FIRE PROTECTION SYSTEM REPAIRS, PIER 3,

NAWILIWILI HARBOR, KAUAI, HAWAII

JOB S70156

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HARBORS DIVISION

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NOTICE TO BIDDERS

(Chapter 103D, Hawaii Revised Statutes)

The receiving of SEALED BIDS for FIRE PROTECTION SYSTEM REPAIRS, PIER 3, NAWILIWILI HARBOR, KAUAI, HAWAII - JOB S70156, will be advertised in HIePRO. Bidders are to register and submit bids through HIePRO only. See the following HIePRO link for important information on registering: https://hiepro.ehawaii.gov/welcome.html.

Plans, specifications, proposal, contract forms, and any other applicable documents may be obtained from HIePRO.

Deadline to submit bids is May 15, 2023, at 2:00 p.m. Hawaii Standard Time. Bids received after said due date and time shall not be considered.

The scope of work consists of potholing, visual and camera closed-circuit television inspection, pressure testing, and rehabilitation of portions of the fire service lines with cure-in-place-pipe or similar means, at the Pier 3 container yard at Nawiliwili Harbor. The estimated cost of construction is between $400,000 and $475,000.

To be eligible for award, bidders must possess a valid State of Hawaii General Engineering Contractor's "A" license at the time of bidding.

The GENERAL PROVISIONS dated 2016 applicable to this project are available on the internet at http://hidot.hawaii.gov/administration/con/.

All questions and requests for information (RFI) applicable to the bid documents shall be submitted via HIePRO no later than five calendar days before bid opening. Questions received after the deadline will not be addressed. Verbal RFI will not receive a response.

Apprenticeship Preference. A 5% bid adjustment for bidders that are parties to apprenticeship agreements pursuant to §103-55.6, Hawaii Revised Statutes (HRS), is applicable to this project.

Employment of State Residents on Construction Procurement Contracts. Compliance with §103B-3, HRS, is a requirement for this project whereby a minimum of 80% of the bidder's work force on this project **must** consist of Hawaii residents.

Campaign Contributions by State and County Contractors. Contractors are hereby notified of the applicability of §11-355, HRS, which states that campaign contributions are prohibited from specified State or County government contractors during the term of the contract

if the contractors are paid with funds appropriated by a legislative body. For more information, contact the Campaign Spending Commission at (808) 586-0285.

Any protest of this solicitation shall be submitted in writing to the Director of Transportation, in accordance with §103D-701, HRS, and §3-126, Hawaii Administrative Rules.

The Equal Employment Opportunity Regulations of the Secretary of Labor implementing Executive Order 11246, as amended, shall be complied with on this project.

The U.S. Department of Transportation Regulation entitled "Nondiscrimination in Federally-Assisted Programs of the U.S. Department of Transportation," Title 49, Code of Federal Regulations (CFR), Part 21, is applicable to this project. Bidders are hereby notified that the State Department of Transportation will affirmatively ensure that the contract entered into pursuant to this advertisement will be awarded to the lowest responsible bidder without discrimination on the grounds of race, color, national origin or sex (as directed by 23 CFR, Part 200).

For additional information, contact Mr. Niko Salvador, Harbors Engineering Program Manager, by phone at (808) 587-1862 or email at niko.g.salvador@hawaii.gov.

The State reserves the right to reject any or all proposals and to waive any defects in said proposals for the best interest of the public.

Dreanalee Kalili

DREANALEE K. KALILI
Deputy Director
Department of Transportation, Harbors

INSTRUCTIONS FOR CONTRACTOR'S LICENSING

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

SPECIAL PROVISIONS

The General Provision is amended as follows:

A. ARTICLE I - TERMS, ABBREVIATIONS, AND DEFINITIONS

1. Section 1.3 Definitions: The definition for "Subcontractor" is amended by deleting it and replacing it with the following:

   "Subcontractor – An individual, partnership, firm, corporation, or joint venture, or other legal entity, as licensed or required to be licensed under Chapter 444, Hawaii Revised Statutes, as amended, which enters into an agreement with the Contractor to perform a portion of the work."

2. Add the following to section 1.3 Definitions.

   "HAWAII ePROCUREMENT SYSTEM (HIePRO) - The State of Hawaii eProcurement System for issuing solicitations, receiving proposals and responses, and issuing notices of award."

B. ARTICLE II – STANDARD PROVISIONS FOR COMPETITIVE SEALED BIDS AND AWARDS

1. 2.7 Request for Substitution of Specified Materials and Equipment Before Bid Opening is amended as follows:

   a. The last sentence in the first paragraph (line 147 to 152) be replaced with the following:

      "Where a bidder intends to use a material or equipment of an unspecified brand, make, or model, the bidder must submit a request to the Department for review and approval at the earliest date possible. Requests shall be submitted via email to the Contact person listed in HIePRO for the solicitation and also posted as a question in HIePRO under the question/answer tab referencing the email with the request. The request must be posted in HIePRO no later than seventeen (17) calendar days before the bid opening date, not including the bid opening date."

   b. The first sentence in the second paragraph (line 154 to 156) shall be replaced with the following:

      "It shall be the responsibility of the bidder to submit sufficient evidence based upon which a determination can be made by the Department that the alternate brand is a qualified equivalent."

2. 2.8 Preparation and Delivery of Bid is amended as follows: Last paragraph (line 189 to 192) shall be replaced with the following:

"The bidder shall submit the proposal in HIePRO. The proposal shall be UPLOADED to HIePRO prior to the bid opening date and time. Proposals received after said due date and time shall not be considered. Original (wet ink) proposal documents are not required to be submitted. The award will be made based on proposals uploaded in HIePRO. Any and all other additional documents explicitly designated and labeled as CONFIDENTIAL OR PROPRIETARY shall be UPLOADED SEPARATELY to HIePRO."

3. 2.11 Bid Security is amended by deleting (a) and replacing it with:

"(a) Unless directed otherwise in the invitation for bids, each bid shall be accompanied by bid security which is intended to protect the Department against the failure or refusal of a bidder to execute the contract for the work bid or to supply the required performance and payment bonds. Bid security shall be in an amount equal to at least five percent of the base bid and additive alternates. Bid security shall be in one of the following forms:

(1) A deposit of legal tender;

(2) A valid surety bid bond, underwritten by a company licensed to issue bonds in the State of Hawaii; or

(3) A certificate of deposit; credit union share certificate; or cashier's, treasurer's, teller's, or official check drawn by or a certified check accepted by a bank, savings institution, or credit union insured by the Federal Deposit Insurance Corporation (FDIC) or the National Credit Union Administration (NCUA) and payable at sight or unconditionally assigned to the Department. These instruments may be utilized only to a maximum of one hundred thousand dollars ($100,000.00). If the required amount totals over one hundred thousand dollars ($100,000.00), more than one instrument not exceeding one hundred thousand dollars ($100,000.00) each and issued by different financial institutions shall be accepted.

(4) Proposal Guaranty listed in (1) and (3) shall be in its original form, and shall be received at the Contracts Office, Department of Transportation, Aliiaimoku Hale, 869 Punchbowl Street, Room 105, Honolulu, Hawaii 96813 before the bid deadline."

4. 2.12 Pre-Opening Modification or Withdrawal of Bids is amended by deleting 2.12 Pre-Opening Modification or Withdrawal of Bids in its entirety and replacing it with the following:

"2.12 Pre-Opening Modification or Withdrawal of Bids. A bidder may withdraw or modify a proposal after the bidder submits the proposal in HIePRO. Withdrawal or modify of proposal must be completed before the time set for the receiving of bids."

5. 2.14 Public Opening of Bids is amended by deleting 2.14 Public Opening of Bids in its entirety.

6. 2.20 Bid Evaluation and Award is amended by replacing 2.20(a) and 2.20(b) with the following:

"(a) The award shall be made to the lowest, responsive, responsible bidder within 15 days after bid opening and shall be based on the criteria set forth in the invitation for bids. The Department may request the bidders to allow the Department to consider the bids for the issuance of an award beyond the 15 day period. Agreement to such an extension must be made by a bidder in writing. Only bidders who have agreed to such an extension will be eligible for the award.

(b) No bid shall be withdrawn or corrected for a period of 15 days after bid opening except for a mistake as described in this article; however, a bidder may withdraw a bid without penalty anytime prior to award of the contract if it finds it is unable to comply with the provisions regarding the employment of State of Hawaii residents as described in Section 7.2 and 103B-3, H.R.S."

C. ARTICLE VII – LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

1. 7.1 Insurance Requirements is amended by deleting paragraph "(b)(4) Builder's Risk for All Work" in its entirety.

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

SPECIFICATIONS

PART I

GENERAL PROVISIONS

(The Hawaii Department of Transportation AIR and WATER Transportation Facilities Division General Provisions for Construction Projects dated 2016 is not physically included in these specifications. The General Provisions are available at http://hidot.hawaii.gov/administration/con/)

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

SPECIFICATIONS

PART II

TECHNICAL PROVISIONS

ARTICLE X - PROJECT DESCRIPTION

10.1 GENERAL

The work to be done under this contract shall include the furnishing of all labor, materials and equipment, and the supervision and services necessary to construct, complete in place, ready for use, all items of work in accordance with the intent of the drawings and these specifications. The Base Bid shall include the total work as shown or specified.

Bidders are encouraged to examine the existing conditions at the project site to familiarize themselves with the nature and extent of work involved. Appointments may be made with the Harbors Division, Niko Salvador, phone no. (808) 587-1862, for clarification of the work involved, and the character and quality of materials described.

10.2 WORK INCLUDED

In general, the work shall include but not be limited to the following items of work:

(A) Environmental protection.

(B) Mobilization and demobilization.

(C) Coordination with Young Brothers, and government agencies.

(D) Demolition/potholing and removal of existing Portland cement concrete pavement, and other structures.

(E) Construction of Portland cement concrete pavement.

(F) Visual and camera CCTV inspection, and pressure testing fire service lines.

(G) Repair portions of the fire service lines with Cured-In-Place-Pipeliner (CIPP)

10.3 DIRECTOR

The term "Director" as used in these Specifications shall mean the Director of Transportation or his authorized representative.

10.4 HARBORS DIVISION CONSTRUCTION ENGINEER

The term "Harbors Division Construction Engineer," "Harbors Construction Engineer," "Construction Engineer" or "Engineer," as used in these Specifications shall mean the Construction Engineer for Harbors Division, State Department of Transportation, or his authorized representative.

10.5 CONTRACTOR'S RESPONSIBILITY

(A) General: The Contractor shall make direct application to the proper utility companies for water, electric power, and telephone service for its use during construction of this project, and shall pay for all connections, service charges, and all costs for construction and ultimate removal of all temporary service line extensions into the site.

The Contractor shall comply with all applicable Federal, State and County laws, including Hawaii Public Health regulations, and all local laws and regulations concerning pollution control and abatement. No burning of debris and/or waste materials shall be permitted on the project site. The Contractor shall be responsible for all dust control. Dust shall be kept within acceptable levels at all times. Noise shall be kept within acceptable levels at all times.
The Contractor shall be responsible for any and all damages to harbor and adjacent facilities caused by their operations. The Contractor shall, at their own expense, make prompt restitution for damages to items caused by their operations or negligence. The Contractor shall hold the State and its Consultants harmless for all claims from such loss or injury.

The Contractor will prepare and obtain approval of site specific Best Management Practices (BMPs) from the Department of Health at least 45 calendar days prior to the start of construction. The site specific BMPs shall be prepared in accordance with the City and County of Honolulu's *Best Management Practice Manual for Construction*, dated November 2011 and comply with the latest edition of the "Construction Site Runoff Control Program" of the Harbors Division. The site specific BMPs shall be submitted to the Harbors Division for review and comment prior to the submittal to the Department of Health.

The Contractor shall ensure that construction dewatering effluent is not allowed to leave the project site. Dewatering, when required, shall be done by back trenching (pit-to-pit discharge). Dewatering effluent within contaminated areas as shown within the construction drawings shall be infiltrated within the contaminated areas shown within the construction drawings. The Contractor is prohibited from discharging dewatering effluent, in any way, into the ocean.

The Contractor shall provide, erect, and maintain warning signs, lights, barricades, fences, and/or other means as necessary to prevent unauthorized persons and the general public from wandering onto the construction area where they may suffer injury or create a hazard to the construction operations or the work. The Contractor shall take all necessary precautions for safety in his operations and to prevent injury to his employees and to others having lawful

access to the construction area. This work shall be done at no cost to the State and shall be considered incidental to the various item of work.

The Contractor shall coordinate all work with the Harbors Division Construction Engineer and Kauai District Manager and shall conform to all harbor regulations affecting their operations.

(B) Site Safety and Health Officer (SSHO): Site Safety and Health Officer shall be provided by the Contractor at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The SSHO shall meet the following qualification requirements:

(1) An Associate Safety Professional (ASP), Certified Safety Trained Supervisor (STS), Construction Health & Safety Technician (CHST), and/or Construction Site Safety Technician (CSST).

(2) A minimum of 10 years of safety work of a progressive nature with at least 5 years of experience on similar projects.

(3) 30-hour OSHA construction safety class or equivalent within the last 5 years.

(4) An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following 5 areas of competency: excavation, scaffolding; fall protection; confined space; and personal protective equipment and clothing to include selection, use, and maintenance.

The SSHO shall have the following duties and responsibilities:

(1) Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, and estimated and actual dates of corrections. Safety inspection logs shall be attached to the Contractor's daily report.

(2) Conduct mishap investigations and complete required reports. Maintain the OSHA Form 300 and Daily Production reports for prime and subcontractors.

(3) Maintain applicable safety reference material on the job site.

(4) Attend the pre-construction conference, pre-work meeting, including preparatory inspection meeting, and periodic in-progress meetings and/or other meetings upon request by the Harbors Construction Engineer.

(5) Implement and enforce the accepted Health and Safety Plan.

(6) Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. A list of unresolved safety and health deficiencies shall be posted on the safety bulletin board.

(7) Ensure subcontractor compliance with safety and health requirements.

(8) Coordinate safety and health requirements with the Contractor's Certified Industrial Hygienist (CIH). If the CIH satisfies the SSHO qualification requirements and is appointed as the SSHO, all duties of the SSHO position shall also be performed.

(9) Failure to perform the above duties may result in dismissal of the SSHO and/or a project stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement. No part of the time lost due to project stoppage will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

(C) Safety Requirements: The Contractor must be familiar with, and shall at all times conform to, all applicable health and safety regulations, including all OSHA standards. The Contractor shall submit, to the Harbors Engineer, a Health and Safety Plan within (30) calendar days after the award of contract for review and acceptance. The Contractor shall not be allowed to commence work until the Health and Safety Plan has been accepted by the Harbors Engineer.

The Contractor shall require its employees, subcontractors, and agents to comply with all applicable Federal, State, and local health and safety laws and regulations.

Acceptance of the Health and Safety Plan by the Harbors Construction Engineer shall not relieve the Contractor from its responsibility of complying with Federal, State and local occupational health and safety laws and regulations. The Contractor is solely responsible for its compliance, and ensuring that its employees, subcontractors and agents also comply, with all applicable Federal, State and local occupational health and safety laws and regulations.

The Contractor shall be familiar with any and all Federal, State and local safety and drug-free workplace regulations and shall comply with all applicable provisions and amendments. Failure to do so will result in immediate discontinuation of any, or all, parts of the operation that are in violation until compliance is achieved.

(1) Precautions at the Jobsite: The Contractor shall take all necessary precautions to protect the workers, invitees and the public, and shall provide, where reasonable and necessary, barriers, guards, temporary bridges, respiratory equipment and lights. The Contractor shall require all personnel to wear hard hats, safety boots, and appropriate clothing while in any work area. In addition, personnel shall utilize safety harnesses, lines, and other restraint devices as required when working at either excessive heights or depths as defined by OSHA regulations.

As a reminder, the Contractor must provide bullrails along unprotected waterside edges of aprons and bulk-heads, except where vehicles are prohibited.

When working around existing piping or conduit, the Contractor shall first tone the area to determine underground line locations. Special care shall be taken during excavation to avoid all buried lines, cables, utilities, cathodic protection cables and conduit, and to maintain the minimum distance from existing cables, conduits and pipe.

(2) Fire Safety: The Contractor's personnel shall be familiar with location and use of firefighting equipment, including blankets, extinguishers, hose and dry powder agents. Smoking materials or other sources of flame or heat should be immediately extinguished in the event of any accident or equipment failure resulting in the release of flammable vapor or liquids. Fire safety equipment shall be provided by the Contractor as may be required by the local, State or Federal authorities.

The Contractor shall not store equipment or park vehicles in a way that obstructs fire lanes nor blocks fire exits from office structures, equipment buildings, or fenced areas.

(3) Mechanical Safety: Dangerous parts of equipment shall be indicated by safety colors or warning signs. Extreme care shall be exercised in operating mobile or moving equipment.

(4) First Aid: The Contractor shall ensure that all employees are aware of the locations and use of first aid equipment. Local emergency telephone numbers for ambulance, fire department and law enforcement agencies shall be posted in prominent places. The Contractor shall provide all necessary first aid equipment, including a first aid kit in its vehicles.

(5) Firearms and Alcohol: Absolutely under no circumstances shall unprescribed, controlled substances, alcohol or firearms of any type be present or carried in vehicles by Contractor's personnel. Any of these items found in the possession of any person shall be grounds for immediate removal from the jobsite and/or dismissal of that person from the job.

(6) Accidents: In the event that an accident or injury occurs at the jobsite, the Contractor shall immediately notify the State of the occurrence. A complete accident report, including photographs of the accident site, shall be provided to the State within two (2) weeks of the occurrence.

(7) Jobsite Invitees: The Contractor shall be responsible for the safety of the personnel of any of its Subcontractors, vendors, suppliers, agents or other invitees who enter the job site area and the Contractor shall require said invitees to comply with the requirements of this Section. The Contractor shall notify the State of invitees in advance.

10.6 STANDARD SPECIFICATIONS AND APPROVED EQUAL

The term "Standard Specifications," as used in these Technical Provisions of these Specifications, shall mean the "Hawaii Standard Specifications for Road and Bridge Construction, Department of Transportation Highways Division, Honolulu, Hawaii, 2005," and all subsequent amendments.

References to "roadway" or "highway" in the Standard Specifications shall mean "paved area".

References to "roadbed" in the Standard Specifications shall mean "pavement bed". References to "highway right-of-way" in the Standard Specifications shall mean Aproject area".

The term "approved equal" as used in the Technical Provisions of these Specifications and Plans shall mean "an equal approved by the Director in writing."

10.7 PERMITS

The Contractor is responsible for complying with all permit requirements for the project and it shall ensure that all permits remain valid and that all permits are renewed in a timely manner, throughout the duration of the project.

(A) The Harbors Division has applied for and obtained the following permits and approvals and they are attached to, and included in, the REFERENCE DOCUMENTS section of these specifications.

(B) Hot Work Permit: The Contractor shall obtain permits for all welding and burning operations on piers, wharves, and aboard vessels. The Contractor shall obtain the permits required for this work directly from the Kauai District manager.

(C) The Contractor also shall consult applicable County, State, and other governmental agencies for required permits, charges and fees. The Contractor shall apply for, and obtain, any permits necessary for it to perform all work required under the contract and is responsible for preparing and furnishing any information needed to complete any permit applications, as well as for paying any permit filing fees and charges, imposed by the permitting agencies as conditions for approval. Permits, charges, and fees required for the Project may include, but not be limited to, the following:

1. Landfill Agreement
2. Fire Hydrant Use Permit
3. Department of Health, NDPES permits for discharges of hydrotesting waters, as well as discharges associated with construction activity dewatering.
4. Construction Dewatering Permit for Industrial Waste Discharge into the City and County Separate Storm Sewer System
5. Industrial Waste Discharge Permit (IWDP) for Temporary Discharge into the County Sewer System
6. DOH Community Noise Permit

The Contractor shall submit two (2) copies of all permits to the Harbors Construction Engineer no later than two working days after receipt of any approved permit.

The Contractor must comply with all conditions and requirements imposed by all clearances and permits listed above, or obtained for and in association with the project, and the Plans and Specifications. See Article XIII, Section 13.2 (B).

10.8 SHOP DRAWINGS

The Contractor shall prepare shop drawings and submit eight (8) sets to the Director. Review of shop drawings is for general conformance with the design concept of the project contract documents and does not relieve the Contractor of his responsibility to provide all work in accordance with the Plans and Specifications.

10.9 MODIFICATIONS TO PLANS AND SPECIFICATIONS

The Contractor and his Subcontractors must submit in writing any requests for modifications to the Plans and Specifications. Shop drawings that are submitted to the design professional for his review do not constitute "in writing" unless it is brought to the attention of the design professional that specific changes are being suggested. In any event, changes to the Plans and Specifications by means of shop drawings become the responsibility of the person initiating the changes. The Contractor shall be responsible for coordinating and making all necessary revisions to the work of all trades to suit the modifications requested.

Construction changes completed without written approval by the Harbor's Construction Engineer will be at the Contractor's risk. All costs associated with unauthorized construction changes shall be the responsibility of the Contractor.

10.10 CONTRACTOR QUALITY CONTROL

(A) General Requirements: Establish and maintain an effective quality control (QC) system. QC consists of plans, procedures and organization necessary to produce an end product which complies with the contract requirements. The QC system shall cover all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Engineer for non-compliance with the quality requirements specified in the contract. In this context, the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent must maintain a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Engineer.

(B) Quality Control Plan: Submit no later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan. The Engineer will consider an interim plan for the first 90 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

1. Content of the CQC Plan: Include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

   a. A description of the quality control organization, including a chart showing lines of authority and acknowledgement that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager who reports to the project superintendent.

   b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

   c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract
   as well as to direct that corrective action be initiated to address non-compliant work. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Copies of these letters must be furnished to the Engineer.

   d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents.

These procedures must be in accordance with Article XVII – Required Submittals.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Engineer must be used).

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

2. Acceptance of Plans: Acceptance of the Contractor's CQC plans is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during construction. The Engineer reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3. Notification of Changes: After acceptance of the CQC Plan, notify the Engineer in writing of any proposed change. Proposed changes are subject to acceptance by the Engineer.

(C) Coordination Meeting: After the preconstruction conference, before start of construction, and prior to acceptance by the Engineer of the CQC Plan, attend a Coordination Meeting with the Engineer and discuss the Contractor's quality control system. Submit the CQC plan a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's management and control and the Engineer's quality assurance. Minutes of the meeting will be prepared by the Contractor, signed by both the Contractor and the Engineer, and will become a part of the contract file. There may be occasions when

subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

(D) Quality Control Organization:

1. Personnel Requirements: The requirements for the CQC organization are a CQC System Manager, Safety and Health Manager (Site Safety and Health Officer), and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager must receive direction and authority from the CQC System Manager and serve as a member of the CQC staff. Personnel identified in the technical specifications as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff must maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff will be subject to acceptance by the Engineer.

   Provide adequate office space, filing systems, and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules, and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at all times, except as otherwise acceptable to the Engineer.

2. CQC System Manager: Identify as CQC System Manager an individual within the onsite work organization who is responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager must be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 5 years of container terminal construction experience and a minimum of 1 years of experience as a CQC System Manager. This CQC System Manager must be on the site at all times during construction and be employed by the prime Contractor. The CQC System Manager must be assigned no other duties. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3. CQC Personnel: In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager. If it is subsequently determined by the Engineer that the minimum CQC requirements are not being met, the Contractor may be required to provide additional staff personnel to the CQC organization at no cost to the State.

4. Additional Requirement: In addition to the above experience and/or education requirements, the QC System Manager must have completed the course entitled "Construction Quality Management for Contractors." This course is periodically offered at the General Contractors Association of Hawaii.

5. Organizational Changes: The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Engineer for acceptance. Requests shall include the names, qualifications, duties, and responsibilities of each proposed replacement. Upon acceptance of any changes, the Contractor shall revise the CQC Plan to accurately reflect the changes. The CQC Plan shall be kept current at all times during the life of the contract.

(E) Submittals and Deliverables: Submittals shall comply with the requirement stated in Article XVII – Required Submittals. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements prior to submitting for review.

(F) Control: Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control must be conducted by the CQC System Manager for each definable feature of the construction work as follows:

1. Preparatory Phase: This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/submittals/materials are approved/accepted, and after copies are at the work site. The phase includes:

   a. Review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by the Engineer until final acceptance of the work.

   b. Review of the contract drawings.

   c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.

   d. Review of provisions that have been made to provide required control inspection and testing.

   e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. Examination of required material, equipment, and sample work assure that they are one hand, conform to approved shop drawings or submitted data, and are properly stored.

g. Review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Engineer.

j. Discussion of the initial control phase.

k. A meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature of work. Provide a minimum of two (2) working days advance notice to the Harbors Construction Engineer of this meeting. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

The Engineer shall be notified at least 48 hours in advance of the preparatory control phase.

2. Initial Phase: This phase is accomplished at the beginning of the definable feature of work. Accomplish the following:

a. Check work to ensure that is it in full compliance with contract requirements. Review minutes of the preparatory phase meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Engineer shall be notified at least 1 workday in advance of the beginning of the initial phase. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily

CQC report. Indicate the exact location of initial phase for future reference and comparison with follow-up phases.

g. The initial phase shall be repeated for each new crew assigned to a definable feature of work to work onsite, or any time acceptable specified quality standards are not being met.

3. Follow-up Phase: Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

4. Additional Preparatory and Initial Phases: Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision, or work crew; if work on a definable feature of work is resumed after a substantial period of inactivity; or if other problems develop.

(G) Tests:

1. Testing Procedure: Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Engineer duplicate samples of test specimens for possible testing by the State. Testing includes operation and/or acceptance tests when specified. Procure the services of a State-approved testing laboratory. Perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording form and test identification control number system, including all of the test documentation requirements have been prepared.

e. Record results of all tests taken, both passing and failing on the CQC report for the date taken, including specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Engineer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Engineer.

Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

2. Testing Laboratories:

a. Validation Requirements: Any laboratory used by the Contractor for testing aggregate, concrete, bituminous materials, soils, rock, and other construction materials must be a State-approved facility.

b. Furnishing or Transportation of Samples for Testing: Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Contractor shall be delivered to a testing laboratory on the Island of Oahu, State of Hawaii, designated by the Engineer. Notification of each specific test and result, exact delivery location, and dates will be made to the Engineer.

(H) Completion Inspection:

1. Punch-out Inspection: Conduct an inspection of the work by the CQC System Manager near the end of the work, or any increment of the work as established by the specifications. Prepare and included CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by the Documentation paragraph in this section. Include in the list of deficiencies the estimated date by which the deficiencies will be corrected. The CQC System Manager of staff shall conduct a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Engineer that the facility is read for the pre-final inspection.

2. Pre-Final Inspection: The Engineer will perform this inspection to verify that the facility is complete and ready to be occupied. The CQC System Manager shall develop a punch list of items which do not conform to the contract documents. The Engineer will review the punch list and add to or correct the items listed. The CQC System Manager shall incorporate the Engineer's comments and provide a pre-final punch list. The CQC System Manager shall ensure that all items on this list have been corrected before notifying the Engineer that a final inspection can be scheduled. Any items noted on the pre-final inspection shall be corrected in a timely manner. These inspections and deficiency corrections required by this paragraph shall be accomplished within the time slate for completion of the entire work.

3. Final Acceptance Inspection: The Contractor's quality control inspection personnel, plus the superintendent or other primary management person, and the Engineer must be in attendance at the final acceptance inspection. Additional State personnel, consultants, or users may also be in attendance. The final acceptance inspection will be formally scheduled by the Engineer based upon results of the pre-final inspection. Notify the

Engineer at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will cause for the Engineer to bill the Contractor for the Engineer's and attending consultants' cost for attendance.

(l) Documentation: Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. Include in these records the work of subcontractors and suppliers. The Contractor shall provide a sample format for the documentation to the Engineer for review and approval. The documentation, at a minimum, shall include the following:

1. Contractor/subcontractor and their area of responsibility.

2. Operating plant/equipment with hours worked, idle or down for repair.

3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

4. Test and/or control activities performed with results and references to specifications/drawing requirements. Identify the control phase (preparatory, initial, follow-up). List of deficiencies noted, along with corrective action.

5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

7. Job safety evaluations stating what was checked, results, and instruction or corrective actions.

8. Instructions given/received and conflicts in plans and/or specifications.

9. Contractor's verification statement.

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Engineer daily within 24 business hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report of every 7 days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the contract. The first report following a day of no

work will be for that day only. Reports must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager report.

(J) Notification of Non-Compliance: The Contractor shall immediately take corrective action upon receipt of notice, from the Engineer, that non-compliance with the foregoing requirements has been detected or discovered. Such notice, if and/or when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of formal notification.

Should the Contractor fail or refuse to promptly comply, or initiate corrective action, the Engineer may, at its discretion, issue an order to the Contractor to stop all or part of the work (a "stop order") until the Contractor takes corrective action that is satisfactory to the Engineer.
The Contractor is not allowed to make any claim for, nor will it be granted, contract time extension or compensation for excess costs or damages incurred by it, inclusive of remobilization and extended office overhead, resulting from the time lost as well as other impacts due to such stop orders.

10.11 LAYOUT OF WORK

The Contractor shall layout his work from reference points and benchmarks indicated on the plans and shall be responsible for all measurements in connection therewith. The Contractor shall furnish all labor, equipment and materials required to establish and maintain all lines and grades as called for in the plans or as required in the process of construction. The Contractor shall be responsible for the proper and accurate layout of the work and for the preservation of stakes and other marks. All survey work shall be performed by a Surveyor licensed in the State of Hawaii and be paid for by the Contractor. Survey costs will be considered incidental to various items of work.

10.12 TESTING

The Contractor shall hire an independent certified testing agency to perform all testing required under these specifications. Testing agency shall be subject to the approval of the Director. The Contractor shall be responsible for costs associated with testing, and for the submittal of test results.

Testing results shall be submitted for review by the State's Construction Engineer in a timely manner so as not to affect the construction schedule.

10.13 HARBOR OPERATIONS

All work shall be coordinated with the Harbors Division, Kauai District Manager and the Harbors Construction Engineer. Before work is started, the Contractor shall submit a work schedule to the Director for approval.

Arrangements for the use of areas within the harbor area, if under the purview of Harbors Division and if available, for work or storage shall be coordinated with the Harbors Construction Engineer and District Manager. However, the State does not warrant or guarantee that areas, beyond or outside of the project limits, and of such size and location that meets the requirements desired by the Contractor for work or storage,

will be available to the Contractor within or for the duration of the project. The Contractor is solely responsible for assessing its requirements for work and storage area(s) and for securing such work or storage areas, outside of or beyond the project limits.

10.14 WATERWAYS

The Contractor shall use all proper precautions and methods of procedure in his operations to ensure that no debris or other deleterious materials be allowed to fall, flow or otherwise enter the ocean. The Contractor shall notify the State Department of Health and the State's Construction Engineer of any petroleum or oil spills immediately. Any petroleum or oil spills shall be immediately removed to the satisfaction of the Director.

10.15 AS-BUILT DRAWINGS

(A) Description:

1. As-built drawings shall refer to those documents maintained and annotated by the Contractor during construction and shall be defined as (1) a neatly and legibly marked set of contract drawings showing the final location of piping, structures, equipment, electrical conduits, outlet boxes and cables; (2) additional documents such as schedules, lists, drawings, and electrical and instrumentation diagrams included in the specifications; additional documents placed on reproducible vellum (post-contract drawings); and (3) Contractor layout and installation drawings

2. Unless otherwise specified, as-built drawings shall be full-sized and maintained in a clean, dry, and legible condition. As-built drawings shall not be used for construction purposes and shall be available for review by the Construction Engineer during normal working hours at the Contractor's field office

(B) General:

1. The Contractor shall keep a record of all field changes that occur during the project on two (2) full-sized sets of the contract plans which shall be kept at the job site. No partial payments will be allowed unless these changes are reflected on both sets of plans, and the plans must be current and kept up to date.

2. The Contractor shall be responsible for furnishing its own 100 percent (full) size as-built drawings set based on the latest Contract Documents. The Contractor shall incorporate any post contract drawings issued under Field Orders, responses to Requests for Information, or as part of Contract Change Orders, into both copies of the as-built plans.

3. Marking of the as-built drawings shall be kept current and annotations, to the as-built drawings, shall be done at the time the material and equipment are installed. These annotations shall be made with an erasable colored pencil conforming to the following color code:

a. Additions and deletions shall be marked in red

b. Comments, as well as dimensions, shall be marked in blue

4. All deviations from the contract drawings as a result of any and all Addenda, Field Orders, Requests for Information (RFI's) and approved Contract Change Orders shall be annotated on all affected drawings.

5. Annotations to the as-built drawings shall reference the specific Addendum number, Field Order number, Request for Information number, or the Contract Change Order number. Annotations without these reference numbers will not be considered complete

(C) Submittals:

1. At the completion of the work, the Contractor shall transmit both copies of the as-built drawings to the Harbors Construction Engineer as a Submittal. The Contractor shall stamp both sets of drawings with the words "As-Built Drawings" and said stamp shall include a statement signed by the Contractor certifying that the drawings accurately and completely reflect the work as constructed. The stamp format and wording shall be submitted to the Construction Engineer for prior approval. No payment for Demobilization will be released until both copies of the As-Built Drawings are received by the Construction Engineer.

2. Record Drawings:

a. The State will prepare the Record Drawing for the State by recording the changes, shown on the As-Built Drawings, onto original tracings. The Final Record Drawings will include an original tracing of the Title Sheet with a stamp containing the words "Record Drawings" as well as a signature line for the Contractor.

b. The Contractor shall review the Record Drawings prepared by the Design Consultant and certify the Record Drawings by signing and dating the Record Drawing title sheet tracing where indicated. Any deviations from the plans determined by the Harbors Construction Engineer to be missing from, incomplete, or inaccurately drawn on the As-Built drawings shall be corrected on the Record Drawing tracings by the State and the Contractor shall be charged for the services. The State will keep a record of the associated cost impacts and deduct them from the contract price

c. Final payment, as well as full payment for Demobilization, will not be released until after the Record Drawing tracings have been signed and certified by the Contractor and returned back to the State.

(D) Measurement and Payment: Separate measurement or payment will not be made for work required under this Article 10.15. All costs in connection with the work specified herein; furnishing, maintaining, producing and submitting as-built drawings, will be considered to be incidental to the various bid items in the Proposal Schedule

10.16 MEASUREMENT AND PAYMENT

Measurement and payment for the various items of work shall be as shown in the Proposal Schedule and as covered in the following Articles of these Specifications.

10.17 CONSTRUCTION ACCESS

The Contractor shall show all access routes to and from the construction site, including specific travel routes within the project area, in the Traffic Control Plan (TCP) as specified in Article XXVI. The TCP shall be approved by the Construction Engineer prior to the start of construction.

Access for construction vehicles will be allowed at the main entry of the project area. The Contractor shall be responsible for ensuring that access is controlled in such a manner as to allow the safe passage of construction vehicles to and from the site.

The access gate and driveway will not be measured or paid for separately, but will be considered incidental to the various contract items in the Proposal Schedule.

10.18 WORKING HOURS

The Contractor shall coordinate his work so as to minimize interferences with harbor operations. All work shall be coordinated and scheduled with the Harbors Division District Manager and the Construction Engineer. Four (4) weeks before work is started, the Contractor shall submit a work schedule and construction phasing plan to the Construction Engineer for review and approval.

Normal working hours within the project site are from 7:00 AM to 3:30 PM, Monday to Friday, except on State Holidays, unless otherwise authorized by the Construction Engineer. Working hours for construction within the City and County of Honolulu or Department of Transportation – Highways Division Rights-of-Way shall conform to the requirements of the authority having jurisdiction. If overtime is required, Contractor to pay Harbors inspector's overtime charges and expenses.

Arrangements for the use of areas within the harbor area, if under the purview of Harbors Division and if available, for work or storage shall be coordinated with the Harbors Construction Engineer and District Manager. However, the State does not warrant or guarantee that areas, beyond or outside of the project limits, and of such size and location that meets the requirements desired by the Contractor for work or storage, will be available to the Contractor within or for the duration of the project. The Contractor is solely responsible for assessing its requirements for work and storage area(s) and for securing such work or storage areas, outside of or beyond the project limits, if it deems that such areas are necessary for it to perform the contract work. The Contractor shall conduct the work in a manner that will not interrupt or otherwise interfere with full operations of the adjoining existing facilities. The Contractor shall at

his own expense, make prompt restitution for damages to these facilities, and payment for loss or injury suffered by users thereof, caused by the Contractor's operations or negligence, holding the State harmless therefrom.

10.19 CONSTRUCTION SCHEDULE

(E) Description: This Section includes specifications for the preparation, updating, revision, and submittal of project progress schedules and the Monthly Progress Status Report. Progress schedules required include the Project Schedule, Updated Project Schedule, and Three-Week Work Plan Schedule. This Section also includes specifications for the submittal of a Payment Schedule, along with a Schedule of Cost Loading and Cash Flow detailing the anticipated monthly payments to be requested based upon the project progress schedule.

(B) General:

1. Progress schedules shall represent a practical plan to complete the Work within the Contract time(s) of completion indicated, and shall convey the Contractor’s intent in the manner of prosecution and progress of the Work.

2. The scheduling and execution of construction in accordance with the Contract Documents are the responsibility of the Contractor. The Contractor shall involve and coordinate all Subcontractors, material Suppliers, and utility companies in the development and updating of progress schedules.

3. The submittal of progress schedules shall be understood to be the Contractor’s representation that the progress schedule meets the requirements of the Contract Documents and that the Work will be executed in the sequence and duration indicated in the progress schedule.

4. The payment schedule shall list and detail the anticipated monthly payments based upon the progress schedule to meet the requirements of the Contract Documents and shall be used by the Harbors Division as a guide for Project budgeting purposes.

(C) Project Schedule:

1. The Project Schedule shall be computer produced in the Critical Path Method (CPM) network format. The schedule shall be computer-produced, utilizing project scheduling software such as Microsoft Project, or other equivalent software as approved by the Engineer.

2. The Project Schedule shall be updated monthly and submitted as indicated in Article 10.19 (D), Submittals.

3. The Project Schedule must show, and be of suitable scale format to illustrate, Contract tasks, percent of work scheduled as well as complete, progress bars, baseline schedules, milestones, start and finish dates, total float, and other breakdowns as required by the Engineer. The schedules shall show clearly the sequence of activities and must list specifically the following activities:

a. Interim milestone completion dates. Phasing and staging of the Work as specified shall be prominently identified and salient features, as well as major divisions, of work must be indicated.

b. Preparation and transmittal of Submittals as well as their review by the State.

c. Applications for any permits as well as time(s) to receive approval and acquisition of permits.

d. Contact with, and coordination of, utility companies, coordination durations, and work to be performed by utility companies.

e. Any long-lead time (over 60 days) orders for material and equipment, including dates for ordering, along with procurement and delivery times.

f. Latest start and finish dates for critical path activities.

g. Work to be performed by other contractors, subcontractors, or agencies.

h. Inspection of the Work, including Preliminary Final Inspection, Final Inspection, punch-list(s) work, and Acceptance by the State and all government agencies and utilities.

4. Descriptions of scheduled activities shall include sufficient detail to identify the work, which is to be accomplished:

a. The schedule shall contain sufficient activities to clearly show the sequence and interdependencies of the Work. The schedule shall be prepared in such a way that an activity or group of activities will correspond directly with the bid item breakdown and/or the breakdown of lump sum bid items. The Engineer may, at its sole discretion, request that the Contractor add additional activities and if so, the Contractor shall revise and resubmit the schedule to comply.

b. Activity durations shall be expressed in whole days. Work that is to be performed by Subcontract shall be clearly defined.

c. Float suppression techniques, such as preferential sequencing (crew movement, equipment use, and form reuse), extended duration, imposed dates, scheduling of work not required for the Contract, and others, shall not be used to affect or limit float in the schedule. The use of constraint dates should be minimized, and must be approved by the Engineer.

d. Critical Path activities are those activities with a total float equal to or less than zero. Schedules with negative total float may be found to be impractical by the Engineer.

5. A schedule showing that Work, which is completed in less than the completion time, specified may be found to be impractical by the Engineer.

6. A schedule showing that Work which is completed in less than the completion time specified, which is found to be practical by the Engineer, shall be considered to have float. The float shall be the time between the scheduled completion of the Work and the Contract completion date established in the Proposal and by the Notice to Proceed, as may be revised by contract amendment. Float time shall not be for the exclusive benefit of either the State or the Contractor. Float shall be a resource available to both parties until it is depleted. Float has no monetary value.

7. A schedule found to be impractical for the preceding reasons or any other reasons shall be revised by the Contractor and resubmitted.

(D) Submittals

1. Project Schedules shall be submitted in time-scaled bar-chart (Gantt) format with logic lines shown on sheets no smaller than 22 inches wide by 34 inches long, nor larger than 34 inches wide by 44 inches long. A time-scaled logic network diagram may also be required by the Engineer. An activity report in a tabular form showing the following information shall be submitted with bar-chart: activity ID, description, duration, total float, early start, early finish, late start, late finish, predecessors, successors, constraints, percent complete, and remaining duration.

2. Payment Schedule (Lump Sum Item Breakdown):

   Within 7 calendar days of the official commencement date in the Notice to Proceed or within such further time as the Engineer may allow, the Contractor shall submit an itemized breakdown cost for each of the lump sum bid items for acceptance by the Engineer and for subsequent use as a guide in determining progress payments. The breakdown costs shall reflect a separate schedule of prices for the various items of work associated with each lump sum bid item, with adequate detail that includes but is not limited to quantities. The sum of the constituent prices, pertaining to the lump sum bid item, must equal the lump sum bid amount reflected in the Proposal. This payment schedule shall be subject to acceptance by the Engineer who, at its sole discretion, may reject it and require the Contractor to revise and submit another, or several other, payment schedules if in the Engineer's opinion the prices (in the breakdown cost) are unbalanced or the breakdown costs are not sufficiently detailed.

   a. No progress payments will be processed until both parties agree to an acceptable breakdown of these bid items.

   b. The Contractor shall submit a tentative Payment Schedule to coincide with submittal of his preliminary Project Schedule.

3. All schedule submittals shall include one reproducible and six full-size copies.

4. Schedule submittals will be reviewed by the Engineer, and shall be updated and revised as indicated in Article 10.20 (H), Review, Updates, and Revisions. Resubmittals shall conform to the same requirements as original submittals.

5. The Contractor shall prepare and submit all schedules and schedule analysis reports in electronic format on CD ROM disk as well as hard copies.

6. All progress schedule submittals are subject to review and acceptance by the Engineer. The Engineer retains the right to withhold progress payments until the Contractor submits a progress schedule and progress schedule updates that are acceptable to the State.

7. The Contractor shall submit progress schedules as follows:

   a. The first Project Schedule shall be submitted within fifteen (15) calendar days after award of contract.

   b. The Contractor must submit the Payment Schedule within seven (7) calendar days after the date of the Notice to Proceed.

8. The first of each type of progress schedule and the first Monthly Progress Status Report submitted by the Contractor will be reviewed for format, as well as content. The Engineer may request format changes. Once the format has been approved, all subsequent Schedules and Progress Status Reports shall be submitted in the approved format.

(E) Three-Week Work Plan

1. A schedule in calendar time-scaled bar chart format depicting the Contractor's intended work activities for the upcoming Three-Week period, along with the previous week, must be submitted on a weekly basis and shall be due on the first working day of each week.

2. Any deviations, such as sequences of work, timing, and durations of activities from the approved Project Schedule, shall be noted and explained in writing.

3. The Three-Week Work Plan shall be submitted on sheets not less than 8-1/2 inches by 11 inches, or as approved by the Engineer.

(F) Monthly Progress Status Report

1. The Monthly Progress Status Report shall be a narrative report that describes work activities accomplished in the reporting period, intended work activities for the upcoming reporting period, problems and actions intended by the Contractor to mitigate the problems, work that is being performed out of sequence with approved schedules, status of Change Orders, Notices of

Potential Claims, status of submittals, and status of Contractor procurement items.

2. The Contractor shall submit the report format and obtain the Engineer's approval of the format.

3. The Monthly Progress Status Report shall be submitted monthly, or with each payment request, on sheets no larger than 11 inches by 17 inches, nor any smaller than 8-1/2 inches by 11 inches.

(G) Review, Updates and Revisions

1. The Engineer will review and return the Contractor's progress schedule submittals with written comments according to the following schedule from the date of receipt: Project (CPM) Schedule as well as Schedule of Cost Loading and Cash Flow: 10 calendar days, Three-Week Work Plan: 5 calendar days

2. The Contractor shall make all corrections to the Project Schedule requested by the Engineer, as well as Schedule of Cost Loading and Cash Flow, and resubmit the schedule(s) for acceptance. If the Contractor does not agree with the Engineer's comments, the Contractor shall provide written notice of disagreement within five days from the receipt of the Engineer's comments. The Engineers's comments to the Three-Week Work Plan for which the Contractor disagrees shall be resolved in a meeting held for that purpose, if necessary.

3. At least once each month, or as often as deemed necessary by the Engineer, the Contractor shall submit an updated Project Schedule showing the progress of the Work to date and anticipated activities to be worked on, and the Monthly Progress Status Report as specified in Article 10.19 (F). The submittal of the Project Schedule update and Monthly Progress Status Report shall be at least five days prior to the submittal of a payment invoice. No invoice will be accepted nor will payment be made if there is not an accepted current update in place.

4. If, according to the accepted Project Schedule, the Contractor is thirty or more days behind the Contract completion date of any milestone indicated, or the schedule contains 30 or more days of negative float, considering all

approved time extensions, the Contractor shall submit a revised schedule, showing a practical plan to complete the Work within the specified Contract completion time. The State may withhold progress payments until a revised schedule, acceptable to Engineer, is submitted by the Contractor.

(H) Acceptance of Progress Schedules

1. Engineer's Acceptance of Progress Schedule(s).

The submittal of, and the State's and/or Engineer's receipt of any progress schedule, shall not be deemed an agreement to modify any terms or conditions of the contract. Any modifications to the contract terms and conditions that appear in or may be inferred from an acceptable progress schedule will not be valid or enforceable unless and until the State exercises discretion to issue an appropriate change order. Nor shall any submittal or receipt of an acceptable progress schedule imply the Engineer's approval of the schedule's breakdown, its individual elements, any critical path that may be shown, nor shall it obligate the State to make its personnel available outside normal working hours or the working hours established by the Contract in order to accommodate such progress schedule.

The Contractor has the risk of all elements (whether or not shown) of the progress schedule and its execution. No claim for additional compensation, time, or both, shall be made by the Contractor or recognized by the Engineer for delays during any period for which an acceptable progress schedule or an updated progress schedule as required by Article 10.19 (H), Review, Updates, and Revisions had not been submitted.

Any acceptance or approval of the progress schedule shall be for general format only and shall not be deemed an agreement by the State that the construction means, methods, and resources shown on the progress schedule will result in work that conforms to the contract requirements or that the sequences or durations indicated are feasible.

2. Accelerated Schedule; Early Completion.

If the Contractor submits an accelerated progress schedule (shorter than the contract time), the Engineer's review and acceptance of an accelerated progress schedule does not constitute an agreement or obligation by the State to modify the contract time or completion date. The Contractor is solely responsible for and shall accept all risks and any delays, other than those that can be directly and solely attributable to the State, that may occur during the work, until the contract completion date. The contract time or completion date is established for the benefit of the State and cannot be changed without an appropriate change order or final acceptance by the State. The State may accept the work before the completion date is established, but is not obligated to do so.

If the progress schedule indicates an early completion of the project, the Contractor shall, upon submittal of the progress schedule, cooperate with the Engineer in explaining how it will be achieved. In addition, the Contractor shall submit the above explanation in writing which shall include the State's part, if any, in achieving the early completion date.

Early completion of the project shall not rely on changes to the Contract Documents unless approved by the Engineer.

(I) Measurement and Payment: Separate measurement or payment will not be made for work required under this Article 10.19. All costs in connection with the work specified herein will be considered to be incidental to the various bid items in the Proposal Schedule.

10.20 HARBOR SECURITY

The Contractor shall submit required documentation of all contractor's and sub-contractor's employees, their representatives, suppliers, manufacturers, and alike, and of all necessary vehicles needing access to the project site to the Harbors Division Construction Engineer and District Manager before starting work on the project. The documentation will include the following:

(A) Authorized personnel's first name, middle initial(s), and last name by company name.

(B) Vehicle(s) license plate number(s) by company name.

(C) If additional security personnel are required to control perimeter access, they must be an employee of an established security guard company doing business in the State of Hawaii for at least the past 12 months. Each guard providing security services for the project shall have, at a minimum, been successfully trained in accordance with the Maritime Transportation Security Act of 2002, MTSA 109 and 33 CFR (Code of Federal Regulations) Part 105.210, Facility personnel with specific security duties. Contractor shall submit a letter to verify qualifications and/or copies of proof of successful training for each assigned security guard.

In addition, for each work day, Harbors security procedures will be as follows:

(D) The State will provide and designate at least one access control point to the project site. . Contractor may use the State designated access point during normal working hours (Monday thru Friday, 7:00 am – 3:30 pm). If the Contractor desires to use an alternate or additional access point(s), or utilize the State designated access point beyond the above indicated normal working hours, a request shall be submitted to the Harbors Construction Engineer at least seven (7) days prior to such action. The request shall identify the location of the alternate access point(s) and/or extended hours of work. Harbors approval of the request must be obtained prior to executing the request. The Contractor will be responsible for all coordinating, hiring and costs associated with providing any and all additional security guards to ensure the site remains secure (to the satisfaction of the State) while the project is on-going (see Item C, above). The

State shall bear no additional costs for security. Upon every entry, each employee must present and possess a valid photo identification (ID) card. If additional guards are required at an existing State controlled access point due to contractor activity, then the State will contact and coordinate the hiring of an additional guard(s). In this case, the Contractor shall be responsible for all costs with providing additional guards. All situations are upon approval of Harbors and solely at contractor's cost.

(E) In the event Harbors Division receives any USCG Notice of Violation (NOV) and/or civil penalties as a result of negligence on the part of the Contractor, its sub-contractors, their representatives, suppliers and manufacturers, the Contractor shall assume full responsibility for said NOVs and/or penalties.

(F) Under the federal Maritime Transportation Security Act (MTSA) and the federal Security and Accountability for Every (SAFE) Port Act all individuals desiring unescorted access to a regulated harbor facility must possess a Transportation Worker Identification Credential (TWIC), proof of MARSEC Awareness training, a valid government issued picture ID card, a valid reason for entry, and a valid driver's license for the drivers of any of their vehicles. The State reserves the right to issue a ninety (90) day suspension of authorized access and entry into the project site to Contractor's and subcontractor's employees, their representatives, suppliers, manufacturers, and authorized personnel needing access to the project site if they have violated or compromised site security. The above mentioned staff are responsible and will be held accountable for any Notice of Violations, fines, and any civil penalties imposed by the United State Coast Guard (USCG) MTSA inspectors if found at fault. The State shall not be responsible for any additional costs or loss of construction time as a result of the suspension(s). The Transportation Worker Identification Credential application can be found on the internet at the following website: http://www.tsa.gov/for-industry/twic. The process for obtaining a TWIC can take an extended period of time. The Contractor will not be granted an extension in contract time if the construction work is delayed by the TWIC process.

(G) Contractor's vehicles must be identified with a company logo and will be subject to search. Any employee's personal belongings will also be subject to search.

(H) If the Contractor wishes to remove any fencing or open any locked gates, they shall coordinate with and request approval from the Harbors Construction Engineer and District Manager. If approval is granted, the Contractor shall then be responsible for securing open fencing or gate(s) immediately after entering, or posting security guard(s) (see Item C, above) to monitor ingress and egress. The State shall bear no additional costs for additional labor, materials and/or security guards required for such actions.

(I) Dumping: Any and all abandoned vehicles, appliances, junk and trash, that become found, dumped or left within the project site, after Notice to Proceed and for the duration of the contract, shall be promptly and totally removed from the project site and disposed of in accordance with State and County requirements. The Contractor is solely responsible for preventing unauthorized access during working and non-working hours to eliminate illegal or illicit dumping within the project site for the duration of the contract. All work necessary to comply with

this item will not be paid separately but shall be considered incidental to the various contract items and no separate payment will be made.

(J) By the end of each day, the Contractor shall re-erect and/or restore any and all fencing/barrier/perimeter security measures to the satisfaction of the Construction Engineer and/or the District Manager. Electricity and lighting shall also be restored and in satisfactory working order, to no less than pre-construction conditions, by the end of each day, to the satisfaction of the Construction Engineer and/or District Manager.

(K) Under no circumstances shall perimeter security be compromised. If determined by the State, and solely by the State, that the contractor has left the project site in a condition that compromises security of the harbor, the State reserves the right to make the necessary arrangements to provide and/or enhance perimeter security, including restoration of electrical power and lighting, all at the sole expense of the contractor.

(L) At times, the maritime security level for the State of Hawaii and/or the general color-coded security level for State of Hawaii may be temporarily elevated. In these events, the contractor may be prohibited to access the project site and may be required to stop work as directed by either the Harbors Division's Construction Engineer or District Manager. The Harbors Division will consider impacts to the work and schedule as a result of prolonged work stoppages longer than 1 week (7 calendar days) in accordance with Articles 8.5 and/or 8.10 of the General Provisions.

(M) Maritime Security Awareness training is mandatory for all personnel entering the Harbor facility. The Contractor shall ensure all of its employees, representatives, subcontractors, vendors, and all alike, requiring access to the harbor area for this project, have been trained before entering the Harbor's property. Prior to starting work on this project, the Contractor shall provide a list of names of all employees, representatives, subcontractors, vendors, and alike, together with a letter attesting that all personnel have received this training to the Harbors District Manager and Construction Engineer. All employees, representatives, subcontractors, vendors, and alike, shall wear their respective company's identification card bearing the company's name, the individual's first and last name, and middle initial (s), and recent photograph of the individual on the front of the identification card at all times while on Harbor's property.

With the possible exception of paragraph K above, all other requirements indicated shall be considered incidental to the project, for the life of the project, and shall be provided by the contractor at no additional cost to the State.

10.21 ALTERNATIVES AND SUBSTITUTIONS FOR EQUIPMENT, ARTICLES OR MATERIALS

These specifications and/or plans may specify equipment, articles or materials under a trade name or the name of a manufacturer and his information catalog. The use of alternatives or substitutions of equal quality and characteristics for the purpose intended will be permitted, upon approval of the Director, in accordance with the requirements of the General Provisions, 6.11 Trade Names and Alternatives.

Please note that these requirements include certain deadlines for requests on use of alternatives before bid opening and/or justification for substitutions after the bid opening. The Director also reserves the right to deny any request he deems irregular or not in the best interests of the State.

END OF ARTICLE

ARTICLE XI - MOBILIZATION AND DEMOBILIZATION

11.1 GENERAL

This work shall include the furnishing of plant, equipment, labor, and materials to perform all work in conjunction with mobilization and demobilization for the job in accordance with this Article of the Specifications.

11.2 DESCRIPTION

(A) Mobilization shall include the setting up and preparing for use, all plant, equipment and materials at the jobsite, for the project.

(B) Demobilization shall include the removal of all Contractor's plant, equipment and surplus materials from the jobsite, for each phase of the project. The cleanup of the jobsite, satisfactory to the Director, shall also be included in this article.

11.3 EXECUTION

Delay in demobilizing completely from outside of the construction limits by the specified date will inconvenience harbor users' operations. The Contractor shall pay the amount shown in the Schedule of Liquidated Damages, as amended by the Special Provisions, for each calendar day delayed in demobilizing completely from outside of the construction limits by the specified date. The terms governing the assessment of liquidated damages, as specified in the General Provisions, and as amended by the Special Provisions, shall be applicable to the Contractors delay in demobilizing from the site by the specified date.

11.4 PAYMENT

(A) Maximum Bid Amount: The maximum bid amount allowed for Mobilization and Demobilization shall be limited to no more than six percent (6%) of the sum of all bid items, with the exception of and excluding any allowance items as well as force account items.

(B) Payment:

1. The State will pay up to Sixty percent (60%), of the Mobilization and Demobilization lump sum price in the Proposal, to the Contractor to complete its mobilization at the work site.

2. The remaining Forty percent (40%) of the Mobilization and Demobilization lump sum price in the Proposal shall be paid to the Contractor upon demobilization from the project site.

ITEM NO.	PAY ITEM	PAY UNIT
1.	Mobilization and demobilization	Lump Sum

END OF ARTICLE

ARTICLE XII - ENVIRONMENTAL PROTECTION

12.1 DESCRIPTION

(A) This work shall include the following:

(1) Obtain the necessary permits to satisfactorily complete this project as required by the EPA, State of Hawaii and County of Kauai.

(2) Provide all air quality testing and monitoring work required by the permits during construction, this Article, and as specified in Article XXXII – Temporary Water Pollution, Dust, and Erosion Control.

(3) Provide all necessary safeguards to the environment as required under this Article and by the permits.

(4) Comply with the Notice of General Permit Coverage (NGPC), National Pollutant Discharge Elimination Permit Standard (NPDES) requirements, Form C, F, and G.

(5) Comply with the Department of Transportation – Harbors Division's *Construction Site Runoff Control Program*. The document is available for review at the Department of Transportation – Harbors Division office.

(B) 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, affect endangered or threatened species and their habitat, or degrade the utilization of the environment for aesthetic and recreational purposes. The control of environmental pollution requires consideration of air, water and land, and involves noise and solid waste-management as well as other pollutants. 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 operations conducted under this contract.

(C) The Contractor shall submit their contact information to the Construction Engineer.

If there is a conflict between the applicable rules and regulations, these Specifications, and the Plans, the more stringent shall apply as determined by the Construction Engineer.

12.2 GENERAL REQUIREMENTS

(A) Applicable Regulations: In order to provide for abatement and control of environmental pollution arising from the activities of the Contractor and subcontractors in the performance of this contract, the work performed shall comply with the intent of the applicable Federal, State and County laws and regulations concerning environmental pollution control and abatement, the

applicable rules and regulations as detailed in these Specifications, and the following:

(1) State of Hawaii, Department of Health, Administrative Rules, Chapter 59, Ambient Air Quality; and Chapter 60, Air Pollution Control Law.

(2) State of Hawaii, Department of Health, Administrative Rules, Chapter 44A, Vehicular Noise Control.

(3) State of Hawaii, Department of Health, Administrative Rules, Chapter 54, Water Quality Standards.

(4) State of Hawaii, Department of Health, Administrative Rules, Chapter 55, Water Pollution Control.

(5) State of Hawaii, Occupational Safety and Health Standards, Title 12, Department of Labor and Industrial Relations.

(6) Kauai County Code and Interim Construction Best Management Practices (BMP's) for Sediment and Erosion Control for the County of Kauai.

(7) Construction Site Runoff Control Program, August 2014, Department of Transportation Harbors Division.

(B) The Contractor shall comply with all applicable Federal, State and local laws relating to the NGPC for Discharges of Storm Water Associated with Construction Activity, including but not limited to the following:

(1) Contractor shall keep a copy of the NGPC, Form C, enclosures, plans, reports, specifications and other related materials submitted in and with the NOI and/or later amendments to the NOI at the job site. Copies will be provided by the Construction Engineer.

(2) Contractor shall provide its legal name, address, contact person, telephone and fax number to the Construction Engineer to be submitted to the State Department of Health (DOH).

(3) 60 calendar days prior to start of construction, Contractor shall submit its site-specific BMPs to DOH. A copy shall be submitted to the Construction Engineer for their information.

(4) The Contractor shall be completely, and solely, responsible for obtaining approval of site-specific BMPs from DOH.

(C) Certifications and Permits: The Contractor will be required to obtain the State of Hawaii, Department of Health, Notification of Demolition and Renovation for asbestos abatement work. The Contractor must file this notification at least ten (10) working days with the State of Hawaii, Department of Health, and with the EPA, Region IX, before the start of demolition. The Contractor shall be responsible for completing and submitting this notification in accordance with its project schedules.

12.3 CONTRACTOR USE OF PREMISES

(A) In the event the Contractor, subcontractors and/or other persons he engages in the project must work in any other area(s) under Harbors Division control other than the one designated for this project, the Contractor shall obtain written approval from the Director or his authorized representative for said use. Adequate notification must be given to the Director or his authorized representative for said use.

12.4 EXECUTION

(A) Compliance with the provisions of this Article by its subcontractors will be the responsibility of the Contractor.

(B) Prior to commencement of the work, the Contractor shall meet with the Director or his authorized representative to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

(C) It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this contract be preserved in their present condition. Insofar as possible, the Contractor shall confine his activities to areas defined by the Plans and Specifications.

(D) The Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the Director or his authorized representative.

(E) All items having any apparent historical or archaeological interest which are discovered in the course of performing the work of this contract shall be left undisturbed and shall be immediately reported to the Director or his authorized representative so that the proper authorities may be notified.

(F) The Contractor shall not dispose of any material into Harbor waters including, but not limited to, fuels, oils, bitumens, calcium chloride, acids, construction debris, or other harmful or hazardous materials. The Contractor shall not dispose of any material into Harbor waters which will result in an increase of turbidity. It is the responsibility of the Contractor to comply with all applicable Federal, State and County laws concerning pollution of water resources.

(G) Erosion Control

(1) Surface drainage from jet grout operations, trenches, cuts or fills within the construction site, whether or not completed, and from demolition, abatement and construction waste disposal areas, shall, if turbidity producing materials are present, be held in a double contained collection areas or shall be bermed to control erosion and runoff. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until jet grout operations are complete or

permanent drainage and erosion control facilities are completed and operative. The area of exposed bare soil and waste areas shall be kept to a minimum. Fills and waste areas shall be constructed by selective placement to eliminate silts or clays on the surface that will erode and contaminate adjacent waters.

(2) Whenever trucks or vehicles leave the site and enter surrounding paved streets, the Contractor shall prevent any material from being carried onto the pavement. Trucks hauling fine material shall be covered in compliance with PUC, State Department of Transportation, and County of Kauai regulations. Waste water shall not be discharged into existing roadways, waterways, or drainage systems such as gutters and catch basins unless treated to comply with State Department of Health water pollution regulations.

(H) Spillage: At all times, special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, waste washing, herbicides, pesticides, insecticides, and cement from entering public waters, including Harbor waters.

(I) Washing and Waste Water: Water used in washing, abatement, demolition or construction and other waste waters shall not be allowed to enter public waters, including Harbor waters.

(J) Disposal of any materials including tanks, wastes, effluent, trash, garbage, oil, grease, chemicals, in areas adjacent to public waters is prohibited. If any waste material is dumped in unauthorized areas, the Contractor shall remove the material and restore area to the condition of the adjacent undisturbed area. If during normal operations of the project, contaminated ground is excavated, the Contractor shall notify the Director or his authorized representative for review. Appropriate action will be determined at that time.

Construction dewatering effluent shall not be discharged, in any way, into the ocean or into drainage systems or drainage ways that ultimately empty into state waters. Dewatering, when required, shall be done by back-trenching (pit-to-pit discharge). Dewatering effluent within contaminated areas, as shown within the construction drawings, shall be infiltrated within the contaminated areas shown within the construction drawings.

(K) Disposal of Construction Debris

(1) All rubbish, concrete, asphalt, water lines, scrap lumber and other construction site debris shall be hauled away daily and disposed of off-site by the Contractor. Such disposal shall be accomplished in compliance with all Federal, State, and County laws and regulations governing waste disposal. To the extent possible, the Contractor shall recycle demolition debris at no extra cost to the State when compared to typical disposal costs.

(2) No burning of debris and construction waste material will be permitted on the project site at any time.

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

(4) All unusable debris and waste material shall be hauled away daily to an appropriate off-site disposal area. During loading operations, debris and waste materials shall be watered down to allay dust.

(5) Cleanup shall include the collection of all waste paper and wrapping materials, cans, bottles, construction waste materials, and removal as required. Frequency of cleanup shall coincide with rubbish producing events.

(6) Construction debris should be disposed of daily.

(L) Air Pollution Control

(1) The Contractor, for the duration of the project, shall maintain all excavations, embankments, haul roads, permanent access roads, plant sites, waste disposal areas, borrow areas, and all other work areas within or outside 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. Dust shall be kept down at all times, including non-working hours, weekends and holidays. Approved temporary methods consist of water sprinkling or similar methods to control dust. Sprinkling must be repeated at such intervals as to keep all parts of disturbed areas damp at all times. The Contractor must have sufficient equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

Dust control activities must comply with the Hawaii Administrative Rules, Title 11 Chapter 60.1, Air Pollution Control.

(2) The methods of dust control and costs shall be the responsibility of the Contractor. Methods of dust control shall include the use of water and/or chemicals over surfaces which may create fugitive airborne dust per HRS 11-60.1.

(3) Wet cutting will be required for cement blocks, concrete and asphaltic concrete pavement, unless attachments are used with dry cutting equipment to capture the dust created thereby.

(4) No unnecessary shaking of bags will be permitted where cement, mortar and plaster are used unless the dust therefrom can be confined.

(5) No dry power brooming will be allowed in unconfined areas. No dry sweeping shall be permitted in cleaning rubbish and fines which can become airborne from floors and other paved areas. Vacuuming, wet mopping, wet and damp power sweeping are permissible. Air blowing will be permitted on written approval from the Director's authorized representative.

(6) The Contractor shall be responsible for all damage claims in accordance with Section 7.15 - "Responsibility for Damage" of the General Provisions.

(M) Noise

(1) Noise shall be kept within acceptable levels at all times in conformance with the State Department of Health Administrative Rules, Title 11, Chapter 46 - Community Noise Control. All internal combustion engine powered equipment shall have mufflers to minimize noise and shall be properly maintained to reduce noise to acceptable levels. The Contractor shall comply with all applicable Federal, State and County noise rules.

(2) The Contractor shall obtain and pay for a Community Noise Permit from the Department of Health when construction equipment or other devices emit noise at levels exceeding allowable limits.

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

(4) Starting-up of construction equipment meeting allowable noise limits shall not be done prior to 6:45 a.m. without prior approval of the Construction Engineer. Equipment exceeding allowable noise levels shall not be started-up prior to 7:00 a.m.

(N) Other

(1) Whenever trucks and vehicles enter surrounding paved streets, the Contractor shall prevent any materials from being carried or dropped onto the pavement.

(2) Waste water shall not be discharged into existing waters such as harbors, streams, waterways, oceans, or drainage systems such as gutters and catch basins, unless treated to comply with Federal and State of Hawaii water pollution regulations. Waste water shall not be discharged into existing waterways, or drainage systems such as gutters and catch basins unless treated to comply with the State Department of Health water pollution regulations.

(3) Trucks hauling debris and/or fine materials within and off the project site shall be covered as required by PUC Regulations.

(4) Except in an emergency, such as a mechanical breakdown, all vehicle fueling and maintenance will be done offsite or if onsite, in a designated area. A temporary berm shall be constructed around the area to confine any runoff from the designated area. Upon project completion, the area shall be cleaned of wastes and returned to prior condition.

(5) No dumping of waste concrete will be permitted on the site. Except for rinsing of the hopper and delivery chute, and for wheel washing when required, concrete trucks shall not be cleaned on site.

(O) Maintenance of Pollution Control Facilities During Construction: During the life of this contract, the Contractor shall maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out, or until the material concerned has become stabilized to the extent that pollutants are no longer being created.

12.5 WARNING SIGNS

(A) General: Furnish all labor, materials and equipment necessary to construct and install temporary warning signs and barricades that comply with OSHA requirements and as directed by the Director or his authorized representative. These warning signs and barricades shall delineate the work area and exclude the public from the work area as specified hereinafter.

(B) Materials:

(1) Backing: Backing shall be 6061-T6 aluminum 0.032" minimum thickness.

(2) Paint: Paint shall be satin finish, exterior grade or factory based enamel or a combination thereof.

(C) Sign Colors: Signs shall have white background; remaining items shall be similar to Rust-Oleum Federal Safety Red.

(D) Installation: Signs shall be located at 50-foot intervals around roped off work area or at all entrances in the case of interior work. Signs shall be attached to the rope barrier, rope barrier supports, individual sign supports or buildings.

(E) Clean-Up: Remove all signs upon completion of this project. Repair any damages caused by sign mounting and removal.

12.6 SUSPENSION OF THE WORK

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

(B) The Director or his authorized representative will notify the Contractor of any non-compliance with the foregoing provisions. The Contractor shall, after receipt of such notification, immediately take corrective action.

(C) If the Contractor fails or refuses to comply within 72 hours after a suspension is ordered by the Construction Engineer, the Director or his authorized representative may issue an order suspending all or part of the work until satisfactory corrective action has been taken. 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. No additional compensation shall be due the Contractor for remedial measures to

correct the condition(s), and no extension of time or compensation for extended overhead will be granted for delays for the time needed to complete remedial measures as well as caused by such suspensions.

(D) The Director may also suspend any operations which it feels are creating pollution problems although they may not be in violation of the requirements contained herein. In this instance, work required to correct the pollution problem and prevent its recurrence shall be done by force account as described in sub-Article 4.3 - "Extra Work" of the General Provisions and paid for in accordance with sub-Article 9.4, "Extra and Force Account Work" therein. The count of elapsed working days in this situation shall be computed in accordance with sub-Article 8.7 - "Determination and Extension of Contract Time" of the General Provisions.

12.7 MEASUREMENT AND PAYMENT

Environmental Protection, including material and labor required to obtain approval of site specific BMPs for DOH, permit fees, erosion control measures, dust control, and other related work will not be measured and paid for separately but will be considered incidental to the various pay items in the Proposal Schedule which require such work.

END OF ARTICLE

ARTICLE XIII - DEMOLITION AND REMOVAL WORK

13.1 GENERAL

(A) This work includes the removal of portions of the fire protection water systems, Portland cement concrete (PCC) and asphalt concrete (AC) pavement, and other structures indicated within the limits on the plans unless indicated otherwise. All materials resulting from removal work shall become the property of the Contractor except as indicated or otherwise specified and shall be removed from the project site daily.

(B) Demolition and removal work shall include but not be limited to the following items of work:

(1) Demolition and removal of concrete and asphalt concrete pavement and other structures as indicated within the limits indicated on the plans in accordance with these Specifications.

(2) Sawcutting and removal of pavements in accordance with these Specifications.

(3) Demolition and removal of portions of water lines and miscellaneous structures within the project limit unless otherwise indicated on the plans to remain in accordance with these Specifications.

(4) Daily disposal of waste materials offsite at a State approved dumpsite.

13.2 GENERAL REQUIREMENTS

The provisions of Section 202 - Removal of Structures and Obstructions of the "Standard Specifications" shall apply except as hereinafter modified.

13.3 SUBMITTALS

(A) Submit proposed demolition and removal procedures to the Construction Engineer 1 week before work is started. Procedures shall provide for coordination with other work in progress, a detailed description of methods and equipment to be used for each operation, and sequence of operations. Required sets of submittals are specified in Article XVII – Required Submittals.

(B) Gas Free Certificate: Submit free certificate to the Construction Engineer for record purposes.

13.4 EXECUTION

(A) Water Lines to be Removed: All work shall be executed in an orderly and careful manner with due consideration for all items to remain. All work shall be as indicated and as required to complete the removal work.

(B) Utilities and Related Equipment: Disconnect and remove existing underground utilities as indicated on the plans and these specifications and terminate in a manner conforming to the latest edition of the appropriate nationally recognized

code as a minimum covering the specific utility at the time. Remove all abandoned utilities.

(C) Asphalt Concrete Pavement: Where asphalt concrete pavement work is to be removed, sawcut along straight line to a depth required to expose the existing Portland Cement Concrete pavement joints.

(D) Dust Control: Take appropriate action to check the spread of dust and to avoid the creation of nuisance in the surrounding area. Comply with all dust regulations imposed by local air pollution agencies.

(E) Use of explosives will not be permitted.

(F) Where pedestrians and driver safety is endangered in the area of removal work, use traffic barricades as specified in Article XXVI – Traffic Control.

(G) The Contractor shall take precautions to prevent damage to items indicated to remain. The Contractor shall repair any damage to items indicated to remain at no cost to the State.

(H) The Contractor shall not damage the bulkhead and pier. Any damage will be repaired immediately to equal or better condition at the Contractor's cost. Repair designs will be done by a structural engineer licensed in the State of Hawaii retained by the Contractor.

(I) Unforeseen Items: The Contractor shall demolish, remove, and dispose of all unforeseen items from the project site at the discretion of the construction Engineer.

13.5 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, flooding or pollution.

13.6 DISPOSITION OF MATERIAL

(A) Title to Materials: Title to all materials and equipment to be removed, except as specified otherwise, is vested in the Contractor upon approval by the Construction Engineer of the Contractor's demolition and removal procedures, and authorization by the Construction Engineer to begin demolition. The State will not be responsible for the condition or loss of, or damage to, such property after notice to proceed.

(B) Unsalvageable Materials: Noncombustible and combustible materials shall be disposed of outside the limits of the project site at the Contractor's responsibility and expense.

(C) Survey for Hazardous Areas: The Contractor shall survey the entire area around the project site to ensure that no hazardous vapors are present. The Contractor shall certify in writing that the project site shall be safe for hot work and free of hazardous vapor. No open flame, hot cutting, welding or other hot work will be permitted without the certification.

13.7 CLEANUP

(A) Debris and Rubbish: Remove and transport debris and rubbish in a manner that will prevent spillage on pavements, streets or adjacent areas. Clean up spillage from pavements, streets and adjacent areas.

(B) Comply with Federal, State, and County hauling and disposal regulations.

13.8 MEASUREMENT AND PAYMENT

Demolition and removal of water lines and appurtenances, asphalt concrete pavement, concrete pavement, concrete, pipes, bollards, construction debris, and all other items within the limit of demolition and removal, excluding items indicated to remain or required to complete work, will be paid for on a lump sum basis in the Proposal Schedule.

Payment shall be full compensation for the demolition, removal, and disposal of water lines and appurtenances, asphalt concrete pavement, concrete pavement, concrete, pipes, bollards, construction debris, and all other items within the limit of demolition and removal, excluding items indicated to remain or required to complete work. All material scheduled to be demolished and removed will be the property of the Contractor and shall be removed from the State DOT Harbors property. The price shall be full compensation for equipment, tools, labor, disposal, materials and incidentals necessary to complete the work.

Cutting and plugging underground pipelines will not be measured or paid for separately, but will be considered incidental to the various contract items in the Proposal Schedule.

Demolition, removal, and disposal of all unforeseen items discovered at the project site will not be measured or paid for separately, but will be considered incidental to the various contract items in the Proposal Schedule.

Backfill, including backfill, soil compaction, soil compaction testing, and all other work related to backfill for demolition and removal shall not be measured or paid for separately, but will be considered incidental to the various contract items in the Proposal Schedule.

Temporary utility service will not be measured or paid for separately, but will be considered incidental to the various contract items in the Proposal Schedule.

ITEM NO.	PAY ITEM	PAY UNIT
2.	Demolition, excavation, and removal of sections of water lines and appurtenances to effectuate CIPP rehabilitation, asphalt concrete pavement, Portland cement concrete pavement, pipes, construction debris, and all other items within the potholing limits of demolition and removal, excluding items indicated to remain or required to complete work.	Lump Sum

END OF ARTICLE

ARTICLE XIV - TRENCH EXCAVATION AND BACKFILL

14.1 DESCRIPTION

This work shall include trench excavation and backfill for underground water utilities and specified under Article XXI - Water System.

14.2 GENERAL REQUIREMENTS

The provisions of Section 204 - Excavation and Backfill for Miscellaneous Facilities of the Standard Specifications shall apply except as hereinafter modified:

(A) Section 204.02 - Materials is amended as follows:

Backfill placed below water level shall consist of clean gravel, such as open graded gravel (ASTM C33, No. 67 Gradation), and shall extend to at least 12 inches above the water level.

Backfill placed above the high water level shall consist of aggregate base course or subbase course material. The excavated on-site base course and subbase course materials may be used as structural backfill.

(B) Section 204.04 - Method of Measurement and 204.05 - Basis of Payment are deleted.

14.3 STRUCTURAL EXCAVATION

(A) Localized soft spots encountered shall be overexcavated and removed and the resulting void backfilled with approved structural fill properly compacted in accordance with these Specifications.

(B) Structural excavation carried below specified levels shall be filled with approved structural fill compacted in accordance with these Specifications, to the proper level at the expense of the Contractor.

(C) Trenching for utilities and utility structures shall be made to the depths and profiles required to install the utility properly. Bottom of trenches shall be even, solid and free from loose material. Overexcavation shall be corrected as specified, for which no extra compensation will be allowed. Any rock or hardpan encountered during excavation shall be broken out to a minimum depth of 12 inches below the bottom of the utility structure.

14.4 STRUCTURAL FILL FOR UTILITY STRCTURES

(A) Backfill placed below water level shall consist of clean No. 3B fine gravel conforming to ASTM C33, No. 67 gradation and shall extend to at least 12 inches above water level. The material need not be placed in compacted lifts. The top of the gravel level shall be compacted to a level surface prior to placing additional structural fill.

(B) Backfill above water levels shall be placed in horizontal lifts not to exceed 8 inches in loose thickness and compacted to a minimum of 95 percent compaction as determined by ASTM D 1557. Excavated onsite granular materials to be re-used as backfill shall be free of deleterious materials and shall have a maximum particle size of 3 (three) inches. Excavated onsite soils may require aeration to reduce the moisture content prior to being used as backfill material.

(C) Areas that fail to meet the minimum density requirements shall be rescarified, recompacted and retested.

(D) Stabilization of Local Soft Spots: If soft and/or loose materials are encountered at the subgrades, the soft and/or loose material shall be overexcavated to a depth of 24 inches. The overexcavation shall be backfilled with open graded gravel (ASTM C33, No. 67 gradation) wrapped in a non-woven filter fabric (Mirafi 180N or approved equal). Excavated soft and/or loose materials shall not be re-used as backfill.

14.5 SUBMITTALS

(A) Soils Testing: The compaction of all fill and the subgrade shall be tested by an independent testing agency. All test results shall be attested to by a geotechnical engineer licensed in the State of Hawaii for more than 10 years and shall be submitted to the Construction Engineer for approval. The cost of soils density and laboratory testing shall be borne by the Contractor. One field density test shall be made throughout the area for each 1,000 square feet of each compacted layer. All test results must be approved before the Contractor can proceed with placing additional fill or the placing of base course.

14.6 MEASUREMENT AND PAYMENT

Trench excavation and backfill, including pipe cushion and gravel backfill, trench restoration, including asphalt concrete pavement, Portland cement concrete pavement, tack coat, prime coat, sidewalks, curbs, and gutters, non-woven filter fabric, stabilization of soft and/or loose materials, soil compaction testing, reinforcing steel, structural and all other work related to trench excavation and backfill will not be measured and paid for separately, but shall be considered incidental to the various water system construction costs in the Proposal Schedule.

END OF ARTICLE

ARTICLE XV – STRUCTURAL EXCAVATION AND BACKFILL

15.1 GENERAL

This Article shall serve as an addendum to the Hawaii Department of Transportation standard specifications 2005 Edition. The work consists of furnishing equipment, materials, labor and appliances and perform all work in connection with excavation, backfill and compaction necessary for the job, including providing and installing the exterior waterproofing system to the below-grade structures in accordance with this Article of the specifications and the standard specifications, Sections 206 and 703.20.

15.2 DESCRIPTION

(A) Excavating and backfill for water and sewer drainage structures

(B) Excavating and backfill for valve structures

(C) Disposing of uncontaminated surplus material from excavations

(D) Provide and install asphalt primer, hot asphalt and fabric waterproofing membrane system where specified on the contract drawings

15.3 MATERIALS

(A) Structural Backfill shall be per Subsection 703.20 of the standard specifications. Only Structural Backfill Material A is allowed for backfilling of drainage structures.

15.4 STRUCTURE EXCAVATION

(A) Excavation for structures shall be adequate to accommodate the new structure at the specified elevation. Excavation shall conform to Subsection 206.03(A) of the standard specifications.

(B) Contractor is responsible for design, construction and inspection of any shoring required for excavations in conformance with OSHA requirements and shall be sufficient in strength to prevent movement of the soil held in place by the shoring.

(C) Due to anticipated soft and/or loose subsurface soil conditions, some movement of soil around the underground structure excavations should be anticipated due to changes in the earth stresses during and after construction, especially during extraction of a sheet pile system, where utilized.

(D) Stabilization of soft spots shall comply with Section 15.4(D).

15.5 STRUCTURAL BACKFILL

(A) Backfill against structures shall be compacted to 90% relative compaction in conformance with Subsection 206.03(B) of the standard specifications.

(B) Backfill to the elevation of the pavement aggregate subbase or the elevation where installation of CLSM is to occur as indicated on the contract documents.

(C) CLSM shall be provided for backfill against structures where detailed. The Contractor shall get written approval to use CLSM backfill in location not specifically specified in the project documents.

(D) Contractor shall submit CLSM mix design for review at least two weeks prior to pouring.

(E) Furnish batch/delivery tickets to the Construction Engineer at the time CLSM is poured or no later than when the truck leaves the work area where the CLSM was poured.

(F) Stabilization of soft spots shall comply with Section 15.4(D).

15.6 MEASUREMENT AND PAYMENT

Structure excavation and backfill will not be measured or paid for separately, but will be compensated as part of the bid items specified in Article X of these specifications of which it is a part.

END OF ARTICLE

ARTICLE XVI - REQUIRED SUBMITTALS

16.1 GENERAL

This Article describes the Contractor submittals that are required for this project. In general, they include but are not necessarily limited to shop drawings, product and material data sheets, material safety data sheets, work plans and schedules, etc., as specified and required by the plans and specifications. As soon as possible after award of the contract, the Contractor shall submit for approval, all required submittals to the Construction Engineer at 79 S. Nimitz Highway, Honolulu, Hawaii 96813. After the State's approval of the submittals, the Contractor shall promptly and timely order the materials for the project so as to not delay the construction schedule and progression of work.

16.2 REQUIRED SUBMITTALS

The Contractor shall submit for review and approval electronic pdf set of each required submittal listed below. To the best of the State's knowledge, this list is deemed to be complete, however, the Contractor shall consider this list to be the minimum required, and shall be responsible for all submittals required by this contract as may be specified elsewhere on the plans and/or specifications.

Supplemental Special Provisions
- A. Qualifications of Bidders

Article X - Project Description
- A. Permits
- B. Shop Drawings
- C. Test Results
- D. As-Built Drawings
- E. Traffic Control Plans
- F. Quality Control Plan
- G. Construction Schedule
- H. Harbors Security Documentation
- I. Health and Safety Plan

Article XII - Environmental Protection
- A. Site Specific Best Management Practices Plan

Article XIII - Demolition and Removal Work
- A. Proposed demolition and removal procedure
- B. Gas Free Certificate

Article XIV - Trench Excavation and Backfill
- A. Compaction test results

Article XV - Structural Excavation and Backfill
- A. CLSM mix design

Article XVII – Portland Cement Concrete Pavement
- A. Concrete Mix Design

Article XVIII – Asphalt Concrete Pavement
- A. Asphalt Concrete Pavement Mix Design

Article XIX - Aggregate Base Course
- A. Certificate of Compliance for aggregate base course
- B. Compaction test results

Article XXI – Water System
- A. CIPP Installation Plan
- B. CIPP manufacturer's detailed product fact sheet
- C. Chlorination certificate

Article XXII – Traffic Control
- A. Traffic control plans

Article XXIII - Reinforced Concrete (Civil Structures)
- A. Concrete mix design
- B. Batch ticket information
- C. Curing concrete elements

Article XXVII – Temporary Water Pollution, Dust, and Erosion Control
- A. Storm Water Pollution Prevention Plan.
- B. Inspection reports

16.3 REVIEW AND ACCEPTANCE PROCESS

The submittal shall be complete. Incomplete submittals will be rejected and will not be reviewed. The Engineer will complete the review of the submittal within 30 days from the date of receipt unless a different review time is established by the contract documents. The Engineer will advise the Contractor, in writing, as to the acceptability of the submittal. Should the Engineer partially or totally reject the submittal, the Contractor shall modify the submittal as required by the Engineer and resubmit the item within 15 days. At this time, the review and acceptance cycle described above shall begin again. The review and acceptance cycle shall begin again as described above each time the submittal is returned to the Contractor for modification. If the volume of the shop drawings submitted at any time for review is unusually large, the Contractor shall inform

the Engineer of its preferred order for reviews, and the Engineer will use reasonable efforts to accommodate the Contractor's priority.

The acceptance by the Engineer of the Contractor's submittal relates only to their sufficiency and compliance with the intention of the contract. Acceptance by the Engineer of the Contractor's submittal does not relieve the Contractor of any responsibility for accuracy of dimensions, details, and proper fit, and for agreement and conformity of submittal with the contract drawings and specifications. Nor will the Engineer's acceptance relieve the Contractor of responsibility for variance from the contract documents unless the Contractor, at the time of submittal, has provided notice and indemnification of such variances required by this section. Acceptance of a variance shall not justify a contract price or time adjustment unless the contractor requests such adjustment at the time of submittal and the adjustment is explicitly agreed to in writing by the Engineer. Any such request shall include price details and proposed scheduling modifications. Acceptance of a variance is subject to all contract terms, stipulations and covenants, and is without prejudice to any and all rights under the surety bond.

If the Engineer returns a submittal to the Contractor that has been rejected, the Contractor, so as not to delay the work, shall promptly make a resubmittal conforming to the requirements of the contract documents and indicating in writing on the transmittal and the subject transmittal what portions of the resubmittal have been altered in order to meet the acceptance of the Engineer. Any other differences between the resubmittal an the prior submittal shall also be specifically described in the transmittal.

No mark or notation made by the Engineer on or accompanying the return of any submittal to the Contractor shall be considered a request or order for a change in work. If the Contractor believes any such mark or notation constitutes a request for a change in the work for which it is entitled to an adjustment in contract price, contract time, or both, the Contractor must follow the procedures established in Article IV – Scope of Work of the General Provisions, as amended by the Special Provisions, or lose its right to claim for an adjustment.

16.4 MEASUREMENT AND PAYMENT

Payment for required submittals will not be made separately. The Contractor shall consider this work incidental to the various bid items in the Proposal Schedule.

END OF ARTICLE

ARTICLE XVII - PORTLAND CEMENT CONCRETE PAVEMENT

17.1 DESCRIPTION

The work shall consist of constructing pavement composed of Portland cement concrete (PCC) with or without reinforcement, on a prepared subgrade or base course according to the contract or as specified by the Construction Engineer.

At the option of the Contractor, the Contractor may construct the pavement with equipment using stationary side forms or slip form paving.

17.2 MATERIALS

Concrete shall have a minimum flexural strength, f'_r of 750 pounds per square inch at 28 days and a minimum flexural strength of 500 pounds per square inch at 7 days, and shall conform to Article XIX - Structural Concrete for Portland Cement Concrete Pavement.

Reinforcing steel materials shall be epoxy coated in accordance with ASTM A775.

Other materials shall conform to the following subsection of the "Standard Specifications":

Joint Filler	705.01
Joint Sealer	705.04
Reinforcing Steel	709.01
Curing Materials	711.01

17.3 QUALITY CONTROL

(A) Paving Plan: Submit paving plan for review by the Construction Engineer. The Contractor shall be responsible for keeping the Paving Plan up-to-date and shall provide an updated copy to the Construction Engineer a minimum of 48 hours prior the commencement of any work included in the updated paving plan. The paving plan shall include the following:

1. Mix design.
2. Construction method.
3. Description of mixing, placing, finishing, curing, and lighting equipment for night work.
4. Miscellaneous materials.
5. Location, sequence, and construction leave-outs indicated in the contract documents or required by the Contractor's operations.
6. A detail paving sequence plan and proposed paving pattern plan showing all planned construction joints and transverse and longitudinal dowel bar

spacing. Proposed paving pattern plan shall include a concrete jointing plan, including enlargements at structures, and concrete jointing grading plan, including enlargements at structures.

7. Pavement demolition work plan, presenting the proposed methods and equipment to remove existing pavement and protect pavement to remain in place.

8. A description of the placing and protection methods proposed when concrete is to be placed in or exposed to hot, cold, windy, or rainy weather conditions.

(B) Contractor Quality Control Staff:

Refer to Article X – Project Description for Contractor personnel qualification requirements. Submit American Concrete Institute certification for Contractor Quality Control staff. All Contractor Quality Control personnel assigned to concrete construction are required to be American Concrete Institute (ACI) certified in the following grade:

1. The minimum requirements for the CQC System Manager consist of being a graduate engineer, graduate architect, or a graduate of construction management with a minimum of 5 years of container terminal construction experience and a minimum of 1 year of experience as a CQC System Manger.

2. CQC personnel responsible for inspection of concrete paving operations: ACI Concrete Transportation Inspector. The ACI Concrete Transportation Inspector is required to be present at the paving site during all paving operations, with the exception of the initial saw cutting operation. The CQC System Manager is required to be present during initial saw cutting operations.

3. CQC staff is required to oversee all aspects of sawing operations (sawing, flushing, vacuuming, checking for random cracking, lighting).

4. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews: ACI Concrete Flatwork Technician/Finisher.

5. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

6. Slipform Paving Equipment Manufacturer's Representative: If slipform paving is to be used, a representative of the slipform paving equipment manufacturer is required to be onsite to inspect and make corrections to the paving equipment to ensure proper operations. Perform a complete and full hydraulic flow test of the vibrator system within 24 hours prior to the commencement of the paving operations. Submit a written slipform paver manufacturer's inspection report signed by the manufacturer's representative noting all inspection, corrections, and flow tests have been performed and the paver is in a condition to perform the required work.

17.4 CONSTRUCTION REQUIREMENTS

(A) Proportioning: Base the proportioning on the predetermined cement content indicated in the approved mix design or designed for minimum flexural strength as specified in the contract.

Determine the slump according to AASHTO T 119 (ASTM C 143) and air content according to AASHTO T 152 (ASTM C 231). Make, cure, and test the test specimens according to AASHTO T 23 (ASTM C 31), AASHTO T 22 (ASTM C 39) and AASHTO T 97 (ASTM C 78), and the cement content according to AASHTO T 121 (ASTM C 138).

State the proportions in terms of aggregates in a saturated surface-dry condition. Adjust the batch weights periodically to take into account the actual moisture of the aggregates at the time of use. The designated proportions govern during the progress of the work except in the following:

1. Do not make changes in the sources or character of the materials without due notice to the Construction Engineer. Do not use the new materials until the Construction Engineer designates and accepts the new proportions based upon laboratory tests and trial mixes.

2. When concrete having the required consistency cannot be produced without exceeding the maximum allowable water-cement ratio specified, increase the cement content as specified by the Construction Engineer.

3. When concrete of the desired plasticity and workability cannot be obtained with the proportions originally accepted, the Construction Engineer will make such changes in aggregate weights as required provided the original designated cement content does not change except as specified in items (1) and (2) above.

(B) Equipment: The Construction Engineer will examine the equipment and tools necessary for handling materials and doing the work for acceptance as to the design, capacity, and mechanical condition. The equipment shall be at the work site sufficiently ahead of the start of this activity for examination. The Contractor shall comply with the following:

1. Batching Plant and Mixers: The batching plant and mixers shall conform to Article XIX - Structural Concrete for Portland Cement Concrete Pavement.

2. Hauling Equipment: Equipment for hauling concrete shall conform to Article XIX - Structural Concrete for Portland Cement Concrete Pavement.

3. Finishing Equipment

   a. Finishing Machine: The finishing machine shall be self-propelled. When in operation, equip the finishing machine with at least two oscillating type transverse screeds supported by the forms. The finishing machine shall handle and finish the mixes required for

this type of construction. The finishing machine shall not displace the reinforcement, side forms, or joints.

b. Vibrators: Vibrators, for full width vibration of the concrete, may be either the surface pan type or the internal type with immersed tube or multiple spuds. The vibrators may be attached to the spreader or the finishing machine or mounted on a separate carriage. The vibrators shall not come in contact with the reinforcement, load transfer devices, subgrade, or side forms. Operate the vibrating equipment according to the manufacturer's recommended frequency. However, the frequency of the surface vibrators shall not be less than 3,500 impulses per minute and the frequency of the internal type shall not be less than 5,000 impulses per minute. Hand vibrators shall have a frequency of not less than 5,000 impulses per minute. Furnish a tachometer for measuring and indicating the frequency of vibration.

c. Machine Floats: Mechanical floats shall be self-propelled. Use mechanical floats designed to finish pavement smoothly and true to grade. Mechanical floats shall run either on side forms or on adjacent lanes of concrete.

Use floats constructed of hardwood, steel, or steel-shod and equipped with devices to permit adjusting the underside of a true flat surface.

d. Slip-Form Pavers: Slip-form pavers shall be self-propelled. Use slip-form pavers equipped with traveling side forms of sufficient dimensions, shape, and strength to produce pavement of the required cross section. Slip-form paving equipment shall spread, consolidate and screed freshly placed concrete so a minimum of handwork is required to produce a dense homogeneous pavement true to the cross section and profile within the specified tolerances.

Use slip-form pavers equipped with high frequency internal vibrators for the full width. The vibrators may be mounted with their axis parallel or normal to pavement alignment. When mounting the vibrators with their axis parallel with the pavement alignment, space the vibrators at an interval not to exceed 2.5 feet measured center to center. When mounting vibrators with their axis normal to the pavement alignment, space the vibrators so that the lateral clearance between individual vibrating units does not exceed 0.5 feet.

Use slip-form pavers designed so that the longitudinal axis at the center of each vibrating unit is not more than 0.5 feet above the pavement grade while spreading, compacting, and shaping the pavement.

The vibration rate of each vibrating unit shall be not less than 5000 cycles per minute. Furnish a tachometer to measure the frequency of vibration.

The Contractor may use the equipment designed to complete the paving operations with one machine or may consist of a mechanical spreader followed by a separator power unit.

4. Concrete Saw: When sawing joints are elected or specified, provide sawing equipment adequate in number of units and power to complete the sawing with a water-cooled diamond edge saw blade or an abrasive wheel to the required dimensions and at the required rate. Provide at least one standby saw in good working order. Maintain an ample supply of saw blades at the work site during sawing operations. Provide adequate artificial lighting facilities for night sawing. This equipment shall be on the work site both before and continuously during concrete placement.

5. Forms: Use straight side forms made of a metal having a thickness of not less than (7/32) inch, furnished in sections not less than 10 feet in length. Forms shall have a depth equal to the prescribed edge thickness of the concrete and a base width equal to at least 80% of the specified pavement thickness. The Construction Engineer will not allow horizontal joint unless accepted by the Construction Engineer as a built-up form. Each form section shall be straight and free from bends and warps. No section shall show a variation greater than 1/8 inch in 10 feet from the true plane on the top and 1/4 inch in 10 feet along the face of the form. The method of connecting form sections shall insure tight, neat joint. Side forms shall be of sufficient rigidity in the form and in the interlocking connection with adjoining forms such that springing will not occur under the weight of the subgrading and paving equipment or from pressure of concrete. The Contractor may use built-up metal forms by rigidly attaching a wood or metal section of suitable width and thickness to the bottom of the form providing an increase in depth of not more than 20%.

   Use the flexible or curved forms of proper radius for curves of 100-foot radius or less. The Contractor may use the straight steel forms in sections of 10 feet or less in length for form lines having a radius greater than 200 feet. The Construction Engineer will permit special forms of wood or steel for curved form lines having a radius of 200 feet or less. Where the use of standard pavement forms are impracticable, submit working drawings for acceptance. Five feet long straight steel form section will be acceptable for curved form lines having a radius of not less than 100 feet.

   Forms shall be of sufficient rigidity to prevent distortion in edge alignment due to pressure of concrete. Do not use the wood forms as a track for operating paving and finishing equipment.

(C) Weather Limitations:

1. Windy Conditions: When windy conditions during paving appear probable, equipment and material shall be at the paving site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

2. Placement and Protection of During Inclement Weather: Do not commence placing operations when heavy rain or other damaging weather conditions appear imminent. At all times when placing concrete, maintain onsite sufficient waterproof cover and means to rapidly place it over all unhardened concrete or concrete that might be damaged by rain. Suspend placement of concrete whenever rain, high winds, or other damaging weather commences to damage the surface or texture of the placed, unhardened concrete, washes cement out of the concrete, or changes the water content of the surface concrete. All unhardened concrete shall be immediately covered and protected from the rain or other damaging weather. Any slab damaged by rain or other weather shall be completely removed full depth, by full slab width, to the nearest original joint, and replaced at the Contractor's expense as specified in Subsection 18.3(X) – Removal and Replacement of Newly Constructed Slabs.

(D) Preparation of Grade: After grading and compacting the pavement bed, trim the grade to the approximate correct elevation, extending the work at least two feet beyond each edge of the proposed concrete pavement.

Grade and maintain the track path in a smooth compacted condition until after constructing the pavement.

(E) Setting Forms

1. Base Support: The foundation under the forms shall be hard and true to grade so that the form, when set, shall be firmly in contact for its whole length and at the specified grade. Fill the grades found below established grade with granular material in lifts of 0.5 inch or less for a distance of 18 inches on each side of the base of the form, and thoroughly compacted. Correct the above grade imperfections or variations by tamping or trimming as necessary.

2. Form Setting: Set the forms sufficiently ahead of concrete placement to provide time to check the line and grade and provide a continuous concrete placement operation. After setting the forms to the correct grade, tamp the grade thoroughly, mechanically or by hand, at both the inside and outside edges of the base of the forms. Stake the forms into place with not less than three pins for each 10-foot section. Place a pin at each side of every joint. Lock the form sections tightly from play or movements. The forms shall not deviate from true line by more than 1/4 inch. Set the forms so that the forms will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Clean and coat the forms with a form release agent or oiled before placing the concrete.

3. Grade and Alignment: Check and correct the alignment and grade elevations of the forms immediately before placing the concrete. When the forms are disturbed or grades become unstable, reset and recheck the forms.

(F) Conditioning of Subgrade or Base Course: Bring the subgrade or base course to proper cross section. Trim the high areas to proper elevation. The low areas

may be filled and compacted to a condition similar to that of surrounding grade, or fill the low areas with concrete integral with the pavement. Maintain the finished grade in a smooth and compacted condition until placing the pavement.

If waterproof subgrade or base course cover material is not specified, moisten the subgrade or base course uniformly and remove excess water standing in pools or flowing on the surface before placing the concrete.

(G) Reinforcement: Cool reinforcement prior to placing concrete.

(H) Wind Barriers: Erect wind barriers if necessary to shield concrete from adverse wind exposure during placing, finishing or curing operations.

(I) Handling, Measuring, and Batching Materials: Handling, measuring, and batching materials shall be according to Article XIX - Structural Concrete for Portland Cement Concrete Pavement.

(J) Mixing Concrete: Mixing concrete shall be according to Article XIX - Structural Concrete for Portland Cement Concrete Pavement.

(K) Limitations of Mixing: Do not mix, place, or finish the concrete when the natural light is insufficient, unless an adequate and acceptable artificial lighting system is operated.

Before placing concrete pavement, have a good and sufficient supply of water available throughout the work. An inadequate water supply will be cause for delaying or shutting down the concrete mixer. In case of a deficiency of water, use the water available for curing the concrete already placed.

Make advance arrangements to prevent delay in delivery and placing of the concrete. An interval of more than 30 minutes between placing of two consecutive batches or loads of concrete shall constitute cause for stopping paving operations. When suspending concrete operations for such cause, make a joint at the location and of the type specified by the Construction Engineer in the concrete already placed and according to Subsection 18.3(O) - Joints at no cost to the State.

(L) Placing Concrete: Make adequate advance arrangements for preventing delay in delivery and placing of the concrete. An interval of more than 30 minutes between placing of any two consecutive batches or loads shall constitute cause for stopping paving operations. When stopping paving operations, make a construction joint at the location and of the type specified by the Construction Engineer at no cost to the State.

Slip-form paving and finishing machines shall be in satisfactory adjustment and operational condition. Before placing concrete, demonstrate proper adjustment of the screeds and floats on slip-form pavers by measurements from grade stakes driven to known elevations. Demonstrate satisfactory operation and adjustments of the propulsion and control equipment, including pre-erected grade and alignment lines by moving the slip-form pavers and finishing machines over a 500-foot length of prepared subgrade with the propulsion and control equipment fully operational.

Either construct the pavement in 15-foot widths separated by longitudinal weakened joints or monolithically in multiples of 15-foot widths with a longitudinal weakened plane joint at each 15-foot spacing, unless shown otherwise on the Plans.

Place concrete during late afternoon/early evening hours to allow "set-up" during cooler evening hours.

Place the concrete while fresh. Do not use water for re-tempering concrete. Deposit the concrete on grade so as to require as little rehandling as possible. Unless truck mixers, truck agitators, or non-agitating hauling equipment are equipped with means for discharge of concrete without segregation of the materials, unload the concrete into an accepted spreading device and mechanically spread on the grade so as to prevent segregation of the materials. Placing shall be continuous between transverse joints without use of intermediate bulkheads. Use shovels for hand spreading, not rakes. Do not allow the workers to walk in the freshly mixed concrete with boots or shoes coated with earth or foreign substances.

Do not use concrete showing improper proportions of materials, including water, in the pavement. Remove and dispose such unsatisfactory concrete at no cost to the State.

Spread, shape, and consolidate the concrete so that the completed pavement will conform to the thickness and cross section requirements of the contract. The sides of pavement may be constructed on a batter not to exceed one horizontal to six vertical (1H:6V), provided the top of the pavement is maintained at the specified width.

When constructing portland cement concrete pavement adjacent to an existing parallel concrete pavement not constructed as part of the contract, spread, compact, and shape the concrete so that:

1. the completed pavement will conform to the thickness and cross section requirements of the contract;

2. the water does not pond on either side of the longitudinal joint with the existing pavement;

3. the new pavement surface at the longitudinal joint conforms as close as possible to the elevation of the existing concrete pavement. Eliminate any differences in elevation between the new pavement and the existing pavement by finishing the new pavement within one foot of the existing pavement by hand methods, adding or removing concrete as necessary;

4. the transverse straightedge, and longitudinal straightedge requirements specified in Subsection 18.3(P) - Final Strike-Off, Consolidation and Subsection 18.3(Q) - Surface Test will not apply to the pavement surface within one foot of the existing concrete pavement;

5. the thickness measurements specified in Subsection 18.3(W) - Tolerance in Pavement Thickness are not made in pavement within one foot of the existing concrete pavement; and

6. the transverse weakened plane joints are constructed in pavement widening to match the spacing and skew of the weakened plane joints in the existing pavement.

When placing concrete adjacent to a previously constructed lane of pavement, do not operate the mechanical equipment on the existing lane of pavement until the existing concrete pavement has obtained a strength of not less than 500 pounds per square inch at 7 days when tested according to AASHTO T 97 - Flexural Strength of Concrete (using Simple Beam with Three Point Loading).

Construct the pavement using only that paving equipment that produces a finished surface meeting straightedge requirements according to Subsection 18.3(P) - Final Strike-Off, Consolidation, and Finishing and Subsection 18.3(Q) - Surface Test. Failure of equipment to produce pavement that conforms to said requirements will constitute cause for stopping placement of concrete until the deficiency or malfunction is corrected.

When placing concrete adjacent to an existing pavement, equip that part of the equipment supported on existing pavement with protective pads on crawler tracks or rubber tired wheels with the bearing surface offset to run a sufficient distance from the pavement edge to avoid breaking or cracking that edge.

Spreading, compacting, and shaping shall also conform to:

1. Stationary Side Form Construction: Spread, shape, and consolidate the concrete by one or more machines. These machines shall uniformly distribute and consolidate concrete without segregation so that the completed pavement conforms to required cross section with a minimum of handwork.

   The number and capacity of machines furnished shall be adequate to finish the work required at a rate equal to that of concrete delivery.

   Effectively consolidate the concrete for the full paving width by means of surface or internal vibrators.

   When using vibrators to consolidate concrete, the rate of vibration shall not be less 3,500 cycles per minute for surface vibrators and shall not be less than 5,000 cycles per minute for internal vibrators.

   Amplitude of vibration shall be sufficient to be perceptive on the surface of concrete more than one foot from the vibrating element. Furnish a tachometer for measuring and indicating frequency of vibration.

   Vibrators shall not rest on new pavement or side forms. Connect the power to vibrators so that vibration ceases when forward or backward motion of the machine is stopped.

   Spread and shape the concrete for concrete required to be placed in short lengths or in widths other than multiples of 15-foot lanes by acceptable powered finishing machines supplemented by hand work as necessary. Consolidation of such concrete shall be by high-frequency

internal vibrators within 15 minutes after depositing the concrete on the subgrade. Vibrate with care so to assure adequate consolidation adjacent to forms and uniformly across the full paving width. The Construction Engineer will not permit use of vibrators for extensive shifting of the mass of concrete. Discontinue the methods of spreading, shaping, and compacting that result in segregation, voids, or rock pockets. Adopt methods that will produce dense homogeneous pavement conforming to required cross section.

2. Slip Form Construction: Slip form paving equipment shall spread, consolidate, and screed freshly placed concrete so that a minimum of handwork is required to produce a dense homogeneous pavement true to cross section and profile. The Construction Engineer will not permit abrupt changes in longitudinal deviation of the pavement. The horizontal deviation shall not exceed 1/10 of a foot from the alignment established by the contract.

   Effectively consolidate the concrete for the full paving width by high frequency vibrators. Operate the slip-form paver with as nearly a continuous forward movement as possible. Coordinate the operations of mixing, delivering, and spreading the concrete to provide a uniform progress with stopping and starting of the paver held to a minimum. When stopping the forward movement of the paver, the vibratory and tamping elements shall also cease immediately. Do not apply tractive force to the machine except those tractive force controlled by the machine.

(M) Test Specimens: Furnish the concrete necessary for casting test beams and cylinders at no cost to the State. Cure the beams as specified for pavement according to AASHTO T 23 (ASTM C 31).

(N) Strike-Off of Concrete and Placement of Reinforcement: After placing the concrete, strike off the concrete to conform to the cross section shown in the contract and to an elevation such that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown in the contract.

When placing reinforced pavement in two layers, strike off the entire width of the bottom layer to such length and depth that the sheet of fabric or bar mat may be laid full length on the concrete in final position without further manipulation.

Place the reinforcement directly upon the concrete, place, strike off, and screed the top layer of the concrete. Remove and replace the portions of the bottom layer of concrete at no cost to the State when more than 30 minutes have elapsed after placement without covering the bottom layer with freshly mixed concrete.

When placing reinforced concrete in one layer, the reinforcement may be positioned ahead of concrete placement or may be placed in plastic concrete, after spreading by mechanical or vibratory means.

For the reinforcing steel, Subsection 602.03 (B) - Storage, Surface Condition, and Protection of Reinforcement of the "Standard Specifications," shall apply.

(O) Joints: Construct the joints normal to the pavement surface of the type, dimensions, and at locations required by the contract.

1. Longitudinal Joints: The width of the joint shall be as required with a depth of d = t/4 where:

   d = minimum depth rounded up to the nearest 0.01-foot

   t = thickness of pavement in each lane

   When paving lanes are poured separately and a sawed longitudinal joint is required, the longitudinal joints shall be as required by the contract.

   Place the deformed steel tie bars of the specified length, size, spacing and material perpendicular to the longitudinal joint at a target depth of d = t/2. Place the deformed steel tie bars by mechanical equipment or secure the deformed steel tie bars rigidly by chairs or other supports to prevent displacement. Use 30 inches long No. 5 rebars and space 30 inches center to center. Tie bars which are to be bent and later straightened shall be grade 40. The Construction Engineer may require other sizes, grades, lengths, and spacing base on slab width, thickness and the type of underlying base. Do not paint or coat the tie bars with asphalt or other material not enclosed in tubes or sleeves.

   a. Longitudinal Construction Joints: When constructing adjacent paving lanes separately, the tie bars may be bent at right angles against the forms of the first lane constructed and straightened into final position before placing concrete in the adjacent lane or an acceptable two-piece tie bar connectors may be used. When inserting a two-piece tie bar connector mechanically during slip form paving, maintain the proper alignment and adequate bond with the plastic concrete.

   b. Sawed Joint: Complete the sawing of longitudinal joints within 12 hours of paving and before concrete is placed in subsequent adjacent lanes and before equipment or vehicles are allowed on the pavement.

2. Transverse Isolation Joints: The expansion joint filler shall be continuous from form to form. Shape the isolation joint to the subgrade and along the form. Furnish the preformed joint filler in lengths equal to the pavement width or equal to the width of one lane. Do not use damaged or repaired joint filler.

   Hold the isolation joint filler in a vertical position to secure the preformed isolation joint filler at the proper grade and alignment during placing and finishing of the concrete. Finished joints shall not deviate more than 0.25 inch in the horizontal alignment from a straight line. When assembling joint fillers in sections, do not use the offsets between units. The Construction Engineer will not permit plugs of concrete anywhere within the isolation space.

3. Transverse Contraction Joints: Transverse contraction joints include planes of weakness created by forming or cutting grooves in the surface of the pavement and, when shown on the plans, shall include load transfer assemblies.

   a. Formed Joints: The Contractor may use the formed joints made by depressing a tool or device into the plastic concrete, regardless whether the joints are to remain in or removed from the finished pavement, only with the written acceptance of the Construction Engineer.

   b. Sawed Joints: Saw contraction joints by cutting grooves in the pavement with an acceptable power saw. The width shall be the minimum width possible with the type of saw being used not exceeding 1/4 inch.

      After sawing each joint, clean the sawed cut and adjacent concrete surface thoroughly.

      The Construction Engineer will designate the first joint immediately after separation or transverse contact joint and every second planned transverse contraction joint as control joints. Saw them from 4 to 12 hours after placing the concrete. The Contractor will be responsible for determining the exact time of sawing in accordance with Subsection 411.03(L) – Joints, of the "Standard Specifications." If necessary and regardless of weather conditions, continue the sawing operations day and night. Complete the sawing of transverse contraction joints before placing the concrete in adjacent lanes and before permitting traffic on the pavement.

      In succeeding lanes of concrete pavement, saw the transverse joints within 24 hours after pouring the concrete. The Contractor will be responsible for determining the exact time. Omit not more than three consecutive planned transverse contraction joints.

      Saw the remaining transverse contraction joints after 24 hours. Complete the transverse contraction joints before pouring the concrete in adjacent lanes and before permitting traffic on the pavement.

      When a crack occurs within 5 feet of a planned transverse contraction joint, omit sawing of that joint. Discontinue sawing when a crack develops in front of the saw. The Construction Engineer will not pay for the joints sawed in violation of these provisions.
      When curing the pavement by curing seal, restore the portions of the seal that are disturbed by sawing operations by spraying the area with additional curing seal.

   c. Transverse Construction Joints: Construct a transverse construction joint when an interruption of more than 30 minutes in the concrete operations occurs. Do not construct the transverse

joint within 10 feet of any expansion joint, contraction joint, or plane of weakness. When the Contractor has not mixed sufficient concrete at the time of interruption to form a slab at least 10 feet long, remove and dispose of any excess concrete back to the last preceding joint as specified by the Construction Engineer at no cost to the State.

4. Load Transfer Devices: Install the load transfer units, when required, at transverse joints. The load transfer units include dowel bars of a grade and size required by the contract spaced on one foot centers and held in position with a wire basket or mechanically implanted. Place the dowels at a depth of d = t/2 where:

d = minimum depth rounded up to the nearest 0.01 foot

t = thickness of pavement of each lane

Place the dowels at this depth in the pavement parallel to the surface and pavement edge with a tolerance for such alignment of +/- 1/4 inch per dowel. Vibrate the concrete around dowel bars without disrupting the alignment of the load transfer devices. Demonstrate that the method of dowel placement will have the bars in the proper location after the paving train has made its final pass over the joint.

Mark the center of the dowel assembly properly on both sides of the pavement slab for reference in forming or sawing the contraction joint.

Use wire baskets that remain in the pavement to hold the dowels and preformed material for load transfer units. Furnish a metal dowel cap or sleeve on each dowel bar to accommodate the expansion. Equip the cap with a stop to prevent closing during pavement operation. Maintain a clearance of one inch between the closed end of the cap and the end of the dowel to accommodate future movement of the concrete slab.

(P) Final Strike-Off, Consolidation and Finishing

1. Sequence: The sequence of operations shall be the strike-off and consolidation, floating and removal of laitance, straightedging, and final surface finish.

In general, the Construction Engineer will not permit the application of additional water to the surface of the concrete to assist in finishing operations. When permitting the application of water to the surface apply the water as a fog spray by an acceptable spray equipment.

2. Finishing at Joints: Compact or firmly place the concrete adjacent to joints without voids or segregation against the joint material, under and around load transfer devices, joint assembly units, and other features designed to extend into the pavement. Vibrate the concrete adjacent to joints mechanically as required in Subsection 18.3(L) - Placing Concrete.

After placing and vibrating the concrete adjacent to the joint as required in Subsection 18.3(L) - Placing Concrete, bring the finishing machine

forward, operating to avoid damage or misalignment of the joints. When operation of the finishing machine to, over, and beyond the joints causes segregation of concrete and damage to or misalignment of the joints, stop the finishing machine when the front screed is approximately 8 inches from the joint. Remove the segregated concrete from in front of and off the joint; lift the front screed and set directly on top of the joint; and resume the forward motion of the finishing machine. When the second screed is close enough to permit the excess mortar in front of the screed to flow over the joint, lift the screed and carry it over the joint. Thereafter, the Contractor may run the finishing machine over the joint without lifting the screeds, provided there is no segregated concrete immediately between the joint and the screed or on top of the joint.

3. Machine Finishing

   a. Nonvibratory Method: Distribute or spread the concrete as soon as placed. Soon after placing the concrete, strike off and screed the concrete by a finishing machine. The machine shall go over each area of pavement as many times and at such intervals as necessary to give the proper compaction and to leave a surface of uniform texture. Avoid excessive operation over a given area. Keep the tops of the forms clean by an effective device attached to the machine and maintain the travel of the machine on the forms true without lift, wobbling, or other variation tending to affect the precision finish.

      During the first pass of the finishing machine, maintain the uniform ridge of concrete ahead of the front screed for its entire length.

   b. Vibratory Method: Vibrators for full width vibration of concrete paving slabs shall conform to Subsection 18.3(B)(3)(b) - Vibrators. When uniform and satisfactory density of the concrete is not obtained by the vibratory method, furnish equipment and methods that produce pavement conforming to the contract. The provisions in Subsection 18.3(P)(3)(a) - Nonvibratory Method, not in conflict with the provisions for the vibratory method shall govern.

4. Nonvibratory Method, Hand Finishing: The Construction Engineer will not permit hand finishing methods except the following:

   a. When the mechanical equipment breaks down, hand methods may be used to finish the concrete already deposited on the grade when the breakdown occurs, or

   b. where operations of the mechanical equipment is impractical such as narrow widths or areas of irregular dimensions, hand methods may be used to finish the concrete.

   Strike off and screed the concrete, as soon as placed. Provide a second screed to strike-off the bottom layer of concrete if reinforcement is used. The screed for the surface shall be at least two feet longer than the maximum width of the slab to be struck off. The screed shall be an

acceptable design and sufficiently rigid to retain its shape. Use a screed constructed either of metal or of other suitable material shod with metal.

Attain consolidation by using a vibrator.

In operation, move the screed forward on the forms with a combined longitudinal and transverse shearing motion, moving always in the direction in which the work is progressing and so manipulated that neither end is raised from the side forms during the strike-off process. When necessary, repeat this operation until the surface is of uniform texture, true to grade and cross section and free from porous areas.

5. Floating: After striking off and consolidating the concrete, smooth, true, and consolidate the concrete further by a longitudinal float, using one of the following methods:

   a. Hand Method: The hand-operated longitudinal float shall not be less than 12 feet in length and 6 inches in width, stiffened properly to prevent the float from flexing and warping. Work the longitudinal float with a sawing motion while the float is held in a floating position parallel to the road centerline and passing gradually from one side of the pavement to the other. Operate the float from the foot bridges, rest on the side forms, and span without touching the concrete.

      Movement ahead along the centerline of the pavement shall be in successive advances of not more than 1/2 the length of the float. Waste excess water or soupy material over the side forms on each pass.

   b. Mechanical Method: Adjust the tracks and float accurately to the required crown. Coordinate the float with the adjustments of the transverse finishing machine so that a small quantity of mortar is carried ahead of the float. Adjust the forward speed so that the float laps the distance specified on each transverse trip. The float shall pass over each area of pavement at least two times. The Construction Engineer will not permit excessive operation over a given area. Waste the excess water or soupy material over the side forms on each pass.

   c. Alternate Mechanical Method: As an alternative to Subsection 18.4(P)(5)(b) - Mechanical Method, a machine composed of a cutting and smoothing float or floats, suspended from and guided by a rigid frame may be used. Use a frame that is carried by four or more visible wheels riding on and constantly in contact with the side forms.

      When necessary, the long-handled floats may be used to smooth and fill in open-textured areas in the pavement. The floats shall have blades not less than five feet in length and 6 inches in width. Do not use the long-handled floats to float the entire surface of the pavement in lieu of, one of the preceding methods of floating.

When striking-off and consolidating by the hand method and the crown of the pavement does not permit the use of the longitudinal float, float the surface transversely by the long-handled float. Do not work the crown out of the pavement during the operation. After floating, remove the excess water and laitance from the surface of the pavement by a straightedge 10 feet or more in length. Lap the successive drags 1/2 the length of the blade.

d. Slip-Form Finishing: Construct the pavement with a preliminary float finish with devices incorporated in the slip-form paver. The Contractor may supplement these with suitable machine floats.

Correct the edge slump of pavement, exclusive of edge rounding, over 0.02 foot before concrete has hardened.

6. Straightedge Testing and Surface Correction: After completing the floating and removing the excess water, but while the concrete is still plastic, test the surface of the concrete for trueness with a 10-foot straightedge. For this purpose, furnish and use an accurate 10-foot straightedge swung from a handle three feet longer than 1/2 the width of the slab. Hold the straightedge in contact with the surface in successive positions parallel to the paving lane centerline and the whole area gone over from one side of the slab to the other as necessary. Advance along the paving lane shall be in successive stages of not more than 1/2 the length of the straightedge. Provide the finished surface of the pavement with no abrupt change of 1/4 inch or more with the approved straightedge. Immediately fill with freshly mixed concrete, strike off, consolidate, and refinish all depressions. Cut down and refinish high areas. Construct the surface across joints to meet the requirements for smoothness. Continue straightedge testing and surface corrections until the entire surface is found to be free from observable departures from the straightedge and the slab conforms to the required grade and cross section.

7. Final Finish: After completing straight edging and surface corrections and as soon as the water sheen has practically disappeared, texture the pavement surface uniformly. Apply the final finish or texture by the use of an artificial turf drag.

Use an artificial turf made of molded polyethylene with synthetic turn blades approximately 0.85 inches long and contain approximately 7,200 individual blades per square foot. Submit the artificial turf for review and acceptance by the Construction Engineer.

Attach the artificial turf suitably to a device that will permit control of the time and rate of texturing. Do not attach this device to other pieces of equipment in the paving train. The device shall be a separate piece of equipment to be used exclusively for the texturing operation. The artificial turf shall be full pavement width and of sufficient size that during the finishing operation, approximately two feet of turf parallel to the pavement centerline is contacting the pavement surface so as to produce a uniform appearing surface according to the contract. When necessary for maintaining intimate contact with the pavement surface, the Contractor may down the turf.

8. Edging at Forms and Joints: After the final finish, but before the concrete has taken its initial set, round the edges of the pavement along each side of each slab, on each side of the transverse expansion joints, and construction (contact) joints to a radius of 1/4 inch. Produce a well-defined and continuous radius and a smooth, dense mortar finish. Do not unduly disturb the surface of the slab by tilting the tool during use.

   At joints eliminate the tool marks appearing on the slab adjacent to the joints by brooming the surface. In doing this, do not disturb the rounding of the corner of the slab. Remove the concrete on top of the joint filler completely.

   When one side of the joint is higher than the other or when the joint are higher or lower than the adjacent slabs, test the joints with a straightedge before the concrete has set and correction made.

(Q) Surface Test: The finished pavement shall conform to the following requirements when tested by the CQC System Manager or authorized representative not more than 14 days following the placement of concrete:

Straightedge the pavement surface at locations determined by the Contractor with a straightedge 12 feet long. When laying the straightedge on a finished pavement in a direction parallel with centerline or normal to centerline, the surface shall not vary more than 0.25 inch from the lower edge.

(R) Curing: Submit the results of the surface test to the Construction Engineer for review and approval. When completing the finishing operations and when marring of the concrete does not occur, cover and cure the entire surface of the newly placed concrete according to the method shown below. When curing requires the use of water, the curing shall have priority to water supplies. Failure to provide sufficient cover material or lack of water to take care of both curing and other requirements shall be cause for immediate suspension of the concrete operations. Do not leave the concrete exposed for more than 1/2 hour between stages of curing or during the curing period. When water is used for curing, maintain the covering in place for 72 hours after pouring the concrete.

1. Evaporation Retarder: Spray the entire surface with an evaporation retarder upon initial screeding prior to curing operations. Apply evaporation retarder at a rate recommended by the supplier.

2. Impervious Membrane Method: Spray the entire surface of the pavement uniformly with white pigmented curing compound, approved by the Engineer immediately after the finishing of the surface and before the set of the concrete has taken place. When initially curing the pavement with jute or cotton mats, the white pigment curing compound may be applied upon removal of the mats. Do not apply the curing compound during rainfall.

   Apply the curing compound under pressure at the rate of one gallon to not more than 150 square feet by mechanical sprayers. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed

condition with the pigment uniformly dispersed throughout the vehicle. During application, stir the compound continuously by effective mechanical means. The Construction Engineer will permit hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms. Do not apply the curing compound to the inside faces of joints to be sealed.

When the curing film becomes damaged from causes within the required curing period, repair the damaged portions immediately with additional compound. Upon removal of side forms, protect the sides of the slabs exposed immediately to provide a curing treatment equal to that provided for the surface.

(S) Removing Forms: Remove the forms from freshly placed concrete after the concrete has set for at least 12 hours, except auxiliary forms used temporarily in widened areas. Remove the forms carefully so as to avoid damage to the pavement. After removing the forms, cure the sides of the slab as outlined in one of the methods indicated above. The Construction Engineer will consider major honeycombed areas as defective work. Remove and replace the major honeycomb areas. Areas or sections removed shall not be less than 10 feet in length nor less than full width of the lane involved. When the removal and replacement of a section of pavement is necessary, also remove and replace remaining portion of the slab adjacent to the joints that is less than 10 feet in length.

(T) Sealing Joints: When required by the contract, fill the joints with joint sealing material before the pavement is opened to traffic, and as soon after completion of the curing period is feasible. Clean each joint thoroughly of foreign matters including membrane curing compound and clean the joint faces and dry the surface before sealing. Stir the material during heating so that localized overheating does not occur.

Apply the sealer as required by the contract or as specified by the Construction Engineer. Pour the sealer without spilling the material on the exposed surfaces of the concrete. Immediately remove and clean the material on the surface of the concrete pavement. The Construction Engineer will not permit the use of sand or similar material as a cover for the seal.

(U) Protection of Pavement: Protect the pavement and its appurtenances against both private and public traffic, and traffic caused by the Contractor's own employees and agents. This shall include flaggers to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, or crossover.

When directed by the Construction Engineer, construct pavement crossings for the convenience of public traffic including the temporary access road required under Article XIV Demolition and Removal Work according to Subsection 104.09 - Maintenance of Traffic, of the "Standard Specifications." The Construction Engineer will not make additional compensation for the work involved.

Repair or replace damages to the pavement before final acceptance.

The Construction Engineer will require the Contractor to have available materials for the protection of the edges and surface of the unhardened concrete. The protective materials include standard metal form or wood plank having a nominal thickness of not less than two inches and a nominal width of not less than the thickness of the pavement at its edges. The surface protective material includes burlap or cotton mats, curing paper, or plastic sheeting. When rain appears imminent, paving operations shall stop. Place the forms against the sides of the pavement and cover the surface of the unhardened concrete with the protective covering.

(V) Opening to Traffic: Do not open the pavement to traffic until the specimen beams conforming to Subsection 411.03(J) - Test Specimens attain a flexural strength of 550 pounds per square inch when tested according to AASHTO T 97. Do not open the pavement to traffic sooner than seven days after concrete placement regardless of strength attainment.

Clean, sign, and mark the pavement properly and clear the pavement of obstructions before opening the paved yard area to traffic.

The Construction Engineer will not allow construction traffic, equipment, or materials on the pavement while the pavement is attaining the required strength.

(W) Tolerance in Pavement Thickness: The Construction Engineer will check the thickness of the pavement by cores taken by the Contractor according to AASHTO T 24. The Construction Engineer will inform the Contractor where to take core samples and observe the Contractor taking core samples. Cores must be drilled in the presence of the Construction Engineer. The state reserves the right to reject any cores that are not drilled in the presence of the Construction Engineer. The Contractor shall notify the Construction Engineer, in writing, a minimum of 48 hours prior to the drilling of cores. Additional drilling of cores due to failure to notify the Construction Engineer will be the responsibility of the Contractor at no cost to the state. The Construction Engineer will test the cores according to AASHTO T 148. Cores are to be taken to determine thickness acceptability after completion of corrective work.

When cores are taken to determine the thickness of PCC pavement, a layer of material may adhere to the bottom of the core. In determining the thickness of the PCC pavement, the Construction Engineer will not measure non-PCC pavement materials at the bottom of the core.

The Construction Engineer will evaluate the pavement on the basis of primary and secondary unit. The primary unit of pavement will be the area of pavement placed during one day's paving operations.

A secondary unit of pavement includes 500 linear feet or fraction thereof, of each mainline paving lane. Also, each 1,300 square yards of pavement in non-paving lane areas will be a secondary unit regardless of when the concrete was placed.

Drill ten (10) cores in each primary limit and drill one (1) core in each secondary unit. When the length of that core is not deficient by more than 0.2 inch from the planned thickness, the Construction Engineer will pay for that secondary unit based on the percentage of work completed against the total contract price.

All additional cost for corings exceeding 0.20 inches deficient will be paid for by the Contractor.

When the length of that core is deficient by more than 0.2 inch but less than 0.6 inch, drill two additional cores within the secondary unit and the Construction Engineer will average the length of the three cores.

When the core in a secondary unit is deficient by more than 0.6 inch, the Construction Engineer will not use the core to determine the average thickness of the secondary unit.

Drill additional cores at intervals not exceeding 10 feet in each direction from the deficient core, measured parallel to the centerline, until one core is obtained in each direction which is not deficient by more than 0.6 inch.

The Construction Engineer will evaluate the pavement between these two cores separately from the balance of the pavement in that secondary unit. The limits for the evaluation will be between the longitudinal weakened plane or construction joint on each side of the core and between the next transverse weakened plane, construction, or expansion joint beyond each of the last two cores. Unless the Construction Engineer allows the pavement to remain, remove and replace the pavement with pavement of the specified thickness. The Construction Engineer will not pay for the removal of the deficient pavement. When the deficient pavement is allowed to remain, the Construction Engineer will not make payment for the deficient pavement. Drill one additional core in the remaining portion of the secondary unit. The Construction Engineer will evaluate this portion separately for payment as hereinbefore specified.

When removing deficient pavement, remove and replace the deficient pavement within the evaluation limits. After replacing the deficient pavement, drill one core at random in the secondary unit outside of the limits of the replaced pavement and drill one core in the new pavement.

The Construction Engineer will not pay for any pavement replacement as a result of concrete thickness or strength deficiency. All corrective measures as a result of deficiencies will be paid for by the Contractor.

Fill the core holes completely with concrete of the same quality as used to construct the pavement.

(X) Removal and Replacement of Newly Constructed Slabs: Where it is necessary to remove full slabs, removal shall be in accordance with Subsection 18.3(Y) – Removal of Existing Pavement Slab. Removal and replacement shall be full depth, by full width of the slab, and the limit of removal shall be normal to the paving lane and extend to each original joint. Dowels of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete using procedures as specified in the contract documents. Original damaged dowels or tie bars shall be cut off flush with the joint face. Protruding portions of dowels shall be painted and lightly oiled. All four edges of the new slab shall thus contain dowels. Placement of concrete shall be as specified for original construction. Prior to placement of new concrete, the underlying material shall be recompacted and shaped as specified in the appropriate section of these specifications, and the surfaces of all four joint faces shall be cleaned of all loose material and contaminants and coated with a

double application of membrane forming curing compound as bond breaker. Care shall be taken to prevent any curing compound from contacting dowels or tie bars. The resulting joints around the new slab shall be prepared and sealed as specified for original construction.

(Y) Removal of Existing Pavement Slab: When existing concrete pavement is to be removed and adjacent concrete is to be left in place, the joint between the removal area and adjoining pavement to stay in place shall first be cut full depth with a standard diamond-type concrete saw. Next, a full depth saw cut shall be made parallel to the joint at least 12 inches from the joint and at least 6 inches from the end of any dowels. This saw cut shall be made with a wheel saw. The wheel saw shall have a large diameter tungsten carbide tipped blades mounted on a heavy-duty chassis which will provide a saw kerf at least 1.5 inches wide. The saws shall be capable of sawing to the full depth required. All pavement to be removed beyond this last saw cut shall be removed in accordance with the approved demolition work plan. All pavement between this last saw cut and the joint line shall be removed by carefully pulling pieces and blocks away from the joint face with suitable equipment and then picking them up for removal. In lieu of this method, this strip of concrete may be carefully broken up and removed using hand-held jackhammers, 30 pounds or less, or other approved light-duty equipment which will not cause stress to propagate across the joint saw cut and cause distress in the pavement which is to remain in place. In lieu of the above specified removal method, the slab may be saw cut full depth to divide it into several pieces and each piece lifted out and removed. Suitable equipment shall be used to provide a truly vertical lift, and safe lifting devices used for attachment to the slab. Damage to adjacent slabs due to the Contractor's operations will be the Contractor's responsibility and shall be repaired or removed at the discretion of the Construction Engineer at the Contractor's expense.

(Z) Repair or Replacement of Cracking in Concrete Pavement: The Construction Engineer shall utilize the following table to determine whether cracks in the Portland cement concrete pavement can be repaired or is the removal of the concrete slab is required. Removal of concrete slabs, when applicable, shall be in accordance with Subsection 18.3(X) – Removal and Replacement of Newly Constructed Slabs and Subsection 18.3(Y) – Removal of Existing Pavement Slab.

Defect	Orientation	Location	Description	Required Repair
Plastic Shrinkage	Any	Anywhere	Only partially penetrates depth	Do nothing
Uncontrolled Crack	Transverse	Crosses or ends at transverse joint	Full-depth	Saw and seal the crack; epoxy uncracked joint sawcut
Uncontrolled Crack	Transverse	Relatively parallel and within 4.5 feet of joint	Full-depth	Saw and seal the crack; Seal joint
Sawcut or Uncontrolled Crack	Transverse	Anywhere	Spalled	Repair spall by PDR if crack not removed
Uncontrolled Crack	Longitudinal	Relatively parallel and within 1 foot of joint; May cross or end at longitudinal joint	Full-depth	Saw and seal the crack; Epoxy uncracked joint sawcut
Uncontrolled Crack	Longitudinal	Relatively parallel and in wheel path (1 – 4.5 feet from joint)	Full-depth, hairline or spalled	Remove and replace panel (slab)
Uncontrolled Crack	Longitudinal	Relatively parallel and further than 4.5 feet from a longitudinal joint or edge	Full-depth	Cross-stitch or Slot-stitch crack; Seal longitudinal joint
Sawcut or Uncontrolled Crack	Longitudinal	Anywhere	Spalled	Repair spall by PDR if crack not removed
Uncontrolled Crack	Diagonal	Anywhere	Full-depth	FDR
Uncontrolled Crack	Multiple per panel (slab)	Anywhere	Two full depth cracks dividing panel (slab) into 3 or more pieces	Remove and replace panel (slab)

PDR: Partial depth repair; Saw around spall leaving 2 inches between spall and 2 inches deep perimeter sawcuts. Chip concrete free, then clean and apply bond break to patch area. Place a separating medium along any abutting joint or crak. Fill area with patching mixture.

FDR: Full depth repair; 10 feet long by one lane wide. Extend to nearest transverse contraction joint if 10 foot repair would leave a segment of pavement less than 10 feet long.

Cross-stitching: For longitudinal cracks only; drill holes at angle, alternating from each side of joint on 30 – 36 inch spacing. Epoxy deformed steel tiebars into holes.

Slot-stitching: For longitudinal cracks only; Deformed bars grouted into slots sawed across the crack; Backfill with non-shrink, cement-based mortar.

17.4 MEASUREMENT AND PAYMENT

Portland cement concrete pavement, inclusive of furnishing reinforcements, dowels, tie bars, other joint materials; furnishing, placing, and removing of forms, protection devices; furnishing and placing curing materials, furnishing and installing longitudinal joints, isolation/expansion joints, transverse expansion joints, transverse construction joints, and transverse contraction joints; grinding and grooving; obtaining cores; testing; backfilling holes with concrete; and furnishing labor, materials, tools, equipment, incidentals, and all other work related to Portland cement concrete pavement will not be be measured and paid for separately, but shall be considered incidental to the various water system and jet grout construction costs in the Proposal Schedule.

END OF ARTICLE

ARTICLE XVIII - ASPHALT CONCRETE PAVEMENT

18.1 DESCRIPTION

This work shall consist of constructing asphalt concrete pavement on a prepared base course, including cold-planing and overlaying asphalt concrete pavement on an existing base surface, in accordance with the requirements of the contract.

18.2 GENERAL REQUIREMENTS

The provisions of Section 401 – Hot Mix Asphalt (HMA) Pavement of the "Standard Specifications" shall apply except as hereinafter modified:

(A) 401.03 (A) Construction Requirements shall be amended to read as follows:

Amend (A) Weather Limitations to read as follows:

"(A) Weather Limitations. Do not place the bituminous plant mix:

(1) on wet surfaces, or

(2) when the air temperature is below 50^{O}F., or

(3) when weather conditions prevent the proper handling or finishing of the bituminous mixtures."

The Contractor shall notify the construction engineer, in writing, if concrete is to be furnished by a ready-mix supplier. The Contractor shall submit Delivery/Batch Ticket Documentation to the construction engineer when the ready-mix concrete is poured and no later than when the truck leaves the work area in which the concrete was poured.

(B) 401.04 Measurement and 401.05 Payment are deleted.

18.3 MEASUREMENT AND PAYMENT

Asphalt concrete pavement, within the pavement stabilization boundary, including bituminous aggregate material, tack coat, and prime coat, will be paid for on a lump sum basis in the Proposal Schedule, complete in place.

Payment shall be full compensation for all tools, material, labor, and appurtenances to complete the work, in accordance with the construction documents, in place, complete.

Asphalt concrete pavement for trench restoration will be paid for under Article XV – Trench Excavation and Backfill.

ITEM NO.	PAY ITEM	PAY UNIT
14.	Asphalt concrete pavement, State Mix IV, in place, complete.	Lump Sum

END OF ARTICLE

ARTICLE XIX - AGGREGATE BASE COURSE

19.1 DESCRIPTION

This work shall consist of constructing the base course in accordance with the requirements of the contract.

19.2 GENERAL REQUIREMENTS

In general, the provisions of Section 304 - Aggregate Base Course and Section 703.06 Aggregate for Untreated Base Course of the "Standard Specifications" shall apply except as hereinafter modified:

(A) 304.03 (A) Hauling and Placing shall be amended by adding the following paragraph:

"The Construction Engineer will not permit the spreading of filler material over the surface of the compacted base. Incorporate the additional material, if required, uniformly throughout the thickness of the compacted material by scarifying and blading. The combined material shall meet quality requirements as specified."

(B) 304.04 Method of Measurement and 304.05 Basis of Pavement are deleted.

19.3 SUBMITTALS

(A) Submit certificate of compliance with these Specifications and material data for the base course material.

(B) Soils Testing: The compaction of the base course shall be tested by an independent testing agency. All test results shall be attested to by a civil engineer licensed in the State of Hawaii and shall be submitted to the Construction Engineer for approval. The cost of soils testing shall be borne by the Contractor. Field density tests shall be made throughout the area for each 1500 sf of each compacted layer. All test results must be approved before the Contractor can proceed with placing additional layers of base course. Base course failing the compaction test or placed on untested areas or areas that fail to meet the minimum density requirements shall be removed and the underlying area shall be rescarified, recompacted, and retested at no cost to the state.

19.4 MATERIAL

(A) Aggregate base course shall be basalt material.

19.5 MEASUREMENT AND PAYMENT

Aggregate base course for the Portland cement concrete pavement including placing, compacting, tools, material, labor, incidentals and all other work related to aggregate base course will not be measured and paid for separately, but shall be considered incidental to the various water system construction costs in the Proposal Schedule.

Aggregate base course cushion material for pipelines and structure foundations will not be measured or paid for separately, but will be considered incidental to the various items ok work within the Proposal Schedule.

END OF ARTICLE

ARTICLE XX – HOT MIX ASPHALT CONCRETE BASE COURSE

20.1 DESCRIPTION

This work shall consist of constructing hot mix asphalt concrete base course on a prepared subbase, including cold-planing and overlaying hot mix asphalt concrete base course on an existing subbase in H.C. 10502, in accordance with the requirements of the contract.

20.2 GENERAL REQUIREMENTS

The provisions of Section 301 – Hot Mix Asphalt Base Course of the "Standard Specifications" shall apply except as hereinafter modified:

(A) 301.04 Measurement and 301.05 Payment are deleted.

20.3 MEASUREMENT AND PAYMENT

Hot mix asphalt concrete base course, including bituminous material, tack coat, cold-planing, all tools, material, labor, incidentals, and all other work related to asphalt concrete pavement will not be measured and paid for separately, but shall be considered incidental to the various items of work within the Proposal Schedule.

END OF ARTICLE

ARTICLE XXI - WATER SYSTEM

21.1 DESCRIPTION

This work includes the reconstruction, rehabilitation and repairs of portions of the fire protection water line system, fire hydrants and appurtenances.

21.2 GENERAL REQUIREMENTS

(A) The American Water Works Association (AWWA) and American National Standards Institute (ANSI) C623-22 First Edition on Cured-In-Place Pipe (CIPP) Rehabilitation of Pressurized Potable Water Pipelines, 4-inches and Larger Standards are attached to Article XXI. In general, Section 2 of the above mentioned attachment contains additional references used in this standard.

(B) In general, the provisions of Section 624 - Water System of the "Standard Specifications" shall apply except as hereinafter modified.

(C) The following construction standards, with certain modifications as hereinafter specified, are hereby incorporated into and made a part of these specifications by reference and shall be applicable to all work performed by the Contractor under this section.

1. "Water System Standards", dated 2002, of the Board of Water Supply, City and County of Honolulu.

    a) Paragraphs relating to Measurement and Payment in the Standards are not applicable to the project.

    b) The sixth paragraph of Section 302.22 shall be revised to read as follows:

    "Due to varying soil conditions, whenever test or thrust blocks or beams for horizontal or horizontal-vertical bends are required, the stamped and signed dimensions and details of the blocks or beams shall be furnished by a licensed structural engineer in the State of Hawaii retained by the Contractor. The design of the blocks shall be furnished by the licensed structural engineer after the Contractor has excavated the trench at the required location to verify the ground conditions."

(D) Contract time of completion includes all connections to existing water systems, payment of Water System Facilities Charges, chlorination, testing, and initiation of water service.

(E) Hydrotesting activities shall conform to the requirements of Article XXVI – Temporary Water Pollution, Dust, and Erosion Control.

21.3 CURED-IN-PLACE PIPE (CIPPP) REHABILITATION

(A) The Contractor shall submit a detailed CIPP Installation Plan and CIPP Manufacturer’s detailed product fact sheet to the Construction Engineer at least 10 days before work commences. Materials shall comply with the requirements of the Safe Drinking Water Act and applicable federal, state, and local regulations for potable water systems.

(B) Textile tube shall consist of multiple layers of woven synthetic materials, fiber reinforcement, flexible needle punched felt or equivalent synthetic material, or a combination of those materials capable of carrying resin, able to withstand installation loads, curing temperatures, operational and test pressures, and shall be compatible with the resin system used by the installer. If the textile tube is capable of adapting to fit irregular pipe sections and negotiate bends, it shall do so without excessive folds or wrinkles. Textile tube shall be fabricated to a size that fits tightly to the internal circumference and length of the host pipe when installed. Preliners can be used when recommended by the manufacturer and approved by the Engineer and shall have no detrimental effects on the stabilized CIPP performance.

(C) CIPP installations shall be completed in accordance with the manufacturer's requirements and recommendations for pipes that have been properly cleaned and prepared for CIPP rehabilitation, where the lengths and diameters of the water main sections to be cleaned have been field verified by visual and camera CCTV inspection prior to the start of work.

(D) The number and location of access pits shall be based on the alignment of the host pipe, presence of appurtenances, and the length of the installations of the CIPP. Excavation and trenching operations shall be completed in accordance with Article XIII Demolition and Removal Work. Excavations shall be properly and safely dimensioned to accommodate the CIPP installation equipment and process. Immediately upon opening the host main at the access points, and prior to starting any installation, the ends of the adjacent water mains that are not to be rehabilitated at the insertion and extraction points shall be securely covered or plugged to prevent debris from entering during the installation process.

(E) The cleaning method used should be compatible with the CIPP manufacturer's guidelines and shall be approved by the Engineer. The cleaning method shall not damage the host pipe, service connection or any appurtenances. The cleaned and prepared interior shall be free of sharp edges, deposits, debris, and protrusions that pay cause point loads on the CIPP.

(F) Prior to the CIPP installation, verification of pipe cleanliness and readiness to install the CIPP shall be performed by a recorded video inspection of the full length of the pipeline to be rehabilitated shall be submitted to the Engineer. Video recording log shall be retained by the Contractor.

(G) Resin impregnation or wet-out shall be completed in accordance with the manufacturer's recommendations to achieve full and consistent resin distribution. The manufacturer shall specify the process to be used, the volume of resin required and control provisions and applicable parameters used. The installation shall be in accordance with the manufacturer's recommendations. Contractor shall obtain the manufacturer's installation procedures and submit to the Engineer for review, including minimum pressure required to hold resin textile tube tight against the host pipe and the maximum allowable pressures. Contractor shall maintain recommended pressure and document the pressures during the installation. Curing shall be in accordance with manufacturer's recommendations and procedures for installation.

(H) After completion of all rehabilitation work, and before returning the pipeline to service, a pipe cleaning and recorded inspection of the repaired section shall be made. A camera CCTV inspection shall be used to confirm fit and finish, continuous

CIPP over length of the section being rehabilitated, and that CIPP is free of visual defects, sags, tears, bubbles, delamination, defects or anomalies.

21.4 MODIFICATIONS TO SECTION 624 - WATER SYSTEM

Make the following amendment to said Section:

(I) Amend **624.02 - Materials** by adding the following:

"Ductile iron pipe for water mains shall conform to "Water System Standards," dated 2002, Section 202 – Ductile Iron Pipe, Fittings, and Appurtenances. All pipes shall be Class 53."

(II) Amend **Section 624.04 - Measurement** to read as follows:

"**(A) Excavation and Backfill.** Quantities for excavation and backfill will not be measured by the Engineer. Payment for backfill shall be included in the various lump sum costs of the water system appurtenances.

(B) Pipe and Fittings. Quantities for pipe will be measured per linear foot by the Engineer. Fittings and warning tape shall not be measured separately, and shall be considered incidental to the pipe.

(C) Water System. Water system appurtenances shall not be measured separately. The Engineer shall consider the items listed incidental to the water system appurtenances in each item of water system appurtenances work.

(1) Gate Valves (Hub Ends, Mechanical Joints and Flanged).

(2) Gate Valve Boxes and Covers.

(3) Copper Pipes and Appurtenances.

(4) Service Laterals, Irrigation Laterals, and Service Connections. Fittings, appurtenances, cutting and plugging, and pipe sleeve installation and other incidentals.

(5) Temporary Bypass for Water Line.

(6) Air Relief Valves.

(7) Air Relief Valve Boxes and Covers.

(8) Fire Hydrants and Fire Hydrant Locator Band.

(9) Test Blocks.

(10) Reinforced Concrete Jacket, Thrust Blocks, and Thrust Beams.

(11) Pipe Test.

(12) Valve Markers.

(13) Electronic Markers.

(14) Pipe Risers, Fittings, and Couplings.

(15) Connections to existing water systems.

(16) Chlorination and Testing

(17) Leak Detection Wells

(18) Any other items related to the construction of the water system appurtenances."

(IV) Amend **Section 624.05 Payment** to read as follows:

"**(A) Excavation and Backfill.** The Engineer will not pay for the accepted quantities of excavation and backfill according to Section 204 – Excavation and Backfill for Miscellaneous Facilities and modified in Subsection 624.04(B) – Backfill.

The price shall be full compensation for furnishing all labor, materials, equipment, tools, and incidentals necessary to complete the work.

(C) Pipe and Fittings. The Engineer will pay for the accepted quantities of pipe and fittings at the contract price per linear foot installed, as shown in the Proposal Schedule.

The price shall be full compensation for furnishing all labor, materials, inclusive of fittings, equipment, tools, and incidentals necessary to complete the work.

(D) Water System Appurtenances. Water system appurtenances shall not be measured separately. The Engineer shall consider the items listed incidental to the water system appurtenances in each item of water system appurtenances work.

(1) Gate Valves (Hub Ends, Mechanical Joints and Flanged).

(2) Gate Valve Boxes and Covers

(3) Copper Pipes and Appurtenances.

(4) Service Laterals, Irrigation Laterals, and Service Connections. Fittings, appurtenances, cutting and plugging, and pipe sleeve installation and other incidentals.

(5) Temporary Bypass for Water Line.

(6) Air Relief Valves.

(7) Air Relief Valve Boxes and Covers

(8) Fire Hydrants and Fire Hydrant Locator Band.

(9) Test Blocks.

(11) Reinforced Concrete Jacket, Thrust Blocks, and Thrust Beams.

(11) Pipe Test.

(12) Water Supply for Construction. The Engineer will not pay for the cost for

the installation and disconnection of the meters, used for water supply, and replacement and repairs separately.

(13) Valve Markers. The Engineer will not pay for furnishing and installing valve markers separately.

(14) Furnishing Material. The Engineer will not pay for the accepted quantities for "furnishing only" of materials that the Board of Water Supply will install at the respective contract unit prices.

The prices shall include the cost of furnishing jointing materials and other accessories and furnishing labors, material, equipment, tools and incidentals necessary to complete the work.

(15) Manufacturer's Certificate of Test. The Engineer will not pay for the cost of the Manufacturer's Certificate of Test according to Subsection 624.02 - Materials. The Engineer will consider them incidental to the various contract items in the proposal.

(16) Electronic Markers.

(17) Electronic Marker Reader.

(18) Pipe Risers, Fittings, and Couplings.

(19) Connections to existing water systems.

(20) Chlorination and Testing (including submittal of chlorination certificate)

(21) Leak Detection Wells

(22) Any other items related to the construction of the water system appurtenances."

The Engineer will make payment under:

ITEM NO.	PAY ITEM	PAY UNIT
3.	6" diameter pipe CIPP rehabilitation of the fire protection water system, inclusive of all labor, material, equipment, tools, camera CCTV inspections and pressure testing, and incidentals required to repair the pipelines, in place, complete.	Linear Foot
4.	12" diameter pipe CIPP rehabilitation of the fire protection water system, inclusive of all labor, material, equipment, tools, camera CCTV inspections and pressure testing, and incidentals required to repair the pipelines, in place, complete.	Linear Foot

END OF ARTICLE

ANSI/AWWA C623-22
(First Edition)

American Water Works Association
Dedicated to the World's Most Important Resource®

AWWA Standard

Cured-In-Place Pipe (CIPP) Rehabilitation of Pressurized Potable Water Pipelines, 4 In. (100 mm) and Larger

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard covers materials and procedures for the rehabilitation of existing water mains 4 in. (100 mm) in diameter and larger by the installation and curing of a resin-impregnated textile tube that is either inverted into the main using a hydrostatic head of potable water or air pressure or pulled into the main and subsequently inflated by potable water or air. The cured-in-place pipe (CIPP) is cured by circulating hot water, introducing controlled steam, or photoinitiated reaction (light) within the resin-impregnated textile tube once installed into the existing pipe. When cured, the finished product will be a continuous, tight-fitting CIPP.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for the materials and installation of CIPP systems for the rehabilitation of existing potable water mains 4 in. (100 mm) in diameter and larger. The standard includes

materials, inspection, and preparation of mains for CIPP installation and curing, testing, and verification requirements.

Sec. 1.3 Application

This standard can be referenced for the rehabilitation of existing potable or source water mains by installation of CIPP systems requiring NSF/ANSI/CAN 61. The stipulations of this standard apply only when this document has been referenced and then only to CIPP systems.

SECTION 2: REFERENCES

The following documents are referenced in this standard. In their latest editions, they form a part of this standard to the extent specified within the standard. In any case of conflict, the requirements of this standard shall prevail.

ANSI*/AWWA C651—Disinfecting Water Mains.

ANSI/AWWA C655—Field Dechlorination.

ASTM† D638—Standard Test Method for Tensile Properties of Plastics.

ASTM D790—Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

ASTM D2290—Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe.

ASTM D3039—Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials.

ASTM D3567—Standard Practice for Determining Dimensions of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings.

ASTM D4541—Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

ASTM D5813—Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems.

ASTM D7234—Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Adhesion Testers.

ASTM F1216—Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

† ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM F1743—Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).

ASTM F2019—Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic Cured-in-Place (GRP-CIPP) Using the UV-Light Curing Method.

ASTM F2994—Standard Practice for Utilization of Mobile, Automated Cured-In-Place Pipe (CIPP) Impregnation Systems.

AWWA M3—Safety Management for Utilities.

AWWA M28—Rehabilitation of Water Mains.

AWWA Committee Report "*Structural Classifications of Pressure Pipe Linings—Suggested Protocol for Product Classification.*"

NSF[‡]/ANSI/CAN[§] 61—Drinking Water System Components—Health Effects.

ISO[¶] 178—Plastics—Determination of flexural properties.

ISO 11296-4—Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks – Part 4: Lining with cured-in-place pipe.s

ISO 11297-4—Plastics piping systems for renovation of underground drainage and sewerage networks under pressure – Part 4: Lining with cured-in-place pipes.

SECTION 3: DEFINITIONS

The following definitions shall apply in this standard:

1. *Constructor*: The party that provides the work and materials for placement or installation.

2. *Cured-in-place pipe (CIPP) system*: The CIPP system consists of a thermosetting resin and one or more layers of flexible needle punched felt or an equivalent nonwoven or woven synthetic material, or a combination of nonwoven and woven synthetic materials, or a combination of felt and nonwoven or woven synthetic materials capable of carrying resin, withstanding installation pressures and stresses, and curing temperatures.

[‡] NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

[§] Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

[¶] International Organization for Standardization, ISO Central Secretariat, Chemin de Blandonnet 8, CP 401 – 1214 Vernier, Geneva, Switzerland.

3. *CIPP terminations*: The cut edge at which the finished CIPP terminates and is sealed or otherwise prevented from becoming exposed to either the water in the pipe or groundwater.

4. *Design reconciliation*: A process conducted post-construction to assess whether the design objective(s) for the installation has/have been met whereby the installed product's characteristics (i.e., all visual and testing results) are reconciled with the pre-construction design values. When deviations are present that compromise the performance of the CIPP, this reconciliation is completed to assess the net impact of post-construction deviations present including fit, finish, and mechanical properties (i.e., values both above and below original design values) on the installed product's ability to conform to the requirements in the design.

5. *Manufacturer*: The party that manufactures, fabricates, or produces materials or products.

6. *Potable water*: Water that is safe and satisfactory for drinking and cooking.

7. *Purchaser*: The person, company, or organization that purchases any materials or work to be performed.

8. *Resin impregnation or wet-out*: The process of injecting resin into and distributing it throughout a textile tube prior to installing into an existing pipe.

9. *Source water*: Source (raw) water is from a supply source prior to treatment. Also referred to as the supply of water for a water utility.

10. *Supplier*: The party that supplies materials or services. A supplier may or may not be the manufacturer.

11. *Textile tube*: Flexible textile tube consisting of the porous material that carries the liquid resin system and any membranes and/or fiber reinforcement, as combined prior to insertion in the pipe to be rehabilitated.

12. *Type testing*: A test carried out under controlled laboratory conditions to demonstrate representative short- or long-term mechanical properties of a product or one of its components.

SECTION 4: REQUIREMENTS

Sec. 4.1 Workmanship

Work shall be completed in a thorough, professional manner by workers skilled in applicable trades for the rehabilitation. The final delivered product shall meet the requirements of the Purchaser's Documents.

Sec. 4.2 CIPP Construction

The constructor, specifically including constructor's onsite supervisory personnel, shall have current training and certification applicable to the CIPP product and installation method being used to establish constructor's competence to perform the rehabilitation in accordance with the Purchaser's Documents. It is strongly recommended that the purchaser has an inspector on-site with the knowledge and capability to ensure that the CIPP is constructed and installed in conformance with the manufacturer's requirements and the Purchaser's Documents.

Sec. 4.3 Materials.

4.3.1 *General.* Materials shall comply with the requirements of the Safe Drinking Water Act and applicable federal, state, provincial, territorial, or other authoritative regulations for potable water systems.

4.3.2 *Textile tube.* The textile tube shall consist of one or more layers of woven synthetic materials, fiber reinforcement, flexible needle punched felt or an equivalent synthetic material, or a combination of those materials capable of carrying resin, able to withstand installation loads (e.g., inversion pressure, abrasion, tensile-pull load), curing temperatures, operational and test pressures, and shall be compatible with the resin system used. If the textile tube is capable of adapting to fit irregular pipe sections and negotiate bends, it shall do so without excessive folds or wrinkles as defined in the Purchaser's Documents. The textile tube shall be fabricated to a size that fits tightly to the internal circumference and the length of the host pipe when installed. Textile tubes that stretch circumferentially should be sized slightly smaller than the host pipe to allow the CIPP to take the shape of and fit tightly to the internal geometry of the host pipe. For textile tubes with a permanent outer membrane that once installed prevents bonding of the CIPP to the host pipe, considerations shall be made to prevent movement as described in Sec. 4.3.4.

4.3.3 *Resin.* The resin shall consist of a thermosetting resin system that is compatible with the application and the CIPP system.

4.3.4 *Adhesion or bond.* Depending on product requirements, the CIPP may or may not adhere or bond to the host pipe. Bonding is beneficial at end terminations and service connections to prevent leakage. Adhesion of the CIPP to the host pipe or the structural integrity of the CIPP may be compromised if the host pipe fails by cracking or is subjected to movement. The CIPP design may require or result in no bond to the host pipe, such as when the textile tube has a permanent outer membrane, a cement-mortar lining or barrier preventing

adhesion to the host pipe, or when a preliner is used for bridge crossings or other applications. When the CIPP is not bonded to the host pipe, the CIPP shall be stabilized to stop leakage at service connections and terminations using mechanical fittings or other methods validated through type testing or demonstration testing and approved by the purchaser.

4.3.5 *Mechanical properties and chemical resistance.* The CIPP system shall have initial and long-term material properties as required to meet all installation and in-service load conditions as outlined in the Purchaser's Documents. The constructor shall provide the purchaser with the expected initial mechanical properties of the in-field installed CIPP in both the circumferential and axial directions for the CIPP system in terms of the Flexural Modulus and Strength tested in accordance with ASTM D790 or ISO 11296-4 Annex B, and Tensile Modulus and Strength tested in accordance with ASTM D638, D2290, or D3039.

The manufacturer shall provide the minimum initial acceptable values for the specific CIPP system as well as design values for the specific application. Long-term values shall be determined in accordance with an acceptable protocol as outlined in the AWWA Committee Report "*Structural Classifications of Pressure Pipe Linings—Suggested Protocol for Product Classification.*"

The finished CIPP shall meet the chemical resistance, abrasion resistance, and bacteriological resistance requirements in accordance with the Purchaser's Documents and shall be resistant to the water treatment chemicals found in the water supply.

4.3.6 *Certification requirements*. All materials used in the CIPP process that come in contact with potable water shall comply with applicable requirements of NSF/ANSI/CAN Standard 61 and indicated by a current listing of the CIPP product by an ANSI accredited certification or testing agency or by a testing agency approved by the purchaser.

4.3.7 *Calibration hose*. Calibration hose used for inflation of the resin-impregnated textile tube shall comply with the material requirements of ASTM F1743 or F2019.

4.3.8 *Preliners.* Preliners shall be used when recommended by the manufacturer and approved by the purchaser and shall have no detrimental effects on CIPP performance. Wherever preliners are approved and used, the CIPP shall be stabilized to stop leakage at service connections and terminations using mechanical fittings or other methods validated through type testing or demonstration testing and approved by the purchaser.

Sec. 4.4 Design

4.4.1 *General.* CIPP design shall be in accordance with the defined project requirements. The latest edition of AWWA Committee Report "*Structural Classifications of Pressure Pipe Linings—Suggested Protocol for Product Classification*" may be used for guidance.

4.4.2 *Additional design considerations.* In addition to internal pressure loads, CIPP is required to sustain external buckling loads during periods when the host pipe is depressurized, as well as transient and cyclic overpressures and/or vacuum loads. Some CIPP systems are designed to resist external loads, while others achieve inherent hoop strength through interaction with the host pipe. Inherent resistance to external buckling normally increases with increased CIPP stiffness. Care should therefore be taken to ensure that such performance requirements are accurately defined.

4.4.3 *Structural verification.* Verification by test results and calculations shall be provided so that the proposed CIPP product can be considered for the recommended structural classification of design.

4.4.4 *Material properties.* Substantiation of material properties used in design shall be provided based on previous installations and quality control tests.

Sec. 4.5 Host Pipe Preparation

4.5.1 *General.* CIPP installations shall be completed in accordance with the Purchaser's Documents requirements and the manufacturer's recommendation for pipes that have been properly and suitably cleaned and prepared for CIPP rehabilitation. The lengths and diameters of water main sections to be cleaned shall be field-verified prior to the start of the work.

4.5.2 *Temporary water supply.* Arrangements to provide and/or maintain temporary domestic and/or fire protection service to customers affected by the proposed rehabilitation project shall be established to maintain service to customers connected to water main lines during the CIPP installation process. The constructor shall provide water service by following local, utility, provincial, territorial, state, and federal requirements. The temporary water supply shall comply with applicable requirements of NSF/ANSI/CAN Standard 61. AWWA M28 *Rehabilitation of Water Mains* provides a detailed discussion of temporary water supply.

4.5.3 *Pipe access.* The constructor shall verify the service status of all adjacent service pipes to ensure the system has been safely isolated and secured prior to access. This may entail testing isolation valves, reviewing thrust-blocking, reviewing system security requirements, and verification of readiness for

rehabilitation. The constructor shall create access pits prior to starting work. The host pipe shall be accessed by exposing the main and cutting and removing sections of the host pipe, including the removal of pipe valves and fittings. All excavations made for pipe access shall be constructed and maintained in accordance with local, state, provincial, and federal safety codes and regulations. Refer to AWWA Manual M3 *Safety Practices for Water Utilities*.

4.5.3.1 Access points. The number and location of access pits shall be based on the alignment of the host pipe, the presence of appurtenances, and the length of installations of the CIPP. Excavation and trenching operations shall be completed in accordance with the Purchaser's Documents and relevant federal, state, provincial, and local regulations. Excavations shall be properly and safely dimensioned to accommodate the requirements of the CIPP installation process selected.

4.5.3.2 Pipeline dewatering. Once the pipeline has been accessed and opened, it shall be fully drained, and the excavations dewatered to facilitate cleaning and preparation operations. Dewatering of water mains with chlorinated water shall comply with the requirements of ANSI/AWWA C655.

4.5.3.3 Plugging openings. Immediately upon opening the host main at the access points and prior to any work for the installation of CIPP, the ends of the adjacent existing water main that are not to be rehabilitated at the insertion and extraction points shall be securely covered or plugged so that no debris shall enter during the rehabilitation work.

4.5.3.4 Plugging of service connections. If required by the manufacturer, or the Purchaser's Documents, the service connections shall be plugged or covered to avoid migration of the resin into the services or stretching of the CIPP at service connections.

4.5.4 *Pipe cleaning and obstructions.*

4.5.4.1 Cleaning method and duration. The cleaning method should be compatible with the CIPP manufacturer's guidelines and shall be approved by the purchaser. The cleaning method shall not damage the host pipe walls, service connections, or any appurtenances. The pipe shall be cleaned as many times as necessary to meet the requirements for surface preparation in the Purchaser's Documents.

4.5.4.2 Cleaning and preparation results. When viewed without magnification, the cleaned and prepared interior circumference of the pipe shall be free of sharp edges, deposits, debris, and protrusions that may cause point loads

on the installed CIPP. Pipe surfaces shall also be free of visible contamination (e.g., sediment and biofilms), loose corrosion products, dust, oxides, loose coatings or linings, and any other foreign matter. Previously applied coatings and linings should be completely removed unless the residual coating or lining is tightly bonded, and the CIPP manufacturer and purchaser agree that the residual material can be safely and properly rehabilitated with CIPP without compromising the CIPP performance and integrity.

4.5.4.3 Infiltration and standing water removal. Any external water entering the existing pipeline and any visible freestanding water from the inside surfaces of the pipeline shall be fully removed in both the pipe and pipe joints so as not to interfere with the proper installation and cure of the CIPP. Standing water shall be disposed of in accordance with federal, state, provincial, territorial, and local regulations.

4.5.4.4 Attention required for sealing and bonding surfaces. Particular attention shall be paid to cleaning and preparing pipe surfaces wherever a long-term leak-tight seal or bond is required between the host pipe and the CIPP. Service connections and termination points are typical examples where particular attention shall be focused to remove corrosion products and provide a properly prepared surface for CIPP resin bonding.

4.5.4.5 Excessive protrusion of service taps. The service taps should be replaced or trimmed back to an acceptable protrusion length in the event that service taps protrude too far into the interior of the host pipe resulting in interference with cleaning and preparation operations or protrude to the extent that they impact the CIPP installation or performance as recommended by the CIPP manufacturer. The method of trimming shall not damage the host pipe or the service taps, be in compliance with any specific supplementary requirements identified in the Purchaser's Documents, and be approved by the purchaser.

4.5.4.6 Voids, holes, and gaps. When the repair or filling of holes, voids, or gaps is necessary to ensure long-term CIPP performance, a detailed procedure outlining the process and materials to be used shall be submitted to the purchaser for approval prior to rehabilitation operations.

4.5.4.7 Waste from cleaning and preparation operations. The waste from cleaning and preparation operations must be handled and disposed of in accordance with requirements in the Purchaser's Documents and local, state, provincial, territorial, and federal requirements.

4.5.4.8 Appurtenances left in place. Generally, all appurtenances within the section to be rehabilitated are removed prior to cleaning and rehabilitation operations. The purchaser must approve if the CIPP should be installed over appurtenances or the appurtenances abandoned in place.

4.5.5 *Pre-lining pipe inspection*. Prior to CIPP installation, verification of pipe cleanliness and readiness to install the CIPP shall be performed. A recorded video inspection of the full length of the pipeline to be rehabilitated shall be made and submitted to the purchaser. Verifications may also include the use of pipe mandrels or other devices for diametric or alignment proofing and may include worker entry for visual inspection. The interior of the pipeline shall be carefully inspected to determine the location of any conditions (e.g., leaking services) that may negatively impact CIPP integrity or prevent proper installation of the CIPP. A video recording or suitable log shall be retained by the constructor for reference. Rectification of any anomalies and removal of any obstructions shall be completed by the constructor in accordance with purchaser requirements or Purchaser's Documents.

Sec. 4.6 CIPP Installation

4.6.1 *Damaged materials*. Damage to textile tube materials may include, but is not limited to, gouging, abrasion, flattening, cutting, soiling, puncturing, or ultraviolet light degradation. Damage shall be considered cause for material rejection unless otherwise approved by the purchaser. Refer to Section 6 for transporting, unloading, storing, and handling of materials.

4.6.2 *Resin impregnation (wet-out).* Resin impregnation or wet-out shall be completed in accordance with the manufacturer's recommendations to achieve full and consistent resin distribution. The manufacturer shall specify the process to be used, the volume of resin required, the quality control provisions to be used, and any other applicable parameters.

4.6.3 *Installation*. The installation of the CIPP shall be in accordance with the manufacturer's recommendations. Before installation begins, the constructor shall obtain the manufacturer's recommended procedures, including the minimum pressure required to hold the resin-impregnated textile tube tight against the existing pipe wall and the maximum allowable pressure so as not to damage the resin-impregnated textile tube or the existing pipe. Once the installation has started, pressure shall be maintained between the minimum and maximum pressures and documented until the installation has been completed.

4.6.4 *Curing*.

4.6.4.1 General. The CIPP shall be cured in accordance with the manufacturer's recommendations and procedures required for the process, which shall be in accordance with the applicable installation procedures in ASTM F1216, F1743, or F2019.

4.6.4.2 Quality assurance. Qualified personnel shall monitor the curing process and maintain written or electronic records in accordance with the Quality Assurance Program (Sec. 5.1) for the parameters discussed in Sec. 5.6.4., to include temperature, internal pressure, and duration throughout the curing process.

4.6.4.3 Readings. Readings shall be made and recorded at regular intervals or continuously, as required by the Quality Assurance Program, for the full heating and cooling cure cycle duration.

4.6.4.4 Cooling. The CIPP shall be cooled in accordance with the manufacturer's procedures before relieving the air pressure, steam pressure, or static water head. Care should be taken in the release of the static water head so that a vacuum does not develop and damage the newly installed CIPP. The collection and disposal of cooling water shall be in accordance with the Purchaser's Documents.

4.6.5 *Reinstatement of service connections*.

4.6.5.1 Reinstating connections. Active service connections (including air relief valves, blow-offs, etc.) that are not replaced or removed prior to CIPP installation shall be reinstated internally, using remotely operated equipment. Restored connections shall be cut neatly to full size, without overcutting. All cuts made shall be smooth so that no ragged edges or attached material remains. Where localized bond is used to attain hydrostatic integrity, careful attention shall be paid to ensure there is no disbonding that can result in leaks between the CIPP and service. A watertight seal at each service connection is imperative and each reinstatement shall be visually inspected for any evidence of disbonding or leakage.

4.6.5.2 Resin removal. Any resin that has migrated into a service connection creating a service blockage shall be removed using remotely operated equipment. If the resin has migrated into the service connection to the extent that it cannot be removed using the remotely operated equipment without damaging the service, the service connection shall be excavated and replaced in accordance with the Purchaser's Documents.

4.6.5.3 Abandoned service connections. Service connections that are not to be replaced or reinstated shall be abandoned in accordance with the Purchaser's Documents.

4.6.5.4 External reinstatement. Where internal reinstatement of water service connections is not possible due to factors beyond the constructor's control, the water services shall be reconnected by excavating the existing service and reconnecting the service to the rehabilitated main as recommended by the CIPP manufacturer's procedures for external reinstatement.

4.6.6 End and service seals.

4.6.6.1 Seals. CIPP terminations shall conform fully to the host pipe and be neat and free of obstructions to form a seal or bond between the CIPP and the host pipe to meet the hydrostatic and leakage requirements in Sec. 5.4.2.1, Hydrostatic integrity of the CIPP. The sealing process shall use materials and processes compatible with the CIPP technology selected and shall comply with applicable requirements of NSF/ANSI/CAN 61 as indicated by a current listing of the product by an ANSI accredited certification or testing agency or by a testing agency approved by the purchaser. Fittings or materials used to seal CIPP terminations shall be in accordance with the CIPP manufacturer's recommendations and guidance provided within the AWWA Committee Report "*Structural Classifications of Pressure Pipe Linings—Suggested Protocol for Product Classification.*"

4.6.6.2 Mechanical fitting. Reinstated service connections using a mechanical fitting shall be sealed by bonding of the CIPP surrounding the opening of the service within the main or by compression. The resulting seal shall meet the hydrostatic and leakage requirements in Sec. 5.4.2.3, Service reinstatements, fittings, and CIPP terminations.

Sec. 4.7 Final Inspection

After completion of all rehabilitation work and before returning the pipeline to service, a pipe cleaning and recorded video inspection of the full length of the pipeline section shall be made. Refer to Sec. 5.3, Visual and CCTV Inspection.

The inside wall of the access point at each end of the pipeline section shall be clearly visible on the inspection video.

The CCTV video will be used to confirm:

- Fit and finish (e.g., CIPP sized correctly).
- The CIPP is continuous over the entire length of the pipeline section.
- The CIPP is free from visual defects such as sags, tears, major wrinkles, bubbles, blisters, out-of-roundness, foreign inclusions, lifts, pinholes, delaminations, disbonding, bumps, fiber reinforcement material defects, or other anomalies.

- The CIPP shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the rehabilitated pipe, including leakage between the host pipe and the CIPP.
- Tight fit of the CIPP to the internal circumference of the host pipe and around service connections.
- CIPP fully cured with no dry or soft spots.
- Full reinstatement of service connections (visual integrity of service openings and seals).

Sec. 4.8 CIPP Maintenance and Repair

4.8.1 *Cleaning.* Cleaning and maintenance activities shall be performed in a manner that does not damage the installed CIPP or seals at the CIPP terminations and service connections. Low-pressure water cleaning, swabbing, non-abrasive foam pigs, or other water line cleaning methods that do not damage the CIPP may be used. Mechanical cleaning methods such as chain flails and drag scrapers, hard or abrasive pigs, or abrasive blasting systems shall not be used for the cleaning and maintenance of the CIPP.

4.8.2 *Defects and repairs.* If a CIPP failure or significant defect is discovered, repairs shall be performed in accordance with Sec. 5.5.5 under Basis for Rejection. Cutting or grinding of wrinkles and folds shall not be permitted. Failed CIPP may require specialized sectional pipe repairs to be installed via open-cut excavation methods. Customized fittings may be required to accomplish this to connect to the existing CIPP. If approved by the purchaser, full relining of the pipe segment or open-cut replacement may be explored if defects are severe.

Sec. 4.9 Return to Service

4.9.1 *Flushing of mains and services.* Once all service connections have been reinstated, the mains, services, and appurtenances shall be flushed to remove air, sediment, contaminants, and other foreign matter.

4.9.2 *Disinfection.* Disinfection shall be in accordance with Sec. 5.4.2.4, Disinfection and bacteriological testing.

4.9.3 *Re-commissioning service.* The return of water service following successful disinfection shall be executed in accordance with the Purchaser's Documents. This operation shall also include the decommissioning and removal of the temporary water supply only after service has been successfully and fully restored to all users.

SECTION 5: VERIFICATION

Sec. 5.1 Quality Assurance Requirements

The constructor shall have a written Quality Assurance Program in place to ensure that the installed CIPP products are in conformance with the manufacturer's requirements and Purchaser's Documents. The Quality Assurance Program shall include a formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives from material receipt through delivery, installation, controls, testing, and warranty.

Sec. 5.2 CIPP Sampling

The sampling plan shall include sufficient sample collection to determine all functional and mechanical properties identified in design or any supplementary Purchaser's Document requirements.

5.2.1 *Sample collection*. Prior to rehabilitation of each section of water main, provide the purchaser with a sampling plan intended to secure samples to be tested to verify that the installation meets the design objectives stated in the Purchaser's Documents or any specific sampling requirements identified in the Purchaser's Documents. Sample types may include the following.

5.2.1.1 Host pipe samples. Samples lined through a section of host pipe water main and then cut out with the host pipe, either at the termination points of the installation or other opportunistic closure locations that are cut out by design or required to be cut out due to installation logistics (e.g., bends or other fittings or appurtenances that were lined through for convenience but are intended to be replaced). While host pipe samples may yield valuable verification data, the procurement of samples of this nature should only be undertaken with due consideration of the risk of adding additional CIPP terminations. CIPP terminations by their nature are inherently more complex and add not only to the cost but increase the risk of leakage. Therefore, the practice of randomly cutting out host pipe samples is not recommended.

5.2.1.2 Confined pipe samples. Confined pipe samples are cut from a section of cured CIPP at the termination point that has been installed through a similar diameter pipe. This is typically used for pipes 18 in. (460 mm) in diameter and less.

5.2.1.3 Fabricated samples. Samples fabricated from material taken from the resin-impregnated textile tube used and cured in a clamped mold placed in

the curing medium during CIPP installation. This is typically used for pipe sizes greater than 18 in. (460 mm) in diameter, areas with limited access, or for CIPP constructed with oriented continuous or discontinuous fiber reinforcement.

5.2.1.4 Other. Other sampling techniques identified in the Purchaser's Documents.

5.2.2 *Field sample preparation and marking.*

5.2.2.1 Sample marking. All samples shall be clearly marked to delineate the type of sample collected as per Sec. 5.2.1, the specific location that the sample was retrieved from, the time and date that the sample was secured, the Purchaser's Documents specific references, and any supplementary marking requirements identified in the Purchaser's Documents.

5.2.2.2 Reinforced samples. Where the CIPP is reinforced with oriented continuous or discontinuous fibers to enhance the mechanical properties of the CIPP, specimens shall be clearly marked to identify the axial and hoop directions of the fiber reinforcement or any other relevant fiber reinforcement features.

5.2.2.3 Sample size. Sample size and its means of procurement shall match the specific requirements of the test and/or testing requirements to be carried out on the sample.

Sec. 5.3 Visual and CCTV Inspection

The constructor must complete and record a digital, color video of the full diameter and axial length of the CIPP with sufficient resolution and lighting to assess the fit and finish of the installation. The finished CIPP shall be continuous over the entire length, exhibit a close fit with the host pipe, be properly connected at all service connections, and be free of dry spots, lifts, disbonding, or delamination. Proper connection criteria for service connections shall be stipulated by the purchaser and shall vary based on the means of connection (e.g., mechanical connections versus localized bonding).

Some CIPP systems inherently have folds included in their design and/or at bends and/or at irregularities in the existing pipeline. Folding can also occur, at local reductions of diameter. Such folding has potential impacts on both hydraulic and structural performance of CIPP designed for pressure applications.

Under no conditions shall the folds reduce the structural capacity of the CIPP to less than the design objectives. For hydraulic performance, the CIPP should not introduce surface irregularities, in addition to those of the existing pipeline, which exceed the greater of 2 percent of the nominal diameter or 0.25 in. (6 mm) as referenced in ISO 11297-4. This requirement can be changed when noted in

the Purchaser's Documents and/or where the CIPP rehabilitated pipe will meet hydraulic performance requirements.

Sec. 5.4 Testing of the Installed CIPP

The purchaser, constructor, or other party as stipulated within the Purchaser's Documents shall complete testing to verify that the CIPP meets all the design requirements specified for the installation by the purchaser and the specific design requirements for the CIPP product used. Material and product testing requirements may vary based on the product used and the specific structural or other technical objectives for the installation (e.g., the structural classification of the CIPP). The Purchaser's Documents shall clearly state the specific tests to be carried out to verify compliance and the frequency for each test to be carried out for the project.

5.4.1 *Material and installed product properties testing.*

5.4.1.1 Testing laboratory. The materials and properties testing should be performed in an ISO 17025 accredited testing facility that shall be experienced in the testing of the specific types of materials and test methods specified. The results shall be submitted to the purchaser for review and approval.

5.4.1.2 Mechanical properties.

5.4.1.2.1 Flexural properties. Carry out flexural modulus and flexural strength tests in accordance with ASTM D790 and/or ISO 11296-4, Annex B. Sample size shall be sufficient to secure the recommended five specimens for testing. A minimum of three specimens shall be allowed where five suitable specimens cannot be obtained from the sample. For anisotropic materials, flexural properties shall be obtained in the hoop and axial directions to confirm overall behavior of the CIPP. When suitable specimens for testing in both the hoop and axial directions cannot be obtained from the sample, flexural properties shall be obtained in the hoop direction as a minimum.

NOTE: ISO 11296-4 does not define flexural strength in the same manner as ASTM D790. To derive the comparable property when using ISO 11296-4, measure flexural strength in accordance with the Annex B ISO 178 procedure until rupture occurs or until a maximum strain of 5 percent is reached, whichever occurs first.

5.4.1.2.2 Tensile strength – Method 1. Carry out tests in accordance with ASTM D638 using Type I specimens when the CIPP includes a fiber reinforcement. Sample size shall be sufficient to secure the recommended five specimens for testing. A minimum of three specimens shall be allowed where five

suitable specimens cannot be obtained from the sample. For anisotropic materials, tensile properties shall be obtained in the hoop and axial directions to confirm overall behavior of the CIPP. When suitable specimens for testing in both the hoop and axial directions cannot be obtained from the sample, tensile properties shall be obtained in the hoop direction as a minimum.

5.4.1.2.3 Tensile strength – Method 2. Carry out tests in accordance with ASTM D3039. Sample size shall be sufficient to secure the recommended five specimens for testing. A minimum of three specimens shall be allowed where five suitable specimens cannot be obtained from the sample. For anisotropic materials, tensile properties shall be obtained in the hoop and axial directions to confirm overall behavior of the CIPP. When suitable specimens for testing in both the hoop and axial directions cannot be obtained from the sample, tensile properties shall be obtained in the hoop direction as a minimum.

5.4.1.2.4 Tensile strength – Method 3. Determine the apparent hoop strength of the installed CIPP system by carrying out a test in accordance with ASTM D2290. Use Procedure A for testing when the CIPP includes a fiber reinforcement. Where the test is being conducted to assess the impact of folds, stitches, seams, or other aspects of the CIPP system that could compromise the performance of the overall system, align the sample to facilitate understanding the apparent in-place hoop strength of the overall system.

5.4.1.2.5 Adhesion testing. Where adhesion to the host pipe is required by design, adhesion testing may be required to verify design intent. Where designated by the purchaser, secure samples of the specified type and conduct adhesion tests in accordance with ASTM D4541 where the substrate is a metal surface or ASTM D7234 where the substrate is a concrete surface.

5.4.1.3 Wall thickness testing. Determine the installed CIPP wall thickness from a host pipe or confined pipe sample type (as identified in Sec. 5.2.1) in a manner consistent with Sec. 8.1.2 of ASTM D5813. Thickness measurements should be made in accordance with ASTM D3567 for samples collected in accordance with Sec. 5.2.1. Make a minimum of eight measurements at evenly spaced intervals around the circumference of the pipe to ensure that minimum and maximum thicknesses have been determined. Deduct from the measured values the thickness of any plastic coatings or CIPP layers not included in the structural design of the CIPP. The average thickness shall be calculated using all measured values and shall meet or exceed the minimum specified design thickness. The minimum thickness at any point shall not be less than 87.5 percent of the specified design thickness.

5.4.2 *Hydrostatic pressure and leakage testing.* After CCTV inspection and all restoration from sample procurement have been completed, perform a hydrostatic pressure and leakage test on the rehabilitated water main. Test the CIPP on a section-by-section basis prior to reinstatement of service connections.

5.4.2.1 Hydrostatic integrity of the CIPP. The CIPP shall be cooled down to the ambient ground temperature that existed before the CIPP installation prior to proceeding with the pressure and leakage test.

5.4.2.1.1 The test section shall be subjected to the hydrostatic pressure and leakage test specified in the Purchaser's Documents. If no pressure is identified, conduct the test at the lesser of two times the specified operating pressure (exclusive of short-term overpressure) or at the specified operating pressure plus 50 psi.

5.4.2.1.2 The pressure and hydrostatic leakage test shall be conducted after placement of all end seals, but before the reinstatement of service connections and corporation stops to avoid the testing of other associated piping not installed under the Purchaser's Documents. When sections of rehabilitated piping are reconnected with new spool pieces, ensure that all connections are watertight during the pressure test.

5.4.2.1.3 The pipe section to be tested shall be isolated with blind flanges or other appropriate methods rated for the required test pressure. Means for air relief and filling the test section with water shall be provided. The line tested shall be configured such that any true leakage from the ends and branch lines can be visually monitored and recorded.

5.4.2.1.4 The ends, termination points, elbows, etc., that are exposed shall be adequately braced, blocked, and supported against the specified test pressure for the duration of the test.

5.4.2.1.5 The test section shall be filled slowly from an approved potable water source. All air shall be expelled from the pipeline during filling. When filling the pipeline with water, all air release valves and the high elevation end of the pipeline shall be opened, until a free flow of water is visible, to release all air from the pipeline to be tested. Ensure the rate of filling does not significantly pressurize the pipeline prematurely. If this technique for expelling air is not sufficient, an alternative is to push a high-density foam pig through the line with the fill water behind it. This is done after each end of the test section is sealed off, so the pig remains in the pipe during the pressure test. When the pipe is full and the pig reaches the far end of the test section, the air in front of the pig is bled off through a relief valve in the blind flange or pressure plug at the termination end.

5.4.2.1.6 Once the pipe is filled, the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the purchaser. The test pressure shall be applied in steps at intervals of 50 psi or one-half of the test pressure, whichever is less, until the required test pressure is reached. The pressure shall be held at each step for a minimum of five minutes.

5.4.2.1.7 A minimum stabilization period of two to three hours is recommended, but not required, before starting the pressure test. During this stabilization period, the test pressure shall be maintained within close proximity of the required test pressure.

> *NOTE: A small annular gap may exist in some locations between the CIPP wall and the existing pipe. During the stabilization period, the CIPP will expand until equilibrium with the host pipe is reached. In addition, some entrapped air may still exist in the pipe and the mean water temperature may fluctuate. These effects can cause erroneous leakage readings if the pressure test is run during this period. Therefore, the required stabilization period may be considerably longer than typically expected for new pipe installations. Decreasing volume of make-up water added during the stabilization period indicates that at least one of these effects is present and is gradually being counteracted.*

5.4.2.1.8 Bleed off any air at the ends of the test section prior to beginning the test. Begin the test at the required test pressure and after a minimum one-hour test period, the amount of make-up water needed to return to the required pressure shall be quantified.

5.4.2.2 Allowable leakage for acceptance. Note any allowance for leakage is for *apparent leakage* due to the effects of entrapped air and other limitations of the hydrostatic leakage test. Any visible signs of leakage from the CIPP or the end terminations shall be cause for rejection and the defects shall be remedied. Where no visible leakage is present, the line shall be accepted if the quantified make-up water for the one-hour test does not exceed 20 gallons per inch-diameter, per mile of pipe, per 24-h day (20 GPDIM). The quantified make-up water for the one-hour test shall be extrapolated to the 24-h rate for comparison purposes. If the make-up water allowance at the test pressure exceeds the allowable, it shall be considered as leakage and the source shall be determined and remedied in a manner acceptable to the purchaser. If any actual leaks are found and repaired, the hydrostatic pressure

and leakage test should be repeated until no actual leaks remain and the allowable apparent leakage is below the guidelines herein.

5.4.2.3 Service reinstatements, fittings, and CIPP terminations. Demonstrate that there are no leaks at service reinstatements and fittings and that CIPP terminations are watertight for the specific project requirements by providing relevant type and/or acceptance testing for the methods used or by other means specified in the Purchaser's Documents or satisfactory to the purchaser.

5.4.2.4 Disinfection and bacteriological testing. Prior to placing the rehabilitated system into service for potable water, the rehabilitated system and all exposed sections of any other pipe and appurtenances of existing pipelines shall be cleaned, disinfected, and verified through bacteriological testing in accordance with ANSI/AWWA C651, unless otherwise specified in the Purchaser's Documents or approved by the purchaser. Pipelines shall be flushed following completion of disinfection procedures. Disposal or neutralization of disinfection water shall comply with applicable regulations and the requirements of ANSI/AWWA C655.

Sec. 5.5 Basis for Rejection

5.5.1 *Visual defects.* Any visual defects that are present in the CIPP that are at variance with Sec. 5.3 or the supplementary requirements of the Purchaser's Documents shall be grounds for rejection. Any methods used to remedy visual defects shall not compromise the structural integrity objectives nor water tightness requirements for the installation.

5.5.2 *Testing results.* Any testing results from the tests carried out under Sec. 5.4 that do not meet the design requirements or the Purchaser's Documents stipulated values or that otherwise illustrate the inability of the overall installation to meet the purchaser‘s stipulated design objectives shall be grounds for rejection.

5.5.3 *Design reconciliation test results.* Note that CIPP inherently has a potential for variances in surface geometry due to folds in the CIPP or other anomalies in the host pipe and mechanical property variance. In instances where no visual deviations are noted and all installed CIPP properties meet or exceed design values, the installations shall not require a Design Reconciliation.

However, in instances where deviations are in excess of the stated minimum values or some of the installed properties are less than the design values based on Sec. 5.4 testing, a Design Reconciliation can often resolve minor deviations with the Purchaser's Documents and can be used to confirm that the installed CIPP still meets the overall design intent despite the presence of variances. A Design

Reconciliation shall be carried out by a party acceptable to the purchaser and shall include the following:

5.5.3.1 Post-construction design review. Perform a post-construction design review to ensure that the completed CIPP meets all design requirements in the Purchaser's Documents. The design review shall use the measured values for the installed product and CIPP thickness from the testing to confirm that the overall variances balance out in terms of obtaining the necessary equivalent structural resistance for the installation. CIPP strength values need to be further reduced to account for time-dependent properties and properties derived from interaction with the host pipe (e.g., close fit) need to be confirmed by acceptable visual classification criteria.

5.5.3.2 Visual defects. Visual defects such as excessive folds or pleats may also be able to be resolved as to meeting structural objectives for the application based on supplemental testing.

5.5.4 *Additional measures*. All additional measures to confirm that a CIPP deemed as structurally deficient will comply with all stipulated design life requirements shall be carried out by the constructor in a manner acceptable to the purchaser or as specifically identified for remedy in the Purchaser's Documents.

5.5.5 *Remediation*. Where the post-construction Design Reconciliation cannot resolve the deficiencies, the constructor shall remediate the CIPP in a manner acceptable to the purchaser or as specifically identified for remedy in the Purchaser's Documents.

Sec. 5.6 Quality Assurance Documentation

Provide the purchaser Quality Assurance Documentation as follows:

5.6.1 *Type testing results*. Where requested by the purchaser, provide test results that served as the basis for the design, including: sustained long-term pressure, short-term over-pressure, testing to support that the service connection reinstatement and end seal methods meet the water tightness requirements of the purchaser, and any other type testing results stipulated in the Purchaser's Documents.

5.6.2 *Resin impregnation records*. Where requested by the purchaser, provide records for each CIPP installation to confirm textile tube impregnation in accordance with ASTM F2994, F2019, or F1216 and resin impregnation records including volume of resin intended to be used and actually installed, roller gap or other settings to control wall thickness, resin components used, and the time, location, and duration of the impregnation.

5.6.3 *Resin-impregnated tube storage and transport.* Where requested by the purchaser, provide records for each resin-impregnated tube on the means employed to store and transport (if applicable) from the impregnation facility to the job site.

5.6.4 *Cure records.* Where requested by the purchaser, provide records for each CIPP installation on the proposed cure method and the actual cure records for the installation, including records of the cool down of the CIPP to the minimum temperature required to terminate the cure process.

5.6.5 *Field records.* Where requested by the purchaser, provide records for each CIPP section for all visual and field testing identified in Sec. 5.3 and Sec. 5.4, including all completed CCTV records, all field records, and records of any Design Reconciliations required to be carried out.

SECTION 6: DELIVERY

Sec. 6.1 Handling, Storage, and Delivery

6.1.1 *Marking and handling requirements.*

6.1.1.1 Textile tube. Care must be taken to properly protect the textile tube during handling. At the time of shipment from the manufacturer, packaging shall be clearly marked with the following information:

1) Manufacturer's information that enables identification of the textile tube structure and CIPP product to be produced.
2) Project name, purchaser name, and other purchaser required information.
3) Product name and lot number.
4) Compliance with NSF/ANSI/CAN Standard 61 as a component of the CIPP.
5) Dimensions including the nominal outside diameter and nominal CIPP wall thickness.
6) Manufacturer's safety, transportation, and storage requirements.

6.1.1.2 Resin. Care must be taken to properly protect resin components during handling. At the time of shipment from the manufacturer, resin component packaging shall be clearly marked with the following information:

1) Manufacturer's information that enables identification of resin components, required mix ratio, and CIPP product to be produced.
2) Product name and batch number.

3) Compliance with NSF/ANSI/CAN Standard 61 as a component of the CIPP.

4) Manufacturer's safety, transportation, and storage requirements.

6.1.2 *Material inspection upon delivery.* Upon delivery to the installation site, textile tube and resin components shall be inspected by constructor for complete marking and required information in accordance with Sec. 6.1.1.

6.1.3 *Storage requirements.*

6.1.3.1 Textile tube. Storage of the textile tube shall be in accordance with product labels, safety data sheets (SDS), and federal, state, provincial, territorial, and local regulations.

6.1.3.2 Resin. Storage of resin components shall be in accordance with product labels, SDS, and federal, state, provincial, territorial, and local regulations.

Sec. 6.2 Affidavit of Compliance

The purchaser may require the constructor to provide an affidavit of compliance or material test reports stating that the materials used comply with the requirements of this standard.

ARTICLE XXII - TRAFFIC CONTROL

22.1 GENERAL

In general, the applicable provisions of Section 645 – Work Zone Traffic Control of the "Standard Specifications" shall apply except as hereinafter modified:

(A) The Contractor shall submit a detailed Traffic Control Plan to the Construction Engineer for approval at least 15 days before work on that phase commences. All items as specified in Section 645.03 shall be provided. Additional items shall include the location and installation of gate(s) in the container yard fencing for construction access, and the location and marking of all barriers and temporary fencing for the Construction Storage and Staging area.

(B) Traffic Plates. Skid resistant plates shall be used. Plates shall be rated and secured to permit the safe passage of all container yard traffic under maximum load conditions, including top pick and Fantuzzi carriers, forklifts, and semi-trailers.

(C) The Contractor shall remove all concrete barriers, temporary signs, temporary striping, and all other Contractor-owned temporary traffic control devices off of the State Department of Transportation, Harbors Division's property after construction is complete.

22.2 PAYMENT

Traffic controls, including traffic control plan, phasing, materials, tools, labor, and incidentals to complete the work will not be measured or paid for separately, but shall be considered incidental to the various items of work in the Proposal Schedule.

END OF ARTICLE

ARTICLE XXIII – REINFORCED CONCRETE

23.1 GENERAL

This Article shall serve as an addendum to the Hawaii Department of Transportation standard specifications 2005 Edition. The work consists of furnishing equipment, materials, labor, appliances and performing all work in connection with forming, installation, finishing, and curing necessary for the job, including waterstops and waterproofing in accordance with this Article of the specifications and the standard specifications, Sections 503, 601, 602, 705.06 and 705.07.

23.2 DESCRIPTION

(A) Reinforced concrete drainage and sewer structures

(B) Installation of waterstops as required

(C) Providing and installing exterior waterproofing on below-grade surfaces where specified

23.3 FORMS

(A) Forms shall conform to the requirements in Section 503.03(C) of the standard specifications.

(B) Removal of light pole pedestal forms shall not occur until a minimum of 24 hours after the concrete was finished or the concrete has achieved adequate strength as to not be damaged during form removal, whichever is longer.

(C) For concrete structures form removal time shall be as indicated in Section 503.03(D) and Table 503.03-1.

23.4 REINFORCING STEEL

(A) Reinforcing steel materials shall conform to Section 602.01 of the standard specifications, ASTM A615, grade 60.

(B) Reinforcing steel fabrication, placement and quality control measures shall be in accordance with the applicable items specified in Section 602 of the standard specifications.

(C) Shop drawings that detail fabrication, bending, and placement shall be submitted for review. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

23.5 CONCRETE

(A) Materials for concrete, concrete mix requirements and quality control shall be as stated in Section 601 of the standard specifications.

(B) Concrete for structures and foundations shall have the following minimum 28 day compressive strengths:

1. Drainage .....,000 psi

Maximum size aggregate in mix design shall be in accordance with standard specifications, Section 601.03(B).

(C) Mix design requirements for other strength concrete shall be in accordance with Table 601.03-1 of the standard specifications. The mix design for each strength of concrete shall be submitted to the Engineer for review prior to pouring.

(D) Contractor shall submit a plan showing location of all construction and expansion joints. Location of construction joints is subject to approval of the Engineer.

23.6 WATERSTOPS

(A) Waterstop shall be polyvinyl chloride (PVC).

Certificate of Compliance shall be submitted by the Contractor before installation to show that waterstop proposed for use conforms to the contract requirements and test results.

(B) PVC waterstop shall conform to Corps of Engineers' Specification No. CRD-C572

(C) Field splice for PVC waterstop shall be made by heat-sealing adjacent surfaces in accordance with manufacturer's recommendations. Thermostatically controlled electric source of heat shall be used to make splices. Apply only enough heat to melt plastic.

(D) Waterstops shall be installed at the locations shown to form a continuous fluid-tight diaphragm. Adequate provision shall be made to support and completely protect the waterstops during the progress of the work. Exposed waterstops shall be protected during application of form release agents to avoid being coated. Suitable guards shall be provided to protect exposed projecting edges and ends of partially embedded waterstops from damage when concrete placement has been discontinued. Splices shall be made by certified, trained personnel using approved equipment and procedures.

(E) Follow manufacturer's recommendations for preparation and installation of waterstops.

23.7 WATERPROOFING

(A) Materials for waterproofing system consisting of asphalt primer, hot asphalt and fabric shall conform to subsection 705.06 of the Standard Specifications.

(B) Exterior waterproofing shall be installed on vertical and horizontal surfaces of below-grade structures where specified and like-surfaces as those specified.

(D) Prepare surface and install waterproofing system as specified in subsection 503.03(H) of the Standard Specifications.

23.8 CONCRETE PLACEMENT

(A) Verify all embedded items are properly located and secured in place prior to beginning concrete placement.

(B) Concrete shall be placed in accordance with the applicable items specified in Section 503.03(F)(1) of the standard specifications.

(C) Concrete shall be place with the aid of closed chute or pipe from no higher than five (5) feet. Aluminum chutes, tremies, troughs and pipes are not permitted to be used to convey concrete.

(D) Consolidation of concrete shall be as specified in Section 503.03(G)(2)(f) of the standard specifications. Special care to properly consolidate concrete around embedded waterstops shall be taken to avoid voids.

(E) The concrete shall be protected from injurious action as required in Section 503.03(K) of the standard specifications.

23.9 CURING OF CONCRETE

(A) The curing of the concrete shall be in accordance with Section 503.03(L) of the standard specifications.

(B) All drainage structures shall be cured by the water method only.

(C) The site work concrete shall be cured by the water curing method only.

(D) Concrete shall be cured for a period of time as specified in Section 503.03(K) of the standard specifications.

23.10 CONCRETE FINISH

(A) Concrete finish work in general shall conform to Section 503.03(M) of the standard specifications.

(B) The concrete finish for surface of pedestal shall be a Class 2 rubbed finish as described in Section 503.03(M)(2) of the standard specifications.

(C) The exposed surface of concrete drainage structures shall have a light broom finish with a Class 6 Float Finish as described in Section 503.03(M)(3)(b) of the standard specifications for sidewalks and median strips. The interior of the structures shall be provide with a Class 2 Rubbed finish [Section 503.03(M)(2)] and the below grade exterior surfaces shall be provided with a Class 1 Ordinary Surface Finish as described in Section 503.03(M)(1) of the standard specifications.

23.11 INSPECTION

(A) Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports

23.12 MEASUREMENT AND PAYMENT

Reinforced concrete and the related work described in the article will not be measured or paid for separately, but will be compensated as part of the bid items specified in Article X of these specifications of which it is a part.

END OF ARTICLE

ARTICLE XXIV - PRIME COAT

24.1 DESCRIPTION

This work includes the furnishing and application of prime coat for asphalt concrete pavements.

24.2 SPECIAL REQUIREMENTS

(A) In general, the provisions of Section 404 – Slurry Seal and Section 702.04 – Emulsified Asphalt (Type SS-1h, CSS-1h) of the "Standard Specifications" shall apply except as hereinafter modified:

(1) 404.04 Method of Measurement and 404.05 Basis of Payment are deleted.

24.3 MATERIALS

Emulsified asphalt shall be SS-1h.

24.4 MEASUREMENT AND PAYMENT

(A) Prime coat will not be paid for separately, but will be considered incidental to the asphalt concrete pavement items in the Proposal Schedule.

END OF ARTICLE

ARTICLE XXV - TACK COAT

25.1 DESCRIPTION

This work includes the furnishing and application of tack coat for asphalt concrete pavements.

25.2 SPECIAL REQUIREMENTS

(A) In general, the provisions of Section 407 - Tack Coat of the "Standard Specifications" shall apply except as hereinafter modified:

(1) 407.04 Method of Measurement and 407.05 Basis of Payment are deleted.

25.3 MEASUREMENT AND PAYMENT

(A) Tack coat will not be paid for separately, but will be considered incidental to the Asphalt Concrete Pavement items in the Proposal Schedule.

END OF ARTICLE

ARTICLE XXVI – TEMPORARY WATER POLLUTION, DUST, AND EROSION CONTROL

26.1 DESCRIPTION

This section is required for all work, including the Contractor's storage sites. It describes the following:

(A) A detailed Storm Water Pollution Prevention Plan (SWPPP) required by a National Pollutant Discharge Elimination System (NPDES) Appendix C General Permit from the State of Hawaii Department of Health (HDOH) and prepared according to Section 7 of Hawaii Administrative Rules (HAR) Chapter 11-55, Appendix C, will satisfy this requirement.

(B) Compliance with applicable federal and other state permit conditions.

(C) Work associated with dewatering and hydrotesting activities and compliance with conditions of the NPDES general permit coverage authorizing discharges associated with construction activity dewatering and hydrotesting.

26.2 GENERAL REQUIREMENTS

In order to provide for the control of temporary water pollution, dust, and erosion arising from the construction activities of the Contractor and his subcontractors in the performance of this contract, the work performed shall comply with all applicable federal, state, and local laws and regulations concerning water pollution control including, but not limited to, the following regulations:

(A) State of Hawaii, HDOH, HAR Chapter 11-54 – Water Quality Standards and Chapter 11-55 – Water Pollution Control.

(B) 40 CFR Part 110, Environmental Protection Agency (EPA), Discharge of Oil.

(C) 40 CFR Part 117, EPA, Determination of Reportable Quantities for Hazardous Substances.

(D) 40 CFR Part 261, EPA, Identification and Listing of Hazardous Waste.

(E) 40 CFR Part 302, EPA, Designation, Reportable Quantities, and Notification.

(F) 49 CFR Part 171, U.S. Department of Transportation, Hazardous Materials Regulations.

26.3 MATERIALS

Materials shall conform to the following when applicable:

(A) Grass and Hydromulch. Grass and/or hydromulch shall be provided in accordance with Section 209 – Temporary Water Pollution, Dust, and Erosion Control of the "Standard Specifications."

(B) Fertilizer and Soil Conditioners. Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Construction Engineer.

(C) Silt Fences. Silt fences shall be synthetic filter fabric mounted on posts and embedded in compacted ground in compliance with American Society for Testing and Materials (ASTM) D6462-03, Standard Practice for Silt Fence Installation.

(D) Inlet Protection. May be constructed of sandbags or other materials acceptable to the Engineer.

(E) Alternate materials or methods to control, prevent, remove, and dispose of pollution are allowable if acceptable to the Construction Engineer.

26.4 CONSTRUCTION

(A) Preconstruction Requirements

(1) Temporary Water Pollution, Dust, and Erosion Control Meeting. The contractor shall be required to submit a SWPPP to the Construction Engineer and address all comments by the Construction Engineer. After the SWPPP is accepted in writing by the Construction Engineer, the Contractor shall schedule a meeting with the Construction Engineer before the start of construction work to discuss the sequence of work, and plans and proposals for water pollution, dust, and erosion control.

(2) Temporary Water Pollution, Dust, and Erosion Control Submittals. The Contractor shall submit the SWPPP to the Construction Engineer prior to the start of work for review of compliance with this Article.

(a) The following information shall be described in the SWPPP as specified in Section 7 of HAR 11-55, Appendix C, at a minimum:

1. Storm water team (by name or position), which is responsible for the development of the SWPPP, any later modifications to it, and for compliance with the

requirements in the NPDES permit. The SWPPP must identify the personnel that are part of the storm water team as well as their individual responsibilities.

2. Nature of construction activities including the size of the project site (in acres) and the total area expected to be disturbed by the construction activities (in acres), construction support activity areas covered by permit, and the maximum area expected to be disturbed at any one time.

3. Emergency-related projects in response to a public emergency (e.g., natural disaster, extreme flooding conditions). If this applies to the project, documentation of the cause of the public emergency, information substantiating its occurrence, and a description of the construction necessary to re-establish affected public services shall be included in the SWPPP. The proclamation of a civil defense emergency or similar proclamation is required to be from the President of the United States or State Governor.

4. Identification of other site contractors (e.g., sub-contractors) who will be engaged in construction activities at the site, and the areas of the site over which each contractor has control. If this piece of information is not available at the time the SWPPP is submitted, the plan must be amended to include the information prior to the start of construction activities.

5. Sequence and estimated dates of construction activities including a schedule of the estimated start dates and the duration of the following activities, according to Section 7.2.5 of HAR 11-55, Appendix C:

    a. Installation of storm water control measures.

    b. Commencement and duration of earth-disturbing activities.

    c. Cessation, temporarily or permanently, of construction activities on-site, or in designated portions of the project site.

d. Final or temporary stabilization of areas of exposed soil.

e. Removal of temporary storm water conveyances/ channels and other storm water control measures, removal of construction equipment and vehicles, and cessation of any pollution-generating activities.

6. Site map or series of maps, showing the following features of the project, according to Section 7.2.6 of HAR 11-55, Appendix C:

a. Boundaries of the property and the locations where construction activities will occur, including:

i. Locations where earth-disturbing activities will occur (noting any sequencing of construction activities);

ii. Approximate slopes and drainage patterns with flow arrows before and after construction;

iii. Locations where sediment, soil, or other construction materials will be stockpiled;

iv. Locations of any contaminated soil or contaminated soil stockpiles;

v. Locations of any crossings of state waters;

vi. Designated points on the site where vehicle will exit onto paved roads;

vii. Locations of structures and other impervious surfaces upon completion of construction; and

viii. Locations of construction support activity areas covered by the permit.

b. Locations of all state waters, including wetlands and indicate which water bodies are listed as impaired.

c. The boundary lines of any natural buffers.

d. Topography of the site, existing vegetative cover, and features (e.g., forest, pasture, pavement, structures), and drainage pattern(s) of storm water onto, over, and from the site property before and after construction.

e. Storm water discharge locations, including locations of any storm drain inlets on-site and in the immediate vicinity of the site to receive storm water runoff from the project; and locations where storm water will be discharging to state waters (including wetlands).

f. Locations of all potential pollutant-generating activities.

g. Locations of storm water control measures; and

h. Locations where chemicals will be used and stored.

7. Construction site pollutants generated by on-site activities. For each pollutant-generating activity, an inventory of pollutants or pollutant constituents (e.g., sediment, fertilizers and/or pesticides, paints, solvents, fuels) associated with that activity, which could be exposed to rainfall and could be discharged from the construction site (include potential spills and leaks).

   A list of all materials and heavy equipment to be used during construction. Vehicles and equipment shall be well maintained and free from any type of fluid leaks.

8. Sources of non-storm water, including, but not limited to, the design, installation, and maintenance of the control measures to prevent its discharge.

9. Buffer documentation. When a State water is located within 50 feet of the project's earth disturbances, the Contractor shall describe which compliance alternative has been selected for the site, and comply with Section 5.1.2.1 of HAR 11-55, Appendix C.

10. Description of storm water control measures to be used during construction activity including information on:

    a. Storm water control measures to be used during construction activity meet the requirements of Section 5 of HAR 11-55, Appendix C.

        i. Information on the type of storm water control measure to be installed and maintained, including design information;

        ii. What specific sediment controls will be installed and made operational prior to conducting earth-disturbing activities in any given portion of the site to meet the requirement of Section 5.1.2.2.1 of HAR 11-55, Appendix C.

        iii. If contaminated soil exists on-site, the control measures to either prevent the contact of storm water with the contaminated soil, including any contaminated soil stockpiles, or prevent the discharge of any storm water runoff which has contacted contaminated soil or any contaminated soil stockpiles;

        iv. For exit points on the site, document stabilization techniques to be used and any additional controls that are planned to remove sediment prior to vehicle exit.

        v. For linear projects, document the location where the use of perimeter controls in portions of the site is impracticable and the reason why (refer to Section 5.1.2.2.1 of HAR 11-55, Appendix C).

b. Stabilization practices including specific vegetative and/or non-vegetative practices. Document the circumstances preventing from meeting the deadlines specified in Section 5.2.1.1 and/or 5.2.1.2 of HAR 11-55, Appendix C.

c. Post-construction measures that will minimize the discharge of pollutants via storm water discharges after construction operations have been finished.

11. Pollution prevention procedures.

a. Spill prevention and response procedures, including:

i. Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or position of the employee(s) responsible for detection and response of spills or leaks;

ii. Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Parts 110, 117, or 302, occurs during a 24-hour period. Spill Contact information must be in location that is readily accessible and available.

b. Waste management procedures on handling and disposing of all wastes generated at the site, including, but not limited to, clearing and demolition debris, sediment removed from the site, construction and domestic waste, hazardous or toxic waste, and sanitary waste.

The Contractor is advised to procure regulated hazardous materials on an as-needed basis, as feasible. All excess regulated hazardous materials

at the conclusion of this project shall remain the property of the Contractor and shall be removed from HDOT Harbors Division property upon the completion of the project.

12. Procedures for inspection, maintenance, and corrective action to be followed for conducting site inspections, maintaining the storm water control measures, and, where necessary, taking corrective actions. Additionally, include following information in the SWPPP:

    a. Personnel responsible for conducting inspections;

    b. Inspection schedule. Contractor's Self-Inspections shall be conducted at applicable schedules listed below. Note that inspections are only required during the project's normal working hours.

        i. Inspection Frequency for sites discharging to impaired waters[1]. For any portion of the site that discharges to an impaired water, the inspection shall be conducted at the following intervals:

            (a) Once every seven (7) calendar days; and

            (b) Within 24 hours of the occurrence of the storm event of 0.25 inches or greater.

            (c) Daily during periods of a prolonged storm event of 0.25 inches or greater.

        ii. Inspection Frequency for sites NOT discharging to impaired waters. At a

[1] "Impaired waters" are waters identified as impaired on the State Clean Water Act Section 303(d) list, and waters with a State-established and EPA-approved Total Maximum Daily Load (TMDL). The construction site will be considered to discharge to an impaired water if the first State water to which the discharge enters is to a water on the section 303(d) list or one with a State established and EPA-approved TMDL. For a discharge that enters a storm water drainage system prior to discharge, the first State water to which discharge occurs is the water body that receives the storm water discharge from the storm water drainage system.

minimum, the inspection shall be conducted in accordance with one of the two schedules listed below:

(a) At least weekly; or

(b) Biweekly (once every 14 calendar days), and within 24 hours of the occurrence of a storm event of 0.25 inches or greater, daily during periods of a prolonged storm of 0.25 inches or greater, and within 24 hours after the end of the storm.

iii. Reductions in inspection frequency. For stabilized areas, the Contractor may reduce the frequency of inspections to monthly (once per month) in any area of the site where the stabilization steps have been completed as follows:

(a) For vegetative stabilization, all activities necessary to initially seed or plant the area to be stabilized; and/or

(b) For non-vegetative stabilization, the installation or application of all such non-vegetative measures.

c. Any inspection or maintenance checklists or other forms that will be used.

Contractor shall either keep a properly maintained rain gauge in a secure location to monitor rainfall at the project site, or obtain the storm event information from a weather station that is representative of the location. If a rain gauge is to be utilized to determine if a storm event of 0.25 inches or greater has occurred on the site, it must have a tolerance of at least 0.05 inches of rainfall, and an opening of at least 1-inch diameter. Install the rain gauge on the project site in an area that will not deter rainfall from entering the gauge opening. Maintain the rain gauge and

replace the gauge if stolen, it does not function properly or accurately, is worn out, or needs to be relocated. Do not begin fieldwork until the rain gauge is installed and the SWPPP is in place. For any day of rainfall during normal business hours that measures 0.25 inches or greater, the Contractor shall record the total rainfall measured for that day.

13. Staff training documentation that the required personnel were trained in accordance with Section 7.2.13 of HAR 11-55, Appendix C, to ensure that all activities on the site comply with the requirements of the issued permit. The list of major required personnel is as listed below:

    a. Personnel responsible for the design, installation, maintenance, and/or repair of storm water controls (including pollution prevention measures);

    b. Personnel responsible for the application and storage of chemicals (if applicable);

    c. Personnel responsible for conducting BMP inspections;

    d. Personnel responsible for taking corrective actions

    At a minimum, personnel must be trained to understand the following, if related to the scope of their job duties (e.g., only personnel responsible for conducting inspections need to understand how to conduct inspections):

    a. The location of all storm water controls on the site required by the issued permit, and how they are to be maintained;

    b. The proper procedures to follow with respect to the permit's pollution prevention requirements; and

    c. When and how to conduct inspections, record applicable findings, and take corrective actions.

    The Contractor is not required to provide or document formal training for subcontractor or other outside service

providers, but must ensure that such personnel understand any requirements of the permit that may be affected by the work they are subcontracted to perform. Detailed discussion is provided in Section 7.2.13.2 of HAR 11-55 Appendix C.

14. Documentation of compliance with Safe Drinking Water Act Underground Injection Control (UIC) requirements for certain subsurface storm water controls, if using any of the following storm water controls at the project site**:**

    a. Infiltration trench (if storm water is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system);

    b. Commercially manufactured precast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate storm water flow; and

    c. Drywells, seepage pits, or improved sinkholes (if storm water is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system).

15. Other information listed below.

    a. Contractor information (general and subcontractors) including legal name, street address, contact person’s name and position title, telephone number, and email address.

    b. Other state, federal, or county permits including:

        i. Copy of the drainage system owner’s approval allowing the discharge to enter their drainage system (if applicable);

        ii. Copy of the Department of the Army permit and Section 401 water quality certification (if applicable); and

iii. A list of other permits (if applicable).

16. Any other information as requested by the Director of HDOH and/or HDOT.

17. SWPPP certification. The owner or its duly authorized representative must certify, sign, and date the Plan in accordance with Section 15 of HAR 11-55, Appendix A.

(b) The Contractor shall keep the current SWPPP on-site or at an easily accessible location throughout the duration of the project. Revisions to the Plan shall be included with the original plan. Modify contract documents to conform to revisions. Include actual date of installation and removal of BMP. Obtain written acceptance by the Construction Engineer before revising SWPPP. Additionally, the planned modifications to the BMP meeting the conditions listed in Section 7.4.1 of HAR 11-55, Appendix C, shall be documented and updated in the SWPPP according to Section 7.4 of HAR-55 Appendix C. An updated Plan shall be kept on-site throughout the remainder duration of the project.

The Contractor shall follow guidelines in the "*The City and County of Honolulu Storm Water Best Management Practice Manual – Construction*," (dated November 2011) in developing, installing, and maintaining BMP for the project. Follow applicable CCH *Rules Relating to Water Quality on Erosion Sediment Control Plan and Post Construction Best Management Practices* for all projects at Honolulu, Kalaeloa Barbers Point, and Kahului Harbors, and use respective Soil Erosion Guidelines for other Maui, Kauai and Hawaii County projects. Information can be found at the respective County websites.

(B) Construction Requirements are as follows.

(1) No work shall be allowed to begin until submittals detailed in Subsection 32.4(A)(2) – Temporary Water Pollution, Dust, and Erosion Control Submittals are completed and accepted in writing by the Construction Engineer. The Contractor shall prevent pollutants from entering state waters. These efforts shall address areas such as those that drain to water, are over water, or drain to storm drains in the area of the project site. The Contractor shall design, operate, implement, and maintain the Plan to ensure that storm water discharges associated with construction

activities will not cause or contribute to a violation of applicable state water quality standards.

(2) Address all comments received from the Construction Engineer.

(3) Modify and resubmit plans and construction schedules to correct conditions that develop during construction which were unforeseen during the design and pre-construction stages.

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

(5) BMP shall be in place and operational until the construction is completed and accepted by Harbors.

(6) Install and maintain either or both stabilized construction entrances and wheel washes to minimize tracking of dirt and mud onto roadways. Restrict traffic to stabilized construction areas only. Clean dirt, mud, or other material tracked onto the road immediately. Modify stabilized construction entrances to prevent mud from being tracked onto roadways.

(7) Chemicals may be used as soil stabilizers for either or both erosion and dust control if acceptable to the Construction Engineer.

(8) Cover exposed surface of materials completely with tarpaulin or similar device when transporting aggregate, soil, excavated material or material that may be a source of fugitive dust.

(9) Cleanup and remove any pollutant that can be attributed to the Contractor.

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

(11) Properly maintain BMP. For projects that require an NPDES Appendix C General Permit from the HDOH, inspect, prepare a monthly compliance report, and make repairs to BMP on a timely basis. Maintain records of BMP inspections for the duration of the project. Submit copies of the inspection reports to the Construction Engineer upon request.

(12) Remove, replace or relocate any BMP that must be removed, replaced or relocated due to potential or actual flooding, or potential danger or damage to the project or public.

(13) The Contractor's designated representative specified in Subsection 32.4(A)(2)(a)1. shall address any BMP concerns brought up by the Construction Engineer within 24 hours of notification, including weekends and holidays. Should the Contractor fail to satisfactorily address these concerns, the Construction Engineer reserves the right to employ outside assistance or use the Construction Engineer's own labor forces to provide necessary corrective measures. The Construction Engineer will charge the Contractor such incurred costs plus any associated project engineering costs. The Construction Engineer will make appropriate deductions from the Contractor's monthly progress estimate. Failure to apply BMP shall result in either or both the establishment and increase in the amount of retainage due to unsatisfactory progress or withholding of monthly progress payment. Continued failure to apply BMP may result in one or more of the following: The Contractor being fully responsible for all additional costs incurred by HDOT Harbors Division including any fines levied by HDOH, suspension of the Contract, or cancellation of the Contract.

(14) The owner or its duly authorized representative shall be responsible for fulfilling the reporting requirements (e.g., state of construction activities, incident notification) according to Section 12 of HAR 11-55, Appendix C and submittal requirements (e.g., monthly compliance report, Notice of Cessation form) according to Section 13 of HAR 11-55, Appendix C.

(C) Hydrotesting Activities. If work includes removing, relocation or installing waterlines, and the Contractor elects to flush waterline or discharge hydrotesting effluent into state waters or drainage systems, obtain a Notice of General Permit Coverage (NGPC) authorizing discharges associated with hydrotesting waters from the HDOH Clean Water Branch (CWB). If a permit is required, prepare and submit permit application (CWB-Notice of Intent (NOI) Form F) to the HDOH CWB. All costs borne shall be the responsibility of the Contractor.

Do not begin hydrotesting activities until the HDOH CWB has issued a NGPC. Hydrotesting operations shall be in accordance with conditions in the NGPC. Submit a copy of the NPDES Hydrotesting Waters Application and Permit to the Construction Engineer.

If the Contractor elects to not obtain an NGPC for the discharge of hydrotesting effluent, then hydrotesting effluent may be disposed of via backtrenching. The

Contractor shall ensure that hydrotesting effluent is not discharged into State waters and/or drainage systems (State of Hawaii and City and County of Honolulu)

(D) Dewatering Activities. If excavation of backfilling operations requires dewatering, and the Contractor elects to discharge dewatering effluent into state waters or existing drainage systems, obtain an NGPC authorizing discharges associated with construction activity dewatering from the HDOH CWB. If a permit is required, prepare and submit permit application (CWB-NOI Form G) to the HDOH CWB. All costs borne shall be the responsibility of the Contractor.

Do not begin dewatering activities until the HDOH-CWB has issued an NGPC. Conduct dewatering operations in accordance with the conditions in the NGPC. Submit a copy of the NPDES Dewatering Application and Permit to the Construction Engineer.

If the Contractor elects to not obtain an NGPC for the discharge of dewatering effluent, then dewatering effluent may be disposed of via backtrenching. The Contractor shall ensure that dewatering effluent is not discharged into State waters and/or drainage systems (State of Hawaii and City and County of Honolulu) Dewatering effluent from within contaminated areas, as shown within the construction drawings, if disposed of by back-trenching, shall be infiltrated within contaminated areas shown within the construction drawings.

26.5 MEASUREMENT AND PAYMENT

Installation, maintenance, monitoring, and removal of the BMP will not be measured or paid for separately. The Contractor shall consider this work incidental to the various bid items in the Proposal Schedule.

The Contractor shall measure additional water pollution, dust, and erosion control as required and requested by the Construction Engineer. The Contractor shall consider this work incidental to the various bid items in the Proposal Schedule.

The Contractor shall reimburse the State within 30-days for the full amount of all outstanding costs incurred by the State for all citations or fines received as a result of the Contractor's non-compliance with regulations.

END OF ARTICLE

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

P R O P O S A L

PROPOSAL TO THE

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

PROJECT:	**FIRE PROTECTION SYSTEM REPAIRS, PIER 3, NAWILIWILI HARBOR, KAUAI, HAWAII**
JOB NO.:	**S70156**
COMPLETION TIME:	**All work for the project, FIRE PROTECTION SYSTEM REPAIRS, PIER S70156, shall be completed within 50 CALENDAR days from the date indicated in the Notice to Proceed (NTP) from the Department.**
LIQUIDATED DAMAGES:	**FIVE HUNDRED AND NO/100 DOLLARS ($500.00) for each and every calendar day which the Contractor has failed to complete the work or portions of the work on time.**
PROGRAM MANAGER:	MR. NIKO SALVADOR DEPARTMENT OF TRANSPORTATION HARBORS DIVISION HALE AWA KU MOKU BUILDING 79 S. NIMITZ HIGHWAY HONOLULU HI 96813 (808) 587-1862

Director of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Sir:

The undersigned bidder declares the following:

1. It has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this proposal.

2. It has not been assisted or represented on this matter by any individual who has, in a State capacity, been involved in the subject matter of this contract within the past two years.

3. It has not and will not, either directly or indirectly offered or given a gratuity (i.e. an entertainment or gift) to any State or County employee to obtain a contract or favorable treatment under a contract.

The undersigned bidder further agrees to the following:

1. If this proposal is accepted, it shall execute a contract with the Department to provide all necessary labor, machinery, tools, equipment, apparatus and any other means of construction, to do all the work and to furnish all the materials specified in the contract in the manner and within the time therein prescribed in the contract, and that it shall accept in full payment therefore the sum of the unit and/or lump sum prices as set forth in the attached proposal schedule for the actual quantities of work performed and materials furnished and furnish satisfactory security in accordance with Section 103D-324, Hawaii Revised Statutes, within 10 days after the award of the contract or within such time as the Director of Transportation may allow after the undersigned has received the contract documents for execution, and is fully aware that non-compliance with the aforementioned terms will result in the forfeiture of the full amount of the bid guarantee required under Section 103D-323, Hawaii Revised Statutes.

2. That the quantities given in the attached proposal schedule are approximate only and are intended principally to serve as a guide in determining and comparing the bids.

3. That the Department does not either expressly or by implication, agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work, or to omit portions of the work, as may be deemed necessary or advisable by the Director of Transportation, and that all increased or decreased quantities of work shall be performed at the unit prices set forth in the attached proposal schedule except as provided for in the specifications.

4. In case of a discrepancy between unit prices and the totals in said Proposal Schedule, the unit prices shall prevail.

5. Agrees to begin work within 10 working days after the date of notification to commence with the work, which date is in the notice to proceed, and shall finish the entire project within the time prescribed.

6. The Director of Transportation reserves the right to reject any or all bids and to waive any defects when in the Director's opinion such rejections or waiver will be for the best interest of the public.

The bidder acknowledges receipt of and certifies that it has completely examined the following listed items: the Hawaii Department of Transportation, Air and Water Transportation Facilities Division General Provisions for Construction Projects dated 2016, Hawaii Standard Specifications for Road and Bridge Construction, 2005, the Notice to Bidders, the Special Provisions, if any, the Technical Provisions, the Proposal, the Contract and Bond Forms, and the Project Plans.

In accordance with Section 103D-323, Hawaii Revised Statutes, this proposal is accompanied with a bid security in the amount of 5% of the total amount bid, in the form checked below. (Check applicable bid security submitted with bid.)

_____Surety Bid Bond (Use standard form),

_____Cash,

_____Cashier's Check,

_____Certified Check, or

_____.
(Fill in other acceptable security.)

The undersigned bidder acknowledges receipt of any addendum issued by the Department by recording in the space below the date of receipt.

Addendum No. 1 _____ Addendum No. 3 _____

Addendum No. 2 _____ Addendum No. 4 _____

In accordance with Section 103D-302, Hawaii Revised Statutes, the undersigned as bidder has listed the name of each person or firm, who will be engaged by the bidder on the project as Joint Contractor or Subcontractor and the nature of work to be done by each. It is understood that failure to comply with the aforementioned requirements may be cause for rejection of the bid submitted.

Name of Subcontractor	Nature and Scope of Work
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

Name of Joint Contractor	Nature and Scope of Work
1.	
2.	
3.	

("None" or if left blank indicates no Subcontractor or Joint Contractor; if more space is needed, attach additional sheets.)

The undersigned hereby certifies that the bid prices contained in the attached proposal schedule have been carefully checked and are submitted as correct and final.

This declaration is made with the understanding that the undersigned is subject to the penalty of perjury under the laws of the United States and is in violation of the Hawaii Penal Code, Section 710-1063, unsworn falsification to authorities, of the Hawaii Revised Statutes, for knowingly rendering a false declaration.

_____
Bidder

By_____
Authorized Signature

_____
Title

_____
Business Address

_____

_____
Business Telephone

_____
Date

_____
Contact Person and Phone Number
(If different from above.)

NOTE:

If bidder is a CORPORATION, the legal name of the corporation shall be set forth above, the corporate seal affixed, together with the signature(s) of the officer(s) authorized to sign contracts for the corporation. Please attach to this page current (not more than six months old) evidence of the authority of the officer(s) to sign for the corporation.

If bidder is a PARTNERSHIP, the true name of the partnership shall be set forth above, with the signature(s) of the general partner(s). Please attach to this page current (not more than six months old) evidence of the authority of the partner authorized to sign for the partnership.

If bidder is an INDIVIDUAL, the bidder's signature shall be placed above.

If signature is by an agent, other than an officer of a corporation or a partner of a partnership, a POWER OF ATTORNEY must be on file with the Department before opening bids or submitted with the bid. Otherwise, the Department may reject the bid as irregular and unauthorized.

PREFERENCES

Bidders agree that preferences shall be taken into consideration to determine the low bidder in accordance with said Sections and the rules promulgated, however, the award of contract will be in the amount of the bid offered exclusive of any preferences.

A. HAWAII PRODUCTS PREFERENCE

In accordance with ACT 174, SLH 2022, effective June 27, 2022, Hawaii Products Preference shall not apply to solicitations for public works construction. Therefore, the Hawaii Products Preference shall not apply to this project.

B. APPRENTICESHIP PROGRAMS PREFERENCE

In accordance with ACT 17, SLH 2009 – Apprenticeship Program, a 5% bid adjustment for bidders that are parties to apprenticeship agreements pursuant to Hawaii Revised Statutes (HRS) Section 103-55.6 may be applied to the bidder's price for evaluation purposes

Any bidder seeking this preference must be a party to an apprenticeship agreement registered with the Department of Labor and Industrial Relations at the time the offer is made for each apprenticeable trade the bidder will employ to construct the public works projects for which the offer is being made.

The bidder is responsible for complying with all submission requirements for registration of its apprenticeship program before requesting the preference.

( ) Yes, I wish to be considered for the Apprenticeship Programs Preference. I have included Certification Form(s) 1 with my bid.

C. RECYCLED PRODUCT PREFERENCE

Recycled product preference shall not apply to this proposal.

FIRE PROTECTION SYSTEM REPAIRS AT PIER 3

NAWILIWILI HARBOR, KAUAI, HAWAI

PROPOSAL SCHEDULE
S70156

ITEM NO.	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	TOTAL
1.	Mobilization and Demobilization	L.S.	Lump Sum	L.S.	$ _____
2.	Demolition, excavation, and removal of sections of water lines and appurtenances to effectuate CIPP rehabilitation, asphalt concrete pavement, Portland cement concrete pavement, concrete, pipes, construction debris, and all other items within the limit of demolition and removal, excluding items indicated to remain or required to complete work.	L.S.	Lump Sum	L.S.	$ _____
3.	6" diameter pipe CIPP rehabilitation of the fire protection water system, inclusive of all labor, material, equipment, tools, camera CCTV inspections and pressure testing, and incidentals required to repair the pipelines, in place, complete.	160.	Linear Foot	$ _____	$ _____
7.	12" diameter pipe CIPP rehabilitation of the fire protection water system, inclusive of all labor, material, equipment, tools, camera CCTV inspections and pressure testing, and incidentals required to repair the pipelines, in place, complete.	1,000	Linear Foot	$ _____	$ _____
TOTAL - BASE BID					**$**

Notes:

1. Bids will be compared on the basis of the BASE BID. All bidders are required to bid on the BASE BID items and Deductive items. The lowest responsible bidder shall be determined from the BASE BID, regardless of whether the State, upon its sole discretion, decides to apply any deductive items from the Contract. Application of deductive items will not affect the determination of the lowest responsible bidder. Further, no additional compensation will be made by the State for losses, including overhead and profit, resulting from the application of any deductive items.

2. If the lowest responsible BASE BID is less than, or approximately equal to the funds available for this project, an award will be made to the lowest responsible bidder. If the lowest responsible BASE BID exceeds the funds available for this project, the State reserves the right to negotiate with the lowest responsible bidder as permitted under Section 103D-302, Hawaii Revised Statutes, as amended, to reduce the scope of work and award a contract.

3. The State reserves the sole right to decrease the overall scope of work by applying deductive items. If the BASE BID minus deductive items applied together still exceeds the pre-established funding amounts, the State reserves the right to negotiate with the lowest responsible bidder as permitted under Section 103D-302, Hawaii Revised Statutes, as amended, to further reduce the scope of work and award the contract thereof. The State also reserves the right to cancel this project at their sole discretion.

4. Bid to include all Federal, State, and local taxes. The prices bid herein shall include all labor, materials, equipment, and incidentals necessary to construct all items in place, including demolition, all in accordance with the plans and specifications.

5. Bidders must complete all unit prices and amounts. Failure to do so may be grounds for rejection of bid.

6. Submission of a Proposal is a warranty that the bidder has made an examination of the project sites and is fully aware of all conditions to be encountered in performing the work and the requirements of the plans and specifications.

7. No additional compensation will be made by the State for losses, including overhead and profit, resulting from the deletion of the work under the Deductive items.

8. The bidder's attention is directed to Section 2.9 – PROPOSAL GUARANTY and Section 3.5 – REQUIREMENT OF CONTRACT BOND of the "General Provisions" as amended by the Special Provisions.