

PART 1 – GENERAL**1.1 Related Work**

- .1 Topsoil and Finish Grading Section 02710

1.2 Site Conditions

- .1 Locate underground and surface utility lines and buried objects.

1.3 Protection

- .1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, surface or underground utility lines which are to remain. Make good any damage.
- .2 Protect approved materials from contamination.

1.4 Inspections

- .1 The Contract Administrator will review and approve stages of work as follows;
- .1) Location and initial layout staking of green
 - .2) Subgrade excavation and shaping
 - .3) Trenching and placement of drainage pipe
 - .4) Placement of root zone mix

PART 2 - PRODUCTS**2.1 Materials**

- .1 Fill: Selected material from excavation, grading, or other sources, approved by the Contract Administrator for use intended, unfrozen and free from rocks larger than 50 mm (2"), cinders, ashes, sods, refuse or other deleterious materials.
- .2 Use approved, onsite fill to create green contouring to elevations indicated on drawings and approved by the Contract Administrator. Refer to Sections 02210 and 02260.
- .3 Non-calcareous pea gravel: Rounded and washed, free from clay and silt fines. Soft limestones, sandstones or shale are not acceptable. Particle size distribution:

<u>Particle Size</u>	<u>% Allowable</u>
≥ 12 mm	0% optimum
6 mm to 9 mm	minimum 65%
≤ 2 mm	less than 10%
≤ 1 mm	less than 5%

Materials shall be tested for weathering stability (ASTM - C - 88), and must show a loss of material less than 12% weight to be acceptable. LA Abrasion Test (ASTM - C - 131) for mechanical stability, values must not exceed 40.

- .4 Medium sand for root zone mix (greens mix): Non-calcareous, sub-rounded to rounded shape. Particle size distribution:

Name	Particle Diameter	Recommendation (by weight)
Gravel	> 3.4 mm	0% optimum
Fine Gravel	2.0 - 3.4 mm	≤ 3%
Very coarse sand	1.0 - 2.0 mm	≤ 10% of the total particles in this range, including a maximum of 3% fine gravel (preferably none)
Coarse sand	0.5 - 1.0 mm	≥ 60% of the particles must fall in this range
Medium sand	0.25 - 0.50 mm	
Fine sand	0.15 - 0.25 mm	≤ 20% of the particles may fall within this range
Very Fine Sand	0.05 - 0.15 mm	≤ 5%
Silt	0.002 - 0.05 mm	≤ 5%
Clay	≤ 0.002 mm	≤ 3%
Total Fines	Very fine sand + silt + clay	≤ 10%

- .5 Corrugated Drain Pipe: 100 mm (4") diameter polyethylene pipe, 1.5 mm x 38 mm (1/16" x 1-1/2") slotted and solid types including only manufacturer specified insert type couplers and fittings required to complete the installation as shown on the drawings.
- .6 Creeping Bentgrass: Certified Penn A1/A4. Deliver and store grass seed in original containers showing:
- .1 Analysis of seed mixture
 - .2 Percentage of pure seed
 - .3 Year of production and name of producer
 - .4 Net mass
 - .5 Date when tagged and location
 - .6 Percentage germination
 - .7 Name and address of distributor
- .7 Fertilizer: C.I.L. Turf Starter 16-32-6 or approved alternate, and trace mineral amendments as identified by soil testing.

2.2 Materials Testing

- .1 Provide the Contract Administrator with two (2) samples, each weighing 5.0 Kg (11 lbs.) of proposed greens mix. Sealed, airtight containers must be used to maintain optimal moisture during transportation to facilitate proper testing.
- .2 Testing will be conducted to determine:

<u>Test</u>	<u>Acceptable Range</u>
_____ .1 Conductivity	Moderate salinity
.2 pH	5.5 to 8.0
.3 Particle size analysis	(Refer to 2.1.4 above)
.4 Fertility analysis	(No amendment required)
.5 Saturated Hydraulic Conductivity	Minimum 30 cm (12") per hour
.6 Total Porosity	35% to 55%
* Air-filled porosity	15% to 30% (at 30 cm tension)
* Capillary porosity	10% to 20% (at 30 cm tension)
.7 Saturation percentage	25% to 55% (at 30 cm tension)
.8 Organic matter content	0% by weight
.9 Inorganic amendment	0% to 3% by weight
.10 Visual analysis of sand fraction	Rounded to sub-rounded
.11 Bulk density	1.4 gm to 1.65 gm/cu. cm

- .3 Provide samples a minimum of three (3) weeks prior to the start of work or as directed by the Contract Administrator.
- .4 The Contract Administrator will determine acceptability of materials and conduct frequent on site testing during construction to confirm the conformity of mixing.

PART 3 - EXECUTION**3.1 Layout**

- .1 The Contract Administrator will install reference hubs and will undertake initial green layout staking as indicated on drawings and will mark proposed finish grade elevations. The Contractor will be responsible for subsequent staking at the direction of the Contract Administrator.

3.2 Excavation and Subgrade Shaping

- .1 Excavate and/or shape green area to a depth of 225 mm (9") below proposed finish grades. The slope of the subgrade should conform to the slope of the finished grade. Thoroughly compact subgrade ($\geq 95\%$ standard proctor density) to prevent future settlement.
- .2 Fine grade subgrade, eliminating uneven areas and all low spots where water will collect. Remove all loose fill, debris, building materials, roots, branches,

stones in excess of 50 mm (2") diameter. Remove subsoil that has been contaminated.

- .3 Grades must be verified and the subgrade contours must be approved by the Contract Administrator prior to cutting drain trenches and placing drainage materials.

3.3 Excavation for Drainage Pipe

- .1 Locate main trench line(s) along the line of maximum slope. Locate lateral lines at an angle of 30° to 45° to the subgrade slope with a continuous fall to the main drainage line(s).
- .2 Unless directed otherwise by the Contract Administrator, lateral lines are to be spaced a maximum of 3.6 m (12') apart. All lateral lines shall extend to the perimeter of the green and, run parallel to each other while sloping toward the main line(s).
- .3 At the low end of each green or green section(s), place a drain line at the perimeter of the green extending from the end of the first set of lateral lines to the main lines exit from the green. This is to ensure that water does not accumulate in the low end of the drainage area.
- .4 Excavate drainage trenches a minimum of 150 mm (6") wide and a minimum of 300 mm (12") deep into a thoroughly compacted subgrade. Loose spoil material from the trenches must be removed from the subgrade cavity, and the floor of each trench left smooth and clean with no depressions visible to ensure trench has a uniform, continuous positive slope (minimum 0.5%) along the entire run of the drain pipe to their outlet.
- .5 Offset junctions of lateral lines with main line by 450 mm (18") to facilitate use of insert fittings for each lateral line.

3.4 Installation of Drain Pipe

- .1 Place slotted pipe into centre of trenches and hand backfill with pea gravel to fill trench just below green subgrade. (DO NOT OVERFILL TRENCHES). Ensure that the pipe is not displaced laterally or vertically during backfilling. If movement occurs, excavate and repeat leveling and backfilling operation.
- .2 At the time of installation, all pipe ends and joints are to be capped and/or coupled with manufacturer approved fittings to prevent soil or stone entering pipes prior to completion of backfilling.

3.5 Greens Mix Preparation and Delivery

.1 Mix Preparation

If metered blending equipment is to be used, blend slow release fertilizer (0-20-10) into greens mix at a rate of 175 gm (0.38 lbs.) per cubic meter. Additional amendment of trace elements as determined by testing may be added during this process. (Optional)

.2 Following the Contract Administrator's approval of off site mixture, deliver to site as required.

.3 Protect mixed soil from segregating or contamination during preparation, storage or transport. Do not stockpile in unprotected conditions. Deliver directly to each installation location.

.4 The Contract Administrator will undertake random testing of delivered greens mix to ensure conformity to specification.

3.6 Placing Greens Mix

.1 Do not place greens mix until the Contract Administrator has approved subgrade and drainage installation.

.2 Place greens mix by depositing material into edge of green cavity and pushing gently out onto subgrade, insuring subgrade is not disturbed.

.3 Ensure that the mix is moist when being spread to assist in firming.

.4 Place material to approximate finish grades as directed by the Contract Administrator. The greens mix should form a uniform compacted depth of 225 mm (9"). Attain initial compaction using spreading machinery, traveling in a circular or oval pattern.

3.7 Finish Grading and Compaction

.1 Fine grade entire green area to contours and elevations as indicated on drawings and as confirmed by the Contract Administrator. Eliminate rough spots and low areas to ensure positive surface drainage.

.2 Compact mix to prevent future settlement and retain surface contours using equipment and methods approved by the Contract Administrator.

.3 Hand level ridges left by compaction equipment.

.4 Leave surface smooth, uniform and firm against foot printing in excess of 6 mm (1/4").

.5 Following the Contract Administrator's approval of finish contours, thoroughly soak entire green profile to enhance compaction.

- .6 Allow top 50mm to 75 mm (2" to 3") to dry. Rake or float green surface in a circular pattern to eliminate all low spots or undulations.
- .7 Repeat as necessary to produce a firm, gently contoured surface suitable for seeding.

3.8 Application of Fertilizer

- .1 Spread C.I.L. Turf starter fertilizer (or approved alternate) over entire green surface at a rate of 1.5 kg (3.3 lbs.) per 100 sq. m. (~1,000 sq. ft.). Application is to be completed within 48 hours prior to seeding.

3.9 Seeding

- .1 Do not seed until surface contours have been approved by the Contract Administrator.
- .2 Lightly rake green surface to prepare seed bed.
- .3 Using a drop seeder, apply Bentgrass seed green at a rate of 0.75 kg (1.65 lbs.) per 100 sq. m. (~1,000 sq. ft.).
- .4 Spread 50% of total seed required over entire green surface in one direction (pass).
- .5 Bury seed to a depth of 6 mm (1/4") by lightly raking by hand or with a small bunker rake.
- .6 Spread remaining 50% of seed at 45° to the original seeding direction (pass) and repeat light raking by hand or with a small bunker rake.
- .6 Roll green surface to firm seed bed and insure good soil/seed contact. Use of knobby turf tires on bunker rake with rakes raised is acceptable for final pass.

3.10 Maintenance (by City of Winnipeg)

- .1 Begin watering program using a fine spray immediately following completion of seed bed firming.
- .2 Continue watering at intervals required to maintain a constantly moist seed bed. (Three to five times per day during daylight hours depending on drying conditions present).
- .3 Maintain seeded area from the start of work until the recognized completion date and acceptance by the Contract Administrator.
- .4 Ensure maintenance equipment is appropriate for the intended use and suitable to Contract Administrator.
- .5 Cut grass only after substantial germination and the majority of grass is 12 mm (1/2") to 19 mm (3/4"), or reached the three leaf stage.