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**AUGLAIZE SOIL AND WATER CONSERVATION DISTRICT**  
**110 Industrial Drive, Suite G**  
**Wapakoneta, Ohio 45895**

**GENERAL CONDITIONS**

**RIGHT OF WAY**

**Subsurface Drain:**

The width of construction right-of-way shall be 60 feet on each side of the proposed tile outlet. A greater distance may be needed for installation of submain or laterals as directed by the contracting officer.

**SUPERVISION**

1. This contract will be administered by the Auglaize County Commissioners.
2. The contracting officer shall be the authorized representative of the County Commissioners.
3. The responsibility of construction inspection will be with the Natural Resource Conservation Service Engineer or his authorized representative and the Auglaize Soil and Water Conservation District.

**ALTERATIONS OF WORK**

4. Should there be any discrepancy discovered between the intentions of these specifications and the special plans prepared for this contract, the contracting officer shall be the deciding authority, and the decision shall be final.
5. The right is reserved by the contracting officer to correct any error or omissions in the plans or specifications. The contractor shall be paid for extra work on unit price bid. The right is also reserved for non-performance and shall be deducted from contract at unit price bid.

**LIABILITIES OF CONTRACTOR**

6. The contractor shall be held entirely responsible for the conduct of his employees, on the job, and any damage that may arise there-from.
7. The contractor shall be held liable for all damages resulting from the use of explosives, mechanical equipment or other devices used in the prosecution of the work, or unnecessary damage to crops or land. However, the contractor is subject only to the plans and specifications, and the direction of the engineer. Landowners or other interested parties have no authority to dictate or give any orders relative to the prosecution of the work, but should report any violation of the specifications to the engineer in charge.

# Construction Specification 2—Clearing and Grubbing

## 1. Scope

The work consists of clearing and grubbing and disposal of trees, snags, logs, brush, stumps, shrubs, and rubbish from the designated areas.

## 2. Protection of existing vegetation

Trees and other vegetation designated to remain undisturbed shall be protected from damage throughout the duration of the construction period. Any damages resulting from the contractor's operations or neglect shall be repaired by the contractor.

Earthfill, stockpiling of materials, vehicular parking, and excessive foot or vehicular traffic shall not be allowed within the drip line of vegetation designated to remain in place. Vegetation damaged by any of these or similar actions shall be replaced with viable vegetation of the same species, similar condition, and like size unless otherwise approved by the contracting officer.

Any cuts, skins, scrapes, or bruises to the bark of the vegetation shall be carefully trimmed and local nursery accepted procedures used to seal damaged bark.

Any limbs or branches 0.5 inch or larger in diameter that are broken, severed, or otherwise seriously damaged during construction shall be cut off at the base of the damaged limb or branch flush with the adjacent limb or tree trunk. All roots 1-inch or larger in diameter that are cut, broken, or otherwise severed during construction operations shall have the end smoothly cut perpendicular to the root. Roots exposed during excavation or other operations shall be covered with moist earth or backfilled as soon as possible to prevent the roots from drying out.

## 3. Marking

The limits of the area(s) to be cleared and grubbed will be marked by stakes, flags, tree markings, or other suitable methods. Trees to be left standing and uninjured will be designated by special markings placed on the trunk about 6 feet above the ground surface.

## 4. Clearing and grubbing

All trees not marked for preservation and all snags, logs, brush, stumps, shrubs, rubbish, and similar materials shall be cleared from within the limits of the designated areas. Unless otherwise specified, all stumps, roots, and root clusters that have a diameter of 1 inch or larger shall be grubbed out to a depth of at least 2 feet below subgrade for concrete structures and 1 foot below the ground surface at embankment sites and other designated areas.

## 5. Disposal

All materials cleared and grubbed from the designated areas shall be disposed of at locations shown on the drawings or in a manner specified in section 7. The contractor is responsible for complying with all local rules and regulations and the payment of any and all fees that may result from disposal at locations away from the project site.

## 6. Measurement and payment

**Method 1**—For items of work for which specific unit prices are established in the contract, the cleared and grubbed area is measured to the nearest 0.1 acre. Payment for clearing and grubbing is made for the total area within the designated limits at the contract unit price. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

**Method 2**—For items of work for which specific unit prices are established in the contract, the length of the cleared and grubbed area is measured to the nearest full station (100 feet) along the line designated on the drawing or identified in the specifications. Payment for clearing and grubbing is made for the total length within the designated limits at the contract unit price. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

**Method 3**—For items of work for which specific unit prices are established in the contract, each tree, stump, and snag having a diameter of 4 inches or larger and each log having a diameter of 4 inches or larger and a length of 10 feet are measured before removal. The size of each tree and snag is determined by measuring its trunk at breast height above the natural ground surface. The size of each log is determined by measuring the butt and by measuring its length from butt to tip. The size of each stump is measured at the top. Diameter is determined by dividing the measured circumference by 3.14.

Payment for clearing and grubbing of each tree, stump, and snag having a diameter of 4 inches or larger and each log having a diameter of 4 inches or larger and a length of 10 feet or larger is made at the contract unit price for its size designation as determined by the following schedule:

Measured diameter (in)	Size designation (in)
4 to 8	6
8 to 12	10
12 to 24	18
24 to 36	30
36 to 60	48
Over 60	60

The sum of such payments shall constitute full compensation for clearing and grubbing (including the clearing and grubbing of smaller trees, stumps, snags, logs, brush, shrubs, and roots), applicable permits and associated fees, and rubbish removal. Such payment shall constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

**Method 4**—For items of work for which specific lump sum prices are established in the contract, payment for clearing and grubbing is made at the contract lump sum price. Such payment shall constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

**All Methods**—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 7.

## 7. Items of work and construction details

## **7. ITEMS OF WORK AND CONSTRUCTION DETAILS**

Items of work to be performed in conformance with this specification and construction details therefore are:

### **Bid Item 1 Clearing and Grubbing**

This item shall consist of the clearing and grubbing of trees where needed to install the tile main in the location designated on the engineering drawings. All removed trees will be piled and burned and the remains will be buried.

Selected trees to be used for lumber or firewood can be removed by the landowner prior to construction of this project. Failure to remove desirable trees prior to this time will result in awarding the contractor possession of all woodland products.

Burning operations shall be subject to all public laws governing such operation. All buried materials must have a minimum cover of 24 inches above normal ground elevations.

Measurement and payment shall be by Method 4.

# Construction Specification 46—Tile Drains

## 1. Scope

The work consists of furnishing and installing drain tile and necessary fittings and appurtenances.

## 2. Material

Unless otherwise specified, the drain tile and fittings shall conform to the requirements of Material Specification 543, Nonreinforced Concrete Pipe, or Material Specification 544, Clay Pipe and Drain Tile, whichever is applicable.

## 3. Excavation

Unless otherwise specified, excavation for the installation of each tile line shall begin at the outlet end and progress upstream.

The trench or excavation for the tile shall be constructed to the depths and cross-sections shown on the drawings. The trench width may be increased above the top of the tile at the option of the contractor.

Trench shields, shoring and bracing, or other methods necessary to safeguard construction personnel and to prevent damage to the existing improvements shall be furnished, placed, and subsequently removed by the contractor.

## 4. Preparing the tile bed

**Method 1**—In stable soils the tile shall be firmly and uniformly bedded throughout its entire length to the specified depth and in the specified manner.

When the bottom of the trench does not provide a sufficiently stable or firm foundation for the drain tile, cradles for the tile (constructed of timber or fabricated lumber of a cleat-and-rail type construction), a sand-gravel mix, or other approved material shall be used to stabilize the bottom of the trench.

Drain tile shall not be laid on a rock foundation. In the event that boulders, rocks or ledge rock, or cemented material that prevents satisfactory bedding are encountered at the required grade with the trench cross-section, the trench shall be excavated to a minimum depth of 6 inches below grade and backfilled to grade with a sand-gravel mixture or other approved material. The bedding material shall be shaped to grade and compacted.

**Method 2**—Tile shall be bedded as shown on the drawings or as specified in section 10 of this specification.

## 5. Laying tile and joint covering

**Method 1**—Gaps between tile ordinarily shall be from 1/8 inch to 1/4 inch in clay, clay loam, and cohesive soil. Tile is laid without gaps in sandy soils and on lines to convey water with no intention of providing drainage.

Where tile is installed with the width of joint opening exceeding the limits stated above for noncohesive silts and fine and medium sands, the joint shall be covered with a permanent type material, such as coal tar pitch treated roofing paper, fiber glass sheet or mat, or plastic sheeting.

For tile installations on a curve alignment, the outside tile gap shall be covered with tile bats (broken tile) or covered as described above when the gap exceeds the recommended gap for the type of soil encountered. To maintain the gap within the allowable range, the inside pipe lip may be chipped and fitted to secure the required joint opening.

The ends and inside surface of all tiles shall be kept clean during installation. All earth or other extraneous material within the tile shall be removed before installation of the next tile section. At the end of work each day and when laying has been temporarily suspended, the inlet end shall be blocked so that earth or other extraneous material cannot enter the tile. The upper end of each tile line shall be blocked with permanent type material following satisfactory completion of tile installation.

**Method 2**—Tile shall be laid and joints shall be covered in the manner shown on the drawings or as specified in section 10 of this specification.

## **6. Connections**

Lateral connections are made with manufactured junctions comparable in strength with the specified tile unless otherwise specified.

Where existing tile lines not shown on the drawings are crossed, they shall be bridged across the new trench or they shall be connected into the new tile lines, as directed by the engineer.

## **7. Blinding or filter material**

**Method 1**—As soon as the tiles are placed satisfactorily, they shall be blinded by covering with friable soil material to a minimum depth of six inches. Material used for blinding shall not be frozen and, unless otherwise specified in section 10 of this specification, shall contain no rocks or stones that when dropped may cause tile damage. Sandy and other noncohesive soil shall not be used for blinding unless the joints are covered. All tile placed during any day shall be blinded at the completion of the work activities that day.

**Method 2**—Tile shall be covered with sand and gravel meeting the gradation, quality, quantities, and dimensions requirements and installed as shown on the drawings or as specified in section 10 of this specification. Material used for blinding shall not be frozen or contain rocks or stones that when dropped may cause tile damage. All tile placed during any day shall be blinded at the completion of the work activities that day.

**Method 3**—Unless otherwise specified, tile shall be covered with material obtained from required trench excavations.

## **8. Backfilling**

Backfilling of the trench shall be completed as rapidly as consistent with the soil conditions.

Automatic backfilling machines may be used only when approved by the engineer. Backfill shall extend above the ground surface and be well rounded and centered over the trench.

Unless otherwise specified, where drain tile is installed under roads and at other designated locations shown on the drawings, the backfill shall be placed in successive layers of not more than 6 inches and each layer shall be compacted before the next layer is placed. The density of the compacted backfill shall not be less than the density of the surrounding adjacent earth material unless otherwise specified in section 10 of this specification.

## **9. Measurement and payment**

For items of work for which specific unit prices are established in the contract, the quantity of each kind, size, and class of tile is determined to the nearest foot of length measured along the centerline of the installed tile. Payment for each kind, size, and class of tile is made at the contract unit price for that kind, size, and class of tile. Such payment constitutes full compensation for furnishing, transporting, and installing the tile, including excavation, shoring, backfill, and all fittings, appurtenances, and other items necessary and incidental to the completion of the work. Payment for appurtenances listed separately in the bid schedule is made at the contract prices for the sizes and types of appurtenances listed.

Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 10 of this specification.

## **10. Items of work and construction details**

## 10. ITEMS OF WORK AND CONSTRUCTION DETAILS

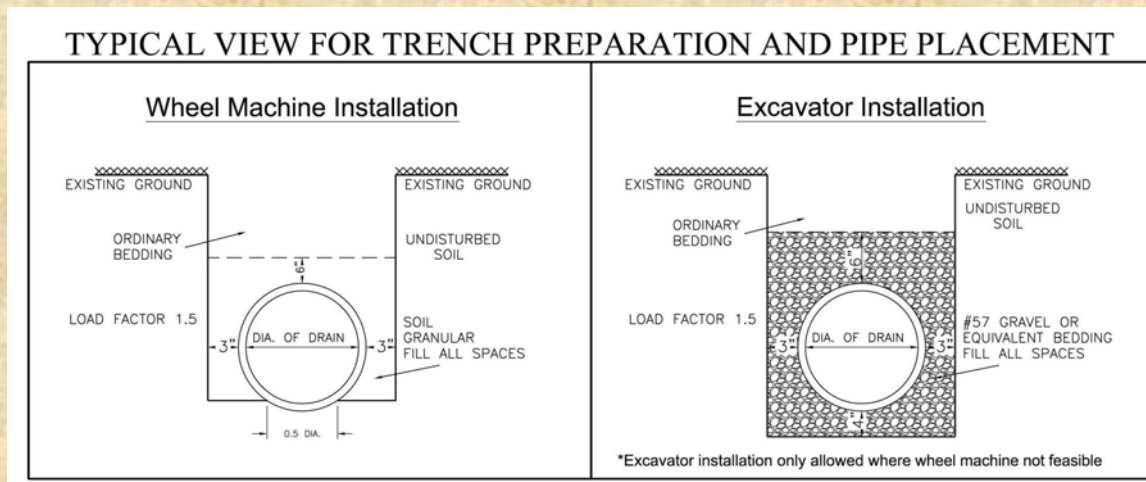
Items of work to be performed in conformance with this specification and the construction details therefore are:

*It shall be required that the trench bottom or "shoe" of the trenching machine, or of the trench box cage, if so equipped, be conformed and shaped to the specific diameter size of the pipe being installed.*

*It will be required that 100% of the trench be backfilled with granular soil material no larger than 2"-3" in diameter. Chunks, clods, or masses of dirt, soil, or debris any larger than this will not be permitted to be backfilled into the excavated trench. The trench will be backfilled at an angle of 45 degrees to the alignment of the trench in order to promote proper enveloping of the backfill material over and around the installed pipe.*

*A backhoe or excavator can only be used on this project for the following purposes: (1) to install pipe at the upper and lower terminus of the project to make end connections (2) to place the first length of pipe leading into or out of a catch basin or receiver (3) to place the first length of pipe leading into or out of a premanufactured elbow fitting (4) in any areas which a trench has unstable sub-grade or base and requires additional excavation and placement of bedding materials (5) to install pipe through a road or driveway, where the trench will be totally backfilled with stone aggregates (6) making lateral connections*

*All pipe which has been installed by a backhoe or excavator in the accepted conditions as listed above, shall be bedded and backfilled over and under the installed pipe as shown on the typical trench detail of the engineering plans, profiles, and specifications.*



**Bid Item 2 NON-Perforated Corrugated Plastic Smooth Interior Pipe 24 Inch**

This item shall consist of furnishing and installing 24 inch **NON-perforated** corrugated plastic smooth interior pipe as shown on the engineering drawings.

Measurement and payment shall be by unit price bid

**Bid Item 3 Perforated Corrugated Plastic Smooth Interior Pipe 18 Inch**

This item shall consist of furnishing and installing 18 inch perforated corrugated plastic smooth interior pipe as shown on the engineering drawings.

Measurement and payment shall be by unit price bid

**Bid Item 4 Pre-Manufactured 18 Inch Elbow for Turn**

This item shall consist of furnishing and installing 18-inch elbows as shown on the engineering drawings.

Measurement and payment will be by unit price bid.

**Bid Item 5 Plastic 4" Diameter**

This item shall consist of furnishing and installing (4) four inch diameter perforated plastic drains as shown on the engineering drawings.

This tile has the capacity to handle three clean 4" tile hook ups. Once the tile has reached the maximum capacity the tile is to be terminated and plugged at the end. The submain will then continue by hooking back into the new main.

Measurement and payment shall be by unit price bid.

**Bid Item 6 Plastic 6" Diameter**

This item shall consist of furnishing and installing (6) six inch diameter perforated plastic drains as shown on the engineering drawings.

This tile has the capacity to handle six clean 4" tile hook ups or one clean 6" hook up. Once the tile has reached the maximum capacity the tile is to be terminated and plugged at the end. The submain will then continue by hooking back into the new main.

Measurement and payment shall be by unit price bid.

**Bid Item 7 Connections into Large Main Outlet**

All encountered existing tile laterals shall be connected to the new main or submain with insert-a-tee connectors. The connected tile shall be hole-sawed into the new main at an angle of 45 degrees above horizontal in the upper 1/3rd of the pipe being connected to, if possible.

The insert-a-tee connection shall not protrude more than 1/2" into the main tile being connected to. The excavated trench leading to the encountered tile lateral shall be dug at a 45 degree angle from horizontal until the elevation of the existing tile lateral is met. The entire connection shall be bedded and backfilled to a point 12" over the top of all exposed pipe material.

Measurement and payment will be by unit price bid.

**Bid Item 8 Connections into Small Submain Outlet**

Where smaller diameter tile lines not shown on the drawings are crossed with the submain, they shall be connected into the new submain line or as directed by the engineer. Any lateral larger than the submain will be run across and hooked directly into the new main.

Measurement and payment will be by unit price bid.

**Bid Item 9 Removal of Old Tile**

This item shall consist of destroying the existing main tile line as shown on the engineering drawings. This shall be accomplished by excavating the existing drain and burying the tile bats at least two feet below the existing ground surface

Measurement and payment will be by unit price bid.

**Bid Item 10 Leveling trenches after settling, filling around settled catch basins**

This item shall consist of leveling tile trenches after settling, filling around settled catch basins after settling.

Measurement and payment shall be by unit price bid.

**Bid Item 11 Animal Guard 18 Inch**

This item shall consist of furnishing and installing the 18-inch animal guard as shown on the engineering drawings.

Measurement and payment shall be by unit price bid.

**Bid Item 12 Manufactured 18"x12" Manufactured Tee**

This item shall consist of furnishing and installing 18"x12" Tee to hook up laterals as shown on the engineering drawings.

Measurement and payment will be by unit price bid.

# Construction Specification 61—Rock Riprap

## 1. Scope

The work shall consist of the construction of rock riprap revetments and blankets, including filter or bedding where specified.

## 2. Material

**Rock riprap** shall conform to the requirements of Material Specification 523, Rock for Riprap, or if so specified, shall be obtained from designated sources. It shall be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits.

At least 30 days before rock is delivered from other than designated sources, the contractor shall designate in writing the source from which rock material will be obtained and provide information satisfactory to the contracting officer that the material meets contract requirements. The contractor shall provide the contracting officer's technical representative (COTR) free access to the source for the purpose of obtaining samples for testing. The size and grading of the rock shall be as specified in section 8.

Rock from approved sources shall be excavated, selected, and processed to meet the specified quality and grading requirements at the time the rock is installed.

When specified in section 8 or requested by the contracting officer, a gradation quality control check shall be made by the contractor and be subject to inspection by the COTR. The test shall be performed at the worksite in accordance to ASTM D 5519 Test Method B Size, Size-Range Grading, on a test pile of representative rock. The weight or size of the test pile shall be large enough to ensure a representative gradation of rock from the source and to provide test results within a 5 percent accuracy.

Based on a specific gravity of 2.65 (typical of limestone and dolomite) and assuming the individual rock is shaped midway between a sphere and a cube, typical size/weight relationships are:

Sieve size of rock	Approx. weight of rock	Weight of test pile
16 inches	300 pounds	6,000 pounds
11 inches	100 pounds	2,000 pounds
6 inches	15 pounds	300 pounds

The results of the test shall be compared to the gradation required for the project. Test pile results that do not meet the construction specifications shall be cause for the rock to be rejected. The test pile that meets contract requirements shall be left on the job site as a sample for visual comparison. The test pile shall be used as part of the last rock riprap to be placed.

**Filter or bedding aggregates** when required shall conform to Material Specification 521, Aggregates for Drainfill and Filters, unless otherwise specified. Geotextiles shall conform to Material Specification 592, Geotextile.

## 3. Subgrade preparation

The subgrade surface on which the rock riprap, filter, bedding, or geotextile is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it shall consist of approved material and shall conform to the requirements of the specified class of earthfill.

Rock riprap, filter, bedding, or geotextile shall not be placed until the foundation preparation is completed and the subgrade surface has been inspected and approved.

#### **4. Equipment-placed rock riprap**

The rock riprap shall be placed by equipment on the surface and to the depth specified. It shall be installed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying material. The rock for riprap shall be delivered and placed in a manner that ensures the riprap in place is reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks. Some hand placing may be required to provide a neat and uniform surface.

Rock riprap shall be placed in a manner to prevent damage to structures. Hand placing is required as necessary to prevent damage to any new and existing structures.

#### **5. Hand placed rock riprap**

The rock riprap shall be placed by hand on the surface and to the depth specified. It shall be securely bedded with the larger rocks firmly in contact one to another without bridging. Spaces between the larger rocks shall be filled with smaller rocks and spalls. Smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on its vertical edge except where it is laid like paving stone and the thickness of the rock equals the specified depth of the riprap course.

#### **6. Filter or bedding**

When the contract specifies filter, bedding, or geotextile beneath the rock riprap, the designated material shall be placed on the prepared subgrade surface as specified. Compaction of filter or bedding aggregate is not required, but the surface of such material shall be finished reasonably smooth and free of mounds, dips, or windrows.

#### **7. Measurement and payment**

**Method 1**—For items of work for which specific unit prices are established in the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest ton by actual weight. The volume of each type of filter or bedding aggregate is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. For each load of rock riprap placed as specified, the contractor shall furnish to the COTR a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

**Method 2**—For items of work for which specific unit prices are established in the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest 0.1 ton by actual weight. The quantity of each type of filter or bedding aggregate delivered and placed within the specified limits is computed to the nearest 0.1 ton. For each load of rock riprap placed as specified, the contractor shall furnish to the engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton. For each load of filter or bedding aggregate, the contractor shall furnish to the COTR a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

**Method 3**—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap and filter or bedding aggregate is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

**Method 4**—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap, including filter and bedding aggregate, is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, including filter and bedding. Such payment is considered full compensation for completion of the work.

**Method 5**—For items of work for which specific unit prices are established by the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest ton by actual weight. For each load of rock for riprap placed as specified, the contractor shall furnish to the COTR a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, including geotextile used for filter or bedding. Such payment is considered full compensation for completion of the work.

**Method 6**—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, including geotextile used for filter or bedding. Such payment is considered full compensation for completion of the work.

**All methods**—The following provision applies to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 8.

No separate payment is made for testing the gradation of the test pile. Compensation for testing is included in the appropriate bid item for riprap.

## **8. Items of work and construction details**

## **8. ITEMS OF WORK AND CONSTRUCTION DETAILS**

Items of work to be performed in conformance with this specification and the construction details therefore are:

Riprap shall be handled in such a manner as to avoid segregation as the various size fractions.

Pre-qualified sources for this material will be National Lime and Stone Company, Buckland Plant.

If the material is obtained from this source, no material certification is required.

### **Bid Item 13 Stone Type D Rip Rap**

This item shall consist of furnishing and placing riprap under the outlet pipe and at outlets of culverts for erosion control.

Riprap furnished under this bid item shall meet the gradation requirements of Type D, Section 601.07 of the State of Ohio, Department of Transportation, Construction and Material Specifications, January 1, 2005.

Measurement and payment shall be by Method 2.

### **Bid Item 14 Gravel Bedding**

This item will consist of furnishing and installing gravel backfill (#57, #67, or equivalent) where needed to stabilize soil conditions and tile drain grades.

Measurement and payment will be by Method 2.

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## Material Specification 521—Aggregates for Drainfill and Filters

### 1. Scope

This specification covers the quality of mineral aggregates for the construction of drainfill and filters.

### 2. Quality

Drainfill and filter aggregates shall be sand, gravel, or crushed stone or mixtures thereof. Aggregates shall be composed of clean, hard, durable, mineral particles free from organic matter, clay balls, soft particles, or other substances that would interfere with the free-draining properties of the aggregates.

Coarse aggregate may be crushed limestone or other material that has limestone particles included. Aggregates from crushed limestone shall be thoroughly washed and screened to remove limestone dust, limestone fines, and fine soil particles. For coarse aggregate containing limestone, the total portion finer than the No. 4 sieve shall not contain more than 3 percent by weight of limestone. Limestone shall not be used for fine aggregates except in combination with other material, such that not more than 5 percent of the portion finer than the No. 4 sieve shall be limestone.

Aggregates shall be tested for soundness according to ASTM Method C 88 and shall have a weighted average loss in 5 cycles of not more than 12 percent when sodium sulfate is used or 18 percent when magnesium sulfate is used.

### 3. Grading

Drainfill and filter aggregates shall conform to the specified grading limits after being placed or after being compacted when compaction is specified. Grading shall be determined by ASTM Method C 136. The percentage of material finer than the No. 200 sieve shall be determined by the method in ASTM Designation C 117.

### 4. Storing and handling

Drainfill and filter aggregates shall be stored and handled by methods that prevent segregation of particle sizes or contamination by mixing with other material.

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## Material Specification 548—Corrugated Polyethylene Tubing

### 1. Scope

The specification covers the quality of corrugated polyethylene tubing and fittings.

### 2. Tubing

Corrugated polyethylene tubing shall conform to the requirements of ASTM F 405, ASTM F 667, ASTM F 894, AASHTO M 252, or AASHTO M 294 for the appropriate tubing sizes and fittings.

### 3. Fittings

ASTM F 405	3-6 inch diameter pipe and fittings
ASTM F 667	8-, 10-, 12-, 15-, 18-, and 24-inch diameter pipe and fittings
ASTM F 894	18- to 120-inch diameter pipe and fittings
AASHTO M 252	3- to 10-inch diameter N12 pipe and fittings
AASHTO M 294	12- to 36-inch diameter N12 pipe and fittings