYMBOLS

	ELECTRICAL DETAIL INDICATOR. (A = NUMBER OR LETTER IDENTIFICATION, B = DRAWING OR SHEET WHERE SHOWN.)		EQUIPMENT OR OTHER ELECTRICAL CONNECTION AS INDICATED
	* - EQUIPMENT AS IDENTIFIED		CONTROL DEVICE OR ITEM CONNECTION AS IDENTIFIED
	UNDERGROUND SERVICE DUCTLINE. REFER DETAIL INDICATOR WHERE SHOWN		STREET LIGHT STANDARD WITH SERVICE CONNECTION TO UTILITY SYSTEM, I = TYPE I, II = TYPE II
	EMBEDDED CONDUIT BELOW EXTERIOR FINAL GRADE		
	UTILITY LINES, OVERHEAD, AS IDENTIFIED, ET - ELECTRIC TRANSMISSION, ED - ELECTRIC DISTRIBUTION, ES - ELECTRIC SECONDARY, T - TELEPHONE, V - CATV, SD - SERVICE DROP		
	UTILITY POLE		
	UTILITY POLE WITH STREET LIGHTING		



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Wallace T. Oki
DATE: 5/20/97

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 1 OF 20 SHEETS

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	97	115

GENERAL NOTES:

- ALL ELECTRICAL ITEMS INDICATED ON THE DRAWINGS ARE NEW AND SHALL BE PROVIDED BY THE CONTRACTOR UNLESS INDICATED AS "EXISTING", OR AS OTHERWISE NOTED.
- ALL LOCATIONS SHOWN ON THE DRAWING FOR ITEMS OF WORK TO BE FURNISHED AND/OR INSTALLED ARE APPROXIMATE. THE CONTRACTOR SHALL SELECT LOCATIONS TO SUIT FIELD CONDITIONS SUBJECT TO APPROVAL OF THE ENGINEER.
- CONTRACTOR SHALL INDICATE ALL FINAL LOCATIONS ON THE "AS-BUILT" DRAWINGS WHERE THEY DIFFER FROM THAT SHOWN ON THE DRAWINGS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK AMONG THE VARIOUS TRADES AS NECESSARY TO AVOID CONFLICTS AND TO INSURE THE INSTALLATION OF ALL WORK WITHIN THE AVAILABLE SPACE.
- CONTRACTOR SHALL INVESTIGATE AND TONE AREA BEFORE DIGGING OR EXCAVATING.
- ALL ELECTRICAL EQUIPMENT SHALL BE NEW AND WARRANTED BY THE MANUFACTURER.
- EXISTING CONDITIONS, MATERIALS, SIZES, LOCATIONS, AND DIMENSIONS SHOWN ON THESE DRAWINGS REPRESENT THE BEST AVAILABLE INFORMATION OBTAINED FROM FIELD INVESTIGATION. PRIOR TO ORDERING MATERIALS AND EQUIPMENT, THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, MATERIALS, SIZES, LOCATIONS, AND DIMENSIONS THAT AFFECT THE WORK OF THIS PROJECT. NOTIFY THE ENGINEER OF ALL QUESTIONS IN WRITING AND RESOLVE ALL CONTRACTOR'S QUESTIONS AND CONCERNS PRIOR TO PROCUREMENT AND BEFORE START OF CONSTRUCTION.
- ALL ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, NATIONAL ELECTRICAL SAFETY CODE, AND FEDERAL, STATE, AND COUNTY GOVERNMENT STANDARDS, REGULATIONS, AND ORDINANCES.
- SITE PLAN INDICATES APPROXIMATE LOCATIONS OF KNOWN BURIED ITEMS. CONTRACTOR SHALL NOT CAUSE ANY HARM TO OR DAMAGE ANY EXISTING BURIED ITEM. CONTRACTOR SHALL PROVIDE ALL NECESSARY MEANS TO LOCATE ALL EXISTING BURIED ITEMS INTERFERRING WITH NEW WORK. CONTRACTOR SHALL REPAIR OR REPLACE ANY DAMAGED BURIED ITEM TO THE SATISFACTION AND ACCEPTANCE OF THE ENGINEER.
- ALL EXPOSED CONDUITS AND FITTINGS, AND METAL PORTIONS OF EQUIPMENT ENCLOSURE SHALL BE FIELD PAINTED FOR CORROSION PROTECTION.
- ALL EQUIPMENT SHALL BE PROPERLY MOUNTED, ANCHORED, AND SUPPORTED BY APPROVED METHODS FOR SEISMIC RESTRAINT OF .3G FORCES.
- THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL BURIED SEWER, WATER AND GAS PIPING, DRAINAGE STRUCTURES, AND ALL OTHER BURIED ITEMS WITH THE APPROPRIATE AGENCIES PRIOR TO DOING ANY EXCAVATION WORK.
- THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL TRAFFIC SIGNAL STANDARDS, HANDHOLES, AND CONTROLLERS WITH THE ENGINEER. THE CONTRACTOR SHALL STAKE-OUT LOCATIONS FOR APPROVAL BY THE ENGINEER.
- THE CONTRACTOR SHALL VERIFY LOCATION OF ALL OVERHEAD UTILITY LINES TO AVOID CONFLICTS DURING CONSTRUCTION. THE CONTRACTOR SHALL NOTE ALL POSSIBLE HAZARDS, HOWEVER REMOTE, AND SHALL TAKE ALL NECESSARY PRECAUTIONS AS REQUIRED TO AVOID ANY AND ALL HAZARDS.

NOTES TO CONTRACTOR –
GTE H.T.CO. REQUIREMENTS

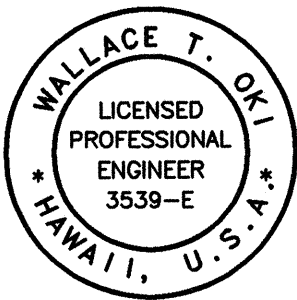
- ALL WORK SHALL BE IN STRICT ACCORDANCE WITH SPECIFICATIONS AND REQUIREMENTS OF GTE H. T. CO. FOR THE FACILITIES WITHIN THEIR JURISDICTION.
- THE CONTRACTOR SHALL CLOSELY COORDINATE ALL WORK WITH GTE H. T. CO. ALL TRENCHES MUST BE INSPECTED BY H. T. CO. PRIOR TO BACKFILLING THE CONCRETE ENCASING OPERATIONS. THE CONTRACTOR SHALL NOTIFY THE H.T.CO. INSPECTOR AT KONA TELEPHONE NUMBER 329-4756 AT LEAST 72 HOURS PRIOR TO POURING OF CONCRETE OR BACKFILLING.
- UNLESS OTHERWISE INDICATED, ALL CONDUITS, SWEEPS, COUPLINGS, ADAPTERS, AND BELL ENDS SHALL BE CARLON GT42, 2-INCH OR 4-INCH PVC CONDUIT MEETING GTE SPECIFICATION GTS-8342.
- STONES, ROCKS, ETC. SHALL NOT BE USED WITH BACKFILL MATERIAL, ONLY SELECT MATERIALS SHALL BE USED AS BACKFILL MATERIAL.
- A 4-INCH WIDE WARNING TAPE RED IN COLOR WITH A BLACK IMPRINTED MESSAGE "WARNING STOP DIGGING-CALL GTE, COMMUNICATIONS CABLE BURIED BELOW. FAILURE TO COMPLY COULD RESULT IN LEGAL ACTION" SHALL BE PLACED 12-INCHES BELOW THE SURFACE OVER THE DUCT OR CONCRETE JACKET FOR THE ENTIRE LENGTH OF DUCT INSTALLATIONS. SEE H. T. CO. STANDARD DRAWING 34028. RECOMMENDED TAPE IS MANUFACTURED BY THOR ENTERPRISES, INC., SUN PRAIRIE, WE 53590 (1-800-827-8467) PART NUMBERS DTOGTE-41 (1000-FT.) AND DTOGTE-46 (6000-FT.).
- MAIN DUCT RUNS EXCEPT RISER CONDUITS AND CROSS-CONNECT PEDESTAL CONDUITS SHOULD BE CONSTRUCTED WITH NO LESS THAN 20 FOOT RADIUS CURVES.
- AFTER THE CONDUITS ARE INSTALLED, A ROUND SOLID TEST MANDREL NOT LESS THAN 12-INCHES LONG AND HAVING A DIAMETER OF ONE-FOURTH INCH LESS THAN THE DIAMETER OF THE CONDUIT SHALL BE PULLED THROUGH EACH CONDUIT AFTER WHICH A BRUSH WITH STIFF BRISTLES SHALL BE PULLED THROUGH TO MAKE CERTAIN THAT NO PARTICLES OF EARTH, SAND, OR GRAVEL HAVE BEEN LEFT IN THE CONDUIT. RECOMMENDED 3-INCH AND 4-INCH MANDRELS/BRUSHES ARE MADE BY GENERAL MACHINE PRODUCTS CO. (GMP), TREVOSE, PA (215-357-5500). RECOMMENDED GMP PART NO. 81823R (TEST MANDREL FOR 3-INCH CONDUIT), GMP PART NO. 81824R (TEST MANDREL FOR 4-INCH CONDUIT), GMP PART NO. 17092 (BRUSH FOR 3-INCH CONDUIT) AND GMP PART NO. 17094 (BRUSH FOR 4-INCH CONDUIT). RECOMMENDED 2-INCH MANDRELS AND BRUSHES ARE MADE BY CONDUX INTERNATIONAL, INC., 145 KINGSWOOD ROAD, MANKATO, MN 56001 (1-800-533-2077). RECOMMENDED CONDUX PART NO. 08013020 (TEST MANDREL FOR 2-INCH CONDUIT) AND PART NO. 08028900 (BRUSH FOR 2-INCH CONDUIT).
- INSTALL NEPTCO WP1800P MULETAPE IN ALL NEW CONDUITS AND CAP ALL CONDUITS AFTER TESTING. THE NEPTCO MULETAPE IS AVAILABLE IN 3000 FT., 6500 FT., AND 10000 FT. REELS. THE NEPTCO MULETAPE IS PRE-LUBRICATED AND PRINTED WITH SEQUENTIAL FOOTAGE MARKINGS. USING THE NEPTCO MULETAPE, THE CONTRACTOR SHALL MEASURE AT LEAST ONE CONDUIT OF A COMMON DUCT RUN. THE DISTANCE SHALL BE MARKED ON THE RECORD PRINTS AND SUBMITTED TO THE H. T. CO. INSPECTOR FOR RECORD KEEPING.
- ALL CONDUITS SHALL ENTER PULLBOXES/MANHOLES AT 90 DEGREE ANGLE AND FLUSH WITH FLARED OR BELL ENDS TO PREVENT CABLE DAMAGE.
- PROVIDE A FIVE-EIGHTH INCH X 8-FT. GROUND ROD IN ALL OTHER H. T. CO. PULL BOXES AND MANHOLES.
- THE TOP OF ALL UTILITY BOXES SHALL BE 1-INCH ABOVE FINISH GRADE IN NON-PAVED SHOULDERS UNLESS OTHERWISE NOTED.
- ALL DUCTS ASSOCIATED WITH PULLBOXES OR MANHOLES SHALL BE INSTALLED WITH ADEQUATE DRAINAGE TOWARD THE PULLBOXES OR MANHOLES. (MINIMUM ONE-FOURTH PERCENT UNLESS OTHERWISE NOTED).
- ALL CONDUITS SHALL CONNECT TO PULLBOXES AND MANHOLES AT ENDS ONLY. NO CONNECTION TO SIDES WILL BE ALLOWED.

NOTES TO CONTRACTOR –
HELCO REQUIREMENTS:

- ALL WORK SHALL COMPLY WITH THE SERVING UTILITY COMPANY'S REQUIREMENTS, SERVICE INSTALLATION MANUALS, AND RULES AND REGULATIONS.
- RESOLVE ANY DISCREPANCY OR QUESTION WITH THE ENGINEER PRIOR TO START OF ANY WORK.
- THE CONTRACTOR SHALL OBTAIN ALL REQUIRED STANDARD DRAWINGS AND INSTALLATION DETAILS FROM THE SERVING UTILITY COMPANIES. THE CONTRACT DRAWINGS DO NOT IN ANY WAY DUPLICATE THE STANDARDS OF THE UTILITY COMPANIES.
- DO ALL NECESSARY EXCAVATION AND BACKFILLING OF DUCTLINES AS PER THE HELCO SPECIFICATION NO. CS-7001 AND CS-7004. PROVIDE WARNING TAPE PER H.T.CO. STANDARD DRAWING 34028.
- PREPARE ALL VAULT SITES AS SPECIFIED BY HELCO SPECIFICATION DRAWING NO. 30-5001 (2-SHEETS).
- FURNISH AND INSTALL SCH 40 PVC DUCTS AS INDICATED ON THE DRAWINGS WITH 3" CONCRETE ENCASEMENT AS INDICATED.
- FURNISH AND INSTALL ALL PULLBOXES, HANDHOLES, AND MANHOLES AS NOTED ON THE DRAWINGS.
- ALL ELECTRIC DUCT LINES SHALL CONTAIN A POLYOLEFIN PULL LINE (JET LINE CAT. NO. 232 OR EQUIVALENT). (200 LB. MINIMUM TEST STRENGTH)
- ALL WORK SHALL BE SUBJECT TO HELCO INSPECTION. CONTRACTOR SHALL GIVE HELCO 3 WORKING DAYS INSPECTION NOTICE PRIOR TO POURING OF CONCRETE, OR FOR ANY OTHER INSPECTION SERVICES.
- ALL ELECTRIC CONDUITS SHALL BE REAMED WITH A MANDREL 1/2" SMALLER IN DIAMETER THAN THE CONDUIT, DUCTS SHALL BE SWABBED AND CLEARED OF ALL BURRS AND FOREIGN MATERIAL.
- REFER TO HELCO SERVICE DRAWINGS FOR SPECIFIC AND STANDARD DETAIL DRAWINGS.
- ALL BENDS DUE TO CHANGE IN GRADE SHALL HAVE A RADIUS BEND OF NOT LESS THAN 20'-0" (HORIZONTAL OR VERTICAL CHANGE).
- ALL STREET LIGHT AND OTHER ELECTRICAL CONNECTION POINTS SHALL BE THOSE DESIGNATED BY HELCO.
- ANY QUESTIONS AS TO THE RESPONSIBILITY OF ANY WORK NOT SPECIFICALLY COVERED IN THESE NOTES AND ON THE DRAWINGS SHALL BE CLARIFIED WITH HELCO'S AND JSL'S ENGINEERING DEPARTMENT.
- ALL HANDHOLES, PULLBOXES, AND MANHOLES WITHIN THE ROAD R/W SHALL BE PLACED WITH TOPS FLUSH WITH FINAL GRADE, PAVEMENT, OR SIDEWALK AS APPLICABLE.
- ELECTRICAL SERVICE INSTALLATION SHALL COMPLY WITH HELCO'S REQUIREMENTS. CONTRACTOR SHALL OBTAIN HELCO'S DRAWING NO. (*) AND PROVIDE ELECTRICAL SERVICES AS INDICATED. CONTRACTOR SHALL CONSULT WITH ENGINEER WHERE HELCO'S DRAWING DIFFERS AND RESOLVE ALL QUESTIONS PRIOR TO START OF ANY ELECTRICAL SERVICE WORK.

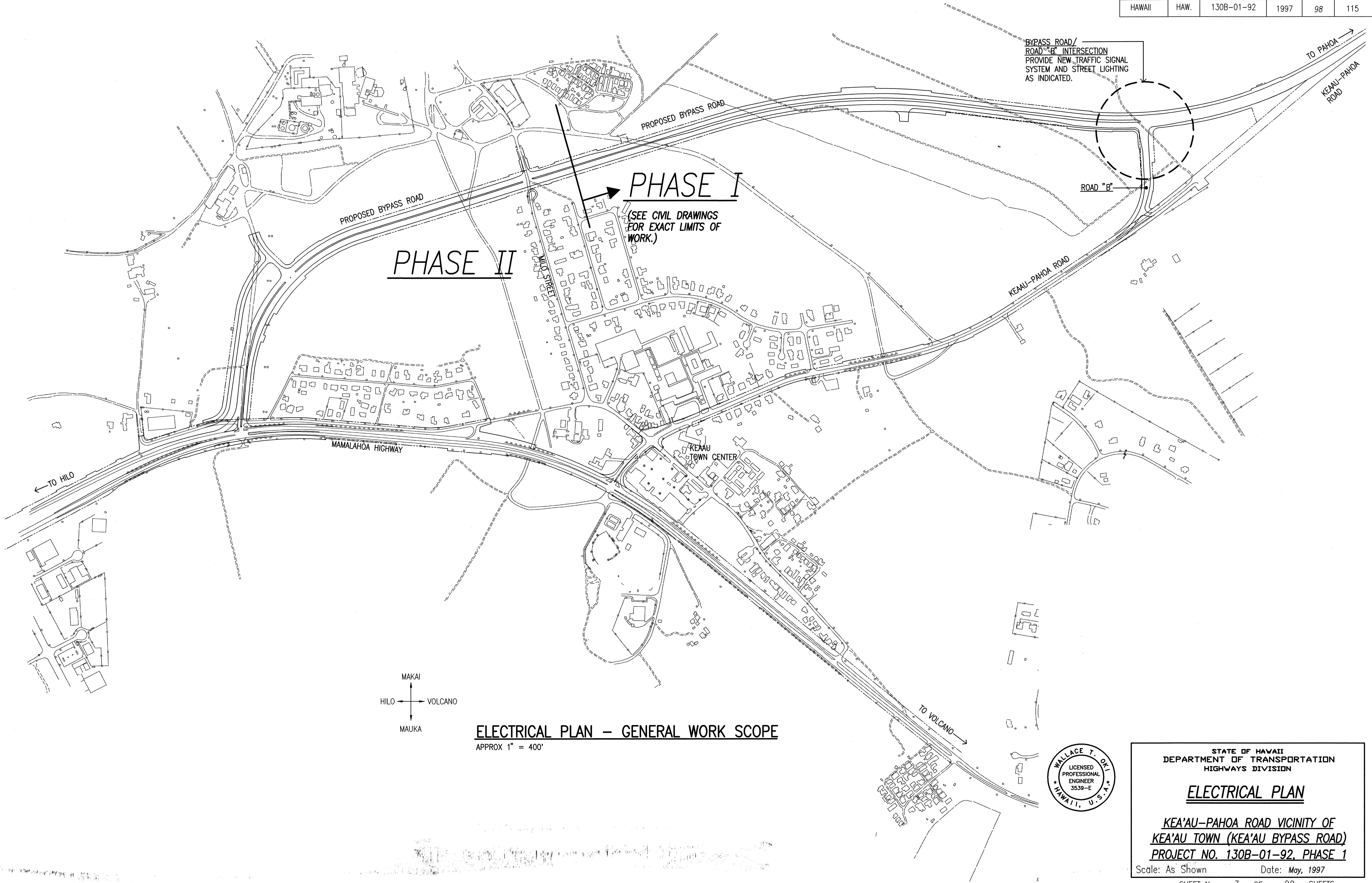
(* – NOT AVAILABLE PRIOR TO BIDDING)

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

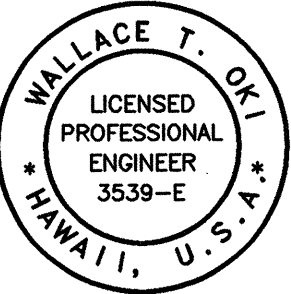


STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>ELECTRICAL PLAN</u>	
KEA'AU-PAHOA ROAD VICINITY OF KEA'AU TOWN (KEA'AU BYPASS ROAD) PROJECT NO. 130B-01-92, PHASE 1	
Scale: As Shown	Date: May, 1997
SHEET No. 2 OF 20 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	98	115



ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
DESIGNED BY	TRACED BY	
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

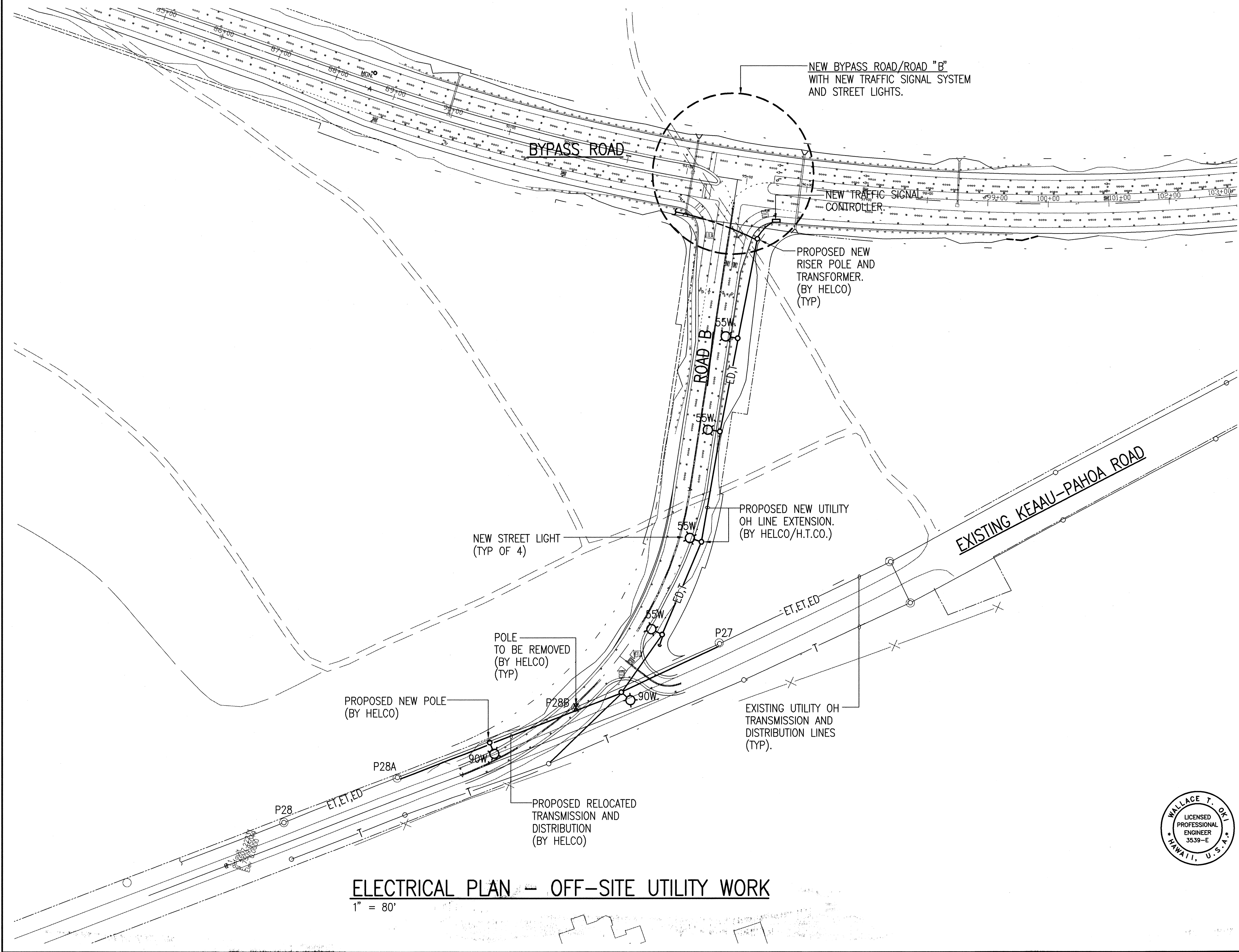
ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

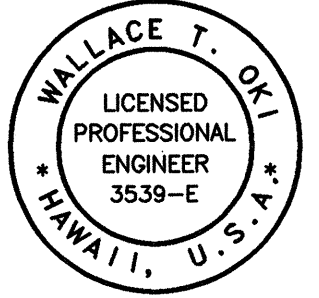
SHEET No. 3 OF 20 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	99	115



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

ELECTRICAL PLAN - OFF-SITE UTILITY WORK
1" = 80'



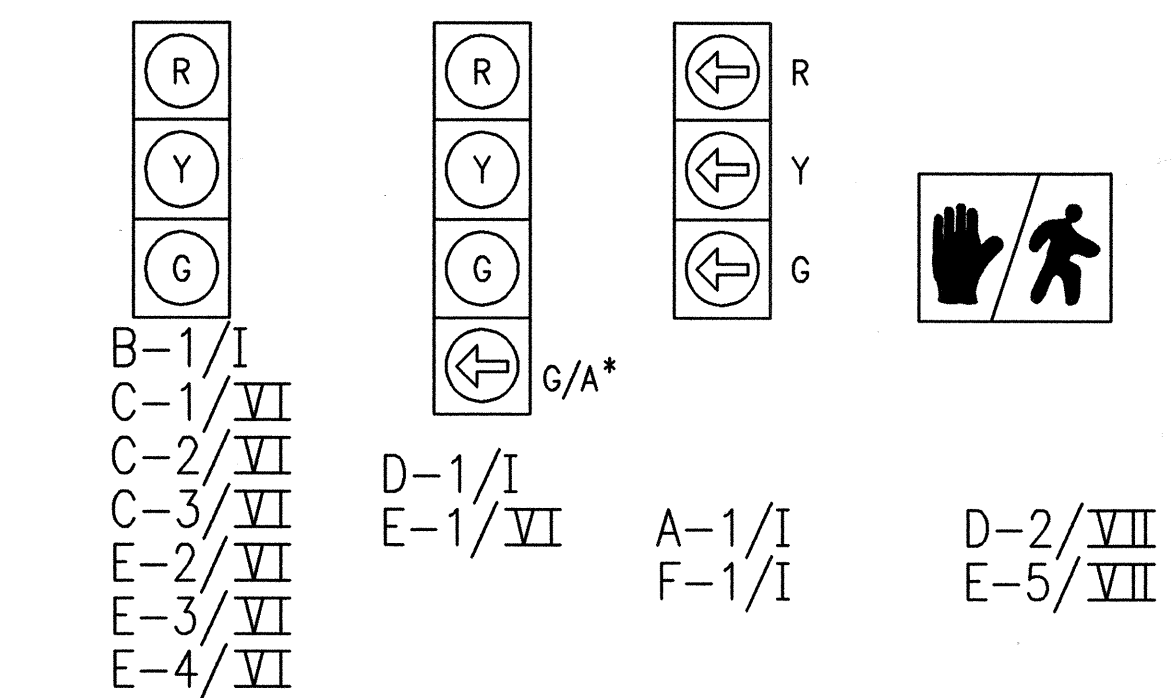
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

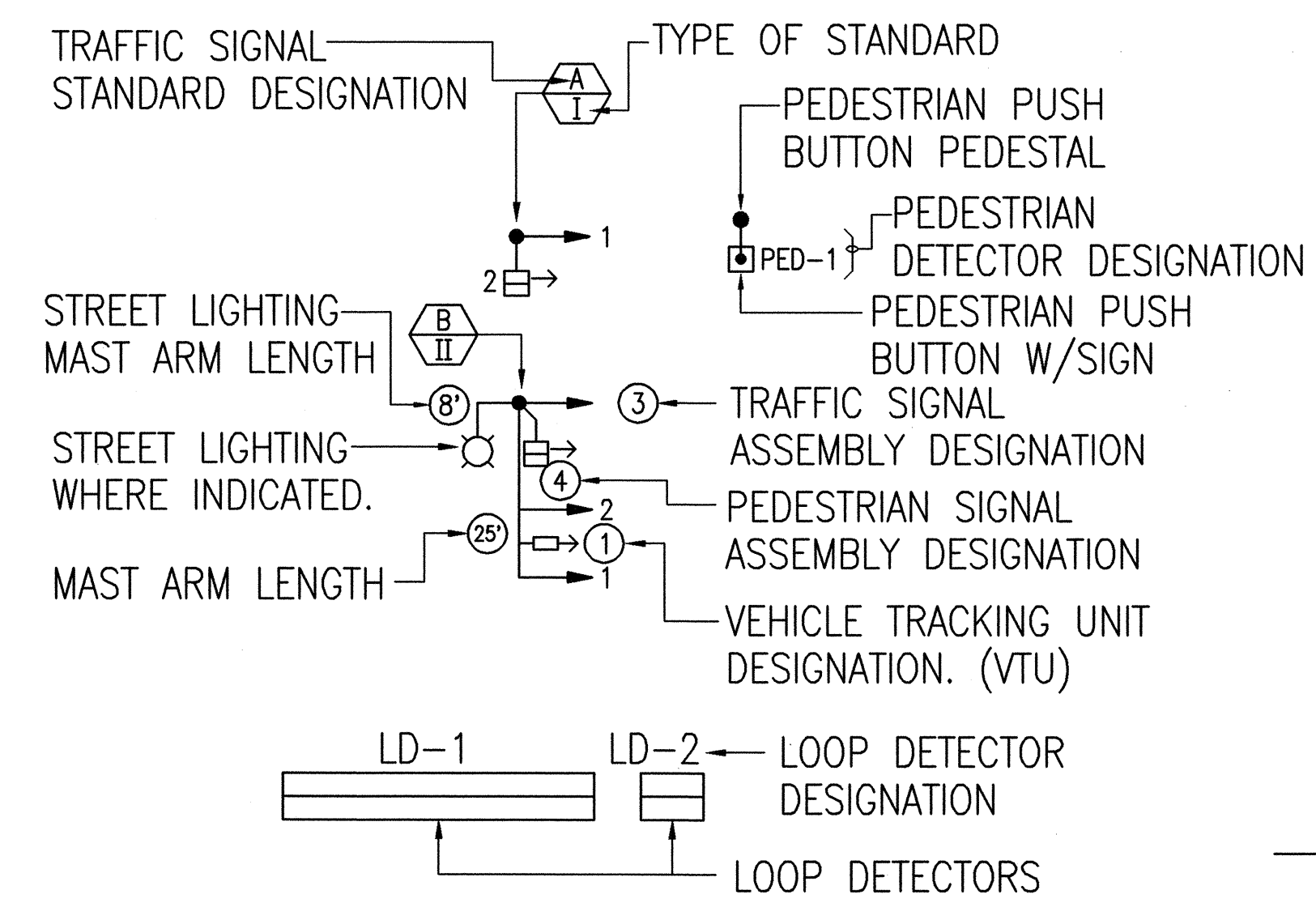
Scale: As Shown Date: May, 1997

SHEET No. 4 OF 20 SHEETS



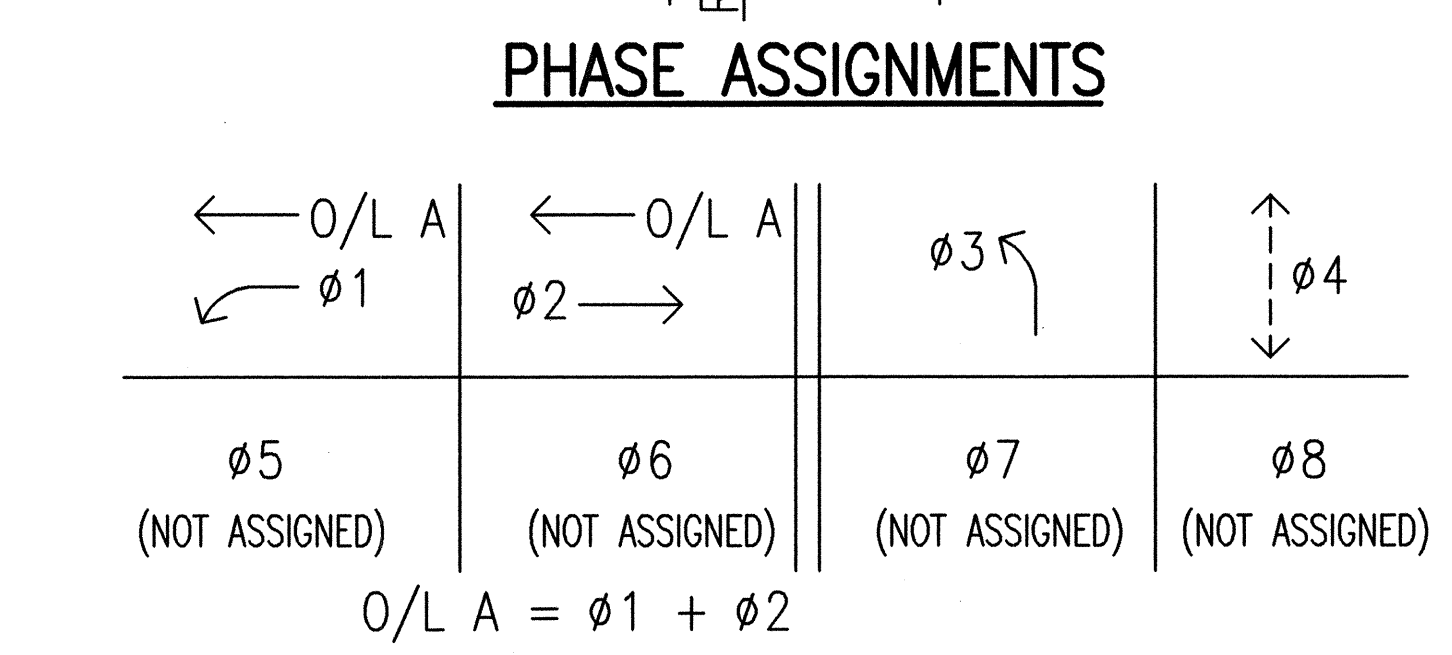
**SIGNAL ASSEMBLY ARRANGEMENT/
TYPE OF MOUNTING**

NOTES:
R = RED
Y = YELLOW
G = GREEN
G/A = GREEN/AMBER (FIBER OPTIC)
* = PROVIDE WITH R10-12 SIGN
△ = PROGRAM VISIBILITY FOR ALL SIGNAL FACES.

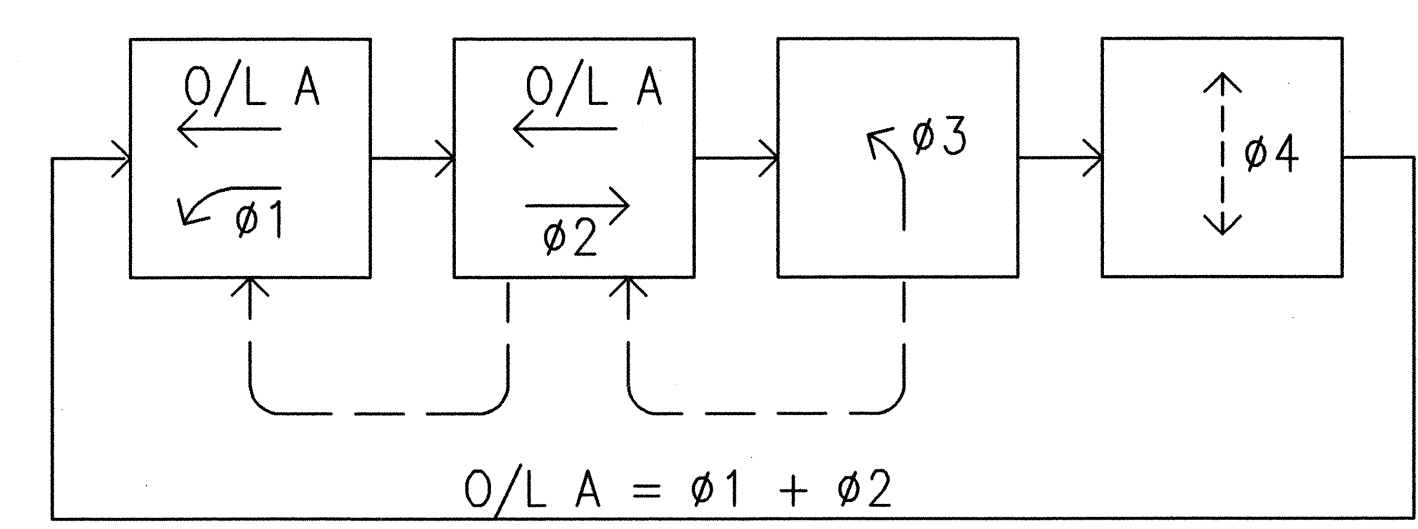


LEGEND

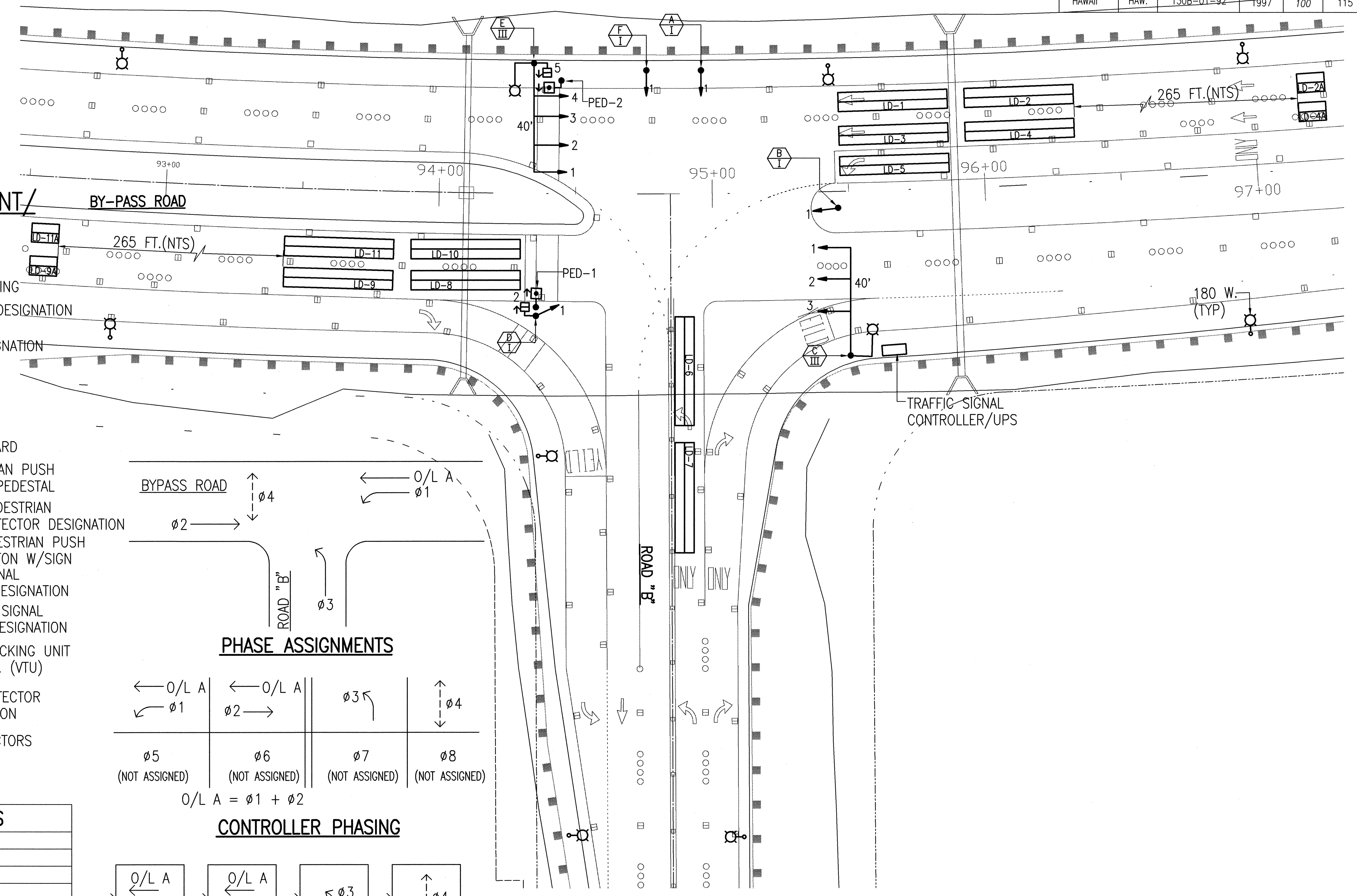
LOOP DETECTOR ASSIGNMENTS			
LD--	AMPLIFIER	CHANNEL	PHASE-NOTES
1,2	A	1	ø2
3,4	A	2	ø2
5	A	3	ø1&2 (INTERNALLY SWITCHED)
2A,4A	D	1	ø2 EXTEND (EXTERNAL)
6,7	B	1	ø3
8,9	C	1	ø2
10,11	C	2	ø2
9A,11A	E	1	ø2 EXTEND (EXTERNAL)



CONTROLLER PHASING



PHASE DIAGRAM



**TRAFFIC SIGNAL PLAN -
BYPASS ROAD/ROAD "B"**

1" = 20'



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

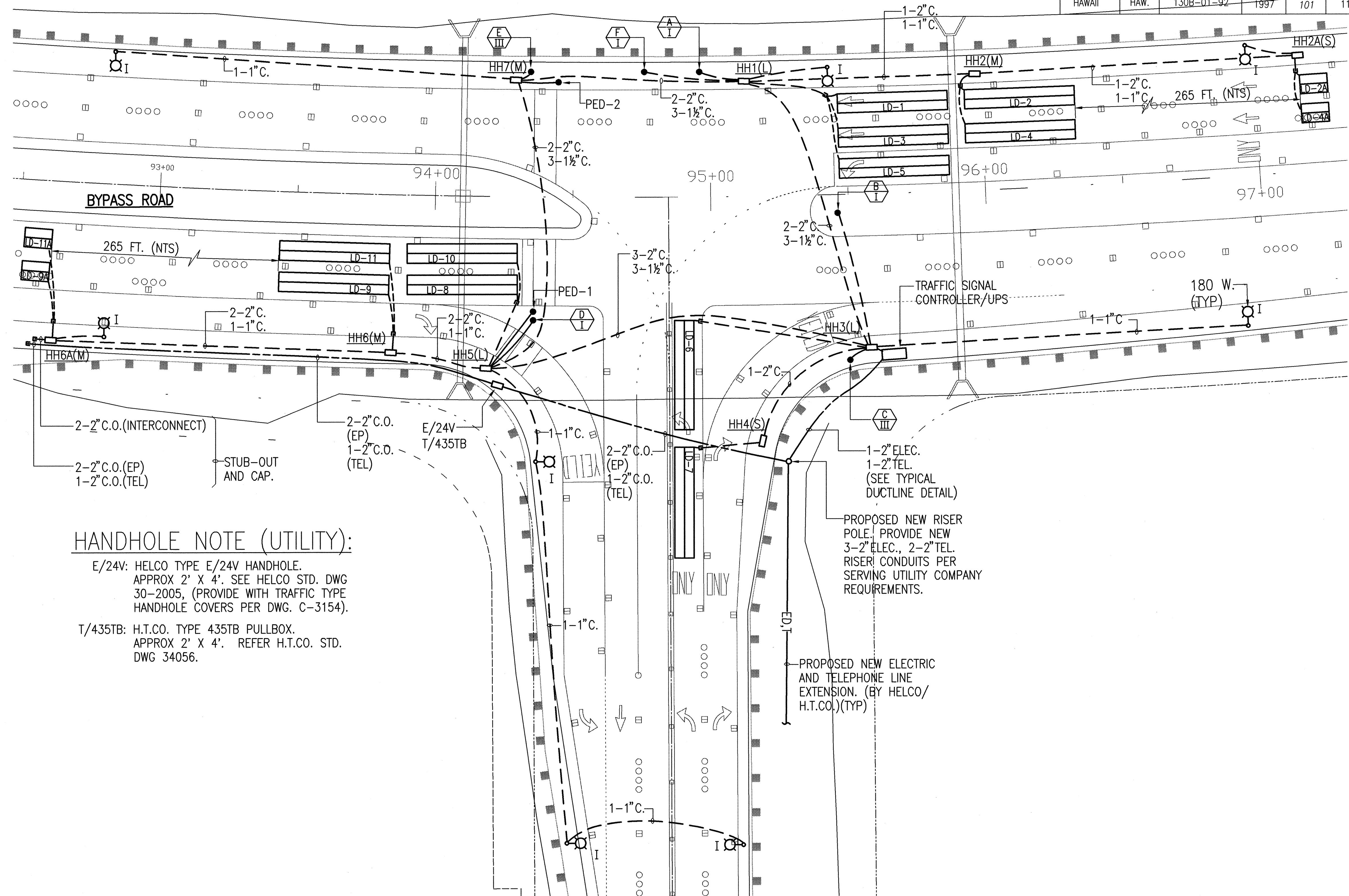
KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 5 OF 20 SHEETS

ORIGINAL SURVEY PLOTTED BY _____ DATE _____
DRAWN BY _____
CHECKED BY _____
NOTE BOOK _____
DESIGNED BY _____
QUANTITIES BY _____

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	101	115

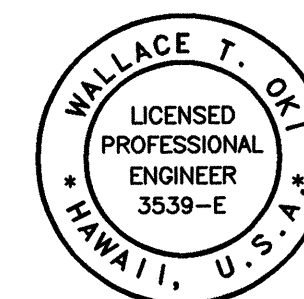


HANDHOLE NOTE (UTILITY):

E/24V: HELCO TYPE E/24V HANDHOLE.
APPROX 2' X 4'. SEE HELCO STD. DWG 30-2005, (PROVIDE WITH TRAFFIC TYPE HANDHOLE COVERS PER DWG. C-3154).

T/435TB: H.T.CO. TYPE 435TB PULLBOX.
APPROX 2' X 4'. REFER H.T.CO. STD. DWG 34056.

ELECTRICAL PLAN – BYPASS ROAD/ROAD "B"
1" = 20'



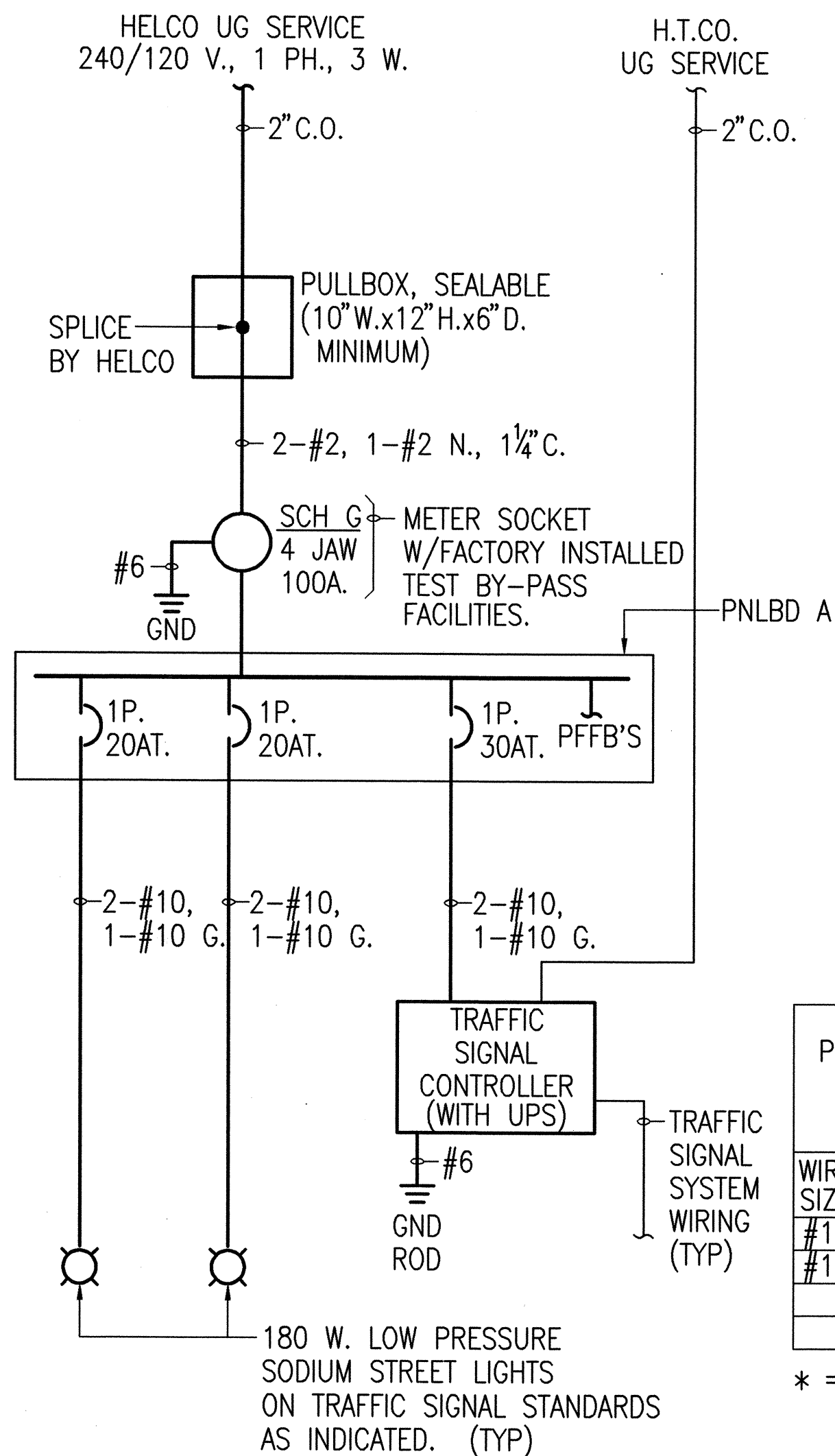
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997
SHEET No. 6 OF 20 SHEETS

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



ONE-LINE DIAGRAM - SERVICES

SERVICE/LOAD DATA:

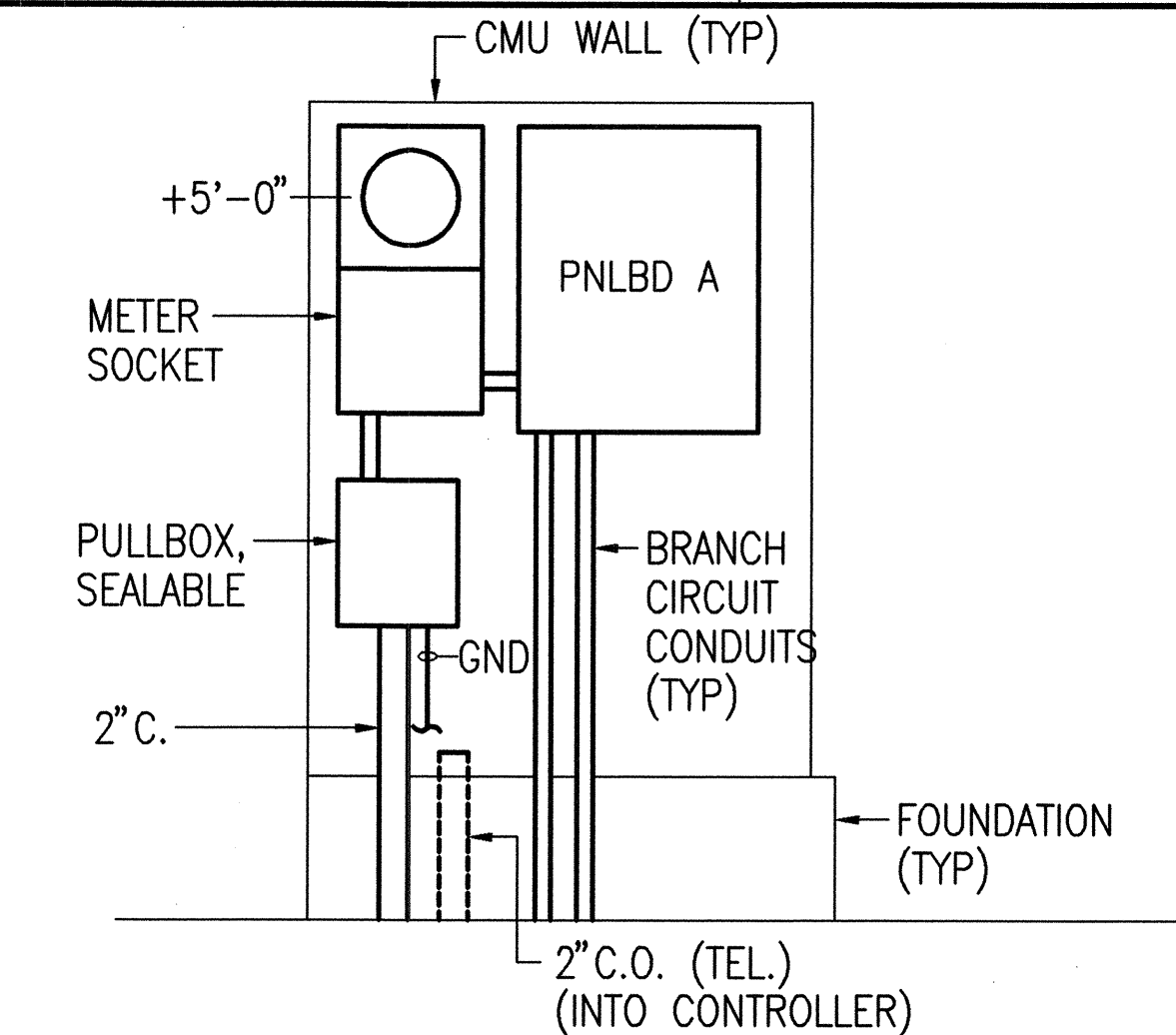
A. ELECTRIC

- SERVICE VOLTAGE: 240/120 V., 1 PH., 3 W.
- TYPE OF SERVICE: UNDERGROUND
- ESTIMATED CONNECTED KVA: ESTIMATED DEMAND KVA:

TRAFFIC SIGNAL	5.0	1.2
STREET LIGHTING	3.0	0.5
TOTAL	8.0	1.7
- ESTIMATED TOTAL DEMAND KVA: 2.0
- DESIGN SERVICE CAPACITY: 100 AMPERES
- METERING: RATE SCH G, HELCO STD. B-5 (4 JAW, 100 A. METER SOCKET)
- BILLING ADDRESS: HIGHWAYS DIVISION
DEPARTMENT OF TRANSPORTATION
50 MAKAAALA STREET
HILO, HAWAII 96720

B. TELEPHONE

- ESTIMATED LINES REQUIRED: 1 LINE
- PROPOSED SERVICE CAPACITY: 1 LINE (DROP SERVICE)
- SERVICE CABINET SIZE: NONE
- SERVICE CONDUIT: 2"



GENERAL ARRANGEMENT (TYP) - SERVICE/METERING EQUIPMENT

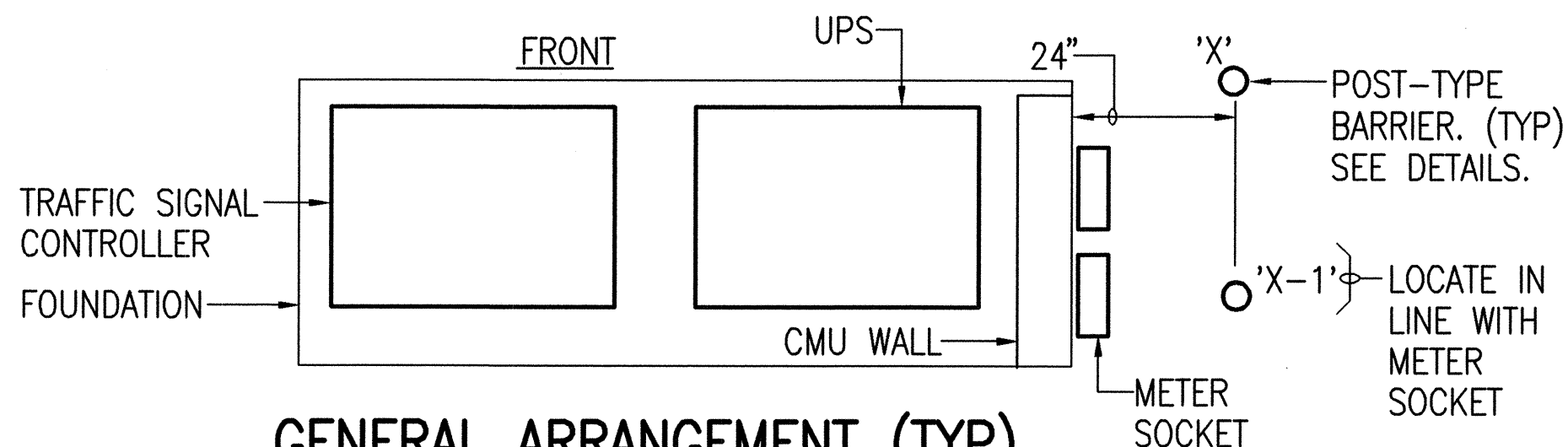
NOT TO SCALE

NOTE:

ALL EQUIPMENT ENCLOSURES SHALL BE SUITABLE FOR OUTDOOR USE AND HAVE NEMA 3R ENCLOSURES AS A MINIMUM REQUIREMENT. PAINT EXTERIOR AND INTERIOR SURFACES WITH CORROSION RESISTANT PAINT. PAINT ALL CONDUITS.

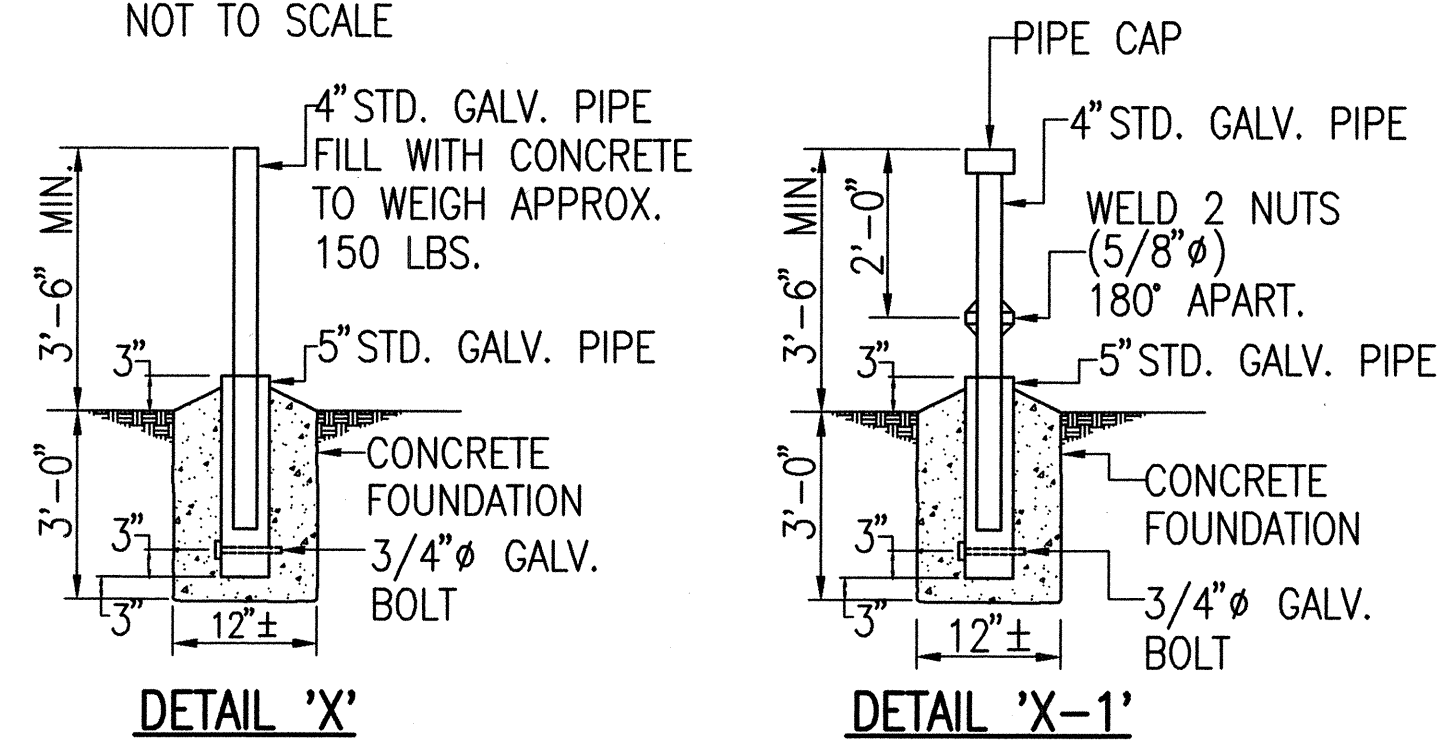
PNLBD A	240/120 VOLTS, 1 PHASE, 3 WIRE, NEUTRAL BUS, GROUND BUS, SURFACE MOUNTING, 100 A. MAIN BUS ONLY, COPPER, BOLT-ON BRANCH BREAKERS, FULL SIZE BREAKERS ONLY, 10,000 AIC, TYPEWRITTEN DIRECTORY, NEMA 3R ENCLOSURE WITH PROVISIONS FOR PAD LOCKING.											
	WIRE SIZE	SERVICE		CIR. AMP	BKR. POLE	CIR. NO.	1 WIRE	CIR. NO.	CIR. POLE	BKR. AMP	SERVICE	WIRE SIZE
	#10	STREET LIGHT		20	1	1	L1	2	1	30	UPS CABINET	#10
	#10	STREET LIGHT		20	1	3	L2	4			PFFB	
		PFFB				5	L1	6			*	
	PFFB				7	L2	8			*		

* = DO NOT USE UNLESS PNLBD EQUIPPED WITH MAIN DISCONNECT.



GENERAL ARRANGEMENT (TYP) BARRIER PLAN

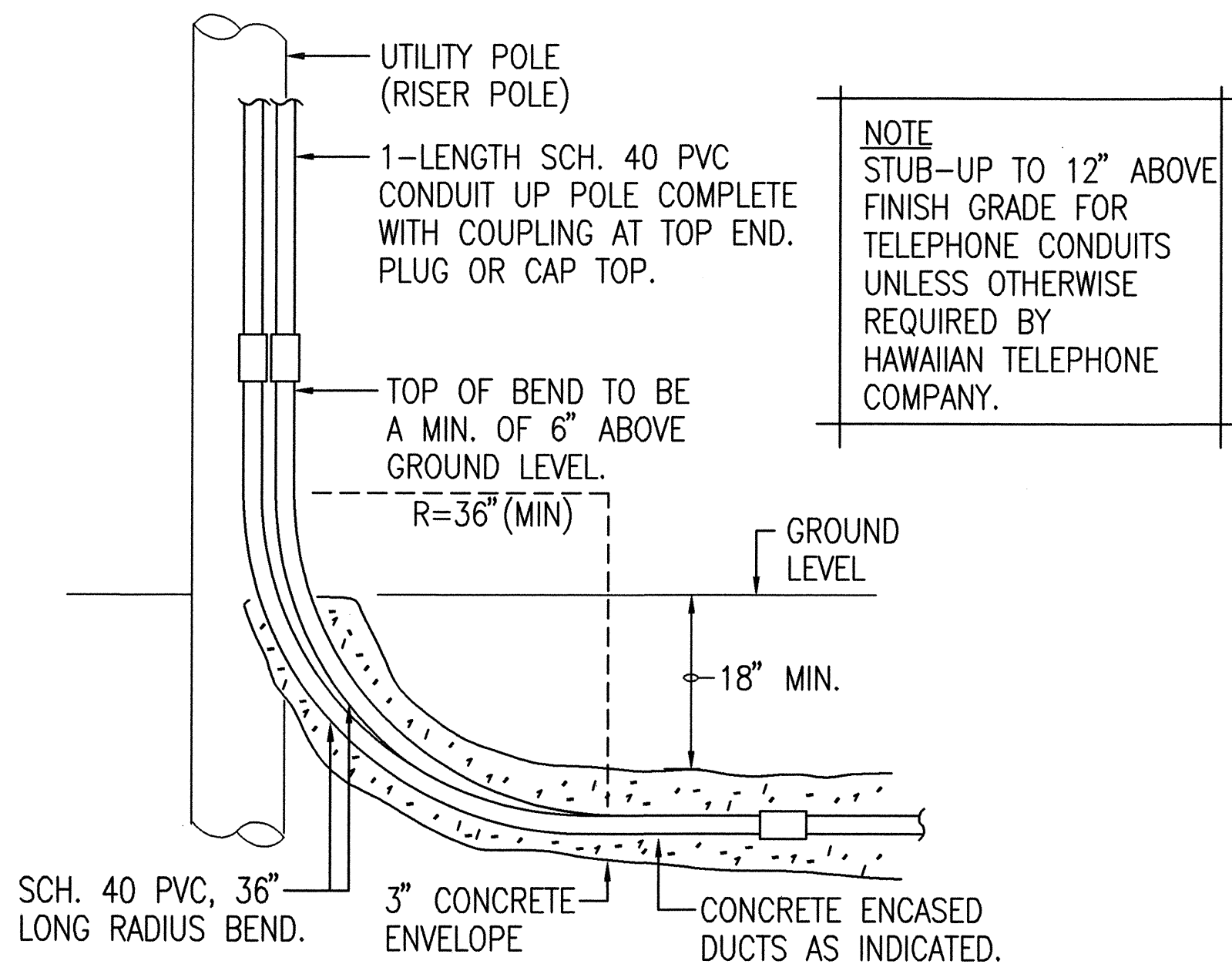
NOT TO SCALE



GENERAL ARRANGEMENT (TYP) - POST-TYPE BARRIERS

NOT TO SCALE

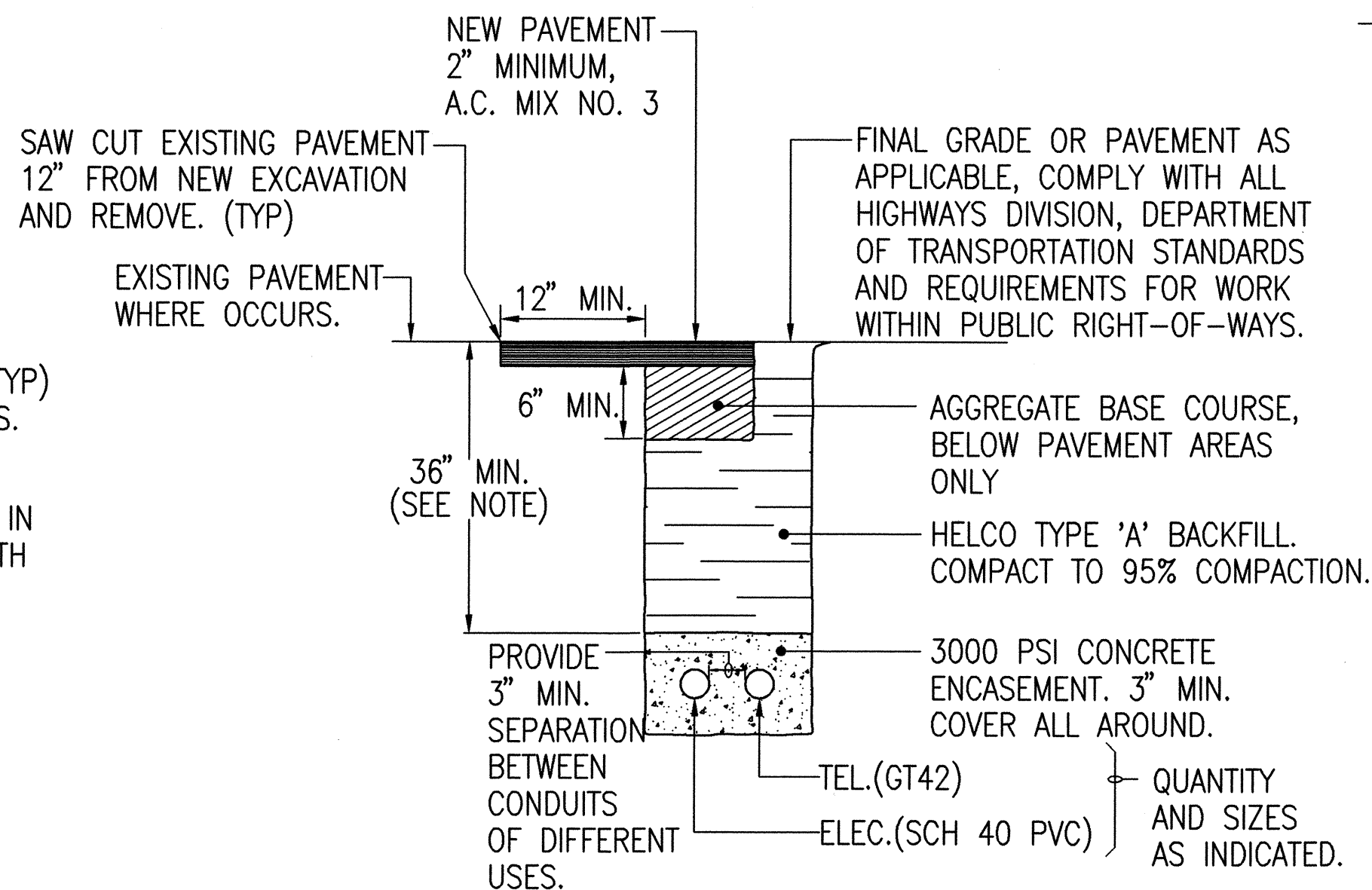
NOTE: ALL INSTALLATION SHALL COMPLY WITH HELCO STD. 30-5000. POSTS SHALL BE PAINTED YELLOW PER ANSI Z53.1



GENERAL ARRANGEMENT (TYP) - RISER CONDUIT DETAIL (TRAFFIC SIGNAL SYSTEM)

NOT TO SCALE

NOTE: PROVIDE QUANTITY AND SIZES AS INDICATED ON THE DRAWINGS. REFER TO HELCO'S DRAWINGS FOR ADDITIONAL RISER DETAIL REQUIREMENTS.



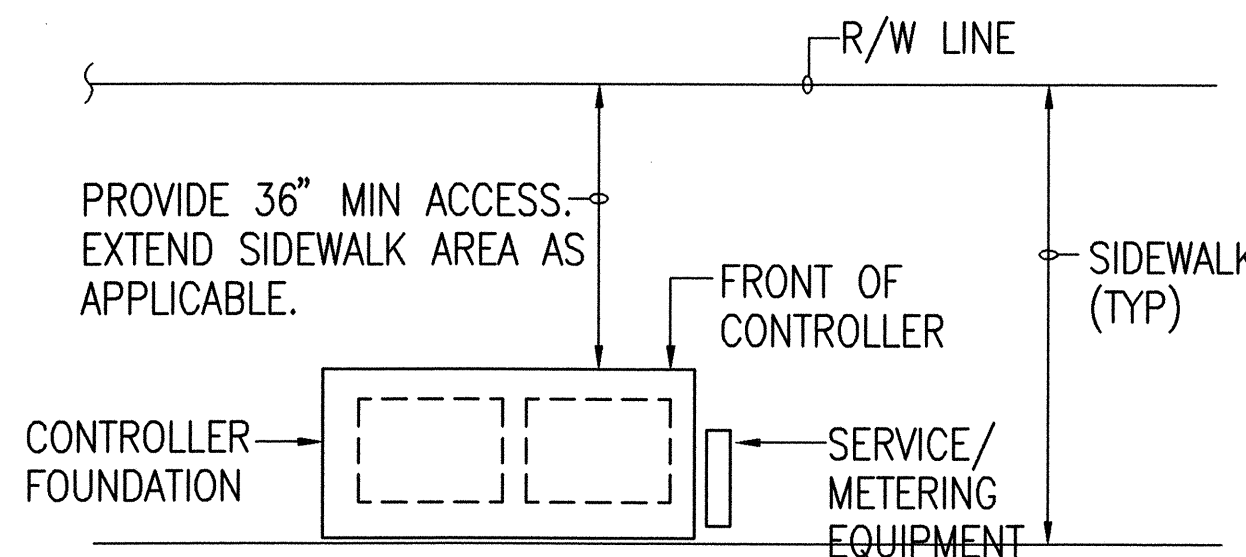
GENERAL ARRANGEMENT (TYP) - DUCTLINE DETAIL (TYPICAL FOR NON-UTILITY DUCTLINE.)

NOT TO SCALE

NOTE: INDICATED BURY DEPTH SHALL BE ADJUSTED IN THE FIELD TO CLEAR AND AVOID INTERFERENCES WITH ALL EXISTING BURIED UTILITY LINES, DRAINAGE STRUCTURES, OR OTHER SYSTEMS.

CORROSION PROTECTION PAINT

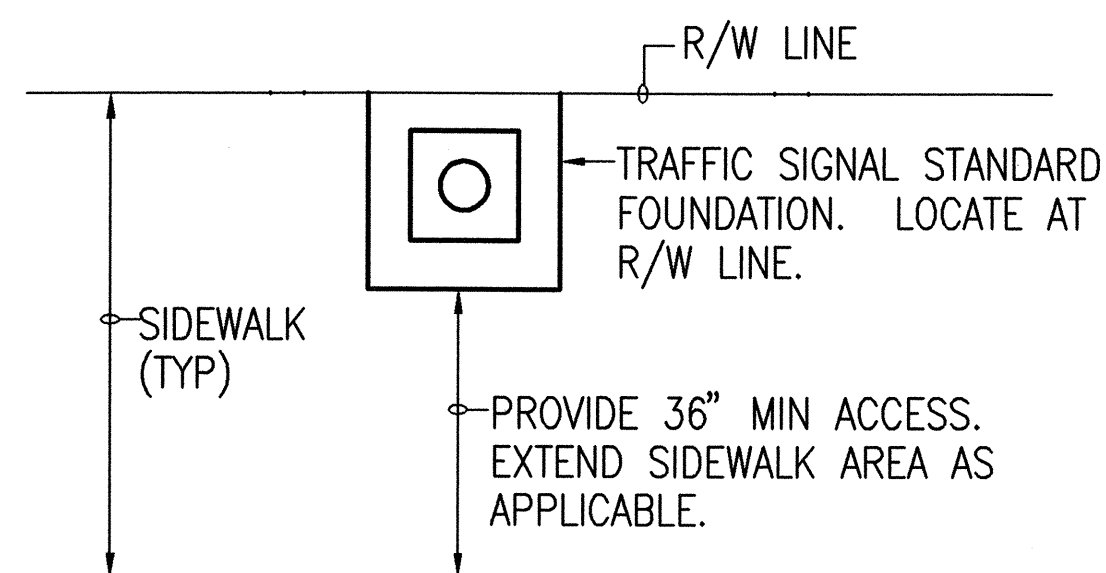
- AMERON "AMERLOCK 400" EPOXY COATING OR APPROVED EQUIVALENT.
- ALUMINUM
- APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.



GENERAL ARRANGEMENT (TYP) CONTROLLER LOCATION

NOT TO SCALE

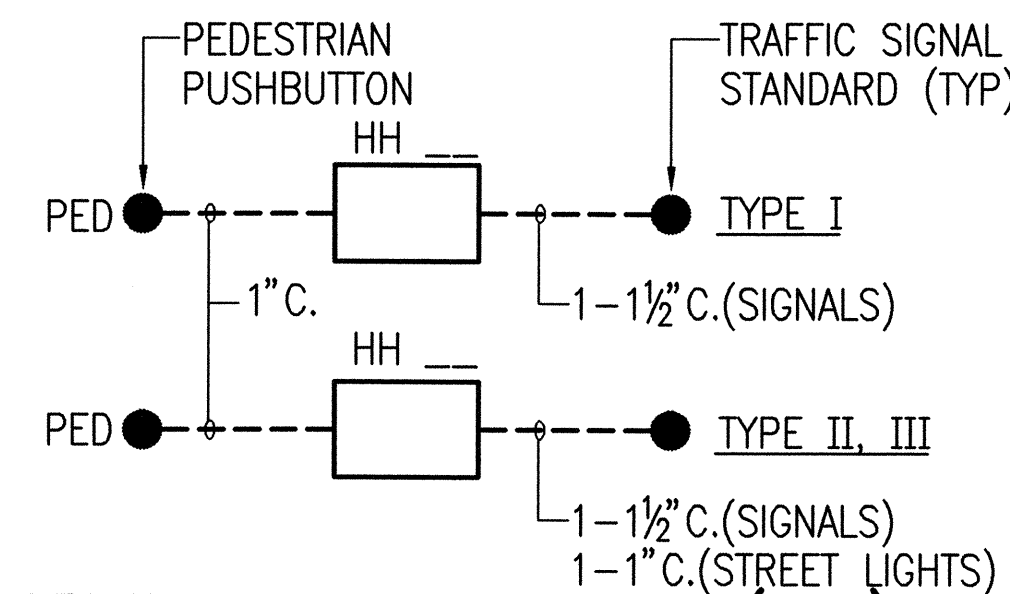
(TYPICAL FOR NON-SIDEWALK LOCATIONS)



GENERAL ARRANGEMENT (TYP) LOCATION FOR TRAFFIC SIGNAL STANDARD FOUNDATION

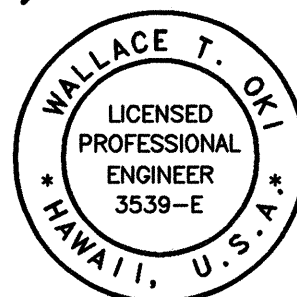
NOT TO SCALE

(TYPICAL FOR NON-SIDEWALK LOCATIONS)



GENERAL ARRANGEMENT (TYP) REQUIRED CONDUITS BETWEEN HH AND TRAFFIC SIGNAL STANDARDS/PED PUSHBUTTON

NOT TO SCALE



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

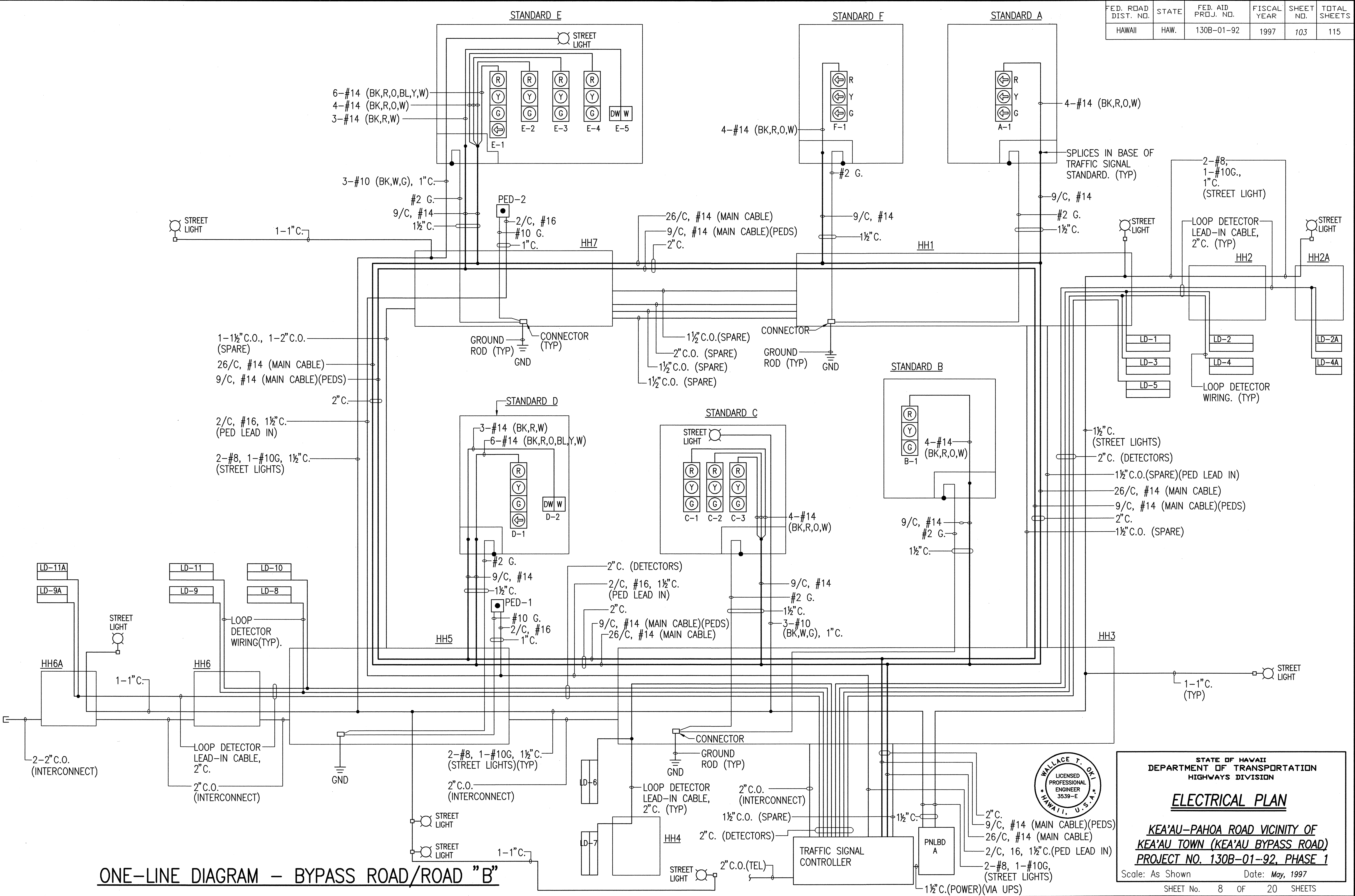
KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown

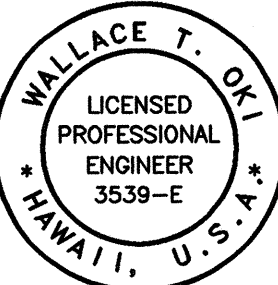
Date: May, 1997

SHEET No. 7 OF 20 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	103	115



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



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

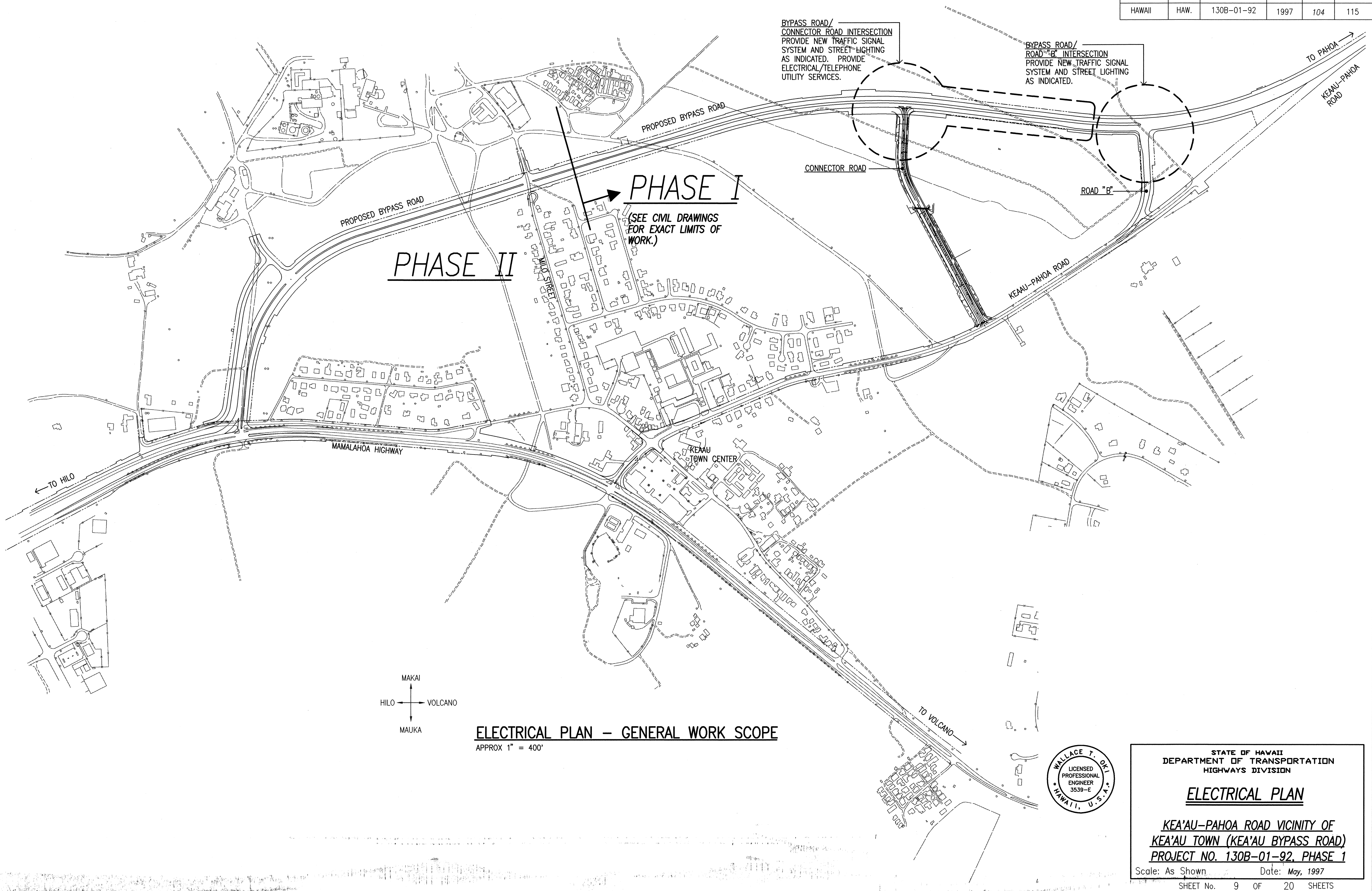
ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

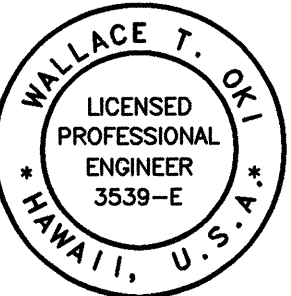
Scale: As Shown Date: May, 1997

SHEET No. 8 OF 20 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	104	115



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



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

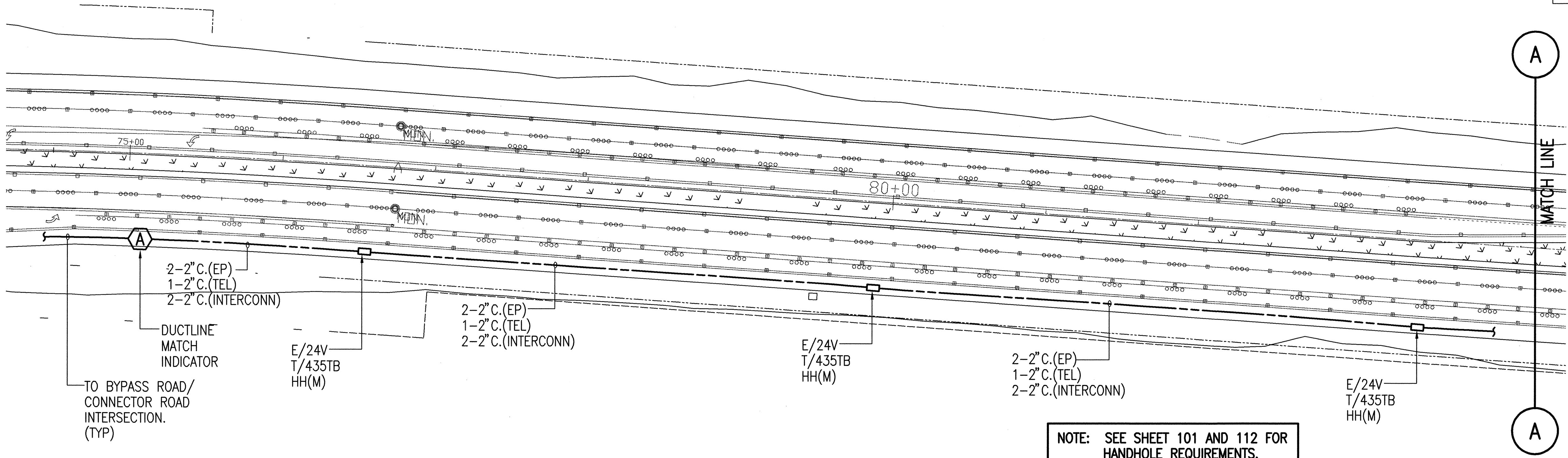
ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 9 OF 20 SHEETS

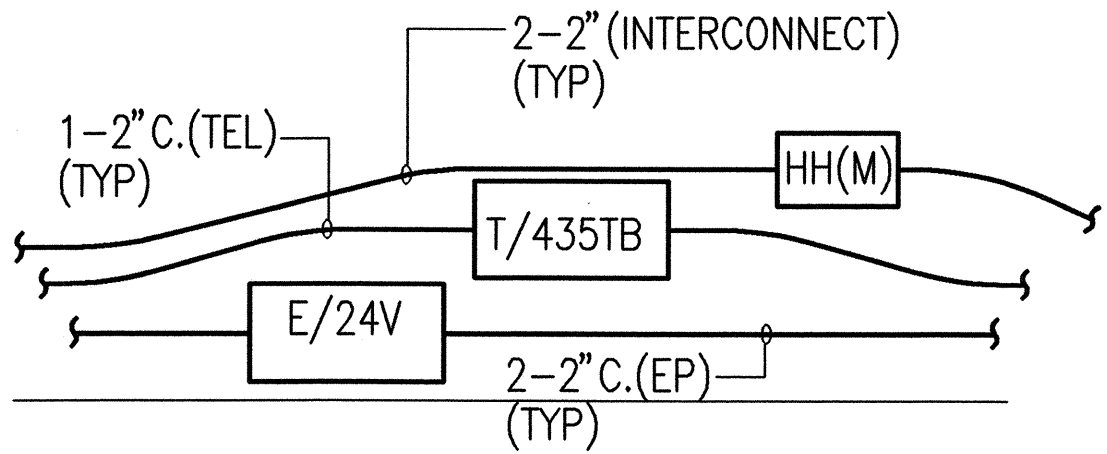
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	105	115



NOTE: SEE SHEET 101 AND 112 FOR HANDHOLE REQUIREMENTS.

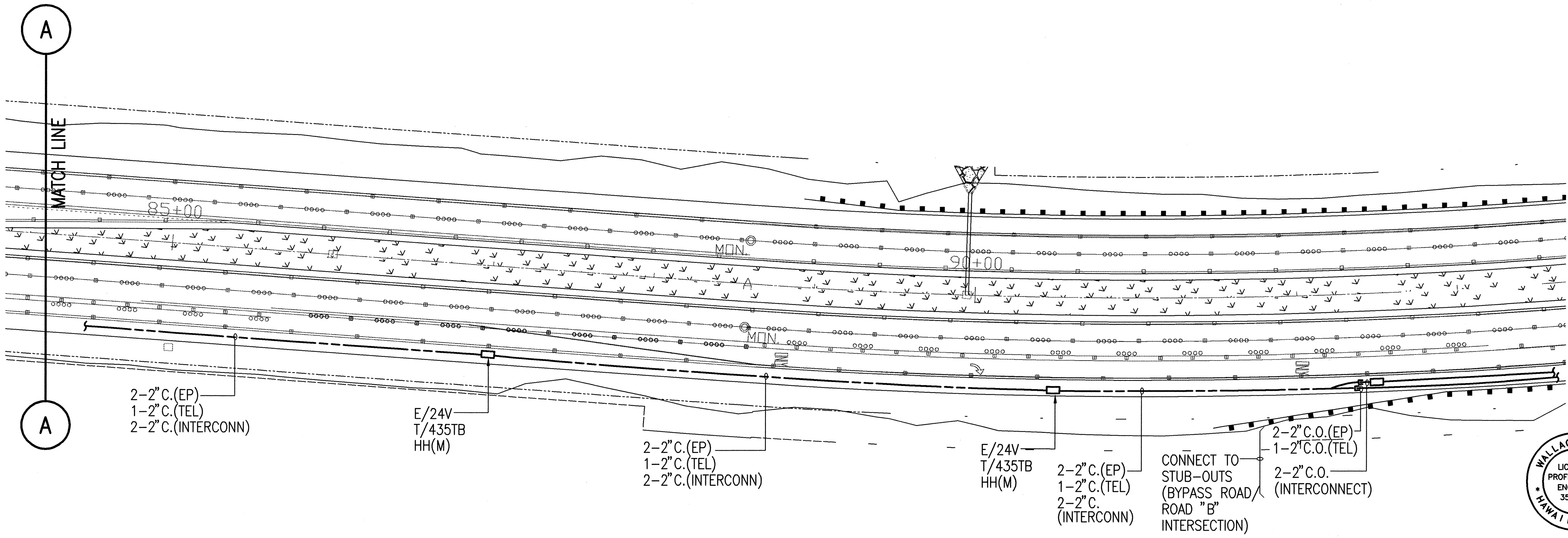
ELECTRICAL PLAN – STA 85+80 TO STA 75+80

1" = 40'



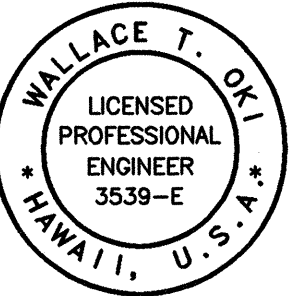
GENERAL ARRANGEMENT – TYPICAL HANDHOLES

NOT TO SCALE



ELECTRICAL PLAN – STA 93+50 TO STA 85+80

1" = 40'



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

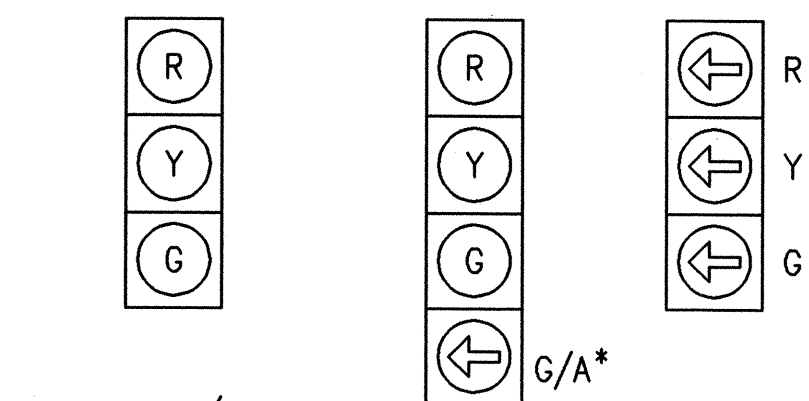
ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 10 OF 20 SHEETS

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



B-1/I
C-1/VI
C-2/VI
C-3/VI
G-2/VI
G-3/VI
G-4/VI

F-1/I
G-1/VI

A-1/I
H-1/I

D-1/VII
E-1/VII
F-2/VII
G-5/VII

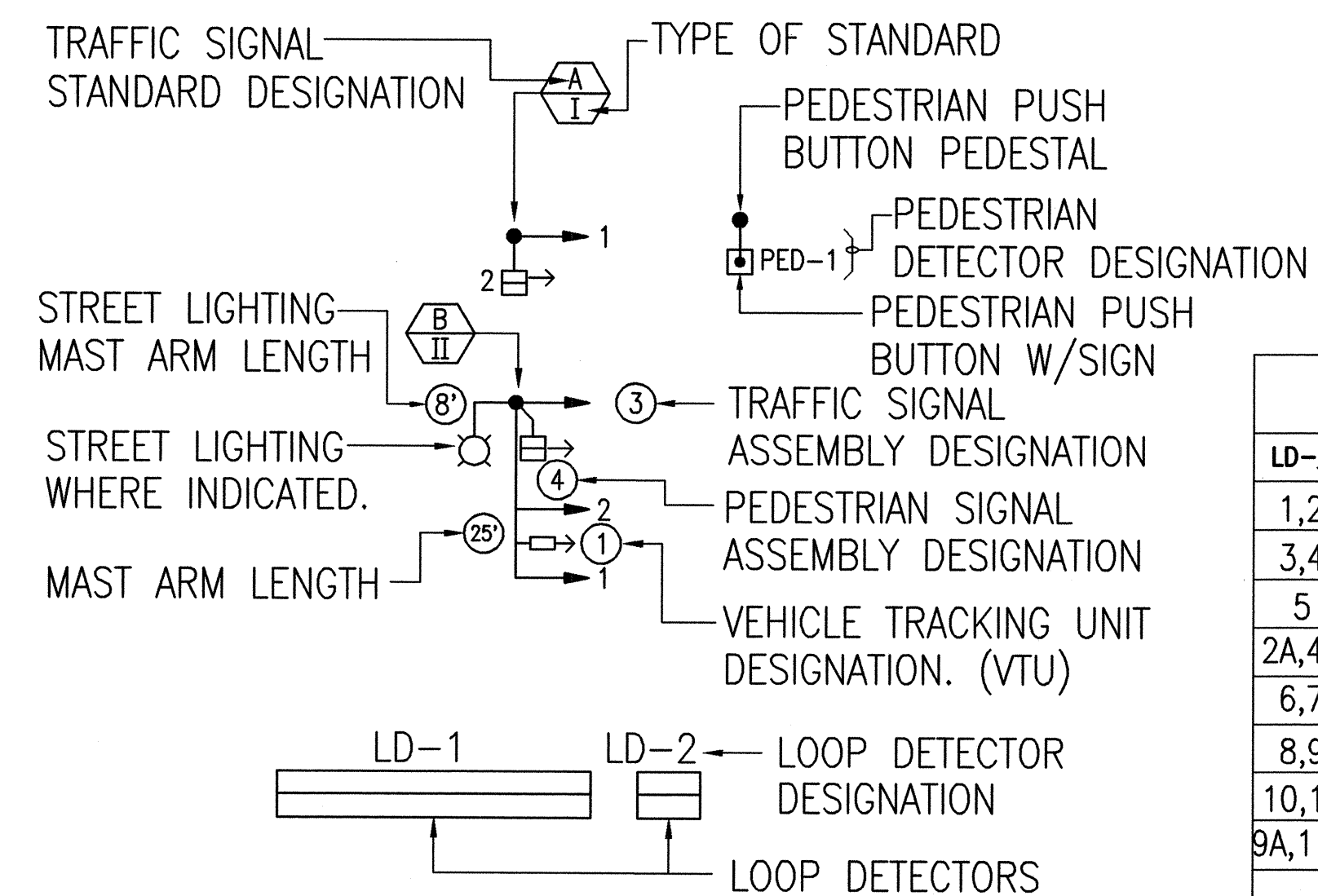
SIGNAL ASSEMBLY ARRANGEMENT/ TYPE OF MOUNTING

NOTES:

R = RED
Y = YELLOW
G = GREEN
G/A = GREEN/AMBER (FIBER OPTIC)

* = PROVIDE WITH R10-12 SIGN
Δ = PROGRAM VISIBILITY FOR ALL SIGNAL FACES.

A-1/I TYPE OF MOUNTING
SIGNAL ASSEMBLY DESIGNATION
TRAFFIC SIGNAL STANDARD DESIGNATION

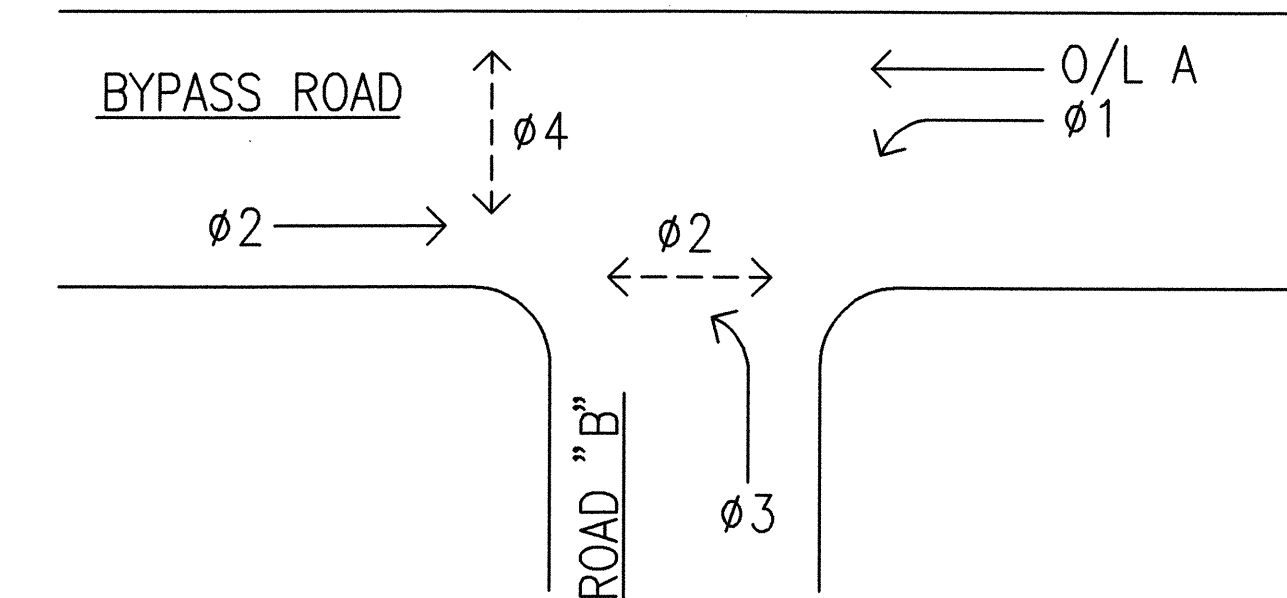


LEGEND

LOOP DETECTOR ASSIGNMENTS			
LD-	AMPLIFIER	CHANNEL	PHASE-NOTES
1,2	A	1	ø2
3,4	A	2	ø2
5	A	3	ø1&2 (INTERNALLY SWITCHED)
2A,4A	D	1	ø2 EXTEND (EXTERNAL)
6,7	B	1	ø3
8,9	C	1	ø2
10,11	C	2	ø2
9A,11A	E	1	ø2 EXTEND (EXTERNAL)

TRAFFIC SIGNAL PLAN - BYPASS ROAD/CONNECTOR ROAD

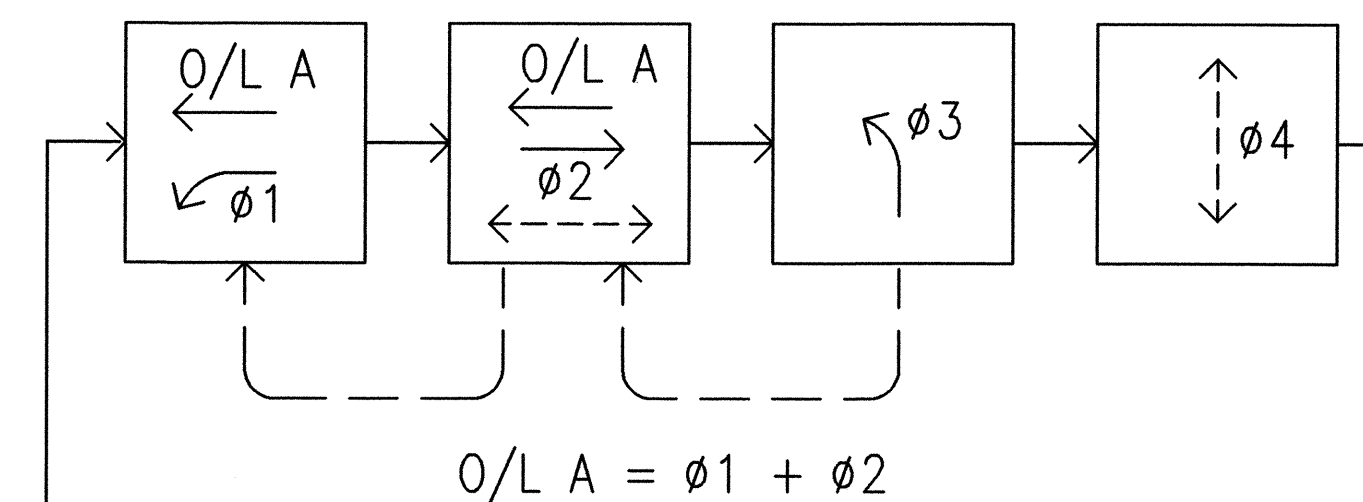
1" = 20'



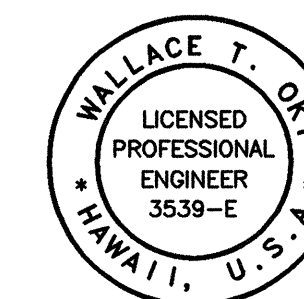
PHASE ASSIGNMENTS

ø1 O/L A	ø2 O/L A	ø3	ø4
ø5 (NOT ASSIGNED)	ø6 (NOT ASSIGNED)	ø7 (NOT ASSIGNED)	ø8 (NOT ASSIGNED)
O/L A = ø1 + ø2			

CONTROLLER PHASING



PHASE DIAGRAM



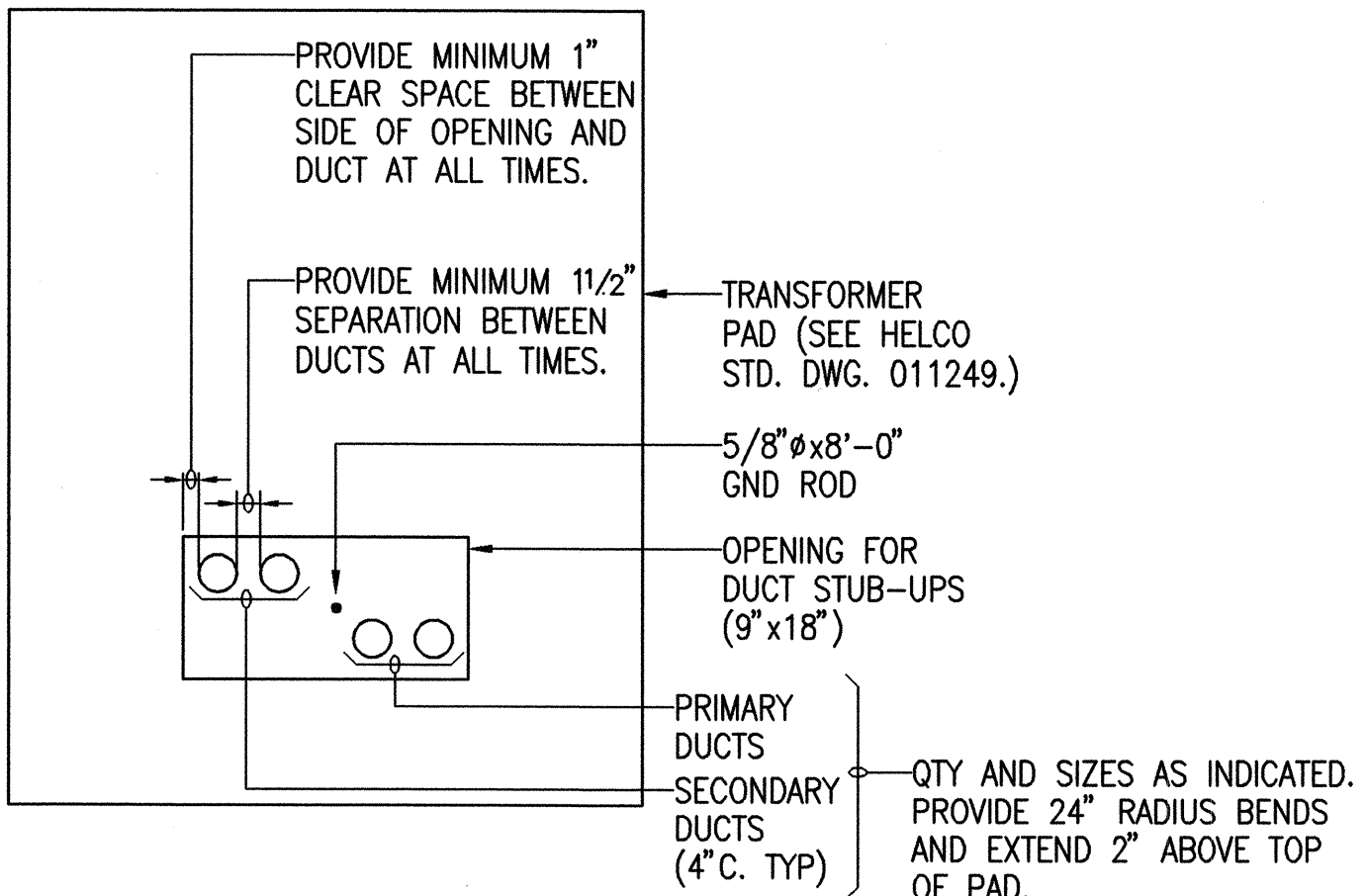
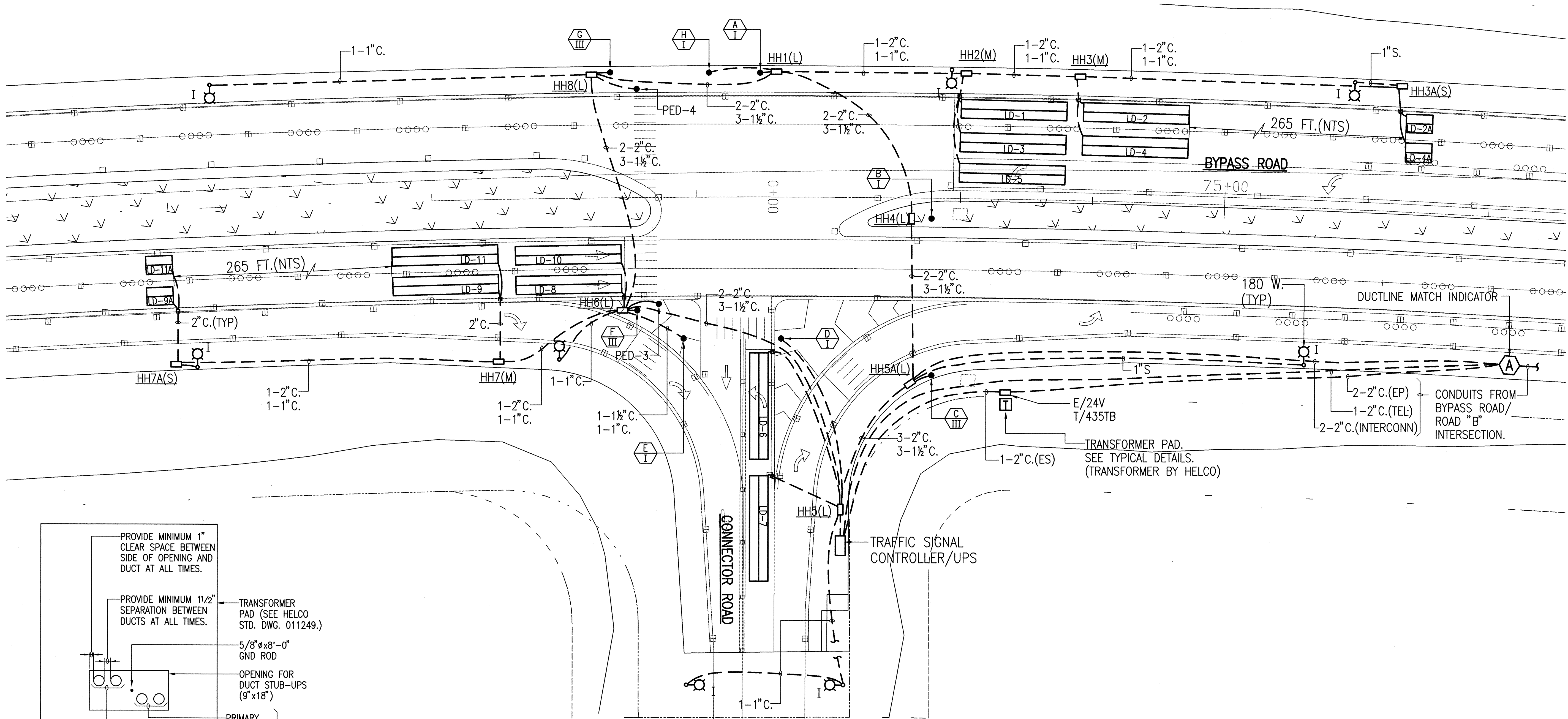
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 11 OF 20 SHEETS

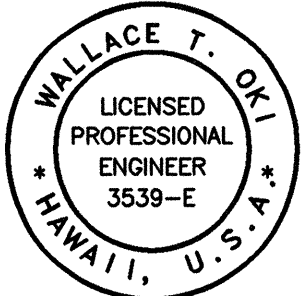


GENERAL ARRANGEMENT (TYP)
3'-4" x 4'-2" TRANSFORMER PAD
SCALE: APPROX. 1" = 1'-0"

- NOTES:
1. GRADE AND COMPACT THE PAD LOT SO THAT THE HIGHER FRONT CORNER MATCHES THE ROAD SHOULDER GRADE. THE LOT SHALL HAVE A SLOPE NOT GREATER THAN 1/2 INCH ON 1 FOOT TOWARD THE ROAD.
 2. GRADE SUFFICIENTLY BEYOND THE LOT SITE TO PREVENT FUTURE BUILD-UP OR EROSION OF THE LOT. CONSTRUCT A RETAINING WALL OF SUITABLE MATERIAL TO PREVENT FUTURE BUILD-UP OR EROSION OF THE LOT AS APPLICABLE.
 3. COMPACT BY ROLLING THE LOT SITE IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR COMPACTING ROAD SHOULDER/SIDEWALK.
 4. EXCAVATE AN AREA 3'-9" x 4'-6" x 4" DEEP AFTER LOT IS COMPACTED. FILL WITH #4 ROCK AGGREGATES.
 5. REFER TO HELCO DRAWING 011249 FOR DETAILS OF CONCRETE PAD.
 6. REFER TO HELCO DRAWINGS FOR ADDITIONAL SPECIFICATIONS AND REQUIREMENTS.

ELECTRICAL PLAN - BYPASS ROAD/CONNECTOR ROAD
1" = 20'

ORIGINAL SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
NOTED BY	
CHECKED BY	
QTY.	



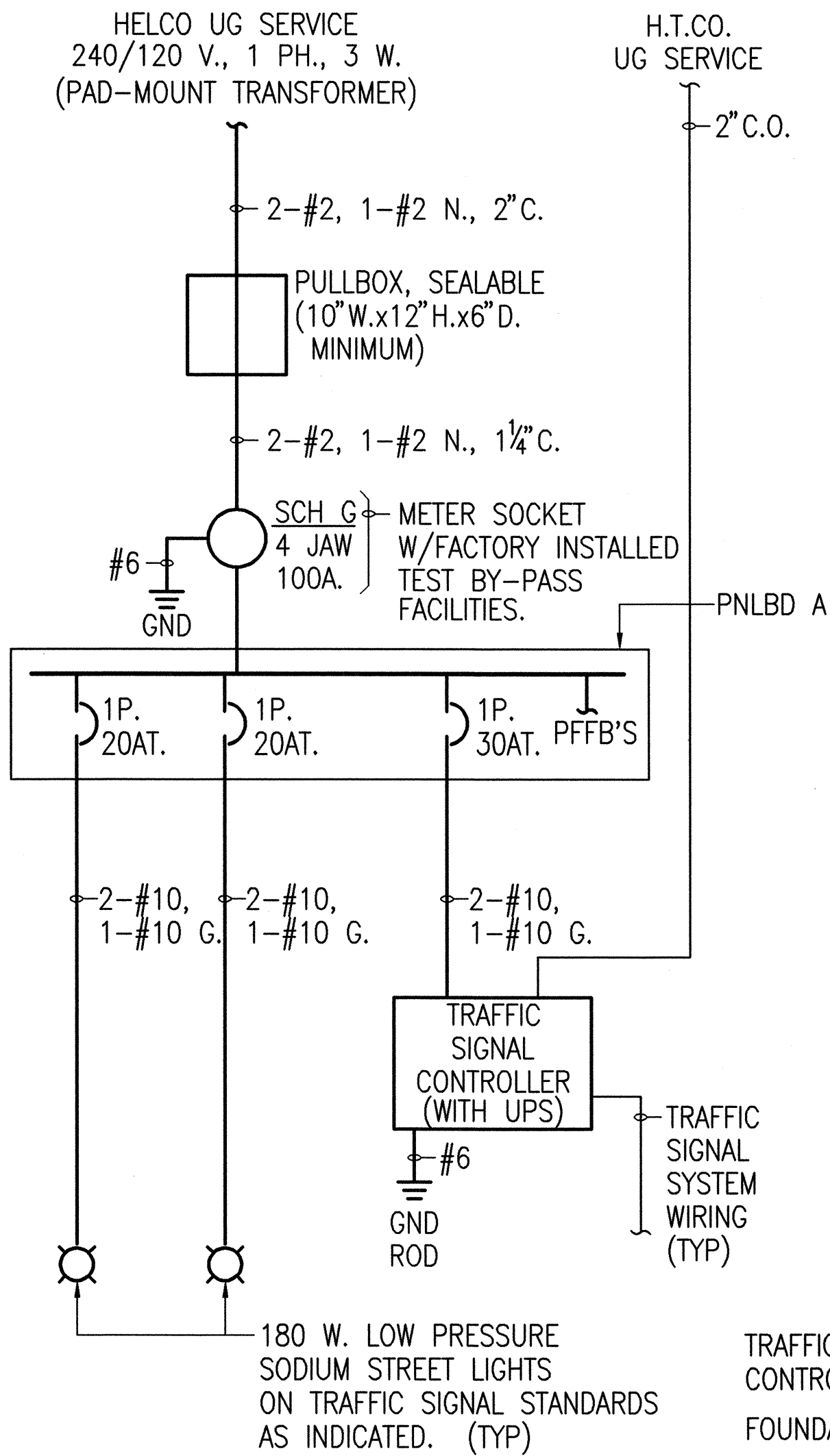
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 12 OF 20 SHEETS



ONE-LINE DIAGRAM - SERVICES

SERVICE/LOAD DATA:

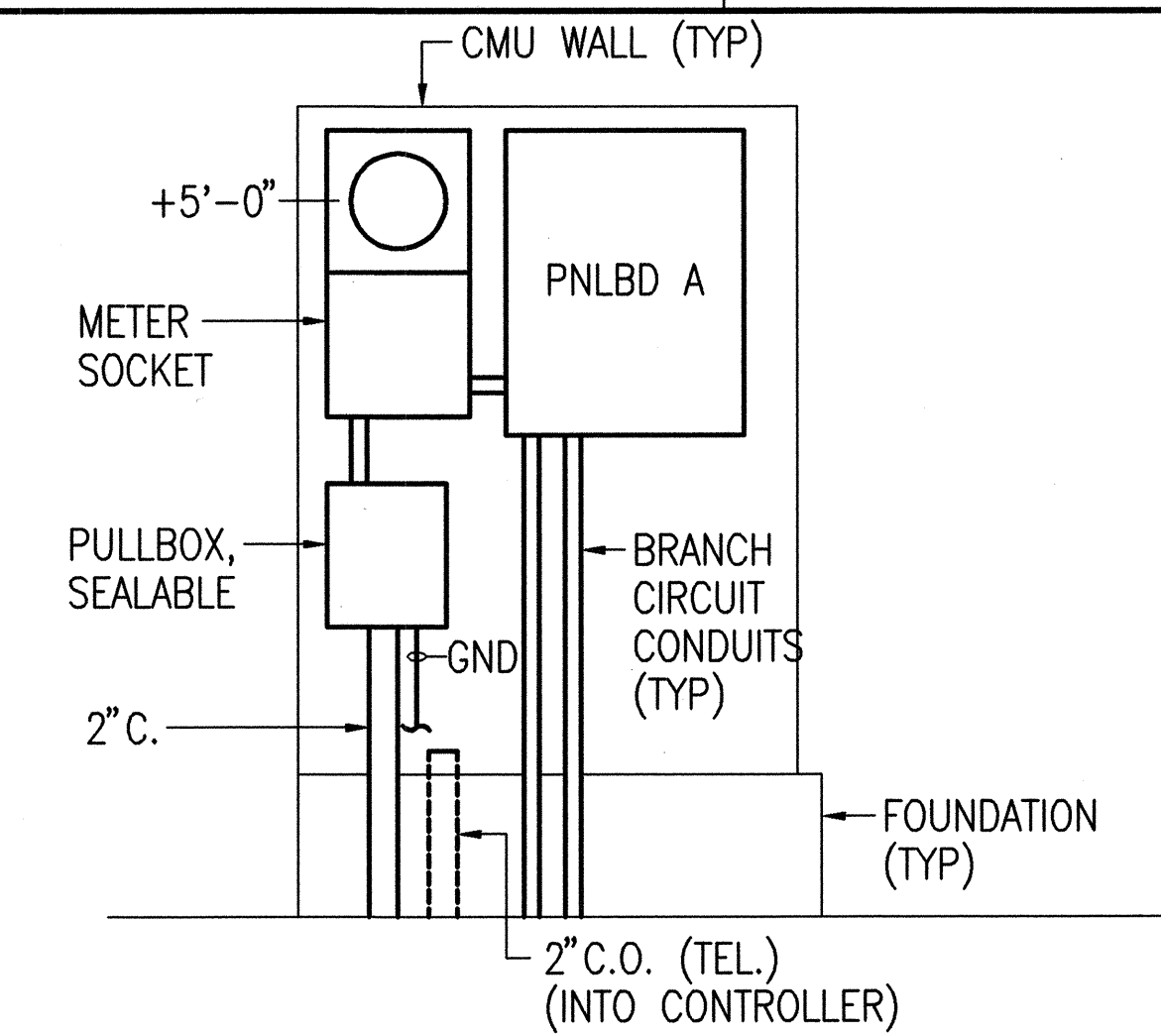
A. ELECTRIC

- SERVICE VOLTAGE: 240/120 V., 1 PH., 3 W.
- TYPE OF SERVICE: UNDERGROUND
- ESTIMATED CONNECTED KVA: ESTIMATED DEMAND KVA:

TRAFFIC SIGNAL	5.0	1.2
STREET LIGHTING	3.0	0.5
TOTAL	8.0	1.7
- ESTIMATED TOTAL DEMAND KVA: 2.0
- DESIGN SERVICE CAPACITY: 100 AMPERES
- METERING: RATE SCH G, HELCO STD. B-5 (4 JAW, 100 A. METER SOCKET)
- BILLING ADDRESS: HIGHWAYS DIVISION
DEPARTMENT OF TRANSPORTATION
50 MAKAA LA STREET
HILO, HAWAII 96720

B. TELEPHONE

- ESTIMATED LINES REQUIRED: 1 LINE
- PROPOSED SERVICE CAPACITY: 1 LINE (DROP SERVICE)
- SERVICE CABINET SIZE: NONE
- SERVICE CONDUIT: 2"

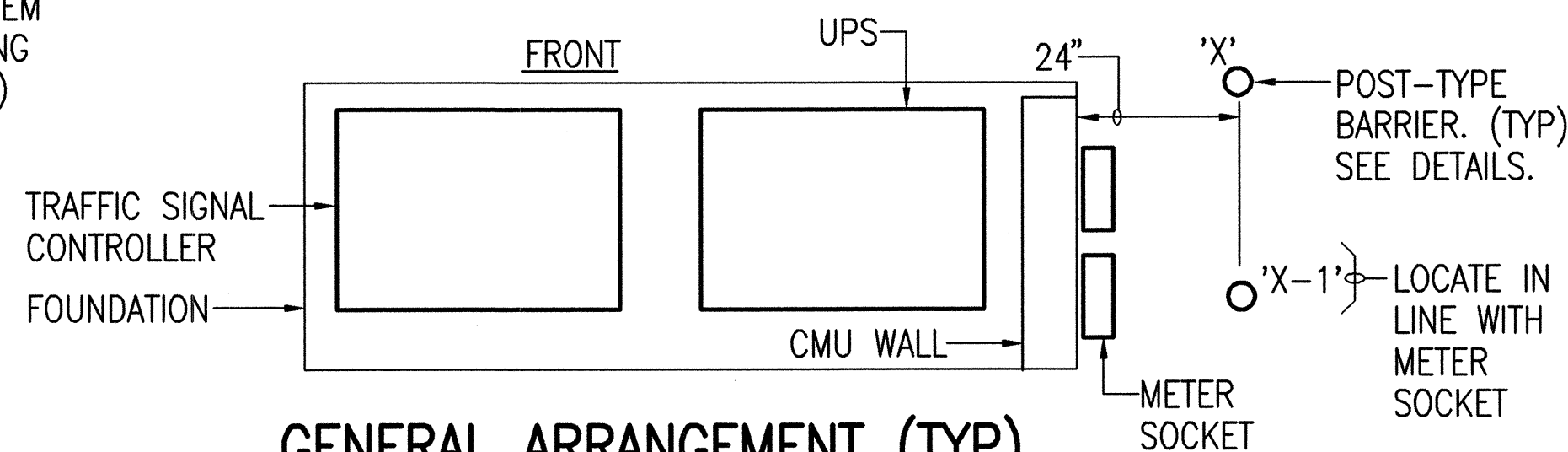


GENERAL ARRANGEMENT (TYP) - SERVICE/METERING EQUIPMENT

NOT TO SCALE

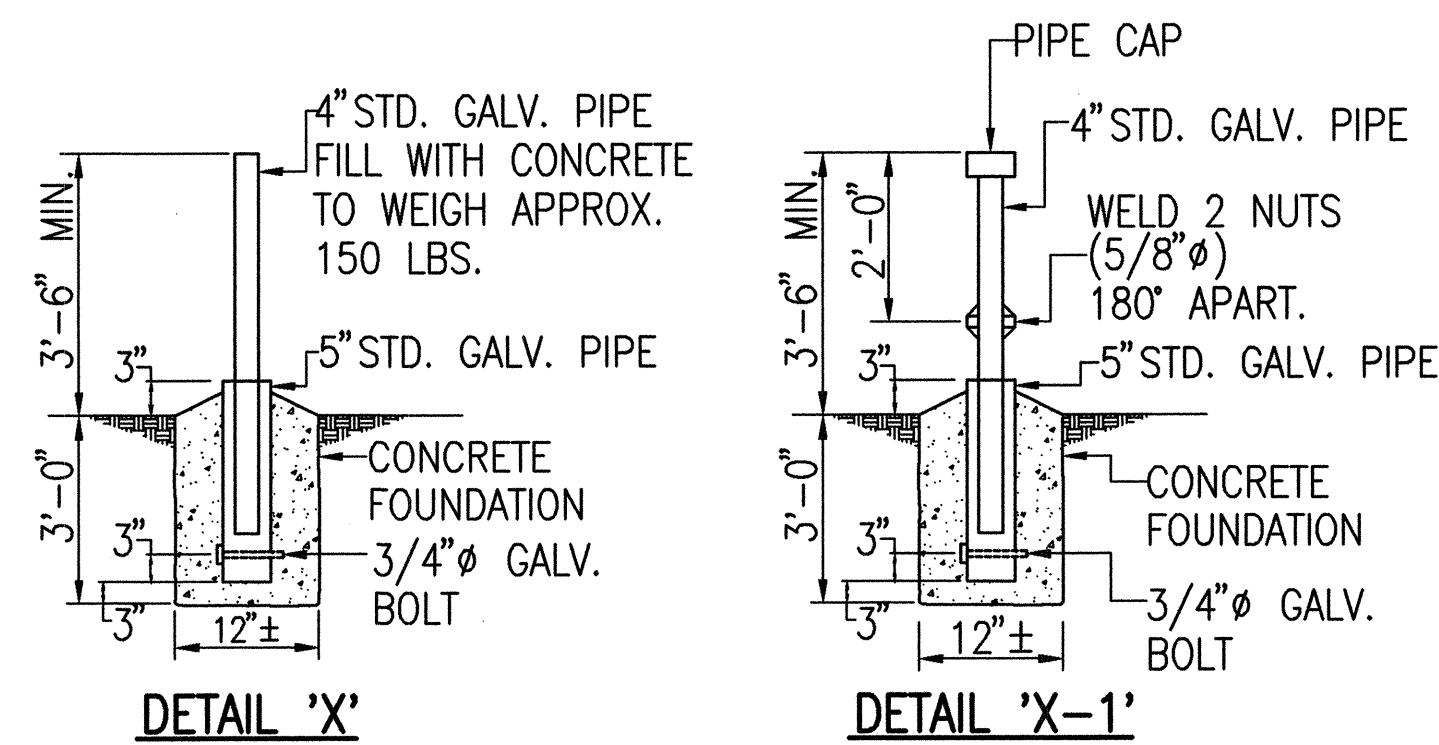
NOTE:

ALL EQUIPMENT ENCLOSURES SHALL BE SUITABLE FOR OUTDOOR USE AND HAVE NEMA 3R ENCLOSURES AS A MINIMUM REQUIREMENT. PAINT EXTERIOR AND INTERIOR SURFACES WITH CORROSION RESISTANT PAINT. PAINT ALL CONDUITS.



GENERAL ARRANGEMENT (TYP) BARRIER PLAN

NOT TO SCALE



DETAIL 'X'

DETAIL 'X-1'

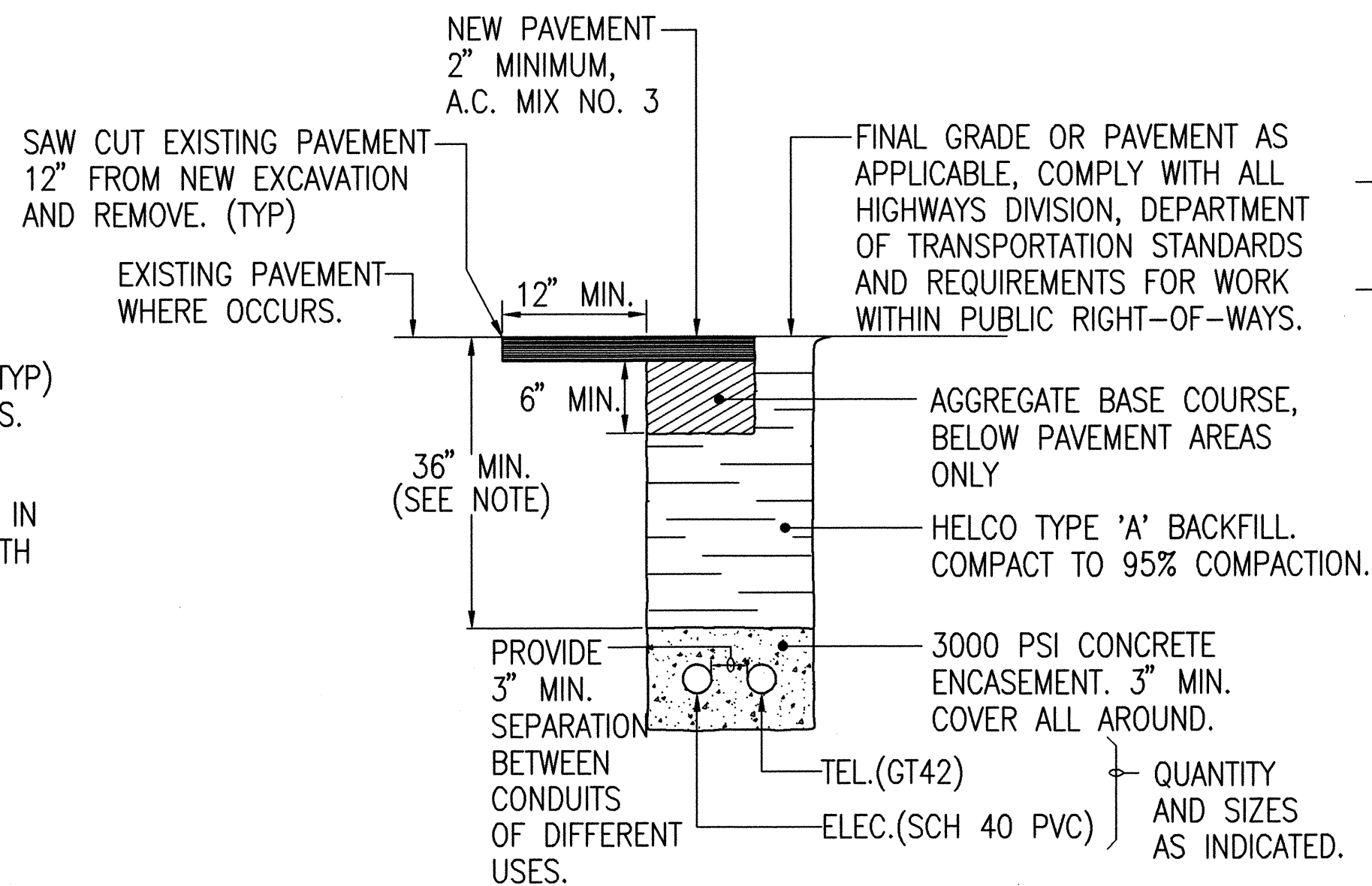
GENERAL ARRANGEMENT (TYP) - POST-TYPE BARRIERS

NOT TO SCALE

NOTE: ALL INSTALLATION SHALL COMPLY WITH HELCO STD. 30-5000. POSTS SHALL BE PAINTED YELLOW PER ANSI Z53.1

PNLBD A	240/120 VOLTS, 1 PHASE, 3 WIRE, NEUTRAL BUS, GROUND BUS, SURFACE MOUNTING, 100 A. MAIN BUS ONLY, COPPER, BOLT-ON BRANCH BREAKERS, FULL SIZE BREAKERS ONLY, 10,000 AIC, TYPEWRITTEN DIRECTORY, NEMA 3R ENCLOSURE WITH PROVISIONS FOR PAD LOCKING.										
	WIRE SIZE	SERVICE	CIR. BKR. AMP/POLE	CIR. NO.	L I N E	CIR. BKR. AMP/POLE	CIR. NO.	SERVICE	WIRE SIZE		
	#10	STREET LIGHT	20 1	1 L1	2	1 30		UPS CABINET	#10		
	#10	STREET LIGHT	20 1	3 L2	4			PFFB			
		PFFB		5 L1	6			*			
	PFFB		7 L2	8			*				

* = DO NOT USE UNLESS PNLBD EQUIPPED WITH MAIN DISCONNECT.



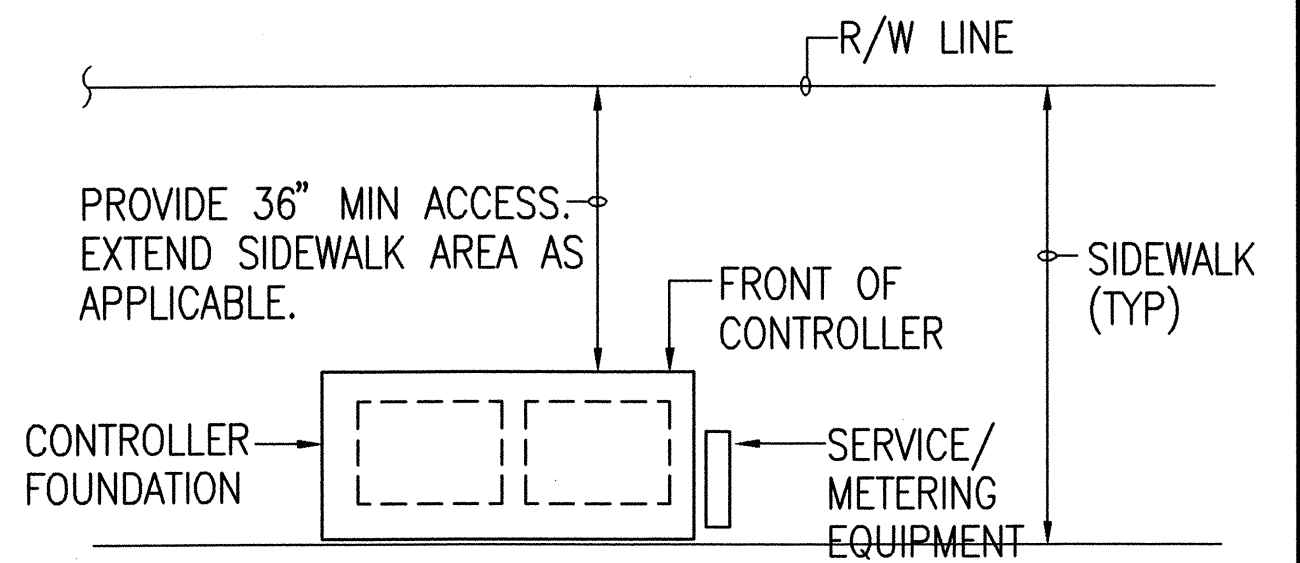
GENERAL ARRANGEMENT (TYP) - DUCTLINE DETAIL

NOT TO SCALE

NOTE: INDICATED BURY DEPTH SHALL BE ADJUSTED IN THE FIELD TO CLEAR AND AVOID INTERFERENCES WITH ALL EXISTING BURIED UTILITY LINES, DRAINAGE STRUCTURES, OR OTHER SYSTEMS.

CORROSION PROTECTION PAINT

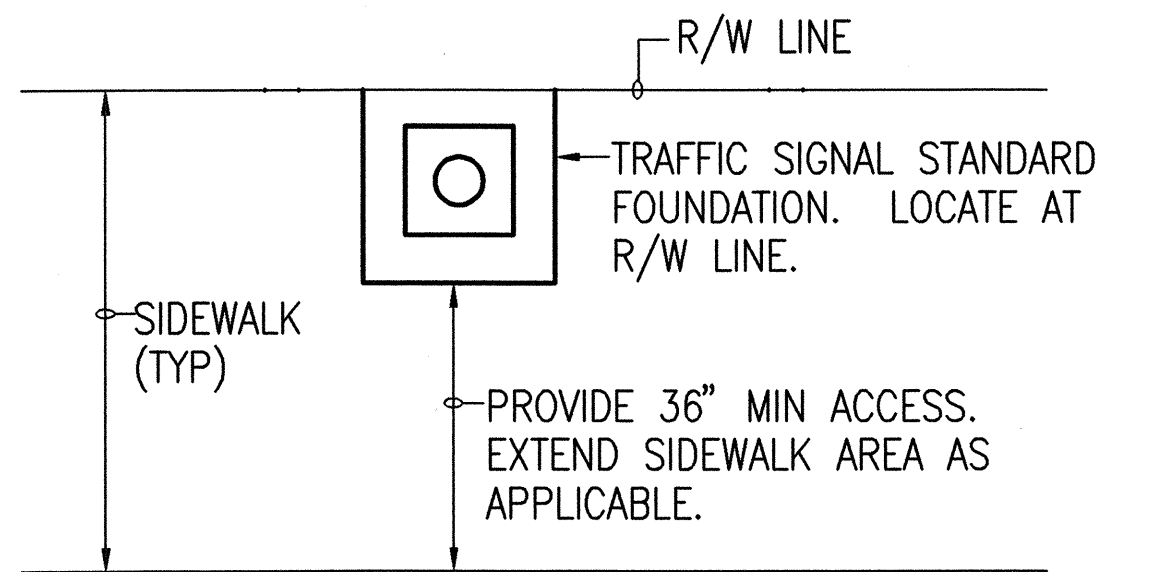
- AMERON "AMERLOCK 400" EPOXY COATING OR APPROVED EQUIVALENT.
- ALUMINUM
- APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.



GENERAL ARRANGEMENT (TYP) CONTROLLER LOCATION

NOT TO SCALE

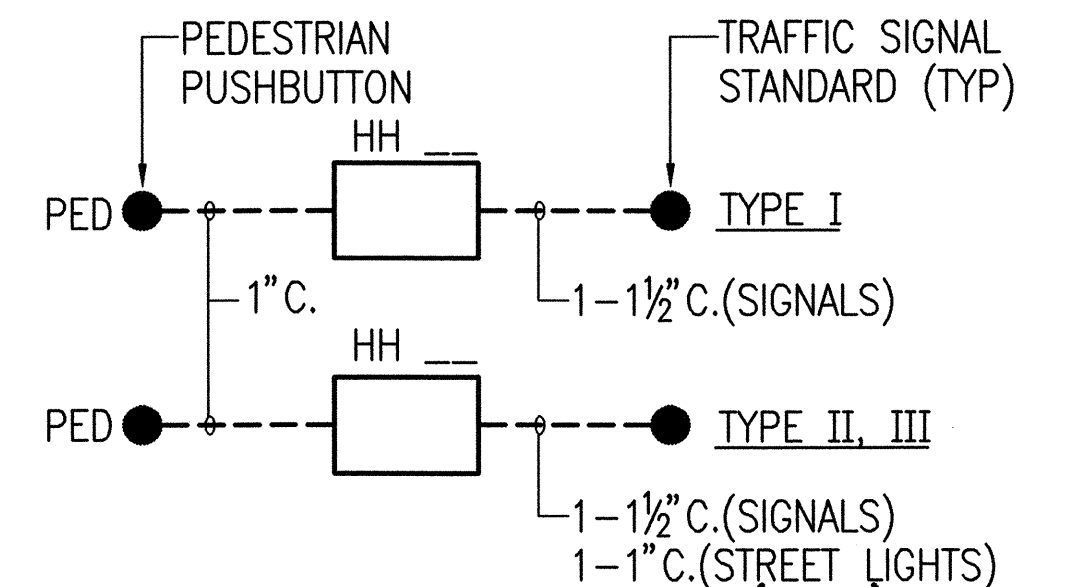
(TYPICAL FOR NON-SIDEWALK LOCATIONS)



GENERAL ARRANGEMENT (TYP) LOCATION FOR TRAFFIC SIGNAL STANDARD FOUNDATION

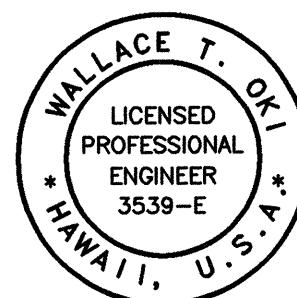
NOT TO SCALE

(TYPICAL FOR NON-SIDEWALK LOCATIONS)



GENERAL ARRANGEMENT (TYP) REQUIRED CONDUITS BETWEEN HH AND TRAFFIC SIGNAL STANDARDS/PED PUSHBUTTON

NOT TO SCALE



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

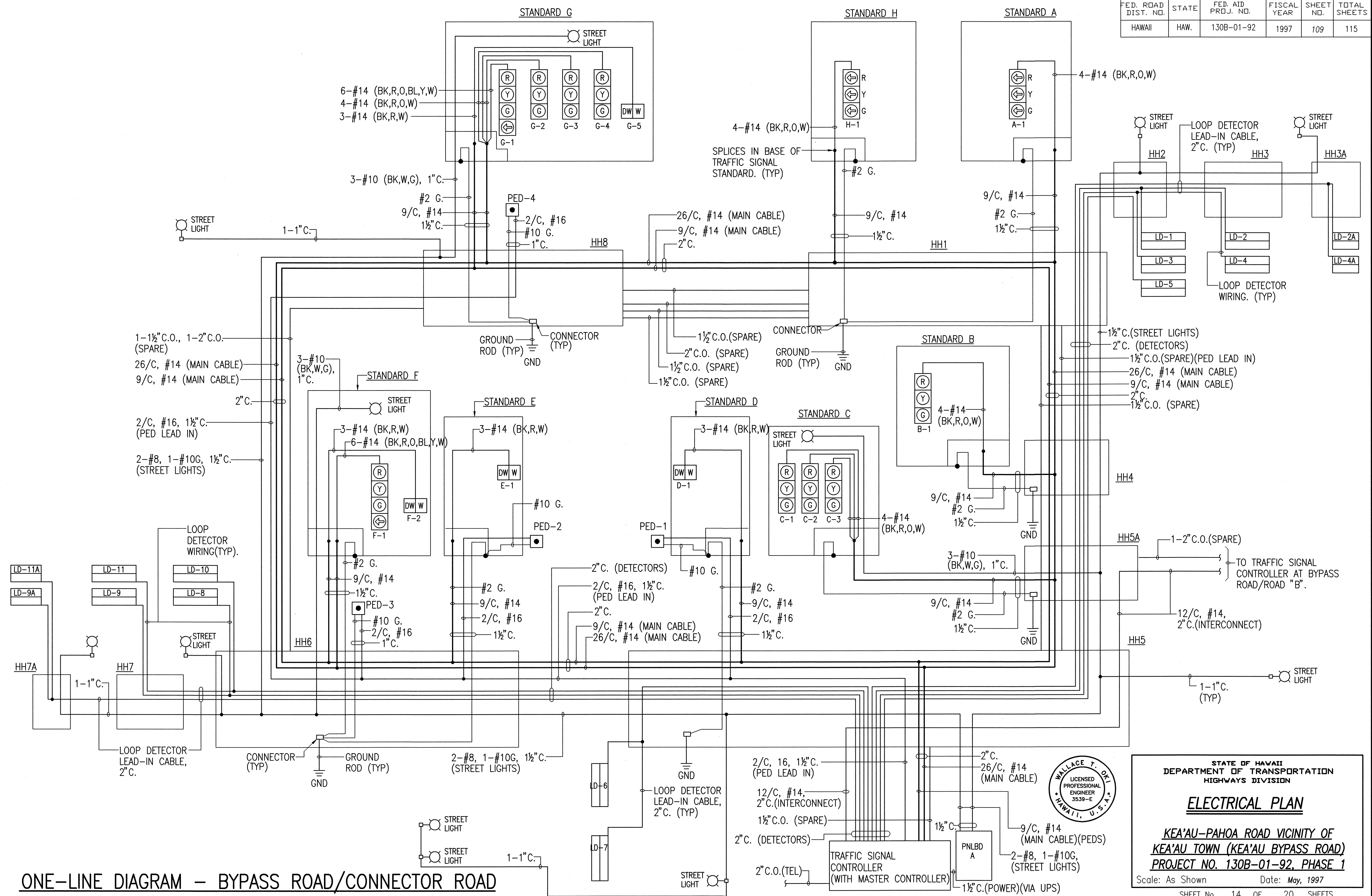
KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown

Date: May, 1997

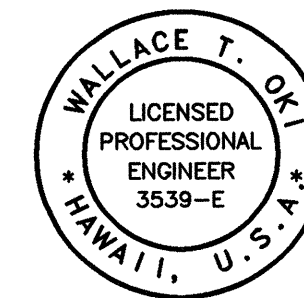
SHEET No. 13 OF 20 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	109	115



ONE-LINE DIAGRAM - BYPASS ROAD/CONNECTOR ROAD

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



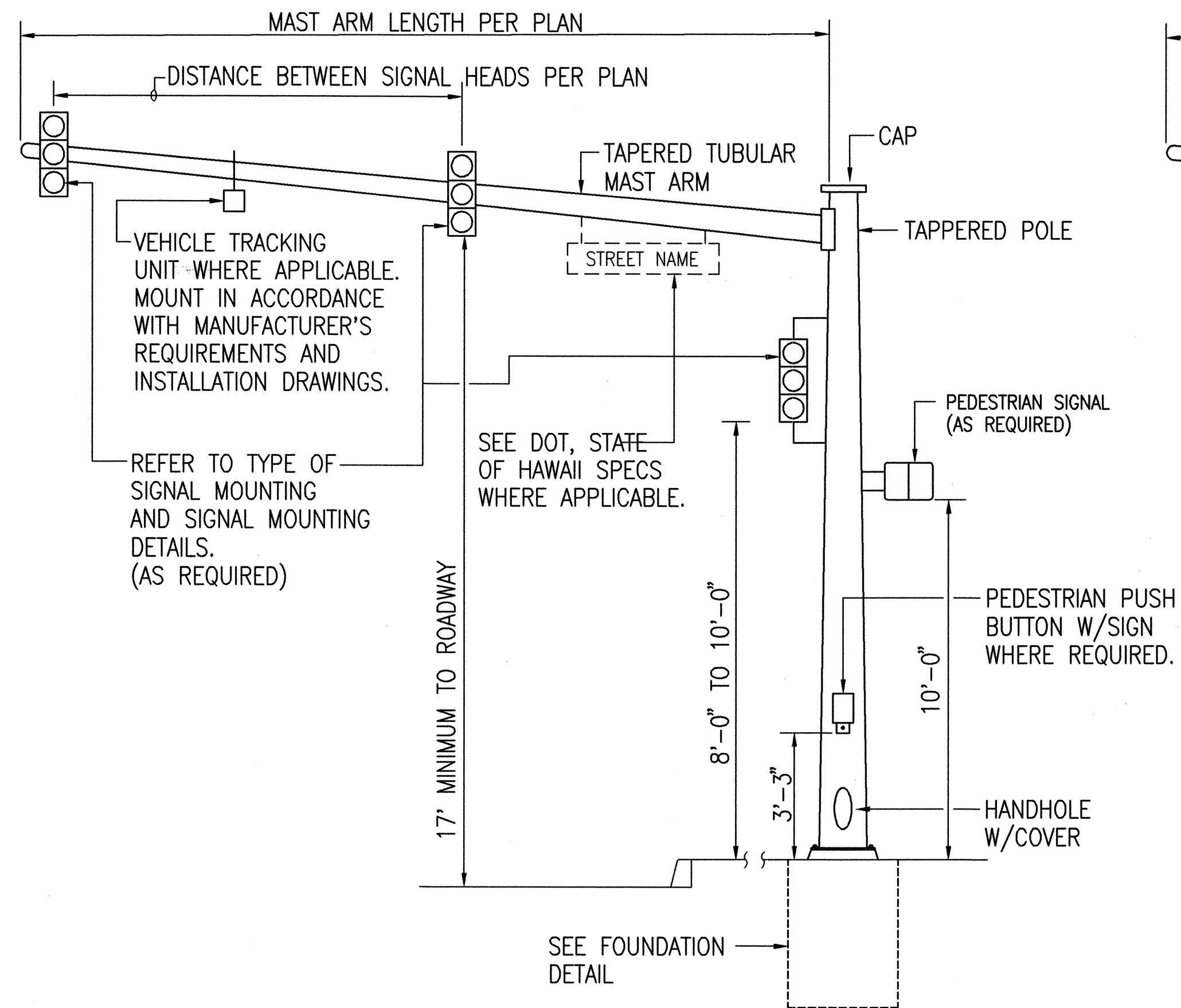
STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

ELECTRICAL PLAN

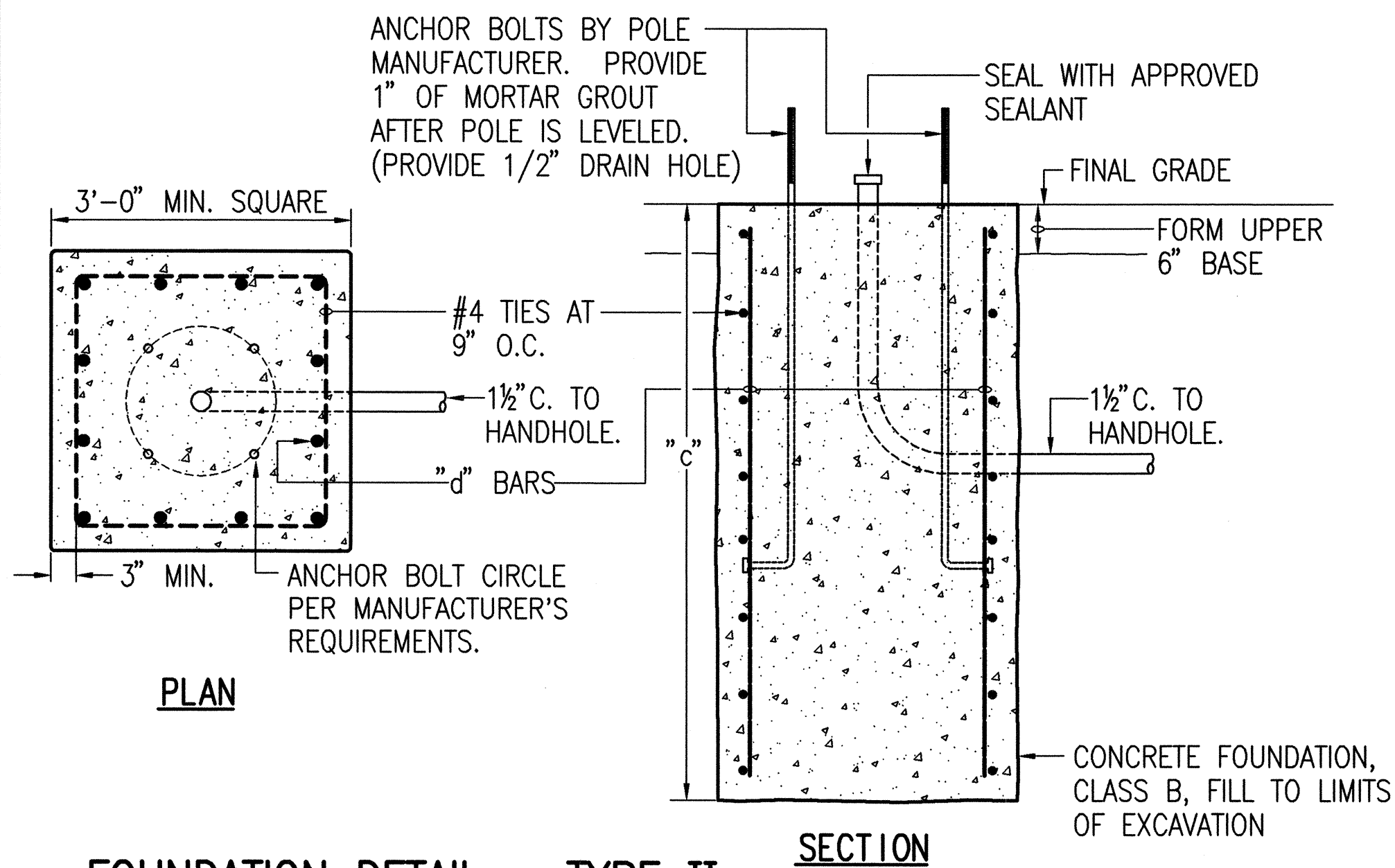
KEA'AU-PAHOA ROAD VICINITY OF
 KEA'AU TOWN (KEA'AU BYPASS ROAD)
 PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 14 OF 20 SHEETS



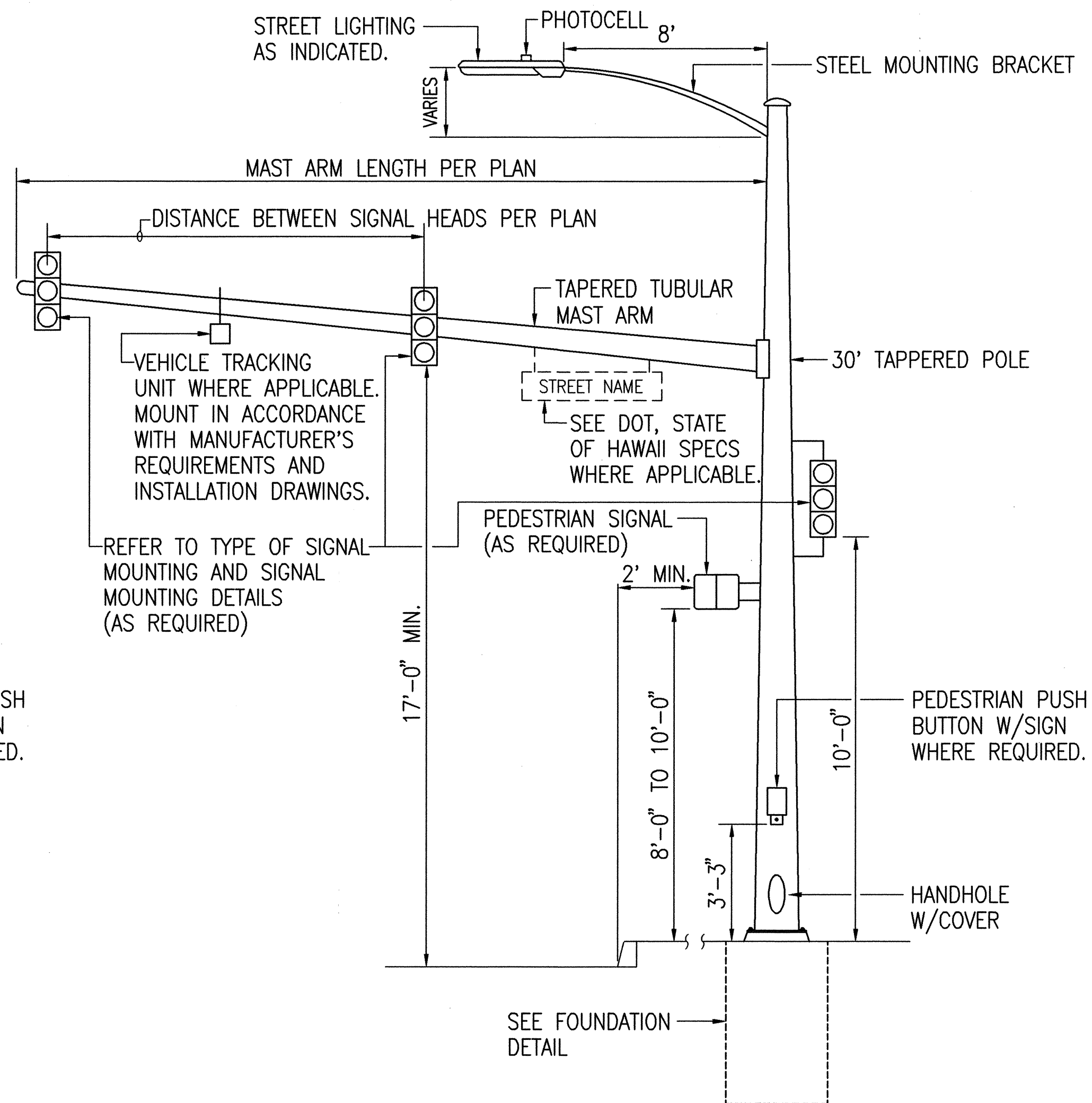
TYPE II TRAFFIC SIGNAL STANDARD
NOT TO SCALE



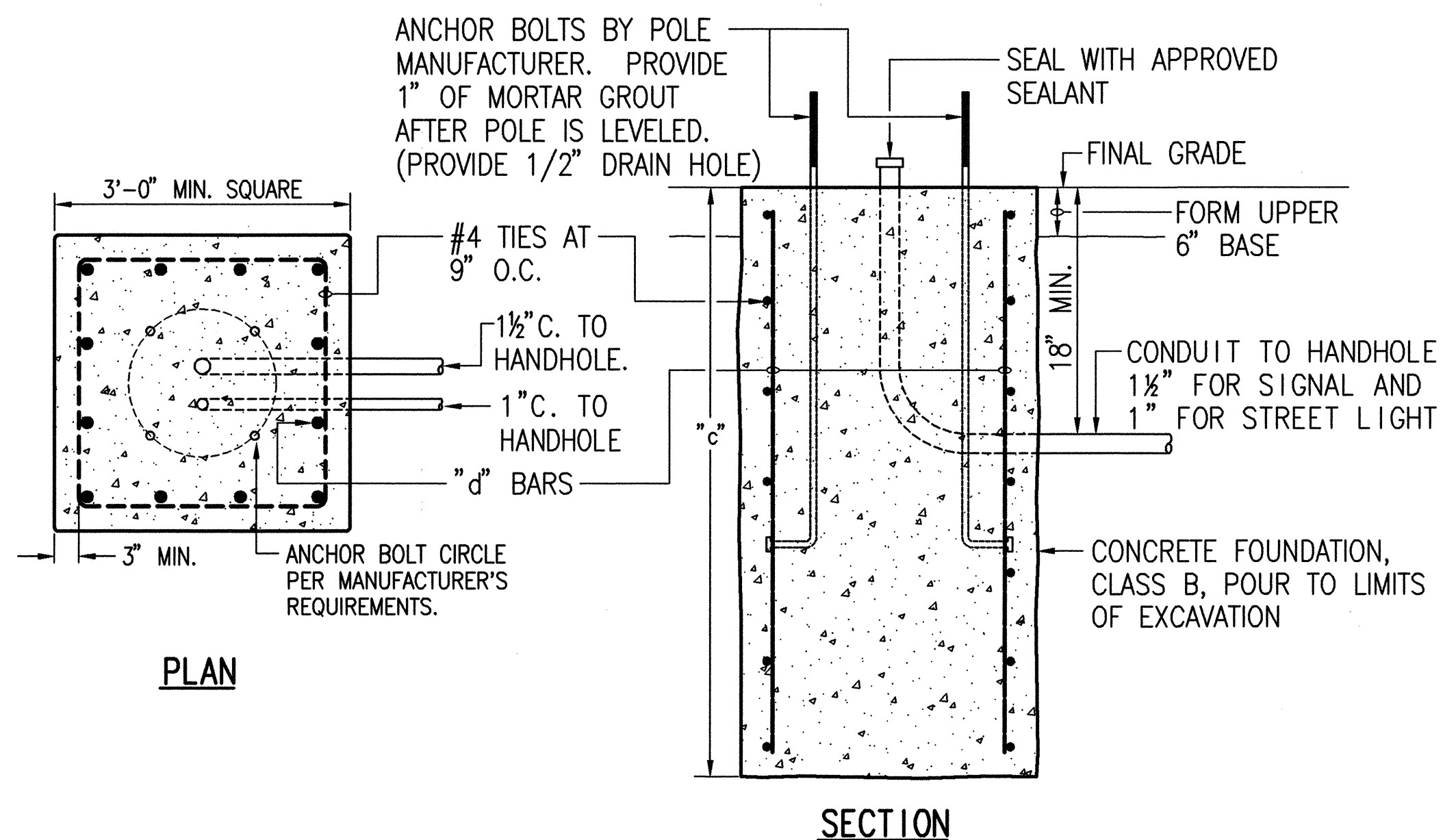
FOUNDATION DETAIL - TYPE II

NOT TO SCALE
NOTE: FOUNDATIONS IN SIDEWALK AREA SHALL BE FLUSH WITH SIDEWALK.

MAST ARM TABLE - TYPE II		
LENGTH	"c"	"d" BARS
16'-18'	5'-0"	12-#6
20'	5'-8"	12-#6
25'	6'-0"	12-#6
30'	6'-6"	12-#6



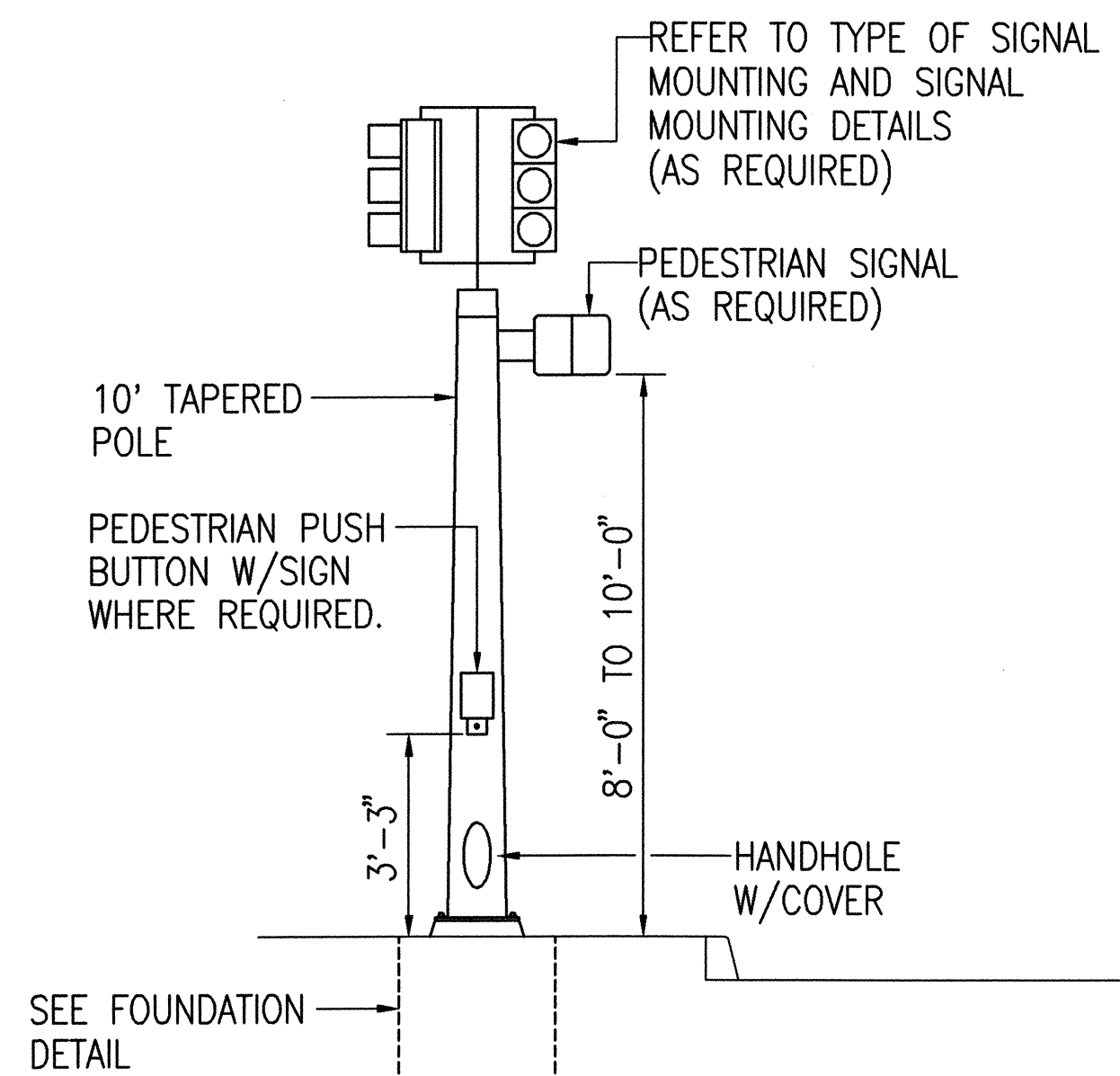
TYPE III TRAFFIC SIGNAL STANDARD
NOT TO SCALE



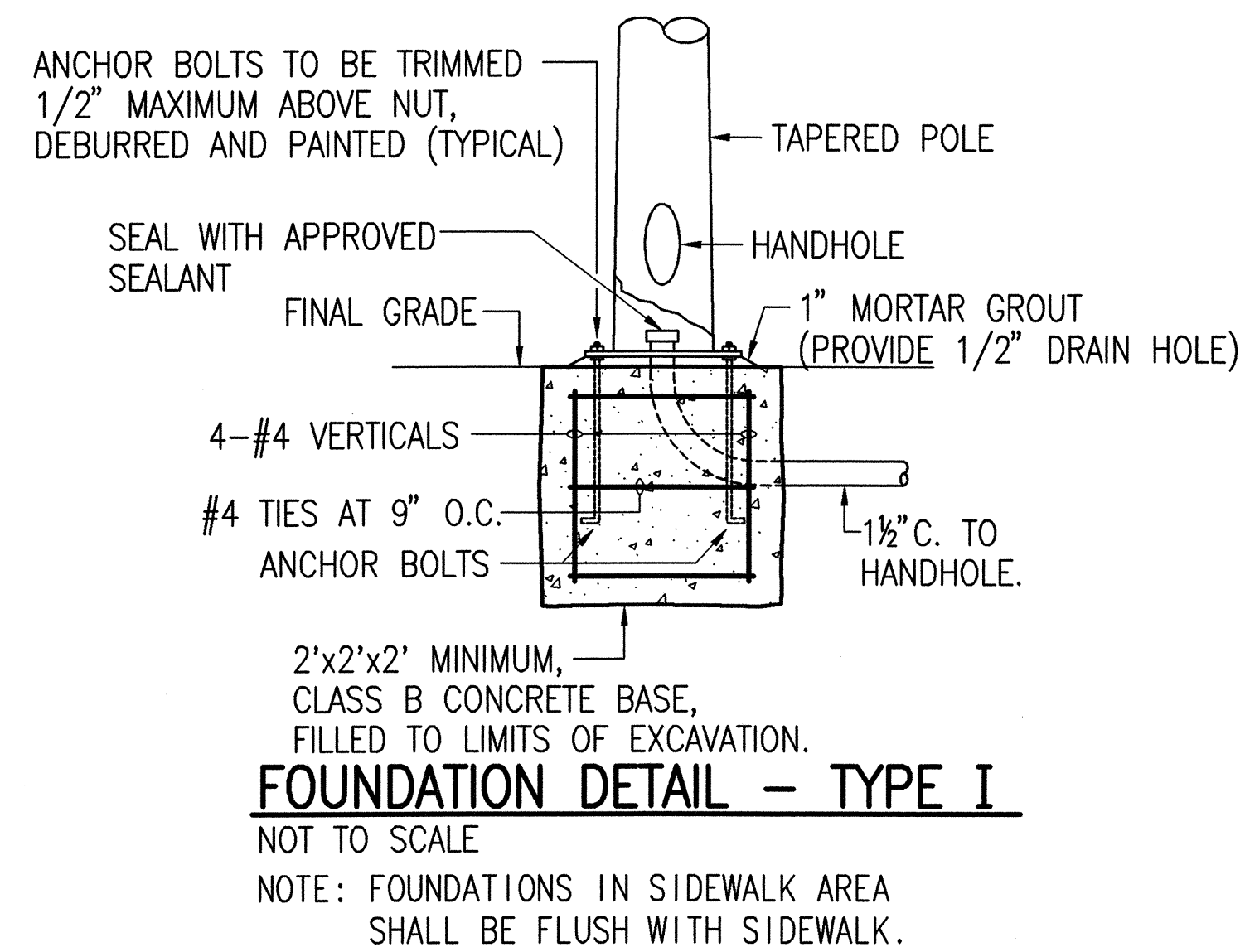
FOUNDATION DETAIL - TYPE III

NOT TO SCALE
NOTE: FOUNDATIONS IN SIDEWALK AREA SHALL BE FLUSH WITH SIDEWALK.

MAST ARM TABLE - TYPE III		
LENGTH	"c"	"d" BARS
16'-18'	5'-6"	12-#6
20'	6'-0"	12-#6
25'	6'-6"	12-#6
30' & 35'	6'-6"	12-#8
40'	7'-0"	12-#8

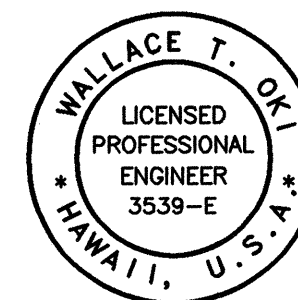


TYPE I TRAFFIC SIGNAL STANDARD
NOT TO SCALE



FOUNDATION DETAIL - TYPE I
NOT TO SCALE

NOTE: FOUNDATIONS IN SIDEWALK AREA SHALL BE FLUSH WITH SIDEWALK.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

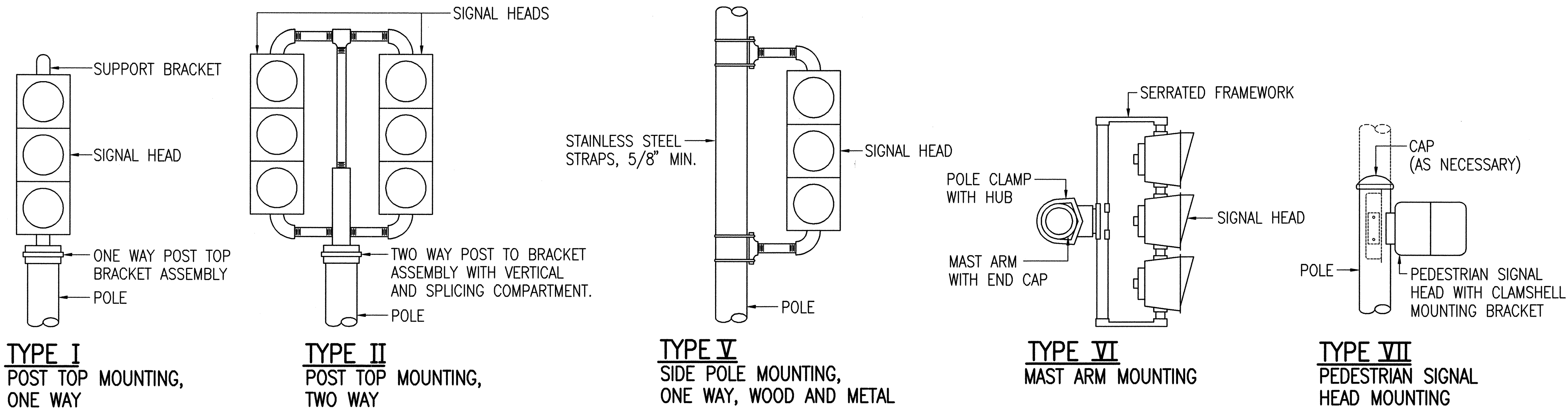
ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 15 OF 20 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	111	115

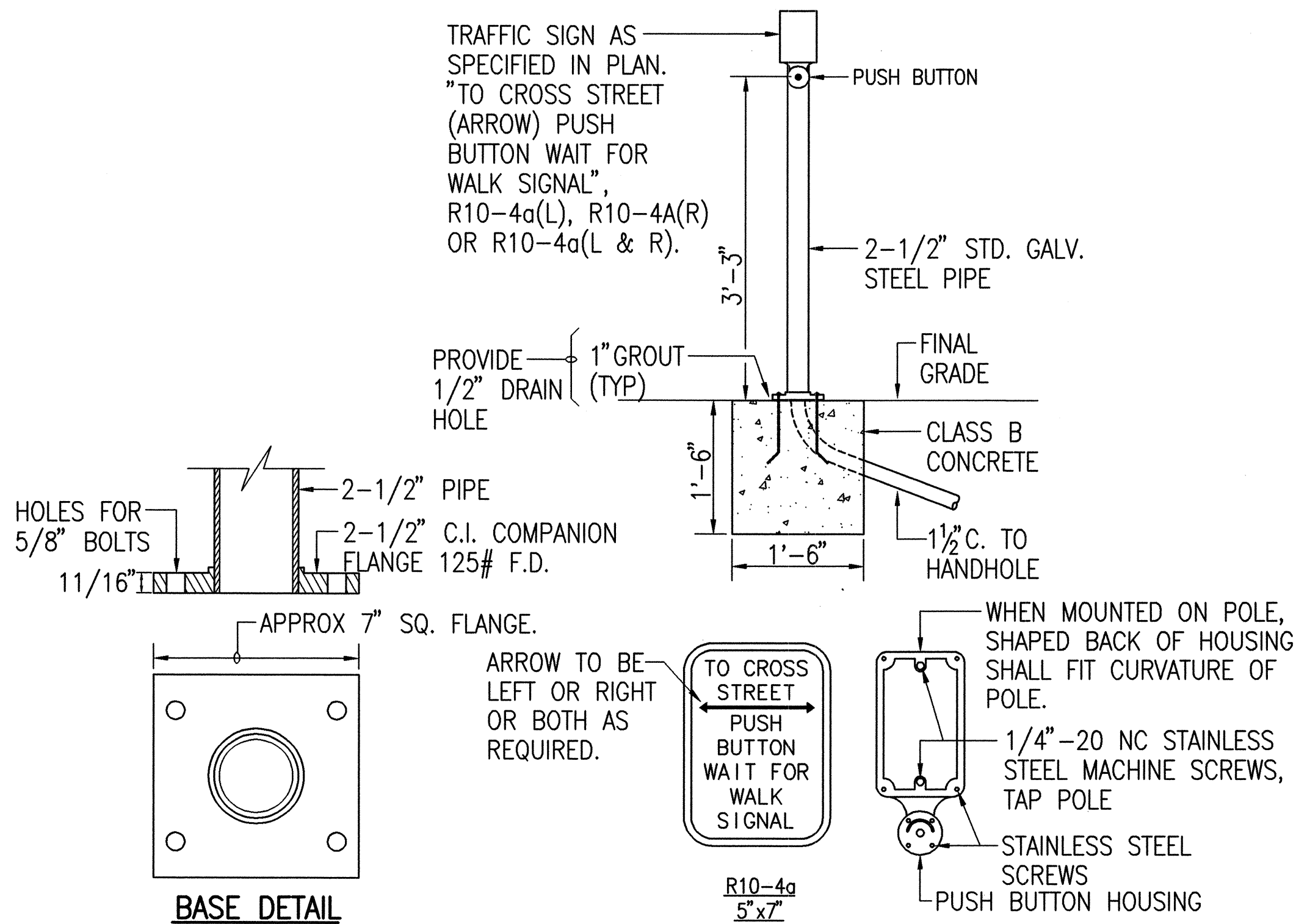


SIGNAL ASSEMBLY MOUNTING

NOT TO SCALE

NOTES:

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



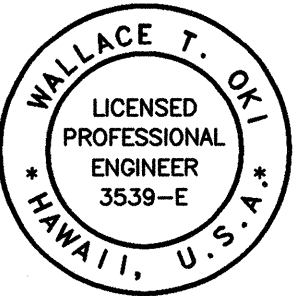
PEDESTRIAN PUSH-BUTTON MOUNTING

NOT TO SCALE

PEDESTRIAN PUSH BUTTON

NOT TO SCALE

ORIGINAL SURVEY PLOTTED BY	DATE
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QUANTITIES BY	
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NOTE BOOK	
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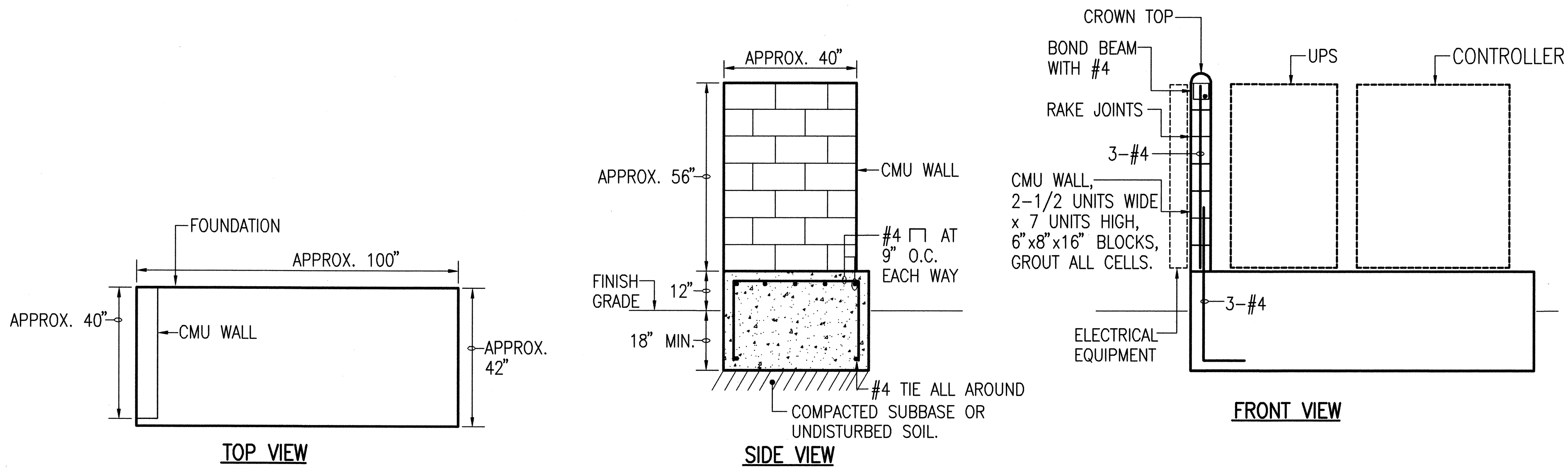


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

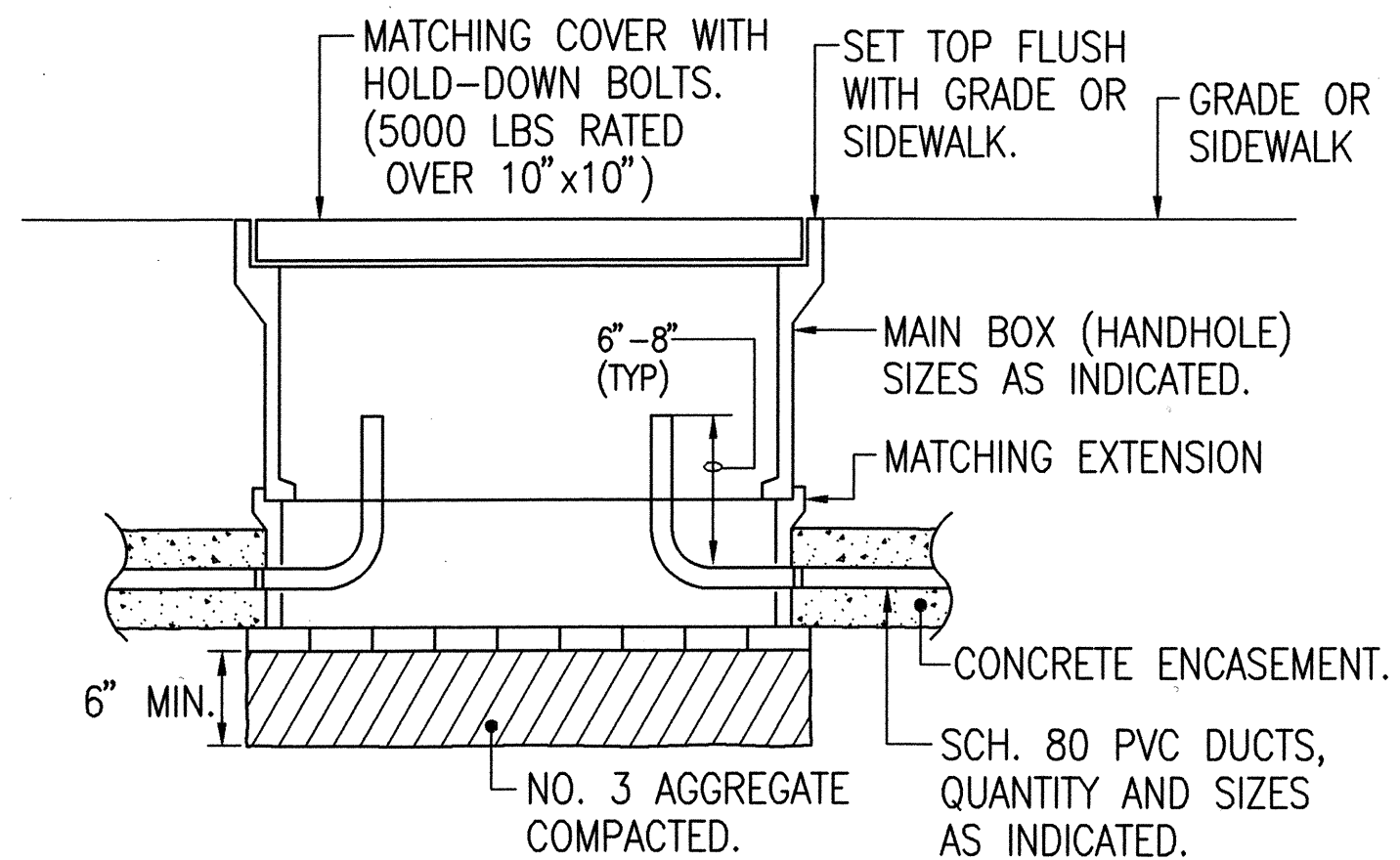
ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1
Scale: As Shown Date: May, 1997

SHEET No. 16 OF 20 SHEETS

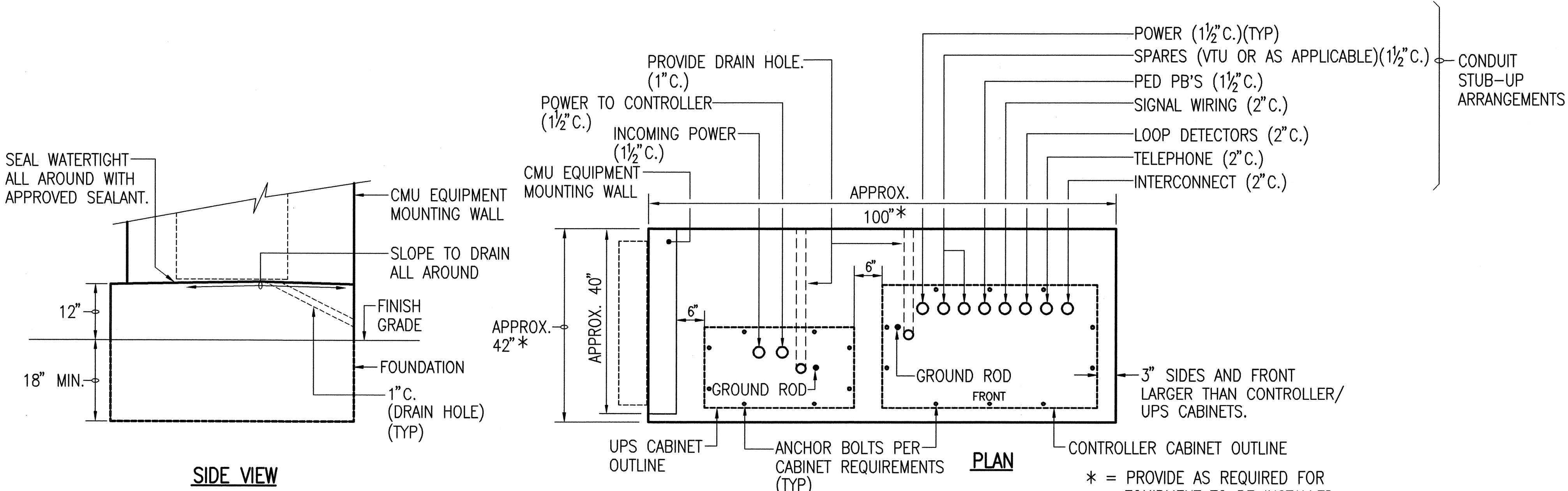


GENERAL ARRANGEMENT (TYP) - TRAFFIC SIGNAL CONTROLLER FOUNDATION
NOT TO SCALE



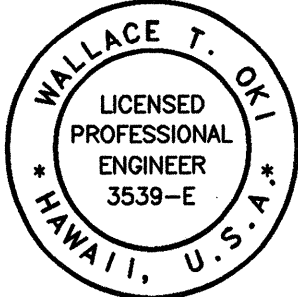
GENERAL ARRANGEMENT (TYP) - HANDHOLE (HH) DETAILS
NOT TO SCALE

- NOTES:
- HANDHOLE SYSTEM SHALL BE "QUAZITE COMPOSOLITE" OR APPROVED EQUAL.
 - ALL COVERS SHALL BE MARKED WITH "TRAFFIC".
 - SIZES
- | | MAIN BOX | EXTENSION | COVER |
|-----|----------|-----------|----------|
| (S) | PC1212BA | PC1212BA | PC1212WA |
| (M) | PG1730BA | PG1730EA | PG1730WA |
| (L) | PG2436BA | PG2436EA | PG2436WA |



GENERAL ARRANGEMENT (TYP) - TRAFFIC SIGNAL CONTROLLER MOUNTING
NOT TO SCALE

ORIGINAL SURVEY PLOTTED BY DATE
PLAN
DRAWN BY
DESIGNED BY
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No.



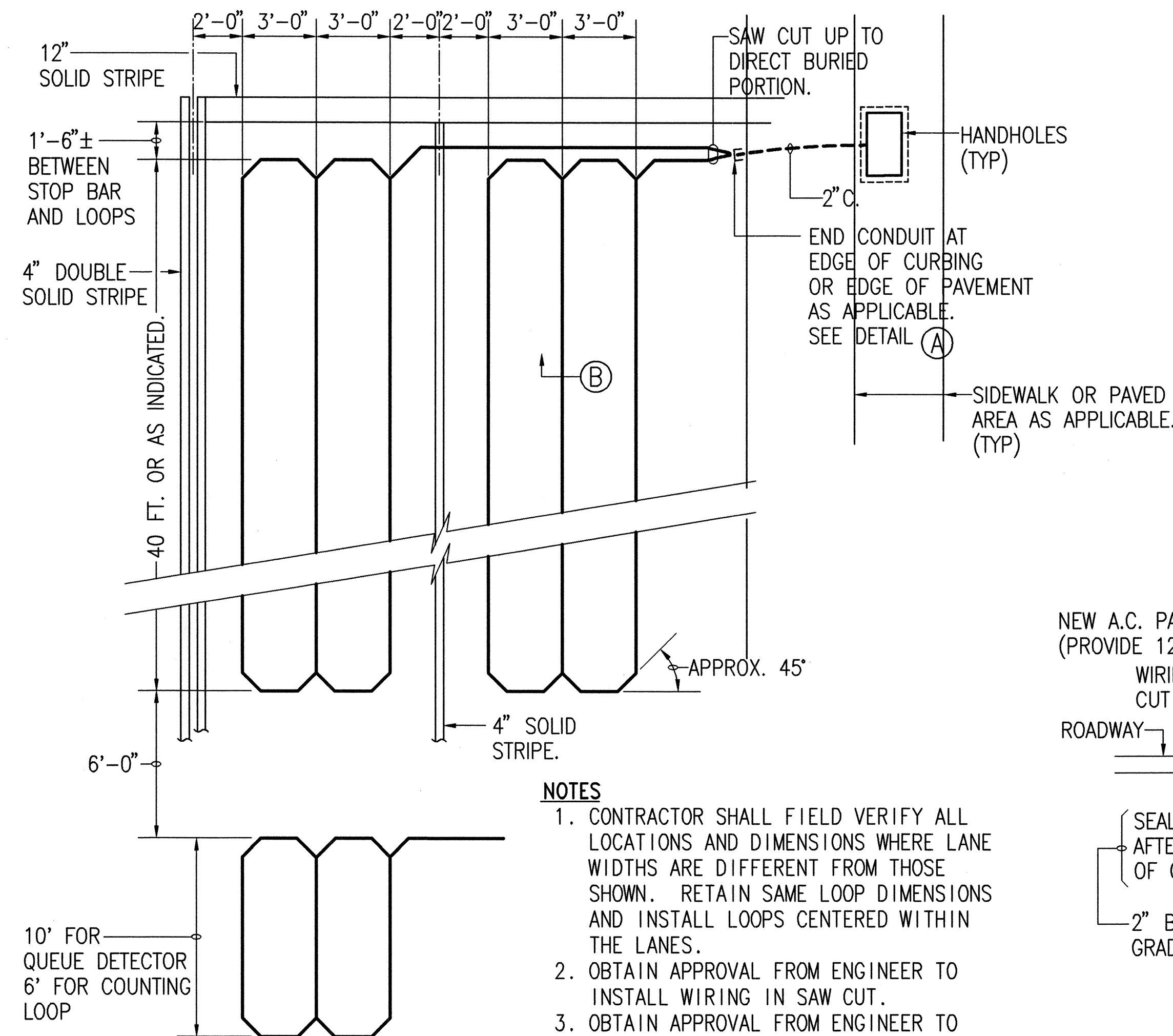
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997

SHEET No. 17 OF 20 SHEETS

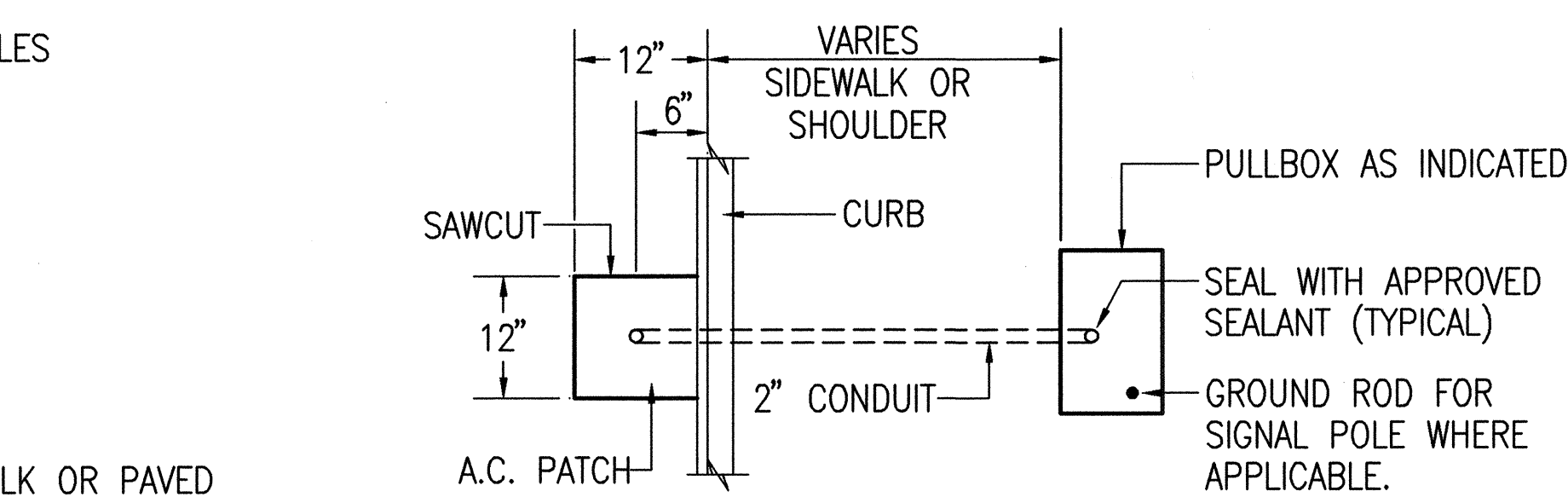


LOOP DETECTOR SAW CUTS

1/4" = 1'-0"

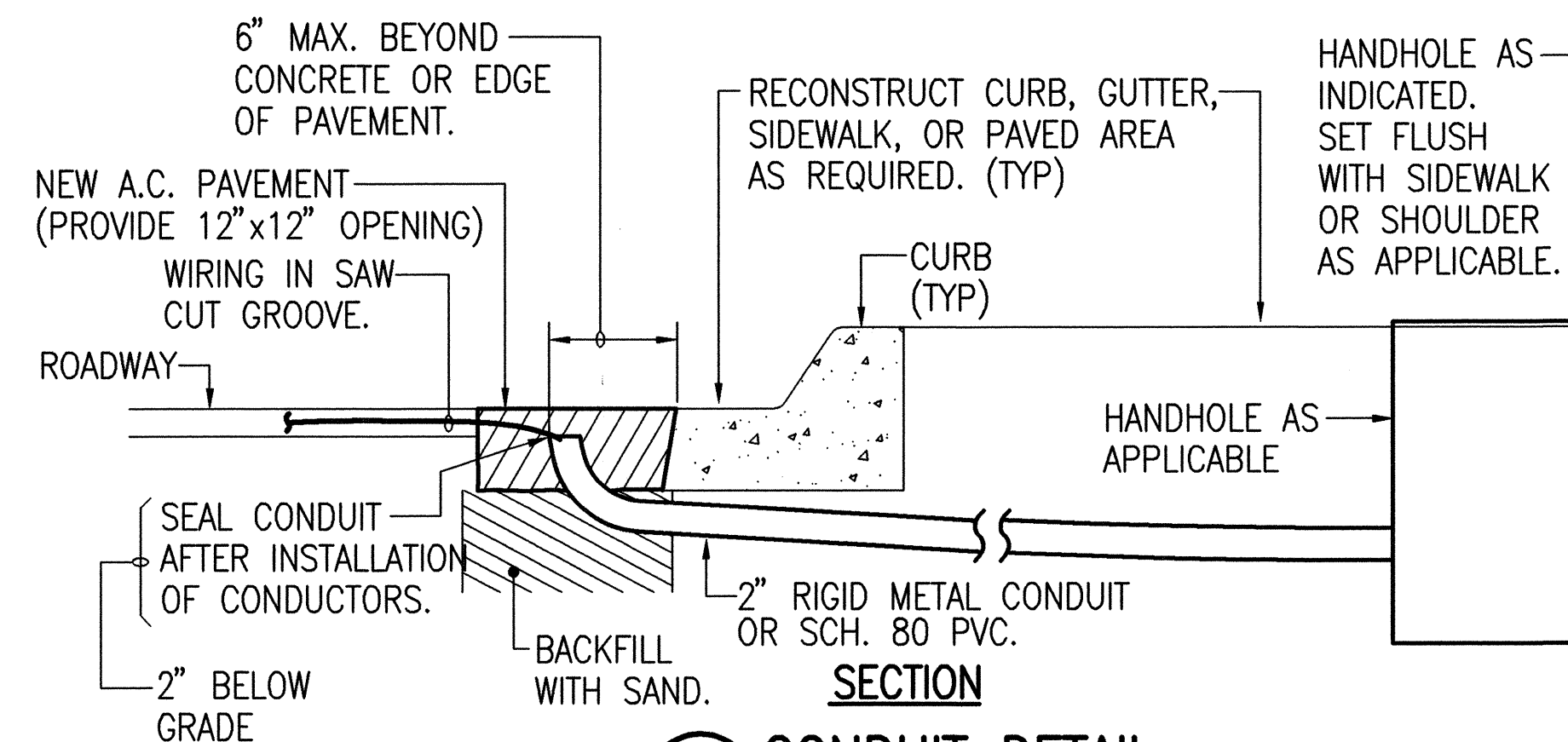
TYPES OF CABLES

- TYPE 1 SIGNAL LOOP CABLE: STRANDED NO. 14, 26 CONDUCTORS.
- TYPE 2 DETECTOR LEAD-IN CABLE AND PEDESTRIAN PUSH BUTTON CIRCUIT CABLE: STRANDED, NO. 16, 2 CONDUCTORS.
- TYPE 3 INTERCONNECT CABLE: SOLID NO. 20, 12 PAIRS
- TYPE 4 LOOP SENSOR CABLE: SOLID NO. 12, SINGLE CONDUCTOR TO IMSA SPEC 51-5.
- TYPE 5 CABLE FROM SIGNAL LOOP TO SIGNAL HEAD: STRANDED, NO. 14, SINGLE CONDUCTOR.
- TYPE 6 SERVICE CABLE: SOLID, NO. 6, 3 CONDUCTORS.



PLAN

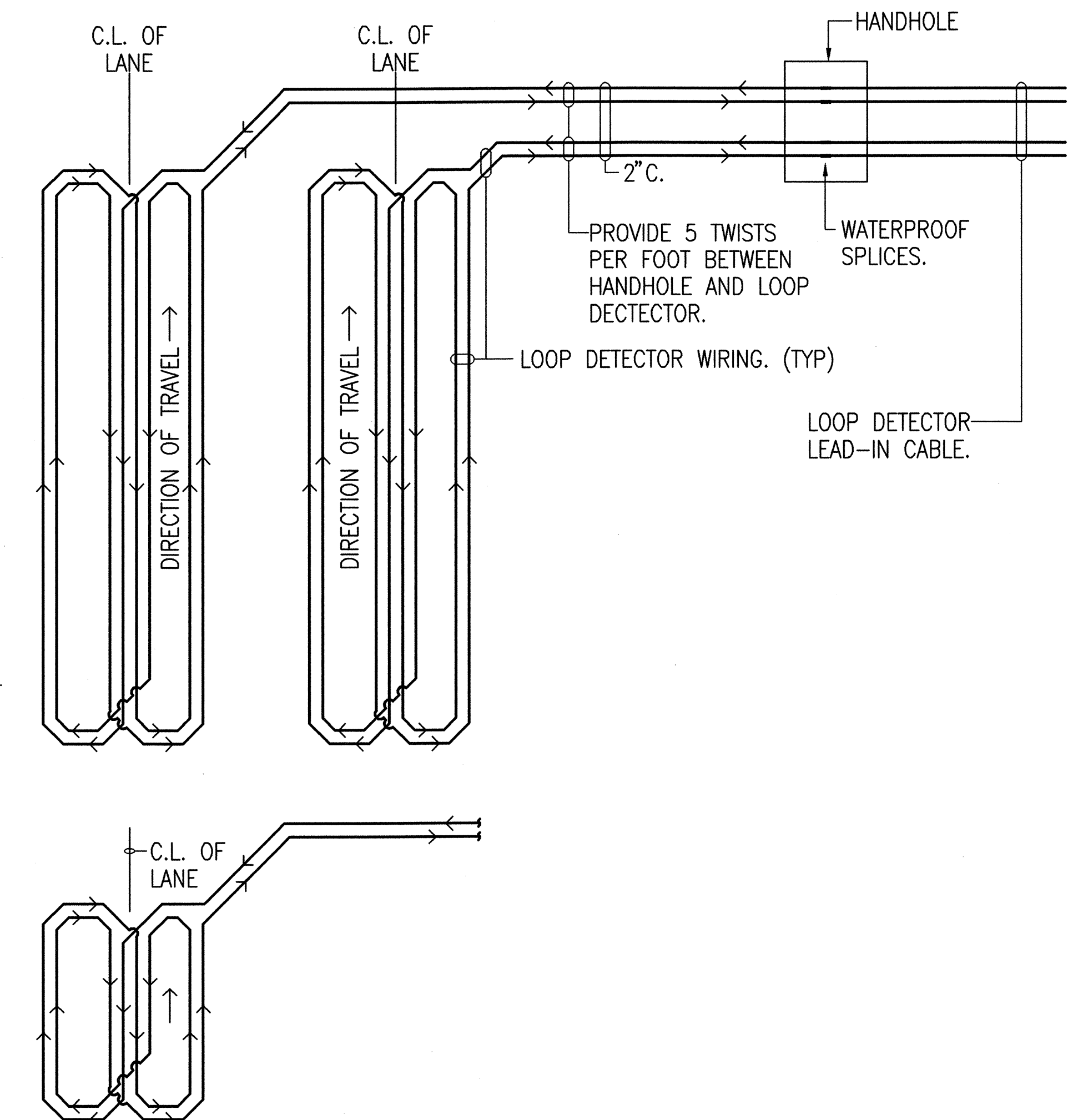
NOT TO SCALE



SECTION

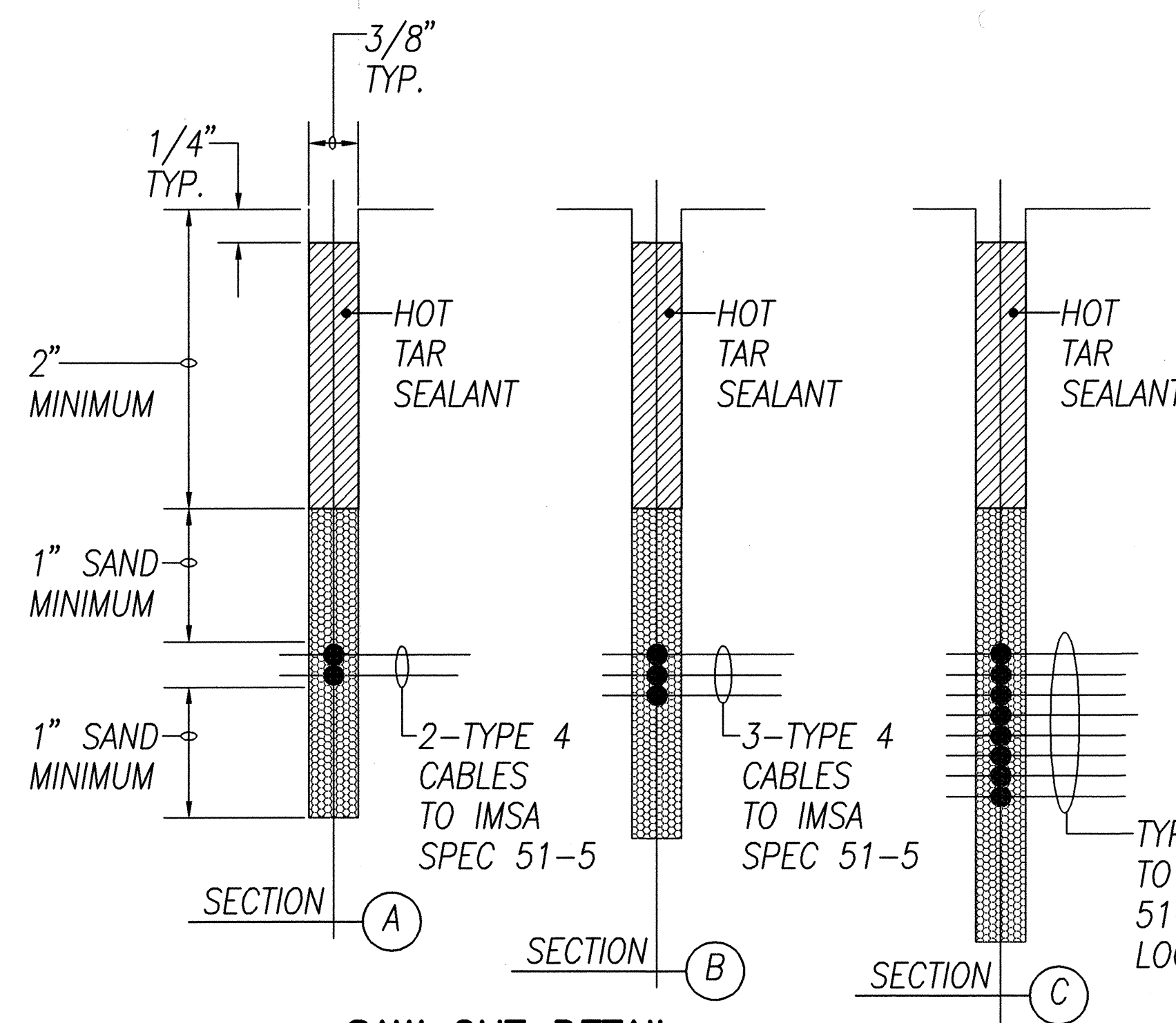
(A) CONDUIT DETAIL

NOT TO SCALE



LOOP DETECTOR WIRING

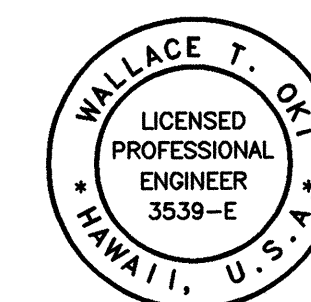
NOT TO SCALE



SAW CUT DETAIL

NOT TO SCALE

LOOP DETECTOR DETAILS (TYPICAL)

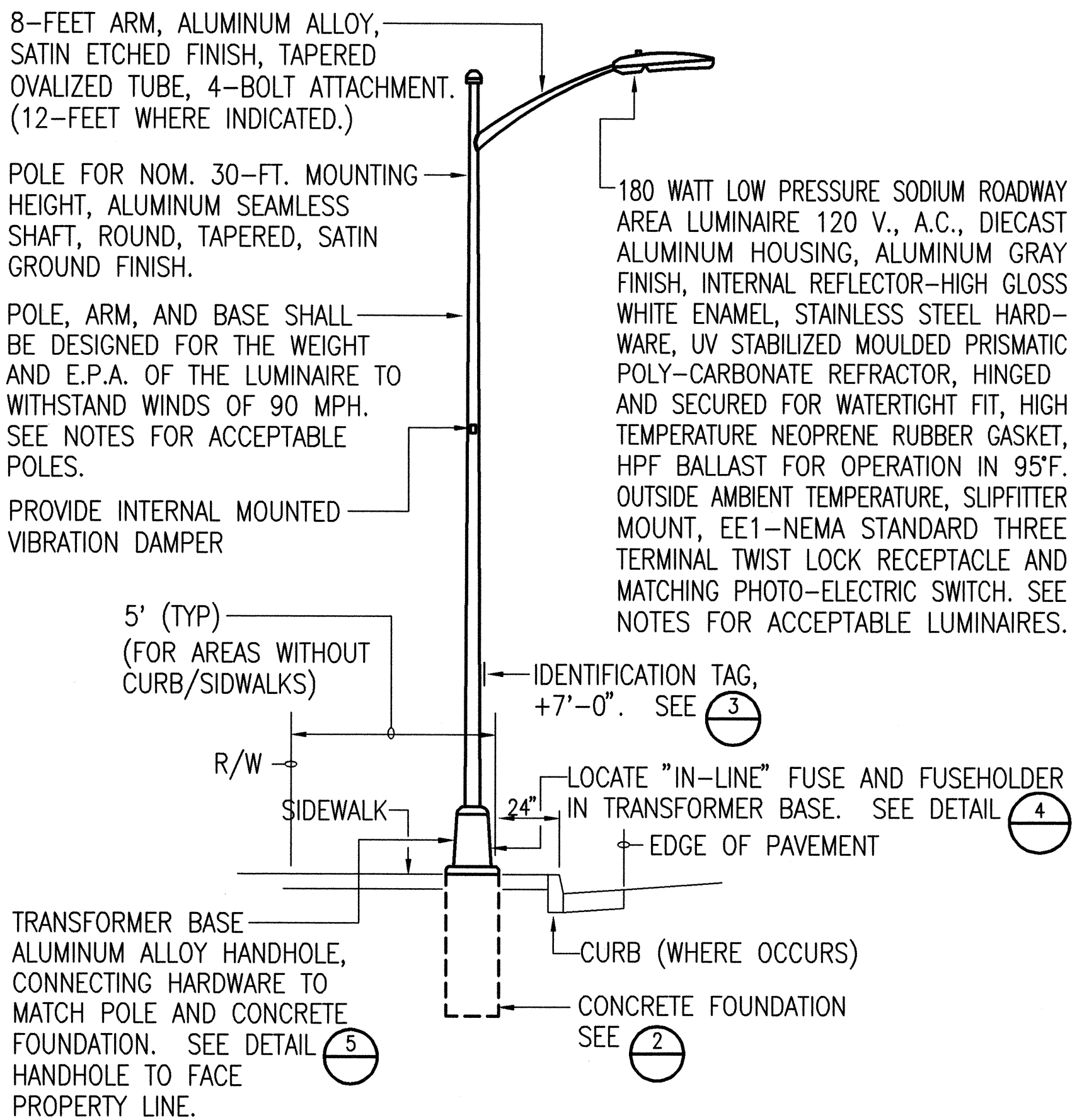


STATE OF HAWAII
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HIGHWAYS DIVISION

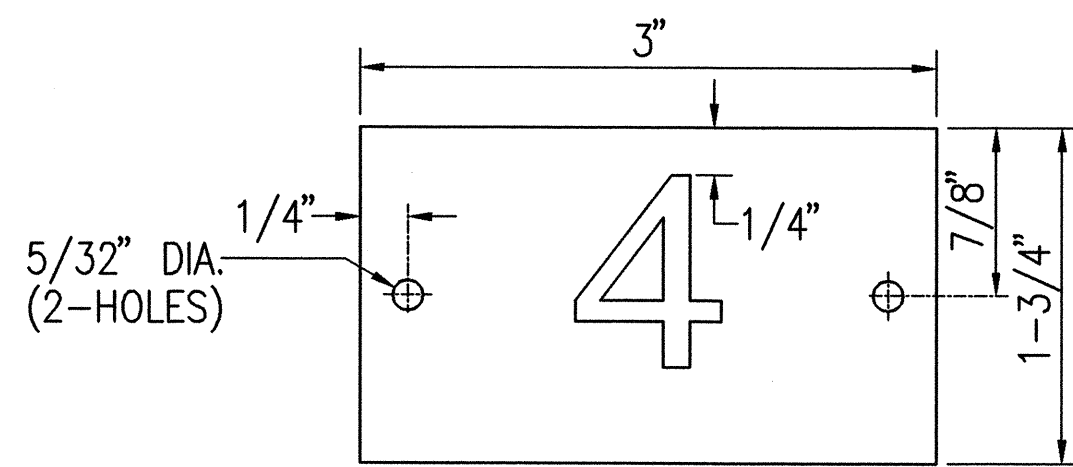
ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997
SHEET No. 18 OF 20 SHEETS

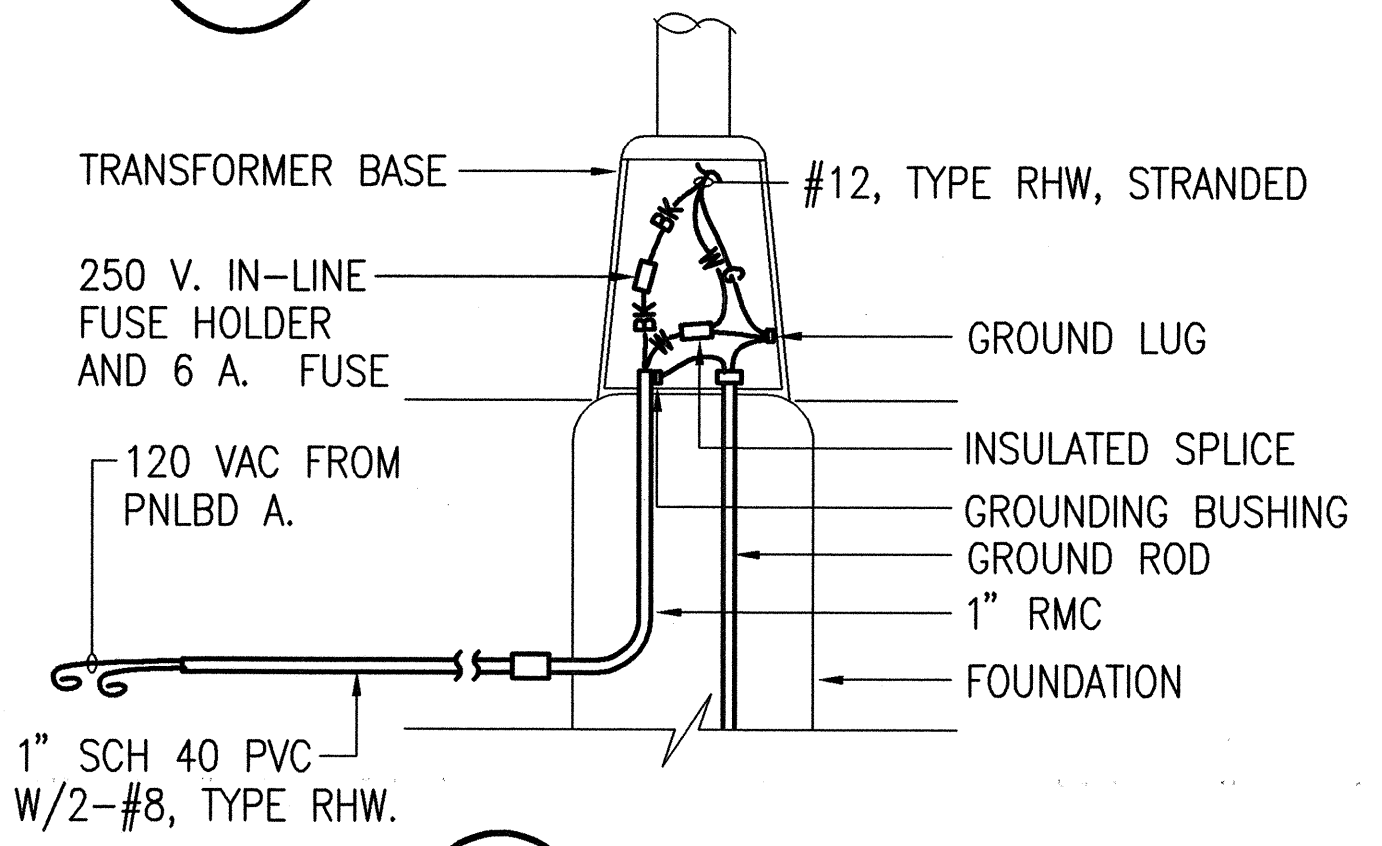


1 TYPE I STREET LIGHTING STANDARD
NOT TO SCALE

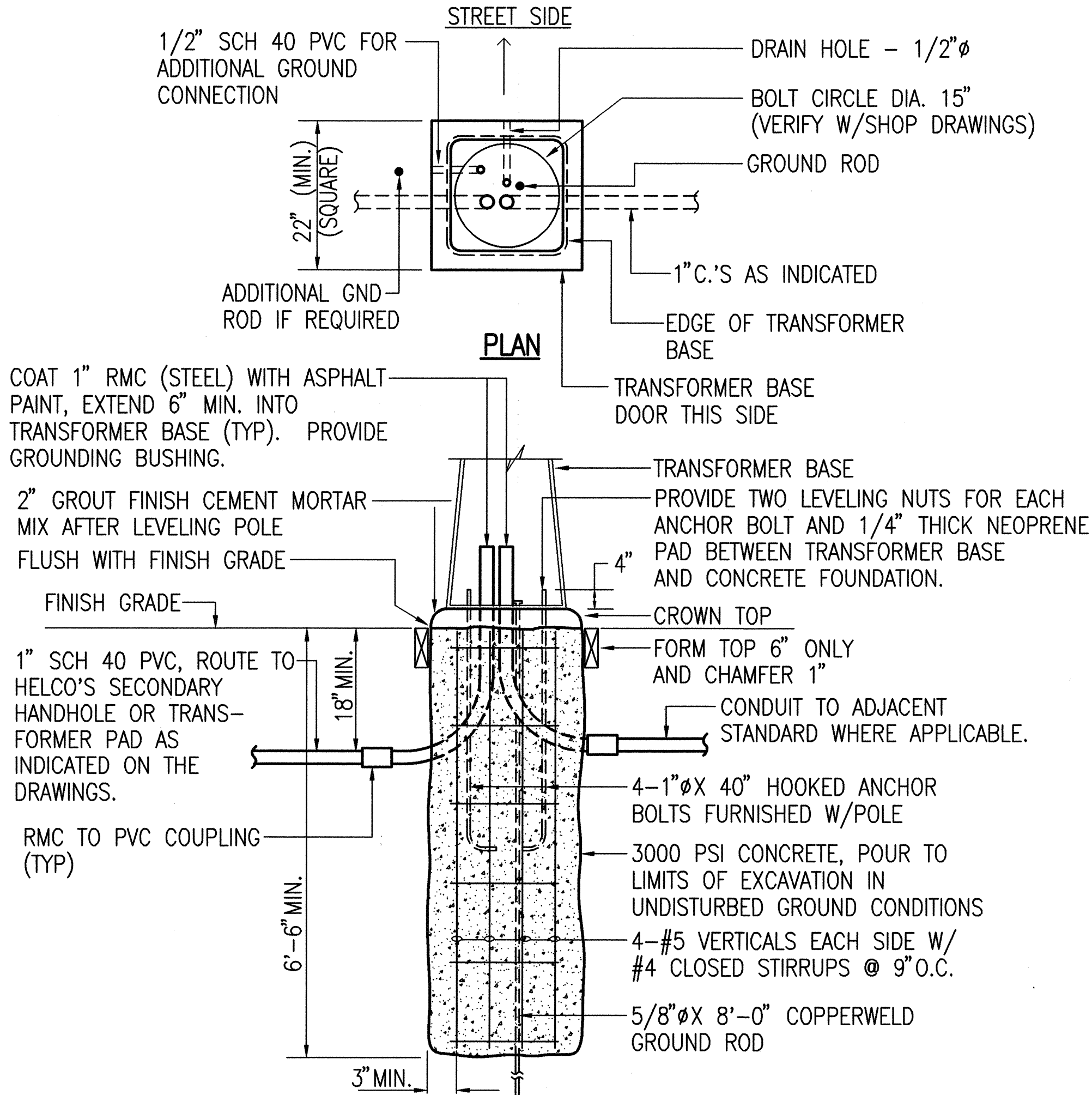


- NOTES:
1. USE 2-PLY PLASTIC - BLACK, WHITE.
 2. NUMBER SIZE SHALL BE 1" HIGH AND ENGRAVED 1/8" WIDE, WHITE IN COLOR (NUMBER AS REQUIRED).
 3. ATTACH TO ALUMINUM POLES WITH NO. 7 ALUMINUM DRIVE SCREWS.

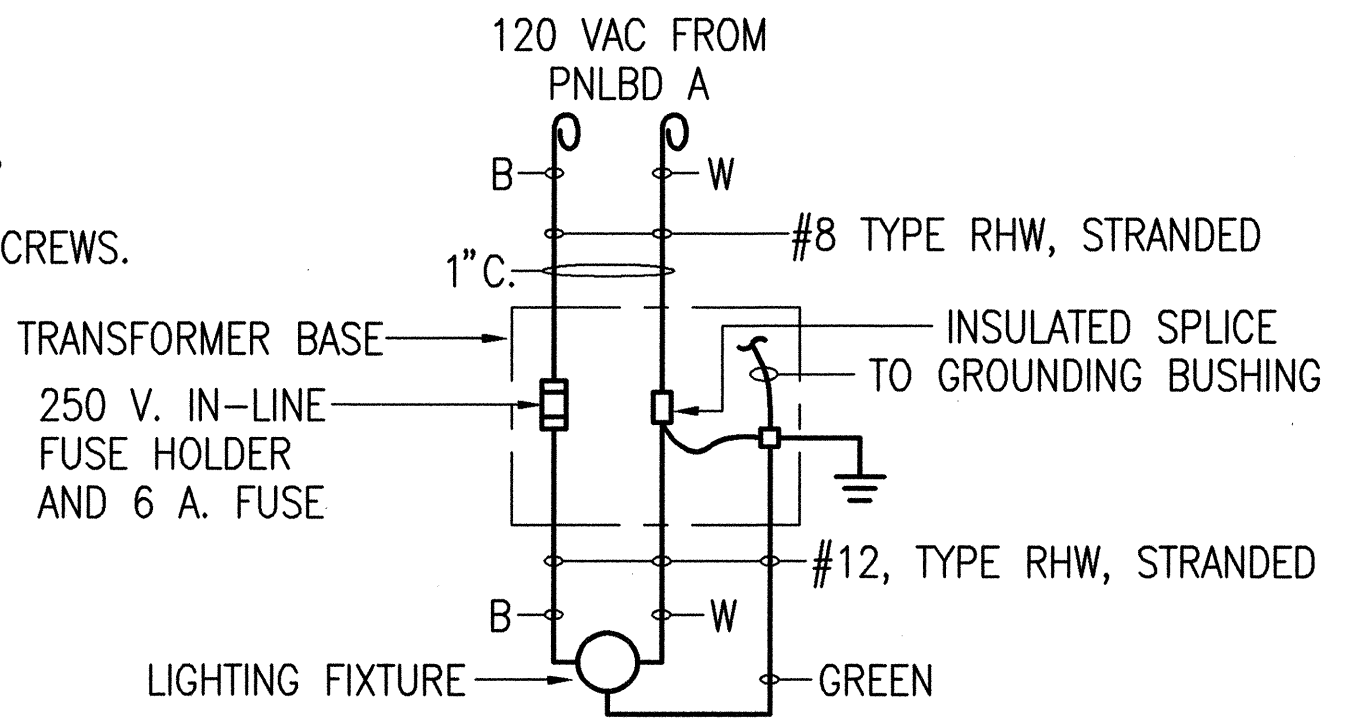
3 POLE NO. IDENTIFICATION TAG
NOT TO SCALE



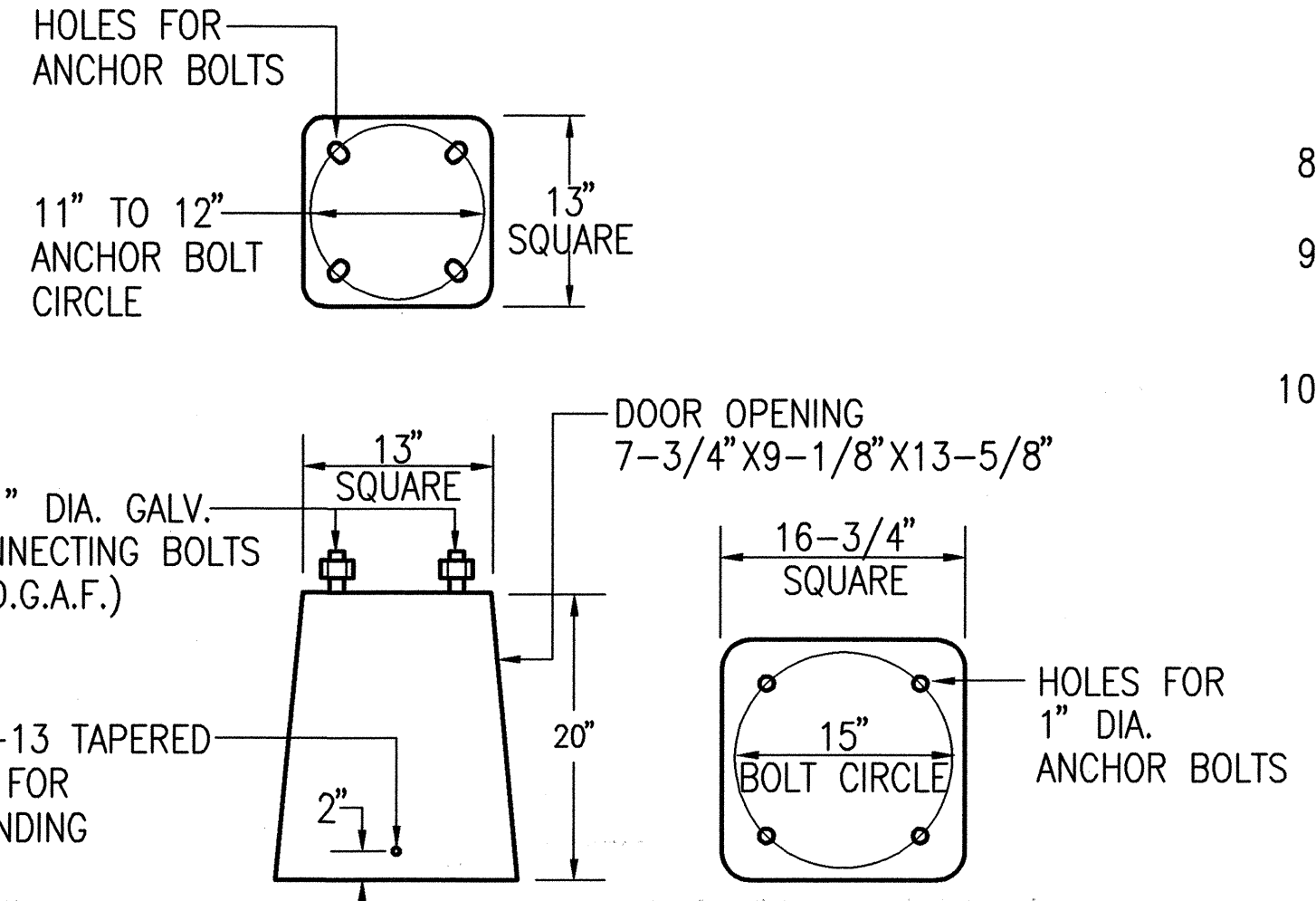
4 WIRING DETAIL
NOT TO SCALE



2 CONCRETE FOUNDATION
NOT TO SCALE



ONE-LINE DIAGRAM



5 TRANSFORMER BASE
NOT TO SCALE

STREET LIGHT NOTES

1. NO CHANGES WILL BE ALLOWED WITHOUT PRIOR APPROVAL FROM TRAFFIC DIVISION, DEPARTMENT OF PUBLIC WORKS, COUNTY OF HAWAII.
2. ALL STREET LIGHT IDENTIFICATION TAG NUMBERING FOR METAL POLES SHALL START WITH "1" AND CONTINUE NUMERICALLY. ALL STREET LIGHT I.D. TAG NUMBERING FOR WOODEN POLES SHALL BE IN ACCORDANCE WITH HELCO'S NUMBERING SYSTEM.
3. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY SECONDARY CIRCUIT EXTENSIONS TO THE INDICATED POWER SOURCE.
4. THE CONTRACTOR SHALL ARRANGE AND ASSUME COSTS TO ENERGIZE STREET LIGHTS A MINIMUM OF 6 HOURS FOR FINAL INSPECTION.
5. THE CONTRACTOR SHALL INSCRIBE THE MONTH AND YEAR OF INSTALLATION OF PHOTOCELLS AND LAMPS. ALL P.E.'S SHALL HAVE THE NORTH INDEX FACING NORTH.
6. ALL LABOR AND MATERIALS SHALL BE WARRANTED FOR A MINIMUM OF ONE YEAR FROM DATE OF DEDICATION TO THE COUNTY.
7. ACCEPTABLE STREET LIGHT MATERIALS:

LUMINAIRES:
WITH PE RECEPTACLE AND 120-240 VOLT HPF BALLAST.
1) AMERICAN ELECTRIC SP2 180 WITH POLYCARBONATE SEMI-CUTOFF LENS.

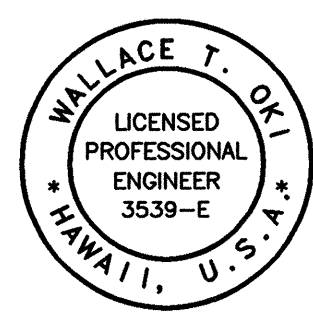
PHOTOCELLS:
COMPLETELY SOLID STATE. FAIL "ON".
1) ALR SST PV

ALUMINUM POLES:
INTERNALLY MOUNTED VIBRATION DAMPER, MINIMUM .188 WALL THICKNESS. MUST BE IN APPROVED BY F.H.W.A. TO BE IN COMPLIANCE WITH AUGUST 1985 AMENDED AND ADOPTED AASHTO SPECIFICATIONS, 11 TO 12 INCH BASE BOLT CIRCLE. ARM LENGTHS SHALL BE PER PLANS.
1) LEXINGTON: 2708-45806T4, 2208-45806T4
2) HAPCO: 21-305X, 21-307X, 21-585X, 21-588HD, 73892-001, 73892-002, 73892-003.

TRANSFORMER BASES:
ALUMINUM WITH 15 INCH BASE BOLT CIRCLE. MUST BE APPROVED BY F.W.H.A. TO BE IN COMPLIANCE WITH AUGUST 1985 AMENDED AND ADOPTED AASHTO BREAKAWAY SPECIFICATIONS.
1) LEXINGTON: 08R-1315B-17.
2) AKRON FOUNDRY TB1-17.

8. SHOP DRAWINGS SHALL BE SUBMITTED FOR APPROVAL BY TRAFFIC DIVISION.
9. ALL UNDERGROUND WIRING STREET LIGHTS SHALL BE GROUNDED TO PROVIDE A MINIMUM 25 OHMS TO GROUND.
10. ALL WORK SHALL CONFORM TO THE LATEST NATIONAL ELECTRICAL CODE.

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



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

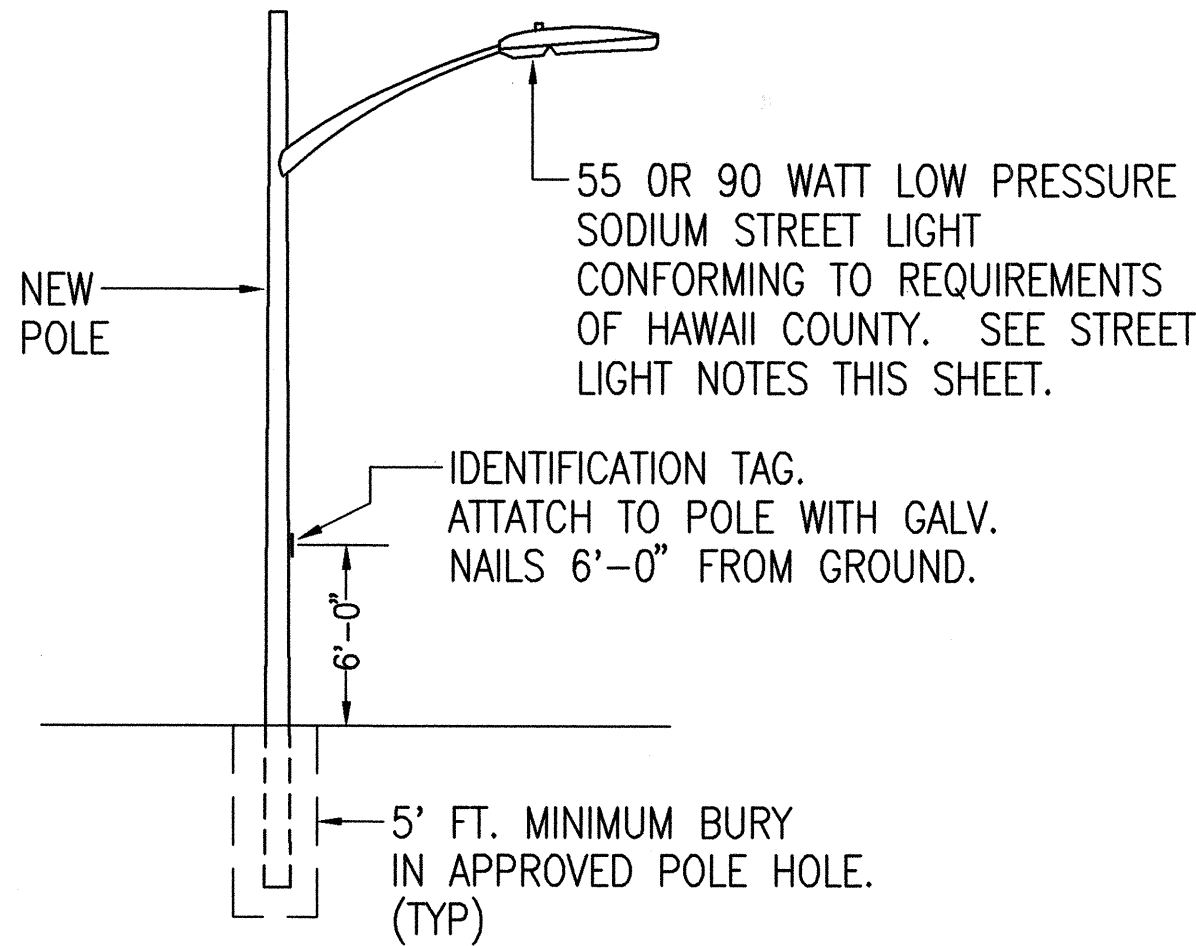
ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

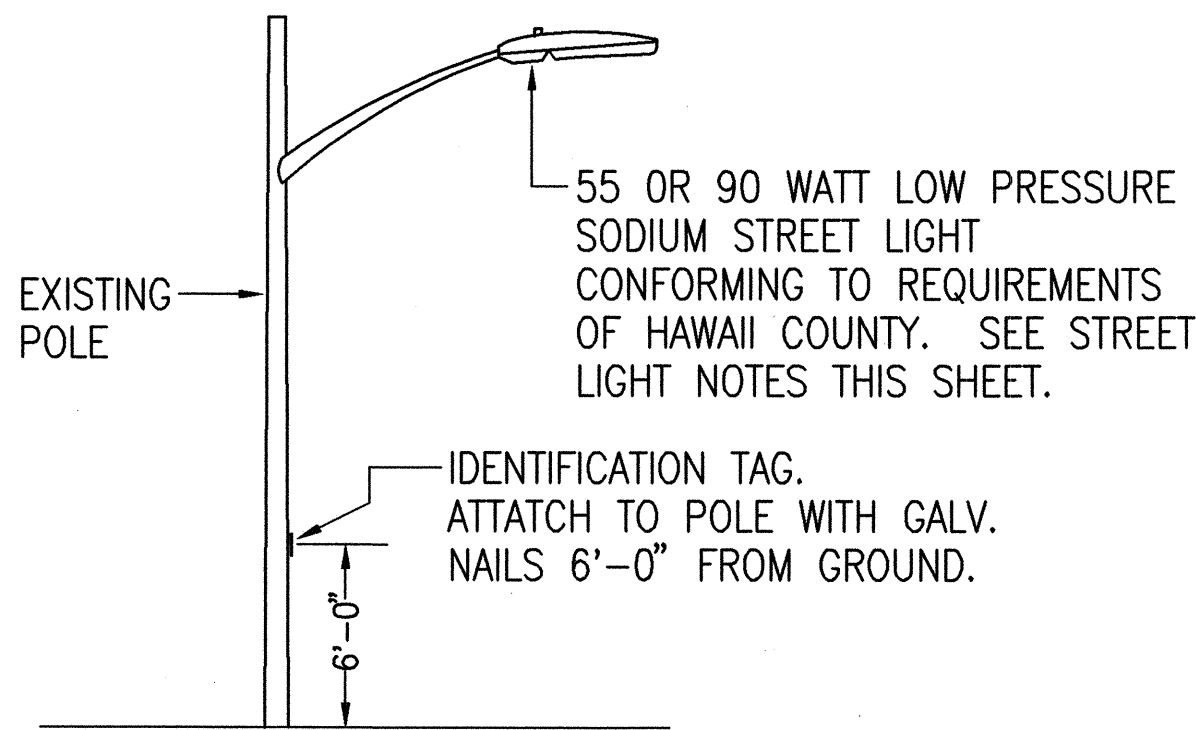
Scale: As Shown Date: May, 1997

SHEET No. 19 OF 20 SHEETS

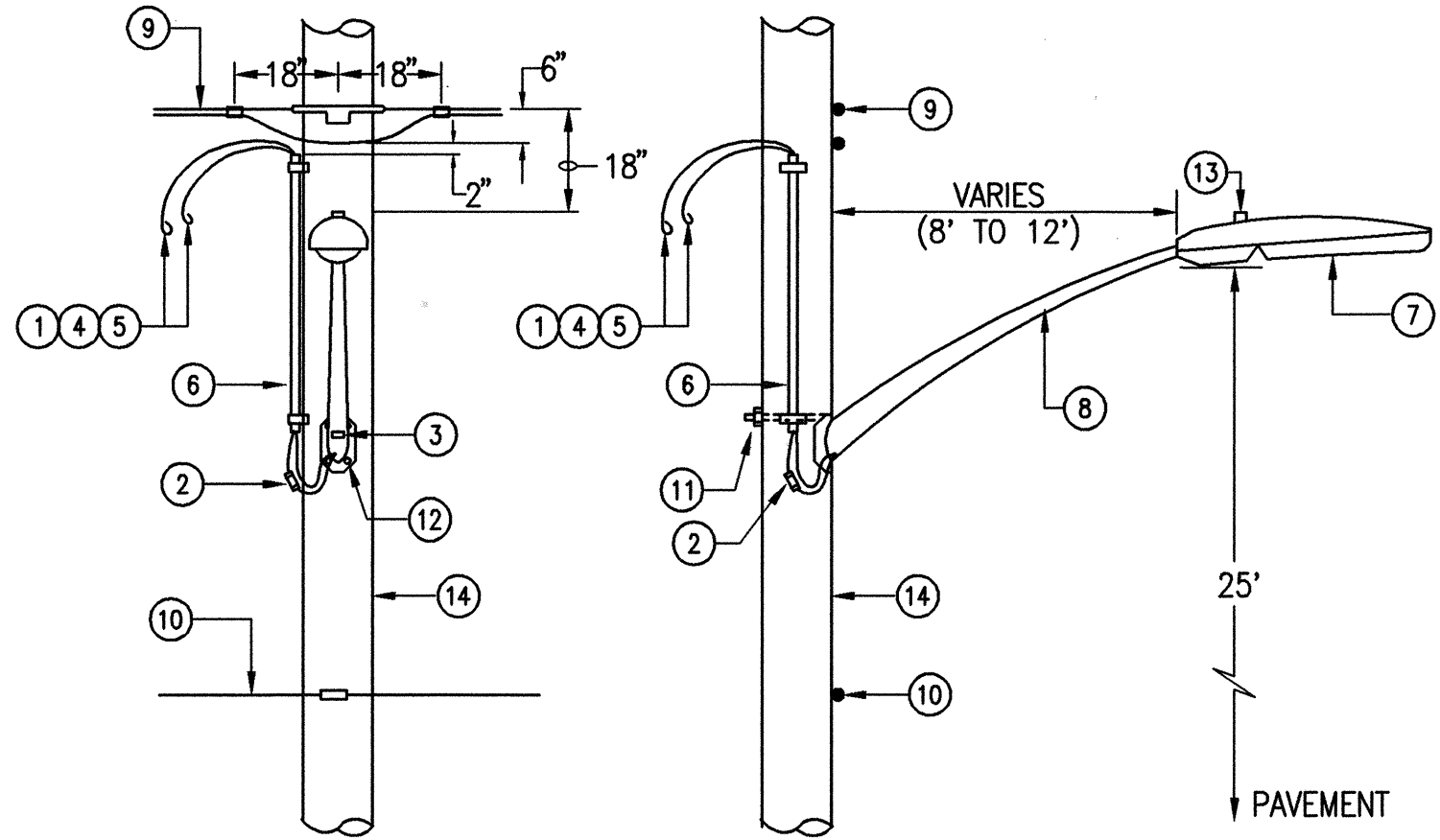
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	130B-01-92	1997	115	115



NEW STREET LIGHT ON NEW POLE
NOT TO SCALE



NEW STREET LIGHT ON EXISTING POLE
NOT TO SCALE



NEW STREET LIGHT ON UTILITY POLE

NOT TO SCALE

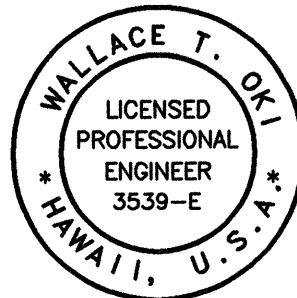
- NOTES**
1. JOINT POLE SHARES SHALL BE PAID BY THE CONTRACTOR.
 2. SUBMIT SKETCH TO TRAFFIC DIVISION INDICATING TOTAL POLE HEIGHT, CONTACT HEIGHTS FOR H.T.CO., CATV, NEUTRALS, SECONDARY, PRIMARY, AND STREET LIGHT, AS APPLICABLE, PRIOR TO INSTALLATION. SUBMIT LETTER CONFIRMING THAT JOINT POLE SHARES HAVE BEEN PAID FOR BY THE CONTRACTOR.

NOTES

- ① NO. 12 AWG-RHW, BLACK AND WHITE COPPER WIRE
- ② IN-LINE FUSE HOLDER AND FUSE (7 AMP) FOR NO. 12 AWG COPPER WIRE ON LOAD SIDE.
- ③ 2" X 2" REFLECTORIZED GREEN STICKER, SIGNIFYING THAT STREET LIGHTS ARE BONDED.
- ④ NO. 12 AWG-RHW BLACK, SINGLE CONDUCTOR COPPER WIRE. MINIMUM 3'.
- ⑤ NO. 12 AWG-RHW WHITE, SINGLE CONDUCTOR COPPER WIRE. MINIMUM 3'.
- ⑥ 3/4" SCHEDULE 80 PVC WITH CONDUIT STRAPS
- ⑦ LUMINAIRE, 90 & 55 WATT LOW PRESSURE SODIUM AS INDICATED.
- ⑧ TAPERED ELLIPTICAL ALUMINUM MOUNTING BRACKET, LENGTH AS INDICATED.
- ⑨ SECONDARY BY HELCO, EXISTING OR NEW AS APPLICABLE.
- ⑩ H.T.CO. LINES (WHERE APPLICABLE)
- ⑪ MACHINE BOLT, 5/8" X REQUIRED LENGTH. (1-REQ'D.)
- ⑫ LAG SCREW, 1/2" X 4".
- ⑬ PHOTOCELL
- ⑭ UTILITY POLE, NEW OR EXISTING AS INDICATED.

FINAL CONNECTIONS TO BE MADE BY HAWAII ELECTRIC LIGHT COMPANY.

ORIGINAL SURVEY PLOTTED BY	DATE
PLAN	
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN

KEA'AU-PAHOA ROAD VICINITY OF
KEA'AU TOWN (KEA'AU BYPASS ROAD)
PROJECT NO. 130B-01-92, PHASE 1

Scale: As Shown Date: May, 1997
SHEET No. 20 OF 20 SHEETS