GENERAL AND TECHNICAL SPECIFICATIONS FOR

WATERFRONT PARK

DOBBS FERRY, NEW YORK

Submitted to:

THE VILLAGE OF DOBBS FERRY
112 MAIN STREET
DOBBS FERRY, NY 10522

Submitted by:

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WATERFRONT PARK
Dobbs Ferry, NY

INDEX OF SPECIFICATIONS

SECTION 01110

SUMMARY OF WORK

PART I - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Description

The work covered in this project includes all materials, labor, and equipment necessary for the rehabilitation of the Waterfront Park located in Dobbs Ferry, New York.

B. In general, the work includes, but is not limited to, the following:

1. Excavation of existing riprap scour protection and concrete rubble to be replaced with new riprap scour protection.

2. Installation of composite sheet pile.

3. Installation of a concrete sheet pile cap.

4. Installation of concrete deadmen.

1.02 EXISTING WORK

A. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

B. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Owner. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.03 LOCATION OF UNDERGROUND UTILITIES

A. Contact Dig Safely New York at 1-800-962-7962 at least two working days prior to the start of excavation, but not more than ten days prior to the start of excavation.

B. Scan the construction site with electromagnetic or sonic equipment, and mark the surface of the ground where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed but indicated or discovered during scanning in locations where other work is to be installed.

C. Coordinate with the Owner on the location of underground utilities and which utilities are to remain and be protected and which are to be removed.

D. Notify the Owner at least 24 hours prior to starting excavation work.

1.04 QUALITY ASSURANCE

A. Use adequate number of skilled work personnel who are thoroughly trained and experienced in the necessary trades, who are familiar with the specified requirements and the methods required for proper performance of the work outlined in this specification.

B. The General Contractor shall coordinate the work to insure no conflicts occur to compromise the timely completion of all work specified.

1.05 WORKING CONDITIONS

A. All work shall commence while the site is fully operational. The Contractor is responsible for any precautions and scheduling necessary in order to maintain this status. Work may begin only after a schedule representing an acceptable plan is approved by the Owner.

B. The Contractor shall coordinate day-to-day activities with the Owner. All conflicts will be resolved with the Owner's representative.

1.06 WORKING HOURS

The Contractor is permitted to perform construction work between the hours of 7:00 AM and 4:30 PM Mondays through Fridays, excluding Federal Holidays. Work performed at any other time other than these periods will only be allowed pending approval of the Owner, following a 48 hour advanced request (72 hour for Sundays and Holidays).

1.07 AVAILABILITY OF UTILITIES

A. ELECTRICAL: The Contractor shall provide their own electrical power. OSHA requirements will govern the use of such utility. All equipment used shall be supplied by the Contractor.

B. WATER: Water will be made available at the nearest hydrant or exterior hose bib. The Contractor will be responsible for supplying all hose and adapters including a backflow preventer.

C. SANITARY FACILITIES: The Contractor shall be responsible for furnishing and maintaining temporary toilet facilities for their employees.

D. The Contractor is responsible for the cost of all utilities.

1.08 EQUIPMENT

The Contractor shall supply all equipment necessary to perform all work, including but not limited to cleaning materials, ladders, etc.

1.09 RECEIPT OF MATERIALS

Shipments of equipment, materials, and supplies shall be addressed to the Contractor not the Owner. The Contractor shall provide all equipment, materials and labor for off-loading. The Owner will not accept shipments for the Contractor.

1.10 STORAGE OF MATERIALS

Contractor's materials may be stored on site at a location approved by the Owner.

1.11 EXISTING MATERIALS

The Owner shall have the opportunity to salvage all materials removed prior to disposal by Contractor.

1.12 DEFINITIONS

Whenever in this specification the following abbreviations are used, they shall be as follows:

ANSI: American National Standards Inst. Inc.
1430 Broadway
New York, NY 10018

APD/DEPA:	American Plywood Association Douglas Fir Plywood Association 1119 "A" Street Tacoma, WA 98401
ASTM:	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWPB:	American Wood Preservers Bureau P. O. Box 6085 Arlington, VA 22206
AWPA:	American Wood Preservers Association 7735 Old Georgetown Road Bethesda, MD 20714
EPA:	Environmental Protection Agency Public Information Center 401 "M" Street, SW Washington, DC 20460
NEC:	National Fire Protection Association National Electrical Code 470 Atlantic Avenue Boston, MA 02210
NFPA:	National Fire Protection Association 60 Battery March Street Boston, MA 02210
NWMA:	National Wood Manufacturers Association 205 West Touhy Avenue Park Ridge, IL 60068
OSHA:	Occupational Safety Health Administration U.S. Department of Labor Government Printing Office Washington, DC 20402
PS:	Product Standard of NBS Government Printing Office Washington, DC 20402

UL: Underwriters Laboratory, Inc.
207 East Ohio Street
Chicago, IL 60611

1.13 POWER OUTAGE

Needed power outages shall be arranged only with prior approval from the Owner, with duration and affected areas held to a minimum.

1.14 SITE VISIT

Offerers or quoters are urged and expected to inspect the site where services are to be performed and to satisfy themselves regarding all general and local conditions that may affect the cost of contract performance, to the extent that the information is reasonably obtainable. In no event shall failure to inspect the site constitute grounds for a claim after contract award.

1.15 FINAL INSPECTION

Final Inspection will not be made until all work under the contract is complete. The Contractor shall notify the Owner in writing 48 hours prior to the date on which the project will be ready for final inspection.

1.16 DUMPING AREA

A. All discarded material shall be removed from the Owner's property and disposed of in an approved site complying with Local, State, and Federal regulations. Certified weight tickets shall be supplied to the Owner within 15 days of the date of the weight ticket for all trash and construction debris disposed. All dumpsters/containers shall be supplied by the Contractor. The Contractor shall provide appropriate signs or covers to prevent use by Tenants.

B. No material shall be washed or swept out of equipment or vehicles (including concrete from chutes of trucks, loose debris, etc.) onto Owner's property or into the water. Any material spilled from Contractor furnished dumpsters/containers shall be immediately cleaned up by the Contractor.

1.17 RECYCLABLES

The Contractor shall recycle or reuse all material designated as recyclable or prohibited from landfilling. Definitions for recyclables and landfill prohibited material can be obtained from the contracted trash hauler. Certified weight tickets

shall be supplied to the Owner within 15 days of the date of removal from the facility for all material recycled or reused, and for landfill prohibited materials.

1.18 AS-BUILT DRAWINGS

A. The Owner will furnish one complete set of black and white prints of all drawings which shall be used to indicate any changes from the contract set. Each sheet shall be marked "AS-BUILT DRAWINGS" in red pencil, and all changes or modifications shall be noted thereon by the Contractor.

B. Changes shall be noted during the construction process for all trades.

C. Keep "AS-BUILT DRAWINGS" current. Do not permanently conceal any work until the required information has been accurately recorded.

D. Use colored pencils or pens for graphic work conforming to the following color code:

Red - Architectural and Structural Work

Blue - Plumbing Work

Green - Electrical Work

Use blue pen for written work

E. Submit a complete set of "AS-BUILT DRAWINGS" to the Owner when all work has been completed, or as directed.

PART II - PRODUCTS

Not used.

PART III - EXECUTION

Not used.

END OF SECTION

SECTION 01320

CONSTRUCTION PROGRESS DOCUMENTATION

PART I - GENERAL

1.01 SUBMITTALS

Submit the following as agreed with the Contractor and the Owner.

A. Schedules

1. Construction schedule.

2. Material delivery schedule.

1.02 CONSTRUCTION SCHEDULE

Within 10 days after receipt of the Notice of Award, prepare and submit to the Owner's Project Manager for approval, three (3) copies of a Critical Path Method (CPM) Schedule for this entire project.

1.03 MATERIAL DELIVERY SCHEDULE

A. Initial Schedule

Within 30 calendar days after approval of the proposed construction schedule, submit for Owner's Project Manager approval, a schedule showing procurement plans for materials and equipment. Submit in the format and content as prescribed by the Owner's Project Manager, and include as a minimum the following information:

1. Description.

2. Date of the purchase order.

3. Promised shipping date.

4. Name of the manufacturer or supplier.

5. Date delivery is expected.

6. Date the material or equipment is required, according to the current construction schedule.

1.04 NETWORK ANALYSIS SYSTEM (NAS)

A. As an alternative to the critical path method (CPM) schedule, the Contractor may use, subject to the approval of the Owner's Project Manager, some other computer generated network analysis system affording similar and equal information and control to that provided by the CPM.

B. The schedule shall include all major project tasks and subtasks. The schedule shall identify as a minimum:

1. Construction time for all major systems and components;

2. Manpower requirements for each activity;

3. Major submittals and submittal processing time.

4. Major material and equipment lead time.

C. CPM Submittals and Procedures

Submit all network analysis and updates in hard copy. Also submit through email transmission. The network analysis system shall be submitted in a format acceptable to the Owner and be capable of running on an IBM compatible computer (IBM is a registered trademark of International Business Machines). The network analysis system shall be kept current, with changes made to reflect the actual progress and status of the construction.

1.05 UPDATED SCHEDULES

Update the construction schedule and material delivery schedule at monthly intervals or when schedule has been revised. Reflect any changes occurring since the last update. Submit copies of the purchase orders and confirmation of the delivery dates as directed.

PART II - PRODUCTS

Not used.

PART III - EXECUTION

Not used.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART I - GENERAL

1.01 DEFINITIONS

A. Submittals consist of shop drawings, product data, samples, and administrative submittals presented for review and approval. All sections of the Construction Contract, General Conditions and Supplemental Conditions apply to all submittals.

B. All submittals are classified as indicated in the paragraph "Submittal Descriptions." The submittals also are grouped as follows:

1. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this Contract, by the Contractor or through the Contractor by way of a subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate a portion of the work.

2. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate a portion of the work, but not prepared exclusively for this Contract.

3. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to a portion of the work, illustrating a portion of the work or establishing standards for evaluating the appearance of the finished work or both.

4. Administrative submittals: Data presented for reviews and approval to ensure that the administrative requirements of the project are adequately met but not to ensure directly that the work is in accordance with the design concept and in compliance with the Contract documents.

C. Approving Authority is the person authorized to approve a submittal.

D. Work: As used in this section, on/off-site construction required by the Contract Documents, including labor necessary to produce the construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.02 PROCEDURES FOR SUBMITTALS

A. The QC organization shall be responsible for reviewing and certifying that submittals are in compliance with Contract requirements. The approving authority on submittals is the QC Manager unless otherwise specified for the specific submittal. At each "Submittal" paragraph in the individual specification sections, the notation "Owner," following a submittal item, indicates the Owner's Project Manager is the approving authority for that submittal item.

B. Constraints

1. Submittals listed or specified in this Contract shall conform to the provisions of this section, unless explicitly stated otherwise.

2. Submittals shall be complete for each definable feature of work; components of the definable feature interrelated as a system shall be submitted at the same time.

3. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, the submittal will be returned without review.

4. Approval of a separate material, product, or component does not imply approval of assembly in which the item functions.

C. Scheduling

1. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of the work so that work will not be delayed by submittal processing. Allow adequate time for potential requirements to resubmit for review.

2. Except as specified otherwise, allow a review period, beginning with receipt by the approving authority, that includes at least 15 working days for submittals for QC Manager approval and 20 working days for submittals for the Owner's Project Manager approval. The period of

review for submittals with the Owner's Project Manager approval begins when the Owner receives the submittal from the QC organization. The period of review for each resubmittal is the same as for the initial submittal.

D. Variations from contract requirements require the Owner's approval and will be considered where advantageous to the Owner. When proposing a variation, submit a written request to the Owner's Project Manager, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to the Owner. If lower cost is a benefit, also include an estimate of the cost saving. Identify the proposed variation separately and include the documentation for the proposed variation along with the required submittal for the item. When submitting a variation for approval, the Contractor warrants the following:

1. The Contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of the work.

2. For submittals with variations, a period of 10 working days is allowed, in addition to the normal submittal review period, for consideration by the Owner.

E. Contractor's Responsibilities

1. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and Contract documents.

2. Transmit submittals to the QC organization in orderly sequence to prevent delays in the work, delays to the Owner, or delays to separate Contractors.

3. Advise the Owner's Project Manager of variation, as required by the paragraph entitled "Variations."

4. Correct and resubmit submittal as directed by the approving authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the Contractor shall provide a copy of that previously submitted transmittal including all reviewer comments for use by the approving authority. Direct specific attention, in writing or on resubmitted submittal, to revisions not requested by the approving authority on previous submissions.

5. Furnish additional copies of submittals when requested by the Owner's Project Manager, to a limit of 6 copies per submittal.

6. Complete work which must be accomplished as a basis of a submittal in time to allow the submittal to occur as scheduled.

7. Ensure no work has begun until submittals for that work have been returned as "approved," or "approved as noted ", except to the extent that a portion of the work must be accomplished as a basis of the submittal.

F. QC Organization Responsibilities

1. Note the date on which the submittal was received from the Contractor on each submittal.

2. Review each submittal; and check and coordinate each submittal with requirements of the work and Contract documents.

3. Review submittals for conformance with project design concepts and compliance with the Contract documents.

4. Act on submittals, determining the appropriate action based on the QC organization's review of the submittal.

   a. When the QC Manager is the approving authority, take the appropriate action on the submittal from the possible actions defined in the paragraph entitled, "Actions Possible."

   b. When the Owner's Project Manager is the approving authority or when a variation has been proposed, forward the submittal to the Owner with a certifying statement or return the submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of the submittal determines the appropriate action.

5. Ensure that material is clearly legible.

6. Stamp each sheet of each submittal with the QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

a. When the approving authority is the Owner's Project Manager, the QC organization will certify submittals forwarded to the Owner's Project Manager with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with Contract Number [_____], is in compliance with the Contract drawings and specification, can be installed in the allocated spaces, and is submitted for Owner approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)
Certified by QC Manager _____, Date _____"
(Signature)

b. When the approving authority is the QC Manager, the QC manager will use the following approval statement when returning submittals to the Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with Contract Number [_____], is in compliance with the Contract drawings and specification, can be installed in the allocated spaces, and is _____ approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC Manager _____, Date _____"
(Signature)

7. Sign the certifying statement or approval statement. The person signing the certifying statements shall be the QC organization member designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.

8. Retain a copy of approved submittals at the project site, including the Contractor's copy of approved samples.

G. Owner's Responsibilities

When the approving authority is the Owner's Project Manager, the Owner will:

1. Note the date on which the submittal was received from the QC Manager on each submittal for which the Owner's Project Manager is the approving authority.

2. Review submittals for approval within the scheduling period specified and only for conformance with project design concepts and compliance with the Contract documents.

3. Identify returned submittals with one of the actions defined in the paragraph entitled "Actions Possible" and with markings appropriate for the action indicated.

H. Actions Possible

Submittals will be returned with one of the following notations:

1. Submittals marked "not reviewed" will indicate the submittal has been previously reviewed and approved, is not required as a submittal, does not have evidence of being reviewed and approved by the Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Returned submittals deemed to lack review by the Contractor or to be incomplete shall be resubmitted with appropriate action, coordination, or change.

2. Submittals marked "approved" or "approved as submitted" authorize the Contractor to proceed with the work covered.

3. Submittals marked "approved as noted" authorize the Contractor to proceed with the work as noted provided the Contractor takes no exception to the notations.

4. Submittals marked "revise and resubmit" or "disapproved" indicate the submittal is incomplete or does not comply with the design concept or the requirements of the Contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until the resubmittal is approved.

1.03 FORMAT OF SUBMITTALS

A. Transmittal Form

Transmit each submittal, except sample installations and sample panels, to the office of the approving authority. Transmit submittals with a transmittal form prescribed by the Owner's Project Manager and standard for the project. The transmittal form shall identify the Contractor, indicate the date of the submittal, and include information prescribed by the transmittal form and required in the paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample panels and sample installations.

B. Identify submittals, except sample panel and sample installation, with the following information permanently adhered to or noted on each separate component of each submittal and noted on the transmittal form. Mark each copy of each submittal identically, with the following:

1. Project title and location.

2. Construction Contract number.

3. The section number of the specification section by which the submittal is required.

4. When a resubmission, an alphabetic suffix on the transmittal number, for example, SD-10A, to indicate the resubmission.

5. The name, address, and telephone number of the subcontractor, supplier, manufacturer, and any other second tier contractor associated with the submittal.

6. Product identification and location in project.

C. Format for Product Data

1. Present product data submittals for each section as a complete, bound volume. Include a table of contents listing page and catalog item numbers for product data.

2. Indicate, by prominent notation, each product which is being submitted; indicate the specification section number and paragraph number to which it pertains.

3. Supplement product data with material prepared for the project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for the project.

D. Format for Shop Drawings

1. Shop drawings shall not be less than 8 1/2 by 11 inches nor more than 30 by 42 inches.

2. Present 8 1/2 x 11 inch sized shop drawings as a part of the bound volume for the submittals required by the section; present larger drawings in sets.

3. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to the information required in the paragraph entitled "Identifying Submittals."

4. Dimension drawings except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Identify materials and products for work shown.

E. Format of Samples

1. Furnish samples in the sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately the same size as specified:

a. Sample of Equipment or Device: Full size.

b. Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.

c. Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

d. Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

e. Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.

f. Color Selection Samples: 2 by 4 inches.

g. Sample Panel: 4 by 4 feet.

h. Sample Installation: 100 square feet.

2. Samples Showing Range of Variation: Where variations are unavoidable due to the nature of the materials, submit sets of samples of not less than three units showing the extremes and middle of the range.

3. Reusable Samples: Incorporate returned samples into the work only if so specified or indicated. Incorporated samples shall be in undamaged condition at the time of use.

4. Recording of Sample Installation: Note and preserve the notation of the area constituting the sample installation but remove the notation at the final clean up of the project.

5. When a color, texture or pattern is specified in naming a particular manufacturer and style, include one sample of that manufacturer and style for comparison.

F. Format of Administrative Submittals

1. When the submittal includes a document which is to be used in the project or become a part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document, but to a separate sheet accompanying the document.

2. Operation and Maintenance Manual Data: Submit "Operation and Maintenance Data." Include components required and the various technical product data.

1.04 QUANTITY OF SUBMITTALS

A. Number of Copies of Product Data

Submit three copies of submittals of product data requiring review and approval only by the QC organization and four copies of product data requiring review and approval by the Owner's Project Manager.

B. Number of Copies of Shop Drawings

Submit shop drawings in compliance with the quantity requirements specified for product data.

C. Number of Samples

1. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by the approving authority and one will be returned to the Contractor.

2. Submit one sample panel. Include components listed in technical section or as directed.

3. Submit one sample installation, where directed.

4. Submit one sample of non-solid materials.

D. Number of Copies of Administrative Submittals

Unless otherwise specified, submit the administrative submittals compliance with the quantity requirements specified for product data.

1.05 FORWARDING SUBMITTALS

A. Samples Required of the Contractor

Submit samples to the Engineer: M.G. McLaren, P.C., Consulting Engineers, 100 Snake Hill Road, West Nyack, New York 10994.

B. Shop Drawings, Product Data, and O&M Data

As soon as practicable after award of the contract, and before procurement or fabrication, submit, except as specified otherwise, to the Owner's Representative, shop drawings and product data required in the technical sections of this specification. The Engineer for this project will review and provide surveillance for the Owner's Project Manager to determine if Contractor-approved submittals comply with the contract requirements, and will review and approve for the Owner's Project Manager those submittals not permitted to be Contractor approved to determine if submittals comply with the contract requirements

1.06 SUBMITTAL DESCRIPTIONS

A. Data

Submittals that provide calculations, descriptions, or other documentation regarding the work.

B. Manufacturer's Catalog Data

Data composed of catalog cuts, brochures, circulars, specifications and product data, and printed information in sufficient detail and scope to verify compliance with requirements of the Contract Documents.

C. Manufacturer's Standard Color Charts

Preprinted illustrations displaying choices of color and finish for a material or product.

D. Drawings

Submittals which graphically show relationship of various components of the work, schematic diagrams of systems, detail of fabrications, layout of particular elements, connections, and other relational aspects of the work.

E. Design Data

Design calculations, mix designs, analyses, or other data, written in nature and pertaining to a part of the work.

F. Instructions

Preprinted material describing installation of a product, system, or material, including special notices and Material Safety Data Sheets, if any, concerning impedances, hazards, and safety precautions.

G. Schedules

A tabular list of data or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

H. Statements

A document, required of the Contractor, or through the Contractor by way of a supplier, installer, manufacturer, or other lower tier contractor, the purpose of which is to further the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verification of quality.

I. Reports

Reports of inspection and laboratory test, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

J. Test Reports

A report signed by an authorized official of an independent testing laboratory that a material, product, or system identical to the material, product or system to be provided has been tested in accordance with requirements specified by naming the test method and material. The test report must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. Testing must have been within three years of the date of award of this Contract.

K. Factory Test Reports

A written report, which includes the findings of a test required to be performed by the manufacturer on a prototype or on an actual portion of the work prepared for this project, before it is shipped to the job site. The report must be signed by an authorized official of the manufacturer's test facility or testing laboratory and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test.

L. Field Test Reports

A written report, which includes the findings of a test made at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation. The report must be signed by an authorized official of a testing laboratory or agency and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test.

M. Certificates

Statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system, or material meet specified requirements. The statements must be dated after the award of this Contract, name the project, and list the specific requirements that it is intended to address.

N. Samples

Samples, including both fabricated and nonfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.

O. Sample Panels

An assembly constructed at the project site in a location acceptable to the Owner's Project Manager and using materials and methods to be employed in the work; completely finished; maintained during construction; and removed at the conclusion of the work or when authorized by the Owner's Project Manager.

P. Sample Installations

A portion of an assembly or material constructed where directed and, if approved, retained as a part of the work.

Q. Records

Documentation to ensure compliance with an administrative requirement or to establish an administrative mechanism.

PART II - PRODUCTS

Not used.

PART III - EXECUTION

Not used.

END OF SECTION

SECTION 01361

TURBIDITY CURTAINS

PART I - GENERAL

1.01 SUMMARY

This Section specifies requirements for Turbidity Curtains (Silt Screens). These requirements establish minimum standards and material requirements for the performance of the work. The Contractor is responsible for the design, furnishing, fabrication, and installation of the Turbidity Curtains.

1.02 REFERENCES

The following is a listing of the publications referenced in this Section:

A. None

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Quality Assurance

1. The Contractor shall submit certification from the manufacturer that all Turbidity Curtains were fabricated, inspected, and shipped in accordance with the manufacturer's requirements.

2. The Contractor shall maintain a quality control program to assure that all installations conform to the requirements of the Contract Drawings, Specifications, field inspection, and testing.

3. The manufacturer of Turbidity Curtains shall have been in business of manufacturing Heavy Duty Turbidity Curtains for at least 10 years and shall show proof of three installations each having been in service for at least 1 year.

B. Job Conditions

1. The Contractor is responsible for taking field measurements as required for correct fit, in the event discrepancies are found, the Contractor is responsible for contacting the Engineer immediately.

2. The Contractor is responsible for maintaining the Turbidity Curtains, anchors, anchor lines, buoys, and surroundings as recommended by the manufacturer.

1.04 SUBMITTALS

Submit the following in accordance with the requirements of "Submittal Procedures" of Division 1 – GENERAL REQUIREMENTS.

A. Product Data – manufacturer's data showing materials, fabrication, installation instructions, and recommendations.

B. Shop Drawings and catalog cuts indicating material and dimensions.

C. Field measurements.

D. Layout Plan – including proposed materials, dimensioned drawings, and installation procedure.

E. Certified test report or certificate of conformance or compliance furnished by the manufacturer's testing laboratory or independent testing agency attesting that each product or material furnished under this specification meets the requirements herein.

PART II - PRODUCTS

2.01 MATERIALS

A. Turbidity Curtains shall meet the following requirements:

1. The visible portion shall be a bright color (safety orange recommended) that will attract the attention of nearby boaters.

2. The fabric, connections, cables, and anchors must be of sufficient strength to resist the load imparted by a 3 knot current acting perpendicular to the curtain.

3. Sufficient buoyancy must be provided to support the curtain and generate a continuous minimum freeboard of 6 inches.

4. Load cables shall be fabricated into the top and bottom hem of every curtain. The cables shall be vinyl coated steel and possess an ultimate capacity of 10,000 pounds. The lower cable shall support ballast of sufficient quantity as to maintain a vertical curtain position.

5. Bottom anchors shall be placed fore and aft to resist ebb and flood currents. Bottom anchors must be sufficient to hold the curtain in the same position relative to the bottom of the watercourse without interfering with the action of the curtain. The anchors shall be attached to a floating anchor buoy. The manufacturer's specifications shall be followed when choosing anchor points on the curtain.

2.02 ACCESSORIES

A. Steel shall conform to ASTM A36 or stronger.

2.03 FABRICATION

A. All Turbidity Curtains shall be fabricated in strict accordance with manufacturer's specifications.

PART III - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's recommendations and instructions.

B. Take care to protect the curtain from abrasion, tearing, and puncture.

C. Install Work in accordance with approved shop drawings.

3.02 PROTECTION

A. Protect and maintain protection of completed Work to ensure that the Work is undamaged at the time of delivery.

END OF SECTION

SECTION 01450

QUALITY CONTROL

PART I - GENERAL

1.01 REFERENCES

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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 880	Criteria for Use in Evaluation of Testing Laboratories and Organization for Examination and Inspection of Steel, Stainless Steel, and Related Alloys
ASTM C 1077	Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C31	Standard Method of Making and Curing Concrete Compressive and Flexural Test Specimens in the Field.
ASTM C39	Standard method of Test for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C94	Standard Specification for Ready-Mix Concrete.
ASTM C138	Standard Method of Test for Unit Weight, Yield, and Air Content of Concrete.
ASTM C172	Standard Method of Sampling Fresh Concrete.
ASTM C192	Standard Method of Making and Curing Concrete Test Specimens in the Laboratory.
ASTM C214	Recommended Practice for Evaluation of Compression Test Results of Field Concrete.
ASTM D 3740	(Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

ASTM E 329 Agencies Engaged in the Testing and/or Inspection of Materials Used on Construction

ASTM E 543 Evaluating Agencies that Perform Nondestructive Testing

1.02 SUBMITTALS

Submit the following in accordance with Section 01330 entitled "Submittal Procedures."

A. Contractor Production Report

1.03 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this Contract.

A. Provide an independent testing laboratory qualified to perform sampling and tests required by this Contract. When the proposed testing laboratory is not accredited by an acceptable "Qualified National Authority" listed in the paragraph entitled "Qualified National Authority," submit to the Contracting Officer for approval, certified statements, signed by an official of the testing laboratory attesting that the proposed laboratory, meets or conforms to the following requirements:

1. Laboratories engaged in testing of construction materials shall meet the requirements of ASTM E 329.

2. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077.

3. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740.

4. Laboratories engaged in inspection and testing of steel, stainless steel, and related alloys will be evaluated according to ASTM A 880.

5. Laboratories engaged in nondestructive testing (NDT) shall meet the requirements of ASTM E 543.

6. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA.

B. Qualified National Authorities are the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology, the American Association of State Highway and Transportation Officials (AASHTO) program, and the American Association for Laboratory Accreditation (A2LA) program. Furnish to the Owner, a copy of the Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the Contract.

C. Prior to approval of non-accredited laboratories, the proposed testing laboratory facilities and records may be subject to inspection by the Engineer. Records subject to inspection include equipment inventory, equipment calibration dates and procedures, library of test procedures, audit and inspection reports by agencies conducting laboratory evaluations and certifications, testing and management personnel qualifications, test report forms, and the internal QC procedures.

D. The Owner retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

E. Cite applicable Contract requirements, tests or analytical procedures used when reporting test results. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify Owner immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Owner. Furnish a summary report of field tests at the end of each month.

F. The Contractor shall furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Owner.

1.04 COMPLETION INSPECTIONS

A. Near the completion of all work or any increment thereof established by a completion time stated elsewhere in the specifications, the Contractor shall

conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings and specifications. Include in the punch list any remaining items on the "Rework Items List" which were not corrected prior to the Punch-Out Inspection. The punch list shall include the estimated date by which the deficiencies will be corrected. A copy of the punch list shall be provided to the Owner. The Contractor or staff shall make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished the Contractor shall notify the Owner that the facility is ready for the Owner "Pre-Final Inspection."

B. The Owner will perform a pre-final inspection to verify that the facility is complete and ready to be occupied. An Owner "Pre-Final Punch List" may be developed as a result of this inspection. The Contractor shall ensure that all items on this list are corrected prior to notifying the Owner that a "Final" inspection can be scheduled. Any items noted on the "Pre-Final" inspection shall be corrected in timely manner and shall be accomplished within the time slated for completion of the entire work, or any particular increment thereof if the project is divided into increments by separate completion dates.

C. The Contractor's Project Manager, the superintendent or other primary contractor management personnel, and the Owner's representative will be in attendance at the Final Acceptance Inspection. Additional Owner personnel may be in attendance. The final acceptance inspection will be formally scheduled by the Engineer based upon results of the "Pre-Final" inspection. Notice shall be given to the Owner at least 14 days prior to the final inspection stating that all specific items previously identified to the Contractor as being unacceptable, along with all the remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection.

1.05 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

A. Contractor Production Reports are required for each day that work is performed. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Production Reports are to be prepared, signed and dated by the project superintendent and shall contain the following information:

1. Date of report, report number, name of contractor, Contract number,

title and location of Contract and superintendent present.

2. Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.

3. Identify work performed by corresponding Scheduled Activity No., Modification No., etc.

4. A list of Contractor and subcontractor personnel on the work site, their trades, employer, work location, description of work performed, hours worked by trade, daily total work hours on work site, and total work hours from start of construction.

5. A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met including the results on the following:

    a. Was a job safety meeting held? (If YES, attach a copy of the meeting minutes.)

    b. Were there any lost time accidents? (If YES, attach a copy of the completed OSHA report.)

    c. Was crane/trenching/scaffold/high voltage electrical/high work done? (If YES, attach a statement or checklist showing inspection performed.)

    d. Was hazardous material/waste released into the environment? (If YES, attach a description of meetings held and accidents that happened.)

    e. List safety actions taken today and safety inspections conducted.

6. A list of equipment/material received each day that is incorporated into the job.

7. A list of construction equipment on the work site including the number of hours used, idle and down for repair.

8 Include a "remarks" section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered,

instructions given and corrective actions taken, delays encountered and a record of visitors to the work site.

1.06 NOTIFICATION ON NON-COMPLIANCE

The Owner will notify the Contractor of any detected non-compliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time for excess costs or damages by the Contractor.

PART II - PRODUCTS

Not used.

PART III - EXECUTION

Not used.

END OF SECTION 01450

SECTION 01525

SAFETY REQUIREMENTS

PART I - GENERAL

1.01 REFERENCES

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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.14	Construction and Demolition Operations - Requirements for Safety Belts, Harnesses, Lanyards and Lifelines for Construction and Demolition Use
ANSI Z359.1	Safety Requirements for Personal Fall Arrest Systems

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	Portable Fire Extinguishers
NFPA 70	National Electric Code
NFPA 241	Safeguarding Construction, Alteration, and Demolition Operations

1.02 DEFINITIONS

A. Certified Industrial Hygienist. An industrial hygienist is an individual who is certified by the American Board of Industrial Hygiene.

B. Certified Safety Professional. A safety manager, safety specialist, or safety engineer that has passed the CSP exam administered by the Board of Certified Safety Professionals.

C. Confined Space. A space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy, engulfment or any other recognized safety or health hazard. Confined spaces include, but are not limited to storage tanks, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines.

D. Multi-employer work site (MEWS). The prime contractor is the "controlling authority" for all work site safety and health of the subcontractors.

E. Recordable Occupational Injuries or Illness. An occupational injury or illnesses which result in serious injuries, lost workday cases, non-fatal cases or significant mishaps.

F. Serious Injuries & Fatalities. Regardless of the time between the injury and death or the length of the illness; hospitalization of three or more employees; or property damage in excess of $200,000.

G. Lost Workday Cases. Injuries, other than fatalities, that result in lost workdays.

H. Non-Fatal Cases. Cases without lost workdays which result in transfer to another job or termination of employment, or require medical treatment (other than first aid) or involve property damage in excess of $10,000 but less than $200,000 or involve: loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses which are reported to the employer but are not classified as facilities or lost workday cases.

I. Safety Officer. The superintendent or other qualified or competent person who is responsible for the on-site safety required for the project. The contractor quality control person cannot be the safety officer, even through the QC has safety inspection responsibilities as part of the QC duties.

J. Significant Contractor Mishap. A contractor mishap which involves falls of 4 feet or more, electrical mishaps, confined space mishaps, diving mishaps, equipment mishaps, and fire mishaps which result in a lost time injury, or property damage of $10,000 or more, but less than $200,000; or when fire department or emergency medical treatment (EMT) assistance is required.

K. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical

treatment does not include first aid treatment provided by a physician or registered personnel.

L. First Aid. A one-time treatment, and follow-up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care, even though provided by a physician or registered professional personnel.

M. Lost Workdays. The number of days (consecutive or not) after, but not including, the day of injury or illness during which the employee would have worked but could not do so; that is, could not perform all or part of his normal assignment during all or any part of the workday or shift; because of the occupational injury or illness.

1.03 SUBMITTALS

A. Submit site specific accident prevention plan for review and approval at least 15 calendar days prior to start of work at the job site. Conform to requirements of Federal, State and local safety and health laws and regulations. Work cannot proceed until the APP has been reviewed and found acceptable by the Owner or his designated representative. The APP shall be site specific and shall include:

1. Name and safety related qualifications of the superintendent. Superintendent must demonstrate the ability to manage the on-site Contractor safety program through appropriate management controls and maintain a log of safety inspections performed. The superintendent must be able to identify hazards and shall have the direct responsibility for expending resources necessary to correct the hazards. The superintendent shall maintain applicable safety reference material on the job site.

2. Emergency action plan to include a map denoting the route to the nearest emergency care facility with emergency phone numbers which will be displayed in clear view for on-site employees.

3. Confined Space Entry Plan. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

B. The APP shall include provisions to deal with hazardous materials. The plan shall include:

1. Inventory of hazardous materials to be introduced to the site with estimated quantities;

2. Plan for protecting personnel and property during the transport, storage and use of materials;

3. Emergency procedures for spill response and disposal, including a site map with approximate quantities on-site at any given time. The site map will be attached to the inventory, showing where the haardous substances are stored;

4. Material Safety Data sheets for materials listed in inventory and not required in technical section of specification.

5. Approved labeling system to identify contents on all containers on-site.

6. Plan for communicating high health hazards to employees and adjacent occupants.

C. Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

1.04 QUALITY ASSURANCE

A. The safety officer shall attend the required preconstruction conference.

B. Hold safety meetings monthly. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the Contractor's daily report.

C. Alcohol and Drug Abuse Plan

1. Describe plan for random checks and testing with pre-employment screening in accordance with the DFAR Clause subpart 252.223-7004, "Drug Free Work Force."

2. Description of the on-site prevention program

D. Fall Protection Plan. The plan shall be site specific and protect all workers at elevations above 6 feet.

E. Site Demolition Plan. The safety and health aspects prepared in accordance with Section 02220, "Demolition"

1.05 ACTIVITY HAZARD ANALYSIS (AHA)

Prepare for each phase of the work. As a minimum, define activity being performed, sequence of work, specific hazards anticipated, control measures to eliminate or reduce each hazard to acceptable levels, training requirements for all involved, and the competent person in charge of that phase of work. For work with fall hazards, including fall hazards associated with scaffold erection and removal, identify the appropriate fall arrest systems. For work with materials handling equipment, address safeguarding measures related to materials handling equipment. For work requiring excavations, include excavation safeguarding requirements. The appropriate AHA shall be reviewed and attendance documented by Contractor at the preparatory, initial, and follow-up phases of Quality Control inspection.

1.06 DRUG PREVENTION PROGRAM

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employees either use illegal drugs or consume alcohol during work hours. Ensure no employees under the influence of drugs or alcohol during work hours. After accidents, collect blood, urine or saliva specimens and test injured employee influence. A copy of the test shall be made available to the Owner upon request.

1.07 FALL HAZARD PREVENTION PROGRAM

A. Delineate the fall protection requirements necessary during the erection and dismantling operation of scaffolds used on the project in the fall protection plan and activity hazard analysis for the phase of work.

B. Institute a fall protection program. As part of the Fall Protection Program, contractor shall provide training for each employee who might be exposed to fall hazards.

1.08 DUTIES OF THE SAFETY OFFICER

A. Ensure construction hazards are identified and corrected.

B. Maintain applicable safety reference material on the job site.

C. Maintain a log of safety inspections performed.

D. Attend the pre-construction.

1.09 DISPLAY OF SAFETY INFORMATION

Display the following information in clear view of the on-site construction personnel:

A. Map denoting the route to the nearest emergency care facility with emergency phone numbers.

B. Activity hazard analysis (AHA)

1.10 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Owner has no responsibility to provide medical treatment.

1.11 REPORTS

A. For OSHA recordable accidents, the prime contractor will conduct a suitable investigation, complete the Contractor Significant Incident Report and provide to the Owner within 5 calendar days of the accident.

B. Notify Owner, within 4 hours, of any accident meeting the definition of OSHA recordable occupational injury or illness. Information shall include Contractor name; contract title; type of contract; name of activity, installation or location where mishap occurred; date and time of mishap; names of personnel injured; extent of property damage, if any; and brief description of mishap (to include type of construction equipment used, PPE used, etc.) In addition to OSHA reporting requirements, initial notification shall be made of any accident involving significant mishaps.

C. Monthly exposure reporting, to the Owner is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. The prime Contractor shall identify, in the APP, who shall complete exposure data (hours worked); accident investigations, reports and logs; and immediate notification of accidents to include subcontractors.

D. Provide the Owner with a copy of each OSHA citation, OSHA report and Contractor response. Correct violations and citations promptly and provide written corrective actions to the Owner.

PART II - PRODUCTS

Not Used

PART III - EXECUTION

3.01 CONSTRUCTION

A. Comply with NFPA 241, the accident prevention plan, the activity hazard analysis and other related submittals and fire and safety regulations.

B. Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. Exceptions to the use of any of the above excluded materials may be considered by Owner upon written request by Contractor.

C. The design should have identified materials such as PCB, lead paint, and friable and nonfriable asbestos. If material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Owner immediately. Within 14 calendar days the Owner will determine if the material is hazardous. If material is not hazardous or poses no danger, the Owner will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Owner will issue a modification.

3.02 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages a minimum of 15 days in advance. As a minimum, the request should include the location of the outage, utilities being effected, duration of outage and any necessary sketches. Once approved and prior to beginning work on the utility system requiring shut down, the Contractor shall attend a pre-outage coordination meeting to review the scope of work and the lock out/tag out procedures for worker protection.

3.03 SAFETY QUALIFICATIONS

A. Qualifications for on-site Superintendent, QC or Safety Representative

1. Demonstrate the ability to manage the on-site Contractor safety program through appropriate management controls, and maintain a log of safety inspections performed.

2. Able to identify hazards and have the direct responsibility for expending resources necessary to abate the hazards.

3. Must have worked on similar types of projects that are equal to or exceed the scope of the project assigned with the same responsibilities.

4. Must submit training certifications showing the place and dates of any training.

5. Must attend the pre-construction conference with the Owner and Engineer.

B. Superintendent/QC, can and will be removed if at anytime the Owner or his/her designated representative finds them non-responsive or not enforcing safety issues at the contract work site. It is the responsibility of the Superintendent/QC to enforce safety issues at all times. If removed, all construction activities will be suspended until an acceptable replacement is approved by the Owner.

3.04 PERSONNEL PROTECTION

A. Provide hazardous noise signs, and hearing protection, wherever equipment and work procedures produce sound-pressure levels greater than 85 dBA steady state or 140 dBA impulse, regardless of the duration of the exposure.

B. Enforce use of the fall protection device named for each activity in the AHA all times when an employee is on a surface 6 feet or more above lower levels. Personal fall arrest systems are required when working from an articulating or extendible boom, scissor lifts, swing stages, or suspended platform. Fall protection must comply with ANSI A10.14.

C. Personal fall arrest device equipment, subsystems, and components shall meet ANSI Z359.1, Personal Fall Arrest Systems. Only an full-body harness with a shock absorbing lanyard is an acceptable personal fall arrest device. Body belts may only be used as positioning devices only such as for steel reinforcing assembly. Body belts are not authorized as a personal fall arrest device. Harnesses must have upper middle back "D" rings for proper body suspension during a fall. Lanyard must be fitted with a double locking snap hook attachment. Webbing, straps, and ropes must be of synthetic fiber or wire rope.

D. Safety nets shall be provided in unguarded workplaces over water, machinery, dangerous operations, or more than 25 feet above surface.

E. Employees shall be provided with a safe means of access to the work area on a scaffold or work platform. Climbing of any braces or supports not specifically designed for access is prohibited. Contractor shall ensure that scaffold and work platform erection is performed by employees that are qualified. Do not use scaffold or work platform without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection plan. Minimum platform size shall be based on the platform not being greater in height than four times the dimension of the smallest width dimension for rolling scaffold. Some Baker type scaffolding has been found not to meet these requirements. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. The first tie-in shall be at the height equal to 4 times the width of the scaffold base.

F. Use of Material Handling Equipment

1. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufactures printed operating instructions. Crane supported work platforms shall only be used in extreme conditions if the Contractor proves that using any other access to the work location would provide a greater hazard to the workers.

2. Cranes must be equipped with Load Indicating Devices , anti-two blocks devices, load, boom angle moment indicating indicators.

G. The competent person for excavation shall be on site when work is being performed in excavation, and shall inspect excavations prior to entry by workers. Individual must evaluate for all hazards, including atmospheric, that may be associated with the work, and shall have the resources necessary to correct hazards promptly.

H. Underground electrical spaces must be certified safe for entry before entering to conduct work. Cable intended to be cut must be positively identified and de-energized prior to performing each cut. Perform all high voltage cutting remotely. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized

subsites, only qualified electrical workers shall be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personnel protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. Insulating blankets, hearing protection, and switching suits may be required, depending on the specific job and as delineated in the Contractor AHA.

I. Contractor shall provide mechanical ventilation for all work accomplished in manholes, unless other hazards are present like friable asbestos.

J. The Contractor Quality Control Manager shall conduct daily safety inspections as part of his/her quality control inspections and document the results on the Contractor's Daily Report.

3.05 ACCIDENT SCENE PRESERVATION

For serious accidents, ensure the accident site is secured and evidence is protected remaining undisturbed until released by the Owner.

3.06 FIRE PROTECTION

A. Prior to performing "Hot Work" (welding, burning, lead melting, blow torches, tar pots, etc.) or operating other flame-producing devices, the Contractor shall obtain approval from the Owner's on-site Representative.

1. All Hot Work will be shut down 30 minutes before the end of work and a fire watch shall ve kept at the scene of operation during this 30 minutes.

B. Melt kettles for tar, asphalt, creosote and similar materials shall not be closer than 25 feet to buildings or combustible materials. Provide a minimum of two 20 pound ABC all-purpose type extinguishers at melting kettle and area of hot material application. Equip kettles with heat controls and means of agitation to ensure controlled uniform temperatures throughout contents to prevent spot heating. Don not heat contents above flash point.

C. The Contractor shall furnish, in accordance with all applicable requirements of the NFPA (National fire Protection association) Standards, sufficient fire extinguishers and fire watch personnel to protect the area in which his work is being performed. The size and type of fire extinguisher used will be subject to review by the Owner through the Engineer.

D. The burning of trash or other waste material shall be prohibited.

E. Heating

1. All sources of temporary heat shall carry an "Underwriters Laboratory" label and portable heaters shall be located so as to avoid ignition of combustible materials.

2. Electrical heaters shall not be connected to extension cords.

3. Open drum fires are prohibited.

F. Electrical

1. All portable electric devices (saws, sanders, compressors, lights, extension cords) not required to be left on shall be disconnected at the close of work each day.

2. All wires plugged into electrical outlets shall be equipped with male plugs. The inserting of the bare ends of wires into outlets is prohibited.

G. Flammables

1. Oil painting materials (paint, brushes, empty paint cans, rags, paint clothes, drop cloths, etc.) and flammable liquids shall be removed from enclosed areas at the close of work each day.

2. Highly flammable liquids such as paints, thinner, etc. that are to be kept inside buildings shall be held to an absolute minimum except in buildings authorized and designed for such storage.

3. Storage of gasoline in excess of five gallon containers shall be permitted only by specific approval from the Owner.

4. All storage areas containing flammable liquids shall be marked with signs indicating "FLAMMABLES" and "NO SMOKING".

H. Fire hose or extinguishers in existing buildings shall not be removed from their locations, unless specifically indicated to be relocated or removed by the plans and specification for the project. No fire hose or extinguishers shall be used for any purpose other than combating a fire.

I. Smoking is strictly prohibited in or near areas where flammable liquids, highly combustible materials or explosives are stored, handled or processed. All existing smoking regulations in occupied areas shall be complied with. "NO SMOKING" signs shall be observed and restrictions complied with.

J. Parking will only be allowed in areas designated for Contractor Personnel.

K. All contractors providing office space or trailers with telephone service shall place or post the fire reporting phone number by the phone. All contractor personnel shall be instructed how to report a fire. Any fire, no matter how small, shall be reported.

L. Prior to quitting time, a person, specifically designated by the Contractor, shall make a check of the job site and contract limits to ensure compliance with all safety conditions of this specification, insuring that the area is in a fire safe condition.

3.07 TEMPORARY WIRING

Provide temporary wiring as required in accordance with NFPA 70, NFPA 10, NFPA 241, and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Program shall include frequent inspection of all equipment and apparatus.

3.08 SITE PROTECTION

A. Contractor shall provide for barricading around all work areas to prevent public access.

B. Fencing shall be provided along the construction site at all open excavations to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 200 pounds against it.

C. Place warning signs at the construction area perimeter designating the presence of construction hazards requiring unauthorized persons to keep out. Signs must be placed on all sides of the project, with at least on sign every 300 feet. All points of entry shall have signs designating the construction site as a hard hat area.

END OF SECTION 01525

SECTION 02200

EARTHWORK

PART I - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, apply to work specified in this section.

1.02 DESCRIPTION OF WORK

A. Summary: Extent of earthwork is shown on the drawings and by the requirements specified in this section. Earthwork generally includes, but is not limited to, the following:

1. Excavation and removal of all material, where required including but not limited to satisfactory materials, surplus materials, debris, rock, shale, earth hardpan fill, abandoned underground utilities, valve chambers, pipe galleries, manholes, basins, filled ground, old foundations, concrete, masonry, pavements, curbs and sidewalks with their foundations; the subsequent disposal of unsuitable materials, refuse; etc.; and, the utilization, placement and compaction of suitable materials in substantial conformance with the lines and grades shown on the contract drawings.

2. Preparation of subgrade for building slabs, structures, walks, pavements, curbs, drainage, and sanitary disposal facilities, site lighting, and site grading to established elevation(s), and subsequent compaction stabilization, backfilling and grading.

3. Drainage fill course for support of building slabs.

4. Excavation, backfilling and compaction of trenches.

5. Excavation trenching, embankment, filling and back filling required in conjunction with underground sanitary, plumbing, mechanical, electrical, utility etc.

6. Grading of site in substantial conformance with established lines, grades, alignments, elevations, and construction tolerances.

B. Unclassified Excavation: Excavation shall be unclassified and shall be performed in substantial conformance with the lines and grades indicated, or established. No consideration will be given to the nature of the materials encountered in the course of construction. Unclassified excavation shall consist of excavation of all materials, of any nature or description. Excavation includes disposal, and placement, and compaction includes disposal, and placement, and compaction in accordance with the drawings and specifications.

C. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction. Unauthorized excavation, as well as remedial work as directed shall be provided as required without any additional cost to the Owner.

1. Under footings, foundation bases, or retaining walls, fill and compact unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation, as specified for authorized excavations for structural bearing soils.

2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed.

D. Additional Excavation: When excavation has reached required subgrade elevations, notify Consultant and soil testing laboratory, as directed and specified. Placement or installation of material on the subgrade shall not begin until the subgrade has been inspected, tested and accepted.

1. Procedure: If unsuitable bearing materials are encountered and classified as such by the Consultant at required subgrade elevations, carry excavations deeper and replace excavated material in accordance with the specifications contained herein, or, as ordered by the Owner's representative or representative of authority having jurisdiction.

2. Compensation: When removal and replacement of unsuitable material is required, and is not due to the fault or neglect of the Contractor in his performance of the work, equitable compensation for the additional costs incurred will be made on the basis of contract conditions pertaining to changes in the work.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Work, and types or methods of construction, shall in no event be less than that necessary to conform to all applicable requirements. Refer to subpart "H", "Obtain and Observe Applicable Section of Referenced Specifications", specified in section "Sitework General Provision", within this

Division. Comply with applicable requirements governing the work materials, or project, even though such requirements are not listed herein, except as otherwise shown on the Contract Drawings or specified herein.

B. Minimum Requirements: Earthwork shall be accomplished in accordance with the requirements and regulations of the Village of Dobbs Ferry and the requirements specified in the subsection 203 "Excavation and Embankment" of the New York State D.O.T. Standard Specifications and Division-2 section "Trench Culvert and Structure Excavation".

1. Compaction shall not be less than 90 percent of the Standard Proctor Density at optimum moisture content in areas that will not support the weight of traffic, improvements, adjacent to structure footings, or foundations. Compaction in all other areas shall not be less than 95% of the Standard Proctor Density at optimum moisture content. Improvements shall include, but not be limited to drainage, sanitary disposal facilities, sidewalks, fire access lanes, utilities, pavements, curbs, and concrete slabs (other than building floor slabs).

2. Access: Provide continuous access to the site. Coordinate work with other contractors and subcontractors working on the site, adjacent roadway systems, or adjacent properties. Access to and from adjacent properties shall not be obstructed. No adjacent roadways or driveways shall, without the consent of the Owner or occupant and without notice to the Consultant, be deprived of means of access thereto. Interference with traffic and inconvenience to abutting property during the performance of the work hereunder shall be minimized, at all times.

3. Safety: Observe applicable local and/or State requirements. Take immediate steps to rectify hazardous or unsafe conditions. Conform to the maintenance and protection of traffic requirements of the municipal authorities and State and County agencies having jurisdiction.

C. Permits and Bonds: Purchase and submit copies of permits and bonds necessary in connection with the performance of the work specified in this section. At the job site, post notices and copies of permits necessary to the proper and lawful performance of the work, in accordance with such permits.

D. Testing and Inspection Service: Owner shall engage soil testing and inspection service for quality control testing during earthwork operations. Allow designated laboratory inspectors to evaluate the construction and material, at any time, during the progress of the work, or after the work has been completed. As required, samples, labor, tools, equipment, etc., for such inspection, or test, will be at the expense of the Owner. Cost(s) incurred for subsequent inspection(s), or

test(s) required because of failure of the first inspection will be charged against the Contractor.

E. Engineer Qualifications: A qualified registered Professional Civil Engineer who is licensed to practice in the State of New York and who is experienced in providing engineering services of the kind indicated for this project.

1.04 SUBMITTALS

A. Test Reports: The laboratory will submit test reports indicating results, and laboratory's interpretation of them relative to compliance with indicated requirements.

B. Layout Drawings: Provide layout drawings in accordance the requirements of Division-2 section "Shoring and Bracing Earthwork".

1.05 JOB CONDITIONS

A. Site Information: Site information data. Data is made available for convenience of Contractor. Before excavating, existing subsurface structures, utilities, etc., which may interfere with, or be affected by the specified construction, shall be located by:

1. Test borings and other exploratory operations may be made by Contractor, as required and allowed, without expense to Owner.

2. Sufficiency of Site Information Data: Site information data and related records of subsurface investigation are not a part of the contract documents and are made available for inspection solely for convenience.

B. Existing Utilities: Prior to start of work verify and locate existing underground utilities, if any, in areas of work. Existing utility lines, drains or structures which are encountered, or uncovered, by excavation, and are to remain, shall be carefully supported and protected from injury. Provide adequate and effective means of protection during earthwork operations. If injured or removed, they shall be restored to a condition equally as good and useful as prevailed at the time the project started, without any additional cost to the Owner.

C. Facilities and Structures Interfacing with Earthwork Operations: Investigate the location of public and private facilities and structures on, under, or over the project site to determine whether such facilities and structures might or might not require placement, replacement, relocation, adjustment, or reconstruction and whether they might interfere with required earthwork operations. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with

Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities in accordance with recognized and accepted engineering and construction practices, and to the satisfaction of utility owner.

1. Interruption and interference: Do not interrupt existing utilities serving adjacent areas except when permitted by utility owner and then only after acceptable temporary utility services have been provided.

2. Contact the utility companies for a utility mark out prior to beginning excavation operations. Assume responsibility for vertical and horizontal location of utilities within the limits of construction, and areas immediately adjacent thereto.

3. Safeguard the property of the respective utility owners which may be affected by earthwork construction operations. The safety and continuity of utility operation shall be of first importance and shall be at all lines protected and safeguarded. Perform and arrange pertaining construction work accordingly.

4. Work done on, under, over, or affecting utility owned property shall be subject to the approval of the utility owner in matters affecting utility owned property and the safety and operation of its facilities.

5. Utility facilities and structures: Within the site of project there may be public utility structures, and notwithstanding any other clause or clauses of the contract documents, do not proceed with the work until diligent inquiry has been made to the Engineer, the utility companies and municipal authorities or other owners to determine their exact location. Notify, in writing, the utility companies and municipalities or other owners involved of the nature and scope of the project and of operations that may affect their facilities or property. Copies of such notices shall be sent to the Engineer and Construction Manager.

6. Attention is directed to the fact that the approximate locations of known utility structures and facilities that may be encountered within and adjacent to the limits of the work as shown on the contract drawings. The accuracy and completeness of this information is not guaranteed. Ascertain all the facts concerning the location of these utilities.

7. Support and secure utility structures so as to avoid damage to them. Satisfactorily maintain the flow in drains and sewers at all times. Do not move, without the owner's written consent, any utility structures, and at the completion of the work their condition shall be as safe and permanent as before. When utility structures, facilities or equipment are damaged they are to be repaired at the Contractor's expense. Service connections

damaged by the Contractor shall be repaired by competent skilled mechanics.

8. Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals and all other utility appurtenances within the limits of the project which are to be relocated or adjusted shall be moved by their owners at their expense unless otherwise indicated. Permit the owners of the utilities, or their agents, access to the site of the work at all times, in order to relocate or protect their facilities, and cooperate with them in performing this work.

9. Materials for this work shall meet the requirements of the respective utility companies.

10. Comply with utility company regulations. When an entry into a service manhole or attachment to any utility company pole is required, notify the utility company sufficiently in advance, and under no condition enter any utility company owned man-hole or place an attachment to a utility company owned pole without a utility company representative present.

11. Whenever work may affect or involve the safety of the utility company's facilities, the time and method of doing such work shall first be submitted to and approved by the utility company. Such approval shall not be considered as signifying relief of responsibility or liability for damage which the utility company may suffer, or for which it may be liable, through course of construction operations.

12. Equipment used on and adjacent to utility company property and/or facilities shall be in first class condition so as to fully prevent any failure that might cause delay in utility operation or damage to utility facilities.

D. Use of Explosives: The use of explosives is not permitted.

E. Protection of Persons and Property: Contractor shall conform to the requirements specified within Division-2 section "Site Work General Provisions". Protection shall include, but not be limited, to:

1. Install and maintain fences, barricades, warning signs, warning lights as required and as ordered by authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. Repair, replace, or otherwise restore such damaged services and/or construction to a condition

as good as prevailed at the time work started, and without additional compensation.

3. Perform excavation within drip-line of large trees to remain by hand. Protect the root system from damage or dryout. Maintain moist condition for root system. Cover exposed roots with burlap. Paint root cuts, 1" diameter and larger, with approved emulsified asphalt tree paint.

F. Pumping, Drainage and Dewatering: Excavate areas so as to afford adequate drainage. Control grading to prevent water running into the excavated areas. Until the work is completed, remove water that may interfere with the proper performance of the work or cause ponding on the site. Excavation shall be carried out in such a manner that the grade throughout the work is kept drained at all times. Temporary on-site drainage facilities shall be provided, subject to approval by the Owner's Representative and representative of authority having jurisdiction. Water shall not be directed or diverted to adjacent properties or right(s) of way.

PART II - PRODUCTS

2.01 DEFINITIONS

A. Suitable soil materials are defined as those complying with ASTM D2487 soil classification Groups GW, GP, GM, SM, SW, and SP or other material approved by the Owner's representative or representative of authority having jurisdiction and as specified herein.

B. Unsuitable soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL and PT. Any material containing vegetable or organic matter, muck, weeds, peat, organic silt, top-soil, or sod, rubbish, garbage or other material that may decay or is otherwise not satisfactory for use in construction is designated as an unsuitable material, and shall not be used. Certain man-made deposits of industrial waste, sludge, land fill or debris may also be determined to be unsuitable materials.

C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand or other approved material as specified herein.

D. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve or other gradation of clean sand and gravel approved, in writing, by the Owner's representative or representative of the authority having jurisdiction.

E. Backfill and Fill Materials: Suitable soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable or organic matter, and other deleterious or objectionable material as determined by the Owner's representative or representative of authority having jurisdiction.

2.02 SUITABLE MATERIALS

A. Backfill and Fill Materials: Suitable material shall be used in bringing fills and backfills to the lines and grades indicated making allowances for pavements, slabs, walks, etc., and for replacing unsuitable materials. Suitable material for backfill and fill shall be well graded granular soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter. Additional material needed shall be borrow excavation, drainage fill, concrete, or used or recycled concrete aggregate as specified in this section.

1. Under exterior slab and paving, within 2'-6" of finished subbase grade, not more than 10% by weight of material shall pass a No. 200 sieve.

2. Back fill in contact with filtered material: 2", maximum particle size. Less than 85% by weight passing No. 10 sieve. At least 15% by weight passing No. 60 sieve. Less than 10% by weight passing No. 200 sieve (non-plastic).

3. Under drainage, sanitary and utility facilities, within 2'-0" of the bearing surface. Provide a well graded, stable granular material acceptable to the Owner's representative or representative of authority having jurisdiction.

C. Select Granular Fill: The requirements specified in New York State D.O.T. Standard Specification subsection 2.03-2., "Select Granular Fill and Select Structure Fill", shall apply

PART III - EXECUTION

3.01 EXCAVATION:

A. General: Excavation work shall be executed in substantial conformance with indicated lines and elevations, except that the Contractor shall make acceptable allowances for pavements, curbs, slabs, walls, drainage, etc., as required. Excavations shall be made in open cut and shall be of sufficient size to satisfactorily complete the work. Widths of excavations shall not exceed the width actually necessary for the proper prosecution of the work. Excavations shall be of such width, in addition to that of the project, as shall be necessary for

the proper and expeditious progress of the work, and to permit placing and readjusting of utilities, sewers, mains, subsurface structures, etc., and permit installation of waterproofing and damp proofing, and the inspection thereof. During excavation, material suitable for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench no closer than 1/2 of the depth of the excavation, but not closer than 3'-0", in any instance. Machine excavation shall not be performed until the location of existing utilities in the vicinity of work areas has been determined by careful excavation. Excavations below indicated depths will not be permitted except to remove unsuitable material. Unsuitable material encountered below the grades shown shall be removed as directed and replaced with suitable material. Suitable material removed below the depths indicated without specific direction shall be replaced to the indicated excavation grade with suitable materials, except that concrete footings shall be increased in thickness to the bottom of the overdepth excavations. Costs incurred for removal and replacement of satisfactory material removed below indicated depths, without specific direction, will not be paid by the Owner, but shall be considered included in the Contract Sum. Compaction shall be as specified in subsection 3.03 of this specification section.

1. Make necessary corrections for pavements, subgrades, walks, slabs, drainage facilities, utilities, sanitary disposal facilities, site lighting and site grading, and other features, services, and construction.

2. Dispose of excess and unsuitable excavated material off-site.

3. Determination of elevations of approved overdepth excavation of unsuitable material below grades indicated shall be done under the direction of the Construction Manager.

4. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing in conformance with the requirements of the Village of Dobbs Ferry or as directed by representative of authority having jurisdiction.

5. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

6. Topsoil shall be carefully removed prior to beginning excavation operation. Topsoil shall be completely stripped, unless otherwise indicated. Stripped material which is, or may be made, suitable for use as topsoil shall be stored.

7. Topsoil shall not be stored in areas where it will interfere with surface drainage or the conservation of trees, shrubs or other vegetation to remain.

8. Topsoil shall not be removed outside the limits of the site.

9. Removal of topsoil shall be performed using such equipment and methods as will permit removal of topsoil without disturbing the materials below that elevation.

10. Stripping of topsoil shall generally follow the contour of the ground. Areas disturbed by construction, or site grading, shall be pulverized to a depth of 2" by disking or plowing. The area shall then be constructed true to grade, shaped to drain, and left free of surface irregularities.

11. Topsoil shall be considered the surface layer of soil and sod suitable for use in seeding and planting. Topsoil shall not contain any mixture of refuse or other material toxic to plant growth. Topsoil shall be free from subsoil, stumps, roots, brush, stones, clay lumps or similar objects larger than 2" in the greatest dimension.

B. Stability of Excavations: Slope sides of excavations shall comply with local codes and ordinances imposed by authorities having jurisdiction. Install an adequate and effective earth support system where sloping is not possible because of space restrictions or stability of material excavated. Brace and shore sides of excavations, as necessary. Remove bracing and shoring when no longer required, unless otherwise indicated or permitted to remain in place. Comply with County, State, and Federal Regulations regarding stability, shoring, bracing, sheathing, and safety of excavations.

1. Maintenance: Maintain sides and slopes of excavations in safe condition until completion of backfilling.

2. Safeguarding: Excavations shall be stable and any portion shall be replaced which has become displaced or unstable due to carelessness or negligence.

3. Shoring, bracing and sheathing shall be withdrawn as backfilling proceeds.

4. Maintain sides and slopes of excavation in safe condition until completion of backfilling.

5. Maintain an earth support system, consisting of good, serviceable sheet piling, uprights, stringers, cross braces, tie backs, etc., in excavations regardless of time period excavations will be open.

C. Underpinning: For excavations carried down to below footing bottoms of adjacent structures, provide underpinning designed and installed under the supervision of a licensed Professional Engineer.

D. Dewatering: Grading and dewatering shall be provided as necessary to prevent surface water and subsurface or ground water from flooding project site and surrounding area. Remove water accumulating in excavation to maintain the stability of the bottom and sides of the excavation, and to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well ponds, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations in a safe manner.

E. Material Storage: Stockpile excavated material off site and return suitable material as required for backfill or fill. Locate and retain soil materials away from edge of excavations. Dispose of excess soil material and waste materials in accordance with governing requirements imposed by local authorities having jurisdiction thereof.

F. Removal of Unyielding Material: Where unyielding material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with suitable materials. Unyielding material shall consist of rock and gravelly soils with stones which may interfere with the proposed construction.

G. Replacement of Unyielding Material: Unyielding material removed from the bottom of the trench shall be replaced with drainage fill or other suitable material. Equitable compensation will be made for the additional costs incurred for removal of unyielding material and its replacement, as directed, under the terms of contract conditions pertaining to changes in the work. Replaced materials shall be compacted as specified herein.

H. Removal of Unstable Material: Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with suitable materials. Unstable material shall consist of materials too wet to properly support the work and materials which fail to provide acceptable stability as evidenced by density tests or visual inspection. When removal of unstable material is required due to the fault or neglect of the Contractor in his performance of the work, the resulting material shall be excavated and replaced by the Contractor without any additional cost to the Owner.

I. Replacement of Unstable Material: Unstable material removed from the bottom of the trench shall be replaced with drainage fill or other suitable material and compacted as specified herein.

J. Removal and Replacement of Unsuitable Materials: When unsuitable materials are encountered at design elevations, remove such materials to the depth directed. Unsuitable materials shall be removed to proper grades, replaced with drainage fill or other suitable material, and compacted as specified herein. If appropriate, equitable compensation will be made for the additional costs incurred for the removal of such unsuitable material and its replacement as required, on the basis of contract conditions pertaining to changes in the work.

K. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

L. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room, and as may be necessary to obtain satisfactory compaction. Coordinate requirements with mechanical and electrical work.

1. Depth: Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups. Except as otherwise indicated, excavate for exterior waterfilled utility system piping (water, steam, condensate, or sanitary sewer) so top of piping is at least 3'-6" below finished grade.

    a) For pipes or conduit 5" or less in nominal size and for flat-bottomed multiple-duct conduit units, do not excavate beyond indicated depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil. Backfill with suitable material.

    b) For pipes or conduit 6" or larger in nominal size, tanks and other mechanical/electrical work indicated to receive subbase, excavate to subbase depth indicated, or, if not otherwise indicated, to 6" below bottom of work to be supported and backfill with suitable material.

2. Rock: Rock where encountered shall be excavated to a depth of at least 6" below required elevation (bottom of pipe). The over depth shall be backfilled with a 6" layer of crushed stone or gravel prior to installation of pipe. Rock shall be cleaned of loose debris and cut to a firm surface. Loose, disintegrated rock and thin strata shall be removed.

3. Grade and bearing: Bottoms of trenches shall be accurately graded as indicated, and compacted as specified herein to provide adequate and uniform bearing and support for the bottom quadrant of each section of pipe. Notch under pipe bells to provide solid bearing for entire body of pipe. Excavate bell holes to the necessary size at each joint, or coupling to eliminate point bearing. Stones 3" or greater in any dimension, or as

recommended by the pipe manufacturer, whichever is smaller, shall be removed to eliminate point bearing, and produce a suitable cushion for the pipe.

4. Inspection: Do not backfill trenches until inspections and/or tests have been made and backfilling authorized. Use care in backfilling to avoid damage or displacement pipe systems. Backfill placed in violation of this provision will be rejected and shall be removed and replaced without additional cost to owner.

5. Unsuitable material at design elevations: When unsuitable materials are encountered at design elevations, remove and replace with bedding materials or backfill as directed. Where recommended, pipe or special installation procedures shall be provided without additional cost to the Owner.

M. Bottom Preparation: Subbase, base, subsurface, surfacing, pavement, etc., shall not be placed on a muddy, spongy or frozen bottom or subgrade.

N. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35°Fahrenheit in a manner acceptable to the Owner's representative or representative of authority having jurisdiction. Frozen ground will be rejected.

3.02 EMBANKMENT

A. Place fill where required for embankment construction in substantial conformance with the line and grade shown on the contract drawings or established by the Architect/Engineer. Make necessary corrections for pavements, subgrades, walks, and slabs and any other improvements shown on the contract drawings. Provide select granular fill, as specified herein, if the material encountered in the cut sections is not suitable. Material required for fill or embankment in excess of that produced by excavation shall be select granular fill.

1. Embankment fill material shall be placed in uniform horizontal layers of not more than 12", loose depth, for the full width of each lift, then compacted as specified herein.

2. Construction standard: Except to the extent that more specific or stringent requirements are indicated, embankment construction shall conform to the applicable requirements specified for excavation in the New York State D.O.T. Standard Specifications.

B. Embankment Compaction: The requirements specified in subpart(s) "Compaction", "Subgrade Stabilization", and "Backfill and Fill" shall apply, with the following addition. Compact each layer for its full width as specified herein.

3.03 COMPACTION

A. General Requirements: Except to the extent that more specific or stringent requirements are indicated, the requirements for compaction specified within the New York State D.O.T. Standard Specifications at subsection(s) "Compaction" (203-3.12), "Proof Rolling In Embankment Sections", (203-3.13) and "Proof Rolling In Cut Sections", (203-3.14), shall apply.

B. Degree of Compaction: The surface of excavations and subgrades shall be compacted to a smooth and compact surface in accordance with the lines, grades, cross sections or elevations shown. Compaction shall be accomplished by sheepsfoot rollers, pneumatic tired rollers, steel sheeted rollers, vibratory compactors, or other approved equipment, including hand operated compactors, well suited to the type of material and work area being compacted. Control compaction to provide at least the percentage of maximum density as specified below for each area classification. Compaction shall continue until the in place density of each compacted layer complies with the percentage of density requirements specified for each area classification. Lift thickness shall be controlled, and shall not exceed the maximum allowed according to the equipment classifications specified in subparagraph B, section 203.12, "Compaction Equipment", New York State D.O.T. Standard Specifications, unless otherwise indicated or acceptable to the Village authorities having jurisdiction.

1. Soft, yielding material and areas of non-uniform density shall be reworked or removed and replaced, and the replacement material graded and compacted in accordance with the provisions for the given material and area classification. Such corrective work shall be done without additional compensation.

2. Should soft or yielding conditions be due to excessive moisture, suspend work in such areas until they sufficiently dry out.

3. Unstable conditions, including soft foundation areas or subbase conditions, which develop prior to or ahead of grading and compaction operations shall be corrected by scarifying, reshaping and recompacting, or by replacement as required.

C. Percentage of Maximum Density Requirements: Compact each layer of soil, fill, backfill, etc., to not less than the following percentages of Standard Proctor Maximum Density at optimum moisture content for each areas classification. Maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) shall be moisture determined in accordance with ASTM D1557. Compact each layer of soil, etc., to not less than the following percentages of density determined in accordance with ASTM D2049k for soils which will not exhibit a well-defined moisture-density relationship (cohesion less soils).

1. Structure: Compact top 8" of subgrade and each layer of backfill or fill material to at least 95%.

2. Building slabs and steps: Compact top 8" of subgrade and each layer of backfill or fill material to at least 95%.

3. Walkways: Compact top 6" of subgrade and each layer of backfill or fill material to at least 95%.

4. Pavements: Compact top 8" of subgrade and each layer of backfill or fill material to at least 95%.

5. Subgrade materials for paved areas: At least 95%.

6. Subgrade material for roadways and parking lot: At least 95%.

7. Structural fill: At least 95%.

8. Non-structural fill: At least 90%.

9. Lawns or unpaved areas: Compact top 6" of subgrade and each layer of backfill or fill material to at least 90%.

D. Moisture Control: Moisten or aerate each layer of material as necessary to provide optimum moisture content, before compacting, to ensure proper compaction. The requirements specified in section "Compaction", (203-3.12), of the New York State D.O.T. Standard Specifications, shall apply with the following modifications. Fill or backfill material to be compacted, shall be at a moisture content for proper compaction of that material using the compactor selected to perform the work. Determine proper limits as the work is progressed. When the moisture content of a lift about to be compacted exceeds the required amount, compaction shall be deferred until the layer has dried back to the required amount. Natural drying may be accelerated by blending in a dry material or manipulation alone, to increase the rate of evaporation.

1. Moisture Conditioning: 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, to prevent free water appearing on surface during or subsequent to compaction operations.

2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.04 SUBGRADE STABILIZATION

A. Subgrade Requirements: Prepare the subgrade below pavement, slabs and sidewalks to establish subgrade elevation and compact to specified density requirements. Complete, progressively maintain, and protect subgrade sufficiently in advance of the succeeding operation.

1. Subgrade-in-Place: Subgrade shall be 6", compacted depth, minimum. Should the subgrade become unstable at any time prior to the placement of the overlying course due to the gradation of the material furnished, correct the unstable condition.

2. Materials and Construction Details Within Right-of-Way Lines: Subgrade work within Town, County or State road, street, highway right-of-way lines, etc., shall comply with the requirements and specifications imposed by the governmental road authority having jurisdiction.

3. Upper course "Type 4" material shall be placed on the grade, in a manner to minimize segregation, using proper equipment and procedures. Uncontrolled spreading from piles dumped on the grade resulting in segregation will not be permitted. (Note: "Type 4" material shall conform to the gradation requirements of the New York State D.O.T. Standard Specifications, except as modified within this section.

4. Maximum layer thickness shall be 6" compacted, unless otherwise indicated. Loose lift thickness shall be a minimum of 1.5 times the maximum particle size. In confined areas as defined by the Architect/Engineer the maximum compacted layer thickness shall be 4".

B. Shape, Grade, and Slope: Prior to placement of pavement, structure, etc., promptly and satisfactorily reshape, and recompact or remove and replace, damaged or unsatisfactory areas. Carefully shape the subgrade to indicated lines and grades. Check the subgrade for line and slope, and make appropriate corrections for pavements, walks, slabs, etc., as shown on the contract drawings or as acceptable to the Architect/ Engineer/Construction Manager, or the representative of the governmental authority having jurisdiction.

1. Subgrade Compaction: Following shaping, the subgrade shall be compacted to a minimum of 95% of the Standard Proctor Maximum Density at optimum moisture content. If unsuitable material, such as clay, loam, or organic material is encountered at the subgrade level it shall be removed as specified herein.

2. Replace unsuitable material with suitable material as specified herein.

3. Backfill and compact the effective working platform in 4" layers until the surface is completed to the established subgrade elevation.

C. Finished Surface: Upon the completion of the subgrade, request an inspection by the Engineer, Construction Manager, and/or the representative of the governmental authority having jurisdiction. Further work shall not be performed on the subgrade and the subgrade shall not be disturbed until the inspection has been made and the work completed in compliance with specified requirements. Test the cross section of finished surfaces for surface irregularities at intervals of not more than 20'-0". The requirements specified in subpart "Surface Tolerance" shall apply.

D. Correction of Surface Irregularities: Except as otherwise indicated, surface irregularities exceeding 3/8" shall be corrected by loosening the surface and removing or adding material as required. Compact the corrected areas and surrounding surface by rolling.

3.05 BACKFILL AND FILL

A. General: Place suitable soil material in layers to required subgrade elevations, for each area classification listed below. Backfill and compact excavation to indicated line and grade. Make necessary corrections for pavements, subgrades, slabs and other improvements indicated on the contract drawings. Backfilling shall be completed and the material compacted before embankment is placed. Provide additional borrow material as required at no additional cost to Owner if sufficient suitable excavated material is unavailable. Prepare and compact subgrades as specified herein.

1. In excavations, and under grassed areas, use suitable excavated or borrow material.

2. Under walks and pavements, use subbase material, or suitable excavated or borrow material, or an acceptable combination of both.

3. Under steps, use sub-base material. (See Section 03300).

4. Under building slabs, use sub-base material or drainage fill material, or an acceptable combination of both. (See Section 03300).

5. Under piping and conduit, use sub-base material where sub-base material is indicated under piping or conduit, shape to fit bottom 90° of cylinder. For piping or conduit less than 2', measured from the top of pipe or conduit below surface or roadways, provide 4" thick concrete slab support. After installation and testing of piping or conduit, provide minimum 4" thick encasement (sides and top) of concrete prior to backfilling or placement of sub-base.

6. Backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing. Concrete shall comply with the requirements specified in Division-3 Section "Concrete Work", and the requirements specified within this section, subpart "Concrete". Special care shall be exercised in placing and compacting material immediately adjacent to pipes in order to avoid damage to the pipe and to prevent pipe displacement or misalignment.

B. Soundness of Excavation: When excavation if required, for the installation of conduit or direct burial cable, notify the Engineer/Construction Manager upon completion of the excavation. Conduit or cable shall not be placed in the excavation until the depth and cross-section has been inspected, tested, and accepted. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Testing, approval and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

7. Verification of in-place density by field density tests made on each lift, unless otherwise indicated.

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

D. Placement and Compaction: Except to the extent that more specific or stringent requirements are indicated, place backfill and fill materials in layers no more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.

1. When existing ground surface has a density less than that specified herein for each area classified with a specific percent maximum density requirement, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum dry density or relatively dry density.

2. Place backfill and fill materials evenly adjacent to structures, piping or conduit, to required elevations. Walls shall be adequately braced before backfilling. Prevent wedging action, eccentric loading or overloading of the structure by equipment used in compacting backfill material. Carry backfill and fill materials uniformly around structure, piping or conduit, to approximately same elevation in each lift.

3. Prevent displacement of piping and conduit. Avoid damage to waterproofing, dampproofing, etc., on walls. Do not damage green masonry, structures and other improvements by filling, rolling or sliding material and/or by movement of earthwork equipment.

4. Fill shall not be placed against structures until they have obtained sufficient strength to resist the thrust of fill material. Damage shall be repaired or replaced as required without additional cost to the Owner.

3.06 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Areas outside of each building and structure shall be constructed true to grade, shaped to drain, and shall be maintained free of trash and debris until inspection has been completed and the work has been accepted. Smooth finished surface within specified tolerances compact with uniform levels of slopes between points where elevations are shown, or between such points and existing grades. Promptly and satisfactorily reshape and recompact, or remove and replace damaged or unsatisfactory areas.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.

1. Finish surface free from irregular surface changes, and as follows:

2. Surface of embankments or excavated areas for construction and other areas on which a base course, walk, or pavement is to be placed shall vary not more than -.05' from the established line, grade, or cross section of the subgrade elevation. The grades surface shall be tested at randomly selected locations. The variation of the surface from the testing edge of a 10'0" straightedge, between any 2 contacts with the surface shall at no point exceed 3/8". Surface variations which exceed 3/8" shall be corrected.

3. Surfaces other than those that are to be paved shall vary not more than 0.10' above or below the established grade or cross-section, unless otherwise indicated.

4. Pavements: Shape surface of areas under pavement to line, grade and cross-section. The variation of the surface from the testing edge of the straight edge, between any 2 contacts with the surface, shall not exceed 3/8" when tested with a 20'-0" straight edge. Surface variations more than 3/8" above or below indicated subgrade elevation shall be corrected.

5. Lawns or unpaved areas: Finish areas to receive topsoil in substantial conformance with indicated line, grade, and cross section. After grading, the finish surface shall not exceed a tolerance of 0.10', above or below required subgrade elevation.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 3/8" when tested with a 10'-0" straight edge.

D. Compaction: After grading, compact subgrade surfaces to the depth and, maximum percentage density requirements, for each area classification, as specified herein.

E. Finished and Graded Excavation, Fills and Embankments: Except as otherwise indicated or specified, all areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth grades. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified. Ditches and gutters shall be finished to permit adequate drainage. The surface of areas to be landscaped shall be finished to a smoothness suitable for the installation of landscaping materials.

F. Graded areas shall be protected from traffic and from erosion, and any settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades reestablished to the required elevations and slopes.

3.07 BUILDING SLAB, DRAINAGE FILL COURSE

A. General: Drainage course consists of placement of drainage fill material, in layers of indicated thickness, over subgrade surface to support concrete building slabs.

B. Placement: Place drainage fill material on prepared subgrade in layers of uniform thickness, confirming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

C. Placement Limitation: When a compacted drainage course in shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

3.08 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed. When ASTM D1556, D1557, D2167, and/or D4253/D4254 field density test results indicate that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specifications requirements, at no additional expense to the Owner. Tests on recompacted areas will be performed at the expense of the Contractor to determine conformance with specification requirements.

1. Check tests on in-place densities: Test will be made for each type material or source of materials to determine maximum density values. Except as otherwise indicated, the following number of tests, if performed at the appropriate time, shall be the minimum for each operation.

2. Paved Areas and Building Slab Subgrade: At least one field density test of subgrade for each 500 square feet of paved areas or building slab. One field density test for each 1500 square feet, or fraction thereof, of compacted fill area. Minimum of 3 tests, each.

3. Foundation Wall Backfill: At least 2 field density tests, at locations and elevations as directed.

4. Footing Subgrade: For each strata of soil on which footings will be placed, at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Architect/Engineer/Construction Manager. (See Section 03300).

B. Compaction Tests for Embankment:

- One test per 1000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

- One test per each 500 cubic yards, or fraction thereof.

C. Sieve Analysis for Embankment:

- One test for each lift.

- One test per each 500 cubic yards, or fraction thereof.

D. Footing bottoms shall be approved by a qualified geotechnical engineer designated by the Consultant. Concrete shall be poured immediately after such approval is given. Unsuitable materials of exposed subgrade shall be removed and replaced by compacted structure fill. (See Section 03300).

E. Removal of Unsuitable Material: Removal of unsuitable material, replacement with structural fill, and compaction, shall be provided as acceptable to the Architect/Engineer/Construction Manager. If appropriate, equitable compensation will be made for the additional cost incurred on the basis of contract conditions relative to changes in the work; or, on the basis of pre-established unit prices per cubic yard of "additional excavation".

F. Additional Compaction: If in the opinion of the Consultant subgrade or fills which have been placed are below specified density provide additional compaction and testing at no additional expense.

G. Defective Work: If, based on reports of testing service and inspection, subgrade, fills, etc., which have been placed are below specified density, additional compaction and testing will be required until satisfactory results are obtained. If the work fails to meet required compaction values, then the material shall be entirely removed and replaced in accordance with the requirements of the specifications.

1. Results of density tests of soil-in-place will generally be considered satisfactory if average of any four consecutive density tests which may be selected are in each instance equal to or greater than specified density and if not more than one density test out of five has a value more than 2% below required density.

2. Removing, replacing and compacting such unsatisfactory compacted work, shall be provided without additional compensation, and shall be completed to the satisfaction and acceptance of the Architect/Engineer.

3.10 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Do not allow traffic on newly graded surfaces. The finished subgrade shall not be disturbed and shall be protected and maintained in a satisfactory condition until subbase, base, pavement, etc., is placed.

B. Condition of Graded Area: Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction, without additional compensation.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), and backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Disposition and Removal: Provide for proper removal from the site of waste materials, including excess, unsuitable or unacceptable excavated material, trash and debris.

B. Accumulated materials, debris, etc., shall be legally disposed of at sites provided outside of the Owner's property. The Contractor shall assume full responsibility for acceptable disposition of the material in compliance with applicable environmental regulations, permit requirements, and any requirements or limitations imposed by the Contract, Town, County, or State; as well as for any damage resulting from his disposal operations.

END OF SECTION

SECTION 02220

DEMOLITION

PART I - GENERAL

1.01 REFERENCES

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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6	Demolition Operations

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR 61-SUBPART M	National Emission Standard for Asbestos
49 CFR 173.301	Shipment of Compressed Gas Cylinders

1.02 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Owner. Remove rubbish and debris from the project site daily; do not allow accumulations on the pier. Store materials that cannot be removed daily in areas specified by the Owner.

1.03 SUBMITTALS

Submit the following in accordance with Section 01330 entitled "Submittal Procedures."

A. Submit proposed demolition and removal procedures to the Owner for approval before work is started.

B. Required data for Demolition plan shall include procedures for coordination with other work in progress, a detailed description of methods and equipment to be used for each operation and of the sequence of operations

C. Submit receipts for all demolition materials required to be disposed off-site, whether hazardous or non-hazardous waste, to ensure that the material was

properly disposed of in accordance with all applicable rules and regulations.

1.04 WORK INCLUDED

A. Remove existing mixed riprap and concrete rubble wall in areas 1, 2, 3, & "Jetty".

B. Remove existing concrete ramp in area 3.

C. Demolish and remove existing concrete slab gravity wall and soil behind wall to allow for installation of sheet piling tie rods and dead men.

1.05 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," safety requirements shall conform with ANSI A10.6.

1.06 NOTIFICATIONS

Furnish timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with applicable regulations. Notify the local air pollution control district/agency and the Owner in writing 10 days prior to the commencement of work in accordance with 40 CFR 61-SUBPART M.

1.07 DUST AND DEBRIS CONTROL

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

1.08 PROTECTION

A. Where pedestrian and driver safety is endangered in the area of removal work or storage, use traffic barricades with flashing lights and warning signs, as appropriate. Notify the Owner prior to beginning such work.

B. Protect existing work which is to remain in place, be reused, or remain the property of the Owner. Repair items which are to remain and which are damaged during performance of the work to their original condition, or replace with new. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction

weakened by demolition or removal work. Repairs, reinforcement, or structural replacement must have Owner approval.

C. Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.

D. Burning will be permitted. Where burning is permitted, adherence to federal, state, and local regulations shall be required. Refer to Section 01525, Subsection 3.01 for additional requirements relating to burning.

1.09 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by the Owner

PART II – PRODUCTS

Not used

PART III - EXECUTION

3.01 EXISTING FACILITIES TO BE REMOVED

A. Remove indicated existing structures three feet below existing Mean Low Water.

B. Remove existing utilities uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Owner. Remove meters and related equipment and deliver to a location in accordance with instructions of the Owner. If utility lines are encountered that are not shown on drawings, contact the Owner for further instructions.

C. Remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated on the Contract Drawings. Provide neat sawcuts at limits of pavement removal as indicated.

D. Sawcut and remove masonry so as to prevent damage to surfaces to remain and to facilitate the installation of new work. Where new masonry adjoins existing, the new work shall abut or tie into the existing construction as specified for the new work.

E. Saw concrete along straight lines to a depth of not less than 2 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

F. Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

1. Holes and depressions caused by previous physical damage or left as a result of removals in existing masonry walls to remain shall be completely filled with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

3.02 FILLING

Caution must be taken to prevent uncovered holes and other such hazards. Fill holes, and other hazardous openings in accordance with Section 02200.

3.03 DISPOSITION OF MATERIAL

A. Except where specified in other sections, all materials and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from Owner’s property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Owner of the Contractor's demolition and removal procedures, and authorization by the Owner to begin demolition. The Owner will not be responsible for the condition or loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

B. Remove and store materials and equipment indicated to be reused or relocated to prevent damage, and reinstall as the work progresses.

C. Remove materials and equipment that are indicated to be removed by the Contractor and that are to remain the property of the Owner, and deliver to a storage site as directed within two miles of the work.

D. Remove and transport debris and rubbish in a manner that will prevent spillage on pavements, streets or adjacent areas. Clean up spillage from pavements, streets and adjacent areas which may occur.

END OF SECTION 02220

SECTION 02352

COMPOSITE SHEET PILING

PART I - GENERAL

1.01 SUMMARY

This Section specifies requirements for composite sheet piling for permanent construction, such as retaining walls, bulkheads and cellular cofferdams.

1.02 REFERENCES

The following is a list of the publications referenced in this Section:

American Society for Testing and Materials (ASTM)

ASTM D4216 PVC and CPVC Compounds

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork (Section 02200)

1.04 QUALITY ASSURANCE

A. Certificates

1. Certify that materials are new and meet or exceed specification requirements by submitting at least two notarized copies of chemical and physical test results.

B. Detail Drawings

1. Submit copies of drawings covering all fabricated accessories.

2. Submit copies of installation layout drawings for approval.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store and handle material carefully to prevent physical damage.

1.06 SUBMITTALS

Submit the following, in accordance with these specifications:

A. A complete description of the hammer and driving equipment including caps and guides.

B. The proposed procedure for installing the sheet piling including the sequence for driving all piles; and installation of waler and tie-back system.

PART II - PRODUCTS

2.01 SHAPES

A. General Requirements

1. Sheet piles and special fabricated shapes shall be of a design that assures continuous interlock throughout the entire length when in place.

2. Provide piling with standard size handling holes located approximately four inches below the top of the pile.

3. Sheet piling supplied for the project shall meet or exceed all required physical characteristics as defined below:

a. Sheet Pile Material - All sheet piling shall be manufactured entirely from a rigid, high impact, UV-inhibited, weatherable vinyl compound. All exposed surfaces of the sheet piling shall be UV resistant, and comprised of virgin material with a minimum ASTM D4216 Cell Classification of 1-41444-33 to ensure reliable performance and color consistency. If mono-extrusion technology is used, the entire sheet pile must be comprised of virgin material with a minimum ASTM D4216 Cell Classification of 1-41444-33.

b. Section Modulus – The section modulus of the sheet piling shall be no less than 37.6 in^3 per linear foot of wall.

c. Moment of Inertia –The moment of inertia of the sheet piling shall be no less than 263 in^4 per linear foot of wall.

d. Thickness – The sheet piling must have a minimum thickness of 0.425 inches in the web and 0.470 inches in the flange.

e. Depth – The sheet piling must have a maximum section depth of 14 inches to prevent web buckling.

f. Coverage & Interlocks – The sheet piling must have a minimum width of 48 inches per sheet resulting in a maximum of 0.25 interlocks per linear foot of wall.

g. Locking System – All male interlocks must incorporate I-Beam Lock reinforcement to resist lock separation and decrease seepage.

h. Surface Finish/Appearance – The sheeting must be black in color. Color samples to be approved by the engineer.

4. Additional length beyond those indicated by the bill of materials or drawings may be required to provide for trimming of tops of sheet piling.

5. Sheet piles and interlocks shall not have excessive kinks, camber or twist that would prevent the pile from reasonably free sliding to final position.

2.02 MATERIALS

B. Corners, tees – Should be acquired through manufacturer of sheet piling to match selected sheet piling.

C. Plate washers, miscellaneous steel - ASTM A36.

D. Tie rods – ASTM A722, per plans.

E. Bolts and nuts - ASTM A325, galvanized in accordance with ASTM A153.

F. Handling holes

1. Provide one maximum 3" diameter handling hole located 4" from one end, each pile.

PART III - EXECUTION

3.01 INSTALLATION

A. Vibratory hammer to be used to drive all piling. Any material which stops the driving shall be removed by the contractor.

B. Piles shall be plumb and straight with all interlocks properly connected to prevent loss of material. Remove and replace piles found to be out of interlock or out of tolerances. Allowable tolerances for placement:

1. Horizontal - 1 inch in 5 feet

2. Vertical - 3/4 inch per foot.

3.02 QUALITY CONTROL

A. Pile Driving

1. Use an approved guide frame or template to set sheet piles in proper position and alignment and to provide adequate lateral support to maintain vertical alignment during driving. Where field conditions require, use two levels of guide wales to maintain vertical alignment during driving.

2. The sheet piles shall be properly set and "shaken out" prior to driving. After placing a pair of sheets within their interlocks, they shall be lowered as far as possible. Should the sheets find or hang up in their interlocks before bearing on the ground, adjacent sheets shall be picked up in pairs and shaken out as required, until the sheets ride smoothly within their interlocks and simultaneously bear on the ground.

3. Top of sheet pile shall be normal to the driving force.

4. Drive sheet piles to the tip elevation(s) shown on the Contract Drawings. Each pair of sheet pile shall not be driven more than 5 feet ahead of the adjacent sections.

5. Sheet piles shall be driven in such a manner as to prevent piles from leaning in the direction of driving and to provide continuous closures of sheet piles, where closure is required. Where possible, drive sheet piling with the ball end leading. If an open socket is leading, provide a bolt or similar object in the bottom of the interlock to keep interlock free of soil material.

6. At the completion of the driving operation on a pile, the pile shall be undamaged, free of defects and in compliance with the requirements of this Section.

7. Cut piles off at cut-off elevation as shown on the Contract Drawings as soon as practical after driving.

8. No jetting will be permitted.

B. Corrections of Deficiencies

1. The Contractor shall notify the Engineer immediately, in writing, of the failure of any sheet pile to meet any requirement of this Section. Such written notification shall include all information required for the evaluation of remedial measures.

END OF SECTION

SECTION 02378

GEOTEXTILE FILTERS

PART I - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work specified in this section.

1.02 DESCRIPTION OF WORK:

A. The work shall include but is not limited to the following:

1. Installing a geotextile as a filtration layer below riprap scour protection.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Demolition of existing structures.

B. Excavation and grading of the embankment.

C. Armor Stone Revetment Construction.

1.04 QUALITY ASSURANCE:

A. Except as modified by governing codes and by this Specification, comply with the applicable provisions and recommendations of latest edition of the following:

US ARMY CORPS OF ENGINEERS

SPM	"Shore Protection Manual," Volumes I and II.
EM 1110-2-1614	"Design of Costal Revetments, Seawalls, and Bulkheads."
EM 1110-2-1601	"Hydraulic Design of Flood Control Channels," Chapter 3.
ETL 1110-2-286	"Use of Geotextiles Under Riprap."
CW-02215	"Plastic Filter Fabric."

AMERICAN SOCIETY FOR TESTING MATERIALS:

ASTM D 123 "Standard Terminology Relating to Textiles."

ASTM D 4759 "Determining the Specification Conformance of Geosynthetics."

ASTM D 4873 "Identification, Storage and Handling of Geotextiles."

B. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

C. Conflicts: Conform to requirements of above standard unless specified otherwise below. In case of apparent conflict between standards, or between standards and the specifications herein below, refer the matter to the Engineer, whose decision shall be final.

D. Owner's acceptance: Owner reserves the right to reject or accept supplier of materials.

E. Workmanship: The Contractor is responsible for correction of restoration work which does not conform to the specified requirements, including coverage, and stability. Correct deficiencies as directed by the Engineer and coordinated with the Engineer.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's application and installation instructions for proprietary materials and items as requested by the Engineer.

1.05 PRODUCT HANDLING

A. Deliver the specified products in original rolls, wrapped for protection from water, sunlight or other contaminants, with the manufacturer's name, labels, product identification, and batch numbers.

B. Store and condition the specified products as recommended by the manufacturer and in accordance with ASTM D 4873. No hooks, tongs, or other sharp instruments shall be used for handling geotextiles.

1.06 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or rain appears to be imminent.

B. Protection: Precautions should be taken to avoid damage due to wind, wave, equipment, and/or materials at the job site during handling and installation.

1.07 ACCEPTABLE CONTRACTORS

A. The approved Contractor shall have satisfactory knowledge and experience with the handling, protection, and installation geotextile fabrics.

B. The approved Contractor must have, in his possession, the manufacturers printed literature on the Engineer approved geotextile fabric to be used.

PART II - MATERIAL

2.01 GEOTEXTILE FABRIC

A. The engineered filtration geotextile fabric shall be a woven fabric of monofilament and multi-filament yarn construction used in erosion control and filtration applications. The material shall conform to the following requirements:

a.	Percent open area:	4 - 6 %.
b.	Apparent opening size:	Smaller than US Standard Sieve No. 70 (0.21mm).
c.	Strength	As specified in USACE CWO2215.
	1. Tensile:	250 lbs
	2. Ultraviolet Resistance:	90 percent
	3. Puncture:	120 lbs
d.	Permittivity	Greater than 5 times the permittivity of the protected soil, 0.28 sec $^{-1}$.

PART III - EXECUTION

3.01 SURFACE PREPARATION

A. Compact and grade the embankment in accordance with the Specification number 02200 Earthwork.

B. The surface should be free from obstruction, debris, depressions, erosion feature, or vegetation. Any irregularities will be removed so as to ensure continuous, intimate contact of the geotextile with the entire surface.

3.02 INSTALLATION

A. If construction permits, periods of slack water and minimal wave activity shall be selected for the geotextile installation.

B. The work shall be scheduled so that the covering of the geotextile with the bedding material is accomplished within seven days.

3.03 PLACEMENT OF THE GEOTEXTILE

A. The fabric strips shall be placed with the long dimension parallel to the shoreline or the entire length of the revetment, and laid smooth and free of tension, stress, folds, wrinkles, and/or creases.

B. Placement will start from the design toe of the revetment. The first strip of fabric should be placed with a minimum of 6 feet of fabric extending past the toe to be keyed into the riprap when placed. Loose fabric shall be pinned to hold it in place until the bedding layer and riprap are installed.

C. Placement will continue with the upper strips of fabric overlapping the lower strips. Temporary pinning of the geotextile to help hold it in place until the bedding material is placed is appropriate. However, the pins shall be removed as the bedding material is installed to relieve the tensile stresses that occur during placement.

D. Each fabric strip shall be placed to provide a minimum overlap of 2 feet below the mean high water (MHW) mark, and 1.5 feet overlap above the same elevation at each seam. Overlaps at the end of the strips shall be staggered at least 5 feet.

E. At the top of the revetment, the fabric shall extend 6 feet past the design limit. This material will be wrapped over the bedding layer. The loose fabric should be pinned to hold it in place until the bedding layer is installed.

F. The Contractor shall adjust the actual length of the geotextile used based on the initial installation experience.

G. Trimming or cutting shall be performed in accordance with manufacturer's recommendations, and in such a manner that the geotextile shall not be damaged in any way.

3.03 PROTECTION

A. The geotextile shall be protected at all times during construction from contamination by surface runoff. Any geotextile so contaminated shall be removed and replaced with uncontaminated fabric.

B. Any damage to the geotextile during installation shall be replaced by the Contractor at no cost to the Owner.

C. Tension in the fabric must be absolutely minimized to prevent puncture by the bedding layer or the stone to be installed.

D. Absolutely no equipment shall be allowed on the installed and unprotected geotextile.

END OF SECTION

SECTION 02380

RIPRAP SCOUR PROTECTION

PART I - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of the armor stone revetment construction is shown on drawings.

B. The work shall include but is not limited to the following:

1. Placing a bedding/filtration layer of gravel.

2. Placing armor stone on the embankment and at the toe.

3. Integrating geo-textile fabrics into the armor stone revetment to prevent undermining.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Demolition of existing structures.

B. Excavation and grading of the embankment.

C. Geotextile filter installment.

1.04 QUALITY ASSURANCE

A. Except as modified by governing codes and by this Specification, comply with the applicable provisions and recommendations of latest edition of the following:

US ARMY CORPS OF ENGINEERS

SPM	"Shore Protection Manual," Volumes I and II.
EM 1110-2-1414	"Water Levels and Wave Heights For Costal Engineering Design."

EM 1110-2-1614 "Design of Costal Revetments, Seawalls, and Bulkheads."

EM 1110-2-1601 "Hydraulic Design of Flood Control Channels," Chapter 3.

EM 1110-2-2302 "Construction with Large Stone."

ETL 1110-2-286 "Use of Geotextiles Under Riprap."

AMERICAN SOCIETY FOR TESTING MATERIALS:

C33 "Specification for Concrete Aggregates."

C127 "Specific Gravity and Absorption of Coarse Aggregate."

D4992 "Evaluation of Rock to be Used for Erosion Control."

D5312 "Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions."

D5313 "Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions."

D5519 "Particle Size Analysis on Natural and Man-Made Riprap Materials."

B. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

C. Conflicts: Conform to requirements of above standards unless specified otherwise. In case of apparent conflict between standards, or between standards and the specifications herein, refer the matter to the Engineer, whose decision shall be final.

D. Owner's acceptance: Owner reserves the right to reject or accept supplier of materials.

E. Workmanship: The Contractor is responsible for correction of restoration work which does not conform to the specified requirements, including coverage, and stability. Correct deficiencies as directed by the Engineer and coordinated with the Engineer.

F. Tests for Stone Materials

1. Test bedding material by method of sampling and testing of ASTM C33.

2. For armor stone and gravel, test material in accordance with ASTM D4992, ASTM D5312, ASTM D5313, and ASTM D5519.

3. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Engineer.

4. Stone Testing Service: Employ at Contractor's expense a testing laboratory as directed by the Engineer to perform material evaluation tests.

5. Materials and installed work may require testing and retesting, as directed by the Engineer, at anytime during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to the performed, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.5 SUBMITTALS

A. Samples: Submit samples of stone materials as specified and as otherwise requested by the Engineer, including names, sources and descriptions.

B. Laboratory Test Reports: Submit laboratory test reports for stone materials as specified.

C. Field Test Reports: Submit field test reports for stone materials as specified.

D. Contractor's Responsibility: The Engineer’s acceptance shall not relieve the Contractor of responsibility for any error or for furnishing material of the proper size, quantity, or quality.

E. Material Certificates: Provide material certificates in lieu of materials laboratory test reports when permitted by the Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.05 JOB CONDITIONS

A. Site information data is made available for convenience of Contractor. Before stockpiling stone, existing subsurface structures, utilities, etc., which may interfere with, or be affected by the specified construction, shall be located by:

1. Sufficiency of Site Information Data: Site information data and related records of subsurface investigation are not a part of the contract documents and are made available for inspection solely for convenience, if available.

B. Protection of Persons and Property: Contractor shall provide protection, which shall include, but not be limited to:

1. Installation and maintenance of fences, barricades, warning signs, warning lights as required.

2. Protection of structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. Repair, replace, or otherwise restore such damaged services and/or construction to a condition as good as prevailed at the time work started, and without additional compensation.

C. Stockpile shall be a maximum of 12 feet high and formed by a series of truckload dumps where the rock essentially remains where it is placed. Subsequent layers shall be started 10 feet from the edge of the previous layer. Stockpiles should remain a minimum of 20 feet from the edge of the embankment.

1.06 ACCEPTABLE CONTRACTORS

A. The approved Contractor shall have:

1. Satisfactory knowledge and experience of waterfront excavation, grading, and placement of shore protection systems above and below water.

B. Drawings at Job Site: The Contractor shall keep a set of shop drawings with the Engineer's acceptance stamp on the job site at all times.

PART II - PRODUCTS

2.01 BEDDING MATERIAL

A. Bedding material shall consist of a washed gravel or crushed stone and shall be free of organic matter and/or objectionable particles. The aggregates shall conform to the requirements of ASTM C33 Size Number 67 and shall consist of hard crystalline stone or gravel, free from shale or decomposed or thin, laminated pieces. It shall be uncoated and clean, and conform to the following gradation requirements.

6 inch thick bedding stone layer:

SIEVE	**3″**	**2 ½″**	**2″**	**1 ½″**
% Passing	100	50-100	10-50	0-10

2.03 ARMOR STONE

A. Armor stone shall consist of quarried stone and shall be free of organic and other objectionable materials. Each piece of rock must be composed of hard strong durable materials that will not slake or deteriorate on exposure to the action of water or atmosphere, and shall conform to the following standards and gradation requirements.

1. Unit Weight: All stone shall have a minimum unit weight of 165 lb/ft^3 based upon water having a unit weight of 62 lb/ft^3, and in accordance with ASTM C127.

2. Absorption: The stone shall have absorption less than 2 percent unless other tests and service records show that the stone is satisfactory.

3. Petrographic Examination: Stone shall be evaluated according to the information required in ASTM D4992, Paragraph 10.

4. Resistance to Freezing and Thawing: Stones shall have a maximum loss of 10 percent after the number of cycles specified by ASTM D5312.

5. Resistance of Rock to Wetting and Drying: Stone shall have a maximum loss of 1 percent when determining the durability when subject to wetting and drying in accordance with ASTM D5313.

6. Size and Shape: Stones shall be angular to subrounded in shape; the least dimension of any stone shall not be less that one-third the greatest dimension.

7. Stone shall be properly graded and conform to the following gradation requirements:

Percent Greater by Weight	**100%**	**50%**	**15%**
Limits of Stone Weight	375	500	625

B. Stones that fail to meet the material requirements stated above may be accepted only if similar rock from the same source has been demonstrated to be sound after five (5) years or more of service under conditions of weather, wetting and drying, and erosive forces similar to those anticipated for the rock to be installed under this specification.

PART III - EXECUTION

3.01 BASE PREPARATION

A. Grading and geotextile base preparation is to be performed in accordance with Specification Sections 02200 and 02378 and shall conform to the cross sections shown on the Contract Drawings within +/- 4 inches.

3.02 PLACEMENT OF BEDDING LAYER

A. A 6 inch bedding layer consisting of 1½-inch to 3-inch diameter gravel. The bedding layer shall be placed on the prepared base as described below, in accordance with the details and limits shown on the Contract Drawings.

1. Bedding shall be spread uniformly on the geotextile on the slope and grades as indicated in the Contract Drawings and in such a manner as to avoid damage to the geotextile.

2. Placing of the bedding layer by methods that tend to segregate the particle sizes within the layer will not be permitted.

3. Placement shall begin at the bottom of the area to be covered and continue up-slope. Subsequent loads of material shall be placed against previously placed material in such a manner to ensure a relatively homogeneous mass.

4. Any damage to the geotextile during placing of the material shall be repaired before proceeding with the work.

5. Compaction is not required, however, the material surface shall be finished to present an adequately even surface free from mounds or windows.

B. Upon completion of the placement, the first layer of geotextile fabric at the top of the revetment shall be unpinned and pulled over the bedding layer in accordance with the Contract Drawings. Temporary pins shall be installed to ensure that the fabric remains in place until placement of the armor stone. The remaining layer of geotextile extending past the toe shall remain pinned.

3.03 PLACEMENT OF ARMOR STONE

A. Armor stone shall be machine placed within specified tolerances, as described below and to the lines and grades shown on the Contract Drawings.

1. Armor stone shall be placed in a manner that will produce a poorly graded mass of rock with minimum practicable percentage of voids.

2. Armor stone shall be placed to its full course thickness in one operation, and in such a manner as to avoid displacing the bedding material. The large stones shall be well distributed and the entire mass of stones in their final position shall be graded to conform to the gradation specified herein.

3. Placement shall begin at the bottom of the embankment and continue up-slope. Subsequent loads of material shall be placed against previously placed material in such a manner to ensure a relatively homogeneous mass.

4. Armor Stone Placed in the Wet: Shall be done during periods of low water.

   a. The stones shall be placed in two passes, with the second pass perpendicular to the first pass to achieve the layer thickness as specified in the Contract Drawings.

   b. The remaining layer of geotextile fabric extending past the toe shall be unpinned and pulled over the first pass of stone, and the second pass of stone placed over the fabric.

5. The finished armor stone shall be free from objectionable pockets of small stones and clusters of large stones.

B. During placement, no stone shall be dropped through the air from a height greater than 2 feet for stones heavier than 500 pounds and 1 foot for stones heavier than 1000 pounds for adequate protection of the bedding layer and the geotextile fabric.

C. Stones required to be placed over or adjacent to drains, outfalls, and subsurface pipes shall not be dropped, but gently lowered and placed in their final position by material handling equipment.

D. Equipment used to place armor stone shall be truck, crane-operated skip-pan, dragline bucket, clamshell, rock-bucket, hydraulic excavator, trackhoe, or other approved equipment.

E. No equipment shall be operated directly on the completed stone protection system.

F. The following methods of placement will not be permitted:

1. Placing the armor stone in layers, except where specified.

2. Placing armor stone by dumping it into chutes, or by similar methods likely to cause segregation of the various sizes.

3. Placing armor stone by dumping it at the top of the slope and pushing it down the slope.

3.04 TOLERANCES

A. Bedding Layer

1. Slope Lines and Grade: plus 2 inches or minus 1 inch.

2. Layer Thickness: plus 3 inches or minus 1 inch.

B. Armor Stone

1. Slope Lines and Grade: plus or minus 6 inches.

2. Layer Thickness: plus or minus 6 inches.

3.05 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. One gradation field test per 5,000 tons of armor stone and 1,000 tons of bedding material shall be performed in accordance with ASTM D5519 and ASTM C136.

END OF SECTION

SECTION 03210

COATED REINFORCING REBARS

PART I - GENERAL

1.01 COMPLEMENTARY SECTIONS

A. The requirements of the General Conditions and the Special Conditions of this volume of specifications shall apply to this section.

1.02 SCOPE

A. Work specified in this section

1. Reinforcing steel for cast-in-place concrete.

B. Related work specified elsewhere

1. Cast-in-place Concrete

1.03 REFERENCE DOCUMENTS

A. Codes and Standards

1. American Concrete Institute (ACI)

a. "Building Code Requirements for Reinforced Concrete (ACI 318-83)".

b. "ACI Detailing Manual - 1980 (SP-66)".

c. "Standard Tolerances for Concrete Construction and Materials (ACI 117-81)".

2. American Society for Testing and Materials (ASTM)

a. Reinforcing Bars, ASTM A615, A616 including supplementary requirement S1, A617, A706, latest edition".

b. Bar Mats, ASTM A184, latest edition; fabricated from reinforcing bars that conform to Section 1.3A.2(a)".

c. Wire, ASTM A82, A496, latest edition".

d. "Welded wire fabric, ASTM A185, A497, latest edition".

e. "Epoxy-coated reinforcing bars, ASTM A775, latest edition; reinforcing bars to be coated shall conform to Section 1.3A.2 (a)".

f. "Zinc-coated (galvanized) reinforcing bars, ASTM A767, latest edition; reinforcing bars to be coated shall conform to Section 1.3A.2(a); supplementary requirements S1 and S2 shall apply when fabrication after galvanization includes cutting and bending; supplementary requirement S2 shall apply when fabrication after galvanization includes only bending.

3. Concrete Reinforcing Steel Institute (CRSI)

a. "Manual of Standard Practice, 24th Edition, 1986".

b. "Placing Reinforcing Bars, 5th Edition, 1986".

4. American Welding Society (AWS)

a. "Structural Welding Code - Reinforcing Steel (AWS D1.4-79)".

PART II - PRODUCTS

2.01 MATERIAL TO CONFORM TO THE FOLLOWING

A. Reinforcing Steel

1. Deformed bars, per ASTM type and grade as specified in the Contract Documents.

2. Spirals, hot rolled plain or deformed bars per ASTM A615-Grade 60 or cold drawn wire per ASTM A82 as specified in the Contract Documents.

3. Plain welded wire fabric per ASTM A185, or deformed welded wire fabric per ASTM A497 with wire size and spacing as specified in the Contract Documents.

4. Epoxy-coated reinforcing bars per ASTM A775 when specified in the Contract Documents; when required, damaged epoxy coating shall be repaired with patching material conforming to ASTM A775 and done in accordance with the material manufacturer's recommendations.

5. "Zinc-coated (galvanized) reinforcing bars per ASTM A767 when specified in the Contract Documents; when required, damaged zinc coating shall be replaced with a zinc-rich formulation conforming to ASTM A767.

B. Identification of Reinforcing Steel

1. Bundles of reinforcing bars shall be tagged showing quantity, grade size, and suitable identification to allow checking, sorting and placing.

2. Bundles of flat sheets and rolls of welded wire fabric shall be tagged showing quantity, style designation, width, and length.

C. Storage and Protection

1. Reinforcing steel shall be stored off the ground and protected from oil, or other deleterious materials. Epoxy-coated reinforcing bars shall be stored on protective cribbing.

2. Rust, seams, surface irregularities, or mill scale shall not be cause for rejection, provided the weight and height of deformations of a hand-wired-brush test specimen are not less than the applicable ASTM specification requirements.

D. Bar Supports

1. Bar supports and bar spacing shall be per recommendations set forth by Chapter 3 of the CRSI Manual of Standard Practice.

2. Steel wire bar supports in concrete areas where soffits are exposed to view or are painted shall be Class 1 or Class 2, Types A or B; Class 3 is acceptable in other areas.

3. Epoxy-coated reinforcing bars supported from formwork shall rest on coated wire bar supports, or on bar supports made of dielectric material or other acceptable materials. Wire bar supports shall be coated with dielectric material, compatible with concrete, for a minimum distance of 2 inches from the point of contact with the epoxy-coated reinforcing bars. Reinforcing bars used as support bars shall be epoxy-coated. In walls reinforced with epoxy-coated bars, spreader bars where specified

by the Engineer, shall be epoxy-coated. Proprietary combination bar clips and spreaders used in walls with epoxy-coated reinforcing bars shall be made of corrosion-resistant material or coated with dielectric material.

4. Zinc-coated (galvanized) reinforcing bars supported from formwork shall rest on galvanized wire bar supports, on wire bar supports coated with dielectric material, or on bar supports made of dielectric material or other acceptable materials. All other reinforcement and embedded steel items in contact with, or in close proximity to galvanized reinforcing bars, shall be galvanized.

E. Tie Wire

1. Wire shall be 16-1/2 gauge or heavier, black-annealed.

2. Epoxy-coated reinforcing bars shall be tied with plastic, epoxy, or nylon-coated tie wire; or other acceptable materials.

3. Zinc-coated (galvanized) reinforcing bars shall be tied with zinc-coated tie wire, or non-metallic coated tie wire, or other acceptable materials.

PART III - EXECUTION

3.01 PLACING DRAWINGS

A. Submit placing drawings prepared in accordance with the ACI Detailing Manual.

3.02 FABRICATION

A. Reinforcing steel shall be accurately fabricated to the dimensions shown in the Contract Documents.

1. Bends shall conform to bend dimensions defined as standard in accordance with details in the ACI Detailing Manual and/or CRSI Manual of Standard Practice, unless otherwise shown.

2. Bars shall be bent cold, and shall not be bent or straightened in a manner that will injure the material.

3. Bars shall be fabricated within the tolerances shown in the ACI Detailing Manual and/or CRSI Manual of Standard Practice.

B. Spirals

1. Provide one and one-half finishing turns top and bottom minimum.

2. Splices shall be a tension lap at 48 bar diameters minimum, but not less than 12 inches, or by welding.

3. Provide spacers per Chapter 5, Section 9 of the CRSI Manual of Standard Practice.

C. Welding as an aid to fabrication and/or installation will not be permitted except as specifically shown in the Contract Documents, or as authorized by the Engineer.

3.03 TESTING AND INSPECTION

A. At the time of shipment, and only upon request, a certified copy of a mill test report showing physical and chemical analysis for each heat of reinforcing bars delivered shall be provided for ASTM A615 material; and for ASTM A616 and ASTM A617 material a mill test report showing a physical analysis for each lot of reinforcing bars delivered shall be provided.

B. Field inspection shall be in accordance with local Building Code requirements.

3.04 PLACING

A. The placement of bars should conform to the recommended practices in CRSI Placing Reinforcing Bars.

B. Reinforcement shall be placed within the tolerances given in ACI-117.

C. When necessary to move reinforcing bars to avoid interference with other reinforcement, conduits, or embedded items exceeding the specified placing tolerances, the resulting arrangement of bars shall be subject to acceptance by the Engineer.

D. Bars shall be securely tied to prevent displacement. All dowels shall be secured in place before depositing concrete, unless otherwise permitted.

E. All splicing of reinforcement shall be as indicated in the Contract Documents, unless otherwise permitted. Concrete cover and bar spacing shall conform to ACI 318.

F. Welded wire fabric shall be furnished in flat sheets or rolls.

G. Welded splices or mechanical connections shall be made only at locations shown in the Contract Documents or as permitted by the Engineer.

1. When required or permitted, welded splices of reinforcing bars shall conform to AWS D1.4. After completion of welding on epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with Section 2.1A.4. All welds, and all steel members used to splice bars, shall be coated with the same material used for repair of coating damage. After completion of welding on zinc-coated (galvanized) bars, coating damage shall be repaired in accordance with Section 2.1A.5. All welds, and all steel splice bars, shall be coated with the same material used for repair of coating damage.

2. When required or permitted, mechanical connections shall be installed per manufacturer's recommendations. After installation of mechanical connections on epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with Section 2.1A.4. All parts of mechanical connections used on coated bars, including steel splice sleeves, bolts, and nuts shall be coated with the same material used for repair of coating damage. After installation of mechanical connections of zinc-coated (galvanized) reinforcing bars, coating damage shall be repaired in accordance with Section 2.1A.5. All parts of mechanical connections used on coated bars, including steel splice sleeves, bolts, and nuts shall be coated with the same material used for repair of coating damage.

H. Reinforcing bars partially embedded in concrete shall not be field bent, except as shown in the Contract Documents or when permitted by the Engineer.

1. When epoxy-coated reinforcing bars are field bent, coating damage shall be repaired in accordance with Section 2.1A.4.

2. When zinc-coated (galvanized) reinforcing bars are field bent, coating damage shall be repaired in accordance with Section 2.1A.5.

I. When epoxy-coated reinforcing bars are cut in the field, the ends of the bars shall be coated with the same material used for repair of coating damage.

J. When zinc-coated (galvanized) reinforcing bars are cut in the field, the ends of the bars shall be coated with zinc-rich formulation conforming to ASTM A767.

K. Epoxy-coated reinforcing bars-coating damage due to handling, shipment, and placing need not be repaired where the damaged area is 0.1 square inches or smaller; damaged areas larger than 0.1 square inch shall be repaired in accordance with Section 2.1A.4; the maximum amount of damage including repaired and un-repaired areas shall not exceed 2 percent of the surface of each bar.

L. Zinc-coated (galvanized) reinforcing bars-coating damage due to handling, shipment, and placing shall be repaired in accordance with Section 2.1A.5.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART I - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work specified in this section.

1.02 DESCRIPTION OF WORK

A. The extent of concrete work as shown on drawings.

B. Concrete work consists of mixing, finishing, and curing of all concrete; furnishing and erecting all reinforcing steel; and furnishing, erecting and removal of concrete formwork.

C. Concrete work shall also include but is not necessarily limited to the following:

1. Setting all inserts, and other embedded items indicated on the drawings and/or required for the work and furnished under other specification sections, including grouting base plates.

2. Pumping and other methods of installing concrete at no additional expense to the Owner.

3. Unit prices for concrete work.

4. Supply and install required sleeves for utility services.

5. Application of sealer to exterior concrete surfaces.

D. Work Not Included

1. Plant and field inspection and testing for concrete.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete work for sheet pile caps, deadmen, slabs, and walkways.

1.04 QUALITY ASSURANCE

A. Except as modified by governing codes and by this Specification, comply with the applicable provisions and recommendations of latest editions of the following:

1. American Concrete Institute Publications

a. ACI-301 "Standard Specifications for Structural Concrete."

b. ACI-214 "Recommended Practice for Evaluation of Strength Test Results of Concrete."

c. ACI-302.1R "Guide for Concrete Floor and Slab Construction."

d. ACI-311.4R "Guide for Concrete Inspection."

e. ACI-315 "Details and Detailing of Concrete Reinforcement."

f. ACI-318 "Building Code Requirements for Structural Concrete."

g. ACI-347R "Guide to Formwork for Concrete."

h. ACI-306R "Cold Weather Concreting."

i. ACI-305R "Hot Weather Concreting."

j. ACI-211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, Mass Concrete."

k. ACI-211.2 "Standard Practice for Selecting Proportions for Structural Lightweight Concrete."

l. ACI-304R "Guide for Measuring, Mixing, Transporting and Placing Concrete."

m. ACI-309R "Guide for Consolidation of Concrete."

n. ACI-212.3R "Chemical Admixtures for Concrete."

o. ACI-212.4R "Guide for the Use of High-Range Water-Reducing Admixtures in Concrete."

2. Concrete Reinforcing Steel Institute

a. CRSI-63 "Recommended Practice for Placing Reinforcing Bars."

b. CRSI-65 "Recommended Practice for Placing Bar Supports, Specifications, and Nomenclature."

3. American Welding Society

a. AWS D12.1 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction."

4. American Society for Testing Materials (ASTM)

a. A615 "Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement or A706 Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement."

b. A185 "Specification for Welded Wire Fabric, Plain, for Concrete Reinforcement."

c. C31 "Standard Practice for Making and Curing Concrete Test Specimens in the Field."

d. C33 "Specification for Concrete Aggregates."

e. C39 "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."

f. C42 "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."

g. C94 "Standard Specifications for Ready-Mixed Concrete."

h. C150 "Standard Specification for Portland Cement."

i. C494 "Standard Specification for Chemical Admixtures for Concrete."

B. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

C. Conflicts: Conform to requirements of above standard unless specified otherwise herein below. In case of apparent conflict between standards, or between standards and the specifications herein below, refer the matter to the Engineer, whose decision shall be final.

D. Owner's acceptance: Owner reserves the right to reject or accept supplier of concrete materials.

E. Workmanship: The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength tolerances, and finishes. Correct deficient concrete as directed by the Engineer and coordinated with the Engineer.

F. Test for Concrete Materials:

1. Test Aggregates by method of sampling and testing of ASTM C33.

2. For Portland cement, sample the cement and determine the properties by the methods of test of ASTM C150.

3. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Engineer.

4. Concrete Testing Service: Employ at Contractor's expense, a testing laboratory as directed by the Engineer to perform material evaluation tests and to design concrete mixes.

5. Materials and installed work may require testing and retesting, as directed by the Engineer, at anytime during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be performed at Contractor's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, polymer patching compounds, joint systems, curing compounds, dry-shake finish materials, and other as requested by Engineer.

B. Shop Drawings:

1. Reinforcement: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 "Details and Detailing of Concrete Reinforcement" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Submit 4 prints.

2. General Contractor shall coordinate and locate all openings, sleeves, inserts, etc. to be formed for all trades, and locate same on reinforcing shop drawings.

3. Shoring and re-shoring framing details, phasing, and materials shall be submitted for approval.

4. Engineer's review is for general conformance and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility.

5. Contractor's Responsibility: The Engineer's acceptance shall not relieve the Contractor of responsibility for any error or for furnishing material of the proper size, quantity or quality.

6. Drawings at Job Site: The Contractor shall keep a set of shop drawings with the Engineer's acceptance stamp on the job site at all times.

C. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design as specified.

1. Preliminary Design Mix Test Reports (ACI-301) or verification of mix designs based on standard deviation analysis. The mix design submittal must be signed and sealed by an engineer registered in the state of New York.

2. Air Entrainment Testing (ASTM C173) for normal and lightweight concrete and ASTM C231 for normal weight concrete.

1.06 PRODUCT HANDLING

A. Comply with ACI-301, Chapter 5.

1.07 ENVIRONMENTAL CONDITIONS

A. Cold Weather Concreting: Refer to Part 1, paragraph "Standards."

B. Hot Weather Concreting: Refer to Part 1, paragraph "Standards."

PART II – PRODUCTS

2.01 MATERIALS

A. Portland Cement: ASTM C150, Type I or Type II. Use only one brand of cement from one mill throughout the work, unless otherwise approved by the Engineer.

B. Admixtures

1. Water Reducing Admixture: The admixture shall conform to ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water. Provide one of the following:

   a. "Eucon WR-75 or WR-89" (The Euclid Chemical Co.)
   b. "Pozzolith 200N" (Master Builders)
   c. "Plastocrete 160" (Sika Chemical Corp.)
   d. "WRDA with Hycol" by (W.R. Grace & Co.)

2. Water Reducing Retarding Admixture: The admixture shall conform to ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water. Provide one of the following:

   a. "Eucon Retarder-75" (The Euclid Chemical Co.)
   b. "Pozzolith 100XR" (Master Builders)
   c. "Plastiment" (Sika Chemical Corp.)
   d. "Daratard 17" (W.R. Grace & Co.)

3. High Range Water-Reducing Admixture (Superplasticizer): The admixture shall conform to ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water. Provide one of the following:

a. "Eucon 37" (The Euclid Chemical Co.)
b. "Rheobuild 1000" (Master Builders)
c. "Sikament" (Sika Chemical Corp.)
d. "Daracem 19 or Daracem 100" (W.R. Grace & Co.)

4. Non-Corrosive, Non Chloride Accelerator: The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test date from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Provide one of the following:

a. "Accelguard 80" (The Euclid Chemical Co.)
b. "Polarset" (W.R. Grace & Co.)
c. "Plastocrete" (Sika Chemical Corp.)

5. Air Entraining Admixtures: Conform to ASTM C260. Provide one of the following:

a. "Air-Mix" (The Euclid Chemical Co.)
b. "Daravair" (W.R. Grace Co.)
c. "MB-VR or Micro-Air" (Master Builders Co.)
d. "Sika-AER" (Sika Chemical Corp.)

6. Silica Fume Admixtures:

a. "Force 10,000" (W.R. Grace Co.)
b. "Eucon MSA" (The Euclid Chemical Co.)
c. "Sikacrete 950" (Sika Chemical Co.)

7. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted. No admixture shall cause an increase in shrinkage when tested in accordance with ASTM C494 and ASTM C157.

8. Certification: Written conformance to the abovementioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to mix design review by the Engineer.

C. Water: Conform to ACI-301, Chapter 4, paragraph 4.2.1.3.

D. Fine Aggregate: Conform to requirements of ASTM C33.

1. It shall not contain more than 3% clay.

2. It shall be no darker than light amber when tested by the calorimetric method.

3. The gradation of the sand shall be constant and the Fineness Modulus shall not vary more than 0.2.

4. It shall conform to the following gradation requirements:

SIEVE	3/8"	No. 4	No. 16	No. 50	No. 100
% Passing	100	95-100	50-85	10-30	2-10

E. Coarse Aggregate: Shall conform to the requirements of ASTM C33 Size No. 67 and shall consist of hard crystalline stone or gravel, free from shale or decomposed or thin, laminated pieces. It shall be uncoated and clean, and conform to the following gradation requirements:

SIEVE	1"	3/4"	3/8"	No. 4	No. 8
% Passing	100	90-100	20-55	0-10	0-5

F. Metal Reinforcement: ASTM A615, Grade 60, new deformed billet stock, or ASTM A706, minimum Yield Stress 60,000 psi.

1. For fabrication tolerances conform to ACI-301, Chapter 5, paragraph 5.4.

2. All reinforcing bars having assigned positions shall have distinguishing marks plainly indicated thereon, which marks shall agree with those given on the shop drawings related to or calling bars.

G. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

1. For slab on grade and footings, use supports with sand plates or horizontal runners where base material will not support chair legs.

2. For exposed to view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic

protected (CRSI, Class 1), stainless steel protected (CRSI, Class 2), or hot dipped galvanized.

H. Non-Shrink, Non-Metallic Grout

1. The non-shrink grout shall be the specified factory pre-mixed grout and shall conform to ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)". In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout, when placed at a fluid consistency shall achieve 95% bearing under a 4' x 4' base plate. Provide one of the following:

   a. "Euco NS" (The Euclid Chemical Co.)
   b. "Masterflow 713" (Master Builders)
   c. "Five Star DP Epoxy Grout" (Five Star Products)

2. When high fluidity and/or increased placing time is required, use high flow grout. In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout, when placed at a fluid consistency, shall achieve 95% bearing under a 18" x 36" base plate. Provide one of the following:

   a. "Euco Hi-Flow Grout" (The Euclid Chemical Co.)
   b. "Masterflow 928" (Master Builders)
   c. "Five Star DP High Flow Epoxy Grout" (Five Star Products)

I. Clear Curing and Sealing Compound (VOC compliant): The compound shall have 30% minimum solids content, and will not yellow under ultraviolet light after 500 hours of test in accordance with ASTM D4887 and will have test data from an independent testing laboratory indicating a maximum moisture loss of 0.39 grams per cm^2 when applied at a coverage rate of 300 ft^2 /gallon.

J. Formwork

1. For unexposed surfaces and rough work, use Exterior Type Douglas Fir, Grade B-B (Concrete Form) Plywood conforming to NBS PS-1, minimum 3/4 inch thick, or undressed lumber, No. 2 common or better. Before reusing forms, withdraw nails and thoroughly clean surfaces to be in contact with concrete. Use "kifs" to provide proper bond where surfaces are scheduled to be plastered.

2. For exposed surfaces not otherwise specified use Special Type Douglas Fir, Grade A-B plywood, conforming to NBS PS-1, minimum ¾-inch thick and constructed so that finished concrete will be straight, smooth, dense, free from honeycombs, bulges or depressions. Keep joints between sections to a minimum and make tight and strongly backed so that adjoining edges remain flush and true. Unsightly joint marks will not be permitted. Cover joints on exposed surfaces with smooth-faced vinyl tape where indicated on drawings. See Article 3.9 for special finishes where indicated on drawings.

3. Form Ties: For securing forms where surfaces will be exposed in the finished work use tie screws with removable bolts, special removable tie wires or Series 300 stainless steel snap ties. For all other forms, use either bolts or wires. Use ties for such type that when forms are removed, no metal is closer that 1-1/2 inches from the finished concrete surface, or as otherwise shown on drawings.

4. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely effect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

K. Epoxy Joint Filler: The epoxy joint filler shall be a two (2) component, 100% solids component, with a Shore D hardness of 50. Provide one of the following:

1. "Euco 700" (The Euclid Chemical Co.)
2. "Sikadur 51SL" (Sika Chemical Corp.)
3. “Five Star Control Joint Sealer” (Five Star Products)

L. Expansion Joint Filler: ASTM D1752, Type I, unless other type is approved by the Engineer.

M. Bonding Compounds

1. Rewettable: Polyvinyl acetate type. Use only in areas not subject to moisture. Provide one of the following:

a. "Euco Weld" (The Euclid Chemical Co.)
b. "Weldcrete" (The Larson Co.)
c. “Thorobond” (BASF Construction)

2. Non-Rewettable: Polymer modified, bonding compound. Provide one of the following:

   a. "SBR Latex" (The Euclid Chemical Co.)
   b. "Daraweld C" (W.R. Grace)
   c. "Acrylic Bonder" (Spec Chem)

N. Epoxy Adhesive: The compound shall be a two (2) component, 100% solids, 100% reactive to compound suitable for use on dry or damp surfaces. Provide one of the following:

1. "Euco Epoxy No. 452MV or No. 620" (The Euclid Chemical Co.)
2. "Sikadur Hi-Mod" (The Sika Chemical Corp.)
3. "Five Star Fluid Epoxy" (Five Star Products)

O. Polymer Patching Mortar: "Thin Top Supreme or Concrete Top Supreme" (horizontal repairs), "Vericoat/Vericoat Supreme" (vertical and overhead repairs) by The Euclid Chemical Co., "Sikatop 121 or 122" (horizontal repairs), "Sikatop 123" (vertical or overhead repairs) by Sika Chemical Corp., or "Surface Repair 5" (both horizontal and vertical or overhead repairs) by Edoco by Dayton.

P. Repair Topping: Self-leveling, polymer modified high strength topping: Topping shall exhibit the following properties:

1. Chaplin Abrasion Test - 020 mm (0.0079") maximum @ 28 days (British Standard 8204)

2. Tensile Bond Strength Reichold Method - 1400 psi @ 14 days.

2.02 MIXES

A. Proportioning of Concrete

1. Assume full responsibility for strength, consistency, water-cement ratio and handling of concrete. Design mixes in accordance with ACI-211.1/211.2 and ASTM C94.

2. Use the minimum amount of water necessary to produce a mix that can be worked readily into corners of forms and around reinforcement without permitting segregation of materials or free water to collect on surfaces.

3. Adjust consistency of any mix to allow for specific placing conditions. The slump of concrete filling small, thin, complicated forms shall be

greater than for large masses; the degree of slump being governed by the least dimensions of the forms. Maximum slump for concrete shall be tested in accordance with ASTM C143, and as shown on the drawings. See paragraph 2.02 F for specified maximum slump.

4. Measure materials for concrete by weighing. Separately weigh each size of aggregate and the cement; each accurate within 1%. Cement in sacks of ninety-four (94) pounds need not be weighted, but weigh bulk cement and fractional package. Measure mixing water by weight or volume to a 2% tolerance. Admixtures shall be measured by volume to a tolerance of 3%.

5. Prepare design mixes, prior to beginning of the work, in accordance with ACI-301, Section 4.2.3, "Proportioning" on the basis of field data or trial mixtures. Refer to Section I, paragraph 1.6 "Quality Assurance" for preliminary test requirements.

6. Air entrain all concrete exposed to freezing and thawing or deicer chemicals in accordance with ACI-318, Chapter 4, paragraph 4.2, determined by volume, as per ASTM C173 or ASTM C231.

7. Rejected Concrete: Concrete in ready-mix trucks rejected for excess water shall be removed from the site. No materials shall be added for correction.

B. Classes of Concrete:

1. The concrete shall have a minimum compressive strength of 5000 psi after 28 days and a maximum w/c ratio of 0.40 or as designated on drawings.

2. Maximum coarse aggregate size: comply with ACI-301, Chapter 4, paragraph 4.2.2.3.

C. Cement Fill: NA

D. All concrete must contain the specified water-reducing admixture or specified high-range water-reducing admixture (superplasticizer). All concrete slabs placed below 50 deg. F air temperatures shall contain the specified non-corrosive, non-chloride accelerator. Concrete required to be air entrained shall contain an approved air entraining admixture. All pumped concrete, concrete required to be water tight or concrete with a water/cement ratio below 0.50 shall contain the specified high-range water-reducing admixture (superplasticizer).

E. Water/Cement Ratio: All concrete intended to have low permeability when exposed to water shall have a maximum water/cement ratio of 0.50 (4000 psi at 28 days or more). All concrete exposed to freezing and thawing in a moist condition shall have a maximum water/cement ratio of 0.45 (4500 psi at 28 days or more). All reinforced concrete exposed to brackish water, deicing salt, seawater or spray from these sources shall have a maximum water/cement ratio of 0.40 (5000 psi at 28 days or more). Use high-range water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with water/cement ratios below 0.50.

F. All concrete containing a high-range water-reducing admixture (superplasticizer) shall have a 9" maximum slump unless otherwise approved by the Engineer. Concrete shall arrive at the job site with 2" to 3" slump, (3" to 4" for concrete receiving a "shake-on" hardener or lightweight concrete), be verified, then the high-range water-reducing admixture added to increase slump to the approved level. All other concrete shall have a maximum 4" slump.

PART III – EXECUTION

3.01 FORMWORK

A. General

1. Forms shall conform to the lines, dimensions and shapes of concrete shown providing for openings, recesses, keys, slots, beam pockets and projections as required.

2. Make forms clean and free of foreign material before placing concrete.

3. Do not use earth cuts as forms for vertical surfaces, unless approved by the Engineer.

B. Design of Formwork

1. Comply with ACI-301 Chapter 2, paragraph 2.2.2. Design of formwork shall be by a licensed professional engineer employed by the Contractor; with formwork drawings bearing the seal of the licensed engineer.

2. Form rods and tie wires of exterior surfaces shall slope down from the inside to outside of forms.

3. Provide forms so that no discernible imperfection is in evidence in finished concrete surfaces due to deformation bulging, jointing, or leakage of forms.

C. Tolerances

1. Comply with ACI-301, Chapter 2, paragraph 2.3.1.2, except as otherwise noted.

D. Preparation of Form Surfaces

1. Comply with ACI-301, Chapter 2, paragraphs 2.3.1.12 and 2.3.1.13.

2. Use non-staining mineral oil or form lacquer.

3.02 REINFORCEMENT

A. General: Comply with ACI-301, Chapter 3, paragraph 3.1

B. Placing Tolerances: Comply with ACI-301, Chapter 3, paragraph 3.3.2.1.

C. Placing

1. Comply with ACI-301, Chapter 3, paragraph 3.3. When splices not shown on Drawings are approved by the Engineer, such splicing shall conform to ACI-318.

2. Place reinforcing bars having assigned positions so that distinguishing marks match those given on the shop drawings relating to or calling for the bars.

3. Secure all reinforcing bars in place with high-density plastic or galvanized metal chairs with plastic tipped legs, supporting and spacing devices and metal tying devices. Reinforcing in concrete members that have one or more surfaces exposed whether painted or unpainted finish, shall be tied with 14 gage soft annealed galvanized wire. Uncoated tie wire in exposed members will not be accepted.

D. Minimum Reinforcement: Where no other reinforcement is shown for concrete fill or toppings, provide 6 x 6 - W2.9 x W2.9 welded wire fabric.

E. Synthetic Fibers: All non-reinforced slabs and toppings shall contain the specified fibers. They shall be 3/4"-long and used at the dosage rate of 5.0 million fibers/yd^3.

3.03 MIXING CONCRETE

A. Ready-Mixed Concrete

1. Comply with ASTM C94.

2. Add mixing water only at the site.

3. Discharge the concrete completely at the site within 1-1/2 hours after the introduction of the cement to the aggregates. In hot weather reduce this time limit so that no stiffening of the concrete shall occur until after it has been placed.

4. Begin the mixing operation within thirty minutes after the cement has been introduced to the aggregates.

B. Batch Mixing at Site

1. Comply with ACI-301, Chapter 4, paragraph 4.3.

2. Excessive mixing requiring the addition of water to preserve the required consistency will not be permitted. Mix concrete to a consistency that can be readily placed without segregation.

3. Where admixtures are specified, equip mixers with a device for measuring and dispensing the admixture.

C. Hand-Mixed Concrete: When hand-mixed concrete is allowed and approved for certain parts of the work, mix on watertight platforms. Carefully measure and proportion cement, sand and aggregate loose by volume. Thoroughly mix cement and sand together dry until mixture is of uniform color. Add the aggregate and turn mass over until the mixture is uniform and homogeneous. Add water by sprinkling and turn the mass over until uniformly mixed and of the required consistency.

D. Re-tempering shall not be permitted.

E. Re-dosage: Re-dosage with the specified high-range water-reducing admixture (superplasticizer) may be done with the prior approval of the structural engineer regarding dosage and time periods.

3.05 PLACING CONCRETE

A. Preparation Before Placing: Conform to ACI-301, Chapter 8, paragraph 8.1.

B. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

C. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

D. General: Comply with ACI 304, and as herein specified. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints. Dropping of concrete over ten feet will not be permitted. Angle and length of chutes shall be limited to avoid segregation. Forms must be free from all dirt and foreign matter before placing of concrete begins.

F. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for concrete consolidation in accordance with ACI-309, "Recommended Practices for Consolidation of Concrete."

G. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically and uniformly space locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layers and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

H. Placing Concrete Slabs: Deposit and consolidate concrete so it is thoroughly worked around reinforcement and other embedded items and into corners.

I. Bring slab surfaces to correct level with straightedge or striking off the surface of the concrete to a pre-determined grade (screeding). This must be done immediately after placement and completed before any excess moisture or bleeding water occurs on the surface. Set edge forms and intermediate screed

strips accurately and sufficiently rigid to support screeds so that proper surface elevations and concrete thickness are achieved, allowing for dead load deflection and camber of formwork.

J. Highway straightedge, bull floating or darbying should immediately follow screeding to eliminate the ridges and fill in the voids left by screeding and must be completed before any excess moisture or bleeding water is present on the surface. This prepares the surface for subsequent edging, jointing, floating, and troweling.

K. Maintain reinforcing in proper position during concrete placement operations.

L. Surface Tolerance: Comply with following requirements based on ASTM E1155 Standard Test Method for Determining Floor Flatness and Levelness Using the "F-Number" System (inch-pound units).

1. Flatness F-Number: $F_f = 35$; differences in elevation between successive 12″ measurements shall not exceed 0.13″.

2. Levelness F-Number: $F_l = 30$; differences in elevation between two points shall not exceed 0.417″/10′-0″.

3.06 CURING

A. Comply with ACI-301, Chapter 5, paragraph 5.3.6.

B. All exposed troweled slabs receiving mastic applied adhesive or "shake-on" hardeners shall be cured with the specified curing and sealing compounds. Exterior slabs, walkways, and curbs, not receiving a penetrating sealer, shall be cured with the specified clear, non-yellowing curing and sealing compound.

3.07 FORM REMOVAL

A. Do not remove forms until the concrete has thoroughly hardened and has attained sufficient strength to support its own weight and construction live loads to be placed thereon, without damage to the structure. In general, do not disturb forms for framing until the concrete has attained at least 40% of design strength for side forms and 80% of design strength for bottom forms. Be responsible for proper form removal and replace any work damaged due to inadequate maintenance or improper or premature form removal.

B. Where use of metal form ties extending to within less than 1-1/2 inches of the face of permanently exposed concrete has been unavoidable, cut off such ties at least 1-1/2 inches deep in the concrete, but not less than 72 hours after concrete has been cast. Remove forms by methods that will not spall the concrete or cause any injury whatsoever. Hammering or prying against concrete will not be permitted.

C. Forms may be removed at the following minimum times, which shall be subject to any other requirements of the Engineer.

	*Over 95°F	70-95°F	60-70°F	50-60°F	Below 50°F
Bottom of Beams & Slabs	10 days	4 days	5 days	6 days	

* Where exposed surfaces of concrete can be effectively sealed to prevent loss of water, the 95°F times may be cut in half.

** Additional cylinders taken to facilitate form stripping shall be at the Contractor's expense.

3.08 REPAIR OF DEFECTIVE AREAS

A. With prior approval of the Engineer, as to method and procedure, all repairs of defective areas shall confirm to ACI 301, Chapter 5, paragraph 5.3.7, except that the specified bonding compound must be used.

B. The specified patching mortars may be used in lieu of the abovementioned method when color match of the adjacent concrete is not required. Prior approval by the Engineer is required.

C. All structural repairs shall be made with prior approval of the Engineer, as to method and procedures, using the specified epoxy adhesive and/or epoxy mortar. Where epoxy injection procedures must be used, an approved low viscosity epoxy made by the manufacturers previously specified shall be used.

D. Exposed floors shall be leveled, where required, with the specified self-leveling repair topping.

3.09 FINISHING

A. Place, consolidate, strike off and level concrete slab to prior elevation.

B. Any finishing operation shall not be done until all bleeding water and excess moisture have left or been removed from the surface.

C. Edging: Use proper edge to form a radius at the edge of slab for walkways and pier deck. If the slab is to be covered with pavers, an edger should not be used.

D. The slab on grade shall be saw cut unless covered with a subsequent finish. The Soff-Cut saw shall be used immediately after final finishing and to a depth of 1-1/4". A conventional saw shall be used as soon as possible without dislodging aggregate and to a depth of 1/4 slab thickness.

E. Floating: After the concrete has stiffened sufficiently to permit the operation, and water sheen has disappeared, the surface shall be floated, at least twice, to a uniform sandy texture. Use a troweling machine with float blades.

F. Troweling: Trowel immediately following floating to produce a smooth, hard surface. No troweling shall be done to a surface that has not been floated by power or by hand. The surface shall be troweled, at least twice, to a smooth dense finish.

G. Finishing Class 2 and Class 3 slabs (pier decks and walks): The placing and finishing operations described under 3.05 and 3.09 A to F should be followed. Two trowelings are required. For non-slip finish follow procedure described in 3.09H.

H. Non-Slip Floor: Non-slip surfaces shall be swirl or broom design. The swirl design shall be produced by a magnesium or aluminum float, steel finishing trowel or soft-bristled broom. Texture shall be as approved by the Engineer from sample panels. These surfaces shall be cured as soon as possible without marring the surface by use of the specified curing compound or a continuous moist curing method approved by the Engineer.

I. Monolithic surface treatments for wear resistance: Application and finishing of materials should follow these basic procedures:

1. Following screeding, bull floating, and after all free water has evaporated or been removed, float all surfaces by hand wood and/or power floats.

2. Evenly distribute approximately 2/3 of the amount specified for the area immediately behind the floating as it proceeds.

3. As soon as the material darkens slightly from absorbed moisture, it should be floated using hand wood floats and/or poser floats.

4. Immediately apply the remaining 1/3 of the specified amount at right angles to the first application.

5. Float as in 3 above.

6. Apply a flat trowel by hand or power.

7. Apply a first raised troweling and successive troweling as required to produce a smooth, dense, wear resistance surface.

8. Burnish (hard) trowel.

9. Cure immediately after finishing following the material manufacturer's printed recommendations or directions.

J. Finishing of Formed Surfaces:

1. Rough Finish - No specific requirements for surface finish other than form and tie removal and repair of voids affecting structural integrity of element involved. Use at all locations not exposed to view. Surfaces to be membrane waterproofed shall have projections or fins of ¼-inch removed.

2. Standard Finish - Reasonably true to line and plane. Patch tie holes and defects. Fill voids and pin holes over 3/8-inch diameter. Rub or grind down fins exceeding 1/8-inch height. Otherwise, leave surfaces semi-rough with texture imparted by forms.

3.10 CONCRETE FILL

A. Install concrete fill on a continuous wire mesh of not less than 14 gage welded wire fabric, 2 inches square, supported approximately ½-inch above the bottom of pans. Screed concrete fill level and finish with wood float.

B. After screeding the concrete finish level, permit it to stand until it will bear weight of workmen standing on boards. At this time the abrasive aggregate having previously been soaked in clean water for about ten minutes, shall be sprinkled uniformly on the surface and immediately wood floated into the concrete finish. The surface shall then be troweled to a smooth dense finish.

3.11 NON-SHRINK GROUT

A. All base plates, leveling plates, equipment base plates and other locations noted on the drawings shall use the specified non-shrink, non-metallic grout.

B. Where fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than 10 sq. ft.

C. Place grout so as to ensure complete bearing and elimination of air pockets.

3.12 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.

2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by moist curing, by curing compound, moisture-retaining cover curing, and by combinations thereof, as herein specified.

1. Provide moisture curing by following methods:

a. Keep concrete surface continuously wet by covering with water.

b. Continuous water-fog spray.

c. Covering concrete surface with specified absorptive cover, thoroughly saturate cover with water and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges with 4" lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows:

   a. Covering concrete surfaces with moisture-retaining cover, place in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during cure period using cover.

3. Provide curing compound to all troweled slabs receiving mastic applied adhesives or mineral aggregate hardeners that shall be cured with the curing and sealing compounds. Exterior slabs, walkways, and curbs, not receiving a penetrating sealer, shall be cured with the specified clear, non-yellowing curing and sealing compound as follows:

   a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by powerspray or roller in accordance with manufacturer's directions. Recoat areas after initial application. Maintain continuity of coating and repair damage during curing period.

   b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, i.e., waterproofing, damp-proofing, pavers, and other coatings and finish material, unless otherwise acceptable to Engineer.

   c. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, sup-ported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

   d. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, broom topping, and other flat surfaces by application of the specified curing and sealing compound or continuous moist curing method.

   e. All surfaces receiving a penetrating sealer shall be cured by a continuous moist curing method approved by the Engineer.

3.13 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passages of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Lighting Post Bases and Foundations: Provide lighting post bases and foundations, as shown on drawings, and if not shown, as required by the item being supported. Set anchor bolts for lighting post to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing lighting posts.

C. Slots, Recesses, Sleeves: This Contractor shall cooperate with and coordinate all other trades in the forming and setting of slots, recesses, chases, sleeves, inserts, bolts, hangers, etc. of other trades not in this Section of the work. All slots, etc., shall be so located as not to infringe on or impair the strength of any structural member, unless approved by the Engineer. The Contractor shall be responsible for using proper care in the placing of the concrete so far as not to dislodge or dislocate embedded items of other trades.

3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The Contractor will employ a testing laboratory to perform other tests and to submit test reports.

B. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.

C. Sampling and testing for quality control during placement of concrete shall include the following:

1. Slump: ASTM C143; one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.

2. Air Content: ASTM C173; volumetric method for lightweight or normal weight concrete or ASTM C231 for normal weight concrete; one for each set of compressive strength test specimens. Chace Air Indicator is <u>not</u> permitted.

3. Concrete Temperature: Test hourly when air temperature is 40^{O}F (4^{O}C) and below, and when 80^{O}F (27^{O}C) and above; and each time a set of compression test specimens made.

4. Compression Test Specimens: ASTM C31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required.

5. Compressive Strength Tests: ASTM C39; one set for each 50 cu. yds. or fraction thereof, of each concrete class placed in any one day, 1 specimen tested at 7 days, 3 specimens tested at 28 days.

    a. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

6. Compressive Test Results: Test of concrete will be deemed satisfactory if the average of all tests representing one class is equal to or greater than the design strength, and if the following additional conditions are met; however, the number of tests on a given class must be great enough to permit application of these additional conditions:

    a. No single test shall be greater than 500 psi below the specified design strength.

    b. The average of any two consecutive test shall not be less than 93% of the design strength.

    c. The average of any three consecutive tests shall not be less than the design strength.

    d. The number of tests below the design strength shall not exceed 20% of the total number of tests.

    e. No more than two consecutive tests hall be below the design strength.

7. Questionable Concrete: Failure to measure up to any of the specified conditions shall constitute questionable concrete and additional tests shall be made at the expense of the Contractor. The Engineer may require core tests to be made at the Contractor's expense when individual compressive tests below specified strengths are identified as having been made from concrete placed in positions of critical structural importance. Additional tests shall be in accordance with "Methods of Securing, Preparing, and Testing Specimens from

Hardened Concrete for Compressive and Flexural Strength: (ASTM C42)." Cores shall be 4 inches in diameter and a minimum of 7-1/2 inches long before capping.

8. Unacceptable Concrete: If core tests fail to demonstrate strengths satisfactory to the Engineer then the unsatisfactory portion of the structure shall be removed and reconstructed at Contractor's expense to meet the requirements of the Drawings and Specifications.

9. Load Tests shall not be permitted.

END OF SECTION

SECTION 05500

MISCELLANEOUS METALS

PART I - GENERAL

1.01 REFERENCES

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.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC S303	Steel Buildings and Bridges
AISC S335	Structural Steel Buildings, Allowable Stress Design and Plastic Design
AISC S342L	Load and Resistance Factor Design, Specification for Structural Steel Buildings

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B18.2.1	Square and Hex Bolts and Screws Inch Series

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME/ANSI B18.2.2	Square and Hex Nuts (Inch Series)
ASME/ANSI B18.21.1	Lock Washers (Inch Series)
ASME/ANSI B18.22.1	Plain Washers

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	Carbon Structural Steel
ASTM A 47	Ferritic Malleable Iron Castings
ASTM A 48	Gray Iron Castings
ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A 569	Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality
ASTM A 653	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 687	High-Strength Nonheaded Steel Bolts and Studs
ASTM A 780	Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM D 1187	Asphalt-Base Emulsions for Use as Protective Coatings for Metal

AMERICAN WELDING SOCIETY, INC. (AWS)

AWS D1.1	Structural Welding Code Steel

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP 3	Power Tool Cleaning
SSPC SP 6	Commercial Blast Cleaning

1.02 SUBMITTALS

Submit the following in accordance with Section 01330 entitled "Submittal Procedures."

A. Manufacturer's Catalog and Product Data

1. Each type of structural steel.

2. Each type of connecting hardware.

3. Each type of coating.

B. Drawings

1. Shop drawings of fabricated parts.

1.03 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1. Use procedures, materials, and equipment of the type required for the work.

1.04 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART II - PRODUCTS

2.01 MATERIALS

A. Structural Carbon Steel – Conform to ASTM A 36.

B. Anchor Bolts – Conform to ASTM A 307.

C. Bolts, Nuts, Studs and Rivets– Conform to ASME/ANSI B18.2.2 and ASTM A325 or A687.

D. Washers – Provide plain washers to conform to ASME/ANSI B18.22.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers to conform to ASME/ANSI B18.21.1.

2.02 FABRICATION FINISHES

A. Galvanizing

Hot-dip galvanize all items specified after fabrication. Galvanizing: ASTM A 123, ASTM A 153 or ASTM A 653 as applicable. Galvanize anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

B. Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A780 or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Owner's Representative. Clean areas to be repaired and remove slag from welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread molten material uniformly over surfaces to be coated and wipe off excess material.

C. Corrosion Protection Coatings

1. All steel components scheduled for contact with salt water shall be thoroughly coated with a coal tar epoxy mastic after fabrication but before installation. The mastic shall be applied and allowed to cure as per the manufacturer's recommendations.

2. Blast clean surfaces in accordance with SSPC SP 6. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean.

3. Acceptable coating materials for brackets and mounting plates shall be Koppers Bitumastic 300-M, Royston Roskote 201, or approved equivalent.

2.03 MISCELLANEOUS PLATES AND SHAPES

A. Provide for items that do not form a part of the structural steel framework, such as lintels, sill angles, support framing, miscellaneous mountings and frames. Provide with connections, fasteners and welds, as shown on the drawings.

B. Provide angles and plates, ASTM A 36, for embedment as indicated. Galvanize embedded items exposed to the elements according to ASTM A 123.

PART III – EXECUTION

3.01 INSTALLATION

Install items at locations indicated, according to manufacturer's instructions. Items listed below require additional procedures.

3.02 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood.

3.03 BUILT-IN WORK

Form for anchorage metal work built-in with concrete or masonry, or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

3.04 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation. Apply 2 coats of cold galvanizing to affected area.

3.05 FINISHES

A. Field Preparation

Surfaces, when assembled, shall be free of rust, grease, dirt and other foreign matter.

B. Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Owner's Representative.

END OF SECTION