

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF BOATING AND OCEAN RECREATION
Honolulu, Hawaii

BOARD OF LAND AND NATURAL RESOURCES

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Acting Chairperson

CONTRACT SPECIFICATIONS AND PLANS


Job No. MA25-04
Lahaina Small Boat Harbor Ramp Removal & Bulkhead Extension
Lahaina, Maui, Hawaii


May 2026

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Approved: 
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May 2026

CONTENTS

NOTICE TO BIDDERS	iii
INFORMATION AND INSTRUCTIONS TO BIDDERS	I-1
SPECIAL PROVISIONS.....	SP-1
TECHNICAL SPECIFICATIONS	S-1
PROPOSAL (attached separately)	
DEPARTMENT OF LAND AND NATURAL RESOURCES INTERIM GENERAL CONDITIONS, DATED OCTOBER 1994 (attached separately)	
GENERAL CONDITIONS AG-008 (attached separately)	

NOTICE TO BIDDERS

(Chapter 103D, HRS)

COMPETITIVE SEALED BIDS for Job No. MA25-04, Lahaina Small Boat Harbor Ramp Removal & Bulkhead Extension, Lahaina, Maui, Hawaii may be submitted to the Department of Land and Natural Resources, Division of Boating and Ocean Recreation, Engineering Branch on the specified date and time through the State of Hawaii e-Procurement System (HIePRO).

The Department of Land and Natural Resources Interim General Conditions dated October 1994, as amended is available on request; and the General Conditions – AG008, latest revision shall be made a part of the specifications. Electronic copies of the General Conditions is available on the HIePRO site.

The project is located at Lahaina Small Boat Harbor, Lahaina, Maui, Hawaii.

The purpose of this Invitation for Bids (IFB) is to award to a Contractor work that shall generally consist of removal of the existing boat ramp and adjacent rock revetment and extension of the sheet pile wall bulkhead at Lahaina Small Boat Harbor.

Due to the nature of work contemplated, bidders must possess a valid State Contractor's license, Classification "A".

The estimated cost of construction is \$1,300,000.

As a condition for award of the contract and final payment, the vendor shall provide proof of compliance with the requirements of 103D-310(c) HRS. Proof of compliance/documentation is obtained through Hawaii Compliance Express (HCE). Vendors shall register in Hawaii Compliance Express (HCE), a program separate from HIePRO. The annual subscription fee to utilize the HCE service is currently \$12.00. Allow 2 weeks to obtain complete compliance status after initial registration. It is highly recommended that vendors subscribe to HCE prior to responding to a solicitation. The vendor is responsible for maintaining compliance. If the vendor does not maintain timely compliance in HCE, an offer otherwise deemed responsive and responsible may not be awarded.

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

The Engineering Branch Head is responsible for administering and overseeing the Contract, including monitoring and assessing contractor performance.

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

Should there be any questions, please use the question and answer section of the HIePRO solicitation.

INFORMATION AND INSTRUCTIONS TO BIDDERS

CONTENTS

		<u>Page</u>
A	Project Location and Scope of Work	I-2
B	Sealed Proposals	I-2
C	General Conditions	I-2
D	Proposal Form	I-2
E	Omissions or Erasures	I-2
F	Notice of Intent to Bid and Questionnaire	I-2
G	Bid Security	I-2
H	Contractor's License Required	I-2
I	Irregular Bids	I-3
J	Withdrawal of Bids	I-3
K	Successful Bidder to File Performance and Payment Bonds	I-3
L	Number of Executed Original Counterparts of Contract Documents	I-3
M	Change Orders	I-3
N	Wages and Hours	I-3
O	Permits	I-3
P	Property Damage	I-4
Q	Time	I-4
R	Bidder's Responsibility to Provide Proper Superintendence	I-4
S	Liquidated Damages	I-4
T	Hiring of Local Labor	I-4
U	Water and Electricity	I-4
V	Public Convenience and Safety	I-5
W	Work to be Done Without Direct Payment.....	I-5
X	As-Built Drawings	I-5
Y	Asbestos Containing Materials	I-5
Z	Worker Safety	I-5
AA	Toilet Facilities	I-5
BB	Signs	I-5
CC	Field Office for Department	I-6
DD	Quantities	I-6
EE	Other Health Measures	I-6
FF	Hawaii Business Requirement	I-6
GG	Compliance With §3-122-112 HAR	I-6

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. SEALED PROPOSALS: **Not applicable. See 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 standard questionnaire. When required, 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. **No bid security is required for bids less than \$50,000.**
- 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. This project will require a Class "A" contractor's license.

- 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. **Performance and payment bonds are not required for bids less than \$50,000.**
- 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. **For contracts less than \$50,000, the State reserves the right to contract the work under a purchase order.**
- 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 Contractor shall procure all required project permits and pay the required

fees, including hiring consultants and payment thereto for services related to obtaining required permits if required. 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 LOCAL LABOR: The Contractor shall hire local labor whenever practicable.

- 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 by the Contractor at the end of the project in both hard copy and 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.

- CC. FIELD OFFICE AREA FOR DEPARTMENT: **Not required for this project.**
- 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 the contactor shall be in compliance with the following requirements:
- 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.

COMPLIANCE, DOCUMENTATION AND HAWAII COMPLIANCE EXPRESS

As a condition for award of the contract and as proof of compliance with the following requirements of 103D-310(c) HRS:

Vendors are required to be compliant with all appropriate state and federal statutes. Proof of compliance (compliance documentation) is required. See the HIePRO Buyer FAQ on the State Procurement website for more information.

Proof of compliance/documentation is obtained through Hawaii Compliance Express (HCE). Vendors shall register in Hawaii Compliance Express (HCE), a program separate from HIePRO. The annual subscription fee to utilize the HCE service is currently \$12.00.

Allow 2 weeks to obtain complete compliance status after initial registration. It is highly recommended that vendors subscribe to HCE prior to responding to a solicitation.

The vendor is responsible for maintaining compliance. If the vendor does not maintain timely compliance in HCE, an offer otherwise deemed responsive and responsible may not be awarded.

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.hawaii.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 replacing the last paragraph with the following:

In the event the Notice to Proceed is not issued within three hundred and sixty-five (365) days after the date of bid opening, the Contractor may submit a claim for increased labor and materials costs (but not overhead costs) that will be incurred after 365 days after the date of bid opening plus the contract time allowed for performance of the work. Such claims shall be accompanied with the necessary documentation to justify the claim. No payments will be made for escalation costs that are not fully justified as determined by the State.

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. INSURANCE REQUIREMENTS

1. **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.
2. 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.
3. 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.

4. 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.
5. All insurance described herein shall 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.
6. 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.
7. 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.
8. 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.
9. In addition, the Contractor's insurance policies shall contain the following clauses:
 - (a) The State of Hawaii is added as an additional insured with respect to operations performed for the State of Hawaii.
 - (b) It is agreed that any insurance maintained by the State of Hawaii will apply in excess of, and not contribute with, insurance provided by this policy.
- 10. 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 contract. 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 commercial general liability insurance shall include the State as an additional insured. The required limit of insurance may be provided by a single policy or with a combination of primary and excess policies.
- (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 State shall be named as additional insured. The required limit of insurance may be provided by a single policy or with a combination of primary and excess policies.

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 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.

TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS	SECTION NO.
<i>DIVISION 1 - GENERAL REQUIREMENTS</i>	
General Specifications	01019
Submittals	01300
Mobilization and Demobilization	01505
Barricades	01530
Environmental Control	01567
<i>DIVISION 2 - SITEWORK</i>	
Site Demolition and Removal	02050
Steel Sheet Piles	02260
Dredging	02281
Stone Material and Revetment Placement	02485
Permanent Tie Back Anchors	02500
<i>DIVISION 3 - CONCRETE</i>	
Cast-in-Place Concrete and Reinforcement	03300
<i>DIVISION 5 - METALS</i>	
Structural Steel	05120

SECTION 01019 – GENERAL SPECIFICATIONS

PART 1 - GENERAL

1.1 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.

1.2 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 Engineer and obtain permission before visiting the site.
- C. Notices: The Contractor shall notify the Engineer and give at least three (3) working days notice before starting any work.
- D. Conditions at Site: Every person bidding on this project is expected to visit the site and examine the conditions and satisfy themselves as to the character and amount of the work to be performed as indicated on the drawings and called for by the specifications. No additional cost will be granted because of the lack of knowledge of such conditions.
- E. Disruption of Utility Services: All work related to the temporary disconnection of electrical systems 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.
- F. 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 with 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 for the user agency personnel and the public at all times.
- G. Parking Policy for Contractor:
1. The Contractor and its employees will not be allowed to park in zones assigned to facility personnel.
 2. Areas to be used by the Contractor shall be as designated by the Engineer. Any lawn and pavement damaged by the Contractor shall be restored as instructed by the Engineer at no cost to the State.
- H. Toilet Accommodations: The Contractor may use the existing toilet facilities if so designated by the Engineer; however, it is the Contractor's responsibility to keep same clean and in a sanitary condition at all times.
- I. 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 damage resulting from its operations.
- J. 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.
- K. 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, as applicable and made part of the Contract. The Contractor shall ensure to coordinate access to for emergency vehicles and vessels with local officials and the harbor master. Emergency vehicles and vessels shall have access to the facilities as needed in case of emergency.
- L. 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.
- M. 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.
- N. 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.
- O. Division of the Work: The Divisions and Sections into which the 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.
- P. 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, 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.
- Q. Required Submittals:
1. Required submittals as specified in the Technical Sections of these Specifications include one or more of the following: technical data; schedules of operations; Environmental Protection Plan, which shall include a Best Management Plan (BMP).
 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 on the plans shall be recorded in red on the as-built drawings.
- c. The following procedures 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 (2) 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 drawings 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.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 – GENERAL

1.1 SUBMITTALS

A. Product information shall be required for:

1. Section 02600 – Drainage System
2. Section 03330 – Cast-in-Place Concrete
3. Section 03400 – Precast Concrete
4. Section 10300 – Fiberglass Reinforced Plastic
5. Any others as called for in the plans and specifications or by the Engineer

B. Other required submittals shall include:

1. Shop drawings
2. Manufacturer's data
3. Written notifications
4. Certificates
5. Test reports
6. Any others as called for in the plans and specifications or by the Engineer

C. Field Record Drawings "As-Built":

1. Submit Field Record Drawings "As-Built".

1.2 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 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 review eight copies of all shop drawings, piping layout, and/or catalog cuts for fabricated items and manufactured items (including mechanical and electrical equipment) 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/she shall state in his/her 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.
- 1.3 FIELD RECORD DRAWINGS “AS-BUILT”
- A. The Contractor shall have Field Record Drawings at the site at all times. The Contractor shall keep a current complete set of full size contract drawings which will serve as Field Record Drawings showing as applicable to every architectural, structural, plumbing, fire protection, mechanical, and electrical, change from the original Contract Documents, including all amendments, post contract documents (PCD), Change Orders, job decisions, revised information from toning operations, etc. The intent of Field Record Drawings is to record the actual in place construction so that any future renovations or tie-ins can be anticipated accurately.
 - B. All deviations, changes, invert, location, etc. from alignment, elevations and dimensions which are stipulated on the Drawings and Shop Drawings, Specifications, amendments, post contract documents (PCD), Change Orders, job decisions, etc. during construction of the

work shall be recorded on the Field Record Drawings before subsequent work conceals the applicable item.

C. The following procedure shall be followed:

1. Immediately after these changes are constructed in place or changed conditions are found, the Contractor shall record them on the Field Record Drawings. This is to ensure that changes are recorded before they are forgotten or concealed.
2. Field Record Drawings shall also record the location of all concealed water and electric services, water piping, sewers, wastes, vents, ducts, conduit and other piping, by indication of measured dimensions to each such line from readily identifiable and accessible walls, columns, partitions, or corner of the buildings.
3. The Contractor shall check all the changes and stamp or mark the Field Record Drawings, "AS-BUILT", and also sign and date each drawing as marked.
4. The Contractor shall submit an accurate, clearly legible copy of the Field Record Drawings, "AS-BUILT", to the State after the punch list corrections have been accepted.
5. Any Field Record Drawings, "AS-BUILT", which the State determines does not accurately record the deviation shall be corrected by the Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01505 – MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

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.

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

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 **GUIDELINES:** If the Contractor utilizes private lands other than the sites provided by the State 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.

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

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

PART 4 - MEASUREMENT AND PAYMENT

Mobilization and demobilization will not be measured for payment. Payment for completion of work required under this Section, including all labor, materials, tools, equipment and all incidentals necessary to accomplish the work, shall be the lump sum bid for mobilization and demobilization, not to exceed 10% of the total sum bid.

END OF SECTION

SECTION 01530 – BARRICADES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

Description: This work shall consist of furnishing, installing and maintaining barricades in accordance with the requirements of the contract.

Barricade application shall be provided for in the latest edition of the FHWA publication, Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), and as amended.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber: Lumber for rails, frames and braces shall be dry, sound, undamaged, well seasoned, and free from any defect which may impair their strength and durability.
- B. Hardware: Nails shall be galvanized wire nails. As many and as large a size as is practicable shall be used.
- C. Paints: Paints shall be exterior enamel paint of the best grade or first line as made by approved manufacturers.
- D. Sheet Reflecting Material: Sheet reflecting material shall conform to the applicable requirements of Subsection 750.07(C) of the "Standard Specifications for Road and Bridge Construction", Hawaii Standard Specifications, 2005.
- E. Alternate Designs: Alternate barricade designs such as plastic molded barricades may be used subject to the Engineer's approval. The Contractor shall submit shop drawings or catalog cuts for approval.

PART 3 - EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

- A. General: Barricades shall be constructed in a first-class, workmanlike manner in accordance with details shown on the plans and as specified herein.

Barricades shall be in good condition and approved by the Engineer for use within the project limits. Barricade application and installation shall be as shown on the plans and as directed by the Engineer in accordance with the guidelines provided in the latest edition of the FHWA publication, Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), and any amendments or revisions thereof as may be made from time to time.

Sandbags or other approved weights shall be provided where required or as directed by the Engineer. Sandbags or other approved weights shall not be placed on any striped barricade rail.

Steady burn and/or flashing lamps shall be required on selected barricades used during hours of darkness. Locations shall be as shown on the plans and as directed by the Engineer. Lamps shall be attached on the barricade ends closest to the traveled way and shall be visible to the motorist.

Barricades furnished and paid for as provided herein may be used for temporary detours, construction phasing, or other temporary traffic control work.

Barricades furnished and paid for use in temporary detours or construction phasing may be used for permanent locations called for on the plans.

Upon completion of the construction work, barricades shall be left in place, relocated, or removed and disposed of as shown on the plans or as directed by the Engineer. Barricades left in place or relocated to new permanent locations shall become the property of the State. Barricades directed to be removed and disposed of shall become the property of the Contractor.

- B. Painting: Wooden rails, frames and braces shall be given a prime coat and 2 finish coats of new, white, exterior enamel paint. Rail faces to be reflectorized may be left unpainted unless otherwise specified or directed.
- C. Reflectorization: Reflectorization of barricade rails shall be done in a first-class, workmanlike manner and the attachment of reflective sheeting shall be as shown on the plans, specified herein, or as directed and approved by the Engineer.

Both vertical faces of each barricade rail shall be reflectorized as shown On the plans. Wooden rails shall be reflectorized with one of the following:

- 1. Reflective sheeting specified in Subsection 750.07(C) of the "Standard Specifications for Road and Bridge Construction", Hawaii

Standard Specifications, 2005.on 0.063-inch sheet aluminum backing.

D. Color: Rails, frames and braces shall be white.

The front and back faces of barricade rails shall have 6-inch wide alternative colored and white stripe sloping downward toward the traveled way at an angle of 45 degrees with the vertical. The colored stripes shall be either orange or red in accordance with the following requirements:

1. Orange and white stripes shall be used in the following conditions:
 - a. Construction work
 - b. Detours
 - c. Maintenance work
2. Red and white stripes shall be used in the following conditions:
 - a. On roadways with no outlet (i.e.. dead-ends, cul-de-sacs)
 - b. Ramps or lanes closed for operational purposes
 - c. Permanent or semipermanent closure or termination of a roadway

E. Maintenance: Barricades shall be kept in good condition throughout their usage during construction until the end of the contract.

F. The Contractor shall repair, repaint, clean or replace the barricades as required and as directed by the Engineer to maintain their effectiveness and appearance.

The Constructor shall immediately replace all lost, stolen or damaged barricades, lamps, sandbags and other approved weights.

Barricades used during construction phasing, temporary detours or other temporary traffic control work shall be cleaned and repaired as necessary prior to being relocated to a permanent location shown on the plans or as directed.

No extra payment will be made for any repair work, repainting, or cleaning of barricades. The Engineer shall determine the suitable condition of each barricade and shall determine when each barricade shall be repaired, repainted or cleaned.

3.2 MEASUREMENT AND PAYMENT

Barricades will not be measured nor paid for separately but shall be considered incidental to and included in the prices bid for the various items of work in this project.

END OF SECTION

Barricades
01530-8

SECTION 01570 – ENVIRONMENTAL CONTROL

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

With the exception of those measures set forth elsewhere in these specifications, environmental protection shall consist of the prevention of environmental pollution as the result of construction operations under this contract. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utilization of the environment for aesthetic and recreational purposes.

The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noises, solid waste, radiant energy and radioactive materials, as well as other pollutants.

Contractor shall provide and maintain, during the life of the contract, environmental protection as defined; plan for and provide environmental protective measures to control pollution that develops during normal construction practice; and comply with Federal, State, and County regulations pertaining to the environment including, but not limited to, water, air, and noise pollution.

A. The work under this section shall include the following:

1. Ensure that all required permits are obtained and valid for the construction period. Permits may include, but are not limited to:
 - a. Section 10 U.S. Army Corps of Engineers permit.
2. Provide all air and water quality testing and monitoring work required by the permits during construction.
3. Provide all facilities, equipment and structural controls for minimizing adverse impacts upon the environment during the construction period.

1.2 SUBMITTALS

Environmental Protection Plan: Within thirty (30) days after the award of the contract, the Contractor shall submit an environmental protection plan. Prior to starting work, the Contractor shall meet with the Engineer to develop mutual understanding relative to compliance with this provision and administration of the environmental protection program. Approval of the Contractor's plan will not relieve the Contractor of their responsibility for

adequate and continuing control of pollutants and other environmental protection measures. The environmental protection plan shall include Best Management Practices (BMPs) to protect resources needing protection (i.e. landscape features, air and water quality, fish and wildlife, etc.); procedures to be followed to correct pollution of the environment due to accident or failure to follow the procedures set out in the environmental protection plan; inspection and maintenance of pollution control measures; monitoring and photo documentation of the work site. Refer to any Nationwide Permit Verification, the conditions of which shall be incorporated in the projects Environmental Protection Plan.

Daily Field Reports: Daily Field Reports (DFRs) shall be submitted to the Engineer on a weekly basis. DFRs shall identify the work activities, equipment and labor; condition of pollution control measures; monitoring and photo documentation of the work site as appropriate.

1.3 DESCRIPTION OF WORK

Applicable Regulations: In order to provide for abatement and control of environmental pollution arising from the construction activities of the Contractor and their subcontractors in the performance of this contract, the work performed shall comply with the intent of the applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement, including, but not limited to the following regulations:

1. State of Hawaii, Department of Health, Administrative Rules, Chapter 55, WATER POLLUTION CONTROL: Chapter 54, WATER QUALITY STANDARDS.
2. State of Hawaii, Department of Health, Administrative Rules, Chapter 59, AMBIENT AIR QUALITY: Chapter 60, AIR POLLUTION CONTROL LAW.
3. State of Hawaii, Department of Health, Administrative Rules, Chapter 44A, VEHICULAR NOISE CONTROL.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 ENVIRONMENTAL PROTECTION PLAN

- A. Before commencement of the work, the Contractor shall submit in writing a plan for implementing the requirements of this section for Environmental Controls, including training for their personnel during the construction period. Work shall not commence until acceptance of the plan by the Engineer. Acceptance of the Contractor's plan will not relieve the Contractor of their responsibility for adequate and continuing environmental controls specified herein.
- B. The Environmental Protection Plan shall contain the following items, as a minimum:

1. The Contractor's plan for mitigation measures to control turbidity in the harbor basin, in the event that turbidity measurements exceed State Water Quality Standards.
 2. The name of the Contractor's designated individual responsible for all environmental monitoring and reporting. The individual's name and contact telephone numbers will also be provided to the Corps of Engineers, U.S. Fish and Wildlife Service, U.S. Coast Guard, and National Marine Fishery Services prior to construction activities.
 3. The Contractor's plan to inform employees about the endangered Hawaiian stilt.
 4. The Contractor's plan for fuel storage, spill prevention, and cleanup.
 5. The Contractor's plan for dust control measures.
- C. The Contractor shall be responsible for compliance with the Environmental Protection Control Plan and provisions of this section by all subcontractors and suppliers.

3.2 BEST MANAGEMENT PLAN (BMP)

The Contractor shall prepare their Best Management Plan (BMP). The Contractor shall comply with the terms of the BMP throughout the construction period. A copy of the accepted BMP shall be submitted to the Engineer.

The BMP shall as a minimum include the following:

1. The contractor shall abide by all applicable Federal, State, and Local Environmental Protection Standards, Laws and Regulations, including the Best Management Practices plans utilizing Army Corps of Engineers Nationwide Permits, and Hawaii Administrative Rules, Title 11 Department of Health, Chapter 55, Water Pollution Control.
2. To the extent practicable, work in the aquatic environment must be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods. Coordinate with U.S. Fish and Wildlife Service to identify these time periods.
3. The contractor shall provide protective measures to capture all debris from demolition and construction activities and ensure that petroleum products or other deleterious materials are not allowed to enter the water.
4. The contractor shall take measures to prevent sediment runoff from areas disturbed by construction activities from entering the water.
5. The contractor shall install temporary sediment control filter at any affected drain inlets before any work commences. Sediment control filters shall remain until after completion of construction activities.
6. The contractor shall use water-depth silt curtains to enclose the work area to control turbidity and reduce the anticipated effects of suspension of disturbed sediments during dredging work.
7. The contractor will capture and dispose of all newly generated waste above water. Solid waste shall be picked up and placed in containers that are regularly emptied. Site contamination shall be

- prevented when handling and disposing of all wastes. The project site shall be cleaned up at the end of each working day to prevent debris from entering the water.
8. No contamination of adjacent waters of the United States, including special aquatic sites, shall result from project-related activities. Special attention must be paid to fouling on barges, vessels, and equipment to minimized transport and potential introduction and spread of aquatic non-native species
 9. The contractor shall ensure all tires of construction vehicles are cleaned off so that dirt or debris is not tracked off the construction site. Washing off tires with water will not be accepted unless the wash runoff is contained and does not enter state waters.
 10. All project related materials and equipment to be placed in any aquatic environment shall be inspected and cleaned of pollutants, organic matter, and invasive species prior to use in any aquatic environment.
 11. Project related materials shall not be stockpiled in the aquatic environment or in close proximity such that materials could be carried into waters by wind, rain, or high surf.
 12. Fueling of project-related vehicles and equipment shall take place away from the water and a contingency plan to control petroleum products accidentally spilled during project activities shall be developed. Absorbent pads and containment booms shall be stored to facilitate the clean-up of accidental petroleum releases.
 - a. Oil or other hazardous substances shall be prevented from entering the ground, drainage area, or local bodies of water. All temporary fuel oil or petroleum storage tanks shall be contained to prevent accidental release. Fueling and lubrication of equipment and motor vehicles shall be conducted in a manner to protect against leaks or spills, lubricants and excess oil will be disposed in accordance with applicable Federal, State and Local Regulations.
 - b. All equipment shall be inspected daily for leaks. Any leaks shall be corrected before equipment is used.
 - c. One spill kit each shall be kept on board the work barge and the landside staging area in case of accidental release of any petroleum products.
 - d. All major spills shall be reported to the National Response Center (Phone: 800-424-8802), United States Coast Guard (Phone: 808-522-8264), State Department of Health Hazard Evaluation and Emergency Response Office (Phone: 808-586-4249).
 13. The contractor shall submit a site-specific Best Management Practices Plan (BMPP) to the Engineer before in-water activities begin. The name and contact information of the designated Point of Contact (POC) for all in-water activities shall be provided in this BMPP. The POC shall ensure that daily visual inspection of the construction site and its environs are conducted to verify that the permitted activities do not result in uncontrolled adverse environmental impacts and that, where environmental harm occurs, it is minimized to the maximum extent practicable. Visual inspections shall be documented with photographs and written descriptions, if necessary. The BMPP shall include measures that:
 - a. In-water activities shall employ, as practical and feasible as possible, sound attenuation measures which shall minimize the intensity and duration of percussion impacts through the aquatic environment.
 - b. Mechanized equipment and construction materials shall be clean, decontaminated and

- free of deleterious substances, including toxic chemicals and clay-coated material.
- c. An Oil Spill Response Plan (OSRP) which details procedures for managing the accidental release of petroleum products to the aquatic environment during removal and installation of new pier structures. No contamination of the marine environment shall result from the permitted activities. Particular care in accordance with the site-specific BMPP must be taken to ensure that no petroleum products, trash, or other debris enter nearshore waters. When such material is found within the operating area, the contractor shall collect and dispose this material at a construction and demolition landfill.
 - d. Protocol and operations measures for the avoidance and protection of green sea and loggerhead turtles and other protected species in active, mechanized equipment and boat areas of operation shall incorporate the following site-specific avoidance and mitigation measures:
 1. Visual surveys shall be made prior to the start of work each day, and periodically during the day, including prior to resumption of work following any break of more than one hour to ensure that no protected species are in the project areas (typically within 50 yards of the work activity).
 2. All in-water work shall be postponed or halted when ESA-listed marine species are present and will only begin or resume after the animals have voluntarily departed the area. In case of sessile species, a conversation plan shall be developed and approved between the Regulatory Branch, U.S. Army Corps of Engineers (Phone: 808-835-4303) and U.S. Fish and Wildlife Service-Pacific Islands Fish and Wildlife Office (PIFWO) (Phone: 808-792-9400) and/or National Marine Fisheries Service Pacific Islands Regional office (PIRO)(Phone: 808-725-5000)
 3. If any listed species enters the area during construction activities, all activities shall cease until the animals voluntarily depart the area.
 4. If an on-site protected species does not depart the area on its own for three or more days, contact PIFWO (808-792-9400) for technical assistance and guidance.
 5. All on-site project personnel shall be apprised of the status of any listed species potentially present in the project area and the protections afforded to those under federal law. The POC shall be familiar with laws and regulations governing listed species in Hawaii, and shall ensure that protocols avoid the potential for contact or harassment with ESA species of record are followed during all periods of in-water work.
 6. The contractor shall designate their own personnel(s) to survey the area adjacent to the proposed action for protected species. The contractor shall also have in their possession at the job site a handout, from the U.S. Fish and Wildlife Service-Pacific Islands Fish and Wildlife Office (PIFWO), with photographs of protected species that

may enter the construction site to assist with identification of the protected species.

7. Records of observations of green sea turtles in the project areas for the duration of in-water activities shall be maintained and submitted at the close of in-water activities.
8. When piloting vessels, vessel operators shall alter the course to remain at least 100 yards from whales and at least 50 yards from other marine mammals and sea turtles.
9. Reduce vessel speed to 10 knots or less when piloting vessels in the proximity of marine animals and turtles. If practical, reduce vessel speed to 5 knots or less when piloting vessels in areas of known or suspected sea turtle activity.
10. If approached by a marine mammals or turtle, put the engine in neutral and allow the animal to pass.
11. Marine mammals and sea turtles shall not be encircled or trapped between multiple vessels and the shore.
12. Do not attempt to feed, touch, ride or otherwise intentionally interact with any ESA-listed marine species.
13. Any interaction or incidental take (take is defined as seriously hurting or killing) of protected species must be immediately reported to the Regulatory Branch, U.S. Army Corps of Engineers (Phone: 808-835-4303). Additional, pursuant to the ESA, any take of protected species must be reported to the U.S. Fish and Wildlife Office of Law in Honolulu (Phone: 808-861-8525). Any incidental take of marine mammals must be reported immediately to the National Oceanic and Atmospheric Administration's (NOAA) 24-hour hotline (Phone: 1-888-256-9840). Information reported must include name and phone number of a point contact, location of the incident, and nature of the take and/or injury.
14. Immediate notification to NOAA Fisheries Pacific Islands Regional Office (PIRO), piro.info@noaa.gov, (Phone: 808-725-5000), Protected Resources Division, NMFS, Pacific Islands Regional Office, shall occur if:
 - a. A take occurs
 - b. New information reveals effects of the action have affected listed species in a manner or to an extent not previously evaluated.
 - c. If the action is subsequently modified and causes effects to listed species in a manner or to an extent not previously considered or evaluated.
 - d. A new species is listed or critical habitat is designated that may be affected by the authorized work.

3.3 AIR POLLUTION CONTROL

- A. Emission: The Contractor shall not be allowed to operate equipment and vehicles that show excessive emissions of exhaust gases until corrective repairs or adjustments are made to the satisfaction of the Engineer.
- B. Dust:
 - 1. The Contractor, for the duration of the contract, shall maintain all excavations, embankments, haul roads, permanent access roads, plant sites, waste disposal areas, borrow areas, and all other work areas within or without the project limits free from dust which would cause a hazard to the work, or the operations of other contractors, or to persons or property. Industry-accepted methods of stabilization suitable for the area involved, such as sprinkling or similar methods, will be permitted. Chemicals or oil treating shall not be used.
 - 2. The Contractor shall construct dust screens around all excavated material.
- C. Burning shall not be permitted.

3.4 WATER POLLUTION CONTROL

- A. Water pollution control shall be in compliance with the requirements stated in Section 3.2 BEST MANAGEMENT PLAN (BMP).
- B. Dredging Operations:

The Contractor shall plan their dredging operations and perform all work necessary to minimize adverse impact or violation of the water quality standard. Silt containment devices, such as curtains, shall be deployed around the dredge area to contain the turbidity and isolate the work area. The silt containment devices shall be inspected by the Contractor on a daily basis and damaged areas repaired accordingly prior to restarting dredging.

In the event that a turbidity plume and/or floating hydrocarbon (oil, gas) products are observed outside of the silt containment devices and structures, in-water work shall be suspended so that appropriate corrective measures are taken. The Honolulu District Regulatory Branch of the Corps of Engineers (Telephone 808-835-4303) shall be notified as soon as practicable and the activity causing the plume will be modified by containment.

3.5 NOISE CONTROL

- A. Noise shall be kept within acceptable levels at all times in conformance with Title 11, Administration Rules, Chapter 43, Community Noise Control for Oahu, State Department of Health, Public Health Regulations. The Contractor shall obtain and pay for community noise

permits from the State Department of Health when the construction equipment or other devices emit noise at levels exceeding the allowable limits.

- B. Construction equipment shall be equipped with suitable mufflers to maintain noise within levels complying with applicable regulations.
- C. Starting up of construction equipment meeting allowable noise limits shall not be done prior to 6:45 A.M. without prior approval of the Engineer. Equipment exceeding allowable noise limits shall not be started up prior to 7:00 A.M.

3.6 SOLID WASTES

The handling of solid wastes shall be in compliance with the requirements stated in section 3.2 BEST MANAGEMENT PLAN (BMP).

- A. Construction waste, such as crates, boxes, building materials, pipes, and other rubbish shall be reduced to a size approved by the City of Maui. Large size objects shall be reduced to a size acceptable by the County Specifications for disposal in their landfills. Other areas or methods proposed by the Contractor will be approved only if the Engineer determines that their effect on the environment is equal to or less than those described herein.
- B. Dispose of electrolyte solution from lead-acid batteries in accordance with hazardous regulations. Do not dump electrolyte onto the ground or into storm drains or sanitary sewers. Transport the electrolyte to a State approved hazardous waste disposal site. The method of transportation and equipment shall comply with applicable Federal and State regulations.

3.7 THREATENED AND ENDANGERED SPECIES

The protection of threatened and endangered species shall be in compliance with the requirements in Section 3.2 BEST MANAGEMENT PLAN (BMP).

3.8 HISTORICAL, ARCHAEOLOGICAL AND CULTURAL RESOURCES

There are no known historical, archaeological or cultural resources within the Contractor's work area as defined on the plans. However, if items of apparent historical or archaeological interest are discovered in the course of any construction activities, they shall be left undisturbed and the Contractor shall immediately report the find to the Engineer.

3.9 SUSPENSION OF WORK

- A. The Engineer will notify the Contractor in writing of any observed noncompliance with the Contractor's environmental protection plan. The Contractor shall, after receipt of such notice, inform the Engineer of the proposed corrective action and take such action as may be approved.

- B. Violation of any of the above requirements or any other pollution control requirements which may be specified in the Specifications herein shall be cause for suspension of the work creating such violation. No additional compensation shall be due the Contractor for remedial measures to correct the offense. Also, no extension of time will be granted for delays caused by such suspensions.
- C. If no corrective action is taken by the Contractor within 72 hours after a suspension is ordered by the Engineer, the State reserves the right to take whatever action is necessary to correct the situation and to deduct all costs incurred by the State in taking such action from monies due the Contractor.
- D. The Engineer may also suspend any operations which they feel are creating pollution problems although they may not be in violation of the above-mentioned requirements.

3.10 MEASUREMENT AND PAYMENT

Environmental control will not be measured nor paid for separately but shall be considered incidental to and included in the prices bid for the various items of work in this project.

END OF SECTION

DIVISION 2 - SITEWORK

SECTION 02050 - SITE DEMOLITION AND REMOVAL

SECTION 02050 - SITE DEMOLITION AND REMOVAL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

Work includes demolition and removal of all components indicated in the plans or specified herein. The Contractor is responsible for examining the project site and determining the existing conditions. Obvious conditions which exist on the site shall be accepted as part of the work, even though they may not be clearly indicated on the drawings and/or described herein, or may vary therefrom.

1.2 SUBMITTALS:

Contractor shall submit proposed demolition and removal procedures to the Engineer for approval before work is started. Procedures shall provide a detailed description of methods and equipment to be used for each operation, sequence of operations, and a plan for coordination with other works in progress.

1.3 DUST, DEBRIS, AND TURBIDITY CONTROL:

- A. Dust: Contractor shall take appropriate action to check the spread of dust to the surrounding area and to avoid the creation of a nuisance in the surrounding area. Water may be used for dust suppression provided it does not create hazardous or objectionable conditions such as flooding, erosion, runoff, or pollution. Contractor shall comply with any dust regulations imposed by local, State, and Federal regulators.
- B. Debris and Turbidity: Above-the-surface demolition operations shall be performed in a manner that prevents debris, dust, or concrete fragments from entering the water. Demolition of subsurface components will be conducted in a manner which minimizes debris from spreading throughout the area. Turbidity curtains or other containment measures shall be used to contain demolition areas as needed. Any gaps/openings in turbidity curtains shall be closed at the end of each workday.
- C. Entrances and Exits: Construction entrances shall be stabilized wherever traffic will be entering or leaving the construction site, temporary stockpile area(s) and staging area(s). If entrance stabilization is not effective at preventing sediment from being tracked onto pavement, then alternative measures to effectively keep surrounding streets free of sediment shall be employed. Sediment that is tracked onto paved roadways shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site.

1.5 PROTECTION

- A. Existing Improvements: Contractor shall maintain safe working conditions and shall prevent damage to adjacent structures or facilities during demolition operations. Contractor shall protect existing structures, facilities, and components that are to remain in place, that are to be reused, or that are to remain the property of the Engineer by temporary covers, shoring, bracing, and supports. Contractor shall repair items damaged during performance of the work, or replace with new.
- B. Trees: Contractor shall protect trees within the project site which might be damaged during demolition with a 6-foot-high fence. Contractor shall erect fence a minimum of 5 feet from the trunks of individual trees or follow the outer perimeter of branches of clumps of trees. Trees scarred or damaged by Contractor equipment or operations shall be restored to a healthy condition or replaced as determined by the Engineer. The Engineer shall approve restoration prior to its initiation.
- C. Utilities: Contractor shall locate and verify all utilities within the project site prior to start of work. All utilities within the demolition area shall be disconnected, capped, or protected prior to demolition. Contractor shall coordinate with the Engineer and utility agencies as needed.
- D. Public Safety: Where pedestrian and driver safety could potentially be endangered in the work or storage areas, Contractor shall provide and maintain barriers in accordance with Section 01530. The contractor shall notify the Engineer prior to beginning any such work. The Contractor shall conduct operations with minimum interference to streets, driveways, and passageways, etc. Throughout work, protection shall be provided for all roads, walkways, property, etc., scheduled to remain in use.

PART 2 - PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.1 WORK INCLUDED

Contractor shall demolish and remove the existing components detailed in Section 3.1(A-C) below, and any other obstructions or encumbrances of any kind or character within the Limits of Work, with the exception of any structures to remain and any active utility lines, boxes and manholes, unless otherwise directed by the Engineer. All work shall be executed in an orderly and careful manner, with due consideration for all items to remain; the Contractor shall be strictly responsible for any damage thereto. Use of explosives will not be permitted. The Contractor shall procure and pay for all necessary permits or certificates that may be required in connection with this work.

This Section includes procedures for demolition and removal work, including the following:

- A. Demolition above the water's surface: Removal of concrete pad and concrete boat ramp noted in the plans. All topside concrete to be removed shall be cut with a carborundum saw prior to removal, with water applied to control dust. Overcutting shall not be permitted.

- B. Demolition below the water's surface: Removal of sub-surface concrete boat ramp, loading dock ruins, aprons, footings, and debris. Following demolition of these sub-surface components, dredging will be conducted in accordance with Section 02881 to deepen the harbor in their previous locations.
- C. Partial Revetment Demolition: Removal of existing revetment stone between station 03+50 and 03+75 to prepare for revetment extension.

3.2 DISPOSITION OF MATERIALS: Title to all materials and equipment to be removed, except as specified otherwise, is vested in the Contractor upon receipt of notice to proceed. The Engineer will not be responsible for the condition or loss of, or damage to, such property after notice to proceed. Materials and equipment shall not be viewed by prospective purchasers or sold on the site. Burning or burying of materials on the site will not be permitted. Contractor shall remove rubbish and debris from the job site daily or shall store materials which cannot be removed daily in areas specified by the Engineer.

3.3 CLEAN-UP

- A. Debris and Rubbish: Remove and transport debris and rubbish in a manner that will prevent spillage into ocean or streets and adjacent areas. Clean-up spillage from ocean, streets and adjacent areas. All debris of any kind accumulated from the work of this Section shall be disposed of off-site.
- B. Regulations: Contractor shall comply with Federal, State, and Local hauling and disposal regulations.

3.4.1 WORK HOURS AND INTERFERENCE WITH NAVIGATION

Demolition work hours are from 7:00 am to 6:00 pm on weekdays, except for State holidays. The work shall be performed in such a manner to, as much as possible, minimize interference with navigation in Lahaina Small Boat Harbor. The scheduling of work shall be coordinated with the Engineer and Harbor Master.

PART 4 – MEASUREMENT AND PAYMENT

- 4.1 POST-DEMOLITION INSPECTION. Contractor shall perform a post-demolition inspection to verify complete removal of structures to the required limits prior to commencement of construction or dredging activities.
- 4.2 PAYMENT. Demolition and Removal shall be considered incidental to the various contract items in the Proposal Schedule and no payment will be made thereof.

END OF SECTION

SECTION 02260-STEEL SHEET PILES

PART 1 – GENERAL

1.1 DESCRIPTION

This section covers requirements for construction and installation of steel sheet pile. This also covers the trimming of the sheet pile to the lines and grades shown on the Drawings or as required. This work also includes pre-drilling to facilitate driving sheet pile to the designated elevations.

1.2 MATERIALS

- A. Steel Sheet Piling. Steel sheet piling shall be hot-rolled and meet the requirements of ASTM A690, (Grade 50). Steel corners, tees, wyes, and crosses shall meet the requirements of ASTM A690. Steel sheet piles required for the Project shall be the type and weight shown on the Drawings.

All steel sheet piling shall be new and unspliced material throughout, unless otherwise reviewed by the Engineer. Any fabricated sections must conform to the requirements of AWS D1.1/D1.1M and the piling manufacturer's recommendations for fabricated sections.

- B. Steel sheet piles and special fabricated shapes shall be of a design that ensures continuous interlock throughout the entire length when in place.
1. Additional Length. Additional length beyond those indicated on the DRAWINGS may be required to provide for trimming of tops of sheet piling.
- C. Interlocks. The interlocks between steel sheet pile sections shall be configured such that the average width of the annular space between all contact points of the interlocks shall be a maximum of one-eighth (1/8) inch, as determined by Engineer. Steel sheet piles and interlocks shall not have excessive kinks, camber or twist that would prevent the pile from reasonably free sliding to grade.
- D. Fabrication. All fabricated connections shall be made with the use of angles or bent plates, as necessary, and shall be adequately welded or connected with high strength bolts as accepted by Engineer.
- E. Handling Holes:
1. Dimensions. If handling holes are provided, they shall be two (2) standard two and nine- sixteenth (2-9/16) inch diameter handling holes located six (6) inches from one end.
 2. Plugs. The holes shall be plugged by welding a piece of steel over the hole prior to installing any riprap, backfill or drop structure cap.
 3. Watertight. The plated hole shall be watertight.

1.3 CONSTRUCTION

- A. Shop Plans. The Contractor shall submit to the Engineer for review and approval complete working drawings and design calculations for the sheet pile system.

Submit Shop Drawings showing connection detail.

Submit detail drawings for sheet piling, including fabricated sections, showing complete piling dimensions and details, driving sequence, and location of installed piling.

Perform and submit wave equation analysis to ensure pile drivability.

- B. Qualifications. Provide qualifications of the proposed sheet pile installer.

The Contractor shall furnish evidence in the form of a list of projects with contact names and numbers to verify that the subcontractor has been engaged in successful installation, supply and testing of three (3) successful past installation of sheet piling of comparable overall heights and sections and comparable penetration into soils similar to those found on the project.

- C. Product Data. Provide Product Data from the manufacturer indicating the following:

1. Pile Material
2. Thickness
3. Strength
4. Section Properties
5. Moment of Inertia
6. Shape
7. Section Modulus

- D. Splice Locations. Splice locations shall be submitted for Review prior to installation.

- E. Erection.

1. Handling and Storing Materials. Do not subject piles to damage by impact bending stresses in transporting to and storing piles onsite.

Store and handle piles such that corrosion protection coating will not be damaged.

- F. Preparation.

1. Any fill along the alignment of the sheet pile must be in place to sub-grade elevations and compacted prior to driving the sheet pile.
2. Fill material (except riprap, boulders, bedding and grout) is not to be placed around the sheet pile after the sheet pile is in place.
3. Examinations. Do not begin sheet pile installation until the earthwork in the area where the piles are to be driven has been completed to the extent that the grade elevation is at no more than twelve (12) inches above or below the top of the piling elevation as indicated on the Drawings.

G. Installation. All welding or gas cutting shall be in accordance with the current standards of the American Welding Society.

1. Virtual Refusal. Steel sheet piling shall be driven to the depths shown on the drawings or to virtual refusal with a minimum sheet pile embedment of 25 feet below the mudline.

Virtual refusal is defined as ten (10) blows per inch with an approved pile hammer.

A pile hammer shall be used to determine virtual refusal.

The hammer shall be operating at the manufacturer's recommended stroke and speed when virtual refusal is measured.

2. Sheet Piling Driving. Steel sheet piling shall be assembled before driving and then driven as a continuous wall, progressively in stages to keep the piles aligned correctly and minimize the danger of breaking the interlock between the sheets.

Steel sheet piling shall be driven to form a tight bulkhead.

A driving head shall be used and any piling which is damaged in driving or which has broken interlocks between sections shall be pulled and replaced at Contractor's expense.

The piling shall be driven within the following tolerances:

- a. Alignment:
 - 1) Sheet pile shall be driven to form a relatively straight line between the termini points shown on the Drawings.
 - 2) Horizontal deviation of any point from a straight line connecting the two ends of the wall section shall be a maximum of six (6) inches.
- b. Plumbness: Each individual sheet pile section shall be driven vertical, within a horizontal tolerance of two percent (2%) of any vertical length measured along the pile.

- c. Elevation
- 1) Tops of sheet pile sections shall be within a tolerance of one (1) inch from plan elevations.
 - 2) Contactor shall not be paid for excess sheet pile trimmed off the end of the pile to meet final grade.
3. Contractor shall brace and/or provide soil grading as necessary during construction operations in order to provide lateral stability for the sheet pile wall. The sheet pile wall has been designed for the soil grades of the final configuration denoted on the Drawings only. Other temporary configurations during the construction period shall not be allowed.
 4. Care shall be taken during driving to keep from causing deformations of the top of the piles, splitting of section, or breaking of the interlock between sections. Care shall also be taken during driving to prevent and correct any tendency of steel sheet piles to twist or get out of plumb.
 5. Steel Z piling shall be driven with the ball-end leading. Proper care and planning shall be used to allow for this construction procedure in both immediate and possible future walls.
 6. Alternate Z piles shall be reversed end for end for proper interlocking in the "normal" position. Piles shall also be aligned properly to maintain a "normal" driving width.
 7. The use of vibratory equipment in any form for demolition, pile removal, probing and pile driving is prohibited.

For sheet piles being driven into bedrock, an approved hammer utilizing a minimum hammer energy of 19,000 foot-pounds per square inch of steel section shall be used to obtain the required depth or virtual refusal. The hammer shall be clearly marked so that it can be identified at the job site.

Steel sheet pile that is full length as shown on the Drawings and is required to be driven below the specified cutoff elevation shall be spliced with additional steel sheet piling with a full penetration butt weld.

- 1.4 Method of Measurement. The Engineer will measure Sheet Pile Walls per square foot (SF).
- 1.5 Basis of Payment. The Engineer will pay for the installation of the approved sheet pile wall on a per Square Foot basis. The price includes full compensation for mobilization of equipment, driving procedures, and interlocking. Payment for these items includes furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

The Engineer will make payment under:

Pay Item

Sheet Pile Wall

Pay Unit

Square Foot'

SECTION 02281 - DREDGING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

Work shall consist of furnishing all labor, tools, materials and equipment necessary and required to dredge to the lines and grades indicated on the plans and as specified herein. Work includes the installation of pollution controls and the removal and disposal of dredged material using the Contractor's best identified means and methods. The Lahaina Boat Ramp Demolition and Bulkhead Wall Construction easement limits are demarcated on the plans.

1.2 SUBMITTALS

Operations Plan and Performance Schedule: Not later than thirty (30) days after the award of the contract, the Contractor shall submit an operations plan and performance schedule for accomplishing the dredging work. No work shall commence until the operations plan and performance schedule have been submitted and approved by the Engineer. The operations plan and performance schedule shall include a plan and schedule of work; method of dredging, schedule of all plant, equipment, auxiliaries and appurtenances; method of protection of surrounding structures, equipment and vessels; method of sweeping and sounding; and method of disposal of excavated materials, including details for containment of the dredged materials.

1.3 EXISTING CONDITIONS

- A. Lahaina Small Boat Harbor was previously dredged in 2017. More recent depth soundings taken in July 2024 are utilized in the plans. In the plans, depths are referenced to the Mean Lower Low Water (MLLW) tidal datum established for Kahului Harbor, Maui. For bidding purposes, the dredged material quantity is estimated to be 1,109 cubic yards, or alternatively, 1,341 cubic yards if including a uniform over-dredge of one (1) foot across the entire dredging footprint. The dredged material consists of silt and sand but may include non-sediment debris. The areas to be dredged are indicated on the plans shall be dredged to a depth of ten (10) feet below MLLW, with an allowable over-dredge of 1 ft.
- B. On June 19, 2023, concrete samples were taken from the exposed and submerged portions of the concrete boat ramp as well as the adjacent concrete apron and sent for testing. The concrete sample results indicated trace concentrations of total metals and TPH-DRO/RRO. All metals and TPH results were well below their respective Tier 1 EALs. All other contaminants were not detected above laboratory reporting limits. Analysis for asbestos indicated that the boat ramp concrete does NOT contain asbestos. Based on the analytical results from this sampling event, the concrete from the Lahaina boat ramp and associated apron meets the analytical acceptance guidelines for disposal at the Central Maui Landfill (CMLF). Prior to disposal, an application for acceptance must be submitted to the County of Maui, CMLF and accepted.

SECTION 02485 - STONE MATERIAL AND REVETMENT
PLACEMENT

PART 1 - GENERAL

1.1 REFERENCES

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

- A. ASTM C 127 (2007) Test Method for Density (Specific Gravity) and Absorption of Coarse Aggregate
- B. ASTM D 75 / D75M (2009) Standard Practice for Sampling Aggregates

1.2 SUBMITTALS

The following shall be submitted:

- A. A selection of borrow sources and detailed plans for quarry operations;
- B. Samples of stone material
- C. Evaluation of Testing of Stone in accordance with references listed above and procedures listed below.

1.3 SOURCES OF STONE

- A. STONE RE-USE: All stone proposed for reuse shall be subject to inspection and approval by the Engineer prior to placement.
- B. STONES FROM OTHER SOURCES: Stone may be quarried or obtained from other sources as approved by the Engineer. All stones shall meet the requirements specified herein. Development of stone source and improvements of any access to the site shall be at the Contractor's responsibility and expense. The sources from which the Contractor proposes to obtain the material shall be selected well in advance of the time when the stones will be needed in the work. Approval of a source or sources of stone shall not be construed as approval of all material from that source or sources. The right is reserved to reject materials produced from localized areas, zones, or strata when such materials are unsuitable as determined by the Engineer.
- C.

1.4 SAMPLING AND FIELD TESTING OF STONE

- A. Sampling: Samples of stones from sources proposed by the Contractor shall be taken. The samples will be used as standards of the rock quality to be furnished by the Contractor. Duplicate sets of samples shall be taken, numbered, referenced and identified. One set shall remain at the Contractor's quarry (source) for later comparison with actual pieces of rock to be furnished for the project. At the Contractor's expense, the second set of samples shall be

delivered to and tested by an independent testing laboratory, no later than 30 days in advance of the time when placing of stone is expected to begin. Sampling, identification, preparation and transportation of samples shall be in accordance with ASTM D 75.

B. Field Testing of Stones: Prior to removal from the source, the Contractor shall field test representative rock pieces selected by the Engineer by dropping from a vertical height of 10 feet onto a solid rock surface or on a bed of comparable size rock proposed for the project. Broken, cracked or otherwise damaged stone found by dropping will not be acceptable and shall be disposed of by the Contractor at their expense.

1.5 QUARRY AND BORROW OPERATIONS

A. Quarry and Borrow Areas: The Contractor shall be responsible for obtaining all rights-of-way required in connection with his borrowing and quarrying operations. The Contractor shall obtain from the Owners the right to procure materials, pay all charges involved and bear all expenses of developing the sources, including rights-of-way for hauling. Necessary plant, labor and materials for clearing, scraping, disposal, loading, hauling and all other operations required to obtain the stones and borrow materials shall be provided by the Contractor at no additional cost to the Owners. The Contractor shall, at his own expense, maintain all haul roads required for access from the quarry areas to the site of work and provide additional haul roads as required. The Contractor shall maintain necessary warning signs, and place warning lights between sundown and sunup along roads subject to public traffic. The Contractor shall be responsible for trespassing upon or injury to private lands adjacent to right-of-way resulting from his actions or those of his employees.

B. Operation Requirements: The Contractor shall submit to the State, within 30 days after receipt of notice to proceed and 30 days before any work in the borrow and quarry areas, plans for the Contractor's borrow and quarry operations.

PART 2 - PRODUCTS

2.1 STONE

A. General: Stone shall be quarried or field stone. The sources from which the Contractor proposes to obtain the stone shall be selected well in advance of the time when the stones will be delivered to the project area. It is the Contractor's responsibility to determine that the stone source or combination of sources selected is capable of providing the quality, quantities, and gradation needed and at the rate needed to maintain the scheduled progress of work.

All stones shall be dense, durable and of a suitable quality to ensure permanence in the structure and in the climate in which it is to be used. Stones shall be free from cracks, seams and other defects that would tend to increase unduly its deterioration from natural causes. Stones shall be washed or brushed clean from contamination by turbidity causing materials such as mud or silt.

B. Physical Requirements: Physical properties of the stone shall conform to the following requirements when tested in accordance with the respective ASTM Standards. A registered

Geologist or registered Engineer shall perform the tests. Acceptance tests shall be performed on an individual stone piece 10 to 30 pounds in weight in lieu of the sizes specified in ASTM C 127. Test apparatus shall be improvised to accommodate the above stone sizes. All acceptance tests shall be made by and at the expense of the Contractor. Samples of stone shall be furnished as specified in paragraph entitled "sampling and field testing of stone".

1. ASTM C 127 Bulk Specific Gravity (Saturated Surface Dry) Not Less than 2.5 (Based upon seawater having a unit weight of 64.0 pounds per cubic foot.)
2. ASTM C 127 Absorption - Not More than 4 percent

C. Proportional Dimension Limitations: Stones shall be generally rectangular in cross section. The maximum aspect ratio (greatest dimension:least dimension) of any stone within a size range shall not be greater than 3:1 when measured across mutually perpendicular axis. Not more than 25 percent (25%) of the stones within a gradation range shall have an aspect ratio greater than 2:1. Flat or elongated stones (aspect ratio greater than 3:1) are not acceptable.

D. Cleanliness: All stone shall be free of contaminants of any kind, including earthen material, dirt, silt, clay, organic matter or any other material that would produce turbidity or otherwise undesirable condition to the shoreline or adjacent water quality. Stone shall be washed if necessary to remove contaminants prior to placement.

PART 3 – EXECUTION

3.1 GENERAL

Revetment extension Grade exposed underlying slope to 1V:1.5H, with leveled landing at -3 ft MLLW. Per Section 1.3A, recovered stone may be stockpiled for potential reuse in revetment extension

The revetment shall be extended in-kind utilizing the typical section from the 1966 as-built plans, provided in the plans. The typical section shall be modified by including a geotextile filter cloth layer placed over the prepared slope and beneath the crushed run filter blanket layer as shown in the plans.

Revetment construction shall start at station 03+75 and work toward station 03+50 (south to north). Construction activities shall proceed in approximately 10-foot sequential increments, with each increment including clearing, excavating, filling, grading, salvaged material stockpiling, slope preparation, geotextile filter fabric placement, underlayer stone placement, and armor stone placement. Crushed run and filter layer stone placement shall not advance more than 10 feet ahead of armor stone placement.

3.2 EROSION CONTROL AND PROTECTION OF ARCHAEOLOGICAL/CULTURAL ARTIFACTS

The Contractor shall prevent erosion and protect the ground surface during construction operations, site access, stockpiling, or other construction activities. Excavation and grading shall not be conducted outside of the immediate area and lines and grades necessary for revetment construction.

The Contractor shall notify the State immediately if artifacts or bones are discovered during construction and shall stop work in the vicinity of artifacts until cleared by the State.

3.3 FOUNDATION PREPARATION

The Contractor shall prepare the revetment foundation to the lines and grades shown on the plans. Care shall be taken to remove rocks or other material on the surface that may cut or tear the geotextile filter fabric during fabric or stone placement.

3.3 GEOTEXTILE FILTER FABRIC

- A. General: The geotextile shall be placed in the manner shown on the drawings. At the time of installation, the geotextile shall be rejected if it has defects, rips, holes, or other damage.
- B. Placement: The geotextile shall be placed with the long dimension perpendicular to the shoreline. Placement shall be reasonably smooth and free of tension, stress, folds, or wrinkles. The strips shall be placed to provide a minimum width of 24 inches of overlap at each joint. Each strip length shall be approximately 15 percent greater than the slope length. Temporary pinning of the geotextile to help hold it in place until the underlayer is placed is allowed. The temporary pins shall be removed as the underlayer stone is placed to relieve tensile stress on the fabric. Fabric ends at the toe and crest shall be wrapped back into the underlayer stone as shown on the drawings.

3.4 UNDERLAYER STONE

- A. General: Underlayer stone shall be of the sizes shown on the drawings, and shall be well graded between upper and lower size limits and shall conform to the requirements of Section 2.1.
- B. Placement: Underlayer stones shall be placed to the lines, grades and thicknesses shown on the drawings. Underlayer stones shall be placed to its full layer thickness in one operation in such a manner as to avoid tearing, puncturing or displacing the geotextile filter fabric. A tolerance of plus or minus 3 inches will be permitted. The stone shall be placed in a manner to produce a well-graded mass of stone with minimum voids. Placement by any method which is likely to cause segregation of the various sizes will not be permitted. Unsegregated stone shall be lowered in a bucket or container and placed in a systematic manner. Placement shall begin at the bottom of the slope and proceed upward. Casting or dropping of the stone over 2 feet or moving by drifting and manipulating down the slope will not be permitted. Final finish of the slope shall be performed as the material is placed. The finished work shall be a well-distributed mass, free of pockets of either smaller or larger stone, having a minimum of voids and maximum stone interlocking. The placement of underlayer stone shall proceed as soon as practicable after placement of geotextile filter fabric to prevent wave action from displacing the geotextile fabric.

3.3 FILTER STONE LAYER

A. General: Filter stone shall be of the sizes shown on the drawings, and shall be well graded between upper and lower size limits and shall conform to the requirements of Section 2.1

B. Placement: Filter layer stones shall be placed to the lines, grades and thicknesses shown on the drawings. A layer thickness tolerance of plus or minus 3 inches will be permitted. The stone shall be placed in a manner to produce a well-graded mass of stone with minimum voids. Placement by any method which is likely to cause segregation of the various sizes will not be permitted. Unsegregated stone shall be lowered in a bucket or container and placed in a systematic manner. Placement shall begin at the bottom of the slope and proceed upward. Casting or dropping of the stone over 2 feet or moving by drifting and manipulating down the slope will not be permitted. Final finish of the slope shall be performed as the material is placed. The finished work shall be a well-distributed mass, free of pockets of either smaller or larger stone, having a minimum of voids and maximum stone interlocking. The placement of underlayer stone shall proceed as soon as practicable after placement of underlayer stone to prevent wave action from displacing the geotextile fabric.

3.4 ARMOR STONE LAYER

A. General: Armor stone shall be of the sizes shown on the drawings, and shall be well graded between upper and lower size limits and shall conform to the requirements of Section 2.1

B. Placement: Where two-stone thickness is indicated on the drawings, armor stone shall be placed within the limits and elevations indicated in such a manner to provide a two-stone thickness subject to a tolerance of plus or minus 6 inches. Placement shall result in a rough, irregular surface with each stone in contact with adjacent stones and leaving minimum sized voids through which underlaying stones cannot pass. Three points of contact (minimum) are required between a stone and adjacent stones. Stones shall be individually placed by equipment suitable for handling material of the sizes indicated without damage to the stones, including the ability to place the stone over its final position before release, and if necessary pick up and reposition the stone. Armor stone placement shall begin at the toe and proceed up the slope. Armor stone shall be placed in a manner to avoid displacing or breaking the underlayer stone, and shall not be dropped from a height greater than 2 feet. It should be anticipated that re-handling of individual stones after initial placement may be required to achieve the placement requirements. Voids between the armor stones shall not be filled with chinking stones. The placement of armor stones shall proceed as soon as practicable after placement of underlayer stones to prevent wave action from displacing the underlayer stones.

3.5 PLACEMENT CHECKS

The Contractor shall establish and maintain periodic placement quality control checks to ensure compliance with contract requirements. At a minimum of 50-foot intervals as the work progresses the Contractor shall perform cross section surveys to verify lines, grades,

and thicknesses of completed work. Construction drawing reference Boat Ramp Cross Sections shall be annotated with the survey data and provided to the State within 72 hours of the survey.

END OF SECTION

SECTION 02500 - PERMANENT TIEBACK ANCHORS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

As specified in Section 01001.

1.02 DESCRIPTION

- A. This work includes furnishing, installing and testing tiebacks and accessories at locations shown on the Contract Drawings. Supply all labor, equipment and material necessary to properly complete the installation of tiebacks, so as to attain the specified load capacities identified on the Plans. Work includes the following:
1. Providing adequate bond length and stressing length, as directed by the Engineer, to meet the requirements specified herein and shown on the Plans.
 2. Providing materials and equipment for installing tiebacks to carry the design loads shown on the Plans.
 3. Prestressing all tiebacks and testing tiebacks, as specified herein.

1.03 DEFINITIONS

- A. Tieback. A high strength steel tendon/bar, fitted with an anchorage at the exposed end and a grouted anchor permitting force transfer to the ground on the other end.
- B. Anchorages. Portion of the tieback, including anchor head, anchor plate and protective cap, which is used to transfer load from the retaining wall to the tieback.
- C. Bonded Length. Portion of the tieback that transfers the tensile force from the tieback to the ground.
- D. Corrugated Sheathing. Corrugated pipe or tube that protects the prestressing steel in the bonded length from corrosion.
- E. Encapsulation Grout. Grout used to protect the tendon in aggressive soils to prevent localized corrosion in the bond length.
- F. Stressing Length. Portion of tieback that is in smooth sheathing.

- G. Smooth Sheathing. Enclosure around pre-stressing steel to prevent permanent bond between the pre-stressing steel and the surrounding grout, and to provide corrosion protection.
- H. Corrosion Inhibiting Compound. Material used to protect against corrosion and/or lubricate the prestressing steel.
- I. Coupler. The means by which the prestressing force can be transmitted from one partial-length of a prestressing bar to another (mainly by bars).
- J. Secondary Grout. Grout that is injected into the anchor hole to cover the stressing length of the tieback and providing corrosion protection for the high strength steel.

1.04 SUBMITTALS

- A. Working Drawings and Data. At least 30 days prior to beginning work, working drawings and data shall be submitted to the Engineer and shall include, but not limited to, the following:
 - 1. Tieback schedule giving:
 - a. Tieback number.
 - b. Design load and lock off load for each tieback.
 - c. Type and size of tiebacks.
 - d. Bonded length.
 - e. Stressing length.
 - f. Casing type and length.
 - 2. A drawing of the tieback system and corrosion protection including:
 - a. Centralizers and their locations.
 - b. Anchorage details.
 - c. Tieback corrosion protection system for the anchorage, bonded length and stressing length.
 - 3. Grout Mix Design
- B. Calculations.

- C. Design calculation shall be submitted for review, if the Contractor elects to submit a tieback anchor system that deviates from the details shown on the Plans. For tiebacks, design calculations shall include a determination of the bonded length for each tieback.
- D. Proposed sequence for tieback installation, if the Contractor elects to submit a tieback anchor system that deviates from the details shown on the Plans.
- E. Stress bar or strand manufacturer's mill test reports for the tiebacks.
- F. Application literature from cement grout suppliers giving details on setting times as a function of temperature, strength gain with time, and recommended storage, mixing and placement procedures.
- G. Applicable manufacturer certification and/or literature for anchorage fittings and accessories.
- H. Detailed description of the proposed procedures, including specific makes and models of equipment to be used for drilling, placing, grouting, and prestressing tiebacks. Drilling procedures shall include proposed hole diameter and method for supporting hole during tieback installation.
- I. Detailed description of proposed procedures and applicable manufacturer's literature for the equipment to be used for testing tiebacks, including but not limited to the following:
 - 1. Diagrams showing arrangement of the testing equipment relative to the tieback and anchorage hardware.
 - 2. The method for locking-off the required transfer load.
 - 3. Calibration data for the system of jack and gauges.
 - 4. Calibration data for the load cell.
 - 5. The proposed equipment set-ups for monitoring elongations during testing of tiebacks.
- J. During the grouting operations, the following data shall be recorded by the Contractor and submitted to the Engineer:
 - 1. Type of mixer and grout pump.
 - 2. Type of cement.
 - 3. Water/cement ratio.

4. Types of additives and their concentrations in mix.
 5. Grout injection pressure.
 6. Test sample strength.
 7. Volume of grout placed.
- K. The Contractor shall also submit a report to the Engineer within 20 working days after completion of the tieback work. The reports shall contain as-built drawings showing the locations of the tiebacks, total tieback lengths, bonded lengths, and results of all performance and proof tests.
- L. A Safety Data Sheet (SDS) must be submitted for each product, when applicable.
- M. The Contractor shall submit with its Best Management Practices (BMP) submittal the contamination control method.

1.05 QUALITY ASSURANCE

- A. **Qualifications.** The Contractor shall submit records documenting a minimum of five years experience in tieback installation of similar or greater scope as required for this project. The Contractor shall have supervisory personnel who participated in the construction of tieback anchor systems similar to the type proposed for a duration of at least three years within the last 10 years. The Contractor's supervisory personnel shall be present at the project site during all tieback installation and testing activities. The Engineer will review and comment on the personnel list submittal. If the submittal is acceptable, then the Engineer will respond in writing on the acceptability of the submittal. If the submittal is not acceptable, then the submittal will be returned and the Contractor will address all of the Engineer's comments. The response shall include, if necessary, but shall not be limited to, the replacement of listed personnel. Modification to the personnel list shall be at no additional cost to the State.
- B. **Damage,** such as abrasions, cuts, nicks welds, weld spatters or corrosion and pitting, will be a cause for rejection of the tieback element. Rejected elements shall be replaced at no additional cost to the State in terms of either material replacement or resulting time delays.
- C. **Project Conditions.**
1. The Contractor shall be fully responsible for the safety of workers and representatives of the Engineer observing the installation and testing of the tiebacks.

2. The Contractor shall be responsible for providing tiebacks of the required load capacity, which adequately meet all tieback test acceptance criteria. Deficient tiebacks shall be replaced or additional tiebacks installed, as determined by the Engineer, at no additional cost to the State. In addition, any cutting, reinforcement, coating repair, or other work required to install a replacement tieback shall be performed at no additional cost to the State.
3. A signed statement that the Tieback Anchor Contractor has inspected both the project site and the subsurface information for the project including soil or rock samples made available in the contract documents. The Contractor shall demonstrate an understanding of the subsurface conditions and all factors affecting the drilling and grouting operation.
4. The Contractor shall acknowledge that the drilling for the tieback anchor may encounter soft/loose soil, hard boulders, and extremely weathered to unweathered rock formation. Voids and fractures may also be encountered within soil and rock formation. These conditions may cause loss ground during drilling and loss grout during grouting operations. Proper construction techniques shall be used and additional cost estimate shall be included in their bid by the Contractors to foresee these conditions, if occurred.
5. The Contractor shall also acknowledge that project site conditions will post difficult and constrict access for construction. The Contractor shall demonstrate the proper technique to ensure the tieback anchor to be installed in the specified inclination shown on the plans. The drilling equipment shall be securely mounted on a drilling platform, which is capable to suspend on the harbor, to minimize disturbance to the harbor and existing walls. The Contractor may elect to have drilling equipment on the harbor. The Contractor shall verify the existing deck has sufficient capacity to install the tieback anchors following the sheet pile installation.

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

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Steel tendons/bars for tiebacks shall be:

1. Steel bars conforming to ASTM A-722, Type II, Grade 150 “Uncoated High-Strength Steel Bars for Prestressed Concrete;” and ASTM A153 “Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware”,

Seven-wire strand conforming to ASTM A-416, “Uncoated Seven-Wire Low-Relaxation Strand for Prestressed Concrete,” Grade 270. The smooth sheath encapsulating the tendons/bars shall be able to safely withstand deformations occurring during transportation, installation, stressing, testing, and transferring load to the tendons/bars.

The bonded length of a tendon/bar for permanent tiebacks shall not be less than the lengths shown on the Plans or modified by the Engineer after the pre-production performance testing of a tieback anchor.

The stressing length of a tendon/bar for permanent tieback shall not be less than the lengths shown on the Plans unless modified by the Engineer after the pre-production performance testing of a tieback anchor.

A corrugated plastic sleeve shall encapsulate the entire length of the tendon/bar of permanent tiebacks. The smooth sheath shall fit snugly over the corrugated plastic sleeve in the stressing length, and shall be attached and sealed to the corrugated sleeve at the top of the bonded length. The sleeve shall have a minimum wall thickness of 0.06 inches. A Portland cement grout shall completely cover the tendon/bar within the corrugated plastic sleeve. A suitable end cap shall be securely fastened at the end of the corrugated sleeve.

The maximum load applied to the tendon/bar shall not exceed 75 percent of the guaranteed ultimate tensile strength of the tendon/bar. The design load shall not exceed 53 percent of the guaranteed ultimate tensile strength of the tendon/bar.

B. Plastic Sheathing/Sleeves.

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

2. The plastic sheath/sleeve shall be gas and watertight, and resistant against chemical attack, and aging.
- C. Steel. Steel, except steel tendons/bars, shall conform to the requirements of ASTM A36.
- D. Cement. Portland cement for tieback grout shall be Type I, Type II, Type III, or Type IL.
1. Cement shall be kept under cover and in a dry condition.
 2. The lowest practical water cement ratio with acceptable workability shall be used for the grout mix.
- E. Grout.
1. Grouts shall attain a minimum compressive strength of 4000 psi prior to stressing. Testing for compressive strength shall conform to ASTM C-109 Mortar and Sand.
 2. Expansive admixtures may only be added to the grout used for secondary grouting, and filling trumpets and anchorage covers.
 3. Water for mixing grout shall be potable, clean and free of injurious quantities of substances known to be harmful to Portland cement or prestressing steel.
- F. Centralizers and Spacers.
1. Centralizers shall be placed at 5-foot intervals in the bonded length, with the bottom centralizer located 5 feet from the bottom of the bonded length, so that no less than 0.5 inches of grout cover is achieved along the tendon.
 2. Bar spacers shall be used in the bonded length of tiebacks, and placed at 10-foot intervals, with the bottom spacer located 5 feet from the bottom of the bonded length. Spacers shall be used to separate elements of multi-element tendons/bars.
 3. Centralizers and spacer may be made of any material, except wood, that is not deleterious to the prestressing steel or plastic sheath.
 4. Centralizers and spacers shall permit the free flow of grout to pass through in the tieback hole.
- G. Corrosion Inhibiting Compound

1. The corrosion inhibiting compound placed in either the free length or the trumpet area shall be an organic compound (i.e., grease or wax) with appropriate polar moisture displacing, corrosion inhibiting additives and self-healing properties. The compound shall permanently stay viscous and be chemically stable and non-reactive with the prestressing steel, the sheathing material, and the anchor grout.
2. Corrosion protection of the unbounded length shall be provided by a combination of sheaths, sheath filled with a corrosion inhibiting compound or grout, or a heat shrinkable tube internally coated with a mastic compound.
3. The corrosion protective sheath surrounding the unbonded length of the tendon/bar shall be long enough to extend into the trumpet, but shall not come into contact with the stressing anchorage during testing. Any excessive protection length shall be trimmed off.
4. The transition between the corrosion protection for the bonded and unbonded lengths shall be designed and fabricated to ensure continuous protection from corrosive attack.

H. Miscellaneous Steel Hardware.

1. Steel plates shall conform to ASTM A36.
2. All bolts, nuts and washers shall be galvanized and conform to the tendon/bar manufacturer's specifications.
3. Trumpets shall consist of steel pipe conforming to ASTM A53 and hot-dip galvanized.
4. All anchorage components shall develop at least 95 percent of the minimum guaranteed ultimate strength of the tieback tendon.
5. Prestressing steel couplers shall be capable of developing 100% of the ultimate strength of the prestressing steel.

I. Equipment.

Equipment for mixing grout shall be a high speed colloidal mixer with shearing action.

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

PART 3 – EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

A. Preparation.

1. Tendons/bars shall be fabricated in accordance with approved Working Drawings and shall be free of dirt, detrimental rust, or other deleterious substances. Tendons/bars shall be on wooden or concrete block while waiting and during installation.
2. The bonded length shall be degreased prior to installation. No solvent residue shall remain on the tendon/bar. Solvents shall not be allowed to contaminate the soil. The Contractor shall include its control method in its BMP submittal.
3. No ordering of materials for the production tieback anchors will be permitted until successful performance of the pre-production tieback anchor testing is completed and accepted by the Engineer. The Engineer shall have a minimum of 15 working days to evaluate the test data and provide lengths of the production tieback anchors. The location of the pre-production performance tieback anchor testing will be as indicated on the Plans or specified herein.

B. Construction Control.

1. The tieback shall be properly inspected before placement into the borehole. While inserting the tieback into the hole, it shall be protected from any damage, especially damage to the corrosion protection media.
2. Tiebacks shall be inserted freely to the prescribed length in the hole. They shall not be driven into the hole or cut off for insertion.
3. The stressing length of a tieback shall not be shortened to less than the minimum length shown on the Plans or specified herein.
4. The centralizers shall ensure that the tendon/bar be positioned concentric in the hole.
5. Grout pressure shall be measured at the point of injection. The grout gate mechanism shall be cleaned prior to delivery to the site and periodically during the project to prevent clogging.
6. Grout components shall be mechanically mixed for 5 to 10 minutes to ensure proper dispersion of cement.
7. The established water cement ratio shall be accurately controlled.

8. Pumping and injection of the grout shall commence immediately after mixing.
9. Grouting shall continue until the returning grout escaping from the hole is free of any additional ingredient(s) that were not part of the grout being injected.
10. The trumpet shall extend well over the tendon/bar sheathing. It shall remain undamaged during placement and stressing. The tendon/bar shall not contact the trumpet at the bearing plate.

C. Installation

1. All tieback anchors shall be installed in the presence of the Engineer, including drilling and grouting. Notice shall be given to the Engineer not less than 5 working days prior to the start of installation.
2. The hole for permanent tiebacks shall be drilled at locations indicated on the Plans.
3. The hole diameter shall be determined by the Contractor to produce the required load capacities and grout cover, but the hole diameter shall not be less than 8 inches. The tieback hole shall extend a minimum of 1 foot beyond the tendon/bar length to be installed.
4. The Contractor shall be responsible for maintaining an obstruction-free and open hole for grouting the tieback. The Contractor shall be solely responsible for determining the drilling method, grouting pressures, and tieback bonded length to satisfy the tieback testing acceptance criteria in accordance with the design loads. The grouting pressure and grouting method shall be based on consideration of existing ground conditions.
5. Immediately suspend or modify drilling operations if ground subsidence is observed, if the permanent tieback anchor is adversely affected, or if adjacent structures and/or archaeological features are damaged from the drilling operation. Immediately stabilize the adverse conditions at no additional cost to the State.
6. The drilling method used shall result in the following:
 - a. Cause minimum disturbance to the surrounding ground and not resulting in any ground loss.
 - b. Not result in collapse of the hole during drilling.

- c. Maintain the position and inclination of the drilled hole, allow the hole to reach the design depth, and produce the design diameter of the drilled hole.
7. Temporary casing shall be used if the hole tends to collapse during drilling or placement of the tieback. The temporary casing shall be withdrawn as grout is placed. Drilling of the tieback hole shall be monitored for the presence of soft zones or cavities in the ground mass penetrated over the length of the bond zone. The presence of such zones shall be noted on the daily record of work.
8. The Contractor shall immediately revise his operations to prevent reoccurrence of obstructed or otherwise unsatisfactory holes and modify tieback installation procedures as required.
9. Any damage to existing site conditions by such operations shall be cause for immediate halting of operations and repair to the satisfaction of the Engineer. The Contractor shall immediately revise his operations to prevent reoccurrence of such damage.
10. Grout shall be injected at the lowest point of the tieback hole by using a tremie pipe. Grouting shall proceed such that the hole is filled without formation of air voids, grouting progressively from the bottom to top.
11. The grout in the stressing length zone shall be the same as that for the bonded length zone. Grouting of the stressing length shall be done by gravity-flow or low pressure pumping. Grout shall terminate one foot before the anchor plate area prior to stressing and testing. Final grouting up to the anchor plate shall be completed upon completion of testing and stressing and approval by the Engineer. The Contractor shall provide the fittings or components needed to accomplish this.
12. The grouting equipment shall be capable of continuous mixing and shall produce a grout free of lumps. The grout pump shall be equipped with a grout pressure gauge at the point of connection of the grout delivery line to the tieback hole capable of measuring at least 150 psi or twice the actual pressure used.
13. If grout loss from the drilled hole exceeds five times the volume of the annular space between the drilled hole and tieback, then tieback installation shall be discontinued and the tendon/bar removed from the hole and cleaned. The Contractor shall fully pressure grout the drilled hole with cement grout at a pressure of at least 5 psi, redrill the hole 24 hours after the grout sets, and install tieback as described herein.

D. Tieback Testing.

1. Each tieback shall be tested.
2. Copies of all test results and graphs shall be transmitted to the Engineer as each test is completed. Final copies of all test results shall be included in the tieback work completion report.
3. Tiebacks shall be tensioned by direct pull with a hollow ram hydraulic jack or a model recommended by the anchor manufacturer, so mounted as to prevent bending of the tieback. Tensioning of a tieback shall not commence until the cement grout has set and has achieved its design strength.
4. Jacks shall have ram travel at least equal to the theoretical elastic elongation of the stressing length plus the bonded length at the maximum test load. A pressure gauge shall be used with each jack. Gauges shall be calibrated with a single jack. All gauges shall be accurate enough to read 100 psi changes in pressure. For performance tests, the jack used shall have two (2) calibrated gauges: a master gauge and backup gauge. The pump shall be capable of applying each load increment in less than 60 seconds.
5. A load cell, which has been calibrated by a certified independent testing laboratory no more than 20 days prior to the start of the testing, shall be used to measure the applied load and changes in load during the load-hole portion of the performance tests. There will be no substitute for the load cell during conduct of the performance tests. The Contractor shall provide the Engineer with the calibration curve for the load cell prior to testing.
6. For the performance tests, the master gauge and backup gauge shall be connected to the same pressure hose between the pump and jack and be used to measure the applied loads. If the load measured by the master gauge and backup gauge differ by more than ten (10) percent, the jack, master gauge and backup gauge shall be recalibrated as a unit at no additional expense to the State.
7. The weight of the jack and load cell shall be supported externally and not by the tendon/bar.
8. Use a micrometer dial gauge, with 0.001-inch precision and minimum 2 inches of travel, aligned perpendicular to the loading head to measure elongation of the tendon/bar. The dial gauge shall be supported on an extension of the tendon/bar head.

9. All testing shall be performed in the presence of the Engineer. Notice shall be given to the Engineer not less than 3 working days prior to the start of a test.
10. Maintain each load increment or decrement for at least 1 minute, or until movement ceases, unless otherwise specified.
11. Performance Test
 - a. Performance test a minimum of the first two and ten percent of the remaining tiebacks installed for retaining wall support. The Engineer will designate which tiebacks shall be performance tested.
 - b. The performance tests will include stressing and monitoring a tieback. During testing, tieback movement, measured at the anchor head, shall be monitored for each load increment to the nearest 0.001 inches from an independent, fixed reference point. The loading sequence shall be as follows:

PERFORMANCE TEST LOADING SCHEDULE	
Cycle	Load P = Design load (as shown on the Plans) AL = Alignment Load = 0.05P
1	AL 0.25P AL
2	AL 0.25P 0.50P AL
3	AL 0.25P 0.50P 0.75P AL
4	AL 0.25P 0.50P 0.75P 1.00P AL

PERFORMANCE TEST LOADING SCHEDULE	
Cycle	Load P = Design load (as shown on the Plans) AL = Alignment Load = 0.05P
5	AL 0.25P 0.50P 0.75P 1.00P 1.25P AL
6	AL 0.25P 0.50P 0.75P 1.00P 1.25P 1.50P (Hold) AL
Final	Adjust to Transfer Load (Lockoff Load)

- a. The lockoff load shall be as shown on the Plans.
- b. The maximum test load shall be held for at least 10 minutes. Total movements with respect to a fixed reference point shall be recorded at 1 minute, 2, 3, 4, 5, 6 and 10 minutes. If the total movement between the 1-minute and 10-minute readings exceeds 0.040 inches, the test load shall be held for an additional 50 minutes. Total movements shall be recorded at 15 minutes, 20, 25, 30, 40, 50, and 60 minutes.
- c. The Contractor shall plot the tendon/bar head movement versus load for each load increment. The Contractor shall also plot the creep movement for the load-hold stage as a function of the logarithm of time. The Engineer will review these data from each performance test to determine whether the tieback is acceptable.
- d. Where, in the opinion of the Engineer, significant differences are indicated from previous performance tests, the Contractor shall perform additional performance tests on the adjacent tieback to be installed.

12. Proof Test

- a. All tiebacks not performance tested shall be proof tested. The requirements for loading and monitoring for proof tests are the same as for performance tests, except that the load sequence shall be as shown in the following:

PROOF TEST LOADING SCHEDULE
P = Design Load AL = Alignment Load (0.05P)
AL
0.25P
0.50P
0.75P
1.00P
1.25P
1.50P
AL
Adjustment of test load to lockoff load

- a. For proof tests, maintain maximum test load for at least 10 minutes. The jack shall be re-pumped as necessary in order to maintain a constant load. The load-hold period shall start as soon as the maximum test load is applied and the ground anchor movement shall be measured and recorded at 1 minute, 2, 3, 4, 5, 6, and 10 minutes. If the ground anchor movement between the 1-minute and 10-minute readings exceed 0.040 inches, the maximum test load shall be held for an additional 50 minutes. If the load-hold is extended, the ground anchor movement shall be recorded at 15 minutes, 20, 30, 40, 50 and 60 minutes. A graph shall be constructed showing a plot of ground anchor movement versus load for each increment in the proof load test. The graph format shall be approved by the Engineer prior to use.

13. Supplementary Extended Creep Test.

- a. For permanent tiebacks, creep test the first two tiebacks installed for retaining wall support.
- b. The creep test shall be conducted by incrementally loading and unloading the anchor in accordance with the schedule of the Performance Test, except that at each new load maximum, the load shall be held constant in accordance with the following schedule.

Load	Observation Period (minutes)
AL	
0.25P	10
0.50P	30
0.75P	30
1.00P	45
1.25P	60
1.50P	300
Notes: P = Design Load AL = Alignment Load = 0.05P	

- a. The times for reading the creep movements shall be 1, 2, 3, 4, 5, 6, 10, 15, 20, 25, 45, 60, 75, 90, 100, 120, 150, 180, 210, 240, 270 and 300 minutes (where appropriate).
- b. If the creep rate exceeds 0.080 inches per logarithmic cycle, the observation period may be extended in an attempt to determine if the creep rate will diminish to the 0.080 inches per logarithmic cycle of time.
- c. The Contractor shall plot the creep movement for the load-hold stage as a function of the logarithm of time. The Engineer will review this data from each creep test to determine whether the tieback is acceptable.

14. Lift-Off Readings.

After applying the lock-off load to the tieback and prior to removing the jack, a lift-off load reading shall be made. The load determined from the lift-off reading shall be within 5 percent of the specified lock-off load. If the load is not within 5 percent of the lock-off load, the anchorage shall be reset and another lift-off reading shall be made.

E. Acceptance Criteria.

1. A performance-tested or proof-tested tieback anchor will be acceptable if the following criteria are satisfied.
 - a. Displacement of the tendon/bar head shall be greater than 0.8 (PL_s/AE) where,

P = applied load

L_s = length from jack pulling head to bottom of stressing length

A = total cross sectional area of steel tendon/bar

E = modulus of elasticity of steel tendon/bar

- b. Displacement of the tendon/bar shall be less than $P(L_s+L_b/2)/AE$ where,

L_b = bonded length of tendon/bar

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

- c. Creep per log cycle $(d_2 - d_1) / \log (t_2/t_1)$ shall be less than 0.040 inches between the 1 and 10-minute readings and 0.080 inches between the 6 and 60-minute readings, where,

d_1 = measured displacement at time t_1

d_2 = measured displacement at time t_2

t_1 = time of first displacement measurement

t_2 = time of second displacement measurement

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

F. Record of Work.

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

PART 4 – PAYMENT

4.01 METHOD OF MEASUREMENT

The Engineer will measure tieback per linear foot, from face of wall to bottom of anchor.

4.02 BASIS OF PAYMENT

The Engineer will pay for the installation of the approved anchors on a per Linear Foot basis. The price includes full compensation for drilling holes; furnishing and installing anchor bars, corrosion protection, and grouting. The Engineer will pay for the testing of the tieback anchors on a per Each basis. Payment for these items includes furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

The Engineer will make payment under:

Pay Item	Pay Unit
Tieback Anchor for Retaining Walls	LINEAR FOOT
Performance Tests for Tieback Anchor	EACH
Proof Tests for Tieback Anchor	EACH
Mobilization for Tieback Installation and Testing	LUMP SUM"

END OF SECTION

DIVISION 3 - CONCRETE

SECTION 03300 – CAST-IN-PLACE CONCRETE AND REINFORCEMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. This section supplements SECTION 39 - PORTLAND CEMENT CONCRETE and SECTION 40 - CONCRETE STRUCTURES of the Standard Specifications for Public Works Construction (September 1986).
- B. This section covers concrete used for concrete curbs, gutters, cut-off walls, walkways, shower tree slab and post base, street light bases and any other repairs identified by the Officer-in-charge.

1.03 DEFINITIONS

A. Cementitious Materials

Portland Cement in combination with one or more of fly ash and other pozzolans.

1.04 SUBMITTALS

- A. Submit in accordance with SECTION 01300 – SUBMITTALS.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mix water to be withheld for later addition at Project site.
 - 2. Submit copies of fiber manufacturers printed batching and mixing instructions.
- C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
 - 1. Curing materials
 - 2. Bonding agents
 - 3. Repair materials
 - 5. Joint-filler

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- D. All concrete construction shall conform to the "Building Code Requirements for Reinforced Concrete" (ACI 318) with modification as noted in the drawings. Other ACI specifications that apply are:
 1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 2. ACI 347R "Guide to Formwork for Concrete."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver concrete until forms, reinforcement, embedded items, chamfer strips, and reveal strips are in place and ready for concrete placement. Protect materials from contaminants such as grease, oil and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed.

PART 2 – PRODUCTS

2.01 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Comply with ACI 347R. Provide new or good finish form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other ACI 347R approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1, or better.
 - b. Medium-density overlay, Class 1, or better, mill-release agent treated and edge sealed.
 - c. Structural 1, B-B, or better, mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1, or better, mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Form oils or waxes shall not be used for concrete surfaces intended to be painted.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- D. Form Ties: Factory-fabricated, removable or snap-off stainless steel or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.
 2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.

2.02 REINFORCEMENT

All reinforcing steel shall be detailed and placed in conformance with the "Specifications for Structural Concrete for Buildings" (ACI 301), the CRSI "Manual of Standard Practice", and the "ACI Detailing Manual-1994."

- B. Tie Wire shall be stainless steel, Type 304 or Type 316, 18 gage minimum.
- C. Reinforcing bars shall conform to ASTM 1035, ChromX 4100 or approved equal.
- D. Anchor bolts, dowels and other embedded items are to be securely tied in place before concrete is poured.
- E. All reinforcing bar bends shall be made cold.
- F. Reinforcing splices shall be made only where indicated on the drawings.
- G. Dowels between footing and wall or columns shall be the same grade, size, spacing, and number as the vertical reinforcing respectively, unless otherwise noted.
- H. Welding of reinforcing steel is not permitted unless otherwise shown on the drawings.
- I. Contractor shall submit reinforcing bar layouts and details for the Engineer's review prior to fabrication. Fabricate from reviewed drawings only.
- J. Reinforcing bars shall be as long as practicable and as detailed and shall be lapped at splices and corners not less than 32 bar diameter (24" minimum), unless otherwise shown. Stagger horizontal wall bar splices. In general, bar splices shall be made at points of minimum stress. In beams and slabs, splice top bars at mid-span, bottom bars over supports, unless otherwise shown.
- K. Embedded metal components made up of alloys that are dissimilar to that of the reinforcing steel shall not be attached directly to reinforcing. Measures shall be taken to electrically isolate said components from any reinforcing to prevent cathodic effects.

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II.
- B. Pozzolans: Fly Ash: ASTM C 618, Class F.
- C. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
 - 1. Class: Moderate weathering region, but not less than 3M.
 - 2. Aggregate Size: No. 57 (1 inch to No.4).
 - 3. Aggregate Size: No. 67 (3/4 inch to No.4).
- D. Size of Coarse Aggregate: Except when otherwise specified or permitted, maximum size of coarse aggregate shall not exceed three-fourths of the minimum clear spacing between reinforcing bars (or bundled bars), one-fifth of the narrowest dimension between the sides of forms, or one-third of the thickness of slabs or toppings.
- E. Water: Potable and complying with ASTM C 94.

2.04 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
- B. Water-Reducing Admixture: ASTM C494, Type A.
- C. Water-Reducing and Retarding Admixture: ASTM C494, Type D
- D. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
- E. High-Range Water-Reducing and Retarding Admixture: ASTM C494, Type G.
- F. Corrosion Inhibitor: Master Builders – MasterLife CI 30 or approved equal calcium nitrite corrosion inhibitor at 3 gal/CY

2.05 CURING MATERIALS AND EVAPORATION RETARDERS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

- E. Clear, Solvent-Borne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, 18 to 22 percent solids.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, 18 to 22 percent solids.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.06 RELATED MATERIALS

- A. Joint-Fillers: ASTM D 1751, asphalt-saturated cellulose fiber or ASTM D 1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, Type IV and V.
- D. Cementitious Coatings: Cement based polymer modified concrete finish materials. Available Products subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ProFinish by Bonded Materials
 - 2. Polycoat by Tremcrete Systems Incorporated
 - 3. Durus by Durus High Tech Cement
 - 4. MBT RS-1150 by Master Builders Technologies

2.07 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
 - 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
- B. Proportion normal-weight concrete mix as follows:

Compressive Strength (28 Days): 4,000 psi.
Compressive Strength (28 Days): 3,000 psi.
- D. Cementitious Materials:
 - 1. Fly Ash: Add with cement. Fly ash content must be a minimum of 25 percent by weight of cementitious material.

- E. Maximum Water-Cementitious Materials Ratio: 0.45.
- F. Limit water-soluble, chloride-ion content in hardened concrete per ACI 318-14 Chapter 19.
- G. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.45.

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and ASTM C 1116 and furnish batch ticket information. Batch ticket information shall include design mix reference, water that can be added at the jobsite, and admixtures. For transit mixing, complete not less than 70 revolutions of the drum at the manufacturer's rated mixing speed. Discharge concrete into its final position within 90 minutes after introduction of batch water to the cement. If a retarder admixture is used, the discharge time limit of 90 minutes may be increased by the time specified for retardation by the admixture manufacturer or the concrete supplier. Mix concrete a minimum of one minute at mixing speed immediately prior to discharge.
- B. Project-Site Mixing: Project-Site mixing with the approval of the Officer-In-Charge. Measure, batch, and mix concrete materials according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. or less, continue mixing at least one and one-half minutes, but not more than five minutes after all ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 - 3. Provide batch ticket for each batch discharged and used in the work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of concrete placement in structure.
 - 4. Hand mixed concrete will not be allowed, except to make up shortages for thresholds, curbs and gutters, thrust blocks and utility trench encasements.

PART 3 – EXECUTION

3.01 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8"
 - 2. Class S, 1/4"
 - 3. Class C, 1/2"
 - 4. Class D, 1"
- D. Construct forms to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
 - 1. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds. Maintain the integrity of the vapor retarder membrane.
- G. Provide openings for weep holes and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete unless otherwise indicated on the construction drawings.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor bolts, stainless steel plates and rebar, accurately located, to elevations required.
 - 2. Install inserts, hangers, metal ties, nailing strips, blocking, grounds and other fastening devices needed for attachment of other work.

3.03 REMOVING AND REUSING FORMS

- A. Leave formwork, for structural elements, that supports weight of concrete in place until concrete has achieved the following:
 - 1. 28-day design compressive strength or 14 days after placing concrete, whichever is longer.
 - 2. Determine compressive strength of in-place concrete by testing representative field or laboratory-cured test specimens according to ACI 301.
 - 3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by the Officer-In-Charge.

3.04 SHORES AND RESHORES

- A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.
- B. Plan sequence of removal of shores and reshores to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.
- C. Due to the reinforcing's very low specific gravity, it may tend to float in concrete during vibration. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.05 JOINTS

- A. General: Construction joints should be true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Officer-In-Charge.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Locate horizontal joints in walls at underside of slabs and beams, and at the top of footings.
 - 3. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near comers, and in concealed locations where possible.
 - 4. Use a bonding agent or epoxy adhesive scrubbed into the surface at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces. Bond agent or epoxy adhesive should be wet or tacky when new concrete is placed on it. If bonding agent or epoxy adhesive is dry, completely remove and reapply.

3.06 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items are complete and that required inspections have been performed. Provide two day notification to Officer-In-Charge for each scheduled pour.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Officer-In-Charge.
 - 1. Do not add water to concrete after adding high-range water reducing admixtures to mix.
- C. Convey concrete from mixer to the place of final deposit rapidly by methods that prevent segregation or loss of ingredients and will insure the required quality of concrete. Use conveying equipment, conveyors, hoppers, baffles, chutes, pumps that are sized and designed to prevent cold joints from occurring and prevent segregation in discharged concrete. Clean conveying equipment before each placement.
- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- E. Deposit concrete in forms in horizontal layers with proper consolidation into previous layers and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layers and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
 3. Make construction joints only where located on Drawings unless otherwise approved by the Officer-In-Charge. Plan pours to continuously place concrete from one construction joint to another.
- F. Deposit and consolidate concrete for mass structure on land side of seawall in a continuous operation, until placement of a section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleed-water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
- H. Lean Concrete shall be used for concrete cut-off walls to provide a uniform and level surface that supports the 0-Face Concrete Curbs.

Grade of concrete: M5: 1:5:10 or M7.5: 1:4:8 (Cement: Sand: Aggregates)

3.07 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive hot temperatures. Comply with recommendations in ACI 305R for hot weather protection during curing. Cure concrete for at least 7 days.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the curing methods listed in paragraph 3.10 D.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including concrete poured on land side of seawall and other repaired surfaces, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moist cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moist cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
 - 3. Curing Compound: Apply uniformly in continuous operation by spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

4. Curing and Sealing Compound: Apply uniformly to top slab of wall and concrete poured on land side of seawall in a continuous operation by spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application where recommended by the manufacturer. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.08 JOINT FILLING

- A. Prepare, clean, and install joint-filler according to manufacturer's written instructions. Defer joint filling as long as possible. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.09 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas. Remove and replace concrete that cannot be repaired and patched to Officer-in-Charge's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing. Compressive strength at 28 days shall be not less than 4,000 psi.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock rockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Officer-in-Charge.
- D. Repairing Unformed Surfaces: Test unformed surfaces for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surface sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 5. Repair defective areas, except random cracks and single holes 1-inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and exposed reinforcement with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 6. Repair random cracks and single holes 1-inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Officer-in-Charge's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Officer-in-Charge's approval.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 3. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 degrees F/4 degrees C and below and when 80 degrees F (27 degrees Centigrade) and above, and one test for each composite sample.
 4. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
 - a. Cast and field cure one set of four standard cylinder specimens for each composite sample.
 5. Compressive-Strength Tests: ASTM C 39; test two laboratory cured specimens at 7 days and two at 28 days.
 - a. Test two field-cured specimens at 7 days and two at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.
- C. Strength of each concrete mix will be satisfactory if every average of any three-consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Officer-In-Charge, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Officer-In-Charge but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Officer-In-Charge. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Officer-In-Charge.

PART 4 – PAYMENT

- A. Payment for furnishing and placement of concrete, rebar and dowels to form concrete curbs, gutters, cut-off walls, grade adjustment walls, fence post footings, base and walkway for shower, and other repairs identified by the Officer-in-charge shall be included in the various items established in the Offer. Such payment will be full compensation for all labor, materials, equipment, transportation, tools, bracing, and all other items necessary and incidental to the completion of the work, except items listed for payment elsewhere in the contract.
- B. Demolition and removal of unusable concrete, debris, excavated material, forms, trench support, tie wires, bracings, straps, structural struts, surface finishing, curing, mixing, hauling, furnishing and placing reinforcing and all other incidentals necessary to complete the work shall also be included in the items established in the Offer.

END OF SECTION

DIVISION 5 – METALS

SECTION 05120 - STRUCTURAL STEEL

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Structural steel.

B. Related Sections:

1. Division 1 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.03 DEFINITIONS

- ###### A. Structural Steel:
- Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.04 SUBMITTALS

- ###### A. Product Data:
- For each type of product indicated.

- ###### B. Shop Drawings:
- Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint, including the following:
1. Power source (constant current or constant voltage).
 2. Electrode manufacturer and trade name, for demand critical welds.
- D. Qualification Data: For qualified fabricator.
- E. Welding certificates.
- F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- G. Mill test reports for structural steel, including chemical and physical properties.
- H. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
- I. Source quality-control reports.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACES.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as

required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.07 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 – PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

- A. Wide Flange: ASTM A992
- B. Channels, Angles: A36
- C. Plates: ASTM A 572, Grade 50.
- D. Pipes: ASTM A 53, Type E or S, Grade B.
- E. Steel Tubes: ASTM A500, Grade C.
- F. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
- B. Galvanizing Repair Paint: ASTM A 780.

2.03 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.04 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning".
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.05 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.06 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

2.07 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.02 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- C. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- D. Splice members only where indicated.
- E. Do not use thermal cutting during erection. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M].
- F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.03 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.05 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

3.06 MEASUREMENT AND PAYMENT

- A. The Engineer will pay for the installation of the Structural Steel on a per pay unit as shown in the proposal schedule. Prices and payments will be full compensation for all work specified in this Section, including furnishing the materials necessary to complete the Structural Steel in place and accepted.

The Engineer will pay for each of the following pay items when included in the proposal schedule:

Pay Item	Unit
Steel Waler	LF

END OF SECTION