DIVISION OF STATE PARKS

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
DIVISION OF STATE PARKS
Honolulu, Hawaii

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BOARD OF LAND AND NATURAL RESOURCES

Suzanne D. Case
Chairperson

# CONTRACT SPECIFICATIONS AND PLANS

Job No. J45CF35A
AKAKA FALLS ROCKFALL MITIGATION
HONOMU, BIG ISLAND, HAWAII

Civil Engineer: AECOM Technical Services, Inc.

November 2021

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
Honolulu, Hawaii

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# CONTRACT SPECIFICATIONS AND PLANS

Job No. J45CF35A
AKAKA FALLS ROCKFALL MITIGATION
HONOMU, BIG ISLAND, HAWAII

Approved: _____
CURT A. COTTRELL
Administrator
Division of State Parks

Approved: _____
CARTY S. CHANG, P.E.
Chief Engineer
Engineering Division

November 2021

NOTICE TO BIDDERS
(Chapter 103D, HRS)

COMPETITIVE BIDS for Job No. J45CF35A, Akaka Falls Rockfall Mitigation, Honomu, Big Island, Hawaii shall be submitted to the Department of Land and Natural Resources, Engineering Division on the specified date and time through the Hawaii State e-Procurement (HIePRO). HIePRO is accessible through the State Procurement Office website at www.spo.hawaii.gov.

The Department of Land and Natural Resources Interim General Condition, dated October 1994, as amended, and the General Conditions –AG008, latest revision shall be made part of the specifications.

The project is located at Akaka Falls State Park, Big Island, Hawaii.

The work shall generally consist of site BMPs, vegetative clearing, scaling, and installing shotcrete, anchored wire mesh and wire mesh drapery systems.

Due to the nature of work contemplated, bidders must possess a valid State Contractor's license, classification C68RL.

All interested parties are invited to attend a State-conducted voluntary pre-bid conference call on 01/31/2022 at 11:30 AM. Interested attendees shall send an email request for invitation to philip.m.nigro@hawaii.gov at least twenty-four (24) hours in advance of the meeting day. The email shall have "Job No. J45CF35A – Pre-Bid Conference" in the subject line and shall contain the following information: Name(s) attending, Company Name, Phone Number, and Email Address. Agenda and call-in information for Pre-Bid Conference shall be sent as part of response to the requestor.

The estimated cost of construction is $2,000,000.

The award of the contract, if it be awarded, will be subject to the availability of funds.

This project is subject to preference to Hawaii Products established by Section 103D, Hawaii Revised Statutes. The Hawaii Product List may be examined at the State Procurement Office website.

Since the estimated cost of construction is $250,000 or more, the apprenticeship agreement preference pursuant to Hawaii Revised Statutes §103-55.6 (ACT 17, SLH 2009) shall apply.

Should there be any questions, please refer to the HIePRO solicitation.

# INFORMATION AND INSTRUCTIONS TO BIDDERS

CONTENTS

## INFORMATION AND INSTRUCTIONS TO BIDDERS

A. PROJECT LOCATION AND SCOPE OF WORK: The project location and scope of work shall be as generally described in the Notice to Bidders.

B. PROPOSALS**:** Bidders shall submit their bid, including the completed proposal form, bid bond, and any other documents required by the solicitation as part of their bid through the State of Hawaii e-Procurement System (HIePRO). See Item D, PROPOSAL FORM.

C. GENERAL CONDITIONS: The Department of Land and Natural Resources Interim General Conditions dated October 1994, as amended, shall be made a part of these contract specifications and are referred to hereafter as the General Conditions.

D. PROPOSAL FORM: **The Bidders shall fill out and upload the electronic copy of the proposal form to the HIePRO website when submitting the bid. Bid Proposals shall not be mailed, faxed or delivered to the State, unless requested to do so after the designated closing date. The successful Bidder shall fill out and print a hard copy of the proposal form, sign and submit the form with the contract award package.**

E. OMISSIONS OR ERASURES: Any proposal which contains any omission or erasure or alteration not properly initialed, or conditional bid, or other irregularity may be rejected by the Board of Land and Natural Resources (Board).

F. NOTICE OF INTENT TO BID AND QUESTIONNAIRE:
A Notice of Intent to Bid is not required for this project. In compliance with HRS Section 103D-310, the lowest responsive and responsible bidder may be required to complete a questionnaire. When requested by the State, the completed questionnaire shall be submitted to the Chief Engineer for evaluation. Failure to furnish the requested information within the time allowed may be grounds for a determination of non-responsibility, in accordance with HRS Section 103D-310 and HAR Section 3-122-108.

G. BID SECURITY: A bid security will be furnished by each bidder as provided in sub-section 2.7 of the General Conditions. The successful bidder's bid security will be retained until Contract execution and furnished a performance and payment bond in an amount equal to one hundred percent (100%) of the total Contract price, including an amount estimated to be required for extra work, is furnished.

The Board reserves the right to hold the bid securities of the four lowest bidders until the successful bidder has entered into a contract and has furnished the required performance bond. All bid securities will be returned in accordance with sub-section 3.5 of the General Conditions.

Should the successful bidder fail to enter into a contract and furnish a satisfactory performance bond within the time stated in the proposal, the bid security shall be forfeited as required by law.

H. CONTRACTOR'S LICENSE REQUIRED: The Board will reject all bids received from contractors who have not been licensed by the State Contractors License Board in accordance

with Chapter 444, HRS; Title 16, Chapter 77, Hawaii Administrative Rules; and statutes amendatory thereto.

I. IRREGULAR BIDS: No irregular bids or propositions for doing the work will be considered by the Board.

J. WITHDRAWAL OF BIDS: No bidder may withdraw his bid between the time of the opening thereof and the award of contract.

K. SUCCESSFUL BIDDER TO FILE PERFORMANCE AND PAYMENT BONDS: The successful bidder will be required to file performance and payment bonds each; in the amount equal to the total contract price, including amounts estimated to be required for extra work, as provided in sub-section 3.6 of the General Conditions.

L. NUMBER OF EXECUTED ORIGINAL COUNTERPARTS OF CONTRACT DOCUMENTS: If requested by the Board, six copies of the Contract, performance and payment bonds shall be executed.

M. CHANGE ORDERS: No work of any kind in connection with the work covered by the plans and specifications shall be considered as change order work, or entitle the Contractor to extra compensation, except when the work has been ordered in writing by the Chief Engineer (Engineer) and in accordance with sub-section 4.2 of the General Conditions.

The Contractor shall clearly identify and inform the Engineer in writing of any deviations from the contract documents at the time of submission and shall obtain the Engineer's written approval to the specified deviation prior to proceeding with any work.

N. WAGES AND HOURS: In accordance with sub-sections 7.3 to 7.9 of the General Conditions relative to hours of labor, minimum wages and overtime pay, the current minimum wage rates promulgated by the Department of Labor and Industrial Relations (DLIR) shall be paid to the various classes of laborers and mechanics engaged in the performance of this contract on the job site. The minimum wages shall be increased during the performance of the contract in an amount equal to the increase in the prevailing wages for those kinds of work as periodically determined by the DLIR.

The Department of Land and Natural Resources will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the said minimum wage rates. The possibility of wage increase is one of the elements to be considered by the Contractor in determining his bid, and will not, under any circumstances, be considered as the basis of a claim against the Department under this Contract.

No work shall be done on Saturdays, Sundays, legal State holidays, and/or in excess of eight (8) hours each day without the written consent of the Engineer. Should permission be granted to work at such times, the Contractor shall pay for all inspection administrative costs thereof. No work shall be done at night unless authorized by the Engineer.

O. PERMITS: The State will process permit applications whenever possible, and the Contractor shall procure the pre-processed permits and pay the required fees. If permit applications are not processed by the State, the Contractor shall process the permit applications, permits and

licenses, and pay all charges and fees. In all cases, the Contractor shall give all notices necessary and incident to the due and lawful prosecution of the work.

P. PROPERTY DAMAGE: It shall be the responsibility of the contractor to respect State property and to prevent damage to existing improvements. The Contractor will be responsible for damages resulting from construction operations. Immediately upon discovery, the Contractor shall repair such damage to the satisfaction of the Engineer.

All trees and shrubbery outside the excavation, embankment or construction limits shall be fully protected from injury.

Q. TIME: The time of completion is specified in the Proposal. It is the Board's intention to insist the Contractor diligently prosecute the work to completion within the specified time.

Prospective bidders are reminded that the State has the option to proceed with or abandon a project depending on whether the project can be completed for occupancy in the specified time.

It is the bidder's responsibility to check the availability of all materials before bidding. The bidder shall select sub-contractors and suppliers who can warrant availability and delivery of all specified or qualified materials to assure project completion within the specified time.

The successful bidder must assume all risks for completing the project by the specified date. There shall be no extension of time for any reason except for delays caused by acts of God, labor disputes involving unions, or actions of the State. If for any reason the project falls behind schedule, the Contractor shall at its own cost, take necessary remedial measures to get the project back on schedule, i.e., working overtime, air freighting all materials, etc. In addition, if the Contractor fails to fully complete the project by the completion date, Contractor will be required to make the facility usable at its own cost.

R. BIDDER'S RESPONSIBILITY TO PROVIDE PROPER SUPERINTENDENCE: The successful low bidder shall designate in writing to the Engineer the name of its authorized superintendent (Superintendent), who will be present at the job site whenever any work is in progress. The Superintendent shall be responsible for all work, receiving and implementing instructions from the Engineer in a timely manner. The cost for superintendence shall be considered incidental to the project.

If the Superintendent is not present at the site of work, the Engineer shall have the right to suspend the work as described under sub-section 5.5 c. and 7.20 - Suspension of Work of the General Conditions.

S. LIQUIDATED DAMAGES: Liquidated damages in the amount specified in the Proposal will be assessed for each and every calendar day from and after the expiration of the time period stated in the Contract for the completion of the project.

T. HIRING OF HAWAII RESIDENTS: The Contractor shall comply with Act 68, SLH 2010, in the performance and for the duration of this contract. The Contractor shall ensure that Hawaii residents compose not less than eighty percent of the workforce employed to perform the contract work on the project. The eighty percent requirement shall be determined by

dividing the total number of hours worked on the contract by Hawaii residents, by the total number of hours worked on the contract by all employees of the Contractor in the performance of the contract. The hours worked by any Subcontractor of the Contractor shall count towards the calculation for this section. The hours worked by employees with shortage trades, as determined by the Department of Labor and Industrial Relations (DLIR), shall not be included in the calculation for this section.

The requirements shall apply to any subcontract of $50,000 or more in connection with the Contractor, that is, such Subcontractors must also ensure that Hawaii residents compose not less than eighty percent of the Subcontractor's workforce used to perform the subcontract.

U. WATER AND ELECTRICITY: The Contractor shall make all necessary arrangements and pay all expenses for water and electricity used in the construction of this project.

V. PUBLIC CONVENIENCE AND SAFETY: The Contractor shall conduct construction operations with due regard to the convenience and safety of the public at all times. No materials or equipment shall be stored where it will interfere with the safe passage of public traffic. The Contractor shall provide, install, and maintain in satisfactory condition, all necessary signs, flares and other protective facilities and shall take all necessary precautions for the protection of the work and the convenience and safety of the public. The Engineer shall have the right to suspend the performance of the work in accordance with sub-section 7.20 - Suspension of Work of the General Conditions.

W. WORK TO BE DONE WITHOUT DIRECT PAYMENT: Whenever the contract that the Contractor is to perform work or furnish materials of any kind for which no price is fixed in the contract, it shall be understood that the Contractor shall perform such work or furnish said materials without extra charge or allowance or direct payment of any sort. The cost of performing such work or furnishing said material is to be included by the Contractor in a unit price for the appropriate item unless it is expressly specified that such work or material is to be paid for as extra work.

X. AS-BUILT DRAWINGS: 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. All authorizations given by the Engineer to deviate from the plans shall be drawn on the job site plans. All deviations from alignments, elevations and dimensions which are stipulated on the plans shall be recorded on the as-built drawings. Final as-built drawings shall be submitted to the Engineer for review and approval. After the Engineer approves the as-built drawings, the contractor shall submit an electronic copy in Adobe PDF format on CD ROM.

Y. ASBESTOS CONTAINING MATERIALS: The use of asbestos containing materials or equipment is prohibited. The Contractor shall insure that all materials and equipment incorporated in the project are asbestos-free

Z WORKER SAFETY: The Contractor shall provide, install and maintain in satisfactory condition all necessary protective facilities and shall take all necessary precautions for the protection and safety of its workers in accordance with the Occupational Safety and Health Standards for the State of Hawaii. The Engineer shall have the right to suspend the performance of the work in accordance with sub-section 7.20 - Suspension of Work of the

General Conditions.

AA. TOILET FACILITIES: All toilet facilities constructed at the project site shall be in accordance with the Public Health Regulations of the State Department of Health (DOH). All necessary precautions shall be observed at the project site. The use of sanitary facilities shall be strictly enforced and workers violating these provisions shall be promptly discharged.

BB. SIGNS: Whenever the project involves closing or obstructing any public thoroughfare, the Contractor shall provide traffic signs conforming to the applicable provisions of the current edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways", published by the Federal Highway Administration as directed by the Engineer for the purpose of diverting or warning traffic prior to the construction area. All traffic signs shall bear proper wording stating thereon the necessary information as to diverting or warning traffic.

When indicated in the Proposal, the Contractor shall provide a project sign, size 4'-0" x 7'-0" to be placed as directed by the Engineer. The sign shall be constructed in accordance with Section 01581 - Project Sign of these specifications and approved by the Engineer. All wording, type and size of lettering and color selection shall be as specified in these specifications or as approved by the Engineer.

All signs shall be kept neat and clean, and properly erected at all times.

CC. FIELD OFFICE AREA FOR DEPARTMENT: When indicated in the Proposal, the Contractor shall provide a housed working area of at least 100 square feet adjacent to the Contractor's office for the Department's use. This area will be used by the Engineer to perform tests and to store equipment. As a minimum, the field office shall include the following: standard sized office desk and chair, lighting, ventilation, window-type air conditioning rated at 5,000 BTU, door and window with locking hardware, electrical outlets, and working communications facilities (a cellular telephone is acceptable). The Department will pay for all long distance toll charges made by the Engineer.

DD. QUANTITIES: All bids will be compared on the basis of quantities of work to be done as shown in the Proposal; the quantities shown in the Unit Price items are estimated, being given as a basis for comparison of bids. The Board reserves the right to increase or decrease the quantities given under the items or delete items entirely as may be required during the progress of the work.

EE. OTHER HEALTH MEASURES: Forms of work site exposure or conditions which may be detrimental to the health or welfare of workers or of the general public shall be eliminated or reduced to safe levels as required by the DOH codes, standards, and regulations. Suitable first aid kits and a person qualified to render first aid, as specified in the DOH regulations, shall be provided at all times when work is scheduled.

FF. HAWAII BUSINESS OR COMPLIANT NON-HAWAII BUSINESS REQUIREMENT: Bidders (Contractors) shall be incorporated or organized under the laws of the State or be registered to do business in the State as a separate branch or division that is capable of fully performing under the contract, as stipulated in §3-122-112 HAR.

GG. COMPLIANCE WITH §3-122-112 HAR:

As a condition for award of the contract and as proof of compliance with the requirements of 103D-310(c) HRS, the apparent low bidder shall furnish the required documents to the Department. If the valid required certificates are not submitted on a timely basis for award of a contract, a bidder otherwise responsive and responsible may not receive the award. Bidder is responsible to apply for and submit the following documents to the Department.

A. TAX CLEARANCE REQUIREMENTS (HRS Chapter 237): Bidder shall obtain a tax clearance certificate from the Hawaii State Department of Taxation (DOTAX) and the Internal Revenue Service (IRS). The certificate is valid for six months from the most recently approved stamp date on the certificate; the certificate must be valid on the date received by the Department.

B. Department of Labor (DLIR) "**Certificate of Compliance**". (HRS Chapter 383 - Unemployment Insurance, Chapter 386 - Workers' Compensation, Chapter 392 - Temporary Disability Insurance, and 393 – Prepaid Health Care): Bidder shall obtain a certificate of compliance from the Hawaii State Department of Labor and Industrial relations (DLIR). The certificate is valid for six months from the date of issue; certificates must be valid on the date received by the Department.

C. Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG) "**Certificate of Good Standing**". Bidder shall obtain a certificate of good standing issued by the Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG). The certificate of good standing is valid for six months from the date of issue; certificates must be valid on the date received by the Department.

Alternately, instead of separately applying for these certificates at the various state agencies, bidder may choose to use the Hawaii Compliance Express (HCE), which allows businesses to register online through a simple wizard interface at http://vendors.ehawaii.gov to acquire a "Certificate of Vendor Compliance" indicating the bidder's status is compliant with the requirements of §103D-310(c), HRS, and shall be accepted for contracting and final payment purposes. Bidders that elect to use the new HCE services will be required to pay an annual fee of $15.00 to the Hawaii Information Consortium, LLC (HIC). Bidders choosing not to participate in the HCE program will be required to provide the paper certificates as instructed in the previous paragraphs.

# P R O P O S A L

FOR

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
State of Hawaii

JOB NO. J45CF35A
AKAKA FALLS ROCKFALL MITIGATION
HONOMU, BIG ISLAND, HAWAII

_____, 2022

Chief Engineer
Engineering Division
Department of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

Dear Sir:

The undersigned, having carefully examined the local conditions and all available records and information covering conditions which may affect the cost of the work to be performed, and having carefully examined the Plans and Specifications, and other contract documents, hereby proposes to furnish and pay for all materials, tools, equipment, labor and other incidental work necessary to perform the work of site BMPs, clearing vegetation, rock slope scaling, and installing shotcrete, anchored wire mesh and wire mesh drapery systems, as required or called for in this Proposal, all according to the true intent and meaning of the Notice to Bidders, Information and Instructions to Bidders, Proposal, Detailed Specifications, Interim General Conditions, Plans, and any and all addenda for:

JOB NO. J45CF35A
AKAKA FALLS ROCKFALL MITIGATION
HONOMU, BIG ISLAND, HAWAII

on file in the office of the Engineering Division for the TOTAL BASE BID (Items 1 to 14) of:

_____

_____Dollars ($_____)
and will fully complete all work under this contract within 200 consecutive calendar days from the date of written notice to proceed, including date of said order, said total sum being itemized on the following pages.

**PROPOSAL**

| Item No. | Quantity | Unit | Description | Unit Price | Total |
|---|---|---|---|---|---|
| | | **BASE BID** | | | |
| 1. | 1 | LS | Clearing, including all labor and disposal of debris. | LS | $_____ |
| 2. | 1 | LS | Rock Slope Scaling, including all labor, materials, and disposal of material. | LS | $_____ |
| 3. | 15 | CY | Rock Removal, including all labor, materials, and disposal of material. | $_____ | $_____ |
| 4. | 25 | EA | Grouted Anchors for Shotcrete, including all labor, material, equipment, anchor testing, installed complete. | $_____ | $_____ |
| 5. | 25 | CY | Shotcrete, including FRP dowels, geocomposite drains, reinforcing steel, both structural and sculpted shotcrete material, and testing, installed complete. | $_____ | $_____ |
| 6. | 1 | LS | Sculpted Shotcrete Finish, including all labor, material, equipment, in place complete. | LS | $_____ |
| 7. | 11,550 | SF | Erosion Mat, including all labor, material, installed compete. | $_____ | $_____ |
| 8. | 11,550 | SF | Wire Mesh (for both drapery and anchored systems), including all labor, material, equipment, installed complete. | $_____ | $_____ |
| 9. | 28 | EA | Draped Mesh Cable Anchors, including all labor, material, equipment, anchor testing, installed complete. | $_____ | $_____ |
| 10. | 3,080 | LF | Soil Anchors and Boundary Rope Anchors, including all labor, material, equipment, anchor testing, installed complete. | $_____ | $_____ |
| 11. | 20 | EA | Supplemental (Short) Anchors, including all labor material, equipment, installed complete. | $_____ | $_____ |
| 12. | 1 | LS | Best Management Practices (BMP's), including all labor, material, installed compete. | LS | $_____ |
| 13. | 1 | LS | Project Sign, in place complete. | LS | $_____ |
| | | | | **Subtotal Base Bid (Items 1-13)** | $_____ |
| 14. | 1 | LS | Mobilization and Demobilization (not to exceed 6% of the Subtotal Base Bid) | LS | $_____ |
| | | | | **Total Base Bid (Items 1-14)** | $_____ |

_____

Name of Company, Joint Venture or Partnership

HAWAII PRODUCTS PREFERENCE AND/OR USE OF HAWAII PRODUCTS

In accordance with Act 175, SLH 2009, the Hawaii products preference is applicable to this solicitation. Bidders offering a Hawaii product ("HP") shall identify the HP in the table below.

Persons desiring to qualify their product(s) not currently on the Hawaii Product List, shall complete Form SPO-38, *Certification for Hawaii Product Preference*, and submit the completed form no later than the deadline specified in the procurement notice and solicitation. The responsibility for certification and qualification shall rest upon the person requesting the preference. One form shall be completed and submitted for each product. Form SPO-38 is available at http://hawaii.gov/spo/

For the purpose of selecting the low bid when a solicitation contains both HP and non-HP, the price offered for a HP item shall be decreased by subtracting 10% for the class I or 15% for the class II HP item(s) offered. The lowest total offer, taking the preference into consideration, shall be awarded the contract, unless the offer provides for additional award criteria. The contract amount of any contract awarded, however, shall be the amount of the price offered, exclusive of the preferences.

In the event of any change that materially alters the bidder's ability to supply the Hawaii product(s), the bidder shall immediately notify the procurement officer in writing and the parties shall enter into discussions for the purpose of revising the contract or terminating the contract for convenience.

| Item No. | Pre-Approved Hawaii Product Description & Manufacturer | Class (I or II) | Quantity | Unit Measure | Unit Price | Total Price |
|---|---|---|---|---|---|---|
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |

RECYCLED PRODUCTS PREFERENCE

This project allows a 10% price preference for recycled products in accordance with HRS 103D-1005. Please indicate your selection of recycled or non-recycled product by indicating its cost FOB jobsite unloaded in the schedule below, including applicable General Excise & Use Taxes.

| DESCRIPTION | RECYCLED PRODUCT COST | NONRECYCLED PRODUCT COST |
|---|---|---|
| _____ | $_____ | $_____ |
| _____ | $_____ | $_____ |
| _____ | $_____ | $_____ |
| _____ | $_____ | $_____ |

The bidder requesting a recycled product preference shall also complete and submit the form "CERTIFICATION OF RECYCLED CONTENT" as shown in the Interim General Conditions and provide all supporting information with this proposal. Additional information may be requested to qualify a product.

The following definitions are applicable to the CERTIFICATION OF RECYCLED CONTENT form:

"Post-consumer recovered material" means any product used by a consumer, including a business that purchases the material, that has served its intended end use, and that has been separated or diverted from the solid waste stream for the purpose of use, reuse, or recycling.

"Product" includes materials, manufactures, supplies, merchandise, goods, wares, and foodstuffs.

"Recovered material" means waste material and by-products that have been separated, diverted, or removed from the solid waste stream after a manufacturing process for the purpose of use, reuse, or recycling. Recovered material does not include those materials and by-products that are generated and normally reused on-site or within original manufacturing processes (such as mill broke, in the case of paper products).

"Recycled content" means the percentage of a product composed of recovered material, or post-consumer recovered material, or both.

"Recycled product" means a product containing recovered material, or post-consumer recovered material, or both.

The bidder agrees that preference for recycled products shall be taken into consideration to determine the low bidder in accordance with said Section and the rules promulgated, however, the award of contract will be in the amount of the bid offered exclusive any preference.

APPRENTICESHIP AGREEMENT PREFERENCE

1. If applicable to this project, any bidder seeking the preference must be a party to an apprenticeship agreement registered with the State Department of Labor and Industrial Relations (DLIR) at the time the bid is submitted for each apprenticeable trade the bidder will employ to construct the project. "Employ" means the employment of a person in an employer-employee relationship.

    a. The apprenticeship agreement shall be registered with the DLIR and conform to the requirements of Hawaii Revised Statutes Chapter 372.

    b. Subcontractors do not have to be a party to an apprenticeship agreement for the bidder to obtain preference.

    c. The bidder is not required to have apprentices in its employ at the time the bid is submitted to qualify for the preference.

2. A bidder seeking the preference must state the apprenticeable trade the bidder will employ for each trade to be employed to perform the work by submitting a completed signed original *Certification Form 1* verifying participation in an apprenticeship program registered with DLIR. "Apprenticeable trade" shall have the same meaning as "apprenticeable occupation" pursuant to Hawaii Administrative Rules (HAR) §12-30-5.

    a. The *Certification Form 1* shall be authorized by an apprenticeship sponsor listed on the DLIR list of registered apprenticeship programs. "Sponsor" means an operator of an apprenticeship program and in whose name the program is approved and registered with the DLIR pursuant to HAR §12-30-1.

    b. The authorization shall be an original signature by an authorized official of the apprenticeship sponsor.

    c. The completed signed original *Certification Form 1* for each trade must be submitted with the bid. Previous certifications shall not apply.

    d. When filling out the *Certification Form 1*, the name of Apprenticeable Trade and Apprenticeship Sponsor must be the same as recorded in the List of Construction Trades in Registered Apprenticeship Programs that is posted on the DLIR website. "Registered apprenticeship program" means a construction trade program approved by the DLIR pursuant to HAR §12-301 and §12-30-4.

    e. The *Certificate Form 1* and the List of Construction Trades in Registered Apprenticeship Programs is available on the DLIR website at: http://hawaii.gov/labor/wdd.

3. Upon receiving the *Certification Form 1*, the Procurement Officer will verify that the apprenticeship program is on the List of Construction Trades in Registered Apprenticeship Programs and that the form is signed by an authorized official of the Apprenticeship Program Sponsor. If the programs and signature are not confirmed by the DLIR, the bidder will not qualify for the preference.

4. If the bidder is certified to participate in an apprenticeship program for each trade which will be employed by the bidder for the project, a preference will be applied to decrease the bidder's bid

amount by five percent (5%) for evaluation purposes.

5. Should the bidder qualify for other preferences (e.g. Hawaii Products), all applicable preferences shall be applied to the bid price.

CONTRIBUTIONS BY STATE AND COUNTY CONTRACTORS PROHIBITED

Contractors are hereby notified of the applicability of Section 11-355, HRS, which states that campaign contributions are prohibited from specified State or county government contractors during the term of the contract if the contractors are paid with funds appropriated by a legislative body.

CONDITION OF AWARD

It is understood that the award of the contract will be made on the basis of the lowest responsible Total Base Bid (Items 1 to 13) selected by the Board of Land and Natural Resources. Write the total of bid items 1 to 13 on page P-1.

It is understood and agreed that the Board of Land and Natural Resources reserves the right to reject any and/or all bids and waive any defects when, in the Board's opinion, such rejection or waiver will be for the best interest of the State of Hawaii.

In the event all bids exceed available funds certified by the appropriate fiscal officer, the head of the purchasing agency responsible for the procurement in question is authorized in situations where time or economic considerations preclude resolicitation of work of a reduced scope to negotiate an adjustment of the bid price, including changes in the bid requirements, with the low responsible and responsive bidder, in order to bring the bid within the amount of available funds. It is understood and agreed upon that the head of the purchasing agency may delete a portion or all of any item(s) in the proposal at the stated unit or lump sum price as necessary to stay within the available funding. The bidder is responsible to make an earnest effort to represent the actual cost of each item, including all materials, labor, equipment, overhead and profit in their bid proposal to preclude claims of anticipated profit or loss of profit because of an unbalanced bid proposal.

It is also understood that if a mutually agreeable cost for the reduced scope of work necessitated by a lack of available funds cannot be agreed upon between the bidder and the head of the purchasing agency within 14 calendar days after the bid opening, then the bid may be rejected in the best interest of the purchasing agency, and the head of the purchasing agency may negotiate in progressive order (lowest to highest) with the next lowest responsible and responsive bidder.

It is also understood and agreed that the award of the contract shall be conditioned upon funds being made available for this project and further upon the right of the Board of Land and Natural Resources to hold all bids received for a period of ninety (90) days from the date of the opening thereof, unless otherwise required by law, during which time no bid may be withdrawn.

It is also understood that Notice to Proceed may be delayed up to one (1) year after the bid opening date, and that no additional compensation will be provided for any claim for escalation or delay for issuance of Notice to Proceed on or before that date.

It is also understood and agreed that the quantities given herewith are approximate only and are subject to increase or decrease, and that the undersigned will perform all quantities of work as either increased or decreased, in accordance with the provisions of the Contract Specifications.

It is also understood and agreed that the estimated quantities shown for the items for which a UNIT PRICE is asked in this Proposal are only for the purpose of comparing on a uniform basis, bids offered for the work under this contract, and the undersigned agrees that he is satisfied with and will at no time, dispute said estimated quantities as a means of claims for anticipated profit or loss of profit, because of a difference between the quantities of the various classes of work done or the materials and equipment installed, and the said estimated quantities. On UNIT PRICE bids, payment will be made only for the actual number of units incorporated into the finished project at the contract UNIT PRICE.

After the HIePRO bid due date and time, the figures will be extended and/or totaled in accordance with the bid prices of the acceptable proposals and the totals will be compared. In the comparison of bids, words written in the proposal shall govern over figures and unit prices will govern over totals. Until the award of the contract, however, the right will be reserved to reject any and all proposals and to

waive any defects or technicalities as may be deemed best for the interest of the State.

It is also understood and agreed that liquidated damages in the amount FIVE HUNDRED AND NO/100 DOLLARS ($500.00) for each and every calendar day in excess thereof prior to completion of the contract shall be withheld from payments due to the Contractor.

It is also understood and agreed that if this bid is accepted, the successful bidder must enter into and execute a contract with the Board of Land and Natural Resources and furnish a Performance and Payment Bond, as required by law. These bonds shall conform to provisions of Section 103D-324 and 325, Hawaii Revised Statutes and any law applicable hereto.

It is also understood and agreed that the successful bidder will provide all necessary labor, materials, tools, equipment, and other incidentals necessary to do all the work and furnish all the materials specified in the contract in the manner and time herein prescribed, and according to the requirements of the Engineer as therein set forth.

It is understood that by submitting this proposal, the undersigned is declaring that his firm has not been assisted or represented on this matter by an individual who has, in a State capacity, been involved in the subject matter of this contract in the past two years.

It is understood that by submitting this proposal in accordance with HAR 3-122-192, the undersigned is declaring that the price submitted is independently arrived without collusion.

It is also understood that by submitting this proposal, a Certification for Safety and Health Programs for bids in excess of $100,000 (in accordance with HRS 396-18), the undersigned certifies that his organization will have a written safety and health plan for this project that will be available and implemented by the Notice to Proceed date of this project. Details of the requirements of this plan may be obtained from the Department of Labor and Industrial Relations, Occupational, Safety and Health Division (HIOSH).

It is further understood and agreed that the successful bidder shall comply with paragraph 3.1.a "SUBCONTRACTING" of the General Provisions which requires that the contractor shall perform with his own organization and with the assistance of workmen under his immediate superintendence, work of a value not less than twenty percent (20%) of the value of all work embraced in the Contract, except that certain contract items of work, if specifically referred to in the special provisions, will be exempted from said twenty percent requirement.

Compliance with §103-310 HRS. As a condition of award all bidders shall comply with all laws governing entities doing business in the State, including Chapter 237 HRS (general excise tax); Chapter 383 HRS (employment security – unemployment insurance); Chapter 386 HRS (workers compensation); Chapter 392 HRS (temporary disability insurance); and Chapter 393 HRS (pre-paid health care), and shall produce all documents to the State (DLNR, Engineering Division) required to demonstrate compliance with these subsections. Any bidder making a false affirmation or certification under this subsection shall be suspended and may be debarred from further offerings or awards pursuant to §103D-702 HRS.

## RECEIPT OF ADDENDA

The bidder also acknowledges receipt of any and all addenda issued by the Engineering Division, by recording the date of receipt of the respective addenda in the space provided below:

| Addendum | Date Received | Addendum | Date Received |
|---|---|---|---|
| No. 1 | _____ | No. 5 | _____ |
| No. 2 | _____ | No. 6 | _____ |
| No. 3 | _____ | No. 7 | _____ |
| No. 4 | _____ | No. 8 | _____ |

It is understood that failure to receive any such addendum shall not relieve the Contractor from any obligation under this Proposal as submitted.

It is also understood and agreed that if this Proposal is accepted and the undersigned should fail or neglect to contract as aforesaid, the Board may determine that the bidder has abandoned the Contract, and thereupon, forfeiture of the security accompanying his proposal shall operate and the same shall become the property of the Board.

## JOINT CONTRACTORS OR SUBCONTRACTORS TO BE ENGAGED ON THIS PROJECT

The Bidder agrees that the following is a complete listing of all joint contractors or subcontractors covered under Chapter 444, Hawaii Revised Statutes (HRS), who will be engaged by the Bidder on this project to perform the required work indicated pursuant to Section 103D-302, HRS. It is the sole responsibility of the contractor to review the requirements of this Project and determine the appropriate licenses that are required to complete the Project. The Bidder certifies that the completed listing of joint contractors or subcontractors fulfills the requirements for the project and the Bidder, together with the listed subcontractors or joint contractors have all the specialty contractor's licenses to complete the work, except as provided for in HRS §103D-302(b). Failure of the Bidder to comply with this requirement may be just cause for rejection of the bid.

"A" General Engineering Contractors and "B" General Building Contractors are reminded that due to the Hawaii Supreme Court's January 28, 2002 decision in Okada Trucking Co., Ltd. v. Board of Water Supply, et al., 97 Haw. 450 (2002), they are prohibited from undertaking any work, solely or as part of a larger project, which would require the general contractor to act as a specialty contractor in any area in which the general contractor has no license. Although the "A" and "B" contractor may still bid on and act as the "prime" contractor on an "A" or "B" project (See, *HRS §*444-7 *for the definitions of an "A" and "B" project.*), respectively, the "A" and "B" contractor may only perform work in the areas in which they have the appropriate contractor's license (*An "A" or "B" contractor obtains "C" specialty contractor's licenses either on its own, or automatically under HAR § 16-77-32*). The remaining work must be performed by appropriately licensed entities.

General Engineering "A" Contractors automatically have these "C" specialty contractor's licenses: C-3, C-9, C-10, C-17, C-24, C-31a, C-32, C-35, C-37a, C-37b, C-38, C-43, C-49, C-56, C-57a, C-57b and C-61.

General Building "B" Contractors automatically have these "C" specialty contractor's licenses: C-5, C-6, C-10, C-12, C-24, C-25, C-31a, C-32a, C-42a and C-42b.

In completing the Joint Contractors or Subcontractors List, describe the specialty contractor's nature and scope of work to be performed for this project and provide the complete firm name of the joint contractor or subcontractor in the respective columns. If the Bidder is a general contractor and providing the work of the required specialty contractor, fill in the Bidder's (general contractor's) name and nature and scope of work to be performed on this project.

List only one joint contractor or subcontractor per required specialty contractor's classification, unless within the same specialty, the work of each joint contractor or subcontractor can be described so that there is no overlap in work descriptions.

If a contractor's license is required by law for the performance of the work which is called for in this bid, the bidder and all subcontractors must have the required license before the submission of the bidder's proposal in the case of a non-federal aid project, and for federal-aid projects, the bidder must have the required license prior to the award of the project and all subcontractors prior to the start of the subcontracted work.

| COMPLETE FIRM NAME OF JOINT CONTRACTOR OR SUBCONTRACTOR | NATURE AND SCOPE OF WORK TO BE PERFORMED |
|---|---|
| | |
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Enclosed herewith is a:

| | | | |
|---|---|---|---|
| 1. | Surety Bond (*1) | ) | |
| 2. | Legal Tender (*2) | ) | |
| 3. | Cashier's Check (*3) | ) | |
| 4. | Certificate of Deposit (*3) | ) | in the |
| 5. | Certified Check (*3) | ) | amount |
| 6. | Official Check (*3) | ) | of |
| 7. | Share Certificate (*3) | ) | |
| 8. | Teller's Check (*3) | ) | |
| 9. | Treasurer's Check (*3) | ) | |

(Cross Out Those Not Applicable)

_____

_____Dollars ($_____)

as required by law.

Respectfully submitted,

_____
Name of Company, Joint Venture
or Partnership

_____
Contractor's License No.

By _____
Signature (*4)

Title _____
Print Name _____
Date _____
Address _____
_____
Telephone No. _____
E-Mail Address _____

NOTES:

1. Surety bond underwritten by a company licensed to issue bonds in this State;

2. Legal tender; or

3. A certificate of deposit; share certificate; or cashier's, treasurer's, teller's, or official check drawn by, or a certified check accepted by, and payable on demand to the State by a bank, a savings institution, or credit union insured by the Federal Deposit Insurance Corporation or the National Credit Union Administration.

   A. These instruments may be utilized only to a maximum of $100,000.

   B. If the required security or bond amount totals over $100,000, more than one instrument not exceeding $100,000 each and issued by different financial institutions shall be accepted.

4. Please attach to this page evidence of the authority of this officer to submit bids on behalf of the Company and also the names and residence addresses of all officers of the Company.

5. Fill in all blank spaces with information asked for or bid may be invalidated. PROPOSAL MUST BE INTACT, MISSING PAGES MAY INVALIDATE YOUR BID.

**End of Proposal**

# SPECIAL PROVISIONS

Amend INTERIM GENERAL CONDITIONS, dated October 1994, as follows:

## Section 2 – Proposal Requirements and Conditions

1. **AMEND** Section 2.1 Qualification of Bidder with the following:

Written Notice of Intent to Bid or Offer: A written Notice of Intent to Bid is not required for the Solicitation.

Standard Qualification Questionnaire: Bidders may be required to complete a standard qualifications questionnaire. When requested, the information shall be furnished within two working days or longer at the discretion of the Engineer. Failure to furnish the requested information within the time allowed may be grounds for a determination of non-responsibility, in accordance with HRS Section 103D-310 and HAR Section 3-122-108.

Hawaii Business or Compliant Non-Hawaii Business Requirement: Bidders shall be incorporated or organized under the laws of the State or be registered to do business in the State as a separate branch or division that is capable of fully performing under the contract, as stipulated in §3-122-112 HAR. A certified letter is not required prior to bid opening.

Compliance with §3-122-112 HAR: As a condition for award of the contract and as proof of compliance with the requirements of 103D-310(c) HRS, the apparent low bidder shall furnish the required documents to the Department. If the valid required certificates are not submitted on a timely basis for award of a contract, a bidder otherwise responsive and responsible may not receive the award. Bidder is responsible to apply for and submit the following documents to the Department.

A. Tax Clearance (HRS Chapter 237): Bidder shall obtain a tax clearance certificate from the Hawaii State Department of Taxation (DOTAX) and the Internal Revenue Service (IRS). The certificate is valid for six months from the most recently approved stamp date on the certificate; the certificate must be valid on the date received by the Department.

B. Department of Labor (DLIR) "Certificate of Compliance". (HRS Chapter 383 - Unemployment Insurance, Chapter 386 - Workers' Compensation, Chapter 392 - Temporary Disability Insurance, and 393 – Prepaid Health Care): Bidder shall obtain a certificate of compliance from the Hawaii State Department of Labor and Industrial relations (DLIR). The certificate is valid for six months from the date of issue; certificates must be valid on the date received by the Department.

C. Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG) "Certificate of Good Standing". Bidder shall obtain a certificate of good standing issued by the Department of Commerce and Consumer Affairs (DCCA), Business Registration Division (BREG). The certificate of good standing is valid for six months from the date of issue; certificates must be valid on the date received by the Department.

**Hawaii Compliance Express.** Alternately, instead of separately applying for these certificates at the various state agencies, bidder may choose to use the Hawaii Compliance Express (HCE), which allows businesses to register online through a simple wizard interface at http://vendors.ehawaii.gov to acquire a "Certificate of Vendor compliance" indicating that bidder's status is compliant with requirements of §103D-310(c), HRS, shall be accepted for contracting and final payment purposes.
Bidders that elect to use the new HCE services will be required to pay an annual fee of $15.00 to the Hawaii

Information Consortium, LLC (HIC). Bidders choosing not to participate in the HCE program will be required to provide the paper certificates as instructed in the previous paragraphs.

2. **ADD** Section 2.4a, Pre-Bid Conferences

Required Pre-bid Conferences: For construction and design-build projects with an estimated value of $500,000 or more and solicited under the competitive sealed bid method (103D-302 HRS); and for construction and design-build projects with an estimated value of $100,000 or more and solicited under the competitive sealed proposal method (103D-303 HRS); a pre-bid conference is required.

Other Pre-Bid Conferences: The Department may require a pre-bid conference for construction or design-build projects that are below the dollar threshold listed in above or when projects have special or unusual requirements.

Other Conditions: The Department may require the prospective Bidders to make a physical inspection of the project site and make attendance at the pre-bid conference a condition for submitting an offer.

Nothing stated at the pre-bid conference shall change the solicitation unless a change is made by written addendum.

3. **DELETE** Section 2.5, Addenda and Interpretations, in its entirety and replace with the following:

"Discrepancies, omissions, or doubts as to the meaning of drawings and specifications should be communicated using the question and answer section on the HIePRO solicitation for interpretation and must be received in the time frame set in the HIePRO solicitation. Any interpretation, if made and any supplemental instructions will be in the form of written addenda to the plans and specifications and made available prior to the offer due date. It shall be the prospective bidder's sole responsibility to verify and obtain any said addenda. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents."

## Section 3 – Award and Execution of Contract

1. **AMEND** Section 3.3, Award of Contract, by deleting "sixty (60)" and replacing with "ninety (90)" in the first paragraph.

2. **AMEND** Section 3.3, Award of Contract, by adding the following after the first paragraph:

"If the contract is not awarded within the ninety (90) days, the Department may request the successful Bidder to extend the time for the acceptance of its bid. The Bidder may reject such a request without penalty; and in such case, the Department may at its sole discretion make a similar offer to the next lowest responsive and responsible bidder and so on until a bid is duly accepted or until the Department elects to stop making such requests."

3. **AMEND** Section 3.9, Notice to Proceed, by deleting "180 days" and replacing with "one (1) year" in the last paragraph.

4. **ADD** Section 3.10, Protests:

"**3.10 PROTESTS**—Pursuant to Section 103D-701, Hawaii Revised Statutes, an actual or prospective

offeror who is aggrieved in connection with the solicitation or award may submit a protest. Any protest shall be submitting in writing to the Chairperson, Department of Land and Natural Resources, 1151 Punchbowl Street, Honolulu, Hawaii 96813, or designee as specified in the solicitation.

A protest shall be submitted in writing within five (5) working days after the aggrieved person knows or should have known the facts giving rise thereto; provided that a protest based upon the content of the solicitation shall be submitted in writing prior to the date set for receipt of offers. Further provided that a protest of an award or proposed award shall be submitted within five (5) working days after the posting of the award of the contract.

The notice of award, if any, resulting from this solicitation shall be posted on the HIePRO website.

**Section 5 – Control of Work**

**AMEND** Section 5.8 Value Engineering Incentive by deleting "$100,000" and replacing with "$250,000" in the first paragraph.

**Section 6 – Substitution of Materials and Equipment**

**ADD** the following to Section 6.3 Sub-paragraph b:

4. If the substitution meets all the requirements of the specifications and plans.

**Section 7 – Prosecution and Progress**

1. **DELETE** Section 7.2d in its entirety and replace with the following:

**"d. Proof of Insurance Coverage**

A Certificate of Insurance or other documentary evidence, to the satisfaction of the Engineer, that the Contractor has in place all insurance coverage required by the contract. The Certificate of Insurance shall contain wording which identifies the Project number and Project title for which the certificate of insurance is issued. Refer to the following for insurance requirements:

**1. Insurance Requirements**

**(a) Obligation of Contractor** - Contractor shall not commence any work until it obtains, at its own expense, all required herein insurance. Such insurance must have the approval of the Department as to limit, form and amount and must be maintained with a company authorized by laws of the State to issue such insurance in the State of Hawaii. Coverage by a "Non-Admitted" carrier is permissible provided the carrier has a AM Best's Rating of "A-VII" or better.

**(b)** All insurance described herein will be maintained by the Contractor for the full period of the contract and in no event will be terminated or otherwise allowed to lapse prior to written certification of final acceptance of the work by the Department.

**(c)** Certificate(s) of Insurance acceptable to the Department shall be filed with the Engineer prior to commencement of the work. Certificates shall identify if the insurance company is a "captive" insurance company or a "Non-Admitted" carrier to the State of Hawaii. The Best's Rating must be stated for the "Non-Admitted" carrier. Certificates shall contain a provision

that coverages afforded under the policies will not be canceled or changed until at least thirty (30) days written notice has been given to the Engineer by registered mail. The insurance policies shall name the State of Hawaii, its officers and employees as an additional insured and such coverage shall be noted on the certificate. Should any policy be canceled before final acceptance of the work by the Department, and the Contractor fails to immediately procure replacement insurance as specified, the Department, in addition to all other remedies it may have for such breach, reserves the right to procure such insurance and deduct the cost thereof from any money due to the Contractor.

**(d)** Nothing contained in these insurance requirements is to be construed as limiting the extent of Contractor's responsibility for payment of damages resulting from its operations under this contract, including the Contractor's obligation to pay liquidated damages, nor shall it affect the Contractor's separate and independent duty to defend, indemnify and hold the Department harmless pursuant to other provisions of this contract. In no instance will the Department's exercise of an option to occupy and use completed portions of the work relieve the Contractor of its obligation to maintain the required insurance until the date of final acceptance of the work.

**(e)** All insurance described herein shall be primary and cover the insured for all work to be performed under the contract, all work performed incidental thereto or directly or indirectly connected therewith, including traffic detour work or other work performed outside the work area, and all change order work.

**(f)** The Contractor shall, from time to time, furnish the Engineer, when requested, satisfactory proof of coverage of each type of insurance required or a copy of the actual policies covering the work. Failure to comply with the Engineer's request may result in suspension of the work, and shall be sufficient grounds to withhold future payments due the Contractor and to terminate the contract for Contractor's default.

**(g)** If the Contractor is self-insured, it shall furnish, upon the request and the satisfaction of the Engineer, any documentation to demonstrate the ability to self-insure itself. The Engineer, from time to time, can conduct an audit to determine the ability of the Contractor to be self-insured. Failure to comply with the Engineer's request will be considered a material breach of the contract, and at the discretion of the Engineer, may be sufficient grounds to terminate the contract, suspend any work or withhold future payments.

**(h)** It is the responsibility of the Contractor to notify the Department of any changes to its insurance policies or if the Contractor receives a notice of cancellation of any of its insurance policies. The Contractor will immediately provide written notice to the Department should the insurance policies evidenced on its Certificate of Insurance form be cancelled, limited in scope, or not renewed upon expiration.

**2. Types of Insurance** - The Contractor shall purchase and maintain insurance described below which shall provide coverage against claims arising out of the Contractor's operations under the contract, whether such operations be by the Contractor itself or by the subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.

**(a)** Worker's Compensation. The Contractor and all subcontractors shall obtain worker's compensation insurance for all persons whom they employ or may employ in carrying out the work under this contact. This insurance shall be in strict conformity with the

requirements of the most current and applicable State of Hawaii Worker's Compensation Insurance laws in effect on the date of the execution of this contract and as modified during the duration of the contract.

**(b)** Commercial General Liability. The Contractor shall obtain General Liability insurance with a limit of not less than $1,000,000 per occurrence and $2,000,000 aggregate. The insurance policy shall contain the following clauses: 1) "The State of Hawaii is added as an additional insured as respects to operations performed for the State of Hawaii."; and 2) "It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contributed with, insurance provided by this policy." The required limit of insurance may be provided by a single policy or with a combination of primary and excess polices."

**(c)** Comprehensive Automobile Liability. The Contractor shall obtain Auto Liability insurance covering all owned, non-owned and hired autos with a combined single Limit of not less than $1,000,000 per accident for bodily injury and property damage. The insurance policy shall contain the following clauses: 1) "The State of Hawaii is added as an additional insured as respects to operations performed for the State of Hawaii."; and 2) "It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contributed with, insurance provided by this policy." The required limit of insurance may be provided by a single policy or with a combination of primary and excess polices.

Furthermore, the Contractor's commercial general liability insurance and automobile liability insurance shall include coverage for bodily injury, sickness, disease or death of any person, arising directly or indirectly out of, or in connection with, the performance of work under this contract.

The Contractor's property damage liability insurance shall provide for all damages arising out of injury to or destruction of property of others including the Department's, arising directly or indirectly out of or in connection with the performance of the work under this contract including explosion or collapse.

The Contractor shall either:

i. Require each of its subcontractors to procure and to maintain during the life of its subcontract, subcontractors' comprehensive general liability, automobile liability and property damage liability insurance of the type and in the same amounts specified herein; or

ii. Insure the activities of its subcontractors in its own policy.

The Contractor will be permitted, in cooperation with insurers, to maintain a self-insured retention for up to 25% of the per occurrence combined single limits of the commercial general liability and the automobile liability policies. The existence of the self-insured retention must be noted on the certificate of insurance coverage submitted to the Department or else it will be understood that the insurer is providing first dollar coverage for all claims. For all claims within the self-insured retention amount, the rights, duties and obligations between the Contractor and the Department shall be identical to that between a liability insurer and the Department, as an additional insured, as if there was no self-insured retention.

**(d)** Builder's Risk Insurance. Unless included in the Specifications of this project, the Contractor shall not be required to provide builder's risk insurance. If required as noted in the Specifications, builder's risk insurance shall be provided during the progress of work and until final acceptance by the Department upon completion of the contract. It shall be "All Risk" (including but not limited to earthquake, windstorm and flood damage) completed value insurance coverage on all completed work and work in progress to the full replacement value thereof. Such insurance shall include the Department as additional name insured. The insurance policy shall contain the following clauses: 1) "The State of Hawaii is added as an additional insured as respects to operations performed for the State of Hawaii."; and 2) "It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contributed with, insurance provided by this policy." The required limit of insurance may be provided by a single policy or with a combination of primary and excess polices.

The Contractor shall submit to the Engineer for its approval all items deemed to be uninsurable. The policy may provide for a deductible in an amount of up to 25% of the amount insured by the policy. With respect to all losses up to any deductible amount, the relationship between the Contractor and the Department shall be that of insurer and additional insured as if no deductible existed".

2. **DELETE** Section 7.16 in its entirety and replace with the following:

"RESPONSIBILITY FOR DAMAGE CLAIMS; INDEMNITY – The Contractor shall indemnify the State and the Department against all loss of or damage to the State's or the Department's existing property and facilities arising out of any act or omission committed in the performance of the work by the Contractor, any subcontractor or their employees and agents. Contractor shall defend, hold harmless and indemnify the Department and the State, their employees, officers and agents against all losses, claims, suits, liability and expense, including but not limited to attorneys' fees, arising out of injury to or death of persons (including employees of the State and the Department, the Contractor or any subcontractor) or damage to property resulting from or in connection with performance of the work and not caused solely by the negligence of the State or the Department, their agents, officers and employees. The State or the Department may participate in the defense of any claim or suit without relieving the Contractor of any obligation hereunder. The purchase of liability insurance shall not relieve the Contractor of the obligations described herein.

The Contractor agrees that it will not attempt to hold the State and its Departments and Agencies and their officers, representatives, employees or agents, liable or responsible for any losses or damages to third parties from the action of the elements, the nature of the work to be done under these specifications or from any unforeseen obstructions, acts of God, vandalism, fires or encumbrances which may be encountered in the prosecution of the work.

The Contractor shall pay all just claims for materials, supplies, tools, labor and other just claims against the Contractor or any subcontractor in connection with this contract and the surety bond will not be released by final acceptance and payment by the Department unless all such claims are paid or released. The Department may, but is not obligated to, withhold or retain as much of the monies due or to become due the Contractor under this contract considered necessary by the Engineer to cover such just claims until satisfactory proof of payment or the establishment of a payment plan is presented.

The Contractor shall defend, indemnify and hold harmless the State and its Departments and Agencies and their officers, representatives, employees or agents from all suits, actions or claims of any character brought

on account of any claims or amounts arising or recovered under the Worker's Compensation Laws or any other law, by-law, ordinance, order or decree.

**Section 8 – Measurement and Payment**

1. **DELETE** Section 8.7a in its entirety and replace with the following:

a. Tax Clearances from the State of Hawaii Department of Taxation and Internal Revenue Service, subject to section 103D-328, HRS, current within two months of issuance date indicating that all delinquent taxes levied or accrued under State Statutes against the contractor have been paid.

2. **ADD** Section 8.7d, Certificate of Compliance:

d. A Certification from the Contractor affirming that the Contractor has, as applicable, remained in compliance with all laws as required by Section 103D-310, HRS, and Section 3-122-112, HAR. A contractor making a false affirmation shall be suspended and may be debarred pursuant to section 103D-702, HRS.

1. Certification of Compliance for Final Payment, State Procurement Office Form-22. Must be Signed Original.

3. **ADD** Section 8.7e, Hawaii Compliance Express:

e. In lieu of submitting the tax clearances from Taxation and IRS, and SPO Form -22, the Contractor may choose to use the Hawaii Compliance Express as described on page SP-1 of this Special Provisions.

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SECTION 01019

GENERAL SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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

1.02 GENERAL

A. 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 the Engineer, and any change shall be made in accordance with the Engineer'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.

B. Examination of Premises: The Contractor shall contact the State Parks Division to obtain permission before visiting the site.

C. Notices: The Contractor shall notify the State Parks Division and give at least three (3) working days notice before starting any work.

D. Disruption of Utility Services: All work related to the temporary disconnection of electrical system shall be pre-arranged with the Engineer 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.

E. Contractor's Operations

1. 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.

2. 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.

F. Parking Policy and Toilet Accommodations for Contractor: Parking Areas to be used by the Contractor shall be as designated by the State Parks Division. Any lawn damaged by the Contractor shall be restored as instructed by the Engineer at no cost to the State. Contractor shall provide portable toilets for fecal matter and urine, of the design and number specified by the DOH.

G. 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, 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.

H. Protection of Public: The Contractor shall submit a Public Safety Plan for review and approval prior to starting work. Work shall not begin until the plan has been approved by the Engineer. Plan shall include all proposed safety measures for protection of the public and any other information as required by the project documents. See Public Health, Safety and Convenience Notes in the plans for further information.

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

J. 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.

K. Clean Up Premises: The Contractor shall clean up and remove from premises all debris accumulated from operations as necessary or as directed. See also Section 7.25 of the General Conditions.

L. Responsibility

1. The State 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.

2. Should the Contractor discover any discrepancy in the plans or specifications, the Contractor shall immediately notify the Engineer 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.

M. Cooperation With Other Contractors: The State 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 the State, conduct its work so as not to interfere with or hinder the progress or completion of the work performed by other contractors.

N. 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.

O. Drawings and Specifications

1. 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 the Engineer in accordance with the General Conditions.

2. 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.

3. 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.

4. The term “Engineer” used in these specifications shall be defined as the State of Hawaii Designee including all personnel authorized for this project.

P. Required Submittals

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

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

3. 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.

c. The following procedure shall be followed:

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

2) 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.

3) The Contractor shall submit the as-built drawings together with the marked-up field office plans to the Engineer.

4) Any as-built drawing which the Engineer determines does not accurately record the deviation shall be corrected by the State, and the Contractor shall be charged for the services.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01090

STANDARD REFERENCES

PART 1 - GENERAL

Wherever used in the project, the following abbreviations will have the meanings listed:

| Abbreviation | Company |
|---|---|
| AA | Aluminum Association Incorporated<br>818 Connecticut Avenue, N.W.<br>Washington, D.C. 20006 |
| AASHTO | American Association of State Highway and Transportation Officials<br>444 North Capitol Street, N.W., Suite 225<br>Washington, D.C. 20001 |
| ACI | American Concrete Institute<br>P.O. Box 19150<br>Detroit, MI |
| AEIC | Association of Edison Illuminating Companies<br>51 East 42nd Street<br>New York, NY 10017 |
| AFBMA | Anti-Friction Bearing Manufacturer's Association<br>60 East 42nd Street<br>New York, NY 10017 |
| AGA | American Gas Association<br>8501 East Pleasant Valley Road<br>Cleveland, OH 44131 |
| AGMA | American Gear Manufacturer's Association<br>1330 Massachusetts Avenue, N.W.<br>Washington, D.C. |
| AISC | American Institute of Steel Construction<br>101 Park Avenue<br>New York, NY 10017 |
| AISI | American Iron and Steel Institute<br>1000 16th Street, N.W.<br>Washington, D.C. 20036 |

| Abbreviation | Company |
|---|---|
| AITC | American Institute of Timber Construction<br>333 West Hampden Avenue<br>Englewood, CO 80110 |
| AMCA | Air Moving and Conditioning Association, Inc.<br>30 West University Drive<br>Arlington Heights, IL 60004 |
| ANSI | American National Standards Institute, Inc.<br>1430 Broadway<br>New York, NY 10018 |
| APA | American Plywood Association<br>1119 A Street<br>Tacoma, WA 98401 |
| API | American Petroleum Institute<br>1801 K Street N.W.<br>Washington, DC 20006 |
| ARI | Air-Conditioning and Refrigeration Institute<br>1814 North Fort Myer Drive<br>Arlington, VA 22209 |
| ASCE | American Society of Civil Engineers<br>345 East 47th Street<br>New York, NY 10017 |
| ASCII | American Standard Code for Information Interchange<br>United States of America Standards Institute<br>1430 Broadway<br>New York, NY 10018 |
| ASE Code | American Standard Safety Code for Elevators, Dumbwaiter and Escalators<br>American National Standards Institute<br>1430 Broadway<br>New York, NY 10018 |
| ASHRAE | American Society of Heating, Refrigeration and Air Conditioning Engineers<br>United Engineering Center<br>345 East 47th Street |

| Abbreviation | Company |
|---|---|
| | New York, NY 10017 |
| ASME | American Society of Mechanical Engineers<br>345 East 47th Street<br>New York, NY 10017 |
| ASTM | American Society for Testing and Materials<br>1916 Race Street<br>Philadelphia, PA 19103 |
| AWPA | American Wood Preservers Association<br>1625 Eye Street<br>Washington, DC 20006 |
| AWS | American Welding Society<br>2501 N.W. 7th Street<br>Miami, FL 33125 |
| AWWA | American Water Works Association<br>6666 West Quincy Avenue<br>Denver, CO 80235 |
| CBM | Certified Ballast Manufacturers<br>2120 Keith Building<br>Cleveland, OH 44115 |
| CMAA | Crane Manufacturers Association of American, Inc.<br>(Formerly called: Overhead Electrical Crane Institute - OECI)<br>1326 Freeport Road<br>Pittsburgh, PA 15238 |
| CRSI | Concrete Reinforcing Steel Institute<br>180 North La Salle Street<br>Chicago, IL 60601 |
| CSA | Canadian Standards Association<br>178 Rexdale Boulevard<br>Rexdale, Ontario, M9W IR3, Canada |
| DEMA | Diesel Engine Manufacturer's Association<br>122 East 42nd Street<br>New York, NY 10017 |

| Abbreviation | Company |
|---|---|
| DIS | Division of Industrial Safety<br>California Department of Industrial Relations<br>2422 Arden Way<br>Sacramento, CA 95825 |
| EEI | Edison Electric Institute<br>90 Park Avenue<br>New York, NY 10016 |
| EIA | Electronic Industries Association<br>2001 Eye Street N.W.<br>Washington, DC 20006 |
| EJMA | Expansion Joint Manufacturer's Association<br>331 Madison Avenue<br>New York, NY 10017 |
| ESO | Electrical Safety Orders,<br>California Administrative Code, Title 8, Chap. 4, Subarticle 5<br>Office of Procurement, Publications Section<br>P.O. Box 20191<br>8141 Elder Creek Road<br>Sacramento, CA 95820 |
| FEDSPEC | Federal Specifications<br>General Services Administration<br>Specification and Consumer Information<br>Distribution Branch<br>Washington Navy Yard, Bldg. 197<br>Washington, DC 20407 |
| FEDSTDS | Federal Standards<br>(see FEDSPECS) |
| FM | Factory Mutual Research<br>1151 Boston-Providence Turnpike<br>Norwood, MA 02062 |
| HEI | Heat Exchange Institute<br>122 East 42nd Street<br>New York, NY 10017 |
| HI | Hydraulic Institute |

| Abbreviation | Company |
|---|---|
| | 1230 Keith Building<br>Cleveland, OH 44115 |
| IAPMO | International Association of Plumbing and Mechanical Officials<br>5032 Alhambra Avenue<br>Los Angeles, CA 90032 |
| ICBO | International Conference of Building Officials<br>5360 South Workman Mill Road<br>Whittier, CA 90601 |
| ICEA | Insulated Cable Engineers Association<br>P.O. Box P<br>South Yarmouth, MA 02664 |
| IEEE | Institute of Electrical and Electronics Engineers, Inc.<br>345 East 47th Street<br>New York, NY 10017 |
| IES | Illuminating Engineering Society<br>C/O United Engineering Center<br>345 East 47th Street<br>New York, NY 10017 |
| ISA | Instrument Society of America<br>400 Stanwix Street<br>Pittsburgh, PA 15222 |
| JIC | Joint Industrial Council<br>7901 Westpark Drive<br>McLean, VA 22101 |
| MILSPEC | Military Specifications<br>Naval Publications and Forms Center<br>5801 Tabor Avenue<br>Philadelphia, PA 19120 |
| MSS | Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.<br>127 Park Street, N.E.<br>Vienna, VA 22180 |

| Abbreviation | Company |
|---|---|
| NAAMM | National Association of Architectural Metal Manufacturers<br>100 South Marion Street<br>Oak Park, IL 60302 |
| NACE | National Association of Corrosion Engineers<br>P.O. Box 986<br>Katy, TX 77450 |
| NEC | National Electric Code<br>National Fire Protection Association<br>470 Atlantic Avenue<br>Boston, MA 02210 |
| NEMA | National Electrical Manufacturer's Association<br>155 East 44th Street<br>New York, NY 10017 |
| NESC | National Electric Safety Code<br>American National Standards Institute<br>1430 Broadway<br>New York, NY 10018 |
| NFPA | National Forest Products Association<br>(Formerly called: National Lumber Manufacturer's Association)<br>1619 Massachusetts Avenue, N.W.<br>Washington, DC 20036 |
| OSHA | Occupational Safety and Health Act<br>U.S. Department of Labor<br>San Francisco Regional Office<br>450 Golden Gate Avenue, Box 36017<br>San Francisco, CA 94102 |
| PPIC | The Plumbing & Piping Industry Council, Inc.<br>Suite 402<br>510 Shatto Place<br>Los Angeles, CA 90020 |
| SAE | Society of Automotive Engineers<br>2 Pennsylvania Street<br>New York, NY 10001 |

| | |
|---|---|
| SAMA | Scientific Apparatus Makers Association<br>One Thomas Circle<br>Washington, DC 20005 |
| SBCC | Southern Building Code Congress<br>1116 Brown-Marx Building<br>Birmingham, AL 35203 |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association, Inc.<br>8224 Old Courthouse Road<br>Tysons Corner Vienna, VA 22180 |
| SSPWC | Standard Specifications for Public Works Construction<br>Building News, Inc.<br>3055 Overland Avenue<br>Los Angeles, CA 90034 |
| TEMA | Tubular Exchanger Manufacturer's Association<br>331 Madison Avenue<br>New York, NY 10017 |
| UBC | Uniform Building Code<br>Published by ICBO |
| UL | Underwriters Laboratories Inc.<br>207 East Ohio Street<br>Chicago, IL 60611 |
| UMC | Uniform Mechanical Code<br>Published by ICBO |
| UPC | Uniform Plumbing Code<br>Published by IAPMO |
| USBR | Bureau of Reclamation<br>U.S. Department of Interior<br>Engineering and Research Center<br>Denver Federal Center, Building 67<br>Denver, CO 80225 |
| WWPA | Western Wood Products Association<br>(Formerly called: West Coast Lumberman's Association - WCLA)<br>Yeon Building |

Portland, CA  97204

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 SUBMITTALS

A. Shop drawings shall be required for:

Any as called for in the plans, specifications or by the Engineer.

B. Other required submittals shall include:

1. Manufacturer's Data.

2. Certificates of Warranty.

3. Any others as called for in the plans, specifications, or by the Engineer.

Submittals are required, as a minimum, for rock slope scaling, shotcrete, sculpting shotcrete, grouted anchors, anchored wire mesh, wire mesh drapery and grout. See respective sections in these documents for submittal requirements.

1.02 BIDDER'S SPECIAL RESPONSIBILITY FOR COORDINATING CONTRACTUAL WORK AND SUBMITTALS:

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

B. The Contractor shall have a rubber stamp made up in the following format:

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.

DATE RECEIVED _____
SPECIFICATION SECTION _____
SPECIFICATION PARAGRAPH _____
DRAWING NUMBER _____
SUBCONTRACTOR NAME _____
SUPPLIER NAME _____
MANUFACTURER NAME _____

CERTIFIED BY: _____

C. This stamp, "filled in", should 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") tied to each sample. The tag on the samples should state what the sample is so that, if the tag is accidentally separated from the sample, it can be matched up again. The back of this tag will be used by the Engineer for his receipt, review, and log stamp and for any comments that relate to the sample.

D. All submittals for material, equipment, and shop drawings listed in the contract documents shall be required and shall be reviewed by the Engineer, prior to any ordering of materials and equipment.

E. Unless otherwise noted, the Contractor shall submit to the Engineer for his review eight copies of all shop drawings and/or catalog cuts for fabricated items and manufactured items required for the construction. Drawings shall be submitted in sufficient time to allow the Engineer not less than twenty regular working days for examining the drawings.

F. The drawing shall be accurate, distinct, and complete and shall contain all required information, including satisfactory identification of items, units and assemblies in relation to the contract drawings and specifications.

G. Unless otherwise approved by the Engineer, 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 Engineer to correct or finish will not be acceptable, and shop drawings which, in the opinion of the Engineer, 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.

H. When the shop drawings have been reviewed by the Engineer, two sets of submittals will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the drawing may be rejected and one set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit eight copies of the drawings, unless otherwise directed by the Engineer. No changes shall be made by the Contractor to the resubmitted shop drawings other than those changes indicated by the Engineer. The resubmittal shall be so indicated on the shop drawing.

I. The review of such drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of the dimensions, fabrication details, and space requirements or for deviations from the contract drawings and specifications, unless the Contractor has called attention to such deviations, in writing, by a letter accompanying the drawings and the Engineer approved the change or deviations, in writing, at the time of submission; nor shall review by the Engineer relieve the Contractor from the responsibility for errors in the shop drawings. When the Contractor does call such deviations to the attention of the Engineer, he shall state in his letter whether or not such deviations involve any deduction or extra cost adjustment.

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01505

# MOBILIZATION AND DEMOBILIZATION

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

This section covers the requirements for mobilization and demobilization.

### 1.02 MOBILIZATION

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.

### 1.03 DEMOBILIZATION

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.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.01 GUIDELINES

A. 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.

B. 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.

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

## 3.02 MEASUREMENT AND PAYMENT

Mobilization and Demobilization will be paid on a lump sum basis and shall not exceed 6% of the total bid price. Measurement for payment will not apply. Payment will be full compensation for the work prescribed in this section and the contract documents.

END OF SECTION

SECTION 01581

PROJECT SIGN

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

Furnish all labor, materials and equipment necessary to construct and install all project sign as specified hereinafter.

### 1.02 SUBMITTAL

The contractor shall provide the Engineer with six (6) shop drawings of the project sign for review and approval by the Engineer prior to ordering the sign.

### 1.03 LETTER STYLE

Copy is centered and set in Adobe Type Futura Heavy. If this specific type is not available, Futura Demi Bold may be substituted. Copy should be set and spaced by a professional typesetter and enlarged photographically for photo stencil screen process.

### 1.04 ART WORK

Constant elements of the sign layout - frame, outline, stripe, and official state information - may be duplicated following drawing measurements, or be reproduced and enlarged photographically using a layout template if provided. The "STATE OF HAWAII" masthead should be reproduced and enlarged as specified, using the artwork provided.

### 1.05 TITLES

The specific major work of the project under construction is emphasized by using 3-3/4" type, all capitals. Secondary information such as location or buildings uses 2-1/4" type, all capitals. Other related information of lesser importance uses letter heights as indicated on 01581-3, upper / lower case letters.

Design should follow the example on page 01581-3.

PART 2 - PRODUCTS

2.01 MATERIALS

A. LUMBER

1. Panel is 3/4" exterior grade high density overlaid plywood, with resin-bonded surfaces on both sides.
2. 4"x4" sign posts shall be Douglas Fir No. 1 or better.

B. PAINTS & INKS

Screen print inks are matte finish. Paints are satin finish, exterior grade. References to Ameritone Color Key Paint are for color match only.

| | | | |
|---|---|---|---|
| COLOR: | 1. | 1BL10A | Bohemian Blue |
| | 2. | 2H16P | Softly (White) |
| | 3. | 2VR2A | Hot Tango (Red) |
| | 4. | 1M52E | Tokay (Gray) |

C. CONCRETE

Concrete shall be class B with a 2,500 psi 28-day compressive strength.

PART 3 - EXECUTION

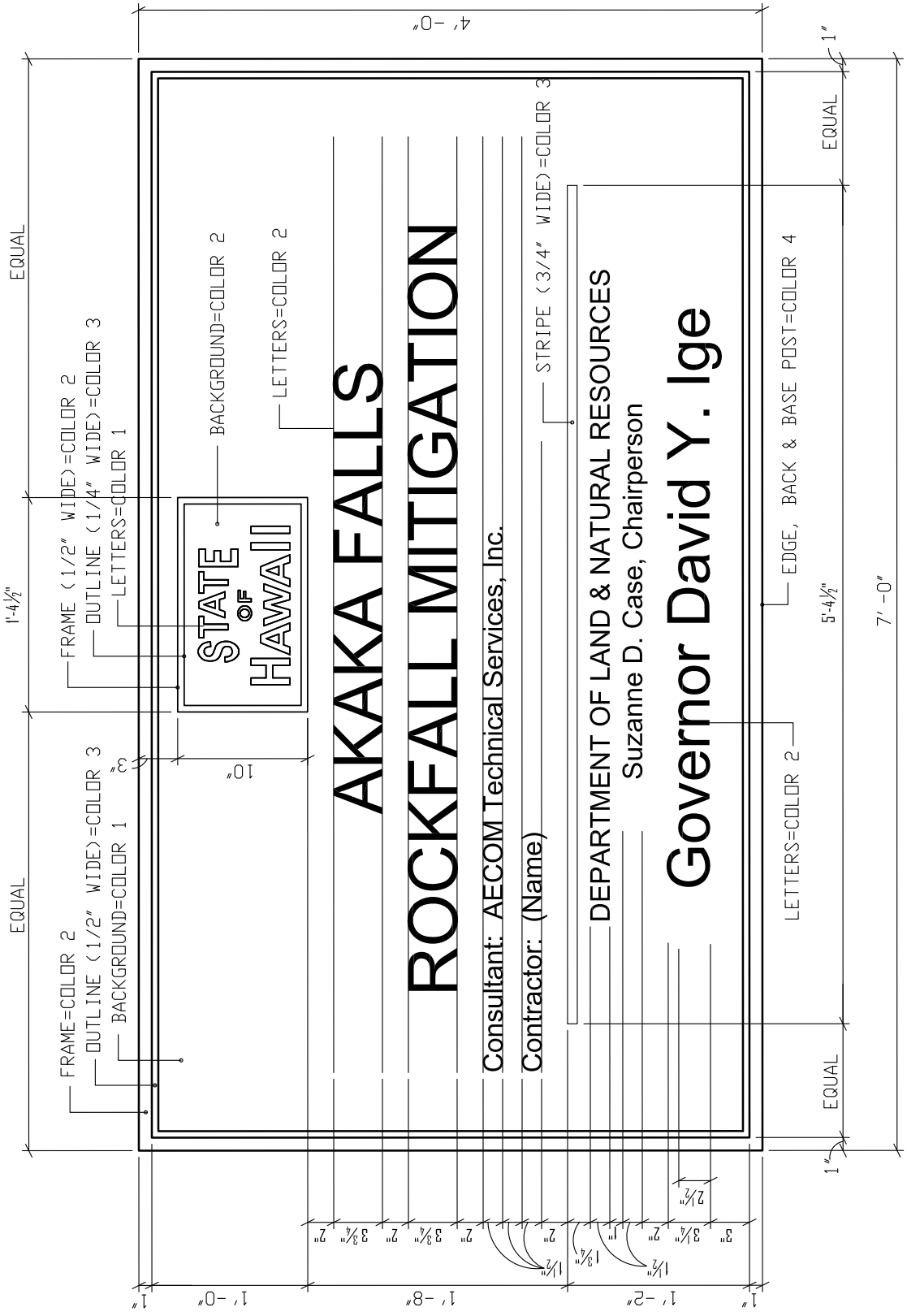
3.01 GENERAL

A. The Project Sign shall be constructed with new materials as specified above.

B. The Project sign shall be installed at the location indicated on the drawings or as designated by the Engineer. The project sign shall be erected upon commencement of work.

3.02 MEASUREMENTS AND PAYMENT

The construction of the project sign, including all equipment, labor and material necessary to furnish and install the project sign will be paid for under the "Project Sign" proposal item.




NOTE: Number of signs required 1

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. Contractor shall coordinate areas of partial trail closure, full trail closure and work hours with the State.

B. 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.

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

D. 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.

3.02 EXISTING UTILITY LINES

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. The Engineer shall then investigate and issue instructions for the preservation or disposition of the unknown line. Authorization for extra work shall be issued by the Engineer only as he/she deems necessary.

3.03 CLEAN UP OF PREMISES

Clean up and remove all debris accumulated from Contractor 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, etc., and leave entire jobsite clean and neat to the satisfaction of the Engineer.

PART 4 – MEASUREMENT AND PAYMENT

Site Preparation will not be paid separately. The cost will be considered incidental to various contract items.

END OF SECTION

SECTION 02150

CLEARING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

The work to be performed under this section shall include clearing trees and vegetation, and objects designated for removal and disposing of vegetation, debris, and unwanted material from the project site as designated in the contract documents or by the Engineer. Perform clearing in advance of proposed improvements and mitigation measures.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. Best Management Practices (BMP): Ensure that all BMP measures are in place before clearing and debris removal starts. If BMP measure is removed temporarily to accommodate construction operations, reinstall before end of workday.

B. Limits: Clearing shall include all vegetation and debris encountered within the limits of anchored wire mesh, wire mesh drapery, and shotcrete. Contractor shall coordinate limits of clearing in the field with the Engineer.

C. Clearing. All vegetation and surface objects encountered within the limits of the proposed anchored wire mesh, wire mesh drapery, and shotcrete including trees, logs, roots of downed trees, brush, grass, weeds, etc. shall be cleared and cut flush to the ground. Trees with a trunk diameter equal to or less than 12 inches shall be cut flush with the ground. Trees with a diameter larger than 12 inches shall remain. Vegetation and tree clearing outside the project limits shall be kept to the minimum extent necessary to perform the contracted work.

Clearing shall also include removal of other unwanted material, such as trash and loose debris.

D. Removal and Disposal of Material. All trash and debris resulting from clearing operations shall become the property of the Contractor and shall be removed from the site to an approved location.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

Clearing shall be paid on a lump sum basis inclusive of all labor and disposal of debris. Measurement for payment will not apply.

### 4.02 PAYMENT

Clearing shall be paid on a lump sum basis in accordance with this section and the project documents.

END OF SECTION

SECTION 02170

ROCK REMOVAL

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

This section describes methods and materials used to remove unforeseen rocks outcrops. The Contractor shall furnish materials, labor, and equipment necessary to remove and dispose portions of rock to the limits determined in the field by the Officer-in-Charge. Mechanical rock splitters or jacks for rock removal shall be used. Other removal methods proposed by the Contractor shall be subject to written acceptance by the Officer-in-Charge. During rock chipping and/or removal, the Contractor shall provide for the safe conduct of the work, careful removal, and the disposition of material to be removed, protection of property that is to remain undisturbed, and coordination with other work involved.

Explosives shall not be used for any rock removal work.

1.02 SUBMITTALS

Contractor shall submit a work plan for removal work including at a minimum: proposed method(s) of removal, types of equipment/materials to be used, safety measures to protect the public, and disposal plan. Work plan shall be approved by the Officer-in-Charge prior to starting removal work.

PART 2 - PRODUCTS

2.01 MATERIALS

The Contractor shall use hydraulic rock splitters, expanders, jacks, or scaling bars at their discretion to remove boulders.

PART 3 - EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

A. Rock Removal:

Rock Removal shall be defined as any area designated as a rock outcrop to be removed according to the Officer-in-Charge after vegetation clearing. Rockfall areas shall be cleared and secured prior to the start of any rock removal work. Contractor shall provide temporary means of protection against accidental

runaway rocks during demolition. Upon verification by the Officer-in-Charge in the field as to the specific location and the limits of rock outcrops to be removed, the Contractor shall remove rock outcrops using the approved methods.

B. Disposal of Rock Material:

All removed rock material shall become the property of the Contractor and properly disposed of off-site in accordance with all Federal, State, and County requirements. The Contractor shall make all necessary arrangements to obtain any required permits for the use of off-site disposal locations.

C. Protection of Existing Facilities:

Existing structures, utilities, and other items of properties to remain shall be protected from damage during rock removal. Any damage resulting from the Contractor's operations to existing structures, utilities, or other items of property shall be repaired by the Contractor, using materials and construction equal to or better than existing, all at the Contractor's own expense.

D. Critical Support Boulder:

The Contractor shall immediately notify the Officer-in-Charge should he/she assess the rock to be removed provides critical support to the boulders above.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

Removal of rock outcrops identified in the contract documents for removal, including proper disposal of rock material shall be measured per cubic yard in accordance with the contract documents.

No separate payment for hauling and disposal of rock material shall be made; the compensation for such work shall be included in the price for Rock Removal.

All preparation work, including installing fall protection anchors, lines and devices, site safety for the crew during work, installing and maintaining miscellaneous protection devices, and removal and cleaning up debris, all in regards to rock removal, shall be considered incidental work and shall not be measured for payment separately.

### 4.02 PAYMENT

Payment for the accepted rock removal shall be made at the contract unit price per cubic yard bid item in the Proposal. Such payment shall represent full compensation for furnishing all labor, tools, equipment, and materials required to complete the work.

No separate payment for hauling and disposal shall be made; the compensation for such work shall be deemed to be included in the contract unit price bid item of which it is a part.

END OF SECTION

SECTION 02160

ROCK SLOPE SCALING

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

This section describes furnishing materials, labor, and equipment necessary to perform rock slope scaling when ordered by the Officer-in-Charge in accordance with the contract documents.

Rock slope scaling operations shall include removal of loose or unstable rocks, soil, and debris from the slope face or ground surface utilizing hand scaling bars and non-explosive measures in accordance with acceptable industry standards within the limits of scaling and/or areas provided on the contract documents and as directed by the Officer-in-Charge in the field.

1.02 TEMPORARY SAFETY MEASURES

The Contractor shall provide for the protection of the public and property and prevent loose or "runaway" rocks from leaving the project work site during all scaling operations. Scaling shall commence only after the approved temporary safety measures are in place and operational.

Exercise care when performing work next to existing improvements, infrastructure, and other facilities adjacent to the project site. Damages to existing improvements shall be immediately reported to the Officer-in-Charge and repaired at no additional cost to the State.

1.03 CONTRACTORS QUALIFICATIONS

The Contractor performing the slope scaling work must have performed satisfactory slope scaling, demolition and removal for a minimum of two (2) years or employ the services of a specialty subcontractor with a minimum of two (2) years of satisfactory slope scaling experience. The Contractor or Subcontractor shall submit a project reference list containing at least two (2) projects in which similar work has been conducted and successfully completed within the past two (2) years. Include a brief description of each project including the typical heights of the slopes scaled, duration of the slope scaling, working hours on the slope, methods employed to scale the slopes, the Owner's name, and current telephone number for reference.

At a minimum, the slope scaling crew shall consist of one (1) scaling supervisor and two (2) slope scalers. For additional slope scaling crews, each slope scaling crew shall

consist of one (1) scaler foreman (in-lieu of the scaling supervisor) and two (2) slope scalers. The number of slope scaling crews to be employed on this project shall be determined by the Contractor or specialty subcontractor performing the slope scaling.

The slope scaling operations shall be conducted within the times and duration specified on the Contract drawings.

A. Scaling Supervisor:

The Contractor's designated representative responsible for the prosecution and coordination of slope scaling activities on this project. The scaling supervisor shall be in charge of and responsible for the safety and work performed by the slope scaling crews. The scaling supervisor shall have a minimum of two (2) years of high slope scaling experience with a minimum of 1,000 hours of demonstrated experience supervising slope scaling. The scaling supervisor shall have completed the American Red Cross "basic first aid course" or equivalent, and shall have experience or training in the use of emergency remote rescue techniques.

B. Scaler Foreman:

An individual who is directly in charge of and responsible for the safety and work performed by a crew of two (2) slope scalers. The scaler foreman shall be actively engaged at the site location and shall be engaged in actual slope scaling activities for at least 50% of the time charged for his/her slope scaling crew. The scaler foreman shall have a minimum of two (2) years of high slope scaling experience with a minimum of 1,000 hours of demonstrated experience performing slope scaling. Scaler foremen shall have completed the American Red Cross "basic first aid course" or equivalent, and shall have experience or training in the use of emergency remote rescue techniques.

C. Slope Scaler:

An individual who is engaged in accessing the slope face and removing loose rock and materials from the slope face using a variety of hand tools at locations that require modified rock climbing techniques for the safe prosecution of the work. Slope scalers shall have a minimum of two (2) years of experience with a minimum of 500 hours of demonstrated experience performing similar slope scaling work.

Approval or denial of the Contractor's qualifications and personnel will be made after review of the submittal. Slope scaling work shall not commence until approval of the Contractor's qualifications and work plan has been obtained in writing from the Officer-in-Charge. The Officer-in-Charge will suspend the work

if the Contractor substitutes unqualified personnel for approved personnel during construction.

## 1.04 PROTECTION OF EXISTING FACILITIES

Existing structures, utilities, and other items of properties to remain shall be protected from damage during rock scaling. Any damage resulting from the Contractor's operations to existing structures, utilities, or other items of property shall be repaired by the Contractor, using materials and construction equal to or better than existing, all at the Contractor's own expense and the satisfaction of the State.

Provide, install, and maintain all necessary signs, lights, flares, barricades, markers, cones, and other protective devices and take all necessary precautions for the protection, convenience, and safety of vehicles, people, and the surrounding properties. The existing slope and all other improvements shall be fully protected during the scaling operations. Exercise care when performing work next to existing infrastructure.

## 1.05 SUBMITTAL AND WORK PLAN

Submit three (3) copies of a method statement, reflecting how the contractor plans to perform his/her rock slope scaling operations including details and methods for protection of the public and all existing improvements, performing the rock scaling, removing the debris, disposal location, names and qualifications of the slope scaling crew(s), work hours, and all necessary equipment.

Submit a list identifying the scaling supervisor, scaler foremen, and slope scalers assigned to this project. In this list, the Contractor shall summarize the individual's experience for the Officer-in-Charge to determine whether the qualifications of each individual meet the minimum requirements of the scaling supervisor, scaler foremen, and/or slope scalers as described by this section.

Submit a Fall Protection Plan for working at heights and all training certifications for personnel working at heights. A fall protection plan is required whenever a worker is working at height. The plan shall be available at the work site at all times. Workers affected by the fall protection plan shall be trained in all its elements and the plan shall be made available to them. All workers working on steep slopes are required to have a certificate of training or training refresher course from an independent government approved or commercial training facilities for working at height dated within 24 months prior to being on steep slopes. No person shall be allowed on steep slopes without such certification.

The Contractor shall provide a detailed work plan of the slope scaling work, prior to any such activity for review by the Officer-in-Charge. The Officer-in-Charge shall have a minimum of ten (10) working days after receipt of the submittal to review and provide comments to the submittal. The work plan shall be approved by the Officer-in-Charge

prior to commencement of the slope scaling work. Include in the work plan the following:

A. The proposed construction sequence and schedule to complete the slope scaling work.

B. The types of equipment and hand tools to be used for the slope scaling activities.

C. The number of slope scaling crews including the number of scaling supervisor(s), scaler foremen, and slope scalers to be employed on the project.

D. Provisions to protect the public, facilities, utilities, pavement surface, and personnel below the scaling area. All public protection measures should be in place and operational before starting scaling each day.

E. Removal and disposal plan for debris generated from the slope scaling work at the end of each shift.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. All scaling activity shall be monitored by the Officer-in-Charge. Contractor shall notify the Officer-in-Charge at least three (3) business days in advance of any scaling work. No section of the slope will be considered completed of scaling until accepted by the Officer-in-Charge.

B. The Contractor shall perform the slope scaling work according to the approved work plan and as directed by the Officer-in-Charge. Maintain the minimum crew size specified and the number of slope scaling crews described in the work plan at all times. Any member of the slope scaling crew who must leave for any reason shall be replaced immediately by a qualified replacement. Do not perform slope scaling when the scaling supervisor is absent, unless an alternate supervisor meeting all the requirements of the scaling supervisor has been designated for the slope scaling work to continue. Deviation from these rules will result in non-payment.

C. Conduct a pre-construction condition survey of the adjacent area that may be impacted by the rock slope scaling operations prior to commencement of the scaling work.

D. Rock slope scaling work shall begin only after protection measures are in place and operational.

E. Start rock slope scaling at the top of the slope and proceed down slope, removing loose rocks and other debris as the work progresses. Material on the slope face that is loose, hanging or creates a safety hazard to the public shall be removed to the Officer-in-Charge's satisfaction.

F. Remove all rock debris that hang up on the slope during scaling operations at completion of the first pass of the slope scaling. Continue scaling of the slopes until the slope scaling has been completed to the satisfaction of the Officer-in-Charge.

G. Exercise care in the slope scaling work and avoid over-steepening the slope face that may cause instability of the slope. Immediately stop all work and notify the Officer-in-Charge if unsafe slope conditions are encountered that may constitute a potential slide.

H. Do not excavate material that will disturb intact rock, compromise the stability of the rock face or slope, or disturb or damage the toe of the slope unless such work is deemed necessary by the State to meet project objectives or correct a more serious condition and is directed by the Officer-in-Charge. Submit corrective action plan and analysis to Officer-in-Charge for review and approval for cases where intact rock has been disturbed, stability of the rock face has been compromised, or toe of slope is damaged. The submission for design and corrective action must satisfactorily demonstrate adequacy to resolve and correct the problem as determined by the State. All work for corrective action resulting from damages from activities not directed or approved by the State will be conducted at no additional cost to the State.

I. Do not remove pieces of rock that will result in undercutting of overlying material. Submit a corrective action plan to the Officer-in-Charge for review and approval to correct any excess undercutting, damage or instability caused by the scaling work. Preparation of the corrective action plan shall be at no cost to the State and no adjustments in contract time will be allowed as the result of preparation, State review, and implementation of the plan.

J. The Contractor shall make all necessary arrangements to obtain any required permits for the use of off-site disposal locations.

K. Each rock slope scaling crew shall consist of one working supervisor and at least two (2) experienced slope scalers. The supervisor shall be available to enable the Officer-in-Charge to communicate with the slope scaling staff for safety considerations. Determine the number of slope scaling crews to be employed on this project based on the extent of the rock slope scaling to be performed and the duration available for performing the work as specified in the contract documents.

L. All slope scaling staff shall be experienced in working on steep slopes with use of fall protection devices. Each worker shall be certified in working at heights as described in the contract documents. Fall protection plan and all certifications shall be submitted to the Officer-in-Charge for review and approval prior to starting work at heights.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

Rock slope scaling will not be measured under this section for payment, inclusive of all labor (crew), equipment, tools, hauling and disposal of scaled material and public protection measures necessary to complete the work as described.

No separate payment for hauling and disposal of scaled material shall be made; the compensation for such work shall be included in the price for Rock Slope Scaling.

All preparation work, including installing fall protection anchors, lines and devices, site safety for the crew during work, installing and maintaining miscellaneous protection devices, and removal and cleaning up debris, all in regards to rock scaling work, shall be considered incidental work and shall not be measured for payment separately.

### 4.02 PAYMENT

Rock Slope Scaling shall be paid on a lump sum basis for the accepted work performed within the limits of scaling on the plans, under this section and in accordance with the contract documents.

END OF SECTION

SECTION 02200

EROSION CONTROL MATTING

PART 1 – GENERAL

1.01 DESCRIPTION

This section describes furnishing, transporting and construction for erosion control matting in accordance with the contract documents and the manufacturer's standards and requirements. The system shall be installed at the location shown in the contract documents.

The erosion control matting has been designed to withstand the static and dynamic forces generated from rocks or soil moving under the permanently installed system. The manufacturer shall be regularly engaged in the manufacturing of slope stabilization systems used in similar application and capacity. The manufacturer shall supply written evidence demonstrating certification of a quality assurance program.

PART 2 - PRODUCTS

2.01 MATERIALS

Erosion mat shall be a permanent stitch bonded turf reinforcement mat (TRM) with dense interlocking polypropylene fibers and mechanically bound together. TRM shall be UV and chemical stabilized and contain no biodegradable components. TRM shall possess strength and elongation properties to limit stretching in saturated conditions. Erosion mat shall be Tensar North American Green C350 or approved substitute.

Contractor shall submit all material literature and installation guidelines to the Engineer for review and approval prior to installation.

PART 3 - EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

A. Preparation of Slope. Clear in accordance with Section 02150 - Clearing.

Level all slope surfaces within the erosion matting limits as shown in the contract documents. Surfaces should be smoothed to eliminate undulations that prohibit intimate contact between the erosion matting and the ground.

The distance between the erosion matting and the soil should not be greater than 1/4 inch. Extra staples shall be installed to achieve the required contact, and shall be considered incidental to the erosion matting.

Erosion matting shall be in the sequence recommended by the contract documents.

All material and debris removed from the slope shall be the property of the Contractor and disposed of off-site at an approved disposal location at no additional cost to the State.

B. Erosion Mat. Install erosion mat as indicated on the contract documents and per manufacturer's recommendations for steep slope installations. Erosion mat shall be secured with 18 inch metal pins spaced at 2 feet center to center with alternating rows staggered. Install 12 inch 8 gauge wire staples at 12 inches on center along all exposed edges in addition to metal securing pins. Metal securing pins and wire staples shall be driven flush to the soil surface. Metal pins shall meet the following minimum requirements.

| | | |
|---|---|---|
| Length | 18.0 | inches |
| Shaft Diameter | 0.20 | inches |
| Head Diameter | 1.5 | inches |

Overlapping of erosion mat shall be 6" minimum at edges when connection horizontally and 2' minimum when connecting vertically or per manufacturer's recommendations, whichever is more stringent.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT:

Erosion Mat installation shall be measured per square foot of accepted erosion mat completely installed. All other costs of material, labor, and equipment shall be considered incidental work and shall not be measured for payment.

### 4.02 PAYMENT:

Erosion Mat will be paid on a unit price basis per square foot of erosion mat installed in accordance to the contract documents.

END OF SECTION

SECTION 02268

WIRE MESH DRAPERY SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS.

Furnish materials, labor, and equipment necessary to install the wire mesh drapery systems to the limits shown on the plans and as specified herein, in place, complete and operational. Wire mesh drapery systems shall meet the following minimum general requirements

A. Be designed to withstand the static and dynamic forces generated from rocks or soil used in similar application and capacity.

B. The material manufacturer shall be regularly engaged in the manufacturing of slope stabilization systems used in similar application and capacity. The manufacturer shall supply written evidence demonstrating certification of a quality assurance program upon request by the Engineer.

C. Demonstrate satisfactory performance in similar applications and capacity. Performance results and examples of previous installations under a permanently installed system shall be made available to the Engineer upon request.

D. Retain the load imposed by the rocks outcrops shown in the plans with no distress of connecting elements. Engineering calculations verifying contract requirements shall be made available to the Engineer upon request.

E. Comprised of readily available components to the extent practical and shall require minimal maintenance. The system shall be resistant to corrosion, UV degradation, and thermal deterioration.

1.02 SLOPE AND FOUNDATION CONDITIONS.

The Contractor should expect to encounter a broad range of foundation materials when installing support anchors, including very hard rock, fractured rock, loose boulders, clinker, soil, and voids and shall be prepared to install the anchors for the wire mesh drapery system per these documents at no additional cost to the State. See Geotechnical Soils Investigation Report by Kokua Geotech, LLC., dated April 2, 2020.

1.03 SUBMITTALS.

Shall submit one (1) set of complete working drawing in electronic pdf file format to the Engineer for approval. Working drawings shall be 24” x 36” in size and include the project name, contract number and the manufacturer’s name, address and telephone number.

Submit wire mesh drapery system specifications, including manufacturer’s drawings, certifications, all material data sheets, and installation guidelines. Include documentation for netting, anchors, wire ropes, and any miscellaneous materials. Material certification shall include written documentation verifying the type and grade of the material. Also include written documentation from the manufacturer verifying that the wire mesh drapery system as a whole will meet or exceed the requirements of this project.

Submit proposed grout mix design specifications, including manufacturer’s data sheets and catalog cuts, plus the procedure and equipment used for placing the grout.

Submit details of proposed drilling methods and equipment, including proposed drill hole diameter. Submit manufacturer’s specifications for anchor materials and sizes and model numbers for drill bits.

Submit proposed pull testing procedure, equipment setup, testing personnel qualifications and calibration charts.

The Contractor shall allow the Engineer fourteen (14) calendar days to review the working drawings after the complete sets of drawings have been received. Fabrication of the wire mesh drapery system shall commence only after the review and approval of the working drawings by the Engineer.

PART 2 - PRODUCTS

2.01. MATERIALS

A. Netting

The netting shall be wire mesh and shall meet the following minimum requirements:

1. Wire Mesh

The high strength wire mesh shall be woven construction and shall be diamond shaped. The high strength wire mesh shall be made with 4-millimeter minimum diameter wire core, and the ends of each wire

shall be fastened into a loop and twisted. The loops of the wire mesh shall be fastened together to prevent unraveling of the mesh. The high strength wire mesh shall be Geobrugg 4mm TECCO Mesh System, or pre-approved equal.

The wire shall be galvanized with Zinc/Aluminum coating. The Zn + Al coating shall be GALFAN coated (95% ZN + 5% Al) with a minimum weight of 150 $g/m^2$.

2. Connection Clips and Press Claws

Connection clips shall be 4-mm minimum diameter high-tensile steel wire galvanized with Zinc/Aluminum coating. The press claws shall be 6-mm minimum diameter carbon steel bar and hot dipped galvanized with a minimum layer thickness of 55 microns (μm). Use connection clips to fasten the meshes together per Manufacturer's guidelines.

3. Seam Ropes

Seam ropes shall be used to secure the wire drape to the support rope system. Seam ropes shall be 5/8-inch diameter wire rope hot dip galvanized. The seam rope shall be laced through each mesh cell opening once in the adjoining zone and tensioned by hand to provide adequate contact between the mesh cells and the support rope system. The Contractor shall submit shop drawings for the mesh panel assembly for review and approval as specified under Subsection 1.03 – Submittals in this section.

B. Anchor System

The anchors shall be wire rope anchors meeting the minimum requirements listed below.

Wire rope anchors shall be single-leg 1" minimum diameter wire rope of 6 by 19 construction, hot-dip galvanized strands with a minimum breaking strength of 103,400 lbs.

Anchors shall meet all minimum requirements for bore hole diameter, embedment depth, spacing and number as indicated by the drawings.

All anchors shall be embedded and fully grouted to withstand a design test load of 12 tons. The Contractor may be required to pull-test up to 25% of all anchors at the discretion of the Engineer. All anchor testing shall be done in the field under the observation of the Engineer.

C. Support Wire Ropes

Support wire ropes shall be hot-dip galvanized and shall have a minimum diameter of 7/8 inch, unless specified larger elsewhere. The ropes shall be 6 by 19 construction (or equivalent), IWRC, with a minimum breaking strength of 79,600 lbs. Support wire ropes shall be as shown in the plans with one (1) cable each at the top, bottom, and side supports.

D. Miscellaneous Materials

All miscellaneous materials such as wire rope clips, thimbles, rings, bolts, nuts, washers, plates, turnbuckles, etc. shall be hot-dip galvanized.

E. Anchor Grout

Requirement for grout shall be the same as spec section 02270 – Anchored Wire Mesh part 2 – MATERIALS.

F. Centralizers

Requirement for centralizers shall be the same as spec section 02270 – Anchored Wire Mesh part 2 – MATERIALS.

G. Grout Socks

Requirement for grout socks shall be the same as spec section 02270 – Anchored Wire Mesh part 2 – MATERIALS.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

Install the wire mesh drapery system in accordance with the requirements of the manufacturer and the contract documents. Prior to construction, mark the limits of the wire mesh drapery system in the field. Do not begin construction until the limits are reviewed and approved by the Engineer.

A. Slope Preparation

Vegetation encountered on the slope shall be cleared as specified in Section 02150 – Clearing. For trees with diameter larger than 12 inches, the wire mesh shall be installed around the base per manufacturer's written requirements and approved by the Engineer. All scaling and/or demolition work shall be in accordance to Section 02160 – Rock Slope Scaling.

B. Layout

Mark the limits of the wire mesh drapery system in the field as shown on the plans. Top and side anchors shall be spaced as shown on the plans. Mark the proposed locations for the ground anchors according to the requirements of the contract documents and approved shop drawings. Contractor shall request inspection of the proposed layout by the Engineer. Do not begin construction until the Engineer has inspected and approved the proposed layout.

C. Anchors

Drill holes to receive the anchors to the minimum diameter, depth and angle specified below unless stated otherwise by the plans and approved shop drawings. The Contractor shall determine the anchor depth to be used in order to meet the max test load of 15 tons (12 tons design test load X 1.25) pullout requirement and meet the minimum required embedment depth. The Contractor shall notify the Engineer of any unexpected or irregular field conditions encountered during drilling.

Bore holes for all wire rope anchors for the wire mesh drapery system (top, side and bottom rows) shall be have a minimum diameter of 4 inches and shall be drilled to accommodate a minimum anchor embedment length of 30 feet into the existing ground surface as shown on the plans. Anchor installation shall be drilled approximately 15-20° from vertical. The final angle and location shall be coordinated with the Engineer in the field.

Clean flush the drill holes of all drill cuttings, sludge, and debris with compressed air immediately prior to inserting the anchor into the hole and grouting the anchor (i.e. same day). Each drilled hole shall be inspected, verified, and approved by the engineer prior to inserting and grouting operation.

Install anchors at the center of the drilled hole. Install PVC centralizers according to the plans, with the first at 1’-0” from anchor bottom. Any installed anchor touching the side of the hole is grounds for rejection of the anchor at the Contractor’s expense. Securely fasten the centralizers to the anchor prior to inserting into the bore hole.

Fill the hole with cement grout. Pump all grout from the bottom of the hole to the top using a grout tube. The grout tube must extend to the bottom of the hole, and shall remain at the bottom of the hole until the hole is completely filled to the top. No top grouting shall be allowed. Remove grout tube immediately after grouting. Contractor shall revisit each grouted anchor hole after initial grouting operations and add more grout where determined necessary by the Engineer, during which the Contractor shall reinsert the grout

tube and pump the additional grout from bottom to top similar to earlier grouting operations. All grout settlement shall be refilled.

It is anticipated that the Contractor may encounter cracks and fractures within the subsurface during drilling and grouting operation. The Contractor shall be prepared to manage complete anchor installation under the above conditions without any additional cost to the State. Use of grout socks shall be as specified in Subsection 2.01.H – Grout Socks.

Provide the Engineer with a schedule of grouting at least 3 days prior to grouting. All grouting operations shall be performed according to the schedule and shall be observed by the Engineer. Grouting performed not in the presence of the Engineer shall be grounds for rejection of the anchor. Notify the Engineer in writing at least 3 working days, excluding weekends and holidays, prior for any changes to the scheduled grouting operation.

D. Testing

Testing shall be performed against a temporary yoke or load frame. No part of the yoke or load frame shall bear within 2 feet of the anchor. At the discretion of the Engineer, a number of anchors equivalent or up to 25% of total anchors installed may be tested. Engineer shall choose which anchors will be tested. Bottom anchors may be excluded from testing at the discretion of the Engineer depending on site conditions encountered during construction. Testing may only be performed after the grout for the anchor has cured for at least 72 hours and attained the specified 3-day compressive strength.

Anchor assemblies shall be pullout tested by the contractor in the presence of the Engineer. A pullout test consists of incrementally loading the anchor assembly to the maximum test load or failure point, whichever occurs first. Failure point shall be the point where the movement of the anchor continues without an increase in the load or when the anchor has displaced 2 inches. The failure load corresponding to the failure point shall be recorded as part of the test data. The Engineer shall determine the test loading schedule at the time of testing. Maximum test load shall be up to 125% of the design test load (12 tons design test load X 1.25).

During the load test the contractor shall monitor and record displacement of the anchors using two (2) dial gauges relative to a stable reference point which is founded a minimum distance of 3 feet from the anchor and test load reaction points. Each test load shall be held long enough until a stable reading can be obtained. Maximum test load shall be held until stable and for a minimum of 10 minutes.

The pullout test shall be conducted by measuring the test load applied to the

anchor and the anchor end movement at each load using the two (2) dial gauges.

Applied test loads shall be measured by the Contractor with either a calibrated pressure gage or a load cell. Movements of the end of the anchor shall be measured and recorded during the load tests.

The pressure gage shall have an accurately reading dial at least 6 inches in diameter and each jack and its gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will be at final jacking force, and shall be accompanied by a certified calibration chart. The jack and gage shall have been calibrated within one-year prior to use on the project and shall have unique and permanent non-removable identifying serial numbers.

Prior to testing, submit to the Engineer for approval a description of test setup and equipment to be used during testing, and all calibration sheets.

The anchor shall be unloaded only after completion of the test.

If more than 25% of the anchors tested fail, all anchors shall be tested at the Contractor's expense. The Contractor shall replace and re-test all failed anchors at no additional cost to the State.

3.02 FINAL CLEANUP

All work area shall be clean and free of grout and cement residue. Spilled grout shall be collected and disposed of. All surplus earth and debris resulting from wire mesh drapery system installation shall be secured or removed from the site. All equipment wash water shall be contained and disposed of offsite. No wash water shall be dumped on site.

3.03 CERTIFICATE OF COMPLIANCE

The Contractor shall provide the Engineer with a Certificate of Compliance from the wire mesh drapery system manufacturer.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASURMENT

Wire Mesh for the drapery system installation shall be measured per square foot of netting completely installed. All other material, labor, and equipment, including but not limited to wire rope, seam rope and clips, shall be considered incidental work and shall not be measured for payment.

Draped Mesh Cable Anchors shall be measured per each of completely installed anchors in accordance with the contract documents. All other material, labor, and equipment shall be considered incidental work and shall not be measured for payment.

4.02 PAYMENT

The cost for the wire mesh drapery system work will be included and paid for on a unit price basis per square foot and shall be paid for under the Proposal line item "Wire Mesh." The cost is for the work prescribed in this section and the contract documents.

The cost for draped mesh cable anchors work will be paid on a unit price basis per each of accepted draped mesh cable anchor in accordance with the contract documents and shall be paid for under the Proposal line item "Draped Mesh Cable Anchors." The cost is for the work prescribed in this section and the contract documents.

END OF SECTION

SECTION 02270

ANCHORED WIRE MESH

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS.

Furnish materials, labor, and equipment necessary to install the anchored wire mesh system to the limits shown on the plans and as specified herein, in place, complete and operational.

1.02 SLOPE AND FOUNDATION CONDITIONS.

The Contractor should expect to encounter a broad range of foundation materials when installing support anchors, including very hard rock, fractured rock, loose boulders, clinker, soil, and voids and shall be prepared to install the anchors for the anchored drapery system per these documents at no additional cost to the State. See Geotechnical Soils Investigation Report by Kokua Geotech, LLC., dated April 2, 2020.

PART 2 - MATERIALS

2.01. MATERIALS

Contractor shall submit all material literature and installation guidelines to the Officer-in-Charge for review and approval prior to installation.

A. Wire Mesh:

1. High Strength Wire Mesh: The high strength wire mesh shall be woven construction and shall be diamond shaped. The high strength wire mesh shall be made with 4-millimeter minimum diameter wire core, and the ends of each wire shall be fastened into a loop and twisted. The loops of the wire mesh shall be fastened together to prevent unraveling of the mesh. The high strength wire mesh shall be Geobrugg 4mm TECCO Mesh System, or pre-approved equal.

   The wire shall be galvanized with Zinc/Aluminum coating. The Zn + Al coating shall be GALFAN coated (95% ZN + 5% Al) with a minimum weight of 150 $g/m^2$.

2. Connection Clips and Press Claws: Connection clips shall be 4-mm minimum diameter high-tensile steel wire galvanized with

Zinc/Aluminum coating. The press claws shall be 6-mm minimum diameter carbon steel bar and hot dipped galvanized with a minimum layer thickness of 55 microns (μm). Use connection clips to fasten the meshes together and press claws to fasten the mesh to the boundary wire ropes per Manufacturer's guidelines.

3. Spike Plates: The spike plates shall be made from 0.4 inch (10 mm) thick steel and shall be hot dipped galvanized with a minimum layer thickness of 85 microns (μm). The spike plate shall be diamond shaped with a width of 7.5 inches (190 mm) and a length of 13 inches (330 mm).

B. Anchor System: Boundary wire rope anchors shall be constructed from 1" minimum diameter wire rope of 6 x 19 construction, hot-dipped galvanized with a minimum breaking strength of 103,400 lbs. Grouted soil anchors shall be constructed from 1-inch minimum diameter solid core threaded bars, hot-dipped galvanized with a minimum yield strength of 59,000 lbs. Boundary wire rope anchors and grouted soil anchors shall meet all minimum requirements for bore hole diameter, embedment depth, spacing and number as indicated by the drawings. Anchors shall be furnished complete with all accessories and shall be a standard product of a company regularly engaged in their manufacture.

1. Miscellaneous Materials: All miscellaneous metals such as wire rope clips, spike plates, thimbles, shackles, anchor couplers, rings, bolts, nuts, washers, plates, links, etc. shall be hot-dipped galvanized steel.

2. Anchor Grout: Grout for the anchors shall consist of cement grout capable of permanently developing the bond and internal strength necessary for the project. Cement grout shall be non-shrink, non-metallic, high strength pre-engineered packaged grout with a minimum compressive strength of 5,000 psi in three (3) days when mixed to flowable consistency. If a non-prepackaged grout is used the Contractor shall submit to the Officer-in-Charge for review and approval, the desired mix design along with compression test results performed by an independent laboratory specifically for this project proving the mix will achieve the minimum compressive strength specified above. Submit all grout material mix design information and compression test results, performed by an independent laboratory for the purpose of this project (results from previous projects will not be accepted), to the Officer-in-Charge for approval. Grout that achieves the specified three (3) day compressive strength will be considered acceptable for the project. Grouting shall not commence until the grout is approved in writing by the Officer-in-Charge. Cement grout shall be capable of being hydraulically pumped to the bottom of the drill hole allowing it to rise upwards filling all cavities of the drill hole.

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

Equipment for mixing grout shall be high speed colloidal mixer with shearing action. The grouting equipment shall be capable of continuous mixing and shall produce a homogeneous grout mixture free of lumps. Batch mixing shall be per manufacturer's recommendations.

3. Support Wire Ropes: Support wire ropes shall be hot-dip galvanized and shall have a minimum diameter of 1/2 inch, unless specified larger elsewhere. The ropes shall be 6 by 19 construction (or equivalent), IWRC, with a minimum breaking strength of 26,600 lbs. Support wire ropes shall be as shown in the plans with one (1) cable each at the top, bottom, and side supports.

4. Centralizers: Centralizers shall be placed along the length of the anchor as detailed in the plans. Centralizers shall permit the free flow of grout to pass through in the drilled hole and shall be securely fastened to prevent displacement. Centralizers shall be made of PVC schedule 40 and shall be the size so to keep the bar at the center of the drilled hole. If the contractor chooses to make drill holes larger than the minimum parameters specified on the plans, the centralizer sizing shall be adjusted to keep the anchor centered in the drilled hole. Any anchor bar that is not in the center of the hole (a deviation from the center of the drilled hole equal to 8% of the hole diameter or 0.5 inches, whichever is smaller, will be permitted) shall be rejected and replaced at no additional cost to the State.

5. Supplemental (Short) Anchors: Where required (not shown on the design drawings), supplemental anchors shall be installed, with the acceptance of the Engineer, in between the grouted soil anchors specified in the contract documents. Supplemental anchors are primarily installed at local depressions missed by the main soil anchors to pull the mesh down for a neat appearance of the anchored wire mesh system. The supplemental anchors shall meet the minimum requirements shown in subsection (B) above. Where installed by the Contractor, the embedment length of the supplemental anchors shall be at least 5 feet. Contractor shall account for a maximum of twenty (20) supplemental short anchors to be installed within the anchored wire mesh area.

6. Grout Socks: Use of grout socks requires a written approval from the Engineer. Contractor shall make every effort to provide reasonable justification to the Engineer for using grout socks. Grout socks shall be of the material which readily allows passage of cement to the surrounding hole area and expanding and conforming into the voids within the bore

hole. Grout sock diameter shall be a minimum of 40% larger than the drilled holes. Contractor shall submit grout sock information and grout sock samples for approval by the Engineer prior to receiving consideration for installation approval.

## PART 3 – QUALITY AND ASSURANCE

### 3.01 TESTING

Grouted soil anchor testing shall be performed at the locations selected by the Engineer. All test data shall be recorded by the Contractor, unless approved otherwise. Pullout testing of anchors shall not be performed until the anchor grout has attained 100 percent of the specified 3-day compressive strength. Testing of boundary rope anchors will not be required.

Provide the Engineer an anchor plan indicating the general layout of each anchor on the slope, and an anchoring numbering system used to identify each anchor. The Contractor shall submit the testing apparatus and set-up diagram to the Engineer for review and approval prior to the testing.

The top 3 feet of all test anchors shall be unbonded. Where temporary casing of the unbonded length of test anchors is required, the casing shall be installed to prevent any reaction between the casing and the grouted bond length of the anchor and/or the stressing apparatus.

A. Testing Equipment: Anchor testing equipment shall include two dial gauges, a dial gauge support, jack and pressure gauge, and a reaction frame. Provide description of test setup and jack, pressure gauge, and calibration curves (tested within 180 days prior to use) for review and acceptance by the Engineer.

1. Dial Gauges: A minimum of two dial gauges capable of measuring to 0.001-inch shall be available at the site to measure the anchor head movement. The dial gauges shall be aligned within 5 degrees of the axis of the anchor and shall be supported independently of the jacking set-up and slope. The dial gauge shall have a travel sufficient to allow the test to be done without having to reset the gauge.

2. Stressing Equipment: A hydraulic jack, calibrated pressure gauge, and pump shall be used to apply and measure the test load.

   The jack and pressure gauge shall be calibrated as a unit by an independent testing laboratory within one-year prior to use on the project. Each jack and its gauge shall be accompanied by a certified calibration chart. Certify and identify all calibrated instruments using a unique and

non-removable label provided by the company or manufacturer performing the calibration tests.

The pressure gauge shall be graduated in 100 psi increments or less and shall have a range not exceeding twice the anticipated maximum pressure during testing unless approved otherwise. The ram travel of the jack shall be sufficient to enable the test to be performed without re-setting the jack.

Upon request from the Engineer, any testing equipment being used by the Contractor can be asked to be certified for calibration by the Manufacturer or Manufacturer's official representative after load testing at no increase in contract price or contract time.

3. Stressing Equipment Set-up: The jack shall be independently supported and centered over the anchor so that the anchor does not carry the weight of the jack. The stressing equipment shall be placed over the anchor in such a manner that the jack bearing plates and stressing anchorage are in alignment. The jack shall be positioned at the beginning of the test such that the unloading and repositioning of the jack during the test shall not be required.

4. Reaction Frame: The test reaction frame shall be sufficiently rigid and of adequate dimension such that excessive deformations of the test apparatus during testing shall not require repositioning of any components. Frame supports shall be a minimum of 18 inches from the anchor being tested and 3 feet minimum between supports.

B. Verification Testing:

1. Sacrificial Anchors: One verification test shall be performed prior to installation of production anchors, at location chosen by the Contractor and accepted by the Engineer, to verify the Contractor's installation methods, anchor pullout capacity, and design assumptions. The anchor used for the verification test shall be sacrificial and shall not be incorporated as a production anchor.

2. Methods and Procedures: Test anchor shall be constructed using the same equipment, methods, and hole diameter as planned for the production anchors. Changes to the drilling or installation method may require additional anchor testing as determined by the Engineer at no increase to the contract price or contract time.

3. Anchor Length: The unbonded length of test anchors shall be at least 3 feet unless approved otherwise by the Engineer. The bond length (grouted length) of test anchors shall be 17 feet. The bar load during testing shall

not exceed 80 percent of the steel ultimate strength for Grade 150 bars or 90 percent of the steel yield strength for Grade 75 bars.

4. Testing Schedule: The Design Test Load (DTL) during testing shall be as shown in the contract documents and schedule below. Verification test anchors shall be incrementally loaded and unloaded in accordance with the following schedule.

**Verification Test Loading Schedule**

| **LOAD** | ***LOAD HOLD TIME*** |
|---|---|
| AL (0.05 DTL* max.) | 1 minute |
| 0.25 DTL | 10 minutes |
| 0.50 DTL | 10 minutes |
| 0.75 DTL | 10 minutes |
| 1.00 DTL | 10 minutes |
| 1.25 DTL | 10 minutes |
| 1.50 DTL (Creep Test) | 60 minutes |
| 1.75 DTL | 10 minutes |
| 2.00 DTL (Max Test Load) | 10 minutes |
| * Design Test Load = 15 kips | |

The Alignment Load (AL) should be the minimum load required to align the testing apparatus and should not exceed 5 percent of the Design Test Load maximum (0.05 times the DTL). Dial gauges should be set to "zero" after the alignment load has been applied.

5. Loading Times: Each load increment shall be held for at least 10 minutes. The verification test anchor shall be monitored for creep for 60 minutes at the 1.50 DTL load increment. Anchor movements during the creep portion of the test shall be measured and recorded at 1, 2, 3, 5, 6, 10, 20, 30, 50, and 60 minutes. The load during the creep test shall be maintained to within 2 percent of the intended load by the use of the load cell.

   Unload the anchor only after completion of the test. Restore the drill hole for remaining 3 feet unbonded length and fill with grout after removal of any soil/rock debris.

C. Proof Testing of Production Anchors: Proof testing shall be performed on at least 10 percent of the production anchors, up to 25 percent, at the discretion of the Engineer. If anchor installation methods are substandard on any particular anchor or series of anchors, additional tests shall be required at no increase to the contract price or contract time.

1. Anchor Length: The temporary unbonded length of the production test

anchors shall be at least 3 feet unless approved otherwise. The bond length of test anchors shall be the remaining anchor length. The bar load during testing shall not exceed 80 percent of the steel ultimate strength for Grade 150 bars or 90 percent of the steel yield strength for Grade 75 bars.

2. Proof Test Schedule: Proof tests shall be performed by incrementally loading the proof anchor to a maximum load of 150 percent of the Design Test Load (DTL). The anchor movement at each load increment shall be measured and recorded. The test load shall be monitored by a jack pressure gauge with a sensitivity and range meeting the requirements of this section. At load increments other than the maximum test load, the load shall be held long enough to obtain a stable reading. Incremental loading for proof tests shall be in accordance with the following loading schedule.

**Proof Test Loading Schedule**

| **LOAD** | ***LOAD HOLD TIME*** |
|---|---|
| AL (0.05 DTL* max.) | Until Stable |
| 0.125 DTL | 5 minutes |
| 0.25 DTL | 5 minutes |
| 0.375 DTL | 5 minutes |
| 0.50 DTL | 5 minutes |
| 0.625 DTL | 5 minutes |
| 0.75 DTL | 5 minutes |
| 0.875 DTL | 5 minutes |
| 1.00 DTL | 5 minutes |
| 1.125 DTL | 5 minutes |
| 1.25 DTL | 5 minutes |
| 1.375 DTL | 5 minutes |
| 1.50 DTL (Max. Test Load) | 10 minutes (if less than 0.04" is measured between the 1 and 10 minute readings), otherwise 60 minutes |
| * Design Test Load = 15 kips | |

3. Alignment Load: The Alignment Load (AL) should be the minimum load required to align the testing apparatus and should not exceed 5 percent of the Design Test Load maximum (0.05 times the DTL). Dial gauges should be set to "zero" after the alignment load has been applied.

4. Loading Times: All load increments shall be maintained to within 5 percent of the intended load. Depending on performance, either 10-minute or 60-minute creep tests shall be performed at the maximum test load

(1.50 DTL). The creep period shall start as soon as the maximum test load is applied and the anchor movement shall be measured and recorded at 1, 2, 3, 5, 6 and 10 minutes. Where the anchor movement between 1 minute and 10 minutes exceeds 0.04 inches, the maximum test load shall be maintained an additional 50 minutes and movements shall be measured and recorded at 20 minutes, 30, 50, and 60 minutes.

Unload the anchor only after completion of the test. Restore the drill hole for remaining 3 feet unbonded length and fill with grout after removal of any soil/rock debris.

D. Test Anchor Acceptance: A test anchor shall be considered acceptable if the following criteria are met.

1. Verification and Proof Tests: For proof tests, a creep rate less than 0.04 inches per log cycle of time between the 1 minute and 10-minute readings is observed or a creep rate of less than 0.08 inches per log cycle of time between the 6 and 60 minute readings, and the creep rate is linear or decreasing throughout the creep test load hold period.

2. Total Movements: The total movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the anchor unbonded length.

E. Proof Test Anchor Incorporated as Production Anchors: At the Contractor's option and with approval of the Engineer, successful proof test anchors meeting the above test acceptance criteria may be incorporated as production anchors provided that: (1) the unbonded test length of the anchor hole has not collapsed during testing; (2) the minimum required drill hole diameter has been maintained; (3) the test anchor length and bar size are equal to or greater than the scheduled production anchor length and bar size, and; (4) the specified corrosion protection is provided. Test anchors meeting these requirements shall be completed by satisfactorily grouting up the unbonded test length. Maintaining the temporary unbonded test length for subsequent grouting is the Contractor's responsibility.

F. Test Anchor Rejection: If a test anchor does not satisfy the acceptance criterion, the Contractor shall determine the cause.

G. Engineer Acceptance of Test Anchors:

1. Proof Test Anchors: The Engineer may require that the Contractor to replace some or all of the production anchors represented by inadequate or failed proof tests. Alternatively, the Engineer may require the installation and testing of additional proof test anchors to verify that adjacent

previously installed production anchors have sufficient carrying capacity. Installation and testing of additional proof test anchors or installation of additional or modified anchors as a result of proof test anchor failure(s) will be at no increase to contract price or contract time.

H. Anchor Installation Records: Records documenting the soil/rock anchor construction shall be maintained by the Contractor. The Contractor shall provide the Engineer with as-built drawings showing the as-built anchor lines and grade within 5-days after completion of the anchor testing.

PART 4 - EXECUTION

4.01 EXECUTION

A. Clear in accordance with Section 02150 – Clearing. Extend clearing to a minimum of 3 feet beyond the mesh limits.

B. The Contractor shall clean the slope by removing any loose and unstable rocks and flatten or equalize the slope so as to make the slope surface as level and smooth as possible within the wire mesh coverage area. Material cleared from the slope shall become the property of the Contractor and shall be disposed at an approved location off-site at no additional cost to the State.

C. Grouted soil anchor and boundary rope anchor installation shall be per these specifications herein. The angle of each anchor shall be as called out on the plans, final angle and location shall be coordinated with the Engineer in the field. Mark the proposed locations for both types of anchors according to the requirements of the contract documents and approved shop drawings. Contractor shall request inspection of the proposed layout by the Engineer. Do not begin construction until the Engineer has inspected and approved the proposed layout.

D. All boreholes shall be cleaned out using compressed air immediately prior to inserting and grouting the anchor, unless otherwise authorized by the Engineer in writing.

E. All grouting must be performed in the presence of the Engineer. Contractor shall notify the Engineer 3 working days (min.) in advance of cleaning and insertion of anchors so that depth and cleanliness of the drilled holes can be confirmed. Any anchor inserted or grouted without the presence of the Engineer shall be cause for rejection of the anchor at no cost to the State.

F. Lay the high strength wire mesh on the slope by unrolling down the slope. The rolls can be shortened or lengthened as necessary by removing or adding sections, respectively. Make the horizontal connection (in line with the slope)

of two mesh panels by either connecting each diamond opening by one Type 1 compression claw or turning-in of wire spirals with ends secured by compression clips (DIN 3093) or wire clips (NG3 DIN 741). The wire spirals shall be the same as the high strength wire mesh.

G. For vertical mesh connection (along length of slope), overlap the mesh panels by two mesh cells. Fasten the overlapped mesh panels with two (2) connection clips at each mesh cell length. The connection clips shall be staggered. Installation shall be as stated in the contract documents or in accordance with the manufacturer's guidelines, whichever is more stringent.

H. Install the required boundary wire ropes and fasten the wire mesh to the boundary wire rope with press claws (minimum of one press claw at every second mesh cell). Tighten the boundary ropes and pull tight against the slope ground. Installation shall be as stated in the contract documents or in accordance with the manufacturer's guidelines, whichever is more stringent.

I. Place the spike plate onto the anchors. Using a torque wrench or hydraulic press, tighten the nuts and push the spike plates and wire mesh in order to tension the anchored wire mesh. Torque the nuts to the values shown in the contract documents or in accordance with the manufacturer's recommendations, whichever is more stringent.

4.02 FINAL CLEANUP

All work area shall be clean and free of grout and cement residue. Spilled grout shall be collected and disposed of. All surplus earth and debris resulting from anchored drapery system installation shall be secured or removed from the site. All equipment wash water shall be contained and disposed of offsite. No wash water shall be dumped on site.

4.03 CERTIFICATE OF COMPLIANCE

The Contractor shall provide the Engineer with a Certificate of Compliance from the wire mesh manufacturer.

PART 5 – MEASUREMENT AND PAYMENT

5.01 MEASURMENT

Wire Mesh shall be measured per square foot of accepted wire mesh completely installed. All other material, labor, and equipment, including but not limited to boundary rope, press claws and clips, shall be considered incidental work and shall not be measured for payment separately.

Soil anchor and boundary rope anchor installation shall be measured per linear foot of accepted soil anchor or boundary rope anchor completely installed. All other costs of material, labor, equipment, and testing shall be considered incidental work and shall not be measured for payment separately.

Supplemental (Short) Anchors shall be measured per each of accepted supplemental anchor completely installed. All other costs of material, labor, and equipment shall be considered incidental work and shall be measured for payment separately.

5.02 PAYMENT

Wire Mesh will be paid on a unit price basis per square foot of wire mesh installed in accordance to the contract documents within the Proposal line item "Wire Mesh."

Soil anchors and boundary rope anchors will be paid for on a unit price basis per linear foot of soil anchor installed in accordance to the contract documents within the Proposal line item "Soil Anchors and Boundary Rope Anchors."

Supplemental Anchors will be paid for on a unit price basis per each of supplemental anchor installed in accordance to the contract documents within the Proposal line item "Supplemental (Short) Anchors."

END OF SECTION

SECTION 02621

COMPOST FILTER SOCK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

This section describes the use of compost filter socks as temporary during-construction perimeter control Best Management Practice (BMP) devices. The socks shall be installed as indicated on the project drawings, or as designated by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Compost Filtration Media. The compost used in filter socks meet all local, state, and federal quality requirements. Biosolids compost must meet the Standards for Class A biosolids outline in 40 Code of Federal Regulations (CFR) Part 503. Compost used for filtration media should follow the guidelines contained in the table below:

| **TABLE** | | | |
|---|---|---|---|
| **Parameters [a,1,4]** | **Units of Measure[a]** | **Vegetated Filter Sock[a]** | **Unvegetated Filter Sock[b]** |
| pH[2] | pH units | 5.0 – 8.5 | 6 – 8 |
| Soluble salt concentration[2] (electrical conductivity) | dS/m (mmhos/cm) | Maximum 5 | Not applicable |
| Moisture content | %, wet weight basis | 30 – 60 | 30 – 60 |
| Organic matter content | %, dry weight basis | 25 – 65 | 25 – 65 |
| Particle size | % passing a selected mesh size, dry weight basis | 3 in.=100%<br>1 in.=90-100%<br>0.75 in.=70-100%<br>0.25 in.=30-75%<br>Max length=6 in. | 2 in.=100%<br>0.375 in=10-30% |
| | | Avoid compost with less than 30% fine particle to achieve optimum reduction | |

| TABLE | | | |
|---|---|---|---|
| **Parameters [a,1,4]** | **Units of Measure[a]** | **Vegetated Filter Sock[a]** | **Unvegetated Filter Sock[b]** |
| | | of total suspended solids | |
| | | No more than 60% passing 0.25 in. sieve in high rainfall/flow rate situations | |
| Stability[3] (Carbon Dioxide Rate) | mg $CO_2$-C per gram of organic matter per day | <8 | (same as vegetated) |
| Physical contaminants (manmade inerts) | %, dry weight basis | <1 | <1 |

**Sources:** [a]Alexander, 2003; [b]Personal communication, B. Faucette, R. Tyler, N. Goldstein, R. Alexander, 2005

**Notes:** [1] Recommended test methodologies are provided in [Test Methods for the Evaluation of Composting and Compost ]. [2] Each plant species requires a specific pH range and has a salinity tolerance rating. [3] Stability/maturity rating is an area of compost science that is still evolving, and other test methods should be considered. Compost quality decisions should be based on more than one stability/maturity test. [4] Landscape architects and project engineers may modify the above compost specification ranges based on specific field conditions and plant requirements.

B. Compost Filter Sock. Compost filter sock shall utilize an outer layer of bi-axial grid, a middle layer of filtration mesh, and an inner layer of containment netting. All layers shall collectively enclose the compost filtration media. Compost filter sock shall be installed as 12" nominal diameters as indicated on the project drawings, or as specified by the Engineer. Compost filter socks shall be Biosock™ as manufactured by EnviroTech BioSolutions and indicated on the project drawings, or approved equal.

C. Wood Anchor Stakes. Wood anchor stakes shall have a minimum length of 18 inches. Do not use rebar or other metal rods.

D. Seeds. If seeds are used to create a vegetated compost filter sock, seeds shall meet the requirements determined by the Engineer.

E. Live Cuttings. If live cuttings are used to create a vegetated compost filter sock, live cutting shall meet the requirements determined by the Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

Installation personnel are required to satisfactorily complete training by the compost filter sock manufacturer prior to the installation of the compost filter socks on the project site. Installation personnel shall follow all manufacturer instructions and guidelines. All installation personnel shall provide evidence of required training upon request of the Engineer.

A. Placement

Compost filter socks shall be installed onsite using a commercial pneumatic bark blower. Alternatively, compost filter socks can be pre-fabricated offsite in pre-determined lengths and then installed onsite. Compost filter socks shall be placed in the areas shown on the project drawings or as designated by the Engineer.

B. Overlap

Where multiple sections of compost filter socks are required to form a continuous run, the sections shall be installed as shown on the plans and shall have a minimum overlap of 12 inches.

C. Anchor Method

The compost filter socks shall be anchored using wooden anchor stakes which meet the minimum requirements set forth in this specification. Wooden anchor stakes shall be installed to a minimum depth required to attain effective anchoring. Finished height of wooden anchor stake installation shall not exceed 1 inch above the finished height of the compost filter sock installation. Wooden anchor stakes shall be installed per the contract plan details and according to the guidelines below:

| Slope Gradient | Anchor Spacing |
|---|---|
| <4:1 | Not Required |
| 4:1 to 3:1 | 10’ On Center |
| >3:1 to 2:1 | 5’ to 10' On Center |
| >2:1 | 5’ On Center (end to end) |

D. Inspection

Inspect compost filter socks when rain is forecast, following rainfall events, and daily during prolonged rainfall. Repair, modify, or supplement compost filter sock installations as needed or as required by the Engineer at no addition cost to the State.

E. Maintenance

Maintain compost filter socks to provide adequate sediment holding capacity. Sediment should be removed when the sediment accumulation reaches three quarters (3/4) of the barrier height. Removed sediment should be incorporated in the project at locations designated by the Engineer or disposed of properly at no additional cost to the State.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

Temporary Compost Filter Socks will not be paid for separately. Measurement for payment will not apply.

### 4.02 PAYMENT

The cost for Compost Filter Socks installed as temporary BMPs shall be included under “Best Management Practices (BMP’s)” as listed in the Proposal schedule. The cost is for the work prescribed in this section and the contract documents.

END OF SECTION

SECTION 03210

GROUTED ANCHORS FOR SHOTCRETE

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

This work shall consist of installation of grouted anchors for shotcrete reinforcing in accordance with the design documents at the locations shown on the plans or as directed by the Engineer. The Contractor shall install all anchors as specified by the design plans, and supply all materials, equipment, and labor required for the installation of the anchors specified herein.

### 1.02 SUBMITTALS

The Contractor shall submit in writing, not less than two weeks prior to the beginning of the drilling, to the Engineer for approval the following items for the grouted anchors:

A. The Contractor shall submit a detailed plan. The plan shall include:

1. The proposed construction sequence.

2. The proposed drilling methods and equipment.

3. The proposed grout mix design specifications, including manufacturer's data sheets and catalog cuts, plus the procedure and equipment used for placing the grout.

4. The proposed anchor specifications, including manufacturers' data sheets, catalog cuts, and material certifications. Material certification shall include written documentation verifying the hot-dip galvanization process.

5. A detailed schedule of work for performing grouted anchor installation, including final cleanup and washing of grouting equipment.

B. Work shall not begin until the plan has been approved in writing by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Grouted Anchors

Requirement for shotcrete anchors, including all accessories, shall be the same as spec section 02270 - Anchored Wire Mesh part 2 - MATERIALS.

B. Grout

Requirement for grouted shall be the same as spec section 02270 - Anchored Wire Mesh part 2 - MATERIALS.

C. Centralizers

Requirement for centralizers shall be the same as spec section 02270 - Anchored Wire Mesh part 2 - MATERIALS.

D. Grout Socks

Requirement for grout socks shall be the same as spec section 02270 - Anchored Wire Mesh part 2 - MATERIALS.

PART 3 – QUALITY AND ASSURANCE

3.01 TESTING

Requirement for testing shall be the same as spec section 02270 - Anchored Wire Mesh subsection 3.01 – TESTING.

PART 4 - EXECUTION

4.01 INSTALLATION

A. The anchors shall be handled and stored in such a manner as to avoid damage. Damage to the bars as a result of abrasions, rust, cuts, nicks, welds, and weld splatter will be cause for rejection. The bars shall be protected from dirt and harmful substances.

B. Prior to installation, all mill scale and grease shall be removed from the bar.

C. All anchors shall be inspected and approved, for not having coating damage, by the Engineer prior to installation. Any anchor installed and not approved shall be rejected and replaced with new anchors without any additional cost to the State.

D. All anchor locations shall be marked in the field to be reviewed and approved by the Engineer prior to drilling. Drilling orientations shall be coordinated with the Engineer.

E. The Contractor shall drill holes to receive the anchors to the diameters and lengths specified by the design documents. The Contractor shall clean flush the drill holes of all drill cuttings, sludge, and debris with compressed air and install the anchor in the presence of the Engineer immediately prior to the grouting (i.e. within 48 hours), unless otherwise directed by the Engineer. The Engineer reserves the right to observe the cleaning process and bar insertion. Any anchor grouted without the Engineer witnessing proper flushing of the drill hole and bar installation may be grounds for rejection at the Contractor's expense.

F. Holes drilled for anchors, in which installation is considered by the Engineer to be impractical, shall be grout filled and re-drilled at the Contractor's expense. All unused holes shall be grout filled at the Contractor's expense.

G. Anchors must be installed at the center of the drilled hole using centralizers as shown on the plans and as described in Subsection 2.01.C.

H. The Contractor shall notify the Engineer in writing at least three (3) working days, excluding weekends and holidays, prior to any scheduled grouting operation, at which time the Contractor shall provide the Engineer with a schedule of grouting. Grouting shall be performed according to the schedule and must be observed by the Engineer. Grouting performed not in the presence of the Engineer shall be grounds for rejection of the anchor at the Contractor's expense. All rejected anchors shall be replaced at no additional cost to the State.

I. It is anticipated that the Contractor may encounter cracks and fractures within the subsurface during drilling and grouting operation. The Contractor shall be prepared to manage complete grouted anchor installation under the above conditions without any additional cost to the State. Use of grout socks requires a written approval from the Engineer. Contractor shall make every effort to provide reasonable justification to the Engineer for using grout socks. Grout socks shall be of the materials which allow passage of cement water to the surrounding anchor hole area. Grout sock diameter shall be a minimum of 40% larger than the drilled holes. Contractor shall submit grout sock information for approval by the Engineer prior to installation.

J. Grout shall be pumped into the bore hole from the bottom to the top. Mix the grout according to the grout manufacturer's instructions for flowable consistency. Pump the grout into the borehole through a pre-inserted grout tube that extends to the bottom of the hole. The grout tube shall be temporarily fastened to the end of the anchor bar prior to inserting the bar into the hole. The end of the grout tube shall remain in the grout until the hole is completely filled to the top. No top grouting will be allowed. All grout tubes must be removed immediately after grouting is completed.

K. Avoid spilling grout, wet or dry, onto the work area. All spilled grout shall be completely removed from the rock surface and disposed of, and the area shall be restored to its natural conditions by the Contractor at no additional cost to the State.

L. No tension loading will be applied to anchors.

4.02 FINAL CLEANUP

All work area, including vegetation, shall be clean and free of grout and cement residue. Clean all spilled grout from the exposed rock surfaces. All rocks, debris, and surplus earth resulting from work of this section shall be removed from the site and properly disposed at the Contractor's expense.

All equipment wash water shall be contained and disposed of offsite. No wash water shall be dumped on site. No equipment shall be washed on site without proper containment apparatus that has been pre-approved by the Engineer.

PART 5 – MEASUREMENT AND PAYMENT

Grouted Anchors for Shotcrete shall be measured per each of accepted grouted soil anchor completely installed. All other costs of material, labor, equipment, and testing shall be considered incidental work and shall not be measured for payment separately. Grouted Anchors for Shotcrete will be paid for on a unit price basis per each grouted anchor installed in accordance to the contract documents.

END OF SECTION

SECTION 03250

SCULPTED SHOTCRETE FINISH

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

This section describes furnishing and constructing sculpted shotcrete finish. The Contractor shall construct the sculpted shotcrete finish as specified by the contract documents or as directed by the Engineer, and supply all materials, equipment, and labor required for the sculpted shotcrete finishes as specified herein.

1.02 GENERAL REQUIREMENTS

Sculpted shotcrete finish shall be applied to the shotcrete areas shown on the drawings and shall be a continuous operation with all other shotcrete work unless approved in writing by the Engineer. The surface shall be finished to produce a rock-like aesthetic finish to simulate the color and texture of the nearby natural rock. Producing a rock-like aesthetic finish will require forming and carving relief into the shotcrete face to the limits shown on the plans. The relief shall be sculpted into shotcrete applied onto the structural shotcrete facing or onto a substrate suitable to sustain the sculpted shotcrete. The texture shall closely resemble that of the cuts within the local area adjacent to the project or approved mock-up.

1.03 QUALIFICATIONS OF SCULPTING SUBCONTRACTOR

A. The sculpted rock company shall have completed at least five (5) permanent sculpted shotcrete projects during the past two (2) years totaling at least 30,000 square feet of shotcreted area.

B. The sculpted rock company's lead sculptor, additional sculptors and lead staining artisan to be used on the project, each shall have experience installing sculpted shotcrete on at least five (5) projects of similar magnitude and difficulty over the past two (2) years. A list containing a summary of each individual's experience may be requested.

C. Work may be suspended by the State if the Contractor uses for sculpting work non-sculpting personnel that do not meet the above requirements.

1.04 SUBMITTALS

A. Stain colors, paints and MSDS data sheets shall be submitted at least two (2) weeks

prior to the beginning of sculpted shotcrete construction. Shotcrete operations shall not commence without prior approval from the Engineer. Shotcrete installed before submittals are approved will be rejected and shall be replaced at the Contractor's expense.

B. Contractor shall produce and submit preconstruction test panels as described in Subsection 2.01 - TEST PANELS. Test panels will be used to validate the competency of the sculpting company and the team selected for this project. No shotcrete work shall begin until the sculpted test panels have been reviewed and approved by the Engineer. Test panels that do not meet the requirements of this section shall be rejected and any additional testing required shall be at the Contractor's expense. Only the sculptors who produce accepted test panels will be allowed to sculpt for this project.

## PART 2 - QUALITY CONTROL/QUALITY ASSURANCE

Throughout the installation of the work of this section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be continuously present at the site whenever work is in progress and shall direct work performed under this section.

In actual installation of the work of this section, use adequate numbers of skilled workmen to ensure installation in strict accordance with the approved design.

In the case of conflict between referenced standards, the more stringent requirement shall govern unless written approval is provided by the Engineer.

### 2.01 TEST PANELS

Test panels shall be produced at the project location and in the presence of the Engineer. Contractor shall notify the Engineer at least three (3) days in advance of shooting and sculpting test panels. For each area of sculpted shotcrete finish, the Engineer will identify a nearby natural rock area to be used as a baseline for color, texture and finish for the sculpted shotcrete finish. Prepare one (1) preconstruction baseline test panel for each proposed finish, for each area. Make test panels at least 30 inches square by 6 inches thick with the same materials and construction as design plans. Test panels shall be produced by the same personnel that will be performing the sculpting of job shotcrete. Test panels shall represent a small section of the finished sculpted surface. The test panel shall be used as a visual reference throughout the construction of the sculpted finish and shall be received and approved by the Engineer before proceeding with the construction.

2.02 MATERIALS

A. Asbestos Prohibition. No asbestos containing materials shall be used under this section. The Contractor shall insure that all materials incorporated in the project are asbestos-free unless specifically approved in writing by the Engineer.

B. Shotcrete Mix Design. See Section 03361 – Shotcrete.

C. Stain. The Contractor must receive notification from the Engineer that the proposed stain color is acceptable. The stains shall consist of a base and accent stain material. The base stain shall be an organic based, non-toxic iron-oxide derivative that provides a spectrum of earth tones. The accent stain shall be hydrochloric acid with chromic, Cupric, Ferrous, Ferric, Manganese chloride stain with Sodium Dichromate.

PART 3 - EXECUTION

3.01 SCULPTING PROCESS

A. Sculpting shall only be performed by the pre-approved staff that produced the accepted test panels. Any sculpting done by unauthorized personnel shall be rejected and replaced at the Contractor's expense.

B. Sculpting and carving of the nozzle-applied shotcrete shall be carved and shaped such that all crevasses shall be created with a slope where water cannot be trapped or puddled on the wall face.

C. Sculpting of shotcrete shall be carved such that finished work shall match an approximate look to that of the test panel.

3.02 SHOTCRETE CURING

Shotcrete curing shall be in accordance with Section 03361 – Shotcrete, subsection 4.08 Curing and Protection.

3.03 SHOTCRETE STAINING

A. All permanently exposed shotcrete surfaces shall be stained. Prior to staining, all permanently exposed shotcrete surfaces shall be cleaned and pressure washed with water to remove latence and provide a clean surface. Sandblasting is not allowed.

B. Application of stain shall be by low pressure sprayer, brush or roller. Shotcrete shall be cured a minimum of 24 hours prior to staining. If staining is done within 7 days of shotcrete application, curing shall continue after application of staining for the remaining

duration of the 7 day cure period.

C. Shotcrete staining shall consist of applying a minimum of two (2) separate applications of at least two (2) multiple stain colors to all sculpted shotcrete such that the sculpted face demonstrates individual color variations and character to match that of the existing field conditions. Staining shall only be performed when the entire sculpting is complete and not performed during sculpting construction. The test panel shall reflect the color variations and patterns of natural rock formations.

D. Staining shall be performed on all portions of the finished surface once it is completed.

E. The first coat shall consist of lighter earth tone. The second application of stain shall consist of darker accent stain to create darker tones and for highlighting.

F. The accent stain shall be applied to replicate a close resemblance to the sculpted test panel. Caution shall be exercised to provide all necessary personal protection to the body during application. The stain material shall produce a spectrum of brown earth tone colors.

G. Shotcrete and staining of the test panel shall be completed at no additional cost to the State.

3.04 FINAL CLEANUP

All equipment wash water shall be contained and disposed of offsite. No wash water shall be dumped on the site. No equipment shall be washed at the project site without proper containment apparatus pre-approved by the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

Sculpted Shotcrete Finish shall be paid for on a lump sum basis. Measurement for payment will not apply. Payment will be in full compensation for the work prescribed in this section and the contract documents including but not limited to labor, color and staining, and shotcrete curing.

The sculpted shotcrete material and test panel shall be measured and paid for according to Section 03361 – Shotcrete.

END OF SECTION

SECTION 03361

SHOTCRETE

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

This section describes furnishing and placing shotcrete (pneumatically applied mortar). Shotcrete consists of pneumatically applied mortar using either the dry-mix or wet-mix process. The Contractor shall place as specified by the design plans or as directed by the Engineer, and supply all materials, equipment, and labor required for the installation of the shotcrete as specified herein.

1.02 SUBMITTALS

The Contractor shall submit in writing to the Engineer, within seven (7) working days after Notice to Proceed, for approval the following items:

A. Submit proposed equipment, manufacturer's specifications, and operating instructions for shotcrete work.

B. Submit specifications, data sheets, and material certifications for all reinforcing members, drain strips, and dowels.

C. Submit ACI certifications for proposed shotcrete nozzle operators.

D. Submit a work plan including equipment washing and final cleanup.

The Contractor shall submit in writing to the Engineer, not less than two (2) weeks prior to the beginning of shotcrete work, for approval of the following items:

E. Submit proposed shotcrete mix design.

For mix design using admixtures, submit the following:

1. Written documentation and supporting data from the manufacturer indicating the admixture attributes.

2. Compressive strength test results, performed by an independent laboratory for the purpose of this project. Results from other projects will not be accepted.

3. Independent certified concrete testing laboratory credentials, concrete inspector's qualifications, and concrete inspector's pass/fail criteria. See Subsection Part 2 – Quality Control/Quality Assurance for details.

## PART 2 - QUALITY CONTROL/QUALITY ASSURANCE

The Contractor shall hire and pay for an independent testing lab to perform all required laboratory tests on shotcrete as described in these documents. For shotcrete with admixtures, Contractor shall hire and pay for a concrete inspector from an independent concrete testing lab for quality control during construction, see Subsection 3.01 – Proportioning, Batching, and Mixing. Concrete inspector and testing lab shall adhere to all applicable ASTM standards and requirements.

### 2.01 PRECONSTRUCTION TESTING

Prepare one (1) preconstruction test panel in accordance with ASTM C 1140 for each proposed mix proportion, each anticipated shooting orientation, and each proposed nozzle operator. Make test panels at least 30 inches square x 6 inches thick. Provide reinforcement of the same size and spacing required for the work. Obtain six (6) test specimens from each panel, as described in Subsection 2.01.1. and 2.01.2. below. Shooting of test panels and all coring shall be performed at the project location in the presence of the Engineer. Contractor shall notify the Engineer at least three (3) days in advance of shooting the test panels. Test panels and core samples produced without the Engineer present shall be rejected and any work required for additional testing shall be at the Contractor's expense. All test results shall be submitted to the Engineer for review and approval prior to placing any shotcrete on site. Job shotcrete placed without the Engineer's written approval of the pre-construction test results shall be rejected and removed/replaced at the Contractor's expense.

1. Three (3) reinforced cores shall be taken from each test panel and sent to the Engineer to be visually graded. Each core shall be taken through a reinforcing member to verify the proper coverage around the reinforcement. The Engineer will visually grade reinforced specimens for conformance to specified core grade as specified in Subsection 2.03 – Shotcrete Core Grade.

   Allow only nozzle operators with test panel mean core grade less than or equal to 2.5 to place job shotcrete. Nozzle operator shall shoot a second test panel if the first test panel is rejected. If nozzle operator's second mean core is greater than 2.5, that nozzle operator will not be permitted to shoot on the project.

2. Three (3) unreinforced cores shall be taken from each test panel and tested for compressive strength to verify shotcrete mix design requirement. Compression testing shall be performed by an independent laboratory

hired and paid for by the Contractor. Test results shall be submitted to the Engineer for review and approval. Testing shall be in accordance with ASTM C 1604/C 1609M.

Panels with cores meeting the compressive strength requirement and acceptable grades will be considered acceptance of the nozzleman upon written approval by the Engineer.

2.02 CONSTRUCTION TESTING

Produce material test panel for each mix and each workday or every 50 cubic yards placed, whichever is less. Keep test panels moist and at 70 degrees F ±10 degrees F until moved to test laboratory. Obtain test specimens either from job site material test panel or from in-place shotcrete. Test specimens from test panels in accordance with ASTM C 1140. Test specimens from in-place shotcrete in accordance with ASTM C 42. The Engineer will grade cores that include reinforcement as specified in Subsection 2.03 - Shotcrete Core Grade.

The mean compressive strength of a set of three cores shall equal or exceed 0.85f'c with no individual core less than 0.75 f'c. The mean of a set of three cubes shall equal or exceed f'c with no individual cube less than 0.88f'c.

2.03 SHOTCRETE CORE GRADE

A. Grade 1:

Shotcrete specimens are solid; there are no laminations, sandy areas or voids. Small air voids with maximum diameter of 1/8 inch and maximum length of 1/4 inch are normal and acceptable. Sand pockets or voids behind continuous reinforcing steel are unacceptable. The surface against the form or bond plane shall be sound, without sandy texture or voids.

B. Grade 2:

Shotcrete specimens shall have no more than two laminations or sandy areas with dimensions not to exceed 1/8 inch thick by 1 inch long. The height, width, and depth of voids shall not exceed 3/8 inch. Porous areas behind reinforcing steel shall not exceed 1/2 inch in any direction except along length of reinforcing steel. The surface against the form or bond plane shall be sound, without sandy texture or voids.

C. Grade 3:

Shotcrete specimens shall have no more than two (2) laminations or sandy areas with dimensions exceeding 3/16 inch thick by 1-1/4 inches long, or one major void, sand

pocket, or lamination containing loosely bonded sand not to exceed 5/8 inch thick and 1-1/4 inches in width. The surface against the form or bond plane may be sandy, with voids containing overspray to a depth of 1/16 inch.

D. Grade 4:

Core shall meet, in general, requirements of Grade 3 cores, but may have two major flaws such as described for Grade 3, or may have one flaw with maximum dimension of 1 inch perpendicular to the face of the core, with maximum width of 1-1/2 inches. The end of the core that was shot against the form may be sandy, with voids containing overspray to a depth of 1/8 inch.

E. Grade 5:

Core that does not meet criteria of core grades 1 through 4, by being of poorer quality, shall be classified as Grade 5.

F. Determine grade by computing the mean of a minimum of three test specimens. Accept mean grade of 2.5 or less. Reject individual shotcrete cores with grade greater than 3.

G. The above core grades are based on cores with surface area of 50 square inches. For cores with greater or lesser area than 50 square inches, adjust allowable flaws relative to 50 square inches.

2.04 EVALUATION OF IN-PLACE SHOTCRETE

Remove and replace shotcrete that is delaminated, exhibits laminations, voids, or sand pockets exceeding limits for specified grade of shotcrete. Remove and replace shotcrete that does not comply with specified material properties. Repair core holes in accordance with ACI 301 Chapter 9. Do not fill holes by shooting.

2.05 ACCEPTANCE

The Engineer will accept shotcrete work that meets requirements of the contract documents. The Engineer will accept shotcrete work that has previously failed to meet one or more requirements, but which has been repaired to meet requirements of the contract documents.

Shotcrete work that fails to meet one or more requirements and that cannot be brought into compliance will be evaluated for acceptance by the Engineer. Modifications may be required to ensure remaining work complies with requirements of the contract documents.

## 2.06 MATERIALS

A. Shotcrete.

Shotcrete mix shall be have a 28 day compressive strength of at least 4,000 psi, and shall contain synthetic fiber reinforcement.

B. Fiber Reinforcement.

Fiber reinforcement shall be 100 percent virgin polypropylene fibrillated fibers specifically manufactured for use as secondary concrete reinforcement, containing no reprocessed olefin materials. Fiber shall comply with ASTM C-1116, Standard Specification for Synthetic Fibers Reinforcement.

Fibers shall have a minimum specific gravity of 0.90 and a minimum tensile strength of 17 ksi. Fiber length shall be minimum 0.75 inch.

Fiber reinforcement shall be added to the shotcrete at a minimum rate of 1.5 pounds per cubic yard of shotcrete materials and mixed in strict accordance with the synthetic fiber reinforcement manufacturer's instructions and recommendations for uniform and complete dispersion.

C. Reinforcing Steel

Reinforcing steel shall be 6 x 6 – W2.9 x W2.9 (or heavier) hot-dipped galvanized welded wire fabric and as specified by the design documents. Wire and wire mesh shall conform to ASTM A1064.

Grouted anchors for shotcrete shall be #8 threaded rebar, grade 75, conforming to ASTM A615 and shall be installed as shown on the plans and as specified in Section 03210-Grouted Anchors. Horizontal and vertical rebar reinforcing shall be #6 bars and be installed as shown on the plans.

Steel reinforcement shall be protected at all times from damage. All reinforcing steel shall be new, free from dirt, detrimental scale, paint, oil, or other foreign substances. Cleaning by sandblasting will not be allowed. All steel shall be kept on pallets and high above the ground and protected as not to allow damage to protective coating.

Reinforcement shall be accurately placed, supported, aligned, and secured against movement. Welded wire fabric shall not be in direct contact with the ground surface at any point. Concrete spacers shall be used where necessary to maintain spacing between the mesh and the slope surface as specified on the plans at no additional cost to the State. Rocks, twigs, and other objects used as spacers will not be accepted.

Splicing of wire mesh shall be made by lapping not less than two (2) mesh squares and securely tied.
No shotcrete shall be placed prior to the inspection and approval of the placement of all reinforcement by the Engineer.

D. Fiber Reinforced Polymer (FRP) Reinforcing Dowels

Fiber reinforced polymer (FRP) reinforcing dowels shall be installed within the shotcrete area as shown on the plans. FRP bars may be made from glass or carbon fibers. Bars shall have a surface treatment that facilitates a bond between the finished bar and shotcrete.

FRP Dowels shall meet the following minimum requirements:

| | | |
|---|---|---|
| Fiber Content: | > 70% by weight | per ASTM D2584 |
| Moisture Absorption: | 1% (max) | per ASTM D570 |
| Void Content: | No Continuous Defects | per ASTM D5117 |

Submit FRP material information to the Engineer for review and approval prior to installation.

E. Geocomposite Drain.

(1) Drain strip shall be a two-part prefabricated soil drain consisting of a formed outer polystyrene core on all sides with a non-woven, needle punched polypropylene filter fabric.

Fabric Properties:

| | | |
|---|---|---|
| Material: | Polypropylene | |
| Grab tensile: | 110 lbs | per ASTM D4632 |
| Puncture: | 65 lbs | per ASTM D4833 |
| Mullen burst: | 215 psi | per ASTM D3786 |
| Elongation: | 60% | per ASTM D4632 |
| AOS Std.: | 100 sieve | per ASTM D4751 |
| Flow rate: | 150 gpm/sq ft | per ASTM D4491 |

Product Properties:

Flow Capacity per unit width: 21 gpm/ln ft per ASTM D4716

Thickness: 1 inch

(2) Geocomposite drain strips shall be 1 foot wide and placed 3 feet center-to-center unless specified otherwise on the plans. If the Contractor needs to cut the drainage

strips along the length to produce the desired width, all work must be in accordance with the manufacturer's approved written directions.

(3) Geocomposite drain shall be suitably wrapped and protected from exposure to direct sunlight.

(4) Geocomposite drains shall be placed in strips and connected in accordance with manufacturer's instructions to maintain continuity of flow channel through the drain. Splices shall overlap a minimum of 6 inches or as recommended by the manufacturer. Splice ends by peeling back the fabric and interlocking the dimpled core. Reattach the fabric and cover with tape.

(5) Geocomposite drains shall be installed to ensure that the drains are hydraulically connected from the top to bottom of the shotcrete. Connect universal tee outlets and weep holes where specified by the design documents, per manufacturer's instructions.

(6) Geocomposite drains shall be attached to the surface by placing geotextile fabric directly against the slope surface. Drain strips shall be secured firmly against the slope surface per manufacturer's recommendations.

(7) Should the geotextile cover fabric become damaged during installation by tearing or puncturing, the damaged section shall be completely cut out and replaced at no additional cost to the State.

(8) Geocomposite drains shall be protected from damage and deleterious contamination where drains must remain exposed until they are covered with embankment or backfill material.

## PART 3 - EXECUTION

Use shotcrete only at locations indicated in the contract documents or ordered by the Engineer. Contractor shall request Engineer inspection of the shotcrete area for proper placement of reinforcing, drainage, etc. prior to shotcrete operations. Contractor shall notify the Engineer of this inspection at least three (3) days in advance of shotcreting. Contractor shall schedule the inspection to have ample time (a full working day at a minimum) to make corrective actions before the shotcrete operation if necessary.

Shotcrete work shall be performed in the presence of the Engineer. Any shotcrete placed without the Engineer present shall be rejected and replaced at the Contractor's expense.

### 3.01 PROPORTIONING, BATCHING, AND MIXING

Batch the quantity of water as specified in mix design accepted by the Engineer for the process used. Proportion mortar ingredients, except water, either by volume or by weight.

Batches requiring fractional sacks will not be allowed unless cement is weighed. Shotcrete shall be placed within 90 minutes from initial batching unless an approved mix design using admixtures validates a longer set time as described below. Otherwise, shotcrete placed that is over 90 minutes old shall not be approved and shall be replaced at the Contractor's expense. Shotcrete shall be in accordance with ASTM C94.

Admixtures may be added to improve set time and workability in which case the shotcrete may be placed within a longer time frame than that specified above. However, the Contractor shall provide, with the initial shotcrete submittal, written documentation and supporting data from the manufacturer indicating the admixture attributes. With every truck load of shotcrete delivered to the job site, the Contractor shall provide specific information and documentation from the batch plant as to the additives the respective quantities that are mixed in that particular batch. This information shall be provided to the Engineer at the time of shotcrete delivery before the shotcrete batch could be considered for approval. In addition, the Contractor shall provide compressive test results, by an independent laboratory, for the proposed mix design with admixture performed for this project and hire a concrete inspector, see paragraph below. Shotcrete operation, including shooting the pre-construction test panels, shall not begin until the proposed mix design and all supplemental information is reviewed and approved by the Engineer.

For shotcrete with admixtures, the Contractor shall provide and hire, at no additional cost to the State, a concrete inspector from an independent certified concrete testing laboratory to monitor properties of the concrete for quality control such as set time, slump, temperature, etc. The concrete inspector shall be present at the site during all shotcrete work and shall validate or reject concrete based on the applicable standards (i.e. set time, slump, temperature, etc.) for the approved shotcrete mix design with admixture. Contractor shall submit the concrete inspector's pass/fail criteria to the Engineer for review and approval prior to shotcrete operation. All rejected shotcrete placed on the job, as determined by the concrete inspector, shall be removed and replaced at the Contractor's expense.

A. Dry-Mix Process.

Thoroughly mix cement and fine aggregate before charging into delivery equipment. Maintain moisture content of fine aggregate between 3 to 6 percent, such that fine aggregate-cement mixture flows at a uniform rate (without slugs) through delivery hose. Any dust resulted from the dry-mix application shall not be allowed to leave the project limits. Contractor shall demonstrate at the site that his/her dry-mix operation will result in no release of cement dust.

B. Wet-Mix Process.

Mix material at central mixing plant or at project site. If mixing is done at project site,

use mixer capable of thoroughly mixing specified materials in sufficient quantity to maintain continuous shotcrete placement.

C. Fiber-Reinforcement.

Fiber reinforcement shall be added to the shotcrete at the minimum rate of 1.5 pounds per cubic yard of shotcrete materials and mixed.

3.02 SHOTCRETE PROCESS- GENERAL

Use either dry-mix or wet-mix shotcrete process as follows:

A. Dry-Mix Process.

1. Mix cement and fine aggregates thoroughly.

2. Feed cement-fine aggregate mixture into special mechanical feeder (gun) or other delivery equipment accepted by the Engineer.

3. Meter mixture into delivery hose by feed wheel or distributor.

4. Convey mixture by compressed air through delivery hose to special nozzle. Fit nozzle with perforated manifold capable of introducing water under pressure and thoroughly mixing water with other ingredients.

5. Jet mortar from nozzle at high velocity onto shotcrete-receiving surface.

Contractor shall shoot sample shotcrete so that the Engineer can check the consistency of the material prior to installation of job shotcrete. Sample shotcrete shall not be placed within areas designated for job shotcrete.

B. Wet-Mix Process.

1. Mix ingredients thoroughly, as specified in Subsection 3.01 A. – Dry-Mix Process, including water.

2. Introduce mortar into delivery equipment chamber.

3. Meter mortar into delivery hose and convey mortar to nozzle by compressed air or by other means.

4. Inject additional air at nozzle to increase velocity and improve gunning pattern.

5. Jet mortar from nozzle at high velocity onto the shotcrete-receiving surface.

3.03 EQUIPMENT

Operate equipment in accordance with manufacturer's recommendations.

A. Dry-Mix Process.

Provide mixing equipment that will mix ingredients thoroughly and continuously.

Discharge fine aggregate-cement mixture into delivery hose in a manner that ensures delivery of a continuous, smooth stream of uniformly mixed material at proper velocity to discharge nozzle.

Equip discharge nozzle with manually operated water injection system (water ring) for directing even distribution of water through fine aggregate-cement mixture. Provide water valve capable of adjusting quantity of water delivered to nozzle. Locate water valve to enable nozzle operator to instantaneously adjust water volume as necessary during shotcrete application.

Deliver conical discharge stream of uniform appearance. If stream distortion or nonuniform appearance is noted, suspend shotcrete application until uniform shotcrete discharge is restored.

Use adequate supply of clean air to maintain required nozzle velocity and simultaneous blowpipe operation for removing rebound.

Supply water at uniform pressure of at least 15 pounds per square inch greater than operating air pressure at the nozzle. Use water booster pump to provide required pressure if line water pressure is inadequate.

B. Wet-Mix Process**.**

Provide wet-mix delivery equipment of design and size that has produced satisfactory results in similar work. Use wet-mix equipment that has adequate capacity to deliver pre-mixed materials accurately, uniformly, and continuously through delivery hose. Follow manufacturer’s recommendations regarding:

1. Type and size of nozzle.

2. Cleaning equipment.

3. Inspecting equipment.

4. Maintaining equipment.

Provide air compressor capable of performing as specified in Subsection 3.03 A. - Dry Mix Process and wet-mix equipment manufacturer's recommendations.

## PART 4 - SURFACE PREPARATION

Perform general clearing of the slope including the removal of vegetation within the shotcrete limits prior to applying shotcrete in accordance with Section 02150 – Clearing.

### 4.01 EARTH

A. Subgrade. Dampen surface immediately before shooting with sufficient moisture to provide firm foundation and to prevent absorption of water from the mortar, but without free surface water.

B. Steel. Remove loose mill scale, rust, oil, paint, or other contaminants by sandblasting or other methods. Prepare surface in accordance with SSPC-SP6.6. If high-pressure water blasting is used, remove all freestanding water before applying shotcrete.

C. Rock. Remove loose material, mud, or other foreign material that will prevent bonding. Clean and pre-wet surface immediately before applying shotcrete.

D. Forms. If forms are to be removed after use, apply form-releasing coating material on forms. Use coating material that does not alter shotcrete properties or interfere with bond of subsequent shotcrete layers. Secure forms to minimize effects of vibration. Construct forms to allow escape of placement air and rebound.

### 4.02 CREW QUALIFICATIONS

Nozzle operators shall possess an ACI Shotcrete Nozzleman certification and have at least two (2) years of experience in this type of work. Nozzle operator may be apprentice with at least six (6) months of experience if supervised by a foreman with at least two (2) years of nozzle operator experience. Apprentice nozzle operators shall possess an ACI Shotcrete Nozzleman-in-Training certification. All nozzle operators shall be ACI certified in wet mix or dry mix process, depending on the method the Contractor chooses to place job shotcrete. All ACI certifications shall be valid. Shotcrete shall only be placed by the ACI certified nozzle operators that were approved for this project. Any shotcrete placed by a non-approved operator shall be rejected and replaced at the Contractor's expense.

### 4.03 ALIGNMENT CONTROL

Provide joints, side forms, headers, and shooting strips for backing or paneling. Place

in a manner that minimizes trapping of rebound. Install ground wires as guides to establish thicknesses, surface planes, and finish lines. Maintain wires taut and true to line at all times during shotcreting application.

4.04 GUNNING

Place shotcrete first in corners, recesses, and other areas where rebound or overspray cannot escape easily. Place shotcrete with nozzle held approximately perpendicular to receiving surface. In corners, direct nozzle at approximately 45-degree angle or bisect corner angle. Build up each layer by making several passes of the nozzle over specified surface. Apply shotcrete from nozzle in steady, uninterrupted flow. Should flow become intermittent, direct flow away from work area until steady, uninterrupted flow is restored.

In gunning walls, apply mortar beginning at the bottom. Build first layer up to thickness that will embed reinforcement, without sagging. Remove slugs, sand spots, and wet sloughs. Resurface affected areas as the work progresses. Allow each layer ample time to set. Remove rebound material from each layer before applying next layer. If final set has taken place, wet down area before next application.

Suspend gunning if high winds prevent nozzle operator from properly applying shotcrete or if rain washes out or causes shotcrete to slough.

4.05 REBOUND

Remove rebound or overspray from previously prepared surfaces prior to shotcrete placement. Reuse of rebound or overspray will not be allowed.

4.06 CONSTRUCTION JOINTS

Form construction joints by tapering to a 1-inch edge over a distance of 12 inches, where joints are not subject to compression loads. Use square construction joints in areas subject to compression loads. Clean construction joints thoroughly and saturate surface of construction joints surface dry immediately before applying shotcrete.

4.07 FINISHING

Exposed surfaces shall have sculpted shotcrete finish similar in shape, color and texture to the adjacent rock slope and as specified by the design documents. See Section 03250 – Sculpted Shotcrete Finish.

4.08 CURING AND PROTECTION

A. All shotcrete shall be cured for a period of not less than seven (7) days by one of the

methods listed below. During this curing period, the shotcrete shall be maintained with minimal moisture loss at a relatively constant temperature. Fresh shotcrete shall be protected from heavy rains, flowing water, mechanical injury, and injurious action of the sun. Curing method selected must be compatible with the finish to be applied to the shotcrete.

Curing shall immediately follow the finishing operation.

Cure by one of the following methods:

B. Water Curing: If cured with water, shotcrete shall be kept wet by mechanical sprinklers, by ponding, or by any other method which will keep the surfaces continuously wet.

C. Saturated Sand Curing: Surfaces cured with sand shall be covered with a minimum of one inch thickness of sand which shall be kept uniformly distributed and continuously saturated during the entire curing period.

D. Curing Compounds: Curing compounds shall not be used on shotcrete surfaces that are to receive paint finish, acid stain or resilient flooring, except those that are recommended by the manufacturer to be compatible with the applied finish. The Contractor shall submit to the Engineer a letter certifying that the curing compound is compatible with the applied finish. Application shall be in accordance with the manufacturer's recommendations. If curing, sealing or other compounds are used which are incompatible with applied finish, such compound shall be thoroughly removed by grinding with a terrazo grinder.

E. Waterproof Paper: Waterproof paper or opaque polyethylene film conforming to ASTM C171 may be used. The paper or film shall be anchored securely and all edges sealed or applied in such a manner as to prevent moisture escaping from the shotcrete.

4.09 FINAL CLEANUP

All work area, including surrounding vegetation, soil and rock surfaces, shall be clean and free of shotcrete or cement residue, wet or dry. All surplus earth resulting from construction shall be cleaned up and disposed. All debris resulting from work of this section shall be removed from the site.

All equipment wash water shall be contained and disposed of offsite. No wash water shall be dumped on the site. No equipment shall be washed on the adjacent roadway without proper containment apparatus that is pre-approved by the Engineer.

## PART 5 - MEASUREMENT AND PAYMENT

Shotcrete installation shall be measured and paid for per cubic yard in accordance with the contract documents, inclusive of all structural and sculpted shotcrete material, horizontal and vertical reinforcement, geocomposite drains, FRP reinforcing dowels, labor, equipment, surface preparation, testing, and inspection.

Grouted Anchors for Shotcrete shall not be paid for under this section. See Section 03210 – Grouted Anchors for Shotcrete.

Sculpting of Shotcrete Finish shall not be paid for under this section. See Section 03250 – Sculpted Shotcrete Finish.

END OF SECTION