DEPARTMENT OF HAWAIIAN HOME LANDS
STATE OF HAWAII

MARCH 27, 2017

ADDENDUM NO. 2

TO

PLANS, BID FORM, SPECIFICATIONS, CONTRACT AND BOND

FOR

PAPAKOLEA SUBDIVISION SEWER IMPROVEMENTS
AUWAIOLIMU SLOPE STABILIZATION AND SEWER LINES C & C-1 IMPROVEMENTS

PAPAKOLEA, OAHU, HAWAII

IFB-17-HHL-011

NOTICE TO ALL PROSPECTIVE BIDDERS

This addendum is hereby made a part of the PLANS, BID FORM, SPECIFICATIONS, CONTRACT AND BOND for the PAPAKOLEA SUBDIVISION SEWER IMPROVEMENTS, PAPAKOLEA, OAHU, HAWAII, and it shall amend the said contract documents as detailed within this Addendum document.

APPROVED: N Sakamoto

Norman Sakamoto, LDD Acting Administrator
Department of Hawaiian Home Lands

Date: March 27, 2017

Please detach, execute, and return immediately, the receipt below, to the Department of Hawaiian Home Lands, Hale Kalanianaole, 91-5420 Kapolei Parkway, Kapolei, Hawaii or transmit facsimile to (808) 620-9299 or via email to mitchell.h.kawamura@hawaii.gov.

Receipt of Addendum No. 1 for the PAPAKOLEA SUBDIVISION SEWER IMPROVEMENTS, AUWAIOLIMU SLOPE STABILIZATION AND SEWER LINES C & C-1 IMPROVEMENTS, PAPAKOLEA, OAHU, HAWAII, is hereby acknowledged.

Signed_____ Title_____

Firm_____ Date_____

ADDENDUM NO. 2
March 27, 2017

TO

PLANS, BID FORM, SPECIFICATIONS, CONTRACT AND BOND

FOR

PAPAKOLEA SUBDIVISION SEWER IMPROVEMENTS
AUWAIOLIMU SLOPE STABILIZATION AND
SEWER LINES C & C-1 IMPROVEMENTS

PAPAKOLEA, OAHU, HAWAII

IFB-17-HHL-011

ITEM NO. 1 GEOTECHNICAL REPORTS

The following geotechnical documents are available and attached to **ADDENDUM NO 2 (March 27, 2017):**

A. "Geotechnical Engineering Consultation, Auwaiolimu Street Slope Mitigation, Honolulu, Oahu, Hawaii", dated September 11, 2013, prepared by Geolabs, Inc.

B. Field report on "Auwaiolimu Street Slope Stabilization & Sewer Lines C, and C-1 Project Field Investigation – Existing Ditch Distress and ECM Slope; Papakolea, Oahu, Hawaii", dated October 26, 2016, prepared by Geolabs, Inc.

ITEM NO. 2 BID OFFER FORM

Replace proposal schedule, pages 3-6 of the Bid Offer Form with the revised proposal schedule attached to **ADDENDUM NO 2 (March 27, 2017).**

ITEM NO. 3 STANDARD QUALIFICATION QUESTIONNAIRE FOR OFFERORS, SPO FORM-21 ("QUESTIONNAIRE")

The Questionnaire shall be due at the time of the bid opening on April 5, 2017.

ITEM NO. 4 ARCHAELOGICAL SERVICES

Assume archaeological services consist of

- archaeological monitoring for 10% of excavation along previously trenched alignment, and on-call monitoring;
- archaeological monitoring for 100% of new trench excavation;

- historic architectural component to document the before demolition/construction and after construction conditions of demolished/reconstructed rock walls and rock-lined ditch.
- final archaeological monitoring report.

ITEM NO. 5 DRAWING MODIFICATION AND CLARIFICATIONS

Replace the following sheets with revised drawings dated **March 27, 2017**. See attached full size revised drawing attached to **Addendum No. 2**.

1. Sheet C-3 – "Construction Notes – 3 and Legend & Abbreviations"
   Revised HECO notes

2. Sheet C-9 – "Site Plan – 1"
   a. Revised limits of work areas to meet existing slope stabilization under bridge
   b. Revised bottom of slope stabilization limits west of overpass bridge

3. Sheet C-10 – "Site Plan – 2"
   Extend chain link fence at top of slope

4. Sheet C-14 – "Typical Sections"
   Removed erosion control matting under anchored wire mesh.

5. Sheet L-1 – "Planting Plan"
   a. Revised plant schedule
   b. Deleted seven (7) Alahee trees atop slope
   c. Revised hydromulch/groundcover area
   d. Extended chain link fence and kuhio vines to end of project area.

ITEM NO. 6 QUESTIONS AND REQUESTS FOR CLARIFICATION RECEIVED AS OF MARCH 20, 2017

1. **Is a financial balance sheet and a letter from an outside auditor acceptable to satisfy the requirements for the qualification questionnaire?**

   Answer: Yes.

2. **Drawing shows dells for anchors. It is not standard practice to use dells in rock. Please explain/clarify this point.**

   Answer: Since the majority of wire mesh anchor installation is anticipated in hard rock formation, the dell called for on the Anchor Details (Sheet C-19) will only be required where soil ground surface conditions may be encountered.

3. **If rocks can be removed from the rock-bolting area during scaling, how will the contractor be reimbursed?**

Answer: Rock removal by scaling may create a pocket depression in the slope that may destabilize adjacent rock blocks; therefore, in-place rock stabilization by rock bolting is recommended as shown on the plans. If the target rock for bolting is removed during the slope preparation scaling and the resulting slope surface stability is satisfactory to the engineer, rock stabilization bolting will not be required and additional payment for scaling of the target rock will not be honored. If the target rock for bolting is removed during the slope preparation scaling effort and the rock removal creates a local slope instability, additional rock bolts or application of local shotcrete may be required to stabilize the affected area.

4. **For the current traffic control plan setup, with barriers creating walkways for pedestrians, contractor will not have sufficient room on the bottom of the slope for equipment. Can the plan be altered to accommodate equipment?**

   Answer: Contractor has the option to modify the traffic control plans, provided it stamped by a licensed engineer in the State of Hawaii and approved by the applicable agencies, including but not limited to the City and County of Honolulu's Department of Planning and Permitting Traffic Review Branch, Department of Design and Construction Civil Division, DHHL, and Disability and Communication Access Board.

5. **In 24-hour work zone, is the contractor permitted to use drills during the 6pm-6am time window?**

   Answer: No.

6. **Regarding Sheet C-4, Please confirm that only 1 EA Bollard is required.**

   Answer: Yes.

7. **Regarding Sheets C-9 and C-10, and Bid Item No. 15, please confirm the quantity of anchored wire mesh required, the proposal quantity seems larger than what is drawn on the plans.**

   Answer: Quantity is revised. See revised Bid Offer Form above in Item No. 2 of this addendum.

8. **Regarding Sheet Regarding Sheet L-1, please confirm the quantity of vines required, the listed quantity of 140 seems less than what is drawn on the plans.**

   Answer: Quantities revised, See revised L-1 issued above in Item No. 5 of this addendum.

9. **Please confirm whether the hydromulching at the erosion control matting will be paid for under Bid Item No. 16 (permanent erosion control matting) or under Bid Item No. 26 (permanent landscaping).**

   Answer: Hydromulching at the erosion control matting shall be paid for under (revised) Bid Item No. 17 "permanent erosion control matting".

10. **Please clarify whether Bid Item No. 13 (Additional rock bolt anchor) accounts for the rock bolts and grouted anchors for the anchored mesh system.**

    Answer: (Revised) Bid Item No. 14 is for the rock bolt anchors (boulder stabilization) and the grouted anchors for the anchor wire mesh system. The quantity is estimated based on the surface area coverage of the anchored wire mesh and the estimated number of rock bolts for rock stabilization.

11. **Compression Claws for border rope connection will not accommodate the .5 in pvc coated rope, because of the PVC coating. The border rope would have to be reduced to 3/8" pvc coated or alternate lacing option with unspecified lacing rope size every 10" to 12" though the mesh.**

    Answer: Follow the manufacturer's recommendation for appropriate size compression claws for the specified 0.5 inch PVC coated wire rope.

12. **The specification listed below is not clear from the plans on how long the protection on the grouted anchor is. Is the anchor pre-grouted or has a bonded and un-bonded zone?**

    The hollow core bolt shall be encapsulated with corrugated IIDPE or PVC. Zinc galvanization shall be included in the diameter (inside and outside) of the anchors. The length of the grouted rock anchors shall be in accordance with the contract documents.

    Answer: The grouted rock anchor and wire rope anchor shall be fully bonded. The design intent is to utilize the hollow core bar for tremie grouting. It is contractor's option to determine whether the hollow core bar will be used as drill rod. When the hollow core bar is used for drilling advancement of the borehole, additional corrosion protection shall be provided in addition to zinc galvanization. As alternative, an equivalent solid bar system may be used with a 0.5-inch PVC grout tube for tremie grouting in lieu of the hollow core bar if it is the contractors prerogative to do so.

13. **Rock Bolts does not state what type of SS is required 304/316?**

    Answer: Rock bolts shall be Type 304 stainless steel.

14. **To clarify rock bolts are stainless and grouted dowels for the anchored mesh system are galvanized?**

    Answer: Rock bolts shall be Type 304 stainless steel. The grouted rock anchors for the anchored wire mesh shall be in conformance with the specifications when the hollow core bar system is used for drilling advancement. Only zinc galvanization will be required if the hollow core bar will not be used for drilling advancement.

GEOLABS, INC.

Geotechnical Engineering and Drilling Services

September 11, 2013
W.O. 6709-10

Ms. Ann Y. Miyasato
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, HI 96819

GEOTECHNICAL ENGINEERING CONSULTATION
AUWAIOLIMU STREET SLOPE MITIGATION
HONOLULU, OAHU, HAWAII

Dear **Ms. Miyasato:**

As requested, this letter report presents our geotechnical engineering findings and recommendations for the proposed stabilization of the existing cut slope along Auwaiolimu Street in the Papakolea area of Honolulu on the Island of Oahu, Hawaii.

Our geotechnical findings and recommendations are based on visual observations (site reconnaissance) only and our experience with previous rockfall mitigation conducted in the vicinity. The following recommendations are subject to the limitations noted at the end of this report.

PROJECT CONSIDERATIONS

The project site is situated along Auwaiolimu Street in the lower portion of Papakolea in Honolulu on the Island of Oahu, Hawaii. It was reported that an eroded surface area in the backyard of 2103 Tantalus Drive is encroaching on the steep cut slope leading down to Auwaiolimu Street. Based on the information provided, we understand that the existing Sewer Line “C”, along the top of the steep slope, is proposed for future rehabilitation.

The steep sub-vertical rock slope between the existing Papakolea residential subdivision and Auwaiolimu Street was developed by cutting into both the Punchbowl volcanic tuff and Koolau basalt rock materials. The slope portion comprised of volcanic tuff formation appears to be closely jointed with open fractures and appears especially susceptible to erosion and falling rock activity. It was reported that rock fragments and boulders continue to spall from the exposed slope face and encroach on the City and County right-of-way at Auwaiolimu Street. In addition, there is some concern that future cut-and-cover trenching work for the proposed sewer line rehabilitation may adversely affect the slope stability.

Geolabs had previously conducted a preliminary geotechnical engineering assessment to provide possible slope stabilization alternatives and preliminary construction cost estimates for the City and County of Honolulu. A slope mitigation measure consisting of the use of anchored wire mesh (Tecco Mesh) was recommended as a feasible alternative to stabilize the rock slope face and to reduce the potential for future rockfall activity.

EXISTING SITE CONDITIONS AND ASSESSMENTS

The project site spans along a section of Auwaiolimu Street in the Papakolea/Punchbowl area of Honolulu on the Island of Oahu, Hawaii, as shown on the Project Location Map, Plate 1. The project site is bounded by the existing Department of Hawaiian Home Lands residential subdivision towards the northeast and the existing Punchbowl Crater towards the southwest. The project site encompasses approximately 550 linear feet of hillslope length along the northern side of Auwaiolimu Street. The existing Tantalus Drive overpass structure crosses perpendicular to the slope length. The limits of slope mitigation span about 550 linear feet between about Sta. 0+75 at the west end of the alignment through about Sta. 6+25 at the east end of the alignment.

Based on our observations, the project site consists of a steep and irregular cut slope composed of highly fractured rock materials. The slope is situated between a residential subdivision along the top of the slope and Auwaiolimu Street along the toe of the slope. An existing sidewalk is between the roadway and the toe of the slope. Based on the topographic site plan, an existing 8-inch sewer line extends parallel along the top of a portion of the slope easterly of the Tantalus Drive overpass. In addition, an existing lined drainage ditch extends along the top of the slope on the western side of the Tantalus Drive overpass.

Within the project limits, the cut slope developed along Auwaiolimu Street is generally composed of medium hard to hard rock materials consisting of both basaltic rock (lavas of the Koolau Volcanic Series erupted from the regional Koolau Volcano) and volcanic tuff (welded ash and cinder deposits of the Honolulu Volcanic Series erupted from the adjacent Punchbowl vent). The younger volcanic tuff rock forms a surface cap over the underlying and older pahoehoe basaltic rock. The volcanic tuff erupted and formed Punchbowl Crater as part of the late stage Honolulu Volcanic Series. Several hundred thousand years ago, the Punchbowl volcanic vent explosively blasted through the Koolau Basalt lavas already in-place in the vicinity. As a result, the layered tuff materials comprising the cone vent overlie the layered basaltic rock. The location of the Punchbowl vent in relation to the project site is shown on the Project Location Map, Plate 1.

Based on our observations, the project hillslope ranges between about 20 and 53 feet above the surface grade of Auwaiolimu Street. The cut slope appears to stand steeply with average overall inclinations of about 0.5H:1V to 0.25H:1V. The irregular slope face contains segments of sub-vertical rock exposure interspersed with some narrow flatter rock terrace features containing thin soil deposits. As a result, some rock

overhangs with basal undercuts are visible locally on the rough and irregular slope face exposures.

The cut slope toe is bounded by an existing 3-foot high CRM retaining wall which forms a variable width debris catchment area along the toe of the slope spanning between about Sta. 0+75 and about Sta. 6+25. The width of the existing catchment (distance between the wall and rock slope toe) varies from about 3 to 12 feet along the alignment. The existing catchment contains appreciable volumes of unconsolidated scree/talus generally consisting of mixed soils, rock fragments, boulders and cobbles, organic waste material, and overcast rubbish from the top of the slope. Locally, the accumulations of unconsolidated debris chokes the available catchment area and overtops the existing retaining walls. Based on hand probing, we observed a typical thickness of unconsolidated soils in the catchment area and mantling the toe of the rock slope ranging between about 1.5 and 3.5 feet. At about Sta. 6+25, the existing CRM retaining wall terminates and transitions to a concrete retention curb of about 1-foot high; which, extends further towards the southeast.

Basaltic Rock Materials

Based on our observations, the basalt rock comprising the cut slope face is generally composed of layered, thin-bedded pahoehoe lava containing some thin and sporadic clinker seams. Occasional cavities, representing small elliptical shaped lava tubes and localized blister type voids, were observed as widely scattered throughout the slope segment length. Large size lava tube was not observed on the slope face, but may exist at a greater depth. The basaltic rock appears to be generally moderately to highly weathered and medium hard to hard. Rock face fracturing appears to be generally random and irregular with near-horizontal bedding surfaces between individual lava flow layers. The basaltic rock appears to be generally severely to moderately fractured with individual rock block size typically averaging about 1 to 3 feet in larger dimension. The basaltic rock is observed mainly comprising the lower half of the slope face and is capped by volcanic tuff rock. The basaltic rock appears to be moderately susceptible to erosion and raveling of loose rock fragments and the production of periodic rockfalls involving rocks with diameters in the 1 to 3-foot larger dimension.

Volcanic Tuff Materials

Based on our observations, the volcanic tuff comprising the cut slope face is generally composed of bedded tuff (welded volcanic ash and cinder) with near horizontal to slightly inclined bedding plane surfaces expressed as prominent fractures on the rock slope face. Primary rock fractures are related to the orientation of the tuff bedding surfaces. Some planar and smooth primary fractures (related to the bedding surfaces) appear adversely inclined in a downwards direction toward the roadway. The fracture condition is conducive to block sliding failure on the inclined and planar bedding surface. Other secondary rock fractures were observed oriented both vertically and diagonally across the slope face. The intersection of the natural rock fractures appear to

produce generally rectangular to sub-angular blocks of tuff rock between about 2 and 4 feet in larger dimension.

Based on our observations, the fractured volcanic tuff rock appears to have greater susceptibility to block sliding and rock raveling type failures than the basaltic rock material. The volcanic tuff also appears to contain a higher frequency of open-fractures bounding individual blocks of rock comprising the slope face.

We observed a fairly continuous layer of highly to extremely weathered tuff (saprolitic soil appearance) at the base of the tuff exposure in contact with the underlying basaltic rock. The layer appears to represent a distinct weathering front between the different rock materials and marks the early depositional horizon for the overlying tuff materials. The layer also appears to be susceptible to scouring/ravelling and erosion which is prone to producing a topographic undercut below the overlying tuff rock material.

Finally, we observed a 1.5 to 2-inch wide open and continuous fracture trending diagonally across full slope face height near about Sta. 4+60. The rock discontinuity has a measured trend of about N10E (10 degrees) orientation in plan view. The open crack may have an adverse impact on the drilling and grout application for anchor installation in the vicinity.

Slope Vegetation

Based on our observations, the cut slopes are generally densely vegetated with mixed vegetation consisting of thick ground cover vines and grasses, small to medium size trees, brush, and a few large trees. Mixed within the slope vegetation is an appreciable volume of rubbish including some tire, carpet, plastic, and various wood and metal debris.

Based on our evaluation, the existing vegetation, including the existing soil and rubbish accumulations mantling the top, toe, and portions of the middle slope face, must be removed to facilitate the proper installation of the anchored wire mesh. All existing woody stem shrubbery and trees on the slope face should be cut flush with the finish ground surface and poisoned to reduce the potential for undesired re-growth on the slope face. In addition, existing ground cover vegetation should be removed to completely expose the slope surface in preparation for the installation of slope improvements.

We observed several large mature trees including banyan and monkey pod species growing along the top edge of the slope. The existing large trees located within about 5 feet of the slope crest should be cut and poisoned close to the existing ground surface. Subsurface tree trunk remnants should not be excavated and instead be left in the ground and covered by the anchored mesh.

Large trees with cantilevered branches and trunks growing from the slope face and along the slope crest are a hazard because of the levering action imparted on the

slope materials by wind loading on the tree canopy. In addition, invasive root penetration into the fractured rock materials comprising the slope face can result in mechanical widening of rock fractures, ultimately resulting in a higher risk for slope instability and falling rock. Large trees with broad canopies have the potential to destabilize the crest of the slope because the top of the slopes are commonly composed of less erosion resistant soils and weathered rock materials. Large trees growing at the exposed crest of a slope have potential to sway and lean or topple, and may result in significant disturbance to the slope crest by loosening and erosion of the weaker soil and rock materials comprising the top edge of the slope.

We observed some existing banyan trees growing on the cut slope face and at the top of the slope. Banyans generally have a lower potential for causing slope instability by wind loading on the canopy and levering action due to the typical large diameter and dense intergrowth of the tree trunk. However, banyan trees generally have the potential to grow very large and the invasive root systems pry into rock fractures and expand with the passage of time. Therefore, to facilitate the installation and the long-term performance of the anchored wire mesh, we recommend that the banyan trees and associated surface root networks be cut, removed, and the root remnants poisoned to facilitate close contact of the wire mesh with the slope face.

The main banyan tree trunk should be cut flush or as low to the ground surface as practical. It may be possible to install the anchored wire mesh around some remaining banyan tree trunks due to the impracticality of complete removal flush with the ground surface. Cutting of the main trunk should include cutting and removal of the root network exposed at the ground surface and any aerial (suspended) root growth. The main banyan trunk should ideally be cut close to the ground surface so that the wire mesh can be installed over the remaining low-height stump; which would remain embedded in the ground. Removal of the embedded stump would likely entail significant excavation and impart substantial disturbance to the slope face; therefore, stump removal by excavation is not recommended. The remaining stump should be treated with an appropriate systemic poison or herbicide to prevent re-growth of the tree. All aerial roots (suspended roots not in contact with the ground surface) must be cut and removed to prepare the slope surface for installation of the improvements.

SLOPE ROCKFALL MITIGATION

Based on our observations, the project site shows evidence of active soil/rock falling and erosion hazard. To mitigate the continuous erosion exposing the existing sewer line at the top of the slope and reduce risk of rockfall encroaching onto Auwaiolimu Street near the toe of the slope, we recommend installing an anchored wire mesh system, to stabilize the fractured rock slope.

Anchored wire mesh system is a slope treatment that involves the installation of steel wire mesh panels anchored onto the slope face with soil/rock nails in an effort to prevent the soils and rocks from moving/falling under the permanent system. The

primary intent of this stabilization system is to closely pin the wire mesh to the slope face as a retention system.

The slope to be anchored with steel wire mesh must be trimmed of vegetation and scaled of loose rocks prior to the installation of the anchored wire mesh system. The anchored wire mesh system and all associated hardware, such as the high strength steel wire mesh, compression claws, and spike plates should be powder coated with a black pigment or other color as directed by the State. Boundary wire ropes should be PVC coated in black unless directed otherwise by the State. All other exposed steel elements should be painted with a black colored rubberized paint. The following provides a brief outline of the anchored wire mesh installation procedures.

1. Trim slope face of vegetation, loose materials and protruding rock outcrops.

2. Install rock bolt anchors at designated locations as shown on the plan or as directed by the engineer, to pin large unstable fractured rock blocks.

3. Stake-out grouted soil/rock anchors in general accordance with the project spacing requirements taking into account the low spots.

4. Excavate the dell for pre-tensioning of the anchored wire mesh before drilling the grouted soil/rock anchors.

5. Install the grouted soil/rock anchors (anchor heads should not project above the terrain line or predominant slope line).

6. Lay the steel wire mesh panels on the slope.

7. Join or seam the steel wire mesh panels together.

8. Fit the boundary wire ropes around the perimeter of the anchored wire mesh system.

9. Install the spike plates and pre-tension with a torque wrench or hydraulic press to the specified forces.

Based on our evaluation for the slope, we recommend that the soil/rock anchor be a minimum of 8 feet long, spaced at 10-foot on-center in a staggered pattern. The drilled hole for the soil/rock anchor should be a minimum of 4 inches in diameter. The grout should have a minimum 28-day unconfined compressive strength of 4,000 psi or greater in 28-days. The grouted soil/rock anchors should have an ultimate pullout capacity of 10 kips.

It should be noted that cavities/voids with various sizes are common in the volcanic and lava rock formation. Therefore, the contractor should include sufficient contingency in his/her bid to account for additional grout in the event cavities/voids are

encountered during soil/rock anchor drilling. The contractor should employ means and methods reducing excessive grout loss, such as grout sock, grout admixture, etc.

We understand that an existing 6-inch cast iron sewer pipe installed in the 1930s partially traverses the northwest side of the rock slope. We also understand that the existing sewer line within the rock slope was installed in a lined rock tunnel about 5 feet tall and 4 feet wide. Details of the existing sewer tunnel alignment were not available at the time this report was prepared. We envision that the contractor is responsible to survey the tunnel alignment in relation to the rock slope as part of pre-construction activities. The contractor should submit the survey data and plan to the State for engineer's review and evaluation. The soil/rock anchors adjacent to the existing sewer tunnel may require relocation to prevent damage to the existing cast iron pipe and to reduce excessive grout loss in the existing tunnel.

The soil/rock anchors should be set in low spots, where possible, in order to pull the anchored wire mesh into the depressions and against the ground. This will avoid major hollow spaces and reduce excessive quantity of vegetation material during greening of the slope face. If the nail pattern does not permit setting soil/rock anchors in low spots, supplemental (short) anchors may be installed to achieve this purpose. The supplemental grouted soil/rock anchors should have a minimum embedment length of 5 feet.

Because the project site is relatively close to the ocean environment, which is very conducive to corrosion, the useful life of the anchored wire mesh system could be highly variable, depending on the quality of the steel wire mesh and hardware, corrosion protection, and workmanship employed during the anchored wire mesh installation.

Rock slope scaling is the manual sweep or removal of loose surface rocks in addition to extensive vegetation removal, including in-situ fractured rock outcroppings and loose boulders, from the hill slope surfaces located within the identified problem area. Slope scaling typically is accomplished by manual labor consisting of specialized slope scaling teams using pry bars to remove precarious loose rock materials while suspended on the slope face. The hill slope typically is scaled from top to bottom such that the generated debris is progressively moved toward the bottom of the slope for collection and proper disposal. The hill slope may be scaled by several passes through the area to scale at progressively greater detail starting with larger blocks of unstable rock and ending with sweeps for remaining "hung-up" and smaller size rock materials.

The contractor's proven prior successful experience with rock slope scaling techniques is absolutely required. Scaling teams should be certified in high angle rescue techniques because the workers likely will be using rappel equipment to work on the steep slopes. The scaling teams also require team foremen on the ground to watch for hazards and direct the effective use of manpower in a safe and orderly manner. Temporary protection of existing down slope improvements, such as roadway pavements, retaining structures, and public utilities is necessary using devices such as wire rope catchment nets, steel roadway plates, etc.

We envision that the rock slope scaling could require an extended period of time to complete due to the existing vegetation/root ground cover on the slopes and the need to perform cutting of some vegetation/root to expose unstable rock blocks for removal.

Slope scaling is a proven effective method for reducing the potential development and occurrence of rockfall hazards. The method usually is employed where other mitigation construction alternatives are too costly to implement and/or maintain. It should be noted that additional future slope scaling may need to be performed again to maintain the desired level of rockfall protection achieved by the initial slope scaling effort.

LIMITATIONS

The discussions and recommendations submitted in this letter report are based upon our experience in the Papakolea area and project vicinity only. A formal subsurface exploration was not conducted for this project. Therefore, variations of subsurface conditions from those assumed herein may occur, and the nature and extent of these variations may not become evident until construction is underway. If variations then appear evident, Geolabs should be contacted to re-evaluate the recommendations presented herein.

This report has been prepared for the exclusive use of R.M. Towill Corporation and their client, State of Hawaii Department of Hawaiian Home Lands, for specific application to the slope stabilization along Auwaiolimu Street in accordance with generally accepted geotechnical engineering principles and practices. No warranty is expressed or implied. This letter report has been prepared solely for the purpose of assisting the architects and engineers in the design for the project only.

The owner/client should be aware that unanticipated soil conditions are commonly encountered. Unforeseen subsurface conditions, such as perched groundwater, soft deposits, cavities/voids, hard layers, or loose fills, may occur in localized areas and may require additional probing or corrections in the field (which may result in construction delays) to attain a properly constructed project. Therefore, a sufficient contingency fund is recommended to accommodate these possible extra costs.

CLOSURE

We appreciate the opportunity to provide our services to you on this project. If you have questions or need additional information, please contact our office.

Respectfully submitted,

GEOLABS, INC.

By _____
Clayton S. Mimura, P.E.
President

CLAYTON S. MIMURA
LICENSED PROFESSIONAL ENGINEER
No. 4176-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

_____ 4-30-14
SIGNATURE EXPIRATION DATE
OF THE LICENSE

CSM:SC:cj

Attachment: Project Location Map, Plate 1

(4 Copies to Addressee)

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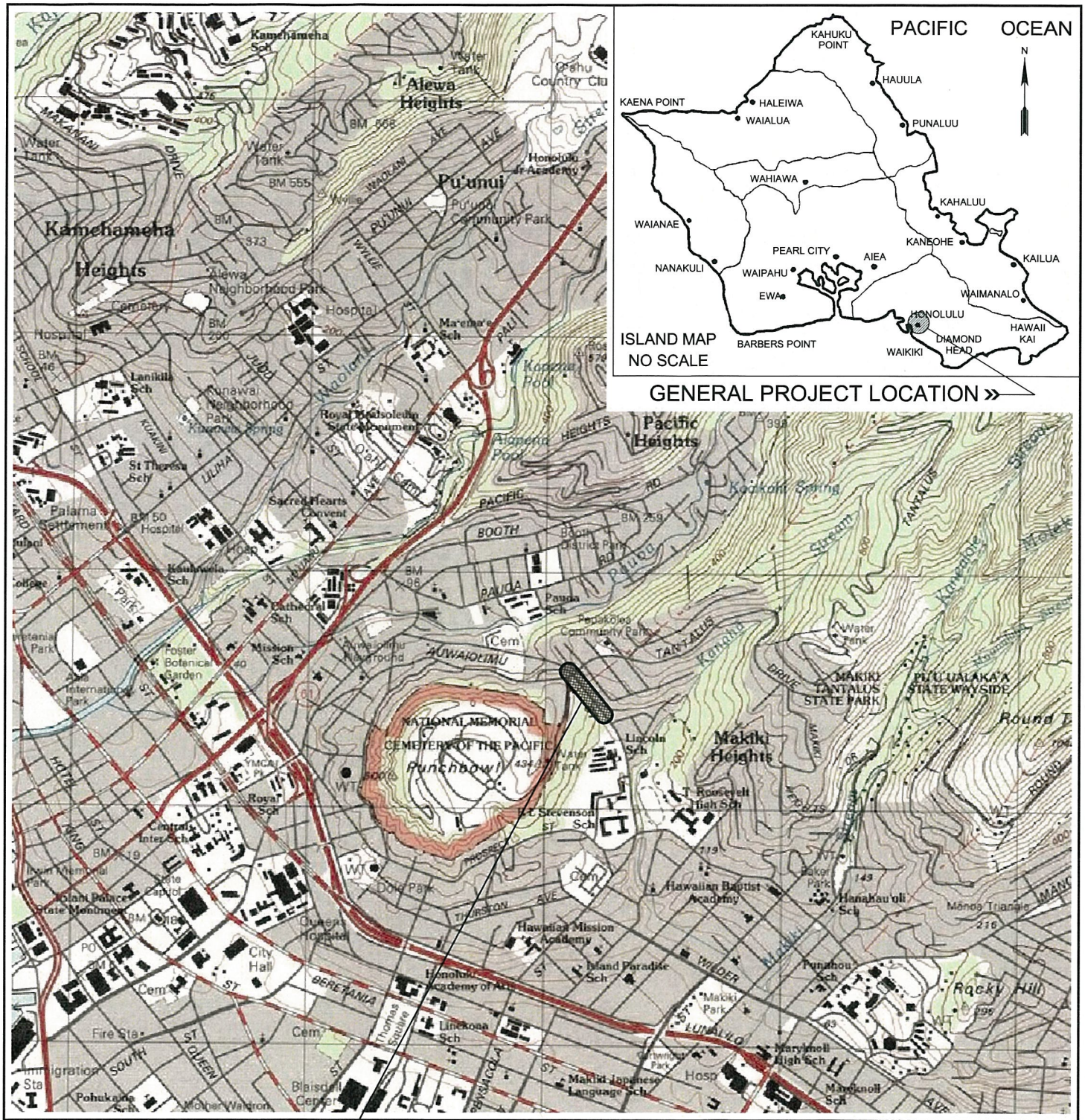


PROJECT LOCATION MAP

AUWAIOLIMU STREET SLOPE MITIGATION
HONOLULU, OAHU, HAWAII

2000 1000 0 2000 FT.

GRAPHIC SCALE

N

REFERENCE: MAP CREATED WITH TOPO!® ©2010 NATIONAL GEOGRAPHIC; ©2007 TELE ATLAS, REL. 1/2007.

GEOLABS, INC.

Geotechnical Engineering

DATE	DRAWN BY	PLATE
MAY 2013	HYC	1
SCALE	W.O.	
1" = 2,000'	6709-10	

CAD User: HENRY File Last Updated: May 30, 2013 10:51:57am Plot Date: May 30, 2013 - 10:59:04am
File: T:\Drafting-9904\Working\6709-10AuwaiolimuStreetSlopeMitigation\6709-10PLM.dwg\PLM
Plotter: DocuColor 242-252-260 PS Plotstyle: GEO-No-Dithering.ctb

GEOLABS, INC.

Geotechnical Engineering and Drilling Services

FIELD REPORT

TO: Ms. Ann Miyasato (RMTC)
(AnnM@rmtowill.com)

DATE: October 26, 2016

W.O.: 6709-10

SUBJECT: Auwaiolimu Street Slope Stabilization & Sewer Lines , , C, and C-1 Project
Field Investigation - Existing Ditch Distress and ECM Slope
Papakolea, Oahu, Hawaii

PRESENT AT SITE: John Chen, Steven Carr (Geolabs, Inc.)

A site visit was made to observe: 1) the existing ditch distress condition adjacent to Hiilani Street and 2) the existing condition of the embankment at the far eastern end of the site proposed for Erosion Control Mat (ECM) installation.

Based on our observations, the existing trapezoid ditch constructed of Grouted Rubble Pavement (GRP) has experienced cracking and offset distress believed to be a result of adjacent top-of-slope ground instability. The trapezoidal ditch has a 2-foot wide

floor and 4-foot high side slopes. An additional height of wall (2-foot) forms an extended splash containment wall along the top edge on the slope-side of the ditch. The length of ditch distress is approximately 25 linear feet spanning from a culvert discharge point to a large banyan tree trunk bounding the slope-side of the ditch, as shown in the photograph below.

Considering limited space between edge of the slope and roadway, construction of the micropile will be challenge, especially some of the areas are partially under the roadway cantilever structure. Based on our observation, we believe the cracked GRP lining may be removed and 2-foot splash containment wall may be reinstalled with a minimum of 12 inches off-set away from the slope edge. This may result in a relative small reduction on cross section area of the trapezoidal ditch, however, it should still be larger than the cross section area of the ditch inlet.

Based on our observations, the approximate 120-foot long segment of slope at the far southern end of the slope stabilization project site stands at about 1.5H:1V. The slope height appears to be about 8 to 12 feet in height and composed of mixed soil with embedded rocks (cobbles and boulders). Based on our observations, the upper half to 1/3 of the slope height contains assorted loose, dry-stacked boulders that form a top of slope retention features for the back yards of Parcels 027 and 028. Excavation for the 6-inch sewer line replacement along the top of slope may destabilize the rocky deposits and create a condition where additional slope stabilization effort may be required.

Based on exposed soil predominated slope at the site, we believe that installation of the erosion control matting is feasible, provided the dry-stacked boulder wall should be completely removed for slope restoration with 2H:1V inclination. For the public safety, chain link fence may be prudent to install at top of the slope along the right-of-way boundary.

Signed John Chen
John Chen, P.E.

The following bid is hereby submitted for the Papakolea Sewer Improvements Auwaiolimu Slope Stabilization & Sewer Lines C and C-1 Improvements to the Department of Hawaiian Home Lands.

No.	Units	Description	Price	Total
1.	L.S.	Mobilization Lump Sum		$
2.	L.S.	Temporary Erosion Control, including installing and maintaining all temporary erosion control measures as specified in the construction plans, and removing all measures upon full establishment of permanent vergetative cover and permanent erosion control measure Lump Sum		$
3.	L.S.	Archaelogical services, including monitoring and final report. Lump Sum		$
4.	L.S.	Partial reconstruction of GRP drainage ditch (approx. 30 LF), including temporary bypass system. In place complete. Lump Sum		$
5.	L.S.	EA, Removal of Trees Lump Sum		$
6.	Allow.	Arborist Allowance		$ 25,000
7.	L.S.	Tree Pruning Lump Sum		$
8.	30,000	Sq. Ft., Removal of vegetation from rock face Per Sq. Ft.	$	$
9.	6,450	Cu. ft., Removal of scree Per Cu. Ft.	$	$

10.	120	Lin. Ft., Demolition and removal of existing chain link fence, complete. Per Lin. Ft.	$	$
11.	L.S.	Demolition and removal of existing concrete pad (Approx 15-ft by 9-ft), complete. (TMK: 1-2-4-041:015) Lump Sum		$
12.	L.S.	Relocation of existing doghouse (Approx. 5-ft by 10-ft), in place complete. (TMK: 1-2-4-041:028) Lump Sum		$
13.	4,000	L.F., Rock bolt anchor Per Lin. Ft.	$	$
14.	400	L.F., Additional rock bolt anchor for fractured rock exposed after clearing and grubbing. Per Lin. Ft.	$	$
15.	Allow	10 Cu. Yd., Shotcrete Fill for rockbolt anchoring. Allowance, Per Cu. Yd.	$	$
16.	26,700	Sq. Ft., Anchored Wire Mesh Per Sq. Ft.	$	$
17.	6,600	Sq. Ft., Permanent erosion control matting. Per Sq. Ft.	$	$
18.	L.S.	Temporary sewer bypass Lump Sum	$	$

Item No.	No. of Units	Description	Unit Price	Unit Total
19.	585	L.F., 6-inch PVC sewer line installed by opoen trenching, inclusive of bypassing and all incidentals in place complete. Per Lin. Ft.	$	$
20.	8	EA, Sewer lateral reconnection, in place complete Each	$	$
21.	2	EA, Connection to sewer manhole and rechannelization. Each	$	$
22.	2	EA, Standard Sewer Manhole (4.00'-4.99' depth from top of cover to invert), in place complete Each	$	$
23.	2	EA, Cut and plug existing 6-inch sewer line, in place complete. Each	$	$
24.	L.S.	Install removable bollards Lump Sum	$	$
25.	49	Cu. Yd., Excavation for grading. Per Cu. Yd.	$	$
26.	425	Lin. Ft., 6'-high Chain Link Fence, including gates. Per Lin. Ft.	$	$
27.	L.S.	Permanent landscape: hydromulch and groundcover of the slopes, and vines along chain link fence, inclusive of installation and removal of temporary irrigation system, and traffic control during hydromulch operation. Lump Sum		$

Item No.	No. of Units	Description	Unit Price	Unit Total
28.	L.S.	Maintenance of grass for 365-day period after completion and approval of planting. Lump Sum		$
29.	L.S.	Traffic Control Lump Sum		$
30.	Allow.	Police officer for traffic control Allowance		$
31.	L.S.	Project Sign Lump Sum		$
32.	L.S.	Field Office, shall be full compensation for furnishing materials, labor, tools, equipment, and incidentals necessary to construct the field office, in place complete, as required. Lump Sum		$

TOTAL SUM BID = _____

_____Dollars ($_____).

The prices herein for the above items shall include all materials, labor, tools, equipment, machinery and all incidentals necessary, inclusive of general excise tax to install or to construct these items in place complete and in accordance with the plans and specifications contained in this IFB.

The CONTRACTOR shall complete all work as specified or indicated in the Contract Documents on or before five hundred forty (540) calendar days after receiving written Notice to Proceed, subject to extensions, as may be granted.

HECO NOTES:

1. THE LOCATION OF HECO'S OVERHEAD AND UNDERGROUND FACILITIES SHOWN ON THE PLANS ARE FROM EXISTING RECORDS WITH VARYING DEGREES OF ACCURACY AND ARE NOT GUARANTEED AS SHOWN. THE CONTRACTOR SHALL VERIFY IN THE FIELD THE LOCATIONS OF THE FACILITIES AND SHALL EXERCISE PROPER CARE IN EXCAVATING AND WORKING IN THE AREA. WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES AND UTILITY CROSSINGS ARE SHOWN, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS AND CROSSINGS TO VERIFY THE DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES TO HECO'S FACILITIES WHETHER SHOWN OR NOT SHOWN ON THE PLANS.

2. THE CONTRACTOR SHALL COMPLY WITH THE STATE OF HAWAII'S OCCUPATIONAL SAFETY AND HEALTH LAWS AND REGULATIONS, INCLUDING WITHOUT LIMITATION, THOSE RELATED TO WORKING ON OR NEAR EXPOSED OR ENERGIZED ELECTRICAL LINES AND EQUIPMENT.

3. THE CONTRACTOR SHALL OBTAIN AN EXCAVATION CLEARANCE FROM HAWAIIAN ELECTRIC'S PLANNING AND DESIGN SECTION OF THE CUSTOMER INSTALLATIONS DEPARTMENT (543–5654) LOCATED AT 820 WARD AVENUE, 4TH FLOOR, A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO STARTING CONSTRUCTION.

4. STATE LAW (OSHA) REQUIRES THAT A WORKER AND THE LONGEST OBJECT HE OR SHE MAY CONTACT CANNOT COME CLOSER THAN A SPECIFIED MINIMUM RADIAL CLEARANCE WHEN WORKING CLOSE TO OR UNDER ANY OVERHEAD LINES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE INFORMED OF AND COMPLY WITH THE LAW.

   AT ANY TIME SHOULD THE CONTRACTOR ANTICIPATE THAT HIS WORK WILL RESULT IN THE NEED TO ENCROACH WITHIN THE MINIMUM REQUIRED CLEARANCE AS STATED IN THE LAW, THE CONTRACTOR SHALL NOTIFY HAWAIIAN ELECTRIC AT LEAST THREE (3) MONTHS PRIOR TO THE PLANNED ENCROACHMENT SO THAT, IF FEASIBLE, THE NECESSARY PROTECTIONS (E.G. RELOCATE OR DE–ENERGIZE HAWAIIAN ELECTRIC LINES) CAN BE INVESTIGATED. HAWAIIAN ELECTRIC MAY ALSO BE ABLE TO BLANKET ITS DISTRIBUTION (12KV AND BELOW) LINES TO PROVIDE A VISUAL AID IN PREVENTING ACCIDENTAL CONTACT. HAWAIIAN ELECTRIC'S COST OF SAFEGUARDING OR IDENTIFYING ITS LINES WILL BE CHARGED TO THE CONTRACTOR.

   CONTACT HAWAIIAN ELECTRIC'S CUSTOMER INSTALLATIONS DEPARTMENT AT 543–7846 FOR ASSISTANCE IN IDENTIFYING AND SAFEGUARDING OVERHEAD POWER LINES.

5. EXISTING HECO OVERHEAD AND UNDERGROUND LINES ARE ENERGIZED AND WILL REMAIN ENERGIZED DURING CONSTRUCTION UNLESS PRIOR SPECIAL ARRANGEMENTS HAVE BEEN MADE WITH HECO. ONLY HECO PERSONNEL ARE TO HANDLE THESE ENERGIZED LINES AND ERECT TEMPORARY GUARDS TO PROTECT THESE LINES FROM DAMAGE. THE CONTRACTOR SHALL WORK CAUTIOUSLY AT ALL TIMES TO AVOID ACCIDENTS AND DAMAGE TO EXISTING HECO FACILITIES, WHICH CAN RESULT IN ELECTROCUTION.

6. CONTRACTOR SHALL NOT EXCAVATE WITHIN 10 FEET FROM HAWAIIAN ELECTRIC'S UTILITY POLES OR ANY ANCHOR SYSTEM SUPPORTING THE UTILITY POLE. IF CONTRACTOR MUST EXCAVATE CLOSER THAN 10 FEET FROM A UTILITY POLE OR ITS ANCHOR SYSTEM, CONTRACTOR WILL BE RESPONSIBLE FOR PROTECTING, SUPPORTING, SECURING AND TAKING ALL PRECAUTIONS TO PREVENT DAMAGE TO OR LEANING OF EXISTING POLES. BEFORE COMMENCING SUCH EXCAVATION, CONTRACTOR MUST SUBMIT ITS BRACING CALCULATIONS AND DRAWINGS, PREPARED AND STAMPED BY A LICENSED STRUCTURAL ENGINEER, TO HAWAIIAN ELECTRIC'S CUSTOMER INSTALLATIONS DEPARTMENT (543–7846) FOR REVIEW. HAWAIIAN ELECTRIC REQUIRES A MINIMUM OF TEN (10) WORKING DAYS TO CONDUCT THE REVIEW OF CONTRACTOR'S SUBMITTAL. CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, INSTALLATION, AND REMOVAL OF THE TEMPORARY POLE RACING SYSTEM, AS WELL AS ALL COSTS INCURRED BY HAWAIIAN ELECTRIC TO REVIEW CONTRACTOR'S DRAWINGS AND TO REPAIR OR STRAIGHTEN POLES IMPACTED BY CONTRACTOR'S ACTIVITIES, INCLUDING RESPONSE AND RESTORATION COSTS INCURRED BY HAWAIIAN ELECTRIC ARISING OUT OF OR RELATED TO OUTAGES CAUSED BY CONTRACTOR'S FAILURE TO MEET THE FOREGOING REQUIREMENTS. HAWAIIAN ELECTRIC'S REVIEW AND APPROVAL OF ANY CONTRACTOR SUBMITTALS INCLUDING ITS WORK PROCEDURE SHALL NOT RELIEVE CONTRACTOR FROM ANY LIABILITY RESULTING FROM CONTRACTOR'S EXCAVATION NEAR OR AROUND HAWAIIAN ELECTRIC'S UTILITY POLES.

7. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHENEVER CONSTRUCTION CROSSES OR IS IN CLOSE PROXIMITY TO UNDERGROUND LINES. HAWAIIAN ELECTRIC'S EXISTING ELECTRICAL CABLES ARE ENERGIZED AND WILL REMAIN ENERGIZED DURING CONSTRUCTION. ONLY HAWAIIAN ELECTRIC PERSONNEL ARE TO BREAK INTO EXISTING HAWAIIAN ELECTRIC FACILITIES, HANDLE THESE CABLES, AND ERECT TEMPORARY GUARDS TO PROTECT THESE CABLES FROM DAMAGE. THE COST OF HAWAIIAN ELECTRIC'S ASSISTANCE IN PROVIDING PROPER SUPPORT AND PROTECTION OF ITS UNDERGROUND LINES WILL BE CHARGED TO THE CONTRACTOR. FOR THE ASSISTANCE/COORDINATION IN PROVIDING PROPER SUPPORT AND PROTECTION OF THESE LINES, THE CONTRACTOR SHALL CALL HAWAIIAN ELECTRIC'S CUSTOMER INSTALLATIONS DEPARTMENT AT 543–7846 A MINIMUM OF TEN (10) WORKING DAYS IN ADVANCE.

   SPECIAL PRECAUTIONS ARE REQUIRED WHEN EXCAVATING NEAR HAWAIIAN ELECTRIC'S 138KV OR 46KV UNDERGROUND LINES (SEE HAWAIIAN ELECTRIC INSTRUCTIONS TO CONSULTANTS/CONSTRICTORS ON "EXCAVATION NEAR HAWAIIAN ELECTRIC'S UNDERGROUND 138KV AND/OR 46KV LINES" FOR DETAILED REQUIREMENTS)

   FOR VERIFICATION OF UNDERGROUND LINES, THE CONTRACTOR SHALL CALL THE HAWAII ONE CALL CENTER AT 866–423–7287 MINIMUM OF FIVE (5) WORKING DAYS IN ADVANCE.

8. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHENEVER CONSTRUCTION CROSSES OR IS IN CLOSE PROXIMITY OF HECO'S UNDERGROUND FUEL OIL PIPELINES. SPECIAL PRECAUTIONS ARE REQUIRED WHEN EXCAVATING NEAR HECO'S UNDERGROUND FUEL OIL PIPELINES (SEE HECO INSTRUCTIONS TO CONSULTANTS/CONTRACTORS ON "EXCAVATION NEAR HECO'S UNDERGROUND FUEL PIPELINES" FOR DETAILED REQUIREMENTS).

9. WHEN TRENCH EXCAVATION IS ADJACENT TO OR BENEATH HECO'S EXISTING STRUCTURES OR FACILITIES, THE CONTRACTOR IS RESPONSIBLE FOR:

   A) ARRANGING FOR HAWAIIAN ELECTRIC STANDBY PERSONNEL TO OBSERVE WORK AT CONTRACTOR'S COST

   B) SHEETING, BRACING, OR OTHERWISE SUPPORTING THE EXCAVATION AND STABILIZING OF THE EXISTING GROUND TO RENDER IT SAFE AND SECURE AND TO PREVENT POSSIBLE SLIDES, CAVE–INS, AND SETTLEMENTS.

   C) PROPERLY SUPPORTING EXISTING STRUCTURES OR FACILITIES WITH BEAMS, STRUTS, UNDER–PINNINGS, OR OTHER NECESSARY METHODS TO FULLY PROTECT IT FROM DAMAGE.

   D) BACKFILLING WITH PROPER BACKFILL MATERIAL INCLUDING SPECIAL THERMAL BACKFILL WHERE EXISTING (REFER TO ENGINEERING DEPARTMENT FOR THERMAL BACKFILL SPECIFICATIONS).

10. ANY WORK REQUIRED TO RELOCATE OR MODIFY HECO FACILITIES SHALL BE DONE BY HECO, OR BY THE CONTRACTOR UNDER HECO'S SUPERVISION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION, AND SHALL PROVIDE NECESSARY SUPPORT FOR HECO'S WORK, WHICH MAY INCLUDE, BUT NOT BE LIMITED TO, EXCAVATION AND BACKFILL, PERMITS AND TRAFFIC CONTROL, BARRICADING, AND RESTORATION OF PAVEMENT, SIDEWALKS, AND OTHER FACILITIES.

    ALL COSTS ASSOCIATED WITH ANY RELOCATION OR MODIFICATION (EITHER TEMPORARY OR PERMANENT) FOR THE CONVENIENCE OF THE CONTRACTOR, OR TO ENABLE THE CONTRACTOR TO PERFORM HIS WORK IN A SAFE AND EXPEDITIOUS MANNER IN FULFILLING HIS CONTRACT OBLIGATIONS SHALL BE BORNE BY THE CONTRACTOR.

11. ANY REDESIGN OR RELOCATION OF HAWAIIAN ELECTRIC'S FACILITIES NOT SHOWN ON THE PLANS MAY BE CAUSE FOR LENGTHY DELAYS. THE CONTRACTOR ACKNOWLEDGES THAT HAWAIIAN ELECTRIC IS NOT RESPONSIBLE FOR ANY DELAY OR DAMAGE THAT MAY ARISE AS A RESULT OF ANY CONFLICTS DISCOVERED OR IDENTIFIED WITH RESPECT TO THE LOCATION OR CONSTRUCTION OF HAWAIIAN ELECTRIC'S ELECTRICAL FACILITIES IN THE FIELD, REGARDLESS OF WHETHER THE CONTRACTOR HAS MET THE REQUESTED MINIMUM ADVANCE NOTICES. IN ORDER TO MINIMIZE ANY DELAY OR IMPACT ARISING FROM SUCH CONFLICTS, HAWAIIAN ELECTRIC SHOULD BE NOTIFIED IMMEDIATELY UPON DISCOVERY OR IDENTIFICATION OF SUCH CONFLICT.

HECO (CON'T.):

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL HAWAIIAN ELECTRIC SURFACE AND SUBSURFACE UTILITIES AND SHALL BE RESPONSIBLE FOR ANY DAMAGES TO HAWAIIAN ELECTRIC'S FACILITIES AS A RESULT OF HIS OPERATIONS. THE CONTRACTOR SHALL IMMEDIATELY REPORT SUCH DAMAGES OR ANY HAZARDOUS CONDITION RELATED TO HAWAIIAN ELECTRIC'S LINES TO HAWAIIAN ELECTRIC'S TROUBLE DISPATCHER AT 548–7961. REPAIR WORK SHALL BE DONE BY HAWAIIAN ELECTRIC OR BY THE CONTRACTOR UNDER HAWAIIAN ELECTRIC'S SUPERVISION. COSTS FOR DAMAGES TO HAWAIIAN ELECTRIC'S FACILITIES SHALL BE BORNE BY THE CONTRACTOR.

    IN CASE OF DAMAGE OR SUSPECTED DAMAGE TO HAWAIIAN ELECTRIC'S FUEL PIPELINE, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY HAWAIIAN ELECTRIC'S SECURITY COMMAND CENTER AT 543–7685 (A 24–HOUR NUMBER) SO HAWAIIAN ELECTRIC PERSONNEL CAN SECURE THE DAMAGED SECTION AND REPORT ANY OIL SPILLS TO THE PROPER AUTHORITIES. ALL COSTS ASSOCIATED WITH THE DAMAGE, REPAIR, AND OIL SPILL CLEANUP SHALL BE BORNE BY THE CONTRACTOR.

13. THE CONTRACTOR MAY REQUEST HAWAIIAN ELECTRIC TO PROVIDE AN INSPECTOR TO STAND–BY DURING CONSTRUCTION NEAR HAWAIIAN ELECTRIC'S FACILITIES. THE COST OF SUCH INSPECTION WILL BE CHARGED TO THE CONTRACTOR.

    THE CONTRACTOR SHALL CALL HAWAIIAN ELECTRIC'S CUSTOMER INSTALLATIONS DEPARTMENT AT 543–7846 A MINIMUM OF TWO (2) MONTHS IN ADVANCE TO ARRANGE FOR HAWAIIAN ELECTRIC STAND–BY PERSONNEL.

14. INDEMNITY
    THE CONTRACTOR SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS HECO FROM AND AGAINST ALL LOSSES, DAMAGES, CLAIMS, AND ACTIONS, INCLUDING BUT NOT LIMITED TO REASONABLE ATTORNEY'S FEES AND COSTS BASED UPON OR ARISING OUT OF DAMAGE TO PROPERTY OR INJURIES TO PERSONS, OR OTHER TORTUOUS ACTS CAUSED OR CONTRIBUTED TO THE CONTRACTOR OR ANYONE ACTING UNDER ITS DIRECTION OR CONTROL OR ON ITS BEHALF. PROVIDED CONTRACTOR'S INDEMNITY SHALL NOT BE APPLICABLE TO ANY LIABILITY BASED UPON THE SOLE NEGLIGENCE OF HECO.

15. CLEARANCES

    THE FOLLOWING CLEARANCES SHALL BE MAINTAINED BETWEEN HAWAIIAN ELECTRIC'S DUCTLINE AND ALL ADJACENT STRUCTURES (CHARTED AND UNCHARTED) IN THE TRENCH:

GUIDELINES FOR MINIMUM HORIZONTAL (PARALLEL) CLEARANCES BETWEEN HAWAIIAN ELECTRIC AND OTHER UNDERGROUND UTILITIES.				
UNDERGROUND UTILITY	HAWAIIAN ELECTRIC DIRECT BURIED CABLE	HAWAIIAN ELECTRIC DIRECT BURIED IN CONDUIT (NO CONCRETE ENCASEMENT)	HAWAIIAN ELECTRIC 3" (MINIMUM CONCRETE ENCASEMENT	APPLICABLE NOTES:
HAWAIIAN ELECTRIC DB CONDUITS	12"	3"	0"	
HAWAIIAN ELECTRIC 3" ENCASEMENT	0"	0"	0"	
TELEPHONE / CATV DB	12"	12"	6"	
TELEPHONE / CATV DB DUCTS	12"	12"	6"	
TELEPHONE / CATV 3" ENCASEMENT	0"	0"	0"	5
TRAFFIC SIGNAL	12"	12"	12"	
WATER DB (BWS OWNED)	36"	36"	36"	1, 4
CUSTOMER OWNED WATER SERVICE LATERALS	12"	12"	12"	
WATER (CONCRETE JACKETED) (BWS OWNED)	36"	36"	36"	1, 4
GAS DB	12"	12"	12"	1
GAS (CONCRETE JACKETED)	12"	12"	12"	1
SEWER DB	36"	36"	36"	1, 2
SEWER (CONCRETE JACKETED)	36"	36"	36"	1, 2
DRAIN	12"	12"	12"	1
FUEL PIPELINES				3

NOTES:

1. WHERE SPACE IS AVAILABLE, PARALLEL CLEARANCE TO OTHER UTILITIES, OR FOREIGN STRUCTURES OTHER THAN COMMUNICATION OR TRAFFIC SIGNAL SHALL BE 36".

2. IF 36" CLEARANCE CANNOT BE MET:
   – IF CLEARANCE IS LESS THAN 12", JACKET SEWER LINE WITH REINFORCED CONCRETE (PER HAWAIIAN ELECTRIC'S STD. 30–1030) FOR A DISTANCE OF 5' PLUS PIPE DIAMETER.
   – IF CLEARANCE IS BETWEEN 12" AND 36", JACKET SEWER LINE WITH PLAIN CONCRETE.

3. ALL FUEL PIPELINE CROSSINGS SHALL BE REVIEWED AND APPROVED BY THE COMPANY THAT OWNS AND MAINTAINS IT.

4. 5 FEET CLEAR TO WATER MAINS 16" AND LARGER.

5. FOR SITUATIONS WITH 0" MINIMUM SEPARATION, A 6" SEPARATION IS RECOMMENDED.

HECO (CON'T.):

15. CLEARANCES (CON'T)

    THE FOLLOWING CLEARANCES SHALL BE MAINTAINED BETWEEN HAWAIIAN ELECTRIC'S DUCTLINE AND ALL ADJACENT STRUCTURES (CHARTED AND UNCHARTED) IN THE TRENCH:

GUIDELINES FOR MINIMUM VERTICAL (CROSSING) CLEARANCES BETWEEN HAWAIIAN ELECTRIC AND OTHER UNDERGROUND UTILITIES.				
UNDERGROUND UTILITY	HAWAIIAN ELECTRIC DIRECT BURIED CABLE	HAWAIIAN ELECTRIC DIRECT BURIED IN CONDUIT (NO CONCRETE ENCASEMENT)	HAWAIIAN ELECTRIC 3" (MINIMUM CONCRETE ENCASEMENT	APPLICABLE NOTES:
HAWAIIAN ELECTRIC DB CONDUITS	6"	3"	0"	
HAWAIIAN ELECTRIC 3" ENCASEMENT	0"	0"	0"	
TELEPHONE / CATV DB	12"	12"	6"	
TELEPHONE / CATV DB DUCTS	12"	12"	6"	
TELEPHONE / CATV 3" ENCASEMENT	0"	0"	0"	4
TRAFFIC SIGNAL	12"	12"	6"	
WATER DB (BWS OWNED)	12"	12"	12"	5
CUSTOMER OWNED WATER SERVICE LATERALS	6"	6"	6"	
WATER (CONCRETE JACKETED) (BWS OWNED)	12"	12"	12"	5
GAS DB	12"	12"	12"	
GAS (CONCRETE JACKETED)	12"	12"	12"	
SEWER DB	24"	24"	24"	1
SEWER (CONCRETE JACKETED)	24"	24"	24"	1
DRAIN	12"	12"	6"	
FUEL PIPELINES				2

NOTES:

1. IF CLEARANCE CANNOT BE MET:
   – IF CLEARANCE IS LESS THAN 12", JACKET SEWER LINE WITH REINFORCED CONCRETE (PER HAWAIIAN ELECTRIC'S STD. 30–1030) FOR A DISTANCE OF 5' PLUS PIPE DIAMETER.
   – IF CLEARANCE IS BETWEEN 12" AND 24", JACKET SEWER LINE WITH PLAIN CONCRETE.

2. ALL FUEL PIPELINE CROSSINGS SHALL BE REVIEWED AND APPROVED BY THE COMPANY THAT OWNS AND MAINTAINS IT.

3. FOR SITUATIONS WITH 0" MINIMUM SEPARATION, A 6" SEPARATION IS RECOMMENDED.

4. CLEARANCES MEASURED FROM OUTER EDGES OR DIAMETERS OF UTILITIES. WHENEVER CONCRETE JACKETS ARE INVOLVED, CLEARANCES SHALL BE TOTAL CLEAR DISTANCES BETWEEN THE CONCRETE JACKET AND UTILITY CONCERNED.

5. 36" CLEARANCE IS REQUIRED FOR TRENCHLESS INSTALLATION WORK.

THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER & HAWAIIAN ELECTRIC OF ANY HEAT SOURCES (POWER CABLE DUCT BANK, STREAMLINE, ETC.) ENCOUNTERED THAT ARE NOT PROPERLY IDENTIFIED ON THE DRAWING.

1

ABBREVIATIONS

AC	ASPHALT CONCRETE
APPROX	APPROXIMATE
BC	BOTTOM CURB
BW	BOTTOM WALL
CITY/C&C HON	CITY AND COUNTY OF HONOLULU
D	DIAMETER/DEPTH
DHHL	DEPARTMENT OF HAWAIIAN HOME LANDS
DET	DETAIL
DPW	DEPARTMENT OF PUBLIC WORKS
DIA/ø	DIAMETER
ELEV	ELEVATION
EX/EXIST	EXISTING
FT	FOOT/FEET
GRP	GROUTED RUBBLE PAVEMENT
H	HEIGHT
LT.	LEFT
MAINT.	MAINTAINED
MAX	MAXIMUM
MIN	MINIMUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PL	PROPERTY LINE
PSI	POUNDS PER SQUARE INCH
O.C.	ON CENTER
OH	OVERHEAD
O/S	OFFSET
ROW, R/W	RIGHT–OF–WAY
S	SEWER/SPREAD
SF	SQUARE FEET
SHT	SHEET
SL	SEWER LINE
SMH	SEWER MANHOLE
STA	STATION
STD	STANDARD
TC	TOP CURB
TMK	TAX MAP KEY
TW	TOP WALL
TYP	TYPICAL
U	UNDERGROUND/UTILITY
W	WATER
WMH	WATER MANHOLE
WV	WATER VALVE

ENGINEER	AM/MH/JB
DRAFTSMAN	SF/MH
CHECKED BY	AM/JN

REVISION	DATE	BRIEF	BY	APPROVED
1	3/27/17	ADD 2: REV HECO NOTES	AM	DHHL

ANN Y.M. MIYASATO
LICENSED PROFESSIONAL ENGINEER
No. 11253-C
HAWAII, U.S.A.

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

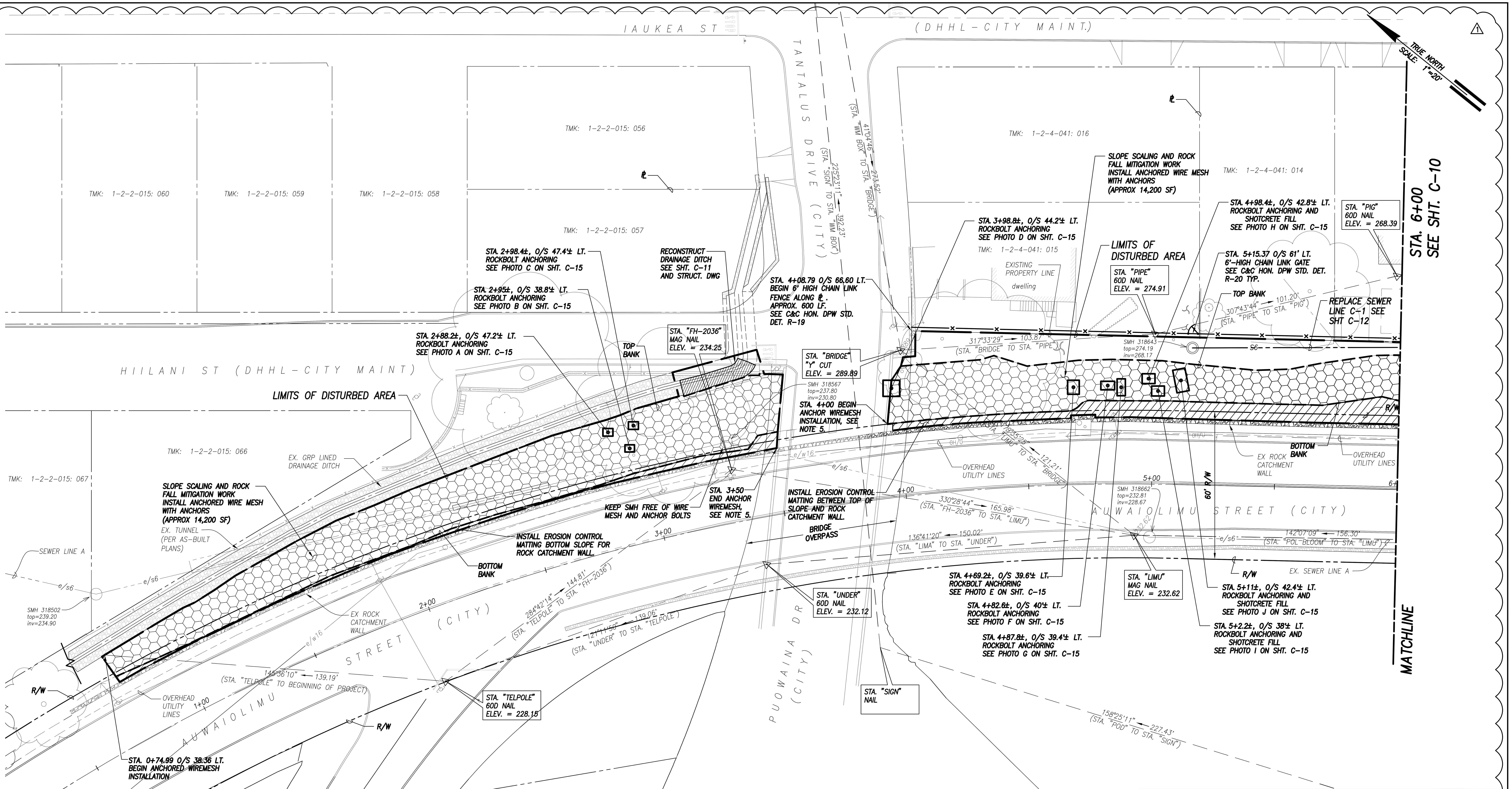
SIGNATURE   Apr 2018 LIC. EXP.

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street Suite 200 Honolulu Hawaii 96819–3494

Department of Hawaiian Home Lands
PAPAKOLEA SEWER IMPROVEMENTS
AUWAIOLIMU SLOPE STABILIZATION & SEWER LINES C & C–1 IMPROVEMENTS
Papakolea, Honolulu, Oahu, Hawaii

CONSTRUCTION NOTES – 3 AND LEGEND & ABBREVIATIONS

FILE	POCKET	FOLDER	NO.



SITE PLAN – 1

SCALE: 1" = 20'

LEGEND

SLOPE SCALING AND ROCK FALL MITIGATION WORK (ANCHORED WIRE MESH)	
EROSION CONTROL MATTING	
LIMITS OF DISTURBED AREA	
PROPERTY LINE	
FENCE LINE	—x—
SEWER LINE	s6

NOTES:

1. CONTRACTOR SHALL EXERCISE CAUTION WHEN WORKING AROUND EXISTING ELECTRICAL OVERHEAD LINES.
2. AFTER CLEARING, ADDITIONAL BOULDERS MAY REQUIRE BOLTING AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
3. CONTRACTOR SHALL EXCERISE CAUTION WHEN WORKING NEAR EXISTING SEWER LINES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PREVENT DAMAGE TO EXISTING SEWER LINES.
4. PRIOR TO INSTALLATION OF ANCHORS, CONTRACTOR SHALL CONDUCT A GEOPHYSICAL SURVEY TO EXISTING SEWER TUNNEL ALIGNMENT. SURVEY DATA SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND EVALUATION. THE ANCHORS ADJACENT TO THE TUNNEL MAY BE RELOCATED TO PREVENT DAMAGE TO EXISTING SEWER LINES AND TO REDUCE GROUT LOSS IN THE TUNNEL.
5. ANCHOR WIREMESH SHALL BE INSTALLED UP TO THE SHOTCRETE SURFACE UNDER THE PUOWAINA DRIVE BRIDGE OVERPASS.

APPROVED:

CHIEF, CIVIL ENGINEERING BRANCH, D.P.P. DATE

CHIEF, TRAFFIC REVIEW BRANCH, D.P.P. DATE

GRAPHIC SCALE:

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

ENGINEER	JB/MH
DRAFTSMAN	SF/MH/MY
CHECKED BY	AM/JN

REVISION	DATE	BRIEF	BY	APPROVED
2	3/27/17	ADD 2: LIMIT OF WORK	AM	DHHL

Planning • Engineering • Environmental Services • Photogrammetry • Surveying • Construction Management

R. M. TOWILL CORPORATION

808 842 1133 2024 North King Street Suite 200 Honolulu Hawaii 96819-3494

Department of Hawaiian Home Lands

PAPAKOLEA SEWER IMPROVEMENTS

AUWAIOLIMU SLOPE STABILIZATION & SEWER LINES C & C-1 IMPROVEMENTS

Papakolea, Honolulu, Oahu, Hawaii

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".

Apr 2018

SIGNATURE LIC. EXP.

SITE PLAN – 1

FILE	POCKET	FOLDER	NO.

STA. 6+00
SEE SHT. C-9
MATCHLINE
TRUE NORTH
SCALE: 1" = 20'
LIMITS OF DISTURBED AREA
STA. "TILES"
60D NAIL
ELEV. = 258.89
STA. 6+32.1 O/S 61' LT.
6'-HIGH CHAIN LINK GATE
SEE C&C HON. DPW STD. DET.
R-20 TYP.
RELOCATION OF
SEWER LINE C
SEE SHT C-13
SLOPE SCALING AND ROCK
FALL MITIGATION WORK
INSTALL ANCHORED WIRE
MESH WITH ANCHORS
(APPROX 14,200 SF)
SMH C-2
SMH
C-1
TOP
BANK
STA. 8+37 O/S 51 LT.
6'-HIGH CHAIN LINK GATE
SEE C&C HON. DPW STD. DET.
R-20 TYP.
STA. 8+42 O/S 51 LT.
END 6'-HIGH CHAIN LINK FENCE.
STA. 8+69 O/S 51 LT.
BEGIN 6'-HIGH CHAIN LINK FENCE
INSTALL EROSION CONTROL
MATTING (APPROX 1,500 SF)
RELOCATE DOGHOUSE,
CONTRACTOR TO
COORDINATE WITH OWNER
LIMITS OF
GRADING
STA. 10+39 O/S 51' LT.
END 6'-HIGH CHAIN LINK FENCE
LIMITS OF
DISTURBED
AREA
SEWER LINE C-1
EX SEWER LINE C
EX ROCK
CATCHMENT
WALL
OVERHEAD
UTILITY LINES
EX. CONC.
HEADER
INSTALL EROSION CONTROL
MATTING BETWEEN THE SLOPE
& EX. CONC. HEADER
BOTTOM BANK
STA. 9+28.5
END ANCHORED WIRE MESH
BEGIN EROSION CONTROL
MATTING INSTALLATION
STA. 10+52
END EROSION CONTROL
MATTING INSTALLATION
SEE SHT. C-12 FOR
GRADING PLAN
A U W A I O L I M U   S T R E E T   (C I T Y)
SEWER LINE A
STA. "POL BLOOM"
PK NAIL
ELEV. = 223.93
STA. "ROOT"
MAG NAIL
ELEV. = 212.25
STA. "AUWA"
60D NAIL
ELEV. = 198.96
STA. "MON-1"
ST. MON.
ELEV. = 283.56
STA. "KAPAHU"
80D NAIL
ELEV. = 184.02

SITE PLAN – 2

SCALE: 1" = 20'

LEGEND

SLOPE SCALING AND ROCK FALL MITIGATION WORK (ANCHORED WIRE MESH)	[hexagon pattern]
EROSION CONTROL MATTING	[hatched pattern]
LIMITS OF DISTURBED AREA	▬ ▬
LIMITS OF GRADING	— — —
PROPERTY LINE	——-·-——
SEWER LINE	——---——
FENCE LINE	——×——

NOTES:

1. CONTRACTOR SHALL EXERCISE CAUTION WHEN WORKING AROUND EXISTING ELECTRICAL OVERHEAD LINES.
2. AFTER CLEARING, ADDITIONAL BOULDERS MAY REQUIRE BOLTING AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
3. CONTRACTOR SHALL EXCERISE CAUTION WHEN WORKING NEAR EXISTING SEWER LINES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PREVENT DAMAGE TO EXISTING SEWER LINES.
4. PRIOR TO INSTALLATION OF ANCHORS, CONTRACTOR SHALL CONDUCT A GEOPHYSICAL SURVEY TO EXISTING SEWER TUNNEL ALIGNMENT. SURVEY DATA SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND EVALUATION. THE ANCHORS ADJACENT TO THE TUNNEL MAY BE RELOCATED TO PREVENT DAMAGE TO EXISTING SEWER LINES AND TO REDUCE GROUT LOSS IN THE TUNNEL.

EARTHWORK SUMMARY

FOR PERMIT PURPOSES ONLY

AREA TO BE GRADED – 0.035 ACRES

CUT= 49 CY
FILL= 0 CY

TOTAL
AREA TO BE DISTURBED – 0.820 ACRES

APPROVED:

CHIEF, CIVIL ENGINEERING BRANCH, D.P.P. DATE

CHIEF, TRAFFIC REVIEW BRANCH, D.P.P. DATE

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

ENGINEER	JB
DRAFTSMAN	SF
CHECKED BY	AM/JN

ANN Y.M. MIYASATO — LICENSED PROFESSIONAL ENGINEER — No. 11253-C — HAWAII, U.S.A.

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SIGNATURE — LIC. EXP. Apr 2018

REVISION	DATE	BRIEF	BY	APPROVED
△				
1	3/27/17	ADD 2: EXTEND CHAIN LINK FENCE	AM	DHHL

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
R. M. TOWILL CORPORATION
808 842 1133 2024 North King Street Suite 200 Honolulu Hawaii 96819-3494

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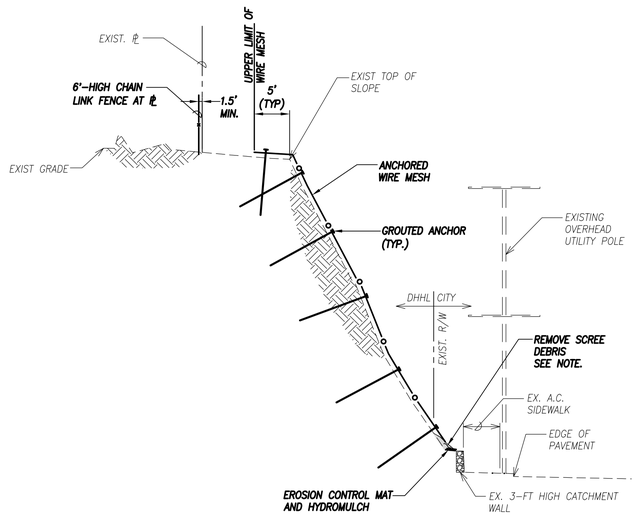
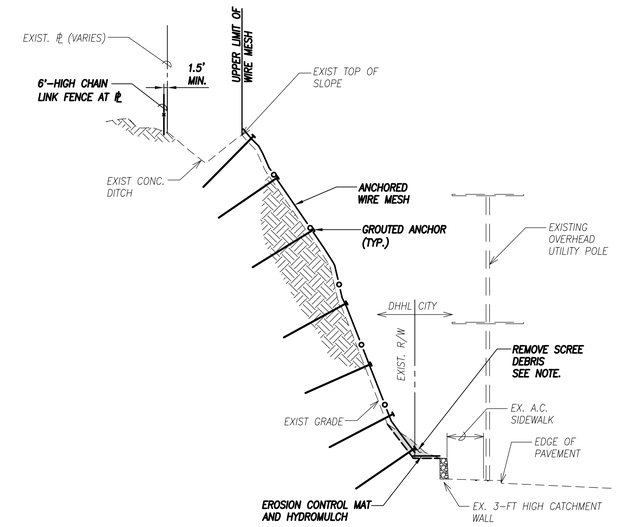
SITE PLAN – 2

FILE	POCKET	FOLDER	NO.



TYPICAL SECTION – ANCHORED WIRE MESH

SCALE: 1" = 10'

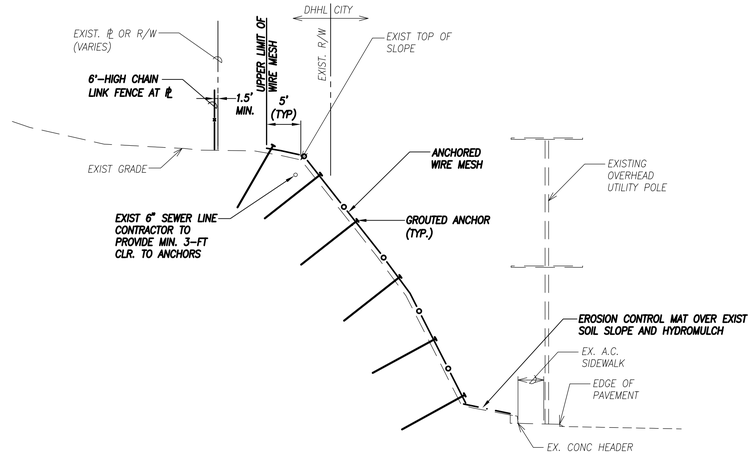


TYPICAL SECTION – ANCHORED WIRE MESH STA. 0+75 TO 3+50

SCALE: 1" = 10'

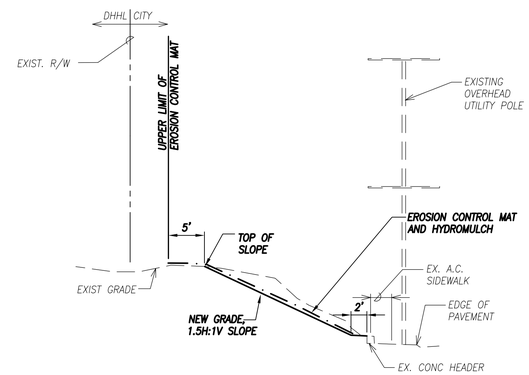
NOTE:

UNDER THE DIRECTION OF THE ENGINEER, THE CONTRACTOR SHALL REMOVE ACCUMULATED FALLEN SCREE AT BASE OF SLOPE. THE REMOVAL OF SCREE MATERIAL SHALL STOP WHEN THE CONTRACTOR REACHES THE EXISTING ROCK SLOPE AND UP TO THE TOP OF THE EXISTING ROCK CATCHMENT WALL TO RESTORE ORIGINAL GRADE.



TYPICAL SECTION – ANCHORED WIRE MESH STA. 4+00 TO 9+28.5

SCALE: 1" = 10'



TYPICAL SECTION – EROSION CONTROL MATTING STA. 9+28.5 TO 10+52

SCALE: 1" = 10'

APPROVED:

CHIEF, CIVIL ENGINEERING BRANCH, D.P.P. DATE

GRAPHIC SCALE

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

ENGINEER	AM			
DRAFTSMAN	SF			
CHECKED BY	AM/JN			
1	3/27/17	ADD 2: REMOVE EROSION CONTROL MATTING UNDER ANCHOR WIRE MESH	AM	DHHL
REVISION	DATE	BRIEF	BY	APPROVED

Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management

R. M. TOWILL CORPORATION

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AUWAIOLIMU SLOPE STABILIZATION & SEWER LINES C & C-1 IMPROVEMENTS

Papakolea, Honolulu, Oahu, Hawaii

TYPICAL SECTIONS

AMN Y.M. MIYASATO LICENSED PROFESSIONAL ENGINEER No. 11253-C HAWAII, U.S.A.

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SIGNATURE Apr 2018 LIC. EXP.

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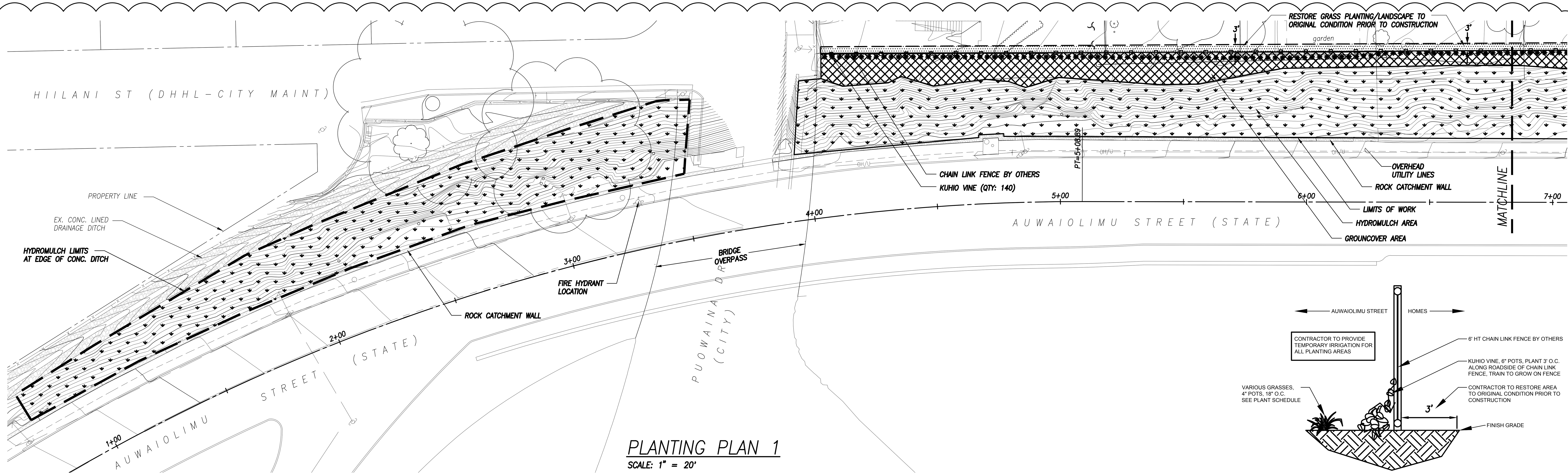
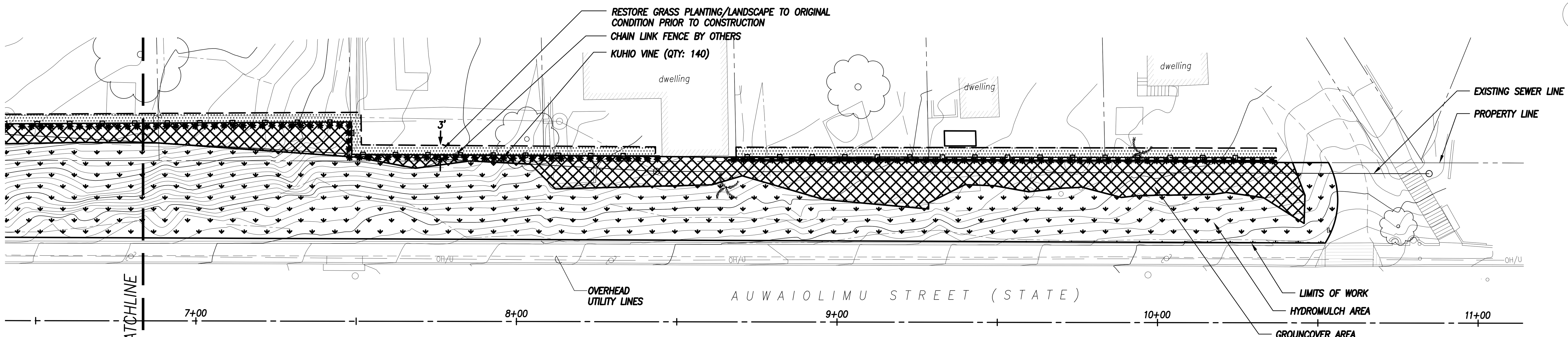


PLANTING PLAN 1

SCALE: 1" = 20'

1 VINE / GRASS PLANTING DETAIL

NOT TO SCALE



PLANTING PLAN 2

SCALE: 1" = 20'

CLEARING NOTES:

1. CONTRACTOR SHALL TREAT ALL TREE STUMPS WITH GARLON 3A HERBICIDE OR EQUAL TO PREVENT RE-GROWTH. HANDLING, APPLICATION AND DISPOSAL SHALL ADHERE TO MANUFACTURER'S RECOMMENDATIONS

IRRIGATION NOTES:

1. ALL PLANTING AREAS TO BE IRRIGATED WITH A TEMPORARY SYSTEM SUPPLIED BY THE LANDSCAPE CONTRACTOR
2. WATER FOR TEMPORARY IRRIGATION MAY COME FROM A NEARBY FIRE HYDRANT. LANDSCAPE CONTRACTOR TO NEGOTIATE WITH BOARD OF WATER SUPPLY AND PAY FOR SOURCE OF WATER.

PLANT SCHEDULE

SYMBOL:	QTY:	BOTANICAL NAME:	COMMON NAME:	REMARKS:
GROUNDCOVER:				
	6,000 SF APPROX.	CAREX WAHUENSIS ERAGROSTIS VARIABILIS OSTEOMELES ANTYLLIDIFOLIA	OAHU SEDGE BUNCH GRASS ULEI	4" POT. MIX EQUAL PARTS OF EACH AT 18" O.C.
GRASS:				
	21,000 SF APPROX.	CYNODON DACTYLON LOLIUM MULTIFLORUM	COMMON BERMUDA GRASS ANNUAL RYE GRASS	HYDROMULCH W/ SEED MIX PER SPECIFICATIONS
VINE:				
	160	IPOMOEA HORSFALLIAE	KUHIO VINE	6" POT, 3' O.C., PLANT ALONG FENCE
RESTORATION:				
	1,300 SF APPROX.	CONTRACTOR TO RESTORE AREA TO ORIGINAL CONDITION PRIOR TO CONSTRUCTION		

LEGEND

- HYDROMULCH AREAS
- HYDROMULCH LIMITS
- PROPERTY LINE
- UTILITY POLES

TRUE NORTH

SCALE: 1"=20'

GRAPHIC SCALE:

1" = 20' — 20' 10' 0 20' 40'

ENGINEER	LI
DRAFTSMAN	KY
CHECKED BY	LI

LESTER H. INOUYE LICENSED PROFESSIONAL LANDSCAPE ARCHITECT No. 5530 HAWAII, U.S.A.

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△				
△1	3/27/17	ADD 2: Rmv trees; extend vines	LI	DHHL

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PLANTING PLAN

FILE	POCKET	FOLDER	NO.