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**DIVISION 900
ROADSIDE IMPROVEMENT, PLANTING AND SEEDING**

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901 –STORMWATER POLLUTION MANAGEMENT

SECTION 901

STORMWATER POLLUTION MANAGEMENT

901.1 DESCRIPTION

Design, implement, inspect and maintain appropriate best management practices to minimize or eliminate erosion, sediment and other pollutants in stormwater runoff from the project.

BID ITEMS

SWPPP Design
SWPPP Inspection
Water Pollution Control Manager
Stormwater Compliance Disincentive Assessment

UNITS

Lump Sum
Each
Each
Lump Sum

901.2 MATERIALS

None Required.

901.3 CONSTRUCTION REQUIREMENTS

a. Permits.

(1) Projects with 1.0 acre or more of erodible surface: KDOT (or the local governmental agency) will submit the Notice of Intent (NOI) for authorization to discharge stormwater runoff from construction activities in accordance with the Kansas Water Pollution Control General Permit. This authorization does not cover Contractor plant sites and Contractor-Furnished borrow and waste sites outside the project limits.

(2) Projects with less than 1.0 acre of erodible surface: Kansas General Permit coverage is not required. The Contractor is required to comply with **subsection 901.3b.** and use appropriate Best Management Practices (BMPs) to minimize stormwater pollution.

A Storm Water Pollution Prevention Plan (SWPPP) (**subsection 901.3c.**) is not required.

Inspection and Maintenance Reports (**subsection 901.3e.**) are not required.

A Water Pollution Control Manager (**subsection 901.3d.**) is not required.

Stormwater Erosion Control Conferences (**subsection 901.3f.**) are not required.

b. General. When Contractor-furnished borrow or plant sites are outside the project limits, obtain all required permits and clearances required for compliance, **SECTION 107.** Provide copies of all such permits and clearances to the Engineer.

Take all measures necessary to minimize or eliminate erosion, sediment and other pollutants in stormwater runoff from the project and project related borrow areas.

Assume responsibility for inspection and maintenance of all erosion and sediment control measures within the project limits, whether originally implemented by the Contractor, KDOT or a third party. Obtain information regarding the SWPPP and active Best Management Practices (BMPs) from the Area Engineer. Maintenance or removal of BMPs not installed by the Contractor may be considered Extra Work, **SECTION 104,** unless addressed by other items of the contract (e.g. sediment removal).

Install devices to establish a perimeter control of the project in areas where it is anticipated that stormwater runoff will leave the project. Install perimeter control devices prior to or simultaneously with the clearing and grubbing operations. Do not perform grading until perimeter control devices are in place and approved by the Engineer.

Unless requested in writing from the Contractor, and approved in writing by the Engineer, or specified otherwise in the Contract Documents, do not exceed 750,000 square feet of surface area of erodible earth material per equipment spread at one time. The Engineer will limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow (within right-of-way) and embankment operations. Limit the exposed erodible earth material according to the capability and progress, and in keeping with the approved schedule.

Areas will not count toward the 750,000 square feet limit, when the following conditions are met:

For areas that will not be disturbed again due to project phasing:

- Finish grade the completed area;

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- Stabilize and maintain stabilization according to **SECTION 902**; and
- Do not disturb the area again without a written request from the Contractor and written approval from the Engineer;

For areas that will be disturbed again due to project phasing:

- Rough grade; and
- Stabilize and maintain stabilization according to **SECTION 902**.

DO NOT clear and grub areas unless work will actively be performed in the exposed area (or portions of the exposed area) within 7 calendar days on exposed steep slope areas (40% or greater) or within 14 calendar days for all other exposed areas.

If areas are cleared and grubbed and not finish graded, not part of project phasing and no meaningful work toward the completion of the bid item is performed within the exposed area (or portions of the exposed area) for 7 calendar days on exposed steep slope areas (40% or greater) or 14 calendar days for all other exposed areas, stabilize and maintain stabilization of the exposed areas according to **SECTION 902** at no cost to KDOT.

If on-site or state-furnished off-site borrow areas are to be excavated below the ground water elevation, construct a temporary berm around the borrow area to prevent stormwater runoff from entering the excavated area.

Do not ford live streams with construction equipment.

Restrict construction operations in rivers, streams and other water impoundments to those areas that must be entered for the construction of temporary or permanent structures. Only use clean aggregate fill for temporary crossing, work platforms, etc. When no longer required, promptly remove all falsework, piling, temporary crossings and other obstructions caused by the construction.

Where practical, do not store equipment or materials (including soil stockpiles) within 50 feet of rivers, streams or other surface waters. Avoid storing equipment or materials (including soil stockpiles) in flowlines of ditches or other drainage courses. Where such storage is necessary, obtain the Engineer's written approval and include in the project SWPPP appropriate best management practices for the storage area.

Install and maintain temporary erosion and pollution control devices as shown in the Contract Documents, **SECTION 902**, the SWPPP and as directed by the Engineer.

Implement temporary erosion and pollution control with best management practices (BMPs) as described in the SWPPP.

At a minimum, perform the following:

- Use temporary best management practices to minimize or eliminate pollutant discharge resulting from the construction of the project;
- Use temporary best management practices to prevent contamination of adjacent streams or other watercourses, lakes, ponds or other areas of water impoundment;
- Coordinate temporary best management practices with the construction of permanent erosion control features to provide continuous erosion control;
- Schedule construction of drainage structures and permanent erosion control features as soon as practicable; and
- Immediately initiate placement of appropriate erosion control Best Management Practices (BMPs) in any exposed steep slope areas (40% or greater) where construction activities have permanently or temporarily ceased, and will not resume for a period exceeding 7 calendar days. For vegetative cover areas, in addition to seeding, watering, mulching, and any other required activities related to the planting and establishment of vegetation, utilize other appropriate erosion control practices such as geotextiles or erosion control mats.
- Immediately initiate temporary stabilization on areas that have been disturbed after construction activities have permanently ceased on that portion of the project site. Immediately initiate temporary stabilization measures on areas that have been disturbed after construction activities have temporarily ceased on that portion of the project site if construction activities will not resume for a period exceeding 14 calendar days. Temporary stabilization may include temporary seeding, geotextiles, mulches or other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb the area.

Notify the Engineer in writing within 24 hours of any chemical, sewage or other material spill which is required to be reported to the KDHE under part 10 of the NPDES permit. The notification shall include at a

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minimum the material spilled, location of the spill, and a description of containment or remediation actions taken. This notice to the Engineer does not relieve the Contractor of responsibility to report to the KDHE or to any other agency.

If temporary erosion and pollution control is not implemented and maintained according to this specification, the approved SWPPP, or the NPDES permit, the Area/Metro Engineer may suspend all or part of the work on the project until conditions are brought into compliance, as determined by the Area/Metro Engineer.

KDOT will not issue the Notice of Acceptance, **SECTION 105**, until all necessary maintenance, corrective actions, removal of unnecessary devices and temporary stabilization is completed for the project. Failure to complete this work within the contract time may result in liquidated damages, **SECTION 108**.

All SWPPP related documentation including the original SWPPP, all revisions/amendments, and inspection reports shall be retained by the Engineer upon Acceptance of the project.

c. Project Storm Water Pollution Prevention Plan (SWPPP). Before the preconstruction conference, submit to the Field Engineer a minimum of 3 original copies of the SWPPP. No contract work may begin until the Field Engineer has approved the SWPPP.

Design the SWPPP to comply with the NPDES permit for the project. At a minimum, the project SWPPP shall include:

- the SWPPP Inspection and Maintenance Report Forms (KDOT Form No. 247);
- The planned sequence of major construction activities;
- the Contractor's Erosion Control Site Plan;
- the SWPPP Contractor Certification Form 246. The Contractor and all subcontractors are required to certify that they understand the terms and conditions of the general NPDES permit. The Engineer will provide the SWPPP Certification Form (Form No. 246), or it can be found on the KDOT Internet;
- a copy of the Project Notice of Intent Form (NOI) for Stormwater Runoff from Construction Activities. (obtained from KDOT);
- An acknowledgement that State and Local requirements have been included in the SWPPP. Review all applicable permits (Corps of Engineers, Department of Agriculture, etc.) for special conditions affecting stormwater pollution control;
- Reference Contract Documents pertaining to temporary erosion and water pollution control. KDOT standard specifications, contractual special provisions and the policy on Storm Water Discharges can be found on the KDOT Internet at www.ksdot.org;
- A detailed description of Best Management Practices (BMPs) which will be used one or more times at the site for erosion and sediment control. Design, install and maintain BMPs to:
 - Control stormwater volume and velocity within the site;
 - Control stormwater discharges;
 - Minimize the amount of soil exposed during construction activity;
 - Minimize the disturbance of steep slopes (slopes of 40% or greater);
 - Minimize sediment discharges from the site;
 - Control discharges from sediment or soil stockpiles;
 - Minimize the generation of dust;
 - Minimize off-site tracking of soils;
 - Provide storm drain inlet protection for inlets down gradient of sites not fully stabilized or where construction will soon be started;
- Design, install, implement and maintain additional BMPs to minimize or eliminate contamination of stormwater runoff to:
 - Minimize discharge of pollutants from equipment and vehicle washing;
 - Minimize the exposure of construction waste, trash, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to stormwater;
 - Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures;
 - BMPs in this category include but are not limited to:
 - Waste management including trash containers and regular site cleanup for proper disposal of solid waste such as scrap material, product/material shipping waste, food containers and cups;
 - Containers and proper disposal for waste paints, solvents, and cleaning compounds;

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- Portable toilets for proper disposal of sanitary waste;
- Storage for construction materials away from drainage courses and low areas.

Update the erosion control site plan as work progresses to show changes due to revisions in work schedules or sequence of construction, or as directed by the Engineer. Update the site map to reflect erosion control devices that have been installed or removed.

d. Water Pollution Control Manager. Designate a Water Pollution Control Manager (WPCM) who shall visit the project during normal work hours on a frequent basis and in no instance less than once per week until all physical work is complete and the Engineer issues the Notice of Acceptance or a partial Notice of Acceptance. The required 180 day observation period for pavement markings is not considered to be physical work. The WPCM shall thoroughly review the project and SWPPP documentation during these site visits to verify the Contractor's compliance with this specification and with the NPDES permit. In addition, the WPCM shall:

- Have the authority to supervise all work performed by the Contractor and subcontractors that involves stormwater requirements or affects stormwater compliance;
- Have the responsibility to order Contractor employees and subcontractors to take appropriate corrective action to comply with stormwater requirements, including requiring any such person to cease or correct a violation of stormwater requirements and to order or recommend such other actions or sanctions as necessary to meet stormwater requirements;
- Be familiar with the Project SWPPP;
- Be responsible for updating the Project SWPPP and site maps to accurately reflect the BMPs in use on the project;
- Be the point of contact for KDOT regarding stormwater compliance;
- Have completed KDOT's Environmental Inspector Training (EIT) and Environmental Manager Training (EMT) programs within the 12 months prior to beginning construction activities. Maintain these certifications for the duration of the project;
- Review and sign SWPPP inspection reports within 3 days after receiving such reports, acknowledging awareness of any deficiencies and ensuring the correction of all deficiencies.
- Maintain and monitor an active email account capable of receiving electronic communications including inspection reports, photos and other documents relevant to stormwater compliance.

The WPCM may, when approved by the Engineer, perform SWPPP Inspections according to **subsection 901.3e**.

Immediately notify the Engineer in writing if the designated WPCM is replaced. The replacement WPCM shall comply with the above requirements, except that they shall have completed the training requirements within the 12 months prior to assuming WPCM duties. The notification shall include training certificates and contact information for the replacement WPCM.

e. SWPPP Inspections. The Contractor's Environmental Inspector shall have completed KDOT's Environmental Inspector Training (EIT) and maintain a current certification while performing SWPPP Inspections.

KDOT's Inspector and the Contractor's Environmental Inspector shall perform a joint inspection of the temporary erosion and pollution control devices every 14 days during normal work hours and within 24 hours of a rainfall event of ½ inch or more. Continue inspections at this frequency until all physical work is complete and the Engineer issues the Notice of Acceptance or a partial Notice of Acceptance. The required 180 day observation period for pavement markings is not considered to be physical work.

Document the SWPPP inspections on KDOT Form 247, (SWPPP Inspection and Maintenance Report). KDOT and Contractor Inspectors shall each sign the report.

Correct any deficiencies noted during a SWPPP Inspection within 7 days of the inspection despite weather conditions that make it difficult (but not impossible) to perform corrections. No additional time shall be granted for making corrections on the basis of weather unless it is physically impossible due to flooding or frozen ground conditions for the Contractor to complete the corrections within the 7 days allowed. No additional time will be granted to complete corrective actions unless approved by the Stormwater Compliance Engineer.

Submit completed copies of KDOT Form 247 to the Area/Metro Engineer and the Contractor's WPCM within 24 hours after an inspection has been made.

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The WPCM shall review and sign the report within 3 calendar days of receiving the completed inspection report. The WPCM's signature acknowledges awareness of all reported deficiencies and corrective actions required to be taken within 7 calendar days of the inspection.

The Contractor Inspector's signature acknowledges awareness of all reported deficiencies and corrective actions required to be taken within 7 calendar days of the inspection.

The obligation to conduct formal inspections and complete an associated report every 14 days and within 24 hours of a rainfall event of ½ inch or more does not limit or otherwise modify the Contractor's obligation to monitor and maintain temporary erosion and pollution control devices daily.

f. Stormwater Erosion Control Conferences. Each project shall have a stormwater erosion control pre-construction conference before the start of construction activities.

KDOT and the Contractor shall also hold stormwater erosion control conferences before the start of each major phase of construction and before the winter shutdown period begins.

These conferences shall be attended by the KDOT Area/Metro Engineer, the WPCM, and Environmental Inspector(s) for the Project, and any erosion control subcontractor(s). The attendance sheet and minutes of the conference will be kept in the SWPPP notebook.

g. Stormwater Compliance Disincentive Assessment. If deficiencies noted during SWPPP inspections performed according to **subsection 901.3e**, are not corrected within 7 calendar days of the inspection, the Contractor shall be liable for a disincentive assessment. The disincentive assessment charged and owing shall be fifty dollars (\$50) per day for each deficiency not corrected.

Should an event causing flooding or frozen ground conditions make it impossible to perform corrections within the allowed time, notify the Area/Metro Engineer and the Stormwater Compliance Engineer within 48 hours of the event. Within 3 days of the notification, submit in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; and a schedule for implementation of any measures to be taken to prevent or mitigate the delay. Include with the submittal any relevant documentation supporting the claim that the delay is due to impossible conditions and that best efforts were made to complete the required corrections and to minimize any delay to the extent possible. No additional time will be granted to submit the required information unless approved in writing by the Stormwater Compliance Engineer.

The Engineer will deduct and withhold from contract funds the Stormwater Compliance Disincentive Assessment under **subsection 901.3g**. The assessments are to be computed in the same manner as damages under **SECTION 108** (Liquidated Damages and Disincentive Assessments) except calendar days include Sundays, Holidays and the Winter Holiday Period. If contract funds are insufficient, the Contractor shall pay KDOT the balance owed. If the Contractor fails to pay KDOT the amount owed within 10 days after demand from KDOT, the Contractor shall be considered in breach of contract under **SECTION 108**.

The disincentive assessments under **subsection 901.3g**, are in addition to federal and state statutory penalties and fines that are allowed against the Contractor under the Clean Water Act and other environmental laws for violations of those laws. See also **subsection 901.3h**.

h. Penalties and Fines. Nothing in **SECTION 901** prevents KDHE, EPA or both from assessing penalties and fines against the Contractor because of the Contractor's failure to comply with applicable laws, regulations, ordinances, NPDES permit, other permits, the SWPPP, governmental administrative compliance orders or corrective orders for the Project, or a combination thereof.

Nothing in this **SECTION 901** prevents KDHE, EPA, or both from assessing penalties and fines against the Contractor because of the Contractor's failure to comply with an administrative claims settlement or consent decree that governs KDOT projects and that is included in the Proposal Form or that is added "Extra Work", **SECTION 104**.

Understand that penalties/fines may be imposed against KDOT, the Contractor, or both because of "shared" responsibility/liability under applicable environmental law, regulations, ordinances; the NPDES permit, other permits, the SWPPP, administrative corrective action orders, administrative claims settlements, consent decrees, legal judgments or a combination thereof. The Contractor shall have no claim that such shared responsibility/liability voids the Contractor's liability for disincentive assessments under **subsection 901.3g**, or for penalties/fines under **subsection 901.3h**.

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901.4 MEASUREMENT AND PAYMENT

The Engineer will measure each SWPPP inspection performed in compliance with this specification.

The Engineer will measure each Water Pollution Control Manager (WPCM). Each is defined as each calendar week (Sunday-Saturday) that the Contractor provides a WPCM according to **subsection 901.3.d**. Each week will be measured only once, regardless of the number of site visits or time spent performing WPCM duties for that week.

The Engineer will measure SWPPP design for payment as a lump sum upon the Area Engineer's approval. All revisions or updates to the SWPPP shall be subsidiary.

The Engineer will assess disincentives under the bid item "Stormwater Compliance Disincentive Assessment" by the Lump Sum.

902 –TEMPORARY EROSION AND SEDIMENT CONTROL

SECTION 902

TEMPORARY EROSION AND SEDIMENT CONTROL

902.1 DESCRIPTION

Install, maintain and remove temporary erosion and pollution control devices as required during the construction of the project.

BID ITEMS

Temporary Berm (Set Price)
Temporary Slope Drain
Silt Fence
Biodegradable Log (***)
Synthetic Sediment Barrier
Filter Sock (***)
Temporary Ditch Check (Rock)
Temporary Inlet Sediment Barrier
Temporary Sediment Basin
Temporary Stream Crossing
Sediment Removal (Set Price)
Temporary Fertilizer (**)
Temporary Seed (**)
Soil Erosion Mix
Temporary Seeding
Erosion Control (*)(**)
Mulching (Temporary)
Water (Erosion Control) (Set Price)
Geotextile (Erosion Control)

UNITS

Linear Foot
Linear Foot
Linear Foot
Linear Foot
Linear Foot
Linear Foot
Cubic Yard
Each
Cubic Yard
Each
Cubic Yard
Pound
Pound
Pound
Lump Sum
Square Yard
Ton
M Gallon
Square Yard

* Class

** Type

*** Size

902.2 MATERIALS

Provide erosion control devices, sediment barriers, fertilizers, seeds, soil erosion mix, erosion control materials and mulch that comply with **DIVISION 2100**.

Provide aggregate that complies with aggregate ditch lining, $D_{50} = 6$ inches, **DIVISION 1100**. Existing aggregate from the project may be used under this specification, provided all applicable physical requirements are met.

Provide water for erosion control that complies with **DIVISION 2400**.

Provide geotextile (erosion control) that complies with **DIVISION 1700** for separation geotextile.

Provide metal pipe, plastic pipe or flexible rubber pipe for temporary slope drains. The Engineer will accept the material for temporary slope drain based on the condition of the pipe and visual inspection of the installed drain.

902.3 CONSTRUCTION REQUIREMENTS

a. General. If the contract does not include temporary erosion and sediment control bid items, and such work is required, items will be added as provided for in **SECTION 104**.

Use [KDOT's Temporary Erosion Control Manual](#) and standard plan sheets or approved alternate reference documents as a guide for the design, installation and maintenance of temporary erosion and sediment control best management practices (BMPs.).

Alternate BMP references include:

- EPA – Stormwater Menu of BMP:
(<http://water.epa.gov/polwaste/npdes/swbmp/Construction-Site-Stormwater-Run-Off-Control.cfm>)
- Mn/DOT – Erosion and Sediment Control Pocketbook Guide:

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(<http://www.dot.state.mn.us/environment/erosion/pdf/2006mndotecfieldhandbook.pdf>)

- NDOR – Construction Stormwater Pocket Guide:
(<http://www.transportation.nebraska.gov/environment/guides/Const-Strmwtr-Pocket%20Guide.pdf>)
- Additional reference material available on KDOT’s internet website:
(<http://www.ksdot.org/bureaus/burconsmain/Connections/swppp.asp>).

b. Temporary Berms. Use temporary berms to divert storm runoff to stabilized slopes or temporary slope drains. Construct temporary berms as shown in the Contract Documents. Compact the berms until no further consolidation is observed, using a dozer track, grader wheel or other equipment.

c. Temporary Slope Drains. Use temporary slope drains to carry storm runoff down fill slopes and cut backslopes. Construct the temporary slope drains as shown in the Contract Documents.

d. Silt Fence. Install silt fence for slope barriers or ditch checks as shown in the SWPPP. When conditions warrant, supplement the temporary silt fence with a support fence. Reduce the post spacing and drive the posts further in the ground in low and soft, swampy areas. Remove and dispose of sediment deposits when the deposit approaches $\frac{1}{3}$ the height of the silt fence.

Dispose of sediment on the project at locations approved by the Engineer. When necessary, stabilize the material as directed by the Engineer.

e. Biodegradable Logs. Install biodegradable logs for slope barriers or ditch checks as shown in the SWPPP. Remove and dispose of sediment deposits when the deposit approaches $\frac{1}{2}$ the height of the biodegradable log.

Do not use straw logs for ditch checks or inlet sediment barriers.

Dispose of sediment on the project at locations approved by the Engineer. When necessary, stabilize the material as directed by the Engineer.

f. Synthetic Sediment Barriers. Install synthetic sediment barriers for slope barriers or ditch checks as shown in the SWPPP. Remove and dispose of sediment deposits when the deposit approaches $\frac{1}{2}$ the height of the barrier.

Dispose of sediment on the project at locations approved by the Engineer. When necessary, stabilize the material as directed by the Engineer.

g. Filter Sock. Install filter socks with approved filler as shown in the SWPPP. Use coarse aggregate filler for protection of curb and gutter inlets.

h. Temporary Ditch Check (Rock). Use rock to construct temporary rock ditch checks as shown in the SWPPP or the Contract Documents. When deposits reach approximately $\frac{1}{2}$ the height of the temporary rock ditch check, remove and dispose of the accumulated sediment.

Dispose of sediment on the project at locations approved by the Engineer. When necessary, stabilize the material as directed by the Engineer.

i. Temporary Inlet Sediment Barrier. Use any of the materials listed in the Contract Documents or the SWPPP to construct temporary inlet sediment barriers. Prefabricated protection devices or alternative systems may be used with the Engineer’s approval. Provide the Engineer with a complete description, literature, test reports, etc. on the proposed system. Submit this information with the SWPPP documents for approval under **subsection 901.3.c.**

When temporary silt fence is used, reduce post spacing and drive the posts further into the ground in low and soft, swampy areas. Remove and dispose of the sediment when deposits reach approximately $\frac{1}{3}$ the height of the silt fence.

When synthetic sediment barriers are used, remove and dispose of the sediment when deposits reach approximately $\frac{1}{2}$ the height of the barrier.

Dispose of sediment on the project at locations approved by the Engineer. When necessary, stabilize the material as directed by the Engineer.

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j. Temporary Sediment Basins. Before constructing a temporary sediment basin, clear the area of all vegetation. Construct the temporary sediment basin with a wide cross-section and a minimum grade, as shown in the Contract Documents. Dispose of excess excavated material.

Remove and dispose of the accumulated sediment when deposits reach approximately 20% of the basin capacity.

Dispose of sediment on the project at locations approved by the Engineer. When necessary, stabilize the material as directed by the Engineer.

k. Temporary Stream Crossing.

(1) General. When the Contractor's operations require a temporary stream crossing, and one is not shown in the Contract Documents, the Contractor may install the crossing at no cost to KDOT. Comply with all applicable rules and regulations, obtain all required permits and provide copies of all permits to the Field Engineer. An unanticipated stream crossing may require a permit from the Corps of Engineers if work is performed within Waters of the U.S. and/or a stream obstruction permit from the Kansas Department of Agriculture if the crossing is in a designated stream.

Before beginning work in the streambed, record existing stream channel elevations.

Construct temporary stream crossings as shown in the Contract Documents or the SWPPP.

Place 1 pipe buried 6 inches into the stream bottom, in the lowest point of the channel to allow the passage of aquatic organisms, with additional pipes placed along the remainder of the stream channel bottom such that ordinary high water (OHW) flows designated in the Contract Documents shall flow through the pipes without overtopping the crossing. If the OHW is not designated in the Contract Documents, the Engineer will determine the OHW. The OHW means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Submit to the Engineer for review and approval, the design flow calculations to determine the number and diameter of pipes required. A minimum 12 inch diameter pipe is required.

Place pipes parallel to flow.

Cover pipes with a minimum of 12 inches of clean aggregate fill.

Dispose of sediment on the project at locations approved by the Engineer. When necessary, stabilize the material as directed by the Engineer.

(2) Maintenance. At a minimum, perform weekly inspections to verify that drift and debris are not blocking the flow of water through the pipes. Perform additional inspections, as needed. Remove drift and debris when blockage occurs. Repair eroded areas, if necessary, to prevent washout and allow passage of flows.

(3) Removal. Remove the temporary crossing and all materials as soon as no longer needed. Restore the disturbed bed and bank area of the stream channel to its pre-existing elevations.

l. Temporary Fertilizer, Seed and Mulch. Repair any rills, gullies or other erosion damage prior to seeding. Prepare the seedbed, fertilize, seed and mulch according to **DIVISION 900**. Apply the temporary fertilizer, seed and mulch at the rates shown in the Contract Documents. Apply water to seeded and mulched areas when approved by the Stormwater Compliance Engineer or Local Public Authority to promote the establishment of vegetation in critical areas.

m. Soil Erosion Mix. Prepare the seedbed, fertilize and seed according to **DIVISION 900**. Lightly hand rake broadcasted seed before placement of the erosion control.

Only use the soil erosion mix under Erosion Control (Class 1) or Erosion Control (Class 2).

There are no seasonal placement limitations for the soil erosion mix.

n. Temporary Seeding. "Temporary Seeding" is to be used only if the project has less than 1 acre of erodible surface. If this item is used: fertilize, seed, and mulch all exposed erodible earth.

Prepare the seedbed, fertilize, seed and mulch according to **DIVISION 900**. Apply the temporary fertilizer, seed and mulch at the rates shown in the Contract Documents.

o. Erosion Control. After seeding according to **DIVISION 900**, install erosion control according to the manufacturer's requirements for edge and junction overlaps, staple size and staple pattern. Installation areas shall be free of erosion rills, rocks, clods or other debris that may cause "tenting" or otherwise inhibit uniform contact.

902 –TEMPORARY EROSION AND SEDIMENT CONTROL

When shown in the plans, install erosion control materials within the time allowed for temporary stabilization under **subsection 901.3b**.

Use Erosion Control materials for the stabilization of all steep slopes (2 ½:1 or steeper) where construction activities have permanently or temporarily ceased and will not resume for a period exceeding 7 calendar days

(1) Areas with Erosion Control (Class 1). Place the Erosion Control (Class 1) on slopes according to the SWPPP. Do not mulch over the Erosion Control (Class 1).

(2) Areas with Erosion Control (Class 2). Place the Erosion Control (Class 2) in channels, ditches or areas of concentrated flow according to the SWPPP.

Do not cover erosion control materials with soil or mulch unless recommended by the manufacturer and approved by the Engineer.

Apply water to completed erosion control installations when approved by the Stormwater Compliance Engineer or Local Public Authority to promote the establishment of vegetation in critical areas.

p. Geotextile (Erosion Control). Install geotextile (erosion control) as a temporary measure to protect steep slopes and other areas where timely installation of the permanent (aggregate or concrete) slope protection is impractical. The installation area should be free of rills, rocks, clods or other debris. Secure geotextile to the ground with staples or other similarly effective methods to achieve uniform contact with minimal “tenting.”

Remove geotextile prior to placement of the permanent slope protection.

Install geotextile (erosion control) as a temporary measure to protect temporary slopes, soil stockpiles and other areas where mulching or other means of stabilization is impractical. Preparation of the slopes and the method of securing the fabric shall be as approved by the Engineer.

q. Maintenance and Removal of Temporary Erosion and Pollution Control Devices. Maintain the effectiveness of the temporary erosion and pollution control devices as long as required to contain sediment runoff. Monitor temporary erosion and pollution control devices daily.

Remove the temporary devices according to the SWPPP or when directed by the Engineer. After removing the temporary erosion and pollution control devices, remove and dispose of the silt accumulation. Grade, fertilize, seed and mulch any bare areas.

When temporary erosion and pollution control devices are installed according to the Contract Documents, SWPPP, or as approved by the Engineer and such devices are no longer effective because of deterioration or functional incapacity, payment will be made for replacement of these devices, as directed by the Engineer. No payment will be made for replacing temporary erosion control devices that become ineffective because of improper installation, lack of maintenance or the Contractor’s failure to pursue timely installation of permanent erosion control devices according to the Contract Documents.

902.4 MEASUREMENT AND PAYMENT

The Engineer will measure temporary berms, temporary slope drains, silt fence, biodegradable logs, synthetic sediment barriers, and filter sock by the linear foot. The Engineer will measure the top of the device from point to point or each bend/turn in the device, add them together from beginning to end to come up with the total liner feet per device. The length installed up side slopes beyond a point level from the top of the device in the ditch bottom will not be measured for payment.

The Engineer will measure temporary rock ditch checks by the cubic yard.

The Engineer will measure each temporary inlet sediment barrier.

The Engineer will measure each temporary stream crossing when shown as a bid item in the contract.

The Engineer will measure temporary sediment basins by the cubic yard excavated to construct the basin.

The Engineer will measure sediment removal by the cubic yard of sediment removed. If the quantity of sediment removal is approximately 50 cubic yards or greater in one location, the Engineer may pay for sediment removal by force account (**SECTION 109**) rather than paying the contract set price for the bid item “Sediment Removal”. Whether paid as a set price or by force account, the Engineer will not pay for a quantity or cost that is incurred because of the Contractor’s failure to install seed timely or failure to remove sediment timely as **SECTION 901** requires.

The Engineer will measure temporary fertilizer, temporary seed and soil erosion mix by the pound.

The Engineer will measure “Temporary Seeding” as a lump sum; no measurement of area is made.

The Engineer will measure erosion control by the square yard.

The Engineer will measure temporary mulching by the ton.

902 –TEMPORARY EROSION AND SEDIMENT CONTROL

The Engineer will measure water used for establishment of vegetation by the M Gallon using calibrated tanks or meters.

The Engineer will measure geotextile (erosion control) by the square yard.

Payment for the various items of temporary erosion and pollution control is full compensation for the specified work. Contract unit prices will govern regardless of overruns or underruns of the estimated quantity unless specifically stated otherwise.

Payment for "Sediment Removal (Set Price)" at the contract set unit prices is full compensation for the specified work.

The Engineer will not measure for separate payment any erosion control devices or seeding installed in Contractor-Furnished borrows and waste locations or plant site locations outside the project limits.

903 –FERTILIZER, AGRICULTURAL LIMESTONE AND PEAT MOSS

SECTION 903

FERTILIZER, AGRICULTURAL LIMESTONE AND PEAT MOSS

903.1 DESCRIPTION

Provide and apply the designated materials as shown in the Contract Documents.

BID ITEMS

Fertilizer (*-**-***)
Agricultural Limestone
Peat Moss
*Percent Nitrogen
**Percent Phosphorous
***Percent Potassium

UNITS

Pound
Ton
Ton

903.2 MATERIALS

Provide fertilizer, agricultural limestone and peat moss that comply with **DIVISION 2100**.

903.3 CONSTRUCTION REQUIREMENTS

a. Fertilizer. Apply the fertilizer to the prepared seedbed (**subsection 904.3b.**) at the rates designated in the Contract Documents. Use an agricultural type broadcast spreader or a fertilizer attachment on the seed drill to apply the fertilizer. Spread the fertilizer uniformly by hand methods in areas where it is impracticable to use a seed drill.

When fertilizer is designated for use with sod, apply the fertilizer before placing the sod.

b. Agricultural Limestone. Before the areas are seeded, apply the agricultural limestone at the rates designated in the Contract Documents. Use a standard lime spreader to apply the agricultural limestone. Fertilizer may be blended with agricultural limestone. When blended, apply before the areas are seeded.

c. Peat Moss. Thoroughly blend the peat moss with soil from the planting pit, or blend the peat moss with the subsoil to the depth shown in the Contract Documents. Apply peat moss at the rates shown in the Contract Documents. Before backfilling, planting, seeding or sodding, blend the peat moss by tilling, cultivating or shovel mixing.

903.4 MEASUREMENT AND PAYMENT

The Engineer will measure the fertilizer by the pound. Bag weight or commercial scale tickets are acceptable.

The Engineer will measure the agricultural limestone by the ton. Commercial scale tickets are acceptable.

The Engineer will measure peat moss by ton.

Payment for "Fertilizer", "Agricultural Limestone" and "Peat Moss" at the contract unit prices is full compensation for the specified work.

904 - SEEDING

SECTION 904

SEEDING

904.1 DESCRIPTION

Prepare the seedbed, provide the seed and plant at the rate and in the locations designated in the Contract Documents.

BID ITEMS

- Seed (*)
- Seed (Hydro) (*)
- Seeding
- * Type of Seed

UNITS

- Pound
- Pound
- Lump Sum

904.2 MATERIALS

Provide seeds and nitrogen-fixing bacteria that comply with **DIVISION 2100**. Do not change seed or seed mixture without approval of the Environmental Scientist (Bureau of Right of Way, Environmental Services Section).

904.3 CONSTRUCTION REQUIREMENTS

a. Seeding Seasons. Determine the seeding season using **TABLE 904-1**.

TABLE 904-1: GRASS & WILDFLOWER SEEDING SEASONS	
Type	Season
Cool Season Grasses	February 15 thru April 20 August 15 thru September 30
Warm Season Grasses and Wildflowers	November 15 thru June 1

If cool season grasses are mixed with warm season grasses, seed the area during the seeding season for warm season grasses.

When the area to be seeded is less than 1 acre (bid item "Seeding" per lump sum), seed the area during the seeding seasons specified for either cool season grasses or warm season grasses. Plant temporary seeding any time of the year.

Seed the project during the proper seeding season to protect the finished grading. This may require seeding different parts of the project at different times or seasons. Complete permanent seeding during the first season after the grading work is finished. Complete the area once the seeding operations begin in an area.

The Environmental Scientist or Stormwater Compliance Engineer may extend the seeding season a few days in special situations depending on area and weather conditions.

b. Preparation of the Seedbed. Unless shown otherwise in the Contract Documents, prepare the seedbed and seed all disturbed or cultivated areas within the right-of-way and construction easements. Seed and mulch the area within 24 hours of seedbed preparation.

Repair eroded areas before the seedbed is prepared.

In urban areas, use a landscape box to level the seedbed. Grade seedbeds to the elevations of abutting sidewalks. Remove rocks and other debris detrimental to lawn maintenance equipment.

Before seeding, use tillage equipment that penetrates 2 to 3 inches to prepare a firm, friable and weed-free seedbed. If the use of disks and harrows is impracticable, prepare the seedbed using hand methods.

Prepare seedbeds in developed urban and residential areas using rotary tillers or similar equipment. Tractor mounted equipment is permitted if the area is large enough to facilitate the use of such equipment.

Do not injure trees while preparing the seedbed. If the Engineer designates areas of desirable perennial native grasses to remain, do not till such areas. If areas of annual grasses such as cheat, crabgrass or triple-awn are encountered, destroy such grasses by thorough disking.

904 - SEEDING

Do not till areas if temporary or existing grasses provide stable slopes with no erosion. Seed the permanent grasses into the existing cover using a no-till drill.

c. Seeding. In rural areas, use seed drills that comply with **subsection 156.1**. If it is impracticable to operate a seed drill, broadcast the seed with a standard manufacture grass seeder. A hydro-seeder may be used in place of the broadcast seeder, when approved by the Engineer.

On lawn areas and small areas in developed urban areas, apply the seed with equipment suitable for the size of the area. Use manually operated drop-seeders, cyclone spreaders or other similar equipment when appropriate. After the seeding, but before mulching, hand rake the seeded lawn areas.

Similar size seeds may be mixed before drilling. The seed company may mix the seeds before delivery, or the Contractor may mix the seeds at the project site. If the seed company mixes the seeds, each bag of mixed seeds shall have a tag indicating the quantity (pounds) of each type seed and the total weight (pounds) of the bag. If the Contractor mixes the seeds, the Engineer must witness the mixing.

If required, inoculate the seeds according **DIVISION 2100**.

The drill used for seeding shall accommodate the seed sizes and weight of seed by the use of as many compartments as required. Seeds of compatible size and weight may be mixed and placed in the same compartment. Drill seed at the rate and in the locations shown in the Contract Documents. Drills shall comply with **subsection 156.1**.

Drill the seeds into the prepared seedbed. The maximum depth for drilling grass seeds is ½ inch. Unless shown otherwise in the Contract Documents, the maximum depth for drilling wildflower seeds is ¼ inch. If grasses and wildflowers are seeded on the same area, drill the grasses first, then the wildflowers.

After an area is fertilized and seeded, use a seed drill with press wheels or separate cultipacker to firm the soil.

d. Hydro-seeding. On steep slopes or other areas inaccessible with a seed drill or broadcast seeder, a hydro seeder may be used when approved by the Engineer. Apply the seed-fertilizer-water slurry within 1 hour after the seed is added to the hydro-seeder tank. Apply seed evenly over the entire site. Use a fan-type nozzle with approximately 500 gallons of water per acre. Add 50 pounds of hydro-mulch per 500 gallons of water for a visual tracer. After the seeding, but before mulching, hand rake the seeded areas inaccessible by a cultipacker.

Immediately apply bonded fiber matrix mulching according to **subsection 905.3c**. Do not apply hydro-seed and bonded fiber matrix in one application.

e. Seeding/Lump Sum. This item is only used on projects with less than 1 acre of seeding.

Prepare the seedbed, fertilize, seed and mulch all disturbed or cultivated areas within the right-of-way and construction easements according to **DIVISION 900**.

904.4 MEASUREMENT AND PAYMENT

The Engineer will measure the total quantity for each type of pure live seed used by the pound.

The Engineer will not measure hydromulch used as a visual tracer for separate payment. This work is subsidiary to the hydro-seeding item.

Bonded fiber matrix mulching will be measured and paid for according to **SECTION 905**.

The Engineer will measure "Seeding" by the lump sum. No measurement will be made of the area seeded.

Payment for the various types of "Seed", "Seed (Hydro)" and "Seeding" at the contract unit prices is full compensation for the specified work.

905 - MULCHING

SECTION 905

MULCHING

905.1 DESCRIPTION

Provide and uniformly place mulching materials as shown in the Contract Documents.

BID ITEMS

- Mulching (Permanent) (Set Price)
- Mulching Tacking Slurry
- Mulching (Hydro)
- Mulching (Hydro BFM*)
- *Bonded Fiber Matrix

UNITS

- Tons
- Pound
- Square Yard
- Square Yard

905.2 MATERIALS

Provide materials that comply with the applicable requirements.

Mulch and Mulching Tacking Slurry	DIVISION 2100
Water	DIVISION 2400

905.3 CONSTRUCTION REQUIREMENTS

a. Mulching. Place and punch the mulch immediately after the fertilizing and seeding operations. Do not allow the mulching operations to lag behind the fertilizing and seeding operations more than 24 hours. If rain is forecast, make every effort to mulch areas the same day they are seeded.

A sufficient length of mulching material is needed for the mulch to interlap and bind together. Short stemmed mulching material is more vulnerable to wind action. When the mulching is applied with a straw blower, if required, remove the cutting knives to prevent cutting the mulch too short.

After an area is fertilized and seeded, uniformly spread the mulch over the area. Apply the mulch at the rates shown in the Contract Documents. The rates shown in the Contract Documents are a guide. The Engineer will determine if the applied mulch is sufficient to protect the seeded area.

After the mulch is applied to an area, punch the mulching material (except wood chips and excelsior material) approximately 2 inches into the ground. Perform the punching operation longitudinally, using a mulch puncher. When needed, use weights on the mulch puncher to punch the mulching material into the soil.

When the slope is too steep to use a mulch puncher, "pat" the mulch with forks as it is placed on the slope. Apply mulching tacking slurry or cover with a light application of soil or sand to reduce wind loss.

On lawns and small areas in urban areas, apply the mulch material using hand methods, unless otherwise approved by the Engineer. As the mulch is placed, "pat" the mulch with a fork.

Apply mulching tacking slurry or cover with a light application of soil or sand to reduce wind loss.

b. Mulching (Hydro). Apply the hydromulch immediately after the seeding and cultipacking. Apply the hydromulch by means of a standard hydraulic slurry seeding machine. Demonstrate, to the Engineer's satisfaction, that the equipment and methods will result in a uniform application of the hydromulch.

Mix the hydromulch at the rate of 50 pounds per 100 gallons of water. Apply the hydromulch at the rate of (dry) 1,800 pounds per acre of seeded and cultipacked slope, immediately after the seeding and cultipacking to maximize adhesion and minimize slumping. Obtain complete coverage from a consistent angle of approach while applying hydromulch. Achieve no more than 65% coverage from the primary angle of application, and 35% coverage from the secondary angle of coverage. Maintain secondary angles of coverage of between 175° and 185° from the primary angle.

Mixing proportions, application methods and rates may be adjusted based on the manufacturer's recommendations.

c. Mulching Tacking Slurry. Place and punch the mulch immediately after the fertilizing and seeding operations.

905 - MULCHING

A sufficient length of mulching material is needed for the mulch to interlap and bind together. Short stemmed mulching material is more vulnerable to wind action. When the mulching is applied with a straw blower, if required, remove the cutting knives to prevent cutting the mulch too short.

After an area is fertilized and seeded, uniformly spread the mulch over the area. Apply the mulch at the rates shown in the Contract Documents. The rates shown in the Contract Documents are a guide, the Engineer will determine if the applied mulch is sufficient to protect the seeded area.

After the mulch is applied to an area, punch the mulching material (except wood chips and excelsior material) approximately 2 inches into the ground. Perform the punching operation longitudinally, using a mulch puncher. When needed, use weights on the mulch puncher to punch the mulching material into the soil.

When the slope is too steep to use a mulch puncher, "pat" the mulch with forks as it is placed on the slope. Apply mulching tacking slurry or cover with a light application of soil or sand to reduce wind loss. On lawns and small areas in urban areas, apply the mulch material using hand methods, unless otherwise approved by the Engineer. As the mulch is placed, "pat" the mulch with a fork. Apply mulching tacking slurry or cover with a light application of soil or sand to reduce wind loss.

Immediately after the designated areas are mulched and punched, use hydraulic slurry equipment to apply the mulching tacking slurry. Unless shown otherwise in the Contract Documents, apply the mulching tacking slurry at the rate of 900 pounds per acre. Distribute the mulching tacking slurry uniformly over the mulch, leaving no bare spots. Arrange work so the mulching tacking slurry can be placed within 24 hours after each area has been mulched.

d. Mulching (Hydro BFM). Apply the BFM over the specified areas by means of a standard hydraulic slurry seeding machine. Demonstrate, to the Engineer's satisfaction, that the equipment and methods will result in a uniform application of the bonded fiber matrix.

Mix the BFM at the rate of 50 pounds per 100 gallons of water. Apply the BFM at the rate of (dry) 3,500 pounds per acre of seeded and cultipacked slope, immediately after the seeding and cultipacking to maximize adhesion and minimize slumping. Obtain complete coverage from a consistent angle of approach while applying BFM. Achieve no more than 65% coverage from the primary angle of application, and 35% coverage from the secondary angle of coverage. Maintain secondary angles of coverage of between 175° and 185° from the primary angle.

Mixing proportions, application methods and rates may be adjusted based on the manufacturer's recommendations.

905.4 MEASUREMENT AND PAYMENT

a. Measured Quantities. All area measurements in this section will be based upon slope measurements.

The Engineer will measure the mulching (permanent)(set price) by the ton.

The Engineer will measure mulching tacking slurry by the pound. Payment will be made based on the dry package weight of the recycled paper fibers and tacking agent. Water will not be measured separately, but is subsidiary to the mulching tacking slurry.

The Engineer will measure mulching (hydro) and mulching (hydro BFM) by square yard.

b. Payment. Payment for "Mulching Tacking Slurry", "Mulching (Hydro)" and "Mulching (Hydro BFM)" at the contract unit prices is full compensation for the specified work.

When temporary seeding and permanent seeding are combined, the Engineer will pay for mulching under the bid item Mulching (Temporary), and the bid item Mulching (Permanent) (Set Price) will be underrun.

When the quantity of "Mulching Tacking Slurry" overruns or underruns the contract quantity by any amount, the contract unit price shall govern.

Payment for "Mulching (Permanent) (Set Price)" at the contract set unit price (subject to the adjustments in **TABLE 905-1**) is full compensation for the specified work.

TABLE 905-1: PERMANENT MULCHING PAYMENT	
Mulching (Permanent) Quantity, M (acres)	Percent of Contract Set Unit Price Per Ton
M ≤ 15	100%
15 < M ≤ 30	90%
30 < M	80%

906 - TOPSOIL

SECTION 906

TOPSOIL

906.1 DESCRIPTION

Provide and place topsoil at the locations shown in the Contract Documents.

BID ITEM

Topsoil

UNITS

Cubic Yard

906.2 MATERIALS

Provide topsoil that complies with **DIVISION 2100**.

The Contractor-furnished site (for excavation of the topsoil) is subject to the environmental clearance provisions noted in **SECTION 107**.

906.3 CONSTRUCTION REQUIREMENTS

Before excavating topsoil from the Contractor-furnished site, remove all grass, weeds, brush, stumps and other objectionable material from the site.

Spread the topsoil at the locations and to the depths shown in the Contract Documents. Do not harm existing plants or structures when placing and spreading the topsoil. Do not spill the topsoil on the roadway. Do not handle or spread topsoil when it is wet enough to form a 1 ½ inch soil ball without easily breaking.

Use only pulverized topsoil where 3 inches or less of topsoil is required.

After the topsoil is spread over the designated areas, remove any stones, roots, large clods (greater than 6 inches) and other objectionable material.

906.4 MEASUREMENT AND PAYMENT

a. Contract Quantities. The Engineer will use the contract quantities for payment, provided the project is constructed essentially to the lines and grades shown in the Contract Documents.

If the Contract Documents are altered, or if the Engineer or Contractor questions the accuracy of the contract quantities for topsoil, either party may request measurement of the quantities involved, when excavated, or after placed.

b. Measured Quantities. The Engineer will measure (by cross-sectioning) topsoil by the cubic yard. The Engineer will compute the quantities by the average end area method. Where it is impractical to measure material by the cross-section method, the Engineer may use three-dimensional measurements.

c. Payment. Payment for "Topsoil" at the contract unit price is full compensation for the specified work.

907 - SODDING

SECTION 907

SODDING

907.1 DESCRIPTION

Provide and place living sod at the locations shown in the Contract Documents.

BID ITEM

Sod (*) (**)

*Variety

**Form of Sod: roots, plugs or strips

UNITS

Square Yard

907.2 MATERIALS

Provide sod that complies with **DIVISION 2100**. Provide sod that is in vigorous growing condition.

907.3 CONSTRUCTION REQUIREMENTS

a. Sodding Seasons. Determine the sodding season using **TABLE 907-1**.

TABLE 907-1: SODDING SEASONS	
Type	Season*
Cool Season Grasses	March 1 thru April 15 September 1 thru November 15
Warm Season Grasses	May 5 thru June 30

*If the soil is workable, the Engineer may allow placement of sod between November 15 and March 1. If sod is placed during this time, maintain the sod until 20 days after the beginning of the spring sodding season.

b. Construction Sequence. Sod the project during the proper sodding season to protect the finished grading. This may require sodding different parts of the project at different times or seasons. Complete the area once the sodding operations begin in an area.

c. Soil Preparation. Before preparing the soil, repair any eroded areas, and remove all weeds and surface stones greater than 1 inch in diameter. Undercut the soil below the adjacent areas so that the top of the new sod is flush with adjacent seedbeds or turfed areas, and 1 inch below sidewalks and tops of curbs.

Cultivate or pulverize the soil to a minimum depth of 1 inch. Smooth the soil, maintaining the grades established by the Grading Contractor. Before sodding, place the fertilizer as specified in the Contract Documents.

d. Placing the Sod. Place and fit sod strips as close together as possible. Stagger the joints between horizontal rows. Fill gaps between sod strips with sod pieces cut to the shape and size of the gaps.

Lay sod strips horizontally on slopes, starting at the bottom and working upwards, unless directed otherwise by the Engineer.

If the sod is placed on slopes of 2½:1 or steeper, or in ditch bottoms, secure the sod with 6 stakes per square yard or per roll of sod. If the sod is placed on slopes steeper than 20:1 and flatter than 2½:1, secure the sod with 2 to 4 stakes per square yard or per roll of sod. Use wooden lath (approximately 6 inches long) or similar wooden materials or ungalvanized wire staples (½ inch wire diameter approximately 6 inches long) to stake the sod. Drive the stakes and staples flush with the sod surface.

After the sod is placed and secured, firm the sod using a small roller, tamper or other method approved by the Engineer.

e. Watering the Sod. Immediately after placing the sod, thoroughly water to a depth of 3 inches. Continue watering the sod every other day for 20 days after the sod is placed. The sod shall be thoroughly watered and growing when it is accepted.

907.4 MEASUREMENT AND PAYMENT

The Engineer will measure sod by the square yard.

Payment for the various types of sod at the contract unit prices is full compensation for the specified work.

908 - TREES, SHRUBS AND OTHER PLANTS

SECTION 908

TREES, SHRUBS AND OTHER PLANTS

908.1 DESCRIPTION

Provide and plant (or transplant) the designated plants as shown in the Contract Documents.

BID ITEMS

Furnishing and Planting Plant Materials
Transplanting Existing Plants

UNITS

Lump Sum
Lump Sum

908.2 MATERIALS

Provide topsoil, plants, fertilizers, peat moss, mulches, weed control fabrics and plant bed edging that complies with **DIVISION 2100**.

908.3 CONSTRUCTION REQUIREMENTS

a. Time of Planting. Follow **TABLE 908-1**.

TABLE 908-1: PLANT PLANTING SEASONS	
Plant Type	Planting Date Range
Deciduous Plants	November 15 thru April 15
Evergreen Plants	October 1 thru April 15

b. Packing and Shipping Plants. Pack all plants to protect against drying, freezing, breaking or other injury.

Do not dig bare-root plants until after they have been subject to a killing frost.

Pack bare-root plants in wet packing material. If it is necessary to transport bare-root plants more than 25 miles, treat the roots with anti-transpirant gel or acrylates before packing them for shipment.

Do not ship the plants to the project site unless the temperature at the project site is above freezing, and the soil is frost-free and in satisfactory workable condition.

Cover all plants with a tarpaulin while in transit.

Notify the Engineer at least 24 hours in advance of the delivery of the plants.

Do not plant or heel-in the plants until inspected by the Engineer.

c. Storage and Protection at the Project Site. After the Engineer has inspected and approved the plants delivered to the project, either plant immediately, or protect them by covering with canvas or heeling-in. Provide a temporary storage ground or a heel-in nursery located near the planting area.

Do not leave plants out of the ground overnight or otherwise unprotected during storage. The Engineer will reject plants damaged in any way by the lack of proper storage.

Do not cover bare-root plants with canvas for more than 10 hours. Heel-in bare-root plants that are not planted within 10 hours of delivery to the project. Treat the roots of bare-root plants with anti-transpirant gel or acrylates as soon as the plants reach the planting site or heel-in nursery.

d. Layout. Stake the locations of all plants, and verify the planting sites with the Engineer. Notify Kansas One Call and have sites investigated for underground utilities. If overhead or underground utility lines compromise the planting sites, the Engineer will relocate the sites.

e. Preparation of the Planting Sites. Remove all rocks and undesirable material encountered from the planting site.

Do not leave excavated plant pits open overnight.

(1) Trees. Clear a 10 foot radius area at each planting site. Remove all weeds, brush and other undesirable material.

908 - TREES, SHRUBS AND OTHER PLANTS

Excavate the plant pit diameter 2 feet larger than the diameter of the root ball, and deep enough to allow the top 6 inches of the root ball to extend above the finished grade.

Mix the excavated soil with peat moss and pulverize the mixture before it is used for the backfill of the plant. Apply the peat moss at the rates in **TABLE 908-2**.

TABLE 908-2: PEAT MOSS APPLICATION FOR TREES		
Root Ball (inch)	Container #	Pounds Peat/Plant Pit
12	5	40
16	10	80
20	25	120

(2) Shrub Beds. Extend the perimeters of the shrub beds 30 inches from the center of the outside row of shrubs. Cultivate the existing soil in the shrub bed to a depth of 10 inches, and remove the loose vegetation. Remove all rocks and deleterious material greater than 6 inches in any dimension.

Excavate the individual plant pits deep enough to allow the top 6 inches of the root ball to extend above the finished grade.

Mix the excavated and cultivated soil with peat moss, and pulverize the mixture. Apply the peat moss at the rates in **TABLE 908-3**.

TABLE 908-3: PEAT MOSS APPLICATION FOR SHRUBS		
Root Ball (inch)	Container #	Pounds Peat/Plant Pit
8	1	20
10	3	30
12	5	40

(3) Groundcover and Perennial Plant Beds. Extend the perimeters of the plant beds 12 inches from the center of the outside row of plants. Cultivate the existing soil in the plant bed to a depth of 10 inches, and remove the loose vegetation. Remove all rocks, gravel and deleterious material greater than 6 inches in any dimension.

Mix the excavated and cultivated soil with peat moss, and pulverize the mixture before it is used for the backfill of the plant. Apply the peat moss at the rate of 4 pounds per square yard.

f. Planting and Mulching. Exercise care in handling all plants. Do not drop or roll plant balls. Do not lift or transport balled and burlapped (B&B) plants by the top or the trunk of the plant; lift the root ball. Replace plants damaged due to improper handling. The Engineer must approve the replacement plants.

Remove all pots and containers, regardless of the pot or container composition, from plants before planting. Do not remove wire cages before placing the plant in the planting pit. When the plant is set in the planting pit, cut and remove all twine, rope or binding material from around the stem or trunk of the plant, and from around the ball. After the plant is set in the planting pit, cut and remove the top loops and the top ring of wire cages.

Plant all plants plumb. Place trees and shrubs so that the top 6 inches of their root balls are above the finished grade. Place groundcover and perennial plants with the tops of their root balls even with or 1 inch below the finished grade.

Use the mixture of excavated material and peat moss to backfill the plants. Carefully firm the backfill material about the roots of the plant (lower 1/3 of the root ball on B&B plants). Place and firm the backfill in 3 to 4-inch layers. Firm the backfill by trampling, or by the use of a tamping tool.

After trees are planted, cultivate an area 8 feet in diameter and 10 inches deep around each tree. Construct a watering basin around each tree as shown in the Contract Documents.

Place weed control fabric over the cultivated area of all shrub beds. Cut slits in the fabric to allow it to fit around the stems of each plant.

Unless shown otherwise in the Contract Documents, place composted, shredded or chipped wood mulch on the cultivated areas around all plants:

- 6 inches thick around all trees;
- 4 inches thick around all shrub beds; and
- 2 inches thick around all groundcover and perennial plants.

908 - TREES, SHRUBS AND OTHER PLANTS

Place the mulching within 24 hours of the planting. Water all plants immediately after planting. Water and rake the mulched areas to provide a uniform surface. Continue to water all plants as required during the establishment period.

Install plant bed edging, when shown in the Contract Documents.

g. Pruning. Do not prune plants except to remove dead or injured branches. Do not cut central leaders. Prune broken or damaged roots. Prune with clean, sharp tools. Remove cuttings from the planting site, or cut into small pieces and place with the mulch.

Remove and replace excessively pruned and misformed stock resulting from improper pruning.

h. Staking or Guying. Unless otherwise shown in the Contract Documents, stake or guy trees according to **TABLE 908-4.**

TABLE 908-4: GUIDELINES FOR STAKING AND GUYING TREES			
Type	Size	Number	Minimum Depth of Stake in Ground (feet)
Deciduous	Less than 1 ¼ inches in caliper	1 Stake	2
Deciduous	1 ¼ to 2 inches in caliper	3 Stakes	2
Deciduous	Greater than 2 inches in caliper	3 Guys	2
Evergreens	Greater than 6 feet tall	3 Guys	2

For staking trees, use wooden stakes 2 inches by 2 inches by 8 feet. For guying trees, use wooden stakes 2 inches by 2 inches by 3 feet. Place the stakes and guys at the same time the tree is planted. Do not damage the tree roots when placing the stakes.

Use pliable steel wire (No. 12 gauge, minimum) to tie trees to the stakes. Protect the tree trunk from the wire by encasing the wire in a section of flexible, rubber hose. Do not restrict the growth of the tree when attaching the wire ties to the trunk of the tree.

Commercial tree ties may be used if approved by the Engineer.

i. Wrapping Tree Trunks. Wrap the trunks of all maple, honeylocust, crabapple and ash trees. Begin wrapping at the base of the trunk, and extend the wrap upward to a point above the lowest tree tie.

Use a tree wrap consisting of double thickness waterproof paper with an asphalt center. Begin the wrap with 2 level loops, then wind upward with ⅓ to ½ width overlaps; end the wrap with 2 level loops. Secure the wrapping with loose-twist cotton twine (6-ply, maximum). Tie the twine around the wrap at the top; then wrap the twine spirally down the tree trunk in the opposite direction to the paper wrap, tying the twine again at the bottom. Place 2 additional ties between the top and bottom. Tie the twine loose enough to accommodate a season’s growth.

Stretchable or biodegradable tape or other materials may be used to secure the wrapping, when approved by the Engineer.

j. Clean-Up. After the planting operations are completed, remove all debris from the planting areas. Remove all labels from the plants. Remove all flags used for marking underground utilities.

Restore all disturbed areas to the finish grade.

k. Plant Establishment Period. The plant establishment period begins when the plants are planted (the current planting season), and ends on the following October 1.

During the plant establishment period, water, cultivate, weed, prune, spray, and repair and adjust the guys and stakes, as necessary. If dead plants are discovered before the end of the current planting season, remove and replace the dead plants before the current planting season expires.

Within 10 days of the end of the plant establishment period, the Engineer will inspect all plants (planted the previous planting season). The Engineer will designate any dead or unacceptable plants. Remove and replace the designated plants before the current planting season expires.

The plant establishment period for replacement plants begins when the plants are replanted (the current planting season) and ends 30 days following the end of the current planting season.

908 - TREES, SHRUBS AND OTHER PLANTS

During the plant establishment period (for the replacement plants), water, cultivate, weed, prune, spray, and repair and adjust the guys and stakes, as necessary. If dead plants are discovered before the end of the current planting season, remove and replace the dead plants before the current planting season expires.

Within 10 days of the end of the plant establishment period for replacement plants, the Engineer will evaluate the replacement plants. If the Engineer determines any replacement plants are unacceptable, the Engineer will deduct such plants from the quantities measured for pay.

Remove unacceptable replacement plants and restore the planting pits to their original condition.

The Engineer will not assess working days for maintaining and replacing plants during the establishment periods.

I. Bare Root Tree Seedlings/Shrubs.

(1) Planting. When planting in excavated holes, carefully spread the roots in a natural position and work in the backfill material around the roots to eliminate air pockets. Use the excavated material to backfill the plants.

When planting in a slot made with a tree planting machine or a planting bar (a special planting spade manufactured for planting seedlings), construct the slot of adequate depth to allow the roots to be fully extended vertically when the seedling is placed in the slot at the proper depth. Take care when planting to prevent the end of the roots from being turned upward. Pruning of large massive root systems into balance with top growth will help in ease of planting and possibly prevent "J" roots from occurring. After placing the seedling in the slot at the proper depth, completely close the slot to eliminate all air pockets.

Install all plants in the plumb position.

Set the plants to a depth where the collar (where the root system turns to the trunk) is at the level of the surrounding soil or a maximum of ½ inch below the level of the surrounding soil.

(2) Mulch Cover. Within 24 hours after planting, place a mulch cover around all plants to control the growth of competing vegetation.

Use wood compost for mulch, applied 4 to 6 inches thick. Start application 1 inch from the tree/shrub trunk.

Install a weed free fabric such as a geo-membrane when specified in the Contract Documents.

Mulch an area extending a minimum of 2 feet from any plants spaced greater than 6 feet apart. Where plants are on less than 6 foot spacing, mulch the entire bed or area, plus a minimum of 3 feet beyond the peripherals of the plants.

Cover the mulch with hold down material when specified in Contract Documents.

(3) Watering. Water the plants when specified in the Contract Documents.

(4) Bracing. Bracing is not required for trees/shrubs seedlings under 4 feet tall measured from ground level.

(5) Rabbit Protective Tubes. Install rabbit protective tubes, when specified in the Contract Documents.

908.4 MEASUREMENT AND PAYMENT

The Engineer will measure furnishing and planting plant materials and transplanting existing plants by the lump sum.

The contract includes the required contract provision, Furnishing and Planting Plant Materials, which is a listing of the unit cost for the individual items, submitted by the Contractor with the proposal. The unit prices shown in the listing will be used to adjust the lump sum amount for overruns, underruns and deducting for unacceptable plants.

Payment for the "Furnishing and Planting Plant Materials" and for "Transplanting Existing Plants", at the contract unit prices is full compensation for the specified work.

909 - MOWING

SECTION 909

MOWING

909.1 DESCRIPTION

Mow the areas designated by the Engineer.

BID ITEM

Mowing

UNITS

Per Mile Per Side

909.2 MATERIALS - None specified.

909.3 CONSTRUCTION REQUIREMENTS

Use standard manufacture mowing equipment that is adequate for the work designated.

Mow only when the ground conditions prevent rutting.

If the mowing produces enough clippings and debris to retard the growth of grass, remove and dispose of the clippings and debris.

909.4 MEASUREMENT AND PAYMENT

The Engineer will measure areas mowed per mile per side for each side of the roadway mowed. The Engineer will use vehicle odometer readings (to the nearest 0.1 mile) for the measurement of quantities. The Engineer will measure the length of mowed areas along the shoulder of the side of the roadway that is mowed. Included in this measurement are all mowed areas from the shoulder to the right-of-way line. On multi-lane roadways with medians, mowing in the median is not measured for separate payment. Exceptions less than 0.1 miles, such as a bridge, are not deducted from the measurements.

Payment for "Mowing" at the contract unit price is full compensation for the specified work.

910 - SOIL COMPOST

SECTION 910

SOIL COMPOST

910.1 DESCRIPTION

Incorporate compost into the soil as designated in the Contract Documents.

910.2 MATERIALS

Provide compost that complies with **DIVISION 2100**.

910.3 CONSTRUCTION REQUIREMENTS

Before incorporating the compost into areas that will be seeded, sodded or planted, thoroughly rototill the areas to a depth of 6 inches.

Spread a layer ($1 \frac{1}{4} \pm \frac{1}{8}$ inch thick) of compost uniformly over the rototilled soil. Use a rototiller to mix the compost and soil to a depth of 6 inches. Fine grade the mixture by raking or dragging to eliminate high spots and low spots. Lightly roll or otherwise compact the soil surface.

Mix compost with the backfill material for all plants. Mix 1 part compost with 5 parts soil (by volume) from the planting hole.

910.4 MEASUREMENT AND PAYMENT

The Engineer will not measure the specified work for separate payment.

911 - STONE MASONRY TREE WELLS

SECTION 911

STONE MASONRY TREE WELLS

911.1 DESCRIPTION

Construct stone masonry for tree wells at the locations designated in the Contract Documents.

BID ITEM

Stone Masonry for Tree Wells

UNITS

Cubic Yard

911.2 MATERIALS

Provide materials that comply with the applicable requirements.

Mortar and Concrete.....	SECTIONS 401 & 402
Aggregate for Mortar and Concrete Not Placed On Grade	SECTION 1102
Stone for Stone Masonry Tree Wells	DIVISION 1100
Burlap.....	DIVISION 1400

Provide granular material for tree root protection, such as sand, sand-gravel, gravel, and crushed stone. Provide material that is uniformly graded from coarse to fine, with all material passing a 3-inch sieve, with a gradation factor of not less than 3.00, and with a plasticity index no greater than 3. The Engineer will accept the granular material based on compliance with the specified requirements and visual inspection at the project site.

911.3 CONSTRUCTION REQUIREMENTS

Do not damage the trees while placing the embankment or constructing the tree wells.

Before placing the embankment around a tree, remove all vegetation; remove no more than 2 inches of soil. Do not damage the root system. Place a uniform layer of porous granular material (6 inches in depth unless shown otherwise in the Contract Documents) above the root spread of the tree (the same area as the branch spread). Place the embankment around the tree without disturbing the layer of porous material covering the root spread of the tree.

Construct the type of stone masonry tree well (either laid in mortar or dry-laid) as shown in the Contract Documents.

Shape the stones before placing in the tree well. Dressing or hammering on the stones is not allowed after they are placed in the tree well.

Select larger stones for the bottom or foundation course of the tree well. Construct the top of the stone masonry tree well to fit the embankment slope unless shown otherwise in the Contract Documents. Firmly place the capstone layer even (flush) with adjacent stones.

(1) Stone Masonry Laid in Mortar. Clean each stone and saturate it with water before setting the stone in mortar. Settle each stone into place in a full bed of mortar. Construct the retaining wall with full-mortared joints 1 to 1 ½ inches thick. Arrange the vertical joints to break a minimum of 6 inches with those in adjoining courses. Do not locate vertical joints above or below a header.

Construct the tree well with headers to tie the masonry together. Arrange the headers to occupy at least ¼ of the surface area on the face and back of the retaining wall. Distribute the headers evenly throughout the tree well.

Use a pointing tool to finish the exposed joints. If the exposed joints are not pointed before the mortar sets, rake the exposed joints to an approximate depth of 1 ½ inches. Thoroughly wet the raked area, pack the wetted area with fresh mortar and finish the joint with a pointing tool.

After the mortar is set, clean and remove all excess mortar from the joints and surface of the stones.

Cure the finished tree well with wet burlap for a minimum of 3 days.

During cold weather, the limitations and protection requirements of **SECTIONS 401 & 710** will apply to the concrete footing and concrete grout.

(2) Stone Masonry Laid Dry. Construct the dry-laid tree well with broken joints, placed to form a solid, self-supporting wall. After the stones are placed, key the stones together by filling the voids with spalls or small stones to obtain a uniform surface.

911 - STONE MASONRY TREE WELLS

911.4 MEASUREMENT AND PAYMENT

The Engineer will measure stone masonry tree wells by the cubic yard. The measurement will be to the dimensions shown in the Contract Documents, or as revised by the Engineer.

Payment for "Stone Masonry for Tree Wells" at the contract unit price is full compensation for the specified work.

912 - PARK STRUCTURES

SECTION 912

PARK STRUCTURES

912.1 DESCRIPTION

Provide materials for and construct the specified park structures as shown in the Contract Documents.

<u>BID ITEMS</u>	<u>UNITS</u>
Bench	Each
Grill	Each
Table (*)	Each
Table Shade (**)	Each
Planter Unit	Each
Bicycle Rack	Each
Grate	Each
Waste Receptacle	Each
Comfort Station (***)	Each
Comfort Station (Modification)	Each
*Wood Without Base, Wood With Concrete Base or Concrete With Concrete Base.	
**Masonry, Stone or Wood.	
***Type shown in the Contract Documents.	

912.2 MATERIALS

Provide materials that comply with the applicable requirements.

Mortar and Grade 3.5 Concrete	SECTIONS 401 & 402
Aggregate for Mortar and Concrete Not Placed On Grade	SECTION 1102
Concrete Masonry Units.....	DIVISION 1300
Concrete Curing Materials	DIVISION 1400
Cement	DIVISION 2000
Welded Steel Wire Fabric	DIVISION 1600
Steel for Grates.....	DIVISION 1600
Lumber	DIVISION 2300
Water	DIVISION 2400

Provide other materials as shown in the Contract Documents. The Engineer will accept other materials based on compliance with dimensions and details shown in the Contract Documents.

912.3 CONSTRUCTION REQUIREMENTS

a. Earthwork. Shape and finish the park areas as shown in the Contract Documents. Eliminate all depressions that will hold surface water. If necessary, provide additional earth material.

b. Mortar and Reinforced Concrete. Use reinforcing steel according to **DIVISION 700**. Form, place, finish cure and protect the concrete according to **SECTION 710**.

c. Park Structures. Provide and construct the park structures as shown in the Contract Documents.

Apply a prime coat and 2 finish coats of paint, color and type as designated in the Contract Documents. Before painting any structure, submit color samples of the paint to the Engineer for approval. The Engineer will approve (or disapprove) the paint based on visual inspection.

912.4 MEASUREMENT AND PAYMENT

The Engineer will measure each park structure.

Payment for the various park structures at the contract unit prices is full compensation for the specified work.

913 – WATER SYSTEMS

SECTION 913

WATER SYSTEMS

913.1 DESCRIPTION

Provide materials for, and construct the water system as shown in the Contract Documents.

BID ITEM

Water System

UNITS

Lump Sum

913.2 MATERIALS

Provide materials that comply with the applicable requirements.

Grade 3.5 Concrete*	SECTIONS 401 & 402
Aggregates for Concrete Not Placed On Grade	SECTION 1102
Aggregates for Underdrains	DIVISION 1100
Concrete Curing Materials	DIVISION 1400
Cement	DIVISION 2000
Welded Steel Wire Fabric	DIVISION 1600
Drain Tile	DIVISION 1900
Water	DIVISION 2400

* Use Grade 3.5 Concrete unless specified otherwise in the Contract Documents.

913.3 CONSTRUCTION REQUIREMENTS

Construct the water system as shown in the Contract Documents. Make all service connections to the water supply unless specified otherwise in the Contract Documents.

913.4 MEASUREMENT AND PAYMENT

The Engineer will measure water systems by the lump sum.

Payment for "Water System" at the contract unit price is full compensation for the specified work.