DIVISION II

CONSTRUCTION AND MATERIAL SPECIFICATIONS SEWERS

# SECTION 2100 – GRADING AND SITE PREPARATION

APPROVED AND ADOPTED THIS 21TH DAY OF MAY 2008

KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

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DIVISION II

CONSTRUCTION AND MATERIAL SPECIFICATIONS

# SECTION 2100 GRADING AND SITE PREPARATION

## SECTION 2101 CLEARING AND GRUBBING

### 2101.1 Scope

This section governs the furnishing of all labor, equipment, tools and materials and the performance of all clearing, grubbing, and demolition within the limits of work as defined in Section 2101.3A of this specification, in the Special Provisions or as shown on the plans.

### 2101.2 Definitions

A. Clearing: Clearing shall consist of removing all vegetable matter such as trees, brush, down timber and other objectionable materials found on or above the surface of the site. It shall include removing buildings, fences, lumber, waste dumps and trash and the salvaging of such materials as may be specified and disposing of the debris. The Contractor shall scalp all excavation and embankment areas. Scalping shall include the removal of material such as sod, grass, residue or agricultural crops and decayed vegetable matter from the surface of the ground without removing more earth than is necessary.

B. Grubbing: Grubbing shall consist of removing and disposing of all vegetable matter such as stumps, roots, buried trees and brush encountered below the surface of the ground or subgrade, whichever is lower, which have not been included in Section 2101.2A entitled “Clearing”.

In all cases of grubbing, the vegetable matter shall be removed to a minimum depth of 12 inches (30.48cm) below ground line or subgrade, whichever is lower, except as provided in Section 2101.3C.

When deleterious materials are encountered below ground line which may be detrimental to the proposed improvement, these shall be removed to a depth necessary to provide adequate support for the proposed improvement.

C. Demolition and Removal: This work shall consist of demolishing, removing, and disposing of all structures and improvements within the construction limits unless included in other items of work as shown on the plans or in the Special Provisions. This work shall apply to all structures and improvements, whether on, above or below the surface of the ground or subgrade.

Demolition and removal shall include but not be limited to items such as buildings, drainage structures, pipes, pavements, fences, retaining walls, guard rails, and signs.

Items such as fences and guard rails shall be salvaged and relinquished to the appropriate owner or relocated, where indicated on the plans.

Relocation of signs, fences, guard rails, etc. shall be considered incidental to removal work except where such relocation is listed separately in the Itemized Proposal of the Special Provisions.

All pipes which are to be abandoned shall be removed unless otherwise shown on the plans or approved by the Engineer.

D. Trees: Vegetable growth 6 inches (15.24cm) in diameter and larger, measured 3 feet (91.44cm) above ground shall be classified as a tree.

E. Brush: Vegetable growth less than 6 inches (15.24cm) in diameter, measured 3 feet (91.44cm) above ground shall be classified as brush.

### 2101.3 Construction Details

A. Limits of Work: The limits for clearing, grubbing, and demolition shall extend to the construction limits unless otherwise shown on the plans.

B. Protection of Greenery, Existing Structures and Private Facilities: The plans will designate trees, shrubs or other plants that are to be saved and the Contractor will take necessary steps to protect this greenery. Trees may be pruned, upon prior approval of the Engineer, but only in accordance with the best practices of arboriculture in respect to the individual species with due regard to their natural form and growth characteristics.

   Existing structures within or adjacent to the construction limits that are not to be removed or demolished, shall be protected by the Contractor during his construction. Any private facilities such as house sewer laterals which are disturbed or damaged by the Contractor's work, shall be repaired by the Contractor prior to the close of the work day. This repair shall be made in a manner sufficient to restore utility service to that property.

C. Embankment Areas: When undisturbed stumps and roots are encountered where the fill depth will exceed 3 feet (91.44cm), the stumps and roots may be left in place provided they do not extend more than 3 inches (7.62cm) above the original ground line.

D. Borrow Areas: All stumps, roots and other objectionable matter shall be removed from the borrow material used for embankment or fill. The borrow area shall be left in a well drained and smooth condition.

E. Backfilling the Site: All trenches, holes, pits, and basement areas resulting from the operations of clearing, grubbing, demolition and removal on the site, shall be backfilled with suitable material placed and compacted in conformance with Section 2102.6 entitled "Embankment".

F. Disposal of Materials: All materials with the exception of those which are designated for salvage or which are used in the embankment in conformance with this specification, shall become the Contractor's property and shall be disposed of by him, outside the project limits.

G. Items to be Left in Place: In removing items such as concrete pavements, curbs, curb and gutter, sidewalks and similar objects where portions of these objects are to be left in place they shall be removed to an existing joint or a new joint, sawed to a minimum depth of 2 inches (5.08cm) or ¼ the slab thickness, whichever is greater. This joint shall be to true line and vertical face. Sufficient portions of such items shall be removed to provide the proper grade and connection to the new work.

## SECTION 2102 GRADING

### 2102.1 Scope

This section governs the performance of all work required toexcavate, remove, dispose or compact all materials encountered within the limits of the project, at the locations shown on the plans, in accordance with the requirements of applicable Sections of the General Provisions and Covenants, and as provided for in the Special Provisions.

### 2102.2 Definitions

A. Grading: Grading as used herein shall mean the performance of all excavation, embankment, and backfill in connection with the construction of all improvements

B. Excavation: Excavation is defined as the removal of materials from the construction area to the lines and grades shown on the plans.

1. Unclassified Excavation: Unclassified excavation is defined as the removal of all material encountered regardless of its nature. All material excavated will be considered as Unclassified Excavation unless the Special Provisions specify Classified Materials.

2. Rock Excavation: Rock excavation is defined as the removal of all rock ledges 6 inches (15.24cm) or more in thickness, and detached rock or boulders having a volume of more than 1 ½ cubic yards (1.15 cubic meters) and shale occurring in its natural state, hard and un-weathered.

   A rock ledge is defined as a continuous body of rock which may include thin interbedded seams of shale or other soft materials less than 12 inches (30.48cm) thick. The vertical limit of each ledge shall be defined by interbedded seams of soft materials 12 inches or more in thickness. The beds of soft interbedded material 12 inches (30.48cm) or more in thickness shall not be included in the measurement for "Rock Excavation" but shall be included in the measurement for "Earth Excavation".

3. Earth Excavation: Earth excavation is defined as the removal of all material not defined as rock.

C. Embankment or Backfill: Embankment or backfill is defined as the placing and compacting of material in the construction area to the lines and grades shown on the plans.

1. Unsuitable Material: Unsuitable material is defined as muck, frozen material, organic material, top soil, rubbish, and rock with a maximum dimension greater than 24 inches (60.96cm).

2. Suitable Material: Suitable material is defined as entirely imperishable with that portion passing the No. 40 (425mm) Sieve having a liquid limit not exceeding 40 and a plastic index not exceeding 25, when tested in accordance with ASTM D-423 and D-424, respectively.

   a. Rock Embankment: Material for rock embankment shall be free of unsuitable material and shall contain, by volume, greater than 10 percent rock or gravel having a maximum dimension greater than 3 inches (7.62cm) but not greater than 24 inches (60.96cm).

   b. Earth Embankment: Material for earth embankment shall be free of unsuitable material and shall, contain by volume, less than 10 percent rock or gravel having a maximum dimension greater than 3 inches (7.62cm).

D. Borrow: Borrow is defined as approved material excavated from an area outside of the project limits and required for the construction of the embankment.

E. Waste: Waste is defined as excavation material not used in the embankment and disposed of outside of the embankment areas.

F. Structures: Structures as used herein refers to bridges, culverts, storm sewer and/or sanitary apputenances, retaining walls and similar construction.

2102.3 Construction Details

A. The Contractor shall adhere to any and all statutes regarding the notification of utilities prior to beginning any work within public right-of-way. Relocation or protection of any existing utilities located in street right-of-way shall be governed by Section 1510 and 1511 of the General Provisions and Covenants. The relocation and/or protection of any utility that is shown on the plans, that lies within a utility easement and is endangered by this construction shall be the responsibility of the Contractor.

B. The Contractor shall make every reasonable effort to protect private facilities. These facilities may not be shown on the plans. When these facilities are disturbed or damaged by the work, the Contractor shall make necessary arrangements for repairs to the facilities for continuous service prior to the close of that work day.

C. It shall be the responsibility of the Contractor to protect all property lot corners and control monumentation. Should it be necessary to disturb any such monument, whether stake, pin, bar, disk, box, or other, it remains the responsibility of the Contractor to reference such markers prior to removal, reset them, and file such relocations or monumentation documents as the law may require. Any such references, removal,

replacement and certification of monuments shall be performed by a registered licensed surveyor. A copy of all such certification documents shall be provided to the Engineer prior to final payment. Any monument destroyed or improperly reset by the Contractor may be replaced by the Engineer to the standards required by law at the expense of the Contractor.

D. Grading, excavation, and backfilling for all improvements, shall be made to the lines, grades, and cross sections indicated by the plans.

E. In addition, to any erosion control measures shown on the plans, the Contractor shall schedule and conduct his operation in such a manner and shall provide any necessary control facilities to protect downstream and adjacent properties from pollution, sedimentation, or erosion caused by the grading operations. Any pollution or damage occurring shall be the responsibility of the Contractor.

F. During construction, the graded area shall be maintained by the Contractor in such condition that it will be well drained at all times. Roadway ditches, channel changes, inlet and outlet ditches and other ditches in connection with the roadway shall be cut and maintained to the required cross section. All drainage work shall be performed in proper sequence with other operations. All ditches and channels shall be kept free of debris or obstructions.

## 2102.4 Excavation

A. This section governs the excavation for all improvements.

B. All suitable material removed by excavation shall be used as far as practicable in the formation of embankment as required to complete the work. The Contractor shall sort all excavated material and stockpile when necessary, so as to provide suitable materials for embankments.

C. After removal of the roadway excavation material to the required section, all material between lines 1 foot (30.48cm) outside of the curbs and within the top 6 inches (15.24cm) of the subgrade shall be compacted to 95 percent of maximum density for the material as defined in Section 2102.6E.

D. Rock encountered within the full width of the roadway, toe of slope to toe of slope, shall be undergraded to an elevation of 6 inches (15.24cm) below the finished subgrade elevation. Care shall be taken to avoid overshooting when blasting. Rock shall be removed in such a manner as to leave no excessive water pockets in the surface.

E. Areas of undergrading or overbreak in rock between lines 1 foot (30.48cm) outside of the curbs shall be backfilled with spalls, rock fragments or a granular type material. Backfill materials shall have a plasticity index not to exceed 10 and a gradation such that at least 50 percent of the material will be retained on the No. 4 (4.75mm) Sieve.

## 2102.5 Undergrading

A. Where materials are encountered which are deemed as unsuitable by the Engineer for use in the work, they shall be removed to the depth and limit as ordered by the Engineer. Areas undergraded shall be backfilled with one of the following materials:

B. Rock fragments or spalls.

C. A granular type material having a plasticity index not to exceed 10 and a gradation such that at least 50 percent of the material will be retained on the No. 4 (4.75mm) Sieve and not more than 40 percent will pass the No. 10 (2.00mm) Sieve.

D. A material meeting the requirements of Section 2102.2C.

## 2102.6 Embankment

A. This section governs embankment for all improvements. The embankments shall be constructed using suitable materials, as herein defined, procured from excavations made on the project site or from borrow areas as required to complete the grading work.

B. Starting the Embankment: Where embankments, regardless of height, are placed against hillsides or existing embankments, either of which have a slope steeper that 1 vertical to 4 horizontal, the existing slope shall be benched or stepped in approximately 24 inch (60.96cm) rises as the new fill is brought up in 12 inch maximum (30.48cm) layers or lifts. The material bladed out, the bottom of the area cut into, and the embankment material being placed, shall be compacted to the required density. Material cut out, bladed into place and compacted shall not be measured and paid for directly but will be considered as incidental work.

   The existing surface upon which embankment material is to be placed shall have all unstable and unsuitable material removed before starting the embankment work. Where embankments 2 feet (60.96cm) or less in depth are to be placed on areas covered by existing pavement, the existing pavement shall be removed and the cleared ground surface shall be compacted to the specified density. Where embankments greater than 2 feet (60.96cm) in depth are to be placed on areas covered by existing pavement, the existing pavement shall be broken into pieces no larger than 24 inches (60.96cm) maximum dimension, left in place and the embankment starred thereon.

C. Placing Earth Embankment: Earth shall be placed in successive horizontal layers distributed uniformly over the full width of the embankment area. Each layer of material shall not exceed 12 inches maximum (30.48cm) in thickness (loose state) and shall be compacted to not less than the required density before the next layer is placed thereon. As the compaction of each layer progresses, continuous blading, or dozing will be required to level the surface and to insure uniform compaction. Embankment construction shall not be performed when material contains frost, is frozen or is snow covered.

D. Placing Earth and Rock Embankment: When earth and stone or rock fragments are mixed in the embankment, all stones or rock fragments exceeding the thickness of the compacted lift shall be disposed of by being incorporated into the embankment outside the limit of the proposed surfaced areas. The thickness of the layer in these areas may be increased if necessary to accommodate the rocks, but shall not exceed 15 inches (38.10cm) in thickness (loose state). The stones or rock fragments are to be placed so there will be no nesting.

E. Consolidated Rock Embankment: When the excavated material consists predominantly of stone or rock fragments of such size that the material cannot be placed in layers of the thickness prescribed, such material shall be placed in the embankment in layers having a thickness of the approximate average size of the larger rocks but not to exceed 24 inch (60.96cm). Rocks or boulders too large to permit placing in a 24 inch (60.96cm) layer shall be reduced in size as necessary to permit placement. Rock shall not be dumped in place but shall be distributed by blading or dozing in a manner to insure proper placement in final position in the embankment. The spalls and smaller stone fragments shall be left on the surface of each layer as formed. Each layer shall be thoroughly consolidated before the next layer is placed.

   The top 12 inches (30.48cm) of the embankment shall not contain material having a maximum dimension greater than 3 inches (7.62cm). The rock fragments or crushed stone shall be well graded to form a dense mass when compacted.

F. Compacting the Embankment: Before placing any embankment, the surface of the existing ground shall be prepared as heretofore specified, moistened as required, and the top 6 inches (15.24cm) compacted to a density of 90 percent as prescribed by the following paragraph:

   All embankment shall be compacted to a density of at least 90 percent of the maximum density for the material used as determined by ASTM D-698 and within a tolerance of minus 3 percent and plus 2 percent

of the optimum moisture at maximum density as determined by the Moisture Density Curve obtained. In addition to the above required compaction, the subgrade between lines 1 foot (30.48cm) outside of the curbs and within the top 6 inches (15.24cm) of the subgrade shall be compacted to a density of at least 95 percent of the maximum density for material used as determined by ASTM D-698 and with a tolerance of minus 3 percent and plus 2 percent of the optimum moisture at maximum density as determined by the Moisture Density Curve obtained.

All work involved in either adding moisture to or removing moisture from embankment materials to within these moisture limits shall be considered incidental to the completion of the grading operation.

G. Moisture – Density Determination: In-place density and moisture content of the embankment will be determined by the Standard Method of Test for Density of Soil in Place by the Sand-Cone Method, ASTM D-1556; or by the Rubber Balloon Method, ASTM D-2167; or by Nuclear Methods, ASTM D-2922.

### 2102.7 Finishing

A. In areas where sodding or seeding is proposed, the upper 12 inches (30.48cm) of the surface area shall be earth material. The top 6 inches (15.24cm) shall be suitable for sustaining grass.

B. Except where other permit or utility work is in progress, the graded surface shall be made free of rock, concrete, and brick, or fragments thereof, or rubbish and shall be finished to the lines, grades, and cross-section indicated on the plans, including shoulder, berm and sidewalk spaces.

C. The Contractor shall repair any damaged surface, and shall not use any finishing equipment that will leave a marred surface. When the subgrade preparation is included as a part of the finishing, the work shall be accomplished according to the requirements of Section 2201 entitled “Subgrade Preparation”, and shall be considered incidental to finishing the grading work.

### 2102.8 Cleanup

Cleanup shall follow the work progressively and final clean-up shall follow immediately behind the finishing. The contractor shall remove from the site of the work all equipment, tools and discarded materials, and other construction items. The entire right-of-way or easement shall be left in a finished and neat condition. Cleanup shall be considered as incidental to the completion of grading work.

## SECTION 2103 MEASUREMENT AND PAYMENT

### 2103.1 Scope

This section covers the methods of measurement, and the basis of payment for the furnishing of all labor, equipment, tools and materials, and for the performance of all related work necessary to complete any construction covered in Section 2100.

### 2103.2 General

Unless specifically altered by the contract Special Provisions, the methods of measurement and payment will be specified herein.

### 2103.3 Items Not Listed in the Proposal

There will be no measurement or separate payment for any items of work not specifically identified and listed in the Proposal and all costs pertaining thereto will be included in the contract unit prices for other items listed in the Proposal.

### 2103.4 Methods of Measurement

The quantities of accepted work will be measured and determined as follows:

A. Clearing, Grubbing, and Demolition:

1. Clearing may be listed in the Proposal and measured per acre (hectare) or hundredth part thereof.
2. Grubbing may be listed in the Proposal and measured per acre (hectare) or hundredth part thereof.
3. Demolition may be included as clearing or may be listed in the Proposal as a separate item and measured per each and as such shall include all work as defined in Section 2101.2C.
4. Tree removal may be included in clearing or may be listed as a separate item in the Proposal and measured as per each.

B. Grading

1. Unclassified Excavation may be listed in the Proposal and measured to determine the quantity in cubic yards (cubic metres) or tenth part thereof.
2. Rock Excavation may be included as Unclassified Excavation or may be listed in the Proposal as a separate item and measured to determine the quantity in cubic yards (cubic metres) or tenth part thereof. No measurement will be made for rock overbreak in excess of 12 inches (30.48cm) below the subgrade elevation.
3. Earth Excavation may be included as Unclassified Excavation or may be listed in the Proposal as a separate item and measured to determine the quantity in cubic yards (cubic metres) or tenth part thereof. No measurement will be made for embankment performed in rock overbreak areas, where the overbreak is in excess of 12 inches (30.48cm) below the subgrade elevation.
4. Embankment may be listed in the Proposal and measured to determine the quantity in cubic yards (cubic metres) or tenth part thereof.
5. Undergrading may be listed in the Proposal and measured to determine the quantity in cubic yards (cubic metres) or tenth part thereof.

## 2103.5 Basis of Payment

Payment for the quantities of accepted work will be made as follows:

A. Clearing, Grubbing, and Demolition:

1. Clearing, grubbing, or clearing and grubbing may be included in the Proposal as separate items or as one item and will be paid for by one of the following:
   a. Payment will be made at the contract unit bid price.
   b. Payment will be made at the contract lump sum bid price.
2. Demolition, if listed as a separate item in the Proposal and not included as a part of Clearing, or Clearing and Grubbing will be paid for by one of the following:
   a. Payment will be made at the contract unit bid price.
   b. Payment will be made at the contract lump sum bid price.
3. Tree Removal, if listed in the Proposal as a separate item and not included as a part of Clearing, or Clearing and Grubbing will be paid for by one of the following:
   a. Payment will be made at the contract unit bid price.
   b. Payment will be made at the contract lump sum bid price.

B. Grading:

1. Unclassified Excavation, Rock Excavation, or Earth Excavation may be included in the Proposal as separate items or as one item and will be paid for by of the following:

a. Payment will be made at the contract unit bid price.

b. Payment will be made at the contract lump sum bid price.

2. Embankment may be included in the Proposal and will be paid for by one of the following:

   a. Payment will be made at the contract unit bid price.

   b. Payment will be made at the contract lump sum bid price.

3. Undergrading may be listed in the Proposal and will be paid for at the contract unit bid price.