

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	ADD.129	234

LIGHT STANDARD IDENTIFICATION LEGEND:

LEGEND:

1	14+00
2	2, FDR #3, AB
3	RW
4	15'
5	TB

DESCRIPTION

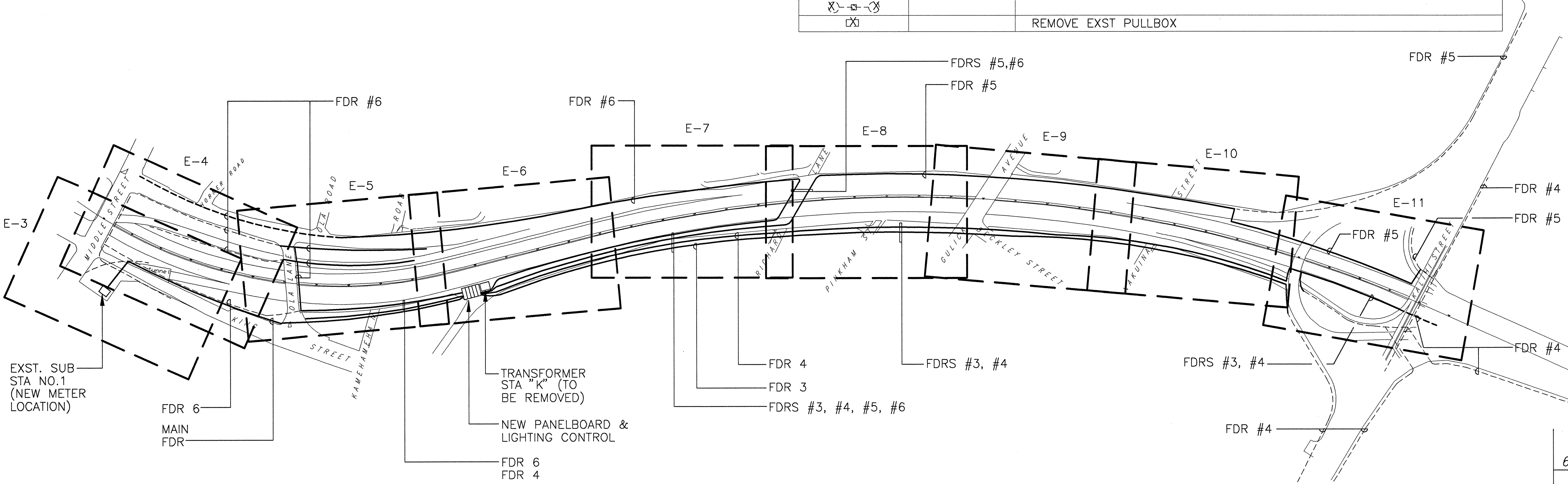
- 1 - STATION NUMBER
- 2 - LIGHT POLE NUMBER, FEEDER NUMBER, PHASE (VERIFY POLE NUMBER WITH D.O.T.)
- 3 - LIGHT POLE BASE SUPPORT SEE NOTE #1 BELOW
- 4 - LUMINAIRE ARM LENGTH IN FEET
- 5 - POLE BASE MOUNTING TYPE, SEE NOTE 2 BELOW

NOTES:

1. "RW" INDICATES MOUNTING IS ON TOP OF RETAINING WALL; "CB" ON TOP OF CONCRETE BARRIER; "G" ON GRADE.
2. "TB" INDICATES TRANSFORMER BASE; "BTB" INDICATES BREAKAWAY TRANSFORMER BASE.

ELECTRICAL SYMBOLS

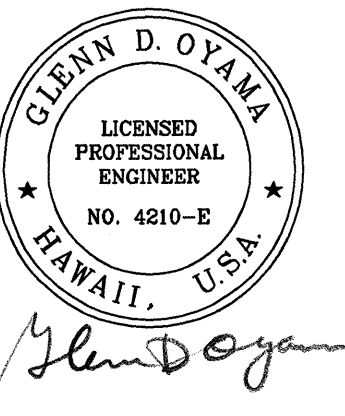
SYMBOL		DESCRIPTION
EXST	NEW	
		STREET LIGHT STANDARD, TWIN LUMINAIRE ARM, 250W HPS
		STREET LIGHT STANDARD (SINGLE LUMINAIRE)
		STREET LIGHT STANDARD TO REMAIN
		EXISTING STREET LIGHT PULLBOX
		EXISTING TRAFFIC SIGNAL PULLBOX
		STREET LIGHT PULLBOX, TYPE "A" SEE DOT STD TE-41
		STREET LIGHT PULLBOX, TYPE "C" SEE DOT STD TE-41
		STAINLESS STEEL JUNCTION BOX, SIZE AS NOTED ON PLANS
		2'X4' PULLBOX, HECO STD DETAIL# 30-2005
P16		UTILITY POLE, POLE #16 INDICATED
		HIGHWAY SIGNAGE LIGHTING, SIGN # E-1 INDICATED. REPLACE LIGHTS AS NOTED
		DENOTES EXPANSION COUPLING
		VEHICLE LOOP DETECTOR
		UNDERGROUND STREET LIGHT DUCTLINE AND WIRING
		STREET LIGHT DUCTLINE AND WIRING CONCEALED IN CONCRETE BARRIER
		EXPOSED STREET LIGHT CONDUIT AND WIRING
		FLEXIBLE CONDUIT W/ WIRES
		CONDUITS IN CONCRETE BARRIER FOR FUTURE FIBER OPTIC CABLE
		OVERHEAD WIRING
		CONCEALED CONDUIT BELOW GRADE
	SLPB	STREET LIGHT PULLBOX
	TSPB	TRAFFIC SIGNAL PULLBOX
	WP	WEATHER PROOF
		CONDUIT INDICATOR, SEE SCHEDULE, SHT. 130
		CONDUCTOR INDICATOR, SEE SCHEDULE, SHT. 130
		REMOVE EXST CABLES, ABANDON CONCEALED RACEWAY
		REMOVE EXST LIGHT STANDARD
		REMOVE EXST PULLBOX



ELECTRICAL KEY PLAN

— NEW FEEDER (FDR)  
--- EXST. FEEDER

TRUE NORTH  
SCALE: 1"=200'



6-18-03	REVISE SYMBOL LIST, ELECTRICAL KEY PLAN AND LEGEND
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>ELECTRICAL SYMBOLS</u> <u>ELECTRICAL KEY PLAN</u>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET No. E-1 OF E-22 SHEETS	

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

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DUCT SCHEDULE	
TYPE	DESCRIPTION
1	2" PVC, SCHEDULE 80, DIRECT BURIED, HIGHWAY LIGHTING
2	2" PVC, SCHEDULE 80, (IN CONCRETE BARRIER HIGHWAY LIGHTING
3	2" PVC, SCHEDULE 80, CONCRETE ENCASED ROADWAY AREA, HIGHWAY LIGHTING
4	4" PVC, SCHEDULE 80, CONCRETE ENCASED HECO
5	EXISTING 2" PVC, HIGHWAY LIGHTING
6	2" PVC, SCHEDULE 80, CONCEALED IN CONCRETE STRUCTURE, HIGHWAY LIGHTING
7	4"PVC, SCHEDULE 80, DIRECT BURIED
8	4"PVC, SCHEDULE 80, CONC. ENCASED
9	4" GRS, PVC COATED
10	2" GRS, PVC COATED, HIGHWAY LIGHTING
11	2" PVC, SCHEDULE 80, TRENCHLESS SLEEVE SEE SHEET 150 FOR NUMBER OF DUCTS FOR VEHICLE DETECTOR SYSTEM

CONDUCTOR SCHEDULE	
TYPE	DESCRIPTION
A	3#1/0 XHHW, 1#2 GND
B	3#2 XHHW, 1#6 GND
C	2#2 XHHW, 1#6 GND
D	3#12, XHHW, 1#12 GND
E	4-600MCM, XHHW #1/0 GND
F	3#4/0 XHHW, 1#1/0 GND

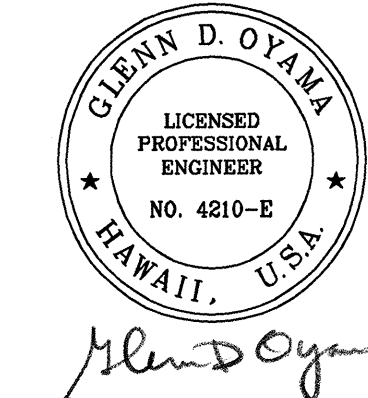
HIGHWAY LIGHTING NOTES:

1. THE CONTRACTOR SHALL NOTIFY THE STATE HIGHWAYS, HIGHWAY LIGHTING AND TRAFFIC SUPERVISOR 72 HOURS IN ADVANCE BEFORE COMMENCING INSTALLATION OF HIGHWAY LIGHTING SYSTEM. PHONE: 837-8056
2. ALL LUMINAIRES SHALL BE HIGH PRESSURE SODIUM TYPE WITH WATTAGE AND I.E.S. TYPE LIGHT DISTRIBUTION AS SHOWN ON THE APPROVED PLANS.
3. THE CONTRACTOR SHALL HAVE ONE SET OF APPROVED PLANS AT THE JOB SITE AT ALL TIMES DURING THE CONSTRUCTION WORK AND RECORD ALL CHANGES WHICH OCCUR DURING CONSTRUCTION OF THE HIGHWAY LIGHTING SYSTEM.
4. CONTRACTOR TO STENCIL DATE OF INSTALLATION AT THE BOTTOM OF EACH PHOTOCCELL.
5. FINAL ACCEPTANCE AND INSPECTION WILL BE UNDERTAKEN ONLY AFTER ALL WORK HAS BEEN COMPLETED.
6. THE CONTRACTOR SHALL MEASURE AND RECORD GROUND RESISTANCE AT EACH STANDARD WITH FOUNDATIONS IN GRADE, AND SUBMIT RECORDED GROUND RESISTANCE TO TRAFFIC SECTION, AND OAHU DISTRICT MAINTENANCE SECTION, DEPARTMENT OF TRANSPORTATION, STATE HIGHWAYS. THE CONTRACTOR SHALL CERTIFY ALL ELECTRICAL TESTS, INCLUDING BUT NOT LIMITED TO: CONTINUITY TEST AND THE GROUND ROD RESISTANT TEST PRIOR TO SUBMISSION TO THE ENGINEER.
7. TRIM TREE BRANCHES TO CLEAR REMOVAL OR INSTALLATION OF HIGHWAY LIGHT STANDARDS, AT NO ADDITIONAL COST TO THE STATE.
8. REMOVE AND REINSTALL CHAIN-LINK FENCES TO INSTALL LIGHT POLE ASSEMBLIES AND RACEWAYS AS REQUIRED. OBTAIN OWNER'S PERMISSION BEFORE COMMENCEMENT OF CHAIN-LINK FENCE WORK.
9. TEMPORARY LIGHTING

THE CONTRACTOR SHALL SCHEDULE THE CONSTRUCTION WORK IN SUCH A MANNER THAT HIGHWAY LIGHTING IS PROVIDED DURING ALL HOURS OF DARKNESS EITHER WITH NEW, TEMPORARY OR EXISTING LUMINAIRES OR A COMBINATION THEREOF. TEMPORARY WIRING AND CONNECTIONS MAY NEED TO BE UTILIZED. TEMPORARY WIRING MAY BE INSTALLED IN EXPOSED CONDUIT, WHERE NOT SUBJECT TO VEHICULAR DAMAGE, OR WITH OVERHEAD WIRING. OVERHEAD WIRING SHALL BE A MINIMUM OF 20 FEET ABOVE ROADWAYS AT ITS LOWEST MEASURED POINT, UNLESS APPROVED BY THE ENGINEER.

THE CONTRACTOR SHALL MAINTAIN EXISTING CIRCUITING OR PROVIDE TEMPORARY CONNECTIONS TO EXISTING HIGHWAY LIGHTS THROUGH CONSTRUCTION OF THE NEW HIGHWAY LIGHTING SYSTEM. EXISTING HIGHWAY LIGHTS SCHEDULED FOR DEMOLITION SHALL REMAIN IN OPERATION TO MAINTAIN EXISTING ILLUMINATION LEVELS UTILIZING EITHER EXISTING OR TEMPORARY WIRING AND CONNECTIONS UNTIL NEW HIGHWAY LIGHTS CAN BE ENERGIZED AND ARE APPROVED BY THE ENGINEER. NEW HIGHWAY LIGHTS SHALL BE ENERGIZED BY EITHER PERMANENT OR TEMPORARY WIRING AND CONNECTIONS PRIOR TO DEMOLITION OF THE EXISTING HIGHWAY LIGHTING SYSTEM.

- 10.WHERE EXISTING HIGHWAY LIGHTING LUMINAIRES ON METAL STANDARDS ARE INDICATED TO BE REMOVED, THE LUMINAIRE AND POLE SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR. EXISTING FOUNDATIONS IN GRADE SHALL BE DEMOLISHED TO 24" BELOW GRADE AND THE SURFACES AFFECTED SHALL BE RESTORED TO MATCH THE SURROUNDINGS. UNLESS INDICATED OTHERWISE, EXISTING FOUNDATIONS ON STRUCTURES SHALL BE ABANDONED IN PLACE, EXISTING ANCHOR BOLTS AND CONDUIT SHALL BE CUT FLUSH WITH THE TOP OF THE EXISTING FOUNDATION, AND THE CONCRETE STRUCTURE SHALL BE FINISHED TO MATCH THE EXISTING SURROUNDING SURFACES.
- 11.ALL TEMPORARY AND PERMANENT NEW POLE LOCATIONS SHALL BE STAKED, AND APPROVAL OF LOCATIONS SHALL BE OBTAINED FROM THE ENGINEER BEFORE INSTALLATION. POLE LOCATIONS IN THE FIELD WILL BE REQUIRED TO CLEAR UNDERGROUND AND AERIAL UTILITY LINES. NEW POLE LOCATIONS SHALL NOT CONFLICT WITH ANY EXISTING OR PROPOSED UTILITY AND SHALL NOT OBSTRUCT ANY ROADWAY SIGN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COSTS INCURRED BY CONFLICTING UTILITIES.
- 12.THE CONTRACTOR SHALL AT HIS EXPENSE, KEEP THE PROJECT AND SURROUNDING AREA FREE FROM DUST NUISANCE AND SHALL BE RESPONSIBLE FOR CLEANING AND REMOVAL OF ALL SILT AND DEBRIS GENERATED BY THE EXCAVATION WORK AND DEPOSITED AND ACCUMULATED WITHIN DOWNSTREAM WATERWAYS, DITCHES, DRAIN PIPES AND ON PUBLIC ROADWAYS. ANY CITATIONS (FINES) RECEIVED BY THE STATE FOR THE CONTRACTOR'S NONCOMPLIANCE OF ANY DEPARTMENT OF HEALTH REGULATIONS SHALL BE DEDUCTED FROM THE PROGRESS PAYMENT.
- 13.THE CONTRACTOR SHALL LOCATE EXISTING BURIED UTILITY LINES IN THE VICINITY OF THE EXCAVATION WORK PRIOR TO COMMENCING EXCAVATION. AS A MINIMUM, AN ELECTRONIC MAGNETIC DEVICE FOR DETECTION OF BURIED LINES SHALL BE UTILIZED PRIOR TO EXCAVATION. TRENCHES SHALL BE EXCAVATED WITH CARE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGES TO EXISTING UTILITIES RESULTING FROM HIS NEGLIGENCE AND SHALL BEAR COST OF REPAIRS TO THE UTILITIES. METHOD OF REPAIR SHALL BE DETERMINED BY THE STATE.
- 14.THE CONTRACTOR SHALL RECONNECT ELECTRICAL POWER TO ALL EXISTING SIGN LIGHTING SYSTEMS AND UNDERPASS LIGHTING FIXTURES. THE CONTRACTOR SHALL PROVIDE ADDITIONAL WIRING AND CONDUIT AS REQUIRED FOR AN OPERATIONAL SYSTEM, AT NO ADDITIONAL COST TO THE STATE.



- 15.AFTER THE EXACT LOCATION OF THE LIGHTING POLE BASE IS DETERMINED, PLACE 2" x 2" x 18" HUBS OR OTHER APPROVED MARKER AT THESE LOCATIONS TO INFORM THE CONTRACTING OFFICER OF FINAL LOCATION. OBTAIN APPROVAL PRIOR TO CONSTRUCTION OF LIGHT BASES. ACTUAL FIELD CONDITIONS MAY DIFFER FROM THAT SHOWN ON THESE DRAWINGS. USE EXTREME CAUTION WHEN EXCAVATING FOR NEW DUCTLINES.
- 16.THE ELECTRICAL CONTRACTOR SHALL HAVE PERSONNEL ON THE PROJECT THAT COMPLY WITH THE FOLLOWING QUALIFICATIONS:
  - a. ONE (1) REGISTERED MASTER ELECTRICIAN IN THE COMPANY.
  - b. CERTIFIED JOURNEYMAN ELECTRICIAN AT EACH CONSTRUCTION LOCATION TO PERFORM SPLICING OF CABLES AND ALL REQUIRED WIRING WORK.
- 17.PROVIDE CONDUIT EXPANSION FITTINGS TO ACCOMMODATE EXPANSIONS AND DEFLECTIONS WHERE CONDUITS CROSS SEISMIC CONTROL AND EXPANSION JOINTS. EXPANSION FITTINGS SHALL BE OF WEATHERTIGHT CONSTRUCTION WITH INSULATED BUSHING ON END OF MOVEABLE CONDUIT. FACTORY-FORMED COPPER BRAID RING ALLOWING CONDUIT EXPANSION AND CONTRACTION. FERALOY END FITTING, STEEL CONDUIT 8" MAXIMUM CONDUIT MOVEMENT. CROUSE-HINDS "XJ" SERIES FOR EXPOSED CONDUIT AND "XD" SERIES FOR CONDUIT CONCEALED IN CONCRETE OR APPROVED EQUAL. REFER TO STRUCTURAL PLANS FOR EXACT LOCATIONS OF EXPANSION JOINTS.
- 18.ALL DUCTLINES TO BE INSTALLED IN CONCRETE SHALL BE INSPECTED AND APPROVED BY THE STATE INSPECTOR AND THE STATE ELECTRICAL MAINTENANCE SUPERVISOR BEFORE PLACING CONCRETE. NOTIFY THE INSPECTOR AND SUPERVISOR 48 HOURS BEFORE PLACING CONCRETE.
- 19.DESIGN ILLUMINATION LEVEL = 1.0 FOOTCANDLE AVERAGE MAINTAINED. DESIGN UNIFORMITY RATIO (AVERAGE:MINIMUM) = 3:1 MAXIMUM. DESIGN MAINTENANCE FACTOR = 0.65

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

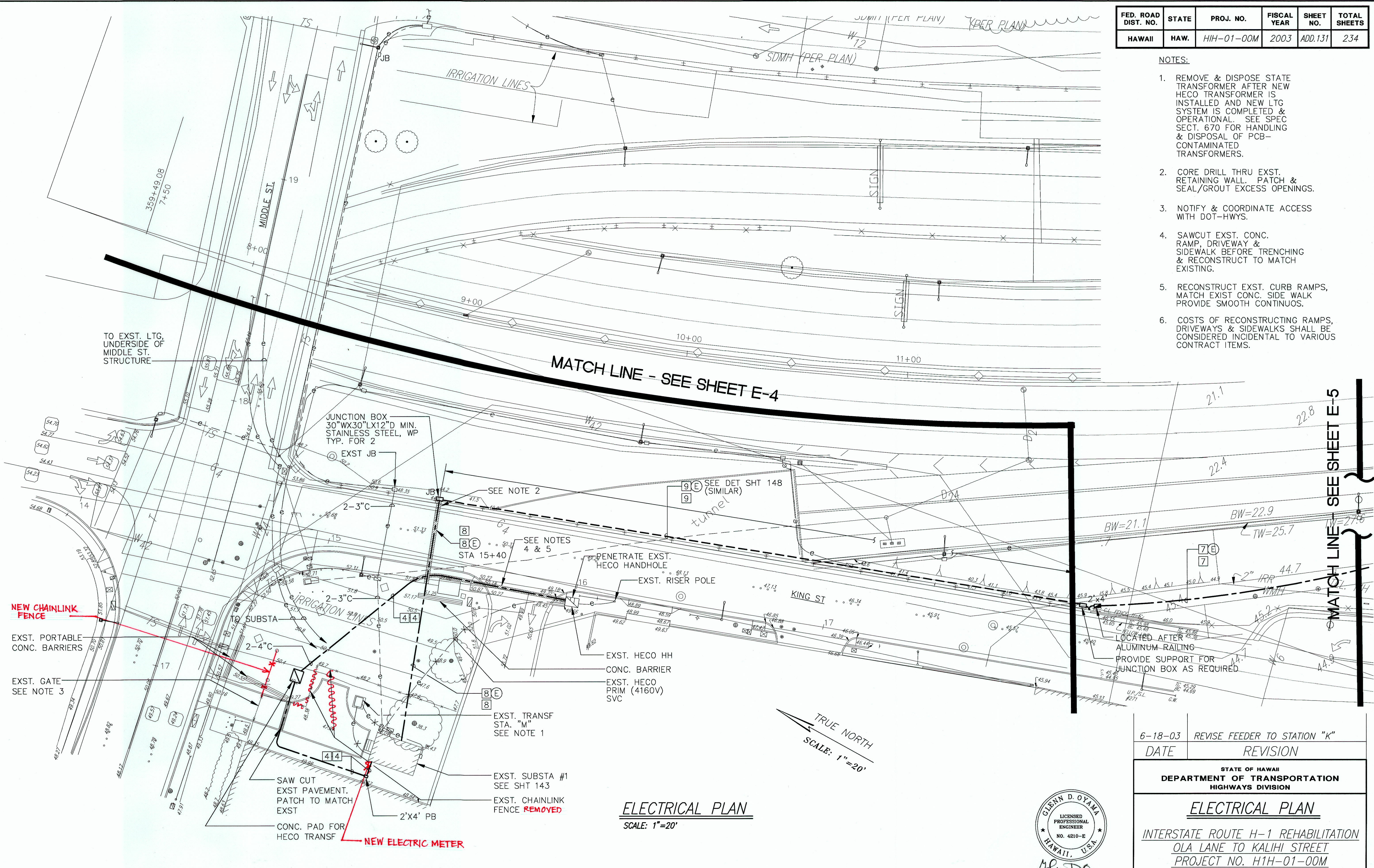
6-18-03	REVISE DUCT AND CONDUCTOR SCHEDULE ADD NOTE #8
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
HIGHWAY LIGHTING NOTES GENERAL NOTES	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
Scale: As Noted	Date: October 31, 2002



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HAWAII	HAW.	H1H-01-00M	2003	ADD.131	234

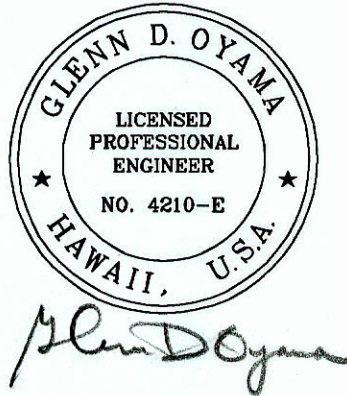
NOTES:

1. REMOVE & DISPOSE STATE TRANSFORMER AFTER NEW HECO TRANSFORMER IS INSTALLED AND NEW LTG SYSTEM IS COMPLETED & OPERATIONAL. SEE SPEC SECT. 670 FOR HANDLING & DISPOSAL OF PCB-CONTAMINATED TRANSFORMERS.
2. CORE DRILL THRU EXST. RETAINING WALL. PATCH & SEAL/GROUT EXCESS OPENINGS.
3. NOTIFY & COORDINATE ACCESS WITH DOT-HWYS.
4. SAWCUT EXST. CONC. RAMP, DRIVEWAY & SIDEWALK BEFORE TRENCHING & RECONSTRUCT TO MATCH EXISTING.
5. RECONSTRUCT EXST. CURB RAMPS, MATCH EXIST CONC. SIDE WALK PROVIDE SMOOTH CONTINUOUS.
6. COSTS OF RECONSTRUCTING RAMPS, DRIVEWAYS & SIDEWALKS SHALL BE CONSIDERED INCIDENTAL TO VARIOUS CONTRACT ITEMS.



SURVEY PLANNED BY	DATE
DESIGNED BY	
NOTED BY	
CHECKED BY	
NO.	

**ELECTRICAL PLAN**  
SCALE: 1"=20'

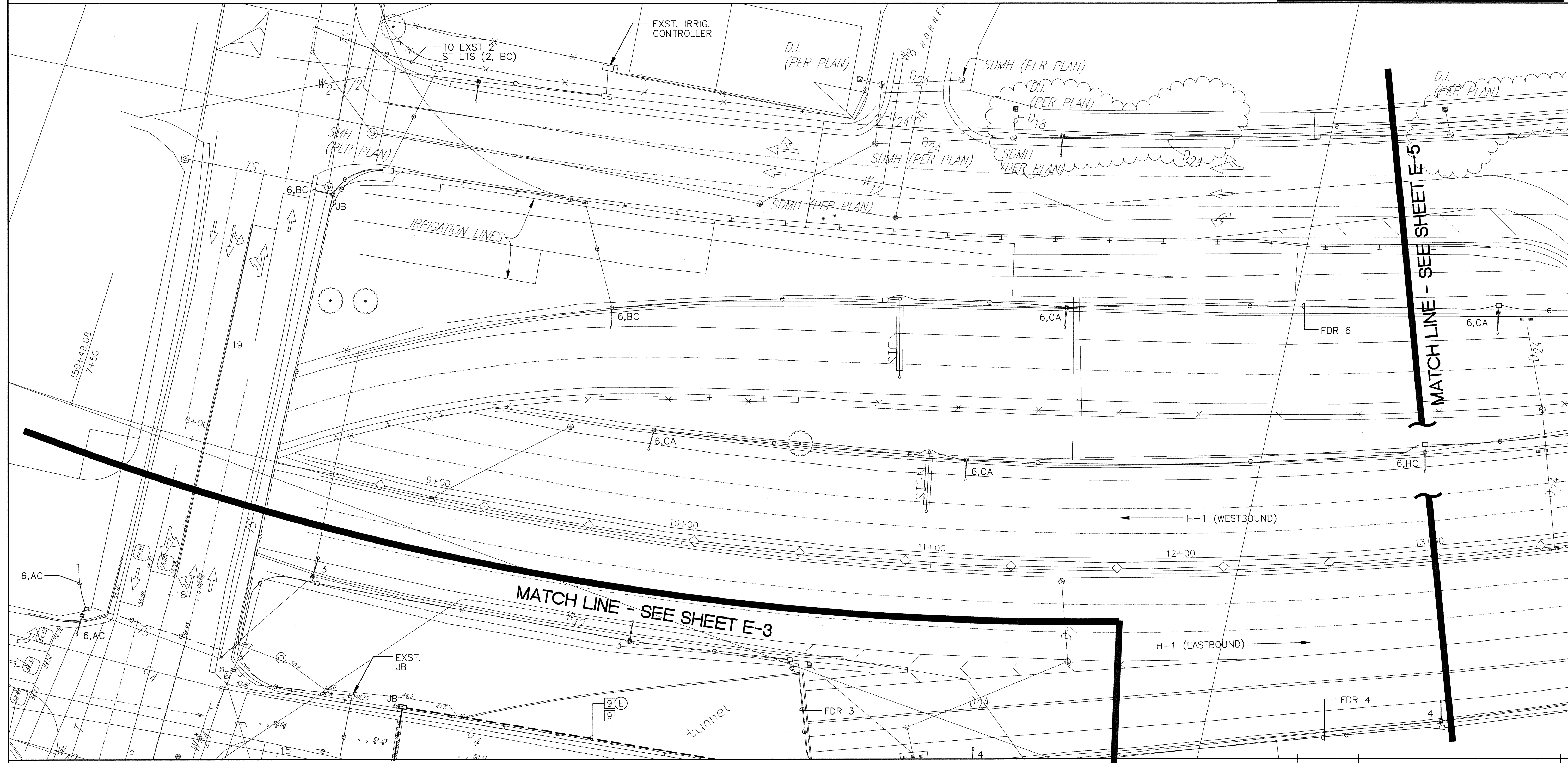


6-18-03	REVISE FEEDER TO STATION "K"
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>ELECTRICAL PLAN</b>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
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SHEET No. E-3 OF E-22 SHEETS	

"AS-BUILT"



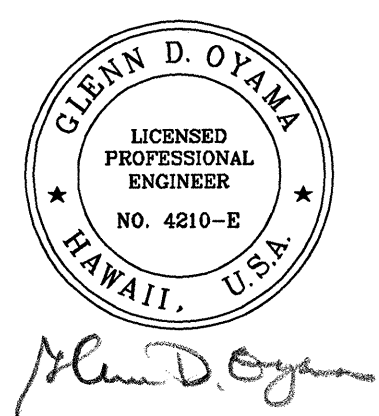
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	ADD.132	234



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

**ELECTRICAL PLAN**  
SCALE: 1"=20'

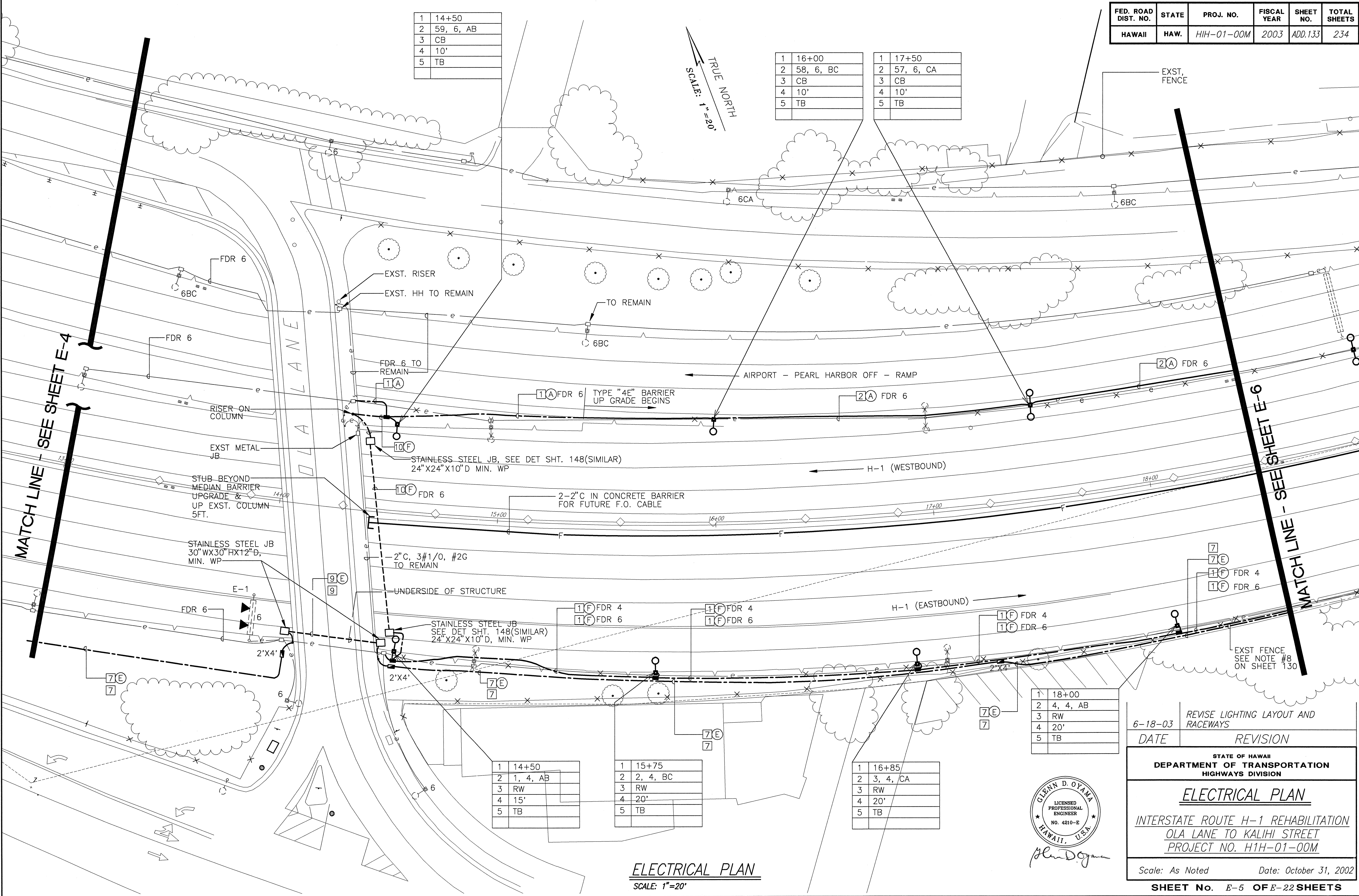
TRUE NORTH  
SCALE: 1"=20'



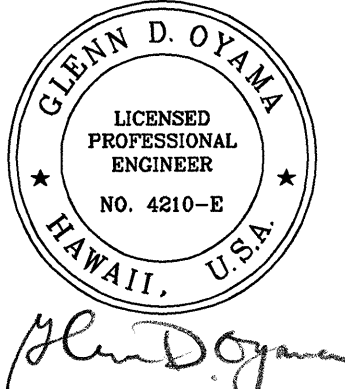
6-18-03	REVISE FEEDER SIZE TO STATION "K"
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>ELECTRICAL PLAN</b>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
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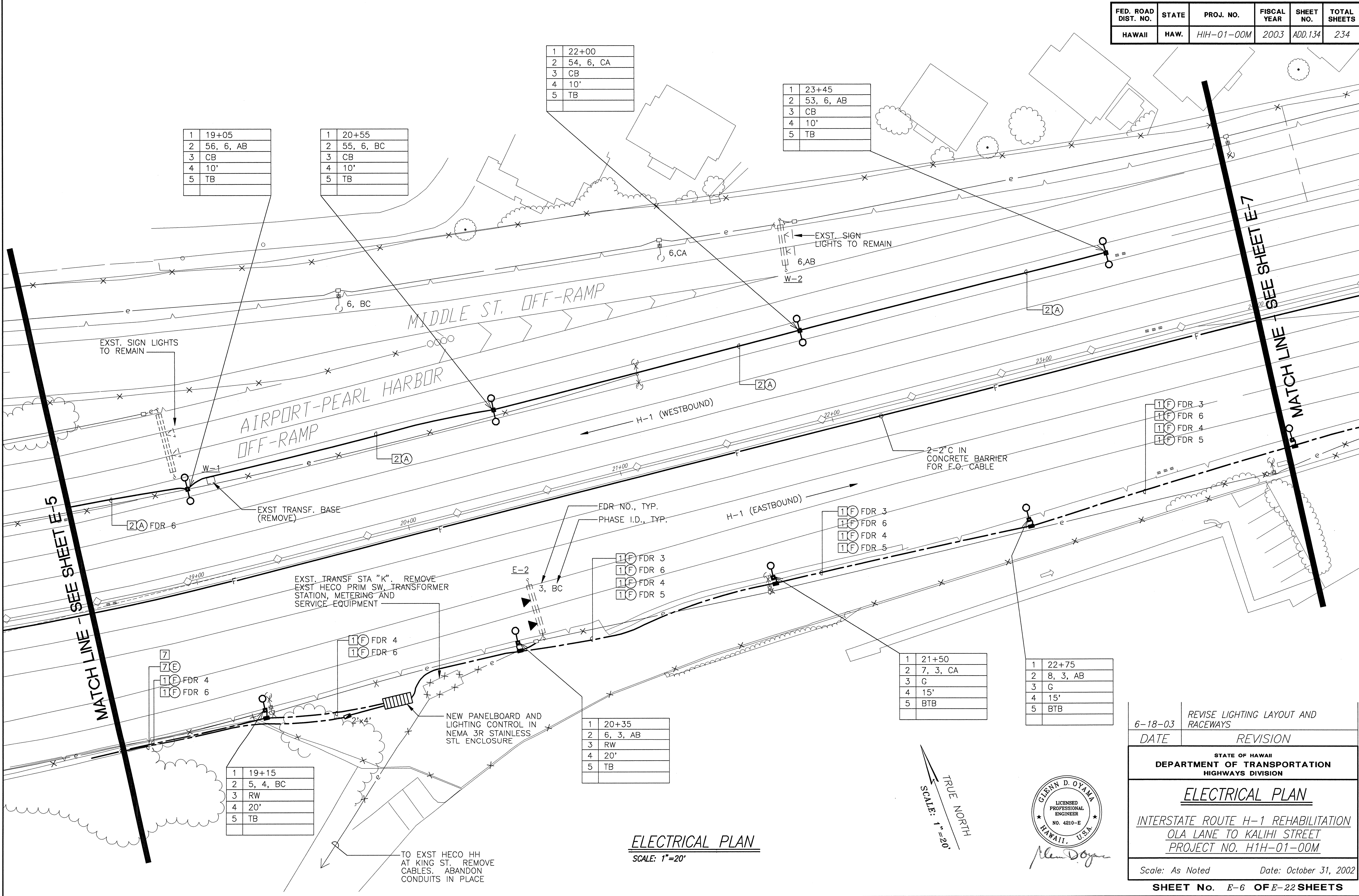
SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	



6-18-03	REVISE LIGHTING LAYOUT AND RACEWAYS
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>ELECTRICAL PLAN</b>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET No. E-5 OF E-22 SHEETS	

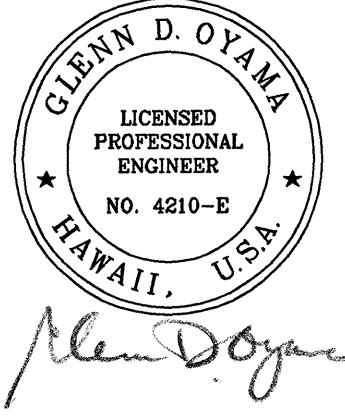


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ORIGINAL PLAN	
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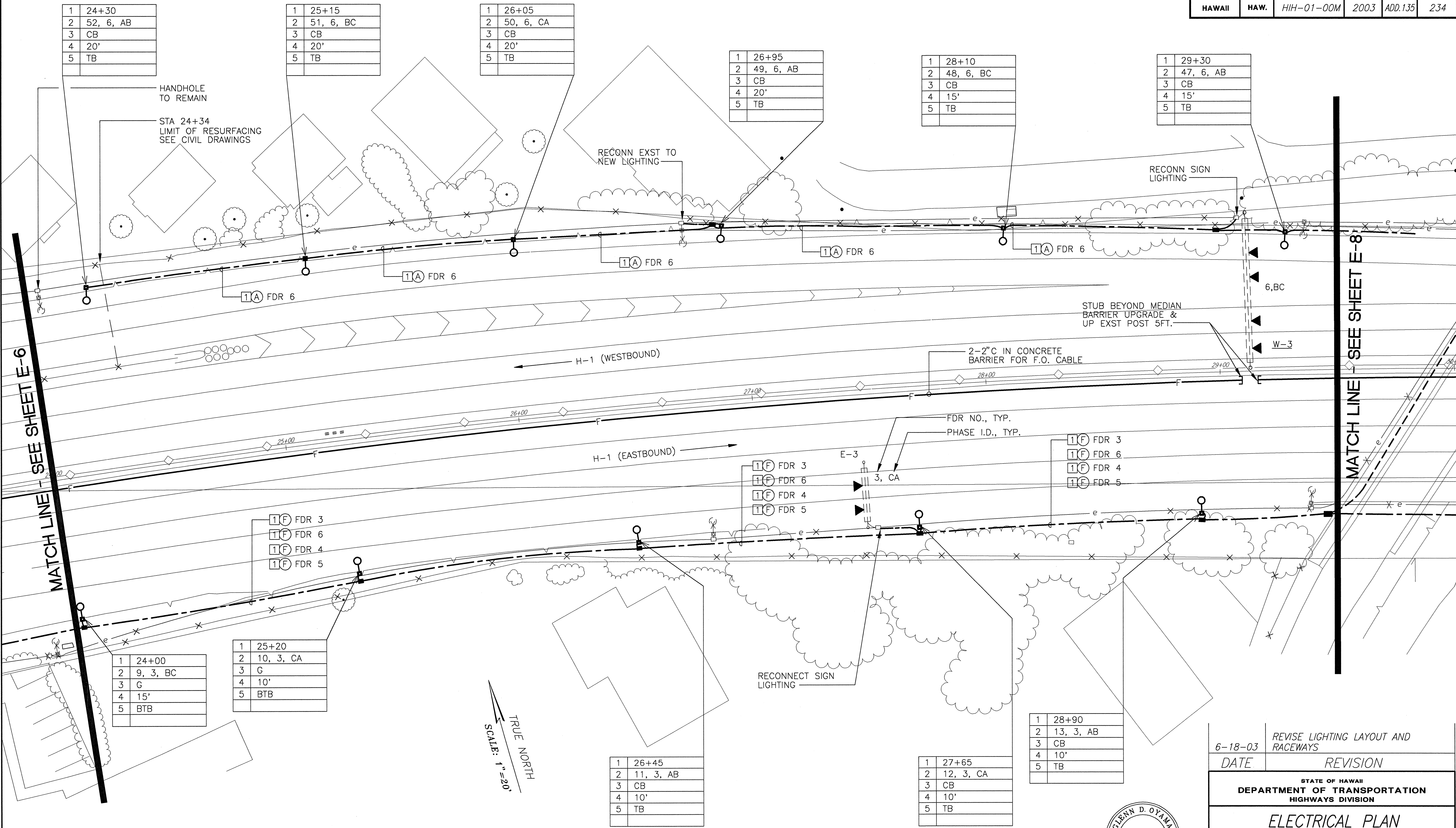
**ELECTRICAL PLAN**  
SCALE: 1"=20'



6-18-03	REVISE LIGHTING LAYOUT AND RACEWAYS
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>ELECTRICAL PLAN</b>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. HIH-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET No. E-6 OF E-22 SHEETS	

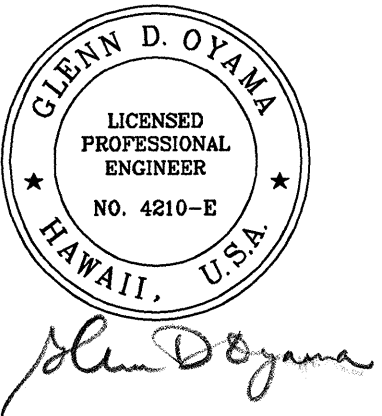


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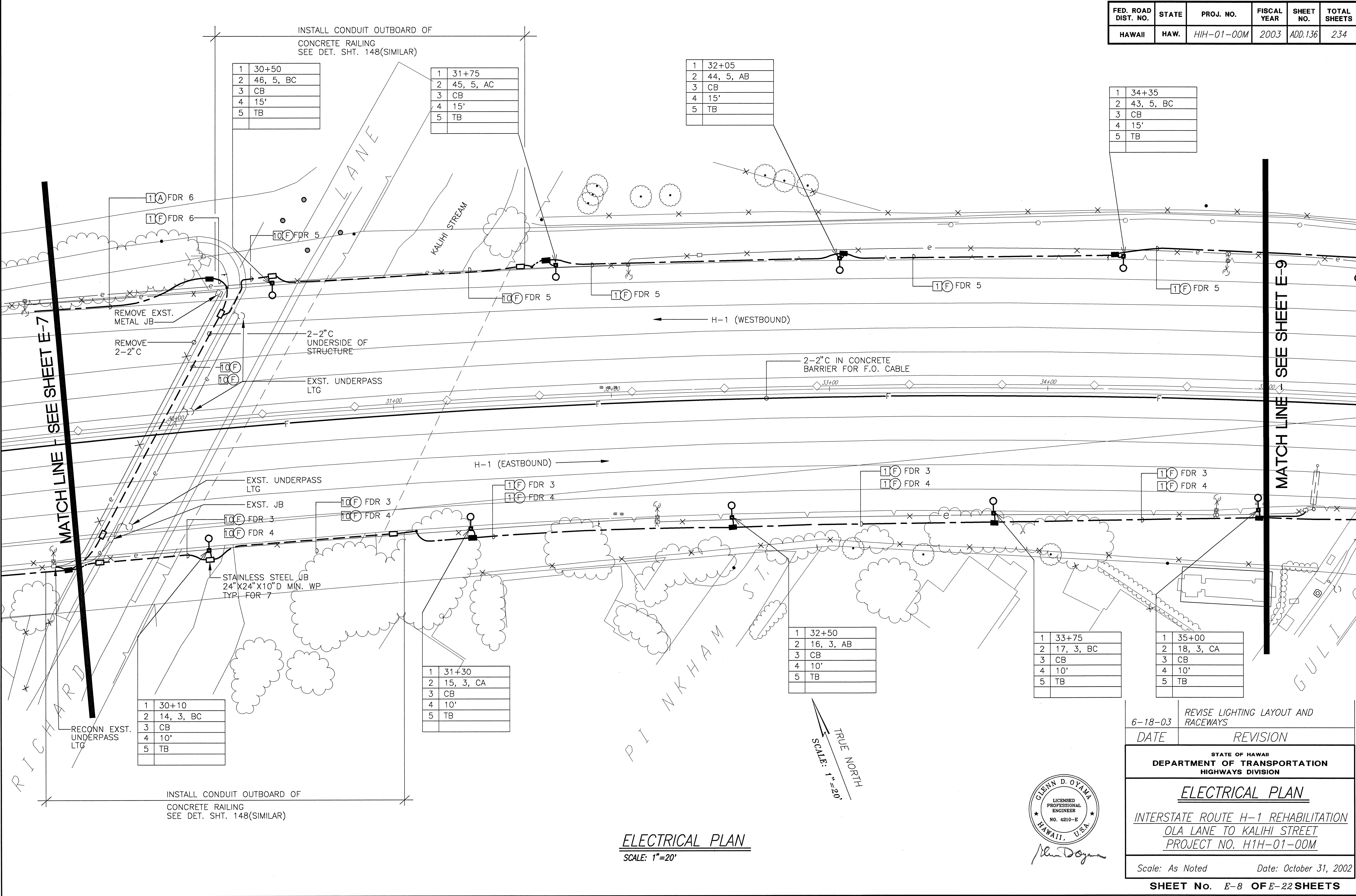
**ELECTRICAL PLAN**  
SCALE: 1"=20'



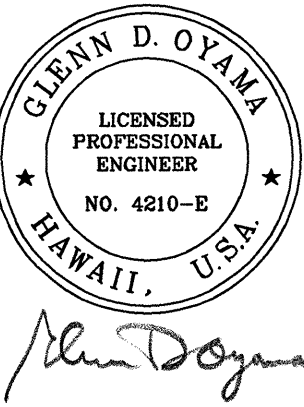
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DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>ELECTRICAL PLAN</b>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
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SHEET No. E-7 OF E-22 SHEETS	



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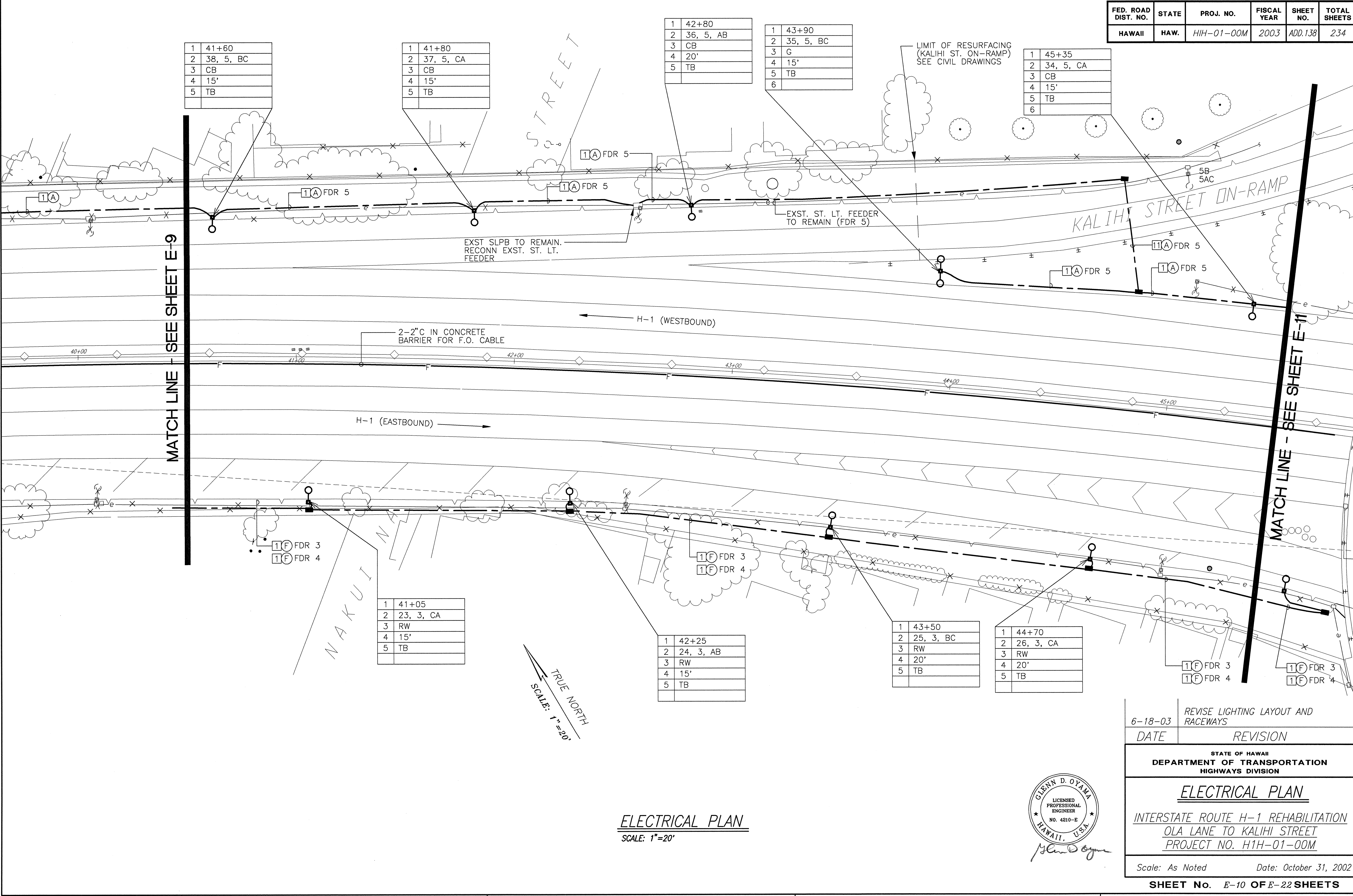
6-18-03	REVISE LIGHTING LAYOUT AND RACEWAYS
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<b>ELECTRICAL PLAN</b>	
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SHEET No. E-8 OF E-22 SHEETS	



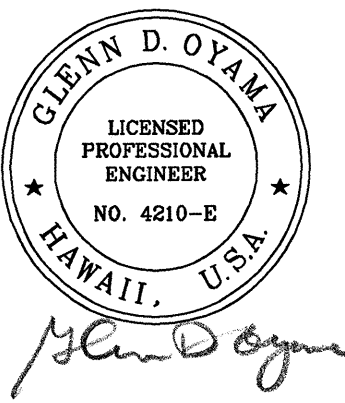




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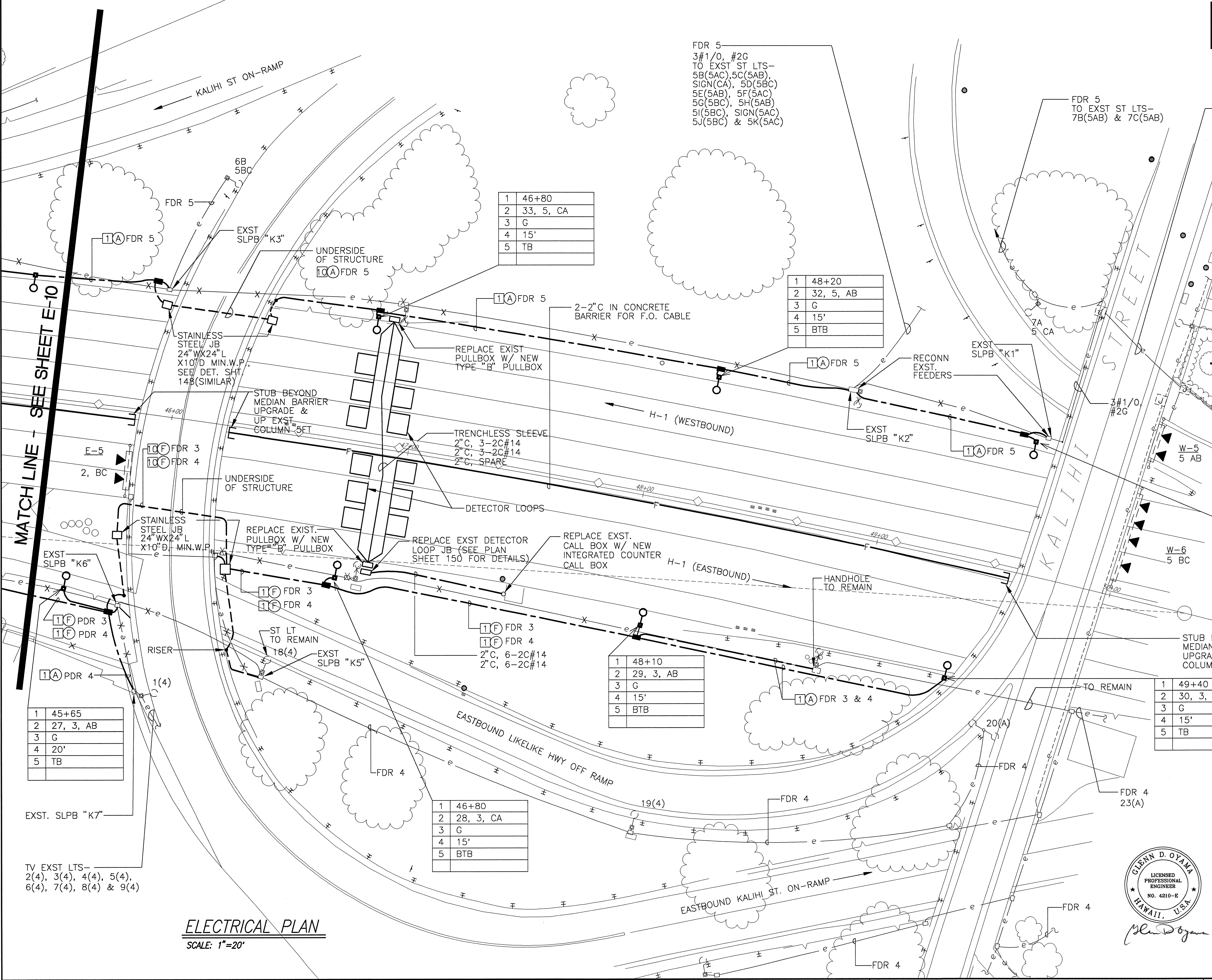


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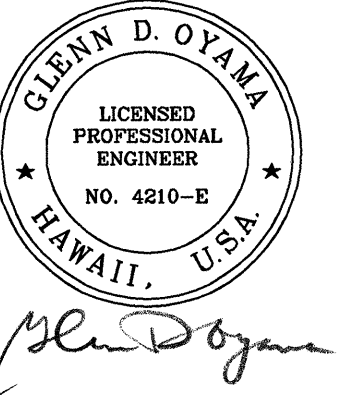


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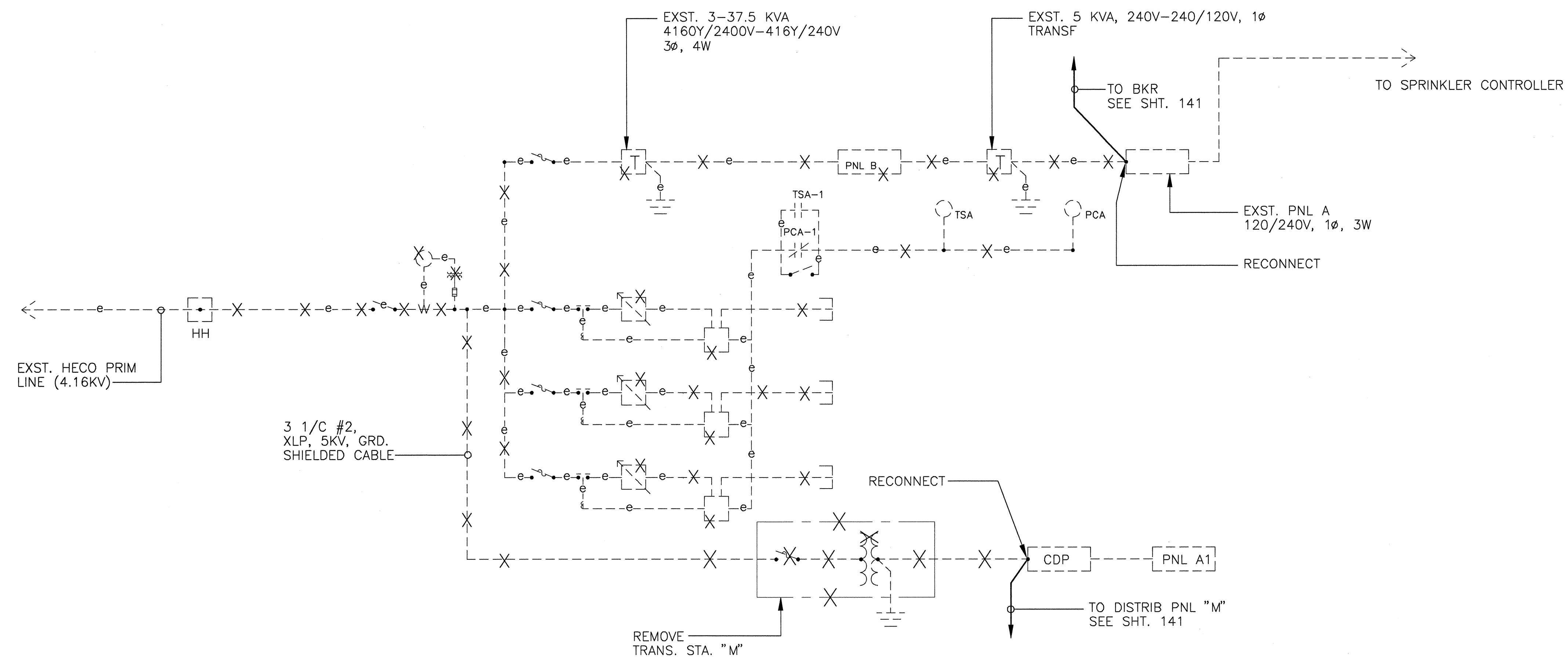
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6-18-03	REVISE LIGHTING LAYOUT AND RACEWAYS
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SHEET No. E-11 OF E-22 SHEETS	

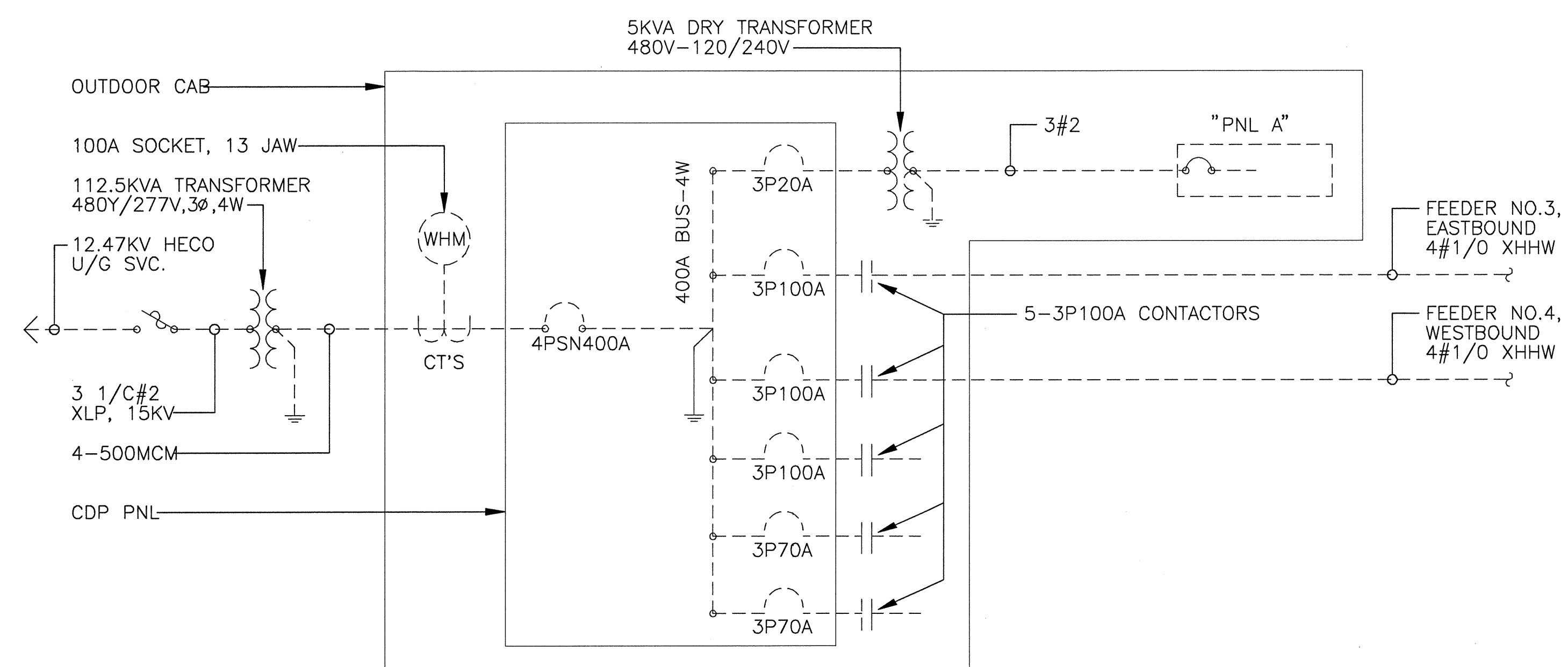




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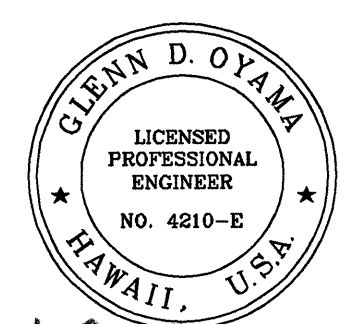


ONE-LINE DIAGRAM (SUB STA NO.1)  
NOT TO SCALE



ONE-LINE DIAGRAM - DEMOLITION WORK (TRANS STA "K")

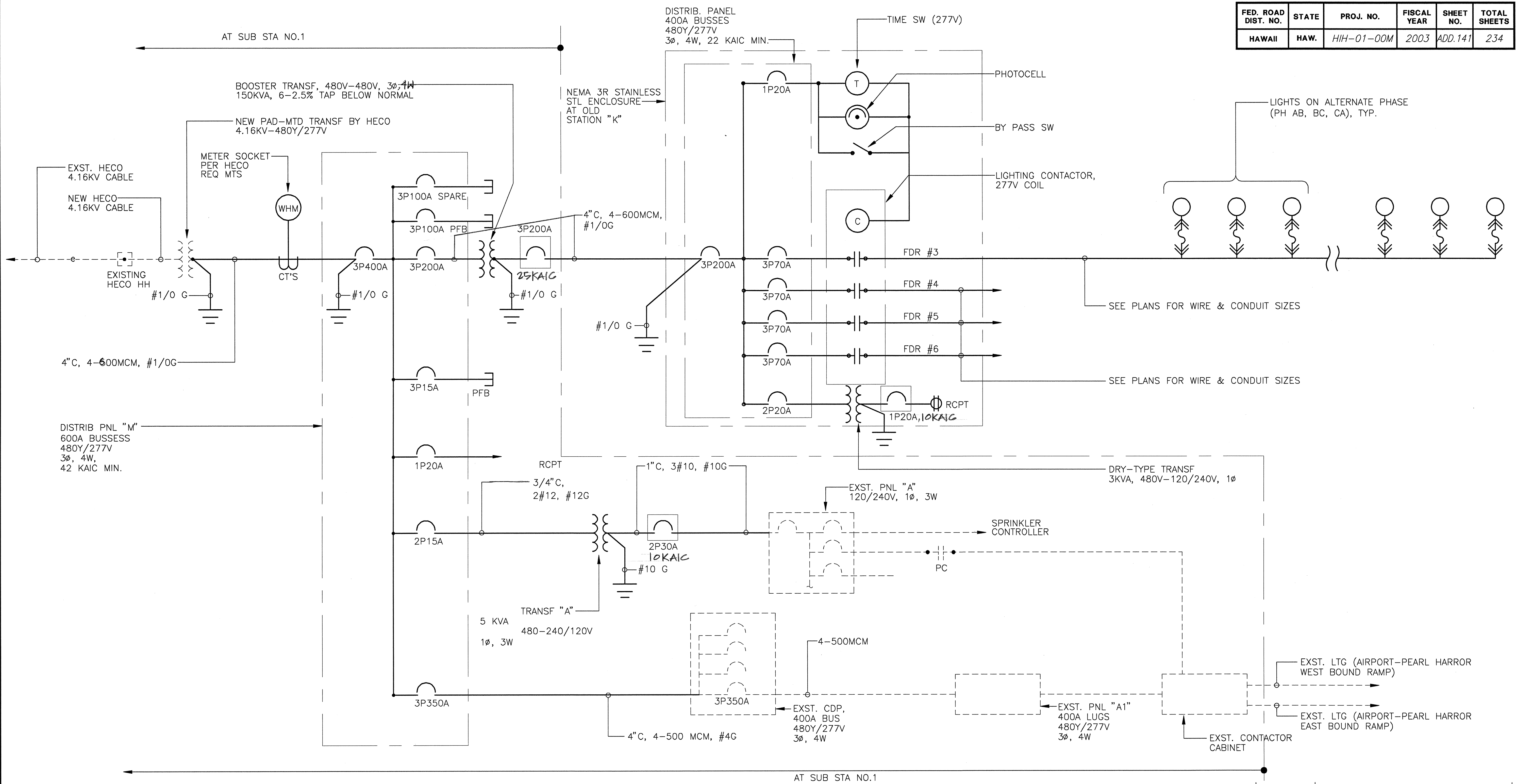
ALL EQUIPMENT & WIRING SHALL BE REMOVED  
BY THE CONTRACTOR UNLESS NOTED OTHERWISE.



6-18-03	REVISE REFERENCE NUMBERS
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>ONE-LINE DIAGRAM</b>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. HIH-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET NO. E-12 OF E-22 SHEETS	



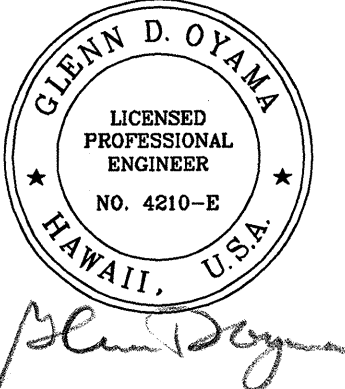
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	ADD. 141	234



# ONE-LINE DIAGRAM - NEW WORK

- NOTES:
1. DASH LINES DENOTE EXST CONDITIONS;  
SOLID LINES DENOTE NEW WORK.

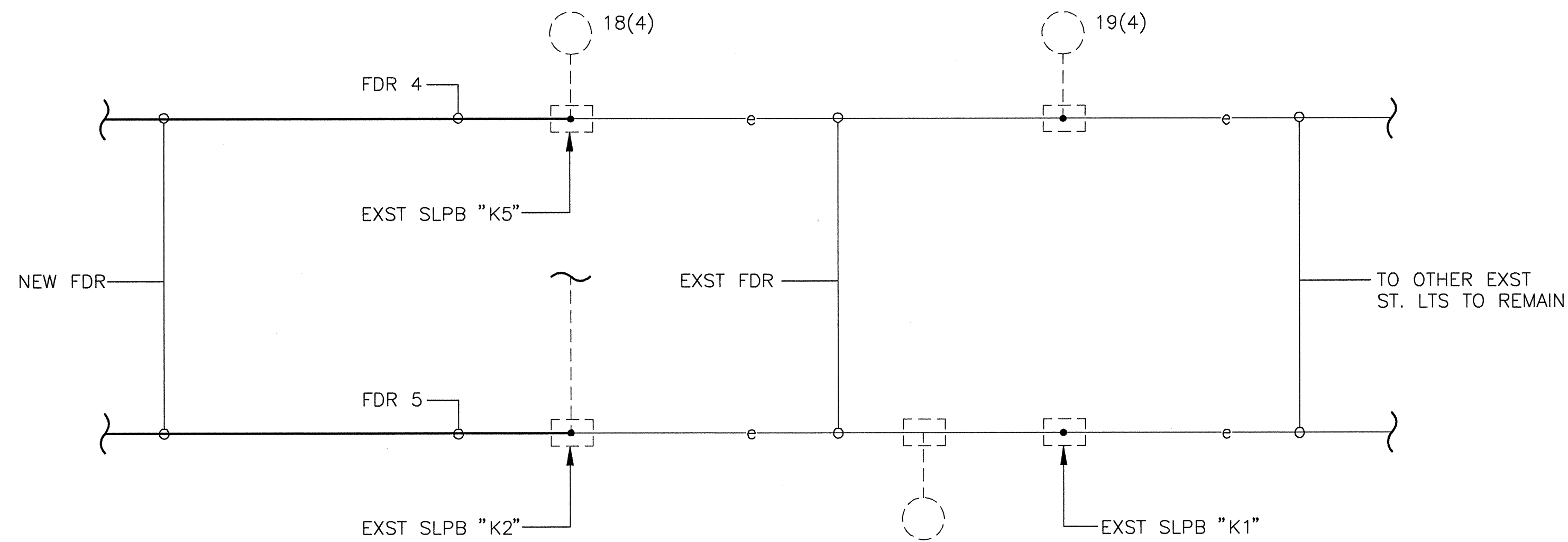
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DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	



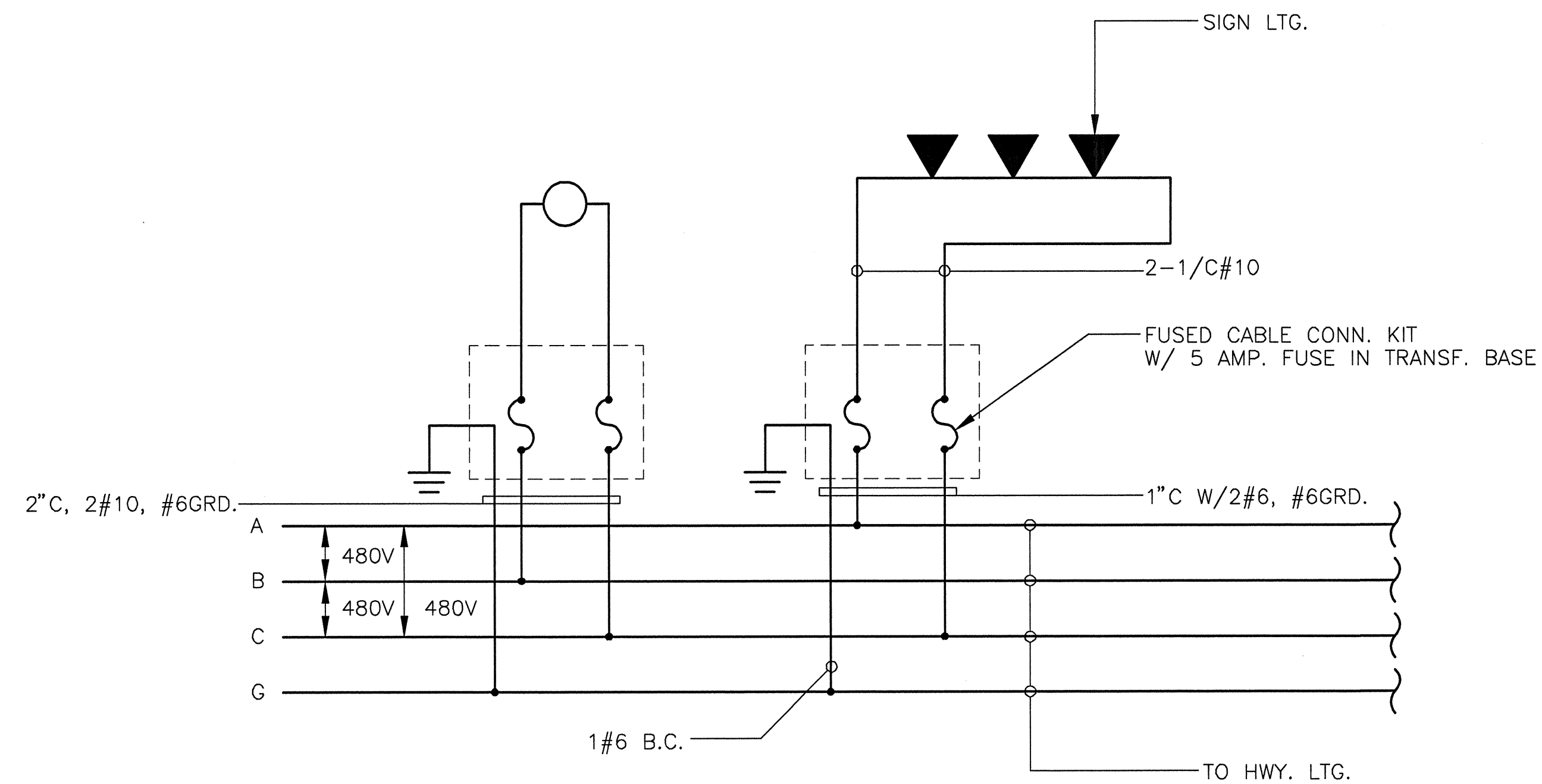
6-18-03	ADD AUTO TRANSFORMER REVISE FEEDERS SIZE
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>ONE-LINE DIAGRAM</u>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. HIH-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET NO. E-13 OF E-22 SHEETS	



FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	ADD.142	234

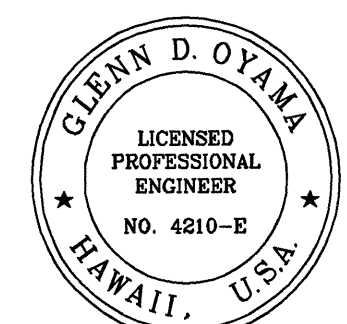


PARTIAL ONE-LINE DIAGRAM  
SCALE: NTS



HIGHWAY LIGHTING AND SIGN LIGHTING WIRING DIAGRAM  
SCALE: NTS

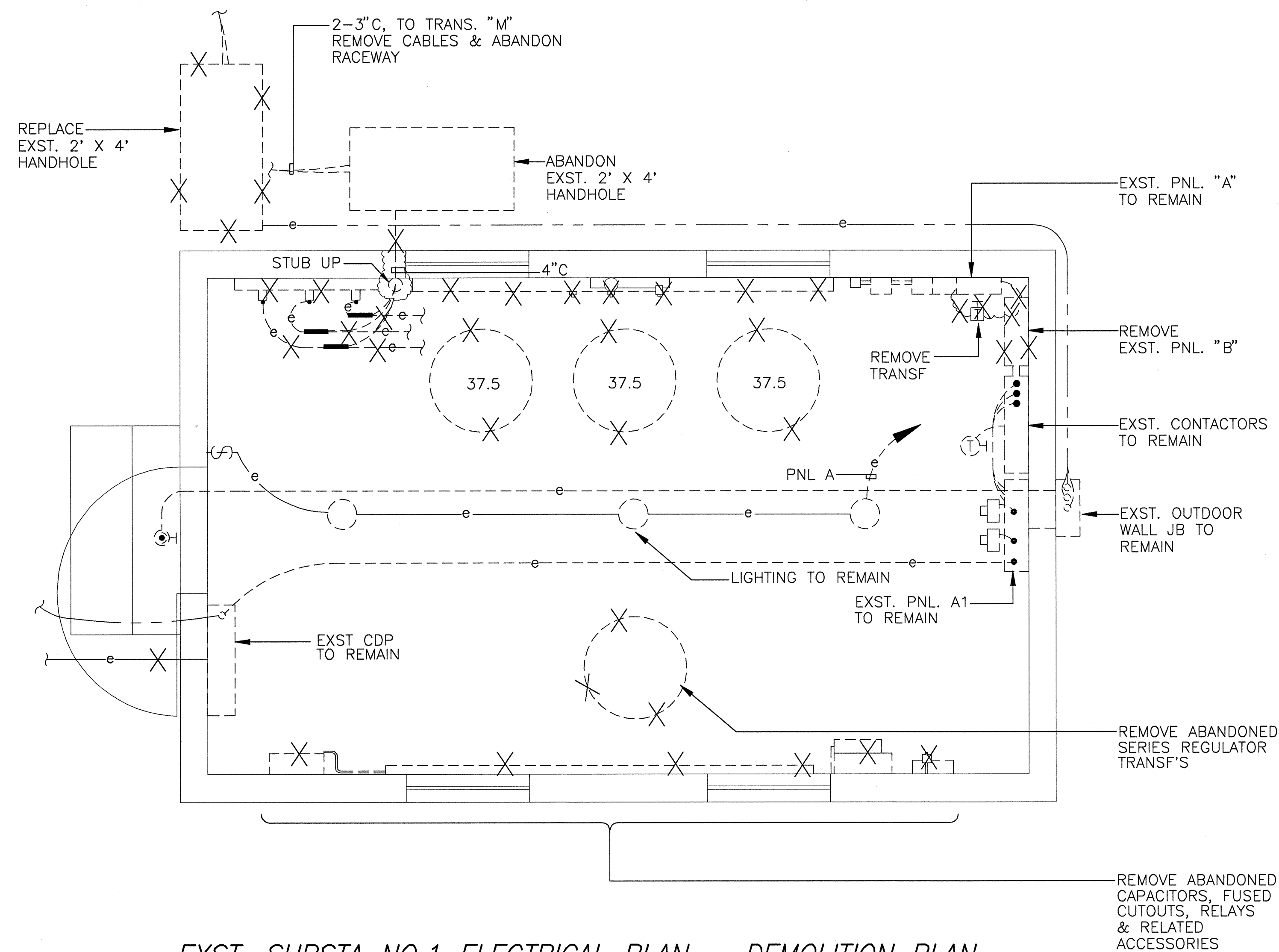
ORIGINAL PLAN No.	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	DESIGNED BY	
	CHECKED BY	



6-18-03	REVISE RACEWAYS AND CIRCUIT ASSIGNMENT
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>MISCELLANEOUS DIAGRAMS</u>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET No. E-14 OF E-22 SHEETS	



FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	ADD.143	234

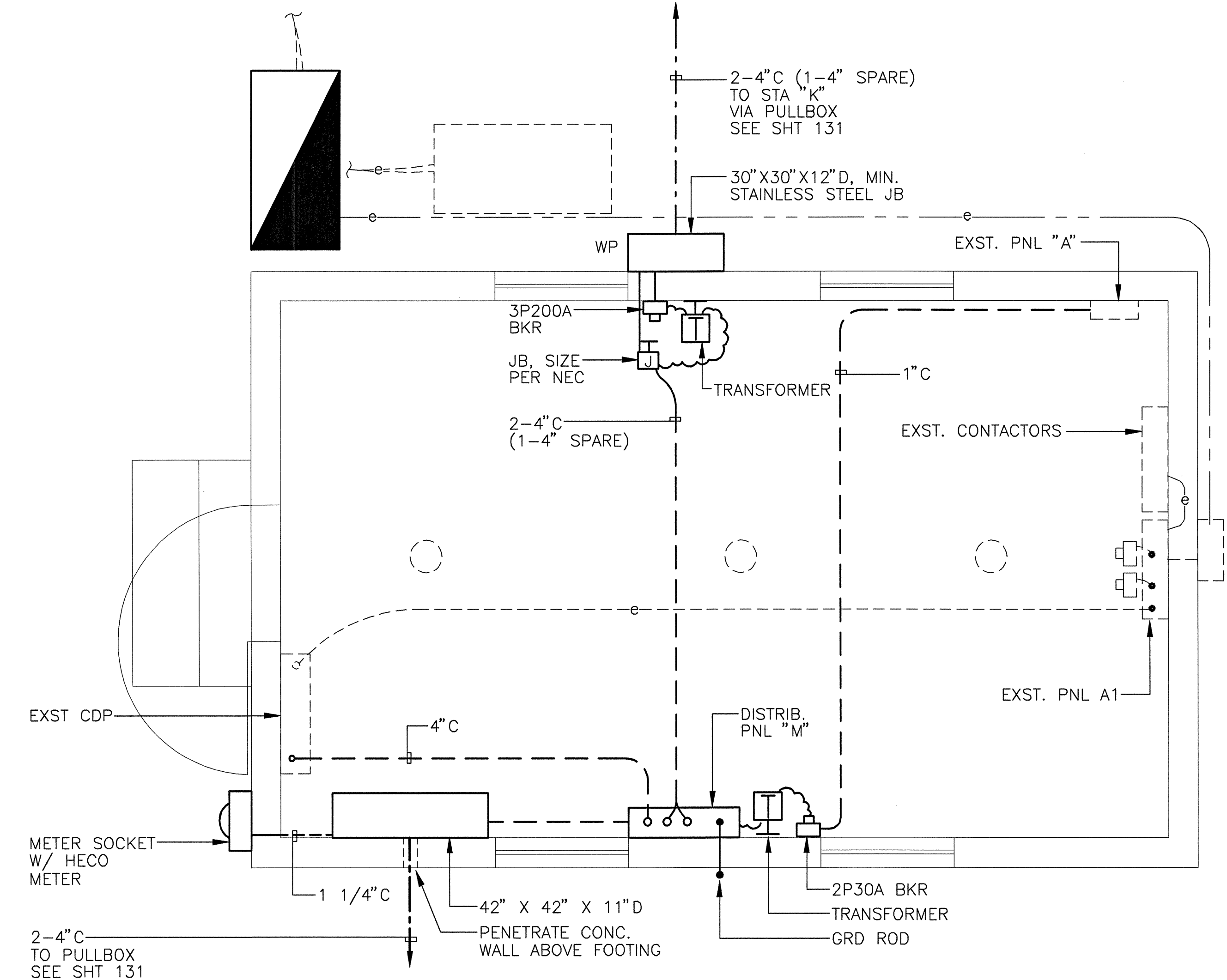


**EXST. SUBSTA NO.1 ELECTRICAL PLAN - DEMOLITION PLAN**

SCALE: 1/2"=1'-0"

**NOTE:**

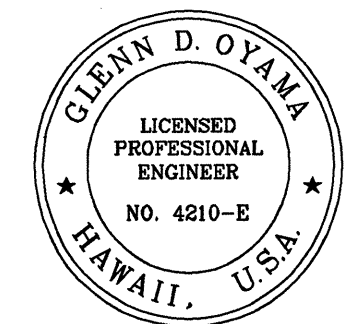
1. COORDINATE W/ HECO PRIOR TO ANY WORK WITHIN AND AROUND THE EXST. SUBSTA.
2. ALL EQPT TO REMAIN UNLESS NOTED OTHERWISE. ITEMS CROSSED OUT DENOTE DEMOLITION/REMOVAL.
3. ALL EQPT REMOVED SHALL BE DISPOSED OF BY THE CONTRACTOR.
4. SEE SPECS SECT. 670 FOR HANDLING & DISPOSAL OF PCB-CONTAMINATED EQPT.



**EXST. SUBSTA NO.1 ELECTRICAL PLAN - NEW WORK**

SCALE: 1/2"=1'-0"

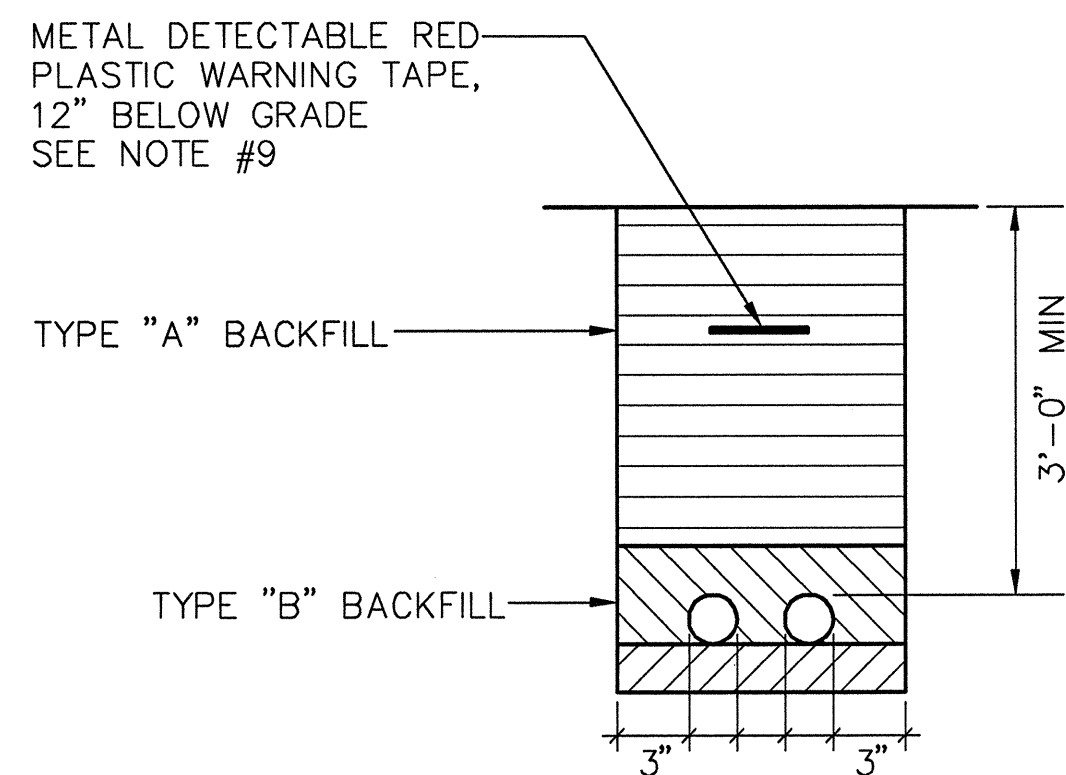
ORIGINAL PLAN	No.	DESIGNED BY	CHECKED BY	DATE	SURVEY PLOTTED BY
NOTEBOOK		DESIGNED BY	QUANTITIES BY		



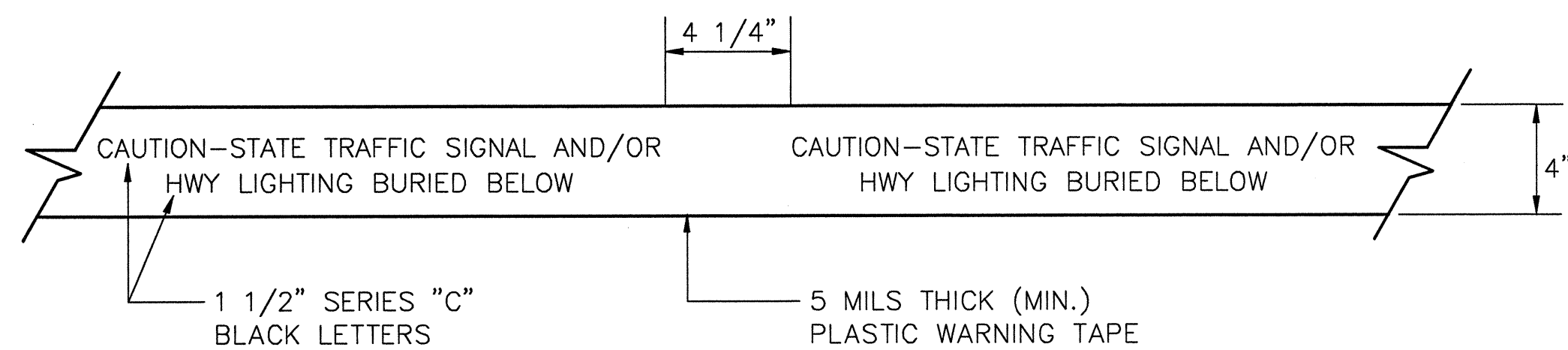
6-18-03	REVISE AND ADD EQUIPMENT IN SUBSTATION NO.1
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<b>EXISTING SUBSTA NO.1 ELECTRICAL PLAN</b>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET NO. E-15 OF E-22 SHEETS	



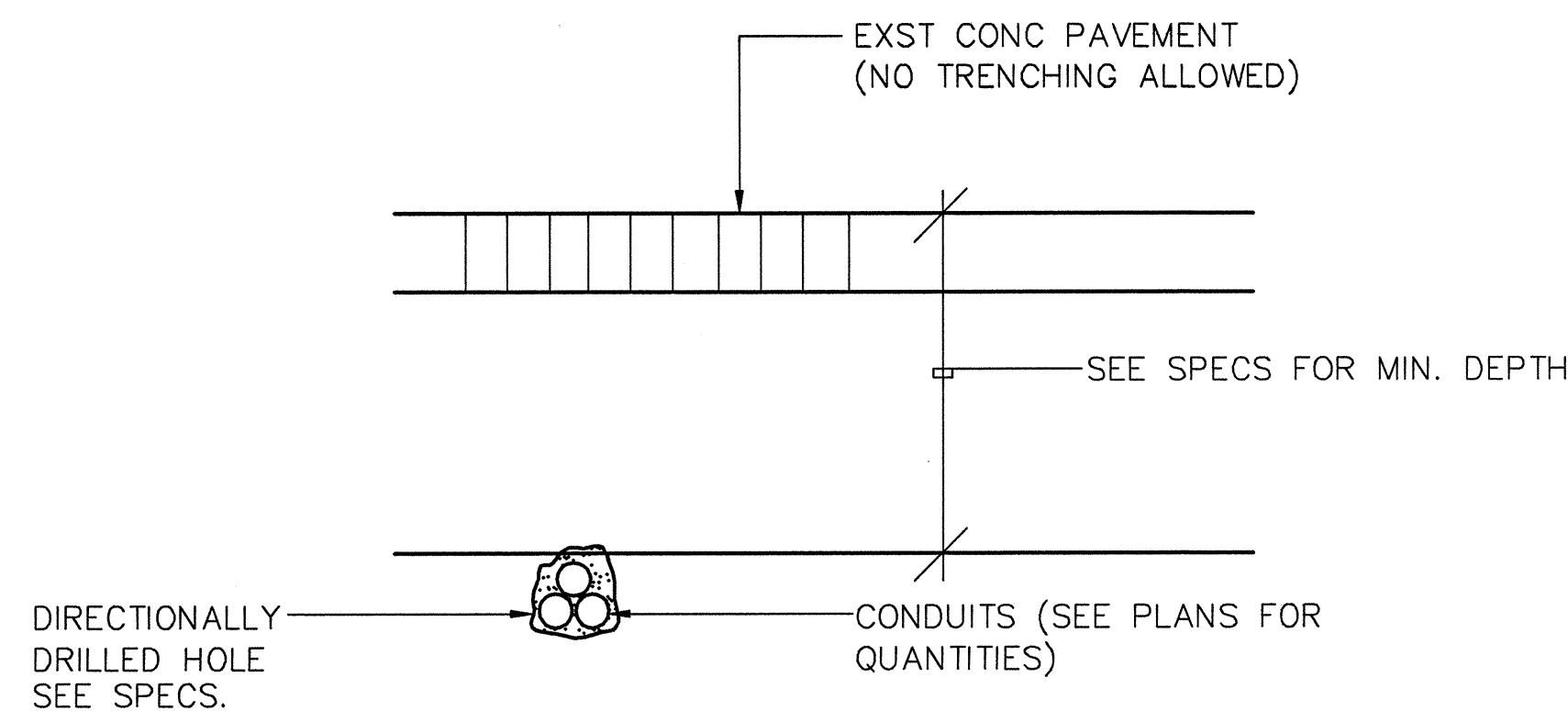
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	ADD.144	234



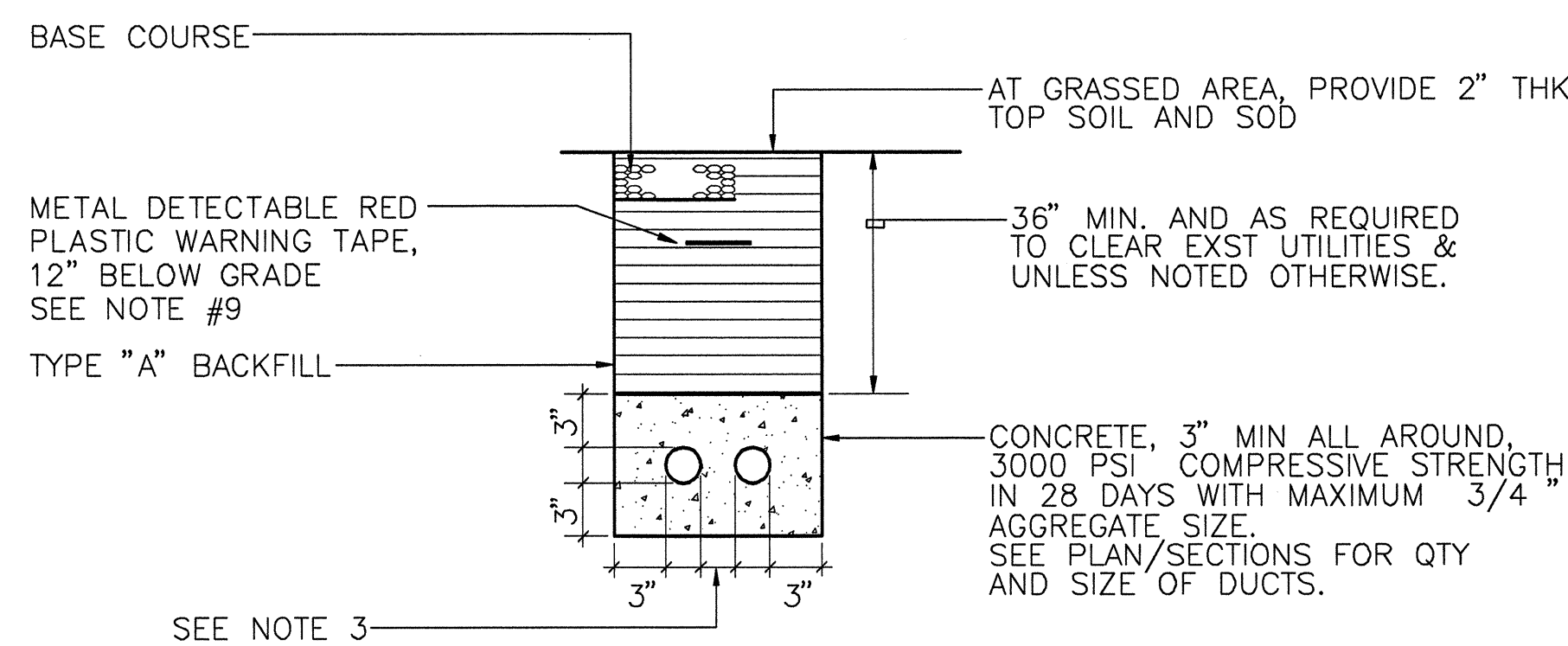
**TYPICAL DUCT SECTION (DIRECT - BURIED)**  
SCALE: NTS



**METAL DETECTABLE RED PLASTIC WARNING TAPE**  
SCALE: NTS



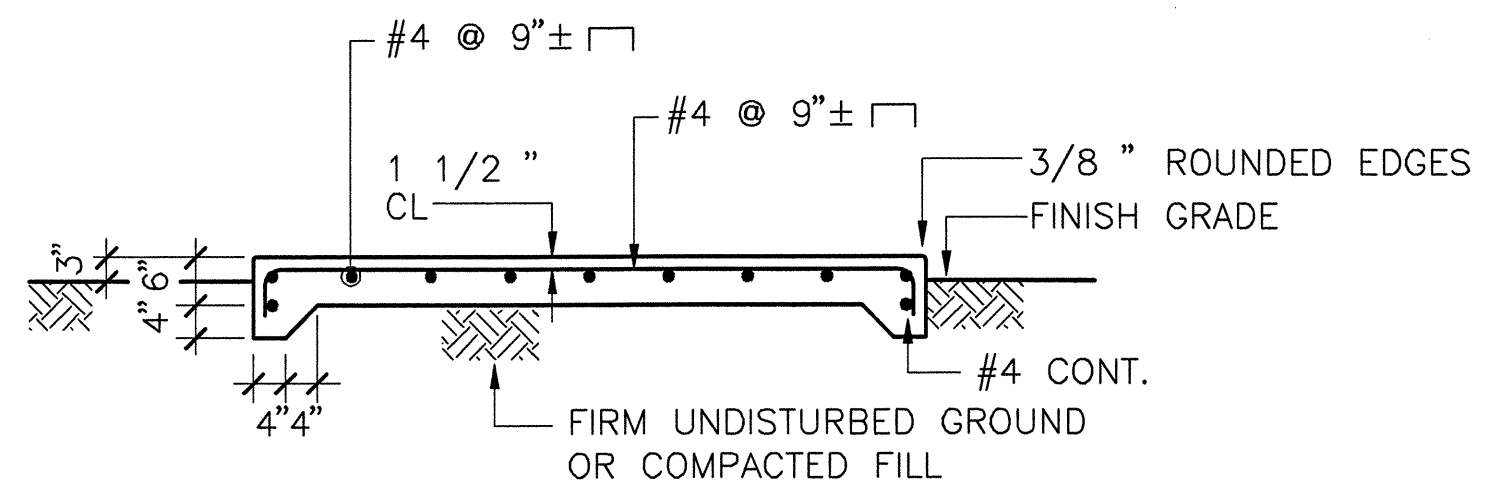
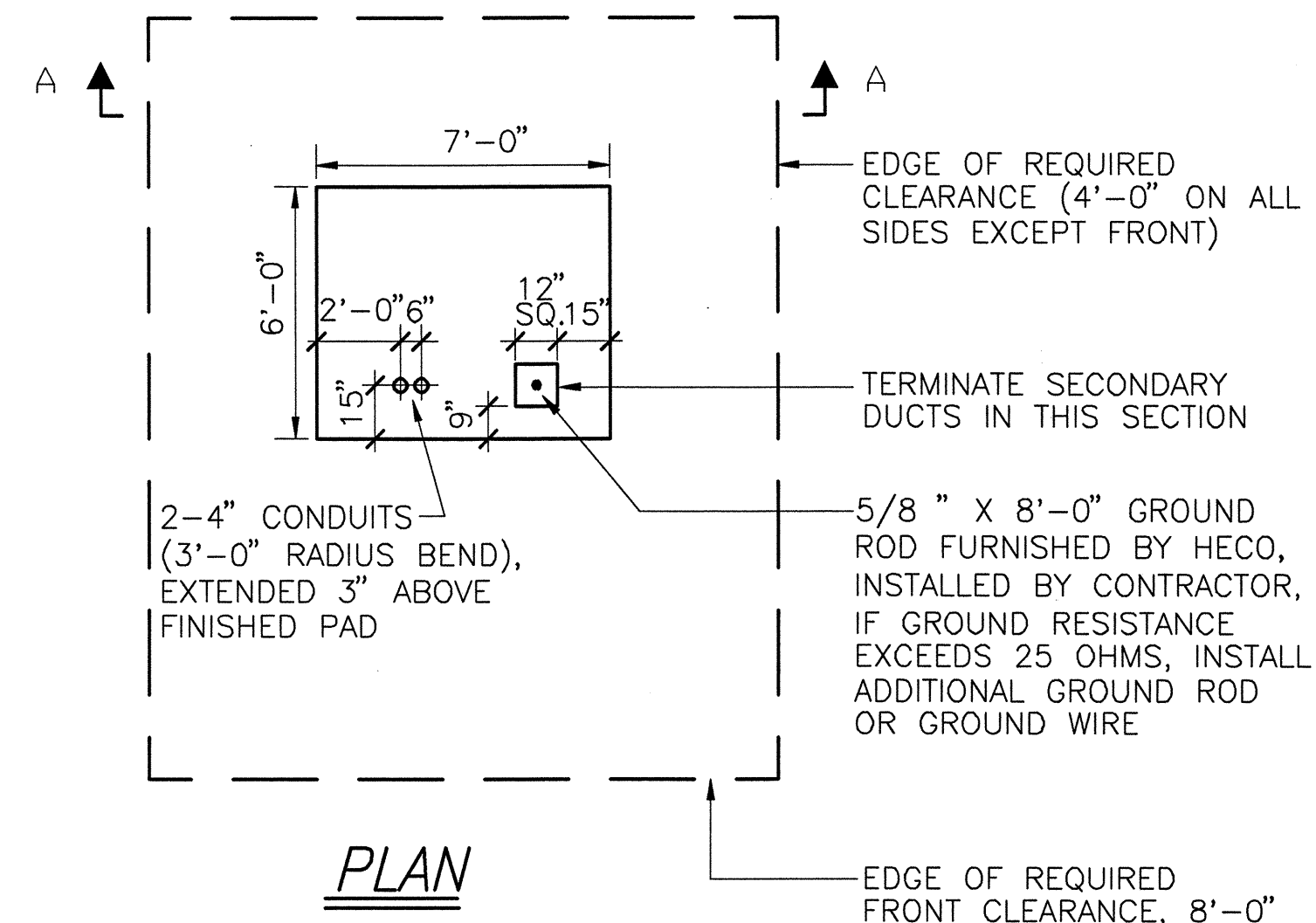
**TYPICAL DUCT SECTION (TRENCH LESS)**  
SCALE: NTS



**TYPICAL DUCT SECTION**  
SCALE: NTS

**NOTES**

- ALL DUCTS SHALL BE SCHEDULE 80 PVC & PROVIDED WITH A POLYOLEFIN PULL LINE (JET LINE CAT. #232 OR EQUIVALENT).
- BACKFILL DATA  
TYPE "A" BACKFILL: EARTH AND GRAVEL, MAXIMUM ROCK SIZE SHALL BE 1" AND THE MIXTURE SHALL CONTAIN NOT MORE THAN 50% BY VOLUME OF ROCK PARTICLES, 95% COMPACTION  
TYPE "B" BACKFILL: EARTH AND GRAVEL, MIXTURE MUST PASS A 1/2" MESH SCREEN & CONTAIN NOT MORE THAN 20% BY VOLUME OF ROCK PARTICLES, 95% COMPACTION. IF MATERIAL AT BOTTOM OF TRENCH IS NOT TYPE "B", AN ADDITIONAL 3" SHALL BE EXCAVATED AND TYPE "B" BACKFILL PROVIDED
- DUCT SEPARATION REQUIREMENTS (MINIMUM)  
ELEC - ELEC: 1-1/2"  
ELEC - COM: 3"
- PERFORM A MANDREL TEST AFTER DUCTS ARE INSTALLED.
- PAVEMENT AND/OR CONCRETE SIDEWALK RESTORATION SHALL BE EQUAL OR BETTER THAN ORIGINAL IN QUALITY AND THICKNESS.
- WHERE GRASSED AREAS AND PLANTS HAVE BEEN DAMAGED DURING CONSTRUCTION, RESTORE THE AREAS TO AS CLOSE AS THEIR ORIGINAL CONDITION AS PRACTICABLE.
- SEE SITE PLAN FOR SIZE OF CONDUITS.
- CUT PAVEMENT 6" BEYOND TRENCH, FLATTEN DUCT BANK AS REQ'D TO PASS OVER OR UNDER EXST AND NEW UTILITIES.
- THE METAL DETECTABLE RED PLASTIC WARNING TAPE SHALL BE A MINIMUM 5 MILS THICK AND 4" WIDE WITH A CONTINUOUS METALLIC BACKING AND CORROSION RESISTANT 1± MIL THICK FOIL CORE. THE MESSAGE ON THE TAPE SHALL READ, "CAUTION-STATE TRAFFIC SIGNAL AND/OR HWY LIGHTING BURIED BELOW," UTILIZING 1 1/2 INCHES SERIES "C" BLACK LETTERING. THE MESSAGE WILL BE REPEATED WITH A 4 1/1" SPACING BETWEEN TOP LINE OF MESSAGE AND START OF NEXT REPEAT.



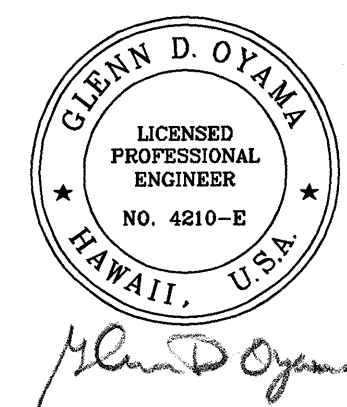
**SECTION A-A**

**THREE PHASE TRANSFORMER PAD DETAIL**  
SCALE: NTS

**NOTES:**

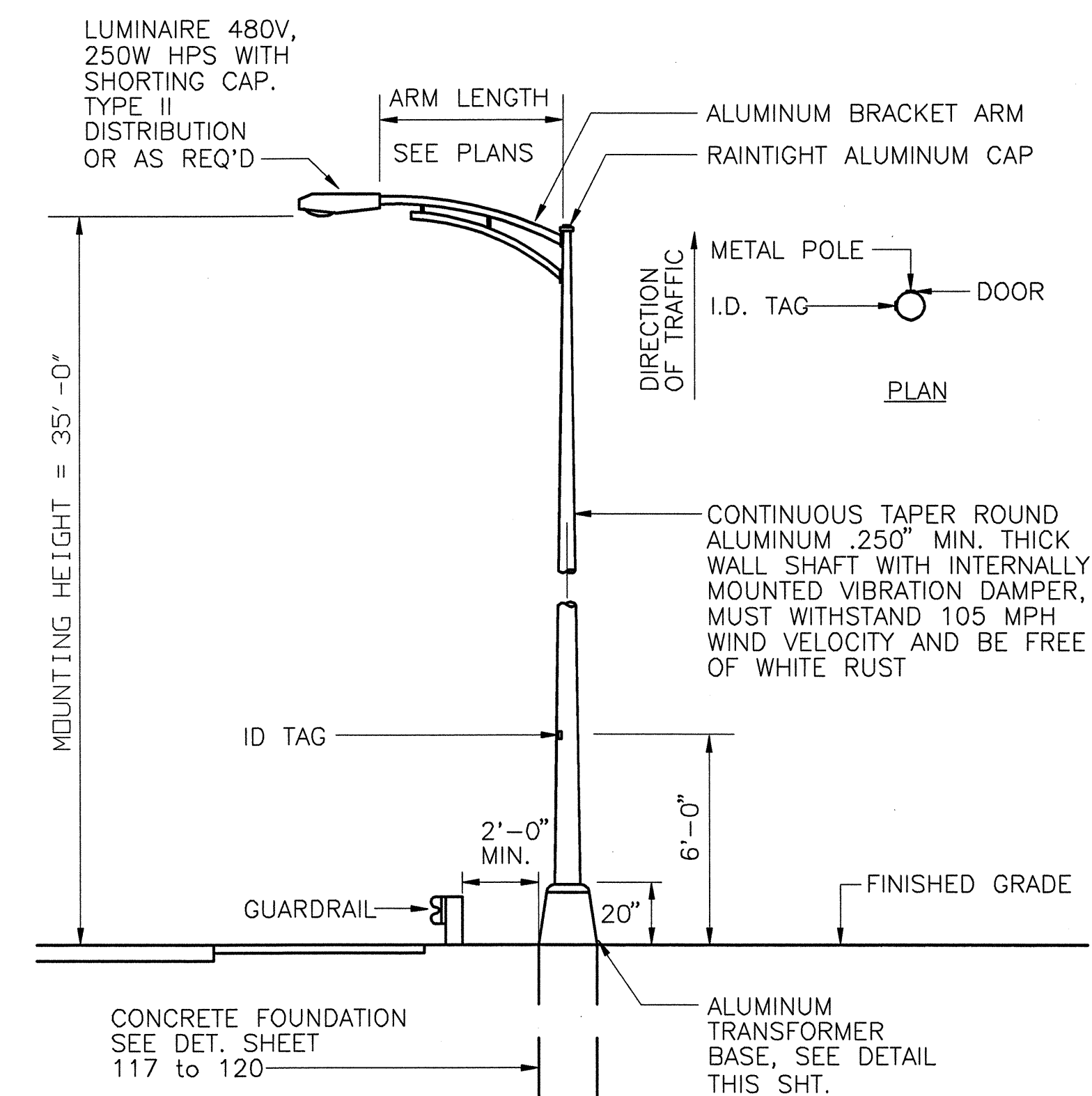
- COMPLY WITH ADDITIONAL REQUIREMENTS PER HECO STD DWG 30-5011
- COMPRESSIVE STRENGTH OF CONCRETE: 3000 PSI IN 28 DAYS
- REINFORCING SHALL BE CLEAN AND NEW ROUND DEFORMED BARS
- CURE CONCRETE BY APPROVED METHOD
- TOP OF CONC PAD TO BE SMOOTH, TRUE AND LEVEL. OTHER EXPOSED SURFACES TO BE SMOOTH AND FREE FROM DEFECTS

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



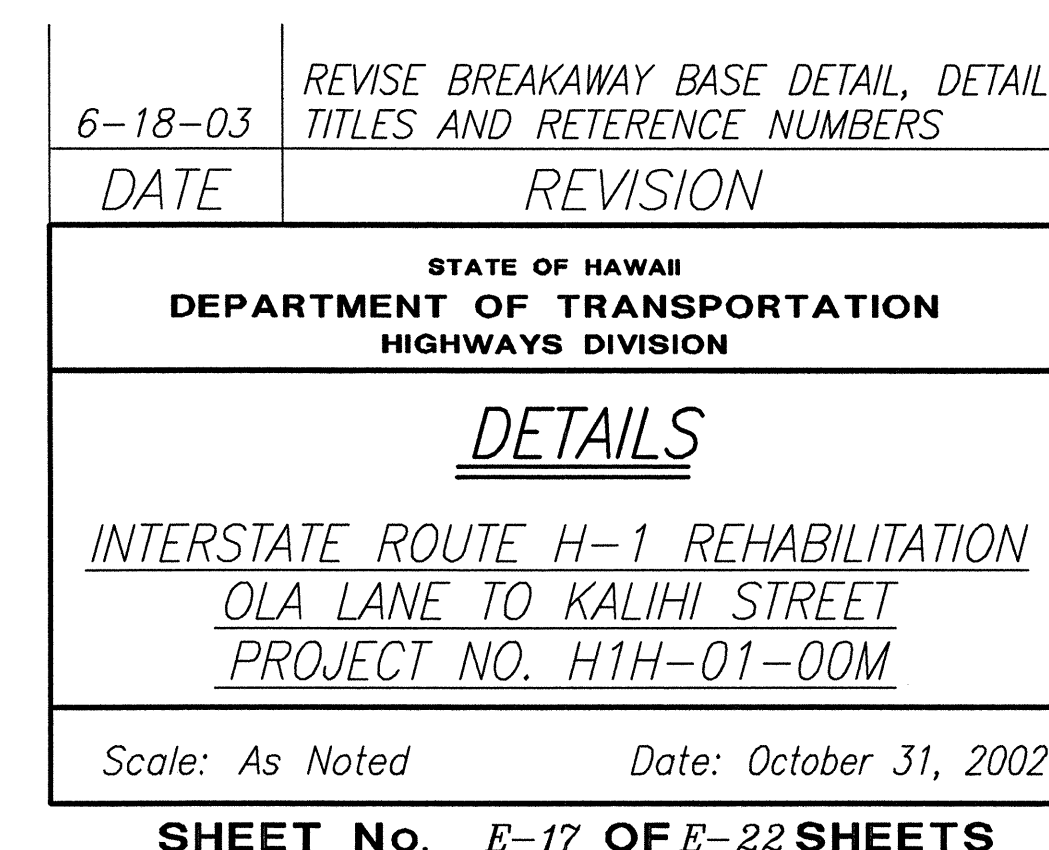
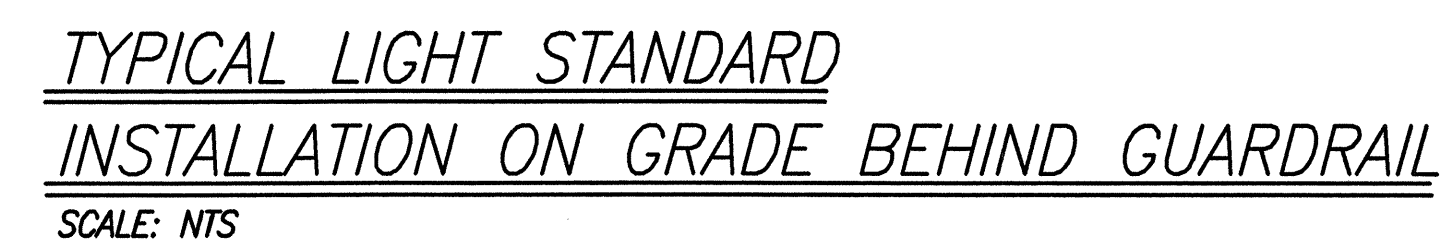
6-18-03	REVISE AND ADD DUCT-SECTION NOTES
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
DETAILS	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. HIH-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET No. E-16 OF E-22 SHEETS	



[illegible]

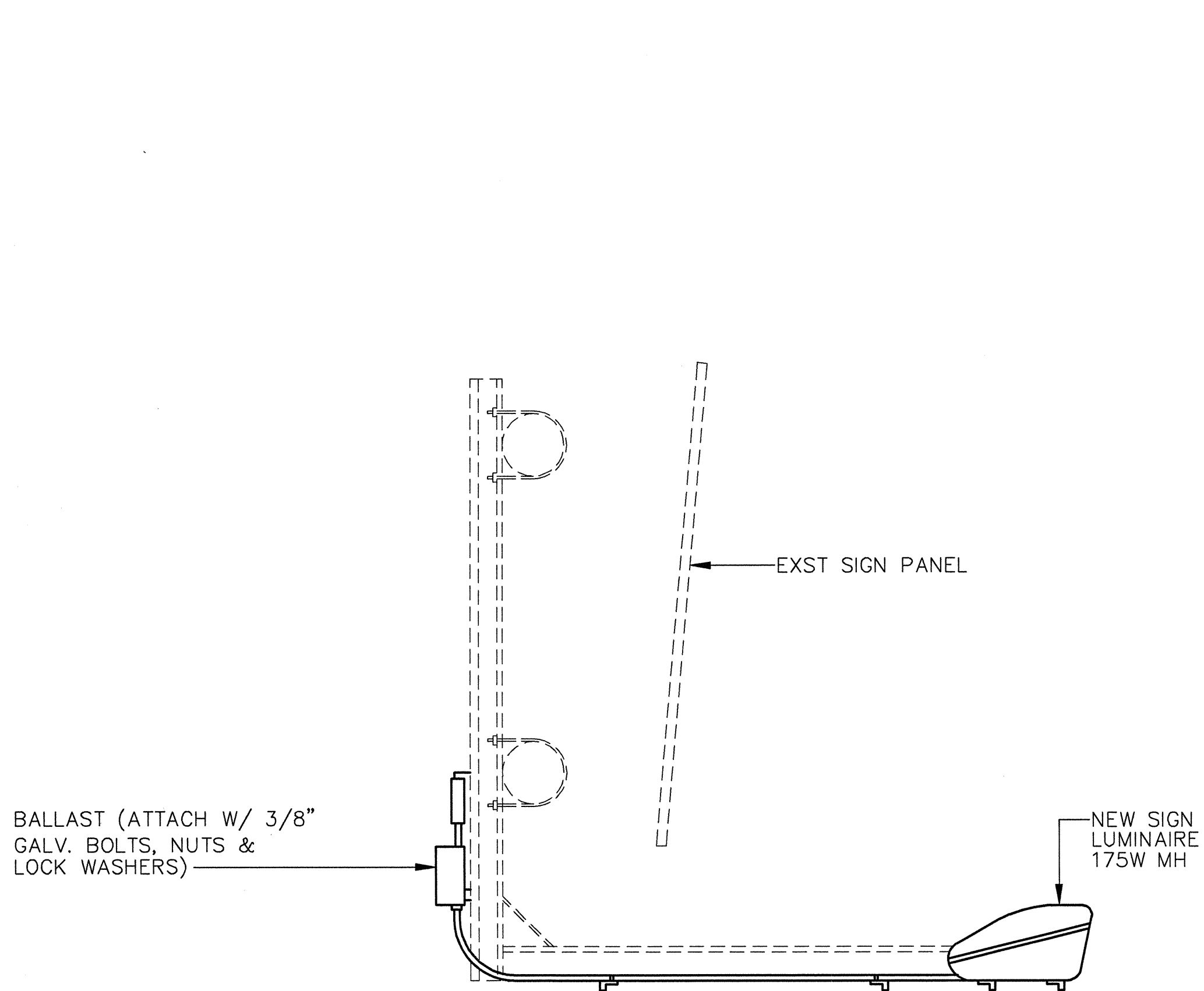
**NOTE:**

MAINTAIN 2'-0" CLEARANCE BETWEEN GUARDRAIL AND HIGHWAY LIGHTING STANDARD. IF THE 2'-0" CLEARANCE CAN NOT BE MAINTAINED, CONTRACTOR SHALL MODIFY THE GUARDRAIL SYSTEM IN ACCORDANCE WITH THE AASHTO ROADSIDE GUIDE.



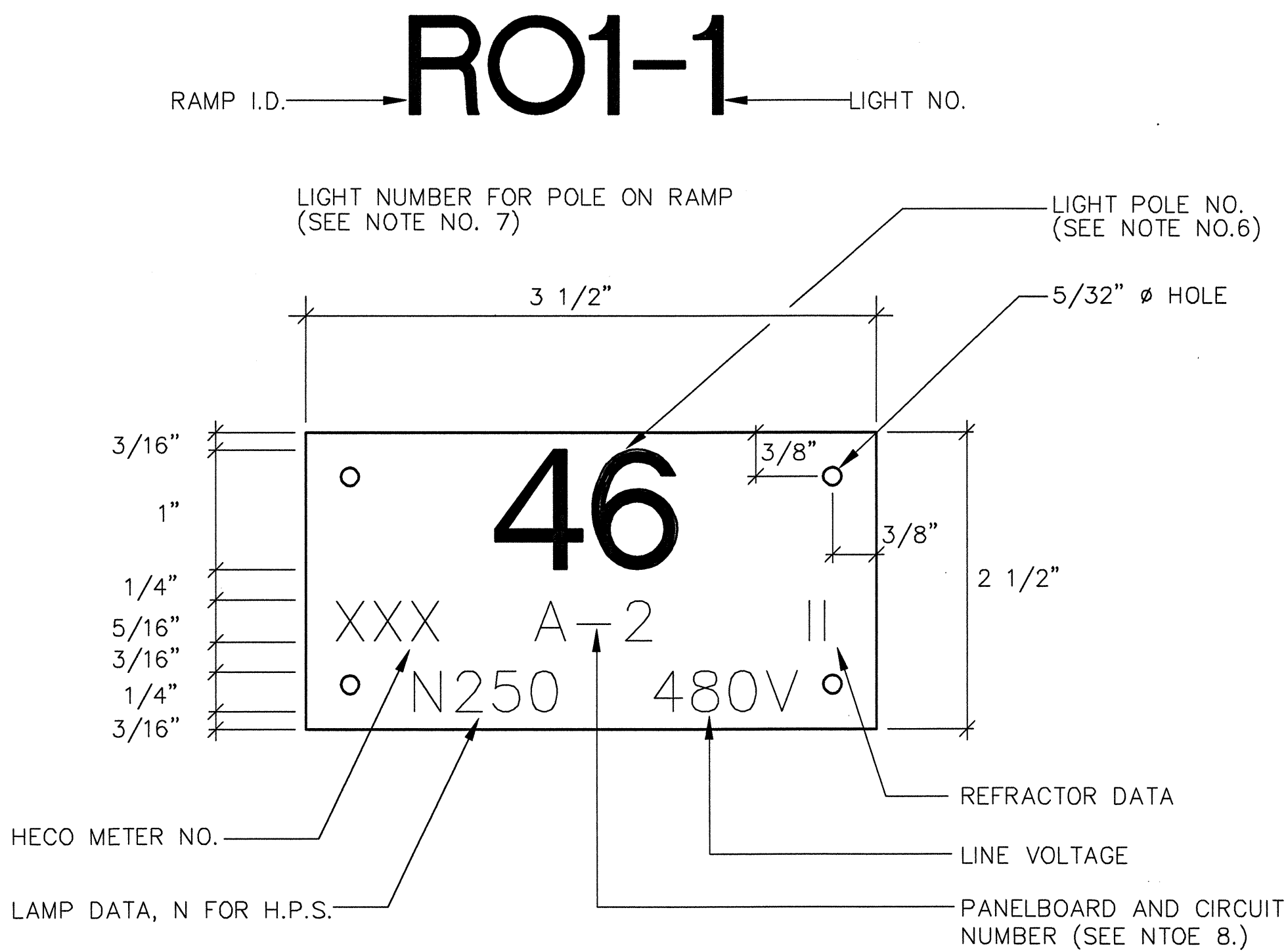


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	ADD.146	234



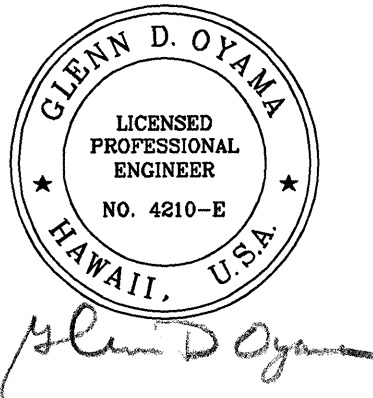
- NOTES:
- ALL PARTS OF THE LUMINAIRE MOUNTING SHALL BE HOT-DIP GALV., PRIME COATED WITH A SUITABLE PRIMER AND PAINTED WITH THREE COATS OF DARK GREEN ENAMEL.
  - LUMINAIRE MOUNTING SHALL BE ADJUSTED AS RECOMMENDED BY THE MANUFACTURER TO PROVIDE OPTIMUM SIGN ILLUMINATION.

DETAIL-SIGN LIGHTING  
SCALE: NTS



- NOTES:
- USE 3 PLY LAMINATED FLEXIBLE PLASTIC BLACK-WHITE-BLACK THICKNESS BLACK CAP SHEET-0.010", WHITE BASE SHEET-0.052", BLACK SHEET-0.010".
  - LIGHT POLE NUMBER SIZE SHALL BE 1" HIGH AND ENGRVED 1/8" WIDE, WHITE IN COLOR (NUMBER AS REQUIRED).
  - NOMENCLATURE SIZE SHALL BE 5/16" HIGH AND ENGRAVED 1/32" WIDE, WHITE IN COLOR (HECO VAULT NUMBER PANEL BOARD AND CIRCUIT NUMBER, LINE VOLTAGE, LAMP DATA AND REFRACTOR DATA AS REQUIRED).
  - ATTACH TO ALUMINUM AND STEEL POST WITH NO. 8 STAINLESS STEEL, 1/2" LONG DRIVE SCREWS IN 1/8" DRILL HOLE. ATTACH TO WOOD POLES WITH 4D ALUMINUM NAILS.
  - NUMBERS ARE INSCRIBED BY CUTTING THROUGH "BLACK CAP SHEET" TO EXPOSE "WHITE LETTERS".
  - LIGHT NUMBERS SHALL BE OBTAINED FROM THE STATE. USE AN ALPHABET SUFFIX TO DESIGNATE LIGHTS MOUNTED ON THE SAME POLE (e.g. 123A & 123B).
  - FOR LIGHT POLES INSTALLED ON RAMP, ASSIGN NUMBERS TO INCLUDE RAMP I.D. AND LIGHT NUMBER. LEGEND MAY BE LESS THAN ONE (1) INCH IN HEIGHT.
  - NOMENCLATURE REQUIRED FOR SYSTEMS WITH TWO OR MORE CIRCUITS (LETTER INDICATES PANELBOARD, NUMBER INDICATES CIRCUIT).
  - PROVIDE SIMILAR TAGS FOR WALL MOUNTED LUMINAIRES UTILIZING HIGH PRESSURE SODIUM LAMPS.

HIGHWAY LIGHT POLE TAG  
DETAIL METERED SYSTEM  
SCALE: NTS

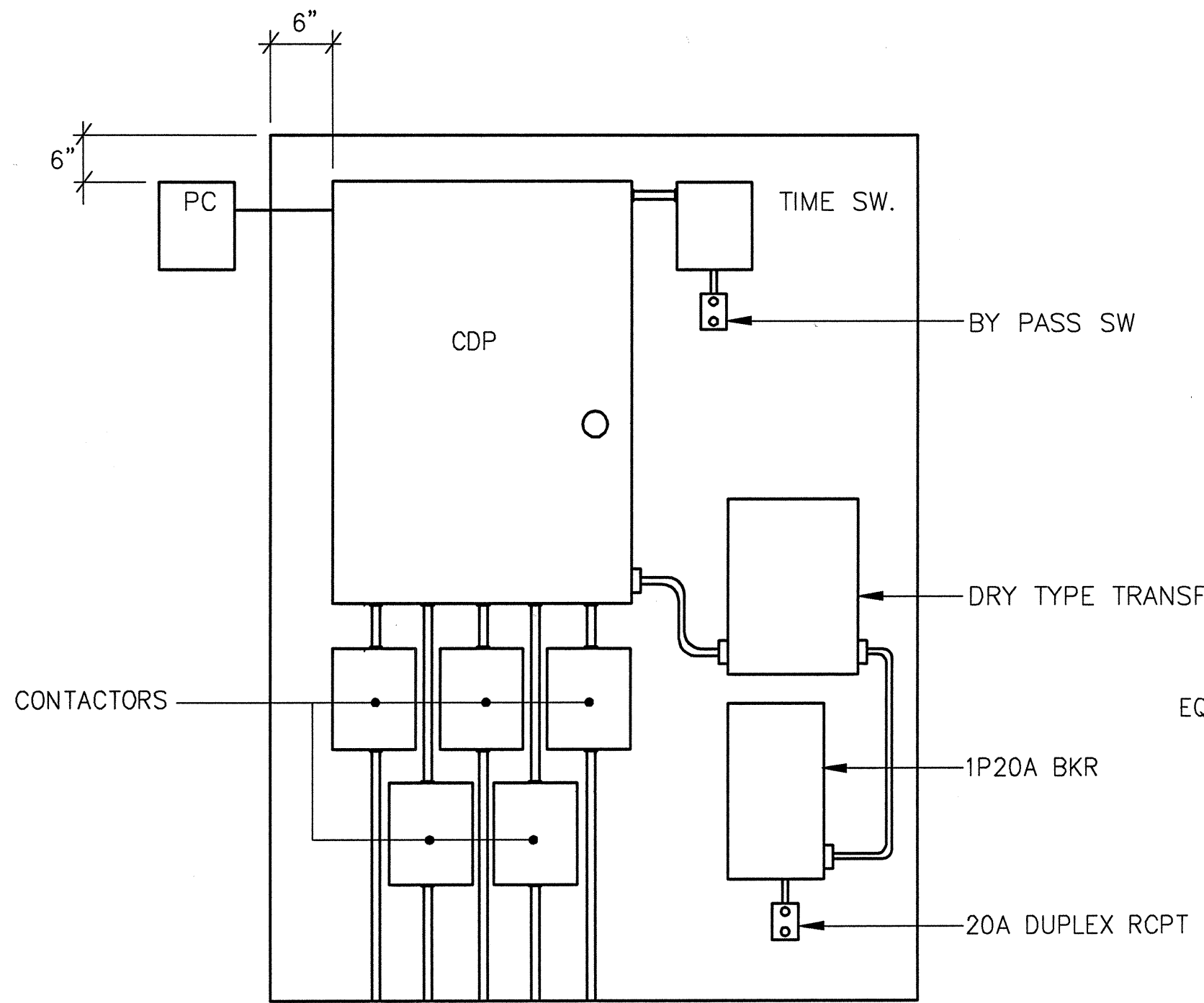


6-18-03	SPELLING CORRECTION FOR NOTE #7
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
DETAILS	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET No. E-18 OF E-22 SHEETS	

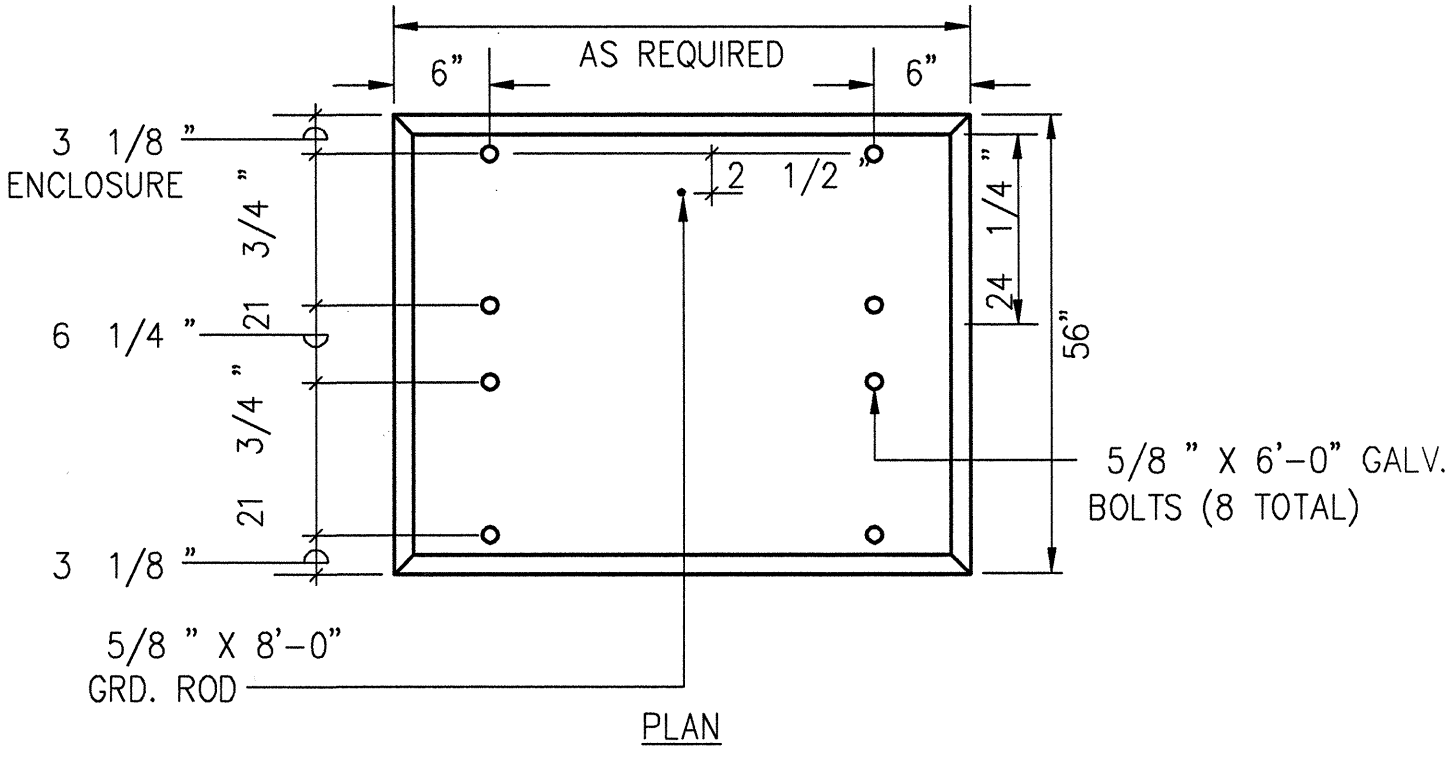
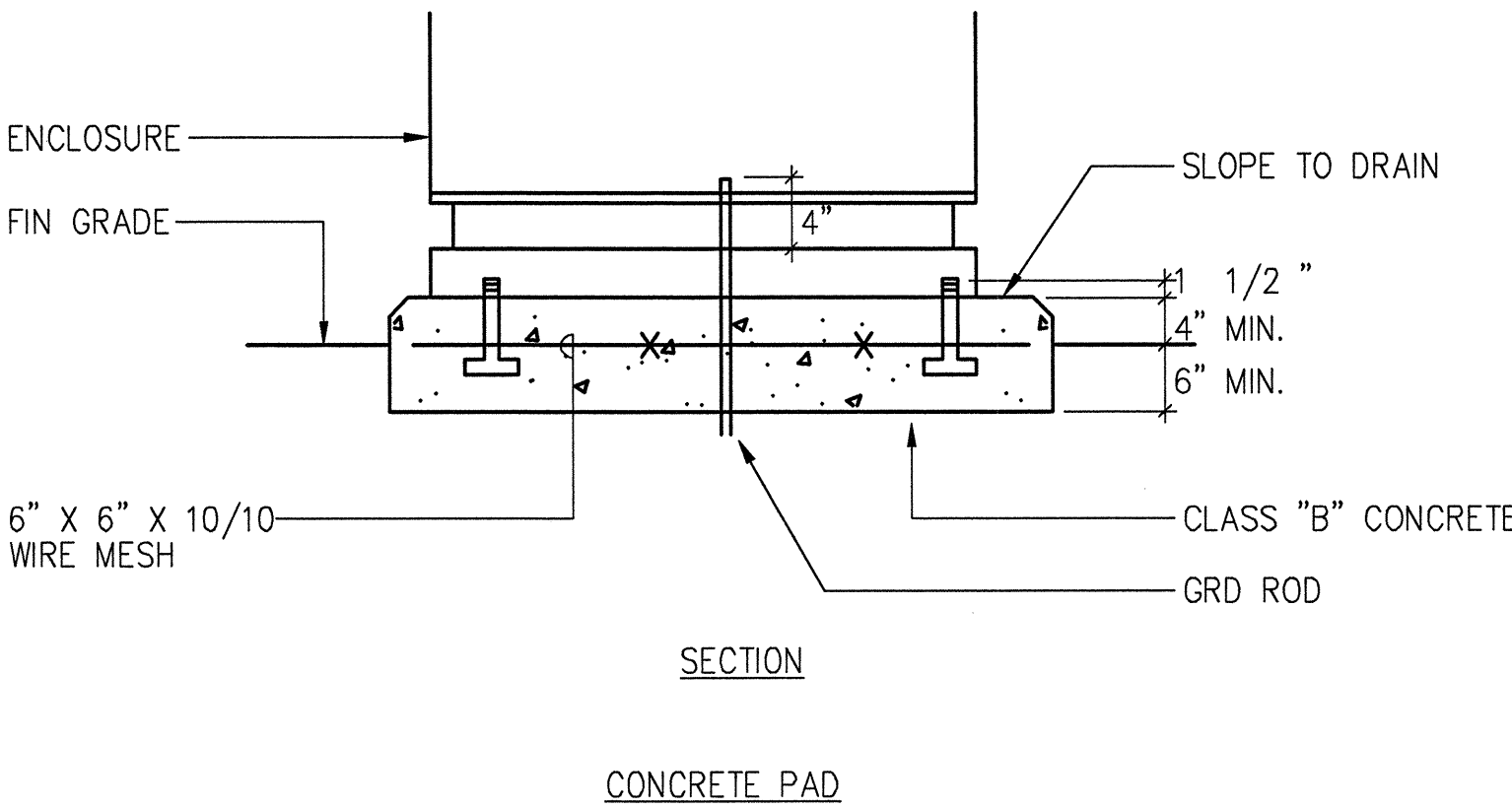
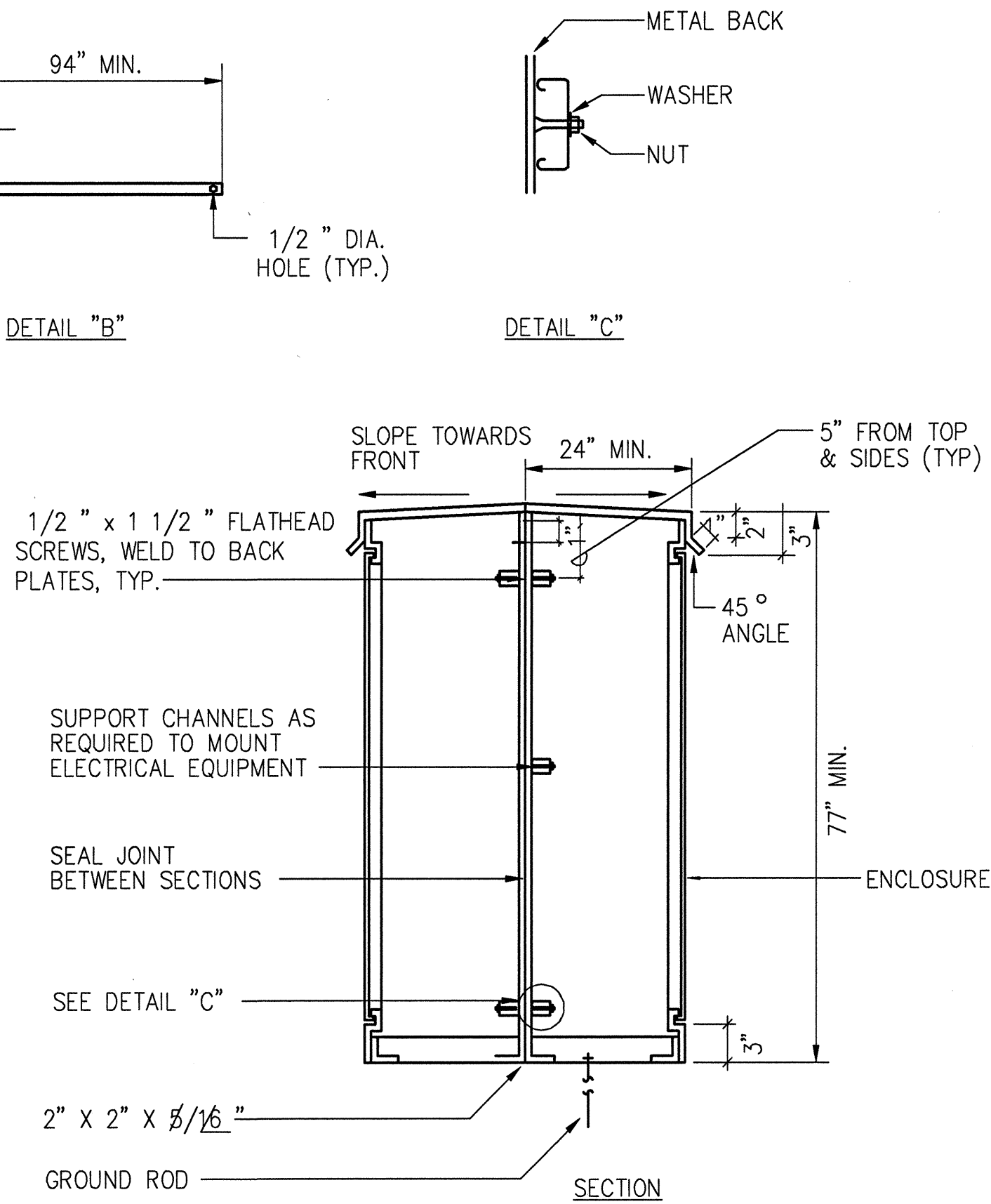
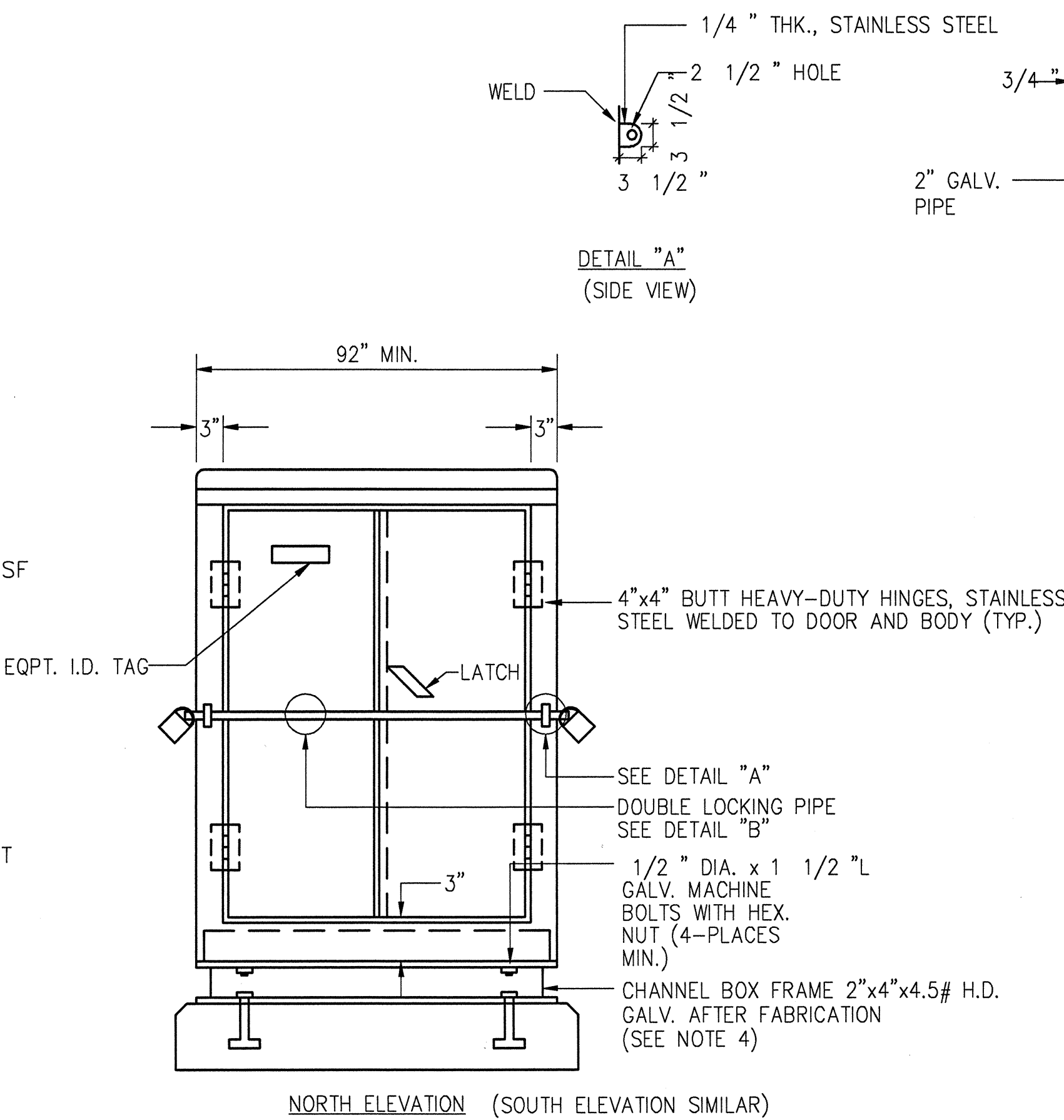
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DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTEBOOK	
No.	



FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	147	234



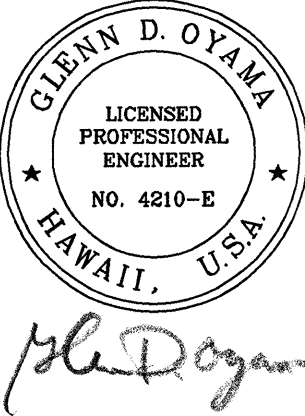
SERVICE EQUIPMENT (STA "K")  
SCALE: NTS



SERVICE AND METERING EQUIPMENT ENCLOSURE DETAIL  
SCALE: NTS  
NOTES:

- CABINET SHALL BE NEMA 3R 10 GA STAINLESS STEEL WITH NEOPRENE GASKETS.
- CABINET TO BE PRIMED WITH ONE COAT SHOP PRIMER. PAINT WITH TWO COATS OF ACRYLIC PAINT, COLOR TO BE SELECTED BY THE ENGINEER.
- PROVIDE SUPPORT CHANNELS GALVANIZED AFTER FABRICATION TO MOUNT ELECTRICAL EQUIPMENT.
- WASH CHANNEL WITH SOLUTION OF CHEMICAL PHOSPHORIC METAL ETCH AND ALLOW TO DRY. APPLY TWO COATS OF GALVANIZED METAL PRIMER AND TWO COATS OF ENAMEL TO MATCH CABINET.
- ALL ENCLOSURE AND PAD DIMENSIONS SHALL BE COORDINATED WITH SIZES OF ELECTRICAL EQUIPMENT PROVIDED TO INSURE ALL EQUIPMENT WILL PROPERLY FIT WITHIN ENCLOSURE, ADJUST ENCLOSURE AND PAD DIMENSIONS AS REQUIRED AT NO ADDITIONAL COST. WITH EXTERIOR DOORS FULLY OPEN, ALL EQUIPMENT SHALL HAVE FRONT CLEARANCES PER NEC (4'-0" MIN).
- GROUND CABINET FRAME. 25 OHMS MAXIMUM RESISTANCE.
- FOUR BRASS SARGENT PADLOCKS SHALL BE PROVIDED BY CONTRACTOR.
- SUBMIT SHOP DRAWING FOR REVIEW AND ACCEPTANCE BY THE ENGINEER PRIOR TO FABRICATION.
- 6" CONCRETE PAD WITH REINF #4 BARS @ 12" O.C. BOTH WAYS & CONCRETE SHALL HAVE STRENGTH OF 3000 PSI @ 28 DAYS.

SURVEY PLOTTED BY	DATE
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QUANTITIES BY	
CHECKED BY	
NO.	



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

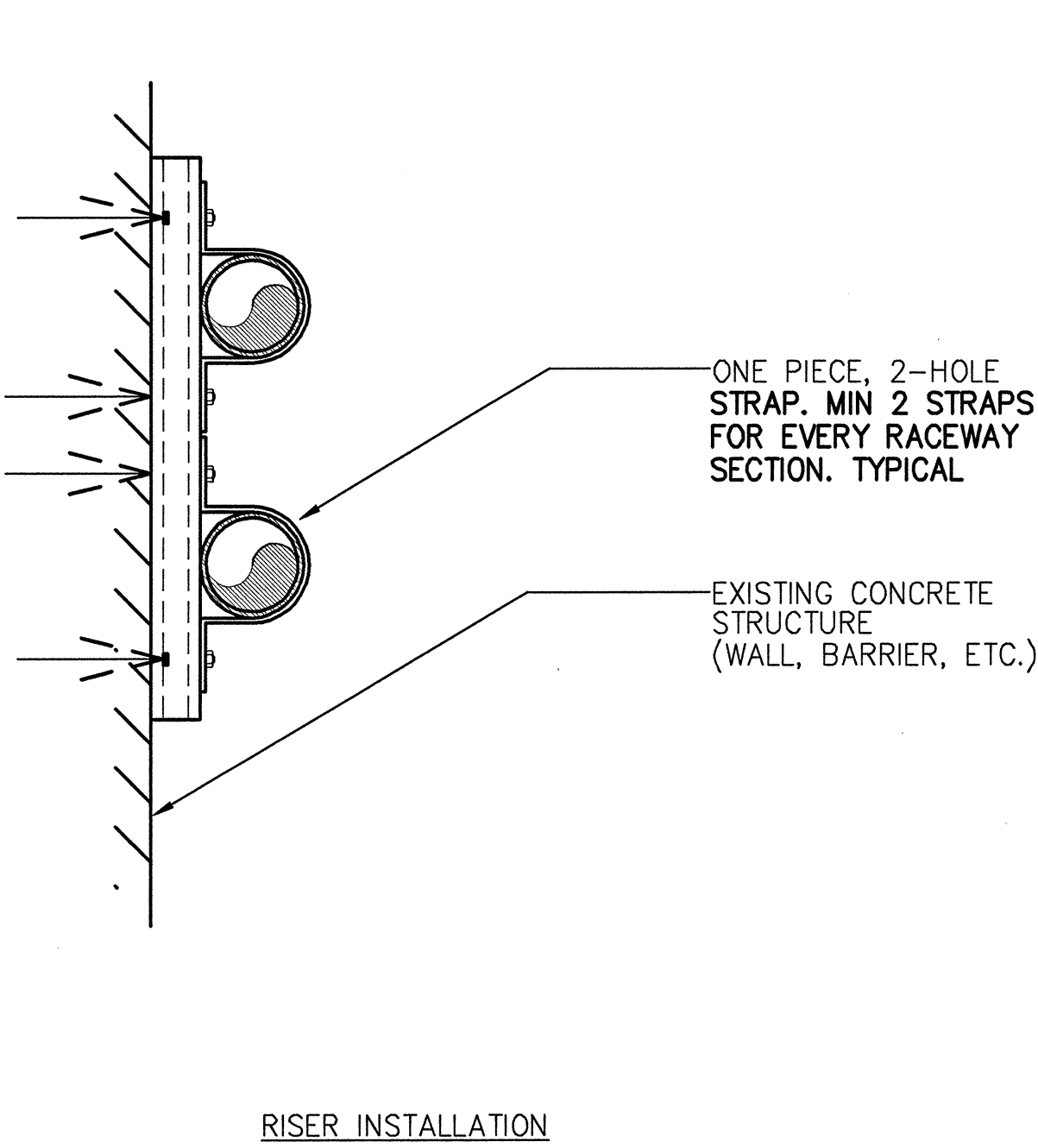
DETAILS  
INTERSTATE ROUTE H-1 REHABILITATION  
OLA LANE TO KALIHI STREET  
PROJECT NO. H1H-01-00M

Scale: As Noted  
Date: October 31, 2002

SHEET No. E-19 OF E-22 SHEETS



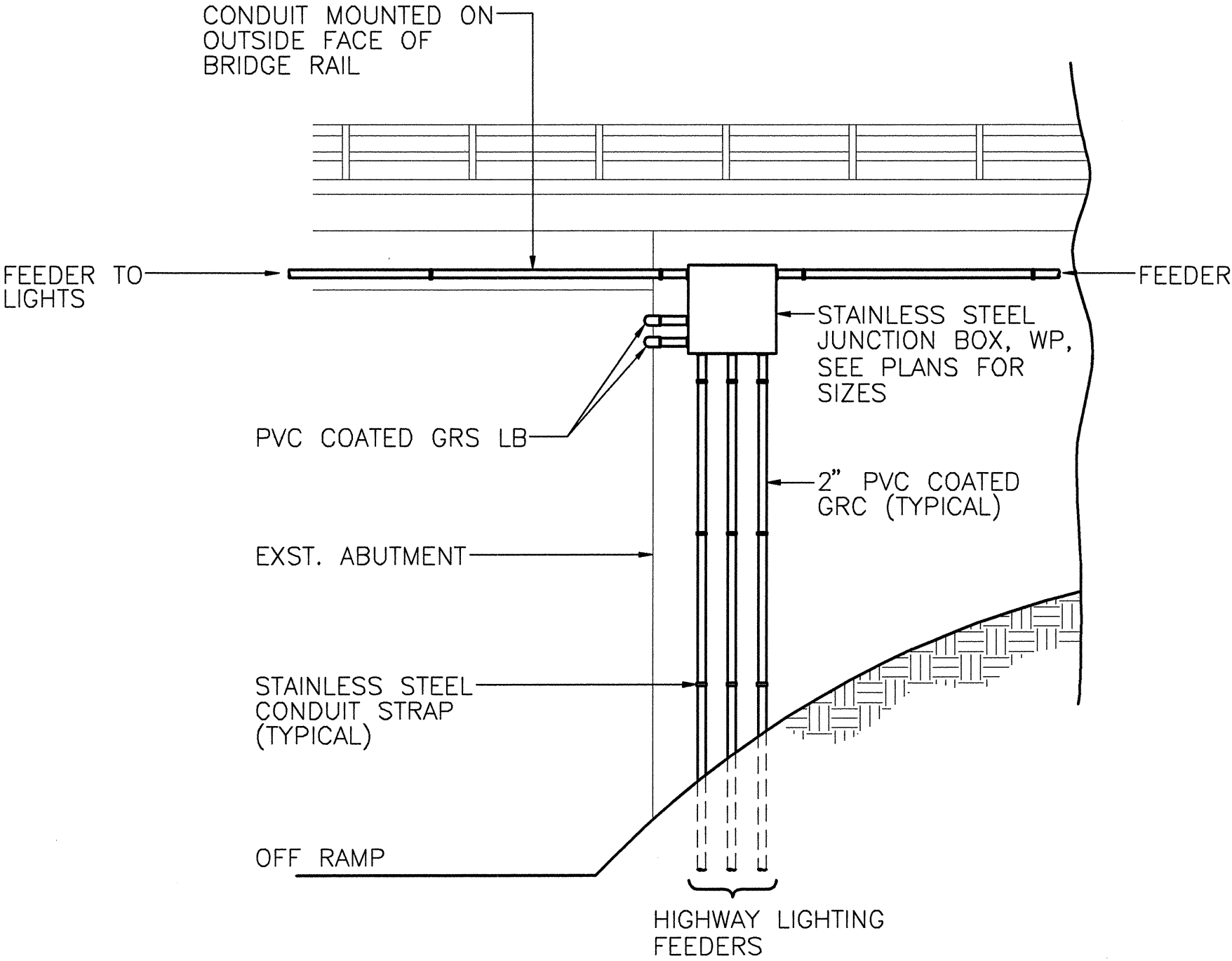
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	ADD.148	234



TYPICAL RACEWAY MOUNTING DETAILS

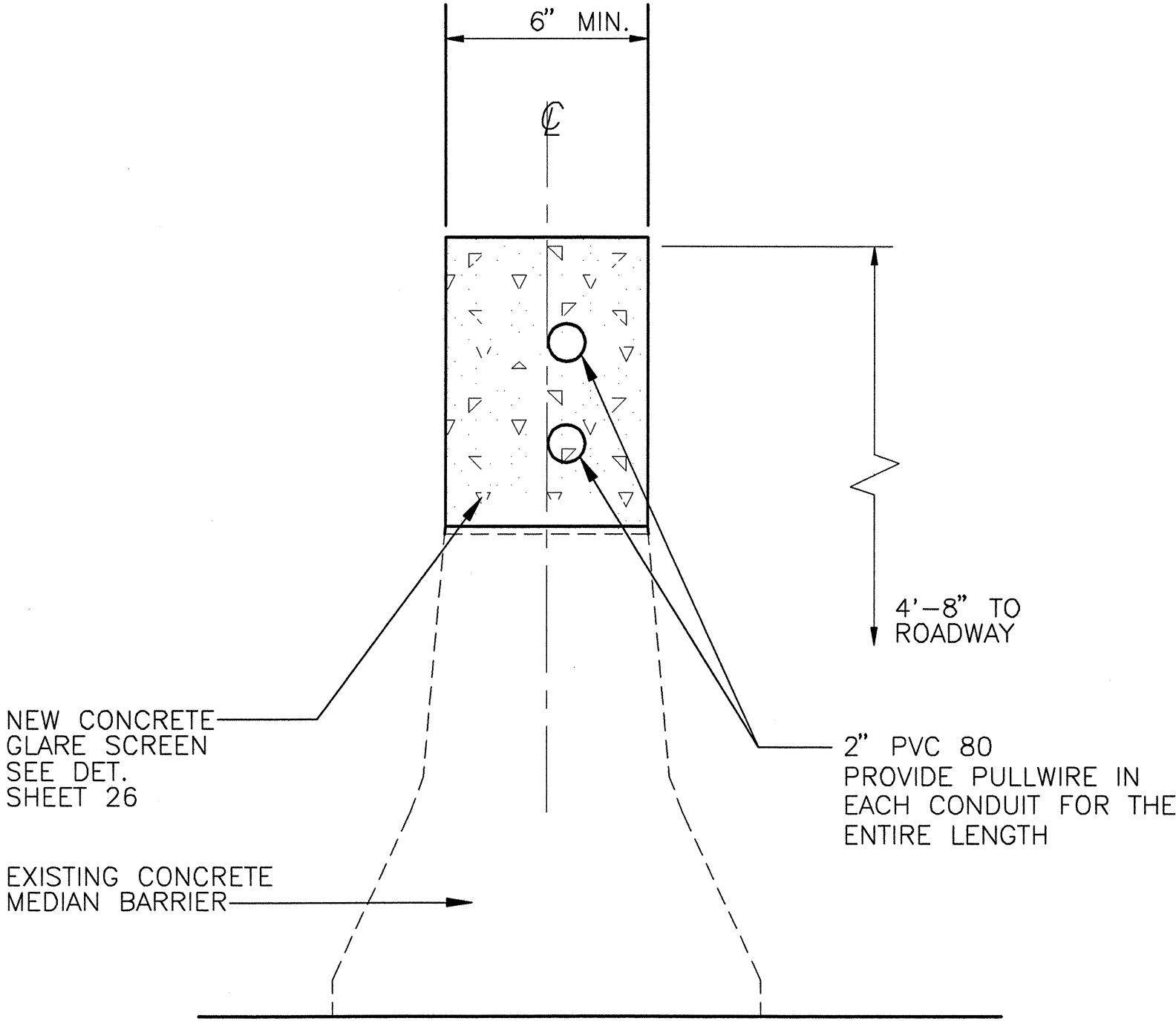
SCALE: NTS

NOTES: 1. ALL MOUNTING CHANNELS, SUPPORTS & HARDWARE SHALL BE STAINLESS STEEL.



TYPICAL CONDUIT ROUTING DETAIL AT ABUTMENTS

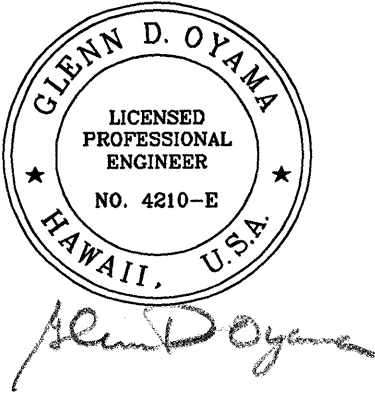
SCALE: NTS



SECTION AT MEDIAN BARRIER FOR FUTURE FIBER OPTIC CABLES

SCALE: NTS

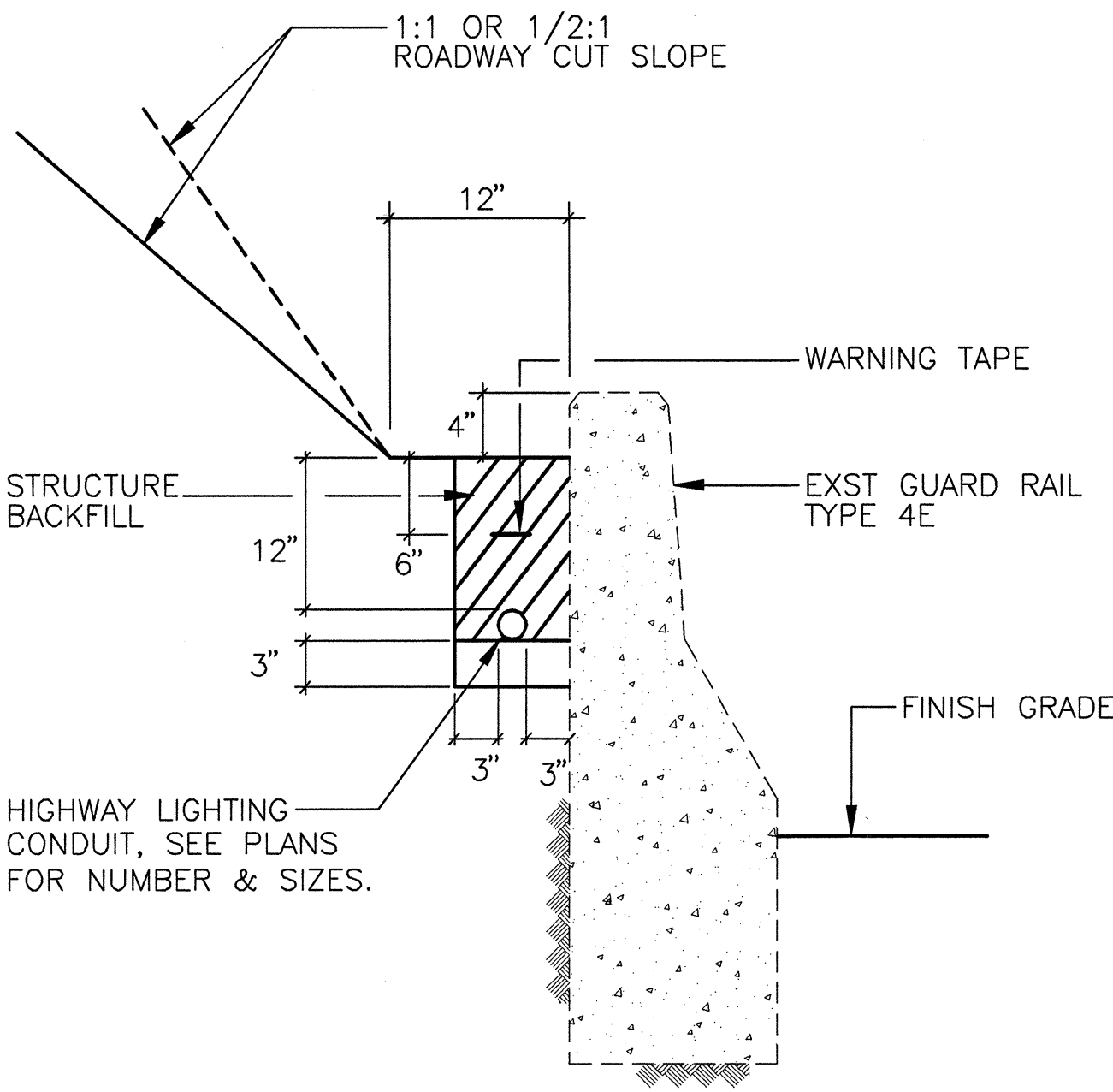
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DRAWN BY	
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QUANTITIES BY	
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ORIGINAL PLAN	
NOTEBOOK	
No.	



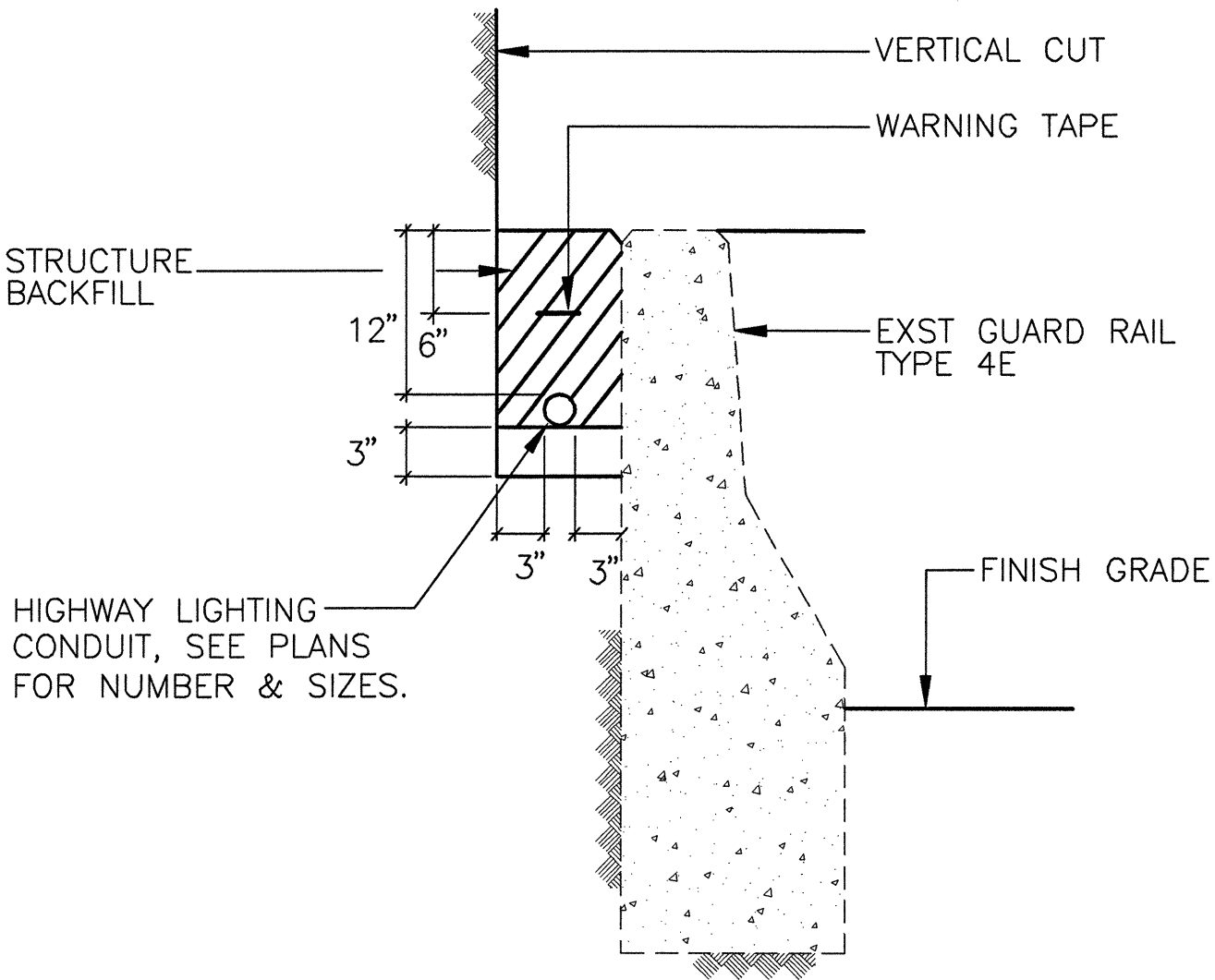
6-18-03	REVISE ABUTMENTS DETAIL REVISE MEDIAN BARRIER HEADING
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>DETAILS</u>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET No. E-20 OF E-22 SHEETS	



FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
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HIGHWAY LIGHTING CONDUIT AT  
EXST GUARD RAIL TYPE 4E  
1:1 OR 1/2:1 ROADWAY CUT SLOPE  
 SCALE: NTS



HIGHWAY LIGHTING CONDUIT AT  
EXST GUARD RAIL TYPE 4E  
VERTICAL ROADWAY CUT  
 SCALE: NTS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTED BY	DRAWN BY	
DESIGNED BY	CHECKED BY	
QUANTITIES BY		
NO.		



6-18-03	REVISE DETAIL HEADING
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
<u>DETAILS</u>	
INTERSTATE ROUTE H-1 REHABILITATION OLA LANE TO KALIHI STREET PROJECT NO. H1H-01-00M	
Scale: As Noted	Date: October 31, 2002
SHEET No. E-21 OF E-22 SHEETS	



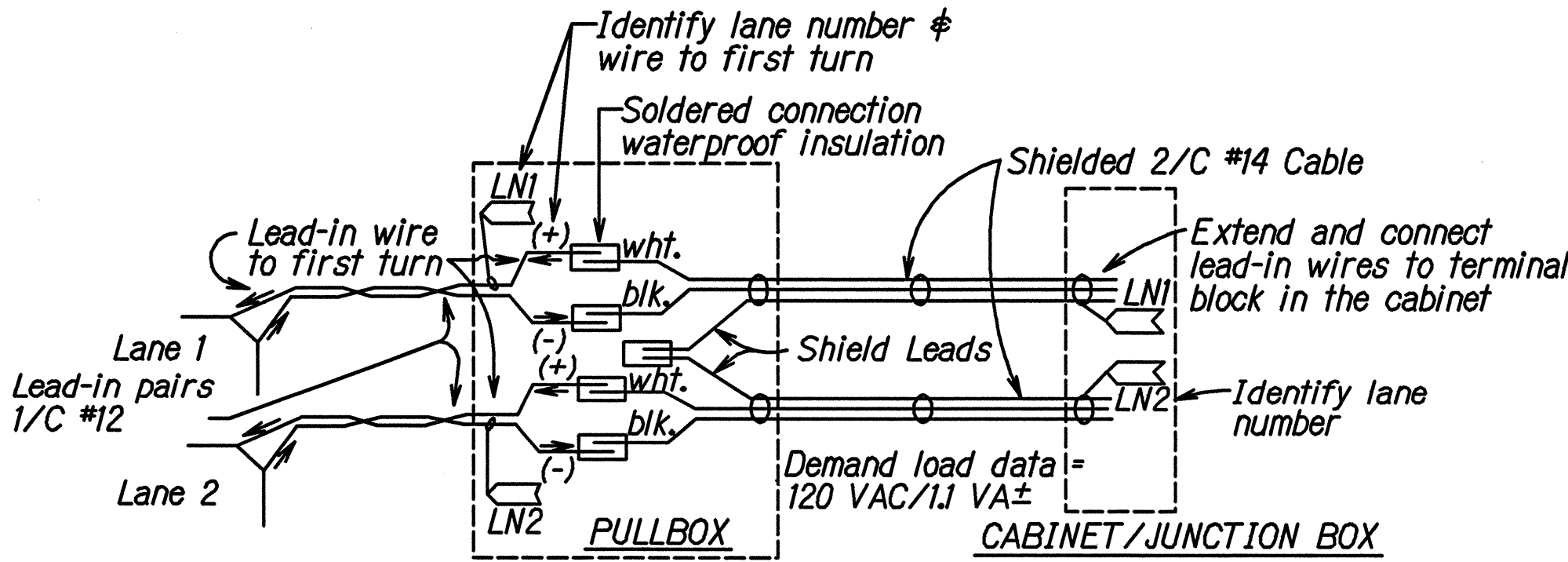
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HIH-01-00M	2003	150	234

GENERAL NOTES

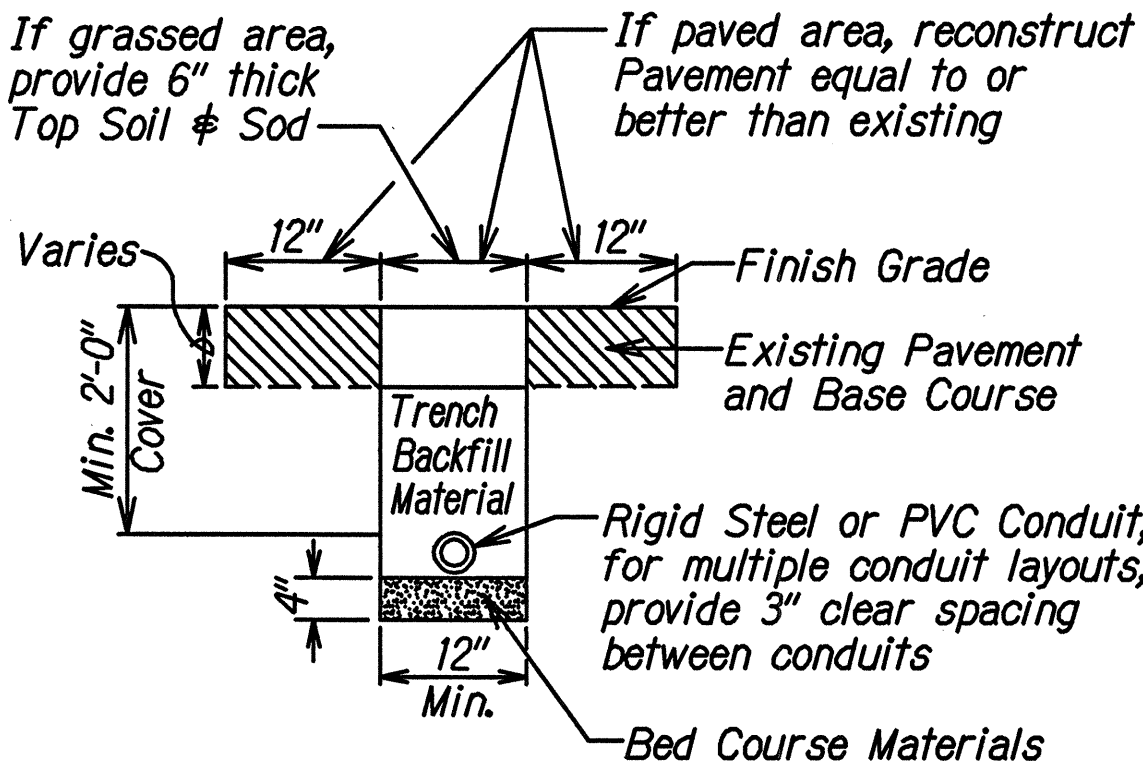
- The locations of new inductance loops, pullboxes and cabinets/junction boxes shall be staked out in the field by the Contractor and approved by the Engineer prior to installation.
- The Contractor shall inform the Engineer at least one day prior to pouring of the concrete slab/pad, saw-cutting pavement and installing inductance loops.
- Continuity of inductance loops and lead-in wires shall be tested and warranted for one year from date of acceptance by the Contractor.
- The Contractor shall restore all affected areas to their original condition. This item of work shall not be paid for separately, but shall be considered incidental to work of other paid items.
- The Contractor shall verify the locations of the existing utilities and underground structures whether or not shown on plans.
- The Contractor shall assume that existing underground utilities not shown on the plans may exist, therefore, he shall contact the different utility companies for information and toning.
- The Contractor shall be held liable for any damages incurred to the existing utilities and underground structures as a result of his operations. All damaged portions shall be replaced in accordance with the standards and specifications of the affected utility company at no cost to the STATE.
- Changes to the contract plans and specifications shall not be permitted, unless otherwise authorized by the Engineer upon written justification and request for approval by the Contractor.

LOOP LAYOUT NOTES

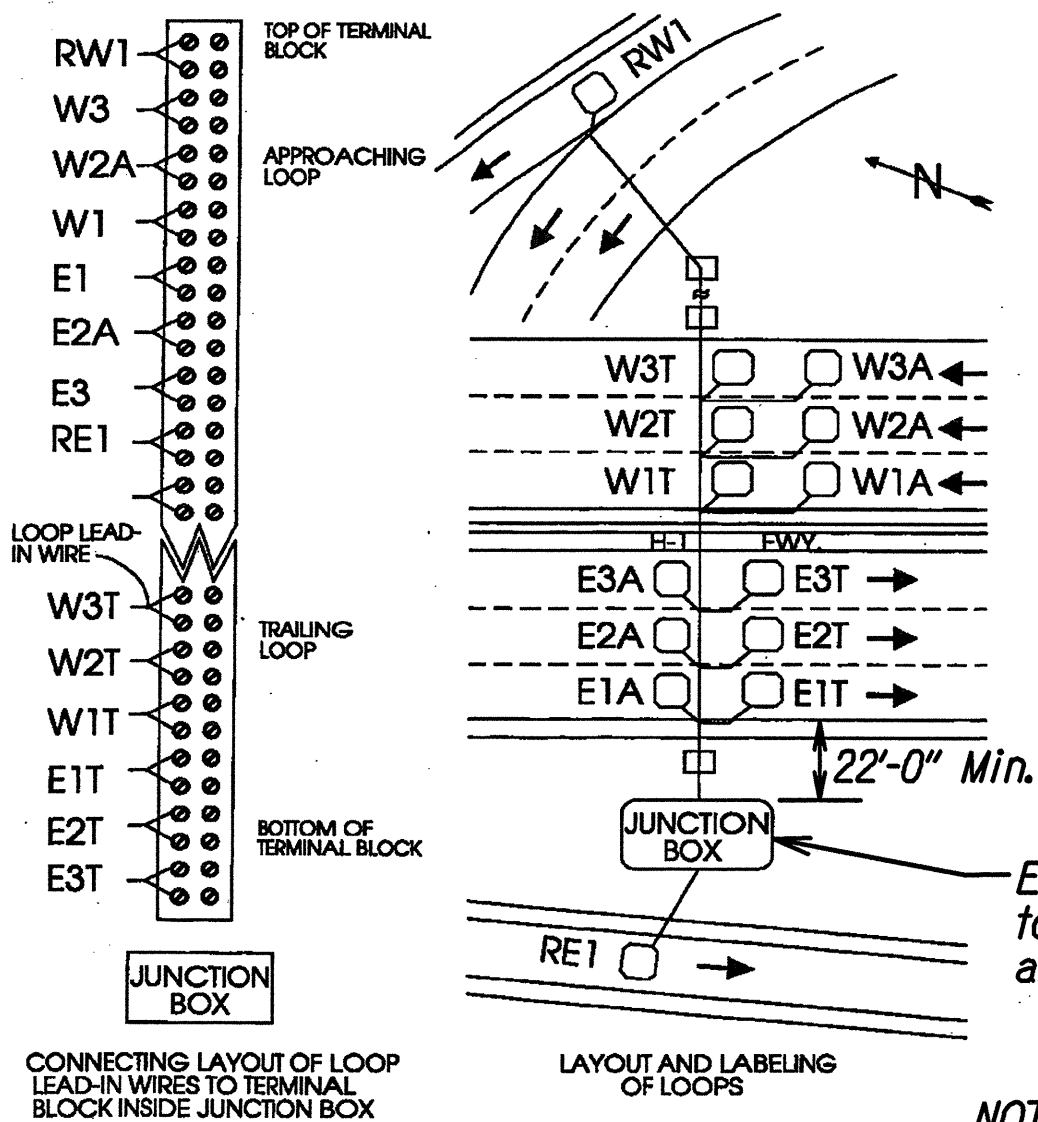
- Detector loop shall consist of three turns of 1/C #12 cable meeting IMSA SPEC 5I-5 or equivalent embedded in a 3/8" minimum sawcut, except as noted.
- Loop and lead-in to the first pullbox shall be one continuous wire. Lead-in wires from the same loop shall be twisted in pairs, two turns per foot. DO NOT twist one loop-pairs with another loop-pairs.
- All lead-in wires shall be crimped with open end lugs that will fit into the terminal board slots snugly.
- Stagger traffic loops on roadway less than 12 foot lane width.
- The Contractor shall connect the inductance wires on each terminal slot.
- The left lane in the direction of traffic flow is designated as Lane 1, and the lane next to its right as Lane 2 and so on as indicated on plans.
- Clean sawcut thoroughly before filling with hot tar or epoxy sealant.
- All loop lead-in wires in all enclosures including pullboxes shall be identified and labeled by direction of traffic flow and lane numbers as shown on plans.
- All cables and wires terminated within an enclosure shall have a minimum 12" additional slack.



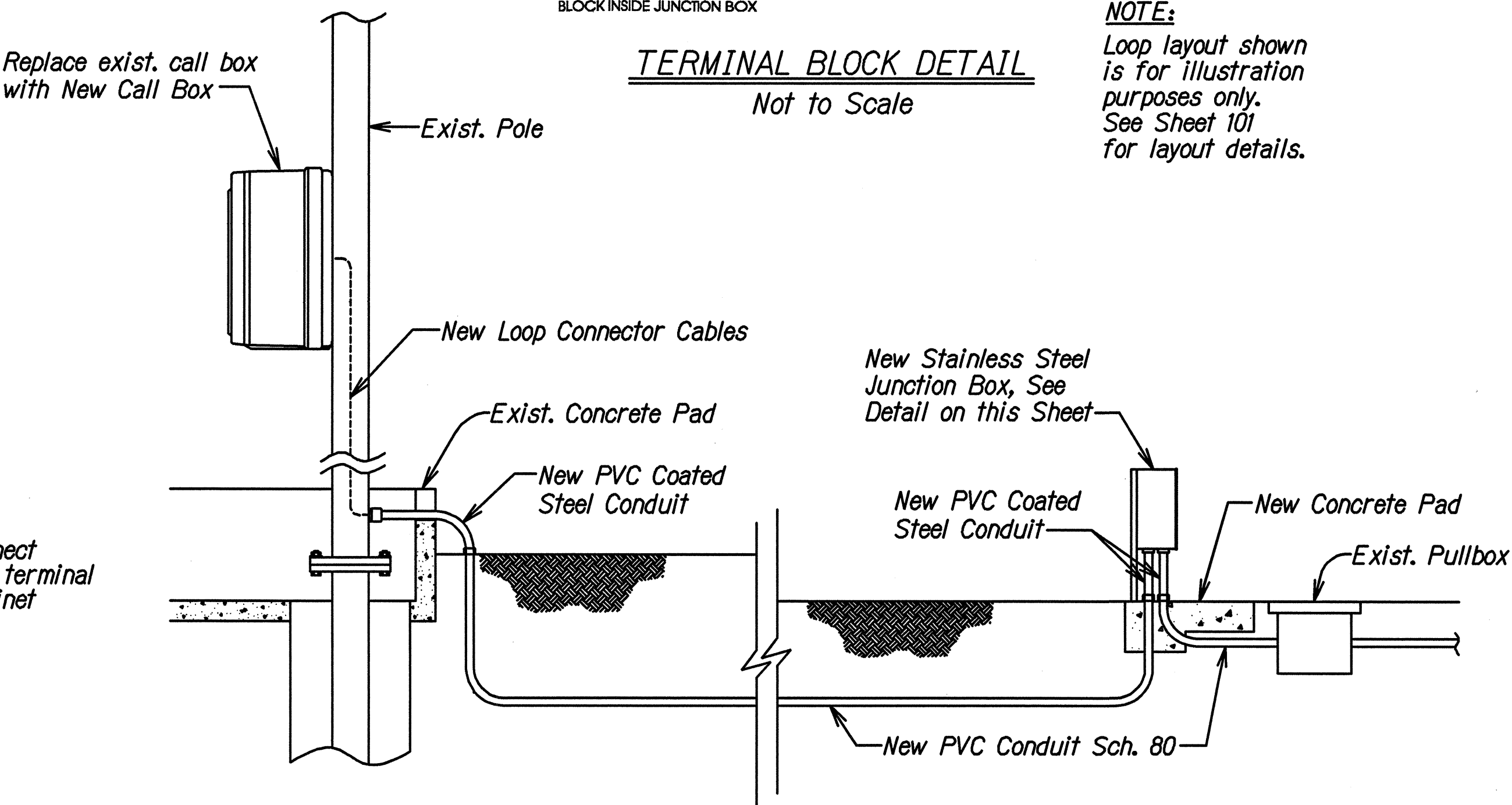
DETECTOR LOOP LEAD-IN WIRING  
AND IDENTIFICATION IN PULLBOX AND CABINET  
Not to Scale



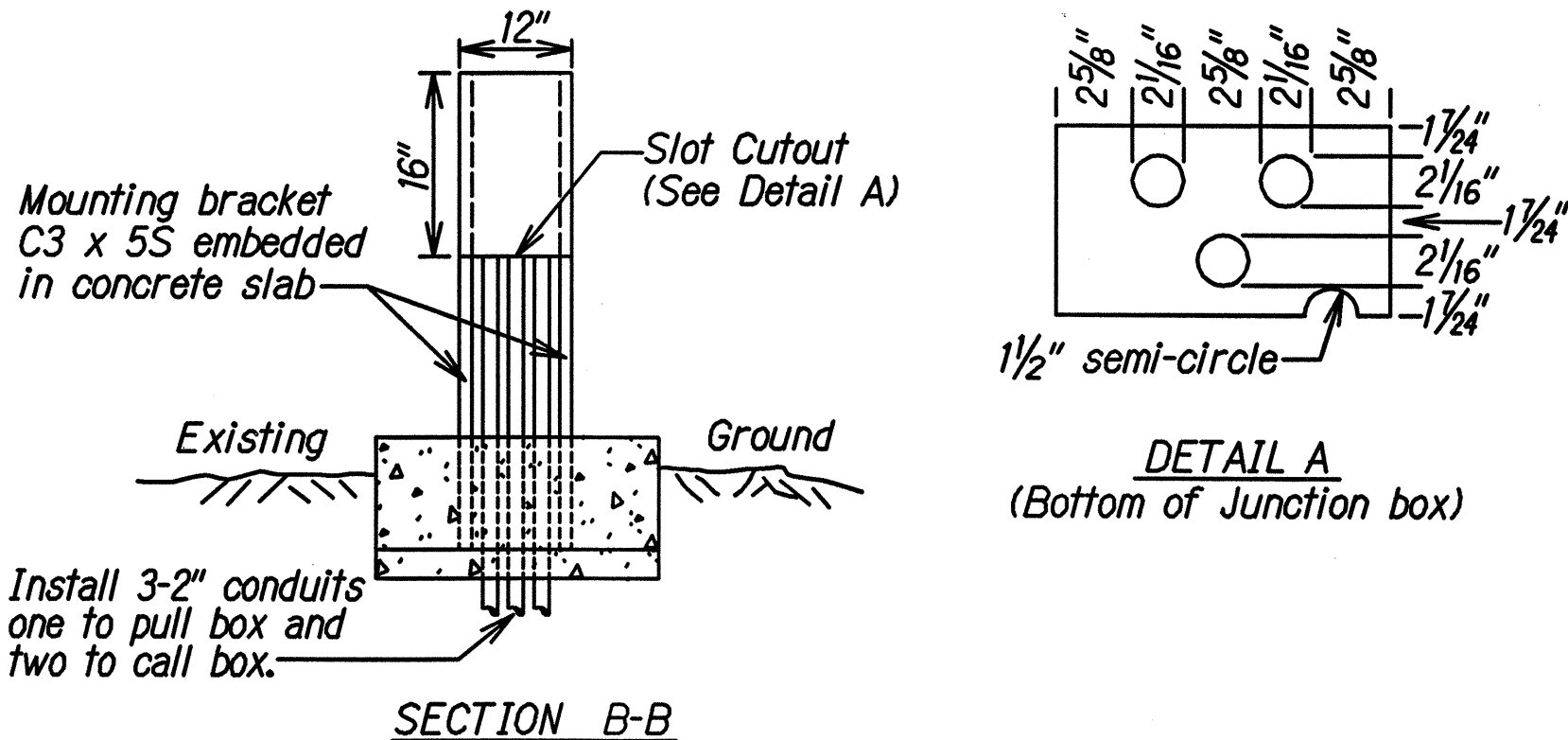
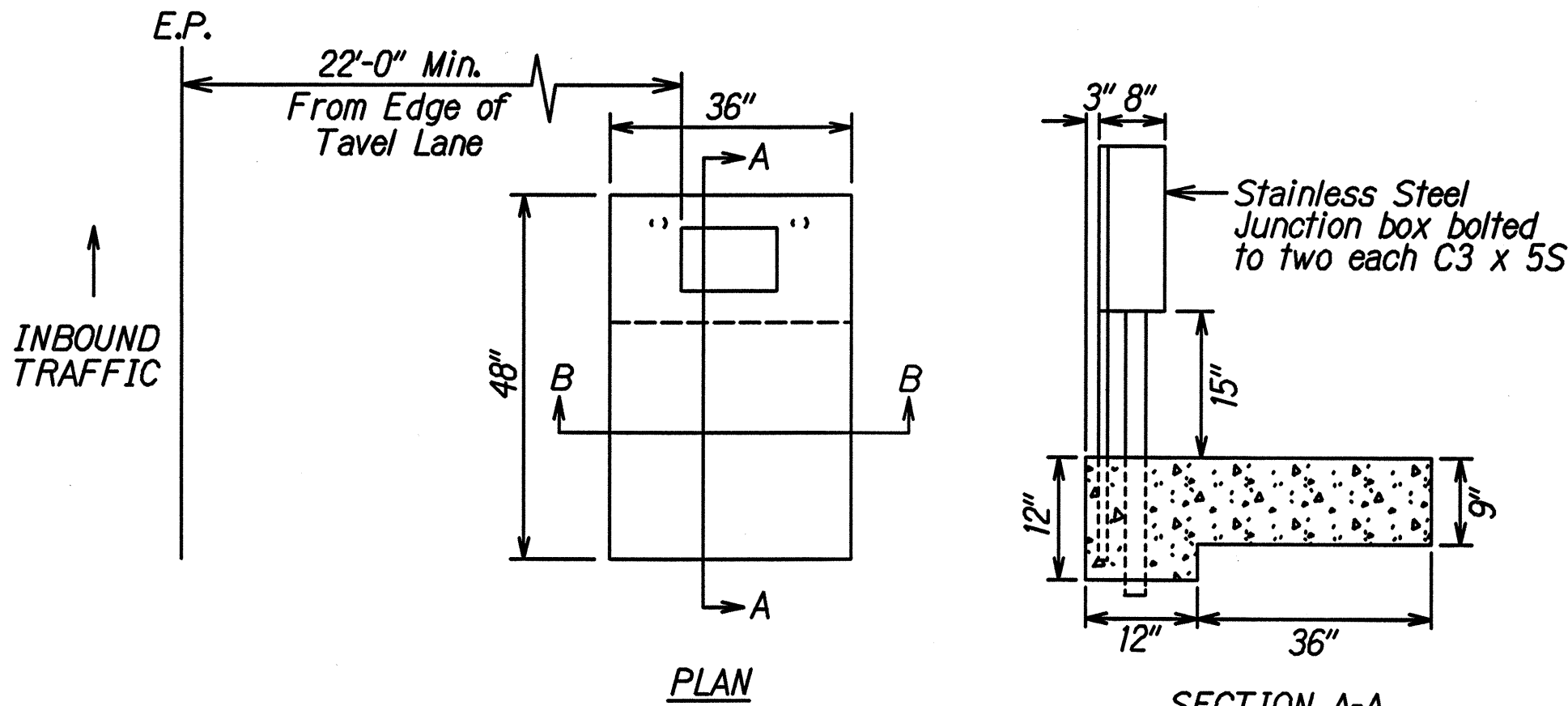
TYPICAL TRENCH SECTION  
FOR CONDUIT  
Not to Scale



TERMINAL BLOCK DETAIL  
Not to Scale



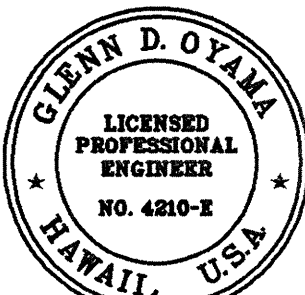
CONDUIT LAYOUT  
Not to Scale



CONCRETE PAD AND JUNCTION BOX  
Not to Scale

CONCRETE PAD AND JUNCTION BOX NOTES

- Removal of existing junction box and concrete pad is considered incidental to other contract items.
- Mount a junction box on concrete slab (36"x48") as shown.
- Concrete for new slab shall be poured in place.
- The Contractor shall furnish keys of the junction boxes to the STATE.
- Mount one 20-pin terminal board on wall inside the junction box
- All conduits shall be steel or schedule 80 PVC.
- All fastenings shall be secured by screws. Holes for the screws shall be drilled and tapped.
- All conduits shall be laid a minimum depth of 24" below the surface's finished grade.



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

VEHICLE DETECTOR SYSTEM  
INTERSTATE ROUTE H-1 REHABILITATION  
OLA LANE TO KALIHI STREET  
PROJECT NO. HIH-01-00M  
Scale: As Shown      Date: October 31, 2002  
SHEET No. E-22 OF E-22 SHEETS