

## SECTION 202 EXCAVATION AND EMBANKMENT

### 202.01. DESCRIPTION.

This work shall consist of excavating material and constructing embankments. This includes furnishing, hauling, stockpiling, placing, disposing, sloping, shaping, compacting, and finishing material as described below. All material used as embankment and/or borrow must be free of dispersive clay as well as any hazardous and/or industrial waste as defined by 40CFR Parts 240 through 281 and state regulations.

- (a) **Excavations.** This work consists of removing, disposing, or compacting all material (except that removed under some other category) as required to construct a roadway in conformity with these Specifications and in reasonably close conformity with the lines, grades, thicknesses, and typical cross-sections shown on the Plans or established by the Engineer. This work involves four types of activity:
  - (1) **Unclassified Excavation.** Removing and disposing of all materials encountered in the work *except* muck excavation and structural excavation covered in section 501;
  - (2) **Muck Excavation.** Removing and disposing of saturated or unsaturated mixtures of soils and organic matter or other materials not suitable for foundation material (regardless of moisture content or other characteristic);
  - (3) **Unclassified Borrow.** Removing and disposing of all borrow excavation obtained off of the right-of-way or easement areas by the contractor which is *not* classified as Select Borrow;
  - (4) **Select Borrow.** Removing and disposing of all borrow material that meets the requirements in Subsection 705.01, or that is specified on the Plan (e.g., specific soil groups, group characteristics, or material obtained from a sandstone formation).
- (b) **Embankments.** Embankment construction consists of (a) constructing roadway embankments, including preparation of the areas upon which they are to be placed within the right-of-way, and (b) placing and compacting approved material.
- (c) **Earthwork.** Earthwork construction consists of all excavation, embankment, or unclassified borrow necessary to complete the project.

### 202.04. CONSTRUCTION METHODS.

- (a) **Excavations.**
  - (1) **Unclassified excavation.** Unclassified excavation requires attention to general characteristics, topsoil, rocks (including pre-splitting), obliteration of old roadways, avoiding the establishment of off-site facilities in wetlands or archeological sites, and avoiding unsuitable materials.

Finish the excavation and embankments for the project to reasonably smooth and uniform surfaces. Compact the top 6 inches (150 mm) of the subgrade in accordance with Section 202.02(b)(2) (earth embankment). The top of finished subgrade shall be within the tolerances shown in Subsection 202.02(f).

*NOTE: Do not waste materials without permission of the Engineer.*

Conduct excavation operations so that the material outside of the limits of the slopes will not be disturbed. Construct embankments that are incidental to unclassified excavation in accordance with Section 202.02(b).

When Plans require that topsoil be salvaged, remove and stockpile it before unclassified excavation begins. This will be paid for as a separate item in accordance with Section 205.

**Rock Excavation:** Unless otherwise provided for on the Plans, excavate rocks or other solid, unyielding material in the finished grade of roadbed cut sections to a depth of at least 12 inches (300 mm) below subgrade.

Backfill with approved material meeting the requirements of Select Borrow Subsections 705.01 or as specified on the Plans in accordance with Subsection 202.02(d)1-Materials. All approved material for backfill shall pass a 3 inches ( 75 mm) sieve. If any material does not reduce to less than 75 millimeters, remove it. Cut to drain all depressions or pockets in the undercut or overbreak areas. In cuts, compaction shall meet the moisture and density requirements described in Subsection 202.02(b)(2) (Earth Embankment), or as shown on the Plans.

*NOTE: Neither an excavation below subgrade nor a backfill will be paid for unless it is verified by the Engineer before backfill is placed.*

When pre-splitting is shown on the plans, the pre-splitting line will be established by the Engineer. Drill bore holes along the slope line, maintaining the drill holes at the angle designated on the plans, and ensuring that all drill holes are in the same plane. The diameter, spacing, and loading of pre-split holes must result in a neat break. Drill the pre-splitting holes for the full depth of the ledge. For the initial pre-splitting of a geological formation, use a 100 foot (30-m) test section. After drilling, loading, and shooting this test section, remove the material to determine if the diameter, spacing, and loading of the pre-split holes are adequate to give an acceptable backslope. If the pre-splitting is determined to be *unsatisfactory*, make adjustments in the spacing, diameter, and loading of the pre-split holes by using another 100 foot (30-m) test section. If the results are determined *acceptable*, however, continue the pre-splitting throughout the geological formation using these methods and procedures. When loading the pre-splitting holes with explosives, follow the manufacturer's recommendations. When the formation is of such character that no apparent advantage is gained by pre-splitting, the Engineer may order its discontinuance. Pre-splitting will be measured and paid as a separate item. Removal of pre-split material shall be measured and paid as unclassified excavation.

**Old Roadways:** Obliterate old roadways with any grading operations necessary to incorporate the old roadway into the new roadway and surroundings, thereby providing a pleasing appearance from the new roadway. Roadway obliteration will be paid for as unclassified excavation, unless it is included as a separate item under Section 210.

**Archeological and Wetland Sites:** Obey all laws and regulations when establishing off-site facilities, including plant sites, borrow pits, waste areas, haul roads, storage sites, parking areas, and similar areas associated with the acquisition, production, and delivery of borrow material and related road building materials.

Do not construct or locate off-site facilities in areas designated as wetlands by the U.S. Army Corps of Engineers (USACE) without written approval of the USACE. Contact the

Regulatory Branch of the USACE (phone, 918-669-7400) to determine the status of wetlands and to get approval for intended locations of off-site facilities. Present the entire plan for off-site facilities and site restoration to the USACE for approval. Forward a copy of the approval to the Engineer prior to the beginning of off-site excavation. When the project lies in an area designated as wetlands, do not disturb the area between the limits of construction and the right-of-way line without approval of the Engineer. Adhere to the requirements of permits which are included as a part of the contract.

Whether in wetlands or not, examine all intended locations of off-site facilities for archeological significance. Identify the intended location (legal description of the 1/4 section) to the Engineer, who will examine the site and confer with the proper authorities for this determination. Allow up to 10 days for the archeological investigation. If a site is determined to be of potential or established archeological significance requiring further investigation, you may either postpone the excavation until the artifacts have been removed or obtain an alternate location for the source of Borrow Material.

Whenever encountering archeological remains during the excavation of a previously approved off-site facility (or on the project itself), immediately cease the operation and notify the Engineer, who will contact the proper authorities for an evaluation. Depending on the significance of the archeological find, there may be only a short delay; but if the delay will be long, you should consider an alternate source of material. In such cases, with approval of the archeological authorities, it may be possible to cover over (rebury) the archeological materials and move to another location. If you remove archeological materials from a site, conform with the National Historic Preservation Act and the Archaeological Resources Protection Act of 1979, the Oklahoma State Register of Historic Places Act, and the Oklahoma Violating Sepulchre and the Remains of the Dead Act (refer to Oklahoma Statute 21, Sec. 1168, and 53, Sec. 361, OS 21, Chapter 47 Section 1168). If the construction operation is delayed due to archeological finds in an off-site facility, the Department will compensate a Contractor only with an extension of time commensurate with the amount of delay involving items on the critical path. Monetary compensation will not be allowed for these purposes.

**Unsuitable Materials:** If excavation to the finished graded section results in a subgrade or slopes of unsuitable soil, the Engineer may require (a) removal of the unsuitable materials and (b) backfill to the finished graded section with an approved material. Do not place the backfill before the Engineer can take the necessary cross-sectional measurements. To be suitable, material for backfilling must be equal to or better than approved materials close to or adjoining those materials removed, as determined by AASHTO M 145, Method of Classification. When shown on the Plans, backfill material shall meet the requirements of Subsection 202.02(d)1-Materials. The Engineer may designate as unsuitable those soils that cannot be properly compacted in embankments. Unsuitable material may also include trash, metal, glass, and other man-made items. Dispose of all unsuitable materials in a manner approved by the Engineer.

When the location of unstable soil is shown on the Plans, remove and replace the soil as shown on the Plans. If excavation requires more than one handling prior to the final placement, it will be paid for at the Contract unit price for unclassified excavation for each handling approved by the Engineer; or it may be paid for as another item of work for the second

handling. More than one handling is defined as an operation requiring a second loading and transporting of the material.

- (2) **Muck Excavation.** Locations and extent of muck excavation will be shown on the plans. Conduct excavation operations so that necessary measurements can be taken before replacing unsuitable material with an approved backfill, which will be either Unclassified Excavation or Unclassified Borrow pay items. Excavated materials that are not suitable for use as Topsoil can be hauled off and disposed of as waste.

Use an approved granular material below the water table level to prevent unsuitable material from becoming mixed with the backfill. Compact the backfill material according to Section 202.02(b) Embankments. Within the roadway fill limits, Muck Excavation may require coffer dams and dewatering, which will be incidental to the Muck Excavation. Quantities of Muck Excavation will be computed according to Section 202.05.

- (3) **Borrow Excavation.** Unless otherwise designated on the Plans or in the proposal, make your own arrangements for obtaining borrow and paying all costs involved. When procurement of borrow from a designated area is mandatory, it will be so shown on the Plans, and the right-of-way for mandatory borrow areas will be furnished by the State or other Agency purchasing right-of-way for the project.

In advance of opening any borrow areas, notify the Engineer far enough ahead of time to take cross-section elevations and measurements of the ground surface (after clearing) and to make any required tests.

*NOTE: Do not excavate for borrow until the Engineer has determined that additional material will be needed. If you place more borrow than is required without written approval of the Engineer and thereby cause a waste of excavation, the amount of such waste will be determined and deducted from the borrow volume as originally measured, and payment will likewise be adjusted.*

Do not place borrow pits and haul roads in a wetland. Once a potential borrow site has been identified, contact the U.S. Army Corps of Engineers regulatory branch for wetland determinations in accordance with "archeological and wetland sites" described in Subsection 202.02(a)(1).

Do not widen roadway cuts and special ditches except when shown on the Plans or authorized by the Engineer. Measure material removed from these as Unclassified Excavation.

Do not excavate borrow from pits closer than 500 feet (152 m) to the near right-of-way on a designated State or Federal highway system, except with written approval of the Engineer. Submit a plan detailing the excavation for borrow pits located in the upstream flood plain of a stream crossing any roadway or bridge project; in evaluating this plan for possible acceptance, the Bridge Engineer will consider possible detrimental effects to the bridge or roadway.

Provide and maintain all necessary haul roads from the borrow pits to the work site at your own expense. Unless otherwise provided, clearing, grubbing, stripping, and replacement of top soil of borrow areas and material not used in the embankment will not be measured for payment. Excavate all borrow pits with uniform slopes, and leave them in a neat, workmanlike condition and in full compliance with all applicable State and Federal laws. Upon completion of borrow excavation, shape the pit for cross-sectioning.

(b) **Embankments.**

Embankments require attention to (1) the preparation of the foundation and (2) construction practices.

- (1) **Preparation of Foundation.** Embankment less than 4 feet (1.2 m) high. Grub the trees and remove the topsoil and organic matter. Completely break up the cleared ground surface to a depth of 6 inches (150 mm) by plowing or scarifying. Compact the ground surface to not less than 95 percent of the Standard Density when tested in accordance to Subsection 106.03. Remove existing pavement or reduce pavement to a maximum size of 6 inches (150 mm).

Embankment more than 4 feet (1.2 m) high. Cut the trees 6 inches (150 mm) above the foundation. Break up the foundation to a depth of 6 inches (150 mm) by plowing or scarifying, where feasible. Place embankment directly on the scarified foundation.

Embankment across ground not capable of supporting equipment. The Engineer will determine whether the unstable material shall be removed or bridged. If bridged, limit the layer thickness to the minimum depth necessary to support equipment. Dump material on top of the layer and push it over the end. In those areas where roadway fills are to be placed which cannot be satisfactorily compacted to a stable and durable condition, the Engineer may designate removal and backfill with suitable material.

Embankment on an existing slope steeper than 1:4. Cut horizontal benches to a sufficient width to accommodate placing and compacting operations and necessary equipment. Begin each bench at the intersection of the original ground and the vertical cut of the previous bench.

- (2) **Construction Practices.** Start embankments at the low point and place in layers approximately parallel to the finished grade. Crown the roadbed to provide drainage at all times. Use effective spreading and disking equipment on each lift to obtain uniform moisture and thickness prior to compacting. If necessary, add or remove water in order to obtain the required density and moisture content.

During all stages of construction, route and distribute hauling and leveling equipment over the width and length of each layer of material.

Do not construct embankments on frozen material or place frozen material in embankments. Do not place rocks, broken concrete, or other solid materials in embankment areas where piling is to be placed or driven.

If an embankment is to be placed on one side only of abutments, wing walls, piers, retaining walls, or culvert headwalls, take care that the area immediately adjacent the structure is not compacted to the extent that it will cause overturning of the structure (or excessive pressure against it). When embankment is to be placed on both sides of a concrete wall, abutment, end bent, or box type structure, conduct operations so that the embankment is always at approximately the same elevation on both sides of the structure.

If rocks or boulders are larger than 6 inches (150 mm) in the largest dimension, do not use them in the embankment nearer than 5 feet (1.5 m) to the structure.

*NOTE: If roadway excavation does not meet these requirements, other imported material will be measured and paid for as unclassified excavation or unclassified borrow.*

**Rock Embankment.** If a large portion of the embankment material is rock, construct the embankment in layers no deeper than the maximum size of the rock present in the material; in no case shall the thickness of the layer exceed 2 feet (600 mm). Material with sizes up to 2 feet (600 mm) may be placed in lifts up to 3 feet (914 mm) in maximum thickness. The larger sizes should be placed near the outer slopes and the very large boulders, greater than 1 yd<sup>3</sup> (0.76 m<sup>3</sup>), shall be embedded in the slopes, broken down to smaller sizes or wasted. End dumping is required: dump the rock onto the lift under construction; then push it with a crawler dozer (minimum 70,000 pounds (31,750kg)) over the leading edge of the lift, thoroughly wetted and compacted with heavy equipment. Level and smooth each layer with suitable leveling equipment and by distribution of spalls and finer fragments of earth. Construct the top 12 inches (300 mm) with approved material—placed in layers not exceeding 8 inches (200 mm) in loose thickness, and compacted as specified for earth embankments (see following paragraph). When specified on the Plans, approved materials will be classified for acceptance in accordance with Subsection 202.02(d)1.- Materials.

*NOTE: No rock larger than 3 inches (75 mm) in any dimension shall be placed in the top 1 foot (0.3m) of compacted embankment.*

**Earth Embankment.** If the roadway embankment is to be made of earth, including backfill, place it in layers not exceeding 8 inches (200 mm) (loose measurement). Compact all embankment material (including the top 6 inches (150 mm) of the subgrade in cuts) to not less than 95 percent of Standard Density when tested in accordance with AASHTO T99 methods C or D, unless otherwise stipulated by the Plans and the Contract or designated by the Engineer. Determine in-place density by AASHTO 205 (Rubber Balloon), AASHTO T 238 (Nuclear), or another approved test method for determining in-place density.

The moisture content of the embankment material at the time of compaction shall be within 2 points of the optimum moisture content as determined by AASHTO T-99, unless otherwise specified on the Plans or approved by the Engineer in writing. If specific or unusual conditions are encountered in the work, the Engineer may designate an adjusted moisture range for compaction of embankment. If desired, request in writing a lower moisture range for compaction of A-4 or A-5 soil groups to within 4 points below optimum moisture. If you successfully demonstrate to the Engineer's satisfaction that the lower moisture range is more practicable, your request may be so approved, provided embankment compaction meets the 95-percent minimum requirement.

Place and roll all material in layers except that which is inaccessible to the roller—for example, material adjacent to culverts or bridge abutments. In such cases, place the material in layers not to exceed 4 inches (100 mm) deep (measured loose), and compact it to the density and moisture content of the adjacent embankment with mechanical tampers.

*NOTE: No additional compensation will be allowed for mechanical tamping. When the completed embankment section is greater than the typical section or greater than the section authorized by the engineer, the excess will be determined (with due allowance for shrinkage) and deducted from the appropriate quantity.*

- (c) **Earthwork.** Construct earthwork on a project using excavation or embankment as defined in subsection 202.02(a) or 202.02(b).

(d) **Selective Subgrade Topping.** When designated on the Plans, construct the upper portion of the roadbed with selective subgrade topping materials; construct the base of the selected subgrade zone within plus or minus 0.20 feet (60mm) of the required elevation shown on the Plans.

(1) **Materials.** Selective subgrade topping materials shall meet the requirements specified for the various classes of topping shown below, or as may be otherwise specified by classification or characteristics referenced in AASHTO M 145.

<u>Selective Subgrade Topping</u>	<u>Specification Requirement</u>
Class I	AASHTO M 145 Granular Materials: A-1, A-2-4, A-2-5 or A-3 Groups
Class II	Subsection 705.01
Class III	5 to 15 P.I.
Class V (Restrictive)	AASHTO M 145 Silt-Clay Materials: <u>1/</u> A-7-5 and A-7-6 Groups A-4 and A-5 Groups

*NOTE: 1/ these materials will be restricted from use in Class V Topping.*

(2) **Selective subgrade topping.**

*NOTE: Selective subgrade topping shall pass a 3 inch (75 mm) sieve unless otherwise specified.*

2.1 *Testing.* Selective subgrade topping materials shall be tested in accordance with Subsection 705.01(b).

2.2 *Classification.* The classification of selective subgrade topping materials for acceptance by group and subgroup classifications will be in accordance with AASHTO M 145. The determination of group index values (numbers) specified for acceptance of group and subgroup classifications will be determined in accordance with the procedures prescribed in AASHTO M 145.

(3) **Sources of Selective Subgrade Topping Materials.**

3.1 *Contractor's Option.* The Contractor shall develop a plan which demonstrates to the Engineer that an adequate quantity of material will be salvaged or reserved for selective subgrade topping. During the movement of excavation, it will be the Contractor's responsibility to follow the approved grading plan to the extent that the available quantity of material needed for selective subgrade topping will be reserved for use.

3.2 *Mandatory Sources Designated on the Plans.* When selective subgrade topping material sources are designated on the Plans as mandatory sources, the Contractor shall excavate such materials within the limits designated, and haul and place the materials at the locations shown on the Plans.

(e) **Sloping, Shaping, Dressing, and Finishing.** Construct and dress the slopes of all cuts, ditches, and embankments in a neat and workmanlike manner, as indicated on the Plans or as directed by the Engineer.

*NOTE: When rock extending to the top of cuts makes rounding impractical, it will not be required.*

Slope, shape, and round old existing banks as specified for new work. The quantities of excavation in rounding tops of cut slopes will be paid for at the price for unclassified excavation and no other compensation will be allowed for this work.

*NOTE: Where a neat, uniform face cannot be obtained using standard equipment, hand trim the slopes.*

Trim the slopes in all cuts and banks of borrow pits from top to bottom in firm material.

Dressing shall include all the necessary clearing of the right-of-way of stumps, brush, weeds, and other rubbish, and disposing of same in accordance with Subsection 201.02.

- (f) **Tolerances.** Finish the roadbed to profile and cross-section within the following tolerances: bring the roadbed to a uniform cross-section with a maximum tolerance of  $\pm 0.1$  foot (30 mm) from the cross-section as given on Plans.

*NOTE: The algebraic difference of the variations from grade of any points in the roadbed not more than 50 feet (15 m) apart shall not exceed 0.1 foot (30 mm).*

When grading and surfacing are in the same contract, finish the roadbed profile and cross-section to within the tolerances specified under Section 301.04.

## 202.05. METHOD OF MEASUREMENT.

- (a) **Measured Quantities.** When payment is specified on a volume basis, measure all accepted excavation and borrow in both its original position and final position. Such measurements will include overbreakage or slides in unclassified excavation, not attributable to carelessness of the Contractor, and authorized excavation of rock, shale, muck or other unsuitable material.

*NOTE: Volumes of structures and obstructions removed, measured and paid for under Section 619 will not be measured and paid for under this Section.*

Authorized excavation of rock, shale, muck or unsuitable material below grade shall consist of that excavation necessary as authorized by the Engineer. If the plane of the designated grade line falls within a layer or stratum of rock, the below-grade excavation to the bottom of the layer, not exceeding 12 inches (300 mm) below the designated bottom of excavation, will be considered as authorized and will be paid as theoretical measurement.

*NOTE: Rock excavation more than 12 inches (300 mm) below the designated grade line will not be paid for unless authorized by the Engineer. If the nature of the material, the thickness of the layers or strata and method of operations are such that it is practical to excavate only to the depth shown on the Plans, no measurement will be made of any material removed below the line designated. The measurements will include overbreakage in rock excavation from the backslopes to an amount not to exceed in any half station of 50 feet (15 m), 10 percent of the actual quantity required for that half station.*

Measurements will be made for unsuitable materials actually excavated and removed to obtain proper compaction in cut sections and in foundations for fill sections.

Measurements will not be made of the suitable material temporarily removed and replaced to facilitate compaction of the material for the full depth shown on the Plans.

Where it is impractical to measure material by the cross-section method due to the erratic

location of isolated deposits, acceptable methods involving three-dimensional measurements may be used.

*NOTE: Where the Contract does not specifically provide for payment for excavation, the work of excavation construction will not be paid for as such but will be considered incidental to the various classifications of embankment.*

- (b) **Measurement of Embankments.** When embankment is specified in the Contract for payment as a separate bid item, accepted quantities for payment will be measured in its original and final position. The Engineer will compute the volume in cubic yards (cubic meters) from the dimensions of the embankment and the depths below the completed grade to which this method of construction applies. It will be the Contractor's responsibility to furnish the number of cubic yards (cubic meters) of material actually required to meet the Plan typical cross-sections.

*NOTE: No allowances will be made for surplus material outside the limits of the typical cross-sections or for any materials or work required to correct settlement, shrinkage, or swell of the embankments. No deductions for the volume of culverts, manholes, and the like will be made. Where the Contract does not specifically provide for payment for embankment, the work of embankment construction will not be paid for as such but will be considered incidental to the various classifications of excavation.*

- (c) **Earthwork.** When shown on the plans, earthwork will not be measured but will be paid for as lump sum. Estimated quantities will be shown on plans.
- (d) **Presplitting of Rock.** When specified in the Contract, presplitting of rock will be measured by the linear foot (meter) of drilling completed and approved.
- (e) **Selective Subgrade Topping.** Selective subgrade topping will not be measured for separate payment but measured as excavation or embankment. Any extra cost will be included.

## 202.06. BASIS OF PAYMENT.

Accepted quantities of excavation and embankment will be measured in accordance with accepted industry practices, such as the following:

**Average End Area From Cross Sections.** This method of volume computing is an average of the cross sectional end areas times the distance between them.

**Average end area (using finite elements) from cross sections.** This method of volume computing uses cross sectional end areas. The end area model is broken into finite elements (sections) and then sums the volumes of the elements. This method accounts for curvature in the alignment and any daylight (no cut/ no fill) points within each element.

**Original surface vs. final surface (Digital Terrain Model).** This method of volume computing creates a three dimensional surface of the original and final survey data. Triangulation is then used between the data points to determine the volume.

**Three Dimensional Measurements.** This method of volume computing may be used for erratic locations of isolated volumes by acceptable measuring practices.

**Weight or Truck Measurement.** This method of volume computing may be used if specified. It shall be done in accordance with Section 109.

Accepted quantities as measured above will be paid for at the contract unit price for the following:

- (A) UNCLASSIFIED EXCAVATION ..... CUBIC YARD (CUBIC METER)
- (B) MUCK EXCAVATION ..... CUBIC YARD (CUBIC METER)
- (C) UNCLASSIFIED BORROW ..... CUBIC YARD (CUBIC METER)
- (D) SELECT BORROW ..... CUBIC YARD (CUBIC METER)
- (E) EMBANKMENTS ..... CUBIC YARD (CUBIC METER)
- (F) PRESPLITTING OF ROCK ..... LINEAR FEET OF DRILLING  
(METER OF DRILLING)
- (G) EARTHWORK ..... LUMP SUM

Such payment shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.

*NOTE: When water is not specified as a pay item for use in embankment or excavation items in the contract, the water used will not be measured or paid for as a separate item but will be considered incidental to the work.*

## **SECTION 203 TEST ROLLING**

### **203.01. DESCRIPTION.**

This work shall consist of the test rolling with heavy pneumatic tired rollers when shown on the Plans or required by the Specifications.

### **203.02. MATERIALS.**

In the event test rolling discloses soft, yielding, or otherwise unstable areas, correct such areas by removing all unsuitable material and replacing it with suitable material. Demonstrate the satisfactory correction of any area by test rolling the corrected area.

### **203.03. EQUIPMENT.**

Heavy pneumatic-tired rollers shall have a minimum of 7 wheels abreast. The tires must be of such size and ply that tire pressures shall not be less than 50 psi (350kPa) for rolling operations. The roller wheels and axles shall be so designed that each wheel will carry an approximately equal load. The roller shall have a loading platform suitable for loading with ballast sufficient to obtain a load of not less than 7,870 pounds (3,570 kg) per wheel. The Contractor shall furnish the Engineer with certified weights of the empty roller and weights of the ballast.

The rolling equipment shall be capable of operation within the limits of the Specification, and must be able to turn without damage to the work being tested. Rolling equipment shall be approved by the Engineer.

### **203.04. CONSTRUCTION METHODS.**

Roll the area to be tested with at least 2 passes or 1 complete coverages. Operate the roller at speeds between 2 and 10 miles (3 and 16 kilometers) per hour as directed by the Engineer.