

TYPICAL SPECIFICATIONS FOR LARGE TURF AND GOLF COURSE APPLICATIONS

These specifications have been compiled by the **Landscape Ontario Irrigation Commodity Group**. They are intended to be guidelines only for designing or specifying an irrigation system.

These specifications should not be construed in whole or in part as absolute specifications.

The reader uses this material at his or her own risk.

Where particular products or manufacturers have been mentioned it is for the purpose of description or example only. Equivalent products and other manufacturers should be considered as viable alternatives.

An initiative of:



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**SUPPLY AND INSTALL AUTOMATIC TURF SPRINKLER SYSTEM
TENDER SUBMISSION FORM (sample only)**

DATED: _____

In accordance with the terms of the tender specifications forming part of this submission, My/our price for performing the work as described in the specifications is as follows:

(Please quote in words and in numerals)

CONSTRUCTION SCHEDULE

Anticipated date of commencement: _____

Anticipated date of completion: _____

I/We hereby certify that the above shall be strictly adhered to if we are awarded this contract.

In witness whereof the parties hereto have executed this Agreement under their respective corporate seals and by the hands of their proper officers thereunto duly authorized.

SIGNED, SEALED AND DELIVERED

In the presence of) _____
) _____
_____)
) for: _____
) _____
) _____
_____)
) for: _____

INTRODUCTION

1.1 PURPOSE

The purpose of these specifications is to provide an assembled and installed sprinkler system which will operate in an efficient and satisfactory manner so that the finished system efficiently irrigates all areas to be covered and shall prove satisfactory in all aspects to the owner. These specifications, design details and irrigation designs are to be considered a part of the sprinkler system contract, and it is expected that the chosen contractor will follow the specifications with due perseverance.

1.2 SCOPE OF WORK

The work contemplated by these specifications consists of the provisions of labour, material, equipment and services required for all work as described in the sprinkler specifications.

The plans and specifications are intended to include everything obviously requisite and necessary to the proper installation of the work whether each necessary item is mentioned herein or not, unless otherwise specified, and the contractor is expected to provide for same.

All work herein specified or called for on the drawings in the specifications or in the detail drawing shall be executed in accordance with all governing ordinances, laws and regulations and shall meet all local conditions. Any changes and/or additions in work necessary to meet ordinances, laws, regulations and/or conditions will be made without additional expense to the owner, but such changes shall have the prior written approval of the owner.

1.3 LOCATION OF SITE

The site location is at _____.

4.4 DRAWING

The drawing referred to accompanies these specifications and has been signed for identification by:

_____.

4.5 TENDER DEPOSIT

A tender deposit in the form of a certified cheque, payable to _____ in an amount equal to ten percent (10%) of the total tender price, to a maximum of \$5000.00, must accompany all tenders. This deposit will be returned by registered mail to all unsuccessful bidders within twenty-one (21) days after the date of the tender closing.

The tender deposit of the successful Contractor shall be returned with the first progress payment.

4.6 CONTRACT FORM

The Contractor presenting the accepted tender shall enter into a signed contract substantially in the form of "Canadian Standard Construction Document CSCD 12-1975" modified as set out in the specifications.

GENERAL

2.1 EXAMINATION AND VERIFICATION OF DRAWING AND JOB SITE

It is agreed between the parties that the contractor has carefully checked and verified all dimensions and has reported all variances from those indicated in the irrigation plan to the owner in writing. If changes are to be made, they will be made in accordance with the appropriate provision.

2.2 CONTRACTOR'S UNDERSTANDING

It is understood and agreed by the Contractor that he has, by careful examination of the site, satisfied himself as to the nature and location of the work, the conformity of the ground, the character, quality and quantity of materials to be used, the character of the equipment, and facilities incidental to the completion of the work, the general and local conditions, and any other matters which may in any way affect the work under the contract. The contract shall not be affected or modified nor shall any of its terms or obligations be affected or modified by verbal agreement or conversation with any officer, agent, or employee of the owner, either before, during or after the execution of the contract.

2.3 OWNER'S AUTHORIZED REPRESENTATIVE

The owner shall designate one person as his authorized representative to work with the contractor. This appointed representative, name of whom shall be given to the contractor in writing, shall have full authority to approve work performed by the contractor and make field changes that are necessary.

2.4 ENGINEERING DECISIONS

Any decisions regarding engineering on the irrigation system shall be made in writing by the owner's authorized representative.

2.5 MAINTENANCE OF SYSTEM

If it should be necessary to carry out work after the golf season opens, shut-down time of the existing system shall be minimized as much as practical.

2.6 AS-BUILT RECORD DRAWING – PROGRESSIVE

The contractor shall provide and keep up to date a complete set of as-built drawings which shall be corrected daily to show changes in sprinkler locations, controller locations, pump locations, piping locations, and other deviations from the original irrigation design drawing as provided to him. All isolation valve locations shall be shown with actual measurements to reference points so they may be located easily in the field.

2.7 DAMAGE CAUSED BY DELAYS

If the construction and acceptance of the project is delayed for any reason not covered under Section GC 8 of the Canadian Standard Construction Documents, (CSCA), and said delay is judged to be the fault of the contractor, said contractor shall be liable for any and all loss and damage including liquidated damages sustained by the owner.

2.8 SCHEDULING OF THE WORK

It is intended that the work will be undertaken in such a way that, until completion and safe as to emergencies if any, not more than two holes will be unfit for normal use at any given time. Therefore, prior to the commencement of any work, the contractor will propose a work schedule for approval by the owner's representative, such approval not to be unreasonably withheld or delayed. The contractor shall use his best efforts to meet the work schedule as so approved, but subject to such changes as may be dictated from time to time by the circumstance, and approved by the owner's representative.

2.9 ADDENDUM / CHANGE ORDER

It is the responsibility of the general contractor or owner to ensure that the irrigation contractor has been duly notified of all changes to the installation site in writing within 48-hours of said work.

THE WORK

3.1 QUICK COUPLER VALVES

Quick coupler valves shall be installed at owner's direction on triple elbow swing joints. All material and labour necessary to install quick coupler valves will be supplied by the contractor.

3.2 SPRINKLERS

The contractor shall install model _____ on the greens, model _____ on the tees, and model _____ on the fairways. The sprinklers shall be installed on the triple elbow swing joint matching the size of the given sprinkler inlet.

3.3 LIGHTNING & SURGE PROTECTION

The contractor shall install lightning surge arrestors, ground rods and ground wire to manufacturer's specifications on both the central control system and all satellite controllers. The grounding system shall be tested by a qualified individual for resistance to ground and shall meet the manufacturer's specification and/or local electrical codes. Both parties shall mutually agree upon a qualified individual to perform the test. If additional grounding is needed, a mutually agreed upon price shall be determined based on the contractors time and materials required.

3.4 SATELLITE CONTROLLERS

The contractor shall install model _____ satellite controllers generally in the locations shown on the drawing. Installation shall comply with manufacturer's specifications and local codes.

3.5 CENTRAL CONTROL SYSTEM

The contractor shall install model _____ central controller according to manufacturer's specifications and local codes.

Central control to be located in the _____. All necessary wire from satellite to point of connection on central control system to be supplied and installed by the contractor.

3.6 MANUAL DRAIN VALVES

Manual drain valves shall be installed as generally indicated on the drawings to drain the pipe line at low points in the system.

3.7 SPARE PARTS

The contractor shall supply a recommended list of spare parts necessary to adequately maintain the system.

EXCAVATION

4.1 PRICE ADJUSTMENTS

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 owner's representative and an adjustment in price shall be agreed upon before excavation of these areas proceeds. Such price adjustments and agreements shall include responsibility for disposal of the unsuitable materials removed from the trench and the acquiring of additional backfill material.

The Contractor shall be responsible for excavating the areas around the existing turf in the manner required to install all necessary sprinklers. The contractor shall also backfill and replace the sod in the areas excavated.

4.2 DEPTH

Minimum depth of cover over water pipe installed by the Contractor shall be 18" for up to 2-1/2" pipe and 24" for 3" pipe and over. The minimum depth of cover over wire or tubing shall be 12".

4.3 BACKFILL

Backfill material shall be free from rocks, large stones, and other unsuitable substances which could damage the pipe or create unusual settling problems. Backfilling will be done in layers and tamped after each layer is put in to prevent excessive settling.

4.4 ASPHALT

If trenching through existing asphalt roadways is necessary, the Contractor shall cut the asphalt to the width of the trench prior to trenching. Removal of cut asphalt and replacement of all asphalt shall be the responsibility of the Contractor.

4.5 EXISTING UTILITIES

The Contractor shall exercise reasonable care to avoid causing damage to any and all underground utilities or structures. The owner shall advise the Contractor of any underground utilities or structures of which he is aware. In the case of a conversion of an existing irrigation system, the Owner shall accurately locate in the field, all existing piping where new connections are to be made. If utility locates are required, they shall be the client's responsibility prior to commencement of work.

4.6 DAMAGE BY EXCAVATION / PULLING

Damages caused by the Contractor after accurate location by the Owner shall be the Contractor's responsibility. Damages caused by the Contractor from lack of location by the Owner shall be the Owner's responsibility.

4.7 PULLING

Where soil conditions are suitable and with approval of the owner's representative, pipe, wire and tubing may be pulled in as long as minimum depths are obtained.

4.8 SLEEVES

The irrigation pipe and wiring shall be protected at all sidewalk, roadway and creek bed crossings with a sleeve measuring 1-1/2" diameter, or two sizes larger than the irrigation pipe, whichever is larger. Sleeving material at roadways and creek beds shall have 18" of cover and walkways 12" of cover. The material for sleeving shall be mutually agreed upon by the contractor and the owner.

4.9 UNDERGROUND WIRING

Installation of underground wiring shall conform to good practice and the requirements of all jurisdictional authorities. All wiring shall be sleeved as outlined in Section 4.8 above.

MATERIALS

5.1 PIPE AND FITINGS

All polyvinyl chloride pipe (PVC), shall be unplasticized Class _____.

All polyethylene pipe shall be of minimum _____ PSI pressure rating.

PVC pipe shall be continuously marked with identification of the manufacturer, type, class and size.

All socket weld fittings to be used on specified PVC pipe shall be Schedule _____ PVC, Type 1. All fittings shall be identified as to pressure rating or schedule.

Solvent for use on PVC pipe and fittings shall be of a type approved by the manufacturer of the pipe and shall be minimum grade S-80 or approved equal.

All plastic pipe may be joined either by bell and spigot type connections or solvent weld connections. If solvent weld connections are used, a double-gasket coupling shall be installed every 120", except on 2" PVC's around greens.

All polyethylene pipe connections shall utilize stainless steel gear or "squeeze" clamps. Insert compression fittings may also be used. Any piping under continuous pressure and all piping of 1-1/4" or larger shall be double clamped.

All swing joints shall utilize a socket weld fitting to connect the swing joint to the PVC pipe. Saddle type connections shall not be used for this purpose.

All swing joints on Polyethylene pipe shall utilize schedule 40 barb fittings with a female threaded outlet feeding the swing arm.

5.2 THRUST BLOCKS

All changes in pipe direction must be thrust blocked according to manufacturer's recommendations.

5.3 RISERS AND SWING JOINT NIPPLES

All new swing joints, risers and nipples installed by the Contractor shall be Schedule _____ PVC or galvanized steel. All threaded fittings shall be sealed with teflon tape.

5.4A 115 VOLT ELECTRIC WIRING

All 115 volt AC wiring shall be installed in accordance with local electrical codes. 115 volt service to controllers shall be as shown and sized in the drawings.

All splices in wiring shall be made watertight using approved methods. Any splices not located at a sprinkler head, valve or controller shall be housed in a valve box.

All 24 volt communication wiring shall be installed as above and as shown and sized in the drawings.

5.4B LARGE CONNECTORS

All 24 volt wire connectors shall be of the underground type as per specifications or of DBY or DBR (3M) or KNE type. Whichever type used must be adequate size for wire.

5.5 CONTROL LINES

Hydraulic Control Lines

All control tubing shall be polyethylene tubing conforming to the following: 1/4" O.D. $\pm .005$ " and 1/8" I.D $\pm .003$ ". Tubing pressure of 200 PSI. All connections for control tubing shall be as manufacturer's specifications and/or recommended by the manufacturer of the tubing.

Electric Valve Wire – Also see Section 4.9

All pulse wires from the satellite to the sprinkler head shall be _____ gauge A.W.G. wire.

All common wires shall be _____ gauge A.W.G. wire.

All connections shall be made watertight using approved methods.

All wiring should be suitable for direct burial.

5.6 SPRINKLER HEADS

All sprinkler heads must be installed so that they have matching precipitation rates, as supported by manufacturer's published recommendations. There shall be no overthrow onto roads or buildings. Refer to Section 3.2.

5.7 CONTROL EQUIPMENT

All controllers should be CSA approved or be of a type approved by local authorities. All controllers are to be installed to manufacturer's specifications. Refer to Section 3.3.

5.8 HANDLING OF MATERIALS

The contractor shall be responsible for correct procedures in loading, unloading, stacking, transporting and handling all materials to be used in the system. The contractor shall avoid rough handling which would affect the useful life of equipment. Pipe shall be handled in accordance with the manufacturer's recommendations on loading, unloading and storage.

5.9 MATERIAL STORAGE

The Owner shall provide a fenced area or a building in which the Contractor can store all materials to be used on the project. Provision of a storage space is for keeping the property neat and in no way waives any requirements of the Contractor to protect his equipment and materials from damage by the elements or from theft or vandalism.

5.10 APPROVAL OF MATERIAL AND SOURCES OF SUPPLY

The Contractor shall supply the Owner's representative with a complete listing of products to be used in the installation of the system and sources of said products. Approval of this list is required prior to the placing of formal orders for materials and supplies by the Contractor.

5.11 MATERIALS AND WORKMANSHIP

Any material specified by name and/or model number in the specifications or on the irrigation drawing or detail drawings shall be deemed to be used for the purpose of identifying the materials and ensuring the specific use of that material in the construction of the system. No substitutions will be considered prior to the contract being signed.

All materials used in the system shall be new and without flaws or defects of any type and shall be the best of their class and kind. All material shall have a minimum guarantee of one year against material defects or defective workmanship.

If substitution of material is desired by the Contractor, sufficient descriptive literature and material samples must be furnished to establish the material as an equal substitute. In addition, the Contractor must state his reasons for desiring substitute materials.

All materials and equipment shall be installed in a neat and workmanlike manner following the recommendations of the manufacturers of the materials.

The owner's authorized representative retains the right to order removal or replacement of any items which, in his opinion, do not present a reasonably neat and workmanlike appearance. Any removal and replacing of materials shall be done when directed in writing at no additional expense to the owner.

5.12 FENCING

Appropriate staking will be provided for the defining of the specified area for material storage.

5.13 BACKFLOW PREVENTION

Wherever an irrigation system ties into a potable water system, a cross connection control device called a backflow preventer is required. The design and operation of the system will dictate which of the many backflow preventers available should be used. It is the joint responsibility of the owner and contractor to ensure that the proper device is used and that it is installed in accordance with the local plumbing code and the manufacturer's recommendations.

SITE MAINTENANCE AND CLEAN UP

6.1 PROTECTION OF WORK AND PROPERTY

The Contractor shall continuously maintain adequate protection of all his work from damage and shall protect the Owner's property from injury or loss arising in connection with work on this contract. The Contractor shall take care to avoid damage to any existing buildings, equipment, piping, pipe coverings, electrical systems, sewers, sidewalks, landscaping, grounds, aboveground or underground installations, or structures of any kind, and shall be held liable for any damage that does occur.

Damage includes mechanical damage as well as damage from leaks in the irrigation system being installed by the Contractor, whether through negligence or otherwise.

The Contractor shall adequately protect adjacent property as provided by law and shall provide and maintain all passage-ways, guard fences, lights and other facilities for protection required by the Public Authority for local conditions. The Contractor shall securely cover all opening into the section of the system he is working on and components of the system as it is being installed to prevent obstructions in the pipe and the breakage, misuse or disfigurement of the equipment.

The obligation of the Contractor under this Section 6.1 shall extend to fencing off or otherwise excluding persons from the area in which the Contractor is working or in which equipment, excavations or other work of the Contractor is located.

6.2 CLEANING PREMISES

The Contractor shall continuously keep a neat and orderly area in which he is installing the system. Disposal of rubbish and waste material resulting from the installation shall be continual. Upon completion of the system, the Contractor shall remove from the Owner's property, at his own expense, all temporary structures, rubbish and waste materials resulting from the installation of said system.

TESTING AND ACCEPTANCE OF SYSTEM

7.1 TESTING SYSTEM

Upon completion of the irrigation system and after sufficient time has been allowed for solvent weld joints to cure, the entire system shall be tested for proper operation. All air will be flushed from the system and all components will be checked for proper operation by the Contractor.

7.2 BALANCING AND ADJUSTMENT

The Contractor shall balance and adjust the various components of the sprinkler system so the overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustment to pressure regulators, pressure relief valves, part circle sprinkler heads, and individual station adjustments on the controllers. The Contractor has the right to call in the designer or owner's representative to aid in the balancing and adjustment of the system.

7.3 SETTING OF CONTROLS

The Contractor shall set the initial watering schedule and programming of the automatic controllers in accordance with the specifications or irrigation plan as furnished by the Owner. Changes in the schedules and programming and instructions on how to make such changes shall be the responsibility of the designer.

7.4 NOTICE OF COMPLETION

When the contractor is satisfied that the system is operating properly, that it is balanced and adjusted, and that all work and cleanup is completed, he shall issue the notice of completion to the Owner's authorized representative. The notice of completion shall include the request for final inspection with date and time given.

7.5 FINAL INSPECTION WITH OWNER'S REPRESENTATIVE

The Owner's representative will respond to the notice of completion by the Contractor and shall appear at the given time for a tour of the project with the purpose of making it the final inspection. Any inconsistencies to the specifications shall be noted by the Owner's representative and a written copy of corrections shall be given to the Contractor.

7.6 AS-BUILT RECORD DRAWINGS

Upon completion of the work, the Contractor shall furnish the owner with a complete set of as-built drawings showing the sprinkler system as installed. The as-built shall be scaled in the same manner as those drawings that have been provided to the contractor. The as-built drawings shall show locations of all pipe routes, power and communication wire routes, controllers, valves, wire splices and all other key components. This is the responsibility of the Contractor and shall not be construed to be the responsibility of any other party, and acceptance of the system is dependent thereon.

7.7 WARRANTY AND GUARANTEE CERTIFICATES

The Contractor shall furnish a certificate of warranty registration and a guarantee of work and materials for a one-year period from date of final acceptance of the system. Final payment for the system shall not be made unless this certificate is presented to the Owner.

7.8 ACCEPTANCE OF THE SYSTEM

The Owner may accept the system even though the corrections on the final inspection have not been made by the Contractor. In such a case, there will be deductions for the uncompleted or uncorrected work based on previous provisions of these specifications. Such deductions shall be made from the final payment.

GUARANTEES AND OBLIGATIONS AFTER ACCEPTANCE

8.1 GUARANTEES

The work included under this contract shall be guaranteed by the Contractor against all defects and malfunctions due to faulty workmanship or defective material for a period of one year from the date of final acceptance by the Owner. Upon being informed, in writing, by the Owner of any defects or malfunctions, the Contractor shall effect all necessary repairs and/or replacements in a reasonably expedient manner at no additional cost to the Owner.

8.2 REPAIR OF SETTLING

The Contractor shall be obliged to repair any settling of backfilled trenches so excavated by him which may occur during the guarantee period. The Contractor is also obligated to restore any and all damaged plantings, paving or improvements within the year period.

8.3 OWNER'S RIGHT TO REPAIR

If the Contractor does not respond to the Owner's request for repair work within a period of ten (10) days, the Owner may proceed with such necessary repairs and charge the Contractor for all expenses incurred in the repair work.

8.4 TRAINING OF COURSE PERSONNEL

Upon completion of the work and acceptance by the Owner, the Contractor shall be responsible for the training of golf course personnel in the operation, maintenance, and repair of the system. The Contractor shall furnish copies of all available parts lists, trouble shooting lists, specification sheets, and catalogue sheets to the owner prior to final payment.

8.5 TRAINING OF MAINTENANCE PERSONNEL IN OPERATION AND MAINTENANCE OF SYSTEM

The Contractor's responsibility of training maintenance personnel in the operation and maintenance of the system, as outlined in previous sections of these specifications, shall not be waived due to acceptance of the system. The Contractor shall make available a capable supervisor to assist the maintenance personnel in the winterizing and spring activation of the system for the first season.