

SECTION 202: EXCAVATION, EMBANKMENT, and BORROW

202.1 DESCRIPTION

This work consists of performing excavation, constructing embankments, and providing borrow, including the hauling, placing, compacting, and disposing of materials.

Preparation of the upper portion of the Subgrade for aggregate base course placement is contained in Section 205, Subgrade Preparation, of these specifications. Unstable Subgrade Stabilization is contained in Section 203 of these specifications.

Definitions are provided below for clarity:

1. Unclassified Excavation is the removal of material within cut sections to the subgrade elevation. It includes suitable, unsuitable and unstable materials other than those requiring specialized equipment or blasting to remove.
2. An Embankment is the portion of the roadbed below the aggregate base and surface courses that is built up in layers consisting of suitable material. Embankments involve fill construction above existing ground to the top of the subgrade, after clearing and grubbing operations and topsoil removals (if performed).
3. Borrow is material from Contractor-provided sources placed in fill and/or Embankment areas when all suitable Unclassified Excavation material has been exhausted.

202.2 MATERIALS

Prior to bidding the project, the Contractor shall perform all work necessary to fully understand the type of materials to be excavated and placed in performing the work and determining the costs associated with excavating, hauling, mixing, wetting, rolling, compacting, disposing, and securing any Borrow sources.

Any geotechnical investigation or pavement investigation results (when available), provided in the contract documents or otherwise, shall be considered as reference information only by the contractor.

202.2.1 Material Classifications

202.2.1.1 Suitable Materials

Suitable materials are those materials which can be compacted to the required Embankment densities and meet all other contract requirements for Embankment materials. The Design R-Value requirements for suitable materials applies to the upper one (1) foot of the subgrade.

Suitable materials that are unstable shall be reworked (e.g., blended, dried, and recompacted) to create a stable platform at the Contractor's expense. Additional stabilization efforts shall be addressed under Section 203, Unstable Subgrade Stabilization, if included as a bid item in the contract, or paid for as Extra Work as directed by the City Engineer or designee. In addition, the City Engineer or designee can designate suitable materials that are unstable as unsuitable materials.

202.2.1.2 Unsuitable Materials

Unsuitable materials include organic materials, frozen lumps, ice, and soils such as peat, shale, gypsum or other materials that may degrade with time, or are contaminated. Unsuitable material also includes those with an R-value less than the Contract R-value applicable to the upper one (1) foot of the subgrade, or if material harmful to the final product is present.

202.2.1.3 Unstable Subgrade

Unstable Subgrade is defined as Subgrade that is soft, pumping, and/or displaces with applied loading when encountered in non-Borrow sections such as cuts or existing grades, due to no fault or neglect of the Contractor. See Section 203, Unstable Subgrade Stabilization, when this item is specified in the contract.

202.2.1.4 Borrow Material

Borrow material shall be suitable material selected to meet the requirements and conditions for Embankment or backfill for which it is to be used. Borrow material shall be obtained from sources selected by the Contractor and approved by the City Engineer or designee. The Contractor shall submit proposed Borrow sources at the preconstruction conference.

Borrow material placed within one (1) foot of the final subgrade elevations shall meet the Design R-Value requirements in the contract. Prior to Borrow operations, the contractor shall perform Design R-Value testing in accordance with AASHTO T-190. This information shall be submitted to the City Engineer or designee with a request to begin Borrow operations. During Borrow placement, if changes in soil properties are identified, additional Design R-Value tests may be required at the Contractor's expense.

202.3 CONSTRUCTION REQUIREMENTS**202.3.1 General**

Perform excavation and Embankment operations within the plan excavation limits, lines, and grades as required by the contract. Finish excavation and Embankment for the Roadway, intersections, and entrances to reasonably smooth and uniform surfaces. Do not remove Materials from the Project limits without the approval of the City Engineer or designee.

Maintain drainage for excavations and Embankment operations. Provide and maintain temporary drainage facilities until the permanent facilities are complete and operational. All work shall meet SWPPP requirements for the project.

Protect utilities and structures during construction operations and repair any damage caused by Contractor operations at Contractor's expense. This may require the Contractor to install temporary protection features. Should any damage occur to these existing features due to the Contractor's operations, the City Engineer or designee may withhold money from the Contractor based on the extent of the damage until repairs are completed to the satisfaction of the utility operator.

Terminate operations in the immediate area of environmental sites or Cultural Resources not listed in the Contract, until the appropriate mitigation actions are completed in accordance with New Mexico Department of Transportation's Specifications for Highway and Bridge Construction, Current Edition, Section 107.12 "Environmental, Cultural Resource and Hazardous Materials Discoveries."

202.3.2 Sequencing

202.3.2.1 Notification

Notify the City Engineer or designee before opening any excavation or Borrow areas.

202.3.2.2 Surveying

Ensure cross-section elevations of the ground surface are taken before opening any excavation or Borrow areas.

202.3.2.3 Temporary Erosion Control

Ensure all erosion control requirements and all necessary temporary sediment and erosion control protection (TESCP) devices are installed prior to initiating excavation and Embankment activities on the construction site. The TESCP items would be paid for under the Storm Water Pollution Prevention Plan (SWPPP) pay item.

202.3.3 Excavation

202.3.3.1 Topsoil and Suitable Material

All existing topsoil shall be stripped from the site and stockpiled for use as slope dressing when grading operations are complete.

During the progress of excavation, material taken from the cuts and deemed suitable for fill materials, shall be saved and utilized for these purposes as directed by the City Engineer or designee. When practical, the selected material shall be hauled directly from excavation to final position on the Embankment.

If handling the selected material directly from excavation to its final position at the time is impractical, the selected material should remain in its original location until it can be placed in the final position. However, if specifically detailed within the plans or specifications or allowed by the City Engineer or designee, the selected material may be excavated, temporarily piled at authorized locations, and later placed on the Embankment at no additional cost to the City.

202.3.3.2 Unclassified Excavation

Unclassified Excavation includes the removal of suitable, unsuitable or unstable materials within a cut section to the subgrade elevation for the width of the roadbed and finishing to a smooth and uniform surface prior to fill placement. It also includes removal of unsuitable or unstable materials below the bottom of the compacted subgrade as deemed necessary by the City Engineer or designee. Cross-sectional measurements shall be taken after removal of the additional unsuitable or unstable materials.

202.3.3.3 Use of Suitable Material

All suitable material removed from the excavations shall be used, insofar as practical, in the formation of Embankments, subgrade, shoulders, slopes, bedding, backfill for culverts and other structures and utilities, and for such other purposes as directed by the City Engineer or designee. All remaining material, not incorporated into the project, is the Contractor's responsibility to dispose of at an off-site location, as determined by the Contractor in accordance with all applicable laws.

202.3.3.4 Removal of Unsuitable Material

All material deemed unsuitable for the intended use, including that which is unstable and not able to be satisfactorily stabilized as determined by the City Engineer or designee, shall be excavated, removed from the site, and disposed of at an off-site location in accordance with all applicable laws.

202.3.3.5 Disposal

Dispose of excess or unsuitable materials outside the project at a permitted location. A disposal plan, including written permission from the owner(s) of the property used for material disposal, shall be submitted to the City Engineer or designee at the preconstruction conference.

Native topsoil shall be preserved where vegetation is intended to remain after construction. Native topsoil should be stockpiled on the project site for later use, but may be stockpiled at off-site locations or transferred to other locations as approved by the City Engineer or designee in accordance with 202.3.3.1, Topsoil and Suitable Material.

202.3.4 Embankment

Embankments involve fill construction above existing ground to the subgrade elevation after clearing and grubbing operations and topsoil removal (if performed). Ensure the Embankment meets the Design R-Value of the contract in the upper one (1) foot of the subgrade. See Section 205, Subgrade Preparation, for requirements applicable to the preparation of the upper portion of Subgrade.

202.3.4.1 Placement

Prior to the placement of any Embankment material in fill areas, the upper six (6) inches of the existing ground area upon which Embankments will be placed shall be compacted to a density of not less than 90% of maximum density as determined by ASTM Designation D 1557.

Embankments shall be formed of suitable material, placed in horizontal layers. Materials shall be placed and compacted in successive layers not more than eight (8) inches in loose depth.

202.3.4.1.1 Frozen Ground

Embankments shall not be constructed when either the existing ground or the fill material is frozen. Suspend Embankment construction until the ground and/or materials are thawed, dried, and are suitable for compaction.

202.3.4.1.2 Benching

When Embankment is placed on existing natural slopes, including rock, compacted against existing Embankments, or placed as part of a phased construction approach, the Embankment shall be benched to facilitate proper compaction. Ensure benches are wide enough to allow operation and placement of compaction equipment.

202.3.4.1.3 Locations of Structures or Utility Lines

Embankment materials consisting of rock, broken concrete, or other solid materials shall not be placed where future bridge foundations consisting of piling or drilled caissons, utility lines, or any other buried structures are specified in the plans as part of the project or noted in the plans as locations of future work.

202.3.4.1.4 Particle Sizes

All Embankment material placed shall be smaller than six (6) inches in greatest dimension. Hard lumps of Embankment materials or rock materials larger than six (6) inches shall be broken down or removed before compacting the material.

No Embankment materials larger than four (4) inches in greatest dimension shall be placed within twelve (12) inches of a structure.

No Embankment materials larger than two and one-half (2-1/2) inches in greatest dimension shall be placed in the upper twenty-four (24) inches of the Embankment, which generally will be the subgrade preparation area.

202.3.4.2 Compaction**202.3.4.2.1 Density**

The Embankment shall be compacted to 95% of maximum density based on ASTM Designation D 1557.

202.3.4.2.2 Moisture Content

The moisture content of the Embankment material, at the time of compaction, shall be optimum moisture content plus or minus two (2) percent.

202.3.4.2.3 Testing

Contractor and Agency testing for Embankment, Unclassified Excavation, Borrow and Design R-Value shall be as per the New Mexico Transportation Department Minimum Testing Requirements at:

http://www.dot.state.nm.us/content/dam/nmdot/Construction/INDEPENDENT_ASSURANCE_PROGRAM_5-29-13.pdf

A sample of each type of soil encountered shall have the moisture density relationship determined in accordance with ASTM Designation D 1557 and, if within the Design R-Value area, be classified in

accordance with the requirements of ASTM Designation 2487 with an estimated resistance Design R-value assigned based on plasticity index (PI) and percent material passing the No. 200 sieve.

The Contractor is responsible for Design R-Value testing of Borrow materials incorporated into the upper one (1) foot of the subgrade. The Contractor is required to submit potential Borrow sources to the City Engineer or designee at the preconstruction conference and to ensure any necessary testing is performed prior to placement of materials on the project.

In areas where field testing fails, the area must be re-worked or material replaced and a passing test performed before placement of any subsequent materials at the Contractor's expense.

202.3.5 Borrow

Suitable excavation material shall be utilized before placing Borrow material, unless otherwise approved by the City Engineer or designee. If the Contractor places more Borrow material than required and causes suitable onsite material to be wasted, the City Engineer or designee will deduct the amount of wasted suitable material from the Borrow volume.

202.3.5.1 Borrow Sources

Sources of Borrow material will be measured by the area excavated and shall be excavated to neat lines to allow accurate measurement of Borrow material. This may require blading or shaping.

If the Borrow source is a new pit, the Contractor shall ensure all permitting approvals are obtained before opening the pit.

202.4 METHOD OF MEASUREMENT

202.4.1 Unclassified Excavation and Borrow

Measure Unclassified Excavation and Borrow in its original position. Cross-sectional measurements shall be taken before any material is excavated or backfill placed.

Excavation beyond the limits shown in the plans will not be included in the measured quantities, unless it is directed by the City Engineer or designee.

For each phase of the project, the Contractor shall measure the original ground surface of any areas that are designated as Unclassified Excavation (cut sections) and/or Embankment (fill sections), or Borrow. Prior to any Work continuing in completed excavation areas, the contractor shall measure the "final surface" of the newly excavated ground surface. For Embankment and Borrow areas, the contractor shall measure the final surface once these operations are completed.

Earthwork quantities will be calculated as the neat volume from the original ground surface (less the existing base course and roadway surfacing) between the limits shown on the plans, and/or authorized changes by the City Engineer or designee, and the new ground surface. No shrinkage or swell factors shall be applied to payment being made on the final cross-sectioned volume.

For the measurements described above the contractor shall survey and submit the original ground surface and final surface data at completion of each phase of construction using an electronic XML-compatible format approved by the City Engineer or designee. The contractor shall use a New Mexico licensed surveyor to stamp and certify cross-sections at 50-foot intervals, unless otherwise specified in the contract or approved by the City Engineer or designee prior to commencement of earthwork operations. The contractor shall submit certified volume summary reports based on this electronic data for each phase of construction including a report that summarizes the basis for the final volumes.

For Borrow from commercial sources, use weight converted to cubic yards at minimum specified density as agreed upon by the City Engineer or designee.

202.5 BASIS OF PAYMENT

202.5.1 Unclassified Excavation

Payment for Unclassified Excavation shall be considered all-inclusive of the costs of the work including: excavation, hauling, preparation of the existing ground, Embankment placement and compaction, benching, disposal of any excess or unsuitable materials at an off-site facility, surveying, and any other costs related thereto. It includes all materials excavated that do not require specialized equipment or blasting. For example, the removal of cobbles using standard construction equipment would be included in the Unclassified Excavation quantities for payment.

Pay Item	Pay Unit
Unclassified Excavation	Cubic Yard

202.5.2 Borrow

Payment for Borrow shall be considered all-inclusive of the costs of the work including: source preparation, excavation, delivery, Embankment placement and compaction, final finishing, benching, permitting of an off-site facility, surveying, and any other costs related thereto.

Pay Item	Pay Unit
Borrow	Cubic Yard

202.5.3 Double Handling

Payment for excavated materials that require more than one (1) handling before final placement will only be made if specifically identified within the contract. This includes topsoil required to be stockpiled and reserved for later use in the work. If payment for double handling is specified in the contract, payment will be made:

1. At the bid item unit price for Unclassified Excavation for each handling approved by the City Engineer or designee; or
2. As another item of work for the second handling if this alternate payment is specified in the contract.