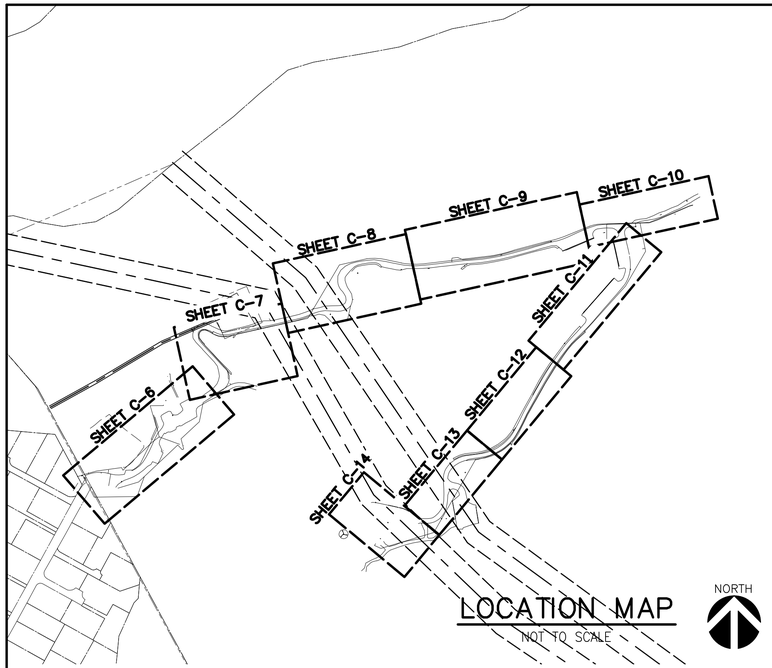


STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

ENGINEERING DIVISION

FOR

DIVISION OF STATE PARKS

JOB NO. F48C612A

KEAIWA HEIAU STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

AIEA, HAWAII

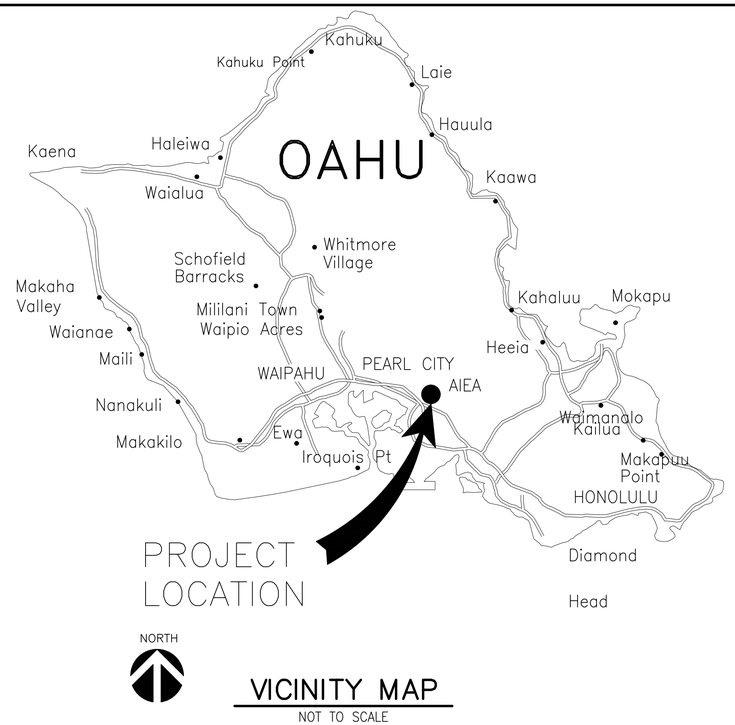
TMK: 9-9-011: 003

PREPARED BY:

CIVIL: AKINAKA & ASSOCIATES, LTD.

STRUCTURAL: KAI HAWAII, INC.

JOB NO: F48C612A APRIL 2026



VICINITY MAP

NOT TO SCALE

INDEX TO DRAWINGS

APPROVED: DATE

ALAN B. CARPENTER
ACTING ADMINISTRATOR
DIVISION OF STATE PARKS
DEPARTMENT OF LAND AND NATURAL RESOURCES

DINA U. LAU
ACTING CHIEF ENGINEER
ENGINEERING DIVISION
DEPARTMENT OF LAND AND NATURAL RESOURCES

PROJECT GENERAL SCOPE:
THE PROJECT INVOLVES REPLACING THE EXISTING GALVANIZED STEEL WATERLINES FEEDING THE KEAIWA STATE PARK RECREATION AREA AND INCLUDES NEW WATER BLADDER TANKS AND A TANK ENCLOSURE BUILDING. THE NEW LINE WILL BE AROUND ~4,500 LF AND BE SCH 80 PVC.

PREFIX:G:\dlnr2403 keaiwa heiau\300 DSGN\310 plans\
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LAYOUT: Layout1

GENERAL CONSTRUCTION NOTES

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE CITY AND COUNTY OF HONOLULU, DEPARTMENT OF PUBLIC WORKS "STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION," DATED SEPTEMBER 1984, AND "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION", DATED SEPTEMBER 1986. UNLESS INDICATED OTHERWISE IN THE PLANS OR THESE NOTES.

2. ALL APPLICABLE CONSTRUCTION WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST REVISION OF THE STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", DATED 2005; THE COUNTY OF DEPARTMENT OF PUBLIC WORKS "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION", DATED 1986 AND "STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION", DATED 1984 WHERE APPLICABLE AND THE APPLICABLE STATE BUILDING CODES AS ADOPTED BY THE STATE BUILDING CODE COUNCIL.

3. EXISTING TOPOGRAPHIC SURVEY WAS CONDUCTED ON MARCH 6, 2026. BY CONTROL POINT SURVEYING THIS TOPOGRAPHIC SURVEY WAS BASED ON THE BEST AVAILABLE INFORMATION AND ACCURACY MUST BE VERIFIED PRIOR TO STARTING CONSTRUCTION.

4. VERIFY AND CHECK ALL DIMENSIONS AND DETAILS SHOWN ON THE DRAWINGS PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR DIRECTION.

5. DURING THE PERFORMANCE PERIOD OF THIS CONTRACT, THE CONTRACTOR SHALL ASSUME SOLE AND COMPLETE CONTROL AND RESPONSIBILITY OF THE JOBSITE. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE SITE SAFETY CONDITIONS FOR ALL PERSONS ENTERING THE JOBSITE, THE CONDITION OF THE SITE AND ALL EXISTING IMPROVEMENTS, AND FOR ALL MATERIAL AND EQUIPMENT STORED AT THE PROJECT SITE.
6. BLASTING IS NOT ALLOWED.

7. IN THE EVENT HISTORIC REMAINS, SUCH AS ARTIFACTS, BURIALS, OR CONCENTRATIONS OF SHELL OR CHARCOAL ARE ENCOUNTERED DURING CONSTRUCTION ACTIVITIES, WORK SHALL IMMEDIATELY CEASE IN THE VICINITY OF THE ENCOUNTER. NOTIFY THE STATE HISTORIC PRESERVATION DIVISION AT (808) 692-8015, FOR AN ASSESSMENT OF THE ENCOUNTER AND RECOMMENDATIONS ON MITIGATION MEASURES.

8. CONSTRUCT TEMPORARY BARRICADES DURING CONSTRUCTION, FOR SAFETY AND THE PROTECTION OF LIFE AND PROPERTY.

9. THE KEIWA HEIAU STATE RECREATION AREA SHALL REMAIN OPEN DURING THE CONSTRUCTION PERIOD. PROVIDE TEMPORARY BARRICADES AND WARNING SIGNS FOR THE SAFETY AND PROTECTION OF THE PUBLIC AND MAINTAIN SAFE PEDESTRIAN AND VEHICLE ACCESS TO THE FACILITY AS REQUIRED. PROVIDE AND MAINTAIN ALL NECESSARY SIGNS AND PROTECTIVE FACILITIES AND TAKE NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE AND SAFETY OF THE PUBLIC.

10. EXISTING PEDESTRIAN WALKWAYS SHALL BE MAINTAINED IN A PASSABLE CONDITION OR PROVIDE FOR ALTERNATE/TEMPORARY ACCESSIBLE PEDESTRIAN ACCESS ROUTES AND FACILITIES PER THE 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN CHAPTER 2, ADAAG 201.3, AND ADAAG 206.1.

11. DO NOT PERFORM ANY CONSTRUCTION ACTIVITIES THAT CAUSE ROCKS, SOIL, OR DEBRIS IN ANY FORM TO FALL, SLIDE, OR FLOW ONTO ADJOINING PROPERTIES, STREETS, OR NATURAL WATER COURSES. FINES DUE TO VIOLATIONS AND ANY NECESSARY REMEDIAL ACTIONS SHALL BE BORNE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE STATE.

12. AS APPLICABLE, COORDINATE CONSTRUCTION ACTIVITIES WITH ADJACENT CONSTRUCTION SITE(S). AVOID CAUSING ANY DELAYS OR HINDERANCE OF WORK OR PERFORMANCE TO THE ADJACENT CONSTRUCTION SITE(S).

13. THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA.

14. COORDINATE ALL SITE UTILITY WORK WITH "THE ONE CALL CENTER" AT (866) 423-7287 AT LEAST 5 WORKING DAYS PRIOR TO THE START OF EXCAVATION OR TRENCHING.

15. VERIFY AND COORDINATE THE ACTUAL LOCATION OF ALL SITE UTILITIES WITH THE RELATED AGENCIES AND UTILITY COMPANIES IN THE PROJECT AREA PRIOR TO EXCAVATING.

16. WHEN CONNECTING NEW UTILITIES TO EXISTING, EXPOSE THE EXISTING UTILITY LINES AT THE DENOTED CONNECTION POINT TO VERIFY CHARACTERISTICS PRIOR TO COMPLETING EXCAVATION FOR NEW UTILITIES.

17. VERIFY AND COORDINATE THE ACTUAL LOCATION OF ALL SITE UTILITIES WITH THE RELATED AGENCIES AND UTILITY COMPANIES IN THE PROJECT AREA PRIOR TO EXCAVATING.

18. IF WATER, SEWAGE OR ELECTRICAL SERVICES ARE PLANNED TO BE INTERRUPTED FOR MORE THAN 1 HOUR, PROVIDE FOR TEMPORARY WATER, SEWAGE, AND ELECTRICAL SERVICES DURING THE INTERRUPTION AT NO ADDITIONAL COST TO THE STATE.

19. MAKE ARRANGEMENTS FOR TEMPORARY CONSTRUCTION SITE UTILITIES SUCH AS ELECTRICITY, WATER, ETC. AT NO ADDITIONAL COST TO THE STATE.

20. ALL EXISTING UTILITIES, SHOWN ON THE PLANS OR UNCOVERED, SHALL BE PROTECTED AT ALL TIMES DURING CONSTRUCTION.

21. ANY DAMAGED UTILITIES, AS A RESULT OF CONTRACTOR OPERATIONS, SHALL BE IMMEDIATELY REPAIRED AT NO ADDITIONAL COST TO THE STATE.

22. ADJUST MANHOLE AND /OR VALVE BOX FRAMES AND COVERS AS REQUIRED BY THE UTILITY COMPANIES AND AGENCIES.

23. CONFORM WITH THE APPLICABLE PROVISIONS OF CHAPTER 54, WATER QUALITY STANDARDS, AND CHAPTER 55, WATER POLLUTION CONTROL, OF TITLE 11, HAWAII ADMINISTRATIVE RULES OF THE STATE DEPARTMENT OF HEALTH.

24. PLAN, CONSTRUCT AND UTILIZE ALL BEST MANAGEMENT PRACTICES (BMP) AS REQUIRED TO COMPLY WITH THE LAWS, STANDARDS, RULES, AND /OR POLICIES OF THE COUNTY, STATE, OR FEDERAL REGULATORY AGENCIES.

25. OBTAIN AND PAY FOR ALL REQUIRED PERMITS FROM THE APPROPRIATE GOVERNMENT AGENCIES.

26. IF REQUIRED, THE CONTRACTOR SHALL PROVIDE THE SERVICES OF AN ESCP (EROSION AND SEDIMENT CONTROL PLAN) COORDINATOR. THE DESIGNEE SHALL HOLD A CURRENT ESCP COORDINATOR CERTIFICATE FROM THE CITY'S DEPARTMENT OF PLANNING AND PERMITTING.

27. RESTORE ALL AREAS DISTURBED OR DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES, TO EQUAL OR BETTER CONDITION(S), INCLUDING BUT NOT LIMITED TO VEGETATION, PAVEMENTS, EMBANKMENTS, CURBS, SIGNS, LANDSCAPING, STRUCTURES, UTILITIES, WALKWAYS, FENCES, ETC. UNLESS SPECIFICALLY NOTED OTHERWISE.

28. PROVIDE THERMOPLASTIC TYPE PAVEMENT STRIPING WHEN REPLACING ANY EXISTING ROADWAY MARKINGS

29. PROVIDE THEFT-RESISTANT FASTENERS FOR ALL MOUNTING ACCESSORIES.

30. PROVIDE STAINLESS STEEL, THEFT-RESISTANT FASTENERS IN ALL PUBLICLY EXPOSED AREAS.

31. PROVIDE ALL INCIDENTAL AND NECESSARY MATERIALS AND LABOR TO COMPLETE THE PROJECT.

32. THE JOB SITE SHALL BE LEFT IN A SAFE AND SECURE CONDITION AT THE END OF EACH WORKDAY. CLEAN UP AND REMOVE ALL RUBBISH FROM THE JOB SITE ON A DAILY BASIS. MAINTAIN THE WORK AREA AND PREMISES IN A CLEAN ORDERLY CONDITION AT ALL TIMES.

33. PRIOR TO ACCEPTANCE OF THE PROJECT BY THE STATE, CLEAN UP AND REMOVE ALL RUBBISH AND DEBRIS FROM THE ENTIRE JOB SITE.

34. TAKE ALL MEASURES TO MINIMIZE DISTURBING OR DAMAGING EXISTING NATIVE PLANT SPECIES DURING CONSTRUCTION.

35. PRIOR TO ENTERING THE JOB SITE, ALL EQUIPMENT AND FOOTWEAR SHALL BE WASHED WITH POTABLE WATER TO PREVENT EXOTIC PLANTS AND SEEDS FROM BEING INTRODUCED TO THE JOB SITE/AREA.

36. HAWAIIAN HOARY BATS OR ʻŌPEʻAPEʻA (LASIURUS CINEREUS SEMOTUS) ARE KNOWN TO RESIDE IN THE VICINITY OF THE PROJECT AREA AND MAY ROOST IN NEARBY TREES. ANY SITE CLEARING SHOULD BE TIMED TO AVOID DISTURBING THE BAT'S BIRTHING AND PUP REARING SEASON (JUNE 1 THROUGH SEPTEMBER 15). IF THIS CANNOT BE AVOIDED, WOODY PLANTS GREATER THAN 15 FEET (4.6 METERS) IN HEIGHT SHOULD NOT BE DISTURBED, REMOVED, OR TRIMMED WITHOUT CONSULTING DOFAW AND STATE'S CONSTRUCTION REPRESENTATIVE. BARBED WIRE IS NOT ALLOWED DUE TO DOCUMENTED BAT MORTALITIES BY ENSNAREMENT.

37. NIGHT WORK REQUIRING OUTDOOR LIGHTING SHOULD BE AVOIDED DURING THE SEABIRD FLEDGING SEASON FROM SEPTEMBER 15 THROUGH DECEMBER 15. ARTIFICIAL LIGHTING DISORIENTS SEABIRDS RESULTING IN COLLISION WITH MANMADE ARTIFACTS OR CAUSE GROUNDING. PROVIDE FULLY SHIELDED LIGHTS FOR ANY REQUIRED NIGHT WORK.

38. INSPECT AND CLEAN ALL EQUIPMENT, GEAR, AND VEHICLES (PERSONAL AND PROJECT) THAT ENTER OR EXIT THE JOB SITE.

39. ENSURE THAT ALL EQUIPMENT, GEAR, AND VEHICLES ARE FREE OF ANY PLANT, ANIMAL, OR EARTHEN MATERIALS PRIOR TO ENTERING THE JOB SITE. ALL EQUIPMENT, GEAR, AND VEHICLES SHALL BE INSPECTED AND CLEANED BEFORE ENTERING THE JOB SITE, AND BEFORE LEAVING ANY WEED INFECTED/CONTAMINATED AREA TO PREVENT TRACKING IN HARMFUL ORGANISMS (E.G.: WEEDS, INSECTS, PESTS) AND PREVENT SPREAD TO PRISTINE AND HEALTHY FOREST AREAS. EQUIPMENT TO INSPECT AND CLEAN INCLUDE BUT IS NOT LIMITED TO:
    39.1. VOLCANIC CINDER ON CLOTHES & FOOTWEAR (TREADS, LACES, BOOT TONGUES), SOCKS, PANT LEGS, POCKETS, JACKETS, RAIN GEAR (POCKETS AND CUFFS)
    39.2. ROACHES, ANTS AND OTHER PESTS ON EQUIPMENT & SUPPLIES-TOOLS, TOOL BAGS, BACKPACKS & BAGS (FOLDS, POCKETS, VELCRO), WOOD AND BUILDING MATERIALS, FENCING MATERIALS, BOTTOMS OF PLASTIC BUCKETS, CARDBOARD BOXES, OPEN FOOD AND WATER CONTAINERS, TENTS, HAMMOCKS, TARPS, HELICOPTER SLING NETS, CHAINSAW BLADES.
    39.3. VEHICLES – THE INSIDE OF THE VEHICLES SHOULD BE VACUUMED AND THE TRUCK BEDS SWEPT OUT REGULARLY, ESPECIALLY IF USED OFF-ROAD. CLEAN PLACES SUCH AS THE INSIDE LIP OF BUMPERS, SEATS, FLOORS, DASHBOARDS, DOOR JAMBS, TIRES (ESPECIALLY TIRE TREADS), AND THE UNDERCARRIAGE.
    39.4. HEAVY EQUIPMENT, TRUCKS, ALL TYPES OF EARTHMOVING CONSTRUCTION EQUIPMENT AND GENERAL CONSTRUCTION EQUIPMENT AND SUPPLIES.
    39.5. OTHER- ENSURE SOIL IS STERILE AND FREE OF INSECTS, WEEDS, AND PATHOGENS. ANYTHING SUSPICIOUS SHOULD NOT BE TAKEN ONTO THE JOB SITE.

40. ON A DAILY BASIS, PACK AND REMOVE ALL TRASH, INCLUDING ANY DISCARDED FOOD, FROM THE JOB SITE TO PREVENT NEGATIVELY AFFECTING THE FLORA AND FAUNA AT THE FIELD SITE. (*DISCARDED FOOD MAY CONTAIN UNSEEN INSECTS, FUNGUS, BACTERIA, AND PARASITES; AND IS AN ATTRACTANT FOR INVASIVE INSECTS).

41. FOLLOW METHODS OF CLEANING SPECIFIED IN H.E.T.F. BIOSECURITY HANDOUT. SPECIFIED METHODS OF CLEANING INCLUDE:
    41.1. WATER & HOSE, BRUSH, TWEEZERS, CLEAN RAG, KNIFE EDGE, BLEACH RINSE AND/OR INSECTICIDE.
    41.2. CLEANING SHALL BE PERFORMED AWAY FROM THE FOREST IN A DOFAW DESIGNATED AREA WITH A NEARBY RECEPTACLE FOR DISPOSAL.
    41.3. LAUNDERING OF WASHABLE ITEMS SHALL BE PERFORMED AFTER EACH TRIP.
    41.4. IF ITEMS CANNOT BE CLEANED, THEY CANNOT BROUGHT INTO THE FOREST.
    41.5. IF CONTAMINATED SUPPLIES ARE DISCOVERED, THEY MUST BE IMMEDIATELY REMOVED AND PROPERLY DISPOSED, AWAY FROM THE H.E.T.F.

42. CLEAN AND DISINFECT EQUIPMENT PRIOR TO MOBILIZATION TO JOB SITE.

43. IN THE EVENT THAT INFECTED OHIA TREES ARE FOUND AT THE FIELD SITE, THE CONTRACTOR SHALL BE INFORMED AND AT THE DIRECTION OF DOFAW TAKE MEASURES TO PREVENT THE SPREAD OF THE CERATOCYSTIS INFECTION OF OHIA TREES.
    43.1. MEASURES INCLUDE AND ARE NOT LIMITED TO:
        43.1.1. CONTACTING RYAN PERALTA (808) 973-9778 REGARDING THE LOCATION OF THE INFECTED OHIA TREES AND INCLUDING DIGITAL PICTURES OF THE CROWN OF THE SUSPECTED INFECTED TREE AND PLACES ON THE WOOD WITH CHARACTERISTIC STAINING OF THE INFECTION.
        43.1.2. DO NOT TRANSPORT AFFECTED OHIA WOODS.
        43.1.3. FOLLOW THE REQUIRED H.E.T.F. BIOSECURITY MEASURES (AS NOTED IN THE ABOVE ITEMS 1-5)

NOTES ON CONTROLS FOR LAND DISTURBANCES

1. HAR CHAPTER 11-55 APPENDIX C REQUIREMENTS THE FOLLOWING SPECIAL CONDITIONS APPLY TO ALL LAND DISTURBANCES WORK CONDUCTED UNDER THIS GENERAL PERMIT:

   A. CONSTRUCTION MANAGEMENT TECHNIQUES

1. CLEARING AND GRUBBING SHALL BE HELD TO THE MINIMUM NECESSARY FOR GRADING AND EQUIPMENT OPERATION.

2. CONSTRUCTION SHALL BE SEQUENCED TO MINIMIZE THE EXPOSURE TIME OF THE CLEARED SURFACE AREA.

3. CONSTRUCTION SHALL BE STAGED OR PHASED FOR LARGE PROJECTS. AREAS OF ONE PHASE SHALL BE STABILIZED BEFORE ANOTHER PHASE IS INITIATED. STABILIZATION SHALL BE ACCOMPLISHED BY TEMPORARILY OR PERMANENTLY PROTECTING THE DISTURBED SOIL SURFACE FROM RAINFALL IMPACTS AND RUNOFF.

4. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN PLACE AND FUNCTIONAL BEFORE EARTH MOVING OPERATIONS BEGIN. THESE MEASURES SHALL BE PROPERLY CONSTRUCTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.

5. ALL CONTROL MEASURES SHALL BE CHECKED AND REPAIRED AS NECESSARY, FOR EXAMPLE, WEEKLY IN DRY PERIODS AND WITHIN TWENTY-FOUR PERIOD DURING PROLONGED RAINFALL, DAILY CHECKING IS NECESSARY. THE PERMITTEE SHALL MAINTAIN RECORDS OF CHECKS AND REPAIRS. CHECK AND REPAIRS.

6. THE PERMITTEE SHALL MAINTAIN RECORDS OF THE DURATION AND ESTIMATED VOLUME OF STORM WATER DISCHARGE(S).

7. A SPECIFIC INDIVIDUAL SHALL BE DESIGNATED TO BE RESPONSIBLE FOR EROSION AND SEDIMENT CONTROLS ON EACH PROJECT SITE.

   B. VEGETATION CONTROLS

1. PRE-CONSTRUCTION VEGETATIVE GROUND COVER SHALL NOT BE DESTROYED, REMOVED, OR DISTURBED MORE THAN TWENTY CALENDAR DAYS PRIOR TO LAND DISTURBANCE.

2. TEMPORARY SOIL STABILIZATION WITH APPROPRIATE VEGETATION SHALL BE APPLIED ON AREAS THAT WILL REMAIN UNFINISHED FOR MORE THAN THIRTY CALENDAR DAYS.

3. PERMANENT SOIL STABILIZATION WITH PERENNIAL VEGETATION OR PAVEMENT SHALL BE APPLIED AS SOON AS PRACTICAL AFTER FINAL GRADING. IRRIGATION AND MAINTENANCE OF THE PERENNIAL VEGETATION SHALL BE PROVIDED FOR THIRTY CALENDAR DAYS OR UNTIL THE VEGETATION TAKES ROOT, WHICHEVER IS SHORTER.

   C. STRUCTURAL CONTROLS

1. STORM WATER FLOWING TOWARD THE CONSTRUCTION AREA SHALL BE DIVERTED BY USING APPROPRIATE CONTROL MEASURES, AS PRACTICAL.

2. EROSION CONTROL MEASURES SHALL BE DESIGNED ACCORDING TO THE SIZE OF DISTURBED OR DRAINAGE AREAS TO DETAIN RUNOFF AND TRAP SEDIMENT.

3. WATER MUST BE DISCHARGED IN A MANNER THAT THE DISCHARGE SHALL NOT CAUSE OR CONTRIBUTE TO A VIOLATION OF THE BASIC WATER QUALITY CRITERIA AS SPECIFIED IN SECTION 11-54-04.

ARCHAEOLOGICAL NOTES

1. IF CULTURAL MATERIALS SUCH AS ARTIFACTS, BURIALS, CONCENTRATIONS OF SHELL OR CHARCOAL BE ENCOUNTERED DURING CONSTRUCTION, ALL EARTH-MOVING ACTIVITY WITHIN AND AROUND THE IMMEDIATE DISCOVERY AREA SHALL CEASE IMMEDIATELY AND THE FIND SHALL BE PROTECTED FROM FURTHER DAMAGE. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE PLANNING DEPARTMENT AND STATE HISTORIC PRESERVATION DIVISION AT (808) 241-3690, WHICH WILL ASSESS THE SIGNIFICANCE OF THE FIND AN RECOMMENDED APPROPRIATE MITIGATION MEASURES, IF NECESSARY.

2. IF PREVIOUSLY UNIDENTIFIED NON-BURIAL HISTORIC PROPERTIES, OR UNANTICIPATED EFFECTS ARE DISCOVERED, THE CONTRACTOR SHALL FOLLOW THE HAWAII ADMINISTRATIVE RULES (HAR) CHAPTER 13-280 "RULES GOVERNING GENERAL PROCEDURES FOR INADVERTENT DISCOVERIES OF HISTORIC PROPERTIES DURING A PROJECT COVERED BY THE HISTORIC PRESERVATION REVIEW PROCESS".

3. IF HUMAN REMAINS ARE DISCOVERED, HAR TITLE 13, SUBTITLE 13, CHAPTER 300 STATES THAT FURTHER DISTURBANCES AND ACTIVITIES SHALL CEASE IN ANY AREA OR NEARBY AREA SUSPECTED TO OVERLIE REMAINS AND THE STATE HISTORIC PRESERVATION DIVISION AND THE POLICE DEPARTMENT WILL BE CONTACTED. THE APPROPRIATE PROCESS WOULD THEN PROCEED IN CONFORMANCE WITH HAR SECTION 13-300, SUBCHAPTER 4, "PROCEDURES FOR PROPER TREATMENT OF BURIAL SITES AND HUMAN SKELETAL REMAINS".

BIOLOGICAL NOTES

1. THE AREA NEAR THE LOOP TRAIL TRAILHEAD IS A KNOWN ELEPAIO HABITAT

2. HELICOPTER USAGE WILL BE AVOIDED DURING THE BREEDING SEASON OF JANUARY THROUGH JULY IN THESE ACTIVE AREAS.

3. IF AN AREA IS IDENTIFIED AS AN ACTIVE TERRITORY AND TREES ARE DETERMINED LIKELY TO BE USED FOR NESTING, IT WILL BE AVOIDED DURING THEIR BREEDING SEASON FROM JANUARY TO JULY.

4. IF WORK IS REQUIRED, DLNR, DIVISION OF FORESTRY AND WILDLIFE BIOLOGISTS WILL SURVEY TREES FOR O'AHU 'ELEPAIO PRIOR TO VEGETATION REMOVAL.

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION
LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

CONSTRUCTION NOTES 1

DESIGNED:	SAK	
DRAWN:	RIT	
CHECKED:	SAK	
APPROVED:		DRAWING NO. C-1
CHIEF ENGINEER		DATE

JOB NO. F48C612A SHEET NO. 2 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/24/2026
Plotted on: 4/24/2026
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EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL FOLLOW THE GUIDELINES IN THE CITY AND COUNTY OF HONOLULU'S "RULES RELATING TO WATER QUALITY"

2. MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY EARTHWORK IS INITIATED.

3. REGULARLY INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROLS TO ENSURE CONTINUED PERFORMANCE.

4. SLOPE PROTECTION
   SLOPE PROTECTION IS REQUIRED ON AREAS WITH SLOPES GREATER THAN 15% AND ON AREAS OF MODERATE SLOPE THAT ARE PRONE TO EROSION UNLESS THEY ARE BEING ACTIVELY WORKED. USE DIVERSION UPSTREAM OF SLOP (DIKES, SWALES, SLOPE DRAINS) TO DIVERT WATER AROUND THE SLOPE. PROVIDE A 10-FT BUFFER ZONE AT THE TOE OF SLOPE. ONLY 5 ACRES MAY BE DISTURBED AT ANYTIME ON SLOPES GREATER THAN 15%.

5. TEMPORARY STABILIZATION
   TEMPORARY STABILIZATION IS REQUIRED ON DISTURBED AREAS WHICH ARE AT FINAL GRADE OR WHEN THE DISTURBED AREA WILL NOT BE WORKED FOR 14 CONSECUTIVE DAYS OR MORE.

6. PERMANENT STABILIZATION
   ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED USING VEGETATIVE COVERING, PAVEMENT, OR EQUIVALENT, PRIOR TO REMOVING EROSION AND SEDIMENT MEASURES. TRAPPED SEDIMENT AND AREAS OF DISTURBED SOIL WHICH RESULT FROM THE REMOVAL OF THE TEMPORARY MEASURES SHALL BE IMMEDIATELY AND PERMANENTLY STABILIZED.

7. PRESERVE EXISTING VEGETATION
   CLEARLY MARK THE AREAS TO BE PRESERVED WITH FLAGS OR TEMPORARY FENCING. WHERE TEMPORARY FENCING IS USED, FENCING MUST BE ADEQUATELY SUPPORTED BY POSTS AND MAINTAINED IN AN UPRIGHT POSITION.

8. MINIMIZE SOIL COMPACTION
   AREAS WHERE FINAL STABILIZATION OR INFILTRATION PRACTICES WILL BE INSTALLED SHALL BE PROTECTED FROM EXCESSIVE COMPACTION DURING CONSTRUCTION. VEHICLE AND EQUIPMENT USE SHALL BE RESTRICTED OR TECHNIQUES TO CONDITION THE SOILS TO SUPPORT VEGETATION SHALL BE IMPLEMENTED IN THE AREAS THAT HAVE BEEN COMPACTED AND ARE DESIGNATED TO REMAIN VEGETATIVE OR POST-CONSTRUCTION INFILTRATION AREAS. CLEARLY MARK THE AREAS TO BE AVOIDED WITH FLAGS OR TEMPORARY FENCING. WHERE TEMPORARY FENCING IS USED, FENCING MUST BE ADEQUATELY SUPPORTED BY POSTS AND MAINTAINED IN AN UPRIGHT POSITION.

9. PERIMETER CONTROLS
   PERIMETER CONTROLS ARE REQUIRED DOWNSLOPE OF ALL DISTURBED AREAS. MAINTAIN DOWNSTREAM VEGETATED BUFFER AREAS.

10. SEDIMENT BARRIERS
    SEDIMENT BARRIERS SHALL BE USED TO PROTECT DISTURBED OR DENUDED AREAS THAT ARE NOT SCHEDULED FOR ACTIVE GRADING WORK WITHIN 24 HOURS. THE SEDIMENT BARRIERS SHALL BE INSTALLED AT THE TOE OF THE SLOPE AND ON CONTOURS AT THE FOLLOWING SPACING.

    SLOPE ≥ 2:1 10 FEET SPACING
    SLOPE ≤ 4:1 AND < 2:1 15 FEET SPACING
    SLOPE < 4:1 20 FEET SPACING

11. INLET PROTECTION
    - ALL STORM DRAIN INLETS ONSITE AND THOSE OFFSITE WHICH MAY RECEIVE RUNOFF FROM THE SITE SHALL USE AND INLET PROTECTION DEVICE UNLESS THEY ARE DIRECTED TO A SEDIMENT BASIN
    - SEDIMENT LEVELS MAY NOT EXCEED ON THIRD OF THE HEIGHT OF A SEDIMENT BARRIER OR INLET PROTECTION DEVICE AT ANY POINT ALONG THE LENGTH OF THE SEDIMENT BARRIER OR THE INLET PROTECTION DEVICE.
    - SEDIMENT BARRIERS AND INLET PROTECTION DEVICES MUST BE REPAIRED OR REPLACED IMMEDIATELY.

12. SEDIMENT BASINS
    SEDIMENT BARRIERS AND INLET PROTECTION DEVICES MUST REPAIRED OR REPLACED IMMEDIATELY.

GOOD HOUSEKEEPING BMPS:

1. BMP AND SITE MAINTENANCE
   - REGULARLY INSPECT AND MAINTAIN BMP'S TO ENSURE CONTINUED PERFORMANCE.

2. DUST CONTROL
   - DUST FROM THE PROJECT SITE SHALL NOT BE TRANSPORTED OR DISCHARGED TO OFF-SITE AREAS.
   - THIS PROJECT WILL USE WATER TO MAINTAIN SOIL MOISTURE TO PREVENT DUST.

3. CONCRETE WASTE MANAGEMENT
   - PREVENT OR REDUCE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM CONCRETE WASTE BY CONDUCTING WASHOUT OFFSITE OR PERFORMING ONSITE WASHOUT IN A DESIGNATED AREA CONSTRUCTED AND MAINTAINED IN SUFFICIENT QUANTITY AND SIZE TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS.
   - PLASTIC LINING MATERIAL SHOULD BE A MINIMUM OF 10 MILLIMETER POLYETHYLENE SHEETING AND SHOULD BE FREE OF HOLES, TEARS, OR OTHER DEFECTS THAT COMPROMISE THE IMPERMEABILITY OF THE MATERIAL.
   - CONTAINMENT AREAS OR DEVICES SHOULD NOT BE LOCATED WHERE ACCIDENTAL RELEASE OF THE CONTAINED LIQUID CAN DISCHARGE TO WATER BODIES, CHANNELS, OR STORM DRAINS.
   - WASHOUT FACILITIES MUST BE CLEANED, OR NEW FACILITIES MUST BE CONSTRUCTED AND READY FOR USE ONCE THE WASHOUT IS 75 PERCENT FULL.
   - ONCE CONCRETE WASTES ARE WASHED INTO THE DESIGNATED AREA AND ALLOWED TO HARDEN, THE CONCRETE SHOULD BE BROKEN UP, REMOVED, AND DISPOSED OF AS SOLID WASTES.

4. STOCKPILE MANAGEMENT
   - STOCKPILES SHALL NOT BE LOCATED IN DRAINAGE WAYS, WITHIN 50 FEET FROM AREAS OF CONCENTRATED FLOWS, AND ARE NOT ALLOWED IN THE CITY RIGHT-OF-WAY. SEDIMENT BARRIERS OR SILT FENCES SHALL BE USED AROUND THE BASE OF ALL STOCKPILES. STOCKPILES SHALL NOT EXCEED 15 FEET IN HEIGHT. STOCKPILES GREATER THAN 15 FEET IN HEIGHT SHALL REQUIRE 8-FOOT WIDE BENCHING IN ACCORDANCE WITH ROH CHAPTER 14, ARTICLE 15. STOCKPILES MUST BE COVERED WITH PLASTIC SHEETING OR A COMPARABLE MATERIAL IF THEY WILL NOT BE ACTIVELY USED WITHIN 7 DAYS.

5. VEHICLE TRACKING CONTROL
   - RESTRICT VEHICLE TRAFFIC TO PROPERLY DESIGNATED AREAS AND REMOVE SEDIMENT FROM VEHICLE TIRES PRIOR TO EXITING THE PROJECT SITE. ALL SEDIMENTS THAT ARE TRACKED OR DISCHARGED OFF-SITE MUST BE SWEPT OR VACUUMED AT THE END OF EACH DAY.

6. MATERIALS DELIVERY, STORAGE, AND USE MANAGEMENT
   - MINIMIZE THE STORAGE OF POTENTIAL POLLUTANTS ONSITE, STORE MATERIALS IN A DESIGNATED AREA, AND INSTALL SECONDARY CONTAINMENT. DO NOT STORE MATERIALS IN BUFFER AREAS, NEAR AREAS OF CONCENTRATED FLOW, OR AREAS ABUTTING THE CITY STORM DRAINAGE SYSTEM, RECEIVING WATERS, OR DRAINAGE IMPROVEMENTS THAT DISCHARGE OFF-SITE.

7. SPILL PREVENTION AND CONTROL
   - KEEP AMPLE SUPPLY OF CLEANUP MATERIALS ONSITE. CLEAN UP SPILLS IMMEDIATELY, USING DRY CLEAN-UP METHODS WHERE POSSIBLE, AND DISPOSE OF USED MATERIALS PROPERLY.

8. GOOD WASTE MANAGEMENT
   - PREVENT OR REDUCE DISCHARGE OF POLLUTANTS TO THE LAND, GROUNDWATER, AND IN STORM WATER FROM SOLID WASTE OR CONSTRUCTION AND DEMOLITION WASTE BY PROVIDING DESIGNATED WASTE COLLECTION AREAS, COLLECT SITE TRASH DAILY, AND ENSURING THAT CONSTRUCTION WASTE IS COLLECTED, REMOVED, AND DISPOSED OF ONLY AT AUTHORIZED DISPOSAL AREAS.

9. PORTABLE TOILETS (SANITARY/SEPTIC WASTE MANAGEMENT)
   - TEMPORARY AND PORTABLE SANITARY AND SEPTIC WASTE SYSTEMS SHALL BE MOUNTED OR STAKED IN, WELL-MAINTAINED, AND SCHEDULED FOR REGULAR WASTE DISPOSAL AND SERVICING. SOURCES OF SANITARY AND/OR SEPTIC WASTE SHALL NOT BE STORED NEAR THE MS4 OR RECEIVING WATERS.

10. VEHICLE AND EQUIPMENT CLEANING, FUELING, AND MAINTENANCE
    - PREVENT POLLUTANTS IN STORM WATER FROM VEHICLE AND EQUIPMENT CLEANING, FUELING AND MAINTENANCE BY USING OFF-SITE FACILITIES WHEN FEASIBLE, PERFORMING WORK IN DESIGNATED AREAS ONLY, USING SPILL PADS UNDER VEHICLES AND EQUIPMENT, CHECKING FOR LEAKS AND SPILLS, AND CONTAINING AND CLEANING UP SPILLS IMMEDIATELY.

11. HAZARDOUS WASTE MANAGEMENT
    - PREVENT OR REDUCE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM HAZARDOUS WASTE THROUGH PROPER MATERIAL USE AND WASTE DISPOSAL.

GOOD HOUSEKEEPING BMPS (CONT.):

12. CONTAMINATED SOIL MANAGEMENT
    - CONTAIN CONTAMINATED MATERIAL SOIL BY SURROUNDING WITH IMPERMEABLE LINED BERMS OR COVER EXPOSED CONTAMINATED MATERIAL WITH PLASTIC SHEETS. CONTAMINATED SOIL SHALL BE DISPOSED OF PROPERLY IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS.

PUBLIC HEALTH, SAFETY, AND CONVENIENCE NOTES:

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

2. THE CONTRACTOR, AT HIS OWN EXPENSE SHALL KEEP THE PROJECT AND ITS SURROUNDING AREAS FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.

3. NO CONTRACTOR SHALL PERFORM ANY CONSTRUCTION ACTIVITY SO AS TO CAUSE FALLING ROCK, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.

4. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE AND SAFETY OF THE PUBLIC. THE CONTRACTOR SHALL APPLY FOR A CONSTRUCTION PERMIT WITH A NOISE POLLUTION CONTROL PLAN.

BEST MANAGEMENT PRACTICES (BMP'S) NOTES:

1. SEDIMENT CONTROL MEASURES AS REFLECTED ON THIS PLAN SHALL BE IN PLACE PRIOR TO COMMENCEMENT OF CONSTRUCTION.

2. INSTALLATION OF SEDIMENT CONTROL DOWN-SLOPE OF DISTURBED AREAS WHERE SOIL IS EXPOSED AND AT EXISTING DRAIN INLETS.

3. INSTALLATION OF EROSION CONTROL (GRASSING) AT DISTURBED AREAS WHERE SOIL IS EXPOSED.

4. CONTRACTOR SHALL PREVENT DUST RESULTING FROM HIS WORK FROM BECOMING

5. AIR-BORNE AT ALL TIMES, INCLUDING NON-WORKING HOURS, WEEKENDS, AND HOLIDAYS, IN CONFORMANCE WITH STATE DEPARTMENT OF HEALTH ADMINISTRATIVE RULES, TITLE 11, CHAPTER 60.1-AIR POLLUTION CONTROL.

6. BEST MANAGEMENT PRACTICES (BMP'S) SHALL NOT BE REMOVED UNTIL AFTER THE COMPLETION OF THIS PROJECT. CONTRACTOR SHALL PROVIDE CONTINUOUS MAINTENANCE AND ADJUSTMENT OF SEDIMENT CONTROL MEASURES DURING THE CONSTRUCTION PERIOD.

RAIN RESPONSE PLAN:

THE FOLLOWING WILL BE PERFORMED WHEN SERVERE RAIN IS IMMINENT OR IS FORECASTED IN THE NEXT 48 HOURS:

1. TEMPORARILY SUSPEND LAND DISTURBING ACTIVITIES INCLUDING CLEARING, GRUBBING, GRADING, AND TRENCHING.

2. INSPECT ALL BMP'S AND MAINTAIN AS NEEDED.

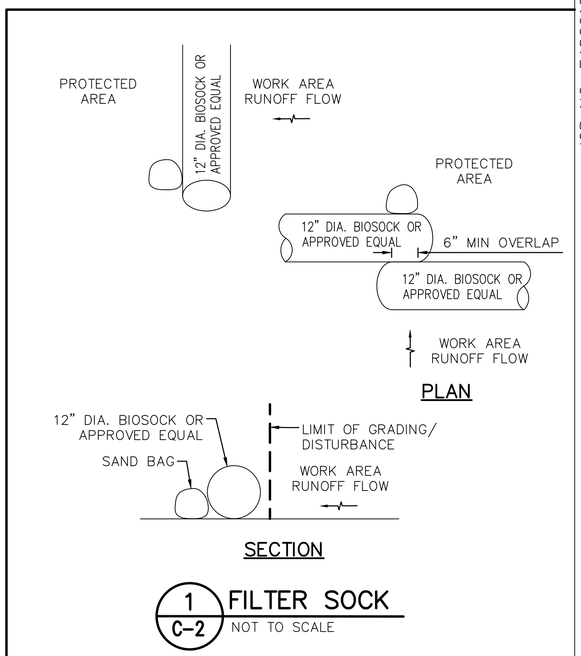
3. REINSTALL BMP'S THAT WERE REMOVED DUE TO ACTIVE WORK IN THE AREA.

4. IF A SEVERE STORM IS EXPECTED, REMOVE INLET PROTECTION DEVICES TO PREVENT FLOODING ON SURROUNDING STREETS.

5. COVER OR RELOCATE MATERIAL STOCKPILES AND LIQUID MATERIAL CONTAINERS TO AVOID CONTACT WITH RAINWATER.

6. PLACE SPILL PANS OR OIL-ONLY SPILL PADS UNDER CONSTRUCTION VEHICLES TO PREVENT RUNOFF FROM CONTACTING ANY SPILLED PETROLEUM PRODUCTS. PROPERLY DISPOSE OF ANY ACCUMULATED OILY WATER AFTER THE RAIN EVENT.

7. RE-INSPECT PROJECT SITE AFTER THE RAIN EVENT AND REPLACE OR MAINTAIN BMP'S AS NEEDED.



1 / C-2 FILTER SOCK
NOT TO SCALE

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA LICENSED PROFESSIONAL ENGINEER No. 7257-C HAWAII, USA

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION
LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

ESCP NOTES

DESIGNED:	SAK	
DRAWN:	RIT	
CHECKED:	SAK	
APPROVED:		DRAWING NO. C-2
CHIEF ENGINEER		DATE

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/15/2026
Plotted on: 4/24/2026
g:\dlnr2403 keaiwa heiau\300 DSGN\310 plans\DLNR 2403 ESCP Notes.dwg

TMK: 9-09: 011: 005
OWNER: STATE OF HAWAII
AREA: 0.36 AC

TRUE NORTH
SCALE: 1: 40

MATCH LINE
SEE BELOW

℄ INLET WL

INSTALL FILTER SOCK SEE SHT. C-2

ESCP PLAN
SCALE: 1" = 40'

TMK: 9-09: 011: 003
OWNER: STATE OF HAWAII
AREA: 384.54 AC

MATCH LINE
SEE ABOVE

INSTALL FILTER SOCK SEE SHT. C-2

TRUE NORTH
SCALE: 1: 40

INSTALL FILTER SOCK SEE SHT. C-2

℄ OUTLET WL

40' 0 40' 80'
SCALE: 1" = 40'-0"

MATCH LINE
SEE SHT C_4

LEGEND

X ——— X FILTER SOCK

ESCP PLAN
SCALE: 1" = 40'

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

ESCP PLAN

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

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DESIGNED:	SAK
DRAWN:	RIT
CHECKED:	SAK
APPROVED:	
CHIEF ENGINEER	DATE

DRAWING NO. C-3

JOB NO. F48C612A SHEET NO. 4 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/24/2026
Plotted on: 4/24/2026
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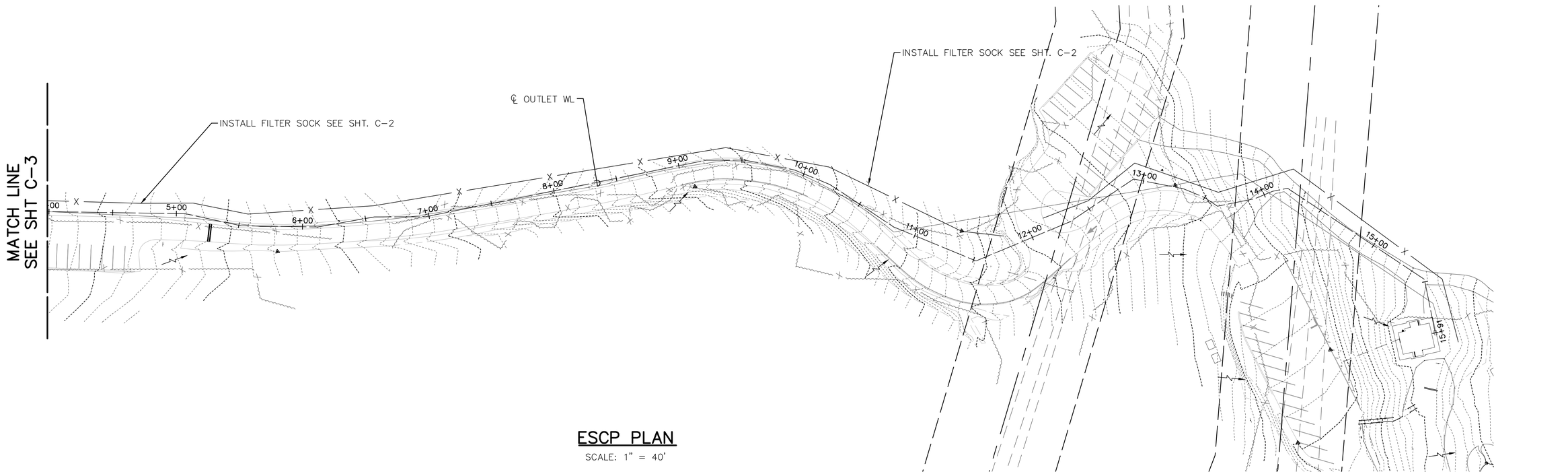

ESCP PLAN

SCALE: 1" = 40'

LEGEND

———— X ———— X FILTER SOCK

40' 0 40' 80'

SCALE: 1" = 40'-0"

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

ESCP PLAN 2

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

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LICENSE EXPIRES 4/30/28

DESIGNED:	SAK	
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CHECKED:	SAK	
APPROVED:		DRAWING NO. C-4
CHIEF ENGINEER		DATE

JOB NO. F48C612A

SHEET NO. 5 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/24/2026
Plotted on: 4/24/2026
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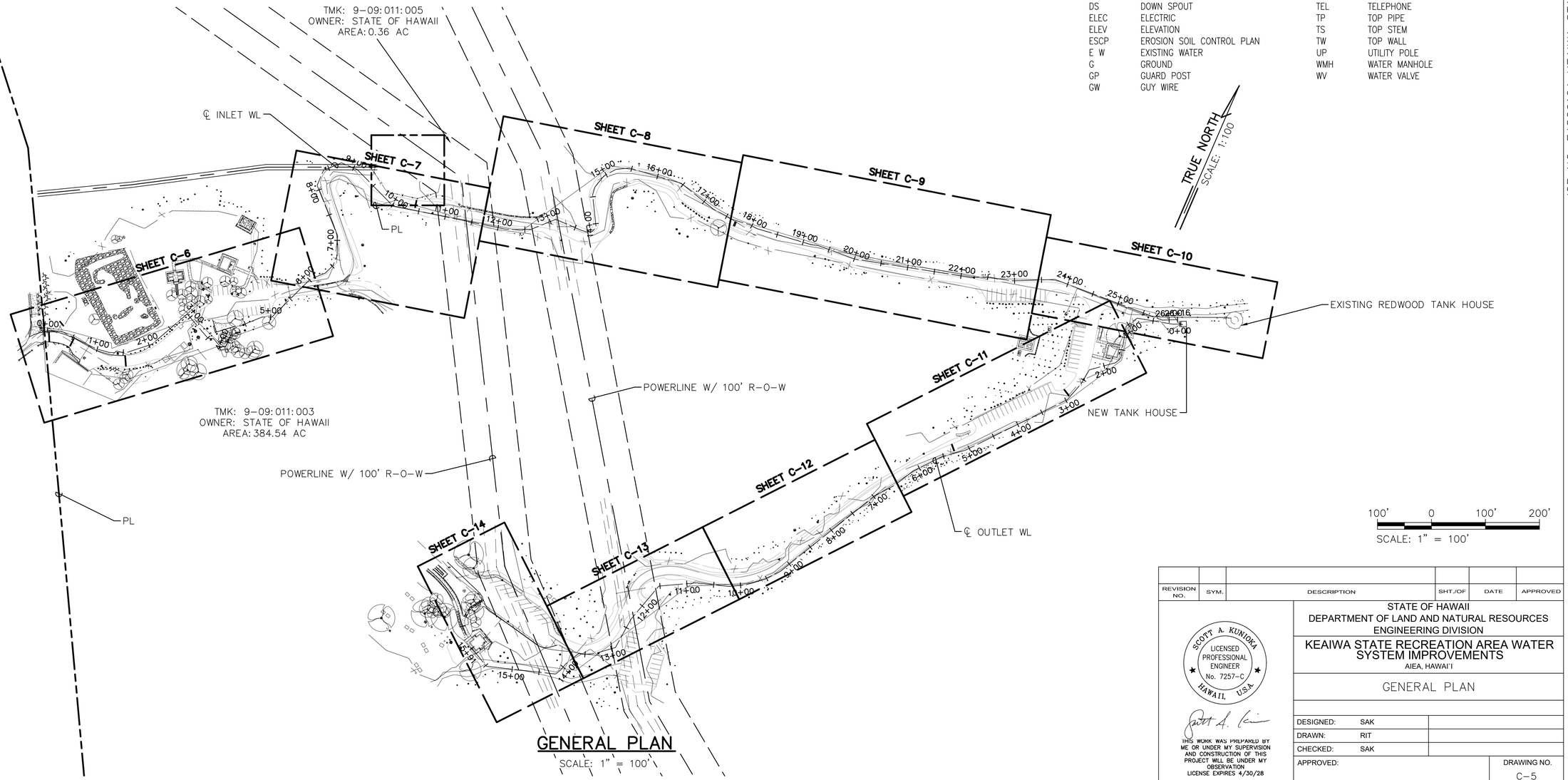
WATERLINE NOTES

1. ALL WORK SHALL BE DONE ACCORDING TO THE WATER SYSTEM STANDARDS, STATE OF HAWAII, DATED 2002, AS AMENDED HEREIN REFERRED TO AS THE WSS.
2. ALL EXISTING WATERLINES, WATERLINE APPURTENANCES, AND UTILITY LOCATIONS SHOWN ON THE PLANS ARE OBTAINED FROM THE LATEST RELIABLE SOURCES. THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY THE EXACT LOCATION OF ALL UTILITIES IN THE FIELD AND SHALL BEAR ALL COST FOR DAMAGES DONE DURING THE CONTRACT PERIOD.
3. WHERE WATER SHUTOFF OF MORE THAN 3-HOURS BECOMES NECESSARY, THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL PROVIDE A TEMPORARY BYPASS LINE, SIZE OF WHICH SHALL BE DETERMINED BY THE ENGINEER. THE ENGINEER ALSO RESERVES THE RIGHT TO REQUIRE BYPASS LINES, REGARDLESS OF THE WATER SHUT-OFF PERIOD, IF DEEMED NECESSARY.
4. CONSTRUCTION PROJECTS REQUIRING TEMPORARY WATER SERVICE FROM BWS SHALL BE METERED AND PAID FOR BY THE CONTRACTOR.
5. ALL NEWLY INSTALLED WATERLINES SHALL HAVE A 4 MIL THICK, 6-INCH WIDE, NON-METALLIC BLUE WARNING TAPE OVER CENTERLINE OF PIPE LABELED "CAUTION – WATERLINE BURIED BELOW" PLACED 12-INCHES BELOW FINISHED GRADE ALONG THE ENTIRE LENGTH OF THE TRENCH.
6. MINIMUM VERTICAL CLEARANCE BETWEEN WATERLINES AND OTHER UTILITIES SHALL BE 12-INCHES PROVIDED THE OTHER UTILITY IS CONCRETE JACKETED, AND 18-INCHES IF NO CONCRETE JACKETS ARE USED. IN ALL APPLICABLE INSTANCES, THE WATERLINES SHALL BE AT A GRADE HIGHER THAN OTHER UTILITIES. UTILIZE PERPENDICULAR CROSSINGS WHERE PRACTICABLE. FOR WATERLINES, CENTER FULL PIPE LENGTHS AT UTILITY CROSSINGS WHENEVER POSSIBLE.
7. WHEN WATERLINE IS WITHIN 6-FEET OF A PRESSURIZED SEWER LINE OR WITHIN 18-INCHES OF A GRAVITY SEWER LINE, THE SEWER MAIN SHALL BE REINFORCED CONCRETE JACKETED. WHENEVER A WATER MAIN CROSSES UNDER A SEWER MAIN, THE SEWER MAIN SHALL HAVE REINFORCED CONCRETE JACKET ON BOTH SIDES OF CROSSING TO A DISTANCE OF 5-FEET FROM THE WATERLINE (MEASURED PERPENDICULAR TO WATERLINE). STANDARD CONCRETE JACKET DETAILS FOR SEWER LINES AS SPECIFIED BY THE DEPARTMENT OF PUBLIC WORKS STANDARDS SHALL BE FOLLOWED. PLASTIC PIPES SHALL NOT BE JACKETED. DUCTILE IRON OR CONCRETE CYLINDER PIPE SHALL BE USED FOR THE PORTION TO BE JACKETED.
8. ALL FITTINGS FOR PVC PIPES SHALL BE INJECTION MOLDED PVC SCHEDULE 80 FITTINGS CONFORMING TO ASTM D246.
9. ALL GATE VALVES SHALL BE OF THE RESILIENT-SEATED GATE VALVES TYPE AND MANUFACTURED TO MEET ALL ALL APPLICABLE REQUIREMENTS OF AWWA C509 AND RATED FOR SERVICE AT 200 PSI WORKING PRESSURE. VALVES SHALL HAVE NO-RISING STEMS, OPEN BY TURNING LEFT AND PROVIDED WITH 2-INCH SQUARE NUT WITH ARROW CAST IN METAL TO INDICATE DIRECTION OF OPENING. EACH VALVE SHALL HAVE MANUFACTURER'S NAME, PRESSURE RATING AND YEAR IN WHICH MANUFACTURED CAST ON THE BODY..
10. THE WATERLINE SHALL BE TESTED AT A MINIMUM OF 225 PSI OR ONE-AND-ONE-HALF TIMES THE STATIC WATER PRESSURE AT THE LOW POINT (WHICHEVER IS GREATER). THE TESTING SHALL BE DONE JUST PRIOR TO PAVING WHENEVER APPLICABLE.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CHLORINATION OF THE WATER SYSTEM PER THE MOST CURRENT STANDARDS OF BOTH DOH AND BWS AND SHALL BEAR ALL COST(S). THE PERSON(S) ENGAGED TO DO THE CHLORINATION WORK MUST HAVE THE APPROPRIATE AND VALID LICENSE TO PERFORM THE WORK IN THE STATE OF HAWAII.
12. EXISTING WATERLINES, VALVES, FITTINGS AND APPURTENANCES NOT DESIGNATED "REMOVE AND SALVAGE" SHALL BE ABANDONED IN PLACE. ALL EXPOSED VALVE BOXES VALVES, PIPES AND APPURTENANCES SHALL BE REMOVED AND DISPOSED OF PROPERLY AT NO COST TO THE STATE.
13. SOLDER (1/8-INCH DIA.) AND FLUX USED SHALL NOT CONTAIN MORE THAN 0.2% LEAD.

ABBREVIATIONS:

AC	ASPHALT CONCRETE	H	HEIGHT
B	BOTTOM	HB	HOSE BIB
BB	BOTTOM BANK	INV	INVERT
BC	BOTTOM CURB	IV	IRRIGATION VALVE
BW	BOTTOM WALL	LP	LAMP POST
CD	CONDUIT	MB	MAILBOX
CLF	CHAIN LINK FENCE	O/H	OVERHEAD
CMU	CONCRETE MASONRY UNIT (HOLLOW TILE)	PBX	PANEL BOX OR PULL BOX
CO	CLEAN OUT	SMH	SEWER MANHOLE
CONC/CC	CONCRETE	STA	STATION
CRM	CONCRETE RUBBLE MASONRY (ROCK) WALL	T	TOP
D	DIAMETER OR DRAIN	TB	TOP BANK
DI	DRAIN INLET	TC	TOP CURB
DS	DOWN SPOUT	TEL	TELEPHONE
ELEC	ELECTRIC	TP	TOP PIPE
ELEV	ELEVATION	TS	TOP STEM
ESCP	EROSION SOIL CONTROL PLAN	TW	TOP WALL
E W	EXISTING WATER	UP	UTILITY POLE
G	GROUND	WMH	WATER MANHOLE
GP	GUARD POST	WV	WATER VALVE
GW	GUY WIRE		



GENERAL PLAN

SCALE: 1" = 100'

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

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LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

GENERAL PLAN

DESIGNED:	SAK	
DRAWN:	RIT	
CHECKED:	SAK	
APPROVED:		DRAWING NO. C-5
CHIEF ENGINEER	DATE	

JOB NO. F48C612A SHEET NO. 6 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
g:\dlnr2403 keaiwa heiau\300 DSGN\310 plans\DLNR 2403 General Plan.dwg

1 STA. 3+88.78 INLET WL
1 – 2" CXFIPT COPPER COUPLING
1 – 2" PVC MALE ADAPTER
1 – 2" x 3" PVC BUSHING
1 – 3" GV SEE DET. 3/C-16
1 – 12" VALVE BOX
CONN. TO 2" EXISTING WATERLINE

2 STA. 3+90.78 INLET WL
1 – 3" ⅛ BEND, (H)
1 – CONC. BLOCK

3 STA. 3+93.28 WL
1 – 3" 1/32 BEND, (H)
1 – CONC. BLOCK

4 STA. 3+98.28 INLET WL
1 – 3" ⅛ BEND, (H)
1 – CONC. BLOCK

5 STA. 4+26.97 INLET WL
1 – 3" ⅛ BEND, (H) ROT. 8° 58'29"
1 – CONC. BLOCK

6 STA. 4+83.67 INLET WL
1 – 3" 1/16 BEND, (H)
1 – CONC. BLOCK

7 STA. 5+01.91 INLET WL
1 – 3" ⅛ BEND, (H) ROT. 4°12'56"
1 – CONC. BLOCK
1 – 3" GV SEE DET. 3/C-16
1 – 12" VALVE BOX

8 STA. 5+56.59 INLET WL
BEGIN PAVEMENT TRENCH RESTORATION SEE DET. 1/C-15

9 STA. 6+01.91 INLET WL
1 – 3" 1/16 BEND, (H) ROT. 4°12'56"
1 – CONC. BLOCK
END PAVEMENT TRENCH RESTORATION

TRUE NORTH
SCALE: 1"=20'

KEAIWA HEIAU STATE RECREATION AREA

EXIST. WATER METER

EXIST 1–½" COPPER WL (TO REMAIN)

EXIST 1–½" COPPER WL

AIEA HEIGHTS DRIVE (CITY)

ALT-18 MAG NAIL ELEV.=954.45

ALT-17 MAG NAIL ELEV.=973.76

ALT-15 MAG NAIL ELEV.=964.08

℄ INLET WL

EXIST. 2" COPPER WL

CAMPSITES
AIEA TRAIL LOOP
PICNIC AREA

MATCH LINE STA. 06+10.00
SEE SHT C-7

NOTE:
IMPROVEMENTS TO EXISTING 1–½" COPPER WATERLINE FROM THE EXISTING METER TO THE PUMP STATION WILL NOT BE DONE WITHIN THIS PROJECT. NO WORK NEAR THE EXISTING HEIAU WILL BE ALLOWED. WORK SHALL BEGIN FROM STATION 3+88.78.

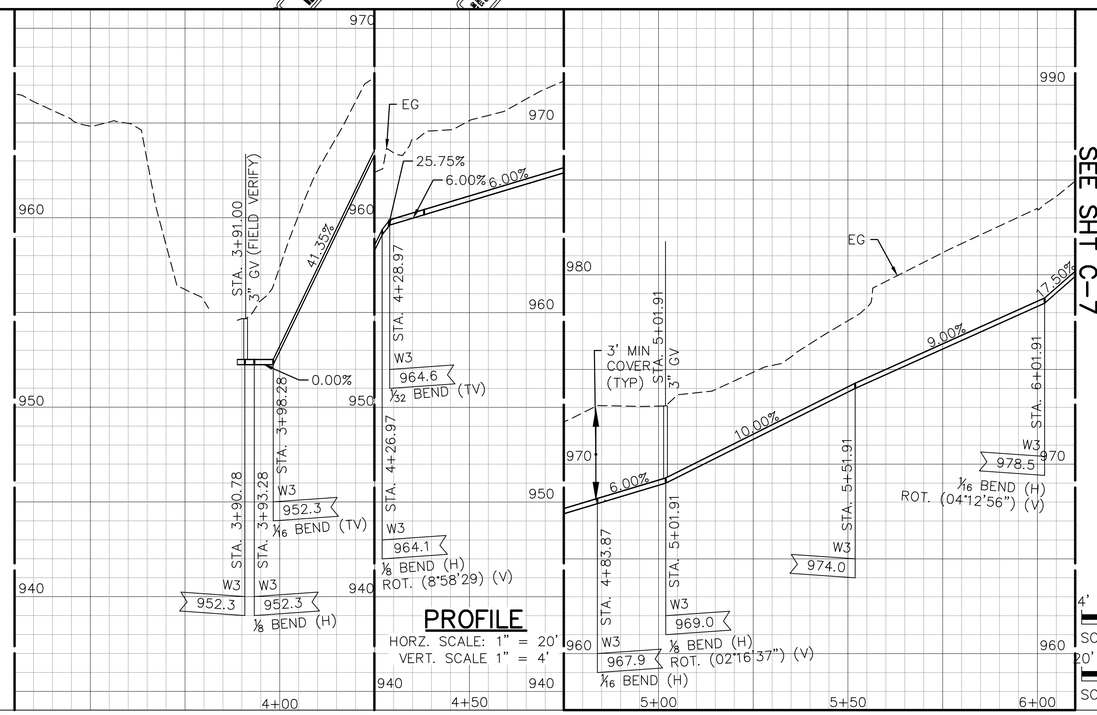
ALL EXISTING UTILITIES ARE APPROXIMATES BASED ON PREVIOUS PLANS. CONTRACTOR TO FIELD VERIFY ANY EXISTING UTILITIES.

THE NEW WATERLINE SHOULD BE KEPT A MINIMUM OF 2' AWAY FROM THE EXISTING WATER LINE AND CROSSINGS SHOULD BE MINIMIZED WHERE POSSIBLE.

IF WATER, SEWAGE OR ELECTRICAL SERVICES ARE PLANNED TO BE INTERRUPTED FOR MORE THAN 1 HOUR, PROVIDE FOR TEMPORARY WATER, SEWAGE, AND ELECTRICAL SERVICES DURING THE INTERRUPTION AT NO ADDITIONAL COST TO THE STATE. IF A COMFORT STATION NEEDS TO BE CLOSED, A STANDARD PORTABLE TOILET AND AN ADA PORTABLE TOILET NEEDS TO BE PROVIDED PER CLOSED COMFORT STATION.

PLAN
SCALE: 1" = 20'

PROFILE
HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'



MATCH LINE STA. 06+10.00
SEE SHT C-7

4' 0 4' 8'
SCALE: 1" = 4'–0"

20' 0 20' 40'
SCALE: 1" = 20'–0"

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

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LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

PLAN & PROFILE 1

DESIGNED:	SAK
DRAWN:	RIT
CHECKED:	SAK
APPROVED:	
CHIEF ENGINEER	DATE

DRAWING NO. C-6

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
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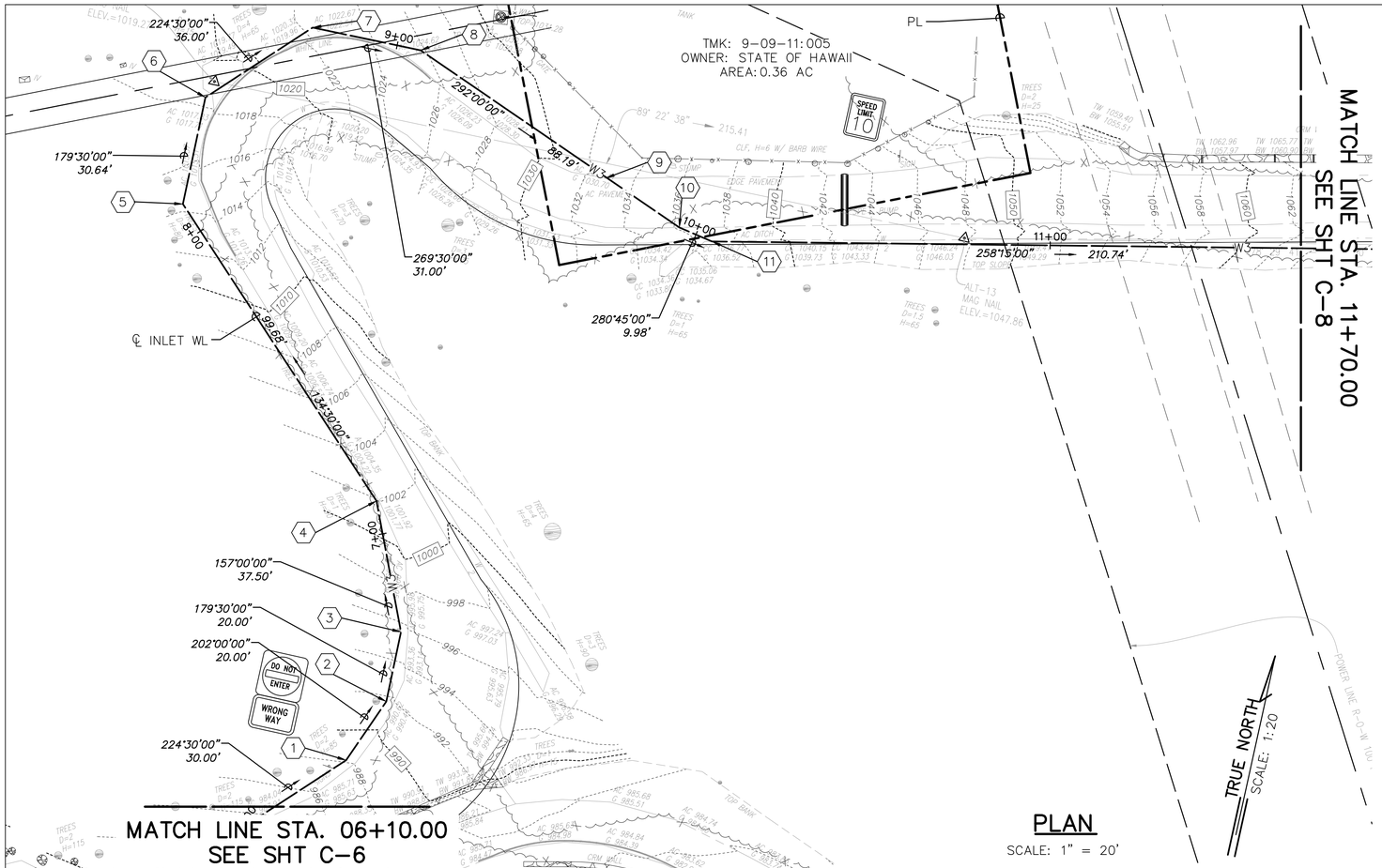

1. STA. 6+31.91 INLET WL
   1 – 3" 1/16 BEND, (H) ROT. 2°24'56"
2. STA. 6+51.91 INLET WL
   1 – 3" 1/16 BEND, (H) ROT. 2°24'56"
   1 – CONC. BLOCK
3. STA. 6+71.91 INLET WL
   1 – 3" 1/16 BEND, (H)
   1 – CONC. BLOCK
4. STA. 7+09.41 INLET WL
   1 – 3" 1/16 BEND, (H) ROT. 3°54'59"
   1 – CONC. BLOCK
5. STA. 8+09.09 INLET WL
   1 – 3" 1/8 BEND, (H)
   1 – CONC. BLOCK
6. STA. 8+39.73 INLET WL
   1 – 3" 1/8 BEND, (H)
   1 – CONC. BLOCK
7. STA. 8+75.73 INLET WL
   1 – 3" 1/8 BEND, (H)
   1 – CONC. BLOCK
8. STA. 9+06.73 INLET WL
   1 – 3" 1/16 BEND, (H) ROT. 00°09'05"
   1 – CONC. BLOCK
9. STA. 9+70.00 INLET WL
   BEGIN PAVEMENT TRENCH RESTORATION
   SEE DET. 1 / C-15
10. STA. 9+94.93 INLET WL
    1 – 3" 1/32 BEND, (H) ROT. 03°39'14"
    1 – CONC. BLOCK
11. STA. 10+04.91 INLET WL
    1 – 3" 1/16 BEND, (H) ROT. 0°26'32""
    1 – CONC. BLOCK
    END PAVEMENT TRENCH RESTORATION

NOTE:
IMPROVEMENTS TO EXISTING 1–½" COPPER WATERLINE FROM THE EXISTING METER TO THE PUMP STATION WILL NOT BE DONE WITHIN THIS PROJECT. NO WORK NEAR THE EXISTING HEIAU WILL BE ALLOWED. WORK SHALL BEGIN FROM STATION 3+88.78.

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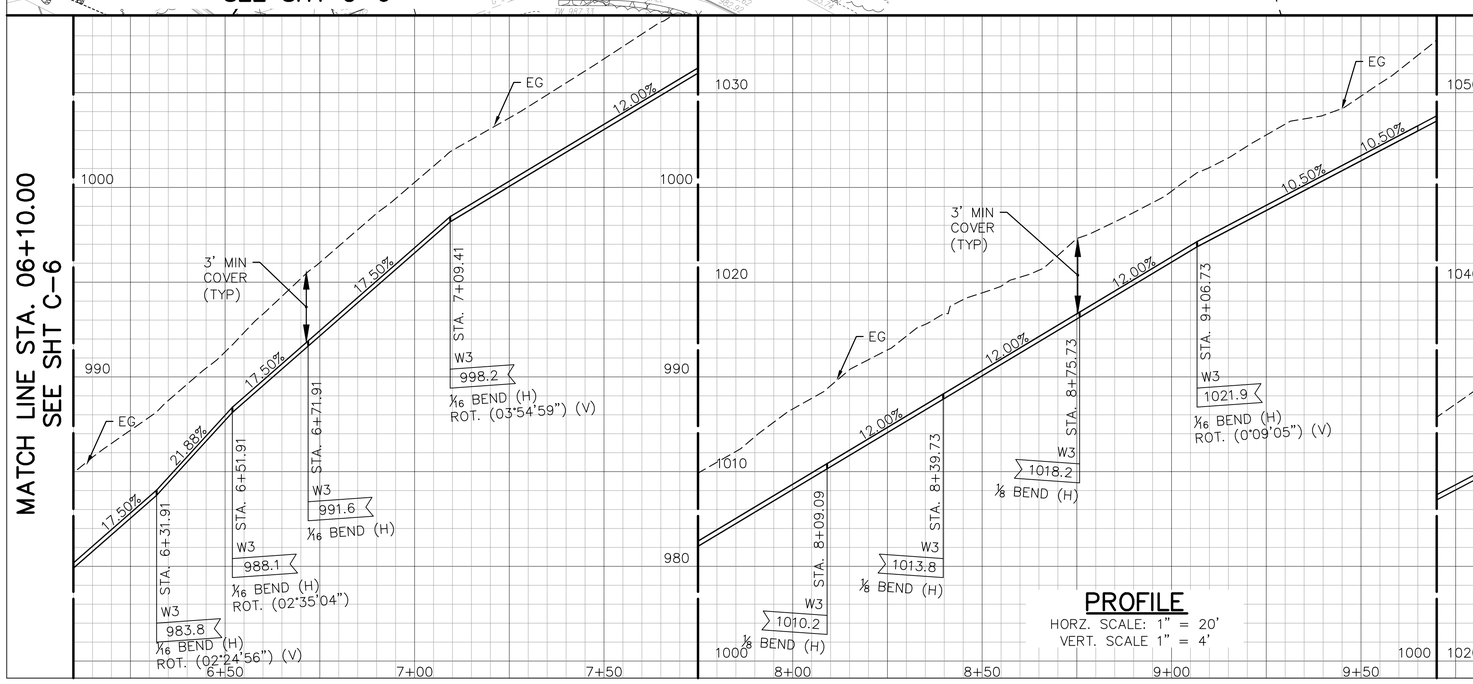
PLAN

SCALE: 1" = 20'

4' 0 4' 8'
SCALE: 1" = 4'-0"

20' 0 20' 40'
SCALE: 1" = 20'-0"



PROFILE

HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION
LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

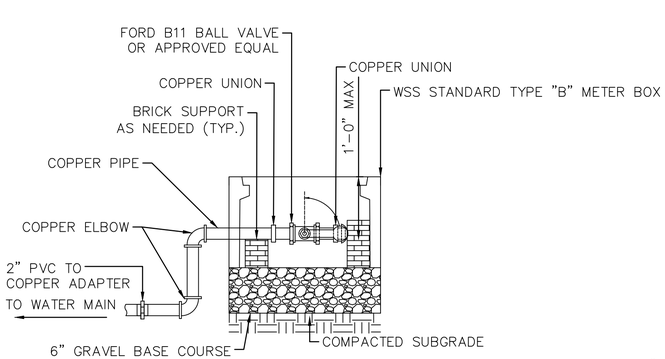
PLAN & PROFILE 2

DESIGNED:	SAK	
DRAWN:	RIT	
CHECKED:	SAK	
APPROVED:		DRAWING NO. C-7
CHIEF ENGINEER		DATE

JOB NO. F48C612A SHEET NO. 8 OF 20 SHEETS

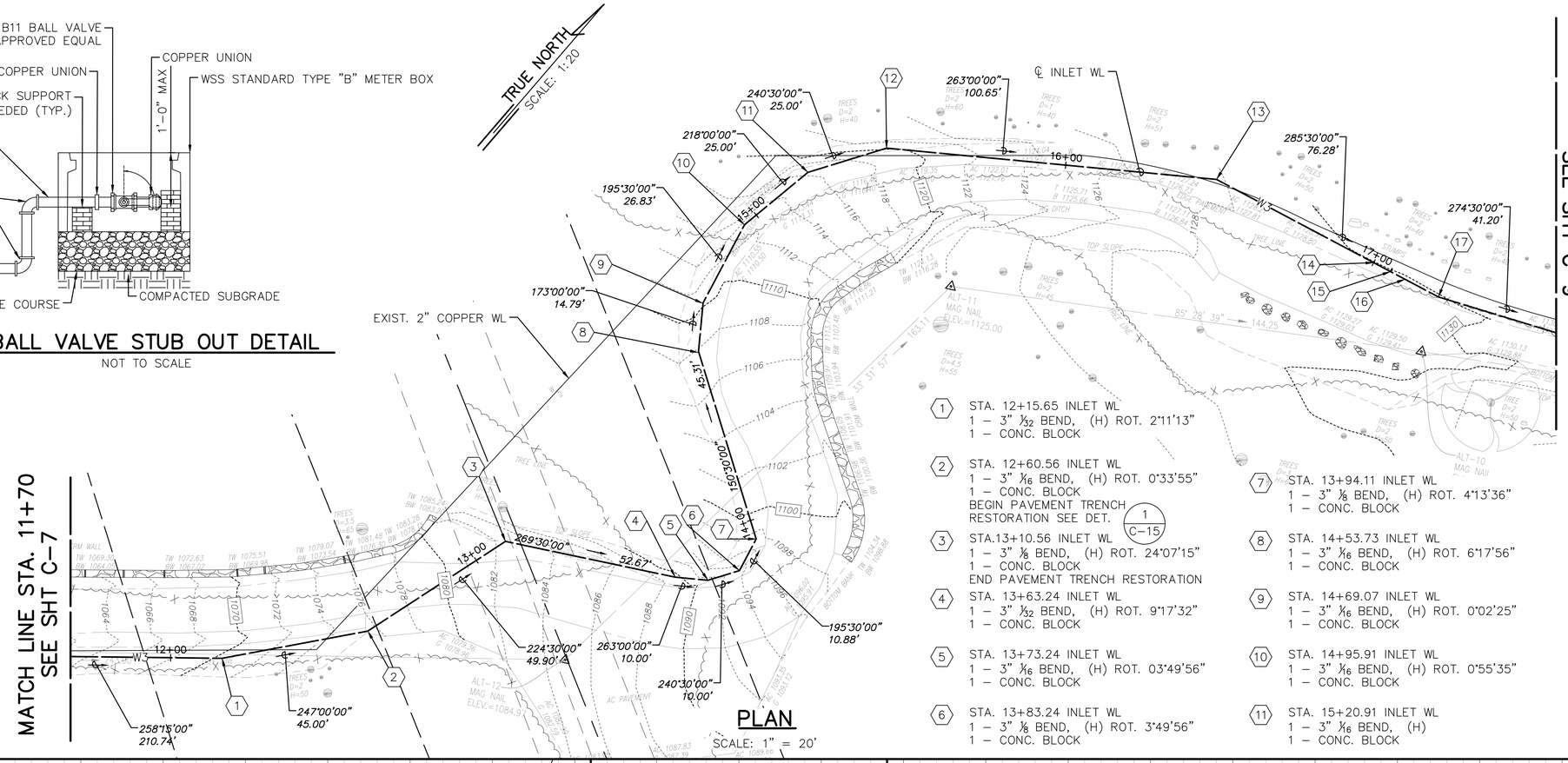
JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
g:\dlnr2403 keaiwa heiau\300 DSGN\310 plans\DLNR 2403 Plan & Profile 2.dwg



1 / C-8 **BALL VALVE STUB OUT DETAIL**

NOT TO SCALE



PLAN

SCALE: 1" = 20'

NOTE:
IMPROVEMENTS TO EXISTING 1-½" COPPER WATERLINE FROM THE EXISTING METER TO THE PUMP STATION WILL NOT BE DONE WITHIN THIS PROJECT. NO WORK NEAR THE EXISTING HEIAU WILL BE ALLOWED. WORK SHALL BEGIN FROM STATION 3+88.78.

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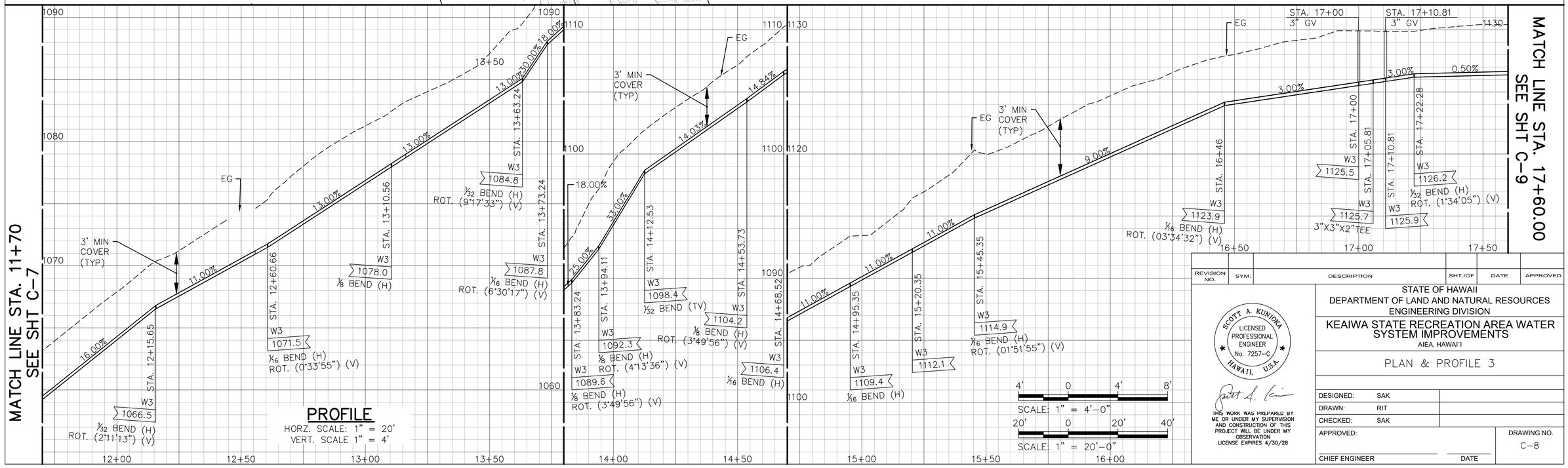
1. STA. 12+15.65 INLET WL
   1 – 3" ⁵⁄₃₂ BEND, (H) ROT. 2°11'13"
   1 – CONC. BLOCK
2. STA. 12+60.56 INLET WL
   1 – 3" ¹⁄₁₆ BEND, (H) ROT. 0°33'55"
   1 – CONC. BLOCK
   BEGIN PAVEMENT TRENCH RESTORATION SEE DET. (1 / C-15)
3. STA.13+10.56 INLET WL
   1 – 3" ⅛ BEND, (H) ROT. 24°07'15"
   1 – CONC. BLOCK
   END PAVEMENT TRENCH RESTORATION
4. STA. 13+63.24 INLET WL
   1 – 3" ⁵⁄₃₂ BEND, (H) ROT. 9°17'32"
   1 – CONC. BLOCK
5. STA. 13+73.24 INLET WL
   1 – 3" ¹⁄₁₆ BEND, (H) ROT. 03°49'56"
   1 – CONC. BLOCK
6. STA. 13+83.24 INLET WL
   1 – 3" ⅛ BEND, (H) ROT. 3°49'56"
   1 – CONC. BLOCK
7. STA. 13+94.11 INLET WL
   1 – 3" ⅛ BEND, (H) ROT. 4°13'36"
   1 – CONC. BLOCK
8. STA. 14+53.73 INLET WL
   1 – 3" ¹⁄₁₆ BEND, (H) ROT. 6°17'56"
   1 – CONC. BLOCK
9. STA. 14+69.07 INLET WL
   1 – 3" ¹⁄₁₆ BEND, (H) ROT. 0°02'25"
   1 – CONC. BLOCK
10. STA. 14+95.91 INLET WL
    1 – 3" ¹⁄₁₆ BEND, (H) ROT. 0°55'35"
    1 – CONC. BLOCK
11. STA. 15+20.91 INLET WL
    1 – 3" ¹⁄₁₆ BEND, (H)
    1 – CONC. BLOCK
12. STA. 15+45.35 INLET WL
    1 – 3" ¹⁄₁₆ BEND, (H) ROT. 01°51'56"
    1 – CONC. BLOCK
13. STA. 16+46 INLET WL
    1 – 3" ¹⁄₁₆ BEND, (H) ROT. 03°34'32"
    1 – CONC. BLOCK
14. STA. 17+00 INLET WL
    1 – 3" GV SEE DET. (3 / C-16)
    1 – 12" VALVE BOX
15. STA. 17+05.81 INLET WL
    1 – 3"X3"X2" TEE
    INSTALL BALL VALVE STUB OUT DETAIL THIS SHT.
16. STA. 17+10.81 INLET WL
    1 – 3" GV SEE DET. (3 / C-16)
    1 – 12" VALVE BOX
17. STA. 17+22.28 INLET WL
    1 – 3" ⁵⁄₃₂ BEND, (H) ROT. 01°34'05"
    1 – CONC. BLOCK



PROFILE

HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'

4' 0 4' 8'
SCALE: 1" = 4'-0"

20' 0 20' 40'
SCALE: 1" = 20'-0"

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

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LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

PLAN & PROFILE 3

DESIGNED:	SAK	
DRAWN:	RIT	
CHECKED:	SAK	
APPROVED:		DRAWING NO. C-8
CHIEF ENGINEER		DATE

JOB NO. F48C612A

SHEET NO. 9 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
g:\dlnr2403 keaiwa heiau\300 DSGN\310 plans\DLNR 2403 Plan & Profile 3.dwg

1. STA. 17+63.48 INLET WL
   1 – 3" 1/16 BEND, (H) ROT. 0°53'07"
   1 – CONC. BLOCK
2. STA. 17+95.79 INLET WL
   1 – 3" 1/32 BEND, (H)
   1 – CONC. BLOCK
3. STA. 18+11.05 INLET WL
   1 – 3" 1/32 BEND, (H)
   1 – CONC. BLOCK
4. STA. 19+14.21 INLET WL
   1 – 3" 1/32 BEND, (H) ROT. 08°57'47"
   1 – CONC. BLOCK
5. STA. 19+28.86 INLET WL
   1 – 3" 1/32 BEND, (H) ROT. 04°54'40"
   1 – CONC. BLOCK
6. STA. 20+00.67 INLET WL
   1 – 3" 1/32 BEND, (H) ROT. 0°41'13"
   1 – CONC. BLOCK
8. STA. 22+00.00 INLET WL
   1 – 3" 1/32 BEND, (H) ROT. 07°13'10"
   1 – CONC. BLOCK
8. STA. 22+18.93 INLET WL
   1 – 3" 1/32 BEND, (H) ROT. 07°13'10"
   1 – CONC. BLOCK
9. STA. 22+49.26 INLET WL
   1 – 3" 1/32 BEND, (H) ROT. 04°14'49"
   1 – CONC. BLOCK
10. STA. 22+94.26 INLET WL
    1 – 3" 1/32 BEND, (H) ROT. 02°44'56"
    1 – CONC. BLOCK

NOTE:
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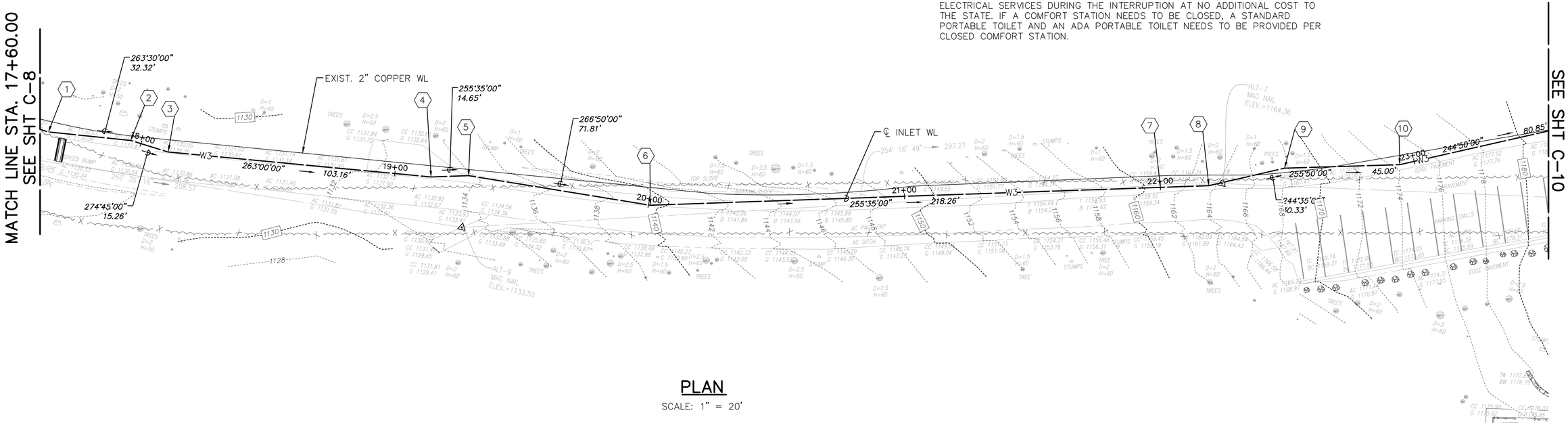
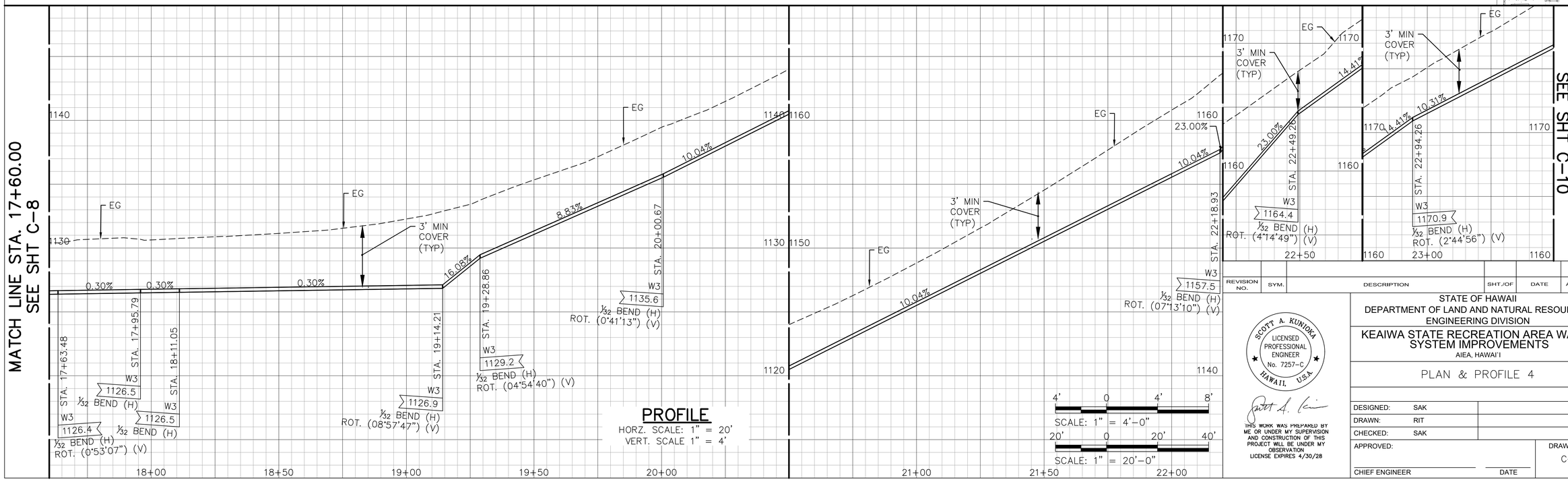
TRUE NORTH
SCALE: 1:20



PLAN
SCALE: 1" = 20'



PROFILE
HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'

SCALE: 1" = 4'–0"
SCALE: 1" = 20'–0"

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
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No. 7257–C
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

PLAN & PROFILE 4

DESIGNED:	SAK	
DRAWN:	RIT	
CHECKED:	SAK	
APPROVED:		DRAWING NO. C–9
CHIEF ENGINEER		DATE

JOB NO. F48C612A

SHEET NO. 10 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
g:\dlnr2403 keaiwa heiau\300 DSGN\310 plans\DLNR 2403 Plan & Profile 4.dwg

1. STA. 23+75.11 INLET WL
   1 – 3" 1/16 BEND, (H) ROT. 0°02'43"
   1 – CONC. BLOCK
2. STA. 24+17.00 INLET WL
   1 – 3"X3"X1" TEE
   1 – 1" PVC TO COPPER TRANSITION ADAPTER
   1 – 1" TO ¾" BUSHING
   1 – CONC. BLOCK
   50 LF – NEW ¾" COPPER
   RECONNECT TO EXIST. WATER FOUNTAIN
3. STA. 25+87.29 INLET WL
   1 – 3" 1/16 BEND, (H)
   1 – CONC. BLOCK
4. STA. 26+00.00 INLET WL
   1 – 3"X3"X1" TEE
   1 – CONC. BLOCK
   INSTALL HOSE BIBB ASSEMBLY SEE DET. 5/C-15
5. STA. 26+12.52 INLET WL
   1 – 3" GV SEE DET. 3/C-16
   1 – 12" VALVE BOX
6. END INLET WL
   STA. 26+15.69 INLET WL
   = STA. 0+00 OUTLET WL O/S 8' LT. OUTLET WL
   CONN. TO NEW TANK. SEE DET. 1/C-16
7. BEGIN OUTLET WL
   STA. 0+05 OUTLET WL
   = STA. 26+15.69 O/S 8' RT. INLET WL
   CONN. TO NEW TANK. SEE DET. 1/C-16

MATCH LINE STA. 23+50.00
SEE SHT C-9

MATCH LINE STA. 01+25.00
SEE SHT C-11

'AIEA LOOP TRAIL

REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE

PROP. NEW TANK HOUSE SEE STRUCT. SHT

EXIST. 2" WL SEE INSET THIS SHT.

REMOVE AND SALVAGE EXISTING REDWOOD TANK. DEMOLITION AND SALVAGING TO BE COORDINATED WITH STATE PARKS.

EXISTING 2" AND 2½" WATERLINE TO BE CAPPED AND ABANDONED AFTER NEW 3" LINE IN SERVICE

NEW ¾" COPPER WATER LINE

CONNECT TO EXIST. CRM DRINKING FOUNTAIN

EXIST. 2" WL

EXIST. 2-½" WL

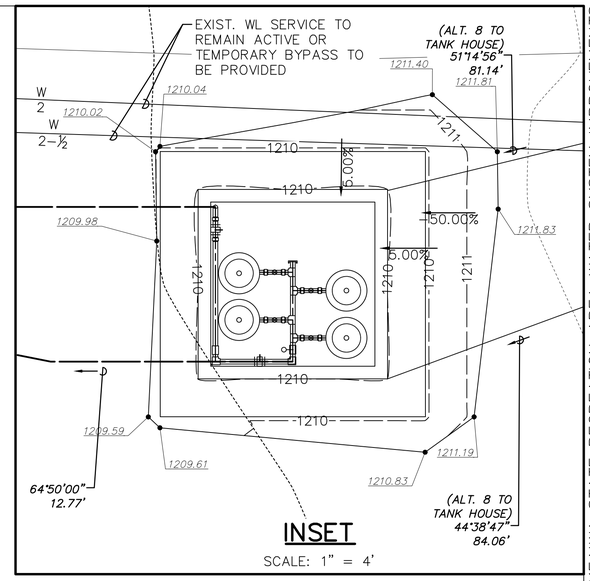
INSTALL NEW VALVE BOX

RESERVED PARKING

℄ OUTLET WL

TRUE NORTH
SCALE: 1:20

PLAN
SCALE: 1" = 20'



INSET
SCALE: 1" = 4'

8. STA. 0+12.77 INLET WL
   1 – 3" 1/32 BEND, (H)
   1 – CONC. BLOCK
9. STA. 0+80.00 OUTLET WL
   1 – 3" 1/8 BEND, (H) ROT. 01°51'35"
   1 – CONC. BLOCK
10. STA. 01+05.00 OUTLET WL
    1 – 3" 1/8 BEND, (H)
    1 – CONC. BLOCK

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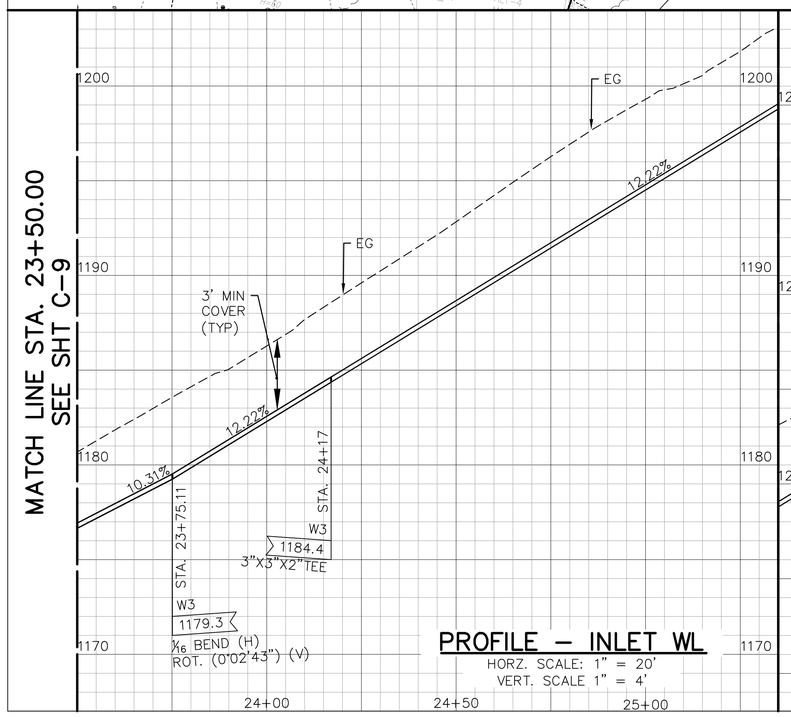
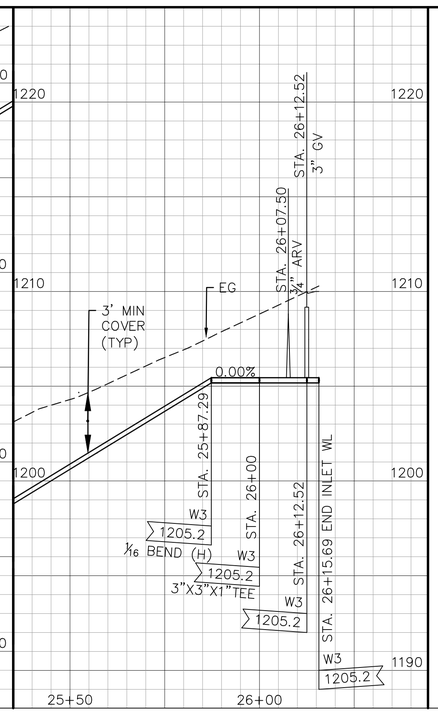
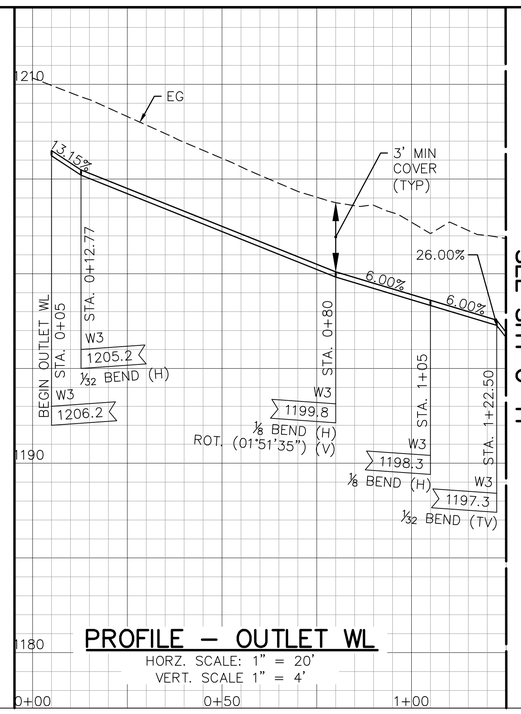


PROFILE – INLET WL
HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'



PROFILE – OUTLET WL
HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'



MATCH LINE STA. 01+25.00
SEE SHT C-11

4' 0 4' 8'
SCALE: 1" = 4'-0"

20' 0 20' 40'
SCALE: 1" = 20'-0"

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

PLAN & PROFILE 5

DESIGNED:	SAK
DRAWN:	RIT
CHECKED:	SAK
APPROVED:	
CHIEF ENGINEER	DATE

DRAWING NO. C-10

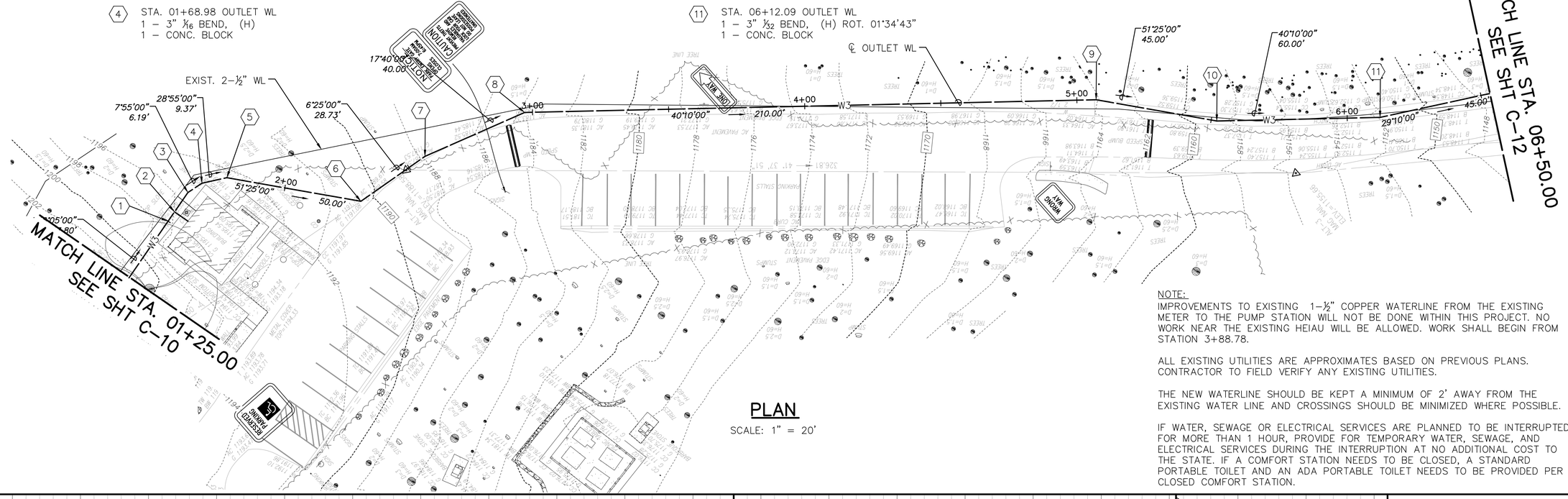
JOB NO. F48C612A SHEET NO. 11 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
g:\dlnr2403 keaiwa heiau\300 DSGN\310 plans\DLNR 2403 Plan & Profile 5.dwg

1. STA. 01+50 OUTLET WL
   1 – 3" GV SEE DET. 3/C-16
   1 – 12" VALVE BOX
2. STA. 01+56.14 OUTLET WL
   CONNECT TO EXIST COMFORT STATION
   SEE DET. 6/C-15
3. STA. 01+62.80 OUTLET WL
   1 – 3" 1/32 BEND, (H)
   1 – CONC. BLOCK
4. STA. 01+68.98 OUTLET WL
   1 – 3" 1/16 BEND, (H)
   1 – CONC. BLOCK
5. STA. 01+78.35 OUTLET WL
   1 – 3" 1/16 BEND, (H) ROT. 01°51'35"
   1 – CONC. BLOCK
6. STA. 02+28.35 OUTLET WL
   1 – 3" 1/8 BEND, (H) ROT. 0°51'10"
   1 – CONC. BLOCK
7. STA. 02+57.09 OUTLET WL
   1 – 3" 1/32 BEND, (H) ROT. 0°34'2"
   1 – CONC. BLOCK
8. STA. 02+97.09 OUTLET WL
   1 – 3" 1/16 BEND, (H) ROT. 00°51'29"
   1 – CONC. BLOCK
9. STA. 05+07.09 OUTLET WL
   1 – 3" 1/32 BEND, (H) ROT. 00°59'25"
   1 – CONC. BLOCK
10. STA. 05+52.09 OUTLET WL
    1 – 3" 1/32 BEND, (H) ROT. 01°52'04"
    1 – CONC. BLOCK
11. STA. 06+12.09 OUTLET WL
    1 – 3" 1/32 BEND, (H) ROT. 01°34'43"
    1 – CONC. BLOCK

TRUE NORTH
SCALE: 1:20



PLAN

SCALE: 1" = 20'

NOTE:
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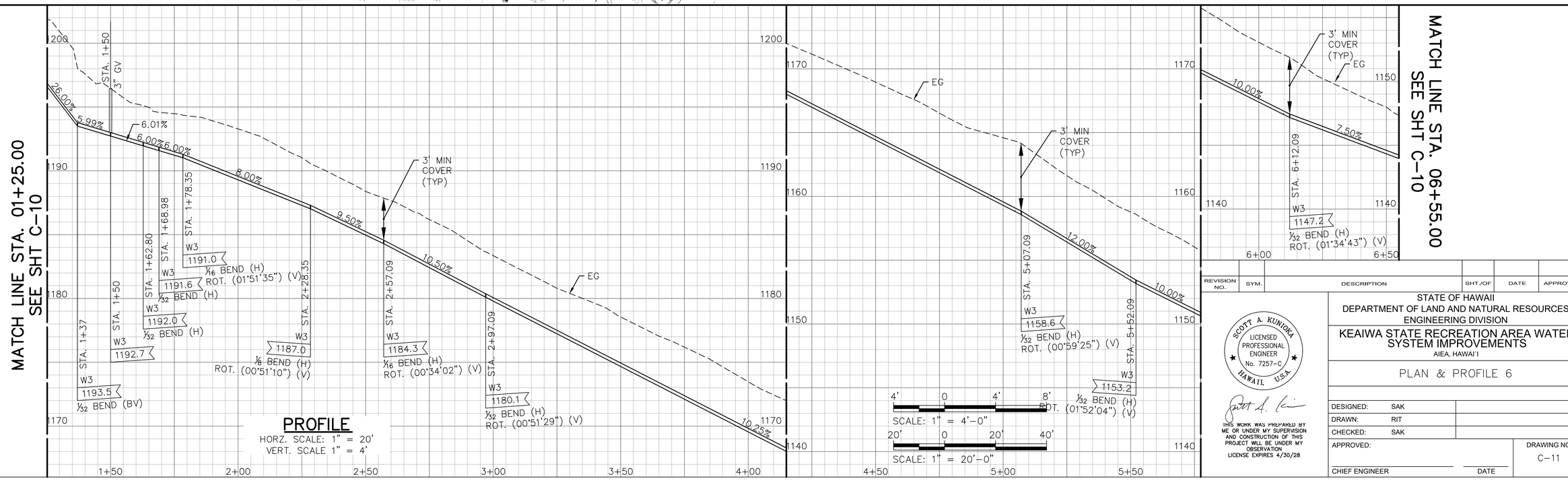


PROFILE

HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'

SCALE: 1" = 4'-0"

SCALE: 1" = 20'-0"

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

PLAN & PROFILE 6

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION
LICENSE EXPIRES 4/30/28

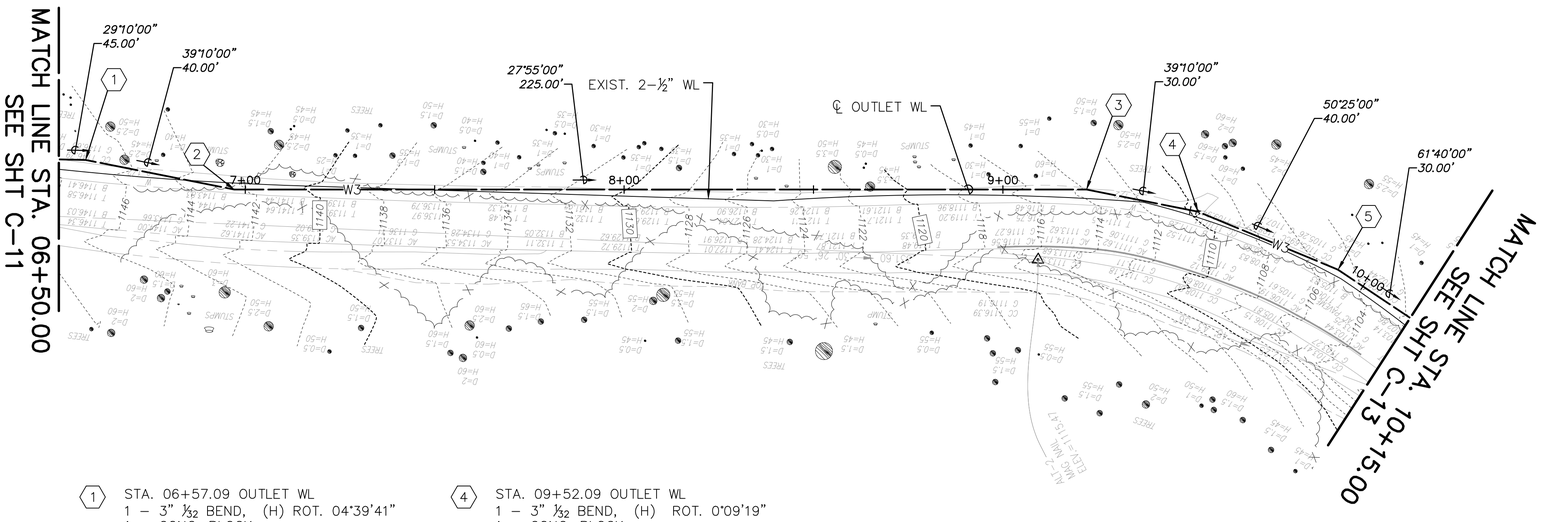
DESIGNED:	SAK
DRAWN:	RIT
CHECKED:	SAK
APPROVED:	
CHIEF ENGINEER	DATE

DRAWING NO. C-11

JOB NO. F48C612A SHEET NO. 12 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
g:\dlnr2403 keaiwa heiau\300 DSGN\310 plans\DLNR 2403 Plan & Profile 6.dwg



TRUE NORTH
SCALE: 1:20

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(1) STA. 06+57.09 OUTLET WL
1 – 3" 1/32 BEND, (H) ROT. 04°39'41"
1 – CONC. BLOCK

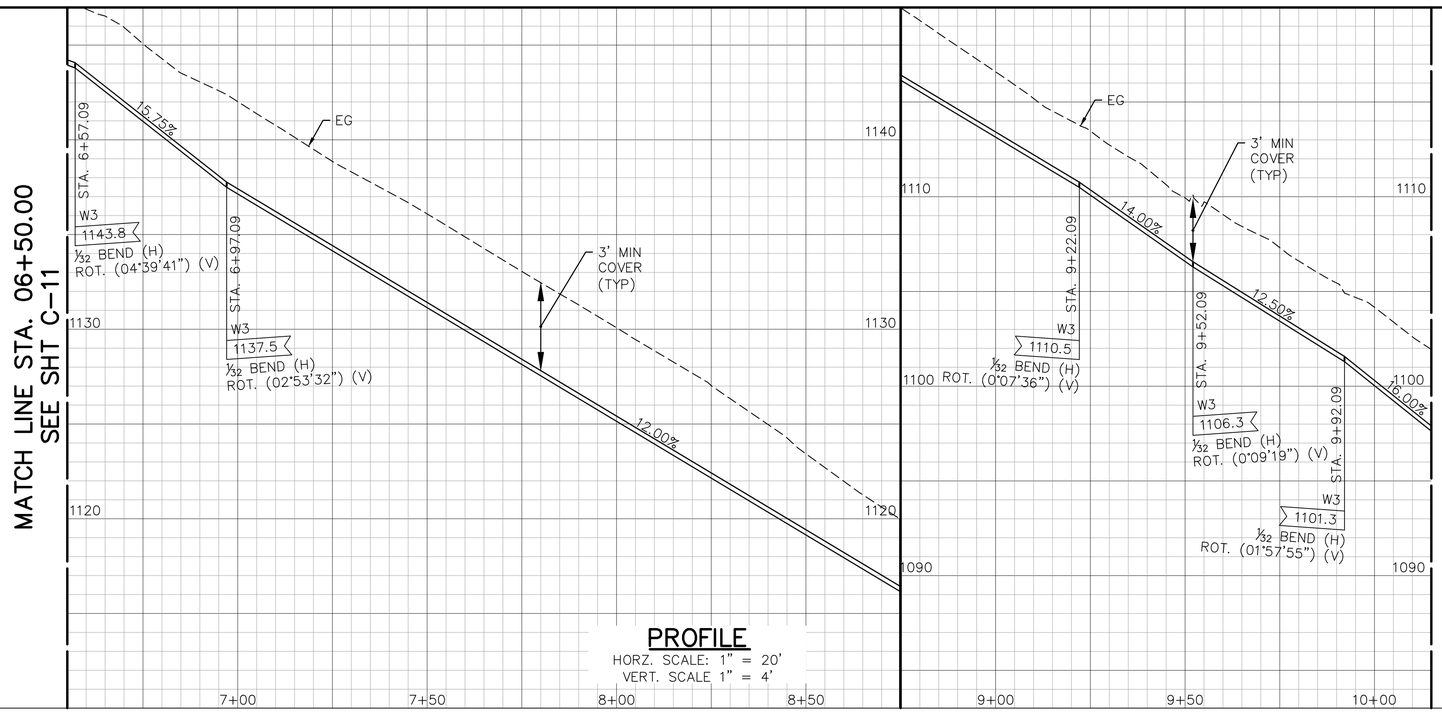
(2) STA. 06+97.09 OUTLET WL
1 – 3" 1/32 BEND, (H) ROT. 02°53'32"
1 – CONC. BLOCK

(3) STA. 09+22.09 OUTLET WL
1 – 3" 1/32 BEND, (H) ROT. 01°07'36"
1 – CONC. BLOCK

(4) STA. 09+52.09 OUTLET WL
1 – 3" 1/32 BEND, (H) ROT. 0°09'19"
1 – CONC. BLOCK

(5) STA. 09+92.09 OUTLET WL
1 – 3" 1/16 BEND, (H) ROT. 01°57'55"
1 – CONC. BLOCK

PLAN
SCALE: 1" = 20'



PROFILE
HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'

4' 0 4' 8'
SCALE: 1" = 4'-0"
20' 0 20' 40'
SCALE: 1" = 20'-0"

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, USA

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION
LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

PLAN & PROFILE 7

DESIGNED: SAK	
DRAWN: RIT	
CHECKED: SAK	
APPROVED:	DRAWING NO. C-12
CHIEF ENGINEER / DATE	

JOB NO. F48C612A

SHEET NO. 13 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
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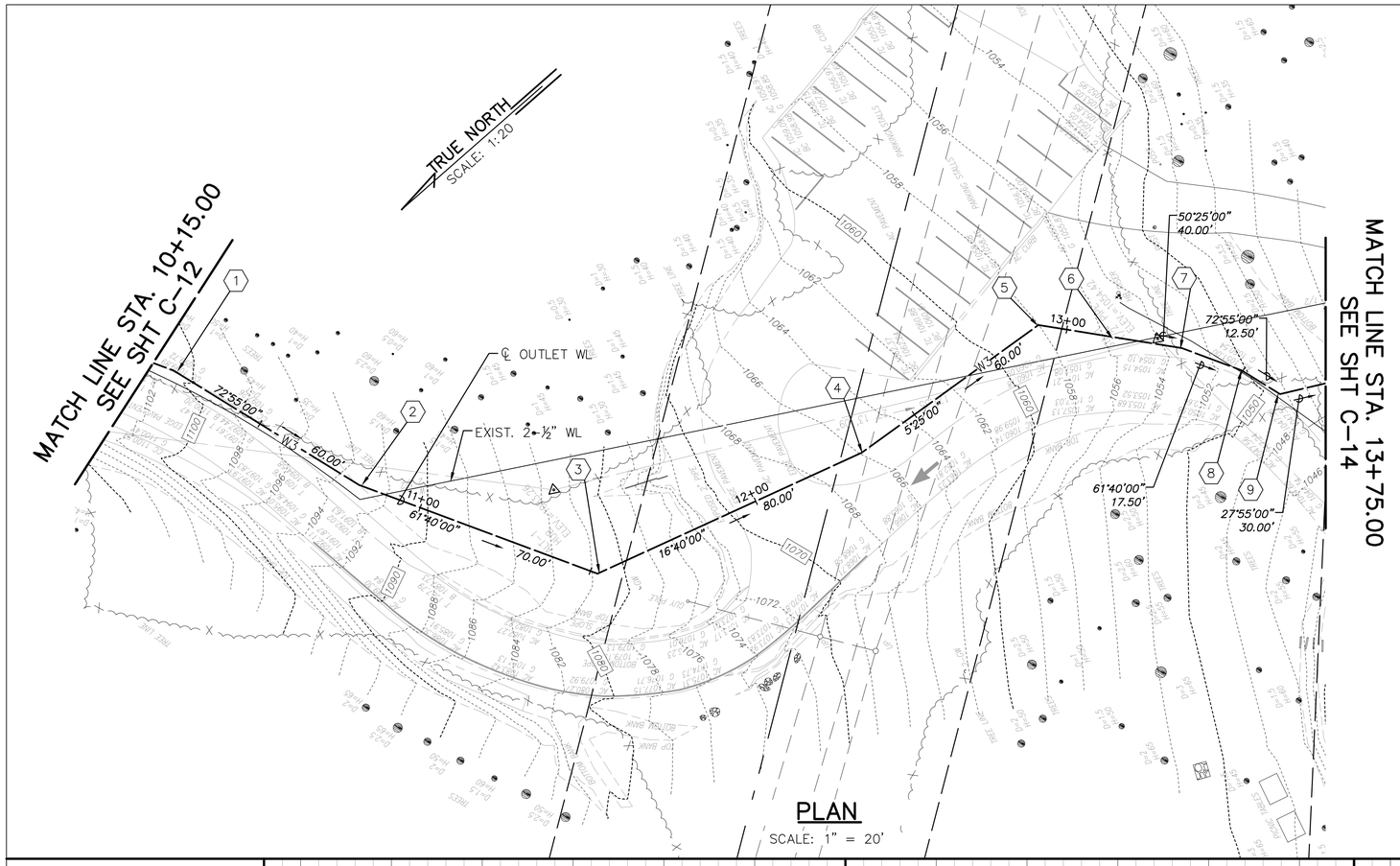

PLAN

SCALE: 1" = 20'

1. STA. 10+22.09 OUTLET WL
   1 – 3" ½32 BEND, (H) ROT. 01°18'59"
   1 – CONC. BLOCK
2. STA. 10+82.09 OUTLET WL
   1 – 3" ½32 BEND, (H) ROT. 01°41'0"
   1 – CONC. BLOCK
3. STA. 11+52.09 OUTLET WL
   1 – 3" ⅛ BEND, (H) ROT. 08°00'8"
   1 – CONC. BLOCK
4. STA. 12+32.09 OUTLET WL
   1 – 3" ½32 BEND, (H) ROT. 01°33'16"
   1 – CONC. BLOCK
5. STA. 12+92.09 OUTLET WL
   1 – 3" ⅛ BEND, (H) ROT. 0°19'22"
   1 – CONC. BLOCK
6. STA. 13+12.79 OUTLET WL
   1 – 3"x3"x1" TEE
   RECONNECT TO EXIST. HOSE BIBB ASSEMBLIES SEE DET. 5/C-15
7. STA. 13+32.09 OUTLET WL
   1 – 3" ⅙ BEND, (H) ROT. 03°11'47"
   1 – CONC. BLOCK
8. STA. 13+49.59 OUTLET WL
   1 – 3" ½32 BEND, (H) ROT. 04°06'36"
   1 – CONC. BLOCK
9. STA. 13+62.09 OUTLET WL
   1 – 3" ⅙ BEND, (H) ROT. 02°08'10"
   1 – CONC. BLOCK

NOTE:
IMPROVEMENTS TO EXISTING 1–½" COPPER WATERLINE FROM THE EXISTING METER TO THE PUMP STATION WILL NOT BE DONE WITHIN THIS PROJECT. NO WORK NEAR THE EXISTING HEIAU WILL BE ALLOWED. WORK SHALL BEGIN FROM STATION 3+88.78.

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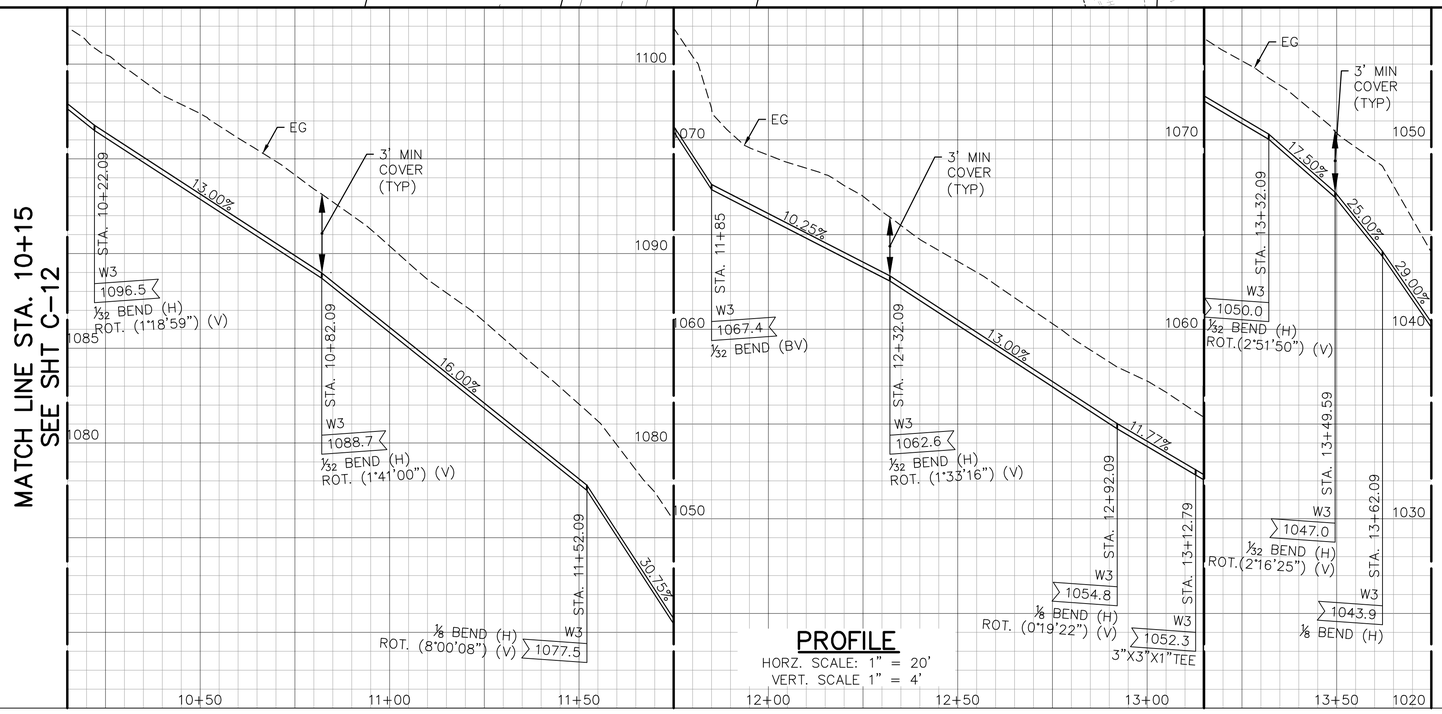
JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS



PROFILE

HORZ. SCALE: 1" = 20'
VERT. SCALE 1" = 4'

4' 0 4' 8'
SCALE: 1" = 4'–0"

20' 0 20' 40'
SCALE: 1" = 20'–0"

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SCOTT A. KUNIOKA
LICENSED PROFESSIONAL ENGINEER
No. 7257-C
HAWAII, U.S.A.

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LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

PLAN & PROFILE 8

DESIGNED:	SAK	
DRAWN:	RIT	
CHECKED:	SAK	
APPROVED:		DRAWING NO. C–13
CHIEF ENGINEER		DATE

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
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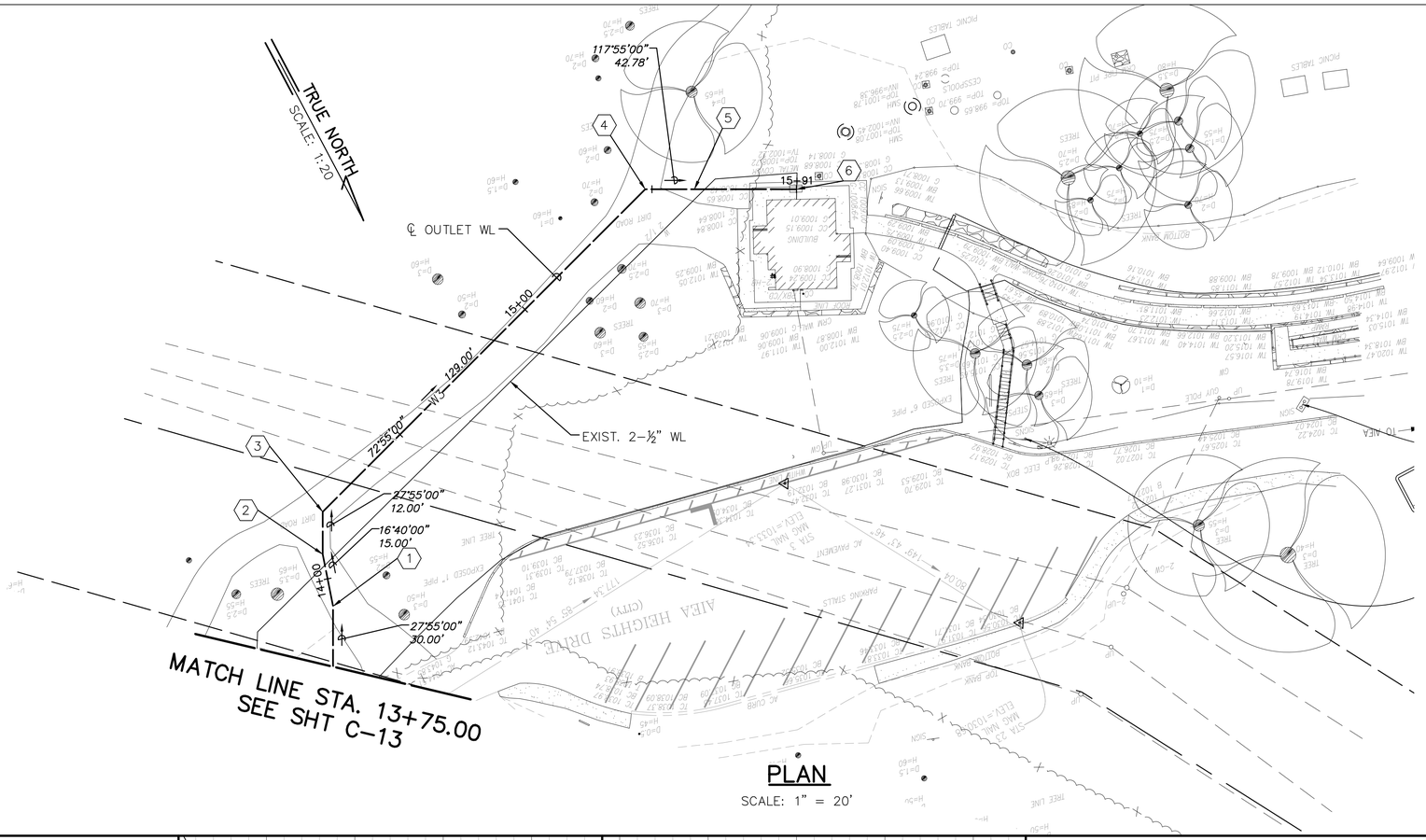

PLAN
SCALE: 1" = 20'

1. STA. 13+92.09 OUTLET WL
   1 – 3" ½₃₂ BEND, (H) ROT. 02°51'50"
   1 – CONC. BLOCK
2. STA. 14+07.09 OUTLET WL
   1 – 3" ½₃₂ BEND, (H) ROT. 02°16'25"
   1 – CONC. BLOCK
3. STA. 14+19.09 OUTLET WL
   1 – 3" ½₃₂ BEND, (H)
   1 – CONC. BLOCK
4. STA. 15+48.09 OUTLET WL
   1 – 3" ½₃₂ BEND, (H)
   1 – CONC. BLOCK
5. STA. 15+62.00 OUTLET WL
   1 – 3" GV
   1 – 12" VALVE BOX WSS STD DET. V–14
6. END OUTLET WL
   STA. 15+90.86 OUTLET WL
   CONN. TO EXIST. COMFORT STATION
   SEE DET. 6/C–15

   1 – 2" BRASS PRESSURE REGULATOR
   AR: 25 PSI TO 75 PSI
   OR: 25 PSI TO 300 PSI

NOTE:
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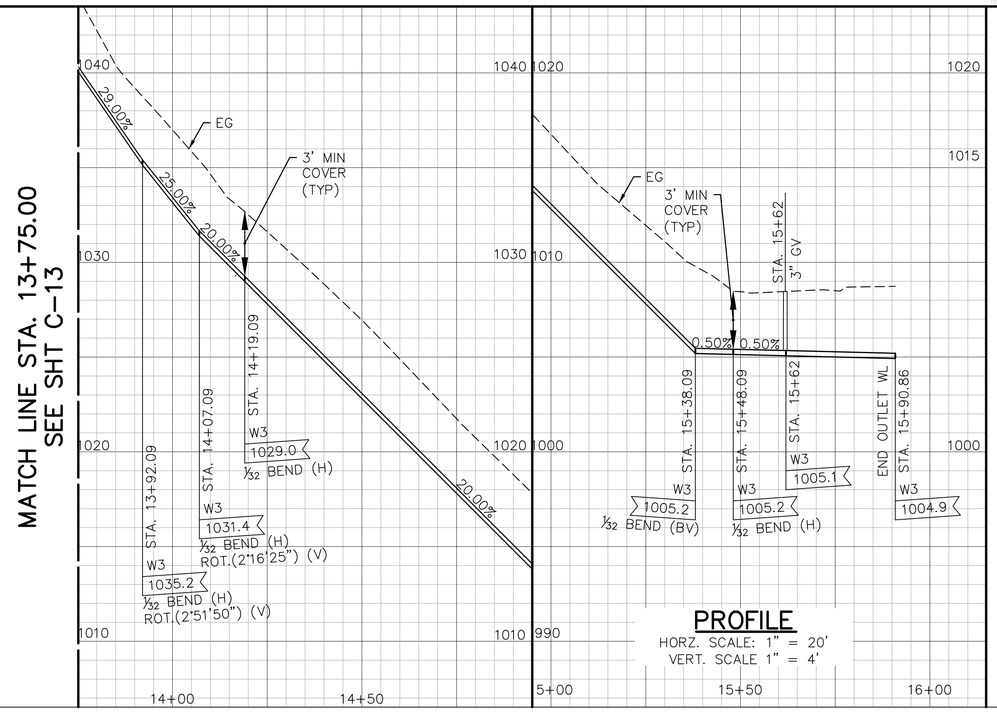

PROFILE
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ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

PLAN & PROFILE 9

DESIGNED:	SAK
DRAWN:	RIT
CHECKED:	SAK
APPROVED:	
CHIEF ENGINEER	DATE

DRAWING NO. C–14

JOB NO. F48C612A SHEET NO. 15 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

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Last Saved: 4/21/2026
Plotted on: 4/24/2026
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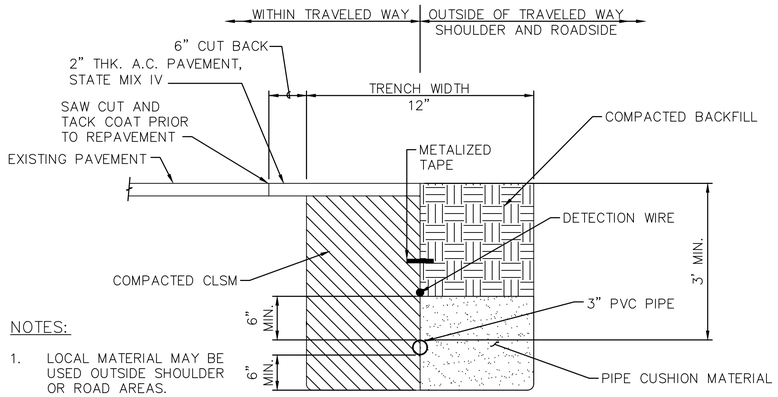


NOTES:

1. LOCAL MATERIAL MAY BE USED OUTSIDE SHOULDER OR ROAD AREAS.

1 / C-15 **WATERLINE TRENCH DETAIL**

NOT TO SCALE

THRUST BLOCKS SCHEDULE				
BEND	LENGTH	WIDTH	HEIGHT	VOLUME (CY)
1/32	1'-0"	1'-0"	1'	0.0400
1/16	1'-0"	2'-0"	1'	0.0740
1/8	1'-0"	2'-0"	1'	0.0752
1/4	1'-7"	1'-7"	1.5'	0.1400

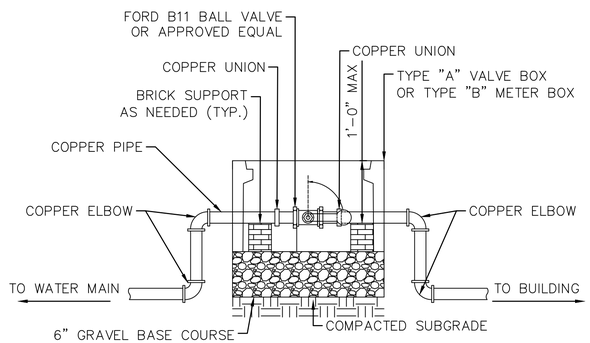
TOP VERTICAL THRUST BLOCKS SCHEDULE				
BEND	A	B	C	D
1/32	2'-3"	1'-6"	1'-3"	2'-6"
1/8	2'-6"	2'-3"	1'-9"	2'-6"

THRUST BLOCK NOTES:

1. CONCRETE USED SHALL BE DWS 2500 CONCRETE
2. CONCRETE SHALL ONLY BE LAID AGAINST UNDISTURBED SOIL.
3. PVC PIPES AND FITTINGS SHALL BE WRAPPED WITH A ONE MILL OR HEAVIER PLASTIC SHEETING PRIOR TO BEING EMBEDDED IN CONCRETE

2 / C-15 **THRUST BLOCK SCHEDULE**

NOT TO SCALE

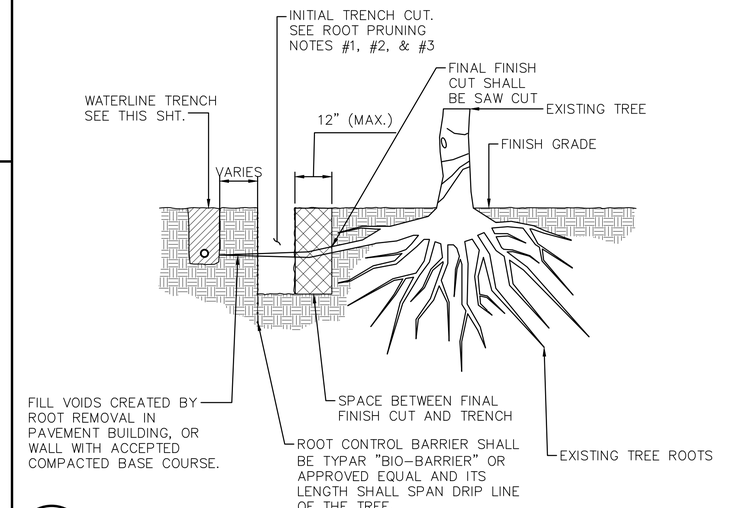


3 / C-15 **BALL VALVE DETAIL**

NOT TO SCALE

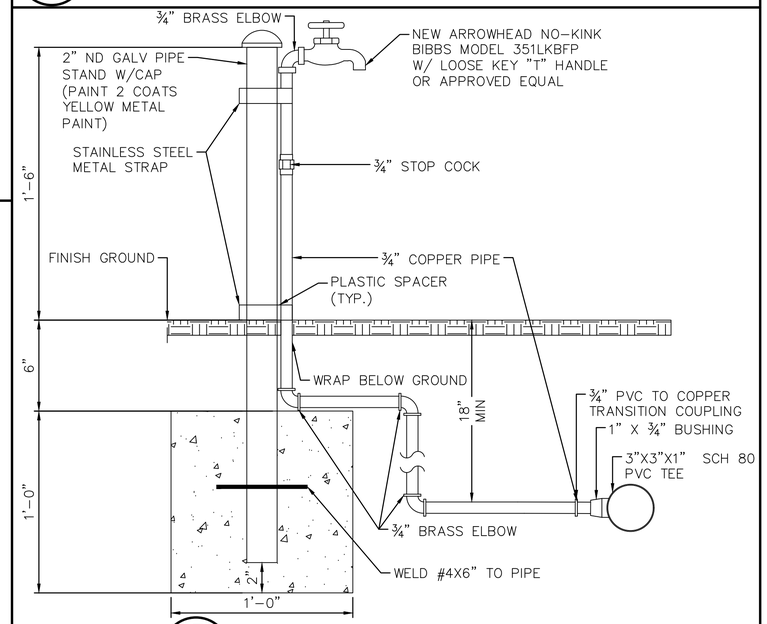
ROOT PRUNING NOTES:

1. MAKE INITIAL TRENCH CUTS 6" BEYOND THE FINAL FINISH CUT WHEN USING A TRENCHER.
2. MAKE INITIAL TRENCH CUT 12" BEYOND THE FINAL FINISH CUT AND AVOID RIPPING ROOTS WHEN USING BACKHOE.
3. BACKFILL TRENCH WITH NATIVE SOIL DUG FROM THE TRENCH AND COMPACT ALL VOIDS TO WATCH EXISTING, FINISH GRADE, AND SEED, SPRIG OR SOD WITH GRASS AS SPECIFIED.
4. WHEN USING BACKHOE EQUIPMENT, USE THE FRONT EDGE OF BUCKET TO SEVER THE TREE ROOTS TO ENSURE A CLEAN CUT OF THE ROOTS.
5. HAND EXCAVATE AROUND ROOTS TO THE SIZE OF DESIRED ROOTBALL AND THEN TRIM OFF PROTRUDING ROOTS BY HAND SAW OR CHAINSAW.
6. WORK SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A QUALIFIED ARBORIST.
7. THE QUALIFIED ARBORIST AND THE DIVISION OF STATE PARKS SHALL DETERMINE THE AMOUNT OF TREE CANOPY THAT SHALL BE PRUNED AFTER.
8. ALL PRUNE ROOTS AND BRANCHES SHALL BE REMOVED AND DISPOSED.



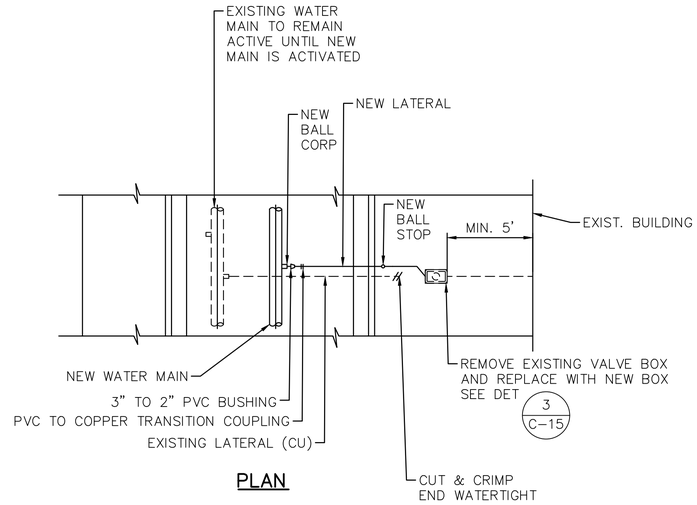
4 / C-15 **TYPICAL TRENCH AND PAVEMENT REPAIR SECTION**

NOT TO SCALE

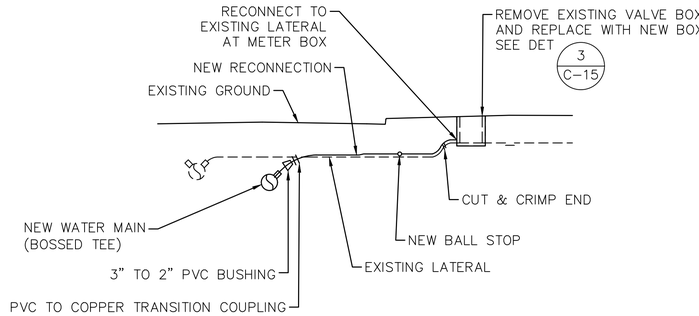


5 / C-15 **HOSE BIBB ASSEMBLY**

NOT TO SCALE



PLAN



PROFILE

NOTES:

1. ALL LATERAL RECONNECTIONS SHALL BE AT THE METER BOX CU TO NPTE ADAPTER.
2. FOR WATER LATERALS THAT ARE 1-½" A WSS STANDARD TYPE "A" VALVE BOX SHALL BE USED. FOR 2" LATERALS A TYPE "B" METER BOX SHALL BE USED.
3. FOR LATERAL CONNECTIONS WITHIN CONCRETE JACKETS, INSTALL LATERAL CONNECTION UP TO BALL CORP. JACKET MAIN AND COMPLETE LATERAL.

6 / C-15 **LATERAL RECONNECTION SCHEMATIC DETAIL**

NOT TO SCALE

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

WATER DETAILS

SCOTT A. KUNIOKA LICENSED PROFESSIONAL ENGINEER No. 7257-C HAWAII, U.S.A.

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LICENSE EXPIRES 4/30/28

DESIGNED:	SAK
DRAWN:	RIT
CHECKED:	SAK
APPROVED:	
CHIEF ENGINEER	DATE

DRAWING NO. C-15

JOB NO. F48C612A

SHEET NO. 16 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
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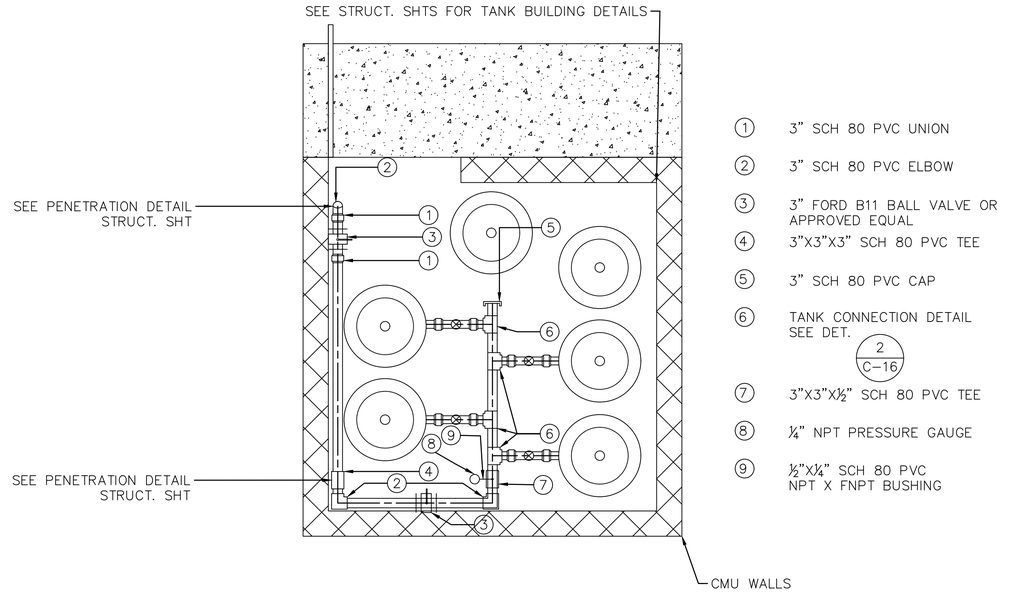
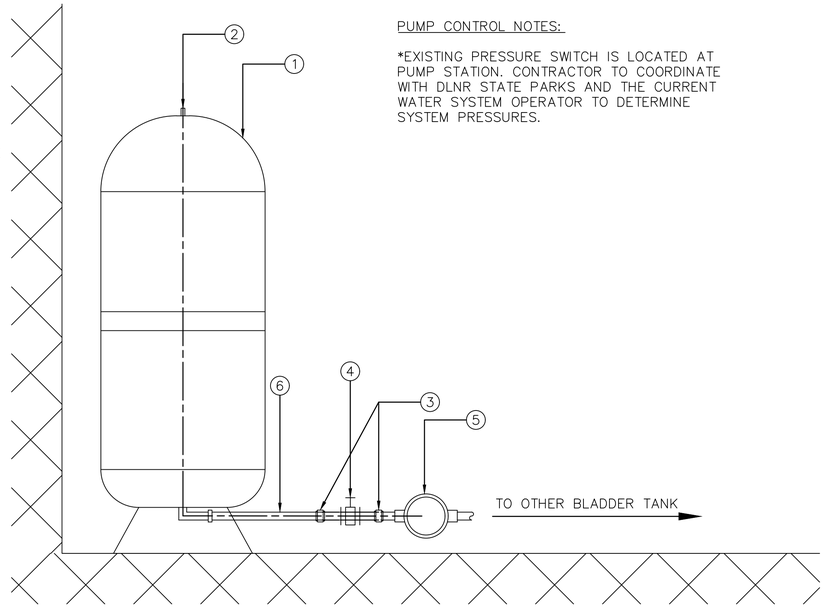


1 C-16 **TANK BUILDING LAYOUT DETAIL**

SCALE: NTS

① WELLXTROL WX-350 TANK OR APPROVED EQUAL
② STAINLESS STEEL SCHRADER VALVE
③ 1-¼" SCH 80 PVC UNION
④ 1-¼" BALL VALVE W/ 316 STAINLESS STEEL HANDLE AND ATTACHMENT NUTS
⑤ 3"X3"X1-¼" SCH 80 PVC TEE
⑥ 1-¼" SCH 80 PVC NIPPLE



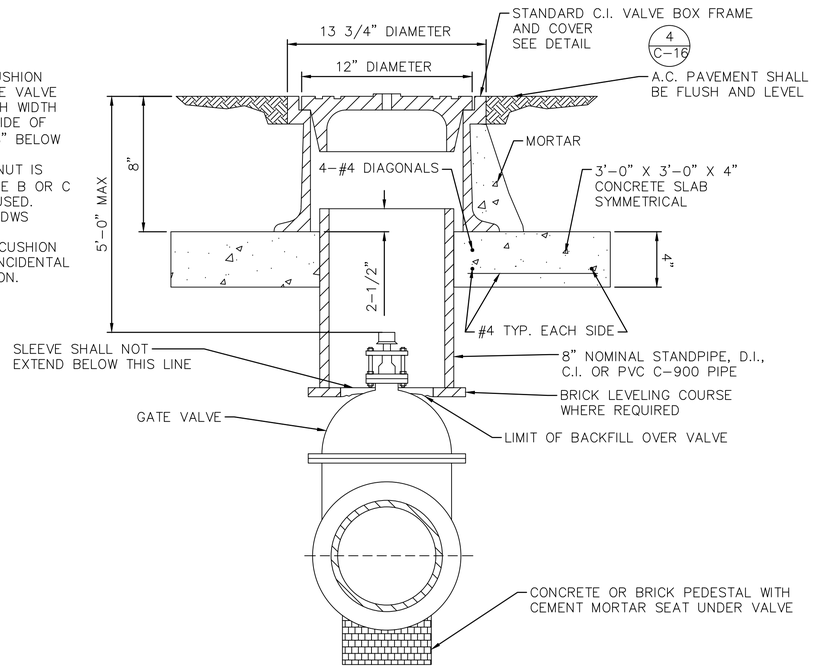
PUMP CONTROL NOTES:

*EXISTING PRESSURE SWITCH IS LOCATED AT PUMP STATION. CONTRACTOR TO COORDINATE WITH DLNR STATE PARKS AND THE CURRENT WATER SYSTEM OPERATOR TO DETERMINE SYSTEM PRESSURES.

2 C-16 **TANK CONNECTION DETAIL**

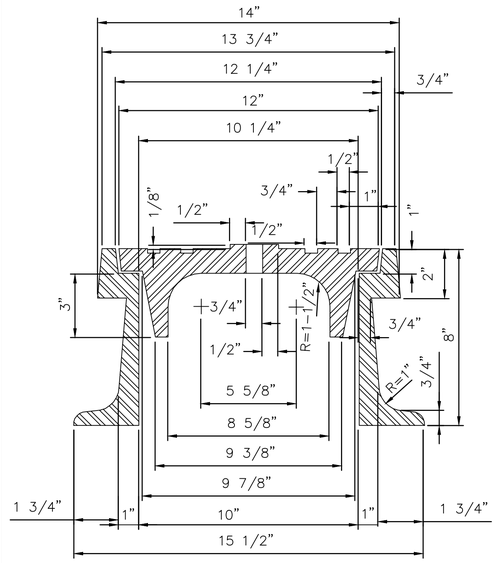
SCALE: NTS

NOTES:
1. THE LIMIT OF PIPE CUSHION BACKFILL AROUND THE VALVE SHALL BE THE TRENCH WIDTH X 4 FEET ON EACH SIDE OF VALVE AND FILL TO 8" BELOW FINISH GRADE.
2. IF VALVE OPERATOR NUT IS DEEPER THAN 5', TYPE B OR C MANHOLE SHALL BE USED.
3. CONCRETE SHALL BE DWS 2500.
4. PAVEMENT FOR PIPE CUSHION BACKFILL SHALL BE INCIDENTAL TO VALVE INSTALLATION.



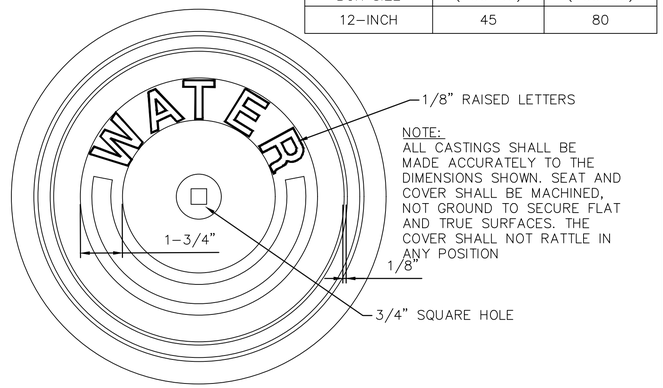
3 C-16 **12" VALVE BOX INSTALLATION FOR GATE VALVE**

NOT TO SCALE



CAST IRON FRAME

TABLE 200-9 – MINIMUM WEIGHT FOR MANHOLE/VALVE BOX COVERS AND FRAMES		
MANHOLE/VALVE BOX SIZE	COVER WEIGHT (POUNDS)	FRAME WEIGHT (POUNDS)
12-INCH	45	80



CAST IRON COVER

4 C-16 **12" VALVE BOX FRAME & COVER**

NOT TO SCALE

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

WATER DETAILS 2

DESIGNED:	SAK	
DRAWN:	RIT	
CHECKED:	SAK	
APPROVED:		DRAWING NO. C-16
CHIEF ENGINEER		DATE

JOB NO. F48C612A

SHEET NO. 17 OF 20 SHEETS

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS

Last Save by: RIT
Last Saved: 4/21/2026
Plotted on: 4/24/2026
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STRUCTURAL GENERAL NOTES:

1. GENERAL:

A. WORKMANSHIP AND MATERIALS MUST CONFORM TO THE BUILDING CODE AMENDED 2018 IBC AS STATED BELOW. HOWEVER, WHERE REFERENCE IS MADE TO PERFORMANCE CONFORMING TO OTHER STANDARDS THE MORE STRINGENT MUST APPLY.

B. THE CONTRACTOR MUST COMPARE ALL THE CONTRACT DOCUMENTS WITH EACH OTHER AND REPORT IN WRITING TO THE CONTRACTING OFFICER ALL INCONSISTENCIES AND OMISSIONS.
C. THE CONTRACTOR MUST TAKE FIELD MEASUREMENTS AND VERIFY FIELD CONDITIONS AND MUST COMPARE SUCH FIELD MEASUREMENTS AND CONDITIONS WITH THE DRAWINGS BEFORE COMMENCING WORK. REPORT IN WRITING TO THE CONTRACTING OFFICER ALL INCONSISTENCIES AND OMISSIONS.
D. THE CONTRACTOR MUST BE RESPONSIBLE FOR COORDINATING THE WORK OF ALL TRADES.
E. THE CONTRACTOR MUST BE RESPONSIBLE FOR METHODS OF CONSTRUCTION, WORKMANSHIP AND JOB SAFETY. THE CONTRACTOR MUST PROVIDE TEMPORARY SHORING AND BRACING AS REQUIRED FOR STABILITY OF STRUCTURAL MEMBERS AND SYSTEMS.
F. CONSTRUCTION LOADING MUST NOT EXCEED DESIGN LIVE LOAD UNLESS SPECIAL SHORING IS PROVIDED. ALLOWABLE LOADS MUST BE REDUCED IN AREAS WHERE THE STRUCTURE HAS NOT ATTAINED FULL DESIGN STRENGTH.
G. THE CONTRACTOR MUST BE RESPONSIBLE FOR PROTECTION OF THE ADJACENT PROPERTIES, STRUCTURES, STREETS AND UTILITIES DURING THE CONSTRUCTION PERIOD.
H. DETAILS NOTED AS TYPICAL ON THE STRUCTURAL DRAWINGS MUST APPLY IN ALL CONDITIONS UNLESS SPECIFICALLY SHOWN OR NOTED.

2. DESIGN CRITERIA:

A. DEAD LOAD
   1. WEIGHT OF ALL COMPONENTS OF THE STRUCTURE, AND APPURTENANCES ATTACHED THERETO.
B. FLOOR LIVE LOAD
   50 PSF
C. ROOF LIVE LOAD: 20 PSF
D. WIND DESIGN DATA
   1. BASIC WIND SPEED (3-SECOND GUST, STRENGTH LEVEL): 153 MPH
   2. RISK CATEGORY: II
   3. EXPOSURE CATEGORY: B
   4. WIND TOPOGRAPHIC FACTOR KZT = 1.0
D. EARTHQUAKE DESIGN DATA:
   1. RISK CATEGORY: III
   2. IMPORTANCE FACTOR: 1.25
   3. MAPPED SPECTRAL RESPONSE ACCELERATIONS
      a. SHORT PERIOD: 0.53g
      b. 1-SEC PERIOD: 0.15g
   4. SITE CLASS: D
   5. SPECTRAL RESPONSE COEFFICIENTS
      c. SHORT PERIOD: 0.49g
      d. 1-SEC PERIOD: 0.28g
   6. DESIGN CATEGORY: D
E. SOILS
   1. ALLOWABLE BEARING CAPACITY: 2,500 PSF

3. FOUNDATION:

A. FOUNDATION DESIGN IS BASED ASSUMED VALUES.
B. CONTRACTOR MUST PROVIDE FOR DE-WATERING OF EXCAVATION FROM SURFACE WATER, GROUND WATER OR SEEPAGE.
C. EXCAVATIONS FOR ANY PURPOSE MUST NOT REDUCE LATERAL SUPPORT FOR ANY FOUNDATION WITHOUT FIRST UNDERPINNING OR PROTECTING THE FOUNDATION AGAINST DETRIMENTAL LATERAL OR VERTICAL MOVEMENT, OR BOTH.
D. BOTTOM OF FOOTINGS MUST BE SCARIFIED TO A DEPTH OF ABOUT 8 INCHES AND COMPACTED TO A MINIMUM OF 95% RELATIVE COMPACTION IN ACCORDANCE WITH ASTM D 1557 TO PROVIDE A RELATIVELY FIRM AND SMOOTH BEARING SURFACE PRIOR TO PLACEMENT OF REINFORCING STEEL AND CONCRETE. IF SOFT AND/OR LOOSE MATERIALS ARE ENCOUNTERED AT THE BOTTOM OF FOOTING EXCAVATIONS, THEY MUST BE OVER-EXCAVATED TO EXPOSE THE UNDERLYING FIRM MATERIALS. THE FOOTING BOTTOM MUST BE EXTENDED DOWN TO THE UNDERLYING FIRM MATERIALS.

4. CONCRETE:

A. CONCRETE CONSTRUCTION MUST CONFORM TO AMERICAN CONCRETE INSTITUTE ACI 318
B. CONCRETE MUST BE REGULAR WEIGHT HARD ROCK CONCRETE AND MUST HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
C. WATER USED IN MIXING CONCRETE MUST BE CLEAN AND FREE FROM INJURIOUS AMOUNTS OF OILS, ACIDS, ALKALIS, SALTS, ORGANIC MATERIALS OR OTHER SUBSTANCES THAT ARE DELETERIOUS TO CONCRETE OR STEEL REINFORCEMENT.
D. ALL INSERTS, ANCHOR BOLTS, PLATES, AND OTHER ITEMS TO BE CAST IN THE CONCRETE MUST BE HOT-DIPPED GALVANIZED ACCORDING TO ASTM A153 UNLESS OTHERWISE NOTED.
E. REINFORCING BARS, ANCHOR BOLTS, INSERTS, AND OTHER ITEMS TO BE CAST IN THE CONCRETE MUST BE SECURED IN POSITION PRIOR TO PLACEMENT OF CONCRETE.
F. NON-SHRINK GROUT MUST BE A PREMIXED NON-METALLIC FORMULA, CAPABLE OF DEVELOPING A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI IN 1 DAY AND 5,000 PSI IN 28 DAYS.

5. REINFORCING STEEL:

A. REINFORCING STEEL MUST BE DEFORMED BARS CONFORMING TO ASTM A615, GRADE 60.
B. CLEAR CONCRETE COVER FOR REINFORCING BARS MUST BE AS FOLLOWS, UNLESS OTHERWISE NOTED:
   1. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH: 3"
   2. CONCRETE FORMED AND EXPOSED TO EARTH OR WEATHER: 2"
C. STANDARD HOOKS ON REINFORCING BARS USED MUST COMPLY WITH ACI 318, SECTION 25.3.1.
D. MINIMUM REINFORCEMENT BEND DIAMETERS MUST COMPLY WITH ACI 318, SECTION 25.3.2.

6. STRUCTURAL STEEL:

A. FABRICATION AND ERECTION OF STRUCTURAL STEEL MUST CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL OF STEEL CONSTRUCTION, FIFTEENTH EDITION.
B. STRUCTURAL STEEL MUST CONFORM TO ASTM A36 UNLESS OTHERWISE NOTED.
C. STEEL WIDE FLANGE SECTIONS MUST CONFORM TO ASTM A992.
D. STEEL TUBES MUST CONFORM TO ASTM A500, GRADE C.
E. HIGH-STRENGTH BOLTS MUST CONFORM TO ASTM F3125, GRADE A325, TYPE N. INSTALLATION MUST BE ASSURED BY TURN OF NUT METHOD.
F. WELDS AND WELDING PROCEDURES MUST CONFORM TO THE STRUCTURAL WELDING CODE AWS D1.1 OF THE AMERICAN WELDING SOCIETY.
G. WELDING MUST BE PERFORMED BY WELDERS PREQUALIFIED FOR WELDING PROCEDURES TO BE USED.
H. WELDING ELECTRODES MUST BE E70XX.
I. ALL STEEL MUST BE HOT-DIPPED GALVANIZED ACCORDING TO ASTM A123.
J. ALL ANCHOR BOLTS, PLATES, AND OTHER ITEMS TO BE CAST IN CONCRETE MUST BE HOT-DIPPED GALVANIZED ACCORDING TO ASTM A153 UNLESS OTHERWISE NOTED.

7. CONCRETE MASONRY UNITS (CMU):

A. CONCRETE MASONRY UNITS SHALL CONFORM TO ASTM C90 FOR LOAD-BEARING CONCRETE MASONRY UNITS NORMAL WEIGHT WITH A UNIT COMPRESSIVE STRENGTH OF 2,800 PSI.
B. MORTAR FOR USE IN MASONRY CONSTRUCTION SHALL CONFORM TO ASTM C270 WITH A MINIMUM COMPRESSIVE STRENGTH OF 1,800 PSI. UNUSED MORTAR SHALL BE DISCARDED WITHIN 2 ½ HOURS AFTER INITIAL MIXING. MORTAR FOR REINFORCED MASONRY SHALL BE TYPE S.
C. GROUT SHALL CONFORM TO ASTM C476 WITH A MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI AT 28 DAYS.
D. ALL CELLS AND BOND COURSES WITH REINFORCEMENT AND INSERTS SHALL BE SOLID GROUTED. CLEANOUTS SHALL BE PROVIDED FOR ALL GROUT POURS OVER 5'-4"IN HEIGHT.
E. WHEN GROUTING IS STOPPED FOR ONE HOUR OR LONGER, HORIZONTAL CONSTRUCTION JOINTS SHALL BE FORMED BY STOPPING THE GROUT POUR 1½ INCHES BELOW THE TOP OF THE UPPERMOST UNIT.
F. THE CONTRACTOR SHALL LOCATE CONSTRUCTION JOINTS SO AS NOT TO IMPAIR THE STRENGTH OF THE STRUCTURE AND TO MINIMIZE SHRINKAGE STRESSES. SUBMIT LOCATION OF CONSTRUCTION JOINTS TO THE ARCHITECT FOR APPROVAL, UNLESS OTHERWISE NOTED. MAXIMUM SPACING BETWEEN CONSTRUCTION JOINTS SHALL NOT EXCEED THE LESSER OF LENGTH TO HEIGHT RATIO OF 1.5 OR 25 FEET.
G. WALLS SHALL BE CONSTRUCTED IN CONVENTIONAL RUNNING BOND, UNLESS OTHERWISE NOTED.
H. SEE ARCHITECTURAL DRAWINGS FOR LAYING PATTERN, HEIGHT OF UNITS, SURFACE TEXTURE, AND JOINT TYPE.
I. OPEN-ENDED BLOCKS MAY BE SUBSTITUTED FOR STANDARD CONCRETE MASONRY UNITS.
J. SHOP DRAWINGS AND STRUCTURAL CALCULATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO FABRICATION. SHOP DRAWINGS SHALL INCLUDE LAYOUT OF MEMBERS, MEMBER SIZES, REINFORCING, CONNECTIONS DETAILS AND BRACING REQUIREMENTS. SUBMITTAL SHALL BE CERTIFIED BY A STRUCTURAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF HAWAII.
K. FABRICATOR SHALL BE A PCI CERTIFIED PLANT.

SPECIAL INSPECTIONS:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING SPECIAL INSPECTIONS FOR THE FOLLOWING ITEMS BY HIRING AN INDEPENDENT THIRD PARTY TO PERFORM ALL INSPECTIONS AS REQUIRED BY THE BUILDING CODE AT THE APPROPRIATE TIME AT NO ADDITIONAL COST TO THE STATE. FREQUENCY OF INSPECTIONS IS DEFINED IN THE IBC, SECTION 1704 TABLES, AS AMENDED BY THE COUNTY. THE CONTRACTOR SHALL CORRECT DEFECTIVE WORK AT NO ADDITIONAL COST TO THE STATE AND PAY FOR RE-INSPECTION AS REQUIRED.

1- REINFORCEMENT
2- CONCRETE PLACEMENT
3- CMU GROUT

REVISION NO.	SYM.	DESCRIPTION	SHT./OF	DATE	APPROVED

SAEID POURSALEH
LICENSED PROFESSIONAL ENGINEER
No. 11475-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION
LICENSE EXPIRES 4/30/28

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

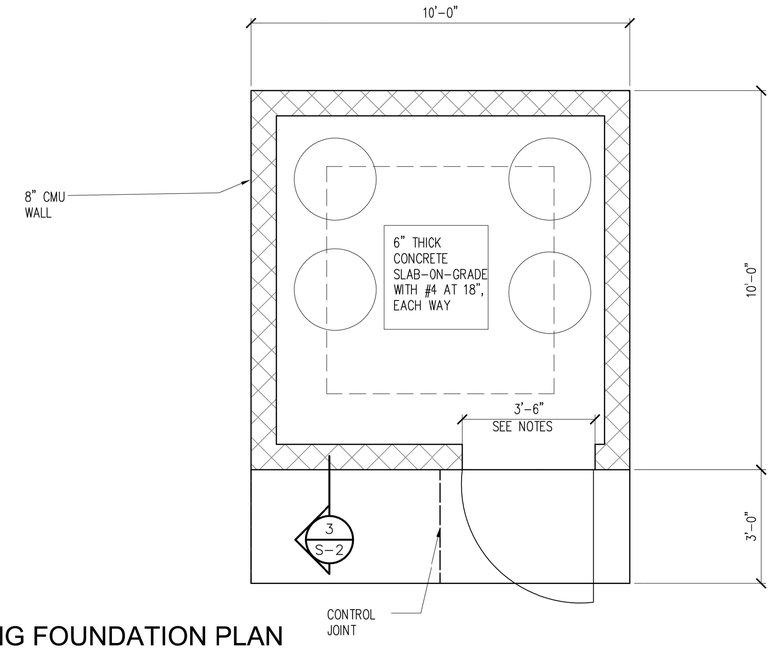
STRUCTURAL NOTES

DESIGNED:
DRAWN:
CHECKED:
APPROVED:
CHIEF ENGINEER DATE

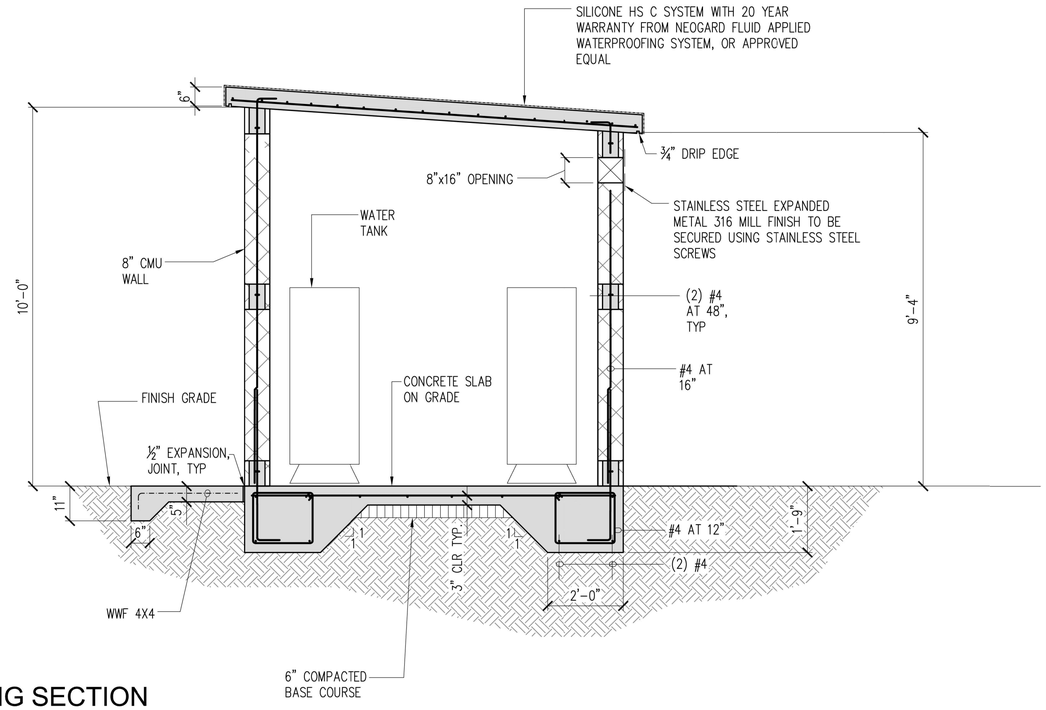
DRAWING NO. S-1

JOB NO. F48C612A

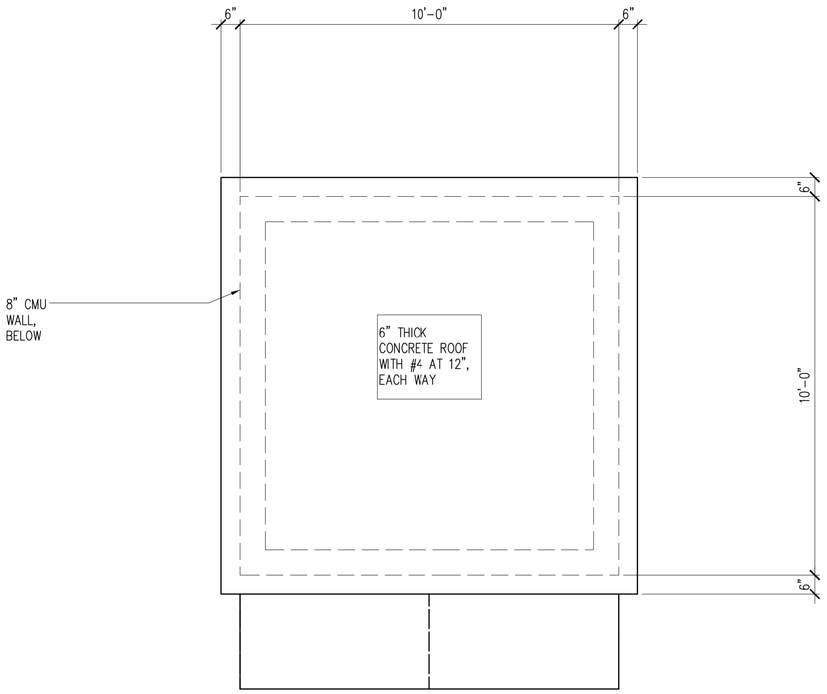
JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS



1 / S-2 **BUILDING FOUNDATION PLAN**
SCALE: 1/2" = 1'-0"



3 / S-2 **BUILDING SECTION**
SCALE: 1/2" = 1'-0"



2 / S-2 **BUILDING ROOF PLAN**
SCALE: 1/2" = 1'-0"

DOOR NOTES:

DIMENSIONS: DOOR TO BE 36" X 80" (STANDARD WIDTH) OR SPECIFY YOUR EXACT OPENING WIDTH.

MATERIAL: ENTIRE ASSEMBLY (DOOR AND FRAME) TO BE STAINLESS STEEL TYPE 316 WITH A #4 BRUSHED FINISH. CONSTRUCTION: DOOR TO BE 16-GAUGE HOLLOW METAL WITH A SEAMLESS EDGE AND POLYSTYRENE CORE (FOR OUTDOOR INSULATION).

HARDWARE PREP: FACTORY-PREPPED FOR A GRADE 1 MORTISE LOCK.

HINGE SECURITY: SUPPLY THREE (3) HEAVY-DUTY 316 STAINLESS STEEL HINGES FEATURING:
NON-REMOVABLE PINS (NRP)
AND SECURITY STUDS (DOG BOLTS) TO PREVENT DOOR REMOVAL IF HINGES ARE CUT.

OUTSWING PROTECTION: PROVIDE A 12-GAUGE 316 STAINLESS STEEL LATCH GUARD TO PROTECT THE MORTISE LOCK FROM PRYING OR TAMPERING.

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No. 11475-S
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LICENSE EXPIRES 4/30/26

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

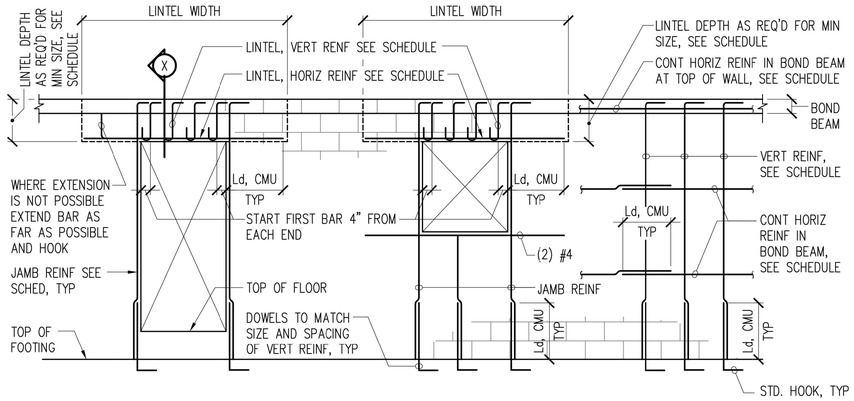
KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

TANK ENCLOSURE BUILDING

DESIGNED:	
DRAWN:	
CHECKED:	
APPROVED:	DRAWING NO. S-2

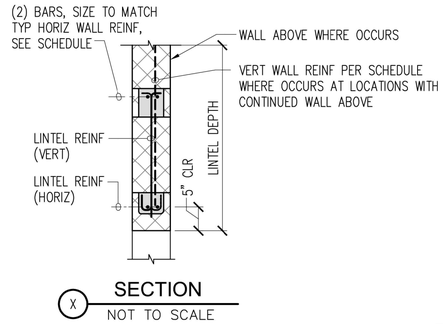
CHIEF ENGINEER — DATE

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS



1 S-3 **TYPICAL CMU WALL ELEVATION DETAIL**

NOT TO SCALE



X **SECTION**

NOT TO SCALE

NOTE: ALL WALLS SHALL BE SOLID GROUTED.

CMU WALL REINFORCING SCHEDULE

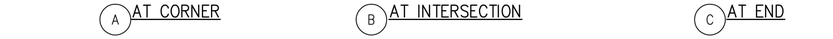
WALL THICKNESS (INCHES)	BAR SIZE AND SPACING		
	HORIZ	VERT	REMARKS
4	(2) #3 AT 48"	#3 AT 24"	
6	(2) #4 AT 48"	(2) #4	AT DOWNSPOUT
8	(2) #4 AT 48"	#4 AT 16"	EXTERIOR WALLS
8	(2) #4 AT 48"	#5 AT 24"	INTERIOR WALLS

CMU DEVELOPMENT LENGTH AND LAP SPLICE LENGTH SCHEDULE

BAR SIZE	Ld, CMU
#3	24"
#4	34"
#5	45"
#6	54"
#7	63"
#8	72"

OPENING SCHEDULE

OPENING WIDTH	LINTEL DEPTH (MINIMUM)	REINFORCING			
		JAMB	LINTEL HORIZ	LINTEL VERT	REMARKS
W < 5'-0"	2'-8"	(2) #4	(2) #4	#4 AT 8"	
5'-1" < W < 7'-0"	2'-8"	(2) #5	(2) #5	#4 AT 8"	
7'-1" < W < 9'-0"	4'-0"	(2) #6	(2) #8	#5 AT 8"	



A AT CORNER

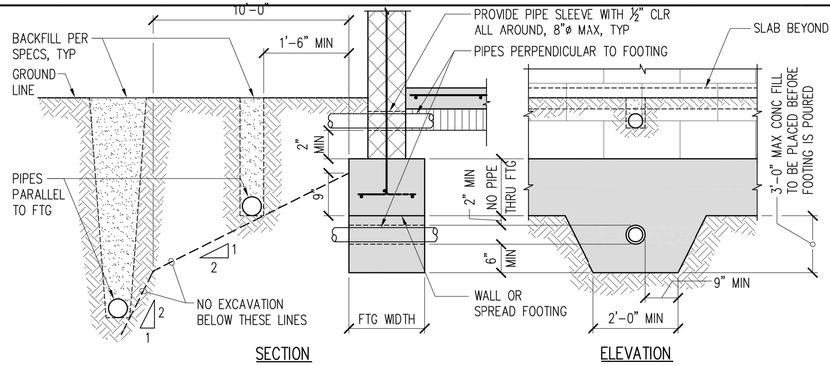
B AT INTERSECTION

C AT END

SINGLE MAT

2 S-3 **CMU WALL REINFORCING AT BOND BEAM**

NOT TO SCALE

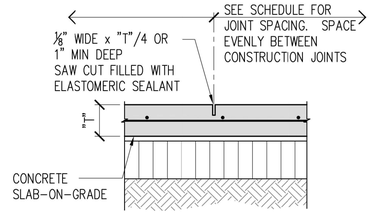


SECTION ELEVATION

NOTES:
1. FOR PIPES PERPENDICULAR TO FOOTING AT MORE THAN 3'-0" BELOW BOTTOM OF FOOTING, TRENCH SHALL BE BACKFILLED WITH COMPACTED FILL PER SPECIFICATIONS.
2. CONTRACTOR SHALL DETERMINE EXACT DEPTH AND LOCATION OF PIPES PRIOR TO EXCAVATION FOR FOOTINGS. FOOTING SHALL BE LOWERED AS REQUIRED.

4 S-3 **TYPICAL PIPE AT FOOTING DETAIL**

NOT TO SCALE

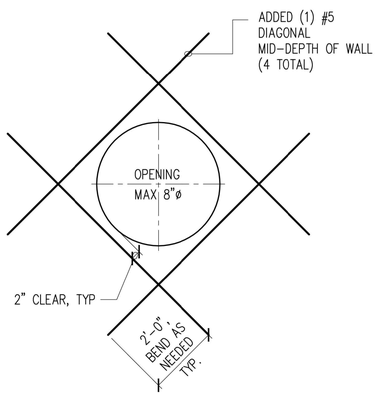


SJ-2

NOTES:
1. SAW CUTTING SHALL OCCUR AS SOON AS CONCRETE SURFACE IS FIRM ENOUGH TO NOT BE TORN BY CUTTING BLADE AND BEFORE SHRINKAGE CRACKING OCCURS, BUT NO LATER THAN 12 HOURS AFTER CONCRETE HAS BEEN POURED.
2. UNLESS NOTED OTHERWISE SUBMIT JOINTING PLANS FOR REVIEW.
3. PIPE DOWEL SHALL BE AS MANUFACTURED BY GREG CARPENTER. INSTALL PER MANUFACTURER RECOMMENDATIONS.

3 S-3 **SAWCUT JOINT DETAIL**

NOT TO SCALE



5 S-3 **TYPICAL ADDED REINFORCEMENT AT FLOOR OPENINGS**

NOT TO SCALE

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
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KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS
AIEA, HAWAI'I

DETAILS

DESIGNED:	
DRAWN:	
CHECKED:	
APPROVED:	DRAWING NO. S-3
CHIEF ENGINEER / DATE	

JOB NO. F48C612A KEAIWA STATE RECREATION AREA WATER SYSTEM IMPROVEMENTS