# SCHEDULE OF REVISIONS

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<th>Description</th>
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<tbody>
<tr>
<td><strong>General</strong></td>
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<tr>
<td>Numbering - The numbering scheme has been revised to better distinguish between the Preamble,</td>
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<tr>
<td><strong>Preamble</strong></td>
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<tr>
<td>Temporary Construction Services – Responsibilities for metering of temporary construction</td>
<td>ii</td>
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<tr>
<td>water service connections has been included.</td>
<td></td>
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<tr>
<td><strong>Design Criteria Manual</strong></td>
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<tr>
<td>Meter Sizing – Revisions to the meter sizing methodology include:</td>
<td>1 and</td>
</tr>
<tr>
<td>• Removing the requirement to size the meter based on 80% of the manufacturer’s maximum</td>
<td>Appendix A</td>
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<tr>
<td>instantaneous flow rating and maximum pressure loss of 48 kPa at the total peak fixed</td>
<td></td>
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<tr>
<td>demand.</td>
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<tr>
<td>• Revising how the total peak fixed demand is calculated based on the domestic and irrigation</td>
<td></td>
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<td>demands.</td>
<td></td>
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<tr>
<td>• Adding a meter sizing table in Appendix A for various flow ranges.</td>
<td></td>
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<tr>
<td>Meter Selection – The protocol for metering residential homes with fire sprinklers has been</td>
<td>1</td>
</tr>
<tr>
<td>updated.</td>
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<td>Meter Location – The horizontal distance between the property line and meter box has been</td>
<td>1</td>
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<td>adjusted to a range of 300 mm to 800 mm.</td>
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<td>Meter Configuration – Sub-sections have been added to detail the requirements for Reducers,</td>
<td>2 - 3</td>
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<td>Setters, and Test Ports.</td>
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<td>Remote Receptacles – The requirement to equip inside meters with a radio transmitter end-</td>
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<tr>
<td><strong>Appendices</strong></td>
<td></td>
</tr>
<tr>
<td>Appendix A – A revised meter sizing calculation sheet and example are provided in addition to a meter sizing table.</td>
<td>Appendix A</td>
</tr>
<tr>
<td>Appendix B – The Supplementary Detail Drawings have been updated.</td>
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APPENDIX B  Supplementary Detail Drawings
PREAMBLE

Introduction

This document outlines the City's requirements for the installation of cold-water meters on municipal water services. It is divided into two separate parts, the Design Criteria and the Supplementary Specifications.

Intent

The Design Criteria are intended to provide direction to the Applicant and Applicant's Engineer on the elements required to be considered in the design of new water meter installations. It is intended to be used in conjunction with the City of Surrey Design Criteria Manual.

The Supplementary Specifications are intended to provide direction to the Applicant and Applicant's Engineer on the specifications that must be incorporated into building servicing contracts for the installation of new water meters. The Supplementary Specifications are to be used in conjunction with the City of Surrey Supplementary Specifications document and the City approved edition of the Master Municipal Construction Document (MMCD).

Glossary of Terms

"Applicant" Refers to a property Owner, Developer, or authorized agent who makes an application for connection to a water service.

"Applicant's Engineer" Refers to a professional engineer hired by the Applicant to design the installation of the meter.

"ASTM" Refers to the American Society for Testing and Materials.

"AWWA" Refers to the American Water Works Association.

"City" Means the City of Surrey.

"CSA" Means the Canadian Standards Association.

"Developer" Means person(s) or organization(s) developing property as per City guidelines.

"General Manager, Engineering" Means the General Manager or their appointed designate of the Engineering Department of the City.

"NFPA" Refers to the National Fire Protection Association.

"Owner" Means the property Owner as defined by the latest Surrey Waterworks Regulation By-law.
Responsibilities

The Surrey Waterworks Regulation and Charges By-law, 2007, No. 16337 (as amended) Part 9 outlines metering requirements for specific scenarios.

For all new connections, the Applicant must supply and install all piping, fittings, meter chamber(s) / vault(s), and equipment.

The City supplies and installs 19 mm meters for single family and duplex residential construction at the Applicant’s cost. Meters for temporary construction service connections are supplied and installed by the Applicant.

Backflow prevention devices, although not covered within this document, are to be installed in accordance with Surrey Waterworks Cross Connection Control By-law, 2013, No. 17988 (as amended).

Timing

For new connections, the installation of a water meter is triggered by an application for a Building Permit or Plumbing Permit. Following the issuance of the Building Permit, the Applicant and City shall confirm the meter size and location within the property and relative to any structures.

For new single family residential dwellings, water meter chambers, setters, and lids are to be installed by the Applicant and the City supplied and installed water meter shall be in place prior to City activation of the water service curb stop.

The meter area must be kept free and accessible at all times in order to facilitate the installation of the meter. The Applicant is responsible for protection of the meter installation from damage and must repair any damage that occurs to the chamber, setter, meter, or lid. The Applicant shall ensure that the meter chamber and lid are adjusted to final grade and remain unobstructed to facilitate maintenance, reading, and testing.

In the case where a drawing submission is required (Design Criteria Manual Section E) installation of the water service, chamber, or meter within private property shall not begin prior to City approval of the meter design drawings.
A. Meter Sizing Methodology

For all single family residential homes without fire sprinklers the water meter size shall be 19 mm except in the case where the Applicant’s Engineer can demonstrate the need for a larger service connection. All other meters should be sized in accordance with AWWA M22 Sizing Water Service Lines and Meters and the City of Surrey Water Meter Sizing Calculation Sheet contained in Appendix A. It should be noted that this methodology is based on the AWWA fixture value method and not the fixture unit method employed in the BC Building Code for piping within buildings.

For developments that are proposed to be phased, the meter chamber and piping must be sized for the meter required for the ultimate build-out of the development. However, the initial meter installed must be sized to accurately capture the range of flows for the first phase.

The Applicant or Applicant’s Engineer must ensure that the meter selection and installation requirements are appropriate for the designed application without unnecessarily oversizing the meter or restricting water pressure.

B. Meter Selection

Meters approved for use in the City are listed in Section 1.1 of the Supplementary Specifications.

Only one domestic meter is to be supplied per property unless otherwise approved by the City. The only exception is duplex units where two separate domestic meters are to be provided.

Fire services shall be separated from domestic services at property line. The exception to this is for single family residential homes that employ fire sprinklers. In this case a combined service is acceptable, but the meter must be of the appropriate size and type for fire protection applications.

Backflow prevention device requirements are outlined in Surrey Waterworks Cross Connection Control By-law, 2013, No. 17988 (as amended).

C. Meter Location

All meters 50 mm and smaller must be located at the property line in a chamber unless otherwise approved by the City.

For property line installations the meter box or vault must be located on private property, within 300 mm to 800 mm from the property line as indicated on Supplementary Detail Drawing SSD-WM1. Water meters shall not be installed within any utility right-of-way, unless such right-of-way is designated for a water meter installation. An area of at least 1.0 m horizontal and 2.0 m vertical around the meter box or vault should be free of major landscaping or objects, including shrubs, fences, retaining walls, etc., to facilitate future
maintenance of the meter assembly. Grading of the area around the chamber must ensure positive drainage away from the chamber.

Where the meter is approved to be installed within a building, the installation should be within reasonable distance of a floor drain. The floor drain must be suitably sized to accept the flows associated with meter testing. The meter should be installed a minimum of 600 mm above the floor slab. A space of at least 1.0 m horizontal and 1.0 m vertical from the meter assembly shall be free of obstruction to allow for convenient servicing and testing of the meter at all times. No electrical, mechanical, or water-sensitive equipment should be placed or installed under the meter assembly or in an area where splash or flow from the meter assembly could occur during the servicing of the meter.

D. Meter Configuration

The general configuration for single family residential meter installations is illustrated on Supplementary Detail Drawing SSD-WM1. For all meters 50 mm and larger, configuration details shall be determined by the Applicant’s Engineer and outlined in the submittal drawings.

For all meters 50 mm and larger, adequate straight length pipe shall be provided upstream and downstream of the meter in order to comply with manufacturer’s recommendations for maximum accuracy. Bypass tees and isolation gate valves may be located within the straight length distance in accordance with manufacturer’s recommendations. A restrained coupling must be provided on the downstream side of the meter for flexibility in case of meter removal.

i. Isolation Valves

Isolation valves are required to be installed upstream and downstream of the meter assembly. Isolation valves must be the same size as the corresponding incoming and outgoing water service connection. Isolation valves must be in the same chamber as the meter, unless otherwise approved by the City.

ii. Reducers

Any reduction in the size of the incoming or outgoing water service connection must occur between the isolation valves and within the chamber. If the installation involves a reduction in water service size, the isolation valve spacing must be sufficient to accommodate a meter that is the same size as the service connection.

iii. Bypasses

A locking bypass is required to be installed on all 50 mm and larger meters.

For all meters, the bypass shall be half the size of the water service (prior to any reduction), except for facilities with critical flow requirements. Where a combined fire and domestic service is approved for a single family residential home with fire sprinklers, the bypass shall be the same size as the water service.
The complete bypass (including tees, piping, and valve) must be within the same chamber as the meter.

After testing the installation, the bypass valve must be closed and sealed.

Bypasses must not be located directly above the meter in a chamber setting; however, rotating the bypass 45 degrees is permitted if space governs.

iv. **Setters**

Setters are only permitted for water meters 50 mm diameter or smaller.

v. **Test Ports**

Test ports shall be provided for all meter assemblies 50 mm diameter or larger. In the absence of a test port on the meter case, a test tee must be installed with a 50 mm diameter threaded lateral and plug at a distance of three pipe diameters downstream of the meter.

vi. **Remote Receptacles**

For exterior meters installations, remote receptacles must be mounted to the chamber lid. At least 1.8 metres of 22 gauge, three-colour (red, green, black) wire shall be provided between the receptacle and meter. Remote wiring connections shall be factory or field sealed to ensure that the connection is waterproof.

For inside meter installations, where approved by the *City*, wall mounted remote receptacles should be located approximately 1.6 metres above grade and easily accessible for reading. Where possible, receptacles should be located adjacent to gas or electric meters. For all inside meters, the remote receptacle shall be equipped with a radio transmitter end-point.

vii. **Chambers**

Meter chambers, or where specifically approved above ground enclosures, must be selected to provide adequate space for removal and testing of all equipment within the meter assembly. Access lids, latches, and ladders must comply with the current requirements of the Workers Compensation Board and provide adequate space for testing and removal of meters, and where applicable, backflow prevention devices.

Thrust beams must be designed for all chambers housing equipment 75 mm or larger to ensure that the thrust force is transferred to the full width of the chamber. The *Applicant’s Engineer* shall ensure that the chamber manufacturer is in agreement with the thrust bearing area on the chamber.
All chambers for meters 75 mm and larger must be equipped with a sump and drained by either a gravity connection to the storm sewer, or where this is not possible by a sump pump. The Owner is responsible for providing power to the sump pump in accordance with the BC Electrical Code.

E. Submissions

For all meters 50 mm and larger, the Plumbing Permit Application submitted by the Applicant shall be accompanied by:

- A site plan at 1:500 scale and chamber layout at 1:250 scale;
- Location of meter chamber relative to overall site development plan (dimensioned from property corner);
- Future phasing of the project;
- Meter size, type, and manufacturer;
- Demand flow calculations in accordance with Appendix A;
- Chamber drain type and discharge location;
- Site specifics (ie. building use);
- On-site fire system (hydrants, fire sprinklers);
- Irrigation systems; and
- Any other relevant information pertaining to the proposed meter installation.

For all meter assemblies 50 mm and larger, the Applicant's Engineer must provide sealed design drawings and shop drawings of the complete meter installation and relevant calculations, to demonstrate the appropriateness of the sizing of the meter, for City approval prior to installing the meter. A meter chamber design drawing template is provided in Appendix B (SSD-WM2).
SUPPLEMENTARY SPECIFICATIONS

1.0 PRODUCTS

1.1 Water Meters

.1 Unless a variation is justified, the City will only accept approved makes and models of water meters. The following meters are approved by the City:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model</th>
<th>Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensus</td>
<td>iPERL</td>
<td>25 mm and smaller</td>
</tr>
<tr>
<td></td>
<td>OMNI C²</td>
<td>50 mm and larger</td>
</tr>
</tbody>
</table>

Alternate meters may be accepted, but must be approved by the General Manager, Engineering.

.2 All meters 25 mm and smaller shall meet the following requirements:

- Must meet appropriate AWWA standards.
- Must be capable of 95% accuracy at low flows less than or equal to 0.031 L/s (0.5 usgpm).

.3 All meters 50 mm and larger shall meet the following requirements:

- Must meet appropriate AWWA standards.
- Must be capable of 95% accuracy at low flows less than or equal to 0.031 L/s (0.5 usgpm).
- Must have bolt flanged ends.

.4 All meters must be new. Used or reconditioned meters are not acceptable.

1.2 Registers

.1 Meters must have encoder-type remote-registration conforming to the latest version of AWWA C707.

.2 The register must provide at least eight-digit visual registration at the meter with the ability to simultaneously encode (in digital format) at least eight significant digits of the meter reading for transmission through the remotely located receptacle. A meter identification number must also be provided with each reading. For the purposes of billing, electronic registration must return registration (meter read) to the nearest cubic metre.
.3 The month and year of manufacture and other identification information must be clearly printed on the face of the register. The register must have an electronic flow-indicating display, including flow direction. The units of measurement shall also be electronically displayed on the register.

.4 All registers must be provided with factory padded moisture protection for internal components suitable for operation in flooded or humid pit/chamber conditions.

.5 All registers must have integral data logging capabilities and able to store a minimum of 30 days of hourly data. Battery life must be guaranteed for a minimum of 10 years.

.6 All registers must be new. Used or reconditioned registers are not acceptable.

1.3 Remote Receptacles

.1 Remote receptacles must either be wall or pit mount style. Remote receptacles must not include a remote display or data storage.

.2 The materials employed must be corrosion resistant, resistant to ultraviolet degradation, unaffected by rain or condensation, and compatible with rugged service and expected life.

.3 Wall mounted receptacles shall be sealed to prevent water intrusion with the terminal screws concealed by the receptacle. Excess wire must be looped and mounted on the wall adjacent to the meter.

.4 The receptacle shall be mounted such that it is easily accessible by the meter reader or City staff.

1.4 Pipe and Fittings

.1 Connections 75 mm in diameter and greater must be restrained to the City watermain.

.2 All pipe material within chambers shall be ductile iron, Schedule 80 PVC, C900 PVC, polyethylene, or Type K copper. All products must be approved for potable water application. All joints within the chamber must be restrained (ie. flanged, glued, welded, threaded).
1.5 Valves

.1 Valves, except for lockable bypass valves, up to 50 mm in diameter must meet AWWA C800, and must have bronze case with National Pipe Threaded (NPT), soldered, compression type or flange connections. Valves must be full port ball valves using rubber o-ring seals. Actuation is to be by a curb-stop style operating nut.

Valves over 50 mm in diameter on domestic services must be ductile iron, resilient seat, with non-rising stem (NRS), gate valves with flanged ends, and must meet AWWA C509. Stem seal to be o-ring type. Actuation is to be by a standard 50 mm square-operating nut.

.2 All valves on fire service lines must comply with NFPA and Fire Code requirements.

.3 All 50 mm bypass valves must be brass (inside) or stainless steel (chamber) with locking lever (MA Stewart or approved equal). All bypass valves must have a lock wing on the operating nut and the case.

1.6 Setters

.1 For 19 mm and 25 mm services, setters shall be equipped with a full port inlet ball valve and dual check valve on the outlet. For 50 mm services, the setter shall be equipped with a full port inlet ball valve and full port outlet ball valve.

.2 All setters must meet NSF 61 Annex F/G requirements.

1.7 Flange Adapters

.1 Flange adapters for 50 mm to 200 mm sizes must conform to AWWA C219.

1.8 Bolts and Nuts

.1 Bolts and nuts must be stainless steel. Bolts shall conform to ASTM F-599 or F-731. Heavy hex nuts shall conform to ASTM F-574 or F-836. Threads, fit, and dimension must conform to AWWA C111.

1.9 Meter Chambers

.1 Meter pits and vaults shall be pre-cast concrete.

Alternate meter pit materials may be accepted, but must be approved by the General Manager, Engineering.

.2 Lids must be capable of withstanding H-20 static loading, except where lids are located in travelling surfaces where H-20 dynamic loading applies.
.3 Lids for meter boxes up to and including 560 mm x 860 mm (internal dimensions) shall be cast iron. Lids for meter chambers larger than 560 mm x 860 mm (internal dimensions) must be aluminum spring assisted and divided into multiple sections where the dimensions exceed 900 mm in any direction. Manhole access is not acceptable unless approved by the City.

.4 Lids must have one 45 mm hole for mounting the remote receptacle, which must be sealed until the installation of the receptacle.

.5 Exterior surfaces of all chambers must be damp proofed by applying an asphalt emulsion coating to all exterior surfaces. Construction joints must be made water tight with an appropriate sealant. All pipe penetrations through chamber walls must be sealed and waterproof.

2.0 EXECUTION

2.1 Meter Installation

.1 Meters must be installed horizontally with the register casing oriented upward. For single family residential dwellings the meter should be centered as much as possible in the chamber.

.2 Meters, valves, and bypasses should be supported with appropriate steel pipe stands. Meter installations must be checked for leakage at completion of the installation. The assembly should be flushed and air must be eliminated from the system. By running water through the meter and performing a visual check of the low-flow indicator, the proper operation of the meter should be established.

.3 For all temporary connections, meters are required and must be installed at the upstream end of the connection.

.4 Insulation blankets must be installed for all single family installations.

2.2 Receptacle Installation

.1 For meters installed at property line, remote register receptacles must be mounted to the meter box or chamber lid according to the manufacturer’s instructions. A minimum length of 1.8 metres of 22-gauge three-colour (red, green, black) wire shall be provided, connected and sealed at the receptacle without terminal exposure. Remote wiring connections must either be factory or field sealed to ensure waterproof connections.
.2 Wall mounted remote receptacles must be located where possible near the gas or electric meter approximately 1.6 metres above grade (ground) and easily accessible for reading. The communication cable (wire) from the meter to the receptacle must be installed in accordance with the manufacturer’s instructions and must not exceed recommended length. The cable must be run neatly in horizontal or vertical directions only, in an approved casing or duct. Buried casing / duct should be at least 600 mm deep. Wall penetrations associated with remote receptacle wiring shall be sealed to prevent moisture intrusion.

3.0 SUPPLEMENTARY DETAIL DRAWINGS

3.1 Supplementary Detail Drawings

.1 The following Supplementary Detail Drawings are provided in Appendix B:

- SSD-WM1 – Installation Detail for Meters 25 mm Diameter and Smaller
- SSD-WM2 – Meter Chamber Design Drawing Template
Appendix A – Water Meter Sizing Calculation Sheet and Example
### General Information

Customer Name: ___________________________  PID Number: ___________________________

Address: ____________________________________  Project Number: _______________________

Building Permit Number: _______________________

Type of Occupancy:  
- [ ] Multifamily  
- [ ] Institutional  
- [ ] Industrial  
- [ ] Commercial  
- [ ] Other

Number of Units: ___________________________

Is this a phased development?  
- [ ] Yes  
- [x] No

Calculations presented below are for:  
- [ ] Buildout  
- [ ] Phase

Separate calculations must be provided for both current phase and buildout.

### Step 1: Calculate Total Fixture Value

<table>
<thead>
<tr>
<th>Fixture</th>
<th>No. of Fixtures</th>
<th>Fixture Value (GPM @ 60 psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathtub</td>
<td>8</td>
<td>x</td>
</tr>
<tr>
<td>Bedpan Washers</td>
<td>10</td>
<td>x</td>
</tr>
<tr>
<td>Bidet</td>
<td>2</td>
<td>x</td>
</tr>
<tr>
<td>Dental Unit</td>
<td>2</td>
<td>x</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>2</td>
<td>x</td>
</tr>
<tr>
<td>Drinking Fountain - Public</td>
<td>2</td>
<td>x</td>
</tr>
</tbody>
</table>
| Hose Bibs (c/w 50 ft Wash Down):  
  - 1/2 inch                  | 5               | x                             |
  - 5/8 inch                  | 9               | x                             |
  - 3/4 inch                  | 12              | x                             |
| Kitchen Sink                 | 2.2             | x                             |
| Lavatory                     | 1.5             | x                             |
| Showerhead (Shower only)     | 2.5             | x                             |
| Service Sink                 | 4               | x                             |
| Toilet:                      |                 |                               |
  - Flush Valve                | 35              | x                             |
  - Tank Type                  | 4               | x                             |
| Urinal:                      |                 |                               |
  - Pedestal Flush Valve       | 35              | x                             |
  - Wall Flush Valve           | 16              | x                             |
| Wash Sink (Each Set of Faucets) | 4     | x                             |
| Washing Machine              | 6               | x                             |
| Other:                       |                 |                               |

Total Fixture Value = ______________________ GPM (A)
Step 2: Calculate Probable Peak Demand
Refer to Figure 4-2 or 4-3

Probable Peak Demand = _______ GPM (B)

Step 3: Apply Pressure Adjustment Factor

Water System Pressure (not to exceed 80 psi) = _______ psi
Pressure Factor from Table 4-1 = _______

Adjusted Peak Demand (B x C) = _______ GPM (D)

Step 4: Identify Irrigation Demand

Total Irrigation Demand = _______ GPM (E)

Larger irrigation areas should be divided into zones, with a maximum irrigation demand of 50 GPM. If the irrigation demand is greater than 50 GPM, the Applicant's Engineer shall provide a detailed irrigation plan with appropriately designed zones.

Step 5: Confirm Design Demand

Design Demand (Greater of D & E) = _______ GPM (F)

Step 6: Size and Select Water Meter

<table>
<thead>
<tr>
<th>Design Demand * (L/s)</th>
<th>Meter Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>(USGPM)</td>
<td>(mm)</td>
</tr>
<tr>
<td>0 - 1.96</td>
<td>0 - 31</td>
</tr>
<tr>
<td>1.96 - 3.09</td>
<td>31 - 49</td>
</tr>
<tr>
<td>3.09 - 11.36</td>
<td>49 - 180</td>
</tr>
<tr>
<td>11.36 - 28.39</td>
<td>180 - 450</td>
</tr>
</tbody>
</table>

* Based on 90% of operating range of City approved meters.

Water Meter Make / Model: = 
Water Meter Size = _______ mm
Water Service Connection Size (for information only) = _______ mm
Meter Location (Outside / Inside) = _______

Meters 50 mm or smaller must be located outside at property line.

Professional Certification

Name: ____________________________
Company: __________________________
Date: ____________________________
Revision: __________________________
Comments: _________________________

Seal
### Customer Information

<table>
<thead>
<tr>
<th>Customer Name</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>PID Number</td>
<td>Example</td>
</tr>
<tr>
<td>Address</td>
<td>Example</td>
</tr>
<tr>
<td>Project Number</td>
<td>Example</td>
</tr>
<tr>
<td>Building Permit Number</td>
<td>Example</td>
</tr>
<tr>
<td>Type of Occupancy</td>
<td>Multifamily X Institutional Other Commercial</td>
</tr>
<tr>
<td>Number of Units</td>
<td>Commercial Other</td>
</tr>
<tr>
<td>Is this a phased development?</td>
<td>Yes No X</td>
</tr>
<tr>
<td>Calculations presented below are for:</td>
<td>Buildout X Phase</td>
</tr>
</tbody>
</table>

### Step 1: Calculate Total Fixture Value

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Fixture Value (GPM @ 60 psi)</th>
<th>No. of Fixtures</th>
<th>Fixture Value (GPM @ 60 psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathtub</td>
<td>8 x 31</td>
<td></td>
<td>248</td>
</tr>
<tr>
<td>Bedpan Washers</td>
<td>10 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bidet</td>
<td>2 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dental Unit</td>
<td>2 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dishwasher</td>
<td>2 x 31</td>
<td></td>
<td>62</td>
</tr>
<tr>
<td>Drinking Fountain - Public</td>
<td>2 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hose Bibs (c/w 50 ft Wash Down):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 1/2 inch</td>
<td>5 x 62</td>
<td></td>
<td>310</td>
</tr>
<tr>
<td>- 1/4 inch</td>
<td>9 x 62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 3/4 inch</td>
<td>12 x 31</td>
<td></td>
<td>68</td>
</tr>
<tr>
<td>Kitchen Sink</td>
<td>2.2 x 31</td>
<td></td>
<td>68</td>
</tr>
<tr>
<td>Lavatory</td>
<td>1.5 x 93</td>
<td></td>
<td>146</td>
</tr>
<tr>
<td>Showerhead (Shower only)</td>
<td>2.5 x 31</td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>Service Sink</td>
<td>4 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Flush Valve</td>
<td>35 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tank Type</td>
<td>4 x 93</td>
<td></td>
<td>372</td>
</tr>
<tr>
<td>Urinal:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Pedestal Flush Valve</td>
<td>35 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Wall Flush Valve</td>
<td>16 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash Sink (Each Set of Faucets)</td>
<td>4 x 31</td>
<td></td>
<td>186</td>
</tr>
<tr>
<td>Washing Machine</td>
<td>6 x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The AWWA M22 sizing methodology is based on the Fixture Values (which are actual peak flows that the device produces) and not Fixture Units which are used in the BC Building Code for building piping design.

In this example, the following fixtures are identified for each of the 31 units in the development:

- 1 bathtub
- 1 standalone shower
- 3 toilets (tank type)
- 3 bathroom sinks (lavatory)
- 1 kitchen sink
- 1 dishwasher
- 1 washing machine
- 2 hose bibs (1/2 inch)

The above fixtures yield a Total Fixture Value of 1463 GPM for the development.

Note: If a fixture is proposed that is not on the list then the peak flow value (fixture value) can be included on one of the blank lines under “Other” based on the manufacturer’s information.
Refer to Figure 4-2 or 4-3

**Probable Peak Demand** = 70 GPM (B)

**Step 3: Apply Pressure Adjustment Factor**

<table>
<thead>
<tr>
<th>Water System Pressure (not to exceed 80 psi)</th>
<th>55 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Factor from Table 4-1</td>
<td>0.95 (C)</td>
</tr>
<tr>
<td><strong>Adjusted Peak Demand (B x C)</strong></td>
<td>66.5 GPM (D)</td>
</tr>
</tbody>
</table>

The Total Fixture Value calculated in Step 1 is 1463 GPM. In other words, this is the peak flow that would be realized if all fixtures were turned on at the same time. Step 2 correlates the total peak flow to a probable peak flow based on the probability of multiple fixtures being on at the same time. The AWWA M22 Manual includes two graphs (Figures 4-2 and 4-3) which outline the probable flow demand for various development types.

For this example, Figure 4-3 applies since the Total Fixture Value falls into the high range. The "Apartments" curve indicates that a Total Fixture Value of 1463 GPM corresponds to a Probable Peak Demand of 70 GPM.

The fixture values listed in Step 1 represent peak flows at a pressure of 60 psi. This step increases or decreases the peak demand based on the pressure at the outlet of the meter. Table 4-1 in the AWWA M22 Manual provides adjustment factors for various pressures.

For this example, the pressure downstream of the meter is identified as 55 psi. Interpolating from Table 4-1, the pressure adjustment factor is 0.95 and the Adjusted Peak Demand is 66.5 GPM.

Note that for the purpose of this sizing methodology, the maximum pressure for which to apply an adjustment is 80 psi.

---

**Example**

The fixture values listed in Step 1 represent peak flows at a pressure of 60 psi. This step increases or decreases the peak demand based on the pressure at the outlet of the meter. Table 4-1 in the AWWA M22 Manual provides adjustment factors for various pressures.

For this example, the pressure downstream of the meter is identified as 55 psi. Interpolating from Table 4-1, the pressure adjustment factor is 0.95 and the Adjusted Peak Demand is 66.5 GPM.

Note that for the purpose of this sizing methodology, the maximum pressure for which to apply an adjustment is 80 psi.
Step 4: Identify Irrigation Demand

Larger irrigation areas should be divided into zones, with a maximum irrigation demand of 50 GPM. If the irrigation demand is greater than 50 GPM, the Applicant's Engineer shall provide a detailed irrigation plan with appropriately designed zones.

Total Irrigation Demand = 35 GPM (E)

Step 5: Confirm Design Demand

Design Demand (Greater of D & E) = 66.5 GPM (F)

The Design Demand is based on the greater of the Adjusted Peak Demand and Total Irrigation Demand. This is because the peak domestic demand and peak irrigation demand are not expected to occur at the same time. Sizing based on the greater of the domestic and irrigation flows avoids unnecessarily oversizing the meter.

For this example, the Adjusted Peak Demand of 66.5 GPM governs over the Total Irrigation Demand of 35 GPM.

Step 6: Size and Select Water Meter

* Based on 90% of operating range of City approved meters.

<table>
<thead>
<tr>
<th>Design Demand</th>
<th>Meter Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L/s)</td>
<td>(USGPM)</td>
</tr>
<tr>
<td>0 - 1.96</td>
<td>0 - 31</td>
</tr>
<tr>
<td>1.96 - 3.09</td>
<td>31 - 49</td>
</tr>
<tr>
<td>3.09 - 11.36</td>
<td>40 - 180</td>
</tr>
<tr>
<td>11.36 - 28.39</td>
<td>180 - 450</td>
</tr>
</tbody>
</table>

Water Meter Make / Model: Sensus OMNI C

Water Meter Size = 50 mm

Water Service Connection Size (for information only) = 75 mm

Water Meter (Outside / Inside) = Outside

Meters 50 mm or smaller must be located outside at property line.

Using the sizing table provided in Step 6, a Design Demand of 66.5 GPM corresponds to a meter size of 2" (50mm).

As per Section C of the Design Criteria Manual, the meter location is outside since it is 50mm or smaller in size. The meter make / model is a Sensus OMNI C, which is an approved product listed in Section 1.1 of the Supplementary Specifications.

Note that the AWWA M22 sizing methodology is based on US customary units. The fixture values, probability curves, and pressure adjustment factors have all been derived using US units. In this final step of the sizing calculation sheet, the units are converted to metric.

The AWWA M22 Manual provides guidance for calculating irrigation demands.

For this example, an area of 3000 ft² is irrigated by a spray irrigation system. The AWWA M22 Manual indicates that for spray irrigation each "section" represents a flow of 1.16 GPM. A "section" is defined as 100 ft². So the calculation yields:

Total Irrigation Demand = 3000 ft² / 100 ft² x 1.16 GPM = 34.8 GPM = 35 GPM (rounded)

Example

Using the sizing table provided in Step 6, a Design Demand of 66.5 GPM corresponds to a meter size of 2" (50mm).

As per Section C of the Design Criteria Manual, the meter location is outside since it is 50mm or smaller in size. The meter make / model is a Sensus OMNI C, which is an approved product listed in Section 1.1 of the Supplementary Specifications.

Note that the AWWA M22 sizing methodology is based on US customary units. The fixture values, probability curves, and pressure adjustment factors have all been derived using US units. In this final step of the sizing calculation sheet, the units are converted to metric.

The comments space is provided to explain any unique aspects of the development that impact the proposed meter sizing.
Appendix B – Supplementary Detail Drawings
NOTES:

1. THIS DRAWING SHOULD BE REVIEWED IN CONJUNCTION WITH THE CITY OF SURREY WATER METER DESIGN CRITERIA MANUAL & SUPPLEMENTARY SPECIFICATIONS.

2. MINIMUM 1.0m HORIZONTAL AND 2.0m VERTICAL CLEARANCE AROUND METER BOX TO REMAIN FREE OF LANDSCAPING OR OTHER OBSTRUCTIONS.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>WATER METER (SENSUS iPERL OR APPROVED EQUAL)</td>
<td>7</td>
<td>#37 PRECAST CONCRETE METER BOX</td>
</tr>
<tr>
<td>2</td>
<td>REMOTE RECEPTACLE</td>
<td>8</td>
<td>CAST IRON LID</td>
</tr>
<tr>
<td>3</td>
<td>METER SETTER (CAMBRIDGE BRASS SERIES 6020 OR APPROVED EQUAL)</td>
<td>9</td>
<td>FOIL BUBBLE WRAP INSULATION BLANKET (CUT TO FIT METER BOX OPENING)</td>
</tr>
<tr>
<td>4</td>
<td>INLET BALL VALVE – FULL PORT (PART OF SETTER)</td>
<td>10</td>
<td>19mm CLEAR CRUSHED DRAIN ROCK (PLACED INSIDE BOX TO STABILIZE SETTER)</td>
</tr>
<tr>
<td>5</td>
<td>DUAL CHECK VALVE (PART OF SETTER)</td>
<td>11</td>
<td>CURB STOP C/W RISER</td>
</tr>
<tr>
<td>6</td>
<td>COMPRESSION FITTINGS (PART OF SETTER)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All Dimensions Shown In millimetres, Unless Otherwise Noted

Title: INSTALLATION DETAIL FOR METERS 25mm DIAMETER AND SMALLER

Revision Date: Approved

DRAWING NUMBER

SSD—WM1

Approved

Date: JUNE 2016

Drawn By: Urban Systems Ltd.
NOTES: