BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 17
TECHNICAL SPECIFICATIONS

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SECTION 01100
MEASUREMENT & PAYMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Supplemental General and Special Conditions and Technical Specification sections, apply to work of this section.

1.02 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets Submittals Schedule and Contractor's Construction Schedule.
2. Submit the Schedule of Values to Owner at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Provide at least one line item for each Schedule of Values.

1. Identification: Include the following Project identification on the Schedule of Values:
2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
4. For unit-price items, payment shall be based on the actual amount of work accepted and for the actual amount of materials in place, as shown by the final measurements.
    a. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and interpreted by the Owner’s Project Engineer.
    b. At the end of each day’s work, the Contractor’s Superintendent or other authorized representative of the Contractor shall meet with the Resident

Project Representative and determine the quantities of unit price work accomplished and/or completed during the workday.

c. The Resident Project Representative will then prepare two "Daily Progress Reports" which shall be signed by both the Resident Project Representative and the Contractor's Representative.

d. Once each month the Resident Project Representative will prepare two "Monthly Progress Summation" forms from the month's accumulation of "Daily Progress Reports" which shall also be signed by both the Resident Project Representative and the Contractor's Representative.

e. These completed forms will provide the basis of the Owner's Project Engineer's monthly quantity estimate upon which payment shall be made. Items not appearing on both the Daily Progress Reports and Monthly Progress Summation will not be included for payment. Items appearing on forms not properly signed by the Contractor will not be included for payment.

f. After the work is completed and before final payment is made therefore, the Owner's Project Engineer will make final measurements to determine the quantities of various items of work accepted as the basis for final settlement.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum

1.03 EXTENT OF WORK

A. BID ITEM 02100-1 MOBILIZATION AND DEMOBILIZATION: This item includes all work associated with project preparations, procurement and assembly of all equipment, materials, supplies, labor, movement of equipment, and accomplishing the work required by the Permits with respect to the protection of the environment, bonds required for the project, and all work shown on the Contract Drawings and specified herein for prosecution of work not otherwise included in other bid items and upon completion of work as specified and/or directed, and the removal of all equipment, materials and supplies from the work area upon project completion.

B. BID ITEM 09900-1 BULKHEAD SECTION LOSS INSPECTION (UT READINGS): This item includes inspection, identification, and documentation of the thickness of each steel sheet pile of the bulkhead at the project site at all locations described in and in accordance with the Contract Documents.

C. BID ITEM 09900-2 BULKHEAD PLATING REPAIRS: This item includes the steel plating repairs all selected areas of the existing steel sheet bulkhead in accordance with the Contract Documents and as directed by the Owner and Owner's Project Engineer.

D. BID ITEM 09900-3 EPOXY REPAIRS: This item includes the coating of epoxy for all selected locations from the bottom of the concrete cap to 6" above the MLW line in accordance with the Contract Documents and as directed by the Owner and Owner's Project Engineer.

E. BID ITEM 09900-4 SPLASH ZONE EPOXY REPAIRS: This item includes the coating of splash zone epoxy for all selected locations from 6" above the MLW line to 2' below the MLW in accordance with the Contract Documents and as directed by the Owner and Owner's Project Engineer.

F. BID ITEM 13110-1 CATHODIC PROTECTION: This item includes the installation of the cathodic protection system and any associated welding in accordance with the Construction Documents.

G. BID ITEM 330500-1 UTILIY INSTALLATION AND PEDESTRIAN WALKWAY RESTORATION: This item includes the installation of both the water lines and empty conduit lines located between the pump house and the bulkhead utility connections as shown on the contract drawings. All required work included but not limited to any demolition, trenching, any required disposal of removed earth and existing utilities, repaving of the existing pedestrian walkways, concrete work, reseeding, the protection of existing utilities and site features to remain, and the replacement/restoration of damages to existing utilities and site features to remain.

H. BID ITEM 09900-5 CONSTRUCTION DEBRIS BOOM (BID ALTERNATE #1): This item includes installation, maintenance, and removal of a construction

debris boom as required to adequately contain construction operations and any resulting debris within the project area.

1.04 MEASUREMENT

A. BID ITEM 02100-1 MOBILIZATION AND DEMOBILIZATION: All costs in connection to all preparatory work for the project including materials and equipment to the project site, coordination, and submittals as required, but not limited to obtaining any necessary permits and approvals for the work specified in accordance with the Contract; full reimbursement for the premiums actually paid for the payment and performance bonds, as shown on the Contract Drawings, and any other work that is necessary in advance of the actual construction operations. Complete mobilization to the project site by the Contractor and all equipment necessary to complete the scheduled work as outlined in the plans and specifications to the satisfaction of the Owner. Upon completion of the said work, demobilization shall include the complete removal of all equipment and excess materials and clean-up of the project site. It shall also include any restoration of structures damaged by the Contractor's operations to the satisfaction of the Owner. All work performed under this bid item will be measured as a LUMP SUM (LS) unit cost. There will only be one mobilization and one demobilization paid. If for any other reason, the Contractor must stop construction and demobilize from the site, then re-mobilize, Owner will not be responsible for payment of any additional costs associated with such work. If in the sole opinion of the Owner's Project Engineer, the Contractor's bid price for Mobilization appears unbalanced, the Owner may request that the Contractor provide a detailed breakdown of all mobilization costs.

If the Contractor cannot justify his mobilization costs based on standard cost accounting procedures, the Owner will only be obligated to make a mobilization payment equal to the accepted detailed costs, plus an amount of 20% for the Contractor's overhead and profit, with the remaining costs being paid at the conclusion of the project. The maximum allowable payment for mobilization shall be 60% of the Contractor's accepted Bid Item for Mobilization/Demobilization or as substantiated by accounting data as set forth herein. The remaining 40% or any remaining contract fund owing under the Contractor Bid Item for Mobilization/Demobilization shall be paid for Demobilization and shall be paid upon complete demobilization from the site, which shall include all cleanup and restoration as set forth herein and in accordance with the Contract Documents. Payment for this item shall not exceed 8% of the total bid of this contract.

B. BID ITEM 13110-1 CATHODIC PROTECTION: All labor, equipment, and materials necessary to install the cathodic protection system and any associated welding in accordance with the Construction Documents shall be paid under this and shall be measured per LS unit cost.

C. BID ITEM 09900-1 BULKHEAD SECTION LOSS INSPECTION: All labor, equipment, and materials required for the inspection, identification, and documentation of the thickness of each steel sheet pile of the bulkhead at the project site at all locations described in and in accordance with the Contract Documents shall be measured per LS unit cost.

D. BID ITEM 09900-2 BULKHEAD PLATING REPAIRS: All labor, equipment, and materials necessary for the steel plating repairs to all selected areas of the existing steel sheet bulkhead in accordance with the Contract Documents and as directed by the Owner and Owner's Project Engineer shall be measured per SQUARE FOOT (SF) unit cost.

E. BID ITEM 09900-3 EPOXY REPAIRS: All labor, equipment, and materials necessary for the coating of epoxy for all selected locations from the bottom of the concrete cap to 6" above the MLW line in accordance with the Contract Documents and as directed by the Owner and Owner's Project Engineer shall be measured per SF unit cost.

F. BID ITEM 09900-4 SPLASH ZONE EPOXY REPAIRS: All labor, equipment, and materials necessary for the coating of splash zone epoxy for all selected locations from 6" above the MLW line to 2' below the MLW in accordance with the Contract Documents and as directed by the Owner and Owner's Project Engineer shall be measured per SF unit cost.

G. BID ITEM 330500-1 UTILIY INSTALLATION AND PEDESTRIAN WALKWAY RESTORATION: All labor, equipment, and materials necessary for the installation of both the water lines and empty conduit lines located between the pump house and the bulkhead utility connections as shown on the contract drawings. All required work included but not limited to any demolition, trenching, any required disposal of removed earth and existing utilities, repaving of the existing pedestrian walkways, concrete work, reseeding, the protection of existing utilities and site features to remain, the replacement/restoration of damages to existing utilities and site features to remain shall, and any incidental work associated with this item shall be measured per LS unit cost.

H. BID ITEM 09900-5 CONSTRUCTION DEBRIS BOOM (BID ALTERNATE #1): All labor, equipment and material necessary for installation, maintenance and removal of a construction debris boom as required to adequately contain construction operations and any resulting debris within the project area shall be measured per LS unit cost.

1.05 WORK NOT PAID FOR SEPARATELY

A. Bonds: Payment for bonds as required by the Contract is to be included in the various items of work in the bid, and no separate payment will be made by the Owner for any bonds.

PART 2 PRODUCTS

[NOT USED]

PART 3 EXECUTION

[NOT USED]

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of this Contract, including Supplemental General and Special Conditions, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;

1.03 SUBMITTALS

A. Submit the following reports directly to the Owner's Project Engineer:

1. Submittal Schedule
2. Request for Information (RFI)
3. Project Schedule
4. Verification of Underground Utilities
5. Substitutions
6. Inspection Plan
7. Work Plan
8. Staging Plan
9. Contractor's Equipment List
10. Equipment Inspections and Certifications (as applicable)
11. Project Health and Safety/Accident Prevention Plan
12. Environmental Protection/Contingency & Emergency Procedures Plan (including Hazardous Material Response)
13. Contractor's Quality Control Plan
14. Daily Construction Reports (to be submitted weekly)
15. List of all Subcontractors
16. Re-fueling and Materials Control Plan
17. Daily Progress Plan
18. Notice to Mariners & U.S. Coast Guard
19. Pre-Construction Photographs
20. Debris Curtain

21. Itemized Breakdown of LUMP SUM items

B. Administrative submittals: Refer to other Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Contractor Agreement
2. Performance, Payment, and Warrantee bonds
3. Insurance certificates
4. Surety Bonds
5. Easements and Permits
6. Applications for Payment(s)
    a. Lien Releases
    b. Field Quantities
    c. Certified Payrolls

PART 2 PRODUCTS

[NOT USED]

PART 3 EXECUTION

3.01 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
    a. The Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittal Preparation: Place a permanent label or title block on each Submittal for identification. Indicate the name of the entity that prepared each Submittal on the label or title block.

1. Include the following information on the label for processing and recording action taken.
    a. Project name.
    b. Date.
    c. Name and address of Owner.

d. Name and address of Contractor.

e. Name and address of Sub-Contractor.

f. Name and address of supplier.

g. Name of manufacturer.

h. Number and title of appropriate Specification Section.

i. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Owner using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

3.02 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Prepare a fully developed, bar type Contractor's construction schedule. Submit within seven (7) days of the date established for "Commencement of the Work". Contractor’s schedule shall be capable of electronic transmission and shall be in a format substantially similar to project management software such as Microsoft Project® or other acceptable electronic media capable of providing the Owner with electronic copies of any and all submitted schedules.

1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".

2. Within each time bar indicate estimated completion percentage in twenty (20) percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.

3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.

5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.
6. Indicate completion in advance of the date established for substantial Completion. Indicate substantial Completion on the schedule to allow time for the Owner's procedures necessary for certification of substantial Completion.

B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit work by separate Contractors.

C. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.

D. Cost Correlation: At the head of the schedule, provide a two-item cost correlation line, indicating "pre-calculated" and "actual" costs. On the line show dollar-volume of Work performed as of the dates used for preparation of payment requests.

E. Distribution: Following response to the initial submittal, print and distribute copies to the Owner, Sub-Contractors, and other parties required to comply with scheduled dates. Post copies in the temporary field office.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

F. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made or milestones are reached in the project. Issue the updated schedule within three (3) days of such event, but in no circumstance less than weekly.

3.03 WORK PLAN

A. Within seven (7) days after receipt of Notice to Proceed, the Contractor shall furnish a detailed work plan to the Owner’s Project Engineer for review and approval. This plan shall include, but not limited to, site preparation/restoration, construction operations, site preparation and restoration. This plan shall include a description of all proposed water and land-based equipment to be utilized in performance of the contract work. No work will be permitted to commence until this plan is approved by the Owner’s Project Engineer.

3.04 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within seven (7) days of the date required for establishment of the Contractor's construction schedule.

1. Prepare the schedule in chronological order; include submittals required during construction. Provide the following information:
   a. Scheduled date for the first submittal.
   b. Submittal category.
   c. Name of Sub-Contractor.
   d. Description of the part of the Work covered.
   e. Scheduled date for re-submittal
   f. Scheduled date the Owner's final release or approval.

B. Distribution: Following response to initial submittal, print and electronically distribute PDF copies to the Owner, Sub-Contractors, and other parties required to comply with submittal dates indicated. Post copies in the temporary field office.

1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work and are no longer involved in construction activities.

3.05 DAILY CONSTRUCTION REPORTS

A. The Contractor shall prepare a daily construction report, recording the following information concerning events at the site; and submit PDF copies to the Owner's Project Engineer via email each week or as requested by the Owner:

1. List of Sub-Contractors at the site.
2. Approximate count of personnel at the site.
3. High and low temperatures, general weather conditions.
4. Accidents and unusual events.
5. Meetings and significant decisions.
6. Stoppages, delays, shortages, losses.
7. Daily plan of areas worked.
8. Emergency procedures.
9. Any Orders and or requests of governing authorities.
10. Change Orders received and implemented.
11. Substantial Completions authorized.
12. Digital photographs of project site prior to and following the completion of construction.

3.06 SHOP DRAWINGS

A. The Contractor shall submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract

Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. The Contractor shall submit shop drawings, which include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. The following information must be included:

1. Dimensions.
2. Identification of products and materials included.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.
6. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".
7. Initial submittal: Submit one correctable translucent reproducible PDF and one blue line- or black-line PDF for the Owner's review; the reproducible PDF will be returned to the Contractor.
8. Final submittal: Submit one PDF to the Owner and Owner's Project Engineer.
    a. One of the prints returned shall be marked-up and maintained as a "Record Document".
9. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

3.07 OWNER'S PROJECT ENGINEER'S ACTION

A. Except for submittals for the record, information or similar purposes, where action and return is required or requested, the Owner's Project Engineer will review each submittal, mark to indicate action taken, and return promptly via electronic mail.

B. Action Stamp: The Owner will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Final Unrestricted Release: Where submittals are marked "No Exception Taken," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
2. Final-But-Restricted Release: When submittals are marked "Approved as Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and

requirements of the Contract Documents; final acceptance will depend on that compliance.

3. Returned for Re-submittal: When a submittal is marked "Revise and Resubmit," do not proceed with that part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. The Contractor is to revise or prepare a new submittal in accordance with the notations; resubmit without delay to the Owner. The Contractor shall repeat if necessary to obtain a different action mark.
    a. Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
4. Other Action: When a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned to the Contractor, marked "Action Not Required".

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 01500
TEMPORARY FACILITIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including Supplemental General and Special Conditions and other Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security, and protection.

B. Temporary utilities may be required and include but are not limited to:

1. Portable electric power and light.
2. Cellular Telephone service.

C. Temporary construction and support facilities required include but are not limited to: Sanitary facilities, including drinking water.

D. Security and protection facilities required include but are not limited to:

1. Environmental protection.
2. Emergency Spill Response Kit.

1.03 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:

1. Building Code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, Fire Department and Rescue Squad rules.
5. Environmental protection regulations.

1.04 PROJECT CONDITIONS

A. Conditions of Use: The Contractor shall keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 PRODUCTS

[NOT USED]

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. The Contractor shall relocate and modify facilities as required.

B. The Contractor shall provide each facility ready for use when needed to avoid delay. The Contractor shall maintain and modify as required. The Contractor shall not remove any facility until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. The Contractor shall install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.

B. The Contractor shall provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.

3.03 PERMITS AND CODES

A. Comply with all applicable codes, ordinances, rules, regulations and laws of all local, municipal, and state authorities having jurisdiction over the work, without additional cost to the Owner.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 01600
ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Supplemental General and Special Conditions and other Specification Sections, apply to this Section.

B. The Contractor must fully adhere to the provisions outlined in **all permits** and shall hold the Owner harmless for failing to comply with a permit condition. The permits that have been issued for this project are included at the end of these specifications.

1.02 SUMMARY

A. This Section specifies requirements for environmental protection.

1.03 SUBCONTRACTORS

A. Assurance of compliance with this specification by Sub-Contractors will be the responsibility of the Contractor.

1.04 NOTIFICATION

A. The Owner/Owner's Project Engineer shall notify the Contractor in writing of any observed noncompliance with the Federal, State or local laws or regulations, permits and other elements of the Contractor's environmental protection plan. The Contractor shall, after receipt of such notice, inform the Owner of proposed corrective actions and take such actions as may be approved. If the Contractor fails to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted, nor costs or damages allowed to the Contractor for any such suspension.

1.05 FINES AND PENALTIES

A. The Contractor shall be solely responsible for any and all permit violations and fines levied thereto as a result of their construction or operations. The Contractor indemnifies the Owner and Owner's Project Engineer from any fines or penalties levied and shall defend said fines or penalties as its sole cost with the Owner's cost relating to any defense of said fines or penalties to be assessed to the Contractor.

PART 2 PRODUCTS

[NOT USED]

PART 3 EXECUTION

3.01 GENERAL

A. The Commonwealth of Massachusetts along with other Municipal and Federal Agencies have issued permits, orders of conditions, and strict regulations for construction in environmentally sensitive areas. In addition to any orders, the following restrictions apply:

1. Under no circumstance shall any equipment be allowed to operate (including grounding of vessels and storage of materials) in or on any grass beds, salt marshes and/or mudflat areas. In addition, no equipment will be operated in such a manner as to cause damage to these areas.

2. Absolutely no release is allowed into any waterway of any petroleum product, epoxies, resins, admixtures, touch-up coatings, concrete, wastewater of any kind, any foreign particles which are associated with any of the activities, or the like of the Contractor beyond the installed products necessary to complete the work. Accidental releases shall be reported to the appropriate authority, Harbormaster, and, if applicable, the Coast Guard. The Contractor assumes all responsibilities for fines or penalties levied and agrees to fully indemnify the Owner and Owner's Project Engineer for any accidental, negligent or intention discharge of any foreign material into any waterway associated with the work prescribed herein.

3. Prior to beginning any work, the Contractor shall submit, in writing, a contingency plan, subject to approval by the Owner, which will set forth the procedures to be followed in the event of an accidental release. This plan will require, as a minimum, that the Contractor have on-site, sufficient sorbent pads and booms to contain an accidental spill. Absolutely no work shall begin on the project until this plan has been approved by the Owner and or the Owner's Project Engineer.

4. Debris from construction operations is to be cleaned up on a regular basis throughout each working day and disposed of off-site at a properly designated facility at the Contractor's expense. Any floating debris and cuttings shall be contained in the work area by floating booms/debris curtains and shall not be allowed to drift about any waterway. Organic debris (epoxies, etc.) are considered releases and shall be cleaned up immediately in accordance with the approved plan.

5. In the event that wetland areas are destroyed in conjunction with the construction, they shall be replaced, at no cost to the Owner, by a firm experienced in the restoration of such areas.

6. Any materials stored or stockpiled on the site will be assessed for its potential to create a run-off problem. Such materials shall be stored and/or protected in such a way that run-off from the stockpiles will not create a nuisance or damage down gradient resource areas. Any and all property located at or used in conjunction with this project shall be returned to pre-construction

conditions prior to completion of project and release of demobilization retainage.

3.02 PROTECTION OF ENVIRONMENTAL RESOURCES

A. The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine his activities to areas defined by the drawings and specifications.

B. Work and Staging Area Limits: Prior to any construction the Contractor shall mark the areas that are required to accomplish all work to be performed under this contract. Monuments and markers shall be protected before construction operations commence. The Contractor shall convey to his personnel the purpose of marking and/or protection of all necessary objects.

C. Best Management Practices (BMPs) shall be used by the Contractor to minimize turbidity at all times. Such BMPs may include a silt curtain/debris curtain, and if used, it shall be bottom-weighted and of suitable material/grade appropriate with the velocity of the current at the site and be placed at a location that does not bottom out during low tide.

D. Disposal of Uncontaminated Solid Wastes: Solid wastes shall be placed in containers, which are emptied on a regular schedule. All handling and disposal shall be conducted to prevent contamination.

E. Disposal of Solid Waste by Removal from the Work Site: The Contractor shall transport all uncontaminated solid waste off of the work site and dispose of it in compliance with Federal, State and local requirements for solid waste disposal.

F. Disposal of Discarded Materials: Discarded materials other than those which can be included in the solid waste category will be handled as directed by the Town Administrator. The Contractor shall comply with Title 40 CFR, Part 260-265.

G. Protection of Water Resources: The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Special management techniques shall be implemented to control water pollution resulting from the construction activities, which are included in this contract.

H. Protection of Fish and Wildlife Resources: The Contractor shall keep construction activities under surveillance, management and control to minimize interference with, disturbance to, and damage of fish and wildlife.

I. Protection of Air Resources: The Contractor shall keep construction activities under surveillance, management, and control to minimize pollution of air resources. All activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with the Commonwealth of Massachusetts and all Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency, specifically as they apply in the

Commonwealth of Massachusetts, shall be maintained for all construction operations and activities.

J. Particulates: Dust particles, aerosols, and gaseous by-products from all construction activities, processing and preparation of materials shall be controlled at all times, including weekends, holidays and hours when work is not in progress.

K. Hydrocarbons and Carbon Monoxide: Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and Massachusetts allowable limits at all times.

L. Odors: Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

M. Protection of Sound Intrusions: The Contractor shall keep construction activities under surveillance, and control to minimize damage to the environment by noise. The Contractor shall use methods and devices to control noise emitted by equipment.

N. Ownership of any fuel on the project site at all times will be under the control of the Contractor. The Contractor will contact, coordinate and comply with any local, county, state or federally mandated regulations, codes or rules set forth regarding the storage, use and or disposition of any petroleum products. Under no circumstances are any permanent fuel facilities to be constructed on the project site. Any fuel spills shall be the sole responsibility of the Contractor.

O. Environmental Window: There are no environmental Time-of-Year (TOY) restrictions applicable to the activities to be conducted for the proposed project.

P. Project Completion Date: All work activities at the project site shall be completed by no later than (DATE). The Contractor must complete all demobilization activities by no later than (DATE).

3.03 POST CONSTRUCTION CLEAN UP

A. The Contractor shall clean up all areas affected by construction to pre-construction conditions prior to completion of the project.

3.04 RESTORATION OF LANDSCAPE DAMAGE

A. The Contractor shall restore all landscape features of staging, storing or other areas damaged or destroyed during construction operations outside the limits of the approved work areas. Such restorations shall be in accordance with the plan submitted for the approval of the Owner. This work will be accomplished at the Contractor's expense.

3.05 MAINTENANCE OF POLLUTION CONTROL FACILITIES

A. The Contractor shall maintain all constructed facilities and portable pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutants.

3.06 TRAINING OF CONTRACTOR PERSONNEL

A. The Contractor shall train his personnel in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities to ensure adequate and continuous environmental pollution control.

***** END OF SECTION *****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 01700
GENERAL SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including Supplemental General and Special Conditions and Specification sections, apply to work of this section.

1.02 SUMMARY

A. The work covered in this section consists of furnishing all plant, labor, equipment and appliances in performing all operations in connection with safety of persons and property during construction. The safety requirements specified in this section are in addition to those contained in the sections pertaining to the specific items of work involved or indicated on the drawings. Where there is a conflict between the requirements of this section and sections pertaining to the specific items of work, the requirements of this section shall govern. Specific requirements of this section include:

- The Contractor shall comply with all aspects of the Owner's Safety and Environmental Policies for each facility.
- The Contractor shall provide safety controls for protection of persons and property in compliance with all applicable Federal, State and Municipal statutes and/or regulations.
- The Contractor shall maintain accurate records and report to the Owner exposure data and all accidents.
- The Contractor shall promptly correct noncompliance with safety provisions where they are observed or when notified.
- The Contractor shall develop a safety program and submit bids for effective accident prevention.
- The Contractor shall attend project meetings relative to administration of the overall safety program.

B. The Contractor shall agree to comply with all Town, State and/or Federal Directives and guidelines in regard to construction and health and safety as related to the COVID-19 Pandemic.

1.03 REFERENCES

A. The following publications listed below form a part of this specification to the extent referenced.

1. U.S. Army Corps of Owner's Project Engineers Owner's Project Engineer Manual (EM): Safety and Health Requirements Manual, EM 385-1-1, latest edition.

2. ASME International B30.5 (2004) Mobile Crane
3. ASME International B30.22 (2003) Articulating Boom Cranes
4. U.S. National Archives and Records Administration (NARA) 29 CFR 1910.94 Ventilation
5. U.S. National Archives and Records Administration (NARA) 29 CFR 1910.120 Hazardous Operations and Emergency Response
6. U.S. National Archives and Records Administration (NARA) 29 CFR 1926.65 Hazardous Operations and Emergency Response
7. U.S. National Archives and Records Administration (NARA) 29 CFR 1926.502 (f) Warning Line Systems
8. National Fire Protection Association (NFPA) 10 (1995) Portable Fire Extinguishers
9. NFPA 241 (1996) Safeguarding Construction, Alteration, and Demolition Operations
10. Occupational Safety and Health Act (OSHA)

PART 2 PRODUCTS

[NOT USED]

PART 3 EXECUTION

3.01 GENERAL SAFETY REQUIREMENTS - U.S. ARMY CORPS OF OWNER'S PROJECT ENGINEERS MANUAL

A. The Contractor shall comply with all pertinent provisions of the Corps of Owner's Project Engineers Manual, EM 385-1-1, latest edition.

B. The Contractor shall submit crane inspection reports as required in accordance with EM 385-1-1 with Daily Reports.

3.02 HOT WORK

A. No Hot Work (burning, welding, chipping, grinding, and electrical power tools) is allowed within 350 feet of a transfer operation.

3.03 ACCIDENT PREVENTION

A. The Contractor shall comply with the Massachusetts Occupational Safety and Health Act, and will also take, or cause to be taken, such additional measures as may be necessary for the prevention of accidents.

B. Prior to commencement of Work the Contractor shall (1) submit proposals in writing for effectuating provisions for accident prevention, and (2) meet in conference with the Owner to discuss and develop mutual understandings relative to administration of an overall safety program.

C. During the performance of Work under the Contract, the Contractor shall institute controls and procedures for the control and safety of persons visiting the job site.

D. The Contractor shall maintain an accurate record of, and shall report to the Owner in writing, exposure data and all accidents resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment incident to Work performed under the Contract.

E. The Owner or Owner's Project Engineer shall notify the Contractor of any noncompliance with the foregoing provisions. The Contractor shall, after receipt of such notice, immediately take corrective action. If the Contractor fails or refuses to comply immediately, the matter will be referred to the proper authority. No part of the time lost due to any stop order issued by proper authority shall be made the subject or claim for extension of time or for extra costs or damages by the Contractor.

F. Compliance with the provisions of this Part by Subcontractors will be the responsibility of the Contractor.

3.04 CONTRACTOR'S SAFETY PROGRAM

A. The Contractor shall have a written safety program in place for this project. At a minimum, it shall include a drug and alcohol policy, accident reporting criteria, and example forms along with an agenda for daily safety meetings and safe operations practices for all trades associated in this project.

B. A safety officer appointed by an officer of the Contractor's Corporation shall be named and charged with any and all safety activities relating to this project.

C. The Owner and the Owner's Project Engineer shall not be responsible for implementing and/or providing any safety training and/or direction regarding the Contractor's operations as they relate to the project's safety.

D. Accident Prevention Program: Within five (5) calendar days after receipt of Notice to Proceed the Contractor shall furnish his Accident Prevention Program and three copies thereof to the Owner or his authorized representative for review and approval. The program shall be prepared in the following format:

1. Administrative Plan
2. Job Hazard Analysis
3. A copy of the company policy statement of accident prevention and any other guidance statements normally provided to new employees.
4. When marine plant and equipment are in use the Contractor shall ensure that oil transfer operations to or from his plant comply with all Federal, State, county, and Municipal laws, codes and regulations. Particular attention is invited to 33 CFR Subchapter 0, Pollution. The Contractor shall incorporate in his accident prevention program, sufficient information to demonstrate that all fuel transfers will be made in accordance with 33 CFR 156 and any other applicable laws, codes and regulations. (CENABEN 1984 APR)

5. The Contractor shall not commence physical work at the project site until the program has been received and acknowledged by the Owner or his authorized representative. As an additional measure to implementation of the Accident Prevention Program, the Contractor shall meet with representatives of the Owner as soon as practicable after receipt of Notice to Proceed and before start of work to discuss and develop a mutual understanding relative to administration of the overall safety program. Minutes of the meeting shall be prepared, signed by the Contractor and the Owner or his authorized representative. At the Owner's discretion, the Contractor may submit his Job Hazard Analysis only for the phases of construction. All remaining phases shall be submitted and accepted prior to the beginning of work in each phase. EM 385-1-1, Section 1.

3.05 ACCIDENT INVESTIGATION AND REPORTING

A. Accidents shall be investigated by the immediate supervisor of the employee(s) involved and reported to the Owner or the Owner's inspector within one working day after the accident. Paragraph 01.D, EM 385-1-1.

B. The Contractor shall insure that all accidents which involve loss of life, occupational disease of the employee, injury incapacitating any person for normal work beyond the day of injury, or damage to property, materials, supplies, or equipment, of $1,000.00 or more, and which relate to the work activities, shall be recorded, investigated, and reported to the Owner or his authorized representative.

C. Each accident shall be verbally reported to the Owner's inspector at the earliest practicable time, but within 24 hours. Each accident involving loss of life or traumatic injury to any person shall be reported to the Owner's inspector verbally, telephonically, or by radio immediately.

D. The Contractor shall promptly investigate each accident and submit a written, signed report on ENG Form 3394 to the Owner's inspector within 48 hours.

E. A factual record of each accident shall be entered in the Contractor's official daily log book.

3.06 DAILY INSPECTIONS

A. The Contractor shall institute a daily inspection program to assure all safety requirements are being fulfilled. Reports of daily inspections shall be maintained in the Contractor's official daily log book. The reports shall be records of the daily inspections and resulting actions. Each report shall include, as a minimum, the following:

1. Phase(s) of construction underway during the inspection.
2. Locations of areas inspections were made.
3. Results of inspection, including nature of deficiencies observed and corrective actions taken, or to be taken, date, and signature of the person responsible for its contents.

3.07 CERTIFICATE OF COMPLIANCE

A. Contractor shall submit copies of all applicable inspections and certifications for all equipment.

***** END OF SECTION *****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 02100
MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Specification sections, apply to the work of this section.

1.02 SUMMARY

B. The work under this section shall include the mobilization and demobilization of all equipment, labor, materials, supervision, survey, and any incidentals required to complete this project in accordance with any permit requirements satisfactorily, these Specifications, the Contract Drawings and shall include, but not be limited to the following:

1. Furnishing, installation and maintenance of erosion and sedimentation controls, temporary safety fence, temporary relocation/reinstallation of existing prefabricated fuel shed, installation and maintenance of environmental controls required by the Permits; staging area/stockpile management, suppression of dust onsite as necessary, management of odors and noise, final site cleanup/restoration, and all other miscellaneous work obviously required to complete the project, but not covered by individual items in the contract.
2. All required site investigation work to identify/confirm existing above and below ground site conditions including, but not limited to, the location of existing utilities and coordination.
3. Obtaining any/all additional permit(s)/authorization(s) that may be required beyond those provided and as required for the scope of work to be completed herein.
4. Miscellaneous cleanup up required to restore the Project Site to pre-construction conditions.

C. Where applicable, locate and identify existing underground and overhead services and utilities within the Contract limits. Provide adequate means of protection of utilities and services designated to remain. Repair utilities and services damaged by the Contractor's equipment and/or work force during the Contract work operations, to the satisfaction of the Town, at the sole expense of the Contractor.

D. Where applicable, arrange for the disconnection, disconnect, and seal all utilities and services designated to be removed before the start of site work operations. Perform all work in accordance with the requirements of applicable utility company or agency involved.

E. When uncharted or incorrectly charted underground or underwater piping of utilities and services is encountered during the progression of work, notify the

applicable utility company or agency to obtain procedure directions. Cooperate with the applicable utility company or agency in maintaining active services in operation.

F. Perform site work operations and the removal of debris and waste materials to assure minimum interference with navigation, streets, walks, parking facilities, buildings, and all other adjacent facilities.

G. Obtain governing authorities written permission, when required, to close or obstruct street, walks and adjacent facilities. Provide alternate routes around closed or obstructed traffic ways, when required by governing authorities.

H. Obtain written permission from property owners to trespass and/or transgress their properties where an easement has not been granted.

I. Control dust caused by the work. Dampen surfaces as required. Comply with pollution control regulations of governing authorities.

J. If the Contractor, in the course of excavation, uncovers or otherwise encounters any artifacts, whether historic or prehistoric, he shall bring them to the immediate attention of the Town, and stop all work in that vicinity of said artifacts until directed by the Town.

K. If the Contractor, in the course of excavation, uncovers or otherwise encounters any suspected hazardous or unidentified substances, he shall bring them to the immediate attention of the Town, and stop all work in that vicinity of said substances until directed by the Town.

L. Where applicable, protect and maintain all light poles (and lights), utility poles and services, traffic signal control boxes, curb boxes, fire hydrants, fire department connections, valves and other services, except items that are designated to be removed or reworked.

M. Contractor shall be responsible for replacement in-kind of any existing structures that are damaged or undermined during the construction process.

N. The Contractor shall be responsible for verifying the existing conditions prior to construction and establishing survey control to develop a baseline for the proposed bulkhead. The Contractor shall coordinate with the Project Engineer and the Town to ensure the proposed baseline is established prior to construction.

O. The Contractor shall coordinate directly with the Project Engineer, Owner, all applicable Owner's staff and selected Contractors that will be responsible for performing additional services beyond the scope of work defined under the contract herein and as required for the location, relocation, installation and/or replacement of existing utilities.

1.03 REFERENCES

A. For all items within this Contract without specific technical specifications and/or publications denoted, and to supplement all conditions of this Contract above and beyond all references mentioned, refer to the Massachusetts Department of

Transportation (MassDOT) Standard Specifications for Highways and Bridges (2024), and all amendments; which is herein made part of this Contract in its entirety. Herein after known as the Standard Specifications.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 INSTALLATION

A. Examine the areas and conditions of the proposed work for this project. Do not proceed with the work until unsatisfactory conditions are corrected.

B. Consult the records and drawings of adjacent work and of existing services and utilities, which may affect the progression of the project.

C. Notify "Dig Safe" and local utilities and services as applicable prior to conducting any work in order to have all known utilities and services marked out before work begins.

D. Protect existing buildings, seawalls, revetment, bulkheads, ramps, paving, floats, gangways, moorings, piers, monuments and all other structures and facilities that are adjacent to the work area, from damage caused by the project operations. Repair all damage caused to the satisfaction of the Town, at the sole expense of the Contractor.

E. Contractor shall provide temporary chain link fencing around perimeter of work area and staging area to prevent public access. Fencing shall be a minimum of 6'high and constructed of galvanized steel chain link with posts at 8' on center. Fence shall be supported by blocks to receive posts and shall have an access gate.

F. Contractor shall replace any damage to ramps, bulkhead, grass area, utilities, drainage, revetment, pavement or sidewalk within the staging area upon completion of work whether or not area was used by the Contractor. Contractor shall also be responsible for restoring any disturbed/damaged area back to its original condition.

G. All areas to be backfilled shall be free of construction debris, refuse, compressible or decayable materials, and standing water. Do not place fill when fill materials are frozen. No fill material containing ice or frozen lumps shall be used.

H. Contractor shall notify the Town when areas to be filled are ready for formal inspection.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 09900
COATING OF STEEL WATERFRONT STRUCTURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including Supplemental General and Special Conditions and Specification sections, apply to work of this section.

1.02 WORK SPECIFIED

A. The work includes: The furnishing of all plant, labor, materials, tools and equipment, and the performance of all operations and incidentals necessary for the coating, handling, storing, and shipping of plant coated steel sheet piling, structural steel, and miscellaneous ancillary items.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. The Owner, through the Engineer, reserves the right of approval of any Subcontractor pre-qualified and selected for this portion of the Work by the Contractor. Approval will be based, in part, on:

1. Documented successful experience in performing work of a similar nature.
2. Acceptable schedule of unit prices for measurement and payment in event of changes in the Work of this Section.

C. Coating materials shall be handled, stored, and applied in accordance with the manufacturer's specifications, or as directed by an authorized representative of the coating manufacturer.

D. All references to SSPC shall be interpreted as Steel Structures Painting Council, part of Association for Materials Protection and Performance.

E. Structural steel fabrications shall be received by coating applicator free of all oil and grease.

1.04 SUBMITTAL

A. The Contractor shall submit the following, in accordance with the requirements of Section 01300, Submittal Procedures.

B. Submit material certification data for the coating system to the Engineer for review no later than the time of delivery of materials to the site. Certification shall include a statement by the coating applicator that the protective coating was installed in strict accordance with the manufacturers written instructions, including all surface preparation.

1.05 PRODUCT DELIVERY AND STORAGE

A. The Contractor guarantees that material shall be stored in a safe manner within Owner-designated area provided at the site.

PART 2 PRODUCTS

2.01 EPOXY COATING

A. Material used for factory epoxy coating of all scheduled surfaces shall be BAR-RUST 235 Multi-Purpose Epoxy Coating as manufactured by Devoe Coatings and Splash Zone A-788 as manufactured by Carboline Company or equivalent accepted by the Engineer.

B. Epoxy coating field touch-up material shall be identical to factory coating specified in paragraph 2.1-A above.

C. The topcoat color for all surfaces is to be black.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Surfaces shall be prepared in strict accordance with the protective coating system manufacturers written instructions. Surfaces are to be abrasion-blasted to a near-white surface cleanliness in accordance with SSPC-SP-10. Blast profile on steel shall be 1.5 to 2.5 mils in depth and be of a sharp, jagged nature as opposed to a "peen" pattern (from shot blasting). Surfaces must be sound, dry, clean, free of oil, grease, dirt, mildew, form release agents, curing compounds, loose and flaking paint, grit dust, and other foreign substances. Roto blasted surfaces are not acceptable.

B. Surfaces requiring field touch-up shall be prepared as described in paragraph 3.1-A above.

3.02 PROTECTIVE COATING APPLICATION

A. The protective coating shall be installed in strict accordance with manufacturers written instructions. Coating is to be applied in two coats to achieve a minimum overall dry film thickness of 15 mils.

B. All holidays or other imperfections in the coating shall be removed or repaired at the Contractors expense prior to final acceptance of the Work.

C. Surfaces requiring field touch-up of any required areas shall be prepared as described in paragraph 3.1-A above or by the following procedure:

1. Clean all surfaces to be repaired per SSPC-SP1 Solvent Clean to remove chlorides and general surface contamination.
2. be repaired per SSPC-SP1 Solvent Clean to remove chlorides and general surface contamination.
3. Grind all welded areas to provide a smooth surface with no sharp edges.

4. Feather existing coatings back to sound material.
5. Clean all other surfaces to be repaired per SSPC-SP2 (Hand Tool Clean) or SSPC-SP3 (Power Tool Clean). Do not grind surfaces smooth; maintain adequate surface profile from original blast cleaning.
6. Stripe-coat all welds and edges with the epoxy coating prior to painting to insure adequate film thickness.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 13110
CATHODIC PROTECTION

PART 1 GENERAL

1.01 DESCRIPTION

A. This Section includes providing all labor, materials, and equipment necessary for a complete cathodic protection system which, as a minimum shall consist of:

1. Testing
2. Galvanic Anodes

B. The work includes supplying cathodic protection materials and their installation to provide a complete, functioning corrosion protection system for underwater structural steel as detailed on the Contract Drawings. The description of the work is as follows:

1. Conduct a native potential survey of the steel piles prior to the installation of any anodes.
2. To ensure all sheet piles are bonded together to form an electrically continuous structure, a minimum of three (3) inch weld at each knuckle should be performed.
3. Install galvanic anodes as indicated.
4. Conduct protected potential survey of steel piles after all anodes are installed for one month.

1.02 REFERENCES

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

NACE INTERNATIONAL

SP0169-2003 Control of External Corrosion or Underground or Submerged Metallic Piping Systems

MILITARY SPECIFICATIONS

MIL-A-24779 Anodes, Sacrificial Aluminum Alloy

1.03 PROJECT RECORD DOCUMENTS

A. Cathodic Protection System - Operation and Maintenance Manuals

1. The corrosion engineers are responsible for submitting operation and maintenance data showing all as-built data, past test reports, past approved submittals and manufacturer’s maintenance and operation literature.

1.04 QUALIFICATIONS

A. The anode installation Contractor shall demonstrate 5 years of successful anode installation on similar projects. The Town of Barnstable shall provide inspection services during anode installation of a Corrosion Engineer who will supervise, inspect and test the installation of the cathodic protection system. The Contractor shall submit evidence of the qualifications of the firm relative to expertise in the installation of anodes.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Only acceptable materials will be permitted on-site. Deliver products to site with each anode identified and complete with factory documentation. Each delivery shall be completed with the Anode Factory Quality Control Test Certificate and Reports for verification by the Engineer.

B. Store products in a dry location as directed by the Engineer and protect products from physical or corrosive damage or vandalism.

1.06 SUBMITTALS

A. The Contractor shall submit the following, in accordance with the requirements of Section 01300, Submittal Procedures.

B. Manufacturer's Catalog Data and Certificates

1. Anodes
2. Anode Factory Quality Control Test Certificate and Reports

C. Drawings

1. Anode installation

1.07 MEASUREMENT AND PAYMENT

A. Measurement for payment shall be the number of anodes shown on the Contract Drawings, electrical continuity provisions and reference electrode test stations. Payment shall be included in the Contract unit price for each anode. The price shall include all costs for furnishing and placing all materials, labor, and equipment required to complete the work as specified herein and shown on the Contract Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Anodes: 6” x 6” x 36” High Potential Aluminum Anodes, or approved equal and the following:

1. Quality Assurance: Sampling of chemical composition shall be taken and tested in accordance with MIL-A-24779. Current output and capacity shall be tested in accordance with MIL-A-24779.
2. Chemical composition shall be as follows:

a. Zinc 2.80 to 6.50%
b. Indium 0.01 to 0.025%
c. Silicon 0.08 to 0.21%
d. Copper 0.006% maximum
e. Iron 0.12% maximum
f. Others 0.02% maximum each (total not to exceed 0.05%)
g. Aluminum Remainder

3. Performance: The current output and capacity of the alloy are dependent on the alloy's galvanic properties, the anode/core size and geometric shape. Therefore, the anode supplied shall not deviate in any geometric dimension by more than 10% and shall have the following galvanic properties in sea water:

a. Open Circuit Potential 1060 mv (Ag-Ag/CL ref.)
b. Efficiency Min. 85%
c. Current Capacity Min. 1150 amp-hrs/lb

4. Weight: Anode weight to be 129.6 pounds not including the core. Efficiency of the aluminum alloy in seawater shall not be less than 85% on a 100% efficiency of 1150 ampere-hours per pound.
5. Workmanship shall be in accordance with MIL-A-24779.

B. Anode Core: 2” x 1/4” Steel Strap with 3-6” standard offset mounting

C. Protective Coating

1. All appurtenances, straps, mounting anode rods, support wire and claps specified parts of the anode shall be coated with a coal tar epoxy polyamide compound as indicated on the Contract Drawings.
2. Coating (Under Water): All connections shall be coated with a two-part epoxy splash zone mastic such as Carboline A-788, or approved equal, as directed by Engineer.

PART 3 EXECUTION

3.07 INSTALLATION

A. Safety

1. Personnel shall be protected in accordance with 29 CFR 1910.

B. Anode Mounting

1. Prior to installation, remove coating, mill scale and any other contaminants and clean to bare metal. Anodes are to be bonded to the outer belly of the sheet piles with a ¼” fillet weld around a minimum of three sides of each end of the strap. Anodes are to be located as indicated on the drawings.

C. Bonding

1. To ensure sustained electrical continuity along the entire bulkhead, bond each sheet pile to its adjacent sheets by a weld, and clean the structure surface by scraping, filing or wire brushing to produce a clean, bright surface. A minimum three-inch weld is required at each knuckle. The weld is ideally installed at the top of the piles well above the tidal and splash zones. Alternatively, welding underwater a minimum of 2 feet below MLLW is a viable option if the top of the pile is not accessible or practical.

    a. Engineer Testing and Third-party Testing Facility:

        All welds and anode supports shall be subject to visual examination during production by Engineer. The Engineer reserves the right to visually examine the welds prior to coating touch- up. The Contractor shall provide assistance, as required, to the third-party facility during inspection. In addition to this, the Employer reserves the right to carry out their own independent testing, at their own expense.

3.08 FIELD QUALITY CONTROL

A. Field tests may be witnessed by the Engineer. Notify the Engineer 5 days prior to performing each field test.

B. Field Testing

1. Galvanic Protection Systems Testing:

    a. Systems shall be tested and inspected by the Town of Barnstable Representative Corrosion Engineer in the presence of the Engineer. Record test data, including date, time, and locations of testing. The readings shall be converted to an equivalent Copper-Copper Sulfate Half-cell (CSE) potential for entry into the Test Report. A plan drawing must accompany the data and a logical system must be used to identify the corresponding points on the plan. Submit to the Owner as a formal, bound Test Report. The Contractor shall correct and retest, at his expense, deficiencies in the materials and installation observed by these tests and inspections. Testing shall include the following measurements:

        1) Native Potential Measurements: Before placement of any anodes measure potentials on piles using a hand-held buffered, saturated Silver-Silver Chloride (Ag-AgCl) reference electrode. A seawater reference electrode (dry type with no buffering solution) can also be used, however, measurements taken by this reference electrode must be corrected for water resistivity at the time of test. The readings shall be converted to an equivalent Copper-Copper Sulfate Half-cell (CSE) potential for entry into the Test Report. The locations of these measurements shall be at the mudline, at the waterline and at the mid-point between these. In all cases, the measurement shall be taken approximately 4-inches from the

surface of the steel pile or on the surface of the concrete encasement. Measurements shall be taken at each end or corner and at every 25 feet thereafter. They must be taken at locations that fall as far from final anode positions as possible and recorded with pile numbers or stationing. These locations shall be used again for the next testing procedure (see below: Protected Structure Potential Measurements).

2. Protected Structure Potential Measurements: With the entire galvanic protection system operating for at least one month but no more than three months, measure potentials on structural steel at same locations and as described above.

C. Criteria for Cathodic Protection

1. Criteria for determining the adequacy of protection shall be determined by one of these two methods.
   a. A negative voltage of at least 0.85 volt (ref. to Cu-CuSO4) as measured between the structure surface and a reference electrode contacting the sea.
   b. In the event that the first criteria cannot be met, comparison of the Native Potential Measurements and the Protected Structure Potential Measurements shall be used to indicate the amount of cathodic polarization achieved. A 100 millivolts (mV) polarization level (difference between native and protected reading) shall indicate adequate protection.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 015713
TEMPORARY EROSION AND SEDIMENT CONTROLS

PART 1 GENERAL

1.01 DESCRIPTION

A. The work in this Section includes the work necessary for the installation of any structures and measures for the prevention and control of soil erosion.

B. The Contractor shall furnish all material, labor and equipment necessary for the proper installation, maintenance, inspection, monitoring, reporting, and removal (where applicable) of erosion prevention and control measures.

1.02 REFERENCES

A. Refer to MassDOT's Standard Specifications, where required.

1.03 REQUIREMENTS

A. Runoff from all disturbed areas and sediment-laden groundwater encountered during trenching, boring or excavation must be routed through a silt control structure or sediment trapping device prior to discharge from the construction area and prior to entering a receiving stream or other water body.

B. Acceptable sediment trapping devices include, but are not limited to silt fence, diversion berms and swales, inlet protection, check dams, silt basins, silt traps, stabilized construction entrances, and vegetative cover.

C. Pump around flow diversions may be used when construction activity is required within a flowing stream, creek, ditch, or piped system.

D. Stockpiles shall be located away from streams, ponds, swales, and catch basins. Soil stockpiles shall be seeded, mulched and contained through the use of approved perimeter controls.

E. Temporary stabilized construction entrances must be used at access points where construction traffic will enter onto public roadways or streets. These are used to reduce silt and mud tracking onto pavement. Construction rock entrances must be kept in good condition and may require cleaning, additional rock, or replacement. Any mud and silt tracked onto public roads must be removed immediately.

F. The construction schedule adopted by the Contractor will impact the placement and need for specific devices required for the control of erosion. The Contactor shall develop and implement such additional techniques as may be required to minimize erosion and off-site sedimentation. The location and extent of erosion and sedimentation control devices shall be revised at each phase of construction that results in a change in either the quantity or direction of surface runoff from constructed areas. All deviations from the erosion and sedimentation control provisions shall have the prior written acceptance of the Engineer.

G. Erosion and sediment controls shall be removed at the completion of construction, as required by the Engineer.

H. Land disturbance activities are not authorized to begin until after all required erosion and sediment control permits are obtained. Contractor shall comply with requirements specified in the Contract Documents or as directed by the Engineer. Contractor shall also comply with all other laws, rules, regulations, ordinances and requirements concerning soil erosion and sediment control.

1.04 SUBMITTALS

A. Prior to commencement of work, the Contractor shall submit for approval, product data for perimeter controls, such as silt fence, filter sock, coir log, or other sediment and erosion controls, along with a proposed work schedule, sequence of operations, and coordination of other work.

B. The Contractor is responsible for meeting all the requirements of the relevant NPDES Permit for Construction Activities as described by Environmental Protection Agency (EPA). The Contractor shall develop a Stormwater Pollution Prevention Plan (SWPPP) based on guidance from EPA.

C. Prior to commencement of work, the Contractor shall submit for approval:

1. Potential erosion and sediment pollution problems and measures to be taken to control those problems.
2. Erosion and sediment control practices to be employed are dependent on their location, size, maintenance requirements and design calculations.
3. The schedule, phasing, and coordination of construction operations and erosion and sediment control practices.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials for use in erosion and sedimentation control devices shall be in accordance with the Contract drawings and MassDOT's Standard Specifications unless otherwise instructed by the Engineer.

B. Acceptable sediment control devices include, but are not limited to, silt fence, silt curtain, filter sock, coir log, erosion control blanket, seed and straw, check dams, turbidity curtain, etc. Sediment control devices shall be constructed in accordance with the Contract drawings and MassDOT's Standard Specifications, unless otherwise instructed by the Engineer. The sediment control methods and materials shall be approved, in writing by the Engineer, prior to the commencement of work.

PART 3 EXECUTION

3.01 INSTALLATION AND MAINTENANCE

A. Erosion and sedimentation control devices shall be established prior to clearing operations in a given area. Erosion and sediment control measures shall be

applied to all disturbed areas. In addition, Contractor shall identify all site access, staging and stockpile areas in the field, and apply appropriate erosion and sediment control measures, prior to initiating any land disturbing activities.

B. All sediment basins, trap embankments and slopes, perimeter dikes, swales and all disturbed slopes steeper than or equal to 3H:1V shall be stabilized with sod or seed and anchored straw mulch, or other approved stabilization measures, as soon as possible, but no later than 7 calendar days after establishment. All areas disturbed outside of the perimeter sediment control system must be minimized. Maintenance shall be performed as necessary to ensure continued stabilization. Requirement for stabilization may be reduced to 3 days for sensitive areas.

C. The Contractor shall furnish the labor, materials and equipment required for routine maintenance of all erosion and sedimentation control devices. Maintenance shall include but not be limited to:

D. The removal and satisfactory disposal of accumulated sediment from traps or silt barriers.

E. Replacement of filter fabrics used for silt fences and stone used in temporary sediment traps, stone filters, and gravel construction entrances, etc.

3.02 INSPECTIONS AND MAINTENANCE

A. Erosion and sediment control devices shall be inspected daily and within 24 hours after each rainfall event of 1/2 inch or more of precipitation. During inspection, the Contractor shall check for areas where runoff has breached, bypassed, or otherwise caused the device to fail or compromise its function. If an erosion and sediment control device becomes ineffective due to weathering, decomposition or damage, then the Contractor shall replace the affected section immediately.

B. Accumulated sediment must be removed when it reaches approximately 1/3 of the height of the silt fence or check dam.

C. The Contractor shall take immediate action will be taken to correct deficiencies to Best Management Practices (BMP). The Engineer reserves the right to stop all construction activities not related to maintaining BMPs until such deficiencies are repaired.

D. In areas that have been permanently stabilized, inspections and, if necessary, maintenance by Contractor, will occur at least once per month for the duration of the contract or project, whichever is longer.

E. During inspections the following will be observed and appropriate maintenance procedures taken:

F. The conformance to specifications and current condition of all erosion and sediment control structures.

G. The effectiveness and operational success of all erosion and sediment control measures.

H. The presence of sediments or other pollutants in storm water runoff at all runoff discharge points.

I. If reasonably accessible, the presence of sediments or other pollutants in receiving waters.

J. Evidence of off-site tracking at all locations where vehicles enter or exit the site.

3.03 REMOVAL OF TEMPORARY SEDIMENT CONTROL STRUCTURES

A. At such time that temporary erosion and sediment control structures are no longer required under this item, the Contractor shall notify the Engineer of their intent, schedule for the removal of the temporary structures, and obtain the Engineer's approval in writing prior to removal.

B. Once the Contractor has received written approval from the Engineer, the Contractor shall remove the temporary structures and all accumulated sediments.

C. Final permanent stabilization will include finished grading per plan contours or the Engineer's approval.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK SPECIFIED

A. The Work covered under this Section of these Specifications consist of furnishing all plant, labor, supervision, equipment, appliances, and materials and in performing all operations in connection with the installation of reinforced concrete for all aspects of the project, all in strict accordance with the Contract Documents.

1.02 SUBMITTALS

A. Shop Drawings and Product Data

1. Shop drawings and product data showing all fabricated dimensions and locations for placing of the reinforcing steel and accessories shall be submitted for review. Shop Drawings shall provide sufficient technical data to demonstrate compliance with the specified requirements. Products, materials, or information submitted for review shall not be used or fabricated until after receipt of the Project Engineer's review comments. Distribute only reviewed shop drawings to the job site.

B. Mix Design.

Submit concrete mix design, with known test results, to the Project Engineer for review. The concrete mix design submittal shall consist of at least the following:

1. Type of cement.
2. Dry weight of cement.
3. Saturated surface-dry weights of fine and coarse aggregates.
4. Specific gravity of fine and coarse aggregates.
5. Quantities, type, name, and producer of admixtures, as applicable.
6. Total weight of water, including the water that is absorbed by and on the surface of the aggregates.
7. Water to cement ratio.
8. Slump: Maximum slump, taken at the truck, will be determined based on the pump hose length. The mix designs shall include the anticipated loss of slump per 100-foot length of specified hose size.
9. Strength test data of the proposed mix design as specified herein.
10. Distribute reviewed mix design to testing laboratory, batch plant, and job site.

C. Concrete Batch Tickets

1. Submit concrete batch tickets for each truck delivered to site. Each ticket shall note at least the following data: design mix strength; batch proportions including actual water and aggregate moisture contents; date and batch time; arrival time at site; discharge time; concrete volume; and any change to concrete made at the site.

D. Construction Joints

1. Submit proposed construction and control joint details and locations for Project Engineer's review.

E. Curing and Protection Procedures

1. Include product data on materials proposed for use.

F. Test Reports

1. Concrete Temperature
2. Concrete Slump
3. Concrete Air Content
4. Compressive Strength Tests

G. Hot and Cold Weather Concreting

1. Submit proposed compliance method.

PART 2 PRODUCTS

2.01 MATERIALS

A. Quality Assurance:

1. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
2. The Owner, through the Project Engineer, reserves the right of approval of any Subcontractor pre-qualified and selected for this portion of the Work by the Contractor. Approval will be based, in part, on a documented successful experience in performing work of a similar nature.
3. Cast-In-Place Concrete work shall conform to all requirements of ACI 301, "Specifications for Structural Concrete for Buildings".
4. Detailing, fabrication, and erection of reinforcing steel shall conform to ACI 318, "Building Code Requirements for Structural Concrete and Commentary" and ACI 315, "Details and Detailing of Concrete Reinforcement".
5. Ready mix plant equipment and facilities shall conform to the "Check List for Certification of Ready Mixed Concrete Production Facilities" of the NRMCA.

B. Concrete:

1. Portland cement: Type II - low alkali conforming to ASTM C 150, "Standard Specification for Portland Cement". Portland cement may be replaced by one of the following supplementary cementitious materials:
   a. Ground Granulated Blast Furnace (GGBF) Slag at a minimum of 40 percent of total cementitious material.
   b. Fly Ash or natural pozzolan at a minimum of 20 percent of total cementitious material.
   c. Silica fume at a minimum of 7 percent of total cementitious material.
2. Aggregate, general:
   a. Shall be normal weight and uniformly graded and clean conforming to ASTM C33, "Standard Specification for Concrete Aggregates".
   b. Do not use aggregate known to cause excessive shrinkage.
3. Aggregate, coarse: Crushed rock or washed gravel with a maximum size of 3/4".
4. Aggregate, fine: Natural washed sand of hard and durable particles varying from fine to particles passing a 3/8" screen, of which at least 12% shall pass a 50-mesh screen.
5. Water: Clean and potable.
6. Air entraining admixture shall conform to ASTM C260, "Standard Specification for Air Entraining Admixture for Concrete". The air entraining agent shall be a nontoxic concentrated solution of neutralized Vinsol resin, such as "Daravair 1000" as manufactured by GCP Applied Technologies or equivalent accepted by the Project Engineer.
7. Water reducing admixture shall conform to ASTM C494 "Standard Specification for Chemical Admixtures for Concrete." Water reducing agent shall be of Type A, F, or G (as noted in concrete mix design) such as "Daracem-100" as manufactured by GCP Applied Technologies or equivalent accepted by the Project Engineer.

C. Reinforcing Steel:

1. All reinforcing steel shall conform to ASTM 615 Grade 60, "Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement".
2. Reinforcing steel shall be fusion bond epoxy coated per ASTM A775 or hot dip galvanized per ASTM A767.
3. Fabricate reinforcement to the required shapes and dimensions, within fabrication tolerances stated in the CRSI "Manual of Standard Practices."
4. Do not use reinforcement having any of the following defects:

a. Bar lengths, depths, or bends exceeding the specified fabricating tolerances.

b. Bends or kinks not indicated on the Drawings or required for this Work.

c. Bars with cross section reduced due to excessive rust or other causes.

D. Moisture Protection:

1. Curing materials for concrete cast above the tidal zone shall conform to ASTM C309, "Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete", wet burlap, or plastic membrane.

E. Accessories:

1. All spacers, chairs, bolsters, and other devices necessary for proper reinforcing steel placement shall be epoxy coated with nylon tipped legs. All reinforcing steel shall be adequately tied with nylon, epoxy, or plastic-coated tie wire and supported with epoxy-coated chairs that hold the bars to the specified clearance. One chair sample shall be submitted to the Project Engineer for review. No clay or concrete bricks or any other material other than reviewed chairs shall be permitted to support reinforcing steel.

F. Bonding Agent and Fusion Bonded Epoxy Coating Touch-Up:

1. Bonding agent shall be Sika Armatec 110 Epocem, as manufactured by Sika Corporation or an equivalent accepted by the Project Engineer.

G. Product Delivery, Storage, and Handling:

1. Conform to the recommendations of ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete".

PART 3 EXECUTION

3.1 INSTALLATION

A. Concrete Mix Proportioning

1. Concrete shall be proportioned by the Contractor in accordance with ACI 301. The proposed design mix, together with all the Test Records, or Trial Mix Data, as required by ACI 301, shall be submitted to the Project Engineer for review at least two weeks prior to the first intended placement. Submit a separate pump mix if different from concrete mix placed by conventional methods.

2. Concrete shall be normal weight with a minimum compressive strength of 5000 psi at 28 days, unless noted otherwise (UNO).

3. Concrete shall have a maximum water to cement ratio of 0.40, UNO.

4. Concrete shall be proportioned to have a slump of 4 inches, + 1 inch, at the discharge end of the pump hose. Use a water reducing agent as

required to achieve the desired slump range. Addition of water at site will not be permitted.

5. Concrete shall contain 4% to 6% entrained air (based on 3/8" coarse aggregate).

B. Form Construction

1. Design, erect, support, brace, and maintain formwork so it will safely support vertical and lateral loads which might be applied until such loads can be supported safely by the concrete structure in accordance with ACI 347.
2. Construct forms to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished structure.
3. Form coating or water shall be applied to all forms. If coating is used, it shall be applied prior to placement of reinforcing steel.
4. Form ties and spreaders shall be of such type as to leave no metal closer than 3 inches from any exposed concrete surface.

C. Reinforcement Placement

1. All coated reinforcing steel shall be protected from damage to the coating during handling and placement. Any coated reinforcing steel, where the coating has been damaged shall be either removed from the site or re-coated, at the Project Engineer's discretion with strict conformance to the manufacturer's instructions at the Contractors expense.
2. Place reinforcement to obtain the required coverage for concrete protection. Minimum concrete cover for all reinforcing shall be 3 inches except where specifically noted otherwise.
3. Clean reinforcement and remove loose dust, earth, and other materials which reduce bond or destroy bond with concrete other than coating.
4. Position, support, and secure reinforcement against displacement by forms, construction, and the concrete placement operations.
5. All reinforcing steel shall be continuous unless specifically detailed otherwise on the Contract Drawings. Provide dowels or lap splices of the appropriate class to maintain continuity. Unless otherwise shown on the Contract Drawings lap bars in compliance with ACI 318. Dowels or splices shall be shown on the shop drawings and shall be subject to the field review of the Project Engineer. No more than 60% of the total number of bars shall be spliced at one location.

D. Embedded Items

1. Install embedded items furnished under this Section and other Sections. All sleeves, inserts, anchors, and embedded items required for adjoining

work or for its support shall be placed prior to casting concrete. All embedded items shall be positioned accurately and supported against displacement.

2. Where existing timber pile tops are to be embedded in the concrete, thoroughly clean the embedded portion of the piles of all debris and foreign matter prior to concrete placement. Do not damage the existing piles by cleaning.

E. Concrete Mixing

1. Transit-mix the concrete in accordance with provisions of ASTM C94.
2. Do not use concrete after 90 minutes from time of introduction of water to the mix.

F. Concrete Placement

1. All concrete work shall conform to the requirements of ACI 318, "Building Code Requirements for Structural Concrete".
2. Preparation:
    a. Remove foreign matter accumulated in the forms.
    b. Rigidly close openings left in the formwork.
    c. Wet wood forms immediately prior to concrete placement. Wet wood forms sufficiently to tighten up cracks. Wet other material sufficiently to maintain workability of the concrete.
    d. Use only clean tools.
3. Conveying:
    a. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic.
    b. Deposit concrete as nearly as practicable in its final location so as to avoid separation due to re-handling and flowing.
    c. Do not use concrete which becomes non-plastic and unworkable, or does not meet required quality control limits, or has been contaminated by foreign materials.
    d. Remove rejected and excess concrete from the job site.
4. Placing concrete in forms:
    a. Concrete shall be cast to full dimensions in one operation.
    b. Free-fall of concrete during placement greater than eight feet is prohibited. The contractor shall place concrete with a tremie tube for drops greater than eight feet.

c. Deposit concrete in horizontal layers not deeper than 24 inches and avoid inclined construction joints.

d. Remove temporary spreaders in forms when concrete has reached the elevation of the spreaders.

e. Place concrete within 90 minutes after cement has been mixed with aggregates. Each batch of concrete delivered at the job site shall be accompanied by a time slip issued at the batching plant, bearing the time of charging of the mixer drum with cement and aggregates.

5. Consolidation

a. Consolidate each layer of concrete immediately after placing, by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.

b. Do not use vibrators to transport concrete inside the forms. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set.

6. Construction Joints

a. Do not use horizontal construction joints.

b. Secure the Project Engineer's review of joint design and location prior to start of concrete placement.

G. Curing And Protection

1. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

2. Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical damage and shall be maintained with minimal moisture loss at a relative constant temperature for the period necessary for hydration of the cement and hardening of the concrete.

3. Concrete surfaces not covered by forms or within the inter-tidal elevations shall be protected from loss of surface moisture for not less than seven days using moisture protection as specified herein.

4. If cold-weather concreting is anticipated, a preconstruction meeting should be held to define how cold weather concreting methods will be used. When the mean daily ambient temperature is at or below 40 degrees F or 45 degrees F and falling the Contractor shall follow the requirements of ACI 306.1, “Standard Specification for Cold Weather Concreting”:

a. Set up proper enclosure and heat to 50 degrees F for at least two (2) hours before starting any pour. Set up individual thermometers within

enclosure to monitor ambient temperatures near the face of fresh concrete. Thermometers shall be placed at a maximum of 50-foot centers, at major corners or returns, and at ends of concrete sections. Monitor and record temperatures in a log at early morning, noon, and early evening.

b. Use a water-reducing admixture with an accelerated set, but do not use or rely upon any material as an anti-freeze. Use of calcium chloride is forbidden.

c. Use vented heaters with blowers so placed that they do not produce localized hot spots which may dry out the concrete. Exposure to exhaust gases from combustion heaters is prohibited for the first 24 hours of the curing period.

d. Maintain the temperature of the formwork at not less than 50 degrees F but not greater than 70 degrees F for 48 hours after completion of pour; formwork may be stripped after 72 hours after completion of pour. After 48 hours of maintaining at least 50 degrees F, the temperature may be allowed to drop gradually and shall be kept above 32 degrees F for a period of seven (7) days after completion of pour. Protection during this period may be provided by existing enclosure or by means indicated in note e below.

e. Protection may be provided by use of insulation methods. Adequate insulation shall consist of at least one of the following:

1) 12" of dry earth; provide moisture cover if over slab concrete.

2) 4" of hay under adequate moisture cover.

3) 1" of insulation blankets with vapor barrier seal.

4) Other insulating material acceptable to the Project Engineer.

NOTE: Extreme conditions of temperature or wind may require more protection.

f. Concrete may not be placed on frozen ground.

g. All frozen concrete shall be removed from the job and replaced at a cost to the Contractor.

5. When the mean daily ambient and substrate temperature is above 80 degrees F, the Contractor shall follow the requirements of ACI 305.1, “Standard Specification for Hot Weather Concreting”. Concrete shall be protected from thermal damage. Provisions for windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light-colored material shall be made in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

a. No concrete shall be placed when the air temperature is above 90 degrees F unless the air is still, and relative humidity is above 80%.

b. Set up proper windbreakers for concrete surfaces whenever the relative humidity is less than 70% for slight air motion or 80% for light breezes.

c. Provide shade for pours otherwise exposed to the sun.

d. Concrete is to be at a temperature of 80 degrees F or less when placed. If necessary, the batching plant shall cool aggregates by spraying or by using chilled water or ice. All such water shall be accounted for as part of the mixing water.

e. Use an admixture with a retarded set.

f. All forms shall be thoroughly wetted at least daily and more often when the relative humidity is low.

g. For slabs, maintain the required materials for curing on hand, so they may be placed immediately upon finishing. All concrete placed in ambient temperatures over 80 degrees F shall be kept wet for a minimum of 24 hours. Intermittent spraying will not be permitted. No water shall be applied before concrete has acquired its initial set. When the concrete temperature of any slab goes above 100 degrees F, place a layer of sand on it and keep it continuously wet until the temperature is below 80 degrees F.

H. Finishing

1. Remove all fins, blemishes, and defective concrete areas and patch where required with reworked cement mortar of the same proportions as that used in the concrete.

2. Form tie holes shall be plugged solid with reworked cement mortar of the same proportions as that used in the concrete.

3. Exposed surfaces of concrete shall receive a wood float finish or a light broom finish, unless noted otherwise.

4. Areas designated as Stamped Concrete (Public Viewing Area) shall be colored Sand Stone or approved equal with New Brick Running Bond pattern or approved equal.

3.2 CONCRETE TESTING

A. Concrete testing shall comply with ACI-318. Test reports shall be submitted to the Project Engineer for review.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 310000
EARTHWORK

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. The work covered by this specification consists of furnishing all plant, labor, equipment, and materials and performing all operations in connection with excavation, excavation of unsuitable organic soils, subgrade preparation, placement and compaction of fill materials, and grading required for the site development and fill placement as shown in the contract documents.

1.02 CODES AND STANDARDS

A. ASTM D422-63(R90) Standard Test Method for Particle-Size Analysis of Soils

B. ASTM D1556-92 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

C. ASTM D1557-91 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft (2700 kN-m/m))

D. ASTM D2216-92 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock

E. ASTM D2922-91 Standard Test Methods for Density of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

F. ASTM D3017-88 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

G. ASTM D4318-93 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

H. ASTM D4643-93 Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method

1.03 SUBMITTALS

A. Testing of On-Site Sources for Gradation: Testing turnaround review time to be 8 hours or less upon being presented to the Project Engineer for review.

B. Testing of materials is the sole responsibility of the contractor.

C. Earthwork Operation and Sequence Plan

D. Bracing Plan

1. If the Contractor selects to use bracing, submit the support of excavation plan to the Project Engineer for review at least 10 working days prior to commencement of construction. The support of excavation system shall

be prepared by a Professional Engineer, registered in the Commonwealth of Massachusetts.

1.04 DEFINITIONS

A. SOURCE shall mean those areas from which any material brought to the site is derived. All material brought to the site shall be certified in writing as clean and free from environmental contaminants. The sources and test results shall meet with the approval of the Project Engineer before any material is delivered to the project.

B. EXISTING MATERIAL shall mean existing fill material on site.

C. UNSUITABLE MATERIALS shall mean Organic Silt or Inorganic Silt as well as debris, trash, organic material, peat, and other objectionable material.

D. ORGANIC MATERIAL shall mean fibrous mats of roots, decaying vegetation, organic silt, peat, timber piles, planks, wharf or fendering, garbage and sanitary wastes.

E. UNSUITABLE CONSTRUCTION DEBRIS shall mean on-site organic debris such as wood, stumps, organic material, roofing debris, or other miscellaneous debris that is unsuitable for compaction when mixed with granular material.

F. TRENCH EXCAVATION shall consist of the excavation of all pipelines, and other minor structures including but not limited to trench drains, underground infiltration chambers, catch basins, field inlets, manholes, oil / water separators, electrical conduit, fuel lines, and drop inlets.

G. UNSTABLE MATERIAL shall mean debris, frozen materials, topsoil, organic silts, quicksand, and such other soft or loose material which does not remain in position when cut for excavations or which does not have sufficient bearing strength to support the loads placed upon it.

H. UNSUITABLE MATERIAL shall mean organic material, peat, organic silt, or combinations thereof, all having unsuitable bearing properties and/or all materials of whatever description that are too loose or saturated for use as backfill to provide satisfactory bearing capacity.

I. TOPSOIL shall mean the surface layer of soil and shall be free from refuse or any material toxic to plant growth. Topsoil shall also be free from subsoil, woody vegetation, stumps, roots. brush, stones, clay lumps, or similar objects larger than 2 inches in greatest dimension except in lawn areas where maximum size shall be 1 inch. The soluble salt contents of the soil shall be between 750 to 1,500 parts per million (ppm) as determined by a conductivity measurement. The soil shall be considered acceptable if the conductivity measurement is between 0.5 and 1.0 milli-mhos/ centimeter for a 1:2 soil/water ratio. Topsoil shall be free from invasive plant species. Topsoil shall meet the following requirements unless otherwise specifically stated in the plans or proposal.

1. The pH of the material shall be between 5.5 and 7.0.

2. The organic content shall be not less than 3% nor more than 20%.

J. EARTH shall mean all excavated material not classified as loose rock or solid rock.

K. COMMON FILL shall mean sand, loam, clay, silt, gravel, topsoil, or similar materials free from debris, frozen materials and containing some rock fragments, stones, pebbles and lumps not exceeding 2 inches in their largest dimension.

L. SAND shall mean clean, hard, strong, durable, inert and uncoated grains, free from injurious amounts of dust, lumps, soft flaky particles, shale, alkali, organic matter, loam or other deleterious substances.

M. SELECT FILL (Structural Fill) shall consist of sandy gravel or gravelly sand, free of organic material, loam, trash, snow, ice, frozen soil or other deleterious materials, and well graded within the following limits*:

Sieve	% Passing
6 inch	100
3/4" inch	95-100
No. 4	45- 55
No. 10	10-15
No. 40	0-2
No.200	0-2

**Select Fill samples are to be provided to the Project Engineer prior to construction.*

N. WASHED GRAVEL shall mean gravel conforming to A.S.T.M. C-33 size 57.

O. CRUSHED STONE shall meet the definition provided by MassDOT Standard Specification for Highways and Bridges Division III Section M2.01.0.

P. CRUSHER RUN shall consist of the residual material resulting from the crushing of clean, washed crushed stone, but in no cases shall contain organics or other deleterious materials.

Q. UNCLASSIFIED EXCAVATION shall consist of the excavation and disposal of all materials of any description, encountered in the course of construction unless otherwise specified in the contract.

R. REVETMENT STONE shall be excavated from within the footprint of the existing revetment to be demolished and reused onsite to repair existing revetment to remain as required.

1.05 RELATED WORK SPECIFIED ELSEWHERE

A. Additional requirements relative to handling, placement, and compaction of backfill fill materials related to utilities are specified in Section 312333

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS, Section 330500 COMMON WORK RESULTS FOR UTILITIES.

B. Additional requirements relative to erosion control measures are specified in Section 015713 TEMPORARY EROSION AND SEDIMENTATION CONTROLS.

1.06 PREPARATION

A. Examine the site thoroughly and determine the existing conditions and difficulty of work to be performed.

B. Before commencing earthwork operations, determine that preparatory work has been completed.

C. Perform field surveys required to accomplish the work.

1.07 DEGREE OF COMPACTION

A. Expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D1557 Modified Proctor Test.

B. Abbreviated in this Specification as a percent of laboratory maximum dry density.

1.08 UTILIZATION OF EXCAVATED MATERIALS

A. Reuse satisfactory material removed from excavations, insofar as practical, in the construction of fills, subgrades and similar purposes.

B. Dispose of unsatisfactory and excess materials removed from excavations in designated waste disposal or spoil areas.

C. Do not dispose of any excavated material in such a manner as to be detrimental to the completed work.

1.09 FIELD QUALITY CONTROL

A. Quality control compaction testing of material placed during construction will be provided by the Contractor. The Project Engineer shall be notified 48 hours prior to any excavation, fill, backfill, or compaction operations.

B. Permit the Project Engineer to observe all subgrades for each layer of fill or backfill. Additional fill or backfill should not be placed unless the Project Engineer has approved the subgrade and/or previous layer of fill.

C. When required or requested by the Project Engineer, the Contractor shall provide field elevations of the compacted subgrade or fill layer.

D. Compacted materials that are below the specified density shall be re-compacted at no additional expense to the Owner.

E. The Contractor shall bear the cost of removal of all unsuitable material placed without approval by the Project Engineer that fail to conform to the specifications.

PART 2 PRODUCTS

2.01 CRUSHED STONE

A. CRUSHED STONE shall consist of one or the other of the following material:

1. Durable crushed rock consisting of the granular fragments obtained by breaking and crushing solid or shattered natural rock, and free from a detrimental quantity of thin, flat, elongated*, or other objectionable pieces.

   *Thin or elongated pieces are defined as follows: Thin stones shall be considered to be such stones whose average width exceeds four (4) times their average thickness. Elongated stones shall be considered to be such stones whose average length is in excess four (4) times their average width.

2. Durable crushed gravel stone obtained by artificial crushing of cobbles, boulders, or field stone with a minimum diameter before crushing of 8 inches.

3. The crushed stone shall be reasonably free from clay, loam, or deleterious material and not more than 1.0% of satisfactory material passing a No. 200 sieve will be allowed to adhere to the crushed stone.

4. Crushed stone shall be uniformly blended according to the following grading requirements:

SIEVE SIZE	PERCENT FINER BY WEIGHT	
	3/4 INCH CRUSHED STONE	1-1/2 CRUSHED STONE
1 ½-Inch	--	100
1 ¼-Inch	--	85-100
1-Inch	100	--
3/4-Inch	90-100	10-40
1/2-Inch	10-50	0-8
3/8-Inch	0-20	--
No. 4	0-5	--
No. 200	<1	<1

B. All crushed stone referred to on the Construction Drawings shall be 3/4-inch crushed stone unless otherwise specified.

C. "1-1/2" crushed rock aggregate" referred to in the drawings shall be 1-1/2" crushed stone.

2.02 COMMON FILL

A. Common fill shall consist of sand, silt, gravel, or similar materials free from trash, topsoil, organic or compressible material, roots and vegetation. Stones, rock, brick, and concrete fragments not exceeding 2 inches in their largest dimension are

acceptable provided they are not nested when placed for compaction and can be readily spread and compacted during filling. Common fill may be acceptable for use as backfill at the discretion of the Project Engineer, provided it can be placed and properly compacted.

2.03 SAND BEDDING FOR UTILITIES

A. Sand Bedding shall be free from ice and snow, roots, sod, rubbish and other deleterious or organic material. Sand Fill shall be a well-graded, medium to coarse sand with a maximum diameter of 1/4 inch and less than 10% passing the # 200 sieve by weight.

PART 3 EXECUTION

3.01 PREPARATION

A. Contact all utility companies and property owners which might have installations in the area to determine location of all utilities and structures.

B. Protect above and below grade utilities which are to remain.

C. Protect plant life, trees, lawns, and other features remaining as a portion of final landscaping.

D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

E. Implement temporary erosion control measures such as silt fencing, hay bales, sediment traps, etc. as required to minimize the effects of erosion and sedimentation in excavations. Refer to Section 01600 ENVIRONMENTAL PROTECTION & Section 015713 TEMPORARY EROSION AND SEDIMENTATION CONTROLS.

3.02 DISPOSAL

A. Remove all unsuitable and organic materials (as determined by the Project Engineer) from the property and dispose offsite as required by local, State and Federal codes, rules and regulations. Remove existing foundations, demolition debris, abandoned utility piping, slabs, pavements, steel, sheeting, timber, floats, piles, and other debris encountered in areas of construction. Dispose of excess or unsuitable material as part of the Contract price.

3.03 DRAINAGE

A. Direct surface water away from excavations, existing buildings, roadways and construction sites to prevent erosion and undermining of foundations.

B. Provide diversion ditches, dikes and grading and maintain as required during construction.

C. Protect excavated slopes and backfill surfaces to prevent erosion and sloughing.

D. Perform excavation so that the site and the area immediately surrounding the site shall be continually and effectively drained.

3.04 DUST SUPPRESSION

A. Project Engineer shall determine if dust generated at the site is significant enough to require dust suppression.

B. Dust suppression shall require application of water by Contractor. Contractor shall at all times keep machinery, and a sufficient supply of water onsite to suppress dust generated at the site, as necessary.

C. Contractor shall suppress dust as necessary throughout construction, and until vegetation or other surface treatments have been established, if necessary.

D. Uniformly apply water to surface, subgrade or layer of soil material requiring dust suppression.

3.05 FILLING AND BACKFILLING

A. Material placement shall begin after approval of the subgrade by the Project Engineer.

B. Use satisfactory materials to replace unsatisfactory materials.

C. Place "Select Fill" or beneficial re-use material as backfill within the limits specified.

D. "Select Fill" to be 95% compacted with a moisture content within 5% of optimum.

E. Place satisfactory materials in horizontal layers not exceeding 24 inches in loose thickness where self-propelled or towed mechanical compaction equipment is used, or 12-inch loose lift thickness when hand-operated compactors are used.

F. Do not begin backfilling until construction below finish grade has been approved and the excavation is clean of trash and debris.

G. Subgrade shall be uniform throughout. There shall not be hard spots or soft spots.

H. Prevent free water from appearing on surface during or subsequent to compaction operations.

I. Soil material too wet to permit compaction to specified density shall be removed and replaced or scarified and air dried.

J. Place and compact fill and backfill to indicated finish grade within a tolerance of one foot horizontally and 1 inch vertically.

K. Do not place successive layers of fill material until the compaction requirements of the previous layer have been satisfied.

L. Maintain positive drainage on the surface of unfinished fills. Blade the unfinished surfaces smooth to a crown at the conclusion of each day's work.

M. Uniformly grade the finished fill surfaces such that they are smooth, compacted, and free from irregular surface changes.

N. Unless otherwise noted compact fill and backfill material to a minimum of 95 percent of the maximum dry density per ASTM D 1557 Modified Proctor.

O. Moisture control:

1. Where subgrade or layer of soil material must be moisture-conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material as needed to obtain optimum moisture content.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

P. The Contractor shall use extra care when compacting adjacent to walls. Where walls are buried on both sides, backfill and compaction shall proceed on both sides of the wall so that the difference in top of fill level on either side of the wall shall not exceed two feet (2 ft.) at any stage of construction. Where backfill of a buried wall is only on one side, only hand-operated roller or plate compactor shall be used within a lateral distance of five feet (5 ft.) of back of wall.

Q. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of a day's operations. Prior to terminating operations for the day, the final layer of fill, after compaction, shall be rolled with a smooth-wheeled roller to eliminate ridges of soil left by tractors, trucks, and compaction equipment.

R. The Contractor shall not place a layer of fill on snow, ice or soil that was permitted to freeze prior to compaction. Removal of these unsatisfactory materials will be required as directed by the Project Engineer.

3.06 MAINTENANCE

A. Protect newly graded areas from traffic and erosion and keep free of trash and debris. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, remove to sound material, reshape, and compact to required density prior to further construction.

3.07 EROSION CONTROL

A. Protect disturbed areas from erosion.

B. Install Erosion Control measures as noted on the contract drawing and as specified in Section 015713 TEMPORARY EROSION AND SEDIMENTATION CONTROLS.

3.08 DAMAGE

A. Any damage resulting from excavation, backfill and compaction shall be repaired by the Contractor to the satisfaction of the Project Engineer and at the Contractor’s expense.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 312333
EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITY SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Excavating trenches for buried utilities.

B. Backfilling and compaction of trenches.

1.02 RELATED SECTIONS:

A. Additional requirements for earthwork activities are specified in Section 015713 TEMPORARY EROSION AND SEDIMENTATION CONTROLS, Section 310000 EARTHWORK, and Section 330500 COMMON WORK RESULTS FOR UTILITIES.

1.03 CODES AND STANDARDS:

A. ASTM D422-63(R90) Standard Test Method for Particle-Size Analysis of Soils

B. ASTM D1557-91 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft (2700 kN-m/m))

C. ASTM D2922-91 Standard Test Methods for Density of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

D. ASTM D3017-88 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.04 DEFINITIONS:

A. Degree of Compaction:

1. Expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D1557.
2. Abbreviated in this Section as a percent of laboratory maximum density.

1.05 SUBMITTALS:

A. Refer to Section 015713 TEMPORARY EROSION AND SEDIMENTATION CONTROLS, Section 310000 EARTHWORK, and Section 330500 COMMON WORK RESULTS FOR UTILITIES for additional submittal requirements.

1.06 PROTECTION OF EXISTING STRUCTURES AND UTILITIES:

A. Protect and support existing structures and utilities where adjacent excavation is likely to cause damage or settlement.

B. Immediately report to Engineer any sewers, drainage, water lines, electric power, gas, telephone conduits or cables, or any other utility lines not indicated on the drawings that are encountered during excavation.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Bedding and backfill material above the installed utility shall meet the requirements specified in the sections under Part 1.2 above.

2.02 PLASTIC MARKING TAPE:

A. Plastic Marking Tape:

1. Acid and alkali-resistant polyethylene film.
2. Provide tape type specifically manufactured for marking and locating underground utilities.
3. Provide tape with the metallic core encased in a protective jacket or with other means to protect it from corrosion.

PART 3 EXECUTION

3.01 EXCAVATION:

A. General:

1. Perform work in accordance with OSHA requirements.
2. Perform excavation of trenches to the lines and grades indicated on drawings.
3. During excavation, stockpile material satisfactory of backfilling in an orderly manner at a distance no closer than 2-feet.
4. Provide grading that will prevent surface water from flowing into the excavation.
5. Remove water accumulating in the excavation as necessary to maintain the stability of the bottom and sides of the excavation.
6. Place and compact backfill material in accordance with Section 310000 EARTHWORK.
7. Refer to the requirements specified in the sections under Part 1.2 above for additional information related to excavation, bedding, and backfilling.

B. Trench Excavation:

1. Trench width and profile below the top of the buried commodity:
   a. Conform to the buried commodity manufacturer's recommendations.
2. Where manufacturer recommendations are not available, follow the guidelines on the Project Drawings. Give special attention to trench side slopes that may be adversely affected by weather or moisture content.

C. Bottom Preparation:

1. Accurately grade the bottoms of trenches to provide uniform bearing and

support of the bottom quadrant of each section of the pipe.

2. Excavate bell holes to the required size at each joint or coupling to eliminate point bearing.
3. Remove stones of 3-inches or greater in any dimension or as recommended by the pipe or cable manufacturer, whichever is smaller, to avoid point bearing.

D. Removal of Unyielding Material: Where unyielding material is encountered in the bottom of the trench, remove material 4-inches below the required grade and replace with suitable materials.

E. Removal of Unsuitable Construction Debris and Unstable Material: Where unsuitable construction debris or unstable material, as specified in Section 310000 EARTHWORK, is encountered in the bottom of the trench, remove material to the directed depth and replace to the proper grade with approved backfill material.

3.02 BEDDING AND BACKFILL:

A. Bedding:

1. Place approved backfill material in 6-inch loose layers and mechanically compact to not less than the 95 percent laboratory maximum density.
2. Minimum final compacted thickness: Four (4) inches.

B. Backfill:

1. Place approved backfill material around and to a depth ½ of the diameter of the pipe or unless otherwise noted on the Construction Drawings.
2. Spread material uniformly along each side of the pipe in 6-inch loose layers not exceeding 6-inches and compacted to 95 percent laboratory maximum density.

C. PLASTIC MARKING TAPE:

1. Install plastic marking tape directly above the top of pipe.
2. Install 3” wide printed underground warning tape with metal core approximately 9” below grade directly above the locations of the pipe as shown on the Contract drawings.

3.03 TESTING AND INSPECTION:

A. Visually inspect pipe joints for displacement or improper fit of the gasket material.

B. Follow pipe and gasket manufacturer’s recommendations for rejection due to non-water tightness of the joint.

C. Remove and re-install defective sections of the pipe with rejected joints.

D. The Contractor shall contact the Project Engineer when the pipe bedding is prepared. The Contractor shall conduct testing to determine the relative degree of

compaction of trench backfill materials. The Contractor shall conduct soil density tests to determine the relative degree of compaction for pipe bedding and trench backfill materials. Contractor shall re-compact any soil that does not meet the minimum soil density. Soil density testing frequency will, at a minimum, be as follows:

1. One test each 100 linear feet of trench backfill placed and compacted, or
2. One test for each 250 cubic yards of trench backfill placed and compacted
3. Not less than one test for each shift.
4. Additional testing may be conducted at the Project Engineer's discretion.

3.04 PROTECTION FROM EROSION AND CONTROL:

A. Implement temporary erosion control measures (i.e. silt fencing, hay bale sediment traps, etc.) to minimize the effects of erosion and sedimentation.

B. Refer to Section 015713 EROSION AND SEDIMENTATION CONTROLS for additional information.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 321000
BITUMINOUS CONCRETE PAVING

PART 1 GENERAL

1.01 DESCRIPTION

A. This work shall consist of producing and placing hot mix asphalt (HMA) pavement and furnishing and installing parking curb stops and surface striping. The HMA pavement shall consist of an aggregate or asphalt base course and asphalt surface course constructed in conformity with the lines, grades, thickness, and cross sections as shown on the plans and as directed on the prepared or existing base in accordance with these specifications. Work under this section shall cover the milling of existing asphalt, composition, mixing, construction upon the prepared subgrade, and the protection of hot asphalt concrete pavement. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course.

1.02 RELATED DOCUMENTS

A. Section 310000 – EARTHWORK

B. Contract Drawings and general provisions of the Contract, including General and Special Conditions and Specification sections, apply to the work of this section.

C. Material and construction standards per MassDOT's Standard Specifications and all amendments or latest version.

1.03 ALIGNMENT AND GRADE CONTROL

A. The contractor's surveyor shall establish and control the pavement (aggregate or asphalt base course and asphalt surface course), alignments, grades, elevations, and cross sections as shown on the drawings.

1.04 SUBMITTALS

A. In accordance with Section 013000 – SUBMITTAL PROCEDURES furnish the following:

1. Data and Test Reports:
    a. Aggregate Base Course: Sources, gradation, liquid limit, plasticity index, percentage of wear, and other tests required by State Highway Department.
    b. Asphalt Base/Surface Course: Aggregate source, gradation, soundness loss, percentage of wear, and other tests required by State Highway Department.
    c. Job mix formula.
    d. SDS (Safety Data Sheets) for all chemicals used on ground.

2. Certifications:
    a. Asphalt prime and tack coat material certificate of conformance to MassDOT requirements.
    b. Asphalt cement certificate of conformance to MassDOT requirements.
    c. Job mix certification: Submit plant mix certification that mix equals or exceeds the MassDOT Specification.
3. Contractor Quality Control Plan.
4. Road Closure & Traffic Management Plan.

1.05 GENERAL

A. The Contractor shall be responsible for notification to "Dig Safe" (888-344-7233) at locations where excavation is scheduled.

B. The Contractor shall provide police details for all road work per the Town of Barnstable guidelines.

C. The Contractor shall provide detour signs as needed for all road work per the Town of Barnstable guidelines.

D. The Contractor shall schedule and execute reconstruction operations so as to maintain pedestrian access to abutting property, particularly to the commercial and residential establishments.

E. All work shall be performed in accordance with the Contract Documents and MassDOT's Standard Specifications Section 450 – Hot Mix Asphalt Pavement.

F. The Contractor's attention is called to the fact that ADA accessible construction shall be in accordance with the provisions of the current Massachusetts Highway Department Standards and ADA Standards. The precise location and dimensions of ADA accessible areas shall be reviewed by the Project Engineer following final determination of profile grades.

G. Contractor must notify the Project Engineer for pre-inspection of the site 24 hours before placing the bituminous concrete pavement.

H. HMA shall only be placed on dry, unfrozen surfaces and only when the temperature requirements per MADOT are met. If the temperature requirements are not met at any point throughout the paving shift, HMA placement shall cease, except as determined and directed in writing by the Project Engineer depending upon the necessity and emergency of attendant conditions, and weather conditions.

I. The Contractor may continue HMA placement when overtaken by sudden rain, but only with material which is in transit from the HMA production facility at the time, and then only when the temperature of the HMA mixture is within the temperature limits specified and when the existing surface on the roadway is free of standing moisture. The Project Engineer is not obligated to accept any material that was not already in transit prior to the onset of rain and the Contractor shall

suspend operations for the day when the requirements of this specification cannot be met.

J. The construction of HMA pavement shall terminate November 15 and shall not be resumed prior to April 1 except as determined and directed in writing by the Project Engineer depending upon the necessity and emergency of attendant conditions, weather conditions, and location of the project. Only in extreme cases will the placement of Surface Courses be permitted between November 15 and April 1. Regardless of any temperature requirements, OGFC mixtures shall not be placed after October 31 or before May 1 without the written permission of the Project Engineer.

Temperature Limitations for HMA Placement

HMA Pavement Course	Lift Thickness (in.)	Min. Air Temperature (d F)	Min. Surface Temperature (d F)
Friction Course	1	50	55
Surface Course	<1 ¾	45	50
Surface Course	>1 ¾	35 (see Note #1)	40
Intermediate Course	All	35 (see Note #1)	40
Base Course	All	35 (see Note #1)	40
Leveling Course	As Specified	45	50
Note 1: When the air temperature falls below 50°F, extra precautions shall be taken in drying the aggregates, controlling the temperatures of the materials, and in placing and compacting the mixtures.			

K. The Contractor shall supply the Project Engineer with two approved dial type thermometers with a temperature range of -50°F to 500°F and two infrared pistol thermometer for each paving machine in operation on the project. The thermometers will remain the property of the Contractor upon completion of the project. The infrared pistol thermometers shall read in Fahrenheit and conform to the following requirements:

1. Portable and battery operated
2. LCD Display to nearest 1°F
3. Temperature operating range of 0°F to 750°F
4. Accuracy of ± 2%
5. Repeatability of ± 5°F
6. Emissivity preset at 0.95

1.06 PROTECTION

A. During the procedure of the work, the Contractor shall be held entirely responsible for the protection and result of the work and damage to the work that may occur through any cause and shall be repaired by the contractor at his expense.

1.07 PROTECTION OF PERSONS AND PROPERTY

A. Contractors are to erect such structures around the locations as may become necessary to allow pedestrians to travel by the locations and to fence in any danger area or other place adjoining the streets where the work is performed constituting a hazard to persons or property, and to properly light and maintain lights at night around the locations in question.

B. Contractor must notify the Project Engineer twenty-four (24) hours before starting the project.

C. Contractor must obtain street obstruction and disturbance permits before work commences.

1.08 QUALITY ASSURANCE

A. The Contractor is responsible for providing an appropriate Quality Control System (QC System) to ensure that all materials and workmanship meet the required quality levels for each specified Quality Characteristic. The Contractor will perform all required Quality Control inspection, sampling, and testing in accordance with these specifications and the Contractor's Quality Control Plan (QC Plan).

PART 2 PRODUCTS

2.01 MATERIALS

A. Material standards per MassDOT's Standard Specifications.

B. Aggregates:

1. Provide aggregates consisting of crushed stone, gravel, sand, or other sound, durable mineral materials processed and blended, and naturally combined.
2. Sub-base Section – Gravel Borrow Type "B": (MHD M1.03.0): 6"
3. Compacted Processed Gravel Base Section (MHD M1.03.1): 12"

C. Asphalts:

1. Hot Mix Asphalt Binder Course (SBC – 25.0): 2.50"
2. Hot Mix Asphalt Finish Course (SSC – 9.5): 1.50"

D. Sealer:

1. Provide a sealer consisting of suitable fibrated chemical type asphalt base binders and fillers having a container consistency suitable for troweling

after thorough stirring and containing no clay or other deleterious substance.

2.02 CONDITION IN THE CONTAINER

A. Paint and protective coatings shall be homogenous, free of contaminant and of a consistency suitable for use in the capacity for which it is specified. The finished product shall be well ground and the pigment shall be properly dispersed and suspended in the vehicle according to the requirements of the paint or protective coating. The dispersion shall be of such nature that the pigment does not settle badly, does not cake or thicken in the container, and does not become granular, jelled or curdled. Any settlement of pigment in the paint or protective coating shall be a thoroughly wetted soft mushy mass permitting the complete and easy vertical penetration of a paddle. Settled pigment shall be easily dispersed, with a minimum resistance to the sidewise manual motion of the paddle across the bottom of the container, to form a smooth uniform product of the proper consistency. The manufacturer shall include in the paint the necessary additives for control of sagging, pigment settling, leveling, and other qualities of a satisfactory working material. The paint shall possess satisfactory properties in all respects which affect its application and curing.

2.03 PACKAGING

A. The finished paint or protective coating shall be furnished in new 20 liter, round, non-tapered containers no thinner than 0.60 millimeter unless otherwise specified. The containers shall have the lug type crimp lids with ring seals and be equipped with ears and bails. The containers shall meet U.S. Department of Transportation Hazardous Materials Shipping Regulations. The container must be lined if necessary so as to prevent attack by the paint. The lining must not come off the can as skins.

B. The following information shall be labeled on each can in a clear legible manner:

1. Name of Manufacturer
2. Place of Manufacture
3. Manufacturer's Batch Number
4. MassDOT Specification Number
5. Date of Manufacture
6. Precautions concerning the handling and the application of the paint or protective coating shall be shown on the label.

2.04 SAMPLING AND TESTING

A. Sampling:

1. At least one sample, not less than one liter, shall be taken for each batch or less of each kind of paint to be used. Samples must be taken in clean, dry, airtight, wide mouth metal cans and the sample must fill the can to within

25 millimeters from the top. Each sample forwarded to the Project Engineer shall be accompanied by the name of the manufacturer, the batch number, the specification number and the quantity of paint represented.

2. Before the Contractor will be permitted to use any paint, the material proposed to be used shall have been sampled, tested and approved.

3. The manufacturer, as may be required by the Project Engineer, shall permit access to an inspection of his/her paint and all operations involved in the manufacture of these materials, shall permit sampling of raw materials and shall furnish such reasonable facilities as the Project Engineer may require for such inspection.

B. Testing:

1. Testing of paints may be completed by the Owner's Representative in accordance with the latest methods of Federal Test Method Standard Number 141, ASTM and Methods in use by the MassDOT Research and Materials Section. In addition, the Owner and/or Project Engineer reserves the right to make use of any information or methods of testing to determine the quality of paint and paint materials.

2. The manufacturer may submit a wet sample of the paint which he/she proposes to furnish. If the color of the wet sample is approved, paints matching the wet sample will, as regards to color, be accepted.

3. The Contractor shall assume all costs arising from the use of patented materials, equipment, devices or processes used or incorporated in the work and agrees to indemnify and save harmless the Owner or the Project Engineer from all suits at law or action of every nature for or on account of the use of any patented materials, equipment, device or processes.

PART 3 EXECUTION

3.01 GENERAL

A. The Asphalt Concrete Paving equipment, weather limitations, job mix formula, mixing, construction methods, compaction, finishing, tolerance, and protection shall conform to the requirements of the appropriate sections of the MassDOT's Standard Specifications, and all amendments or latest version, for the type of material specified.

3.02 SAWCUTTING

B. The pavement shall be sawcut through its full depth at all joints between existing and proposed pavements, and at all utility trenches, to provide a uniform, smooth vertical surface. Existing pavements shall be sawcut at the limits of work as shown on the plans and as required by the Project Engineer.

C. Sawcut edges which become broken, ragged or undermined as a result of the Contractor's operations shall be re-cut prior to the placement of abutting proposed pavement at no additional cost to the Department.

D. Sawcut surfaces in asphalt pavements shall be sprayed or painted with a uniform, thin coat of asphalt emulsion tack coat immediately before placement of hot mix asphalt against the cut surfaces.

3.03 SWEEPING UNDERLYING SURFACE

A. The Contractor shall provide a mechanical sweeper equipped with a water tank, spray assembly to control dust, a pick-up broom, a dual gutter broom, and a dirt hopper. The sweeper shall be capable of removing millings and loose debris from the underlying surface.

B. Prior to opening a milled area to traffic, all milled pavement surfaces shall be thoroughly swept in accordance with the applicable milling specification required by the contract to remove all remaining millings and dust. All pavement surfaces shall be swept clean, free of dust, fines, and slurry immediately prior to application of the tack coat. Any new HMA pavement course that has been open to traffic, or that was placed 30 days prior to placement of the subsequent pavement course, shall also be swept immediately prior to application of the tack coat.

3.04 MIXING ASPHALTIC CONCRETE MATERIALS

A. Provide hot plant-mixed asphaltic concrete paving materials.

1. Temperature leaving the plant: 290 degrees F minimum, 320 degrees F maximum.
2. Temperature at time of placing: 280 degrees F minimum.

3.05 CONSTRUCTION METHODS

A. Subgrade

1. Shape to line and grade and compact with self-propelled rollers.
2. All depressions that develop under rolling shall be filled with acceptable material and the area re-rolled.
3. Soft areas shall be removed and filled with acceptable materials and the area re-rolled.
4. Should the subgrade become rutted or displaced prior to the placing of the subbase, it shall be reworked to bring to line and grade.
5. Proof-roll the subgrade with maximum 45 tonne (50 ton) gross weight dump truck as directed by Project Engineer. If pumping, pushing, or other movement is observed, rework the area to provide a stable and compacted subgrade.

B. Base Course

1. Base:
   a. Spread and compact to the thickness shown on the drawings.

b. Rolling shall begin at the sides and continue toward the center and shall continue until there is no movement ahead of the roller.

c. After completion of the base rolling there shall be no hauling over the base other than the delivery of material for the top course.

2. Thickness tolerance: Provide the compacted thicknesses shown on the Contract Drawings within a tolerance of minus 0.0" to plus 0.5".

3. Smoothness tolerance: Provide the lines and grades shown on the Contract Drawings within a tolerance of 3/16-inch in 10-feet

4. Moisture content: Use only the amount of moisture needed to achieve the specified compaction.

C. Surface shall be pitched to provide proper drainage.

3.06 PLACEMENT OF ASPHALTIC CONCRETE PAVING

A. Remove all loose materials from the compacted base.

B. Apply the specified prime coat, and tack coat where required, and allow to dry in accordance with the manufacturer's recommendations as approved by Project Engineer.

C. Receipt of asphaltic concrete materials:

1. Do not accept material unless it is covered with a tarpaulin until unloaded, and unless the material has a temperature of not less than 280 degrees F.

2. Do not commence placement of asphaltic concrete materials when the atmospheric temperature is below 50 degrees F, not during fog, rain, or other unsuitable conditions.

D. Spreading:

1. Spread material in a manner that requires the least handling.

2. Where thickness of finished paving will be 4-inch or less, spread in one layer.

3. Avoid overhandling of materials that can cause separation for fines.

E. Rolling:

1. After the material has been spread to the proper depth, roll until the surface is hard, smooth, unyielding, and true to the thickness and elevations shown own the drawings.

2. Roll in at least two directions until no roller marks are visible.

3. Finished paving smoothness tolerance:

4. No depressions which will retain standing water.

5. No deviation greater than 1/8" in 6-feet.

3.07 MILLING EXISTING HMA PAVEMENT

A. When specified on the plans, existing HMA pavement courses shall be milled and removed from the project by the Contractor.

B. Adjustments to milling depth shall be approved by the Project Engineer and shall be used for consideration of the HMA pavement thickness measurements.

C. Each vertical face of the milled pavement that will be abutted by new pavement shall be thoroughly coated with a hot poured joint sealer prior to placing new HMA mixture adjacent to the vertical face.

3.08 PATCHING EXISTING PAVEMENT COURSES

A. Areas of existing HMA pavement courses that are significantly distressed or unsound shall be removed and replaced with patches using new Hot Mix Asphalt. The location and limits of patching will be as identified in the plans or as directed by the Project Engineer.

B. Each existing pavement course determined to be unsound shall be removed to the full depth of the pavement course within a rectangular area. For each patch location equal to or greater than 50 ft² in area (and having a minimum dimension of 4-ft) where the existing pavement courses are removed down to subbase, the subbase shall be compacted by mechanical means to not less than 95% of the maximum dry density of the subbase material as determined by AASHTO T 99 Method C at optimum moisture content. Each edge of the patch area shall be sawcut or otherwise neatly cut by mechanical means to provide a clean and sound vertical face. The vertical face of each edge shall be thoroughly coated with a hot poured joint sealer immediately prior to placing the HMA patching mixture.

C. Delaminated areas of existing pavement courses resulting from pavement milling shall be cut back neatly by mechanical means to the limits of any unsound material. After removing all unsound material, the underlying pavement surface within the patch limits shall receive a thorough tack coat.

D. HMA patching mixture shall be the same mixture type as the existing pavement course being patched or as specified on the plans or as directed by the Project Engineer.

3.09 HMA JOINTS

A. The Contractor shall plan the sequence of HMA placement to minimize transverse and longitudinal joints in each pavement course. Paving operations should employ long pulls or tandem pavers, whenever practicable, to reduce the number and length of joints. Finished joint surfaces, including joints in the roadway and bridge joints, shall be uniform and true to the required grade and crossslope without deviations exceeding ¼ in., both transversely and parallel to the joint, when measured with a 10-ft standard straightedge.

B. Transverse Joints

1. Where the start or end of a new HMA pavement course meets existing HMA pavement, the existing pavement shall be sawcut to form a transverse butt joint for the full depth of all new pavement courses. The sawcut shall follow a straight line and provide a clean and sound vertical face. Material at any intermediate transverse joint resulting from suspension of placement of a new HMA pavement course shall also be sawcut and removed to provide a clean vertical face before continuing placement of the pavement course.
2. When traffic is to be carried over any transverse joint before completion of an HMA pavement course, the Contractor shall provide a temporary tapered joint with a maximum 12:1 slope. The HMA mixture forming the taper shall be placed on heavy wrapping paper or other suitable material to serve as a bond breaker. The temporary tapered joint shall be sawcut to reveal the full depth of the pavement course and form a transverse butt joint with a clean vertical face. The temporary tapered joint material shall be completely removed before resuming placement of the HMA pavement course.
3. Prior to the start of HMA placement at each transverse joint, the vertical joint face shall be thoroughly coated with a hot applied pavement joint adhesive meeting the requirements of MassDOT's Standard Specification Section 450.30: General. The asphalt sealer temperature and application rate for each pavement course shall be established in the Contractor's QC Plan and shall follow the Manufacturer's recommendation. No reheating of the joint face shall be permitted. Equipment used to apply the hot applied pavement joint adhesive shall be capable of maintaining the sealer at the established temperature and application rate sufficient to uniformly coat the vertical joint face without runoff or accumulation of the asphalt sealer.

C. Longitudinal Joints

1. All longitudinal joints in HMA Surface Courses shall be located on the roadway centerline or on a lane line or edge line of the traveled way. The longitudinal joints in each pavement course below the Surface Course shall be successively offset from the joint in the Surface Course by no more than 12 in. and no less than 6 in. Joints shall be straight and parallel to the lane line of the roadway.

3.10 STONE BOUND, MANHOLES, SHUT-OFFS, WATERGATES, STOPS, GAS SHUT-OFFS, MANHOLES AND CATCH BASIN FRAMES AND COVERS

D. All shall be carefully set to the proposed finished grade, with 3-inch of concrete to underside of flange where applicable.

E. Utility shut-offs must be covered with plastic to prevent concrete from adhering to the covers. The plastic must be removed when the cleanup is performed the following day.

3.11 LEVELING COURSES

A. HMA Leveling Courses shall only be used when specified in the Contract. The HMA mixture used for a Leveling Course shall be as specified in the Contract and shall conform to the relevant materials requirements of this specification.

3.12 PREPARATION OF CURBS, EDGING, & UTILITIES

A. All curbs or edging shall be installed or reset to the line and grade established on the Contract Drawings. The surface elevation of all catch basin frames and grates, manholes, utility valve boxes, or other utility structures located in the pavement shall uniformly match the grade and cross-slope of the final pavement riding surface. Adjustment of all curbs, edging, and utilities shall be completed prior to the placement of the HMA Surface Course. Hand placement of HMA along curbs and edging or around utilities after placement and compaction of the Surface Course shall not be permitted.

3.13 APPLICATION OF SEAL COAT

A. Prepare the surfaces, mix the seal coat material, and apply in accordance with the manufacturer's recommendations as approved by the Project Engineer.

B. Apply one coat of the specified sealer.

C. Achieve a finished surface seal which, when dry and thoroughly set, is smooth, tough, resilient, of uniform black color, and free from coarse textured areas, lap marks, ridges, and other surface irregularities.

3.14 PROTECTION

A. Protect the asphaltic concrete paved areas from traffic until the sealer is set and cured and does not pick up under foot or wheeled traffic.

3.15 OPENING TO TRAFFIC

A. No vehicular traffic or loads shall be permitted on the newly completed HMA pavement until adequate stability has been attained and the material has cooled sufficiently to a temperature of 140°F or less as indicated by an infrared thermometer. The Contractor shall clearly outline, in the QC Plan, the specific criteria related to opening new pavement to traffic. The final determination to open the pavement to traffic shall be made by the Project Engineer and the Construction QC Manager.

3.16 FINAL CLEAN UP

A. Remove all debris, rubbish, and excess material from the work area.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

SECTION 330500
COMMON WORK RESULTS FOR UTILITIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 RELATED DOCUMENTS:

A. This Section includes the following:

1. PVC Schedule 40.
2. Viega PureFlow PEX.
3. Viega Pure Flow Fitting Standards.
4. Piping joining materials.
5. Transition fittings.
6. Dielectric fittings.
7. Sleeves.
8. Identification devices.
9. Grout.
10. Piped utility demolition.
11. Piping system common requirements.
12. Equipment installation common requirements.
13. Painting.
14. Concrete bases.
15. Metal supports and anchorages

1.03 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

C. PE: Polyethylene plastic.

D. PVC: Polyvinyl chloride plastic.

E. CI: Cast Iron.

F. DI: Ductile Iron.

G. HDPE: High Density Polyethylene

1.04 SUBMITTALS:

A. Product Data for the following:

1. Product Data: For each type of product as indicated in the Contract drawings, submit the manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications stating that materials comply with requirements.
2. Dielectric fittings.
3. Identification devices.

B. Welding certificates.

C. Test Reports: Submit certified reports for tests required.

D. Maintenance Data: Provide maintenance data and parts list for all water system work.

E. As-Built Documents: Utility Sub-Contractors shall be responsible for transfer of as-built information related to their Work to the Record Contract Drawings. The drafting must be done by experienced draftsmen and match the original Drawings.

F. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

1.05 QUALITY ASSURANCE:

G. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

H. The installer shall be a qualified installer, licensed within the jurisdiction, and familiar with the installation of cross-linked polyethylene (PEX) tubing systems.

I. The installation of cross-linked polyethylene (PEX) tubing for hot and cold water distribution systems shall conform to the requirements of the ICC International Plumbing Code or IAPMO Uniform Plumbing Code.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Cross-linked polyethylene plastic tubing and fittings shall be stored in a flat, dry, well ventilated location, not exposed to direct sunlight and supported to prevent sagging and bending. Normal care in handling shall be exercised to avoid abuse of

the tubing. The tubing and fittings shall not be thrown or dropped on the ground, walked on, or dragged.

1. PEX tubing should not be left exposed in direct sunlight for extended periods of time; short periods not to exceed 6 months are permissible.
2. Plastic manifolds and fittings should not be left exposed in direct sunlight for extended periods of time; short periods not to exceed 15 days are permissible.

1.07 COORDINATION:

A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.

C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Section 033000 CAST-IN-PLACE CONCRETE.

PART 2 PRODUCTS

2.01 PVC PIPE

D. Product Summary: PVC Schedule 40 Conduit for application underground, encased or exposed applications in accordance with the National Electrical Code (Article 352).

E. Product**:**

1. CANTEX Schedule 40 PVC Conduit;
2. Prime Conduit, Inc. Schedule 40 PVC Conduit;
3. Or approved equivalent

F. Product Requirements: Conduit shall be schedule 40, rated for use with 90° C conductors, ETL Listed to UL 651 or approved equal. Material shall comply to NEMA Specification TC-2 (Conduit), TC-3 (Fittings) and UL 651 (Conduit) and 514b (Fittings).

1. Conduit and fittings shall carry a ETL label or printline (Conduit - on each 10 foot length; Fittings - stamped or molded on each fitting).
2. Conduit and fittings shall be identified for type and manufacturer and shall be traceable to location of plant and date manufactured. The markings shall be legible and permanent.
3. The Conduit shall be made from polyvinyl chloride compound (recognized by ETL) which includes inert modifiers to improve weatherability and heat distortion. Clean rework material, generated by the manufacturer's own conduit production, may be used by the same

manufacturer, provided the end products meet the requirements of this specification.

4. The conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections which could mar conductors or cables.
5. Conduit is generally gray in color, unless otherwise agreed upon by both parties and/or any regulatory or inspection agency involved in specific projects.

2.02 VIEGA PUREFLOW PEX PIPE

G. Product Summary: cross-linked polyethylene tubing, and fittings using PureFlow press and PureFlow crimp technology for hot and cold water distribution systems. The system is assembled when the fitting barb is inserted fully into the tubing and either a stainless press sleeve or copper crimp ring is pressed/crimped over the tubing and fitting using the appropriate tool to create a leak proof permanent joint.

H. Product:

1. Viega Pureflow PEX;
2. Or approved equivalent

I. Manufacturer:

Viega LLC 585 Interlocken Blvd.
Broomfield CO, 80021
Phone: (800) 976-9819
www.viega.us

J. Material: Tubing Standard - Viega PureFlow PEX high-density cross-linked polyethylene tubing shall be manufactured to the requirements of ASTM F876 and meet the standard grade hydrostatic pressure ratings from Plastic Pipe Institute in accordance with TR-4/03. The following three standard grade ratings are required:

6. 200°F at 80 psig
7. 180°F at 100 psig
8. 73.4°F at 160 psig
    a. Chlorine testing: According to ASTM F876 shall meet or exceed the following end use condition: End use conditions of: 100% at 140°F. Per PEX 5306 (CL5).
    b. UV testing: According to ASTM F876 PEX tubing products shall meet or exceed the following exposure limits: Viega PureFlow PEX 6 months.

2.03 VIEGA PURE FLOW PEX FITTING STANDARD

K. Fitting Standard: PureFlow Press fittings shall be manufactured from UNS, C87700, C87710 bronze or polyphenylsulfone, meeting the requirements of ASTM F877 and ASTM F3347 (metallic) or ASTM F3348 (polymer) tested as a system with Viega PureFlow PEX tubing. The PureFlow Press sleeve shall be manufactured out of a 304 grade or better stainless steel and have three view holes (attached sleeve) to ensure proper PEX tubing insertion. The attached sleeve fitting will incorporate a tool locator ring that shall be in place while making a proper press connection. The PureFlow Press connection shall be made with a Viega supplied ratcheting PureFlow Press hand tool or PureFlow Press power tool.

L. Fitting Standard: PureFlow Crimp fittings for use with copper crimp rings shall be manufactured from UNSC69300 or C87850 Brass / Eco Brass® meeting the requirements of ASTM F1807 and or PolyAlloy polymer meeting the requirements of ASTM F2159. The PureFlow Crimp connection shall be made by use of a full circle crimp tool designed to crimp F1807 copper crimp rings.

M. Manifolds: Acceptable manifolds shall include:

1. Copper Manifolds: Shall be copper material having a male or female solder, ProPress or PureFlow Crimp inlets. All outlets shall be PureFlow Press, PureFlow Crimp or ProPress fittings. Shall be provided by the Cross-linked Polyethylene system manufacturer.
2. Polymer Manifolds: Shall be plastic material having a male NPSM thread, PureFlow Press or PureFlow Crimp inlets. All outlets shall be PureFlow Press or PureFlow Crimp connections provided by the PEX system manufacturer.
3. The location of a manifold with valves shall be accessible and in an area not subject to freezing. Proper support of the manifold shall be provided.

N. Adapter Fittings: PEX adapter fittings shall conform to one of the following ASTM standards; F877, F1807, F2159, or ASME B1.20.1 and be listed to the CSA B137.5. The adapter fittings shall mate to NPT threads, copper tubing, copper fittings or ProPress fittings.

O. Source Quality Control:

1. The PEX tubing and fitting manufacturer shall maintain a third party listing of the tubing and fittings. The tubing and fittings shall be certified in accordance with ANSI/NSF 14/61 to verify suitability to transport potable water. The tubing and fittings shall have the mark "NSF-pw", "cNSF® us pw-G", or "NSF 61" permanently marked on the product to verify the material listing.
2. The manufacturer of the PEX tubing and fittings shall maintain a quality control program in accordance with ISO 9001 or NSF International in the manufacturing plant to assure that the tubing and fittings are continually being produced to the required standard. The tubing and fittings shall be certified as complying with NSF 14.

2.04 IDENTIFICATION DEVICES:

A. General: Products specified are for applications referenced in other utilities Sections. If more than single type is specified for listed applications, selection is Installer's option.

A. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.

B. Pipes with OD, Including Insulation, Less Than 6-inches: Full-band pipe markers, extending 360 degrees around pipe at each location.

C. Pipes with OD, Including Insulation, 6-inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.

D. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.

1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.

E. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.

1. Material: 0.0375-inch- thick stainless steel.
2. Size: 1-1/2 inches in diameter, unless otherwise indicated.
3. Shape: As indicated for each piping system.

F. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S- hooks.

PART 3 EXECUTION

3.01 OBSERVATION:

A. All piping shall be observed in place by the City or Project Engineer prior to backfilling. Any pipe buried without approval of the City or Project Engineer shall be uncovered by the Contractor for observation at no expense to the Owner.

B. PEX tubing should be examined for defects, cuts, abrasions, cracks, fading color, or blemishes. There shall be no cracks or heavy deformations of the tubing. Fittings and manifolds shall be checked for any signs of abuse. Any damaged tubing or fittings shall be rejected.

3.02 LOCATION

A. The location of the centerline of the proposed pipeline will be staked in the field before utility construction begins.

B. The Contractor shall determine the location and elevation of underground utilities before commencing construction. Exploratory excavation shall be made sufficiently ahead of construction to permit revisions as required to meet the existing conditions. The Contractor shall take precautionary measures to protect the utility lines shown on these plans and any other lines not shown.

3.03 MATERIALS HANDLING:

A. Pipe, fittings, and appurtenances shall be inspected before they are lowered into trench. Interior of pipe and joint surfaces shall be thoroughly cleaned and shall be maintained clean. Open end of pipeline shall be securely plugged whenever pipe laying is not in progress.

B. Pipe and fittings which do not fit together to form a tight joint shall be rejected. Pipe and fittings shall be selected so that there will be as small a deviation as possible at joints so that the interior presents a smooth surface.

C. Pipe cutting shall be done squarely and neatly to permit a proper connection between the tubing and fitting with sharp tools using methods approved by pipe manufacturer in such a manner that it will not crack the pipe.

3.04 PIPED UTILITY DEMOLITION:

A. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.

B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.05 PEX TUBING INSTALLATION

C. Pressure rating: Install components having a pressure rating equal to or greater than the system operating pressure.

D. Install PEX tubing that is free of blemishes, cuts, gouges, kinks or noticeable fading of color.

E. Changes in direction: PEX tubing shall not exceed an eight times the tubing outside diameter (OD) free bend radius or a five times the tubing OD supported bend radius, with use of a Viega approved bend support. Install fittings for changes in direction where any minimum bend radius is exceeded and branch connections.

F. PureFlow Press connections: PureFlow Press fittings shall be made in accordance with the manufacturer's installation instructions. The Stainless press sleeve shall be placed over the end of the squared off PureFlow PEX tubing while fully inserting the fitting barb into the tubing. Full tubing insertion shall be verified by a visual confirmation of PEX being present through the view holes before engaging a press connection. Full insertion for an attached sleeve connection means tubing must be completely visible in at least two view holes and partially visible in the final view hole. The PureFlow Press connection shall be made with a Viega supplied ratcheting PureFlow Press hand tool or PureFlow Press power tool.

G. PureFlow Crimp connections: PureFlow Crimp fittings shall be made in accordance with the manufacturer's installation instructions. The copper crimp ring shall be placed over the end of the squared off PEX tubing then the PureFlow Crimp fitting fully inserted into the tubing. Position the crimp ring 1/8" to 1/4" from the end of the tubing before engaging a crimp connection. The PureFlow Crimp connection shall be made with a Viega supplied full circle crimp tool or equivalent.

H. Threaded joints: Threaded joints shall have a potable water listed joint sealant tape applied to the male threads only. Tighten joint with a wrench and backup wrench as required.

I. Penetration protection: Provide allowance for thermal expansion and contraction of PEX tubing passing through a wall, floor, ceiling or partition by wrapping with pipe insulation, or by installing through an appropriately sized sleeve. Penetrations of fire resistance rated assemblies shall maintain the rating of the assembly.

J. Horizontal support: PEX tubing must be supported every 32horizontally with Viega approved suspension clips or plastic insulators.

K. Vertical support: PEX tubing must be supported at each floor or ceiling penetration and every four feet in between.

3.06 PIPING INSTALLATION:

A. Install piping according to the following requirements and utilities Sections specifying piping systems.

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

C. Install piping to permit valve servicing.

D. Install piping at indicated slopes.

E. Install piping free of sags and bends.

F. Install fittings for changes in direction and branch connections.

G. Select system components with pressure rating equal to or greater than system operating pressure.

H. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
    a. Exception: Extend sleeves installed in or other wet areas 2-inches above finished floor level.
2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
    a. PVC Pipe Sleeves: For pipes smaller than NPS 6.

I. Verify final equipment locations for roughing-in.

J. Refer to equipment specifications in other Sections for roughing-in requirements.

3.07 PIPELINE FOUNDATION

A. Trenches shall be cut to specified depth limit by machinery. In select earth material, where machine excavation is stopped the specified distance above grade and another bedding material is not specified for the pipe, bed for pipe shall be formed of that material and trench bottom trimmed by hand to grade. Stones and

unsuitable material shall be removed, and low spots refilled with crushed stone, as specified in Section 310000 EARTHWORK, and Section 312333, EXCAVATION, TRENCHING, & BACKFILLING FOR UTILITY SYSTEMS.

B. In rock, the pipe shall be bedded in crushed stone.

C. Pipe bed shall be hand shaped so that the pipe barrel is uniformly supported along its entire length. Joint holes shall be accurately located along pipe bed. Holes shall be cut sufficiently large for making joint and no larger. In no case shall pipe be laid on blocks.

D. After pipe is laid and adjusted to its final position, bed shall be repaired where disturbed by laying operation, and joint holes filled. Repairs shall be made by ramming bedding material under bottom and haunches of pipe so pipe is supported for its full length and is tightly held in position.

3.08 SPECIAL PIPE FOUNDATIONS

A. Where required by the Contract Documents or directed by the Owner's Representative, a cradle of crushed stone, or concrete shall be provided to form a stable, firm bed of dimensions shown for full width of trench. No material greater than 1 inch in diameter shall be used in the cradle.

B. In deep trenches, initial backfill over pipe with concrete cradle shall not exceed a depth that will put excessive stress on pipe or concrete. Remaining backfill shall be placed not less than 48 hours after pipe is laid. Initial backfill shall not be placed until concrete has reached its initial set.

3.09 PIPELINE SEPARATION:

A. Where an existing pipe crosses a trench at an elevation which conflicts with the proposed grade for the new pipe line, either the grade for the new pipe line shall be changed or the existing pipe shall be moved, as directed. The new pipe line shall have a clearance from all existing lines of not less than 6-inches unless specified or directed otherwise. Pipe shall be installed in accordance with the Town standards. The space between the two pipes shall be solidly filled with compacted crushed stone. During construction, temporary supports shall be provided as required to maintain existing pipe lines in position. Before the trench is refilled, existing pipe lines shall be permanently supported.

3.10 PIPING JOINT CONSTRUCTION:

A. Join pipe and fittings according to the following manufacturer's recommendations.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

E. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

F. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other- than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

G. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

H. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

I. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.

J. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.11 PIPING CONNECTIONS:

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Install dielectric fittings at connections of dissimilar metal pipes.

3.12 EQUIPMENT INSTALLATION:

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

C. Install equipment to allow right of way to piping systems installed at required slope.

3.13 IDENTIFICATION:

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Plastic markers, with application systems.
2. Locate pipe markers on exposed piping according to the following:
    a. Near each valve and control device.
    b. Near each branch, excluding short takeoffs terminal units. Mark each pipe at branch if flow pattern is not obvious.
    c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
    d. At manholes and similar access points that permit view of concealed piping.
    e. Near points of origination and termination.

B. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

*****END OF SECTION*****

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

ATTACHMENT A

PERMITS

Order of Conditions & Amendment

DEP File No. SE3-6206

BISMORE PARK MARINA
BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT
TOWN OF BARNSTABLE – HYANNIS HARBOR, MA

ATTACHMENT B

PRODUCT SPECIFICATION SHEETS

ATTACHMENT C
CONTRACT DRAWINGS

ENTITLED:

BISMORE PARK MARINA

BULKHEAD REHABILITATION AND WATER LINE REPLACEMENT

(SHEETS 1 THROUGH 4, INCLUDING COVER SHEET)

PREPARED BY:

FOTH INFRASTRUCTURE & ENVIRONMENT, LLC

(DATED 11/2024; STAMPED BY: JERAMY PACKARD, P.E.)