



TOWN OF AURORA

DESIGN CRITERIA MANUAL FOR ENGINEERING PLANS

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Design Manual Revision Record:

Path: K:\Operational Services\ADM\PoliciesProcess\Standards\Design Criteria Manual\DesignCriteriaManual Rev.2018
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Revision	Date	Remarks
1	January 2000	Revisions to Criteria and Drawings
2	September 2009	Format Update & Revisions
3	February 2013	Revisions to Criteria and Drawings
4	April 2013	Parking Lot LED lighting
5	August 2013	Revisions to Manholes, Service Connections & Hydrants
6	December 2013	Revisions to Sanitary Section.
7	March 2014	Overall Updates and Revisions

1.0 SUBDIVISION APPROVALS PROCESS:

The process outlined in this Manual begins only after Draft Plan Conditions have been approved by Council, and lead to the point where the preparation of the Subdivision Agreement commences. Prior to the approval of Draft Plan Conditions, and after the engineering plans for the development have been approved, the subdivision approvals process is coordinated by the Planning and Development Services Department.

The overall subdivision approvals process is described in more detail in the *Town of Aurora Subdivision and Condominium Manual and Application Form*, available from the Planning and Development Services Department.

1.1 General Process:

The submission of engineering plans for new subdivisions is to be made directly to the Planning and Development Services Department. Any internal distribution of these plans and supporting documents will be made by the Planning and Development Services Department until the engineering design of the project is completed. At that time, the Planning and Development Services Department will advise the Planning and Development Services Department to commence the preparation of the Subdivision Agreement. External to Town submissions of the drawings (example, to the LSRCA, York Region, etc.) are the responsibility of the applicant.

1.2 Municipal Addresses:

Municipal addresses shall be included on, at a minimum, the General, Grading, and Composite Utility drawings.

The applicant may contact the Planning and Development Services Department at the time of the second submission of the engineering drawings to request that they commence the process to generate municipal addresses.

Municipal addresses must be shown on the drawings prior to their final review and signature by the Director of Planning and Development Services.

1.3 Topsoil Removal Permit:

The removal (i.e. stripping) of topsoil from any site in size 2.0 ha. or greater in the Town of Aurora is governed by the Town's Topsoil Removal Bylaw 3399-92 (See Appendix 'A'). Prior to any land-disturbing activities, one must apply for and receive a Topsoil Removal Permit. (See Appendix 'A')

Below are the documents/approvals required for issuance the Topsoil Removal Permit;

1. Application with applicable fee as per Topsoil Removal Permit Application Form provided in Appendix A-5 .
2. Erosion & Sediment Control (ESC) Plans for any grading within the draft subdivision plan showing;
 - a. all the proposed erosion and sediment controls measures prior to and during construction including the extent of grading/filling, the access location, the location of soil pile storage etc.
 - b. progressive stripping and grading to ensure minimum duration of exposed soil areas to the extent possible.
3. Environmental Site Assessment (ESA) as per the Ministry's most recent regulations.
4. Sign off from the Town's Parks and Recreation Services. Please note that should existing trees be removed for topsoil stripping or any other construction activities, a Tree Removal Permit in accordance with By-Law 4474-03.D or a Vegetation Management Agreement as required by our Parks Dept. will be required prior to topsoil removal.
5. Sign off from the Town's Planning & Development Services.
6. Heritage Impact Assessment clearance from the Town's Heritage Program Manager, if there are any heritage resources within the subject lands.
7. Where the subject lands disturbance effects/abuts a York Region road right of way, provide clearance letter from the Region for the proposed ESC Plans for the topsoil removal permit. Also for any construction access from the Regional road, a Road Occupancy Permit from the Region will be required.
8. LSRCA Approval/Permit for the topsoil removal works.
9. Ministry of Tourism and Culture approval of Archeological Report(s).
10. Decommissioning of wells (if any on the site) as per applicable Ontario regulations.
11. Septic tank decommissioning (if any on the site, require permit from Town's Building Dept. for decommissioning).
12. Security for installation, maintenance, removal of Erosion and Sediment controls and seeding/stabilization etc. – Security amount will be based on the cost estimate to be provided following approval of the ESC Plans from the Town and all other concerned agencies.
13. Insurance policy certificate for Commercial General Liability - \$2 million (minimum) and Automobile Liability - \$2 million (minimum) with the Town additionally

insured. This can also be provided after approval of ESC Plans and sign offs from applicable Depts./agencies.

Along the Topsoil Permit application, four copies of the Erosion & Sediment Control Plans/reports be submitted to the Director of Planning and Development Services for distribution to the Town's internal Depts. (items 4, 5 and 6 above). For external approvals (items 7,8 and 9 above), please submit the required documents directly to the agencies/authorities for their approval/clearance.

One may submit an application for a Topsoil Permit with the first submission of the engineering drawings. The Permit can be approved in advance of the pre-Servicing Agreement or the Subdivision Agreement.

1.4 Pre-Servicing Agreements:

The Town allows the creation of Pre-Servicing Agreements, in order to allow municipal servicing to commence in advance of the finalization of the Subdivision Agreement.

The following must be completed prior to a Pre-Servicing Agreement being executed:

- i. All engineering plans, with the exception of the Composite Utility Plan*, must be completed and signed by the Director of Planning and Development Services.
- ii. Approvals from all outside agencies (MOE, LSRCA, York Region, etc.) must be received.
- iii. The Cost Estimate must be acceptable, and the required insurance, fees, and securities must be in place. The Cost Estimate used for this agreement will include the costs of the earthworks (cut/fill to pre-grade, engineered fill, import, and export of fill), municipal services (watermain, sewers, and appurtenances), road works to base asphalt stage, and all stormwater management facilities. Items which are not to be included in the Pre-servicing Agreement include above-ground works such as acoustic fences, streetlights, water meters, driveways, and completion of road works.

***Note:** Should the final Composite Utility Plans not be completed at this stage, it will be required that the applicant submit a letter to the Town acknowledging that they are proceeding at their own risk, and that the Town will not be held responsible if changes are required to plans or constructed services in order to accommodate utility requirements.

2.0 SUBMISSION OF ENGINEERING DRAWINGS:

2.1 General Requirements:

- a) All plans submitted for the approval of municipal servicing within new subdivisions are to be A1 (ISO) size and have a Town of Aurora title block (CAD file is available from Planning and Development Services Department).

- b) Scales:
 - i. General and drainage plans to be at 1:1000 minimum
 - ii. Plan & profile - 1:500 horizontal, 1:100 vertical
 - iii. Grading plans - 1:500 scale
 - iv. Composite utility plans - 1:500 scale
- c) All drawings to have north arrow & index map showing internal street layout.
- d) All submissions to be referenced to a Town of Aurora geodetic benchmark.
- e) All plans are to have same street names and lot numbering as per registered plan.
- f) All lots to have municipal addresses.
- g) Chainage shall increase from left to right on plan and profile sheets, with plan north to top or right on sheet wherever possible.
- h) All work to be done in ink on 3 mil mylar material or on acceptable vellum for AutoCAD plotting.
- i) All sets of plans to have a cover sheet which indicates the names of the development, consultant & owner, a list of drawings (on right hand side), and general index map of the subdivision showing the road pattern and lot layout (min. suggested scale of 1:2000).
- j) Road, watermain, and sewer location and description information will be added to the Town's PSAB database as part of the subdivision process, and the water system design shall be verified by the Town's consultant on a peer-review basis.

All electronic GIS/CAD files (ESRI shapefile, Geodatabase or AutoCAD-dwg) drawings shall conform to the following projection:

- Universal Transverse Mercator (UTM)
- North American Datum (NAD) 83
- Zone 17N
- Spheroid – GRS1980

These GIS spatial files must be tied and geo-referenced to the horizontal and vertical control monuments within the local area. The location and description with respect to the monuments shall be indicated on the drawings. This information is to be provided in the specified digital format (including horizontal and vertical location in UTM coordinates for all infrastructure items) at the following times:

- i. With 1st Submission: All information necessary to verify the water system design.
 - ii. Prior to issuance of the Certificate of Completion: All information on underground infrastructure (sewers and watermain).
 - iii. Prior to issuance of Certificate of Acceptance: All information on roads and other specified above-ground infrastructure.
- k) All details shall reference Ontario Provincial Standard (OPS) Drawings & Specifications except where superseded by Town of Aurora standards and the Accessibility for Ontarians with Disabilities Act (AODA Design of Public Spaces Standards).

- l) General construction notes as shown on Appendix 'C' shall appear on the engineering plans.
- m) Storm and sanitary design sheets shall appear on the engineering plans.
- n) Road, watermain, and sewer location and description information will be added to the Town's asset management database in accordance with PSAB 3150 requirements as part of the subdivision process. The water system design shall be verified by the Town's consultant on a peer-review basis.

2.2 1st Submission:

- a) Two (2) sets of plans containing each of the following drawings to be submitted to the Director of Planning and Development Services:
 - i. General site plan(s);
 - ii. Grading plan(s);
 - iii. Storm sewer drainage area plan;
 - iv. Sanitary sewer drainage area plan;
 - v. Composite utility plan;
 - vi. Plan and profile drawings for all streets & easements;
 - vii. Stormwater management facility plan;
 - viii. Traffic control plan;
 - ix. All construction detail plans (OPSD drawings need not be included).
 - x. Sanitary, storm and hydraulic grade line design sheet plan.
- b) Two (2) sets of the storm, 100-Year Hydraulic Grade Line, and sanitary sewer design calculation sheets. This work is to be done on the Town's standard sheets included in Appendix 'A1'.
- c) One (1) copy of the following to Director of Planning and Development Services:
 - i. Proposed registered plan of subdivision
 - ii. Cost estimate for the construction & installation of all municipal services & roads
 - iii. Geotechnical report, including recommendations for road construction which may exceed the minimum Town requirements
 - iv. Stormwater Management Report, including recommendations to the satisfaction of LSRCA and the Town of Aurora
 - v. Acoustical Study, with recommendations (as required)
 - vi. Internal Traffic Study

* **Note:** Submissions which do not address all conditions from draft plan approval will not be accepted.

2.3 2nd Submission:

- a) Six (6) copies of all plans are to be submitted after all changes have been made. This shall include a letter of explanation responding to each comment made regarding the

first submission.

- b) The Planning and Development Services Department will circulate one (1) set of plans to each of the Building and By-Law Services Department, Parks and Recreation Services Department, Planning and Development Services Department, and Central York Fire Services for comments relating to the engineering plans. The plans will be circulated with a request that comments be provided within a certain timeframe, after which the Planning and Development Services Department will proceed on the assumption that no comments are going to be provided.
- c) Three (3) copies of MOE application forms for storm, sanitary, and watermain sewers required for signing by Director of Planning and Development Services may be submitted with the 2nd Submission. The Director will sign the applications once he is satisfied that the design has been completed to the point where future major changes are unlikely to be required.

2.4 Subsequent Submissions:

Two (2) copies of all plans to be resubmitted after all changes have been made, unless more sets are requested. A letter of explanation responding to each comment made regarding the previous submission and updating the revision block is required.

Excessive subsequent revision submissions may be subject to an additional engineering review fee, at the discretion of the Director of Planning and Development Services.

2.5 Final Submission/Approval:

- a) All original drawings are to be submitted for signature by the Director along with one (1) additional set of prints. Once signed, the consultant shall provide the Planning and Development Services Department with two (2) sets of full size black line prints and two (2) half-size (reduced) sets, and one (1) copy of the General Plan(s) including base plan in acceptable digital (.DWG) format.
- b) All approvals must be received in writing from all authorities involved, including signatures of utility representative on Composite Utility Plan.
- c) Composite Utility Plan(s) are required prior to final approval and the Subdivision Agreement, they are not required at the time of the Pre-Servicing Agreement
- d) A copy of the tender document to include the detailed estimate of quantities and costs for all municipal works for the subdivision
- e) Summary of costs for all municipal servicing works as required for inclusion in the subdivision agreement

* **Note:** i) After completion of all works and before assumption of services by the Town, the original drawings (both digital and hard copy), complete with as constructed information and Town's asset management database in accordance with PSAB

3150 are required, and shall be submitted for the permanent records of the Town (See section 2.7 and Appendix 'A' for requirements).

ii) The following specifications manual is also available for reference:

Town of Aurora's General Specifications for the Construction of Buried Pipelines and Roadway Systems

All works shall be constructed in accordance with the General Specifications Manual.

Information contained within this Design Criteria Manual is for the purpose of design and layout only. The General Specifications Manual shall supersede any information to the contrary contained herein.

2.6 COMPOSITE UTILITY PLAN:

All Composite Utility Plan(s) be at 1:500 scale and shall show the following information:

- a) Street names, lot numbers and municipal addresses, and easements;
- b) Above-ground public works (roads, sidewalks, driveway aprons, maintenance holes, valve boxes, valve chambers, hydrants;
- c) Above ground utility plant including proposed hydro, gas, telecommunications service pedestals, community mailboxes, streetlights, traffic and traffic regulatory signs, transformers, etc.);
- d) Joint-Use trench and detail.
- e) All above and below ground utilities shall be shown on composite utility plans.

As well as the above, the road cross-sections used in the development shall be shown on every plan.

Prior to the Director of Planning and Development Services approving the Composite Utility Plan, it must be signed by all of the utility companies.

2.7 AS-CONSTRUCTED DRAWING REQUIREMENTS:

- a) One complete set of as-constructed original drawings (paper copy), as per the Subdivision Agreement, to be submitted to the Town for review.
- b) One copy of all as-built drawings to be submitted in both hard-copy (mylar) and digital copy once the Town's review has been completed. The digital file shall include spatial data in AutoCAD Map 3D 2012 or earlier format and if available in GIS format (shapefile or file geodatabase version 10.0 or earlier), with all formats having the following projected coordinate system:
 - Universal Transverse Mercator (UTM)
 - North American Datum (NAD) 83
 - Zone 17N Spheroid – GRS1980
- c) All as-built information shall include, but not limited to roads, watermains and sewers are to be provided in the specified digital format for inclusion in the Town's asset management database (PSAB 3150).
- d) "As-Constructed" to be shown in the revision block with appropriate date.

- e) The MOE approval numbers for any and all works are to be indicated on the Index Sheet and on the General Plans in the area directly above the title block.
- f) All lot numbers, block numbers, and street names are to be as per the registered plan. Municipal house address numbers shall be in accordance with the Subdivision municipal address list provided by the Town's Planning and Development Services Department.
- g) General grading plans need only show major changes in grading design or changes in direction of run-off, including the addition or deletion of retaining walls.

Roads:

- a) As-constructed profile elevations shall be indicated at 30m interval along the centreline chainage.
- b) Any changes to the road structure including changes in material or thickness shall be noted on the profile for all affected areas.

Sewers:

- a) Show as-constructed invert elevations and pipe slopes (%) on plan and profile sheets by striking-out "proposed" figures and indicating "existing" figures above or below, as permitted. If the elevation difference is greater than or equal to 0.50m or, the pipe slope changes by 0.5% (minimum), then the profile of sewer must be redrawn.
- b) Any changes to length, size, type, class, etc. must be shown on plans by striking-out the proposed information and placing the as-constructed information above or below.
- c) Any maintenance hole location which differs by more than 3.0m shall be redrawn.
- d) Any changes to type of maintenance hole (i.e. - poured instead of precast) shall be noted on the profile drawing.
- e) Show as-constructed maintenance hole top-of-cover elevations on profile drawings.

Watermains:

- a) If the depth of the watermain varies by more than 0.50m, the profile must be redrawn.
- b) Any change to size, class, type, bedding, etc. must be shown on the plans by striking-out the proposed and showing the as-constructed information above or below.
- c) Any changes to length, size, type, class, etc. must be shown on plans by striking-out the proposed information and placing the as-constructed information above or below.
- d) Show a minimum of two ties to all mainline valves and chambers from permanent surface features (i.e. maintenance holes, catchbasins, buildings).
- e) Show a minimum of two ties to all stub ends required for future connection.
- f) Show ties to service boxes for all those which are located in any but standard location (in accordance with standard drawing M-409).

3.0 STORM SEWER DESIGN:

3.1 Design Equations and Velocity Requirements:

- a) Flow in pipes will be determined on the basis of Manning's formula for circular pipes.

$$Q = A \cdot V$$

$$V = \frac{1}{n} \cdot R^{2/3} \cdot S^{1/2} \text{ and}$$

Where n = 0.013 for Concrete and P.V.C. Pipe
and
n = 0.024 for Corrugated Steel Pipe

- b) The minimum allowable actual velocity in a storm sewer shall be as follows:
- i) First run of a sewer shall be 0.45 m/s
 - ii) Second to fourth run of a sewer ("Interim" runs) shall be 0.6 m/s
 - iii) Fifth and subsequent runs of a sewer shall be 0.75 m/s

If the specified minimum velocities cannot be met, the applicant will be required to provide the Town with an annuity in the Subdivision Agreement, in perpetuity to cover the costs of the Planning and Development Services Department for flushing of the sewer.

- c) The maximum allowable actual velocity shall be 4.5 m/s.

3.2 100-Year Hydraulic Grade Line Analysis:

- a) 100-year hydraulic grade line shall be shown on road plan and profile drawings, and presented on the Town of Aurora Hydraulic Grade Line Analysis sheet. (See Appendix "A", A-2).
- b) Minimum basement level shall be 0.5m above 100-year hydraulic grade line.
- c) Minimum basement elevations must be shown on plan for all lots and blocks with basement level within 0.5m to 1.0m above the 100-year hydraulic grade line.

3.3 Installation and Testing:

All installation, testing and inspection shall be per "[Town of Aurora General Specifications for the Construction of Buried Pipelines and Roadway Systems](#)" (internal hyperlink only – Manual can be purchased through IES Department), "[York Region - Sanitary Sewer System Inspection, Testing and Acceptance Guideline \(revised September 2011\)](#)" and Ontario Provincial Standard specifications.

3.4 Storm Maintenance Holes:

- a) Placement of maintenance holes shall be at:
 - i. all junctions;
 - ii. changes in size, direction, etc.;
 - iii. maximum of 120m spacing.
- b) Minimum maintenance hole diameter shall be 1200mm
- c) Minimum drop across maintenance holes shall be 0.050m (0.100m for 90 degrees bends), maximum to be 1.0m. Drops in excess of 1.0m shall require drop structure as per Town standard S-30I.
- d) Where changes in pipe size occur obverts shall match.
- e) All maintenance holes shall be benched to the obvert of the pipes.
- f) Maximum change in direction shall be 90 degrees for pipes up to 900mm diameter, and 45 degrees for pipes over 900mm diameter.
- g) Maintenance hole details shall be shown for cast-in-place, non-standard, or as requested by the Town of Aurora's Engineer illustrating the type, size, benching location, and elevations.
- h) Storm maintenance hole frame and cover shall be per OPSD 401.01, type 'B'. Maintenance holes located outside of the road allowance (i.e. within an easement, walkway, or open space, etc.) shall be equipped with a security type cover per O.P.S.D. 401.060.
- i) Maintenance Holes 5.0m depth or greater shall be provided with Safety Platforms as per OPSD 404.02.
- j) All storm maintenance hole tops shall have a solvent damp proofing asphalt compound mastic applied after paving.

3.5 Catchbasins:

- a) Maximum spacing shall be 75m for pavement grades up to 4.0% and 60m for pavement grades greater than 4.0%.
- b) Catchbasins shall be located at the end of the radius on the upstream side of sidewalk at intersections where the sidewalk crosses.
- c) Lateral pipes shall be sized as follows:
Single Catchbasin – 250mm diameter at 1.0% minimum
Double catchbasin – 300mm diameter at 1.0% minimum

- d) Any low point on the road shall have a double catchbasin
- e) Catchbasins shall not be located within driveways, sidewalk, and walkway curb depressions.
- f) Rear lot catchbasins are to be sump less.
- g) Catchbasin Maintenance Holes are to be sump less.
- h) Catchbasin frame and cover for local residential roads as per Town Standard Drawing S-305, except at road low points and intersections use catchbasin frame and cover as per OPSD 400.100.
- i) Rear lot catchbasins to have square frame with birdcage grate as per OPSD 400.120.
- j) Catchbasin frame and cover for collector, arterial and industrial roads as per OPSD 400.100.
- k) Catchbasin frame and cover for parking lots as per OPSD 400.020.
- l) All maintenance catchbasin tops shall have a solvent damp proofing asphalt compound mastic applied after parging.

3.6 Storm Pipes:

- a) Minimum pipe diameter for storm sewer mains shall be 300mm.
- b) All storm sewer pipes 250mm to 300mm diameter shall be P.V.C. ribbed pipe and conform to CSA B182.4. Pipes larger than 450mm to be concrete, Class III, per CSA A257.2. 375mm and 450mm storm sewers may be either PVC or concrete.
- c) Pipe diameter for single catchbasin laterals shall be 250mm and 300mm for double catchbasins (pipe slope at a minimum of 1.0%). All catchbasin laterals shall be P.V.C. ribbed pipe.
- d) Storm sewers shall be located in the standard corridor of 1.5m offset from centreline. The south and west side of centre is the preferred location.
- e) Geometric requirements for easements for sewers and water mains to follow Public Works Policy No. 31. Refer to Appendix 'E'.
- f) Minimum depth of cover on any storm sewer pipe shall be 1.2m.
- g) All sewers to have bedding and backfill in accordance with standard drawing S-300.
- h) All storm mains are to be CCTV inspected prior to start of maintenance and prior to assumption.

- i) CCTV inspections of 25% of storm laterals be undertaken prior to occupancy. If all laterals meet the requirements, then no further CCTV inspections will be required.

3.7 Storm Service Connections:

- a) Each lot or block shall be serviced in accordance with Standard Drawings M409, M410, and M411. Any services which must deviate from this location or those on cul-de-sacs shall be indicated on the engineering drawings.
- b) Residential lots to have 150mm polyvinyl chloride, white coloured pipe.
- c) Industrial/Commercial lots/blocks shall have adequately sized services, complete with an inspection maintenance hole at 0.3m behind streetline complete with benching.
- d) All sewer connections to be made with manufactured tees at the main and approved test fittings at street line, as per standard drawing S-302.
- e) Storm services shall be staked at the property line with 50mm x 100mm (2"x4") wood stakes buried 1.2m into ground and painted white.
- f) No connections shall be made to trunk sewers or mains without the approval of the Town of Aurora and/or the Regional Municipality of York.

4.0 STORM WATER MANAGEMENT:

The stormwater management for a proposed development has to incorporate the requirements of the MOE "Stormwater Management Planning and Design Manual", March 2003 or latest revision, Lake Simcoe Region Conservation Authority (LSRCA) requirements of the Watershed Development Policy and Town of Aurora Public Works policies No. 24, 61 and 68. Refer to Appendix 'E'.

The stormwater management practices employed on a proposed development site have to highlight the following objectives as per the MOE *Stormwater Management Planning and Design Manual*:

- i. preserve groundwater and baseflow characteristics
- ii. protect water quality
- iii. avoid undesirable geomorphologic change of a watercourse
- iv. avoid any increase in the flood damage potential
- v. maintain the diversity of the aquatic life and opportunities for human uses

The stormwater management plan should include lot level, conveyance, and end-of-pipe controls for best-management practice purposes. Lot level ("source") and conveyance ("transport") controls reduce the end-of-pipe storage requirements for erosion control, achieve water balance objectives, and provide water quality and quantity control for small/frequent storms. End-of-pipe controls (i.e. stormwater management facilities) are required to meet water quality, erosion and flood control objectives.

4.1 Design Requirements:

All minor system flows will be calculated on the basis of the rational formula:

$$Q = 2.78 \cdot A \cdot C \cdot I, \text{ where } Q = \text{Flow (l/s)}$$

$$A = \text{Area (ha)}$$

$$C = \text{Run-off Co-efficient}$$

$$I = \text{Intensity (mm/hr.)}$$

When designing a stormwater management system the consultant has to use the most conservative out of the following two design storms:

1. 12 hr SCS (Toronto Bloor Station)
2. 4 hr Chicago storms

The intensity based on a 4hr Chicago storm (Bloor Street) can be calculated as:

$$I = a / (b + t)^c \quad \text{where,}$$

		2 year	5 year	10 year	25 year	50 year	100 year
a =	constant =	647.7	929.8	1021	1100	1448	1770
b =	constant =	4	4	3	2	3	4
c =	constant =	0.784	0.798	0.787	0.776	0.803	0.82

An initial time of 15 minutes shall be assumed unless a longer time can be established on the basis of overland flow time.

The values for 'C' for new developments shall be as follows:

Commercial/Industrial	= 0.75 - 0.85
Institutional	= 0.60 - 0.70
Residential - Single, Semi	= 0.45
- Townhouse	= 0.55
- Apartments	= 0.60 - 0.75
Parks, Open Space	= 0.3

All submissions must include storm drainage plans at a scale of 1:1000. Said plan shall clearly show the drainage areas in hectares (to nearest 1/100th) and specify the run-off coefficient used. Catchment areas will be established in relation to the location of the proposed maintenance holes. Any and all external areas draining to the subject site shall be included and shown on a drainage plan at an appropriate scale.

A **Stormwater Management Report** must be included which details all relevant information for the effects of increased development and makes recommendations which will control run-off to pre-development levels for all storms from 2 years up to and including 100 year storm (or greater if requested by the LSRCA). Upon completion of construction a Storm Water Management Facility Certification Report is required (see Appendix 'B', B-7).

4.2 Quantity and Quality Control of the Stormwater Runoff:

Stormwater management quantity and quality design shall be as per the requirements of the MOE *Stormwater Management Practices Planning and Design Manual*, March 2003 or latest revision, the LSRCA, and the Town of Aurora.

The Stormwater Management Plan(s) and Report for a proposed development shall describe in detail the manner in which stormwater runoff from the site will be addressed; both in quantity and quality, and ensure that the pre-development runoff characteristics of the site are maintained.

Stormwater runoff peak flow discharges must be controlled to a minimum of the pre-development levels for all design storm events (i.e. 1:2 year, 1:5 year, 1:10 year, 1:25 year, 1:50 year and 1:100 year) on the proposed development site, or as specified by an approved master drainage plan or watershed plan.

New development shall comply with Enhanced "Level 1" stormwater quality protection as per the 2003 MOE *Stormwater Management Planning and Design Manual* and LSRCA requirements.

4.3 Sizing of a Stormwater Management Facility:

When sizing a stormwater management facility for erosion protection and base flow maintenance, a minimum of a 24 hour detention of runoff from a 25mm storm shall be provided. The detention time and storage volume requirements may be increased as specified by an approved master drainage plan, watershed plan, or required by LSRCA or TRCA.

The Town may require the installation of a maintenance pipe at pond outlet in the event that the permanent pool needs to be drained. In this regard, a low flow maintenance pipe sized for a 6 hour detention time as to not affect the downstream receiving waters should be provided. Further details about the maintenance pipe are to be found in the MOE *Stormwater Management Planning and Design Manual*.

4.4 Oil/Grit Separators:

Oil/grit separators are required to be installed only for small drainage areas (<2 hectares) such as; industrial and commercial sites, parking areas, infill/retrofit, storm sewer reconstruction developments, or pre-treatment for other stormwater management practices. Oil/grit separators are best used for water quality control for re-development projects in an urban core, or for stormwater quality retrofits for an existing development. In new residential developments where space is not as limited, a stormwater management facility designed for erosion protection, flood control, and water quality control would be the best stormwater management practice.

4.5 Erosion and Sediment Control:

A detailed Erosion and Sediment Control Plan must be provided showing the measures that will be implemented before, during, and after construction to minimize soil erosion and avoid

sedimentation/deposition onto adjacent properties.

All erosion and sediment control measures must be shown on the Erosion and Sediment Control Plan along with technical notes, design specifications and installation details.

5.0 SANITARY SEWERS SYSTEM:

5.1 General:

All submissions are to include sanitary drainage plan(s) at a scale of 1:1000. These plans shall show the area (in hectares to the nearest 1/100th), the number of units (if applicable) and the calculated population (based on units).

Sanitary Sewerage system shall generally be designed in accordance with Ministry of the Environment Design Guidelines for Sewage Works 2008 (or later) and Region of York standards and guidelines.

5.1.1 System Type

The sanitary sewer system is to be designed to carry domestic, commercial and industrial sewage for each area or subdivision under consideration. Flow is to be by gravity and pumping will be considered only where other alternatives are not possible and only with the approval of the Town. No storm drainage system or downspout (rainwater leader) shall drain into a sanitary sewer.

5.1.2 Service Area

Design Period – The system shall be designed to service all areas within the subdivision to their maximum future development in accordance with the Official Plan and the Town-Wide Water & Wastewater Master Plan.

Tributary Area Inflows - Allowance shall be made for inflows from external lands within the drainage shed to the approval of the Town.

Connection Locations – The exact location for connecting sewers to adjacent sewers shall be approved by the Town.

Infill Developments – Capacity of existing sewer system to be verified using historical design sheets (if available) and a complete analysis of the receiving sewer system (e.g., drainage maps, design sheets/computer modelling, flow monitoring, etc.) to the extent deemed appropriate by the Town.

5.1.3 Drains

All floor drains are to be connected to the sanitary sewer. No foundation drains or roof water leaders shall be connected to the sanitary sewer.

5.2 Design Flows:

5.2.1 Wastewater Flows

The sewers are to be sized for maximum design flows plus an allowance for infiltration. Minimum velocities and slopes are to be determined for maximum design flows without infiltration. Sewage flow shall be based on the following design criteria (York/Durham

Sewage System Master Plan Update, latest version).

The average daily flow generation rates to be used for analysis purposes are as follows:

- Residential: 400 l/capita/day
- Employment: 400 l/capita/day
- Infiltration flow: 0.26 l/s/ha

Population estimates shall generally be based on the densities provided in Table 1 wherever sufficiently detailed information is available; otherwise estimates shall be in compliance with the Town's Official Plan, the relevant Secondary Plan, Block Plan or other appropriate planning document.

Table 1- Population Densities

Type of Unit or Land Use	Density
Single Family and Semi-Detached Residential	3.8 persons/unit
Street Town houses, Block Townhouses and Slack Townhouses	3.5 persons/unit
Apartments	2.5 persons/unit
industrial	95 persons/ha
Commercial	75 persons/ha
institutional	50 persons/ha
Parks & Recreational	50 persons/ha
School	0.30 persons/student
Hospital and Nursing Home	4.0 persons/bed
Hotel/Motel	0.5 person/bed
Office Commercial	115 persons/ha of floor
Shopping Centre	115 persons/ha of floor

Peak wastewater flows are to be determined by multiplying the average daily wastewater flow rate by the Harmon Peaking Factor (subject to a minimum of $M = 2.0$ and maximum of $M = 4.0$):

$$M = 1 + \frac{14}{4 + p^{0.5}}$$

where M is the Harmon Peaking Factor and p is the population (or equivalent) in thousands.

5.2.2 Infiltration Allowance

In addition to the peak wastewater flows, an infiltration allowance of 0.26 L/s/ha is to be included in determining the design flow (based on gross service areas). To satisfy self-cleansing requirements in sanitary sewers, assume dry weather infiltration reduces to zero for several days during dry months.

5.2.3 Sanitary Sewer Flows

The relevant figures are to be entered on the Town of Aurora Standard Sanitary Design Sheet.

5.2.4 Sanitary Sewer below Groundwater Table

Anti-Seepage collars shall be installed wherever the sanitary sewer is below the groundwater table. The locations of the collars shall be determined by the Geotechnical Engineer.

5.2.5 Sanitary Miscellaneous

- a) Polyvinyl chloride green coloured pipe shall be installed from the main to property line;
- b) Lateral connections from street line to the building and within building envelope shall be inspected and approved by Town's Building/Plumbing inspector;
- c) "Bulkhead" shall be installed at the downstream sanitary sewer of each development at the existing sewer connection manhole. Bulkheads will be removed at first occupancy. Locations of bulkhead shall be shown on engineering drawing set;
- d) Where the sanitary depth does not permit the use of PVC pipe, then pressure pipe shall be used;
- e) Sanitary sewer pipe 600mm and greater shall be pressure pipe only, standard concrete pipe shall not be used;
- f) Minimum depth of sewer shall be 2.8m;
- g) Sanitary sewers shall be located in the standard corridor of 1.5m offset from centreline. The north and east side of centre is the preferred location;
- h) Geometric Requirements for easements for sewers and watermains to follow Public Works Policy No. 31. Refer to Appendix 'E'.
- i) CCTV inspections of all sanitary sewer mains shall be required prior to occupancy and prior to assumption; and
- j) Flow monitoring will be required for each development phases per Region of York requirements as part of final approval.

5.3 Sewer Design:

5.3.1 Formula

Manning's formulae shall be used for determining the capacity of the sewers:

$$Q = \frac{1}{n} A \times R^{\frac{2}{3}} \times S^{\frac{1}{2}} \quad \text{and} \quad V = \frac{1}{n} R^{\frac{2}{3}} \times S^{\frac{1}{2}}$$

where

Q is the full flow capacity of the pipe (m³/s)

V is the full flow velocity in the pipe (m/s)

n is Manning's roughness coefficient (dimensionless)

A is the cross-sectional area of the pipe (m^2)

R is the hydraulic radius of the pipe (i.e., cross-sectional area \div wetted perimeter; m)

S is the slope of the pipe (i.e., slope of hydraulic grade line when flowing full; m/m)

For concrete or polyvinyl Chloride (PVC) sewer pipe a roughness coefficient (n) of 0.013 shall be used.

5.3.2 Minimum Size

The minimum size of sewers shall be 200mm diameter in residential areas and 250mm diameter in industrial areas.

5.3.3 Minimum Velocity

The minimum velocity for sewers operating partially full shall result in self-cleansing equivalent to that produced by flow in a 200 mm diameter sewer operating full at a velocity of 0.6 m/s.

5.3.4 Maximum Velocity

The maximum allowable velocity shall be 4.0 m/s at full flow.

5.3.5 Allowable Grades

The grades for sewers shall be the grade necessary to meet the minimum and maximum velocity requirements. The first leg of a sewer shall be a minimum grade of 1.0%. The maximum sewer grade shall be 2.0% or not greater than the road grade where the road grade exceeds 2.0%.

5.3.6 Hydraulic Losses

A sufficient drop shall be provided across each maintenance hole to offset any hydraulic losses to a maximum change in velocity of 0.6 m/s in special cases. The obverts of inlet pipes shall not be lower than obverts of outlet pipes, and drop structures shall be used only when drops of more than 1.0 metre are necessary in accordance with OPSD 1003.020.

5.3.7 Downstream Size

The downstream pipe diameter shall always be greater than or equal to the upstream pipe diameter.

5.4 Layout Details:

5.4.1 Trunk and Local Sewers

- (a) Location – Sanitary sewers shall generally be located 1.5 metres north or east of the road centre line in separate trench or in a common trench. The minimum clearance between the outside wall of the adjacent sewer pipes shall be 0.8 metres. On crescent roads or roads with numerous bends the sewer position may generally follow the same relative side of the road allowance.
- (b) Depth – A minimum cover of 2.8 metres below the centre line road elevation or sufficient depth for basement floor drains and frost cover. Where sewers are located

within an easement, a minimum frost cover of 1.2 metres may be used, provided such sewers cross below watermains. The maximum height of fill shall be in compliance with OPSD 806.040, OPSD 806.060, OPSD 807.010, OPSD 807.030, or similar.

- (c) Clearances – Minimum clearances between services shall be provided in accordance with MOE guidelines.
- (d) Alignment – Sanitary sewers shall generally be straight aligned between maintenance holes, however, curvilinear or properly deflected sewer pipes within the manufacturer's specifications are allowed with the approval of the Town.

5.4.2 Maintenance Holes

- (a) Location – Maintenance holes shall be placed at the end of each line, at changes in pipe size, direction, material and at abrupt changes in grade and alignment;
- (b) Spacing – The maximum spacing between maintenance holes shall 120 metres;
- (c) Minimum maintenance hole diameter shall be 1200mm;
- (d) Minimum drop across maintenance holes shall be 0.050m (0.100m for 90 degrees bends), maximum to be 1.0m. Drops in excess of 1.0m shall require drop structure as per Town standard S-30I;
- (e) Where changes in pipe size occur obverts shall match;
- (f) All maintenance holes shall be benched to the obvert of the pipes;
- (g) Maximum change in direction shall be 90 degrees for pipes up to 900mm diameter, and 45 degrees for pipes over 900mm diameter;
- (h) Maintenance holes shall be precast concrete with a pre-benched monolithic base containing kor 'n' seal or equivalent sewer connection gaskets, in accordance with all applicable OPSD details;
- (i) Maintenance hole details shall be shown for cast-in-place, non-standard, or as requested by the Town of Aurora's Engineer illustrating the type, size, benching location, and elevations;
- (j) Sanitary maintenance holes shall have frames and covers as per OPSD 401.010, Type 'A' and shall be made watertight by installing a 2mm rubber gasket between the frame and grate and by installing rubber plugs within the grate's pick holes. Maintenance holes located outside of the road allowance (i.e. within an easement, walkway, or open space, etc.) shall be equipped with a security type cover per OPSD 401.060 and shall also be made watertight as described above;
- (k) Maintenance Holes 5.0m depth or greater shall be provided with Safety Platforms as per OPSD 404.02;
- (l) Drop Maintenance Holes – Drop maintenance holes shall be sized in accordance with OPSD 1003.020 and provided for all sewer junctions having an elevation difference in excess of 0.6m that cannot be eliminated by changing sewer grades;
- (m) All sanitary maintenance hole joints, between base of maintenance hole up to the precast concrete adjustment units, shall be sealed with an external rubber sleeve (i.e. Gator wrap or equivalent). The width of the rubber sleeve shall be 225mm (9") or greater. The seal shall be made of a stretchable, self-shrinking, intra-curing halogenated based rubber with a minimum thickness of 30 mils. The backside of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-linked and fused bond between the rubber and butyl adhesive;

- (n) All precast concrete adjustment units (Moduloc or approved equivalent) shall have a solvent damp proofing mastic asphalt compound applied after parging;
- (o) Sanitary maintenance holes should not be located in ponding areas;

5.4.3 Service Connections

- (a) Location – Single or double connections for residential and industrial use, shall generally be located at least 1.5 metres from water service connections, near the centre of lots or the common lot lines in accordance with Standard Drawings M-409, M-410, M-411 and OPSD 1006.010 (rigid main pipe) or OPSD 1006.020 (flexible main pipe). Connections for commercial, institutional or multiple use will be considered on an individual basis if similar locations cannot be used. Non-standard locations must be detailed on plan and profile and lot grading plans. Park service may be required by the Parks and Recreation Services Department.
- (b) Depth – Service connections at property line shall be located at a minimum depth of 2.6 metres. Service connections should cross under any watermains.
- (c) Test Fittings And Maintenance Holes – All residential connections shall have test fittings and plugs according to Standard Drawings S-302 and S-304. All industrial connections shall have inspection maintenance holes and bulkheads in accordance with all applicable OPSD details and located 0.3metre off street line on private property. Connection requirements for other uses (commercial, institutional, etc.) shall be determined at the design stage for those individual blocks unless known.
- (d) Residential Sanitary Connections – Single sanitary connections shall be a minimum of 125 millimetres in diameter and double connections, not preferred, shall be a minimum of 150 millimetres in diameter. The minimum grade shall be 2% and maximum 5%. Any grade greater 5% may be fitted with a vertical riser. Adjacent lots with greater than 0.2 m basement elevation differences shall not be serviced by double lot sanitary sewer service connections.
- (e) Industrial Sanitary Connections – Sanitary connections shall be a minimum of 200 millimetres in diameter. The minimum grade shall be 2%.
- (f) Service connections are to be installed on the main sewer lines wherever possible. In unique or other special circumstances, service connections may be installed directly into maintenance holes, but only subject to the approval of the Town's Planning and Development Services Department.
- (g) Services on residential lots to be located as per Town standard drawing M-409 (Appendix 'C'). Any services which must deviate from this location (or those on cul-de-sacs) shall be indicated on the engineering drawings.
- (h) Sanitary services shall be staked at the property line with 50mm x 100mm (2"x4") wood stakes buried 1.2m into ground and painted black.
- (i) Re-Development Applications
 - i) In re-development applications, existing service connections may be reused subject to a condition assessment including, but not necessarily limited to, CCTV inspection to the satisfaction of the Town. Any obvious occurrences of root intrusion, displaced joints or other physical defects will require replacement with a new connection.
 - ii) For low-rise residential re-development, existing service connections may only be reused on a 1-for-1 basis with respect to the number of units serviced (i.e., number of units draining to service connection under redevelopment scenario

- cannot exceed the number of units previously draining thereto), subject to satisfactory condition assessment.
- iii) Where existing service connections are to be reused, the hydraulic capacity of the connection to convey the design flow for the proposed development shall be verified by a Professional Engineer.
 - iv) Any re-development applications servicing more than one (1) unit on a single property must have a control maintenance hole.

5.5 Materials:

5.5.1 Specifications

- a) Sanitary sewer pipe material shall be comprised of Polyvinyl chloride (PVC.) as per C.S.A. B-137.3, B-182 or B-182.4(DR35) or better based on the pipe depth in accordance with the following specifications, unless otherwise noted:
 - i) 100 mm – 150 mm diameter: CSA B182.1, ASTM D3034, Min. DR 28
 - ii) 200 mm to 375 mm diameter: CSA 182.2, ASTM D3034, Min. DR 35
 - iii) > 375 mm (Max. 600 mm) diameter: CSA 182.2, ASTM F679 (T-1), Min. DR 35
 - iv) Pressure pipe shall be used for sanitary sewer pipe greater than 600mm
 - v) Where the sewer pipe in excess of 8 metres in depth, or the depth does not permit the use of PVC pipe, then pressure pipe shall be used, standard concrete pipe shall not be allowed
- b) Joints – All sanitary sewers shall have watertight joints.
- c) Bedding- Bedding type selection shall be based on depth of sewer, sewer material, trench width and configuration and soil conditions in accordance with OPSS and OPSD.
 - i) PVC pipe: bedding and cover material shall conform to OPSS Granular A and recycled materials are not permitted;
 - ii) High Performance Bedding (HPB) is not an acceptable bedding material except in congested installations where proper placement and compaction of granular bedding is not possible and as specifically directed by the Town. Any requests for HPB are to be supported with a geotechnical engineer's justification; and
 - iii) Pipe loading calculations shall accompany the design submission.

5.6 Forcemain:

Wastewater forcemain shall be generally designed in accordance with the following considerations:

- a) Cleansing velocity of at least 0.60 m/s shall be maintained;
- b) Maximum velocity of 4.0 m/s;
- c) Minimum diameter shall not be less than 100 mm;
- d) Friction losses should be based on Hazen-Williams formula with a "C" factor of 100; or other acceptable methods using a generally equivalent friction factor;
- e) Air relief valves- An automatic release valve shall be placed at high points in the force main to prevent air pockets;
- f) The design of the profile and size of the force main shall minimize the excessive negative head to the system;

- g) Configuration and head conditions should be evaluated as to the need for and placement of vacuum relief valves. Fittings and isolation valves shall be stainless steel;
- h) Force mains should enter the gravity sewer system at a point not more than 200 mm above the flow line of the receiving maintenance hole.
- i) To be located in the boulevard opposite the watermain, subject to MOE clearance guidelines;
- j) Minimum cover of 1.8 m;
- k) Cathodic protection of all metallic pipes, mechanical joints/fittings/restraints, etc. Sizing to be determined by a geotechnical engineer subject to a minimum of 5.5 kg each;
- l) Pipe materials may include:
 - i) Polyvinyl Chloride (PVC), DR26 minimum, conforming to CSA B137.3 and ASTM D3139. Must be **green** in colour. Alternatively, if the proposed size does not available on market, a tape marked "Sanitary" shall be used to wrap along the entire section of the sanitary sewer. Tracer wire with 8 gauge shall be installed.
 - ii) Polyethylene (PE) conforming to CSA B137.0, B137.1, ASTM D3035, D3350 or CG 5 Spec. 41-FP-25M. PE3408/3608. To be installed with 14 AWG tracer wire or, if in horizontal directional drilling (HDD) applications, 4×8 gauge tracer wire.
- m) Pipe and joints shall be equal to water main strength materials suitable for design conditions. The force main, reaction blocking, and station piping shall be designed to withstand water hammer pressures and associated cyclic reversal of stresses that are expected with the cycling of wastewater lift stations. The need for surge protection chambers shall be evaluated. Forcemain pipe materials shall be approved by the Town Engineer. Pressure rating (class) to be as per design;
- n) Hydraulic transient (i.e., surge) analysis required to confirm pressure rating of pipe, surge protection devices, the provision of water hammer relief and identify potential vacuum and other conditions to be mitigated. Pump cycle times should be designed to minimize pump starts and stops to the extent practical;
- o) The hydraulic grade lines for the range of potential pumping rates (i.e., minimum, average, maximum) shall be provided along the entire profile of the forcemain;
- p) Detailed calculations for the system curve shall be provided;
- q) Bedding material to be mortar sand conforming to OPSS 1004 Granular D and placed in accordance with applicable OPS Drawings.
- r) Thrust blocks to be in accordance with all applicable OPSD details;
- s) Clean-outs - The need for clean-outs on the force main shall be determined during plan review by the Town of Aurora. As a general guideline, clean-outs will not be required on force mains under 600 m in length; and
- t) Additional requirements may be identified at the time of detailed design based on site-specific conditions, at the discretion of the Town.

5.7 Testing & Inspection:

5.7.1 General

- a) All newly constructed sanitary sewers, maintenance holes and forcemains shall be watertight and free from leakage. The commissioning of sanitary sewers shall conform to latest version of York Region's Sanitary Sewer System Inspection, Testing and Acceptance Guideline in effect at the time of construction. Detailed reports shall be prepared, signed and stamped by the Qualified Representative (e.g. Professional Engineer) describing the application of and conformity with the Region's requirements including testing procedures and results to the satisfaction of the Town prior to acceptance.
- b) Force Main Pressure Test – Contractor shall fill and pressure test the force main. The minimum required test pressure shall be the maximum force main operating pressure plus 50 psi.
- c) CCTV inspections of all sanitary sewer mains including the Qualified Representatives comments on the report shall be required prior to occupancy and prior to assumption of the service. 25% of sanitary laterals to be video inspected to 1.5m beyond street line at the location selected at the sole discretion of Town site staff. If any of the selected laterals does not meet the requirements, then all remaining sanitary laterals CCTV inspections will be required.
- d) Engineer shall obtain the invert elevations of all sewer laterals at the street line and provide certification that laterals are installed with positive unaffected flows and sufficiently low to accommodate floor drains. Additional camera inspection of laterals may be required based on the data provided upon instructions from the Director of Planning and Development Services.
- e) Tracer wire inspections and conductivity tests shall be conducted prior to acceptance of forcemains. Inspections are to ensure that tracer wire is visible in maintenance holes, at pumping stations, etc. Conductivity tests are to ensure that the tracer wire is appropriately connected and continuous over its entire length.
- f) A representative of the Town is required to be present during any testing of services. Depending on pipe material and installation condition, the following OPS Drawings may apply: OPSD 802.010, 802.013, 802.014, 802.030, 802.031, 802.032, 802.033, 802.034, 802.050, 802.051, 802.052, 802.053 or 802.54.
<http://www.raqsbc.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>

5.7.2 Cracked Sewer Service Connection Tee Fittings

- a) Any cracked service connection tee fittings discovered during CCTV inspections shall be repaired to the satisfaction of the Town.
- b) In cases where top asphalt is not in place, the cracked sewer service connection tee fitting shall be excavated, removed and replaced.
- c) In cases where top asphalt has been placed, and subject to the approval of the Town:
 - i) The cracked sewer service connection tee fitting may be repaired by means of a tee liner or other suitable trenchless technology approved by the Town; and
 - ii) The developer to provide the Town with a cash contribution (at the prevailing rate) towards the ongoing inspection and maintenance of the

- tee liner plus the cost of ultimately replacing the sewer service connection tee fitting in the future.
- iii) In cases where top asphalt has been placed and it has been determined by the Town that the sewer service connection tee fitting cannot be adequately repaired by installing a tee liner or other acceptable trenchless technology, then it shall be excavated, removed and replaced.

5.8 Decommissioning:

5.8.1 Service Connections

Sanitary service connections shall be decommissioned by cutting and capping/plugging the connection at the main line and filling in any abandoned sections with a grout, lean concrete mix or other suitable material which must be approved by the Town.

5.8.2 Maintenance Holes

Any sewer openings to the maintenance holes (MHs) are to be plugged from within the MH, the cone section of the MH is to be removed and the MH is to be filled with sand prior to backfilling and restoration of the surface.

5.8.3 Sewer Lines

Any abandoned sewer lines are to be plugged at the ends and filled with a grout, lean concrete mix or other suitable material which must be approved by the Town's Planning and Development Services Department.

5.8.4 Forcemain

The following is required when decommissioning forcemains:

- 1) Saw-cutting of existing pipe.
- 2) Removal and disposal off-site of existing pipes, fittings, thrust restraints and thrust blocks, as required.
- 3) Filling of abandoned main with grout.
- 4) Supply and placement of 15 MPa concrete plug in the ends of the existing forcemains that are to be abandoned in place. Minimum length of the concrete plug shall be 300mm.
- 5) Supply and placement of mechanical plug on existing forcemain to remain in service, where required.

5.9 Sanitary Sewer Lifting Station:

5.9.1 General

The following are the standard specifications for sanitary pumping stations to be installed and connected to the Town of Aurora sanitary sewer collection system. The purpose of these specifications is to provide a minimum standard for pump stations that complies with the guidelines set out by the Planning and Development Services Department the most cost effective and reliable design for maintenance and operation. Sewage pump stations shall consist of a wet well, sewage pumps, control systems, electrical systems (normal and

emergency), superstructures, site security, grading and access. The developer shall be responsible for extending all necessary utilities to the pump station site (water, electrical, gas, phone etc.).

Sanitary sewer pump stations will only be considered when the thorough study of all alternatives clearly indicates the impracticability of gravity collection and disposal. The wet well for pump stations shall be equipped with a minimum of 3 hour storage capacity at peak pumping rate and an emergency generator. The generator and all controls shall be in a building as approved by the Planning and Development Services Department.

Sanitary sewer pumping stations:

- 1) Shall generally be designed in accordance with Ministry of the Environment (MOE) and Region of York standards and guidelines.
- 2) To be provided with permanent standby power facilities.
- 3) Shall preserve the architectural nature of the community where they are situated and, where applicable, conform to architectural control plans. Landscaping is required and subject to the approval of the Town.
- 4) Permanent and high accuracy flow meters on influent sewer and discharge header, well level and discharge header pressure sensors to have SCADA capability. Additional requirements may be determined by the Town.
- 5) Safety - The design of a pumping station requires a review of the components of the system to assure that the system is safe to operate. Access ladders for the wet well and valve vault, a hoist for lifting out the pump, lighting, ventilation to remove dangerous gases and security for the electrical system are the major safety items that need to be considered.

5.9.2 Engineering Report

All pump station plans shall be accompanied by an engineering report. The following information shall be included in the report:

1) Title Page

Title page should include the project (subdivision) name, Legal Description and/or Municipal Address, date, developer/owner's name and engineering firm preparing plans.

2) Sewer System Information

a) Introduction

- i) Type, location and size of development
- ii) Number of and range in size of lots or buildings to be serviced

b) Existing Sewer System

- i) Location and type of gravity system the force main will discharge into
- ii) Future of sanitary sewer service
- iii) State whether the entire development will be serviced by the proposed phase or if several phases will be involved
- iv) State the number of lots this phase will encompass initially and finally if future phases are to be constructed

- 3) Listing of results from the design calculations to be presented in the following order
 - a) Number of Lots or Buildings
 - b) Population Equivalent
 - c) Average Daily Flow in L/Sec
 - d) Peak Daily Flow in L/Sec
 - e) The Volume of the Retention Chamber (8-hour minimum, may require 24 hours in some cases)
 - f) Static Head
 - g) Total Dynamic Head
 - h) The Pump Selected (including type manufacturer, model number, size, Hp, RPM, phase and L/Sec)
 - i) Total Cycle Time for Average Daily Flow
 - i) Number of Minutes ON (Pumping Time)
 - ii) Number of Minutes OFF (Fill Time)
 - j) Total Cycle Time for Peak Daily Flow
 - i) Number of Minutes ON (Pumping Time)
 - ii) Number of Minutes OFF (Fill Time)
 - k) Size and Length of Force Main
 - l) Velocity Maintained in Force Main
 - m) Force Main Retention Time (at initial flows and at design flows)
 - n) Air Release Valve Sizing Calculations (if applicable)
 - o) Maximum Force Main Operating Pressure

4) Cost Effective Analysis

Consultant shall perform a cost effective analysis for all proposed pump stations and expansions of existing Town of Aurora-owned pump stations. Cost analysis shall compare the construction, operation, maintenance, life cycle costs and any applicable salvage values over a 50-year period between proposed pump station and a reasonable gravity sewer alternative. Operation and maintenance costs that must be considered including the following, but not limit to, labor, electrical, equipment replacement, building, operation and routine maintenance. Pump stations will only be considered a viable option if the cost analysis clearly shows that the gravity sewers are not economically feasible.

5) Pump Information

Pump performance curves, make and model shall be included with the engineering report.

6) Leakage Testing

Leakage tests should be specified, including testing methods and leakage limits.

5.9.3 Pump Requirements

At least 2 pumps shall be provided. If only 2 units are provided, they should be of the same size, to provide a firm capacity with one unit out-of service and at least capable of handling the 10-year design peak hourly flow (L/Sec). Where more than 2 pumps are provided, each unit shall be designed to handle maximum flow conditions and must be of such capacity that with any one unit out of service the remaining units will have capacity to handle maximum sewage flows.

The designer should ensure that all pumps will be subjected to hydrostatic and operating tests performed by the manufacturer.

5.9.4 Pump Selection Considerations

- a) Submersible pumps are preferred for all situations. Pumps are to be removable and replaceable without dewatering the wet well or requiring personnel to enter the wet well. All pumps in a lift station shall be identical and interchangeable;
- b) Pump impellers shall be of a non-clog design and be capable of passing spherical solids of up to 75 mm in diameter;
- c) Pumps are to be selected which provide optimum efficiencies at actual operating points. The power rating of the motor should not be exceeded by the pump at any operating condition on the characteristic curve for the pump selected;
- d) Service pumps will generally not be operating at their fully intended capacity due to mechanical wear and the subsequent loss of efficiency, and increases in force main friction loss due to the deposition of solids and grit. Pump design capacity shall be in accordance with the manufacturer specification; Any pump capacity exceeding the manufacturer rated capacity shall not be permitted;
- e) Flush valves, recirculation pipes or mixers shall be provided for aeration and suspension of grit and solids in the wet well;
- f) Pump selection shall also take into account the availability of local repair service. Pumps selected shall also take into account the manufacturer's experience and history in the design and selection of pumps for raw sewage use;
- g) Lift Station shall be designed with Flygt Pumps equipped with flush valves. Alternate pump selection would require that a present-worth analysis be undertaken and approved by the Town.
- h) Pump motors shall operate at 3 phase power;
- i) Minimum pump discharge piping diameter shall be 100 mm; and
- j) The pump discharge piping diameter and material shall be uniform from the pump discharge base to the common header tee.

5.9.5 Lift Station Electrical Requirements

- a) Inlet (if possible) and outlet flow meter (flow rate and totalizer);
- b) Soft starter and Across the line starter option with pilot lights(run, fault), hour meters, amp meter and HOA switch;
- c) Level transmitter with level switches backup option (Low Level, Stop, Lead Start, Lag Start and High Level) such as Flygt level switches. Note: Transducer and level switches cables shall have quick connectors located in a non-classified area;
- d) Pumps shall have Plug and Receptacle on cable;
- e) Backup generator shall be natural gas with louver controls (fresh air, outside vent and re-circulate) and automatic transfer switch.

5.9.6 Piping and Valves

The piping from the individual pump discharge bases, through the valving assembly and out to the force main, shall be in accordance with the following (100mm Diameter Piping and Larger):

- a) Piping - The discharge piping shall be ductile iron Class 53 or greater A.N.S.I. A-21.51 (AWWA C151) with rigid radius grooves for end preparation in accordance with AWWA C606.
- b) Fittings - Fittings shall be ductile iron, ASTM A-536, Grade 65-45-12, or cast iron, ASTM A-48, conforming to the requirements of AWWA C110 for center to end dimensions, AWWA C153 or AWWA 21.10/AWWA C110 for wall thickness, and AWWA C606 rigid radius grooving dimensions for end preparation. Fittings shall be cement lined and have a universal primer coating.
- c) Mechanical Couplings - Mechanical couplings shall be ductile iron conforming to ASTM A536, Grade 65-45-12 with a universal primer coating as manufactured by Victaulic (style 31, style 75 or style 307), or approved equal. Couplings shall incorporate gaskets that are specially made to conform to ductile iron pipe surfaces and 304 stainless steel nuts and bolts.
- d) Transition Fittings
 - i) Grooved to Flanged - The connection of grooved pipe and fittings to flanged pipe and fittings shall be facilitated with flange adapters as manufactured by Victaulic (style 341 Vic-Flange) or approved equal. The flange adapters shall be ductile iron conforming to ASTM A-536, Grade 65-45-12, with a universal primer coating. Gaskets shall have properties as designated by ASTM D-2000 and shall be suitable for the required service. Use 304 stainless steel bolts and nuts on all flange adapters and flanged components.
 - ii) Force Main Connection - The ductile iron pipe shall be extended at least 1.2 metre from the outside of the valve vault. The force main shall be connected to the ductile iron pipe with a mechanical coupling. The coupling shall be a MEGALUG Mechanical Joint Restraint or approved equal.
- e) Discharge Risers
 - i) PVC - When plastic pipe is utilized for the pump discharge riser and the riser exceeds 2 meter in length, stainless steel support braces must be installed between the riser and wet well wall. The braces shall be placed at a maximum spacing of 2 meter.
 - ii) DIP - When ductile iron pipe is utilized for the pump discharge riser and the riser exceeds 2.4 meter in length, stainless steel support braces must be installed between the riser and wet well wall. The braces shall be placed at a maximum spacing of 2.4 meter.
- f) Maintenance Considerations

Isolation valves should be considered where forcemains connect into a common forcemain. Cleanouts at low points and chambers for pig launching and catching should be considered for any forcemain to facilitate maintenance

5.9.7 Wet Well Size and Detail

1) Size Considerations

- a) Wet wells are to be of adequate size to suit equipment space, operator access requirements and active volume considerations.
- b) To minimize dead storage volume, the depth from the “pump off” level to the floor of the wet well shall be kept to an acceptable minimum. The required depth will

be dictated by suction pipe inlet conditions, pump manufacturer's requirements for submergence or cooling, net positive suction head, priming requirements and vortex control.

- c) Wet wells must be sized small enough to minimize the total retention time, the time sewage is held in the wet well and any rising forcemain, and yet be large enough to control the frequency of pump starts. The maximum retention time in the wet well should not exceed thirty (30) minutes for the design minimum flow rate anticipated when the contributing area is fully developed. Total retention time in the wet well and forcemain shall be kept to a minimum (generally less than four (4) hours) to avoid anaerobic fermentation and the resultant production of odorous, hazardous and corrosive gases. Otherwise, provisions must be made to control anaerobic conditions. It is desirable to have a wet well with sufficient active volume so that all sewage within the discharge forcemain will be replaced during one pumping cycle, especially if sags exist in the forcemain profile.
 - d) Wet wells shall be sized large enough to maximize pump life by decreasing the frequency of pump starts. However, in the interest of limiting excessive detention time, wastewater pumping stations will inherently be subject to relatively high frequencies of switching cycles. Exceeding a frequency of 12 starts per hour for motors above 30 kw increases the cost of switch gear and motor maintenance and the reliability and life of the machinery and electrical components will decrease. Accordingly sufficient storage between switching levels should be provided to limit the number of pump starts, normally to 6 per hour with pump alternation and 12 per hour with the standby pump inoperative. The manufacturer's recommendations with regard to the allowable frequency of pump starts for the specific size and type of motor are to be satisfied.
- 2) Shaping and Benching
- a) Wet wells shall be arranged and benched to limit dead spaces where solids can accumulate and to provide smooth, uniform, unobstructed flow to the pump suction influence zones. Wet well floors should have a minimum slope of 1:1 to a hopper type bottom. The horizontal area of the hopper type bottom should be no larger than necessary for the proper installation of the pump or suction pipe.
 - b) The cross sectional area and shape of the wet well above the benching is to be constant or increasing from the bottom towards the top.
 - c) The critical flood line shall be permanently marked on the walls of the wet well.
- 3) Vent
- a) The wet well structure shall be vented with a 100 mm Sch. 40 stainless steel or aluminum vent pipe. Wet well ventilation system shall consist of the gooseneck vent installed on the opposite side of the wet well from the fresh air in-take (c/w a bird/insect screen).
 - b) Wet well ventilation fan, if required, must be rated for the area and force fresh air in above the operating level of pump start.
- 4) Vortex Prevention
- Suction elbows, baffle plates, vortex breakers, or drop tubes are to be provided as required.

5) Corrosion Considerations

- a) All bolts, nuts, other fasteners and piping used in the wet well areas, including platform chain and pump lifting chain, shall be stainless steel. All supports, brackets, gratings, ladders and other structures shall be of corrosion resistant materials.
- b) All-aluminum doors or hatches are required for access to the wet wells. Installation of electrical equipment and wiring within the wet well is to be avoided unless it is essential that it be located in the wet well.

6) Electrical

All electrical equipment and wiring located within the wet well shall be Class 1 Category 2 as per the Canadian electrical Code.

5.9.8 SCADA Requirements

- 1) SCADAPack (compact Smart RTUs) should be used in combination with SCADAPack Vision (panel-mounted operator interface terminal) for onsite SCADA system;
- 2) On site SCADA system should be housed inside a pre-fabricated CSA approval electrical panel, equipped with UPS battery backup.;
- 3) On site SCADA system should be compatible with Clear SCADA server, through a preferable Ethernet communication or phone landline with phone stick if sharing a common phone line.;
- 4) On site parameters that need monitoring and/or controlling by SCADA system should be included but not limited to pump status, wet well sewer level with time stamp, pump start/stop adjustable set points, flow rate, flow totalizer, intruders, air quality, generator activity status, and alarms.;
- 5) On site operator display/interface should be included but not limited to pump status – wet well sewer level with time stamp, pump start/stop adjustable set points, flow rate, flow totalizer, intruders, air quality, generator activity status, and alarms;
- 6) SCADA system alarms should be independent from the ProTalk alarms that should serve as backup to each other;
- 7) SCADA alarms that shall be included: high/low temp, air quality (H₂S ,CO, O₂, and Flammable) generator fault/fail to run, transfer switch, utility power fail, pump fault/fail to run, level transducer fault, and high/low level alarms; and
- 8) All SCADA equipment, software, shop drawings, schedule, and the site specific program files shall be reviewed by Town of Aurora prior to installation. The supplier shall conduct a bench test for all equipment to be installed. The bench test results shall be documented and provided to the Town. All SCADA equipment, software, as-built drawings with schedule, site specific program files, license and warranty agreements, and all relevant documentation shall be transferred to the Town in hardcopy and electronic file format prior to assumption.

5.9.9 Commissioning

Commissioning testing of wastewater pumping stations is required and shall be certified by a Professional Engineer. Testing generally includes the following, although additional testing may be required by the Town:

- 1) Testing of station performance over full range of flows, including transitions between pumps;
- 2) Perform a performance pump test to demonstrate the pumping efficiency, capacity and function in accordance with the pumping station design report;
- 3) Continuous high-frequency (min 1 Hz) pressure monitoring during testing procedure and for 24 h period under normal operations using portable equipment;
- 4) Reporting to include the following:
 - (a) Plots of pressure and flow during testing procedure
 - (b) Reports to include all relevant interpretation and explanations, including discussion of impact to operations and life cycle costs

5.9.10 Assumption

The Owner shall maintain the facility and provide maintenance reports on an annual basis (based on monthly inspections) until assumption of the facility by the Town. The Town will not assume the facility and forcemain until a minimum of 75% of the dwelling units are occupied.

Prior to the pumping station assumption by the Town, the following shall be required:

- a) Engineer certification in relation to the overall pumping station construction and performance in writing, signed and stamped by a Professional Engineer;
- b) Provide as-constructed drawings; including three copies of operation and maintenance manuals as well as the original design report and approved shop drawings for all equipment to the Town prior to final inspection;
- c) A copy of the closed out Permit from ESA;
- d) An installation test reports of feeders, pumps etc.;
- e) I/O point to point check lists;
- f) Manuals including PLC Logic and Panelview Logic if so equipped and all schematic drawings;
- g) Pumping stations shall have PLC's and SCADA ready;
- h) Supply an ALLEN BRADLEY PLC with Ethernet connectivity complete with a hub/switch (8 port) and panel door port. (PLC password and IP address to be provided to the Town's Operation Manager);
- i) Provide documentation for load bank testing of genset, including oil sample testing report;
- j) Confirm that "Normal" and "Emergency" power is in phase and demonstration of the genset operation from Normal to Emergency and back to Normal mode proving louver operation;
- k) Engineering certification of ensuring the pumps rotation are correct;
- l) All electrical enclosures are operational and clean;
- m) Confirm capacitor sizing verse pump motor sizing. (If equipped) Perform Power Factor testing with and without load. Record same for evaluation;
- n) Demonstrates alarm functions get annunciated local and remote;

- o) Demonstration of a complete pump cycle, including alternation of lead pump as well as initiating a lead pump failure to prove lag pump backup operation;
- p) Provide Pump servicing reports;and
- q) Provide spare parts and information package for all warranties;
- r) Provide one (1) spare street light per subdivision (complete with luminaire assembly, arm, pole, and control device) for the Town's inventory in case of emergency street light replacement;
- s) Provide a plastic laminate fact sheet on the pumping station, including lowest basement elevation, location of forcemain outlet to gravity system and bypass invert elevation. The fact sheet shall be a minimum size of 11" x 17" and mounted adjacent to the control panel; and
- t) Provide a plastic laminate with process flow diagram indicating valves and key interlocks.

6.0 WATERMAIN DESIGN:

Water distribution systems shall be designed to provide adequate servicing of the subject lands (as required by MOE), as well as those lands which are situated beyond the site from the existing water source. Mains must be sized to supply for domestic needs, and have the capacity to provide adequate fire flow.

6.1 Design Flow:

- i 3.8 persons per household
- ii 23.3 cubic meter/ha/day for commercial
- iii Average Day Demand = 390 litres/capita/day
- iv Max day demand peaking factor = 1.80
- v Peak hour demand peaking factor = 5.00
- vi Minimum hour demand peaking factor = 0.65

6.2 Fire Flow Demands:

- i Residential = 6000 L/min (100 L/s)
- ii Commercial = 10000 L/min (167 L/s)
- iii School = 15000 L/min (250 L/s)

6.3 Operating Pressures:

- i Pressure range during maximum day demand = 350 KPa to 550 KPa
- ii Maximum pressure for all demand scenarios = 700 KPa
- iii Minimum pressure during peak hour demand = 275 KPa
- iv Minimum pressure during maximum day demand plus fire flow = 140 KPa

C-factor as recommended by the MOE

It shall be verified that these flows and pressures are available at all locations within the development. Consultants are required to provide the input values and demands in an approved tabular (spreadsheet) format, for verification by the Town.

6.4 Design Requirements:

- a) Mains shall be located at the required corridor of 4.5m from street line, preferably on the north and east side, or as may otherwise be shown on the standard road cross-sections. No permanent dead-end mains will be permitted.
- b) Geometric Requirements for easements for sewers and watermains to follow Public Works Policy No. 31. Refer to Appendix 'E'.
- c) Minimum diameter to be 200mm, except on small cul-de-sacs where 150mm watermain may be permitted to be used by specific approval of the Director of Planning and Development Services. Watermains up to and including 400mm shall be P.V.C. C900 Class 150 pipe. All watermains larger than 400mm shall be cement-lined Ductile Iron Class 52 conforming to ANSI specification A21-4-1974 or latest amendment.
- d) Minimum cover on watermain shall be 1.7m.
- e) Maximum hydrant spacing to be 125m.
- f) Mainline valves are to be gate valves and shall be located at all legs of all intersections (opposite curb radii). Maximum spacing is 150m.
- g) Valves for 300mm mains and larger shall be placed in precast concrete chambers. Chambers to have valve box and maintenance hole top flush with ground which shall be graded positively away from the chamber. Valve box access to be directly overtop operating valve (see Std's. W-102 & W-103).
- h) Valve chambers shall be connected to storm sewers with 150mm pipe. If not practical to do so chambers shall have open sump and stone-filled pit.
- i) Blow-offs shall be provided at the end of all dead end mains (see Std. W-108).
- j) Air release valves shall be placed in chambers at high points in mains 250mm and larger in size. For smaller mains hydrants can be used in place of air release valves, if the hydrant spacing can be adjusted to allow for a hydrant to be placed at the high point.
- k) Drain chambers on mains shall be placed on low points.
- l) Corrosion protection shall be to Town requirements and shall be itemized on construction drawings.
- m) All watermains to have 12 gauge tracing wire installed according to applicable Aurora standard drawings.
- n) Watermains to have 2.5m clearance from all sewers and minimum 0.5m vertical separation.
- o) All work to be as per Town of Aurora *General Specifications for the Construction of Buried Pipelines and Roadway Systems* Ontario Provincial Standard Specifications.

- p) All materials to conform to Town of Aurora approved materials list.
- q) All type “K” copper mains shall be continuous. No couplers permitted.
- r) All joints within engineered fill areas shall be restrained.
- s) Maintenance Holes or chambers 5.0m depth or greater shall be provided with Safety Platforms as per OPSD 404.01 or OPSD 404.02.

6.5 Water Service Connections:

- a) Each lot or block will be serviced in accordance with std. drawing – M409, 410 and 411.
- b) Residential lots to have 25mm type 'K' copper complete with curb stop and box located on streetline.
- c) Commercial/Industrial lots/blocks to have minimum 200mm water service complete with valve & box on streetline. Valves shall be anchored back to main.
- d) Water valves for residential development shall not be located in driveways.
- e) Services on residential lots to be located as per Town standard drawing M-409 and installed per W-101. Any services which must deviate from this location (or those on cul-de-sacs) shall be indicated on the engineering drawings.
- f) No connections shall be made to trunk sewers or mains without the approval of the Town of Aurora and/or the Regional Municipality of York.
- g) Water services shall be staked at the property line with 50mm x 100mm (2"x4") wood stakes buried 1.2m into ground and painted blue.

6.6 Sampling Stations and Hydrants:

- a) One Test Tap Water Sampling Station by Regal Waterworks Inc. shall be provided for each subdivision phase.
- b) All fire hydrants to be painted red with the 100mm storz painted black.
- c) All fire hydrants to be provided with colour coded markers.

7.0 TRANSPORTATION AND ROAD DESIGN:

7.1 ROAD DESIGN REQUIREMENTS:

- a) All roads to be constructed as per standard road cross-sections (Std. Dwg. R-209 through to R-213).

- b) Minimum pavement width shall be 8.0m (edge of pavement to edge of pavement).
- c) Minimum curb and sidewalk grade is 0.5%, maximum grade is 5%. For steeper roads, sidewalk will follow slope of the road.
- d) Boulevard cross-fall slope shall be 2% (max. allowable 5% only where specified).
- e) Changes in vertical alignment shall be designed utilizing smooth vertical curves having a "K" factor in accordance with current provincial specifications for vertical curves (i.e.- "K" values are to be 8, 10, 12, 15, 20, 25, etc.).
- f) Minimum centreline radius horizontal curve to be 115m for collector roads and 90m for local roads.
- g) Minimum angle bend to be according to Town standard drawing R-206.
- h) Curb radius at intersecting roads to be 9.0m.
- i) Cul-de-sac design to be as per Town standard drawing R-205.
- j) The following day lighting criteria for road allowances shall be incorporated into the design layout as per the Town's Official Plan:
- | | |
|-----------------------|----------------------------|
| Arterial - Any road | 15.0m x 15.0m |
| Collector - Collector | 10.0m x 10.0m |
| Collector - Local | 7.0m x 7.0m |
| Local - Local | 5.0m x 5.0m (or 5m radius) |
- k) All road pavement structures to have the following minimum compacted thickness unless otherwise recommended (exceeding) by a geotechnical engineer. All material shall be as per current OPS Specifications.
- For residential - local
- 40mm - HL3 surface course asphalt
 - 50mm - HL8 binding course asphalt
 - 150mm - 19mm crusher-run limestone base
 - 300mm - 50mm crusher-run limestone sub-base
- For residential collector and Industrial
- 50mm - HL3 surface course asphalt
 - 75mm - HL8 binding course asphalt
 - 150mm - 19mm crusher-run limestone base
 - 450mm - 50mm crusher-run limestone sub-base
- l) Testing and analysis of materials All work to be as per Town of Aurora *General Specifications for the Construction of Buried Pipelines and Roadway Systems* Ontario Provincial Standard Specifications.
- m) Testing and analysis of materials used shall be performed by a qualified Geotechnical Engineer and written reports of findings shall be submitted to the Director of Planning and Development Services for approval.

- n) All work to be carried out in accordance with current O.P.S. or Town specifications. Town specifications prevail where they exist.
- o) Utility road crossings to be a minimum 1.2m depth for local roads. All other roads including collector or industrial developments shall be 1.5m in depth.
- p) Where roads must be temporarily terminated for future extension beyond the limits of the subject development a temporary cul-de-sac must be constructed. The cul-de-sac must have full depth paving and concrete curbs per Town standards. Minimum radius of curb shall be 13.5m and appropriate easements shall be granted to the Town for the cul-de-sac.

7.2 DRIVEWAY SPECIFICATIONS:

- a) All residential driveways shall be constructed with asphalt pavement, or other hard surface acceptable to the Town, from the curb to the garage door of the dwelling. For estate lots, only the apron section of the driveway (from the curb or edge of the road to the property line) is required to be constructed in accordance with this specification.
- b) Driveway slopes shall be a minimum 2% and a maximum 8%
- c) The minimum clear distance between the edge of driveways and a utility structure shall be 1.2m.
- d) Driveway widths are subject to Zoning;
- e) Residential driveways shall be constructed with a minimum:
 - 150mm compacted depth of 19mm crusher-run limestone base
 - 50mm compacted depth of HL3A surface course asphalt

7.3 SIDEWALK SPECIFICATIONS:

7.3.1 Sidewalk Design for Subdivisions:

- a) Sidewalks locations shall be as per standard drawings R-209 to R-213.
- b) Based on road type:
 - Arterial roads: sidewalk shall be constructed on both sides.
 - Collector roads: 20.0m right-of-way sidewalk shall be constructed on one side.
23.0m right-of-way sidewalk shall be constructed on both sides.
 - Industrial collector roads: sidewalk shall be constructed on both sides if possible.
 - Local roads: 18.0m Right-of-way sidewalk shall be constructed on one side.
20.0m right-of-way sidewalk shall be constructed on one side.
23.0m right-of-way sidewalk shall be constructed on both sides.
- c) No sidewalks are required within cul-de-sacs with 30 units or less, unless there is a

walkway or path leading from the cul-de-sac to: another walkway or path; street; park; school; or plaza.

- d) All public walkways are required to lead to a sidewalk

7.3.2 Sidewalk Design For Capital Construction:

- a) Site conditions may dictate the locations and design of sidewalks. Proper engineering design and safety constraints shall be paramount when locating and designing sidewalks. Also, new and replacement sidewalks including curb cuts must be designed to ensure pedestrian accessibility as per AODA Design of Public Spaces Standard Guidelines.
- b) Sidewalks shall be typically located on the side of the street dictated by, but not limited to factors such as: cost, street lights, utility locations, connectivity of the sidewalk system, topographical constraints (ground elevations), and physical constraints (road allowance and driveway slopes).

7.4 TRAFFIC IMPACT STUDY:

The **Internal Traffic Study** is meant to be a separate study from the traditional traffic study that might be required for a new development, which would generally analyse the “big-picture” effects that traffic from the development would have at access points, on surrounding roads, and at intersections both internally and externally to the development. As outlined below the Internal Traffic Study requirements, otherwise refer to the “Town of Aurora Traffic Impact Study Guidelines” for all other traffic requirements.

Study Requirements:

The **Internal Traffic Study** is to address the following topics:

- i. Internal traffic flows in the development;
- ii. Proposed road design standards to accommodate the projected traffic loadings;
- iii. Potential on-street parking problems and recommended solutions;
- iv. Proposed traffic calming measures (if deemed necessary);
- v. Pedestrian and bicycle movements, along with any special design features proposed to accommodate these movements;
- vi. Traffic impacts on adjacent areas;
- vii. Linkages to facilities, other land uses, and transit;
- viii. Any other issues deemed necessary for the specific development;
- ix. Other authorities (i.e. MTO, York Region, and etc.).

7.5 TRAFFIC CONTROL PLAN:

This plan shall show all traffic control signage and line painting required in the development. The design of the signage shall follow the requirements of the *Ontario Traffic Manuals*, or the latest amendment thereto. The design shall also be optimized where possible to reduce the number of sign poles by combining two or more signs onto a single pole rather than using a separate pole for each sign.

8.0 GRADING AND DRAINAGE:

8.1 Objectives:

- The design of the overall grading of a development forms part of the engineering design of the subdivision, and is reviewed and approved by the Planning and Development Services Department.
- For infill developments an “Application to Construct” from the Building and By-Law Services Department requires a grading plan review and site review from the Planning and Development Services Department. See Drawing Standard M403.
- For commercial/industrial development where the development of individual Blocks will be done through the Planning and Development Services Departments Site Plan approval process. The Planning and Development Services Department will review and approve the grading as part of the review of the Site Plan application.
- Individual lot grading/house siting plans shall be submitted to the Building and By-Law Services Department for distribution to the Planning and Development Services Department for review and approval per the building permit application. Those plans shall incorporate all requirements of standard drawing. The consulting engineer shall certify these plans are correct with respect to the general grading plans.
- Grading design principals presented herein shall be utilized to:
 - i. minimize the use of rear lot catchbasins;
 - ii. minimize the use of retaining walls;
 - iii. the area grading and resulting drainage patterns shall not adversely affect the adjacent lands;
 - iv. all areas to be graded to drain water away from dwelling to provide maximum land usage;
 - v. the area draining across a sidewalk shall be minimized by designing the development such that if a sidewalk is placed in front of lots that have back to front drainage patterns, the lots behind the lots with the sidewalk must also have back-to-front drainage;
 - vi. no new development or phase shall drain into a preceding phase unless accommodated with the use of rear lot catchbasins.

8.2 Grading and Drainage Design Requirements:

- a) A 0.6 metre undisturbed strip shall be maintained within the subject property abutting all other existing lands.
- b) No alterations to existing boundary elevations or adjacent lands shall be undertaken unless written agreement with the adjacent property owner is obtained and submitted in a format acceptable to the Town of Aurora.
- c) Lawns and swales to be designed with minimum 2% and maximum 5% slope.
- d) Driveway grades shall not be less than 2% slope or greater than 8% slope.

- e) Side yard swales shall be placed on lot lines; run-off shall not be directed from one property onto the lower site.
- f) The maximum vertical grade transition across a front or rear yard shall be 1.2m. For walkout lots, the maximum vertical grade transition within the side yard between dwellings shall be 2.4m.
- g) 3:1 slopes shall not exceed a maximum height of 0.6m within the rear yard area. Two transition slopes may be used, one offset from each of the opposite property lines.
- h) Grades in excess of 3:1 or grade greater than 1.2m in height shall be accomplished by use of a retaining wall.
- i) Minimum depth of “usable” rear yard is to be 4.0 meters.
- j) The maximum flow allowed in a swale between two houses is that from 5 rear yards.
- k) The maximum length of a swale shall not exceed 90m.
- l) All areas beyond the approved plan, which are disturbed during construction, shall be restored to the satisfaction of the Town of Aurora.
- m) Minimum separation of 150mm shall be provided between the brickline and the final ground elevation and 200mm between siding and the final ground elevation.
- n) All lots to have 300mm of topsoil and sod.
- o) The maximum ponding depth over a rear lot catchbasin is 0.3m.
- p) The maximum rear yard swale length shall be 3 lot widths for single and semi-detached houses.
- q) The rear yard swale shall be offset 1.2m from the rear lot line.
- r) Sideyard separation of dwellings less than 1.2m, where sod is not likely to flourish may be replaced with 19mm clear stone at a depth of 100mm on subgrade with positive grade from the house to the swale low point.

8.3 Grading Plan Requirements:

8.3.1 Subdivision Grading Plan Requirements

- a) The following information is to be shown on all development general grading plans:
 - i. description and elevation of Town of Aurora benchmark;
 - ii. surface features such as streetlights, valves, hydrants, and driveways, etc.;
 - iii. existing contour lines before development to a minimum 50m beyond the limit of construction;

- iv. existing and proposed grades at lot corners;
 - v. specified house grades and house type (i.e. walkout);
 - vi. proposed road centreline grade and elevation at maximum 50m intervals;
 - vii. direction of surface run-off and length and slope of all major swales and ditches;
 - viii. all fencing, acoustical barriers and berms on all lots & blocks;
 - ix. retaining walls with top and bottom elevations;
 - x. easements including description and dimension;
 - xi. tree/vegetation preservation or other restrictive covenants.
 - xii. "Limit of Construction" and "Limit of Subdivision".
 - xiii. standard notes for general grading plan as per Appendix B, 7.0
- b) Subdivision individual detailed lot grading plan shall include:
- i. all lot grades (existing and proposed) to 5.0m beyond the property limit;
 - ii. driveway grades along both sides of the driveway (percentage grade);
 - iii. driveway widths at property line and garage;
 - iv. model of home;
 - v. proposed top of foundation, garage slab grade, as well as footing elevations and bottom of foundation, where applicable;
 - vi. retaining walls including top and bottom elevations;
 - vii. slope detail, percentage of fall;
 - viii. swales;
 - ix. surface runoff pattern;
 - x. sidewalk location;
 - xi. servicing structures such as transformers and terminal boxes, hydrants, streetlight poles, etc.;
 - xii. all fencing, acoustical barriers, and/or berms;
 - xiii. location and invert elevations of storm and sanitary laterals;
 - xiv. location of water box;
 - xv. location of proposed or registered easements;
 - xvi. the extent of engineered fill where applicable;
 - xvii. setbacks to the property line from the dwelling and deck or porch (covered or uncovered), where applicable;
 - xviii. tree preservation or other restrictive covenants;
 - xix. stamped or signed by the Controlling Architect and the development Engineer.

8.3.2 Infill Grading Plan Requirements

- a) The following information shall be shown on all infill grading plans:
- i. all lot grades (existing and proposed) to 5.0m beyond the property limit, this shall include grades of adjacent dwelling information;
 - ii. driveway grades along both sides of the driveway (percentage grade);
 - iii. driveway widths at property line and garage;
 - iv. proposed top of foundation, garage slab grade, as well as footing elevations and bottom of foundation, where applicable;
 - v. retaining walls including top and bottom elevations;
 - vi. swales offset from lot line a minimum 0.45m at a minimum 2.0% and maximum 5.0%;

- vii. lawn and swale slope detail, percentage of fall;
 - viii. surface runoff directional pattern;
 - ix. sidewalk location;
 - x. servicing structures such as transformers and terminal boxes, hydrants, streetlight poles, etc.;
 - xi. all fencing, acoustical barriers, and/or berms;
 - xii. location and invert elevations of storm and sanitary laterals;
 - xiii. location of water box;
 - xiv. location of proposed or registered easements;
 - xv. the extent of engineered fill where applicable;
 - xvi. setbacks to the property line from the dwelling and deck or porch (covered or uncovered), where applicable;
 - xvii. tree preservation or other restrictive covenants;
 - xviii. erosion and sediment control measures;
 - xix. applicable Regional Conservation Authority permit No. if applicable;
 - xx. stamped and signed by a Profession Engineer or Ontario Land Surveyor.
- b) The following standard notes shall appear on all infill grading plans:
- i. Grades and swales shall be a minimum 2.0% and maximum 5.0%.
 - ii. Driveway grades shall be a minimum 2.0% and maximum 8.0%.
 - iii. All disturbed areas to be established with 200mm of topsoil and sod.
 - iv. All existing boundary swales and grades shall be maintained to 0.3m within proposed lot.
 - v. Driveway shall be a minimum of 1.2m clear distance from boulevard appurtenances (ie. Streetlights, hydrants, utility pedestals, etc.).
 - vi. Limits of construction shall be maintained with erosion and sedimentation controls.
 - vii. All roof drains shall discharge onto splash pads.
 - viii. Minimum separation of 150mm shall be provided between the brickline and the final ground elevation and 200mm between siding and the final ground elevation

8.4 Retaining Walls:

Retaining walls considered as “Designated Structures” as per the Ontario Building Code (O.B.C.) section 1.3.1.1. shall require a permit from the Town of Aurora Building and By-Law Services Department. All other structures not considered as “Designated Structures” per the O.B.C. shall conform or require the following as per the Planning and Development Services Department requirements:

- a) Retaining walls are required where a 3:1 slope exceeds 1.0m in height.
- b) The use of timber retaining walls will not be permitted.
- c) Retaining walls are to be constructed entirely on the upper lot so that the tiebacks, backfill, or wall system does not cross property boundaries.
- d) All retaining walls with an exposed face height 0.6m or greater shall be designed and certified by a Professional Engineer specializing in structural engineering. The design must be accompanied by calculations clearly demonstrating that it is structurally satisfactory for the particular location and soil type.

- e) Any and all retaining walls shall have their construction certified by the Professional Engineer prior to the release of grading securities and to commence the maintenance period.
- f) Any retaining wall with an exposed face 0.6m and higher shall incorporate a black vinyl chain link fence 1.2m high. The structural stability of the retaining wall in use must be able to withstand any extra forces exerted by the fence as well as the earth loads.
- g) The detailed drawing shall include the following notes and illustrate:
 - i. That "The walls have been designed in accordance with accepted engineering principles";
 - ii. That "The wall is suitable for the geotechnical condition of the site and for the loading type";
 - iii. A weeping tile and outlet locations shown;
 - iv. A filter cloth envelope surrounding the compacted free draining granular material;
 - v. Sufficient top of wall and bottom of wall elevations;
 - vi. Type and material of wall;
 - vii. A cross-section for the length, type, and location of any tie-backs;
 - viii. The location, type, and fastening of the 1.2m black vinyl chain link fence.
 - ix. Surcharge load used and appropriate design calculation.
 - x. A swale at top of wall, if drainage directs to the wall.

9.0 ACOUSTICAL REQUIREMENTS:

The Planning and Development Services Department does not support the exercising of the 5 dBA "cushion" as permitted in the MOE guidelines (Noise Assessment Criteria in Land Use Planning, Publication LU-131, or latest revision thereof) for the sound level in the Outdoor Living Area.

- a) The maximum allowable height for any acoustic wall/fence shall be 2.5 metres. Any additional height must be accommodated through effective use of grading and berming.
- b) All acoustic fencing shall be constructed entirely onto the private lot side.
- c) Acoustic fence gates shall have a 1.2m clear opening.
- d) Gate installations allowing direct access from private property to public lands are not permitted.
- e) Acoustical fence details shall be shown on the engineering plans and on the Landscape Plans. The drawings shall incorporate the fence details and construction type. The berm details with sufficient amount of grades, and include the type of soil used, and footing depth.
- f) The construction of the acoustical barrier shall be designed and construction certified by a Professional Engineer. (Appendix 'B', B-6)

10.0 STREET LIGHTING:

10.1 STREET LIGHTING DESIGN:

10.1.1 Design:

Lighting designs shall be based on the latest version of *American National Standards Institute/Illuminating Engineering Society of North America's American National Standard Practice for Roadway Lighting*; (ANSI/IESNA RP-8-00).

Roadway lighting must provide uniform lighting at a level that is adequate and comfortable for vehicular and pedestrian movement on the roads and sidewalks. All roadway lighting systems shall be designed by an Engineer experienced in roadway lighting. Designs shall be carried out using the luminance method as described in RP-8-00 (unless noted otherwise) by a qualified engineer, while incorporating the Town standards and specifications as given below.

As per the current roadway lighting policy, all proposed lighting shall be reviewed and approved by the Planning and Development Services Department. Lighting design submissions to the Town must include:

- a) Photometric distribution diagram
- b) design criteria used
- c) design calculations
- d) contract drawings and specifications
- e) manufacturers literature

All roadway lighting design and construction must satisfy Electrical Safety Authority (ESA) requirements, and is subject to ESA inspection and approval. All materials used for roadway lighting must meet Canadian Standards Association (CSA) specifications.

10.1.2 Materials:

All roadway lighting equipment used must meet the current Town's roadway lighting standards and specifications. It shall be the responsibility of the street lighting contractor to ensure they have the latest revisions of the Town's street lighting specifications and list of approved suppliers prior to ordering any materials. All street lighting components are to be manufactured in strict accordance with the Town's current requirements.

Unless otherwise indicated, all electrical materials shall be new and of uniform pattern throughout the work.

ESA shall approve all materials, components or completed assemblies of components the

equipment manufactured to the Canadian Highway Bridge Design Code (CHBDC), Municipal Standards (MS) or the Ontario Provincial Standards (OPS).

10.1.2.1 Streetlight Conductor:

2 number 6 Cu. RWU-90-CSA c/w 1-#6 jacketed green ground (for 120V).

3 number 6 Cu. RWU-90-CSA c/w 1-#6 jacketed green ground (for 240V).

Cables are to be installed in 50mm continuous PVC Type 2 duct in accordance with the ESA.

The pedestal supply cable shall be 3-#2Cu RWU-90-CSA.

10.1.3 Electrical Drawings:

The electrical layout drawings are a schematic representation of the requirements. All equipment shall be installed in locations detailed in the contract.

10.1.4 Road Surfaces:**TABLE 1****Classification of Road surfaces Based on Reflectance (RP-8)**

Type of Road Surface	Reflectance Value	Description of Road Surface
R1	0.10	Portland cement concrete
R2	0.07	Asphalt with minimum of 60% gravel
R3	0.07	Asphalt with dark aggregate
R4	0.08	Asphalt with a very smooth texture

10.1.5 IES Illumination and Luminance Design Criteria:

The illuminance method of roadway lighting calculations determines the amount or quality of light incident on the roadway surface and the luminance method of roadway lighting calculations determines how 'bright' the road is by determining the amount of light reflected from the pavement in the direction of the driver. The recommended illuminance and luminance values, uniformity ratios and the disability veiling ratios are given in Table 2. The design values for luminance (and illuminance in the case of sidewalks) in Table 2 are taken from ANSI/IES RP-8, 2000.

TABLE 2**Illuminance & Luminance Design Criteria for Mid-Block Sections (Non-Intersection Areas)**

Road and Pedestrian Conflict Area Classification	Luminance Values for Mid-Block Roadways					Illumination for Sidewalks	
	Average Maintained Illuminance (R2 & R3) (Lux) E_{avg}	Average Maintained Luminance (cd/m^2) L_{avg}	Uniformity Ratio (Maximum Allowed) L_{avg} / L_{min}	Uniformity Ratio (Maximum Allowed) L_{max} / L_{min}	Veiling Luminance Ratio (Maximum Allowed) L_{vmax} / L_{avg}	Average Maintained Illuminance (Lux) E_{avg}	Uniformity Ratio (Maximum Allowed) E_{avg} / E_{min}
Residential (Local– Low)	4.0	0.3	6.0 to 1	10.0 to 1	0.4 to 1	3.0	6.0 to 1
Industrial (Local– medium)	7.0	0.5	6.0 to 1	10.0 to 1	0.4 to 1	5.0	4.0 to 1
Residential (Collector – Low)	6.0	0.4	4.0 to 1	8.0 to 1	0.4 to 1	4.0	4.0 to 1
Industrial (Collector– Medium)	9.0	0.6	3.5 to 1	6.0 to 1	0.4 to 1	5.0	4.0 to 1

The above illuminance and luminance values are to be used in calculating the spacing for standard and decorative street lighting fixtures on local residential, local industrial, residential collector and industrial collector streets.

10.1.6 Maximum Spacing for Street Lights on Standard Road Sections:

Using the luminaire/pole combinations listed below, table 3 gives the allowable spacing for street lights for straight sections, gradual curves and gently sloping grades for two sided and single sided arrangements.

TABLE 3
Maximum Spacing on Straight Sections

Type of Luminaire	Type of R.O.W.	Two Sided	One Sided	
			Same side as SW	Opposite side as SW
100 Watt Standard (9.6m pole)	20m Local Residential (Std. Dwg. R-210)	52m	48m	37m
100 Watt Decorative (8.8m pole)	20m Local Residential (Std. Dwg. R-210)	47m	45m	27m
150 Watt Standard (11.3m pole)	26m Residential Collector (Std. Dwg. R-212)	67m	N/A	54m
150 Watt Decorative (9.6m pole)	26m Residential Collector (Std. Dwg. R-212)	55m	N/A	49m
150 Watt Standard (11.3m pole)	20m Local Industrial (Std. Dwg. R-213)	65m	62m	60m

Notes:

- 1) *This spacing covers placing the streetlights on the same side or opposite side of the sidewalk.*
- 2) *This spacing is based on a two meter offset from curb face. If the standard off-set of five meters is used, the spacing is reduced to 40 meters.*
- 3) *Assumes the brackets will be mounted on the hydro poles at a height which will result in a luminaire mounting height of at least 10.5 meters (34.5 feet).*

10.1.7 Curves and Hills:

Table 2, Maximum Spacings on Straight Sections, is to be used on relatively straight and level sections only. When lighting curves and/or hills; the spacings in Table 2 should be modified in accordance with the procedures given in ANSI/IES RP-8 2000.

10.1.8 Lighting for Intersections:

The luminance method is difficult to use with the design of lighting for intersections due to the basic assumptions inherent in luminance design and the methods used in its calculation. Therefore illuminance criteria and calculations are recommended for use in the design of intersections. Intersections should be illuminated to a level equal to the sum of the recommended average illumination levels for each of the intersecting roads. These levels are given in Table 3, below.

At a minimum, all lane changes (additions or subtractions), left or right turn lanes, median islands, etc. should be adequately illuminated and are recommended to be included in the

illumination design calculations.

TABLE 4
Illuminance Design Criteria for Intersections and Sidewalks/Bike paths

Illuminance Design Criteria for Roadways at Intersections					
Road and Pedestrian Conflict Area Classification	Average Maintained Illumination at Pavement by Pedestrian Area classification (R2 & R3 Pavements) E_{avg} (lux)				Maximum Illuminance Uniformity Ratio E_{avg} / E_{min}
	Low/Low	Low/Medium	Medium/Low	Medium/Medium	
Local/Local	8.0	11.0	11.0	14.0	6 to 1
Local/Collector	10.0	13.0	13.0	16.0	4 to 1
Collector/Collector	12.0	15.0	15.0	18.0	4 to 1

Note: Meeting the IES E_{avgmin} (minimum vertical illuminance at 1.5 m above the sidewalk/bikeway measured in both directions parallel to the main pedestrian flow) specification is not required by the Town at this time due to the short spacing needed to meet the requirement.

Typical lighting layouts for intersections are given in ANSI/IES RP-8-00 in Annex “D”, Figure D3 on page 40 and in the Transportation Association of Canada’s (TAC) “Intersections Lighting”, 2006.

10.1.9 Light Trespass:

The basic light trespass requirements as per the current acceptable practice, the vertical illuminance values should be limited to a maximum of 3.0 lux at a height of 1.5m above finished grade along the property line.

TABLE 5
Recommended Lighting Configurations for Town Roads

Type of Road	Lighting Configuration ⁽¹⁾	Pole Offset ⁽²⁾⁽³⁾⁽⁴⁾
All Roads 3 Lanes or Less	Single Sided or Staggered	TAC criteria or on shoulder rounding
All Roads 4 Lanes or Greater	Opposite	TAC criteria

Notes:

- 1) The lights on the hydro pole side of the road shall be mounted on the hydro poles if possible.
- 2) Lights should be installed on all the primary traffic signal poles where possible. Where

overhead line or other restrictions prevent the placing of an appropriate street light/bracket combination on a traffic signal pole, an alternate location shall be used.

- 3) Pole types and offsets shall be set in accordance with the Transport Association of Canada (TAC) Clear Zone Offsets criteria given in their "Clear Zone Requirements" chart (Figure 5-40, Guide for the Design of Roadway Lighting, Volume 1, 2006).
- 4) Where the TAC offset is not possible on rural cross sections, the poles shall be placed on the shoulder rounding.

10.1.10 Road/Entrance Crossings:

The street lighting ducts shall be heavy wall PVC or polyethylene duct with a minimum cover of 1200 mm under roadways and all commercial and industrial driveways. The ducts shall be installed in accordance with the requirements of the Town of Aurora. Where a road crossing is required on a project that does not include road reconstruction, it shall be installed via a trenchless method.

10.2 STANDARD STREET LIGHTING:

10.2.1 Standard Poles:

Standard street light poles must conform to the *Municipal Electrical Association (MEA) Guide to Municipal Standard Construction, Street Lighting, Part 6, Section VIII, Sub-section 5 (Specification for Poles)*, latest revision.

9.6m Direct Buried Concrete Pole-The pole for use with the 100 watt standard luminaire shall be a 31.5 foot (9.6m) direct buried Class B pre-stressed round concrete pole with provision for electrical ground, mold finish and suitable for a powerlite RE6MA bracket, being either a StressCrete catalogue No. E-315-BPR-G-MOO-s/f126, or a Utility structures Inc. Catalogue No. CP315B10.

11.3m Direct Buried Concrete Pole- The pole for use with the 150 watt standard luminaire shall be a 37 foot (11.3m) direct buried Class B pre-stressed round concrete pole with provision for electrical ground, mold finish and suitable for a powerlite RE8MA bracket, being either a StressCrete catalogue No. E-370-BPR-G-MOO-s/f128, or a Utility structures Inc. Catalogue No. CP37B10.

10.2.2 Standard Brackets:

Standard street light brackets must conform to the *MEA Guide to Municipal Standard Construction, Street Lighting, Part 6, Section VIII, Sub-section 4 (Specification for Tapered Aluminium Brackets)*, latest revision.

1.8m Elliptical Bracket- The bracket for use with the 100 watt street lighting luminaire shall be a 6 foot (1.8m) tapered elliptical aluminium bracket - powerlite

catalogue No. RE6MA.

2.4m Elliptical Bracket- The bracket for use with the 150 watt street lighting luminaire shall be a 8 foot (2.4m) tapered elliptical aluminium bracket - powerlite catalogue No. RE8MA.

10.2.3 Standard Luminaires:

Luminaires, regardless of style, shall come complete with a bird stop and have a full cutoff distribution classification. Semi-cutoff and non-cutoff luminaires are not permitted. If the impact of using a full cutoff luminaire on a particular project is severe, then approval from the Town may be obtained to waive this requirement. 'Cobra Head' luminaires will be the standard installation of the Town, and shall conform to the *MEA Guide to Municipal Standard Construction, Street Lighting, Part 6, Section VIII, Sub-Section 2.1* (Specification for High Pressure Sodium Roadway Lighting Luminaires), latest revision; however, requests for other types will be considered.

100 Watt Street Lighting Luminaire- The 100 watt street lighting luminaire shall be a **Powerlite 100 watt HPS R47** luminaire, 120 Volt supply voltage, HPF reactor ballast complete with photo control cell – Powerlite catalogue No. R47G10S4W2MSRCS (distribution to match photometric curve No. TR1348.IES), or a **Cooper lighting 100 watt HPS OVZ** luminaire, 120 Volt supply voltage, HPF reactor ballast complete with photo control receptacle – Cooper Lighting catalogue No. OVZ10S12RHTL (distribution to match photometric curve No. 31605.IES).

150 Watt Street Lighting Luminaire- The 150 watt street lighting luminaire shall be a **Powerlite 150 watt HPS R47** luminaire, 120 Volt supply voltage, HPF reactor ballast complete with photo control cell – Powerlite catalogue No. R47G15S4W2MSRCS (distribution to match photometric curve No. TR1379.IES), or a **Cooper lighting 150 watt HPS OVZ** luminaire, 120 Volt supply voltage, HPF reactor ballast complete with photo control receptacle – Cooper Lighting catalogue No. OVZ15S12RHTL (distribution to match photometric curve No. 32520.IES).

10.2.4 Standard Street Lighting Table:

In general, the luminaire, pole and bracket combinations in Table 4 below are recommended.

TABLE 6
Typical Pole, Luminaire & Bracket Combinations

Pole Size Catalog No.	Luminaire Catalog No., Photometric files	Bracket Size Catalog No.
31.5 foot (9.6 m) Stress-Crete: E-315-BPR-G-MOO-s/f126 Utility Structures Inc.: CP315B10	100 Watt Powerlite: R47G10S4W2MSRCS, TR1348 Cooper: OVZ10S12RHTL, 31605.IES	6 foot (1.8 m) Powerlite RE6MA
37.0 foot (11.3 m) Stress-Crete: E-370-BPR-G-MOO-s/f128 Utility Structures Inc.: CP37B10	150 Watt Powerlite: R47G15S4W2MSRCS, TR1379 Cooper: OVZ10S12RHTL, 32520.IES	8 foot (2.4 m) Powerlite RE8MA
30.0 foot (9.1 m) POWCO 8530 Series Octagonal Steel	200 Watt, General Electric M-400A Series Luminaire, Catalogue No. MDRL20S1P21RMC31, GE-1010.IES	8 foot (2.4 m) Powerlite RE8MA
35.0 foot (10.7 m) POWCO 8535 Series Octagonal Steel	250 Watt, General Electric M-400A Series Luminaire, Catalogue No. MDRL25S1P21RMC31, GE-1010.IES	8 foot (2.4 m) Powerlite RE8MA

Note:

- 1) Pole types assume TAC criteria as described in the Town of Aurora Street lighting design criteria Table 4 can be met, otherwise alternatives may be necessary.

10.3 DECORATIVE STREET LIGHTING:

10.3.1 Decorative Poles:

Decorative street light poles must conform to the *MEA Guide to Municipal Standard Construction*, Street Lighting, Part 6, Section VIII, Sub-section 5 (Specification for Poles), latest revision.

8.8m Decorative Direct Buried Concrete Pole- The pole for use with the 100 watt decorative luminaire shall be a 29.0 foot (8.8m) direct buried Class A pre-stressed octagonal concrete pole with black finned cap and provision for electrical ground, black polished finish and suitable for a powerlite AS5SEBK or a Cooper SCA5001BK bracket, being either a StressCrete catalogue No. E-290-APO-G-S11-FC (Blk) S/F, or a Utility structures Inc. Catalogue No. MA-290-A-2-BE-60-F.

9.6m Decorative Direct Buried Concrete Pole- The pole for use with the 150 watt decorative luminaire shall be a 31.5 foot (9.6m) direct buried Class B pre-stressed octagonal concrete pole with black finned cap and provision for electrical ground, black polished finish and suitable for a powerlite AS6SEBK or a Cooper SCA6001BK bracket, being either a StressCrete catalogue No. E-315-APO-G-S11-FC (Blk) S/F, or a Utility structures Inc. Catalogue No. CP315BSPBE.

10.3.2 Decorative Brackets:

Street light brackets must generally conform to the *MEA Guide to Municipal Standard Construction*, Street Lighting, Part 6, Section VIII, Sub-section 4 (Specification for tapered Aluminium Brackets), latest revision, with the changes necessary to apply to arms for decorative fixtures.

1.5m Decorative Bracket- The bracket for use with the 100 watt decorative street lighting luminaire shall be a 5 foot (1.5m) black bracket/scroll arm - powerlite catalogue No. AS5SEBK or Cooper Lighting catalogue No. SCA5001BK.

1.8m Decorative Bracket- The bracket for use with the 150 watt decorative street lighting luminaire shall be a 6 foot (1.8m) black bracket/scroll arm - powerlite catalogue No. AS6SEBK or Cooper Lighting catalogue No. SCA6001BK.

10.3.3 Decorative Luminaires:

Luminaires are to be “coach light” style and shall conform to the *MEA Guide to Municipal Standard Construction*, Street Lighting, Part 6, Section VIII, Sub-section 2.1 (Specification for High Pressure Sodium Roadway Lighting Luminaires), latest revision. Luminaires, regardless of style, shall have a full cutoff distribution classification. Semi-cutoff and non-cutoff luminaires are not permitted. If the impact of using a full cutoff luminaire on a particular project is severe, then approval from the Town may be obtained to waive this requirement.

100 Watt Decorative Street Lighting Luminaire- The 100 watt street lighting luminaire shall be a Cooper Lighting 100 watt HPS “Springdale” black coach style luminaire, 120 Volt supply voltage, HPF reactor ballast complete with photo control receptacle – Copper Lighting catalogue No. SDL10S12RH2RBK (distribution type to match photometric curve No. C4731.IES).

150 Watt Decorative Street Lighting Luminaire- The 150 watt street lighting luminaire shall be a Cooper Lighting 150 watt HPS “Springdale” black coach style luminaire, 120 Volt supply voltage, HPF reactor ballast complete with photo control receptacle – Copper Lighting catalogue No. SDL15S12RH2RBK (distribution type to

match photometric curve No. C4731.IES).

10.3.4 Decorative Street Lighting Table:

In general, the pole, luminaire and bracket combinations in Table 4 below are recommended.

TABLE 7
Typical Pole, Luminaire & Bracket Combinations

Pole Size Catalog No.	Luminaire Catalog No., Photometric files	Bracket Size Catalog No.
29.0 foot (8.8 m) Stress-Crete: E-290-APO-G-S11-FC(Blk)S/F Utility Structures Inc.: CP29ASOBE	100 Watt, Cooper: SDL10S12RH2RBK, C4731	5 foot (1.5 m) Powerlite: AS5SEBK Cooper: SCA5001BK
31.5 foot (9.6 m) Stress-Crete: E-315-BPO-G-S11-FC(Blk)S/F Utility Structures Inc.: CP315BSOBE	150 Watt, Cooper: SDL15S12RH2RBK, C4731	6 foot (1.8 m) Powerlite: AS6SEBK Cooper: SCA6001BK

Note:

1. Pole types assume TAC criteria as described in the Town of Aurora Street lighting design criteria Table 4 can be met, otherwise alternatives may be necessary.

Street lighting system shall be designed by a qualified engineer and incorporate the above suggested details. Upon completion of the installation of the street lighting system the consultant shall be required to certify that the lighting has been installed in accordance with these standards and is providing satisfactory lighting levels.

10.4 LED STREET LIGHTING

The Town of Aurora is dedicated to the installation of LED lighting for both retrofit and new development projects. All developments and retrofit projects shall review feasibility of installing LED lighting to reflect Town of Aurora's policies related to the LED enhancement.

10.4.1 Design:

Refer to Design comments as per Section 10.1.1 for LED Street Lighting and Parking Lot Lighting Design.

The luminaire shall be UL listed under UL 1598 for luminaires or an equivalent standard from a recognized testing laboratory. The Luminaires shall be expected to operate an average time of 11.5 hours per night at an average nighttime temperature or 70 F for a projected L70 life of at least 100,000 hours. The individual LEDs shall be connected such that a

catastrophic loss or a failure of 1 LED will not result in the loss of the entire luminaire. A house side shield is required for house side light control that does not hang below the bottom of the luminaire.

10.4.2 Luminaire Identification

Each luminaire shall have the manufacturer's name, trademark, model number, serial number, date of manufacture (month-year), rated voltage in watts, and lot number as identification permanently marked on the back of the module.

10.4.3 Compatibility

The luminaire shall be operationally compatible with currently used lighting control systems, photoelectric controls, and wireless (radio frequency, mesh network, etc.) and power line carrier lighting control systems.

10.4.4 Photoelectric Control

Photoelectrical control shall conform to Section 86-6.07, "Photoelectric Controls" of the Standard Specifications except as modified herein. A photoelectric unit shall be supplied for each luminaire, connected to the same voltage as the luminaire.

10.4.5 Materials:

Refer to Materials comments as per Section 10.1.2 for LED Street Lighting and Parking Lot Lighting Design.

10.4.6 Electrical Drawings:

Refer to Electrical Drawings comments as per Section 10.1.3 for LED Street Lighting and Parking Lot Lighting Design.

10.4.7 Road Surfaces:

Refer to Road Surfaces as per Section 10.1.4, Table 1- 'Classification of Road Surfaces based on Reflectance (RP-8)' for LED Street Lighting and Parking Lot Lighting Design.

10.4.8 IES Illumination and Luminance Design Criteria:

Follow IES Illumination and Luminance Design Criteria as per Section 10.1.5, Table 2- 'Illuminance & Luminance Design Criteria for Mid-Block Sections (Non-Intersection Areas)'. The design values for luminance and illuminance are taken from ANSI/IES RP-8, 2000.

10.4.9 Maximum Spacing for Street Lights on Standard Road Sections:

Maximum Spacing between LED Street Lighting Luminaires shall be used as per LED luminaire/pole combinations listed below in Table 3a - Maximum Spacing on Straight Sections for LED Street Lighting for Retrofit projects **and** Table 3b- Maximum Spacing on Straight Sections for LED Street Lighting for New projects.

The allowed spacing is optimized luminaire spacing for street lights for straight sections, gradual curves and gently sloping grades for two sided and single sided arrangements for different road geometries.

TABLE 8a
Maximum Spacing on Straight Sections
For LED Street Lighting- Retrofit Projects

Luminaire		Mounting Height/ Arm Length (m)	Type of R.O.W.	Maximum Spacing (m)		
Existing	LED Replacement			One Sided	Two Sided	
					Opposite	Staggered
250 Watt Standard HPS	GE Lighting Cat# ERS3-0-KXEX-5-40 (Evolve Series)	14.1/2.9	Major Arterial 17.5 m Road Width 5 lanes @ 3.5 m with 3m setback	n/a	60	n/a
	LED Roadway Lighting Cat# SAT-72S-525mA-T2 (Satellite Series)					
150 Watt Standard HPS	GE Lighting Cat# ERS2-0-EXEX-5-40 (Evolve Series)	11.3/2.4	Collector 14 m Road Width 4 lanes @ 3.5 m with 3m setback (Std. Dwg. R-212)	n/a	67	n/a
	LED Roadway Lighting Cat# SAT-48S-525mA-T2M (Satellite Series)					
100 Watt Standard HPS	GE Lighting Cat# ERS1-0-CXEX-5-40 (Evolve Series)	9.6/1.8	Local 8 m Road Width 2 lanes @ 4 m with 2.0 m setback (Std. Dwg. R-210)	48	n/a	52
	Cooper Lighting Cat# NAV-AA-01-E-UNV-SL2 (Nav Navion Series)					

100 Watt Decorative HPS	Cooper Lighting Cat# SDL-B03-LED-E-U-SL2-KU (Street works Series)	9.6/1.8	Local 8 m Road Width 2 lanes @ 4 m with 2.0 m setback (Std. Dwg. R-210)	45	n/a	47
150 Watt Decorative HPS	Cooper Lighting Cat# SDL-B03-LED-E-U-SL2-KU (Street works Series)	11.3/2.4	Collector 14 m Road Width 4 lanes @ 3.5 m with 3m setback (Std. Dwg. R-212)	n/a	55	n/a
150 Watt Standard HPS	GE Lighting LED Roadway Lighting	11.3/2.4	Parking Lot (Generic)	n/a		

TABLE 8b
Maximum Spacing on Straight Sections
For LED Street Lighting- New Projects

LED Luminaire	Mounting Height/ Arm Length (m)	Type of R.O.W.	Maximum Spacing (m)		
			One Sided	Two Sided	
				Opposite	Staggered
GE Lighting Cat# ERS3-0-KXEX-5-40 (Evolve Series)	14.1/2.9	Major Arterial 17.5 m Road Width 5 lanes @ 3.5 m with 3m setback	n/a	61	n/a
LED Roadway Lighting Cat# SAT-72S-525mA-T2 (Satellite Series)					
CREE LED Lighting – XSPA or equivalent			n/a	n/a	n/a
GE Lighting Cat# ERS2-0-EXEX-5-40 (Evolve Series)	11.3/2.4	Collector 14 m Road Width 4 lanes @ 3.5 m with 3m setback (Std. Dwg. R-212)	n/a	68	n/a
LED Roadway Lighting Cat# SAT-48S-525mA-T2M (Satellite Series)					
CREE LED Lighting – XSPA or equivalent			n/a	n/a	n/a

GE Lighting Cat# ERS1-0-CXEX-5-40 (Evolve Series)		9.6/1.8	Local 8 m Road Width 2 lanes @ 4 m with 2.0 m setback (Std. Dwg. R- 210)	58	n/a	105
LED Roadway Lighting Cat# SAT-48S-525mA-T2M (Satellite Series)				n/a	n/a	n/a
CREE LED Lighting – XSPA or equivalent				n/a	n/a	n/a
Cooper Lighting Cat# SDL-03-LED-E-U-SL2-BKU(Street works Series)		9.6/1.8	Local 8 m Road Width 2 lanes @ 4 m with 2.0 m setback (Std. Dwg. R- 210)	45	n/a	47
CREE LED Lighting – XSPA or equivalent				n/a	n/a	n/a
Cooper Lighting Cat# SDL-03-LED-E-U-SL2-BKU (Street works Series)		11.3/2.4	Collector 14 m Road Width 4 lanes @ 3.5 m with 3m setback (Std. Dwg. R- 212)	n/a	55	n/a
CREE LED Lighting – XSPA or equivalent				n/a	n/a	n/a
150 Watt Standard HPS	GE Lighting	11.3/2.4	Parking Lot (Generic)	n/a		
	LED Roadway Lighting					

The Consultant is responsible for determining which lighting levels apply, together with the evaluating optimized spacing required to achieve these levels utilizing IES recommended practices. Note that where Town Standard Drawings are utilized, the Consultant is responsible to complete a photometric analysis to confirm spacing which meets Town's requirements and to include this information on the Detailed Design Drawings.

10.4.10 Curves and Hills:

Table 8a and 8b, Maximum Luminaire pole spacing on Straight Sections for both retrofit and new projects, is to be used on relatively straight and level sections only. When lighting curves and/or hills; the spacing in Table 8a and 8b should be modified in accordance with the procedures given in ANSI/IES RP-8 2000.

10.4.11 LED Lighting for Intersections:

Refer to ANSI/IES RP-8-00 table 9 for illuminance levels for intersections

10.4.12 Light Trespass:

Refer to Section 10.1.9 for LED Street Lighting and Parking Lot Lighting Trespass considerations.

10.4.13 Road/Entrance Crossings:

Refer to Section 10.1.10

10.5 STANDARD LED STREET LIGHTING:**10.5.1 Standard Poles and Brackets:**

Refer to Section 10.2.1 and 10.2.2 for standard Poles and Brackets for LED lighting

10.5.2 Standard LED Luminaires:

Standard LED Luminaires, regardless of style, shall come complete with a bird stop and have a full-cutoff distribution classification. Semi-cutoff and non-cutoff luminaires are not permitted. If the impact of using a full-cutoff luminaire on a particular project is severe, then approval from the Town may be obtained to waive this requirement.

10.5.2.1a LED Standard Luminaire on Local Roadway Retrofit Projects:

The LED street lighting luminaire equivalent to 100 Watt HPS shall be a

Cooper lighting 51 watt LED Nav Navion Series luminaire, 120 Volt supply voltage, Complete with photo control receptacle – Cooper Lighting catalogue no. NAV-AA-01-E-UNV-SL2

(Distribution to match photometric curve no.: NAV-AA-01-E-UNV-SL2.IES)

OR

GE Lighting 62 watt LED Evolve Series luminaire, 120 Volt supply voltage, Complete with photo control cell – GE Lighting Catalog# ERS1-0-CXEX-5-40

(Distribution to match photometric curve no.: GE454651.IES)

10.5.2.1b LED Standard Luminaire on Local Roadway New Projects:

The LED street lighting luminaire equivalent to 100 Watt HPS shall be a

GE Lighting 62 watt LED Evolve Series luminaire, 120 Volt supply voltage, Complete with photo control cell – GE Lighting Catalog# ERS1-0-CXEX-5-40

(Distribution to match photometric curve no.: GE454651.IES)

OR

LED Roadway Lighting 83 watt LED Satellite Series luminaire, 120 Volt supply voltage, Complete with photo control receptacle – LED Roadway Lighting Catalog# SAT-48S-525mA-T2M

(Distribution to match photometric curve No. SAT-48S-525mA-T2M.IES)

10.5.2.2a LED Standard Luminaire on Collector Roadway Retrofit Project:

The LED street lighting luminaire equivalent to 150 Watt HPS shall be a

GE Lighting 80 input watt LED Evolve Series luminaire, 120 Volt supply voltage, Complete with photo control cell – GE Lighting Catalog# ERS2-0-EXEX-5-40

(Distribution to match photometric curve No. GE454657.IES)

OR

LED Roadway Lighting 83 watt LED Satellite Series luminaire, 120 Volt supply voltage, Complete with photo control receptacle – LED Roadway Lighting Catalog# SAT-48S-525mA-T2M

(Distribution to match photometric curve No. SAT-48S-525mA-T2M.IES)

10.5.2.2b LED Standard Luminaire on Collector Roadway New Project:

The LED street lighting luminaire equivalent to 150 Watt HPS shall be a

GE Lighting 80 input watt LED Evolve Series luminaire, 120 Volt supply voltage, Complete with photo control cell – GE Lighting Catalog# ERS2-0-EXEX-5-40

(Distribution to match photometric curve No. GE454657.IES)

OR

LED Roadway Lighting 83 watt LED Satellite Series luminaire, 120 Volt supply voltage, Complete with photo control receptacle – LED Roadway Lighting Catalog# SAT-48S-525mA-T2M

(Distribution to match photometric curve No. SAT-48S-525mA-T2M.IES)

10.5.2.3a LED Standard Luminaire on Major Arterial Roadway Retrofit Project:

The LED street lighting luminaire equivalent to 250 Watt HPS shall be a

GE Lighting 152 input watt LED Evolve Series luminaire, 120 Volt supply voltage, Complete with photo control cell –

GE Lighting Catalog# ERS3-0-KXEX-5-40

(Distribution to match photometric curve No. GE454949.IES)

OR

LED Roadway Lighting 111 input watt LED Satellite Series luminaire, 120 Volt supply voltage, Complete with photo control receptacle –

LED Roadway Lighting Catalog# SAT-72S-525mA-T2

(Distribution to match photometric curve No.: SAT-72M-525mA-T2.IES)

10.5.2.3b LED Standard Luminaire on Major Arterial Roadway New Project:

The LED street lighting luminaire equivalent to 250 Watt HPS shall be a

GE Lighting 152 input watt LED Evolve Series luminaire, 120 Volt supply voltage, Complete with photo control cell –

GE Lighting Catalog# ERS3-0-KXEX-5-40

(Distribution to match photometric curve No. GE454949.IES)

OR

LED Roadway Lighting 111 input watt LED Satellite Series luminaire, 120 Volt supply voltage, Complete with photo control receptacle –

LED Roadway Lighting Catalog# SAT-72S-525mA-T2

(Distribution to match photometric curve No.: SAT-72M-525mA-T2.IES)

10.5.3 Standard LED Street Lighting Table:

In general, the luminaire, pole and bracket combinations in Table 4 below are recommended.

TABLE 9
Typical Pole, LED Luminaire & Bracket Combinations

Pole Size Catalog No.	Equivalent HPS R.O.W	LED Luminaire Catalog No., Photometric files	Bracket Size Catalog No.
31.5 foot (9.6 m) Stress-Crete: E-315- BPR-G-MOOs/ f126 Utility Structures Inc.: CP315B10	100 Watt Standard HPS Local Roadway	GE Lighting Cat# ERS1-0-CXEX-5-40 Series: Evolve Photometric File:GE454651.IES	6 foot (1.8 m) Powerlite RE6MA
		Cooper Lighting Cat# NAV-AA-01-E-UNV-SL2 Series: Nav Navion Photometric File: NAV-AA-01-E-UNV-SL2.IES	
37.0 foot (11.3 m) Stress-Crete: E-370- BPR-G-MOOs/f128 Utility Structures Inc.: CP37B10	150 Watt Standard HPS Collector Roadway	GE Lighting Cat# ERS2-0-EXEX-5-40 Series: Evolve Photometric File: GE454657.IES	8 foot (2.4 m) Powerlite RE8MA
		LED Roadway Lighting Cat# SAT-48S-525mA-T2M Series: Satellite Photometric File:	

		SAT-48S-525mA-T2M.IES	
46.25 foot (14.1 m)	250 Watt Standard HPS	GE Lighting Cat# ERS3-0-KXEX-5-40 Series: Evolve Photometric File: GE454949.IES	9.5 foot (2.9 m)
		LED Roadway Lighting Cat# SAT-72S-525mA-T2 Series: Satellite Photometric File: SAT-72M-525mA-T2.IES	

10.6 DECORATIVE LED STREET LIGHTING:

10.6.1 Decorative Poles and Brackets:

Refer to Section 10.3.1 and 10.3.2 for decorative Poles and Brackets for LED lighting

10.6.2 Decorative LED Luminaires:

Luminaires are to be “coach light” style and shall have a full-cutoff distribution classification. Semi-cutoff and non-cutoff luminaires are not permitted. If the impact of using a full-cutoff luminaire on a particular project is severe, then approval from the Town may be obtained to waive this requirement.

10.6.2.1 LED Decorative Luminaire on Local Roadway:

Cooper lighting 73 input watt LED Street works Series “Springdale” black coach style luminaire, 120 Volt supply voltage, Complete with photo control receptacle – Cooper Lighting Catalog # SDL-B03-LED-E-SL2-BKU

(Distribution to match photometric curve No. SDLB03LED SL2. IES)

10.6.2.2 LED Decorative Luminaire on Collector Roadway:

Cooper lighting 73 input watt LED Street works Series “Springdale” black coach style luminaire, 120 Volt supply voltage, complete with photo control receptacle – Cooper Lighting Catalog# SDL-B03-LED-E-SL2-BKU

(Distribution to match photometric curve No. SDLB03LED SL2. IES)

10.6.3 Decorative LED Street Lighting Table:

In general, the luminaire, pole and bracket combinations in Table 5 below are recommended.

TABLE 10
Typical Pole, LED Decorative Luminaire & Bracket Combinations

Pole Size Catalog No.	Equivalent HPS R.O.W	LED Luminaire Catalog No., Photometric files	Bracket Size Catalog No.
29.0 foot (8.8 m) Stress-Crete: E-290-APO-G-S11- FC(Blk)S/F Utility Structures Inc.: CP29ASOBE	100 Watt Decorative HPS Local Roadway	Cooper Lighting Cat# SDL-B03-LED-E- SL2-BKU Series: SDL Photometric File: <i>SDLB03LEDSDL2.IES</i>	5 foot (1.5 m) Aluminous: NSB-5 Cooper: SCA5001BK
29.0 foot (8.8 m) Stress-Crete: E-290-APO-G-S11- FC(Blk)S/F Utility Structures Inc.: CP29ASOBE	100 Watt Decorative HPS Local Roadway	King Luminaire K601-S-PFAFL-60SSL	5 foot (1.5 m) Aluminous: NSB-5 Cooper: SCA5001BK
31.5 foot (9.6 m) Stress-Crete: E-315-BPO-G-S11- FC(Blk)S/F Utility Structures Inc.: CP315BSOBE	150 Watt Decorative HPS Collector Roadway	Cooper Lighting Cat# SDL-B03-LED-E- SL2-BKU Series: SDL Photometric File: <i>SDLB03LEDSDL2.IES</i>	6 foot (1.8 m) Aluminous: NSB-6 Cooper: SCA6001BK
31.5 foot (9.6 m) Stress-Crete: E-315-BPO-G-S11- FC(Blk)S/F Utility Structures Inc.: CP315BSOBE	150 Watt Decorative HPS Collector Roadway	King Luminaire K601-S-PFAFL-III 75SSL	6 foot (1.8 m) Aluminous: NSB-6 Cooper: SCA6001BK

10.7 LED PARKING LOT LIGHTING:

Luminaires for parking lots shall have a full-cutoff distribution classification. Semi-cutoff and non-cutoff luminaires are not permitted.

The lighting design criteria for parking lots shall be as follows:

Average horizontal illuminance	10.0 lux (1.0 fc)
Uniformity Ratio: Maximum to Minimum	20:1 (or better)
Minimum horizontal illuminance	2.0 lux

The light spill restrictions beyond the limits of the parking lot shall be based on the Lighting Zone Classification.. The following table (based on IES TM11) shows recommended Light Trespass Limitations.

Lighting Zone	Eye Illuminance Levels (lux)
LZ1	1.0
LZ2	3.0
LZ3	8.0
LZ4	15.0

The LED street lighting luminaire for municipal parking lot equivalent to 150 Watt HPS shall be a

GE Lighting input watt LED, 500ma 120 Volt supply voltage,
Complete with photo control cell –



GE Lighting Evolve

OR

CREE XAL Area lighting LED luminaire, 550ma, 120 Volt supply voltage, Complete with photo control receptacle –



OR

Cooper Lighting Gleon LED luminaire, 550ma 120Volt supply complete with photoelectric control receptacle



APPENDIX 'A'

STANDARD DESIGN SHEETS

No.	Description	Date
A-1	Town of Aurora Storm Sewer Design Sheet	Sept/09
A-2	Town of Aurora Hydraulic Grade Line Analysis Sheet	Sept/09
A-3	Town of Aurora Sanitary Sewer Design Sheet	Sept/09
A-4	Town of Aurora Topsoil Removal By-Law	May/92
A-5	Town of Aurora Topsoil Removal Permit Application	Jan/16
A-6	Town of Aurora Municipal Infrastructure Data Sheets	Nov/12



A-1

**Town of Aurora
Storm Sewer Design
Sheet**



A-2

**Town of Aurora
Hydraulic Grade Line
Analysis Sheet**



A-3

**Town of Aurora
Sanitary Sewer Design
Sheet**



A-4

**Town of Aurora
Topsoil Removal
By-Law**

BY-LAW NO. 3399-92

OF THE CORPORATION OF THE TOWN OF AURORA

**BEING A BY-LAW to protect and conserve Topsoil within the
Town of Aurora**

WHEREAS the Topsoil Preservation Act, R.S.O. 1990 c.T.12 (as amended) provides that Councils of Municipalities may pass by-laws to regulate or prohibit the removal of Topsoil and to provide for the rehabilitation of lands from which Topsoil has been removed.

NOW THEREFORE the Council of the Corporation of the Town of Aurora enacts as follows:

1. For the purpose of this By-Law, the following definitions and interpretations shall govern.
 - 1.1 "Director" means the Director of Public Works appointed by the Council of the Corporation of the Town of Aurora.
 - 1.2 "Corporation" means The Corporation of the Town of Aurora.
 - 1.3 "Council" means Council of the Corporation of the Town of Aurora.
 - 1.4 "Lot" means a parcel of land, described in a deed or other document legally capable of conveying land, or shown as a Lot or Block on a registered plan of subdivision.
 - 1.5 "Topsoil" means that horizon in a soil profile known as the "A" horizon, containing organic material.
 - 1.6 "Erosion" means the detachment and movement of soil, sediment or rock fragments by water, wind, ice or gravity.
 - 1.7 "Land Disturbance" means any man-made change of the land surface including removing vegetative cover, excavating, filling and grading.
 - 1.8 "Land Development" means the construction of buildings, roads, parking lots, paved storage areas and similar facilities.
 - 1.9 "Owner" includes the registered owner of a property and a lessor, lessee, tenant, mortgagee in possession or person in charge or control of any property.
 - 1.10 "Person" includes a Corporation, a Partnership and a natural individual.
 - 1.11 "Site" means the lands, or lot, for which it is proposed to conduct any Land Disturbance.
2. No owner of any Lot or his agents, servants or employees shall remove or permit the removal of any Topsoil from any point on the surface of any Lot within the Town of Aurora, which causes Land Disturbance to a Lot of 2 hectares or greater, unless:
 - 2.1 The exemptions contained in Section 2 (Subsections 2 and 3) of the Topsoil Preservation Act, R.S.O. 1990 c.T.12 (as amended) apply to the removal;
 - or
 - 2.2 A Topsoil Removal Permit has been issued therefore by the Director and all terms and reconcilements of the Topsoil Removal Permit have been and continue to be complied with during the term of the Topsoil Removal Permit.

3. All applications for Topsoil Removal Permits shall be made by the owner of the Lot, or his authorized agent, in writing to the Director, or such other person or office as Council may from time to time appoint, during normal business hours.
4. The fee for a permit to remove Topsoil shall be established by Council on a per hectare basis, or fraction thereof, as detailed in Schedule "A" from time to time. Further, the owner shall deposit a letter of credit to ensure site management control measures as detailed in Schedule "A" from time to time.
5. All applications for Topsoil Removal Permits shall be in a form established by the Director from time to time and shall be filed with the Public Works Department before any Topsoil Removal Permit may be issued. The application shall contain all information required therein and be duly executed by the applicant.
6. Topsoil Removal Permits shall only be issued after approval or acceptance of the application by the Director or a person appointed by the Director.
7. No Topsoil Removal Permits shall be issued unless the applicant provides a control plan(s) for Erosion, sedimentation control and rehabilitation for the affected land. Monitoring and maintenance of control measures may be undertaken by the Director or his appointee during the term of the permit. The permit may be revoked if non-compliance of control measures occurs. Permits will be valid for a period of 180 days from the date of issuance. The Director may extend the permit one or more times for additional 180 day periods. Additional control measures, improvements to existing control measures and additional permit fees may be required.
8. The Topsoil Removal Permit may require that rehabilitation of lands from which Topsoil have been removed shall take the form of any or all of the following requirements:
 - (1) Levelling and regrading of affected Lands.
 - (2) Planting of trees.
 - (3) The replacement of Topsoil (minimum 10cm depth) and stabilization by either sodding, hydroseeding, mulching or such other methods as may be stipulated by the Director.
9. As a condition for issuance of the Topsoil Removal Permit all sedimentation basins and other control measures necessary to meet the requirements of this By-Law shall be in place prior to any land disturbance of the site. These measures shall be maintained by the Topsoil Removal Permit holder or subsequent landowner during the period of land disturbance in a manner satisfactory to the Director to ensure adequate compliance with the requirements of this By-Law and to prevent damage occurring as a result of erosion, sedimentation or flooding.
10. Notwithstanding any other provisions of this By-Law, the Director may waive the requirement for a Control Plan if it is unnecessary to provide for control measures in connection with the removal of Topsoil and may therefore reduce the fee for the Topsoil Removal Permit.
11. The Director shall issue a Topsoil Removal Permit where the requirements of this By-Law are met and where the Director is satisfied that no damage will occur as a result of erosion, sedimentation or flooding and that the land will be rehabilitated to the same or better condition than it was in at the time prior to the removal of the topsoil for which the Topsoil Removal Permit is issued.
12. Where the Director refuses to issue a Topsoil Removal Permit, the applicant shall be informed in writing of the refusal and may be required to provide additional information if the application is to be given further consideration.


- 13. Any Lot which has been the site of previous or on-going Land Disturbances or Land Development prior to the passing of this By-Law is subject to the conditions set forth in this By-Law.
- 14. Any owner who contravenes any provision or requirement of this By-Law may be issued a Notice of Contravention by the Director advising of the contravention and setting forth the period of time within which the corrective measures specified in the Notice of Contravention must be implemented to the satisfaction of the Director.
- 15. Any owner who contravenes this By-Law may by Order of the Director, be directed to forthwith cease and desist all operations with respect to Topsoil removal.
- 16. Every Owner who:
 - (1) provides misleading or false information in an application under this By-Law in any statement or plan required to be produced under this By-Law;
 - (2) fails to comply with any Notice of Contravention, Order of the Director or other requirement under this By-Law; or
 - (3) contravenes any provision or requirement of this By-Law and every director or officer of a corporation who concurs in such production, failure or contravention is guilty of an offence and on conviction pursuant to the Provincial Offences Act, R.S.O. 1990, C.P. - 33 (as amended) is liable to the maximum penalty as prescribed by the Provincial Offences Act.
- 17. The issuance of a Topsoil Removal Permit does not preclude the applicants' responsibility to obtain all other approvals as may be necessary from any other government or agency.
- 18. All Schedules attached to this By-Law shall form part of this By-Law.
- 19. In the event that any particular provision or provisions or part of a provision is found to be invalid or unenforceable for any reason whatsoever, then the particular provision or provisions or part of the provision shall be deemed to be severed from the remainder of this By-Law and all other provisions shall remain in full force and shall be valid and enforceable to the fullest extent permitted by law.
- 20. By-law 3208-90 be and is hereby repealed.
- 21. Provisions for this By-Law come into force and effect on final passage by Council.

READ A FIRST AND SECOND TIME THIS 27th DAY OF MAY 19 92

READ A THIRD TIME AND FINAL PASSED THIS 27th DAY OF MAY 19 92.



J. WEST, MAYOR



L. ALLISON, MUNICIPAL CLERK

SCHEDULE "A" TO BY-LAW #3399-92

TOPSOIL REMOVAL PERMIT FEES

1. Basic Permit fee for 180 day permit: \$ 200.00
2. Fee per hectare or fraction thereof: \$ 20.00 per hectare
3. Maximum fee for 180 day permit: \$1000.00

Example: 15 ha. = \$200 + (\$20 x 15 ha.) = \$500.00

Note: Fees include inspection of control plans by Town Staff.

LETTER OF CREDIT FOR SITE MANAGEMENT CONTROL MEASURES

An irrevocable letter of credit to cover 100% of estimated site management control measures is required.

All Letters of Credit must:

- be in the name of the registered owner of the property with the company name precisely spelled out;
- include accurate reference of the property by means of legal description (eg. Lot 5, Plan 65M-2000);
- be issued by one of the five major Chartered Banks (Montreal, Nova Scotia, Commerce, Royal, Toronto Dominion);
- be submitted to the Public Works Department prior to signing of the Topsoil Removal Permit;
- be worded in accordance with the attached example.

LETTER OF CREDIT FORM

The Town of Aurora
100 John West Way
Box No. 1000
Aurora, Ontario
L4G 6J1

We hereby authorize you to draw on the _____ (Bank) _____, Ontario for the account of _____ an aggregate amount of _____ Dollars available by drafts at sight as follows:

Pursuant to the request of our customer, the said _____ (Applicant) we, _____ (Bank) _____ hereby establish and give to you an Irrevocable Standby Letter of Credit in your favour in the total amount of \$ _____ which may be drawn upon us by you and which demand, we shall honour without enquiring whether you have the right as between yourselves and our said customer to make such demand and without recognizing any claim of our said customer.

Provided, however, that you are to deliver to the _____ (Bank) _____, Ontario at such time as a written demand for payment is made upon us, the original Standby Letter of Credit for our endorsement of any payment thereon accompanied by a certificate signed by you agreeing and/or confirming that monies drawn pursuant to this Standby Letter of Credit are to be and/or have been expended pursuant to obligations incurred or to be incurred by you in connection with issuance of a Topsoil Removal Permit as issued to _____ by The Corporation of the Town of Aurora re: (Legal Description and Municipal Address of Property).

The amount of this Standby Letter of Credit may only be reduced by drawings endorsed hereon and/or by notice in writing given to us by you.

This Standby Letter of Credit will continue up to _____ and will expire on that date and you may call for payment of the full amount outstanding under this Standby Letter of Credit at any time up to that date.

It is a condition of this Standby Letter of Credit that it shall be deemed to be automatically extended for one year from the present or any future expiration date hereof, unless thirty days prior to any such date we shall notify you in writing that we elect not to consider this Standby Letter of Credit renewed for any such additional period. Upon receipt by you of such notice, you may draw hereunder by means of your sight draft accompanied by your above written certificate.

The drafts drawn under this Credit are to state on their face that they are drawn under the _____ (Bank) _____, Ontario, Standby Letter of Credit No. _____ dated _____ 19 ____.

We hereby agree that drafts under this Credit will be duly honoured upon presentation provided that all terms and conditions of the Credit have been complied with.

SCHEDULE "B" TO BY-LAW #3399-92

TOPSOIL BY-LAW - ADMINISTRATIVE PROCEDURE

PERMIT APPLICATION

No owner of any lot or his agents, servants or employees shall remove or permit the removal of any topsoil from any lands with an area of 2 hectares or greater without receiving prior approval of a control plan for the site by the Director of Public Works and a permit from the Public Works Department.

Permit fees are on a per hectare basis, or fraction thereof as detailed in Schedule "A" of the By-Law.

CONTROL PLAN

Applicants will submit the following documents with their permit application:

- (a) **Existing Site Map:** A map of existing conditions on a scale of 1:1000 or greater detailing:
- (1) Site boundaries and adjacent lands which accurately identify site location as well as a key plan;
 - (2) Lakes, streams, wetlands, channels, ditches and other water courses on and immediately adjacent to the site;
 - (3) Regional Storm Flood Plain and Conservation Authority Fill Regulation line;
 - (4) Location of the predominant soil types;
 - (5) Vegetative cover;
 - (6) Location and dimensions of stormwater drainage systems and natural drainage patterns on and immediately adjacent to the site;
 - (7) Locations and dimensions of utilities, structures, roads, highways, and paving; and
 - (8) Site topography at a contour interval not to exceed one metre.
- (b) **Plan of Final Site Conditions:** A plan of final site conditions after the Land Disturbance on the same scale as the existing site map showing the site changes.
- (c) **Site Construction Plan:** A site construction plan and covering document including:
- (1) Locations and dimensions of all proposed Land Disturbance activities;
 - (2) Locations and dimensions of all temporary soil or dirt stockpiles;

- (3) Locations and dimensions of all construction site management control measures including calculations necessary to meet the requirements of this By-Law;
- (4) Schedule of anticipated starting and completion date of each land disturbing or land developing activity including the installation of construction site management control measures needed to meet the requirements of this By-Law, and
- (5) Provisions for maintenance of the construction site control measures during construction.

REVIEW OF CONTROL PLAN

Within 45 days of receipt of the application, control plan, and fee, the Public Works Department shall review the application and control plan to determine if the requirements of this By-Law are met. The Public Works Department may request comments from other department or agencies. If the requirements of the By-Law are met, the Public Works Department shall approve the plan and notify the applicant and issue a permit. If the conditions are not met, the Public Works Department shall inform the applicant in writing and may either require needed information or disapprove the plan. Within 30 days of receipt of needed information, the Public Works Department shall again determine if the plan meets the requirements and if the plan is disapproved, the Public Works Department shall inform the applicant in writing of the reasons for the disapproval.

PERMITS

- (a) **Duration:** Permits shall be valid for a period of 180 days, or the length of the building permit or other construction authorizations, whichever is longer, from the date of issuance. The Public Works Department may extend the period one or more times for additional 180 day periods. The Public Works Department may require additional control measures as a condition of the extension if they are necessary to meet the requirements of this By-Law.
- (b) **Letter of Credit:** As a condition of approval and issuance of the permit, the Public Works Department will require the applicant to deposit an irrevocable letter of credit in an amount equal to 100% of the cost of work to guarantee a good faith execution of the approved control plan and any permit conditions.
- (c) **Permit Conditions:** All permits shall require the permittee to:
 - (1) Notify the Public Works Department with 48 hours of commencing any land disturbing activity;
 - (2) Notify the Public Works Department of completion of any control measures with 14 days after their installation;
 - (3) Obtain permission in writing from the Public Works Department prior to modifying the control plan;
 - (4) Install all control measures as identified in the approved control plan;

- (5) Maintain all road drainage systems, stormwater drainage systems, control measures and other facilities identified in the control plan;
- (6) Repair any siltation or erosion damage to adjoining surfaces and drainageways resulting from land developing or disturbing activities;
- (7) Inspect the construction control measures after each rain of 1cm or more and at least once each week and make needed repairs;
- (8) Allow the Public Works Department to enter the site for the purpose of inspecting compliance with the control plan or for performing any work necessary to bring the site into compliance with the control plan; and
- (9) Maintain a copy of the control plan on site during any site activity.

INSPECTION

The Public Works Department shall inspect construction sites at least once a month during the period starting March 1 and ending October 31 and at least 2 times during the period starting November 1 and ending February 28 to ensure compliance with the control plan.

DEFAULT BY OWNER

- (1) Upon the failure by the Owner to complete all or part of the works in the time stipulated in the Control Plan, the Town may draw the appropriate amount from the securities posted and use the funds to arrange for the completion of the said works, or any part thereof;
- (2) Upon the failure by the Owner to repair or maintain a specific part of the works as requested by the City, and in the time requested, the City may at any time authorize the use of all or part of the securities to pay the cost of any part of the work it may in its or their absolute discretion deem necessary; or
- (3) In the case of emergency repairs or clean-up, the City may undertake the necessary works at the expense of the Owner and reimburse itself out of securities posted by the applicant.

OTHER AGENCY APPROVALS

This permit does not preclude applicants responsibility to obtain all other approvals as may be required by other agencies.

SCHEDULE "C" TO BY-LAW #3399-92

TOPSOIL BY-LAW - SITE DESIGN CRITERIA

The following requirements shall be met on all sites of 2 hectares or greater where topsoil is being removed.

1. **Site Dewatering** Water pumped from the site shall be treated by temporary sedimentation basins, grit chambers, sand filters, upflow chambers, swirl concentrators or other appropriate controls. If the water is demonstrated to have no particles greater than 40 microns, then dewatering operations may be conducted provided the water is not permitted to discharge directly into receiving water streams or bodies.
2. **Waste and Material Disposal** All waste and unused building materials (including garbage, cleaning wastes, wastewater, toxic materials, or hazardous materials) shall be properly disposed and not allowed to be carried by runoff into a receiving channel or storm sewer system.
3. **Tracking** Each site shall have gravelled roads, access drives and parking areas of sufficient width and length to prevent sediment from being tracked onto public or private roadways. In addition, a temporary construction entrance must be installed at all sites to remove mud from the vehicle tires and keep it off roads. The temporary entrance will be a minimum 25 metre by 4 metre strip of clear stone 15cm deep with a woven filter fabric underneath to prevent the gravel from sinking into the ground. If this measure is insufficient a wash rack may be required at the entrance. Any sediment reaching a public or private road shall be removed by street cleaning (not flushing) before the end of each workday.
4. **Drain Inlet Protection** All storm drain inlets shall be protected with filter fabric, or equivalent barrier meeting accepted design criteria, standards and specifications.
5. **Site Erosion Control** The following criteria apply only to land development or land disturbing activities that result in runoff leaving the site:
 - (a) Channelized runoff from adjacent areas passing through the site shall be diverted around disturbed areas. Otherwise, the channel shall be protected by filter fences being placed along the channel edges to reduce sediment reaching the channel.
 - (b) All activities on the site shall be conducted in a logical sequence to minimize the area of bare soil exposed at any one time.
 - (c) Runoff from the entire disturbed area on the site shall be controlled as follows:
 - (i) All disturbed ground left inactive shall be stabilized by seeding, sodding, mulching or covering, or any other measure deemed acceptable by the Director. The period of time of inactivity will be at the discretion of the Director but will not exceed 30 days.

- (ii) For sites with less than 4 hectares disturbed at one time and slopes less than 12 percent grade, filter fences, or equivalent control measures shall be placed along all sideslope and downslope sides of the site;
 - (iii) For sites with more than 4 hectares disturbed at one time or with slopes greater than 12 percent grade, or if a channel originates in the disturbed area, one or more sedimentation basins shall be constructed. Each sedimentation basin shall have a surface area of a least 1 percent of the area draining to be the basin and at least 1 metre of depth and constructed in accordance with accepted design specifications. Sediment shall be removed to maintain a depth of 1 metre. The basins shall be designed to trap sediment greater than 40 microns in size, based on the one hour duration 5 year design storm. It is not permitted to discharge the basin into receiving water streams or bodies. Basin discharge rate shall be sufficiently low as to not cause erosion along the discharge channel; and
 - (iv) A 3 metre wide buffer strip will be provided along the perimeter of the downslope sides of the site.
- (d) Any soil or dirt storage piles containing more than one hundred cubic metres of material should not be located with a downslope drainage length of less than 10 metres to a roadway or drainage channel. If remaining for more than 30 days, they shall be stabilized by mulching, vegetative cover, tarps or other means. Erosion from piles which will be in existence for less than 30 days shall be controlled by filter fence barriers around the pile.



A-5

**Town of Aurora
Topsoil Removal Permit
Application**

**TOPSOIL REMOVAL PERMIT - APPLICATION
TOWN OF AURORA**

Year 2018

Location

Street No.	Street Name	Lot No./Plan No.	Lot/Con.	Site Area (ha)	Estimated Cost of Work
------------	-------------	------------------	----------	----------------	------------------------

Owner Name (Print)

Street Number	Street Name	Signature
---------------	-------------	-----------

City/Town	Province	Postal Code	Company Office, Name	Area Code	Telephone Number
					Res: _____
					Bus: _____

Applicant Name (Print)

Street No.	Street Name	Signature
------------	-------------	-----------

City/Town	Province	Postal Code	Contact Name Re: Application	Area Code	Telephone Number
					Res: _____
					Bus: _____

Contractor Name (Print)

Street Number	Street Name
---------------	-------------

City/Town	Province	Postal Code	Contact Name Re: Application	Area Code	Telephone Number
					Res: _____
					Bus: _____

Reason for Application:

Application Date YY/MM/DD	Proposed Start Date YY/MM/DD	Proposed Completion Date YY/MM/DD
------------------------------	---------------------------------	--------------------------------------

Office Administration

Letter of Credit (Value)	Total Permit Fee	(\$625 Flat Fee + \$35.40 per h Receipt No.
--------------------------	------------------	---

Start Date YY/MM/DD	Completion Date YY/MM/DD	Date Permit Issued YY/MM/DD	Permit Number
------------------------	-----------------------------	--------------------------------	---------------

This application has been submitted with plans

Approved

Prepared by: _____

Director of Planning and Development Services

Dated: _____



A-6

**Town of Aurora
Municipal
Infrastructure
Data Sheets**



**Town of Aurora
Sanitary Manhole Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	GPS Location Northing	GPS Location Easting	Manhole ID	Diameter	Material	Depth	Construction Year	Assumption Year	Life Expectancy	Value	Surface Elevation

As-built drawings are needed.



**Town of Aurora
Sanitary Lateral Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Address)	Line ID	Diameter	Pipe Length	Material	Average Depth	Construction Year	Assumption Year	Life Expectancy	Value	Up Stream Invert	Down Stream Invert

As-built drawings are needed.



**Town of Aurora
Sanitary Sewer Mains Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	Line ID	Diameter	Pipe Length	Material	Average Depth	From House No.	To House No.	Construction Year	Assumption Year	Life Expectancy	Value	% Slope	Up Stream MH Invert	Down Stream MH Invert	Up Stream MH ID	Down Stream MH ID

As-built drawings are needed.



**Town of Aurora
Storm Sewer Manhole Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	GPS Location Northing	GPS Location Easting	Manhole ID	Diameter	Material	Depth	Construction Year	Assumption Year	Life Expectancy	Value	Surface Elevation

As-built drawings are needed.



**Town of Aurora
Catchbasin Manhole Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	GPS Location Northing	GPS Location Easting	Catchbasin ID	Diameter	Material	Depth	Construction Year	Assumption Year	Life Expectancy	Value	Surface Elevation

As-built drawings are needed.



**Town of Aurora
Drainage Collection Storm Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	GPS Location Northing	GPS Location Easting	Drainage Collector ID	Type	Diameter	Material	Depth	Construction Year	Assumption Year	Life Expectancy	Value	Surface Elevation	Up Stream Invert	Down Stream Invert	Up Stream ID	Down Stream ID

As-built drawings are needed.



Town of Aurora
Oil/Grit Separator Data Collection Requirements

Consultant:
Checked by:
Date:

Location (Nearest Address)	GPS Location Northing	GPS Location Easting	ID (Oil/Grit Separator)	Model	Type	Size	Material	Depth	Construction Year	Assumption Year	Life Expectancy	Value	Surface Elevation	Up Stream Invert	Down Stream Invert	Up Stream ID	Down Stream ID

As-built drawings are needed.



Town of Aurora
Storm Lateral Data Collection Requirements

Consultant:
Checked by:
Date:

Location (Address)	Line ID	Diameter	Pipe Length	Material	Average Depth	Construction Year	Assumption Year	Life Expectancy	Value	Up Stream Invert	Down Stream Invert

As-built drawings are needed.



Town of Aurora
Storm Sewer Main Data Collection Requirements

Consultant:
Checked by:
Date:

Location (Nearest Address)	Line ID	Diameter	Pipe Length	Material	Average Depth	From House No.	To House No.	Construction Year	Assumption Year	Life Expectancy	Value	% Slope	Up Stream MH Invert	Down Stream MH Invert	Up Stream MH ID	Down Stream MH ID

As-built drawings are needed.



Town of Aurora
Stormwater Management Pond Data Collection Requirements

Consultant:
Checked by:
Date:

Location (Address)	Facility Type	SWM ID	Area m ²	Construction Year	Assumption Year	Life Expectancy	Value

As-built drawings are needed.



**Town of Aurora
Water Valves Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	GPS Location Northing	GPS Location Easting	Valve ID	Diameter of Watermain	Enclosure	Valve Function	Construction Year	Assumption Year	Life Expectancy	Value

As-built drawings are needed.



**Town of Aurora
Water Hydrant Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	GPS Location Northing	GPS Location Easting	Hydrant ID	Hydrant Class	Hydrant Model	Hydrant Colour (Body)	Hydrant Colour (Bonnet Caps)	Construction Year	Assumption Year	Life Expectancy	Value

As-built drawings are needed.



Town of Aurora
Water Service Connection Data Collection Requirements

Consultant:
Checked by:
Date:

Location (Nearest Address)	Line ID	Diameter	Pipe Length	Material	Average Depth	Construction Year	Assumption Year	Life Expectancy	Value

As-built drawings are needed.



**Town of Aurora
Water Mains Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	Line ID	Diameter	Pipe Length	Material	Average Depth	From House No.	To House No.	Construction Year	Assumption Year	Life Expectancy	Value	Valve Type	Join Type

As-built drawings are needed.



Town of Aurora Streetlight Data Collection Requirements

Consultant:
Checked by:
Date:

Location (Nearest Address)	Construction Year	Assumption Year	GPS Location of Poles				Pole (material & type)		Arm (type & length)	Luminaire (wattage & control)			Wiring (size & fuse rating)		Life Expectancy	Pole Price	Arm Price	Light Price	Value	
			Pole No.	Lum No.	Northing	Easting	Material	Type	Type	Type	Watt	Ctrl	Size	Fuse						

As-built drawings are needed.



**Town of Aurora
Bridge and Culvert Data Collection Requirements**

Consultant:

Checked by:

Date:

Location (Nearest Address)	Length (m)	Type (bridge or culvert)	Dimensions	Material	Construction Year	Assumption Year	Estimated Life Expectancy	Value	Description

As-built drawings are needed.



**Town of Aurora
Sidewalk & Walkway Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	Side of Road	Length (m)	# of bays	Width (m)	Area m ²	Material	Construction Year	Assumption Year	Estimated Life Expectancy	Value

As-built drawings are needed.



**Town of Aurora
Street Sign Data Collection Requirements**

Consultant:
Checked by:
Date:

Location (Nearest Address)	Street Name	GPS Location Northing	GPS Location Easting	MTO Code	Construction Year	Assumption Year	Estimated Life Expectancy	Value	Description

As-built drawings are needed.



**Town of Aurora
Road Data Collection Requirements**

Consultant:
Checked by:
Date:

Road Segment ID	Road Name	Road Length	Material	Width	Right of Way	Lane Count	Road Type	From House No.	To House No.	Construction Year	Assumption Year	Life Expectancy	Value

As-built drawings are needed.



Town of Aurora
Retaining Wall Data Collection Requirements

Consultant:
Checked by:
Date:

Location (Nearest Address)	Retaining Wall ID	Material Type	Dimensions	Construction Year	Assumption Year	Life Expectancy	Value

As-built drawings are needed.

APPENDIX 'B'

TOWN OF AURORA STANDARD LETTERS

No.	Description	Date
B-1	Overall Site Completion Certification Letter	Sept/09
B-2	Interim Lot Grading Certification Letter	Sept/09
B-3	Final Lot Grading Certification Letter	Sept/09
B-4	Lot Grading Reduction of Securities Letter	Sept/09
B-5	Retaining Wall Certification Letter	Sept/09
B-6	Certification of Completion of Noise Attenuation Works	Sept/09
B-7	Storm Water Management Facility Certification Report	Sept/09

Company's Letterhead
(Engineering Firm)

Date:

Town of Aurora
Planning and Development Services – Engineering Division
100 John West Way, Box 1000
Aurora, Ontario
L4G 6J1

Attention: _____
(Director of Planning and Development Services)

Dear Sir:

Re: Engineer Certificate of Completion
(Subdivision or Project Name)
(Subdivision Owner Name)
(Registered Plan No.)

The undersigned hereby certifies that all aboveground and underground public works pertaining to the mentioned subdivision have been completed in accordance with the approved engineering drawings and in accordance with the requirements and specifications as per the subdivision agreement with the Town of Aurora.

I further certify that the maintenance period, as stipulated in the agreement, has expired, and that all deficiencies have been rectified to the Town's satisfaction, and that requirements for final acceptance as set out in the agreement for Planning and Development Services have been complied with.

Sincerely,

_____, P.Eng
(Name), P.Eng
(Company Name)

ENGINEERS SIGNATURE AND STAMP REQUIRED ON THIS LETTER.

SAMPLE FORM - INTERIM LOT GRADING CERTIFICATE

Date

Town of Aurora
100 John West Way, Box 1000
Aurora, ON
L4G 6J1

Attn: (Tech Assist.)
Technical Assistant, Planning and Development Services

Re: Interim Lot Grading Certificate
Builder Name
Lot(s):
Plan:
Date of Inspection:

Based on our recent visual inspection, we hereby certify that the above-noted lot(s) meet the following criteria for "interim occupancy" at the time of our inspection:

1. The grading roughly conforms to the detailed lot-grading plan and there is positive drainage away from the dwelling.
2. There is adequate vehicular access from street to dwelling and there is satisfactory pedestrian access from the driveway to the front door.
3. The municipal number is clearly and permanently affixed to the outside of the dwelling.
4. The adjacent property is in a suitable condition such that it does not appear to pose a safety hazard.
5. The lot is clear of building materials and debris.
6. All other items specifically cited in the [*insert applicable agreement (Subdivision Agreement or Site Plan Agreement or Vacant Land Condominium Development Agreement)*] pertaining to interim occupancy are complied with.

Yours truly,

CONSULTING ENGINEER FIRM

Name of Counsulting Engineer

See Reverse for Comments

Yes ____ *No* ____

cc: Building Administration Department
Builder
Developer

SAMPLE FORM - FINAL LOT GRADING CERTIFICATE

Date

Town of Aurora
100 John West Way, Box 1000
Aurora, ON
L4G 6J1

Attn: (Tech. Assist.)
Technical Assistant, Planning and Development Services

Re: Final Lot Grading Certificate
Builder Name
Lot(s):
Plan:

Based on our visual inspection conducted on *[insert date]*, we hereby certify that the above-noted lot(s) are graded and sodded in general conformity with the general lot grading plans for this development and the approved plot plan. The lot(s) have been sodded for a minimum of one winter and spring season. The driveway(s) has been paved and all required lot improvements have been completed.

Accordingly, we request the release of the applicable securities as stated in the *[insert applicable agreement (Subdivision Agreement or Site Plan Agreement or Vacant Land Condominium Development Agreement)]*.

This approval shall not relieve the Builder of his responsibility to correct any settlements or deficiencies, which may occur prior to assumption of the development by the Town.

Yours truly,

CONSULTING ENGINEER FIRM

Name of Consulting Engineer

cc: *Builder*
Developer

SAMPLE FORM - REDUCTION LOT GRADING CERTIFICATE

Date

Town of Aurora
100 John West Way, Box 1000
Aurora, ON
L4G 6J1

Attn: (Tech. Assist.)
Technical Assistant, Planning and Development Services

Re: Lot Grading Reduction Certificate
Builder Name
Lot(s):
Plan:

Based on our visual inspection conducted on *[insert date]*, we hereby certify that the above-noted lot(s) are graded and sodded in general conformity with the general lot grading plans for this development and the approved plot plan.

Accordingly, we also request a reduction in the securities held in respect to this lot(s) as stated in the *[insert applicable agreement (Subdivision Agreement or Site Plan Agreement or Vacant Land Condominium Development Agreement)]*.

Minor lot grading deficiencies may have been present at the time of the inspection, however they do not pose a safety hazard and the cost of rectification is less than the amount of the securities to be retained after the reduction.

Yours truly,

CONSULTING ENGINEER FIRM

Name of Consulting Engineer

cc: *Builder*
Developer

Company's Letterhead
(Engineering Firm)

Date:

Town of Aurora
Planning and Development Services– Engineering Division
100 John West Way, Box 1000
Aurora, Ontario
L4G 6J1

Attention: _____
(Director of Planning and Development Services)

Dear Sir:

Re: Construction of Retaining Wall
(Subdivision or Project Name)
(Municipal Address of Wall)
(Lot No. and Plan No.)

This letter is to certify that the retaining wall at the above location has been constructed in accordance with the design drawings prepared by _____, dated _____ .

We also confirm that the wall is suitable for the type of loading and for the geotechnical condition of the said location.

Sincerely,

_____, P.Eng
(Name) , P.Eng
(Company Name)

ENGINEERS SIGNATURE AND STAMP REQUIRED ON THIS LETTER.

Company's Letterhead
(Engineering Firm)

Date:

Town of Aurora
Planning and Development Services – Engineering Division
100 John West Way, Box 1000
Aurora, Ontario
L4G 6J1

Attention: _____
(Director of Planning and Development Services)

Dear Sir:

Re: Certificate of Completion of Noise Attenuation Works
(Subdivision or Project Name)
(Property Location)
(Registered Plan No.)

The undersigned hereby certifies that all noise attenuation works pertaining to the mentioned subdivision have been completed in accordance with the approved Noise Attenuation Report and in accordance with the requirements and specifications as per the subdivision agreement with the Town of Aurora.

Sincerely,

_____, P.Eng
(Name) , P.Eng
(Company Name)

ENGINEERS SIGNATURE AND STAMP REQUIRED ON THIS LETTER.

*Company's Letterhead
(Engineering Firm)*

Date:

Town of Aurora
Planning and Development Services– Engineering Division
100 John West Way, Box 1000
Aurora, Ontario
L4G 6J1

Attention: _____
(Director of Planning and Development Services)

Dear Sir:

Re: Stormwater Management Facility Certification Report
(Subdivision or Project Name)
(Subdivision Owner Name)
(Registered Plan No.)

The undersigned hereby certifies that the Storm Water Management Facility for the above noted project is functional and meets the design requirements for the volume capacity in accordance with the approved engineering drawings and in accordance with the requirements and specifications as per the subdivision agreement with the Town of Aurora.

I further certify that the as-constructed survey provided has been constructed in general conformance with the approved design and the MOE Certificate of approval No. (*Number required*).

Table 1: Design and As-Constructed Features

Pond Structure *	Design	As-Constructed	Deviation
Inlet Headwall Invert (m)			
Permanent Pool Volume (m)			
Orifice Plate Diameter (mm)			
Orifice Plate Invert (m)			
Extended Detention Elevation (m)			
Extended Detention Time (hr)			
Manhole Weir Invert (m)			
Manhole Weir Length (m)			
Overflow Spillway Invert (m)			
Overflow Spillway Length (m)			
Top of Pond Elevation (m)			
Maximum Side Slope			
Other:			

* **Note:** Each Pond will have its own required structures; the above is for example only.

Table 2: Stage/Storage/Outflow for Pond

Storm Return Period	Design			As-Constructed		
	Q _{out} from Pond	Storage (m ³)	Elevation (m) NWL= _ _ _ _	Q _{out} from Pond	Storage (m ³)	Elevation (m) NWL= _ _ _ _
2 Year						
5 Year						
10 Year						
25 Year						
50 Year						
100 Year						

Sincerely,

_____, P.Eng
(Name), P.Eng
(Company Name)

- Attach. 1. Pond Approved Plan
2. Pond As-Constructed Survey
3. As-Constructed Hydrology Modelling and Pond Operating Characteristics
4. Maintenance and Operation Guideline

ENGINEERS SIGNATURE AND STAMP REQUIRED ON THIS LETTER.

APPENDIX 'C'

DRAWING GENERAL NOTES:

Unless otherwise noted on the drawings, the following applicable requirements shall apply to the works.

1.0 Sewer Pipe Material:

- 1.1 Concrete pipe 450mm diameter and larger shall be CSA A257.2 with rubber gaskets conforming to CSA A257.3.
- 1.2 Polyvinyl Chloride DR35 or better based on depth of the pipe shall conform to CSA B182.1, with bell and spigot gasketed joints, complying with CSA 182.2, and all fittings as provided by the CSA certified manufacturer.
- 1.3 Polyvinyl chloride ribbed pipe shall conform to CSA B182.4, with bell and spigot gasketed joints, complying with CSA 182.2 and 182.4, and all fittings as provided by the CSA certified manufacturer.
- 1.4 Sewer pipe bedding and cover shall be per Town of Aurora standard drawing S-300 with bedding material being HL8 limestone and pipe cover material being granular 'B' Type I as per OPSS 1010 with 100% passing the 4.75mm sieve. All pipe bedding and cover material to be placed in uniform layers not exceeding 200mm in thickness, loose measurement, and compacted to at least 100% standard proctor maximum dry density.
- 1.5 All trenches are to be backfilled with suitable native material. Backfill material shall be placed in uniform layers not exceeding 300mm in thickness, loose measurement, for the full width of the trench and each layer shall be compacted to at least 95% standard proctor maximum dry density.

2.0 Maintenance Holes:

- 2.1 Steps shall be solid aluminium in accordance with OPSD 405.020.
- 2.2 Frames and covers shall be per OPSD-401.01, Type 'A' for sanitary and Type 'B' for storm. Sanitary maintenance holes shall be made watertight by installing a 2mm rubber gasket between the frame and grate and by installing rubber plugs within the grate's pick holes.
- 2.3 Maintenance holes are to be set to base course grade and then adjusted to final grade prior to placement of top course asphalt.

- 2.4 All sanitary maintenance holes shall be precast concrete with a pre-benched monolithic base containing kor 'n' seal or equivalent sewer connection gaskets.
- 2.5 All maintenance hole benching and benching slopes to follow OPSD 701.021.
- 2.6 All maintenance holes are to be benched to obvert.
- 2.7 All sanitary maintenance hole joints, between base of maintenance hole up to the precast concrete adjustment units shall be sealed with an external rubber sleeve (i.e. Gator wrap or equivalent). The width of the rubber sleeve shall be 225mm (9") or greater. The seal shall be made of a stretchable, self-shrinking, intra-curing halogenated based rubber with a minimum thickness of 30 mils. The backside of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-linked and fused bond between the rubber and butyl adhesive.

3.0 Catchbasins:

- 3.1 Catchbasin frame and cover for local residential roads as per Town Standard Drawing S-305, except at road low points and intersections use catchbasin frame and cover as per OPSD 400.100. Rear lot catchbasins to have square frame with birdcage grate as per OPSD 400.120. Catchbasin frame and cover for collector, arterial and industrial roads as per OPSD 400.100. Catchbasin frame and cover for parking lots as per OPSD 400.020.
- 3.2 Single catchbasin lead - min. 250mm diameter.
- 3.3 Double catchbasin lead - min. 300mm diameter.
- 3.4 All catchbasins shall be initially set to base course asphalt.
- 3.5 Catchbasins are to have sumps; catchbasin/maintenance holes to be sumpless.
- 3.6 Rear lot catchbasins are to be sumpless and have a pyramid grate.
- 3.7 rear-lot catchbasin leads are to be concrete encased.

4.0 Service Connections:

- 4.1 Sanitary - 125mm diameter PVC DR28 (green) with inspection chamber installed on property line, and marker painted black.
- 4.2 FDC/Storm -150mm diameter PVC DR28 (white), with marker painted white.
- 4.3 Water - 25mm diameter, type K soft copper ASTM B-88, marker painted

blue.

Water Services are not to be located within driveways.

- 4.4 All services shall extend a minimum 1.5m beyond the property line and have watertight caps. (See Single Lot, Semi-Detached Lot and Townhouse Unit Servicing - M-409, M-410, M-411 & M-412).

5.0 Watermains and Appurtenances:

- 5.1 150mm to 400mm diameter - watermain shall be PVC per A.W.W.A. C-900, Class 150 and blue in colour, complete with an approved form of electrochemical corrosion protection on all iron fittings.
- 5.2 greater than 400mm diameter - watermain shall be Ductile Iron Class 52 ANSI Spec. A21.4-1974 cement-lined and coal tar coated complete with an approved form of electrochemical corrosion protection.
- 5.3 Ductile Iron watermain shall have no internal bituminous coating.
- 5.4 50mm dia. watermain shall be type 'K' soft cooper per ASTM B-88.
- 5.5 Watermain to be bedded in granular D, Limestone screenings from 150mm below invert to 300mm above obvert per standard drawing W-100.
- 5.6 Hydrants to have drainage pits, be painted red and be equipped with chains. The hydrant shall have a 100mm storz connection and the storz painted black.
- 5.7 Where watermains and service connections cross above sewers sufficient vertical separation shall be maintained to allow for proper bedding and structural support of the watermain and sewer main. When vertical separation is less than the specified bedding depth, the watermain or service connection shall pass under the sewer with a vertical separation of at least 0.5 metre between crown of watermain and the invert of the sewer. All crossing pipes shall be supported.
- 5.8 Watermains shall have a 2.5 metre horizontal clearance from other pipes. Water services shall have a 1.2 metre horizontal clearance from other utilities.
- 5.9 Services shall be installed with continuous copper piping from main to service box without joints.
- 5.10 Valve chambers are required for all valves 300mm diameter and larger.
- 5.11 Valve boxes shall be telescopic type.

- 5.12 Tracing wire is to be 12 gauge, plastic-coated, braided copper tracer wire (T.W.U. 75c 600V) and be installed along all mains per Town of Aurora standard drawings W-105 and W-106.
- 5.13 Electrochemical corrosion protection for Metallic Watermain and Appurtenances are as follows:
- i. All buried valves and fittings shall be wrapped with Denso and/or PetroGuard tape.
 - ii. All valves and metallic fittings in chambers to be wrapped with Denso and/or PetroGuard tape or protected by installing $\frac{3}{4}$ " large protecto caps on each both equal or approved.
 - iii. All metallic fittings, valves and copper water services shall be fitted with 12 lb zinc anodes (anode type Z-12-24 as specified in OPSS 442) with the exception of valves that are installed in easements or are 400mm in diameter and larger which shall be fitted with 24 lb zinc anodes (anode type Z-24-48 as specified in OPSS 442).
 - iv. All hydrant bases shall be fitted with 24 lb zinc anodes (anode type Z-24-48 as specified in OPSS 442).
 - v. All metallic watermain shall be fitted with anodes that are sized and spaced in accordance with Table 4 of OPSS 442.
 - vi. Zinc anode placement and installation shall be carried out in accordance with OPSS 442 and OPSD 1109.011. Ground clamps are to be used to connect anode wires to copper water services
 - vii. No copper conductivity strips to be used.

6.0 General:

- 6.1 Native subgrade to be compacted to minimum 95% standard proctor maximum dry density and shall be proof rolled.
- 6.2 Structures within the travelled portion of the road shall be backfilled with granular 'B' Type 1 as per OPSS 1010 with 100% Passing the 4.25mm sieve. The granular 'B' backfill shall be compacted to 100% SPMDD and have 1V:4H frost tapers from frost line to subgrade.
- 6.3 Concrete sidewalk shall be 125mm depth except at driveways where minimum depth is to be 175mm. All sidewalk to be bedded by 100mm of 19mm crusher-run limestone.
- 6.4 Perforated subdrains to be continuous and shall be capped using an expandable plug on low side of catchbasin.
- 6.5 All driveways shall be constructed from the curb to the dwelling (except for estate lots) with 150 mm of 19mm crusher-run limestone and 50mm of HL3A asphalt, unless otherwise approved. For estate lots, only the apron section of the driveway (from the road to the property line) is

required to be constructed with asphalt.

- 6.6 All dimensions for roadways are to edge of the pavement. See standard cross-section for details.
- 6.7 Minimum pavement (compacted thickness) design is:
For residential - local
- 40mm - HL3 surface course asphalt
- 50mm - HL8 binding course asphalt
- 150mm - 19mm crusher-run limestone base
- 300mm - 50mm crusher-run limestone sub-base
For residential collector and Industrial
- 50mm - HL3 surface course asphalt
- 75mm - HL8 binding course asphalt
- 150mm - 19mm crusher-run limestone base
- 450mm - 50mm crusher-run limestone sub-base
- 6.8 Precast concrete adjustment units (Moduloc or approved equivalent) for maintenance holes and catchbasins shall have a solvent damp proofing mastic asphalt compound applied after parging. Precast adjustment units to be in accordance with OPSD 704.010.

7.0 Grading:

- 7.1 All grades and swales shall be a minimum 2% and maximum 5%.
- 7.2 Driveway grades shall be a minimum 2% and maximum 8%.
- 7.3 Houses shall have a minimum 0.15m elevation difference to the adjacent swale low point swale.
- 7.4 Where slopes exceed 5%, 3:1 slopes shall be used to make up difference.
- 7.5 All roof drains shall discharge onto splash pads on grassed areas.
- 7.6 Water service valve boxes shall not be located in driveways.
- 7.7 All lots to have minimum 200mm topsoil and sod.
- 7.8 Minimum separation of 150mm shall be provided between the brickline and the final ground elevation and 200mm between siding and the final ground elevation.
- 7.9 Driveways shall be a minimum 1.2m clear distance from all street hardware (poles, hydrants, catchbasins, utility pedestals, etc.).
- 7.10 Swale depth to be according to flow - minimum 150mm.
- 7.11 Maximum swale length shall be 90m.

APPENDIX 'D'

INDEX OF STANDARD DRAWINGS

No.	Description	Date
E-500	Electrical Abbreviations and Symbols	Sep/09
E-501	Electrical Legend	Sep/09
E-510	Underground Electrical Ducts in Trenches	Jan/13
E-511	Underground Electrical Ducts – Profiles	Jan/13
E-512	Underground Electrical Ducts at Utility Crossings	Jan/13
E-520	Electrical Handhole and Ducts – Details	Sep/09
E-521	460mm Diameter Precast Concrete Handwell	Sep/09
E-522	675mm Diameter Precast Concrete Handwell	Sep/09
E-530	Pole Base for Base Mounted Lighting Poles	Sep/09
E-531	Anchorage Assembly for Lighting Poles	Sep/09
E-540	Direct Buried Poles in Slopes	Sep/09
E-541	Base Mounted Poles in Slopes	Sep/09
E-542	Wood Lighting Pole Direct Buried	Sep/09
E-543	Wood Pole with Overhead and Underground Services	Sep/09
E-544	Concrete Lighting Pole Direct Buried	Sep/09
E-545	Decorative Lighting Pole Direct Buried	Sep/09
E-546	Metal Lighting Pole Direct Buried	Sep/09
E-547	Telecom/Street (Trafalgar) Lighting Pole Direct Buried	Sep/09
E-550	1.8m or 2.4m Elliptical Bracket	Sep/09
E-551	Elliptical Brackets Mounting Details	Sep/09
E-552	60inch or 72inch Decorative Scroll Arm	Sep/09
E-560	Pole Wiring for 120/240 System	Sep/09

INDEX OF STANDARD DRAWINGS

No.	Description	Date
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E-570	Underground Power Supply Mounting Details	Sep/09
E-571	Power Supply on Steel Poles with Buried Hydro Supply	Sep/09
E-572	Pedestal Service Enclosure Installation Details	Sep/09
E-573	Underground Hydro Supply Details	Sep/09
E-580	Aerial Cable Attachment Details	Sep/09
E-581	PVC Junction Box Mounting Details	Sep/09
E-582	Typical Pole Guying Details	Sep/09
M-400	Front Lot Drainage	Nov/09
M-401	Split Lot Drainage	Apr/16
M-402	Lot Drainage for Walkout and Backsplit Dwellings	Apr/16
M-403	Lot Grading Plan Requirements for Infill Lots	Nov/09
M-404	Siltation Control Fencing	May/13
M-405	Granular Erosion Control Device	May/09
M-406	Temporary Sediment Basin	May/09
M-409	Single Lot Servicing	Nov/16
M-410	Semi-Detached Lot Servicing	Nov/16
M-411	Townhouse Unit Servicing	Nov/16
M-412	Single Lot Servicing (2C Lands only)	Nov/16
R-200	Concrete Sidewalk	Feb/09
R-201	Sidewalk Ramps	Dec/15
R-201a	Detectable Warning Plate	Dec/15

INDEX OF STANDARD DRAWINGS

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R-202	Driveway Entrance Detail	Aug/15
R-203	Walkway Detail	Feb/09
R-204	Monolithic Concrete Sidewalk And Retaining Wall	Jan/13
R-205	Typical Cul-de-Sac	Mar/14
R-206	Typical Angle Bend Detail	Feb/09
R-207	Traffic Sign and Pavement Marking Installation Detail	Feb/09
R-208	Street Name Sign Detail	Feb/09
R-209	Typical 18m Residential Right-of-Way	Jan/13
R-210	Typical 20m Residential Right-of-Way	Jan/13
R-211	Typical 23m Residential Right-of-Way	Jan/13
R-212	Typical 26m Residential Right-of-Way	Jan/13
R-213	Typical 20m Industrial Right-of-Way	Jan/13
R-214	Typical 23m Industrial Right-of-Way	Feb/17
R-215	Industrial, Commercial & Multi-Residential Entrances Curb Detail	Jul/12
R-216	Residential Driveway Curb Detail	Jan/13
R-217	Rural Entrance	Jan/13
R-218	Interlocking Paver Sidewalk	Jan/13
R-219	Standard Benchmark Detail	Nov/18
S-300	Sewer Bedding and Backfill Details	Apr/14
S-301	Typical Drop Structure for Standard Maintenance Holes	Mar/09
S-302	Sewer Service Connection Detail	May/09
S-303	Catchbasin and Subdrain Detail	Oct/18
S-304	Sanitary Service Inspection Chamber	Sept/19

INDEX OF STANDARD DRAWINGS

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W-100	Watermain and Water Service Bedding Detail	Apr/14
W-101	Standard Water Service Connection for 19mm and 25mm Diameter	Jan/09
W-102	Circular precast Valve Chamber for 300mm Watermain	Jan/09
W-103	Precast Valve Chamber for 350mm and Larger Watermains	Jan/09
W-104	Valve and Box Installation for 150mm, 200mm, and 250mm Diameter Watermains	Jan/09
W-105	Hydrant and Valve Installation	Jan/09
W-106	Watermain and Water Service Insulation Detail	Apr/14
W-107	Standard Water Service Connection 32mm, 40mm, & 50mm Diameter	Jan/09
W-108	50mm Diameter Blow-off Assembly	Jan/09
W-109	Sampling Station	Jan/09
W-110	Air Valve and Chamber	Jan/09
W-111	Drain Valve and Chamber	Jan/09
W-112	Check Valve and Chamber Detail	Jan/09
W-113	Meter Chamber and By-pass Detail for Domestic Service 100mm, 150mm, and 200mm	Oct/15
W-114	Combined Fire and Domestic Water Connections	Oct/15
W-115	Single Building Commercial & Industrial Lot Servicing with Private Hydrants	Oct/15
W-116	Single Building Commercial & Industrial Lot Servicing without Private Hydrants	Oct/15
W-117	Multiple Building Commercial & Industrial Lot Servicing with Single Water Connection	Oct/15
W-118	Multiple Building Commercial & Industrial Lot Servicing with Two Water Connections	Oct/15
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W-125	Total Isolation of Existing and New Systems	Jan/13
W-126	Connection at Existing Valve 300mm or Greater Watermain	Jan/13
W-127	Colour Coding of Hydrants	Mar/14
W-128	Automatic Flushing Device	Feb/18
W-129	Temporary Watermain Connection Detail From Watermain	Nov/18

ABBREVIATIONS

AFG	ABOVE FINISHED GRADE	OESC	ONTARIO ELECTRICAL SAFETY CODE
AC	ALTERNATING CURRENT	PCS	PERMANENT COUNTING STATION
AI	ALUMINUM	PUC	PUBLIC UTILITIES COMMISSION
AWG	AMERICAN WIRE GAUGE	PVC	POLYVINYL CHLORIDE
AMB	AMBER	PXO	PEDESTRIAN CROSSOVER
BFG	BELOW FINISHED GRADE	RF	RADIO FREQUENCY
BGRD	BARE GROUND	RFI	RADIO FREQUENCY INTERFERENCE
BLK	BLACK	RMS	RAMP METERING STATION
BLU	BLUE	TS	TRAFFIC SIGNAL
CCT	CIRCUIT	XFMR	TRANSFORMER
CE CODE	CANADIAN ELECTRICAL CODE	UPC	UNDERPAVEMENT CROSSING
CU	COPPER	VDS	VEHICLE DETECTOR STATION
CCTV	CLOSED CIRCUIT TELEVISION	WHT	WHITE
COMM	COMMUNICATION	YEL	YELLOW
C/W	COMPLETE WITH		
COND	CONDUCTOR		
CONT	CONTROL		
CDT	CONDUIT		
CSA	CANADIAN STANDARDS ASSOCIATION		

ELECTRICAL SYMBOLS

DB	DIRECT BURIED	A	AMPERE	Ω	OHM
DC	DIRECT CURRENT	F	FARAD	V	VOLT
EC	ELECTRICAL CHAMBER	H	HENRY	VA	VOLT AMPERE
EMI	ELECTROMAGNETIC INTERFERENCE	Hz	HERTZ	W	WATT
ELV	EXTRA LOW VOLTAGE			Wh	WATT HOUR
EQPT	EQUIPMENT				
ESA	ELECTRICAL SAFETY AUTHORITY				

IDENTIFICATION CODES

FOR EXISTING CABLES, Note 1

FOC	FIBRE OPTIC CABLE	BCU	BELL CABLE, UNDERGROUND
ATMS	ADVANCED TRAFFIC MANAGEMENT SYSTEM	CCA	COMMUNICATIONS CABLE, AERIAL
GRN	GREEN	DC	EXTRA LOW VOLTAGE DETECTOR CABLE
GRD	GROUND	GC	GUY CABLE
HW	ELECTRICAL HANDWELL	HC	HYDRO CABLE
HV	HIGH VOLTAGE	LC	LIGHTING CABLE
HEC	HYDRO ELECTRIC COMMISSION	PC	POWER CABLE
IESNA	ILLUMINATION ENGINEERING SOCIETY OF NORTH AMERICA	TS	TRAFFIC SIGNAL CABLE
IGRD	INSULATED GROUND (GREEN)	TV	TELEVISION CABLE
IMPD	IMPEDANCE		
IND	INDUCTANCE		
ITS	INTELLIGENT TRANSPORTATION SYSTEMS		

IDENTIFICATION CODES

FOR EXISTING POLES

JB	JUNCTION BOX	A	AUTHORITY OWNED POLE
LCS	LANE CONTROL SIGN	B	BELL POLE
LV	LOW VOLTAGE	C	COMMUNICATIONS POLE
MH	ELECTRICAL MAINTENANCE HOLE	GP	GUY POLE
NEUT	NEUTRAL	H	HYDRO POLE
NIC	NOT INCLUDED IN CONTRACT	HM	HIGH MAST LIGHTING POLE
NTS	NOT TO SCALE	LS	LIGHTING POLE
		TS	TRAFFIC SIGNAL POLE
		TV	TELEVISION POLE

NOTE 1. ADD SUFFIX 'U' FOR UNDERGROUND OR SUFFIX 'A' FOR AERIAL.
 NOTE 2. ADD PREFIX 'E' TO INDICATE EXISTING. EG. EJB (EXISTING JUNCTION BOX).

TOWN OF AURORA

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SEPT 2009






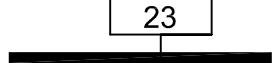
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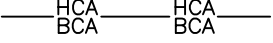

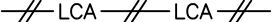
E-500





ELECTRICAL ABBREVIATIONS AND SYMBOLS

DUCTS AND CABLES



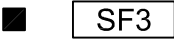
-  DUCTS AND/OR CABLES, UNDERGROUND
-  DUCTS AND/OR CABLES, SURFACE MOUNTED
-  DUCTS AND/OR CABLES EMBEDDED. "EXP" INDICATES EXPANSION JOINT
-  CABLES, INSTALLED IN EXISTING DUCTS
-  CABLES, AERIAL
-  UNDERPAVEMENT CROSSING IDENTIFICATION CODE

-  DUCT STUB WITH PLUG
-  EXISTING CABLES AND/OR DUCTS TO REMAIN IN PLACE
-  EXISTING CABLES AND/OR DUCTS TO BE REMOVED
-  EXISTING CABLES AND/OR DUCTS TO BE ABANDONED




MANHOLES, JUNCTION BOXES

-  JUNCTION BOX, EMBEDDED OR SURFACE MOUNTED WITH IDENTIFICATION CODE
-  ELECTRICAL HANDWELL, UNDERGROUND WITH IDENTIFICATION CODE





PADS AND FOOTINGS

-  FOOTING IN EARTH OR ROCK WITH IDENTIFICATION CODE
-  FOOTING ON STRUCTURE WITH IDENTIFICATION CODE
-  SIGN FOOTING WITH IDENTIFICATION CODE


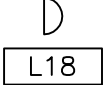
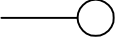
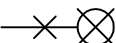
POLES

-  POLE WITH IDENTIFICATION CODE
-  EXISTING POLE TO REMAIN WITH IDENTIFICATION CODE
-  EXISTING POLE TO BE REMOVED WITH IDENTIFICATION CODE






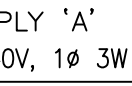
GUYING

-  SINGLE GUY WITH SINGLE ANCHOR
-  DOUBLE GUY WITH SINGLE ANCHOR
-  DOUBLE GUY WITH DOUBLE ANCHOR
-  SINGLE GUY WITH SIDEWALK STRUT AND SINGLE ANCHOR

LUMINAIRES

-  LUMINAIRE
-  UNDERPASS OR SURFACE MOUNTED LUMINAIRE WITH IDENTIFICATION Code
-  LUMINAIRE WITH BRACKET
-  EXISTING LUMINAIRE AND BRACKET TO BE REMOVED

POWER SUPPLY

-  POWER SUPPLY EQUIPMENT
-  TRANSFORMER
-  GENERATOR
-  POWER SUPPLY EQUIPMENT, PAD AND/OR FOOTING MOUNTED.
-  PHOTOELECTRIC CONTROLLER
-  POWER SUPPLY EQUIPMENT IDENTIFICATION CODE OTHER DESCRIPTION MAY BE USED FOR TRANSFORMER, GENERATOR, ETC.

TOWN OF AURORA

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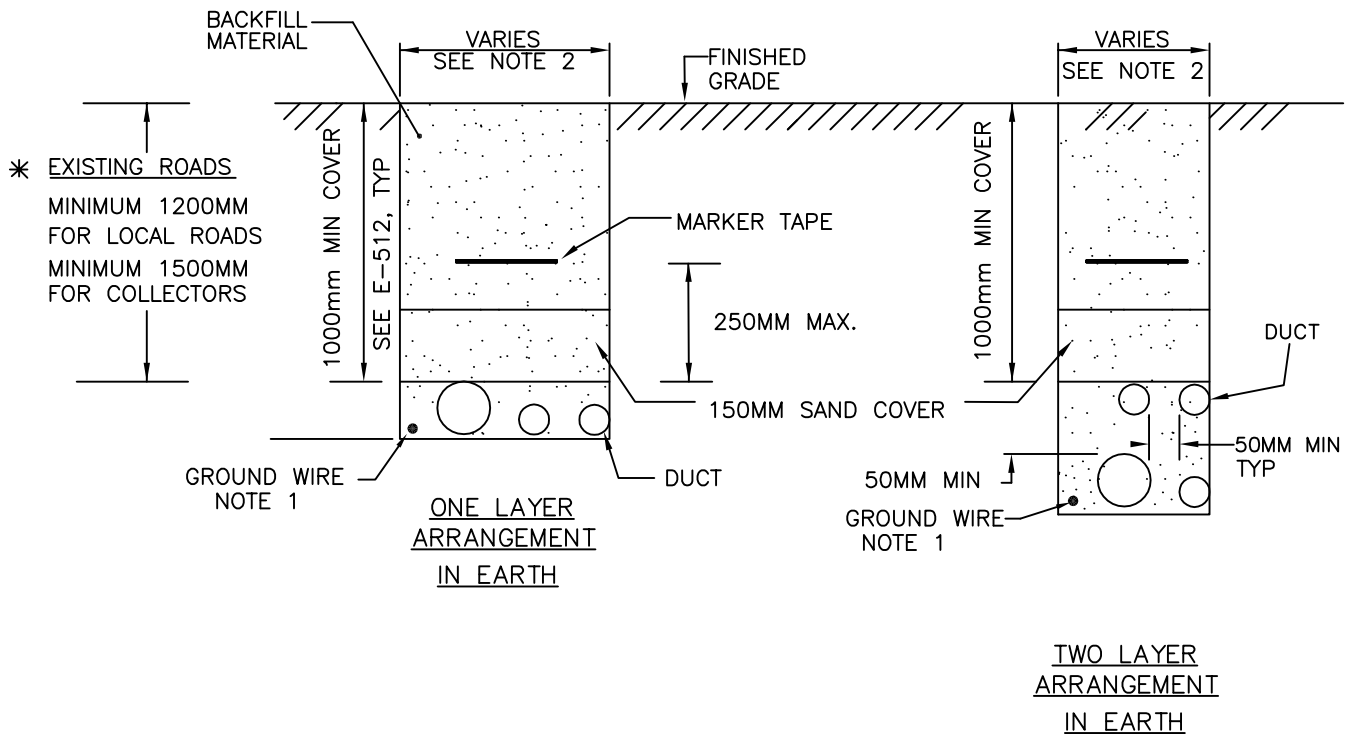
SEPT 2009

DRAWING NO.:

E-501



ELECTRICAL LEGEND



NOTES:

1. INSTALL GROUND WIRE IN THE DUCT, OR TRENCH AS INDICATED IN THE CONTRACT.
2. THE WIDTH OF THE TRENCH VARIES AND DEPENDS UPON THE SIZE AND QUANTITY of ducts.
3. INSTALL CABLE BRICK, OR CONCRETE SLAB, MARKER TAPE, CONCRETE DUCT MARKER WHERE INDICATED IN THE CONTRACT. SEE E-510.
4. THIS DRAWING IS USED IN CONJUNCTION WITH E-512.
5. CONTRACTOR HAS THE OPTION OF INSTALLING ONE, OR TWO LAYER DUCT ARRANGEMENT.
6. N/A – NOT APPLICABLE, UNDESIRABLE, OR EXCEEDING EQUIPMENT LIMITS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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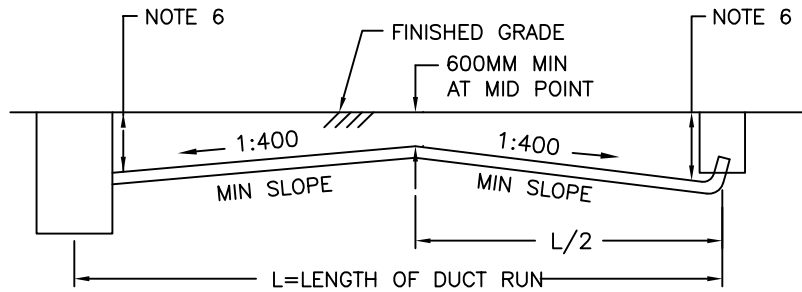
JAN 2013

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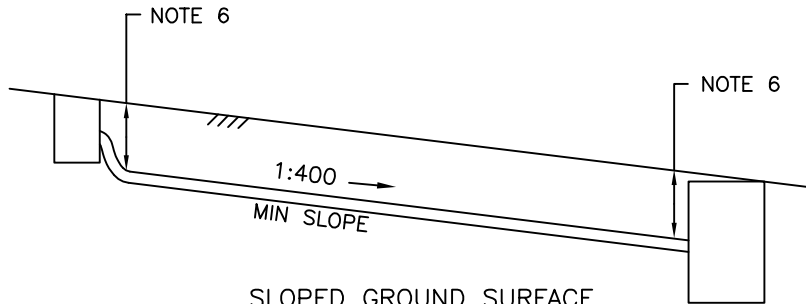
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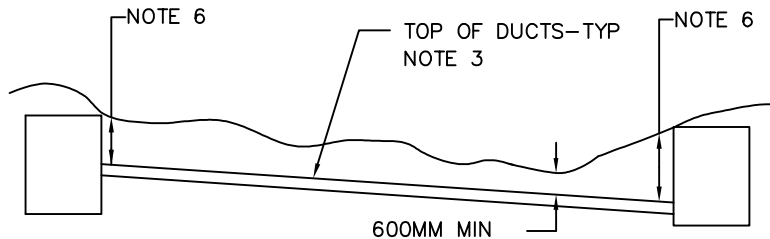
**UNDERGROUND ELECTRICAL DUCTS
IN TRENCHES**



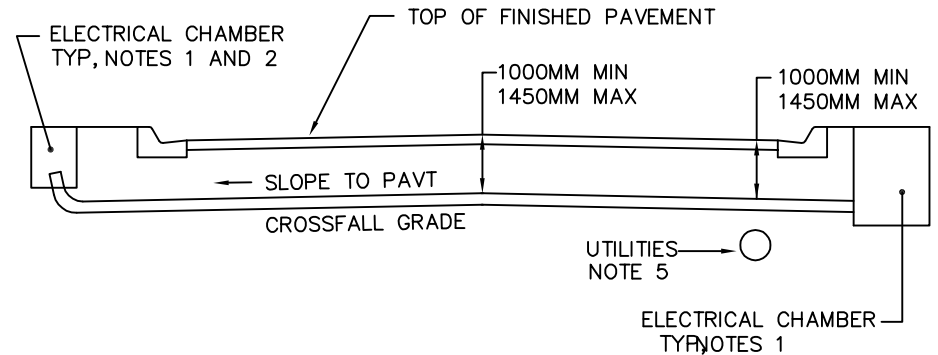
FLAT GROUND SURFACE



SLOPED GROUND SURFACE



UNEVEN GROUND SURFACE



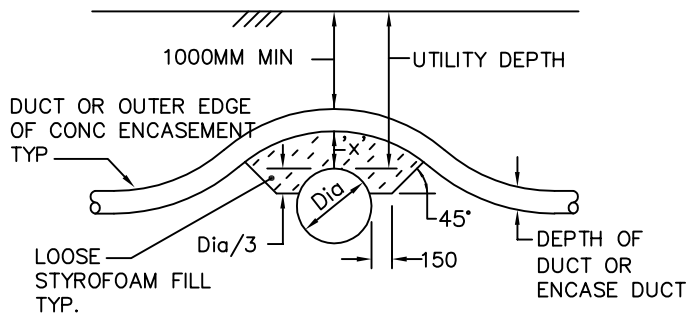
OPEN CUT METHOD ACROSS EXISTING ROADWAYS
(Note 4)

NOTES:

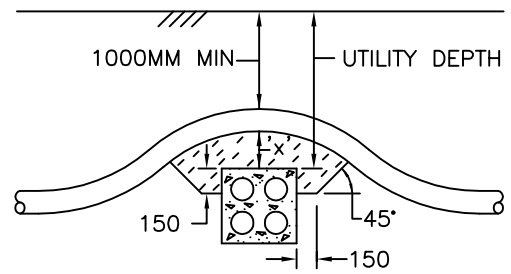
1. FOR TYPE AND SIZE OF ELECTRICAL CHAMBERS, SEE LAYOUT DRAWINGS.
2. FOR DUCT CONNECTION TO ELECTRICAL HANDHOLES, SEE E-520.
3. DEPTH OF COVER GIVEN IS TO TOP OF DIRECT BURIED DUCTS, OR TO TOP OF CONCRETE ENCASEMENT.
4. FOR SUBSURFACE AND UNDERPAVEMENT INSTALLATION, THE COVER SHALL BE 100MM MIN AND 1450MM MAX MEASURED FROM THE TOP OF STEEL ENCASEMENT, OR DUCT TO THE FINISHED GRADE.
5. FOR TREATMENT AT UTILITY CROSSINGS, SEE E-512.
6. DUCT SHALL BE INSTALLED 1000MM MIN. AND 1450MM MAX. MEASURED FROM THE FINISHED GRADE.
7. FOR CABLE WITH 750V AND ABOVE REFER TO OPSD 2100.01

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

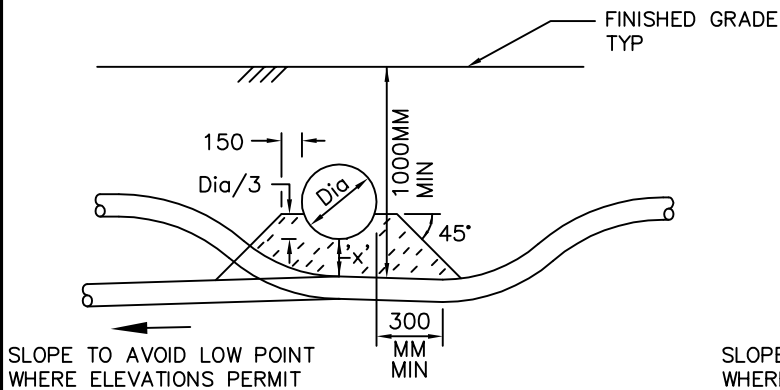
TOWN OF AURORA		APPROVED:	SCALE: N.T.S
	UNDERGROUND ELECTRICAL DUCTS - PROFILES		REVISION: JAN 2013
			DRAWING NO.: E-511



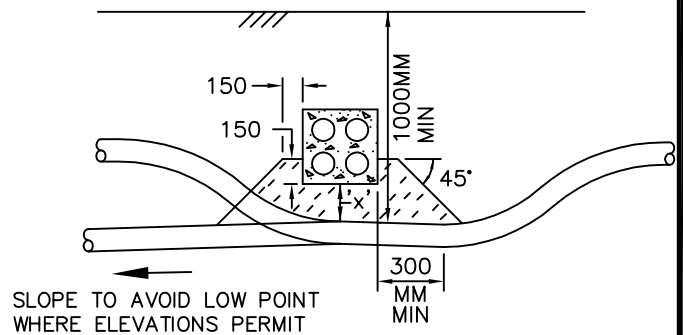
CROSSING OVER UTILITY



CROSSING OVER CONCRETE
ENCASED UTILITY



CROSSING UNDER UTILITY



CROSSING UNDER CONCRETE
ENCASED UTILITY

NOTES:

A. THE REQUIRED CLEARANCE 'X' BETWEEN THE UTILITY AND THE DUCTS OR CONCRETE ENCASEMENT IS:

<u>UTILITY</u>	<u>'X' MM MIN</u>
DUCTS, DIRECT BURIED OR ENCASED	100
ALL OTHER PIPES	300
HIGH VOLTAGE CABLES	300
ALL OTHER CABLES	300

B. TRENCH WIDTHS SHALL BE KEPT TO THE MINIMUM REQUIRED FOR WORKING SPACE. MANUAL EXCAVATION AND BACKFILL METHODS SHALL BE USED, WITH THE UTILITY SUPPORTED IN PLACE WHERE REQUIRED, WHERE CROSSING UNDER A UTILITY IS NECESSARY.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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REVISION:

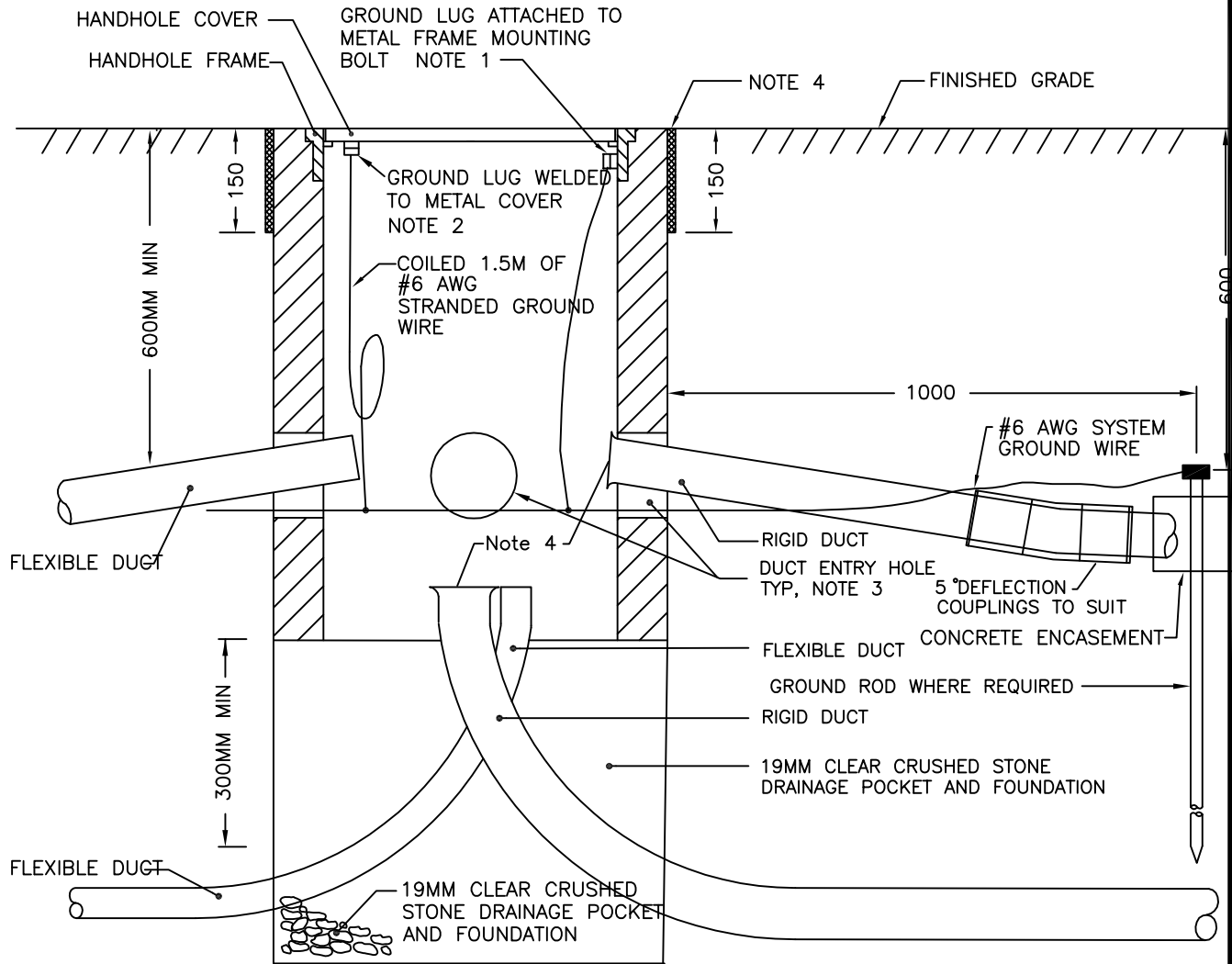
JAN 2013

DRAWING NO.:

E-512



ELECTRICAL DUCTS AT UTILITY CROSSINGS



NOTES:

- 1 FOR HANDHOLES WITH METAL FRAMES, ATTACH #6 AWG SIZE COPPER GROUND LUG TO FRAME.
- 2 FOR HANDHOLES WITH METAL COVERS AND NON METALLIC FRAMES, THE GROUND WIRE SHALL BE ATTACHED TO THE HANDHOLE COVER USING A GROUND LUG SUITABLE FOR #6 AWG COPPER WIRE.
- 3 DUCT ENTRY HOLES TO BE FILLED WITH EXPANSION FOAM.
- 4 RIGID DUCTS TERMINATING IN HANDHOLES, OR OTHER PERMANENT OPENINGS OF UNDERGROUND SYSTEMS SHALL BE PROVIDED WITH AN END BELL.
5. FOR SPECIFIC HANDHOLE DETAILS SEE E-521 and E-522

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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REVISION:

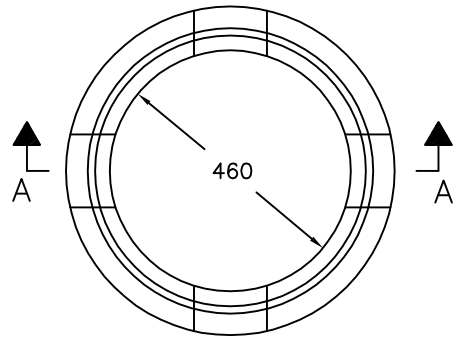
SEPT 2009

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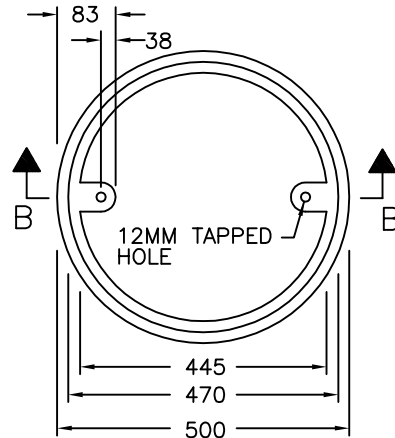
E-520



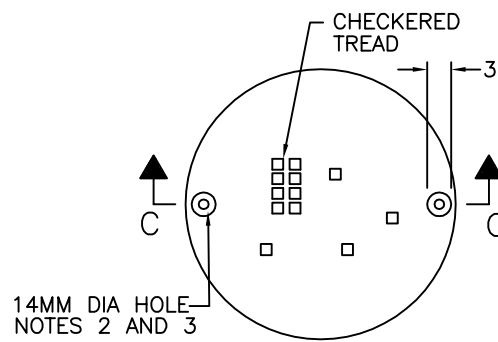
**ELECTRICAL HANDHOLE AND
DUCTS DETAILS**



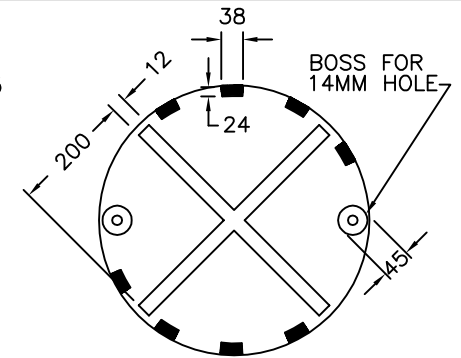
PLAN-HANDHOLE



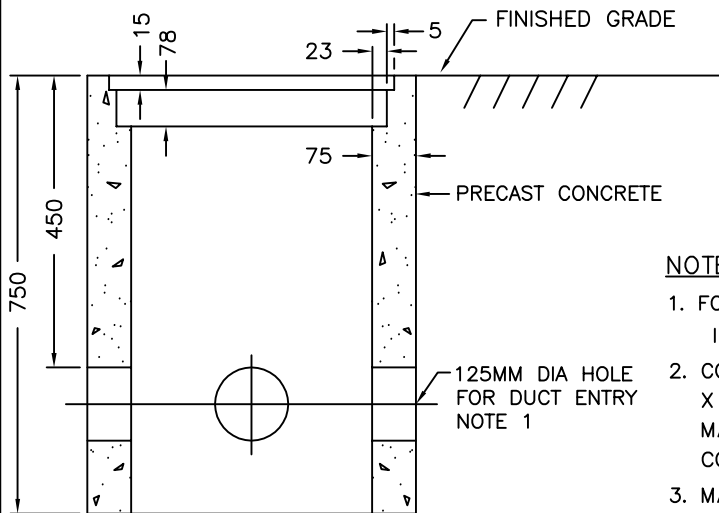
PLAN-FRAME



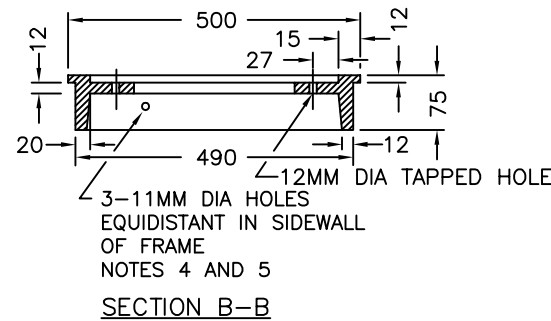
PLAN-COVER



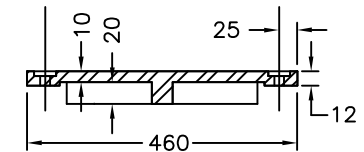
UNDERSIDE OF COVER



SECTION A-A



SECTION B-B



SECTION C-C

NOTES:

1. FOR INSTALLATION OF DUCTS AND GENERAL INSTALLATION DETAILS REFER TO E-520.
2. COVER TO BE RETAINED WITH 2-12MM DIA X 20MM LONG STAINLESS STEEL HEX HEAD MACHINE BOLTS TO BE FLUSH WITH TOP OF COVER WHEN FASTENED.
3. MATERIAL FOR FRAME AND COVER-ANSI/ASTM STANDARD A48-1990 GRAY IRON CASTING, CLASS NO 30C.
4. FRAME TO BE ATTACHED USING 3-10MM DIA X 38MM LONG MACHINE BOLTS ANCHORED IN CONCRETE WALL.
5. ONE GROUND LUG FOR #6 AWG STRANDED COPPER TO BE ATTACHED TO ONE FRAME ATTACHING BOLT.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S



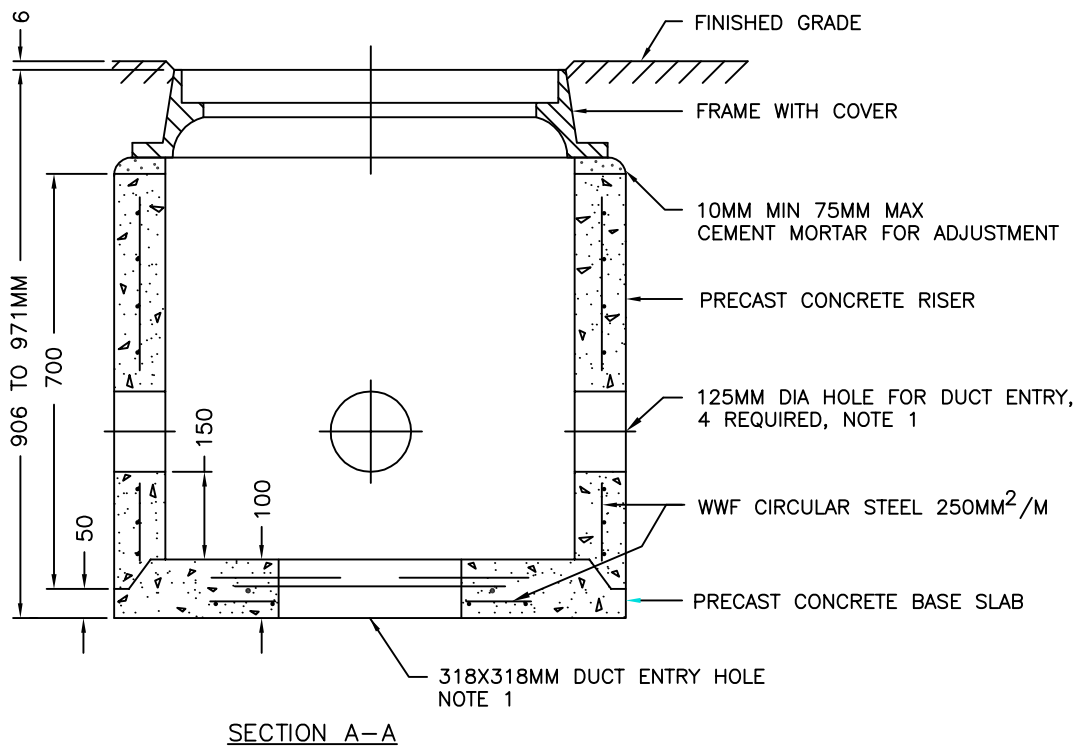
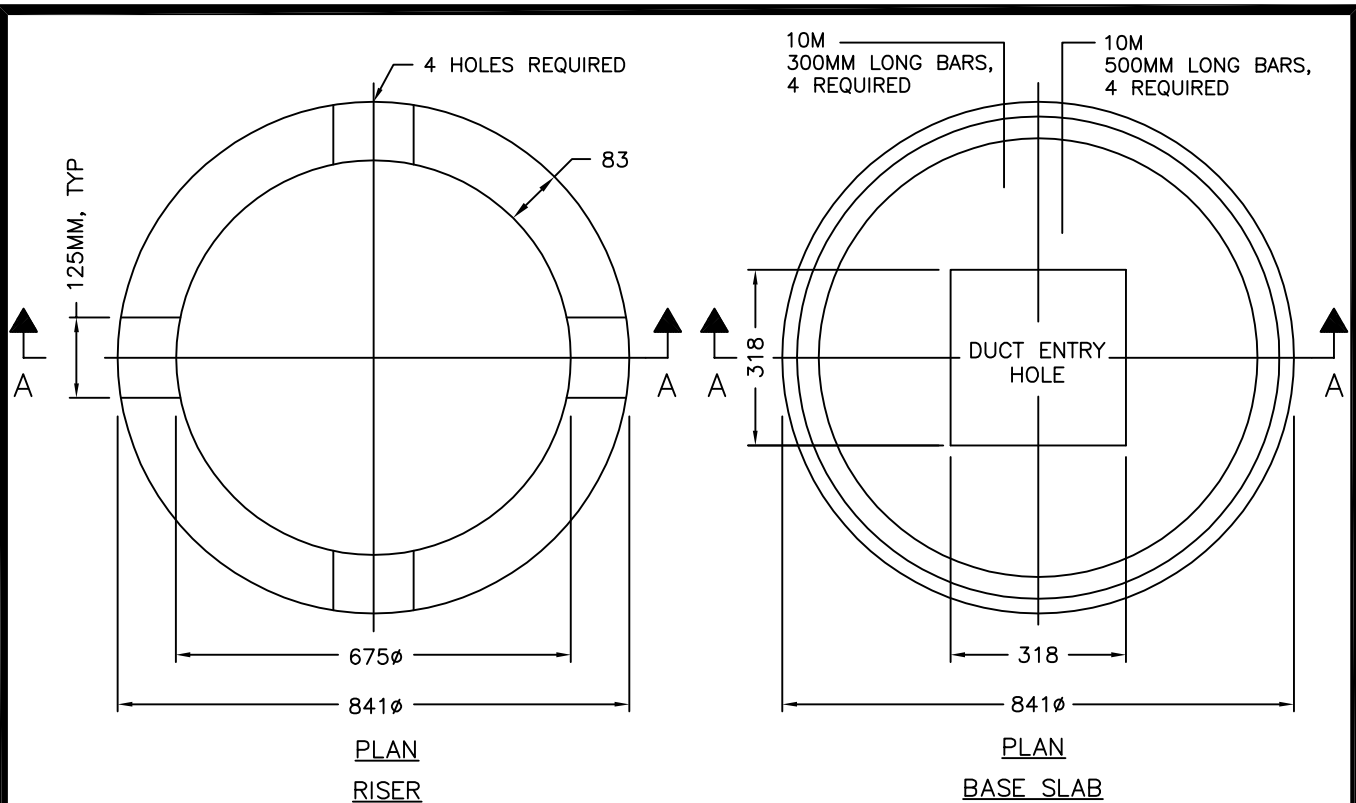
**460mm DIAMETER PRECAST
CONCRETE HANDWELL**

REVISION:

SEPT 2009

DRAWING NO.:

E-521



NOTES:

1. FOR DUCT INSTALLATION AND GENERAL INSTALLATION DETAILS SEE E-520.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

SEPT 2009

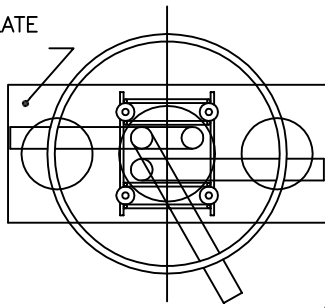
DRAWING NO.:

E-522

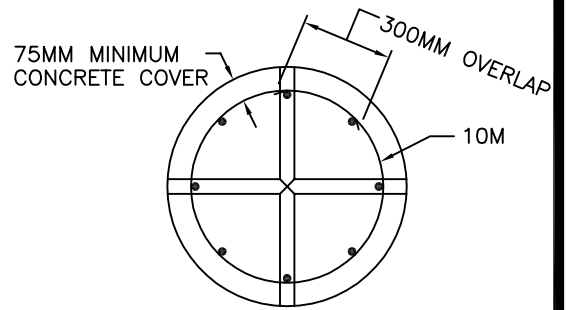


**675mm DIAMETER PRECAST
CONCRETE HANDWELL**

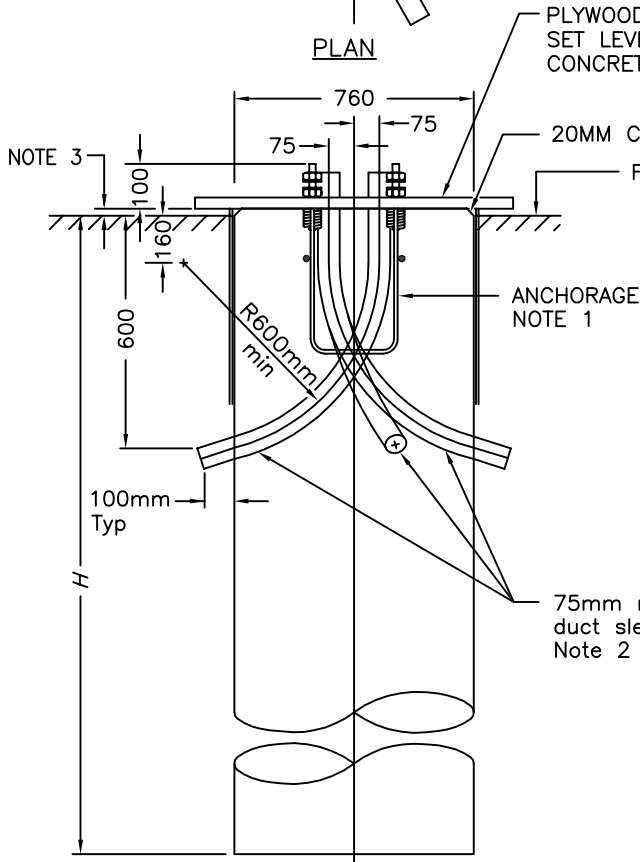
PLYWOOD TEMPLATE
SEE E-531



PLAN



PLAN



ELEVATION
LAYOUT

PLYWOOD TEMPLATE TO BE
SET LEVEL. REMOVE AFTER
CONCRETE IS SET.

20MM CHAMFER
FINISHED GRADE

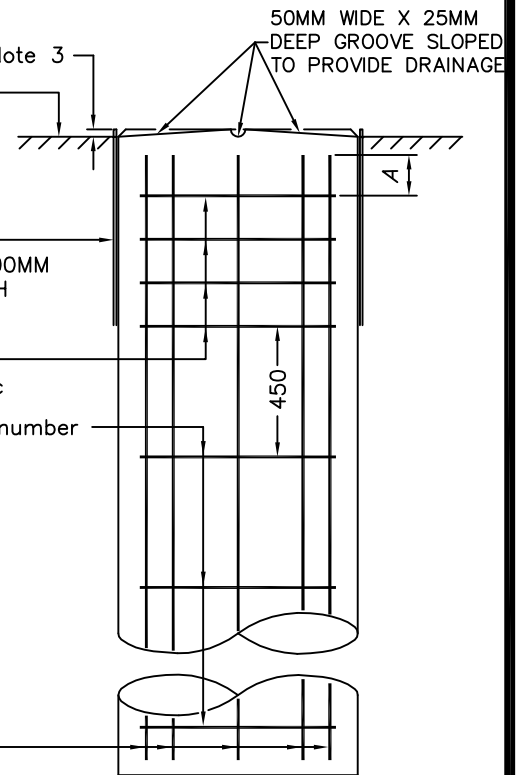
ANCHORAGE
NOTE 1

75mm rigid
duct sleeve
Note 2

Note 3
FIBRE TUBING
FORMWORK, 600MM
MINIMUM DEPTH

4-10M ties
@ 150mm c/c
See table for number
of 10M ties @
450mm c/c

8-20M rods



ELEVATION
REINFORCEMENT

NOTES:

1. FOR ANCHORAGE ASSEMBLY SEE E-531.
2. MINIMUM OF TWO SLEEVES REQUIRED FOR EACH CONCRETE FOOTING. THREE SLEEVES AS SPECIFIED.
3. TOP OF FOOTING SHALL BE INSTALLED AT 40MM ±15MM ABOVE FINISHED GRADE IN PAVED OR CONCRETE AREAS AND 75MM ±25MM ABOVE FINISHED GRADE IN EARTH OR GRANULAR AREAS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm)
UNLESS OTHERWISE NOTED.

N/A - NOT APPLICABLE

POLE LENGTH m	BURIAL DEPTH H m	ROD LENGTH m	A mm	NO. OF 10M TIES @ 450 c/c	BOLT CIRCLE DIA FOR METAL POLES		
					Aluminum	Steel	Sectional Steel
5.6	2.15	2.00	100	3	N/A	N/A	449
7.0	2.15	2.00	100	3	N/A	N/A	449
7.5	2.15	2.00	100	3	406	406	N/A
8.7	2.45	2.30	250	3	N/A	N/A	449
9.0	2.45	2.30	0	4	406	406	N/A
10.5	2.60	2.45	100	4	406	406	449
12.0	2.75	2.60	150	4	406	406	N/A
13.6	2.90	2.75	0	5	406	406	N/A
15.1	3.05	2.90	100	5	406	406	N/A

TOWN OF AURORA

APPROVED:

SCALE:
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REVISION:

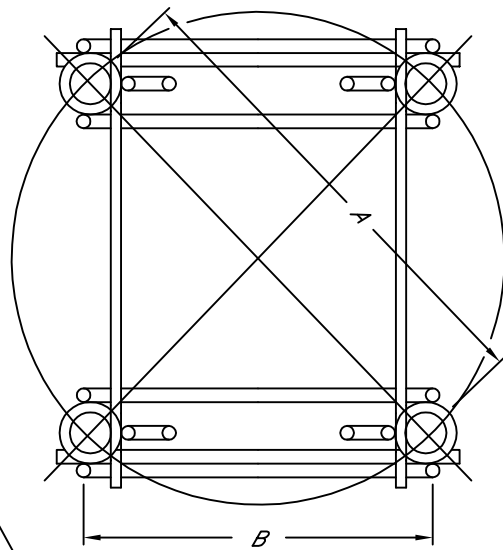
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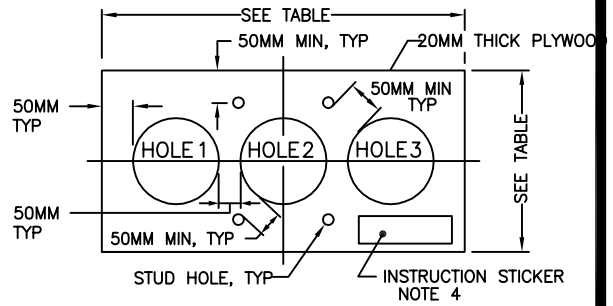
E-530



**POLE BASE FOR BASE MOUNTED
LIGHTING POLES**



PLAN



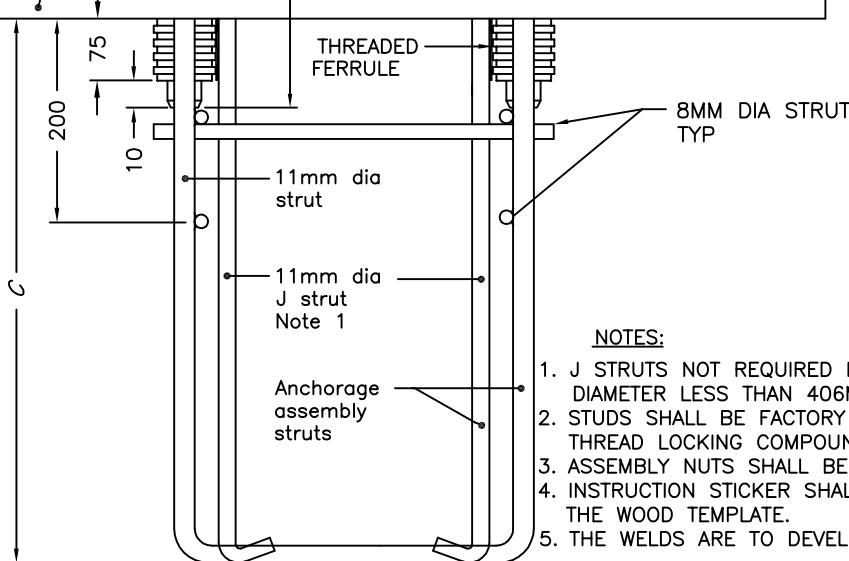
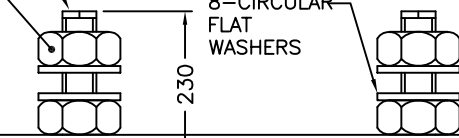
DETAIL A

4-FULLY THREADED SQUARE HEAD STUDS NOTE 2

8-STEEL HEX NUTS NOTE 3

8-CIRCULAR FLAT WASHERS

PLYWOOD TEMPLATE SEE DETAIL A



ELEVATION

CONSTRUCTION NOTES.

1. DO NOT REMOVE STUDS FROM THREADED FERRULES.
2. PLACE ANCHORAGE IN FOOTING WITH WOOD TEMPLATE OVER FORMWORK.
3. TIE ANCHORAGE TO STEEL IN FOOTING.
4. TIE DUCTS TO ANCHORAGE.
5. LEVEL ANCHORAGE IN ALL DIRECTIONS WITH A CARPENTER'S LEVEL AND SECURE IN THE LEVEL POSITION PRIOR TO POURING CONCRETE TO THE TOP OF THE FORMWORK.
6. WHEN CONCRETE HAS ACHIEVED INITIAL SET REMOVE NUTS, WASHERS, AND WOOD TEMPLATE AND FINISH TOP OF CONCRETE.
7. REPLACE NUTS AND WASHERS AND HAND TIGHTEN.

NOTES:

1. J STRUTS NOT REQUIRED IN ASSEMBLY WITH BOLT CIRCLE DIAMETER LESS THAN 406MM.
2. STUDS SHALL BE FACTORY SET IN FERRULE WITH PREAPPLIED THREAD LOCKING COMPOUND.
3. ASSEMBLY NUTS SHALL BE SHIPPED HAND TIGHT ONLY.
4. INSTRUCTION STICKER SHALL BE ATTACHED ON TOP FACE OF THE WOOD TEMPLATE.
5. THE WELDS ARE TO DEVELOP THE STRENGTH OF THE STRUTS

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE SHOWN.

ASSEMBLY DIMENSIONS				WOOD TEMPLATE DIMENSIONS			
STUD DIA	BOLT CIRCLE DIA A mm	STUD DISTANCE B mm	ANCHORAGE DEPTH C mm	LENGTH mm	WIDTH mm	HOLE DIA	
						1 and 3	2
32mm (1-1/4")	406	287	250mm FOR STRUCTURES	1000	400	247	306
			457	1000	400	247	306
	449	318	457	1000	418	225	349
19mm (3/4")	190	135	305	600	300	155	90

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

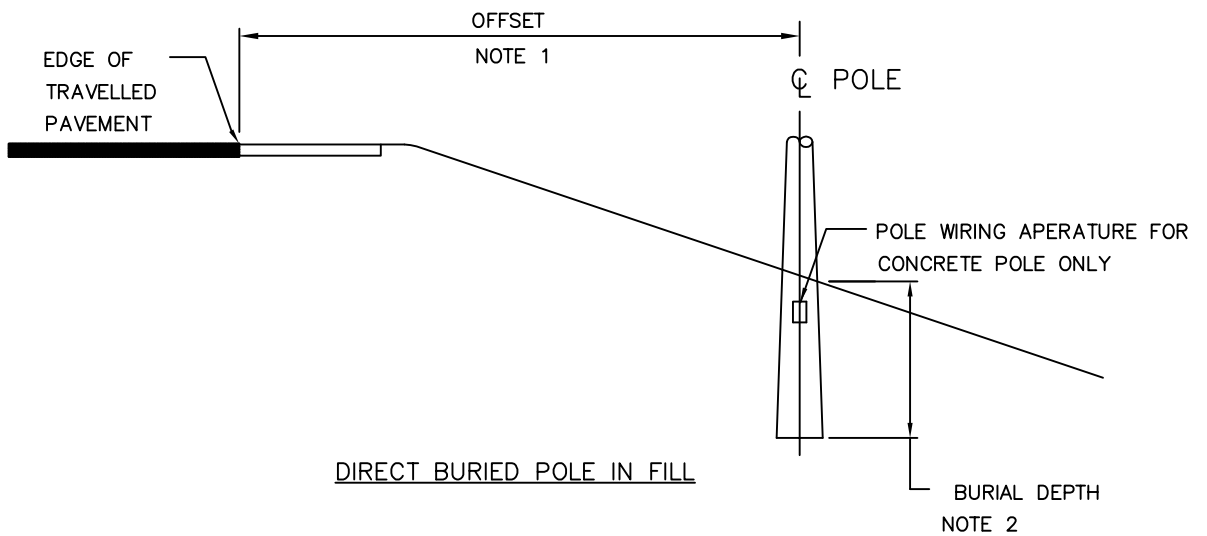
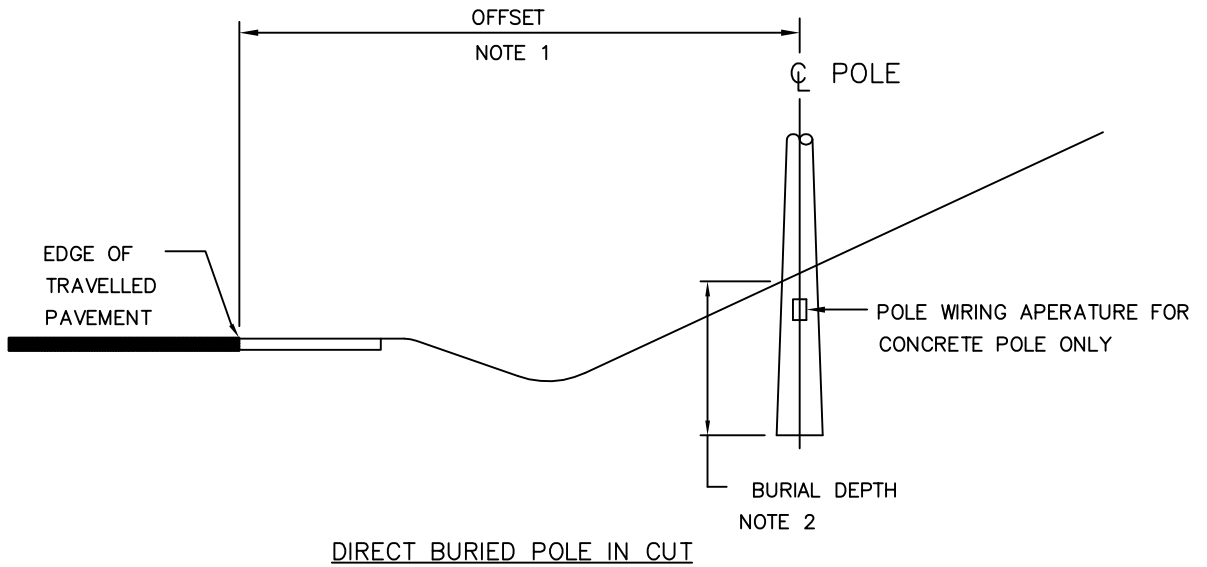
SEPT 2009

DRAWING NO.:

E-531



ANCHORAGE ASSEMBLY FOR LIGHTING POLES



NOTES:

1. LOCATE POLE AT SAFE OFFSET BASED ON DESIGN SPEED, REFER TO CONTRACT DRAWINGS FOR OFFSET.
2. POLE BURIAL DEPTH SHALL BE MEASURED FROM THE LOWEST GRADE ELEVATION AT POLE.
3. THIS DRAWING TO BE READ IN CONJUNCTION WITH E-542 E-544.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

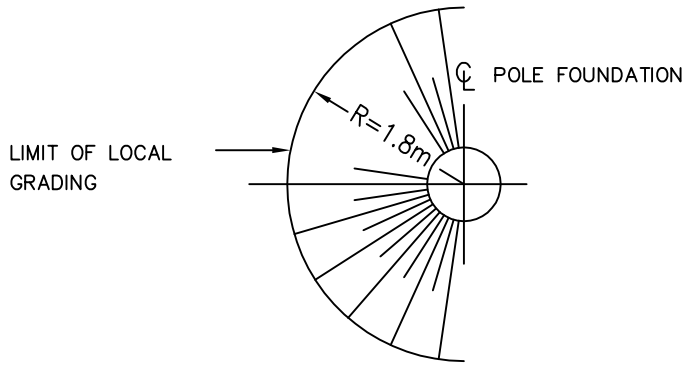
SEPT 2009



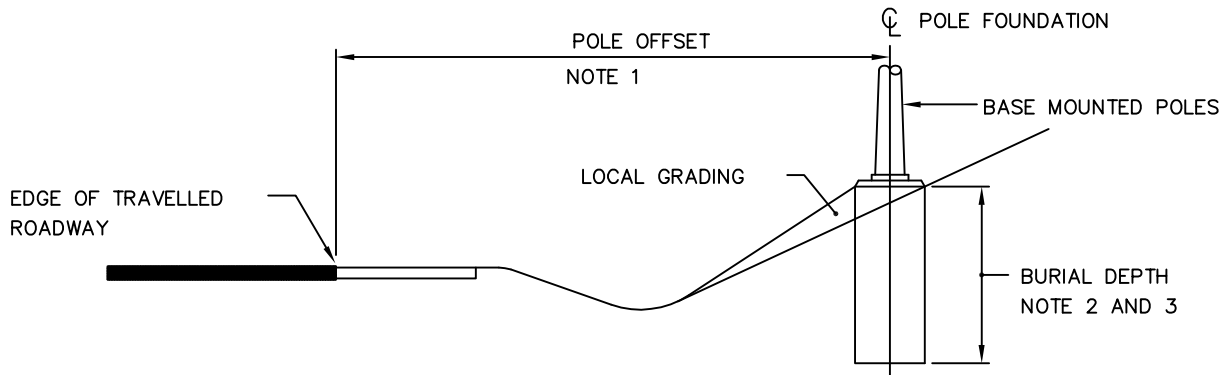
DIRECT BURIED POLES IN SLOPES

DRAWING NO.:

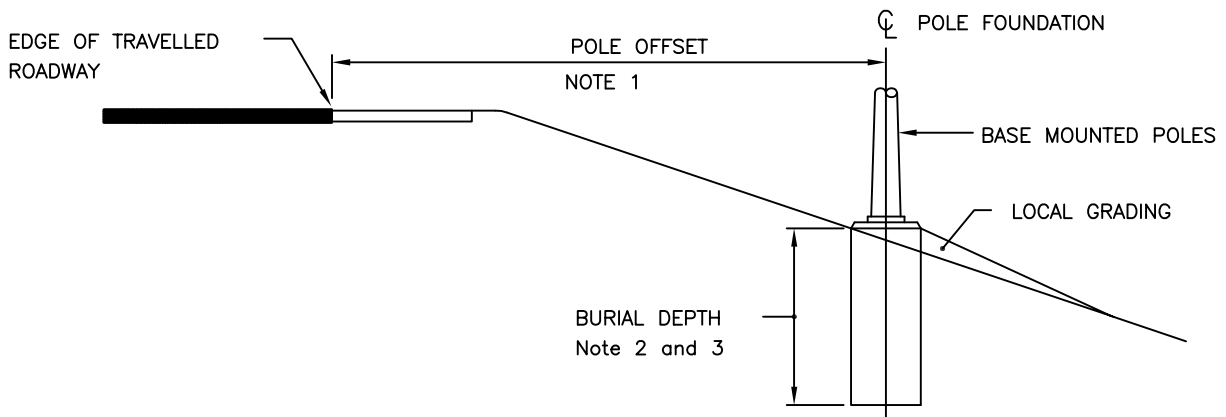
E-540



TYPICAL PLAN



POLE FOUNDATION IN CUT



POLE FOUNDATION IN FILL

NOTES:

1. LOCATE POLE AT SAFE OFFSTE BASED ON DESIGN SPEED, REFER TO CONTRACT DRAWINGS FOR OFFSET.
2. POLE BURIAL DEPTH SHALL BE MEASURED FROM THE HIGHEST GRADE ELEVATION AT POLE FOUNDATION.
3. FOR BURIAL DEPTHS SEE STANDARD E-530.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

SEPT 2009

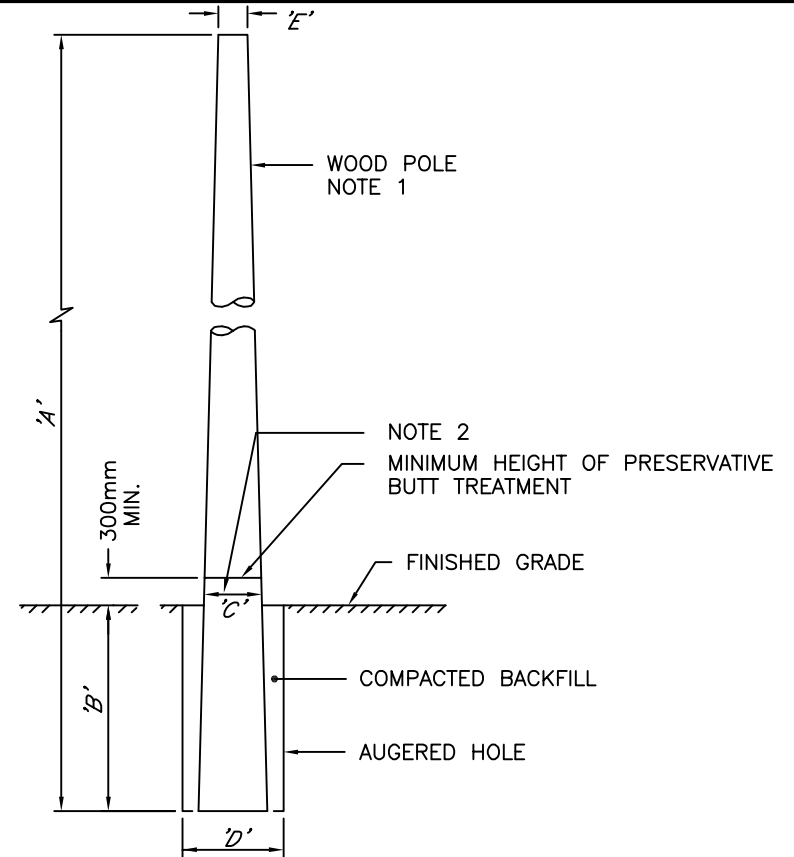


BASE MOUNTED POLES IN SLOPES

DRAWING NO.:

E-541

Class of pole	Approximate breaking strength N	Pole length		Minimum diameter 2.0m above butt 'C' mm	Minimum augering dia 'D' mm	Minimum pole top dia 'E' mm
		'A' m	'B' m			
1	20200	8.0	1.50	310	610	215
		9.5	1.65	330	685	
		11.0	1.80	350	685	
		12.5	1.95	370	685	
		14.0	2.10	390	760	
15.5	2.25	410	760			
2	16600	8.0	1.50	290	610	200
		9.5	1.65	310	610	
		11.0	1.80	330	685	
		12.5	1.95	350	685	
		14.0	2.10	370	685	
15.5	2.25	390	710			
3	13500	8.0	1.50	265	610	185
		9.5	1.65	290	610	
		11.0	1.80	310	610	
		12.5	1.95	330	685	
		14.0	2.10	350	685	
15.5	2.25	370	685			
4	10700	8.0	1.50	245	560	170
		9.5	1.65	265	610	
		11.0	1.80	290	610	
		12.5	1.95	310	610	
		14.0	2.10	330	685	
15.5	2.25	340	685			
5	8500	8.0	1.50	230	560	155
		9.5	1.65	245	560	
		11.0	1.80	265	610	
		12.5	1.95	290	610	
		14.0	2.10	310	610	
15.5	2.25	330	685			



NOTES:

1. LENGTH AND CLASS OF POLE AS SPECIFIED IN THE CONTRACT.
2. THE MINIMUM POLE DIAMETER 'C' SHALL BE 2.0m FROM THE BUTT OF THE POLE.
3. POLE TO BE CSA APPROVED, TYPE AS INDICATED IN THE CONTRACT, COMPLETE WITH PRESERVATIVE BUTT TREATMENT IN ACCORDANCE WITH CSA STANDARDS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S



WOOD LIGHTING POLE DIRECT BURIED

REVISION:

SEPT 2009

DRAWING NO.:

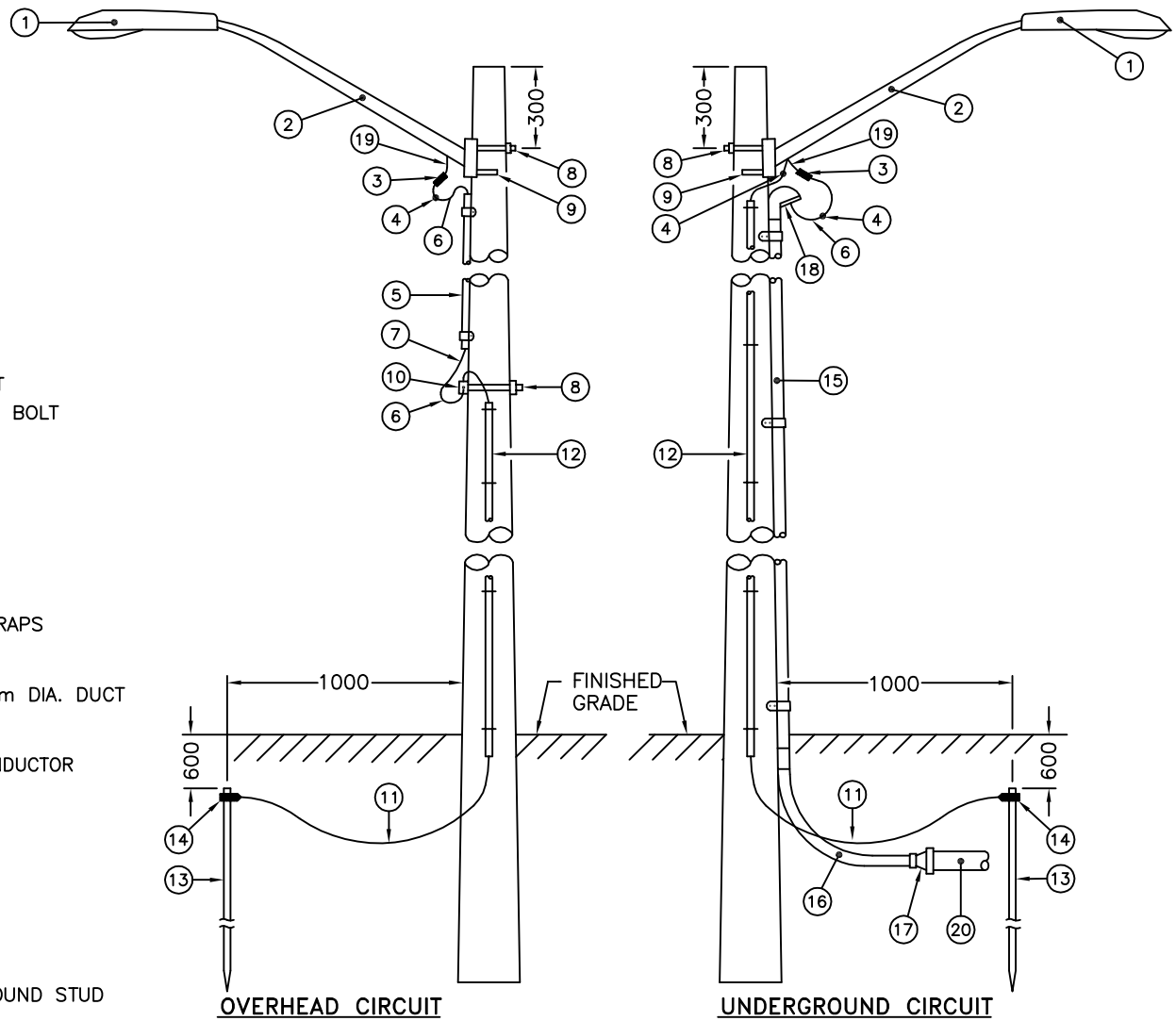
E-542

MATERIALS:

- ① LUMINAIRE AS SPECIFIED IN THE CONTRACT
- ② SINGLE OR DOUBLE ELLIPTICAL BRACKET
- ③ 600V, 15A IN LINE TYPE FUSE HOLDER, COMPLETE WITH INSULATING BOOTS
- ④ COMPRESSION CONNECTORS WITH INSULATING COVERS
- ⑤ 25mm RIGID PVC CONDUIT WITH PVC PIPE STRAPS
- ⑥ 150mm DRIP LOOP
- ⑦ SECONDARY AERIAL BUS, 2-#12 AWG LOW VOLTAGE CABLES AND #12 AWG GROUND CONNECTOR
- ⑧ 16MM DIAMETER GALVANIZED THROUGH BOLT, COMPLETE WITH 50X50MM SQUARE WASHER, LOCK WASHER, AND NUT
- ⑨ 12MM DIA X 150MM LONG GALVANIZED SQUARE HEAD LAG BOLT
- ⑩ SPOOL AND CLEVIS WITH SECONDARY AERIAL CABLE
- ⑪ #6 AWG GROUND CONNECTOR
- ⑫ PROTECTIVE MOULDING STAPLED TO POLE
- ⑬ GROUND ROD
- ⑭ GROUND ROD CONNECTION
- ⑮ 32mm DIAMETER RIGID PVC CONDUIT WITH PVC PIPE STRAPS
- ⑯ 32mm DIAMETER RIGID PVC 90° BEND
- ⑰ COUPLING FROM 32mm DIA. RIGID PVC CONDUIT TO 50mm DIA. DUCT
- ⑱ ENTRANCE FITTING
- ⑲ #12 AWG LOW VOLTAGE CABLES AND #12 AWG GROUND CONDUCTOR
- ⑳ 50mm DIAMETER DUCT

NOTES:

- A. CONNECT #12 AWG GROUND CONDUCTOR TO LUMINAIRE GROUND STUD AND SECONDARY AERIAL BUS.
- B. LENGTH OF WOOD POLE AND POLE SETTING DEPTH AS SPECIFIED.



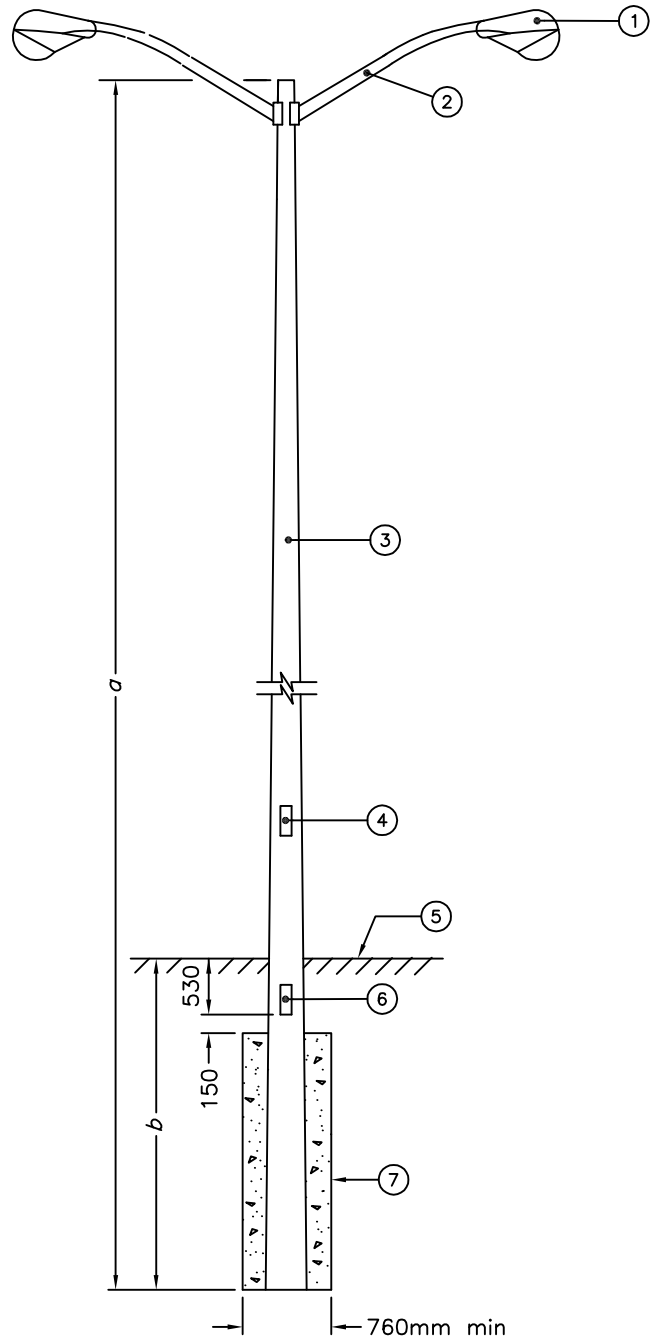
ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

	TOWN OF AURORA	APPROVED:	SCALE: N.T.S
	WOOD POLE WITH OVERHEAD AND UNDERGROUND SERVICES		REVISION: SEPT 2009
			DRAWING NO.: E-543

CONCRETE LIGHTING POLE Installation data	
Pole length a m	Burial depth b m
9.0	1.65
9.6	1.65
10.7	1.65
11.3	2.00
12.5	2.00
14.0	2.00

MATERIALS:

- ① LUMINAIRE
- ② TAPERED ELLIPTICAL BRACKET, E-551
- ③ CONCRETE LIGHTING POLE
- ④ POLE HAND HOLE
- ⑤ FINISHED GRADE
- ⑥ UNDERGROUND THROUGH WIRING APERTURE
- ⑦ CONCRETE ENCASEMENT IN EARTH



ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

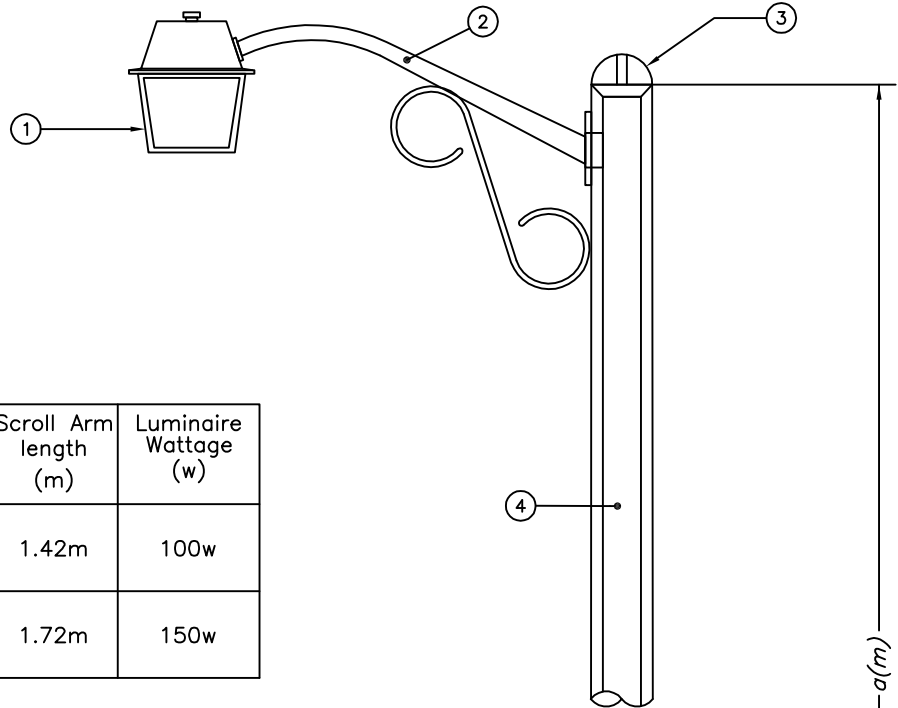
SEPT 2009

DRAWING NO.:

E-544



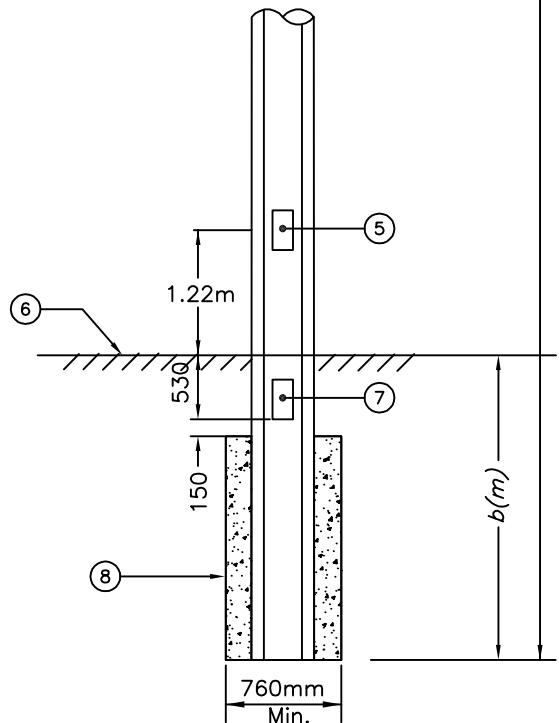
CONCRETE LIGHTING POLE DIRECT BURIED



Pole Length 'a'(m)	Burial Depth 'b'(m)	Scroll Arm length (m)	Luminaire Wattage (w)
8.8m	1.65m	1.42m	100w
9.6m	1.65m	1.72m	150w

MATERIALS:

- ① "SPRINGDALE" BLACK COACH STYLE LUMINAIRE
- ② BLACK BRACKET SCROLL ARM
- ③ BLACK FINNED POLE CAP
- ④ BLACK DIRECT BURIED CLASS 'A' OCTAGONAL PRESTRESSED CONCRETE POLE
- ⑤ POLE HAND HOLE
- ⑥ FINISHED GRADE
- ⑦ UNDERGROUND THROUGH WIRING APERTURE
- ⑧ CONCRETE ENCASEMENT IN EARTH



ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

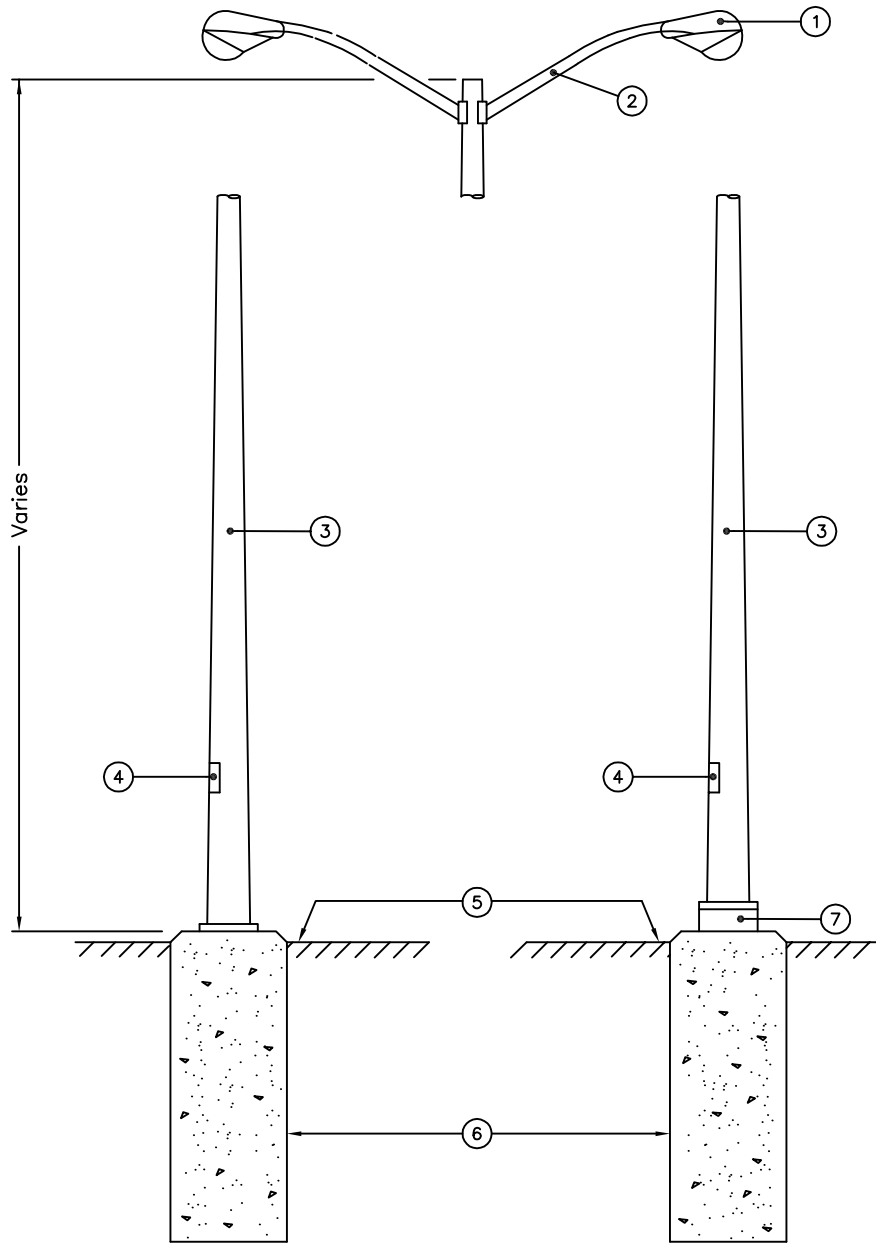
SEPT 2009



**DECORATIVE LIGHTING POLE
DIRECT BURIED**

DRAWING NO.:

E-545



BASE MOUNTED

FRANGIBLE BASE MOUNTED

MATERIALS:

- | | |
|---|--------------------|
| ① LUMINAIRE | ⑤ FINISHED GRADE |
| ② TAPERED ELLIPTICAL BRACKET,
A-EL5.02 | ⑥ CONCRETE FOOTING |
| ③ METAL LIGHTING POLE | ⑦ FRANGIBLE BASE |
| ④ POLE HAND HOLE | |

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
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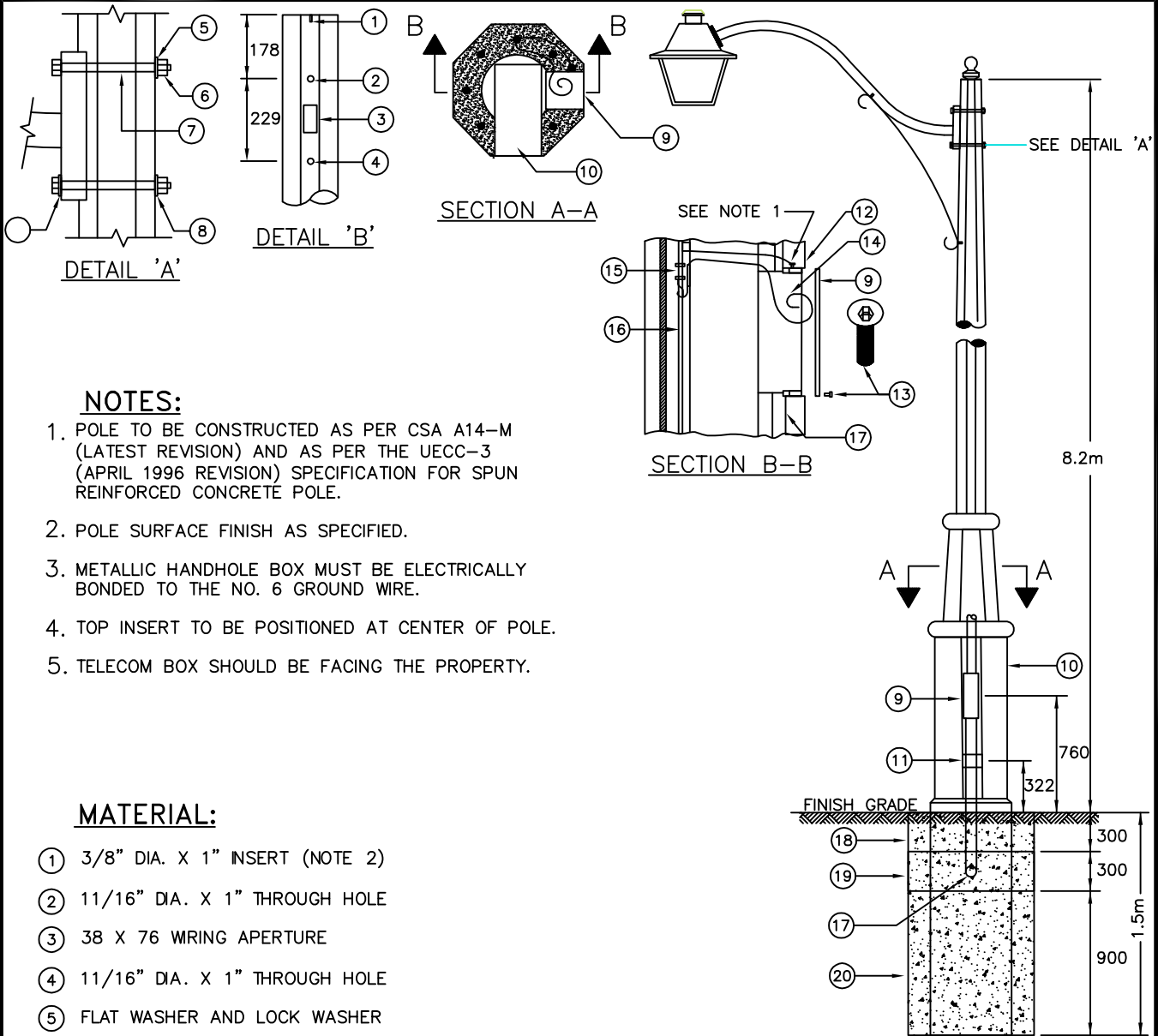
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METAL LIGHTING POLE BASE MOUNTED

DRAWING NO.:

E-546



NOTES:

1. POLE TO BE CONSTRUCTED AS PER CSA A14-M (LATEST REVISION) AND AS PER THE UECC-3 (APRIL 1996 REVISION) SPECIFICATION FOR SPUN REINFORCED CONCRETE POLE.
2. POLE SURFACE FINISH AS SPECIFIED.
3. METALLIC HANDHOLE BOX MUST BE ELECTRICALLY BONDED TO THE NO. 6 GROUND WIRE.
4. TOP INSERT TO BE POSITIONED AT CENTER OF POLE.
5. TELECOM BOX SHOULD BE FACING THE PROPERTY.

MATERIAL:

- | | |
|---|--|
| <ul style="list-style-type: none"> ① 3/8" DIA. X 1" INSERT (NOTE 2) ② 11/16" DIA. X 1" THROUGH HOLE ③ 38 X 76 WRING APERTURE ④ 11/16" DIA. X 1" THROUGH HOLE ⑤ FLAT WASHER AND LOCK WASHER ⑥ NUT ⑦ 5/8" X 8" BOLT ⑧ FLAT WASHER ⑨ DEEP CAST METALLIC HANDHOLE BOX AND COVER. (89X261X127) ⑩ TELECOM BOX (NOTE 3) ⑪ POLE IDENTIFICATION PLATE ⑫ 1/4"-20X3/4" THREADED CORE. ALLEN KEY BUTTON PAN ⑬ 1/4"-20X3/4" ALLEN KEY BUTTON PAN HEAD STAINLESS STEEL BOLT. | <ul style="list-style-type: none"> ⑭ GROUNDING LEAD- USE NO. 6 AWG MIN. STRANDED CU. WIRE, THREE TURNS, CRIMPED TO STEEL ROD. LEAD TO EXTEND 305MM OUTSIDE THE HANDHOLE. ⑮ CRIMP CONNECTOR ⑯ STEEL ROD ⑰ 2" DIA. PVC DUCT ⑱ CLEAN BACKFILL ⑲ SAND ⑳ LIMESTONE SCREENING |
|---|--|

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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SCALE:
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REVISION:

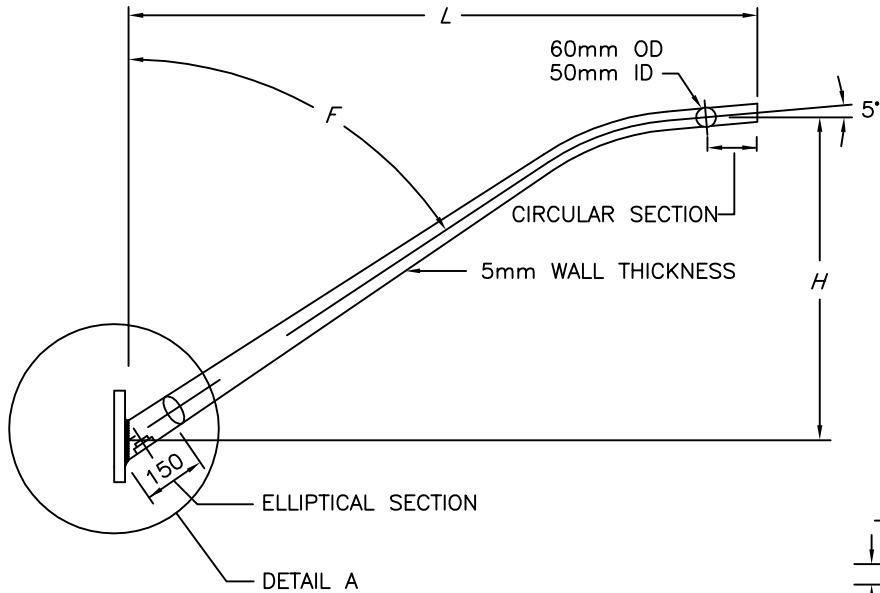
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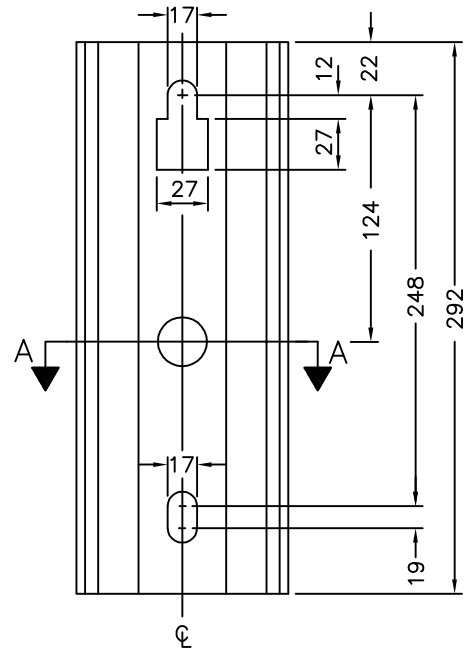
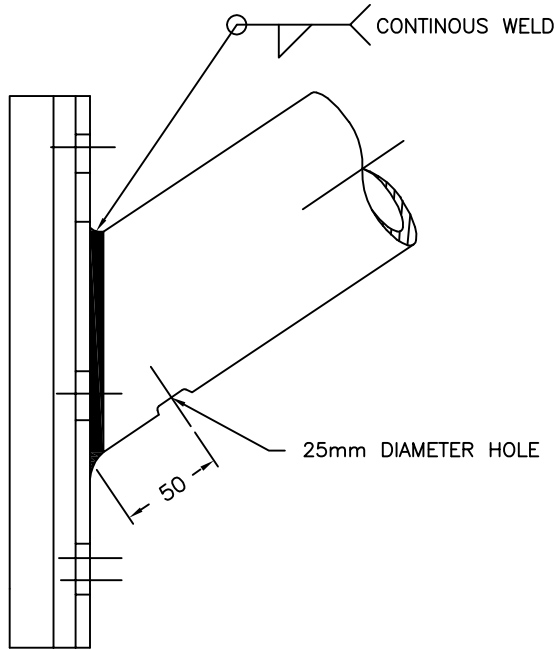
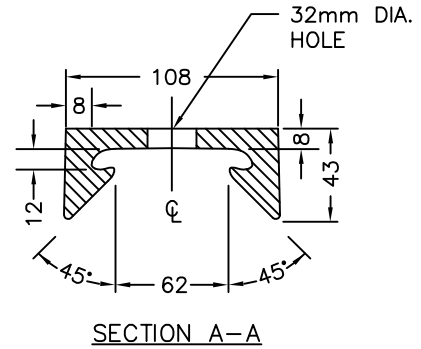
E-547



**TELECOM/STREET LIGHT (TRAFALGAR)
POLE DIRECT BURIED**



DIMENSION	BRACKET	
	1.8m	2.4m
L	1.8m	2.4m
H	0.9m	1.2m
F	56°	56°
Elliptical section	64x108 mm OD	70x125 mm OD
Circular section	60mm OD	60mm OD



NOTES:

1. FOR MOUNTING DETAILS, REFER TO E-551.
2. WELD TO BE ACCORDING TO CSA W59.2-M1991.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

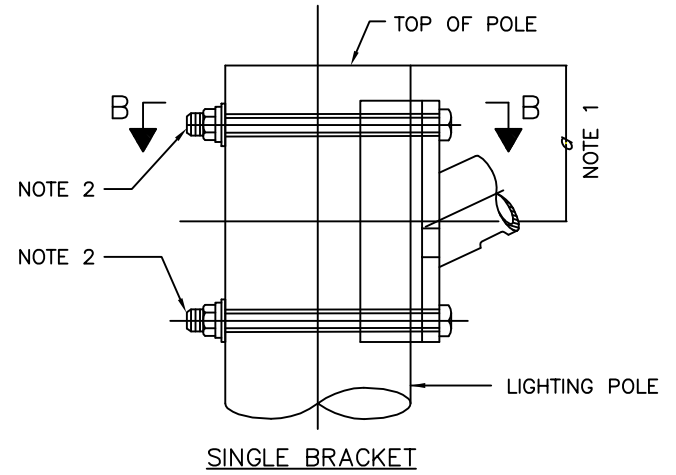
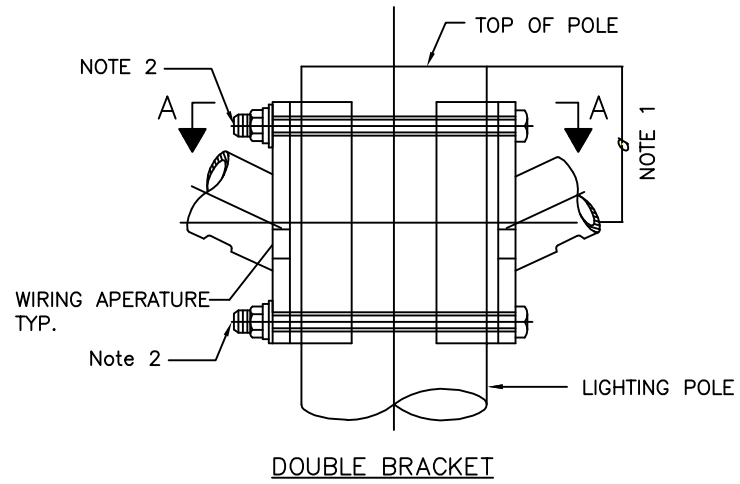
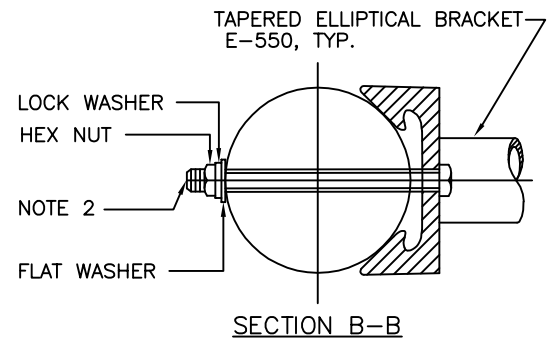
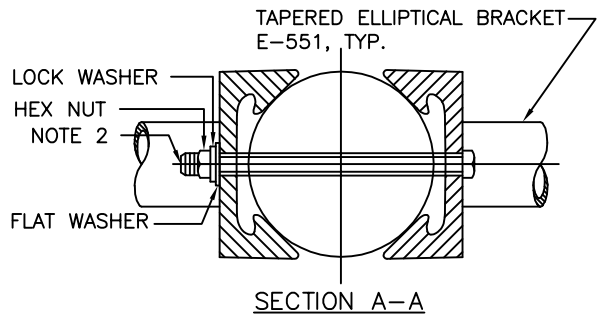
SEPT 2009



1.8m or 2.4m ELLIPTICAL BRACKET

DRAWING NO.:

E-550

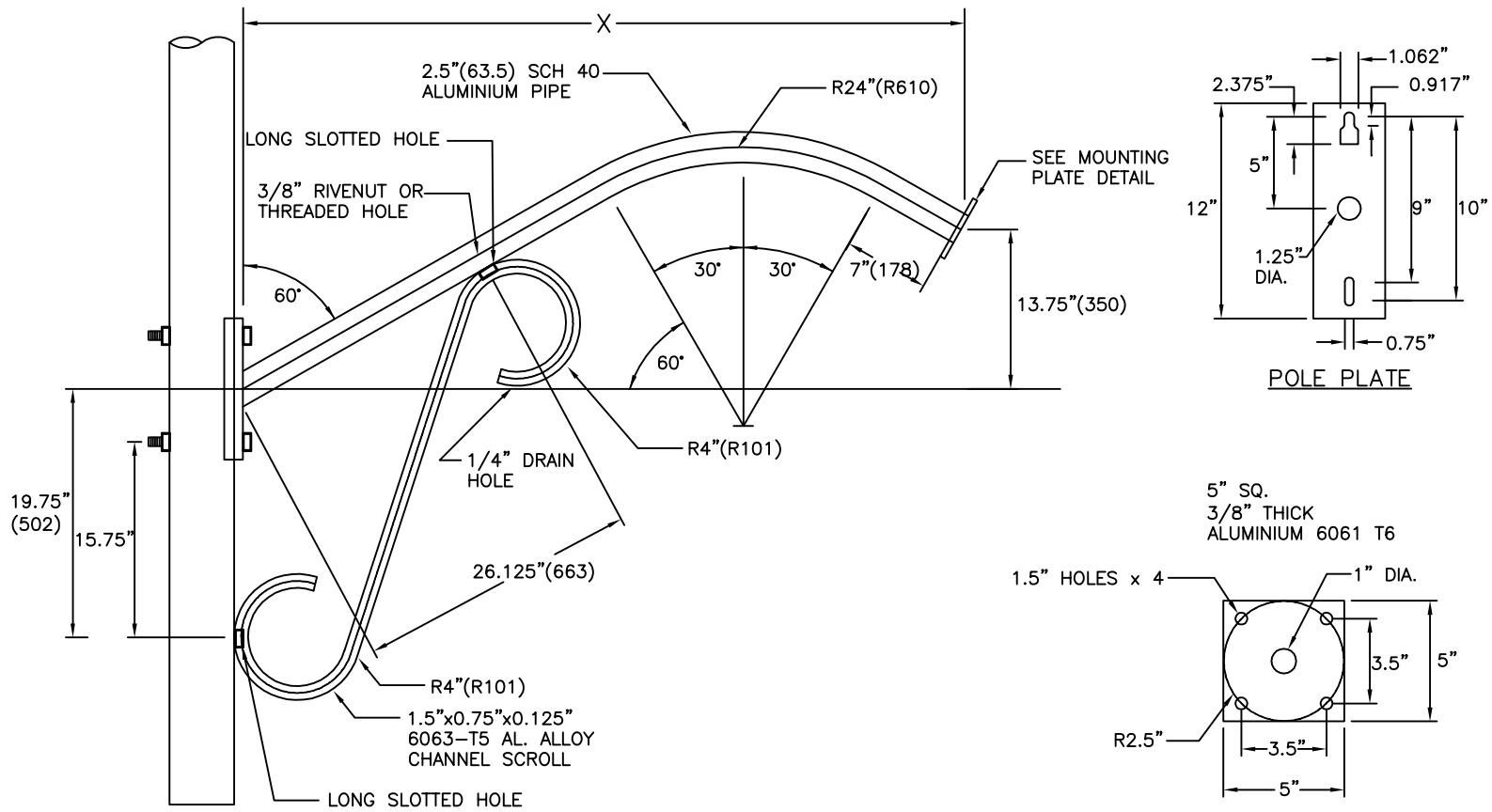


NOTES:

1. FOR SECTIONAL STEEL POLES DIMENSION $\sigma = 300\text{mm}$.
FOR ALL OTHER METAL POLES AND CONCRETE POLES, DIMENSION $\sigma = 230\text{mm}$.
2. 16MM DIA GALVANIZED STEEL SQUARE HEAD BOLT. BOLT LENGTH TO SUIT POLE.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA		APPROVED:	SCALE: N.T.S
	ELLIPTICAL BRACKETS MOUNTING DETAILS		REVISION: SEPT 2009
			DRAWING NO.: E-551



ITEM	DETAIL	QTY
1	3/8-16x1-1/2" SS BOLT	2
2	3/8 SS FLAT WASHER	2
3	5/8-11x2" SS BOLTS	2
4	5/8 SS FLAT WASHER	2
5	5/8 SS LOCK WASHER	2
6	5/8-11 HEX HEAD SS NUT	2

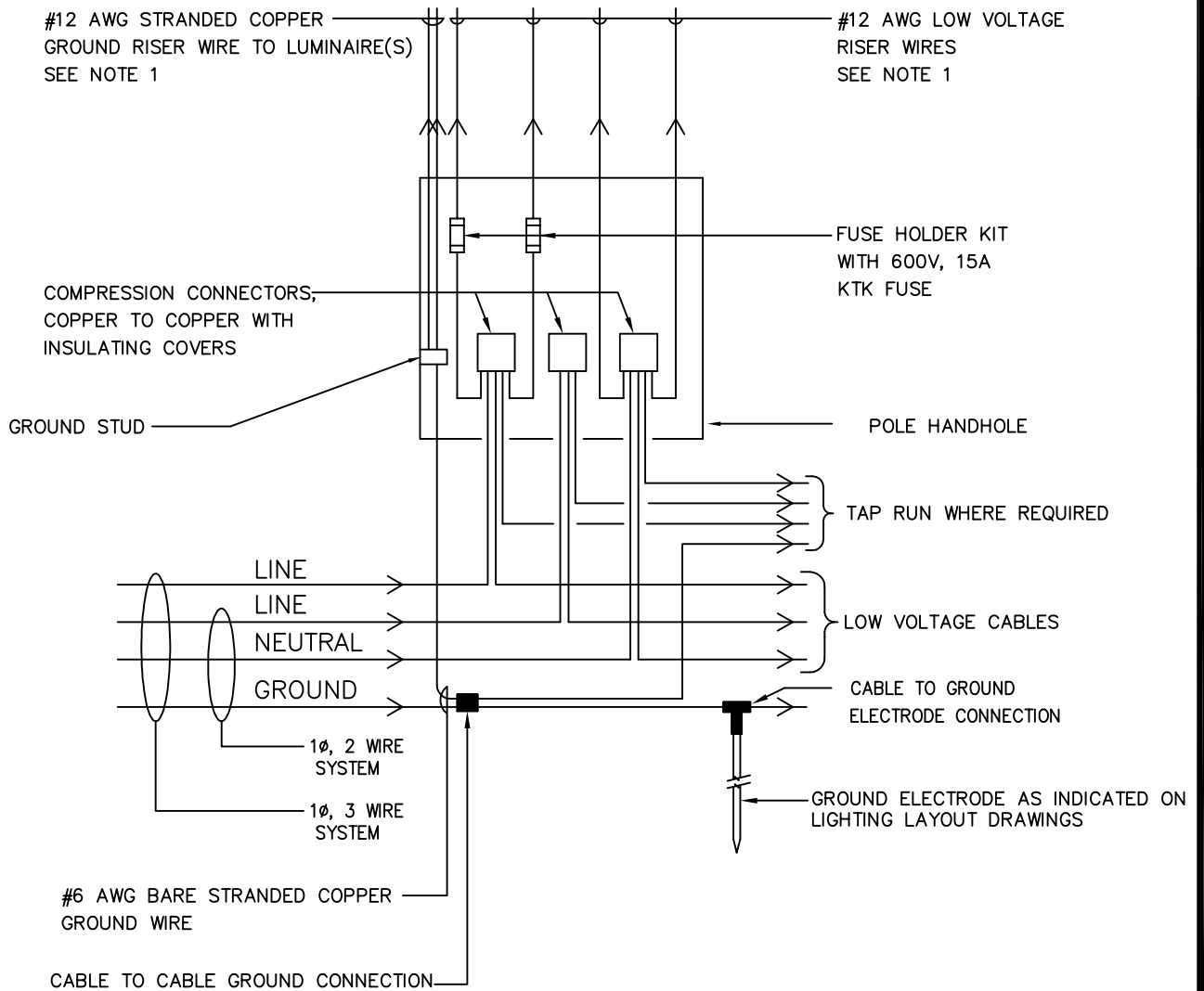
ARM LENGTH	X
25' POLE	60"
32' POLE	72"

NOTE:

- STANDARD ARM FINISH SHALL BE ELECTROSTATICALLY APPLIED POLYELECTER POWDER COAT AFTER PHOSPHATE WASH AND HEAT DRY.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

	TOWN OF AURORA	APPROVED:	SCALE: N.T.S
	60 INCH OR 72 INCH DECORATIVE SCROLL ARM		REVISION: SEPT 2009
			DRAWING NO.: E-552



NOTE:

1. BROKEN LINES INDICATE ADDITIONAL CONDUCTORS FOR DOUBLE LUMINAIRE INSTALLATION.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

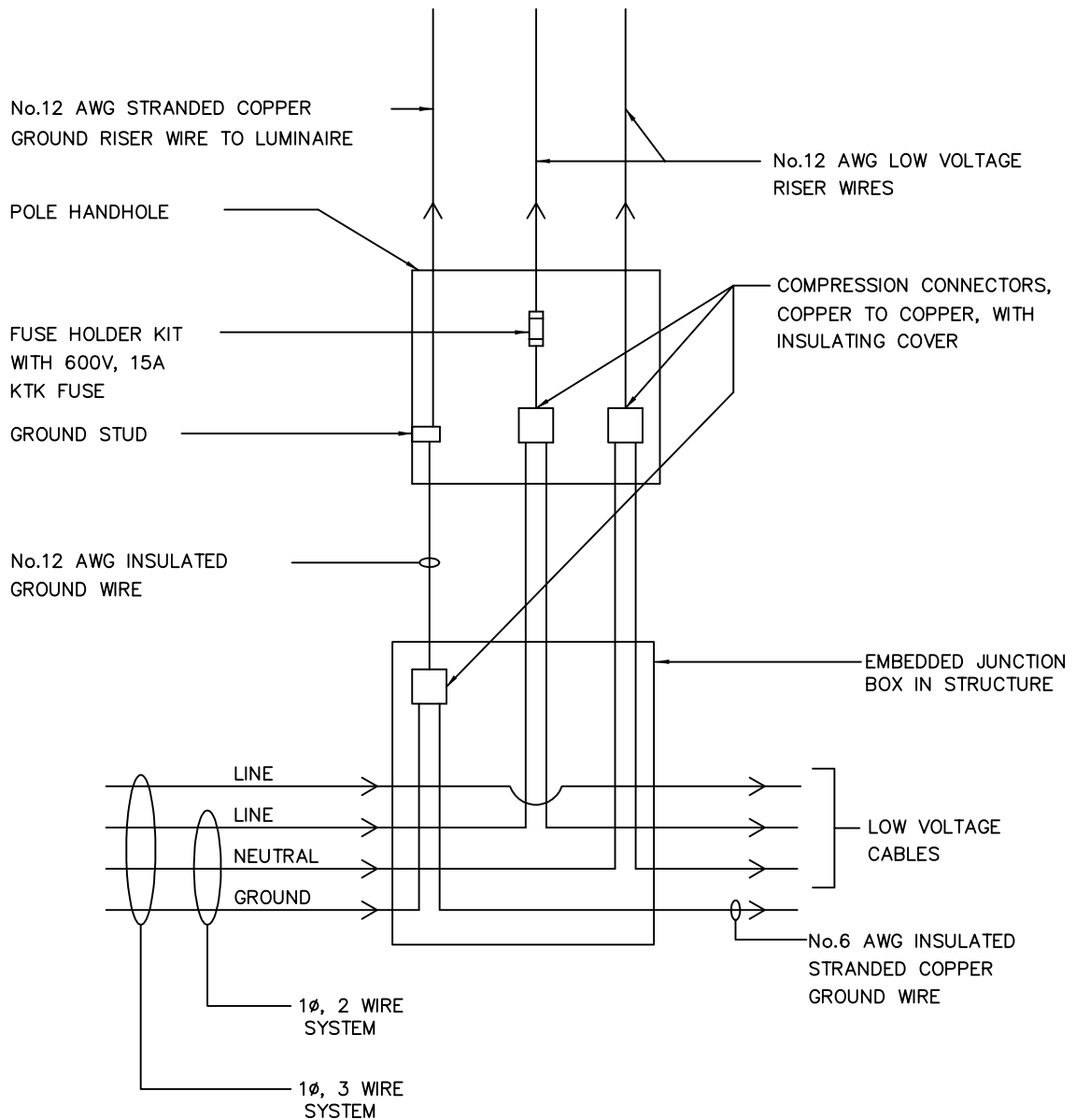
SEPT 2009

DRAWING NO.:

E-560



POLE WIRING FOR 120/240V SYSTEM



TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

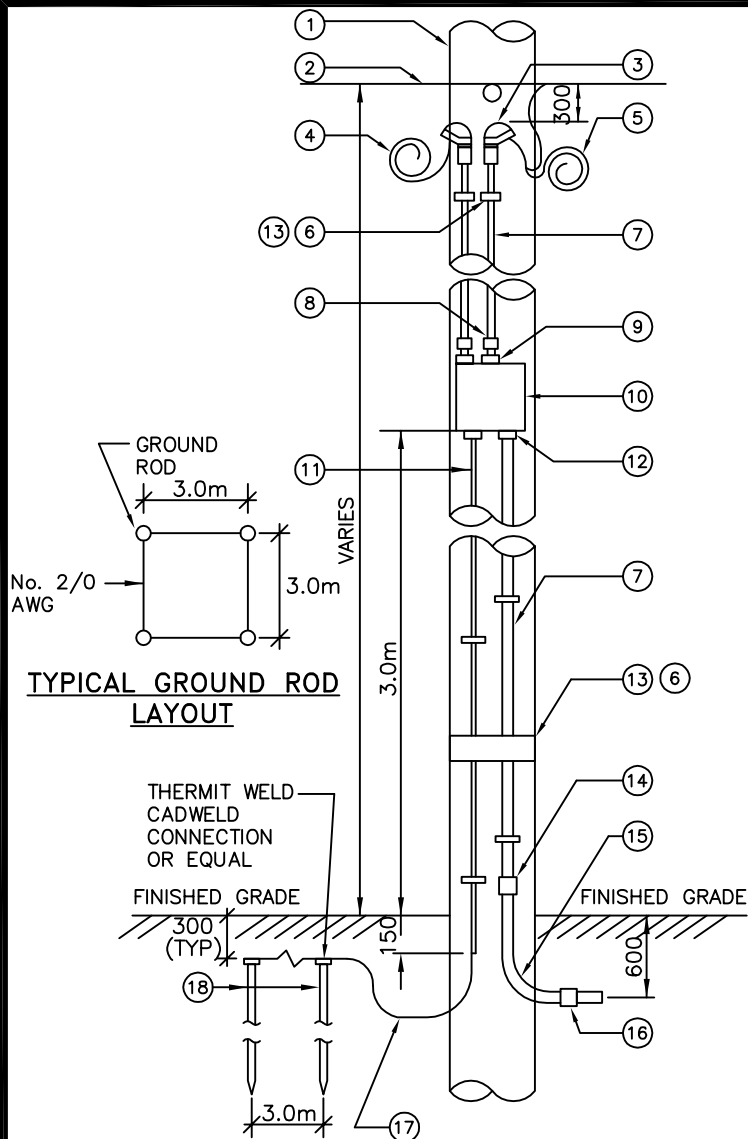
SEPT 2009

DRAWING NO.:

E-561



**POLE WIRING FOR 120/240V
SYSTEM ON STRUCTURE**



TYPICAL GROUND ROD LAYOUT

NOTES:

1. 16MM WIDE STAINLESS STEEL BAND SHALL BE USED ON CONCRETE POLES INSTEAD OF PVC COATED PIPE STRAPS.
2. WORK ON HYDRO POLE SHALL BE DONE WITH THE APPROVAL OF THE LOCAL HYDRO AUTHORITY.
3. CO-ORDINATE THIS WORK WITH THE LOCAL HYDRO AUTHORITY.
4. MOUNTING DETAILS SHOWN ARE TYPICAL ONLY AND SHALL BE ADAPTED TO SUIT SITE CONDITIONS AND THE LOCAL HYDRO AUTHORITY.

MATERIALS:

- ① EXISTING HYDRO POLE
- ② EXISTING NEUTRAL AND SECONDARY BUS, WHERE APPLICABLE
- ③ 32MM DIA. RIGID PVC ENTRANCE CAP
- ④ POWER CABLE TO FEED ELECTRICAL EQUIPMENT (WHERE APPLICABLE)
- ⑤ LEAVE SUFFICIENT COILS OF CABLES FOR CONNECTION TO SECONDARY BUS OR TRANSFORMER BY LOCAL HYDRO
- ⑥ PVC COATED STEEL PIPE STRAPS EVERY 1.2M. SEE NOTE 4.
- ⑦ 50MM DIA. RIGID PVC CONDUIT (CSA 136-1966) CONNECTED WITH SOLVENT WELDED COUPLINGS
- ⑧ FEMALE ADAPTER AND METALLIC CONDUIT NIPPLE (POLYMER TAPE/TEFLON TAPE TO BE USED FOR NIPPLE ATTACHMENT)
- ⑨ ENTRY HUB (METAL) C/W GASKET
- ⑩ WEATHERPROOF LOAD CENTRE ENCLOSURE C/W TOP AND BOTTOM HUBS AND CIRCUIT BREAKERS, AS SPECIFIED (TYP.)
- ⑪ 38MM DIA. RIGID PVC CONDUIT
- ⑫ PVC ADAPTERS
- ⑬ SEE NOTE 4
- ⑭ 'O' RING EXPANSION COUPLING, RIGID PVC
- ⑮ 90° BEND, RIGID PVC CONDUIT
- ⑯ RIGID PVC COUPLING
- ⑰ 2/0 AWG BARE STRANDED COPPER GROUND WIRE
- ⑱ FOUR (4)- 20MM X 3M COPPER CLAD GROUND RODS

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

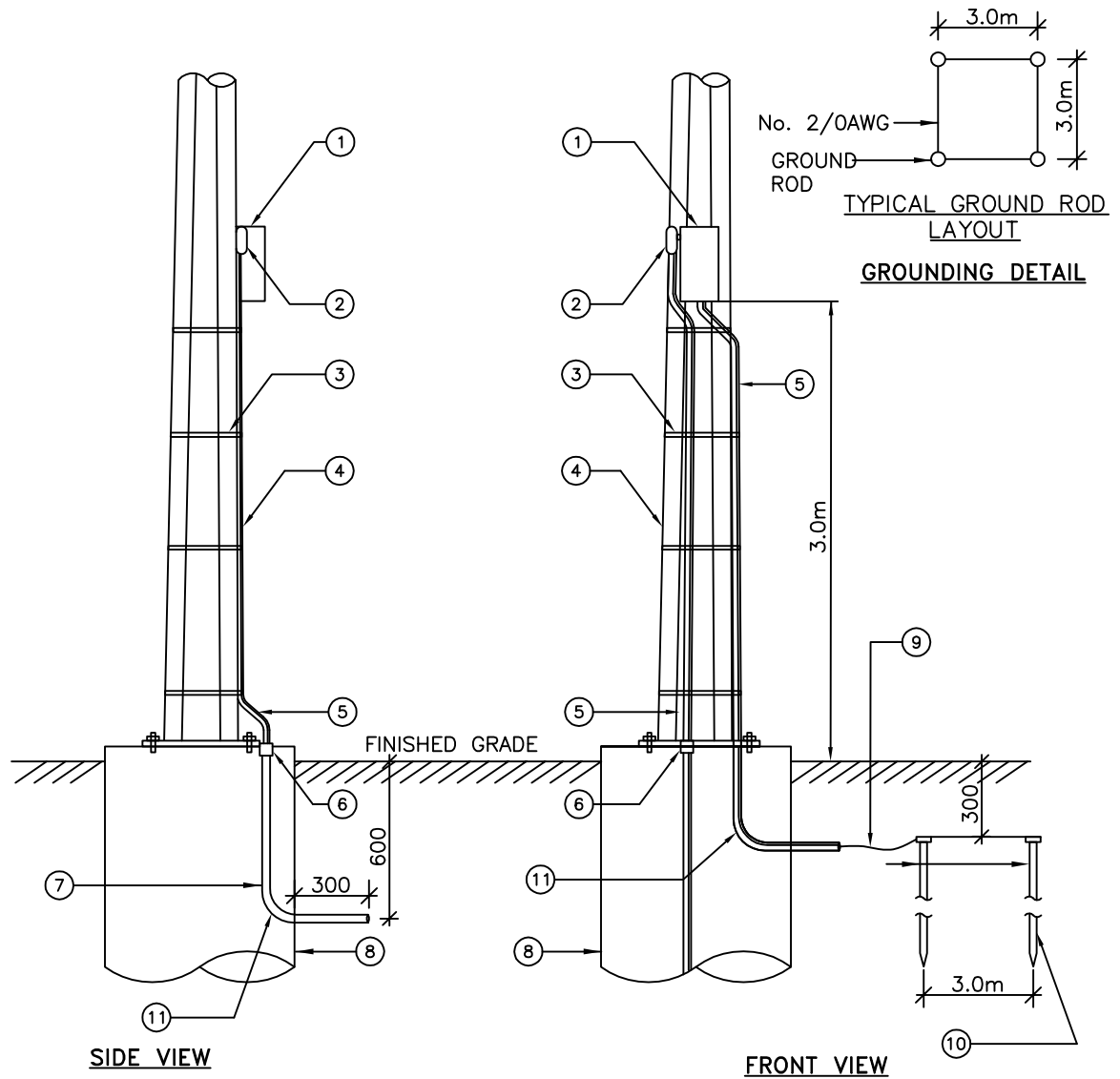
SEPT 2009

DRAWING NO.:

E-570



UNDERGROUND POWER SUPPLY MOUNTING DETAILS



MATERIALS:

- | | |
|--|--|
| <ul style="list-style-type: none"> ① WEATHERPROOF LOAD CENTRE ENCLOSURE C/W TOP AND BOTTOM HUBS AND CIRCUIT BREAKERS, AS SPECIFIED ② 'LL' FITTING ③ 16 STAINLESS STEEL STRAPPING, 4.5 KN ULTIMATE STRENGTH, EVERY 1.2M ④ STEEL POLE ⑤ 38MM DIAMETER RIGID PVC CONDUIT | <ul style="list-style-type: none"> ⑥ REDUCER BUSHING ⑦ 50MM DIAMETER RIGID PVC CONDUIT ⑧ CONCRETE FOOTING ⑨ NO. 2/0 AWG BARE STRANDED COPPER GROUND WIRE ⑩ FOUR (4)-20MM X 3.0 COPPER CLAD GROUND RODS OR EQUAL WITH THERMIT WELD CONNECTION ⑪ 90° ELBOW |
|--|--|

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
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REVISION:

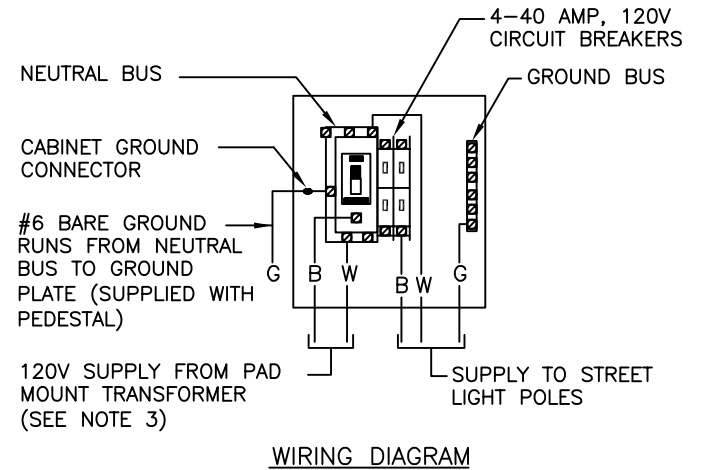
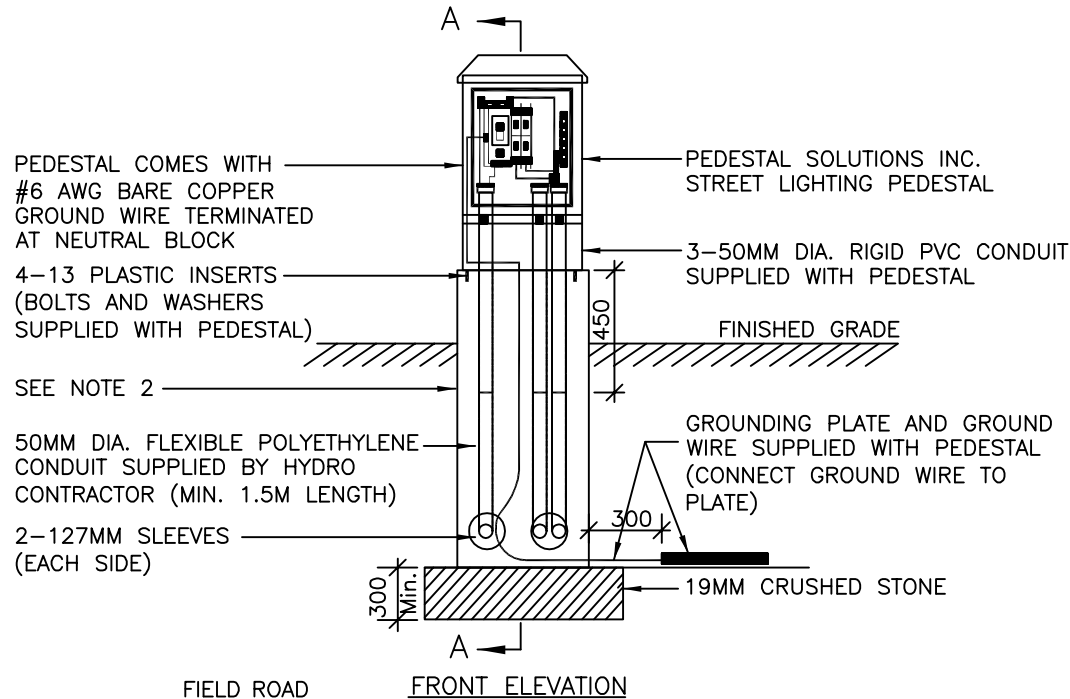
SEPT 2009

DRAWING NO.:

E-571



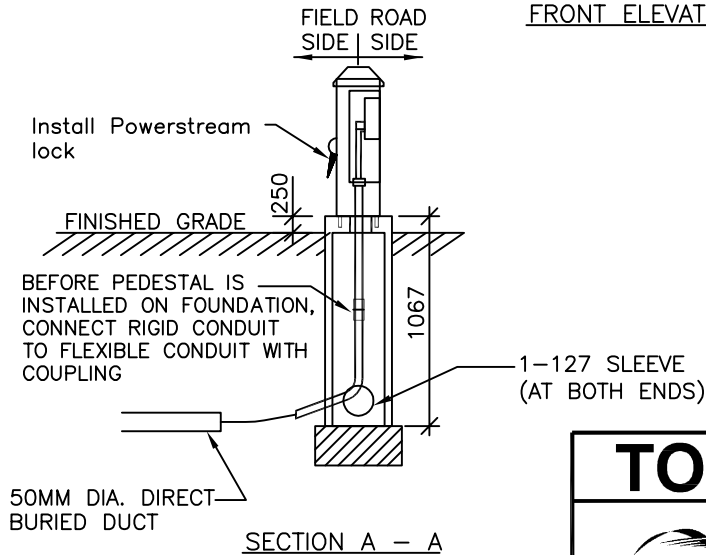
**POWER SUPPLY ON STEEL POLES
WITH BURIED HYDRO SUPPLY**



NOTES:

1. REMOVE ALL LOOSE MATERIAL FROM THE FLOOR OF THE EXCAVATION AND FILL, TO FINISHED GRADE OF BEDDING, WITH 300MM OF 19MM CRUSHED STONE, THOROUGHLY COMPACTED.
2. CONCRETE FOUNDATION FROM BROOKLIN CONCRETE PRODUCTS.
3. SUPPLY CABLE FROM TRANSFORMER TO PEDESTAL IS #2 COPPER AND FROM PEDESTAL TO STREET LIGHTS IS BASED ON VOLTAGE DROP. THE GROUND WIRE IS NOT REQUIRED FROM THE TRANSFORMER TO THE PEDESTAL.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.



TOWN OF AURORA

APPROVED:

SCALE:
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REVISION:

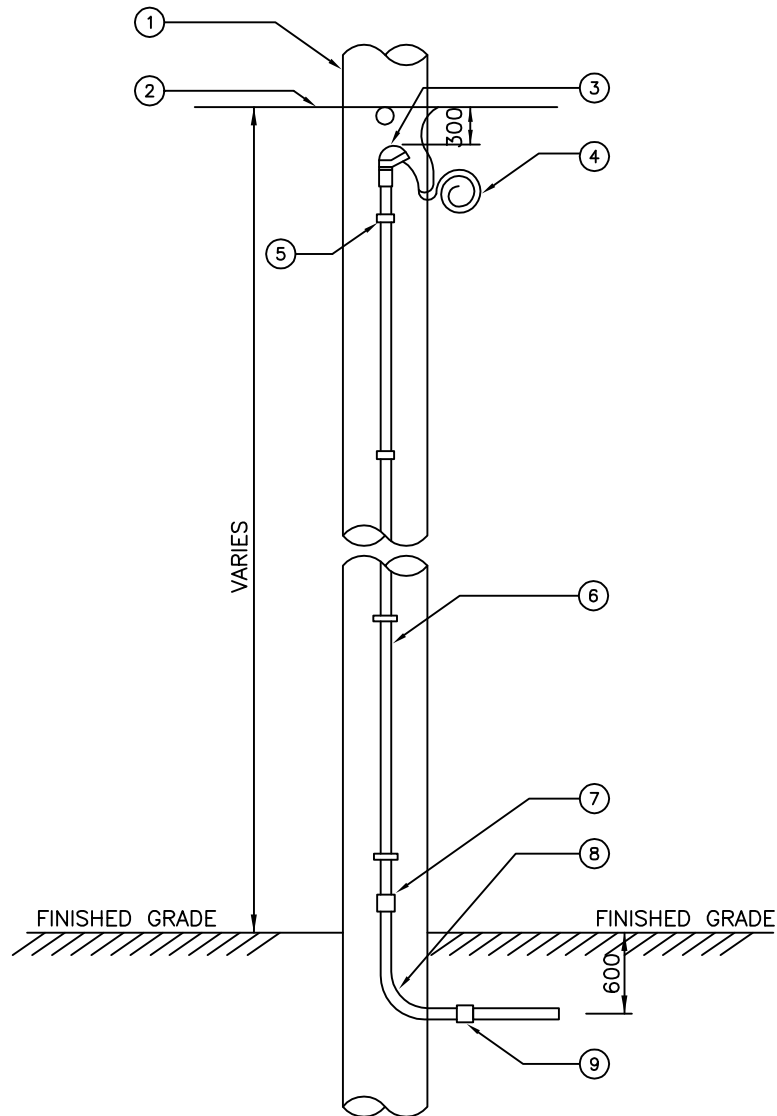
SEPT 2009

DRAWING NO.:

E-572



**PEDESTAL SERVICE ENCLOSURE
INSTALLATION DETAILS**



MATERIALS:

- ① HYDRO POLE
- ② EXISTING NEUTRAL AND SECONDARY BUS, WHERE APPLICABLE
- ③ 32MM DIA. RIGID PVC ENTRANCE CAP
- ④ LEAVE SUFFICIENT COILS OF CABLES FOR CONNECTION TO SECONDARY BUS OR TRANSFORMER BY LOCAL HYDRO
- ⑤ PVC COATED STEEL PIPE STRAPS EVERY 1.2M
- ⑥ 50MM DIA. RIGID PVC CONDUIT (CSA 136-1966) CONNECTED WITH SOLVENT WELDED COUPLINGS
- ⑦ 'O' RING EXPANSION COUPLING, RIGID PVC
- ⑧ 90° BEND, RIGID PVC CONDUIT
- ⑨ RIGID PVC COUPLING

NOTES:

1. WORK ON HYDRO POLE SHALL BE DONE WITH THE APPROVAL OF THE LOCAL HYDRO AUTHORITY.
2. MOUNTING DETAILS SHOWN ARE TYPICAL ONLY AND SHALL BE ADAPTED TO SUIT SITE CONDITIONS AND THE LOCAL HYDRO AUTHORITY.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

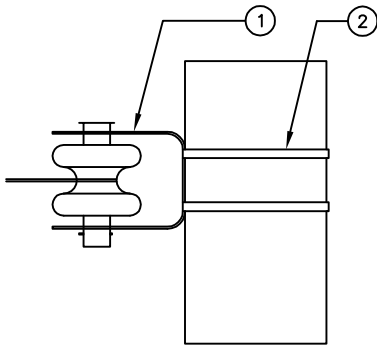
SEPT 2009

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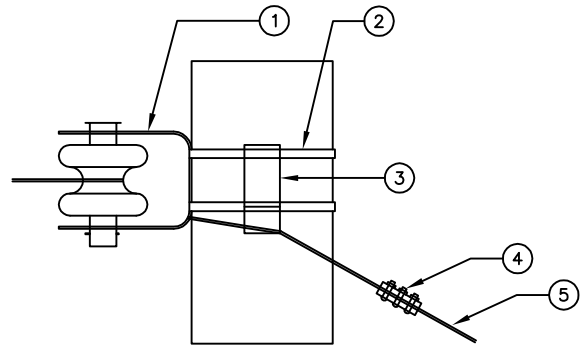
E-573



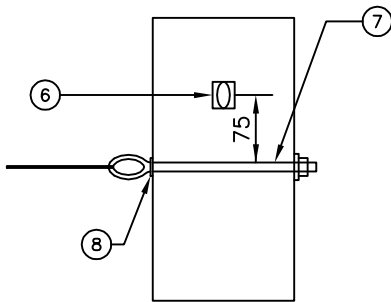
UNDERGROUND HYDRO SUPPLY DETAILS



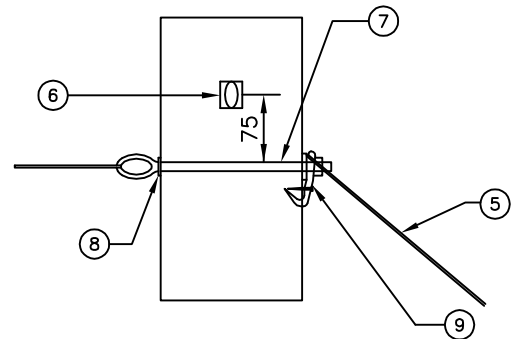
AERIAL CABLE ATTACHMENT DETAIL
STEEL OR CONCRETE POLE



AERIAL CABLE ATTACHMENT DETAIL
STEEL OR CONCRETE POLE
WITH BACK GUY



AERIAL CABLE ATTACHMENT DETAIL
WOOD POLE



AERIAL CABLE ATTACHMENT DETAIL
WOOD POLE WITH BACK GUY

MATERIALS:

- ① SECONDARY CLEVIS WITH PORCELAIN SPOOL INSULATOR
- ② 16MM STAINLESS STEEL STRAPPING, 4.5KN ULTIMATE STRENGTH
- ③ GALVANIZED "J" HOOK, EACH SIDE
- ④ 3 BOLT GUY CLAMP
- ⑤ GUY CABLE
- ⑥ EYE BOLT, FOR SEPERATE GUY
- ⑦ 16MM DIAMETER EYE BOLT, LENGTH TO SUIT
- ⑧ 50MM X 50MM DIAMETER GALVANIZED STEEL SQUARE WASHER
- ⑨ GUY FITTING WITH CATCH LUG & 10 X 100 GALVANIZED STEEL LAG SCREW

NOTES:

- 1. NO HOLES ARE TO BE DRILLED IN THE STEEL OR CONCRETE POLES FOR THE ATTACHMENT OF AERIAL CABLES.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

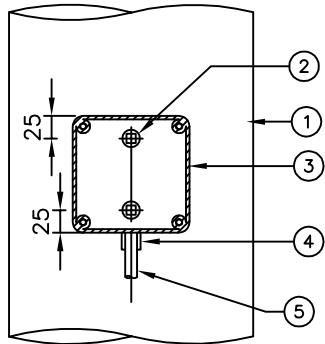
SEPT 2009

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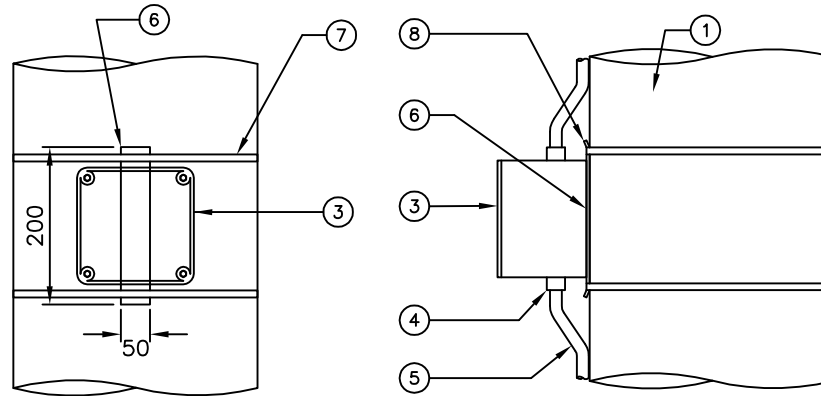
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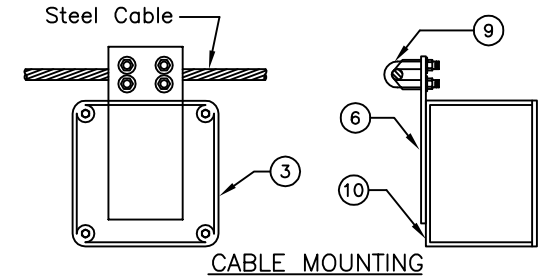
AERIAL CABLE ATTACHMENT DETAILS



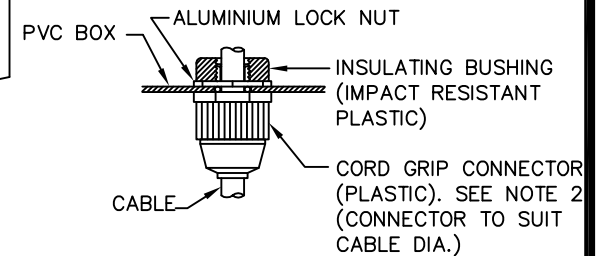
MOUNTING ON WOOD POLE



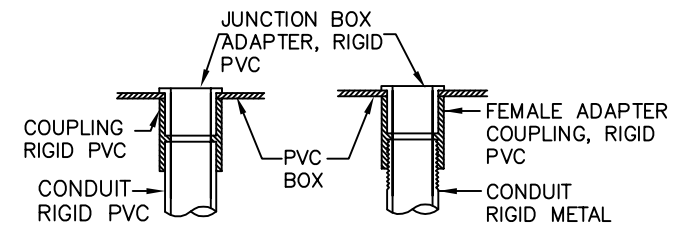
MOUNTING ON CONCRETE OR METAL POLE



CABLE MOUNTING

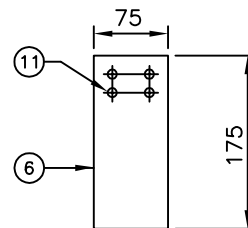


TYPICAL LIQUID TIGHT STRAIN RELIEF CONNECTOR



TYPICAL CONNECTION RIGID PVC CONDUIT

TYPICAL CONNECTION RIGID METAL CONDUIT



MOUNTING PLATE FOR CABLE MOUNTING

- ⑪ WIRING ENTRANCES FIELD DRILLED TO SUIT (SEE LIQUID TIGHT STRAIN RELIEF CONNECTOR DETAIL)

- MATERIALS:
- ① POLE
 - ② 10MM DIA. X 75MM LONG GALV. STEEL LAG SCREWS C/W GALV. STEEL WASHERS SIZED TO FIT. DRILL 12MM DIA. HOLE BEFORE LAGGING
 - ③ 150MM X150MM X150MM RIGID PVC JUNCTION BOX C/W COVER, GASKET AND STAINLESS STEEL COVER SCREWS
 - ④ CONDUIT CONNECTION WHERE APPLICABLE
 - ⑤ NUMBER AND SIZE OF CONDUITS AS REQUIRED
 - ⑥ 6MM THICK RIGID PVC MOUNTING PLATE CEMENTED TO JUNCTION BOX
 - ⑦ 16MM STAINLESS STEEL STRAPPING 4.5 KN ULTIMATE STRENGTH
 - ⑧ BEND 3MM TO HOLD STRAPPING BOTH ENDS
 - ⑨ WIRE ROPE CLAMP, GALV. SIZE TO SUIT STEEL CABLE C/W GALV. STEEL LOCKWASHERS & NUTS
 - ⑩ HOLES TO SUIT WIRE ROPE CLAMP

NOTES:

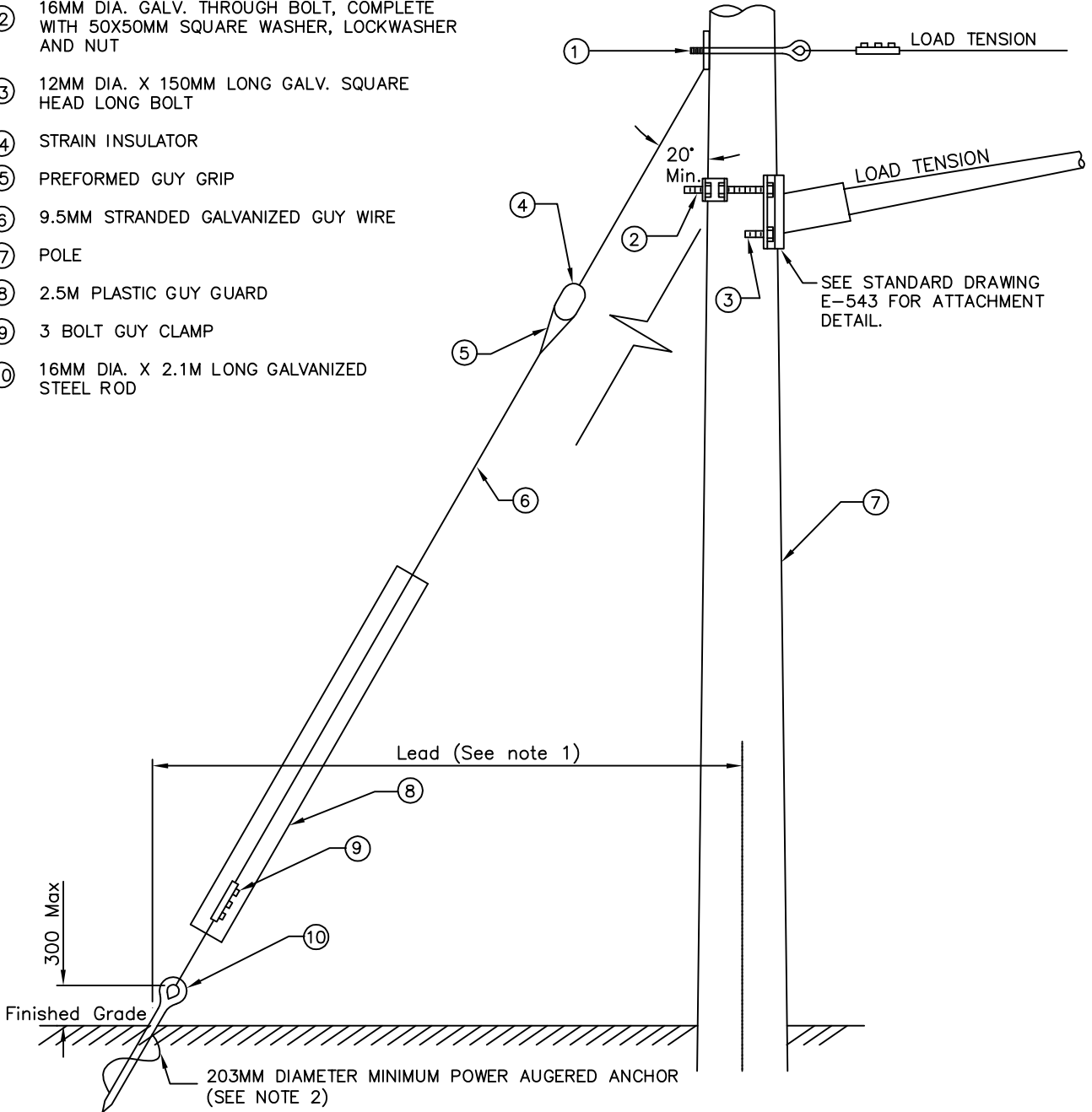
1. ALL RIGID PVC CONNECTIONS SHALL BE MADE WITH AN APPROVED SOLVENT CEMENT.
2. FOR CABLE MOUNTING, DRILL WIRING ENTRANCES ON BOTTOM OF JUNCTION BOX ONLY.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA		APPROVED:	SCALE: N.T.S
	PVC JUNCTION BOX MOUNTING DETAIL		REVISION: SEPT 2009
			DRAWING NO.: E-581

MATERIALS:

- ① GUY FITTING
- ② 16MM DIA. GALV. THROUGH BOLT, COMPLETE WITH 50X50MM SQUARE WASHER, LOCKWASHER AND NUT
- ③ 12MM DIA. X 150MM LONG GALV. SQUARE HEAD LONG BOLT
- ④ STRAIN INSULATOR
- ⑤ PREFORMED GUY GRIP
- ⑥ 9.5MM STRANDED GALVANIZED GUY WIRE
- ⑦ POLE
- ⑧ 2.5M PLASTIC GUY GUARD
- ⑨ 3 BOLT GUY CLAMP
- ⑩ 16MM DIA. X 2.1M LONG GALVANIZED STEEL ROD



NOTES

- 1. FOR MINIMUM LEAD SETTINGS REFER TO PROPER TABLES AND CHARTS.
- 2. WHERE IT IS IMPRACTICAL TO INSTALL POWER DRIVEN ANCHORS, 254mm DIAMETER EXPANDABLE TYPE ANCHORS SHALL BE INSTALLED AND NATIVE BACKFILL SHALL BE COMPACTED.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

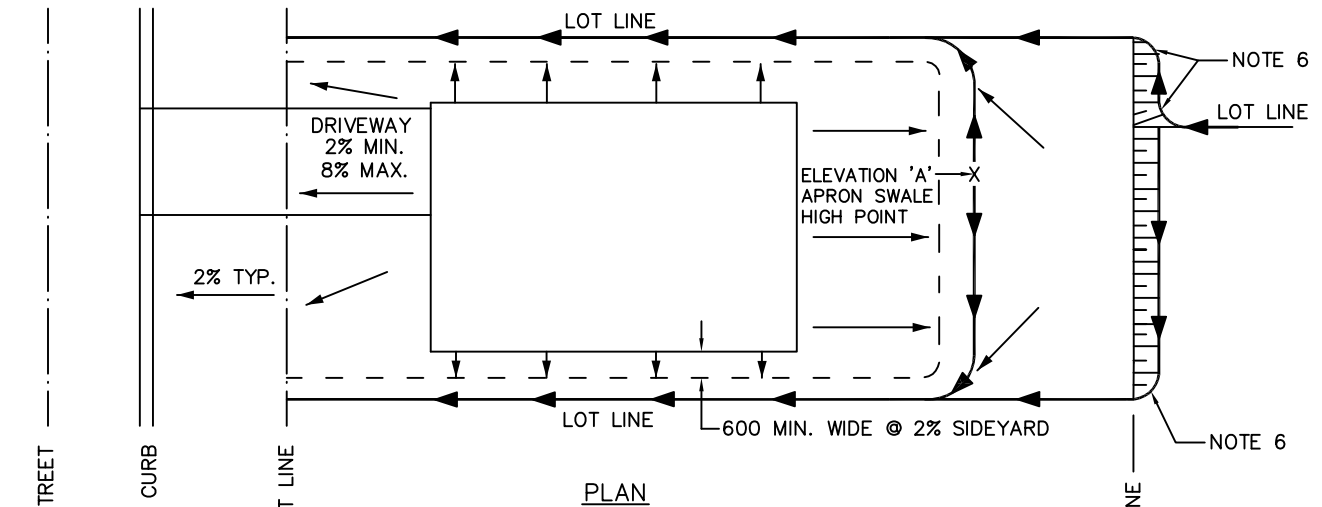
SEPT 2009

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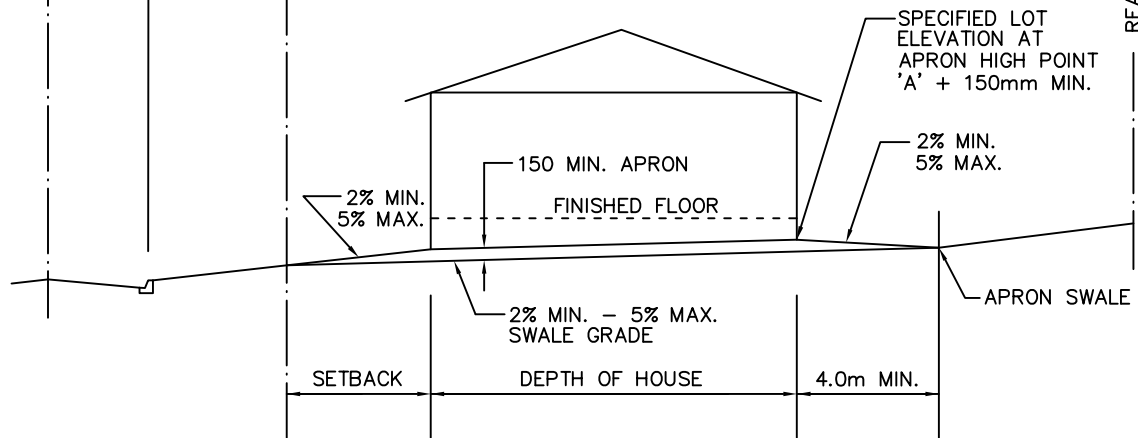
E-582



TYPICAL POLE GUYING DETAILS



PLAN



PROFILE

NOTES

1. DRIVEWAY SHALL NOT EXCEED THE WIDTH OF THE GARAGE.
2. ALL EMBANKMENTS SHALL BE 3:1.
3. SIDEWALKS TO BE LOCATED ON OPPOSITE SIDE OF THE STREET.
4. ALL DOWNSPOUTS SHALL DISCHARGE ONTO CONCRETE SPLASH PADS.
5. DRIVEWAYS SHALL NOT BE USED FOR OUTLETS FOR SIDEYARD SWALES.
6. DRAINAGE FROM REAR ADJOINING LOTS SHALL BE CONVEYED BY SWALES TO SIDE LOTS LINES.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

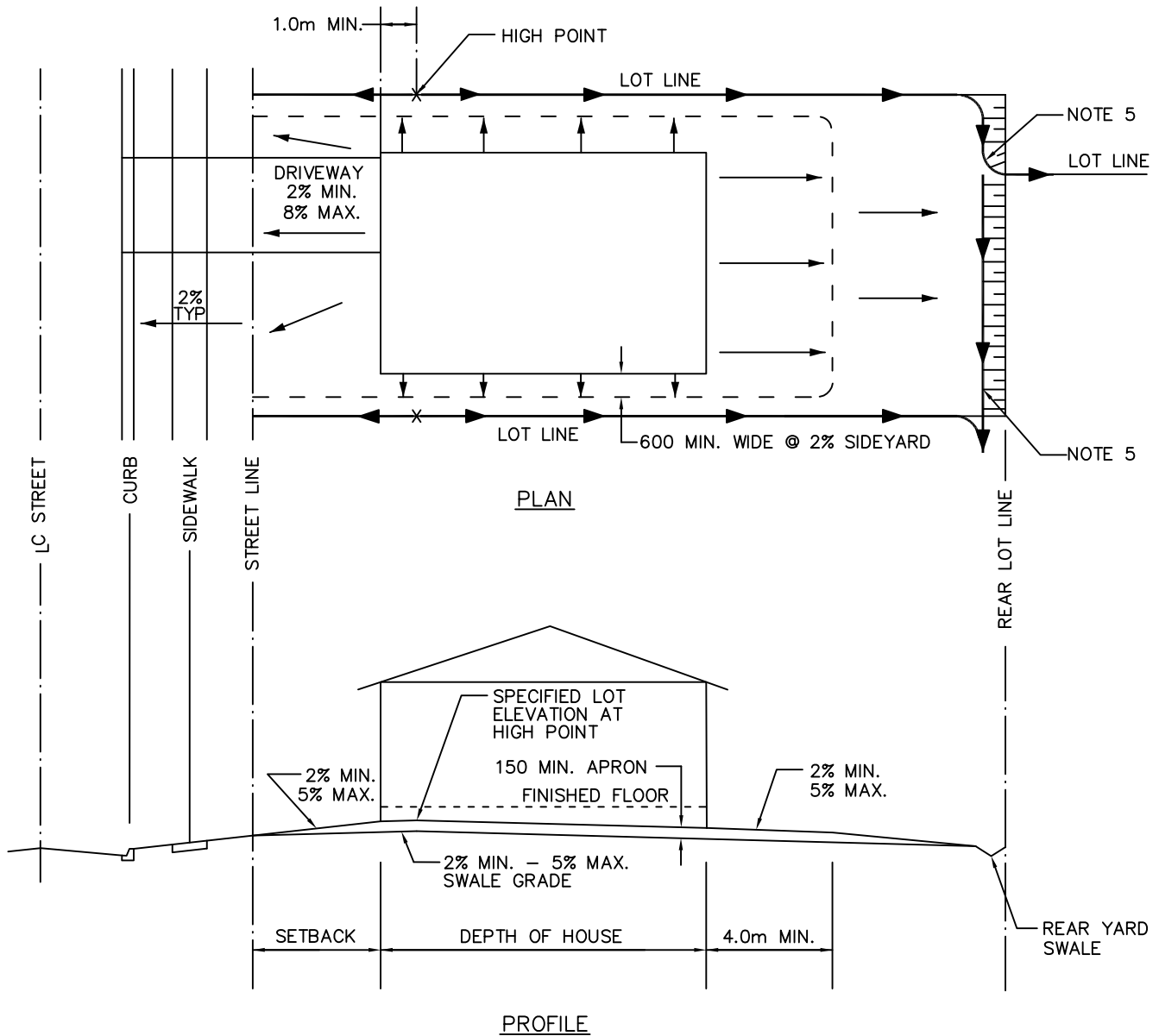
NOV 2009

DRAWING NO.:

M-400



FRONT LOT DRAINAGE



NOTES

1. DRIVEWAY SHALL NOT EXCEED THE WIDTH OF THE GARAGE.
2. ALL EMBANKMENTS SHALL BE 3:1.
3. ALL DOWNSPOUTS SHALL DISCHARGE ONTO CONCRETE SPLASH PADS.
4. DRIVEWAYS SHALL NOT BE USED FOR OUTLETS FOR SIDEYARD SWALES.
5. DRAINAGE TO REAR ADJOINING LOTS SHALL BE CONVEYED BY SWALES TO SIDE LOTS LINES.
6. DOWNSPOUTS FROM 1.0m MIN. HIGHPOINT TO DISCHARGE TO THE FRONT.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

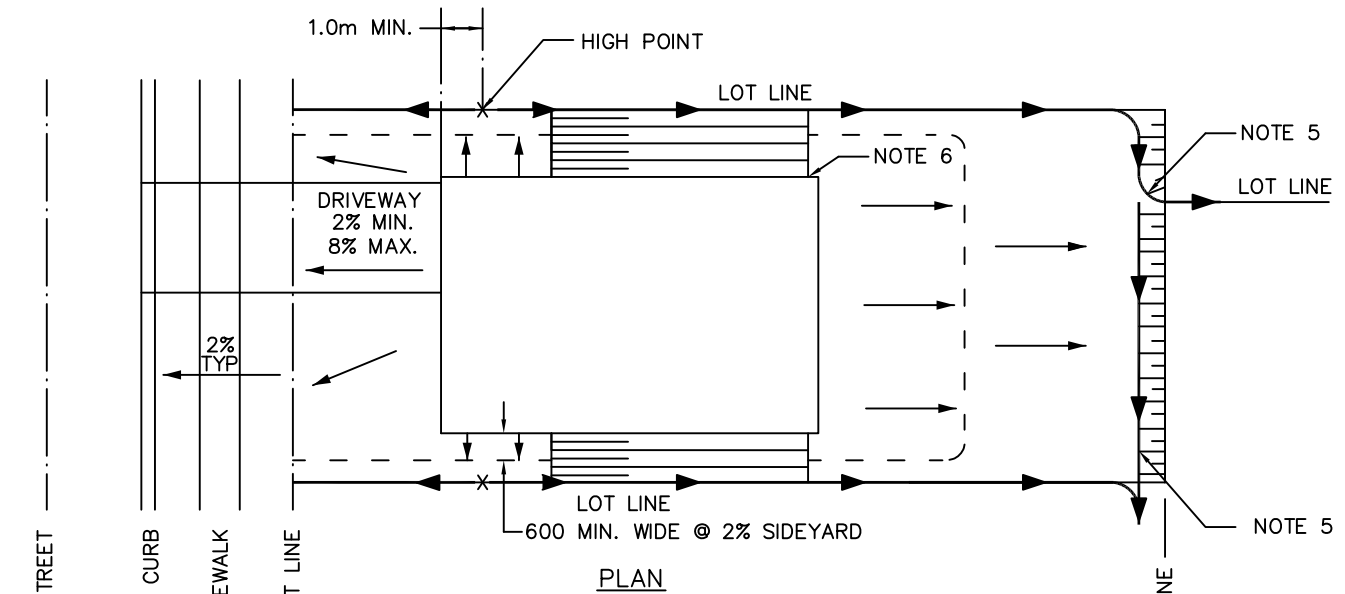
APRIL 2016

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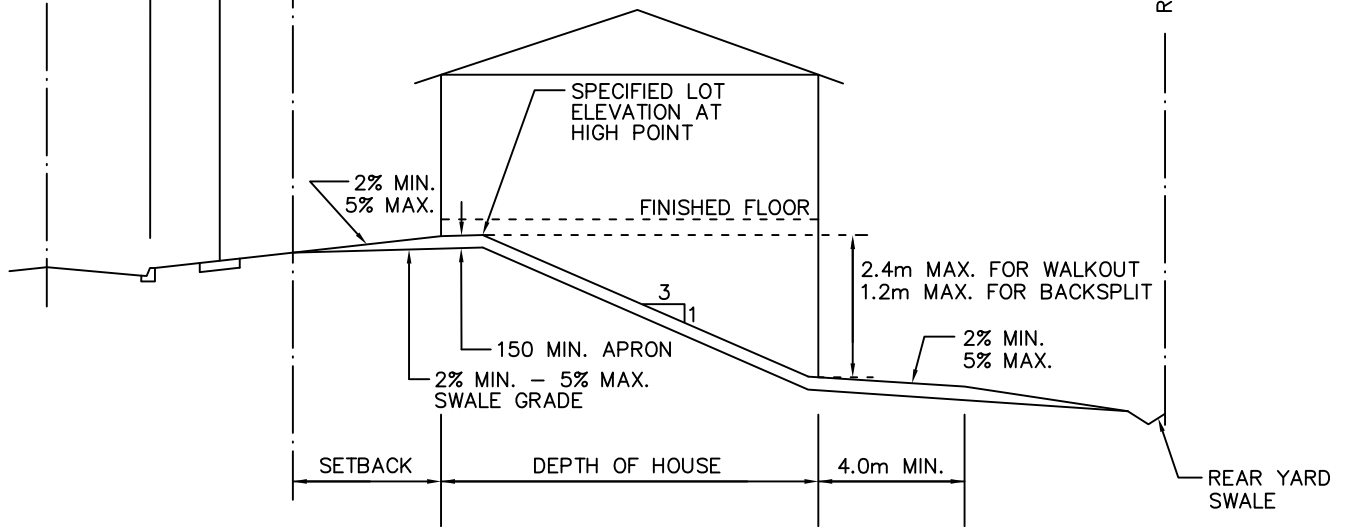
M-401



SPLIT LOT DRAINAGE



PLAN



PROFILE

NOTES

1. DRIVEWAY SHALL NOT EXCEED THE WIDTH OF THE GARAGE.
2. ALL EMBANKMENTS SHALL BE 3:1.
3. ALL DOWNSPOUTS SHALL DISCHARGE ONTO CONCRETE SPLASH PADS.
4. DRIVEWAYS SHALL NOT BE USED FOR OUTLETS FOR SIDEYARD SWALES.
5. DRAINAGE TO REAR ADJOINING LOTS SHALL BE CONVEYED BY SWALES TO SIDE LOTS LINES.
6. SIDEYARD 3:1 SLOPES SHALL NOT EXTEND BEYOND REAR FACE OF DWELLING.
7. DOWNSPOUTS FROM 1.0m MIN. HIGHPOINT TO DISCHARGE TO THE FRONT.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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REVISION:

APRIL 2016

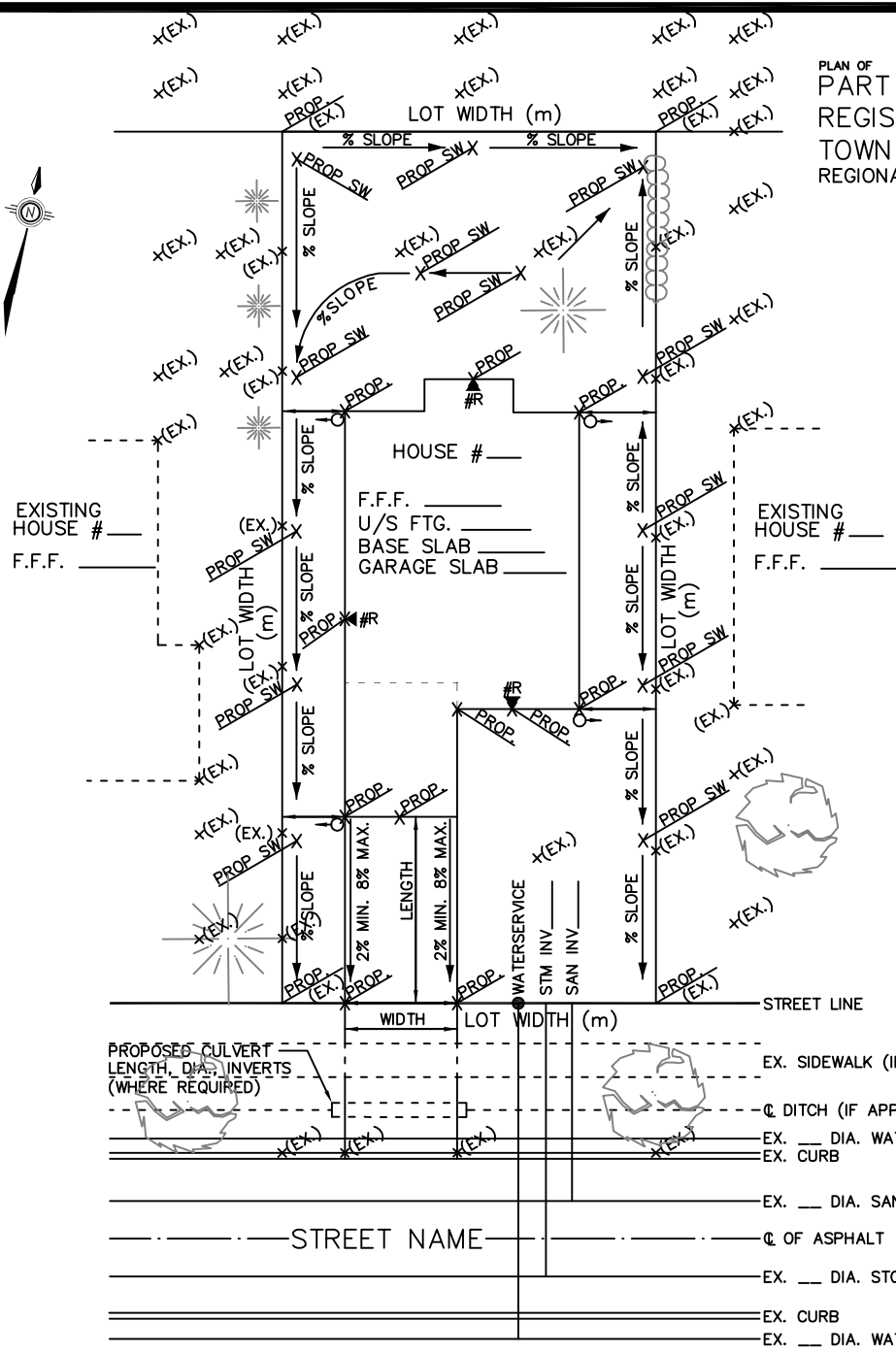
DRAWING NO.:

M-402



**LOT DRAINAGE FOR
WALKOUT AND BACKSPLIT DWELLINGS**

PLAN OF
PART OF LOT _____
REGISTERED PLAN _____
TOWN OF AURORA
REGIONAL MUNICIPALITY OF YORK



LEGEND

- ROOF WATER LEADER
- EXISTING ELEVATION REQUIRED
- PROPOSED ELEVATION REQUIRED
- PROPOSED SWALE ELEVATION REQUIRED
- FINISHED FIRST FLOOR ELEVATION REQUIRED
- UNDERSIDE OF FOOTING ELEVATION REQUIRED
- BASEMENT SLAB ELEVATION REQUIRED
- GARAGE SLAB ELEVATION REQUIRED
- Q OF PROPOSED SWALE & FLOW DIRECTION
- SWALE GRADIENT REQUIRED
-
- x(EX.)
- x PROP.
- x PROP SW
- F.F.F.
- U/S FTG.
- BASE SLAB
- GARAGE SLAB
-
- % SLOPE

NOTES:

1. GRADING PLANS SHALL BE DRAWN AT 1:250 SCALE.
2. ALL DRAINAGE SWALES TO BE LOCATED WITHIN THE LOT AND A MINIMUM OF 0.45m FROM LOT LINES.
3. REFER TO DRAWINGS M-400, M-401 AND M-402 FOR DETAILED LOT GRADING SPECIFICATIONS.
4. EXISTING GRADES SHALL BE MAINTAINED WITHIN 0.3m FROM ALL PROPERTY LINES ON PROPOSED LOT.
5. EDGE OF DRIVEWAY SHALL BE MINIMUM 1.2m FROM ALL ABOVE GROUND UTILITIES (HYDRANTS, STREET LIGHTS, PEDISTALS ETC.)

TOWN OF AURORA

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REVISION:

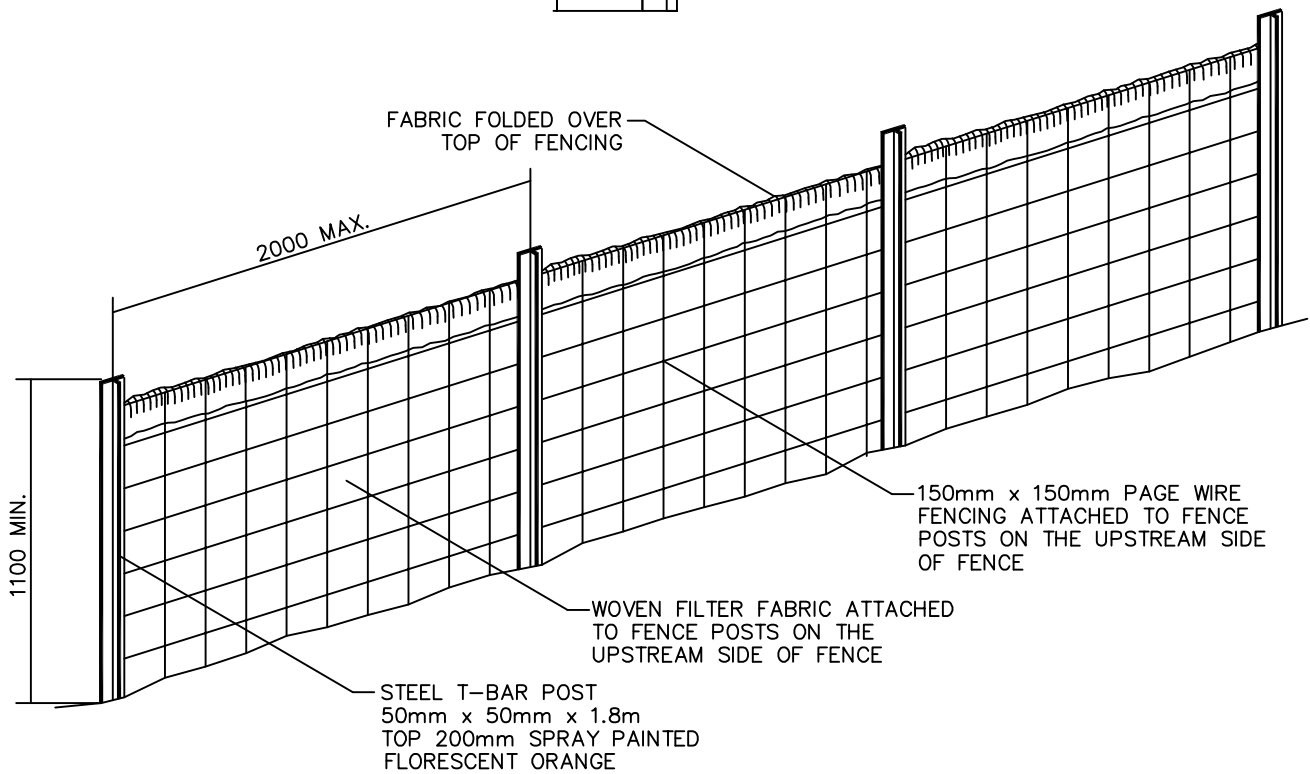
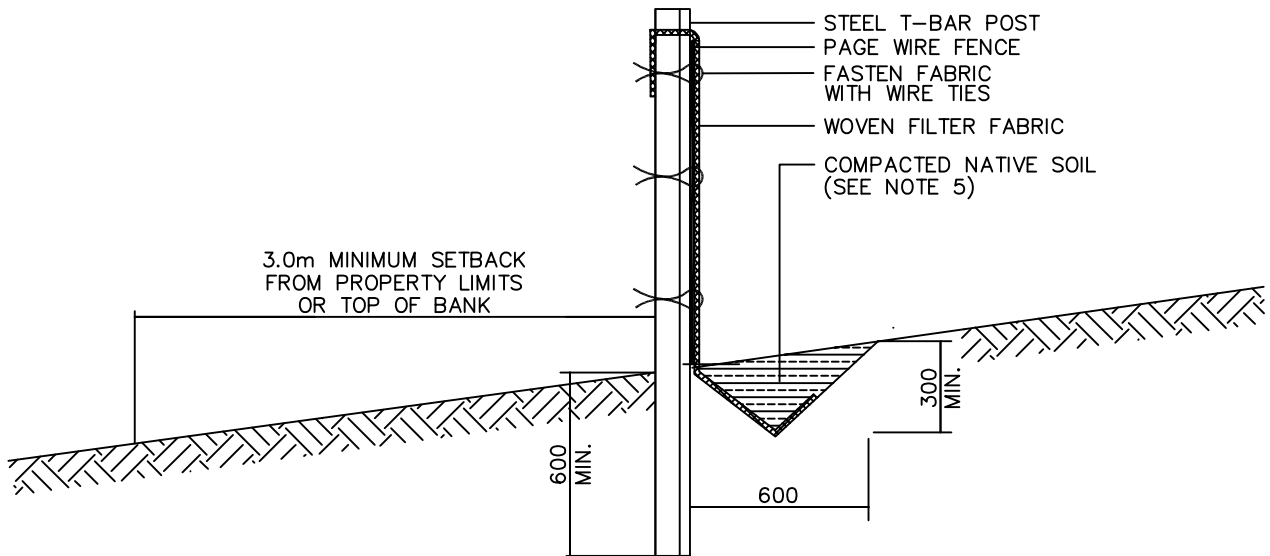
NOV 2009

DRAWING NO.:

M-403



**LOT GRADING PLAN REQUIREMENTS
FOR INFILL LOTS**



NOTES

1. SILTATION CONTROL FENCING SHALL BE ALIGNED WITH LAND CONTOURS FOR SHEET OVERLAND FLOW.
2. SILTATION CONTROL FENCING SHALL BE USED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL, VOLUME 2, CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT.
3. SILTATION CONTROL FENCING SHALL BE INSTALLED WITH FILTER FABRIC TOED INTO THE SOIL A MINIMUM DEPTH OF 300mm BY EITHER STATIC SLICING OR TRENCH METHOD. BACKFILL COMPACTION SHALL BE MINIMUM 95% S.P.D.
4. FILTER FABRIC SHALL BE BACKFILLED WITH COMPACTED 19mm CRUSHER-RUN LIMESTONE IN FROZEN CONDITIONS.
5. WOVEN GEOTEXTILE FILTER FABRIC SHALL BE U.V. STABILIZED MATERIAL.
6. FILTER FABRIC SHALL BE FOLDER OVER THE TOP OF THE FENCE AND FASTENED AT 300mm MAXIMUM INTERVALS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
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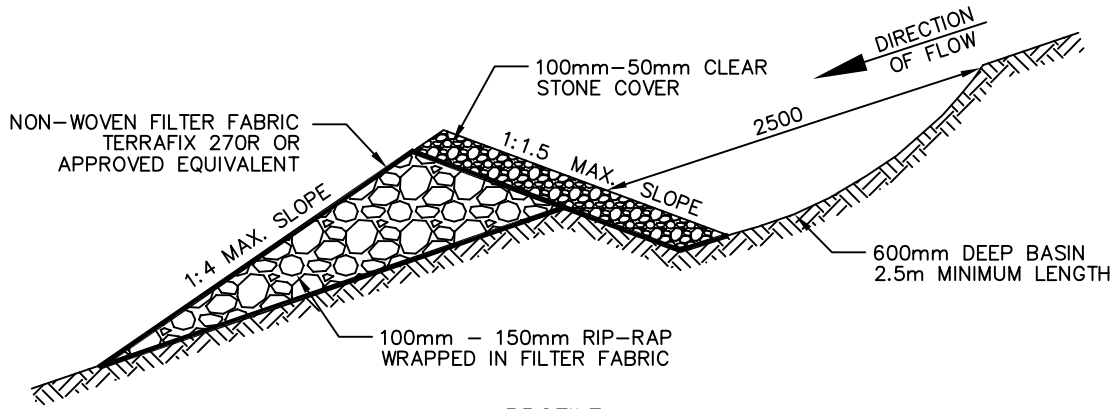
MAY 2013

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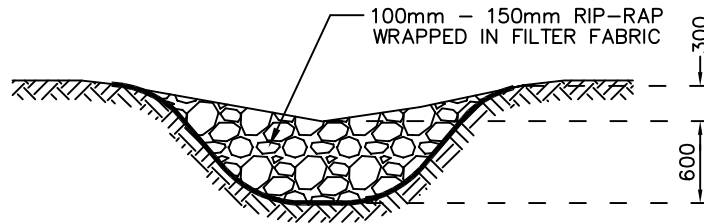
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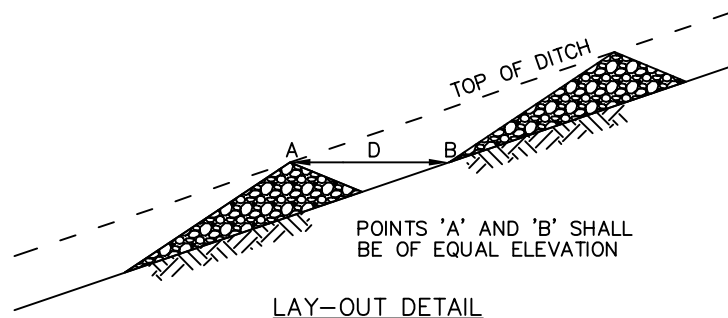
SILTATION CONTROL FENCING



PROFILE



CROSS-SECTION



LAY-OUT DETAIL

NOTES

1. THE CONDITION OF ALL SILTATION AND EROSION CONTROL DEVICES SHALL BE NOTED AFTER EVERY RAINFALL.
2. SEDIMENT SHALL BE REMOVED AND TRAP SHALL BE RESTORED TO ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 50% OF THE DESIGN DEPTH OF THE TRAP.
3. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA IN SUCH A MANNER THAT IT WILL NOT ERODE.
4. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN A MANNER THAT WILL MINIMIZE EROSION AND WATER POLLUTION.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

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REVISION:

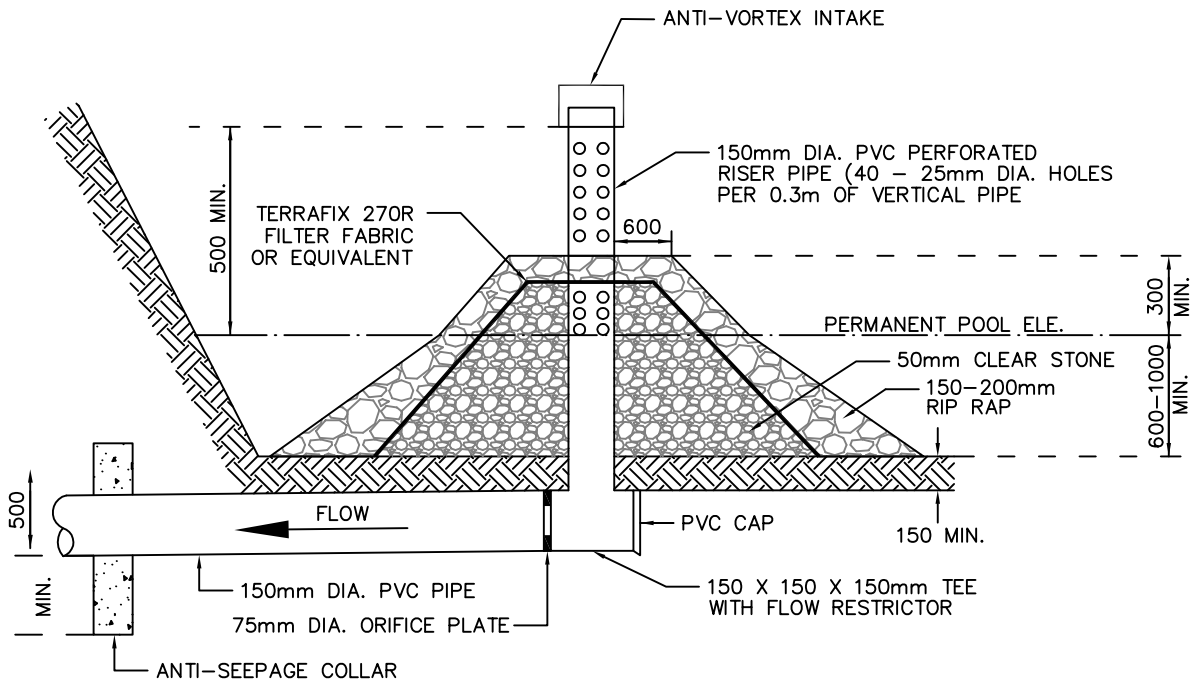
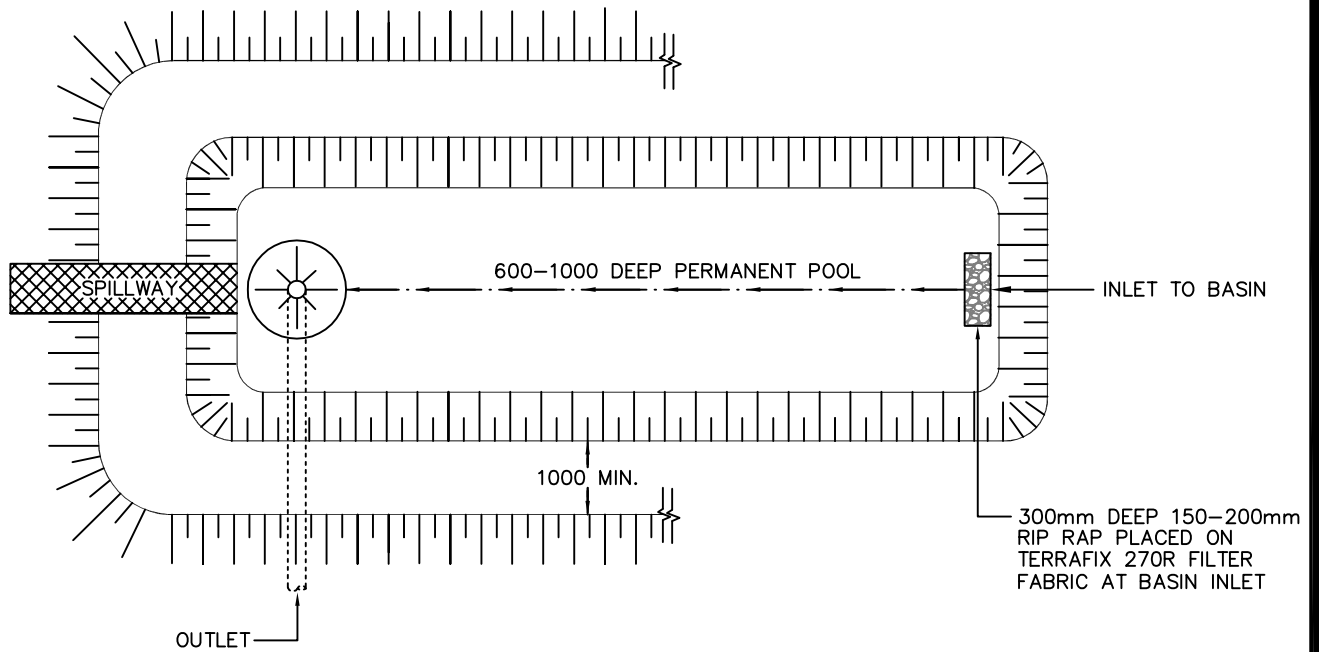
MAY 2009



GRANULAR EROSION CONTROL DEVICE

DRAWING NO.:

M-405



NOTES

1. BASIN BERMS TO BE CONSTRUCTED WITH IMPERVIOUS MATERIAL AND COMPACTED TO 95% S.P.D. COMPACTION OF POND BERMS TO BE CONFIRMED BY A GEOTECHNICAL CONSULTANT.
2. A 1.5m HIGH BARRIER FENCE SHALL BE ERECTED ALONG PERIMETER OF SEDIMENT BASIN.
3. THE BASIN SHALL BE CONSTRUCTED WITH A MINIMUM LENGTH TO WIDTH RATIO OF 4:1.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

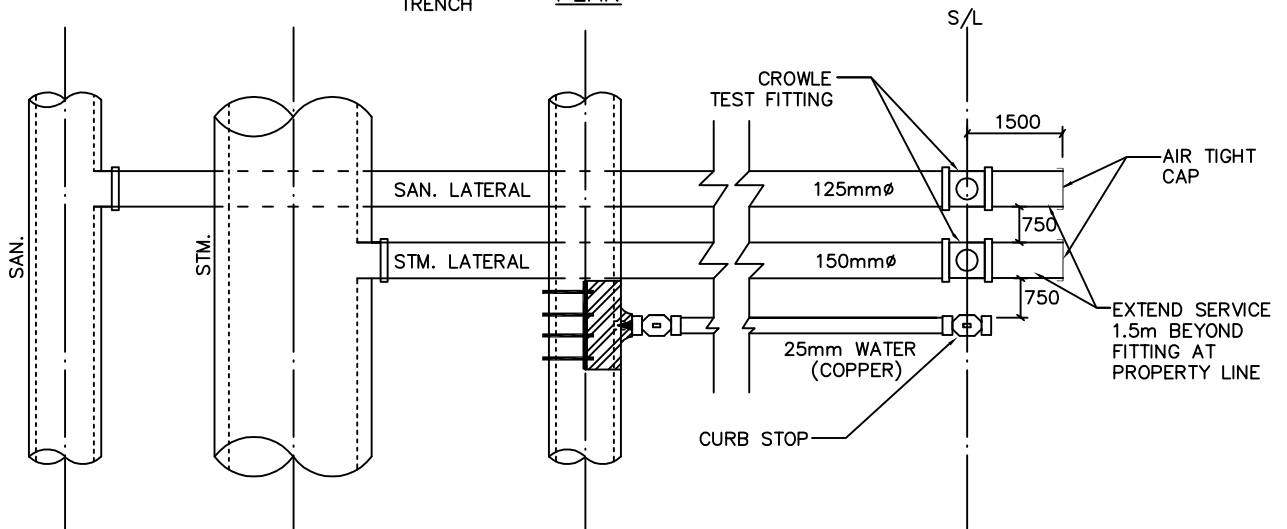
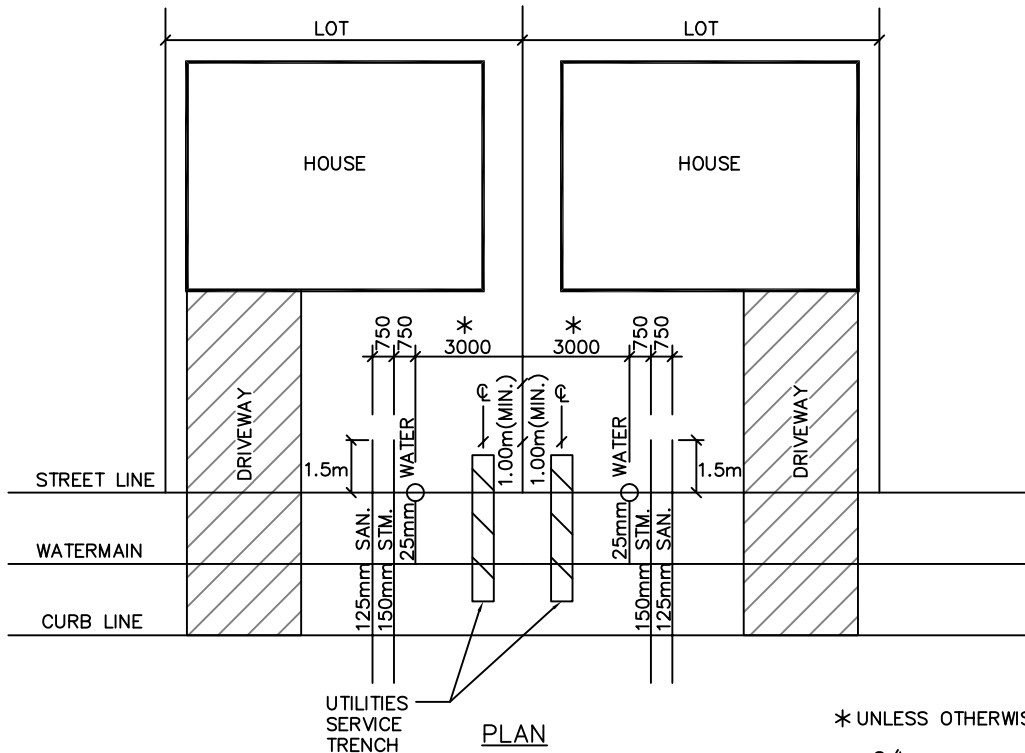
MAY 2009

DRAWING NO.:

M-406



TEMPORARY SEDIMENT BASIN



NOTES.

1. HYDRO SERVICES TO BE PAIRED WHENEVER POSSIBLE.
2. HYDRO SERVICES TO BE INSTALLED 1.0m (MIN.) OFF PROPERTY LINE WITH A MINIMUM CLEARANCE OF 1.0m TO WATER. SANITARY, AND STORM LATERAL SERVICES.
3. ON THE DRIVEWAY SIDE HYDRO REQUIRES MIN. 1.2m CLEARANCE BETWEEN THE DRIVEWAY AND PROPERTY LINE.
4. ALL SERVICES TO BE LOCATED AS SHOWN. STORM, SANITARY AND WATER SERVICES TO BE LOCATED ON OPPOSITE SIDE OF LOT TO DRIVEWAY AND PLUGGED.
5. WATER SERVICE MUST BE A MINIMUM OF 1.0m FROM THE DRIVEWAY.
6. THERE SHALL BE 0.75m CLEARANCE BETWEEN SERVICES.
7. MIN. DEPTH OF COVER TO THE SAN. & STM. SERVICES, AT THE STREET LINE TO BE 3.0m.
8. STORM CONNECTION TO BE 0.15m HIGHER THAN SANITARY CONNECTION AT STREETLINE.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

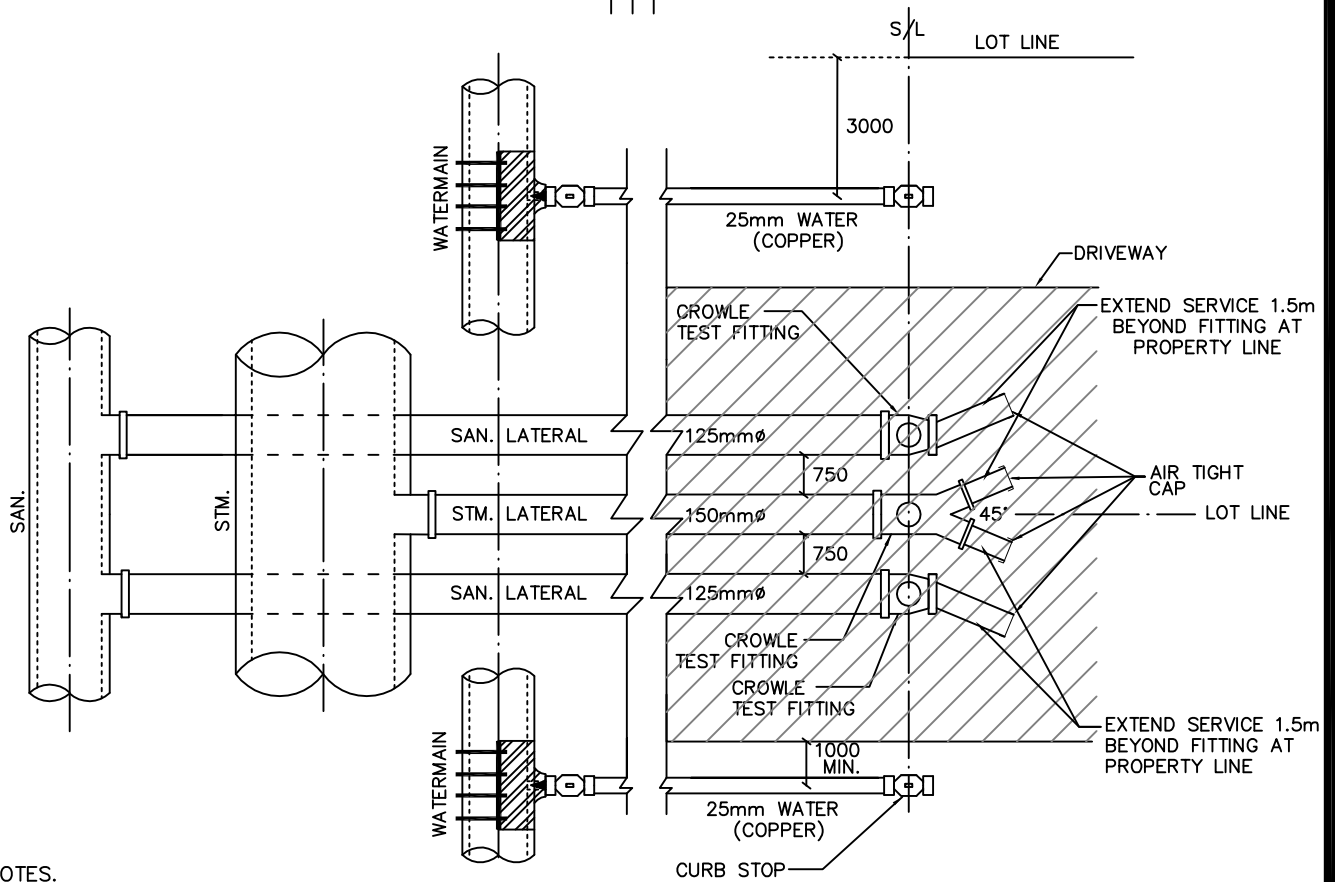
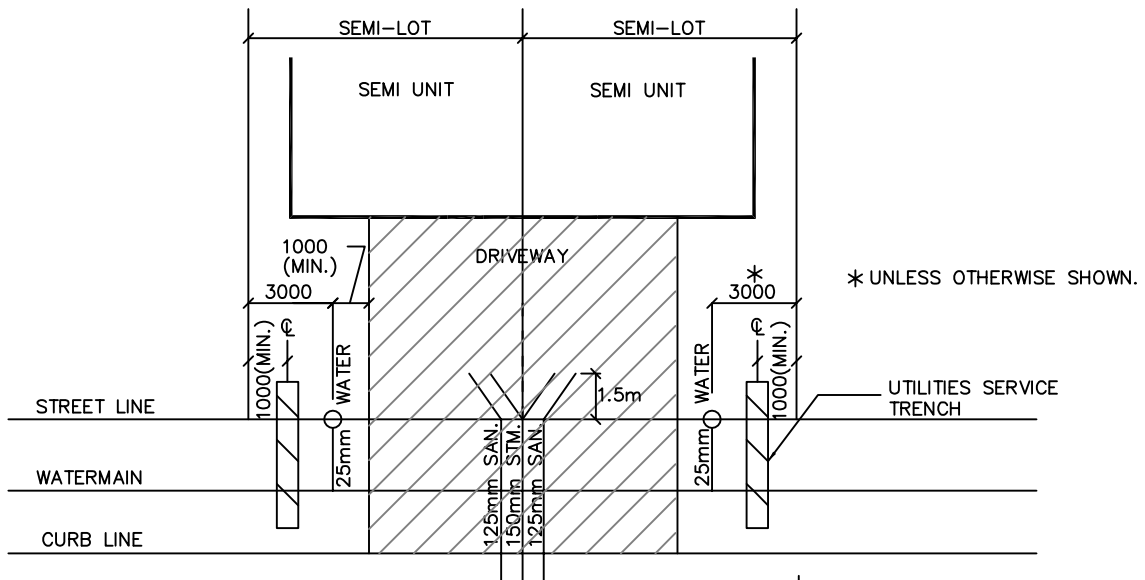
NOV. 2016

DRAWING NO.:

M-409



SINGLE LOT SERVICING



NOTES.

1. HYDRO SERVICES TO BE PAIRED WHEREVER POSSIBLE.
2. HYDRO SERVICES TO BE INSTALLED 1.0m MIN. OFF PROPERTY LINE WITH A MINIMUM CLEARANCE OF 1.0m TO WATER. SANITARY AND STORM LATERAL SERVICES.
3. ON THE DRIVEWAY SIDE HYDRO REQUIRES MIN. 1.2m CLEARANCE BETWEEN THE DRIVEWAY AND PROPERTY LINE.
4. WATER SERVICE MUST BE A MINIMUM OF 1.0m FROM THE DRIVEWAY.
5. THERE SHALL BE 0.75m CLEARANCE BETWEEN SERVICES.
6. MIN. DEPTH OF COVER TO THE SAN. & STM. SERVICES, AT THE STREET LINE TO BE 3.0m.
7. STORM CONNECTION TO BE 0.15m HIGHER THAN SANITARY CONNECTION AT STREETLINE.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

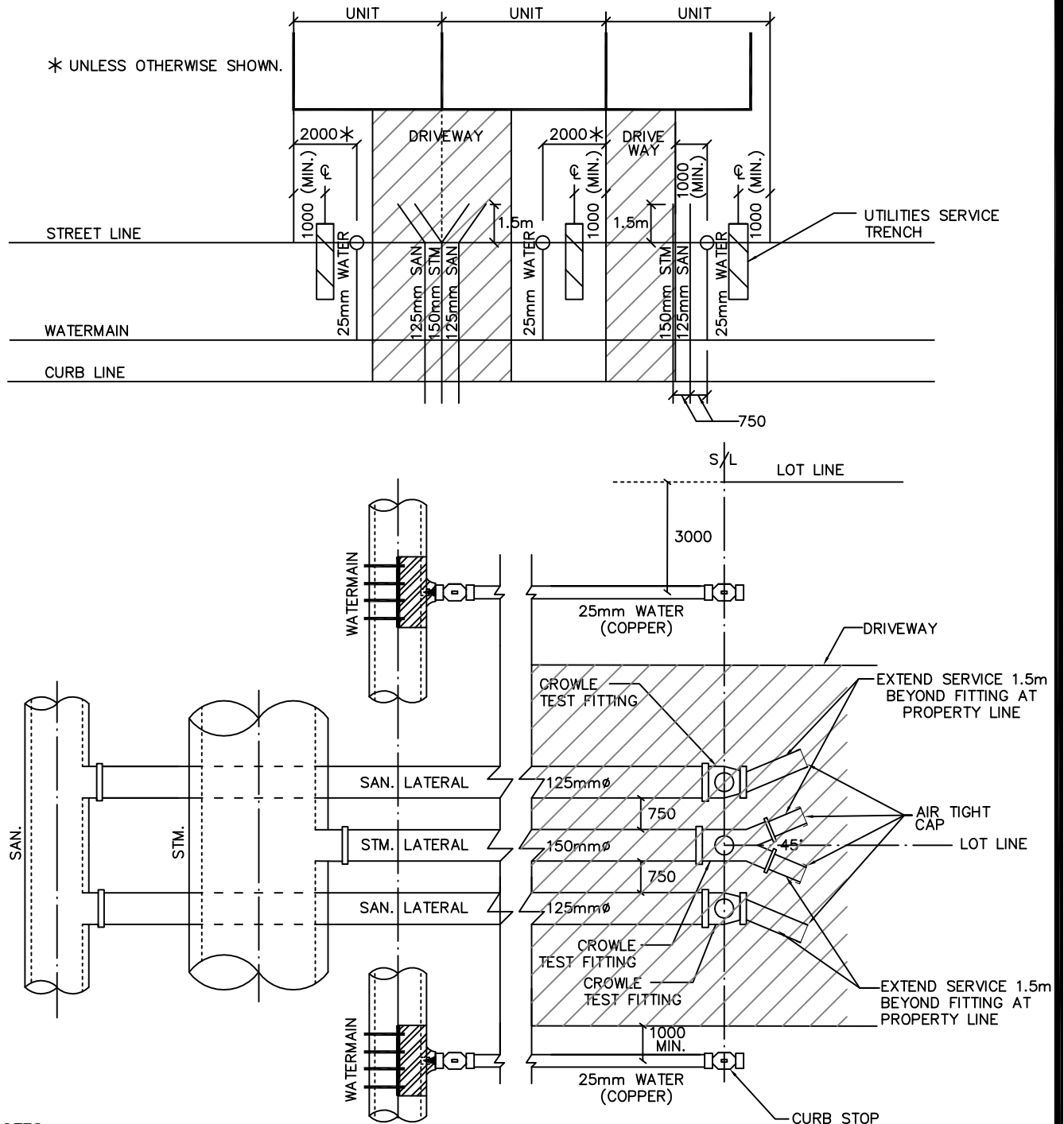
NOV. 2016

DRAWING NO.:

M-410



SEMI-DETACHED LOT SERVICING



NOTES.

1. HYDRO SERVICES TO BE PAIRED WHEREVER POSSIBLE.
2. HYDRO SERVICES TO BE INSTALLED 1.0m MIN. OFF PROPERTY LINE WITH A MINIMUM CLEARANCE OF 1.0m TO WATER. SANITARY AND STORM LATERAL SERVICES.
3. ON THE DRIVEWAY SIDE HYDRO REQUIRES MIN. 1.2m CLEARANCE BETWEEN THE DRIVEWAY AND PROPERTY LINE.
4. WATER SERVICE MUST BE A MINIMUM OF 1.0m FROM THE DRIVEWAY.
5. THERE SHALL BE 0.75m CLEARANCE BETWEEN SERVICES.
6. MIN. DEPTH OF COVER TO THE SAN. & STM. SERVICES, AT THE STREET LINE TO BE 3.0m.
7. STORM CONNECTION TO BE 0.15m HIGHER THAN SANITARY CONNECTION AT STREETLINE.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

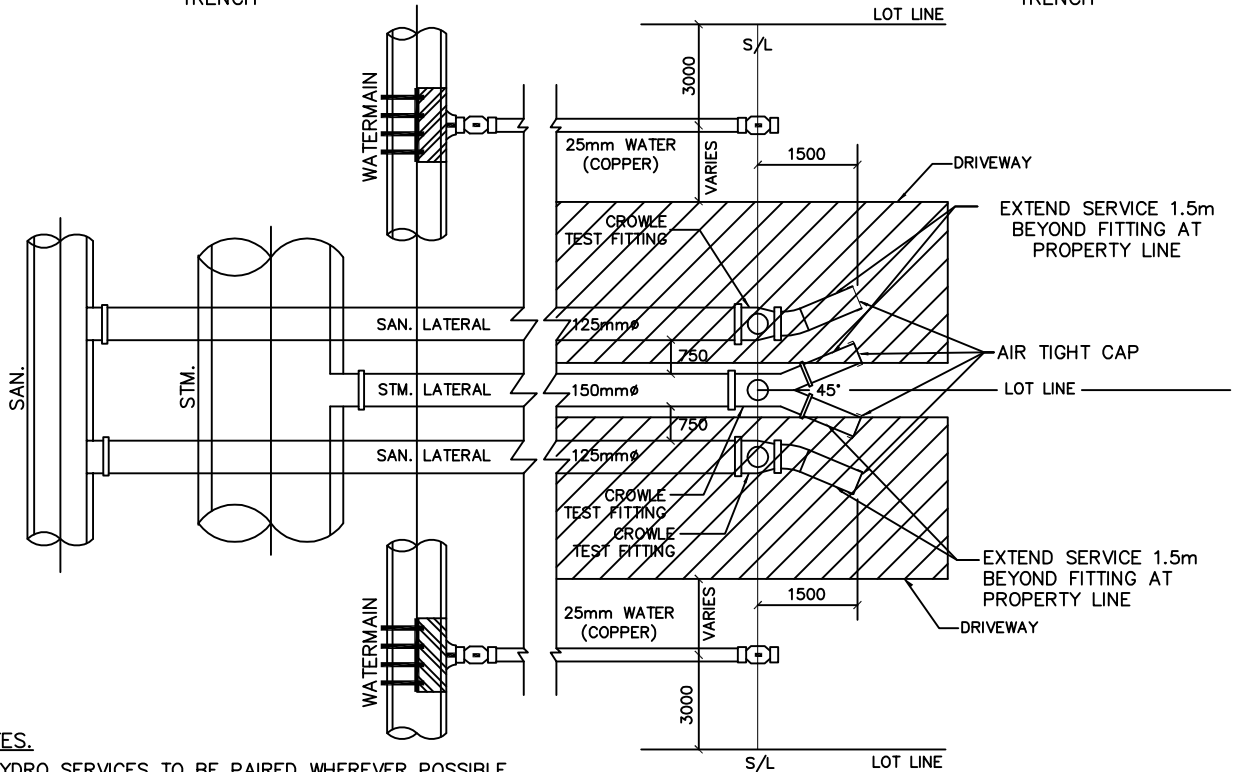
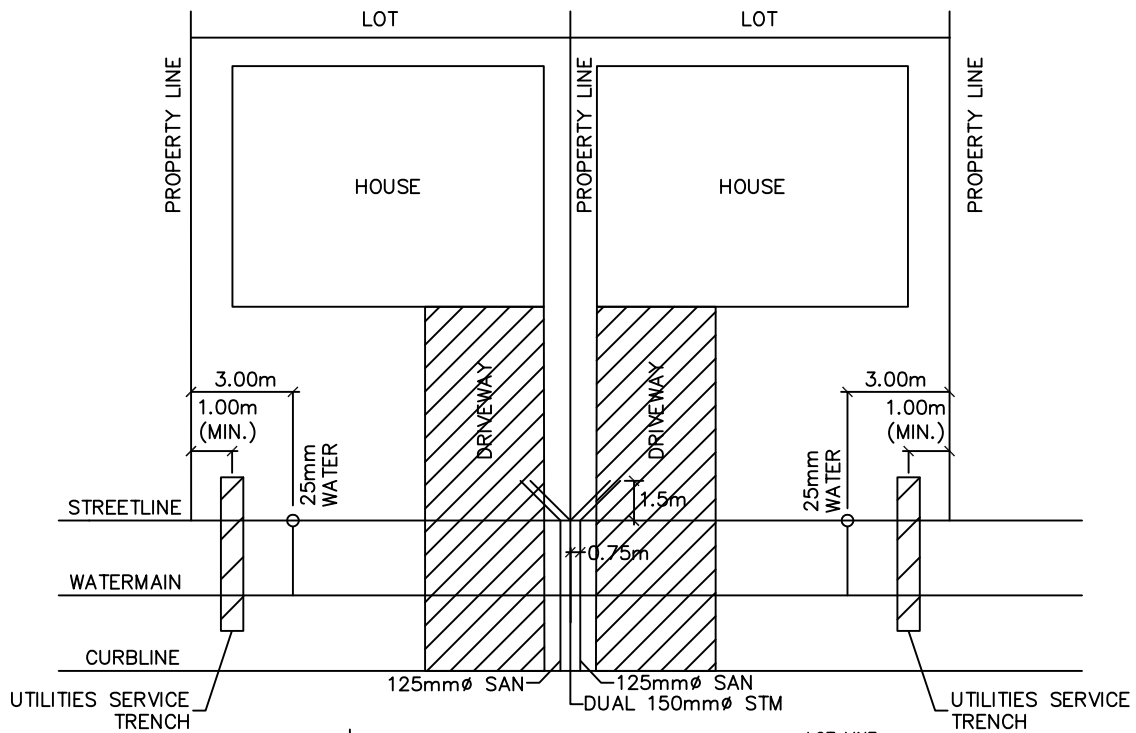
NOV. 2016

DRAWING NO.:

M-411



TOWNHOUSE UNIT SERVICING



NOTES.

1. HYDRO SERVICES TO BE PAIRED WHEREVER POSSIBLE.
2. HYDRO SERVICES TO BE INSTALLED 1.0m MIN. OFF PROPERTY LINE WITH A MINIMUM CLEARANCE OF 1.0m TO WATER SANITARY AND STORM LATERAL SERVICES.
3. ON THE DRIVEWAY SIDE HYDRO REQUIRES MIN. 1.2m CLEARANCE BETWEEN THE DRIVEWAY AND PROPERTY LINE.
4. WATER SERVICE MUST BE A MINIMUM OF 1.0m FROM THE DRIVEWAY.
5. THERE SHALL BE 0.75m CLEARANCE BETWEEN SERVICES.
6. MIN. DEPTH OF COVER TO THE SAN. & STM. SERVICES, AT THE STREET LINE TO BE 3.0m.
7. STORM CONNECTION TO BE 0.15m HIGHER THAN SANITARY CONNECTION AT STREETLINE.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

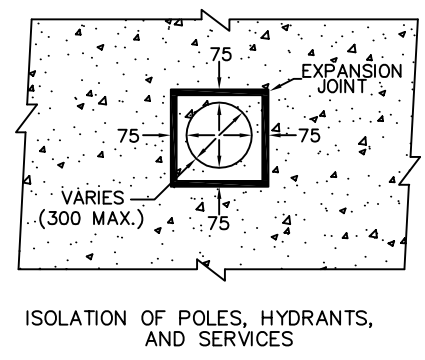
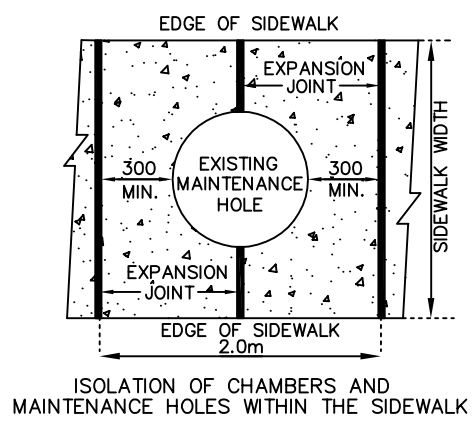
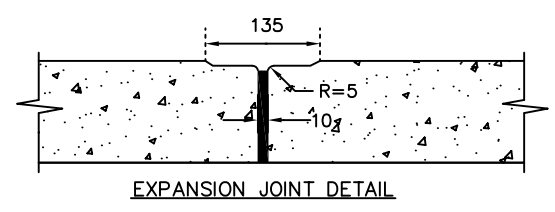
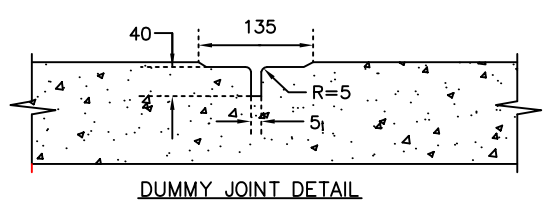
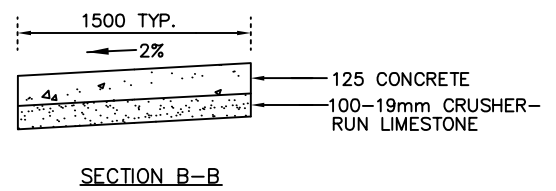
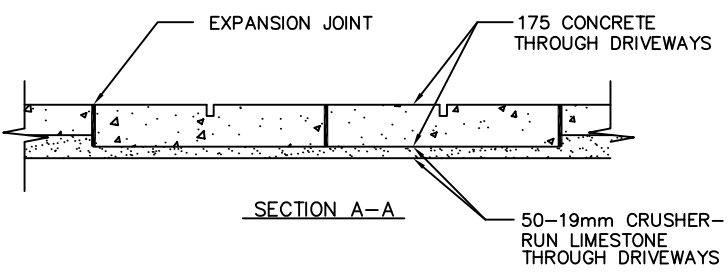
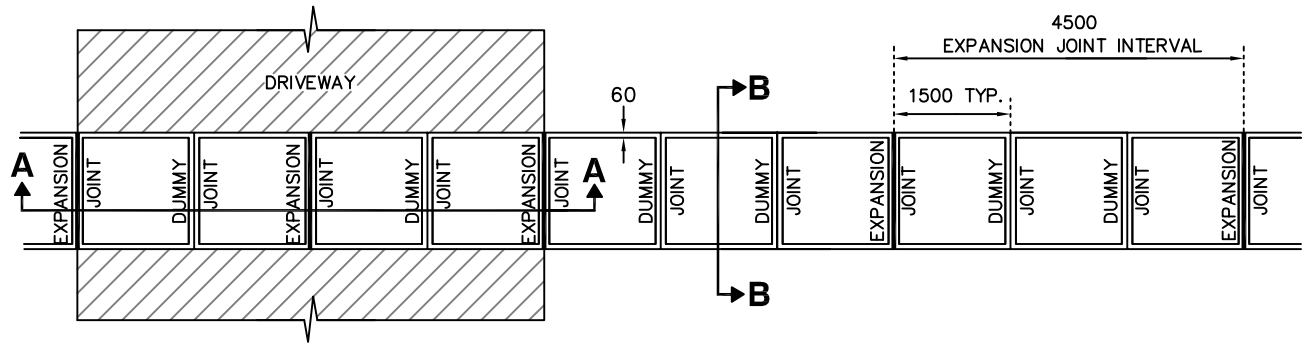
NOV. 2016

DRAWING NO.:

M-412



**SINGLE LOT SERVICING (DUAL)
(2C LANDS ONLY)**



NOTES

1. EXPANSION JOINTS ARE REQUIRED AT 4.5m INTERVALS AND:
 - a) BETWEEN SIDEWALK AND ABUTTING CURB.
 - b) ADJACENT TO ABUTTING RIGID OBJECTS (UTILITY POLES, MAINTENANCE HOLES, VALVE BOXES ETC.)
 - c) AT THE EDGE OF EACH DRIVEWAY.
 - d) AT ALL CONSTRUCTION JOINTS.
2. DUMMY JOINTS HAVE HAVE A STANDARD SPACING OF 1.5m. IN NO CASE LESS THAN 1.0m OR MORE THAN 2.0m.
3. ALL CONCRETE TO BE 30MPa; 7% +/- 1.5% AIR ENTRAINED.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

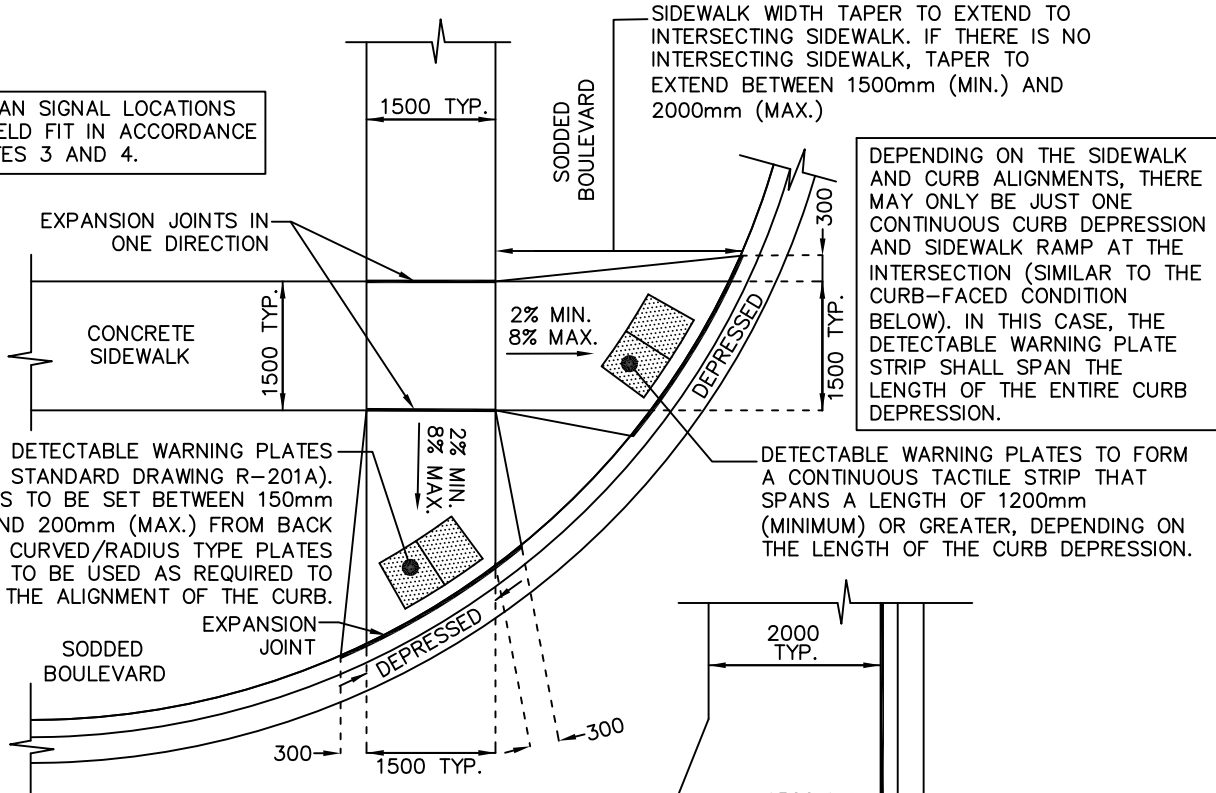
REVISION:
FEB. 2009



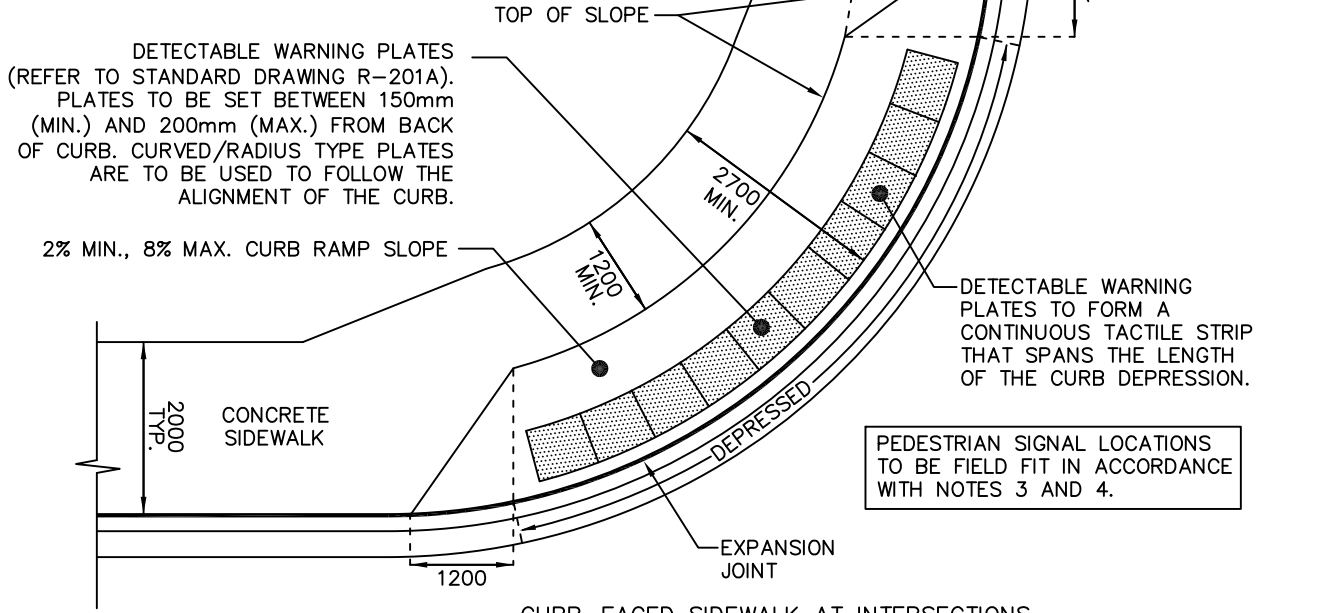
CONCRETE SIDEWALK

DRAWING NO.:
R-200

PEDESTRIAN SIGNAL LOCATIONS TO BE FIELD FIT IN ACCORDANCE WITH NOTES 3 AND 4.



SIDEWALK AT INTERSECTIONS WITH BOULEVARD



CURB-FACED SIDEWALK AT INTERSECTIONS

NOTES

1. SEE STANDARD DRAWING R-201A FOR DETECTABLE WARNING PLATE DETAILS.
2. THIS STANDARD IS TO BE USED AS A GUIDE ONLY AND WILL REQUIRE ADJUSTMENTS TO SUIT FIELD CONDITIONS.
3. PEDESTRIAN SIGNAL POLES MUST BE LOCATED WITHIN 1500mm FROM THE BACK OF THE CURB.
4. WHERE TWO PEDESTRIAN SIGNALS ARE INSTALLED ON THE SAME INTERSECTION CORNER, THE POLES MUST BE A MINIMUM OF 3000mm APART.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

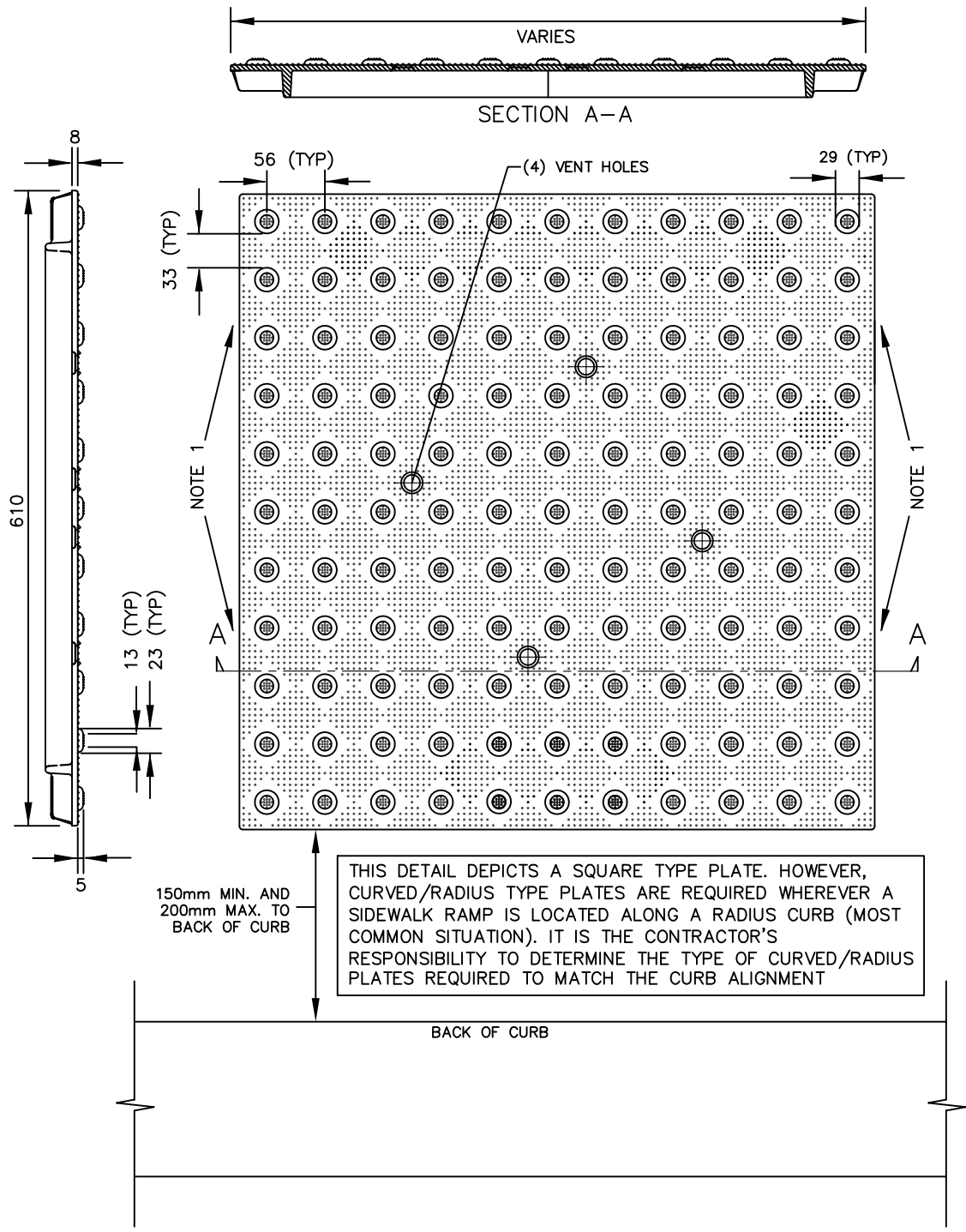
DEC 2015

DRAWING NO.:

R-201



SIDEWALK RAMPS

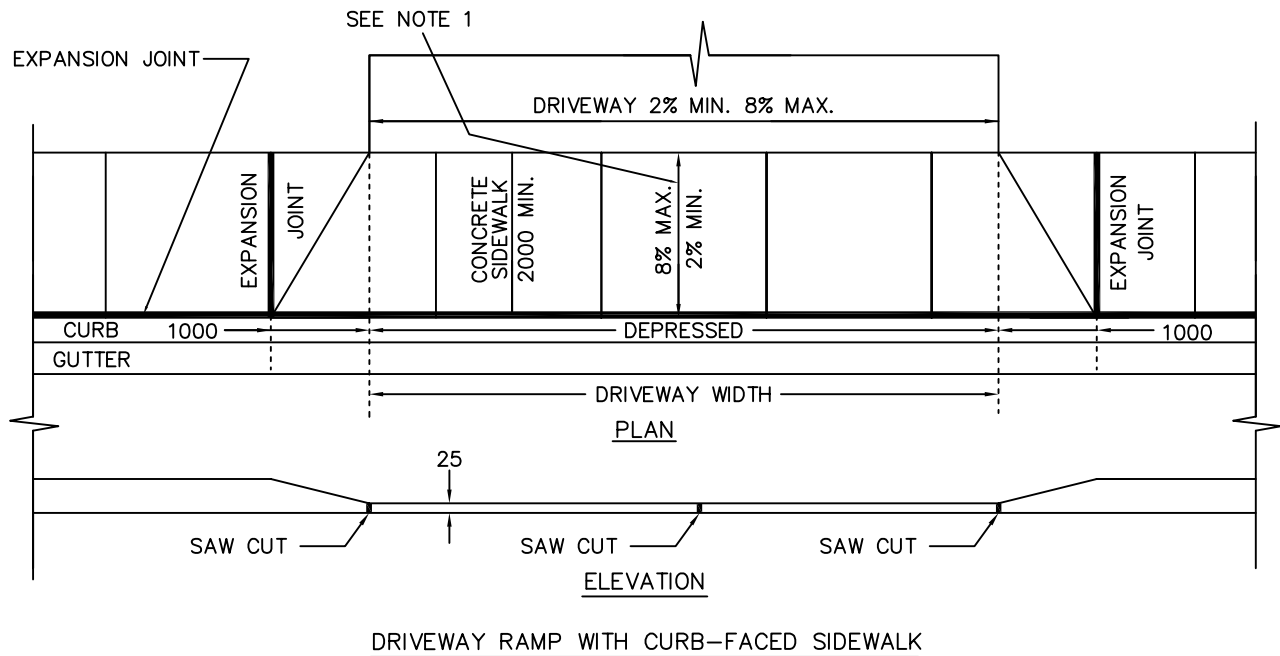
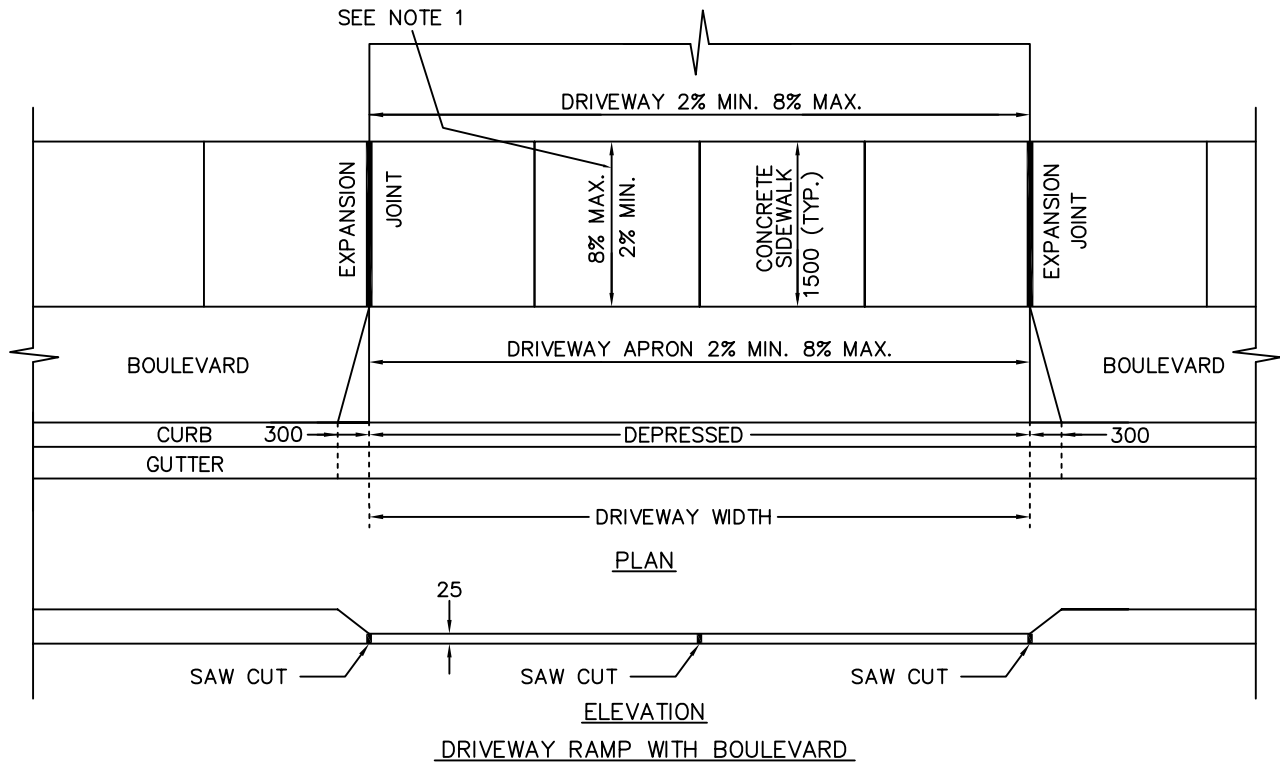


NOTES

1. LOCK LUG AND SLOTS TO INTERCONNECT ADJACENT CAST IRON PLATES. ALTERNATIVELY, THE PLATES CAN BE BOLTED TOGETHER.
2. INSTALL PLATES INTO WET CONCRETE TO FINAL POSITION.
3. PRESS ASSEMBLY INTO WET CONCRETE TO FINAL POSITION.
4. SEE STANDARD DRAWING R-201 FOR DETAILS ABOUT LOCATIONS OF TACTILE PLATES.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

<h1>TOWN OF AURORA</h1>	APPROVED:	SCALE: N.T.S
	<h2>DETECTABLE WARNING PLATE</h2>	REVISION: DEC 2015
		DRAWING NO.: R-201A



NOTES:

1. ALL NEW CONSTRUCTION TO FOLLOW AODA REQUIREMENTS FOR SIDEWALK CROSSWALK.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

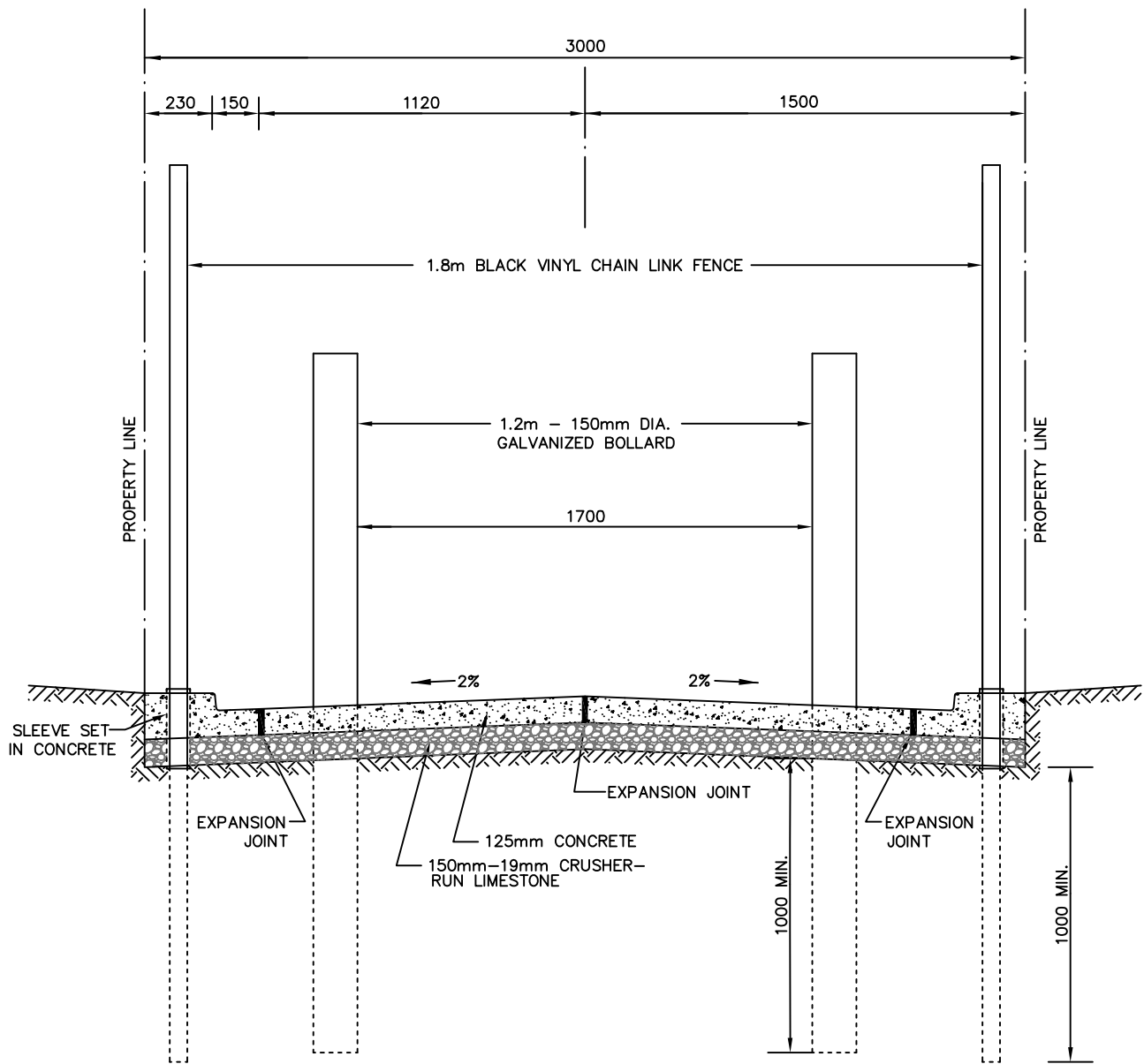
AUG. 2015

DRAWING NO.:

R-202



DRIVEWAY ENTRANCE DETAIL



NOTES

1. TRANSVERSE EXPANSION JOINTS ARE REQUIRED AT 4.5m INTERVALS AND DUMMY JOINTS EVERY 1.5m.
2. ALL CONCRETE TO BE 30MPa; 7% +/- 1.5% AIR ENTRAINED.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

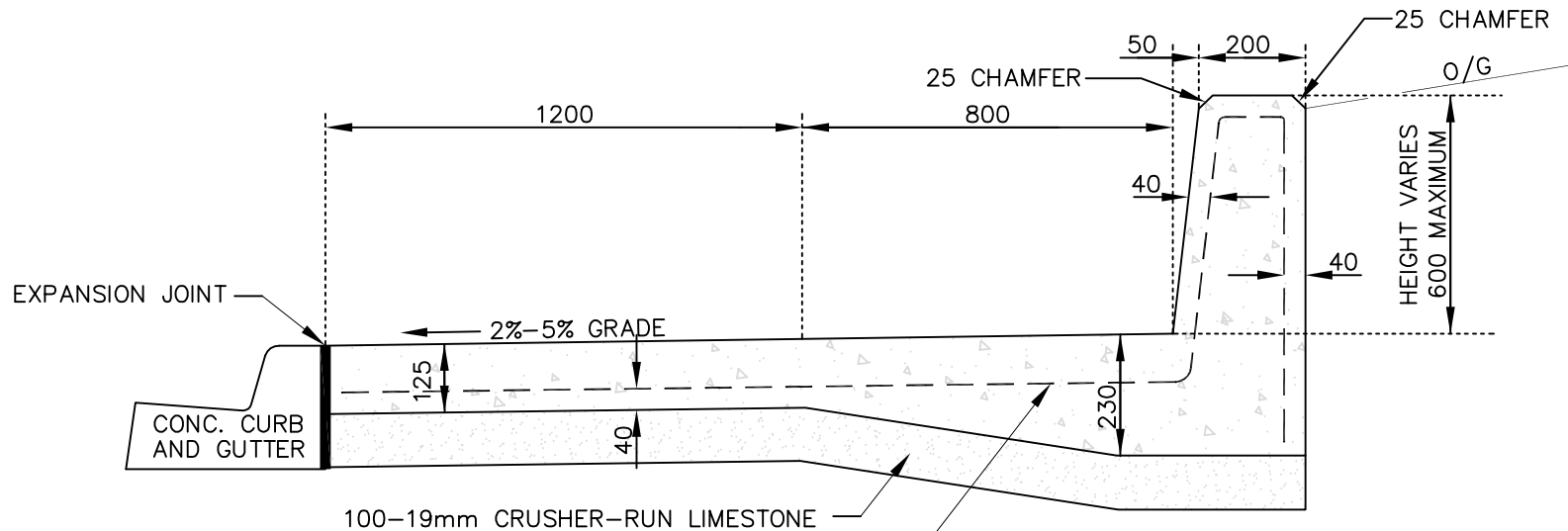
FEB. 2009

DRAWING NO.:

R-203



WALKWAY DETAIL

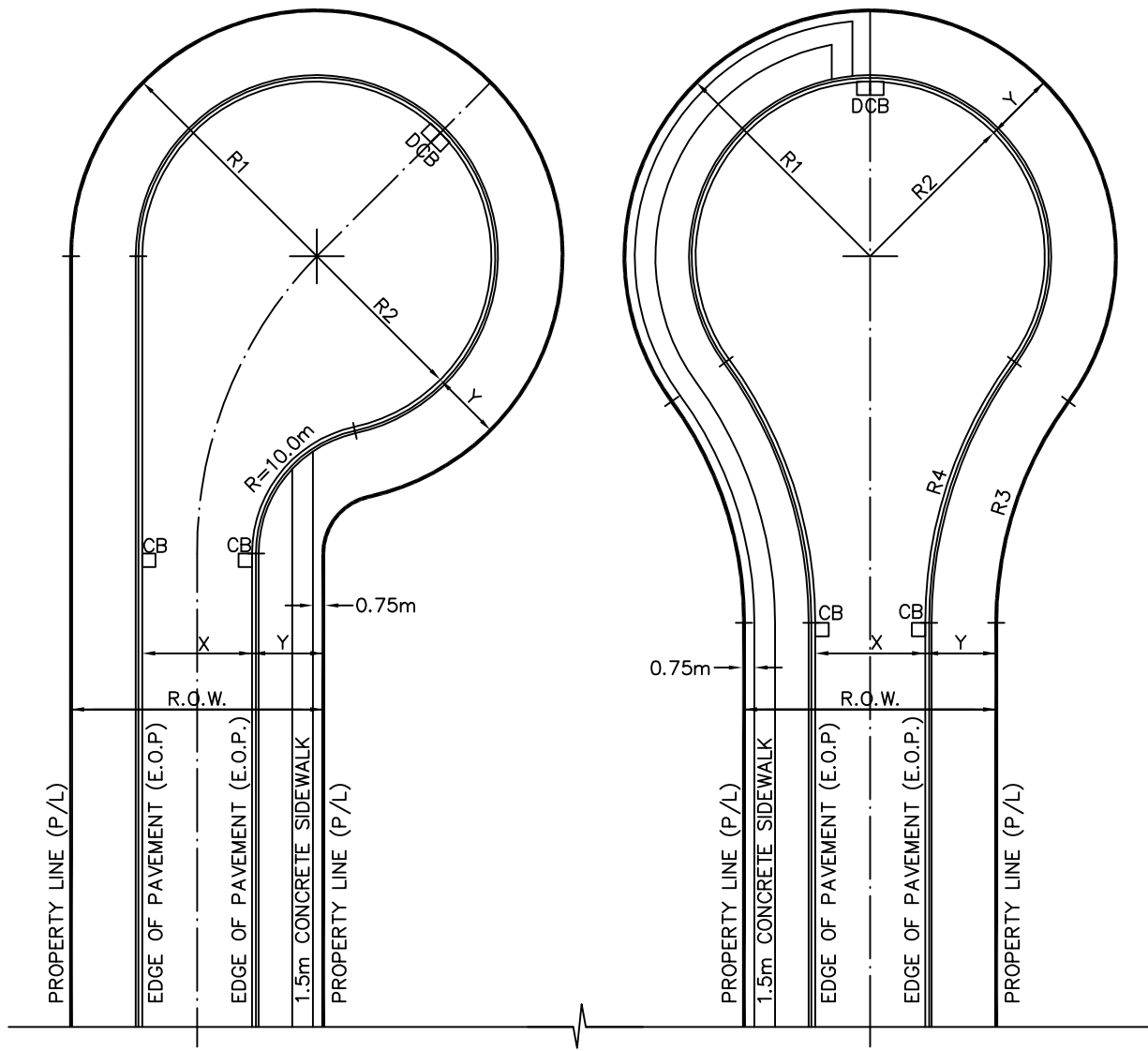


100-19mm CRUSHER-RUN LIMESTONE

UNCOATED 150mm SQUARE STEEL WIRE FABRIC (No. 3.8)
 FOR CONCRETE REINFORCEMENT CONFORMING TO
 C.S.A. G30.5, 1998 SHALL BE PLACED IN THE SIDEWALK
 AND RETAINING WALL

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

<h1 style="text-align: center;">TOWN OF AURORA</h1>		APPROVED:	SCALE:
		<h2 style="margin: 0;">MONOLITHIC CONCRETE SIDEWALK AND RETAINING WALL</h2>	
	<h2 style="margin: 0;">MONOLITHIC CONCRETE SIDEWALK AND RETAINING WALL</h2>		



	R.O.W. WIDTH	'R1' P/L RADIUS	'R2' E.O.P. RADIUS	'R3' P/L RADIUS	'R4' E.O.P. RADIUS	'X' ROAD WIDTH	'Y' BOULEVARD WIDTH
RESIDENTIAL	18m	18m	13.0m	30.0m	35.0m	8.0m	5.0m
	20m	20m	14.25m	28.0m	33.75m	8.5m	5.75m
INDUSTRIAL	20m	20m	15.25m	28.0m	32.75m	10.5m	4.75m

NOTES

1. GUTTER ELEVATIONS AND GRADES AROUND CUL-DE-SAC SHALL BE DETAILED ON ENGINEERING DRAWINGS.
2. MINIMUM GUTTER GRADE TO BE 0.5%.
3. BOULEVARD WIDTHS TO BE MAINTAINED.
4. CUL-DE-SAC STREETS LESS THAN 350m IN LENGTH MAY NOT REQUIRE SIDEWALK.
5. MINIMUM 1.0m SPACING BETWEEN DRIVEWAY CURB DEPRESSIONS.
6. CATCHBASINS TO BE INSTALLED AS INDICATED DEPENDING ON DIRECTION OF DRAINAGE.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

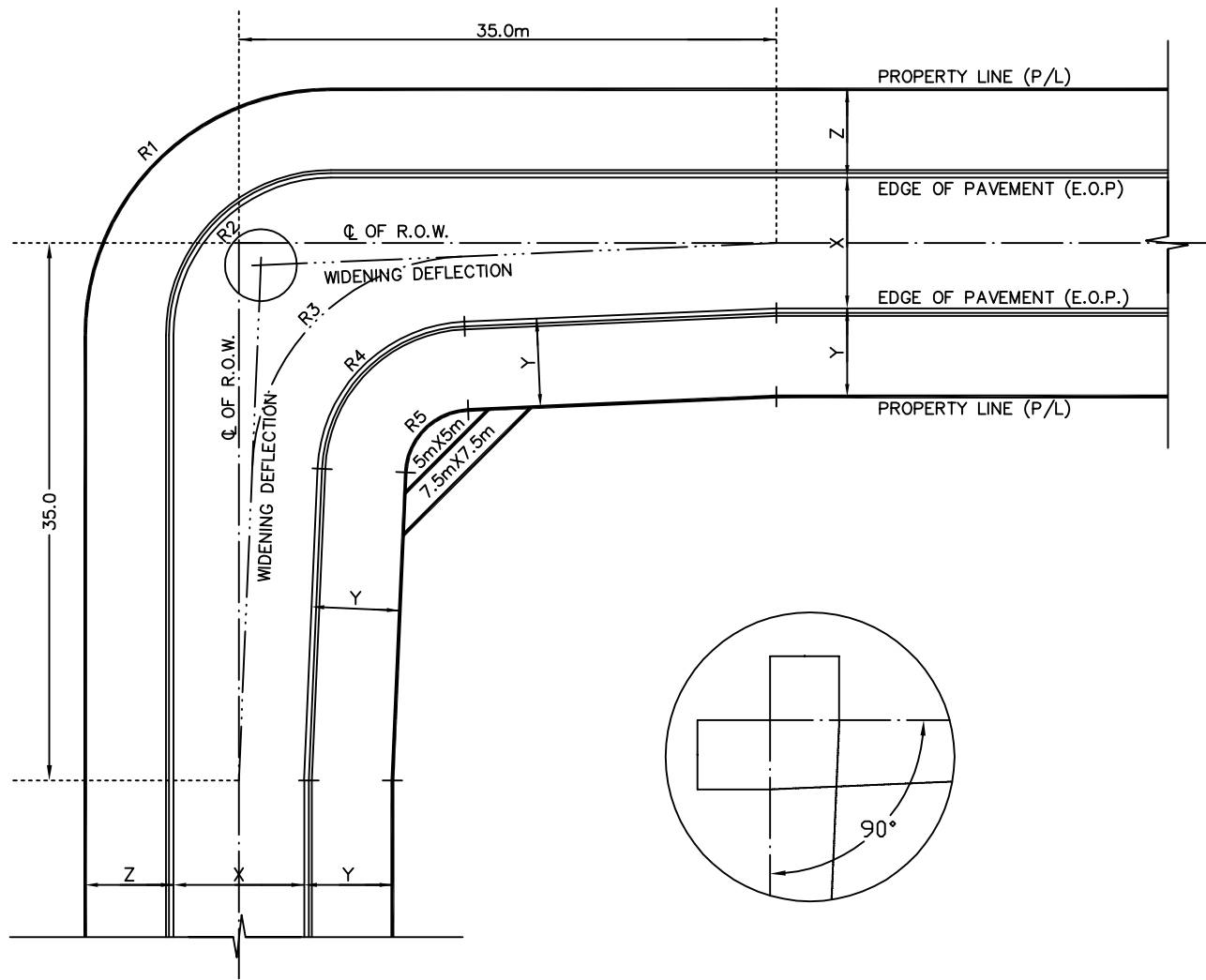
MAR. 2014

DRAWING NO.:

R-205



TYPICAL CUL-DE-SAC



	R.O.W. WIDTH	'R1' P/L RADIUS	'R2' E.O.P. RADIUS	'R3' ϕ RADIUS	'R4' E.O.P. RADIUS	'R5' P/L RADIUS	'X' ROAD WIDTH	'Y' BOULEVARD WIDTH	'Z' BOULEVARD WIDTH
RESIDENTIAL	18m	16.0m	10.5m	14.0m	10.0m	5.5m	8.0m	4.5m	5.5m
	18m	16.0m	11.5m	14.0m	10.0m	4.5m*	8.0m	5.5m	4.5m
	20m	16.0m	10.25m	14.25m	10.0m	4.25m*	8.5m	5.75m	5.75m
INDUSTRIAL	20m	16.0m	11.25m	15.25m	10.0m	4.25m*	10.5m	4.75m	4.75m

* PROPERTY LINE RADIUS IS LESS THAN 5.0m, A 5.0m X 5.0m DAYLIGHTING SHALL BE USED.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

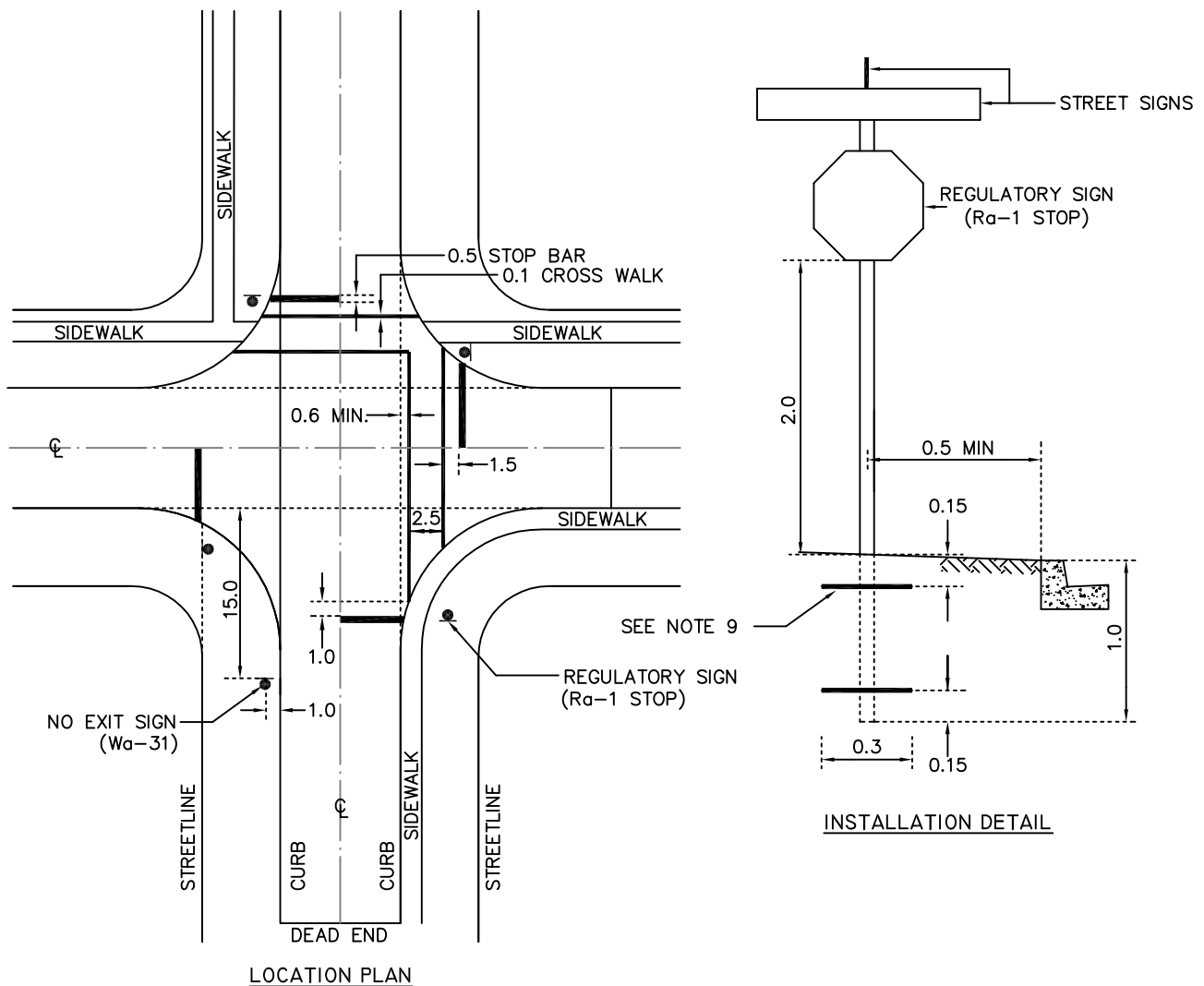
FEB. 2009

DRAWING NO.:

R-206



TYPICAL ANGLE BEND DETAIL



NOTES:

1. REGULATORY/WARNING SIGNS AS PER OHTA REG. 615/616 OR AMENDMENTS THEREOF.
2. STOP SIGNS (Ra-1) POSTS SHALL BE 75mm X 3.66m ALUMINUM COMPLETE WITH TOP CAP.
3. STOP SIGNS SHALL BE Banded TO THE POST WITH MINIMUM 12.7mm X .76mm STAINLESS STEEL BANDING AND FLARED LEG STAINLESS STEEL BRACKETS (BANDRIT BRACKETS OR EQUIVALENT).
4. ALL OTHER REGULATORY/WARNING SIGNS SHALL BE MOUNTED ON 3.66M 80,000psi U-FLANGE POSTS WHICH HAVE THE TOP 1200mm PUNCHED ON 50mm CENTRES WITH 11mm HOLES.
5. ALL REGULATORY SIGNS SHALL CONFORM WITH THE CURRENT VERSION OF THE ONTARIO TRAFFIC MANUAL (O.T.M.).
6. ALL WARNING SIGNS AND INSTALLATIONS SHALL CONFORM WITH THE CURRENT VERSION OF THE O.T.M.
7. ALL REGULATORY AND WARNING SIGNS SHALL BE MOUNTED A MINIMUM OF 2.0M ABOVE FINISHED GROUND ELEVATION.
8. ALL REGULATORY AND WARNING SIGN BLANKS SHALL BE ALUMINUM AND BE HIGH DENSITY REFLECTORIZED SURFACES.
9. SIGN POSTS SHALL BE ANCHORED USING 0.3m LONG 15M REINFORCING STEEL BARS INSERTED THROUGH HOLES DRILLED IN SIGN POST OR BY 0.15m LONG ANGLE IRON WELDED TO THE SIGN POST ON EACH SIDE.
10. SIGN POSTS TO BE BACKFILLED WITH 19mm CRUSHER-RUN LIMESTONE.

ALL DIMENSIONS ARE EXPRESSED IN METRES (m) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

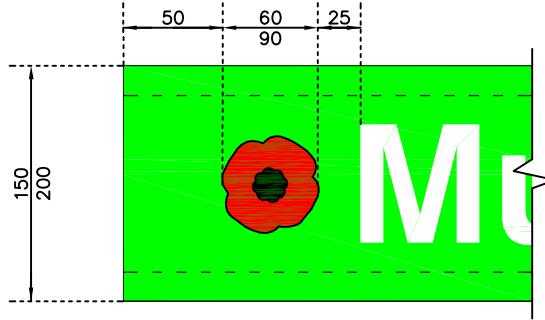
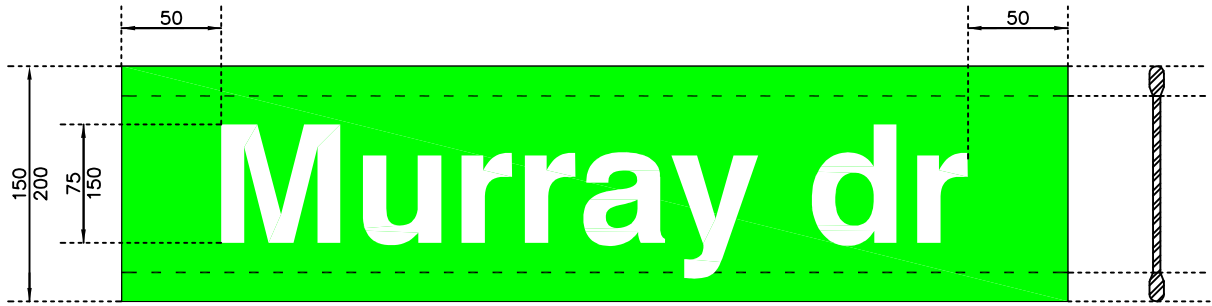
FEB. 2009

DRAWING NO.:

R-207



**TRAFFIC SIGN AND PAVEMENT MARKING
INSTALLATION DETAIL**



POPPY DESIGNATED STREET NAME BLADE DETAIL

NOTES

1. SIGN BLADES SHALL BE 150mm WIDE EXTRUDED ALUMINUM (200mm WIDTH AT INTERSECTION OF ARTERIAL ROADS).
2. SIGNS TO HAVE REFLECTIVE COATING (3M ENGINEERING GRADE OR EQUIVALENT) WITH GREEN COLOURED PIGMENT FOR BACKGROUND. ALL LETTERING IN WHITE.
3. LETTERING SHALL BE HELVETICA MEDIUM STYLE CHARACTERS AND SHALL BE APPROPRIATELY SIZED.
75mm LETTERING FOR 150mm BLADES.
150mm LETTERING FOR 200mm BLADES.
4. ALL LETTERS SHALL BE LOWER CASE EXCEPT FOR THE FIRST LETTER OF EACH "PROPER NAME" WHICH SHALL BE UPPER CASE.
5. ALL COMMON NAMES SHALL TO BE LOWER CASE; ONLY STANDARD NAMES SHALL BE ABBREVIATED. FOR EXAMPLE:
STREET (st) ROAD (rd) DRIVE (dr) COURT (ct) AVENUE (ave) CRESCENT (cres) BOULEVARD (blvd)
6. ALL OTHER "COMMON NAMES" SHALL BE SHOWN IN FULL.
FOR EXAMPLE:
lane circle way gate gardens terrace
7. WHENEVER A STREET NAME INCLUDES A DIRECTIONAL ELEMENT, THIS SHALL BE SHOWN AS A LOWER CASE SINGULAR LETTER (NORTH (n), SOUTH (s), EAST (e), WEST (w)).
8. THE FOLLOWING ARE EXAMPLES OF THE STANDARDS DESCRIBED:

Hillary place	St. Andrew's ct
Mill st	St. John sideroad e
Collins cres	Vandorf sideroad
Aurora Heights dr	Industrial parkway n
Crawford Rose dr	Kennedy st w
Little Erica way	Lee gate

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

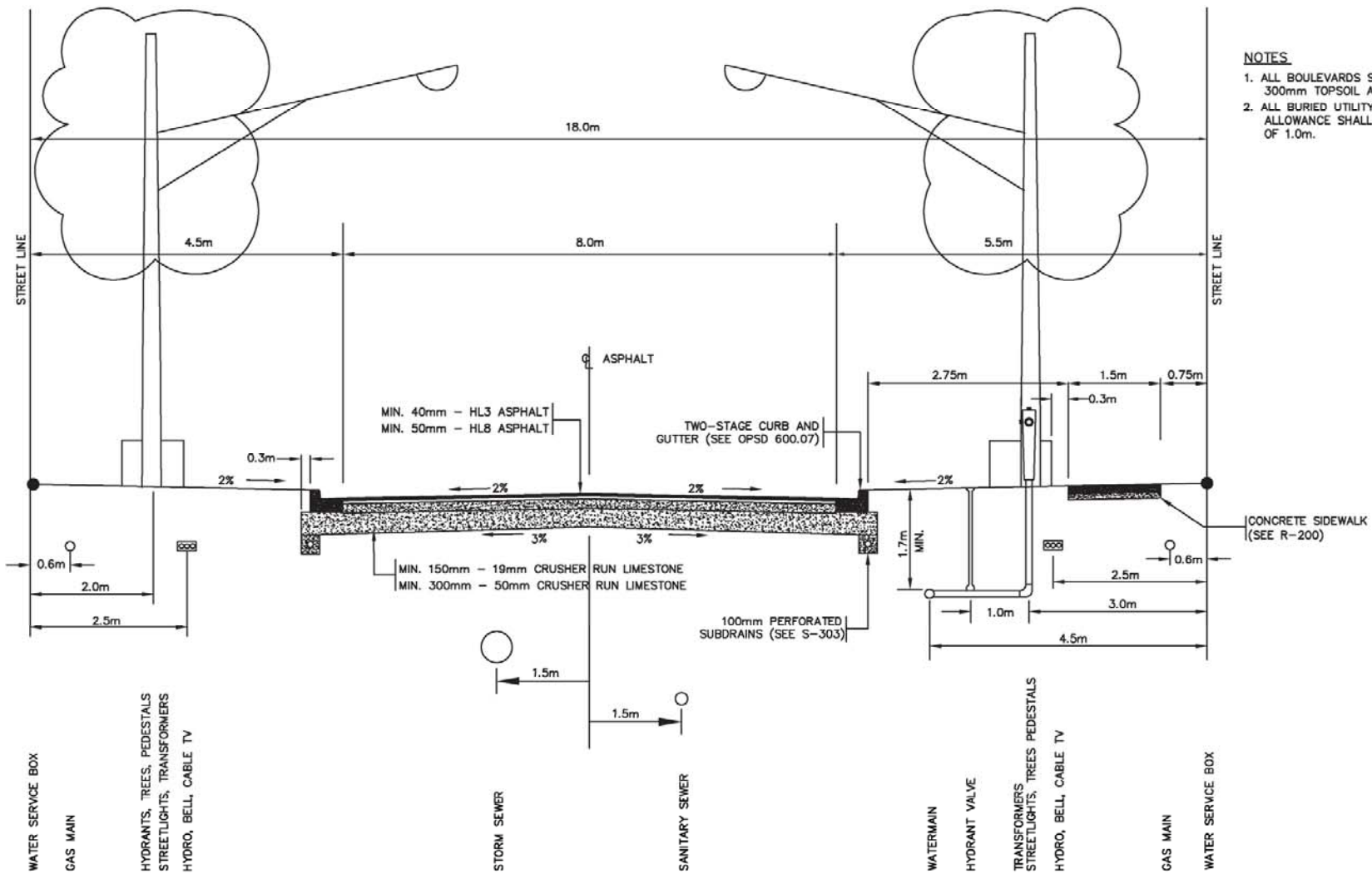
FEB. 2009



STREET NAME SIGN DETAIL

DRAWING NO.:

R-208



NOTES

1. ALL BOULEVARDS SHALL BE LANDSCAPED WITH 300mm TOPSOIL AND No. 1 NURSERY SOD.
2. ALL BURIED UTILITY PLANT WITHIN THE ROAD ALLOWANCE SHALL HAVE A MINIMUM COVER OF 1.0m.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S.

REVISION:

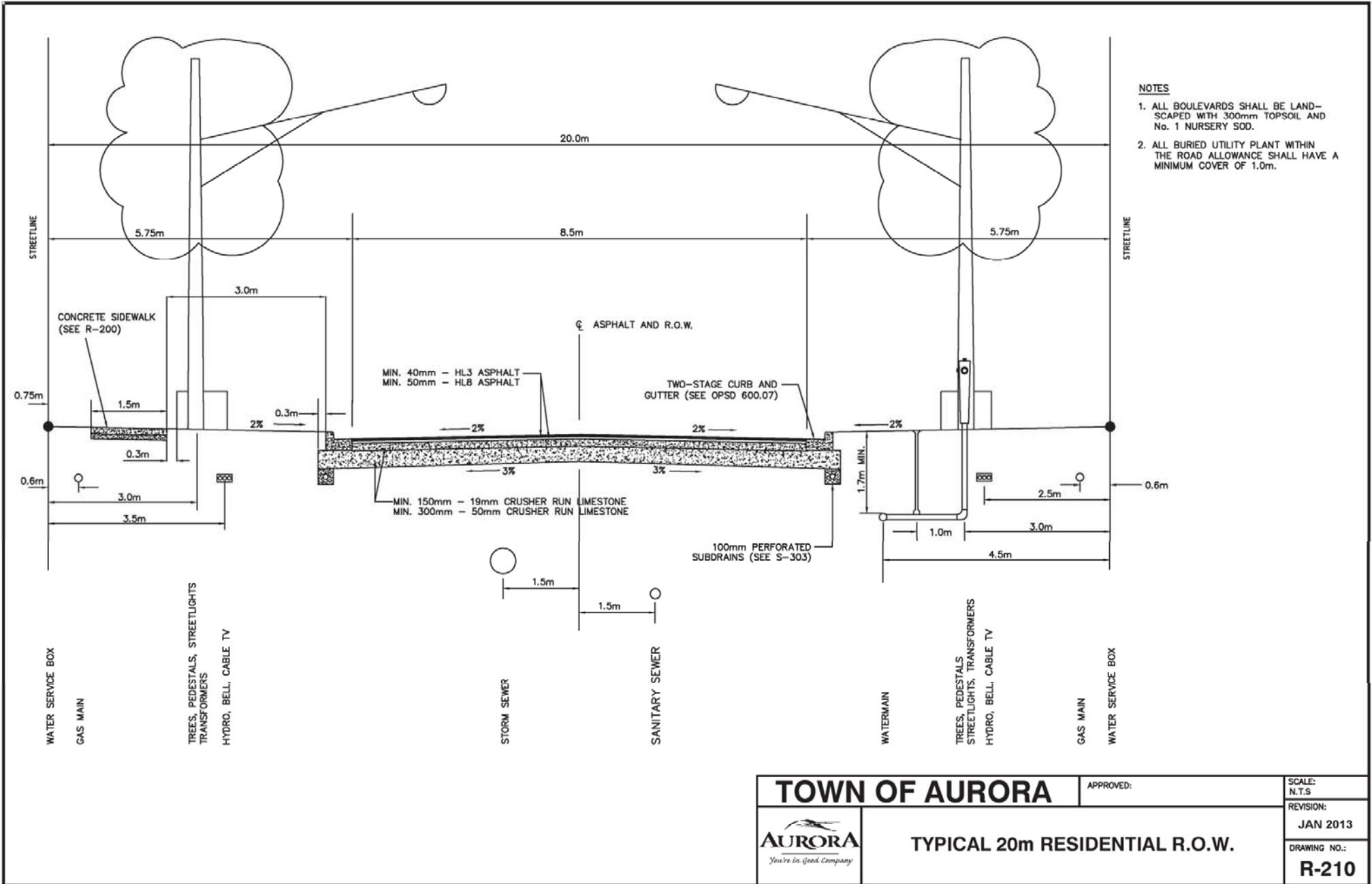
JAN 2013

DRAWING NO.:

R-209



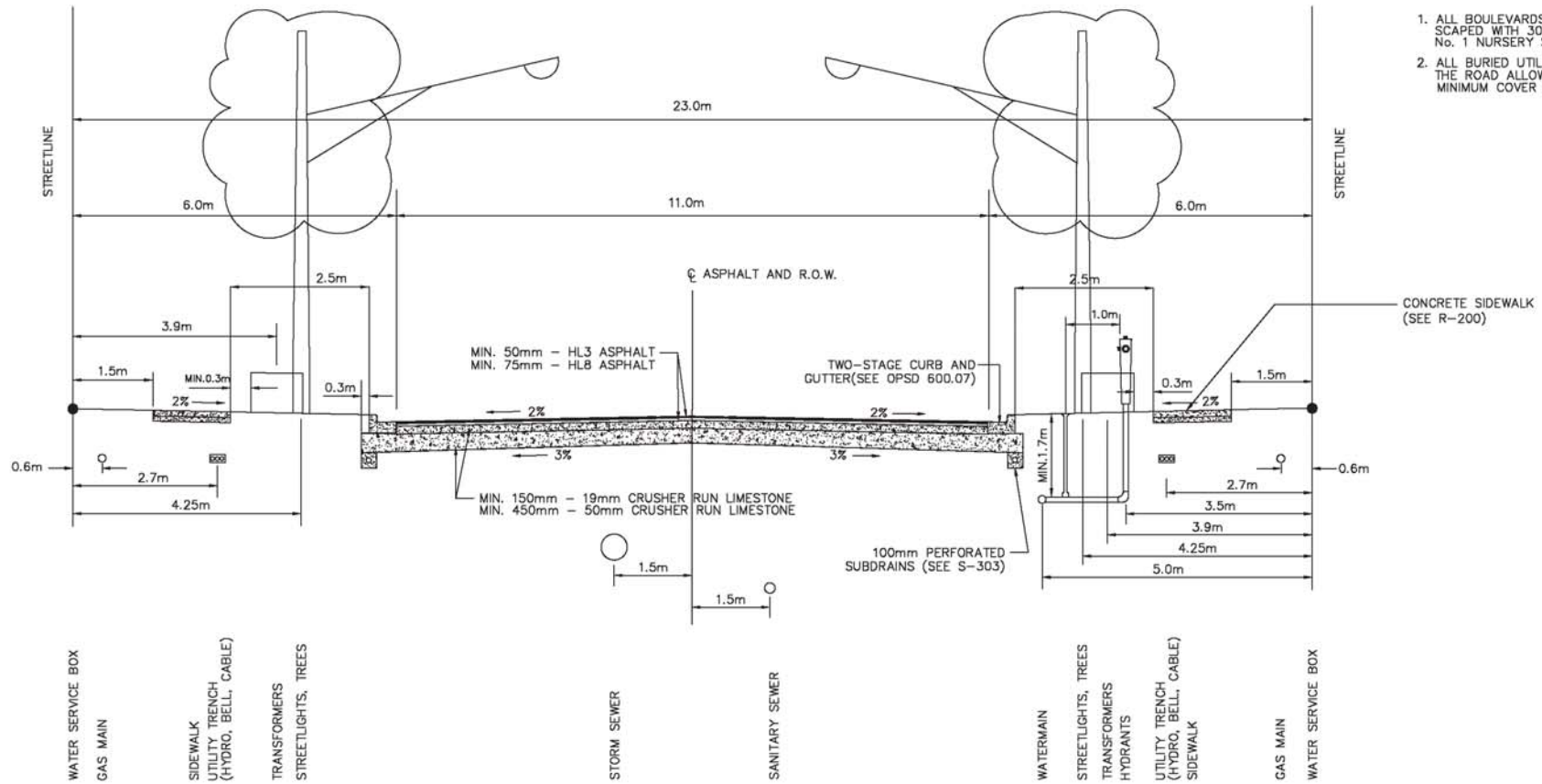
TYPICAL 18.0m RESIDENTIAL R.O.W.



TOWN OF AURORA 		APPROVED:	SCALE: N.T.S
			REVISION: JAN 2013
TYPICAL 20m RESIDENTIAL R.O.W.			DRAWING NO.:
			R-210

NOTES

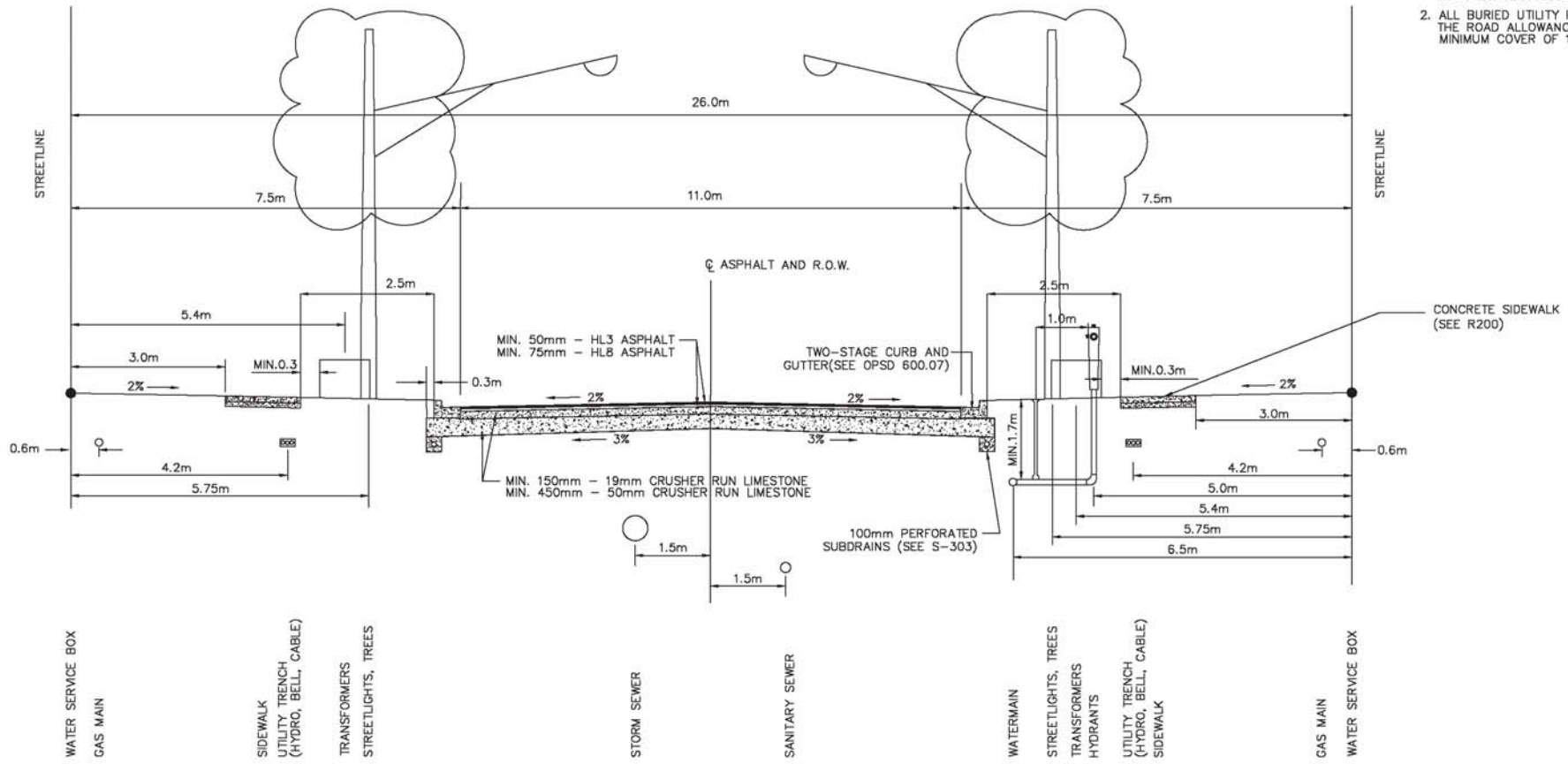
1. ALL BOULEVARDS SHALL BE LAND-SCAPED WITH 300mm TOPSOIL AND No. 1 NURSERY SOD.
2. ALL BURIED UTILITY PLANT WITHIN THE ROAD ALLOWANCE SHALL HAVE A MINIMUM COVER OF 1.0m.



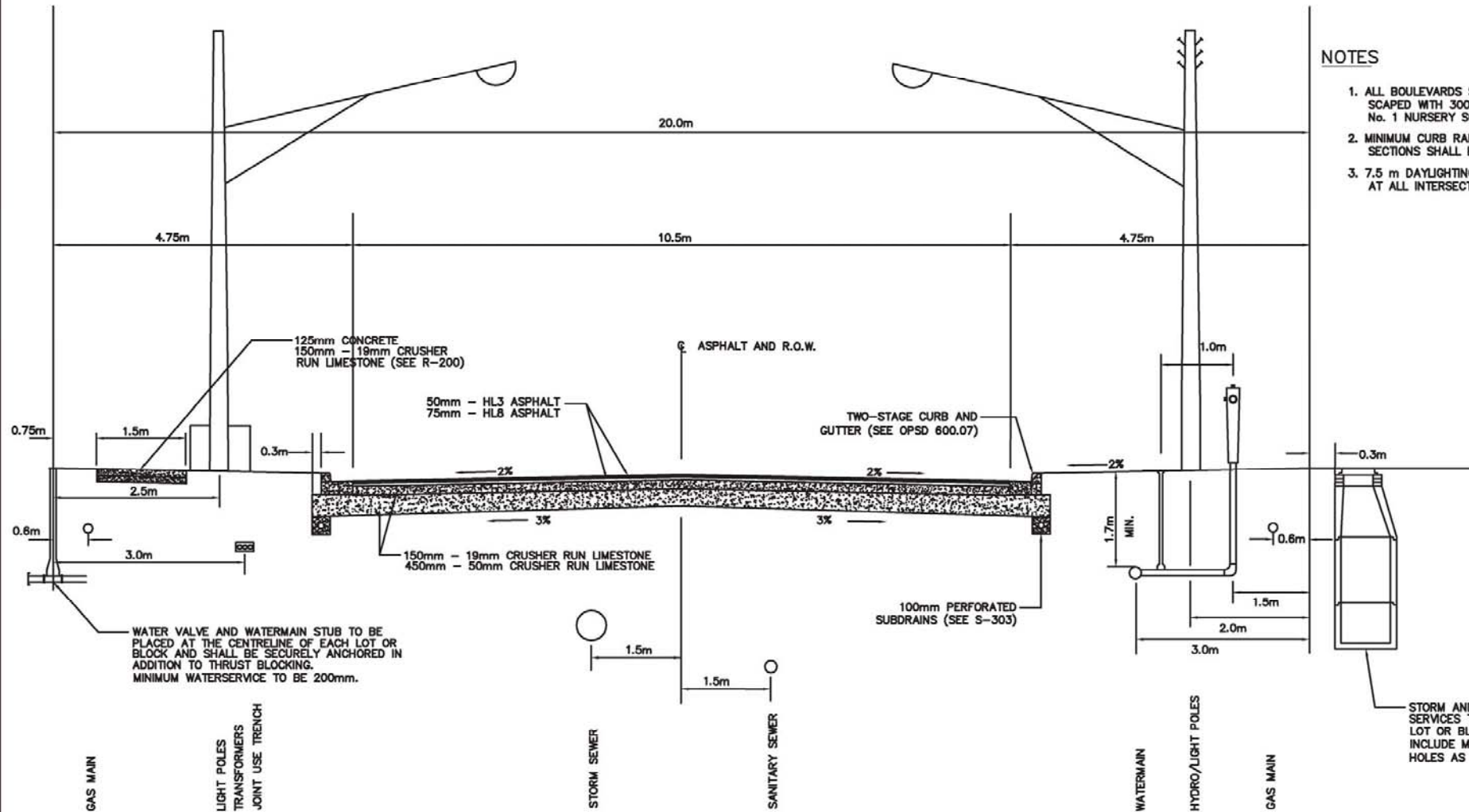
TOWN OF AURORA		APPROVED:	SCALE: N.T.S
 <i>Your to good Company</i>	TYPICAL 23m RESIDENTIAL R.O.W.		REVISION: JAN 2013
			DRAWING NO.:
			R-211

NOTES

1. ALL BOULEVARDS SHALL BE LAND-SCAPED WITH 300mm TOPSOIL AND No. 1 NURSERY SOD.
2. ALL BURIED UTILITY PLANT WITHIN THE ROAD ALLOWANCE SHALL HAVE A MINIMUM COVER OF 1.0m.



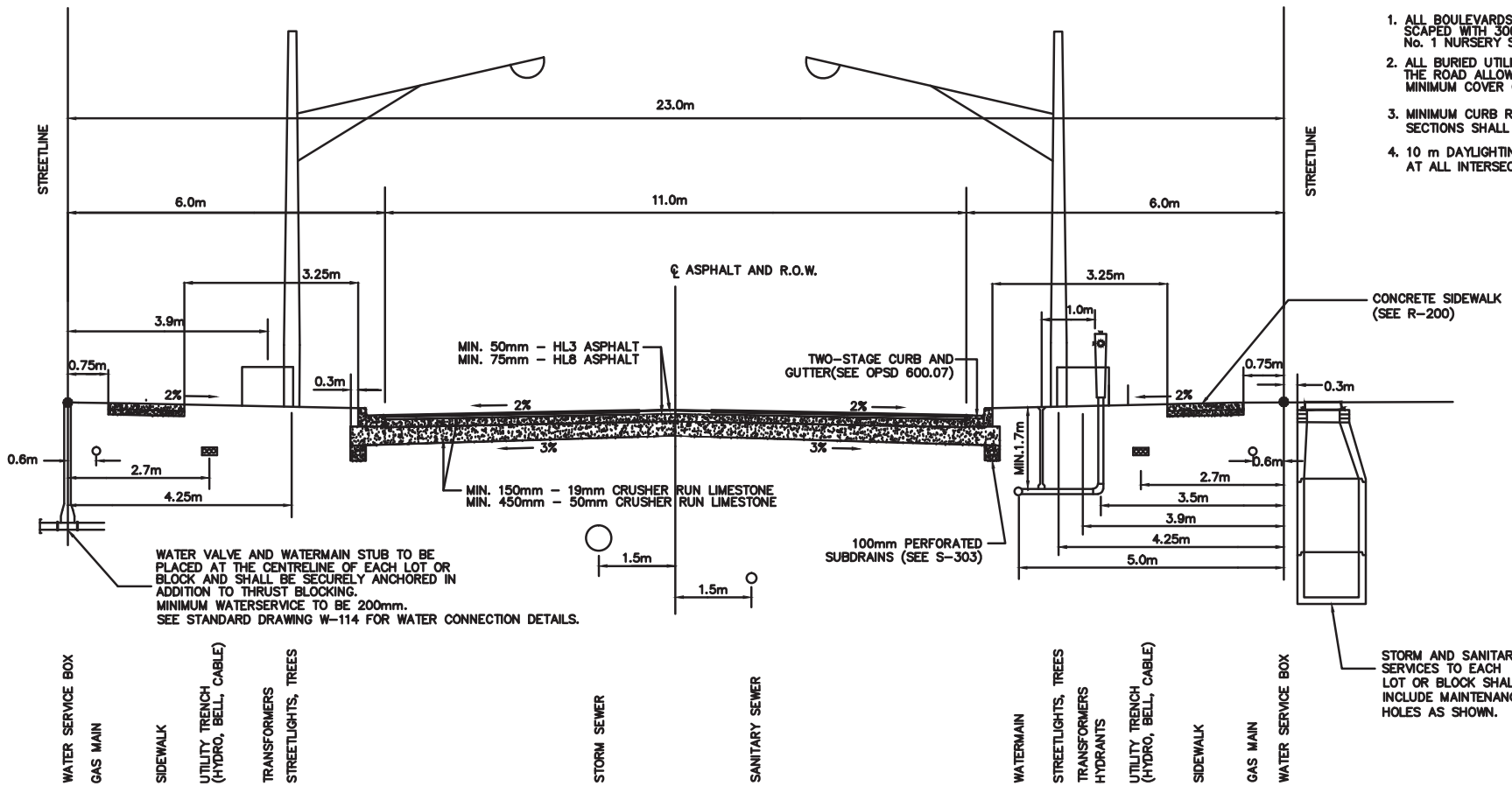
TOWN OF AURORA		APPROVED:	SCALE: N.T.S
 AURORA <i>You're in good Company</i>		TYPICAL 26m RESIDENTIAL R.O.W.	
		REVISION: JAN 2013	
		DRAWING NO.: R-212	



NOTES

1. ALL BOULEVARDS SHALL BE LANDSCAPED WITH 300mm TOPSOIL AND No. 1 NURSERY SOD.
2. MINIMUM CURB RADIUS AT INTERSECTIONS SHALL BE 12.5 m.
3. 7.5 m DAYLIGHTING SHALL BE USED AT ALL INTERSECTIONS.

<h1 style="margin: 0;">TOWN OF AURORA</h1> <p style="font-size: small; margin: 0;">You're in good company</p>		APPROVED:	SCALE: N.T.S
		<h2 style="margin: 0;">TYPICAL 20m INDUSTRIAL R.O.W.</h2>	
			DRAWING NO.: R-213



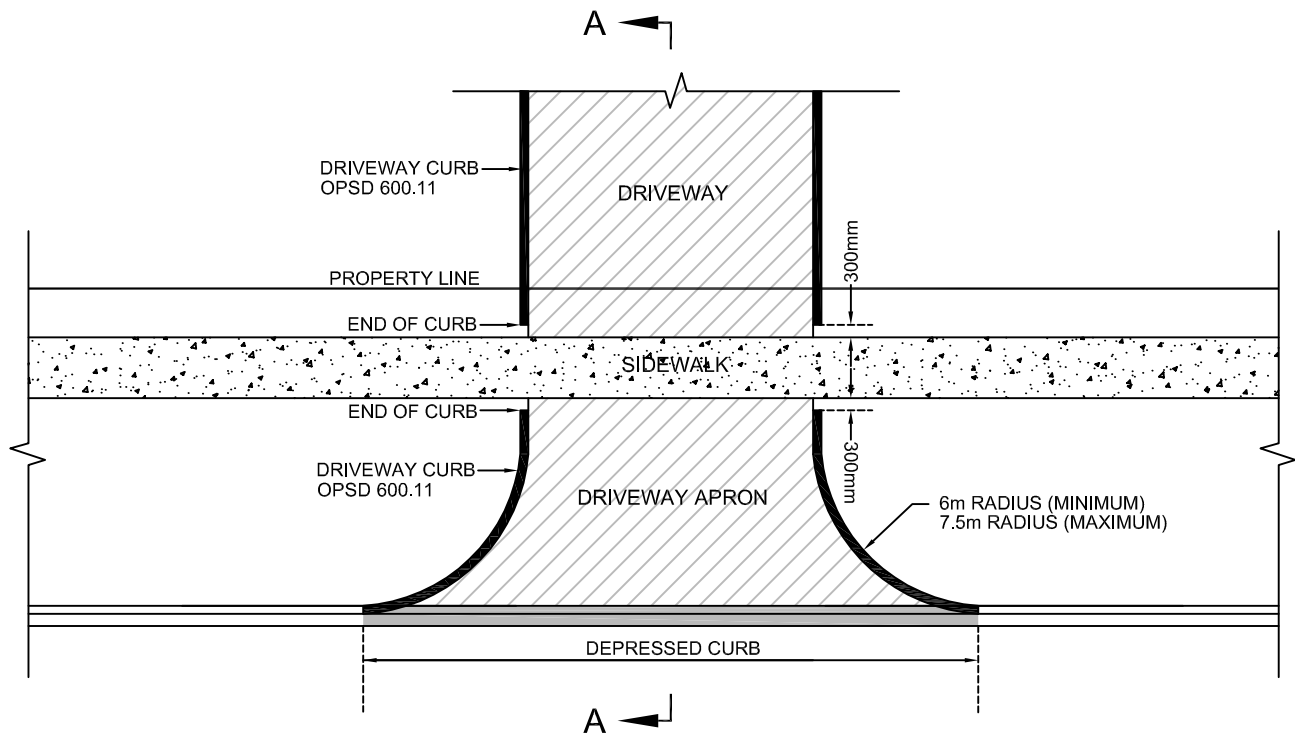
NOTES

1. ALL BOULEVARDS SHALL BE LAND-SCAPED WITH 300mm TOPSOIL AND No. 1 NURSERY SOD.
2. ALL BURIED UTILITY PLANT WITHIN THE ROAD ALLOWANCE SHALL HAVE A MINIMUM COVER OF 1.0m.
3. MINIMUM CURB RADIUS AT INTERSECTIONS SHALL BE 12.5 m.
4. 10 m DAYLIGHTING SHALL BE USED AT ALL INTERSECTIONS.

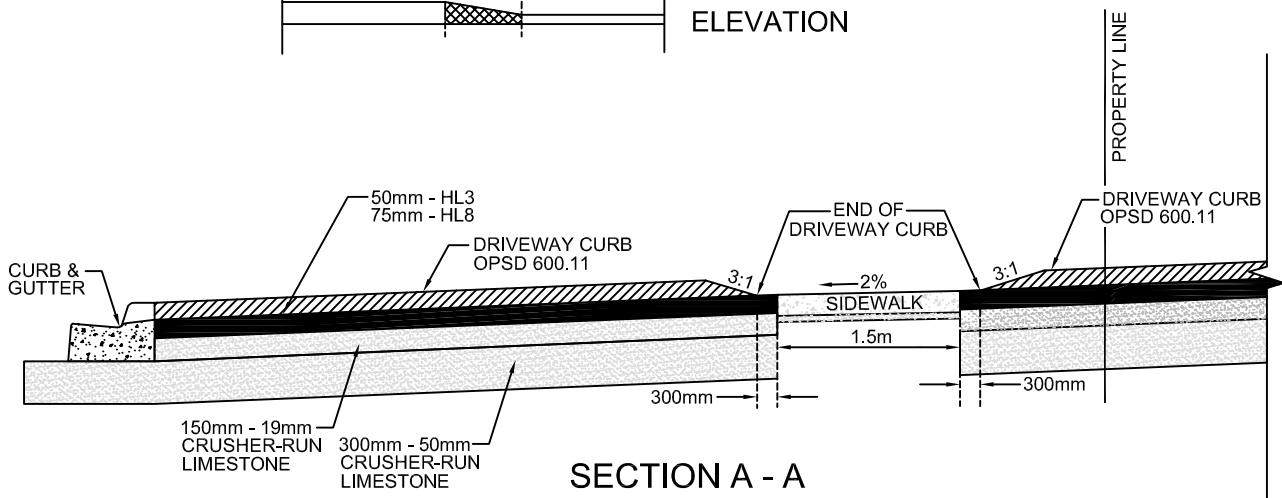
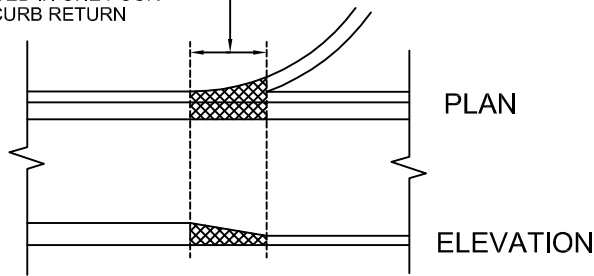
WATER VALVE AND WATERMAIN STUB TO BE PLACED AT THE CENTRELINE OF EACH LOT OR BLOCK AND SHALL BE SECURELY ANCHORED IN ADDITION TO THRUST BLOCKING. MINIMUM WATERSERVICE TO BE 200mm. SEE STANDARD DRAWING W-114 FOR WATER CONNECTION DETAILS.

STORM AND SANITARY SERVICES TO EACH LOT OR BLOCK SHALL INCLUDE MAINTENANCE HOLES AS SHOWN.

TOWN OF AURORA		APPROVED:	SCALE: N.T.S.
	TYPICAL 23m INDUSTRIAL R.O.W.		REVISION: FEB 2017
			DRAWING NO.: R-214



MIN. 1.0m OF EXISTING CURB & GUTTER TO BE REMOVED AND REPLACED IN ONE POUR TO MATCH CURB RETURN



ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

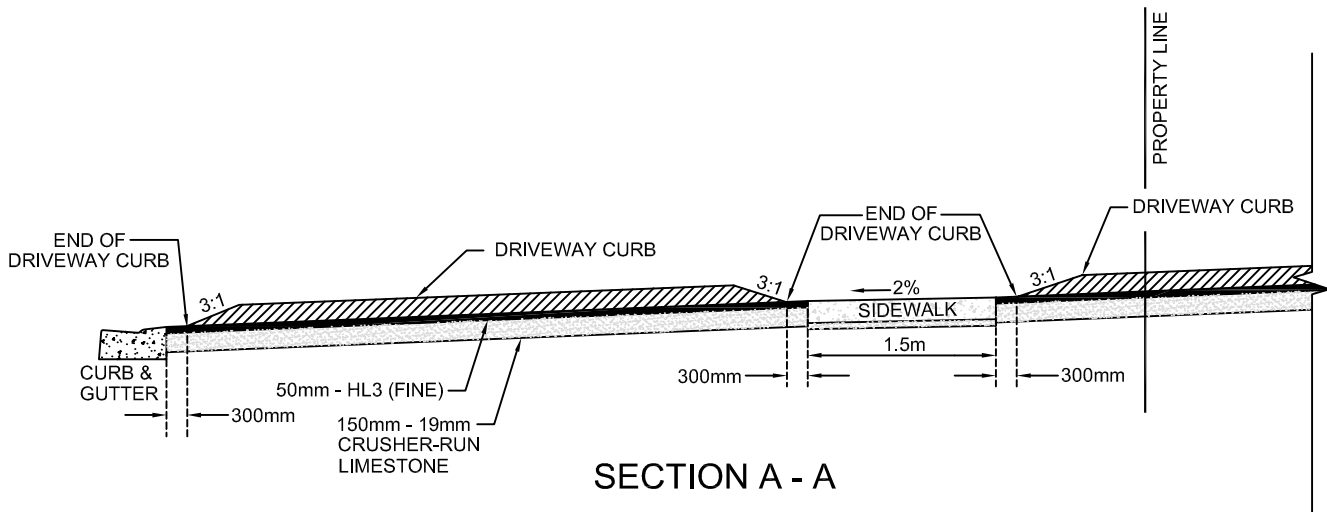
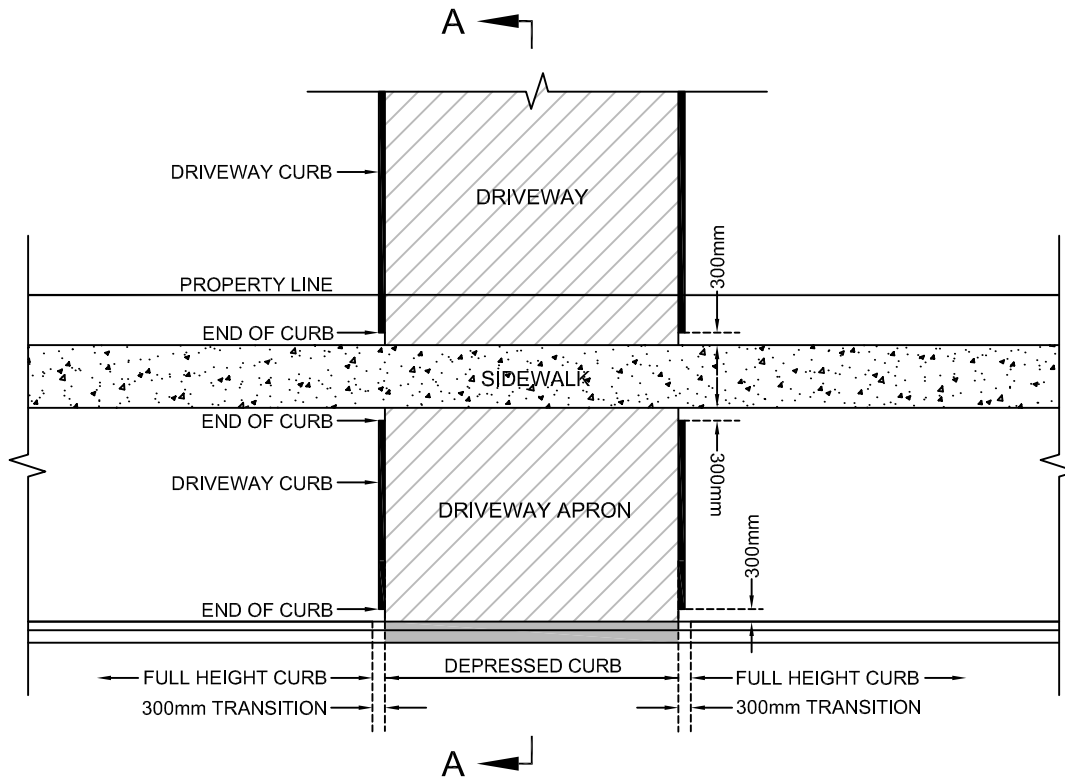
JULY 2012

DRAWING NO.:

R-215



**INDUSTRIAL, COMMERCIAL AND
MULTI-RESIDENTIAL ENTRANCES
CURB DETAIL**



ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

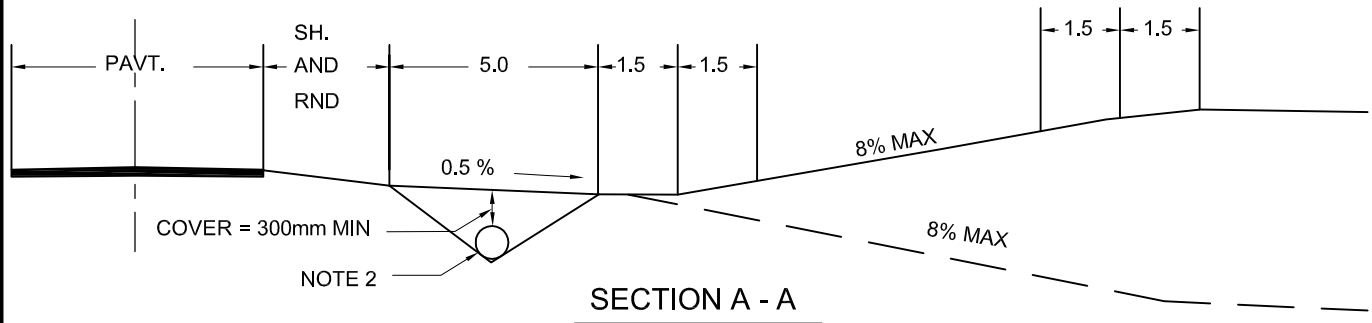
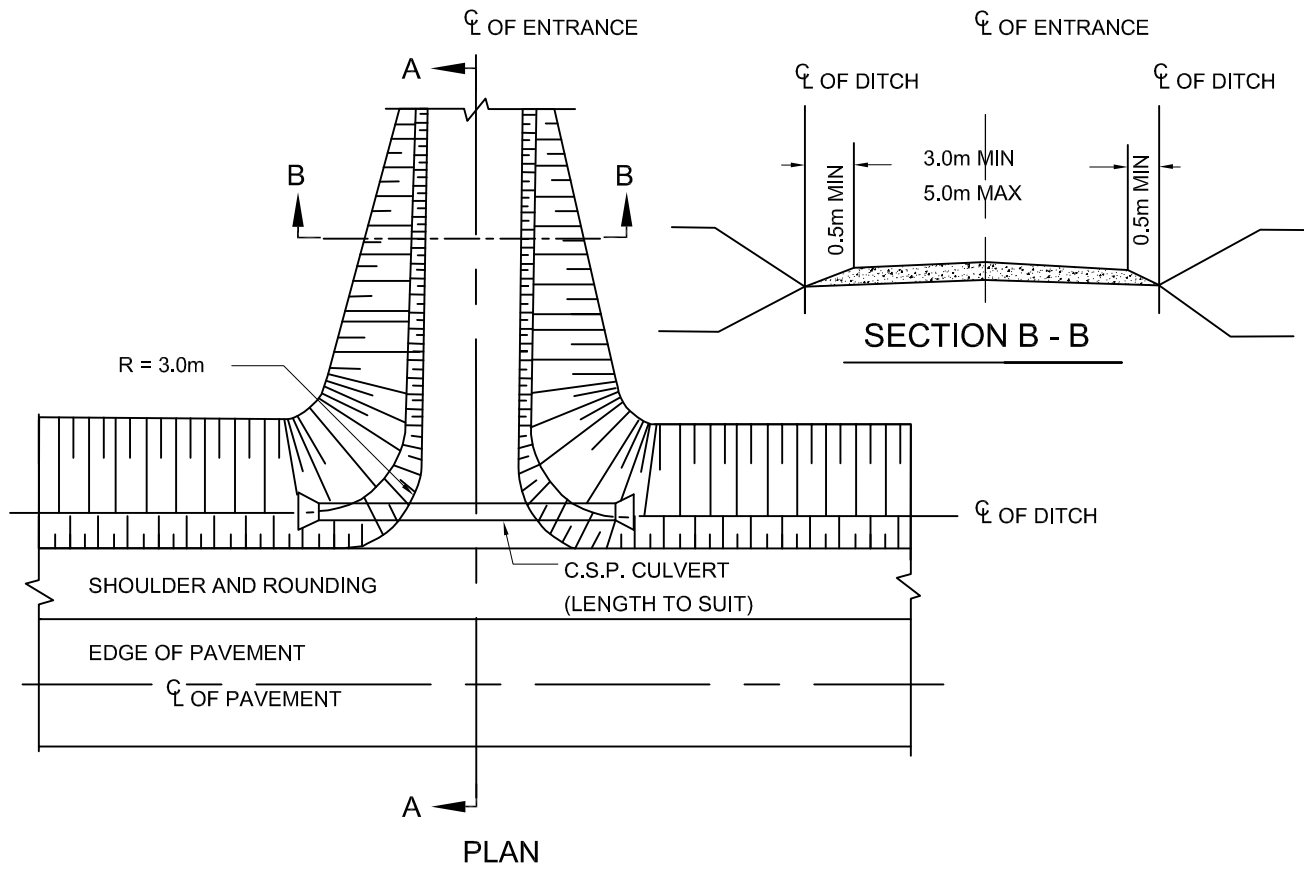
JAN 2013

DRAWING NO.:

R-216



RESIDENTIAL DRIVEWAY CURB DETAIL



NOTES:

1. MAXIMUM GRADIENT: 8 % FOR RESIDENTIAL ENTRANCE
10 % FOR FARM AND FIELD ENTRANCE
2. DRIVEWAY CULVERT TO BE CORRUGATED STEEL PIPE COMPLETE WITH MANUFACTURED END SECTIONS OR EQUIVALENT END PROTECTION
3. CULVERT TO BE 400mm MINIMUM DIAMETER AND 1.6mm MINIMUM THICKNESS.
4. DRIVEWAY TO BE CONSTRUCTED OF 150mm OF 19mm CRUSHER-RUN LIMESTONE TOPPED WITH 50mm OF COMPACTED HL3A ASPHALT (ALTERNATE SURFACE TREATMENT MUST HAVE PRIOR APPROVAL).
5. ENTRANCES IN "ESTATE LOT DEVELOPMENTS" SHALL BE PAVED FROM THE EDGE OF THE TRAVELED ROAD TO THE STREET LINE, UNLESS OTHERWISE APPROVED.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

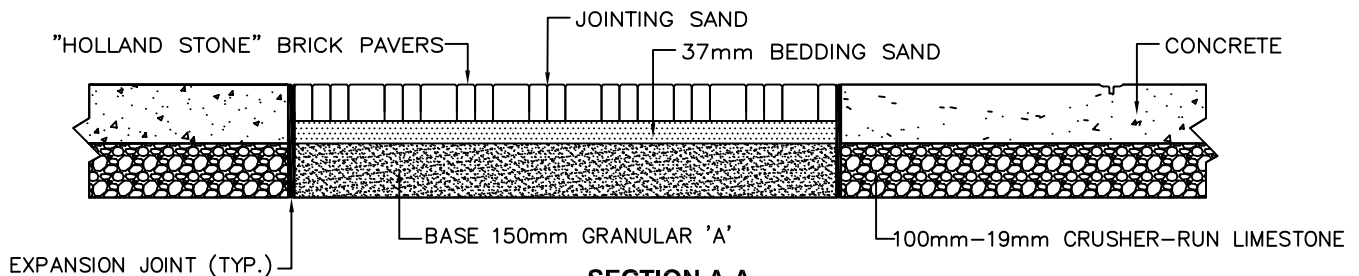
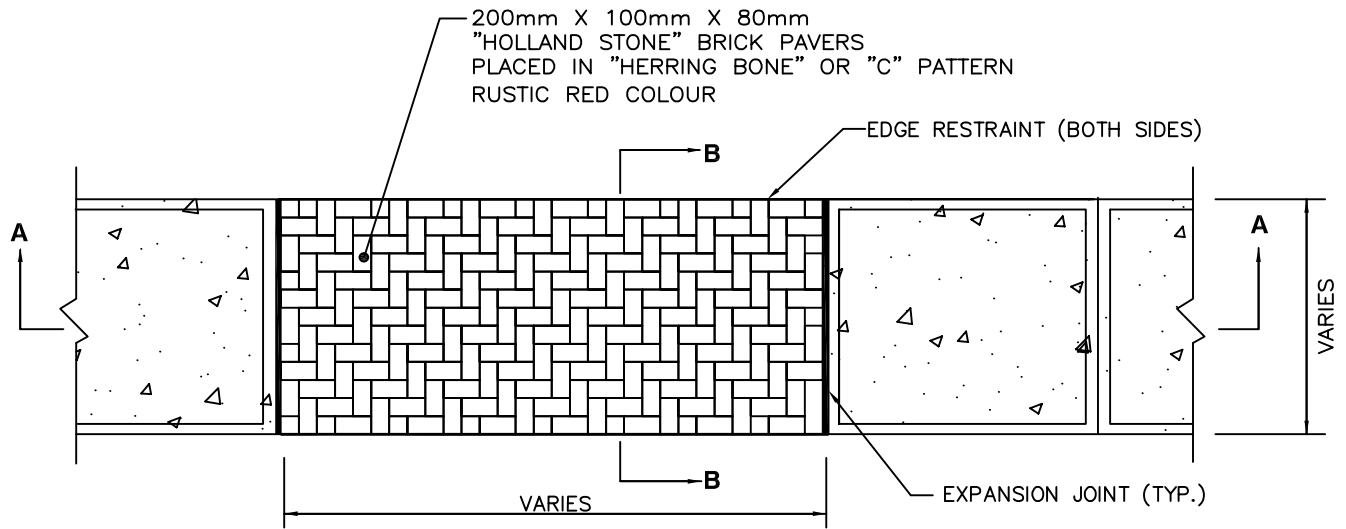
JAN 2013

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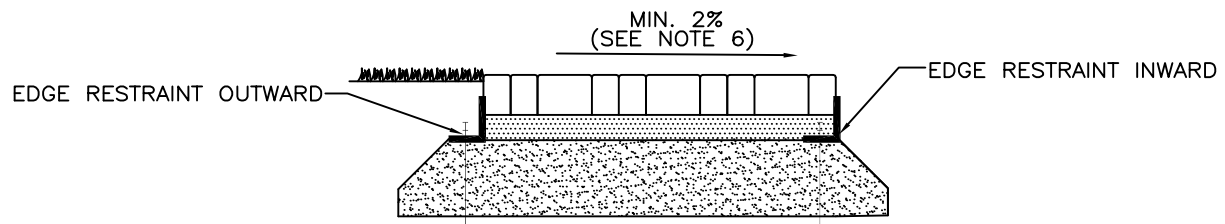
R-217



RURAL ENTRANCE



SECTION A-A



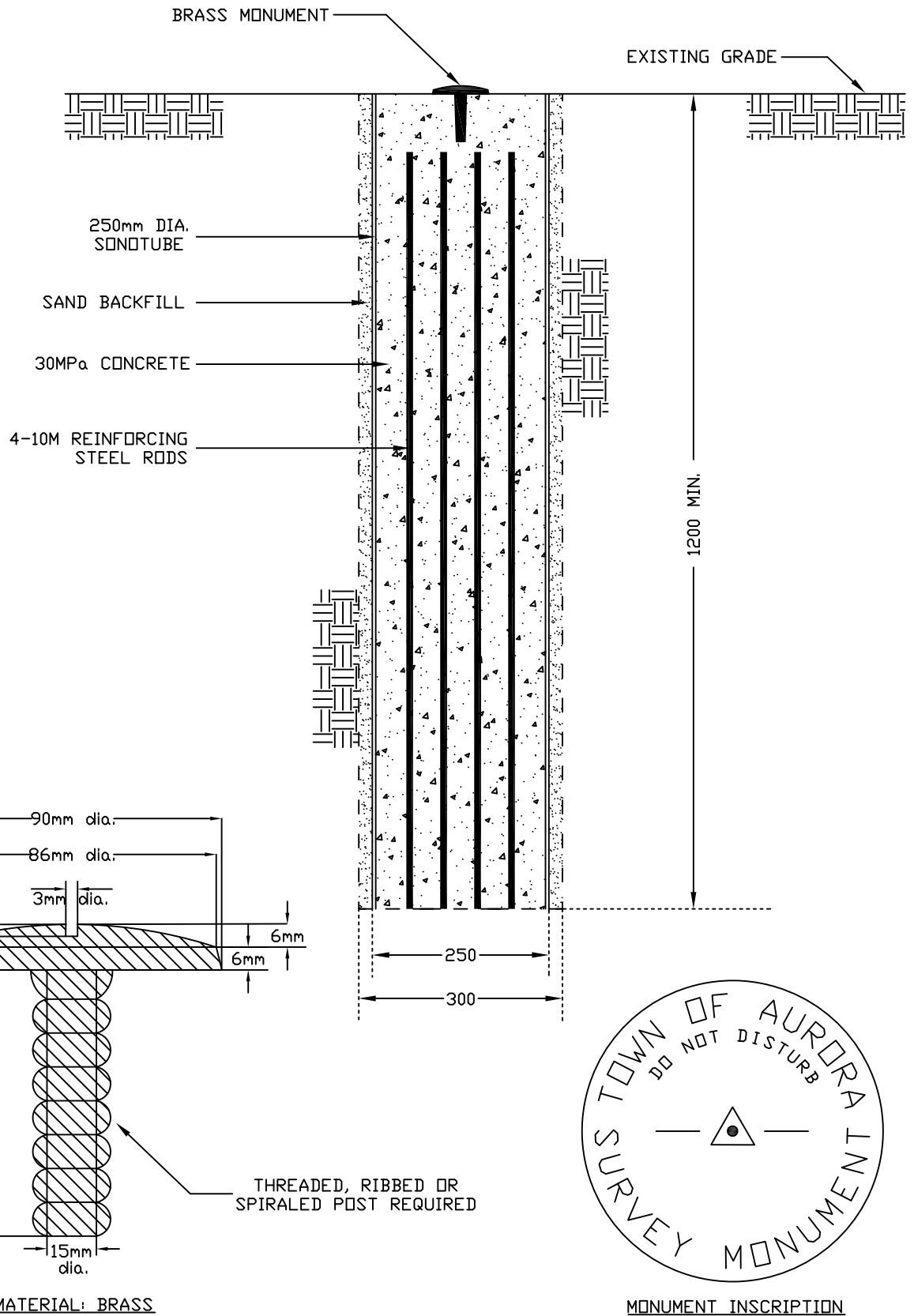
SECTION B-B

NOTES:

1. INTERLOCKING STONE TO BE; TYPE: HOLLANDSTONE, COLOUR: RUSTIC RED, THICKNESS: 80mm
2. BEDDING SAND TO BE 100% PASSING 4.75mm.
3. JOINTING SAND TO BE 100% PASSING 2.36mm SIEVE AND SHALL BE SWEEPED AND COMPACTED INTO JOINTS.
4. JOINTS SHALL NOT BE GREATER THAN 5mm.
5. EDGE RESTRAINT SHALL BE MINIMUM 50mm VERTICAL FACE FROM TOP OF GRANULAR BASE. LOCATION OF WORK SHALL DETERMINE EDGE RESTRAINT INWARD OR OUTWARD.
6. MINIMUM 2% CROSS FALL WHEREVER POSSIBLE, OTHERWISE GRADE SHALL MATCH TO EXISTING SOD, DRIVEWAY, WALKWAY, TREE ROOTS, ETC. TO MINIMIZE DISTURBANCE IN EXISTING AREAS.
7. ALL TREE ROOTS SHALL BE TRIMMED UNDER THE DIRECTION OF A CERTIFIED ARBORIST OR THE ENGINEER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

<h1>TOWN OF AURORA</h1>	APPROVED:	SCALE: N.T.S
	<h2>INTERLOCKING PAVER SIDEWALK</h2>	REVISION: FEB. 2013
		DRAWING NO.: R-218



TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

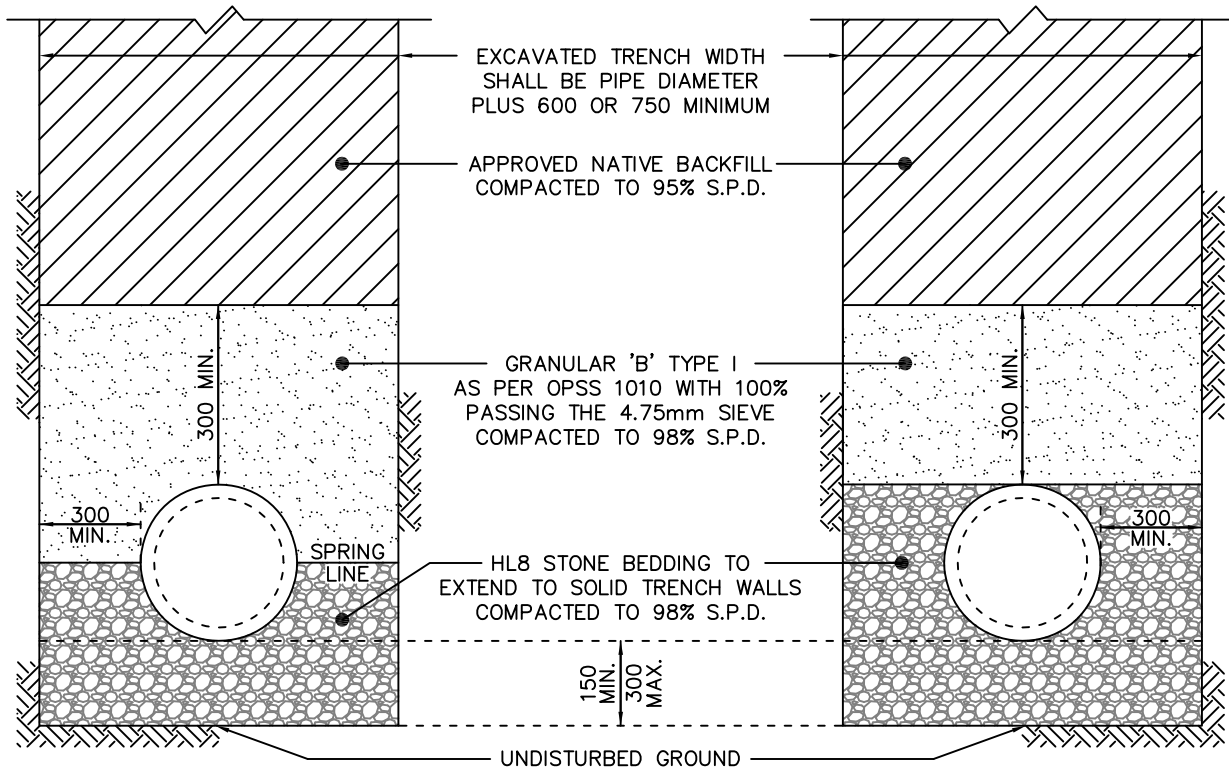
NOV 2018

DRAWING NO.:

R-219



STANDARD BENCHMARK DETAIL



RIDGID PIPE

FLEXIBLE PIPE

NOTES

1. THE BEDDING MATERIAL SHALL BE HAND-SHAPED TO LINE AND GRADE TO PROVIDE UNIFORM LONGITUDINAL SUPPORT.
2. GRANULAR MATERIAL TO BE PLACED IN TRENCH IN 200mm, LOOSE MEASUREMENT, AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. NATIVE MATERIAL SUITABLE FOR BACKFILL TO BE PLACED IN TRENCH IN 300mm LAYERS, LOOSE MEASUREMENT, AND COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. IN CASE OF OVER-EXCAVATION, THE OVER EXCAVATED AREA TO BE FILLED WITH APPROVED MATERIAL IN 200mm LAYERS, LOOSE MEASUREMENT, AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
5. BLOCKING SHALL NOT BE USED TO BRING PIPE TO GRADE.
6. IN POOR SOIL CONDITIONS, THE GEOTECHNICAL ENGINEER MAY VARY PIPE FOUNDATION TO SUIT.
7. GRANULAR MATERIAL AS PER LATEST OPS SPECIFICATIONS.
8. MINIMUM TRENCH WIDTH TO BE O.D. PLUS 600mm. MAXIMUM TRENCH WIDTH TO BE O.D. PLUS 750mm.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

APR. 2014

DRAWING NO.:

S-300



SEWER BEDDING AND BACKFILL DETAIL

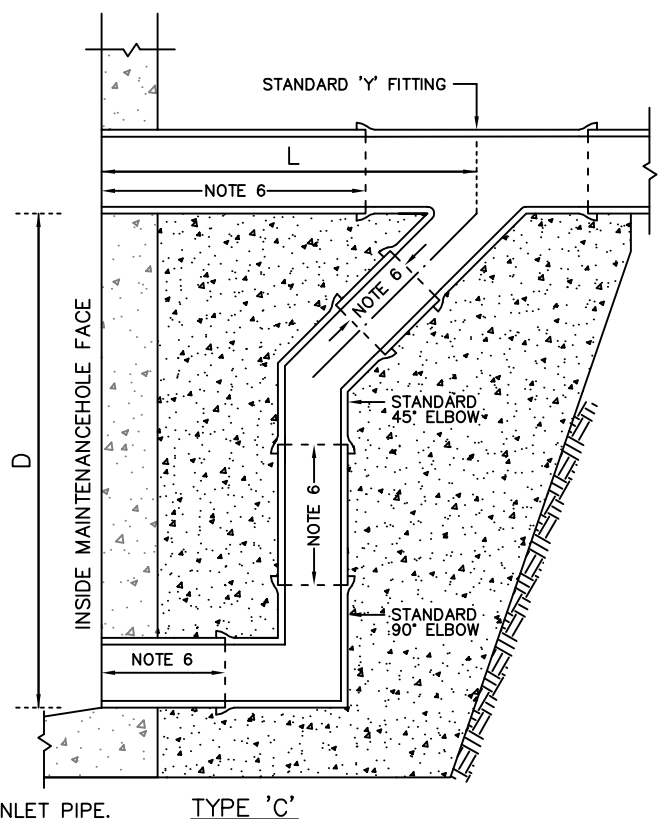
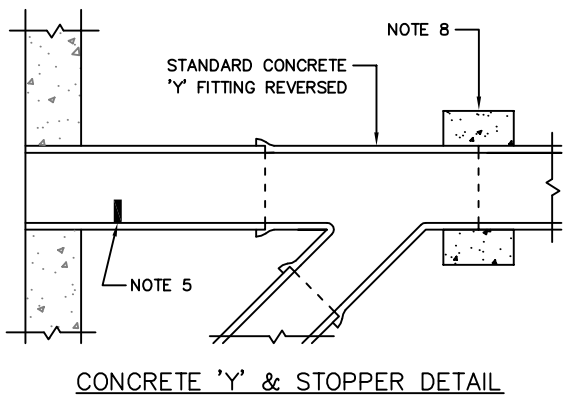
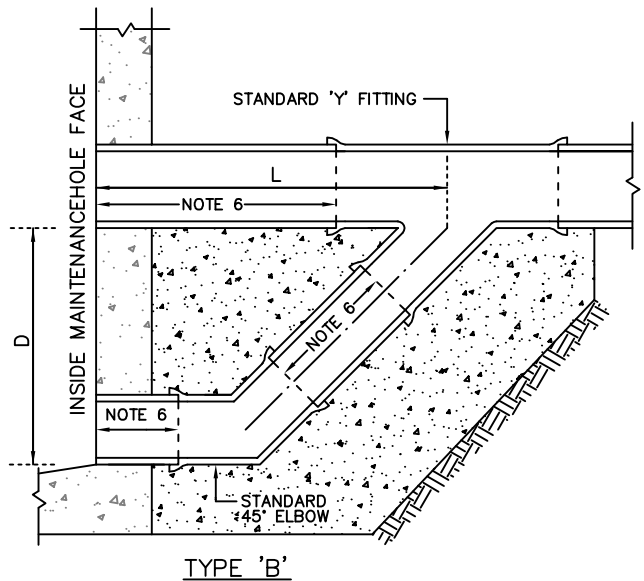
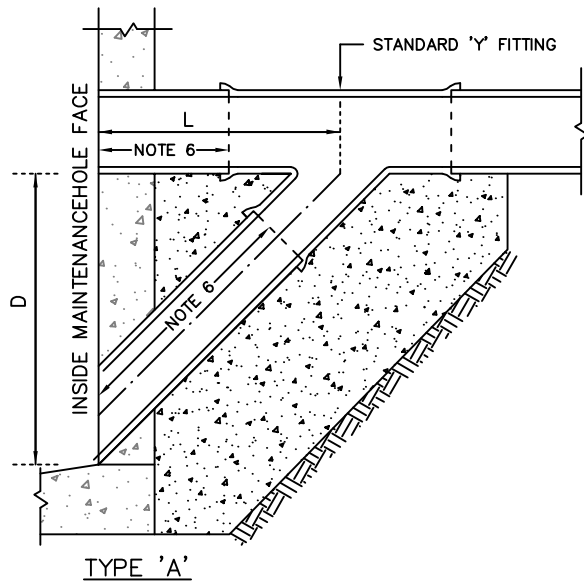


TABLE OF MINIMUM DIMENSIONS

DROP PIPE (mm)	TYPE 'A'		TYPE 'B'		TYPE 'C'	
	'D'	'L'	'D'	'L'	'D'	'L'
200	915	815	610	760	1220	1070
250	1015	840	645	815	1300	1070
300	1090	865	710	915	1450	1145
375	1170	915	915	1145	1905	1220
450	1300	990	990	1220	2060	1300
525	1425	1045	1065	1300	2210	1450
600	1525	1090	1145	1370	2440	1525
675	1625	1145	1220	1450	2515	1600
750	1730	1220	1300	1525	2670	1675

NOTES

1. DROP PIPE TO BE MINIMUM OF ONE SIZE SMALLER THAN INLET PIPE.
2. DROP PIPE TO BE CROWN LEVEL WITH OULET PIPE.
3. DROP PIPE TO BLEND WITH FLOW AND BENCHED TO CROWN.
4. DROPSTRUCTURE TO BE ENCASED WITH A MINIMUM OF 150mm OF 20MPa CONCRETE.
5. FOR SEWERS 375mm AND LARGER, A 15mm STOPPER SHALL BE INSERTED IN THE INVERT OF THE MAIN LINE BETWEEN THE DROP STRUCTURE AND MAINTENANCEHOLE.
6. ADJUSTMENT TO 'D' & 'L' TO BE MADE WITH PLAIN END STRAIGHT PIPE.
7. MINIMUM DIMENSIONS BASED ON USE OF STANDARD FITTINGS.
8. CONCRETE 'Y' FITTINGS SHALL BE JOINED TO UPSTREAM MAIN WITH A 300mmX150mm THICK 20MPa CONCRETE COLLAR.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

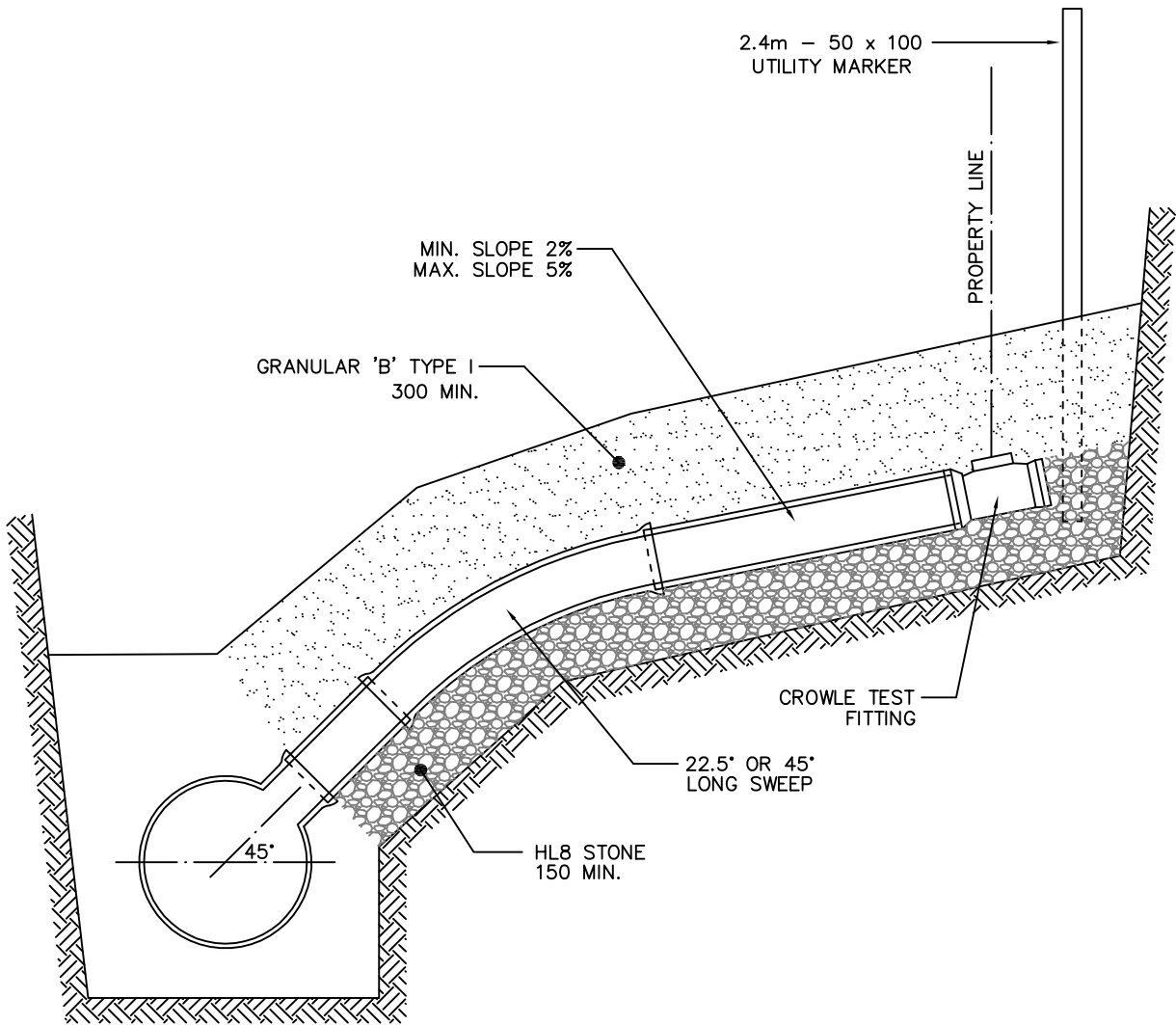
MAR. 2009

DRAWING NO.:

S-301



TYPICAL DROP STRUCTURES FOR STANDARD MAINTENANCE HOLES



NOTES

1. CONNECTIONS SHALL BE MADE WITH PREFABRICATED TEES FOR NEW SEWERS AND CAST IRON SADDLES FOR EXISTING SEWERS.
2. MINIMUM SERVICE CONNECTION SIZES:
125mm D.R.28 FOR SANITARY CONNECTIONS.
150mm D.R. 28 FOR STORM CONNECTIONS.
3. SERVICE CONNECTIONS SHALL BE SECURELY PLUGGED AT PROPERTY LINE WITH AN EXPANDING TYPE PLUG.
4. ALL TEST FITTINGS SHALL BE MARKED 'STORM' OR 'SANITARY'.
5. BEDDING AND BACKFILL SHALL BE IN ACCORDANCE WITH DRAWING S-300.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

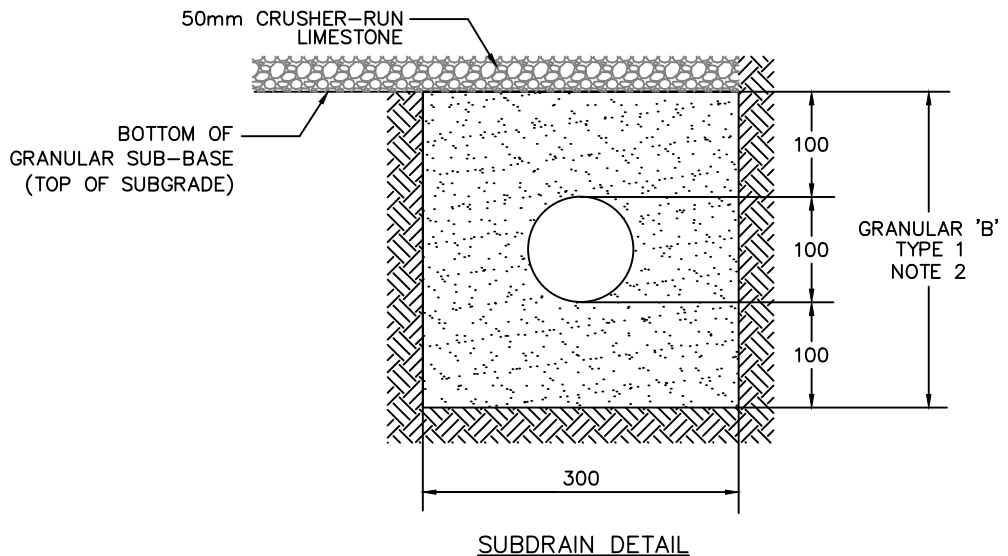
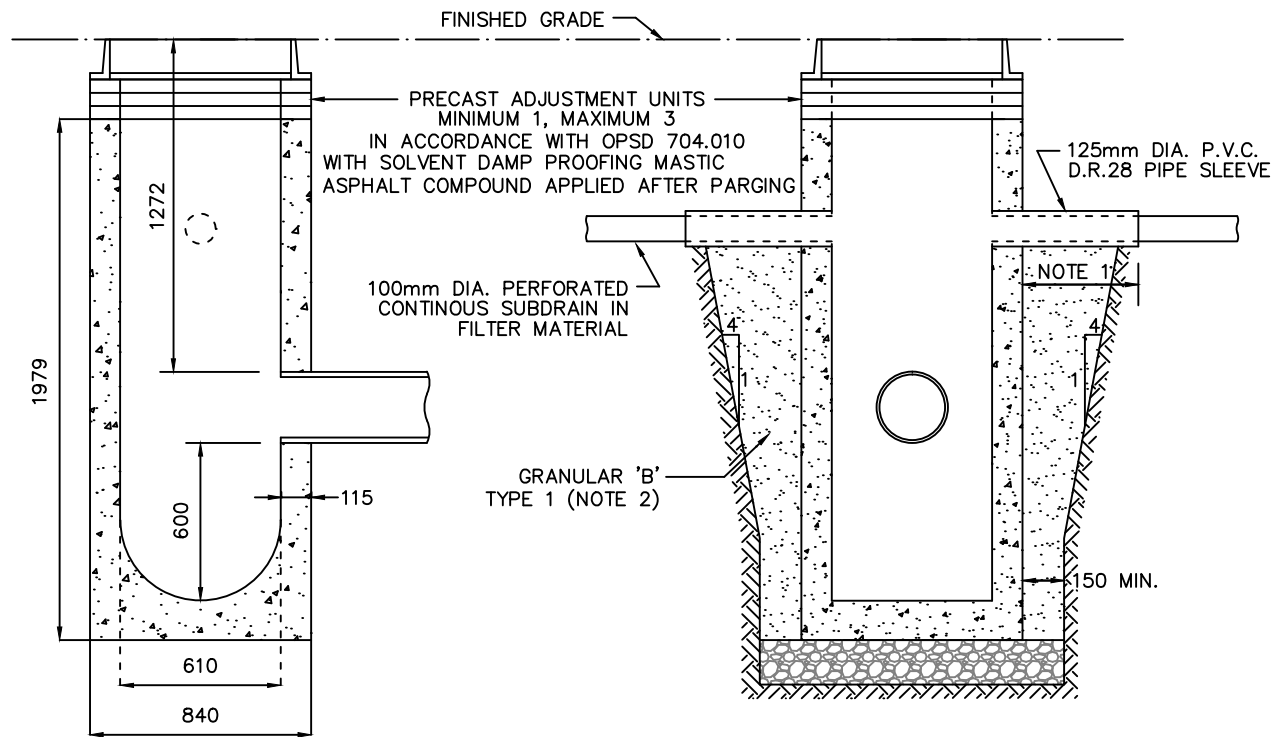
MAY 2009

DRAWING NO.:

S-302



SEWER SERVICE CONNECTION DETAIL



NOTES

1. P.V.C. PIPE SLEEVE SHALL EXTEND BEYOND THE FROST TAPERS.
2. GRANULAR 'B' TYPE 1 AS PER OPSS 1010 WITH 100% PASSING THE 4.25mm SIEVE.
3. SUBDRAIN INVERT SHALL BE ABOVE THE OVERTOP OF THE CATCHBASIN LEAD.
4. TOP OF SUBDRAIN SHALL BE 100mm BELOW THE BOTTOM OF THE GRANULAR SUB-BASE (TOP OF SUBGRADE).

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

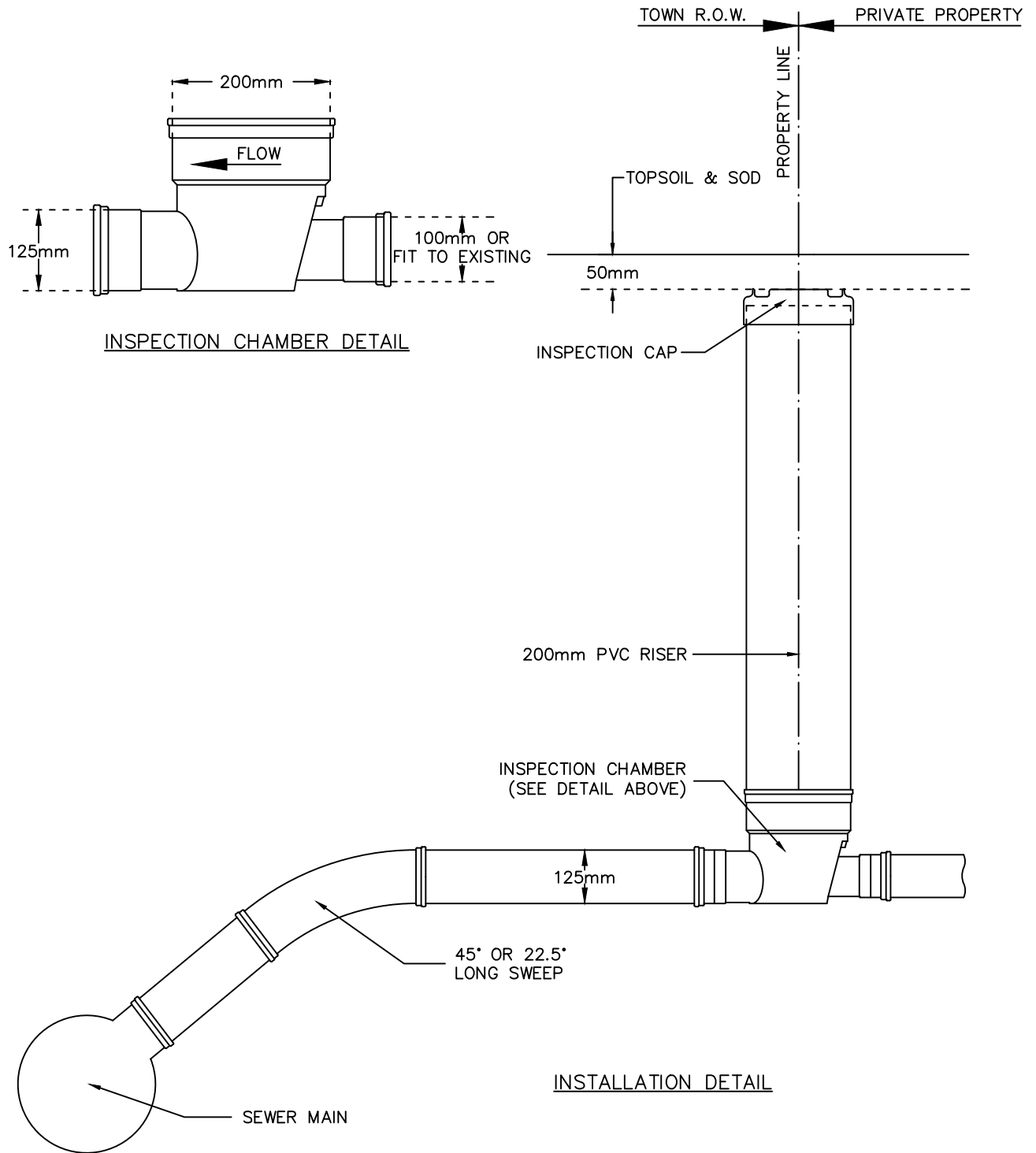
OCT 2018

DRAWING NO.:

S-303




CATCHBASIN AND SUBDRAIN DETAIL

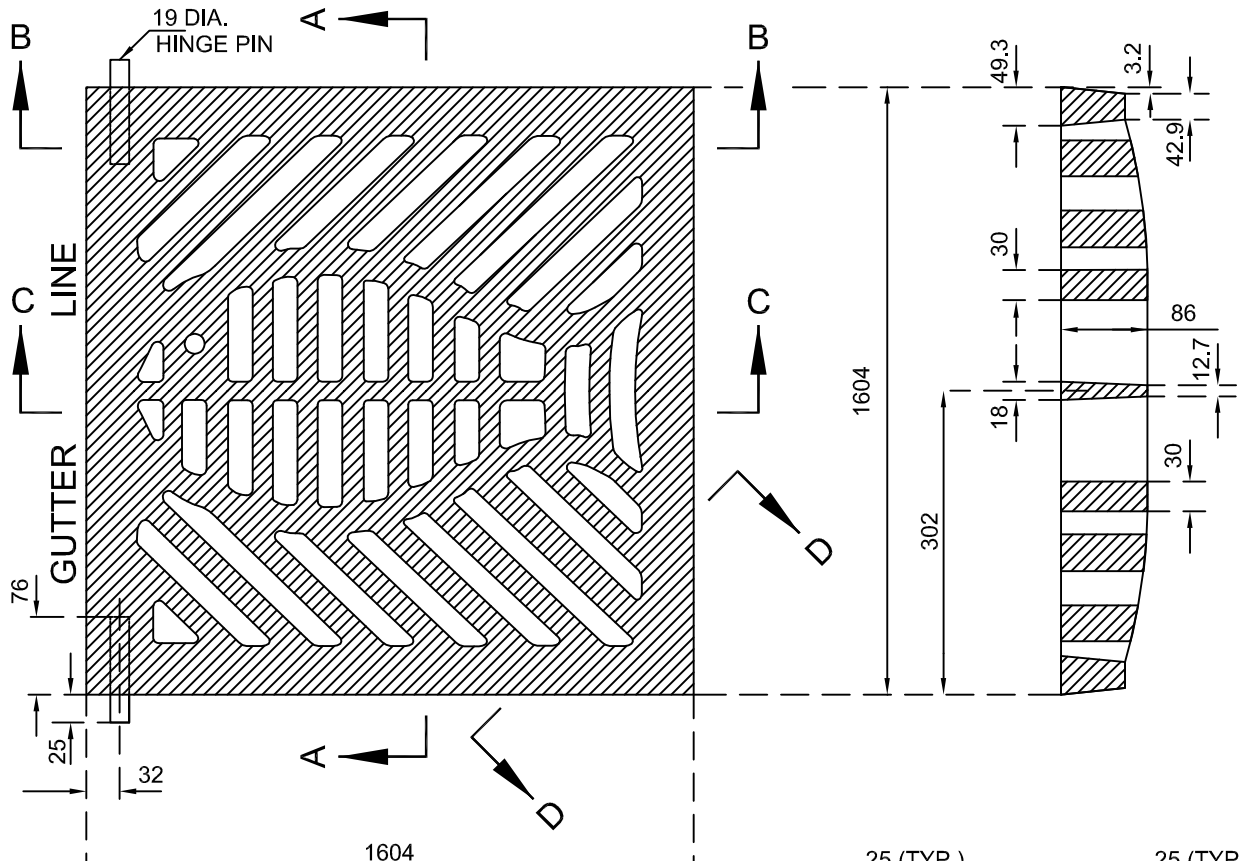


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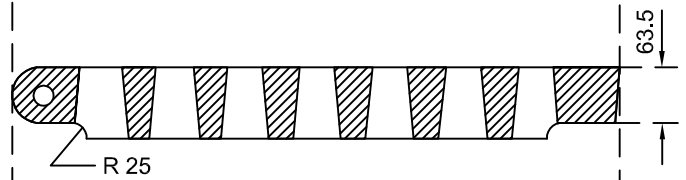
1. SANITARY SEWER SERVICE SHALL BE INSTALLED IN ACCORDANCE WITH DRAWING S-302.
2. BEDDING AND BACKFILL SHALL BE IN ACCORDANCE WITH DRAWING S-300.
3. A MINIMUM OF TWO HORIZONTAL SWING TIES SHALL BE MADE AND RECORDED PRIOR TO COVERING THE INSPECTION CAP.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

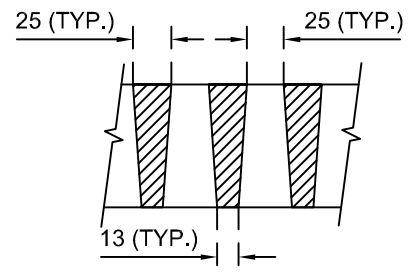
<h1>TOWN OF AURORA</h1>	APPROVED:	SCALE: N.T.S
	<h2>SANITARY SERVICE INSPECTION CHAMBER</h2>	REVISION: SEPT 2019
		DRAWING NO.: S-304



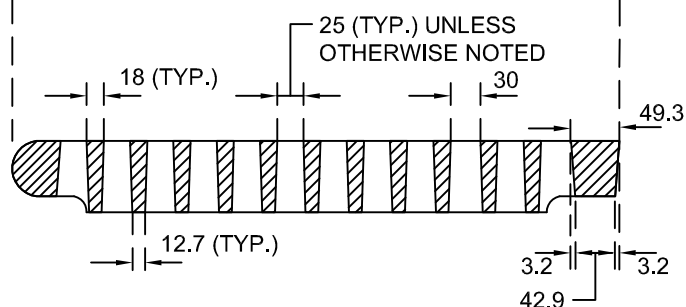
SECTION A-A



SECTION B-B



SECTION D-D



SECTION C-C

NOTES

1. GRATES SHALL BE HINGE-TYPE.
2. FRAMES SHALL BE OPSD 400.02.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

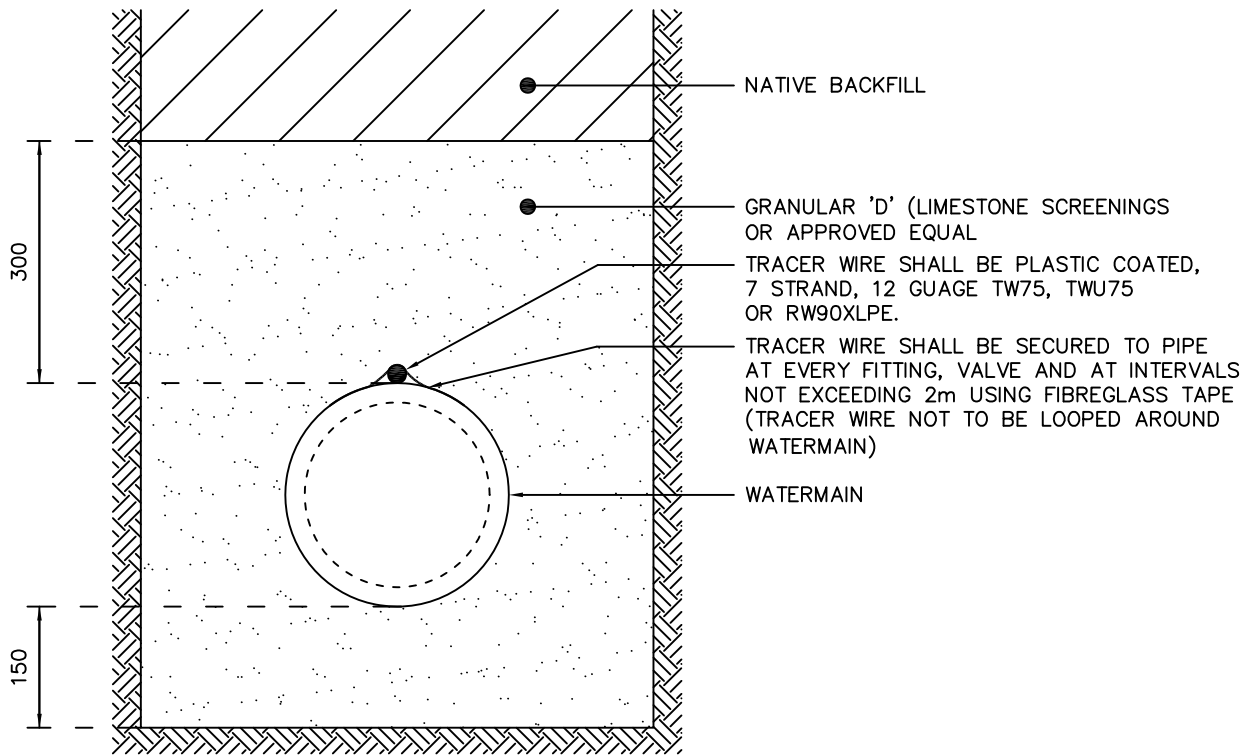
FEB. 2013

DRAWING NO.:

S-305



**FISH PATTERN
CATCHBASIN GRATE**

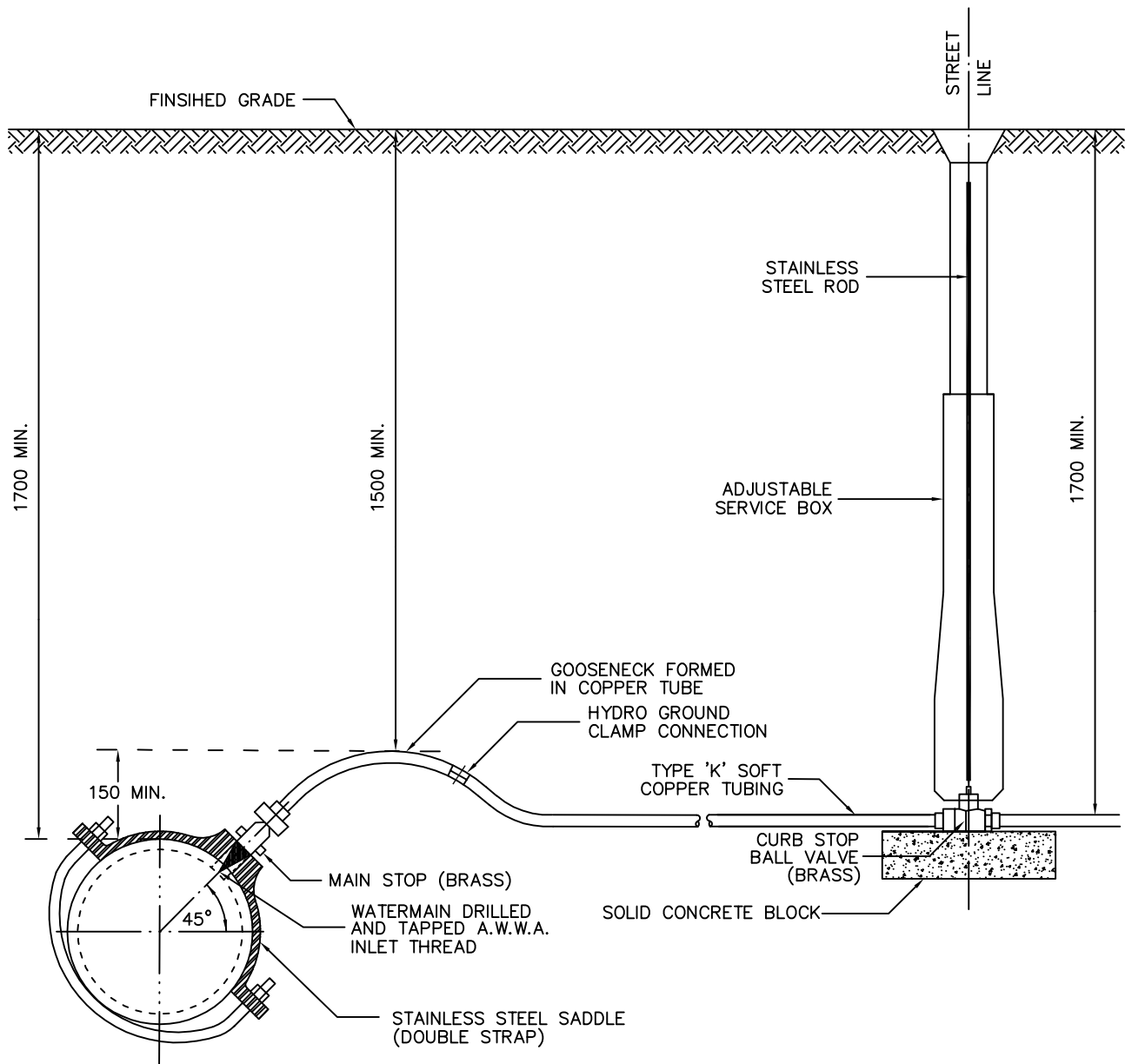


NOTES

1. THE BEDDING MATERIAL SHALL BE HAND-SHAPED TO LINE AND GRADE TO PROVIDE UNIFORM LONGITUDINAL SUPPORT.
2. MATERIAL TO BE PLACED IN TRENCH IN 200mm, LOOSE MEASUREMENT, LAYERS AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. IN CASE OF OVER-EXCAVATION, THE OVER EXCAVATED AREA TO BE FILLED WITH APPROVED MATERIAL IN 200mm, LOOSE MEASUREMENT, LIFTS AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. BLOCKING SHALL NOT BE USED TO BRING PIPE TO GRADE.
5. IN POOR SOIL CONDITIONS, THE GEOTECHNICAL ENGINEER MAY VARY PIPE FOUNDATION TO SUIT.
6. GRANULAR MATERIAL AS PER LATEST OPS SPECIFICATIONS.
7. MINIMUM TRENCH WIDTH TO BE O.D. PLUS 600mm. MAXIMUM TRENCH WIDTH TO BE O.D. PLUS 750mm.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

<h1 style="margin: 0;">TOWN OF AURORA</h1>	APPROVED:	SCALE: N.T.S
	<h2 style="margin: 0;">WATERMAIN AND WATER SERVICE BEDDING DETAIL</h2>	REVISION: APR. 2014
		DRAWING NO.: W-100



NOTES

1. MINIMUM DISTANCE BETWEEN MAINSTOPS ALONG WATERMAIN IS 1.0m
2. ALL WATER SERVICES TO BE INSTALLED AT 90 DEGREES TO THE WATERMAIN UNLESS OTHERWISE APPROVED.
3. DRY TAPPING IS PROHIBITED.
4. COPPER TUBING SHALL BE PROTECTED WITH A No. 6 PACKAGED ANODE.
5. A HYDRO GROUND CLAMP SHALL BE USED TO CONNECT THE ANODE TO THE COPER TUBING.
6. ANY JUNCTION MADE BETWEEN MAIN STOP AND CURB STOP SHALL BE MADE WITH APPROVED COUPLINGS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

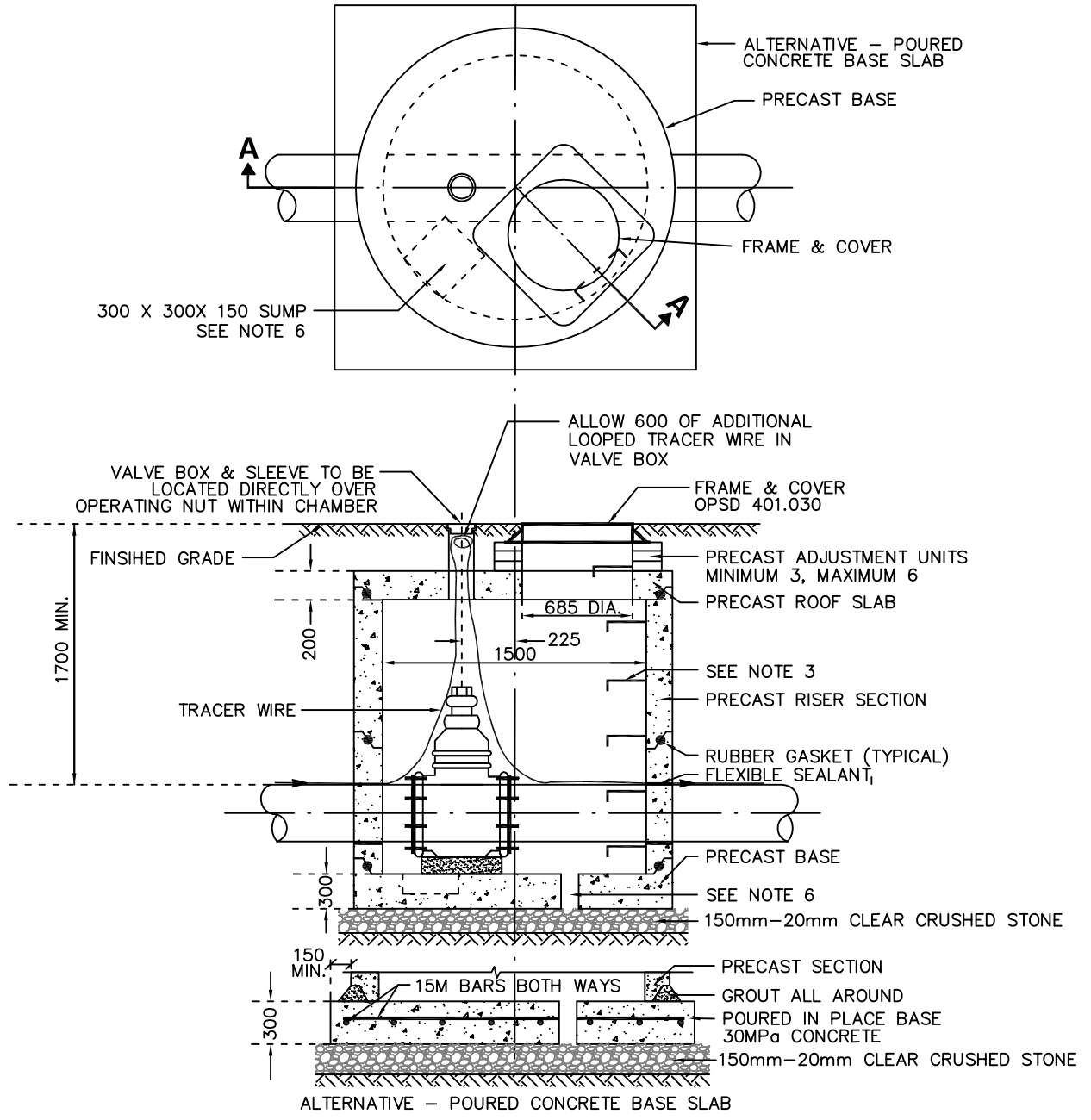
JAN. 2009



**STANDARD WATER SERVICE CONNECTION
19mm AND 25mm DIAMETERS**

DRAWING NO.:

W-101



SECTION A-A

NOTES

1. PRECAST SECTIONS TO BE MANUFACTURED TO A.S.T.M. C-478 SPECIFICATIONS.
2. FILL ALL JOINTS & LIFT HOLES WITH 1:3 NON-SHRINK MORTAR MIX BEFORE BACKFILLING.
3. ALUMINIUM STEPS AS PER O.P.S.D. 405.01 AT 300mm C.C. FIRST STEP TO BE 75mm BELOW FRAME.
4. PRECAST ADJUSTMENT UNITS SHALL BE EXTERNALLY PARGED ALL AROUND.
5. VALVES & FITTINGS IN CHAMBERS SHALL BE PROTECTED FROM CORROSION BY PROTECTO CAPS ON EVERY BOLT.
6. ALL CHAMBERS SHALL BE BUILT TO CONTAIN A POSITIVE DRAINAGE SYSTEM, CONNECTING INTO THE STORM SEWER WITH A BACK-FLOW PRVENTOR. WHERE A STORM SEWER CONNECTION IS NOT POSSIBLE, THE CHAMBER SHALL INCLUDE A 300 X 300 X 150 SUMP.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

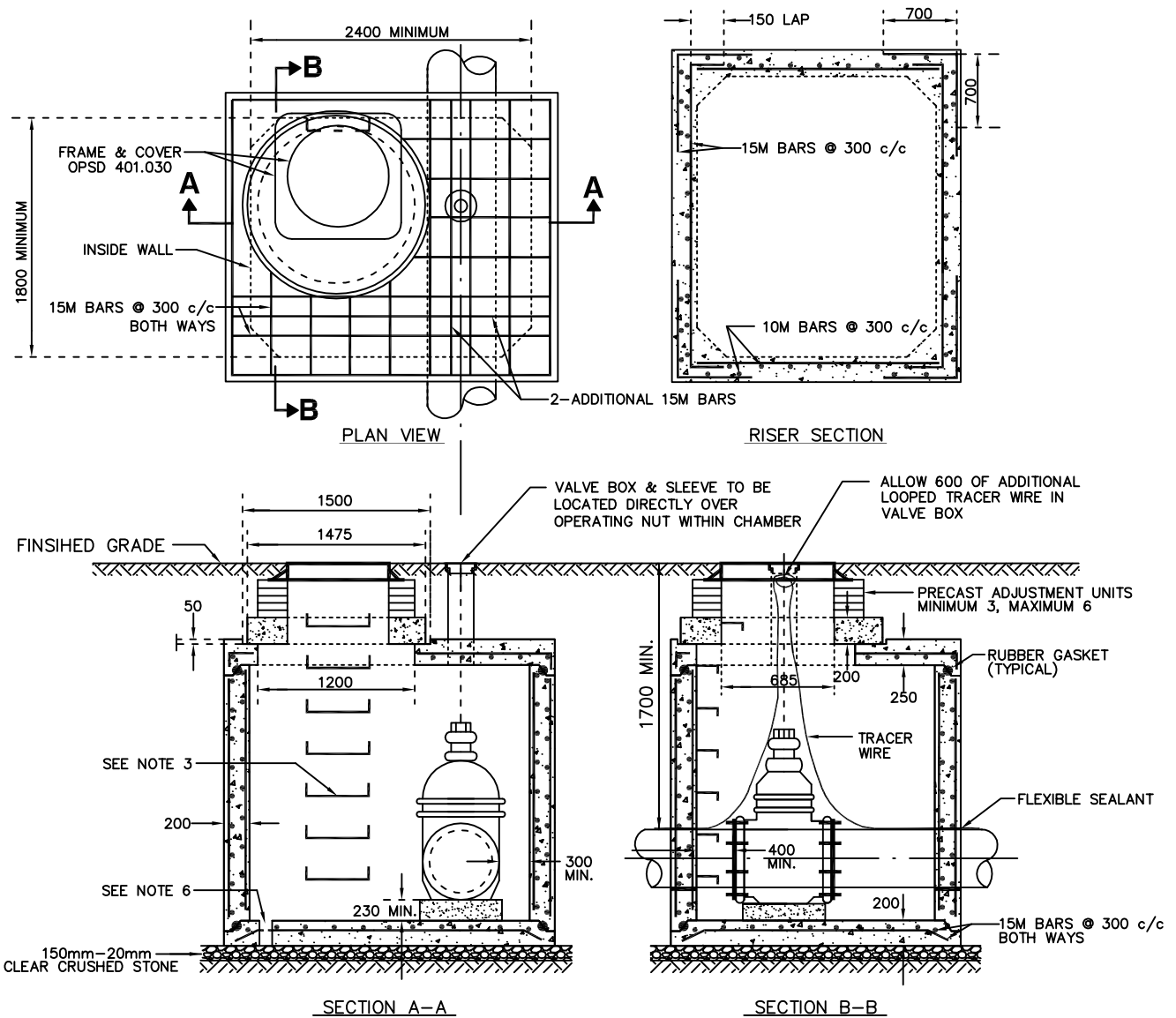
SCALE:
N.T.S

REVISION:
JAN. 2009



**CIRCULAR PRECAST VALVE CHAMBER
FOR 300mm WATERMAINS**

DRAWING NO.:
W-102



NOTES

1. CONCRETE STRENGTH TO BE 30 MPa. MINIMUM COVER TO REINFORCING STEEL TO BE 50mm.
2. REINFORCING STEEL IS TYPICAL ONLY. ACTUAL REINFORCEMENT AS PER SITE SPECIFIC REQUIREMENTS AND AS PER DESIGNER'S REQUIREMENTS.
3. ALUMINIUM STEPS AS PER O.P.S.D. 405.01 AT 300mm C.C FIRST STEP TO BE 75mm BELOW FRAME.
4. PRECAST ADJUSTMENT UNITS SHALL BE EXTERNALLY PARGED ALL AROUND.
5. VALVES & FITTINGS IN CHAMBERS SHALL BE PROTECTED FROM CORROSION BY PROTECTO CAPS ON EVERY BOLT.
6. ALL CHAMBERS SHALL BE BUILT TO CONTAIN A POSITIVE DRAINAGE SYSTEM, CONNECTING INTO THE STORM SEWER WITH A BACK-FLOW PRVENTOR. WHERE A STORM SEWER COMMECTION IS NOT POSSIBLE, THE CHAMBER SHALL INCLUDE A 300 X 300 X 150 SUMP.
7. POLYETHELENE BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS.
8. VALVE CHAMBER TO BE SIZED TO MAINTAIN MINIMUM DISTANCES FROM INSIDE WALL TO VALVE FLANGES.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

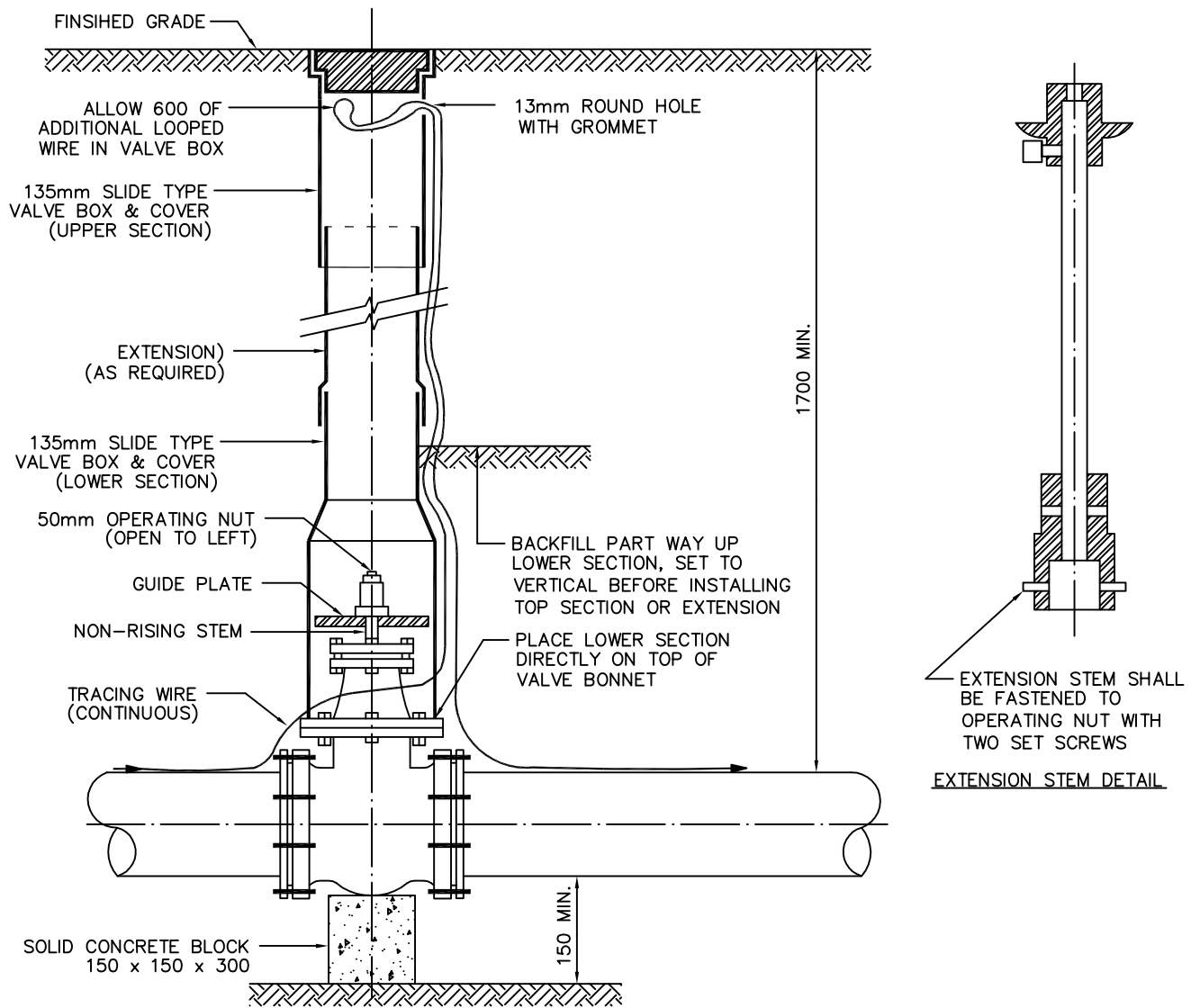
JAN. 2009

DRAWING NO.:

W-103



**PRECAST VALVE CHAMBER
FOR 350mm AND LARGER WATERMANS**



NOTES

1. VALVE BE AND VALVE STEM EXTENSIONS SHALL ONLY BE USED IF REQUIRED.
2. WHEN THE DEPTH OF THE OPERATING NUT IS GREATER THAN 2.0m BELOW GRADE, AN EXTENSION STEM AND BOX SHALL BE USED
3. TRACER WIRE SHALL BE PLASTIC COATED, 7 STRAND, 12 GAUGE TW75, TWU75 OR RW90XLPE.
4. FOR CORROSION PROTECTION, ONE NUMBER 6 PACKAGED ANODE SHALL BE USED.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

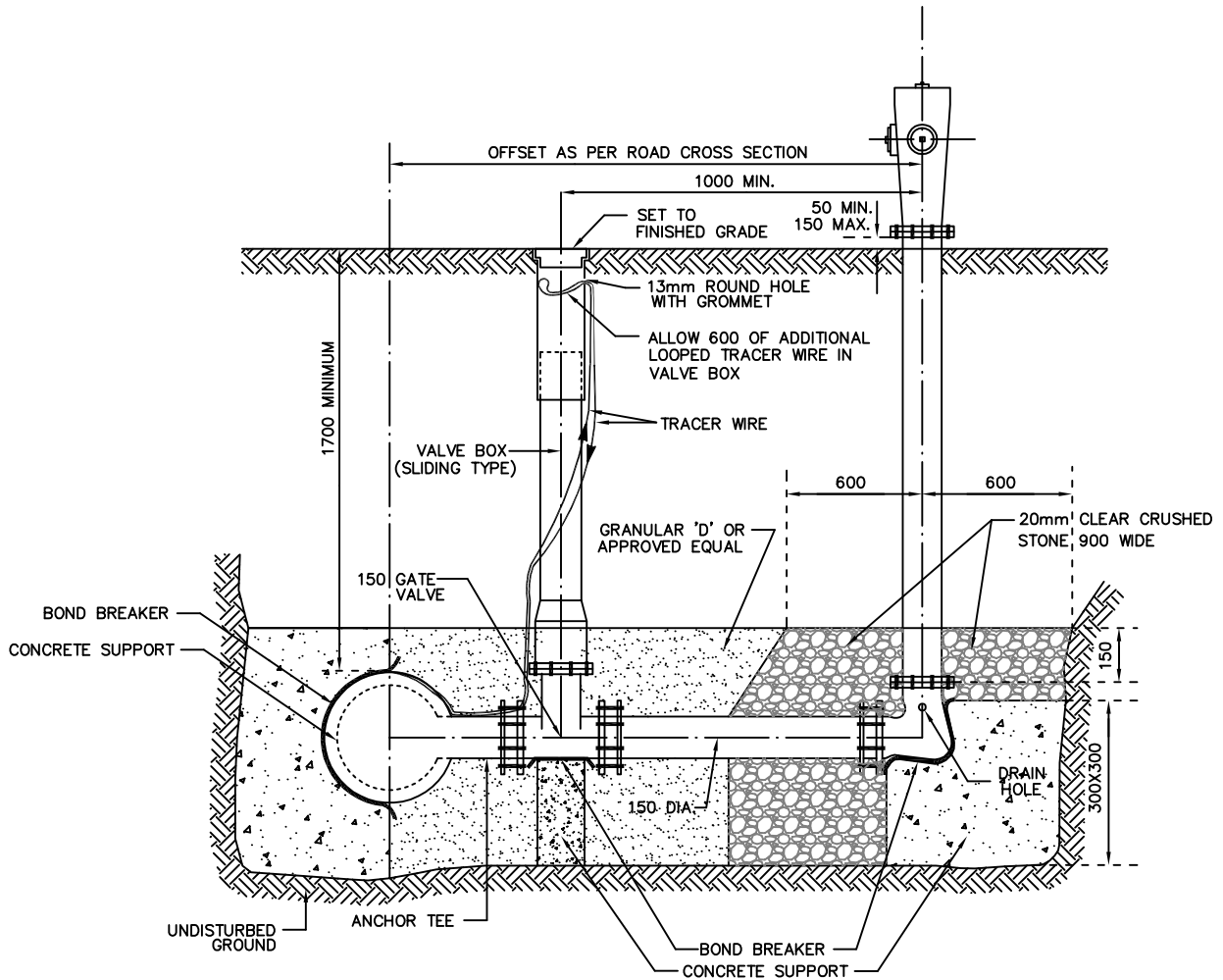
JAN. 2009

DRAWING NO.:

W-104



**VALVE AND BOX INSTALLATION FOR
150mm, 200mm AND 250mm WATERMAINS**



NOTES

1. ALL CONCRETE TO BE 20 MPa. MINIMUM.
2. ALL CONCRETE BLOCKING TO BE POURED AGAINST UNDISTURBED TRENCH WALL.
3. POLYETHELENE BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS.
4. STEEL TIE ROD AND/OR JOINT RESTRAINER GLANDS SHALL BE USED WHEN ANCHOR TEE IS NOT PRACTICAL.
5. ONE NUMBER 6 PACKAGED ANODE SHALL BE USED ON EACH MECHANICAL FITTING FOR CORROSION PROTECTION.
6. DRAIN HOLES SHALL BE PLUGGED IN AREAS OF HIGH GROUND WATER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

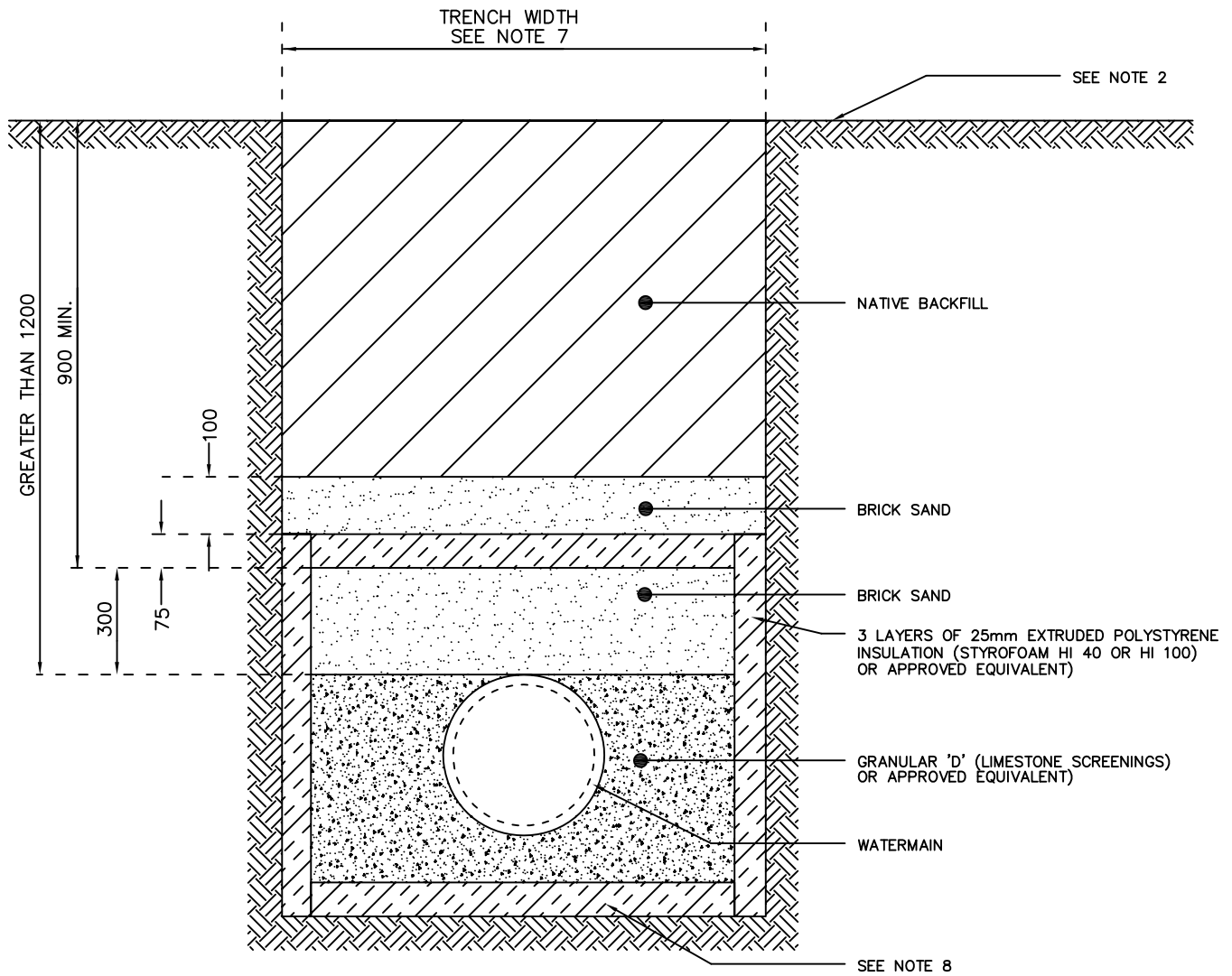
JAN. 2009

DRAWING NO.:

W-105



HYDRANT AND VALVE INSTALLATION



NOTES

1. THE BEDDING MATERIAL SHALL BE HAND-SHAPED TO LINE AND GRADE TO PROVIDE UNIFORM LONGITUDINAL SUPPORT. UNIFORM LONGITUDINAL SUPPORT.
2. MATERIAL TO BE PLACED IN TRENCH IN 200mm, LOOSE MEASUREMENT, LAYERS AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
3. IN CASE OF OVER-EXCAVATION, THE OVER EXCAVATED AREA TO BE FILLED WITH APPROVED MATERIAL IN 200mm, LOOSE MEASUREMENT, LAYERS AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. BLOCKING SHALL NOT BE USED TO BRING PIPE TO GRADE.
5. IN POOR SOIL CONDITIONS, THE GEOTECHNICAL ENGINEER MAY VARY PIPE FOUNDATION TO SUIT.
6. GRANULAR MATERIAL AS PER LATEST OPS SPECIFICATIONS.
7. MINIMUM TRENCH WIDTH TO BE O.D. PLUS 600mm. MAXIMUM TRENCH WIDTH TO BE O.D. PLUS 750mm.
8. INSULATION SHALL BE REQUIRED IN THE BOTTOM OF THE TRENCH WHEN CROSSING CULVERTS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

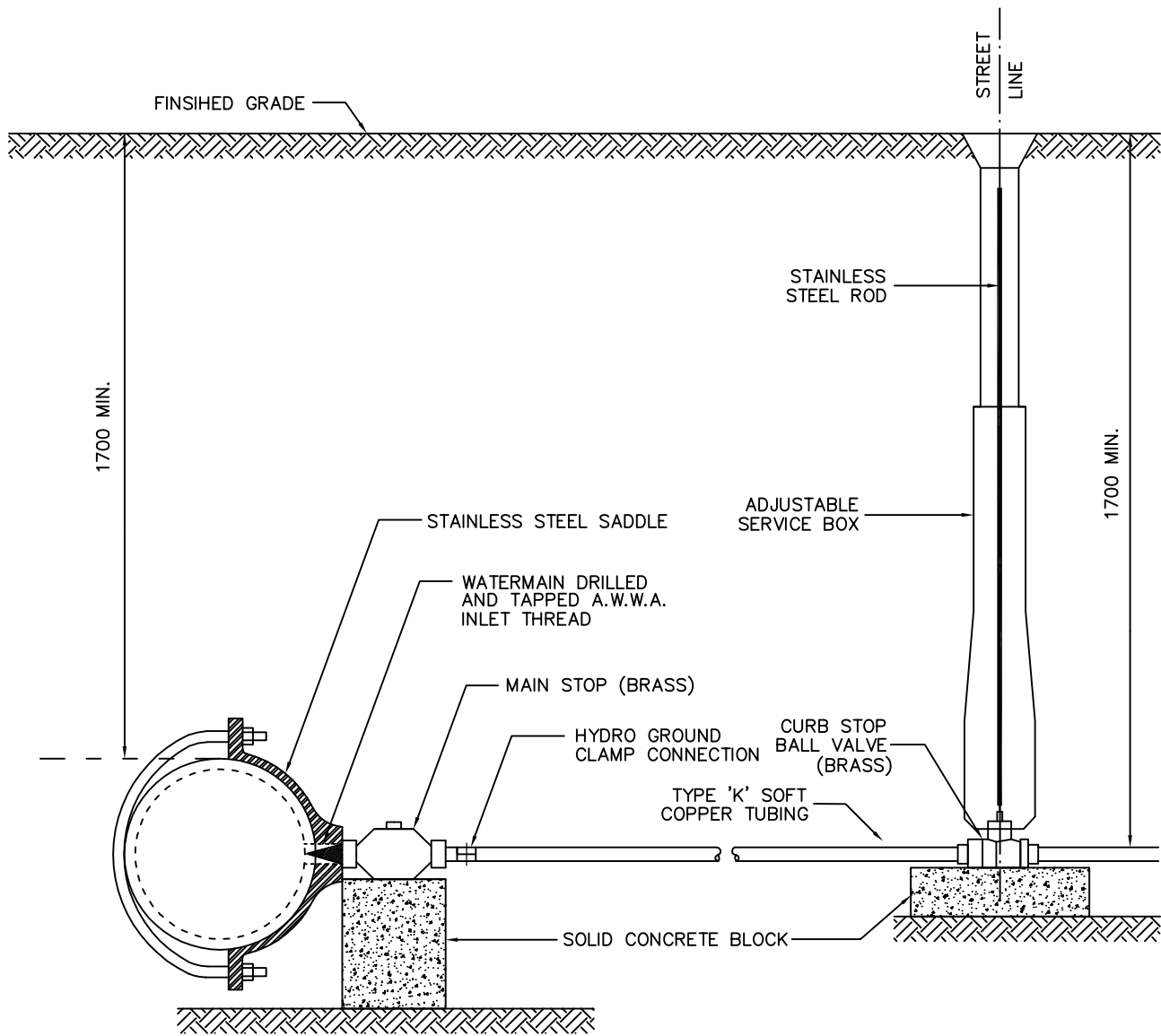
APR. 2014

DRAWING NO.:

W-106



**WATERMAIN AND WATER SERVICE
INSULATION DETAIL**



NOTES

1. MINIMUM DISTANCE BETWEEN WATER SERVICES ALONG WATERMAIN IS 1.0m
2. ALL WATER SERVICES TO BE INSTALLED AT 90 DEGREES TO THE WATERMAIN UNLESS OTHERWISE APPROVED.
3. DRY TAPPING IS PROHIBITED.
4. COPPER TUBING SHALL BE PROTECTED WITH A No. 6 PACKAGED ANODE.
5. A HYDRO GROUND CLAMP SHALL BE USED TO CONNECT THE ANODE TO THE COPER TUBING.
6. ANY JUNCTION MADE BETWEEN MAIN STOP AND CURB STOP SHALL BE MADE WITH APPROVED COUPLINGS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

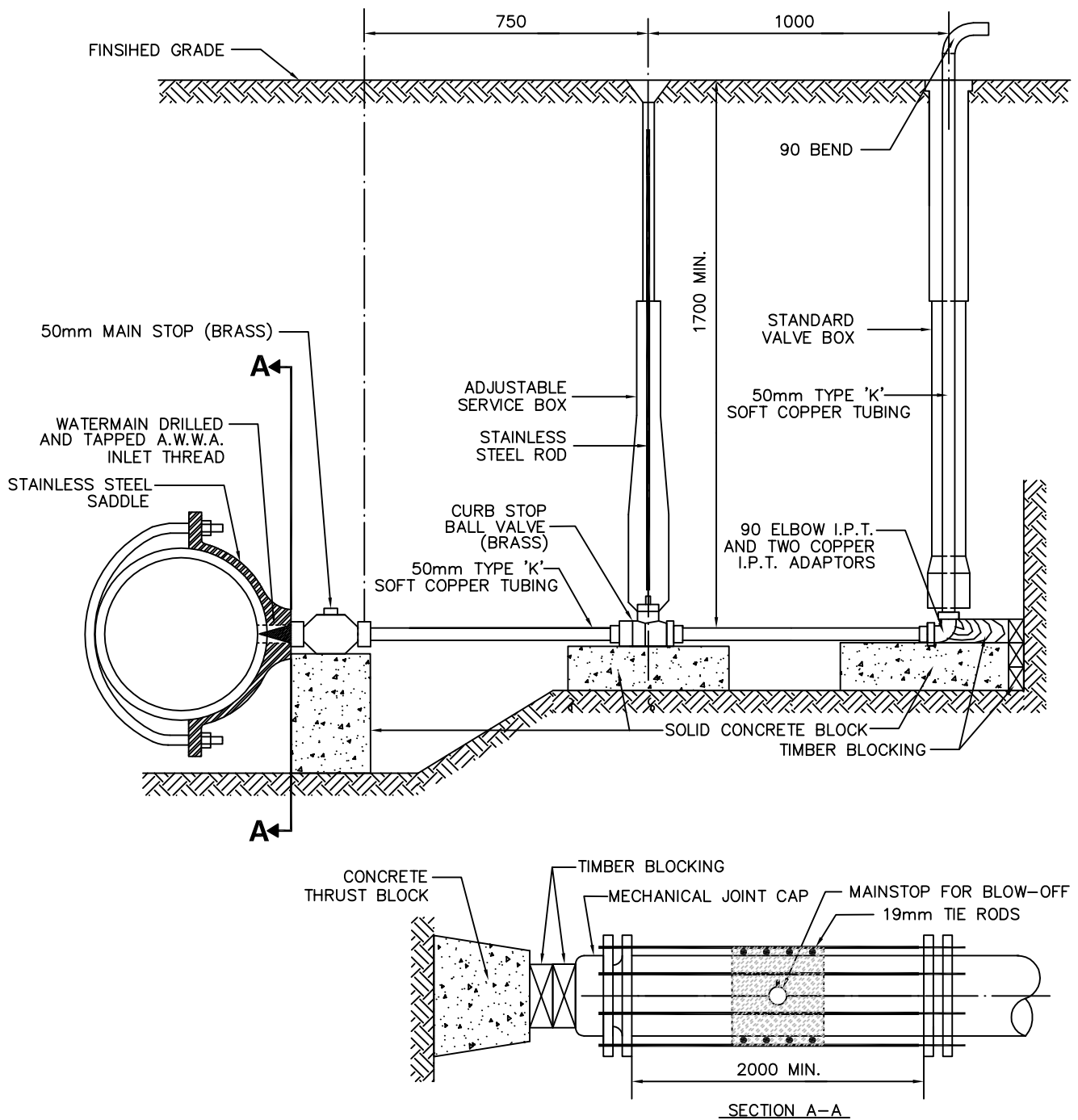
JAN. 2009

DRAWING NO.:

W-107



**STANDARD WATER SERVICE CONNECTION
32mm, 40mm AND 50mm DIAMETERS**



NOTES

1. BLOW-OFF TO BE REMOVED AT THE DIRECTION OF THE ENGINEER AND SHALL INCLUDE THE REMOVAL OF THE VALVE BOX, SERVICE BOX, COPPER TUBING AND THE CURB STOP c/w ALL FITTINGS.
2. TAPPED PORTION OF WATERMAIN TO BE REMOVED PRIOR TO FINAL WATERMAIN CONNECTION. FIRST STEP TO BE 75mm BELOW FRAME.
3. CURB STOP TO BE SELF-DRAINING.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

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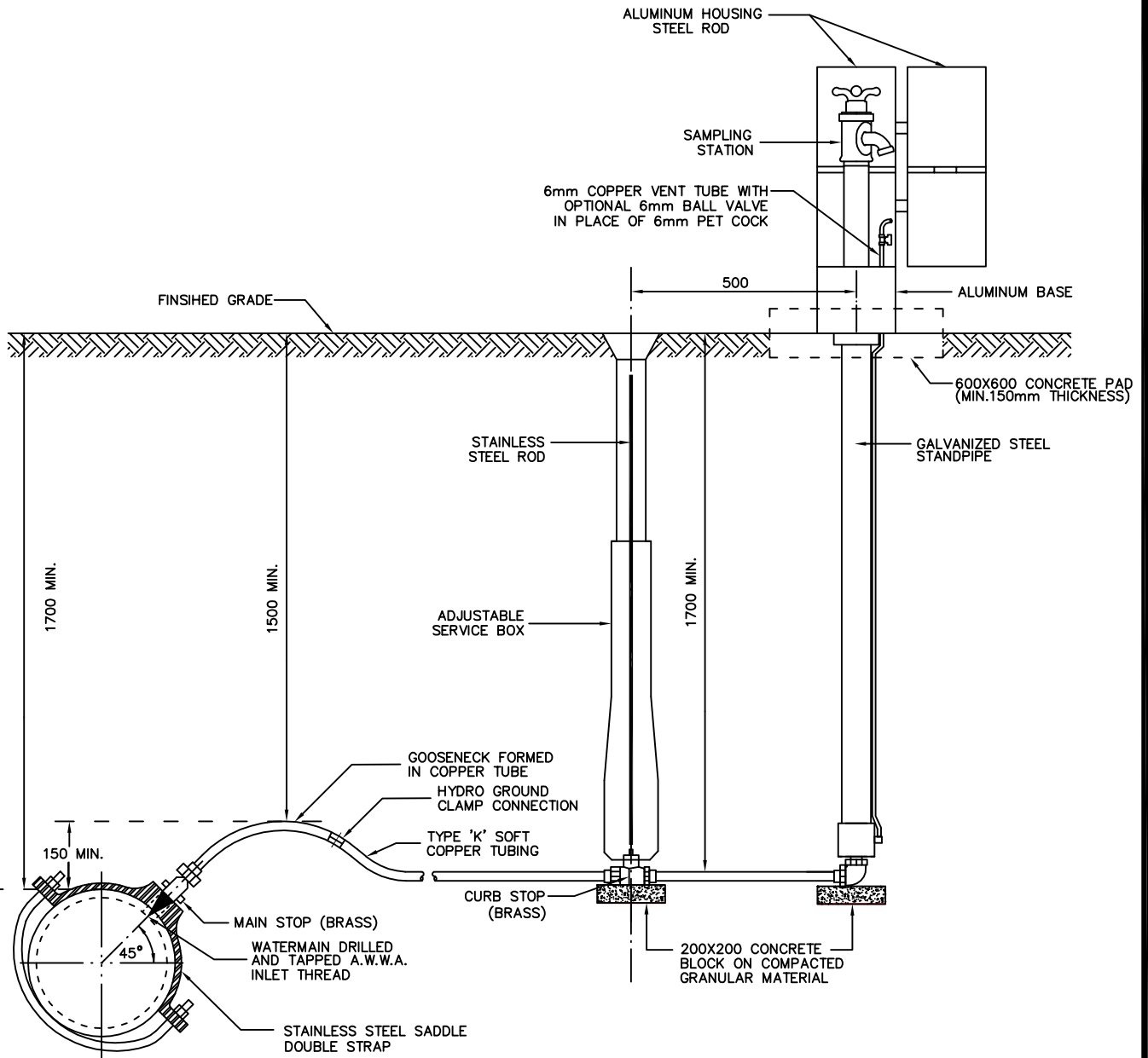
JAN. 2009

DRAWING NO.:

W-108



50mm BLOW-OFF ASSEMBLY



NOTES

1. SAMPLING STATION TO BE FURNISHED WITH A 19mm FIP INLET AND A 19mm HOSE OF UNTHREADED NOZZLE.
2. ALL SAMPLING STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE, ALUMINUM-CAST HOUSING.
3. THE STATION SHALL REQUIRE NO KEY FOR OPERATION AND THE WATER WILL FLOW IN AN ALL BRASS WATERWAY.
4. ALL WORKING PARTS SHALL BE BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING. EXTERIOR PIPING SHALL BE GALVANIZED STEEL OR BRASS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

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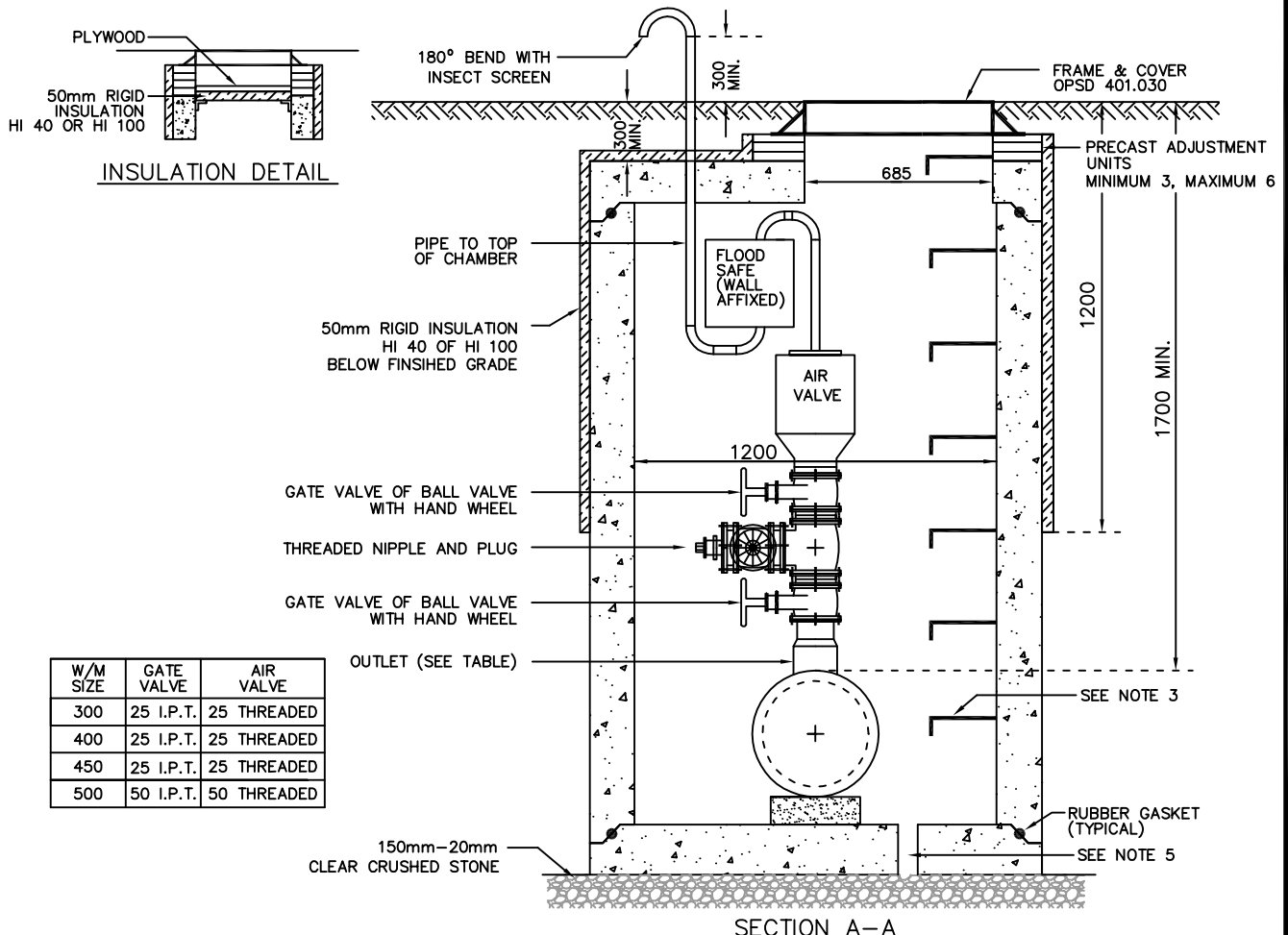
JAN. 2009

DRAWING NO.:

W-109



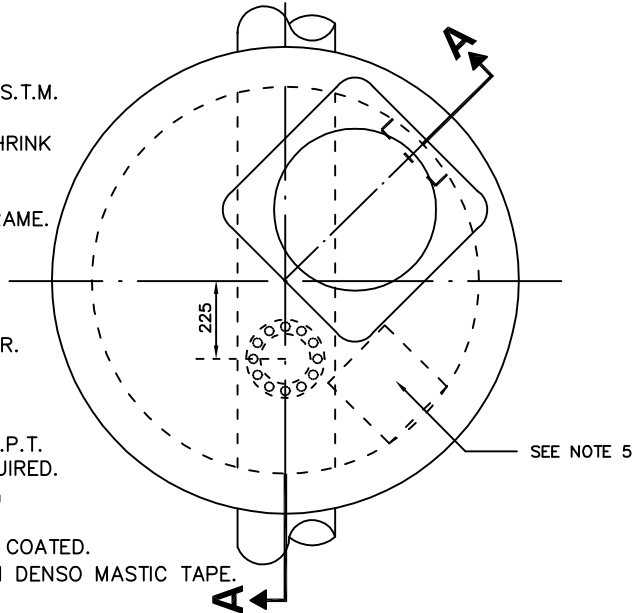
SAMPLING STATION



SECTION A-A

NOTES

1. PRECAST SECTIONS TO BE MANUFACTURED TO A.S.T.M. C-478 SPECIFICATIONS.
2. FILL ALL JOINTS & LIFT HOLES WITH 1:3 NON-SHRINK MORTAR MIX BEFORE BACKFILLING.
3. ALUMINIUM STEPS AS PER O.P.S.D. 405.01 AT 300mm c.c. FIRST STEP TO BE 75mm BELOW FRAME.
4. PRECAST ADJUSTMENT UNITS SHALL BE EXTERNALLY PARGED ALL AROUND.
5. ALL CHAMBERS SHALL BE BUILT TO CONTAIN A POSITIVE DRAINAGE SYSTEM, CONNECTING INTO THE STORM SEWER WITH A BACK-FLOW PRVENTOR. WHERE A STORM SEWER COMMECTION IS NOT POSSIBLE, THE CHAMBER SHALL INCLUDE A 300 X 300 X 150 SUMP.
6. 25mm AND 50mm AIR VALVES SHALL CONTAIN I.P.T. THREADED OUTLET WITH BRASS NIPPLES AS REQUIRED.
7. SNORKLE ASSEMBLY FROM AIR VALVE TO 300mm MINIMUM ABOVE GRADE.
8. AIR RELEASE VALVE TO BE FUSION BOND EPOXY COATED.
9. ALL FITTINGS TO BE CORROSION PROTECTED WITH DENSO MASTIC TAPE.



ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

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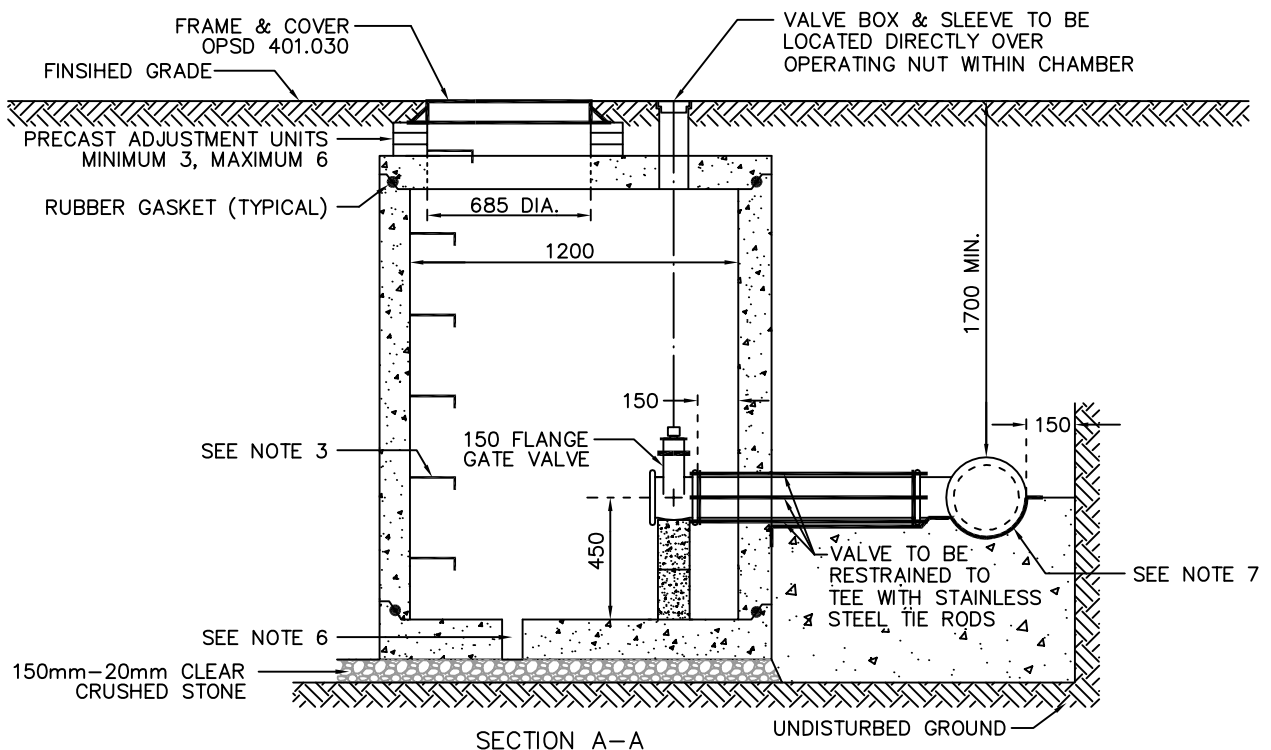
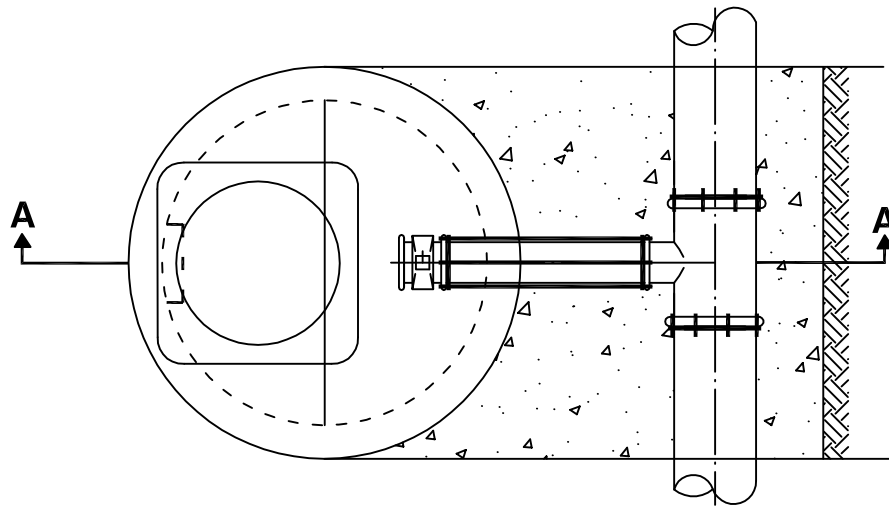
JAN. 2009

DRAWING NO.:

W-110



AIR VALVE AND CHAMBER



NOTES

1. PRECAST SECTIONS TO BE MANUFACTURED TO A.S.T.M. C-478 SPECIFICATIONS.
2. FILL ALL JOINTS & LIFT HOLES WITH 1:3 NON-SHRINK MORTAR MIX BEFORE BACKFILLING.
3. ALUMINIUM STEPS AS PER O.P.S.D. 405.01 AT 300mm C.C. FIRST STEP TO BE 75mm BELOW FRAME.
4. PRECAST ADJUSTMENT UNITS SHALL BE EXTERNALLY PARGED ALL AROUND.
5. VALVES & FITTINGS IN CHAMBERS SHALL BE PROTECTED FROM CORROSION BY PROTECTO CAPS ON EVERY BOLT.
6. ALL CHAMBERS SHALL BE BUILT TO CONTAIN A POSITIVE DRAINAGE SYSTEM, CONNECTING INTO THE STORM SEWER WITH A BACK-FLOW PREVENTOR.
7. POLYETHELENE BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

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REVISION:

JAN. 2009

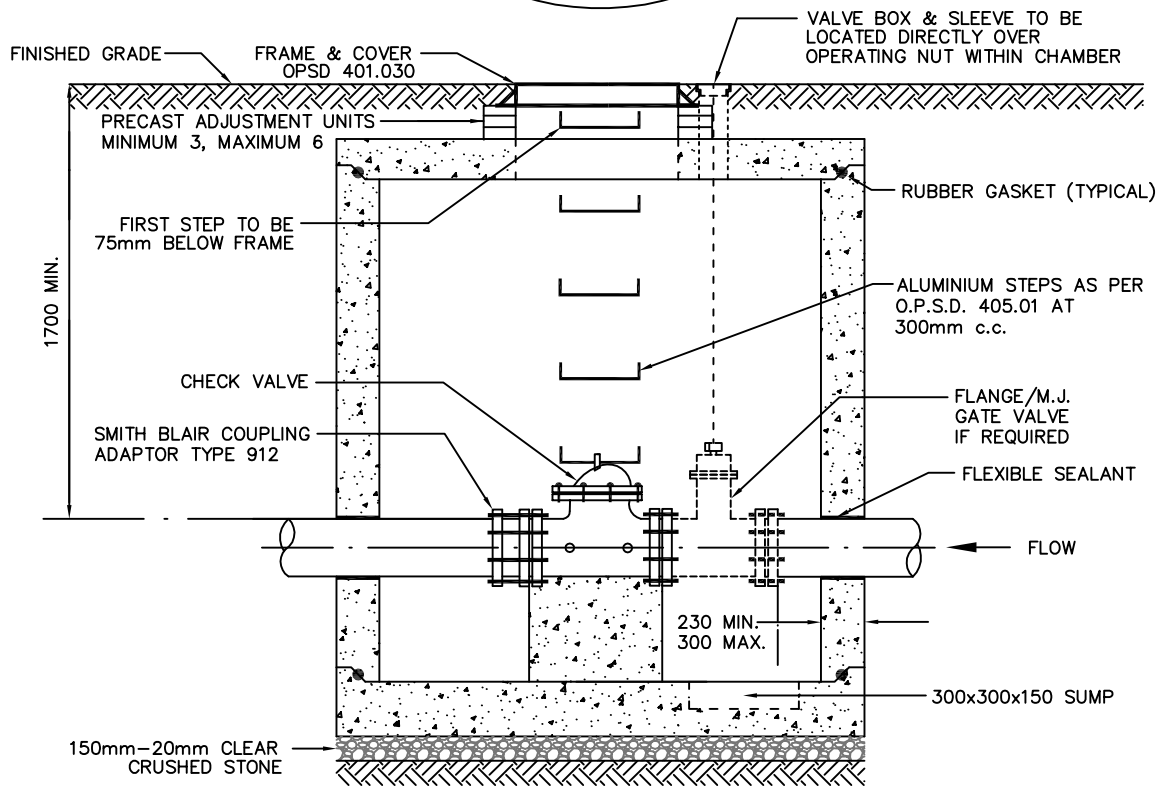
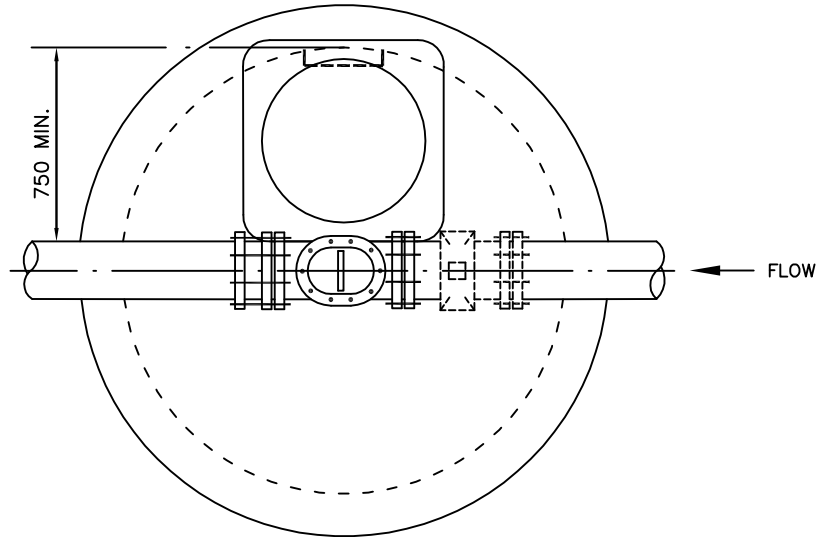
DRAWING NO.:

W-111



DRAIN VALVE AND CHAMBER

CHECK VALVE CHAMBER SIZING	
VALVE SIZE	CHAMBER DIA.
150	1500
200	1500
250	1800
300	1800



NOTES

1. PRECAST SECTIONS TO BE MANUFACTURED TO A.S.T.M. C-478 SPECIFICATIONS.
2. FILL ALL JOINTS & LIFT HOLES WITH 1:3 NON-SHRINK MORTAR MIX BEFORE BACKFILLING.
3. PRECAST ADJUSTMENT UNITS SHALL BE EXTERNALLY PARGED ALL AROUND.
4. VALVES & FITTINGS IN CHAMBERS SHALL BE PROTECTED FROM CORROSION BY PROTECTO CAPS ON EVERY BOLT.
5. ALL CHAMBERS SHALL BE BUILT TO CONTAIN A POSITIVE DRAINAGE SYSTEM, CONNECTING INTO THE STORM SEWER WITH A BACK-FLOW PRVENTOR. WHERE A STORM SEWER CONNECTION IS NOT POSSIBLE, THE CHAMBER SHALL INCLUDE A 300 X 300 X 150 SUMP.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
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REVISION:

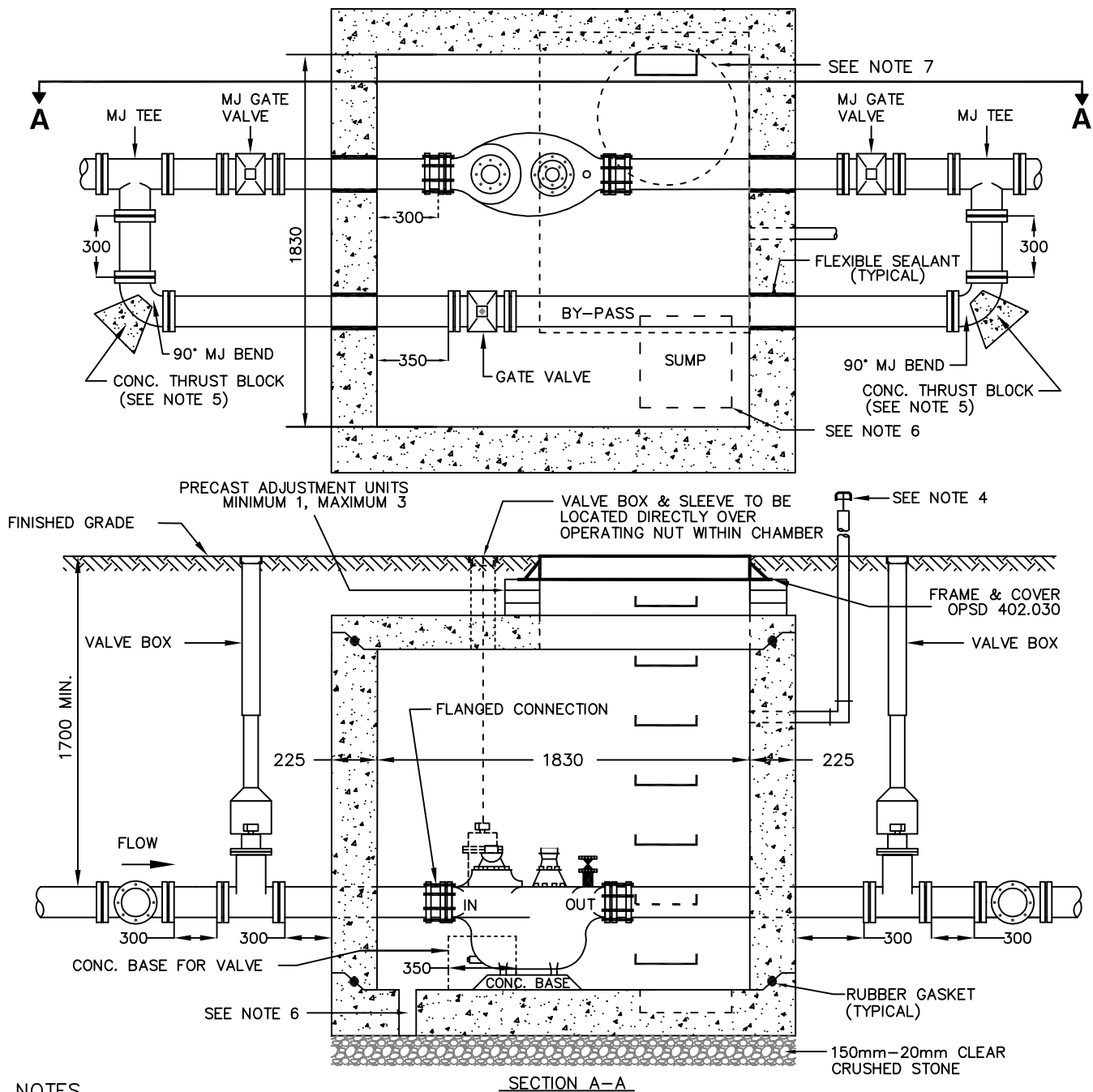
JAN. 2009



CHECK VALVE AND CHAMBER DETAIL

DRAWING NO.:

W-112



NOTES

1. JOINTS IN CHAMBER SHALL BE TYTON. BY-PASS MAY BE ONE SIZE SMALLER THAN METER.
2. 50mm CONDUIT TO BE INSTALLED FROM CHAMBER WALL TO A SUITABLE LOCATION.
3. SENSUS FIRELINE METER SHALL BE USED FOR PRIVATE HYDRANTS ON A BULK METER SYSTEM.
4. REMOTE READER LOCATION SHALL BE IN ACCORDANCE WITH THE APPROVED SITE PLAN.
5. MECHANICAL JOINT RESTRAINER SYSTEM MAY BE USED IN LIEU OF CONCRETE THRUST BLOCKS.
6. ALL CHAMBERS SHALL BE BUILT TO CONTAIN A POSITIVE DRAINAGE SYSTEM, CONNECTING INTO THE STORM SEWER WITH A BACK-FLOW PREVENTOR. WHERE A STORM SEWER CONNECTION IS NOT POSSIBLE, THE CHAMBER SHALL INCLUDE A 300 X 300 X 150 SUMP.
7. ALUMINIUM STEPS AS PER O.P.S.D. 405.01 AT 300mm c.c. FIRST STEP TO BE 75mm BELOW FRAME.
8. VALVES & FITTINGS IN CHAMBERS SHALL BE PROTECTED FROM CORROSION BY PROTECTO CAPS ON EVERY BOLT.
9. PRECAST ADJUSTMENT UNITS SHALL BE EXTERNALLY PARGED ALL AROUND.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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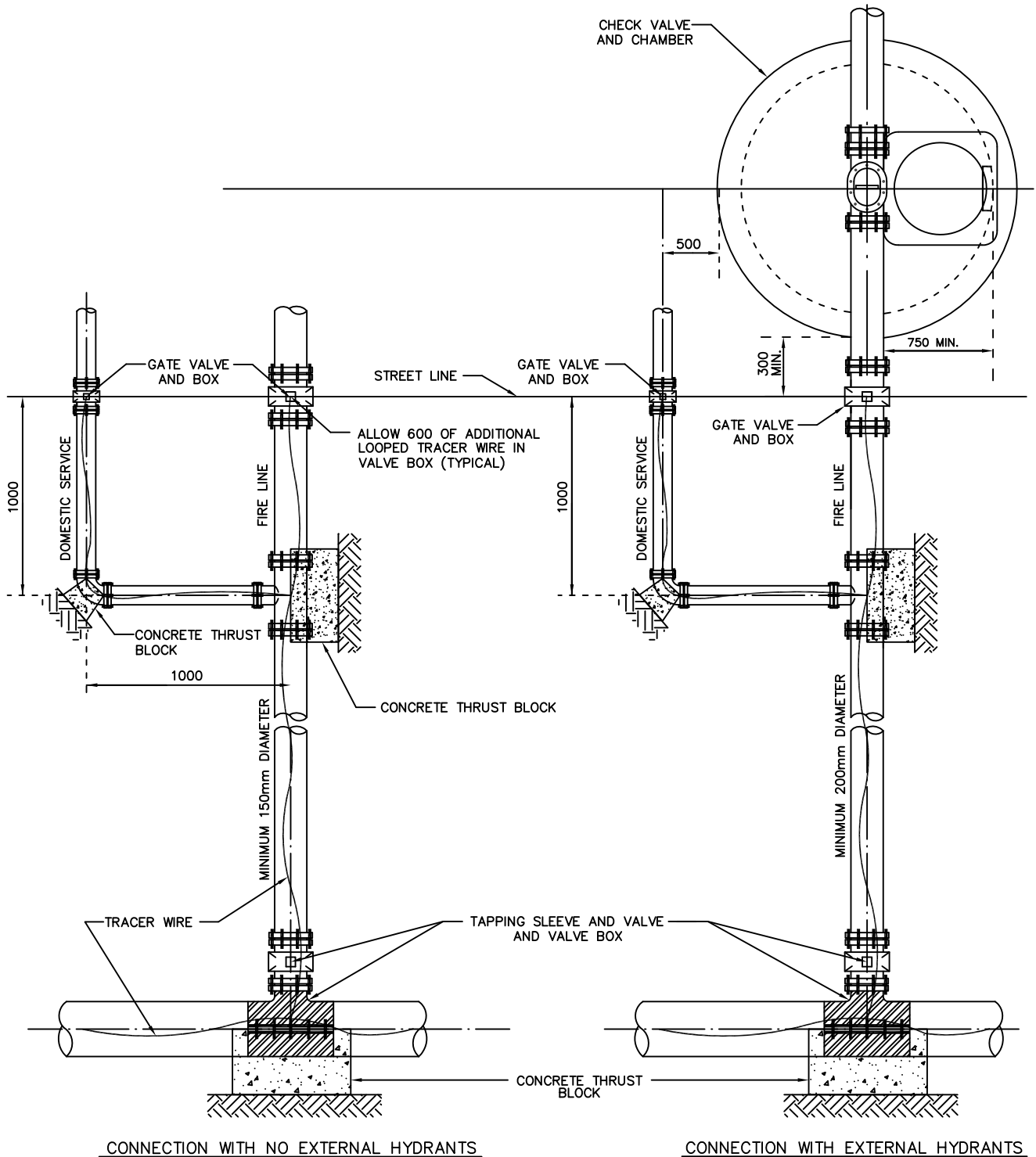
OCT. 2015

DRAWING NO.:

W-113



**METER CHAMBER AND BY-PASS DETAIL
FOR DOMESTIC SERVICE
100mm, 150mm AND 200mm**



CONNECTION WITH NO EXTERNAL HYDRANTS

CONNECTION WITH EXTERNAL HYDRANTS

NOTES

1. CHECK VALVE AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-112.
2. VALVE AND BOX TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-111.
3. STANDARD FOR SERVICES GREATER THAN 5.0m IN LENGTH.
4. SERVICES LESS THAN 5.0m IN LENGTH REQUIRE SEPARATE DOMESTIC SERVICE AND FIRE LINE CONNECTIONS.
5. VALVES AND CHECK VALVE CHAMBERS SHALL NOT BE PERMITTED IN DRIVEWAYS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
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REVISION:

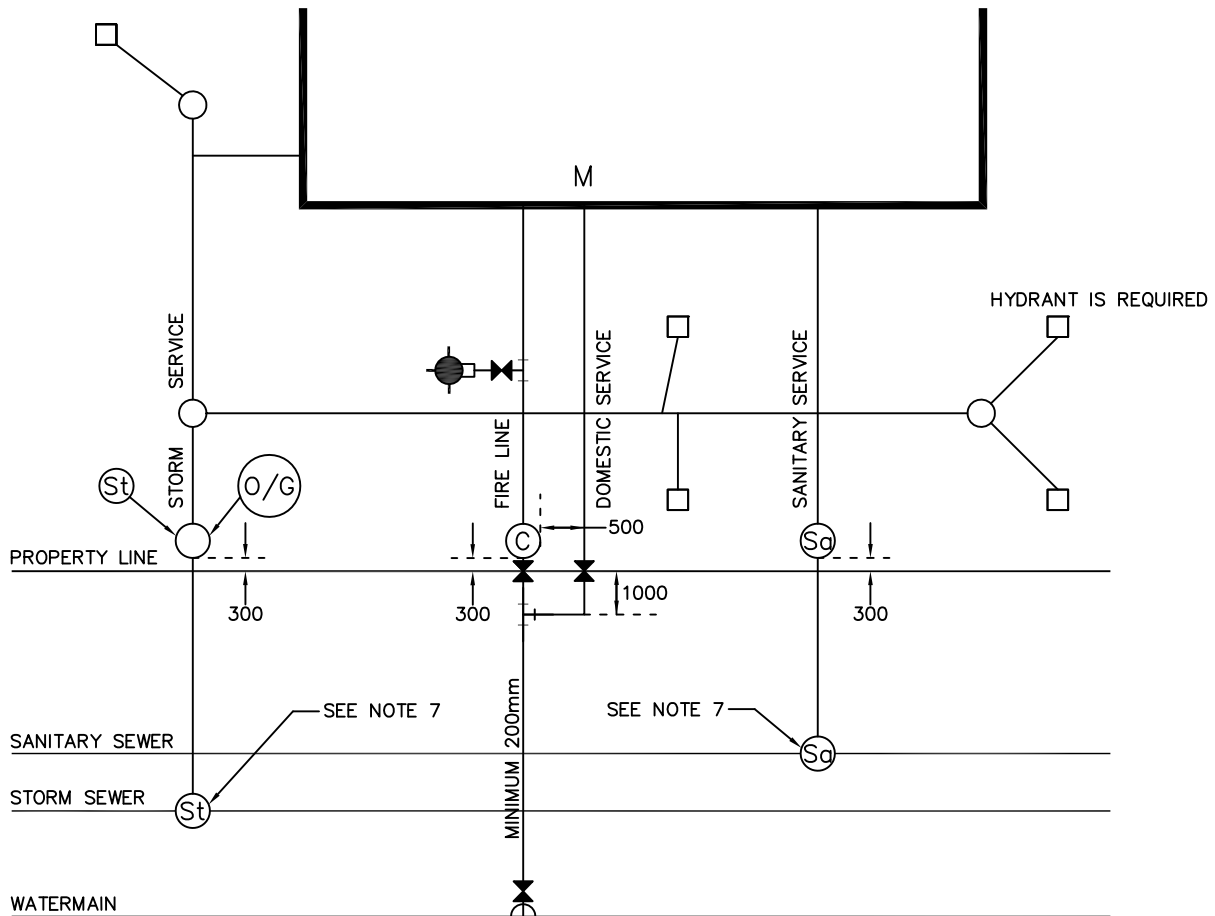
OCT. 2015

DRAWING NO.:

W-114



**COMBINED FIRE AND DOMESTIC
WATER CONNECTIONS**



LEGEND

	VALVE AND BOX		FIRE HYDRANT c/w VALVE AND BOX
	CHECK VALVE IN CHAMBER		DIRECTION OF PUMPER NOZZLE
	TAPPING SLEEVE AND VALVE AND BOX		SANITARY SEWER INSPECTION MAINTENANCE HOLE
	MECHANICAL TEE		STORM SEWER INSPECTION MAINTENANCE HOLE
	WATER METER		OIL/GRIT SEPARATOR
			CATCHBASIN

NOTES

1. WATER SERVICES TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-107.
2. CHECK VALVE AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-112.
3. VALVE AND BOX TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-102, W-103 & W-104.
4. STANDARD FOR SERVICES GREATER THAN 5.0m IN LENGTH.
5. SERVICES LESS THAN 5.0m IN LENGTH REQUIRE SEPARATE DOMESTIC SERVICE AND FIRE LINE CONNECTIONS.
6. VALVES AND CHECK VALVES SHALL NOT BE PERMITTED IN DRIVEWAYS.
7. MAINTENANCE HOLE REQUIRED ON THE MAINLINE SEWER WHERE THE SERVICE DIAMETER IS GREATER THAN OR EQUAL TO 50% OF THE DIAMETER OF THE MAINLINE SEWER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
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REVISION:

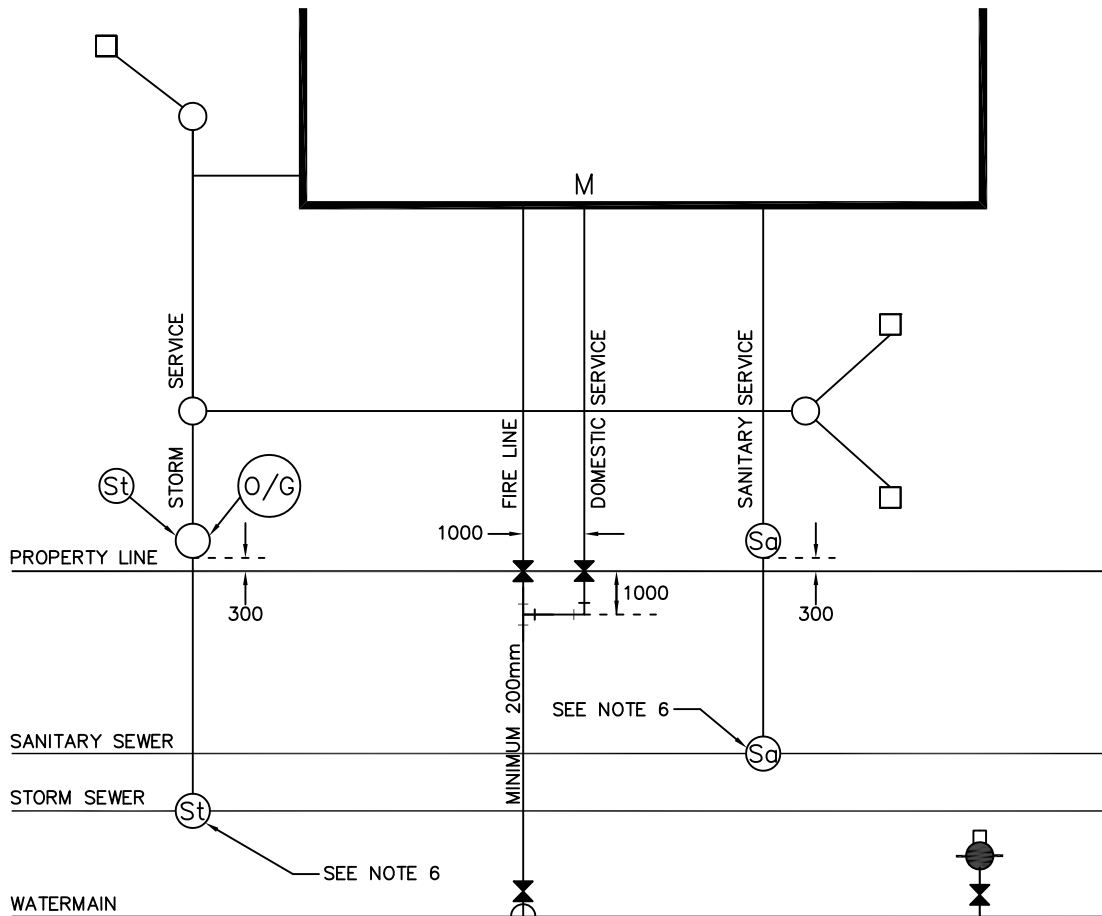
OCT. 2015

DRAWING NO.:

W-115



SINGLE BUILDING COMMERCIAL & INDUSTRIAL LOT SERVICING WITH PRIVATE HYDRANTS



LEGEND

- | | | | |
|--|----------------------------------|--|--|
| | VALVE AND BOX | | FIRE HYDRANT c/w VALVE AND BOX |
| | TAPPING SLEEVE AND VALVE AND BOX | | DIRECTION OF PUMPER NOZZLE |
| | MECHANICAL TEE | | SANITARY SEWER SAMPLING MAINTENANCE HOLE |
| | WATER METER | | STORM SEWER SAMPLING MAINTENANCE HOLE |
| | CATCHBASIN | | OIL/GRIT SEPARATOR |
| | | | NON-SAMPLING MAINTENANCE HOLE |

NOTES

1. WATER SERVICES TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-107.
2. VALVE AND BOX TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-102, W-103 & W-104.
3. STANDARD FOR SERVICES GREATER THAN 5.0m IN LENGTH.
4. SERVICES LESS THAN 5.0m IN LENGTH REQUIRE SEPARATE DOMESTIC SERVICE AND FIRE LINE CONNECTIONS.
5. VALVES SHALL NOT BE PERMITTED IN DRIVEWAYS.
6. MAINTENANCE HOLE REQUIRED ON THE MAINLINE SEWER WHERE THE SERVICE DIAMETER IS GREATER THAN OR EQUAL TO 50% OF THE DIAMETER OF THE MAINLINE SEWER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

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REVISION:

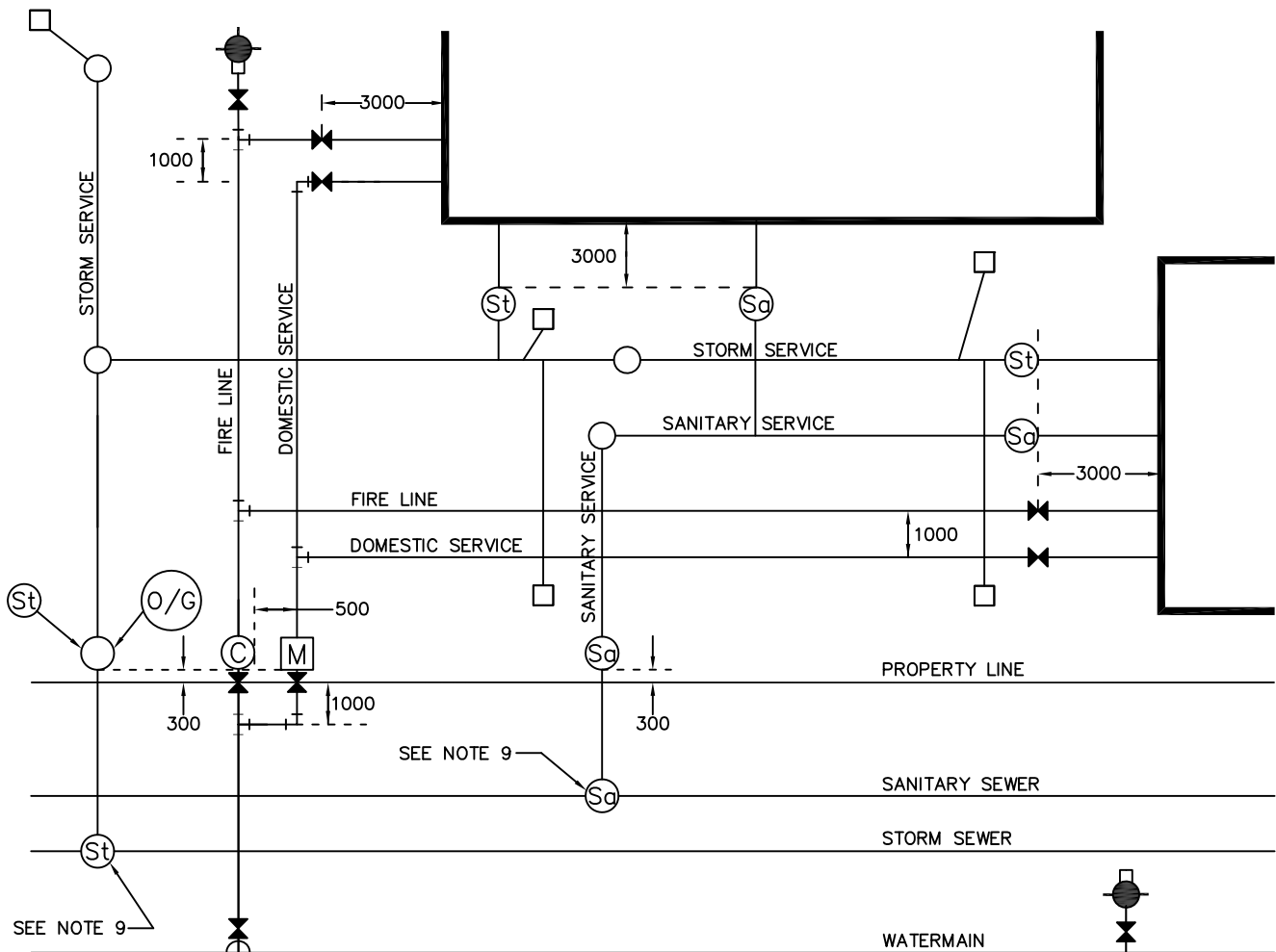
OCT. 2015

DRAWING NO.:

W-116



**SINGLE BUILDING COMMERCIAL
& INDUSTRIAL LOT SERVICING
WITHOUT PRIVATE HYDRANTS**



LEGEND

- VALVE AND BOX
- CHECK VALVE IN CHAMBER
- TAPPING SLEEVE AND VALVE AND BOX
- MECHANICAL TEE
- WATER METER IN CHAMBER

- FIRE HYDRANT c/w VALVE AND BOX
DIRECTION OF PUMPER NOZZLE
- SANITARY SEWER SAMPLING MAINTENANCE HOLE
- STORM SEWER SAMPLING MAINTENANCE HOLE
- OIL/GRIT SEPARATOR
- CATCHBASIN
- NON-SAMPLING MAINTENANCE HOLE

NOTES

1. WATER SERVICES TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-107.
2. CHECK VALVE AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-112.
3. VALVE AND BOX TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-102, W-103 & W-104.
4. METER AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-113.
5. STANDARD FOR SERVICES GREATER THAN 5.0m IN LENGTH.
6. SERVICES LESS THAN 5.0m IN LENGTH REQUIRE SEPARATE DOMESTIC SERVICE AND FIRE LINE CONNECTIONS.
7. VALVES AND CHECK VALVES SHALL NOT BE PERMITTED IN DRIVEWAYS.
8. IF THERE ARE NO EXTERIOR HYDRANTS TO BE CONNECTED TO FIRE LINES, THEN THE CHECK VALVE AND CHAMBER MAY BE DELETED.
9. MAINTENANCE HOLE REQUIRED ON THE MAINLINE SEWER WHERE THE SERVICE DIAMETER IS GREATER THAN OR EQUAL TO 50% OF THE DIAMETER OF THE MAINLINE SEWER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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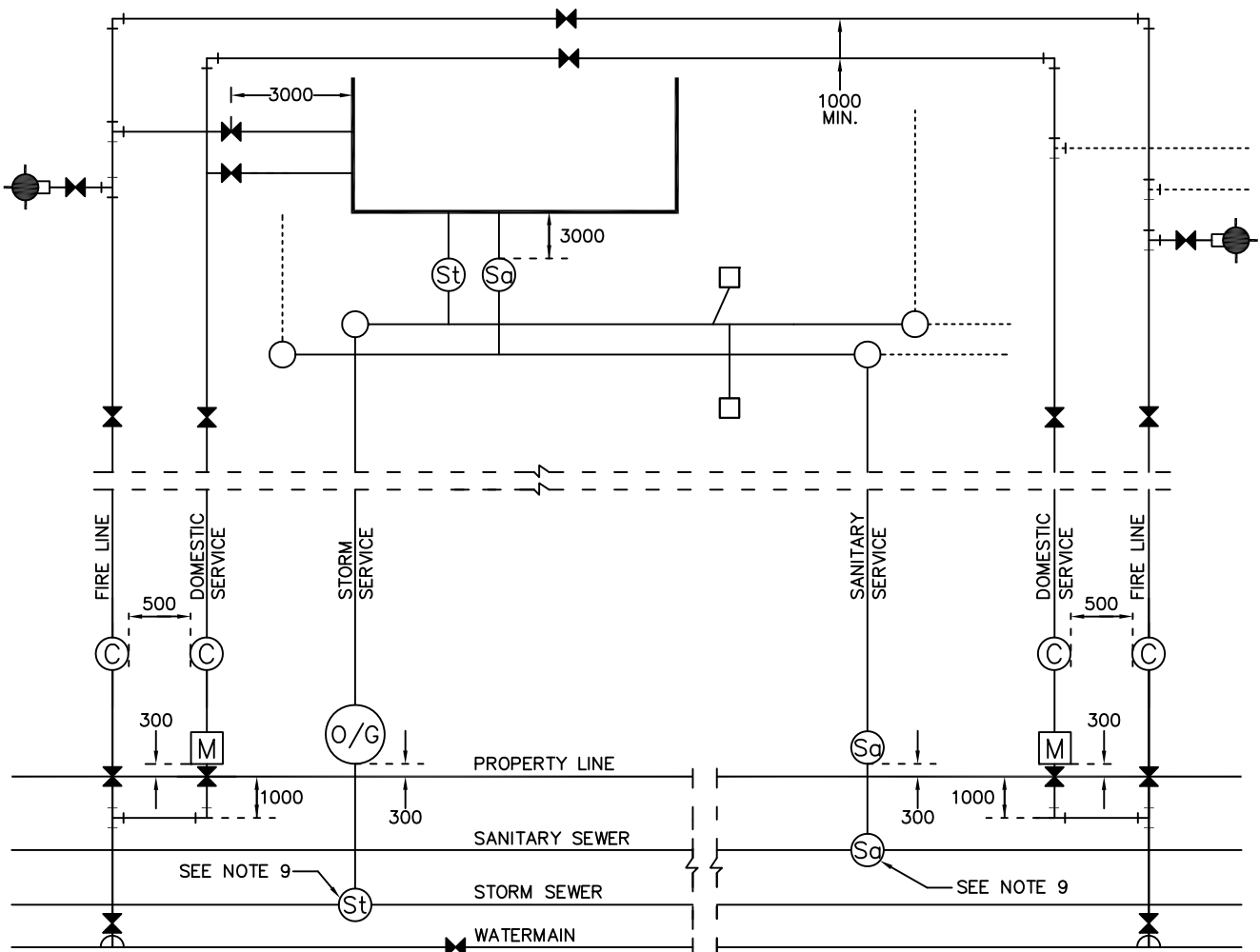
OCT. 2015

DRAWING NO.:

W-117



**MULTIPLE BUILDING COMMERCIAL
& INDUSTRIAL LOT SERVICING
WITH SINGLE WATER CONNECTION**



LEGEND

- VALVE AND BOX
- CHECK VALVE IN CHAMBER
- TAPPING SLEEVE AND VALVE AND BOX
- MECHANICAL TEE
- NON-SAMPLING MAINTENANCE HOLE

- FIRE HYDRANT c/w VALVE AND BOX
- DIRECTION OF PUMPER NOZZLE
- SANITARY SEWER SAMPLING MAINTENANCE HOLE
- STORM SEWER SAMPLING MAINTENANCE HOLE
- OIL/GRIT SEPARATOR
- CATCHBASIN
- METER IN CHAMBER

NOTES

1. WATER SERVICES TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-107.
2. CHECK VALVE AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-112.
3. VALVE AND BOX TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-102, W-103 & W-104.
4. METER AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-113.
5. STANDARD FOR SERVICES GREATER THAN 5.0m IN LENGTH.
6. SERVICES LESS THAN 5.0m IN LENGTH REQUIRE SEPARATE DOMESTIC SERVICE AND FIRE LINE CONNECTIONS.
7. VALVES, CHECK VALVES AND METER CHAMBERS SHALL NOT BE PERMITTED IN DRIVEWAYS.
8. IF THERE ARE NO EXTERIOR HYDRANTS TO BE CONNECTED TO FIRE LINES, THEN THE CHECK VALVE AND CHAMBER MAY BE DELETED.
9. MAINTENANCE HOLE REQUIRED ON THE MAINLINE SEWER WHERE THE SERVICE DIAMETER IS GREATER THAN OR EQUAL TO 50% OF THE DIAMETER OF THE MAINLINE SEWER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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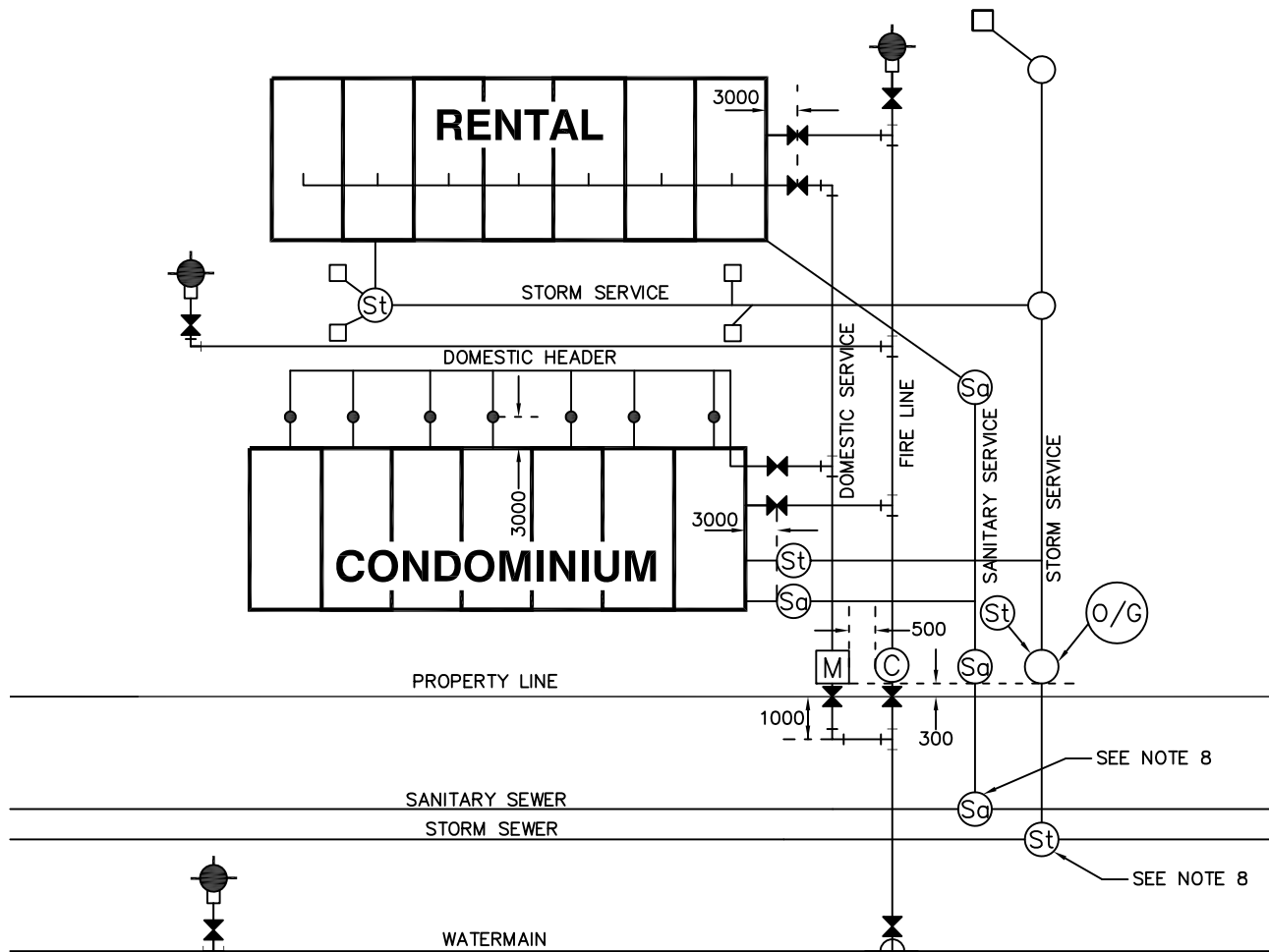
OCT. 2015

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





W-118



**MULTIPLE BUILDING COMMERCIAL
& INDUSTRIAL LOT SERVICING
WITH TWO WATER CONNECTIONS**



LEGEND

-  VALVE AND BOX
-  CHECK VALVE IN CHAMBER
-  TAPPING SLEEVE AND VALVE AND BOX
-  WATER METER IN CHAMBER
-  NON-SAMPLING MAINTENANCE HOLE
-  CURB STOP
-  FIRE HYDRANT c/w VALVE AND BOX
-  DIRECTION OF PUMPER NOZZLE
-  SANITARY SEWER SAMPLING MAINTENANCE HOLE
-  STORM SEWER SAMPLING MAINTENANCE HOLE
-  OIL/GRIT SEPARATOR
-  CATCHBASIN

NOTES

1. WATER SERVICES TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-107.
2. CHECK VALVE AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-112.
3. VALVE AND BOX TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-102, W-103 & W-104
4. METER AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-113.
5. STANDARD FOR SERVICES GREATER THAN 5.0m IN LENGTH.
6. SERVICES LESS THAN 5.0m IN LENGTH REQUIRE SEPARATE DOMESTIC SERVICE AND FIRE LINE CONNECTIONS.
7. VALVES AND CHECK VALVES SHALL NOT BE PERMITTED IN DRIVEWAYS.
8. MAINTENANCE HOLE REQUIRED ON THE MAINLINE SEWER WHERE THE SERVICE DIAMETER IS GREATER THAN OR EQUAL TO 50% OF THE DIAMETER OF THE MAINLINE SEWER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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REVISION:

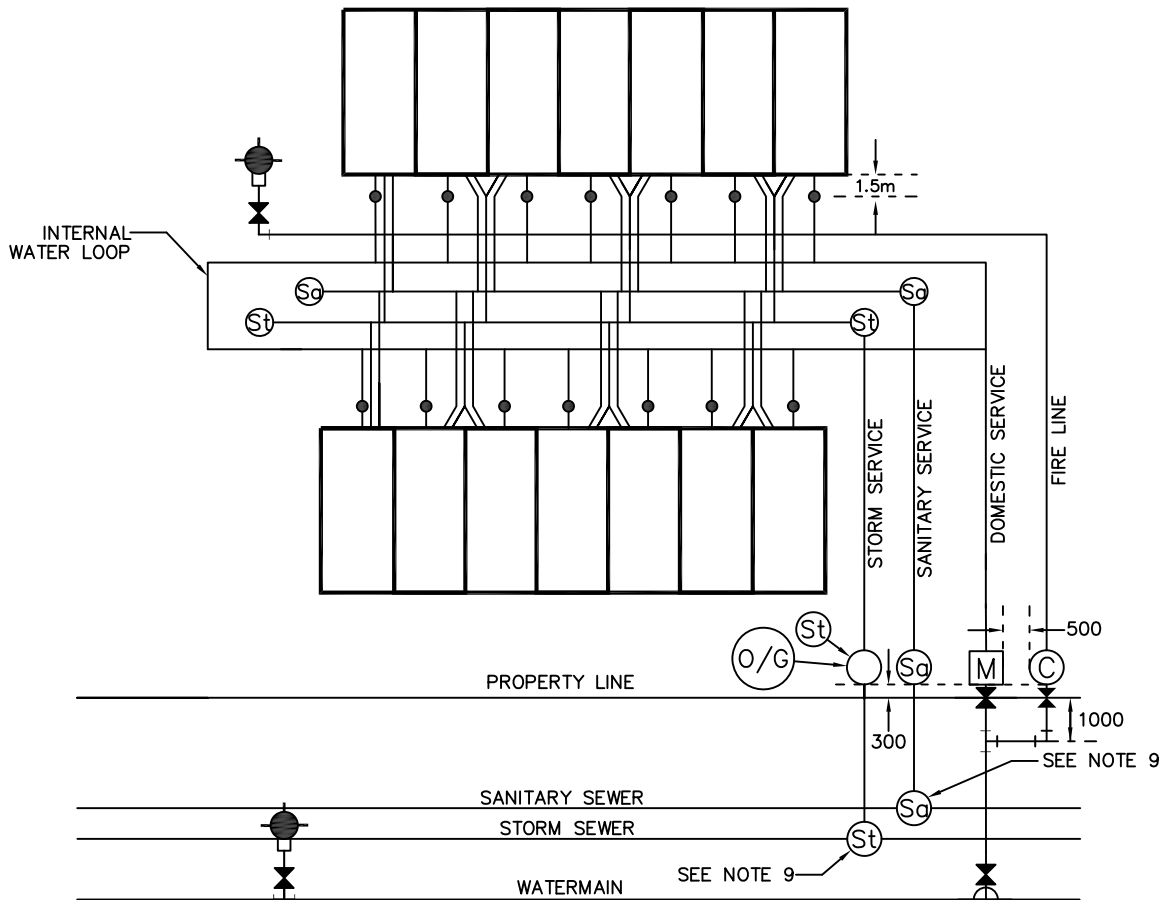
OCT. 2015

DRAWING NO.:

W-119



**MULTIPLE UNIT INDUSTRIAL/COMMERCIAL
LOT SERVICING**



LEGEND

	VALVE AND BOX		FIRE HYDRANT c/w VALVE AND BOX
	CHECK VALVE IN CHAMBER		DIRECTION OF PUMPER NOZZLE
	TAPPING SLEEVE AND VALVE AND BOX		SANITARY SEWER SAMPLING MAINTENANCE HOLE
	METER IN CHAMBER		STORM SEWER SAMPLING MAINTENANCE HOLE
	CURB STOP		OIL/GRIT SEPARATOR
			NON-SAMPLING MAINTENANCE HOLE

NOTES

1. WATER SERVICES TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-107.
2. CHECK VALVE AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-112.
3. VALVE AND BOX TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-102, W-103 & W-104.
4. METER AND CHAMBER TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING W-113.
5. STANDARD FOR SERVICES GREATER THAN 5.0m IN LENGTH.
6. SERVICES LESS THAN 5.0m IN LENGTH REQUIRE SEPARATE DOMESTIC SERVICE AND FIRE LINE CONNECTIONS.
7. VALVES AND CHECK VALVES SHALL NOT BE PERMITTED IN DRIVEWAYS.
8. INDIVIDUAL UNIT SERVICING TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING M-411.
9. MAINTENANCE HOLE REQUIRED ON THE MAINLINE SEWER WHERE THE SERVICE DIAMETER IS GREATER THAN OR EQUAL TO 50% OF THE DIAMETER OF THE MAINLINE SEWER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

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REVISION:

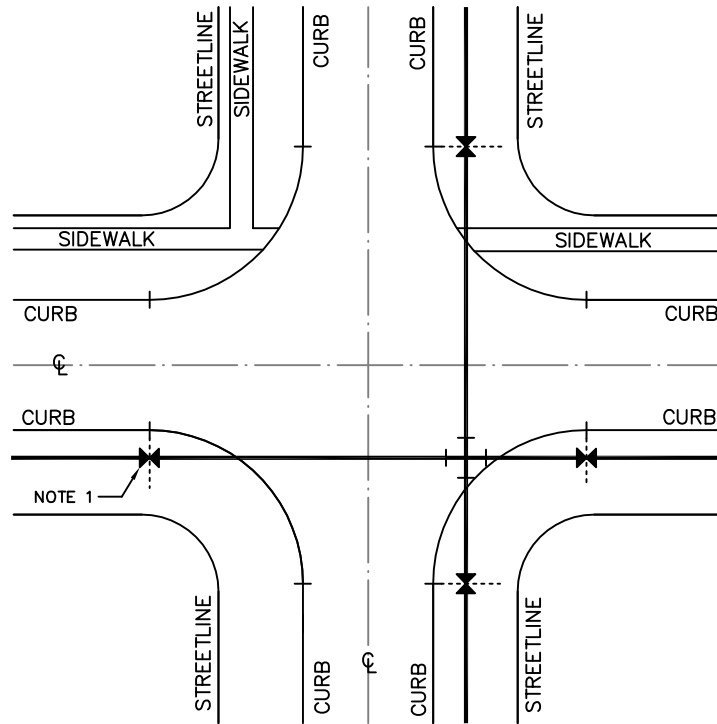
MAY. 2019

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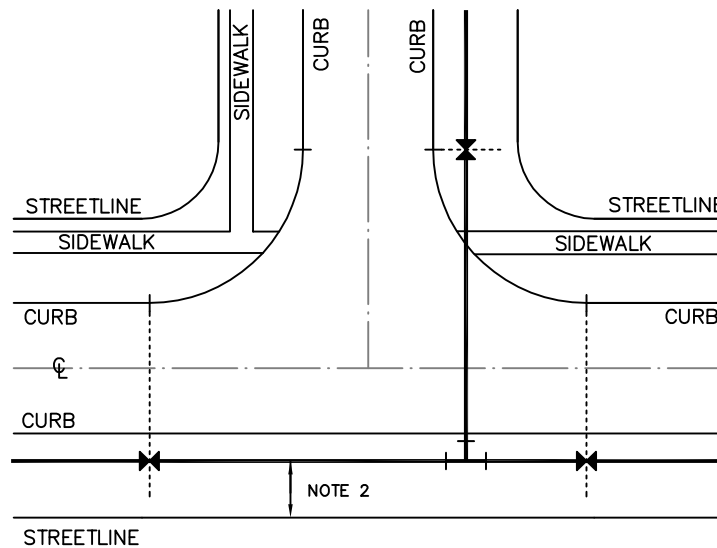
W-120



TOWNHOUSE CONDOMINIUM SERVICING



FOUR-WAY INTERSECTION



THREE-WAY INTERSECTION

NOTES:

1. VALVES SHALL BE LOCATED AT THE BEGINNING OR END OF CURB RADII.
2. WATERMAIN OFFSET FROM STREETLINE AS SPECIFIED ON TOWN OF AURORA TYPICAL CROSS SECTION DETAILS.
3. 150mm, 200mm & 250mm WATERMAINS SHALL BE FITTED WITH VALVE AND BOX ASSEMBLIES.
4. 300mm AND LARGER WATERMAINS SHALL BE FITTED WITH VALVE AND CHAMBER ASSEMBLIES.

ALL DIMENSIONS ARE EXPRESSED IN METRES (m) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

APRIL 2009

DRAWING NO.:

W-121



**WATER VALVE LOCATIONS
AT INTERSECTIONS**

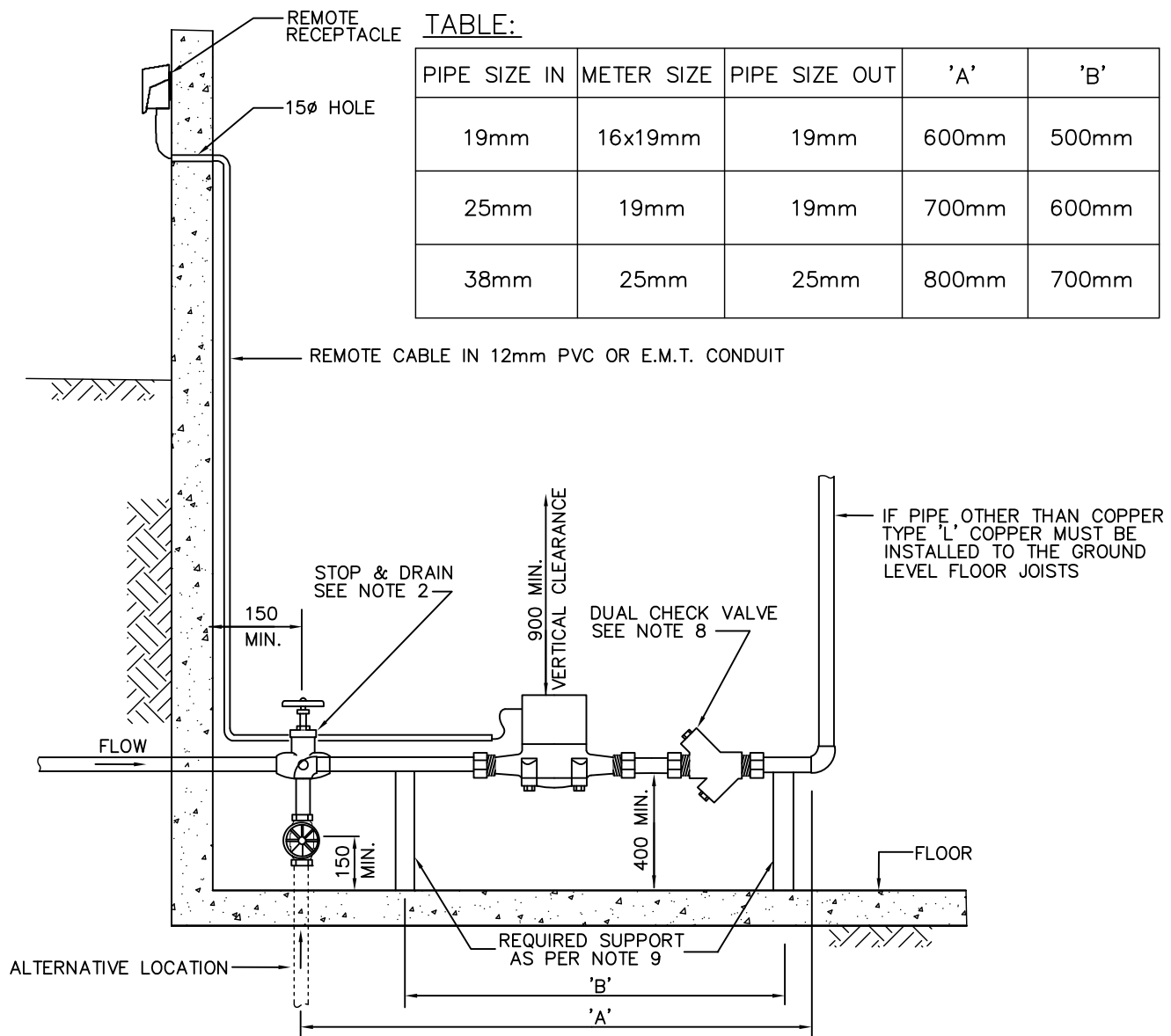


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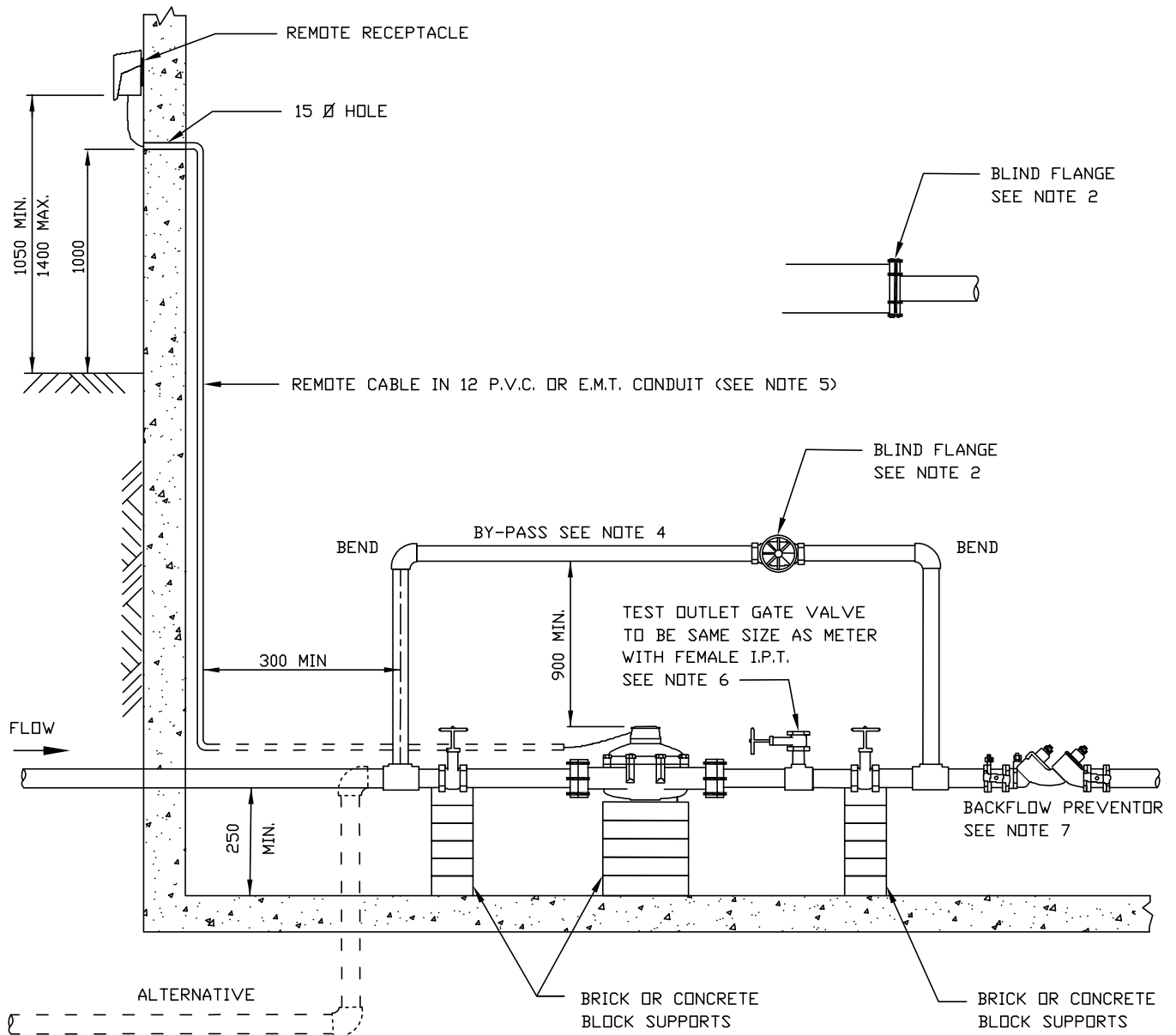
PIPE SIZE IN	METER SIZE	PIPE SIZE OUT	'A'	'B'
19mm	16x19mm	19mm	600mm	500mm
25mm	19mm	19mm	700mm	600mm
38mm	25mm	25mm	800mm	700mm

NOTES:

- 175mm MINIMUM CLEARANCE BETWEEN WALL AND C/L OF PIPE AND 75mm CLEARANCE BETWEEN WALL AND METER.
- STOP AND DRAIN TO BE THE SAME SIZE AS INCOMING PIPE.
- IF HOT WATER TANK IS WITHIN 3.0m OF METER. THEN A CHECK VALVE IS REQUIRED BETWEEN METER AND HOT WATER TANK.
- ALL COPPER PIPING AFTER THE STOP AND DRAIN SHALL BE TYPE 'L' COPPER.
PIPING FOR METER TO BE RUN HORIZONTALLY AND METER TO BE INSTALLED ON HORIZONTAL PIPING ONLY.
- WHERE THE INCOMING PIPE IS OTHER THAN COPPER, 500mm OF HORIZONTAL TYPE 'L' COPPER PIPE (AS PER ABOVE TABLE).
- METER SIZE TO BE ONE PIPE SIZE SMALLER THAN INCOMING SERVICE SIZE.
- METERS MUST NOT BE LOCATED BEHIND FURNACES, WATER TANKS, ETC.
- WHERE REQUIRED, DUAL CHECK VALVE BACKFLOW PREVENTER IS TO BE INSTALLED DOWNSTREAM OF METER.
- IF PLUMBING RISER/WATER SERVICE IS PLASTIC, SUPPORTS SHALL BE REQUIRED FOR METER ASSEMBLY AREA.
TO AVOID INSTALLING SUPPORTS, RISER SHALL BE COPPER AND ATTACHED TO LOWER FLOOR LEVEL JOISTS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

<h1>TOWN OF AURORA</h1>	APPROVED:	SCALE: N.T.S
AURORA <i>You're in Good Company</i>	<h2>19mm TO 25mm METER INSTALLATION IN BUILDING</h2>	REVISION: FEB. 2013
		DRAWING NO.: W-122



NOTES:

1. 300mm MINIMUM CLEARANCE BETWEEN WALL AND > OF PIPE.
2. 100mm OR LARGER SERVICE MAY BE REDUCED BY USING A TAPPING FLANGE.
3. IF HOT WATER TANK IS WITHIN 3.0m OF METER, THEN A CHECK VALVE IS REQUIRED BETWEEN METER AND HOT WATER TANK.
4. BY-PASS MAY BE ONE PIPE SIZE SMALLER THAN METER METER SIZE AND MAY BE INSTALLED HORIZONTALLY. VALVE INSTALLED WITHIN BY-PASS SHALL NOT BE A BALL STYLE VALVE
5. WHERE METER ROOM IS NOT ADJACENT TO AN OUTSIDE WALL OR IS BELOW EXTERIOR FINISHED GRADE, CONTRACTOR/ APPLICANT SHALL PROVIDE A CONTINUOUS E.M.T. CONDUIT COMPLETE WITH NYLON FISH LINE FROM METER ROOM TO 1000mm ABOVE EXTERIOR FINISHED GRADE.
6. TEST OUTLET SHALL BE LOCATED BETWEEN THE OUTLET SIDE OF THE METER AND THE OUTLET SIDE ISOLATION VALVE.
7. WHERE REQUIRED, BACKFLOW PREVENTOR SHALL BE INSTALLED AFTER BOTH THE METER AND BY-PASS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

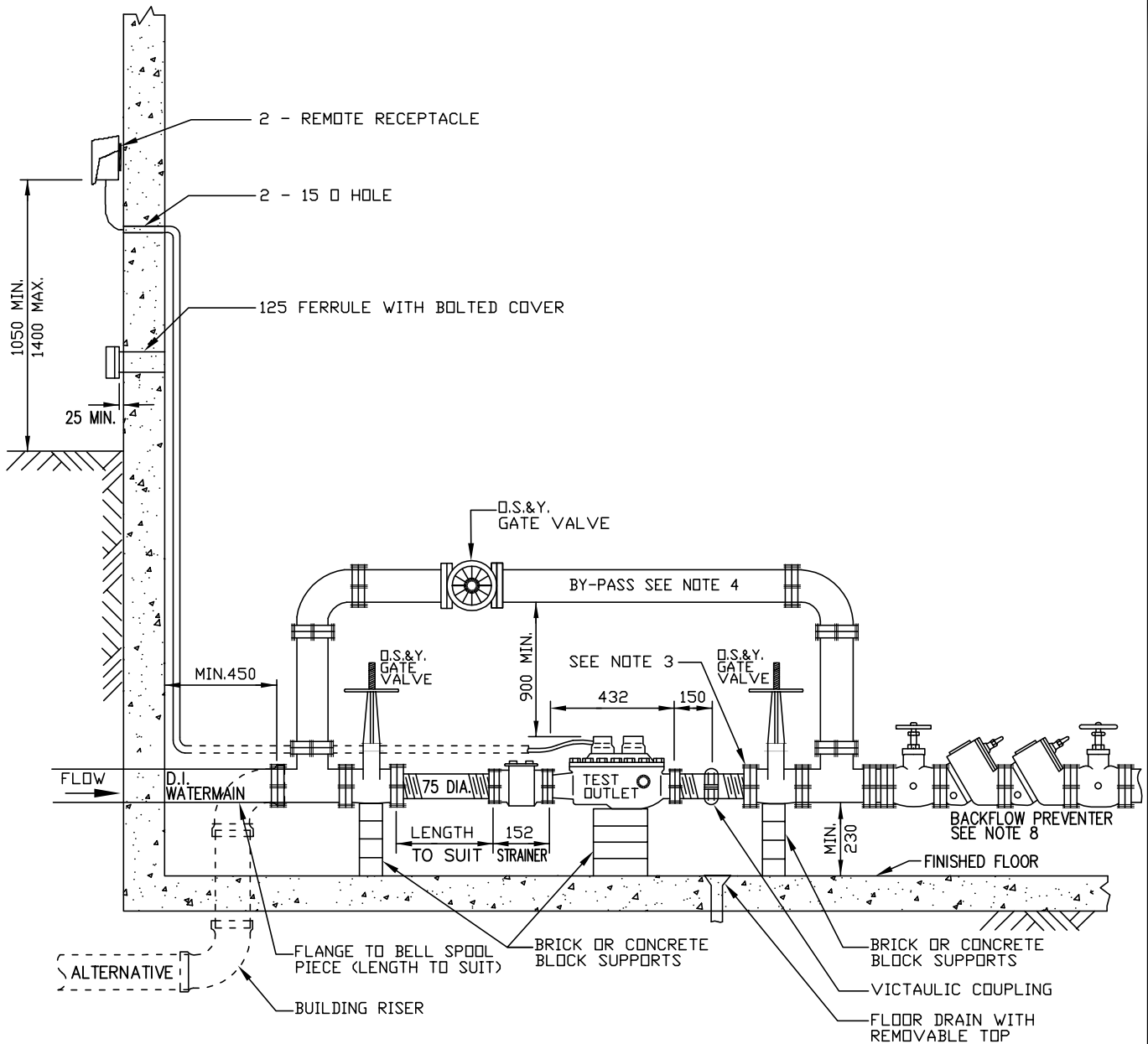
FEB. 2013

DRAWING NO.:

W-123



**38mm TO 50mm METER INSTALLATION
IN BUILDING**



NOTES:

1. PROVISION IS TO BE MADE FOR THE DISPOSAL OF WATER USED FOR IN PLACE TESTING OF TRU-FLO COMPOUND METER EITHER THROUGH FLOOR DRAIN OR THE 125mm FERRULE.
2. IF HOT WATER TANK IS WITHIN 3.0m OF METER, THEN A CHECK VALVE IS REQUIRED BETWEEN METER AND HOT WATER TANK.
3. FLANGED ENDS COMPLETE WITH TAPPED BLIND FLANGE.
4. BY-PASS MAY BE ONE PIPE SIZE SMALLER THAN METER METER SIZE AND MAY BE INSTALLED HORIZONTALLY.
5. WHERE METER ROOM IS NOT ADJACENT TO AN OUTSIDE WALL OR IS BELOW EXTERIOR FINISHED GRADE, CONTRACTOR/ APPLICANT SHALL PROVIDE A CONTINUOUS 12mm E.M.T. CONDUIT COMPLETE WITH NYLON FISH LINE FROM METER ROOM TO 1000mm ABOVE EXTERIOR FINISHED GRADE.
6. MIN. 300mm CLEARANCE BETWEEN WALL AND EDGE OF METER.
7. METER SHALL BE ACCESSIBLE AT ALL TIMES.
8. WHERE REQUIRED, BACKFLOW PREVENTOR SHALL BE INSTALLED AFTER BOTH THE METER AND BY-PASS.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

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SCALE:
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REVISION:

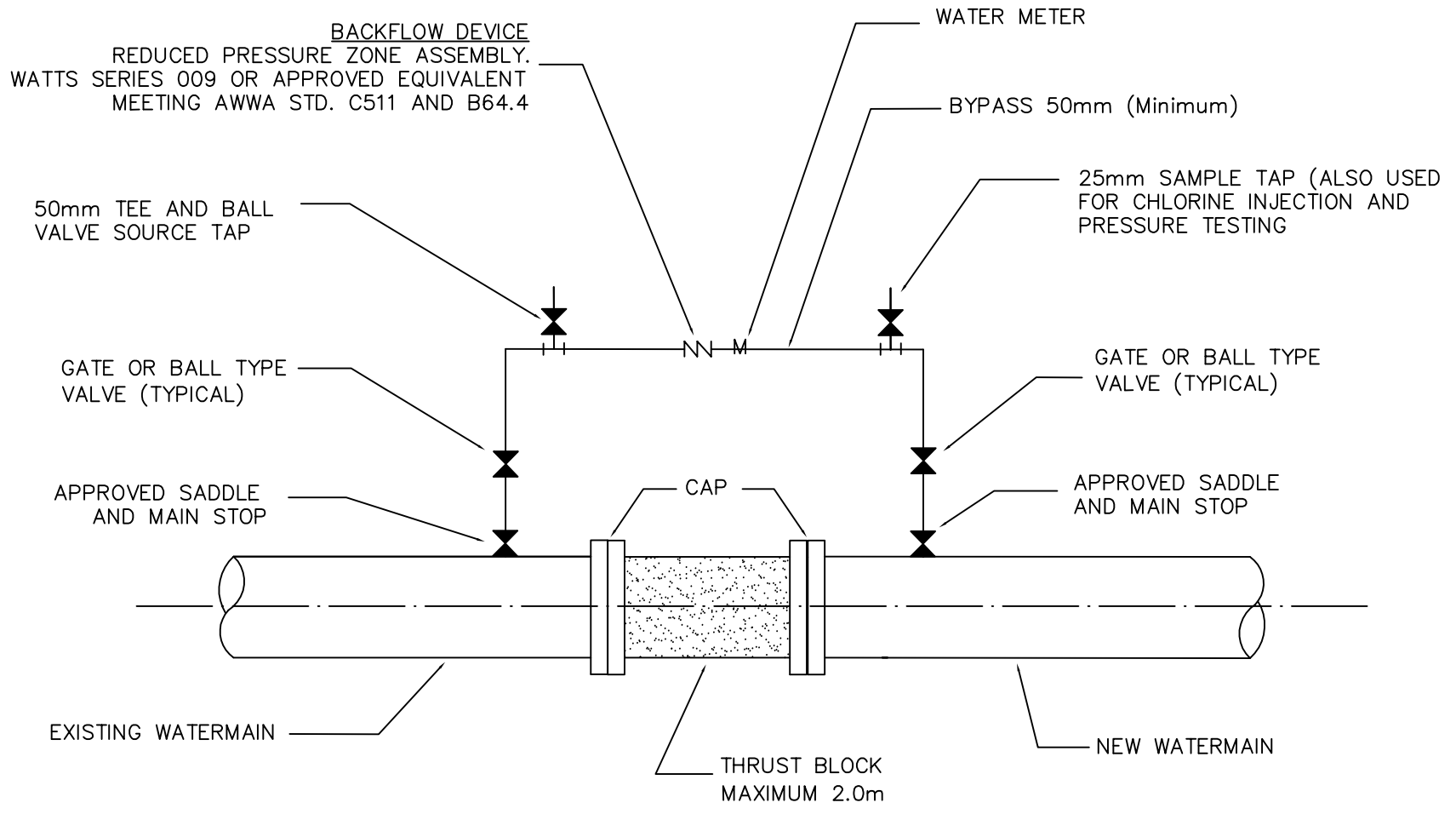
FEB. 2013

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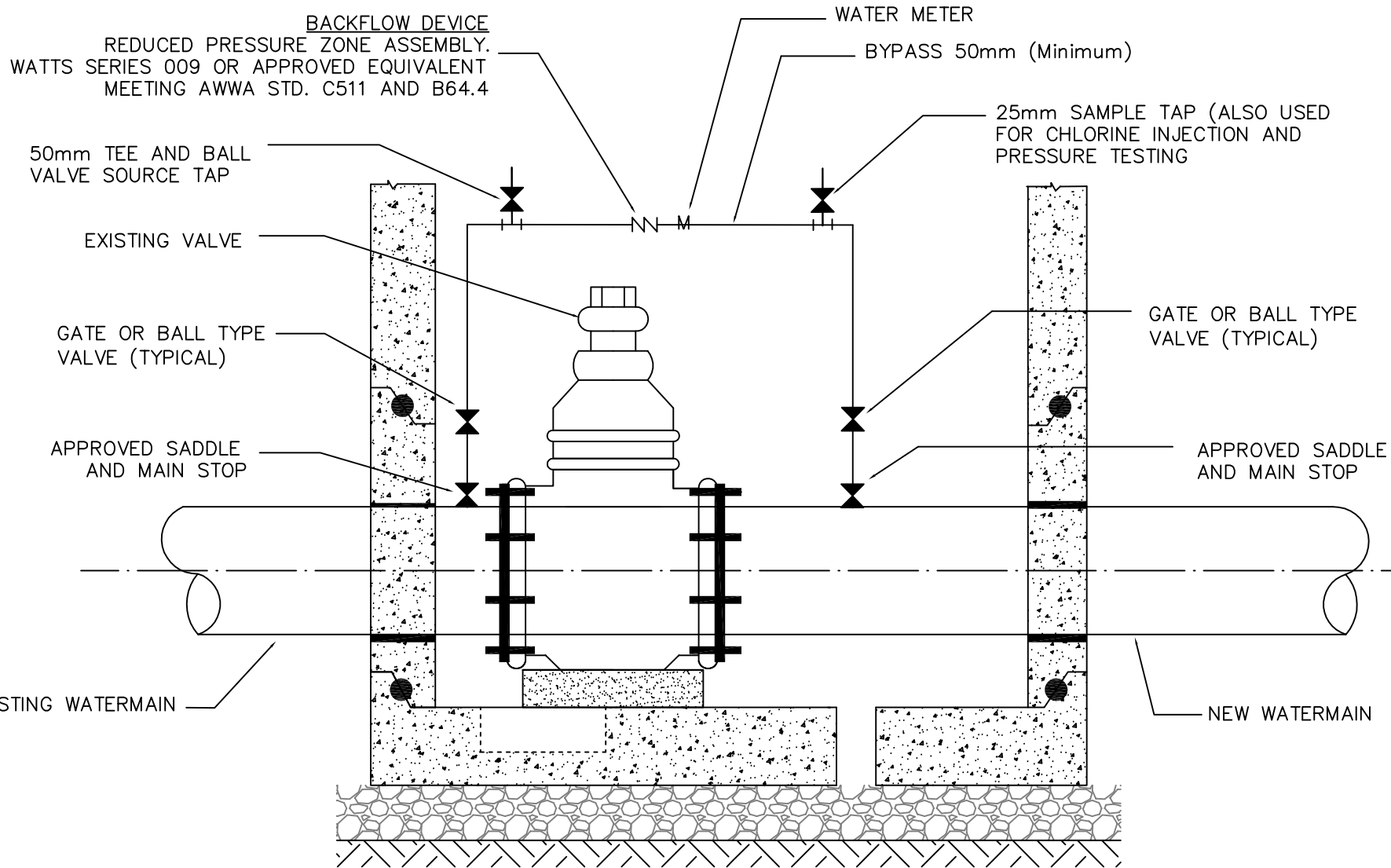
W-124



**75mm TRU-FLO COMPOUND METER
IN BUILDING**



TOWN OF AURORA		APPROVED:	SCALE: N.T.S
	TOTAL ISOLATION OF EXISTING AND NEW SYSTEMS		REVISION: JAN. 2013
			DRAWING NO.: W-125



TOWN OF AURORA

APPROVED:

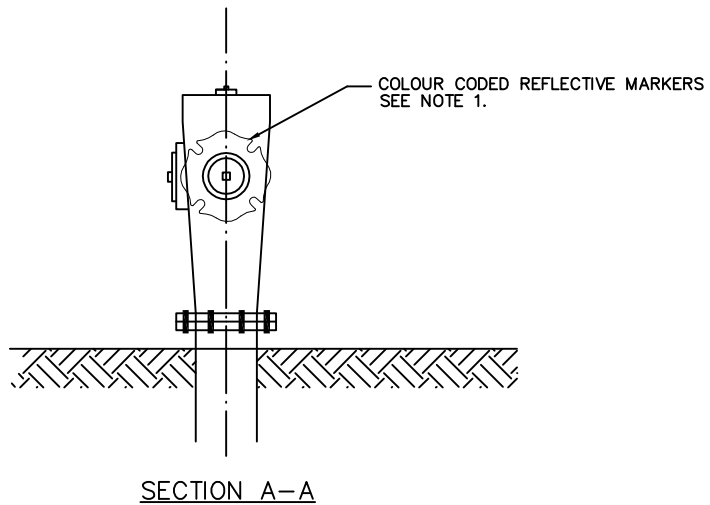
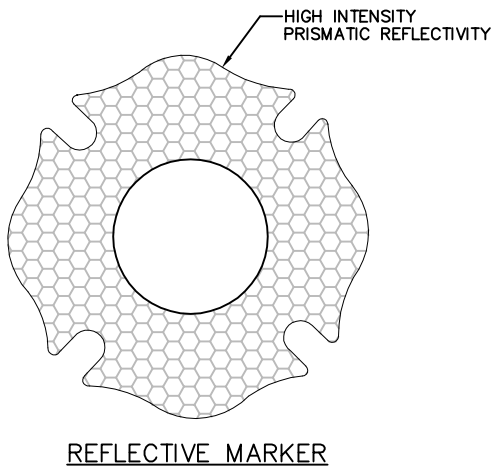
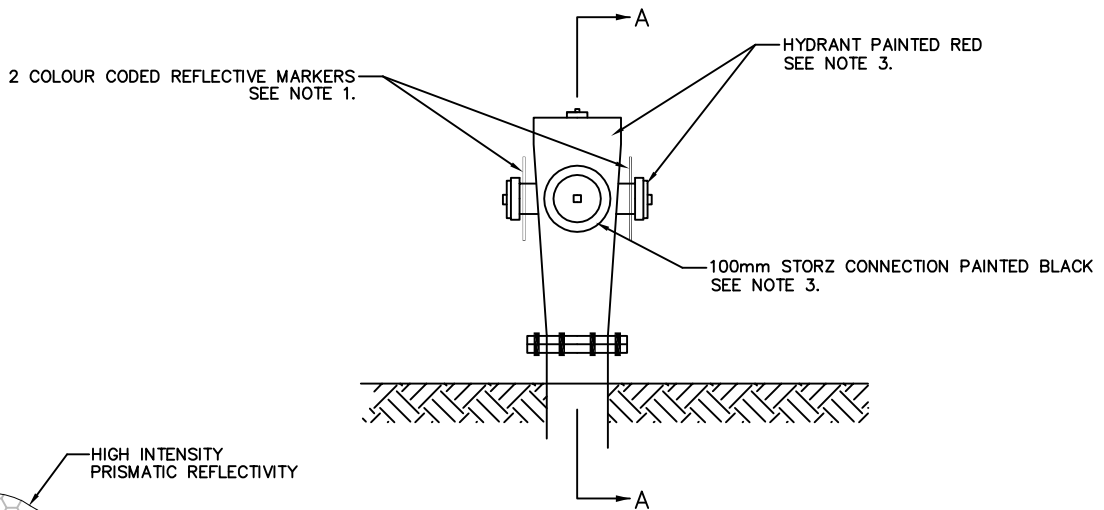
SCALE:
N.T.S

REVISION:
JAN. 2013

DRAWING NO.:
W-126



**CONNECTION AT EXISTING VALVE
300mm OR GREATER WATERMAIN**



NOTES

1. MARKER TO BE COLOUR COORDINATED TO HYDRANT FLOW RATE PER:
 - CLASS AA, BLUE MARKER FOR FLOWS - 5,500 L/MIN. (1210 IMPERIAL GPM) OR GREATER;
 - CLASS A, GREEN MARKER FOR FLOWS - 4,500 L/MIN. TO 5,500 L/MIN (1,189 TO 1,453 IMPERIAL GPM);
 - CLASS B, ORANGE MARKER FOR FLOWS - 2,250 L/MIN. TO 4,500 L/MIN (500 TO 999 IMPERIAL GPM).
2. HYDRANT FLOW RATE LESSER THAN 2,250 L/MIN. IS NOT ACCEPTABLE.
3. HYDRANT TO BE PAINTED RED INCLUDING 65mm PORTS. RED PAINT TO BE EITHER:
 - SHERWIN WILLIAMS #B65 400 SERIES DFT @ 2-4 MILS WITH SHERWIN WILLIAMS MACROPOXY 646 FAST CURE; OR
 - SICO CORROSTOP ULTRA BRIGHT RED #635720; OR
 - DULUX AQ278 METAL CLAD HIGH GLOSS POLYURETHANE ALKYD ANTI-RUST DURABLE HIGH GLOSS FINISH
4. 100mm STORZ CONNECTION TO BE PAINTED BLACK.
5. MARKERS TO BE FIRE SERVICE MALTESE CROSS SHAPE WITH HIGH INTENSITY PRISMATIC REFLECTIVE FILM.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETRES (mm) UNLESS OTHERWISE NOTED.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

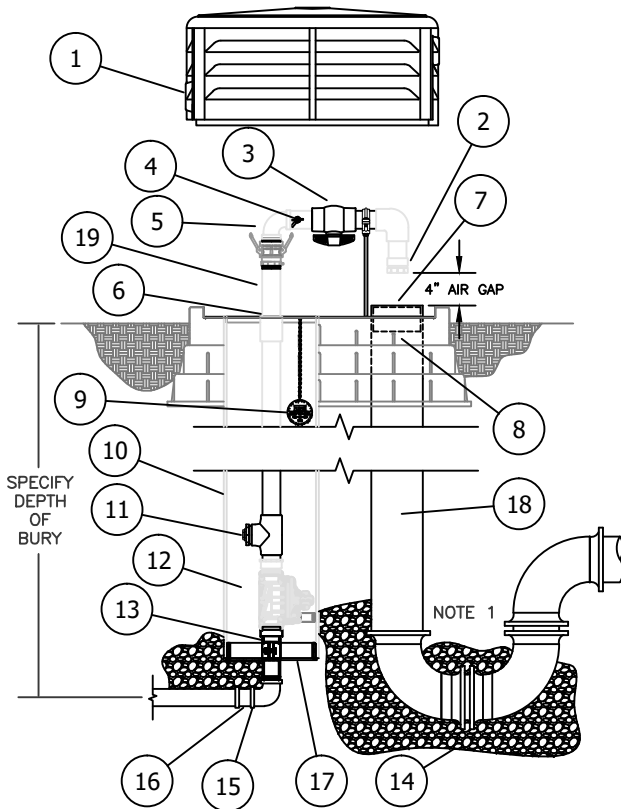
MAR. 2014

DRAWING NO.:

W-127



COLOUR CODING OF HYDRANTS



ITEM	ITEM / DESCRIPTION	OPTIONAL	BY OTHERS
1	UV RESISTANT LOCKABLE LID		
2	DIFFUSER / TRAP		
3	2" PVC BALL VALVE		
4	SAMPLING POINT		
5	2" STAINLESS STEEL QUICK DISCONNECT		
6	REMOVABLE ACCESS PLATE		
7	DECHLOR BASKET	X	
8	6" SEWER PIPE CONNECTION		
9	CONTROLLER		
10	SDR 35 PVC PIPE		
11	AUTOMATIC DRAIN		
12	2" AUTOMATIC VALVE		
13	O-RING CONNECTOR		
14	1" CLEAN ROCK		X
15	2" S.S. FIP INLET		X
16	2" MIP x COMPRESSION ADAPTER		X
17	DEBRIS PLATE		
18	6" PVC SEWER PIPE & P TRAP		X
19	SCHEDULE 80 PVC PIPE		

Automatic flushing device shall have a 2" stainless steel FIP inlet that will lead vertically to the bottom of a 2" automatic flushing valve. The flushing valve shall control the flow of water through the hydrant and its diaphragm with the extension and retraction of a DC latching solenoid and have a 150 PSI rating. Each unit shall be furnished with a stand-alone valve controller. The valve controller will not require a second hand-held device for programming. Controller must have minimum of 12 possible flushing cycles per day. Controller shall be submersible to 12 feet, operate with a 9 volt battery, and have resin-sealed electrical components. The solenoid shall have no loose parts when removed from the valve. Each unit shall have a all stainless steel sampling point. Removal of the 2" valve shall be possible via an o-ring connector located beneath the valve after the above ground disconnection of the stainless steel access plate. Valve assembly shall be housed in a PVC enclosure and each unit shall be self-draining, non-freezing. All above-ground components shall be contained within a UV-Resistant locking cover.

Unit model # shall be 9800 as manufactured by Kupferle Foundry Company, St. Louis MO (1-800-231-3990), or approved equal.

NOTE: Flush water lines free of debris before installation

NOTES

1. KUPFERLE RECOMMENDS THE INSTALLATION OF A 6" DWV P TRAP.

TOWN OF AURORA

APPROVED:

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N.T.S

REVISION:

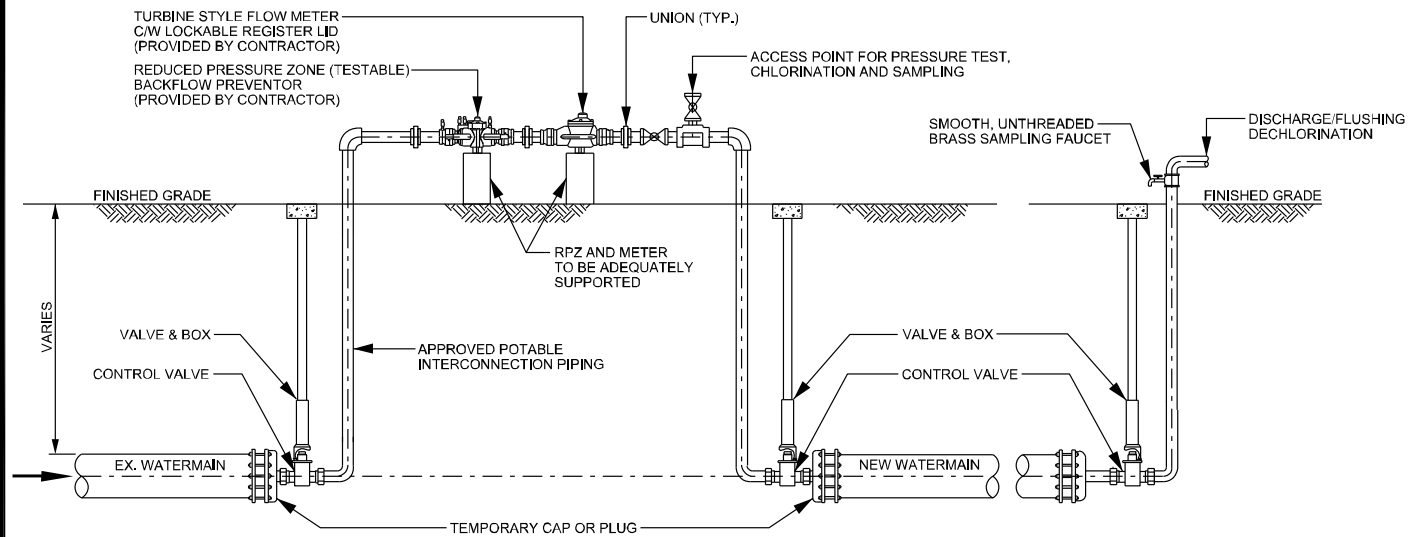
FEB. 2018

DRAWING NO.:

W-128

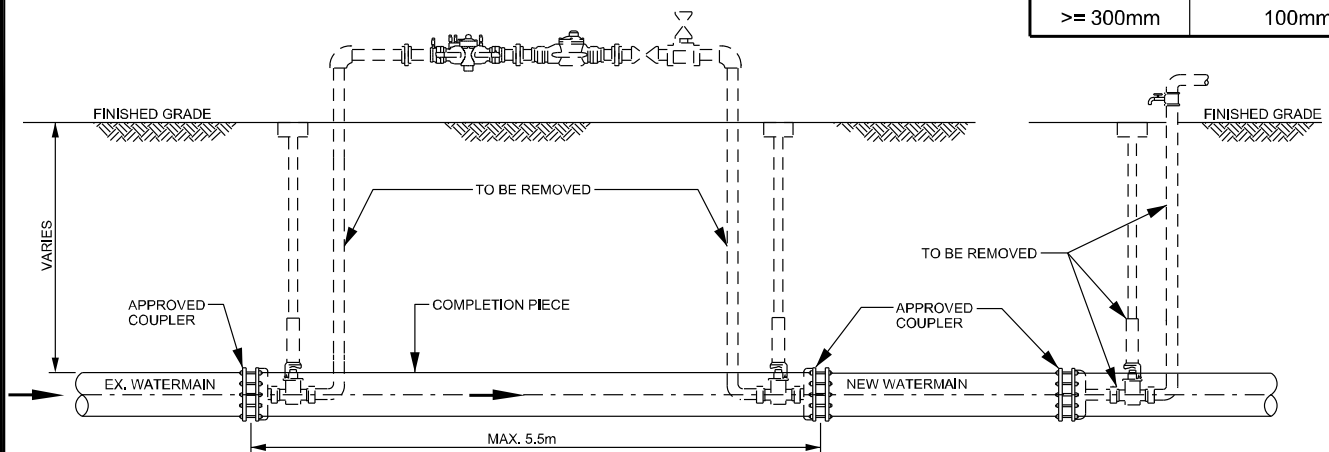


AUTOMATIC FLUSHING DEVICE



BACKFLOW PREVENTION VALVE AND FLOW METER ASSEMBLY

INTERCONNECTION	
WM SIZE	MINIMUM CONNECTION SIZE
< 300mm	50mm
>= 300mm	100mm



WATERMAIN COMPLETION ASSEMBLY

NOTE

1. THE REDUCED PRESSURE ZONE BACKFLOW PREVENTER (RPZ) MUST BE PROVIDED BY THE CONTRACTOR AND TESTED AS PER CSA B64-10. THE TESTING LOGS MUST BE ON SITE AND AVAILABLE FOR REVIEW BY THE AGENCY AT ANYTIME.
2. THE BACKFLOW PREVENTION VALVE AND FLOW METER ASSEMBLY SHALL BE DISCONNECTED DURING WATERMAIN PRESSURE TESTS.
3. THE FINAL CONNECTION OF THE WATERMAIN SHALL BE COMPLETED ONLY AFTER AUTHORIZATION BY TOWN OF AURORA.
4. THE WATERMAIN SHALL BE DRAINED BY CONTROLLED MEANS AND TEMPORARY CAP OR PLUGS INSTALLED AS REQUIRED. SUFFICIENT TRENCH DEWATERING CAPACITY SHALL BE USED WHEN THE EXISTING AND NEW WATERMANS ARE DRAINED PRIOR TO THE FINAL CONNECTION TO ENSURE NO BACKFLOW OF TRENCH WATER INTO EITHER WATERMAIN.
5. THE WATERMAIN SHALL BE CUT BACK TO REMOVE THE TAPPING POINTS OF THE BACKFLOW PREVENTION VALVE ASSEMBLY. ENSURE COMPLETION PIECE IS LESS THAN 5.5m AND DISINFECTED ACCORDING TO AWWA 651-05.
6. ONLY MUNICIPAL STAFF SHALL OPERATE MUNICIPALITY OWNED VALVES.
7. ALL NEW PIPING AND APPURTENANCES PLACED IN THE CONNECTION SHALL BE THOROUGHLY DISINFECTED WITH 1-5% SOLUTION OF SODIUM HYPOCHLORITE SOLUTION (ANSI/NSF60 CERTIFIED) ACCORDING TO AWWA C651.
8. A PHYSICAL SEPARATION MUST BE MAINTAINED AT ALL CONNECTION POINTS OF NEW WATERMANS TO THE EXISTING SYSTEMS UNTIL BACTERIOLOGICAL TESTS HAVE PASSED. A SAMPLING TAP MUST BE PROVIDED AT THE END OF EACH BRANCH OR STUB.
9. THIS DETAIL IS FOR SCHEMATIC INFORMATION ONLY. THE ACTUAL CONFIGURATION USED MUST SATISFY THE INTENT OF THIS DRAWING.
10. FREEZING PROTECTION MUST BE PROVIDED WHEN APPLICABLE. INSULATION IS REQUIRED BETWEEN FROST BOX & GROUND TO PREVENT ADHERENCE TO GROUND.
11. ALL TEMPORARY CAPS TO BE EITHER RESTRAINED OR APPROVED ALTERNATIVE. ALL RESTRAINED JOINTS AS PER PIPE MANUFACTURER'S SPECIFICATION.
12. RPZ AND FLOW METER TO BE LOCATED IN THE BOULEVARD.

TOWN OF AURORA

APPROVED:

SCALE:
N.T.S

REVISION:

NOV 2018

DRAWING NO.:

W-129



**TEMPORARY WATERMAIN
CONNECTION DETAIL FROM WATERMAIN**

APPENDIX 'E'

PLANNING AND DEVELOPMENT SERVICES POLICIES

No.	Policy	Date	Revised Date
24	Overland Stormwater Flow Routes	Sept 3, 1992	
31	Easements for Municipal Services	Nov 15, 1994	
61	Stormwater Mangement Quantity and Quality Control Requirements for Site Plans	Apr 22, 2003	
68	Stormwater Management Facility and Facility Block Design, Safety and Maintenance Policy	Sept 7, 2011	Nov 12, 2013

**TOWN OF AURORA
PUBLIC WORKS DEPARTMENT
POLICY & PROCEDURE MANUAL**


POLICY NO. 24

EFFECTIVE DATE: September 3, 1992

SUBJECT/NAME: Overland Stormwater Flow Routes

PURPOSE: To define the requirements for dedication of overland stormwater flow routes.

POLICY: Where overland stormwater flow routes are not located on road allowances or dedicated walkways, they will be located on blocks to be transferred to the Town. These blocks will be a minimum of 3.0 meters in width with the actual width being determined by the hydraulic and geometric design requirements to carry the flows for the designated design storm.


Wayne Jackson, P. Eng.
Director of Public Works

**TOWN OF AURORA
PUBLIC WORKS DEPARTMENT
POLICY & PROCEDURE MANUAL**

POLICY NO. 31

EFFECTIVE DATE: November 15, 1994


SUBJECT/NAME: Easements for Municipal Services

PURPOSE: To establish the geometric requirements for easements for sewers and watermains.

POLICY: Where an easement is required for any municipal service (sanitary sewer, storm sewer or watermain) the minimum width will be 3.0 meters.

The width of the easement may be required to be wider than 3.0 meters depending on the geometric requirements for installation/replacement of the sewer or watermain based on the minimum open trench excavation requirements of the Construction Safety Act (including the determination of the soil classification) and the size of the equipment required to perform the necessary works.

In residential subdivisions where the easement is located between lots, the sewer or watermain should be constructed 0.5 meters off the property line to allow for fence construction on the property line without directly affecting the sewer or watermain. This will result in the easement being centred about the underground service, not the property line, with more property width on one lot.


Wayne Jackson, P.Eng.
Director of Public Works

TOWN OF AURORA
INFRASTRUCTURE AND ENVIRONMENTAL SERVICES DEPARTMENT
POLICY & PROCEDURE MANUAL

POLICY NO. 61

EFFECTIVE DATE: April 22, 2003

SUBJECT/NAME: Stormwater Management Quantity and Quality Control Requirements for Site Plans

PURPOSE: This policy outlines a general procedure to follow to determine the quality and quantity control requirements for developments that are approved through the Site Plan control process. The object is to streamline the stormwater management approval process for site plans.

POLICY:

1.0 Introduction

Development has a direct impact to the quality and quantity of storm drainage runoff. Every applicant proposing development within the Town is responsible for the quality and quantity treatment of storm drainage runoff to mitigate the impacts of development, in accordance with the current Town of Aurora, Lake Simcoe Region Conservation Authority (LSRCA), and Provincial Stormwater Management Guidelines.

Property developed through the Site Plan control process may require approvals relating to the proposed Stormwater Management (SWM) system from the Region of York, the Lake Simcoe Region Conservation Authority (LSRCA), the provincial government: Ministry of Natural Resources (MNR), Ministry of Environment (MOE), or the federal government: Department of Fisheries and Oceans (DFO). In other cases, the SWM system may not require approvals from any outside agencies. This Public Works Department policy is intended to deal primarily with sites that require no approvals from any outside agencies, although it applies to all sites developed under the Site Plan control process.

It is noted that the owner is required to ensure that all necessary approvals have been obtained from any and all outside owners and agencies for all proposed SWM works prior to commencement of construction of the works. The approval from the Town for the SWM system does not relieve the owner from that obligation.

1.1 Site Plan Amendments

This policy it is not intended to be retroactive. For site plan amendments it will apply to the portion of the site subject to the amendment and not to the previously approved site plan.

2.0 General Requirements and Scenarios

In consultation with the Town and LSRCA, the owner's Consultant shall determine if an approved Master Servicing Plan, Stormwater Management Report, Subdivision Agreement, etc., exists which specifies the level of quality or quantity control required, other treatment measures to be implemented for the proposed development site, and existing or proposed downstream stormwater management facilities. The Consultant shall then determine which of the following scenarios applies to the proposed development:

2.1 Scenarios

1. Downstream quality and quantity control facilities are in place or proposed which service the proposed development area (proceed to Section 3.0);
2. Only downstream quantity control facilities are in place. No downstream quality control in place (proceed to Section 4.0); or
3. No downstream quality or quantity treatment facilities in place or proposed to service the subject development (proceed to Section 5.0)

Backflow Preventers

Backflow preventers are not permitted to be used as control devices in storm sewer mains under any circumstances.

Section 3.0: Existing or Proposed Downstream Quality/Quantity Control

For this case, downstream facilities are in place to provide the required quality and quantity treatment of storm drainage for the proposed development, or have been proposed and approved but not yet constructed. Additional site quantity control may be required depending on the minor and major system design as outlined in Sections 3.1 and 3.2.

3.1 Minor System (5-year event)

The Consultant shall review existing storm drainage area plans and

design sheets and compare original design parameters (contributing area, runoff coefficient) to the proposed design parameters. If the proposed flows (up to and including the 5-year design storm) are less than or equal to the original design flows then no additional quantity control is required for the minor system. If proposed design flows exceed the original design then the Consultant shall follow the option indicated in either Section 3.1.1 or 3.1.2.

3.1.1 Option 1 – Residual Capacity Analysis

The consultant may investigate whether the existing downstream minor system has residual capacity to accommodate additional design flows from point of connection to the existing outfall. The consultant shall also assess the ability of the existing downstream SWM facility to accommodate any additional storm runoff and maintain the same level of quality and/or quantity treatment. The approval for an owner to utilize residual capacity in the downstream minor system shall be at the sole discretion of the Town.

3.1.2 Option 2 – Additional Site Quantity Control

The Consultant may provide on-site quantity control to reduce post development flows (up to and including the 5-year peak design flow) to the original design flows. Roof top storage, oversized sewer pipes storage and paved area storage will be permitted. The depth of ponding within a paved area shall not exceed 0.25m. Storage within depressed landscaping/grassed areas will be permitted and depth of ponding shall not exceed 0.6m. At-source infiltration of roof drainage is encouraged as a method of quantity control where native soils are suitable based on geotechnical recommendations.

3.1.3 Contributing External Areas – Minor System

The proposed minor system shall be designed to accommodate contributing external drainage from adjacent built up lands or to accommodate future development of external lands as identified within the Master Servicing Plan, Subdivision Agreement, etc. The Town will identify any requirements for drainage easements within the development.

3.2 Major System (100 Year Event)

The Consultant shall confirm the original design intent for the direction of major system flow which shall outlet to an existing R.O.W. or a defined overland flow route within Town ownership or control (i.e. an

easement). Generally, no exceptions to the original design intent will be permitted. The site shall be graded, to ensure positive drainage to the intended major system outlet such that the depth of ponding under 100-year event does not exceed 0.3m.

In situations where the proposed site servicing or grading impose constraints that would not permit conveyance of the major system flows as per the original intent of the design, the Consultant shall undertake the procedure setout in Section 3.2.1

3.2.1 Analysis of Alternate Major System Routes

The consultant shall investigate alternate major system flow routes from the site through any adjacent properties to an existing watercourse, existing R.O.W., or overland flow route within Town lands/easement. The purpose of this investigation is to determine if a suitable alternate overland flow route exists which is acceptable to the Town and to any affected property owners (if necessary). If the alternate major system flow route is accepted, then on-site quantity storage may be required to limit peak flows to pre-development levels at the discretion of the Town. Any deviation from the original intent of the design shall be at the sole discretion of the Town.

In lieu of the above investigation, or if the overland flow route is not acceptable to the Town or other affected property owners, or the Town is aware of historical drainage issues in the area, the consultant will be required to provide on-site storage to control 100-year post development flows to the capacity of the minor system (i.e. major system flows will be contained within the site). Rooftop storage, oversized sewer pipes storage and paved area storage will be permitted and depth of ponding within a paved area shall not exceed 0.30m. Storage within depressed landscaping/grassed areas will be permitted and depth of ponding shall not exceed 0.6m.

3.3 Contributing External Areas – Major System

The proposed major system shall be designed to accommodate contributing external drainage from adjacent built up lands or to accommodate future development of external lands as identified within a Master Servicing Plan, Subdivision Agreement, etc. The Town will identify any requirements for drainage easements within the development.

3.4 Interim or Temporary Facilities

In situations where the ultimate downstream facilities have not been

constructed and/or where trunk sewers have not been completed to convey storm drainage to the ultimate facility, interim or temporary on-site facilities will be considered by the Town. Any temporary facility must provide an equivalent level of quality and quantity control provided in the ultimate facility to the satisfaction of the Town. Any temporary facility will be required to remain in place until the ultimate facilities or trunk sewers are constructed. The Site Plan Agreement will be structured to require the owner to be solely responsible for maintenance and operation of temporary facilities as well as any demolition, removals and restoration associated with decommissioning of the temporary facility, including disposal of any contaminated sediments in accordance with applicable Provincial guidelines and regulations. Ponding depths within any temporary facility shall be in accordance with the Provincial guidelines for the design of quantity and quality control facilities.

Section 4.0: Only Existing Downstream Quantity Control, No Downstream Quality Control

4.1 Minor and Major System Design – Quantity Control

In this scenario, Consultants shall follow the procedures outlined in Section 3.0 to address any additional on-site quantity control relating to design of major and minor system that may be required.

4.2 Quality Control

The Consultant shall propose quality treatment of stormwater in accordance with the latest version of the MOE Stormwater Management Practices Planning and Design Manual. The Consultant shall review and recommend lot level controls, conveyance controls and end-of-pipe stormwater controls to provide quality treatment of stormwater. The level of protection required shall be determined in consultation with the Town and the LSRCA (if necessary). The minimum acceptable level of protection shall be Level 1, which provides for at least 80% Total Suspended Sediments (TSS) removal, unless specifically approved otherwise by the Town and/or LSRCA.

For all Site Plans, the minimum level of quality control that is acceptable in the Town is the provision of an oil/grit separator sized for Level 1 protection. Any relief from this minimum requirement shall be at the sole discretion of the Town, and it shall normally be granted only when no storm sewer system is required to service the Site.

Section 5.0: No Downstream Quality or Quantity Controls

5.1 Major and Minor System Design – Quantity Control

Where the Town and/or LSRCA have confirmed that no downstream quantity controls are in place, the consultant shall follow the procedure outlined in Section 3.0 for design of the minor and major storm drainage systems. In this case, original design intent or parameters are replaced by existing site conditions. The intent of the proposed major and minor system design will be to limit post development flows from the site to pre development levels for all design storms up to and including the 100 year storm. The Town reserves the right to request site-specific quantity controls based on historical drainage issues which may be impacted by the proposed development.

5.2 Quality Treatment

Follow the same procedure outlined in Section 4.2 to address quality treatment requirements.

6.0 SWM System Installation and Maintenance

The owner of the site is solely responsible for the operation and maintenance of the SWM system on the site.

After the installation of the SWM controls the owner of the site shall provide a letter from the engineering consultant certifying that the SWM controls have been installed in accordance with the approved plans. This requirement shall be included as a condition in the Site Plan Agreement for the Site.

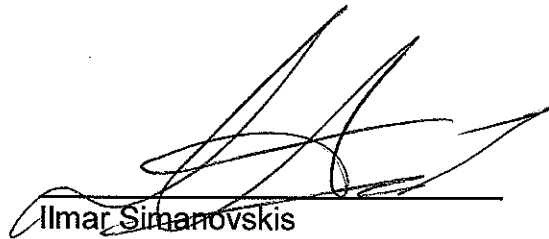
If a Certificate of Approval has been issued by the provincial MOE for the SWM system, the site owner shall be required by one of the conditions attached to the said approval to operate and maintain the SWM system on the site in accordance with the requirements of the Ministry. This requirement shall be reflected in the Site Plan Agreement for the site and shall be registered on title to ensure that any future owners of the site will be aware of this requirement.

If a Certificate of Approval is not required for SWM system, the owner shall be required in the Site Plan Agreement to maintain the system in accordance with the guidelines contained in the latest version of the MOE Stormwater Management Practices Planning and Design Manual. This requirement shall be registered on title to ensure that any future owners of the site will be aware of this requirement.

7.0 Drawings and Documentation

If required to implement SWM controls, the owner shall submit a SWM Report which is signed and bears the seal of a Professional Engineer. The Report shall detail:

- Existing and proposed drainage patterns and areas;
- Stormwater runoff calculations, including details of existing and proposed runoff coefficients;
- Techniques proposed for quantity and/or quality control;
- Amounts and locations of stormwater quantity storage; and
- Any drawings or other information required to describe the proposal.

A handwritten signature in black ink, appearing to read 'Ilmar Simanovskis', is written over a horizontal line.

Ilmar Simanovskis
Director of Infrastructure & Environmental Services

Figure 1 – Overall

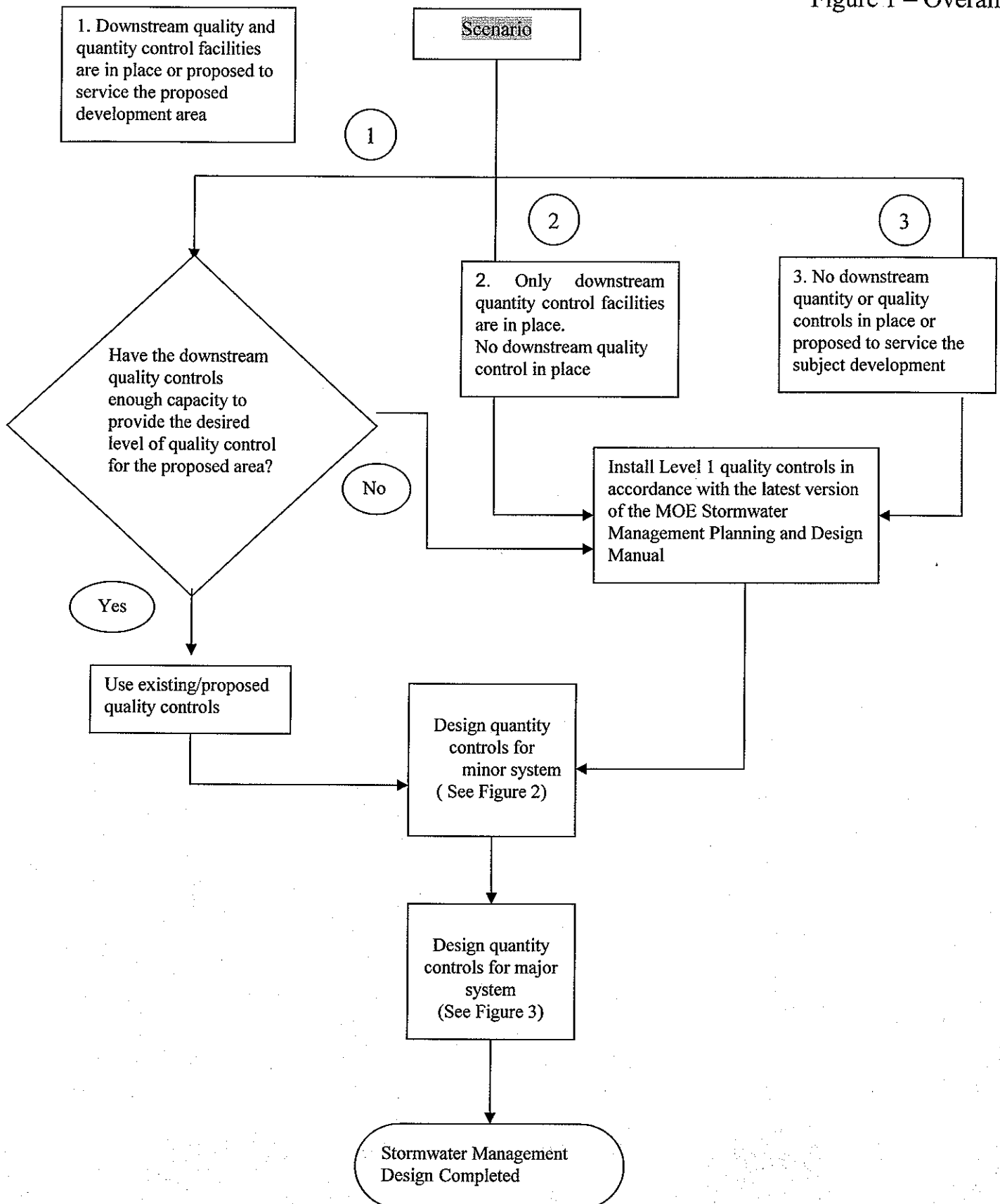


Figure 2 – Minor System Quantity Control

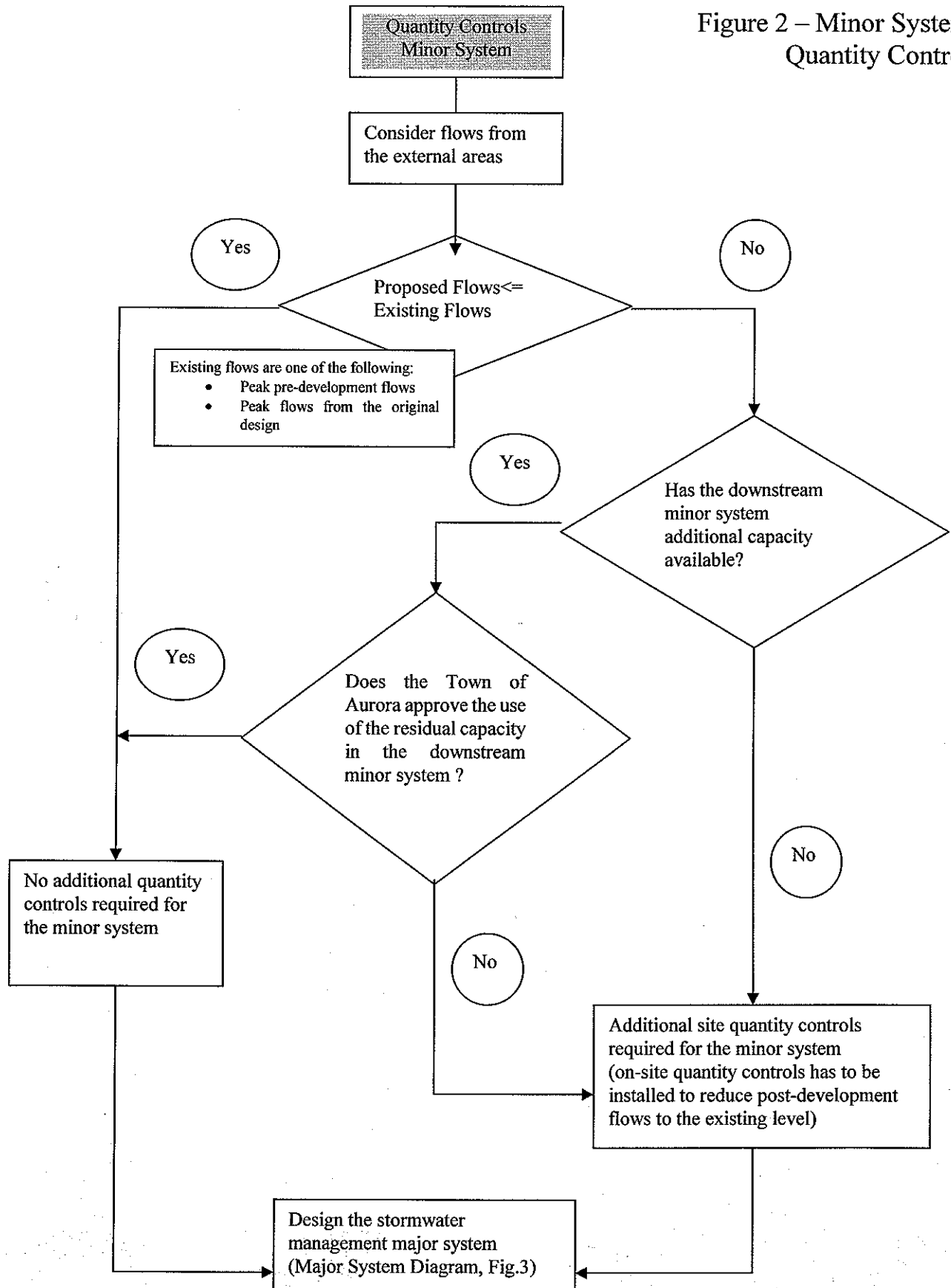
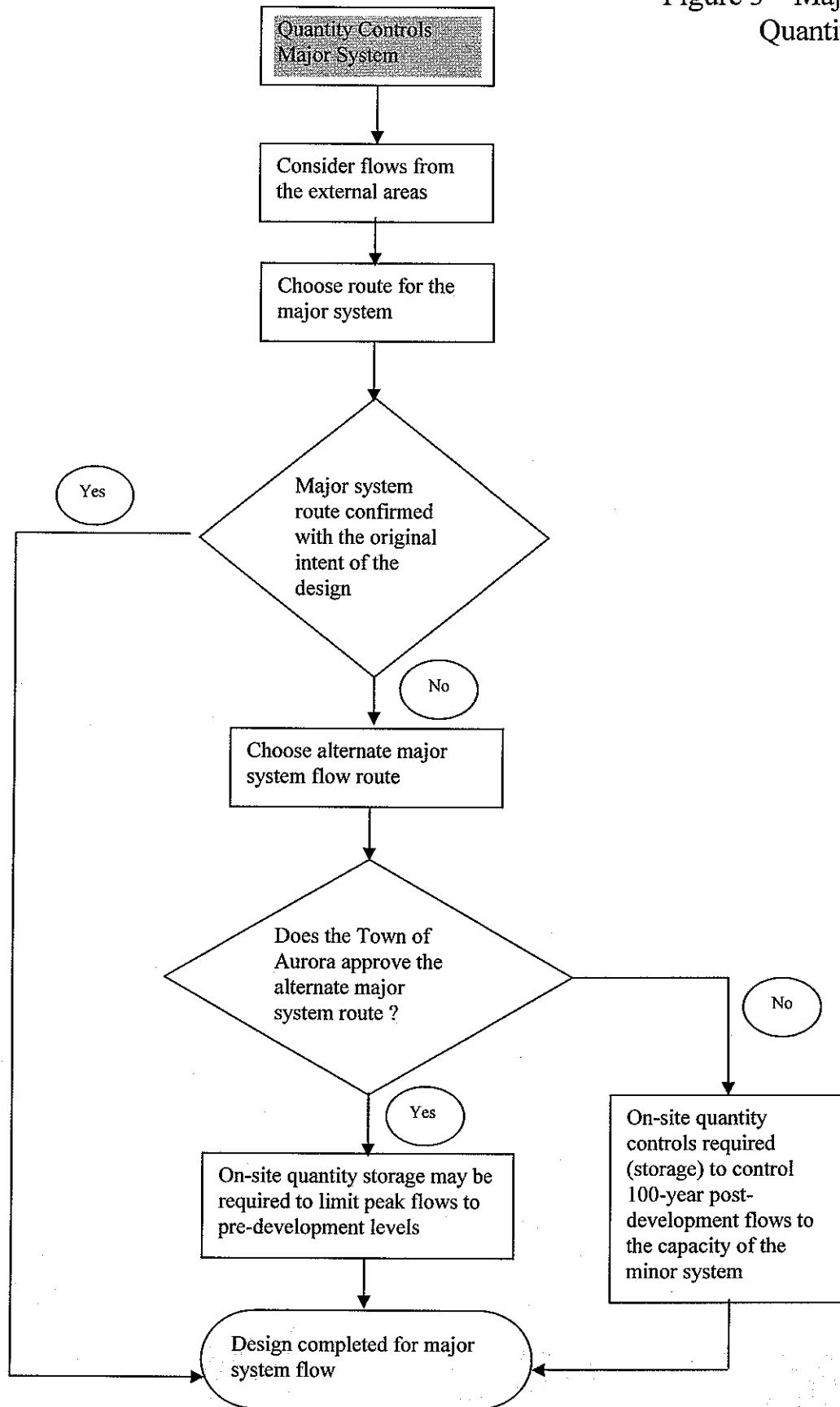


Figure 3 – Major System
Quantity Control



**TOWN OF AURORA
INFRASTRUCTURE & ENVIRONMENTAL SERVICES
POLICY & PROCEDURE MANUAL**

POLICY#68

EFFECTIVE DATE: September 7, 2011

REVISED DATE: November 12, 2013

**SUBJECT/NAME: STORM WATER MANAGEMENT FACILITY AND
FACILITY BLOCK DESIGN, SAFETY AND
MAINTENANCE POLICY**

1. Definitions:

SWM: Storm Water Management

SWM Facility (Facility):

Within this policy and at the Town's discretion SWM facility may be interpreted as any SWM facility type including but not limited to: dry, wet and hybrid SWM ponds, wetlands, oil grit separators of various types, infiltration and filtration facilities, underground facilities, etc.

SWM Pond (Pond):

Within this policy and at the Town's discretion SWM Pond may be interpreted as any SWM facility type that retains or will retain open water.

2. Purpose/Policy:

- To ensure SWM facilities are effective in providing erosion, flood and enhanced water quality control;
- To provide SWM facilities that are adaptable to changes in design criteria, policies, land use and environment;
- To ensure that SWM facilities are not only functional components of a community, but are also aesthetically pleasing, a key component of connected open space areas and are well integrated within their surrounding environment;
- To improve the ease, safety and cost effectiveness in the maintenance of SWM facilities and facility blocks;
- To ensure public safety within SWM facilities;
- To provide guidance for the planning, design and review of SWM facilities within the Town of Aurora.

3. Policies and Design Criteria:

3.1 This policy shall be read in conjunction with the most recent policies and design guidelines of the applicable authorities including but not limited to:

- Town of Aurora (TOA);
- Ministry of the Environment (MOE);
- Lake Simcoe Region Conservation Authority (LSRCA);
- Toronto and Region Conservation Authority (TRCA);
- Ministry of Natural Resources (MNR);
- Department of Fisheries and Oceans (DFO);

Where there are conflicts the most stringent policy and design guidelines shall govern.

3.2 Effort must be shown to:

- Meet the criteria found within the most recent Town of Aurora Design Criteria Manual; and to
- Meet the preferred design criteria of the most recent MOE Stormwater Management Planning and Design Manual.

Written approval from the Town of Aurora is required prior to any deviations from meeting these criteria.

3.3 The following design criteria must be met unless approved otherwise in writing by the Town of Aurora:

- Retaining walls are not permitted within SWM pond blocks;
- Maximum slope to be 5:1 from 0.5m above the SWM pond's maximum water level to the base of the pond and below all areas within a SWM pond block that are accessible to the public. All other areas within SWM pond blocks shall have a maximum slope of 4:1.

4. Adaptability:

4.1 An effort shall be made to design and size a SWM facility and facility block that can be easily altered to accommodate change, including but not limited to:

- Differences in design to that of actual conditions;
- Changes in drainage area and land-use;
- Development and construction phasing;
- Changes in the environment including climate change;
- Future changes in design criteria and policies;
- Creation of and changes to SWM master plan design criteria and sub-watershed design criteria;
- Changes in technology.

- 4.2 Where more than one phase of development has been proposed a SWM plan shall ensure that SWM facilities provide the approved levels of control of storm water runoff as the catchment areas are being altered during development.
- 4.3 Consideration shall be provided of how a SWM facility's outlet structures and weirs may be efficiently and effectively modified so that the SWM facility's flow rates and detention times may be adjusted, if required. Modification without excavation or draining of a permanent pool is preferable.
- 4.4 The Town of Aurora at its own discretion will decide if the adaptability measures provided for a SWM facility and facility block are adequate on a case by case basis.

5. Opportunities:

- 5.1 The Town of Aurora would like to:
 - Reduce the number of SWM facilities it needs to maintain;
 - Improve SWM facility efficiency and effectiveness;
 - Improve connectivity of SWM pond blocks with other open spaces and trail networks.
 - Reduce surface water temperature released from a SWM facility;
 - Provide runoff volume control;
 - Increase groundwater recharge;
 - Infiltrate treated surface water runoff;
 - Utilize new technologies and SWM practices that are cost effective;
 - Consider using a more holistic, multi-component approach to storm water management and try to integrate various technologies and/or SWM practices with each other;
 - Where feasible, customize treatment of surface water runoff based on its expected and potential contaminant loading;
 - Achieve above standard control of storm water runoff, where feasible;

As such, where there is opportunity, land to be developed should attempt to satisfy the above.
- 5.2 Before Draft Plan approval and through to final design of a SWM facility, existing and potential storm water reuse opportunities for the developer, adjacent property owners and the Town should be investigated.
- 5.3 The Town of Aurora at its own discretion will decide if the above existing and potential opportunities for a SWM facility and facility block have been adequately considered on a case by case basis.

6. SWM Facility Block Design Features, Setbacks and Buffers:

- 6.1 Features of and within the SWM facility block should blend into the facility block's surroundings. The following should be taken into consideration, where feasible:
- Geometric forms to be avoided;
 - Minimize use of exposed hard surfaces;
 - Concealment of facility inlet and outlet structures and exposed hard surfaces;
 - Minimize clearing of existing vegetation;
 - Where feasible natural stone and plant material should be used in place of concrete and hard structures.
- 6.2 Appropriate buffers and setbacks shall be provided within the SWM pond block. As a minimum the following shall be provided, unless approved otherwise in writing by the Town of Aurora:
- A minimum 1.5m buffer with maximum 5% slope shall be provided around the perimeter of the pond block except at road right-of-ways which shall have a 3.0m buffer with maximum 5% slope and at Town owned open areas, which does not require a buffer unless requested by the Town;
 - Pond berms shall have a minimum width of 3.0m;

7. SWM Pond Permanent Pools and Active Storage Area:

- 7.1 A wet pond is the Town of Aurora's preferred end of pipe SWM facility.
- 7.2 For ponds that have a contributing drainage area inadequate for sustaining a permanent pool a multi-component approach to meet water quality objectives shall be implemented.
- 7.3 The shape of a SWM pond should be designed to prevent dead zones (stagnant areas) or standing water. No dead bay areas should be permitted.
- 7.4 A 0.30m freeboard shall be provided above the design high water level.
- 7.5 For ponds with a permanent pool a terrace shall be provided 3m wide either side of the permanent pool's normal water level shoreline with a 7:1 maximum slope.
- 7.6 Maximum pond depth shall be 3.0m with an additional 0.30m freeboard to improve public safety and prevent the pond from becoming stratified and creating anoxic conditions.
- 7.7 A geotechnical report should be provided to confirm if a liner is needed to sustain a permanent pool and/or for protecting aquifers.

- 7.8 Where feasible vegetation should be located and maintained such that organic debris from them into the pond is limited.
- 7.9 For wet pond designs consideration should be made to ensure wetland vegetation does not create dead zones within the permanent pool.

8. Storm Water Passing Through SWM Facility Block:

- 8.1 Storm water shall pass through a SWM facility block by means that do not jeopardize the public's safety, cause erosion or damage to the infrastructure within it. The storm water that exits a SWM facility block shall not negatively impact public health and safety downstream. The following shall be considered and any deviations from the following will require written approval from the Town:
- Storm water passing through a SWM facility block must not exceed safe depth/velocity relationships for up to the 100 year storm event;
 - Major overland flow routes should be within blocks and road right-of-ways instead of easements;
 - Adequate erosion protection shall be provided for the emergency overflow and overland flow routes. Where major flows discharge to a ditch or watercourse, the maximum velocity of flow should not exceed 1.5m/s. An energy dissipater to reduce flow velocity to an acceptable rate should be considered when flow velocities exceed 1.5m/s;
 - Exposed rock lined channels that convey storm water from a pipe outlet to a SWM facility should be avoided;
 - The outlet structure for a facility shall discharge to a point downstream which has the ability to safely and adequately accommodate the maximum discharge;
 - The discharge point from the facility and the path of the storm water downstream of it shall be defined and checked as to their ability to safely and adequately accommodate the maximum discharge;
 - The flow path from the facility emergency overflow spillway to an approved outlet must be identified. The overflow spillways shall discharge to the regional downstream flow path.

9. SWM Facility Inlet and Outlet Structures:

- 9.1 The following should be considered in regards to SWM facility inlet and outlet structures:
- Submerged inlets should be avoided, since they may freeze, as they are filled with standing water;
 - The outlet structure for SWM ponds should be located within the pond banks for maintenance access, safety and aesthetics;
 - For cleaning purposes, the outlet structure should be designed to allow easy and safe access for cleaning of the inlet side during peak runoff;
 - To maximize water quality treatment the SWM pond outlet should be located as far as possible from the pond inlet;
- 9.2 For safety purposes, escape aides (i.e., ladders, steps, etc.) should be provided on the inlet side of all outlet structures.
- 9.3 All inlet and outlet openings shall be provided with protection, such as trash racks, grates or stone filters, to ensure that they remain functional and for public safety. Inlet pipes, outlet pipes and principal spillway openings shall be designed to prevent access from children.
- 9.4 Outlet structures shall be designed to prevent entry of major debris into the structure.
- 9.5 The hydraulic and structural design of the protection provided over inlet and outlet openings should allow for passage of design flows with fifty percent blockage with debris and have at least twice the required hydraulic capacity to allow for possible plugging.
- 9.6 Consideration should be provided in ensuring that the velocity of flow through the protection provided over inlet openings will not create a hazard to the public. Velocity of flow through gratings on inlets to pipes should not exceed 1.0m/s for maximum expected flows during the 100 year storm event.
- 9.7 A maximum clear bar spacing of 150mm should be used for gratings.
- 9.8 Deviations from the above will require written approval from the Town.

10. Emergency Spillway:

- 10.1 An emergency overflow spillway shall be provided on all SWM facilities.
- 10.2 An emergency overflow spillway shall be provided to allow the safe exit of storm water should the outlet structure fail or the storm event exceeds the 100-year event.

- 10.3 The SWM facility shall provide sufficient storage so the operation of the emergency overflow spillway does not occur during the 100 year storm event.

11. Stream warming:

- 11.1 Proposed landscaping and SWM pond design should make an effort to maximize shading over the pond and discharge channel.
- 11.2 Consideration should be provided in orientating, grading and shaping the pond to maximize the amount of possible shading to reduce stream warming.
- 11.3 The SWM facility design shall avoid excessive concrete and riprap use and minimize tree clearing along the downstream channel.

12. Modeling:

- 12.1 All ponds shall provide enhanced water quality control.
- 12.2 A minimum 24 hour detention time for the 25mm storm event should be provided by all SWM ponds. The detention time and storage volume requirements may be increased as specified by an approved master drainage plan, watershed plan or required by conservation authorities.

13. Inspection, Maintenance & Safety Access:

- 13.1 Before Draft Plan approval a functional servicing report will need to demonstrate that the SWM facility and facility block is located and sized appropriately to accommodate the need for inspection, maintenance and monitoring.
- 13.2 A SWM facility and facility block shall incorporate the need for maintenance and inspection. At the detail design stage a maintenance and operation guideline shall be provided for a SWM facility. The guideline should identify what maintenance and inspection will be required. It should also provide a detailed description and methodology of how maintenance will be provided including but not limited to the type of equipment, materials, space/storage requirements, how access will be provided, etc. Frequency of maintenance and inspections should also be included in this guideline along with a breakdown of the costs associated with maintenance and inspection.
- 13.3 From start of construction to SWM facility assumption the developer shall follow the Operation, Maintenance and Monitoring guidelines provided in the most recent MOE Stormwater Management and Planning Design Manual. During this period annual operation and maintenance inspection reports shall be provided to the Town by a qualified professional engineer registered in the Province of Ontario.

Inspections should be made after every significant storm event, where at least 25mm of rain falls in a 24 hour period, to ensure the SWM facility is functioning according to its original design. The level of inspection and monitoring will be approved by the Town on a case by case basis. The final report shall provide operation, maintenance and monitoring recommendations for after SWM facility assumption.

- 13.4 Developers shall provide to the Town cash in lieu of maintenance required during a 50 year life expectancy of a proposed SWM facility proposed by them. Any deviations from this will require written approval from the Town. The monies to be provided to the Town will be based on the estimated present cost of future maintenance and should follow the estimated maintenance costs provided in Chapter 7 Capital and Operational Costs of the most recent MOE Stormwater Management Planning and Design Manual. The amount of monies to be provided to the Town in lieu of future maintenance will be approved by the Town in writing on a case by case basis.
- 13.5 The Town may wish after facility assumption to monitor how well a SWM facility is functioning to see if it is meeting its design criteria and/or to see if changes in land use or environment are affecting its performance. A maintenance plan should discuss how monitoring could be incorporated along with its associated costs.
- 13.6 Landscape maintenance for SWM facilities will be directed by the Town on a case by case scenario.
- 13.7 Access for Maintenance, inspection, survey, monitoring and emergency shall be provided within a SWM facility and facility blocks. The following should be considered regarding access roadways within a SWM facility and facility block:
 - Access should be provided to the facility inlet, base of pond forebay, pond terrace, pond base, facility outlet, facility structures, spillways, gate valves and fill slopes that hold back water;
 - Maintenance right-of-way to extend to the facility block from a public or private road;
 - Minimum maintenance right-of-way width between private lots to be 10.0m;
 - Minimum width to be 4.0m with the addition of 0.5m minimum roundings;
 - Maximum cross fall to be 2%;
 - Maximum gradient to be 10%;
 - Minimum centerline radius to be 12m;
 - Access roadway structure to be determined based on its expected use. The Town of Aurora will approve the access roadway structure on a case by case basis. As a minimum the access roadway structure should consist of geotextile under 300mm of granular 'A';
 - Allow vehicles to turn around safely within the facility block.

- 13.8 Where feasible, a maintenance pipe outlet should be provided for each pond and forebay area. The maintenance pipe shall be designed to prevent sediment deposition and have capacity to drain the pond and/or forebays in no less than 6 hours. Draining of pond and forebays shall be avoided during the spring season. The maintenance pipes shall be equipped with a gate valve. The gate valves should be located where they will not normally be inundated with water and can be operated in a safe matter. The gate valves should be protected from vandalism. An access chamber with lockable lid may be sufficient.
- 13.9 The Town of Aurora shall be notified in writing prior to draining a pond and/or forebay.
- 13.10 Graduated fixed vertical sediment depth markers should be installed within the pond's permanent pool to indicate water level and locations to measure sediment deposition over time.

14. Fill Slopes that hold back water (Embankments):

- 14.1 The following shall be taken into consideration regarding fill slopes that hold back water:
- Minimize the use of embankments to hold back water where feasible;
 - The type of vegetation allowed on and in proximity to embankments;
 - Inspection and maintenance required on and in proximity to embankments;
 - The facility outlet structure, outlet piping and emergency spillway, where feasible, should be located in an undisturbed abutment area, not in the embankment for stability reasons;
 - Outlet structures and piping within an embankment should be installed with collars to prevent water from seeping through the fill of an embankment and causing structural failure.

15. Safety:

- 15.1 Fencing, as per Town standards, shall be provided within the pond block adjacent to private property lines. Gate access shall not be permitted.
- 15.2 Safety barriers shall be provided over any features within the pond and pond block with a sharp elevation drop greater than 600mm.
- 15.3 Where there is a need to discourage or limit public access to areas around the perimeter of a pond, living fences and barrier planting shall be utilized in place of fencing.

15.4 Town of Aurora standard warning signage to be placed as follows:

- Along pond block perimeter;
- Adjacent to pedestrian and cycle traffic routes within the pond block;
- One sign minimum per street frontage (facing street);
- Maximum sign spacing to be 75m.

15.5 A SWM pond should provide markers, for the public to see, indicating the SWM pond's water level.

16. Landscaping:

16.1 Landscaping of SWM facilities and facility blocks shall be in accordance with Town of Aurora Landscape Standards Policy.

17. Storm water Management Facility Certification Report:

17.1 SWM facilities shall be certified prior to assumption to ensure they are constructed properly and that they will function as per their design criteria. The following should be followed to ensure a SWM facility is certified properly:

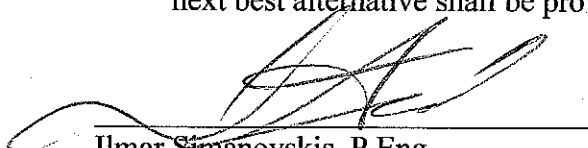
- Prior to assumption sediment that has accumulated within the SWM facility should be removed. Pipes within the facility may be flushed and SWM facility structures, filter media, infiltration media and outlet pipe stone jackets may be cleaned at the Town's discretion;
- Once the SWM facility has been cleaned to the Town's approval then an as-constructed survey of the facility should be completed.

17.2 A SWM Facility Certification Report is required as shown in the Town of Aurora's most recent Design Criteria Manual. The following attachments are required with this certification report:

- Facility Approved Plan;
- Facility As-Constructed Survey;
- As-Constructed Hydrology Modeling and Facility Operating Characteristics;
- Maintenance and Operation Guideline.

18. Infill Areas and Retrofits:

18.1 New SWM facilities within existing development areas or retrofits to existing SWM facilities shall follow the above policies. If a policy is proven unfeasible the next best alternative shall be provided and approved in writing by the Town.


Ilmar Simanovskis, P.Eng.
Director of Infrastructure & Environmental Services

NOV 25, 2013