BLDG 1784, SOLAR RENEWABLE ENERGY SYSTEM AT KALAELOA

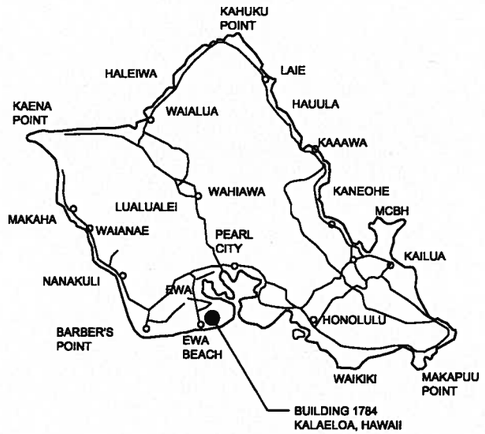
CONTRACT NO. PN#15120012, CA-1209-C

FOR THE
DEPARTMENT OF DEFENSE
STATE OF HAWAII

HAWAII ARMY NATIONAL GUARD (HIARNG)

PREPARED BY
CH2M HILL

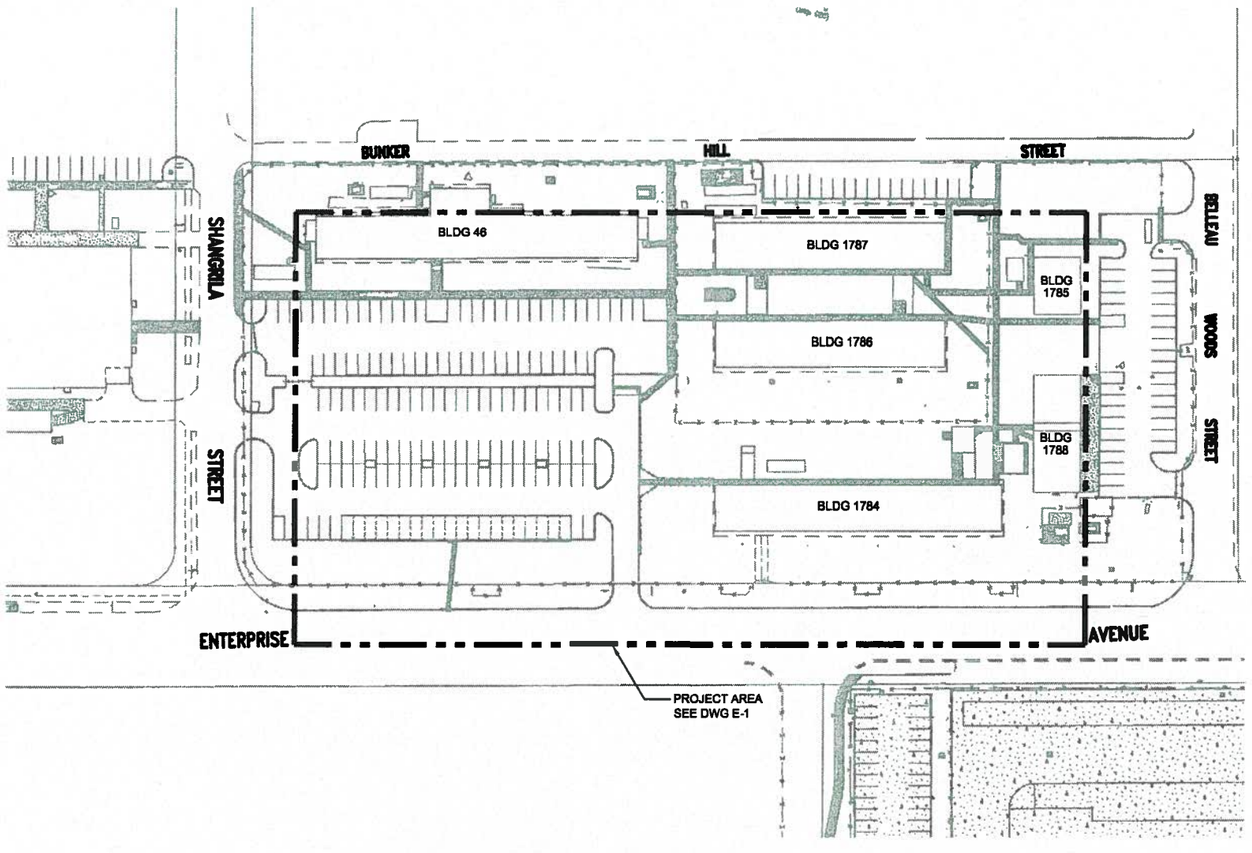
DRAWING INDEX



OAHU

LOCATION MAP

NTS



VICINITY MAP

1"=60'-0"

NORTH

PROJECT NORTH

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

BY: Debra Vieira

EXP DATE: APRIL 30, 2018

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

NO	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL DESIGN

SUBMITTAL DATE: 5 SEPT 2014

DES CM | DRW JJS | CHK DLV

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD

STATE OF HAWAII
BUILDING 1784
KALAELOA, OAHU, HAWAII

SOLAR RENEWABLE ENERGY SYSTEM

TITLE SHEET, LOCATION MAP AND INDEX

SCALE: AS NOTED

STATE JOB NO. CA-1209-C

FEDERAL PROJECT NO. PN#15120012

SHEET 1 OF 9

G-1

GENERAL CONSTRUCTION NOTES

A. EXERCISE ALL DUE CARE AND CAUTION NECESSARY TO AVOID ANY DAMAGE INFLICTED TO AND IMPAIRMENT IN THE USE OF ANY EXISTING UNDERGROUND AND OVERHEAD LINES. ANY DAMAGE INFLICTED ON EXISTING LINES RESULTING FROM THE CONTRACTOR'S OPERATIONS SHALL BE IMMEDIATELY REPAIRED OR RESTORED AS DIRECTED BY THE CONTRACTING OFFICER AT THE CONTRACTOR'S EXPENSE.

B. THE CONTRACTOR ASSUMES SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT APPLIES CONTINUOUSLY AND IS NOT LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE ENGINEER-OF-RECORD, CH2M HILL, THE STATE OF HAWAII AND CONTRACTING OFFICER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE ENGINEER-OF-RECORD, CH2M HILL, STATE OR CONTRACTING OFFICER.

C. KEEP THE PROJECT WORK AREAS AND SURROUNDING AREA FREE FROM RUBBISH, DUST, NOISE, EROSION, ETC. COMPLY WITH THE AIR AND WATER POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE HAWAII STATE DEPARTMENT OF HEALTH.

D. PROTECT EXISTING IMPROVEMENTS AND UTILITIES. REPLACE AND RESTORE TO THEIR ORIGINAL OR BETTER CONDITION ALL IMPROVEMENTS DAMAGED AS A RESULT OF THE CONSTRUCTION, INCLUDING, BUT NOT LIMITED TO, PAVEMENTS, EMBANKMENTS, ELECTRICAL CIRCUITS, PIPES, CURBS, SIGNS, LANDSCAPING, STRUCTURES, UTILITIES, WALLS, CEILINGS, FENCES, AND SO FORTH. DEMOLITION AND RESTORATION OF EXISTING ITEMS ARE INCIDENTAL AND INCLUDED IN THE CONTRACT WORK.

E. PROVIDE "RECORD" DRAWINGS OF ALL NEW WORK UPON COMPLETION OF WORK. ON FULL SIZE CONTRACT DRAWINGS CLEARLY MARK ALL CHANGES AND ADJUSTMENTS PERFORMED IN THE FIELD, DRAWN ACCURATELY AND TO SCALE WITH APPROPRIATE CALLOUTS, ORIENTATIONS AND DIMENSIONS.

F. DURING CONSTRUCTION USE PREVENTIVE MEASURES TO CONTROL FORESEEABLE DUST, EROSION OR SEDIMENTATION WHICH ARISE AS A RESULT OF CONTRACT ACTIVITIES.

G. REMOVE ALL SILT AND DEBRIS DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS, AND OTHER AREAS RESULTING FROM THIS WORK. THE COST FOR ANY NECESSARY REMEDIAL ACTION SHALL BE PAID BY THE CONTRACTOR.

H. PRESERVE EXISTING MONUMENTS, BENCH MARKS, RANGE TIES, PROPERTY MARKERS, REFERENCE POINTS, AND STAKES.

I. SHOULD ANY UNIDENTIFIED MATERIAL, SITE OR REMAINS, SUCH AS ARTIFACTS, SHELL, BONE, OR CHARCOAL DEPOSITS, BURIALS, ROCK OR CORAL ALIGNMENTS, PAVINGS OR WALL BE ENCOUNTERED, IMMEDIATELY CEASE WORK IN THE AFFECTED AREA. NOTIFY THE CONTRACTING OFFICER IMMEDIATELY. PETROGLYPHS AND OTHER ARCHAEOLOGICAL FEATURES MUST BE PROTECTED DURING CONSTRUCTION. PROCEED WITH SUBSEQUENT WORK ONLY UPON AN ARCHAEOLOGICAL CLEARANCE FROM THE SHPD, THROUGH THE CONTRACTING OFFICER. SUCH DELAYS, IF ENCOUNTERED, ARE INCLUDED AS PART OF THE CONTRACT WORK.

J. SHOULD SOFT, YIELDING OR NON-HOMOGENEOUS SOILS BE ENCOUNTERED, OVER EXCAVATE THESE SOILS UNTIL COMPETENT UNDERLYING MATERIAL IS REACHED. DISPOSE OF SOILS PROPERLY OFFSITE. PROVIDE SUITABLE MATERIAL AND BACKFILL THE OVER EXCAVATED LOCATIONS.

K. ALL SURFACE RESTORATIONS SHALL BE PERFORMED IN STRICT CONFORMANCE WITH DETAIL 2320 ON DRAWING E-3 AND THE SPECIFICATIONS, REFER UNCERTAIN CASES TO THE CONTRACTING OFFICER AND INSTALL AS DIRECTED AS PART OF THE CONTRACT WORK.

L. OBTAIN AND PAY FOR REQUIRED PERMITS FROM APPROPRIATE GOVERNMENT AGENCIES. COORDINATE THE STORAGE OF MATERIAL AND EQUIPMENT WITH THE CONTRACTING OFFICER. SECURITY OF MATERIALS STORED AT THE SITE IS ENTIRELY THE RESPONSIBILITY OF THE CONTRACTOR

M. OBSERVE AND COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH, SAFETY AND ENVIRONMENTAL HEALTH.

N. PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES AND OTHER PROTECTIVE FACILITIES. TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE AND SAFETY OF THE PUBLIC AND HIARNG PERSONNEL.

O. SHOULD HAZARDOUS MATERIAL BE ENCOUNTERED, NOTIFY THE CONTRACTING OFFICER AND SUSPEND WORK IN THE AREA UNTIL THE MATERIAL IS PROPERLY REMEDIATED, HANDLED AND DISPOSED BY OTHERS. SUCH DELAYS WHICH MAY OCCUR AS A RESULT OF HAZARDOUS MATERIAL DISCOVER AND REMEDIATION ARE PART OF THE CONTRACT WORK.

P. NOTWITHSTANDING MANUFACTURER'S WARRANTY LIMITS OR DATE PLACED IN SERVICE, PROVIDE A WRITTEN GUARANTEE TO REPAIR OR REPLACE ANY CONTRACT WORK THAT MAY DEVELOP DEFECTS DUE TO FAULTY MATERIALS OR WORKMANSHIP FOR A PERIOD OF AT LEAST ONE (1) YEAR AFTER FINAL PAYMENT.

Q. SEE ALSO GENERAL NOTES ON THE DRAWINGS AND THE SPECIFICATIONS. IN THE EVENT OF DISCOVERY OF CONFLICTING REQUIREMENTS THE GREATER (MORE COSTLY) REQUIREMENT IS APPLICABLE AND INCLUDED IN THE CONTRACT WORK UNLESS OTHERWISE DIRECTED IN WRITING BY THE CONTRACTING OFFICER.

R. DRAWINGS SHALL NOT BE SCALED. REFERENCE SCALES INDICATED ON THE DRAWINGS ARE INTENDED FOR INFORMATION USE ONLY AND SHALL NOT BE USED TO DETERMINE SPECIFIC DIMENSIONS OR QUANTITY OF MATERIALS.

S. PRIOR TO FABRICATION AND CONSTRUCTION, THE CONTRACTOR SHALL VERIFY EXISTING ELEVATIONS AND DIMENSIONS ASSOCIATED WITH THE WORK. ALL OMISSIONS OR CONFLICTS BETWEEN VARIOUS ELEMENTS OF THE CONTRACT DRAWINGS AND/OR SPECIFICATIONS SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTING OFFICER / OWNER PRIOR TO PROCEEDING WITH RELATED WORK.

T. SPECIFICATIONS SHALL BE USED IN CONJUNCTION WITH THE DRAWINGS FOR PURPOSES OF BIDDING, SCHEDULING, AND CONSTRUCTION.

U. THE CONTRACTOR SHALL COORDINATE WITH THE CONTRACTING OFFICER / OWNER TO LOCATE ALL EXISTING UNDERGROUND UTILITIES AND BURIED ITEMS PRIOR TO CONSTRUCTING FOUNDATIONS.

V. THE STRUCTURAL DRAWINGS REPRESENT THE FINISHED STRUCTURE AND DO NOT INDICATE THE METHOD OF CONSTRUCTION. CONSTRUCTION LOADS SHALL NOT EXCEED THE DESIGN LIVE LOADS.

W. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK RELATED TO CONSTRUCTION, ERECTION METHODS, BRACING, SHORING, RIGGING, GUYS, SCAFFOLDING, FORMWORK, ETC. REQUIRED TO SAFELY PERFORM THE WORK.

X. STRUCTURAL MEMBERS SHALL NOT BE CUT (FOR PIPES, DUCTS, ETC.) UNLESS SPECIFICALLY DETAILED OR APPROVED IN WRITING BY THE CONTRACTING OFFICER / OWNER.

ENVIRONMENTAL REQUIREMENTS

1. IN ORDER TO FACILITATE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA) REPORTING REQUIREMENTS, PRIOR TO START OF CONSTRUCTION AND WITHIN 30 DAYS OF COMPLETION OF THE PROJECT, CONTRACTOR SHALL SUBMIT TO HIARNG-ENV A HAZARDOUS MATERIAL INVENTORY LOG OF CHEMICAL PRODUCTS TO BE USED IN THE PROJECT, AND PROVIDE AN UPDATE NO LATER THAN 31 JANUARY OF EACH CALENDAR YEAR. THE LOG SHALL INCLUDE THE PRODUCT NAME AND MANUFACTURER ID NUMBER, CONTAINER SIZE, AMOUNT USED, AND MAXIMUM NUMBER OF CONTAINERS TO BE STORED ON SITE AT ANY GIVEN DAY DURING THE PROJECT. MATERIAL SAFETY DATA SHEETS (MSDSS) SHALL BE PROVIDED OR MADE AVAILABLE TO THE COR AND HIARNG-ENV UPON REQUEST.
2. PRIOR TO START OF CONSTRUCTION, CONTRACTOR WILL PROVIDE TO HIARNG-ENV AN ESTIMATE OF THE MAXIMUM AMOUNT OF HAZARDOUS WASTE EXPECTED TO BE GENERATED PER MONTH, AND THE TOTAL AMOUNT ANTICIPATED BEING STORED ON-SITE AT ANY GIVEN TIME. ALL WASTE WILL BE STORED IN A SECURED AREA PENDING REMOVAL FOR DISPOSAL, WITH SIGNAGE INDICATING CONTACT INFORMATION AND SHALL BE MANAGED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS FOR DISPOSAL OF WASTE GENERATED FROM THIS PROJECT AND SHALL PROVIDE COPIES OF ALL WASTE DISPOSAL DOCUMENTATION (INCLUDING ANY REQUIRED LAB ANALYSES, WASTE PROFILES, AND ANY OTHER SUPPORTING DOCUMENTATION) TO THE COR AND HIARNG-ENV, ALONG WITH DRAFT COPIES OF THE WASTE MANIFESTS FOR REVIEW PRIOR TO WASTE SHIPMENT OFF-SITE FOR DISPOSAL. IF THE CONTRACTOR UTILIZES A HIARNG EPA ID NUMBER FOR WASTE DISPOSAL, MANIFESTS WILL ONLY BE SIGNED BY INDIVIDUALS AUTHORIZED BY HIARNG-ENV.
4. HIARNG-ENV APPROVAL IS REQUIRED FOR ANY FUELING OPERATIONS BEING CONDUCTED ON-SITE. IF APPROVED, FUELING OPERATIONS WILL BE CONDUCTED IN ACCORDANCE WITH (IAW) ALL APPLICABLE REQUIREMENTS.
5. HIARNG-ENV APPROVAL IS REQUIRED FOR ANY ABOVEGROUND STORAGE TANK STAGED ON-SITE. FOR STORAGE OF OIL EXCEEDING THE EPA THRESHOLD OF 1,320 GALLONS SHELL CAPACITY OF OIL IN CONTAINERS 55 GALLONS OR GREATER, CONTRACTOR IS RESPONSIBLE FOR PREPARING A SPILL PREVENTION, CONTROL, AND COUNTERMEASURES (SPCC) PLAN IN ACCORDANCE WITH 40 CFR 112 AND SHALL PROVIDE A COPY OF THE PLAN TO HIARNG-ENV.
6. FOR ALL OIL-FILLED OPERATIONAL EQUIPMENT BEING INSTALLED UNDER THIS PROJECT, INCLUDING PAD-MOUNTED TRANSFORMERS, ABOVEGROUND STORAGE TANKS, AND GENERATORS, PROVIDE TANK OIL/FUEL CAPACITY, TYPE OF OIL/FUEL, SERIAL NUMBER, AND MANUFACTURE DATE TO HIARNG-ENV PRIOR TO INSTALLATION. FOR TRANSFORMERS, ALSO PROVIDE MSDS FOR THE DIELECTRIC OIL. PAD-MOUNTED TRANSFORMERS SHALL BE MADE OF 304L GRADE STAINLESS STEEL, INCLUDING THE TANK, CABINET, FINS, AND ALL ASSOCIATED HARDWARE. FOR TRANSFORMERS WITH FINS, THE PAD SHALL EXTEND BEYOND THE FINS.
7. CONTRACTOR SHALL USE PROTECTIVE MEASURES FOR ON-SITE CHEMICALS, EQUIPMENT AND VEHICLES TO PREVENT SPILLS AND LEAKS INTO THE ENVIRONMENT AND ENSURE ONLY RAINWATER ENTERS ON-SITE UICS, STORM DRAINS, SWALES, STREAMS, AND OTHER PATHS TO NAVIGABLE WATERS.
8. CONTRACTOR SHALL REPORT SPILLS IMMEDIATELY TO THE COR AND HIARNG-ENV AND COMPLETE THE HIARNG SPILL INCIDENT REPORT FORM AS REQUIRED. CONTRACTOR SHALL IMMEDIATELY CLEAN UP ALL SPILLS IAW FEDERAL AND STATE GUIDELINES AND TO THE SATISFACTION OF HIARNG-ENV. CONTRACTOR SHALL MAINTAIN ADEQUATE SPILL SUPPLIES COMMENSURATE WITH THE POTENTIAL FOR SPILLS, AND WILL CONTRACT OUT SPILL CLEANUP BEYOND THEIR CAPABILITIES. CONTRACTOR SHALL ACCOMPLISH ALL REGULATORY VERBAL AND WRITTEN NOTIFICATIONS TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE (LEPC), NATIONAL RESPONSE CENTER (NRC), ENVIRONMENTAL PROTECTION AGENCY (EPA), AS APPLICABLE, AND PROVIDE HIARNG-ENV COPIES OF ALL SPILL REPORTS.
9. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY AND ALL REQUIRED ENVIRONMENTAL PERMITS, E.G., CONSTRUCTION-RELATED SURFACE DISCHARGE PERMITS, COUNTY-REQUIRED INDUSTRIAL WASTEWATER DISCHARGE PERMITS, MINOR (POLLUTION) SOURCE AIR PERMITS, ETC. FOR ANY CONTRACT-RELATED WORK.

ABBREVIATIONS

+/-	PLUS OR MINUS
A	AMPERE
AC	AIR CONDITIONING, ALTERNATING CURRENT
ADDL	ADDITIONAL
AFF	ABOVE FINISH FLOOR (OR GRADE)
AIC	AMPERE INTERRUPTING CAPACITY
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
BLDG	BUILDING
B.O.	BOTTOM OF
C	CONDUIT, CONTACTOR
CB	CIRCUIT BREAKER
CLR	CLEAR
COMM	TELECOMMUNICATIONS
CO	CONDUIT ONLY, CLEAN OUT
C.O./C.O.R.	CONSULTING OFFICER/CONTRACTING OFFICER'S REPRESENTATIVE
CONC	CONCRETE
CT	CURRENT TRANSFORMER
DC	DIRECT CURRENT
EMBED	EMBEDMENT
EXST	EXISTING
FDR	FEEDER
FLR	FLOOR
G, GND	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HDOE	HAWAII DEPARTMENT OF EDUCATION
HECO	HAWAII ELECTRIC COMPANY
HH	HANDHOLE
HIARNG	HAWAII ARMY NATIONAL GUARD
J-BOX	JUNCTION BOX
KA	KILOAMPERES
L	LIGHTING
LC	LOAD CENTER
MLO	MAIN LUGS ONLY
MIN	MINIMUM
MFR	MANUFACTURER
MTD	MOUNTED
N	NEUTRAL
NAVFAC	NAVAL FACILITIES (HAWAII)
NIC	NOT IN CONTRACT
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (STANDARD)
OC	ON CENTER
PB	PULL BOX
PFB	PROVISIONS (FOR) FUTURE BREAKER
PH	PHASE
PSI	POUNDS PER SQUARE INCH
PNL	PANEL
PVC	POLYVINYL CHLORIDE (CONDUIT)
RGS	RIGID GALVANIZED STEEL (CONDUIT)
SCCR	(INTEGRATED EQUIPMENT) SHORT CIRCUIT CURRENT RATING (RMS SYMMETRICAL)
SHPD	STATE HISTORIC PRESERVATION DIVISION
SL	SITE LIGHT
SMH	SANITARY MANHOLE
SST	STAINLESS STEEL
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VOLTMETER, VOLT
W	WATT
W/	WITH
WM	WATER METER
WP	WEATHERPROOF
WVB	WATER VALVE BOX
XFMR	TRANSFORMER

SYMBOL LEGEND

SYMBOL	DESCRIPTION
GENERAL	
(1)	KEYED SHEET NOTE REFERENCE
3356	DETAIL REFERENCE, SEE DETAIL DRAWINGS
ELECTRICAL	
J	PULL/JUNCTION BOX ON WALL OR SOFFIT FACE
J	PULL / JUNCTION BOX ON STRUCTURE OR CEILING
———	EXPOSED WIRING, IN CONDUIT UON
- - - -	CONCEALED OR UNDERGROUND WIRING, IN CONDUIT UON
	EQUIPMENT OR ENCLOSURE AS INDICATED
	DISTRIBUTION EQUIPMENT AS INDICATED
	DISCONNECT SWITCH, "F" DENOTES FUSED, "C" DENOTES CIRCUIT BREAKER
M	UTILITY REVENUE METER IN APPROVED SOCKET
⊗	GROUND ROD
[1°C, 3#4, #10G]	TYPICAL CIRCUIT CALLOUT WITH TRADE SIZE OF CONDUIT AND QUANTITY AND SIZE OF CONDUCTORS.

DEBRA L. VIEIRA
LICENSED PROFESSIONAL ENGINEER
No. 14653-E
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

BY: Debra Vieira
EXP DATE: APRIL 30, 2016

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

A/E INFO

SEAL

NO.	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
FINAL DESIGN
SUBMITTAL DATE 5 SEPT 2014
DES CM DRW JJS CHK DLV

DEPARTMENT OF DEFENSE
STATE OF HAWAII
HAWAII ARMY NATIONAL GUARD
KALAELOA, OAHU, HAWAII
BUILDING 1784

SOLAR RENEWABLE ENERGY SYSTEM

NOTES, LEGEND AND ABBREVIATIONS

SCALE: AS NOTED
STATE JOB NO. CA-1209-C
FEDERAL PROJECT NO. PN#15120012
SHEET 2 OF 9

G-2

STRUCTURAL DESIGN CRITERIA:

1. DESIGN CODE AND STANDARD:
   UFC 1-200-01: GENERAL BUILDING REQUIREMENTS
   UFC 3-301-01: STRUCTURAL ENGINEERING
2. LIVE LOAD:
   ROOF:
   MINIMUM ROOF LIVE LOAD ——— 20 PSF (REDUCIBLE)
   250 LB (CONCENTRATED)
3. DEAD LOAD:
   PV MODULES ——— 15 PSF
   MEP ——— 5 PSF
   5 PSF, MAX SHALL BE USED TO RESIST WIND UPLIFT
4. OCCUPANCY CATEGORY ——— II
5. WIND LOAD (IN ACCORDANCE WITH ASCE 7):
   BASIC WIND SPEED (3-SECOND GUST) ——— 105 MPH
   EXPOSURE ——— C
   ENCLOSURE CLASSIFICATION ——— OPEN
6. SEISMIC LOAD:
   SITE CLASS ——— D
   SPECTRAL RESPONSE ACCELERATIONS:
   Ss ——— 0.587g
   S1 ——— 0.165g
   SEISMIC DESIGN CATEGORY ——— D
7. SEISMIC LATERAL RESISTING SYSTEM:
   NON-BUILDING STRUCTURE (IN ACCORDANCE WITH ASCE 7, CHAPTER 15)

SUBMITTALS:

THE FOLLOWING SUBMITTALS SHALL BE SUBMITTED IN ACCORDANCE WITH SPECIFICATION 01 33 00:

1. SPECIAL INSPECTOR, TESTING TECHNICIAN, AND TEST LAB QUALIFICATIONS.
2. PRE-ENGINEERED SUPPORT STRUCTURE MFGR QUALIFICATIONS.
3. CONCRETE MIX DESIGN INDICATING COMPLIANCE WITH ALL MATERIAL REQUIREMENTS. PROVIDE PRODUCT DATA SHEETS FOR ALL ADMIXTURES AND POZZOLANS.
4. REBAR SHOP DRAWING FOR CIP PIERS.
5. PRE-ENGINEERED SUPPORT STRUCTURE DRAWINGS AND STRUCTURAL CALCULATIONS. CALCULATIONS SHALL INCLUDE COLUMN BASE REACTIONS FOR VERIFICATION OF THE FOUNDATION DESIGN. DRAWINGS SHALL IDENTIFY ALL QC/QA TESTS AND INSPECTIONS REQUIRED FOR CODE COMPLIANCE.
6. WELD AND WELDER CERTIFICATIONS IN ACCORDANCE WITH AWS D1.1 AND AWS D1.3.
7. MILL CERTIFICATIONS FOR STEEL, FASTENERS, AND ANCHOR RODS INDICATING COMPLIANCE WITH THE PEB DESIGN.
8. SPECIAL INSPECTIONS AND TEST REPORTS.
9. GEOTECHNICAL RECOMMENDATIONS FOR CIP DRILLED PIERS.

SPECIAL INSPECTION AND TESTING

1. THE GENERAL CONTRACTOR SHALL ENGAGE 3RD PARTY SPECIAL INSPECTION AND TESTING AGENCIES TO PERFORM THE QUALITY ASSURANCE ACTIVITIES IDENTIFIED BELOW. THE CONTRACTOR SHALL PAY FOR THESE SERVICES.
2. MINIMUM QUALIFICATIONS FOR TEST AND INSPECTION AGENCIES SHALL BE AS FOLLOWS:
   a. PIER DRILLING INSPECTOR SHALL BE A REGISTERED GEOTECHNICAL ENGINEER IN THE STATE OF HAWAII.
   b. CONCRETE AND REINFORCING INSPECTORS SHALL BE ICC OR ACI CERTIFIED SPECIAL INSPECTORS FOR CONCRETE.
   c. CONCRETE SAMPLING AND TESTS SHALL BE PERFORMED BY ACI CERTIFIED FIELD TECHNICIANS.
   d. HIGH STRENGTH BOLTING INSPECTORS SHALL BE ICC CERTIFIED FOR STEEL.
   e. WELDING INSPECTORS SHALL BE AWS CWI, OR ACWI WORKING UNDER THE SUPERVISION OF A CWI.
3. THE 3RD PARTY AGENCIES SHALL OPERATE INDEPENDANTLY OF THE CONTRACTOR AND REPORT INSPECTION AND TEST RESULTS DIRECTLY TO THE CONTRACTING OFFICER.
4. THE CONTRACTOR SHALL SCHEDULE ALL INSPECTIONS AND TESTS AND NOTIFY THE CONTRACTING OFFICER NO LESS THAN 48 HRS PRIOR TO THESE ACTIVITIES.
5. CONTRACTOR SHALL CORRECT NON-COMPLIANT WORK AND SCHEDULE RE-INSPECTIONS WHEN DEEMED NECESSARY BY THE CONTRACTING OFFICER.
6. QUALITY ASSURANCE TESTS AND INSPECTIONS:
   a. DURING DRILLING FOR CIP PIERS, OBSERVE DRILLING OPERATIONS AND CONFIRM SHAFT WALLS AND BEARING SURFACES ARE SUITABLE.
   b. PRIOR TO PLACEMENT OF CONCRETE INTO DRILLED SHAFTS, INSPECT REBAR CAGE, ANCHOR RODS, AND SHAFT SURFACES.
   c. DURING EACH DAY OF CONCRETE PLACEMENT TEST SLUMP, TEMPERATURE, AIR CONTENT, AND PREPARE COMPRESSIVE STRENGTH CYLINDERS.
   d. PROVIDE SPECIAL INSPECTION AND NON-DESTRUCTIVE TESTING FOR STEEL WELDING AND HIGH STRENGTH BOLTING IN ACCORDANCE WITH PEB REQUIREMENTS.

DRILLED PIERS:

1. DRILLING SHALL NOT BEGIN UNTIL THE PRE-ENGINEERED SUPPORT STRUCTURE SUBMITTAL HAS BEEN APPROVED. THIS IS NECESSARY TO CONFIRM PIER SIZES AND REINFORCING.
2. DRILLED PIERS SHALL BE INSTALLED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT.
3. DRILLED SHAFTS SHALL BE INSPECTED BY A REGISTERED GEOTECHNICAL ENGINEER. IF, IN THE OPINION OF THE GEOTECHNICAL ENGINEER, THE DRILLED SHAFT CONDITIONS ARE NOT SUITABLE TO SUPPORT THE REQUIRED LOADS, THE GENERAL CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER IMMEDIATELY, AND ALLOW THE GOVERNMENT 10 BUSINESS DAYS TO DETERMINE MITIGATIVE MEASURES.
4. PRIOR TO CONCRETE PLACEMENT, SHAFT SHALL BE CLEAR OF LOOSE MATERIALS OR DEBRIS.
5. REBAR CAGE SHALL BE IN PLACE AND FULLY SUPPORTED, AT THE TIME OF CONCRETE PLACEMENT.

CONCRETE:

1. CONCRETE MATERIALS, WORKMANSHIP AND QUALITY CONTROL SHALL BE IN ACCORDANCE WITH ACI 301 AND ACI 318.
2. CONCRETE PROPERTIES SHALL BE AS FOLLOWS:
   MINIMUM COMPRESSIVE STRENGTH f'c ..... 5000 PSI
   SLUMP ..... 2-4 INCHES PRIOR TO ADDITION OF PLASTICIZERS
   6-8 INCHES AFTER ADDITION OF PLASTICIZERS
   AIR CONTENT 2%-5%
   AGGREGATE ..... ASTM C33
   INCLUDING APPENDIX FOR EVALUATING ALKALI REACTIVITY
   CEMENT ..... ASTM C150, TYPE II, 564 LB MIN PER CU. YD.
   WATER ..... POTABLE, MAX W/C RATIO SHALL BE 0.45
3. EXPOSED EDGES OF CONCRETE PIER SHALL BE CHAMFERED 3/4 INCH, UNLESS SPECIFICALLY NOTED OTHERWISE.
4. REINFORCING BARS SHALL BE COLD BENT. BARS EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT, EXCEPT WHEN SPECIFICALLY INDICATED ON THE DRAWINGS.
5. SUPPLY ALL FORMWORK AND ACCESSORIES REQUIRED TO FORM, PLACE, AND CURE THE CONCRETE IN ACCORDANCE WITH THESE DRAWINGS AND THE REFERENCED STANDARDS.
6. ALLOW THE COR TO INSPECT CONCRETE SURFACES IMMEDIATELY UPON REMOVAL OF FORMS AND PRIOR TO ANY PATCHING. EXCESSIVE HONEYCOMB OR EMBEDDED DEBRIS IN CONCRETE IS NOT ACCEPTABLE. PATCH IMPERFECTIONS AS DIRECTED BY THE COR.
7. CONCRETE NOT CONFORMING TO THE REQUIRED LINES, DETAILS, DIMENSIONS, TOLERANCES OR SPECIFIED MATERIAL PROPERTIES WILL BE CONSIDERED DEFECTIVE CONCRETE. REPAIR OR REPLACEMENT OF DEFECTIVE CONCRETE WILL BE AT THE DISCRETION OF THE COR. DO NOT PATCH, FILL, TOUCH-UP, REPAIR, OR REPLACE CONCRETE EXCEPT ON THE EXPRESS DIRECTION OF THE COR.

PRE-ENGINEERED STEEL SUPPORT STRUCTURE

1. SEE SPECIFICATION 13 34 19 FOR ADDITIONAL REQUIREMENTS.
2. THE GENERAL CONTRACTOR SHALL PROVIDE ALL COMPONENTS NECESSARY FOR A COMPLETE SUPPORT STRUCTURE INSTALLATION INCLUDING, BUT NOT LIMITED TO, ANCHOR RODS AND ALL MISC STEEL NECESSARY TO SUPPORT MEP SYSTEMS.
3. ALL COMPONENTS OF THE SUPPORT STRUCTURE, INCLUDING THE ANCHOR RODS, SHALL BE DESIGNED BY A REGISTERED ENGINEER EMPLOYED BY THE SUPPORT STRUCTURE MFGR. THE SUPPORT STRUCTURE SHALL BE DESIGN FOR THE LOADS IDENTIFIED IN DETAIL 3/S-2.
4. COLUMN BASES SHALL BE DESIGNED WITH RIGID MOMENT CONNECTIONS TO THE FOUNDATION.
5. THE FOUNDATION IS DESIGNED FOR THE COLUMN REACTIONS IDENTIFIED ON DRAWING S-1. IF THE FINAL COLUMN REACTIONS, AS DETERMINED BY THE SUPPORT STRUCTURE ENGINEER, ARE HIGHER THAN THE REACTIONS INDICATED, THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER IMMEDIATELY AND ALLOW THE GOVERNMENT 14 BUSINESS DAYS TO REVISE THE FOUNDATION DESIGN.
6. SUPPORT STRUCTURE DESIGN, MATERIALS, WORKMANSHIP, AND QUALITY CONTROL SHALL BE IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE.
7. THE SUPPORT STRUCTURE ENGINEER SHALL SPECIFY ALL QC/QA TESTS AND INSPECTIONS REQUIRED FOR BUILDING CODE COMPLIANCE.
8. STRUCTURAL STEEL SHALL BE DESIGNED, FABRICATED, AND ERECTED IN ACCORDANCE WITH AISC 360, AISC 303, AWS D1.1 AND THE SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGHT BOLTS.
9. COLD FORMED STEEL SHALL BE DESIGNED, FABRICATED, AND ERECTED IN ACCORDANCE WITH AISI S100, AISI S200, AND AWS D1.3.
10. ALL WELD PROCEDURES, MATERIALS, AND WELDERS SHALL BE PREQUALIFIED IN ACCORDANCE WITH AWS D1.1 FOR STRUCTURAL STEEL OR AWS D1.3 FOR SHEET STEEL.
11. THE SUPPORT STRUCTURE MFGR SHALL HAVE AT LEAST 5 YEARS OF DOCUMENTED EXPERIENCE FABRICATING WORK OF A SIMILAR NATURE. DOCUMENTED EXPERIENCE SHALL BE SUBMITTED TO THE CONTRACTING OFFICER FOR REVIEW AND APPROVAL.

GEOTECHNICAL

1. FOUNDATION DESIGN IS BASED ON THE FOLLOWING GEOTECHNICAL DESIGN RECOMMENDATIONS:
   a. SITE CLASS: D
   b. DEEP FOUNDATION TYPE: CIP DRILLED PIERS
   c. ALLOWABLE TIP BEARING: 3660 PSF
   d. CIP PIER DIAMETER: 4'-0"
   e. BEARING DEPTH: 14 FT BELOW FINISHED GRADE
   f. BEARING STRATUM: CORALLINE GRAVEL, MEDIUM DENSITY
2. GEOTECHNICAL DESIGN RECOMMENDATIONS ARE BASED ON THE SOIL DATA REPORT:
   "DRAFT SOIL DATA REPORT - GEOTECHNICAL EXPLORATION", 31 JULY 2014 PREPARED BY PACIFIC GEOTECHNICAL ENGINEERS INC, PGE JOB NO. 5000-023.
3. THE GENERAL CONTRACTOR SHALL ENGAGE A GEOTECHNICAL ENGINEER REGISTERED IN THE STATE OF HAWAII TO REVIEW THE SOIL DATA REPORT AND PREPARE THE FOLLOWING RECOMMENDATIONS REQUIRED BY THE BUILDING CODE:
   a. ADDITIONAL SOILS INVESTIGATION. IF THE CONTRACTORS GEOTECHNICAL ENGINEER DESIRES ADDITIONAL INVESTIGATION, THE CONTRACTOR SHALL PROVIDE THESE SERVICES.
   b. PIER INSTALLATION PROCEDURES
   c. CONTRACTOR FIELD INSPECTION AND REPORTING PROCEDURES
   d. LOAD TEST REQUIREMENTS
4. GEOTECHNICAL RECOMMENDATIONS SHALL BE SEALED AND SUBMITTED TO THE CONTRACTING OFFICER PRIOR TO CONSTRUCTION.

DENNIS R. PEARSON
LICENSED PROFESSIONAL ENGINEER
No. 14413-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature

4/30/14

Expiration Date of the License

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

A/E INFO

SEAL

NO.	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL DESIGN
SUBMITTAL DATE: 5 SEPT 2014
DES: KP | DRW: MR | CHK: DRP

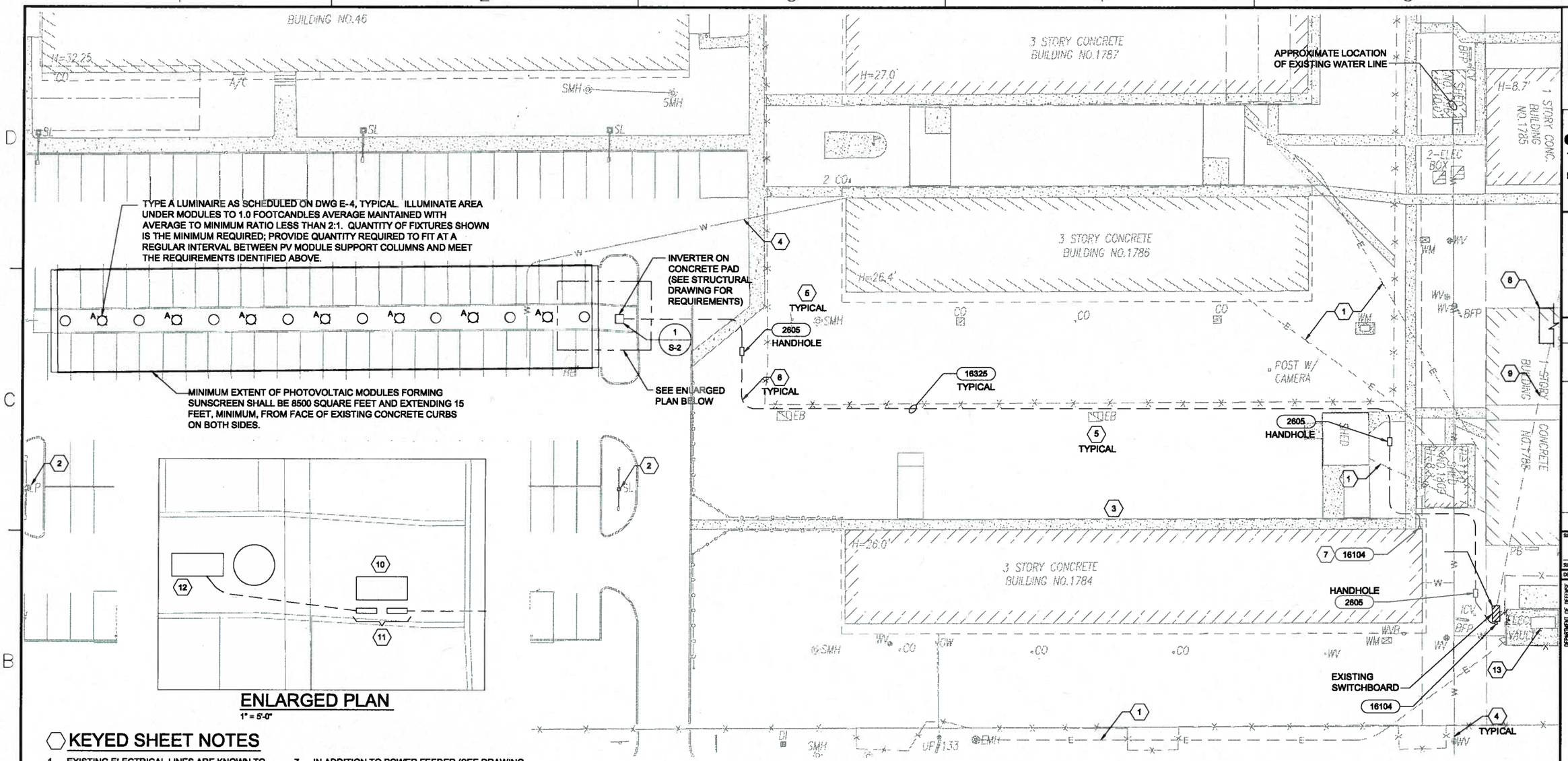
DEPARTMENT OF DEFENSE
STATE OF HAWAII
HAWAII ARMY NATIONAL GUARD
KALAELOA, OAHU, HAWAII
BUILDING 1784

SOLAR RENEWABLE ENERGY SYSTEM

STRUCTURAL NOTES

SCALE: AS NOTED
STATE JOB NO. CA-1209-C
FEDERAL PROJECT NO. PN#15120012
SHEET 3 OF 9

G-3



ENLARGED PLAN

1" = 5'-0"

SITE PLAN

1" = 20'-0"

PROJECT NORTH

KEYED SHEET NOTES

1. EXISTING ELECTRICAL LINES ARE KNOWN TO RUN BETWEEN THESE LOCATIONS. ROUTING IS DIAGRAMMATIC AND ALL EXISTING LINES ARE NOT SHOWN. LOCATE EXISTING UNDERGROUND LINES AS REQUIRED; SEE GENERAL NOTES.
2. MAINTAIN CONTINUITY OF SERVICE TO EXISTING PARKING AREA LIGHTS.
3. ELEVATOR RECENTLY ADDED ON THE WEST SIDE OF BUILDING 1784 IS NOT SHOWN.
4. APPROXIMATE LOCATION OF EXISTING WATER LINES; ALL EXISTING LINES ARE NOT SHOWN. LOCATE EXISTING UNDERGROUND LINES AS REQUIRED; SEE GENERAL NOTES.
5. EXISTING SANITARY SEWER AND STORM LINES ARE KNOWN TO BE IN THE WORK AREAS. LOCATE EXISTING UNDERGROUND LINES AS REQUIRED; SEE GENERAL NOTES.
6. HORIZONTAL UNDERGROUND ELBOWS SHALL BE 36" MINIMUM RADIUS.
7. IN ADDITION TO POWER FEEDER (SEE DRAWING E-2) RUN TWO 1" CONDUITS FROM INVERTER LOCATION TO LOCATION IN BUILDING AS DIRECTED BY CONTRACTING OFFICER. ONE CONDUIT SHALL BE WIRED (MODBUS RS485 DATA FEED) FROM INVERTER TO GOVERNMENT EMS. NETWORK CONNECTION PROVIDED BY HIARNG. SEE EMS TIE-IN DIAGRAM ON DRAWING E-4. THE OTHER SHALL BE LEFT EMPTY AND CAPPED AT BOTH ENDS FOR FUTURE SECURITY SURVEILLANCE CLOSED CIRCUIT TELEVISION.
8. APPROXIMATE LOCATION FOR THE BUILDING 1788 NETWORK CLOSET. COORDINATE ACTUAL LOCATION WITH THE CONTRACTING OFFICER.
9. 1 INCH CONDUIT AND CABLE CONNECTION (MODBUS RS485 DATA FEED) BETWEEN SWITCHBOARD METER AND BUILDIING 1788 NETWORK CLOSET. CONTRACTOR TO ESTABLISH ROUTING BASED ON SITE CONDITIONS USING EXISTING PATHWAYS WHERE POSSIBLE. ALL PENETRATIONS THROUGH THE FACILITY PERIMETER SHALL BE SEALED AND PAINTED TO MATCH SURROUNDING AREA IF REPAIRS ARE REQUIRED.
10. INTEGRATED INVERTER.
11. SPLICE BOX AND PANELBOARD MOUNTED ON A FREESTANDING, GALVANIZED UNISTRUT SUPPORT AND ANCHORED TO THE INVERTER EQUIPMENT PAD. SUPPORT SHALL PROVIDE A MINIMUM 6" CLEARANCE TO THE BACK OF THE INVERTER. WP/GFCI RECEPTACLE MOUNTED ON RACK BETWEEN PANELBOARD AND SPLICE BOX.
12. ELECTRIC VEHICLE CHARGING STATION PEDESTAL MOUNTED ON CONCRETE PAD. INSTALL PEDESTAL WITH A MINIMUM 36" SET BACK FROM FRONT FACE OF CURB. SEE 1/S-2
13. EXISTING 300 KVA TRANSFORMER.

GENERAL SHEET NOTES

A. SEE ALSO GENERAL CONSTRUCTION NOTES ON DRAWING E-2.

B. FEEDER ROUTING AND HANDHOLE LOCATIONS ARE DIAGRAMMATIC. REVIEW AVAILABLE RECORD DRAWINGS, SURVEY EXISTING CONDITIONS AND LOCATE EXISTING LINES AS PART OF THE CONTRACT WORK. SUBSEQUENTLY SUBMIT FULL-SIZED SHOP DRAWING OF PROPOSED ROUTING AND HANDHOLE LOCATIONS FOR APPROVAL BY THE CONTRACTING OFFICER.

C. UNDERGROUND PIPES AND ELECTRICAL CONDUITS ARE KNOWN TO EXIST IN ALL AREAS OF WORK. DETERMINE THE LOCATIONS AND DEPTHS OF ALL EXISTING LINES PRIOR TO EXCAVATING THE AREA. DO NOT RELY SOLELY ON ANY RECORD DRAWINGS OBTAINED. PERFORM UNDERGROUND LOCATES OF EXISTING LINES PRIOR TO EXCAVATION. AS PART OF THE CONTRACT WORK, CONTACT UTILITY COMPANIES AND PAY ANY COSTS ASSOCIATED WITH LOCATING THEIR FACILITIES.

D. CONTRACTOR SHALL PROTECT ALL EXISTING SITE WORK AND UTILITIES DURING CONSTRUCTION AND SHALL REPLACE ALL ITEMS DAMAGED TO EQUAL OR BETTER CONDITION AT NO ADDITIONAL COST TO THE GOVERNMENT.

DEBRA L. VIEIRA LICENSED PROFESSIONAL ENGINEER NO. 14692-E HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

BY: Debra Vieira

EXP DATE: APRIL 30, 2016

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

SUBMITTAL PHASE: FINAL DESIGN

SUBMITTAL DATE: 5 SEPT 2014

DES CM | DRW JJS | CHK DLV

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
KALAELOA, OAHU, HAWAII
BUILDING 1784
STATE OF HAWAII

SOLAR RENEWABLE ENERGY SYSTEM

ELECTRICAL SITE PLAN

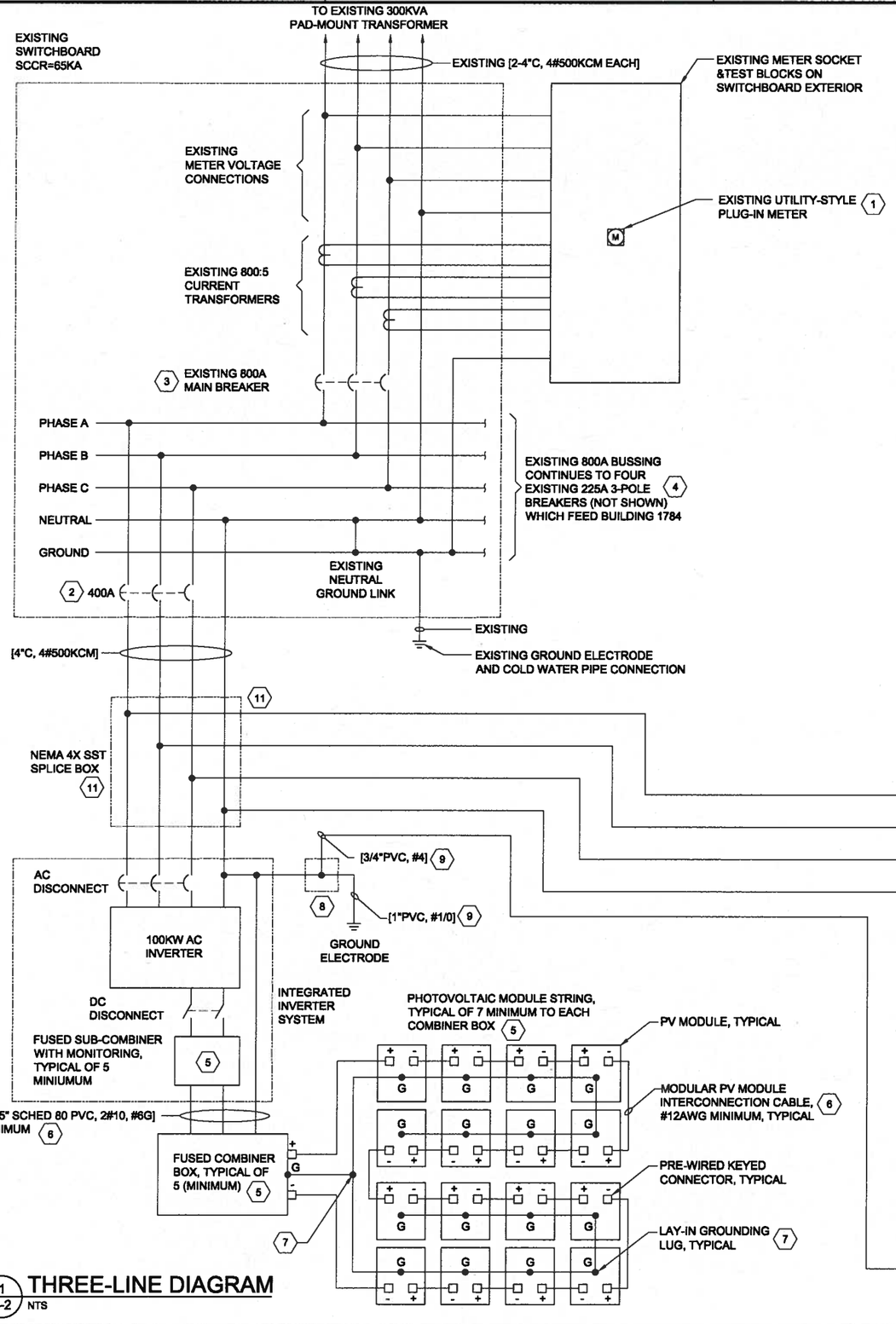
SCALE: AS NOTED

STATE JOB NO. CA-1209-C

FEDERAL PROJECT NO. PN#15120012

SHEET 4 OF 9

E-1



1 E-2 THREE-LINE DIAGRAM NTS

GENERAL NOTES

A. ALL WORK SHOWN ON THIS DRAWING IS NEW UNLESS OTHERWISE NOTED.

B. AC SYSTEM CHARACTERISTICS ARE 208Y/120V THREE-PHASE FOUR-WIRE PLUS GROUND WITH SOLIDLY GROUNDED WYE SERVICE TRANSFORMER CONNECTION.

C. AC CIRCUITS AND BUSSING ARE ALL THREE-PHASE FOUR-WIRE PLUS GROUND UNLESS OTHERWISE NOTED.

D. INFORMATION REGARDING EXISTING EQUIPMENT AND CIRCUITS IS BASED ON UNVERIFIED RECORD DRAWINGS PREPARED BY OTHERS AND LIMITED VISUAL OBSERVATIONS BY THE ENGINEER. INVESTIGATE AND VERIFY EXISTING CONDITIONS AS PART OF CONTRACT WORK. REFER UNCERTAIN CONDITIONS TO THE CONTRACTING OFFICER FOR RESOLUTION PRIOR TO EXECUTING THE WORK; INSTALL AS DIRECTED AS PART OF THE CONTRACT WORK.

E. PERFORM ARC FLASH STUDY AND PROVIDE ARC FLASH LABELING ON NEW EQUIPMENT AND EXISTING SWITCHBOARD AS PART OF CONTRACT WORK. AVAILABLE THREE-PHASE FAULT CURRENT AT SWITCHBOARD IS 14,000A RMS SYMMETRICAL. SEE KEYED NOTES FOR EXISTING BREAKERS AND THEIR SETTINGS.

KEYED SHEET NOTES

1. EXISTING ITRON SENTINEL METER (TYPE SS4S1D) SHALL BE MODIFIED AND RE-PROGRAMMED BY FACTORY AUTHORIZED TECHNICIAN TO ALSO RECORD REVERSE ENERGY AND TOTALIZE NET ENERGY USE.
2. PROVIDE NEW BREAKER IN EXISTING EATON CUTLER-HAMMER POW-R-LINE SWITCHBOARD DISTRIBUTION SECTION. PROVIDE NEW BREAKER MOUNTING KIT AND COVERS AS REQUIRED. TWO EXISTING 225A FUTURE BREAKER PROVISIONS SHALL BE LEFT INTACT. MAINTAIN EXISTING SHORT CIRCUIT CURRENT RATING (SCCR).
3. EXISTING SWITCHBOARD MAIN BREAKER IS CUTLER-HAMMER HMDL 65KA WITH MT3800T THERMAL MAGNETIC TRIP UNIT SET AT MINIMUM INSTANTANEOUS TRIP (3200A) ON ALL THREE PHASES.
4. EXISTING SWITCHBOARD DISTRIBUTION BREAKERS ARE CUTLER-HAMMER HJD 65K WITH JT3225T THERMAL MAGNETIC TRIP UNITS SET AT MAXIMUM INSTANTANEOUS TRIP (2250A) ON ALL THREE PHASES OF ALL FOUR BREAKERS.

KEYED SHEET NOTES

5. THE EXACT QUANTITY AND ARRANGEMENT OF COMBINER BOXES AND PV MODULES WILL VARY ACCORDING TO THE CONTRACTOR'S SELECTIONS. INDICATED MINIMUM QUANTITIES AND SPECIFIED TECHNICAL REQUIREMENTS FOR ALL COMPONENTS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM SHALL BE PROVIDED AS PART OF THE CONTRACT WORK. THE SYSTEM SHALL ALSO PERFORM AS SHOWN AND SPECIFIED.
6. PROVIDE MINIMUM SIZE DC CONDUCTORS AND CONDUITS INDICATED. CONTRACTOR SHALL DESIGN AND FURNISH CONDUCTORS IN CODE-SIZED PVC SCHEDULE 80 CONDUIT FOR TOTAL DC VOLTAGE DROP NOT MORE THAN 2%.
7. RUN BARE #10AWG SOLID GROUNDING WIRE TO LAY-IN LUGS ON ALL PV MODULES. RUN SPLICE FREE TO THE EXTENT POSSIBLE. WHERE SPLICES AND T-TAPS ARE REQUIRED THEY SHALL BE MADE WITH CRIMP COMPRESSION CONNECTORS USING ONLY THE MANUFACTURER'S RECOMMENDED TOOL.
8. C-TAP GROUNDING ELECTRODE CONDUCTOR IN "T" CONDULET TO CONNECT GROUND FOR 120V CIRCUITS NEUTRAL.
9. AS AN EXCEPTION TO THE SPECIFICATION GROUNDING ELECTRODE CONDUCTORS SHALL BE RUN IN PVC REGARDLESS OF HEIGHT.
10. SERVICE RATED 100AMP, 208/120V, 3 PHASE, NEMA 4X SST PANELBOARD. 20 AMP SINGLE POLE BREAKERS UNLESS OTHERWISE NOTED. 22 KAIC RATED BREAKERS.
11. PROVIDE MINIMUM 24" HIGH X 16" WIDE NEMA 4X BOX. RUN 500KCM CONDUCTORS THROUGH UNSPLICED. USE CRIMP COMPRESSION C-TAP CONNECTORS WITH HEAT SHRINK INSULATION TO TO TAP THE FEEDER CIRCUIT WITH #1 AWG TO SUPPLY LINE-SIDE OF BREAKER FOR 208/120V CIRCUITS. SEE KEYED NOTE 10.
12. PROVIDE FOUR WP/GFCI DUPLEX RECEPTACLES (NOT SHOWN). PROVIDE WITH PAD-LOCKABLE IN-USE COVERS. LOCATE ON EACH END AND CENTER OF PV SUPPORT STRUCTURE ON COLUMNS, AND ONE ADJACENT TO INVERTER UNIT. MOUNT APPROXIMATELY 48" ABOVE GRADE. VERIFY LOCATIONS WITH CONTRACTING OFFICER. SEE KEYED NOTE 14.
13. PROVIDE PAD-LOCKABLE NEMA 4X ENCLOSURE FOR SWITCH AT APPROVED LOCATION NEAR INVERTER; SUPPORT AND MOUNT 48" ABOVE GRADE.
14. WIRE LIGHTING, RECEPTACLE, AND SPARE CIRCUITS THROUGH AND HOME RUN WITH [3/4"C, 4#10, #10G] FROM BREAKER TO SOUTH END OF PV MODULE SUPPORT STRUCTURE. INDIVIDUAL BRANCHES TO FIXTURES AND RECEPTACLES MAY BE [3/4"C, 2#12, #12G]. WIRES SHALL BE COLOR CODED THROUGHOUT.
15. TWO - 40 AMP, TWO POLE BREAKERS TO ELECTRIC VEHICLE CHARGING STATION. COMBINE BOTH CIRCUITS IN A SINGLE CONDUIT TO THE CHARGING STATION PEDESTAL. [1"C, 4#8, 2#8G]
16. DUAL 30 AMP SERVICE ELECTRIC VEHICLE CHARGING STATION, WITH INTEGRAL PEDESTAL.
17. SPARE 20 AMP SINGLE POLE BREAKERS.

DEBRA L. VIEIRA LICENSED PROFESSIONAL ENGINEER NO. 14668-E HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

BY: Debra Vieira

EXP DATE: APRIL 30, 2016

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

A/E INFO

SEAL

APPR

DATE

DESCRIPTION

STN

SUBMITTAL PHASE
FINAL DESIGN

SUBMITTAL DATE 5 SEPT 2014

DES CM | DRW JJS | CHK DLV

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
STATE OF HAWAII

KALAELOA, OAHU, HAWAII
BUILDING 1784

SOLAR RENEWABLE ENERGY SYSTEM

ELECTRICAL THREE-LINE DIAGRAM

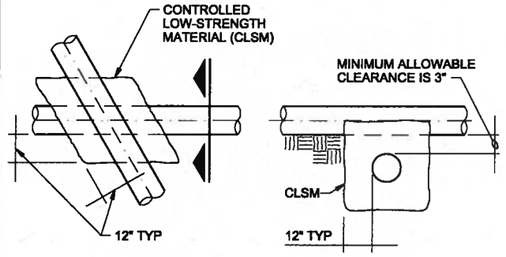
SCALE: AS NOTED

STATE JOB NO.
CA-1209-C

FEDERAL PROJECT NO.
PN#15120012

SHEET 5 OF 9

E-2

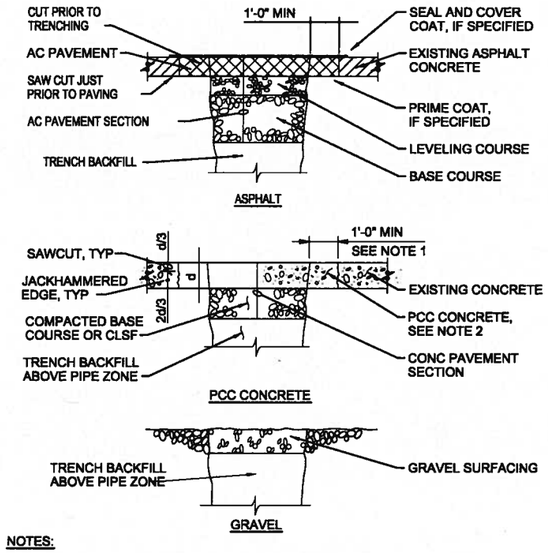


NOTES:

PROVIDE CLSM SUPPORT AND INSTALL ACCORDING TO THIS DETAIL WHERE LINES CROSS AS FOLLOWS:

1. WHEN BOTH LINES ARE NEW AND CLEARANCE BETWEEN THEM IS LESS THAN 12".
2. WHEN A NEW LINE IS CROSSING OVER AN EXISTING LINE AND THE CLEARANCE BETWEEN THEM IS LESS THAN 12".
3. AT ALL CROSSINGS WHERE A NEW LINE IS CROSSING UNDER AN EXISTING LINE.

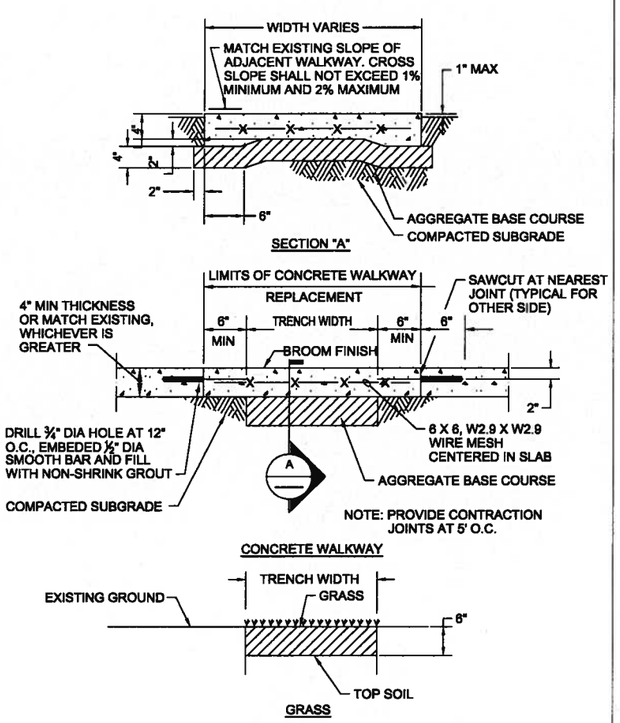
CONDUIT/PIPE CROSSINGS (2315)
NTS

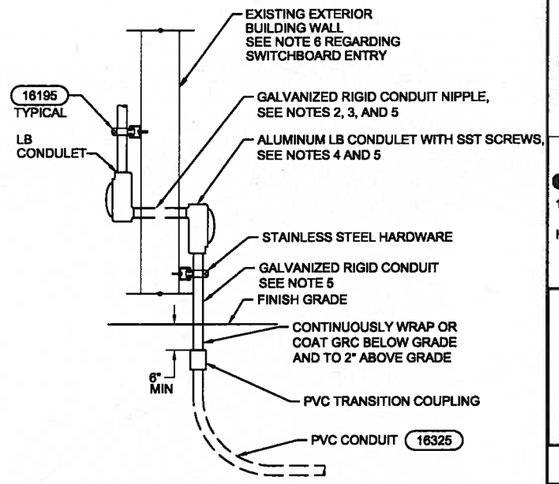


NOTES:

1. IF LOCATION OF TRENCH SAW CUT IS WITHIN 2 FEET OF AN EXISTING JOINT OR EDGE OF CONCRETE, REPLACE ENTIRE CONCRETE TO THE JOINT OR EDGE.
2. CONSTRUCT JOINTS ACROSS NEW CONCRETE TO MATCH EXISTING JOINT TYPES AND LOCATIONS.
3. SURFACE RESTORATION MUST BE COMPATIBLE WITH TYPE OF BACKFILL USED. COMPACTED CRUSHED ROCK BASE SHOULD NOT BE PLACED ON NATIVE MATERIAL.
4. RESTORE SURFACES FOR ALL EXCAVATIONS IN ACCORDANCE WITH THIS DETAIL.
5. NEW PAVEMENTS THICKNESS SHALL MATCH EXISTING.

SURFACE RESTORATION (2320)
NTS

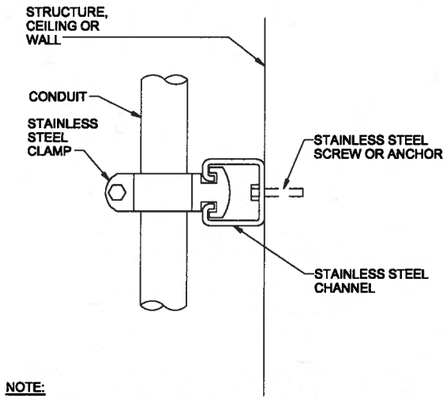




NOTES:

1. INSTALL CONDUITS ENTERING THROUGH EXISTING WALLS IN ACCORDANCE WITH THIS DETAIL UNLESS OTHERWISE INDICATED.
2. DRILL HOLE USING METHODS THAT LEAVE A SMOOTH OPENING WITH NO MORE THAN 3/8" GAP BETWEEN CONDUIT AND OPENING.
3. SEAL OPENING AROUND CONDUIT, WITH POLYURETHANE-BASED IMMERSIBLE SEALANT.
4. SEAL INSIDE CONDUIT AFTER CONDUCTOR INSTALLATION.
5. APPLY CORROSION INHIBITOR ON JOINTS BETWEEN DISSIMILAR METALS.
6. INSTALL CONDUIT ENTERING EXISTING SWITCHBOARD IN SIMILAR FASHION EXCEPT WIRES MAY RUN OPEN IN SWITCHBOARD, BUT DO NOT ROUTE THROUGH UTILITY CT METERING OR SERVICE CONDUCTOR COMPARTMENTS.

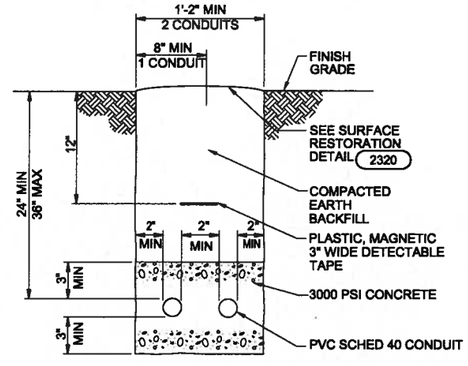
CONDUIT ENTRANCE (16104)
NTS



NOTE:

1. EXCEPT WHERE OTHERWISE NOTED SUPPORT ALL EXPOSED CONDUITS ON FORMED CHANNELS IN ACCORDANCE WITH THIS DETAIL. SEE SPECIFICATIONS FOR MATERIAL REQUIREMENTS.

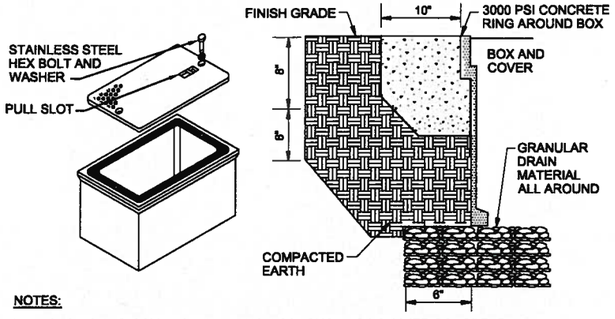
CONDUIT SUPPORT ON STRUCTURE (16195)
NTS



NOTES:

1. WHERE NEW CONDUITS CROSS WITHIN 12" OF EXISTING CONDUITS OR PIPES, SEE 2315.
2. CONCRETE ENCASEMENT MAY BE TERMINATED AND REPLACED WITH SAND FILL OF EQUAL PROPORTIONS WHERE CONDUIT(S) ARE WITHIN 2'-0" OF STUB-UPS TO ABOVE GRADE OR TERMINATIONS AT HANDHOLES.

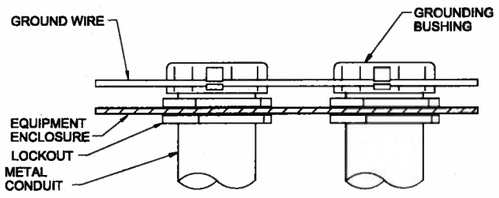
TRENCH AND CONDUIT ENCASEMENT (16325)
NTS



NOTES:

1. HOUSING AND COVER SHALL BE NON-CONDUCTING POLYMER CONCRETE REINFORCED WITH A HEAVY WEAVE FIBERGLASS REINFORCING WITH COMPRESSIVE STRENGTH OF NO LESS THAN 10,000 PSI.
2. ASSEMBLY LOAD RATING SHALL BE ANSI 77 TIER 15 FOR APPLICATIONS SUBJECT TO OCCASIONAL NON-DELIBERATE HEAVY VEHICULAR TRAFFIC.
3. PROVIDE STAINLESS STEEL BOLTS AND INSERTS AND LABEL "ELECTRICAL" ON COVER.
4. RESTORE AREA SURROUNDING HANDHOLE. 2320
5. SIZE HANDHOLE AS REQUIRED. MINIMUM 16" WIDE X 24" LONG CLEAR INSIDE. NOTE CONDUITS OVER 2" TERMINATING ON SIDES, AND CONDUITS OVER 3" SIZE TERMINATING ON ENDS, WILL REQUIRE AN INCREASE IN BOX SIZE IN ACCORDANCE WITH NEC.
6. CONDUITS (NOT SHOWN) STUBBING UP IN THE HANDHOLE SHALL BE TURNED UP SO THE BOTTOM OF THE CONDUIT END OPENING IS 3" MINIMUM ABOVE THE GRAVEL AND ANGLED FOR PULLING CONDUCTORS STRAIGHT OUT THROUGH THE COVER OPENING.
7. CLOSE CONDUIT ENDS DURING CONSTRUCTION AND SEAL WATERTIGHT AFTER CONDUCTOR INSTALLATION. SEAL EMPTY CONDUIT ENDS.

COMPOSITE HANDHOLE (2605)
NTS



NOTE:

1. EXCEPT BRANCH CIRCUIT WIRING INDOORS, THE ENDS OF ALL METAL CONDUITS SHALL BE GROUNDED IN ACCORDANCE WITH THIS DETAIL.

CONDUIT GROUNDING (16452)
NTS

DEBRA L. VIEIRA LICENSED PROFESSIONAL ENGINEER NO. 14888-E HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

EXP DATE: APRIL 30, 2016

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

APP'R	DATE	DESCRIPTION

SUBMITTAL PHASE: FINAL DESIGN

SUBMITTAL DATE: 5 SEPT 2014

DES CM | DRW JJS | CHK DLV

DEPARTMENT OF DEFENSE — STATE OF HAWAII

HAWAII ARMY NATIONAL GUARD

KALAELOA, OAHU, HAWAII

BUILDING 1784

SOLAR RENEWABLE ENERGY SYSTEM

ELECTRICAL DETAILS

SCALE: AS NOTED

STATE JOB NO. CA-1209-C

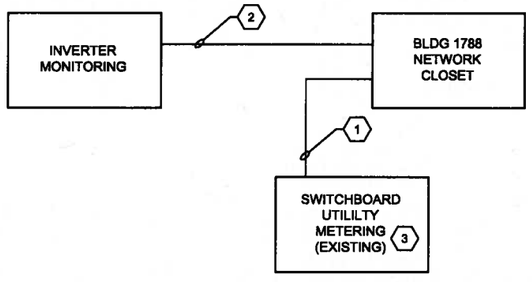
FEDERAL PROJECT NO. PN#15120012

SHEET 8 OF 9

E-3

TYPE	INPUT	DESCRIPTION	BASIS OF DESIGN	LAMPS	MOUNTING AND REMARKS
A	120V	LED CANOPY LUMINAIRE, DIE CAST ALUMINUM HOUSING WITH INTEGRAL HEAT SINK, UL WET LISTED HOUSING. TYPE 5 MEDIUM DISTRIBUTION. PF > 90%, THD < 20%, WITH SURGE PROTECTION AND BIRD SPIKES. INCLUDE PROGRAMMABLE MULTIPLE LIGHTING LEVELS WITH OCCUPANCY SENSORS.	CREE EDGE SERIES WITH PROGRAMMABLE MULTI-LEVEL CONTROLS CAN-EDG-5M-PD	2500 LUMEN LED 400K CRI > 70	PENDANT MOUNTED

1 / E-4 LUMINAIRE SCHEDULE



2 / E-4 ENERGY MANAGEMENT SYSTEM (EMS)TIE-IN DIAGRAM

NTS

GENERAL NOTES

A. ALL WORK SHOWN ON THIS DRAWING IS NEW UNLESS OTHERWISE NOTED.

KEYED SHEET NOTES

1. 1" CONDUIT AND BELDEN 9341 OR APPROVED EQUIVALENT CABLE. FOR ADDITIONAL INFORMATION, SEE KEYED SHEET NOTE 9 ON DRAWING E-1.
2. 1" CONDUIT AND BELDEN 9341 OR APPROVED EQUIVALENT CABLE. FOR ADDITIONAL INFORMATION, SEE KEYED SHEET NOTE 7 ON DRAWING E-1.
3. COORDINATE COMMUNICATION REQUIREMENTS WITH EXISTING METER AND CONTRACTING OFFICER.

DEBRA L. VIEIRA LICENSED PROFESSIONAL ENGINEER NO. 14522-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

BY: Debra Vieira

EXP DATE: APRIL 30, 2016

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

A/E INFO

SEAL

NO	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE: FINAL DESIGN

SUBMITTAL DATE: 5 SEPT 2014

DES: CM | DRW: JJS | CHK: DLV

DEPARTMENT OF DEFENSE: HAWAII ARMY NATIONAL GUARD

STATE OF HAWAII: BUILDING 1784, KALAELOA, OAHU, HAWAII

SOLAR RENEWABLE ENERGY SYSTEM

ELECTRICAL SCHEDULES AND DIAGRAMS

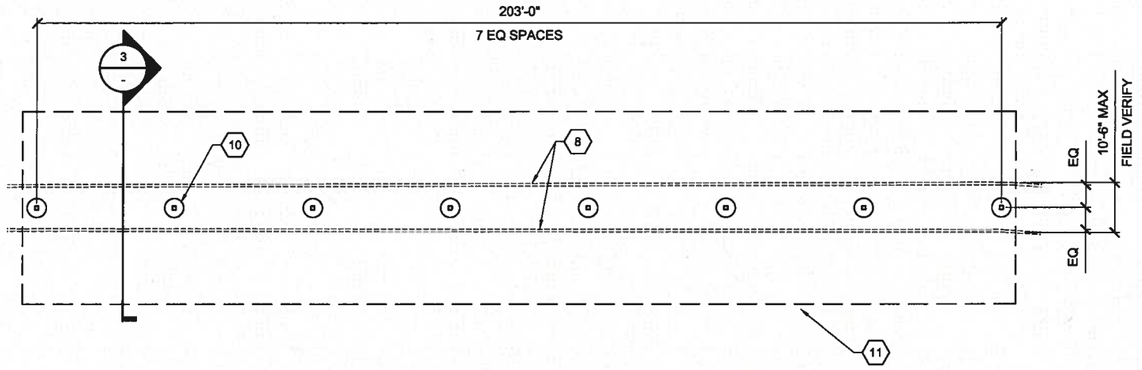
SCALE: AS NOTED

STATE JOB NO. CA-1209-C

FEDERAL PROJECT NO. PN#15120012

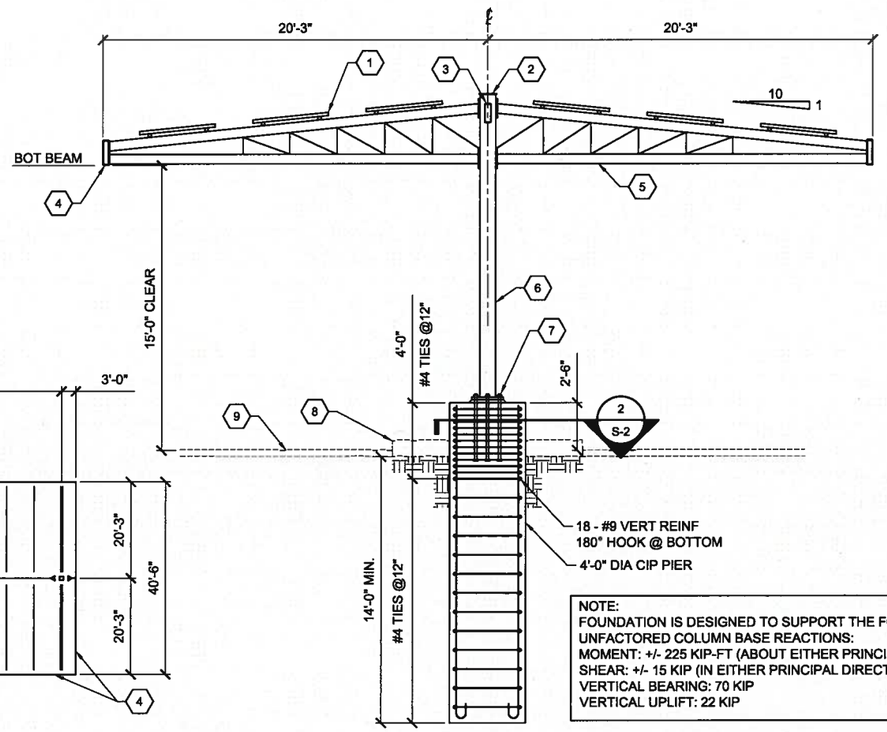
SHEET 7 OF 9

E-4

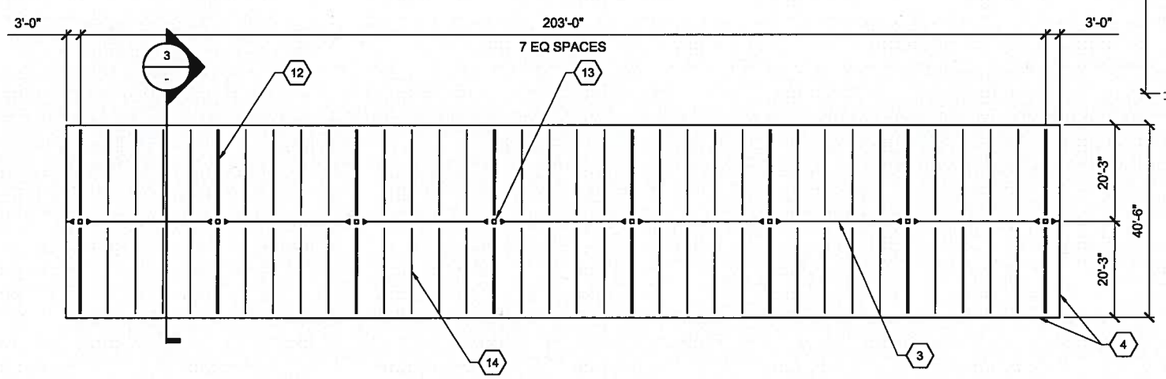


1 S-1 **FOUNDATION PLAN** 1/16" = 1'-0"

NORTH PROJECT NORTH



NOTE:
FOUNDATION IS DESIGNED TO SUPPORT THE FOLLOWING UNFACTORED COLUMN BASE REACTIONS:
MOMENT: +/- 225 KIP-FT (ABOUT EITHER PRINCIPAL AXIS)
SHEAR: +/- 15 KIP (IN EITHER PRINCIPAL DIRECTION)
VERTICAL BEARING: 70 KIP
VERTICAL UPLIFT: 22 KIP



2 S-1 **PRE-ENGINEERED SUPPORT STRUCTURE PLAN** 1/16" = 1'-0"

NORTH PROJECT NORTH

3 S-1 **SECTION** 1/8" = 1'-0"

GENERAL SHEET NOTES

A. SEE DRAWING G-3 FOR GENERAL STRUCTURAL NOTES.

B. GENERAL CONTRACTOR SHALL PROVIDE 3RD PARTY SPECIAL INSPECTION AND TESTING AS SPECIFIED IN DRAWING G-3.

C. GENERAL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND STRUCTURAL DESIGN DOCUMENTS FOR APPROVAL IN ACCORDANCE WITH DRAWING G-3.

D. PRE-ENGINEERED STEEL SUPPORT STRUCTURE SHALL BE DESIGNED BY A REGISTERED ENGINEER IN ACCORDANCE WITH DRAWING G-3.

E. THE GENERAL CONTRACTOR SHALL PROVIDE ALL COMPONENTS NECESSARY FOR A COMPLETE CANOPY INSTALLATION INCLUDING ANCHOR RODS AND ALL MISC STEEL NECESSARY TO SUPPORT MEP SYSTEMS.

KEYED SHEET NOTES

1. PV PANELS AND MISC SUPPORTS, ACTUAL QUANTITY AND LAYOUT MAY DIFFER.
2. CAP PLATE
3. TUBE STEEL RIDGE BEAM WITH RIGID MOMENT CONNECTIONS TO COLUMNS
4. 16" DEEP TUBE STEEL PERIMETER BEAMS
5. STEEL OUTRIGGER FRAMES, ACTUAL WEB CONFIGURATION MAY DIFFER
6. SQ TUBE STEEL COLUMN, 10" MIN.
7. COLUMN BASE AND ANCHORS, SUPPORT STRUCTURE ENGINEER SHALL DESIGN COLUMN BASE WITH A RIGID MOMENT CONNECTION TO THE FOUNDATION
8. EXISTING CONCRETE, DEMO AS REQUIRED TO INSTALL NEW FOUNDATIONS
9. EXISTING PAVING
10. 8 - CANOPY COLUMNS ON 4'-0" DIA CIP PIERS
11. EDGE OF SUPPORT STRUCTURE (ABOVE)
12. 8 - STEEL OUTRIGGER FRAMES
13. 8 - SQ TUBE STEEL COLUMNS
14. STEEL SUPPORT BEAMS @ 6'-0" MAX BETWEEN OUTRIGGER FRAMES

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

A/E INFO

SEAL

NO	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
FINAL DESIGN
SUBMITTAL DATE 5 SEPT 2014
DES KP DRW MR CHK DRP

DEPARTMENT OF DEFENSE
STATE OF HAWAII

HAWAII ARMY NATIONAL GUARD
KALAELOA, OAHU, HAWAII
BUILDING 1784

SOLAR RENEWABLE ENERGY SYSTEM

STRUCTURAL PLAN, SECTION AND DETAILS

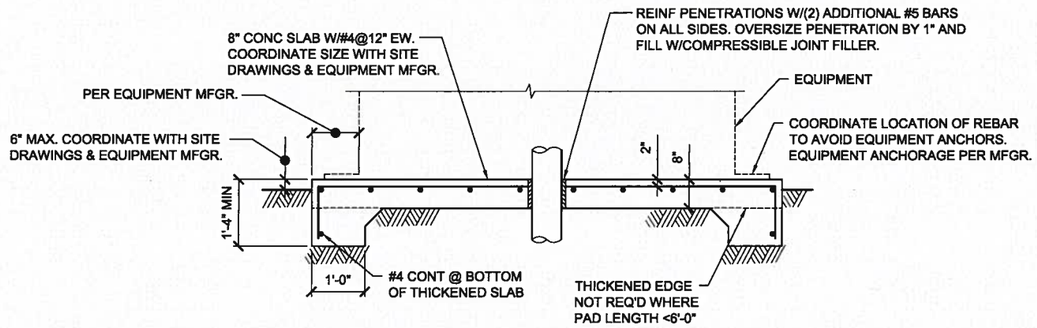
SCALE: AS NOTED
STATE JOB NO. CA-1209-C
FEDERAL PROJECT NO. PN#15120012
SHEET 8 OF 9

S-1

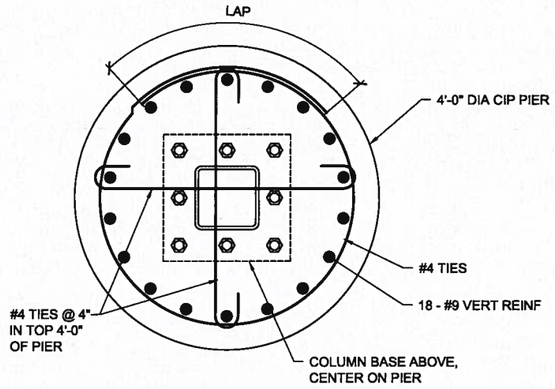
DENNIS R. PEARSON
LICENSED PROFESSIONAL ENGINEER
No. 14413-S
HAWAII, USA

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

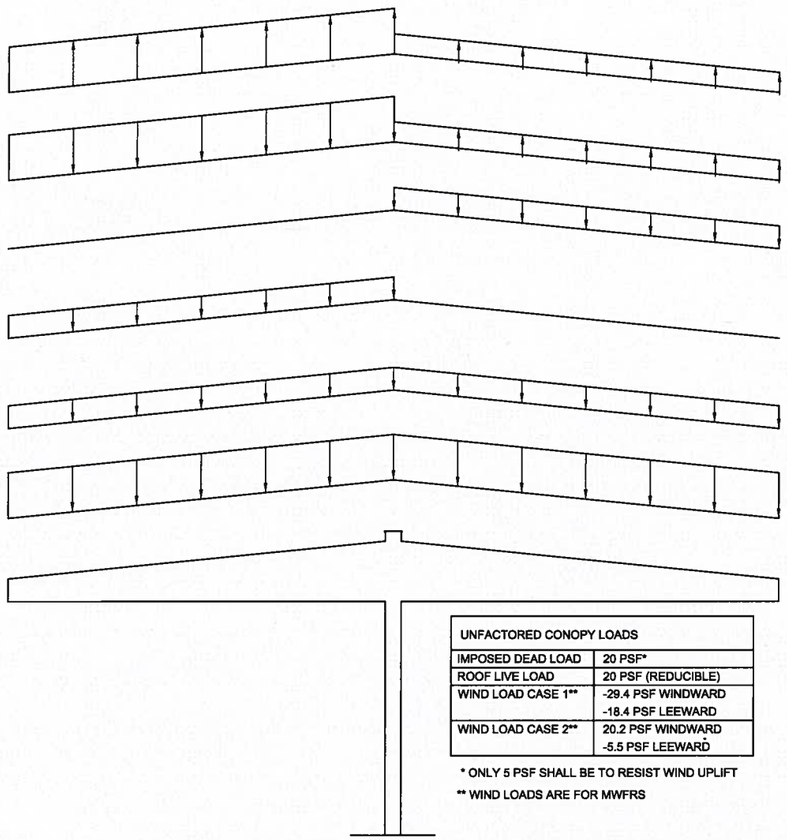
Signature
4/30/14
Expiration Date of the License



1/S-1 EQUIPMENT PAD
NTS



2/S-1 CIP PIER
1" = 1'-0"



UNFACTORED CONOPY LOADS	
IMPOSED DEAD LOAD	20 PSF*
ROOF LIVE LOAD	20 PSF (REDUCIBLE)
WIND LOAD CASE 1**	-29.4 PSF WINDWARD -18.4 PSF LEEWARD
WIND LOAD CASE 2**	20.2 PSF WINDWARD -5.5 PSF LEEWARD

* ONLY 5 PSF SHALL BE TO RESIST WIND UPLIFT

** WIND LOADS ARE FOR MWFRS

3/- DESIGN LOADS FOR STEEL CANOPY FRAME

CH2MHILL.
1132 BISHOP STREET
SUITE 1100
HONOLULU, HI 96813

A/E INFO

SEAL

NO.	DESCRIPTION	DATE	APPR

SUBMITTAL PHASE
FINAL DESIGN
SUBMITTAL DATE 5 SEPT 2014
DES KP DRW JRP CHK DRP

DEPARTMENT OF DEFENSE
HAWAII ARMY NATIONAL GUARD
STATE OF HAWAII
KALAELOA, OAHU, HAWAII
BUILDING 1784

SOLAR RENEWABLE ENERGY SYSTEM

STRUCTURAL SECTIONS AND DETAILS

SCALE: AS NOTED
STATE JOB NO. CA-1209-C
FEDERAL PROJECT NO. PN#15120012
SHEET 9 OF 9

S-2

DENNIS R. PEARSON
LICENSED PROFESSIONAL ENGINEER
No. 14413-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature

4/30/16
Expiration Date of the License