1.0 GENERAL

1.1 References

1.1.1 Prairie Roots: A Handbook for Native Prairie Restoration (NPSS)

1.1.2 Restoring Canada's Native Prairies: A Practical Manual by J. Morgan and others.

1.1.3 Saskatchewan Noxious Weeds Act, 1984

1.2 Related Work

1.2.1 Section 02210 - Site Grading – Rough

1.2.2 Section 02212 - Planting Soil and Finish Grading

1.3 Delivery and Storage

1.3.1 Seed shall be mixed and tested by a recognized seed house and clearly marked with the name of the supplier and the specified seed composition.

1.3.2 The contractor shall supply the consultant with the certificates of analysis for all of the lots of seed used, a minimum of 14 days prior to seeding providing sufficient time for rejection.

1.3.3 The contractor is responsible for ensuring seed is viable.

1.3.4 Deliver and store grass seed in original containers showing:

.1 Analysis of seed mixture

.2 Percentage of pure seed

.3 Year of production

.4 Net mass

.5 Date when tagged and location

.6 Percentage germination

.7 Name and address of distributor

1.4 Measurement and Payment

1.4.1 Supply of seed will be measured in kilograms.

1.4.2 Seeding will be measured in square metres of surface area on the drawings. If there is a discrepancy, the actual surface area in the field will be used.

1.4.3 Seed protection on slopes will be measured in square metres of surface area on the drawings. If there is a discrepancy, the actual surface area in the field will be used.

1.4.4 Payment for seeding will not occur until Substantial Performance.

2.0 PRODUCTS

2.1 Grass Seed

2.1.1 Western and Northern wheatgrass seed to be: Certified No. 1 Grade in accordance with Government of Canada "Seeds Act" and "Seeds Regulations" and having minimum germination of 75% and minimum purity of 97%.

2.1.2 All other native seed must meet seed certificate minimum purity standards as set by the Canadian Methods and Procedures for Seed Testing and having a minimum germination of 70% and minimum purity of 97%.

2.1.3 All seed is to be Zone 2B hardy.

2.1.4 Seed is to be free of weeds listed under the Saskatchewan Noxious Weeds Act.

2.1.5 In addition to 2.1.4 seed is to be free of: Kentucky bluegrass, quack grass, crested wheatgrass, smooth brome, sweet clover, foxtail barley, absinthe, star thistle, dalmatian toadflax, baby's breath, ox-eye daisy, burdock, common tansy and canary reedgrass.

2.1.6 Supply 2 copies of seed certificates to the landscape architect.

2.1.7 Substitutions are to be approved by the consultant.

2.1.8 Use a grass seed mixture and respective rate equivalent to one of the following as indicated on the Drawings or as directed by the landscape architect.

SEED MIX NAME	SEED MIX AND RATE
Mix #4 Native dry meadow short varieties, unirrigated grasses	On cultivated surfaces, sow seed uniformly. Seed at a rate of .115kg (.25 lbs) per 100 sq.m (1000 sq.ft) using a native drill seeder OR seed at a rate of .23 kg (.5 lbs) per 100 sq.m (1000 sq.ft) using a broadcast seeder. -20% Mat Muhly / *Muhlenbergia richardsonis* (If not available increase Blue Grama to 30% and Rocky Mtn Sheep's fescue to 20%.) -20% Blue Grama / *Bouteloua gracillis* -20% Plains rough fescue / *Festuca hallii* -20% June grass / *Koeleria macrantha* -10% Rocky Mountain Sheep's fescue (*Festuca ovina* var.saximontana) Sheep's fescue (*Festuca ovina*) is not acceptable. -5% Northern wheatgrass / *Agropyron dasystachyum* -5% Western wheatgrass / *Agropyron smithii*
Mix #5 Native dry meadow feature areas -may be tall; unirrigated grasses	On cultivated surfaces, sow seed uniformly. Seed at a rate of .115kg (.25 lbs) per 100 sq.m (1000 sq.ft) using a native drill seeder OR seed at a rate of .23 kg (.5 lbs) per 100 sq.m (1000 sq.ft) using a broadcast seeder. - 25% June grass / *Koeleria macrantha* - 15% Green needle grass / *Stipa viridula*

	- 15% Needle and Thread / *Stipa comata* - 10% Blue Grama / *Bouteloua gracillis* - 10% Plains Rough fescue / *Festuca hallii* - 10% Mat Muhly / *Muhlenbergia richardsonis* (if seed is not available increase Blue Grama to 20% or replace with Little Bluestem / *Schizachyrium scoparium*, Note: tall plant) - 5% Western wheatgrass / *Agropyron smithii* - 5% Northern wheatgrass / *Agropyron dasystachyum* - 5% Western Porcupine grass / *Stipa curtiseta*
Mix #6 - Native wet meadow and wet ditch areas; unirrigated grasses. - In saline conditions, substitute 40% Fowl bluegrass with: -20% Fowl bluegrass and -20% Desert Salt grass (Distichlis stricta)	On cultivated surfaces, sow seed uniformly. Seed at a rate of .115kg (.25 lbs) per 100 sq.m (1000 sq.ft) using a native drill seeder OR seed at a rate of .23 kg (.5 lbs) per 100 sq.m (1000 sq.ft) using a broadcast seeder. - 40% Fowl bluegrass /*Poa palustris* - 20% Tufted hairgrass / *Deschampsia caespitosa* - 10% Green needle grass / *Stipa viridula* - 10% Streambank wheatgrass */ Agropyron riparium* - 10% Western wheatgrass / *Agropyron dasystachyum* - 5% Canada reed grass */ Calamagrostis canadensis* - 5% Slender wheatgrass /*Agropyron trachycaulum* Additional potted plants to consider: in # 2 pots plant 500 mm o/c - Cattails / *Typha latifolia*; - Bullrushes / *Schoenoplectus acutus* - Sedges / Carex spp. - Horsetail / *Equisetum arvense*
Mix #9 Overseeding Mix - Existing road-right of way with saline damage	Seed at a rate of .9 to 1.3 kg per 100 sq.m (2 to 3 lbs per 1,000 square feet) 100% SeaLink Creeping red fescue / *Festuca rubra litoralis* **OR** native option. Seed at a rate of .115kg (.25 lbs) per 100 sq.m (1000 sq.ft) using a native drill seeder. 100% Desert Salt grass / *Distichlis stricta*
Mix #10 Overseeding Mix - Native Forbs - stage two	Do not seed deeply. On cultivated surfaces, sow seed uniformly. Seed at a rate of .115kg (.25 lbs) per 100 sq.m (1000 sq.ft) using a native drill seeder OR seed at a rate of .23 kg (.5 lbs) per 100 sq.m (1000sq.ft) using a broadcast seeder. - 10% Many-flowered Aster / *Aster ericoides* - 5% Yarrow / *Achillea millefolium* - 10% Gaillardia / *Gaillardia aristata* - 10% Pussytoes /*Antennaria aprica* (*parvifolia*) - 10% Rhombic-leaved Sunflower / *Helianthus laetiflorus* - 10% Blue Flax / *Linum lewisii* - 10% Blazing Star / *Liatrus ligulistylis* or *Liatris punctata* - 10% Purple Prairie Clover / *Petalostemon purpureum* - 10% Prairie Coneflower / *Ratabida columnifera* - 10% Low Goldenrod / *Solidago missouriensis* - 5% Indian bread-root /*Psoralea esculenta*

Name Changes:
Desert salt grass / *Distichlis spicata (syn. Distichlis stricta)*
Streambank wheatgrass / *Elymus lanceolatus ssp. lanceolatus (syn. Agropyron riparium)*

Slender wheatgrass / *Elymus trachycaulus* ssp. trachycaulus (syn. *Agropyron trachycaulum*)
Northern wheatgrass / *Elymus lanceolatus* (syn. *Agropyron dasystachyum*)
Plains rough fescue / *Festuca altaica (syn. Festuca hallii)*
Western porcupine grass / *Hesperostipa curtiseta* (syn. *Stipa curtiseta*)
Needle-and-thread / *Hesperostipa comata* (syn. *Stipa comata*)
Green needlegrass / *Nassella viridula* (syn. *Stipa viridula*)
Little blue stem / *Schizachyrium scoparium (syn. Andropogon scoparium)*
Crocus / *Pulsatilla patens* (syn. *Anemone patens*)
Aster, tufted white prairie / *Symphyotrichum ericoides* var. *pansum* (syn. *Aster ericoides* var. *pansus*)
Prairie clover, purple / Dalea purpurea (syn. Petalostemon purpureum)

2.2 Cover Crop: (**Using a cover crop is at the discretion of the client**. **Remove if not using.)** to be either Canada Wild Rye, or oats. Seed at a rate of 0.3 kg per 100 sq.m.

2.3 Wildflower cover crop: (**Using a cover crop is at the discretion of the client**. **Remove if not using.)** Use most inexpensive variety. Acceptable varieties are: Gaillardia aristata, Ratibida columnifera, or Helianthus species. Obtain approval from consultant for substitutions.

2.4 Water: potable, free of impurities that would inhibit germination. The contractor is responsible for supplying hoses if a water connection is available. If no such connection exists or connections have been shut off for seasonal purposes, it is the contractor's responsibility to supply water via water truck for establishment of the grass at no additional cost to the client.

2.5 Fertilizer: Fertilize according to recommendation of soil reports.

2.6 Fertilize: (remove if not required.)

2.6.1 For areas under 1000sq.m.where no soil report is required.

2.6.2 Fertilizer to be a high phosphate fertilizer such as 11-48-0. Apply at a rate of 0.5 kg per 100 m^2.

2.7 Turf establishment blanket is at the discretion of the contractor. Must be adequate to meet acceptance.

2.8 Turf establishment blanket to be: A Type 2D erosion control blanket for use on slopes with gradients not exceeding 2:1. Blanket to be 100% agricultural straw stitched with cotton thread between two woven biodegradable jute nets. Blanket to have nets on both top and bottom. Longevity of the blanket is to be 3-12 months. The blanket is to be free of any weed seeds.

2.9 Pins for securing blanket to be 10cm or longer Biodegradable T-shaped stakes with 3.8cm head.

2.10 If hydro-mulching is preferred to a turf blanket it is the contractor's responsibility to provide sufficient information for review by the consultant and city staff. Information to include: equipment, mulch composition, method of application, safety precautions and experience. Hydro-mulching does not give good seed to soil contact and is only recommended for steep sites not reachable by ordinary equipment.

3.0 EXECUTION

3.1 Workmanship

3.1.1 Keep site well drained.

3.1.2 Clean up immediately soil or debris spilled onto pavement, dispose of deleterious materials.

3.2 Preparation of Surface

3.2.1 Obtain Landscape Architect's approval of topsoil grade and depth before starting seeding. See Planting Soil and Finish Grading Section 02212, for placement of topsoil. If not using topsoil, verify soil has been properly cultivated to a depth of 100mm.

3.2.2 Verify control of weeds prior to laying topsoil. It is the contractor's responsibility to use weed free soil and seed and is responsible for errors in judgement.

3.2.3 Broadcast Seeding: Harrow or rake areas to be seeded to 25 mm depth immediately prior to broadcast seeding. Fine grade free of humps and hollows and free of deleterious and refuse material. Seed immediately afterward but **before** the site is packed. If using topsoil, roller packing the site once prior to harrowing / raking may be required to ensure a reasonably firm bed and to ensure seed is not planted too deeply. Roller pack immediately after seeding.

3.2.4 Drill seeding: After cultivation, topsoil should be roller packed sufficiently to barely register a footprint. Pack a second time if foot sinks more than 10mm. Do not harrow or rake prior to seeding. Seed immediately **after** packing.

3.3 Seeding

3.3.1 All broadcast sowing (not drill seeding) is to occur during calm weather (winds less than 10 km/h).

3.3.2 Hand broadcasting is only acceptable for repair work and areas under 1000 sq.m.

3.3.3 Use equipment suitable for area involved to the approval of the Consultant. A native drill seeder (Dewdrop, Truax) is preferred for native seeding and requires half the amount of seed compared to a broadcast seeder.

3.3.4 When seeding native grasses add an inert carrier, such as vermiculite, feed grade rolled oats, or coarse sand to the seed mix so that you can see where

the seed has been spread. Fertilizer can also be used as the inert carrier but must be calibrated to ensure correct coverage for both fertilizer and seed.

3.3.5 If using a cover crop calculate correct coverage and spread with seed.

3.3.6 Sow seed uniformly. Use half of required amount of seed in one direction and remainder at right angles.

3.3.7 Roller pack the site immediately after broadcast seeding. If using a native drill seeder, the site has been packed prior to seeding. Good seed to soil contact is important when seeding native grasses. Do not rake after seeding. This will bunch the seed into furrows.

3.3.8 Native seed cannot be seeded deeply or it will not germinate. Do not place deeper than 10mm. Insure the machinery is properly calibrated.

3.3.9 Weeds can be more easily identified if 2 or 3 small boards (1/2 m sq.) are placed in various locations on the site prior to seeding. Once the native seeds have germinated the boards are removed and marked with painted stakes. All the plants in these marked areas will be weeds. This will allow a plant comparison between the seeded area and non-seeded areas and a way of identifying weeds, as well as distinguishing between foreign grasses and native grass.

3.3.10 Water immediately afterward with fine spray, avoiding washing out seed. Apply enough water to ensure penetration of 50mm (2”).

3.3.11 When fall seeding do not water seed bed.

3.3.12 Protect seeded areas against damage. Remove this protection after grass areas have been accepted by the Consultant.

3.3.13 Reseed at two week intervals where germination has failed. Do not reseed after June 15. Wait until the fall.

3.3.14 Native areas are to be seeded from early May to early June. Fall planting is to occur within two weeks of freeze up, usually no earlier than September 30. Exceptions can occur where seed is irrigated. The areas to be reseeded should be kept moist until 2 weeks past germination and then watched during periods of drought. Seeding prior to a rain is advantageous. In no case should seed be planted after August 1.

3.3.15 In the case of dormant seeding (late fall) protect seeded areas from pedestrian and vehicular damage.

3.4 Fertilizing Program

3.4.1 Fertilize according to soil test recommendations or as noted in Products item 2.3. Application may be avoided if recommended by test results.

3.4.2 Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

3.4.3 Postpone fertilizing until next spring if application falls within four week period prior to expected end of growing season.

3.4.4 Fertilizer is applied once during initial establishment. The fertilizer can be used as the inert carrier, but the machinery needs to be properly calibrated to ensure correct coverage for both seed and fertilizer.

3.5 Seed Protection on Slopes

3.5.1 Cover seeded slopes where slope is 3:1 or steeper with turf establishment blanket. Roll blanket down over slopes without stretching or pulling.

3.5.2 Lay blanket smoothly on soil surface, burying top end of each section in narrow 150 mm trench. Leave 300 mm overlap from top roll over bottom roll. Leave 100 mm overlap over adjacent section. Secure blankets with pins as specified.

3.6 Maintenance during Establishment (8 -12 week period)

3.6.1 Ensure maintenance equipment suitable to Consultant.

3.6.2 Perform operations from time of seed application until acceptance by Consultant.

3.6.3 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass and to ensure moisture penetration of 75 to 100mm. Control watering to prevent washouts. Water every four to seven days for the first month if rain is not forecasted. Do not water in second or third month unless there has been less than 25mm (1”) of rain for 4 weeks. Water will encourage weed growth; established native seedlings can withstand drought and gives the plants an advantage over weeds and other grasses.

3.6.4 Do not water fall seeding.

3.6.5 Repair and reseed dead or bare spots as soon as possible to allow establishment of grasses prior to acceptance.

3.6.6 Maintain grass free of pests and diseases utilizing acceptable integrated pest management practices.

3.6.7 If using a cover crop, cut crop when it reaches 300mm. Cut to 200mm.

3.6.8 Control **annual** weeds by cutting flower heads prior to forming seed. Annual weeds do not need to be removed. Set mower blades high, approximately 150 to 200mm, to cut flower heads but not the native grasses which will be very short in the first year. This may need to be done every second week depending on extent of weeds present.

3.6.9 Hand weeding of perennial weeds should be considered for smaller areas with few weeds.

3.6.10 Control **perennial** weeds by hand-pulling or spot-spraying 6-10 weeks after germination. Blanket spraying is to be considered when perennials weeds become denser than 50% of the area. Use a selective broadleaf herbicide to eliminate perennial invasive broadleaf plants such as Canada Thistle and other legislated weeds found in the Provincial Noxious Weed Act. Do not underestimate hand weeding in small projects; this is a rainy

day task when weeds are easy to pull and the contractor cannot work on other projects.

3.6.11 Unwanted grasses listed in 2.1.4 and 2.1.5 may have to be controlled using glyphosate with a wick applicator. Use Saskatchewan Watershed fact sheets (available online), to manage Crested wheatgrass and other invasive species.

3.6.12 If chemical means are used, comply with Section 02282 - Chemical Vegetation Control. Apply Kilex® (or other dicamba and picloram solutions) near trees and shrubs only with prior approval of Consultant.

3.6.13 Remove garbage from site every second week.

3.7 Substantial Performance

3.7.1 Native Areas will be considered substantially performed by the Consultant provided that seeded areas are properly established and:

.1 Turf is free of eroded, bare or dead spots and 98% free of weeds on Saskatchewan's Noxious Weed List as well as the following invasive alien plants not on the list: Crested wheat grass, Smooth Brome, Foxtail Barley, Star Thistle, Sweet Clover, Absinthe, Dalmatian Toadflax, Baby's breath, Ox-eye daisy, Burdock, Common Tansy and Canary Reed Grass.

.2 "Bare" will be determined by a count of plants. Density of native seedlings must be greater than 60 seedlings per sq.metre eight weeks after seeding. Plants will be counted in a sample area with the lowest germination.

.3 Annual weeds have been cut on a regular basis.

.4 Areas seeded in fall will be accepted in following spring, two months after start of growing season (April 15 - May 1) provided acceptance conditions are fulfilled.

.5 Areas have been fertilized once.

.6 All seed types specified are present in mixtures with 7 or less plants. 80% of seed types specified are present on mixtures with more than 7 plants.

3.8 Native Grass Maintenance during Warranty Period

3.8.1 Perform operations from time of Substantial Performance until end of warranty period, which is one year unless otherwise stated in the tender documents.

3.8.2 Perform all operations noted in "Maintenance during Establishment" Section 3.6.

3.8.3 Do not water unless, there is an extended drought period (less than 25mm (1") of rain for 4 weeks). Water will encourage weed growth. Water areas that have been reseeded.

3.8.4 Areas will not be cut except to control weeds and at the discretion of the client. Grass may have to be cut every second week.

3.8.5 Weed control is the main maintenance task during the warranty period. If annual weeds have not disappeared with cutting during the tenth month of the maintenance period, chemical control may be required to meet maintenance acceptance. (In a two-year maintenance program continue annual weed control with cutting until the 20th month.)

3.8.6 Along with invoice, supply client / consultant with monthly written notes on what procedures have been undertaken. If any issues appear, meet with client on site.

3.8.7 At the end of the warranty period meet with the consultant and client to ensure maintenance acceptance.

3.9 Maintenance Acceptance

3.9.1 Maintenance Acceptance will occur at the end of the warranty period, which is one year from Substantial Performance unless otherwise stated in the tender documents.

3.9.2 Grass is free of eroded, bare or dead spots and 98% free of **all** annual and perennial weeds.

3.9.3 “Bare” will be determined by a count of plants. Density of native seedlings must be greater than 60 seedlings per sq.metre. Plants will be counted in a sample area with the lowest germination.