

## 200 EARTHWORK

### ITEM 203 - ROADWAY EXCAVATION AND EMBANKMENT

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**203.01 Description.** This work consists of preparing areas upon which embankments are to be placed; excavating for the roadways and channels, including the removal of all material encountered not being removed under another item; constructing embankments with the excavated material and material from other approved sources as necessary to complete the planned embankments; furnishing and incorporating all water required for compacting embankment; disposing of unsuitable and surplus material finishing shoulders, slopes, and ditches, and proof rolling per *Item 204*.

All excavation is considered unclassified excavation. *If the excavation contains regulated materials such as garbage, solid waste, and hazardous waste or material, the contract documents will detail the removal for these items.*

*Use all suitable excavated material in the work. Alternatively, legally use, recycle, or dispose of all excavated materials according to applicable federal, state and local regulations.*

#### 203.02 Definitions.

1. **Reclaimed Asphalt Concrete Pavement.** *Reclaimed asphalt concrete pavement (RACP) that is blended to meet the requirements in 703.11.*
2. **Base.** *Selected material of planned thickness placed on the subgrade as a foundation for other bases, or asphalt or concrete pavements. The base is a part of the pavement structure.*
3. **Borrow.** *Material obtained from approved sources, located outside the construction limits that are required for the construction of the embankment. When borrow is specified or used, use suitable materials that conform to 703.11.*
4. **Compaction Testing.** *The City will perform the compaction testing of embankment and subgrade according to City of Columbus Supplemental Specification 1501.*

5. **Embankment.** A structure consisting of soil, granular material, shale, rock, or random material constructed in lifts, or courses, to a predetermined elevation and cross section.
6. **Excavation.** The excavation and disposal of all materials required by the contract documents.
7. **Granular Materials.** Natural materials including broken or crushed rock, gravel, sand, durable siltstone, and durable sandstone that can be placed in an 8 inch (203 mm) loose lift and in which at least 65 percent by weight of the grains or particles are retained on a 200 (75 um) sieve.
8. **Maximum Dry Weight.** *The maximum dry weight is determined according to AASHTO T 99 or by City of Columbus Supplemental Specification 1501. The City will use this maximum dry weight for compaction acceptance.*
9. **Optimum Moisture.** The water content at which the maximum density is produced in an embankment material. The optimum moisture is determined according to AASHTO T 99, AASHTO T 272 or City of Columbus Supplemental Specification 1501.
10. **Petroleum Contaminated Soil (PCS).** *PCS is petroleum-contaminated soil regulated under OAC 1301: 7-9-16.*
11. **Recycled Portland Cement Concrete.** Recycled Portland Cement Concrete (RPCC) that is blended to meet the requirements in 703.11. RPCC shall not include reinforcing steel.
12. **Random Material.** Mixtures of suitable materials that can be placed in 8 inch (200 mm) loose lifts.
13. **Recycled Materials.** *Fly ash, bottom ash, foundry sand, or other materials or manufacturing bi-products not specifically named as suitable materials.*
14. **Rock.** Sandstone, limestone, dolomite, glacial boulders, brick, and RPCC too large to be placed in an 8 inch (203 mm) loose lift.
15. **Shale.** Laminated material with a finely stratified structure formed by the natural consolidation of soil. For the purpose of this specification, the following bedrock types are also considered as shale: mudstone, claystone, siltstone, and clay bedrock
16. **Slag Materials.** *Slag materials include air-cooled blast furnace slag (ACBF), granulated slag, open hearth slag (OH), basic oxygen furnace slag (BOF), and electric arc furnace slag (EAF) meeting the requirements in 703.11.*
17. **Soil.** All natural earth materials, organic or inorganic, resulting 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 200 (75 um) sieve.

18. **Suitable Materials.** *Suitable materials for embankment construction consist of soil, granular material, slag materials, shale, rock, brick, random material, RACP, RPCC, or PCS. Furnish suitable materials in the work that conforms to 703.11.*

*Do not use recycled materials unless specifically allowed by supplemental specification.*

**203.03 Restrictions on the Use of Embankment Materials.** Suitable materials are further restricted as follows:

1. *Use silt identified as ODOT Group Classification A-4b and RACP only if placed at least 3 feet (1 m) below the surface of the subgrade.*
2. *Do not place RPCC and RACP in any location where it would inhibit the growth of vegetation.*
3. *Do not use any suitable material that cannot be incorporated in an 8 inch (203 mm) lift in the top 2 feet (0.6 m) of the embankment.*
4. *Do not use shale in the top 2 feet (0.6 m) of the embankment that is not completely compacted and pulverized into a soil with 100 percent of the material passing the No. 4 (4.75 mm) sieve, except for hard shale or durable siltstone.*
5. *If using RPCC, OH slag, EAF slag, BOF slag, or blends of these materials, place these materials at least 1 foot (0.3 m) below the flow line of the underdrains.*
6. *Do not use materials that cannot be satisfactorily placed and compacted to a stable and durable condition.*
7. *Material excavated in the work that contains excessive moisture is unsuitable for embankment construction unless dried. Dry or aerate such material before incorporating in the work. The Contractor may elect to waste this material, instead of drying it.*
8. *If electing to use PCS, submit the information stated below in a suitable format at least 10 working days before the intended usage.*
  - A. *Have an independent, City-approved laboratory pre-qualified in remedial design environmental site assessment review the proposed usage. The consultant shall provide all documentation used to ensure that the proposed usage obeys all OEPA regulations. The consultant shall coordinate all EPA required meetings, documentation, and testing requirements. The consultant shall randomly monitor the construction to ensure that the environmental requirements are carried out on the project. The consultant shall report any discrepancies to the City and*

*the Contractor. The consultant shall certify the report or reports to the City.*

*B. Use PCS that conforms to all current federal, state and local environmental policies, rules, and regulations and the following:*

*(1) Use PCS material that does not exceed the petroleum constituent concentrations stated below:*

*Benzene (B)..... 35 parts per million  
Toluene (T) ..... 109 parts per million  
Ethylbenzene(E)..... 32 parts per million  
Total Xylenes (X)..... 165 parts per million*

*(2) Include test results from BTEX testing by using United States Environmental Protection Agency (USEPA) test method SW 846, method 8020, or equivalent method.*

*(3) Perform the tests on every 100 tons (90 metric tons) of PCS used.*

**203.04 General.** Perform the required clearing and grubbing before starting the excavation, grading, and embankment operations.

Coordinate the amount of and limit the areas of the project that are cleared and grubbed with the quantity of erosion controls that are placed according to Item 207.

Remove all existing pavement prior to the embankment construction.

Temporarily discontinue operations when the excavating operations encounter remains of prehistoric archaeological sites, historical archaeological sites, or human remains. Preserve the artifacts or other archeological items or human remains until a determination as to what the disposition and/or removal of such items is made by the Director. Such excavation is considered extra work.

If the Contractor encounters any abnormal material such as, but not limited to, drums, tanks, or stained earth or any unusual odors during construction operations, the Contractor shall temporarily discontinue the work in this area, leave equipment in place, cordon off the area, and notify the Engineer. The area is considered to contain hazardous or toxic material and must be handled according to *The Handbook for the Removal of Regulated Waste*. Upon notification by the Engineer to resume work, the Contractor may file for an extension of time according 108.07.

1. **Drainage and Maintenance of the Work.** Maintain a well-drained embankment and excavation operation. If trenching for narrow widening and in other areas of the embankment construction, construct ditches of an adequate depth and at frequent intervals across the berm or embankment to

maintain drainage. Deepen side ditches when necessary to ensure thorough embankment or subgrade drainage.

*Construct the embankment with sufficient cross slope to drain in case of rain.*

*If rain saturates the embankment construction, stay off the embankment construction until the embankment dries or stabilizes. Expedite the construction by removing the saturated embankment or dry the embankment by scarifying, plowing, disking, and re-compacting the embankment.*

*Throughout the embankment construction operation and at the end of each day's operation, shape to drain, compact, and re-compact the work area to a uniform cross section. Eliminate all ruts and low spots that could hold water.*

*If using embankment construction areas to haul on, continuously move the hauling equipment around on the embankment to take advantage of the compactive effort. Continually re-grade and compact the haul roads and maintain the construction site.*

*Reconnect all pipes, tiles, and other conveyance unless directed by the Engineer in writing to abandon and plug them.*

2. ***Rock or Shale Blasting Operations.*** *Blasting shall not be performed except with written permission of the Director and as outlined below.*

**Drilling and Blasting in Rock Cuts.** Where rock encountered in a cut 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 proposed backslopes which are designed at inclinations steeper than one to one and where depths of cut in rock or shale exceed 5 feet (1.5 m).

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 to 3 inch (63 to 76 mm) nominal diameter holes, spaced not more than 3 feet (0.9 m) 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 (0.3 m) 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 1/2 foot (0.15 m) at any place from the plane of specified presplit slope, or an approved offset plane as herein above

provided. Also, no hole shall deviate more than 1 foot (0.3 m) 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 1/4 pound (0.11 kg) nor more than 1 pound (0.45 kg) of 40 percent dynamite per foot (0.3 m) of hole and spaced not more than 20 inches (0.5 m) center to center of charge, except that 1/2 to 2 1/2 pounds (0.23 to 1.13 kg) 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 feet (0.76 m) nor more than 3 feet (0.9 m) 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:

- A. Continuous column commercial explosives manufactured especially for presplitting.
- B. Multiple strands of high strength 175-200 grains (35 to 45 grams) of explosive per foot (meter) detonating fuse taped together at 4 to 6 foot (1.2 to 1.8 m) 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 adjacent fragmentation charges within the section by a minimum of 25 millisecond.

The cost of all material, 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, in the opinion of the Engineer, would be hazardous to highway traffic if allowed to remain, shall be removed. The use of explosives shall be governed by the provisions of Section 107.11.

3. **Slides and Breakages.** Remove all slides and breakages beyond the limits of the planned finished work when caused by improper excavation methods.
4. **Shoulders, Slopes, and Ditches.** Place topsoil in areas to be seeded or sodded according to Item 659. Build shoulders to the lines shown on the plans and to the tolerances in 203.08. Reshape shoulders, slopes, and ditches that have been damaged by erosion during construction.

Keep new and existing pavement, and the paved area of the berm clear of earth stockpiles or other berm materials.

5. **Pavement Widening Construction.** Locate sound pavement edges, and cut and trim pavement to a neat line. The Contractor shall repair and restore damage caused by its equipment or methods. Include the cost of cutting, trimming, and disposal in the unit bid price for 203 Excavation.
6. **Borrow.** *Unless otherwise designated in the contract, the Contractor shall make its own arrangements for obtaining borrow and shall pay all costs involved. Place borrow used as embankment according to all the requirements for constructing embankment. All work shall be in accordance to Section 105.19.*
7. **Staged Construction and Waiting Periods.** If specified in the contract documents, control the rate of fill accordingly. Adhere to the rate of fill and to the waiting periods during the work.

**203.05 Embankment Construction Methods.** Embankment construction includes preparing areas upon which embankments are to be placed; placing and compacting approved material within roadway areas where unsuitable material has been removed; and placing and compacting approved material in holes, pits, and other depressions within the roadway.

*If scalping is required, scarify, plow, disk, and compact the existing embankment foundation. Compact the top 8 inches (203 mm) of the foundation to 95 percent of standard proctor or to a maximum test section dry density according to City of Columbus Supplemental Specification 1501. If the foundation cannot be compacted, the City will design replacement material or the Engineer may increase the lift thickness of the next layer of embankment.*

*The Engineer may increase the lift thickness of the next embankment layer to bridge the soft or wet foundation areas that will not support the weight of the trucks or hauling equipment. Dump successive loads of rock, hard shale, or granular material in a uniform lift. Do not exceed the thickness required to support the equipment placing the material. Manipulate, blade, distribute, level, and doze the material in place until the area is stabilized and material is above the normal water elevation. Once the bridging has been accomplished, construct the remaining lifts according to 203.06.*

If the existing slope is steeper than 8:1, bench into the existing slope as follows:

1. Scalp the existing slope according to Item 201.
2. Cut horizontal benches in the existing slope to a sufficient width to blend the new embankment with the existing embankment and to accommodate the placement, and compaction operations and equipment.
3. Bench the slope as the embankment is placed, and compact into layers.
4. Begin each bench at the intersection of the original ground and the vertical cut of the previous bench. Re-compact the cut materials along with the new embankment.

If constructing embankment on only one side of abutments, wing walls, piers, or culvert headwalls, construct the embankment so that the area immediately adjacent to the structure is not compacted in a manner that causes overturning of or excessive pressure against the structure. If constructing embankment on both sides of a concrete wall, pipe, or box type structure, construct the embankment so that the elevation on both sides of the structure is always approximately the same.

**203.06 Spreading and Compacting.** Do not use frozen embankment material or place embankment material on frozen ground.

Spread all embankment material, except for rock and RPCC in 203.06.D, in successive horizontal loose lifts, not to exceed 8 inches (203 mm) in thickness. Compact all embankment material lifts, except for rock and hard shale, to the specified density and moisture controls in 203.07.

1. **Soil and Granular Embankment.** *For soil or granular material, when a test section is used, use a minimum compactive effort of 8 passes with a steel wheeled roller having a minimum weight of 10 tons (9 metric tons).*
2. **Shale.** *The Engineer will test for soft shale according to 703.11, to determine if compaction testing is required. For soft shale, when a test section is used, use a minimum compactive effort of 10 passes with a tamping foot roller having a minimum weight of 15 tons (14 metric tons) or with rollers meeting the requirements of 703.11.*

*Use water to aid in breaking down large particles and to bring the shale to optimum moisture content.*

*Compact hard shale, as defined in 703.11, with a minimum compactive effort of 10 passes of a tamping foot roller having a minimum weight of 15 tons (14 metric tons) or with rollers meeting the requirements of 703.11. When the hard shale is mixed with fine material, use fine material that is at optimum moisture content. No density testing will be required. If shale mixture contains large particles of shale, break down the particles during placement until the voids are filled.*

*Place and compact shale and rock mixtures using the same procedure as for shale. Reduce rock size in a shale-rock mixture to less than or equal to 8 inches (203 mm), or separate rock greater than 8 inches (203 mm) from the mixture and use as rock fill. Use the construction methods for rock when the shale-rock mixture contains less than 15 percent shale.*

3. **Rock.** Reduce the rock until it is small enough to be incorporated into the following horizontal lift thickness: Place rock in a maximum loose lift thickness less than the largest diameter of the rock pieces or to a loose lift of less than 3 feet (1 m), which ever results in the least lift thickness. When placing rock fill within a length of 6 times the height of the fill at an abutment, place rock fill in loose lifts not to exceed 18 inches (0.5 m). *(For example, if the fill height is 20 feet (6 m), then the rock fill within 120 feet (36 m) of the abutment is placed in less than 18 inch (0.5 m) loose lifts.)*

*Do not dump the rock, but distribute and place the full width of the lift by blading or dozing to ensure proper placement. Evenly distribute the larger rocks, and reduce the voids, pockets, and bridging to ensure minimum deformation. Incorporate smaller rock pieces in the upper portions of each rock lift to fill the voids during this manipulation.*

When placing embankment material other than rock on top of the rock lift, level and smooth the rock surface using suitable leveling equipment and distribute the smaller rock, rock spalls, or finer rock fragments.

*Roll lifts made up principally of rock smaller than 8 inches (203 mm) with 8 passes with a steel wheeled roller having a minimum weight of 10 tons (9 metric tons).*

When constructing rock and other embankment materials at approximately the same time, perform the following:

- A. Use the rock at the base of the embankment.
- B. Use rock in the outer portions of the embankment.
- C. Use the larger rocks on the outside side slopes.

- D. Use the other embankment material in the inner portion of the fill.
- E. Keep the top of the other embankment materials higher than the rock.
- F. Construct the other embankment materials to a sufficient width to allow the proper compaction.
- G. *When rock is placed on top of other embankment material, construct the other embankment material at a center to side slope grade of approximately 4 percent.*

4. **Random Materials.** Reduce the random material until it is small enough to incorporate into an 8 inch (203 mm) lift, *except for RPCC in 1 through 4 below.*

*When using a uniformly graded mixture, use material with a moisture content less than 2 percent below optimum to obtain compaction. When large pieces are incorporated in the lifts, use fine material with a moisture content less than 2 percent below optimum to obtain compaction.*

*Compact natural soil and granular material blends with RACP or RPCC to the same requirements as a granular embankment.*

*When using RPCC slabs or large RPCC pieces in the embankment construction, conform to the following:*

- A. *Use natural soil or granular material that is at least 2 percent below optimum moisture in the blend. Reduce the slabs or pieces to less than 3 foot by 3 foot (1 m by 1 m) in size and place the blend in a maximum loose lift thickness of 12 inches (300mm).*
- B. *Manipulate, level, and distribute the mixture by blading or dozing to fill the voids and pockets, and reduce bridging.*

Compact the soil or granular embankment to the required density specified in 203.07.

5. When the RPCC slabs or large RPCC pieces consists of more than 50 percent of the embankment lift, place the blended material in maximum loose lifts of 18 inches (0.5 m). Do not place one slab directly on the other. Compact, manipulate, level, and distribute as stated in 1, 2 and 3 above.
6. **Areas Inaccessible to Rollers.** *For areas inaccessible to rollers, such as adjacent to culverts, retaining walls, or other structures, construct the embankment in 6 inch (150 mm) horizontal loose lifts.*

**203.07 Compaction and Moisture Requirements.** Construct all embankments, except rock and hard shale, using moisture and density controls. *Unless otherwise specified*

*in the contract documents, the Engineer will perform all compaction tests according to City of Columbus Supplemental Specification 1501.*

1. **Moisture Controls.** Sprinkle enough water on the embankment material to meet the density requirements. Apply the water using tank trucks equipped with suitable sprinkling devices. Thoroughly incorporate the water into the material by using discs, plows, or other approved equipment. Continue to water and to manipulate until the required moisture is uniformly distributed throughout the lift.

Before or during compaction, allow the embankment material that contains excess moisture to dry to a moisture content needed to meet the density requirements. Continue drying until the required moisture is uniform throughout the lift. However, for material that displays pronounced elasticity or deformation under the action of loaded rubber tired construction equipment or other equipment, reduce the moisture content to secure stability. Expedite and manipulate the embankment material by drying the wet embankment material by using plows; discs; by adding dry material, lime, or cement; or by other methods.

*Do not mix shale in the lifts to reduce the moisture content of the embankment material.*

2. **Compaction Requirements.** Compact all embankment materials, except for rock and hard shale, in horizontal lifts to a dry density greater than the percentage of maximum dry density in the following table, *or to a maximum dry density determined by the test section methods specified in City of Columbus Supplemental Specification 1501.*

### **Embankment Compaction Requirements**

| <b>Maximum Laboratory<br/>Dry Weight<br/>lbs/ft<sup>3</sup> (kg/m<sup>3</sup>)</b> | <b>Minimum Compaction<br/>Requirements in<br/>Percent of Laboratory<br/>Maximum</b> |
|--|---|
| 90 to 104.9 (1442 to 1680)   | 102   |
| 105 to 119.9 (1682 to 1920)  | 100   |
| 120 and more (1922 and more)   | 98  |

*When a test section method is used for compaction acceptance: Use at least 98 percent of the test section maximum dry density for acceptance of the production embankment construction. Use at least the same number of passes and compactive effort used to construct the test section to construct the production embankment areas. Construct a new test section when the material, supporting foundation, or embankment changes. Reduce the moisture content if the material becomes unstable.*

**203.08 Earthwork Construction Tolerances.** Finish the completed excavation and embankment to the cross sections shown on the plans. The Engineer will allow occasional deviations in the work within the following tolerances:

*When topsoil is specified perform the following:*

1. *In fill areas, construct the embankment to the bottom of the topsoil depth.*
  - A. *In cut areas, construct the cut an additional depth for the topsoil.*
  - B. *For cuts or fills, the cross sections show the finished grade, which is the top of the topsoil.*
2. *Check the excavation and embankment work with templates, slope boards, electronic methods, or other methods detailed in Item 623.*
3. For the backslopes (cut slopes), from the back of the ditch to the existing ground, and for the foreslopes (fill slopes), from the edge of the graded shoulder to the bottom of the ditch, do not allow deviations greater than 1 foot (0.3 m) as measured in the horizontal plane.
4. Do not construct shoulders and ditches less than the horizontal measurement from the centerline or to a higher elevation than shown on the plans. However, the cross section may vary below the plan grades by less than 1/2 inch (13 mm) at the pavement edge and by less than 2 inches (50 mm) elsewhere.
5. Construct or fine grade the subgrade to within 1/2 inch (13 mm) of the plan elevation at any location. Construct or fine grade the subgrade to within 1/2 inch (13 mm) of the plan grade as measured with a 10 foot (3 m) straightedge applied to the surface parallel to the centerline of the pavement.

**203.09 Method of Measurement.**

1. **Excavation and Embankment.** The City will measure Excavation by the number of cubic yards (cubic meters) of material in the original position, acceptably excavated, using the average end area method.

The City will measure Embankment, Granular Embankment, and Granular Material by the number of cubic yards (cubic meters) of material in the final position, acceptably placed, using the average end area method.

Measurement will include overbreakage or slides not attributable to carelessness of the Contractor, embankment settlement caused by soft embankment foundation, unsuitable materials excavated and removed to obtain proper stability in cut sections and in foundation areas for fill sections.

The City may use three dimensional measurements where it is impractical to measure material by the cross section method due to the erratic location of isolated deposits.

The City will not measure excavation or embankment outside plan limits.

**203.10 Basis of Payment.** If the contract does not include a lump sum for 201 Clearing and Grubbing or an estimated quantity for 201 Tree or Stump Removed, \_\_\_ Size, or an estimated quantity for the pay items under 202 Removal of Structure and Obstruction, the City will not pay for this work directly but will considered it incidental to 203 Items.

*The City will not pay for material excavated in the work that was wasted instead of being dried.*

*If the Contractor elects to use PCS, the City will not pay for additional work necessary to comply with the requirements specified by federal, state and local regulations.*

If during excavation the Contractor encounters remains of prehistoric archaeological sites, historical archaeological sites, or human remains, the City will pay for such excavation according to 109.04.

If during excavation the Contractor encounters hazardous or toxic material or waste, the City will pay according to 109.04.

If necessary to expedite the construction, the City will not pay for removing the saturated embankment or drying the embankment.

If caused by improper excavation methods, the City will not pay for removing slides and breakages beyond the limits of the planned finished work. The City will pay for the removal of slides and breakages beyond the limits of the planned finished work according to 109.04, when there is no Contractor fault or neglect.

If caused by the lack of implementing erosion controls, the City will not pay for reshaping shoulders, slopes, and ditches damaged by erosion during construction.

If caused by the Contractor's equipment or methods, the City will not pay for repairing or restoring damaged areas designated for salvage.

The City will adjust contract quantity to correct errors and reflect authorized changes. The City will pay for work constructed to the profile grade and cross sections shown on the plans, within allowable tolerances. The City will use check measurements or final cross sections to establish the final quantity for payment.

When topsoil is specified, the City will not make deductions or additions from the earthwork quantities for the topsoil.

*The City will not change the plan quantity for minor discrepancies in the computation of earthwork quantities caused by the plan survey, plotting of cross sections and calculating the end areas. The City will not recalculate volumes where two consecutive cross section end areas vary by less than 5 percent from the plan quantity. Unless there is a quantity change of 5 percent or greater in the end area calculations, the City will only pay for the plan quantity. When the Contactor finds a discrepancy, the Contractor shall submit the supporting*

*documentation to show that two consecutive cross section end areas vary by 5 percent or more from the plan quantity.*

*The City will make revisions to the plan quantity for changes for the following: two consecutive end areas in differing by more than 5 percent; undercutting; foundation settlement; changes in the grades or slopes; removing slides; or arithmetic errors. For quantities measured for payment, the City will use the original plan cross sections, corrected for errors, as the original field cross sections. Additional original cross sections may be interpolated at points necessary to more accurately determine quantities.*

*When borrow is required, all work is included in the excavation or embankment pay items.*

The City will pay for accepted quantities at the contract prices as follows:

| <b>Item</b> | <b>Unit</b>                         | <b>Description</b>         |
|-------------|-------------------------------------|----------------------------|
| 203         | <i>Cubic Yard<br/>(Cubic Meter)</i> | <i>Excavation</i>          |
| 203         | <i>Cubic Yard<br/>(Cubic Meter)</i> | <i>Embankment</i>          |
| 203         | <i>Cubic Yard<br/>(Cubic Meter)</i> | <i>Granular Embankment</i> |
| 203         | <i>Cubic Yard<br/>(Cubic Meter)</i> | <i>Granular Material</i>   |