



NEW WESTMINSTER

July 19, 2013

**ADDENDUM #1
NWIT-13-17
4th Street Pedestrian Overpass
New Westminster, BC**

This addendum modifies the Invitation to Tender only as noted:

INSTRUCTIONS TO BIDDERS

8.0 Evaluation of Bids

<DELETE AND REPLACE WITH>

“8.1 The City will review and evaluate all valid submitted Bids. The object of the review process is to identify the Bid that, in the City’s opinion, offers the best value for the *Work* specified in the Tender Documents.”

“8.2 The City will evaluate Bids based on the Schedule, References, Experience of the Superintendent, Offer Price, Separate Prices, and Unit Prices.”

BID FORM

<ADD>

17.0 EXPERIENCE OF SUPERINTENDENT

“17.1 Bidder must complete Attachment #1 outlining the experience of their proposed Project Superintendent.”

<ADD>

ATTACHMENT #1 – Experience of Superintendent (2 pages following)

ADDITIONAL INFORMATION

Please see Tender Addendum 1 from Associated Engineering (29 pages following)

Please acknowledge this addendum on page 8 of 9 in the Bid Form.

END OF ADDENDUM #1

Yours truly,

Heather M. Rossi
Intermediate Buyer
email: hrossi@newwestcity.ca

CORPORATION OF THE CITY OF NEW WESTMINSTER

ATTACHMENT #1

Experience of Superintendent

CORPORATION OF THE CITY OF NEW WESTMINSTER

EXPERIENCE OF SUPERINTENDENT

Name: _____ Years Experience: _____

Experience:

Date: _____

Project Name: _____

Responsibilities: _____

References: _____

Date: _____

Project Name: _____

Responsibilities: _____

References: _____

Date: _____

Project Name: _____

Responsibilities: _____

References: _____



Date: July 16, 2013 File: 20132297.00.C01.00
To: Keith Whiteley, A.Sc.T.
From: Craig Schaper, P.Eng.
Project: 4th St Pedestrian Overpass
Subject: Tender Addendum 1

MEMO

This Addendum forms part of the Bid Documents and amends the original Contract Requirements, Specifications, and Drawings.

1. Revised "General Notes" **DWG 2297-102 (Rev 1)** includes revisions / updates for:
 - a. Steel grades for rolled sections and plates.
 - b. Steel grades for HSS sections.
 - c. BC MoT paint system.
 - d. Field splice coating lap detail.
2. Revised "Site Plan" **DWG 2297-103 (Rev 1)** for re-located laydown area. An aerial photo is also provided for further illustration. Access and construction material transportation from the laydown area to the site is **only** across the 6th Street level crossing at the west end, unless the Contractor negotiates further access from the railway companies.
3. Revised **DWG 2297-106 (Rev 1)**, **DWG 2297-107 (Rev 1)**, and **DWG 2297-125 (Rev 1)** for pile cap (and hence overpass) re-positioning of 585 mm towards the park.
4. Revised "Parkade Deck Cantilever Retrofit" **DWG 2297-126 (Rev 1)**, includes dimension changes.
5. Revised "Parkade Replacement Fence Details" **DWG 2297-127 (Rev 1)**, includes fully revised bracket details.
6. Specification **Section 05 12 23 Clause 1.1.2.3** is revised as follows: API 5L-X52, PSL 1 (product specification level 1), high-strength seamless structural pipe, 360 MPa minimum yield strength.
7. Additional Specification **Section 05 12 23 Clause 1.1.2.4** as follows: ASTM A500 Grade C, seamless structural tubing, 345 MPa minimum yield strength (shaped HSS), 317 MPa minimum yield strength (round HSS).
8. Specification **Section 03 30 55 Clause 3.3.2**: revise "uniform tined or broomed finish" to "broomed finish in transverse direction".
9. Specification **Section 01 56 00 R1** "Railway Property Protection & Control" with **Clause 1.2.3 & Clause 1.3.3** revised for updated contact for CP Rail. (Revised specification provided.)
10. Additional Specification **Section 32 80 00** "Irrigation" relating to the landscaping component of this project. (New specification provided.)



Memo To: Keith Whiteley, A.Sc.T.

July 16, 2013

- 2 -

11. An additional preferred supplier of Stainless Steel Mesh Product Specification has been identified. Additional Specification **Section 32 31 20 Clause 1.2.2** as follows:

TWG – M13Z-145 Mesh S/S: Stainless steel mesh with 64.5% open area; weight 8.6 kg/m² (1.75 lb/ft²); mesh thickness 9.3 mm (0.365in.).

12. Bid Query 1:

Q: Will an alternative material transportation method be allowed, of crane-lifting material pallets over the tracks at the east end of the laydown area (i.e. overhead load “air-rights”)?

A: CN Rail has been contacted regarding this query. CN Rail has stated that the Contractor would need to submit a plan of the crane positioning and lift details, and submit this to CN Rail and CP Rail for their consideration. If the Contractor plans to include a laydown area crane in their construction methodology, submittals to the railway companies will be fully the responsibility of the Contractor and all associated costs must be included in the Contractor's bid price. The Contractor must allow for the possibility of the railway companies not approving the overhead load transfer and the possible need to default back to using the 6th Street level crossing.

13. Bid Query 2:

Q: Are there railway utilities in the area of the crane lift required to hoist the overpass framework?

A: We are not aware of any utilities in the area of the overpass alignment. However, utility locates will be required as part of the Contractor's crane lift planning.

14. Bid Query 3:

Q: Is there any soil contamination on site?

A: Soil contamination was identified during the Westminster Pier Park construction in the area below the present basketball court. This contamination was contained with secant walls, and monitoring has shown no further soil contamination outside this area.

15. Bid Query 4:

Q: Can the fence in front of the DeltaLok wall be removed for construction and who pays for this?

A: The removal and reinstatement of the length of fencing, to the extent required for the construction of the overpass, must be included in the Contractor's Mobilization / Demobilization Cost. The opened length of fencing should be minimized and must be closed off with temporary fencing each day, prior to the Contractor leaving site. Please note that the fencing is in line with a rail switch along the route from the 6th Street level crossing to the overpass location.





Memo To: Keith Whiteley, A.Sc.T.

July 16, 2013

- 3 -

16. Bid Query 5:

Q: Are closures of Front Street possible?

A: Closures are only expected to be necessary for the hoisting of the overpass framework. Plans for any necessary closure(s) must be submitted to the City for approval and coordination. The cost of closures must be included in the Contractor's traffic management plan, or other bid items related to the closure.

17. Bid Query 6:

Q: With flagging costs being difficult to define, can these costs be paid directly by the City?

A: Yes, the City will pay the flagging costs until the target date of substantial completion of 20 February 2014. To reflect this change the **Clause 1.3.7** has been revised and an additional payment **Clause 1.4.5** has been included in the revised Specification **Section 01 56 00 R1** "Railway Property Protection & Control".

18. Bid Query 7:

Q: What are the City's noise by-laws?

A: Regular construction activities should be completed between 7am and 7pm. Where construction is necessary during night-shifts, the details of these activities must be submitted for approval by the City.

19. Query:

Q: Can the main girder rolled sections be replaced with equivalent plate girders?

A: Yes, the Contractor's fabricator may submit a proposed equivalent plate girder section for the Engineer's consideration and approval. The Contractor must incorporate any review comments from the Engineer.

20. Query:

Q: Can the central field welds in the overpass cross-beams be omitted?

A: Yes. The central field welds are optional. These were included to facilitate the transportation of the overpass framework in two halves. If feasible, the Contractor may elect to fabricate the full overpass framework in the shop and transport the full width to site.

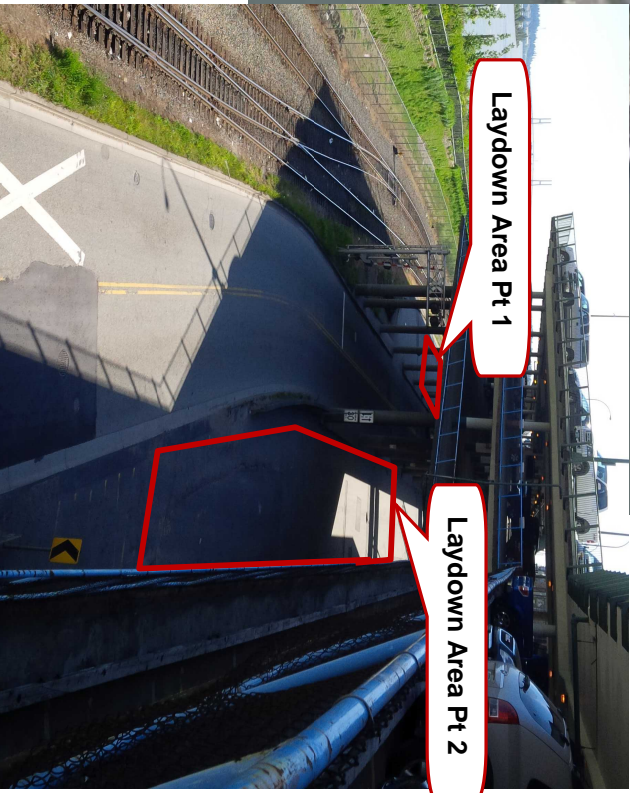
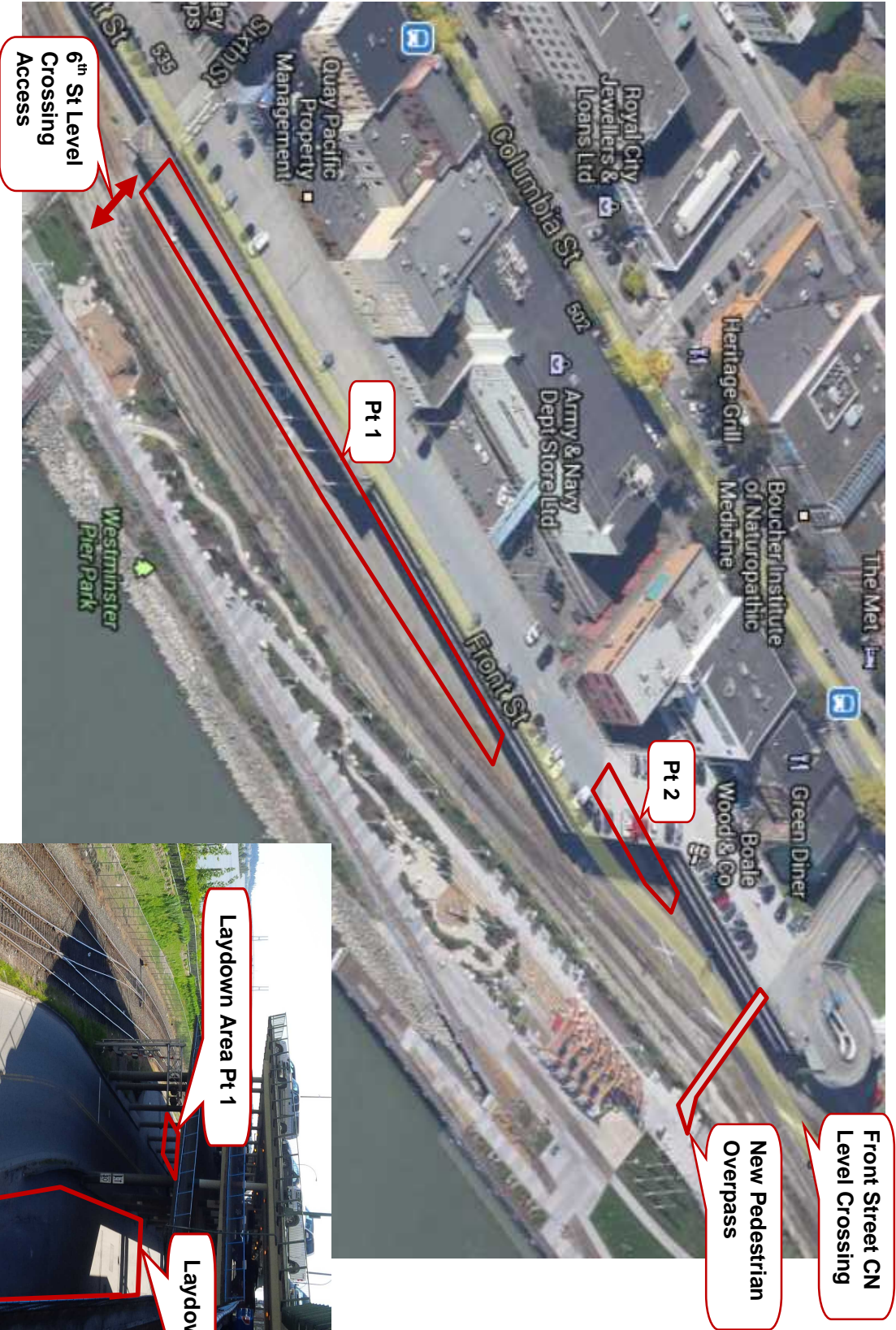
21. Query:

Q: Can the two field welds in the pylon cross-beams be replaced with shop welds?

A: Yes. We had assumed that the pylon frame (pylons and cross-beam) could not be transported as one piece. However, if feasible, the Contractor may elect to fabricate the full pylon frame in the shop and transport the full frame to site.



4th St Ped OP – Construction Laydown Areas & Access



1 General

1.1 SCOPE

- .1 Section 01 56 00 addresses general requirements for protecting Railway Property (of CN Rail and CP Rail) and coordination and safety requirements around active railway lines during construction. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.
- .2 Besides the owners of the railway tracks – CN Rail (north track) and CP Rail (south track) – SRY Rail Link and BNSF also operate in this railway corridor.

1.2 PROTECTION OF RAILWAY PROPERTY

- .1 Prior to the Contractor moving onto Railway Property a work permit must be issued from CN Rail via:

Name: Rob Sewell
Title: Technical Services Engineer
Address: 11717 138th St, Surrey, BC V3R 6T5
Phone: 604-582-4424

- .2 Work shall be undertaken in accordance with “CN Guidelines Regarding Access to Workplace” a copy of which is provided in the Contract Specific Reference Documents.
- .3 Prior to the Contractor moving onto Railway Property a work permit must be issued from CP Rail via:

Name: Doug Younger
Title: Engineer Public Works
Address: 401-9th Ave S.W., Calgary, Alberta, T2P 4Z4
Phone: 403-319-6416

- .4 Work shall be undertaken in accordance with any CP Rail guidelines regarding access to workplace.
- .5 The Contractor is responsible for all procedures and temporary works to protect the railway property, including any proposed temporary level crossings over the tracks.

1.3 ACCOMMODATION OF RAILWAY TRAFFIC

- .1 The Contractor will ensure the safety of, and minimize interference with traffic on the Canadian National Railway and Canadian Pacific Railway lines.
- .2 The Contractor shall perform all work to fully accommodate CN Rail, CP Rail, SRY Rail Link and BNSF train schedules.
- .3 The Contractor will submit for approval procedures and schedules for any portion of the Work on or over the railway right-of-way, with drawings as necessary, to both:

Canadian National Railway:

Att: Rob Sewell, Technical Services Engineer
11717 138th St, Surrey, BC V3R 6T5
Phone: 604-582-4424 Email: Robert.Sewell@cn.ca

Canadian Pacific Railway:

Att: Doug Younger, Engineer Public Works
401-9th Ave S.W., Calgary, Alberta, T2P 4Z4
Phone: 403-319-6416 Email: Doug_Younger@cpr.ca

- .4 Copies of this information shall be sent to the Consultant. No Work will be done on or over the CN Rail or CP Rail right-of-way without prior approval from CN Rail and CP Rail.
- .5 All equipment within 10 m of the nearest rail shall be stop operation, and moved clear of the operating width of the train, when instructed by the flagger on the approach of a train and remain clear until the flagger indicates that it is safe to return to work within the track limits.
- .6 CN Rail and CP Rail will decide which operations can be performed while the track remains open and which operations require traffic closure.
- .7 In general, a flagger will be required whenever work is done over the railway track, within 10 m of the railway track or when equipment crosses the railway track. The Contractor shall give the respective Railway Representatives notice of the start of such operations. The Contractor will not commence such operations until flaggers have been posted. A full-time flagger will be provided by CN Rail, if CN Rail is able to provide, and by a flagging contractor only if CN Rail does not have flaggers available. CP Rail will provide a part-time flagger as required to suite their train schedules. CN Rail, CP Rail and (if relevant) the flagging contractor will charge their flagging costs to the City.
- .8 Closure of railway traffic will be provided only for hoisting operation of the main overpass girders over the railway corridor. Closure of traffic will be limited to three (3) hours and will only be provided at a time acceptable to CN Rail. The Contractor will not start such operations until receipt of confirmation from the CN Rail contact or flagger that the closure is in effect.
- .9 The Contractor shall provide CN Rail with a three (3) month schedule of flagging requirements submitted a minimum of six (6) weeks in advance of commencing the work.
- .10 The Contractor shall be responsible for the cost of train delays if the operations requiring traffic closure are extended beyond the established time limits.

1.4 PAYMENT

- .1 Payment for all work performed under this Section will be made at the lump sum price shown in Bid Form.
- .2 The Contractor will be paid in pro-rata increments based on the completed contract time in relation to the total contract duration as defined in the bid documents.
- .3 In the event that the construction duration is longer than the total contract duration as defined in the bid documents, no additional payment for work performed under this Section will be made.
- .4 The City will pay the cost of the railway flagging until February 20, 2014. City will invoice the Contractor the costs of any flagging required after Feb 20, 2014. All other costs besides flagging cost related to railway requirements and coordination with the railway companies are to be included in the lump sum price bid. Furthermore, payment of the flagging costs by the City does not remove the responsibility of the Contractor for direct coordination and liaison with the railway companies.

2 Products

Not Used

3 Execution

Not Used

END OF SECTION

1 General

1.1 GENERAL REQUIREMENTS

- .1 Refer to Division 01 - General Requirements.
- .2 All Contract Documents form an integral part of this section.

1.2 DESCRIPTION

- .1 Furnish all equipment, materials, labour, and services necessary for the complete supply and installation of fully operational two wire, automatic irrigation system including but not limited to trenching, excavation, backfill, sleeving, connection to municipal water supply and supply of water to irrigation heads, back flow preventer(s) and pressure reducing valves, controller, and decoder. Coordination of reviews, testing, and approvals with the Consultant.

1.3 RELATED WORK IN OTHER SECTIONS

- .1 All Contract Documents form an integral part of this section.

1.4 CODES AND REGULATIONS

- .1 Work of this section shall be installed in accordance with the requirements of local and applicable provincial and federal regulations. Any Work shown on the Drawings or described in the Specifications that varies from the regulations shall be changed to comply with the requisite authority at no cost to the Owner.
- .2 WorkSafe BC regulations shall be followed.

1.5 PERMITS AND FEES

- .1 Obtain and pay for all permits covering the Work connected with the installation of the systems specified and as shown on the Drawings.

1.6 QUALITY ASSURANCE

- .1 Irrigation Work shall be done by an experienced and competent irrigation Contractor having adequate equipment and fully trained personnel for all phases of the Work specified.
- .2 The irrigation Contractor shall be a member in good standing of the Irrigation Industry Association of British Columbia (IIABC) and have met the qualification standards currently applied to Contractors by that organization. The Contractor must provide proof of membership to the Consultant prior to the start of Work of this section.

- .3 Contractor shall verify Site measurements as they relate to irrigation coverage. If any conditions are observed on Site that will impair proper and intended uniform irrigation coverage, notify the Consultant before proceeding with Work that would yield unsatisfactory coverage.

1.7 SUBMITTALS AND INSTRUCTIONS

- .1 Maintenance Data and Operation Instructions/Manual: prior to and as a condition of substantial performance, submit to the Consultant three copies of all operating and maintenance manual for all components including cleaning and lubrication schedules, overhaul/adjustment schedules, and similar maintenance operations. Each manual shall be bound in a three ring binder. Clearly indicate the Project name, name, address, and telephone number of the irrigation Contractor, and date of substantial performance on the spine of each the binder.
- .2 As-Built Drawings: submit an electronic file (AutoCAD Version 14) on disc and three sets of up-to-date as-built Drawings illustrating the 'as constructed' condition of the complete irrigation system. These as-built Drawings shall be professionally drawn or produced with the use of computer aided drafting/design from a base 'dwg' file provided by the Consultant of the irrigation plans 'Issued for Construction'. All components of the irrigation system shall be shown as installed including the location of the controller, water source, backflow preventer, and pressure reducing valves.
- .3 As-Built Record Sketches: the Contractor is to maintain a set of as-built record sketches on Site at all times. The as-built record sketches are to be updated daily noting changes made to the irrigation design Drawings. The Consultant will without notice, periodically review the as-built record sketches during the irrigation installation process.
- .4 Maintenance Materials: submit to the Consultant two sets of all special tools, keys, and equipment provided by the manufacturer for proper operation and maintenance of the installed system.
- .5 System Demonstration: as part of the requirements for the completion and acceptance of the Work of this section, demonstrate the complete operating and maintenance procedures for this system to a designated representative of the City of New Westminster and the Consultant. This instruction shall include but not be limited to demonstration of the relative timing differences between zones, of different precipitation rates and a schedule of run times suggested for various weather conditions.

1.8 DELIVERY AND STORAGE

- .1 Deliver and store materials in new condition, in unopened containers and protect until installed. Ensure that the pipe is not gouged, bent, or cracked during delivery, handling, and storage.

1.9 SITE CONDITIONS

- .1 Existing Conditions/Underground Services: prior to the start of Work, verify and mark the location of all below ground Site utilities/underground services by hand digging or employing personnel trained in the use of an electronic toning device or M-scope. Verify the location of any above ground elements that may impede the Work of this section. Notify the Consultant immediately for directions as to the procedure should any piping, conduit, structures, or utilities be encountered during excavation or trenching.
- .2 Repair to Underground Services: the Contractor shall employ the appropriate skilled trades to repair all damage to underground services caused by the Work of this Contract. Damage to services that are shown on the Drawings or have been brought to the Contractor's attention in the field prior to commencement or during construction of the Work shall be repaired at the Contractor's expense.
- .3 Repair of damages to underground services where the location of services were clearly unknown after all reasonable measures were taken by the Contractor to ascertain the existence of these services will be paid for by the Owner.
- .4 The Contractor shall cooperate with the Owner and utility companies to keep their respective utilities in operation.
- .5 Site Preparation: prior to the Work of this section, carefully inspect any installed Work of other trades or Contractors and verify with the Consultant that all such Work is complete to the extent that the Work this section may commence.
- .6 Discrepancies: the Contractor is to immediately notify the Consultant in the event of discrepancy, errors, or conflicts between the Drawings and the actual Site conditions.

1.10 PROTECTION

- .1 Protect existing buildings, equipment, sidewalks, landscape reference points, monuments, markers, and other completed Work. At no expense to the Owner, make good any damage resulting from Work of this Contract.
- .2 The Contractor shall bring only vehicles or equipment onto the Site that are essential for construction of the system.
- .3 Trenching and other excavations for vaults, valve boxes, etc. are not to be left open during non-Work hours unless they are protected to current WorkSafe BE standards. Cover, clearly mark, and protect all open excavations to ensure public safety.

1.11 GUARANTEE

- .1 The Contractor shall provide a written warranty for all workmanship for a period of two years from date of substantial performance.
- .2 Manufactured Products, including but not limited to irrigation heads, piping, quick couplers, controllers, valve boxes, and valves shall be warranted from the date of substantial performance as per the manufacturer's standard warranty period or a minimum of two years, whichever is greater.

1.12 EQUALS

- .1 Equals will not be considered for Work of this section. All items are as specified in the Specifications or on the Contract Drawings.

1.13 SEQUENCE

- .1 Ensure/coordinate installation of all sleeving and irrigation piping as required under all paved surfaces and through planter walls, under stairs as noted on the Drawings.
- .2 As required, coordinate the layout and location of the water supply/municipal connection point(s) for the automatic irrigation system with the mechanical Contractor.
- .3 As required, coordinate the layout and location of the electrical conduit by the electrical Contractor for the low voltage control wire from the controller location in the service building mechanical room to a location accessible outside the building face.

1.14 INSPECTION

- .1 Prior to commencement of Work of this section, the Contractor is to arrange an on Site meeting with the Consultant to review procedures and protocols.
- .2 Work is to remain uncovered for inspection of workmanship and materials. Notify the Consultant a minimum of 48 hours prior to required inspections. Failure to provide such notice or closing in Work that has not been inspected is sufficient grounds for withholding any payments due to the Contractor. The Consultant will request all buried Work not approved to be unearthed for proper inspection.

1.15 MEASUREMENT PROCEDURES

- .1 No measurement will be made under this Section. Include Irrigation costs in applicable lump sum prices of related landscaping work to which they are applied.

2 Products

2.1 PIPE AND FITTINGS

- .1 Wherever “as per manufacturer's Specifications” is used, it shall mean in strict accordance with the manufacturer's printed directions. Review any conflicts between manufacturers instructions and this Specification with the Consultant prior to proceeding with Work.
- .2 All materials throughout the system shall be new and in perfect condition.
- .3 Plastic Pipe: plastic pipe shall be rigid un-plasticized polyvinyl-chloride (PVC):
 - .1 Lateral Lines: unless otherwise noted, non CSA Schedule 40 PVC.
 - .2 Main Lines: Schedule 40 PVC conforming to ASTM D-2466-97.
 - .3 All pipe to be continuously and permanently marked showing manufacturer's name or trademark, type of material, pipe size, and pressure rating.
 - .4 The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign material, blisters, deleterious substances, wrinkles, and dents.
- .4 Plastic Pipe Fittings:
 - .1 Schedule 40 PVC conforming to ASTM D-2466-97 (and F438-97 for CPVC) standards designed for solvent welding to PVC pipe except where valves, risers, etc. Require threaded joints.
 - .2 Fittings for PVC pipe shall be to 2/3 interface fit to ensure a fully sealed joint. Provide minimum 25 mm (1 in.) clearance between fittings to allow for repair. Consultant will require fittings that do not provide this clearance to be removed and reinstalled in accordance with the Specification.
 - .3 All threaded connections shall be joined with a minimum of three wraps Teflon tape—no substitutions accepted.
 - .4 Threaded nipples shall be Schedule 80 PVC and be manufactured from the same material specified for the pipe.
 - .5 Threaded connections of PVC to metal shall have male threads on the PVC and female threads on the metal.
- .5 Primers and Pipe Solvents: CSA approved type as recommended by pipe manufacturer for the temperature and conditions under which the Work is being performed. Deliver in sealed containers clearly marked with name of manufacturer and lot number. Use of non CSA specialty primers or solvents such as “Wet R Dry” are not acceptable.
- .6 Sleeves: shall be Schedule 40 PVC to the extent and locations noted on the Contract Drawings. Coordinate the location of sleeves with Work of other trades:

.1 Sized a minimum of two pipe sizes larger than the irrigation lateral line to be carried.

.2 Sized a minimum of three pipe sizes larger if carrying a mainline:

2.2 VALVES AND VALVE BOXES

- .1 Solenoid Valves: Rainbird, sized one pipe size smaller in diameter than the pipe they control. Integrally regulated solenoid valves are not acceptable unless Site topography deems their use necessary and specific approval by the Consultant has been given.
- .2 Quick Coupler Valves and Blow-Out Tees: Rainbird 33DRC, brass body, 19 mm (3/4 in.).
- .3 Isolation Valves: cast bronze gate valves with non-rising stems; R&W Model 280 for valves up to 63.5 mm (2 1/2 in.) diameter, or pre-approved equal.
- .4 Bronze Ball Valves: Jones J1949SG-19 mm to 50 mm (3/4 in. to 2 in.), size as required, 90 degree shut off curb stop type, or pre-approved equal.
- .5 Valve Boxes: shall be green plastic irrigation boxes complete with captive lock bolt covers; sized to suit valves and other components with adequate room for operating and maintenance access. Carson as supplied by International Plastics Ltd. or pre-approved equals.

Control Valve Box Size	
Carson 1419	Two Valves
Carson 1324	Three Valves
Carson 910-4	Quick Coupler Valves

2.3 SPRINKLER HEADS

.1 Sprinkler Heads

.1 Sprinkler heads shall be Rainbird, types and sizes as indicated on Drawings with the diameter or radius of throw, pressure, and discharge required for head-to-head coverage.

.2 All sprinkler Rainbird heads shall be marked with the manufacturer's name and identification such that they can be identified without being removed from the system.

.2 Sprinklers Risers

.1 Rainbird Rotor Pop-Up Sprinklers:

.1 Nipple: Schedule 80 PVC, length as required.

.3 Rainbird Stationary Pop-Up Sprinklers

.1 The risers shall be of sufficient height so as not to cause any interruption of the stream from the sprinkler nozzle when the plant material has reached its optimum growth.

2.4 CONTROL AND COMMON GROUND WIRE

- .1 Insulated 14/2 Rainbird brand maxi cable, or 14/2 NMWU sized to suit load, resistance, and distances. Insulated cover colour for control/signal wire to be consistent. White wire shall be common wire.
- .2 Locate Wire: 14-gauge insulated solid copper, TWU, RW90 or approved equal.
- .3 Direct Bury Splice Kit: 2.5.1 DBY or DBR by 3M or approved equal.
- .4 Confirm control wire size with the manufacturer of zone control valves to ensure wire is sized to the length of its run and in compliance with the BC Electrical Code, latest edition.
- .5 Wire, breakers, conduits, and related materials that comprise the electrical supply to the controller shall be CSA approved.

2.5 AUTOMATIC CONTROLLER AND CONTROL EQUIPMENT

- .1 Rainbird Model EXP-LXD two-wire decoder controller automatic irrigation controller.
- .2 Line Surge Protection: Rainbird LSP - one line surge protector.
- .3 Grounding Plate for Surge Protectors: Paige 100 mm by 914 mm by 1.6 mm (4 in. by 36 in. by 0.064 in.) solid copper ground plate or approved equal.
- .4 Decoder: Rainbird FD - turf two wire decoder. See Drawings for number of addresses decoder is to accommodate.
- .5 Rain Sensor: Rainbird RSD - CEx rain sensor..

2.6 BACK FLOW PREVENTER

- .1 Watts Series 007 M1 QT, 15 mm to 80 mm (1/2 in. to 3 in.) double check back flow preventer, or approved equal. Back flow preventer shall be complete with brass unions or gate valves and test cocks, sized as required. All back flow prevention devices to be CSA and BCWWA approved and conform with all current City of New Westminster (plumbing department) cross connection control standards.

2.7 PRESSURE REDUCING VALVE

- .1 Watts Series 223 sized to suit system. Working range from 172 kPa to 517 kPa (25 psi to 75 psi) or pre-approved equal.

2.8 YELLOW WARNING TAPE

- .1 S-14687, 75 mm (3 in.), 5 mLl, yellow 'caution' tape as supplied by ULINE, www.uline.ca or pre-approved equal.

2.9 PIPE BEDDING SAND

- .1 Clean sharp, washed sand with particle size passing a 5 mm sieve.

2.10 VALVE BOX DRAIN ROCK

- .1 19 mm (3/4 in.) clean round stone or crushed rock.

2.11 FILTER MEDIUM

- .1 Needled, non-woven polypropylene mat. Acceptable Products include Nilex 4545 by Nilex Geotechnical Projects, Burnaby, BC, or Mirafi 150N by Tencate Systems, Oakville, Ontario, or approved equal.

2.12 MISCELLANEOUS MATERIALS

- .1 Electrical Tape: all weather, black plastic 19 mm (3/4 in.) wide, minimum 0.1778 mm thick.
- .2 Thread Lubricant: type manufactured for plastic to metal connections such as Teflon tape or Permatex 2.
- .3 Ground Enhancing Material (GEM): Eritech by Erico or approved equal..

3 Execution

3.1 IRRIGATION SYSTEM LAYOUT

- .1 Coordinate exact locations of lines, valves and heads, within lawn areas and planting beds, with the Work of other trades to avoid conflicts during installation.
- .2 Layout of sprinkler heads shall be in accordance with the construction Drawings. Irrigation construction Drawings are diagrammatic in nature, Contractor to ensure that full head to head coverage on a triangular layout is achieved throughout the entire Project. Alternative layouts shall be reviewed with the Consultant and the adjustments made recorded on the 'as-built' Drawings.
- .3 Prior to the start of installation of Work for this section, the Contractor shall, using 'on-Site flagging', layout all irrigation system components. The Consultant may require minor changes to system layout that will not affect quantities of components to ensure that on-Site elements and situations have been accommodated.

3.2 INSTALLATION OF PIPING

- .1 Layout the piping system in accordance with Drawings. Route piping to take into account Site elevation changes and to minimize possible low head drainage issues.
- .2 No irrigation line shall be directly over and parallel to another irrigation line or service line of any other trade. Ensure minimum horizontal and vertical clearance requirements as dictated by Canadian Electrical Code for all piping installations near any electrical conduit/service.
- .3 Where possible, main supply lines may occupy the same trench as sprinkler lines, provided a minimum horizontal clearance of 150 mm (6 in.) is maintained. Multiple lateral lines may occupy the same trench provided that a minimum of 50 mm (2 in.) horizontal clearance can be maintained and the pipes are all in the same plane.
- .4 Install pipes in long 'S' curves to allow for expansion and contraction. Ensure longest mainline straight run is installed and sized to compensate for potential surges in system.
- .5 Comply with all the manufacturer's printed data and recommendations regarding pipe cutting, cleaning, bevelling, deburring, fitting preparation, primer and cement application, and correct joining techniques. Ensure that all joints are properly fused and bonded and that all curing times given Site climatic conditions are fully observed prior to testing or charging of piping system.
- .6 Prior to the start of construction, verify that all pipe, fittings, primers, and cements are compatible for uniform installation.
- .7 Obtain field assistance from pipe manufacturer/Supplier as necessary to ensure correct installation and joining techniques are used.
- .8 Do not cement pipe and fittings under wet or muddy conditions.
- .9 Pipes that are not run with a parallel traceable control wire shall have a 14-gauge, insulated solid copper wire; TWU, RW90 or equivalent locate wire installed adjacent to the pipe run over its entire distance. Terminate all trace wires in the nearest valve box to allow for connections to locater.
- .10 Install yellow warning tape 250 mm (10 in.) above all mainline runs with low voltage wiring located below piping. Yellow warning tape on lateral lines is not required.
- .11 Trenching and Backfilling:
 - .1 Open excavation operations shall be carried out in a safe and orderly manner and in accordance with the requirements of WorkSafe BC. Approved shoring shall be used where required for safe working conditions.

- .2 With the exception of 'on slab' installation, trenches shall be set back a minimum of 300 mm (12 in.) from paved surfaces and curbs to avoid undermining base material.
- .3 All trenches are to be hand or machine excavated. Pulling pipes is not acceptable. All trenches shall be dug on the alignment and to the following depths:
 - .1 'On Grade': water main service pipe shall be buried to a depth of at least 750 mm (30 in.) below finished grade.
 - .2 'On Grade': irrigation main and zone lines shall be buried to a depth of at least 400 mm (16 in.) below finished grade measured to top of pipe. Trenches are to be straight with uniform slopes to the bottom of the trench.
 - .3 'On Slab': irrigation main and zone lines shall be set on top of drainage medium. Wherever possible, main and zone lines to run directly adjacent to edge of paved surfaces, curbs, or walls.
- .4 Where the pipes are to be laid in sub-surface material, the trench shall be excavated to a depth at least 100 mm (4 in.) below the bottom of the pipe elevation. The trench shall be backfilled with at least 100 mm (4 in.) of sand carefully compacted by hand. The remainder of the backfill to finish grade shall be with growing medium.
- .5 Prior to backfilling, all lines, valves, and fittings shall be inspected by the City of New Westminster inspector. Any Work closed in before inspection will be required to be exposed for inspection at no extra cost to the Owner. Provide 48 hours minimum notice to Consultant to arrange inspections.
- .6 All material refuse such as pipe pieces, excess wire, rags, fittings, or PVC cement canisters left shall be removed from trenches prior to backfill operation.
- .7 Backfilling shall take place in an orderly fashion. Where the line is within an enclosed planting bed or sodded lawn area and does not penetrate below the growing medium, the growing medium shall be carefully placed over the pipe and be carefully tamped by hand to achieve compaction equivalent to the surrounding area.
- .8 Contractor is responsible to repair all trenches which have settled below the adjacent grade for a period of one year from date of substantial performance.

3.3 INSTALLATION OF EQUIPMENT

- .1 General: install all equipment as shown on plans and details to City of New Westminster Parks and Recreation standards.
- .2 Valve Boxes: install valves in valve boxes, allowing adequate space within boxes for proper operation/servicing of each component. Valve box installation to meet the following requirements:
 - .1 Ensure valve box is clean and clear of all debris.
 - .2 Valve boxes to be blocked (with brick or concrete pavers) so that neither blocking or valve box rest on lateral or mainlines when supporting the weight of expected traffic.

- .3 All valve boxes to be wrapped from underneath using a full piece filter medium cut to accommodate pipes and/or wiring contained in the box. Filter medium shall be large enough to fully cover any opening into the valve box to minimize the migration of soil into the bottom of the box.
 - .4 Place 150 mm (6 in.) of drain rock on filter medium. Ensure drain rock completely covers the bottom of the valve box.
 - .5 The top of the valve box is to be level and flush with grade, and located in shrub areas where possible.
 - .6 Valves to be installed vertical and centred in the valve box.
 - .7 Quick coupler valves to be installed within valve boxes upstream of any solenoid valves.
- .3 Automatic Controllers: locate controller at location indicated on Drawings. Ensure controller(s) are located to allow for substantial viewing of the system operation. Coordinate location with Consultant. Ensure all line voltage connections are made by the electrician to Canadian Electrical Code requirements. Provide the appropriate number of 50 mm (2 in.) diameter conduits into the base of lockable metal box to accommodate all control wires.
- .4 Rain Sensor:
- .1 Provide suitably sized metal conduit run from controller to rain sensor location. Terminate the conduit at rain sensor location with a female threaded end sized to acceptable threaded male end of sensor.
 - .2 Run control wires sized as per manufacturers instructions from controller to rain sensor.
 - .3 Wire of rain sensor to controller in accordance with manufacturers written instructions.
 - .4 Calibrate and test rain sensor to ensure it is operational and performing as specified.
- .5 Two-Wire Bus Control Wiring:
- .1 Irrigation control system design is based on the use of a common two-wire bus (TWB) full loop design. This allows for the connection of all irrigation devices to the main central control via the TWB. Ensure white wire only as the common wire.
 - .2 Protect wiring by taping to main line at 600 mm (24 in.) intervals. Ensure an additional 600 mm (24 in.) of extra wire is looped in valve box for each valve. Provide an additional 300 mm (12 in.) of wire at all direction changes. Do not run decoder wire above main line.
 - .3 Wire splices are to be made in accessible locations such as valve boxes or 250 mm (10 in.) round valve box.

.4 Provide for a minimum of 300 mm (12 in.) wire slack above finish grade of top of valve box at all splice locations, valve wiring, and miscellaneous locations to allow for future expansion.

.5 Wire splices shall be made using CSA approved direct bury splice kit. Minimize the number of splices wherever possible ensuring continuous uninterrupted wire runs.

.6 The Contractor shall obtain approval from Consultant for all wiring to be installed in separate trench. Cable runs in separate trenches shall be marked with yellow caution tape 75 mm (3 in.) above cable for the entire length of cable run.

.7 Control wire runs from stub-out outside of building to controller to be in 50 mm (2 in.) diameter galvanized steel pipe or rigid Schedule 40 PVC conduit buried a minimum of 600 mm (24 in.) below grade to connection point at controller inside mechanical room.

.8 Two-wire bus layout shall accommodate shortest runs from device to device”

Wire Size	One Valve Activated	Two Valve Activated	Three Valve Activated	Four Valve Activated	Five Valve Activated
14-gauge	1,005 m 3,300 ft	503 m 1,650 ft	335 m 1,100 ft	243 m 800 ft	198 m 650 ft
12-gauge	1,219 m 4,000 ft	792 m 2,600 ft	533 m 1,750 ft	396 m 1,300 ft	320 m 1,050 ft
10-gauge	1,219 m 4,000 ft	1,219 m 4,000 ft	838 m 2,750 ft	624 m 2,050 ft	503 m 1,650 ft

.9 Maximum run for entire TWB shall not exceed 3,048 m (10,000 ft.).

.10 Maximum distance for any device from the drip irrigation control system shall not exceed 1,219 m (4,000 ft.). Maximum length of paired wires installed in loop 3,048 m (10,000 ft.).

.11 Wire size shall allow for no more that 5 V drop at the end of the run when fully loaded.

.6 Quick Coupler Valves (QCV): install in valve box to allow for free insertion and rotation of quick coupler keys 50 mm (2 in.) below box lid on swing jointed piping to provide sufficient “give” should a hose or line be pulled. Ensure QVC installation is stabilized. Piping from the mainline to the QCV to be brass up to and including the first direction change. Brass male fittings into plastic female fittings are not acceptable and will be rejected.

.7 Irrigation Heads: install all heads on triple swing joint assemblies. Adjust all heads to 12 mm (1/2 in.) below finished grade for sodded lawn areas and flush with finish grade in planter areas:

.1 All sprinkler heads to be installed a minimum 50 mm away from any hard surface.

.2 All pop-up sprinklers (spray heads and rotors) with 13 mm (1/2 in.) and 19 mm (3/4 in.) inlets to be installed on 13 mm (1/2 in.) swing pipe with manufacturer

recommended fittings. Swing pipe length to ensure proper vertical alignment of head, and future height adjustment.

.3 Maximum flow through swing pipe to be 23 ℓ per minute (5 gpm). If a sprinkler head requires more than 23 ℓ per minute (5 gpm), a properly sized unitized swing joint is to be used.

.4 All pop-up sprinklers with 25 mm (1 in.) or larger inlets to be installed on unitized swing joints.

.5 Swing pipe to be used to feed sprinkler heads on lateral lines only. No other uses will be accepted.

3.4 DECODER, SURGE PROTECTOR, AND GROUND PLATE

.1 Decoders and surge protectors to be installed as per manufacturers written instructions at locations indicated on Contract Drawings.

.2 Place ground plate in ground enhancing material as per manufacturers written instructions.

3.5 TESTING

.1 Testing: upon completion of the irrigation system, provide 48 hours notice to the Consultant for observation of the system pressure test. Test all plastic pipe and sprinklers as follows:

.1 After the pipe is in place in the bottom of the trench with risers in place, cap the risers where the sprinklers will be attached and all pipe couplings and fittings exposed.

.2 Apply a pressure of 0.551 MPa (80 psi) to each section, using a test pump and calibrated container. Inspect visually for leaks at couplings and fittings, cut out and replace any that leak. Maintain test pressure for one hour. After replacing any defective sections, pressure test for one hour and note any pressure loss.

.3 After approval by Consultant and City of New Westminster inspector, backfill the pipe maintaining pressure in the line, noting any sudden drop in pressure. If there is any indication of a leak, locate the defective section and replace. Leaks shall not be repaired by patching.

.4 Contractor to provide a written record of the pressure testing process indicating the date, parties present, pressures applied, and duration of pressure tests. Written record shall indicate zones that required retesting.

.2 Flushing: after testing and prior to attaching sprinklers, flush out each section to remove any accumulated dirt.

.3 Adjustment: adjust the irrigation heads for optimum coverage and rate of flow, including minor adjustment in actual head locations. Controller operation settings shall be coordinated with the Consultant and the City of New Westminster inspector. The Contractor is required to balance and adjust the various components of the system

to ensure the efficient operation of the system. This includes the adjustment of any pressure regulators, full and part circle radius heads, valves controller settings.

- .4 Coverage Test: when the irrigation system has been completed, a coverage test will be carried out in the presence of the Consultant and the City of New Westminster inspector to demonstrate head-to-head coverage in planting and lawn areas. The Contractor shall carry all necessary adjustments to ensure head-to-head coverage.
- .5 Controller Test: when the irrigation system has been completed, a demonstration of the irrigation controller will be carried out in the presence of Consultant and the City of New Westminster inspector. The demonstration shall include but not be limited to the sequencing through each irrigation zone. The Contractor shall carry all necessary adjustments to ensure full automated operation to the satisfaction of the Consultant and the City of New Westminster inspector.
- .6 Irrigation systems that are substantially complete after September 15, 2013 shall be fully winterized by the Contractor including but not limited to blowing out all main and lateral lines from the water source to each irrigation head, zone by zone. The Contractor is responsible to return in the following Spring agreed to with the Consultant and the City of New Westminster inspector and start-up the system performing all maintenance functions necessary to provide a fully operating system.

3.6 WINTERIZING

- .1 Winterize the system for the first time with the City of New Westminster's designated representative(s) observing. Winterizing shall include all operations necessary to protect the system from freezing temperatures, including manual and solenoid valve operations to isolate vulnerable parts of the system and draining components and pipes and/or blowing water out of all pipes with compressed air..

3.7 SPRING START-UP

- .1 Provide Spring "start-up" May 15, 2013 with the Consultant and the City of New Westminster inspector. Spring start-up shall include charging the system with water, reviewing zone scheduling and duration, head operation and replacement as required, leak repairs and general maintenance to ensure system is operating to the satisfaction of the Consultant and the City of New Westminster Inspector.
- .2 Submit certificate of proof of double check valve assembly test and pass upon date of substantial completion.

3.8 SITE MAINTENANCE/CLEAN-UP

- .1 The job Site shall be kept in a neat, clean, and orderly condition at all times during the installation process.

- .2 Trenching, laying pipe, and backfilling shall be continuous so that the amount of open trenching at the end of each workday is minimized. Any open trench or other excavations shall be barricaded and marked with high visibility marking tape to current WorkSafe BC requirements.
- .3 Any damage to paving, planting, or any other structures/elements due to settlement of improperly compacted trenches shall be immediately repaired at the Contractor's expense to satisfaction of Consultant and the City of New Westminster inspector.
- .4 Remove and dispose of off Site all surplus material, excess excavated materials, trash, debris, and waste material from the Work of this section.

END OF SECTION