

Division II
Section 2100
Grading and Site Prep



**DIVISION II
CONSTRUCTION AND MATERIAL SPECIFICATIONS**

**SECTION 2100 SANITARY SEWERS
GRADING AND SITE PREP**

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SECTION 2100 GRADING AND SITE PREP

2101 SCOPE

This section governs the furnishing of all labor, equipment, and materials to perform all work associated with excavation, compaction, trenching, and backfilling as shown on the plans or as established by the City Engineer.

Site grading and general clean-up of the construction area shall be performed simultaneously and immediately following completed work. The construction site shall be graded to uniform slopes and shall conform to existing contours, or to new profiles as shown on the plans. The construction site shall be graded in such a manner as to prevent ponding.

2101 MATERIALS

Upon the request of the City Engineer, the Contractor shall provide three (3) copies of certified test reports indicating the material conforms to the specifications as outlined in the following sections. The manufacturer shall perform all tests in conformance with applicable standards. Testing may be witnessed by the City Engineer or approved independent testing laboratory.

All materials shall be stored to prevent deterioration or intrusion of foreign matter. No deteriorated or damaged material shall be used.

2101.1 Backfill Material

Backfill material will be classified as sand, granular, aggregate base or surfacing, earth or earth and rock. Samples of all imported material to be used for backfill shall be furnished to the City Engineer for approval prior to construction.

2101.1.1 Sand

Sand may be used in trenches only from the top of pipe to within two (2) feet of the finished grade. The maximum size of the particles in sand shall be approximately one-sixteenth (1/16) inch in any dimension.

2101.1.2 Granular Material

Granular material shall be similar to the specifications for UD-1 material in the Kansas Department of Transportation Standard Specifications for State Road and Bridge Construction. Limestone screenings may also be used as granular material. The maximum particle size shall be approximately three eighths (3/8) inch in any dimension.

2101.1.3 Aggregate Base or Surfacing

Aggregate base or surfacing material shall conform to the specifications for AB-3 Aggregate in the Kansas Department of Transportation Standard Specifications for State Road and Bridge Construction.

2101.1.4 Earth

Earth shall consist of soils native to the Manhattan area. Earth may be used as backfill in any area provided it is not of an expansive nature, and it is free of rocks larger than three-quarters (3/4) inch in any dimension.

2101.1.5 Earth and Rock

Earth and rock may be used as backfill in embankments and trenches. However, the maximum dimension of the rock shall not exceed 12 inches, and the earth and rock material will not be allowed within the first two (2) feet above the pipe, nor within the top two (2) feet of the finished grade. When earth and rock is used, it shall be placed and thoroughly consolidated with sufficient earth to completely fill all voids between the rocks.

2101.2 SOIL STABILIZATION MATERIALS

2101.2.1 Fly Ash

Only Type C Fly Ash from Jeffery Energy Center, or approved equivalent, shall be used.

2101.2.2 Lime

Lime shall be hydrated pebble lime.

2102 CLEARING AND GRUBBING

Clearing and grubbing shall be carried on well in advance of the construction so as not to delay the progress of the work. All areas designated for clearing and grubbing will have all vegetation, roots, stumps, and other objectionable material removed.

The Contractor will be responsible for the disposal of waste material. Burning of waste material shall be allowed only with the written permission of the City of Manhattan Fire Department, or the appropriate authority having jurisdiction.

Unless noted on the plans for removal or trimming, or so designated by the City Engineer, the Contractor shall leave all trees, shrubbery and planted areas in place, and protect them from damage during his operations. Where existing trees will interfere with the normal operation of equipment the Contractor will be responsible to trim low limbs. The trimming shall be performed in a professional manner, prior to equipment operation.

2103 BLASTING

Blasting shall be permitted only with the written approval of the City Engineer. Prior to blasting, a pre-blast survey of existing improvements shall be conducted by the Contractor, and the results of the survey shall be provided to the City Engineer. All blasting shall be done under the supervision of a licensed blaster.

2104 EXCAVATION

All Excavated material not required for embankments or backfill of trenches shall be promptly disposed of by the Contractor. The Contractor shall be responsible for providing a disposal site unless otherwise directed by the Contract Documents or the City Engineer.

2104.1 Trenching

The Contractor shall perform all trench excavation to the elevations shown on the drawings. Unless the Contractor finds justification for opening longer trenches, the maximum length of trench open at any time shall be 300 feet. Open trenches in excess of 300 feet shall be approved by the City Engineer prior to opening. The walls to prevent collapse. Shoring shall consist of sheeting and bracing, the use of a trench or other appropriate methods. The Contractor shall be responsible for the safety of the public and construction personnel with regard to all open trenches.

From the base of the trench to the top of the pipe, trench walls shall be vertical. When installing pipes with an inside diameter of six (6) inches or less the trench below the top of the pipe shall be no more than 24 inches wide. Then installing pipes with an inside diameter greater than six (6) inches, the trench below the top of the pipe shall not be more than 16 inches wider than the outside diameter of the pipe.

The bottom of each pipe trench shall provide uniform and continuous support for the pipe between bell holes. In locations where an unsatisfactory trench bottom is encountered, due to rock or unstable soil, the Contractor shall remove the material a minimum of six (6) inches below the pipe subgrade over the entire width of the trench. The unsuitable material shall be replaced with suitable granular material, and shall be compacted to provide a stable and uniform subgrade. Limestone screenings may not be used in this situation. It shall be the responsibility of the Contractor to provide a uniform and stable subgrade at his own expense.

2104.2 Grading

Prior to construction, all areas, which are to be paved or are to receive embankments shall be cleared and grubbed according to these specifications. Upon completion of clearing and grubbing, the top six (6) inches shall be scarified and compacted to the required density.

When rock is encountered below proposed pavement it shall be removed a minimum of six (6) inches below the bottom of said pavement. Suitable fill material, including granular material, aggregate base, or earth shall be placed and compacted to the finished subgrade elevations. The maximum allowable thickness of granular material shall be one (1) inch. Sand shall not be used to fine grade for paving.

The Contractor shall take the necessary measures to prevent rutting or pumping of the subgrade. Should either occur the Contractor shall cease paving operations and recompact the subgrade to the minimum density required.

Backfill material behind the curb shall be free of broken concrete, or other unsuitable, imported, construction material. The Contractor shall use the best available, on-site material, and if possible, it shall be free of gravel, rock or crushed rock in excess of three-quarters (3/4) inch diameter.

2105 SOIL STABILIZATION

2105.1 Fly Ash Soil Stabilization

This item shall consist of constructing a mixture of soil, fly ash, and water in accordance 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 City Engineer.

2105.1.1 Preparation of Roadbed

The roadbed shall be bladed to the proper cross-section, and the area to be stabilized shall be scarified to a minimum 12 inch depth.

2105.1.2 Application of Fly Ash

After the roadbed has been properly prepared, the fly ash shall be spread on the soil at fly ash, at optimum moisture. Mixing shall be done using a Pulvermixer, or approved disk. The mixture shall be initially compacted using a sheepsfoot roller. The compaction shall be completed with a rubber tire or steel wheel roller to provide a uniformly compacted surface. The density of the finished subgrade shall meet the requirements outlined in Section 6 of EARTHWORK AND TRENCHING. After compaction is completed, the soil shall be fine graded in compliance with the plans.

2105.1.3 Maintenance of Roadbed

Until pavement is constructed, the Contractor shall be required to maintain the completed subgrade, at his own expense. The subgrade shall be in good condition, satisfactory to the City Engineer, and any unsatisfactory areas that develop prior to paving shall be repaired in a manner that will insure restoration of a durable, uniform subgrade.

2105.2 Lime Treated Subgrade

This item shall consist of constructing one or more courses of a mixture of soil, hydrated pebble lime and water in accordance with these specifications, and in reasonably close conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the City Engineer.

2105.2.1 Preparation of Roadbed

The roadbed shall be bladed to the proper cross section, and the area to be stabilized shall be scarified to a minimum 12 inch depth.

2105.2.2 Application of Lime

After the roadbed has been properly prepared, the pebble lime shall be spread evenly on the soil at the rate of 4% of the dry weight of the soil (approximately 37.00 pounds per square yard for 12 inch scarification). Prior to placing pavement, the Contractor shall provide load tickets to verify the proper amount of lime was used on the project. Water shall be added as necessary to achieve a thorough mix of the soil and the lime, at optimum moisture. Mixing shall be done using a Pulvermixer or approved disk. The mixture shall be initially compacted using a sheepsfoot roller. The compaction shall be completed with a rubber tire or steel wheel roller to provide a uniformly compacted surface. The density of the finished subgrade shall meet the requirements outlined in Section 6 of GRADING AND SITE PREP. After compaction is complete the soil shall be fine graded in compliance with the plans.

2105.2.3 Maintenance of Roadbed

Until pavement is constructed, the Contractor shall be required to maintain the completed subgrade, at his own expense. The subgrade shall be in good condition, satisfactory to the City Engineer, and any unsatisfactory areas that develop prior to paving shall be repaired in a manner that will insure restoration of a durable, uniform subgrade.

2106 COMPACTION REQUIREMENTS

The quality of the compaction as specified herein shall be subject to compaction tests when deemed necessary by the City Engineer. It shall be the Contractor's responsibility to make any necessary excavation in order to accommodate compaction tests at locations selected by the City Engineer. Upon completion of the test, the Contractor will backfill and recompact. If the quality of the compaction does not meet the herein specified requirements, the material shall be removed and replaced to meet the designated requirements at the expense of the Contractor. Typically, compaction testing will be done using a Troxler Nuclear Density Gauge.

All backfill, except sand, shall consist of lifts measuring 12 inches thick or less prior to compaction. Each lift shall be compacted to a minimum of 95% of maximum density as determined by the Standard Proctor Density Test before placing the next lift. When backfilling a trench, no heavy equipment will be used within two (2) feet of the top of pipe. Compaction shall be achieved using hand operated equipment or other lightweight equipment that will not damage the pipe due to overloading. To insure uniform, consistent compaction, the moisture content of the material being compacted shall not exceed the material's optimum moisture content by more than two (2) percent.

Testing of on-site materials(s) to determine the maximum density and optimum moisture content shall be the responsibility of the City of Manhattan. Similar testing of imported materials shall be the responsibility of the Contractor. Test results on imported material shall be provided to the City Engineer prior to importation of the material.

Sand shall be compacted by means of flooding the trench and simultaneously vibrating the sand to obtain the necessary compaction. The Contractor shall not allow the vibrator to come within one (1) foot of the top of the pipe. The contractor shall remove any free water that is not absorbed into the trench walls within a reasonable amount of time.