PART 1 - GENERAL

1.1 Related Work

.1	Site Grading	Section 02210
.2	Topsoil and Finish grading	Section 02260
.3	Sodding	Section 02938

1.2 Site Conditions

.1 The Contractor shall examine the work of other Sections upon which the work of this Section depends and correct any defects.

1.3 Laying Out Work and Inspections

.1 All work shall be laid out by the Contractor who shall be fully responsible for the accuracy thereof.

.2 The Contractor shall stake locations of heads, valves and piping and receive approval from the Contract Administrator prior to excavation and installation.

.3 The Contractor shall have all materials inspected and approved by the Contract Administrator prior to installation.

.4 The Contractor shall not allow nor cause any of his work to be covered or enclosed until it has been inspected, tested, and approved by the Contract Administrator. Should any of the work be enclosed or covered before such inspection and test, it shall be uncovered at the Contractor's expense; and after it has been inspected, tested and approved, the Contractor shall make all repairs with like materials necessary to restore all work and that of other Contractors to its original conditions.

.5 The Contractor agrees to supply all necessary conduit, trenching, fasteners and line for the proper installation of automated systems.

.6 Notification shall be made to the Contract Administrator 48 hours in advance of commencing irrigation system installation.

1.4 Testing

.1 Upon completion of the irrigation installation, the installed system shall be tested and balanced. The Contractor shall notify the Contract Administrator for a final test to allow the Contract Administrator to be on site to consult. All components shall then be checked for proper operation; and the system shall not be accepted by the Contract Administrator until all portions are operating as intended and until all deficiencies have been corrected. The Contractor shall provide all gauges and fittings required for testing.

1.5 Balancing and Adjustments

.1 The Contractor shall balance and adjust the various components of the irrigation system so the overall operation is most efficient and coverage is uniform.

1.6 As-Built Plan

.1 The as-built irrigation plan must be updated daily in the field as work progresses. The as-built drawings shall be marked to indicate any and all changes made. The Contractor shall supply the Contract Administrator with written notes on any changes required to be included on the as-built plan, showing the exact location and size of all components of the system including the exact trench location for all buried pipe and wire. Refer to Section 01001, paragraph 4.2 for additional submission requirements.

1.7 Warranty Maintenance

.1 The Contractor shall test and adjust all equipment for smooth, trouble-free operation of the irrigation system.

.2 Defects or misalignment of any part of the work caused by settlement of bedding or backfill material within the warranty period shall be corrected by the Contractor at their expense. Depressions caused by such settlement shall be repaired by the Contractor at their expense. The Contractor shall carry out corrections to defective or deficient work within 48 hours of notification by the Contract Administrator.

.3 Emergency repairs may be required to protect property or permit operation of the work. The Contract Administrator shall notify the Contractor immediately. The Contractor must make repairs within 24 hours of notification. If repairs are not made within 24 hours, the Contract Administrator will arrange for the emergency repairs to be carried out and will invoice the Contractor. Maintenance not of an emergency nature shall be brought to the attention of the Contractor in writing and he shall take the necessary action to correct the faulty work.

.4 The Contractor shall familiarize the Owner with the operation of the irrigation system and locations of control equipment.

PART 2 - PRODUCTS

2.1 Materials

.1 **Irrigation Pipe:**

.1 H.D.P.E.: Type PE4710, DR 17, Series 125 or better (Pipe sizes 50 mm (2") and greater), high density polyethylene to ASTM F714-13 and CSA B137.1. Join by thermal butt fusion in strict accordance with manufacturer's written instructions. The pipe and material must be identified by the cell classification, 445474C and must meet or exceed the requirements of ASTM F714-13, ASTM D1473 as outlined in ASTM D3350, "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials".

.2 **Fittings:**

.1 Approved PVC saddle fittings at head connections. Butt fusion fittings at pipe connections. Fittings to be approved by pipe manufacturer for fusion with pipe. Use pipe manufacturer's approved brass saddles and flange assemblies to connect to non-fusion materials.

.2 Unitized Swing Joints: 25mm (1") Unitized "O" ring type. , Lasco G140-212 or approved alternate.

.3 50 mm (2") brass butterfly valve (lever type): Located and sized as indicated on drawings.

.4 Quick Coupling Valves: 25 mm (1") brass valves. Rainbird 5RC, Toro 474-00 or 474-01, Buckner QB5RC10, Hunter HQ-5RC are acceptable.

2.2 Sprinklers:

Rotary Pop-up Sprinklers: Acceptable Products:

.1 Greens: At 40 psi. operating pressure must have a minimum radius of 55' and a minimum flow rate of 14 g.p.m.

Rainbird Eagle 351B-54, Toro FLX35B-42-3134 , Hunter G75B-10S or approved alternate

2.3 Valve Boxes

.1 Valve boxes shall be prefabricated plastic boxes complete with locking cover for single valve locations, or variant to suit valve size or approved alternate.

PART 3 - EXECUTION

3.1 Excavation

.1 All excavation shall be unclassified and shall include all materials encountered except materials which cannot be excavated by normal mechanical excavation means. Such exceptions shall be brought to the attention of the Contract Administrator and an adjustment shall be agreed upon before excavation of these areas proceeds. Such price adjustments and agreement shall include responsibility for disposal of the unsuitable materials removed from the trench and the acquiring of additional backfill material.

.2 All piping should be laid and continuously supported on undisturbed or well-compacted soil.

.3 The minimum depth of cover over 50 mm (2″) pipes shall be 400 mm (12″). Adequate clearance should be maintained between plastic lines and all other underground utilities or other sources of heat.

.4 Where trenches are over-excavated, they shall be backfilled and tamped to provide compacted bearing for the pipe.

.5 Backfill material shall be free from rocks, large stones, and other unsuitable substances which could damage the pipe or create unusual settling problems. Backfilling shall be done in 150 mm (6″) lifts and tamped after each lift is placed to prevent excessive settling.

.6 Chain trenchers shall be equipped with a "crumber", or trenches shall be manually cleaned of loose material before sand bedding begins.

.7 Excavated material shall not be left on the turf (where applicable) beside the trench for a period of more than 24 hours.

.8 The Contractor shall repair all concrete and asphalt damaged in the course of this contract.

.9 Backfilling of trenches containing plastic pipe shall be done when pipe is cool to avoid excessive contraction during warm weather. Such backfilling can be done in early morning hours or the pipe may be water-cooled prior to backfilling procedures.

.10 The Contractor shall avoid damage to any and all underground utilities and structures. The Contractor shall notify the Owner of all underground utilities including power, gas, and telephones and have the locations staked prior to commencing excavations.

.11 Sleeves shall be installed where pipes or electrical wires pass under roads or walks.

.12 The minimum width of trenches for main pipes shall be 100 mm (4") wider than the nominal size of the pipe in the trench (i.e. 100 mm (4") pipe requires 200mm (8") trench width, etc.)

.13 Where trenches cross existing turf areas that are to be re-seeded or sodded the backfilled trench must be re-compacted and re-seeded using the seed mixture appropriate for that area, and approved by the Contract Administrator. After the trench has been backfilled, re-compacted and topsoil placed, all trenching debris shall be removed from the grass on each side of the trench by hand raking or other suitable means. The Contractor shall be responsible for watering the trench area until the turf is established and accepted as per the specification for seeding and shall repair any settling of the trench during the warranty period.

.14 In all cases pipe and heads shall be located a minimum of 450 mm (18") inside the property lines or perimeter boundaries as indicated on drawings.

3.2 Installation of Pipes

.1 Lateral lines may be installed by standard trenching techniques or by "pulling in" pipe. If the pull-in method is used, the pipe "plow" shall be a vibratory type. The "Bullet" which precedes the pipe and is used to form the opening for the pipe, shall not be less than 25 mm (1") larger in diameter than the outside diameter of the pipe.

.2 The ridge created by the vibratory plow shall be eliminated by mechanical tamping so that the soil over the pipe is returned to its original grade.

.3 In situations where extensive rock is present in the trench bottom, all 75 mm (3") and larger main water pipe shall be sand bedded to a minimum depth of 100 mm (4") below the pipe and up to the centre line of the pipe. The pipe shall be left uncovered at this stage for inspection by the Contract Administrator and shall not be backfilled until approval has been given.

.4 HDPE is generally joined above grade alongside the trench or at a central location, then pulled to the ditch. It may be pressure tested prior to installation.

.5 Pipe may be lowered or rolled into the trench and woven slightly from side to side, which is desirable from the standpoint of expansion and contraction but not absolutely necessary. At points in the system where the line must cross under existing lines, across or through inaccessible areas, the pipe shall be joined on firm ground and pushed or pulled into place.

.6 In warm weather, sufficient time should be allowed for contraction, as the pipe reaches ground temperature before joining sections of termination points.

.7 Changes in direction may be made with field bends, elbows and tees. Pipe may be field bent to a radius of 35 times the diameter of the pipe.

.8 Where gasket repair couplings are used for splicing or joining, the enclosed gap in the pipe shall not exceed 25 mm (1″) for pipe sizes 100 mm (4″) and smaller.

3.3 Sprinkler Heads

.1 All sprinkler heads shall be installed on approved unitized swing joints.

.2 The sprinkler heads shall be installed so that the top is at the finished grade level and marked with a 600 mm (24″) coloured flag to prevent damage by equipment.

.3 Backfill around the swing joint and sprinkler with coarse sand as shown on detail drawing 7/L3.

3.4 Quick Coupling Valves

.1 All quick-coupling valves shall be installed on approved unitized swing joints.

.2 The quick-coupling valve shall be installed so that the top is at finished grade level and marked with a 600 mm (24″) fluorescent orange stake to prevent damage by equipment.

.3 Backfill around the swing joint and quick-coupling valves shall be free of rocks larger than 25 mm (1″) in diameter or roots, debris, and other extraneous matter.