TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01010 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS AND COVENANTS: The General Conditions, Construction General Specifications, Special Provisions, and other applicable documents preceding these specifications shall govern all work specified hereinafter in all Divisions and Sections.

1.02 APPLICABLE REGULATIONS: The Contractor shall comply with all local laws, ordinances, rules and regulations pertaining to such work and must obtain all required permits, licenses, and certificates and publish and post all notices required thereby.

1.03 DESCRIPTION OF THE WORK: Major components of this project include, but are not limited to the following:

Installation of 69 micro-pile tiebacks to reinforce the existing rock masonry retaining walls at 2403 Kaululaau Street and 2147 Tantalus Drive at depths of 17 and 22 feet, respectively, with minimum 7 feet of embedment into rock. Installation of approximately 2,312 square feet of reinforced shotcrete at the front side of the retaining walls with dowels drilled into the existing rock masonry wall. Installation of 64 weep holes to provide wall drainage.

These specifications are divided for convenience into titled divisions and sections as set forth in the TABLE OF CONTENTS preceding these specifications and shall not be considered an accurate or complete segregation of the several units of labor and materials. No responsibility, either direct or implied is assumed by the Department of Hawaiian Home Lands (DHHL) for omissions or duplications of the subject matter. The Contractor will be held responsible for the complete work whenever or wherever the parts are described in one or more trade heads. Any mention in these sections or indication on the drawings of articles, materials, operations, or methods, require that the Contractor furnish each item so mentioned or indicated, of the kind, type, or design and quality of each item so mentioned or indicated on the drawings, and that the Contractor furnish all labor, materials, equipment, incidentals and supervision necessary to complete the work in accordance with the drawings and the true meaning and intent of these specifications, even though such mention of articles, materials, operations, methods, quality, qualifications or condition is not expressed in complete sentences.

Where devices or items, or parts thereof are referred to in the singular, it is intended that such references shall apply to as many such devices, items, or parts as are required to properly complete the work.

Schedule of work included in these specification sections are given for convenience and shall not be considered as a comprehensive list of items necessary to complete the work of any section. The Contractor shall employ the usual standard practice of coordinating the work covered in each section with the work of other sections. The necessary information and the items, accessories, anchors, connections, patterns, templates, etc., shall be delivered when required in order to prevent any delay in the progress and completion of the work.

1.04 PLANS AND SPECIFICATIONS: These specifications are intended to cover all labor, materials and standards of workmanship employed in the work indicated on the plans and called for in the specifications or reasonably implied therein. The plans and specifications complement one another. Any part of the work mentioned in one and not represented in the other, shall be done the same as if it had been mentioned or represented in both.

The Contractor shall not alter from the drawings and specifications. In the event of errors or discrepancies, the Contractor shall immediately notify the Project Manager.

All figured dimensions take precedence over scaled measurements. No important dimension shall be determined by scale.

Specifications and drawings are prepared in abbreviated form and may include incomplete sentences. Omissions of words or phrases such as "the Contractor shall", "as shown on the drawing", "a", "an", and "the" are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.

1.05 STATE WATERS:

A. During construction of this project, DHHL does not intend for any discharges of construction water into State waters, as defined by HAR, Title 11-54 and Title 11-55.

B. The Contractor shall be responsible for the planning, permitting, designing, and implementing measures to avoid any construction activity discharges from entering State waters.

C. The Contractor shall be responsible for submitting, obtaining, and procuring the following NPDES permits with the State Department of Health (DOH) if required.

1. Hydrotest fluids.

2. Dewatering fluids.

D. DHHL has obtained NPDES permit for stormwater runoff due to construction activity with the State DOH. For any deviation from the approved permit, the Contractor shall be responsible for submitting, obtaining, amending and/or procuring as required.

E. The cost and time to obtain approvals for all permits shall be inclusive in the Bid Price and any permit approval delays shall be the responsibility of the Contractor.

1.06 COORDINATION WITH CONCURRENT PROJECTS: The Contractor shall coordinate work with DHHL and the contractor(s) of any concurrent DHHL, at no additional cost to DHHL.

1.07 REFERENCE STANDARDS: All work shall be done in accordance with the most current standards listed below as amended and/or amplified herein.

ASTM	American Society for Testing and Materials
UPC	Uniform Plumbing Code

END OF SECTION

SECTION 01070 – SAFETY AND HEALTH

PART 1 - GENERAL

This section shall supplement construction documents pertaining to the safety and health in connection with the performance of the project

1.01 WORK INSIDE EXISTING MANHOLES: The Contractor shall exercise extreme caution when working inside any sewer manhole.

The following are major health and safety hazards which may be present in the sewer manholes.

- Ammonia gas (NH3) poisoning,
- Oxygen deficiency,
- Hydrogen sulfide gas poisoning,
- Flammable gases and liquids,
- Pathogens, and
- Carbon monoxide poisoning

The Contractor shall assume all responsibility for the health and safety of his personnel who are working at the job site. Failure to comply with the provisions of the safety plan or with the applicable safety and health regulations outlined previously will be grounds for stoppage of work with no additional compensation.

1.02 SAFETY AND HEALTH REGULATIONS: The Contractor shall comply with hand safety requirements as specified in Section 01560, "Confined Space Entry".

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01300 - SUBMITTAL PROCEDURE

PART 1 - GENERAL

1.01 GENERAL: Where required by the specifications the Contractor shall submit descriptive information which will enable the Project Manager to advise whether the Contractor's proposed materials, equipment or methods of work are in general conformance to the design concept and in compliance with the drawings and specifications.

Shop drawings and submittals shall be made in accordance with Section 5.5 – Shop Drawings and Other Submittals of the Interim General Conditions.

The information to be submitted shall consist of:

- Drawings
- Specifications
- Manufacturer's Instruction Manuals
- List of Deviations
- Performance Schedule
- Submittal Schedule
- Laboratory Test/Reports
- Descriptive Data
- Certificates
- Samples
- Test Results and such other information, all as specifically required in the specifications.

1.02 CONTRACTOR'S RESPONSIBILITIES:

A. GENERAL

1. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. Submittals shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the contract drawings and specifications. The Contractor shall verify that the material and equipment described in each submittal conform to the requirements of the specifications and drawings. Submittals shall be made only by the Contractor, who shall indicate by a signed stamp, in accordance with paragraph 1.02.A.5, on the submittals, that the Contractor has checked the submittals, and that the work shown conforms to contract requirements and has been checked for dimensions and relationship with work of all other trades involved. If the information shows deviations from the specifications or drawings, the Contractor, by statement in writing accompanying the information, shall identify the deviations and state the reason(s) therefore.

The Contractor shall insure that there is no conflict with other submittals and shall notify the Project Manager in each case where its submittal may affect the work of another contractor or DHHL. The Contractor shall insure coordination of submittals among the related crafts and subcontractors.

2. To expedite the submittal procedures, the Project Manager shall be allowed to contact directly all material or equipment suppliers for necessary information that is missing in the submittal. The supplier shall be responsible for documenting the discussion and coordinating with the Contractor. The Contractor shall be responsible for the accuracy and completeness of information contained in all submittals.

3. All equipment and manufacturer's instruction submittals, including follow-up submittals, shall be submitted no later than 30 calendar days following the Notice to Proceed nor later than the time necessary to procure the item or avoid schedule delays as established in the Contractor's construction schedule.

4. The Contractor is responsible for the coordination of all contractual work and submittals.

5. The Contractor shall maintain at the job site two sets of full size contract drawings, marking them in red to show all variations between the construction actually provided and that indicated or specified in the contract documents, including buried or concealed herein, or where variations in scope or character of work from that of the original contract are authorized, the drawings shall be marked to define the construction actually provided. Where equipment installation is involved, the size, manufacturer's name, model number and power input or output characteristics are applicable shall be shown on the as-built drawings. The representations of such changes shall conform to standard and details as necessary to clearly portray the as-built construction.

6. All changes made to the submittal drawings by the Contractor in the form of written or typewritten markings shall be initialed and dated by the Contractor.

7. The stamp below, certified by the Contractor, shall appear on the title sheet of each shop drawing, on a cover sheet of submittals in an 8-1/2" x 11" format, or on one face of a cardstock tag (min. 3" x 6") securely attached to each sample. The tag shall clearly identify the nature of the sample. The back of this tag will be used by the Project Manager for his/her receipt, review, and log stamp and for any comments that relate to the sample.

CONTRACTOR NAME

PROJECT: _____

_____

JOB NO: _____

THIS SUBMITTAL HAS BEEN CHECKED BY THIS GENERAL CONTRACTOR. IT IS CERTIFIED CORRECT, COMPLETE, AND IN COMPLIANCE WITH CONTRACT DRAWINGS AND SPECIFICATIONS. ALL AFFECTED CONTRACTORS AND SUPPLIERS ARE AWARE OF, AND WILL INTEGRATE THIS SUBMITTAL INTO THEIR OWN WORK.

SUBMITTAL NO. _____
DESCRIPTION _____
DATE RECEIVED _____
SPECIFICATION SECTION _____
SPECIFICATION PARAGRAPH _____
DRAWING NUMBER _____
SUBCONTRACTOR NAME _____
SUPPLIER NAME _____
MANUFACTURER NAME _____
NUMBER OF DEVIATIONS _____
EXCEPTIONS TAKEN: Yes _____ No _____

DETAILS OF EXCEPTION _____
_____
_____

CERTIFIED BY: _____

8. The person signing the Contractor's submittal stamp shall be the one designated under the contract agreement with the DHHL. The signature shall be in original ink. Stamped signature will not be acceptable. Submittal form shall be completely filled out, signed and dated.

9. When the Contractor takes any exception to the submittal drawings, such exception shall be brought to the attention of the Project Manager. The exception shall be submitted with the shop drawings together with sufficient details and justifications.

B. SUBMITTALS: Submittals referred to herein shall include shop drawings and other submittals for both shop and field-fabricated items.

The submittals shall include satisfactory identification of items, units, and assemblies in relation to the Specification section number, and the system or equipment identification shown on the Drawings, or as provided in the applicable specification section.

Should the Contractor propose any item on his/her shop drawings, or incorporate an item into the work, and that item should subsequently prove to be defective or otherwise unsatisfactory, (regardless of the Project Manager's preliminary review), the Contractor shall, at his/her own expense, replace the item with another item that will perform satisfactorily.

C. PERFORMANCE (CONSTRUCTION) SCHEDULE: The Contractor shall provide a construction schedule for scheduling and coordinating the work within the contract time. Approved contract time extensions shall be incorporated into updated schedules, reflecting their effect at the time of occurrence. Failure of the Contractor to comply with these requirements for submittal of the performance schedule and reports shall be cause for no payments by the Owner. Project status review and update shall be provided each month and submitted with progress payment requests.

D. SUBMITTAL SCHEDULE: Within 30 days after receipt of notice to proceed, the Contractor shall submit to the Project Manager in duplicate, a schedule, listing all items that will be submitted to the Project Manager for review and approval. The schedule shall include, among other things, a list of shop drawings and manufacturer's literature, certificates of compliance, material samples, and guarantees. The schedule shall indicate the type of item, contract requirement reference, the Contractor's scheduled dates for submitting the above items and projected needs for approval answers and procurement dates. In preparing the schedule, the Contractor shall allow the appropriate time for the Project Manager's review and approval as stated in the General Conditions, section 5.5; additional time shall be allowed to provide for possible resubmittal. Also, the scheduling shall be coordinated with the approved progress schedule.

E. SUBMITTALS REQUIRED FOR FOREIGN-MANUFACTURED ITEMS: In addition to the submittal requirements stated above, suppliers of foreign-manufactured items shall submit the names and addresses of companies within the United States that maintain technical service representatives and a complete inventory of spare parts and accessories for each foreign-made item proposed for incorporation into the work. Failure to prove the foregoing capabilities shall be just cause for rejection of the foreign-manufactured items.

F. RECORD DRAWINGS: Record drawings shall be submitted by the Contractor in conformance with Section 01340, "Drawings to be Furnished By Contractor."

G. SAMPLES AND TESTING: Where required in the Specifications, and as determined necessary by the Project Manager, samples of materials, appliances, and fittings to be used or offered for use in connection with the work shall be submitted to the Project Manager at the Contractor's expense, with information as to their sources, with all shipping charges prepaid, and in such quantities and sizes as may be required for proper examination to establish the quality or equality thereof, as applicable.

All samples shall be submitted in ample time to enable the Project Manager to make any necessary examinations, without delay to the work. The Contractor will be held responsible for any loss of time due to his/her neglect or failure to deliver the required samples to the Project Manager, as specified.

Samples also shall be taken during the course of the work, as required by the Project Manager.

Laboratory tests and examinations that the Project Manager elects to make in its own laboratory will be made at no cost to the Contractor, except that, if a sample of any material or equipment proposed for use by the Contractor fails to meet the Specifications, the cost of testing subsequent samples shall be borne by the Contractor.

All tests required by the Specifications to be performed by an independent laboratory shall be made at the sole expense of the Contractor.

Material used in the work shall conform with the submitted samples and test certificates as approved by the Project Manager.

H. COST FOR SERVICES: Costs for providing services during installation and testing shall be included in the costs for providing the applicable specified equipment.

1.03 TRANSMITTAL PROCEDURE:

A. General: A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required. Submittals of various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

B. A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted. Original submittal numbers shall have the following format: "XXX"; where "XXX" is the sequential number assigned by the Contractor. Resubmittals shall have the following format: "XXX-Y"; where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 25B, for example, is the second resubmittal of submittal 25.

C. CONTACT:

Department of Hawaiian Home Lands
91-5420 Kapolei Parkway
Kapolei, Hawaii 96707

Attention: Kehaulani Quartero

D. Deviation from Contract: If the Contractor proposes to provide material or equipment which does not conform to the specifications and drawings, it shall indicate so under "deviations" on the submittal transmittal form accompanying the submittal copies. The Contractor shall prepare its reason for a change, including cost and time differential. The contractor shall be responsible for omission or deviation in the submittal. Failure to identify deviation shall be subject to rejection of the submittal without review.

E. Submittal Completeness: Submittals which do not have all the information required to be submitted, including deviations, shall be considered as not complying with the intent of the contract and are not acceptable and will be returned without review. Contractor is advised to review and assure that all submittals are complete prior to submittal to the Project Manager.

1.04 REVIEW PROCEDURE:

A. When the contract requires a submittal, the Contractor shall submit to the Project Manager for review, the specified information in accordance with the General Conditions and as follows:

1. **Three (3) copies** of all the submitted information.

2. Only **one (1) set of sample** materials need be submitted, unless otherwise directed by the Project Manager.

B. Unless otherwise specified, within **30 calendar days** after receipt of the submittal by the Project Manager the submittal shall be reviewed and the Project Manager shall return **one (1) copy** of the marked-up submittal or detailed shop drawing comment forms. The returned submittal shall indicate one of the following actions:

If the review indicates that the material, equipment or work method is in general conformance with the design concept and complies with the drawings and specifications, submittal copies will be marked **"No Exceptions Taken."** In this event the Contractor may begin to implement the work method or incorporate the material or equipment covered by the submittal.

If the review indicates minor corrections are required, copies will be marked **"MAKE CORRECTIONS NOTED."** The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in the O&M data, a corrected copy shall be provided in the O&M Manual.

If the review reveals that the submittal is insufficient or contains incorrect data, copies will be marked **"REVISE AND RESUBMIT."** Except at his/her own risk, the Contractor shall not undertake work covered by this submittal until the submittal has been revised, resubmitted and returned and marked either "NO EXCEPTIONS TAKEN," or "MAKE CORRECTIONS NOTED."

If the review indicates that the material, equipment, or work method is not in general conformance with the design concept or in compliance with the drawings and specifications, copies of the submittal will be marked **"REJECTED."** Submittals with deviations which have not been identified clearly may be rejected. Except at its own risk, the Contractor shall not undertake work covered by such submittals until a new submittal is made and returned marked either "NO EXCEPTIONS TAKEN, or "MAKE CORRECTIONS NOTED."

C. No changes shall be made by the Contractor. The resubmittals shall be a complete set and not just the portions that have been changed.

D. Unless otherwise approved by the Project Manager, shop drawings shall be submitted only by the Contractor, who shall indicate by a signed stamp on the drawings or other approved means that the Contractor has checked the shop drawings and that the work or equipment shown is in accordance with contract requirements and has been checked for dimensions and relationship with work of all other trades involved. All deviations from the plans and specifications shall be listed. The practice of submitting incomplete or unchecked shop drawings for the Project Manager to correct or finish will not be acceptable, and shop drawings which, in the opinion of the Project Manager, clearly indicate that they have not been checked by the Contractor will be considered as not complying with the intent of the contract documents and will be returned to the Contractor for resubmission in the proper form.

E. The Project Manager shall be allowed by the Contractor to contact manufacturers, dealers, vendors, suppliers, and subcontractors directly for the sole purpose of expediting the submittal process.

1.05 EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS:

A. The Project Manager's review of drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of its responsibility for errors therein and shall not be regarded as an assumption of risks or liability by the Owner or by any officer, employee, agent, consultants or subcontractor thereof, and the Contractor shall have no claim under the contract on account of the failure, or partial failure, of the method of work, material, or equipment so reviewed, unless the Contractor has called attention to such deviations, in writing, by a letter accompanying the drawings and the City approved the change or deviations, in writing, at the time of submission; nor shall review by the Project Manager relieve the Contractor from the responsibility for errors in the shop drawings. When the Contractor does call such deviations to the attention of the Project Manager, he/she shall state in his/her letter whether or not such deviations involve any deduction or extra cost adjustment. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the City has no objection to the Contractor, upon its own responsibility, using the plan or method of work proposed or providing the material or equipment proposed.

B. If such deviation is not indicated to the Project Manager in writing, and such deviation is inadvertently approved, such approval will be rescinded and any cost related to redoing the work to conform with the plans and specifications shall be borne by the Contractor.

C. The approval of the above drawings, lists, prints, specifications, or other data shall in no way release the Contractor from his/her responsibility for the proper fulfillment of the requirements of this contract nor for fulfilling the purpose of the installation nor from his/her liability to replace the same should it prove defective or fail to meet the specified requirements.

PARTS 2 AND 3 – (NOT USED)

END OF SECTION

SECTION 01320 – PROJECT MANAGEMENT AND PROGRESS DOCUMENTATION

PART 1 – GENERAL

1.01 SUMMARY: This Section includes administrative and procedural requirements for management of the project and documenting the progress of construction during performance of the Work, including the following:

1. Notice to Community Groups and Individuals.
2. Project Meetings.
3. Progress Reports.

1.02 NOTICE TO COMMUNITY GROUPS AND INDIVIDUALS:

The Contractor shall be responsible for coordinating the Project work with affected residents and for notifying them in writing two (2) weeks prior to commencing any work affecting them or requiring access to their property. Work shall not commence until such timely notices have been given.

A. The required written notices shall be coordinated with the Project Manager and shall include the following information:

1. Brief description of the project.
2. Method of construction.
3. Dates that work will be performed.
4. Detailed description of the work that will be performed.
5. Description of the inconveniences that may be experienced by property owner, the duration of inconveniences, and the measures that will be taken to minimize the inconveniences.
6. Description of restoration that will be performed upon completion of the work.
7. Names and daytime and emergency telephone numbers of key Contractor and DHHL personnel.
8. If applicable, detail the portions of access ways, roadways, driveways, and parking spaces that will be temporarily blocked or unavailable for public use and the alternative measures that will be provided.

B. The Contractor shall submit draft copies of all notices to the Project Manager for approval a minimum of four (4) weeks prior to commencing any work.

C. Copies of all notices shall be submitted to the Project Manager at the same time they are mailed to property owners, lessees, and community groups.

D. The Contractor shall maintain a notification log which will include:

a. Date and time of the notification,

b. The contact person's name

c. If no contact was made, the notation that the information was left at the person's door.

1.03 PROJECT MEETINGS:

A. Preconstruction Conference: The Project Manager may schedule a preconstruction conference before the start of construction, at a time convenient to the Project Manager, but no later than seven (7) days before the Project start date or jobsite start date whichever is later. Conference will be held at the Project site or another convenient location. The Project Manager shall conduct the meeting to review responsibilities and personnel assignments.

B. Progress Meetings: The Contractor shall schedule and attend meetings and conferences as directed by the Project Manager.

1. Agenda: Items to be discussed at the progress meetings are:
   a. Construction Schedule
   b. Outstanding requests for information (clarification)
   c. Interface requirements
   d. Sequence of operations
   e. Status of outstanding submittals
   f. Deliveries
   g. Off-site fabrication
   h. Access
   i. Site utilization
   j. Temporary facilities and controls
   k. Work hours
   l. Hazards and risks
   m. Progress cleaning
   n. Quality and work standards.
   o. Change Orders and Change Proposals
   p. Documentation of information for payment requests

2. Contractor's Construction Schedule: The Contractor shall review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

3. Corrective Action Plan: The Contractor shall provide a plan of corrective action for any item which is delayed or expected to be delayed, then that item impacts the contractual dates.

4. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.04 PROGRESS REPORTS:

A. The General Contractor and all Subcontractors shall keep a daily report of report events.

B. The form of the Contractor Daily Progress Report shall be as directed by the Project Manager.

C. Submit copies of the previous week's reports on Monday morning at 10:00 a.m.

D. Submit copies of the reports with the monthly payment request for the whole period since the last payment request submittal.

E. Deliver the reports in hard copy or by e-mail as directed by the Project Manager.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01410 – PERMITS AND LICENSES

PART 1 - GENERAL

1.01 GENERAL: The Contractor shall consult with all appropriate governmental agencies to determine the applicable permits, charges and fees required for the Project. Unless otherwise specified in the Contract, two (2) copies of all permits required for the Project shall be submitted to the Project Manager.

Permits, charges, and fees required for the Project may include, but not be limited to, the following:

A. Sidewalk and Driveway Permit

B. Trenching Permit

C. Grading Permit

D. Street Usage Permits (City and/or State)

E. Fire Hydrant Usage Permit

F. Community Noise Control Permit

G. Dumping Charges

H. Chapter 55 Water Pollution Control, Hawaii Administrative Rules, Title 11, State Department of Health, permits for discharges of storm water runoff associated with construction.

I. Noise Variance

Time required to obtain all permits and fees associated with Items A thru I above shall be included in the work order completion period.

END OF SECTION

SECTION 01430 – TEMPORARY WATER POLLUTION, DUST AND EROSION CONTROL

PART 1 - GENERAL

1.01 GENERAL: This section covers temporary water pollution, dust, and erosion controls during construction operations under this contract and for those measures set forth in other sections of the TECHNICAL SPECIFICIATIONS. This section describes detailed plans, diagrams, and written site-specific best management practices (BMP); constructing, maintaining, and repairing temporary water pollution, dust, and erosion control measures at the project site, including local material sources and work areas. It is the responsibility of the Contractor to investigate and comply with all applicable Federal, State and County laws and regulations concerning environmental protection and pollution control, and to secure all necessary permits.

1.02 SUBMITTALS: The Contractor shall submit the following in accordance with provisions as herein specified:

A. Water Pollution, Dust, and Erosion Control Meeting. Submit Site Specific BMP to Project Manager. Schedule a water pollution, dust, and erosion control meeting with Project Manager after site specific BMP is accepted in writing by Project Manager. Meeting shall be scheduled 14 days before start of construction work. Discuss sequence of work, plans and proposals for water pollution, dust, and erosion control.

B. Water Pollution, Dust, and Erosion Control Submittals:
Submit the following:

1. Written site specific BMP describing activities to minimize water pollution and soil erosion into State waters, drainage or sewer systems. BMP shall include the following:

a. An identification of potential pollutants and their sources.
b. List of all materials and heavy equipment to be used during construction.
c. Descriptions of the methods and devices used to minimize the discharge of pollutants into state waters, drainage or sewer systems.
d. Details of the procedures used for maintenance and subsequent removal of any erosion or siltation control devices.
e. Methods of removing and disposing hazardous wastes encountered or generated during construction.
f. Spill control.
g. Methods of storing and handling of oils, paints and other products used for the project.
h. Material storage and handling areas, and other storage areas.
i. Fueling and maintenance of vehicles and other equipment.
j. Tracking of sediments offsite from project entries and exits.
k. Litter management.
l. Toilet facilities.
m. Other factors that may cause water pollution, dust and erosion control.

2. Provide plans indicating location of water pollution, dust and erosion control devices; provide plans and details of BMP's to be installed or utilized; show areas of soil disturbance, indicate areas where vegetative practices are to be implemented, and areas used for the storage of soil or waste. Indicate intended drainage patterns on plans. Include separate drawings for each phase of construction that alters drainage patterns. Indicate approximate date when device will be installed and removed.

3. Construction schedule.

4. Names of specific individual(s) designated responsible for water pollution, dust, and erosion controls on the project site. Include home and business telephone numbers, fax numbers, and e-mail addresses.

Date and sign BMP. Keep accepted copy on site throughout duration of the project. Revisions to the BMP shall be included with original BMP. Modify contract documents to conform to revisions. Include actual date of installation and removal of BMP. Obtain written acceptance by Project Manager before revising BMP.

Follow guidelines in the "Construction Best Management Practices Field Manual" dated January 2008, in developing, installing, and maintaining BMPs for all projects. Follow Honolulu's City and County "Rules for Soil Erosion Standards and Guidelines" for all projects on Oahu.

1.03 IMPLEMENTATION: After receipt of Notice to Proceed, the Contractor shall submit in writing the above site-specific BMP for approval of the Project Manager within 5 days after Notice to Proceed. Approval of the Contractor's plan will not relieve the Contractor of his responsibility for adequate and continuing control of pollutants and other environmental protection measures.

1.04 SUBCONTRACTORS: Assurance of compliance with this section by subcontractors will be the responsibility of the Contractor.

1.05 NOTIFICATION: The Project Manager will notify the Contractor in writing of any observed noncompliance with the aforementioned Federal, State or local laws or regulations, permits, and other elements of the Contractor's site specific BMP. The Contractor shall, after receipt of such notice, inform the Project Manager of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Project Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or costs or damages allowed to the Contractor for any such suspension.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 WATER POLLUTION CONSTRUCTION REQUIREMENTS:

Do not begin work until submittals detailed in Subsection 1.02, Submittals, are completed and accepted in writing by Project Manager.

Install, maintain, monitor, repair and replace site-specific BMP measures, such as for water pollution, dust and erosion control.

Address all comments received from Project Manager.
Modify and resubmit plans and construction schedules to correct conditions that develop during construction which were unforeseen during the design and pre-construction stages.

Coordinate temporary control provisions with permanent control features throughout the construction and post-construction period.

Do not expose or disturbed surface area of earth material (including clearing and grubbing) until BMP measures are installed and accepted in writing by the Project Manager. BMP measures shall be in place and operational at the end of workday.

Clean up and remove any pollutant that can be attributed to the Contractor.

Install or modify BMP measures due to change in the Contractor's means and methods, or for omitted condition that should have been allowed for in the accepted site specific BMP or a BMP that replaces an accepted site specific BMP that is not satisfactorily performing.

Properly maintain all BMP features. Inspect, remove debris collected, prepare a written report, and make necessary repairs to BMP measures at the following intervals:

1. Weekly during dry periods.

2. Within 24 hours of any rainfall of 0.5 inch or greater which occurs in a 24-hour period.

3. Daily during periods of prolonged rainfall.

4. When existing erosion control measures are damaged or not operating properly as required by site specific BMP.

5. Temporary removal of construction BMPs that may affect drainage or cause a potential flooding hazard in the event of a weather advisory warning.

Remove, destroy, replace or relocate any BMP that must be removed, destroyed, replaced or relocated due to potential or actual flooding, or potential danger or damage to project or public.

Maintain records of inspections of BMP work. Keep continuous records for duration of the project. Submit weekly copy of records to Project Manager.

In addition to weekly reports, submit to Project Manager all amounts spent initializing and maintaining bmp during previous week. Amount spent includes, but is not limited to: purchases of erosion control material, construction of storage areas, and installation of water pollution, erosion and dust control measures. Submit report weekly along with site inspection report.

Protect finished and previously seeded areas from damage and from spillover materials placed in upper lifts of embankment.

When there are conflicts between these requirements and laws, rules, or regulations of other Federal or State local agencies, the more restrictive laws, rules, or regulations shall apply.

Non-Compliance: The Project Manager will notify the Contractor of any non- compliance with the foregoing provisions and the action to be taken. If the Contractor fails or refuses to comply promptly, the Project Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No extension of time or payment for excess costs or damages shall be made for the time lost due to such stop action.

The Contractor's designated representative specified in Subsection 1.02.B.4 shall address any BMP concerns brought up by Project Manager within 24 hours of notification, including weekends and holidays. Failure to satisfactorily address these concerns, Project Manager's own labor forces to provide necessary corrective measures. Project Manager will charge Contractor such incurred costs plus any associated Project Management costs. Project Manager will make appropriate deductions from Contractor's monthly progress estimate. Failure to apply BMP measures shall result in either or both the establishment and increase in the amount of retainage due to unsatisfactory progress or withholding of monthly progress payment. Continued failure to apply BMP measures may result in one or more of the following: assessment of liquidated damages, suspension, or cancellation of Contract with the Contractor being fully responsible for all additional costs incurred by State.

3.02 DUST CONTROL CONSTRUCTION REQUIREMENTS:

A. For the duration of the contract, the Contractor, at his own expense, shall keep the project area and the surrounding areas free from dust that would cause a hazard or nuisance to the work or the operations of other contractors or to persons or property. The work shall be in conformance with the Air Pollution Control Standards and the Regulations of the State Department of Health. Contractor shall construct dust fence as designated on plan and submit dust fence assembly and materials used for fence. Approved temporary methods of stabilization consisting of sprinkling or similar methods may be permitted to control dust. If approved, sprinkling must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Chemicals or oil treating shall not be used.

B. Control dust as the work proceeds and whenever a dust nuisance or hazard occurs. Controls shall be maintained from the start of construction until completion of the project or as directed by the Project Manager. No separate or direct payment will be made for dust control and the cost thereof shall be considered incidental to and included in the Contract price.

C. The Contractor shall construct dust screens around all non-granular stockpile materials and spoil materials.

END OF SECTION

SECTION 01518 – ENVIRONMENTAL POLLUTION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK: Furnish all labor, material and equipment and perform all work required for the prevention of environmental pollution during and as the result of construction operations under this Contract.

This Section contains general specifications pertaining to the prevention of environmental pollution to be maintained until completion of the contract and shall become a part of the work of all other Sections as applicable. The requirements of this Section take precedence over conflicting or contradictory provisions of other Sections.

The work in this Section shall include the following:

1. Obtain all permits required by the State Department of Health

2. Provide all air and water quality testing and monitoring work required by the permits during construction.

3. Provide the facilities, equipment, and structural controls for minimizing adverse impacts upon the environment during the construction period.

1.02 DEFINITIONS:

A. For the purpose of this specification, Environmental Pollution is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely affect human/animal health or welfare.

2. Unfavorably alter ecological balances important to human/animal life.

3. Affect other species of importance to man.

4. Degrade the utility of the environment for its normal daily function, for aesthetic, and for recreational purposes.

B. The control of environmental pollution requires consideration of air, water, and land, and involves noise control, solid waste management, and management of other pollutants.

1.03 RELATED SECTIONS:

Section 01430	Temporary Water Pollution, Dust and Erosion Control

1.04 GENERAL REQUIREMENTS

A. Comply with all applicable Federal and State laws, including the latest Hawaii Public Health regulations, local laws and regulations concerning pollution control and abatement.

B. The Contractor shall become familiar with the latest requirements of the National Pollutant Discharge Elimination System (NPDES) Permit and all other necessary permits to discharge water to State receiving waters, into storm drainage system and into sanitary sewer system prior to bidding on this project. The Contractor will apply for appropriate NPDES permits required by the State Department of Health (DOH). The Contractor shall prepare and submit a written site-specific construction BMP Plan to DOH thirty (30) calendar days prior to constructions.

C. Notification: The Project Manager will notify the Contractor in writing of any non-compliance with the foregoing provisions and the action to be taken. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose of notification. After receipt of such notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to comply promptly, the Project Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it was later determined that the Contractor was in compliance.

D. Sub-Contractor: Compliance with the provisions of this Section by subcontractors will be the responsibility of the Contractor.

1.05 NOISE CONTROL:

A. The Contractor shall comply with the provisions of Chapter 46, Community Noise Control for Oahu, of the State Department of Health, Administrative Rules. When required, the Contractor shall obtain a Community Noise Permit. Construction equipment and on-site vehicles or devices requiring an exhaust of gas or air shall have mufflers. The Contractor shall comply with conditional use of the permit as specified in the rules and the conditions issued with the permit. Should there be a base yard or stockpile area located adjacent to residences, mitigative measures, such as barriers or berms, shall be developed in the event that noise complaints are received.

B. The Contractor shall comply with provisions of Chapter 46, Community Noise Control for Oahu, of the State Department of Health, Administrative Rules, and with all approval conditions issued with the project's Community Noise Variance for all work activities conducted during the following times:

- Mondays through Fridays: Midnight to 7:00 a.m. and from 6:00 p.m. to Midnight.
- Saturdays: Midnight to 9:00 a.m. and from 6:00 p.m. to Midnight
- Sundays: Midnight to Midnight

Construction activities will not be performed during federal and state holidays, and/or special events.

C. Compliance with the provisions of this section by the subcontractors will be the responsibility of the Contractor.

D. The Project Manager will notify the Contractor of any non-compliance with the foregoing provisions and the action to be taken. If the Contractor fails or refuses to comply promptly, the Project Manager, upon the recommendation of the Project Manager, may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No extension of time or payment for excess costs or damages shall be made for the time lost due to such stop action."

1.06 LAND RESOURCES PROTECTION:

A. General: Unless otherwise indicated on the drawings, existing land resources within the property lines and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the project. Insofar as possible, confine construction activities to areas defined by the plans or specifications.

B. Restoration of Damage: Restore any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations as nearly as possible to its original condition at the Contractor's expense. The Project Manager will decide what method of restoration shall be used and whether damaged trees or other landscape feature shall be treated and healed or removed from the site and replaced with new.

C. Post-Construction Clean-Up: Obliterate all signs of temporary construction facilities such as work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the Project Manager. No separate payment will be made for post- construction cleanup or obliteration and all cost thereof shall be considered a portion of the Contract Price, except as otherwise provided for in the Contract Documents.

1.07 HISTORICAL AND ARCHAEOLOGICAL FINDS: All items having any apparent historical or archeological interest discovered in the course of construction activities shall be carefully preserved. Leave the archeological find undisturbed and immediately report the find to the Project Manager and the State Historic Preservation Officers from the State Department of Land and Natural Resources at phone (808) 692-8015 to assess the significance of the find and recommend an appropriate mitigation measure, if necessary.

1.08 BURNING: No materials may be burned within the contract area at any time within the contract period.

PART 2 – (NOT USED)

PART 3 – (NOT USED)

END OF SECTION

SECTION 01750 - GUARANTEE

This work shall be done in accordance with Section 7.35 - Guarantee of Work of the Interim General Conditions and the criteria listed below.

Any period that a particular equipment is not operable due to its failure, shall not be considered as a part of the guarantee period. The guarantee period shall be extended for a like period. If due to failure of other equipment the equipment is unable to perform its intended function, the guarantee period shall be extended for a like period. Time that equipment is operating shall be counted as applying to the warranty. Such time shall be determined by use of plant operator's log or other suitable documentation.

If the Contractor fails to perform corrective work in the manner and within the time stated, the Department of Hawaiian Home Lands (DHHL) may proceed to have such work performed at the Contractor's expense and his sureties will be liable therefor. The DHHL shall be entitled to reasonable attorney's fees and court costs necessarily incurred by the Contractor's refusal to honor and pay such costs of corrective work.

The Contractor's performance bond shall continue in full force and effect during the period of this guarantee.

The rights and remedies of the DHHL under this provision do not preclude the exercise of any other rights or remedies provided by this contract or by law with respect to unsatisfactory work performed by the Contractor.

This guarantee shall be deemed supplemental to guarantee provisions provided in other sections of the specifications for the individual units and systems of units so specified.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

DIVISION 31 - EARTHWORK

SECTION 315119 – SHOTCRETE & TIEBACK RETAINING WALL SYSTEM

PART 1 – GENERAL SPECIFICATIONS

1.01 DESCRIPTION

1. Work shall consist of furnishing all labor, tools, materials and equipment necessary and required to construct in-place and complete all work as indicated on the drawings and as specified herein. 033713 Shotcrete 315100 Tiebacks

   A. Construction plans are unapproved and Notice to Proceed will be provided on approval of plans.

1.02 GENERAL

1. Construction Lines, Levels and Grades: The Contractor shall verify all lines, levels and elevations indicated on the drawings before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of DHHL, and any change shall be made in accordance with DHHL's instruction. The Contractor shall not be entitled to extra payment for failing to report the discrepancies before proceeding with any work whether within the area affected or not.

2. Examination of Premises: The Contractor shall contact DHHL and obtain permission before visiting the site.

3. Notices: The Contractor shall notify DHHL and give at least three (3) working days' notice before starting any work.

4. Disruption of Utility Services: All work related to the temporary disconnection of electrical system shall be pre-arranged with DHHL so that any disruption of such services will be kept to a minimum. In the event temporary power hook-up is required, the Contractor shall provide the necessary services.

5. Contractor's Operations

   A. The Contractor must employ, insofar as possible, such methods and means of carrying out the work so as not to cause any interruption or interference to the facility's operations. Where the Contractor's operations would result in interruptions which would hamper the operations of the facilities, the Contractor shall rearrange the schedule of work accordingly.

   B. The Contractor shall maintain safe passageway to and from the facility's occupied rooms and other occupied spaces for the user agency personnel and the public at all times.

6. Parking Policy for Contractor

   A. The Contractor and its employees should be discouraged from parking near the construction area.

   B. Parking is available on the public street and the Contractor shall be courteous to the adjacent residents.

7. Toilet Accommodations: There are no toilet accommodations on site. The Contractor shall make their own arrangements for portable toilet facilities.

8. Protection of Property: The Contractor shall continually maintain adequate protection of all its work from damage and shall protect all property, including but not limited to buildings, equipment, furniture, grounds, and vegetation, material, utility systems located at and adjoining the job site. The Contractor shall repair, replace or pay the expense of repair of damages resulting from its operations.

9. Use of Power-Driven Equipment: The Contractor shall take all necessary safety precautions to protect the facility personnel, and the public whenever power driven equipment is used.

10. Safety: The Contractor shall carefully read and strictly comply with the requirements of the Hawaii Occupational Safety and Health Law, Chapter 396, Hawaii Revised Statutes, as amended, is applicable and made a part of the Contract.

11. Clean up Premises: The Contractor shall clean up and remove from premises all debris accumulated from operations as necessary or as directed.

12. Responsibility

   A. DHHL will hold the Contractor liable for all the acts of Subcontractors and shall deal only with the prime Contractor in matters pertaining to other trades employed on the job. The Contractor shall be responsible for coordinating the work of all trades on the job.

   B. Should the Contractor discover any discrepancy i n the plans or specifications, the Contractor shall immediately notify DHHL before proceeding any further with the work, otherwise, the Contractor will be held responsible for any cost involved in correction of work placed due to such discrepancy.

13. Cooperation with Other Contractors: DHHL reserves the right at any time to contract for or otherwise perform other or additional work within the contract zone limits of this Contract. The Contractor of this project shall, to the extent ordered by DHHL, conduct its work so as not to interfere with or hinder the progress or completion of the work performed by other contractors.

14. Division of the Work: The Divisions and Sections into which these Specifications are divided shall not be considered an accurate or complete segregation of work by trades. This also applies to all work specified within each Section.

15. Drawings and Specifications

A. The Contractor shall not make alterations in the drawings and specifications. In the event the Contractor discovers any errors or discrepancies, the Contractor shall immediately notify DHHL in accordance with the General Conditions.

B. Where devices, or items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items or parts as are required to properly complete the work.

C. Specifications and drawings are prepared in abbreviated form and include incomplete sentences. Omission of words or phrases such as "the Contractor shall", "as shown on the drawings", "a", "an", and "the" are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.

16. Required Submittals

A. Required submittals as specified in the Technical Sections of these specifications include one or more of the following: Shop drawings; material samples; technical data; schedules of materials; schedules of Operations; guarantees; operating and maintenance manuals; and as-built drawings.

B. The Contractor shall make a comprehensive list of the required submittals, by Specification Section, and submit this list to Project Representative within 15 days after notice to proceed.

C. As-Built Drawings: When as-built drawings are required for submittal, the following shall apply:

a. As-built drawings, the intent of which is to record the actual in-place construction so that any future renovations or tie-ins can be anticipated accurately, shall be required.
b. All deviations from alignments, elevations and dimensions which are stipulated on the plans shall be recorded in red on the as-built drawings.

D. Immediately after these changes are constructed in place, the Contractor shall record them on the field office plans.

E. Within two weeks after final inspection of the project, the Contractor shall transfer the changes marked on the field office plans onto a clean copy of plans using a red pencil. Any deletions shall be so noted and redrawn as necessary. The Contractor shall stamp or mark the tracings "AS-BUILT", and also sign and date each drawing so marked.

F. The Contractor shall submit the as-built drawings together with the marked-up field office plans to Project Representative.

G. Any as-built drawing which Project Representative determines does not accurately record the deviation shall be corrected by DHHL, and the Contractor shall be charged for the services.

PART 2 – MOBILIZATION AND DEMOBILIZATION

2.01 MOBILIZATION

1. Mobilization shall consist of the transporting, assembling, constructing, installing, and making ready for use at the job site, all the equipment, machinery, structures, utilities, materials, labor, and incidentals necessary to do the work covered by this contract.

2.02 DEMOBILIZATION

1. Demobilization shall consist of the dismantling and removal of the above-mentioned equipment, machinery, structures, utilities, materials, and incidentals, and the cleaning up of the site.

2.03 GUIDELINES

1. If the Contractor utilizes private lands other than the sites provided by the Department for mobilization purposes, the provisions of this section shall apply, and the mobilization and demobilization work on said private lands shall be in accordance with the agreement between the Contractor and the land owner.

   A. Any and all additional mobilization or demobilization costs in excess of the maximum amounts specified in the Proposal shall be included in the appropriate unit prices bid in the Proposal. The Contractor shall not receive any compensation for mobilization and demobilization in addition to those specified in the Proposal.

   B. All equipment, machinery, buildings, utilities and incidentals mobilized and demobilized under this section shall remain the property of the Contractor.

PART 3 – POLLUTION CONTROL

3.01 DESCRIPTION

1. Rubbish Disposal

   A. No burning of debris and/or waste materials shall be permitted on the project site.

   B. No burying of debris and/or waste material except for materials which are specifically indicated elsewhere in these specifications as suitable for backfill shall be permitted on the project site.

C. All unusable debris and waste material shall be hauled away to an appropriate off-site dump area. During loading operations, debris and waste materials shall be watered down to allay dust.

D. No dry sweeping shall be permitted in cleaning rubbish and fines which can become airborne from floors or other paved areas. Vacuuming, wet mopping or wet or damp sweeping is permissible.

E. Clean-up shall include the collection of all waste paper and wrapping materials, cans, bottles, construction waste materials and other objectionable Materials and removal as required. Frequency of clean-up shall coincide with rubbish producing events.

2. Dust

A. The Contractor shall prevent dust from becoming airborne at all times including non-working hours, weekends and holidays in conformance with The State Department of Health, Administrative Rules, Title 11, Chapter 60.1 - Air Pollution Control.

B. The method of dust control and costs shall be the responsibility of the Contractor. Methods of dust control shall include the use of water, chemicals or asphalt over surfaces which may create airborne dust.

C. The Contractor shall be responsible for all damage claims in accordance with Section 7.19 - "Responsibility for Damage Claims; Indemnity" of the DHHL CONSTRUCTION GENERAL CONDITIONS.

3. Noise

A. Noise shall be kept within acceptable levels at all times in conformance with the State Department of Health, Administrative Rules, Title 11, Chapter 46 - Community Noise Control for Oahu or County Noise Limits of the Hawaii County Code which ever applies. The Contractor shall obtain and pay for The Community Noise Permit from the State Department of Health when the construction equipment or other devices emit noise at levels exceeding the allowable limits.

B. All internal combustion engine-powered equipment shall have mufflers to minimize noise and shall be properly maintained to reduce noise to acceptable levels.

C. Starting-up of construction equipment meeting allowable noise limits shall not be done prior to 6:45 a.m. without prior approval of DHHL. Equipment exceeding allowable noise levels shall not be started-up prior to 7:00 a.m.

4. Erosion

A. During interim grading operations, the grade shall be maintained so as to preclude any damage to adjoining property from water and eroding soil.

B. Temporary berms, cut-off ditches and other provisions which may be required because of the Contractor's method of operations shall be installed at no cost to DHHL.

C. Drainage outlets and silting basing shall be constructed and maintained as shown on the plans to minimize erosion and pollution of waterways during construction.

5. Others

A. Wherever trucks and/or vehicles leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being carried onto the pavement. Waste water shall not be discharged into existing streams, waterways, or drainage systems such as gutters and catch basins unless treated to comply with the State Department of Health water pollution regulations.

B. Trucks hauling debris shall be covered as required by PUC Regulation. Trucks hauling fine materials shall be covered.

C. No dumping of waste concrete will be permitted at the job-site.

D. Except for rinsing of the hopper and delivery chute, and for wheel washing where required, concrete trucks shall not be cleaned on the job-site.

E. Except in an emergency, such as a mechanical breakdown, all vehicle fueling and maintenance shall be done in a designated area. A temporary berm shall be constructed around the area when runoff can cause a problem.

F. When spray painting is allowed such spray painting shall be done by the "airless spray" process. Other types of spray painting will not be allowed.

6. Suspension of Work

A. Violations of any of the above requirements or any other pollution control requirements which may be specified in the Technical Specifications herein shall be cause for suspension of the work creating such violation. No additional compensation shall be due the Contractor for remedial measures to correct the offense. Also, no extension of time will be granted for delays caused by such suspensions.

B. If no corrective action is taken by the Contractor within 72 hours after a suspension is ordered by DHHL, DHHL reserves the right to take whatever action is necessary to correct the situation and to deduct all costs incurred by DHHL in taking such action from monies due the Contractor

PART 4 – SITE PREPARATION

4.01 DESCRIPTION

1. The work to be performed under this section shall include clearing the premises of all obstacles and obstructions, the removal of which will be necessary for the proper reception, construction, execution and completion of the other work included in this contract

4.02 GENERAL

1. Maintenance of Traffic: The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, passageways, etc.

2. When necessary, the Contractor shall provide and erect barriers, etc., with special attention to protection of personnel.

3. Protection: Throughout the progress of the work protection shall be provided for all property and equipment, and temporary barricades shall be provided as necessary. Work shall be done in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, and the State of Hawaii's Occupational Safety and Health Standards, Rules and Regulations.

4. Fires: No burning of fires of any kind will be allowed.

5. Reference Points: Bench marks, etc., shall be carefully maintained, but if disturbed or destroyed, shall be replaced as directed, at the Contractor's expense.

6. Disposal: All materials resultant from operations under this Section shall become the property of the Contractor and shall be removed from the site. Loads of materials shall be trimmed to prevent droppings.

4.03 EXISTING UTILITY LINES

1. The existence of active underground utility lines within the construction area is not definitely known other than those indicated in their approximate locations on the Drawings. Should any unknown line be encountered during excavation, the Contractor shall immediately notify the Engineer of such discovery. DHHL shall then investigate and issue instructions for the preservation or disposition of the unknown line. Authorization for extra work shall be issued by DHHL only as deemed necessary.

4.04 CLEARING AND GRUBBING

1. The Contractor shall clear the premises of all obstacles and obstructions, the removal of which will be necessary for the proper reception, construction, execution and completion of other work included in this contract.

2. The Contractor shall protect from injury and damage all surrounding trees, plants, etc., and shall leave all in as good as condition as at present. Any damage to existing improvement shall be repaired or replaced by the Contractor to the satisfaction of the Engineer.

3. Debris from clearing and grubbing operations shall not be placed in streams, water courses or at locations that will impede flow of the natural drainage pattern.

4.05 ASPHALT REMOVAL

1. Prior to removal of asphalt, saw cut between pavement to be removed and the remaining paved areas as designated on the Drawing.

2. Stockpile removed asphalt in storage piles in areas as directed by DHHL. Construct storage piles to freely drain surface water. Dispose of removed asphalt as specified for waste material, unless otherwise specified by DHHL.

4.06 CLEAN UP PREMISES

1. Clean up and remove all debris accumulated from building operations from time-to-time as directed. Upon completion of the construction work and before final acceptance of the contract work, remove all surplus materials, equipment, scaffoldings, etc., and leave entire job site raked clean and neat to the satisfaction of the Project Representative.

PART 5 – SHOTCRETE

5.01 DESCRIPTION

1. This work includes furnishing all materials and labor required for weep holes, reinforcing steel and shotcrete shown on the Plans. The work also includes any preparatory trimming and cleaning of soil/rock surfaces and shotcrete cold joints to receive new shotcrete.

5.02 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only

1. American Concrete Institute (ACI) Standard 211. 1, "Recommended Practices for Selecting Proportions for Normal and Heavyweight Concrete".

2. ACI 506.2, "Specification for Materials, Proportioning, and Application of Shotcrete".

3. ACI 506.3R, "Guide to Certification of Shotcrete Nozzlemen".

5.03 SUBMITTALS

The following items shall be submitted in accordance with Section I- General Specifications

1. Mix Design

2. Methods of application and equipment

3. Certifications of compliance for materials

4. Affidavit of compliance with ACI 506.3R for nozzle operators

5. Test results

5.04 QUALITY ASSURANCES

1. Shotcrete work shall be performed by a firm or company regularly engaged in the business of applying shotcrete materials, using nozzle operators and workers skilled and experienced in the type of work specified.

2. Shotcrete supervisor shall have not less than two years' experience as a shotcrete nozzle operator.

5.05 MATERIALS

1. Portland Cement: ASTM C 150, Type II. Type H cement may be used, subject to written approval of the Engineer.

2. Aggregate: ASTM C33 normal weight aggregate with combined gradation of coarse and fine aggregate conforming to ACI 506.2, Gradation No. l or Gradation No.2, as applicable to the work.

   A. Maximum aggregate size may be varied, subject to the acceptance of the Engineer.

   B. Specific Gravity of aggregate shall not be less than 2.50.

3. Water: Clean and potable, free of impurities detrimental to shotcrete.

4. Admixture: ASTM C494, Type C or Type E, containing no water-soluble chlorides or materials corrosive to steel or other properties that may cause cracking or spalling (for wet-mix shotcrete only.)

5. Ground Wires: No. 18 or 20 gage steel annealed wire.

6. Thickness Pins: Noncorrosive thickness-indication pins designed not to cause infiltration of water through shotcrete.

7. Reinforcing Steel: ASTM 615, Grade 60.

5.06 DESIGN MIX

1. Design of shotcrete mix, whether dry-mix or wet-mix, including recommended amounts of admixture and water to be used, shall be obtained by the Contractor from a qualified independent testing laboratory or agency, for from a ready-mix plant, properly equipped to design shotcrete/concrete mixes. The laboratory, agency, or ready-mix plant shall meet the applicable requirements of ASTM E329, and shall meet with approval of the Engineer. The mix design shall be certified and signed by a professional engineer who is currently registered as structural or civil engineer in the State of Hawaii. Cost of obtaining the mix design shall be paid for the Contractor.

2. Shotcrete mix shall conform to the following requirements:

   A. Proportion of cement to aggregate shall be as required to achieve the indicated or specified strength.

   B. Water content at time of discharge from nozzle shall not exceed amount required to achieve the maximum permitted slump.

   C. Compressive strength of shotcrete shall be not less than the indicated 28-day compressive strength (pounds per square inch).

3. Upon receipt of acceptable shotcrete mix design and test results from the pre-approved independent testing laboratory, agency, or ready-mix plant, conforming with specified requirements, the Contractor shall submit the accepted mix design to the Engineer for a review prior to placing any shotcrete.

4. Shotcrete shall not be placed until the submitted mix design has been approved by the Engineer in writing.

5.07 EQUIPMENT AND MIXING

1. Equipment Standards: Equipment shall be appropriate and suitable for dry-mix or wet-mix shotcrete, as applicable, in accordance with the requirements of ACI 506.2.

2. Batching and Mixing Equipment: Material shall be batched by weight and machine mixed, and delivered to the site pre-mixed. For wet-mix shotcrete, conform with the applicable requirements of ASTM C94 for ready-mixed concrete.

3. Delivery Equipment: Conform with the applicable requirements of ACI 506.2. Equipment shall be capable of discharging mixture into delivery hose under close control and shall deliver a continuous stream of material at the proper volume to discharge nozzle. Discharge nozzle shall be equipped with a manually operated and adjustable air-injection system for directing an even distribution of air through the mixture. Nozzle shall deliver a conical discharge stream of uniform appearance. Equipment shall be cleaned daily and inspected for worn parts. Plaster guns are not permitted.

4. Air Supply: System shall employ a properly operating compressor of ample capacity to perform the work. Comply with capacity requirements specified in ACI 506.2, with modification for hose lengths and working heights.

5.08 EXECUTION

1. Examination of Substrate Surfaces

A. Examine earth, rock, concrete, and masonry surfaces, as applicable and determine that such surface have been properly prepared as hereinafter specified.

B. Inspect reinforcing steel and determine that it is properly placed and tied, that sufficient clearances have been provided, and that it is free of grease, oil, loose rust, and other coatings that may impair bond with concrete.

C. Assure that sleeves and other items to be embedded in shotcrete are in place and that provisions for penetrations have been made.

D. Proceeding with shotcrete placement shall imply acceptance of substrate surfaces and conditions as satisfactory.

2. Preparation of Substrate Surfaces

A. Prepare earth, rock, concrete, masonry surface, as applicable with ACI 506.2.

B. Rock faces shall be free of loose rock.

C. Absorptive substrate shall be evenly dampened before placing shotcrete.

D. Form work shall be designed and constructed to provide for escape of compressed air and rebound during shotcrete placement.

E. Drain any free-standing water away from shotcrete operations.

F. Provide ground wires to establish thickness and surface planes. Install vertically and horizontally as required.

G. As an alternate to ground wires, thickness measuring pins may be used to establish layer thickness and surface plane, provided such pins do not penetrate waterproofing membranes and do not detrimentally damage substrate. Install pins on 5 foot centers in each direction.

3. Shotcrete Placement

A. Operations and Placement Standards: Shotcrete operations and placement shall conform with the applicable requirements of ACI 506.2.

B. Gunning/Nozzle Operation:

a. Build each layer by making several passes over the working area. Thickness of each layer shall be governed by the requirement that sagging of shotcrete shall not occur. Maintain top surface of thick layers at 45 degrees slope. Each layer to be covered by a succeeding layer shall be allowed to take its initial set.
b. Laitance, loose material, and rebound shall be removed by air-jetting. Laitance that has taken a final set shall be removed by sandblasting and the surface cleaned with air-water jet. All layers to be shot shall be damp.
c. Unless otherwise permitted, begin application at the lowest elevation.
d. Do not trowel or finish initial layers in any way.

4. Rebound: Any rebound more accumulated loose aggregate shall be removed from the surface to be covered prior to placing succeeding layers. Rebound shall not be salvaged for use.

5. Construction Joints: Unfinished work shall not stand more than 30 minutes unless construction joins are provided for. Construction joints shall be designed and approved as specified. Entire joint surface shall be cleaned, roughened and dampened prior to application of additional shotcrete.

6. Finishing: Bring shotcrete layers to within ¼ inch of final finish surface. When surface has taken its initial set, trim excess material with a sharp edge cutting screed. Remove ground wires. Provide flash coat or finish coat as required for the final finish. Comply to applicable requirements of the ACI 506.2.

7. Curing: Immediately following shotcrete finishing, surfaces shall be cured for not less than seven days using an approved curing method as specified in ACI 506.2.

8. Cleaning: Clean surfaces and work site of rebound and waste materials, and remove from site

5.09 FIELD QUALITY CONTROL

1. Requirements: Conform with applicable requirements. Quality Control- All tests, cores, and core tests shall be performed by an independent testing laboratory or agency employed by the Contractor at no additional cost.

2. Inspections:

A. Visual inspection by the Engineer will be performed of the shotcrete work, including equipment, materials, forms, reinforcement, embedded items, placement, finishing, curing and protection of the finished product.

B. Surfaces may be sounded with a hammer to locate drummy or hollow-sounding areas resulting from rebound pockets or lack of bond. Such hollow-sounding areas, voids, sags, and other defects shall be carefully cut out and replaced.

3. Quality Control Tests:

A. The Engineer will require, at no additional expense adjustment to the mix proportions, requalification of the of the shotcreting crew, or additional curing of the shotcrete if either of the following conditions occur:

a. The average seven-day strength of any two specimens for the shotcrete mix is less than 70 percent of the specified 29-day strength, (three days for High-Early Design or
b. The average 28-day strength of any two specimens for the shotcrete is a less than 100 percent of the specified 28-day strength.)

4. Test Cores:

A. Should test panels indicated that shotcrete not meeting the specified requirements has been produced, the Engineer will require test cores, taken from the areas represented by the test panels, to determine compliance of the in-place shotcrete with a specified requirement.

B. Test cores shall be 3 inches minimum diameters, obtained and tested in accordance to ASTM C42.

C. Three cores shall be taken for each determination of in-place strength. Shotcrete in the area represented by the core tests shall be considered structurally adequate in strength and no single core is less than 75 percent of the design strength. Locations represented by erratic core strengths shall be ordered to be retested at the direction of the Engineer.

D. Fill core holes with low-slump concrete or mortar of same mix design as the placed shotcrete.

PART 6 – TIEBACK ANCHORS

6.01 DESCRIPTION

1. This work includes furnishing, installing and testing tiebacks and accessories at locations shown on the Contract Drawings. Supply all labor, equipment and materials necessary to properly complete the installation of the tiebacks, so as to attain the specified load capacities identified on the Plans. Work includes the following:

   A. Providing adequate bond length and stressing length, as directed by the Engineer, to meet the requirements specified herein and shown on plans.

   B. Provide materials and equipment for installing tiebacks to carry the design load shown on the plans.
   C. Prestressing all tiebacks and testing tiebacks, as specified herein.

2. Definitions:

   A. Tieback. A high strength steel tendon/bar, fitted with an anchorage at the exposed end and a grouted anchor permitting force transfer to the ground on the other end.

   B. Anchorages. Portion of the tieback, including anchor head, anchor plate and protective cap, which is used to transfer load from the retaining wall to the tieback.

   C. Bonded Length. Portion of the tieback that transfers the tensile force from the tieback to the ground.

   D. Coupler. The means by which the prestressing force can be transmitted from one partial-length of the prestressing bar to another (mainly by bars).

   E. Permanent Tieback. A tieback used in support of the permanent retaining wall system and that is provided with double corrosion protection.

   F. Secondary Grout. Grout that is injected into the anchor hole to cover the stressing length of the tieback and providing corrosion protection for the high strength steel.

6.02 SUBMITTALS

1. Working Drawings and Data. At least 30 days prior to beginning work, the working drawings and data shall be submitted to the Engineer and shall include, but not limited to the following:

   A. Tieback schedule giving:

      a. Tieback number.
      b. Lock off load for each tieback.
      c. Type and size of tiebacks.

d. Bonded length.
e. Elevation of wall.

2. A drawing of the tieback system and corrosion protection including:

   A. Centralizers and their locations.

   B. Anchorage details.

   C. Tieback corrosion protection system for the anchorage, bonded length and stressing length.

3. Proposed sequence for tieback installation.

4. Stress bar or strand manufacturer's mill test reports for the tiebacks.

5. Application literature from cement grout suppliers giving details on setting times as a function of temperature, strength gain with time, and recommended storage, mixing and placement procedures.

6. Applicable manufacturer certification and/or literature for anchorage fittings and accessories.

7. Detailed description of the proposed procedures, including specific makes and models of the equipment to be used for drilling placing, grouting and prestressing tiebacks. Drilling procedures shall include proposed hole diameter and method for supporting hole during tieback installation

8. Detailed description of proposed procedures and applicable manufacturer's literature for the equipment to be used for testing tiebacks, including but not limited to the following:

   A. Diagrams showing arrangement of the testing equipment relative to the tieback and anchorage hardware.

   B. The method for locking-off the required transfer load.

   C. Calibration data for the system of jack and gauges.

   D. The proposed equipment set-ups for monitoring elongations during testing of the tiebacks.

9. During the grouting operations, the following data shall be recorded by the Contractor and submitted to the Engineer:

   A. Type of mixer and grout pump.

   B. Type of cement.

C. Water/Cement Ratio.

D. Type of additives and their concentrations in the mix.

E. Grout injected pressure.

F. Test samples strength.

G. Volume of grout placed.

10. The Contractor shall also submit a report to the Contracting Officer within 20 working days after completion of the tieback work. The reports shall contain as-built drawings showing the locations of the tiebacks, total tieback lengths, bonded lengths and resulting of all performance tests.

11. A Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each product, when applicable

6.03 QUALITY ASSURANCES

1. Qualifications. The Contractor shall submit records documenting a minimum of five years' experience in tieback installation of similar or greater scope as required for this project. The Contractor shall have supervisory personnel who participated in the construction of tieback anchor systems similar to the type proposed for a duration of at least three anchor systems similar to the type proposed for a duration of at least three years within the last 10 years. The Contractor's supervisory personnel shall be present at the project site during all tieback installation and testing activities. The Contracting Officer will review and comment on the personnel list submittal. If the submittal is acceptable, then the Contracting Officer will respond in writing on the acceptability of the submittal. If the submittal is not acceptable, then the submittal will be returned and the Contractor will address all of the comments made. The response shall include, if necessary, but shall not be limited to, the replacement of the listed personnel. Modification to the personnel list shall be at no additional cost to the owner. No additional time shall be available to the Contractor for providing the experience personnel.

2. Damage, such as abrasion, cuts, nicks welds, weld spatters or corrosion and pitting, will be a cause for rejection of the tieback element. Rejected elements shall be replaced at no additional cost to the owner in terms of either material replacement or resulting time delays.

3. Project Conditions:

A. The Contractor shall be fully responsible for the safety of workers and representatives of the Contracting Officer observing the installation and testing of the tiebacks.

B. The Contractor shall be responsible for providing tiebacks of the required load capacity, which adequately meet all tieback test acceptance criteria. Deficient tiebacks shall be replaced or additional tiebacks installed, as determined by the Engineer, at no additional cost to the owner. In addition, any cutting, reinforcement, coating repair, or other work required to install a replacement tieback shall be performed at no additional cost to the owner.

4. The work shall also conform to the recommendations and specifications of the Post-Tensioning Institute's (PTI) "Post-Tensioning Manual," and "Recommendations for Prestress Rock and Soil Anchors" and FHWA Geotechnical Engineering Circular No. 4 "Ground Anchors and Anchored System".

5. Certifications of compliance for materials

6. Affidavit of compliance with ACI 506.3R for nozzle operators

7. Test results

6.04 MATERIALS

1. Steel bars conforming to ASTM A-722, "Uncoated High-Strength Steel Bars for Prestressed Concrete".

2. Plastic Sheathing/Sleeves:

A. 1. Smooth and corrugated sheaths/sleeves shall be high-density polyethylene (HOPE) conforming to ASTM D 3350 and having a minimum strength of 7,000 psi. The corrugated sleeves shall also conform to the technical bulletin 7 "Corrugated Plastic Ducts for Internal Bonded Post-Tensioning," January 2000 Edition. The materials shall be free of water-soluble chlorides and other ingredients that might enhance corrosion, hydrogen embrittlement, or stress corrosion on the prestressing steel. The plastic shall be non-reactive with the grout and its ingredients.

B. The plastic sheath/sleeve shall be as and watertight, and resistant against chemical attack, and aging

3. Steel, except steel tendons/bars, shall conform to requirements of ASTM A36.

4. Cement. Portland cement for tieback grout shall be Type I, Type II, or Type III. Cement shall be kept under cover and in a dry condition. The lowest practical water cement ratio with acceptable workability shall be used for the grout mix.

5. Grout

A. Grouts shall attain a minimum compressive strength of 4,000 psi prior to stressing. Testing for compressive strength shall conform to ASTM C-109 Mortar and Sand.

B. Expansive admixtures may only be added to the grout used for secondary grouting, and filling trumpets and anchorage covers.

C. Water for mixing grout shall be potable, clean and free of injurious quantities of substances known to be harmful to Portland cement or prestressing steel

6. Centralizers and Spacer

A. Centralizers shall be placed at 10-foot intervals in the bonded length, with the bottom centralizer located 2 feet from the bottom of the bonded length, so that no less than 0.5 inches of grout cover is achieved along the tendon.

B. Bar spacers shall be used in the bonded length of tiebacks, and placed at ten foot intervals, with the bottom spacer located five feet from the bottom of the bonded length. Spacers shall be used to spate elements of multi-element tendons/bars.

C. Centralizers and spacer may be made of any material, except wood, that is not deleterious to the prestressing steel or plastic sheath.

D. Centralizers and spacers shall permit the free flow of grout to pass through in the tieback hole.

7. Miscellaneous Steel Hardware

A. Steel plates shall conform to ASTM A36.

B. All bolts, nuts and washers shall be galvanized and conform to the tendon/bar manufacturer's specifications.

C. All anchorage components shall develop at least 95 percent of the minimum guaranteed ultimate strength of the tieback tendon.

D. Prestressing steel couplers shall be capable of developing 100% of the ultimate strength of the prestressing steel.

E. All bearing plates and anchor plates shall be galvanized after fabrication

8. Equipment

A. Equipment for mixing grout shall be a high-speed colloidal mixer with shearing action. The grouting equipment shall be capable of continuous mixing and shall produce a grout free of lumps. The grout pump shall be equipped with a grout pressure gauge at the point of connection of the grout delivery line to the tieback hole capable of measuring at least 150 psi or twice the actual pressure used.

6.05 CONSTRUCTION REQUIREMENTS

1. Preparation

   A. Tendon/bars shall be fabricated in accordance with approved Working Drawings and shall be free of dirt, detrimental rust, or other deleterious substances. Tendons/bars shall be on wooden or concrete blocks while waiting and during installation.

   B. The bonded length shall be degreased prior to installation. NO solvent residue shall remain on the tendon/bar. Solvent shall not be allowed to contaminate the soil. The Contractor shall include its control method in its BMP submittal.

   C. No ordering of materials for the production tieback anchors will be permitted until successful performance of the pre-production tieback anchor testing is completed and accepted by the Engineer. The Engineer shall have a minimum of 15 working days to evaluate the Contractor's submitted test data and design calculations of the bonded and unbounded lengths for the production tieback anchors. The location of the pre-production performance tieback anchors are shown on the contract drawings.

2. Construction Control

   A. The tiebacks shall be properly inspected before the placement into the borehole. While inserting the tieback into the hole, it shall be protected from any damage, especially damage to the corrosion protection media.

   B. Tieback shall be inserted freely to the prescribed length into the hole. They shall not be driven into the hole or cut off for insertion.

   C. The stress length of the tieback shall not be shortened to less than the minimum length shown on the plans or specified herein.

   D. The centralizers shall ensure that the tendon/bar be positioned concentric in the hole.

   E. Grout pressure shall be measured at the point of injection. The grout gate mechanism shall be cleaned prior delivery to the site and periodically during the project to prevent clogging.

   F. Grout components shall be mechanically mixed for 5 to 10 minutes to ensure proper dispersion of the cement.

   G. The established water cement ratio shall be accurately controlled.

   H. Pumping and injection of the grout shall commence immediately after mixing.

I. Grouting shall continue until the returning grout escaping from the hole is free of any additional ingredients that were not part of the grout being injected.

3. Installation

A. The hole for permanent tiebacks shall be drilled at location indicated on plans.

B. The hole diameter shall be determined by the Contractor to produce the required load capacities and grout cover. Where the tieback anchor must pass through the existing rock wall, the existing rock wall shall be cored at the appropriate tieback location prior to drilling the tieback. The work shall be done without further deterioration of the wall. The cored hole through the existing rock wall shall be only sufficiently large enough to accommodate the drilling of the tieback hole at the correct alignment.

C. The Contractor shall be responsible for maintaining an obstruction-free and open hole for grouting the tieback. The Contractor shall be solely responsible for thoroughly investigating the site, reviewing the geotechnical report and determining the drilling method, grouting pressures, and tieback bonded length to satisfy the tieback testing acceptance criteria in accordance with the design loads. Use of drilling muds, such as bentonite slurry, to assist in drill cutting removal is not allowed. The grouting pressures and grouting method shall be based on consideration of existing ground conditions.

D. Immediate suspend or modify drilling operations if ground subsidence is observed, if the permanent tieback anchor is adversely affected, or if adjacent structures and/or archaeological features are damaged from the drilling operations. Immediately stabilize the adverse conditions at no additional cost to the owner.

4. The drilling method used shall result in the following:

A. Cause minimum disturbance to the surrounding ground and not resulting in any ground loss.

B. Not result in collapse of the hole during drilling.

C. Maintain the position and inclination of the drilled hole, allow the hole to reach the design depth, and produce the design diameter of the drilled hole.

5. Temporary casing shall be used if the hole tends to collapse during the drilling or placement of the tiebacks. The temporary casing shall be withdrawn as grout is place. Drilling of the tieback hole shall be monitored for the presence of soft zones or cavities in the ground mass penetrated over the length of the bond zone. The presence of such zones shall be noted on the daily record of work. Temporary casings, if used, may be left in place, but only within the unbounded section. The Contracting Officer will not pay for abandoned casings.

6. The Contractor shall immediately revise his operations to prevent reoccurrence of obstructed or otherwise unsatisfactory holes and modify tieback installation procedures as required.

7. Any damage to existing site conditions by such operations shall be cause for immediate halting of operations and repair to the satisfaction of the Contracting Officer. The Contractor shall immediately revise his operations to prevent reoccurrence of such damage.

8. Grout shall be injected at the lowest point of the tieback hole by using a tremie pipe. Grouting shall proceed such that the hole is filled without formation of air voids, grouting progressively from the bottom to top.

9. The grout in the stressing length zone shall be the same as that for the bonded length zone. Grouting of the stressing length shall be done by gravity-flow or low-pressure pumping. Grout shall terminate one foot before the anchor plate area prior to stressing and testing. Final grouting up to the anchor plate shall be completed upon completion of testing and stressing. The Contractor shall provide the fittings or components needed to the accomplish this.

10. The grouting equipment shall be capable of continuous mixing and shall produce a grout free of lumps. The grout pump shall be equipped with a grout pressure gauge at the point of connection of the grout delivery line to the tieback hole capable of measuring at the least 150 psi or twice the actual pressure used.

11. If the grout loss from the drilled holes exceeds five times the volume of the annular space between the drilled hole and tieback, then tieback installation shall be discontinued and the tendon/bar removed from the hole and cleaned. The Contractor shall fully pressure grout the drilled hole with cement grout at the pressure of at least 5 psi, redrill the hole 24 hours after the grout sets, and install tieback as described herein. DHHL will pay for this work as extra and force account.

12. Tieback Testing:

    A. At least 10% (minimum of 2) of the tiebacks shall be tested.

    B. Copies of all test results and graphs shall be transmitted to the Engineer as each test is completed. Final copies of all test results shall be included in the tieback work completed report.

C. Tiebacks shall be tensioned by direct pull with a hollow ram hydraulic jack or a model recommended by the anchor manufacturer, so mounted as to prevent bending of the tieback. Tensioning of a tieback shall not commence until the cement grout has set and has achieved its design strength.

D. Jacks shall have a ram travel at least equal to the theoretical elastic elongation of the stressing length plus the bonded length at the maximum test load. A pressure gauge shall be used with each jack. Gauges shall be calibrated with a single jack. All gauges shall be accurate enough to read 100 psi changes in pressure. For performance tests, the jack used shall have two (2) calibrated gauges: a master gauge and backup gauge. The pump shall be capable of applying each load increment in less than 60 seconds.

E. A load cell, which has been calibrated by a certified independent testing laboratory no more than 20 days prior to the start of the tieback testing, shall be used to measure the applied load and changes in load during the load-hole portion of the performance tests. There will be no substitute for the load cell during conduct of the performance tests. The Contractor shall provide the Engineer with the calibration curve for the load cell prior to testing.

F. For the performance tests, the master gauge and backup gauge shall be connected to the same pressure hose between the pump and jack and be used to measure the applied loads. If the load measured by the master gauge and backup gauge differ by more than ten (10) percent, the jack, master gauge and backup gauge shall be recalibrated as a unit at no additional expense to the Owner.

G. The weight of the jack and load cell shall be supported externally and not by the tendon/bar. The jack alignment shall always match the alignment of the tieback during stressing.

H. Use a micrometer dial gauge, with 0.001 -inch precision and minimum 2 inches of travel, aligned perpendicular to the loading head to measure elongation of the tendon/bar. The dial gauge shall be supported on an extension of the tendon/bar head.

I. All testing shall be performed in the presence of the Engineer. Notice shall be given to the Engineer not less than 24 hours prior to the start of a test.

J. Maintain each load increment or decrement for at least I minute, or until movement ceases.

K. Performance Test

a. Performance tests shall be conducted on these tiebacks selected by the Engineer.
b. The performance tests will include stressing and monitoring a tieback. During testing, tieback movement, measured at the anchor head, shall be monitored for each load increment to the nearest 0.0001 inches from an independent, fixed reference point. The loading sequence shall be as follows:

PERFORMANCE TEST LOADING SCHEDULE	
Cycle	P= 17.5kips for Kaululaau Street P= 15.0kips for Tantalus Drive (Design Load per geotechnical report) AL= Alignment Load = 0.05P
1	AL 0.25P AL
2	AL 0.25P 0.50P AL
3	AL 0.25P 0.50P 0.75P AL
4	AL 0.25P 0.50P 0.75P 1.00P AL
5	AL 0.25P 0.50P 0.75P 1.00P 1.25P AL
6	AL 0.25P 0.50P 0.75P 1.00P 1.25P 1.50P(Hold) AL
Final	Adjust to Transfer Load (Lockoff Load)

L. The lockoff load shall be 5 kips.

M. The maximum test load shall be held for 10 minutes. Total movements with respect to a fixed reference point shall be recorded at 1 minute, 2, 3, 4, 5, 6 and 10 minutes. If the total movement between 1-minute and 10-minutes readings exceed 0.040 inches, the test load shall be held for an additional 50 minutes. Total movements shall be recorded at 15 minutes, 20, 25, 30, 40, 50 and 60 minutes.

N. The Contractor shall plot the tendon/bar head movement versus load for each load increment. The Engineer will review these data from each performance test to determine whether the tieback is acceptable.

O. Where, in the opinion of the Engineer, significant differences are indicated from previous performance test, the Contractor shall perform additional performance tests on the adjacent tieback to be installed. DHHL will pay for the work as extra and force account work.

6.06 ACCEPTANCE CRITERIA

1. A tested tieback anchor will be acceptable if the following criteria are satisfied.

A. Displacement of the tendon head shall be greater than 0.8(PLs/AE), where,

P = Applied Load
Ls = length from jack pulling head to bottom of stressing length
A = total cross-sectional area of steel tendon
E = modulus of elasticity of steel tendon

B. Displacement of the tendon shall be less than P(Ls + Lb/2)/AE

Lb = bonded length of tendon

However, anchors with longer apparent free lengths will not be rejected if the cause of the behavior has been investigated and satisfactorily explained.

C. Creep per log cycle (d2-d1)/log (t2/t1) shall be less than 0.040 inches between the 1 and 10-minute readings and 0.080 inches between the 6 and 60-minute readings, where,

d1 = measured displacement at time t1
d2 = measured displacement at time t2
t1 = time of first displacement measurement
t2 = time of second displacement measurement

2. Tiebacks not meeting Criterion 1 shall not be incorporated into the structure. Those not meeting Criterion 2 or 3 may be accepted to work at loads less than design values. The acceptable load for these tiebacks will be determined by the Engineer.

6.07 TEST NAIL REJECTION

If a test nail does not satisfy the acceptance criteria, it will be rejected. The Contractor shall determine the cause for the failure.

1. Verification Test Nails

The Engineer will evaluate the results of each verification test. Installation methods which do not satisfy the nail testing requirements shall be rejected. The Contractor shall propose alternative methods and install replacement verification test nails. Replacement test nails shall be installed and tested at no additional cost.

2. Test Nails

The Engineer may require the Contractor to replace some or all the installed production nails between a failed test nail and the adjacent passing test nail. Alternatively, the Engineer may require the installation and testing of additional test nails to verify that adjacent previously installed production nails have sufficient load carrying capacity. Contractor modifications may include, but are not limited to; the installation of additional test nails; increasing the drill hole diameter to provide increased capacity; modifying the installation or grouting methods; reducing the production nail spacing from that shown on the Plans and installing more production nails at a reduced capacity; or installing longer production nails if sufficient right-of-way is available and the pullout capacity behind the failure surface controls the allowable nail design capacity. The nails may not be lengthened beyond the temporary construction easements or the permanent right-of-way on the Plans. Installation and testing of additional test nails or installation of additional or modified nails as a result of test nail failure(s) will be at no additional cost.

6.08 RECORD OF WORK

1. Documentation of all work done shall be recorded accurately and completely. This shall include drilling of the tiebacks hole, grouting, testing, and stressing of tiebacks, equipment used for testing and their calibration data, type of steel tendons/bars, materials and procedures used for corrosion protection of strands or tendon bars.

2. The Contractor shall provide the Engineer with as-built drawings showing as-built nail locations and as-built shotcrete facing line and grade within 5 days after completion of the shotcrete facing and as-built shotcrete permanent facing line and grade within 5 days after completion of the shotcrete permanent facing.

END OF SECTION