

N. SEEDING, SODDING, AND SITE RESTORATION

1. Topsoil: Topsoil shall be fertile, friable soil of loamy character, free of sub-soil, stumps, refuse, roots, hard dirt, heavy or stiff clay, coarse sand, noxious weeds, noxious weed seeds, sticks, brush and other foreign material. It shall not be infested with nematodes nor with any other noxious animal life or toxic substances. Sandy loam of low fertility, even though mixed with leaf mold, manure, or other fertilizers, will not be accepted.
2. Grass seed: Grass seed shall be clean, dry, new crop seed and for established areas shall be a blend as specified below, unless otherwise specified on the plans or directed by the City's Engineer:
 - a. Kentucky Blue Grass 20% by weight.
 - b. Creeping Red Fescue 30% by weight.
 - c. Perennial Rye 30% by weight.
 - d. Annual Rye 20% by weight.
 - e. Purity 85%
 - f. Germination 80%
 - g. Maximum weed seed 1%

It shall comply with standards of the Official Seed Analysis of North America and be recommended for full sun exposure in Columbia, Missouri. Seed shall be free from Johnson grass, Canadian thistle, or field bind weed seed and be approved by the Inspector. If re-establishing pasture or cropland, seed used shall match existing crop cover.

3. Fertilizer: Fertilizer shall be a mixture containing 12 pounds each of soluble nitrogen, phosphate, and potash per 100 pounds.
4. Mulch for Broadcast Seeded Areas: Mulch for broadcast seeded areas shall be clean wheat straw.
5. Plants, Trees and Shrubs: Plants, trees and shrubs shall be same strain as those removed. They shall be approximately the same size and dimensions as those removed and shall be nursery grown.
6. Sod: Sod shall be the same type as removed or damaged, shall be best

quality, not more than two years old and meeting the following standards:

a. Thickness of Cut: Sod shall be machine cut at a uniform soil thickness of 5/8 inch, plus or minus 1/4 inch, at the time of cutting. Measurement for thickness shall exclude top growth and thatch.

b. Pad Size: Individual pieces of sod shall be cut to the suppliers standard width and length. Maximum allowable deviation from standard widths and lengths shall be plus or minus 1/2 inch on width and plus or minus 5 percent on length. Broken pads and torn or uneven ends will not be acceptable.

c. Strength of Sod Sections: Standard size sections of sod shall be strong enough to support their own weight and should retain their size and shape when suspended vertically from a firm grasp on the upper 10 percent of the section.

d. Moisture Content: Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) will adversely affect its survival.

e. Mowing Height: Before stripping, sod shall be mowed uniformly at a height of 1 to 2-1/2 inches.

f. Thatch: Sod shall be relatively free of thatch, up to 1/2 inch allowable (uncompressed).

g. Diseases, Nematodes, and Insects: Sod shall be reasonably free of diseases, nematodes, and soil-borne insects. State nursery and/or plant materials? laws require that all sod entering interstate commerce be inspected and approved for sale. The same applies to sod being shipped intra-state. The inspections and approval must be made by the state agricultural department, office of the state entomologist.

h. Weeds: Sod shall be free of objectionable grassy and broad leaf weeds. Sod shall be considered free of such weeds if less than 5 such plants are found per 100 square feet of area. Sod will not be acceptable if it contains any of the following weeds: quack grass, Johnson grass, poison ivy, nutsedge, nimblewill, Canada thistle, bind weed, wild garlic, ground ivy, perennial sorrel, bromegrass, bentgrass, and Bermuda grass.

7. Preliminary Cleanup: Disturbed areas, including those disturbed by site

grading, trenching, storing of dirt, pipe laying, pipe storage, movement of equipment, and other work shall be cleared of all rubbish, brush, rock, trash, and excess dirt as soon as is practical after the pipe is laid and backfilled. In established lawn and parkway area, surface shall be raked the same day backfill operations are performed in order to remove all above items, including all rock measuring two-inches or more in its greatest dimension. In pasture and cropland areas, all above items shall be removed in a timely fashion. Contractor may use tractor-drawn equipment, including rock rakes and steel roller drum.

8. Planting: Individual trees, plants and shrubs shall be replaced as necessary by the Contractor and as stipulated by the City's Engineer. Planting shall be in accordance with How to Plant a Tree by the University of Missouri - Columbia Extension Division (Publication G 6850). Where stipulated, replacement trees, plants, and shrubs shall be of the same size, type, strain, and value as those removed. Planting of replacement trees, plants, and shrubs shall be done as soon as possible after installation of mains, with due consideration given to optimal times of the year to plant the given species.
9. Application of Topsoil: For established lawn and parkway areas, after preliminary cleanup has been performed, topsoil meeting the requirements of paragraph 1, shall be applied to a minimum depth of four inches to disturbed areas. Topsoil shall be pulverized and graded to match existing terrain, or as specified by the Inspector. Surface shall be raked smooth to provide a good seedbed.

For pasture and cropland areas, topsoil shall be stripped from the area and windrowed separately from the subsoil for replacement after preliminary cleanup.

10. Seeding: Initial seeding shall be performed as soon as practical after preliminary cleanup and application of topsoil. Seeding windows are specified as follows: Autumn seeding shall be performed between August 15 and October 15 and spring seeding shall be performed between March 15 and May 15. If initial seeding is performed within either of the specified seeding windows, the only additional work required of the Contractor shall be warranty work. If initial seeding falls outside either of the specified seeding windows, then re-seeding during the soonest seeding window shall be considered part of the work. The final determination as to need

for re-seeding shall rest with the Inspector.

For Hydraulic Seeding the seed, fertilizer, and mulch shall be mixed with water and constantly agitated so that a uniform mixture can be applied hydraulically to the specified areas. Seed shall not be added to the water more than four hours before application. Ratios of seed, fertilizer, mulch, and water shall be calculated so that seed will be applied at the rate of six pounds minimum per 1000 square feet of area, fertilizer will be applied at the rate of 12 pounds minimum per 1000 square feet of area, and mulch will be applied at the rate of 1000 pounds minimum dry weight per acre. Wet application rate of the mixture shall be 2000 pounds per acre minimum.

For Broadcast Seeding applicable to areas disturbed by service installation only, seed and fertilizer shall be broadcast at the rate of six and twelve pounds per 1,000 square feet, respectively. Seed and fertilizer shall be raked to a depth of approximately 1/4 inch. Mulch shall be applied to approximately 1/2 inch depth.

11. Sodding: Delivery of sod shall be timed so that sod will be transplanted within a period of 36 hours unless a suitable preservation method is approved prior to delivery. Sod not transplanted within this period shall be inspected and approved by the City's Engineer prior to its installation. During periods of higher than optimal temperature and after all unevenness in the soil surface has been corrected, the soil shall be lightly moistened immediately prior to laying the sod. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to and tightly against each other. Lateral joints shall be staggered to promote more uniform growth and strength. Care shall be exercised to ensure that the sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would cause air drying of the roots. As sodding is completed in any one section, the sod shall be pressed into contact with the sod bed by tamping or rolling, so as to eliminate air pockets, provide a true and even surface, and assure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Following compaction, screened soil of good quality shall be used to fill all cracks. Excess soil shall be worked into the grass with rakes or other suitable equipment. The quantity of fill soil shall be such as will cause no smothering of the grass. It shall then be thoroughly watered to a depth sufficient that underside of the new sod pad and the soil

immediately below the sod are thoroughly wet.

Staking of sod will not be required unless sod cannot be transplanted and maintained as specified herein. If required, sod shall be staked with six stakes per square yard or roll of sod. Stakes shall be of lath or similar materials and shall be driven six inches into the ground, leaving approximately one-half inch of the top above the sod line.

12. Protection: Seeded and sodded areas shall be protected against traffic. If necessary, barricades or warning signs shall be erected. Such protective devices shall be maintained until final acceptance of the project.
13. Maintenance: All seeded and sodded areas shall be maintained by the Contractor until acceptance, but in no case shall maintenance be for less than 30 days following completion of all seeding, mulching, and sodding operations. Maintenance shall include watering, mowing, reseeding, repair or erosion damage, maintenance of mulch, and removal of litter. The City will assume maintenance upon acceptance.
14. Replanting: Prior to the end of the maintenance period, seeded and sodded areas that show signs of substantial desiccation, as evident by a loss of color and a distinct yellowing or where no germination is evident, shall be considered as failed and shall be reseeded or resodded and continue to be reseeded or resodded until an acceptable cover is obtained. Replanting operations shall be as originally specified.
15. Maintenance of Grades: Original grades of grass areas shall be maintained after commencement of planting operations and during the maintenance period. Any damage to the finished surface from construction operations shall be repaired within a reasonable time. In the event erosion occurs from either watering operations or rainfall, such damage shall be repaired within a reasonable time. Ruts, ridges, tracks, and other surface irregularities shall be corrected, and reseeded where required.
16. Maintenance of Mulch: Mulched areas shall be maintained until covered with growing grass seedlings. Mulch material that has been removed from the site by wind or other causes shall be replaced and secured.
17. Mowing: All sodded areas shall be mowed at least once for acceptance.

Not more than 1/3 of the grass lead shall be removed by the initial cutting or subsequent cuttings. Height shall be maintained by 2-1/2 inches.

Mowing equipment shall be rotary type in good operating condition, well adjusted, and with sharp blades. Extra care shall be taken when mowing around trees and shrubs to prevent bark damage. Any trees and shrubs with damaged bark as a result of maintenance operations shall be replaced by the Contractor at his expense. Clippings shall be blown off of private driveways and parking lots.

18. Removal of Litter: Prior to any mowing operations, all debris that would interfere with mowing shall be collected and removed. The debris includes, but shall not be limited to, paper and cardboard, cans, bottles, and any other wastes that detract from the general appearance of any area of the site.
19. Waiver: Some aspects of this Section N may be waived by the City's Engineer if the property which is the subject of the waiver request is owned by the same party that is contracting to install the water main. Such request must be made in writing and state that the owner of the property is installing the main and will accept all responsibility for all of the requirements herein being requested to be waived. The request will also state that the owner will be solely responsible for and hold harmless the City of Columbia for any damage to the owners or any surrounding property due to the contractor's lack of compliance with those provisions being waived.