SECTION 303

EARTHWORK

I. GENERAL

1.1 DESCRIPTION OF WORK

The Contractor shall furnish all labor, supervision, material (except as herein provided), tools, equipment, supplies, and laboratory and field services; and, shall perform all Work necessary for earthwork in accordance with the requirements of these specifications and in conformity with the specified tolerances for the lines, grades, typical sections, and cross sections shown on the Drawings or as established by the Owner. Earthwork shall include regular, undercut, and minor structure excavation; placing fill and select material; disposing of surplus and unsuitable material; shaping; compacting; sloping; dressing; sheeting; bracing; shoring; trenching; bedding and back-filling; dewatering and temporary erosion and sediment control.

1.2 MATERIALS

Materials shall be furnished by the Contractor in accordance with Section 200.

1.3 SUBMITTALS

Submittals shall be made by the Contractor in accordance with the procedures set forth in Sections 105 and 200.3.

II. EXECUTION

Excavation shall be done in such a manner that there are no violations of the *Virginia Erosion and Sediment Control Handbook*, latest edition.

2.1 ROADWAY EARTHWORK

A. Loose rock 3-inches or larger shall be removed from the surface of cut slopes.

B. When slides occur, the Contractor shall remove and dispose of material as directed by the Owner.

C. Where required, surface ditches shall be cut on the top of slopes of excavation or at the foot of slopes of embankments and at such other points not necessarily confined to the right-of-way or shown on the Drawings, and shall be of such dimensions and grades as directed by the Owner.

D. Allaying dust shall be performed in accordance with the requirements of Section 511 and the Contract Documents.

E. Prior to the beginning of excavation, grading, and fill operations in any area, necessary clearing and grubbing in that area shall have been performed in accordance with the requirements of Section 301and the Contract Documents.

F. Regular Excavation

1. Regular excavation shall be unclassified and shall consist of removing, relocating and disposing of all material located within the construction limits, including widening cuts and shaping slopes necessary for preparing the roadbed and all related improvements; stripping topsoil; excavating to plan grade; cutting ditches, channels, waterways, intersections, approaches, entrances, sidewalks, hauling & disposing surplus materials; and performing other work incidental thereto. The Owner may require suitable materials in existing pavement structures to be salvaged for use on the project.

   Materials unearthed during regular excavation shall be considered as either suitable material or unsuitable material. Unsuitable materials shall be disposed of in a legal manner off-site unless otherwise specified in the Contract Documents or as directed by the Owner. Suitable materials shall be used during the prosecution of the work and as specified in the Contract Documents.

   If excavated materials deemed unsuitable by the Owner are requested by the Contractor to be considered as suitable or select material, the Contractor shall provide all required and requested laboratory reports and certifications necessary to show that the materials meet the conditions specified for suitable or select material in the Contract Documents, at no additional cost to the Owner. The Owner reserves the right to make final determination as to the suitability of the materials.

2. Balance points if shown on the Drawings are theoretical and may vary because of actual field conditions.

3. Undrained areas shall not be left on any surface of the roadway prism during construction. Excavation operations shall be conducted so that material outside limits of slopes will not be disturbed.

4. Excavated material acceptable for reuse in the project and contaminated by the Contractor by mixing or other means shall be disposed of and replaced by the Contractor at no expense to the Owner.

5. Stripping and Stockpiling Topsoil

   a. Topsoil shall be as specified in Section 602.

   b. The Contractor shall strip topsoil to whatever depth it may occur from areas to be excavated, filled, or graded. Topsoil designated on the Drawings for use in finish grading shall be stockpiled at a location approved by the Owner. The Contractor shall provide all necessary dust and erosion control measures at each stockpile.

   c. Stripping topsoil shall be confined to the area over which excavation is to be actively prosecuted within 15 days following the stripping operation. Excavation and fill construction shall be confined to the minimum area

necessary to accommodate the Contractor's equipment and work force engaged in the earth moving work.

d. Topsoil stockpiled for later use in the work shall be stored within the right-of-way unless the working area is such that the presence of the material would interfere with the orderly prosecution of the work. Stockpile areas outside the right-of-way shall be located by the Contractor at the Contractor's expense. Topsoil stripped from within the project limits and reused in the work shall be removed first from stockpiles located on private property. Surplus topsoil remaining on private property after completion of top soiling operations shall be either moved onto the right-of-way and stockpiled, shaped, and seeded, or disposed of off-site in a legal manner, as directed by the Owner.

e. The topsoil is the property of the Owner and shall not be used as backfill or removed from the site, unless otherwise authorized by the Owner.

6. Off-site source material shall not be used until all suitable on-site source material has been placed.

7. After excavation the surface shall be graded, shaped, and rolled to conform to the line and grade shown on the Drawings and in conformance with Section 305.

G. Undercut Excavation for Roadway Excavation

1. Undercut excavation shall be unclassified and shall consist of removing and disposing of unsuitable material located below plan grade, or finished subgrade, within the construction limits and in accordance with the Measurement and Payment section.

2. Undercut excavation shall be disposed of in a legal manner or as indicated in the Contract Documents.

3. Areas of doubtful quality, after cutting to the designated subgrade, shall be jointly examined by the Owner and the contractor, and doubtful material removed after agreement as to the extent of the area. Replacement with bedding stone or select material will be the decision of the Owner.

H. Demolition of Pavement, Structures and Base Removal for Areas in the Proposed Pavement

1. Demolition, grading and removal of the existing pavement structure and shoulders shall be completed prior to testing and stone base placement operations. Material encountered shall be unclassified and will include all materials encountered between back edge of proposed curbs or edge of proposed pavement, as shown on the Drawings, down to existing finished subgrade.

2. Cement-stabilized courses underlying existing pavement that are designated for demolition and are located 3 feet or less below the proposed subgrade shall be removed. Such courses within the proposed roadway prism that are located more than 3 feet below the proposed subgrade shall be removed or broken into particles

not more than 18-inches in any dimension, sufficiently displaced from their existing position to allow for adequate drainage, and kept in the roadway prism.

3. Driveways must be saw-cut as straight as possible prior to removal.

I. Demolition of Pavement, Structures and Base Removal For Areas Outside the Proposed Pavement

1. Removal of the existing pavement structure and shoulders in areas outside of the proposed new roadway cross-section, but within the construction limits and indicated as being removed on the plans shall be removed to a sufficient depth to allow installation of the design feature.

2. Should any additional pavement, either new or existing, be broken, undercut, or disturbed by the Contractor, other than where shown on the plans, that portion affected shall be completely removed to the extents determined by the Owner and replaced with the designated section at no additional cost to the Owner.

3. Driveways must be saw-cut as straight as possible prior to removal.

4. Those construction methods to be used in demolishing the existing pavement structure and to obscure the old roadway must be in accordance with VDOT Road and Bridge Specifications Section 508.02.

J. Backfill for Replacing Undercut Excavation

Backfill shall be select material or bedding stone as directed by the Owner.

K. Backfilling Openings Made for Structures

1. Backfilling shall be a part of the structure installation, complete in place, although the Owner may require that select material be used and obtained from off site or a source within the construction limits entirely apart from the structure. The opening to be backfilled shall be dewatered prior to backfilling. Backfill shall not be placed against or over cast-in-place box culverts or other structures until the top concrete slab section(s) has been in place 14 days, exclusive of days on which the average high-low ambient temperature is below 40 degrees Fahrenheit in the shade, or until the concrete control cylinder(s) has attained a compressive strength equal to 93 percent of the 28 day design compressive strength.

2. Backfill shall be compacted in horizontal layers not more than six-inches in thickness, loose measurement. Backfill shall be placed in a manner to deter impoundment of water and facilitate existing drainage.

3. Box culverts shall not be opened to construction equipment traffic until concrete has attained 100 percent of the 28-day design compressive strength and has a backfill cover of at least four feet unless otherwise indicated in the Contract Documents or approved by the Owner. The minimum height of backfill cover required to protect pipe culverts from construction equipment shall be in accordance with the Contract Documents.

4. Where backfill can be deposited on only one side of abutments, wingwalls, piers, or culvert headwalls, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause overturning or excessive pressure against the structure. When backfill is to be placed on both sides of a concrete wall or box structure, operations shall be conducted so that the fill is always at approximately the same elevation on both sides of the structure.

5. Openings subject to flooding shall be backfilled as soon as practicable or when directed by the Owner.

L. Fill Operations

1. Construction shall include but not be limited to: constructing roadway, constructing embankments, roadbed areas including preparing areas upon which they are to be placed; hauling, placing, compacting and grading excavated material, or select material where unsuitable material has been removed; and, placing and compacting fill or select material in holes, pits, and other depressions within the construction area.

2. Fill material shall be approved material either excavated on-site or brought to the site, and placed so as to be uniformly compacted throughout. Fill material shall not be placed on frozen ground or areas covered with ice or snow.

3. The Contractor shall schedule excavation and fill work in a manner that will minimize the quantity of material for which more than one handling is required prior to final placement. The provisions for additional payment for each rehandling of material specified in the Measurement and Payment Section will not apply to placing surplus materials for widening embankments and flattening embankment slopes.

4. Fill materials to be placed over swampy areas that will not support the weight of hauling equipment may be constructed by end dumping successive loads in a uniformly distributed layer of a thickness capable of supporting the hauling equipment while subsequent layers are placed. The nose, or leading edge, of the fill material shall be maintained in a wedge shape to facilitate mud displacement in a manner that will prevent its entrapment in the fill material. The front slope of the fill material shall be maintained steeper than 2:1. The use of compacting equipment will not be required on the original course. However, the remainder of the fill material shall be constructed in layers and compacted in accordance with the requirements of these specifications.

5. When fill material is to be placed and compacted on an existing road, the surface shall be scarified to such degree as will permit an ample bond between old and new material. Hydraulic cement concrete and asphalt concrete pavement structures within the proposed roadway prism shall be demolished in accordance with the requirements of VDOT Section 508.

6. Where embankments are constructed one-half width at a time or against slopes of existing embankments or hillsides, or where the roadway embankment crosses existing embankments, hillsides, and depressions at a skew angle of 30 degrees or

more and the existing slopes are steeper than 4:1, existing slopes shall be continuously benched over such areas. For slopes steeper than 4:1 but not steeper than 1 1/2:1, the bench shall be at least 6 feet in width. For slopes steeper than 1-1/2:1 but less than 1/2:1, the bench shall be at least 4 feet in width. Benching shall consist of a series of horizontal cuts beginning at the intersection with the original ground and continuing at each vertical intersection of the previous cut. Material removed during benching operations, if used, shall be recompacted as specified herein along with the new embankment material.

7. Fill material shall be placed in successive uniform layers not more than eight-inches in thickness over the entire roadbed area, loose measure. Each layer shall be compacted at optimum moisture, within a tolerance of $\pm$20 % of optimum moisture content, to a density of at least 95 % as compared to the theoretical maximum density at optimum moisture content as defined in ASTM D 698, Standard Proctor Test.

8. Material having moisture content above optimum by more than 30 % shall not be placed on a previously placed layer for drying unless it is shown that the layer will not become saturated by the downward migration of moisture to the material.

9. Field density determinations will be performed in accordance with the requirements of AASHTO T191, T205, or T214, modified to include material sizes used in the laboratory determination of density, with a portable nuclear field density-testing device or by other approved methods. When a nuclear device is used, density determinations for fill material will be related to the density of the same material tested in accordance with the requirements of VTM-1 or VTM-12, and a control strip will not be required.

10. As the compaction of each layer progresses, continuous leveling and manipulating will be required to ensure uniform density. Prior to placement of subsequent layers, construction equipment shall be routed uniformly over the entire surface of each layer or the layer shall be scarified to its full depth in the area where the equipment is routed and recompacted.

M. Settlement Plates and Surcharge

1. Settlement plates shall be placed where shown on the Drawings and where directed by the Owner. The Contractor shall expedite construction of embankments, surcharge loads, and fill areas to provide the maximum time possible for settlement prior to completing grading operations.

   Fill material quantities will be adjusted as specified to include extra fill for subsurface consolidation.

2. Settlement Plates

   a. The base of settlement plates shall be firmly seated into original ground for the full depth of the steel fins. The base shall be leveled. The Owner shall be provided sufficient time to obtain the elevation of the seated base and the top elevation of the pipe extensions prior to placement of material. Pipe

extensions shall be not more than four-feet in length and shall be installed vertically as the fill material is constructed such that the top of the pipe is not covered. As each extension is added, the Owner shall be provided time to obtain the top elevation of the existing pipe and the top elevation of the new pipe extension. Pipe extensions shall be properly flagged at all times. Care shall be taken while placing and compacting fill material around pipe extensions. Settlement plates shall be maintained until no longer required, as determined by the Owner. Upon completion of placement of the normal roadway fill material plus two-feet of the specified surcharge, the Contractor shall immediately commence placing the remaining surcharge material to the limits shown on the Drawings or as directed by the Owner. The remaining surcharge material shall be placed in lifts of not more than one-foot in depth and compacted uniformly with construction hauling and spreading equipment. Each lift shall be completed over the entire surcharge area before the next lift is begun.

b. If an extension pipe is damaged, the Contractor shall immediately notify the Owner and promptly repair it under the observation of the Owner. Contractor shall remove and replace all damaged pipe. Excavation, removal of pipe sections, backfill, compaction, and repair of settlement plates and pipe extensions shall be at the Contractor's expense. The Owner shall be provided time to obtain the top elevation of the undamaged connection and the top elevation of each subsequent pipe extension.

c. Settlement plates shall remain in place until settlement has been completed as indicated by elevation readings taken by the Owner. Evaluation of the readings by the Owner will be the final and sole governing factor for releasing materials for grading operations. Upon written release by the Owner, extensions of settlement plate pipe shall be removed to at least two-feet below the subgrade, the pipe capped, and the area backfilled and compacted.

3. Surcharge

When authorized by the Owner, surcharge material shall be removed to the subgrade and embankment slopes graded to the typical section. Removed surcharge material shall be placed as directed in areas not previously brought to grade or shall be disposed of in accordance with the Contract Documents.

N. Geotextile Fabrics for Roadbed Stabilization

1. Geotextile fabrics shall be placed where shown on the Drawings, except in utility trenches where cut through existing pavement, and where directed by the Owner.

2. Fabric shall be wrapped in an ultra-violet protective wrapping, stored off of the ground, kept in a dry condition, and maintained in accordance with Section 200.

3. Fabric shall be laid in the direction of traffic. Fabric shall be overlapped with adjacent rolls a minimum of 18-inches both side-to-side, and end-to-end. At the option of the Contractor, overlaps may be reduced to four-inches if the adjacent

fabric panels are sewn or stapled together in accordance with the manufacturer's recommendations.

4. Installation shall be in conformance with the manufacturer's guidelines. Install after final preparation of compacted subgrade, and after all utility installations; after completion and acceptance of testing; and, just prior to installation of the aggregate base.

O. Surplus Material

1. Upon satisfactory completion of all earthwork operations, all unused excavated material and select material shall be considered surplus material and shall be disposed of legally off site, unless directed otherwise by the Owner, or as specified in the Contract Documents.

2. Wherever sufficient right-of-way exists and when approved in advance in writing by the Owner, surplus materials may be used to widen embankments and flatten slopes, as directed by the Owner, and shall be placed in uniform layers of not more than 18-inches in thickness before compaction. Each layer of material placed shall be compacted to the extent necessary to produce uniform, stable, and even slopes.

2.2 TRENCHING, BACKFILLING, AND COMPACTING

A. Existing Utilities

1. The Contractor shall be responsible for anticipating and locating underground utilities and obstructions in accordance with the requirements of Section 105.9.2.

2. Before the initiation of any trenching work, the Contractor shall locate all existing utilities, culverts, and other structures. Work shall be coordinated with affected utility companies. Contractor shall contact MISS UTILITY at **(811)** before excavation begins.

3. When construction appears to be in close proximity to existing utilities, the trench (es) shall be opened a sufficient distance ahead of the work or test pits made to verify the exact locations and inverts of the utility to determine if changes in line or grade are required for the new work.

4. Protect, maintain in service, and prevent damage to utilities not designated to be removed.

5. When utilities are encountered and are not shown or are different from that shown on the Drawings, notify the Owner for instructions before proceeding.

6. All existing pipes and structures indicated on the plans to be removed that are not within the trench excavation limits of proposed trenching shall be removed, backfilled, and compacted.

7. The Contractor should be aware that in some instances buried cables, gas lines, water lines, etc., two-inches and smaller in diameter may have to be excavated by hand and

slightly relocated to facilitate construction of the pipeline under this contract. This shall be considered incidental to the work, and shall be performed at no additional cost to the Owner.

8. Should the location of any pipe or conduit greater than two-inches in diameter, pole, or other structures, above or below the ground be such that in the opinion of the Owner or his representative its removal, realignment, or change will be required due to work to be performed under this Contract, the removal, realignment, or change will be done as a Change Order, or will be done by the Owner of the obstructions, without cost to the Contractor. The Contractor shall maintain at his own expense the structures until such removal and before and after such realignment or change. The Contractor shall not be entitled to any claim for damages or extra compensation because of the presence of said structure, or because of any delay in the removal or relocation of the same.

B. Trench Sheeting and Shoring

1. The Contractor shall install all sheeting, bracing, and shoring necessary to perform the Work, protect workers, and allow for inspections by the Owner in accordance with all federal, state, and local laws.

2. Where trenches are open in the vicinity of pedestrian or vehicular traffic travel lanes, suitable barriers will be constructed and maintained.

3. The Contractor shall conduct all work to provide for adequate drainage of the construction area and adjacent areas affected by construction through temporary ditching, piping, or other means as may be appropriate and approved. Existing drainage shall not be impeded by construction operations.

4. Sheeting, bracing, or shoring shall be used by the Contractor as needed to protect the Work or as shown on the Drawings. Sheeting and shoring not specifically shown on the plans as to remain shall be continuously removed when the Work is completed in a given area.

5. Should it be determined that removal of sheeting and/or shoring in excavated areas might endanger adjacent properties or structures, the Owner may direct that the sheeting and/or shoring be left in place. In such instances, sheeting will be cut off at least two feet below finished grade and left in place.

C. Trenching - General

1. All trenching work shall be open cut unless indicated on the Drawings and shall conform to the lines and grades shown on the Drawings. Excavation conducted by the Contractor below the established grades shall be backfilled with VDOT No. 57 stone and compacted at the Contractors expense.

2. The bottom of the trench shall be carefully finished to provide a trough which will permit the barrel of the pipe to be in direct contact with the ground surface throughout the entire pipe length on undisturbed earth or bedding, as required.

3. Dry conditions shall be maintained within the trench at all times using appropriate construction and dewatering methods. Pipe trenches shall remain dry until the pipe sections have been connected, inspected, backfilled, and any concrete structures have been installed.

4. If rock is encountered at the plan grade of trench excavation, it shall be removed to a depth of no less than six-inches and replaced with VDOT No. 57 stone.

5. Remove from the project site and dispose of material unsuitable for backfill, trash, and excess material continuously during the progress of the Work. Keep pavement and adjacent areas clean and free of mud, dirt, and debris at all times.

D. Undercut Excavation for Trenching

1. In the event unsuitable material is encountered at or below the level of the pipe bed, areas of doubtful quality shall be jointly examined by the Owner and the Contractor. If approved by the Owner and after agreement as to the extent of the area, such material shall be removed and replaced. Materials used for replacement shall be crushed stone or gravel aggregate conforming to VDOT No. 57 stone, as directed by the Owner.

2. Undercut excavation shall be unclassified and shall consist of removing and disposing of unsuitable material located below plan grade, or finished subgrade, within the construction limits and in accordance with the Measurement and Payment section.

3. Undercut excavation shall be disposed of in a legal manner or as indicated in the Contract Documents.

4. The Contractor's particular attention is called to the fact that materials required for replacement of or stabilizing unsuitable bearing will not be authorized for payment by the Owner to correct conditions which have resulted from the Contractor's negligence, or from work during wet weather or other wet trench conditions resulting from the Contractor's choice of methods or from working during adverse weather conditions. The Contractor will be paid for stabilizing bearing only when it can be shown that unsuitable bearing conditions existed prior to excavation and when the Owner determines that a payment authorization is justified.

E. Trench Bedding and Backfilling

1. Backfilling operations shall be conducted using approved material once the pipe installation has been approved by the Owner and appropriate as-built information is recorded by the Contractor. All excavated material shall be considered unclassified regardless of the material encountered.

2. Pipe shall be bedded in accordance with the Drawings. Bedding materials shall be crushed stone or gravel aggregate conforming to VDOT No. 57 stone, or as otherwise specified and shown on the Drawings.

3. Where, in the field, trench excavation material is deemed suitable by the owner, this material shall be used for backfill. Where, in the field, trench excavation material is

deemed unsuitable, the Contractor shall provide and install a select material or other approved material as directed by the Owner.

4. Backfill material shall be solidly compacted on both sides of the pipe in six-inch layers up to at least one foot above the top of the pipe. The maximum size stone in the first foot of backfill shall not exceed one-inch in diameter. The remainder of the backfill material shall be deposited and compacted by mechanical equipment in layers not exceeding one foot in thickness, loose measure. The maximum size stone in this portion of the trench shall not exceed two-inches in diameter.

5. In areas where paving is to be placed over the backfilled trench, the entire depth of backfill shall be deposited in six-inch layers, loose measure, and compacted.

6. Flooding with water to achieve compaction shall not be permitted.

7. Compact each layer of trench backfill material not less than the following percentages at the maximum density as determined in accordance with VTM-1:

   a. 95 percent beneath and within 25 feet of buildings and structures, including those shown for future consideration;

   b. 95 percent beneath pavement, walks, and road shoulders, including those shown for future construction;

   c. 90 percent in other, unpaved areas.

   d. The Owner reserves the right to provide testing by an independent testing firm to assure compliance with these specifications for compaction of backfill. Failing test results shall be carefully reviewed with the Contractor and proper remedial actions, including retesting, shall be taken by the Contractor at no additional cost to the Owner.

   e. Compaction density testing for pipeline installations shall be performed at the direction of the Owner, or the Owner's representative, at an average frequency of once every 300 linear feet of pipe. The number of tests at each location shall be based upon the trench width and the number of lifts (loose measure), as follows:

Trench Width			
Lifts	< 4 feet	4 feet < 7 feet	> 7 feet
Initial lift	One on each side of the pipe		
<= 12–inch lifts	Every other lift	Every other lift @ 1/3 point of trench width	Every other lift @ 1/4 point of trench width

   f. Pavement subgrade and shoulders shall be compacted to densities up to 100 percent in accordance with Section 305.

F. Restoration - General

Restoration of the areas affected by the Work shall be returned to a condition of a quality equal to or better than the conditions existing prior to the commencement of construction.

G. Pavement Removal for Placement of Pipelines:

1. The Contractor shall furnish all labor, materials, and equipment necessary for the removal and replacement of all pavement where shown or specified on the Drawings. All existing pavement shall be saw-cut, unless otherwise approved by the Owner, in a straight line parallel to the Work in progress. Final pavement replacement shall be in accordance with the requirements of the Contract Documents.

2. Upon completion of the backfilling operations, the street surface damaged or destroyed shall be promptly placed in a condition safe for temporary use as determined by the Owner. The minimum requirements for a temporary surface shall be eight-inches of crushed stone laid to the original line and grade and thoroughly compacted; six inches of crushed stone with 3 inches of cold asphalt mix; or as otherwise indicated in the Contract Documents. The Contractor shall maintain the temporary surface in a safe and dust free condition until final pavement is applied and shall hold the Owner harmless from damages from his failure to do so.

2.3 TOLERANCES

Finish Grade and Slopes

A. The finished grade of the top of earthwork shall be no more than 0.10 foot above or below the plan grade.

B. Slopes shall be graded in the following manner:

1. Slopes steeper than 2:1 shall be grooved and shall not deviate from the theoretical plane surface by more than 0.5 feet.

2. Slopes steeper than 3:1 up to and including 2:1 shall be rough graded in a manner to provide horizontal ridges and grooves having an average deviation of between 6-inches and 12-inches from the theoretical line of the typical cross section as is accomplished by the normal operation of heavy grading equipment.
3. Slopes 3:1 and flatter shall be uniformly finished and shall not deviate from the theoretical plane surface by more than 0.10 feet.

III. MEASUREMENT FOR PAYMENT

A. Excavation

1. Regular Excavation

a. Where payment is specified on a cubic yard basis, regular excavation will be based on plan quantities, and shall be measured by cross-sectioning the plan

excavation area. Volumes will be computed from cross-section measurements shown on the Drawings by the average end-area method. Undercut excavation will not be included in regular excavation.

b. When there are authorized deviations from the lines, grades, or cross-sections, measurements will be made and the volume computed in cubic yards by the average end-area method. The plan quantity will then be adjusted to include quantities for payment. Deviations due to unsuitable material will be measured separately and are not to be included in this paragraph.

c. Excavation for benching slopes to accommodate roadway embankments will not be measured for separate payment.

d. Excavation of all material down to the plan subgrade, except for existing pavement, will be measured as regular excavation.

e. Excavated material, with the exception of topsoil (Class A) stockpiled on the project site, requiring more than one handling prior to final placement will be paid for at the unit price bid for regular excavation for each handling approved by the Owner. If there is a pay item for the second handling, the work will be paid for at this specified unit price. If there is no pay item specifically for additional handling, no payment will be made for more than one handling.

f. Payment will be made at the unit price bid per cubic yard, square yard, or lump sum, as indicated on the Bid Form.

2. Pavement Demolition, Base Removal, and Grading for Areas in the Proposed Pavement

a. Scarifying, saw cutting, grading, and base removal within the area to receive new pavement will be measured in square yards and will be measured from the edge of existing surface to edge of existing surface to be removed and shall extend to the surface of the existing subgrade.

b. Payment will be made at the unit price bid per square yard per depth of the pavement and base material encountered.

3. Pavement Demolition, Base Removal, and Grading for Areas outside the Proposed Pavement

a. Scarifying, saw cutting, grading, and base removal, outside the area to receive new pavement, will be measured in square yards.

b. Payment will be made at the unit price bid per square yard per depth of the pavement and base material encountered.

4. Demolition of Existing Curb and Gutter

Demolition of existing curb and gutter shall be measured and paid by the linear foot.

5. Demolition of Existing Structures and Pipe Removal

   a. Demolition of existing structures, other than where deemed as unclassified excavation, shall be measured and paid as each, or will be considered incidental to other areas of Work, if not indicated as a separate pay item on the Bid Form.

   b. Removal of pipe shall be measured and paid per linear foot or will be considered incidental to other areas of Work, if not indicated as a separate pay item on the Bid Form.

   c. Removal of sidewalk shall be considered incidental or measured and paid per square yard, as indicated on the Bid Form.

   d. Removal of driveways shall be considered incidental or measured and paid per square yard, as indicated on the Bid Form. See Sections 305 (Gravel), 315/315A (Asphalt), and/or 502 (Concrete) for driveway replacement measurement and payment.

6. Undercut Excavation

   a. Measurement will be made by cross-sectioning the undercut area. The number of cubic yards will be computed by the average end-area method. When it is impractical to measure material by the average end-area method because of erratic location of isolated deposits, a mutually acceptable method of measurement may be used.

   b. When unsuitable material must be removed from an area of the project where undercut is not shown on the Drawings, it shall be measured from the bottom of the plan excavation, per cubic yard.

   c. Payment will be made at the unit price bid per cubic yard.

B. Fill Operations

1. If fill material is a pay item and regular excavation is to be paid for on a plan quantity basis, the quantity of fill material for which payment will be made will not be measured separately but will be computed in accordance with the following:

   a. The actual quantity of suitable material excavated and used on the project.

   b. The quantity of unsuitable material will be measured and subtracted from the adjusted regular excavation quantity. Quantities computed from the plan dimensions will be used for unsuitable material removed from fill areas or below the normal top of earthwork in cut areas and will be adjusted for deviations based on actual measurement. Actual dimensions will be used to determine the quantity of any unsuitable material.

c. The Contractor shall be responsible for determining the effect of any shrinkage or swell factor of the material, and no adjustment will be made in pay quantities for this factor.

d. Backfill of undercut excavation, in roadways, shall be measured based on the cubic yard of material placed; or, ton (based on actual measurement or delivery certificates), as approved by the Owner.

e. Select and suitable material backfill will be measured based on the cubic yard of material suitably placed.

f. Backfill of openings for structures will not be measured nor be a pay item.

g. Topsoil (Class B) will be measured per Section 602. Class A topsoil will be required as regular excavation.

h. Payment will be made at the unit price bid per cubic yard.

2. When fill material is a pay item and regular excavation is to be paid for on the basis of measured quantities, the quantity of fill material will be measured by the cubic yard and computed by the average end-area method from the dimensions of the fill material cross-section.

   Cross-sections of the area to be covered by fill material will be taken after the denuding or removal of unsuitable material and before any material is placed thereon. These cross-sections shall extend laterally from the centerline to the toes of slopes as indicated on the typical cross-section. The elevations as determined by these sections will be considered the original ground line. The pay quantity to be measured will be the volume of material included, to the section above the original ground, and below the upper limits of the typical cross-section, except that when regular excavation is a pay item, the area to be cross-sectioned will exclude that portion of the fill material constructed from regular excavation. Material outside the limits of typical cross-sections, as shown on the Drawings, will not be measured nor paid for separately.

3. Settlement plates, to include all pipe extension and all other items pertinent and necessary for settlement plate use, will be measured and paid as each, complete-in-place, cut-off two-feet below grade, unless otherwise specified. This price shall include extensions of settlement plate pipe and the cost of removal to two-feet below the subgrade, the pipe capped, and the area backfilled and satisfactorily compacted.

4. Surcharge placement and removal, complete, will be measured and paid in cubic yards, computed by the average end-area method, using plan quantities and adjusted as defined herein. The price shall include furnishing, placing, compacting, and removing surcharge material and disposing of surplus and unsuitable materials.

5. Geotextile fabric for roadway, if used, will be measured and paid per square yard of area satisfactorily covered. This price shall include furnishing, installing, lapping, securing, and placing the material, complete-in-place. Overlaps will not be measured nor paid for separately.

C. Trenching Operations

1. Trench excavation and native backfill shall not be measured nor paid for separately but shall be included in Storm Sewer (Section 302), Water Main (Section 801), Sanitary Gravity Sewer (Section 802), and Force Main (Section 803) measurements and payments, as indicated in their respective sections.

2. If the Contractor excavates, by error or intent, beyond the required depth, no measurement of excavation beyond the required depth will be made.

3. Sheeting, bracing and shoring left in place, when directed by the Owner, shall not be measured separately, but shall be paid for at a lump sum price based on the sales price of comparable material paid for by the Contractor, as evidenced by invoices, plus 15 percent. No other costs or charges will be considered, measured, or paid for under this bid item.

4. In pipe trenches, undercut excavation below the plan trench bottom will be measured and paid in cubic yards as computed by using the average end-area method. Use the tables found on Standard Detail EW-01 and EW-03 for allowable dimensional data.

5. Backfilling for undercut excavation shall be paid for at the unit price bid per cubic yard or ton, as indicated on the Bid Form, and shall include the cost for hauling and disposal of unsuitable material.

6. When select fill is required by the Owner, material shall be measured by the cubic yard or tons as indicated on the Bid Form and in accordance with Standard Detail EW-03. The unit price shall include the cost for hauling and disposal of unsuitable material. Tonnage for backfill material shall be computed using the unit weights of materials with the volumes derived in accordance with Standard Detail EW-02 and Standard Detail EW-03.

D. Erosion Control Items

Erosion and sediment control items will be bid and paid as a collective lump sum item, or per the individual items identified below and in accordance with the Bid Form.

1. The costs for all temporary erosion and siltation control measures shall include installation, maintenance, repair and replacement, and disposal of any and all accumulated silt and the erosion and siltation control measures themselves, upon satisfactory completion of the Work.

2. Limiting the scope of construction operations, shaping the top of earthwork, and constructing temporary earth berms for temporary erosion and siltation control, will not be measured for payment but shall be included in the price for other appropriate pay items.

3. Erosion control rip-rap (dumped rock excavation) will be measured and paid by the ton or in square yards of surface area, complete in place, as indicated on the Bid form.

4. Check dams (log, rock or baled straw) and silt settlement boxes will be measured and paid at the unit price per each check dam or silt sediment box installed and maintained, complete in place.

5. Temporary silt fences will be measured and paid in linear feet, complete-in-place. This price shall include furnishing and installing the fence; maintaining, removing, and disposing of the fence; periodic removal of accumulated silt; and, dressing the area.

6. Geotextile fabric attached to brush barriers or existing fence or used for another function specified on the Drawings and not included in other pay items will be measured and paid in square yards, complete-in-place, excluding laps. This price shall include trimming the brush barrier; furnishing, installing, maintaining, and removing the fabric; and, dressing the area. The brush barrier will not be measured for payment; the cost thereof shall be included in the price for clearing and grubbing.

7. Temporary filter barriers will be measured and paid in linear feet, complete-in-place, excluding laps. This price shall include furnishing, installing, and maintaining the filter barrier; removal and disposal of the filter fabric; periodic removal of accumulated silt; and, dressing the area. Decomposed or ineffective geotextile fabric replaced after six months from the installation date and decomposed or ineffective burlap fabric replaced after three months from the installation date, will be measured in linear feet of temporary filter barrier and paid for at one-half the unit price bid for temporary filter barrier. Decomposed geotextile fabric required to be replaced prior to six months and decomposed burlap fabric required to be replaced prior to three months after installation will not be measured for payment. When permitted, baled straw silt barriers used in lieu of temporary filter barriers will be measured and paid for in linear feet of temporary filter barrier, complete-in-place.

8. Temporary erosion and siltation control measures required to correct conditions created because of the Contractor's negligence, carelessness, or failure to install temporary or permanent controls in accordance with the Contract Documents, and sequence for performance of such work will not be measured for payment.

9. Sediment basins will be measured and paid in cubic yards of sediment basin excavation. This price shall include excavation, maintenance and backfill, or removing to original ground when no longer needed.

10. Slope drains will be measured and paid in units of each, per location, regardless of size or length. This price shall include furnishing, installing, maintaining and removal of the drain and end section or portable flume. Raising of the slope drain and addition of pipe lengths will not be measured nor considered as a new location.

11. Inlet protection will be measured and paid, complete-in-place, in for each type of protective device specified, including stone, wire mesh, sod, concrete block, or silt fence, as specified. This price shall include furnishing, installing, maintaining and removing the filter barrier; wire reinforcement; disposing of the filter fabric; periodic removal of accumulated silt; and, dressing the area.

12. Siltation control excavation for sediment traps and basins shall be measured and paid at the unit price bid per cubic yard and computed using the average end-area method. The price shall include excavation and disposal of accumulated silt.

13. Construction entrances shall be measured and paid as each, independent of size or area. This price shall include furnishing and installing stone; maintaining and backfill, or removing to original ground when no longer needed; and dressing the area.

E. Surplus material shall not be measured for separate payment.

End of Section