TOWN of PENETANGUISHENE

LAND DEVELOPMENT ENGINEERING POLICY

Revision No. 1, April, 2009

Liberty ENGINEERING

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October, 2002
LIBRTY ENGINEERING

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ADDENDA

ADOPTION of LAND DEVELOPMENT ENGINEERING POLICY

This Policy relating to engineering Design Standards and the requirements for submission to the Town of Penetanguishene of Engineering Design Drawings and Documents for the Development and Redevelopment of Lands in the Town of Penetanguishene is hereby adopted as Policy by the Council of the Town of Penetanguishene at the Meeting of Council of the Town of Penetanguishene on _____, 2009.

Dated the _____ Day of _____, 2009.

_____ _____

Mayor Chief Administrative Officer

1.0 INTRODUCTION

1.1 PURPOSE

For the purposes of achieving uniformity in the approach to the design and construction of infrastructure works in the Town of Penetanguishene, and to set out the parameters for Developers contemplating the development or redevelopment of lands within the municipal boundaries, the Town of Penetanguishene has caused to be prepared and has adopted this Policy Document.

1.2 ENGINEERING RESPONSIBILITY

The responsibility for the design and construction supervision of infrastructure works for the development or redevelopment of lands within the boundaries of the Town of Penetanguishene lies with a Professional Engineer in the employ of a Consulting Engineering Firm retained by the Developer of such lands. The selection of the Consulting Engineering Firm by the Developer is subject to approval by the Town. The responsibilities of the Consulting Engineer include:

- Design of all the works required under the Subdivision Agreement or Site Plan Agreement;
- Preparation of Drawings, Specifications and Contract Documents for the said works;
- Preparation and submissions of Applications for approvals to all agencies having jurisdiction, and follow-up work to obtain all approvals;
- Preparation of Estimates of Cost for the contemplated works;
- Arranging for tendering of the works and the awards of Contracts. The selection of Contractors is subject to approval by the Town;
- Supervision of construction and the production of records of construction;
- Preparation and submission to the Town of ■As Constructed• drawings;
- Certification to the Town that the completed works conform to the accepted design drawings and specifications.

This Policy Document is not to be interpreted to be a Design Manual. Adherence to the criteria for the design of infrastructure works as given in this Policy Document is not a substitute for the application of sound engineering principles and excellence in design. Furthermore, adherence to the criteria does not provide relief from the responsibility for the design of the infrastructure works.

Included in the responsibilities of the Developer and his/her engineer is the responsibility for examining the density/lot sizes within the proposed development to ensure that the lot sizes and infrastructure design are compatible with the nature and topography of the land, and that the density and lot sizes conform to the existing zoning requirements, or to the zoning intended by the Town for the development or redevelopment of the property.

This policy sets out for land development and redevelopment the Design Parameters to which the Developer will normally adhere. The Town recognizes that there exist topographical and other physical conditions which require engineering and design applications outside of the normal parameters. In such cases the Town's Public Works and Engineering Staff will examine with the Developer's engineer alternative approaches to infrastructure design.

1.3 ENGINEERING REVIEW

Engineering designs for infrastructure works for the development or redevelopment of lands within the Town will be reviewed for acceptance by the Town's Public Works staff and/or Engineering staff. All such review and acceptance processes will be at the expense of the Developer. Similarly, time spent by Town staff or Consultants engaged by the Town for the examination of alternative approaches as mentioned in Section 1.2 above will be at the Developer's expense.

2.0 GENERAL SERVICING REQUIREMENTS

2.1 PRELIMINARY DESIGN/DRAFT PLAN

The Developer of vacant lands or of lands for redevelopment shall cause to be prepared a Preliminary Draft Plan or Preliminary Site Plan for review and comments by the Town Public Works, Planning and Engineering Staff and Consultants. In cases of Draft Plans of Subdivision, it is recommended that the intended lot sizes are agreed upon by the Town prior to the preparation of Engineering Designs and Drawings.

At the Preliminary Design/Draft Plan stage the Developer shall have engineering studies completed to determine the space requirements for such facilities as, but not necessarily limited to, Storm Water Management facilities, Drainage Easements, Utility Easements, Pumping Stations and Park Lands. The Preliminary Plan shall show evidence that in its preparation the following matters have been taken into consideration:

- That the configurations of lots and/or buildings are in accordance with the applicable zoning requirements;
- That the configuration of lots and/or buildings are compatible with the configurations of roads, grades, drainage requirements (both sanitary and storm), water supply requirements, etc.;
- That the locations of dead-end roads at the boundaries of the development are compatible with the future development of adjacent lands;
- That the need for possible widening of road rights-of-way for existing adjacent roads has been addressed;
- That the proposed widths of rights-of-way within the Development are adequate to accommodate side slopes, drainage facilities and sidewalks;

- Such other matters as would necessitate overall revisions to the Plan (red line revisions in the case of Draft Plans) if not resolved at the Preliminary Design stage.

2.2 APPROVALS

2.2.1 ENGINEERING APPROVALS and ACCEPTANCE

Six copies of the Engineering Drawings, Specifications and Contract Documents and the design documentation for the Sanitary Sewage System, the Storm Water Drainage System, the Storm Water Management facilities and the Water Supply System are to be submitted to the Chief Administrative Officer of the Town of Penetanguishene for acceptance. These items will not be considered as having received acceptance from the Town until the original tracings of all the Engineering Drawings are stamped with the Acceptance Stamp of the Town, and signed by the Director of Public Works and the Town Engineer. Upon the receipt of the Town's acceptance the Developer shall deposit with the Town six sets of white prints of the accepted Engineering Drawings, one mylar copy of the Engineering Drawings and four copies of the Specifications, Contract Documents and Cost Estimates. In addition, the Developer shall deposit with the Town one digital copy of the accepted Engineering Drawings in a format that is compatible with the computer system and software of the Town•s Public Works Department.

2.2.2 MOE APPROVALS

The necessary Application Forms for approval by the Ontario Ministry of the Environment of the proposed Sanitary Sewage System, the Storm Water Drainage and Management Systems and the Water Supply System shall be prepared by the Developer for review by the Town Public Works and/or Engineering Staff. The applications will not be signed by the Chief Administrative Officer and the Director of Public Works for submission to the Ministry until the Engineering Drawings are stamped and signed as stated in Section 2.2.1 above. The developer is responsible for submitting the Application Forms to the Ministry and for obtaining the approvals.

2.2.3 OTHER APPROVALS

The Developer is responsible to apply for and obtain all other agency approvals (e.g. MNR, DFO, Severn Sound Environmental Association, etc.) that are required for the development to proceed.

2.2.4 PERMIT for ROAD OCCUPATION

In Appendix ■A• may be found a sample of the ■PERMIT for ROAD OCCUPATION•. For each instance when construction is required on an existing Town road a ■PERMIT for ROAD OCCUPATION• shall be obtained from the

Public Works Department by the developer or his/her agent, the required information entered, and the completed permit form returned to Public Works.

2.2.5 RESTORATION of EXISTING ROADS

When construction on an existing road is necessary, the disturbed area is to be restored to the same condition as, or better than, the existing condition.

2.2.6 SITE WORK PRIOR to APPROVAL or ACCEPTANCE

In the absence of an executed Development Agreement or Subdivision Agreement no work related to the development or redevelopment of the lands which are or will be subject to a Development Agreement or a Subdivision Agreement shall be commenced unless the Developer enters into a Pre-Servicing Agreement with the Town.

In cases when the Developer applies for approval from the Town to perform construction work under a Pre-Servicing Agreement on the lands to be developed or redeveloped, the Developer shall deposit with the Town for its approval the following:

- A Schedule showing the work to be undertaken prior to receipt of Approval and/or Acceptance of the Engineering Drawings and MOE approvals, and the time frames for such work;
- A drawing showing the extent of the areas which will be subject to such work, and the details of;
  a) The vegetation which will be removed as a result of the undertaking of such work, including access roads;
  b) The siltation and run-off controls to be implemented in association with such work;
  c) All proposed demolition and decommissioning work.

These requirements are in addition to all other requirements which may be set out in the Pre-Servicing Agreement with the Town.

No Sewers or Watermains shall be constructed prior to there being accepted Engineering Drawings and MOE Certificates of Approval.

2.3 INFRASTRUCTURE TO BE INSTALLED

2.3.1 SANITARY DRAINAGE SYSTEM

The Developer is responsible for the installation of a Sanitary Sewage Collection System, including Pump Stations, Appurtenances and Service Laterals to property lines to service the proposed Development.

Agreement with the Director of Public Works shall be obtained by the Developer regarding the design and construction requirements for project specific sanitary collection structures such as lift and pump stations.

The System shall be designed to accommodate the flows generated within the proposed Development and the flows which are presently, or will be in the future, generated on lands upstream of the proposed Development. The Developer will be responsible for the examination of the downstream Sanitary Sewer System to ensure that the flows generated by the proposed Development can be accommodated. The elimination of restrictions in the downstream collection system will be the subject of negotiations with the Town.

2.3.2 STORM DRAINAGE SYSTEM

The Developer is responsible for the installation of a Storm Water Drainage System, including Appurtenances. The system to be designed will be determined by way of discussions with the Town's Public Works, Engineering, Planning and Administrative Staff during the Preliminary Design stage for the Development. The type of system to be constructed is to be decided upon prior to the submission for Draft Plan or Site Plan approval.

The system shall be designed to accommodate the flows generated within the proposed Development and the flows which are presently, or will be in the future, generated on lands upstream of the proposed Development. The Developer will be responsible for the examination of the downstream Storm Water Drainage System to ensure that the receiving system has adequate capacity to receive the discharge at the downstream boundary of the proposed Development. In cases when the Storm Drainage System discharges onto privately owned lands where no receiving Storm Drainage System exists, the Developer is responsible for submitting to the Town documentation stating that the owners of such private properties are informed of the proposed Development, of the effects of the proposed Development and drainage over those properties and have agreed in writing to refrain from raising objections relating to those effects.

2.3.3 STORM WATER MANAGEMENT FACILITIES

Stormwater Management in the Town of Penetanguishene is subject to the provisions in the **SEVERN SOUND REMEDIAL ACTION PLAN - URBAN STORMWATER MANAGEMENT STRATEGY**, dated July, 1998. Copies of the Strategy Document may be obtained from the Town of Penetanguishene Municipal Offices for a charge of $ 50.00.

The Developer is responsible for the construction of facilities which are integrated with the Storm Drainage System of his/her own Development, or with the Storm Drainage System which exists, or is planned to be constructed in the area of the Town in which his/her Development is situated. Alternatively, or in addition, the

Developer may be responsible to contribute toward Storm Water Management facilities which exist or are planned to be constructed in the Drainage Area in which his/her Development is situated.

Storm Water Management facilities are the subject of the establishment of requirements for each development or redevelopment for which approval by the Town is required. The general requirements such as the locations of the facilities, extent of drainage area subject to Storm Water Management in relation to a specific development or redevelopment and the type of storage/detention structures are to be established at the time of the preparation of Draft Plans or Preliminary Site Plans.

2.3.4 WATER DISTRIBUTION SYSTEM

The developer is responsible for the installation of a Water Distribution System for potable water, including Appurtenances, Hydrants and Service Laterals to the property lines.

The system shall be designed to provide adequate domestic, commercial and/or industrial flows, and fire flows. The Developer is responsible for the examination of the existing water system to which the Development's system will connect to ascertain that adequate flows are available. The correction of inadequacies in the available flows will be the subject of negotiations with the Town.

The system shall be designed in cognizance of the flow requirements for lands situated beyond the proposed Development, and watermains shall be sized accordingly.

Dead end watermains shall be fitted with a hydrant or a 50 mm minimum diameter blow-off.

2.3.5 ROADS

The Developer is responsible for the construction of roads, and/or, where necessary, the improvements to existing roads, to service all developed properties created as a result of the Development. The classes of roadways (local, collector, arterial, etc.) shall be determined at the time of the preparation of the Draft Plan.

A Traffic Impact Study may need to be completed for the proposed development to gauge the anticipated impact on the existing road network. This requirement will be determined on a site specific basis.

Generally, when roads are designed to be dead ends at the boundaries of the Development, road construction will be completed to the development's boundary lines. Where required, provisions for permanent or temporary turnarounds shall be made.

Generally, all infrastructure items installed within road rights-of-way which are dead ends shall be completed to the Development boundaries.

For public roads, the Town of Penetanguishene has adopted various road cross sections for use in new developments. These variations include:

- Full Urban Cross Section with curb and gutter, storm sewers and sidewalk;
- Rural Cross Section with open ditches and driveway culverts;
- Semi-Urban Cross Section with paved shoulders and enclosed ditches, and a sidewalk.

For each of these Cross Sections the pavement width and the right-of-way width is determined by the road classification (local, collector, arterial).

On public roads that have a Full Urban Cross Section, the developer is responsible for the construction of a concrete sidewalk on one side. On public roads with a Semi-Urban Cross Section, the developer is responsible for the construction of a paved shoulder on both sides as well as a concrete sidewalk on one side.

For all road Cross Sections the right-of-way widths are to be designed such that the tops and toes of slopes are situated inside the right-of-way lines.

The Developer is responsible for the construction of paved driveway ramps for all properties created in the Development. The driveway ramps shall extend from the edge of the roadway pavement to the sidewalk or to the property line. Driveway culverts for Rural Cross Section roads are to be installed by the Developer or by the person(s) who actually build(s) on an individual property. The Developer is responsible for the construction of ditches that are sufficiently deep to accommodate driveway culverts with adequate cover over them. The supply, installation and maintenance of driveway culverts are subject to the Public Works Department Policy Document which may be obtained at Public Works.

2.3.6 UTILITIES

In all development or redevelopment projects the Developer is responsible for the coordination with PowerStream Barrie Hydro Distribution Inc., Bell Canada, Rogers and Enbridge Consumers Gas for the installation of utilities. All costs associated with the installation of utilities are the responsibility of the Developer. The Developer shall submit to the Town documented proof that each of the utility companies is satisfied with the arrangements made.

Electrical, telephone and cable television lines shall be installed underground.

Drawings showing the plant to be installed by, or on behalf of, the respective utility companies (Bell, Cable, Gas, Hydro) shall be prepared and submitted to the

Town for acceptance. Prior to submitting these utility drawings to the Town, the developer's engineer shall review them. The submission to the Town shall be accompanied by written confirmation from the developer's engineer that the locations of the utilities' infrastructure conform to the Town's standards.

2.3.7 STREET LIGHTING

The Developer is responsible for the construction of street lights in accordance with the requirements set out by the Town and by PowerStream Barrie Hydro Distribution Inc. Street lighting units shall normally be Full Cut-off Dark Sky compliant LED Edge slim low profile fixtures, photocell controlled with no less than 6320 delivered lumens (Generation B – Four Light bar assembly), silver coloured, as manufactured by Ruud/Beta LED Lighting (Ruud/Beta Part No. X-AL-3-2-068-B-1-R-S), or approved equivalent. In cases when the Developer wishes to install street lights having a particular style, approval for the use of such street light units shall be obtained from the Town and from PowerStream Barrie Hydro Distribution Inc. but they must be LED light units.

2.3.8 TRAFFIC CONTROL DEVICES, SIGNS and PAVEMENT MARKINGS

The Developer is responsible for the installation of Traffic Control Devices, Traffic Signs, Street Name Signs and Pavement Markings. Traffic Control Devices shall normally include Traffic Heads and Pedestrian Heads with optical and audible signals.

Wiring for Traffic Control Devices shall be underground.

2.3.9 WALKWAYS and TRAILS

As determined by the layout of the lots, roadways and parkland in the Development, and as dictated by the need for proper circulation of pedestrian traffic, the Developer is responsible for the installation of Walkways constructed in accordance with Town standards as detailed in the Town Park Policy. The locations of Walkways shall be determined at the time of the preparation of the Draft Plan or the Preliminary Site Plan.

Similarly, the Developer is responsible for the installation of Trails. The locations of Trails shall be determined in dialogue/communication with Town staff.
Trail locations shall be determined generally in the context of the overall Trail Network in the Town. The construction standards for Trails shall be as detailed in the Town Park Policy.

2.3.10 COMMUNITY MAIL BOXES

The Developer is responsible for establishing with the Town and with Canada

Post the requirements for Community Mail Boxes, and for making accommodations within the Development for their location(s). In addition, the Developer is responsible for the design and construction of the necessary facilities to permit safe access to the Mail Boxes, including provisions for short-term parking of automobiles, as set out in the Penetanguishene Standard Drawings.

2.3.11 PARKLAND and EQUIPMENT

The location and size of the Parkland dedication shall be determined at the time of preparation of the Draft Plan or the Preliminary Site Plan. The equipment to be installed in the Parkland by the Developer will be a matter of negotiation with the Town in the context of the Town Park Policy.

2.3.12 FENCING

The extent of Fencing required within the Development will be a matter of negotiation with the Town. However, at all locations where newly created lots in the Development abut Public Lands other than at their road frontages and flankages, the Developer shall install fencing.

Fencing shall be Chain Link Fencing as per OPSD – 972.130, CHAIN LINK FENCE WITH TOP RAIL, except for the following:

- Fence height shall be 1.5 metres;
- Chain Link Fence fabric shall be green vinyl coated, 9 gauge gross, 11 gauge wire;
- Mesh shall reject a 38 mm Diameter ball.

3.0 ENGINEERING, DESIGN AND CONSTRUCTION PARAMETERS

3.1 GENERAL

3.1.1 CONSTRUCTION CONTRACT

The Developer shall be responsible for the preparation of a Contract Document for the construction of the infrastructure works, whether the Developer retains the services of Contractors outside of his/her own organization or whether the Developer is his/her own Contractor.

The Contract Document shall include complete Engineering Drawings and Specifications accepted by the Town for the construction of the works.

The Contract Document shall specifically state that all construction activities shall be in accordance with the Ontario Health and Safety Act, and all applicable statutes.

3.1.2 STANDARD SPECIFICATIONS and DETAIL DRAWINGS

Except as stipulated in the following paragraphs in this Section 3.0, the infrastructure works will be designed and constructed in keeping with the Ontario Provincial Standard Specifications (OPSS), the Ontario Provincial Standard Drawings (OPSD) and the Town of Penetanguishene Standard Drawings. When there are differences between the provisions in this Policy and those in OPSS and OPSD, this Policy shall take precedence.

The Contract Document shall include, either physically or by reference, the applicable Ontario Provincial Standard Specifications, latest revisions by Specification Number and Date. Special Provisions included in the Contract Document shall not alter the Materials or Construction Specifications features of the Ontario Standard Specifications.

Included in the Engineering Drawings for the infrastructure works shall be actual copies of the applicable Ontario Provincial Standard Drawings and Town Standard Drawings. Binding of the Standard Drawings in the Contract Document book only is not acceptable.

3.1.3 SPECIFIC SPECIFICATIONS and DETAIL DRAWINGS

For those items of infrastructure works which, by virtue of the requirements set out in this Land Development Engineering Policy, are different from OPSS and OPSD, the Developer is responsible for the preparation of Specific Specifications and Detail Drawings for inclusion in the Contract Document.

3.1.4 SHOP DRAWINGS

All Shop Drawings included as part of the infrastructure works are to be reviewed and stamped by a Professional Engineer retained by the Developer and submitted to the Town for acceptance.

3.1.5 COST ESTIMATES

The Developer is responsible for the preparation of Cost Estimates for all infrastructure works shown on the Engineering Drawings. The Cost Estimates are to be submitted to the Town for acceptance.

The format of the Cost Estimates shall be such as to clearly show the Estimated Quantities and Unit Prices of all work items. Furthermore, each work item shall be shown as being part of one of three Work Categories, viz:

a) UNDERGROUND WORKS - including:

i) Sanitary Sewers, Pumping Stations, Appurtenances and Service Laterals;
ii) Storm Sewers, Appurtenances, and Stormwater Management Facilities;
iii) Watermains, Appurtenances and Service Laterals.

b) PAVEMENT STRUCTURE - including:

i) Granular Base Course and Granular Surface Course, Curbs and Gutters where applicable, and Base Course of Asphalt;
ii) Traffic Signs.

c) ABOVE-GROUND WORKS - including:

i) Surface Course of Asphalt, Asphalt in Driveway Aprons, Sidewalks, Walkways, Fencing, Topsoil and Sod or Seed, Parkland Grading and Equipment, Street Lighting, Signs and Pavement Markings.

3.1.6 CONSTRUCTION SUPERVISION

The Developer is responsible for the full-time resident supervision of all construction activities by a Professional Engineering firm approved by the Town. Included in, but not necessarily limited to, the supervision responsibilities are:

- Notices of construction activities to Agencies having jurisdiction;
- Materials testing and compaction testing;
- Testing for the acceptance of finished works;
- Maintenance of all erosion and siltation control devices;
- Maintenance of traffic control and signs;
- Prevention of contamination of municipal streets and roads;
- Communication with Town, Fire Department, Police and Ambulance Services and School Boards as required for access and safety;
- Communication with the Town Public Works and/or Engineering Staff;
- Coordination of the installation of all utilities (hydro, gas, telephone, cable);
- Public relations with residents in the area of influence of the construction activities;
- Preparation and submission to the Town Director of Public Works and the Town Engineer of bi-weekly Progress Reports containing the following information:

- Construction completed to date, identified by street name where applicable;
- Value of completed construction and the comparison of that value to the estimated value as stated in the Cost Estimate submitted to the Town as required in Section 3.1.5 above;
- Evaluation of the construction progress in terms of time related to the scheduling provisions in the Construction Contract;
- Copies of all test reports;
- Report on problems and/or unexpected conditions and solutions implemented;
- Public relations contacts with residents, including descriptions of complaints/problems and resolutions thereof.

- Certification that infrastructure works are installed in accordance with the accepted drawings and specifications.

3.1.7 PRE-CONSTRUCTION MEETING

Prior to the commencement of construction activities in the context of the proposed development or redevelopment, the Developer shall arrange a Pre-Construction Meeting. Present at the Pre-Construction Meeting shall be an authorized representative of the Developer, the Developer's engineer, the Director of Public Works of the Town of Penetanguishene or his/her authorized representative, the Town Engineer, and other Town staff as deemed appropriate by the Director of Public Works.

At the Pre-Construction Meeting the Developer shall submit the construction schedule, shall introduce the Contractor and his/her Site Superintendent, shall introduce his/her Consulting Engineer's supervisory staff, and shall submit a list of contact names and telephone numbers for those persons responsible for the management of the construction process.

A Pre-Construction Meeting shall be arranged prior to the commencement of construction activities related to a Subdivision Agreement, a Development Agreement or a Pre-Servicing Agreement.

3.2 DESIGN PARAMETERS

3.2.1 ENGINEERING DRAWINGS

As stated in Section 2.2.1 above, prior to the commencement of construction the Developer shall have deposited with the Town six white prints of the accepted and stamped Engineering Drawings, as well as four copies of the accepted Specifications, Contract Documents and Cost Estimate.

The Engineering Drawings shall be prepared in accordance with the following requirements:

- Neat, legible, in ink, on metric size A1 (595mm x 841mm) sheets and utilizing Leroy or equivalent lettering system;
- On a medium suitable for reproduction by a white printer or photocopier;
- On all drawings include:

  - Title Block complete with Revision Record Block, the name, "Town of Penetanguishene", the name of the Development, standard metric scales, drawing number and name of the Consulting Engineering Firm, including telephone and fax numbers and address, and the signed and dated Professional Engineer's Stamp of the Design Engineer;
  - Geodetic bench mark description and North arrow;
  - Show a Key Plan showing the subject street section location within the overall Development plan and an accompanying North arrow;
  - All elevations shall be to Geodetic reference; clearly differentiate between existing elevations and new design elevations;
  - Generally orient the drawings such that the North arrow points upward;
  - Arrange Plan and Profile drawings such that each street can be filed as an individual entity. To the degree possible, arrange the Plan and Profile to be vertically aligned one above the other;
  - Lot and Block identification numbers shall conform to the Final Registered Plan;
  - All plan views shall show street names outside of the right-of-way lines;
  - Line work on drawings shall be such as to differentiate between existing and new construction features. Similarly, differentiation between existing and new contour lines shall be evident in the line work. Existing conditions shall be shown with dashed lines of 0.13mm maximum thickness and new construction with lines of 0.35mm minimum thickness, utilizing different line patterns for the different services;
  - Lettering for labeling of existing features, including elevations shall be light weight italic lettering while lettering for new construction and elevations shall be heavier weight vertical lettering;
  - Town Engineering staff shall be consulted regarding drafting requirements not set out herein.

Generally, the following Engineering Drawings constitute a complete set:

- Title Sheet - showing the crest of the Town in the middle top portion, the name of the Development, a Key Plan to a scale of 1:10,000 showing the

Project Site location in the surrounding area with a North arrow, a list of all the drawings by number and title included in the set, and the name of the Consulting Engineer in the bottom right hand corner;

- General Servicing Plan - at a scale no smaller than 1:1000, showing all infrastructure services, including all utilities, to be constructed within the Development, as well as the existing infrastructure services which are to remain and existing services to which new services will be connected outside of the Development boundaries. Contour lines are not required on the General Servicing Plan;

  All infrastructure features, whether existing or new, are to be labeled to identify the nature of the service (sanitary sewer, storm sewer, watermain, etc.), pipe types and sizes, Maintenance Holes and numbers, valves, hydrants, bends, plugs, blow-offs, curbs and gutters, sidewalks, street lights, traffic control devices, etc. From the Plan and Profile drawings identify and highlight on the General Servicing Plan all locations where underground pipes require vertical deflections to avoid conflict where one service crosses the path of another.

  All Lot Numbers, Block Numbers or Letters, Easements, Reserves and Street Names shall be shown. If the Development is to be constructed in Phases, the Phase boundaries and Phase numbers shall be shown;

  If the General Servicing Plan is too large for one sheet, match lines shall be clearly shown as well as a Key Plan identifying where the portion on the subject sheet fits within the overall Development;

  The General Services Plan shall show a larger scale detail showing the standard locations of the service laterals to individual properties;

  The location(s) of Community Mail Boxes shall be shown;

  The General Services Plan shall contain a Legend identifying the line and lettering types used and their particular significances.

- Erosion and Sedimentation Control Plan – at a scale no smaller than 1: 1000, a plan showing the proposed erosion and sedimentation control measures to be implemented both during construction and upon completion of all works. Multiple sheets and Phasing shall be treated as specified in the General Servicing Plan above.

  Show existing contour lines at a maximum vertical interval of one meter, extending a minimum of 30 meters outside the Development boundaries.

  Show the contour lines' elevations at the lines' ends not less frequently than every fifth line.

  Show only the infrastructure relating to Storm Drainage and Stormwater Management in addition to the specific erosion and sedimentation control measures.

  Include on the plan a construction staging schedule defining the installation and removal times of sedimentation and erosion control measures relating those times to the progress of the construction of the development infrastructure. The time frames are to cover the period from the installation of the sedimentation and erosion control measures until such time as ground cover is restored.

Include a legend on the drawing(s) for the interpretation of all symbols used.

- Lot Grading and Drainage Plan - at a scale no smaller than 1:500 showing all road allowances, lots, blocks, easements and reserves with identifying numbers or letters. Multiple sheets and Phasing shall be treated as specified in the General Services Plan above. Infrastructure and utility items need not be shown.

  Show existing contour lines at a maximum vertical interval of one meter, extending a minimum of 30 meters outside the Development boundaries.

  Show the contour lines' elevations at the lines' ends not less frequently than every fifth line.

  Show the centrelines of all roadways and show the finished centreline elevations at twenty meters intervals.

  Show existing and new ground elevations at all lot and block corners and at grade change points under the new grading configuration. On large blocks, show existing and new ground elevations at a frequency sufficient to permit ready interpretation of the new drainage pattern.

  Show the new ground elevation at the front of each house to be built. For houses with entrance levels at more than one floor (walk out basements), show the new ground elevations for both levels.

  Show direction arrows for all surface drainage on lots and blocks. Show swales to be constructed including invert elevations at beginnings and ends, and at break points. Longitudinal grades in swales shall be 2.0% minimum and sideslopes shall no steeper than 3:1. Show inlet structures on lots and blocks, and associated pipes, with Top-of-Grate and invert elevations. Drainage swales are to be constructed on all side yard and rear yard property lines such that surface water from one property is prevented from crossing over into a neighbouring property.

  Show drainage easements, areas of vegetation and slopes which must remain undisturbed, and locations of siltation and erosion control devices.

  Show the location and general features of the Storm Water Management facility.

  Include a legend on the drawing(s) for the interpretation of all symbols used.

NOTE: An application for a Building Permit for each building within a development needs to be accompanied by a Detailed Lot Grading Plan. These individual Lot Grading Plans shall clearly show the following:

- The existing and proposed ground elevations at the lot corners. These elevations shall be consistent with the elevations on the Lot Grading and Drainage Plan where applicable;
- The proposed swales on the side and rear property lines of the subject land parcel. The longitudinal slopes in the swales shall be shown as well as the finished elevations in the swales at break points and opposite all corners of the proposed building. Thus, the

footprint of the building shall be shown on the Individual Lot Grading Plans;

- For the proposed building the elevations of the Underside of Footing, the Top of Foundation Wall and the Garage Floor elevation shall be shown;
- The elevation of the Sanitary Service Lateral invert at the front property line as recorded under the provisions of Section 4.1.2 in this document;
- The elevations of the Top-of-Curb or, where applicable, of the invert of the ditch or swale on the road right-of-way opposite the front corners of the subject property. Also, where applicable, show the top of curb elevation in the curb cut opposite the centre of the garage door;
- In a rural setting, the length, size and location and the inverts at the ends of the driveway culvert.

- Sanitary Servicing Plan - at a scale no smaller than 1:1000 showing all road allowances, lots, blocks, easements and reserves with identifying numbers or letters. Multiple sheets and Phasing shall be treated as specified in the General Services Plan above. Infrastructure and utility items other than those relating to the sanitary sewer system need not be shown. Show existing contour lines at a maximum vertical interval of one meter, extending a minimum of 30 meters outside the Development boundaries. Show the contour lines' elevations at the lines' ends not less frequently than every fifth line.
  Show the centrelines of all roadways.
  Show all sanitary sewer pipes, materials, sizes and flow directions; Maintenance Holes including numbers and sizes; inverts and pipe grades, including all such information for existing features.
  Show the extent of all sanitary drainage areas considered in the design of the system, including information regarding the number of hectares and the development densities. For areas outside of the Development boundaries, state the appropriate numerical information and include topographic maps in the sewer design documentation.
  Include a legend on the drawing(s) for the interpretation of all symbols used.
- Storm Drainage Plan - at a scale no smaller than 1:1000 showing all road allowances, lots, blocks, easements and reserves with identifying numbers or letters. Multiple sheets and Phasing shall be treated as specified in the General Services Plan above. Infrastructure and utility items other than those relating to the storm sewer system need not be shown.
  Show existing contour lines at a maximum vertical interval of one meter, extending a minimum of 30 meters outside the Development boundaries. Show the contour lines' elevations at the lines' ends not less frequently than every fifth line.

Show the centrelines of all roadways.
Show all storm sewer pipes, materials, sizes and flow directions; Maintenance Holes and inlet structures including numbers and sizes; inverts and pipe grades, including all such information for existing features.
Show all ditches and culvert pipes, materials, sizes and flow directions. Show locations where headwalls are to be constructed.
Show the extent of all storm drainage areas considered in the design of the system, including information regarding the number of hectares and the run-off coefficients. For areas outside of the Development boundaries, state the appropriate numerical information and include topographic maps in the sewer/drainage system design documentation.
Engineering information relating to Storm Water Management shall be shown including paths and depths of major storm overland flows, temporary and permanent erosion and siltation control devices, energy attenuation devices and Storm Water Management facilities.
Include a legend on the drawing(s) for the interpretation of all symbols used.

- Watermain Plan - at a scale no smaller than 1:1000 showing all road allowances, lots, blocks, easements and reserves with identifying numbers or letters. Multiple sheets and Phasing shall be treated as specified in the General Services Plan above. Infrastructure and utility items other than those relating to the watermain system need not be shown.
  Show existing contour lines at a maximum vertical interval of one meter, extending a minimum of 30 meters outside the Development boundaries.
  Show the contour lines' elevations at the lines' ends not less frequently than every fifth line.
  Show the centrelines of all roadways.
  Show all watermain pipes, fittings, valves, valve chambers; sizes and materials; and hydrants, including all such information for existing features.
  Show water sampling points locations within the development system and the watermain swabbing entrance points.
  Include a legend on the drawing(s) for the interpretation of all symbols used.
- Plan and Profile Drawings - for all roadways, blocks and easements, whether within or outside of the boundaries of the Development, where infrastructure services are to be constructed, including drainage outfall ditches, sewers and channels that convey flows to receiving facilities.
  Plan and Profile Drawings shall be drawn at scales of 1:500 horizontally and 1:50 vertically.
  The following requirements for Plan and Profile Drawings shall apply:

1) **Geometry**

- The Plan portions shall show the right-of-way lines, including the survey bars planted for the right-of-way alignment, all lot, block and easement lines where they meet the right-of-way lines, lot and block numbers or letters, and street names shown outside of the road allowance. At all intersecting side streets all geometric and infrastructure features shall be shown for a length of thirty metres from the centreline of construction;
- The Plan shall show the centreline of the new construction or reconstruction, including the relationship to the right-of-way lines; hash marks and chainages at twenty metre stations and the chainages of points of intersection, beginnings and ends of horizontal curves; curve radii, lengths and curve deflection angles; superelevations;
- Chainages shall be calculated from the final survey plan. Zero chainages shall be generally at the westerly and southerly ends of streets, and placed at the centreline of intersecting streets. Generally the chainage shall increase from left to right on the drawing, and chainage points in Plan and Profile shall coincide vertically. For curved alignments the Plan shall be broken into sections in order to maintain reasonable coincidence with the chainage points in the Profile;
- The Plan shall show right-of-way width, pavement width, sidewalk width, shoulder width and offsets to all infrastructure features, as well as all pavement radii at intersections. The alignments of all infrastructure features and utilities shall be as detailed in the applicable Town of Penetanguishene Standard Road Cross-Section Drawings;
- The Profile portions shall show the existing ground profile on the centreline of construction and the elevations on twenty metres stations, the new finished centreline grade profile (top of asphalt) and elevations on twenty metres stations, the chainage on twenty metres stations, the locations and chainages of beginnings and ends of vertical curves and of points of intersection of tangents, the lengths of vertical curves, the K-factors and the grades percentage of tangents (positive or negative) to two decimal places;
- Plans and Profiles and all infrastructure features shall be extended sufficiently beyond the actual limits of the subject street/roadway to show the continuity with adjacent roads.

2) **Roadways**

- The Plan shall show all curbs and gutters, sidewalks, pavement edges, shoulders and ditch flow lines;

- The Profile shall show the existing and finished ground/road profile and the underside of the granular road base on the centreline of construction. Also shown in the Profile shall be the centreline of intersecting streets and roads, the names of such intersecting streets and roads, the chainage of the point of intersection and the finished road elevation at the point of intersection.

3) **Sanitary Sewers, Storm Sewers, Ditches and Culverts**

- The Plan shall show all sanitary sewers, storm sewers and catchbasin connections labeled with pipe size, pipe material, length and slope for each run between Maintenance Holes, and sewer type (sanitary or storm). The details for catchbasin connection pipes may be covered in General Notes or Typical Details. All Maintenance Holes and inlet structures (catchbasins) shall be shown and identified by numbers. Separate numbering systems are required for sanitary and storm sewer Maintenance Holes, the numbers running consecutively for each system. The numbering system for sanitary Maintenance Holes will have all numbers pre-fixed with the letters SA, e.g. SA 1. The numbering system for storm sewers will have all numbers pre-fixed with the letters ST, e.g. ST 1. The numbering system for catchbasins will have the numbers run consecutively, regardless of catchbasin types, and each number will be pre-fixed with one of the following designations:
  - SCB for single inlet catchbasins, e.g. SCB 1;
  - DCB for double inlet catchbasins, e.g. DCB 2;
  - DICB for ditch inlet catchbasins, e.g. DICB 3.

  The numbering methods and the meanings of the pre-fixes will be clearly described in General Notes and/or Legends on the Engineering Drawings.

  For catchbasins outside of the road allowance, the top of grate and invert elevations shall be shown on the Plan. For all Catchbasins the appropriate OPSD number or, if necessary, reference to a special detail shall be shown.

  All sanitary sewer service laterals shall be shown on the Plan;
- All Maintenance Holes, sewer pipes and culvert pipes shall be shown at their appropriate scales in the Profile. Each Maintenance Hole shall be identified by number, including the appropriate pre-fix. The chainage of the chamber centreline, all pipe inverts identified by compass point, the top of cover elevation and the chamber's OPSD number or special detail reference shall be shown.

The sewer pipes shall show their use (sanitary or storm), materials, sizes, classes of bedding, lengths and percentage of slope to two decimal places. Whereas the lengths of sewer pipes are to be given from centreline to centreline of access chambers, the slopes percentages are to be calculated for the actual pipe lengths from interior face to interior face of the Maintenance Holes.

Maintenance Holes requiring safety grates are to be noted as such.

In locations where there are existing buildings which are to be connected to the sanitary sewer, the basement elevations of such buildings are to be plotted on the Profile.

For culvert pipes the materials, sizes, classes of bedding, lengths, inverts at the ends and percentage of slope to two decimal places shall be shown. Between culverts the ditch invert profiles shall be plotted and identified for ditches on both sides. Sewer and culvert end walls, the inverts and reference to OPSD or special details shall be shown.

All locations where pipe placements require special care to avoid conflicts with other pipes shall be highlighted on the Profile.

4) **Watermains**

- The Plan shall show all watermains, pipe sizes, materials, valves, valve chambers, bends with degrees of deflection, tees and crosses with sizes, hydrants, blow-offs and air/vacuum relief valves. Appropriate references to detail drawings shall be made;
- The Profile shall show the watermain plotted in the appropriate scale. All locations where the watermain profile needs to vary from the general road profile to maintain minimum cover or to cross other pipes and/or ditches shall be highlighted on the Profile.

- Storm Water Management Drawing - the Engineering Drawings shall include all details of Stormwater Management facilities such as area, existing and proposed grades, slopes, inlet and outlet structures, drains and sub-drains and water levels for the several design storms.

  Included with the Stormwater Management Engineering Drawings shall be information outlining how Stormwater Management will be implemented to prevent an increase in storm flows from the site and the escape of pollutants (including silt) during the construction period.
- Composite Utilities Plan - at a scale no smaller than 1 : 1000 showing all utilities (sewers, watermains, Bell, Cable, Gas, Hydro), each in its correct position within the respective road allowances.
- Detail Drawings - drawings shall be prepared containing copies of all the applicable Ontario Provincial Standard Drawings as part of the set of Engineering Drawings. In addition, details for items not covered by the OPSD's, such as certain water works items, shall be prepared and included. When OPSD's are used but altered, this shall be noted on the altered OPSD's.

3.2.2 SPECIFIC DESIGN FEATURES

In the following paragraphs are the Engineering Design Features which apply in the Town of Penetanguishene:

- Soil Information
  - At intervals not exceeding 150m along the centrelines of proposed roads soils investigation boreholes shall be drilled by Geotechnical Engineering specialists to depths of 4m minimum. Borehole logs shall be prepared showing the usual information regarding soil types encountered, compactness and water content. The water table level shall be shown;
  - In areas designated for disposal of surface water by percolation into the ground, percolation rates shall be established and standpipes installed to monitor the seasonal variations in the levels of the water table;
  - The report prepared by the Geotechnical Engineering specialists shall contain recommendations relating to the design and installation of sewers and watermains, footings where applicable, roadway pavement structures and drainage. The infrastructure works shall be designed, and the construction specifications shall be written in cognizance of the soils encountered and the recommendations contained in the Soils Report, and in keeping with the requirements set out in this Policy.
    These requirements apply to Plans of Subdivision as well as to Site Plans.
- Sanitary Sewers and Storm Sewers
  - Minimum sewer pipe slopes, access chamber spacing, allowances for hydraulic losses in access chambers, numbers of people per living unit, infiltration allowances, peaking factors, etc. are all to be in accordance with Guidelines for the Design of Sanitary and Storm Sewage Works, Water Works, etc., issued by the Ontario Ministry of the Environment in July, 1985, with the specifics set out in the following paragraphs and the Sanitary Sewer Design Parameters in Appendix "C";
  - Engineering submissions to the Town shall include completed sewer design sheets for both sanitary and storm sewers. Sample Design Sheets may be found in Appendix "C";
  - The minimum pipe size for sanitary sewers is 200mm diameter.
    The minimum pipe size for sanitary service laterals is 100mm diameter for a single family dwelling and 150mm diameter for a duplex dwelling. For multiple dwelling buildings and commercial/industrial buildings the Town Public Works and Engineering Staff shall be consulted regarding the sizes of the service laterals. Service laterals shall be connected to the sewer

main by means of saddles, and shall have Inspection Tees at the road right-of-way limit;

- Generally, MAINLINE FULL-PORT BACKWATER VALVES or approved equivalent shall be installed inside the building on the Sanitary Service Lateral. Backwater Valves on Sanitary Service Laterals having a diameter greater than 100 mm shall be subject to discussion and acceptance with and by the Town Public Works Department and Building Department. Details of MAINLINE BACKWATER VALVE PRODUCTS may be found on Pages 7 through 14 in Appendix "C";
- Floor drains are to be connected to the sanitary sewer. Foundation drains and roof water leaders are <u>not</u> to be connected to the sanitary sewer.
- Sanitary sewer pipe and service lateral material shall be Polyvinyl Chloride (PVC), SDR 35 minimum strength for sewer mains and SDR 28 minimum strength for service laterals, unless other material is approved by the Town;
- The minimum pipe size for storm sewers is 300mm diameter. No lateral connections other than from surface storm water inlets are permitted. Permitted lateral connections to the sewer main shall be by means of integrally cast Tees or saddles. Foundation drains and roof water leaders are to discharge onto landscaped areas in front, rear and side yards. Lot grading design is to accommodate these discharges;
- In Semi-Urban cross-sections the minimum diameter of the Perforated Storm Drainage Pipe is 400 mm;
- Storm sewer pipe material shall be concrete, reinforced as required for the particular pipe diameter, or High Density Polyethylene equivalent to that manufactured by BIG♣O♣ Inc.;
- The minimum cover over the top of sanitary sewer pipes shall be 2.75 m. The minimum depth to the springline of storm sewer pipes shall be 1.6m below finished grade over the pipe;
- OPSD and OPSS standards shall be used as the minimum standards for details of pipe bedding and cover. Application of these standards is subject to confirmation from the Geotechnical Engineering specialist retained by the Developer. Alternatively, based on the recommendations made by the Geotechnical Engineering specialist, pipe bedding and cover material shall be designed specifically for the particular site conditions;
- Maintenance Holes shall generally be precast units, 1,200 mm diameter minimum size. The maximum height of modular rings for grade adjustments on Maintenance Holes is 300mm;
- For Perforated Pipe Storm Sewers in Semi-Urban Cross Sections Big "O" BOSS 2000 or equivalent Maintenance Holes may be used;

- Storm sewer inlet structures (catchbasins) shall generally be precast units with sumps, sized to accept storm flows from up to five year return storms. Inlet structure laterals shall be 300mm minimum diameter and installed at a minimum slope of one percent. For storm events greater than the five year return storm, overland flow paths shall be designed. Inlet structures other than catchbasins shall be designed under similar parameters;
- For Perforated Pipe Storm Sewers in Semi-Urban Cross Sections Big "O" BOSS 2000 or equivalent catchbasins may be used;
- Storm sewer outlet structures (headwalls) shall be designed to properly retain earth slopes and to prevent erosion in the receiving channel. Storm sewers shall not be connected directly into existing or proposed road crossing culverts;
- Sanitary sewers, including service laterals and Maintenance Holes, shall be tested prior to acceptance for infiltration/exfiltration. Permissible infiltration/exfiltration flows are as specified in OPSS 410. Sections in which infiltration/exfiltration flows exceed these limits shall be repaired and retested;
- Storm sewers, including inlet structures and lateral connections, shall be tested prior to acceptance for infiltration/exfiltration. The permissible leakage rates are as specified in OPSS 410. Sections in which the infiltration/exfiltration rates exceed the permissible values shall be repaired and retested, or alternatively, provisions shall be made to prevent the migration of fine soil particles;
- Documented test results of sewer infiltration/exfiltration tests shall be deposited with the Town;
- These requirements for Storm sewers are not intended to preclude the possibility of storm drainage systems designed to encourage infiltration of surface water into the ground.

- Storm Water Management Facilities

- Included in the Developer's submission for acceptance of the storm sewer/storm drainage system shall be the comprehensive design of the Storm Water Management provisions, both for the finished development and during the construction period. A Stormwater Management Report addressing all features of the Stormwater Management design shall be prepared and submitted to the Town for acceptance and to the Ministry of the Environment for approval;
- One basic design parameter for Storm Water Management is that post development flow rates are to be not greater than pre-development flow rates at the downstream boundaries of the proposed development. When the post-development flows become more concentrated due to a change from sheet-flows to single outlet flows, then provisions to prevent erosion and damage to downstream structures, ditches and channels shall be designed and

constructed for each such outlet. This basic parameter shall generally be satisfied for 1:2, 1:5, 1:10, 1:25, 1:50 and 1:100 years storm events. Rainfall Intensity Curves are included in Appendix "C".

- The second basic parameter to be satisfied is that the quality of storm flows entering receiving bodies be the highest attainable.

  The approach to Storm Water Management for each proposed development shall be agreed upon with Town Administrative and Engineering staff at the time of Draft Plan or Preliminary Plan preparation, and shall conform to the **SEVERN SOUND REMEDIAL ACTION PLAN - URBAN STORMWATER MANAGEMENT STRATEGY**. It is in the context of Storm Water Management in relation to such features as site location, soil conditions, topography and proposed land uses that decisions will be made regarding road cross-sections and drainage systems to be incorporated into the proposed Development.

- The third basic parameter to be satisfied is that storm drainage from the property under development or redevelopment shall be managed from both quantity and quality perspectives during the construction period. Storm flow rates are not to increase from the pre-development rates even temporarily, and silts and pollutants are to be captured on site at all times.

  It will be a requirement that the submissions (Engineering Drawings and Specifications) made to the Town for acceptance clearly show the sequence of construction and the Stormwater Management facilities, both temporary and permanent, that will be implemented to ensure the management of storm flows throughout the construction period as well as after the completion of construction.

- <u>Water Distribution System</u>

  - The minimum size for watermain pipe is 150mm Dia. Watermain pipe shall be Class 150 Polyvinyl Chloride. Service laterals for single family residences shall be 19mm minimum Dia. Class 160 Polyethylene. The diameters and pipe materials for service laterals for multi-residential, commercial and industrial units shall be appropriately selected by the Developer's Consulting Engineer. Each water service lateral, regardless of its size, shall be fitted with a Backflow Preventer.
  - Watermain pipes and service laterals shall be equipped with tracing wire;
  - Watermains shall be sized to provide fire flows within the Development and be compatible with the Town's overall water distribution system, including the demands foreseen for future development outside the subject Development. The Developer's Consulting Engineer shall electronically model the watermain network to ensure that pressure and flow parameters are satisfied.

The modeling software may be obtained from the Town Public Works Department, Water Division.

- Valves of a size matching the watermain in which they are situated shall be installed on all watermain branches at intersections in the standard locations grouped together near the intersection of the watermain pipes. On long runs valves shall be spaced at 300m maximum.
  Valves up to 250mm Dia. shall be equipped with a valve box. Valves larger than 250mm Dia. shall be set in a valve chamber;
- At high points in the watermains automatic air/vacuum relief valves shall be installed. Blow-offs or hydrants shall be installed at dead-end watermains, and blow-offs shall be 50 mm Dia. minimum;
- Thrust protection at bends and tees, including hydrant branches, shall be by means of mechanically restrained joints, designed and installed in accordance with the manufacturer's recommendations. The engineering drawings shall have a table included to show the length of pipe/number of joints that are to be mechanically restrained at restrained locations. The EBAA Pipe Joint Restraint Calculator available at http://rcp.ebaa.com/ or equivalent is to be used to establish the information in the table;
- The minimum cover over all watermains and service laterals is 1.7 m. This minimum cover specification applies everywhere, including ditch crossings. The minimum cover depth at culvert crossings and at enclosed ditch crossings shall be measured from the culvert or ditch-pipe invert. Where watermains cross under storm sewers, the watermain depth shall be such as to provide adequate frost protection.
- Hydrants shall be spaced at intervals not exceeding 150 m in residential developments and 90 m in commercial and industrial developments, measured along the watermain alignment;
- For hydrants positioned behind ditches, access shall be provided as per OPSD - 217.050, except that the minimum diameter for the culvert shall be 400 mm;
- Watermains, including service laterals, shall be disinfected and tested in the presence of Public Works staff for leakage prior to acceptance. Permissible rates of leakage are as specified in OPSS 701. Documented test results shall be delivered to the Town.
  Dechlorination of the watermain will be done using a Town approved chemical agent (i.e. sodium thiosulphate tablets). The dechlorination procedure shall be presented to the Town for approval prior to the commencement of the dechlorination procedure;
- Ontario Provincial Standard Details are applicable except as altered by the Water Division Standards included in Appendix "B".

Copies of the applicable Standard Drawings are to be included in the Engineering Drawings for the Development;

- Only Public Works staff is permitted to operate water valves situated in active watermains;
- At all locations where newly constructed watermains are to be connected to the Town's existing watermain network such connections shall be made utilizing the "NEW WATERMAIN TEMPORARY CONNECTION" as detailed in Appendix "B".

- Roadways

  - The roadway cross-sections for the Development are to be determined in conjunction with Town Administrative, Planning and Engineering Staff at the time of the preparation of the Draft or Preliminary Plan. The Town of Penetanguishene Standard Road Cross Section Drawings are included in Appendix "A" herein;
  - The right-of-way width for residential streets is 20m minimum. For arterial, collector and industrial roadways the standard right-of-way width is 26m. Road classifications shall be confirmed with Town Planning, Administrative and Engineering staff at the time of preparation of the Draft or Preliminary Plan, as shall be the requirements for right-of-way widenings on existing roads abutting the Development;
  - The centreline radius for horizontal curves shall conform to the directives set out in the Geometric Design Standards for Ontario Highways issued by the Ministry of Transportation, Ontario. The minimum daylighting at intersections is 5m x 5m triangles or a 5m radius. The minimum edge-of-pavement radius at intersections is 10m;
  - The minimum and maximum longitudinal grades of the road centreline are 0.5% and 6.0% respectively unless topography requires special considerations. Changes in profile grade of greater than 1% shall be by way of vertical curves. Horizontal and vertical sight lines shall conform to Geometric Design Standards for Ontario Highways issued by the Ministry of Transportation, Ontario, except as altered by the provisions contained in this Policy;
  - For permanent culs-de-sac the right-of-way lines shall be configured as shown in Drawing Nos. 6, 8, 10 and/or 12 in Appendix "A". For temporary culs-de-sac, it is permissible to dedicate to the Town easements rather than right-of-way property to accommodate the property requirements in the culs-de-sac. The standard requirements for temporary culs-de-sac are shown on Drawings Nos. 7, 9, 11 and 13 in Appendix "A";
  - The minimum longitudinal grade of curb-and-gutter systems and enclosed ditch inverts is 0.50% except in culs-de-sac where the minimum grade is 1.00%. In open ditches the minimum

longitudinal grade is 2.00% and the maximum is 6.00%. Ditch inverts with longitudinal grades of 4.00% to 6.00% shall have erosion protection more substantial than topsoil and sod. Where longitudinal ditch invert slopes exceed 6%, storm sewers shall be installed;

- Granular base and asphaltic concrete thicknesses shown on the Town of Penetanguishene Standard Road Cross Section Drawings are the minimum thicknesses which will be accepted. The actual thicknesses for individual Developments will be determined on the basis of recommendations made by the Geotechnical Engineering specialist resulting from the soils investigations on the site;
- The entire width of the road allowances shall be cleared of vegetation and debris. All debris, stumps, logs, boulders, brush, etc. shall be taken to an approved disposal site. Top soil stripped on the development property shall be stockpiled and reused within the Development;
- Prior to the placement of granular materials on the sub-grade, the sub-grade shall be compacted to 95% Standard Proctor Density, proof rolled and judged for acceptability by the Town Engineer;
- Where existing pavements are affected by the construction in the Development, restoration to as good as or better than original condition shall be the responsibility of the Developer. Closures of existing roadways are subject to twenty-four hours prior notice to the Town, the Fire Department, the Police Department, School Bus operating companies and ambulance service agencies;
- The Developer is totally responsible for the prevention of the contamination of existing streets/roads surfaces with mud and debris as a result of construction operations in the Development;
- Sidewalks and curbs shall be constructed to permit ready access by wheel chairs and buggies, in accordance with Ontario Provincial Standard Details;
- Driveways to all properties in the Development shall be constructed. The minimum pavement structure for residential driveways is 50mm HL3 Asphalt over 150mm Granular "A".
  Where soil conditions warrant, and for commercial and industrial access roads, driveways/accesses shall be specifically designed and approved. Designs for all driveways/accesses shall be generally in accordance with the applicable Ontario Provincial Standard Details. Residential driveways shall have a minimum slope of 2.00% down from the house to the curb or edge of pavement, and a maximum slope of 6.00%.

o <u>Utilities (Bell, Cable, Gas, Hydro)</u>

- Utilities are to be installed in the locations shown on the Town of Penetanguishene Standard Road Cross Section Drawings.
  Trenches for utilities located under the pavement structure and

under sidewalks shall be backfilled with granular material compacted to 100 % Standard Proctor Density.
Trenches for utilities located on boulevards and side-slopes within the road allowances and on easements shall be backfilled with non-organic native material compacted to 95 % Standard Proctor Density.

4.0 ACCEPTANCE OF INFRASTRUCTURE WORKS

4.1 SUBSTANTIAL COMPLETION

4.1.1 CERTIFICATION

The Developer's Consulting Engineer shall deposit with the Town a Certificate of Substantial Completion of the infrastructure works in a Subdivision or Site Plan for which Substantial Completion is applied. The Certificate shall state that all the works were installed in accordance with the accepted engineering drawings and specifications, and shall bear the stamp and signature of the Professional Engineer responsible for the construction supervision in the Development.

The Certificate of Substantial Completion shall accompany the letter from the Developer making application to the Town to have the infrastructure works that are identified in the Certificate of Substantial Completion declared as substantially complete.

4.1.2 DOCUMENTATION

The application for acceptance of the infrastructure works as Substantially Completed shall be accompanied, in addition to the Certificate of Substantial Completion prepared by the developer's Consulting Engineer, by the following items of documentation;

- Statutory Declaration from the Developer that all accounts relating to the construction of the infrastructure works are paid;
- Four copies of the engineering drawings, including the Composite Utilities Plan, showing "As Constructed" information for the infrastructure works. These drawings are to be clearly marked as being "As Constructed" drawings. They are to be prepared by the developer's consulting engineer who undertook the construction supervision, and they are to be marked with the date of their issuance.
- For subdivisions the developer shall deposit with the Public Works Department a three ring binder containing pages on each of which is shown one lot in the subdivision identified by its lot number and municipal address. On each page shall be shown for the applicable lot the

horizontal locations of the Water Service Lateral and the Sanitary Service Lateral in relation to the front lot corners and, for the Sanitary Service Lateral, in relation to the nearest Sanitary Maintenance Hole. Also shown shall be the elevation of the invert of the Sanitary Service Lateral at the street right-of-way line.

- Also included in the three ring binder for subdivisions shall be a list of all the fire hydrants in the subdivision, each identified by the municipal address at which a hydrant is located. For each hydrant shall be listed the geodetic elevation of the top of the flange bolt which is located closest to the street right-of-way line.
- For Site Plans the locations of Service Laterals are to be shown on the "As Constructed" drawing, as well as the elevation of the invert of the Sanitary Service Lateral at the location where it crosses the right-of-way line onto the street right-of-way. Also, a clearly defined geodetic Benchmark shall be shown.

4.1.3 INSPECTION by MUNICIPAL STAFF

Upon receipt by the Town of the Certificate of Substantial Completion a joint inspection by Municipal Staff and the Developer's Consulting Engineer shall be conducted. Deficiencies will be identified and corrected by the Developer.

4.1.4 SUBSTANTIAL COMPLETION in STAGES

In Subdivision and Site Plan Developments application for Substantial Completion may be made for several stages of the Infrastructure Works as follows:

a) UNDERGROUND WORKS - including:

i) Sanitary Sewers, Appurtenances, Sewage Pumping Station and Service Laterals;
ii) Storm Sewers, Appurtenances, and Stormwater Management Facilities;
iii) Watermains, Appurtenances and Service Laterals.

b) PAVEMENT STRUCTURE - including:

i) Granular Base Course and Granular Surface Course, Curbs and Gutters where applicable, and Base Course of Asphalt;
ii) Traffic Signs.

c) ABOVE-GROUND WORKS - including:

i) Surface Course of Asphalt, Asphalt in Driveway Aprons, Sidewalks, Walkways, Fencing, Topsoil and Sod or Seed, Parkland Grading and Equipment, Street Lighting, Signs and Pavement Markings.

The work for which application is made will be Substantially Completed on the date the Town issues a letter to the Developer declaring the work to be substantially completed.

4.1.5 SURFACE ASPHALT

The Surface Course of Asphalt on roadways in subdivisions shall not be placed until at least one winter season has passed after the date of placement of the Base Course of Asphalt. Similarly, the Surface Course of Asphalt on parking areas and internal roadways in Site Plans shall not be placed until at least one winter season has passed after the date of the placement of the Base Course of Asphalt. All storm water inlets shall be set at elevations which will permit the flow of surface water into them as per the storm drainage design, both before and after the placement of the Surface Course of Asphalt. Covers for Maintenance Holes shall be set flush to permit snow plowing both before and after the placement of the Surface Course of Asphalt.

4.2 MAINTENANCE

4.2.1 BEGINNING of MAINTENANCE PERIOD

In Subdivision Plans of Development the infrastructure works will be subject to maintenance by the developer for periods detailed as follows, beginning on the day when the Town declares the works to be substantially completed. The Maintenance Periods are:

a) For UNDERGROUND WORKS - 24 Months;
b) For PAVEMENT STRUCTURE - 24 Months;
c) For ABOVE-GROUND WORKS - 12 Months.

In Site Plan Developments, the maintenance of on-site infrastructure works will remain the responsibility of the developer or of subsequent owners.

Regardless of the lengths of the Maintenance Periods specified in this section, note the requirements in Section 4.2.4 below where it states that maintenance remains the responsibility of the developer of a subdivision until all the infrastructure works have received Final Acceptance from the Town.

4.2.2 MAINTENANCE OPERATIONS by DEVELOPER

On road allowances the maintenance responsibilities of the developer until Final Acceptance include snow plowing and street sweeping but not garbage collection.

4.2.3 MAINTENANCE REPAIRS

In Subdivision Developments, all infrastructure works constructed by the Developer and which require maintenance repair work during the Maintenance Period(s) shall be attended to by the Developer. If, in the opinion of the Town, the Developer fails to deal with maintenance matters expeditiously, the Town reserves the right to perform or cause to be performed the maintenance work it deems necessary, at the Developer's expense.

4.2.4 TERMINATION of MAINTENANCE PERIOD

When all Maintenance Periods stipulated in Section 4.2.1 above have run their courses, the Developer may apply for Final Acceptance of the infrastructure works by the Town of Penetanguishene. When Final Acceptance has been given by the Town and the public roads assumed by the Town the Developer's maintenance responsibilities will end. For Final Acceptance the minimum requirements set out in Section 4.3 must be satisfied.

4.3 FINAL ACCEPTANCE

4.3.1 APPLICATION

Upon the completion of the Maintenance Periods the Town will entertain an application in writing from the Developer for Final Acceptance of the infrastructure works. The Application will include a Certificate of Final Completion stamped and signed by the Developer's Consulting Engineer stating that all the infrastructure works are completed and are in conformance with the accepted engineering drawings and specifications, and that all maintenance items identified during the Maintenance Period have been addressed and corrected.

4.3.2 CAMERA SEWER INSPECTIONS

At the end of the Maintenance Period the Developer shall have all sanitary and storm sewers flushed and shall have conducted by a qualified firm approved by the Town television camera inspections of all sanitary and storm sewer mains in the Development as well as those built by the Developer outside of the Development to service the Development. The Developer shall submit to the Town digital video records and the inspection report produced by the inspection firm.

4.3.3 INSPECTION by MUNICIPAL STAFF

Upon receipt by the Town of the Certificate of Final Completion and the sewer video records and inspection reports, a joint inspection by Municipal Staff and the Developer's Consulting Engineer shall be conducted. Deficiencies will be identified and corrected by the Developer.

Immediately prior to this joint inspection the developer shall have arranged to have every Water Valve and Curb Stop within the development located and clearly marked. As part of this joint inspection the developer shall operate, in the presence of the Municipal Staff, every Water Valve and Curb Stop to ensure that all Valve Boxes and Curb Stop Boxes are straight and that each Water Valve and Curb Stop operates properly.

4.3.4 DOCUMENTATION

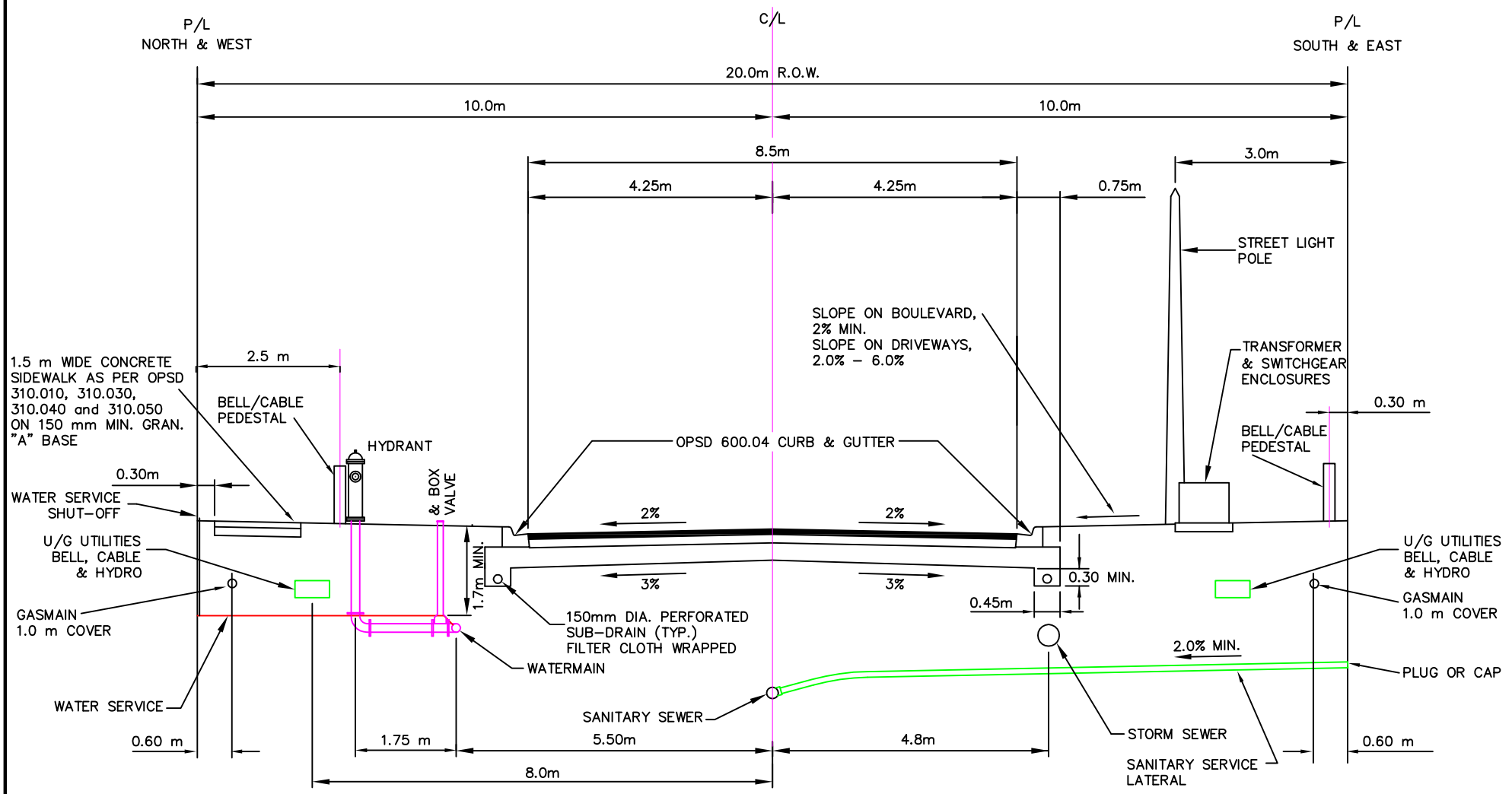
The application for Final Acceptance of the infrastructure works shall be accompanied, in addition to the Certificate of Final Completion, by the following items of documentation;

- Statutory Declaration from the Developer that all accounts relating to the construction of and performance of maintenance works to the infrastructure works are paid;
- Four revised copies of the "As Constructed" drawings if necessary due to changes caused by maintenance works conducted during the Maintenance Period;
- Digital copies of the "As Constructed" drawings. The format of the digital copies is to be confirmed with the Public Works Department to ensure compatibility with the Department's computer system and software.

4.3.5 FINAL COMPLETION

The work in the Development will be Finally Completed on the date the Town issues a letter to the Developer declaring the work to be Finally Complete.

APPENDIX "A"



NOTES :

ROAD BASE :

ASPHALT – BASE COURSE 50mm HL8
SURFACE COURSE 40mm HL3

GRANULAR 'A' 150mm (MIN.)

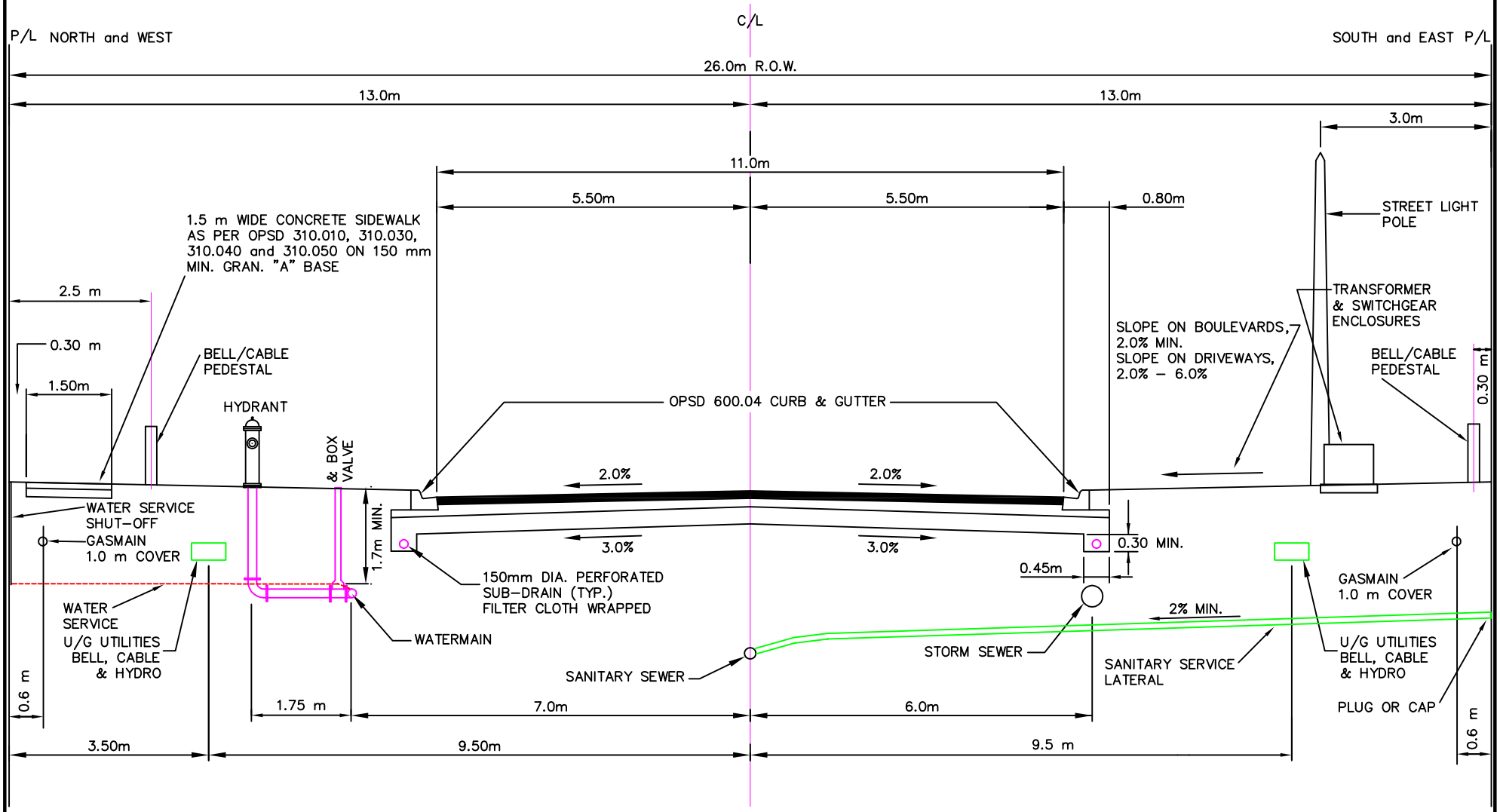
GRANULAR 'B' 300mm (MIN.)

ALL BOULEVARDS SHALL RECEIVE 75mm TOPSOIL & NURSERY SOD.

TOWN OF PENETANGUISHENE

STANDARD URBAN RESIDENTIAL ROAD SECTION
(20.0m R.O.W.)

DATE :	APRIL, 2008	SCALE:	1 : 100
DRAWN:	L. HUYER	DWG. NO.	1
CHECKED:	H. BORGDORFF		



NOTES :

ROAD BASE :

ASPHALT – BASE COURSE 90mm HL8
SURFACE COURSE 40mm HL3

GRANULAR 'A' 150mm (MIN.)

GRANULAR 'B' 300mm (MIN.)

ALL BOULEVARDS SHALL RECEIVE 75mm TOPSOIL & NURSERY SOD.

TOWN OF PENETANGUISHENE

STANDARD URBAN ARTERIAL ROAD SECTION (26.0m R.O.W.)

DATE :	APRIL, 2008	SCALE:	1 : 100
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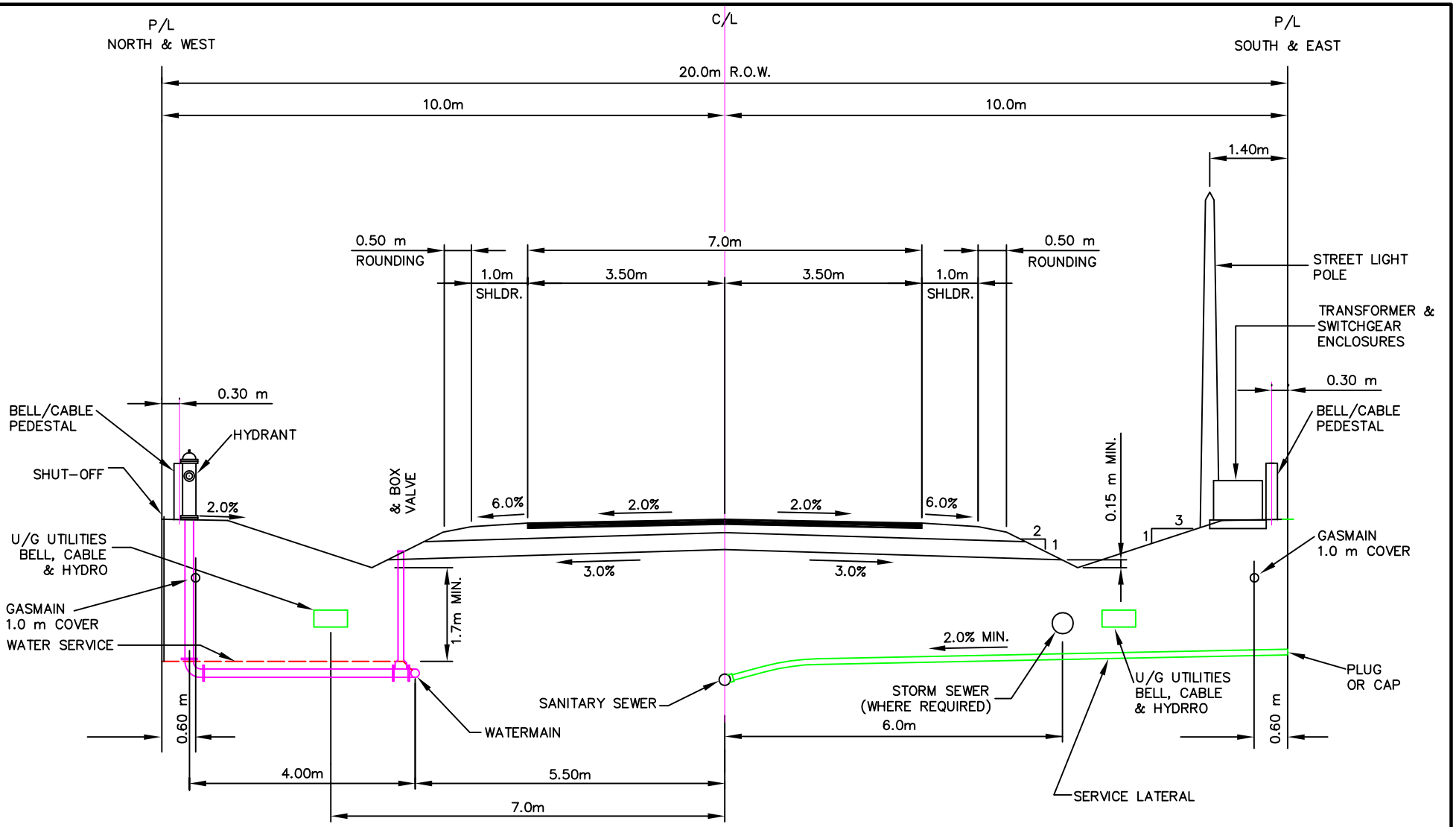
CHECKED:	H. BORGDORFF		



NOTES :

ROAD BASE :

ASPHALT – BASE COURSE 50mm HL8
SURFACE COURSE 40mm HL3

GRANULAR 'A' 150mm (MIN.)

GRANULAR 'B' 300mm (MIN.)

ALL BOULEVARDS AND DITCHES SHALL RECEIVE EROSION PROTECTION OF 75 mm TOPSOIL AND SOD. WHERE MORE SUBSTANTIAL EROSION PROTECTION IS REQUIRED, IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED UNDER "ROADWAYS" IN SECTION 3.2.2, THE DETAILS OF SUCH EROSION PROTECTION SHALL BE SHOWN ON THE ENGINEERING DRAWINGS FOR THE SUBJECT DEVELOPMENT.

TOWN OF PENETANGUISHENE

STANDARD RURAL RESIDENTIAL ROAD SECTION (20.0m R.O.W.)

DATE :	APRIL, 2008	SCALE:	1 : 100
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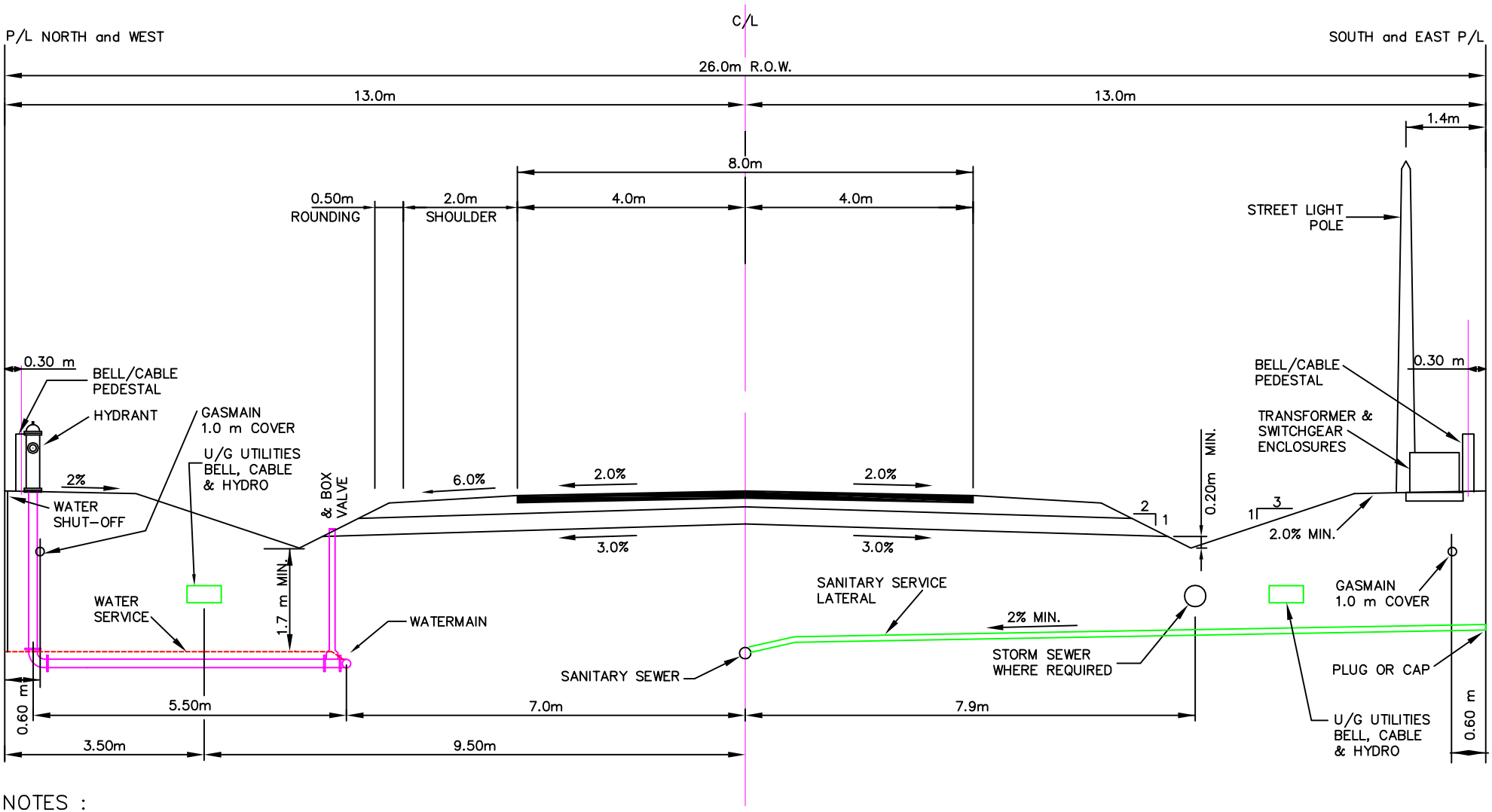
CHECKED:	H. BORGDORFF		



NOTES :

ROAD BASE :

ASPHALT – BASE COURSE 90mm HL8
SURFACE COURSE 40mm HL3

GRANULAR 'A' 150mm (MIN.)

GRANULAR 'B' 300mm (MIN.)

ALL BOULEVARDS AND DITCHES SHALL RECEIVE EROSION PROTECTION OF 75 mm TOPSOIL AND SOD. WHERE MORE SUBSTANTIAL EROSION PROTECTION IS REQUIRED, IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED UNDER "ROADWAYS" IN SECTION 3.2.2 THE DETAILS OF SUCH EROSION PROTECTION SHALL BE SHOWN ON THE ENGINEERING DRAWINGS FOR THE SUBJECT DEVELOPMENT.

TOWN OF PENETANGUISHENE

STANDARD RURAL ARTERIAL ROAD SECTION (26.0m R.O.W.)

DATE :	APRIL, 2008	SCALE:	1 : 100
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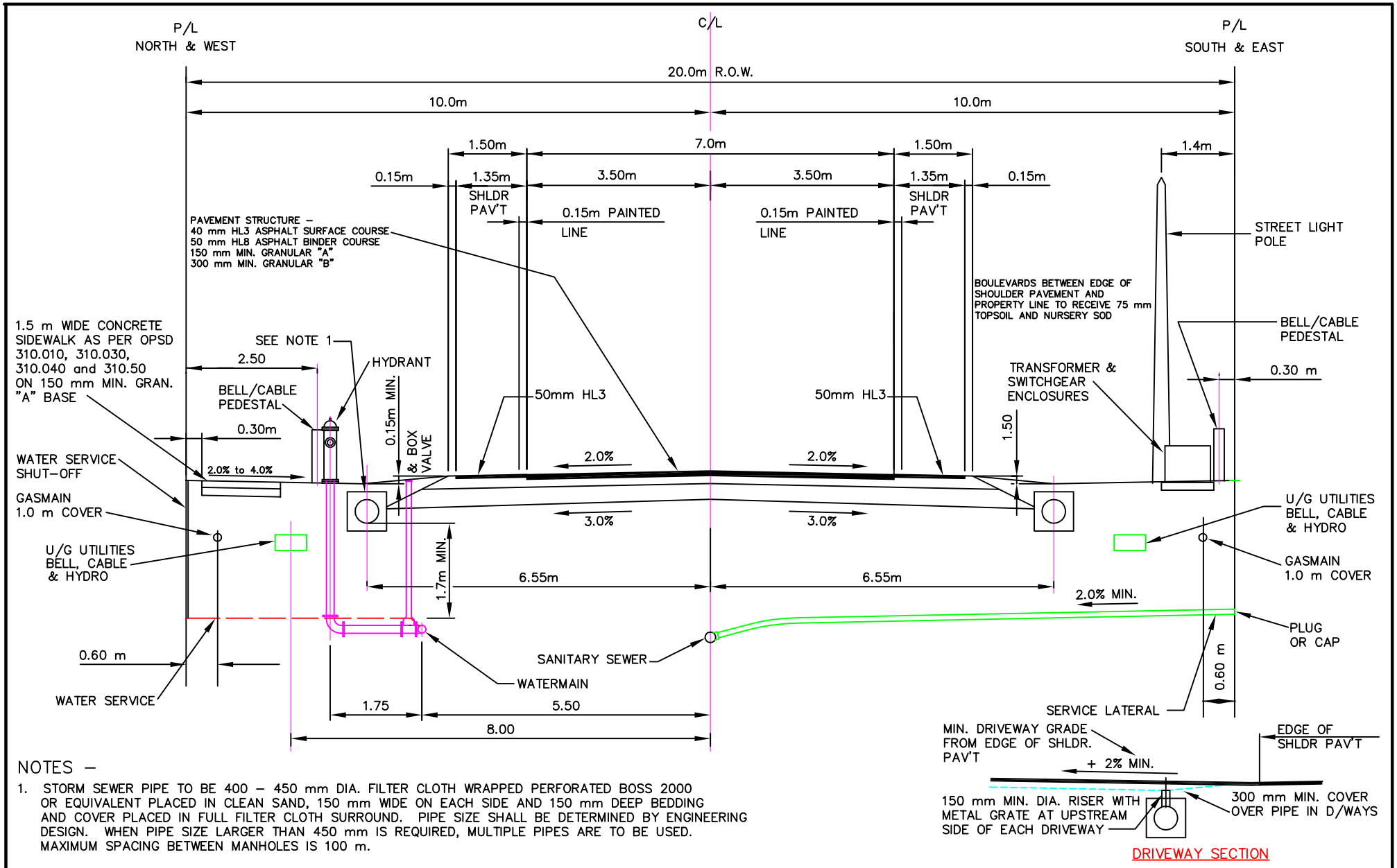
CHECKED:	H. BORGDORFF		



DRIVEWAY SECTION

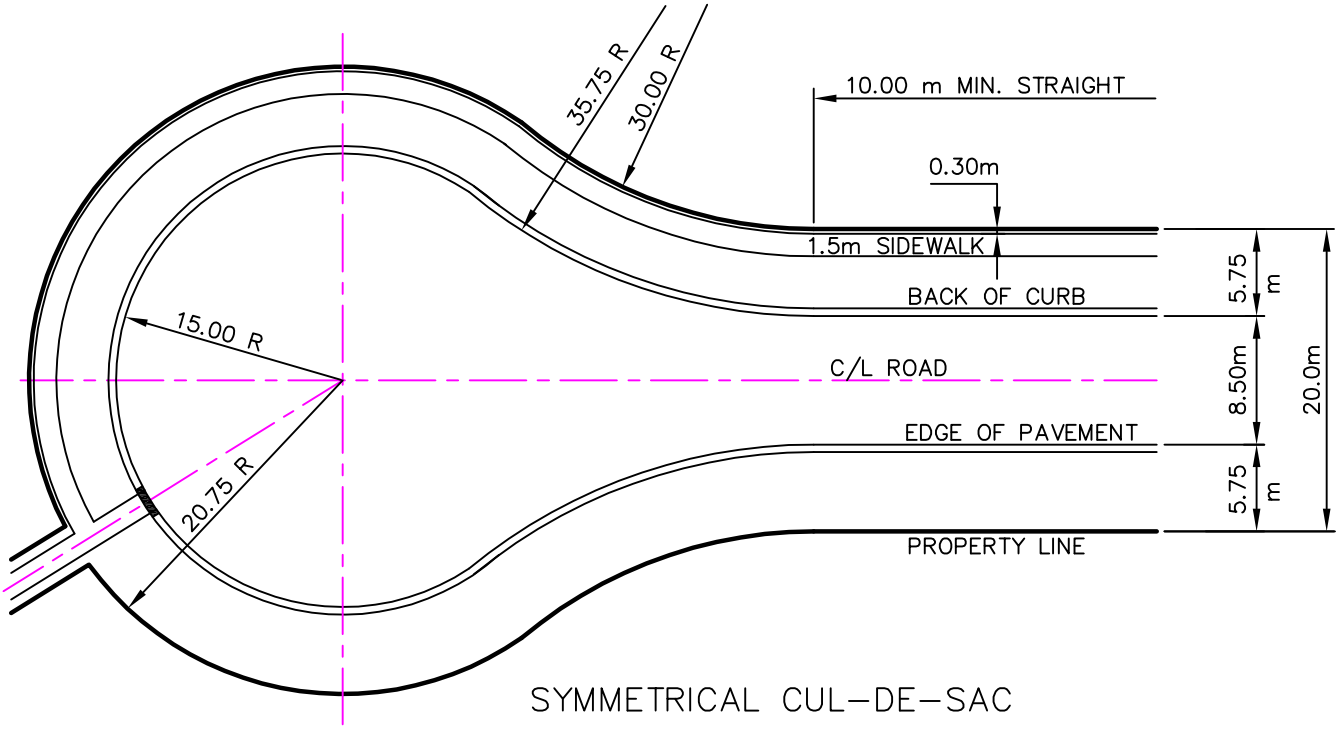
NOTES –

1. STORM SEWER PIPE TO BE 400 – 450 mm DIA. FILTER CLOTH WRAPPED PERFORATED BOSS 2000 OR EQUIVALENT PLACED IN CLEAN SAND, 150 mm WIDE ON EACH SIDE AND 150 mm DEEP BEDDING AND COVER PLACED IN FULL FILTER CLOTH SURROUND. PIPE SIZE SHALL BE DETERMINED BY ENGINEERING DESIGN. WHEN PIPE SIZE LARGER THAN 450 mm IS REQUIRED, MULTIPLE PIPES ARE TO BE USED. MAXIMUM SPACING BETWEEN MANHOLES IS 100 m.

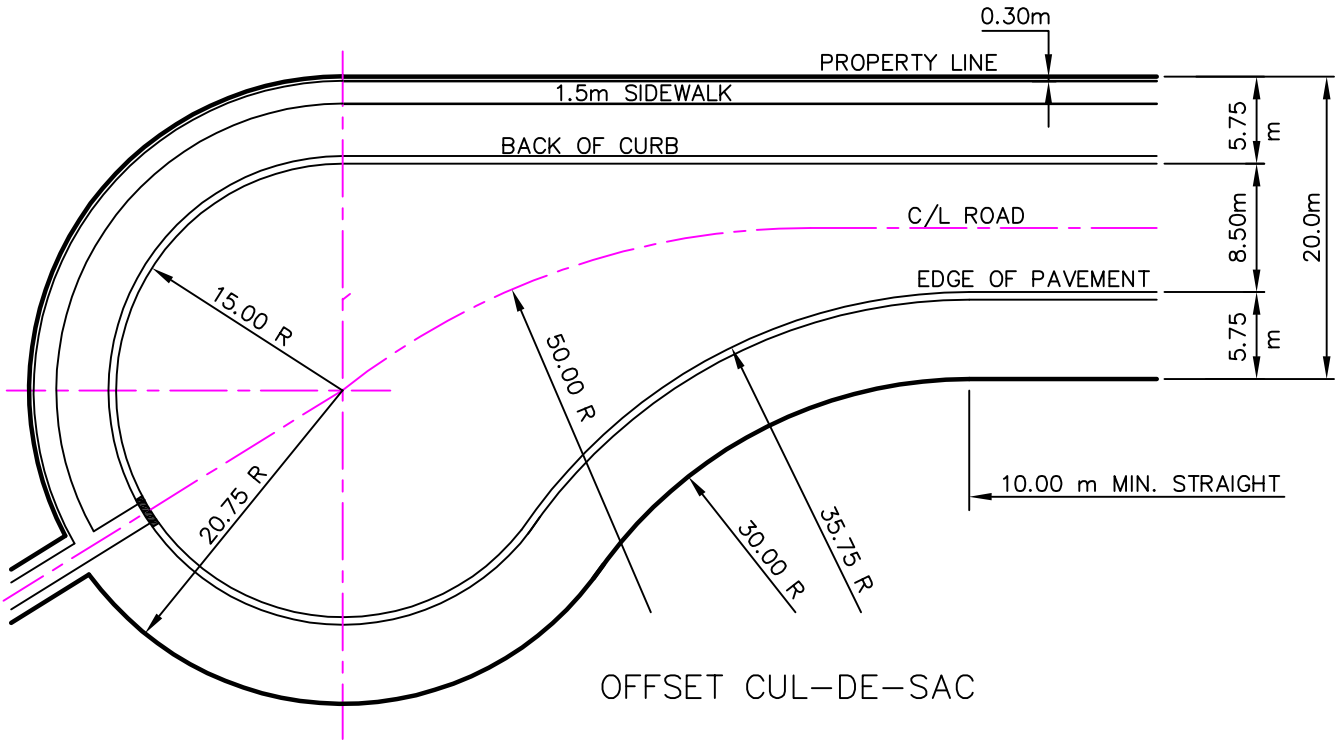
TOWN OF PENETANGUISHENE

SEMI – URBAN RESIDENTIAL ROAD SECTION (20.0m R.O.W.)

DATE :	APRIL, 2008	SCALE:	1 : 100
DRAWN:	L. HUYER	DWG. NO.	5
CHECKED:	H. BORGDORFF		



SYMMETRICAL CUL–DE–SAC



OFFSET CUL–DE–SAC

DIMENSIONS ARE IN METRES

TOWN OF PENETANGUISHENE

PERMANENT URBAN RESIDENTIAL CUL–DE–SAC
(20.0m R.O.W.)

DATE :	APRIL, 2008	SCALE:	1 : 50
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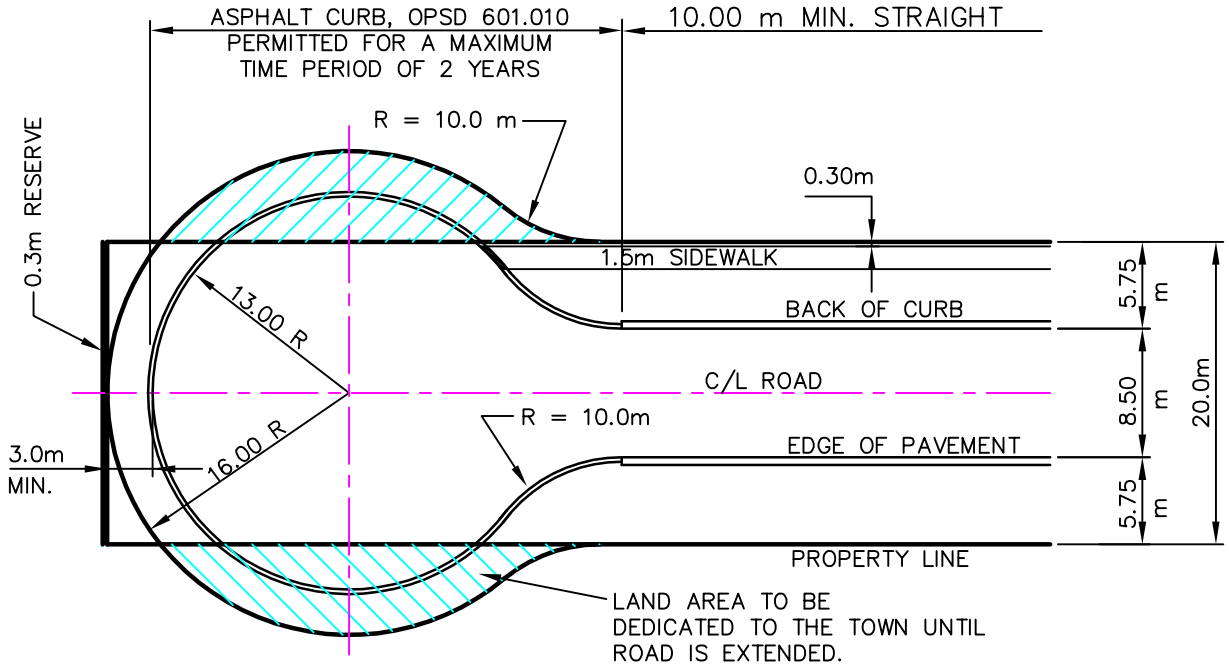
CHECKED:	H. BORGDORFF		



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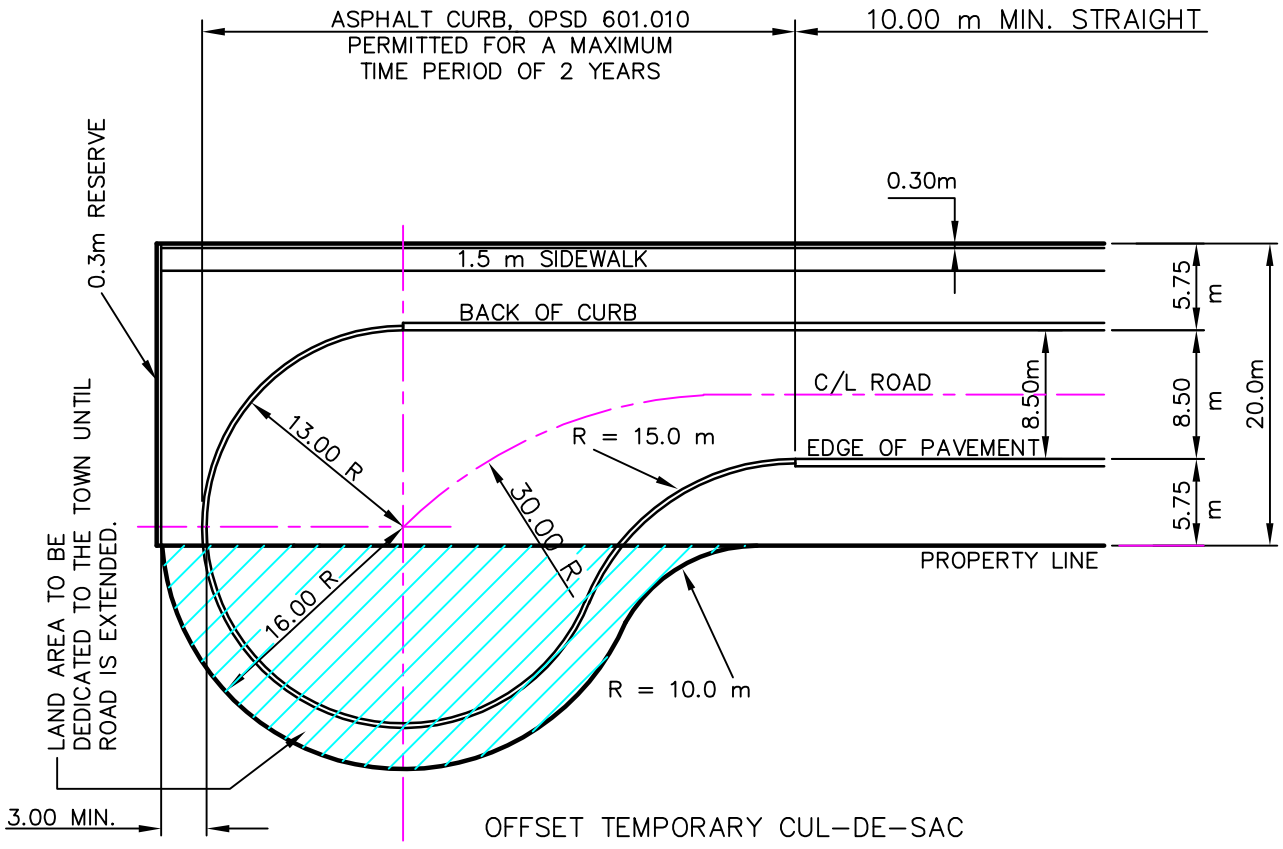
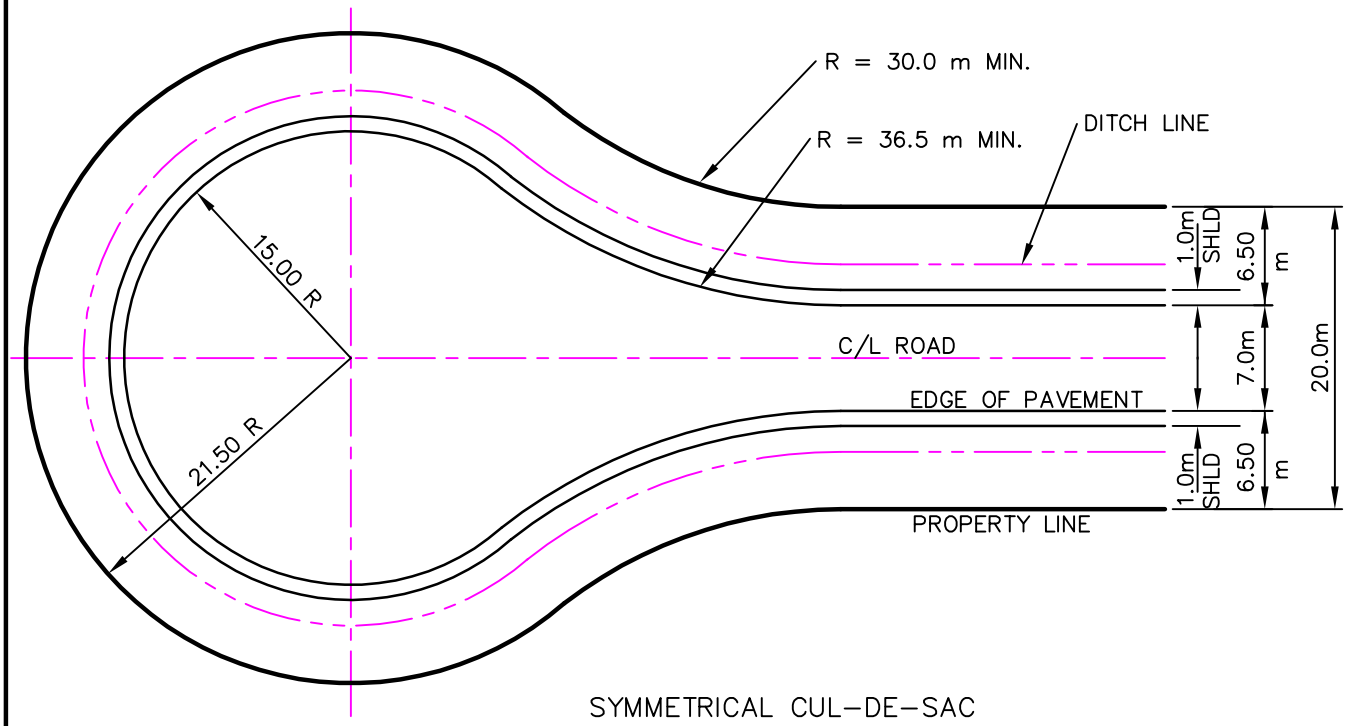


OFFSET TEMPORARY CUL–DE–SAC

TOWN OF PENETANGUISHENE

TEMPORARY URBAN RESIDENTIAL CUL–DE–SAC
(20.0m R.O.W.)

DATE :	APRIL, 2008	SCALE:	1 : 50
DRAWN:	L. HUYER	DWG. NO.	7
CHECKED:	H. BORGDORFF		



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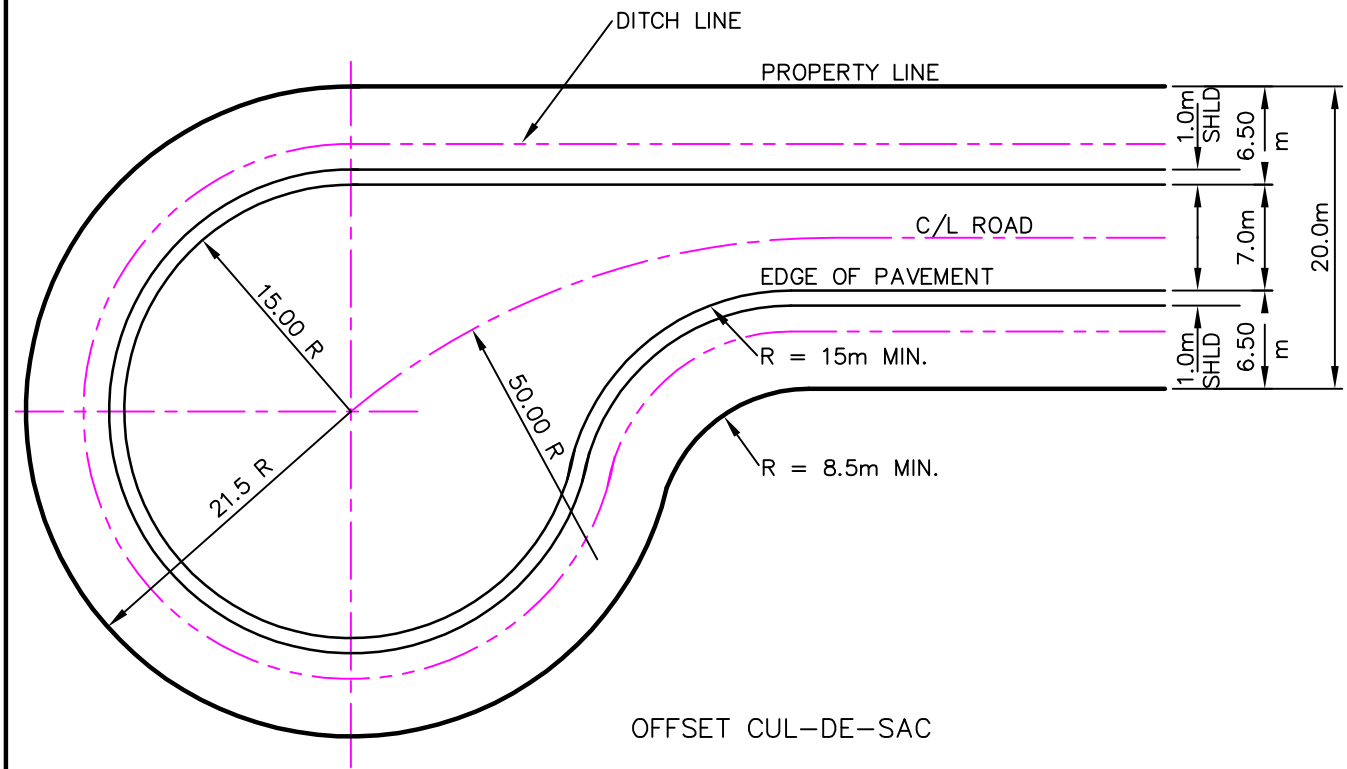
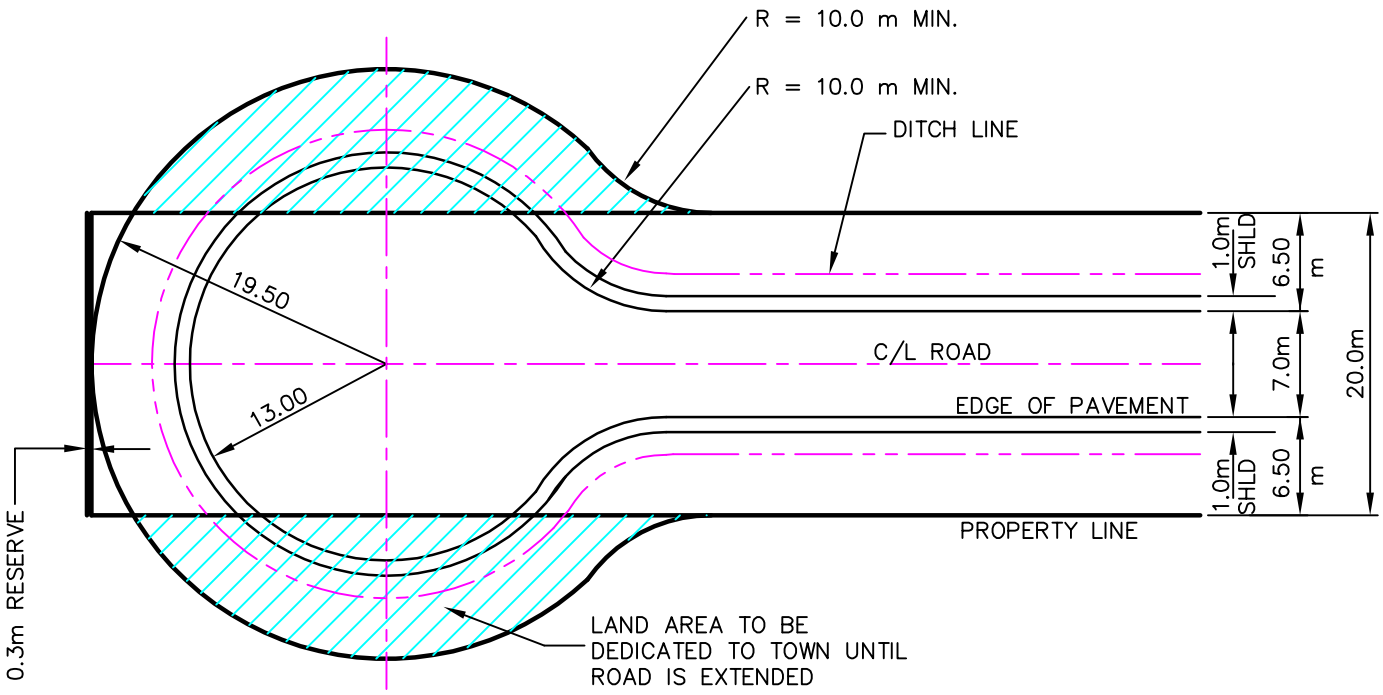


OFFSET CUL–DE–SAC

TOWN OF PENETANGUISHENE

PERMANENT RURAL RESIDENTIAL CUL–DE–SAC (20.0m R.O.W.)

DATE :	APRIL, 2008	SCALE:	1 : 50
DRAWN:	L. HUYER		**DWG. NO. 8**
CHECKED:	H. BORGDORFF		



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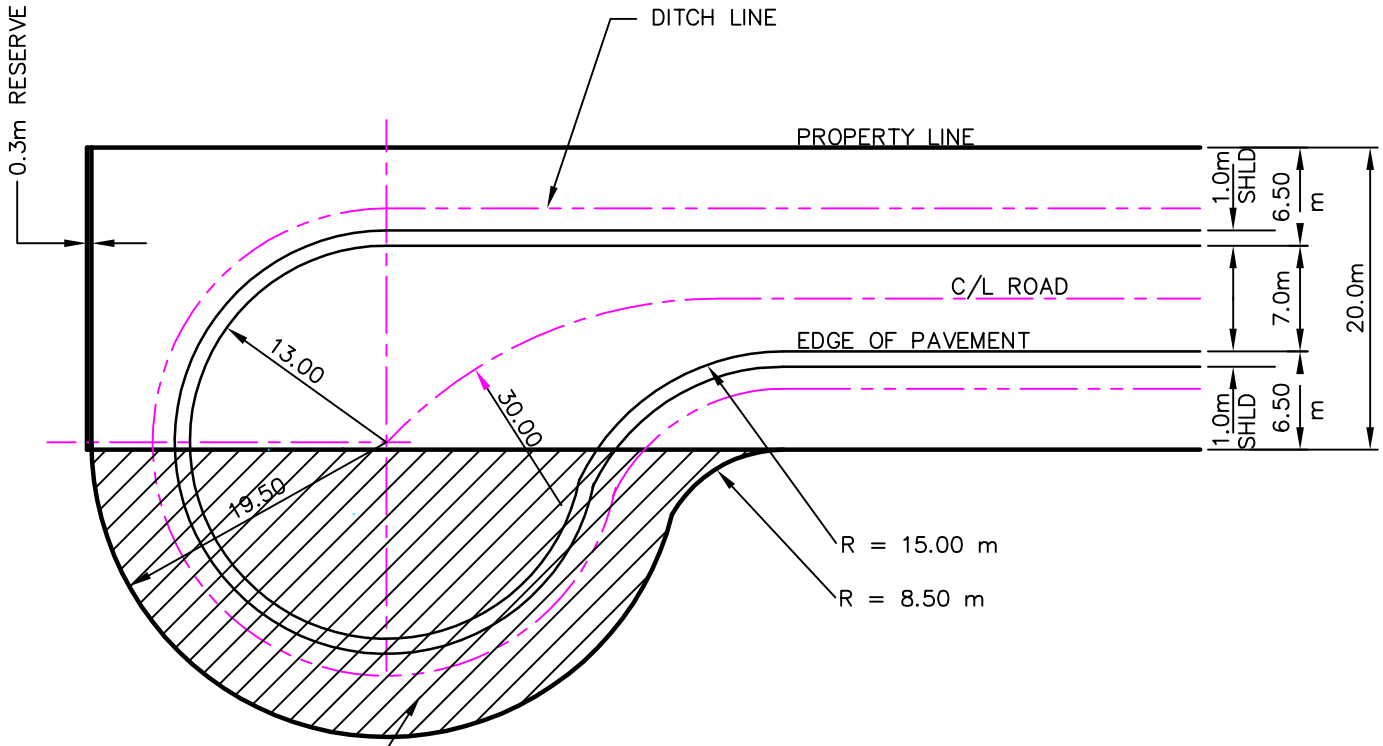
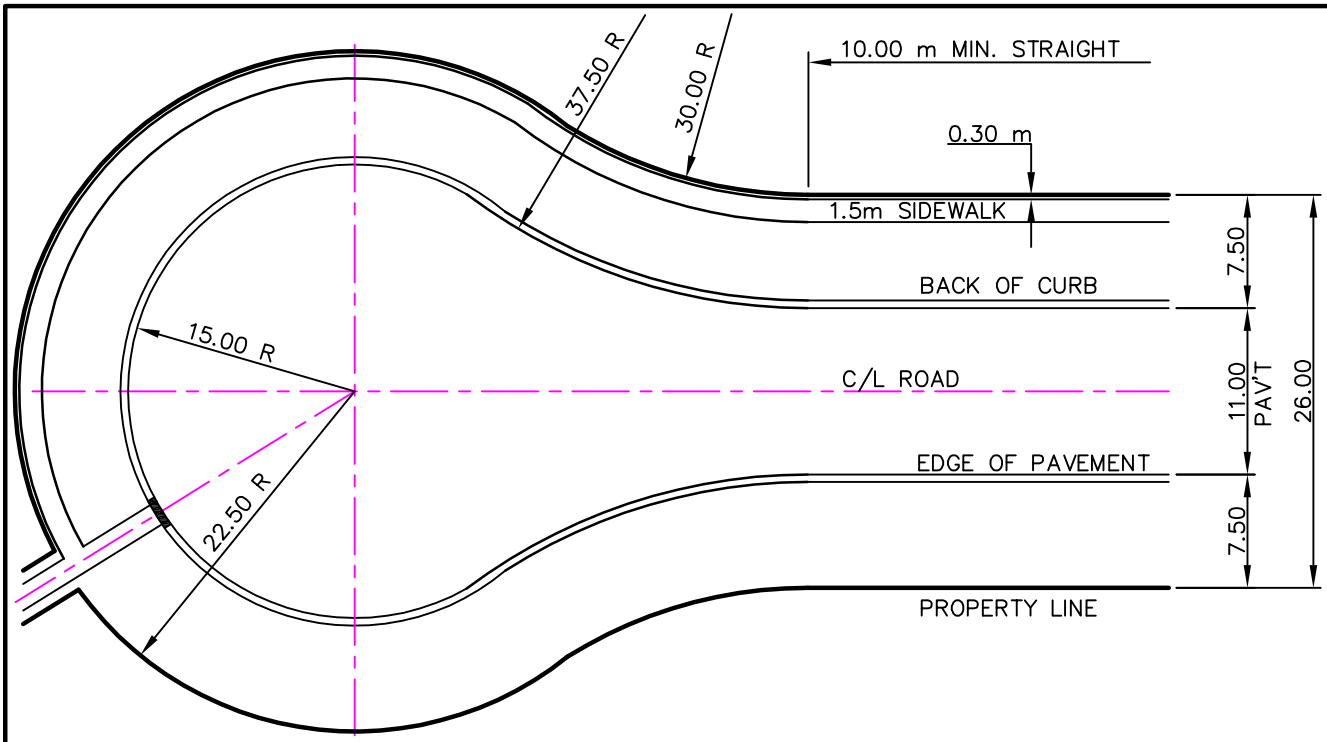


OFFSET TEMPORARY CUL–DE–SAC

TOWN OF PENETANGUISHENE

TEMPORARY RURAL RESIDENTIAL CUL–DE–SAC
(20.0m R.O.W.)

DATE :	DECEMBER, 2008	SCALE:	1 : 50
DRAWN:	L. HUYER		DWG. NO. 9
CHECKED:	H. BORGDORFF		



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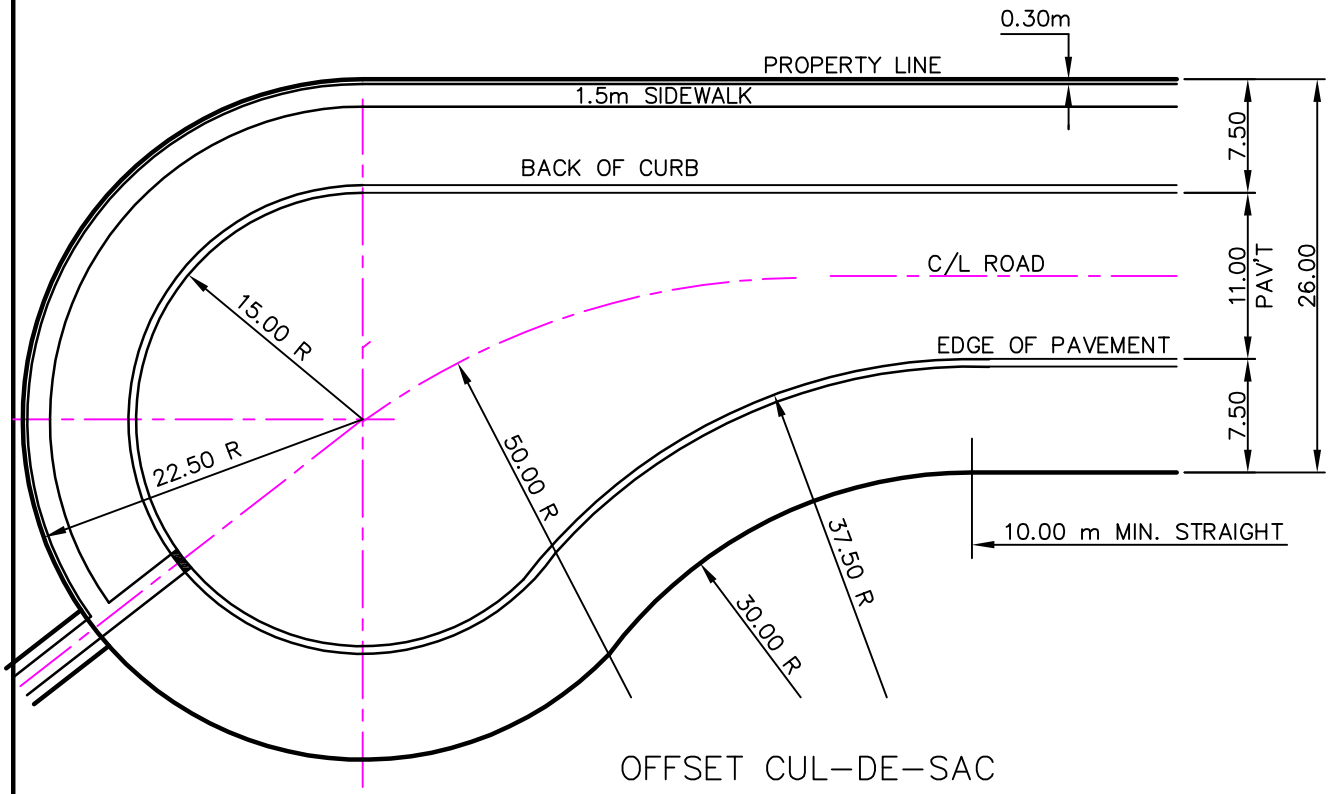

OFFSET CUL–DE–SAC

DIMENSIONS ARE IN METRES

TOWN OF PENETANGUISHENE

PERMANENT URBAN ARTERIALTIAL CUL–DE–SAC
(26.0m R.O.W.)

DATE :	DECEMBER, 2008	SCALE:	1 : 50
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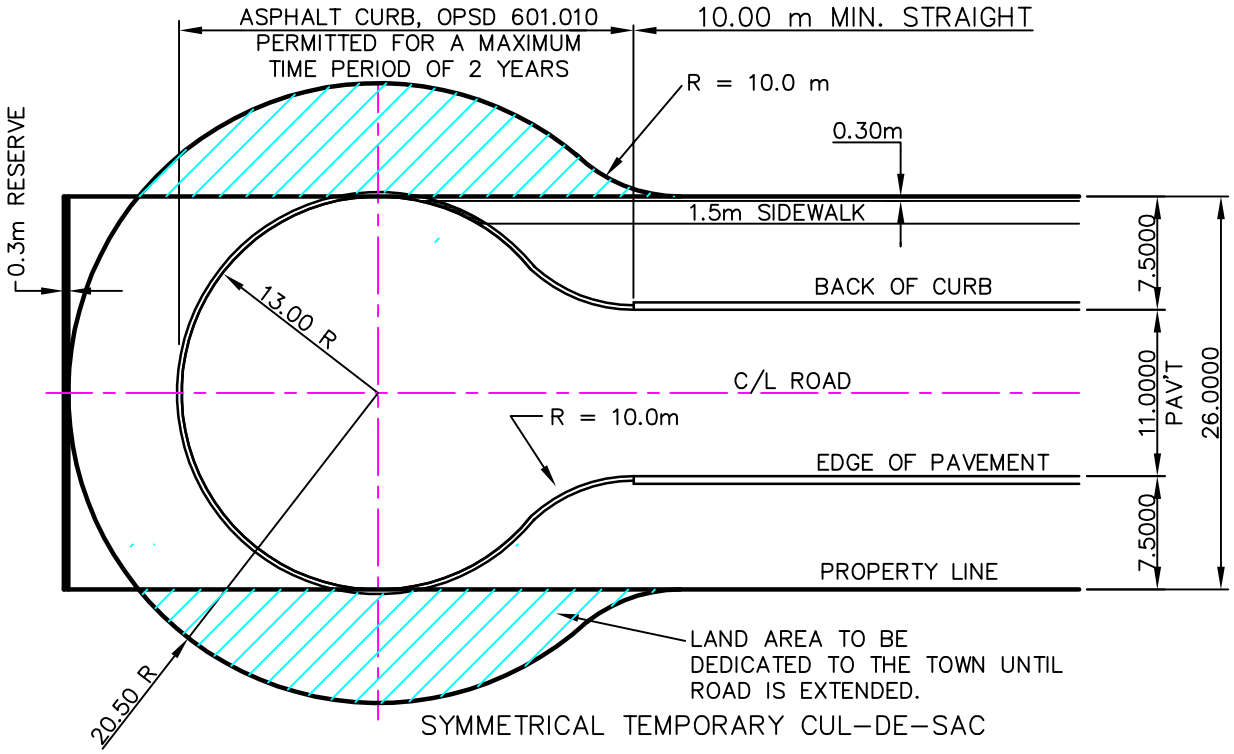
CHECKED:	H. BORGDORFF		**DWG. NO. 10**



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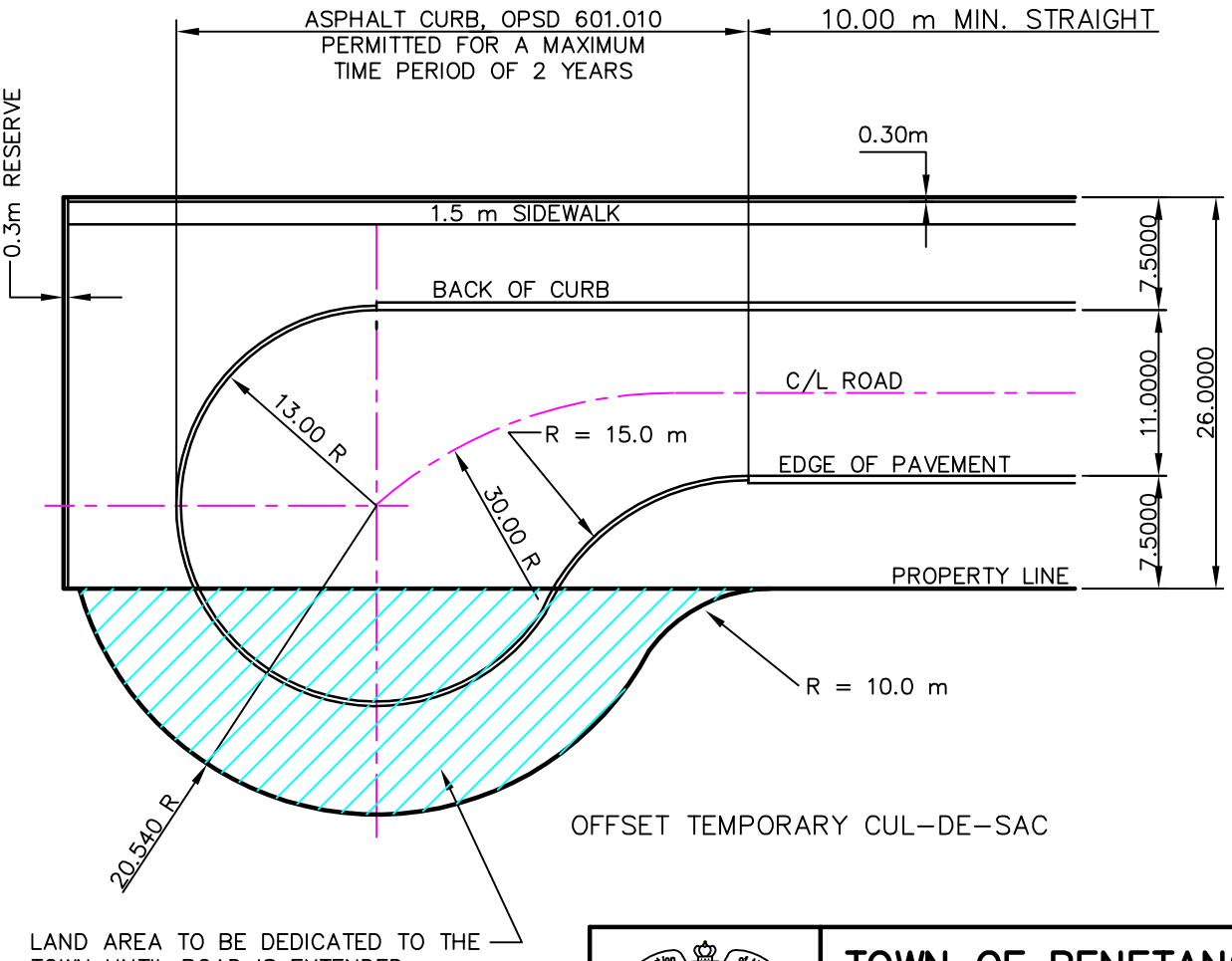
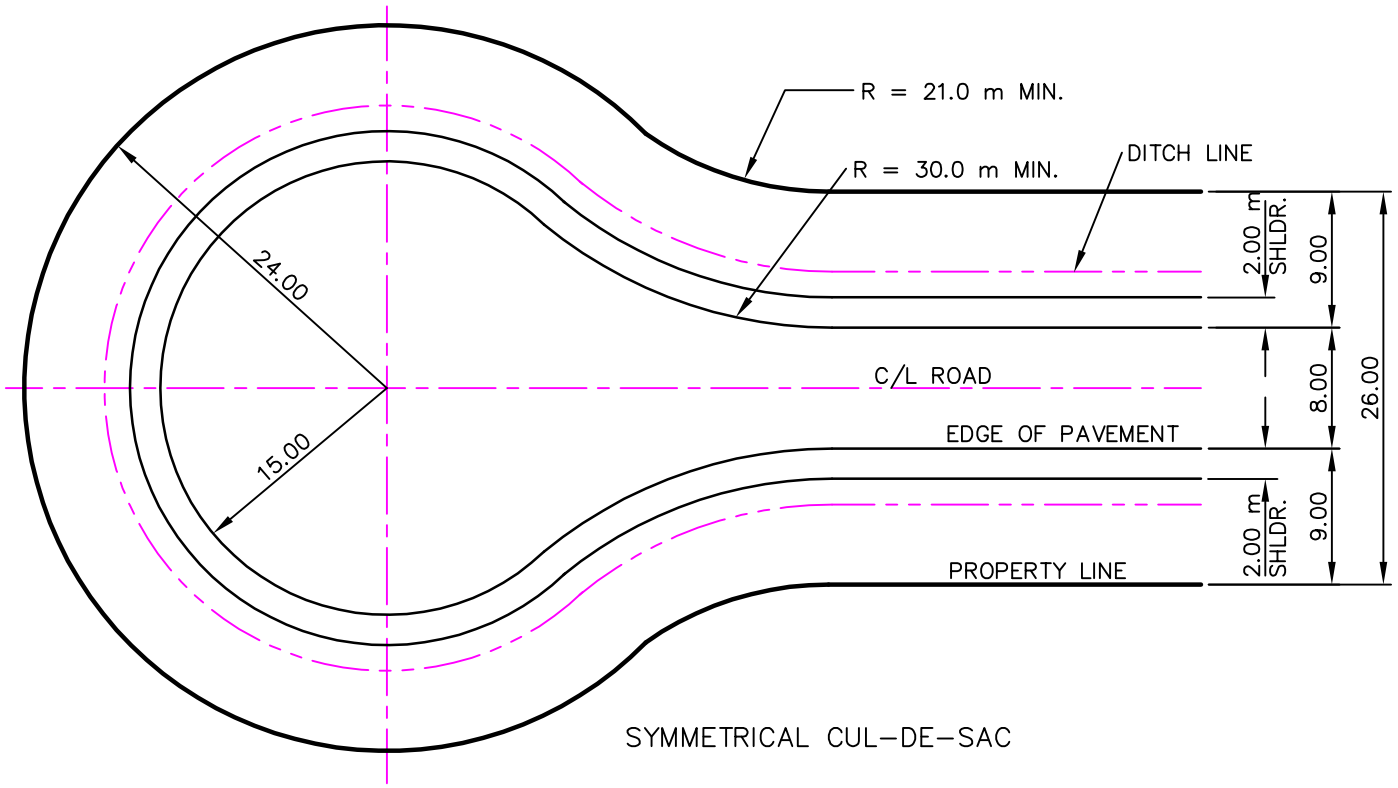


OFFSET TEMPORARY CUL–DE–SAC

TOWN OF PENETANGUISHENE

TEMPORARY URBAN ARTERIAL CUL–DE–SAC
(26.0m R.O.W.)

DATE :	DECEMBER, 2008	SCALE:	1 : 50
DRAWN:	H. BORGDORFF	DWG. NO.	11
CHECKED:	H. BORGDORFF		



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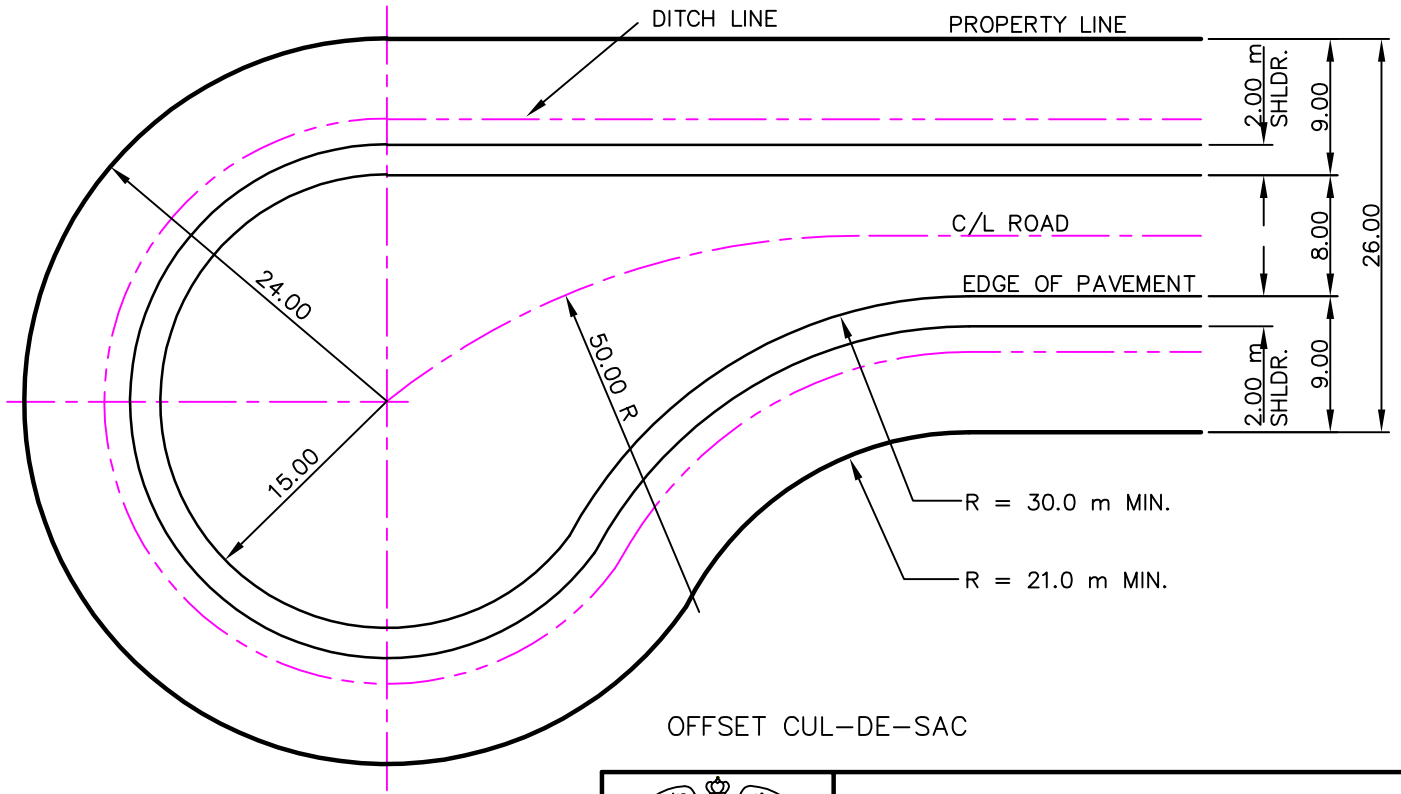
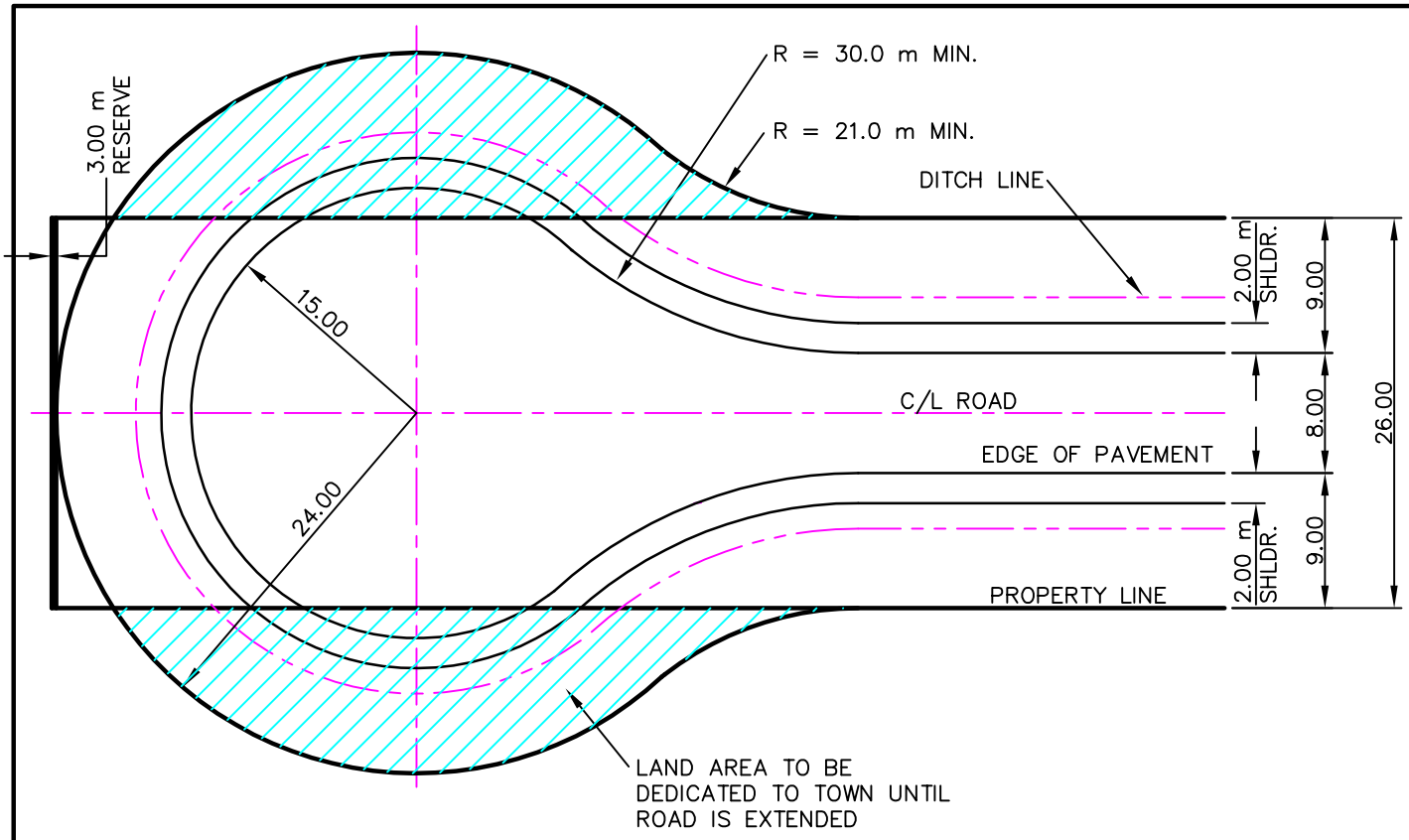


OFFSET CUL–DE–SAC

TOWN OF PENETANGUISHENE

PERMANENT RURAL ARTERIAL CUL–DE–SAC (26.0m R.O.W.)

DATE :	DECEMBER, 2008	SCALE:	1 : 50
DRAWN:	H. BORGDORFF		**DWG. NO. 12**
CHECKED:	H. BORGDORFF		



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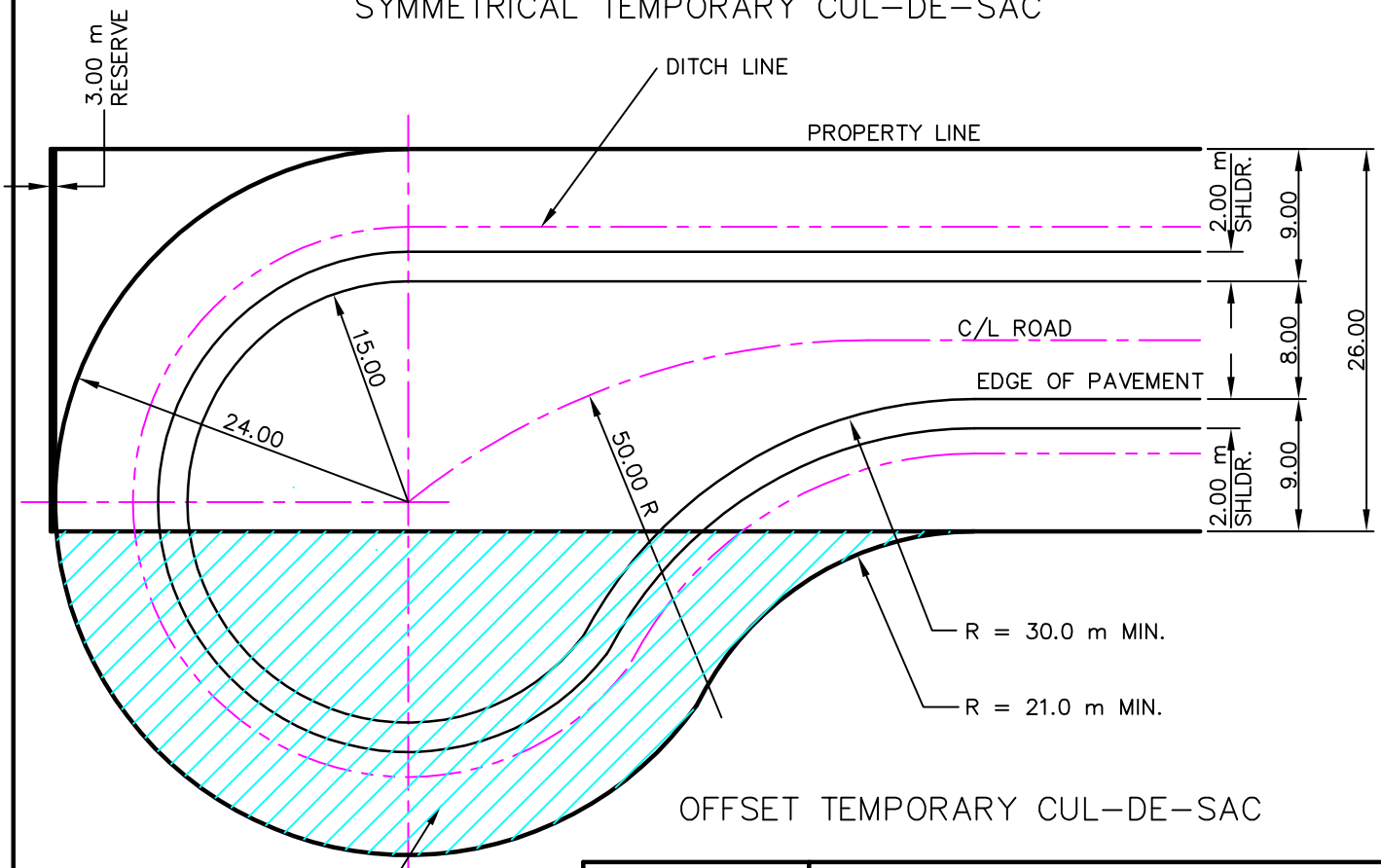
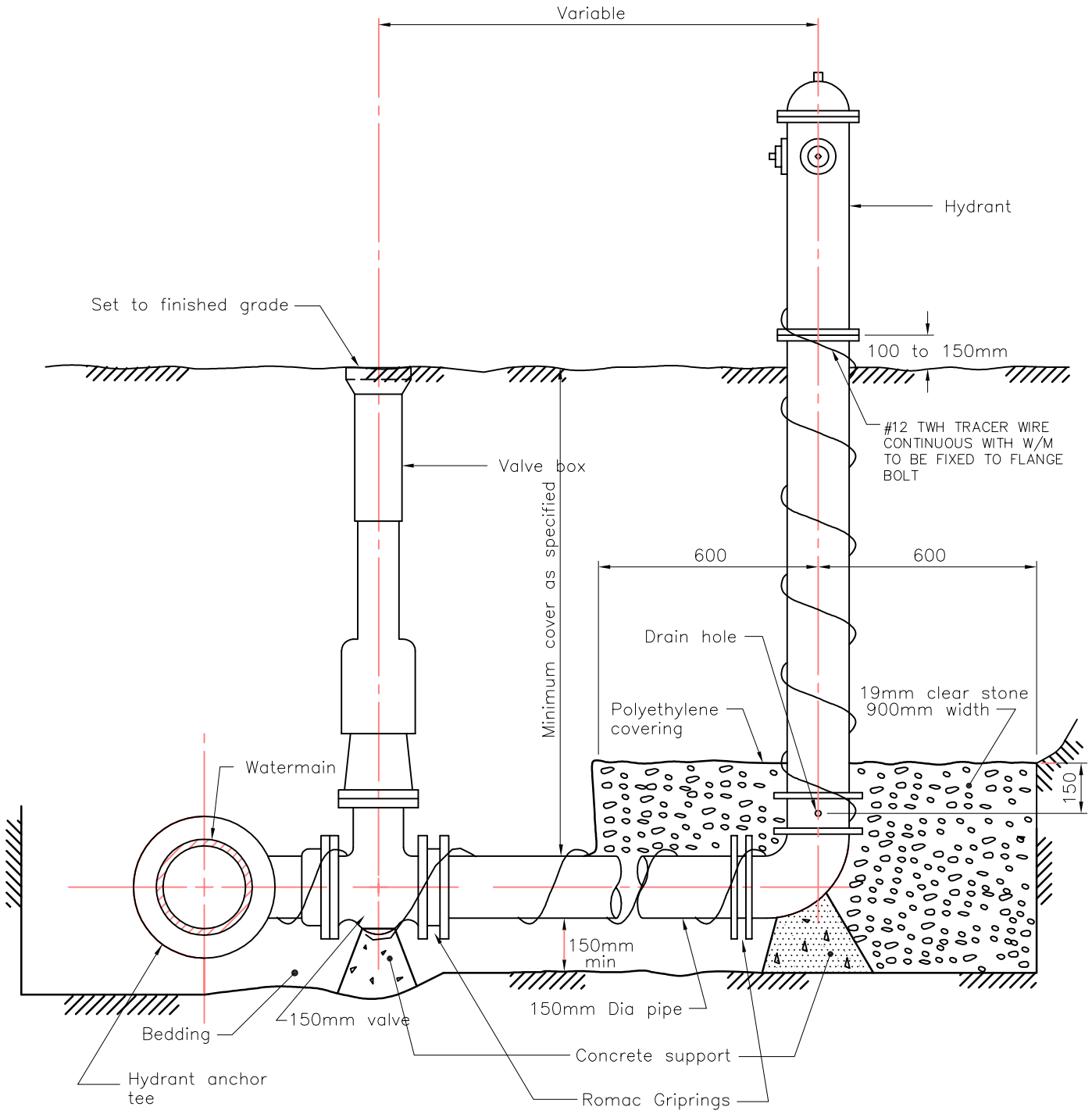


OFFSET TEMPORARY CUL–DE–SAC

TOWN OF PENETANGUISHENE

TEMPORARY RURAL ARTERIAL CUL–DE–SAC
(26.0m R.O.W.)

DATE :	DECEMBER, 2008	SCALE:	1 : 50
DRAWN:	H. BORGDORFF		DWG. NO. 13
CHECKED:	H. BORGDORFF		



NOTES:

A All concrete supports to be poured against undisturbed ground.

B Polyethylene bond breaker to be used between concrete and fittings.

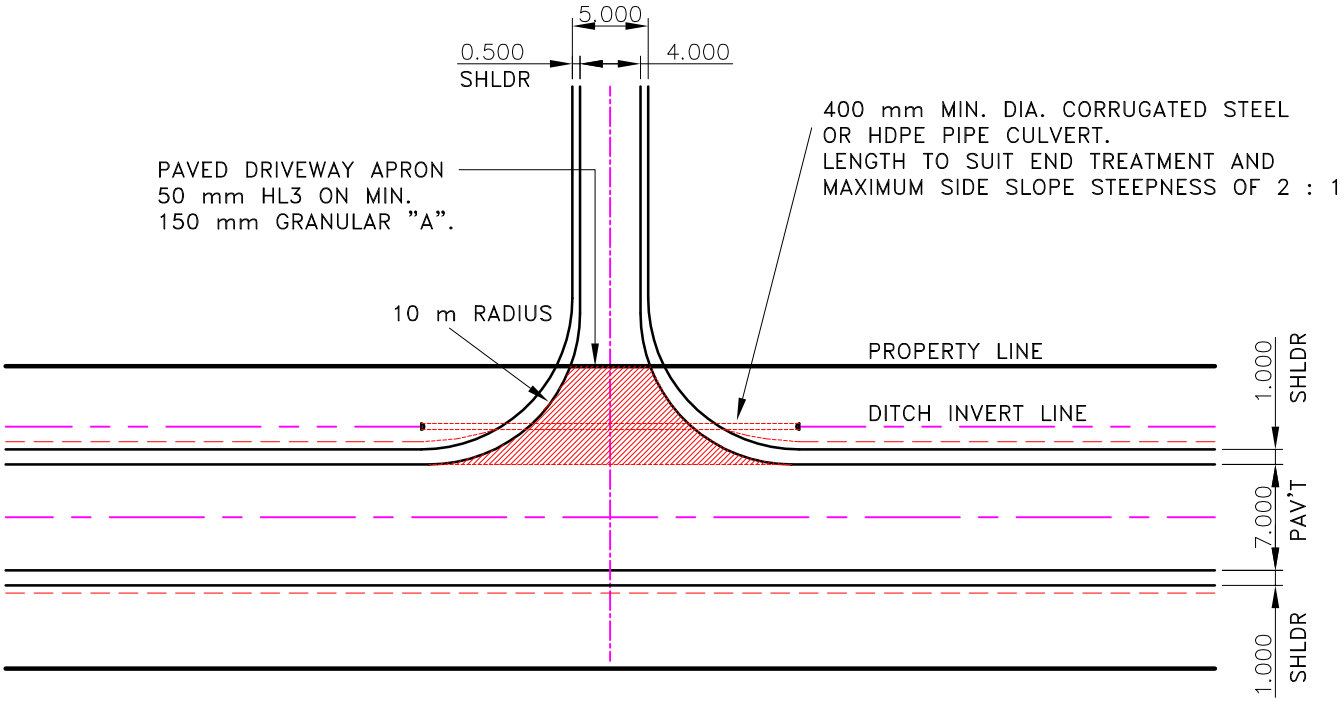
C Flange of standpipe extensions not to be in frost zone.

D All dimensions are in millimetres or metres unless otherwise shown.

TOWN OF PENETANGUISHENE

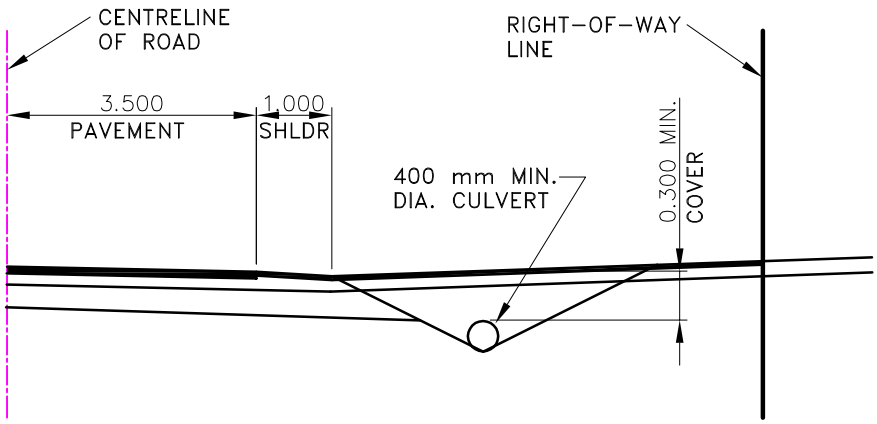
TYPICAL HYDRANT AND VALVE INSTALLATION DETAIL

DATE :	DECEMBER, 2008	SCALE:	1 : 100
DRAWN:	L. HUYER		
CHECKED:	H. BORGDORFF		**DWG. NO. 14**



PLAN

SCALE: 1 : 500



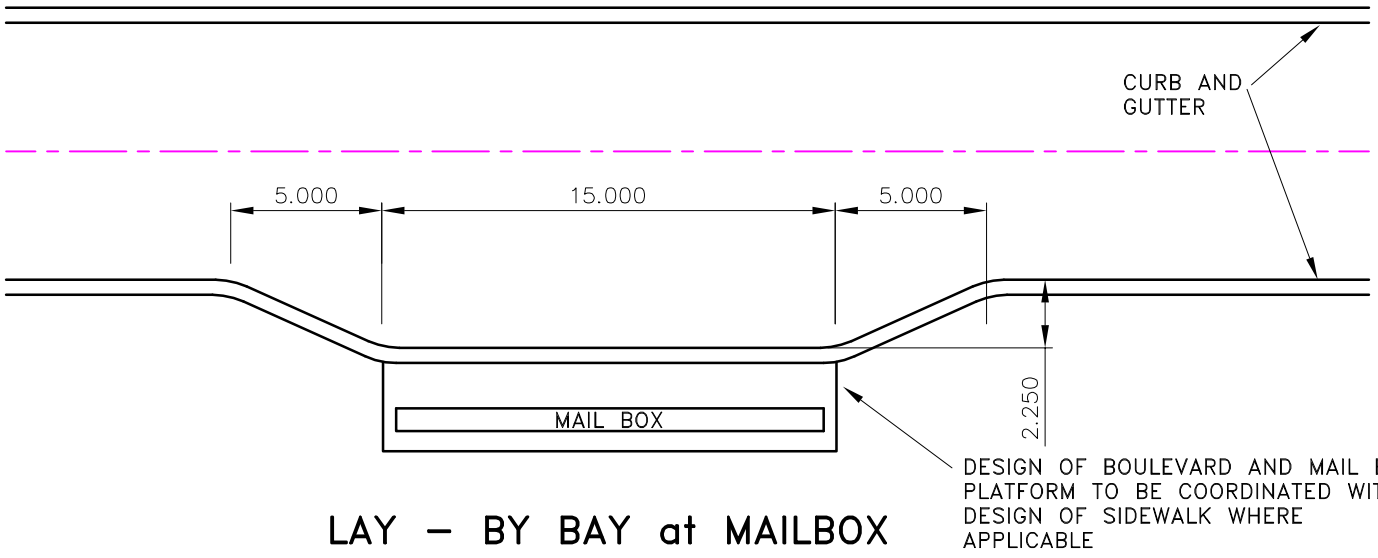
PROFILE

SCALE: 1 : 100

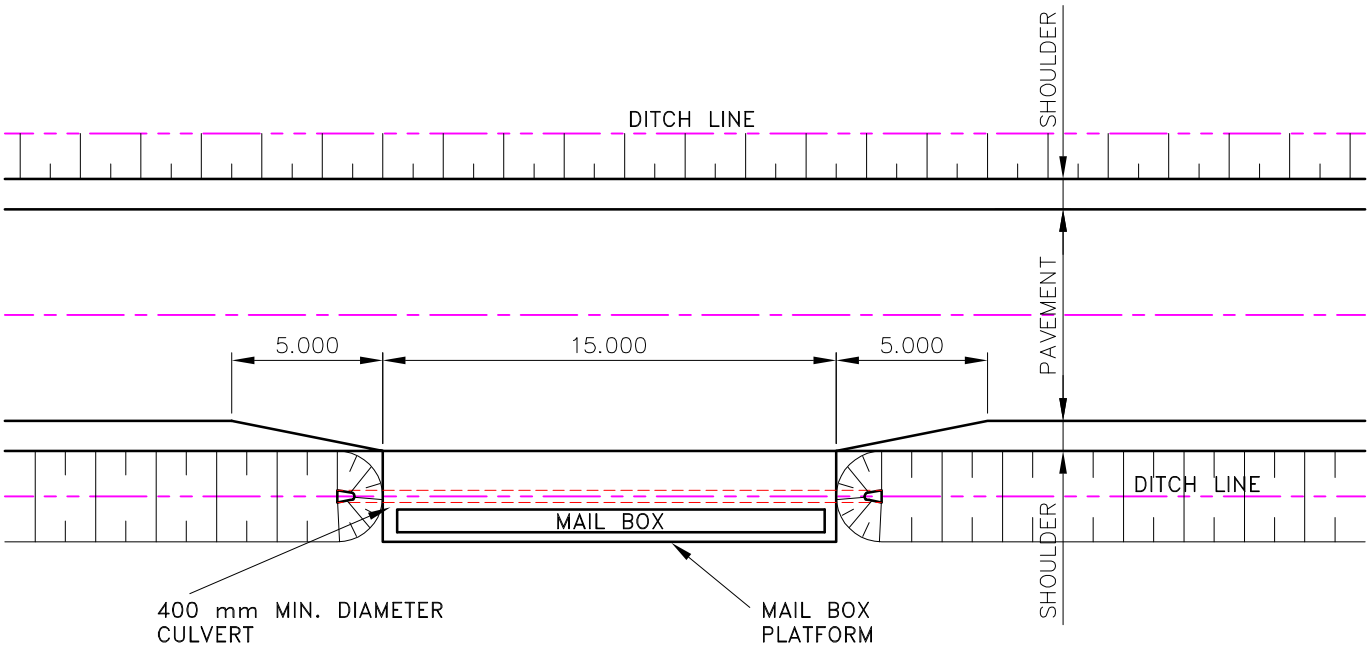
TOWN OF PENETANGUISHENE

RURAL RESIDENTIAL DRIVEWAY

DATE : JANUARY, 2002	SCALE: AS NOTED
DRAWN: H. BORGDORFF	
CHECKED: H. BORGDORFF	**DWG. No. 15**



LAY – BY BAY at MAILBOX
URBAN ROAD



LAY – BY BAY at MAILBOX
RURAL ROAD

TOWN OF PENETANGUISHENE

LAY – BY BAY at
MAILBOXES

DATE :	DECEMBER, 2008	SCALE:	1 : 250
DRAWN:	H. BORGDORFF		**DWG. No. 16**
CHECKED:	H. BORGDORFF		

TOWN of PENETANGUISHENE

Department of Public Works
24 Centennial Drive
PENETANGUISHENE, Ontario, L9M 2G2
Tel: (705) 549-7992 Fax: (705) 549-4263

PERMIT for ROAD OCCUPATION

PERMIT No.
JOB No.

This Permit is subject to the following conditions and to any supplementary conditions, regulations, specifications and engineering standards in effect at the time of issuance of this Permit as approved by the Corporation of the Town of Penetanguishene.

APPLICANT

NAME:

ADDRESS:

AFTER HOURS CONTACT:
NAME:

TELEPHONE:

TELEPHONE:

LOCATION of WORKS

STREET NAME: _____ at _____

between _____ and _____

Application is hereby made to construct: (check one or more of the following to indicate the proposed work)

□ GAS □ HYDRO □ BELL □ CABLE TV
□ WATER WORKS □ SEWER WORKS □ OTHER _____

OCCUPANCY REQUESTED

FROM: _____ TO: _____
Enter date Enter Date

ROAD CLOSURE

□ NO □ FULL □ SINGLE LANE

Detour Via: _____ Closure Date: _____

DECLARATION

In consideration of any permit issued in respect to this Application, we, the Applicant, for ourselves, our heirs, executors, administrators, successors and assigns hereby agree to observe, keep and perform and be subject to the regulations and conditions of the said permit and to indemnify and save harmless the Town and the Director of Public Works from and against all loss, cost, charges, damages, expenses, claims and demands whatsoever which may be put or which the Town may suffer or sustain or for which the Town may be held liable by reason of anything done or omitted to be done in the construction, maintenance, alteration or operation of the work authorized. This permit is issued under the authority vested by the Town of Penetanguishene, By-Law No. 2002-28, and the regulations pursuant thereto and is subject to the Conditions on the Reverse hereof.

_____ _____
SIGNATURE (APPLICANT) DATE

ADDITIONAL CONDITIONS for APPROVAL

PERMIT ISSUED BY: _____ DATE: _____

FINAL INSPECTION

COMMENTS:

_____

_____

DATE: _____ INSPECTOR: _____

OFFICE – White APPLICANT – Canary OPERATIONS SUPERVISOR – Pink

GENERAL NOTES

1 Road closure requires the Applicant to give notice to Police, the Fire Department, School Boards, Ambulance Services and any other persons as may be requested by Public Works 24 Hours prior to the closure.

2 One lane will be maintained for traffic where possible.

3 The occupation will be properly signed, lighted, protected, and have personnel properly outfitted to comply with the Ontario Health and Safety Act, Town of Penetanguishene Health and Safety Policy, Municipal By-Laws, and Provincial and Federal Statutes.

CONDITIONS

1. Road crossing where required will be bored or pushed, open road cut will require special consideration and authorization.
2. Prior to any open road cut crossing, written authorization shall be obtained from Public Works Department.
3. Any and all damage caused by or during construction will be reported forthwith.
4. The applicant shall be solely responsible to protect all persons that may enter the site in accordance with the Occupational Health and Safety Act, Town of Penetanguishene Health and Safety Policy and or all other Provincial or Municipal Acts, By-laws or Policies.
5. All Traffic Signing must be erected and maintained as directed by the Ministry of Transportation, Ontario Manual or Uniform Traffic Control Devices. All devices must be in place prior to commencement of any work.
6. Any and all excavations shall be compacted to a minimum of 95% standard proctor when backfilled.
7. Elevations prior to construction shall be maintained after construction to ensure proper drainage.
8. Restoration shall be carried out expediently and continually until completed to a value equal or better that prior to construction and approval of the works is accepted upon final inspection.
9. This permit shall be revoked and a stop work order issued by the Director of Public Works or any authorized personnel for any contravention or infraction of the conditions contained herein, regulation or by-law.
10. Notice of STOP WORK ORDER will cause all construction to cease immediately, until written notice is received by the applicant, from the Town, to continue work.
11. When it becomes necessary to detour traffic due to construction, the applicant shall submit a drawing showing proposed detour route and location of all signs for the proposed route. This proposal shall be subject to approval from the Town.
12. **EXTENSIONS**

    Where time extension is required, the holder of this permit shall apply for such extension at least 24 hours in advance of stated date or re-opening. Time extension must be authorized by the Director of Public Works or his authorized representative before taking effect. Failure to comply will render this permit void.

APPENDIX "B"

TOWN OF PENETANGUISHENE

WATER DIVISION

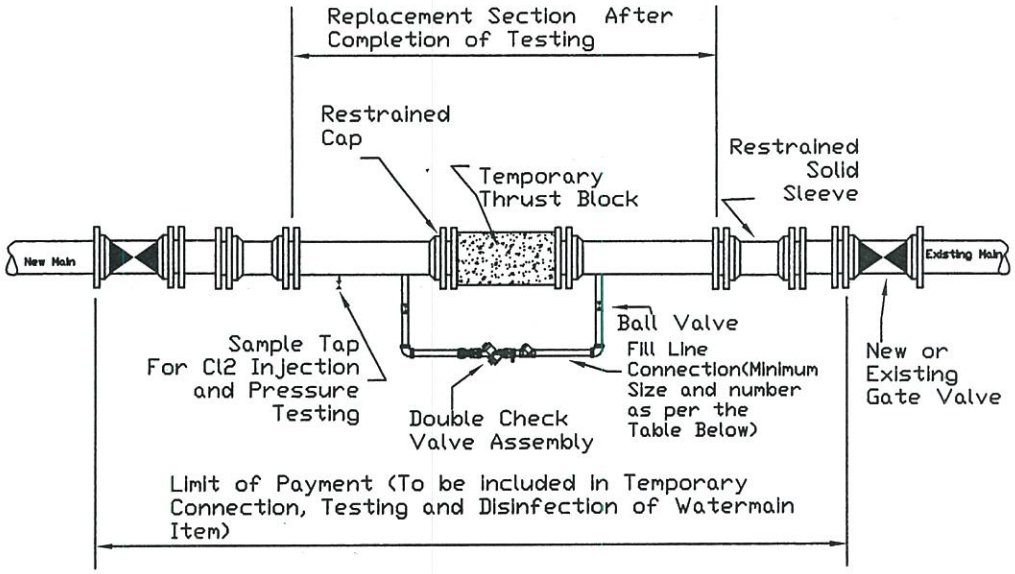
MATERIAL	AWWA/ANSI	FEATURES	MANUFACTURER CATALOGUE #
WATERMAIN PIPE			
PVC class 150	C900;DR18	Pushon joint, colour Coded blue, 6m in length	Any
WATER SERVICE PIPE			
From 19mm to 50mm	Class 160 P.S.I.	Polyethylene pipe must be traced	Any
WATERMAIN VALVES			
Resilient Seated Gate Valves	C509	52mm square nut MJXMJ (150mm – 300mm)	Mueller; Concord/Daigle;Clow
Pressure Reducing and Check Valves	N/A	Flange X Flange	Clayton Valve; SingerValve Val-matic Valves
Backflow Preventer for all sizes	N/A		Watts Regulator Company or approved equivalent
Air Release Valve for 12mm – 25mm	N/A	I.P. X I.P. Thread	Val-matic #25

MATERIAL	AWWA/ANSI	FEATURES	MANUFACTURER CATALOGUE #
HYDRANTS			
Fire Hydrant	C502	1.83m barrel length Chrome yellow 2 CSA 62mm standard hose connections, 1 CSA 115mm Pumper connection Breakaway Flange; Self Draining; Hydrant Anchor 'T's to be used	Canada Valve Century
REPAIR COUPLINGS AND CLAMPS			
D.I. and PVC Waterman Repair coupling 50mm – 300mm	ASTM A-536	Stainless Steel Bolts	Smith-Blair #441 Omni; Romac Style 501 Robar Cast Coupling
Stainless Steel Repair Clamp 15mm - 50mm Clamp; series C30	N/A	Full circumferential gasket	Smith-Blair #244 Redi Cambridge Brass Band-O
100mm – 300mm	N/A	With conductivity plates Full circumferential gasket	Cambridge Brass Series 425 Smith – Blair 261 full circle Robar Style 1 "O" Clamp
WATERMAIN FITTINGS			
D.I. and PVC Waterman Including: T's, sleeves, Hydrant Anchor 'T's, Caps, Plugs, Bends, Reducers and Reducing 'T's.	N/A	Mechanical joint; concrete Lined,D.I. bodies; Restraining glands where required.	Any

MATERIAL	AWWA/ANSI	FEATURES	MANUFACTURER CATALOGUE #
RESTRAINERS			
PVC Watermain 100mm – 300mm	ASTM A-536		Romac Gripring
D.I. Watermain 100mm – 300mm	ASTM A-536		Uni-Flange series 1400 EBAA Megalug 1100series
PIPE RESTRAINERS			
PVC Watermain 100mm – 300mm	ASTM A-536	Up to 200PSI	Romac Style 611
D.I. Watermain 100mm – 300mm	ASTM A-536	Up to 200PSI	Uni-Flange 1390 Romac Style 611
VALVE BOXES			
Valve Box	N/A	Easily adjustable; self leveling	Mueller MVB Composite
TRACER WIRE			
Tracer Wire Underground Connectors Item ID: 30-264 (50-pack)	N/A	#12 TWU stranded copper IDEAL Model #64 Connector	Any Ideal Industries
CURB STOPS	N/A	Ball valves only CJ X CJ	Cambridge Brass; Ford; Mueller

MATERIAL	AWWA/ANSI	FEATURES	MANUFACTURER CATALOGUE #
MAIN STOPS	N/A	AWWA X CJ	Cambridge Brass; Ford; Mueller
SERVICES SADDLES			
PVC 100mm – 300mm Clamps series 403 saddle #372	N/A		Cambridge Brass Teck Smith-Blair Double strap Robar “BOSS” clamp
SERVICE BOXES lid, A-729 rod;	N/A	Slide type boxes Stainless steel where required	Mueller A-726 box, A-800 EMCO D-1 box and lid

NEW WATERMAIN TEMPORARY CONNECTION



Pipe Diameter	Flow Required to produce 2.5ft/s (0.76m/s) (approx.) Velocity in Main	Size of Tap in. (mm)			Number of Open 2½-in. (64mm) Hydrant Outlets
		1 (25)	1½ (38)	2 (50)	
In. - mm	Gpm - l/s	Number of Taps on Pipe			
4 - 100	100 - 6.3	1	-	-	1
6 - 150	200 - 12.6	-	1	-	1
8 - 200	400 - 25.2	-	2	1	1
10 - 250	600 - 37.9	-	3	2	1
12 - 300	900 - 56.8	-	-	2	2
16 - 400	1600 - 109.9	-	-	4	2

REQUIRED FLOW AND OPENINGS TO FLUSH PIPELINES (276kPa/40 PSI RESIDUAL PRESSURE IN WATERMAIN)
A MINIMUM VELOCITY OF 2.5ft/s (0.76m/s) WHEREVER POSSIBLE TO ALLOW FOR PROPER FLUSHING.

TOWN OF PENETANGUISHENE	DRAWN BY M. Lefaive	REV
SCALE N.T.S.	DATE JULY 11, 2003	FILE NAME New Main Connection.dwg

APPENDIX "C"

SANITARY SEWER DESIGN SHEET

q = average daily per capita flow (____ L/cap.d)
I = unit of peak extraneous flow (____ L/ha.s)
M: peaking factor
Q(p) = peak population flow (L/s)
Q(i) = peak extraneous flow (L/s)
Q(d) = peak design flow

$M = 1 + \frac{14}{4 + P^{0.5}}$ where P = population in 1000's

$Q(p) = \frac{PqM}{86.4}$ (L/s)

$Q(i) = IA$ (L/s) where A = area in hectares

$Q(d) = Q(p) + Q(i)$ (L/s)

LOCATION			INDIVIDUAL		CUMULATIVE		Peaking factor M	Pop flow Q(p) (L/s)	Peak extraneous flow Q(i) (L/s)	Peak design flow Q(d) (L/s)	PROPOSED SEWER						
STREET	FROM	TO	Pop	Area A (hectares)	Pop.	Area A (hectares)					Length (m)	Pipe size (mm)	Type of pipe	Grade %	Capacity (L/s) n= ____	Full flow velocity (m/s)	Actual velocity at Q(d)

DESIGN	PROJECT	SHEET Nº
CHECKED		____ of ____
DATE		

STORM SEWER DESIGN SHEET

$Q = 2.78\,AIR$

Where Q = peak flow in litres per second (L/s)

A = area in hectares (ha)

I = rainfall intensity in millimetres per hour (mm/h)

R = runoff coefficient

LOCATION			AREAS (ha)			Indiv.	Accum	Time of	Rainfall Intensity	Peak Flow	SEWER DATA								
STREET	FROM	TO	R=	R=	R=	2.78 AR	2.78 AR	Conc.	I	Q (L/s)	Type of Pipe	Diameter (mm)	Slope (%)	Length (m)	Capacity (L/s) n = ____	Velocity (m/s)	Time of Flow (minutes)		

DESIGN	PROJECT	SHEET . No
CHECKED		____ of ____
DATE		

RAINFALL INTENSITY, DURATION, FREQUENCY VALUES
PREPARED BY THE HYDROMETEOROLOGY DIVISION, CANADIAN CLIMATE CENTRE (08/80)

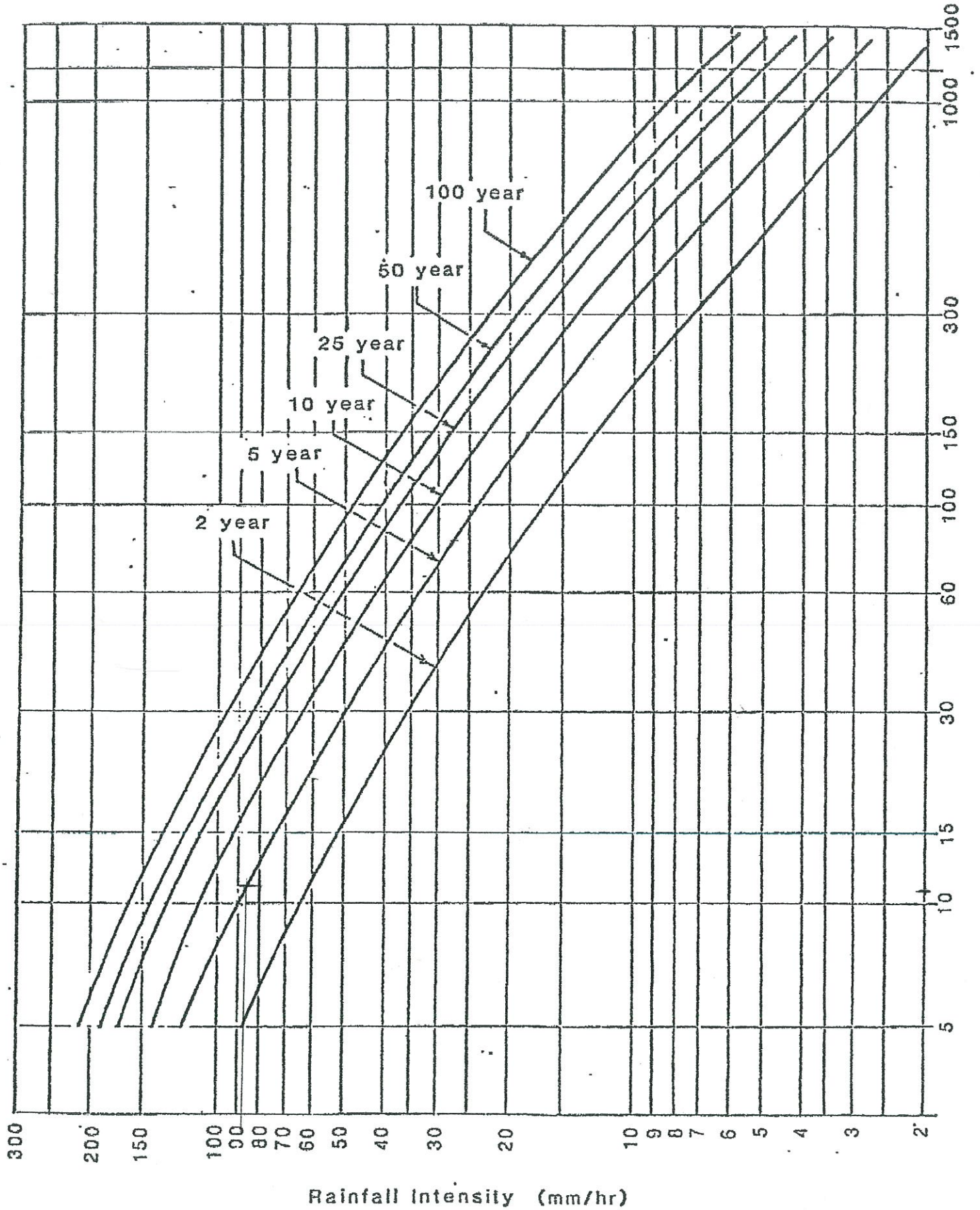
Climate	Station Name	Year	5 min	10 min	15 min	30 min	1 hr	2 hr	6 hr	12 hr	24 hr
6115820	Orillia T.S.	1965	8.1	11.2	12.2	16.3	16.5	16.5	29.7	38.9	63.9
6115820	Orillia T.S.	1966	5.1	6.3	7.1	13.2	18.6	23.8	27.9	28.7	38.9
6115820	Orillia T.S.	1967	9.1	15.7	21.1	35.6	44.7	53.1	57.7	57.9	58.7
6115820	Orillia T.S.	1969	5.6	11.2	13.2	17.8	17.8	18.0	33.5	38.9	41.7
6115820	Orillia T.S.	1970	5.6	7.6	9.4	12.2	15.5	26.4	29.7	30.0	45.7
6115820	Orillia T.S.	1971	6.3	9.4	12.2	15.2	17.5	20.3	22.9	31.2	33.5
6115820	Orillia T.S.	1972	6.6	8.4	8.9	16.5	20.8	24.4	35.1	36.6	69.8
6115820	Orillia T.S.	1973	10.2	12.4	15.5	16.8	21.6	24.1	28.7	37.3	37.6
6115820	Orillia T.S.	1974	13.0	22.1	27.7	29.5	35.8	40.4	65.5	72.4	72.4
6115820	Orillia T.S.	1975	5.8	8.9	10.7	17.5	19.8	26.9	31.5	33.5	35.6
6115820	Orillia T.S.	1976	7.6	10.9	15.7	23.9	27.4	28.7	38.6	62.4	42.4
6115820	Orillia T.S.	1977	4.6	7.1	10.7	14.0	14.5	16.8	26.7	31.0	39.6
6115820	Orillia T.S.	1978	11.4	12.1	12.5	17.1	18.2	25.0	34.8	35.2	35.2
6115820	Orillia T.S.	1979	8.6	12.2	16.2	31.1	42.0	52.2	103.4	103.7	104.0
Mean Extreme			7.7	11.1	13.8	19.8	23.7	28.3	40.4	44.1	48.5
Standard Deviation			2.4	3.9	5.2	7.0	9.6	11.5	20.9	20.1	18.4
Years of Record			14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00

Return Period in Years	Rainfall Amounts (mm)								
2	7.3	10.6	13.1	18.8	22.3	26.7	37.4	41.3	45.9
5	10.1	14.9	18.9	26.7	33.1	39.6	60.9	63.9	66.5
10	11.9	17.8	22.7	31.9	40.2	48.1	76.4	78.8	80.2
25	14.2	21.5	27.5	38.5	49.2	58.9	96.0	97.7	97.4
50	15.9	24.2	31.1	43.4	55.9	66.9	110.6	111.7	110.2
100	17.6	26.9	34.7	48.3	62.6	76.8	125.0	125.7	123.0

Return Period Rainfall Rates Expressed as mm/hr With 50% Confidence Limits

Years	5 min	10 min	15 min	30 min	1 hr	2 hr	6 hr	12 hr	24 hr
2	87.9±4.9	63.3±3.9	52.2±3.5	37.5±2.4	22.33±1.60	13.34±0.96	6.24±0.58	3.44±0.28	1.91±0.13
5	120.8±9.4	89.6±7.5	75.4±6.6	53.3±4.5	33.10±3.08	19.79±1.84	10.15±1.12	5.32±0.54	2.77±0.25
10	142.7±13.2	106.9±10.5	90.8±9.3	63.8±6.3	40.23±4.31	24.05±2.58	12.74±1.57	6.57±0.75	3.34±0.34
25	170.2±18.2	128.9±14.5	110.2±12.8	77.0±8.7	49.24±5.94	29.45±3.56	16.01±2.16	8.14±1.04	4.06±0.47
50	190.7±22.0	145.2±17.5	124.6±15.5	86.8±10.5	55.92±7.18	33.45±4.30	18.43±2.60	9.31±1.25	4.59±0.57
100	211.0±25.7	161.3±20.5	138.9±18.1	96.5±12.3	62.56±8.41	37.42±5.03	20.84±3.05	10.47±1.47	5.12±0.67

Intensity – Duration – Frequency Curves



Runoff Coefficients:

The following runoff coefficients (C) are to be used for drainage design:

Runoff Coefficients (C)	
Land Use	**Runoff Coefficient (C)**
Commercial	
• Downtown Areas	0.70 - 0.95
• Suburban	0.50 - 0.70
Industrial	
• Heavy	0.60 - 0.90
• Light and General	0.50 - 0.80
Residential	
• Apartments and Multiple Units	0.60 - 0.75
• Mixed Residential	0.40 - 0.60
• Single Family	0.30 - 0.50
• Estate Residential	0.25 - 0.40
Institutional	0.40 - 0.75
Parks, Cemeteries	0.10 - 0.35
Rural Lands	
• Woodland (rolling)	0.12 - 0.42
• Pasture (flat)	0.10 - 0.40
• Pasture (rolling)	0.15 - 0.45
• Cultivated (flat)	0.22 - 0.55
• Cultivated (rolling)	0.30 - 0.60

Notes:

(1) Runoff coefficients should be determined from the above noted ranges, according to specific site conditions such as soil, topography, ground cover etc.

(2) For storm sewer pipe, minimum flow velocity shall be 0.80 m/s, and maximum flow velocity shall be 6.0 m/s

(3) Minimum storm sewer diameter shall be 300mm.

(4) Minimum driveway culvert diameter shall be 400mm.

(5) The minor system shall be designed to convey peak discharges from a 5-year storm without surcharging. The major system shall be designed to convey peak discharges from a 100-year storm.

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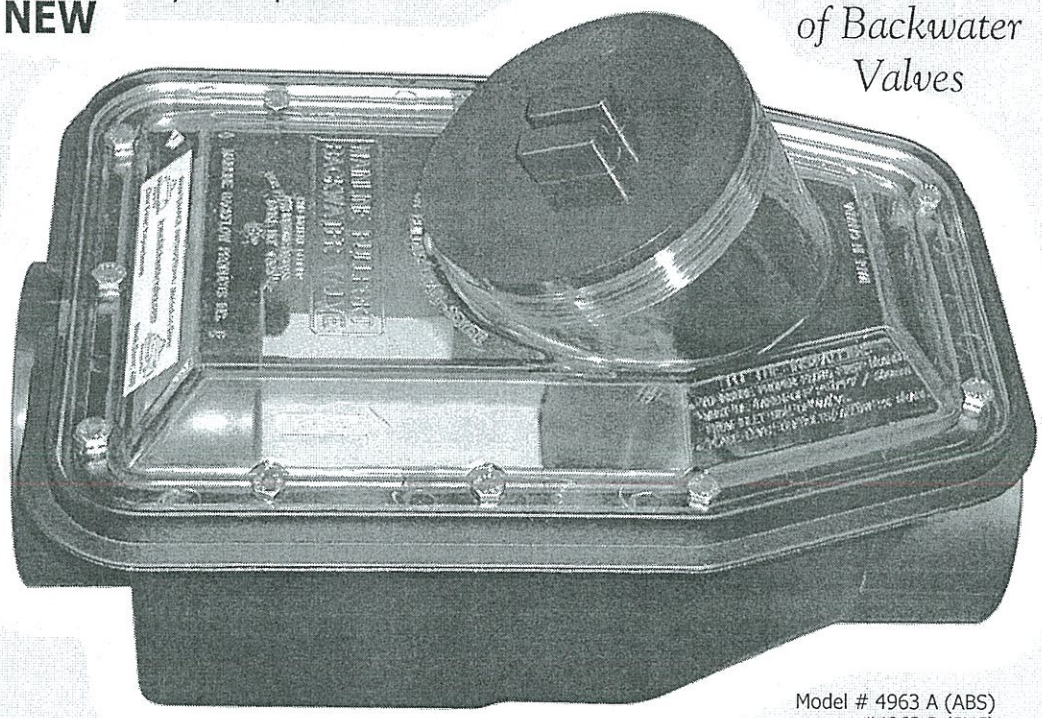
New Generation of Backwater Valves

NEW

Clear transparent lid provides easy visual inspection

Built-in sewer clean-out



Model # 4963 A (ABS)
#4963 P (PVC)

MAINLINE ACCESS BOX
Model # PE 2013

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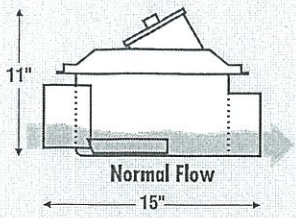
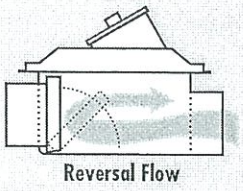


MAINLINE
FULLPORT BACKWATER VALVE



Model # 4963 A (ABS)
#4963 P (PVC)

NEW MAINLINE **Clear Top** for easy visual inspection and cleaning

MAINLINE Fullport (Normally-open) Non-Flow Restricting

MAINLINE No problems with Blockages

MAINLINE Gate closes automatically when sewer starts to backup

MAINLINE Cleaning-rod does not destroy the gate when feeding or retrieving cable

MAINLINE Normally-open design allows the free circulation of air throughout the plumbing system to the municipal sewer

MAINLINE Award-winning technology

WINNER
Manning Innovation Awards
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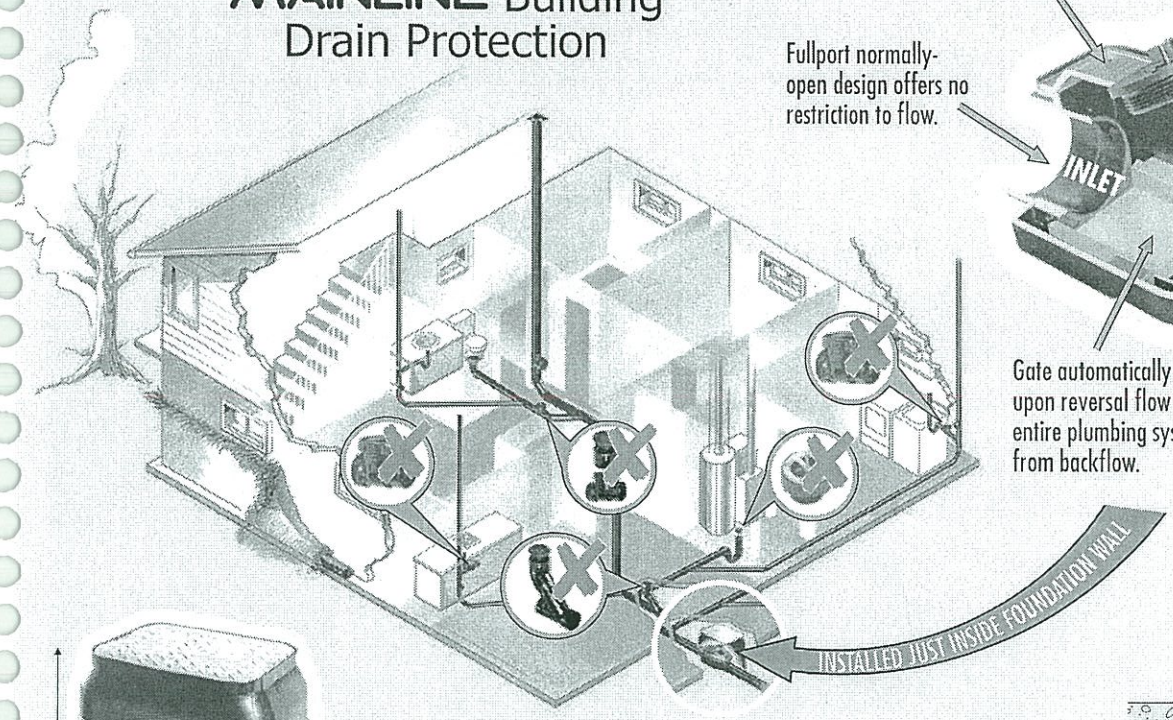
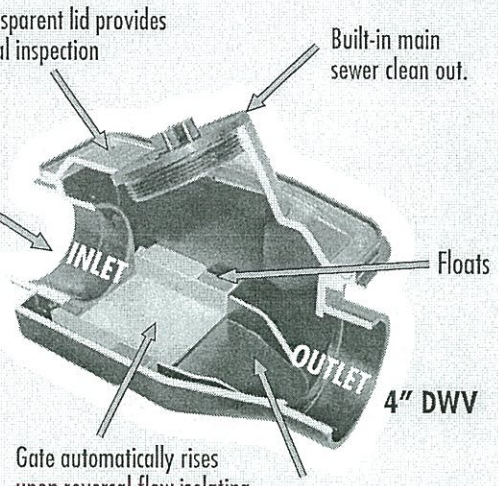
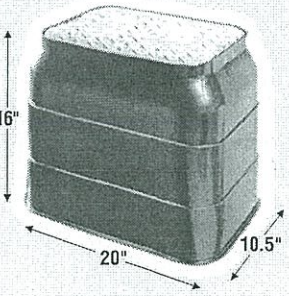
2005

MAINLINE Building Drain Protection







ACCESS BOX
Model # PE 2013

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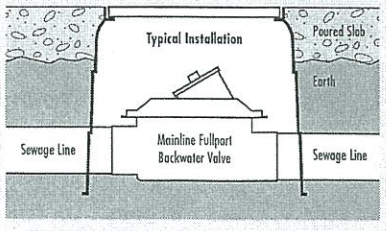


Note: 3/4" height difference between Inlet and Outlet

Printed in Canada

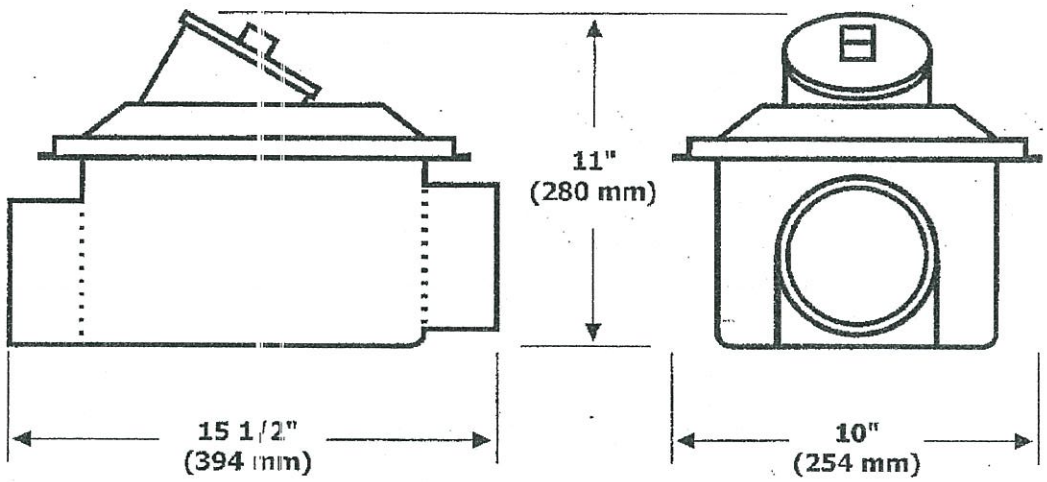
Lid Gasket

Flat-section closed-cell gasket
Neoprene 3/16 x 3/8 (1220 RL BL x 1)

Floatation Devices

Closed-cell cross-linked polyethylene (PEX) foam
"Boltaron Polyethylene"

Dimensions



Model #4963

MAINLINE BACKFLOW PRODUCTS INC.

Specifications

Mainline Access Box
Model # PE2013

Application
Intended to be used as an access opening for the Mainline Fullport Backwater Valve Model # 4963. (May be used for other access applications example: Cleanouts, irrigation etc.)

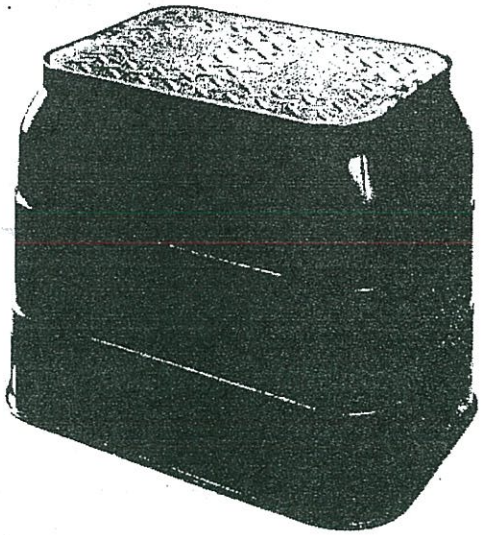
Reading Plate
Maintenance instructions for building owner
(Reading plate may be customized for distributor)

Materials
Body and Lid – High-density polyethylene (plastic)
Bolts – Zinc coated ¼ x 1 ½ in.

Weight
Approximately 5 lbs.

Dimensions

Length	20 in.	(508 mm)
Width	12.5 in.	(318 mm)
Height	16 in.	(406 mm)



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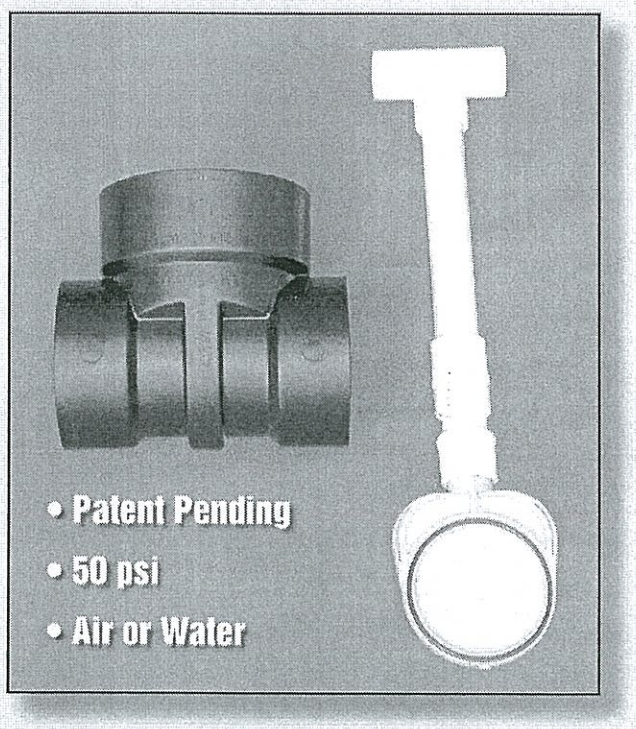
INNOVATIVE TECHNOLOGY



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Horizontal or Vertical Applications

Safest / Quickest / Easiest and most Reliable Pressure Test You Will Ever Conduct!

Simply Slide the Test-Gate in the Tee and you're Ready to Test!

Eliminates: Inflatable Test Balls, Mechanical Plugs and HubSett

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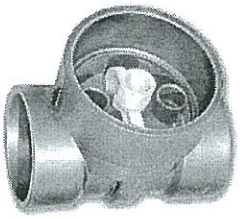
www.backwatervalve.com

MAINLINE
TEST-EZE-TEE

Order Information: **TEST-TEE** model # ML3TT **TEST-GATE** model # ML3TG **SPACER-GATE** model # ML3BLG
*Note: * all items sold separately * available in 3" at this time*

Good Installation Procedures

1. Install tee in line *(prevent solvent cement from entering body)*
2. Check and lubricate o-ring on Test-Gate
3. **Install Test-Gate at same time of tee installation**
   (this prevents debris from entering guide slot)
4. After Test, remove Test-Gate *(reuse on next installation)*
5. Test-Gates may be extended by using ½" pipe
   (fasten with screw)
   Building a removable puller key recommended (see below)
6. Body may be extendable with 4" DWV



If Test-Gate not installed in tee at time of installation, order and install optional Spacer-Gate to keep debris from entering guide slot.

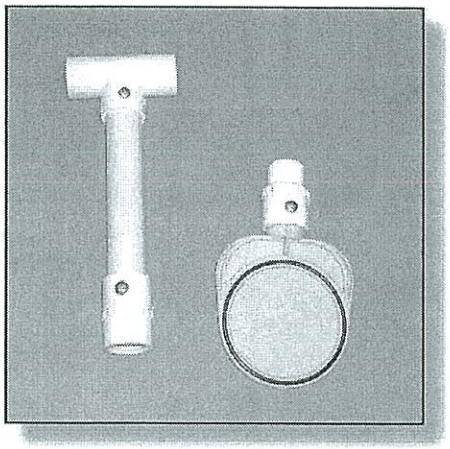
Building a Removable Puller Key for your Test-Gate

Advantages of building a removable key are that the key will not be left in ground where it may be prematurely removed by another contractor; provides savings in pipe when building multiple solid keys.

1. Test-Gate
Attach a ¾" MIP adapter to Test-Gate *(Note: Tight fit. Place adapter onto firm surface and hammer Test-Gate onto adapter. Fasten with screw)*

2. Puller-Key
Put a ¾" tee onto a piece of ¾" pipe and put a ¾" FIP onto the end of the pipe.

Note: Puller keys may be made of ½" pipe or other methods

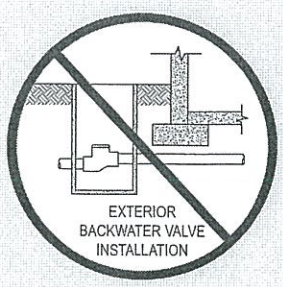


Optional Fill Feature:
Test-Eze-Tee has two ½" knockouts built into the body. By knocking out the knockout and solvent welding a piece of ½" pipe and hose or air connection, you may fill the system through the tee.

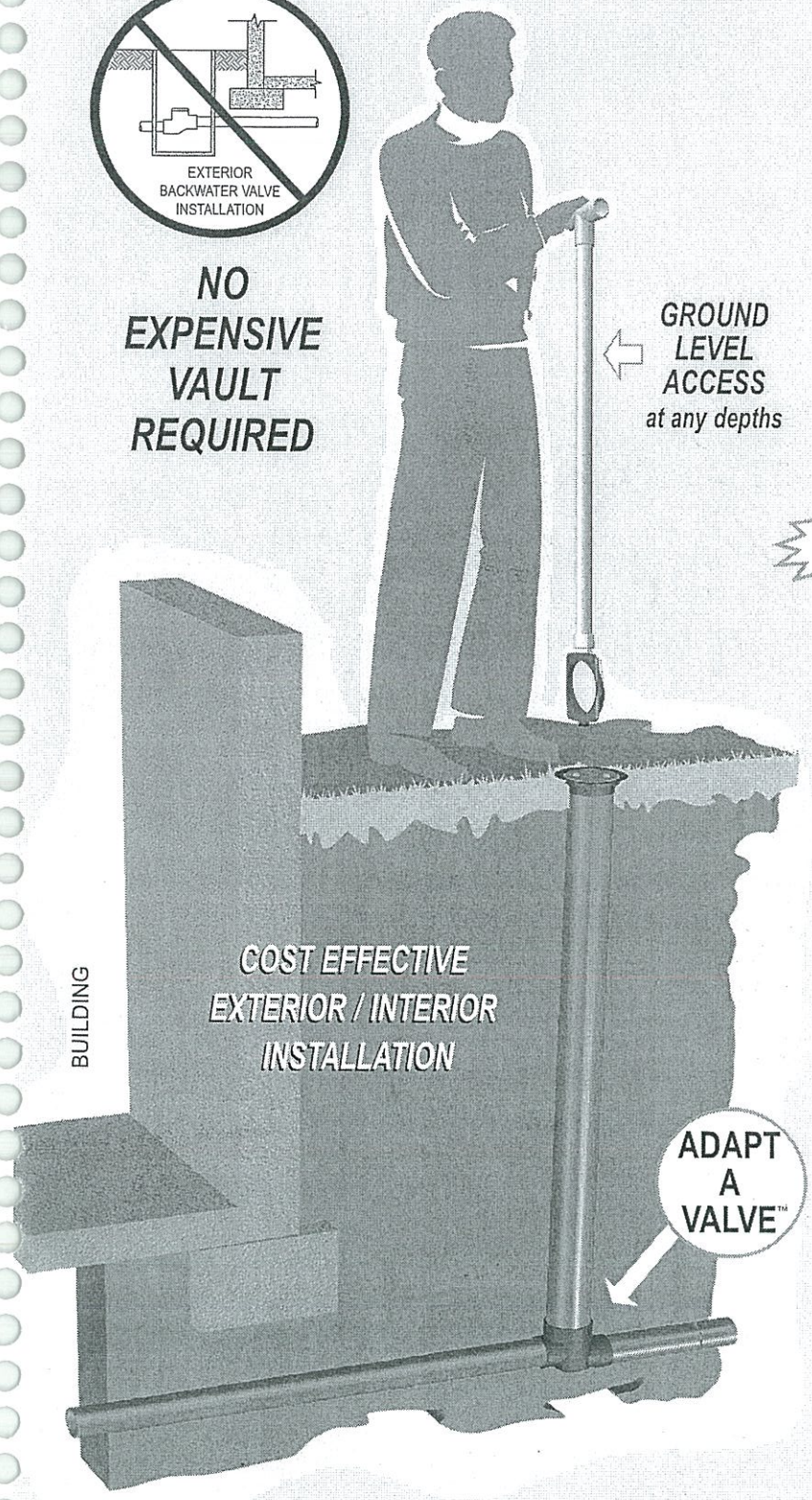
For More Information contact 1-877-734-8691

www.backwatervalve.com

MAINLINE
ADAPT - A - VALVE™

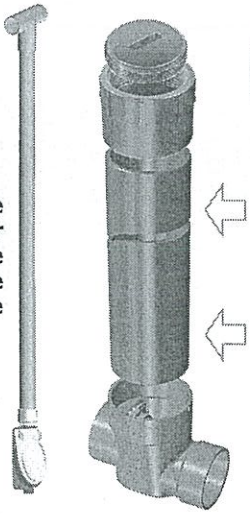


NO EXPENSIVE VAULT REQUIRED



BUILDING

EXTENDABLE BACKWATER VALVE



NEW! TEST-EZE-GATE

MAINLINE
BACKFLOW PRODUCTS

www.backwatervalve.com
Toll free # 1-877-734-8691

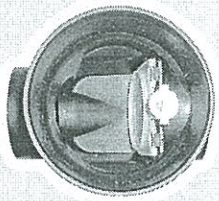
Printed in Canada

MAINLINE
ADAPT - A - VALVE™

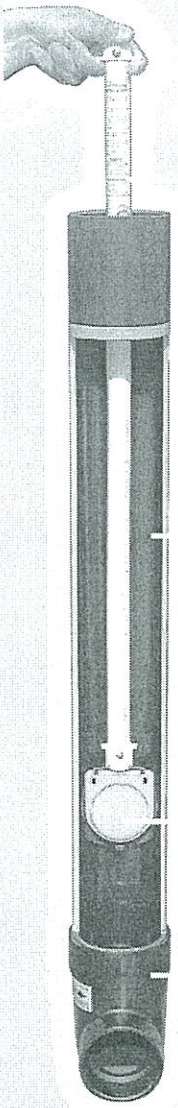
EXTENDABLE BACKWATER VALVE

- Eliminates Manhole or Expensive Vaults
- Allows easy ground level access at any depths
- Removable seat and gate (Cassette) allows full service of unit
- Reflective sticker in body serves as guide for ease of cassette insertion
- Cassette locks in body
- Lightest gate in the industry offers next-to-no flow restriction
- Double-hinge gate design keeps gate aligned to seat
- O-ring seal
- For SDR Pipe use SDR adapters

NORMALLY-CLOSED GATE



Available Models:
ML-3XA (3" ABS) / ML-3XP (3" PVC)
ML-4XA (4" ABS) / ML-4XP (4" PVC)



AT FINISHED GRADE, USE STANDARD DWV THREADED PLUG AND FIP or ALTERNATE CAP
(Not Included)

EXTENDABLE CASSETTE ALLOWS RETRIEVAL OF CASSETTE
(3/4" Pipe not included)

3" Backwater valve EXTENDABLE with 4" DWV pipe*

4" Backwater valve EXTENDABLE with 6" DWV pipe*

CASSETTE

EXTENDABLE VALVE BODY

**pipe not included*

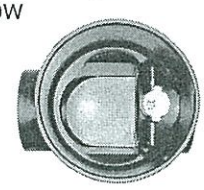
OPTIONS

TEST-EZE GATE FEATURE for ADAPT-A-VALVE

- Allows testing through your backwater valve
- Simply slide Test Gate into body and Pressure up
- Available for both 3" and 4" Adapt-a-Valve models

NORMALLY-OPEN GATE FEATURE
Available by Special Order on 4" Model Only

- Installed with gate in horizontal position
- Special Gate, fitted with floats, floats gate to closed position on Reversal Flow
- Offers no flow restriction
- Air-flow not restricted
- O-ring seal



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LISTED COMPONENTS
- Cassette + Extension Adapter
- Backwater Gate
- Air gate component
- Extension Body
- Test Gate

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