State of Hawaii, Department of Health, Clean Water Branch
NPDES Form G
Application for HAR, Chapter 11-55 - NPDES Individual Permit Authorizing Discharges Associated with Construction Activity Dewatering

All sections of this form MUST be completed for National Pollutant Discharge Elimination System (NPDES) Permit compliance.

G.1 – General Information

You are required to fulfill all requirements and check the box below. If you do not check the box, your application will be considered incomplete, and the CWB may deny your request for NPDES permit coverage with prejudice.

☒ *I certify that:*

- *I will design, implement, operate, and maintain a Site-Specific Dewatering Plan to ensure that my discharges associated with construction activity dewatering will not violate HAR, Chapter 11-54; HAR, Chapter 11-55; and HAR, Chapter 11-55, Appendix G.*
- *My Site-Specific Dewatering Plan shall adequately address the minimum items in Attachment D of this form and contain appropriate measures to address Section 303(d) pollutants of concern for my receiving State water.*
- *Prior to any discharge of dewatering effluent, I will provide treatment to remove all pollutants of concern identified in Sections G.6, G.7, G.8, and G.9.*

G.2 –Dewatering Discharge Information

a. *Provide the quantity of discharge based on your proposed method of dewatering for the project* 312,138 *(gallons)*

b. *Provide the rate of discharge based on your proposed method of dewatering for the project* 16,803 *(gpd)*

c. *Check the appropriate box(es) to indicate the frequency of discharge (how often discharge into the receiving State water will occur):*

☐ *Continuous. "Continuous discharge" means a discharge which occurs without interruption throughout the operating hours of the facility, except for infrequent shut-downs for maintenance, process changes, or other similar activities.*

☐ *Emergency.*

☐ *Daily.*

☒ *Intermittent. "Intermittent discharge" means a discharge that is not continuous.*

G.3 –Maps

Attach, title, and identify all maps (pdf - minimum 300 dpi) listed below, in Attachment A. Please reference which maps account for the features listed below.

a. Island on which the activity is located. O'ahu. See **Attachment A, Figure 1, Project Location**.

b. Location(s) of the proposed dewatering activity. See **Attachment A, Figure 1, Project Location**; **Attachment A, Figure 2, Site Layout Plan**; and **Attachment B, Construction Drawings, C-18**.

c. Topographic map or maps which clearly show the legal boundaries of the activity; location of all existing and/or proposed outfalls or discharge points; and receiving State water(s) and receiving storm water drainage system(s), if applicable, identified and labeled.

See **Attachment B, Construction Drawings.**

d. Location(s) where the water quality sample was collected in relation to the proposed dewatering activity. See **Attachment C, Source Water Quality Assessment, Figure 2** and **Attachment A, Figure 2, Site Layout Plan**.

e. Plan and profile of the proposed excavation. **Attachment B, Construction Drawings.**

G.4 – Flow Chart or Line Drawing

Attach or insert in Attachment A, a flow chart showing the following (Check each item, as applicable):

See **Attachment A, Figure 3, Dewatering Flow Chart**.

☒ *a. General route taken by dewatering effluent through the project or activity from intake to the discharge point*

☒ *b. Source water (e.g. ground water, seepage, storm water, etc.) from areas to be dewatered*

☒ *c. Treatment systems that will be utilized*

☒ *d. Estimated quantity of flow through each applicable route from upslope to the receiving State water*

☐ *e. Drainage system(s) receiving dewatering effluent, as applicable (e.g., City and County of Honolulu Municipal Separate Storm Sewer System (MS4), etc.)*

☒ *f. State water name(s) receiving dewatering effluent*

Indicate which item(s) are not identified and explain why the item(s) are not identified
No drainage system will receive dewatering effluent

G.5 - Existing or Pending Permits, Licenses, or Approvals

Place a check next to all applicable Federal, State, or County permits, Licenses, or approvals for the project and specify the permit number.

☒ *Other NPDES Permit or NGPC File No.:* NPDES Forms C (Construction Storm Water) and NPDES Forms F (Hydrotesting Activities)

☒ *Department of the Army Permit (Section 404):* POH-2005-00342 (April 4, 2019)

If your project requires work in, above, under or adjacent to State waters, please contact the Army Corps of Engineers (COE) Regulatory Branch at (808) 438-9258 regarding their permitting requirements. Provide a copy of the COE permitting jurisdictional determination (JD) or the JD with COE Person's Name, Phone Number, and Date Contacted.

☐ *Facility on SARA 313 List (identify SARA 313 chemicals on project site:* _____

☐ *RCRA Permit (Hazardous Wastes):* _____

☐ *Section 401 Water Quality Certification:* The project is exempted from obtaining a Section 401 Water Quality Certification (WQC), as provided by Senate Bill 1016 SD1 HD1 (expires June 30, 2022).

☒ *Other (Specify):* Special Management Permit (Resolution 278-CD1); U. S. Coast Guard Clearance (obtained); Section 106, National Historic Preservation Act, Consultation (completed); Section 7, Endangered Species Act, Consultation (completed); Section 4(f) Department of Transportation Act, Consultation (completed); Stream Channel Alteration Permit (exempt per Senate Bill 1016 SD1 HD1); HDOT Plan Review (pending); Grading Permit (pending); Coastal Zone Management Federal Consistency Review (pending)

G.6 – Activity Description

a. Describe the construction activity. The existing Kaipapaʻu Stream Bridge is deficient due to age and dilapidation, and requires demolition and replacement. The project area required for construction would be approximately 1.6 acres. The project's scope of work includes installation of erosion controls, clearing, grubbing, grading, temporary placement of sand bags to redirect the stream during construction relocation and installation of waterlines and electrical lines, construction and use of a temporary detour roadway and Acrow bridge, demolition of the existing bridge and construction of a new bridge, partial demolition and reconstruction of the abutments, removal of the existing center pier wall, excavation & construction of eight new drilled shafts outside the stream channel, maintenance dredging, and bank stabilization with shotcrete and dumped rip-rap. All excavated material (soils & dewatering effluent) will be placed in a temporary retention area for treatment and disposal. No excavated material will discharge to the stream.

The replacement of the Kaipapaʻu Stream Bridge and maintenance work will be completed through phased construction and demolition. Silt fences will be installed on down slope portions of the project site. A staging area, temporary dewatering basin, temporary concrete wash-out basin, and stabilized construction entrances will be prepared.

Sandbags will be used to divert normal-stream flow around the work area. The temporary placement of sandbags to redirect the stream during construction of the temporary detour road (sandbag diversion approximately 610 feet long) and new bridge (sandbag diversion

approximately 600 feet long) and will be designed based on the Contractor's means and methods. It is assumed that 7 sandbags (1-foot-wide each) will be placed at the base (4 sandbags on the side of the channel closer to the work area, and 3 sandbags on the other side of the temporary channel). Placement of the temporary sandbag diversion will require approximately 25 cubic yards (CY) of temporary fill placed within the Mean Higher High Water (MHHW) and 5 CY of temporary fill placed within the Ordinary High Water Mark (OHWM).

A temporary construction entrance ramp will be constructed on the mauka and makai portions of the stream comprised of dumped rip-rap. There will be no interruption of stream flow. In-stream work will be completed during the low rainfall season (August to October), and during fair weather conditions.

Approximately 270 CY of maintenance dredging will be performed to remove accumulated sediment and debris from under and around the bridge partially within the MHHW. Approximately 5 CY is located within the MHHW of Kaipapaʻu Stream. The excavated spoils and demolition debris will not be discharged into the stream. Spoils will be dewatered in a detention basin and dried debris will be disposed of off-site at a County-approved landfill. Removed material will be contained in a temporary stockpile site with implemented best management practices (BMPs) to contain and prevent material from comingling with storm water runoff and entering into State waters. A solid waste disclosure form will be submitted to the Department of Health (DOH) Solid Waste Branch.

The temporary Acrow bridge will be 90 feet long by 42 feet wide, or approximately 3,780 square feet, and constructed with pre-cast concrete pier columns supporting the steel deck. The bridge will be comprised of two lanes and a pedestrian walkway on the makai side of the Kaipapaʻu Stream Bridge to mitigate traffic impacts during construction. The Acrow bridge will be constructed and installed in two 45-foot spans and supported by five pre-cast concrete piers, one of which is located within the MHHW. Placement of the one pier in the MHHW will require 1 CY of temporary fill below the MHHW. Temporary dumped rip-rap will be placed around the Acrow bridge pier within the MHHW and be sized approximately 54 feet long by 15 feet wide by 2 feet deep, or 810 square feet, with a volume of 50 CY. A 6-foot temporary layer of filter rock will be placed under the rip-rap with a volume of approximately 13 CY. Upon completion of the bridge replacement, the Acrow bridge and piers will be removed and disturbed areas restored to their pre-construction condition.

Demolition of the existing Kaipapaʻu Stream Bridge will include the removal of the existing concrete center pier wall, of which approximately 5 CY is located within the MHHW(26 feet long by 4 feet wide or approximately 104 square feet).

The new replacement bridge will be 110 feet long by 57 feet wide, or approximately 6,270 square feet, and include two 12-foot travel lanes plus two 8.5-foot shoulders, two 5-foot pedestrian walkways/bicycle lanes, reinforced guardrails, and drainage features. The new bridge will be constructed using prestressed concrete planks and cast-in-place bridge decks. The new right-of-way (ROW) will be 66 feet wide. The project will involve partial demolition and reconstruction of the abutments requiring excavation and construction of eight new 4-foot drilled shafts outside of the OHWM and MHHW. All work proposed for the reconstruction of the Kaipapaʻu Stream Bridge would be completed above and along the outer banks of the streams and no work is proposed within the stream. The new bridge would accommodate utilities currently attached to the existing bridge. No debris would be allowed to fall into or enter the stream.

The north bank makai of the bridge will be stabilized with dumped rip-rap outside of the MHHW. In addition to stabilization, the dumped rip-rap will provide construction access to the stream for mechanical equipment.

A section of the existing wall running along the northern bank mauka of the bridge collapsed during a major storm in 2008. Emergency repairs were conducted to create a wall of sandbags. The existing sandbag wall, located outside the OHWM, will be stabilized with the placement of basalt boulders at the toe of the sandbags. The existing sandbags will then be covered with shotcrete. Work for the stabilization of the wall will be performed above the OHWM. No debris would be allowed to fall into or enter the stream.

Portions of an existing 12-inch diameter waterline beneath Kaipapaʻu Stream will be repaired. The portions of the 12-inch waterline to be replaced are located outside the stream (see **Attachment B, Construction Drawings, C-20, C-28**) and will be repaired via open trench (approximately 85 linear feet). The existing 12-inch waterline under the stream will be temporarily removed from service during the repairs and then reconnected and placed back into service following completion of the 12-inch waterline work. During repairs a temporary 12-inch 125-foot-long or 125 square foot waterline will be placed on the existing pedestrian bridge.

The replacement of an existing 16-inch diameter will require the removal of the existing waterline, placement of a temporary waterline, and installation of the new 16-inch diameter waterline over the stream. The temporary 16-inch diameter 250-foot-long or 333 square foot waterline will be placed on the temporary detour bridge during construction. The new permanent 16-inch diameter 155 feet long or 207 square feet waterline will be installed over the stream within the new bridge 3.2-foot-wide concrete bridge

encasement. Following the installation of the 16-inch permanent waterline the temporary waterline will be removed.

Above the MHHW and OHWM, the project will also include the reconstruction of the 6-foot-high concrete wall with wood fence panels on the northern side of the bridge, replacement of fencing, acquisition of two properties (Tax Map Keys (TMKs) 5-4-18: 3 and 5-4-11: 20), removal of an existing septic system and leaching field on TMK: 5-4-11: 20, and demolition of two buildings on TMK 5-4-18: 3 and one building on TMK 5-4-11: 20. Acquisition of property and demolition of structures is required for construction access and for the installation of waterlines to be supported on the outside edges of the new bridge.

In-water work would only be required for the minor maintenance dredging, removal of the existing bridge center pier wall, temporary placement of sandbags to divert the steam around the open work area, and temporary placement of one Acrow bridge pier within Kaipapaʻu Stream.

The sequencing of construction activity is as follows:

- Install best management practices (BMPs)/erosion control measures (see **Attachment B, Construction Drawings, Sheet C-18** and **C-27**).
- Install temporary 12" water line and relocate existing 12" water line (see **Attachment B, Construction Drawings, Sheets C-20, C-28,** and **C-29**).
- Relocate electrical utilities.
- Construct trial and load test drilled shafts and perform load test.
- Construct detour roadway and temporary Acrow bridge (see **Attachment B, Construction Drawings, Sheets C-22**, and **C-27**).
- Demolish existing Kaipapaʻu Stream Bridge. Expose existing 16" water line jacket and concrete support system.
- Construct Phase 1 of new Kaipapaʻu Stream Bridge (see **Attachment B, Construction Drawings, Sheets S0.7, S0.7A,** and **S0.7B**).
- Partially remove detour roadway and temporary bridge. Construct temporary pavement transitions, signing and pavement markings.
- Construct Phase 2 of new Kaipapaʻu Stream Bridge (see **Attachment B, Construction Drawings, Sheets S0.8, S0.8A,** and **S0.8B**).
- Remove remainder of detour roadway and temporary bridge.
- Construct sandbags and shotcrete lining along north bank above stream, upstream of Kaipapaʻu Stream Bridge (see **Attachment B, Construction Drawings, Sheet C-18**).
- Construct dumped riprap along north and south bank above stream, downstream of Kaipapaʻu Stream Bridge (see **Attachment B, Construction Drawings, Sheets C-16** and **C-18**).

- Construct AC pavement (see **Attachment B, Construction Drawings, Sheet C-16**).
- Construct final signing and pavement markings.
- Remove temporary BMPs.

b. *Check one of the boxes below to indicate if the construction activity requires NPDES permit coverage for discharges of storm water associated with construction activities.*

☐ *Yes, my construction activity has a total land disturbance of one (1) acre or more. My NPDES Permit or NGPC File No. is included in G.5 above.*

☒ *Yes, my construction activity has a total land disturbance of one (1) acre or more. I will submit an NPDES permit application to the CWB.*

☐ *No, my construction activity disturbs less than one (1) acre. I will utilize BMPs at the construction site to prevent pollution to State waters.*

c. *Describe the portion of the project that involves construction dewatering* Dewatering activities will be required for the installation of the eight 4-foot drilled shafts and piles for the bridge abutments. See **Attachment A, Figure 2, Site Layout Plan**; and **Attachment B, Construction Drawings, Sheets C-18** and **C-20.**

d. *Provide the estimated date when construction will begin.* The estimated scheduled start time for construction is January 2021. The overall duration of the project is expected to be approximately three years. A detailed schedule of construction activity will be completed when a contractor is selected for the project and provided to DOH-CWB 30 days prior to the start of construction.

e. *Provide the estimated date when construction will end.* To be determined by the General Contractor, dates will be submitted to DOH CWB 30 days before the start of construction.

f. *Provide the estimated date when dewatering activities will begin.* To be determined by the General Contractor, dates will be submitted to DOH CWB 30 days before the start of construction.

g. *Provide the estimated date when dewatering activities will end.* To be determined by the General Contractor, dates will be submitted to DOH CWB 30 days before the start of construction.

h. *Describe the time frame of when the proposed dewatering discharges will take place during the work day (work hours, overnight, 24 hours a day, etc.).* Dewatering activities will be intermittent according to the construction phasing. Dewatering activities is expected to occur only during normal working hours.

i. *Describe the history of land use at the proposed construction site and surrounding area. The history of land use shall include the facilities and/or activities that have occurred in the past. Make note of any known or possible contamination that may have taken place at the proposed construction site or in the surrounding area. Include any completed or on-going corrective measures that have been implemented to remediate the contaminated area(s)* The project is located along Kamehameha Highway (State Route 83) near

Milepost 21 in the Hauʻula, Island of Oʻahu, Hawaiʻi, and includes replacing the existing 1932 Kaipapaʻu Stream Bridge with a new bridge and maintenance dredging and bank stabilization of the Kaipapaʻu Stream. The bridge serves northbound traffic (toward Kahuku) and southbound traffic (toward Kaneʻohe) on Kamehameha Highway. The bridge structure has two 40-foot spans and is constructed from reinforced concrete with a wooden pedestrian walkway attached to the mauka (west) side of the bridge. The bridge crosses Kaipapaʻu Stream approximately 300 feet upstream from coastal marine waters. Beneath and makai of the Kaipapaʻu Stream Bridge the stream is tidally influenced. Lands surrounding the bridge are single family residential and commercial in character and are privately owned. Parcels immediately surrounding Kaipapaʻu Stream Bridge are single family residential.

j. *Describe the potential pollutant(s) that may be present and its source(s) at the proposed construction site and surrounding area. If any known or possible contamination that has taken place at the proposed construction site or in the surrounding area has not been remediated, the pollutant(s) and its source(s) should be included in this item. This item should address the pollutant(s) and source(s) associated with the past or existing conditions at the construction site and surrounding areas, not those associated with the proposed construction activity .* There are no pre-existing conditions other than soils that would result in potential for adverse impacts due to construction storm water runoff. The following practices will be employed to prevent discharges due to erosion: (1) adherence to the County-approved Erosion Control Plan; and (2) structural measures including the use of temporary BMPs shall be placed to divert storm flows around materials storage locations. PVC sheet plastic or similar material shall also be placed to prevent inadvertent mixing of stored materials with storm water. Where mixing of storm water with soils cannot be avoided use of silt fencing and/or vegetative controls including grassing and hydro-mulching will be employed.

G.7 – Physical Source Water Quality

a. *Provide the source of the construction activity dewatering effluent (i.e.* ground water, seepage, storm water, etc.. Groundwater

b. *Place an "x" in either the "Believe Present" column or the "Believe Absent" column based on the test results or your best estimate.*

Parameter	*Believe Present*	*Believe Absent*
Floating Debris		X
Scum or Foam		X
Color		X
Odor		X

List the Discharge Point(s) that you identified in Section 6 of the e-Permitting CWB Individual NPDES Form that apply to this table Discharge Point No. 1 (From), Kaipapaʻu Stream (21.61717846380141, -157.9142857880188); and

Discharge Point No. 2 (To), Kaipapaʻu Stream (21.617151034652878, -157.91334701486358) (See **Attachment A, Figure 2, Site Layout Plan**).

Please ensure that all Discharge Points are accounted for. If you leave this item blank, we will assume that this table applies to all Discharge Points. If needed, you may copy, paste, and complete this table for each Discharge Point with different test results.

G.8 – Water Quality Parameters

a. You are required to fulfill all requirements and check the box below. If you do not check the box, your application will be considered incomplete, and the CWB may deny your request for NPDES permit coverage with prejudice.

See **Attachment C, Source Water Quality Assessment.**

☒ *I certify that:*

- *I tested all of the parameters in the Table G.8 below, and a copy of the laboratory data sheets with Quality Assurance/Quality Control and Chain of Custody documents is included in Attachment B. I am reporting the results of my test in Table G.8 below.*
- *I have included a description of my sample collection technique in Attachment B.*
- *All test results were obtained from a representative sample as defined in HAR, Chapter 11-55, Appendix A, Section 14(a). Note: The burden of proving that sampling or monitoring is representative is on the Permittee.*
- *The test methods that I utilized were promulgated in 40 CFR Part 136 and, when applicable, listed in the references of chemical methodology for seawater analyses (see HAR, Chapter 11-54, Section 10(b)). Note: If a test method has not been promulgated for a particular parameter, you may apply for approval of an alternate test procedure by following 40 CFR Section 136.4.*
- *The test methods that I utilized have detection limits below and closest to the numerical limit specified in HAR, Chapter 11-54. For situations where the numerical limitation is below the detection limit of the test methods, I used the test method which has the detection limit closest to the numerical limitation.*

b. Complete Table G.8 below. The test results shall be reported to the nearest decimal place or whole number as shown in the parentheses following each parameter. For example, "Temperature (0.1 °C)" -Temperature shall be reported to the nearest tenth of a centigrade and "Ammonia Nitrogen (1 µg/l)" - Ammonia Nitrogen shall be reported to the nearest whole microgram per liter. One test result may be reported for Salinity, Chloride, or Conductivity. If the test result is not detectable, indicate that the test result is "N.D." or "not detected."

Table G.8

Parameter	*Test Result*	*Units*
Total Nitrogen (10 µg/l)	710	*µg/l*
Ammonia Nitrogen (1 µg/l)	N.D.	*µg/l*
Nitrate + Nitrite (1 µg/l)	540	*µg/l*
Total Phosphorus (10 µg/l)	28	*µg/l*
Turbidity (0.1 NTU)	0.42	*NTU*
Total Suspended Solids (1 mg/l)	0.6	*mg/l*
pH (0.1 standard units)	6.74	*standard units*
Dissolved Oxygen (0.1 mg/l)	3.54	*mg/l*
Oxygen Saturation (1%)	62	*%*
Temperature (0.1 ^{o}C)	24.7	*^{o}C*
Salinity (0.1 ppt)	N.D.	*ppt*
*or Chloride (0.1 mg/l)**	N/A	*mg/l*
*or Conductivity (1 µmhos/cm)**	357	*µmhos/cm*
Oil and Grease (1 mg/l)	N.D.	*mg/l*

* *Fresh waters and effluent samples*

List the Discharge Point(s) that you identified in Section 6 of the e-Permitting CWB Individual NPDES Form that apply to Table G.8 Discharge Point No. 1 (From), Kaipapa‘u Stream (21.61717846380141, -157.9142857880188); and Discharge Point No. 2 (To), Kaipapa‘u Stream (21.617151034652878, -157.91334701486358) (See **Attachment A, Figure 2, Site Layout Plan**).
Please ensure that all Discharge Points are accounted for. If you leave this item blank, we will assume Table G.8 applies to all Discharge Points. If needed, you may copy, paste, and complete Table G.8 for each Discharge Point with different test results.

G.9 – Toxic Parameters

a. *You are required to fulfill all requirements and check the box below. If you do not check the box, your application will be considered incomplete, and the CWB may deny your request for NPDES permit coverage with prejudice.*

See **Attachment C, Source Water Quality Assessment.**

☒ *I certify that:*

- *I tested and I am reporting (in micrograms per liter) all of the parameters which are believed to be present in the construction dewatering effluent in Tables G.9.a to G.9.h below. Note: Everything identified in G.6.g. and G.6.h. shall be included.*
- *For all test results that were not detectable, I indicated "N.D." or "not detected" in the "Test Result" column of Tables G.9.a to G.9.h.*

- *For all parameters not believed to be present, I indicated "N/A" for "not applicable" in the "Test Result" column of Tables G.9.a to G.9.h.*
- *If the "Test Result" columns of Tables G.9.a to G.9.h are left blank, the CWB will consider these parameters to be present. The NPDES permit will require all of these parameters to be monitored.*
- *A copy of the laboratory data sheets with Quality Assurance/Quality Control and Chain of Custody documents, are included in Attachment B.*
- *All test results were obtained from a representative sample as defined in HAR, Chapter 11-55, Appendix A, Section 14(a). Note: The burden of proving that sampling or monitoring is representative is on the Permittee.*
- *The test methods that I utilized were promulgated in 40 CFR Part 136 and, when applicable, listed in the references of chemical methodology for seawater analyses (see HAR, Chapter 11-54, Section 10(b)). Note: If a test method has not been promulgated for a particular parameter, you may apply for approval of an alternate test procedure by following 40 CFR Section 136.4.*
- *The test methods that I utilized have detection limits below and closest to the numerical limit specified in HAR, Chapter 11-54. For situations where the numerical limitation is below the detection limit of the test methods, I used the test method which has the detection limit closest to the numerical limitation.*

b. *Complete Tables G.9.a to G.9.h below. The parameters are categorized into Metals, Organonitrogen Compounds, Pesticides, Phenols, Phthalates, Polynuclear Aromatic Hydrocarbons, Volatile Organics, and Others and are listed alphabetically. A Glossary of Chemicals is listed in Attachment C.*

List the Discharge Point(s) that you identified in Section 6 of the e-Permitting CWB Individual NPDES Form that apply to Tables G.9.a to G.9.h Discharge Point No. 1 (From), Kaipapa‘u Stream (21.61717846380141, -157.9142857880188); and Discharge Point No. 2 (To), Kaipapa‘u Stream (21.617151034652878, -157.91334701486358) (See **Attachment A, Figure 2, Site Layout Plan**).

Please ensure that all Discharge Points are accounted for. If you leave this item blank, we will assume Tables G.9.a to G.9.h applies to all Discharge Points. If needed, you may copy, paste, and complete Tables G.9.a to G.9.h for each Discharge Point with different test results.

Table G.9.a - Metals

Total Recoverable Metal Parameter	*Test Result*	*Units*
Aluminum	N/A	*µg/l*
Antimony	N/A	*µg/l*
Arsenic	N/A	*µg/l*
Beryllium	N/A	*µg/l*
Cadmium	N/A	*µg/l*
Chromium (VI)	N/A	*µg/l*
Copper	N/A	*µg/l*
Lead	N/A	*µg/l*
Mercury	N/A	*µg/l*
Nickel	N/A	*µg/l*
Selenium	N/A	*µg/l*
Silver	N/A	*µg/l*
Thallium	N/A	*µg/l*
Tributyltin	N/A	*µg/l*
Zinc	N/A	*µg/l*

Table G.9.b. - Organonitrogen Compounds

Organonitrogen Compound Parameter	*Test Result*	*Units*
Benzidine	N/A	*µg/l*
2,4-Dinitro-o-cresol	N/A	*µg/l*
Dinitrotoluenes	N/A	*µg/l*
1,2-Diphenylhydrazine	N/A	*µg/l*
Nitrobenzene	N/A	*µg/l*
Nitrosamines	N/A	*µg/l*
N-Nitrosodibutylamine	N/A	*µg/l*
N-Nitrosodiethylamine	N/A	*µg/l*
N-Nitrosodimethylamine	N/A	*µg/l*
N-Nitrosodiphenylamine	N/A	*µg/l*
N-Nitrosopyrrolidine	N/A	*µg/l*

Table G.9.c. - Pesticides

Pesticide Parameter	*Test Result*	*Units*
Aldrin	N.D.	*µg/l*
Chlordane	N/A	*µg/l*
Chlorpyrifos	N/A	*µg/l*
DDT	N.D.	*µg/l*
Demeton	N/A	*µg/l*
Dieldrin	N.D.	*µg/l*
Endosulfan	N.D.	*µg/l*
Endrin	N.D.	*µg/l*
Guthion	N/A	*µg/l*
Heptachlor	N.D.	*µg/l*
Lindane	N/A	*µg/l*
Malathion	N/A	*µg/l*
Methoxychlor	N.D.	*µg/l*
Mirex	N/A	*µg/l*
Parathion	N/A	*µg/l*
TDE - metabolite of DDT	N/A	*µg/l*
Toxaphene	N.D.	*µg/l*

Table G.9.d. - Phenols

Phenol Parameter	*Test Result*	*Units*
2-Chlorophenol	N/A	*µg/l*
2,4-Dichlorophenol	N/A	*µg/l*
2,4-Dimethylphenol	N/A	*µg/l*
Nitrophenols	N/A	*µg/l*
Pentachlorophenol	N/A	*µg/l*
Phenol	N/A	*µg/l*
2,3,5,6-Tetrachlorophenol	N/A	*µg/l*
2,4,6-Trichlorophenol	N/A	*µg/l*

Table G.9.e. - Phthalates

Phthalate Parameter	*Test Result*	*Units*
Bis (2-ethylhexyl) phthalate	N/A	*µg/l*
Dibutyl phthalate (esters)	N/A	*µg/l*
Diethyl phthalate (esters)	N/A	*µg/l*
Dimethyl phthalate (esters)	N/A	*µg/l*

Table G.9.f. - Polynuclear Aromatic Hydrocarbons

Polynuclear Aromatic Hydrocarbon Parameter	*Test Result*	*Units*
Acenaphthene	N.D.	*µg/l*
Fluoranthene	N.D.	*µg/l*
Naphthalene	N.D.	*µg/l*
Polynuclear aromatic hydrocarbons	N.D.	*µg/l*

Table G.9.g. - Volatile Organics

Volatile Organic Parameter	*Test Result*	*Units*
Acrolein	N.D.	*µg/l*
Acrylonitrile	N.D.	*µg/l*
Benzene	N.D.	*µg/l*
Carbon tetrachloride	N.D.	*µg/l*
Bis(2-chloroethyl)ether	N/A	*µg/l*
Bis(chloroethers-methyl)	N/A	*µg/l*
Bis(chloroisopropyl)ether	N/A	*µg/l*
Chloroform	N.D.	*µg/l*
Dichlorobenzenes	N.D.	*µg/l*

Volatile Organic Parameter	*Test Result*	*Units*
Dichlorobenzidine	N/A	*µg/l*
1,2-Dichloroethane	N.D.	*µg/l*
1,1-Dichloroethylene	N/A	*µg/l*
Dichloropropanes	N.D.	*µg/l*
1,3-Dichloropropene	N.D.	*µg/l*
Ethylbenzene	N.D.	*µg/l*
Hexachlorobenzene	N/A	*µg/l*
Hexachlorobutadiene	N/A	*µg/l*
Hexachlorocyclohexane, alpha	N/A	*µg/l*
Hexachlorocyclohexane, beta	N/A	*µg/l*
Hexachlorocyclohexane, technical	N/A	*µg/l*
Hexachlorocyclopentadiene	N/A	*µg/l*
Hexachloroethane	N/A	*µg/l*
Isophorone	N/A	*µg/l*
Pentachlorobenzene	N/A	*µg/l*
Pentachloroethanes	N/A	*µg/l*
1,2,4,5-Tetrachlorobenzene	N/A	*µg/l*
1,1,2,2-Tetrachloroethane	N.D.	*µg/l*
Tetrachloroethanes	N.D.	*µg/l*
Tetrachloroethylene	N/A	*µg/l*
Toluene	N.D.	*µg/l*
1,1,1-Trichloroethane	N.D.	*µg/l*
1,1,2-Trichloroethane	N.D.	*µg/l*
Trichloroethylene	N/A	*µg/l*
Vinyl chloride	N.D.	*µg/l*

Table G.9.h. - Others

Other Parameter	*Test Result*	*Units*
Chlorine	N/A	*µg/l*
Cyanide	N/A	*µg/l*
Dioxin	N/A	*µg/l*
Polychlorinated biphenyls	N/A	*µg/l*

G.10 – Site-Specific Dewatering Plan

You are responsible for the design, implementation, operation, and maintenance of the Site-Specific Dewatering Plan to ensure that discharges associated with construction activity dewatering will not cause or contribute to a violation of HAR, Chapter 11-54, Chapter 11-55, and Chapter 11-55 Appendix G.

Are you submitting the Site-Specific Dewatering Plan with your NPDES application?

☐ *Yes. My Site-Specific Dewatering Plan complies with Section G.1 and the minimum requirements in Attachment D. It is included in Attachment D*

☒ *No. My Site-Specific Dewatering Plan will comply with Section G.1 and the minimum requirements in Attachment D.* ***If you do not submit the Site-Specific Dewatering BMPs Plan with your NPDES application, you acknowledge that:***

- *The CWB may not provide comments on information in Section G.10.*
- *You are required to submit Section G.10 to the DOH-CWB for comment at least 30 calendar days prior to starting dewatering activities. All questions/concerns that the DOH may have must be answered to the satisfaction of the CWB.*
- *The CWB will review Section G.10 in the order received and will not expedite the review to accommodate your schedule.*
- *The CWB has no required time limits to review any Site-Specific Dewatering Plan after issuance of an NPDES Permit.*
- *You are potentially exposing yourself to significant delays.*

G.11 – Additional Information

Include any other site-specific information pertaining to the project or activity in Attachment E. If nothing is included in Attachment E, the CWB will assume you do not want to include additional information.

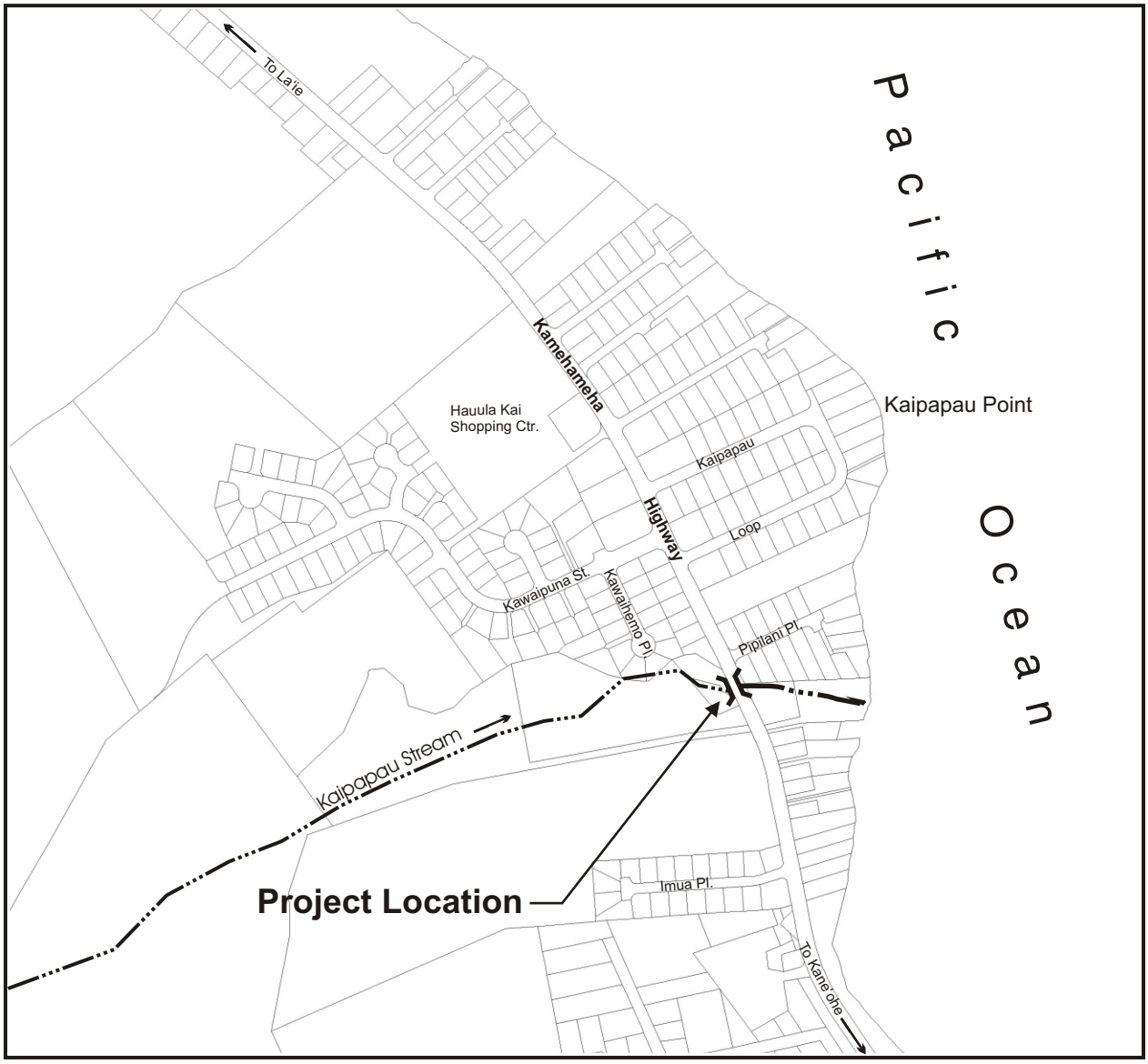
Attachment A – Maps and Flow Chart (Sections G.3 and G.4)

MAPS AND FLOW CHART

Attachment A- Contents
Figure 1 – Project Location
Figure 2 – Site Layout Plan
Figure 3 – Dewatering Flow Chart

Attachment A, Figure 1

Project Location (Item G.3.)



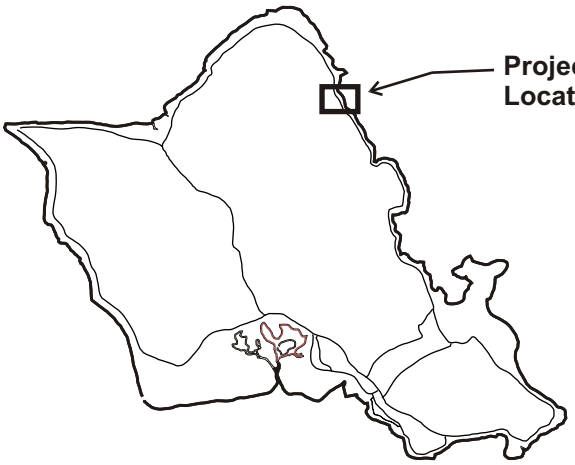


FIGURE 1
PROJECT LOCATION
Kaipapa‘u Stream Bridge Replacement
Ko‘olauloa District, O‘ahu, Hawai‘i

0 1000 Feet 2000

R. M. TOWILL CORPORATION Nov 2009

Attachment A, Figure 2

Site Layout Plan (Items G.3., G.6., G.7., G.8., & G.9.)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2020	19	149

Discharge Point No. 1 (From)
Kaipapa'u Stream
Class 2 Inland Waters
Latitude 21.61717846380141
Longitude -157.9142857880188

Benchmark
Sta. "BRIDGE"
1/2" PIPE
℄ Sta.1247+19.86
O/S 17.85' Rt.
191.89 S
2885.48 E
Elev=10.24 MSL

Concrete Washout Basin (5'x5'x5') See det., sht. C-35

Construction parcel

Temporary sand bags See det., sht. C-35

New Easement

Kaipapau Stream

Limit of Grading

True North 1"=20'

Stabilized entry/exit 12" min. thickness, #2 crushed rock, typ. See det., sht. C-35

Temp. stream diversion Grade as req'd. to drain and provide 0.5% min. slope

Limit of Grading

New R/W

8' High Dust Fence

Compost filter sock See det,. sht. C-35

Match exist. pav't. and provide smooth riding conn. See det., sht. C-37

To Kaneohe

To Kahuku

℄ KAMEHAMEHA HWY.

Abut. No. 1

Abut. No. 2

Match exist. pav't. and provide smooth riding conn. See det., sht. C-37

Compost filter sock See det,. sht. C-35

New R/W

New Easement

Limit of Grading

Approx. location of human burial (SIHP-4796). See Section 106 of the National Historic Preservation ACT Notes

Match exist. conc. pav't. and provide smooth conn.

New Utility Easement

Piipiani Pl. (Private)

Match exist. ac pav't. and provide smooth conn. See det., sht. C-37

Construction parcel

8' High Dust Fence

Compost filter sock See det,. sht. C-35

12' High Dust Fence

New R/W

New Easement

Discharge Point No. 2 (To)
Kaipapa'u Stream
Class 2 Inland Waters
Latitude 21.617151034652878
Longitude -157.91334701486358

Temp. Dewatering Basin (20'x15'x8')

Legend

- Discharge Point
- Location of Dewatering Basin
- Discharge Flow
- Anticipated Dewatering Locations

Legend:

- Project Limits
- Exist. Ground Contour
- Finished Grade Contour
- Limit of Grading
- Dust Fence
- Compost Filter Sock
- Top of Bank
- Bottom of Bank
- Fill Condition / Cut Condition
- Drainage Flow Direction
- Stabilized Entry/Exit

ROADWAY GRADING, EROSION & SEDIMENT CONTROL PLAN

Scale: 1"=20'

Notes:

1. For additional finished grade elevations, see sht. C-20.
2. For bridge deck elevations, see structural drawings.
3. For grading work under bridge, see sht. C-19.
4. The contractor shall be responsible for obtaining grading permit from the City and County of Honolulu, Department of Planning and Permitting.

Graphic Scale:
1" = 20' 20' 10' 0 20' 40'
Scale in Feet

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4/30/20
SIGNATURE LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROADWAY GRADING, EROSION & SEDIMENT CONTROL PLAN
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2019

SHEET No. C-18 OF SHEETS

SURVEY PLOTTED BY
DRAFT BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
ORIGINAL PLAN
WORK DONE BY
No.

RMTC JOB NO. : 1-19548-0E

Attachment A, Figure 3

Dewatering Flow Chart (Item G.4.)

DEWATERING EFFLUENT FLOW CHART

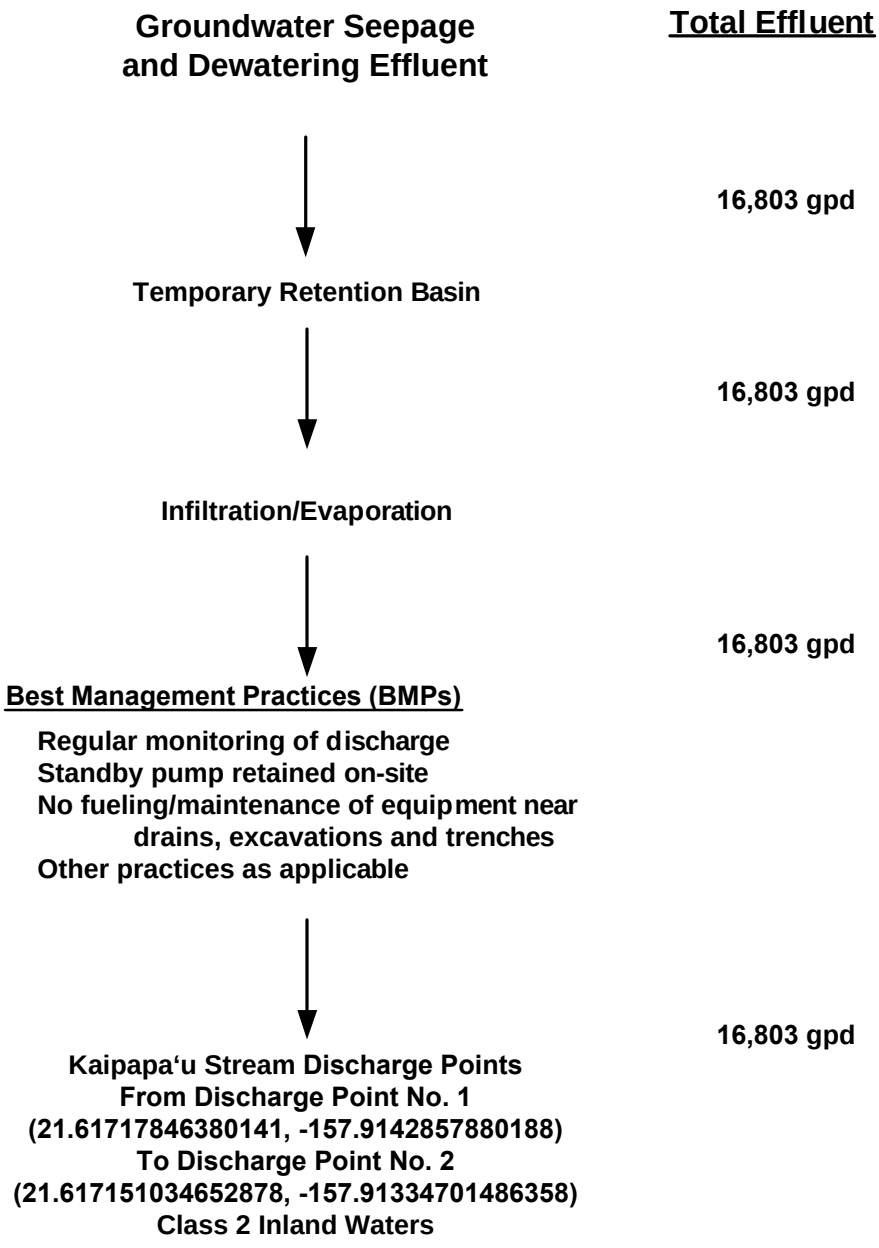


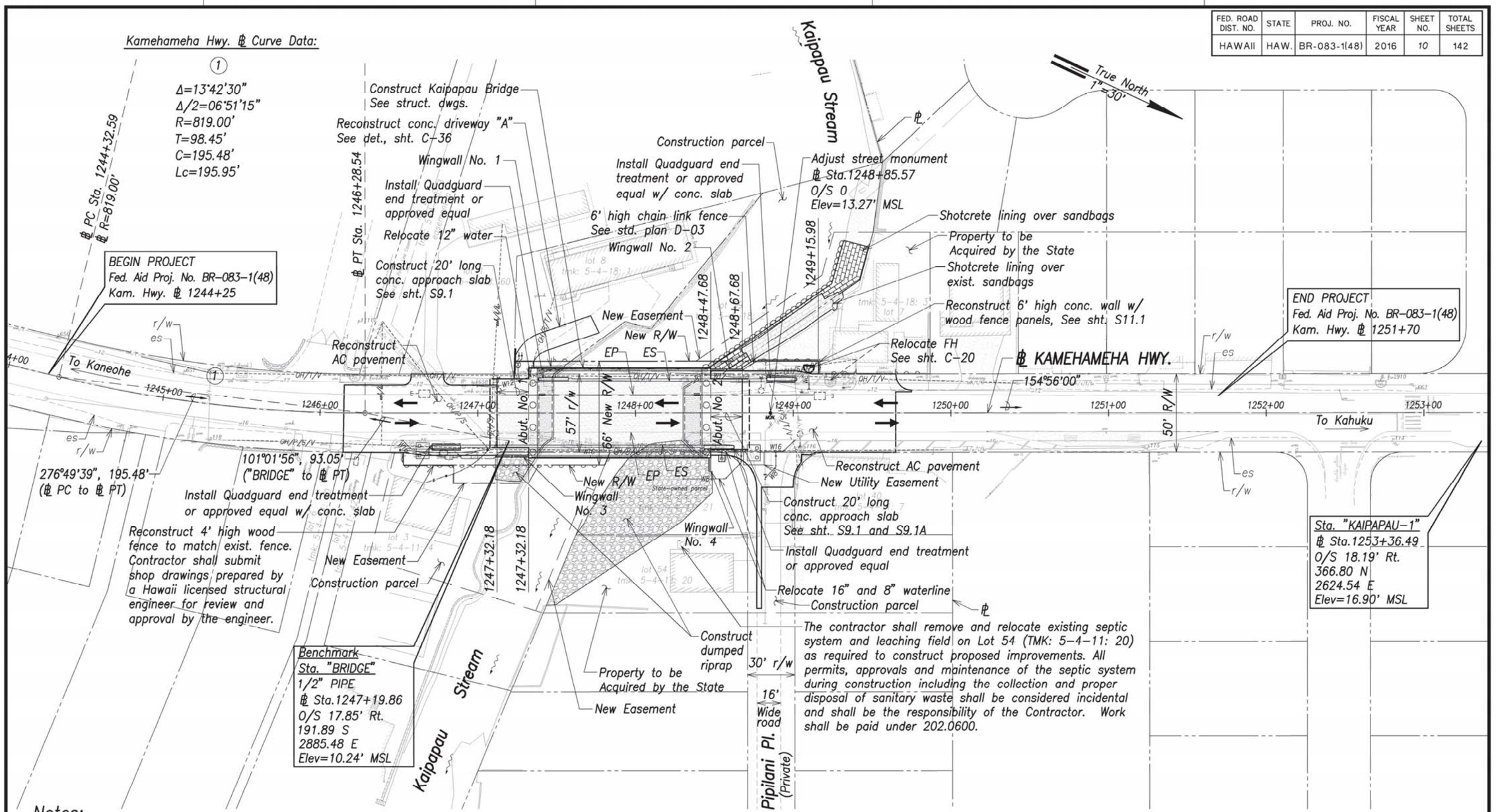
FIGURE 3
DEWATERING FLOW CHART
Kaipapa‘u Bridge Replacement
Hau‘ula, Ko‘olauloa, O‘ahu, Hawai‘i

R.M. TOWILL CORPORATION September 2019

Attachment B

Construction Drawings

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	10	142



Notes:

1. See sheet C-10 for construction phasing and sheet C-29 for 16" waterline phasing.
2. The Contractor shall comply with Environmental Permit Conditions.
3. Kaipapau Stream is able to convey a 2-year storm, 1-hour storm. The stream frequently overtops. It is critical that the Contractor shall ensure that the flow capacity of the Kaipapau Stream is not reduced during a storm event. Equipment and materials within the stream during a storm event shall be removed immediately. Final damages that occur due to the contractor equipment and materials blocking flow during a rain storm will be the contractor's responsibility.
4. The Contractor shall construct a temporary detour road, temporary detour waterline, and other temporary improvements. See sht. C-10.

GENERAL SITE PLAN

SCALE 1"=30'

Graphic Scale:

1" = 30' 30' 15' 0 30' 60'

Scale in Feet

APPROVED:

Manager and Chief Engineer, BWS (for work affecting BWS facilities State R/W & BWS easements only) DATE

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R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GENERAL SITE PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

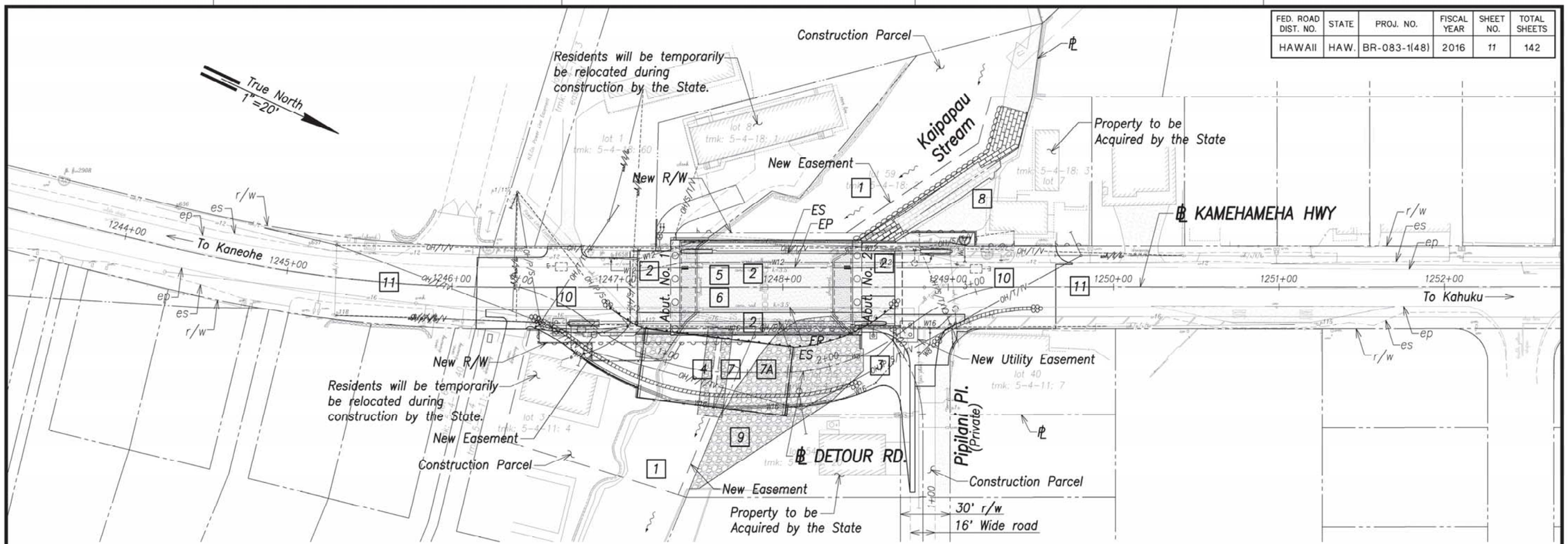
Scale: As Noted Date: April 2015

SHEET No. C-9 OF SHEETS

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

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	11	142



OVERALL CONSTRUCTION PHASING PLAN

Scale: 1"=20'

Phasing Notes:

1. For electrical phasing see electrical drawings.
2. For structural phasing see structural drawings.
3. The Contractor shall perform work to ensure continuous traffic and pedestrian flow.
4. Phasing indicated shall not be modified unless approved in writing by the Engineer.
5. The Contractor shall ensure that water and other utility line construction are fully coordinated with Board of Water Supply and Private Utility Companies.
6. All temporary measures required shall be considered incidental to the various items of work.
7. For water line phasing see sht. C-28 and C-29.

Suggested Construction Sequence of Major Constuction Items:

1. Install best management practices/erosion control measures. See Notes sheets and sht. C-17.
2. Install temporary 12" waterline and relocate existing 12" water line. See 12" Waterline Plan and Profile, sht. C-20. Relocate electrical utilities. See electrical drawings for temporary and permanent electrical relocation phasing.
3. Construct trial and load test drilled shafts and perform load test. See structural drawings.
4. Construct detour roadway and temporary bridge. See sht. C-22 to C-27 and stuctural drawings.
5. Demolish existing Kaipapau Stream bridge. See sht. C-15 and structural drawings. Expose existing 16" water line jacket and concrete support system.
6. Construct Phase 1 new Kaipapau Stream bridge. See Construction Sequence, Phase 1 of structural drawings, shts. S0.7, S0.7A, and S0.7B.
7. Partially remove Detour roadway and temporary bridge. Construct temporary pavement transitions, signing and pavement markings. Temporary work shall be considered incidental to the various items of work. Construct Phase 2 of new Kaipapau Stream bridge. See Construction Sequence, Phase 2 of structural drawings, shts. S0.8, S0.8A, and S0.8B..

7A. Remove remainder of Detour roadway and temporary bridge.

8. Construct sand bags and shotcrete lining along north bank, upstream of Kaipapau Stream bridge. See sht. C-18.
9. Construct dumped riprap along north and south bank, downstream of Kaipapau Stream bridge. See sht. C-16 and C-18.
10. Construct AC pavement. See sht. C-16. The contractor shall submit a pavement phasing plan and schedule for Engineer's review and approval.
11. Construct final signing and pavement markings. See sht. C-21.

Graphic Scale:
1" = 20' 20' 10' 0 20' 40'
Scale in Feet

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERALL CONSTRUCTION PHASING PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2015

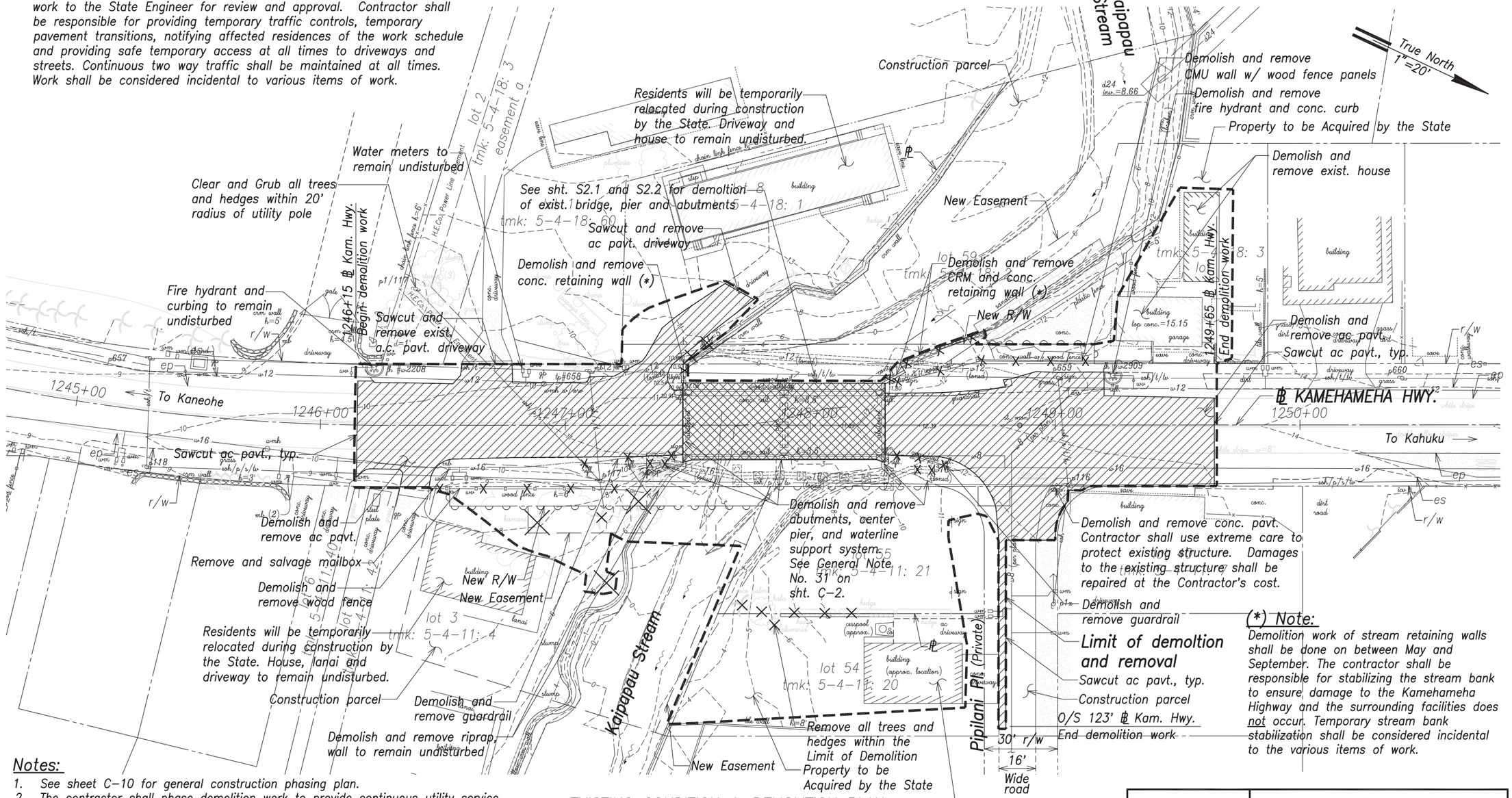
SHEET No. C-10 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	16	142

Phasing Note:

Contractor shall submit a phasing plan and schedule for demolition work to the State Engineer for review and approval. Contractor shall be responsible for providing temporary traffic controls, temporary pavement transitions, notifying affected residences of the work schedule and providing safe temporary access at all times to driveways and streets. Continuous two way traffic shall be maintained at all times. Work shall be considered incidental to various items of work.



Notes:

1. See sheet C-10 for general construction phasing plan.
2. The contractor shall phase demolition work to provide continuous utility service.
3. See C-20 and C-32 for waterline demolition work.
4. See C-21 for signing and striping demolition work.
5. See electrical drawings for electrical demolition and temporary relocation work.
6. See structural drawings for structural demolition work.
7. Traffic controls, detour, and best management practices shall be in place prior to the start of demolition work.
8. The contractor shall demolish and remove everything within the Limit of Demolition and Removal unless otherwise indicated to remain.
9. See General Note No. 30 on sht. C-2.

EXISTING CONDITION & DEMOLITION PLAN

Scale: 1"=20'

Bridge Note:

The contractor shall perform photographic documentation of the existing Kaipapau Stream bridge acceptable to the State Historic Preservation Division (SHPD) prior to the start of bridge demolition. Work shall be considered incidental to the various items of work.

Graphic Scale:

1" = 20' 20' 10' 0 20' 40'

Scale in Feet

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EXISTING CONDITION & DEMOLITION PLAN

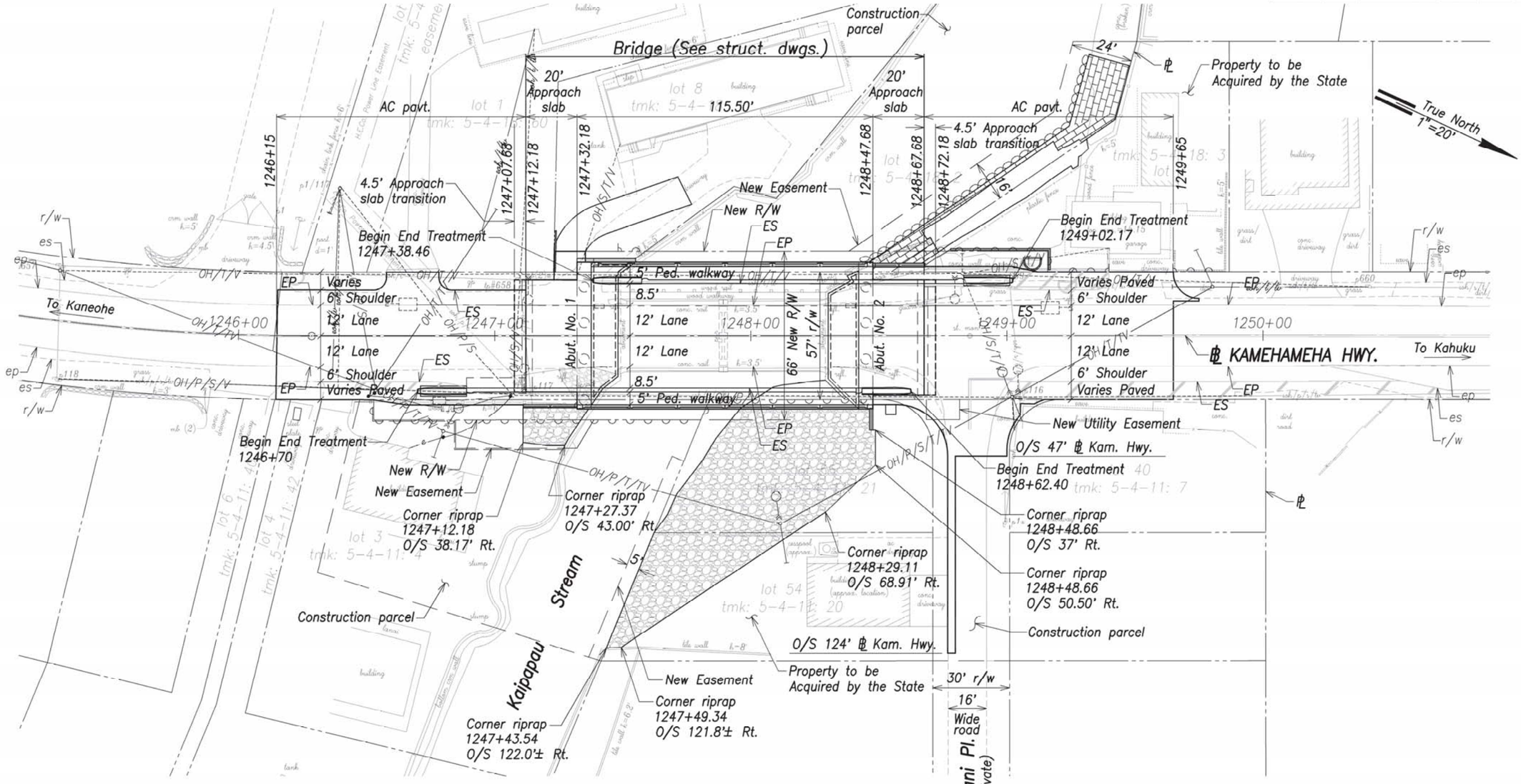
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. C-15 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	17	142



SITE LAYOUT PLAN
SCALE 1"=20'

Pavement Note:

Contractor shall submit a pavement phasing plan and schedule for the AC pavement work to the State Engineer for review and approval. Contractor shall be responsible for providing temporary traffic controls, temporary pavement transitions, notifying affected residences of the work schedule and providing safe temporary access at all times to driveways and streets. Continuous two way traffic shall be maintained at all times. Work shall be considered incidental to various items of work.

Legend:

Dumped Riprap

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SITE LAYOUT PLAN

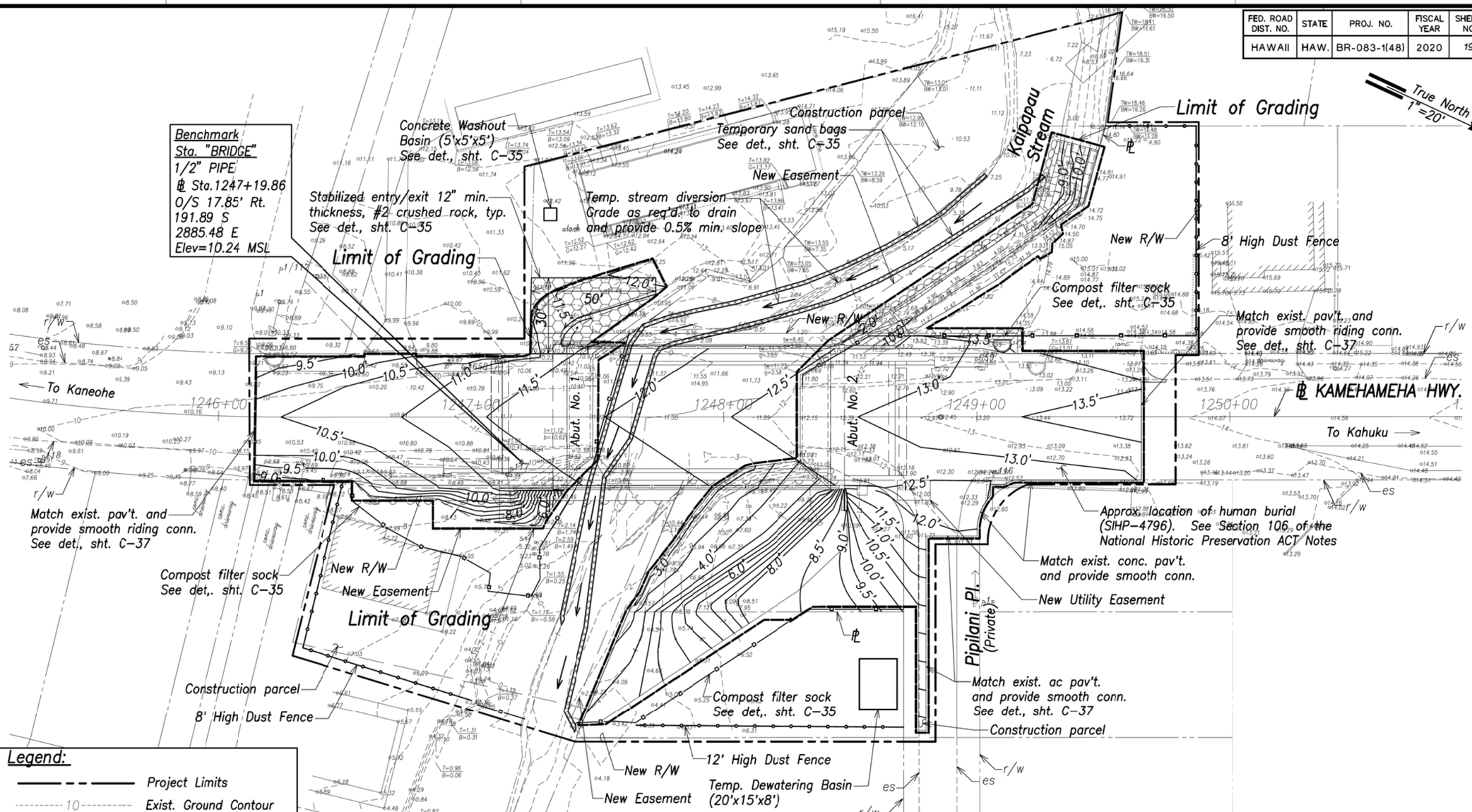
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. C-16 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2020	19	149



Legend:

- Project Limits
- 10 Exist. Ground Contour
- 10 Finished Grade Contour
- Limit of Grading
- Dust Fence
- Compost Filter Sock
- Top of Bank
- Bottom of Bank

Fill Condition Cut Condition

- Drainage Flow Direction
- Stabilized Entry/Exit

ROADWAY GRADING, EROSION & SEDIMENT CONTROL PLAN

Scale: 1"=20'

Notes:

1. For additional finished grade elevations, see sht. C-20.
2. For bridge deck elevations, see structural drawings.
3. For grading work under bridge, see sht. C-19.
4. The contractor shall be responsible for obtaining grading permit from the City and County of Honolulu, Department of Planning and Permitting.

Graphic Scale:

1" = 20' 20' 10' 0 20' 40'

Scale in Feet

SURVEY PLOTTED BY ____ DATE
DRAWN BY ____ EST
TRACED BY ____
DESIGNED BY ____ WC
QUANTITIES BY ____
CHECKED BY ____
ORIGINAL PLAN
NOTE BOOK
No.____

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, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROADWAY GRADING, EROSION & SEDIMENT CONTROL PLAN

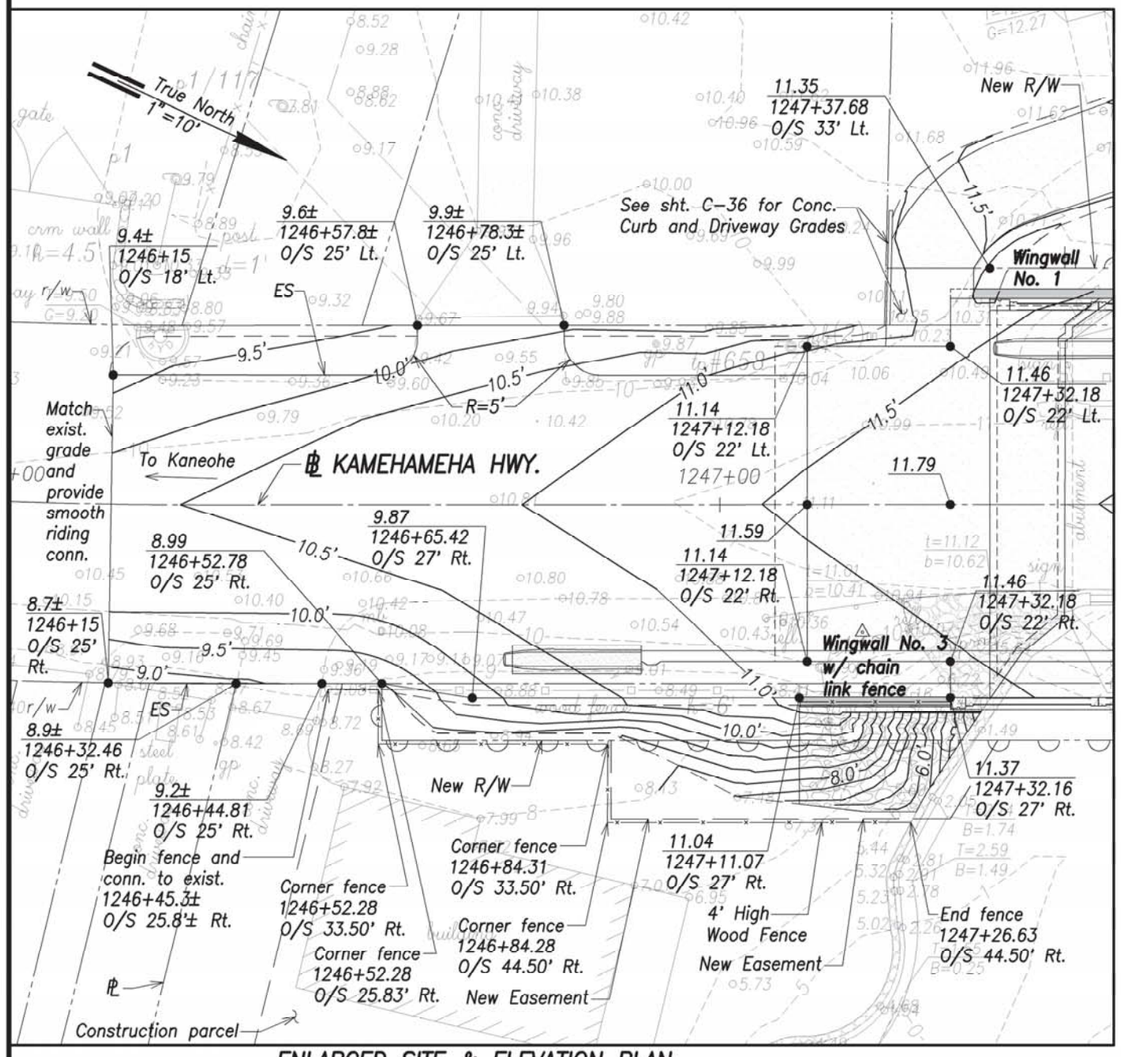
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2019

SHEET No. C-18 OF SHEETS

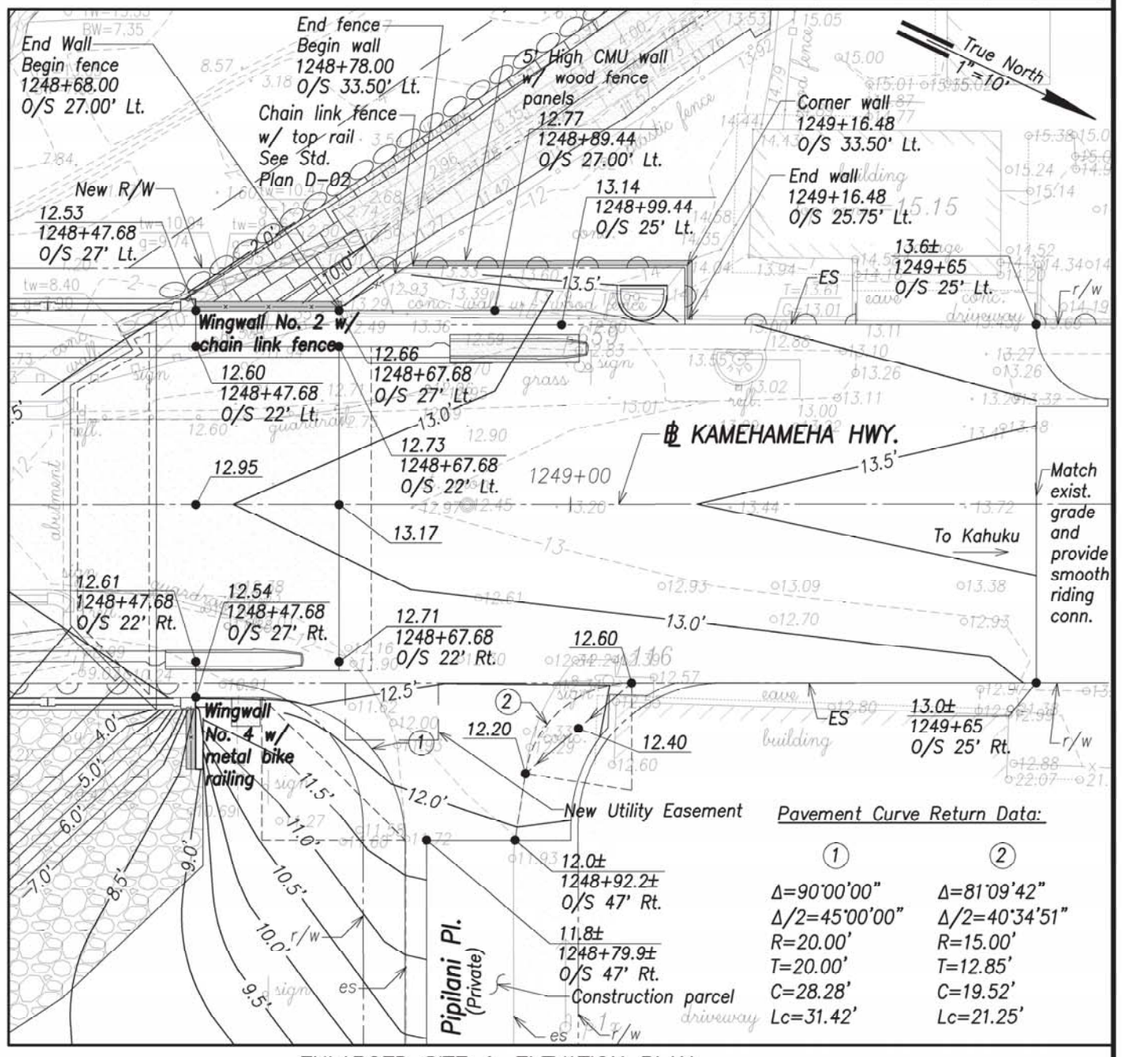
RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	20	142



ENLARGED SITE & ELEVATION PLAN (KANEOHE SIDE)

Scale: 1"=10'



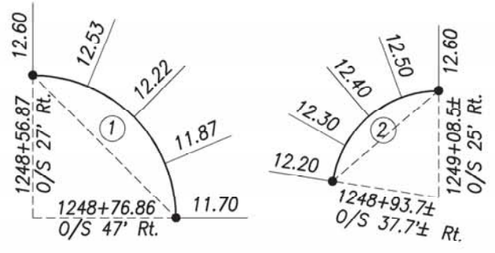
Pavement Curve Return Data:

①	②
Δ=90°00'00"	Δ=81°09'42"
Δ/2=45°00'00"	Δ/2=40°34'51"
R=20.00'	R=15.00'
T=20.00'	T=12.85'
C=28.28'	C=19.52'
Lc=31.42'	Lc=21.25'

ENLARGED SITE & ELEVATION PLAN (KAHUKU SIDE)

Scale: 1"=10'

Pipilani Place
Pavement Curve Return Grades:



Legend:

- Exist. Ground Contour
- Finished Grade Contour
- 10.00 / 2+37.40 / O/S 31.3' Rt. — Finished Grade Elevation
- ℄ Station / ℄ Offset

Graphic Scale:

1" = 10'

10' 5' 0 10' 20'

Scale in Feet

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

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, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

4/30/16
SIGNATURE LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ENLARGED SITE & ELEVATION PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. C-19 OF SHEETS

RMTC JOB NO. : 1-19548-0E

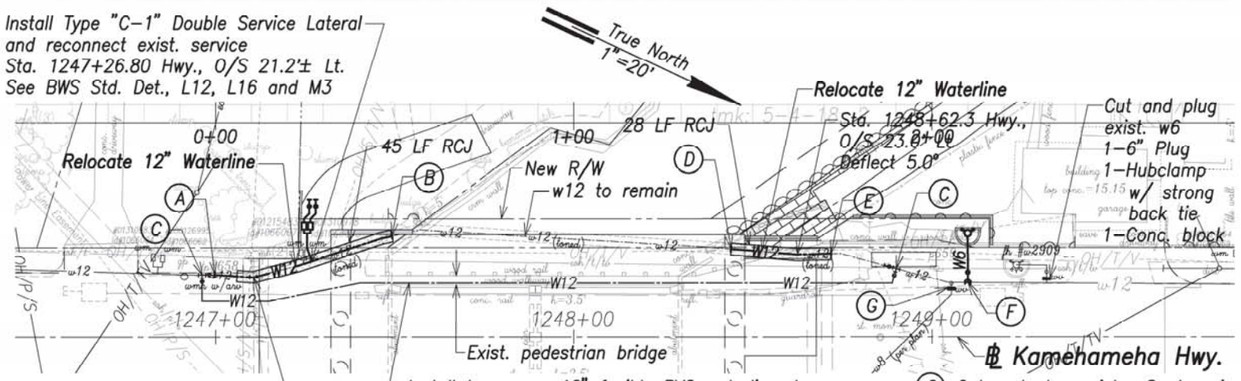
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	21	142

(A) Sta. 1246+99.7± Hwy.,
O/S 17.5'± Lt.
=Sta. 0+00.0± 12" W.L.
Deflect 4.0°

(B) Connect to exist. w12
Sta. 1247+49.3± Hwy.,
O/S 28.2'± Lt.
=Sta. 0+51.0± 12" W.L.
Materials for conn.
1–12" Sleeve, 12" long
8± LF 12" D.I.P., Cl. 52
Temp. for testing
1–12" Cap w/4" C.O.
1–Conc. block
Contractor to verify
invert and location

(C) Connect to exist. w12
Sta. 1246+96± Hwy.,
O/S 17.4'± Lt. and
Sta. 1248+90± Hwy.,
O/S 19.2'± Lt.
Materials for conn.
1–12" x 12" Tee
2–12" GV, 150#
2–Valve box w/ cover
1–Conc. block w/
struct. struts
Temp. for testing
1–12" Cap w/4" C.O.
1–Conc. block
Contractor to verify
invert and location

Install Type "C–1" Double Service Lateral and reconnect exist. service
Sta. 1247+26.80 Hwy., O/S 21.2'± Lt.
See BWS Std. Det., L12, L16 and M3



Sta. 1247+10.50 Hwy.,
O/S 16.70' Lt.
=Sta. 0+10.55 12" W.L.
1–12" 1/8 Bend (H & TV)
1–Conc. block

Install temporary 12" fusible PVC waterline. Lay temporary 12" waterline on existing pedestrian walkway. In areas outside of the existing pedestrian walkway and provide temporary ADA accessible route, place temporary waterline in shallow open trench and cover with steel plates. See Temporary Waterline Notes on this sheet.

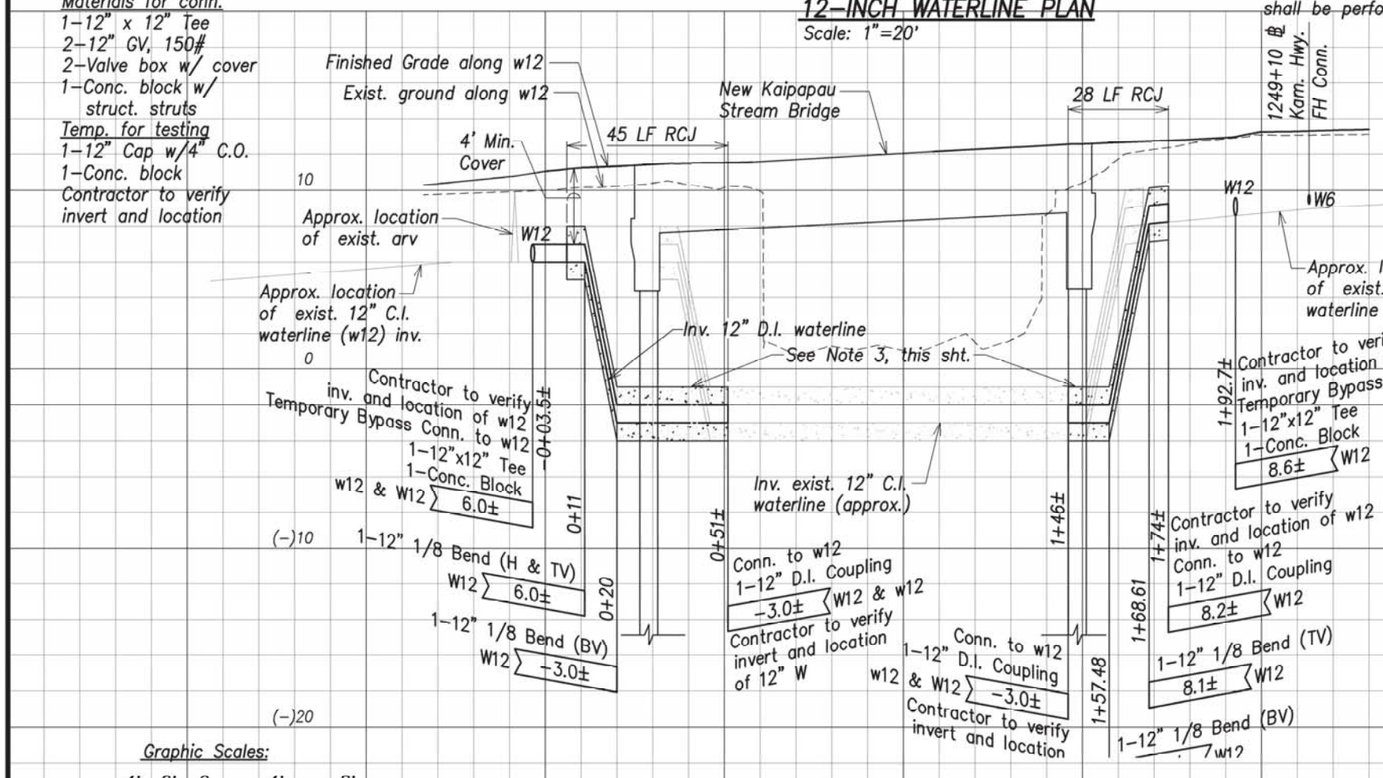
(D) Connect to exist. w12
Sta. 1248+43.9± Hwy.,
O/S 24.6'± Lt.
=Sta. 1+46.0± 12" W.L.
Materials for conn.
1–12" Sleeve, 12" long
8± LF 12" D.I.P., Cl. 52
Temp. for testing
1–12" Cap w/4" C.O.
1–Conc. block
Contractor to verify
invert and location

(E) Connect to exist. w12
Sta. 1248+71.9± Hwy.,
O/S 23.3'± Lt.
=Sta. 1+74± 12" W.L.
Materials for conn.
1–12" Sleeve, 12" long
8± LF 12" D.I.P., Cl. 52
1–12" 1/8 Bend (TV)
Temp. for testing
1–12" Cap w/4" C.O.
1–Conc. block
Contractor to verify
invert and location

(F) FH Connection
Sta. 1249+10 Hwy.
O/S 15.1'± Lt.
1–12" x 6" Tapping Tee (MJ x FE)
1–6" 1/4 Bend (BV)
1–6" GV (MJ x FE), Cl. 150
1–Valve box
1–FH (Ht.=6'–4")
1–FH Extension piece
1–FH Marker
1–FH Curb guard
14 LF 6" D.I.P. Cl. 52
1–Conc. block
1–Conc. block w/ struct. struts
See BWS Std. Det. FH4 and FH11
For Profile, see sht. C–37
Temp. for Testing
1–6" cap w/ 2–1/2" C.O.
1–Conc. block

(G) Cut and plug exist. w8 at main.
Remove valve and box. Salvage frame and cover.
1–8" Plug
1–Hubclamp w/ strong back tie
1–Conc. block
See sht. C–29 for Phase when work shall be performed.

12–INCH WATERLINE PLAN
Scale: 1"=20'



Graphic Scales:
1" = 4' 4' 2' 0 4' 8' Scale in Feet
1" = 20' 20' 10' 0 20' 40' Scale in Feet

12–INCH WATERLINE PROFILE
Scales: 1"=20' Horiz.
1"=4' Vert.

Notes:
1. The existing waterlines shown on these plans were located using record drawings and toning information from the Board of Water Supply. The contractor shall make an independent check by probing the waterlines and coordinating with the Board of Water Supply to ascertain the exact locations of the waterlines. Any discrepancies shall be immediately brought to the attention of the Engineer prior to any work on the water system.
2. Demolish and remove existing waterline as required to construct waterline.
3. Dewatering for removal of water system shall be considered inciental to Item No. 202.0520.
4. Dewatering for installation of the temporary and pernanent water system shall be considered incidental to Item No. 624.1003 Water Systems. No additional compensation will be provided for dewatering.

Temporary Waterline Notes:
1. The temporary waterline shall be constructed, tested and in–service prior to starting construction of permanent water system. The contractor shall coordinate with the Board of Water Supply (BWS) for shut–down of the 12–inch waterline. The maximum down time shall be six (6) hours unless otherwise approved by the BWS. The contractor shall be responsible for providing advanced notification to all users affected by the waterline shut–down.
2. The temporary waterline shall not be in–service for more than two (2) months unless otherwise approved by the BWS.
3. Contractor to provide all fittings, bends as required and install temporary 3/4" ARV in cage at high point of temporary waterline
4. The contractor shall be responsible for providing safe temporary pedestrian access at all times that meets ADA requirements.
5. The contractor shall be responsible for providing traffic controls during temporary waterline installation.

APPROVED:

Manager and Chief Engineer, BWS DATE
(for work affecting BWS facilities
State R/W & BWS easements only)

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4/30/16
SIGNATURE LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

12–INCH WATERLINE PLAN & PROFILE

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR–083–1(48)

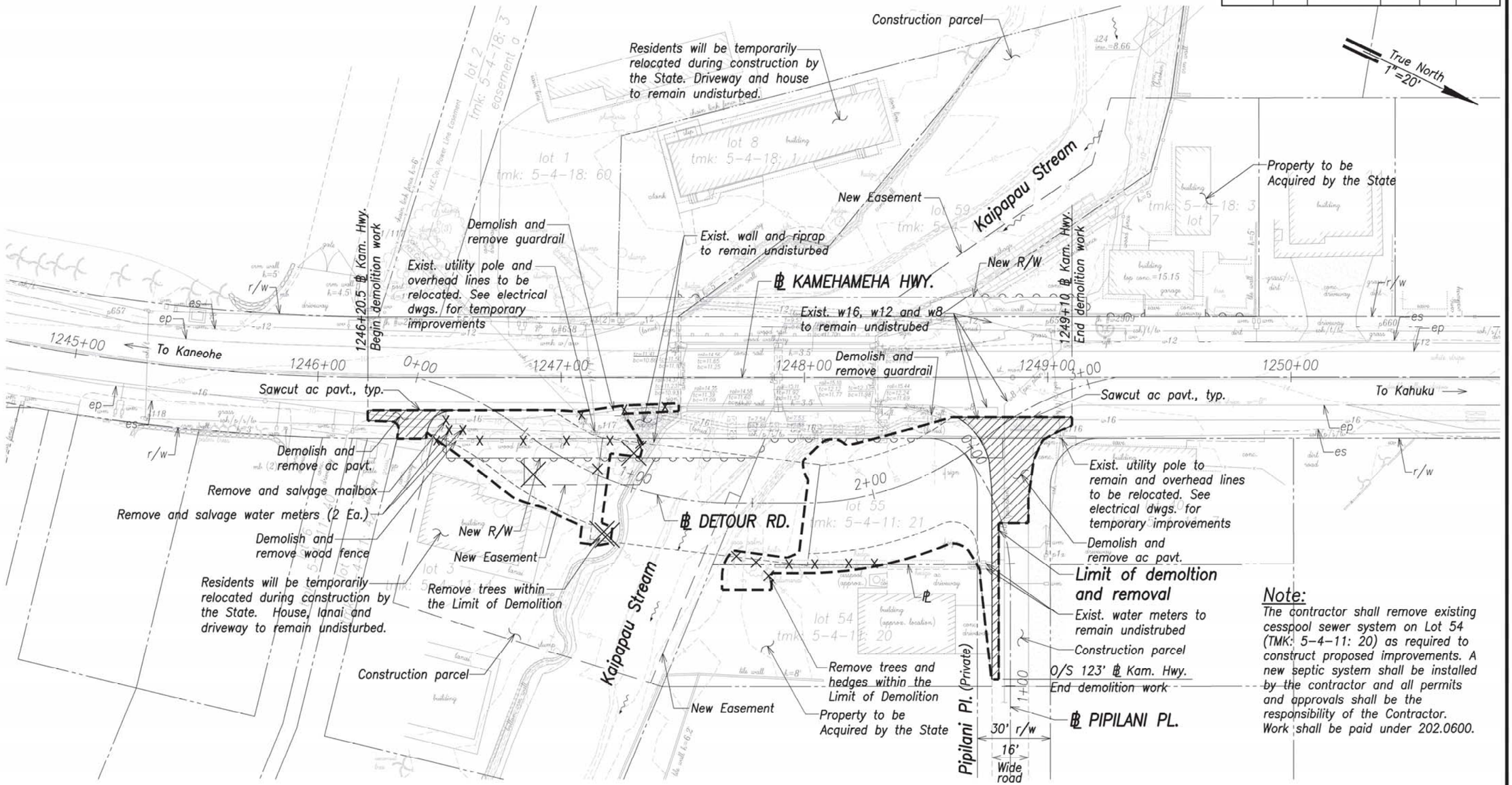
Scale: As Noted Date: April 2015

SHEET No. C–20 OF SHEETS

ORIGINAL PLAN | NOTE BOOK | No. | SURVEY PLOTTED BY RST | DRAWN BY | TRACED BY WC | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE

RMTC JOB NO. : 1–19548–0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	25	142



Note:
The contractor shall remove existing cesspool sewer system on Lot 54 (TMK: 5-4-11: 20) as required to construct proposed improvements. A new septic system shall be installed by the contractor and all permits and approvals shall be the responsibility of the Contractor. Work shall be paid under 202.0600.

DETOUR ROAD – EXISTING CONDITION & DEMOLITION PLAN

Scale: 1"=20'

Graphic Scale:
1" = 20' 20' 10' 0 20' 40'
Scale in Feet

ORIGINAL PLAN	SURVEY PLOTTED BY ____ DATE
	DRAWN BY ____ RSY
NOTE BOOK	TRACED BY ____
	DESIGNED BY ____ WC
No.	QUANTITIES BY ____
	CHECKED BY ____

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4/30/16
SIGNATURE — LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETOUR RD. – EXISTING CONDITION & DEMOLITION PLAN

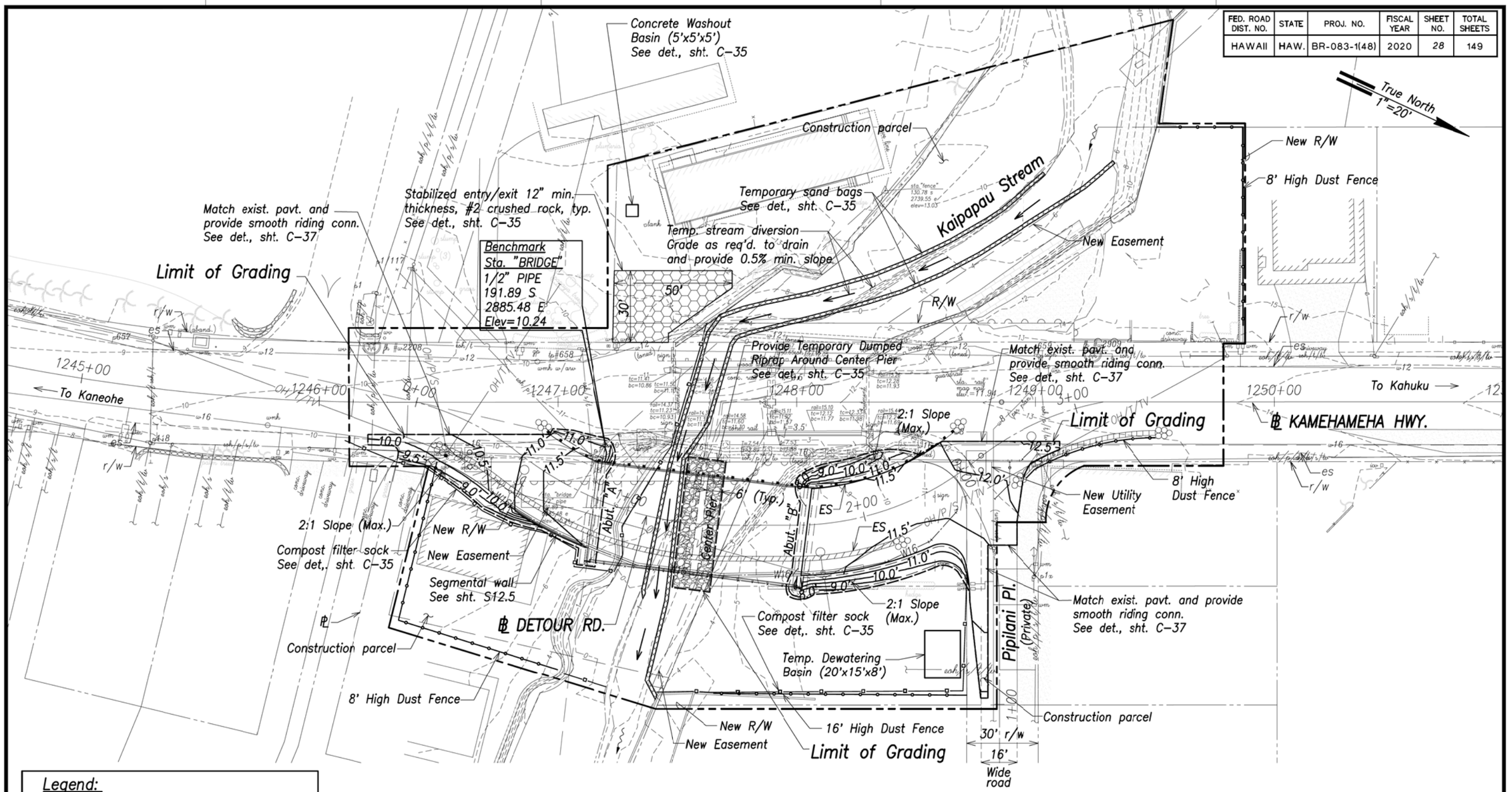
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. C-24 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2020	28	149



Legend:

- Project Limits
- 10 — Exist. Ground Contour
- 10.0' — Finished Grade Contour
- Limit of Grading
- Dust Fence
- Compost Filter Sock
- Drainage Flow Direction
- Stabilized Entry/Exit

DETOUR ROAD – GRADING, EROSION AND SEDIMENT CONTROL PLAN

Scale: 1"=20'

Graphic Scale:

1" = 20' 20' 10' 0 20' 40'

Scale in Feet

SURVEY PLOTTED BY ____ DATE
DRAWN BY ____ EST
TRACED BY ____
DESIGNED BY ____ WC
NOTE BOOK ____
QUANTITIES BY ____
CHECKED BY ____
ORIGINAL PLAN
NO. ____

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETOUR ROAD-GRADING, EROSION AND SEDIMENT CONTROL PLAN

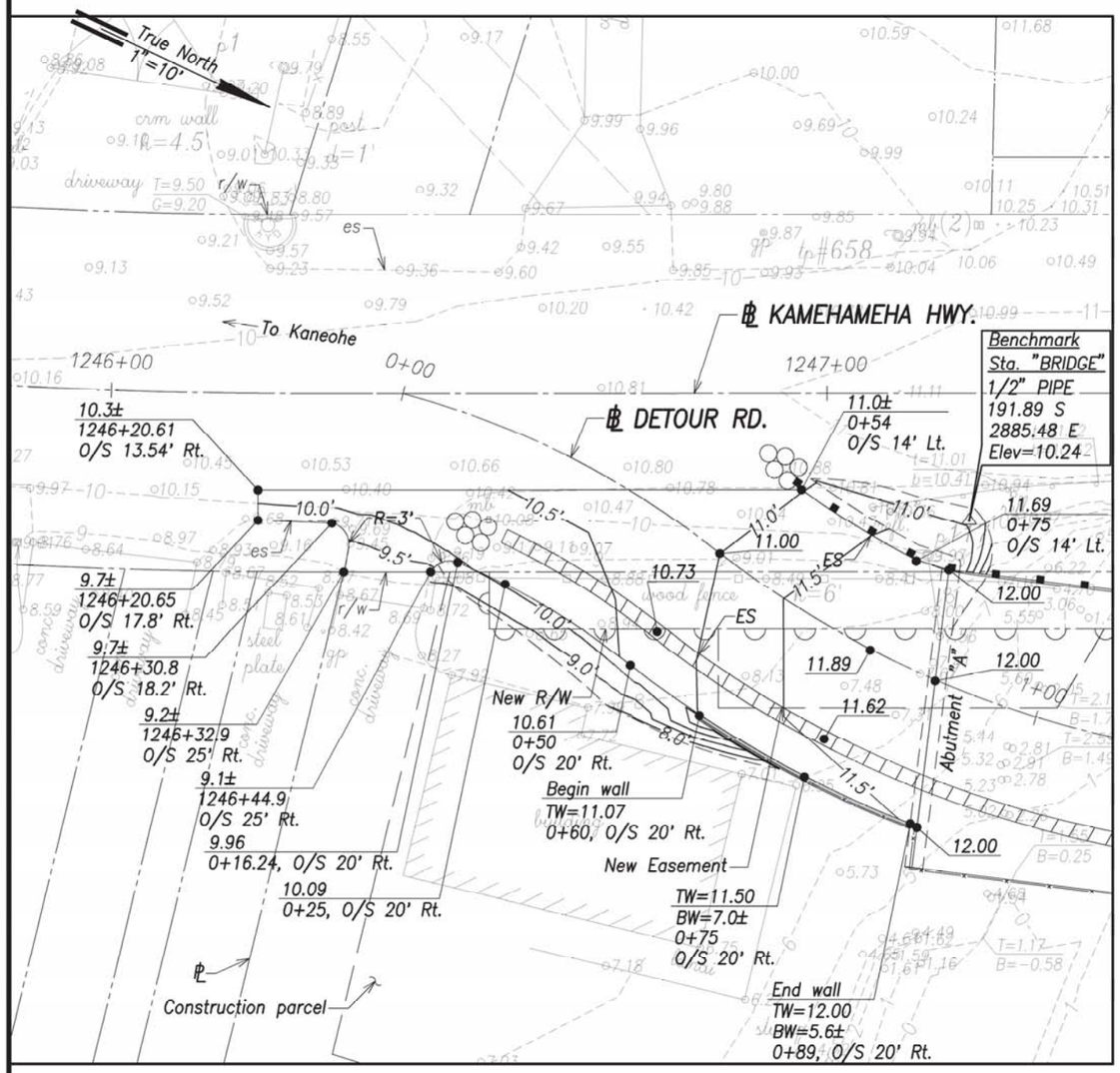
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2019

SHEET No. C-27 OF SHEETS

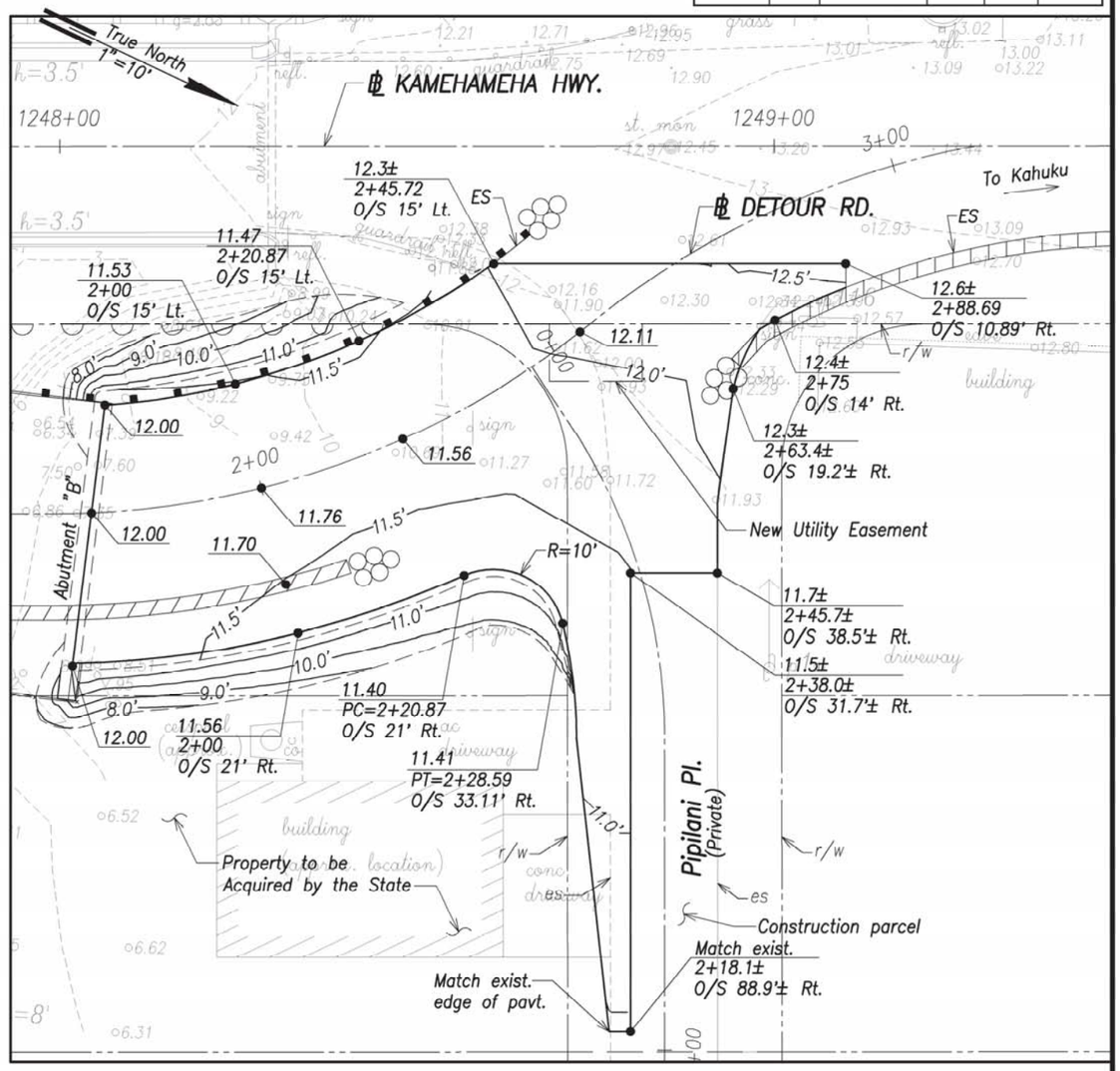
RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	28	142



DETOUR ROAD ENLARGED SITE & ELEVATION PLAN (KANEOHE SIDE)

Scale: 1"=10'



DETOUR ROAD ENLARGED SITE & ELEVATION PLAN (KAHUKU SIDE)

Scale: 1"=10'

Legend:

10	Exist. Ground Contour
10.0'	Finished Grade Contour
10.00 2+37.40 O/S 31.3' Rt.	Finished Grade Elevation ℄ Station ℄ Offset

Graphic Scale:

1" = 10' 10' 5' 0 10' 20'

Scale in Feet

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SIGNATURE L.C. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETOUR ROAD ENLARGED SITE & ELEVATION PLAN

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

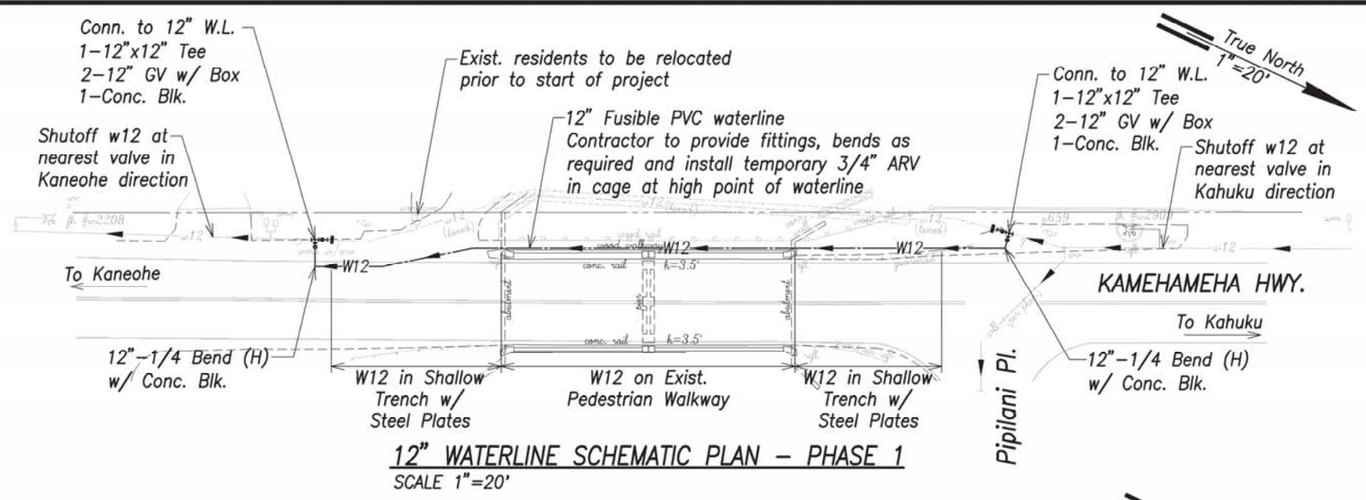
Scale: As Noted Date: April 2015

SHEET No. C-27 OF SHEETS

ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE | RST | WC | No. | NOTE BOOK

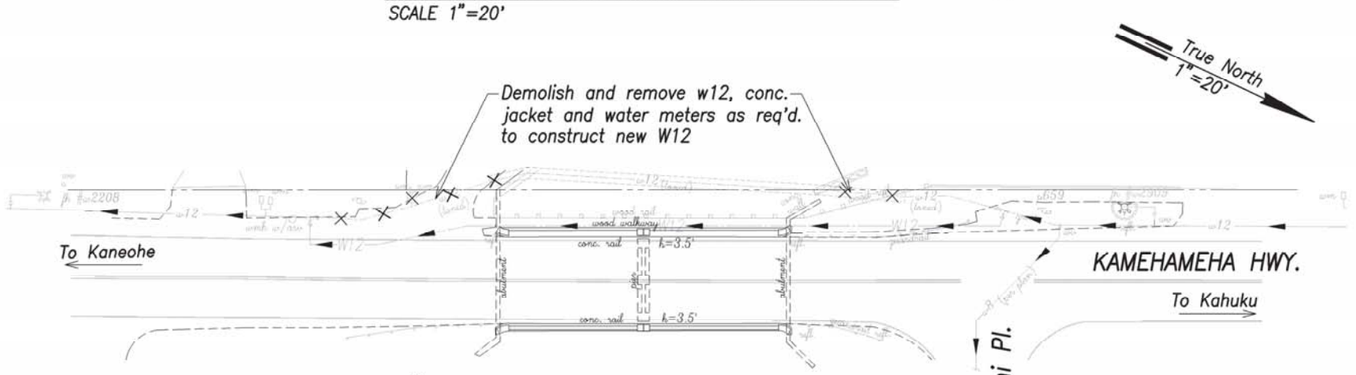
RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	29	142



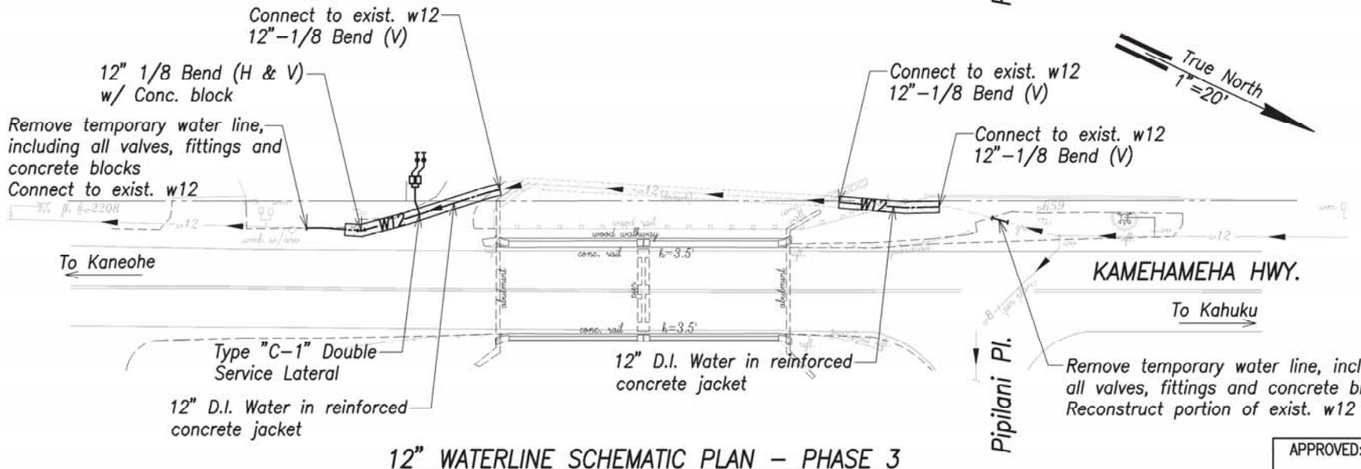
12" WATERLINE SCHEMATIC PLAN – PHASE 1

SCALE 1"=20'



12" WATERLINE SCHEMATIC PLAN – PHASE 2

SCALE 1"=20'



12" WATERLINE SCHEMATIC PLAN – PHASE 3

SCALE 1"=20'

Suggested Phasing for Work on 12" Waterline:

PHASE 1:

Construct temporary bypass waterline improvements shown on this sheet and perform pressure test and chlorination. Shutoff existing w12 by closing the nearest existing valves in the Kaneohe and Kahuku direction and make connections to the existing w12. (Note: Maximum allowable time for w12 shutdown is 6 hours.)

PHASE 2:

Excavate trench and construct shoring for new W12 improvements. Remove portions of existing w12 in concrete jacket required to construct new improvements.

PHASE 3:

Construct permanent waterline improvements shown on this sheet and perform pressure test and chlorination. Shutoff existing w12 by closing the nearest existing valves in the Kaneohe and Kahuku direction and make connections to the existing w12. Remove W12 bypass waterline, including all gate valves, fittings and concrete blocks on both sides of existing bridge. (Note: Maximum allowable time for w12 shutdown is 6 hours.)

Note:

The contractor shall check the invert and location of the existing 12–inch waterline prior to the start of waterline construction and adjust the invert of the new 12–inch waterline to match the existing invert for future connection.

Graphic Scale:

1" = 20' 20' 10' 0 20' 40'

Scale in Feet

ORIGINAL PLAN	SURVEY PLOTTED BY: RST	DATE
	DRAWN BY:	
	TRACED BY:	
NOTE BOOK	DESIGNED BY: WC	
	QUANTITIES BY:	
No.	CHECKED BY:	

APPROVED:

Manager and Chief Engineer, BWS (for work affecting BWS facilities State R/W & BWS easements only) — DATE

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4/30/16

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R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

12" WATERLINE PHASING PLAN

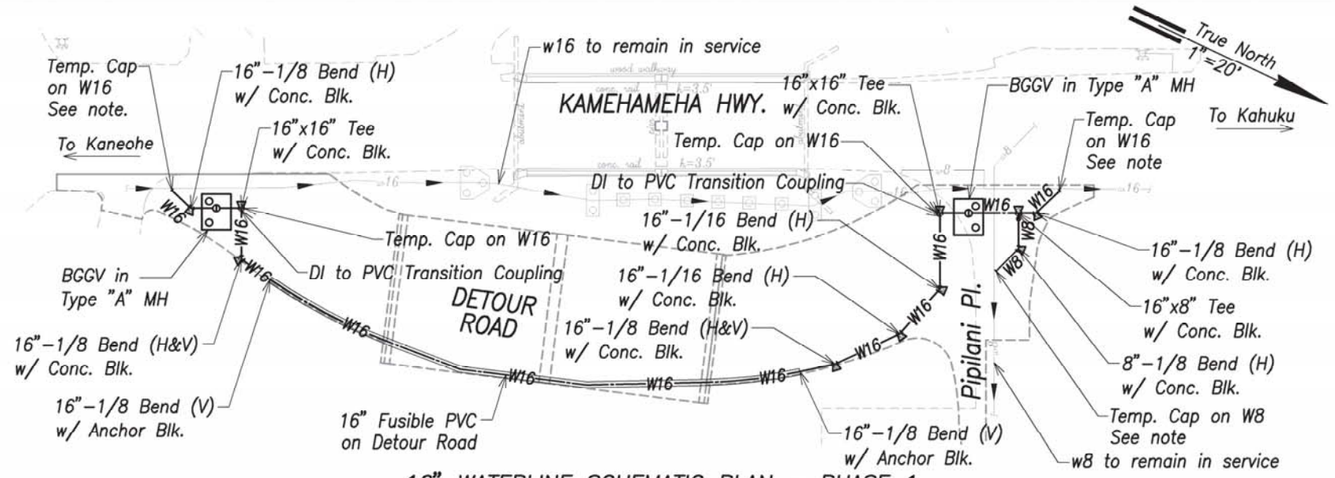
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR–083–1(48)

Scale: As Noted Date: April 2015

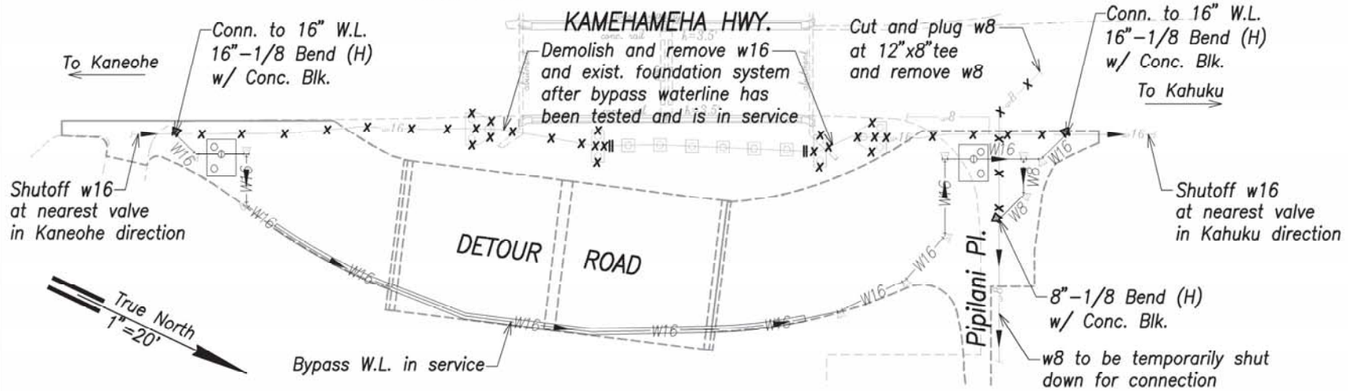
SHEET No. C-28 OF SHEETS

RMTC JOB NO. : 1–19548–0E

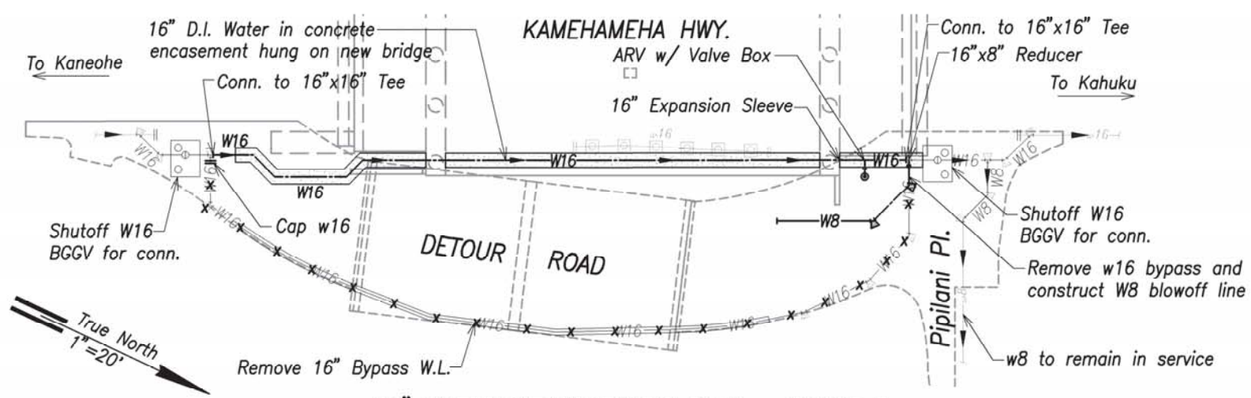
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	30	142



16" WATERLINE SCHEMATIC PLAN – PHASE 1
SCALE 1"=20'



16" WATERLINE SCHEMATIC PLAN – PHASE 2
SCALE 1"=20'



16" WATERLINE SCHEMATIC PLAN – PHASE 3
SCALE 1"=20'

Suggested Phasing for Work on 16" Waterline:

PHASE 1:
Existing w16 and w8 serving Pipilani Road shall remain in service at all times. Construct detour road and temporary bridge. Construct Phase 1 waterline improvements shown on this sheet and perform pressure test and chlorination.

PHASE 2:
Shutoff existing w16 by closing the nearest existing valves in the Kaneohe and Kahuku direction. Drain w16 using existing w8 blowoff line. Construct Phase 2 waterline improvements shown on this sheet. Open existing valves to restore water service. (Note: Maximum allowable time for w16 and w8 shutdown is 8 hours)

After temporary W16 waterline is in service, demolish and remove the existing w16 and existing foundation system shown in Phase 2 on this sheet. Abandon-in-place the existing w16 and existing foundation system under Kaipapau Stream. The contractor shall plug both ends of abandoned waterline.

PHASE 3:
Construct new bridge and Phase 3 waterline improvements, including W8 blowoff line and W16 encased in concrete between new bridge girders, as shown on this sheet. See structural drawings for details. Perform pressure test and chlorination. Shutoff W16 bypass waterline using bevel gear gate valves on both sides of new bridge. (Note: Maximum allowable time for W16 is 8 hours) Connect W16 on both sides of new bridge. Open bevel gear gate valves to restore water service.

After W16 waterline is in service, demolish and remove the bypass waterline.

Note:
The contractor shall check the invert and location of the existing 16-inch waterline prior to the start of waterline construction and adjust the invert of the new 16-inch waterline to match the existing invert for future connection.

Graphic Scale:
1" = 20' 20' 10' 0 20' 40'
Scale in Feet

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

APPROVED:

Manager and Chief Engineer, BWS (for work affecting BWS facilities State R/W & BWS easements only) DATE

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4/30/16
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R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

16" WATERLINE PHASING PLAN

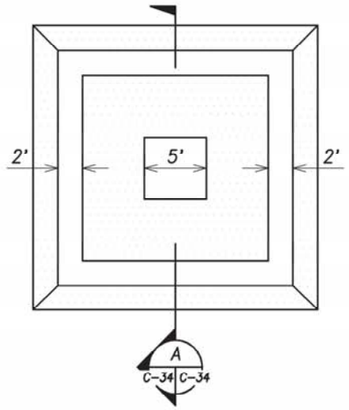
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. C-29 OF SHEETS

RMTC JOB NO. : 1-19548-0E

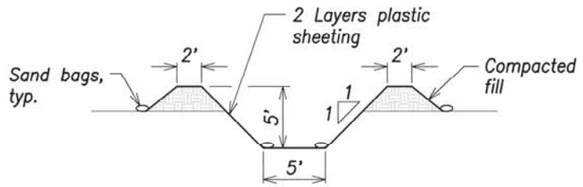
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	35	142



PLAN VIEW

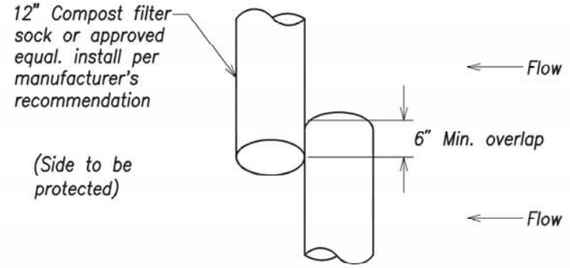
Notes:

1. Line basin with 2 layers of 4 mil. polyethylene plastic.
2. Place sand bags on top sheeting.
3. Clean out hardened concrete to maintain basin capacity.

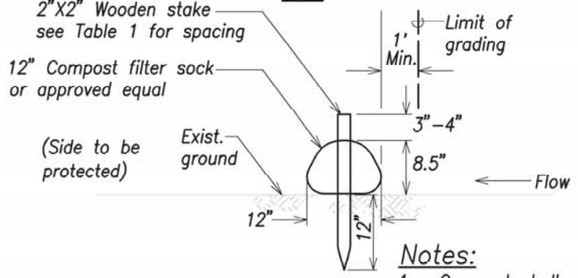


SECTION

CONCRETE WASH-OUT BASIN DETAIL
NOT TO SCALE



PLAN



SECTION

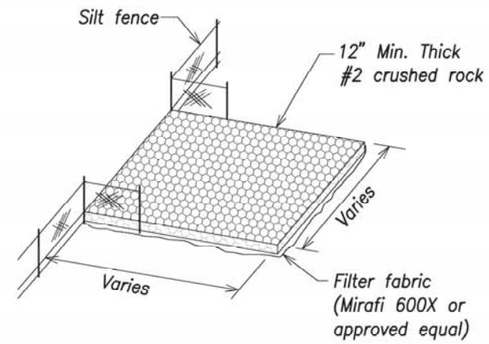
Notes:

1. Compost shall not contain biosolids and should be consistent with EPA guidelines as well as meet all local, state and federal quality requirements.
2. Contractor shall inspect compost filter socks when as required by the project SWPPP.

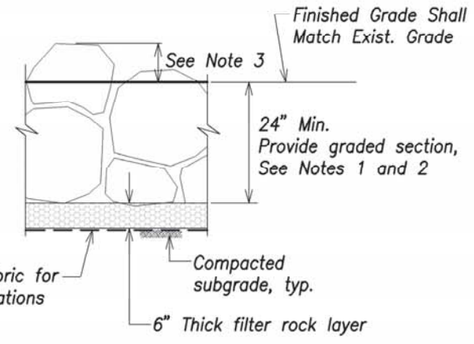
Table 1: Wooden stake anchor spacing

Slope	Anchor spacing
< 4:1	Not required
4:1 to 3:1	10' O.C.
> 3:1 to 2:1	5' to 10' O.C.
> 2:1	5' O.C.

COMPOST FILTER SOCK DETAIL
NOT TO SCALE



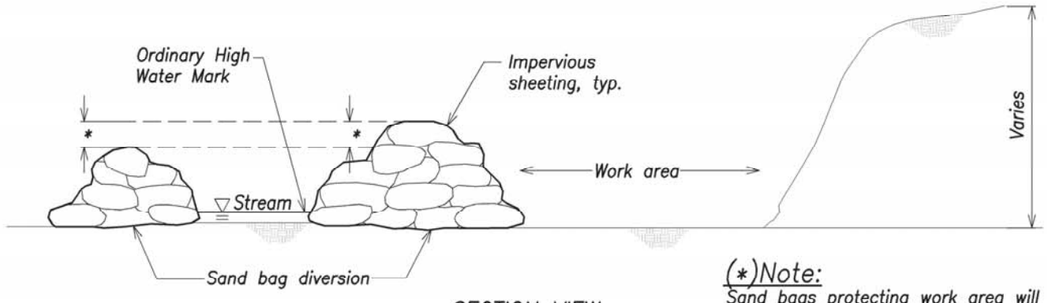
STABILIZED CONSTRUCTION ENTRANCE
Not To Scale



Notes:

1. Riprap shall be basalt rock and consist of 6"ø average stone size, 12"ø maximum stone size.
2. Riprap gradation:
   D_{85} = 9"
   D_{50} = 6"
   D_{15} = 4"
3. 6" Max. from highest adjacent rock finish top.

TEMPORARY DUMPED RIPRAP
Not to Scale



SECTION VIEW

SAND BAG DETAIL
Not To Scale

(*)Note:
Sand bags protecting work area will be constructed 1.5' higher than the opposite side to allow overflow of stream away from work area during high rainfall events.

ORIGINAL PLAN
SURVEY PLOTTED BY — DATE
DRAWN BY — RST
TRACED BY
DESIGNED BY — WC
NOTE BOOK
QUANTITIES BY
No. — CHECKED BY

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, ENTITLED "PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS AND LANDSCAPE ARCHITECTS."

4/30/16
SIGNATURE — LIC. EXPIRATION
R. M. TOWILL CORPORATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EROSION & SEDIMENT CONTROL DETAILS
Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: As Noted — Date: April 2015

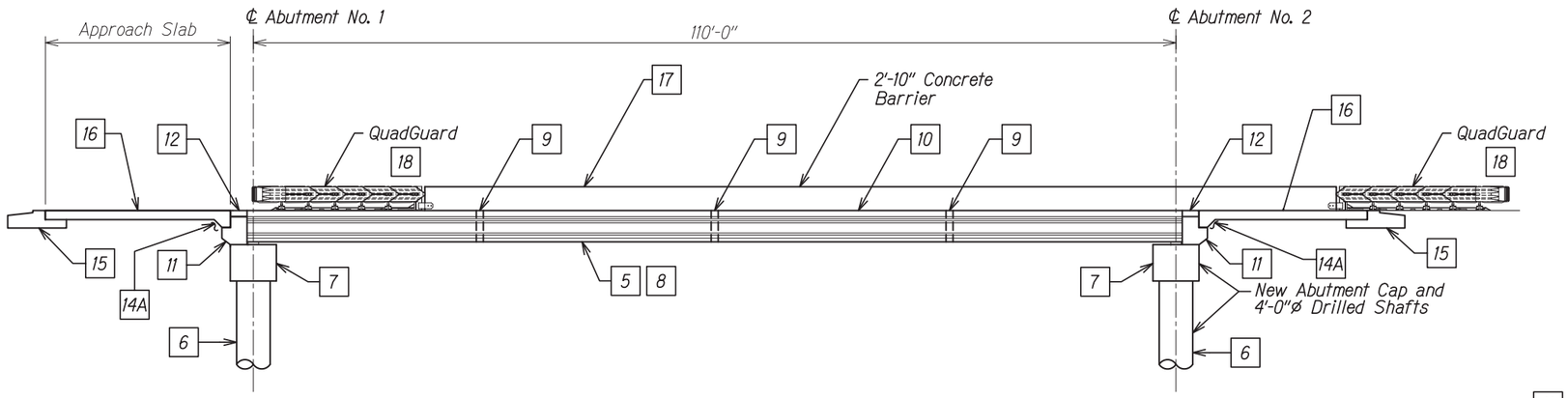
SHEET No. C-34 OF SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	62	148

To Kaneohe ←

→ To Kahuku



CONSTRUCTION SEQUENCE

Scale: 1/8" = 1'-0"

CONSTRUCTION SEQUENCE NOTES:

1. Order of construction sequence shall not be changed.
2. Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The Engineer will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.
3. Contractor shall submit overweight vehicular details for approval prior to their use.

LEGEND:

[#] Phase 1 Stages

CONSTRUCTION SEQUENCE ELEVATION

[1] Relocate existing utility lines.

[2] Construct trial and load test shafts. Perform load test.

[3] Install detour road and temporary bridge.

[4] Demolish existing bridge.

[5] Construct precast girders. (May be done concurrently with Stages 1 through 4.)

[6] Construct 4 ft diameter drilled shafts. Shaft numbers 1, 2, 3, 5, 6, 7.

[7] Cast Phase 1 drilled shaft cap beams, girder seats, and corbels for concrete encased ducts at least 7 days after the final drilled shaft concrete pour in Stage 6 or until the concrete in Stage 6 has attained a compressive strength of 4,500 psi, whichever occurs later.

[8] Erect Phase 1 precast girders at least 15 days after the concrete pour in Stage 7 or until the concrete in Stage 7 has attained a compressive strength of 5,000 psi, whichever occurs later. Place slush grout immediately prior to placement of precast girders.

[9] Construct Phase 1 intermediate diaphragms.

[10] Pour Phase 1 cast-in-place deck except areas over end beams and electrical duct encasement.

[11] Pour Phase 1 corbel and end beams to top of precast girder at least 30 days after the concrete pour in Stage 10. The concrete pour shall occur between midnight and 3:00 AM (3 hour window).

[12] Pour remainder of Phase 1 deck concrete a minimum of 24 hours after the concrete pour in Stage 11.

[13] Construct Phase 1 wing walls at least 8 days after the concrete pour in Stage 12 or after the concrete in Stage 12 has attained a compressive strength of 5,000 psi, whichever occurs later.

[14A] Backfill to Phase 1 limits and to bottom of approach slab at least 14 days after the concrete pour in Stage 13 or until the concrete in Stage 13 has attained a compressive strength of 5,000 psi, whichever occurs later. Maximum height difference of backfill between abutments shall not exceed 2 feet. Install concrete encased ducts behind abutments when backfill height is at the elevation of the bottom of the concrete encased electrical ducts. Continue backfilling after concrete for encased electrical ducts has attained its 28 day compressive strength.

[14B] Construct barrier wall.

[15] Construct Phase 1 sleeper slabs.

[16] Construct Phase 1 approach slabs.

[17] Construct mauka aesthetic railing, concrete barrier and fence wall.

[18] Install mauka quadguards.

[19] Install temporary barriers.

STEWART N. WILLIAMS
LICENSED PROFESSIONAL ENGINEER
No. 3908-S
HAWAII, U.S.A.

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4/30/16
SIGNATURE LIC. EXPIRATION
MITSUNAGA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE
PHASE 1

KAMEHAMEHA HIGHWAY
Kaipapau Stream Bridge Replacement
Federal Aid Proj. No. BR-083-1(48)

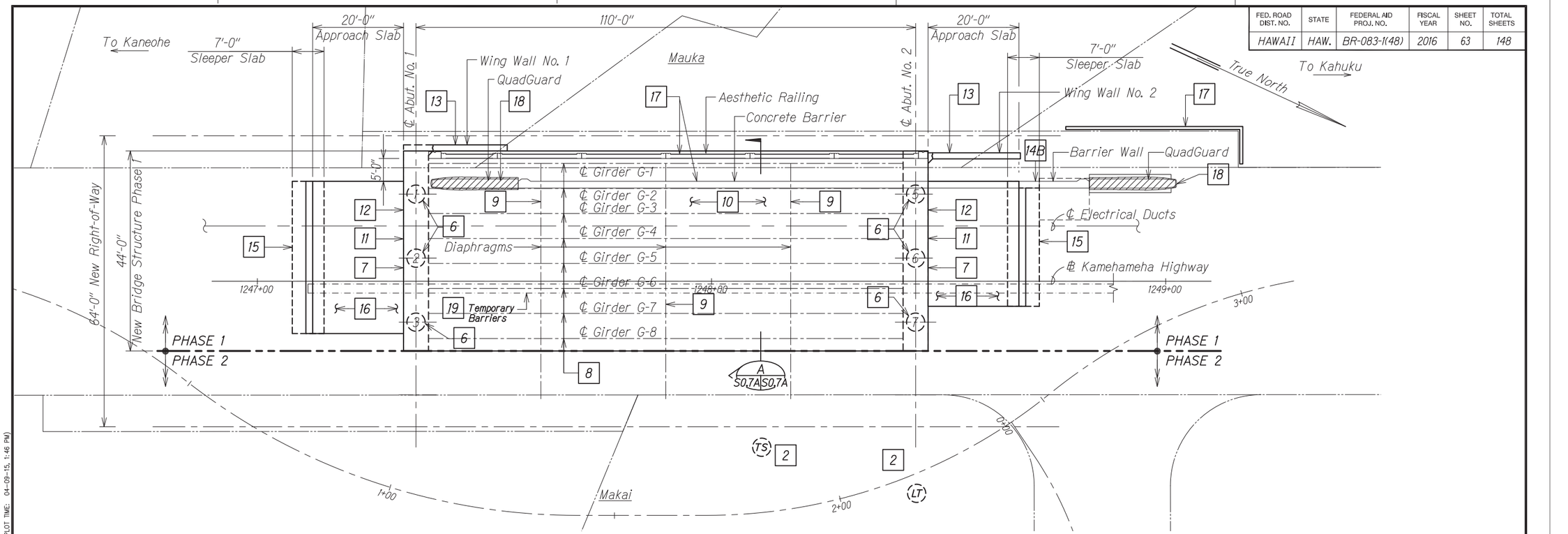
Scale: As Noted Date: April 2015

SHEET No. S0.7 OF 12 SHEETS

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

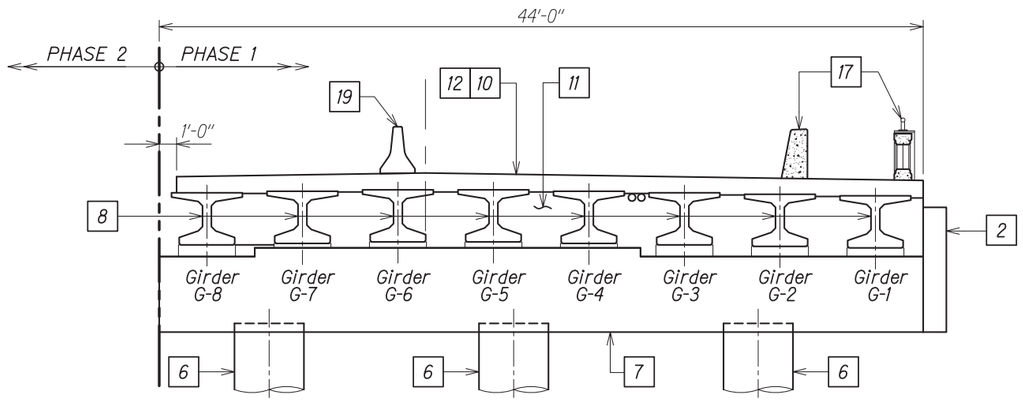
DRAWING NAME: K:\VERBATIM 12-10-14\B R I D G E\K A I 15-4-8\15-4-9 SW CADD PLOT\---1BI SW CADD 2015-04-10\KSB-S007.DWG PLOT TIME: 04-09-15, 10:52 AM)

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	63	148



PROPOSED CONSTRUCTION SEQUENCE PLAN (PHASE 1)

Scale: 3/32" = 1'-0"



CONSTRUCTION SEQUENCE (PHASE 1)

Scale: 1/4" = 1'-0"

A S0.7A S0.7A

LEGEND:

- # — Construction Sequence Stage
- (#) — Drilled Shaft ID
- (TS) — Trial Shaft
- (LT) — Load Test Shaft

STEWART N. WILLIAMS — LICENSED PROFESSIONAL ENGINEER — No. 3908-S — HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

4/30/16
SIGNATURE — LIC. EXPIRATION
MITSUNAGA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE PHASE 1

KAMEHAMEHA HIGHWAY
Kaipapau Stream Bridge Replacement
Federal Aid Proj. No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. S0.7A OF 12 SHEETS

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

DRAWING NAME: K:\VERBATIM 12-10-14\B R I D G E\K A I 15-4-8\15-4-9 SW CADD PLOT\---1BI SW CADD 2015-04-10\KSB-S007A.DWG PLOT TIME: 04-09-15, 1:46 PM)

KAIPAPAU STREAM BRIDGE REPLACEMENT – OVERALL CONSTRUCTION SEQUENCE

	Structural Construction Stage	Description	References: Civil	Electrical	Geotech.	Structural	Waterline Work	Exist Bridge Open	Detour Open	Detour Off Peak Lane Closures Anticipated	Remarks
	Prior to Site Mobilization for Demolition	1. Prior to Site Mobilization, the Contractor shall submit required BMP's and other Municipal and National permit applications as indicated in the project Plans, Special Provisions and Specifications. 2. The Contractor shall submit Prefabricated Steel Beam Bridge Structural Computations and Erection drawings to the Owner for Review and Approval Prior to Fabrication.	Civil Sequence See C-10. See Civil 1			Structural Sequence S0.7,S0.7A, S0.8,S0.8A		Exist Bridge Open to Traffic			
	1	1. Install approved BMP measures. 2. Relocate Existing overhead utility lines. 3. Install temporary 12" fusible PVC waterline on existing (upstream) pedestrian walkway.	C-15,16,17, C-20, C-28, see Civil 2	E-8, E-9, E-10, E-11			Temporary 12" fusible PVC waterline				
	2	1. Construct Trial and Load Test shafts * 2. Perform Load Test. Demobilize drilled shaft equipment off site.	See Civil 3		Special drilling equipment*	S1.1, S8.3					*Special Provisions Section 511
	3	1. Install Detour Pier, Abutments and Temporary Bridge. Construct Civil Phase 1 waterline Improvements C-29; C-30. 2. Construct Detour Approach Retaining Wall, Fills and Roadway – chainlink fence see C-23. 3. Construct Civil Phase 2 waterline improvements–see C-29; C-31.	See Civil 4 C-23, C-29, C-30, C-31, C-32	E-10, E-11, E-15	Excavation Bracing–Spec. Prov. 205*	S12.1, S12.2 S12.3, S12.4 S12.5	Civil Phase 1 & 2 (W16) waterline work–see C-29, C-30.		Detour Open to Traffic		*Excavation Bracing anticipated upstream of detour.
	4	1. Relocate existing water line W12 (prior to existing bridge demolition) – see C-20, C-28. 2. Demolish existing bridge.	See Civil 5 C-20, C-28		Excavation Bracing–Spec. Prov. 205*	S2.1, S2.2	Relocate Exist W12 waterline C-20, C-28.	Exist Bridge Demolition			*Exc. Bracing upstream of existing.
	5	Construct precast girders. (May be done concurrently with stages 1 through 4.)	See Civil 6			S4.x series					
	6	Construct 4 ft. diameter drilled shafts. 1, 2, 3, 5, 6, 7. *			Special drilling equipment*	S1.1,S1.2,S6.1, S6.2,S8.1,S8.2					*Special Provisions Section 511
STRUCTURAL PHASE 1	7	Cast phase 1 drilled shaft cap beams, girder seats, and corbels for concrete encased ducts at least 7 days after the final drilled shaft concrete pour in stage 6 or until the concrete in stage 6 has attained a compressive strength of 4,500 psi, whichever occurs later.			Structure – Excavation Bracing per Spec Prov 205	S0.7, S0.7A, S6.x series					Marks 7 through 18 are PHASE 1. Structural see 20 for PHASE 2
	8	Erect phase 1 precast girders at least 15 days after the concrete pour in stage 7 or until the concrete in stage 7 has attained a compressive strength of 5,000 psi, whichever occurs later. Place slush grout immediately prior to placement of precast girders.			Required at Makai Limit	S0.7, S0.7A, S1.2, S1.3, S6.x series					
	9	Construct phase 1 intermediate diaphragms.				S0.7,S0.7A, S5.x series					
	10	Pour phase 1 cast-in-place deck except areas over end beams and duct encasement.				S0.7,S0.7A S1.6,S3.1,S3.2					
	11	Pour phase 1 end beams to top of precast girder and corbel at least 30 days after the concrete pour in Stage 10. The concrete pour shall occur between midnight and 3:00 AM (3 hours).				S0.7,S0.7A, S6.x series					Concrete Placement At Night
	12	Pour remainder of phase 1 deck concrete a minimum of 24 hours after the concrete pour in stage 11.									
	13	Construct phase 1 wing walls at least 8 days after the concrete pour in stage 12 or after the concrete in stage 12 has attained a compressive strength of 5,000 psi, whichever occurs later.				S0.7,S0.7A, S7.x series				Lane Closure Duration Approx 3 weeks each abutment with Further Lane Closure Duration Approx 2 weeks each approach	
	14	Backfill to phase 1 limits and to bottom of approach slab and at least 14 days after the concrete pour in Stage 13 or until the concrete in Stage 13 has attained a compressive strength of 5,000 psi, whichever occurs later. Maximum height difference of backfill between abutments shall not exceed 2 feet. Install concrete encased ducts when backfill height is at the elevation of bottom of concrete encased ducts. Continue backfilling after concrete for encased ducts has attained its 28 day compressive strength.		Signal Corps Work E-1, E-5 E-12, E-13, E-16		S0.7,S0.7A,S6.x S9.x					
	15	Construct phase 1 sleeper slabs.									
	16	Construct phase 1 approach slabs.		Signal Corps Work E-1, E-5 E-12,E-13,E-16							
	17	Construct mauka aesthetic railings and concrete barrier.									
	18	Install mauka quadguards.									
	19	Install Temporary Barriers and Temporary Striping on PHASE 1 of New Bridge.	See Civil for Barriers								

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	64	148

CONSTRUCTION SEQUENCE NOTES:

1. Order of construction sequence shall not be changed unless authorized in writing by the Engineer.
2. Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The Engineer will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.
3. Contractor shall submit overweight vehicular details for approval prior to their use.
4. Construction shall be conducted such that no construction debris, wash water or other contaminants shall enter the Stream Waters.
5. Closing of the Prefabricated Steel Beam Bridge Structure:
   (a) If for any reason or at any time, the Prefabricated Beam Bridge Structure's ability to safely carry traffic is in question, the Contractor shall be responsible for immediately taking the actions necessary to protect the public by closing, repairing and reopening the Prefabricated Steel Truss Bridge.
   (b) When the Contractor closes the Prefabricated Steel Beam Bridge Structure, the Contractor shall immediately notify the Engineer and the appropriate Law Enforcement Agency.
   (c) Closing of the Prefabricated Steel Beam Bridge shall be included as incidental to Maintenance of Traffic Control.
6. The Contractor shall phase 16 inch waterline (W16) to allow no more than 8 hours of down time. Liquidated Damages of $100,000 per day will be imposed if the Contractor exceeds the 8 hour restriction.

ORIGINAL PLAN
SURVEY PLOTTED BY ____ DATE
DRAWN BY BSY
TRACED BY
NOTE BOOK WC
DESIGNED BY
QUANTITIES BY
CHECKED BY
No.

STEWART N. WILLIAMS
LICENSED PROFESSIONAL ENGINEER
No. 3908-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

4/30/16
SIGNATURE LIC. EXPIRATION
MITSUNAGA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERALL CONSTRUCTION SEQUENCE
STRUCTURAL PHASE 1

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: AS NOTED Date: April 2015

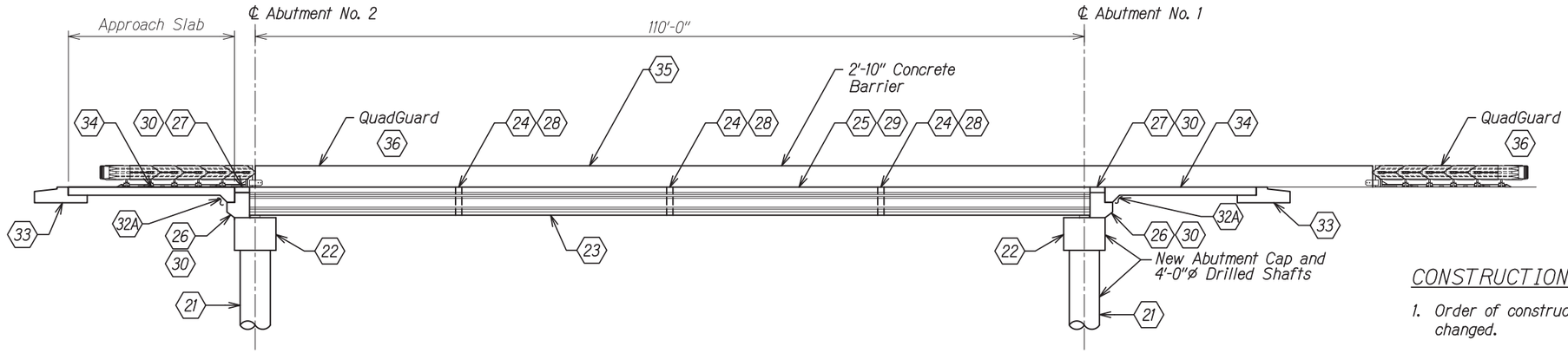
SHEET No. S0.7B OF 12 SHEETS

RMTC JOB NO. : 1-19548-0E

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	65	148

To Kaneohe ←

→ To Kahuku



CONSTRUCTION SEQUENCE

Scale: 1/8" = 1'-0"

CONSTRUCTION SEQUENCE NOTES:

1. Order of construction sequence shall not be changed.
2. Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The Engineer will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.
3. Contractor shall submit overweight vehicular details for approval prior to their use.

LEGEND:

(#) Phase 2 Stages

CONSTRUCTION SEQUENCE ELEVATION

(20) Partially remove temporary bridge as required to construct Phase 2 of Kaipapau Stream Bridge

(21) Construct 4 ft diameter shafts – Shaft nos. 4 and 8.

(22) Cast Phase 2 drilled shaft cap beams, girder seats, and corbels for concrete jacketed waterline at least 7 days after the final drilled shaft concrete pour in Stage 21 or until the concrete in Stage 21 has attained a compressive strength of 4,500 psi, whichever occurs later.

(23) Erect Phase 2 precast girders at least 15 days after the concrete pour in Stage 22 or until the concrete in Stage 22 has attained a compressive strength of 5,000 psi, whichever occurs later. Place slush grout immediately prior to placement of precast girders.

(24) Construct Phase 2 intermediate diaphragms between girders G-9 and G-10, install dowels connecting G-10 and G-11, and install W16 with light-weight concrete jacket between girders G-10 and G-11.

(25) Pour Phase 2 cast-in-place deck except areas over end beams and closure pour.

(26) Pour Phase 2 corbel and end beams (except at closure pour) to top of precast girder at least 30 days after the concrete pour in Stage 25. The concrete pour shall occur between midnight and 3:00 AM (3 hour window).

(27) Pour remainder of Phase 2 deck concrete (except at closure pour) a minimum of 24 hours after the concrete pour in Stage 26.

(28) Pour Phase 2 intermediate diaphragms between girders G-8 and G-9 at least 4 days after the concrete pour in Stage 27.

(29) Pour Phase 2 cast-in-place deck closure except over end beams. Material for cast-in-place deck closure pour shall be VESLMC. (See Special Provisions).

(30) Pour Phase 2 corbel and end beam closure from top of drilled shaft cap beam to top of deck. Material for end beam closure pour shall be VESLMC. (See Special Provisions).

(31) Construct Phase 2 wing walls at least 8 days after the concrete pour in Stage 30 or after the concrete in Stage 30 has attained a compressive strength of 5,000 psi, whichever occurs later.

(32A) Backfill to bottom of approach slab at least 14 days after the concrete pour in Stage 31 or until the concrete in stage 31 has attained a compressive strength of 5,000 psi, whichever occurs later. Maximum height difference of backfill between abutments shall not exceed 2 feet. Install jacketed waterline behind abutments when backfill height is at the elevation of the bottom of the jacketed waterline. Continue backfilling after concrete for jacketed waterline has attained its 28 day compressive strength.

(32B) Construct Barrier Wall.

(33) Construct Phase 2 sleeper slabs.

(34) Construct Phase 2 approach slabs.

(35) Constuct Makai aesthetic railing and concrete barrier.

(36) Install Makai quadguards.

(37) Remove remainder of temporary bridge.

STEWART N. WILLIAMS
LICENSED PROFESSIONAL ENGINEER
No. 3908-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

4/30/16
SIGNATURE LIC. EXPIRATION
MITSUNAGA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE
PHASE 2
KAMEHAMEHA HIGHWAY
Kaipapau Stream Bridge Replacement
Federal Aid Proj. No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. S0.8 OF 12 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
NOTE BOOK	TRACED BY	
	DESIGNED BY	
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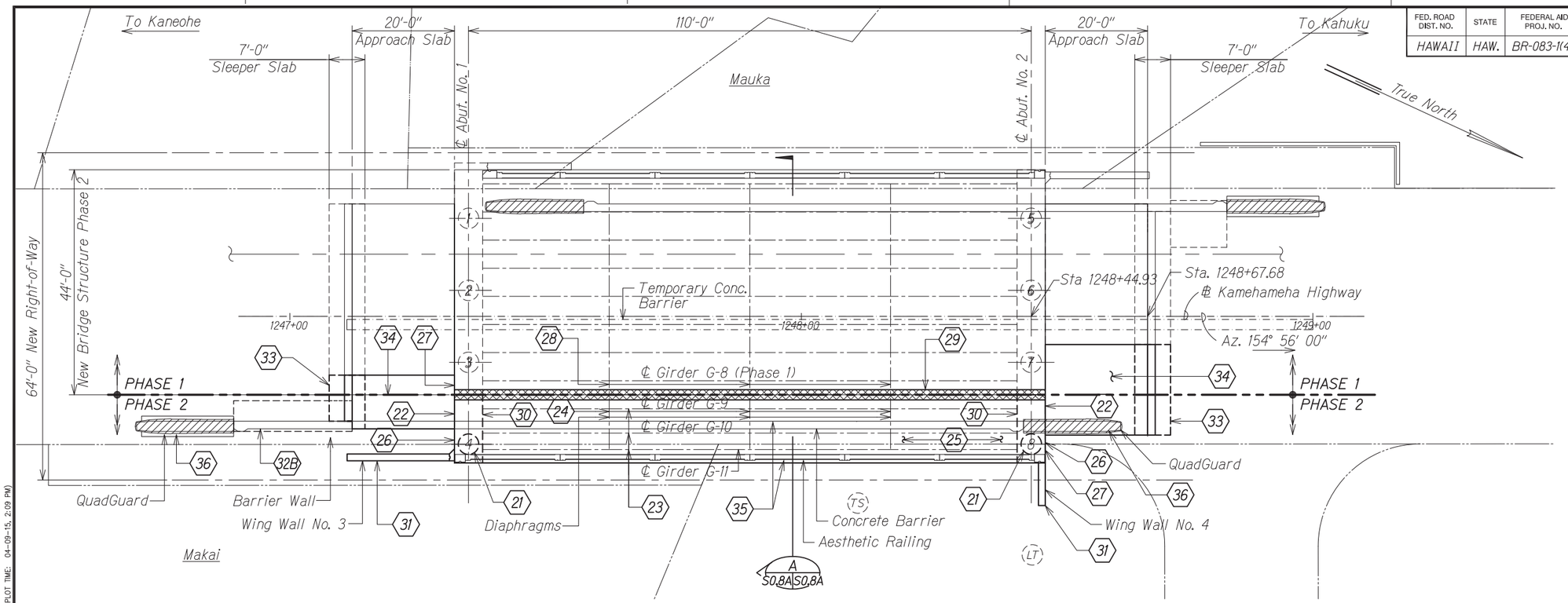
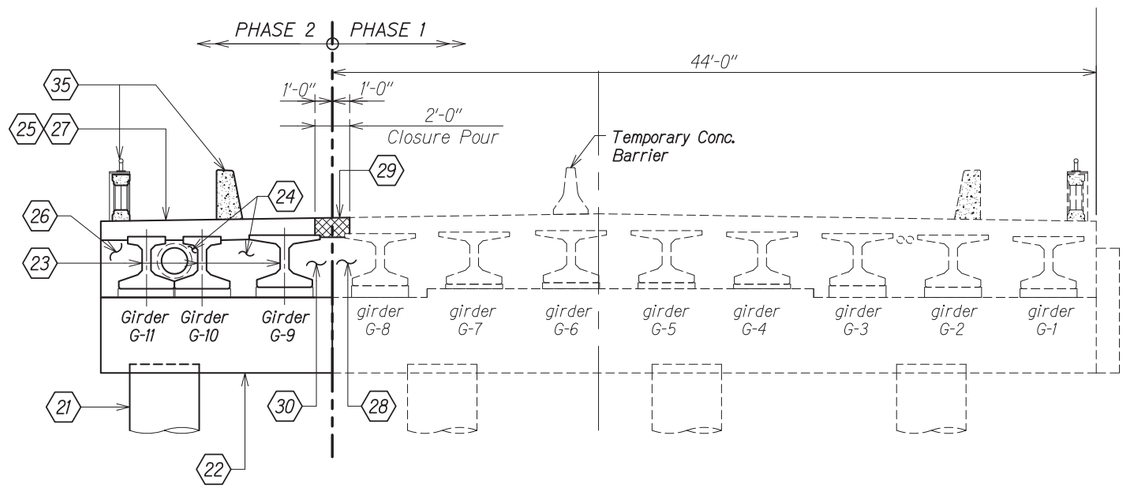
DRAWING NAME: K:\VERBATIM 12-10-14\B R I D G E\K A I 15-4-8\15-4-9 SW CADD PLOT\---1BI SW CADD 2015-04-10\KSB-S008.DWG PLOT TIME: 04-09-15, 11:03 AM)

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	66	148



PROPOSED CONSTRUCTION SEQUENCE PLAN (PHASE 2)

Scale: 3/32" = 1'-0"



CONSTRUCTION SEQUENCE (PHASE 2)

Scale: 1/4" = 1'-0"

A S6.3 S6.3

LEGEND:

- (#) Construction Sequence Stage
- (#) Drilled Shaft ID
- (TS) Trial Shaft
- (LT) Load Test Shaft
- Closure Pour

STEWART N. WILLIAMS LICENSED PROFESSIONAL ENGINEER No. 3908-S HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

4/30/16
SIGNATURE LIC. EXPIRATION
MITSUNAGA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONSTRUCTION SEQUENCE
PHASE 2

KAMEHAMEHA HIGHWAY
Kaipapau Stream Bridge Replacement
Federal Aid Proj. No. BR-083-1(48)

Scale: As Noted Date: April 2015

SHEET No. S0.8A OF 12 SHEETS

ORIGINAL PLAN	DATE
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NOTE BOOK	DRAWN BY
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No.	QUANTITIES BY
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KAIPAPAU STREAM BRIDGE REPLACEMENT – OVERALL CONSTRUCTION SEQUENCE

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	BR-083-1(48)	2016	67	148

Structural Construction Stage		Description	References: Civil	Electrical	Geotech.	Structural	Waterline Work	Exist Bridge Open	Detour Open	Detour Off Peak Lane Closures Anticipated	Remarks
	20	1. Open PHASE I of New Bridge to traffic. Close Temporary Bridge and Detour Roadway to traffic. 2. Remove Mauka portion of Temporary Bridge Only (Remainder to remain in place to support construction equipment for construction of PHASE 2 portion of New Bridge and to support temporary W16 until Final W16 is constructed).				S0.8, S0.8A		PHASE I of New Bridge Open to Traffic to allow Detour Closure	Close Detour and Remove Limited Portion of Temporary Bridge	Not Applicable	Close Detour; Open PHASE 1 of New Bridge: Start Construction of PHASE 2 of New Bridge
STRUCTURAL PHASE 2	21	Construct 4 ft. diameter drilled shafts – Shaft nos. 4 and 8.	See Civil 6		Special drilling equipment*	S1.1, S1.2, S6.1, S6.2, S8.1, S8.2			Detour Closed		*Special Provisions Section 511
	22	Cast Phase 2 drilled shaft cap beams, girder seats, and corbels for concrete jacketed waterline at least 7 days after the final drilled shaft concrete pour in stage 21 or until the concrete in stage 21 has attained a compressive strength of 4,500 psi, whichever occurs later.			Structure Excavation Bracing per Spec for 205 Required at Approaches.	S0.8, S0.8A, S6.x series					Special Provisions Section 205
	23	Erect Phase 2 precast girders at least 15 days after the concrete pour in stage 22 or until the concrete in stage 22 has attained a compressive strength of 5,000 psi, whichever occurs later. Place slush grout immediately prior to placement of precast girders.				S0.8, S0.8A, S1.2, S1.3, S6.x series	Civil Phase 3 (W16) waterline improvements seeC-29,C32				
	24	Construct Phase 2 intermediate diaphragms between girders G-9 and G-10 and light-weight W16 concrete jacket between girders G-10 and G-11.	C-29, C-30			S0.8,S0.8A, S5.x series					
	25	Pour Phase 2 cast-in-place deck except areas over end beams and closure pour.				S0.8,S0.8A S1.6,S3.1,S3.2					
	26	Pour Phase 2 end beams (except at closure pour) to top of precast girder and corbel at least 30 days after the concrete pour in Stage 25. The concrete pour shall occur between midnight and 3:00 AM (3 hours).				S0.8,S0.8A, S6.x series					Concrete Placement At Night
	27	Pour remainder of Phase 2 deck concrete (except at closure pour) a minimum of 24 hours after the concrete pour in stage 25.									
	28	Pour Phase 2 intermediate diaphragms between girders G-8 and G-9 at least 4 days after the concrete pour in stage 27.									
	29	Pour Phase 2 cast-in-place deck closure except over end beams. Material for cast-in-place deck closure pour shall be VESLMC.									
	30	Pour Phase 2 end beams closure from top of drilled shaft cap beam to top of deck. Material for end beam closure pour shall be VESLMC.									
	31	Construct Phase 2 wing walls at least 8 days after the concrete pour in stage 30 or after the concrete in stage 30 has attained a compressive strength of 5,000 psi, whichever occurs later.				S0.8,S0.8A, S7.x series					
	32	Backfill to bottom of approach slab at least 14 days after the concrete pour in Stage 31 or until the concrete in Stage 31 has attained a compressive strength of 5,000 psi, whichever occurs later. Maximum height difference of backfill between abutments shall not exceed 2 feet. Install jacketed waterline when backfill height is at the elevation of bottom of the jacketed waterline. Continue backfilling after concrete for jacketed waterline has attained its 28 day compressive strength.				S0.8,S0.8A,S6.x S9.x					
	33	Construct Phase 2 sleeper slabs.									
	34	Construct Phase 2 approach slabs.									
	35	Construct Makai aesthetic railings and concrete barrier.									
	36	Install Makai guadguards. Remove Detour; construct stream hardening. Remove Temporary Barriers at New Bridge. Open Phase 1 and Phase 2 of New Bridge to traffic.	See Civil 7 thru 12	Permanent Electrical Plan See E-12,E-13, E-14			Remove temp W16 at Closed Detour	PHASE I and PHASE 2 of New Bridge Open	Remove Remainder of Detour		

CONSTRUCTION SEQUENCE NOTES:

1. Order of construction sequence shall not be changed unless authorized in writing by the Engineer.
2. Each sequence stage shall be completely finished before proceeding to the next stage unless otherwise noted. The Engineer will be the sole judge of whether the sequence stage is complete, and may direct the Contractor to stop work on a sequence stage to complete work on the preceeding sequence stage.
3. Contractor shall submit overweight vehicular details for approval prior to their use.
4. Construction shall be conducted such that no construction debris, wash water or other contaminants shall enter the Stream Waters.
5. Closing of the Prefabricated Steel Beam Bridge Structure:
   (a) If for any reason or at any time, the Prefabricated Beam Bridge Structure's ability to safely carry traffic is in question, the Contractor shall be responsible for immediately taking the actions necessary to protect the public by closing, repairing and reopening the Prefabricated Steel Truss Bridge.
   (b) When the Contractor closes the Prefabricated Steel Beam Bridge Structure, the Contractor shall immediately notify the Engineer and the appropriate Law Enforcement Agency.
   (c) Closing of the Prefabricated Steel Beam Bridge shall be included as incidental to Maintenance of Traffic Control.
6. The Contractor shall phase 16 inch waterline (W16) to allow no more than 8 hours of down time. Liquidated Damages of $100,000 per day will be imposed if the Contractor exceeds the 8 hour restriction.

ORIGINAL PLAN | SURVEY PLOTTED BY | DATE
NOTE BOOK | DRAWN BY | BSY
No. | TRACED BY | WC
DESIGNED BY
QUANTITIES BY
CHECKED BY

STEWART N. WILLIAMS
LICENSED PROFESSIONAL ENGINEER
No. 3908-S
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

4/30/16
SIGNATURE | LIC. EXPIRATION
MITSUNAGA & ASSOCIATES, INC.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERALL CONSTRUCTION SEQUENCE
STRUCTURAL PHASE 2

Kamehameha Highway
Kaipapau Stream Bridge Replacement
Federal Aid Project No. BR-083-1(48)

Scale: AS NOTED | Date: April 2015

SHEET No. S0.8B OF 12 SHEETS

RMTC JOB NO. : 1-19548-0E

Attachment C

Source Water Quality Assessment (Items G.3., G.8., & G.9.)

Source Water Quality Assessment for Kaipapa‘u Stream Bridge replacement project Hau’ula, O‘ahu

January 10, 2019 | ***DRAFT*** | AECOS No. 1060B

Allen Cattell
AECOS, Inc.
45-939 Kamehameha Highway, No. 104
Kāne‘ohe, Hawai‘i 96744
Phone: (808) 234-7770 Fax: (808) 234-7775 Email: aecos@aecos.com

Introduction

Hawai‘i Department of Transportation (HDOT) will be replacing Kamehameha Highway-Kaipapa`u Stream Bridge (herein referred to as the "Project") in Hau`ula on the windward coast of O`ahu (Figure 1). *AECOS*, Inc. was contracted[1] to collect and analyze water samples and provide a Source Water Quality Assessment (SWQA) for potential environmental impacts from dewatering activities associated with the Project.

Kaipapa`u Stream (State Perennial Stream ID No. 3-1-10) is an interrupted perennial stream that originates in the northern part of Ko`olau Mountain and descends to the Pacific Ocean from an elevation of around 2600 ft (792 m). An interrupted perennial stream is one that flows year-round in the upper reaches and usually intermittently at lower elevations. Kaipapa`u Stream flows under the bridge at Kamehameha Highway and discharges at the coastline between Kaipapa‘u Point and Hau‘ula Beach Park. Kaipapa’u Stream is listed on the 2018 State of Hawaii Water Quality Monitoring Assessment Report (HDOH, 2018) as having “insufficient data” to make a determination as to whether the stream is meeting state water quality criteria.

[1] This report was prepared for R.M. Towill Corporation and may become part of the public record.

Methods

Water quality samples were collected on November 26, 2018 under Kaipapa'u Stream Bridge (Sta. Bridge; Figure 2). Temperature, conductivity, pH, and dissolved oxygen (DO) were measured in the field. Samples for turbidity and total suspended solids (TSS) were collected in appropriate containers, stored on ice, and delivered to *AECOS* Inc. laboratory on O'ahu for analyses (*AECOS* Log No. 36914). Samples for nutrients (nitrate+nitrite, ammonium, total nitrogen, total phosphorus), oil and grease, 32 polynuclear aromatic hydrocarbons, 30 pesticides/PCBs, and 51 volatile organics were collected in appropriate containers, stored on ice, and shipped to Calscience Environmental Laboratories for analyses. Sample collection techniques are detailed in Appendix A. Samples were analyzed according to methods listed in Table 1.

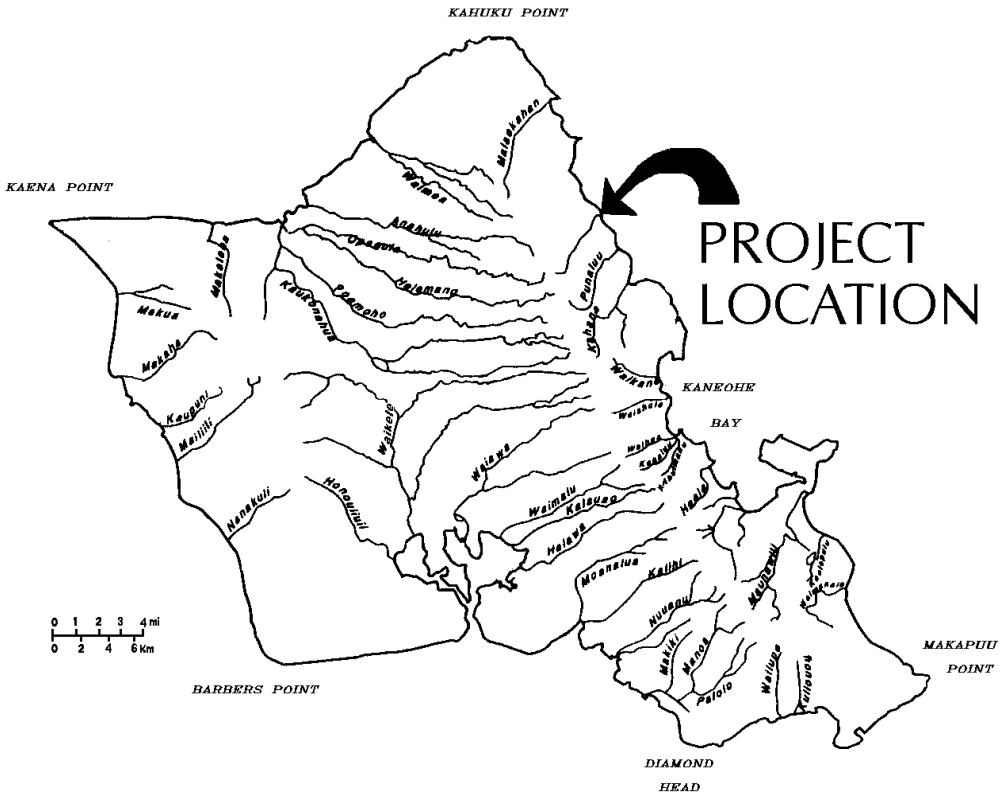

Figure 1. Project location on the Island of O`ahu.

Figure 2. Location of water quality sampling station: Sta. Bridge.

Results

Laboratory quality assurance/quality control (QA/QC) statements for all analyses of water quality samples are provided in Appendix A. Table 2 presents results of the November 26, 2018 sampling event for physical parameters, inorganic nutrients, turbidity, TSS, and oil and grease.

Water quality samples were also analyzed for 32 polynuclear aromatic hydrocarbons, 30 pesticides/PCBs, and 51 volatile organics. Laboratory results for these 113 compounds were all "not detected" and therefore are not expected to occur during proposed bridge construction.

Stream water temperature and conductivity values were typical for freshwater streams. pH levels were slightly acidic and DO saturation levels were low. Particulates (turbidity and TSS) were both low for flowing streams. Ammonium was not present in detectable amounts, whereas nitrate+nitrite and total

nitrogen concentrations were elevated. Total phosphorus was typical of stream waters. "Oil and grease" was not present in detectable concentrations.

Table 1. Methods used in analyses of water sampled from Well Site.

Analysis	Method	Reference
Temperature	SM 2550 B	SM (1998)
pH	SM 4500 H+	SM (1998)
Dissolved Oxygen	YSI meter/SM 4500-O G	SM (1998)
Conductivity	SM 2510-B	SM (1998)
Turbidity	EPA 180.1 Rev 2.0	USEPA (1993)a
Total Suspended Solids (TSS)	SM 2540 D	SM (1999)
Ammonia	SM4500 NH3 B/C	SM (1999)
Nitrate + Nitrite	SM 4500 NO3-E	SM (1999)
Kjeldahl Nitrogen	EPA 351.2	USEPA 1993b
Total Nitrogen	By calculation	
Total Phosphorus	SM 4500 P B/E	SM (1998)
Oil & Grease	EPA 1664A	USEPA (1999)
Polynuclear Aromatic Hydrocarbons	EPA 610	USEPA (1995)
Pesticides & PCBs	EPA 605	USEPA (1995)
Volatile Organics	EPA 624	USEPA (1995)

Table 2. Results for selected water quality parameters measured at Sta. Bridge on November 26, 2018.

Temp. (°C)	Salinity (PSU)	Conduct. (µmhos/cm)	pH	DO sat. (%)	Turbidity (ntu)
24.7	nd†	357	6.74	62	0.42

TSS (mg/l)	Ammonium (µgN/l)	Nitrate + Nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)	Oil & Grease (mg/l)
0.6	nd	540	710	28	nd

† nd = not detected

Assessment

Water quality data collected from Kaipapa'u Stream on November 26 (see Table 2) can be compared to certain water quality criteria established for streams (Table 7).. Criteria for turbidity, TSS, and nutrients are based on geometric means not to exceed specific criterion values. Since geometric means require a minimum of three separate sampling events per station, our single event results cannot be compared with state geometric mean criteria. Nevertheless, these criteria are useful guides for what HDOH regards as good water quality. Our results for physical parameters (temperature, DO saturation and pH) can be evaluated for compliance with state criteria.

Table 3. Water quality criteria applicable to streams (HDOH, 2014a).

Parameter	Geometric Mean value not to exceed this value	Value not to be exceeded more than 10% of the time	Value not to be exceeded more than 2% of the time
Total Nitrogen (µg N/L)	250.0* 180.0**	520.0* 380.0**	800.0* 600.0**
Nitrate+Nitrite (µg N/L)	70.0* 30.0**	180.0* 90.0**	300.0* 170.0**
Total Phosphorus (µg P/L)	50.0* 30.0**	100.0* 60.0**	150.0* 80.0**
Total Suspended Solids (µg/L)	20.0* 10.0**	50.0* 30.0**	80.0* 55.0**
Turbidity (NTU)	5.0* 2.0**	15.0* 5.5**	25.0* 10.0*

* Wet season – November 1 through April 30
** Dry season – May 1 through October 31
Other "standards":
- pH units are not to deviate more than 0.5 units from ambient and are to be neither lower than 5.5 nor higher than 8.0.
- Dissolved oxygen is not to decrease below 80% of saturation.
- Temperature is not to vary more than 1C^{o} from ambient conditions.
- Specific conductance is to be less than 300 µmhos/cm.

Criteria for specific conductance and DO saturation did not meet state criteria on November 26, 2018 at Sta. Bridge. pH values were within criteria specified for streams. The criterion for temperature is based on "deviations from ambient conditions" and essentially pertains to discharges that might cause deviations. The cause of elevated nitrate+nitrite and total nitrogen concentrations are unknown. Particulates, ammonium, and total phosphorus were low at Sta. Bridge.

Dewatering effluents during bridge replacement construction will likely result in increases in turbidity and TSS levels and nutrient (nitrogen and phosphorus moieties and will not meet NPDES requirements for discharge into state waters. It is also likely that oil and grease will be present in dewatering effluents due to machine operations. No treatment of polynuclear aromatic hydrocarbons, pesticides, PBCs or volatile organics will be required due to lack of presence at the Project site.

Potential dewatering treatment options for the Project include:

1) Pumping to an on-site settling basin, allowing for percolation back into the ground. This is the most economical option, but depends on available open-ground for a settling basin, groundwater intrusion rate, and percolation rate at a selected settling basin site. Percolation rate could be increased by pre-filtration of particulates. If available ground area is limited, back trenching may be a viable option;
2) Transport of dewatering effluents off-site to a state-approved landfill. This option would be feasible if only a small amount of dewatering effluents is generated.

It should be noted that there are no practical treatment methods available to reduce nutrient concentrations to levels that would permit direct discharge into state waters such as Kaipapa'u Stream.

Conclusions

It is likely that dewatering will generate effluents that will result in increases of turbidity and TSS levels as well as nutrient (nitrogen and phosphorus moieties) concentrations that exceed state standards. Oil and grease may also exceed state standards due to equipment operations during the dewatering process, rendering these effluents unsuitable for direct discharge into state waters. Potential dewatering treatment options for the Project include percolation via

settling basins or back-trenching or transport and disposal in a state-approved landfill.

Water quality impacts generated by construction should be temporary and minimal if effective treatment and BMPs are employed. An Applicable Monitoring and Assessment Plan (AMAP) should be developed to monitor effectiveness of best management practices (BMPs) deployed during construction.

References

Hawai'i Department of Health (HDOH). 2014. Hawai'i Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards. State of Hawai'i, Department of Health. 86 pp.

_____. 2018. 2018 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to §303(d) and §305(b),Clean Water Act (P.L. 97-117). 127 pp.

Standard Methods (SM). 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. 1998. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1220 pp.

U.S. Environmental Protection Agency (USEPA). 1993a. Method 180.1: Determination of Turbidity by Nephelometry. Revisions 2. Environmental Monitoring Systems Laboratory, Office of Research and Development, Cincinnati, Ohio 45268. 16 pp. 11 pp.

_____. 1993b. Method 351.2, Revision 2.0: Determination of Total Kjeldahl Nitrogen by Semi-Automated Colorimetry. Environmental Monitoring Systems Laboratory, Office of Research and Development, Cincinnati, Ohio 45268. 16 pp.

_____. 1995. 40 CFR, Part 136, Revised as of July 1, 1995. Appendix A to Part 136 - Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. 333 pp.

_____. 1999. Method 1664, Revision A: N-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated N-Hexane Extractable Material

(SGT-HEM; Non-polar Material) by Extraction and Gravimetry. EPA-821-R-98-002. 23 pp.

Appendix A

Report of Analytical Results

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WORK ORDER NUMBER: 18-11-2057

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: AECOS, Inc.

Client Project Name: 36914

Attention: Ann Mello
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Approved for release on 12/10/2018 by:
Julie Lam
Project Manager

ResultLink

Email your PM

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Contents

Client Project Name: 36914
Work Order Number: 18-11-2057

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Work Order Narrative

Work Order: 18-11-2057 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 11/28/18. They were assigned to Work Order 18-11-2057.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

DoD Projects:

The test results contained in this report are accredited under the laboratory's ISO/IEC 17025:2005 and DoD-ELAP accreditation issued by the ANSI-ASQ National Accreditation Board. Refer to certificate and scope of accreditation ADE-1864.

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Sample Summary

Client:	AECOS, Inc. 45-939 Kamehameha Hwy #104 Kaneohe, HI 96744-3221	Work Order:	18-11-2057
		Project Name:	36914
		PO Number:	
		Date/Time Received:	11/28/18 10:45
		Number of Containers:	13
Attn:	Ann Mello		

Sample Identification	Lab Number	Collection Date and Time	Number of Containers	Matrix
Bridge	18-11-2057-1	11/26/18 10:47	13	Aqueous

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: EPA 610
Method: EPA 610
Units: ug/L

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Bridge	**18-11-2057-1-J**	**11/26/18 10:47**	**Aqueous**	**HPLC 5**	**12/01/18**	**12/03/18 19:30**	**181201L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Naphthalene	ND	0.96	0.074	0.999	
Acenaphthylene	ND	0.96	0.049	0.999	
Acenaphthene	ND	0.96	0.036	0.999	
Fluorene	ND	0.96	0.042	0.999	
Phenanthrene	ND	0.96	0.038	0.999	
Anthracene	ND	0.96	0.042	0.999	
Fluoranthene	ND	0.96	0.033	0.999	
Pyrene	ND	0.96	0.044	0.999	
Benzo (a) Anthracene	ND	0.96	0.034	0.999	
Chrysene	ND	0.96	0.031	0.999	
Benzo (b) Fluoranthene	ND	0.96	0.033	0.999	
Benzo (k) Fluoranthene	ND	0.96	0.034	0.999	
Benzo (a) Pyrene	ND	0.19	0.027	0.999	
Dibenz (a,h) Anthracene	ND	0.96	0.041	0.999	
Benzo (g,h,i) Perylene	ND	0.96	0.040	0.999	
Indeno (1,2,3-c,d) Pyrene	ND	0.96	0.051	0.999	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decafluorobiphenyl	72	40-160	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: EPA 610
Method: EPA 610
Units: ug/L

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-07-025-115**	**N/A**	**Aqueous**	**HPLC 5**	**12/01/18**	**12/03/18 17:52**	**181201L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Naphthalene	ND	1.0	0.077	1.00	
Acenaphthylene	ND	1.0	0.051	1.00	
Acenaphthene	ND	1.0	0.038	1.00	
Fluorene	ND	1.0	0.044	1.00	
Phenanthrene	ND	1.0	0.040	1.00	
Anthracene	ND	1.0	0.044	1.00	
Fluoranthene	ND	1.0	0.035	1.00	
Pyrene	ND	1.0	0.046	1.00	
Benzo (a) Anthracene	ND	1.0	0.036	1.00	
Chrysene	ND	1.0	0.033	1.00	
Benzo (b) Fluoranthene	ND	1.0	0.034	1.00	
Benzo (k) Fluoranthene	ND	1.0	0.036	1.00	
Benzo (a) Pyrene	ND	0.20	0.028	1.00	
Dibenz (a,h) Anthracene	ND	1.0	0.042	1.00	
Benzo (g,h,i) Perylene	ND	1.0	0.041	1.00	
Indeno (1,2,3-c,d) Pyrene	ND	1.0	0.053	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decafluorobiphenyl	78	40-160	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: EPA 608
Method: EPA 608
Units: ug/L

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Bridge	**18-11-2057-1-K**	**11/26/18 10:47**	**Aqueous**	**GC 51**	**11/29/18**	**12/04/18 14:37**	**181129L16A**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Aldrin	ND	0.096	0.026	1.00	
Alpha Chlordane	ND	0.096	0.026	1.00	
Alpha-BHC	ND	0.096	0.027	1.00	
Aroclor-1016	ND	0.96	0.28	1.00	
Aroclor-1221	ND	0.96	0.27	1.00	
Aroclor-1232	ND	0.96	0.24	1.00	
Aroclor-1242	ND	0.96	0.17	1.00	
Aroclor-1248	ND	0.96	0.19	1.00	
Aroclor-1254	ND	0.96	0.22	1.00	
Aroclor-1260	ND	0.96	0.25	1.00	
Aroclor-1262	ND	0.96	0.25	1.00	
Beta-BHC	ND	0.096	0.029	1.00	
Chlordane	ND	0.96	0.32	1.00	
4,4'-DDD	ND	0.096	0.026	1.00	
4,4'-DDE	ND	0.096	0.026	1.00	
4,4'-DDT	ND	0.096	0.026	1.00	
Delta-BHC	ND	0.096	0.027	1.00	
Dieldrin	ND	0.096	0.027	1.00	
Endosulfan I	ND	0.096	0.027	1.00	
Endosulfan II	ND	0.096	0.026	1.00	
Endosulfan Sulfate	ND	0.096	0.028	1.00	
Endrin	ND	0.096	0.029	1.00	
Endrin Aldehyde	ND	0.096	0.025	1.00	
Endrin Ketone	ND	0.096	0.023	1.00	
Gamma Chlordane	ND	0.096	0.026	1.00	
Gamma-BHC	ND	0.096	0.029	1.00	
Heptachlor	ND	0.096	0.025	1.00	
Heptachlor Epoxide	ND	0.096	0.024	1.00	
Methoxychlor	ND	0.096	0.024	1.00	
Toxaphene	ND	1.9	0.57	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	83	50-135	
2,4,5,6-Tetrachloro-m-Xylene	65	50-135	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: EPA 608
Method: EPA 608
Units: ug/L

Project: 36914

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-731-611**	**N/A**	**Aqueous**	**GC 51**	**11/29/18**	**12/04/18 13:12**	**181129L16A**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
Aldrin	ND	0.10	0.027	1.00	
Alpha Chlordane	ND	0.10	0.027	1.00	
Alpha-BHC	ND	0.10	0.028	1.00	
Aroclor-1016	ND	1.0	0.29	1.00	
Aroclor-1221	ND	1.0	0.28	1.00	
Aroclor-1232	ND	1.0	0.25	1.00	
Aroclor-1242	ND	1.0	0.18	1.00	
Aroclor-1248	ND	1.0	0.20	1.00	
Aroclor-1254	ND	1.0	0.23	1.00	
Aroclor-1260	ND	1.0	0.26	1.00	
Aroclor-1262	ND	1.0	0.26	1.00	
Beta-BHC	ND	0.10	0.030	1.00	
Chlordane	ND	1.0	0.33	1.00	
4,4'-DDD	ND	0.10	0.027	1.00	
4,4'-DDE	ND	0.10	0.027	1.00	
4,4'-DDT	ND	0.10	0.027	1.00	
Delta-BHC	ND	0.10	0.029	1.00	
Dieldrin	ND	0.10	0.029	1.00	
Endosulfan I	ND	0.10	0.028	1.00	
Endosulfan II	ND	0.10	0.027	1.00	
Endosulfan Sulfate	ND	0.10	0.029	1.00	
Endrin	ND	0.10	0.031	1.00	
Endrin Aldehyde	ND	0.10	0.026	1.00	
Endrin Ketone	ND	0.10	0.024	1.00	
Gamma Chlordane	ND	0.10	0.027	1.00	
Gamma-BHC	ND	0.10	0.030	1.00	
Heptachlor	ND	0.10	0.026	1.00	
Heptachlor Epoxide	ND	0.10	0.025	1.00	
Methoxychlor	ND	0.10	0.025	1.00	
Toxaphene	ND	2.0	0.59	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
Decachlorobiphenyl	79	50-135	
2,4,5,6-Tetrachloro-m-Xylene	62	50-135	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 624
Units: ug/L

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Bridge	**18-11-2057-1-A**	**11/26/18 10:47**	**Aqueous**	**GC/MS WW**	**11/29/18**	**11/29/18 19:18**	**181129L015**

Comment(s): - The compound 2-chloroethylvinyl ether hydrolyzes under acidic conditions. Acrolein and acrylonitrile have been documented to be acid sensitive. The sample has been acid preserved and therefore, these compounds may be biased low.

- Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
1,1,1,2-Tetrachloroethane	ND	1.0	0.40	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	10	4.0	1.00	
Naphthalene	ND	10	2.5	1.00	
Tert-Butyl Alcohol (TBA)	ND	10	4.0	1.00	
Isopropanol	ND	50	20	1.00	
Acetone	ND	50	20	1.00	
Benzene	ND	0.50	0.20	1.00	
Bromodichloromethane	ND	1.0	0.40	1.00	
Bromoform	ND	1.0	0.40	1.00	
Bromomethane	ND	1.0	0.81	1.00	
2-Butanone	ND	5.0	3.3	1.00	
Carbon Disulfide	ND	20	8.0	1.00	
Carbon Tetrachloride	ND	0.50	0.20	1.00	
Chlorobenzene	ND	1.0	0.40	1.00	
Chloroethane	ND	1.0	0.40	1.00	
Chloromethane	ND	1.0	0.40	1.00	
2-Chloroethyl Vinyl Ether	ND	2.0	0.80	1.00	
Chloroform	ND	1.0	0.40	1.00	
1,3-Dichlorobenzene	ND	1.0	0.40	1.00	
1,4-Dichlorobenzene	ND	1.0	0.40	1.00	
1,2-Dichlorobenzene	ND	1.0	0.40	1.00	
Dibromochloromethane	ND	1.0	0.40	1.00	
Dichlorodifluoromethane	ND	1.0	0.40	1.00	
1,1-Dichloroethane	ND	1.0	0.40	1.00	
1,2-Dichloroethane	ND	0.50	0.40	1.00	
1,1-Dichloroethene	ND	1.0	0.40	1.00	
c-1,2-Dichloroethene	ND	1.0	0.40	1.00	
t-1,2-Dichloroethene	ND	1.0	0.40	1.00	
1,2-Dichloropropane	ND	1.0	0.40	1.00	
c-1,3-Dichloropropene	ND	0.50	0.20	1.00	
t-1,3-Dichloropropene	ND	0.50	0.20	1.00	
Ethylbenzene	ND	1.0	0.40	1.00	
2-Hexanone	ND	20	8.0	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 624
Units: ug/L

Parameter	Result	RL	MDL	DF	Qualifiers
Methylene Chloride	ND	2.0	0.86	1.00	
4-Methyl-2-Pentanone	ND	10	4.0	1.00	
Styrene	ND	1.0	0.40	1.00	
1,1,2,2-Tetrachloroethane	ND	1.0	0.40	1.00	
Tetrachloroethene	ND	1.0	0.40	1.00	
Toluene	ND	1.0	0.40	1.00	
1,1,1-Trichloroethane	ND	1.0	0.40	1.00	
1,1,2-Trichloroethane	ND	1.0	0.40	1.00	
Trichloroethene	ND	1.0	0.40	1.00	
Trichlorofluoromethane	ND	5.0	2.0	1.00	
Vinyl Acetate	ND	5.0	2.5	1.00	
Vinyl Chloride	ND	0.50	0.20	1.00	
o-Xylene	ND	1.0	0.40	1.00	
p/m-Xylene	ND	1.0	0.40	1.00	
1,2-Dibromoethane	ND	1.0	0.40	1.00	
Acrylonitrile	ND	2.0	1.7	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	1.0	0.40	1.00	
Acrolein	ND	5.0	3.8	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,2-Dichloroethane-d4	114	80-134	
Toluene-d8	102	80-120	
1,4-Bromofluorobenzene	115	80-120	
Dibromofluoromethane	97	80-126	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 624
Units: ug/L

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-681-1055**	**N/A**	**Aqueous**	**GC/MS WW**	**11/29/18**	**11/29/18 17:35**	**181129L015**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	RL	MDL	DF	Qualifiers
1,1,1,2-Tetrachloroethane	ND	1.0	0.40	1.00	
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	10	4.0	1.00	
Naphthalene	ND	10	2.5	1.00	
Tert-Butyl Alcohol (TBA)	ND	10	4.0	1.00	
Isopropanol	ND	50	20	1.00	
Acetone	ND	50	20	1.00	
Benzene	ND	0.50	0.20	1.00	
Bromodichloromethane	ND	1.0	0.40	1.00	
Bromoform	ND	1.0	0.40	1.00	
Bromomethane	ND	1.0	0.81	1.00	
2-Butanone	ND	5.0	3.3	1.00	
Carbon Disulfide	ND	20	8.0	1.00	
Carbon Tetrachloride	ND	0.50	0.20	1.00	
Chlorobenzene	ND	1.0	0.40	1.00	
Chloroethane	ND	1.0	0.40	1.00	
Chloromethane	ND	1.0	0.40	1.00	
2-Chloroethyl Vinyl Ether	ND	2.0	0.80	1.00	
Chloroform	ND	1.0	0.40	1.00	
1,3-Dichlorobenzene	ND	1.0	0.40	1.00	
1,4-Dichlorobenzene	ND	1.0	0.40	1.00	
1,2-Dichlorobenzene	ND	1.0	0.40	1.00	
Dibromochloromethane	ND	1.0	0.40	1.00	
Dichlorodifluoromethane	ND	1.0	0.40	1.00	
1,1-Dichloroethane	ND	1.0	0.40	1.00	
1,2-Dichloroethane	ND	0.50	0.40	1.00	
1,1-Dichloroethene	ND	1.0	0.40	1.00	
c-1,2-Dichloroethene	ND	1.0	0.40	1.00	
t-1,2-Dichloroethene	ND	1.0	0.40	1.00	
1,2-Dichloropropane	ND	1.0	0.40	1.00	
c-1,3-Dichloropropene	ND	0.50	0.20	1.00	
t-1,3-Dichloropropene	ND	0.50	0.20	1.00	
Ethylbenzene	ND	1.0	0.40	1.00	
2-Hexanone	ND	20	8.0	1.00	
Methylene Chloride	ND	2.0	0.86	1.00	

RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 624
Units: ug/L

Parameter	Result	RL	MDL	DF	Qualifiers
4-Methyl-2-Pentanone	ND	10	4.0	1.00	
Styrene	ND	1.0	0.40	1.00	
1,1,2,2-Tetrachloroethane	ND	1.0	0.40	1.00	
Tetrachloroethene	ND	1.0	0.40	1.00	
Toluene	ND	1.0	0.40	1.00	
1,1,1-Trichloroethane	ND	1.0	0.40	1.00	
1,1,2-Trichloroethane	ND	1.0	0.40	1.00	
Trichloroethene	ND	1.0	0.40	1.00	
Trichlorofluoromethane	ND	5.0	2.0	1.00	
Vinyl Acetate	ND	5.0	2.5	1.00	
Vinyl Chloride	ND	0.50	0.20	1.00	
o-Xylene	ND	1.0	0.40	1.00	
p/m-Xylene	ND	1.0	0.40	1.00	
1,2-Dibromoethane	ND	1.0	0.40	1.00	
Acrylonitrile	ND	2.0	1.7	1.00	
Methyl-t-Butyl Ether (MTBE)	ND	1.0	0.40	1.00	
Acrolein	ND	5.0	3.8	1.00	

Surrogate	Rec. (%)	Control Limits	Qualifiers
1,2-Dichloroethane-d4	114	80-134	
Toluene-d8	101	80-120	
1,4-Bromofluorobenzene	116	80-120	
Dibromofluoromethane	97	80-126	

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Analytical Report

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221
Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix
Bridge	**18-11-2057-1**	**11/26/18 10:47**	**Aqueous**

Comment(s): (24) - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Results	RL	MDL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
HEM: Oil and Grease (24)	ND	1.0	0.80	1.00		mg/L	11/29/18	11/29/18	EPA 1664A
Ammonia (as N) (24)	ND	0.050	0.0086	1.00		mg/L	N/A	12/06/18	EPA 350.1
Total Kjeldahl Nitrogen (24)	0.17	0.20	0.047	1.00	J	mg/L	N/A	12/05/18	EPA 351.2
Phosphorus, Total (24)	0.028	0.050	0.020	1.00	J	mg/L	N/A	12/01/18	EPA 365.1
Nitrate-Nitrite (as N) (24)	0.54	0.10	0.029	1.00		mg/L	12/03/18	12/03/18	SM 4500-NO3 E
Total Nitrogen (24)	0.71	0.10	0.10	1.00		mg/L	N/A	12/06/18	Total Nitrogen by Calc

Method Blank							**N/A**		**Aqueous**

Comment(s): (24) - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Results	RL	MDL	DF	Qualifiers	Units	Date Prepared	Date Analyzed	Method
HEM: Oil and Grease (24)	ND	1.0	0.80	1.00		mg/L	11/29/18	11/29/18	EPA 1664A
Ammonia (as N) (24)	ND	0.050	0.0086	1.00		mg/L	N/A	12/06/18	EPA 350.1
Total Kjeldahl Nitrogen (24)	ND	0.20	0.047	1.00		mg/L	N/A	12/05/18	EPA 351.2
Phosphorus, Total (24)	ND	0.050	0.020	1.00		mg/L	N/A	12/01/18	EPA 365.1
Nitrate-Nitrite (as N) (24)	ND	0.10	0.029	1.00		mg/L	12/03/18	12/03/18	SM 4500-NO3 E

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RL: Reporting Limit. DF: Dilution Factor. MDL: Method Detection Limit.

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Quality Control - Spike/Spike Duplicate

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 1664A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-11-2130-1	**Sample**	**Aqueous**	**N/A**	**11/29/18**	**11/29/18 19:30**	**I1129HEMS2**
18-11-2130-1	**Matrix Spike**	**Aqueous**	**N/A**	**11/29/18**	**11/29/18 19:30**	**I1129HEMS2**
18-11-2130-1	**Matrix Spike Duplicate**	**Aqueous**	**N/A**	**11/29/18**	**11/29/18 19:30**	**I1129HEMS2**

Parameter	Sample Conc.	MS Spike	MS Conc.	MS %Rec.	MSD Spike	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
HEM: Oil and Grease	ND	38.46	35.19	91	38.46	35.87	93	78-114	2	0-18	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 350.1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-11-2368-1	**Sample**	**Aqueous**	**ACA 1**	**N/A**	**12/06/18 14:16**	**181206S01**
18-11-2368-1	**Matrix Spike**	**Aqueous**	**ACA 1**	**N/A**	**12/06/18 14:16**	**181206S01**
18-11-2368-1	**Matrix Spike Duplicate**	**Aqueous**	**ACA 1**	**N/A**	**12/06/18 14:16**	**181206S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Ammonia (as N)	ND	0.5000	0.3851	77	0.4063	81	90-110	5	0-25	3

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 351.2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-11-2254-3	**Sample**	**Aqueous**	**ACA 1**	**N/A**	**12/05/18 11:58**	**181205S01**
18-11-2254-3	**Matrix Spike**	**Aqueous**	**ACA 1**	**N/A**	**12/05/18 11:58**	**181205S01**
18-11-2254-3	**Matrix Spike Duplicate**	**Aqueous**	**ACA 1**	**N/A**	**12/05/18 11:58**	**181205S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Total Kjeldahl Nitrogen	2.705	1.000	3.560	85	3.575	87	90-110	0	0-20	3

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

AECOS, Inc.		Date Received:	11/28/18
45-939 Kamehameha Hwy #104		Work Order:	18-11-2057
Kaneohe, HI 96744-3221		Preparation:	N/A
		Method:	EPA 365.1
Project: 36914			Page 4 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
Bridge	**Sample**	**Aqueous**	**ACA 1**	**N/A**	**12/01/18 12:47**	**181201S02**
Bridge	**Matrix Spike**	**Aqueous**	**ACA 1**	**N/A**	**12/01/18 12:47**	**181201S02**
Bridge	**Matrix Spike Duplicate**	**Aqueous**	**ACA 1**	**N/A**	**12/01/18 12:47**	**181201S02**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Phosphorus, Total	ND	0.2000	0.2282	114	0.2227	111	90-110	2	0-25	3

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

AECOS, Inc.		Date Received:	11/28/18
45-939 Kamehameha Hwy #104		Work Order:	18-11-2057
Kaneohe, HI 96744-3221		Preparation:	N/A
		Method:	SM 4500-NO3 E
Project: 36914			Page 5 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
18-11-2368-2	**Sample**	**Aqueous**	**UV 7**	**12/03/18**	**12/03/18 20:37**	**I1203NO3S2**
18-11-2368-2	**Matrix Spike**	**Aqueous**	**UV 7**	**12/03/18**	**12/03/18 20:37**	**I1203NO3S2**
18-11-2368-2	**Matrix Spike Duplicate**	**Aqueous**	**UV 7**	**12/03/18**	**12/03/18 20:37**	**I1203NO3S2**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Nitrate-Nitrite (as N)	ND	0.5000	0.5266	105	0.5238	105	70-130	1	0-25	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: EPA 610
Method: EPA 610

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-07-025-115	**LCS**	**Aqueous**	**HPLC 5**	**12/01/18**	**12/03/18 18:25**	**181201L01**
099-07-025-115	**LCSD**	**Aqueous**	**HPLC 5**	**12/01/18**	**12/03/18 18:57**	**181201L01**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Benzo (b) Fluoranthene	2.000	1.803	90	1.778	89	40-160	1	0-20	
Benzo (k) Fluoranthene	2.000	1.846	92	1.839	92	40-160	0	0-20	
Benzo (a) Pyrene	2.000	1.644	82	1.627	81	40-160	1	0-20	
Dibenz (a,h) Anthracene	2.000	1.818	91	1.718	86	40-160	6	0-20	
Benzo (g,h,i) Perylene	2.000	1.887	94	1.820	91	40-160	4	0-20	
Indeno (1,2,3-c,d) Pyrene	2.000	1.856	93	1.880	94	40-160	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 1664A

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-16-923-517	**LCS**	**Aqueous**	**N/A**	**11/29/18**	**11/29/18 19:30**	**I1129HEML2**
099-16-923-517	**LCSD**	**Aqueous**	**N/A**	**11/29/18**	**11/29/18 19:30**	**I1129HEML2**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
HEM: Oil and Grease	40.00	36.90	92	37.10	93	78-114	1	0-18	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 350.1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-735-419	**LCS**	**Aqueous**	**ACA 1**	**N/A**	**12/06/18 14:16**	**181206L01**
099-12-735-419	**LCSD**	**Aqueous**	**ACA 1**	**N/A**	**12/06/18 14:16**	**181206L01**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Ammonia (as N)	0.5000	0.5365	107	0.5417	108	90-110	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 351.2

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-741-335	**LCS**	**Aqueous**	**ACA 1**	**N/A**	**12/05/18 11:58**	**181205L01**
099-12-741-335	**LCSD**	**Aqueous**	**ACA 1**	**N/A**	**12/05/18 11:58**	**181205L01**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Total Kjeldahl Nitrogen	1.000	1.024	102	1.008	101	90-110	2	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 365.1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-739-261	**LCS**	**Aqueous**	**ACA 1**	**N/A**	**12/01/18 12:47**	**181201L02**
099-12-739-261	**LCSD**	**Aqueous**	**ACA 1**	**N/A**	**12/01/18 12:47**	**181201L02**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Phosphorus, Total	0.2000	0.2059	103	0.2065	103	90-110	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: SM 4500-NO3 E

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-14-282-702	**LCS**	**Aqueous**	**UV 7**	**12/03/18**	**12/03/18 20:37**	**I1203NO3L2**
099-14-282-702	**LCSD**	**Aqueous**	**UV 7**	**12/03/18**	**12/03/18 20:37**	**I1203NO3L2**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Nitrate-Nitrite (as N)	0.5000	0.5040	101	0.5038	101	80-120	0	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: EPA 608
Method: EPA 608

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-731-611	**LCS**	**Aqueous**	**GC 51**	**11/29/18**	**12/04/18 17:19**	**181129L16A**
099-12-731-611	**LCSD**	**Aqueous**	**GC 51**	**11/29/18**	**12/04/18 17:34**	**181129L16A**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Aldrin	0.5000	0.2924	58	0.2250	45	50-135	36-149	26	0-25	X,ME
Alpha Chlordane	0.5000	0.3254	65	0.2534	51	50-135	36-149	25	0-25	
Alpha-BHC	0.5000	0.3651	73	0.2761	55	50-135	36-149	28	0-25	X
Aroclor-1016	2.000	2.210	110	2.260	113	50-135	36-149	2	0-25	
Aroclor-1260	2.000	1.820	91	1.950	98	50-135	36-149	7	0-25	
Beta-BHC	0.5000	0.3945	79	0.2665	53	50-135	36-149	39	0-25	X
4,4'-DDD	0.5000	0.3518	70	0.2762	55	50-135	36-149	24	0-25	
4,4'-DDE	0.5000	0.3321	66	0.2650	53	50-135	36-149	22	0-25	
4,4'-DDT	0.5000	0.3098	62	0.2511	50	50-135	36-149	21	0-25	
Delta-BHC	0.5000	0.3715	74	0.2759	55	50-135	36-149	30	0-25	X
Dieldrin	0.5000	0.3462	69	0.2685	54	50-135	36-149	25	0-25	
Endosulfan I	0.5000	0.3595	72	0.2780	56	50-135	36-149	26	0-25	X
Endosulfan II	0.5000	0.4183	84	0.3272	65	50-135	36-149	24	0-25	
Endosulfan Sulfate	0.5000	0.3375	68	0.2534	51	50-135	36-149	28	0-25	X
Endrin	0.5000	0.3475	70	0.2707	54	50-135	36-149	25	0-25	
Endrin Aldehyde	0.5000	0.3651	73	0.2871	57	50-135	36-149	24	0-25	
Gamma Chlordane	0.5000	0.3122	62	0.2453	49	50-135	36-149	24	0-25	ME
Gamma-BHC	0.5000	0.3604	72	0.2784	56	50-135	36-149	26	0-25	X
Heptachlor	0.5000	0.3488	70	0.2655	53	50-135	36-149	27	0-25	X
Heptachlor Epoxide	0.5000	0.3400	68	0.2646	53	50-135	36-149	25	0-25	
Methoxychlor	0.5000	0.3610	72	0.2814	56	50-135	36-149	25	0-25	

Total number of LCS compounds: 21
Total number of ME compounds: 2
Total number of ME compounds allowed: 1
LCS ME CL validation result: 'Not Pass (See Narrative)

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.
45-939 Kamehameha Hwy #104
Kaneohe, HI 96744-3221

Project: 36914

Date Received: 11/28/18
Work Order: 18-11-2057
Preparation: N/A
Method: EPA 624

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-681-1055	**LCS**	**Aqueous**	**GC/MS WW**	**11/29/18**	**11/29/18 13:32**	**181129L015**
099-15-681-1055	**LCSD**	**Aqueous**	**GC/MS WW**	**11/29/18**	**11/29/18 14:04**	**181129L015**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	ME CL	RPD	RPD CL	Qualifiers
Benzene	50.00	54.93	110	55.69	111	37-151	18-170	1	0-30	
Bromodichloromethane	50.00	61.42	123	60.92	122	35-155	15-175	1	0-30	
Bromoform	50.00	53.39	107	55.20	110	45-169	24-190	3	0-30	
Bromomethane	50.00	73.64	147	67.41	135	1-243	0-283	9	0-30	
Carbon Tetrachloride	50.00	58.81	118	55.66	111	60-140	47-153	6	0-30	
Chlorobenzene	50.00	57.50	115	56.03	112	37-160	16-180	3	0-30	
Chloroethane	50.00	33.43	67	31.57	63	14-230	0-266	6	0-30	
Chloromethane	50.00	54.29	109	47.01	94	1-273	0-318	14	0-30	
2-Chloroethyl Vinyl Ether	50.00	15.66	31	17.51	35	1-305	0-356	11	0-30	
Chloroform	50.00	64.81	130	63.07	126	51-138	36-152	3	0-30	
1,3-Dichlorobenzene	50.00	55.08	110	53.71	107	59-156	43-172	3	0-30	
1,4-Dichlorobenzene	50.00	54.47	109	51.83	104	18-190	0-219	5	0-30	
1,2-Dichlorobenzene	50.00	54.23	108	52.88	106	18-190	0-219	3	0-30	
Dibromochloromethane	50.00	58.50	117	59.08	118	53-149	37-165	1	0-30	
1,1-Dichloroethane	50.00	48.35	97	45.99	92	1-234	0-273	5	0-30	
1,2-Dichloroethane	50.00	57.02	114	58.20	116	49-155	31-173	2	0-30	
1,1-Dichloroethene	50.00	60.23	120	55.52	111	59-155	43-171	8	0-30	
t-1,2-Dichloroethene	50.00	57.11	114	55.88	112	54-156	37-173	2	0-30	
1,2-Dichloropropane	50.00	45.17	90	45.82	92	1-210	0-245	1	0-30	
c-1,3-Dichloropropene	50.00	60.21	120	58.83	118	1-227	0-265	2	0-30	
t-1,3-Dichloropropene	50.00	68.58	137	68.76	138	17-183	0-211	0	0-30	
Ethylbenzene	50.00	61.19	122	58.03	116	37-162	16-183	5	0-30	
Methylene Chloride	50.00	48.40	97	48.17	96	1-221	0-258	0	0-30	
1,1,2,2-Tetrachloroethane	50.00	52.02	104	54.75	110	46-157	28-176	5	0-30	
Tetrachloroethene	50.00	62.29	125	58.88	118	64-148	50-162	6	0-30	
Toluene	50.00	52.95	106	51.14	102	47-150	30-167	3	0-30	
1,1,1-Trichloroethane	50.00	65.24	130	62.95	126	52-162	34-180	4	0-30	
1,1,2-Trichloroethane	50.00	60.39	121	62.10	124	52-150	36-166	3	0-30	
Trichloroethene	50.00	57.11	114	54.75	109	71-157	57-171	4	0-30	
Trichlorofluoromethane	50.00	65.47	131	58.65	117	17-181	0-208	11	0-30	
Vinyl Chloride	50.00	48.67	97	42.07	84	1-251	0-293	15	0-30	
o-Xylene	50.00	60.42	121	57.60	115	60-140	47-153	5	0-30	
p/m-Xylene	100.0	124.3	124	119.4	119	60-140	47-153	4	0-30	
Acrylonitrile	50.00	39.98	80	44.90	90	40-160	20-180	12	0-30	
Methyl-t-Butyl Ether (MTBE)	50.00	54.65	109	54.68	109	60-130	48-142	0	0-30	
Acrolein	100.0	94.47	94	98.72	99	40-160	20-180	4	0-30	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

AECOS, Inc.	Date Received:	11/28/18
45-939 Kamehameha Hwy #104	Work Order:	18-11-2057
Kaneohe, HI 96744-3221	Preparation:	N/A
	Method:	EPA 624
Project: 36914		Page 9 of 9

Total number of LCS compounds: 36
Total number of ME compounds: 0
Total number of ME compounds allowed: 2
LCS ME CL validation result: Pass

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RPD: Relative Percent Difference. CL: Control Limits

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Sample Analysis Summary Report

Work Order: 18-11-2057 Page 1 of 1

Method	Extraction	Chemist ID	Instrument	Analytical Location
EPA 1664A	N/A	784	N/A	1
EPA 350.1	N/A	1086	ACA 1	1
EPA 351.2	N/A	1086	ACA 1	1
EPA 365.1	N/A	1086	ACA 1	1
EPA 608	EPA 608	669	GC 51	1
EPA 610	EPA 610	1037	HPLC 5	1
EPA 624	N/A	1179	GC/MS WW	2
SM 4500-NO3 E	N/A	1139	UV 7	1
Total Nitrogen by Calc	N/A	92	N/A	1

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Glossary of Terms and Qualifiers

Work Order: 18-11-2057 Page 1 of 1

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
CI	See case narrative.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
HDH	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but heavier hydrocarbons were also present (or detected).
HDL	The sample chromatographic pattern for TPH matches the chromatographic pattern of the specified standard but lighter hydrocarbons were also present (or detected).
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
ME	LCS Recovery Percentage is within Marginal Exceedance (ME) Control Limit range (+/- 4 SD from the mean).
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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AECOS, Inc.

45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

SUB CHAIN OF CUSTODY FORM

PROJECT FILE No. **18-11-2057**

LOG NUMBER [36914]

CLIENT: AECOS, Inc. CONTACT: Ann Mello amello@aecos.com

ADDRESS: (see above) PHONE No.: ☎

Purchase Order No.:

☐ RUSH
☐ SEE REVERSE

SPECIAL INSTRUCTIONS

	SAMPLED ☑	SAMPLE ID	DATE	TIME	SAMPLE TYPE	CONTAINER(S)		REQUESTED ANALYSES	PRESERVATION
1	☑	Bridge	11-26-18	1047	Stream	2	1L poly	NO_3NO_2 (Sm4500 NO_3 E), TN (EPA 351.2 TKN by SFA) NH_3 (EPA 350.1 by SFA), TP (EPA 365.1 by SFA)	H_2SO_4
2						1	1L amber glass	Oil and Grease (EPA 1664A) (DL ≤1 mg/L)	H_2SO_4
3						3	40ml VOA	EPA 624	HCl
4						3	40 ml VOA	EPA 624	"
5						1	1L amber glass	EPA 610 (PAH)	"
6						1	1L amber glass	EPA 608 (Pesticides)	"
7						1	1L amber glass	Spare	"
8									
9									
10									

CLIENTS PROVIDING SAMPLES TO THE LABORATORY SHOULD COMPLETE AS MUCH OF THE ABOVE FORM AS POSSIBLE, NOTE: NAME AND DATED SIGNATURE OF PERSON COLLECTING THE SAMPLE MUST BE ENTERED BELOW ↓. INFORMATION REQUESTED IN SHADED BOXES ABOVE TO BE FILLED IN BY THE LABORATORY.

SAMPLED BY: C. Linebaugh, N. Shrader (PRINT NAME) DATE 11-26 2018

RELINQUISHED: (SIGNATURE) CL (Aecos) DATE 11-26 2018 TIME 1215

RECEIVED BY: (SIGNATURE) CL (Aecos) DATE 11-26 2018 TIME 1215

RELINQUISHED: (SIGNATURE OR INITIALS) DATE 11-27 2018 TIME 1200

RECEIVED FOR LABORATORY: (SIGNATURE) DATE 11/28 2018 TIME 1045

RELINQUISHED: (SIGNATURE OR INITIALS) DATE 20__ TIME

(Fedex)

COMMENTS:

* Please Report down to MDL!
200 ug/L RL / 47 ug/L MDL requested for TN

PRECAUTIONS:

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AECOS, Inc.
45-939 Kamehameha Highway Suite 104
Kaneohe, Oahu, HI 96744
Tel: (808) 234-7770 Fax: 234-7775

2057

Subcontractor: EC

Requested By: Jessica Withrow
Date Requested: 11-27-18
Send results to: amello@aecos.com

Turnaround Time Requested : Normal TAT

Log No.	# of samples	# of bottles	Sample Type	Analysis requested	Date collected	Sample Prep / preservation
[36914]	1	2	stream	NH_3, NO_3NO_2, TN, TP	11-26-18	H_2SO_4
	1	1	stream	Oil and Grease	11-26-18	H_2SO_4
	1	3	stream	EPA 624	11-26-18	HCL
	1	3	stream	EPA 624	11-26-18	⊖
	1	1	stream	EPA 610 (PAH)	11-26-18	⊖
	1	1	stream	EPA 608 (pesticides)	11-26-18	⊖
	1	1	stream	Space	11-26-18	⊖

PLEASE RETURN AECOS COOLERS with replacement bottles: (YES) NO

OTHER SPECIAL NOTES/INSTRUCTIONS:

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ORIGIN ID:HNLA (808) 234-7770
AECOS, INC
AECOS, INC
45-939 KAMEHAMEHA HIGHWAY, #104

KANEOHE, HI 96744
UNITED STATES US

SHIP DATE: 27NOV18
ACTWGT: 35.00 LB
CAD: 3872316/INET4040
DIMS: 22x15x15 IN

BILL SENDER

TO JULIE LAM
EUROFINS CALSCIENCE
7440 LINCOLN WAY

GARDEN GROVE CA 92841
(714) 895-5494 REF: [36914]
INV:
PO: DEPT:

552J2/E4AF/DCA5

FedEx Express

E

J18211808150 1uv

TRK# 0201 7738 1533 8457

WED - 28 NOV 10:30A
PRIORITY OVERNIGHT

WZ APVA

92841
CA-US SNA

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After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $1,000, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

2057

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WORK ORDER NUMBER: 18-11-0057

SAMPLE RECEIPT CHECKLIST

COOLER 1 OF 1

CLIENT: AECOS, Inc.

DATE: 11/28/2018

TEMPERATURE: (Criteria: 0.0°C – 6.0°C, not frozen except sediment/tissue)

Thermometer ID: SC6 (CF: 0.0°C); Temperature (w/o CF): 3.9 °C (w/ CF): 3.9 °C; ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling

☐ Sample(s) received at ambient temperature; placed on ice for transport by courier

Ambient Temperature: ☐ Air ☐ Filter Checked by: MJ

CUSTODY SEAL:

Cooler ☐ Present and Intact ☐ Present but Not Intact ☑ Not Present ☐ N/A Checked by: MJ

Sample(s) ☐ Present and Intact ☐ Present but Not Intact ☑ Not Present ☐ N/A Checked by: MJ

SAMPLE CONDITION:	Yes	No	N/A
Chain-of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Sampling date ☐ Sampling time ☐ Matrix ☐ Number of containers			
☐ No analysis requested ☐ Not relinquished ☐ No relinquished date ☐ No relinquished time			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☐	☑	☐
Sample container(s) intact and in good condition	☑	☐	☐
Proper containers for analyses requested	☑	☐	☐
Sufficient volume/mass for analyses requested	☑	☐	☐
Samples received within holding time	☑	☐	☐
Aqueous samples for certain analyses received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfide ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation chemical(s) noted on COC and/or sample container	☑	☐	☐
Unpreserved aqueous sample(s) received for certain analyses			
☑ Volatile Organics ☐ Total Metals ☐ Dissolved Metals			
Acid/base preserved samples - pH within acceptable range	☑	☐	☐
Container(s) for certain analysis free of headspace	☑	☐	☐
☑ Volatile Organics ☐ Dissolved Gases (RSK-175) ☐ Dissolved Oxygen (SM 4500)			
☐ Carbon Dioxide (SM 4500) ☐ Ferrous Iron (SM 3500) ☐ Hydrogen Sulfide (Hach)			
Tedlar™ bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE: (Trip Blank Lot Number: _____)

Aqueous: ☐ VOA (3) ☑ VOAh ☐ VOAna$_2$ ☐ 100PJ ☐ 100PJna$_2$ ☐ 125AGB ☐ 125AGBh ☐ 125AGBp ☐ 125PB ☐ 125PBznna (pH__9)

☐ 250AGB ☐ 250CGB ☐ 250CGBs (pH__2) ☐ 250PB ☐ 250PBn (pH__2) ☐ 500AGB ☐ 500AGJ ☐ 500AGJs (pH__2) ☐ 500PB

☑ 1AGB (3) ☐ 1AGBna$_2$ ☐ 1AGBs (pH__2) ☑ 1AGBs (O&G) ☑ 1PB (2) ☐ 1PBna (pH__12) ☑ 250 PJ ☐ _____ ☐ _____

Solid: ☐ 4ozCGJ ☐ 8ozCGJ ☐ 16ozCGJ ☐ Sleeve (___) (pH <2) ☐ EnCores® (___) ☐ TerraCores® (___) ☐ _____ ☐ _____ ☐ _____

Air: ☐ Tedlar™ ☐ Canister ☐ Sorbent Tube ☐ PUF ☐ _____ **Other Matrix** (_____): ☐ _____ ☐ _____ ☐ _____

Container: **A** = Amber, **B** = Bottle, **C** = Clear, **E** = Envelope, **G** = Glass, **J** = Jar, **P** = Plastic, and **Z** = Ziploc/Resealable Bag

Preservative: **b** = buffered, **f** = filtered, **h** = HCl, **n** = HNO_3, **na** = NaOH, **na$_2$** = $Na_2S_2O_3$, **p** = H_3PO_4, Labeled/Checked by: MJ

s = H_2SO_4, **u** = ultra-pure, **x** = Na_2SO_3+$NaHSO_4.H_2O$, **znna** = Zn $(CH_3CO_2)_2$ + NaOH Reviewed by: TRS

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WORK ORDER NUMBER: 18-11-2057

SAMPLE ANOMALY REPORT

DATE: 11 / 28 / 2018

SAMPLES, CONTAINERS, AND LABELS:

Comments

- ☐ Sample(s) NOT RECEIVED but listed on COC
- ☐ Sample(s) received but NOT LISTED on COC
- ☐ Holding time expired (list client or ECI sample ID and analysis)
- ☐ Insufficient sample amount for requested analysis (list analysis)
- ☐ Improper container(s) used (list analysis)
- ☐ Improper preservative used (list analysis)
- ☐ pH outside acceptable range (list analysis)
- ☐ No preservative noted on COC or label (list analysis and notify lab)
- ☐ Sample container(s) not labeled
- ☐ Client sample label(s) illegible (list container type and analysis)
- ☑ Client sample label(s) do not match COC (comment)
  - ☐ Project information
  - ☐ Client sample ID
  - ☐ Sampling date and/or time
  - ☑ Number of container(s)
  - ☑ Requested analysis
- ☐ Sample container(s) compromised (comment)
  - ☐ Broken
  - ☐ Water present in sample container
- ☐ Air sample container(s) compromised (comment)
  - ☐ Flat
  - ☐ Very low in volume
  - ☐ Leaking (not transferred; duplicate bag submitted)
  - ☐ Leaking (transferred into ECI Tedlar™ bags*)
  - ☐ Leaking (transferred into client's Tedlar™ bags*)

* Transferred at client's request.

Received 13-containers instead of 12. see containar type

Received 1-250 ml plastic container unpreserved analysis not requested on COC.

MISCELLANEOUS: (Describe)

Comments

HEADSPACE:

(Containers with bubble > 6 mm or ¼ inch for volatile organic or dissolved gas analysis)

ECI Sample ID	ECI Container ID	Total Number**	ECI Sample ID	ECI Container ID	Total Number**

(Containers with bubble for other analysis)

ECI Sample ID	ECI Container ID	Total Number**	Requested Analysis

Comments: _____

** Record the total number of containers (i.e., vials or bottles) for the affected sample.

Reported by: UFSO

Reviewed by: TTLS

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Attachment D – Glossary of Chemicals (Section G.9)

This glossary is for general use and is not intended to be a complete or definitive reference. The parameters are categorized into Metals, Organonitrogen Compounds, Pesticides, Phenols, Phthalates, Polynuclear Aromatic Hydrocarbons, Volatile Organics, and Others and are listed alphabetically.

The information was obtained primarily from Environmental Protection Agency (EPA) Ambient Water Quality Criteria documents which are referenced in EPA's Quality Criteria for Water (EPA 440/5-86-001), updated May 1, 1987. Additional information was obtained from the EPA pamphlet "Suspended, Cancelled and Restricted Pesticides," January 1985; The Condensed Chemical Dictionary, 10th Ed. (Van Nostrand Reinhold Co., Inc., New York, 1981); and The Farm Chemicals Handbook (Meister Publishing Company, Willoughby, OH, 1988).

Information on organotins was obtained from the International Organotin Symposium held at Halifax, Nova Scotia in September 1987 and published in Volume 4 of the Oceans '87 Proceedings, by the Marine Technology Society, Washington D.C., and IEEE Ocean Engineering Society, Piscataway, NJ.

a. Metals

Antimony - A metal used as a hardening alloy for lead, particularly in lead-acid batteries. Also used as a semiconductor and in pyrotechnics.

Arsenic - A metal used as an alloy with lead and copper in shot, batteries, and cables. Arsenic trioxide is used as a pigment and as an insecticide, rodenticide, herbicide, sheep and cattle dip, hide preservative, and wood preservative. It was used as a pesticide in the production of canec panels in Hilo. Use in houses is restricted to concentrations below 1.5 percent. Carcinogen.

Beryllium - A metal for various high-technology uses including nuclear reactor moderator and structural material. Carcinogen.

Cadmium - A metal used in electroplating and coating, alloys, nickel-cadmium batteries, pigments, and in a variety of other industrial areas.

Chromium - A metal used in plating, alloys and in pigments. Hexavalent forms are most toxic and are used in cooling tower additives.

Copper - A metal used in wiring, plumbing, electroplating, alloys, insecticides, and in anti- fouling paints.

Lead - A metal used in batteries, gasoline additives, solder, and ammunition.

Mercury - A metal used in dentistry, electronics, instruments, lamps, metallurgy and formerly in anti-fouling paints.

Nickel - A metal used in alloys, electroplating, and batteries.

Selenium - A metalloid element used in electronics, rubber production, dandruff shampoo, and a trace element in animal feed.

Silver - A metal with various electronic, chemical, plating, photographic, and dental uses.

Thallium - A metal. Pesticide registration of thallium sulfate cancelled.

Tributyltin - Tributyltin is of environmental concern primarily because of its use in marine anti- fouling paints. This use has recently been restricted by Congress. Organotins have also been used in agriculture and residential areas to control fungi and insects including moths, houseflies, cockroaches, and mosquito larvae. The largest use is in stabilizing polyvinyl chloride polymers used in construction materials and food packaging.

Zinc - A metal used in alloys, electroplating, galvanizing, batteries, and cathodic protection.

b. Organonitrogen Compounds

Benzidine - Aromatic amine used in dye production. Carcinogen.

Dinitro-o-cresol - Pesticide, fungicide, insecticide and miticide. Also used as a blossom- thinning agent on fruit trees.

Dinitrotoluene - Commercial and military explosive.

Diphenylhydrazine - Used as a reagent for the sugars arabinose and lactose and for the production of phenylbutanone and benzidine.

Nitrobenzene - Used in the production of aniline dyes, rubber, medicinals, metal polish, shoe black, perfume, and as a combustion propellant and chemical reaction, and crystallizing solvent.

Nitrosamines - Only small quantities are synthesized for research and rubber and pesticide production. Primary environmental exposure is probably due to the nitrosation of amine

and amide precursors in reactions in air, soil, water, food, and animal systems. Carcinogen.

c. Pesticides

Aldrin - Insecticide used in ground injection for termite control and non-food plant dip. Registration for other uses cancelled. Metabolizes to dieldrin. Carcinogen.

Chlordane - Insecticide used for termite control and non-food plant dip. Registration for other uses cancelled. Carcinogen.

Chlorpyrifos - Organophosphorus insecticide (a.k.a. Dursban, Lorsban). Used locally for termite control.

DDT - Persistent lipid-soluble chlorinated pesticide. Formerly most widely used. All pesticide uses cancelled except by government agencies and physicians. Metabolizes to DDE and TDE. Carcinogen.

Demeton - Systemic insecticide and acaricide applied as a foliage spray and soil drench.

Dieldrin - Persistent insecticide used in ground injection for termite control and as non-food plant dip. Registration for other uses cancelled. Carcinogen.

Endosulfan -Insecticide and acaricide (a.k.a. Thiodan). Used on pineapples in Hawaii.

Endrin - Pesticide, rodenticide, and avicide. Used on sugarcane to control the sugarcane beetle. Registration cancelled for control of the sugarcane borer. Teratogen.

Guthion - Organophosphorus pesticide used for many pests on various fruits, melons, nuts, vegetables, field crops, ornamental, and shade trees.

Heptachlor - Insecticide registered for termite control and non-food plant dip. Registration for other uses cancelled. Carcinogen.

Lindane - Broad spectrum insecticide used in livestock sprays, forestry, christmas trees, structural treatments, hardwood logs and lumber, dog sprays, dusts and dips, flea collars, moth sprays, seed treatments, shelf paper, and household sprays. Carcinogen.

Malathion - Organophosphorus insecticide used for many insects including: aphids, spider mites, scale insects, house flies, mosquitos, and for insects attacking fruits, vegetables, ornamental and stored products. Used in public health programs to control mosquitos.

Methoxychlor - Organochlorine pesticide.

Mirex - Organophosphorus insecticide. Registration cancelled 12/01/77. Mirex was used to control fire ants on pineapples in Hawaii.

Parathion - Organophosphorus pesticide used on fruit, nut, vegetable, and field crops. TDE - Metabolite of DDT. Carcinogen.

Toxaphene - 175 compounds of chlorinated camphene. Formerly the most heavily used pesticide. Registration cancelled in 1982 with exceptions for cattle, pineapples, and bananas. No U.S. production. Persistent in the environment. Carcinogen.

d. Phenols

Chlorinated Phenols - (Includes cholorinated cresols). Synthesis of dyes, pigments, resins, pesticides, herbicides and used directly as flea repellents, fungicides, wood preservatives, mold inhibitors, antiseptics, disinfectants, and anti-gumming agents in gasoline. Chlorinated phenol pesticide products include 2,4-D, 2,4-DCP, 2,4,5-T, 2,3,4,6-TCP, and PCP. Some forms carcinogenic.

2-Chlorophenol - Intermediate in chemical production of fungicides, slimicides, bactericides, antiseptics, disinfectants, and wood and glue preservatives. Can be produced in the chlorination of drinking water and sewage. May be biodegraded.

2,4-Dichlorophenol - Used in the production of herbicides (2,4-D) and in mothproofing, antiseptics, and seed disinfectants. Metabolic and photodegradation product of the above.

Nitrophenols - 2,4,6 trinitrophenol (picric acid) has been used as an explosive, dye intermediate, reagent, germicide, fungicide, staining agent and tissue fixative, and in photochemicals, pharmaceuticals, and metal etching. Mono and dinitrophenols would occur in the environment primarily from discharges from manufacturing plants or possibly from the degradation of pesticides. They are used in the

production of dyes, photochemicals, pesticides, wood preservatives, explosives, and leather treatments. See also 2,4 dinitro-o-cresol.

Pentachlorophenol - Very common pesticide, fungicide, and bactericide (a.k.a. PCP).

Phenol - Used in production of epoxy and phenolic resins, pharmaceuticals, germicides, fungicides, slimicides, herbicides, dyes and acids, and as a disinfectant and antiseptic.

e. Phthalates

Phthalate Esters - Plasticizers used especially in Polyvinyl chloride (PVC) production. Easily extractable and up to 60 percent of the total weight of plastic. Also used in the production of pesticide carriers, cosmetics, fragrances, munitions, industrial oils, and insect repellents.

f. Polynuclear Aromatic Hydrocarbons

Acenaphthene - Coal tar product used in the manufacturing of dyes and plastics and as an insecticide and fungicide. Also detected in cigarette smoke and gasoline exhaust.

Fluoranthene - A polynuclear aromatic hydrocarbon. Primarily a pyrolysis product formed in frying, smoking, incineration, etc. Natural as well as man-made sources. Carcinogen.

Naphthalene - Primary parameter of coal tar. Used in dye production, formulation of solvents, and chemical synthesis. Also used in lubricants and motor fuels, and as a moth repellant, insecticide, anthelminthic, vermicide, and intestinal antiseptic.

Polynuclear Aromatic Hydrocarbons - Diverse class of compounds formed by incomplete combustion of organics with insufficient oxygen. Examples include benzo[a]pyrene and benz[a]anthracene. Carcinogen.

g. Volatile Organics

Acrolein - Biocide for weed, algae, mollusk and slime control, and to protect liquid fuels from microorganisms. Also used in leather tanning, tissue fixation, paper, textiles, crease- proofing cotton, and as a chemical intermediate, plasticizer, copolymer in photography, builder in laundry and dishwashing detergents, and coating for aluminum and steel.

Acrylonitrile - Copolymer used in the production of fibers and plastics (e.g., ABS Acrylonitrile- Butadiene-Styrene plastic), and latexes and chemicals. Banned as a resin for soft drink containers and as a fumigant. Similar toxic effects as cyanide. Carcinogen.

Benzene - Coal tar and petroleum product used in pharmaceutical and chemical synthesis, including the production of styrene, detergents, pesticides, thinners, and inks. Also used as a cleaner and degreaser, solvent, and gasoline anti-knock additive. Carcinogen.

BHC - Benzene hexachloride. See hexachlorocyclohexane and lindane. C arcinogen.

Carbon Tetrachloride - Solvent and grain fumigant also used in fire extinguishers. Carcinogen.

Chlorinated Benzenes - Solvents for fats, oils and greases, also used as fumigants, degreasers, lubricants, dielectrics, dye carriers, wood preservatives; in chemical, pesticide, and herbicide production; heat transfer; military pyrotechnics; and termite control. Carcinogen.

Chlorinated Ethanes - Used in the production of tetraethyl lead and vinyl chloride and as solvents and chemical intermediates. Some forms carcinogenic.

Chloroalkyl ethers - Used in organic synthesis, textiles, ion exchange resins, pesticides, and reaction solvents.

Chloroform - Chemical solvent. Formed in the chlorination of sewage and water supplies. Carcinogen.

Dichlorobenzenes - Used in air deodorants, insecticides, chemical production, dyes, herbicides, and degreasers.

Dichlorobenzidine - Used in the production of dyes and pigments and a curing agent for polyurethanes. Carcinogen.

Dichloroethylenes - Intermediate in chemical production, and polyvinylidene chloride copolymers in food packaging materials (e.g., plastic wrap) and tank coatings. Degradation products of larger chlorinated hydrocarbons. Carcinogen.

Dichloropropane - Soil fumigant for nematodes, oil and fat solvent, and degreaser. Dichloropropene - Soil fumigant for nematodes, used in Hawaii on pineapples. Also oil and fat solvent and degreaser.

Ethylbenzene - Up to 20 percent of gasoline. Widespread commercial use including production of styrene, diluents in paints, and used as insecticides.

Hexachlorobutadiene - Organic solvent used in chlorine production recovery, in rubber and lubricant production, and as a gyroscope fluid. Carcinogen.

Hexachlorocyclohexane - Broad spectrum insecticide (a.k.a. BHC). Only the gamma isomer, lindane, is currently registered and produced. Carcinogen.

Hexachlorocyclopentadiene - Base of several chlorinated pesticides including: aldrin, dieldrin, chlordane, heptachlor, endrin, isodrin, kepone, mirex, endosulfan, and pentac. Also used in the production of flame retardants.

Isophorone - Solvent for fats, oils, gums, natural and synthetic resins, cellulose derivatives, lacquers, pesticides and herbicides. Used in chemical and plant growth retardant production.

Tetrachloroethylene - Solvent in textile and dry cleaning, metal cleaning, and chemical production (a.k.a. perchloroethylene or PCE). Carcinogen.

Toluene - Aviation fuel and high-octane blending stock, chemical intermediate, thinner, solvent for paints, gums, resins, oils, rubber, and vinyl, and used in plastic cement, chemicals, explosives, and detergents.

Trichlorinated ethanes - Metal degreaser, chemical intermediate, adhesive and resin solvent, pesticide, dry cleaning solvent, formerly used as a fumigant 1,1,2 isomer carcinogenic.

Trichloroethylene - Degreasing solvent in metal industries. Formerly dry cleaning solvent and extractive solvent in foods (a.k.a. TCE). Carcinogen.

Vinyl chloride - Polymerized in the production of PVC, the most widely used material in the manufacture of plastics. All pesticide uses cancelled (whether an active or inert ingredient) for uses in the home, food handling establishments, hospitals, and enclosed areas. Degradation product of larger chlorinated hydrocarbons. Carcinogen.

h. Others

Chlorine - Chlorine is commonly used to disinfect wastewater and water supplies and to control fouling organisms in cooling water systems.

Cyanide - Used and formed in many industrial processes including steel, petroleum, plastics, synthetic fibers, metal plating, mining, and chemical industries.

Dioxin - Trace contaminant of chlorinated phenols, chlorinated phenoxy acids (especially the herbicide 2,4,5-T and Silvex), and hexachlorophene. Carcinogen.

Polychlorinated biphenyls (PCBs) - Used as a transformer and capacitor fluid. Also used as a heat transfer, hydraulic, compressor, and vacuum pump fluid, plasticizer, and in lubricants and wax extenders. No longer manufactured in the United States. All pesticide uses eliminated. Carcinogen.

Attachment E – Site-Specific Dewatering Plan (Section G.10)

a. *Provide the dewatering facility designer information.*
Legal Name: _____
Mailing Address: _____
City, State and Zip Code +4: _____
Street Address: _____
City, State and Zip Code +4: _____
Contact Person & Title: _____
Phone No.: _____
Fax No.: _____
Email: _____

b. *Provide the treatment facility designer information.*
Legal Name: Legal Name: _____
Mailing Address: _____
City, State and Zip Code +4: _____
Street Address: _____
City, State and Zip Code +4: _____
Contact Person & Title: _____
Phone No.: _____
Fax No.: _____
Email: _____

c. *Describe the pumping devices to be used, their pumping capacity, and the number of devices to be used.* _____

d. *Describe the dewatering treatment from intake to discharge (i.e., sheet piled excavation, slotted intake pipe, gravel filter, filter fabric around intake, sedimentation basin, filter tank, etc.), including how the discharge will reach State water(s).* _____

e. *Describe the design concerns, including, but not limited to, estimated flow amount, construction location, and amount of space available, and the pollutants that may be present in the source water and those associated with the construction activity.*

_____

f. *Provide all calculations used in designing the treatment system, including estimating the flow rate.* _____

g. *Describe the mitigative measures, including the corrective action to be taken (i.e, add filter tank, increase sediment basin or tank volume, reduce flow quantity, etc.) when and if the construction dewatering effluent does not meet the conditions of the NPDES Permit and basic and specific water quality criteria.* _____

h. *Provide the name and title of the field person responsible for the operation and maintenance of the dewatering system.* _____

i. *Provide the Operations Plan. The Operations Plan shall include a description of operations from startup to termination of the discharge (i.e., install dewatering well, excavate top "x" feet of ground, discharge initial effluent to excavation until clear, route*

discharge to treatment system when effluent is clear, route discharge back to excavation if effluent becomes turbid, visual inspections, sample collections, etc.). _____

j. *Provide the maintenance scheduling or action criteria.* _____

k. *Provide the maintenance program.* _____

l. *Provide the Sediment Handling and Disposal Plan. The Sediment Handling and Disposal Plan shall describe the handling (storage and transport) and disposal of both the sediment collected in the treatment system and the excavated material.* _____

m. *Provide the monitoring and visual inspection program.* _____

n. *Provide the Cessation of Discharge Plan. The Cessation of Discharge Plan shall indicate under what conditions the discharge will be stopped (i.e., storm event, discharge noncompliance, maintenance, etc.).* _____

o. *Provide the Effluent Control Plan. The Effluent Control Plan shall indicate the normal dewatering operations (pump, treatment, discharge).* _____

p. *Provide the treatment requirements. Treatment requirements shall include a statement of what is expected from the treatment system.* _____

q. *Construction Pollution Prevention Plan*

i. *Describe the prohibited practices. Examples of prohibited practices are: discharging the dewatering effluent without the appropriate permits, treatment, or when physical changes are discovered; continuing the dewatering operation when contamination is encountered; storing construction materials near the dewatering site(s); and falsifying the dewatering effluent water quality test report to conform to the basic water quality criteria.* _____

ii. *Describe other management practices that will be utilized to prevent pollution of State waters.* _____

iii. *Describe your practices to control project site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage or stockpiling area(s)*

_____

Attachment F

Dewatering Discharge Calculations (Item G.2.)

DEWATERING DISCHARGE ESTIMATE

Project: Kaipapau Stream Bridge Replacement

Prepared for: State Department of Transportation, Highways Division

Consultant:	R. M. Towill Corporation	Prepared by:	RSY
Date:	9/19/19	Checked by:	WC

1.0 PURPOSE

Determine the estimated dewatering discharge flow rate that will occur during construction of the new bridge and relocation of a 12-inch waterline.

Note: these calculations are intended for NPDES-NOI permit purposes only.

2.0 DESCRIPTION OF CONDITIONS

The dewatering discharge requirement is the amount of water entering the excavation through the portion of the earthen walls below the groundwater elevation. The amount of water flowing through the earthen walls is assumed to be equal to the rate of water moving through the groundwater aquifer, which can be estimated using Darcy's Law.

3.0 REFERENCES

3.1 *Pre-Conceptual Design Report, Kamehameha Highway, Kaipapau Stream Bridge Replacement,* R. M. Towill Corporation, January 2006

3.2 *Principles of Engineering Geology and Geotechnics* , Krynine and Judd, McGraw-Hill Book Company Inc., New York, 1957.

3.3 *Civil Engineering Handbook, Fourth Edition* , Urquhart, McGraw-Hill, 1959

3.4 *Civil Engineering Reference Manual* , Lindeburg, Professional Publications, California, 1992.

3.5 *Geotechnical Engineering Exploration* , Geolabs, August 6, 2014.

4.0 CRITERIA & ASSUMPTIONS

4.1 Assume groundwater elevation will vary with tidal fluctuations. The worst-case (maximum) groundwater elevation is assumed to be 2 feet.

4.2 The top excavation elevation is assumed to range from +0 feet (stream bed) to +10 feet (north abutment) mean sea level (msl).

4.3 Per the structural plan S8.1, shaft excavation will be a drilled shaft with diameter of 4 feet to a depth of:

Abutment 1	(-)79.6	ft msl
Abutment 2	(-)64.5	ft msl
Test Shaft	(-)92.0	ft msl

4.4 Per the civil plan sheet C-21, the 12-inch waterline excavation below the water table is about 80 LF, with assumed bottom trench elevation of (-)5 ft msl (1 foot below bottom of concrete jacket).

DEWATERING DISCHARGE ESTIMATE

Project: Kaipapau Stream Bridge Replacement

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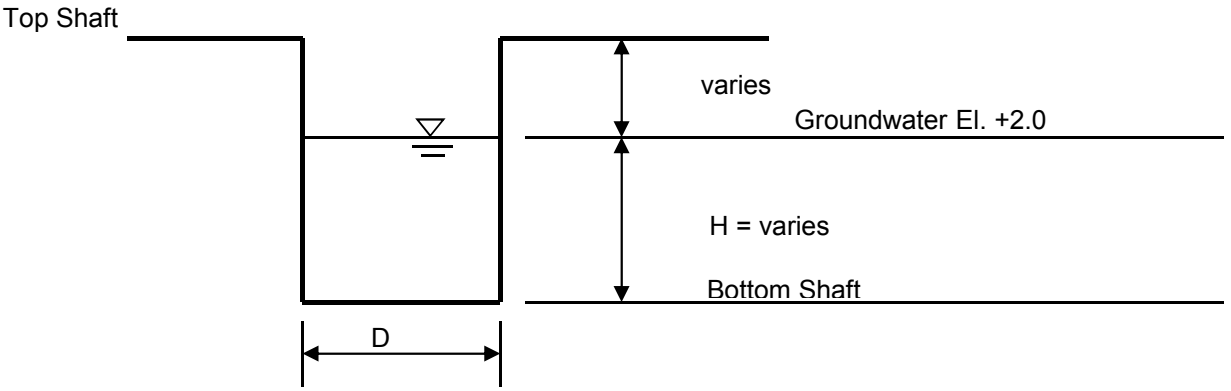
Date:	9/19/19	Checked by:	WC

5.0 CALCULATIONS

5.1 Shaft Excavation

5.1.1 Sketch of shaft excavation (not to scale)



5.1.2 Darcy's Law can be expressed as Q = AKJ (adapted from Ref. 3.4, pg. 6-6), where:

Q = Discharge flow rate, ft^3/day
A = Seepage flow area, ft^2
K = Hydraulic conductivity, ft/day
J = Hydraulic gradient, ft/ft

5.1.3 Determine A

A is the area of the earthen walls below the groundwater elevation, where:

Abutment 1

D = 4 ft (shaft diameter)
H = 81.6 ft (height of groundwater above shaft bottom)
A = Area of the shaft bottom + Area of the shaft sides
A = $(\pi * D^2 / 4) + (\pi * D * H)$
A = 1038 ft^2

Abutment 2

D = 4 ft (shaft diameter)
H = 66.5 ft (height of groundwater above shaft bottom)
A = Area of the shaft bottom + Area of the shaft sides
A = $(\pi * D^2 / 4) + (\pi * D * H)$
A = 848 ft^2

Test Shaft

D = 4 ft (shaft diameter)
H = 94 ft (height of groundwater above shaft bottom)
A = Area of the shaft bottom + Area of the shaft sides
A = $(\pi * D^2 / 4) + (\pi * D * H)$
A = 1194 ft^2

DEWATERING DISCHARGE ESTIMATE

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5.1.4 Determine K

From the geotechnical report (Ref. 3.5), pg. 8:

Abutment 1 (Boring No. 1)	0.038 ft/min	54.7 ft/day
Abutment 2 (Boring No. 3)	0.042 ft/min	60.5 ft/day
Test Shaft (Boring No. 3)	0.042 ft/min	60.5 ft/day

K was measured at two different depths and using the constant head and falling head methods. The hydraulic conductivity at the lower depth and the constant head method was used.

5.1.5 Determine J

The hydraulic gradient in flat areas is typically 1%+ (Ref. 3.2, pg. 181).

J = 0.01 ft/ft (assumed)

5.1.6 Calculate Q for each shaft

Abutment 1 shafts

Q = A * K * J

Q = 568.0 ft^3/day

Q = 4,249 gal/day 2.95 gpm

Abutment 2 shafts

Q = A * K * J

Q = 513.0 ft^3/day

Q = 3,837 gal/day 2.66 gpm

Test Shaft

Q = A * K * J

Q = 722.0 ft^3/day

Q = 5,401 gal/day 3.75 gpm

5.1.7 Calculate Shaft Volume

Abutment 1
4 ft diameter
81.6 ft depth

V = 1,025 ft^3 = 7,671 gal

Abutment 2
4 ft diameter
66.5 ft depth

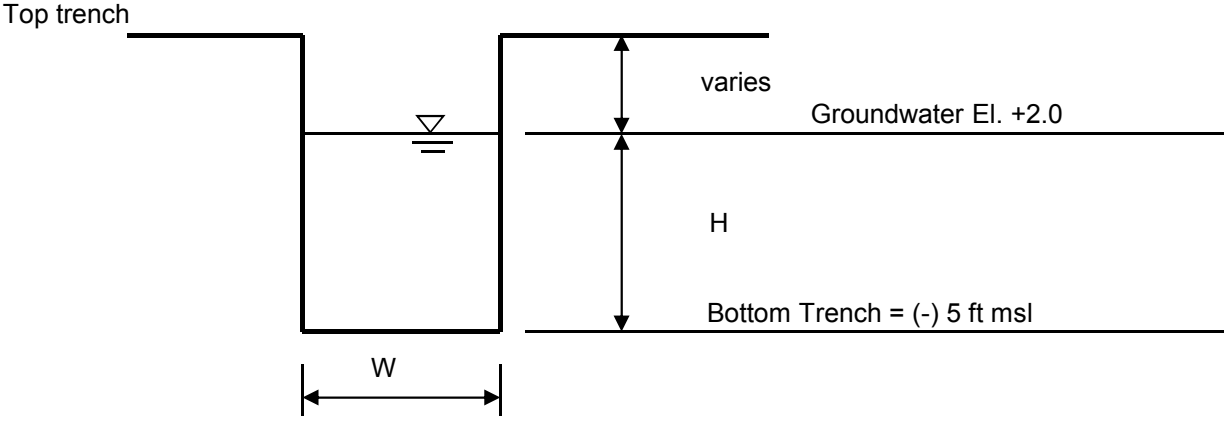
V = 836 ft^3 = 6,251 gal

Test Shaft
4 ft diameter
94 ft depth

V = 1,181 ft^3 = 8,836 gal

5.2 Waterline Trench Excavation

5.2.1 Sketch of waterline trench excavation (not to scale)



5.2.2 Similar to the calcs for the shaft excvation, use Darcy's Law, Q = AKJ, where:

Q = Discharge flow rate, ft^3/day
A = Seepage flow area, ft^2
K = Hydraulic conductivity, ft/day
J = Hydraulic gradient, ft/ft

5.2.3 Determine A

A is the area of the earthen walls below the groundwater elevation, where:

W = 3 ft (trench width)
H = 7 ft (height of groundwater above trench bottom)
L = 80 ft (length of trench under groundwater)
A = Area of the trench bottom + Area of the ternch sides
A = L * W + 2 * (W * H) + 2 * L * H)
A = 1,402 ft^2

5.2.4 Determine K

Similar to the calcs for the shaft excvation, K is obtained from the geotechnical report (Ref. 3.5), pg. 8: Boring No. 3 is the closest to the waterline trench location.

Boring No. 3	0.078 ft/min	112.3 ft/day

K was measured at two different depths and using the constant head and falling head methods. The hydraulic conductivity at the higher depth and the constant head method was used.

K =	0.001 cm/sec	Ranges from 10-3 to 10-7, assume high end of range as
	2.83 ft/day	worst case

5.2.5 Determine J

The hydraulic gradient in flat areas is typically 1%+ (Ref. 3.2, pg. 181).

J = 0.01 ft/ft (assumed)

5.2.6 Calculate Q for the waterline trench

Q = A * K * J
Q = 1,574.7 ft^3/day
Q = 11,779 gal/day 8.18 gpm

5.3 Calculate Total Dewatering Volume

Shaft Assumptions:

1. Construction Period = 5 days per shaft
2. Dewatering during construction & once during concrete pouring into steel casing
3. 4 shafts per abutment

Trench Assumptions:

1. Construction Period = 5 days

DEWATERING DISCHARGE ESTIMATE

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DEWATERING VOLUME

Abutment 1				
Volume during shaft drilling	=	4 shafts x 5 days x 21,243 gpd =	84,970	gallons
Volume during concrete pour	=	4 shafts x 7671 gallons =	30,683	gallons
TOTAL VOLUME, ABUTMENT 1	=		115,653	gallons
Abutment 2				
Volume during shaft drilling	=	4 shafts x 5 days x 19,187 gpd =	76,746	gallons
Volume during concrete pour	=	4 shafts x 6251 gallons =	25,005	gallons
TOTAL VOLUME, ABUTMENT 2	=		101,751	gallons
Test Shaft				
Volume during shaft drilling	=	1 shaft x 5 days x 27,003 gpd =	27,003	gallons
Volume during concrete pour	=	1 shaft x 8836 gallons =	8,836	gallons
TOTAL VOLUME, TEST SHAFT	=		35,840	gallons
Waterline Trench				
Volume during waterline construction =		5 days x 58,595 gpd =	58,895	gallons
GRAND TOTAL VOLUME	=		312,138	gallons

5.9 Calculate Dewatering Basin Capacity

Dewatering Basin Dimensions (from civil plan sheet C-18)

Length	20	ft
Width	15	ft
Depth	8	ft

Dewatering Basin Volume	2400	CF	
Dewatering Basin Floor Area	300	SF	
Percolation Rate	0.0052	ft/min	from Geotechnical Report, page 8, Boring No.3,
	1.56	CF/min	Falling Head, at depth of 17 ft
	2,246	CF/day	
	16,803	gpd	

Compare to the required dewatering rates for the different areas of construction:

Area	Dewatering Rate
Abutment 1 shafts	4,249 gpd
Abutment 2 shafts	3,837 gpd
Test shaft	5,401 gpd
Waterline trench	11,779 gpd

There is sufficient percolation for each individual area.