YORK REGION IRRIGATION DESIGN GUIDELINES

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FORESTRY

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1 IRRIGATION DESIGN GUIDELINES OVERVIEW

1.1 Introduction

The York Region Irrigation Design Guidelines, hereafter referred to as “the Guidelines”, provides high-level parameters for the design of future boulevard planter and landscaped median irrigation systems. In combination with these design parameters, and related Region specifications and standard drawings, the Guidelines are to be followed in the development of irrigation plans and associated tender documents.

Natural Heritage and Forestry, hereafter referred to as “Forestry”, is responsible for managing over 77,000 street trees and enhanced landscaping areas on the Region’s right-of-way. Enhanced landscaping includes shrubs, perennials, and ornamental grasses, and the growing media in which they are planted, in boulevard planters and medians and other planting bed types. Irrigation systems are an important and expanding network of civil infrastructure that supports the Region’s green infrastructure, as outlined in the York Region Green Infrastructure Asset Management Plan (2022). Irrigation systems maximize the longevity of these biological assets (trees, plants, soils, etc.) in the harsh conditions that exist in the Regional road rights-of-way. Adding automated irrigation is anticipated to reduce maintenance costs per meter because of the reduced demand for surface watering, which also reduces greenhouse gas emissions by reducing the use and frequency of large trucks carrying water to those areas.

Forestry is responsible for the operation and maintenance of automated irrigation systems for Region-owned enhanced landscape features on the right-of-way.

For York Region major capital projects, Public Works Capital Infrastructure Services staff are responsible for the procurement of detailed design consultants and related contract administration and inspection services for the construction of these projects. Staff work with a variety of internal and external stakeholders to optimize the planning and delivery of these projects, including representatives from Forestry from Public Works Operations and Services. Similarly, staff from this Capital group also deliver the projects through construction and for the duration of the warranty period.

For projects with enhanced landscape features that are led by others (i.e., not the Region), irrigation requirements must be determined in consultation with Forestry during the development application process or during early discussions pertaining to a partnership project that has Region involvement, such as local area municipality capital projects.

1.2 Purpose

The Irrigation Design Guidelines aim to provide an overview of the expected components in each irrigation system to be owned and operated by the Region to provide automated watering to enhanced landscape features through a central control and monitored system. The intent of the Guidelines is to encourage improved design practices for irrigation design submissions for Forestry review by providing consistent designs that meet industry best practices. This also supports the concept that irrigation can be a municipal standard for sustainably managing green infrastructure. While there are many types of irrigation products and manufacturers, the

Guidelines aim for consistency in design and installation that will also enable a practical approach to the maintenance and operations of these systems at the regional level.

To have consistency at a Regional level, York Region has previously procured a centralized irrigation control system meeting the needs of the Region through an open and competitive process. Through this process, it was identified that Rain Bird's IQ Platform met the necessary requirements to manage and oversee the growing number of irrigation systems across the Region.

1.3 Roles and Responsibilities

For purposes of the Guidelines, the entity and/ or groups who are actively involved with the irrigation servicing and system installation process shall be understood as follows:

- Project owner: the person(s) or entity initiating the construction project. Owners could refer to the Regional Municipality of York, a local municipality, a private landowner or developer, etc.
- Forestry representative: the staff or person(s) acting on behalf of the Natural Heritage and Forestry division from York Region involved with the design, construction and/ or operations of the proposed irrigation system.
- Lead design consultant: the procured detailed design consultant group or company as a whole that coordinates the entire project and the required subconsultants.
- Irrigation designer: the company, subconsultant or person(s) responsible for leading the design of the irrigation system, which reports to the lead design consultant.
- Construction services consultant: the company or person(s) responsible for supporting the project owner with project management support, quality control, contract administration, and inspection services during construction. Typically, this is managed through a contract for Contract Administration and Inspection Services.
- General contractor: the company who has bid on and successfully been awarded construction of the project.
- Irrigation subcontractor: the company hired by the general contractor to perform work that is outlined in the Irrigation Specifications as required to be completed by a qualified irrigation professional.

The above list of participants during the design and installation process of irrigation systems is not comprehensive nor indicates specific direction. It is only intended to provide some consistency throughout the Guidelines and an introduction to the required multidisciplinary approach required for a successful project.

2 SUBMISSION REQUIREMENTS

The lead design consultant is responsible for producing a comprehensive package of documents to service, supply, and install a functional irrigation system on the Region's right-of-way that is integrated with the Region's centralized control system. The package must include servicing and irrigation designs, construction notes, standard drawings, and specifications in accordance with Region documents.

During construction, the construction services consultants may be required to support various permitting and application processes related to servicing the proposed irrigation. Liaising between the general contractor and the Forestry representative will also be required to ensure a successful delivery of the irrigation system design. These processes are described below and further detailed under various component's design requirements.

2.1 Qualifications

The irrigation designer shall be a qualified irrigation professional with a minimum of five (5) years of experience in designing similar irrigation systems, including two (2) years of experience with municipal projects.

The Irrigation Plans shall be stamped by a Certified Irrigation Designer in good standing with the Irrigation Association (IA).

2.2 Irrigation Plans

An Irrigation Plan shall be supplied based on the Guidelines using standard drawings supplied by the Region, unless noted otherwise. The Plan shall include the points of connection for the irrigation system from the supplied water source, typically with the local municipality, and the power connection with the local hydro authority.

The Irrigation Plan, and all sheets with the layout and details, shall be:

- Formatted consistently with contract drawings for the project, including being shown on the appropriate title block and using typical scales (i.e., 1:500, 1:250, etc.).
- Categorized (i.e., IR-01, IR-02, etc.) and listed within the project's drawing list or index, typically located after the cover page, and,
- Located directly after the project's Landscape Plans

Refer to section 4, Supplemental Resources, for an example layout of a Region irrigation system.

Related Design Milestones & Design Revisions

Irrigation Plans are to be submitted as supplemental to Landscape Plans early in the design phase.

A detailed response matrix addressing comments from a previous submission is required and shall detail how each comment has been addressed complete with sheet numbers / references where the comments have been

addressed, as applicable. Responding with ‘acknowledged’ or ‘noted’ is unacceptable, as the comment/ issue must be addressed at that time (i.e., not indicated as to be completed at the next stage).

For York Region capital projects and other similarly structured projects, the Plans are required at the 60% detailed design submission. As the project moves forward to 90% and pre-tender stages, it is expected that the design be finalized and capture any requirements and comments provided by the Forestry representative and other reviewers during design review and related discussion meetings.

A Note on Drainage

The Guidelines do not address detailed requirements associated with drainage related to irrigated areas. Typically, drainage is outlined on New Construction or other contract drawings, such as Median Planter Layout / Drainage Plans. Drainage for proposed boulevard or tree grate planters and raised medians must be addressed during detailed design.

This design shall be coordinated with all applicable design disciplines, specifically landscape and civil, to ensure that drainage has been addressed in areas of proposed automated irrigation, including connections to storm sewers and catch basins as necessary.

Proper drainage for the backflow preventer and proposed water meter chambers shall be determined during detailed design by reviewing the local context of these components, including requirements for sump drains or pits to address any potential flooding due to natural occurrences or issues with the components. Where required, the diameter of the sump shall be noted and further sizing requirements, such as the cubic dimension (length x width x depth).

2.2.1 Legend

The Irrigation Plans shall include detail key ID labels for all major components of the irrigation system. The legend shall specify the applicable model, material types and sizes, ensuring the design is consistent with the Guidelines and the project’s specifications.

The following items shall be shown using differing industry standard symbols, differentiated letters, and/or line types on the Plans:

- Point of Connection - Water
    - Include owner and size of watermain
- Point of Connection - Power
- Concrete Service Pad
    - Include backflow prevention assembly and irrigation controller
- Conduits
- Mainline Piping
- Lateral Supply Piping
- Master Valves
- Flow Sensors
- Quick Coupling Valves
- Drip Control Zone Kits
- Air/ Vacuum Relief Valves
- Automatic Flush Valves

- Manual Flush Valves
- Dripline Areas (polygons)
    - Include a hatch pattern throughout coverage areas
- Irrigation Notes, including but not limited to the following:
    - “Location of Rain/ Freeze sensor to be determined on site”
    - “Refer to [indicate contract drawing sheets] for planter drainage”
    - Irrigation Controller communication cartridge type noted as 4G
- Zone key ID labels, or ‘Valve Callouts’, that match the required Valve Schedule, described below.

The Irrigation Plan shall provide a Valve Schedule (i.e., a zone chart), for proper review of the irrigation layout with the following column headings, at a minimum:

- Labelled zone (i.e., number and/or letter code) matching zone key ID labels on the Plans
- Valve Model and Size (i.e., the Drip Control Zone Kit model)
- Flow in litres per minute (LPM)
- Pressure in pounds per square inch (PSI)

2.2.2 Notes and Standard Drawings

The Irrigation Plan shall include an initial sheet with General Construction Notes providing supplemental information for all irrigation system coordination and major component details, including timing and scheduling of installation, inspections, mechanical and electrical requirements, conduits and piping requirements for roadways, and any other pertinent notes for the servicing and water distribution of the system (i.e., irrigation). The General Construction Notes shall be coordinated with the Guidelines and the project specifications.

The Irrigation Plan shall conclude with details sheets which include all York Region NHF-500 series irrigation standard drawings at a minimum. Including the Region’s standard drawings alone does not satisfactorily meet this requirement as each design is unique and will require further specialized detailing to address site specific needs.

Additional standard drawings will be required for points of connection, including watermain connections and electrical servicing. All applicable Ontario Provincial Standard Drawings (OPSD), hydro authority, local municipal engineering standards, and/or other York Region drawings required as part of the work must be coordinated and included on the Plans.

Refer to the resources provided online at York Region’s Construction Design Guidelines and Standards at www.york.ca/standards , including Roadworks and Electrical items and the Street Tree and Horticultural Design Guidelines and Standards section.

2.3 Tender Documents

The lead design consultant shall prepare a comprehensive tender package for plan takers to review and bid on. The package must include specifications, bid forms and related cost estimates consistent with the proposed Irrigation Plan.

Related Design Milestone

Once contract drawings have been reviewed and revised, typically through 3-4 iterations, related contract documents to support the implementation of the Irrigation Plans shall be prepared.

For York Region capital projects and other similarly structured projects, the preliminary Bid Form, Specifications and Cost Estimate are required at the 90% / Pre-Tender detailed design submission.

Minor administrative revisions may still be required at the 100% / Pre-Tender Stage, but the Irrigation Plans, Bid Form, and Specifications shall otherwise be contract ready with all previous comments addressed. An updated and final Construction Cost Estimate for the irrigation system shall also be provided at this stage, grouped with related items, under Streetscaping and/or Landscaping.

2.3.1 Specifications

The specifications shall follow and customize, where appropriate, the Region's provided template referring to the general terms related to the construction and installation of the irrigation system and the three (3) different parts. Irrigation Specifications are divided into the following parts: Miscellaneous (including water service connections, conduits, and concrete pad, etc.), Electrical, and Irrigation.

These specifications are to be tailored and updated for each project and each servicing item, as the water source connections and electrical may differ between project locations. Significant changes to the bid form items and details, particularly related to the automated irrigation system itself (Part C), must be discussed with the Forestry representative prior to formal submission.

Refer to the resources provided online at York Region's Construction Design Guidelines and Standards at www.york.ca/standards.

2.3.2 Bid Form & Cost Estimate

A bid form and cost estimate enable reviewers to ensure that all items have been properly captured in the contract and allows the Owner to budget appropriately. Both documents shall be consistent with the items provided in the proposed design and with the Region's specifications template. These documents shall be provided at the appropriate milestone and/ or as directed.

3 DESIGN CRITERIA

The following design parameters are to be used for designing the irrigation system for the described area(s) starting at the water and power source working out to the extremities of the system.

Automated irrigation systems shall be designed for landscaped areas that are not being proposed in softscape boulevards. This typically includes landscaped center medians, boulevard planters, and/or tree grate planters. For projects with enhanced landscape features (i.e., other than typical boulevard Regional street tree planting), it is recommended to consult with Forestry to understand the irrigation requirements.

Region-owned irrigation systems shall only include dripline irrigation and other low volume irrigation components that are compatible with the Region's pre-selected centralized control platform, Rain Bird IQ. Proposed systems with any spray or sprinkler products will not be accepted.

3.1 General Layout Considerations

The design shall optimize the layout of the irrigation system in coordination with the project area and other existing centralized control irrigation systems. For a large project area, this may be limited by two parallel Regional roads and/ or between signalized intersections. The design shall avoid irrigation conduits below existing or proposed intersections. Such projects across extensive areas will typically consist of multiple points of connection, each with their own unique service connections and irrigation systems.

The lead design consultant and irrigation designer shall also base the design and layout consideration using industry best practices, recommendations provided by the manufacturers of the irrigation components and typical construction practices for working in the Regional road corridor.

The design must ensure that each drip zone and the specified piping, valve types and sizes does not exceed the limitations of the components installed in that zone. For example, dripline areas shall not exceed the length of dripline for that valve. Piping considerations, flow and pressure must all be factored into the number of zones required to successfully operate the system.

Even though the Guidelines utilize drip and low volume components, which inherently extends the typical water window for irrigating an area, the design should still focus on efficiency and sustainable practices as it relates to irrigation.

Refer to section 4, Supplemental Resources, for an example layout of a Region irrigation system.

3.2 Miscellaneous Servicing Items

Various site servicing works shall be designed in preparation for the installation of the irrigation system components. This includes coordinating all water and electrical/ power points of connections for the proper function of the irrigation system. During construction, the servicing work is coordinated by the general contractor and performed by various qualified crews and subcontractors.

All servicing components shall be within the boulevard. The design must ensure that the water source, power source, backflow prevention assembly and enclosure, irrigation controllers, and other components, as described in section 3.5., are not proposed within the roadway (i.e., curb to curb) or within the medians. These components shall be located a minimum of 2.0m from back of curb to provide space for snow storage and reduce the likelihood of snow plowing and/ or vehicular damage. When there is sufficient space in the corridor, these components shall be proposed further from any travel lanes and behind any active transportation facility (i.e., sidewalk, multi-use path, cycle tracks, etc.).

All underground piping is to be located within the boulevard areas as much as possible, including connections to watermains. This means the design shall avoid underground infrastructure under roadway lanes and prioritize back of curb locations.

Refer to the York Region standard drawing NHF-500 for Irrigation Service Connection Detail – Plan View and NHF-501 for Irrigation Service Connection Detail – Profile View.

3.2.1 Concrete Service Pad

The design shall provide a single concrete pad for each point of connection serving as the base for the backflow preventer enclosure and controller pedestal, with the backflow prevention assembly and irrigation controller inside, respectively.

The concrete pad shall strive to make use of minimum sizing requirements and shall be of sufficient length and width which meets or exceeds the required clearances provided by the manufacturer's installation instructions for the enclosure and pedestal. Typically, the pad length shall be parallel to the roadway, unless there is sufficient width in the corridor to position the pad perpendicular to the road.

The pad must provide the required conduits, also referred to as sleeves, for the various piping for the water service to the backflow prevention assembly, and the power wiring to the controller based on manufacturer's installation procedures. The alignment of these items will be arranged based on each water source location. However, it is preferred for the enclosure opening and controller face to be in the same direction and located on the side of the pad which allows future maintenance contractors to work safely in the corridor and does not impede a clearway for pedestrians, cyclists and/ or other micro-mobility devices using nearby facilities.

If the concrete pad must be located within 1000mm of an adjacent facility (i.e., sidewalk, cycle track, etc.), the designer shall ensure that the concrete pad is extended to provide a continuous surface to the adjacent facility while providing a 500mm clear zone in front of the enclosure and pedestal.

The pad shall also include a 100mm diameter sump drain to be connected to the storm sewer, when determined necessary for drainage during detailed design. This drain shall be located within the backflow prevention enclosure directly below the assembly. Refer to the York Region standard drawing NHF-513 for Pedestal Mount Controller and Service Pad.

3.2.2 Conduits

The design shall propose polyvinyl chloride pipe (PVC) conduits, below all hardscaping and asphalt (i.e., roadways) to protect the irrigation mainline and/ or lateral supply piping. Conduit shall be twice the size of the irrigation pipe inside or sufficient size for wiring, as described below. All conduits shall be SDR 21 Class 200.

All mainline conduits shall be accompanied by a separate 1” conduit running adjacent specifically for control wiring. Conduits below roadways and along boulevard hardscape areas also require a tracer wire and fish line for future infrastructure works.

For projects with median planters requiring a connection from the boulevard to the median, the design shall ensure that the mainline travels in the softscape boulevard until it can directly connect to a proposed median planting area (i.e., soil to soil) with a direct conduit. This means conduit T-connections shall be avoided below the roadway and other hardscape areas to reduce impacts to the roadway and/ or other hardscaping if future repairs are required.

Refer to the York Region standard drawing NHF-519 for Irrigation Miscellaneous details.

3.2.3 Watermain Connection

The proposed design must address providing a water source for the irrigation system in the Region’s right-of-way. The water supply for the irrigation system shall be provided by a local municipal watermain in the public realm and be coordinated with a separate, permanent water meter for Region water usage (i.e., shall not be set up as temporary or shared). Regional watermains or private water sources are not to be used. Proposed irrigation systems shall utilize a 50mm point of connection.

Typically, the point of connection is made by utilizing a live tap. The condition of any existing watermain proposed to be utilized shall be verified prior to final design to ensure its in a good state. The verification is recommended to include daylighting of the pipe connection to the transmission main, and / or as directed by the watermain owner.

If a new watermain is included in the proposed capital project, connections to the new watermain in consultation with the local municipality to reduce the need for a live tap may be proposed.

The water source point of connection shall be in a precast chamber below grade and with the 50mm municipal water meter, to record water usage in the system. The service is to include, but not be limited to, specified saddle type, main stop, 50mm diameter Type K copper pipe, curb stops and slide type service box. One curb stop shall be operated by the local municipality and a second, ball-style self-draining valve, accessible by an extended curb box, shall be operated by the Region. Regular maintenance and operation of the irrigation system, including system opening and closing, shall not require the use of persons in confined spaces and must be fully operable from above grade.

Refer to section 2.2 on Irrigation Plans to understand potential drainage requirements for components related to watermain connections.

Contract Administration

Water source connections can take a considerable amount of time. Include ‘Initiate Water Meter Application for Irrigation’ in the Construction Schedule to avoid delays during construction.

Upon award of the construction contract, or as deemed necessary by the Owner, the water meter application shall be properly coordinated between the Owner, construction services consultant, the Contractor and local municipality. The application will require understanding the proposed water usage of the system. Additional processes for the commissioning of the watermain, including pressure tests, flushing and disinfection shall be coordinated appropriately as part of the project.

3.2.4 Backflow Prevention Assembly and Enclosure

A backflow preventer shall be used to prevent cross-contamination of the irrigation system with the supplied domestic water source.

The design shall include a backflow prevention assembly at each irrigation system point of connection, above ground in an enclosure, located in close proximity to the water chamber and Region self-draining curb stop. The enclosure will house a double check valve assembly as well as other components to support its maintenance and servicing. At both the inlet and outlet of the backflow preventer, the assembly shall include a gate valve located above a service tee with an attached ball valve with plug and chain. The gate valve allows the irrigation system to be isolated and the tee with ball valve and plug serves as a connection point to facilitate system closing (i.e., winterization). These components shall be installed on the vertical rise of the copper piping coming out of the service pad in proper order, with compression elbows connecting to the horizontally installed backflow preventer. The backflow preventer's weight shall be secured by rods supporting each side, close to the elbows, with riser clamps to prevent movement and ensure stability.

The enclosure is to be located on the concrete pad described in section 3.2.1 of the Guidelines. The enclosure shall be insulated and of an aluminum material. It shall not be set up with a heating system for the enclosure.

The backflow prevention assembly also includes a heat trace cable, which encircles the assembly components in the enclosure to prevent freezing. This is an additional measure to protect the components even though the systems are winterized.

After the backflow preventer, the end of the copper piping shall have a female threaded adapter for the irrigation subcontractor to begin the automated irrigation system installation.

3.3 Electrical Items

Refer to the York Region standard drawing NHF-500 for Irrigation Service Connection Detail – Plan View, NHF-501 for Irrigation Service Connection Detail – Profile View and NHF-513 for Pedestal Mount Controller and Service Pad. Additional Region standard drawings are available online and will be required for Electrical Items.

3.3.1 Service Connection

Due to the road corridor context of Region irrigation systems, all new proposed irrigation systems must be supplied with a new and permanent power source in the Region's right-of-way (i.e., not privately owned or billed).

Typically, power is to be provided by a new, metered connection service request with the local power authority (i.e., Alectra, Hydro One, NT Power).

All electrical servicing for the irrigation system shall be accounted for during detailed design, including primary power of 120 VAC to the controller for controller operation and a secondary 120 VAC outlet for within the backflow prevention enclosure. The specified power wire shall be non-metallic wet underground (NMWU) direct burial wire, two conductor insulated parallel cable with a bare ground.

For the controller, the concrete pad will provide one conduit for 120 VAC primary power + ground wire and 24 VAC station zone wires installed, which is provided by the electrical contractor. The controller shall be operated on its own circuit.

For the backflow prevention assembly, a second 120 VAC outlet, within a weatherproof receptable inside the backflow preventer enclosure, for the specified heat trace cable shall be provided.

Contract Administration

Power source connections can take a considerable amount of time. Include 'Initiate Hydro connection service request for Irrigation' in the Construction Schedule to avoid delays during construction.

Upon award of the construction contract, or as deemed necessary by the Owner, it shall be the responsibility of the construction services consultant to coordinate with the local power authority for the new connection service request and complete a load letter, when required. The new connection service request must be for a metered connection due to the low power consumption required, which is not economically practical at the flat rate for a municipal service.

The construction services consultant shall direct new connections to York Region – Accounts Receivable. Forestry representatives shall be contacted for additional information, such as the combined billing account number for irrigation systems.

3.3.2 Grounding of Irrigation Controller

Grounding of the controller is integral to protecting the unit from surges and lightning damage and is a requirement for any service pedestal on the road allowance. The controller shall be grounded as per the manufacturer's specifications by implementing the Electrical Specifications, which includes a ground rod located in a handwell adjacent to the concrete pad where the controller is installed.

3.4 Irrigation Items

For the purposes of the Guidelines and any Region related projects, the irrigation system begins downstream from the backflow prevention enclosure at the copper stub where the irrigation subcontractor is required to install components for water distribution.

Ongoing coordination and consistency between the civil, mechanical, electrical and irrigation designers is required for proper design of the system.

3.4.1 General

As noted above, the irrigation system installation is considered separate to site servicing described in the Miscellaneous Servicing and Electrical items. Irrigation system installation work is typically coordinated by the general contractor but mostly performed by landscape and/ or irrigation subcontractors.

The irrigation system shall be designed in coordination with the locations and service sizes provided by the proposed servicing. This includes coordinating with other disciplines on items that may not necessarily be

installed by the irrigation subcontractor during construction. The servicing items and conduits below roadways and between planters shall be proposed on one comprehensive Irrigation Plan, as described in section 2.2.

Software Compatibility

All components shall be compatible with the Rain Bird IQ software platform, which is the pre-selected centralized irrigation control system for York Region.

Wiring

All electrical valve wire shall be a direct burial, thermoplastic wet underground (TWU), insulated copper wire which provides the 24 VAC power for operation. This includes control wires, common wires, and the master valve wire.

Control wiring, also referred to as station wiring, from the zones of the irrigation system to the controller must be installed for the proper function of the system. In hardscape areas and below roadways, the wiring is to be installed within the provided conduits running along the mainline piping, as described in section 3.2.2 of the Guidelines. In all softscape areas (i.e., sodded boulevard, planting soil areas, etc.), the control wiring shall be installed below the mainline piping, which provides some protection to the wiring from digging or accidental excavation.

Valve Boxes

Each component specified throughout the irrigation system shall be installed within an irrigation valve box with a lockable lid to protect the asset from vandalism and to provide staff access to the underground components in the system.

Valve boxes shall be located throughout the system for the ease of maintenance and operations, as well as the safety of persons performing any work on the system. For example, in boulevard planters, valve boxes are to be placed on the opposing side of the planter from the roadway to increase the distance of persons working in the valve box. For a median planter, the valve box is to be placed in the center of the median so that there is equal space between the adjacent traffic lanes forming a ‘buffer zone’ around the worker.

3.4.2 Controller

Each system will be operated by an irrigation controller that stores the irrigation scheduling data from the Region’s central IQ software to control the drip zones and record and monitor flow data. The controller unit is also able to record irrigation water usage using the specified master valve and flow sensor assembly and has the capability of shutting down and isolating the entire system automatically, or remotely, if a leak (overflow condition) is detected. This is known as seek and eliminate excessive flow or ‘SEEF’.

The electrical service, a 120 VAC power outlet described in section 3.3., required for the controller will be supplied on the concrete pad located beside the backflow prevention assembly. Each controller shall be housed in a cabinet mounted on a pedestal installed on the concrete pad, described in section 3.2.1. The specified cabinet and pedestal for the irrigation controller shall be stainless steel with key access.

It is the responsibility of the general contractor to coordinate the configuration of each controller to operate with the IQ platform as noted in the Irrigation Specifications.

Refer to the York Region standard drawing NHF-513 for Pedestal Mounted Controller and Service Pad Detail.

Communication Cartridge

Each controller shall be integrated into the existing Rain Bird IQ central control platform with the installation of the cellular communication cartridge, as directed by the Forestry representative, in the back of the controller control module. The latest cartridge type is referred to as 4G. The design shall clearly note the specified cartridge on the Irrigation Plans.

It is the responsibility of the general contractor to coordinate the supply, install, and successful integration of the cartridge with the controller and the existing Rain Bird IQ platform as per the Region specifications.

Wireless Rain/ Freeze Sensor

Each controller is to have a wireless rain/freeze sensor to override downloaded irrigation scheduling in the event of rain and/or freezing temperatures. Wireless rain/freeze sensors are to be approximately located on the Irrigation Plans with the following noted and included beside the legend item “Location of Rain/ Freeze sensor to be determined on site.”

Sensor location is to be discussed with the Forestry representative during construction to ensure its placement reduces the chance of vandalism and is also within range of the control interface. The control interface unit is to be mounted in the pedestal with the wiring connected to the specified power and sensor terminals in the controller.

It is the responsibility of the general contractor to coordinate the supply, install, and successful integration of the sensor with the controller and the existing Rain Bird IQ platform as per the Region specifications.

Refer to the York Region standard drawing NHF-515 for Wireless Rain-Freeze Sensor Detail.

Contract Administration

The Forestry representative must be contacted to acquire the Region’s SIM card required for the specified controller to operate and properly connect to the centralized irrigation control system. Forestry will supply the SIM card once requested. Sufficient time to acquire the SIM card shall be provided to Forestry as this may take a minimum of 10-15 business days or more depending on the capacity of the Region’s technology department at the time.

During construction, the Forestry representative must also be consulted for the location of the rain/ freeze sensor.

Prior to final inspection, the system will require configuration of the sensor, cartridge, and SIM card to the central control and must be confirmed to be properly operating by Forestry.

3.4.3 Master Valve and Flow Sensor

The first major components to the irrigation system shall be a master valve and flow sensor after the points of connection (i.e., near the concrete pad).

A master valve and flow sensor assembly within the same valve box shall be located as close as possible downstream from the backflow preventer. Locating these at the beginning of the system will inform Forestry if there is a break, leak and/or some other low or high flow occurrences throughout the system. The master valves and flow sensors shall be sized appropriately to the flow requirements of proposed zones to ensure proper

readings for the Region's centralized control systems. Sizing these components appropriately will require the use of documents provided by the manufacturer's, which assist with the system design.

The master valve is required to provide automatic system isolation. The specified master valve in the Region's installation specifications is a globe style valve with a pressure regulating dial.

The flow sensor is required to send flow rate data back to the controller, and thus, be accessible to staff monitoring the system. The specified flow sensor unit is an ultrasonic type equal-to or smaller than the incoming piping. Ultrasonic flow sensors have an improved ability to read low flow systems.

To properly transfer data without interference, a flow sensor cable that is a direct burial, shielded type will be required from the flow sensor to the controller to ensure proper transmission. This cable shall also be in conduit, if located under a hardscape area between the valve box and the controller.

Refer to the York Region standard drawing NHF-502 for Master Valve- Flow Sensor Assembly Detail.

3.4.4 Mainline and Lateral Supply Piping

Upstream from all drip control zone valves shall be proposed mainline piping while downstream from the zone valves to the headers will be lateral supply piping. For either piping, all PVC piping shall run in required conduits, described in section 3.2.2., under all hardscape and roadway areas.

Once all drip areas have been established and once the number of drip control zone valves are confirmed, the design shall propose a PVC mainline to run from the point of connection to all zones. The mainline must be sized accordingly to ensure that the furthest area will meet the flow requirements for proper irrigation. Generally, the mainline piping is to be standard 50mm PVC SDR 26 Class 160. In some cases, a smaller pipe may be used but this should be limited to small areas only where the flow requirements do not justify a 50mm mainline. Overall, the design shall not exceed 5ft per second as an industry best practice to reduce wear and tear on the system, keep pressure loss within acceptable limits and improve the system performance. All mainlines shall be noted to be installed at a minimum of 400-460mm below finished grade.

The use of lateral supply piping in a typical Region irrigation system is limited. When required, lateral piping shall also be PVC and be sized to zone flow requirements. For a 25mm PVC lateral, it shall be SDR 21 Class 200 and for a 38mm, it shall be SDR 26 Class 160. All lateral supply piping shall be noted to be installed at a minimum of 300mm below finished grade.

3.4.5 Quick Coupling Valves

Quick coupling valves shall be installed on the mainline to facilitate the use of hoses and assist with system closing procedures. The specified, standard size of quick coupler for Region irrigation, to provide consistent key access for staff, is a 25mm x 25mm coupler.

Quick coupling valves shall be proposed in optimal locations throughout the irrigation system and may include more than one for each system. A minimum of 1 quick coupling valve shall be proposed downstream from the master valve and flow sensor assembly in the boulevard to be used for winterization procedures. Additional couplers

may be installed in a midpoint boulevard planter and/or at the midpoint of the median planting to allow connection of a hose for hand watering.

Unitized quick coupling valve swing joints with a brass nipple and stabilizer shall be used to connect the quick coupling valve to the piping.

Refer to the York Region standard drawing NHF-503 for Quick Coupling Valve with Stabilizer Detail.

3.4.6 Drip Control Zones

Each drip zone requires its own electric valve to turn on and off the zone once initiated through the master valve and by the controller. The design shall optimize an organized system of properly sized and located drip control zones for all areas requiring irrigation. Each zone represents one station on the controller and will be operated one at a time during the water window. The zones may be limited by maximum dripline extents, flow requirements of the valves, or other factors such as locations and proximity of planters. Details of each zone shall be included in the required Valve Schedule on the Irrigation Plans, as described in section 2.2.1.

Each zone (i.e., station) shall be operated through a drip control zone kit, which includes an isolation ball valve, electric valve, and pressure regulated basket filter. These components together control each zone of the drip irrigation in the system.

Refer to the York Region standard drawing NHF-505 for Drip Control Zone Kit Detail and NHF-506 for Dripline Feed Layout Detail.

Each zone shall also be provided with the appropriate quantity and optimal location of automatic flush valves, manual flush valves, and air/ vacuum relief valves.

Automatic flush valve

Each drip zone shall include an automatic flush valve to release pressure in the dripline tubing when not in use and flush the tubing each time the zone is activated. The specified automatic flush valves shall be installed on each zone at the farthest point to reduce potential sediment build-up and eliminate clogging.

Refer to the York Region standard drawing NHF-510 for Automatic Flush Valve Detail.

Manual flush valve

Each drip zone shall include manual flush valves to be installed at the end point(s) of all lateral supply piping to allow initial flushing when the system is installed, winterization of the system each fall, start-up of the system each spring and after any repairs.

Refer to the York Region standard drawing NHF-504 for Manual Flush Valve Detail.

Air/ vacuum relief valve

Each drip zone shall include an air/vacuum relief valve installed at the highest point to allow the removal of air from the dripline tubing upon zone activation and the introduction of air into the dripline tubing when the zone is turned off.

Refer to the York Region standard drawing NHF-511 for Air-Vacuum Relief Valve Assembly Detail.

3.4.7 Dripline Tubing

Each proposed control zone must be irrigated with subsurface dripline components to provide water directly to areas with trees, shrubs, and perennials.

Dripline irrigation shall be completed using dripline tubing in a grid layout with supply headers and exhaust headers with rows of dripline connected at each end. The result is that all rows are being supplied from both ends for a fully charged system.

Each drip control zone shall consist of subsurface dripline tubing laid on top of the soil (i.e., engineered growing media or planting soil) in a grid pattern at 300mm spacing so that the inline emitters are spaced in a triangular pattern.

Headers are to be installed at the starting point of the proposed dripline network in each specific area of each zone. The design shall propose prefabricated headers, as specified, which provide consistent quality and spacing and reduces the need for additional small components to be cut and fitted together by each installation contractor with their own styles and methods.

Blank dripline tubing, a similar polyethylene tubing without emitters, can be proposed in areas that do not need irrigation. This tubing is generally not required in the Region's irrigation systems. The design shall be coordinated with others if there are obstructions proposed within the dripline areas that impact the proposed design and would require blank tubing so that the area does not receive irrigation. For example, other types of utility or hand wells for underground access to other assets are to be avoided in any irrigated area.

The specified subsurface dripline tubing is a 0.9GPH polyethylene tubing that is copper infused with pressure compensating inline emitters spaced at 305mm intervals. The copper type tubing has been specified to reduce the likeliness of roots penetrating the tubing. This subsurface tubing is to be laid on the growing media and secured at finished grade with tie-down stakes prior to the installation of mulch.

The specified tie-down stakes are galvanized steel used to secure dripline tubing and fittings throughout the drip irrigation areas.

The specified dripline fittings are to be compression or barbed types used to provide a leak-free connection at changes in direction and points of transition to threaded fittings and throughout the drip areas.

Refer to the York Region standard drawing NHF-507 for Dripline Installation at Grade Detail and for NHF-508 Dripline Riser Assembly Detail.

3.4.8 Tree Grate Planters

When the project's Landscape Plans include trees within tree grate planters (i.e., a tree grate and frame with soil cells below ground to provide sufficient soil volume), the design shall propose only drip-type or low volume components.

4 SUPPLEMENTAL RESOURCES

4.1 NHF-500 Series Standard Drawings

Refer to the below list of York Region irrigation standard drawings, referred to as the NHF-500 series.

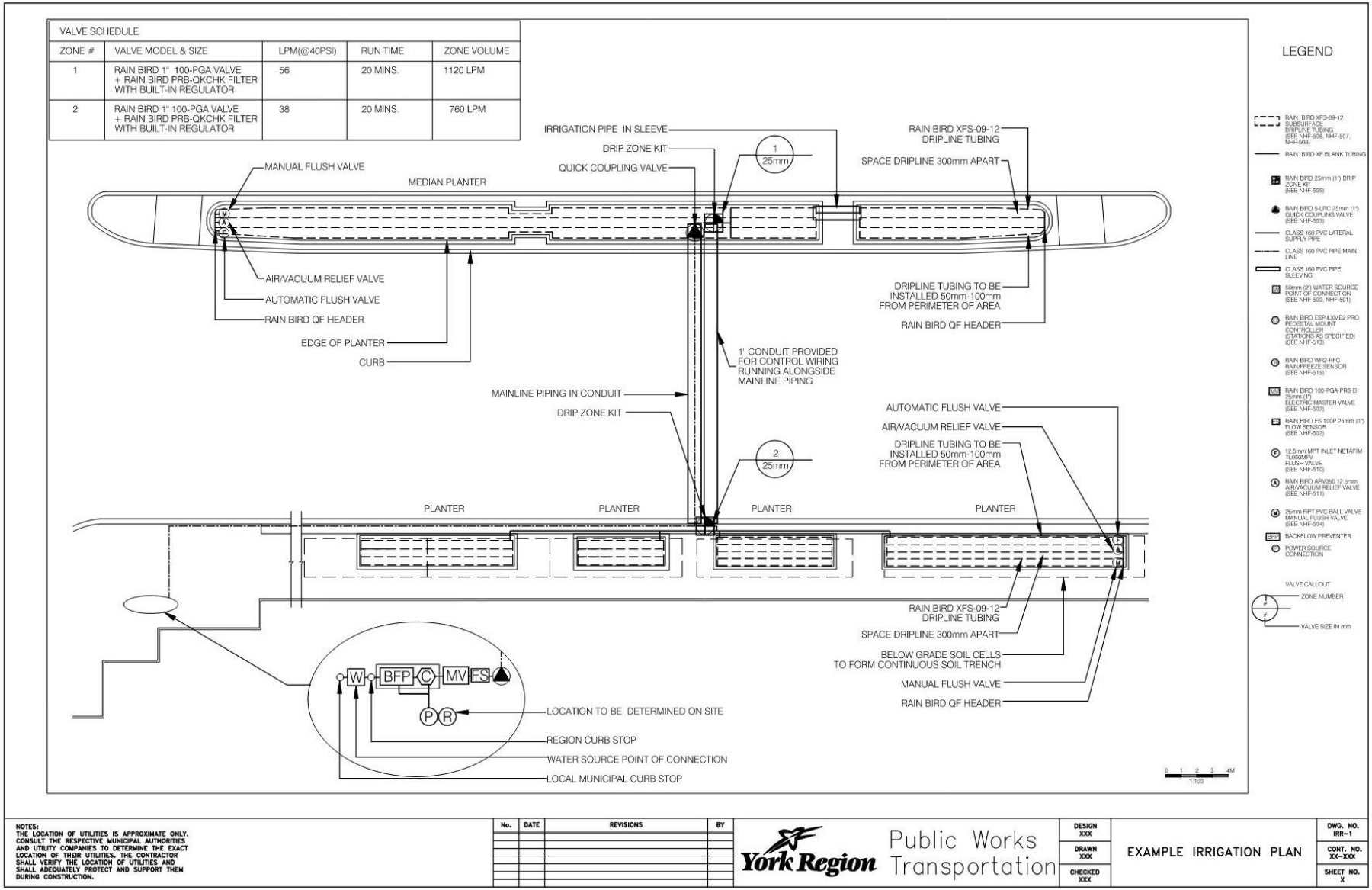
- NHF-500 Irrigation Service Connection – Plan View
- NHF-501 Irrigation Service Connection – Profile View
- NHF-502 Master Valve-Flow Sensor Assembly
- NHF-503 Quick Coupling Valve with Stabilizer
- NHF-504 Manual Flush Valve
- NHF-505 Drip Control Zone Kit
- NHF-506 Dripline Feed Layout
- NHF-507 Dripline Installation at Grade
- NHF-508 Dripline Riser Assembly
- NHF-510 Automatic Flush Valve
- NHF-511 Air-Vacuum Relief Valve Assembly
- NHF-513 Pedestal Mount Controller and Service Pad
- NHF-515 Wireless Rain + Freeze Sensor
- NHF-519 Irrigation Miscellaneous

Be advised that the following previously provided Region standard drawings are no longer active and shall not be included in proposed Irrigation Plans:

- NHF-509 Dripline Operation Indicator
- NHF-512 Tree Grate Irrigation (in revision)
- NHF-514 Grounding for Rain Bird ESP-LXMEF Pedestal Mount Controller

4.2 Example Project Layout

Refer to the example layout provided on the next page that demonstrates a high-level overview of the Region's requirements for a new irrigation system and potential layout for a small system.


VALVE SCHEDULE
ZONE # | VALVE MODEL & SIZE | LPM(@40PSI) | RUN TIME | ZONE VOLUME
1 | RAIN BIRD 1" 100-PGA VALVE + RAIN BIRD PRB-QKCHK FILTER WITH BUILT-IN REGULATOR | 56 | 20 MINS. | 1120 LPM
2 | RAIN BIRD 1" 100-PGA VALVE + RAIN BIRD PRB-QKCHK FILTER WITH BUILT-IN REGULATOR | 38 | 20 MINS. | 760 LPM
IRRIGATION PIPE IN SLEEVE
DRIP ZONE KIT
QUICK COUPLING VALVE
MANUAL FLUSH VALVE
MEDIAN PLANTER
RAIN BIRD XFS-09-12 DRIPLINE TUBING
SPACE DRIPLINE 300mm APART
AIR/VACUUM RELIEF VALVE
AUTOMATIC FLUSH VALVE
RAIN BIRD QF HEADER
EDGE OF PLANTER
CURB
DRIPLINE TUBING TO BE INSTALLED 50mm-100mm FROM PERIMETER OF AREA
1" CONDUIT PROVIDED FOR CONTROL WIRING RUNNING ALONGSIDE MAINLINE PIPING
MAINLINE PIPING IN CONDUIT
DRIP ZONE KIT
AUTOMATIC FLUSH VALVE
AIR/VACUUM RELIEF VALVE
DRIPLINE TUBING TO BE INSTALLED 50mm-100mm FROM PERIMETER OF AREA
PLANTER
PLANTER
PLANTER
PLANTER
RAIN BIRD XFS-09-12 DRIPLINE TUBING
SPACE DRIPLINE 300mm APART
BELOW GRADE SOIL CELLS TO FORM CONTINUOUS SOIL TRENCH
MANUAL FLUSH VALVE
RAIN BIRD QF HEADER
W
BFP
C
MV
FS
P
R
LOCATION TO BE DETERMINED ON SITE
REGION CURB STOP
WATER SOURCE POINT OF CONNECTION
LOCAL MUNICIPAL CURB STOP
LEGEND
VALVE CALLOUT
ZONE NUMBER
VALVE SIZE IN mm
NOTES:
THE LOCATION OF UTILITIES IS APPROXIMATE ONLY. CONSULT THE RESPECTIVE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES TO DETERMINE THE EXACT LOCATION OF THEIR UTILITIES. THE CONTRACTOR SHALL VERIFY THE LOCATION OF UTILITIES AND SHALL ADEQUATELY PROTECT AND SUPPORT THEM DURING CONSTRUCTION.
No. | DATE | REVISIONS | BY
York Region
Public Works
Transportation
DESIGN XXX
DRAWN XXX
CHECKED XXX
EXAMPLE IRRIGATION PLAN
DWG. NO. IRR-1
CONT. NO. XX-XXX
SHEET NO. X