

Note to Designers: Mid-height basin seed mix may be used for sunny and/or partially shaded locations. Species typically grow up to 6 feet in height. Mix contains a range of species for establishing vegetation where there is a gradation of dry to moist basin conditions. Mix is intended for areas that are infrequently or not mowed.

GENERAL

Work under this item shall conform to the relevant provisions of Subsections 765 and 767 of the Standard Specifications and the following:

Work under this item shall consist of furnishing the mix specified below in the required quantity, seeding, mowing, and other care to establish a stand of native grass in the areas shown on the Plans or as required by the Engineer. For the purposes of these specifications, the term "grass" shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SUBMITTALS

- 1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.
- 2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. A copy of this submittal shall be forwarded to the Landscape Architect. Substitutions or changes in the mix at this time must be approved by the Landscape Architect.
- 3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.
- 4) Seed Tags. The Contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

Number of tags submitted must correspond to number of bags delivered.

Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

A copy of this submittal shall be forwarded to the Landscape Architect.

- 5) Verification of Seed Delivery. Prior to payment, Contractor shall submit the Seed Delivery Verification form contained within the Contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this Contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job. A copy of this submittal shall be forwarded to the Landscape Architect.
- 6) Seed Sample. If requested or if seed is from a previously opened bag, the Contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

Seeding seasons for native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

MATERIALS

Fertilizer

No fertilizers shall be applied.

Water

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

Permanent Seed Mix

Mid-height Basin Seed Mix shall be as specified below or approved equal. Any species substitutions shall be with a species having similar characteristics and function. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site

conditions. Substitutions must be approved by the Landscape Architect per the documentation submittal process.

<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS by Weight</u>
<u>Grass</u>		
Elymus virginicus	Virginia Wild Rye	27.0%
Schizachyrium scoparium 'Albany Pine'	Little Bluestem 'Albany Pine'	22.5%
Elymus riparius	Riverbank Wild Rye	18.0%
Panicum virgatum	Switch Grass	15.0%
Dichanthelium clandestinum 'Tioga'	Deertongue grass 'Tioga'	5.0%
Carex vulpinoidea	Fox Sedge	2.0%
Agrostis perennans	Upland Bentgrass	1.5%
Carex vulpinoidea	Fox Sedge	0.5%
Poa palustris	Fowl Bluegrass	0.3%
Juncus effusus	Soft Rush	0.1%
Juncus tenuis	Path Rush	<u>0.1%</u>
		92.0%
<u>Herb/Forb</u>		
Chamaecrista fasciculata	Partridge Pea	3.0%
Penstemon digitalis	Beard-tongue	1.0%
Vernonia noveboracensis	New York Ironweed	0.6%
Helenium autumnale	Common Sneezeweed	0.5%
Verbena hastata	Blue Vervain	0.4%
Aster puniceus	Aster - Swamp	0.4%
Aster cordifolius	Blue Wood Aster	0.3%
Asclepias incarnata	Swamp Milkweed	0.3%
Monarda fistulosa	Wild Bergamot	0.2%
Aster novae-angliae	New England Aster	0.2%
Solidago rigida	Rigid Goldenrod	0.2%
Desmodium canadense	Showy Tick Trefoil	0.2%
Eupatorium perfoliatum	Boneset	0.2%
Eupatorium maculatum	Spotted Joe Pye Weed	0.2%
Solidago juncea	Early Goldenrod	0.1%
Euthamia graminifolia	Grass-leaved Goldenrod	0.1%
Lobelia cardinalis	Cardinal Flower	<u>0.1%</u>
		<u>8.0%</u>
		100.0%

Application Rate

15 lbs. Pure Live Seed (PLS) / Acre (approx. 1 lb. PLS / 322 SY).

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed).

For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy, it is calculated to be $90\% \times [78 + 10 + 2]\% = 81\%$ PLS.

Therefore, each pound of PLS would need $1 \text{ pound} / 0.81 = 1.2$ pounds of seed with a 90% purity and 90% total germination

50% Increase Adjustment for Field Conditions

Seeding out of season requires written approval and a 50% increase in the permanent mix at the time of construction.

SEEDING

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional soil and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

Surface preparation shall be compensated for under the specified soil as appropriate to the project.

Jute mesh, when specified in the Contract, shall be placed after seeding and per the Standard Specifications and the manufacturer's instruction.

Surface preparation shall be approved by the Engineer prior to seeding.

Cover Crop

Cover crop shall be used to prevent erosion until the permanent seed establishes.

Seed Application

Seeding shall occur within 72 hours of placement of specified soil and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Seed application shall be by broadcast seeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The Contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with the Engineer. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the Landscape Architect and the Engineer.

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding, mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the Landscape Architect will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
 - At least 3 types of the permanent seeded grass species shall be visible.
 - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to using incorrect mix.

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with Engineer.

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance. Seeding that shows good germination and is

determined by the Engineer and Landscape Architect to not require weed control at time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, Contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the Contractor's expense.

METHOD OF MEASUREMENT

Mid-height Basin Seed Mix will be measured for payment by the square yard, complete in place.

BASIS OF PAYMENT

Mid-height Basin Seed Mix will be paid at the Contract unit price per square yard upon Conditional, Interim, and Final Acceptance as described above, which price shall include all labor, materials, equipment, and incidental costs required to complete the work. No separate payment will be made for submittals, seed, seeding, rolling to ensure seed-to-soil contact, mowing for weed control, water, and over-seeding to correct poor germination or establishment, but all costs in connection therewith shall be included in the Contract unit price bid.

Schedule of payment shall be as follows:

30% upon Conditional Acceptance.

20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.

50% upon Final Acceptance of Establishment.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under the specified soil item(s) as relevant to the project.

Cover crop will be paid for separately under Item 765.21 Annual Cover Crop for Native Seeding.

NATIVE SEED WORKSHEET

Project Description: _____ Project No: _____

Contractor: _____ Contract No: _____

Seed Mix Number & Description: _____

Contractor: Complete Prior To Ordering

Pounds of Seed Required Per Contract:

_____ lbs./acre for _____ Acre(s) OR _____ SY

Additional 50% increase if required (out of season):

_____ **lbs. Total Seed Required**

Calculated Quantity for Pure Live Seed (PLS¹):

_____ **Total Pounds PLS**

Engineer: Verification at Time of Application

Number pounds delivered to site²: _____ Date(s): _____

Actual Seed Bag Tag/s Received or photo documented by Engineer: _____

¹ *PLS = % pure seed x % viable seed (total germination, hard seed, and dormant seed).*

² *Quantity delivered should match pounds **Total Pounds PLS** and **Verification of Seed Delivery**. Pounds should be shown on each Seed Tag.*

SUPPLIER VERIFICATION OF SEED DELIVERY

Date _____

We hereby certify that (*Seed Supplier*): _____

Furnished to (*Contractor*): _____

For use on: (*Project Description*) _____

Project #: _____ Contract #: _____

Pounds of Pure Live Seed: _____

Of Mix (*Description*): _____

Lot Number _____

The material was delivered on (*Date*) _____.

The labels and contents meet all State and Federal regulations. The mixture consists of the following species, including cultivars (as applicable) and ecotype region, and at the following percentages (may be attached separately):

Name (print): _____ Title: _____

Supplier: _____

Signature and Seal: _____