

SECTION 02900

RESTORATION AND LANDSCAPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnishing and installing fertilizer and lime
2. Tillage and seed bed preparation
3. Furnishing and installing temporary seed
4. Permanent seeding
5. Furnishing and installing loam
6. Furnishing and installing mulch
7. Replanting of trees and shrubs damaged from construction access and activities.
8. Maintenance

1.02 RELATED SECTIONS (NOT USED)

1.03 CODES AND REFERENCES

- A. U.S Department of Agriculture – Federal Seed Act.
- B. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:

1. Copy of supplier's invoices for seed, mulch, lime, and fertilizer which shows the quantity by weight delivered.
2. Representative label bearing either manufacturer's or vendor's guaranteed statement of analysis for seed including seed age, purity and germination, mulch, lime, and fertilizer.
3. Evidence of qualifications as specified in Paragraph 1.05.A.

4. Proposed planting plan and plant list for replacement trees and shrubs, including species, sizes, and proposed locations.
5. Documentation of approval by the Needham Conservation Commission and/or the Needham Tree Warden, as applicable, prior to purchase and installation of replacement plant material.

1.05 QUALITY ASSURANCE

- A. Seeding shall be performed by a nursery or landscape construction firm that has successfully completed two (2) projects of similar size and complexity to this contract within the last five (5) years.

1.06 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping:

1. Deliver package materials in containers labelled with production name.

B. Storage and Protection

1. Protect materials from deterioration during delivery and storage.

1.07 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. Do not perform any work specified in this section during periods of severe weather as indicated by the National Weather Service and frozen or snow covered ground.
2. Landscape restoration shall be done between April 1 and June 1 and between September 1 and October 1.

B. Existing Conditions:

1. Do not start restoration work until earthwork in area is complete.
2. Complete final grading and mechanical compaction including the following prior to initiating work:
 - a. Fill eroded areas and areas having ponding of water.
 - b. Eliminate ruts, deep tracks, furrows, and ridges.
3. Maintain established grades as indicated on Contract Drawings.

1.08 MAINTENANCE**A. Maintenance:**

1. Maintain and water all seeded and restored areas until Substantial Completion.
2. Eliminate weed growth in restored areas.
3. Maintain mulched areas until covered with growing grass seedlings. Replace and secure materials displaced by erosion at no additional cost to the Authority.
4. Clear entire area of excess soil and waste material. Remove all hydromulch overspray from pavements, structures, trees, and shrubs.
5. Remove soil clods and debris from roads.
6. Protect seeded areas against traffic by erecting barricades or placing warning signs.

PART 2 PRODUCTS**2.01 MATERIALS****A. Loam Borrow**

1. Planting soil shall be loam borrow. Loam shall be fertile, friable, natural loam capable of sustaining vigorous plant growth. It shall be free of any admixture of subsoil, stones one inch in diameter or larger, clods of hard earth, plants, roots, sticks or extraneous material. Loam requirements:
 - a. Loam shall have a pH of between 5.0 and 7.0.
 - b. Loam shall have an organic content of 5-12, determined by the Thomas Rapid test method.
 - c. Loam shall meet the following mechanical analysis:

	<u>Percent Passing</u>	<u>Percent Retained</u>
1 inch screen	100	0
½ inch screen	97-100	0-3
No. 100 Mesh Sieve	60-40	40-60

- d. The clay content of the material passing the US No. 100 mesh shall not be greater than 60%, as determined by the Bouyoucous hydrometer or by the decantation method.

- e. A certified analysis of the loam from each source shall be submitted to the Authority before delivery to the site. Soil added to the site shall be tested for hazardous materials.
- f. If loam does not meet the requirements of Paragraph 2.01A as a result of the analysis, all deficiencies shall be corrected at no additional cost to the Authority.

B. Seed

1. Comply with Federal and State seed laws and noxious weed restrictions and applicable rules and regulations pertaining to sale and shipment of seed.
2. Fully label each container of seed as required by law and indicate germination and purity which shall not be less than following percentages:

	<u>Purity</u>	<u>Germination</u>
Kentucky Bluegrass	85	75
Creeping Red Fescue	98	85
Redtop	90	85
Birdsfoot Trefoil	98	80
Perennial Ryegrass	95	85
Rye	98	80

3. Test samples of all seed used within nine (9) months prior to seeding. Seed shall not exceed more than one percent weed content.
4. Mix each seed mixture to provide uniform distribution of each species at time of seeding.

C. Starter Fertilizer

1. Pelleted or granulated.
2. Fertilizer to have following analysis in percent by weight: Available Nitrogen 10 parts, Available Phosphorus 20 parts and Available Potassium 10 parts.

D. Lime

1. Ground limestone or hydrated or burnt lime which contains at least 50 percent total oxides. Ground to such fineness that at least 50 percent will pass through

100-mesh sieve and 98 to 100 percent will pass through 20-mesh sieve.

E. Mulch

1. Mulch to include threshed straw of oats, wheat, barley, rye, smooth broomgrass hay, sudangrass hay, or prairie hay.
2. Prairie hay to consist of Bluestem grasses, Switchgrass, Indiangrass, or other desirable native perennial grass.
3. Prepare wood cellulose fiber mulch from virgin wood fibers, dyed green to allow visual metering, and containing a tacking agent. Nominal moisture content not to exceed 10 percent, air dry weight.

F. Water and Watering Equipment

1. Provide water and watering equipment.

G. Inoculant

1. Pure culture of nitrogen-fixing bacteria prepared specifically for the species. Not to be used later than date indicated on container. Use twice the supplier's recommended rate of inoculant on dry seeding.

H. Replanting Materials

1. All plant materials used for replanting shall be new, nursery-grown, healthy, and free from defects, disease, or insect infestation.
2. Plant materials shall be of a size and quality suitable to achieve the replacement requirements specified in Part 3.04 REPLANTING.
3. All replacement plants shall be legibly tagged with the species name.
4. Replacement trees shall be native species appropriate to the project area and site conditions.
5. All deciduous replacement trees shall meet the following standards:
 - a. Trees shall have a single, straight trunk, well formed, and sturdy. No part of the trunk shall be crooked as compared with normal trees of the same variety.
 - b. Trees shall be free from all signs of pest and disease damage. The trunk shall be free from sun scald, frost cracks, and wounds resulting from abrasions, fire, animal damage, or other causes.

- c. All trees shall have healthy, vigorous leaves or needles of size, color, shape, and texture for the particular species and variety.
 - d. Tree caliper shall be measured in accordance with standard nursery practice.
 - e. Branching of all deciduous trees shall be representative of the species, cultivar, or variety. Branches shall have sound attachment to the trunk with angles no less than 30 degrees and no greater than 90 degrees from the vertical.
 - f. Trees failing to meet these requirements shall be rejected and replaced at no additional cost to the Authority.
6. Shrubs
- a. Replacement shrubs shall be native species and shall be replaced in kind with respect to size, form, and function, unless otherwise directed by the Authority.
7. Root Systems
- a. Root balls shall be firm, moist, and proportionate to the size of the plant material.
 - b. Root systems exhibiting circling, kinked, or damaged roots shall be rejected.
8. Substitutions
- a. Substitution of species or sizes shall not be permitted without prior approval by the Authority.

PART 3 EXECUTION

3.01 INSTALLATION

A. Clearing

- 1. Cut and remove vegetation prior to grading and tilling.
- 2. Remove collected material from site. Do not bury.
- 3. Trim tree limbs that overhang the project route.

B. Fertilizer and Lime

- 1. Apply within 24 hours prior to tilling operation in all areas to be seeded or sodded.
- 2. Apply fertilizer at 400 pounds/acre.

3. Apply lime at one ton/acre.

C. Tillage

1. After clearing, incorporate lime and fertilizer.
2. Scarify existing soil to a minimum depth of three (3) inches. Place a minimum of six (6) inches of planting soil (loam borrow) over scarified subgrade, then prepare seed bed by tilling to achieve a uniform, friable surface. In compacted areas, till the soil to a minimum depth of six (6) inches.
3. Perform tilling operations in direction parallel to contour lines on slope and not in an uphill/downhill configuration.
4. Smooth seed bed to eliminate clods and voids.

D. Temporary Seeding

1. In areas to be seeded, if earthwork operations are completed more than 30 days before specified seeding season, place temporary cover of rye.

E. Provide stand of grass in seeded areas as follows:

1. Seeded areas to be uniform in density, weed free, and at least two (2) inches tall.
2. Seeded areas will be considered weed free if less than five (5) grassy or broadleaf weeds are found per 100 sq. ft. of area.
3. Seeded areas will not be acceptable if they contain any of following weeds: bermudagrass, quackgrass, bindweed, johnsongrass, poison ivy, nutsedge, nimblewill, thistle, wild onion or garlic, ground ivy, and perennial sorrel.
4. Seeded areas shall have no bare spots greater than three (3) inches in diameter over greater than five percent (5%) of the overall seeded area. At least 90 percent of the grass established shall be permanent grass species. Seeded areas not meeting Contract Documents shall be prepared and reseeded in accordance with this Section at no additional cost to the Authority.

3.02 APPLICATION

A. Temporary Seeding

1. Apply rye at rate of 3-1/2 pounds per 1000 sq. ft.
2. Apply with grain drill at one (1) to two (2) inch depth. Other methods will not be acceptable.

3. Mulch with hay or straw as specified herein.
 4. Apply to grassy areas disturbed by work.
- B. Permanent Seeding: Apply following mixtures

1. In areas to be maintained as lawn areas:

<u>Species</u>	<u>Proportion</u>
Kentucky Bluegrass	30 %
Creeping Red Fescue	25 %
Perennial Ryegrass	45 %

2. Distribute specified seed mixtures uniformly over area, cover seed to average depth of 1/8 inch, and firm soil in one operation.
3. Place markers between successive passes to assure that no gaps exist.

C. Mulching

1. Apply straw uniformly over seeded areas to depth of 1-1/2 inches. Collect all wire from baled mulch.
2. Anchor straw mulch by crimping mulch into soil to depth of three (3) inches. No straw mulch shall be spread unless it can be anchored on same day.
3. Protect pavements, trees, and shrubs from overspray.

3.03 SURFACE RESTORATION OF OFF-ROAD AREAS

- A. Restore surfaces of all disturbed off-road areas to their original condition once construction of the pipeline and appurtenances in off-road areas has been completed.

3.04 REPLANTING REQUIREMENTS

A. General

1. Trees and shrubs removed, destroyed, or damaged beyond recovery as a result of construction access, staging, restoration, and other construction-related activities shall be replaced.
2. Location of replacement plants are subject to the Authority's approval.

B. Tree Replacement

1. Replacement trees shall be furnished and installed in kind at a ratio of two (2) caliper inches of replacement tree for each one (1) caliper inch of tree removed or damaged beyond recovery.
2. Shade trees for use in paved areas shall have no branches lower than seven (7) feet above finish grade. The lowest branches shall not be higher than eight (8) feet above finish grade. Flowering trees for use in areas away from pedestrian traffic shall have the first branch of their crowns no higher than four (4) feet from finish grade.

C. Shrub Replacement

1. Replacement shrubs shall be furnished and installed in kind and quantity as directed by the Authority.

D. Seasonal Planting and Approvals

1. Where trees or shrubs are required to be replanted, planting shall be performed during appropriate planting seasons, preferably in early spring prior to bud break or in early to mid-November following leaf drop, unless otherwise approved by the Authority.
2. Replacement trees shall be planted as close to the location of the removed tree as feasible, unless otherwise directed by the Authority or applicable local jurisdiction.
3. Prior to purchase and installation of replacement plant material, submit a proposed planting plan and plant list for review and approval by the Needham Conservation Commission and/or the Needham Tree Warden, as applicable.
4. Where replanting cannot be completed immediately due to seasonal limitations, protect disturbed areas and complete replanting at the earliest suitable planting period.

E. Planting Procedures

1. Planting pits shall be excavated to accommodate the full root system of the replacement plant material without crowding or distortion of roots.
2. Plant material shall be set plumb and at the proper depth, with root flares exposed and positioned at or slightly above finished grade.
3. Backfill material shall be placed in lifts and firmly tamped to eliminate voids while avoiding excessive compaction.

4. All plant material shall be watered immediately after planting to ensure full saturation of the root zone.

F. Maintenance

1. Maintain all replacement trees and shrubs until Substantial Completion. Maintenance shall include watering, straightening, re-mulching, and protection of plant material to promote healthy establishment.
2. Replacement plantings shall be kept free of weeds and in a healthy growing condition.

G. Acceptance

1. Any replacement tree or shrub that fails to survive, is in poor condition, or does not exhibit healthy growth at the time of inspection shall be removed and replaced at no additional cost to the Authority.

**** END OF SECTION ****