

## 200 EARTHWORK

### ITEM 201 CLEARING AND GRUBBING

- 201.01 Description**
- 201.02 General**
- 201.03 Clearing and Grubbing**
- 201.04 Scalping**
- 201.05 Method of Measurement**
- 201.06 Basis of Payment**

**201.01 Description.** This work shall consist of clearing, grubbing, scalping, removal of trees and stumps, and removing and disposing of all vegetation and debris within the limits of the right-of-way and easement areas, except such objects that are to remain or are to be removed in accordance with other sections of these specifications. When the bid schedule contains a lump sum for 201 Clearing and Grubbing, the lump sum price bid will be paid and shall be full compensation for all the work described in this section, including removal of all trees and stumps marked for removal. When the bid schedule contains 201 Removal of Trees and Stumps on an individual basis, the balance of the work described in this section shall be performed but will not be paid for directly, but shall be considered as a subsidiary obligation of the Contractor under other contract items.

**201.02 General.** The Engineer shall exercise control over clearing and grubbing and shall designate all trees, shrubs, plants, and other objects to be removed. This work shall also include the preservation from injury or defacement of all vegetation and objects to remain. Paint required for cut or scarred surfaces of trees or shrubs selected for retention shall be a suitable asphaltum base paint.

Before the Contractor removes any tree or stump which the plans state is to be removed, the Engineer shall review the plan requirements and appropriately mark each tree or stump which is to be removed. Only such trees and stumps which have been marked for removal by the Engineer shall be removed.

Limitations of areas of clearing and grubbing and earthwork operations shall be in accordance with 108.04 and 207.

**201.03 Clearing and Grubbing.** All surface objects, brush, roots and other protruding obstructions not designated to remain and all trees and stumps marked for removal shall be cleared and/or grubbed, including mowing, as required. In locations which will be a minimum of 3 feet below the slope of embankment, the Contractor

#### 201.04

may leave undisturbed stumps and roots and nonperishable solid objects, provided they do not extend more than 6 inches above the existing ground surface.

In all other areas, trees and/or stumps up to and including 24" diameter shall be removed to a minimum of 12 inches below the proposed finish grade. Trees and/or stumps greater than 24" diameter and any roots within 12 inches of the tree or stump's periphery shall be removed to a minimum of 24 inches below the proposed ground surface.

All roots beyond 12 inches of the tree trunk or stump's periphery, regardless of the distance away, shall be removed to a depth of 6 inches below the proposed ground surface.

Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable material and compacted in accordance with 203.10.

Materials and debris removed from the right-of-way may be disposed of at locations off the project with the written permission of the property owner on whose property the materials and debris are placed. The Contractor shall make all necessary arrangements with property owners for obtaining suitable disposal locations and the cost involved shall be included in the unit price bid. The Contractor shall comply with all applicable laws, regulations, permit requirements, etc. Of the authority having jurisdiction over the dump site.

Low hanging branches and unsound or unsightly branches on trees or shrubs within the right-of-way which are designated to remain shall be removed as directed. Branches of trees extending over the roadbed shall be trimmed to give a clear height of 20 feet above the pavement surface or as directed by the Engineer.

**201.04 Scalping.** The Contractor shall scalp areas where excavation or embankment is to be made, except that areas need not be scalped where the embankment to be constructed is 4 feet or more in height to subgrade elevation. Scalping shall include the removal of material such as roots, sod, grass, residue of agricultural crops, sawdust, and decayed vegetable matter from the surface of the ground.

Areas on resurfacing and widening projects which do not support new pavement and do not involve new ditch or sidewalk construction shall be cleared of weeds and brush, but need not be scalped prior to placement of embankment required to build up the shoulder.

Sod and incidental topsoil removed in the scalping operation shall be salvaged and stockpiled for use as specified in 203.04(e). The stockpiles of scalping shall be made in such a manner and at such locations that they will be well drained and will not impound water.

The depth of scalping performed under this section is not intended to include topsoil. Additional depth of material which is required to be removed over and above scalping operations as described in this section shall be measured and paid for at the contract unit price bid per cubic yard for 203.

**201.05 Method of Measurement.** Measurement will be by one of the following alternate methods:

- (a) Lump Sum Basis. When the bid schedule contains a Clearing and grubbing "lump sum" item, no measurement of area will be made.
- (b) Individual Unit Basis. The diameter of trees will be measured at a height of 54 inches above the ground for a single stem tree. Multiple stem trees will be measured at a height of 54 inches above the ground using the following formula: The largest trunk diameter plus 70 percent of the sum of the remaining trunk diameters. Trees with a single stem but are multiple branching at less than 54 inches above the ground will be measured at the narrowest point between the root flare and the branch flare. See Figure 201-1.

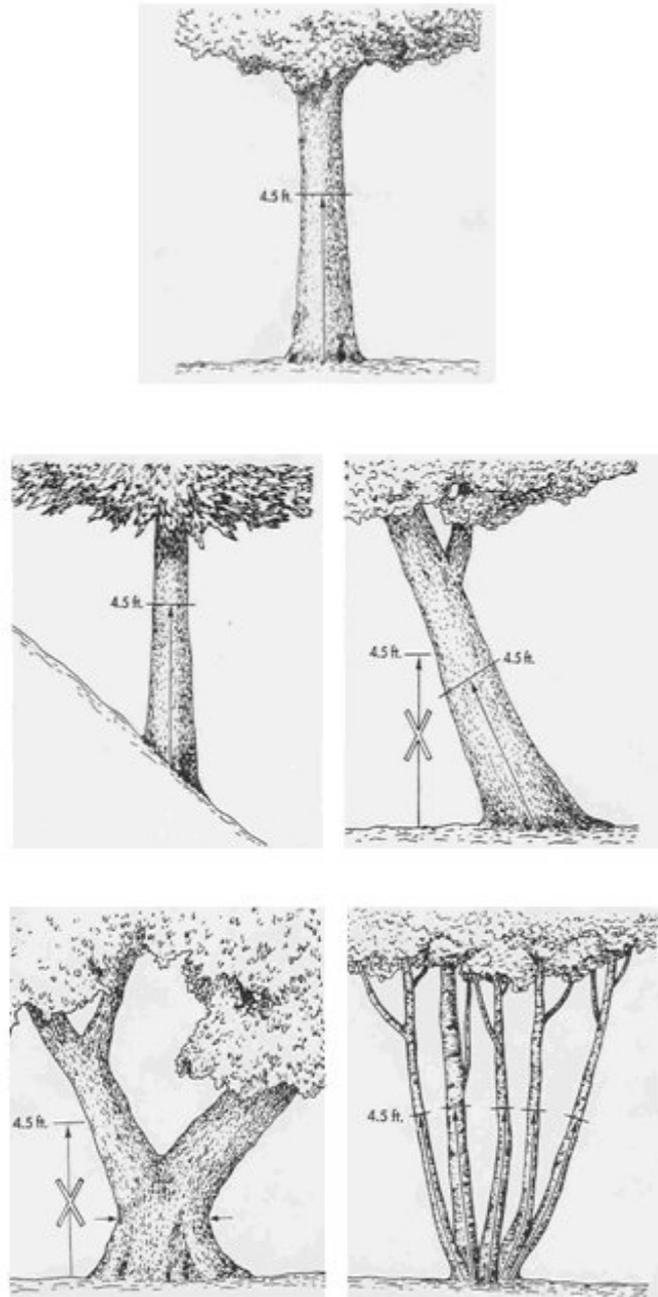


Figure 201-1

Removal of trees or stumps less than 12 inches in diameter will not be paid. Stumps will be measured by taking the average diameter at the cutoff. When the bid schedule indicates measurement by individual unit basis, trees or stumps will be designated and measured in accordance with the following schedule of sizes:

<b>Diameter</b>	<b>Pay Item Designation</b>
12 inches to 24 inches	18 inch
Over 24 inches to 36 inches	30 inch
Over 36 inches to 60 inches	48 inch
Over 60 inches	60 inch

Tree removal shall include removal of the stump to a depth of 12 inches.

**201.06 Basis of Payment.** Payment for accepted quantities will be made at the contract price for:

<b><u>Item</u></b>	<b><u>Unit</u></b>	<b><u>Description</u></b>
201	Lump Sum	Clearing and grubbing
201	Each	Stumps removed, ____ inch
201	Each	Trees Removed, ____ inch

## **ITEM 202 REMOVAL OF STRUCTURES AND OBSTRUCTIONS**

**202.01 Description**

**202.02 Construction Requirements**

**202.03 Bridges, Culverts and Other Drainage Structures Removed**

**202.04 Pipe Removed**

**202.05 Pavement, Walks, Curbs, etc. Removed**

**202.06 Buildings Removed**

**202.07 Underground Storage Tanks, Septic Tanks and Vaults Removed or Abandoned**

**202.08 Guardrail and Fence Removed**

**202.09 Manhole, Catch Basin and Inlet Removed**

**202.10 Manhole, Catch Basin and Inlet Abandoned**

**202.11 Pipe Abandoned**

**202.12 Method of Measurement**

**202.13 Basis of Payment**

**202.01 Description.** This work shall consist of the removal, wholly or in part, and satisfactory disposal of all buildings, fences, guardrails, structures, old pavements, abandoned pipe lines, storage tanks, septic tanks, vaults, and any other obstructions which are not designated or permitted to remain, except for the

## 202.02

obstructions to be removed and disposed of under other items in the contract. It shall also include the salvaging and storage within the project limits of designated materials and backfilling the resulting trenches, holes, and pits. Removal of structures and obstructions as set forth in this section shall be performed under Item 203 Grading or under the item of work which necessitates such removal, unless specific pay items are noted on the plans and listed in the Proposal.

Any and all material being removed in conjunction with an improvement, renovation, remodeling and addition to City-owned property is subject to the following provisions:

- a. The Contractor and Subcontractor shall inform the Engineer when salvageable material is removed and available for inspection to determine if the respective item(s) shall be retained by the City.
- b. If the material(s) are determined to be salvageable, the City has three days, unless additional time for removal is requested, in which to claim and remove any such items, during which time the Contractor shall store the materials at locations determined by the Engineer. If the material is not claimed within this period of time, it shall be the Contractor's responsibility to dispose of the material at no cost to the City.
- c. The term salvage shall include, but is not limited to such items as: castings, piping, brick, steel, iron, copper, brass, aluminum and other metals, wiring, conduit, lighting, lamps, panels, boxes, fixtures, motors, electrical incidentals, machines, plumbing, plumbing fixtures, water heaters, HVAC equipment and incidental appurtenances, miscellaneous building materials, doors, door frames, windows, frames, granites, marbles, stone panels, trees, shrubbery and plant material.
- d. The Contractor shall file a "Notice of Intent to Fill" with a local approved agency of the Ohio Environmental Protection Agency for any clean hard fill that is to be removed from the site and used as fill at a different site.

**202.02 Construction Requirements.** The Contractor shall raze, remove and dispose of all buildings and foundations, structures, fences, guardrails, old pavements, abandoned pipe lines, storage tanks, septic tanks, vaults and other obstructions any portions of which are within the limits of the project, except utilities and those items for which other provisions have been made for removal. All designated salvageable material shall be removed, without unnecessary damage, in sections or pieces which may be readily transported, and shall be stored by the Contractor at specified places within the project limits. Unusable material shall be destroyed or disposed of outside the limits of the project with written permission of the property owner on whose property the material is placed. Copies of all agreements with property owners shall be furnished the Engineer upon request. Basements or cavities left by structure removal shall be filled to the level of the

surrounding ground, and if within the area of construction, shall be compacted in accordance with 203.

When existing conduits are encountered in removal operations and are determined by the Engineer to be inactive or are to be abandoned, they shall be abandoned as per 202.11 or as directed by the Engineer before backfilling operations proceed.

**202.03 Bridges, Culverts and Other Drainage Structures Removed.**

Bridges, culverts and other drainage structures in use by traffic shall not be removed until satisfactory arrangements have been made to accommodate traffic. The substructures of existing structures, including piling, shall be removed down to the proposed stream bottom and those parts outside the stream shall be removed to a minimum of three feet below proposed ground surface or as shown on the plans. Where such portions of existing structures lie wholly or in part within the limits for a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure.

When specified, all structural steel, timber, and other reusable materials shall be carefully dismantled: and when specified, steel members shall be match marked as directed by the Engineer. Specified salvaged materials shall be considered as the property of the City and such materials shall be stored as specified in 202.02. Where alteration of an existing structure requires removal of portions of the structure, such removal shall be performed with sufficient care as to leave the remaining portion of the structure undamaged. In case of damage to the existing structure, repair or replacement shall be made at the Contractor's expense and to the approval of the Engineer.

**202.04 Pipe Removed.** This section provides for Pipe removed for reuse or storage and Pipe removed. For both types of removal, the work under this section shall include excavating all material necessary to permit removing the pipe; disposing of excavated material, including broken pipe; sealing openings left in walls of manholes, catch basins or other structures that are to remain in place; removing and disposing of pipe headwalls.

(a) For Pipe removed for reuse or storage, the work shall include removing, cleaning when reused, transporting and storing the pipe. All pipe shall be carefully removed and every precaution taken to avoid breaking or damaging the pipe. Pipe to be relaid shall be removed and stored when necessary, so that there will be no loss or damage before relaying. The Contractor will be required to replace sections lost from storage or damaged by negligence or by use of improper methods at no additional cost to the City.

(b) For Pipe removed, the pipe becomes the property of the Contractor and shall be disposed of in accordance with 202.02.

## 202.05

(c) Excavating. Where the plans call for pipe to be removed for reuse or storage, a section of pipe shall be removed sufficient in length to permit determining the quality of pipe and the possibility of removing it without damage. If the Engineer determines that the pipe is worth salvaging and can be salvaged, the Contractor shall perform the remainder of the excavation in a manner that will not damage the pipe. If the Engineer determines otherwise, the pipe shall be removed and disposed of and the original item shall be non-performed.

Where caving occurs, the caved materials shall be excavated before the trench is backfilled. All excavated material shall be used or disposed of in accordance with the provisions of 203.

(d) Backfill. The trench resulting from the removal of pipe shall be backfilled in accordance with the provisions of 203 except when the trench lies within the limits of subsequent excavation.

**202.05 Pavement, Walks, Curbs, Etc. Removed.** When designated for removal, an existing wearing course, concrete base course, concrete or full depth (6" thick) asphalt pavement, bituminous wearing course on brick and/or concrete base, concrete walks, concrete gutters, stone or concrete curbs, concrete traffic dividers, etc., shall be removed and disposed of as follows:

(a) Materials to be salvaged shall be carefully removed and stored within the project limits at locations determined by the Engineer. A portion of all asphalt grindings generated from the removal of a wearing course shall be salvaged and delivered to the City Public Works Bureau on Triplett Boulevard. The Contractor shall salvage and deliver not less than 50% of the total amount of asphalt grindings generated unless otherwise specified in the contract documents. If the City refuses the salvage material, the material becomes the responsibility of the Contractor to properly dispose.

(b) Materials that are not to be salvaged or that are not suitable for reuse shall be disposed of in the same manner as excavation, 203.05.

(c) Where only a portion of an existing walk, pavement, etc. is to be removed, full depth sawing with a diamond saw blade shall be used at the limits of the designated repair/removal areas. All repair/removal areas will be located by the Engineer prior to start of the work. Aerosol spray paint for outlining shall be provided by the Contractor. Payment for the work associated with sawing shall be included in the 202 item which necessitates the sawing.

**202.06 Buildings Removed.** Buildings and appurtenances designated for removal shall not be disturbed by the Contractor until being furnished with a written notice of possession and approval to proceed by the Engineer. As soon as such approval has been given, the Contractor shall schedule and perform the removals in a manner that will accommodate utility rearrangements and clearance of structures. If the Contractor desires to use buildings located within the project limits for storage,

office, living quarters or other purposes, a copy of a written agreement between the Contractor and the property owner shall be furnished to the Engineer allowing such use during the period of the contract and saving the City harmless from any claims whatsoever by reason of such use. Buildings and appurtenances designated for removal are not the property of the Contractor until they have been severed and removed from the real estate and the Contractor has no right to rent, sell or otherwise transfer title to such buildings or appurtenances prior to such severance and removal.

Foundations, floors, tanks, and basement, pit, well and cistern walls shall be removed to a minimum of 3 feet below the grade of the surrounding area.

Tanks shall be completely removed and basements shall be cleared of all debris, appliances, wood or metal partitions, wood floors, etc., so that only masonry walls and concrete basement floors remain. All floor slabs, under which a pit, well, cistern or tank exists shall be broken and removed.

Basement floors which are left in place shall be broken up into pieces not to exceed one square foot and all drains that are not removed shall be sealed with masonry or with precast clay or concrete stoppers.

All materials except that belonging to a public or private utility company shall become the property of the Contractor. The Contractor shall notify the owners of water, electric or gas meters when the meters are ready for removal and shall be responsible for disconnection of all utilities in compliance with local requirements.

As soon as removal work has been otherwise completed and approved by the Engineer, backfilling shall be performed as described in 202.02. The final grade of backfill in areas outside the prism of construction shall be such as to present a neat, well-drained appearance and to prevent water from draining unnecessarily onto adjacent properties.

**202.07 Underground Storage Tanks, Septic Tanks and Vaults Removed or Abandoned.** Underground storage tanks, septic tanks and vaults located within the proposed project limits shall be emptied and the removed contents disposed of in accordance with 202.02 in a manner that will comply with requirements of the State and Local Boards of Health or other authorities having jurisdiction.

Underground storage tanks shall be removed in their entirety and shall become the property of the Contractor and disposed of by him. Septic tanks and vaults located above the subgrade or finished ground lines shall be removed and disposed of. When septic tanks and vaults are located below the subgrade or finished ground lines, tops and walls shall be removed to a minimum depth of three feet below these lines, floors shall be broken up into pieces not to exceed one square foot and drains that are not removed shall be sealed with masonry or with precast clay or concrete stoppers. Backfilling shall be in accordance with 202.02.

**202.08 Guardrail and Fence Removed.** Where so required by the plans and proposal, existing guardrail (including any attached posts, signs and delineators) and fence shall be carefully dismantled and stored for reuse as specified or for salvage by the City. Wood posts, drums and other material not considered salvageable shall be disposed of as directed. Temporary beam rail or drums shall not be removed without the approval of the Engineer.

**202.09 Manhole, Catch Basin and Inlet Removed.** Existing drainage structures of these types designated for removal shall be removed under this item. Casting shall become the property of the City unless otherwise directed by the Engineer.

**202.10 Manhole, Catch Basin and Inlet Abandoned.** Existing drainage structures of these types which are designated to be abandoned shall be removed to a minimum of three feet below the finished subgrade or ground surface in a manner that will not damage pipes that are to remain.

When directed, existing pipes shall be connected through the structure with new pipe of a type and in a manner acceptable to the Engineer, without additional cost to the City. After connecting across or sealing the existing pipes and removing walls to the required depth, remaining cavities shall be backfilled as required. When connecting pipes are used, suitable backfill shall be carefully tamped solidly under and around the pipe.

When directed, existing inlet and outlet pipes shall be sealed with precast vitrified or concrete stoppers or with masonry of a type and thickness acceptable to the Engineer.

Castings shall become the property of the City unless otherwise directed by the Engineer.

**202.11 Pipe Abandoned.** Existing pipe designated on the plans or as directed by the Engineer, to be abandoned shall be plugged and filled under this item. The ends shall be sealed as detailed on the plans or as directed by the Engineer. Starting at the lowest end the pipe shall be pumped full of cement grout filler. The filler shall be composed of 10 parts of fine aggregate 703.03 and 1 part of portland cement 701.01 by volume. The aggregate and the sand shall be thoroughly mixed dry in an approved mechanical mixer and only enough water shall be added to obtain a grout capable of being pumped.

**202.12 Method of Measurement.** When the contract stipulates that payment will be made for removal of obstructions on a Lump Sum basis, the pay item will include all structures or obstructions encountered at locations or within areas designated on the plans or in the proposal, in accordance with the provisions of this section. When the proposal stipulates that payment will be made for the removal or abandonment of specific items on a Linear foot, Square yard, Pound or Each basis, measurement will be made by the unit stipulated in the contract.

Pipe removal for reuse or storage, pipe removed, or pipe abandoned may be paid based upon the diameter size of the pipe. When the bid schedule indicates measurement based upon the diameter of the pipe, these items will be designated and measured in accordance with the following schedule of sizes:

<b>Pipe Diameter</b>	<b>Pay Item Designation</b>
Up to 12 inches	12 inch
Over 12 inches to 36 inches	24 inch
Over 36 inches to 57 inches	48 inch
Over 57 inches	60 inch

If no diameter measurement is given in the bid schedule, all pipe to be removed or abandoned shall be paid for at the contract price for that item.

**202.13 Basis of Payment.** The accepted quantities of structures and obstructions removed and stored or disposed of, as directed, will be paid for at the contract lump sum price bid or at the price bid per unit specified in the proposal, which prices shall be full compensation for removal and storage or disposal of such items, including excavation and backfill incidental to their removal, and the custody, preservation, storage on the project limits and disposal as provided herein.

Payment will be made at the contract price for:

<b><u>Item</u></b>	<b><u>Unit</u></b>	<b><u>Description</u></b>
202	Lump Sum	Structures removed
202	Lump Sum, Cubic Yard Or Pound	Portions of structures removed
202	Linear Foot	Pipe removed for reuse or storage___inch
202	Linear Foot, Lump Sum	Pipe removed___inch
202	Linear Foot	Pipe abandoned___inch
202	Square Yard	Pavement removed
202	Square Yard	Wearing course removed
202	Square Yard	Base removed
202	Linear Foot	Curb removed for storage
202	Each	Precast traffic dividers removed for reuse or storage
202	Lump Sum	Buildings removed
202	Each	Underground storage tank removed
202	Each	Septic tank removed
202	Each	Vault removed or abandoned
202	Linear Foot	Guardrail removed
202	Linear Foot	Guardrail removed for reuse or storage
202	Linear Foot	Fence removed for reuse or storage
202	Each	Manhole removed
202	Each	Manhole abandoned

**203.01**

202	Each	Catch basin or inlet removed
202	Each	Catch basin or inlet abandoned
202	Each	Temporary drums removed
202	Linear Foot	Water Mains removed

**ITEM 203 GRADING**

**203.01 Description**

**203.02 Definitions**

**203.03 Borrow**

**203.04 General**

**203.05 Disposal of Excavated Materials**

**203.06 Tolerances**

**203.07 Embankment Construction**

**203.08 Requirements for Suitable Material**

**203.09 Construction Methods**

**203.10 Construction of Embankment and Subgrade with Moisture Density Control and Treatment of Subgrade in Cut**

**203.11 Moisture Control**

**203.12 Embankment Compaction**

**203.13 Subgrade**

**203.14 Proof Rolling**

**203.15 Method of Measurement**

**203.16 Basis of Payment**

**203.01 Description.** This work shall consist of preparation of areas upon which embankments are to be placed; excavation for the roadway and channel, including the removal of all material encountered not being removed under some other item; constructing embankments with the excavated material and material from other sources necessary to complete the planned embankments; furnishing and incorporating all water required for compacting embankment and subgrade; disposing of unsuitable and surplus material; preparing the subgrade; testing the stability and uniformity of compaction of the subgrade for areas specifically called for on the plans; finishing shoulders, slopes and ditches; all in accordance with these specifications and in reasonably close conformity with the lines, grade, thicknesses and cross sections shown on the plans. All excavation shall be considered as unclassified excavation.

The Contractor shall file a "Notice of Intent to Fill" with the local approved agency of the Ohio Environmental Protection Agency for any clean hard fill that is to be removed from the site and used as fill at a different site.

Where embankment is a separate pay item, payment for roadway excavation shall be made under 203 Excavation Not Including Embankment Construction. Payment for roadway embankment shall be made under 203 Embankment, which

shall include payment for furnishing suitable material from sources other than excavation if needed to complete embankments, with no separate payment for borrow for planned embankments. The Contractor shall control disposition of excavated material, using it in embankment, if suitable, or disposing of it as he desires.

Where embankment is not a separate pay item, payment for roadway excavation shall be made under 203 Excavation Including Embankment Construction, which shall include payment for placing suitable excavated material in embankment. If borrow is needed to complete planned embankments, it shall be measured and paid for separately under 203 Borrow. No excavated material shall be disposed of without permission, and all suitable material from excavation, or an equivalent volume from other sources, shall be used for planned embankments to the extent of project requirements.

When the proposal does not contain a lump sum for 201 Clearing and Grubbing or an estimated quantity for 201 Trees or Stumps Removed, or an estimated quantity for 202 Removal of Structures and Obstructions, this work shall be performed but will not be paid for directly, and shall be considered as a subsidiary obligation of the Contractor under 203.

**203.02 Definitions.** Embankment. A structure consisting of suitable material as per 203.08 constructed in layers to a predetermined elevation and cross section.

Subbase. Selected material of planned thickness placed on the subgrade as a foundation for a base or surface course. Subbase is a part of the pavement structure.

Soil. All earth materials, organic or inorganic, which have resulted from natural processes such as weathering, decay, and chemical action in which more than 35 percent by weight of the grains or particles will pass a No. 200 sieve.

Granular Materials. Natural or synthetic mineral aggregate such as broken or crushed rock, gravel, slag or sand which can be readily incorporated in an 8 inch layer, and in which at least 65 percent by weight of the grains or particles are retained on a No. 200 sieve. Open hearth and basic oxygen steel slags shall be subject to approval by the Laboratory.

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 as shale: mudstone, claystone, siltstone and clay bedrock.

Rock. Sandstone, limestone, dolomite, glacial boulders, brick and old concrete which cannot readily be incorporated in an 8-inch layer.

Random Material. A mixture of previously defined materials suitable for use in embankment which can be readily incorporated in an 8 inch layer.

### 203.03

Optimum Moisture. The water content at which the maximum density is produced in a soil by a given compactive effort using AASHTO Designation: T 99.

Field Testing. Testing of embankment and subgrade compaction shall be in accordance with the City of Akron Testing Laboratory procedures.

Laboratory Dry Weight. The maximum laboratory dry weight shall be the weight provided by the Laboratory when the sample is tested in accordance with AASHTO T 99.

Excavation. The excavation and disposal of all materials of whatever character encountered in the work.

Borrow. Material obtained from approved sources, outside the project limits, and used for the construction of embankments or for other portions of the work.

Engineering Fabric. Synthetic fabrics meeting the requirements of 712.09, used for subgrade reinforcement or drainage filter.

**203.03 Borrow.** Borrow shall meet the requirements for suitable embankment material set forth in this section. Borrow shall be resorted to only when sufficient quantities of suitable materials are not available from other items of the contract. Unless otherwise designated in the contract, the Contractor shall make his own arrangements for obtaining borrow and shall pay all costs involved including, but not limited to, material, delivery and placement in accordance with all of the requirements for constructing embankment. Borrow used in embankment shall be placed in accordance with all of the requirements for constructing embankment.

Borrow will not be paid for as a separate item:

- (a) Where embankment is a pay item in the contract, or
- (b) Where the Contractor elects to use borrow in place of excavation.

If the Contractor places more borrow than is required and thereby causes a waste of excavation, the amount of such waste will be deducted from the borrow volume as measured in the borrow area. All borrow areas shall be bladed and left in such shape as to permit accurate measurements after excavating has been completed. The Contractor shall notify the Engineer sufficiently in advance of opening any borrow areas so that cross section elevations and measurements of the ground surface after stripping may be taken.

Borrow areas shall meet the requirements of 105.17 and cleaning up of all borrow areas shall meet the requirements of 104.06.

**203.04 General.** Excavation and embankments for the pavement, walks, roadway, and intersections shall be finished to conform to the plan cross sections

within the tolerances set forth in 203.06. The Contractor shall satisfy himself as to the nature and distribution of the materials to be excavated. The unit price bid for excavation shall apply to all materials, of whatever nature, to be excavated.

Prior to beginning excavation, grading, and embankment operations in any area, all necessary clearing and grubbing in that area shall have been performed. Limitations of areas of clearing and grubbing and of earthwork operations shall be in accordance with 108.04 and 207.

Removal of full depth asphalt pavement, portland cement concrete pavement and portland cement concrete base course will be paid for as a contract item as specified in 202.

When the Contractor's excavating operations encounter remains of prehistoric people's dwelling sites or artifacts of historical or archaeological significance, the operations shall be temporarily discontinued. The Engineer will contact archaeological authorities to determine the disposition thereof. When directed by the Engineer, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and shall remove them for delivery to the custody of the proper state authorities. Such excavation will be considered and paid for as extra work.

Where excavation to the finished graded section results in a subgrade of unstable soil, the Engineer may require the Contractor to remove some or all of the unstable materials, place synthetic fabric and cover material, or place aggregate refill, to the finish graded section using approved material and compacted in accordance with 203.12. The Contractor shall conduct his operations in such a way that the Engineer can take the necessary cross sectional measurements before the backfill is placed.

(a) Drainage. During the process of excavation, the pavement area shall be maintained in such condition that it will be well drained at all times. When trenching is done for narrow base widening, ditches of an adequate depth shall be constructed to provide positive drainage to the nearest outlet. Side ditches shall be constructed, if necessary to provide a free outlet for water to insure the thorough drainage of the subgrade at all times.

The ends of all abandoned pipe lines encountered in earthwork operations shall be effectively plugged and filled, as per 202.11.

(b) Rock and Shale Excavation. Where granular subbase is not a part of the pavement design, and where rock, shale or coal is encountered in subgrade, it shall be excavated to a depth of 6 inches below the surface of the subgrade for the full cross section width of the roadway including walks, and the additional excavation so made shall be paid for at the contract unit price bid for excavation. The portion so excavated shall be filled with suitable embankment material.

## 203.04

Where granular subbase is a part of the pavement design, excavation of rock, shale or coal below plan subgrade elevation is not required. The Contractor shall be paid for thickness of granular subbase material shown on the typical section in rock excavation areas. Rock or shale may be undercut to a uniform depth below the plan subgrade for the full cross section width of the pavement and walks. The area thus excavated shall be backfilled with embankment material suitable for use as subgrade. No payment will be allowed for this extra excavation or for the material and placement costs of the new subgrade material.

(c) **Drilling and Blasting in Rock Cuts.** Drilling and blasting shall meet the requirements as set forth in this section and also in 107.09. Where rock encountered in cuts requires drilling and blasting, all necessary precautions shall be exercised to preserve the rock in the finished slope in a natural undamaged condition, with the surfaces remaining reasonably straight and clean. The Contractor shall presplit rock and shale along the proposed backslopes which are designed in inclinations steeper than one to one and where depths of cut in rock or shale exceed 5 feet.

The Contractor shall first completely remove all overburden soil along the line(s) of presplitting to expose the rock surface prior to drilling the presplitting holes. The Contractor shall then drill 2-1/2 to 3 inch nominal diameter holes, spaced not more than 3 feet center to center along the required slope line and at the required slope inclination to the full depth of the cut or to a predetermined stage elevation. If any cut is presplit by vertical stages (lifts), the presplit drill holes for the next stage may be offset a distance of not more than 1 foot inside the previously presplit face, but in no case shall any of the presplit holes be started inside of the payment line. No payment will be made for additional excavation quantities caused by these offsets.

No hole shall deviate more than one-half foot at any place from the plane of specified presplit slope, or an approved offset plan as herein above provided. Also, no hole shall deviate more than 1 foot at any place from a vertical plane through the top of the hole, normal to the plane of slope.

Before placing the charge, each hole shall be tested for its entire length to ascertain the possible presence of any obstruction. No loading will be permitted until the hole is free of all obstructions for its entire depth. All necessary precautions shall be exercised so that the placing of the charge will not cause caving of material from the walls of the hole. The charge for each hole shall consist of not less than one-fourth pound nor more than one pound of 40 percent dynamite per foot of hole and spaced not more than 20 inches center to center of charge, except that one-half to two and one-half pounds of dynamite shall be placed in the bottom of the hole, and except near the top of the hole the charges shall be reduced sufficiently to eliminate overbreak and heaving. The top charge shall not be less than 2-1/2 nor more than 3 feet below the top of rock.

The spacing of the dynamite charges in each hole shall be accomplished by means of securely taping (or attaching by other approved means) each piece of dynamite to the detonating fuse at the required intervals, or by deck loading. If the latter is used, the dynamite must be in intimate contact with the detonating fuse to assure detonation of all charges.

Either of the following charges may be used as an alternate, provided the results are satisfactory and with the written permission of the Engineer:

(1) Continuous column commercial explosives manufactured especially for presplitting.

(2) Multiple strands of high strength (175-200 grains of explosive per foot) detonating fuse taped together at 4 to 6 foot intervals.

All space in each hole not occupied by the explosive charge shall be filled with No. 8 size coarse aggregate meeting the requirements of 703.01. No other material or type of stemming will be permitted.

Firing shall be by means of detonating fuse extending the full depth of each hole and attached to a trunk line of detonating fuse at the surface, which shall be fired by dynamite cap(s). Permission to use any other method of detonating must be approved by the Engineer in writing.

The detonation of presplitting charges shall precede the detonation of adjacent fragmentation charges within the section by a minimum of 25 millisecond.

The cost of all material, all labor and equipment necessary for presplitting and other work included herein shall be included in the unit price bid for the pertinent 203 excavation item.

Changes may be made in details of procedure outlined in the above requirements for presplitting, including hole spacing and size, provided that written permission is secured from the Engineer and satisfactory results can be obtained.

In rock cuts, portions of rock which would be hazardous if allowed to remain, shall be removed when and as directed.

(d) Slide and Breakages. All slides and breakages beyond the finished work as planned, if caused by improper methods of excavation, shall be removed by the Contractor at his own expense. Slides and breakages beyond the finished work as planned which occur due to no fault or neglect of the Contractor shall be paid for at the contract unit price for excavation.

(e) Shoulders, Slopes and Ditches. Sod and topsoil salvaged in the scalping operations shall be placed upon areas to be seeded or sodded. With 2 inches of the surface in a loose condition, the shoulders shall be built at an elevation that

## 203.05

will allow subsequent operation of seeding and sodding to conform to the lines shown on the plans within the tolerances set forth in 203.06. Shoulders, slopes and ditches which have been damaged by erosion during construction shall be reshaped by the Contractor at no additional expense to the City.

(f) **Pavement Widening Construction.** For work performed under this item the Contractor shall, under the direction of the Engineer, locate the edges of sound pavement, and shall cut and trim the pavement to a neat line as established by the Engineer. Damage done to those areas designated for salvaging, by the Contractor's equipment or methods, shall be repaired and restored at the Contractor's expense. The old pavement materials resulting from this cutting and trimming operation shall be used or disposed of in accordance with the provisions of 203. The cost of cutting, trimming, and disposal of excavated material shall be included in the unit price bid for 203 Excavation.

**203.05 Disposal of Excavated Material.** All surplus or unsuitable excavated material, including rock or large boulders, that cannot be used in embankments shall be disposed of by one of the following methods as determined by the Engineer:

(1) Wasted adjacent to or incorporated in the regular construction where and as directed by the Engineer.

(2) Disposed of by the Contractor at his own responsibility and expense outside the limits of the project.

Material wasted outside the limits of the project shall be in accordance with the provisions of 105.17.

**203.06 Tolerances.** The Contractor shall check the work under this item with templates, slope boards or other devices satisfactory to the Engineer. The completed work shall conform to the plans within the following tolerances:

For cut and for fill slopes beyond the sidewalk or shoulder, deviations of one foot measured in a horizontal plane will be permitted. For shoulders and ditches, the horizontal measurements from the centerline shall not be less than the plan dimensions, and the elevations thereof shall not be higher than specified, but may vary not more than 1/2 inch at the sidewalk or pavement edge and 2 inches elsewhere, below the established grades. For subgrade, the surface shall at no place vary more than 1/2 inch from a ten-foot straight edge applied to the surface parallel to the centerline of the pavement, nor more than 1/2 inch from subgrade elevation established by construction layout stakes.

For excavation and embankment beyond plan lines, measurement for payment will be made only to plan lines.

**203.07 Embankment Construction.** Embankment construction shall consist of preparation of the areas upon which embankments are to be placed, and the

placing and compacting of embankment material in holes, pits and other depressions within the roadway area. Only approved materials shall be used in the construction of embankments and backfills. Frozen material shall not be placed in the embankment nor shall embankment be placed on frozen material.

**203.08 Requirements for Suitable Material.** Granular materials and shale as defined in 203.02 are suitable for use in embankment. Rock and random material will not be permitted, unless authorized by the Engineer in writing.

Soil is suitable for use in embankment outside R/W's provided it has the following characteristics:

Maximum laboratory dry weight shall be not 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 subgrade.

Silt from excavation or borrow identified as Ohio classification A-4b shall be considered suitable for use in embankment only when placed at least 3 feet below the surface of the subgrade.

Soil, in addition to the above requirements, shall have a liquid limit of not to exceed 65, and the minimum plasticity index number of soil with liquid limits between 40 and 65 shall be not less than that determined by the formula liquid limit minus 30.

**203.09 Construction Methods.** When embankment is to be placed and compacted on hillsides or where new embankment is to be compacted against existing embankments, or where embankment is built half-width at a time, slopes that are steeper than 8:1 when measured at right angles to the roadway shall be continuously benched over those areas where it is required as the work is brought up in layers. Benching shall be of sufficient width to permit operations of placing and compacting equipment. Each horizontal cut shall begin at the intersection of the original ground and the vertical sides of the previous cuts. Material thus cut out shall be recompacted along with the new embankment material at the Contractor's expense.

Soil, granular material and shale shall be spread in successive loose layers, not to exceed 8 inches in thickness. The layers thus placed shall be compacted as specified in this section. Compaction of the outer 5 feet of each layer measured horizontally from the face of the slope shall be obtained with a roller capable of covering the layer to the outer edge.

If embankment can be deposited on one side only of abutments, wing walls, piers or culvert headwalls, care shall be taken that the area immediately adjacent to the structure is not compacted in a manner such that it will cause overturning or excessive pressure against the structure. When embankment is to be placed on both sides of a concrete wall or a pipe or box type structure, operations shall be so

**203.09**

conducted that the embankment is always at approximately the same elevation on both sides of the structure.

(a) Soil. All soil used in embankment shall be placed in accordance with provisions of 203.12.

(b) Granular Material. Granular material shall be compacted to the density established as satisfactory by the Engineer based on field density test. The moisture content shall be as determined by the Engineer to obtain the desired compaction.

(c) Shale. Shale which consists predominantly of fine particles which can be readily tested for compaction shall be placed and compacted in accordance with requirements for soil. Shale containing sufficient amounts of large particles to make checking of the compaction impracticable shall be broken down in placing until the voids between the shale particles are filled insofar as is practicable. When so directed by the Engineer, water shall be used to aid in breaking down the shale. Watering of the shale shall be performed in accordance with the provisions of 203.11. The moisture content and compaction shall be as directed by the Engineer.

Shale embankment, within a length of 6 times the height of the fill at an abutment, shall be sprinkled as directed by the Engineer to bring the moisture content to within a range of optimum minus 3 percent and optimum plus 2 percent. Each layer shall be rolled with at least 6 coverages of a fully ballasted tamping roller, or with other rollers satisfactory to the Engineer.

Mixtures of shale and rock shall be placed in accordance with the above noted provisions for shale. Rock in such mixtures shall be reduced in size not to exceed 8 inches or separated from the mixture and placed as rock fill.

(d) Rock. Rock fill shall be placed in not to exceed 3 foot lifts except that within a length of 6 times the height of the fill at an abutment, thickness of rock layers shall not be greater than 18 inches. Rock which cannot be incorporated into lifts of the above specified thicknesses shall be reduced in size until it can be so incorporated. Lifts made up principally of small rock shall be rolled as directed by the Engineer. Care shall be exercised in placing rock so that the side slopes will conform with the requirements of the plan.

When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portions of the embankment as rock fill and the other material shall be incorporated into the inner portion as rolled embankment. Rolled embankment adjacent to rock fill shall be held at substantially the same elevation as the rock, but always above the rock and of sufficient width to permit the proper compaction of this portion.

The top 2 feet of all embankments shall be constructed of material other than rock according to the specifications for placing that material. Material for this upper

2 feet shall be reserved by the Contractor from the suitable excavation to the extent that it is available. Should this material be available and not be reserved, it shall be furnished and placed by the Contractor at his expense. In all cases where embankment material other than rock is superimposed upon rock, the top of the rock fill shall be leveled and smoothed with suitable leveling equipment and by distribution of spalls and finer fragments of earth.

(e) Areas Inaccessible to Rollers. Embankment in areas inaccessible to rollers shall be composed of embankment material which can readily be incorporated into a 4 inch layer, loose depth, placed and compacted in accordance with the following provisions: Embankment material, other than granular material, shall be deposited in level layers not exceeding 4 inches in thickness, loose depth, and compacted by mechanical devices to the density required in 203.12. Granular material shall be compacted as required in this section except that it may be deposited in water without compaction to a height not exceeding normal water level.

Effective spreading equipment shall be used on each lift to obtain uniform thickness prior to compacting. As the compaction of each layer progresses, continuous leveling and manipulating will be required to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density.

(f) Engineering Geogrid. Where geogrid is to be placed for subgrade reinforcement, the subgrade shall be excavated to a depth shown on the plan, or as directed by the Engineer. Isolated soft areas shall be removed and refilled if directed, to result in a plane parallel to the finished subgrade surface. The prepared surface shall be free of ruts, plant material and standing water.

The geogrid shall be placed with adjacent edges overlapped at least three feet. Cover material, conforming to 203.13 (c), shall be placed in lifts between six inches and eight inches deep, and compacted according to 203.12 to the final subgrade cross section. Care shall be exercised to ensure that the geogrid is not torn or displaced, nor the underlying soil rutted or displaced, while laying geogrid and placing cover material.

**203.10 Construction of Embankment and Subgrade with Moisture and Density Control and Treatment of Subgrade in Cut.** All 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.

**203.11 Moisture Control.** Embankment and subgrade material which does not contain sufficient moisture to be compacted, in accordance with the requirements of this subsection, shall be sprinkled with water as directed by the Engineer to bring the moisture content to within the range of optimum, plus or minus 3 percent. Water shall be applied by means of tank trucks equipped with suitable sprinkling devices

**203.12**

and shall be thoroughly incorporated into the material which is to be compacted by means of discs or other approved equipment.

Embankment and subgrade material containing excess moisture shall be required to dry prior to or during compaction to a moisture content not greater than 3 percentage points above optimum, except that for material which displays pronounced elasticity or deformation under the action of loaded rubber tired construction equipment, the moisture content shall be reduced to optimum 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 directed by the Engineer.

**203.12 Embankment Compaction.** 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 AASHTO T-99 or other approved method.

**EMBANKMENT SOIL COMPACTION REQUIREMENTS**

<b>Max Lab Dry Wt. lbs/cu.ft.</b>	<b>Min Comp. requirements % Lab. Max.</b>
90 to 104.9.....	102%
105 to 119.9.....	100%
120 and more.....	98%

**203.13 Subgrade.** When Item 203 Subgrade Compaction is not a separate pay item, all work shall be done in accordance with this specification, but payment shall be considered to be included in the price bid for the various items requiring this work. All soil subgrade shall be prepared in accordance with this subsection. Soils with a maximum laboratory dry weight of less than 100 pounds per cubic foot are considered unsuitable for use where subgrade compaction for a depth of 12 inches is required, and when encountered in the upper 12 inches of the subgrade shall be replaced with granular material.

(a) **Compaction Requirements.** Soil subgrade with maximum laboratory dry weight of 100-105 pounds per cubic foot shall be compacted to not less than 102 percent of maximum dry density. All other soil subgrade shall be compacted to not less than 100 percent of maximum dry density. The maximum dry density shall be as determined by AASHTO T 99 or other approved method.

Subgrade under new pavement shall be compacted to a depth of 12 inches below the surface of the subgrade and for the entire width of the pavement or base, including curb and gutter plus 18 inches.

(b) Drainage. The surface of the subgrade shall be maintained in a smooth condition to prevent ponding of water after rains, and ditches shall be constructed and maintained in accordance with 203.04(a), to insure the thorough drainage of the subgrade surfaces at all times.

(c) Soft Subgrade. Where soft subgrade is encountered in cuts, due to no fault or neglect of the Contractor, in which satisfactory stability cannot be obtained by moisture control and compaction as provided for under 203.11 and 203.13 (a), the unstable material shall be excavated to the depth required by the Engineer. Material thus excavated shall be disposed of in accordance with 203.05.

The excavation thus made shall be filled using Aggregate Refill, Type 1 or Type 2, as directed by the Engineer as follows:

1. Aggregate Refill Type 1 - Material shall be crushed limestone meeting the requirements of 304.02 and be placed and compacted in accordance with 304.03 and 304.04.
2. Aggregate Refill Type 2 - Material shall be crushed limestone or air-cooled blast furnace slag, #1 and #2 size aggregate meeting requirements of 703.02 and be placed and compacted in accordance with 304.03 and 304.04. If slag is used, it shall conform to the requirements of 703.01. The slag supplier shall be on ODOT's list of approved suppliers.

In addition to the above, the Engineer may direct the Contractor to furnish and install one of the following:

1. Engineering geogrid such as Tensar BX1200 in accordance with 609.
2. Engineering geogrid such as Tensar BX1300 in accordance with 609.

Where soft subgrade in cuts is due to the failure of the Contractor to maintain adequate surface drainage as required in 203.04(a), or is due to any other fault or neglect of the Contractor, the unstable conditions shall be corrected as outlined above at no expense to the City.

(d) Full Width New Pavement Construction. After the surface of the subgrade has been shaped to approximate cross section grade, and before any pavement, base or subbase material is placed thereon, the subgrade for a distance of at least 18 inches outside the limits of the surface of the planned pavement shall be compacted. When the rolling is completed, the surface of the subgrade shall be shaped as necessary to conform to the grade and cross section shown on the plans within the tolerance set forth in 203.06, and shall be so maintained until the overlying course is in place.

**203.14 Proof Rolling.** Proof rolling shall be performed on areas described on the plans or as directed by the Engineer.

(a) Equipment. The equipment shall consist of four heavy rubber tired wheels mounted on a rigid steel frame. The wheels shall be evenly spaced in one line across the width of the roller and shall be arranged so that all wheels will carry approximately equal loads when operated over an uneven surface. The maximum center-to-center spacing between adjacent wheels shall not exceed 32 inches. The compacting equipment shall have a suitable body for ballast loading with such capacity that the gross load may be varied from 10 to 50 tons.

The tires shall be capable of operating at inflation pressures ranging from 90 to 150 pounds per square inch. From 90 to 95 percent of the volume of the tire shall be filled with liquid. The Contractor shall furnish the Engineer charts or tabulations showing the contact areas and contact pressures for the full range of tire inflation pressures and for the full range of loading for the particular tires furnished.

Ballast to obtain the weight directed by the Engineer shall consist of ingots of known weight, or sand bags with a unit weight of 100 pounds, or bags of other material of known unit weight, or other suitable material such that the total weight of the ballast used can be readily determined at all times. There shall be a sufficient amount of ballast available to load the equipment to a maximum gross weight of 50 tons.

(b) Construction. The designated areas of subgrade, prior to the placing of the overlying course, shall be compacted to requirements of 203.13. The subgrade shall then be rolled with one or more coverages, as directed, of the heavy pneumatic tired roller. One coverage shall be considered to represent two trips of the roller, each trip offset from the other by the width of one tire, to obtain complete area coverage. The roller shall be operated in a systematic manner so that the number of coverages over all areas can be readily determined and recorded.

Moisture content of the subgrade at the time of proof rolling shall conform to the requirements of 203.11.

Within the ranges set forth above, the load and tire inflation pressure shall be adjusted as directed. It is the intent to use a contact pressure as nearly as practical to the maximum supporting value of the subgrade. The equipment shall be operated at the speed directed, but in no case shall the speed exceed five miles per hour, and the normal operating speed shall not be less than 2-1/2 miles per hour.

Where the operation of the heavy pneumatic tired roller shows the subgrade to be unstable or to have non-uniform stability, the Contractor shall correct the unstable areas in accordance with the provisions 203.13 so that the stability of the subgrade will be uniform and satisfactory. The subgrade shall then be checked for conformance to the plan lines and any irregularities to the surface caused by

operation of the heavy pneumatic tired roller shall be corrected, and the subgrade shall be shaped to the plan lines within the tolerance specified in 203.06.

Proof rolling will not be required where rock or shale occurs in subgrade, or in areas where subbase has been thickened to replace frost susceptible silts or other unsuitable subgrade material.

**203.15 Method of Measurement.** The quantities of excavation to be paid for shall be the number of cubic yards of material in the original position, acceptably excavated, measured by the method of average end areas. Excavation outside plan lines shall not be included in measurement for payment.

(a) **Contract Quantity Payment.** The quantities of excavation and embankment, when embankment is specified as a separate bid item, for which payment will be made will be those shown in the contract, provided the project is constructed to the lines and grades shown on the plans, within allowable tolerances, and provided the plan quantities are adjusted to correct errors and to take into account authorized changes. Check measurements or final cross sections shall be used to establish the quantity for payment.

When the plans have been altered or when disagreement exists between the Contractor and the Engineer as to the accuracy of the plan quantities, either party shall have the right to request and cause the quantities involved to be measured in accordance with "measured quantities." When the quantities are measured for payment, the original plan cross-sections plotted on the plans, corrected for errors, if any, shall be used as original field cross sections. Additional original cross sections may be interpolated at points where necessary to more accurately determine quantities.

(b) **Measured Quantities.** When payment is specified on a volume basis, all accepted excavation shall be measured in its original position by cross-sectioning the area excavated, which measurements will include overbreakage or slides not attributable to carelessness of the Contractor. Volumes will be computed from the cross-section measurements by the average end area method.

Measurements will be made for unsuitable materials actually excavated and removed at the direction of the Engineer, to obtain proper stability in cut sections and in foundations for fill sections.

Where it is impracticable to measure material by the cross section method due to erratic location of isolated deposits, acceptable methods involving three-dimensional measurements may be used.

(c) **Measurement of Embankments.** Where the contract does not specifically provide for payment for embankment or borrow, the work of embankment construction will not be paid for as such, but will be considered incidental to the various items of excavation.

When payment for embankment constructed with moisture and density control is specified as a separate bid item, the quantities to be paid for shall be the number of cubic yards of embankment in the completed position, acceptably placed as herein described, measured by the method of average end areas. Embankment outside plan lines shall not be included in measurement for payment.

(d) Measurement of Borrow. Borrow will be measured and paid for by the cubic yard or ton in accordance with 109.

Borrow material in a natural formation shall be measured by the method of average end areas or by weight. Where measurement by the method of average end areas is used, the borrow area shall be cross-sectioned after the surface has been cleared and scalped and again after excavating in the borrow area has been completed. The cubic yards to be paid for shall be determined from these cross sections. Where measurement by weight is used, the density of the material in its original position shall be determined by a series of representative field measurements made after clearing and scalping have been performed, and as the material in the borrow area becomes exposed by excavating operations. Acceptable material excavated from the borrow area for incorporation into the embankment shall be weighed and load slips furnished. The cubic yards to be paid for shall be determined by dividing the average weight per cubic yard of the undisturbed material as determined by the density tests into the total weight of borrow material as determined by the load weight slips.

Borrow material from sources other than natural formations, such as cinders, slag, processed stone or gravel, and quarry strippings shall be measured as follows: The weight per cubic yard of any such material in its compacted condition in the embankment shall be determined. Ninety-five percent of the density, thus determined, divided into the weight of the material furnished shall be the cubic yards of such material.

Where measurements show that completed embankment exists outside allowable tolerances, the quantity outside plan lines shall be multiplied by a shrinkage factor determined by the Engineer, and the resulting quantity shall be deducted from the measured borrow to determine the pay quantity for this item. Volume of roadway excavation outside plan lines will not be considered in the determination of deductions from measured borrow.

(e) Measurement of Subgrade Compaction. The quantity to be paid for shall be the number of square yards of subgrade acceptably compacted to a depth of 12 inches as herein described, measured by the number of square yards of pavement surface, paved median, and curb and gutter supported by the compacted subgrade. Rock and shale subgrade in cuts shall not be included in quantities measured for payment.

(f) Measurement of Aggregate Refill. The quantity of aggregate refill to be paid for shall be the number of cubic yards of authorized material in place and satisfactorily compacted. The number of cubic yards shall be the calculated volume of the excavation refilled as per 203.15(b).

The accepted quantities shall be paid for at the Contract unit prices bid for Item 203 - Aggregate Refill, which prices shall constitute full compensation for furnishing all labor, material equipment, tools and incidentals including the excavation and disposal of all materials required to be replaced, and any necessary sheeting, bracing, pumping and draining required to complete the work as directed.

(g) Measurement of Proof Rolling. The quantity shall be the actual number of hours of accepted proof-rolling time. No measurement of time will be made for idle equipment due to repairs, servicing, loading or unloading ballast, increasing or decreasing tire pressure, bad weather, wet subgrade, standing by so as to be available when next needed, or for any other reason, or for the use of the equipment at times or locations other than as directed by the Engineer. The actual rolling time shall be recorded to the nearest 0.1 hour by the Contractor and will be checked by the Engineer.

**203.16 Basis of Payment.** The accepted quantities will be paid for at the contract price per unit of measurement for each of the pay items listed below that is included in the bid schedule.

Payment will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
203	Cubic Yard	Excavation including embankment construction
203	Cubic Yard	Excavation not including embankment construction
203	Cubic Yard or Ton	Borrow
203	Cubic Yard	Embankment
203	Square Yard	Subgrade compaction
203	Hour	Proof rolling
203	Cubic Yard	Aggregate Refill Type 1
203	Cubic Yard	Aggregate Refill Type 2

## **ITEM 207 TEMPORARY SOIL EROSION AND SEDIMENT CONTROL**

**207.01 Description**

**207.02 General**

**207.03 Construction Requirements**

**207.04 Performance**

**207.05 Method of Measurement**

**207.01**

**207.06 Basis of Payment**

**207.01 Description.** This work shall consist of temporary control measures as detailed in the plans or ordered by the Engineer during the life of the contract to control soil erosion and sedimentation through use of straw or hay bales, dikes, slope protection, sediment pits including basins and dams, slope drains, coarse aggregate, mulches, grasses, filter fabric fences and other erosion control devices or methods.

The permanent control provisions contained in the contract shall be coordinated with the temporary erosion control features to the extent practicable to assure economical, effective and continuous erosion control throughout the construction and post-construction period.

Temporary control may be required for construction work outside the right-of-way such as borrow pit operations, haul roads, equipment and material storage sites, waste areas, and temporary plant sites.

**207.02 General.**

(a) Commercial fertilizer shall be (12-12-12) and shall conform to 659.

Temporary ditch checks shall consist of straw or hay bales or coarse aggregate.

Temporary inlet filters and filter dikes shall consist of straw or hay bales or filter fabric adequately supported on fence.

Temporary dikes shall consist of suitable 203 material.

(b) Temporary seeding and mulching shall consist of annual ryegrass (*Lolium multiflorum*). Seed and mulching material shall be applied in accordance with 659. Sediment pits may be included as part of the slope drain protection.

Temporary sediment basins and dams shall be constructed by methods described in 203 Excavation and Embankment or 601 Rock Channel Protection, Type C. Sand or fabric filters may be required.

(c) Temporary slope drains shall consist of pipe, coarse aggregate, riprap, rock channel protection, mats, plastic sheets, or other materials. Such materials shall be approved by the Engineer before being incorporated into the work.

**207.03 Construction Requirements.** Contractor shall limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and provide immediate permanent or temporary control measures to prevent contamination of adjacent streams or other water courses, and lakes, ponds, or other areas of water impoundment. Such work shall involve construction of temporary ditch checks, filters, benches, dikes, dams, sediment basins, slope drains

and use of temporary mulches, matting, seeding or other control devices or methods necessary to control erosion and sedimentation.

The Contractor shall incorporate all permanent erosion control features into the project at the earliest practicable time. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages as soon as substantial areas of exposed slopes are made available. This will require the establishing of final grades and application, if specified in the contract, of Items 659 Liming, Commercial Fertilizer, and Seeding and Mulching. When directed by the Engineer, the temporary items of fertilizer, seeding and mulching materials shall be used. Temporary control measures will be used when and as directed by the Engineer to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise, temporary erosion control measures will be required between successive construction stages.

The Engineer will limit the area of excavation, borrow and embankment operations in progress commensurate with the Contractor's capability and progress in keeping the finished grading, mulching, seeding, and other such permanent control measures current in accordance with the accepted schedule. Mulching, seeding, and other such permanent control measures shall be applied after completion of 8 feet (vertical) of embankment or cut, unless otherwise directed by the Engineer. Should seasonal limitations or embankment construction make such coordination unrealistic, temporary erosion control measures shall be taken immediately.

The amount of surface area of erodible earth material exposed at one time by clearing and grubbing, excavation, borrow or fill within the project limits shall not exceed 50,000 square feet.

The Engineer may increase or decrease the allowable amount of surface area of erodible earth material to be exposed at one time by clearing and grubbing, excavation, borrow and fill operations as determined by his analysis of project conditions. Factors such as soil erodibility, slope, cut or fill height, exposed area contributing to a watercourse and weather will be considered in this determination.

In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal or State or local agencies, the more restrictive laws, rules or regulations shall apply.

#### 207.04

Temporary seeding areas shall be fertilized at 1/2 the normal plan or specification rate of application in accordance with 659.

All areas of temporary seeding shall be seeded with lawn seed sown at the rate of 6 pounds per 1000 square feet and mulched in accordance with 659.

When, in the judgment of the Engineer, project conditions are such that incorporation of fertilizer into the soil and preparation of the seed bed cannot be performed in accordance with 659, these requirements may be waived except that temporary seed shall not be placed on frozen ground.

When directed by the Engineer, the seed bed shall be thoroughly watered in accordance with the requirements of Item 659.

When directed by the Engineer, temporary seeded areas shall be mowed in accordance with Item 659.

Temporary erosion control features shall be acceptably maintained and shall subsequently be removed or replaced when directed by the Engineer. Removed materials shall become the property of the Contractor and shall be disposed of in accordance with 203.05.

**207.04 Performance.** If, in the opinion of the Engineer, proper control of soil erosion and sedimentation is not being provided by the Contractor, the Engineer may take the necessary steps to provide corrective measures, and the cost of such services will be deducted from any monies which may be due or become due the Contractor.

**207.05 Method of Measurement.** Temporary erosion and sediment control work, completed and accepted, will be measured as follows:

(a) Temporary seeding and mulching will be measured by the square yard of seeded and mulched area completed in accordance with these specifications.

(b) Temporary slope drains will be measured by the linear foot complete in place.

(c) Straw and hay bales installed will be counted and paid for by each bale staked in place.

(d) Rock required will be paid for under Item 601 Rock Channel Protection, Type C.

(e) Temporary benches, dikes, dams, and sediment basins will be measured by the cubic yard of excavation performed, including necessary cleaning of sediment basins, and the cubic yard of embankment placed at the direction of the Engineer, in excess of plan lines and elevations.

(f) Filter fabric fence will be measured by the linear foot complete in place.

Control work performed for protection of construction areas outside the project limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly, but shall be considered as a subsidiary obligation of the Contractor, with costs included in the contract prices bid for the items to which they apply.

In the event that temporary erosion and sediment control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled, and are ordered by the Engineer, such temporary work shall be performed by the Contractor at his expense.

**207.06 Basis of Payment.** Accepted quantities of temporary soil erosion and sedimentation control work ordered by the Engineer and measured as provided above, will be paid for at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
207	Square Yard	Temporary seeding and mulching
207	Linear Foot	Temporary slope drains
207	Cubic Yard	Temporary benches, dikes, dams, and sediment basins
207	Each	Straw or hay bales
207	Linear Foot	Filter fabric fence