

SECTION 02335

ROADWAY EARTHWORK

PART 1 - Description

This section covers work for all excavations, embankments, grading, or removal of unsuitable material from roadbed excavations; sloping, shaping and dressing of all slopes for the construction and preparation of the graded road bed to receive the placement of a subbase or pavement material. Subgrade preparation shall also consist of the final grading of the roadbed in both cuts and fills to the density specified. .

1.01 Definitions

- A. Unclassified Excavation Above Subgrade - Unclassified excavation above subgrade is defined as any material excavated above the subgrade elevation within the street right-of-way which is placed in fill or disposed of as directed by the Engineer, and any material taken from borrow pits and deposited as embankments or fill within the streets above the proposed subgrade elevation.
- B. Optimum Moisture Content (OMC) - Optimum moisture content is defined by ASTM D698.
- C. Undercutting - This work consist of the removal and disposal of unsatisfactory excavated material below grade in cut sections or below the subgrade elevation within the street paving width as directed by the engineer. Areas to have unclassified excavation may be designated on the plans if sufficient information is available. Undercut areas shall be backfilled with suitable material from imported borrow excavations, gravel backfill, or materials stabilized with gravel or soil cement as ordered by the Owner
- D. Imported Borrow Excavation - Imported borrow excavation shall consist of excavation made from borrow areas inside or outside the project limits, and outside the normal grading limits for completion of embankments.
- E. Subgrade - That part of the roadbed to receive the immediate construction of a base or pavement thereon.
- F. Subbase - That part of the roadbed above the subgrade and below the base or pavement extending across the entire section of the roadway.

PART 2 - Materials (Not Used)

PART 3 - Execution

3.01 Excavation to Grade

- A. Excavation shall be made to grade, dimensions, and cross sections as shown on the plans or as directed by the engineer. The top of the finished subgrade shall be of such smoothness that when tested with a ten foot (10') (3m) straight edge it shall not show any deviation in excess of one-half inch (1/2") (12.5mm) from true grade as established by grade hubs or pins. Any deviations in excess of these amounts shall be corrected by loosening, adding, or removing materials, reshaping, and recompacting by wetting and rolling.
- B. Excavation shall be done in one process. All material above the subgrade shall be removed to the top elevations shown on the plans or specifications. When the excavation has been completed, the material at subgrade elevation shall be examined and inspected by the engineer. If the material at proper grade and depth meets or exceeds the requirements of material for subgrade course, as specified in these specifications and/or as determined by the Engineer, further excavation will not be required.
- C. If subbase material (bound aggregate) is specified, it shall be installed and prepared as specified in Section 02710.

3.02 Subgrade Preparation

- A. Excavation to the subgrade shall be cut approximately one inch (1/2") (13mm) above subgrade and the subgrade shall be scarified 12 inches (12") (304mm), the moisture adjusted to within $\pm 2\%$ of optimum moisture content and compacted to at least 95% of maximum density as determined by ASTM D698. The compacted subgrade shall extend one foot (1') (.3m) beyond the outside edges of the pavement base course or from rear face of the curb and gutter.
- B. Undercutting below subgrade shall be performed where spongy, organic, or otherwise unsuitable material is encountered, which, in the opinion of the engineer, will not provide a suitable foundation for the subbase or pavement material. The unsuitable material shall be removed to the depth specified by the engineer and replaced with acceptable material or stabilized with gravel or Portland Cement, or undercut and backfilled with gravel as directed by the Owner, who shall be the sole judge as to the method to be used. Replacement material shall be moisture conditioned and compacted to a minimum of 95% maximum density, as determined by ASTM D698 and a moisture content of $\pm 2\%$ of optimum.

3.03 Subgrade Protection.

- A. During construction, the subgrade shall be kept shaped and drained. Ditches and drains along the subgrade shall be maintained so as to drain effectively at all times. Where ruts occur in the subgrade, it shall be brought to grade, reshaped, and recompacted prior to placing of subbase or pavement material. The storage or stockpiling of materials on the subgrade will not be permitted. No subbase course or pavement material shall be laid until the subgrade has been checked, proof-rolled, and approved by the Engineer. Under no circumstances shall subbase or pavement material be placed on a muddy subgrade.

3.04 Imported Borrow Excavation

- A. Where fill is required for embankment, the fill shall be composed of clean earth, sand, or gravel, free from organic matter or other objectionable foreign material. The area to receive fill shall be stripped of all vegetation and other unsuitable material before fill placement is started. Slopes shall have surfaces broken up in such a manner that fill material will bond with existing surface as directed by the Engineer. The fill shall be placed in layers not to exceed ten inches (10")(254mm) inches in depth prior to compaction. The material in each layer shall be moistened to within $\pm 2\%$ of optimum moisture content as directed by the Engineer and shall be rolled until at least 95% of maximum density as measured by ASTM D698. When borrow is required, it shall be taken from a source approved by the Engineer. Fill shall be defined as imported borrow excavation. Unless otherwise specified, the top twelve inches (12")(304mm) of the pavement subgrade in both cut and fill sections shall be compacted to 100% of maximum density.

3.05 Parkway and Shoulder Finish

- A. Promptly after completion of curb and gutter construction, the areas between the curb and gutter and the property lines, shall be brought to a uniform, smooth grade, unless otherwise directed by the engineer. Hand raking may be required around trees and in areas where larger equipment cannot be used. Fill material placed in such areas shall be free from stones, sticks, or other materials which will be objectionable for seeding or sodding purposes. Backfill material shall be suitable for the growth of lawn grass. The backfill shall be compacted to a minimum of 90% of maximum dry density as measured by ASTM 698 -- however, finished grade shall be left one inch (1") (25mm) high to allow for settlement. The Contractor shall maintain the parkway area until final acceptance.

3.06 Soil Erosion Control

- A. It shall be the responsibility of the Contractor to take such action as may be necessary to minimize water pollution due to blowing dust or soil erosion due to precipitation. All disturbed soils shall be covered with hydromulch according to the erosion control plan. If this method is used, care shall be taken to avoid development of mud holes and to avoid erosion. With the Engineer's approval, other methods of soil erosion control may be utilized, such as hygroscopic materials. Such materials shall not be used if they may have a deleterious effect on future work to be accomplished on the surface to which they are applied, if they may harm vegetation with which they come in contact, if they may contribute to corrosion of metals, or if they are dangerous or irritating to humans or to animals. Refer to sections 02115 and 02481 for details on erosion control and hydromuching.

3.07 Subgrade Proof Rolling

- A. Before the placing of any type of pavement surfacing on the finished subgrade, such subgrade

shall be proof rolled with at least one pass of coverage for its full width and length with a self-propelled pneumatic roller single axle (min load) or other approved equipment by the City Engineer. Ground contact pressure of all tires shall be 85-90 psi (585-621 kPa). At the discretion of the Engineer, the specified ground pressure may be lowered and alternate equipment can be utilized. When the proof rolling shows an area to be unstable, such area shall be brought to satisfactory stability by additional compaction, reworking, or removal of unsuitable material and replacement with acceptable material.

B. Schedules for Proof Rolling.

1. All utilities, including laterals or service pipes located under the street or the curb, gutter must be in place before the Proof Rolling operation is performed.
2. Proof Rolling shall not take place more than 24 hours prior to the placing of the concrete for the curb, gutter, and/or bound aggregate base course or the hot mix asphalt street section.
3. The Owner, City representatives, and Engineer must be notified, and approval of the subgrade condition must be given, prior to the installation of any portion of the street section including curb and gutter.

END OF SECTION