

A. ADMINISTRATION

A.1.0 General

Part A of the City of Kitchener Standard Specifications for Watermains outlines the administrative requirements for the City of Kitchener, in addition to the Region of Waterloo and Area Municipal Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS), Part A. The DGSSMS can be obtained online through the Region’s website (www.region.waterloo.on.ca) under “Living Here”, “Water” and then by clicking along the left hand side “Reports and Specifications (Water Quality, Compliance, etc.)”

The Contract Administrator is referenced to and shall ensure that the watermain and appurtenances are supplied and installed in accordance with the requirements outlined in the City of Kitchener Standard Specifications for Watermains.

The Chief Municipal Engineer for the City of Kitchener is specified in the DGSSMS, Part A.

A.1.1 Design Water Demands

The Utilities Engineer of the Utilities Division of the City of Kitchener may designate specific watermains that will be required to supply areas adjacent to the area under design. In such cases, where the diameter of the designated main exceeds 300 mm, the City of Kitchener will arrange for the payment of the oversizing costs.

A.2.0 Design Submissions

The following sections refer to the City of Kitchener design submission requirements.

A.2.1 Water Distribution Design Report

A Water Distribution Design Report must be submitted to the satisfaction of the Utilities Engineer or designate. The report must include at a minimum the design parameters as noted in the DGSSMS and in Section B.2.0.

A.2.2 Design Drawings

All design drawings must be submitted to and approved by the Chief Municipal Engineer or designate, prior to tendering; and in addition, supplementary review and approval is required for Cathodic System Protection Design.

A.2.3 As-Built Drawing Requirements

The following section outlines the requirements for the as-built drawings for the City of Kitchener Utilities Department:

1. Watermain as-built drawings must be received and approved by the Chief Municipal Engineer or designate before Commencement of the Maintenance Guarantee Period by the City of Kitchener.

The as-built watermain drawings shall incorporate information shown on drawings KES M-42, KES M-43 and KES M-44. In addition, the manufacturer, make and model of the following must be provided:

- Pipe (mains, services & fire hydrant leads)
- Joint Restraints
- Fire Hydrants
- Valves
- Curb Stops
- Main Stops
- Saddles

The diameter and materials of all mains and services must be clearly labelled or noted.

2. The digital watermain as-built drawing shall be plan only, appear similar to and incorporate information shown on drawings KES M-42, KES M-43 and KES M-44. All extraneous line work shall be removed from the watermain as-built drawing. Section / profile drawings shall be provided when the watermain is installed more than 3.0m below grade and/or where vertical bends are installed.

The entire new water distribution system shall be generated as a single file with text height appropriate for 1:500 plot scale.

Information that must be included in the as-built drawing include the following:

- Key plan, north arrow and legend
- All above ground features such as existing/proposed curbs, road allowances, catch basins, maintenance holes, hydrants, sidewalks, etc.
- Street names and civic address numbers or lot and block numbers
- Size and material for water mains and services
- A minimum of 2 ties to all main valves, hydrant valves, tees, reducers, bends, end caps, anodes and blow-offs and labeled as such
- Ties to be to surface features (i.e. maintenance holes, catch basins, etc.) as opposed to property bars and preferably at right angles to each other
- Running dimensions to all water service boxes with measurements on curves to be chord dimensions with min. two ties every 5th service box from surface features

- Ties from hydrant to hydrant valve and hydrant to water main
- Water services drawn from water service boxes to water main

A.2.4 Preparation of As-Built Drawings

All water system related drawings, specified herein, shall be produced using a computer assisted drafting program such as “AutoCAD”, and be supplied to the Utilities Division in a form compatible with their current system.

Digital files may be sent by email to angela.mick@kitchener.ca or delivered (on CD-ROM) to 83 Elmsdale Drive (Attention: Angela Mick).

In addition to the above, paper prints are required. These may be dropped off at 83 Elmsdale Drive or mailed to:

City of Kitchener, City Hall
Attn: Angela Mick (Elmsdale)
P.O.Box 1118
200 King Street West
Kitchener, ON N2G 4G7

To accommodate the fact computer generated as-built drawings may not be available at the completion of the water distribution system, the following as-built drawing requirements will be accepted for Commencement of the Maintenance Guarantee Period.

- Two (2) original red-lined as-built drawings completed to the satisfaction of the Utilities Engineer or designate and containing all the information as outlined in Section A.2.3. The red-line drawings are to be submitted prior to initial field inspection.
- Digital watermain as-built drawings and one (1) paper copy of the same prepared to the satisfaction of the Chief Municipal Engineer or designate shall be delivered to the Utilities Division within six (6) months of the Commencement of the Maintenance Guarantee Period (Initial Acceptance) by the City of Kitchener. Under no circumstances, will the water distribution system receive Final Acceptance without the submission of digital as-built drawings.

A.3.0 Requirements for Initial and Final Acceptance

A.3.1 Initial Acceptance

Refer to Section D.2.3 (Temporary Water Distribution System) of the DGSSMS for the layout plan and certification of operation for the backflow preventer. Refer to Section D.2.8 (Commissioning) of the DGSSMS for information on the submission and testing requirements to be followed by the Contractor to complete the commissioning of the watermain. The following additional requirements must be satisfied and be in the

possession of the Utilities Engineer or designate before Commencement of the Maintenance Guarantee Period of the water distribution system:

- Watermain pressure and leakage test report documenting which watermains were tested, allowable leakage and actual leakage (provide calculations), maximum and minimum pressures experienced, length of test, persons conducting test, and the date and time of the test.
- Temporary layout plan (for reconstruction projects).
- Certificate of operation for backflow preventer.
- Water sampling plan.
- Satisfactory results as provided by an accredited laboratory for analysis of bacteriological parameters. Satisfactory residual chlorine results to be provided by appropriately licensed sampler.
- Watermain commissioning plan.
- Written confirmation by the Contract Administrator that a satisfactory conductivity test has been performed.
- Watermain as-built drawing (Refer to Section A.2.3 and A.2.4)
- Satisfactory initial field inspection by City of Kitchener Utilities staff. The Utilities initial field inspection will be conducted after the base course of asphalt is placed. The as-built drawings shall be provided prior to the field inspection. The City of Kitchener will provide three (3) field inspections at no cost to inspect the water system and check deficiencies; however, subsequent inspections may be invoiced to the Developer on an hourly basis.

A.3.2 Final Acceptance

The following requirements shall be satisfied before the water distribution system will be released from the Maintenance Period:

- Digital as-built records of the water system and two (2) paper copies of the same.
- Satisfactory final field inspection by City of Kitchener Utilities staff. The City of Kitchener will provide three (3) field inspections at no cost to inspect the water system and check for deficiencies; however, subsequent inspections may be invoiced to the Developer on an hourly basis.

B. DESIGN GUIDELINES**B.1.0 General**

Part B of the City of Kitchener Standard Specifications for Watermains outlines the design guidelines for the City of Kitchener, in addition to the Region of Waterloo and Area Municipal Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS), Part B. The DGSSMS can be obtained online through the Region's website (www.region.waterloo.on.ca) under "Living Here", "Water" and then by clicking along the left hand side "Reports and Specifications (Water Quality, Compliance, etc.)."

B.2.0 Design Parameters for Water Distribution Design Report

The Water Distribution Design Report must include at a minimum the design parameters as noted in the DGSSMS, water demands, boundary conditions, hydraulic analysis, transient pressure design, and system performance during all water demand scenarios including fire.

B.3.0 Isolation Valving**B.3.1 Location of Main Valves**

Road levellers shall not be installed. The valve box must be raised to the road / ground surface.

B.4.0 Watermain Sizes

The City of Kitchener does not accept 250 mm, 350 mm or 400 mm size watermain piping in any new construction attached to the water distribution system.

C. MATERIAL SPECIFICATIONS

C.1.0 General

Part C of the City of Kitchener Standard Specifications for Watermains outlines the material specifications for the City of Kitchener, in addition to the Region of Waterloo and Area Municipal Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS), Part C. The DGSSMS can be obtained online through the Region's website (www.region.waterloo.on.ca) under "Living Here", "Water" and then by clicking along the left hand side "Reports and Specifications (Water Quality, Compliance, etc.)."

C.2.0 Watermain Pipe

Concrete pressure pipe may only be used on a case by case basis if approval is obtained from the Chief Municipal Engineer.

C.3.0 Fire Hydrants

The hydrants shall be painted with a high gloss exterior paint over a quick dry oxide primer. The barrel shall be painted yellow and the bonnet and hose nozzle caps red. Storz connections shall be painted black.

C.4.0 Valve Boxes

Valve stem extensions shall conform to City of Kitchener Utility Division requirements, when needed. Do not install tracing wire up valve boxes.

C.5.0 Valve Chambers

Valve chamber covers shall be as per drawing KES M-17-1 and M-17-2 with "WATER" designation on the lid.

C.6.0 Service Boxes

Approved boxes for 25mm curb stops must include stainless steel rods, are:

- Mueller A-726
- Cambridge Brass series 161

Approved boxes for 38 mm and 50 mm curb stops must include stainless steel rods, are:

- Mueller A-728 (modified to operate with same key as for A-726 box)
- Cambridge Brass series 161-1

C.7.0 Easements

The minimum easement width required in the City of Kitchener shall be 5.0m.

C.8.0 Temporary Watermains

All fittings on the temporary watermain shall be copper or PVC.

D. CONSTRUCTION SPECIFICATIONS

D.1.0 General

Part D of the City of Kitchener Standard Specifications for Watermains outlines the construction specifications for the City of Kitchener, in addition to the Region of Waterloo and Area Municipal Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS), Part D. The DGSSMS can be obtained online through the Region’s website (www.region.waterloo.on.ca) under “Living Here”, “Water” and then by clicking along the left hand side “Reports and Specifications (Water Quality, Compliance, etc.)”

D.2.0 Material Handling

This shall include all loading, hauling, stringing, storing, and handling of pipe, valves, fittings, or other material required for the construction of watermains.

D.2.1 Loading and Unloading

Watermain pipe, fittings, valves, hydrants and accessories shall be loaded and unloaded by lifting with hoists or skidding, so as to avoid shock or damage. Under no circumstances shall such material be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

D.2.2 Storing

The Contractor, and Sub-Contractor if any, shall be responsible for the safe storage of all material intended for installation by them, until it has been incorporated into the completed project. The interior of all pipe, fittings and other accessories shall be kept free from all dirt and foreign matter.

Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

D.2.3 Basis of Payment

The Contractor shall supply all materials, furnish all facilities for handling, and shall provide a suitable place for storage of all construction materials at no expense to the City. All work prescribed in this article, except for granular backfill materials, shall not be paid for directly, but shall be included as part of the unit prices for watermain construction.

D.3.0 Clearing

This work shall include the clearing of all trees, brush, hedges, or other obstacles lying within the confines of the designated area of construction.

D.3.1 Method of Construction

In all cases where cultivated shrubbery or trees are encountered on the right-of way, the Chief Municipal Engineer shall have the right to determine which trees or shrubs must be removed to allow the work to be completed safely. All corn, cane or other growing crops, that are cut on the right-of way, shall be gathered and stacked in orderly piles along the right-of-way so that the spoil pile can be placed between the stacks and the open ditch; or shall be disposed of otherwise, at the direction of the Engineer. Where large trees are cut on the right-of-way, they shall be cut close to the ground so that the remaining stumps will not extend more than 150 mm above the ground surface level. The trunks shall be stripped of all leaves and branches. The branches and leaves removed from such trees shall be disposed of as directed by the Chief Municipal Engineer, and the remaining logs shall be cut into suitable lengths and placed in orderly piles along the edge of the right-of-way. Under no circumstances shall brush and/or other debris be left onsite or placed within the trench limits. All work related to tree removals shall be done in accordance with standard safety procedures, and all necessary approvals for said removal shall be obtained from the appropriate authorities.

D.3.2 Basis of Payment

The work prescribed in this Article shall be paid for directly.

D.4.0 Trenching

The maximum width of the trench from the bottom of the trench to the top of the pipe shall be no greater than 750 mm plus the outside diameter of the barrel of the pipe being installed. Where the Contractor excavates the trench wider than this maximum, the Contractor may, at no expense to the City, be required to provide the next adequate bedding class or a stronger class of pipe.

All excavated material shall be piled in a manner such that it will not endanger the work nor obstruct sidewalks and driveways. Hydrants under pressure, valve pit covers, valve boxes or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear, or other satisfactory provisions made for street drainage, and natural watercourses shall not be obstructed. Appropriate erosion control methods shall be used to protect existing watercourses.

D.5.0 Laying Pipe

The watermain shall be installed in accordance with AWWA C600 for Ductile Iron (DI) and AWWA C605 for Polyvinyl Chloride (PVC).

This shall include the joining and placing of the pipe and fittings in the trench to proper line and grade.

D.5.1 Method of Construction

Every precaution shall be taken to prevent foreign matter from entering the pipe while it is being lowered and placed in the trench. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that, before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size be placed over each end of the pipe and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. At all times that pipe laying is not actively in progress, the open ends of pipe, already in the trench shall be closed by a watertight plug.

Pipe shall be laid with the bell or pre-coupled ends facing in the direction of laying, unless directed otherwise by the Engineer. Where pipe is laid on a grade greater than 10%, the laying shall proceed up-grade with the bell end at the higher end of each length of pipe.

D.5.1.1 Layout of Line and Grade

The Contractor will be provided with property corners and an elevation bench mark from which he will be entirely responsible for the accuracy of the work, both as to location and elevation according to the plans and profiles. The Contractor shall give the owner sufficient notice when setting out work so that lines and grades can be checked by the Owner before actual construction is commenced.

The minimum depth for watermains and water services to the curb stop shall be 2.0 m below the final grade unless explicitly shown on the construction drawings.

The Contractor shall supply, erect and maintain approved batter boards and site rails to ensure accurate grade and line of the pipes. At least three (3) batter boards shall be used at all times.

D.5.1.2 Joining Pipe and Fittings

Pipes shall, in general, be joined in strict conformance with the recommendations of the manufacturer of the pipe in use, and as herein specified. The Contractor shall provide and maintain bracing or chain blocks to prevent "creep" until the pipe is anchored and fixed.

a) Push-on Joints

For ductile iron pipe, the socket and the spigot are to be wiped clean and a film of lubricant applied to the gasket bulb seating area in the socket. The gasket is to be inserted with the bulb entering first. Lubricant is to be applied to the inside surface of the gasket and outside surface of the spigot. The spigot is to be placed in the socket and the pipe forced into the socket until the first painted stripe disappears.

For PVC pipe, the ball area and gasket must be clean and factory installed gaskets must not be tampered with or altered. Apply lubricant to bevelled spigot end only. Push lubricated end past gasket until reference line is even with bell.

b) Mechanical Joints

Place the gland and rubber gasket over the plain end of the pipe and then insert the plain end into the bell until the spigot is firmly seated in the bell. The gasket is then pushed into position so that it is evenly seated in the socket. The gland is moved into position against the face of the gasket. Bolts are inserted and tightened. All nuts shall be tightened with a suitable (preferably "torque limiting") wrench. Nuts spaced 180 degrees apart, shall be tightened alternatively, in order to produce equal pressure on all parts of the gland.

The torque for various sizes of bolts shall be as follows:

<u>Size in Millimetres</u>	<u>Range of Torque in Newtons/Metre</u>
16	61 - 81 Nn/m
19	102 - 122 Nn/m
25	136 - 163 Nn/m
31	163 - 203 Nn/m

For PVC pipe, use plain rubber tip gaskets (not lead tip). Do not use bevelled pipe ends.

D.6.0 Setting Valves

Road levellers of any style shall not be installed. The valve box must be raised to the final grade.

D.7.0 Installation of Services

Approved Service Saddles must be used with all P.V.C. mains, and as per the following Schedule with Ductile Iron mains:

<u>Diameter of DI Watermain</u>	<u>Service Size</u>		
	<u>25 mm</u>	<u>38 mm</u>	<u>50 mm</u>
100 mm	S.S.	S.S.	S.S.
150 mm	N.R.	S.S.	S.S.

200 mm	N.R.	N.R.	S.S.
250 mm	N.R.	N.R.	S.S.

- S.S. Indicates where service saddle is to be used.
- N.R. Indicates where service saddle is not required, but may be used.

In the event that water service boxes must be raised beyond the extension height, only screwed couplers will be accepted to install extensions. Extensions utilising set screws or other means will not be accepted.

Services shall be installed perpendicular to the watermain. Bends shall not be installed without the written approval of the Utilities Engineer.

D.8.0 Tracer Wires at Hydrant

Refer to drawing K.E.S. M-36 for standard hydrant installation (including tracer wire).

D.9.0 Installation of Anodes

D.9.1 Connection to Existing Watermain

If the existing watermain is non-metallic, solder the new tracing wire to the existing tracing wire.

If the existing watermain is metallic, the tracing wire shall not under any circumstances be connected to the existing main or to metallic fittings or valves connected to the existing metallic main.

D.10.0 Temporary Water Distribution Systems

D.10.1 Method of Installation

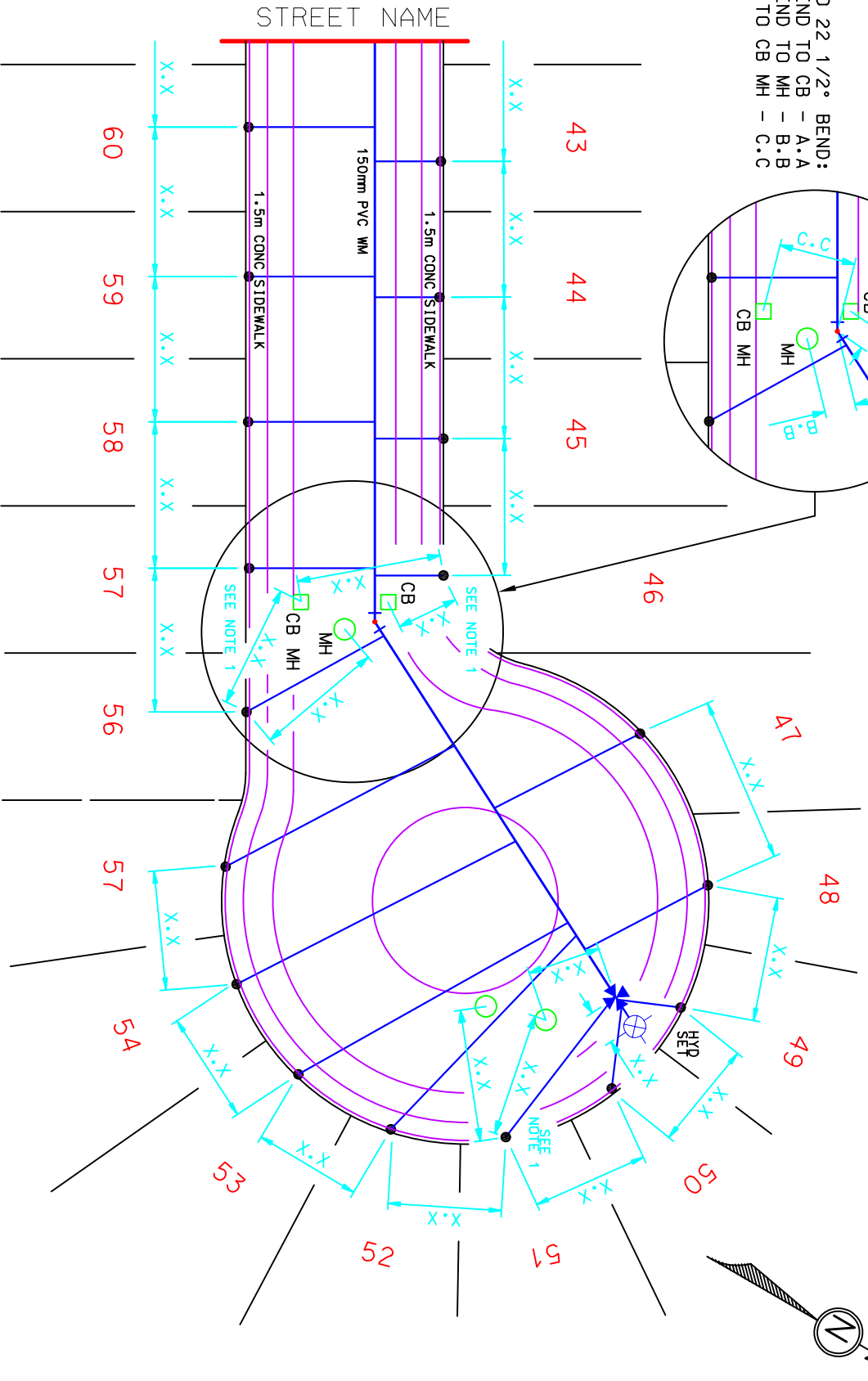
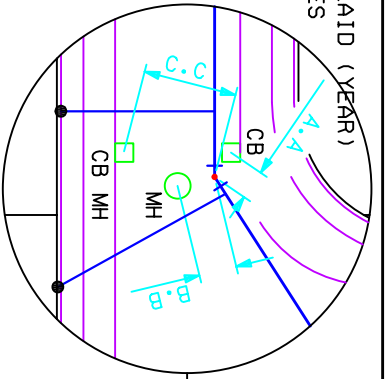
If the temporary water system must be disconnected, or a Boil Water Advisory (BWA) or Drinking Water Advisory (DWA) is issued by the Medical Officer of Health, the Contractor/Developer must supply potable bottled water or an alternate potable water supply to the interrupted water users.

E. STANDARD DRAWINGS**E.1.0 General**

Part E of the City of Kitchener Standard Specifications for Watermains outlines the standard drawings for the City of Kitchener, in addition to the Region of Waterloo and Area Municipal Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS), Part E. The DGSSMS can be obtained online through the Region's website (www.region.waterloo.on.ca) under "Living Here", "Water" and then by clicking along the left hand side "Reports and Specifications (Water Quality, Compliance, etc.)."

150MM PVC WATERMAIN LAID (YEAR)
25MM PE WATER SERVICES

TIES TO 22 1/2° BEND:
BEND TO CB - A.A
BEND TO MH - B.B
BEND TO CB MH - C.C

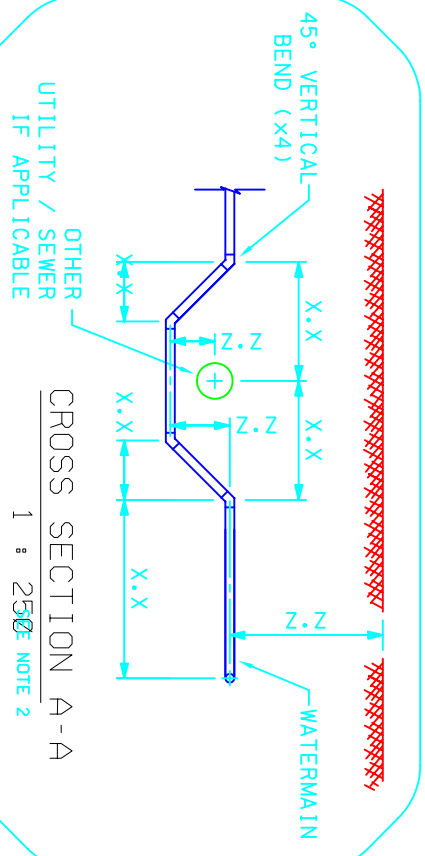
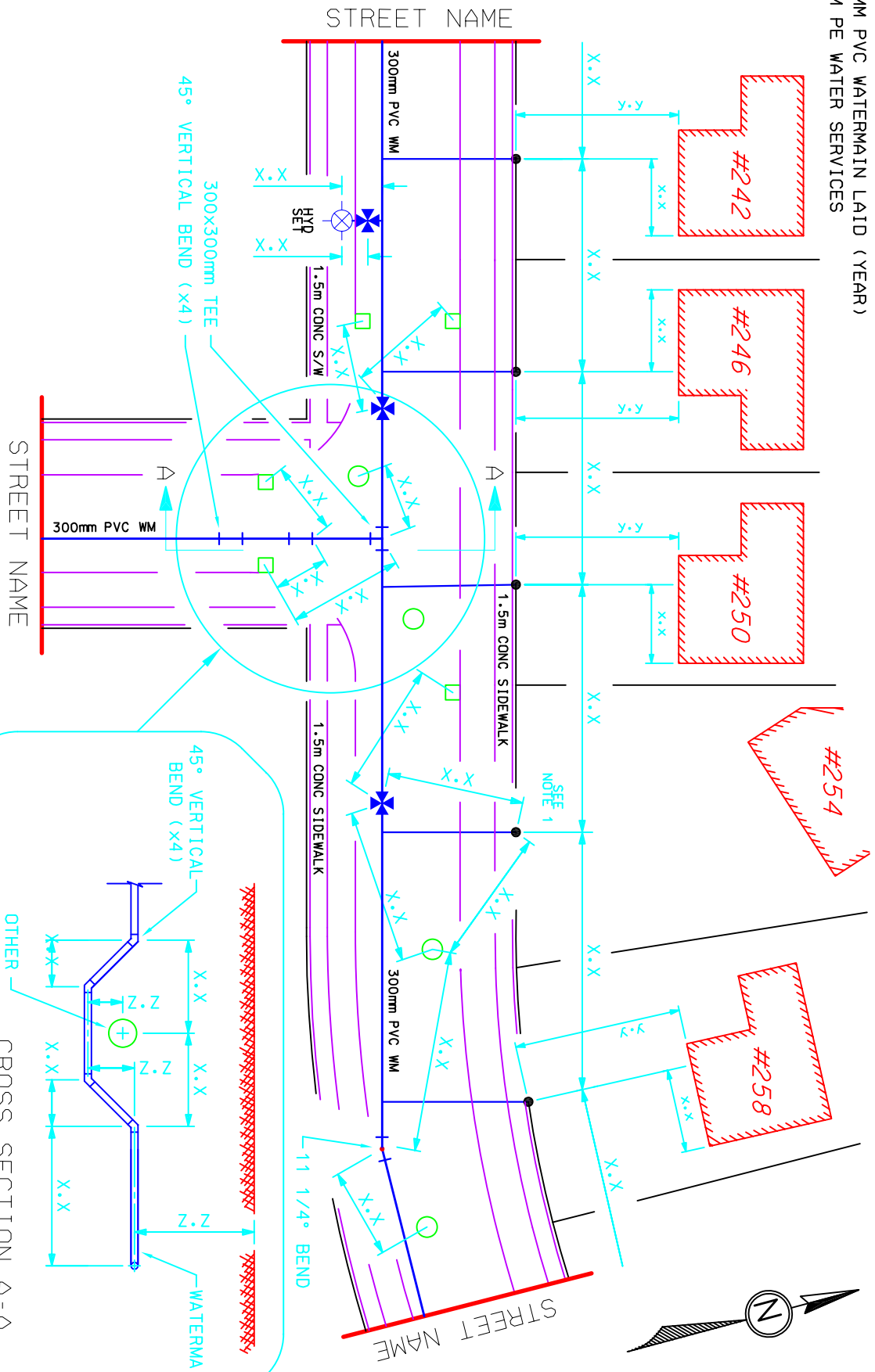


- NOTES:**
1. EVERY 5TH WATER SERVICE BOX TO HAVE MIN. TWO TIES TO SURFACE FEATURES (I.E CBS, MHS, ETC.)
 2. SECTION/PROFILE DRAWING PROVIDED WHEN THE WATERMAIN IS INSTALLED MORE THAN 3.0M BELOW GRADE AND/OR VERTICAL BENDS ARE INSTALLED.
 3. MEASUREMENT SYSTEM IS METRIC.



THE CORPORATION OF THE CITY OF KITCHENER			
STANDARD AS-BUILT DRAWING REQUIREMENTS			
NEW SUBDIVISION EXAMPLE (CUL-DE-SAC)			
SCALE	1 : 500	DATE	MAR 30 2005
DRAWN	D. KUHN	DWG NO	KES M-43

300MM PVC WATERMAIN LAID (YEAR)
25MM PE WATER SERVICES



CROSS SECTION A-A
1 : 250 SEE NOTE 2

- NOTES:
- IF X,Y DIMENSIONS FROM A BUILDING ARE IMPRACTICAL DUE TO AN EXTENSIVE BUILDING SET-BACK FROM THE STREET OR THE BUILDING IS SET AT AN ODD ANGLE TO THE STREET THEN SWING TIES TO SURFACE FEATURES (I.E. CB'S, MHS, ETC.) ARE ACCEPTABLE.
 - SECTION/PROFILE DRAWING PROVIDED WHEN THE WATERMAIN IS INSTALLED MORE THAN 3.0M BELOW GRADE AND/OR VERTICAL BENDS ARE INSTALLED.
 - MEASUREMENT SYSTEM IS METRIC.

KITCHENER UTILITIES

THE CORPORATION OF THE CITY OF KITCHENER
STANDARD AS-BUILT DRAWING REQUIREMENTS
RECONSTRUCTION EXAMPLE

SCALE	1 : 500	DATE	MAR 30 2005
DRAWN	D. KUHN	DWG NO	KES M-44