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***SECTION 5***  
***SPECIFICATIONS***

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## SECTION 011100 - SUMMARY OF WORK

### PART 1 - GENERAL

#### 1.1 LOCATION OF THE PROJECT

- A. The projects are located in the City of Eastlake, Lake County, Ohio. There are two (2) separate locations. The Base Bid location is the shoreline of a parcel referred to as Willoway Beach which is located between 37599 Lakeshore Boulevard and 37529 Lakeshore Boulevard. Alternate 1 is the demolition of the existing restroom building at the Willoway Beach site and Alternate 2 is located at 35867 Galalina Boulevard.

#### 1.2 PROJECT DESCRIPTION

- A. The project consists of placing revetment and incidental items to protect the shoreline at the project site including installing stone, filter fabric and storm drainage to provide shoreline erosion control and demolition of an existing building.

#### 1.3 SPECIFICATIONS

- A. In general, these Specifications describe the work to be performed by the various trades, other than work specifically excluded. It shall be the responsibility of the Contractor and Subcontractors to perform all work incidental to their trade, whether or not specific mention is made of each item, unless such incidentals are included under another Item.
- B. It is advised that the Contractor and all Subcontractors familiarize themselves with the contents of the complete Specifications, particularly for the trades preceding, following, related or adjacent to their work.

#### 1.4 DRAWING SCHEDULE

- A. The work to be done under this Contract is shown on the following Drawings:

<u>Title</u>	<u>Sheet No.</u>
Cover Sheet	1
General Notes	2
Willoway Beach – Existing Conditions Plan	3
Willoway Beach – Plan View	4
Willoway Beach – Cross Sections	5
35867 Galalina Boulevard – Existing Conditions Plan	6
35867 Galalina Boulevard – Plan View	7
35867 Galalina Boulevard – Cross Sections	8
Construction Details	9

END OF SECTION 011100

## SECTION 011419 – USE OF SITE

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. The Contractor will be required to stay within designated areas of the site designated for the improvements and as outlined on the construction documents.

#### 1.2 USE OF STREETS

- A. During the progress of the work, the Contractor shall make ample provisions for both vehicle and pedestrian traffic on any public street and shall indemnify and save harmless the Owner from any expense whatsoever due to their operations over said streets. The Contractor shall also provide free access to all the fire hydrants, water, and gas valves located along the line of his work. Gutters and waterways must be kept open or other provisions made for the removal of storm water.
- B. In the event of the Contractor's failure to comply with these provisions, the Owner may cause the same to be done, and may deduct the cost of such work from any monies due the Contractor under this Agreement, but the performance of such work by the Owner at its instance shall serve in no way to release the Contractor from his general or particular liability for the safety of the public or the work.
- C. The Contractor shall repair at no cost to the Owner, all existing roads, parking areas, grassed areas that are damaged due to the execution of his work. The Contractor shall remove daily all mud, soil and debris that may be tracked onto existing streets, drives, or walks by his equipment or that of subcontractors or suppliers.

#### 1.4 RIGHTS-OF-WAY

- D. Whenever it is required to perform work within the limits of public or private property or in rights-of-way, such work shall be done in conformity with all agreements between the Owner and the owners of such. Care shall be taken to avoid injury to the premises entered, which premises shall be left in a neat and orderly condition by the removal of rubbish and the grading of surplus materials, and the restoration of said public or private property to the same general conditions as pertained at the time of entry for work to be performed under this contract.
- E. The Contractor shall not (except after consent from the proper parties) enter or occupy with men, tools or equipment, any land outside the rights-of-way or property of the Owner.
- F. When the Contractor performs construction within 10 ft. of a right-of-way or easement line, he shall place tall stakes properly identified at points of change in width or direction of the right-of-way or easement line and at points along the line so that at least two stakes can be seen distinctly from any point on the line.

1.5 EASEMENTS

- A. Where the work is to be constructed upon easements/work agreements, such easements/work agreements will be secured by the Owner without cost to the Contractor. The Contractor shall not enter upon or occupy any private property outside of the limits of the easements furnished.
- B. Care shall be taken to avoid injury to the premises entered, which premises shall be left in a neat and orderly condition by the removal of rubbish and the grading of surplus materials, and the restoration of said public or private property to the same general conditions as pertained at the time of entry for work to be performed under this contract.

1.6 PROTECTING EXISTING BUILDINGS, STRUCTURES AND ROADWAYS

- A. The Contractor shall, at his own expense, shore up and protect any buildings, roadways, utilities or other public or private structures which may be encountered or endangered in the prosecution of the work, and that may not be otherwise provided for, and he shall repair and make good any damages caused to any such property by reason of his operations. All existing fences removed due to the prosecution of the work shall be replaced by the Contractor. No extra payment will be made for said work or material, but the cost of this work must be included in the price stipulated for the work to be done under this contract.

1.7 SITE FACILITIES

- A. The Contractor shall furnish and place sufficient quantities of portable toilet facilities at locations convenient for use by the Contractor's personnel, Subcontractors, the Engineer, and the Owner.

1.8 RESTORATION

- A. The contractor shall restore all areas per the plans and specifications and if not specified, at least to the condition existing prior to the start of work.

END OF SECTION 011419

## SECTION 011423 - ADDITIONAL WORK, OVERTIME

### PART 1 - GENERAL

#### 1.1 NIGHT, SUNDAY AND HOLIDAY WORK

- A. No work will be permitted at night, Sunday or legal holidays except as noted on the plans or in the case of emergency and then only upon written authorization of the Engineer. Where no emergency exists, but the Contractor feels it advantageous to work at night, Sunday or legal holidays, the Contractor shall notify the Engineer at least two (2) days in advance, requesting written permission. Any work performed during the absence of the Engineer will be done at the Contractor's risk and responsibility and may be subject to rejection upon later inspection.

END OF SECTION 011423

## SECTION 013119 - PROJECT MEETINGS

### PART 1 - GENERAL

#### 1.1 PRECONSTRUCTION MEETING

- A. Prior to the Contractor beginning any work on the project, the Owner will schedule and hold a preconstruction meeting to discuss all aspects of the contract work.
- B. The Contractor shall be present and be prepared to comment in detail on all aspects of his work.
- C. The Contractor shall bring to the preconstruction meeting a proposed construction progress schedule, erosion control plan, quality control program, concrete mix designs, asphalt mix designs (JMF), etc. Approval of each by the Engineer is required prior to the start of any work.
- D. Included in the construction progress schedule shall be an implementation sequence of the proposed erosion control efforts required by the contract.

#### 1.2 PROGRESS MEETINGS

- A. Monthly progress meetings will be held at a location to be determined by the Owner on a regularly scheduled day mutually convenient to the Owner, Contractor, and Engineer.
- B. The Contractor shall provide an updated construction progress schedule and be prepared to comment in detail on all aspects of his work.

END OF SECTION 013119

## SECTION 013223 – SURVEY AND LAYOUT DATA

### PART 1 - GENERAL

#### 1.1 STAKING

- A. The Contractor shall hire a surveyor licensed in the state the work is to be installed to provide all reference points not already established and staking. The Contractor shall protect and preserve the established staking and reference points as long as required for installation of the work and field verifications by any party. The Contractor's surveyor shall replace and accurately relocate all staking and reference points so lost, destroyed or moved.

#### 1.2 LAYOUT OF WORK

- A. The Contractor shall lay out his work and be responsible for correct locations, elevations and dimensions of all work executed by him under this Contract. The Contractor must exercise proper precautions to verify the figures shown on the Drawings before laying out the work and will be held responsible for any error resulting from his failure to exercise such precaution. The Contractor shall insure the new construction aligns with any existing work.

END OF SECTION 013223

## SECTION 013236 – VIDEO MONITORING AND DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. Provide all labor, materials, equipment, and services, and perform all operations necessary to furnish to the Owner a complete color audio-video DVD record of the surface features within the proposed construction zone of influence. This record shall include, but not be limited to, all audio-video DVDs, storage cases, video logs, and indexes. The purpose of this coverage shall be to accurately document the pre-construction condition of these surface features.

#### 1.2 QUALIFICATIONS

- A. The video DVD documentation shall be done by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction color audio-video DVD documentation. The firm shall furnish such information as the Owner deems necessary to determine the ability of that firm to perform the work in accordance with the Contract specifications.

#### 1.3 PRODUCTS

- A. The color audio-video recording delivered to the Owner shall be on a high quality DVD format.

END OF SECTION 013236

## SECTION 013543 - ENVIRONMENTAL PROTECTION

### PART 1 - GENERAL

#### 1.1 UNNECESSARY NOISE, DUST AND ODORS

- A. The Contractor's performance of this contract shall be conducted so as to eliminate all unnecessary noise, dust and odors.

#### 1.2 SEWAGE, SURFACE AND FLOOD FLOWS

- A. The Contractor shall take whatever action is necessary to provide all necessary tools, equipment and machinery to adequately handle all sewage, surface flows and flood flows which may be encountered during the performance of the work. The entire cost of and liability for handling such flows is the responsibility of the Contractor and shall be included in the price for the appropriate item.

#### 1.3 WORK IN FREEZING WEATHER

- A. Written permission from the Engineer shall be obtained before any work is performed which, in the judgment of the Engineer, may be affected by frost, cold, or snow. When work is performed under such conditions, the Contractor shall provide facilities for heating the materials and for protecting the finished work.

#### 1.4 POLLUTION CONTROL

- A. It shall be the responsibility of the Contractor to prevent or limit pollution of air and water resulting from his operations.
- B. The Contractor shall perform work required to prevent soil from eroding or otherwise entering onto all paved areas and into natural watercourses, ditches, and public sewer systems. This work shall conform to all local ordinances and/or regulations, if any, and if not otherwise regulated by local ordinances or regulations shall at a minimum conform to the Ohio EPA General Storm Water NPDES Permit for Construction Activities and the Ohio Department of Natural Resources Rainwater and Land Development manual. This work may consist of but not be limited to construction and continual maintenance of silt fence, bio bag filters, sedimentation traps, stilling basins, check dams, temporary seeding, temporary mulching, erosion mats and other means to clarify waters containing suspended materials from excavations, embankments, cleared and grubbed or stripped areas, stockpiles, well points, and disposal sites and shall be commensurate with the contractor's schedule, sequence of work, means and methods. If a SWPPP plan is not required for the project, the contractor shall at a minimum submit a plan of his proposed erosion control prevention methods for approval by the Owner and/or other regulatory authorities having jurisdiction prior to starting any construction activities which may cause erosion.

- C. The Contractor shall perform work required to prevent dust attributable to his operations from entering the atmosphere. Dust on unsurfaced streets or parking areas and any remaining dust on surfaced streets shall be controlled with water and/or calcium chloride dust palliative as needed.
- D. Any material removed from sanitary or storm sewers shall be disposed in accordance with all applicable regulations.

END OF SECTION 013543

## SECTION 014126 - GENERAL REGULATIONS AND PERMITS

### PART 1 - GENERAL

#### 1.1 REGISTRATION

All Contractors and subcontractors shall be registered with the Building Department having jurisdiction. Contact the Building Department for additional registration information.

#### 1.2 PERMITS

The Contractor shall apply for all permits from the Owner and/or other authorities having jurisdiction. The Owner will waive all permit and inspection fees for permits under their jurisdiction; however, the Contractor must pay all permit and inspection fees for permits issued by other authorities having jurisdiction. Required permits from ODNR and USACE are being obtained by the Owner.

#### 1.3 ARCHAEOLOGICAL DISCOVERIES

Contractors and subcontractors are required under O.R.C. Section 149.53, to notify the Ohio Historical Society and the Ohio Historic Site Preservation Board of Archaeological Discoveries located in the project area, and to cooperate with those entities in archaeological and historic surveys and salvage efforts if such discoveries are uncovered within the project area.

Contact: Department Head  
Resource Protection and Review  
Ohio Historic Preservation Office  
800 E. 17th Avenue  
Columbus, Ohio 43211-2497  
614-298-2000

Should archaeological discoveries or other activities delay progress of the work, an adjustment in contract time will be made.

END OF SECTION 014126

## SECTION 015213 - FIRST AID

### PART 1 - GENERAL

#### 1.1 AID TO THE INJURED

The Contractor shall keep in his office and on the work site, all articles necessary for giving "First Aid to the Injured." He shall also have standing arrangements for the immediate removal and hospital treatment of any employee or other person who may be injured on the work site.

END OF SECTION 015213

## SECTION 017800 - FINAL COMPLIANCE AND SUBMITTALS

### PART 1 - GENERAL

- 1.1 The following forms and related sign-offs shall be documented in accordance with provisions of the contract. These forms shall be completed by the Contractor and approved by the Owner before final retainer is approved for release. Forms for Items A to E will be attached to the Contractor's executed copy of the contract.
- A. Certificate of Substantial Completion (To be submitted at time of Substantial Completion).
  - B. Contractor's Certification of Completion.
  - C. Contractor's Affidavit of Prevailing Wage.
  - D. Consent of Surety Company for Final Payment.
  - E. Affidavit of Final Acceptance Date and Correction Period.
  - F. Before the OWNER will approve and accept the work and release the retainer, the CONTRACTOR will furnish the OWNER a written report indicating the resolution of any and all property damage claims filed with the CONTRACTOR by any party during the construction period. The information to be supplied shall include, but not be limited to, name of claimant, date filed with CONTRACTOR, name of insurance company and/or adjuster handling claim, how claim was resolved and if claim was not resolved for the full amount, a statement indicating the reason for such action.

END OF SECTION 017800

## SECTION 017821 - CLEANING AND PROTECTION

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. On or before the completion date for the work, the Contractor shall tear down and remove all temporary structures built by him, all construction plant used by him, and shall repair and replace all parts of existing embankments, fences or other structures which were removed or injured by his operations or by the employees of the Contractor. The Contractor shall thoroughly clean out all buildings, sewers, drains, pipes, manholes, inlets and miscellaneous and appurtenant structures, and shall remove all rubbish leaving the grounds in a neat and satisfactory condition.
- B. As circumstances require and when ordered by the Engineer, the Contractor shall clean the road, driveway, and/or sidewalk, private property on which construction activity under this contract has resulted in dirt or any other foreign material being deposited with an automatic self-contained mechanical sweeper with integral water spray, vacuum and on-board or supplementary containment.
- C. Failure to comply with this requirement when ordered by the Engineer or his representative, may serve as cause for the Engineer to stop the work and to withhold any monies due the Contractor until such order has been complied with to the satisfaction of the Engineer.
- D. As the work progresses, and as may be directed, the Contractor shall remove from the site and dispose of debris and waste material resulting from his work. Particular attention shall be given to minimizing any fire and safety hazard from form materials or from other combustibles as may be used in connection with the work, which should be removed daily.
- E. The Contractor shall wash all windows and other glass surfaces, leaving all areas free from putty marks, paint, etc.
- F. During and after installation, the Contractor shall furnish and maintain satisfactory protection to all equipment against injury by weather, flooding or breakage thereby permitting all work to be left in a new condition at the completion of the contract.

END OF SECTION 017821

## SECTION 024116.13 - BUILDING DEMOLITION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Demolition and removal of buildings.
  - 2. Demolition and removal of structures.
  - 3. Demolition and removal of site improvements.
  - 4. Disconnecting, capping or sealing, and abandoning site utilities in place.

#### 1.3 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
- B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property.

#### 1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

#### 1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, for information only, unless otherwise indicated.
- B. Proposed dust-control measures.
- C. Proposed noise-control measures.
- D. Schedule of demolition activities indicating the following:
  - 1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity.
  - 2. Dates for shutoff, capping, and continuation of utility services.
- E. Inventory of items to be removed and salvaged.

- F. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by demolition operations.
- G. Record drawings at Project closeout according to Division 1 Section "Contract Closeout."
  - 1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.
- H. Landfill records for record purposes indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

#### 1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Predemolition Conference: Conduct conference at Project site to comply with preinstallation conference requirements of Division 1 Section "Project Meetings."

#### 1.7 PROJECT CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of Work.
- B. Owner assumes no responsibility for actual condition of buildings to be demolished.
  - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Storage or sale of removed items or materials on-site will not be permitted.

#### PART 2 - PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

##### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.
- C. Inventory and record the condition of items to be removed and salvaged.

- D. Survey the condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.
- E. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

### 3.2 UTILITY SERVICES

- A. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving structures to be demolished.
  - 1. Arrange to shut off indicated utilities with utility companies.

### 3.3 PREPARATION

- A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.
- B. Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during demolition operations.
- C. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- D. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.

### 3.4 EXPLOSIVES

- A. Explosives: Use of explosives will not be permitted.

### 3.5 POLLUTION CONTROLS

- A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
  - 1. Do not create hazardous or objectionable conditions, such as ice, flooding, and pollution, when using water.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

### 3.6 DEMOLITION

- A. Building Demolition: Demolish buildings completely and remove from the site. Use methods required to complete Work within limitations of governing regulations and as follows:
  - 1. Locate demolition equipment throughout the building and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - 2. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
  - 3. Break up and remove concrete slabs on grade, unless otherwise shown to remain. .
- B. Below-Grade Construction: Demolish foundation walls and other below-grade construction, as follows:
  - 1. Completely remove below-grade construction, including foundation walls and footings.
- C. Filling Below-Grade Areas: Completely fill below-grade areas and voids resulting from demolition of buildings.
- D. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 024116.13

## SECTION 310000 - EARTHWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The Work covered by this Section shall include all excavation, embankment and related work for the construction of the armor stone revetment and other incidental work associated with the construction of the armor stone revetment and regarding of the shoreline slope.
- B. The Work covered by this Section consists of:
1. making all necessary excavations for the construction of all Work;
  2. preparing subgrade for foundations, slabs, walks, and pavements;
  3. doing all pumping, fluming, and dewatering necessary to keep the trenches and other excavation free from water;
  4. providing for uninterrupted flow of existing drains and sewers, and the disposal of water from any sources during the progress of the Work;
  5. supporting and protecting all trench walls, structures, pipes, conduits, culverts, posts, poles, wires, fences, buildings and other public and private property adjacent to the Work;
  6. removing and replacing existing sewers, culverts, pipelines and bulkheads where necessary;
  7. removing after completion of the Work all sheeting and shoring or other soil support materials not necessary to support the sides of trenches;
  8. removing and disposing all surplus excavated material;
  9. doing all backfilling and grading, of compacting backfill to limits specified or ordered by the Engineer;
  10. restoring all property damaged as a result of the Work involved in this Contract.
- C. The Work includes transporting surplus excavated materials not needed for backfill at the location where the excavation is made, to other parts of the Work where filling is required, and disposal of all types of surplus material off the site.
- D. The Work includes:
1. constructing a structure of soil or granular material in layers to a predetermined elevation and cross section;
  2. supporting and protecting all structures, pipes, conduits, culverts, posts, poles, wires, fences, buildings and other public and private property adjacent to the Work;
  3. placing all fill and performing rough grading;
  4. compacting fill to limits specified or ordered by the Engineer;
  5. restoring all property damaged as a result of the Work involved in this Contract.

## 1.2 RELATED DOCUMENTS AND SECTIONS

- A. Section 353116.40 – Armor Stone

## 1.3 DEFINITIONS

- A. Backfill: Soil or granular materials used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, not including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Bedding: Layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow: Satisfactory soil imported for use as fill or backfill.
- D. Excavation: Removal and disposal of material encountered above subgrade or foundation elevations.
  - 1. Additional Excavation: Excavation below subgrade or foundation elevations as directed by Engineer.
  - 2. Trench: Narrow linear excavation
  - 3. Unauthorized Excavation: Excavation below subgrade or foundation elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
  - 4. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface or subsurface conditions encountered, including rock, soil materials and obstructions.
- E. Embankment: A structure consisting of soil, granular material, shale, rock, or other approved material, constructed in layers to a predetermined elevation and cross-section.
- F. Granular materials: Natural aggregate, such as broken or crushed rock, gravel, or sand that can be readily incorporated into an 8-inch layer, and in which at least 65% by weight of the grains or particles are retained in a No. 200 sieve.
- G. Laboratory Dry Weight: The maximum laboratory dry weight shall be the weight provided by the laboratory when the sample is tested in accordance with ASTM D-698 Method A, C, or D.
- H. Optimum Moisture: The water content at which the maximum density is produced in a soil by a given compaction effort (ASTM D-698).
- I. Pavement Prism: Also referred to as the zone of influence. The area below a line drawn 45 degrees to the horizontal from the surface at the edge of pavement, sidewalk or curb.

- J. Pipe Embedment: The material placed in a trench surrounding a pipe or conduit consisting of the foundation, bedding, haunching, and initial backfill.
- K. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material one (1) cu. yd. or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D 1586, exceeds a standard penetration resistance of 100 blows/2 inches.
- L. Shale: Laminated material, formed by the consolidation in nature of soil, having a finely stratified structure. For the purpose of these specifications, the following bedrock types shall also be considered shale: mudstone, claystone, siltstone and hard clay.
- M. Soil: All earth materials, organic or inorganic, which have resulted from natural processes such as weathering, decay, and chemical reaction.
- N. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, pavement, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- O. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage course, or topsoil materials.
- P. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Source-locations of all materials shall be identified to the Engineer.
  - 2. Source quality laboratory test of all fill materials as required to show compliance with material specifications.

#### 1.5 REFERENCES

- A. State of Ohio - Department of Transportation - Construction and Material Specifications, Material Detail 703.16, Suitable Materials for Embankment Construction.

## 1.6 QUALITY ASSURANCE

- A. Qualifications
- B. Regulatory Requirements
- C. Certifications
- D. Pre-Construction Conference

## 1.7 PROJECT CONDITIONS

- A. Environmental Requirements
  - 1. All work shall adhere to conditions of the approved ODNR Temporary Shore Structure Permit and the USACE Nationwide Permit.
- B. Existing Conditions
  - 1. Existing ground elevations of the site are shown by figures and/or by contours on the Drawings. The contours and elevations of the present ground are believed to be reasonably correct, but do not purport to be absolutely so, and, together with any schedule of quantities, are presented only as an approximation. The Contractor shall satisfy himself, however, by actual examination on the site of the Work, as to the existing elevations and contours, and the amount of work required.
- C. Existing Utilities
  - 1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
  - 2. Notify Engineer not less than two days in advance of proposed utility interruptions.
  - 3. Do not proceed with utility interruptions without Engineer's written permission.
  - 4. Contact utility-locator service for area where Project is located before excavating.

## 1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to the site, store and protect under provisions of Section 016600, Product Handling and Protection.
- B. Comply with all provisions of Section 013543, Environmental Protection.

## 1.9 PROHIBITION OF EXPLOSIVES

- A. The use of explosives is not permitted.

## PART 2 - PRODUCTS

### 2.1 EMBANKMENTS

- A. Soils suitable for use in an embankment must conform to ODOT 703.16 and are restricted as follows:
1. Maximum laboratory dry weight shall not be less than 90 pounds per cubic foot, except that soils having maximum dry weights of less than 100 pounds per cubic foot shall not be used in the top 12 inches of embankment.
  2. Soil having a liquid limit in excess of 49 are considered as unsuitable for use in an embankment.
  3. Silt from excavation or borrow identified as Ohio Classification A-4b shall be considered suitable for use in an embankment only when placed at least 3 feet below the surface of the subgrade.
  4. No slag, recycled Portland cement concrete or recycled asphaltic concrete products are suitable for use in an embankment.
  5. Do not use any suitable material that cannot be incorporated in an 8-inch lift in the top 2 feet of the embankment.
  6. Do not use shale, hard shale, or siltstone in the top 2 feet of embankment.
  7. Do not use materials that cannot be satisfactorily placed and compacted to a stable and durable condition.
  8. Material excavated in the work that contains excessive moisture is unsuitable for embankment construction unless dried. Dry or aerate such material before incorporating in the work. The Contractor may elect to waste this material, instead of drying it.
  9. Granular material Type E as specified in ODOT 703.16.C, is not allowed.
  10. No petroleum contaminated soils are suitable for use in an embankment.

## PART 3 - EXECUTION

### 3.1 REPLACING, MOVING AND REPAIRING OF EXISTING UTILITIES

- A. The Contractor shall:
1. replace, move, repair and maintain all utilities and all other structures encountered in the work
  2. coordinate and communicate with applicable utility companies
  3. repair all damage done to any of the said structures and appurtenances through his acts or neglect and shall keep them in repair during the life of this contract. The Contractor shall in all cases leave them in as good condition as they were previous to the commencement of the work and to the satisfaction of the Engineer.

### 3.2 DEWATERING

- A. Drainage and Removal of Water
  - 1. The Contractor shall dispose of water from the Work in a suitable manner without damage to adjacent property or structures.
  - 2. Where open water courses, ditches, or drain pipes are encountered during the progress of the Work, the Contractor shall provide protection and securing of the continuous flow in such courses or drains and shall repair any damage that may be done to them.

### 3.3 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. It shall be the responsibility of the Contractor to dispose of all surplus material that cannot be used in backfill or embankments at his expense outside the limits of the project. Unsuitable excavated material, including rock or large boulders, shall be disposed of outside the limits of the project.
- B. Surplus material may be wasted adjacent to or incorporated in the regular construction only when ordered in writing by the Engineer.

### 3.4 EMBANKMENT

- A. In making fill for embankment, the surface of the existing ground shall be cleared, grubbed, stripped of organic material, plowed, compacted according to the requirements specified in this Section, and stepped on slopes so as to enable bond or firm bearing for the new fill. The materials for these fills shall be selected of approved materials free from organic matter and placed in horizontal layers not exceeding eight (8) inches in thickness when loose, each layer being thoroughly compacted. Materials shall not be placed when fill or foundation is frozen.
- B. Where fill is to be placed on side slopes steeper than one (1) vertical to six (6) horizontal, steps shall be formed into the slope before any embankment is placed. These steps shall be cut at vertical intervals at no more than two (2) feet and shall have a horizontal dimension of not less than three (3) feet.
- C. As fill progress, the top shall be kept crowned or sloped for drainage. No pavement shall be placed upon embankment until it meets compaction testing requirements.
- D. Fills that abut or contain concrete or masonry structures shall be placed with care to avoid undue or unbalanced loads on these structures.
- E. Following the completion of embankment, all slopes shall be neatly and evenly dressed to proper elevation, grade and dimension.

### 3.5 CONSTRUCTION WITH MOISTURE AND DENSITY CONTROL

- A. All backfill and embankments, except rock embankments, shall be constructed using moisture and density control. All subgrade, except rock and shale in cut sections, shall be constructed using moisture and density control.
- B. Backfill, embankment and subgrade material which does not contain sufficient moisture to be compacted in accordance with the requirements of Article 3.17 of this Section shall be sprinkled with water as directed by the Engineer to bring the moisture content to within the range of optimum plus or minus three (3) percent. Water shall be thoroughly incorporated into the material by means of discs or other approved equipment.
- C. Backfill, embankment and subgrade material containing excess moisture shall be dried, prior to installation, to a moisture content not greater than three (3) percentage points above optimum, except that for material within the moisture content range specified herein that displays pronounced elasticity or deformation under the action of loaded construction equipment, the moisture content shall be reduced to optimum or below if necessary to secure stability. For subgrade material, these requirements for maximum moisture shall apply at the time of compaction of the subgrade and also at the time of placing pavement or subbase. Drying of wet soil shall be expedited by the use of plows, discs, or by other approved methods when so ordered by the Engineer.

### 3.6 COMPACTION REQUIREMENTS

- A. Embankment shall be placed and compacted in layers until the density is not less than the percentage of maximum dry density indicated in the following table determined by ASTM D-698.

#### EMBANKMENT SOIL COMPACTION REQUIREMENTS

Maximum Laboratory Dry Weight <u>Pounds/Cubic Foot</u>	Minimum Compaction Requirements Percent Laboratory <u>Maximum</u>
90-104.9	102
105-119.9	100
120 and more	98

B. Test Sections

1. If it is determined by the Engineer that the composition of the material is such that it cannot be tested for density using a nuclear densometer or other methods; or where, in the opinion of the Engineer, in-place compaction testing is not feasible; and if approved by the Engineer, the Contractor may construct a test section to demonstrate acceptable compactive effort in lieu of in-place compaction testing. Test sections shall be constructed at no additional cost to the Owner.
2. The test section shall be completed by repeatedly compacting the material until no further density is achieved. This value shall be the Minimum Test Section Density (MTSD). The compaction equipment used to complete the test section shall be of suitable size to compact the material and shall be the same equipment used to compact the in-place material.
3. The test section shall be constructed with moisture density control as specified in this Section.
4. The material shall be compacted to at least 98% of the MTSD.
5. Each lift of in-place fill or backfill shall be densified using a compactive effort equal to or greater than the effort applied to achieve the MTSD; i.e., if six passes were required to achieve MTSD, then each lift of material shall be compacted using six or more passes.
6. Construct a new test section when, in the opinion of the Engineer, the fill or backfill material has changed character or when the supporting material has changed character.

3.7 GRADING

- A. Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

END OF SECTION 310000

## SECTION 329219 – SEEDING, MULCHING, AND EROSION CONTROL MATTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Installation of seeded areas shall be to the extent shown on Contract Drawings and shall include supplying all seed, topsoil, soil conditioning materials, mulching materials and watering, and the incorporation of these materials into the work as specified.
- B. The Contractor shall place topsoil at the depths specified in those areas requiring seeding. Topsoil shall be furnished by the Contractor.
- C. The installation of permanent erosion control matting shall be to the extent shown on the Contract Drawings and shall include supplying erosion control matting, appropriate anchors, fasteners and the incorporation of these materials into the work as specified.

#### 1.2 SUBMITTALS

- A. Product Data: For the following:
  - 1. Provide copies of soils tests for both new topsoil (provided) and onsite topsoil for review and approval. This applies to all areas that require seeding, including reconditioned areas.
  - 2. Provide location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown in the past 2 years.
  - 3. Provide the name of the seed supplier, name and phone number, list of the seed, including varieties of seed, labels, and an analysis of the seed for review, 4 weeks prior to the start of seeding.
  - 4. Provide soil amendments information based on soils test requirements.
  - 5. Hydroseed mixture, mulch and application rates prior to performing the work.
  - 6. Provide the name of the erosion control matting supplier, samples, technical data and installation instructions.

#### 1.3 QUALITY ASSURANCE

- A. Any subcontracted restoration work shall be performed by a qualified firm specializing in landscape work.
- B. The Contractor shall have a soils test done at their expense and analyzed by a state approved testing agency. Soil tests shall be done on both the topsoil stockpiled from the site and new topsoil brought to the site. A minimum of two (2) tests shall be done. The tests shall include percent organic matter, pH, Buffer pH, Phosphorus, Exchangeable Potassium, Calcium, Magnesium, Cation Exchange Capacity and Percent Base Saturation with recommendations for nitrogen, phosphate, potash, magnesium and lime based on plant type and use.
- C. Seed: All seed specified shall meet O.D.O.T. specifications as to the percentage purity,

weed seed, and germination. All seed shall be approved by the State of Ohio, Department of Agriculture, Division of Plant Industry, and shall meet the requirements of these specifications.

- D. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

#### 1.4 PROJECT CONDITIONS

- A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, such conditions shall be rectified by the Contractor before planting, with approval from the Engineer.
- C. Soil Stabilization: The Contractor shall provide permanent or temporary soil stabilization to denuded areas within fifteen (15) days after final grade is reached on any portion of the site. Any such area which will not be regraded for longer than fifteen (15) days shall also be stabilized. Soil stabilization includes any measures which protect the soil from the erosive forces of raindrop impact and flowing water. Applications include seeding and/or mulching, or the use of other erosion control measures as directed by the Engineer. If necessary, the Contractor shall coordinate soil stabilization practices with the local Soil and Water Conservation District.
- D. Spring-sown work shall be installed between April 1st and May 30th and Fall-sown work shall be installed between September 1st and October 15th. No permanent seeding shall take place between May 30th and September 1st and between October 15th and April 1st. The dates for seeding may be changed at the discretion of the Engineer.

### PART 2 - PRODUCTS

#### 2.1 TOPSOIL

- A. Topsoil shall be furnished by the Contractor. Stockpiled material, if any, shall be utilized prior to obtaining additional topsoil.
- B. All topsoil shall conform to the U.S. Department of Agriculture soil texturing triangle and shall contain between 3% to 8% organic matter. Topsoil shall be loamy and not consist of more than 38% clay. New topsoil shall be screened to remove clay lumps, brush, weeds, litter, roots, stumps, stones larger than ½” in any dimension and any other extraneous or toxic matter harmful to plant growth.

New topsoil shall be obtained only from naturally well drained sites where topsoil occurs in

a depth of not less than 4". Do not obtain from bogs or marshes.

- C. Soil amendments shall be added according to the soils test requirements. Amendments can include, but are not limited to fertilizer, lime, compost, sand, and organic matter. Organic matter shall consist of composted leaves or other approved material.

## 2.2 SEED

- A. Seed shall be vendor mixed, delivered in original bags and shall be proportioned as follows:

Seed to be placed on slopes shall be the following:

Freedom Lawn II, low mow maintenance seed, by Ohio Prairie Nursery (opnseed.com), or approved equal.

Common Name

Annual Ryegrass  
Hard Fescue  
Chewing's Fescue  
Creeping Red Fescue  
Kentucky Bluegrass

Mix proportions shall be per the supplier.

Seed to be placed in all other areas shall be the following:

<u>Common Name</u>	<u>Proportion by Weight</u>
Kentucky Blue Grass	50%
Perennial Rye	50%

## 2.3 MULCH

- A. Mulch shall be clean straw free of seed and weed seed.
  - 1. Anchoring for mulch shall be an ODOT specified SS-1 at 60 gal./ton non-toxic tackifier such as Hydro-stik, or equal, or by securing with a photo degradable netting.
- B. If hydroseeding is used, wood fiber mulching material shall be used and shall consist of virgin wood fibers manufactured expressly from whole wood chips and shall conform to the following specifications.

- Moisture content  $10.0\% \pm 3.0\%$

- Organic content 99.2%  $\pm$  0.8% O.D. Basis
- pH 4.8  $\pm$  0.5
- Water holding capacity, minimum 1,000  
(grams of water per 100 grams of fiber)

Wood fiber mulching material shall be processed in such a manner as to contain no growth or germination inhibiting factors, and must contain a biodegradable green dye to aid in visual metering during application.

## 2.4 EROSION CONTROL MATTING

- A. Turf Reinforcement Matting in slope areas shall be North American Green (nag.com), SC150, or approved equal and shall consist of UV-stable, polypropylene top net, 70% straw/30% coconut fiber matrix, and photodegradable polypropylene bottom net.

## PART 3 - EXECUTION

### 3.1 PREPARATION - GENERAL

- A. Rough grading to a depth necessary to accept the specified thickness of topsoil must be approved prior to placing topsoil.
- B. Loosen subgrade, remove any stones greater than 1/2" in any dimension. Remove sticks, roots, rubbish, and other extraneous matter.
- C. Spread topsoil to a minimum depth of 4 inches, to meet lines, grades, and elevations shown on plan, after light rolling and natural settlement. Remove sticks, roots, rubbish, stones greater than 1/2" in any dimension, and other extraneous matter. Topsoil shall be tilled thoroughly by plowing, disking, harrowing, or other approved methods. Add specified soil amendments and mix thoroughly into the topsoil.
- D. Preparation of Unchanged Grades: Where seed is to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for planting as follows: Till to a depth of not less than 6 inches. Apply soil amendments and initial fertilizers as specified. Remove high areas and fill in depressions. Till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter. Soils test requirements apply here as well.
  1. Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of project limits. Do not turn existing vegetation over into soil being prepared for seed. If necessary, supply and install topsoil in areas where there is no topsoil left after vegetation has been removed.
  2. Apply specified soil amendments at rates specified in the soils test and thoroughly mix into upper 2 inches of topsoil. Add topsoil if existing grade has less than 4" of topsoil.

Delay application of amendments if planting will not follow within two (2) days.

- E. Fine grade areas to smooth, even surface with loose, uniformly fine texture. Roll, rake, and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Remove sticks, roots, rubbish, stones greater than 1/2" in any dimension, and other extraneous matter. Limit fine grading to areas which can be planted immediately after grading.
- F. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.
- G. Restore areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

### 3.2 SEEDING

- A. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage. Seed shall not be sown when the ground is frozen, muddy, or when weather conditions prevent proper soil preparation, interference with sowing and/or proper incorporation of seed into the soil.
- B. Sow seed using a spreader or hydroseeder. Do not seed when wind velocity exceeds 5 miles per hour.
  - 1. Seed rate for all areas not otherwise called out shall be 3 lbs. per 1000 S.F. at right angles to each other with total amount to equal a minimum of 6 lbs. per 1000 S.F.
  - 2. Seed rate for Freedom Lawn II shall be 2 ¼ lbs. per 1000 S.F. at right angles to each other with total amount to equal a minimum of 4 1/2 lbs. per 1000 S.F.
- C. For seed sown with a spreader, mulch shall be spread uniformly to form a continuous blanket at a rate of 100 lbs. per 1,000 S.F. Mulch shall be 1 1/2" loose measurement over seeded areas and shall be anchored.
- D. Contractor has the option to hydroseed large lawn areas, using equipment specifically designed for such application. The rate of application of wood fiber mulching materials is 40 lbs./1,000 S.F. Contractor shall not hydroseed within close proximity to buildings and structures, or when unfavorable wind conditions may blow the hydroseed material onto the structure. Contractor shall clean all areas not to be seeded of overspray.
- E. The seeded area shall be watered, as soon as the seed is applied, at the rate of 120 gallons per 1000 square feet. The water shall be applied by means of a hydroseeder or a water tank under pressure with a nozzle that will produce a spray that will not dislodge the mulching material. Cost of this watering shall be included in the cost of seeding and mulching.

### 3.3 EROSION CONTROL MATTING FOR SLOPE AREAS

- A. After soil has been prepared and seed installed on slope areas, install erosion control matting per manufacturer's instructions for 1 ½ : 1 slope installation.

### 3.4 DORMANT SEEDING METHOD

- A. The dormant seeding method shall be used for this project.
- B. Seeding shall not take place from October 15 through November 15. During this period prepare the seed bed, add the required amounts of lime and fertilizer, and other amendments, then mulch and anchor.
- C. From November 15 through April 1, when soil conditions permit, prepare the seed bed, lime and fertilize, apply the selected seed mixture, mulch, and anchor. Increase the seeding rate by 50 percent.

### 3.5 RECONDITIONING EXISTING LAWNS

- A. A soils test shall be required for existing lawns prior to any reconditioning.
- B. Recondition all existing lawn areas damaged by Contractor's operations including storage of materials and equipment and movement of vehicles. Also recondition existing lawn areas where minor regrading is required.
- C. Provide soil amendments as called for in the soils test.
- D. Provide new topsoil, as required, to fill low spots and meet new finish grades.
- E. Cultivate bare and compacted areas according to the topsoil specifications.
- F. Remove diseased and unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from the Contractor's operations, including oil drippings, stone, gravel, and other loose building materials.
- G. All work shall be the same as for new seeding.
- H. Water newly planted seed areas. Maintenance of reconditioned lawns shall be the same as maintenance of new lawns.

### 3.6 ESTABLISHMENT

- A. Maintain work areas as long as necessary to establish a uniformly close stand of grass over the entire lawn area. A uniformly close stand of grass is defined as the seeded areas having 90%+ coverage of grass at 60 days after seeding. 90%+ coverage is defined as very little or no dirt showing when seeded area is viewed from directly overhead.
- B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth acceptable lawn.

1. Mowing
  - a. Mow lawn areas during the period of maintenance to a height of 2 inches whenever the height of the grass becomes 3 inches. A minimum of 3 mowings is required during the period of maintenance. The slope area is not required to be mowed.
2. Refertilizing
  - a. Distribute fertilizer on the seeded area between August 15 and October 15, during the period when grass is dry, and in accordance with the manufacturer's recommendations. The fertilizer shall be as specified in the soils test.
3. Reseeding
  - a. Reseed with the seed specified for the original seeding, at the rate of 4 lbs. per 1,000 S.F. in a manner which will cause minimum disturbance to the existing stand of grass and at an angle of not less than 15 degrees from the direction of rows of prior seeding.
4. Watering
  - a. The Contractor shall keep all work areas watered daily to achieve satisfactory growth. Water shall be applied at a rate of 120 gallons per 1,000 square feet.
5. Any mulching which has been displaced shall be repaired immediately. Any seed work which has been disturbed or damaged from the displacement of mulch shall be repaired prior to remulching.
6. Repair any erosion control matting that is loose according to the manufacturer's specifications for original installation.

### 3.7 INSPECTION AND ACCEPTANCE

- A. When seeding work is complete and an acceptable stand of growth is attained, the Contractor shall request the Engineer to make an inspection to determine final acceptance.
- B. Acceptance shall be based upon achieving a vigorous uniformly stand of the specified grasses. If some areas are satisfactory and some are not, acceptance may be made in blocks, provided they are definable or bounded by readily identified permanent surfaces, structures, or other reference means. Partial acceptance decisions may be made by the Engineer. Excessive fragmentation into accepted and unaccepted areas shall not be allowed. Unaccepted areas shall be maintained by the Contractor until acceptable.
- C. No payment shall be made until areas are accepted.
- D. All seeded areas shall be guaranteed for one full growing season to commence upon final acceptance of the areas.

END OF SECTION 329219

## SECTION 353116.40 - ARMOR STONE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The construction drawings and General Provisions of this Contract, including the General and Supplementary Conditions, Specific Project Requirements, Proposal, and all referenced standard specifications, apply to work of this Section.

#### 1.2 SUMMARY

- A. The work covered by this section consists of furnishing all necessary labor, equipment and materials, and performing all operations in connection with the construction of the stone revetment shown on the contract drawings and in accordance with these specifications and conditions of the contract.

#### 1.3 QUALITY OF WORK

- A. All materials for the construction of the stone revetment shall meet the approval of the Owner. Sources from which the Contractor proposes to obtain the materials shall be selected by the Contractor well in advance of work and, unless otherwise specified, all test samples shall be obtained by the Contractor under Owner supervision and delivered at the Contractor's expense to a point designated by the Owner sufficiently in advance of the time when the placing of the material is expected to begin.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. General: All stone shall be of a quality to insure permanence of the revetment. The stone shall be durable, sound, free from cracks, seams, and other defects which tend to increase deterioration from natural causes. It shall be highly resistant to weathering and disintegration under freezing and thawing and wetting and drying, as evidenced by laboratory test. The materials to be furnished shall meet all requirements specified. The Engineer, at any time during the contract, may reject material, at the source or job site, not meeting specified requirements. Materials which have been delivered to the project site and are rejected shall be removed from the project site.

- B. Quality: Acceptability of stone material will be determined by suitable laboratory tests, visual inspection, and/or service records as required by the Engineer. Tests which the material may be subjected to include petrographic analysis, specific gravity, abrasion, absorption, wetting and drying, freezing and thawing, gradations, and any others determined necessary to assure acceptable material. All laboratory tests will be made by the Contractor and at his expense. Visual inspection for cracks, fractures, seams, defects, and deterioration will be made by the Engineer. Service records will include documentation to show the stone has performed satisfactorily on similar structures.
- C. Specific Gravity: All stone shall have a minimum specific gravity of 2.50 (156 lb./C.F.). Reference is made to Paragraph 3.05.B of this specification for data on the recalculation of contract quantities and redesign of stone size and mat thickness should the actual specific gravity vary.
- D. Elongation: The least dimension of any piece of stone shall be no less than one-third of its greatest dimension.
- E. Gradation and Location of Material:
  - 1. Stone material shall have the gradations listed below and shall be placed in the work at locations indicated and/or shown on the drawings. Gradation limits are in-place requirements. Adjustments in production methods shall be made as necessary to assure final placed materials are within specified ranges.

<u>Type</u>	<u>Weight Range</u>
Armor Stone	2 ton to 4 tons; 50% greater than 2.1 tons
Armor TOE Stone	4 ton to 6 tons; 50% greater than 4.1 tons

## PART 3 - EXECUTION

### 3.1 PLACEMENT

- A. General: All material shall be placed uniformly within the slope lines and grades indicated on the drawings or as directed by the Engineer. Material shall be placed by equipment suitable for handling materials of the size specified. All stone shall be placed progressively beginning at the bottom of the section and in such a manner as to produce a graded mass of stone with maximum interlocking and minimum voids.

- B. Temporary Storage: Storage of stone on the lake bottom, prior to permanent placement, shall be subject to approval of the Engineer and shall include appropriate weight adjustments for losses, which shall be at the Contractor's expense. Storage in other areas of the project shall be subject to approval of the Engineer.
- C. Limitation of Placement Procedures: Stone construction in advance of completed permanent stone protection shall be at the Contractor's risk. In the event an unprotected bluff is damaged or causes damage to a completed section, the damaged portion shall be replaced or reshaped, as approved by the Engineer, at no additional cost to the Owner. The Contractor shall keep the Owner or representative advised as to any and all situations that may result in a possible interruption of the work. Any material used for protecting the exposed ends of the revetment shall be the property of the Contractor and shall equal permanent construction.
- D. Placement of Stone Protection on Filter Cloth: The filter cloth shall be in place prior to placement of the stone thereon. Placement of the filter cloth shall be as by the manufacturer and in accordance with the specification entitled, "Filter Cloth." The stone shall be placed and shall not be dropped from a height greater than one (1) foot. During placement of stone, any damage to the cloth shall be repaired in an approved manner by the Contractor at no additional expense to the Owner.
- E. Armor Stone: Armor stone shall be placed individually and in a manner to avoid displacing underlying materials, placing undue impact force on underlying material, and to minimize chipping of stones. The stone shall be placed with minimum voids and with maximum interlocking of stones. All stone, when placed, shall be stable, keyed, and interlocked, with no overhanging or "floaters". Rehandling of individual stones after initial placement will be required to achieve the above requirements. Equipment proposed for use shall be capable of placing the stone near its final position before release and capable of moving the stone, if necessary, to its final position. Dragline buckets and skips shall not be used for placement of stone. Placement shall begin at the bottom of the slope. Casting or dropping of stone over one (1) foot or moving by drifting or manipulation down the slope will not be permitted. The outer surface shall be even, with the extreme limits of tolerance ( $\pm 6$  inches) not continuous over an area greater than 1,000 square feet of structure surface.

### 3.2 CONTRACTOR QUALITY CONTROL

- A. General:
  - 1. The Contractor shall establish and maintain quality control for all work performed at the quarry and job site under this section to assure compliance with contract requirements. The Contractor shall maintain records of his quality control test(s), inspections, and corrective actions. Quality control measures shall cover all materials, equipment, tests, and construction operations.

2. Stone materials produced during start-up operations at the quarry shall be visually inspected for quality, and tested for weight and/or gradations to assure compliance with the specifications. Three (3) consecutive tests shall pass all requirements and be witnessed by the Engineer or his representative prior to full production operations or shipment of any material to the project site.

B. Quarry Samples: Prior to delivery of any stone to the job site after start-up testing is complete, the Contractor and the Engineer's representative shall meet at each quarry designated to supply stone materials and select stones, with required quality and weight, to be set aside at the quarry, as reference samples of the material to be shipped to the project site, and samples retained until completion of the project. All stones shall be sampled. Samples shall consist of at least one (1) stone representing each size in the gradation range. Basic quarry and material inspections shall be provided by the Contractor as part of his "Quality Control Program".

C. Production Testing:

1. Production quality control tests shall be accomplished at the quarry prior to shipment of materials to the project site and shall be performed at uniform intervals throughout the project construction. General acceptance of the stone will be at the quarry based on these tests. The following testing will be required:

<u>Stone Type</u>	<u>Gradation</u>	<u>Type of Testing</u>	<u>Minimum Number of Tests</u>
Armor	Over 1 ton size	Visual and measurement	Visual - all stone  Measurement: 15% of all material produced

2. Testing shall be increased as necessary to maintain quality control during production and shall be at the Contractor's expense.

D. Visual Inspection: A visual check of all stone over 1 ton size shall be made at the quarry for elongation, cracks, deterioration, and other defects visible to the naked eye on at least 2/3 of the surface area of the stone. Five (5) percent of the stone checked for cracks shall be wetted and reinspected for minute cracks to determine if they would be detrimental to the stone quality and if additional inspections are necessary on all stone. Stones with cracks that are detrimental to a long-lasting product shall not be shipped to the project site.

E. Measurement: Stones shall be measured on three (3) orthogonal axes and weight computed. Computed weights and measurements shall be recorded. Weighing of stones shall be recorded. Weighing of stones shall be performed only as necessary to verify questionable computed weights. Stone selected for measurements shall

represent all sizes specified in order to verify conformance with the specified weight limits.

3.3 PROJECT SITE INSPECTION AND TESTS

- A. Any materials broken, cracked, out of gradation, or improperly placed in the work shall be removed and replaced with new stones or corrected as directed by the Engineer at no additional expense to the Owner.
- B. Visual inspections shall be made of all materials for size, gradations, fractures, etc. to assure that handling during loading, transportation, unloading, and/or placement does not cause segregation of the materials and to assure they are placed in accordance with the contract requirements.

3.4 MEASUREMENT

- A. Location and thickness shall conform to the plan dimension for the specified type of stone. Material placed beyond the tolerance limits specified for each type of material will not be paid for. Any material wasted or used by the Contractor for other purposes and any material not placed in the work in accordance with the requirements of the specifications will not be measured or paid for. Adjustments in stone size or mat thickness due to variations in actual specific gravity will not be cause for pay adjustments.
- B. Adjustments for materials placed beyond plan dimensions as requested by the Owner, in writing, will be measured by surface area in square yards and converted to weight using the conversion factors stated below, unless modified in writing by the Engineer.

3.5 CONVERSION FACTORS

- A. For in-place quantities, the following factors were used in determining the weights, thickness, and sizes shown on the plans:

<u>Material</u>	<u>Specific Gravity</u>	<u>Percent Voids</u>
Armor stone	2.50	30%

- B. If the specific gravities of any of the material proposed for use by the Contractor are different by more than plus or minus five (5) percent from those shown above, it shall be cause for the Engineer to redesign the stone sizes and mat thickness for the project, at the Contractor's expense, and with no change in the unit prices.

3.6 PAYMENT

- A. Payment will be at the contract unit price, which shall include all costs of furnishing and placing materials, and labor and equipment required to complete the work as specified herein and shown on the contract drawings.

END OF SECTION 353116.40