Section 205. ROADWAY EARTHWORK

205.01 Description. Construct earth grades by excavating soil or rock and by placing embankments or fills. Salvage and stockpile selected materials; furnish, place and compact embankment materials; trim the earth grade; dispose of surplus or unsuitable material; and maintain the work in a finished condition until accepted.

Earth excavation is all work to excavate materials, except rock and subgrade undercutting, which separate items in the contract do not cover.

Refer to the Density Control Handbook for maximum unit weight and in-place density test methods.

A. Soil Series Notation and Boring Logs. Investigate all local conditions before bidding, according to subsection 102.04. Soil series notations and boring logs shown on the plans are for information only. Refer to the Field Manual of Soil Engineering for detailed data regarding soil series notations and soils descriptions.

B. Terminology Used
1. CIP used with an embankment item denotes Compacted-in-Place.
2. LM used with an embankment item denotes Loose Measure.
3. Sound earth is any natural or otherwise approved material, that can be compacted to the required density, contains no organic material, and has a maximum unit weight of at least 95 pounds per cubic foot.
4. Frost heave textured material is any material containing more than 50 percent silt particles by weight, and having a plasticity index less than 10.
5. Silt is any material having a particle size of 0.075 to 0.002 mm.

205.02 Materials. Use materials meeting the following.

Granular Material Class II, III ........................ 902
Open-Graded Aggregate ............................. 902
Geosynthetics .................................... 910

Foundry sand that has been used for metal casting is not permitted.
205.03 Construction.

A. Preparing Roadway Foundation. Remove material from the roadway foundation and salvage or dispose. Compact the roadway foundation to the depth and density specified.

1. Removing and Salvaging Topsoil. Before removing topsoil, reduce all vegetation to a height of approximately 6 inches. Remove and dispose of all cut vegetation, brush, rocks, and other litter.

   Remove topsoil to the required depth from designated areas before excavating or placing embankment. Use equipment and methods that avoid lifting subsoil. Suspend topsoil removal if soil or weather conditions are unsuitable, as determined by the Engineer.

   Locate and shape topsoil stockpiles outside of the drip line of preserved trees. Locate topsoil stockpiles away from drainage courses and wetlands. Stockpile topsoil from the roadway within the right-of-way and outside the limits of construction or use in the slopes. If temporarily stockpiling topsoil outside the right-of-way, obtain and provide the Engineer written permission from the owner of the property where the material will be placed.

   Remove topsoil as follows:

   a. Peat and Muck Areas. Do not remove topsoil.

   b. Borrow and Clear Vision Areas. Remove topsoil to the depth and width required.

   c. Inlet, Outlet, and Berm Ditch Areas. Remove topsoil within the construction limits.

   d. Roadway Cut Areas. Remove topsoil within the grading limits.

   e. Roadway Embankment Areas. Remove topsoil within the grading limits.

2. Salvaging Materials. Remove existing gravel, crushed stone, or selected excavated materials. These materials may be salvaged. The Engineer may approve the use of salvaged material as earth shoulders, approaches, temporary roadway surfacing, or other items. Salvaged material may not include foreign or undesirable material. Temporarily stockpile salvaged material outside the grading limits and within the right-of-way limits as approved. Excess salvaged material is the property of the Contractor and must be removed before
project completion. Trim excess salvaged material stockpiles to a neat appearance when approved to remain on the project.

3. **Disposing of Stones, Broken Rock, and Boulders.** Stones, broken rock, and boulders may be placed in the right-of-way in a safe and scenic manner, if approved. Bury such material that cannot be incorporated in the work between the roadway and right-of-way lines, or dispose outside the right-of-way. Bury the top of the stones, broken rock, and boulders at least 12 inches below the natural ground level. If disposed of outside the right-of-way, obtain and provide to the Engineer, written permission from the owner of the property upon which the material will be placed.

B. **Rock Excavation.** Excavate all boulders one-half cubic yard or more in volume. Excavate rock or cemented soils that do not soften when wet or that cannot be excavated without continuous drilling, blasting, or continuous use of a ripper or other special equipment.

Expose the surface of the rock to permit measurements before starting rock excavation. Remove rock encountered in the excavation to the required cross section and according to the following.

1. Excavate so that no rock projects more than 6 inches above the lines of the required cross section.

2. Excavate backslopes to the neat line slopes shown on the plans, with no rock projecting more than 12 inches from the true slope.

3. Excavate the rock surface to provide drainage. Do not leave undrained pockets in the surface of the rock.

4. Remove all rock or boulders loosened in the excavation and overhanging ledges, either on or outside the required cross section.

C. **Peat Excavation.** Remove peat, muck, marl, and underlying very soft clay. Coordinate removal with swamp backfill operations.

D. **Swamp Backfill.** Construct embankments across peat marshes according to the method specified on the plans. Furnish granular material Class III for swamp backfill.

Where total excavation of peat results in a reasonably dry trench, backfilling may be conducted as a separate operation. Backfill the reasonably dry trench immediately after completing the excavation according to the controlled density method. Excavating and backfilling in separate
operations may only be done in shallow peat areas and only with approval of the Engineer.

Coordinate the rate of advancement of the embankment and surcharge in deep swamps with the rate of excavation of the upheaved peat. If a trench of the required depth is not maintained full width ahead of the surcharge, use additional peat excavating equipment or stop construction of embankment and surcharge until the two operations are in balance.

Rehandling of waste material to facilitate proper displacement will be included in the cost of peat excavation.

Dispose of peat as shown on the plans or according to subsection 205.03.P.

The Department will bore swamp backfill to determine if unsuitable material has been completely excavated or displaced. If the borings show that unsuitable material is present under the swamp backfill, the Department will determine the corrective action. Borings will be completed and the Contractor will be notified of corrective action required, within 60 days after the swamp backfill is completed.

Corrective action may consist of excavating, placing a surcharge, excavating relief trenches, or a combination of these actions.

When a surcharge is to be placed over the swamp backfill, the Engineer will determine the width and elevation. Leave the surcharge in place until the Engineer determines that the swamp backfill has stabilized or the required settlement has taken place. The Engineer may require that the surcharge remain in place for up to 90 days.

Material from the surcharge is the property of the Contractor.

Secure approval of swamp backfill and complete all peat excavation and spreading before placing the pavement structure.

E. Subgrade Undercutting. Undercut the subgrade and backfill to replace material susceptible to frost heaving or differential frost action and to remedy unstable soil conditions.

Removing topsoil and peat excavation is not part of subgrade undercutting. Subgrade undercutting includes excavation below subgrade in cut sections; excavation at the transition from cut to fill sections; and
205.03

excavation, other than peat excavation, as required below the topsoil in fill sections. Excavated material is the property of the Contractor.

1. Limits of subgrade undercutting

   a. After the subgrade is excavated to the approximate grade, the Engineer will promptly inspect the grade to decide if subgrade undercutting will be required and to determine the limits of undercutting.

   b. Where shallow fills are to be placed, the Engineer will inspect the fill area and determine the limits of the subgrade undercutting before embankment is placed.

   c. Remove deposits of frost heave textured material within lines 2 feet outside the proposed surface, including paved shoulders to a depth of 4 to 5 feet below the plan grade, north of the north boundary of Township 12 North and to a depth of 3.5 to 4 feet below the plan grade, south of the north boundary of Township 12 North.

2. Backfill of Subgrade Undercut

   a. Backfill subgrade undercutting Type I with selected clay or other approved material.

   b. Backfill subgrade undercutting Type II with granular material Class II.

   c. Backfill subgrade undercutting Type III with the material excavated from subgrade undercut areas, after mixing the excavated material to break up the undesirable strata of soils, or with approved backfill material.

   d. Compact subgrade undercutting backfill to not less than 95 percent of its maximum unit weight.

F. Subgrade Manipulation. Scarify, mix, and blend the roadbed subgrade to a depth of 12 inches below the top of subgrade. Compact to not less than 95 percent of its Maximum unit weight.

G. Earth Excavation. All excavated materials, except according to Subsection 205.03.A, are the property of the Contractor.

Compact the subgrade to not less than 95 percent of its maximum unit weight to a depth of at least 10 inches. If the subgrade cannot be
compacted to 95 percent of its maximum unit weight, using conventional construction methods, the Engineer may authorize use of other methods to attain compaction.

In cut sections where the existing material appears to meet subbase specifications, construct the grade to top of subbase rather than to the bottom of subbase. The Engineer will then determine whether the existing material meets subbase requirements. Shape material meeting subbase requirements to the top of subbase and compact to not less than 95 percent of its maximum unit weight to a minimum depth of 12 inches. The Engineer will adjust earthwork quantities accordingly. Excavate material not meeting subbase requirements to the bottom of subbase. Claims for damage caused by the halting of grading operation for making this subbase determination will not be allowed.

Maintain the roadbed and ditches and keep well drained at all times. Installing and removing temporary drainage facilities will be at the Contractor’s expense.

Conduct grading to avoid removing or loosening material outside the required slopes. If material is removed, or loosened outside the required slopes, replace and compact to the required density and cross section.

Dispose of surplus or waste material resulting from ditch construction according to subsection 205.03.P. Remove roots, stumps, or other objectionable materials in the slopes and bottom of the ditch and backfill the holes with suitable material. Maintain all ditches until final acceptance.

H. Roadway Embankment.

1. Stepping Side Slope. Embankments constructed on existing side slopes 1:6 or steeper must be stepped before embankment is placed. Form steps with a horizontal dimension of not less than 3 feet.

2. Borrow. Borrow will consist of approved material secured from locations outside the roadway. Excavate, transport, and place borrow material according to subsection 105.03.

After removal of borrow, leave borrow areas free-formed rather than having rigid geometric shapes. Make side slopes as flat as practical but not steeper than 1:4. Round the top and bottom of slopes with vertical curves to blend into adjacent terrain. Grade overburden, other than topsoil, if left in the borrow area, to eliminate unsightly mounds.
Where practical, shape areas to drain, leaving usable land after completion. In granular soil, leave the area at least 12 inches above the high ground water level. In cohesive soil, leave the area at least 12 inches above the high water elevation of the drainage outlet.

Where the area cannot be drained, create a pond or a wetland. Create ponds by excavating to a minimum depth of 8 feet below normal ground water level in granular soil, or to 8 feet below the lowest drainage outlet in cohesive soil. Create wetlands by excavation to a directed depth.

Restore all borrow areas as shown on the plans or in a manner that will leave the land in a useful condition and with a natural appearance. Restore borrow areas within Department right-of-way as required by contract documents. Fence all ponded borrow areas unless otherwise directed.

Restore borrow areas outside Department right-of-way, covered by Act 451, Part 91 as amended, Soil Erosion and Sedimentation Control (formerly Act 347), according to permit requirements. Topsoil, seed, and mulch all other borrow areas, outside Department right-of-way, not left as ponds or wetlands. Place topsoil, seed, fertilizer, and mulch above the normal water surface in all borrow areas left as ponds or wetlands. Restore borrow areas not having existing topsoil as approved. Use materials and application rates specified in Section 815 or as otherwise approved. Where surrounding land use indicates, the Engineer may approve pine seedlings at approximately 6 foot spacing as an alternative for topsoil, fertilizer, seed and mulch.

Boulders may be allowed to remain in borrow areas, provided they are left in natural appearing positions.

The Engineer may waive restoration requirements when borrow is taken from the working area of an existing commercial source or when the property owner has a permit from an approved public agency allowing otherwise.

3. **Winter Grading.** Remove ice and snow from the surface of the ground before placing embankment.

If the original ground contains more than 4 inches of frost within limits of 1:1 slopes spreading outward from the finished shoulders, remove the frozen material.
Remove frozen material on a partially completed fill before placing more fill on the embankment. Stockpile frozen material in approved areas outside the grading limits until thawed. Use the thawed material in any portion of the embankment if it meets the moisture requirements at the time of use.

4. Placing and Compacting Embankment. After the ground area has been prepared construct embankments with sound earth or a mixture of sound earth and stones, broken rock, concrete or masonry except as provided for in the disposal of peat excavation material and as restricted for the top 3 feet of embankment. Do not place frost heave textured materials in the top 3 feet of embankment below subgrade surface. Construct the top 3 feet of embankment to a uniformly stable condition using a uniformly textured material. Provide a minimum 50-foot longitudinal transition between two different textured materials.

Deposit embankment materials and compact according to the controlled density method. The Engineer may specify or authorize the 12-inch layer method, rock embankment method, or methods for treatment of peat marshes.

Do not construct embankments by methods that create an unstable slope condition. Do not place impervious material on the outside of embankments blocking the drainage of granular materials, nor place a combination of pervious and impervious material in the embankment creating potential pockets of saturated material. Do not place peat excavation materials in upland areas between the 1:1 slope extending down from the subgrade surface/front slope intercept point and the final plan fill slope in fills more than 14 feet high.

Stones occurring within construction limits and broken rock from rock cuts may be placed in embankments. Use only stones and broken rock 12 inches or less in greatest dimension. Place in layers. Fill voids with sound earth and compact to not less than 95 percent of its maximum unit weight. Do not place stones and broken rock layers within 3 feet of the subgrade surface.

Where filling in layers of the specified thickness is not feasible, such as filling in water or constructing on poorly drained soil, embankment may be constructed in one layer of granular material Class III to the minimum elevation that equipment can operate, as determined by the Engineer. Thoroughly compact the fill material
placed in this manner. Above this elevation, construct the embankment according to the controlled density method.

Backfill and compact embankment adjacent to structures according to subsections 205.03.I and 206.03.B. Construct all other embankment and backfill as follows:

a. **Controlled Density Method.** Deposit cohesive material for embankments and spread in layers not more than 9 inches deep, loose measure, and extending to the full width of the fill area. If the specified density is attained, deposit, spread, and compact granular material in layers not more than 15 inches deep.

Furnish cohesive material with a moisture content not greater than 3 percent above optimum at the time of compaction. Furnish granular material that has a moisture content below saturation, as determined by the one point cone chart in the *Density Control Handbook*. Provide cohesive material in the top 3 feet of embankment having a moisture content not exceeding optimum. If the material contains excess moisture, dry it to the required moisture content before compacting. Each layer of material must meet moisture requirements and be compacted to not less than 95 percent of its maximum unit weight, before placing the succeeding layer.

If the specified percentage of maximum unit weight and the specified moisture content have been attained but the compacted material is not sufficiently stable to provide proper support for the subbase, the Engineer may direct that the material be dried by aeration and recompacted. The aeration may be accomplished by disking or manipulation by other approved means.

b. **Twelve Inch Layer Method.** Deposit the material and spread in layers not more than 12 inches deep, loose measure, parallel to the finished grade, and extending to the full width of the embankment. Deposit the material by operating the hauling equipment over the layer being placed. Compact each layer to not less than 95 percent of its maximum unit weight according to the twelve inch layer method test in the *Density Control Handbook*. 
c. **Rock Embankment.** Construct rock embankment of shattered rock less than 12 inches in greatest dimension obtained by blasting or ripping. Deposit rock on the fill and push over the end of the fill. Do not deposit the shattered rock directly over the end of the fill from the hauling equipment. Place the rock embankment in layers not exceeding 3 feet thick. Choke the surface of the rock embankment with rock fragments and rock fines to prevent infiltration of the earth embankment. Use granular material Class III if insufficient rock fines are available to properly choke the surface of the rock embankment.

Do not use this method in fills less than 1.5 feet deep. Do not place the stones and broken rock layers within 3 feet of the subgrade surface. Cover structures located under rock embankment with not less than 24 inches of granular material Class III before placing the rock embankment.

I. **Structure Embankment.**

1. **Compaction of Original Ground.** In fill areas on which a structure is to be built, remove the topsoil from the area within the toe of slope according to Subsection 205.03.A.1. Compact the area to not less than 95 percent of its Maximum Unit Weight, 9 inches deep.

2. **Placing Structure Embankment.** Place and compact structure embankment to the limits shown on the plans before casting overlying footings. Protect structure embankments from freezing until overlying footings are cast. Use material and compaction methods as follows.

   a. **Under Structure Footings Supported by Piling.** Construct structure embankment of granular material Class III within the limits shown on the plans. Sound earth is permitted as an alternate material for these embankments when placed between April 1 and November 15. Use sound earth meeting Subsection 205.01 except rocks or broken concrete must be less than 3 inches in greatest dimension. Deposit and compact structure embankment according to the controlled density method.

   b. **Under Structure Footings for Which Piling is Not Specified.** Use granular material Class III within the limits shown on the plans and deposit and compact according to the controlled density method. Compact to 100 percent of its maximum unit weight.
within the limits of 1:1 slopes spreading outward in all directions from the bottom edge of the structure footings.

3. **Winter Grading for Structure Embankment.** Construct embankment during winter weather according to subsection 205.03.H.3 with the following addition. Before placing an embankment to support a structure, remove all ground containing frost within limits of 1:1 slopes spreading outward in all directions from the bottom of structure footings. Stockpile frozen material outside the grading limits in approved areas until thawed.

J. **Machine Grading.** Machine grading normally consists of light grading to an approximate depth of 12 inches. This work includes scarifying, plowing, diskng, moving, compacting, and shaping the earth to develop the cross section shown on the plans. Grade ditches to drain runoff waters. Grade all intersections, approaches, entrances, and driveways as shown or as directed. Loading or hauling of material will not be required for this item. The Engineer must approve using the excavation from ditches and roadbed in shaping shoulders and adjacent fills.

K. **Intercepting Ditch.** Construct ditches at the locations shown on the plans, or as directed to control erosion.

L. **Temporary Railroad Crossing.** Construct temporary railroad crossing to comply with subsection 107.20.

M. **Granular Blanket.** Excavate the unstable soil in the slope and backfill within the limits and to the depth shown on the plans, or as directed. Dispose of excavated material according to subsection 205.03.P.

1. For granular blanket, Type 1, backfill with granular material Class II.

2. For granular blanket, Type 2, dress the excavated area with a nominal 3-inch layer of granular material Class II before placing the drainage layer. Construct the drainage layer of one of the following:
   a. Two-inch layer of open-graded aggregate with geotextile blanket above and below.
   b. Three-dimensional mesh with geotextile blanket above and below.
   c. Other geocomposite section approved.
Place a minimum 12 inch layer of granular material Class II on the drainage layer to bring the slope and ditch section to the established elevation and cross section.

Construct underdrains adjacent to, or as a part of the slope protection according to section 404.

N. Trimming and Finishing Earth Grade. Construct the earth grade to the required grade remove all exposed stones and rocks more than 3 inches in diameter.

Trim the subgrade to the grade called for on the plans. Where a subbase is required, trim the subgrade to within 1 inch of the established grade. Where a subbase is not required, trim the subgrade to within \( \frac{3}{4} \) inch of the established grade.

Trim and shape the earth grade outside the subgrade to the required lines, grades, and cross sections. Finish slopes to Class B tolerance unless Class A tolerance is specified.

Finish Class A slopes to \( \pm 1 \) inch of the average slopes shown on the plans. Make measurements at right angles to the slope.

Finish Class B backslopes to \( \pm 6 \) inches of the average slopes shown on the plans. Make measurements at right angles to the slope. Do not leave abrupt variations in the finished surface. Remove all debris and undesirable material.

Finish Class B fill slopes to \( \pm 2.5 \) inches of the required grade and cross section from the outside shoulder line for a distance of 3 feet down the slope. Finish the remainder of the fill slope as Class B backslope.

Where trees or other restrictions do not interfere, round the tops of backslopes, bottoms of fill slopes and all other angles in the lines of the cross section to form vertical curves as shown on the plans or as directed. Make all transitions in length of vertical curves gradual and present a uniform and attractive appearance. When ditches are constructed in peat, vertical curves may be omitted.

O. Channel Excavation. Trim, straighten, widen, deepen or relocate the channel of the stream or watercourse. Remove and dispose of all materials, of whatever nature encountered. Remove masonry and concrete structures encountered. Removals will be paid for according to section 204. Complete all work in the new channel before diverting the stream.
flow to the new channel. Maintain all channels and keep free from debris until final acceptance of the channel.

P. Disposing of Surplus and Unsuitable Material. The Department assumes no legal obligation to ensure that the Contractor’s responsibilities under this section are fulfilled. The obligation for compliance rests directly and solely with the Contractor.

1. Definition of Wetlands and Floodplains. According to Federal Executive Order No. 11990 wetlands are “those areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.” US Army Corps of Engineers Regulation 33 CFR 323.2(a) and Michigan Act 451, Michigan Natural Resources and Environmental Protection Act, Part 303, and Wetland Protection, and Part 31, Floodplain Regulatory Authority contain similar definitions.

Floodplains are areas of land adjoining inland or coastal waters subject to flooding by the base flood. The base (100-year) flood is a flood or tide having a one percent chance of being exceeded in a given year.

2. Disposal Within the Right-of-Way. Do not dispose of material, either temporarily or permanently, beyond the normal plan fill slope across wetlands or floodplains. The Engineer may allow disposal of material within the right-of-way to fill low areas or to flatten slopes, at the Contractor’s expense. The Engineer may allow burying, piling, or placing material in a safe and scenic manner in selected areas within the right-of-way, at the Contractor’s expense.

3. Disposal Outside the Right-of-Way. Do not dispose of material, either temporarily or permanently, in a wetland or floodplain. Obtain and file with the Department written permission from the owner of the property if disposal is outside the right-of-way. Disposal and restoration of the area must comply with subsection 205.03.H.2 and is at the Contractor’s expense.
4. **Contractor Responsibility.** Contact the appropriate regulatory agencies for a determination of what a regulated wetland or floodplain is, before disposing of surplus or unsuitable material in areas outside the right-of-way that are not shown on the plans as disposal sites. Any surplus or unsuitable material disposed of in any portion of a wetland or floodplain not provided for on the plans must immediately be moved to an upland site, at the Contractor’s expense. Restore the vacated area as required by the regulatory agencies, at the Contractor’s expense. The Engineer will not allow requests for extensions of contract time, without assessment of liquidated damages.

5. **Notification to Regulatory Agencies.** The Department will notify the regulatory agencies if the Contractor disposes of surplus or unsuitable material in any portion of a wetland or floodplain not shown on the plans.

### 205.04 Measurement and Payment.

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<td>Excavation, Peat</td>
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<td>Granular Material, CI ____</td>
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A. **Roadway Earthwork Volumes.** Unless otherwise specified, roadway earthwork volumes will be computed either by average end areas, using cross sections determined from original and final elevation measurements, or by the staked-section method.

The staked-section method will use original cross sections taken preceding construction and slope stake and grade stake data from field notes for computation of earthwork quantities. Quantities will be adjusted for any change in design or authorized deviation from the estab-
lished grade and cross section. Sufficient measurements will be taken during construction to verify conformance to the required grade and cross section.

**B. General.**

1. Payment for work and materials required to build, maintain, remove, and restore borrow haul routes will be considered as having been included in the contract unit prices bid for other contract items.

2. When buried rubbish and trash is encountered that is not indicated on the plans or in the proposal, subsection 103.02.C shall apply.

3. Removing topsoil and other selected excavated materials from embankment areas will be measured and paid for as **Excavation, Earth.**

4. Topsoil and frozen material removed to facilitate the Contractor’s operations will be at the Contractor’s expense. If the progress clause set up in the proposal specifically requires the Contractor to construct embankments during the winter, the frozen material removed and the embankment required to replace it will be paid for at the contract unit prices for **Excavation, Earth** and **Embankment** respectively. The winter grading limits will be as directed by the Engineer.

5. Compaction of existing material in embankment and cut sections, after topsoil stripping, will not be paid for separately, but will be considered as included in the contract unit prices bid for other contract items.

6. **Granular Material Cl II** and **Granular Material Cl III** will be measured in place, by volume. **Granular Material Cl III** required for filling in water or constructing on poorly drained soil, will be measured and paid for as **Backfill, Swamp.**

7. **Underdrains, Bank** will be measured and paid for in accordance with subsection 404.04.

8. Trimming of the subgrade and slopes to the specified tolerances shall be considered included in the prices bid for other items of work.

9. Restoration of borrow and disposal areas shall be at the Contractor’s expense.

10. **Excavation, Channel** will be measured by volume, in its original position.
11. **Intercepting Ditch** will be measured by length along the center of the ditch in stations.

C. **Excavation, Rock** will be measured by the staked section method with no allowance for overbreak. Overbreak is the material removed outside the plan or authorized cross section for rock excavation. No deduction will be made for rock projecting inside the lines of the cross section within the limits specified. The removal of the overburden will be measured and paid for as **Excavation, Earth**. Boulders over 0.5 cubic yard in volume will be measured individually and the volume computed from average dimensions taken in three directions.

D. **Peat Excavation and Swamp Backfill**.

1. Measurement of total **Excavation, Peat** will be in its original position.

2. Measurement of partial **Excavation, Peat** and displacement will include the volume of the peat excavated to form the trench, and the excavation of the upheaved peat in the trench. The volume of upheaved peat to be removed from the trench will be estimated at 100 percent of the actual peat displaced. Peat displaced outside the pay limits shown on the plans will not be included in the pay quantity. Sufficient borings to determine the depth of displacement to be used in computing pay quantities will be made by the Department.

3. Excavation of peat, muck, marl, and underlying very soft clay will be paid for as **Excavation, Peat**.

4. In the treatment of peat marshes, no claims will be allowed for delays of less than 60 days caused by the Department’s testing and determining methods of correction. Any corrective work necessary in areas where the total excavation method is required will be at the Contractor’s expense.

For any corrective work necessary in areas where the partial peat excavation and displacement method is specified or directed, the costs will be shared equally between the Department and the Contractor. Payment for the corrective work includes all labor, material, and equipment necessary to perform the work, including excavation and relief trenches, if required.

If a time surcharge is recommended, the Contractor shall be paid for one-half of the swamp backfill quantity required for the sur-
charge. After stabilization of the backfill, or after the required settlement has occurred, the Contractor will be paid for one-half of the quantity of swamp backfill removed as earth excavation.

If excavation or relief trenches are required, the costs will be shared equally between the Department and the Contractor.

5. When called for on the plans, placement of temporary surcharge will be paid for at the contract unit price for Embankment, CIP or Backfill, Swamp. The removal of surcharge will be paid for as Excavation, Earth.

6. The work required for maintaining a temporary surcharge that is moved forward as the fill progresses will not be paid for separately.

7. Backfill, Swamp will be measured in its original position when practical. To facilitate measurement, the Contractor shall designate and isolate an area in the borrow pit or roadway cut for the exclusive source of material for Backfill, Swamp and excavation shall be done in an orderly manner. When more than initial and final cross sections are required to measure and compute the volume of material removed, the Contractor will be required to pay for the cost of additional cross sections and computations. If it is not practical to calculate the volume of Backfill, Swamp in its original position, the volume will be computed within the limits shown on the plans, or from borings taken in the fill, and will then be increased by 15 percent. The Backfill, Swamp volume will not be increased by 15 percent when the peat excavation results in a dry hole.

Backfill, Swamp used to construct sand core fills, as detailed in the plans and/or as directed by the Engineer, shall not receive the 15 percent increase as previously described.

E. Subgrade Undercutting and Subgrade Manipulation.

1. Subgrade Undercutting will be measured in its original position. No deduction will be made in subgrade undercut quantities for those areas where an underdrain is installed. There will be no adjustment in the contract unit price for any quantity changes of the type of Subgrade Undercutting specified. Payment for this contract item includes the removal and disposal of undesirable material and replacement with material of the type specified.

2. Subgrade Manipulation will be measured for payment only in designated areas.
F. Earth Excavation and Embankment.

1. Embankment, LM will be measured by volume, loose measure. The contract price is payment in full for furnishing, hauling, placing, and compacting the material at the required locations.

2. The work of stepping side slopes will be considered included in the work of constructing roadway embankments and will not be paid for separately.

3. When determined by the Engineer, quantities for Excavation, Earth and Embankment, CIP will be based on plan quantities. Surplus or unsuitable material disposed of outside the plan cross sections will not be included in the pay quantities for embankment materials.

4. When the Engineer determines that it is not feasible to determine quantities based on plan quantities, measurement for Excavation, Earth and Embankment, CIP will be as follows:
   a. Excavation, Earth will be measured by volume, utilizing the staked-section method except when excavation is performed without predetermined excavation limits.
   b. Embankment, CIP will be measured by volume, based on the grade and cross section shown on the plans or authorized, utilizing the staked-section method. No allowance will be made for possible increase in quantity of fill material required due to normal consolidation of the natural ground under the embankment. When surplus or unsuitable material is disposed of outside the plan cross sections, it will not be measured as Embankment, CIP.

5. If material is removed in embankment areas to a greater depth than specified, payment for Excavation, Earth; Embankment, CIP and Embankment, Structure, CIP will be made only for the amount specified or as directed.

6. Embankment, Structure, CIP will be measured by volume, based on the grade and cross section shown in the plans, utilizing the staked-section method. No allowance will be made for possible increase in quantity of fill material required due to normal consolidation of the natural ground under the embankment.
7. Sound earth, when used as structure embankment under pile-supported footings, will be measured and paid for as Embankment, CIP.

G. **Machine Grading** will be measured by length along the edge of surface. Each side of the road, where work is performed, will be measured separately.

H. **Granular Blanket**.

1. **Granular Blanket, Type 1** will be measured in place by volume, which includes the volume of granular material Class II, within the limits and to the depth shown on the plans or authorized.

2. **Granular Blanket, Type 2** will be measured and paid for in place, by volume, which includes the volume of the drainage layer and the volume of granular material Class II, within the limits and to the depth shown on the plans or as authorized.