SP-155072
(New)

SPECIAL PROVISIONS
FOR
SAND BASED TURF

Des Moines County
EDP-0977(653)--7Y-29

Effective Date
June 15, 2021

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

155072.01 DESCRIPTION.

A. Summary.

1. **Section Includes.**
   - **a.** Seeding of Lawn areas
   - **b.** Sodding of Sand-Based Turf areas
   - **c.** Maintenance
   - **d.** Warranty

2. Related Requirements: Special Provisions for Irrigation System.

B. References and Regulatory Requirements.

1. USDA Federal Seed Act - labeling and purity standards and miscellaneous requirements.

2. State Seed Laws – where applicable.

3. Association of Official Seed Analysts (AOSA): “Rules for Testing Seed”.

4. Turfgrass Producers International (TPI): Guidelines for Turfgrass Sod.

C. Definitions.

1. Finish Grade: Elevation of finished surface of planting soil.

2. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

3. Pests: Living organisms that occur where they are not desired or that cause damage to grasses, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

4. Pure Live Seed (PLS): (percent germination x percent purity)/100 = Percent PLS

5. Topsoil: Soil that has been modified with soil amendments and fertilizers to produce a soil mixture best for lawn growth. Refer to Article 4170.09 of the Standard Specifications for topsoil.

6. Sand-based Turf: Sodded lawn with a custom blended, sand-based soil, aggregate drainage layer, and underdrain system.

7. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before topsoil is placed.

D. Preinstallation Meetings.
Conduct preinstallation meeting at Project site.

E. Action Submittals.

1. Product Data.
- **a.** Straw mulch.
- **b.** Erosion Control Blanket
- **c.** Fertilizers - from manufacturer.
- **d.** Pesticides and herbicides: Product label, manufacturer's product data sheet, application instructions and application equipment.
- **e.** Seeding and mulching equipment.
- **f.** Straw Mulch tackifier – materials and equipment.
- **g.** Lawn maintenance equipment.
- **h.** Sand-based turf soil mix design.

2. Source Quality Control.

a. Test Report.
Test reports including soil amendments and fertilization rates for each seed mix. Refer to Article 4170.09 of the Standard Specifications.

b. Certifications/Licenses.

1) Certification of Grass Seed for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity (PLS), germination, weed seed, year of production, and date of packaging. Include identification of source, name and telephone number of supplier.

2) Certification of sod from proposed sod supplier that identifies quality standard, turf species stating the botanical and common names, proportions of each species in the sod, composition of the root zone soil in which the sod has been grown, and date the sod was planted. Include identification of source, name and telephone number of supplier.

c. Project Work Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a project work schedule to the Engineer indicating dates for delivery, installation, and Substantial Completion for all landscape work. The Schedule shall be comprehensive and address procurement, delivery, and installations of irrigation, planting and lawn areas of the site. Refer to Article SP-155072.01, I, for a complete list of schedule requirements.

d. Maintenance Schedule: Within 4 weeks following the issuance of the Notice to Proceed, submit a detailed typewritten approach and schedule for the warranty maintenance of all landscape activities outlined in Article 155072.03, J. Coordinate landscape maintenance with other applicable special provisions (Exterior Plantings, Irrigation) and combine all maintenance activities into one plan of action. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

e. Irrigation Plan: Prior to the issuance of Substantial Completion, submit a detailed typewritten approach and schedule that outlines watering requirements for maintaining the landscape as described herein. The Irrigation Plan shall be submitted in conjunction with the Maintenance Schedule. The plan shall address how the irrigation system will be operated during the warranty period, frequencies and durations that will be established to provide the correct watering rates for plants and lawns, inspection protocols and winterization procedures. If the automatic irrigation system is inoperative or not present, provide an approved temporary irrigation system or hand water from a source approved by the Engineer. The system shall have the ability to be operated without moving hoses or sprinklers around the site between seeded/planted areas (i.e. system can be set to water one area for the required maintenance period) and may be automated with a timer. Supply all water and equipment at the Contractor's expense from a source approved by the Engineer. Reliance on natural precipitation will only be allowed with provision of recorded data from a rain gauge located within a 2 mile radius of the project site. The schedule shall be comprehensive and shall be the basis for monthly payment during the maintenance period.

f. Maintenance Report Forms: Using the approved Maintenance Schedule and Irrigation Plan as the framework for all maintenance activities (plant maintenance, seed bed maintenance, and irrigation operations). The Contractor shall provide detailed maintenance report forms for each site visit. The reports shall be completed by the on-site maintenance superintendent performing the work prior to leaving the site and shall be submitted monthly as back-up to each invoice. Office prepared reports will not be permitted and payment for this work will only be made by the Contracting Authority when proof of completed specified maintenance has been provided. Each report shall include the following:

1) Date of activity.
2) Length of time on site (start time and finish time).
3) Name and signature of the maintenance superintendent.
4) Number of personnel performing the work.
5) Site climatic conditions (rain, wind, temperature, etc.)
6) Detailed description of maintenance activities performed by area.

F. Informational Submittals.

1. Include list of at least three similar projects completed in the last 5 years by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

2. Provide resumes of field technician (foreman) responsible for managing the purchase and installation of all materials. Separate resumes shall be provided for the seeding, planting, irrigation and maintenance technicians.

3. License certificates for pesticide applicator.

G. Quality Assurance.

1. The Contractor shall be a company specializing in seeding, sodding, and exterior landscape, installations and maintenance, having a minimum 5 years' experience in projects of the scope and scale being specified.

2. Installer's field technician: The installer shall provide a full-time supervisor on site when work is in progress.

3. Maintenance field technician: The maintenance activities for all turf areas shall be performed by skilled employees of the landscape installer. Subcontractors specializing in landscape and turf maintenance will not be permitted unless approved in writing by the Engineer.

4. Pesticide applicator: State licensed, commercial.

H. Delivery, Storage, and Handling.

1. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.

2. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding". Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

3. Straw Mulch: Straw mulch shall be stored off the ground under a cover that provides protection from moisture and humidity.

4. Bulk Materials.
- **a.** Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
- **b.** Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
- **c.** Accompany each delivery of bulk materials with appropriate certificates.

I. Scheduling.

1. Work Schedule.
- **a.** Upon authorization to proceed with the work, submit a project work schedule indicating the dates of each of the following items:
  - **1)** Submittal schedule.
  - **2)** Delivery of materials to the site.
  - **3)** Layout of seed bed locations on the site.
  - **4)** Installation including; topsoil placement, fine grading, sodding**,** and seeding.
  - **5)** Substantial Completion of the work.
- **b.** Update schedule monthly to reflect progress of the work.

2. Seasonal Limitations.

a. Cool Season Grasses: Install during the spring and fall only when soil temperatures are between 50°F and 65°F and air temperatures is 60°F to 75°F.
  1) Approximate spring installation: Between April 1 and May 15.
  2) Approximate fall installation: Between August 15 and September 30 but no later than 60 days before the first average annual frost date.
  3) Dormant seeding: Not permitted for cool season grasses.

b. Sodding: Comply with Cool Season Grass dates identified above.
Dormant sodding: Not permitted.

c. If special circumstances warrant installation outside the normal installation season, submit a written request to the Engineer describing conditions and stating the proposed variance. Seeding and Sodding outside the specified seasons may extend warranty obligations and will be dependent upon the extent of the variance.

d. Weather limitations: Proceed with seeding and sodding only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

e. Coordination with Plantings: Plant trees, shrubs, and other plants after finish grades but prior to lawn installation unless otherwise indicated. When planting trees, shrubs, and other plants after lawn installation, protect completed areas, and promptly repair damage caused by planting operations.

J. Warranty, Maintenance, and Acceptance.

1. Substantial Completion.

a. The Substantial Completion inspection shall occur for the entire project and only one Notice of Substantial Completion will be issued. Phased approvals will not be permitted. Following the inspection, the Engineer will issue a punch list identifying all work requiring completion or correction.

b. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Contracting Authority.

c. Substantial Completion will be provided for all lawn areas complying with the following:
  1) Engineer approval of all specified submittals.
  2) The work shall be 100% complete (including all site preparation, earthwork, topsoil, seeding, sodding, mulching, planting, irrigation and clean-up), and ready for inspection.

d. After receiving a Notice of Substantial Completion, warrant and maintain all lawn areas (see Article 155072.03, M) in a vigorous, well-kept condition until Final Acceptance.

2. Final Acceptance.

a. Approximately 2 weeks prior to the expiration of the warranty and maintenance period, the Engineer will conduct an inspection of all lawn areas, plantings, irrigation system and review all previously submitted maintenance report forms to verify all completed maintenance activities. There shall be thorough documentation previously submitted by the Contractor and field observations made by the Engineer that the specified maintenance has occurred. Following the inspection, the Engineer will issue a punch list identifying all work requiring completion, replacement or correction.

b. The Contractor shall complete all punch list items within 2 weeks of its issuance. All repairs shall occur at no additional cost to the Contracting Authority.

c. Final Acceptance will be based upon Engineer approval and the work having:
  1) Uniform finished grades conforming to the plans and free of erosion.
  2) All maintenance items completed and documented by Contractor through maintenance report forms.
  3) Satisfactory Seeded Lawn: At end of warranty and maintenance period, a healthy, uniform well-rooted, even-colored, close stand of grass has been established, free of weeds, disease and insect problems, and surface irregularities, with 100% coverage of the specified species.

4) Satisfactory Sodded Lawn: At end of warranty and maintenance period, a healthy, well-rooted, even-colored, viable lawn, free of weeds, disease and insect problems, open joints, bare or dead areas, and surface irregularities.

d. Areas which do not meet the contract requirements shall be regraded as needed and seeded, or sodded. Use specified materials and procedures to reestablish lawn that does not comply with requirements, and continue maintenance at no cost to the Owner until lawn is satisfactory.

e. Final Acceptance and the end of the warranty period for the lawns will occur only after all punch list items have been satisfactorily completed and the site is left in the condition specified under Cleanup and Protection.

3. Warranty and Maintenance Period.

a. The end of the warranty and maintenance period shall be:

1) 60 days from date of completion of Substantial Completion punch list but no less than three maintenance mowings.

2) When the initial warranty and maintenance period has not elapsed before end of growing season (October 31), or if lawns are not fully established, continue maintenance during next growing season until all maintenance and warranty obligations have been met.

b. The Contractor will not be held responsible for defects resulting from neglect by Contracting Authority, abuse or damage by others, or unusual phenomena or incidents beyond landscape installer's control which result from floods, hail storms, winds over 100 mph, fires or vandalism, unless Contractor has not completed specified installation in a manner that could have protected the landscaping from these phenomena.

155072.02 MATERIALS.

A. Seed.

1. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

2. Other varieties than those specified may be submitted for approval to the Engineer, but they must be newer, more improved cultivars than what is listed.

3. Seed Species.

a. Quality: Seed of grass species as listed below for solar exposure, with not less than 90% germination, not less than 98% pure seed, and not more than 0.3% weed seed:

b. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of four improved turf type varieties.

c. Install at a rate of 4 pounds PLS per 1000 square feet of bed.

B. Turfgrass Sod.

1. Provide an approved nursery grown, Number 1 Quality/Premium sod, complying with “Specifications for Turfgrass Sod Materials” in TPI’s “Guideline Specifications to Turfgrass Sodding”. Furnish sod comprised of the specified species and of uniform density, color, and texture, strongly rooted, weed free and capable of vigorous growth and development once installed. Sod shall be 2 years old and shall have been grown at a sod nursery in a mineral-based root zone. Sod grown on peat (organic soil) will not be approved. Sod shall be free of objectionable grassy and broad leaf weeds.

2. Thickness and width of sod shall be kept to strict dimensions, with width being 24 inches and containing 90 degree angle cut edges. Netting associated with harvest must be removed before installation.

3. **Turfgrass Sod Species.**
   - **a.** Sod of grass species as follows, with not more than 0.5% weed seed.
   - **b.** Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three improved turf type varieties.

4. Sod Stakes: Sod Stakes shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer spacing and installation instructions.

C. Straw Mulch.

1. **Straw Mulch.**
   - **a.** Provide stalks from oats, wheat, rye, barley or rice that are free of weeds, air-dry, clean, mildew- and seed-free, threshed straw of wheat, rye, oats, or barley.
   - **b.** Straw shall be in an air dry condition and suitable for placing with commercial mulch blowing equipment.

2. **Tackifier.**
   - **a.** Hydraulically applied tackifier shall be an organic based or polymeric emulsion blend designed for use over long-fibered mulch (straw). Tackifier shall:
     Be powder or liquid based
     - **1)** Achieve a drying time between 12 and 18 hours
     - **2)** Minimum 4 month longevity after application
   - **b.** Asphalt Emulsion tackifier is not permitted.

3. Hydraulic mulch is not permitted.

D. Erosion Control Blanket.

1. **Erosion Control Blanket - Type 1.**
   - **a.** Intended for use on flat surfaces or slopes 4:1 (H:V) or greater where only sheet flow will be encountered.
   - **b.** Straw/jute blanket shall be constructed with a 100% agricultural straw matrix (0.5 pounds per square yard), with jute or cotton netting on top and bottom, sewn together with biodegradable cloth thread. The blanket shall be 100% biodegradable and have a typical functional longevity of 12 months after installation. Plastic netting will not be permitted.

2. Fasteners: Fasteners shall be natural based plastic that is 100% biodegradable from microbial activity in accordance with ASTM D5338 or D6400, formed in a T-shaped with barbed heads and shoulders, minimum six inches long, color green and installed per manufacturer's spacing and installation instructions.

E. Equipment.

1. **Tiller.**
   - **a.** Equipment used for subsoiling or ripping compacted subsoils on slopes up to 2:1 (H:V): A minimum D-7 size tractor with a mounted ripper consisting of three to five tines spaced a maximum 24 inches apart. Tines shall be equipped with 12 inch wide winged ripper points and shall be capable of penetrating subsoils up to 24 inches deep in one pass.

b. Equipment used for subsoiling or ripping compacted subsoils on slopes up to 4:1 (H:V): A tractor mounted disk harrow consisting of six to twelve offset disks weighing a minimum 1800 pounds each. The harrow shall be capable of penetrating subsoils up to 18 inches deep in one pass.

2. Fine Grading: Hand rake, tractor mounted york rake or other similar equipment.

3. Hydroseeder: Hydroseeding will not be permitted.

4. Drop Spreader with Cultipacker, as manufactured by Brillion or John Deere or equivalent.

5. Broadcast Seeding: A spinning-disc type broadcaster with a calibration gauge (hand held and tractor mounted) shall be used to broadcast the seed over the designated areas.

6. Seed Imprinting Equipment: Used with spinning-disc type broadcaster to lightly cover or press seed into the soil. A tractor or all-terrain vehicle mounted dragging devise consisting of anchor chains, disk chains, cables, chain harrow or other similar equipment.

7. Straw Mulcher: A power mulcher that thrashes and separates, then evenly distributes the straw at a capacity between 2 and 20 tons per hour, with a discharge distance between 35 and 100 feet in still air.

8. Crimping Device: A mulch disc or other mechanical anchoring/crimping device for use in anchoring straw mulch into place, such as a Reinco Model MD-96 or equivalent, having flat discs with notched edges spaced 8 inches apart to impress mulch 1 to 3 inches down into soil.

F. Water.

1. Water for lawns shall be available from on-site sources.

2. Water shall be free of wastewater effluent or other hazardous chemicals.

G. Topsoil.
Refer to Special Provisions for Flow Through and Landscape Planters.

H. Sand-Based Turf Soil Mix.

1. Design Intent: Create well-drained turf areas capable of standing up to high traffic use shortly after heavy rain events.

2. Basis of Design Product.
a. Waupaca Sand & Solutions (E3481 Royalton Street, Waupaca, WI 54981) sports field soil mix.
b. Material consisting of blended rootzone soil mix comprised of well-graded sand, silt and clay conforming to the following particle size distribution. The percentage of organic content shall be in the range of 0.15% to 0.75%.

Class	Sieve Size	% Retained
Sand		91.0 – 94.0
Silt		3.0 – 4.5
Clay		3.0 – 4.5
Silt + Clay		6.0 – 9.0

Class	Sieve Size	% Retained
FG	#10	0 – 3.0
VCoS	#18	10.0 – 15.0
CS	#35	16.0 – 26.0
MS	#60	35.0 – 45.0
FS	#100	12.0 – 17.0
VFS	#270	1.0 – 5.0

3. Coordinate with Engineer for approval of locally available, comparable sand-based sports field soil mixes.

I. Soil Amendments.

1. Peat shall be a product having at least 95% organic content consisting of sphagnum peat moss with a pH range of 3.0 to 4.0 and Von Post decomposition value of H1 to H3, or low-lime reed-sedge peat with a pH range of 4.0 to 5.0 and Von Post decomposition value of H4 to H6. Product shall be free of sticks, wood or other debris.

2. Compost shall be a heavily decomposed mature/stabilized, humus-like material derived from the aerobic decomposition of yard clippings or other compostable materials. Manure is not suitable for use. The compost shall have a dark brown or black color, be capable of supporting plant growth without ongoing addition of fertilizers or other soil amendments and shall not have an objectionable odor. The compost shall be free of plastic, glass, metal and other physical contaminants, as well as viable weed seeds and other plant parts capable of reproducing (except airborne weed species). Composting facility shall be tested in accordance with the United States Composting Council, Seal of Testing Assurance (STA) following procedures as outlined in the Test Methods for the Examination of Composting and Compost protocols (TMECC).
- **a.** pH: 5.5 to 8.
- **b.** Moisture content: 35% to 55% by weight. No visible free water or dust is produced when handling it.
- **c.** Sieve analysis: 100% passing 3/4 inch screen.
- **d.** Soluble salt content: Less than 5%.
- **e.** Organic matter content: Minimum 60%.

3. Sand shall be clean, coarse, ungraded, meeting the requirements of ASTM C33 for fine aggregates.

4. pH Adjusters:
- **a.** Lime shall be finely ground agricultural grade dolomitic limestone containing not less than 85% calcium and magnesium carbonates conforming to ASTM C602, Class T or O.
- **b.** Elemental sulfur shall be granular, biodegradable, horticultural grade material containing at least 90% sulfur, with a minimum of 99% passing through No. 6 sieve and a maximum of 10% passing through No. 40 sieve.

J. Fertilizer.

1. Fertilizer shall be a complete fertilizer of neutral character, consisting of fast and slow-release nitrogen and shall be applied at the rates and formulations that release nutrients when new plants can effectively draw them from the soil. The percentages of slow release and fast release nitrogen shall be adjusted based on the time of year fertilizers are being applied.

2. Composition: The percentages by weight shall be determined per recommendations of the soil testing reports for lawns.

K. Pesticides.

1. General: Pesticide and herbicides shall be registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides and herbicides unless authorized in writing by authorities having jurisdiction.

2. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within seeded areas at the soil level.

3. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

155072.03 CONSTRUCTION.

A. Examination.

1. General.
- **a.** The Contractor shall establish a quantifiable system to be employed in the field for measuring areas, weighing products and calibrating equipment on a daily basis to ensure all products are installed at the specified rates of application.
- **b.** Prior to beginning work, examine and verify the acceptability of the project site and notify the Engineer of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected or resolved.
- **c.** Identify areas of subsoil compaction prior to placement of topsoil.
- **d.** Verify that no foreign or deleterious material has been deposited in soil within a planting area.
- **e.** Where lawn installation occurs in close proximity to other site improvements, provide adequate protection to all features prior to commencing work. Promptly repair any items damaged during installation operations to their original condition.
- **f.** Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
- **g.** Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
- **h.** Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- **i.** If lawn areas die or are rejected due to non-conformity to contract requirements, they must be removed from the site immediately and replaced before Substantial Completion.

2. Utilities: Have all underground utilities located by servicing agencies. In the vicinity of utilities, hand-excavate to minimize possibility of damage.

3. Coordination with Other Work.
- **a.** The Contractor shall coordinate work with other contractors or trades to determine the appropriate sequence of landscape installation with respect to other work on the site.
- **b.** Completed work installed out of construction sequence which is subsequently disturbed by the completion of work by other trades shall be repaired by the landscape installer at no cost to the Contracting Authority.
- **c.** Maintain grade stakes and layout controls set by others until removal is mutually agreed upon by all parties concerned.

B. Subgrade Preparation.

1. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by lawn installation operations.

2. Install erosion control measures, if necessary, to prevent erosion or displacement of soils and discharge of soil-bearing water run-off or airborne dust to adjacent properties, natural resources and walkways.

3. Vegetation Removal: Strip and dispose of organic debris and root mat.

4. Topsoil stripping and stockpiling: Refer to Article 2105.03 of the Standard Specifications.

5. Maintain subgrade in areas to receive topsoil in a uniform condition so as to prevent future depressions. Prior to placing topsoil;
   a. Till all subsoils to a minimum depth of 18 inches with approved equipment to remove all compacted subsoils. Tilling shall be complete breaking thoroughly fracturing. Perform tilling in two directions, one perpendicular to the other.
   b. Upon completion of tilling, the subsoils will require light compaction and leveling to prevent ponding of water and settlement after topsoil placement. As a final operation, a light-weight tracked dozer shall be employed that will remove surface irregularities and prevent excessive settlement. During this procedure, the surface of the subsoil on slopes greater that 4:1 (H:V) shall be imprinted with tracks from the dozer. Imprinting shall be perpendicular to the slope and shall be approximately one-inch deep.
   c. Do not proceed with topsoil placement until subgrade tilling and imprinting is completed to the satisfaction of the Engineer.
   d. Repair disturbances to previously graded areas and remove surplus subgrade material associated with any landscape construction.

6. If the prepared subgrade is eroded or compacted by rainfall prior to topsoil placement, rework the surface as specified.

7. In locations where existing topsoil has not been removed, till entire area in accordance with Article 5 above. Do not till within dripline of existing trees.

C. Placing Topsoil, Soil Amendments, and Fertilizer.

1. Provide, fertilize and amend topsoil in accordance with testing laboratory recommendations specified, refer to Article 4170.09 of the Standard Specifications.

2. Uniformly distribute topsoil on lawn areas so that after light compaction and finish grading, a uniform depth of 6 inches is achieved. Where appropriate, reduce elevation of planting soil to allow for thickness of sod. Placement shall include spreading, cultivating, lightly compacting, dragging and grading to the conditions specified below.

3. Topsoil, when placed, shall be dry enough so as not to puddle or bond. Do not place topsoil when the subgrade is frozen, excessively wet, extremely dry or in a condition otherwise detrimental to proper grading or lawn operation.

4. Following topsoil placement but prior to finish grading, broadcast all soil amendments and fertilizer and rototill into the topsoil. The coverage areas for soil amendments and fertilizer shall be carefully calculated by the installer and fully blended into the entire topsoil profile. Do not incorporate soil amendments and fertilizer more than 5 days in advance of seeding.

D. Pre-Installation Preparation.

1. **Finish Grading.**

a. Immediately before lawn installation scarify, loosen, float, and drag topsoil as necessary to bring it to the proper condition. Remove all foreign matter larger than 1 inch in diameter. There shall be no visible plants, roots, debris or any foreign material present prior to installation.
b. Finished grades shall slope to drain, be free of depressions or other irregularities, lightly compacted to prevent settlement, and shall be uniform in slope between grading controls and the elevations indicated.
c. Finished grade for seeded lawn areas shall meet existing grades at contract limits and be 1/2 inch below top of curbs, walk paving, and metal edging if used.
d. Finished grade for sodded areas shall meet existing grades at contract limits and be 1 inch below top of curbs, walk paving, and metal edging if used.

2. Before lawn installation obtain Engineer's acceptance of finish grading. Restore seedbed areas if eroded or otherwise disturbed after finish grading.

E. Seeding and Mulching.

1. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to partially dry before seeding. Do not create muddy soil.

2. Pay close attention to weather conditions. Ensure each area being seeded is fully completed in advance of weather conditions such as heavy rains and strong winds that will result in damage to the unfinished work. Fully completed shall mean seeding, dragging, mulching, crimping and tackifier.

3. Seeding Procedures.
a. Do not sow seed when weather conditions are unfavorable, such as during drought or high winds.
b. Perform seeding with only approved equipment. Do not broadcast or drop seed when wind velocity exceeds 10 mph.
c. Sow the seed uniformly at rates specified in Article SP-155072.02, A.
d. Do not use wet seed or seed that is moldy or otherwise damaged.
e. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucers, plant beds and other seed beds.
f. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
g. Immediately following seeding, rake, drag or float all seed beds to provide a light covering of topsoil approximately 1/8 inch deep. When using equipment that lightly injects the seed into the soil, include equipment that lightly rolls the seed bed to provide good moisture contact between the seed and soil.
h. Maintain soil moisture in accordance with Article SP-155072.03, H.

4. Mulching Procedures.
a. Do not use any straw that contains weeds and other plants that will contaminate the seed beds with unspecified plants. Carefully inspect each bale of straw prior to spreading and any bales observed to be contaminated with weeds shall be removed from the site on a daily basis.
b. Do not mechanically blow straw when wind speeds exceed 10 mph.
c. Remove all straw that has been deposited outside the limits of seeding and on adjacent pavement, plant beds and tree saucers.

d. Spread straw mulch evenly at the rate of approximately 2 tons dry straw per acre. Place all mulch over all seeded areas within 24 hours after seeding. A mechanical blower or hand spreading shall be used to apply mulch material, provided the machine has been specifically designed and approved for this purpose. Mulch shall be uniform in thickness and cover resulting in a blanket of straw approximately 1 1/2 inches loose thickness with little to no visible soil.

5. Anchoring Mulch Procedures.

a. Anchor the mulch by using both an approved crimping device and applying tackifier on the mulched surface immediately following mulching operation.

b. Mulch shall be crimped in all seed beds where slopes are less than 4:1 (H:V) and of sufficient width to allow equipment to perform crimping without damaging the finish seed bed. Crimp all locations in two directions. When finished, straw shall be anchored one to two inches into the seed bed in rows no more than eight inches apart.

c. Tackifier shall be applied at the rate recommended by the manufacturer and shall be applied uniformly to all mulch either simultaneously with mulching operation or in a separate application. Take precautionary measures to prevent materials from marking or defacing structures, pavements, utilities, or plantings. Immediately clean all stains and damaged areas.

d. Any seed and mulch displaced due to improper crimping and bonding with tackifier shall be immediately replaced to the specified condition at no addition cost to the Contracting Authority.

F. Sodding.

1. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen.

2. Correct all inequalities and soft spots in the sod bed before installation. Roll site with a 200 pound roller to firm the soil. Sod must be installed onto moist, smooth soil. Water thoroughly and allow surface to partially dry before installation. Do not create muddy soil or excessively moist condition that will result in rutting and disturbances to the finish grades. During installation, continue to fine grade areas immediately in advance of the work to maintain a smooth surface.

3. Sod shall be entire pieces except where trimming is required at the ends of each row. No piece shall be less than 12 inches in any dimension.

4. Lay sod to form a solid mass with joints staggered to prevent water from channelizing and eroding the sod bed. Butt ends and sides of sod rolls tightly together; do not overlap and do not stretch sod to make edges meet. Stagger rolls to offset joints in adjacent courses. There shall be no visible gaps between any adjacent piece of sod or at transitions between pavement, curbs and edging.

5. Lay sod perpendicular to slopes, and peg sod on slopes exceeding 3:1 or steeper with two pegs per square yard. When sod may be displaced during installation (steep slopes), work from ladders or treaded planks installing pegs immediately after each piece is installed.

6. Tamp or roll sod with a 200 pound roller immediately after it is laid to ensure full contact between the sod root mass and topsoil. The finished surface shall be true to grade and shall be smooth, even, and equally firm at all points.

7. After the sod is completely installed, resod all areas which have browned out or fail to show a uniform stand of grass. Repair all visible cracks between pieces of sod.

8. Maintain soil moisture in accordance with Article SP-155072.03, H.

G. Turf Renovation.

1. All preparation work shall be conducted in accordance with Articles 155072.03, A through D. Following surface preparation, lawn installation shall be completed in accordance with the applicable lawn installation methods specified above. Blend newly seeded and sodded areas into adjacent existing lawns.

2. Renovate existing lawns where indicated. In areas where diseased or contaminated lawns are identified, remove existing topsoil and dispose off site.

3. Renovate lawns damaged by Contractor's operations, such as storage of materials, haul roads or other areas outside the limits of work.

4. Renovate lawns where topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations has occurred. Remove existing topsoil and dispose off-site.

5. Mow, dethatch, core aerate, and rake existing turf where identified.

6. Maintain soil moisture in accordance with Article SP-155072.03, H.

H. Watering.

1. Immediately following lawn installation water all bed areas thoroughly and immediately with a fine mist until soil is soaked to a depth of at least 2 inches or as indicated above. Puddling of water or allowing the seedbed to dry is unacceptable.

2. For seeded areas, maintain soil in a moist condition (in hot dry weather irrigation may be required two to four times per day) until seeds have sprouted and reached a height of 1 inch. Water thereafter a minimum of once every 2 to 3 days unless natural rainfall has provided equivalent watering. Provide irrigation to moisten soil to a depth of 4 inches to encourage deeper rooting.

3. For sodded areas, begin watering the entire area within 24 hours of installation and water daily for the first two weeks; twice a day in hot dry weather. Keep soil in all areas moist but not soaked to 2 inches below the bottoms of the plants. Water thereafter a minimum of once every 2 to 3 days unless natural rainfall has provided equivalent watering until Final Acceptance. During this period, moisten soil to a minimum depth of 4 inches to encourage deeper rooting.

4. Watering at accelerated rates that dislodge seed and mulch materials or cause erosion shall be immediately repaired at no cost to the Contracting Authority.

I. Erosion Control Blanket.

1. Install erosion control blanket at swales and slopes steeper than 5H:1V.

2. Immediately following seeding, erosion control blanket shall be rolled out in place in the direction of the slope fall line. The material shall be applied without stretching and shall lie smoothly but loosely on the soil surface. Installers shall minimize walking directly on the seed or topsoil bed either before or after the blanket is applied.

3. All ends shall be buried a minimum of 4 inches deep and the trench shall be firmly tamped after closing.

4. In cases where roll ends join, the up-slope piece shall overlap the down-slope piece by at least 18 inches.

5. Anchor edges prior to backfilling trench, all overlaps at 12 inch intervals, and the center of each panel on 3 foot intervals.

6. The upslope ends of the blanket shall be buried a minimum of 6 inches deep and anchored at 12 inch intervals prior to backfilling trench.

7. Reseed all disturbed edges immediately following straw blanket installation and work seed into blanket.

J. Maintenance.

1. General: Maintain and establish lawn areas by watering, fertilizing, pest and weed control, litter removal, mowing, trimming, repairs, and performing other operations as required to establish healthy, viable lawn. Maintenance shall also include grade repair, seeding, sodding and all associated soil amendments and fertilizers.

2. Provide all maintenance under the supervision of a skilled employee of the lawn installer.
- **a.** The skilled maintenance supervisor shall be: capable of operating the automatic irrigation system controller, conducting turf diagnostics to identify the presence of disease, insect and fertility problems, and directing a maintenance crew in the performance of horticultural maintenance practices identified below. Maintenance requirements identified below shall be the basis for information to be included in the Maintenance Schedule and Irrigation Plan identified in this section and thoroughly documented under the required Maintenance Report Forms to verify the work has been properly performed.
- **b.** Failure to perform and submit factual Maintenance Report Forms could result in non-payment for said services and require the extension of the warranty and maintenance period an additional year at the Contractor's expense.

3. Provide all equipment, materials, labor and services to maintain the landscape beginning immediately after each area is installed and continuing until Final Acceptance and the end of the warranty period. During this period, perform the following:
- **a.** Inspect the entire landscape at least once per week during the growing season and perform needed maintenance promptly.
- **b.** Prior to each mowing, collect all debris, litter and miscellaneous materials accumulating on the site and remove from the site.
- **c.** Irrigation: Irrigate all turf areas to maintain optimum moisture within the root zone as specified under 3.08 above. When using an automatic sprinkler system, the lawn installer responsible for maintenance shall bear full responsibility to set each zone to the correct frequency and duration.
- **d.** Mow all lawns weekly during the growing season and as described below. Mowing frequencies shall be adjusted based on cutting requirements and may require more frequent visits during high growth periods. Use mulching mower only with sharpened blades and alternate direction of each mowing session to prevent rutting.
- **e.** Fertilize as described below.
- **f.** Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Apply herbicides and pesticides as described below.

g. Remove leaves bi-weekly during the fall as they accumulate on the lawns. Bag and dispose off-site. Do not mow in advance of leaf removal.
h. Repair bare, eroded or settled areas and restore to provide a uniformly smooth lawn with the specified grasses. Provide same materials and installation procedures as those used in the original installation.
i. Reclaim/replace soil materials and turf damaged or lost in areas of subsidence. Roll, regrade, and replant bare or eroded areas to produce a uniformly smooth lawn.
j. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

4. Mowings: Mow turf as soon as top growth is tall enough to cut. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. At the time of each mowing, adjust mowing equipment to meet this requirement. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
a. Mow kentucky bluegrass to a height of 2 1/2 to 3 inches.
b. For sodded lawns wait at least 2 weeks after installation for first mowing.
c. Mowing heights may increase during the hot summer months based on regional conditions.
d. Collect all grass clippings if mowings are not sufficiently timed to allow for composting into the existing lawn and accumulations of clippings can be observed on the surface of the grass. Collection and off-site disposal shall be performed at no additional cost to the Contracting Authority.

K. Post-Installation Fertilization.
Apply fertilizers at the time of season, rate of application and grade of N-P-K that maximizes the health of the lawn and minimizes the potential run-off of fertilizers to adjacent waterways and groundwater. Avoid the use of phosphorus unless site soils are deficient of this nutrient.

L. Pesticide Application.

1. Apply pesticides, and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Contracting Authority and others in proximity to the Work.

2. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

M. Cleanup and Protection.

1. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

2. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off site.

3. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

4. Protect newly seeded areas from stormwater flows discharging from paved surfaces until grass establishment. Additional water diversion and erosion control measures such as wattles and check dams may be utilized at Contractor's discretion and expense.

5. Remove nondegradable erosion-control measures after grass establishment period.

155072.04 METHOD OF MEASUREMENT.
Sand Based Turf will be measured by square yard.

155072.05 BASIS OF PAYMENT.
Payment for Sand Based Turf will be full compensation for complete installation of sand-based turf and sod. All materials as stated shall be incidental to the bid item.