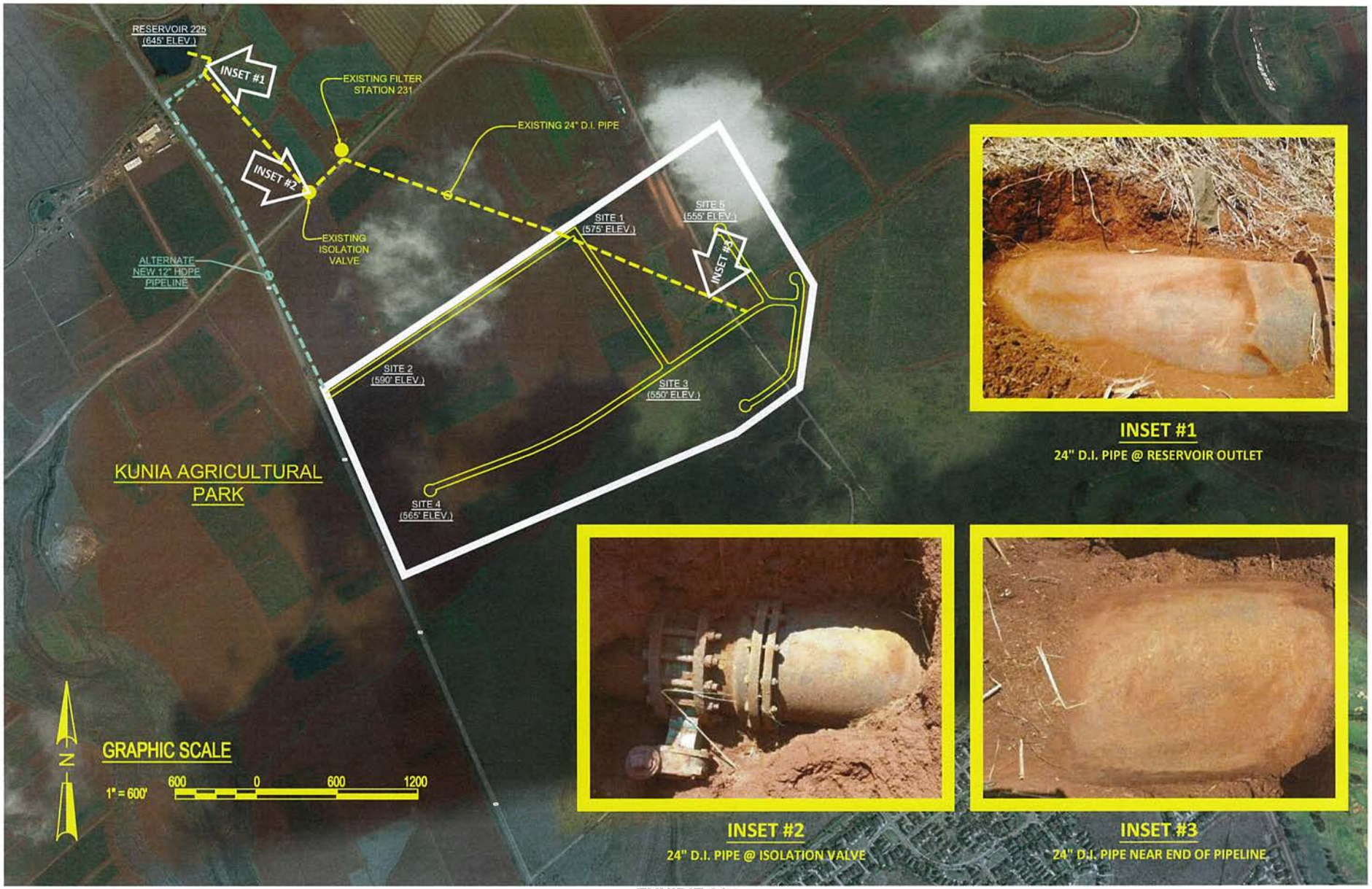

RESERVOIR 225
(645' ELEV.)
INSET #1
EXISTING FILTER
STATION 231
EXISTING 24" D.I. PIPE
INSET #2
EXISTING
ISOLATION
VALVE
ALTERNATE
NEW 12" HDPE
PIPELINE
SITE 1
(575' ELEV.)
SITE 5
(555' ELEV.)
INSET #3
SITE 2
(590' ELEV.)
SITE 3
(550' ELEV.)
SITE 4
(565' ELEV.)
KUNIA AGRICULTURAL
PARK
N
GRAPHIC SCALE
1" = 600'
600
0
600
1200
INSET #1
24" D.I. PIPE @ RESERVOIR OUTLET
INSET #2
24" D.I. PIPE @ ISOLATION VALVE
INSET #3
24" D.I. PIPE NEAR END OF PIPELINE

EXHIBIT 21a

**Derek B. Simon**

**From:** harold@itcwater.com
**Sent:** Wednesday, November 12, 2014 3:46 PM
**To:** Wallenstrom, Jon
**Cc:** Bouslog, Ann
**Subject:** Fwd: KUNIA AG PARK
**Attachments:** KUNIA AG PARK.pdf

Jon,
A safe budgetary design build number is $275,000 to $300,000.
Once you get past the press of tomorrow's meeting we would be happy to meet at your convenience to work on next steps.
Regards,
Harold

Sent from my iPad

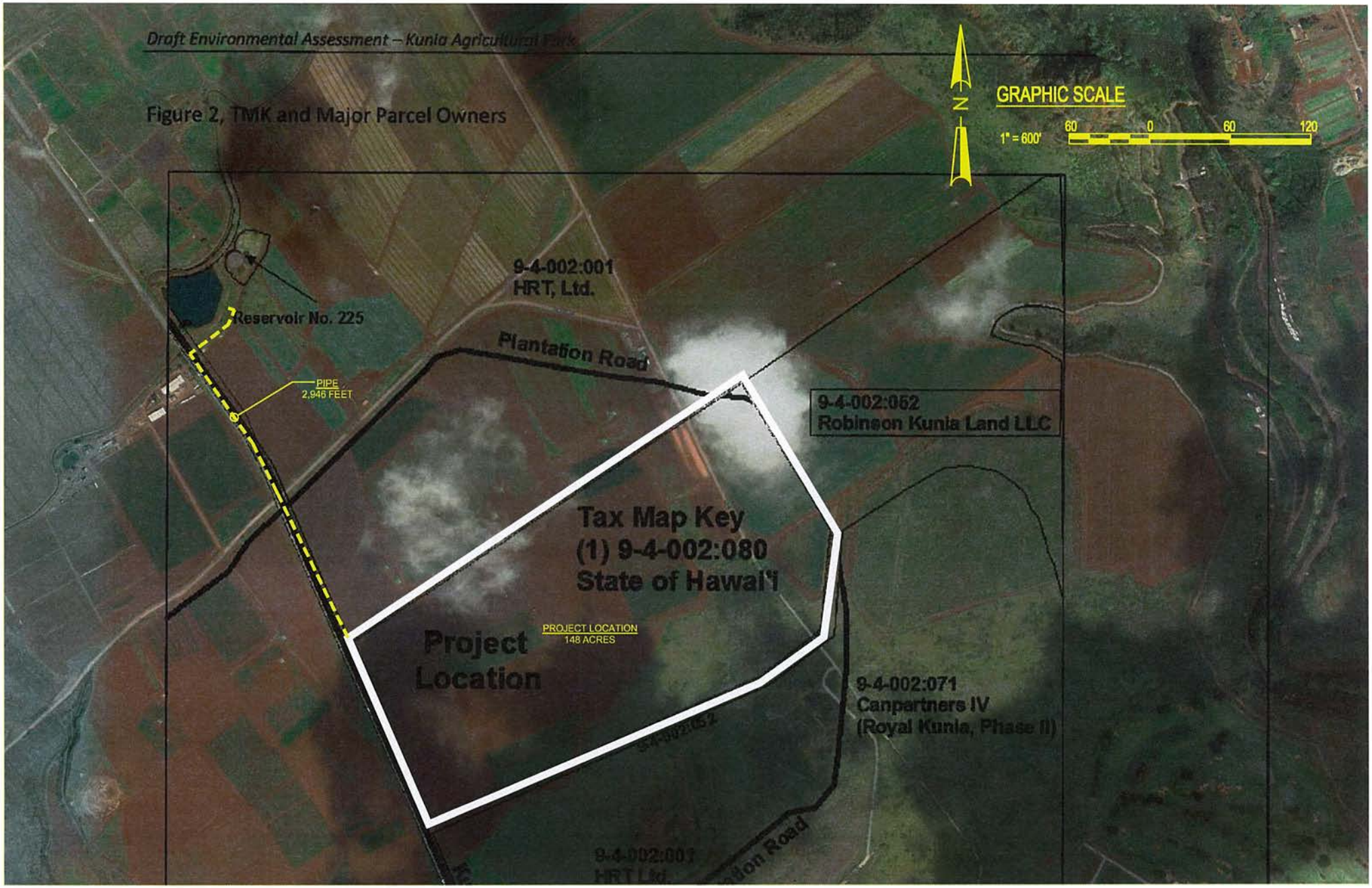
Begin forwarded message:

> **From:** <Guy@ItcWater.Com>
> **Date:** November 12, 2014 at 3:41:19 PM HST
> **To:** "'HAROLD EDWARDS'" <harold@itcwater.com>, "MIKE FARRELL" <mike@itcwater.com>, "BILL HEWETSON" <bill.hewetson@itcwater.com>
> **Subject: KUNIA AG PARK**
>
> See attached PDF plan for pipe alignment. Pipeline approximately 3,000 feet long.
>
> ***Aloha,***
>
> ***GUY PACARRO***
> ***ITC Water Management***
> ***Engineer***
> ***62-180 Kawailoa Drive.***
> ***Haleiwa, Hawaii 96712***
> ***(808)637-5078 Office***
> ***(808)637-4779 Fax***

ITC Water Management, Inc.

**EXHIBIT 21b**

Figure 2, TMK and Major Parcel Owners



**Derek B. Simon**

**From:** Nonie Toledo <nonie@toledoassociates.com>
**Sent:** Sunday, July 19, 2015 9:47 AM
**To:** Scott Enright
**Cc:** Nakamura, Gayle M
**Subject:** DOA Water pipe from Ho'ohana

Aloha Chair,

Last we spoke, I provided you the alternatives for the water pipe for Ho'ohana.
The two alternatives discussed with staff were:

1. Existing Pipe:
- Can be done quickly
- Probably larger than a new one
- Probably better water pressure
- No long term perpetual
- Long term easement would be conveyed along Kunia Road, at which time (after Ho'ohana existence ceases, a new pipe would need to be constructed along the road

2. Provide New Pipe along Kunia Road:
- Long term easement would be done at time of construction
- Pipe would be probably smaller than existing pipe (which services many users)
- Water pressure adequate?

Your staff prefers # 2 alternative. We just need confirmation that that is the official request by your department, and then we will proceed to plan for that alternative with the consultants and contractors.

As you know, an integral predecessor of the pipe is the approval of the Ho'ohana PPA. We believe the decision is ripe for decision making at this point, and we have done all we can to impact the decision makers from a procedural standpoint (info to the CA and PUC) as well as an informational/advocacy standpoint.

Please let me know if you have any questions and also which pipe alternative you would like for Ho'ohana to pursue. (optimistic!)
Or let me know if you would like me to gather the water pipe consultants for a meeting.

Aloha,
Nonie

Nonie Toledo
c (808) 372-4444 f (866) 591-1546




**EXHIBIT 22**

in error, please notify us immediately by email and delete the original email message, any attachments, and all copies. Thank you.

# ROYAL KUNIA IRRIGATION LINE

## KUNIA, EWA, OAHU, HAWAII

TAX MAP KEY : 9-4-003: 001

2018/CP-____

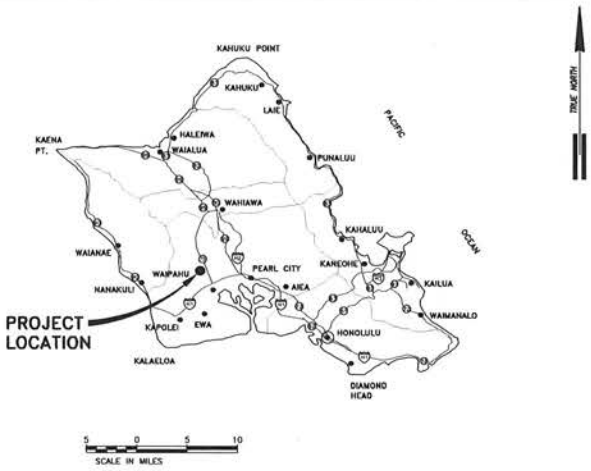
DECEMBER 2018

**PREPARED FOR :**

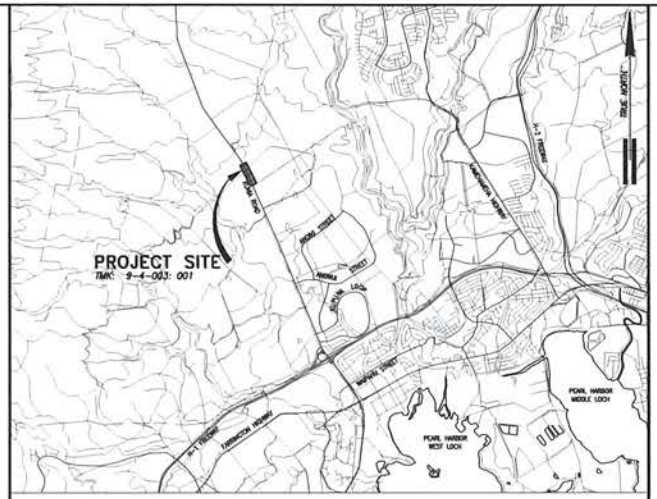
**RP2 VENTURES LLC**
**2024 N. KING ST.**
**SUITE 200**
**HONOLULU, HAWAII 96819**

**PREPARED BY :**

R. M. TOWILL CORPORATION
SINCE 1930
(808) 842-1133 2024 NORTH KING STREET SUITE 200 HONOLULU, HAWAII 96819




VICINITY MAP




LOCATION MAP
NOT TO SCALE

*INDEX TO DRAWINGS:*

| SHT. | DWG. | DESCRIPTION |
|---|---|---|
| 1 | T-1 | TITLE SHEET AND INDEX |
| 2 | C-1 | NOTES |
| 3 | C-2 | NOTES, LEGEND, AND ABBREVIATIONS |
| 4 | C-100 | GENERAL SITE PLAN |
| 5 | C-101 | EROSION AND SEDIMENT CONTROL NOTES & DETAILS |
| 6 | C-102 | PUMP STATION SITE PLAN |
| 7 | C-103 | PUMP STATION PROFILES |
| 8 | C-200 | PLAN & PROFILE -1 0+00 TO 5+00 |
| 9 | C-201 | PLAN & PROFILE -2 5+00 TO 10+00 |
| 10 | C-202 | PLAN & PROFILE -3 10+00 TO 15+00 |
| 11 | C-203 | PLAN & PROFILE -4 15+00 TO 20+00 |
| 12 | C-204 | PLAN & PROFILE -5 20+00 TO 25+30 |
| 13 | S-1 | STRUCTURAL NOTES |
| 14 | S-2 | CONCRETE PAD DETAILS |
| 15 | M-001 | DETAILS |
| 16 | M-010 | KUNIA IRRIGATION PUMP STATION PLAN AND SECTION |
| 17 | E-1 | ELECTRICAL SYMBOL LIST, GENERAL ELECTRICAL NOTES |
| 18 | E-2 | ELECTRICAL SITE PLAN |
| 19 | E-3 | PUMP STATION ELECTRICAL PLAN |
| 20 | E-4 | EQUIPMENT ELEVATIONS, ELECTRICAL DETAILS AND PANEL SCHEDULES |

# EXHIBIT 23

T-1 SHEET 1 OF 20 SHEETS

ROYAL KUNIA IRRIGATION LINE

## CONSTRUCTION NOTES

1. ALL APPLICABLE CONSTRUCTION WORK SHALL BE DONE IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, SEPTEMBER 1986, AND STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION, SEPTEMBER 1984, AS AMENDED, OF THE DEPARTMENTS OF PUBLIC WORKS, CITY & COUNTY OF HONOLULU, AND THE COUNTIES OF KAUAI, MAUI AND HAWAII.
2. 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. WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR NEW LINES.
3. NO CONTRACTOR SHALL PERFORM ANY CONSTRUCTION OPERATIONS SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW INTO EXISTING CITY DRAINAGE SYSTEMS, OR ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATION OCCUR, THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
4. THE GENERAL CONTRACTOR/DEVELOPER/OWNER OF THE PROJECT SHALL BE RESPONSIBLE FOR CONFORMANCE WITH APPLICABLE PROVISIONS OF THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS," AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL," AS WELL AS CHAPTER 14 OF THE REVISED ORDINANCES OF HONOLULU, AS AMENDED. BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING CONSTRUCTION.

   THE GENERAL CONTRACTOR/DEVELOPER/OWNER OF THE PROJECT SHALL OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT COVERAGE(S) FOR THE FOLLOWING:
   1. STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES THAT DISTURB ONE (1) ACRE OR MORE, AND
   2. DISCHARGES OF HYDROTESTING EFFLUENT, DEWATERING EFFLUENT, AND WELL DRILLING EFFLUENT TO STATE WATERS.

   IN ACCORDANCE WITH STATE LAW, ALL DISCHARGES RELATED TO PROJECT CONSTRUCTION OR OPERATIONS ARE REQUIRED TO COMPLY WITH STATE WATER QUALITY STANDARDS (HAWAII ADMINISTRATIVE RULES, CHAPTER 11-54). BEST MANAGEMENT PRACTICES SHALL BE USED TO MINIMIZE OR PREVENT THE DISCHARGE OF SEDIMENT, DEBRIS, AND OTHER POLLUTANTS TO STATE WATERS. PERMIT COVERAGE IS AVAILABLE FROM THE DEPARTMENT OF HEALTH, CLEAN WATER BRANCH AT HTTP://HEALTH.HAWAII.GOV/CWB. THE OWNER/DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR OBTAINING OTHER FEDERAL, STATE, OR LOCAL AUTHORIZATIONS AS REQUIRED BY LAW.
5. FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL NOTIFY THE CIVIL ENGINEERING BRANCH, D.P.P. AT 768-8084 TO ARRANGE FOR INSPECTIONAL SERVICES AND SUBMIT TWO (2) SETS OF APPROVED CONSTRUCTION PLANS SEVEN (7) DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION WORK. FOR CITY PROJECTS, THE CONTRACTOR SHALL COORDINATE INSPECTIONAL SERVICES WITH THE RESPONSIBLE CITY AGENCY.
6. CONFINED SPACE

   FOR ENTRY BY STATE AND CITY PERSONNEL, INCLUDING INSPECTORS, INTO A PERMIT REQUIRED CONFINED SPACE AS DEFINED IN 29 CFR PART 1910.146(b), THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING:
   - A. ALL SAFETY EQUIPMENT REQUIRED BY THE CONFINED SPACE REGULATIONS APPLICABLE TO ALL PARTIES OTHER THAN THE CONSTRUCTION INDUSTRY, TO INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING:
     1. FULL BODY HARNESSES FOR UP TO TWO PERSONNEL.
     2. LIFELINE AND ASSOCIATED CLIPS.
     3. INGRESS/EGRESS AND FALL PROTECTION EQUIPMENT.
     4. TWO-WAY RADIOS (WALKIE-TALKIES) IF OUT OF LINE-OF-SIGHT.
     5. EMERGENCY (ESCAPE) RESPIRATOR (10 MINUTE DURATION).
     6. CELLULAR TELEPHONE TO CALL FOR EMERGENCY ASSISTANCE.
     7. CONTINUOUS GAS DETECTOR (CALIBRATED) TO MEASURE O2, H2S, CO AND FLAMMABLES (CAPABLE OF MONITORING AT A DISTANCE OF AT LEAST 20 FEET AWAY).
     8. PERSONAL MULTI-GAS DETECTOR TO BE CARRIED BY INSPECTOR.
   - B. CONTINUOUS FORCED AIR VENTILATION ADEQUATE TO PROVIDE SAFE ENTRY CONDITIONS.
   - C. ONE ATTENDANT/RESCUE PERSONNEL TOPSIDE (TWO, IF CONDITIONS WARRANT IT).
7. PURSUANT TO CHAPTER 6E, HRS, IN THE EVENT ANY ARTIFACTS OR HUMAN REMAINS ARE UNCOVERED DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY SUSPEND WORK AND NOTIFY THE HONOLULU POLICE DEPARTMENT, THE STATE DEPARTMENT OF LAND AND NATURAL RESOURCES-HISTORIC PRESERVATION DIVISION (692-8015). IN ADDITION, FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL INFORM THE CIVIL ENGINEERING BRANCH, DEPARTMENT OF PLANNING AND PERMITTING (768-8084); AND FOR CITY PROJECTS, NOTIFY THE RESPONSIBLE CITY AGENCY.
8. FOR PROJECTS ABUTTING STATE HIGHWAYS' RIGHTS-OF-WAY, THE OWNER OR HIS AUTHORIZED REPRESENTATIVE SHALL NOTIFY THE STATE DEPARTMENT OF TRANSPORTATION, HIGHWAYS DIVISION, OAHU DISTRICT, DRAINAGE DISCHARGE UNIT AT 831-6793 FOR AN ASSESSMENT OF STATE HIGHWAYS PERMITS REQUIREMENTS.
9. ALL CONSTRUCTION WORK SHALL BE IN ACCORDANCE WITH SOILS REPORT "GEOTECHNICAL ENGINEERING EXPLORATION OFF-SITE IRRIGATION WATERLINE ROYAL KUNIA AGRICULTURAL PARK" BY GEOLABS, INC. DATED FEBRUARY 2019.

## PUBLIC HEALTH, SAFETY AND CONVENIENCE

1. THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH AND 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 STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH. THE CITY SHALL REQUIRE SUPPLEMENTARY MEASURES AS NECESSARY.
3. THE CONTRACTOR SHALL NOT PERFORM ANY GRADING/CONSTRUCTION OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATER COURSES. SHOULD SUCH VIOLATIONS OCCUR, THE COSTS INCURRED FOR ANY REMEDIAL ACTION BY THE STATE SHALL BE PAYABLE BY THE CONTRACTOR.
4. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, BARRICADES, AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE, AND SAFETY OF THE PUBLIC. TEMPORARY PEDESTRIAN ROUTES SHALL BE ACCESSIBLE PER THE ADAAG GUIDELINES.
5. THE CONTRACTOR SHALL APPLY FOR A PERMIT WITH A NOISE CONTROL PLAN AND OTHER REQUIRED POLLUTION CONTROL PLANS.

## ARCHAEOLOGICAL NOTES

1. PURSUANT TO CHAPTER 6E, HRS, IN THE EVENT ANY ARTIFACTS OR HUMAN REMAINS ARE UNCOVERED DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY SUSPEND WORK AND NOTIFY THE HONOLULU POLICE DEPARTMENT, THE STATE DEPARTMENT OF LAND AND NATURAL RESOURCES-HISTORIC PRESERVATION DIVISION (692-8015). IN ADDITION, FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL INFORM THE CIVIL ENGINEERING BRANCH, DEPARTMENT OF PLANNING AND PERMITTING (768-8084); AND FOR CITY PROJECTS, NOTIFY THE RESPONSIBLE CITY AGENCY.
2. ALL TRENCHING AND EXCAVATION WORK IN THE ARCHAEOLOGICAL SITE(S) SHALL BE MONITORED BY AN ARCHAEOLOGIST RETAINED BY THE OWNER FOR THIS PROJECT.

## TEMPORARY DUST CONTROL

1. THE PROJECT SITE SHALL BE KEPT DUST FREE FOR SEVEN (7) DAYS A WEEK. AT THE END OF EACH WORKING DAY, THE SITE SHALL BE SUFFICIENTLY DAMPENED TO PREVENT DUST EROSION DURING NON-WORKING HOURS.
2. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS SO THAT EXCAVATION, EMBANKMENT, AND IMPORTED MATERIAL SHALL BE DAMPENED TO PREVENT DUST PROBLEMS.

## NOTES FOR ENVIRONMENTAL PROTECTION

1. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL PROVIDE EFFECTIVE MEASURES FOR THE CONTROL OF FUGITIVE DUST EMISSIONS FROM THE PROJECT AND SURROUNDING AREAS CAUSED BY HIS OPERATIONS. THESE MEASURES SHALL MEET THE REQUIREMENTS OF STATE ADMINISTRATIVE RULES, DEPARTMENT OF HEALTH, AIR POLLUTION CONTROL (11-60.1)
2. DEMOLITION WASTES AND CONSTRUCTION WASTES SHALL BE DISPOSED OF AT AN AUTHORIZED SITE HAVING A DEPARTMENT OF HEALTH SOLID WASTE MANAGEMENT PERMIT. OPEN BURNING IS PROHIBITED. THE CONTRACTOR SHALL INFORM THE COUNTY ENGINEER OF THE LOCATION OF THE DISPOSAL SITES. THE DISPOSAL SITE MUST ALSO FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCES.
3. ALL EXCESS MATERIAL SHALL BE REMOVED FROM THE PROJECT SITE.
4. THE PROJECT SITE SHALL BE KEPT DUST FREE FOR SEVEN (7) DAYS A WEEK. AT THE END OF EACH WORKING DAY, THE SITE SHALL BE SUFFICIENTLY DAMPENED TO PREVENT DUST EROSION DURING NON-WORKING HOURS.

## EROSION CONTROL/BEST MANAGEMENT PRACTICES NOTES THAT ARE REQUIRED BUT NOT LIMITED TO THE ITEMS LISTED BELOW (STATE R/W)

1. EROSION CONTROL MEASURES TO BE INSTALLED PRIOR TO START OF PROJECT AND BE MAINTAINED UNTIL COMPLETION OF PROJECT.
2. CONTRACTOR TO PERIODICALLY INSPECT SILT FENCE, STABILIZED CONSTRUCTION ENTRANCE, CATCH BASIN AND INLET FILTERS ESPECIALLY DURING HEAVY RAINFALL. CONTRACTOR SHALL ALSO ENSURE DRAINAGE THROUGH FILTER MATERIAL IS MAINTAINED.
3. THE FINAL LIFT OF EACH DAY'S WORK SHALL BE COMPACTED TO PREVENT EROSION OF FILL MATERIAL.
4. GOOD HOUSEKEEPING SHALL BE UTILIZED TO ENSURE PROTECTION OF ROADWAYS FROM MUD, DIRT, AND DEBRIS.
5. THE CONTRACTOR SHALL ENSURE THAT ALL TIRES OF CONSTRUCTION VEHICLES ARE SUFFICIENTLY CLEANED OFF SO THAT DIRT OR DEBRIS IS NOT TRACKED OFF THE CONSTRUCTION SITE. WASHING OFF TIRES WITH WATER WILL NOT BE ACCEPTABLE UNLESS THE RUNOFF IS CONTAINED AND DOES NOT ENTER THE STORM DRAIN SYSTEM OR ONTO THE STATE'S ROW
6. AT THE END OF GRADING OPERATIONS AND AT THE COMPLETION OF THE PROJECT, CONTRACTOR SHALL INSPECT ALL CATCH BASIN, DRAIN INLET AND DRAIN MANHOLE SURROUNDING THE PROJECT SITE. ANY ACCUMULATED SEDIMENT AND DEBRIS FOUND IN THE STORM DRAIN STRUCTURES SHALL BE REMOVED. PLEASE NOTE THAT FLUSHING INTO THE DRAIN STRUCTURES ARE PROHIBITED.
7. ANY DIRT OR GRASSED AREA DISTURBED SHALL BE RESTORED BY RE-GRASSING THE AREA OR BY SEEDED HYDROMULCH. THE GRASS SHALL BE FULLY ESTABLISHED AT COMPLETION OF PROJECT.

## GRADING NOTES

1. ALL GRADING WORK SHALL BE DONE IN ACCORDANCE WITH CHAPTER 14, ARTICLES 13, 14, 15 AND 16, AS RELATED TO GRADING, SOIL EROSION AND SEDIMENT CONTROL OF THE REVISED ORDINANCES OF HONOLULU, 1990, AS AMENDED.
2. NO CONTRACTOR SHALL PERFORM ANY GRADING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES. SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
3. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 60.1, "AIR POLLUTION CONTROL."
4. 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. WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES.
5. ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUN OFF FROM LEAVING THE SITE.
6. ALL SLOPES AND EXPOSED AREAS SHALL BE SODDED OR PLANTED AS SOON AS FINAL GRADES HAVE BEEN ESTABLISHED. PLANTING SHALL NOT BE DELAYED UNTIL ALL GRADING WORK HAS BEEN COMPLETED. GRADING TO FINAL GRADE SHALL BE CONTINUOUS, AND ANY AREA, WITHIN WHICH WORK HAS BEEN INTERRUPTED OR DELAYED SHALL BE PLANTED.
7. FILLS ON SLOPES STEEPER THAN 5H:1V SHALL BE KEYED.
8. THE CITY SHALL BE INFORMED OF THE LOCATION OF THE BORROW/DISPOSAL SITE FOR THE PROJECT WHEN THE APPLICATION FOR A GRADING PERMIT IS MADE. THE BORROW/DISPOSAL SITE MUST ALSO FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCE.
9. NO GRADING WORK SHALL BE DONE ON SATURDAYS, SUNDAYS AND HOLIDAYS AT ANY TIME WITHOUT PRIOR NOTICE TO THE DIRECTOR, D.P.P., PROVIDED SUCH GRADING WORK IS ALSO IN CONFORMANCE WITH THE COMMUNITY NOISE CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 46, "COMMUNITY NOISE CONTROL".
10. THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.

## GRADING NOTES (CONTINUED)

11. THE GENERAL CONTRACTOR/DEVELOPER/OWNER OF THE PROJECT SHALL BE RESPONSIBLE FOR CONFORMANCE WITH APPLICABLE PROVISIONS OF THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS," AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL," AS WELL AS CHAPTER 14 OF THE REVISED ORDINANCES OF HONOLULU, AS AMENDED. BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING CONSTRUCTION.

    THE GENERAL CONTRACTOR/DEVELOPER/OWNER OF THE PROJECT SHALL OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COVERAGE(S) FOR THE FOLLOWING:
    1. STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES THAT DISTURB ONE ACRE OR MORE, AND
    2. DISCHARGES OF HYDROTESTING EFFLUENT, DEWATERING EFFLUENT, AND WELL DRILLING EFFLUENT TO STATE WATERS.

    IN ACCORDANCE WITH STATE LAW, ALL DISCHARGES RELATED TO PROJECT CONSTRUCTION OR OPERATIONS ARE REQUIRED TO COMPLY WITH STATE WATER QUALITY STANDARDS (HAWAII ADMINISTRATIVE RULES, CHAPTER 11-54). BEST MANAGEMENT PRACTICES SHALL BE USED TO MINIMIZE OR PREVENT THE DISCHARGE OF SEDIMENT, DEBRIS, AND OTHER POLLUTANTS TO STATE WATERS. PERMIT COVERAGE IS AVAILABLE FROM THE DEPARTMENT OF HEALTH, CLEAN WATER BRANCH AT http://health.hawaii.gov/cwb. THE OWNER/DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR OBTAINING OTHER FEDERAL, STATE, OR LOCAL AUTHORIZATIONS AS REQUIRED BY LAW.
12. WHERE APPLICABLE AND FEASIBLE THE MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY EARTH MOVING PHASE OF THE GRADING IS INITIATED.
13. TEMPORARY EROSION CONTROLS SHALL NOT BE REMOVED BEFORE PERMANENT EROSION CONTROLS ARE IN-PLACE AND ESTABLISHED.
14. TEMPORARY EROSION CONTROL PROCEDURES SHALL BE SUBMITTED FOR APPROVAL PRIOR TO APPLICATION FOR GRADING PERMIT.
15. IF THE GRADING WORK INVOLVES CONTAMINATED SOIL, THEN ALL GRADING WORK SHALL BE DONE IN CONFORMANCE WITH APPLICABLE STATE AND FEDERAL REQUIREMENTS.
16. BUILDING PERMIT FOR RETAINING WALLS SHALL BE OBTAINED PRIOR TO COMMENCEMENT OF GRADING WORK ON SITE.
17. FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL NOTIFY THE CIVIL ENGINEERING BRANCH, D.P.P. AT 768-8084 TO ARRANGE FOR INSPECTIONAL SERVICES AND SUBMIT TWO (2) SETS OF APPROVED CONSTRUCTION PLANS SEVEN (7) DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION WORK. FOR CITY PROJECTS, THE CONTRACTOR SHALL COORDINATE INSPECTIONAL SERVICES WITH THE RESPONSIBLE CITY AGENCY.
18. PURSUANT TO CHAPTER 6E, HRS, IN THE EVENT ANY ARTIFACTS OR HUMAN REMAINS ARE UNCOVERED DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY SUSPEND WORK AND NOTIFY THE HONOLULU POLICE DEPARTMENT, THE STATE DEPARTMENT OF LAND AND NATURAL RESOURCES-HISTORIC PRESERVATION DIVISION (692-8015). IN ADDITION, FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL INFORM THE CIVIL ENGINEERING BRANCH, DEPARTMENT OF PLANNING AND PERMITTING (768-8084); AND FOR CITY PROJECTS, NOTIFY THE RESPONSIBLE CITY AGENCY.
19. FOR ALL PROJECTS, WHICH WILL DISTURB ONE (1) ACRE OR MORE OF LAND, THE CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL A NOTICE OF GENERAL PERMIT COVERAGE (NGPC) IS RECEIVED FROM THE DEPARTMENT OF HEALTH, STATE OF HAWAII, AND HAS SATISFIED ANY OTHER APPLICABLE REQUIREMENTS OF THE NPDES PERMIT PROGRAM. ALSO, FOR NON-CITY AND OTHER NON-GOVERNMENTAL AGENCY PROJECTS, THE CONTRACTOR SHALL PROVIDE A WRITTEN COPY OF THE NGPC TO THE PERMITTING AND INSPECTION SECTION, CIVIL ENGINEERING BRANCH, D.P.P., AT LEAST SEVEN (7) CALENDAR DAYS BEFORE THE START OF CONSTRUCTION. FOR CITY OR OTHER GOVERNMENTAL PROJECTS, THE CONTRACTOR SHOULD PROVIDE A WRITTEN COPY OF THE NGPC TO THE APPROPRIATE CITY DEPARTMENT OR GOVERNMENTAL AGENCY FOR THEIR REQUIREMENTS.
20. ALL GRADING AND CONSTRUCTION WORK SHALL IMPLEMENT MEASURES TO ENSURE THAT THE DISCHARGE OF POLLUTANTS FROM THE CONSTRUCTION SITE WILL BE REDUCED TO THE MAXIMUM EXTENT PRACTICABLE AND WILL NOT CAUSE OR CONTRIBUTE TO AN EXCEEDANCE OF WATER QUALITY STANDARDS.
21. NON-COMPLIANCE TO ANY OF THE ABOVE REQUIREMENTS SHALL MEAN IMMEDIATE SUSPENSION OF ALL WORK, AND REMEDIAL WORK SHOULD COMMENCE IMMEDIATELY. ALL COSTS INCURRED SHALL BE BILLED TO THE VIOLATOR. FURTHERMORE, VIOLATORS SHALL BE SUBJECTED TO ADMINISTRATIVE, CIVIL AND/OR CRIMINAL PENALTIES.
22. FOR BENCH MARK, SEE SHEET C-4.

## WATER NOTES

1. UNLESS OTHERWISE SPECIFIED, ALL MATERIALS AND CONSTRUCTION OF WATER SYSTEM FACILITIES AND APPURTENANCES SHALL BE IN ACCORDANCE WITH THE CITY AND COUNTY OF HONOLULU BOARD OF WATER SUPPLY'S "WATER SYSTEM STANDARDS", DATED 2002, THE "WATER SYSTEM EXTERNAL CORROSION CONTROL STANDARDS", VOLUME 3, DATED 1991, AND ALL SUBSEQUENT AMENDMENTS AND ADDITIONS.
2. NUTS AND BOLTS FOR FLANGE CONNECTIONS WITHIN METER BOXES SHALL BE BRONZE STAINLESS STEEL EXCEPT COUPLING ADAPTERS WHERE "COR-TEN" (U.S. STEEL) OR "MAYARI" (BETHLEHEM STEEL) MAY BE USED. FLANGE CONNECTIONS OUTSIDE OF METER BOX MAY USE "COR-TEN" OR "MAYARI" TYPE NUTS AND BOLTS.

## WATER NOTES (CONTINUED)

3. TEST PRESSURE SHALL BE ONE OF THE FOLLOWING:
   - A. PREVAILING LINE PRESSURE, JOINTS LEFT EXPOSED FOR 24 HOURS TO CHECK FOR LEAKS PRIOR TO BACKFILL.
   - B. 150 PSI. DURING THE 30-MINUTE PRESSURE TEST, THE PRESSURE SHALL NOT DROP MORE THAN 10 PSI.
4. THE CONTRACTOR SHALL CHLORINATE THE ENTIRE INSIDE SURFACE OF EACH PIPE AND FITTING WITH DISINFECTION SOLUTION OF 5 OUNCES OF SODIUM HYPOCHLORITE MIXED WITH 10 GALLONS OF WATER (FOR CONNECTION ONLY).
5. AFTER INSTALLATION OF TAPPING SLEEVE AND VALVE PRIOR TO ACTUAL TAPPING OPERATIONS, THE ASSEMBLY SHALL BE TESTED AT 150 PSI ON BOTH SIDES OF THE VALVE.
6. THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES AS SHOWN ON THE PLANS ARE FROM THE LATEST AVAILABLE DATA BUT IS NOT GUARANTEED AS TO THE ACCURACY OR THE ENCOUNTERING OF OTHER OBSTACLES DURING THE COURSE OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL PAY FOR ALL DAMAGES TO EXISTING UTILITIES. THE CONTRACTOR SHALL NOT ASSUME THAT WHERE NO UTILITIES ARE SHOWN, THAT NONE EXIST.
7. POLYGON SHAPE FOR MECHANICAL JOINT GLANDS AS DESCRIBED IN AWWA STANDARD C111 SHALL BE "STRAIGHT-SIDED" OR AN APPROVED EQUAL ON A JOB-TO-JOB BASIS.
8. THE CONTRACTOR/DEVELOPER SHALL OBTAIN A NPDES PERMIT PRIOR TO CHLORINATION AND/OR DEWATERING. A COPY OF THE PERMIT SHALL BE SUBMITTED TO THE BOARD OF WATER SUPPLY, CAPITAL PROJECTS DIVISION, CONSTRUCTION SECTION.
9. INSTALL 4 MIL THICK, NON-METALLIC, BLUE COLORED, 6 INCHES WIDE WARNING TAPE OVER CENTERLINE OF THE PIPE AND BELOW THE BASE COURSE ALONG THE ENTIRE LENGTH OF TRENCH. TAPE SHOULD BE MARKED WITH "CAUTION WATER LINE BURIED BELOW."
10. PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL VERIFY IN THE FIELD THE LOCATION OF EXISTING WATER MAINS AND APPURTENANCES.
11. ALL SECTIONS OF THE WATER MAIN REQUIRING REINFORCED CONCRETE JACKETING SHALL BE DUCTILE IRON PIPE CLASS 52 WITH DUCTILE IRON FITTINGS.
12. THE CONTRACTOR SHALL COORDINATE THE SECURING OF THE EXISTING WATER SYSTEM WITH THE OWNER PRIOR TO EXCAVATING BEHIND OR REMOVING ANY EXISTING THRUST BLOCKS, STRUCTURAL STRUTS OR REACTION BEAMS, OR ANY FITTING SUCH AS TEES, PLUGS, CAPS, BENDS, OFFSETS, AND VALVES, OR ANY OTHER PIPELINE APPURTENANCE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASSOCIATED DAMAGES RESULTING FROM FAILURE TO ADEQUATELY SECURE THE EXISTING SYSTEM.
13. PIPE CUSHION SHALL BE OF HIGH RESISTIVITY MATERIAL. THE CONTRACTOR SHALL SUBMIT A SOIL CERTIFICATION THAT HIGH RESISTANT CUSHION MATERIAL HAS A RESISTIVITY GREATER THAN 5,000 OHM-CM. REMAINDER OF THE BACKFILL MATERIAL SHALL CONTAIN NO HAZARDOUS SUBSTANCES ABOVE REGULATORY ACTION LEVELS INCLUDING BUT NOT LIMITED TO LEAD, ASBESTOS, MERCURY, CHROMIUM, CADMIUM, ZINC, STRONTIUM, AND POLYCHLORINATED BIPHENYLS (PCB).
14. POLYVINYL CHLORIDE (PVC) PIPES SHALL BE CLASS 150. ALL DUCTILE IRON VALVES AND METALLIC FITTINGS SHALL BE WRAPPED WITH TWO LAYERS OF 8 MIL POLYETHYLENE WRAP. NO BENDING OF POLYVINYL CHLORIDE PIPES SHALL BE PERMITTED. THE INSTALLATION OF PVC PIPE, ACCORDING TO THE PLANS AND SPECIFICATIONS AS BID ON BY THE CONTRACTOR, MAY REQUIRE ADDITIONAL DESIGN WORK. ADDITIONAL FITTINGS AND SPECIAL COUPLINGS SHALL BE CONSIDERED INCIDENTAL TO THE UNIT PRICE BID IN THE PROPOSAL FOR PVC PIPE. ANY ADDITIONAL DESIGN WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
15. ALL POLYVINYL CHLORIDE (PVC) PIPE DEFLECTIONS SHALL BE ACCOMPLISHED ONLY BY THE USE OF SPECIAL PVC DEFLECTION COUPLINGS. DEFLECTION AROUND CURVES SHALL BE ACCOMPLISHED ONLY BY THE USE OF PVC DEFLECTION COUPLINGS.
16. BOSSED TEES REQUIRED FOR ALL LATERAL AND AIRV CONNECTIONS TO PVC MAINS.
17. ALL PVC FITTINGS SHALL CONFORM TO AMERICAN WATER WORKS ASSOCIATION (AWWA) C-907. DUCTILE IRON FITTINGS SHALL BE USED FOR ALL TYPES OF FITTINGS NOT SPECIFIED IN AWWA C-907.
18. REACTION BLOCK REQUIREMENTS FOR PVC FITTINGS SHALL BE THE SAME FOR DUCTILE IRON FITTINGS.
19. THE USE OF HUB CLAMPS AND SET SCREWS ON PVC FITTINGS IS NOT APPROVED.
20. PRIOR TO THE PVC FITTING INSTALLATION, THE CONTRACTOR SHALL SUBMIT FOR APPROVAL BY THE BWS, THE MANUFACTURER'S CERTIFICATION THAT ALL PVC FITTINGS CONFORM TO AWWA C-907.
21. ALL POLYVINYL CHLORIDE (PVC) PIPE DEFLECTIONS SHALL BE ACCOMPLISHED ONLY BY THE USE OF SPECIAL PVC DEFLECTION COUPLINGS. DEFLECTION AROUND CURVES SHALL BE ACCOMPLISHED ONLY BY THE USE OF PVC DEFLECTION COUPLINGS.
22. ALL PVC FITTINGS SHALL CONFORM TO AMERICAN WATER WORKS ASSOCIATION (AWWA) C-907. DUCTILE IRON FITTINGS SHALL BE USED FOR ALL TYPES OF FITTINGS NOT SPECIFIED IN AWWA C-907.
23. REACTION BLOCK REQUIREMENTS FOR PVC FITTINGS SHALL BE THE SAME FOR DUCTILE IRON FITTINGS.
24. THE USE OF HUB CLAMPS AND SET SCREWS ON PVC FITTINGS IS NOT APPROVED.
25. PRIOR TO THE PVC FITTING INSTALLATION, THE CONTRACTOR SHALL SUBMIT FOR APPROVAL BY THE BWS, THE MANUFACTURER'S CERTIFICATION THAT ALL PVC FITTINGS CONFORM TO AWWA C-907.
26. THE CONTRACTOR SHALL INSTALL BOSSED TEES TO ALL SERVICE LATERAL CONNECTIONS AND AIRVS TO PVC WATER MAINS.

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R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE

WAIPAHU, HAWAII

NOTES

4/30/20

SHEET C-1 OF 20 SHEETS

## GENERAL NOTES

1. THE EXISTING UTILITIES HAVE BEEN SHOWN ON THESE PLANS INSOFAR AS IT IS POSSIBLE TO DO SO. THEIR LOCATIONS AS SHOWN ARE APPROXIMATE ONLY AND THE CONTRACTOR SHALL MAKE AN INDEPENDENT CHECK ON THE LOCATION OF THESE UTILITIES BY PROBING, AND BY CONTACTING THE VARIOUS UTILITY COMPANIES AND GOVERNMENTAL AGENCIES TO ASCERTAIN THEIR EXACT LOCATIONS.
2. THE CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES WHETHER SHOWN ON THE PLANS OR NOT. BEFORE DISRUPTING SERVICE OF ANY UTILITY, THE CONTRACTOR SHALL CONTACT THE OWNER'S REPRESENTATIVE AND APPROPRIATE RESPONSIBLE UTILITY AUTHORITY. DAMAGE TO EXISTING UTILITIES AS A RESULT OF CONSTRUCTION ACTIVITIES SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. ANY MODIFICATIONS TO TEMPORARY OR PERMANENT STRUCTURES SHALL COMPLY WITH ADAAG 201.3 AND ACCESSIBLE ROUTES SHALL BE PROVIDED IN ACCORDANCE WITH ADAAG 206 AND COMPLY WITH CHAPTER 4.
3. THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR UTILITIES SUCH AS ELECTRICITY, ETC. REQUIRED FOR HIS OPERATIONS, AND ALL COSTS FOR THESE UTILITIES SHALL BE BORNE BY THE CONTRACTOR.
4. UNLESS RELOCATION IS CALLED FOR ON THE PLANS, EXISTING UTILITIES SHALL REMAIN IN-SERVICE AND IN PLACE. IF RELOCATION OF EXISTING UTILITIES IS REQUIRED FOR THE CONTRACTOR'S CONVENIENCE, INTERRUPTION OF SERVICE SHALL BE KEPT TO A MINIMUM AND SHALL BE DONE AT THE CONTRACTOR'S EXPENSE, AND ONLY WITH THE APPROVAL OF THE ENGINEER.
5. UTILITIES SHALL BE INSTALLED IN ACCORDANCE WITH PROVISIONS OF CHAPTER 22, REVISED ORDINANCES, 1969, AS AMENDED (UNDERGROUND UTILITIES).
6. THE CONTRACTOR SHALL 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 CLARIFICATION.
7. IF THERE ARE ANY FUEL SPILLAGES, EXISTING LEAKS, ETC. FOUND DURING CONSTRUCTION, REPORT THE FOREGOING TO THE HAZARD EVALUATION AND EMERGENCY RESPONSE UNIT (PH. NO. 586-4248) OF THE DEPARTMENT OF HEALTH. FOR NON-WORKING HOURS, CALL THE STATE HOSPITAL OPERATOR (PH. NO. 247-2191).
8. NO BLASTING SHALL BE PERMITTED ON THIS PROJECT.
9. THE GENERAL CONTRACTOR/DEVELOPER/OWNER OF THE PROJECT SHALL BE RESPONSIBLE FOR CONFORMANCE WITH APPLICABLE PROVISIONS OF THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS," AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL."
10. THE GENERAL CONTRACTOR/DEVELOPER/OWNER OF THE PROJECT SHALL OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COVERAGE(S) FOR THE FOLLOWING:
    1. STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES THAT DISTURB ONE (1) ACRE OR MORE, AND
    2. DISCHARGES OF HYDROTESTING EFFLUENT, DEWATERING EFFLUENT, AND WELL DRILLING EFFLUENT TO STATE WATERS.
11. IN ACCORDANCE WITH STATE LAW, ALL DISCHARGES RELATED TO PROJECT CONSTRUCTION OR OPERATIONS ARE REQUIRED TO COMPLY WITH STATE WATER QUALITY STANDARDS (HAWAII ADMINISTRATIVE RULES, CHAPTER 11-54). BEST MANAGEMENT PRACTICES SHALL BE USED TO MINIMIZE OR PREVENT THE DISCHARGE OF SEDIMENT, DEBRIS, AND OTHER POLLUTANTS TO STATE WATERS. PERMIT COVERAGE IS AVAILABLE FROM THE DEPARTMENT OF HEALTH, CLEAN WATER BRANCH AT HTTP://EALTH.HAWAII.GOV/CWB. THE OWNER/DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR OBTAINING OTHER FEDERAL, STATE, OR LOCAL AUTHORIZATIONS AS REQUIRED BY LAW.

## STATE HISTORIC RESERVATIONS NOTES

1. PURSUANT TO CHAPTER 6E, HRS, IN THE EVENT ANY ARTIFACTS OR HUMAN REMAINS ARE UNCOVERED DURING CONSTRUCTION OPERATIONS, HE CONTRACTOR SHALL IMMEDIATELY SUSPEND WORK AND NOTIFY THE HONOLULU POLICE DEPARTMENT, THE STATE DEPARTMENT OF LAND AND NATURAL RESOURCES-HISTORIC PRESERVATION DIVISION (692-8015). IN ADDITION FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL INFORM THE CIVIL ENGINEERING BRANCH, DEPARTMENT OF PLANNING AND PERMITTING (768-8084), AND FOR CITY PROJECTS, NOTIFY THE RESPONSIBLE CITY AGENCY.

## FREE SERVICE FOR LOCATING UNDERGROUND UTILITIES

1. A FREE SERVICE IS AVAILABLE TO CONTRACTORS FOR LOCATING UNDERGROUND UTILITIES. SERVICE IS PROVIDED BY UNDERGROUND SERVICE ALERT NORTH, AT TOLL FREE TELEPHONE NO. 1-800-227-2600. CALL UNDERGROUND SERVICE ALERT NORTH AT LEAST TWO (2) DAYS PRIOR TO THE START OF ANY EXCAVATION WORK.

## CIVIL DRAWING LEGEND

- EXIST. RIGHT-OF-WAY, PROPERTY LINE
- EXIST. CONTOUR
- NEW MINOR CONTOUR
- RIGHT-OF-WAY, PROPERTY LINE
- ROADWAY Ø
- IRRIGATION LINE AND SIZE
- NEW GATE VALVE
- NEW AIR RELIEF VALVE
- NEW WATER TEE
- EASEMENT LINE
- EXIST. WATER LINE
- EXIST. SEWER LINE
- EXIST. SEWER LATERAL
- EXIST. SEWER MANHOLE
- EXIST. DRAIN LINE
- EXIST. DRAIN MANHOLE
- EXIST. ELEC./CABLE/TELEPHONE LINE
- EXIST. STREET LIGHT/SIGNAL LINE
- EXIST. STREET LIGHT
- EXIST. LIGHT POLE
- EXIST. CATCH BASIN
- EXIST. SLOPE

## ABBREVIATIONS

**A**

| | |
|---|---|
| AC | ASPHALTIC CONCRETE |
| ACI | AMERICAN CONCRETE INSTITUTE |
| ALT | ALTERNATE |
| ASTM | AMERICAN SOCIETY OF TESTING AND MATERIALS |

**C**

| | |
|---|---|
| CFR | CODE OF FEDERAL REGULATIONS |
| CIPP | CURED IN PLACE PIPE |
| CLR | CLEAR |
| CO | CLEANOUT |
| CONC | CONCRETE, CONCENTRIC, CONCENTRATION |

**D**

| | |
|---|---|
| DET | DETAIL |
| DI | DUCTILE IRON |

**E**

| | |
|---|---|
| EFF | EFFLUENT |
| EL, ELEV | ELEVATION |
| EP | ELECTRICAL POLE |
| EQUIP, EQP EX. | EQUIPMENT EXISTING |

**F**

| | |
|---|---|
| FH | FIRE HYDRANT |
| FL | FLANGED |
| FM | FORCE MAIN |
| FTG | FOOTING |

**G**

| | |
|---|---|
| GV | GATE VALVE |

**H**

| | |
|---|---|
| HB | HOSE BIB |
| HT | HEIGHT |

**I**

| | |
|---|---|
| INV | INVERT ELEVATION |
| IR, IRR, IRRIG. | IRRIGATION |

**L**

| | |
|---|---|
| LAT | LATERAL |

**M**

| | |
|---|---|
| MECH | MECHANICAL MANUFACTURER |
| MFR | MINIMUM |
| MIN MJ | MECHANICAL JOINT |

**N**

| | |
|---|---|
| NO | NUMBER |

**O**

| | |
|---|---|
| O.C. | ON CENTER |
| OSHA | OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION |

**P**

| | |
|---|---|
| PAVT, PVT | PAVEMENT |
| PE | POLYETHYLENE |
| PROJ | PROJECTION |
| PTF | PRE TREATMENT FACILITY |
| PVC | POLYVINYL CHLORIDE |

**R**

| | |
|---|---|
| REQ'D | REQUIRED |
| ROW | RIGHT OF WAY |
| REINF. CONC. | REINFORCED CONCRETE |

**S**

| | |
|---|---|
| S | SLOPE, SEWER |
| SCH | SCHEDULE |
| SFM | SEWER FORCE MAIN |
| SHT | SHEET |
| SMH | SEWER MANHOLE |
| SST, SS | STAINLESS STEEL |
| STA. | STATION |
| STRUCT. | STRUCTURAL |

**T**

| | |
|---|---|
| TEMP | TEMPORARY |
| THK | THICK |
| TMK | TAX MAP KEY |
| TS/FO | TRAFFIC SIGNALS/FIBER OPTIC CABLE |

**U**

| | |
|---|---|
| U/G | UNDERGROUND |

**W**

| | |
|---|---|
| W | WATER |
| WL | WATER LINE |
| WM | WATER METER |
| WSE | WATER SURFACE ELEVATION |
| WV | WATER VALVE |

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| CHECKED BY | GR |

LICENSED PROFESSIONAL ENGINEER No. 9300-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTITUTION OF THE PROJECT MANUAL AS INSTRUMENTS OF SERVICE FOR USE SOLELY FOR THIS PROJECT. I AM REGISTERED UNDER CHAPTER 464, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

4/30/20
DATE

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R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

**NOTES, LEGEND, AND ABBREVIATIONS**

APPROVED BY



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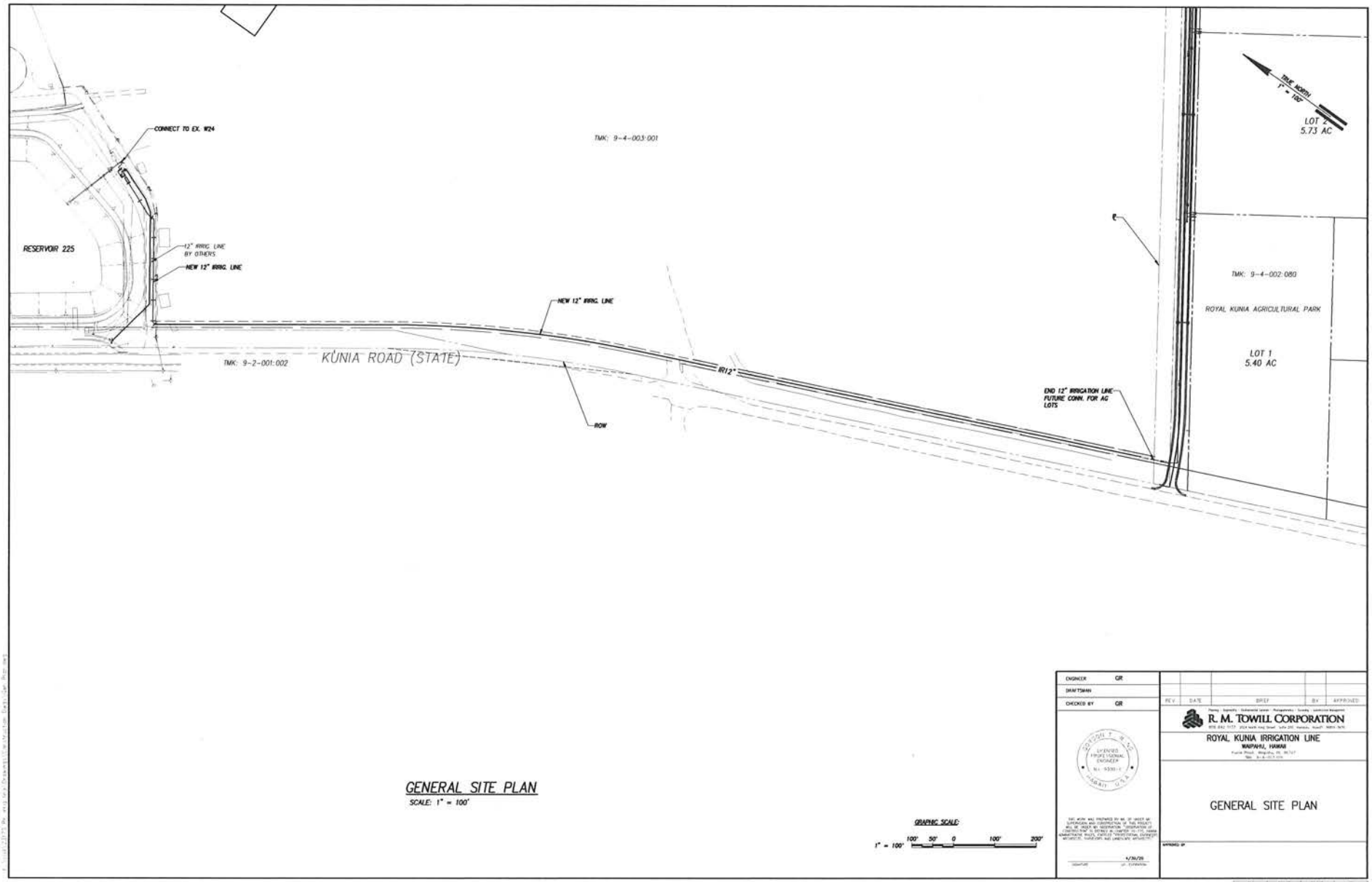


## GENERAL SITE PLAN

SCALE: 1" = 100'

GRAPHIC SCALE:

1" = 100' 100' 50' 0 100' 200'

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| ENGINEER | GR |
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R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

GENERAL SITE PLAN

4/30/26

APPROVED BY

SHEET C-100 OF 20 SHEETS

## EROSION AND SEDIMENT CONTROL PLAN SCHEDULE AND RAIN RESPONSE PLAN:

PROJECT SEQUENCE:

1. INSTALL STABILIZED CONSTRUCTION ENTRANCES, PERIMETER CONTROLS, INLET PROTECTION, AND TEMPORARY FENCING FOR PROTECTED AREAS, CLEARING AND GRUBBING AS NECESSARY FOR THE INSTALLATION OF THESE BMPS.
2. CONSTRUCT DIVERSION DITCH WITH CHECK DAMS UPSLOPE OF THE GRADED AREA TO DIRECT RUNOFF AROUND THE SITE. INSTALL VELOCITY DISSIPATION STRUCTURE AT TEMPORARY OUTLET.
3. CONSTRUCT TEMPORARY SEDIMENT BASINS, STABILIZE IMMEDIATELY.
4. CONSTRUCTION TEMPORARY SWALES TO DIRECT RUNOFF INTO THE SEDIMENT BASINS. STABILIZE IMMEDIATELY.
5. INSTALL PERMANENT DRAINAGE SYSTEM WITH TEMPORARY INLET PROTECTION FOR INLETS THAT DO NOT DRAIN TO THE SEDIMENT BASINS. CLEAR AND GRUB AS NEEDED FOR INSTALLATION.
6. CLEAR, GRUB AND GRADE THE SITE IN 2 PHASES, REFER TO SITE PLAN. RELOCATE, RECONSTRUCT AND MAINTAIN BMPS AS NEEDED TO KEEP THEM EFFECTIVE AT ALL TIMES. INITIATE TEMPORARY STABILIZATION IMMEDIATELY ONCE GRADING IS COMPLETED IN EACH PHASE.
7. INITIATE STABILIZATION OF STEEP SLOPES (> 15%) WITH HYDROSEEDING AS SOON AS GRADING IS COMPLETED ON THOSE AREAS. INSTALL PERMANENT IRRIGATION SYSTEM PRIOR TO PERMANENT SEEDING.
8. PROCEED WITH CONSTRUCTION WITH LEAST POSSIBLE DISTURBANCE OF VEGETATIVE AREAS AND TEMPORARY STRUCTURES.
9. PLANT PERMANENT GROUND COVER ACCORDING TO THE LANDSCAPING PLAN AS SOON AS POSSIBLE.
10. REMOVE OR DISMANTLE TEMPORARY EROSION CONTROL STRUCTURES AFTER FULL ESTABLISHMENT OF PERMANENT VEGETATIVE COVER.
11. PRACTICE GOOD HOUSEKEEPING MEASURES THROUGHOUT THE DURATION OF CONSTRUCTION
12. INSPECTIONS WILL BE PERFORMED WEEKLY.

RAIN RESPONSE PLAN:

THE FOLLOWING WILL BE PERFORMED WHEN HEAVY RAINS, TROPICAL STORM OR HURRICANE IS IMMINENT OR IS FORECASTED IN THE NEXT 48 HOURS:

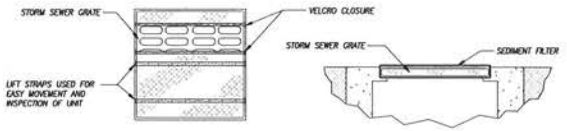
1. TEMPORARY SUSPENSION OF ACTIVE TRENCHING.
2. INSPECT ALL PERIMETER CONTROLS, AND INLET PROTECTION DEVICES, AND MAINTAIN AS NEEDED. REINSTALL ANY PERIMETER CONTROLS THAT WERE REMOVED DUE TO ACTIVE WORK IN THE AREA. IF A SEVERE STORM IS EXPECTED, REMOVE INLET PROTECTION DEVICES TO PREVENT FLOODING ON SURROUNDING STREETS.
3. COVER OR RELOCATE MATERIAL, STOCKPILES AND LIQUID MATERIAL CONTAINERS TO AVOID CONTACT WITH RAINWATER.
4. 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.
5. RE-INSPECT AFTER THE RAIN EVENT AND REPLACE OR MAINTAIN BMPS AS NEEDED.

## EROSION PREVENTION/ 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. 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 SLOPE (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%.
4. 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.
5. 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.
6. 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.
7. 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 THESE USES 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.
8. PERIMETER CONTROLS ARE REQUIRED DOWNSLOPE OF EQUIPMENT/VEHICLE STAGING AREAS AT THE END OF EACH BUSINESS DAY AND AROUND MATERIAL STOCKPILES THAT ARE NOT ACTIVELY BEING USED. STOCKPILES ARE NOT ALLOWED IN THE CITY RIGHT-OF-WAY.
   ARE REQUIRED DOWNSLOPE OF ALL DISTURBED AREAS. MAINTAIN DOWNSTREAM VEGETATED BUFFER AREA.
9. SEDIMENT FENCES OR BARRIERS SHALL BE USED DOWN SLOPE OF ALL DISTURBED AREAS. UNTIL SLOPES ARE STABILIZED A SEDIMENT FENCE OR BARRIER 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
10. INLET PROTECTION
    - ALL STORM DRAIN INLETS ONSITE AND THOSE OFFSITE WHICH MAY RECEIVE RUNOFF FROM THE SITE SHALL USE AN INLET PROTECTION DEVICE UNLESS THEY ARE DIRECTED TO A SEDIMENT BASIN.
    - SEDIMENT LEVELS MAY NOT EXCEED ONE 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 UNCLOGGED AND CLEANED WHEN PERFORMANCE IS COMPROMISED.
    - TORN, WEATHERED OR SAGGING SEDIMENT BARRIERS OR INLET PROTECTION DEVICES MUST BE REPAIRED OR REPLACED IMMEDIATELY.
11. SEDIMENT BASINS MUST BE KEPT IN EFFECTIVE OPERATING CONDITION AND SEDIMENT SHALL BE REMOVED TO MAINTAIN AT LEAST ONE HALF OF THE DESIGN CAPACITY AT ALL TIMES.
12. TRACKING CONTROL
    - MINIMIZE SEDIMENT TRACK-OUT ONTO OFF-SITE STREETS, OTHER PAVED AREAS, AND SIDEWALKS FROM VEHICLES EXITING THE CONSTRUCTION SITE BY RESTRICTING VEHICLE TRAFFIC TO PROPERLY DESIGNATED AREAS AND USING ADDITIONAL CONTROLS TO REMOVE SEDIMENT FROM VEHICLE TIRES PRIOR TO EXITING THE SITE.
    - VEHICULAR PARKING AND MOVEMENTS ON PROJECT SITES MUST BE CONFINED TO PAVED SURFACES OR PREDEFINED PARKING AREAS AND VEHICLE PATHS, WHICH SHALL BE MARKED WITH FLAGS OR BOUNDARY FENCING.
    - ALL POLLUTANTS AND MATERIALS THAT ARE DROPPED, WASHED, TRACKED, SPILLED, OR OTHERWISE DISCHARGED FROM A PROJECT SITE TO OFF-SITE STREETS, OTHER PAVED AREAS, SIDEWALKS OR THE MS4 MUST BE CLEANED USING DRY METHODS SUCH AS SWEEPING OR VACUUMING.
    - WASHING POLLUTANTS AND MATERIALS THAT ARE DISCHARGED FROM THE PROJECT SITE TO THE MS4 INTO DRAIN INLETS OR CATCH BASINS IS PROHIBITED UNLESS THE MATERIAL IS SEDIMENT AND THE INLETS ARE DIRECTED TO A SEDIMENT BASIN OR SEDIMENT TRAP.
13. BEST MANAGEMENT PRACTICES (BMPS) SHALL NOT BE REMOVED UNTIL FINAL STABILIZATION IS COMPLETE FOR THAT PHASE.
14. REFER TO CITY AND COUNTY OF HONOLULU BEST MANAGEMENT PRACTICES MANUAL- CONSTRUCTION, FOR MORE INFORMATION ON BMPS.
15. A COMPREHENSIVE LIST OF BMPS BASED ON THE DPP RULES RELATING TO WATER QUALITY AND CCH CONSTRUCTION BMP MANUAL WERE REVIEWED TO COMPLETE THIS ESCP. THE FOLLOWING BMPS WERE DETERMINED TO BE NOT APPLICABLE BECAUSE THEY WOULD NOT EFFECTIVELY MANAGE EROSION PREVENTION AND SEDIMENT CONTROL BASED ON THE SPECIFIC SITE CONDITIONS. AS CONSTRUCTION PROGRESSES, REVISIONS MAY BE NECESSARY AND WILL BE PROVIDED TO DPP INSPECTORS.
    - DEWATERING PRACTICES ARE NOT APPLICABLE.
    - VELOCITY DISSIPATION DEVICES AND DIVERSION BMPS ARE NOT APPLICABLE.
16. AN ESCP COORDINATOR FOR THE PROJECT MUST BE DESIGNATED TO DPP IN WRITING AT LEAST TWO WEEKS PRIOR TO STARTING WORK.
17. NOTIFY DPP IN WRITING OF PROJECT START DATE TWO WEEKS PRIOR TO STARTING WORK.
18. WRITTEN APPROVAL FROM DPP IS REQUIRED BEFORE PROCEEDING TO EACH NEXT PHASE OF DEVELOPMENT SHOWN ON THE SITE PLAN.
19. PRACTICE GOOD HOUSEKEEPING MEASURES THROUGHOUT THE DURATION OF CONSTRUCTION.
20. REGULARLY INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROLS TO ENSURE CONTINUED PERFORMANCE.
21. INSPECTIONS WILL BE PERFORMED WEEKLY.

## GOOD HOUSEKEEPING BMPs:

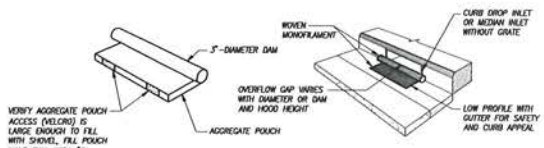
1. STREET SWEEPING AND VACUUMING. ALL POLLUTANTS DISCHARGED FROM CONSTRUCTION SITE TO OFF-SITE AREAS MUST BE SWEPT OR VACUUMED EACH DAY BEFORE LEAVING THE JOB SITE.
2. MATERIALS DELIVERY, STORAGE AND USE MANAGEMENT. PREVENT, REDUCE, OR ELIMINATE THE DISCHARGE OF POLLUTANTS FROM MATERIAL DELIVERY, STORAGE, AND USE TO THE STORM WATER SYSTEM OR WATERCOURSES BY MINIMIZING THE STORAGE OF HAZARDOUS MATERIALS ONSITE, STORING MATERIALS IN A DESIGNATED AREA, INSTALLING SECONDARY CONTAINMENT. CONSTRUCTION MATERIALS, WASTE, TOXIC AND HAZARDOUS SUBSTANCES. STOCKPILES AND OTHER SOURCES OF POLLUTION SHALL NOT BE STORED IN BUFFER AREAS, NEAR AREAS OF CONCENTRATED FLOW, OR AREAS ABUTTING THE MS4, RECEIVING WATERS, OR DRAINAGE IMPROVEMENTS THAT DISCHARGE OFF-SITE. PRIMARY AND SECONDARY CONTAINMENT CONTROLS AND COVERS SHALL BE IMPLEMENTED TO THE MEP.
3. SPILL PREVENTION AND CONTROL. CREATE AND IMPLEMENT SPILL PREVENTION AND RESPONSE PLANS TO ELIMINATE AND MINIMIZE THE DISCHARGE OF POLLUTANTS TO THE MS4 AND RECEIVING WATERS FROM LEAKS AND SPILLS BY REDUCING THE CHANCE FOR SPILLS, ABSORBING, CONTAINING, AND CLEANING UP SPILLS AND PROPERLY DISPOSING OF SPILL MATERIALS. AT A MINIMUM, ALL PROJECTS SHALL CLEANUP ALL LEAKS AND SPILLS IMMEDIATELY.
4. HAZARDOUS MATERIALS. PREVENT OR REDUCE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM HAZARDOUS WASTE THROUGH PROPER MATERIAL USE AND WASTE DISPOSAL. IN THE EVENT THAT HAZARDOUS MATERIALS ARE DISCHARGED TO THE MS4, THE PROPERTY OWNER OR ESCP COORDINATOR SHALL IMMEDIATELY NOTIFY THE DEPARTMENT OF FACILITIES MAINTENANCE, HONOLULU FIRE DEPARTMENT, AND HONOLULU POLICE DEPARTMENT OF THE DISCHARGE BY TELEPHONE. A WRITTEN REPORT DESCRIBING THE POLLUTANTS THAT WERE DISCHARGED, THE REASONS FOR THE DISCHARGE, AND THE MEASURES THAT HAVE BEEN TAKEN OR WILL BE TAKEN TO PREVENT A REOCCURRENCE OF THE DISCHARGE SHALL BE SUBMITTED TO THE DIRECTOR NO LESS THAN 3 DAYS AFTER NOTIFICATION BY PHONE.
5. NONHAZARDOUS MATERIALS. IN THE EVENT THAT NONHAZARDOUS MATERIALS ARE DISCHARGED TO THE MS4, THE PROPERTY OWNER OR ESCP COORDINATOR SHALL NOTIFY THE CITY DEPARTMENT OF FACILITIES MAINTENANCE BY TELEPHONE NO LATER THAN THE NEXT BUSINESS DAY. A WRITTEN REPORT DESCRIBING THE POLLUTANTS THAT WERE DISCHARGED, THE REASONS FOR THE DISCHARGE, AND THE MEASURES THAT HAVE BEEN TAKEN OR WILL BE TAKEN TO PREVENT A REOCCURRENCE OF THE DISCHARGE SHALL BE SUBMITTED TO THE DIRECTOR NO LESS THAN 3 DAYS AFTER NOTIFICATION BY PHONE.
6. VEHICLE AND EQUIPMENT CLEANING. ELIMINATE AND MINIMIZE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM VEHICLE AND EQUIPMENT CLEANING OPERATIONS BY USING OFF-SITE FACILITIES WHEN FEASIBLE, WASHING IN DESIGNATED, CONTAINED AREAS ONLY, AND ELIMINATING DISCHARGES TO THE STORM DRAIN SYSTEM BY EVAPORATING AND/OR TREATING WASH WATER, AS APPROPRIATE OR INFILTRATING WASH WATER FOR EXTERIOR CLEANING ACTIVITIES THAT USE WATER ONLY.
7. VEHICLE AND EQUIPMENT FUELING. PREVENT FUEL SPILLS AND LEAKS BY USING OFF-SITE FACILITIES, FUELING ONLY IN DESIGNATED AREAS, ENCLOSING OR COVERING STORED FUEL, AND IMPLEMENTING SPILL CONTROLS SUCH AS SECONDARY CONTAINMENT AND ACTIVE MEASURES USING SPILL RESPONSE KITS.
8. VEHICLE AND EQUIPMENT MAINTENANCE. ELIMINATE AND MINIMIZE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM VEHICLE AND EQUIPMENT MAINTENANCE OPERATIONS 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.
9. SOLID 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.
10. 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.
11. 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 A 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.
12. LIQUID WASTE MANAGEMENT. LIQUID WASTE SHALL BE CONTAINED IN A CONTROLLED AREA SUCH AS A HOLDING PIT, SEDIMENT BASIN, ROLL-OFF BIN, OR PORTABLE TANK OF SUFFICIENT VOLUME AND TO CONTAIN THE LIQUID WASTES GENERATED. CONTAINMENT AREAS OR DEVICES MUST BE IMPERMEABLE AND LEAK FREE AND SHOULD NOT BE LOCATED WHERE ACCIDENTAL RELEASE OF THE CONTAINED LIQUID CAN DISCHARGE TO WATER BODIES, CHANNELS, OR STORM DRAINS.
13. 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.
14. CONTAMINATED SOIL MANAGEMENT. AT MINIMUM CONTAIN CONTAMINATED MATERIAL SOIL BY SURROUNDING WITH IMPERMEABLE LINED BERMS OR COVER EXPOSED CONTAMINATED MATERIAL WITH PLASTIC SHEETING. CONTAMINATED SOIL SHOULD BE DISPOSED OF PROPERLY IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS.
15. DUST CONTROL. DUST FROM THE PROJECT SITE SHALL NOT BE TRANSPORTED OR DISCHARGED TO OFF-SITE AREAS.
16. BMP AND SITE MAINTENANCE. THE CONTRACTOR SHALL MAINTAIN TEMPORARY EROSION CONTROL MEASURES THROUGHOUT THE PROJECT DURATION. THE CONTRACTOR SHALL CLEAN TRASH AND DEBRIS AROUND THE SURROUNDING AREA ON A WEEKLY BASIS.




| MECHANICAL PROPERTIES | TEST METHOD | UNITS | MARV |
|---|---|---|---|
| GRAB TENSILE STRENGTH | ASTM D 4632 | kN (lbs) | 1.62 (365) X 0.89 (200) |
| GRAB TENSILE ELONGATION | ASTM D 4632 | % | 24 X 10 |
| PUNCTURE STRENGTH | ASTM D 4833 | kN (lbs) | 0.40 (90) |
| MULLEN BURST STRENGTH | ASTM D 3786 | kPa (psi) | 3097 (450) |
| TRAPEZOID TEAR STRENGTH | ASTM D 4533 | kN (lbs) | 0.51 (115) X 0.33 (75) |
| UV RESISTANCE | ASTM D 4355 | % | 90 |
| APPARENT OPENING SIZE | ASTM D 4751 | Mm (US Std Sieve) | 0.425 (40) |
| FLOW RATE | ASTM D 4491 | $l/min/m^2$(gal/min/ft )$^2$ | 5907 (145) |
| PERMITTIVITY | ASTM D 4491 | $Sec^{-1}$ | 2.1 |

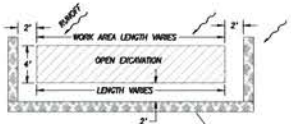
## SEDIMENT FILTER FOR DRAIN INLETS

NOT TO SCALE



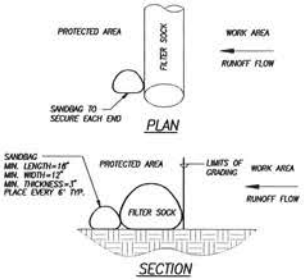

## SEDIMENT FILTER FOR CATCH BASINS

NOT TO SCALE




## TYPICAL OPEN EXCAVATION BMP (FOR TRENCH BMP AND PIT BMP CONDITIONS)

NOT TO SCALE




## FILTER SOCK

NOT TO SCALE

GRAPHIC SCALES:

1" = 50' — 50' 25' 0 50' 100'

ENGINEER GR
DRAFTSMAN
CHECKED BY GR

GLENN T. WATO LICENSED PROFESSIONAL ENGINEER No. 9320-E HAWAII, U.S.A.

4/30/20

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL INTERPRETATION OF CONSTRUCTION IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, CERTIFIED PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS, AND LANDSCAPE ARCHITECTS.

| REV | DATE | BRIEF | BY | APPROVED |
|---|---|---|---|---|

R. M. TOWILL CORPORATION
2024 North King Street, Suite 200, Honolulu, Hawaii 96819-3470

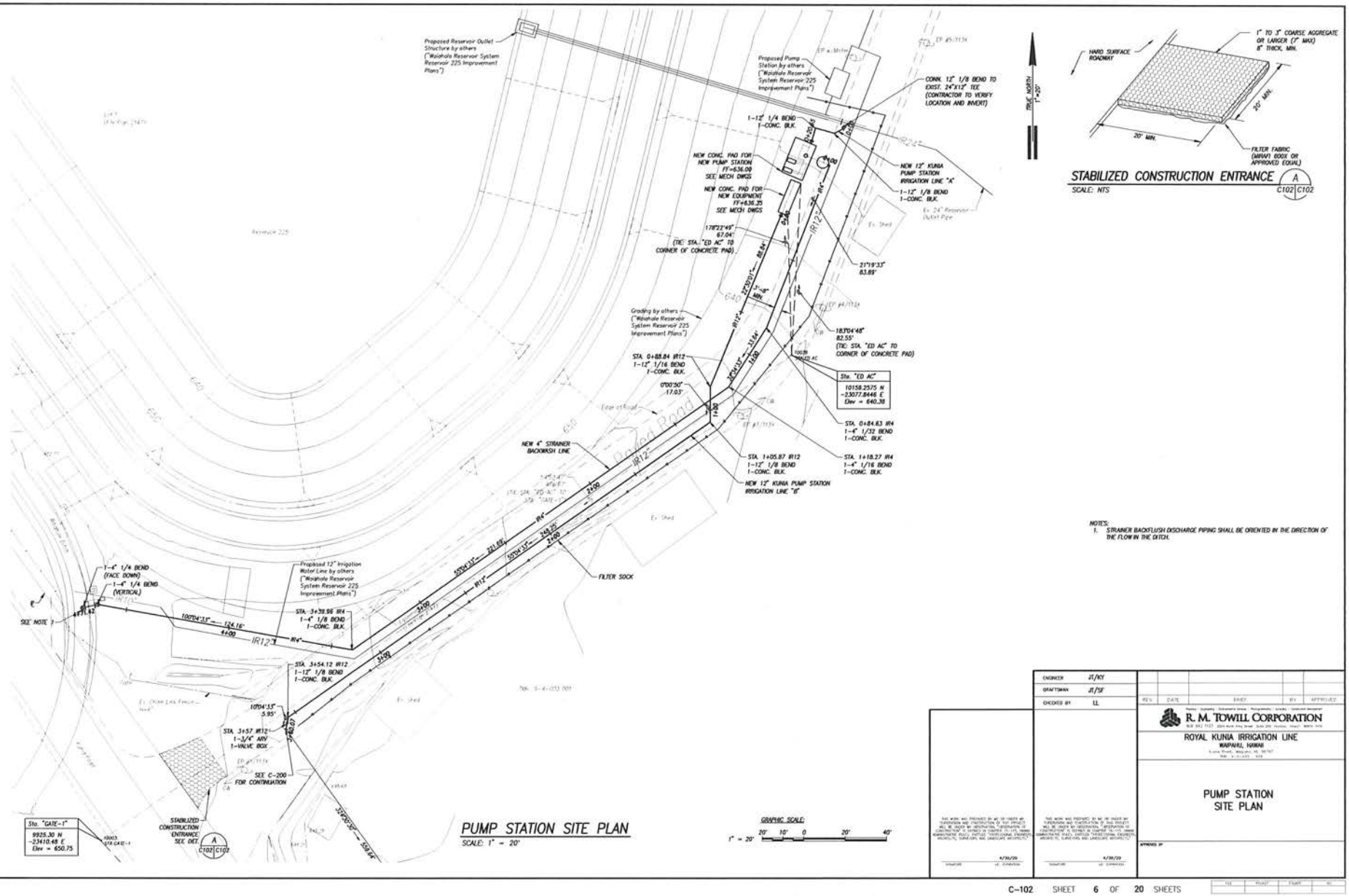
ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII
Kunia Road, Waipahu, HI 96797
Tax: 1-9-4: 423, 509

# EROSION AND SEDIMENT CONTROL NOTES & DETAILS

APPROVED BY



| FILE | SCALE | FOLDER | NO. |
|---|---|---|---|
| | | | |




## PUMP STATION SITE PLAN

SCALE: 1" = 20'

GRAPHIC SCALE: 1" = 20' (20' 10' 0 20' 40')

## STABILIZED CONSTRUCTION ENTRANCE (A C102 | C102)

SCALE: NTS

NOTES:
1. STRAINER BACKFLUSH DISCHARGE PIPING SHALL BE ORIENTED IN THE DIRECTION OF THE FLOW IN THE DITCH.

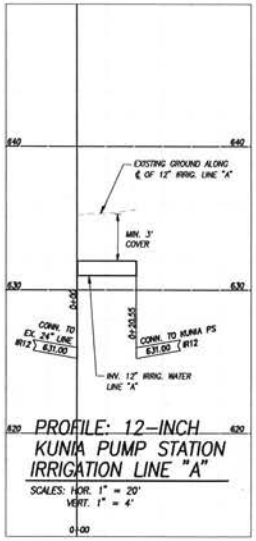
| | |
|---|---|
| ENGINEER | JT/KY |
| DRAFTSMAN | JT/SF |
| CHECKED BY | LL |

R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

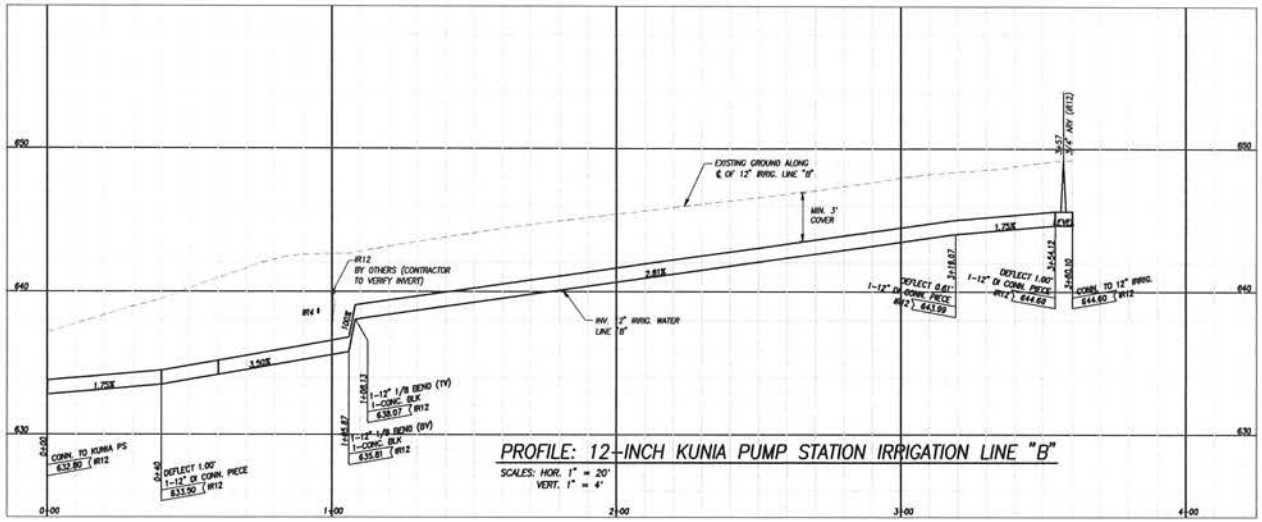
PUMP STATION SITE PLAN

C-102 SHEET 6 OF 20 SHEETS



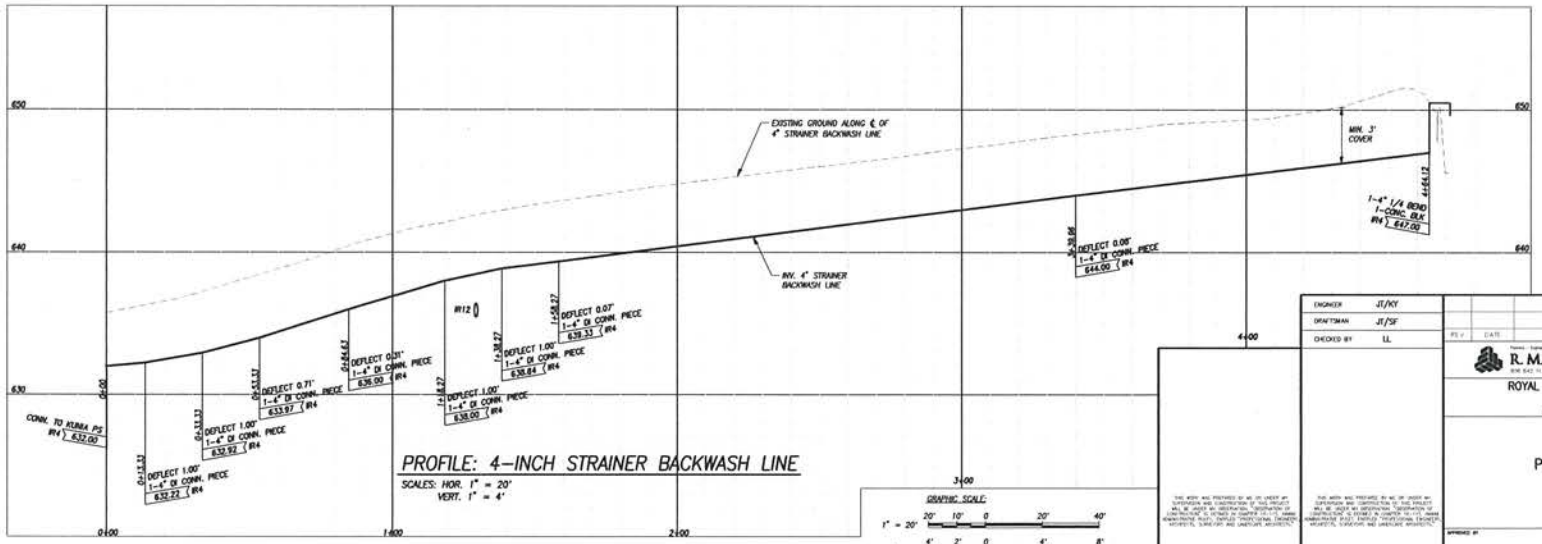

## PROFILE: 12-INCH KUNIA PUMP STATION IRRIGATION LINE "A"

SCALES: HOR. 1" = 20'
VERT. 1" = 4'




## PROFILE: 12-INCH KUNIA PUMP STATION IRRIGATION LINE "B"

SCALES: HOR. 1" = 20'
VERT. 1" = 4'




## PROFILE: 4-INCH STRAINER BACKWASH LINE

SCALES: HOR. 1" = 20'
VERT. 1" = 4'

GRAPHIC SCALE:
1" = 20' 20' 10' 0 20' 40'
1" = 4' 4' 2' 0 4' 8'

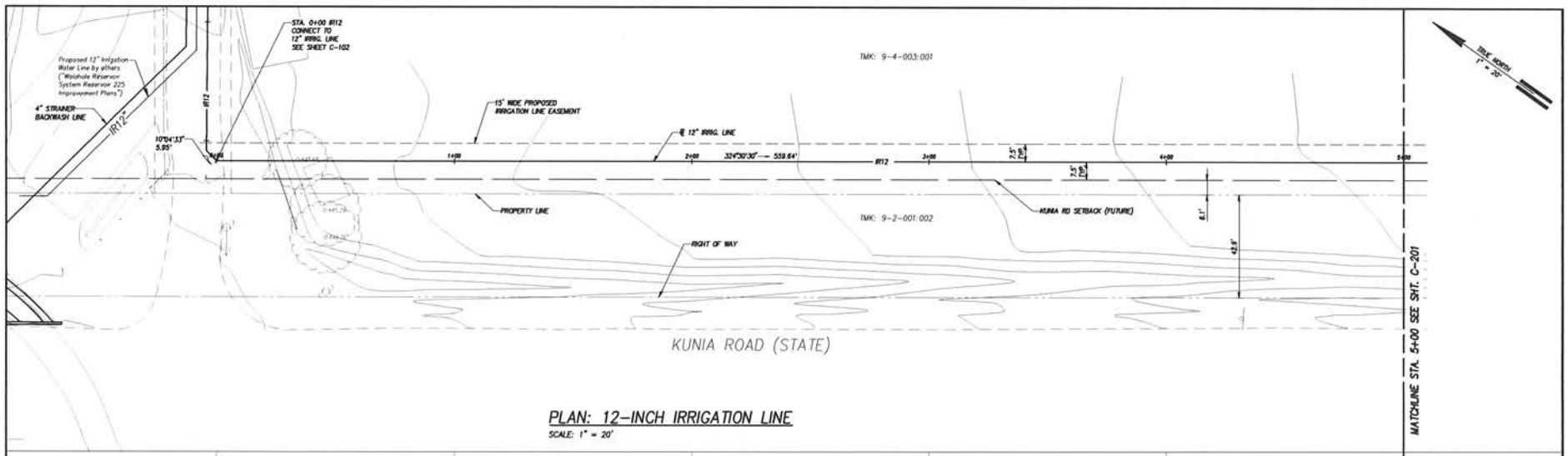
| | |
|---|---|
| ENGINEER | JT/KY |
| DRAFTSMAN | JT/SF |
| CHECKED BY | LL |

R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

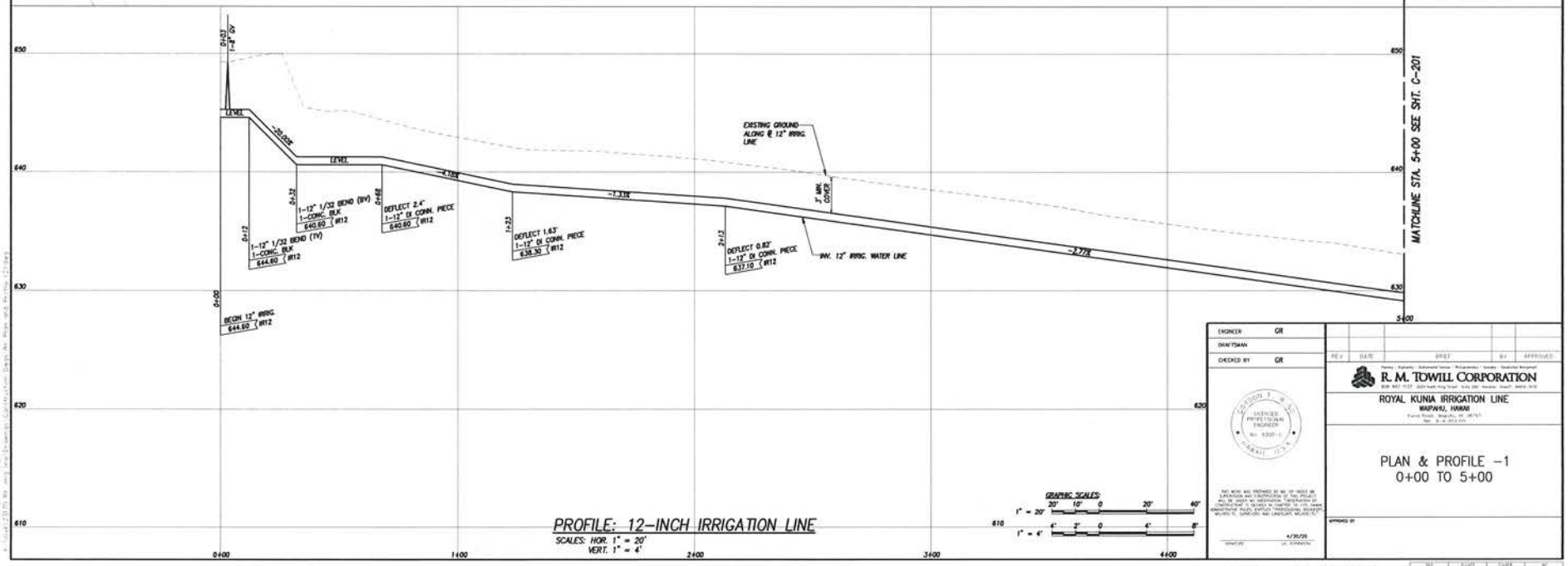
PUMP STATION PROFILES

C-103 SHEET 7 OF 20 SHEETS




## PLAN: 12-INCH IRRIGATION LINE

SCALE: 1" = 20'




## PROFILE: 12-INCH IRRIGATION LINE

SCALES: HOR. 1" = 20'
VERT. 1" = 4'

GRAPHIC SCALES:
1" = 20' — 20' 10' 0 20' 40'
1" = 4' — 4' 2' 0 4' 8'

| | |
|---|---|
| ENGINEER | GR |
| DRAFTSMAN | |
| CHECKED BY | GR |

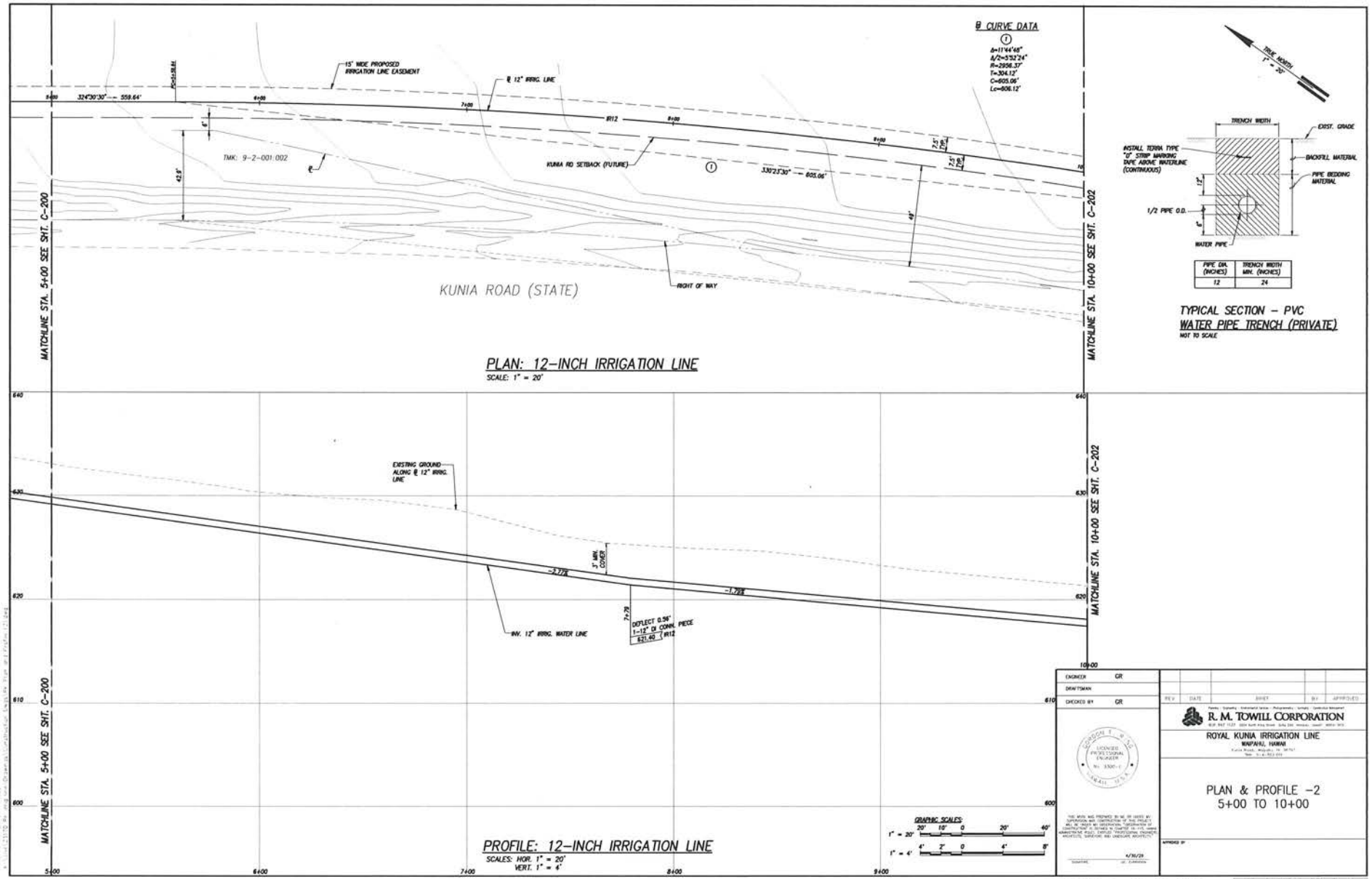
LICENSED PROFESSIONAL ENGINEER No. 9300-E

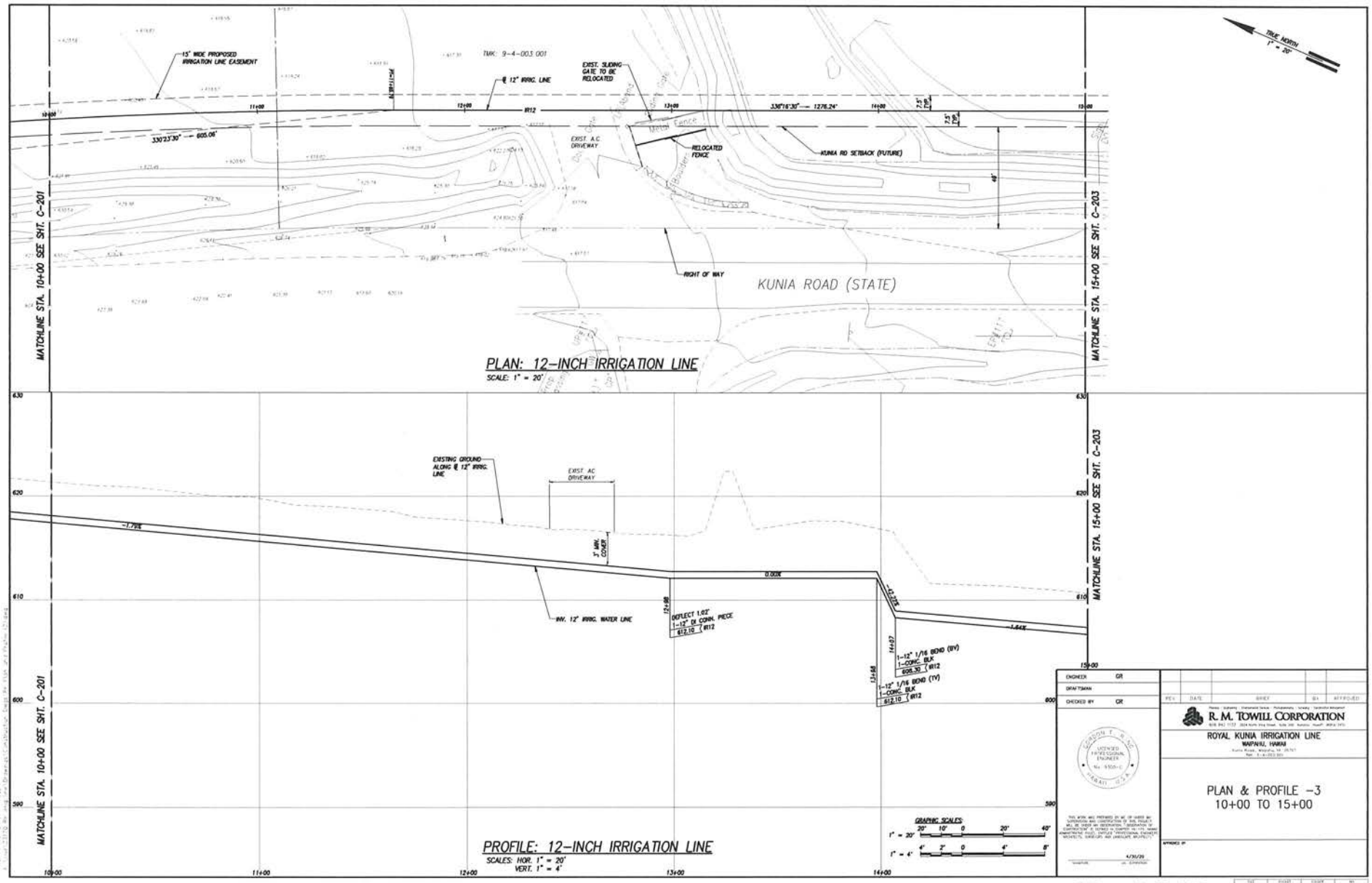
4/30/25

R. M. TOWILL CORPORATION

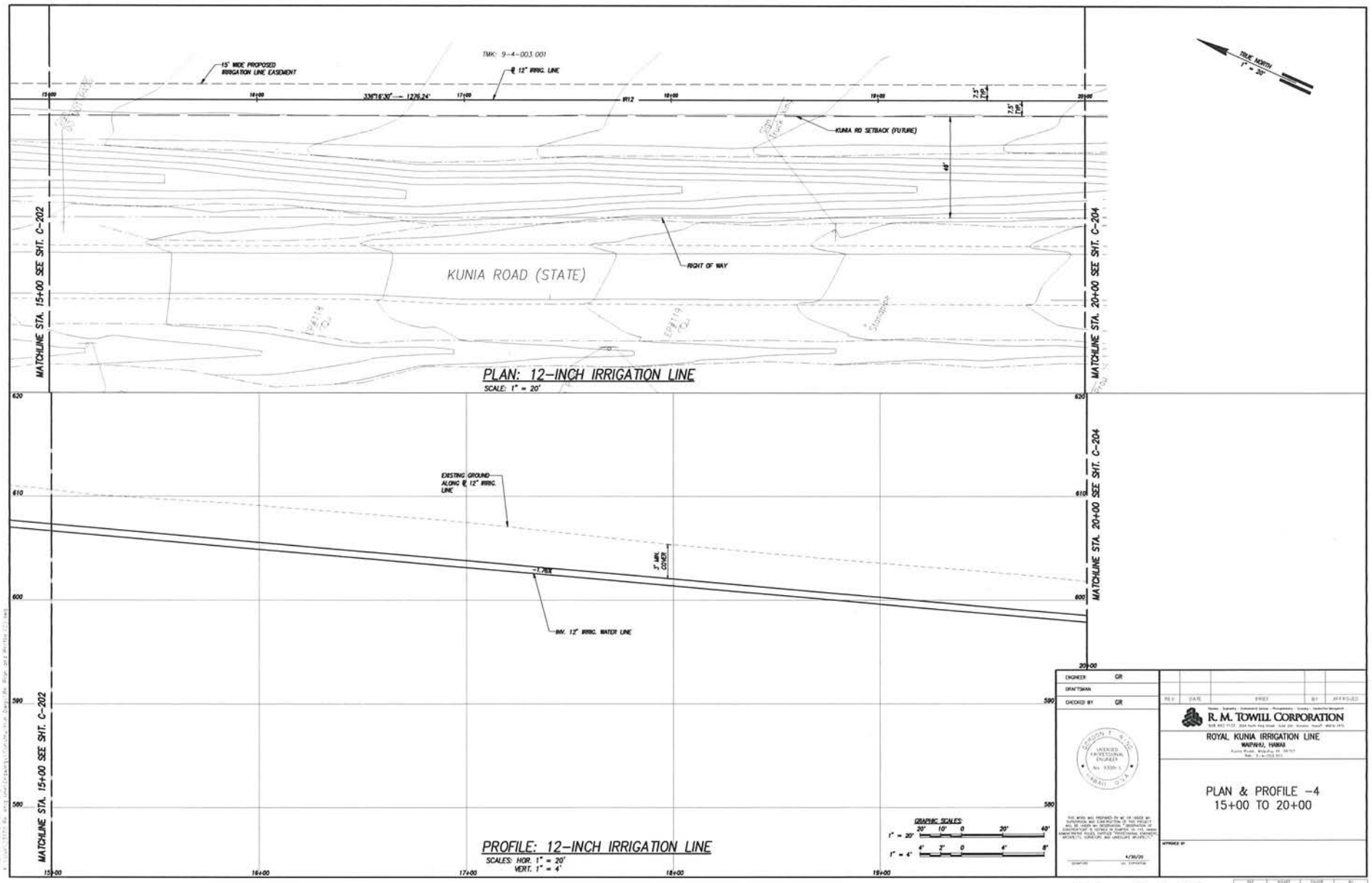
ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

PLAN & PROFILE -1
0+00 TO 5+00

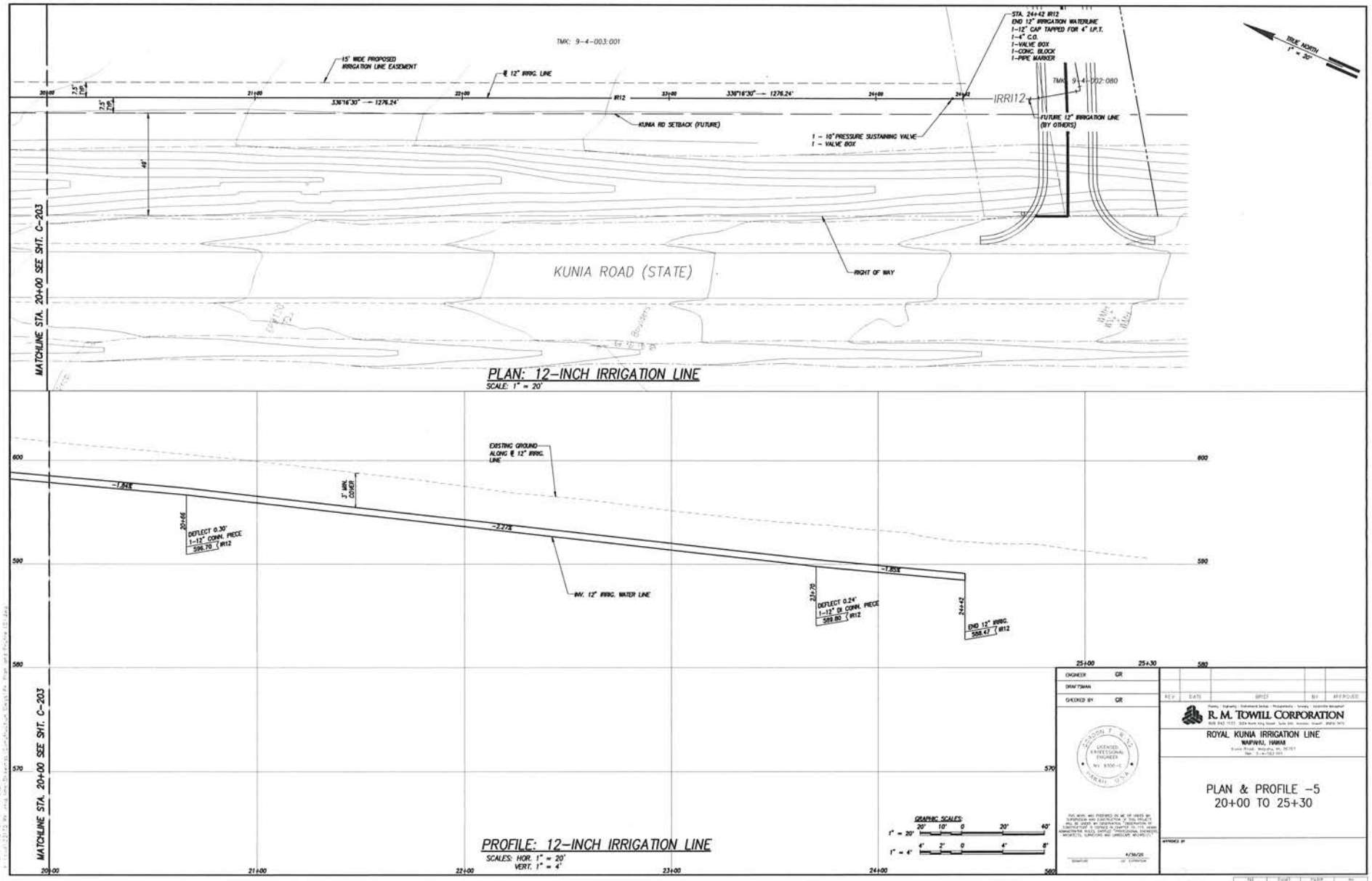

℄ CURVE DATA
Δ=11°44'48"
Δ/2=5°52'24"
R=2956.37'
T=304.12'
C=605.06'
Lc=606.12'
15' WIDE PROPOSED IRRIGATION LINE EASEMENT
℄ 12" IRRIG. LINE
TMK: 9-2-001:002
KUNIA RD SETBACK (FUTURE)
RIGHT OF WAY
KUNIA ROAD (STATE)
MATCHLINE STA. 5+00 SEE SHT. C-200
MATCHLINE STA. 10+00 SEE SHT. C-202
PLAN: 12-INCH IRRIGATION LINE
SCALE: 1" = 20'
TRUE NORTH
TRENCH WIDTH
EXIST. GRADE
INSTALL TERRA TYPE "D" STRIP MARKING TAPE ABOVE WATERLINE (CONTINUOUS)
BACKFILL MATERIAL
PIPE BEDDING MATERIAL
1/2 PIPE O.D.
WATER PIPE
PIPE DIA. (INCHES) | TRENCH WIDTH MIN. (INCHES)
12 | 24
TYPICAL SECTION - PVC
WATER PIPE TRENCH (PRIVATE)
NOT TO SCALE
EXISTING GROUND ALONG ℄ 12" IRRIG. LINE
3' MIN. COVER
-2.27%
-1.72%
INV. 12" IRRIG. WATER LINE
DEFLECT 0.56°
1-12" DI CONN. PIECE
621.40 W12
PROFILE: 12-INCH IRRIGATION LINE
SCALES: HOR. 1" = 20'
VERT. 1" = 4'
GRAPHIC SCALES:
1" = 20' 20' 10' 0 20' 40'
1" = 4' 4' 2' 0 4' 8'
ENGINEER GR
DRAFTSMAN
CHECKED BY GR
R. M. TOWILL CORPORATION
ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII
PLAN & PROFILE -2
5+00 TO 10+00




C-202 SHEET 10 OF 20 SHEETS




C-203 SHEET 11 OF 20 SHEETS




C-204 SHEET 12 OF 20 SHEETS

GENERAL:

A. WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE BUILDING CODE OF THE CITY AND COUNTY OF HONOLULU (AMENDED IBC 2006 EDITION). HOWEVER, WHERE REFERENCE IS MADE TO PERFORMANCE CONFORMING TO OTHER STANDARDS THE MORE STRINGENT SHALL APPLY.

B. THE CONTRACTOR SHALL COMPARE ALL THE CONTRACT DOCUMENTS WITH EACH OTHER AND REPORT IN WRITING TO THE ENGINEER ALL INCONSISTENCIES AND OMISSIONS.

C. THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AND VERIFY FIELD CONDITIONS AND SHALL COMPARE SUCH FIELD MEASUREMENTS AND CONDITIONS WITH THE DRAWINGS BEFORE COMMENCING WORK. REPORT IN WRITING TO THE ENGINEER ALL INCONSISTENCIES AND OMISSIONS.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE WORK OF ALL TRADES.

E. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION, WORKMANSHIP AND JOB SAFETY.

F. THE CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AND BRACING AS REQUIRED FOR STABILITY OF STRUCTURAL MEMBERS AND SYSTEMS.

G. CONSTRUCTION LOADING SHALL NOT EXCEED DESIGN LIVE LOAD UNLESS SPECIAL SHORING IS PROVIDED. PERMITTED CONSTRUCTION LOADS SHALL BE PROPERLY REDUCED IN AREAS WHERE THE STRUCTURE HAS NOT ATTAINED FULL DESIGN STRENGTH.

H. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF THE ADJACENT PROPERTIES, STRUCTURES, STREETS AND UTILITIES DURING THE CONSTRUCTION PERIOD. ANY DAMAGED OR DETERIORATED PROPERTY SHALL BE RESTORED TO THE CONDITION PRIOR TO THE BEGINNING OF WORK OR BETTER AT NO COST TO THE OWNER.

I. DETAILS NOTED AS TYPICAL ON THE STRUCTURAL DRAWINGS SHALL APPLY IN ALL CONDITIONS UNLESS SPECIFICALLY SHOWN OR NOTED.

FOUNDATION:

A. FOUNDATION DESIGN IS BASED ON GEOLABS, INC. REPORT, DATED FEBRUARY 2019.

B. CONTRACTOR SHALL PROVIDE DE-WATERING OF EXCAVATED AREAS, AS REQUIRED.

C. CONTRACTOR SHALL PROVIDE DESIGN AND INSTALLATION OF ALL CRIBBING, SHEETING, AND SHORING NECESSARY TO PRESERVE EXCAVATIONS AND EARTH BANKS. SHORING SHALL CONFORM TO OSHA REGULATIONS.

D. FOOTINGS SHALL BEAR ON 24 INCHES OF IMPORTED NON-EXPANSIVE GRANULAR COMPACTED ENGINEERED FILL. BOTTOM OF FOOTINGS SHALL BE COMPACTED 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 SHALL BE OVER-EXCAVATED TO EXPOSE THE UNDERLYING FIRM MATERIALS. THE OVER-EXCAVATED AREA SHALL BE BACKFILLED WITH SELECT GRANULAR MATERIAL COMPACTED TO A MINIMUM OF 90% RELATIVE COMPACTION OR THE FOOTING BOTTOM MAY BE EXTENDED DOWN TO THE UNDERLYING COMPETENT MATERIAL. CONTRACTOR MAY SUBSTITUTE FLOWABLE CONCRETE FOR THE GRANULAR MATERIAL UPON APPROVAL FROM THE ENGINEER.

FOUNDATION CONT:

E. EXCAVATIONS FOR FOOTINGS SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER (PROVIDED BY CONTRACTOR) PRIOR TO PLACEMENT OF CONCRETE AND REINFORCING.

F. ENGINEERED FILL AND BACKFILL SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CITY AND COUNTY OF HONOLULU OF THE STATE OF HAWAII, SEPTEMBER 1986.

G. FILL SHOULD BE MOISTURE CONDITIONED TO WITHIN TWO PERCENT OF THE OPTIMUM MOISTURE CONTENT AND PLACED IN HORIZONTAL LIFTS NOT TO EXCEED SIX INCHES. FILL SHALL BE COMPACTED TO MINIMUM 95% RELATIVE DENSITY AS MEASURED BY ASTM D1557, METHOD A OR D.

CONCRETE:

CONCRETE SHALL COMPLY WITH ACI 318.

A. CONCRETE SHALL BE REGULAR WEIGHT HARD ROCK CONCRETE AND SHALL HAVE MINIMUM 28 DAY COMPRESSIVE STRENGTHS 4000 PSI.

B. CONCRETE DELIVERY TICKETS SHALL RECORD ALL FREE WATER IN THE MIX AT BATCHING PLANT, ADDED FOR CONSISTENCY BY DRIVER, AND ANY ADDITIONAL REQUEST BY CONTRACTOR UP TO THE MAXIMUM AMOUNT ALLOWED BY THE MIX DESIGN.

C. ALL INSERTS, ANCHOR BOLTS, PLATES, AND OTHER ITEMS TO BE CAST IN THE CONCRETE SHALL BE HOT-DIP GALVANIZED ACCORDING TO ASTM A153 UNLESS OTHERWISE NOTED.

D. REINFORCING BARS, ANCHOR BOLTS, INSERTS, AND OTHER ITEMS TO BE CAST IN THE CONCRETE SHALL BE SECURED IN POSITION PRIOR TO PLACEMENT OF CONCRETE.

E. CONDUITS, PIPES, AND SLEEVES PASSING THROUGH A SLAB OR FOOTING THAT DO NOT CONFORM TO TYPICAL DETAILS SHALL BE LOCATED AND THE PROPOSED CONSTRUCTION DETAIL SUBMITTED TO THE ENGINEER FOR APPROVAL.

F. CONDUITS, PIPES, AND SLEEVES EMBEDDED WITHIN A SLAB OR WALL (OTHER THAN THOSE MERELY PASSING THROUGH) SHALL BE:
   a. NO LARGER IN OUTSIDE DIMENSIONS THAN ONE THIRD THE OVERALL SLAB OR WALL THICKNESS IN WHICH THEY ARE EMBEDDED.
   b. PLACED IN THE MIDDLE ONE THIRD OF SLAB OR WALL THICKNESS.
   c. SPACED NO CLOSER THAN THREE DIAMETERS OR WIDTHS ON CENTER.

G. CONDUITS, PIPES, AND SLEEVES SHALL NOT BE PLACED THROUGH OR EMBEDDED IN A BEAM UNLESS SPECIFICALLY DETAILED.

H. THE CONTRACTOR SHALL LOCATE CONSTRUCTION JOINTS NOT SHOWN ON THE DRAWINGS, SO AS NOT TO IMPAIR THE STRENGTH OF THE STRUCTURE AND TO MINIMIZE SHRINKAGE STRESSES. SUBMIT PROPOSED LOCATIONS OF CONSTRUCTION JOINTS TO THE ENGINEER FOR APPROVAL. ALL CONSTRUCTION JOINTS SHALL BE CLEANED, LAITANCE REMOVED AND WETTED.

K. SEE ARCHITECTURAL DRAWINGS FOR CHAMFERS, EDGE RADII, DRIPS, REGLETS, FINISHES AND OTHER NON-STRUCTURAL ITEMS NOT SHOWN OR SPECIFIED ON THE STRUCTURAL DRAWINGS.

L. NON-SHRINK GROUT SHALL BE A PREMIXED NON-METALLIC FORMULA, CAPABLE OF DEVELOPING A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI IN 1 DAY AND 7,000 PSI IN 28 DAYS.

M. A POSITIVE SEPARATION JOINT SHALL BE PROVIDED BETWEEN THE EXTERIOR WALKWAY SLABS AND THE BUILDING CONSTRUCTION WITH A ½-INCH JOINT FILLER, UNLESS NOTED OTHERWISE. JOINT FILLER SHALL BE ASTM D1751 OR ASTM D994, ASPHALT IMPREGNATED.

REINFORCING STEEL:

A. REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A615, GRADE 60.

B. CLEAR CONCRETE COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED:
   FOOTINGS, GRADE BEAMS, ETC. CAST AGAINST EARTH ---------- 3"
   FOOTINGS, WALLS, GRADE BEAMS, ETC. FORMED AND EXPOSED TO EARTH OR WEATHER---------- 2"
   CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND---------- 1½"

C. CLEAR DISTANCE BETWEEN THE SURFACE OF A BAR AND ANY SURFACE OF A MASONRY UNIT SHALL BE NOT LESS THAN 3/4 INCH, UNLESS OTHERWISE NOTED.

D. REINFORCING STEEL SHALL BE SPLICED WHERE INDICATED ON PLANS. PROVIDE LAP SPLICE LENGTH PER TYPICAL DETAILS AND SCHEDULE, UNLESS OTHERWISE NOTED.

E. MECHANICAL SPLICE CONNECTORS SHALL DEVELOP IN TENSION 125 PERCENT OF THE SPECIFIED MINIMUM YIELD STRENGTH OF REINFORCING BARS.

F. BAR BENDS AND HOOKS SHALL BE "STANDARD HOOKS" IN ACCORDANCE WITH ACI 318-05.

STRUCTURAL STEEL:

A. FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION.

B. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 UNLESS OTHERWISE NOTED.

C. STEEL WIDE FLANGE SECTIONS SHALL CONFORM TO ASTM A992.
   PLATES AND BARS SHALL CONFORM TO ASTM A36.

D. WELDS AND WELDING PROCEDURES SHALL CONFORM TO THE STRUCTURAL WELDING CODE AWS D1.1 OF THE AMERICAN WELDING SOCIETY.

E. WELDING SHALL BE PERFORMED BY WELDERS PREQUALIFIED FOR WELDING PROCEDURES TO BE USED.

F. WELDING ELECTRODES SHALL BE E70XX.

G. HIGH-STRENGTH BOLTS SHALL CONFORM TO ASTM A325, TYPE N. LOAD INDICATOR WASHERS SHALL BE USED.

H. ALL ANCHOR BOLTS, PLATES, AND OTHER ITEMS TO BE CAST IN CONCRETE SHALL BE HOT-DIP GALVANIZED ACCORDING TO ASTM A153 UNLESS OTHERWISE NOTED.

I. BOLTS SHALL CONFORM TO ASTM A307, GRADE A UNLESS OTHERWISE NOTED, AND SHALL BE HOT-DIP GALVANIZED ACCORDING TO ASTM A153.

K. ALL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION ACCORDING TO ASTM A123 AND PAINTED ACCORDING TO SPECIFICATION SECTION 9.5.

L. ANY DAMAGED GALVANIZED SURFACE SHALL BE REPAIRED AS FOLLOWS:
   1) PREPARE SURFACE PER SSPC-SP1, SOLVENT CLEANING.
   2) APPLY TWO COATS OF COLD APPLIED GALVANIZING COMPOUND CONTAINING 95% METALLIC ZINC CONTENT BY WEIGHT IN DRY FILM AND 52% SOLIDS CONTENT BY VOLUME.
   3) APPLICATION RATE SHALL BE 1.5 MILS DRY FILM THICKNESS PER COAT.

| | | | | | |
|---|---|---|---|---|---|
| ENGINEER | KK | | | | |
| DRAFTSMAN | KK | | | | |
| CHECKED BY | KK | REV | DATE | BRIEF | BY | APPROVED |

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION. "DESIGNATION OF CONSTRUCTION IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

4/30/20
SIGNATURE DATE OF EXPIRATION

R. M. TOWILL CORPORATION
Planning • Engineering • Environmental Services • Photogrammetry • Surveying • Construction Management
2024 North King Street, Suite 200, Honolulu, Hawaii 96819-3471

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII
Waipahu Street, Waipahu, HI, 96797
TMK: 9-4-XXX: XXX

STRUCTURAL NOTES

APPROVED BY

| FILE | PROJECT | FOLDER | NO. |
|---|---|---|---|
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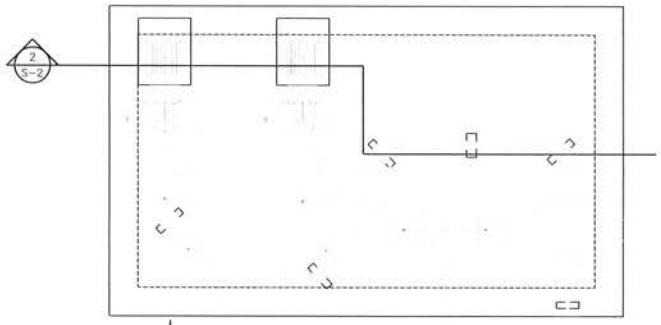
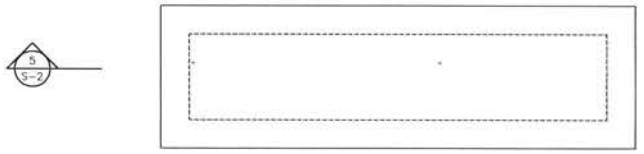
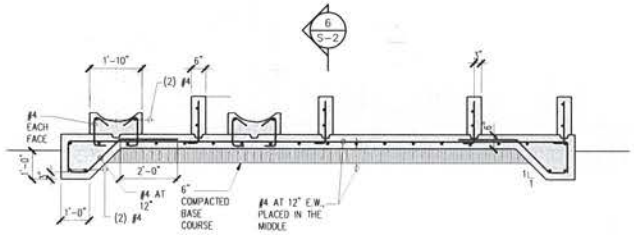
S-1 SHEET OF SHEETS




1 S-2 **PAD PLAN VIEW**
SCALE: 1/2" = 1'-0"




4 S-2 **PAD PLAN VIEW**
SCALE: 1'-0"




2 S-2 **SECTION**
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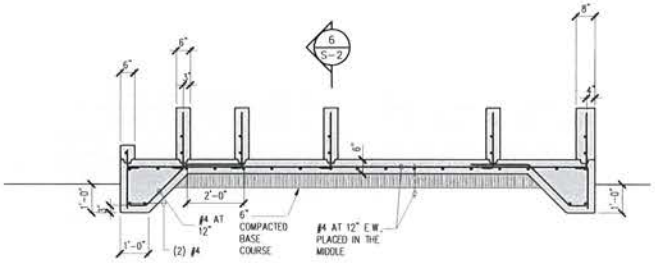


5 S-2 **SECTION**
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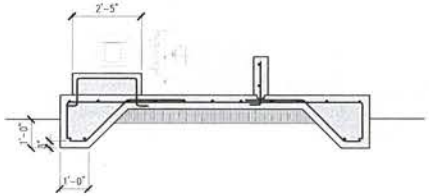


3 S-2 **SECTION**
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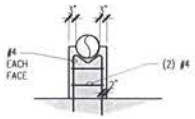


6 S-2 **SECTION**
SCALE: 1/2" = 1'-0"

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| ENGINEER | XX |
| DRAFTSMAN | XX |
| CHECKED BY | XX |

| REV | DATE | BRIEF | BY | APPROVED |
|---|---|---|---|---|
| | | | | |

KEN KAZUO HAYASHIDA
LICENSED PROFESSIONAL ENGINEER
No. 6818-S
HAWAII, U.S.A.

4/30/20
SIGNATURE DATE OF EXPIRATION

R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

CONCRETE PAD DETAILS

APPROVED BY

| TMK | PERMIT | PROJECT | NO. |
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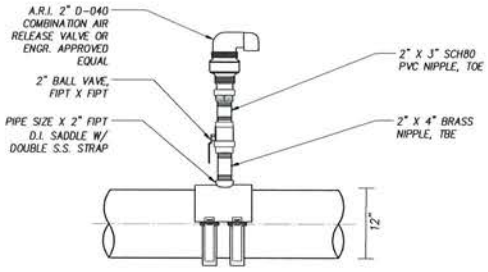
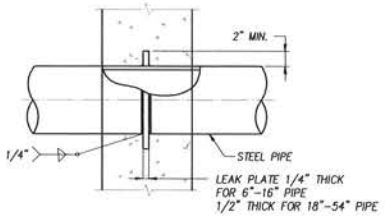
S-2 SHEET OF SHEETS




AIR RELEASE VALVE DETAIL 1 VAR|M001

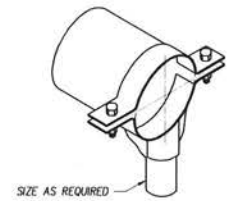
SCALE: NTS




NOTE: GALV. WELDMENT AFTER FAB.

DETAIL FOR WALLS 4 VAR|M001

SCALE: NTS



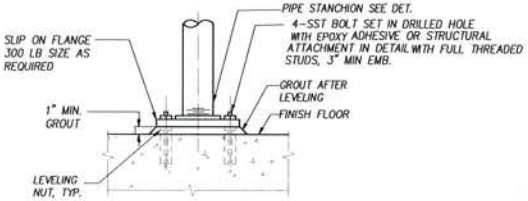

NOTE: SIZES 4" THRU 36"

PIPE SADDLE WITH STRAP 6 VAR|M001

SCALE: NTS

NOTES:

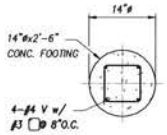
1. ROD SIZE IS BASED ON CARRYING SINGLE PIPE. WHEN MORE THAN ONE PIPE IS TO BE SUPPORTED, RODS SHALL BE SIZED USING DESIGN WEIGHTS TO DETERMINE TOTAL LOAD AS SHOWN IN TABLE A.
2. WHERE MODULARLY SPACED INSERTS ARE REQUIRED, PIPES SHALL BE SUPPORTED AT THE INSERT MODULE. NO SPECIAL INSERTS SHALL BE ALLOWED FOR INDIVIDUAL PIPE SUPPORTS UNLESS SPECIFICALLY DETAILED OR AUTHORIZED BY THE ENGINEER.
3. SPACING BASED ON SCHEDULE 80 AT 120° F. SCHEDULE 40 OR HIGHER TEMPERATURES REQUIRE SHORTENED SPANS. SEE MANUFACTURERS RECOMMENDATIONS.
4. THERE SHALL BE AT LEAST ONE HANGER PER PIPE LENGTH, LOCATED AS CLOSE TO THE BELL AS POSSIBLE.
5. MSS REFERS TO MANUFCTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY, STANDARD PRACTICE SP 58 AND SP 69.
6. FITTINGS SHALL NOT BE LESS THAN MSS CL. B.
7. UNLESS OTHERWISE NOTED, ALL RODS, STRUCTURAL AND PIPE ATTACHMENTS, PIPE SUPPORT RACK AND TRAPEZE PIPE HANGER COMPONENTS SHALL BE 316 STAINLESS STEEL. ALL HARDWARE ASSOCIATED WITH HANGERS SHALL BE 316 STAINLESS STEEL.
8. DESIGN WEIGHTS REFER TO THE PIPE SIZE SHOWN SUPPORTED AT THE SPACING LISTED AND SHALL BE USED FOR DESIGN OF ALL SPECIAL HANGER SYSTEMS.
9. WHEN USED WITH PVC OR FIBERGLASS PIPE, PROVIDE STEEL SHIELD AROUND PIPE AT CLAMP WITH LOOSE FIT. WRAP COPPER TUBES WITH 2" STRIP OF RUBBER FABRIC.
10. ALL HARDWARE SHALL BE STAINLESS STEEL TYPE 316.
11. ALL ANCHOR BOLTS SHALL BE EPOXY ENCAPSULATED. EXPANSION BOLTS NOT ACCEPTABLE.
12. ALL PIPE SUPPORTS SHALL BE STAINLESS STEEL TYPE 316.



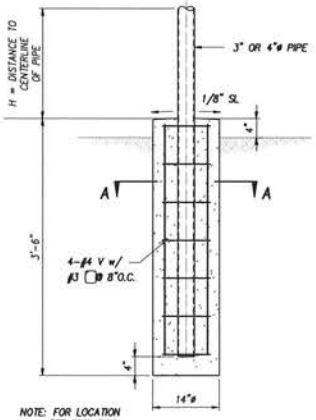

CAPACITY: 2-1/2" THROUGH 12" PIPE SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS

DETAIL 2 VAR|M001

SCALE: NTS




SECTION A-A




NOTE: FOR LOCATION SEE CIVIL DWG.

PIPE SUPPORT DETAIL 5 VAR|M001

SCALE: NOT TO SCALE

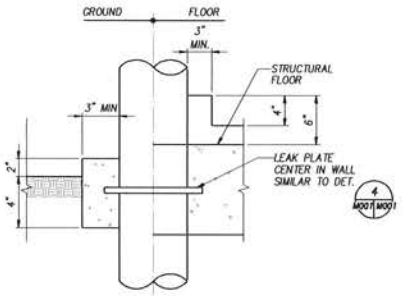

NOTE: SIZES 4" THRU 36"

FLANGE PIPE SUPPORT 7 VAR|M001

SCALE: NTS

TABLE A

| PIPE SIZE | DESIGN WEIGHT | ROD SIZE BASED ON SINGLE ROD SEE NOTE 1 | MAXIMUM SPAN, IN FEET, FOR PIPES NOT IN RACKS. SEE NOTE 2 | | | |
|---|---|---|---|---|---|---|
| | | | STEEL OR FRP | COPPER | PLASTIC SEE NOTE 3 | CAST IRON SEE NOTE 4 |
| 4" | 600 LBS | 5/8" | 10 | 10 | 6 | PRESSURE PIPE 12 FT SOIL PIPE 10 FT |
| 6" | 750 LBS | 3/4" | 10 | 10 | 7 | |
| 8" | 950 LBS | 7/8" | 10 | 10 | 7 | |
| 10" | 1200 LBS | 7/8" | 10 | – | – | |
| 12" | 1450 LBS | 7/8" | 10 | – | – | |




DETAIL FOR GROUND OR SLABS ON GRADE, SUB FLOORS & AC PAV'T. 3 VAR|M001

SCALE: NTS

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| ENGINEER | JT/KY |
| DRAFTSMAN | JT/SF |
| CHECKED BY | LL |

| REV | DATE | BRIEF | BY | APPROVED |
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R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE

WAIPAHU, HAWAII

DETAILS

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES. PURSUANT TO CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS.

4/30/20

DATE

LIC. EXPIRATION

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES. PURSUANT TO CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS.

4/30/20

DATE

LIC. EXPIRATION

APPROVED BY

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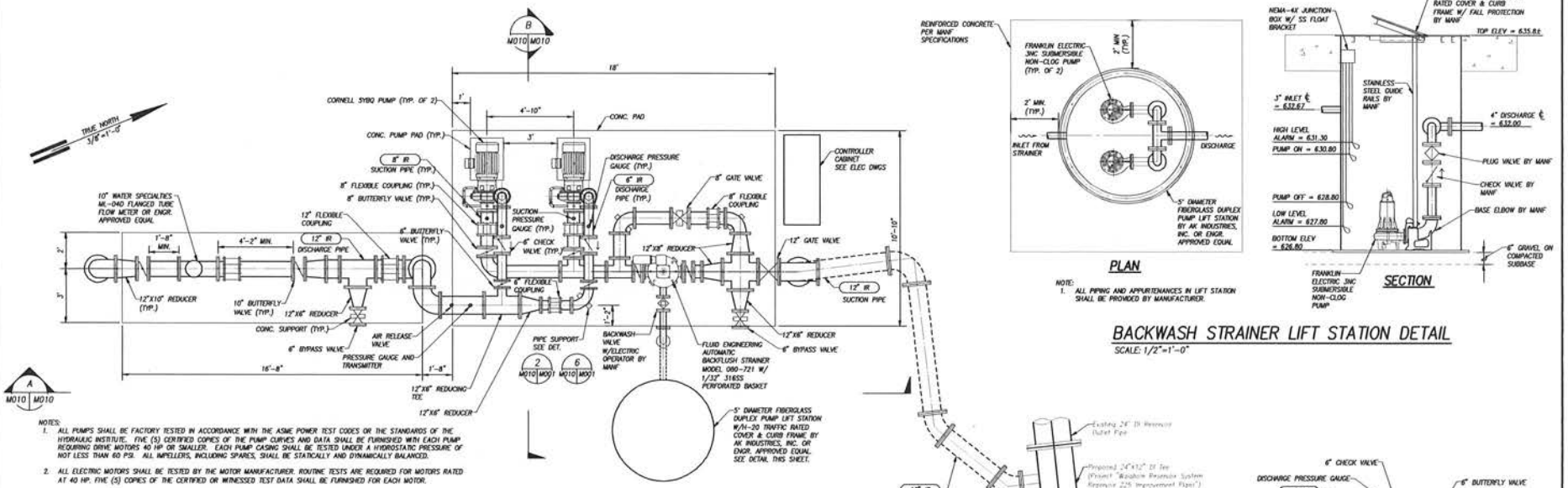



## KUNIA IRRIGATION PUMP STATION – PLAN

SCALE: 3/8"=1'-0"




**PLAN**

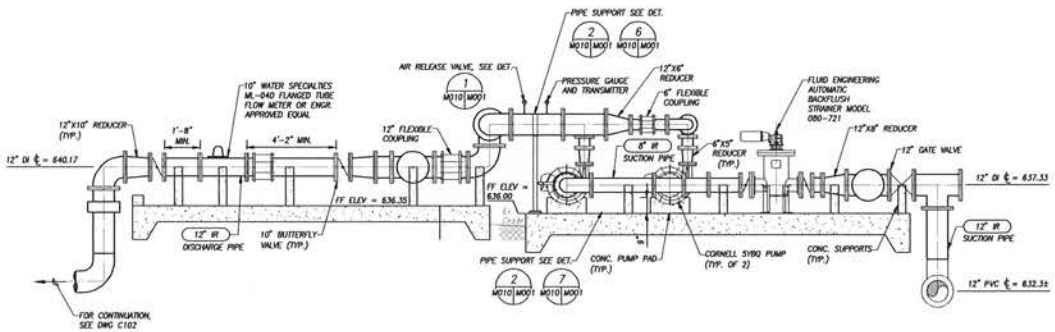
NOTE:
1. ALL PIPING AND APPURTENANCES IN LIFT STATION SHALL BE PROVIDED BY MANUFACTURER.




**SECTION**

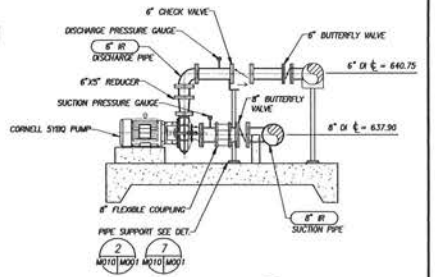
## BACKWASH STRAINER LIFT STATION DETAIL

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




## SECTION

SCALE: 3/8"=1'-0" A M010 M010




## SECTION

SCALE: 3/8"=1'-0" B M010 M010

NOTES:
1. ALL PUMPS SHALL BE FACTORY TESTED IN ACCORDANCE WITH THE ASME POWER TEST CODES OR THE STANDARDS OF THE HYDRAULIC INSTITUTE. FIVE (5) CERTIFIED COPIES OF THE PUMP CURVES AND DATA SHALL BE FURNISHED WITH EACH PUMP REQUIRING DRIVE MOTORS 40 HP OR SMALLER. EACH PUMP CASING SHALL BE TESTED UNDER A HYDROSTATIC PRESSURE OF NOT LESS THAN 60 PSI. ALL IMPELLERS, INCLUDING SPARES, SHALL BE STATICALLY AND DYNAMICALLY BALANCED.
2. ALL ELECTRIC MOTORS SHALL BE TESTED BY THE MOTOR MANUFACTURER. ROUTINE TESTS ARE REQUIRED FOR MOTORS RATED AT 40 HP. FIVE (5) COPIES OF THE CERTIFIED OR WITNESSED TEST DATA SHALL BE FURNISHED FOR EACH MOTOR.
3. ALL PUMPS SHALL BE FIELD TESTED TO DEMONSTRATE SATISFACTORY OPERATIONS.
4. FULL SPEED TEST FOR PUMPS:
   A) RECORD NOT LESS THAN THREE OPERATING POINTS BETWEEN SHUT-OFF AND RUNOUT WITH POINTS TAKEN AT THE SPECIFIED RATING POINTS. TAKE READINGS TO DETERMINE FLOW, DIFFERENTIAL PRESSURE, RPM HORSEPOWER AND EFFICIENCY.
   B) OPERATE EACH PUMP FOR NOT LESS THAN ONE HOUR AND TAKE READINGS TO DETERMINE THAT THE PUMP WILL OPERATE SATISFACTORILY WITHOUT VIBRATION OR CAVITATION AT THE SPECIFIED MINIMUM HEAD CONDITION WITH NOT MORE THAN THE SPECIFIED NPSH AVAILABLE.
   C) VIBRATION TESTING: FIELD VIBRATION MEASUREMENTS SHALL BE PERFORMED DURING THE OPERATIONAL TESTS. VIBRATION AND CRITICAL SPEED LIMITS SHALL NOT EXCEED THE LIMITS AS RECOMMENDED BY THE MANUFACTURER.

GRAPHIC SCALE:
1/2" = 1'-0" 2' 0 2' 4'
3/8" = 1'-0" 2' 0 2' 4' 6'

| | |
|---|---|
| ENGINEER | JT/KY |
| DRAFTSMAN | JT/SF |
| CHECKED BY | LL |

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND I ACCEPT RESPONSIBILITY FOR IT AS DEFINED IN THE RULES GOVERNING THE LICENSING OF ENGINEERS AND LAND SURVEYORS. DESCRIPTION OF CONTRACTOR'S DUTIES IS DEFINED IN CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

4/30/20

| REV | DATE | BRIEF | BY | APPROVED |
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R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

KUNIA IRRIGATION PUMP STATION
PLAN AND SECTION

APPROVED BY



Thu, 14 May 2020 - 2:34pm
J:\3370.02\Engr\Construction Dwgs\M - Pump Station Plan and Section.dwg

## ELECTRICAL SYMBOL LIST / MOUNTING HEIGHT SCHEDULE

| MOUNTING HEIGHT FROM GRADE TO | | (SPECIAL MOUNTING HEIGHTS INDICATED ON PLAN) | | |
|---|---|---|---|---|
| | | SYMBOL | | |
| TOP | ℄ | EXISTING | NEW | DESCRIPTION |
| | | | | RECEPTACLE, DUPLEX, GFCI TYPE, 125V, NEMA TYPE 5-20R |
| | | | | EQUIPMENT TERMINATION WITH FLEXIBLE CONDUIT WHIP |
| | | | J | JUNCTION BOX |
| | | | T | DRY TYPE TRANSFORMER, WALL MOUNTED |
| 6'-0" | | | | PANELBOARD |
| | | | | |
| | | | | CONCRETE ENCASED DUCTLINE, SEE TYPICAL DUCT DETAIL 2/E-4 |
| | | | | EXPOSED RACEWAY, PROVIDE STRAP 8'-0" ON CENTER MAXIMUM |
| | | | A-1,3 | HOMERUN ARROW TO PANELBOARD. LETTER INDICATES PANELBOARD, NUMBERS INDICATES CIRCUITS. |
| | | -e/OH- | | OVERHEAD CONDUCTORS |
| | | | +42" | DENOTES 42" ABOVE FINISHED FLOOR OR GRADE |
| | | | SS | STAINLESS STEEL |
| | | | GFCI | GROUND FAULT CIRCUIT INTERRUPTER |
| | | | HECO | HAWAIIAN ELECTRIC COMPANY |
| | | | WP | WEATHERPROOF |
| | | | | UTILITY POLE |
| | | | | |
| | | | | DENOTES DEMOLITION/REMOVAL |
| | | | M | METER SOCKET |
| | | | | |
| | | | 1 | NOTE INDICATOR |
| | | | 1/E-2 | DETAIL INDICATOR: TOP HALF DENOTES DETAIL NUMBER, BOTTOM HALF DENOTES SHEET NUMBER |

## GENERAL ELECTRICAL NOTES:

1. ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), NATIONAL ELECTRICAL SAFETY CODE, AND ALL LOCAL RULES AND REGULATIONS.
2. THE CONTRACTOR SHALL VISIT THE JOB SITE AND FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS AND THE EXTENT OF REMOVAL, RELOCATION, RECONNECTION AND/OR NEW WORK PRIOR TO BIDDING. BID SUBMISSION SHALL BE CONSIDERED AS EVIDENCE THAT THE CONTRACTOR HAS VISITED THE SITE AND RESOLVED ALL DISCREPANCIES AND QUESTIONS AND NO EXTRA PAYMENT WILL BE AUTHORIZED FOR WORK MADE NECESSARY BY THE CONTRACTOR'S FAILURE TO DO SO.
3. EXISTING DEVICE LOCATIONS, CIRCUIT ASSIGNMENTS, WIRING CONNECTIONS AND CONDUIT RUNS INDICATED WERE DERIVED FROM AVAILABLE REFERENCE DOCUMENTS AND LIMITED FIELD INVESTIGATION. FIELD VERIFY ALL EXISTING CONDITIONS AND MAKE ANY NECESSARY ADJUSTMENTS TO SATISFY THE INTENT OF THE DRAWINGS AND SPECIFICATIONS.
4. ALL CIRCUITS SHALL INCLUDE AN INSULATED GREEN GROUNDING CONDUCTOR, SIZED PER THE NATIONAL ELECTRICAL CODE. THIS CONDUCTOR SHALL BE CARRIED IN ALL RACEWAYS AND SHALL BE ATTACHED TO THE DEVICE OR EQUIPMENT HOUSING USING A SUITABLE GROUNDING LUG.
5. WORK INCIDENTAL TO THE CONTRACT AND NECESSARY TO COMPLETE THE PROJECT, ALTHOUGH NOT SPECIFICALLY REFERRED TO ON THE CONTRACT DOCUMENTS, SHALL BE FURNISHED AND PERFORMED BY THE CONTRACTOR.
6. THE CONTRACTOR AGREES THAT HE SHALL ASSUME 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; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
7. SHOULD PROJECT CONDITIONS REQUIRE REARRANGEMENT OF WORK, THE CONTRACTOR SHALL MARK SUCH CHANGES ON THE AS-BUILT DRAWINGS. IF THESE CHANGES REQUIRE ALTERNATE METHODS TO THOSE SPECIFIED IN THE CONTRACT DRAWINGS, THE CONTRACTOR SHALL SUBMIT DRAWINGS TO REFLECT THE PROPOSED ALTERNATE METHODS TO THE PROJECT MANAGER. THE CONTRACTOR SHALL NOT PROCEED UNTIL APPROVAL IS OBTAINED. REARRANGEMENT OF WORK FOR THE PURPOSE OF COORDINATION SHALL NOT BE CONSIDERED AN ITEM FOR EXTRA COST.
8. MAINTAIN CONTINUITY OF ALL EXISTING CIRCUITS TO AREAS AND SYSTEMS OUTSIDE OF THE PROJECT LIMITS AND THAT PASS THROUGH THE PROJECT LIMITS. PROVIDE NEW JUNCTION BOXES, CONDUITS AND WIRING, AND THE LABOR REQUIRED TO FACILITATE SAID CONTINUITY. BOXES, CONDUITS AND WIRING SHALL BE IN ACCORDANCE WITH THE NEC.
9. EXISTING CONDITIONS: ALL EXISTING DUCTLINES INDICATED ON THE DRAWINGS ARE APPROXIMATE LOCATIONS BASED UPON AVAILABLE "AS-BUILT" DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR TONING THE ROUTES OF THE PROPOSED DUCTLINES TO IDENTIFY ANY POTENTIAL CONFLICTS PRIOR TO EXCAVATION. DAMAGE TO EXISTING UTILITIES CAUSED BY THE CONTRACTOR AS A RESULT OF THE FAILURE TO TONE THE ROUTE PRIOR TO EXCAVATION WORK, WILL REQUIRE THE CONTRACTOR TO REPAIR THE DAMAGE AT NO COST TO THE STATE, TO THE SATISFACTION OF THE PROJECT MANAGER.
10. DO NOT USE A COMMON NEUTRAL FOR MULTIPLE BRANCH CIRCUITS INSTALLED IN A COMMON CONDUIT. PROVIDE A DEDICATED NEUTRAL FOR EACH INDIVIDUAL CIRCUIT. WHERE MULTIPLE DEDICATED NEUTRALS ARE INSTALLED IN A COMMON CONDUIT, PROVIDE COLOR CODING OF EACH NEUTRAL CONDUCTOR IN ACCORDANCE WITH NEC 2008.

| | |
|---|---|
| ENGINEER | MA |
| DRAFTSMAN | OL |
| CHECKED BY | MA |

| REV | DATE | BRIEF | BY | APPROVED |
|---|---|---|---|---|
| | | | | |

R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

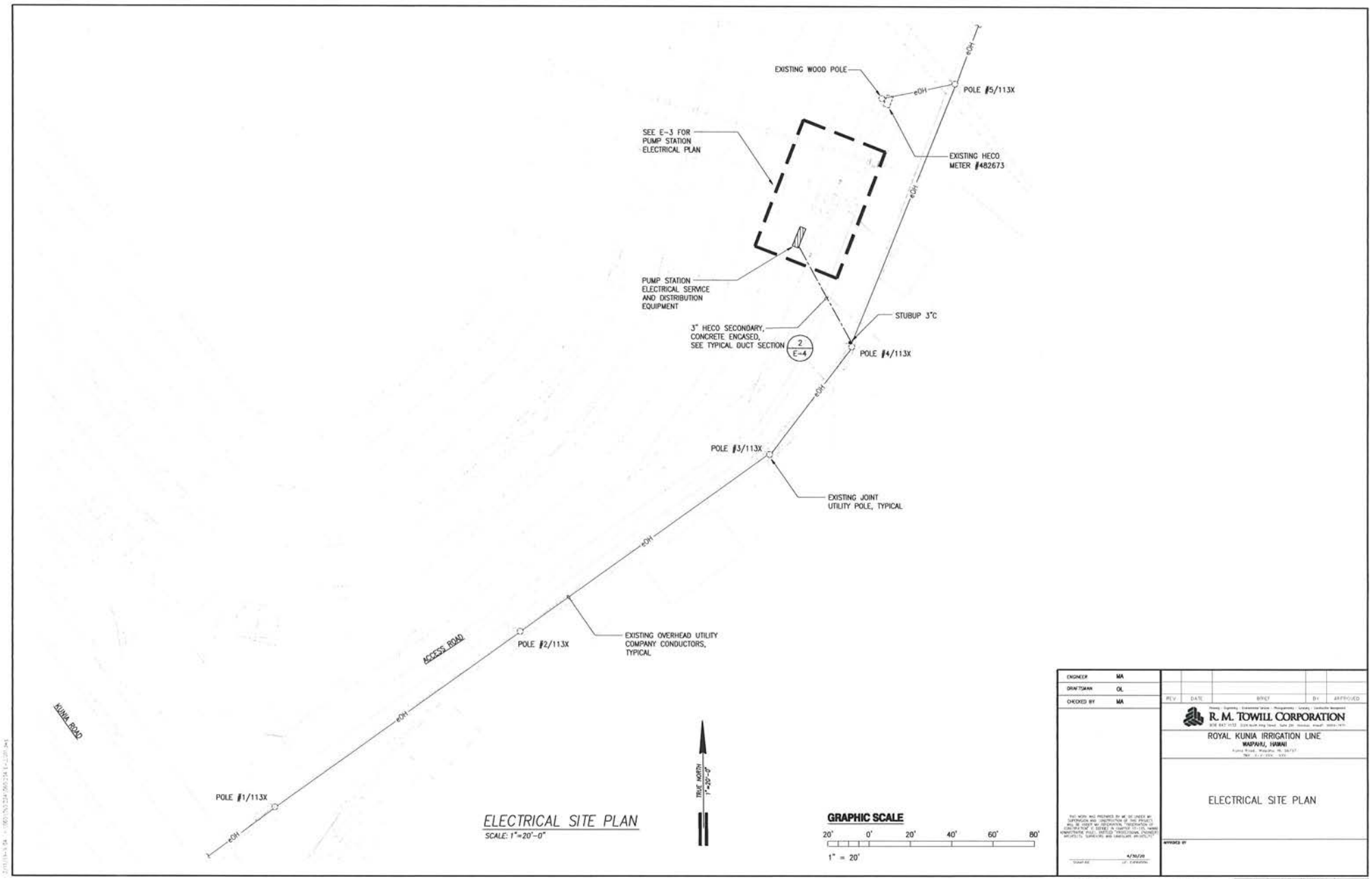
ELECTRICAL SYMBOL LIST,
GENERAL ELECTRICAL NOTES

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. "OBSERVATION OF CONSTRUCTION" IS DEFINED IN CHAPTER 11-15-1, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

4/30/26
DATE OF SIGNATURE

APPROVED BY

SHEET E-1 OF xx SHEETS




## ELECTRICAL SITE PLAN

SCALE: 1"=20'-0"

| | |
|---|---|
| ENGINEER | MA |
| DRAFTSMAN | OL |
| CHECKED BY | MA |

| REV. | DATE | BRIEF | BY | APPROVED |
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ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

ELECTRICAL SITE PLAN

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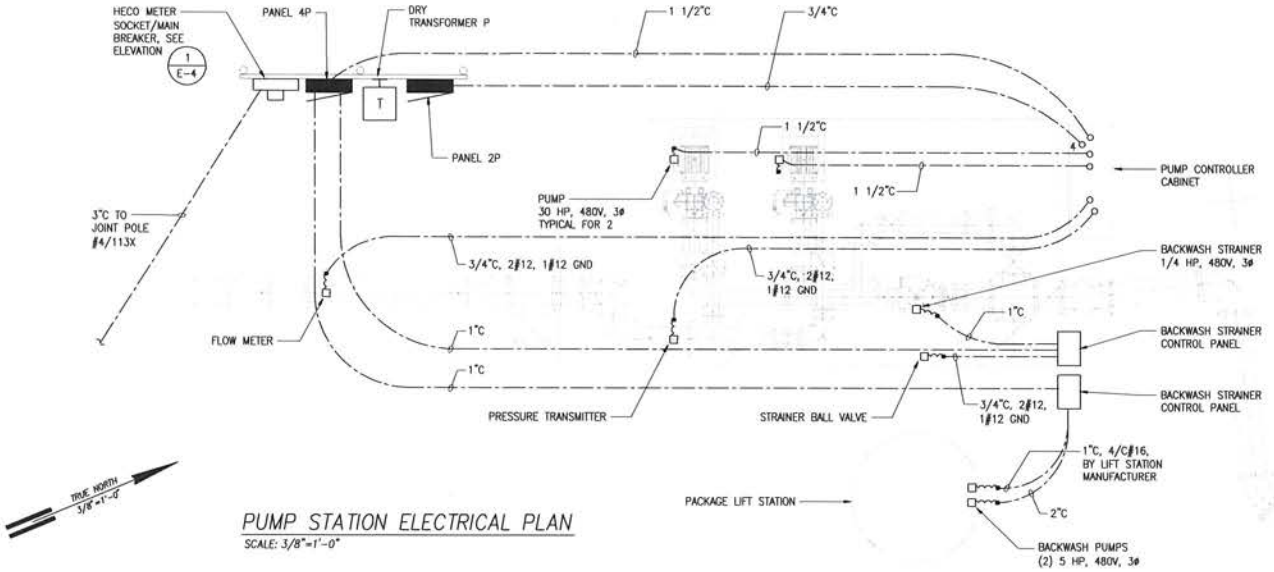
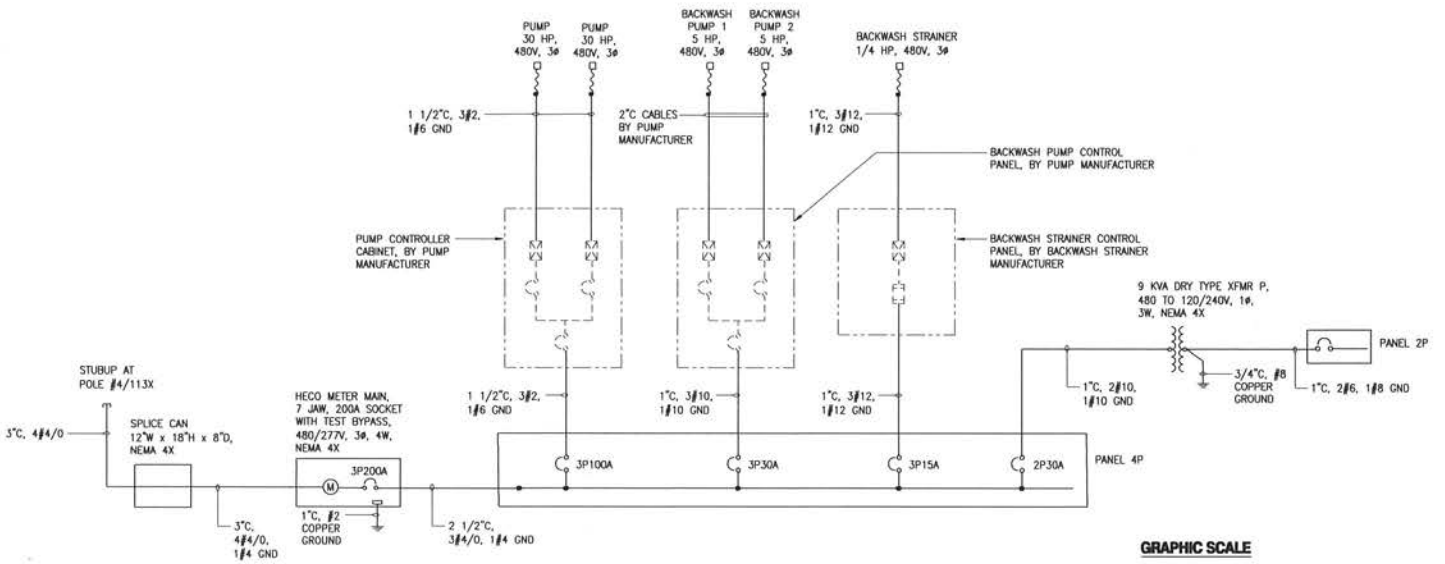
SHEET E-2 OF xx SHEETS




## PUMP STATION ELECTRICAL PLAN

SCALE: 3/8"=1'-0"




## PUMP STATION ONE LINE DIAGRAM

SCALE: NONE

**GRAPHIC SCALE**

1' 0 2' 4' 6' 8' 10' 12'

3/8" = 1'-0"

| | |
|---|---|
| ENGINEER | MA |
| DRAFTSMAN | OL |
| CHECKED BY | MA |

| REV | DATE | BRIEF | BY | APPROVED |
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| | | | | |

R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE

WAIPAHU, HAWAII

PUMP STATION ELECTRICAL PLAN

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND I ACCEPT RESPONSIBILITY FOR THE PROJECT WILL BE UNDER MY DIRECTION TO PERFORMANCE OF CONSTRUCTION. I, EXCEPT AS CHAPTER 16-115, HAWAII ADMINISTRATIVE RULES, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

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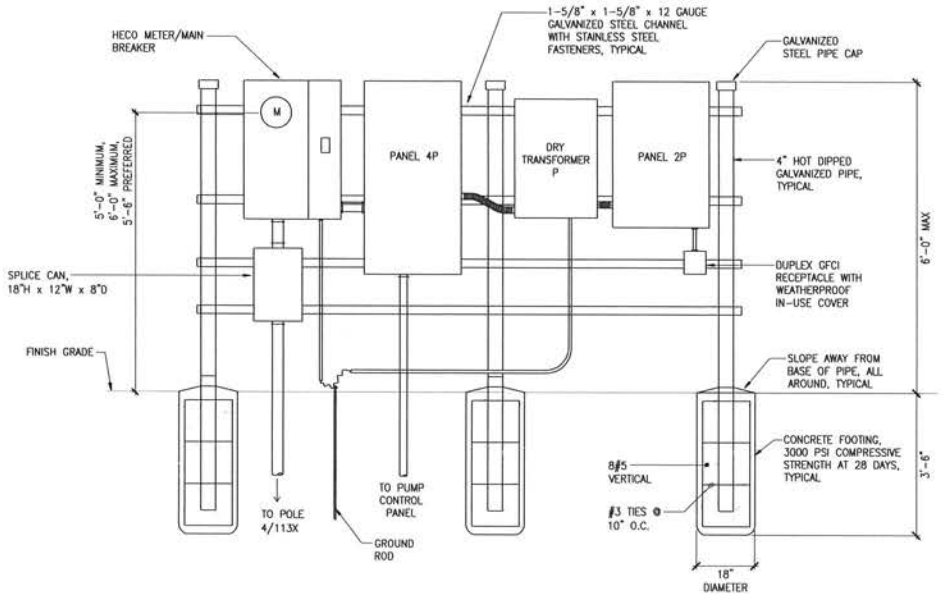
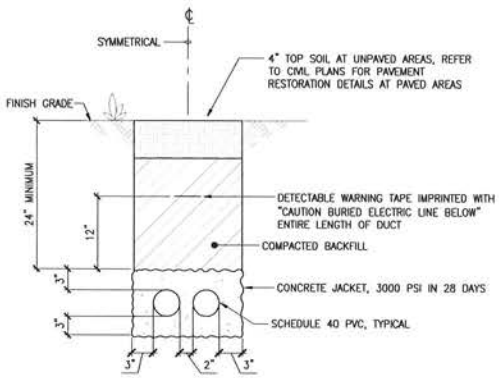



1 / E-4 SERVICE EQUIPMENT ELEVATION

SCALE: NOT TO SCALE




2 / E-4 TYPICAL DUCT DETAIL

SCALE: NOT TO SCALE

**PANEL 4P** — 480/277 VOLTS, 3 PHASE, 4 WIRE; MIN AIC: 14,000; 225 AMP MAIN LUGS; MOUNTING: SURFACE; REQ'D OPTIONS: NEMA 4X, STAINLESS STEEL ENCLOSURE

| WIRE SIZE (AWG) | CKT NO | USE | CKT BKR POLE | CKT BKR AMP | CONNECTED LOAD (KVA) PHASE A | PHASE B | PHASE C | CKT BKR AMP | CKT BKR POLE | USE | CKT NO | WIRE SIZE (AWG) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 1 | | | 100 | 22.0 0.3 | | | | 15 | PFB | 2 | 12 |
| 2 | 3 | PUMP CONTROL PNL | | | | 22.0 0.3 | | | | BACKWASH STRAINER | 4 | 12 |
| 2 | 5 | | 3 | | | | 22.0 0.3 | | 3 | PFB | 6 | 12 |
| 10 | 7 | DRY XFMR P | | 30 | 3.0 4.0 | | | 30 | | PFB | 8 | 10 |
| 10 | 9 | | 2 | | | 3.0 4.0 | | | | BACKWASH PUMPS | 10 | 10 |
| – | 11 | PFB | 1 | – | | | – 4.0 | | 3 | PFB | 12 | 10 |
| – | 13 | PFB | 1 | – | – – | | | | – 1 | PFB | 14 | – |
| – | 15 | PFB | 1 | – | | – – | | | – 1 | PFB | 16 | – |
| – | 17 | PFB | 1 | – | | | – – | | – 1 | PFB | 18 | – |
| | | CONNECTED LOAD/PHASE | | | 29.3 | 29.3 | 26.3 | | | | | |
| | | TOTAL CONNECTED LOAD | | | 84.9 KVA | | | | | | | |
| | | DEMAND FACTOR | | | 0.8 | | | | | | | |
| | | TOTAL DEMAND LOAD | | | 68 KVA= | | 82 AMPS | | | | | |

**PANEL 2P** — 120/240 VOLTS, 1 PHASE, 3 WIRE; MIN AIC: 10,000; 2P50 AMP MAIN BREAKER; MOUNTING: SURFACE; REQ'D OPTIONS: NEMA 4X, STAINLESS STEEL ENCLOSURE

| WIRE SIZE (AWG) | CKT NO | USE | CKT BKR POLE | CKT BKR AMP | CONN LOAD (KVA) PHASE A | PHASE B | CKT BKR AMP | CKT BKR POLE | USE | CKT NO | WIRE SIZE (AWG) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 1 | RECEPTACLE | 1 | 20 | 0.5 – | | – | 1 | PFB | 2 | – |
| 12 | 3 | CONTROL PANEL | 1 | 20 | | 0.5 – | – | 1 | PFB | 4 | – |
| – | 5 | SPARE | 1 | 20 | 0.5 – | | – | 1 | PFB | 6 | – |
| – | 7 | SPARE | 1 | 20 | | 0.5 – | – | 1 | PFB | 8 | – |
| – | 9 | PFB | 1 | – | – – | | – | 1 | PFB | 10 | – |
| – | 11 | PFB | 1 | – | | – – | – | 1 | PFB | 12 | – |
| | | CONNECTED LOAD/PHASE | | | 1.0 | 1.0 | | | | | |
| | | TOTAL CONNECTED LOAD | | | 2.0 KVA | | | | | | |
| | | DEMAND FACTOR | | | 0.8 | | | | | | |
| | | TOTAL DEMAND LOAD | | | 1.6 KVA = | | 7 AMPS | | | | |

| | |
|---|---|
| ENGINEER | MA |
| DRAFTSMAN | OL |
| CHECKED BY | MA |

| REV. | DATE | BRIEF | BY | APPROVED |
|---|---|---|---|---|

R. M. TOWILL CORPORATION

ROYAL KUNIA IRRIGATION LINE
WAIPAHU, HAWAII

EQUIPMENT ELEVATIONS, ELECTRICAL DETAILS AND PANEL SCHEDULES

APPROVED BY

4/30/20

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