

**TOWNSHIP OF CLEARVIEW
ENGINEERING STANDARDS
2016**

March 22, 2017 revision

Clearview Engineering Standards 2016.docx

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INTRODUCTION

The Township of Clearview Engineering Standards are intended to provide for an engineering basis for subdivision and site plan design, to establish a uniform criteria of minimum standards, and to improve the processing of engineering design submissions for development related works. Alternatives to these standards, which improve or maintain the quality of the design will be considered for acceptance subject to the approval of the Township Public Works and Planning Departments.

It is understood that these standards may be referred to as a schedule in a subdivision agreement and that the current revision of the standards are then considered part of the agreement.

1.0 ENGINEERING DESIGN DRAWINGS AND REPORTS

1.1 Submissions

Engineering design drawings prepared by the Developer's Consulting Engineer and submitted to the Township Public Works and Planning Departments must be complete and must be submitted with the following reports:

- a) A covering letter to address previous discussions relating to the design drawings.
- b) A soils report by a geotechnical consultant including recommendations for road sub-base, base and asphalt design, groundwater levels affecting road structure, foundation, retaining wall, slope stabilization, stormwater pond base and berm design, nitrate impacts and any aspect of the soils affecting the engineering design.
- c) A drainage and stormwater management report addressing the method whereby stormwater run-off is accommodated within and beyond the site and the method whereby erosion and siltation will be controlled.
- d) Sewer design calculation sheets.
- e) A hydrogeological report where servicing includes a private septic system or proposed private well(s).
- f) A traffic analysis.
- g) A water supply and distribution report providing calculations to support the design of the water supply and distribution system.
- h) Consulting Engineers Letter → letter from consultant by owner confirming terms of retainer.
- i) Confirmation letter from utilities confirming availability.

1.2 Engineering Drawings

Engineering drawings shall consist of the following:

- Water Distribution Plan;
- Sanitary Sewer Plan;
- Including external sewer, water and storm water where applicable;
- Vegetation Preservation & Planting Plan;
- Landscape Plan;
- Plans for the following:
 - Canada Post
 - Enbridge Gas
 - Collus
 - Hydro One
 - Bell Canada
 - Rogers Cable

- Cover Sheet;
- Legal Plan of Subdivision;
- General Service Plan showing all structures, services and utilities;
- Storm Sewer Plan (including external drainage plan where applicable);
- Lot Grading Plan (Including basement elevations);
- Park Development Plans;
- Plan and Profile drawings of all streets, easements and external works;
- Detail Sheets including standard and special details;
- Other Plans as required such as site plan, retention pond plan, etc.

1.3 Other Approvals

A copy of all other reviews and approvals that may be required for the development shall be submitted to the Township Public Works and Planning Departments. This may include, but not be limited to, the following authorities: Ministry of Environment and Climate Change, Ministry of Transportation, Ministry of Natural Resources, Nottawasaga Valley Conservation Authority, Simcoe County District Health Unit, Niagara Escarpment Commission, County of Simcoe, OMAFRA and DFO, etc.

1.4 “As-Built” Drawings

As-Built drawings for underground services shall be provided within 90 days of connection to municipal water system. Before the expiration of the maintenance periods for aboveground services, three sets of “As-Built” printed drawings, one set of “As-Built” hard copies and one set of drawings and GIS data on compact disc are to be submitted to the Township Public Works and Planning Departments for review and comments. Revisions must have been made to the drawings to reflect any changes to the line and/or grade of the roadways and services, and to incorporate all the grading modifications resulting from final lot grading. All valves, curb stops and service connections shall be properly tied into fixed reference points. Drawings to be CADD12 or most recent version. GIS files to be compatible with the most recent version of ArcGIS, in NAD_1983_UTM_ZONE_17N projection, and in a *.gdb or *.shp file format.

The “As-Built” drawings shall include the following information:

1.4.1 Road System

- (a) Elevation of centre line of roadway every 20 metres.
- (b) Revised horizontal and vertical curve information.
- (c) Any additional information that has been required for construction after approval of engineering drawings.
- (d) Revised bench marks located in a permanent location throughout the new development at sufficient intervals on permanent structures.
- (e) Elevation & grades of driveways to be supplied.

1.4.2 Stormwater Management System

- (a) Invert elevations of all storm sewers.
- (b) Invert elevations of all storm maintenance holes.
- (c) Revised percentages of all storm sewers along with "As-Built" distances between maintenance holes.
- (d) Any additional information that has been required for construction after approval of engineering drawings.
- (e) Provide GIS Co-ordinates for each maintenance hole & catch basins.
- (f) Details of any SWM facilities such as ponds.

1.4.3 Sanitary Sewer System

- (a) Invert elevations of all sanitary sewers including mains & services at p/l.
- (b) Invert elevations of all sanitary maintenance holes.
- (c) Revised percentages of all sanitary sewers along with "As-Built" distances between maintenance holes.
- (d) Any additional information that has been required for construction after approval of the engineering drawings.
- (e) Provide GIS Co-ordinates for each maintenance hole.
- (f) Must show that no foundation drains or roof leaders are tied into sanitary sewers
- (g) Location measurements to all sanitary services for each individual lot. These should have swing ties from property corners, buildings or other fixed structures such as fire hydrants and maintenance holes.

1.4.4 Water Distribution System

- (a) Elevations of top of watermain every 30 metres.
- (b) Location measurements to all water service boxes for each individual lot. These should have swing ties from property corners, buildings or other fixed structures such as fire hydrants and maintenance holes.
- (c) Location by measurement of trees, bends, valves and dead ends, including mains & services & hydrants.
- (d) Any additional information that has been required for construction after approval of the engineering drawings.

1.4.5 Lot Grading

- (a) Elevations of the final lot grades for all lot corners for the entire plan of subdivision.
- (b) Invert elevations of all culverts.
- (c) Invert elevations of all ditches at 20 metre intervals.

2.0 DRAFTING REQUIREMENTS

2.1 Quality

All original drawings and prints shall be neat and **legible**, using the latest version of AutoCAD or Civil3D, Computer Drafting and shall be updated for "As-Built" in the same manner. Design review submissions shall include hardcopies and PDF files. Approved for construction submissions and "as built" submissions shall include hardcopies, PDF files and AutoCAD/Civil3D files.

2.2 Drawing Sheet Size

Drawings shall be of a consistent size of 595 mm by 841 mm (metric size A1).

2.3 Scales

Standards metric scales to be used are 1:20, 1:50, 1:100 and any factors of 10. Scales shall be as follows and shown on drawings:

- The key plan shall be shown on the cover sheet at a scale of 1:5000;
- The General Service Plan and the Storm Sewer Plans shall be 1:1000;
- The Lot Grading Plan and the Park Development Plan shall be 1:500 or 1:200 if required;
- Plan and Profile Drawings shall be 1:500 (Horizontal) and 1:50 (Vertical).

2.4 Title Blocks

All drawings shall include a complete title block with a revisions block, design engineer's block, the lot and concession numbers, Township name and Township acceptance block, and a drawing number to the satisfaction of the Township.

2.5 Basic Information

The following standards shall apply in preparation of the drawings:

- (a) All plans shall include a north arrow in the upper right hand quadrant. All east-west streets shall generally be drawn with the north arrow pointing to top, all north-south streets with the north arrow generally pointing to the right, and all cul-de-sacs or other roads where this does not apply shall be drawn with the stations numbered from left to right.
- (b) All elevation data shall be referred to geodetic datum and at least one bench mark shall be shown on each plan indicating a geodetic elevation.
- (c) The intersection of centre lines of streets shall be used as zero chainage. The centerline chainage is to be shown in ink from the outset, calculated from the final survey. When the plan must be broken because of curvature, etc., the profile shall be broken as well, so that insofar as possible, chainage points in plan and profile coincide vertically.

- (d) In general, east-west streets shall have zero chainage at their westerly limits and north-south streets shall have zero chainage at their southerly limits. Chainages on a plan-profile shall increase from left to right.
- (e) All existing utilities, structures and other features such as trees and hedges shall be shown and identified using a broken line.
- (f) The beginnings and ends of curves must be shown on a plan and profile with the radii of curvature shown on the plan. Chainages of points of curvature shall be calculated from the final plan. The chainage elevations and names of intersecting streets shall be shown in plan and profile.
- (g) The drawings shall be in ink at the outset, according to the final survey. Street names shall be kept clear of the road allowance.
- (h) The drawings shall show any required off-street drainage and separate profiles should be prepared for drainage easements.
- (i) The drawings shall show clearly the proposed profiles, road widths and cross-sections, ditches, ditch gradients, curb and gutter gradients, culvert sizes, gauges and gradients, existing and proposed services, and limits of the proposed work. All detail for intersecting streets including grades must be shown for a minimum distance of 30 metres from the intersection of the intersecting street. All street lines shall be shown as well as all easements for drainage or services.
- (j) The drawings shall show the lot frontage distances and dimensions of easements and land to be dedicated to the Township.
- (k) The Township Public Works and Planning Departments shall be consulted as to the manner of showing information not set out in these requirements.

2.6 Sewer Details

The standard abbreviations, sewer diameter, length and grade, diameter and size of maintenance holes, inlets and connections to the sewer shall be shown on appropriate General Plans. This information plus sewer bedding, type and class of sewer pipe, maintenance hole numbers and inverts, flow direction, grate elevations and drop structures shall be shown on Plan and Profile Drawings. Chainage of maintenance hole locations shall be shown in profile.

2.7 Watermain Details

The standard abbreviations, watermain diameter, length, type and class of pipe, and the valves, services, hydrants and connections to the watermain shall be shown on appropriate General Plans and on Plan and Profile Drawings.

2.8 Road Details

Horizontal control data (beginning and end of curve, radius, length, etc.) shall be shown on appropriate General Plans and on Plan and Profile drawings.

Vertical control data (proposed road grade, length of run and percent slope, beginning and ending of vertical curves) shall be shown on Lot Grading Plans and on Plan and Profile drawings. Existing and proposed centerline road grades shall be shown every 20 metres with stations shown measured in metres with kilometres separated by a + sign on long runs (e.g., – STA0+000, STA 0+020, STA 0+040...STA 1+020). Stations of interest (curve stations, intersections, end stations, etc.) shall be shown calculated to the nearest millimeter (e.g., - BVCSTA0+041.169, EVCSTA0+066.169, ENDSTA 0+069.124).

2.9 Miscellaneous Details

Other details shall be according to the Township Standard Drawings where applicable or if a Township Standard Drawing is not available in accordance with Ontario Provincial Standards. Township Standards take precedence when available. All necessary details shall be included on sheets similar to other drawing sheets, if not on relevant drawings. Township Standard Drawings may be printed on these sheets directly. Township Standards may not be edited unless agreed to by the Public Works Department.

3.0 GENERAL SERVICING PLAN

A copy of the General Servicing Plan shall be submitted indicating the proposed locations of the water distribution system, the sewage collection system(s) as well as all aboveground and underground utilities such as Hydro, Bell, Cable and Gas.

All locations must be established and resolved by the Developer's Engineer in conjunction with the Utility companies and the Township and in accordance with the locations shown on the typical cross-sections.

4.0 ROADWAYS

4.1 Provincial Standards

Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD) shall apply together with these Township standards.

Where there are any apparent conflicts or discrepancies, the Township's Standards and Standard Drawings shall take precedence.

4.2 General

Where a plan of subdivision is serviced by a sanitary sewer system, all roadways shall be serviced by storm sewers and curb and gutter facilities. In areas of the municipality where a sanitary sewer system is not servicing the plan of subdivision:

- (a) Where lot frontages are less than 23 meters – storm sewers and curb and gutter facilities shall be supplied.

- (b) Where lot frontages are greater than 23 meters, storm ditches may be supplied unless otherwise required by the Municipality. Where ditch grades are less than 0.50% storm sewers and curb & gutter facilities shall be supplied.

Where ditches have been approved by the Municipality, roadways shall consist of an asphalt surface and granular shoulders.

The following are general requirements for the design of roads and rights-of-way:

- (a) Street allowances shall be a minimum 20 metres wide. Where the subdivision adjoins or incorporates an existing County Road or Township arterial road as shown on the Township's Official Plan, the Developer shall deed to the County or Township the required widenings.
- (b) Minimum daylighting at intersections of Township roads and County or Provincial roads shall be 3.0 metres x 3.0 metres.
- (c) The edge of the roadway's paved surface shall have a minimum radius of 10 metres at intersections.
- (d) The minimum grade on any roadway shall be 0.3 percent and the maximum grade shall be 6 percent with an open ditch section and 8 percent with a curb and gutter section.
- (e) Finished roadways shall have a crossfall of 2 percent from the centre line to each outside edge of shoulder.
- (f) On all streets, horizontal and vertical sight distances conforming to MTO geometric design standards shall be provided.
- (g) On all fill sections requiring guide rails the shoulder widths shall be 0.6 metres wider than the specified widths above.
- (h) All roads are to be extended to the limit of the subdivision boundary and shall terminate at a turning "T" or cul-de-sac (at discretion of the Township) when not connecting to an existing road.
- (i) Cul-de-sacs shall have a minimum radius of 23.0 metres to property line and a minimum radius in accordance with the Township Public Works and Planning Departments Standards for asphalt.
- (j) The road design for industrial and/or commercial developments shall take into account the type of traffic anticipated on the development. Granular base thicknesses, asphalt type and thickness, shoulder width, cul-de-sac radii shall be designed specifically for the development utilizing these standards as minimum requirements.
- (k) The configuration on entrance roads for subdivisions and entrance roads for commercial, industrial and institutional developments shall conform to OPSD 300.01 and 300.02 unless otherwise approved by the Township.
- (l) Where new roads are to connect to existing roads the design shall extend along the existing road for a sufficient length to verify a satisfactory transition.
- (m) Roads shall be classified as arterial, collector or residential in accordance with the Township Official Plan.

- (n) Provisions shall be included in the road design for communal mailboxes. The Developer shall be responsible for providing parking areas, structural concrete foundations, etc. all as required by the Township for communal mailboxes in locations designated by the Township.
- (o) Driveway entrances within cul-de-sacs are to be located on the adjoining sides of property.
 - (i) Where it has been determined that a 26 m ROW is required, the Township will require sidewalks on both sides of the ROW.
 - (ii) Sidewalks will be required on at least one side of the street in all new developments having municipal water or sewers.

4.3 Clearing and Grubbing

Trees shall be removed so that the specifications for sight distances, grading, ditching, etc., may be met. All stumps, logs, brush, boulders, debris, etc. shall be removed from the entire street allowance and deposited off the site of the subdivision to a disposal area approved by the Township Public Works and Planning Departments and the Ministry of Environment and Climate Change.

Unless noted otherwise, all healthy trees behind the back slope of ditches and not obstructing visibility or installation of services shall be preserved. The Township Public Works Department may give special permission to leave trees on the street allowance, providing that they are situated more than 1.2 metres behind the curbs.

4.4 Grading

Where curb and gutter is required:

The boulevard area from the curb to the property line shall be graded to provide positive drainage toward the roadway if possible, with a minimum grade of 2%.

- All side slopes, ditches and boulevards to the street line shall be protected with 75 mm of topsoil and nursery sod.
- Where the curb and gutter is not required:
 - The area between the edge of the road shoulder and the street line shall be graded and the ditches cut with sideslopes of 3:1 from the edge of the shoulder to the bottom of the ditch and from the bottom of the ditch to the original ground. In fills over 1.5 metres, measured vertically from the edge of shoulder to the toe of slope, the fill slope shall not be steeper than 2:1. The ditch shall be located at the toe of the fill slope. In fills over 3.0 metres, measured vertically from the edge of boulevard to the toe of slope, timber guide rails shall be installed conforming to the Ontario Provincial Standard Drawings and Ministry of Transportation Ontario protection warrants.
 - All sideslopes, ditches and boulevards to the street line shall be protected with 75 mm of topsoil and nursery sod.

4.5 Base Construction

The sub-grade shall be excavated or filled to the required grade for the required width of surface plus shoulders or curbs plus the additional width necessary for the required depth of granular roadbase. Where earth fill is required, it shall be placed in lifts not exceeding 150 mm in depth and each lift shall be thoroughly consolidated.

All vegetation, boulders over 150 mm in diameter, topsoil and organic or frost heave susceptible materials, shall be removed from the road base to a depth of at least one metre below finished grade and replaced with suitable material. In swamp or other areas where the material at this depth is unsuitable, such treatment as required by the soils report, or as the Township Public Works and Planning Departments may direct, shall be carried out.

The sub-grade shall be shaped to conform to the required longitudinal grade and cross-section and shall have a crossfall of 3% from the centerline of roadway to each side.

The sub-grade shall be compacted with suitable mechanical compaction equipment as required to produce a solid base for the road gravel. All soft spots shall be excavated and backfilled with granular base material.

The granular base shall be laid on dry, smooth, properly graded sub-grade, and shall be spread for the required width of surface plus shoulders and tapered at the edges to meet the edge of sub-grade.

The granular road base shall consist of a bottom course of 300 mm minimum Granular "B" full width across the roadway and shoulders and a top course of 150 mm minimum Granular "A" full width across the roadway and shoulders conforming in all aspects to the Ontario Provincial Standard Specifications.

The granular materials shall be spread in layers of 150 mm maximum compacted depths, and each layer shall be thoroughly compacted to the satisfaction of the Township Public Works Department. No granular base or surface material shall be placed until the grade on which it is to be laid has been inspected and approved by the Township Public Works Department.

4.6 Roadway Surface Asphalt

As soon as the granular base has been completed it shall be thoroughly compacted and shaped and the base course asphalt placed. The base course shall consist of 40 mm minimum thickness of HL4 base course asphalt.

Upon approval of the Township Public Works Department which shall not be given for at least one year from the date of placement of the base course or until 75 percent of the houses have been constructed the surface course asphalt may be placed. A tack coat shall be applied ahead of the surface course as per OPSS.

The surface course shall consist of 40 mm minimum thickness of HL3 surface course asphalt.

In rural cross-sections, a single 50 mm lift of HL4 shall be required. Timing of the placement of the single asphalt lift shall be in accordance with the conditions of the Subdivision Agreement for the development. The Township shall determine the suitability of a rural cross-section on a site-specific basis.

Asphalt work shall conform in all respects to Ontario Provincial Standard Specifications.

4.7 Driveways

The maximum grade for access driveways shall be 8% (shown on drawings) except in site-specific cases. This maximum grade is not recommended and should be employed only in exceptional cases where conditions prohibit the use of lesser grades. The minimum grades permissible are 2% on boulevards and 1% on lots. Maximum grade change shall be 4% at curb or sidewalk and 1% per 2.0 metres average. All grades are to be shown on as built drawings.

The location of driveways in cul-de-sacs shall be adjacent to each other and detailed on the engineering drawings for approval by the Township Public Works Department.

Cement end treatments or peers at driveway ends are prohibited on the ROW in subdivisions and areas where the posted speed limit is greater than 50 km/hr.

All access driveways shall be located a minimum of 1.5 metres from utility poles, hydro transformers, catch basins, hydrants, watermain valves, Bell maintenance holes, Bell and Cable T.V. junction boxes, water service valve boxes, side lot lines and other driveways. Where frontage limitations interfere with standard locations, site-specific solutions shall be detailed in the Plan and Profile and Lot Grading Plans.

Between the edge of curb and property line, the driveway entrance shall have a 150 mm thickness of Granular "A" and 50 mm thickness HL3 asphalt surface.

In areas with roadside ditches, the Developer shall install driveway entrance culverts for each lot. Culverts shall be minimum 450 mm diameter CSP, minimum 1.6 mm thickness or HDPE, minimum 320kPa stiffness and minimum length of 7.5 meters.

Entrances will be restricted to one per residential property within a plan of subdivision.

4.8 Concrete Curb and Gutter

Concrete curb and gutter conforming to Ontario Provincial Standard Drawing OPSD 600.100 (roll over) or OPSD 600.010 (barrier) shall be installed along all edges of roadway's paved surface as required by the Township. Roll over curb is generally acceptable on local residential streets. The curb shall be dropped at all entrances and walkways. Terminations at the limits of the subdivision shall be either joined to existing concrete curbs or terminated as per OPSD 608.010.

The City of Barrie Standard BSD-17 may be used as an alternative.

Pipe sub-drains shall be provided under all curb and gutter unless it is deemed unnecessary by a qualified soils consultant to the satisfaction of the Township Public Works Department. Sub-drains shall be continuous perforated, corrugated, plastic pipe with geotextile. Sub-drains shall be bedded in a 300 mm x 300 mm trench below and at each edge of the sub-grade and shall conform to OPSS 405.

Concrete shall conform to Ontario Provincial Standard Specification for mix-design, placing concrete and curbing. Curb construction shall conform to OPSS 353. Concrete shall have a minimum compressive strength of 30 MPa at 28 days and air entraining agent to provide 5-8% air entrainment.

Curbs shall be bedded on the granular base construction and upon completion of the curbs, Granular "A" backfill shall be placed behind the curb and thoroughly compacted to prevent the displacement of the curb by the subsequent Granular "A" and asphalt operations.

Asphalt gutters per OPSD 601.010 are to be used on rural roads when the road grade is greater than 5%. For lengths greater than 60 m gutter outlets required every 60 m.

4.9 Ditches and Culverts

Ditches and culverts shall be sized to take the total expected storm run-off calculated by a recognized design method. Acceptable methods for culvert calculations and ditch sizing are detailed in the MTO Drainage Design Manual and are summarized on the MTO Website (<http://www.mto.gov.on.ca/english/publications/drainage/hydrology/section10.shtml#flow>). Where tailwater elevations impact hydraulic capacity the method used must respect this tailwater condition. Acceptable Hydrologic calculations include, Rational Method, SWMHYMO, GTTHYMO, MIDUSS, EPA SWMM, PC SWMM, as appropriate based on the assumptions of the method.

Ditches shall be constructed as follows:

- (a) Distance centre to centre of ditches to be as required for the depth of ditch and side slopes.

- (b) Depth below finished centerline grade
- | | | |
|---------|---|-------------|
| Maximum | - | 1.20 metres |
| Minimum | - | 0.75 metres |

- (c) Ditch Grade
- | | | |
|---------|---|------|
| Maximum | - | 6.0% |
| Minimum | - | 0.5% |

Where the groundwater table is at or above the proposed ditch grade, at any time of the year, a perforated pipe subdrain (minimum 200 mm diameter) with filter fabric protection shall be provided. Sub-drains shall be bedded in a 300 mm x 300 mm clear stone trench below the swale and shall conform to OPSS 405. Sub-drains shall be installed a minimum of 0.5 m below C/L of ditch to avoid maintenance damage. Sub-drains will be inspected post-utility installation.

- (d) Where considered necessary by the Township, ditches shall be piped.
- (e) Where drainage is conveyed from the roadside ditch to a suitable outlet through an easement it shall be piped using ditch inlets and grates. Storm sewer pipe material shall be concrete, PVC or PE, minimum size 300 mm diameter. Concrete pipe material must be ES or Class III. PVC or PE pipe material must be 320 kPa pipe stiffness complete with bell and spigot connections.
- (f) The minimum ditch protection on all ditches shall be 75 mm of topsoil and sod. All topsoil shall be from a source approved by the Township Public Works and Planning Departments.
- (g) Normal ditch-to-ditch road culverts shall be installed where required as follows:
- i) Length: Minimum required from centre of ditch to centre of ditch.
 - ii) Size: Minimum of 600 mm diameter.
 - iii) Material: Standard galvanized corrugated pipe.
 - iv) Gauge: As recommended by manufacturer for H20 highway loading, minimum 2.0 mm thickness.
 - v) Cover: 300 mm minimum at the shoulder of the road for road crossings and all entrance culverts.
 - vi) Bedding: Culverts to be bedded and backfilled with granular material in accordance with Ontario Provincial Standard Specifications.
 - vii) End Protection:
 - a) In subdivisions and areas where the posted speed limit is 50 km/hr or less, all road driveway and walkway culvert ends shall be protected with precast interlocking paving stones as per Township Standard Drawing STD-D1.
 - b) In areas where the posted speed limit is greater than 50 km/hr, culverts shall have sufficient length to provide a minimum 5.0 m entrance width plus stable side slopes (minimum 2:1).

- (h) Where it is necessary to construct culverts under roadways or driveways larger than the minimum size, the culvert shall be designed in accordance with a method recognized by the Ministry of Transportation Ontario. The culverts shall be of reinforced concrete or corrugated metal and detail drawings and calculations shall be submitted for approval to the Township Public Works and Planning Departments.
- (i) The Township Public Works Department may require guide markers to be placed to mark the ends of the culverts. Driveway entrance culverts for each lot shall be installed by the Developer, minimum size 450 mm diameter CSP, minimum 1.6 mm thickness or HDPE, minimum 320kPa stiffness and minimum length 7.5 metres. No driveway or culvert shall be placed closer than 1.5 metres to any water valve, curb stop, lot line, transformer or utility pole.
- (j) Where culvert ends are spaced less than 3 m, they shall be joined as one, having regard for maximum length of pipe.
- (k) Where culvert ends are spaced more than 3 meters, they shall not be joined as one.
- (l) Culverts are to be installed at all fire hydrants in rural areas.
- (m) Where fill depth over the culvert exceeds 4 m concrete pipe material is required.
- (n) In locations where the culvert acts as a fish barrier, an effort shall be made to eliminate the fish barrier in consultation with NVCA.

5.0 GRADING

5.1 General

Lot grading shall conform to the following specifications subject to the requirements of the major drainage system and limits on the depth of street flow.

Major drainage system design depths shall follow the requirements of the NVCA Natural Hazards Technical Guide.

5.2 Grades

Generally, all lots shall be excavated or filled so that the whole of the lot area from the street line to the building envelope shall have positive drainage to the street and shall have an elevation not less than 0.45 metres and not more than 1.5 metres higher than the finished crown of the road opposite the centre of the lot.

Lots are to be designed with a 5% grade for 1.5 m to 3.0 m from the house foundation. The underside of floor slab and associated drains shall be entirely located a minimum of 0.4 metres above the seasonal high groundwater elevation.

The slope from the curb to the rear of the building shall be a minimum of 2% and maximum of 5%.

Yard areas shall be designed with 1 to 5% grades. Non-yard areas shall have maximum grade of 30%. A soils stability report is required if slopes steeper than 30% are proposed.

Any lot with a 10% average grade may require split level dwellings and cross-sections may be required.

Swales shall be designed with 1% to 5% grades depending on flow and shall generally be 2% where possible. 150 mm diameter pipe sub drains shall be provided under all swales with gradients of less than 1.0%. Sub-drains shall be perforated, corrugated plastic pipe with geotextile placed at 0.5 m offset from property line. Sub-drains shall be bedded in a 300 mm x 300 mm clear stone trench below the swale and shall conform to OPSS 405.

Private lot catch basins shall be allowed where necessary and located where all structures "(or buildings)" are protected from flooding if the inlet is blocked or surcharged by a major storm event.

Rear lot drainage shall be collected via Option A or B below, subject to site specific conditions and Township approval. Rear yard catchbasins and outlet pipes are to be located entirely on the same lot and shall be located a minimum of 1.0 metre from the property line.

- A) Connection to the storm sewer via a privately owned pipe and landscaping drain. Connections for catchbasins shall be regarded as service connections and shall be the responsibility of the lot owner to maintain. Refer to standard detail STD-STM1 for layout and details.
- B) A rear yard catchbasin and pipe system within a Township owned easement. Where several lots drain to a catchbasin on private property, an easement shall be provided. The catchbasin drain lead and easement shall be located 1.5m from the lot line, away from any area of potential future fencing, and have a minimum easement width of 3.0m. Grades are to be consistent with adjacent properties. Where more than four homes require rear lot drainage a storm pipe system shall be required.

Sump pumps must pump over the foundation wall. Direct connection is not permitted.

5.3 Lot Grading Plan

A lot grading plan, which may incorporate the information required for the drainage plan, shall be submitted to and approved by the Township Public Works and Planning Departments.

Grades of the subdivision shall meet grades of the adjacent lands for a minimum distance of 3 metres.

The plan shall show existing elevations for each lot corner along with contours plotted at 0.5 m intervals. Contours shall be extended 30.0 m outside of the development area. Where external areas drain to the lot contours shall extend to include the external area.

Proposed elevations for the street centerline at 20 m intervals, lot corners, building lines, break points in side yard swales and first floor of each house shall be shown. Minimum specified house grades shall be shown as per the standard detail drawings.

5.4 Sodding and Seeding

Each lot is to receive 75 mm topsoil and be sodded from the street line to the rear building line of the dwelling. The remaining area is to be seeded or sodded. Seed and sod must be of a quality satisfactory to the Township.

5.5 Lot Development Plans

5.5.1 Basic Requirements

After approval of the general lot grading plan and prior to the issuance of building permits, the Consulting Engineer may be required to submit to the Township Engineer for approval 3 sets of the proposed lot development plan for those particular lots for which a building permit is desired. That submission would be accompanied by a letter, which would express the Consulting Engineer's approval. The details and content of the lot development plan and the design criteria for lot grading and drainage are outlined in the following section.

It is expected that the majority of proposed lot development plans would conform to the general lot grading plan. All deviations, which are certified by the Consulting Engineer and subsequently approved by the Township, will require a revision to the general lot grading plan.

5.5.2 House Plans

House plans shall be submitted with the lot development plans to verify locations and elevations of the following:

- Footing, basement floor, first floor and garage floor;
- Seasonal high groundwater elevation;
- Top of foundation wall;
- Window sills, minimum opening elevation;
- Doorways;
- Patios and walkouts;
- Retaining walls;
- Bench mark.

5.5.3 Grading and Detail

The lot development plans shall show the following grading and miscellaneous detail:

- Existing and proposed elevations at lot corners;
- Driveway location and elevations of sidewalk(s) and percent grades for sidewalks and driveways;
- Direction of surface flow;
- Location, grade and inverts of swales;
- Centre line elevation of roadway adjacent to lot;
- Location of all catchbasins and elevation of grates;
- Hydrants, utility poles, transformers, telephone pedestals, and sidewalks;
- Proposed ground elevations adjacent to the building and at corners;
- Water and sewer service locations and elevations;
- Limit of seeding and sodding;
- Septic/well locations & grades where applicable.

6.0 STORM DRAINAGE SYSTEM

6.1 General

Generally, stormwater run-off shall be accommodated by a system of catch basins, maintenance holes and storm sewers or by roadside open ditches and culverts. Storm sewers shall be required in urbanized areas. Storm sewers shall be required when the roadside ditches are not able to convey the 5-year return frequency storm, when the ditch exceeds the maximum depth, or when the ditch grades exceed 6%, or less than 0.5%.

The storm drainage system is to be designed to limit flood damage and hazards for non-frequent storm conditions, to provide a reasonable level of convenience and safety for pedestrian and traffic use by removal of lot and street surface run-off during frequent storm conditions and to prevent the impairment of water quality and disturbance to natural streams.

6.2 Service Areas

The system shall be designed to service all areas within the subdivision to their maximum future development in accordance with the Official Plan Section 7.3.1. Allowance shall be made for inflows from the appropriate adjacent external drainage area and outlets to the appropriate adjacent sewer or watercourse. The exact location for connecting sewers or channels to adjacent sewers or areas shall be approved by the Township Public Works Department.

6.3 Easements

If the required drainage works from municipal lands or lands to be dedicated to the municipality result in drainage through other lands, all such work shall be carried out by means of a storm drain and appurtenances of sufficient size for the drainage requirements of the area. The design shall be based on the run-off to be expected from the area when completely developed with buildings, pavement, sidewalks, and parking areas, and such design shall be approved by the Township Public Works and Planning Departments.

The Developer will obtain at no expense to the Township by deed or grant of easement in a form approved by the Township Solicitor, any necessary rights in land for drainage through lands other than its own. The Township shall be protected or indemnified by the Developer from all claims or actions of any nature or kind whatsoever arising from the use of such lands until such time as the services installed therein become vested in the Township in the manner herein before provided.

6.4 Drainage and/or Stormwater Management Report

The Drainage and/or Stormwater Management Report setting out the existing and proposed drainage system shall be submitted for approval to the Township Public Works Department. The report may also have to be approved by the Ministry of Environment and Climate Change, and the Ministry of Natural Resources, and the Nottawasaga Valley Conservation Authority. This report among other things shall pay particular attention to the following:

- (a) Possible areas within the subdivision not having suitable drainage outlets.
- (b) The possible obstruction of natural drainage patterns by development and buildings.
- (c) Details of a suitable drainage outlet(s) from the subdivision.
- (d) Natural watercourses entering the subdivision and adjacent lands draining to the subdivision.
- (e) Accumulated flows at all proposed drainage structures.
- (f) Tailwater conditions for all SWM ponds and storm sewer outfalls.
- (g) Floodplain limits and elevations relative to all proposed development.
- (h) Existing high groundwater elevations.

The report shall include a plan showing the major overland system design. When the Rational Method is used, the relevant figures are to be entered on Storm Sewer Design Sheets. When computer modeling is used, the report shall indicate model parameters and assumptions used to give outflow hydrographs and hydraulic grade line levels where applicable.

This report shall provide recommendations for dealing with all drainage that affects the design of drainage works for the development, and such recommendations, when approved by the Township Public Works and Planning Departments shall be incorporated into the Engineering Drawings.

6.5 Design Flows

Potential increases in run-off rates resulting from new development shall be controlled as required by the Township. Where downstream constraints exist such as those established by the Township or the Conservation Authority, the drainage report shall demonstrate how run-off rates will be controlled to satisfy those constraints. In the absence of such constraints, the post-development flows from a 5-year return frequency storm generally shall not exceed the flows for pre-development conditions for the same storm at the outlet for the minor system unless it is demonstrated to the satisfaction of the Township Public Works Department that uncontrolled flows will have no adverse effects. Similarly, for the major system, post-development run-off from a 100-year return frequency storm generally shall not exceed the pre-development run-off for the same storm.

6.6 Methods of Computation

Pre-development peak flows shall be computed by a method such as the Rational Method or by an approved computer model. Watershed definition and pre-development flows must be approved by the Township Public Works and Planning Departments.

Preliminary estimates of post-development flow rates may be computed using a method such as the Rational Method.

For all systems and for the design of surcharged sewers and detention facilities, the latest version of the computer model OTTHYMO is recommended. Other hydrograph methods may be considered if it is demonstrated that the results are comparable to those from OTTHYMO. Post-development design flows may be determined using the Rational Method only where the design area is less than 40 hectares and run-off control facilities are not considered.

Rainfall intensity-duration-frequency equations or their curves and design storm hydrographs must be approved by the Township Public Works and Planning Departments. The Township requires use of the online MTO IDF Curve lookup tool.

Where the first leg of a residential storm sewer system is sized using the Rational Method, the initial inlet time shall be 15 minutes for the 5-year storm and 5 minutes for the 2-year storm.

This shall apply where the upstream drainage area does not include large open space areas. Where peak flows from external areas enter a subdivision sewer system, the more critical case based on either the time of concentration including the external area or the time of concentration excluding the external area shall be used. Actual velocities of computed peak flows shall be used to estimate time of concentration.

A design evaluation of inlet times shall be submitted to justify inlet times different from those specified above, especially in the cases where the sewer is designed for certain surcharge levels for larger storms and where the sizing is optimized for both situations. Such an evaluation shall be approved by the Township Public Works Department prior to submission of design drawings.

Please refer to NVCA Standards for run-off coefficients.

Intensity-Duration-Frequency (IDF) curves shall follow the MTO Online Tool.

Manning's Formulae shall be used to determine the capacity of the sewers. For concrete sewers a roughness coefficient of 0.013 shall be used. For corrugated pipe used as culverts, not storm sewers, an appropriate roughness coefficient shall be used.

In general, a storm sewer system shall be designed to convey not less than the 5-year return frequency storm without surcharge. Surcharged design may be considered for higher design levels where suitable methods are used, or where foundation drains are not connected to the storm sewer, subject to the approval of the Township Public Works Department.

6.7 Design Levels

The system is to be designed to provide convenience drainage for frequent storms (minor system) and flood protection from rare events (major system).

6.8 Minor System

Storm sewers and culverts are to be designed for at least a 5-year return frequency storm without surcharge where adequate overland drainage capacity exists to satisfy the major system requirements.

Exceptions to this may be considered under the following circumstances and subject to approval by the Township Public Works Department:

- (a) When the major system is inadequate either because there is no outlet for overland flows or there is insufficient surface detention potential, the sewer system shall be designed to carry as much flow as necessary to achieve the greater of the 100 year or Timmins storm, level of protection for the major system as specified below.

6.9 Major System

Run-off rates in excess of the design capacity of the minor system shall be conveyed via streets and swales to a safe outlet. The combination of overland flow system and minor system shall be designed for a minimum 100 year return frequency storm, to prevent flooding of private property with maximum level of road flooding and surface detention as defined below.

LOCATION**STORM RETURN FREQUENCY (YEARS)**

	5	25	100/Regional
Walkways and open spaces	Minor surface flow up to 25 mm deep on walkways	As required for overland flow outlets	As required for overland flow outlets
Collector and industrial roads	Within the roadside ditch or 1.0 m wide in gutter or 0.10 m deep at low point catch basins	Up to crown	0.10 m above crown, 0.3 m above E/P Achieve Emergency Access per NVCA
Arterial roads	Within the roadside ditch or 0.10 m wide in gutter or 0.10 m deep at low point catch basins	One lane clear	Up to crown
Private property	Minor ponding in swales	No structural damage or ponding in yard areas	No structural damage Ponding in yard areas 0.3 m below building openings No basement flooding
Public property	Minor ponding in swales or ditches, no erosion	No structural damage, ponding in flat areas, some erosion	No structural damage, ponding in flat areas

Street grading must provide a continuous gradient to direct street flows to a safe outlet at low points. Outlets can be walkways or open sections of roadway leading to parks, open spaces or river valleys.

Major system calculations shall assume 50% blockage of all minor system inlets. Major system design shall ensure sanitary inlets and MH lids are not submerged. If unavoidable maintenance hole insert supplied by No Flow In Flow or approved equivalent to be used.

6.10 Outfalls

Outfall structures to existing channels or watercourses shall be designed to minimize potential erosion or damage in the vicinity of the outfall from maximum design flows.

6.11 Detention and Retention Facilities

Where deemed necessary by the Township to reduce run-off increases and to meet identified downstream flow constraints, detention and/or retention facilities shall be provided for both the major and minor systems.

Land area set aside expressly for stormwater management facilities where it is not part of a privately owned facility (i.e., roof top storage or otherwise incorporated into industrial/commercial lands) shall be designated as a "stormwater detention/retention site" and dedicated by the Developer to the Township. It shall not be considered as part of the park system. A structural engineer must approve all roof top detention facilities.

All storm water management facilities shall be provided with an outlet (overflow spillway) designed to accommodate the regional storm flow without failure. Suitable erosion protection shall be provided downstream of the outlet for all flow conditions. Operation during spring snow melt or freezing conditions shall be investigated and any required changes shall be incorporated.

SWM facilities to be transferred to the Township must include aesthetic considerations to achieve a visually pleasing final constructed form. Undulations to be incorporated into pond perimeter grading to achieve an "organic" pond shape; no box shaped ponds. Pond landscaping should be visually pleasing and long term low maintenance. Pond layout and design shall be approved by Public Works and Planning Departments.

If a SWM facility contains a permanent pool, a minimum 4 foot chain link fence shall be required for the "**Block**" that the facility is located within.

6.12 Water Quantity

An effort shall be made to maximize the initial abstraction in rear yard areas as a Low Impact Development (LID) effort to achieve quality and quantity control objectives. Water Quantity control must be achieved for all site outlets for 2-100 year storm events. Reliance on infiltration techniques shall be subject to Township approval and acceptable geotechnical evaluation.

6.13 Water Quality

The potential use of stormwater management facilities for water quality control shall be investigated as directed by the Township Public Works and Planning Departments. Where LID is proposed, hydraulic calculations are required to demonstrate no circulating of infiltrated water into sump pumps or foundations.

6.14 General Design Criteria For Piping

Generally, storm sewer systems shall be designed in accordance with the Ministry of Environment and Ministry of Transportation Guidelines.

6.15 Downstream Size

Except for special cases, the downstream pipe diameter shall always be greater than or equal to the upstream pipe diameter.

6.16 Roof Leaders

Leaders are to be discharged to rear yards onto the ground surface to splash blocks and flows be directed away from the building in such a way as to prevent ponding or seepage into weeping tile. Flows must be directed as to not impact adjacent properties. Where flat roofs are used, as in commercial or industrial sites, detention roof hoppers requiring smaller or fewer roof leaders may be used as part of the stormwater management design.

6.17 Foundation Drainage

Direct connections of foundation drains to storm sewers are not permitted. Sump pump must pump over wall, and drains shall include an air gap before entering storm sewer. **Foundation drains/sump pumps shall not be connected to sanitary sewers.**

6.18 Other Connections

All other connections to the storm sewers shall be made as approved by the Township Public Works Department.

6.19 Materials

Sewer pipe material shall be concrete, PVC or PE, minimum size 300 mm diameter. Catch basin leads shall be 250 mm for single catchbasins, 300 mm for double catch basins. Concrete pipe material must be ES or Class III. PVC or PE pipe material must be 320 kPa pipe stiffness complete with bell and spigot connections.

7.0 STORM SEWER LAYOUT DETAILS

7.1 Trunk and Local Sewers

Storm sewers shall generally be located as per the standard detail drawing for storm sewers.

Where storm sewers are located on easements, the easement width shall be 3.0 m minimum.

A minimum depth of 1.5 metres to the spring line from the finished road or ground surface elevation, or a sufficient depth for any foundation drains or other connections shall be provided.

Minimum clearance between services shall be provided in accordance with the Ministry of Environment and Climate Change Guidelines.

7.2 Maintenance Holes

Maintenance holes shall be placed at the end of each sewer, at changes in size and material, and at abrupt changes in grade and alignment. Curved or properly deflected sewer lines are allowed with the approval of the Township Public Works Department. Catchbasin maintenance holes shall have a 30cm sump.

The maximum spacing between maintenance holes shall generally be according to the following:

- 90 m for 200 mm up to 600 mm diameter
- 150 m for 600 mm diameter and greater

Drop maintenance holes shall be provided for all sewer junctions having an invert elevation difference in excess of 0.9 metres that cannot be eliminated by changing sewer grades.

7.3 Catchbasins

Catchbasins are to be located at low points (doubles), upstream of pedestrian crossings and not within 1.0 metre of curb depressions. Preferably, catchbasins where required, shall be located at lot lines.

The maximum allowable spacing shall be 90 metres where catchbasins are not used as inlet controls. Where catchbasins are designed for inlet controls, spacing shall be determined by design.

Catchbasin capacities shall be determined in conjunction with the overall stormwater management system. On roadways, catchbasins shall have a minimum capacity to collect the run-off from the 5-year return frequency storm, sufficient catchbasin capacity shall be provided to permit the design flows to enter the sewer system. Inlet control devices may be used where the hydraulic grade line needs to be strictly controlled i.e., – to prevent surcharging of the sewer line.

Catchbasin leads shall be minimum 250 mm at 0.7% grade for single catchbasins and 300 mm at 0.7% grade for double catchbasins. Leads shall connect to maintenance holes where possible. Where catchbasins are designed for inlet controls, restrictive outlets will be permitted subject to the approval of the Township Public Works Department.

8.0 SANITARY SEWER SYSTEM

8.1 General

For subdivisions in which sanitary sewers are required, the sewer system shall be designed to carry domestic, commercial and industrial sewage for each area or subdivision under consideration. Flow is to be by gravity and pumping will be considered only where other alternatives are not possible and only with the approval of the Township Public Works Department.

If the need for a pumping station is approved by the Township, it shall be designed in accordance with the Township's Pumping Station Design Guide (**Appendix D**), MOECC Guidelines including standby power, and to the satisfaction of the Township Public Works Department.

8.2 Service Area

The system shall be designed to service all areas within the subdivision to their maximum future development in accordance with the Township's Official Plan. Allowance shall be made for inflows from the appropriate adjacent subdivisions or areas and shall meet with the approval of the Township Public Works and Planning Departments. Discharges of the system are to be into appropriate sewers and are to be approved by the Township Public Works Department.

The exact location for connecting to sewers in adjacent subdivisions or areas shall be as approved by the Township Public Works and Planning Departments.

8.3 Drains

All floor drains are to be connected to the sanitary sewer. Foundation drains, sump pumps, and roof water leaders **are not** to be connected to the sanitary sewer.

8.4 Design Flows

The sewers are to be sized for maximum design flows plus an allowance for infiltration. Minimum velocities and slopes are to be determined for maximum design flows without infiltration.

The average daily domestic flow is to be taken as 450 litres/capita/day.

Equivalent domestic flows for areas intended for uses other than residential shall be calculated on an area basis and reviewed with the Township Public Works and Planning Departments prior to design.

Maximum design flows are to be determined using average daily flows and the Harmon Peaking Factor.

A wet weather infiltration rate of 20,000 litres/hectare.day = 0.23 litres per second per gross hectare is to be used. To satisfy self-cleansing requirements in sanitary sewers, assume dry weather infiltration reduces to zero for several days during dry months.

8.5 Sewer Design

Manning's Formulae shall be used for determining the capacity of the sewer. A roughness coefficient of $n = 0.013$ shall be used for all types of pipe.

Pipe strength design calculations shall be provided to the Township Public Works Department for approval.

Sewer pipe shall be minimum strength PVC-SDR 35 with rubber gasket joints as approved for use by the Ministry of Environment and Climate Change and shall be a minimum diameter of 200 mm.

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

The maximum velocity shall be 3.0 m/s at full flow.

The maximum and minimum grades for pipes shall be the grade necessary to meet the maximum and minimum velocity requirements; however, the grade for the minimum velocity requirement shall not exceed 2% or the road grade where the road grade exceeds 2%.

A sufficient drop shall be provided across each maintenance hole to offset any hydraulic losses, the obverts of inlet pipes shall not be lower than obverts of outlet pipes, and drop structures shall be used only when drops of more than 0.9 metres are necessary.

Except for special cases, the downstream pipe diameter shall always be greater than or equal to the upstream pipe diameter.

8.6 Trunk and Local Sewers

Sanitary sewers shall generally be located as per the standard detail drawing for sanitary sewers.

Where sanitary sewers are located in easements, the easement width shall be 3.0 m for sewers at a depth less than 2.0 m and 6.0 m for sewers greater than 2.0 m depth.

A minimum cover of 2.8 metres below the centre line road elevation or sufficient depth for basement floor drains and frost cover shall be provided. Where sewers are located within an easement a minimum frost cover of 1.5 meters may be used provided such sewers cross below watermain.

Minimum clearances between services shall be provided in accordance with MOECC Guidelines.

8.7 Maintenance Holes

Maintenance holes shall be placed at the end of each line, at changes in size and material, and at abrupt changes in grade and alignment. Curved or properly deflected sewer lines are allowed with the approval of the Township Public Works and Planning Departments.

Maintenance hole types and sizes shall be in accordance with MOECC Guidelines. All maintenance holes are to be benched to the satisfaction of the Township Public Works and Planning Departments and frost straps are to be provided between the upper through to the base maintenance hole section.

The maximum spacing between maintenance holes shall be generally according to the following:

- 110 m for 200 mm up to 900 mm diameter;
- 180 m for 975 mm diameter and greater.

Drop maintenance holes shall be provided for all sewer junctions having an elevation difference in excess of 0.9 metres that cannot be eliminated by changing sewer grades.

Where maintenance holes are located in areas to be flooded by the major design storm, maintenance hole inserts supplied by No Flow In Flow or approved equal shall be supplied and the maintenance hole is to be suitably vented.

8.8 Service Connections

Single connections for residential and industrial use, shall generally be located at least 2.5 metres right of water service connections, which are located at the centre line of the lot. Connections for commercial, institutional or multiple use will be considered on an individual basis if similar locations cannot be used. Non-standard locations must be detailed on Plan and Profile and Lot Grading Plans.

Service connections shall be located at a minimum depth of 2.7 metres, or sufficient depth for basement floor drains and frost cover. Service connections should cross under any watermains and be marked with a 50 x 100 mm wooden post painted green. All connections to the sanitary main shall be pre-manufactured approved tees.

Sewer service connection details as per Township Standard Drawing STD-SAN1. Single residential sanitary connections shall be minimum 125 mm diameter PVC-DR 28 with an end cap braced at the property line. The minimum slope shall be 2%. Connections for commercial, industrial and institutional will be considered separately and generally be 150 mm minimum diameter with an end cap.

Upon completion of the work, Standard Service Record Sheets (one for each lot) shall be prepared by the Developer's Engineer and turned over to the Township. The sheets shall show clearly:

- (a) Lot, lot number and street lines;
- (b) Tie from the end of the service to the lot lines;
- (c) North arrow;
- (d) Type, diameter and depth below grade at the end of each service;
- (e) Any other pertinent information.

Standard Service Record Sheet is provided in **Appendix A**.

8.9 Testing of Sewers and Maintenance Holes

The complete sewer system including service connections to the property line and maintenance holes shall be tested in accordance with MOECC Guidelines, OPS specifications (OPS 411), and to the satisfaction of the Township. Before the expiration of the maintenance period the complete system shall be inspected by an approved video camera testing company and the Township Public Works Department shall be provided with a copy of the appropriate data prior to final approval. Any sections of sewer or service connections, which fail to meet the requirements, shall be repaired or replaced at the direction of the Township Public Works Department. Only chemical pressure grouting repair techniques will be considered acceptable.

9.0 WATER SUPPLY SYSTEM

9.1 General

For subdivisions that require new communal water supply, the developer shall have discussions with the Township to determine the adequacy of the water supply and requirements of the Public Works Department.

10.0 WATER DISTRIBUTION

10.1 General

Watermains and service connections shall be provided to serve the entire subdivision to the limits of the Plan of Subdivision. A general servicing plan of the subdivision shall show the complete water distribution system for the development. The detailed plan and profile drawings, which must be prepared by a Professional Engineer, shall show plans and profiles for all watermains drawn to the same scales as for the roads (1:500), and typical details of service connections, hydrants, valves and all fittings together with detailed drawings of the proposed water supply system all to a scale of not less than 1:50. Preliminary design of the proposed work shall be submitted to the Township Public Works Department for approval in principle. Final approval by the Township to construct the works will not be given until the municipality and the municipalities consulting engineers have accepted the

works. "Form 1" in accordance with the Drinking Water Works Permit shall be completed by the Design Engineer.

The standard drawings, W1 to W5 inclusive, attached to this schedule, depict in part the Township's requirements for services, locations, and methods of construction. These standards will form part of the engineering drawings. The Township must approve any variation from these standards.

10.2 Watermain Locations

Watermains shall be in separate trenches and shall be located in accordance with Standards W1 to W5.

Watermain bedding shall be constructed with bedding as per OPSD 802.010 (granular "A" embedment material) or high performance bedding for flexible pipes and OPSD 802.030 or 802.031 Class "B" (granular "A" bedding material, granular "A" or select native cover material) for rigid pipe unless otherwise approved by the Township. Alternative embedment material shall be sand meeting gradation requirements of OPSS 1004.05.05 compacted to 98% Standard Proctor Density. Geotechnical certification of alternative material must be provided every 150 metres. The compaction testing must include the entire envelope (haunches, bedding and top of pipe).

10.3 Extra Mains and Extra Fittings

No roadway leading out of the subdivision shall be completed by the Developer and accepted by the Township until connecting watermains are installed complete to the subdivision limits. Extra fittings, thrust blocks and/or restraints shall be installed at any point on the watermains as requested by the Township Public Works Department to provide for future connections.

10.4 Watermain Size

Watermains shall be adequately sized to meet water demands in accordance with MOECC Guidelines. Fire flow demands shall be determined using Fire Underwriters Survey methodology. Fire flows shall not be less than:

- 65 L/s for single family residential;
- 100 L/s for multi-residential and commercial;
- 140 L/s for large commercial and industrial.

The minimum size shall be 150 mm diameter for residential areas and 200 mm diameter where the abutting properties plan to be used for industrial or commercial purposes. The Township may also require a larger main on a subdivision street for circulation or other reasons.

10.5 Watermain Pipe

Watermain pipe shall be C900 Class 235 rated polyvinyl chloride (PVC) pipe with rubber gasket joint fittings. All PVC watermain is to be installed with a tracer wire brought up at watermain valve locations, placed through the upper section of the valve box so the wire is accessible by removing the valve box lid as noted on the standard drawings. Push-on PVC rubber gasket joint fittings are not to be used on any hydrant lead, elbow or tee.

All watermain fittings, bends, valves, ends of main, etc., and connections 100 m and larger shall include thrust blocks as per OPSD 1103.010, 1103.020 and STD-W4, as well as restraining devices for at least 10 m on each side of the thrust block.

10.6 Services

Each housing unit shall have a separate 25 mm diameter 1300kPa rated polyethylene water service. Water service connections are to be located at the centre line of the lots as per Township Standard Drawing STD-W1.

Service connections to watermains shall be broadband stainless steel saddles on PVC.

Water services on private property shall be installed on the property to be serviced and, in no case, cross a property line or pass through other private property.

Water services shall be installed to the property line with a Cambridge Brass mainstop, Cambridge Brass non draining curbstop and Clow-Concord service box or approved equals to the centre of the property line. All water services shall be installed in conjunction with watermain construction and in advance of road construction.

10.7 Cover on Watermain and Services

The minimum cover on watermains, water services, and hydrant branches under ditches shall be 1.7 metres.

In areas where the Township's Representative allows a watermain to be installed with less than a minimum cover, the Contractor is to supply and install Styrofoam SM insulation or Urecon insulation as directed by the Township's Representative to protect watermains, hydrant leads and appurtenances.

10.8 Hydrants

Hydrants shall be Canada Valve Century type with Storz pumper port as shown on Township Standard Drawing STD-W5. Hydrant leads shall be 150 mm diameter and shall have a shut-off valve placed 900 mm from the hydrant. Hydrants shall be spaced at a maximum distance of 150 metres. A hydrant shall be placed at the end of any dead end watermain. Wherever possible, hydrants shall be located at corners a minimum of 4.5 metres back from the street line at intersections. Hydrants shall maintain an absolute minimum of a 1.5 metre clearance from the edge of all driveways, utilities or any other above grade obstacles. Hydrant flange elevation should be set at a grade that will give a final flange elevation of 50 mm to 100 mm above final grade. Hydrants shall be bedded in 20 mm clear stone and braced with poured concrete thrust blocking and restraining devices to the satisfaction of the Township Public Works Department.

Hydrant markers shall be Yellow, 1.2 metre high, FH-800 Series Canadian, and connected to the side port.

10.9 Valves

Generally, gate valves shall be installed at the intersections of street lines in a minimum of two (2) directions from a tee and three directions from a cross. Where streets extend for greater than normal distances without intersections the Township Public Works Department may require an extra valve in the main at an intermediate point. Valves shall be Clow Canada F6100 R/W per STD W3.

All valves at points of termination of a stage of construction shall be braced with two additional lengths of watermain pipe beyond the gate valve and a temporary fire hydrant installed. Where watermain valves are located under traveled road surfaces, the top of the operating box shall be set 50 mm below road grade for gravel surfaces and flush with road grade for paved surfaces. Gate valves for pipe sizes of 75 mm diameter and greater shall be as shown on Township Standard Drawing STD-W3.

10.10 Specifications

Please see the Township's Approved Product and Equipment List in **Appendix E** for product and supplier details.

Hydrants are to be painted chrome yellow. All hydrants, valves elbows or tees are to have sacrificial zinc caps on every 2nd bolt of the mechanical joint fittings. In addition to thrust blocks, restraining devices are required at all hydrant leads, elbows and tees. Push-on PVC rubber gasket joint fittings are not to be used on any hydrant lead, elbow or tee

10.11 Testing, Disinfecting, Swabbing and Flushing

Testing of the system shall conform to AWWA Standard C-651 Disinfecting Watermains and the following sequence: temporary connection, remove swabs/charge the watermain, pressure test, chlorinate the system, flush the system, take water sample(s) for bacteriological analysis, tracer wire continuity and complete final tie-ins. The Township's representative shall be on-site for all testing and will record results per the Township's Drinking Water Quality Management System procedures. No tie-ins to the existing water distribution system shall be allowed until all parties have signed the Subdivision Agreement. Final tie-in will not be permitted until all testing and sampling has been completed to the satisfaction of the Township. When all the above conditions are met, the new system shall be connected to the existing system.

The Township's Watermain Commissioning Checklist is included in **Appendix B**.

10.11.1 *Temporary Connection*

At the discretion of the Township's Water Manager, a Contractor may be permitted a temporary connection to the existing water system. This connection will be made from an existing hydrant through a double check valve assembly to the new watermain.

10.11.2 *Swabbing*

Swabs shall be new and be supplied by the Contractor. The swabs shall be numbered and the Township's Representative is required to witness the installation of swabs by the Contractor. A swabbing schedule shall be prepared by the Developer's Consultant and approved by the Township's Representative. The swabbing schedule shall indicate where the swabs are to be installed and removed. All swabs shall be accounted for and removed from the system prior to pressure testing the system. Any swabs that are not accounted for must be located and removed, including material, labour, equipment and excavation, with no cost to the Township.

10.11.3 *Pressure Test*

The pressure test will be for a two hour period at 150 psi with zero leakage and zero pressure drop. If the pressure test meets this criterion, the system as a whole, shall be accepted.

If the above criterion is not met, the system will be divided into sections no greater than 305m in length. Each section will be tested individually and will be required to meet the allowable leakage and test pressure criteria, as outlined in the AWWA Specification C605 "Hydrostatic Testing" and "Pressure and Leakage Test".

10.11.4 Chlorination

The system shall be chlorinated in accordance with the most recent version of the MOECC 2015 Watermain Disinfection Procedure. The Tablet or Continuous Feed disinfection method is preferred meaning: The minimum contact time of 24 hours; Initial concentration equal or greater than 25mg/L; and Maximum Allowable Decrease in Chlorine Concentration of 40% of the initial chlorine Concentration to a maximum of 50 mg/L

It is the responsibility of the Contractor, during charging, swabbing, chlorination and flushing of the system, to supply a means for the water to escape without causing damage/erosion to the existing grade of the property or any adjacent property.

10.11.5 Continuity Test

The Township's Representative shall do a continuity test on the watermain or tracer wire during the test procedures. Should the Township's Representative find a problem with continuity or installation of the tracer wire, the Contractor will not be allowed a final tie-in to the system. The Contractor/Developer shall be responsible for the repair, at no cost to the Township.

10.11.6 Sampling

A Township Representative (certified Water Distribution Operator) shall take water samples from all newly installed watermains for bacteriological analysis. After disinfection and flushing, watermain shall sit for a minimum of 16 hours without any water use. Without flushing the main, samples will then be collected a minimum of 15 minutes apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release.

10.11.7 Tie In

When all testing has been completed to the satisfaction of the Township's Representative, the final tie-ins may be scheduled. At the discretion of the Township's Representative, the Contractor may be permitted to do the tie-in. A Township Representative (certified Water Distribution Operator) must be present when the Contractor performs the final tie-in. When the Contractor is not granted permission to do the tie-in, the Contractor shall provide all materials, excavation, labour, equipment, necessary safety devices and restoration for the Township Representatives to complete the actual tie-in. The Contractor shall provide assistance as required by the Township's Representatives.

10.11.8 *Water Meters*

The Township will install a water meter and backflow prevention device for each service connection. The cost of the meter and installation shall be the Developer/Owner's expense. Water meters located in a crawl space or other inaccessible areas will not be accepted. The Developer/Owner shall keep the water meters accessible, clean, dry, and protected from freezing.

10.12 Construction Sequence

All water services, hydrants and other works on any section of watermain shall be installed in conjunction with watermain construction at a time stipulated by the Township and shall be completed prior to construction of finished roads and ditches.

Backfill to watermains and services across roadways shall be approved granular material thoroughly compacted. The mains and services shall not be backfilled until approval from the Township has been given.

10.13 Acceptance of Water System

Generally, the Township shall accept the watermains for operating purposes as soon as the supply and distribution system has been constructed, tested and disinfected to the satisfaction of the Township. Once accepted, the Township shall be the Operating Authority and shall operate and control the system.

Notwithstanding the above, assumption of the water system by the Township shall be subject to and in accordance with the Subdivision Agreement for the Development.

10.14 Miscellaneous

The Township will not be liable for any costs arising out of the construction of watermains for the development.

Upon completion of the work, Standard Service Record Sheets (one for each lot) shall be prepared by the Developer's Engineer and turned over to the Township Public Works Department. The sheets shall show clearly:

- (a) Lot, lot number and street lines;
- (b) Ties from the end of the service to the lot lines;
- (c) North arrow;
- (d) Type, diameter and depth below grade at the end of each service;
- (e) Any other pertinent information.

The Township reserves the right to order field revisions, as deemed required by the Township's Representative, at the expense of the Developer/Owner.

11.0 UTILITIES

11.1 General

The General Service Plan shall indicate the proposed location of Bell and television facilities, hydro transformers, streetlights and gas facilities. Hydro, phone, and television cabling shall be located in a common trench wherever possible.

All locations must be established and resolved by the Developer's Engineer in conjunction with the utility companies and following the locations shown on the typical cross-section.

Utility crossings for new roads shall be placed prior to placement of granular road base materials. Utility crossing on existing roads shall not be carried out until approved by the Township. Utility crossings for existing roads shall have the asphalt surface saw-cut and removed for the width of the trench plus a minimum of 0.3 metres out from each side of the trench walls.

Frost tapers with a 10:1 slope to the 1.5 m depth frost line shall be constructed. The frost tapers shall begin at a point 0.3 metres out from each side the trench wall.

Compaction of backfill for utility trenches with boulevards shall be 98% Standard Proctor Density and 100% for driveways and traveled roads. Granulars shall be reinstated and properly compacted. An asphalt tack coat shall be applied to saw-cut edges prior to the final layer of asphalt.

For non-trenching installations, a minimum 1.5 m boring depth must be provided for utilities under roadways where possible.

11.2 Telephone

Telephone service shall be underground and shall be installed by Bell Canada or an approved Contractor. The Developer must bear the cost of any surcharges for underground installation made by Bell Canada and must grant Bell Canada any necessary easements for their services.

11.3 Hydro

Hydro service shall be underground and shall be installed by Ontario Hydro/Collus Power or an approved Contractor. The Developer must bear the cost of any surcharges for underground installation made by Ontario Hydro and must grant Ontario Hydro any necessary easements for their services.

11.4 Gas

Gas services shall be underground on the opposite side of the street to the watermains and shall be installed by the Gas Company or an approved Contractor. The Developer must bear the cost of any surcharges for underground installation made by the Gas Company and must grant the Gas Company any necessary easements for their services.

11.5 Cable T.V.

Cable T.V. service shall be underground and shall be installed by the Cable T.V. Company or an approved Contractor. The Developer must bear the cost of any surcharges for underground installation made by the Cable T.V. Company and must grant the Cable T.V. Company any necessary easements for their services.

12.0 STREET LIGHTING

The Township has adopted thematic style lighting to enhance the aesthetic qualities of the public streetscape.

The location of all utilities must be established and resolved in conjunction with the Township and the Utility Companies, while generally following the locations shown on the typical road cross-sections.

A qualified engineering consultant shall prepare the street light design, including photometric layouts using an approved computer lighting program such as AGi32, AutoLux, or equivalent.

All drawings must be sealed by a registered Professional Electrical Engineer, licensed to practice in the Province of Ontario. Any attachments to hydro poles must have Hydro Authority approval and comply with Regulation 22/04 (or the latest revision thereof). All roadway lighting design and construction is subject to Electrical Safety Authority (ESA) inspection and approval.

The Township Streetlight Design Guide (**Appendix C**) is based on recommended practices for street and roadway lighting published by the Illuminating Engineering Society of North America (IESNA) RP-8-14 and the Transportation Association of Canada (TAC) "Guide for Design of Roadway Lighting", Volumes 1 and 2.

All materials must be CSA-approved.

All street lighting cabling, power supply, layout and installation shall be in accordance with the current Ontario Electrical Safety Code.

The proposed street lighting layout shall be submitted to the Township Public Works and Planning Departments for approval prior to commencement of any installation.

Please see **Appendix C** for further details on lighting equipment.

13.0 SIGNS

13.1 General

A plan of all street and traffic signs shall be submitted to the Township Public Works and Planning Department for approval.

Where applicable, street name signs and posts shall conform to the municipal 911 standards.

13.2 Traffic Signs

Traffic signs shall be provided and installed by the Developer at the cost of the Developer. The signs are to be of a standard type approved by the Ministry of Transportation Ontario and shall be located as required by the Township, following the passing of a by-law for their installation.

The shape, colour, height and location of traffic signs shall be in accordance with the Manual of Uniform Traffic Control Devices as published by the Ministry of Transportation. All Regulatory traffic signs shall be manufactured using "High Intensity" sheeting conforming to ASTM D4956-90 Type III or Type IV material.

Traffic signs are typically to be located in the intersection as follows:

- 2.0 metres offset from edge of asphalt of approach road;
- 5.0 metres offset from edge of asphalt of through road.

13.3 Street Name Signs

At each intersection there shall be erected a double unit street name sign. The signs shall be typically located in the intersection as follows:

- 3.0 metres offset from edge of asphalt or approach road;
- 5.0 metres offset from edge of asphalt of through road;
- In boulevard, on opposite side of road from traffic sign.

Street Name Blades are to be manufactured with extruded aluminum, 16 centimeters in width, with white letters on a green background. The shape, colour, height and location of traffic signs shall be in accordance with the Manual of Uniform Traffic Control Devices as published by the Ministry of Transportation. All Regulatory traffic signs shall be manufactured using "High Intensity" sheeting conforming to ASTM D4956-90 Type III or Type IV material.

13.4 Traffic and Street Sign Posts

Sign posts for street name signs and traffic signs are to be "U-Flange" steel posts manufactured from 80,000 psi high carbon steel with hot-dipped-galvanizing around the pre-punched holes.

Posts are to be 3.6 metres in total length and are to be buried 1.2 metres in the ground. "U-flange" section shall be 32 mm x 50 mm.

Hardware for sign mounting to conform to the following specifics by Clemmer Industries Limited or approved equivalent:

- Post Cap, B-2
- Cross Mounting Bracket, D-1;
- U Flange Post Adaptor, E-2.

14.0 STREET NAMES

Proposed street names shall be subject to the approval of the Township.

15.0 WALKWAYS

The Developer shall construct all walkways shown on the plan of subdivision. Walkways shall be constructed with 150 mm minimum depth of Granular "A" on a properly constructed foundation. Walkways between residential lots shall be paved with 50 mm of bituminous paved surface, minimum width 3.0 metres, and fenced with 1.2 metre high chain link fence along both sides from property line to property line.

Gates for walkways shall be installed at the street line in accordance with Township Standard Drawing STD-WG1 and a walkway culvert properly sized with suitable end protection shall be installed.

16.0 SIDEWALKS

Concrete sidewalks, where required, shall be located in accordance with the applicable typical road cross section and be 1.5 metres wide conforming to OPSD 351.09. Minimum thickness shall be 125 mm except at driveways where the thickness shall be 150 mm. Concrete strength shall be 30 MPa at 28 days with entrained air at 5-8% per OPSS tolerances. All sidewalks shall be placed on 150 mm of Granular "A" that has been compacted to 100% SPMDD.

Sidewalk locations and size shall be in accordance with the overall Sidewalk Master Plan. Sidewalks to be on one side of the street on residential and collector roadways, and both sides of the street on arterial roadways.

17.0 MAILBOXES

An area is to be provided in a location approved by the Township for Canada Post Community Mailboxes. The area shall be beyond the edge of shoulder or back of curb with provision for structural concrete bases when required.

Where the area is provided on a semi-urban roadway, it will consist of 50 mm HL3 asphalt on a granular base. The asphalt shall extend from the edge of the paved portion of the road to the back of the mailboxes. The location of the mailbox area is to be indicated on the General Service Plan.

18.0 PUBLIC OPEN SPACE DEVELOPMENT

18.1 General

The Developer or its representative shall prepare and submit plans and detailed drawings, where required, to the Township for approval.

Public open space areas shall be developed in accordance with the following requirements.

18.2 Site Preparation

- a) Unless otherwise directed, all Open space sites are to be left in a natural state. Site-specific works may be required by the Township with Open Space natural areas.
- b) Developer is responsible to protect all existing healthy trees from any damage from the drip line of their root zones, inward. This protection shall remain during the entire construction phase.
- c) Underbrush less than 50 mm in diameter to a height of 1.0 metre above ground shall be removed by the Developer.
- d) All dead, diseased or damaged trees shall be removed by the Developer.
- e) All dead, diseased or damaged wood in live trees shall be removed by the Developer, utilizing all proper pruning practices.
- f) Any other trees that the Township deems necessary for removal shall be removed by the Developer.
- g) Any fallen limbs, trees, litter and debris shall be removed from the Open Space site by the Developer.
- h) Any stumps that the Township deems necessary for removal shall be removed and disposed of by the Developer.
- i) The existing topsoil shall not be removed from the Open Space site. Existing topsoil may be stockpiled in an area designated by the Township to allow for grading.
- j) The stockpiling or the burial of litter and debris on the Open Space site shall not be permitted.

18.3 Grading

- a) The Developer shall do all rough grading and filling where required establishing the subgrade to a depth to allow the placing of 150 mm of topsoil over the subgrade to reach the desired finished grade. The existing grade shall be maintained around trees, and fill shall not be placed over tree root areas.
- b) Again note that the Developer is responsible to protect all existing healthy trees from the drip line of their root zones, inward. This protection shall remain in place during the entire construction phase.

18.4 Topsoil or Sand Surface

- a) Where designated, a screened organic loam topsoil or a screened sand shall be placed over the subgrade to a uniform depth of 150 mm.
- b) Topsoil shall be free of chemical contaminants and shall have an acidity range between 6.0 pH and 7.5 pH.
- c) The Developer shall remove and dispose of any contaminated soil or sand from the site.

18.5 Mechanical Seeding, Hydro-Mulching or Sodding

- a) Seeding, hydro-mulching or sodding shall be done by the Developer in areas designated by the Township.
- b) Application equipment and procedures shall meet the acceptance of the Township.
- c) Grass seed shall be a Canada No. 1 Seed Mixture for park or athletic turf, and as per OPSS 804.
- d) The recommended seeding rate is approximately 140 kg/hectare.
- e) No area shall be seeded, hydro-mulched or sodded until the Township has approved the surface preparation.
- f) Sod shall be No. 1 Bluegrass-Fescue sod, be uniform in texture, free of weeds and in a good healthy condition, and contain sufficient moisture to maintain its vitality during transportation and placing.
- g) In designated slope areas, sod will require pegging by a system acceptable to the Township.
- h) The Developer shall be responsible for proper turf maintenance up to the time of Substantial Completion of Open Space areas, to the acceptance of the Township.

18.6 Additional Woody Plant Material Required

- a) The Developer shall be responsible for the supply, delivery, planting and after-planting maintenance up to the time of Substantial Completion of Open Space areas to the acceptance of the Township.
- b) The planting and the plant material required shall be designated by the Township and planted and maintained by procedures acceptable to the Township.
- c) Plant material shall consist of 2.5 m high deciduous hardwood trees or 2.5 m high conifers suitable for shade, buffer or specimen planting.
- d) Plant material shall be balled and burlapped.
- e) A clean wood chip mulch shall be placed 100 mm deep over root areas and the Township must approve staking and tying procedures.

18.7 Street Access Points, Access Walkways, Subdivision Walkways and Perimeter Fencing

- a) Walkway gates to be installed to meet Township Standard Drawing STD-WG1 at street access points.
- b) Culvert to be installed at street entrance of walkways and Open Space areas in accordance with Township Standard Drawing STD-D1.
- c) Three-metre wide walkways to Open Space areas and Subdivision Walkways shall be paved, fence line to fence line.
- d) Galvanized chain link fencing to be installed for park perimeter fencing according to Township Standard, STD-P1.
- e) Security lighting, where required, shall be installed by the Developer and lighting shall be the same type as the subdivision street lighting and shall meet all Township Public Works and Planning Departments Standards for street lighting.
- f) Removal barrier posts are to be installed at the entrance to each walkway to restrict vehicle access. The Township shall approve type of removable barrier and opening area.

18.8 Interior Park Walkways

- a) Interior walkways through parks and other open space shall be 3.0 metres wide and surfaced with 50 mm of asphalt and 150mm of granular A, including in urban parks and around stormwater management ponds. Compacted limestone screenings will be considered in rural type areas.
- b) Security lighting where required shall be installed by the Developer and shall be the same type as the subdivision street lighting, and shall meet all Township Public Works and Planning Departments Standards for street lighting.

18.9 Park Water Service

Each park site shall have a 50 mm water supply connection installed to the property line, complete with a frost-free hydrant, and this service shall conform to all Township Engineering Standards for water services.

Developer shall confirm with the Township the preferred method of metering, either in a pit or in a building.

The location of this water service shall be shown on the landscape drawings as well as the water system drawings.

18.10 Log Barrier Posts

200 mm diameter posts of pressure treated lumber may be required to be located 300 mm inside the unfenced street property lines and located along these street lines at 1.8 metre intervals. These posts are essential in areas where the ditches or ditch lines can be easily crossed by motorized vehicles.

18.11 Securities For Construction and Maintenance

The Developer shall pay the securities required by the Township for the construction and maintenance of these works. The value of the required securities shall be determined by the Township Public Works and Planning Departments, and shall be included in the Subdivision Agreement.

18.12 Completion

The Developer shall be required to complete all the Open Space works prior to the issuance of more than 25% of the Building Permits for the first phase of the development. This shall be included in the Subdivision Agreement.

18.13 Guarantee

The Developer shall guarantee all materials, equipment and works, with the exception of plant materials, for a period of two years following acceptance. Plant materials shall be guaranteed for a period of one year following acceptance. This shall be included in the Subdivision Agreement.

19.0 SPECIAL PROVISIONS

NOTWITHSTANDING the above engineering standards, the Developer agrees to provide additional or alternative services which may be determined by the Township particularly with respect to the water supply and distribution systems, and the sanitary sewer system, all subject to the approval of the Township Public Works and Planning Departments.

20.0 STANDARD DRAWINGS

Ontario Provincial Standard Drawings shall apply together with the attached Township of Clearview Standard Drawings **(Appendix F)** :

1.	Dwg. No. STD-R1A	Standard 9.0 m Road – 20 m R.O.W. (Open Ditch)
2.	Dwg. No. STD-R2	Standard 7.0 m Road – 20 m R.O.W. (Curb & Gutter with Service Locations
3.	Dwg. No. STD-R3	Standard 8.5 m Road – 20 m R.O.W. (Curb & Gutter) with Service Locations
4.	Dwg. No. STD-R4	Standard 8.5 m Road – 26 m R.O.W. (Curb & Gutter) with Service Locations
5.	Dwg. No. STD-R5A	Standard Turning Basin 7.0 m Road – 20 m R.O.W. (Open Ditch)
6.	Dwg. No. STD-R5B	Standard Turning Basin, 7.0 m Road 20 m R.O.W. (Curb & Gutter)
7.	Dwg. No. STD-D1	Culvert End Wall Detail (50 kph Zone or Less)
8.	Dwg. No. STD-P1	Chain Link Fence
9.	Dwg. No. STD-WG1	Walkway Gate Detail
10.	Dwg. No. STD-WW1	Walkway Detail (Parks)
11.	Dwg. No. STD-STM1	Split Lot Drainage
12.	Dwg. No. STD-SAN1	Sewer Service Connection Details
13.	Dwg. No. STD-W1	Water Service Connection Detail
14.	Dwg. No. STD-W2	Watermain Bedding Detail (Open Cut)
15.	Dwg. No. STD-W3	Gate Valve and Extendable Valve Box
16.	Dwg. No. STD-W4	Concrete Thrust Block Detail
17.	Dwg. No. STD-W5	Valve and Hydrant Detail
18.	Dwg. No. STD-W6	Test Tap Sampling Station Detail
19.	Dwg. No. STD-W7	2" Blow-Off Flushing Hydrant
20.	Standard Notes –	General
21.	Standard Notes –	Roads
22.	Standard Notes –	Sanitary
23.	Standard Notes –	Storm
24.	Standard Notes –	Watermains
25.	Standard Notes –	Erosion and Sediment Control

Appendix A

Standard Service Record Sheet



Township of Clearview

217 Gideon Street
Stayner, Ontario L0M
1S0 Tel:
705-428-6230 Fax:
705-428-0288

SERVICE RECORD

Municipality: Township of Clearview **Project No.** _____

Street No.: _____

AS CONSTRUCTED SERVICE LOCATION

SERVICE LOCATION

DIFFERENT THAN PROPOSED _____

PLAN: _____

SAME AS PROPOSED _____

LOT: _____

NORTH

LOT LINE

LOT LINE

PROPERTY LINE

CENTRE LINE OF ROAD

TYPE OF PIPE & DIAMETER

DEPTH TO INVERT AT P/L

INVERT ELEVATION AT P/L

Storm _____

Water _____

Sewer _____

TO THE BEST OF OUR KNOWLEDGE, THE DIMENSIONS SHOWN IN THE ABOVE ARE CORRECT

CONSULTANT

COMPILED BY

DATE

REMARKS: _____

Appendix B

Watermain Commissioning Procedure

TESTING SCHEDULE FOR WATERMAIN CONSTRUCTION

Location: _____

Job ID - Contract # _____

Operator / Inspector on-site: _____

Step	Test Type	Date mm/dd/yy	Time Started	Time Completed	Result	Inspector Initials	Township Initials	Contractor Initials	Instructions / Comments
LOADING, SWABBING, FLUSHING AND PRESSURE TESTING - (ALL WORK TO BE DONE BY OWNER / CONTRACTOR WITH A TOWNSHIP REPRESENTATIVE PRESENT)									
A	Loading of main								
B	Blow Swabs and Flush				# IN # OUT				Numbers to be recorded as removed
C	Hydrostatic Testing				psi.				Test to 1035 kpa (150 psi) and hold for 2 hrs.
D	Disinfect - Initial Free Cl ₂ (50 - 250 mg/L - hold 24 hrs.)				mg/L				
E	Flush Cl ₂ after 24 hrs. Flush to normal system residual				mg/L				Minimum Concentration Required after 24 hrs. to be 80 % of initial test.
1ST SET OF BACTERIOLOGICAL SAMPLES - TO BE TAKEN AFTER THE MAIN HAS BEEN ALLOWED TO SIT UNDISTURBED FOR AT LEAST 16 HOURS FOLLOWING COMPLETION OF STEP E. (SAMPLING WILL BE CONDUCTED BY THE TOWNSHIP, DELIVERY TO BE DONE BY OWNER / CONTRACTOR)									
F	Free Cl ₂ Residual (.20 - 4.00 mg/L)				mg/L				If residual <.20 mg/L, no bact. sample - return to step D
G	1st set of Bacteriological samples				Attach results				If unacceptable begin at step D again
2ND SET OF BACTERIOLOGICAL SAMPLES - MUST BE TAKEN AT LEAST 15 MINUTES AFTER 1ST SET - (SAMPLING AND DELIVERY SAME AS ABOVE)									
H	Free Cl ₂ Residual (.20 - 4.00 mg/L)				mg/L				If residual <.20 mg/L, no bact. sample - return to step D
I	2nd set of Bacteriological samples				Attach results				If unacceptable begin at step D again

Other Comments / Notes:

Authorization by Overall Responsible Operator / Acting Overall Responsible Operator to connect: (NO CONNECTIONS SHALL BE MADE UNTIL SIGNED AND DATED)		
Print Name	Signature	Date

Appendix C
Streetlight Design Guide

TOWNSHIP OF CLEARVIEW

STREET LIGHTING DESIGN GUIDE

December 2016

STREET LIGHTING DESIGN GUIDE

1. General

The Township has adopted thematic style lighting to enhance the aesthetic qualities of the public streetscape. The following specifications are based on products supplied by King Luminaire. Equivalent alternatives will be considered by the Township upon request. Preference will be given to manufacturers who are members of the International Dark-Sky Association (IDA) and luminaires that have IDA approval.

The location of all utilities must be established and resolved in conjunction with the Township and the Utility Companies, while generally following the locations shown on the typical road cross-sections.

A qualified engineering consultant shall prepare the street light design, including photometric layouts using an approved computer lighting program such as AGi32, AutoLux, or equivalent.

All drawings must be sealed by a registered Professional Electrical Engineer, licensed to practice in the Province of Ontario. Any attachments to hydro poles must have Hydro Authority approval and comply with Regulation 22/04 (or the latest revision thereof). All roadway lighting design and construction is subject to Electrical Safety Authority (ESA) inspection and approval.

The guidelines are based on recommended practices for street and roadway lighting published by the Illuminating Engineering Society of North America (IESNA) RP-8-14 and the Transportation Association of Canada (TAC) "Guide for Design of Roadway Lighting", Volumes 1 and 2.

2. Definitions (from IES)

2.1. Roadway Classifications

Arterial

- The part of the roadway system that serves as the principal network for through traffic flow. The routes connect areas of principal traffic generation and important rural highways entering the city.

Collector

- The roadways serving traffic between arterials and local roadways. These are roadways used mainly for traffic movements within residential, commercial and industrial areas.

Local

- Roadways used primarily for direct access to residential, commercial and industrial areas. They do not include roadways carrying through traffic. Long local roadways will generally be divided into short sections by a system of collector roadway systems.

2.2. Land Use Area Classifications

Commercial

- A business area of a City where ordinarily, there are many pedestrians during night hours. This definition applies to densely developed business areas outside, as well as within, the central part of a City. The area contains land use, which frequently attracts a heavy volume of nighttime's vehicular and pedestrian traffic.

Intermediate

- Those areas of a city, characterized by frequent moderately heavy nighttime pedestrian activity, as in blocks having libraries, community recreation centers, large apartment buildings, industrial buildings or neighbourhood retail stores.

Residential

- A residential development or a mixture of residential and small commercial establishments, characterized by few pedestrians at night. This definition includes areas with single-family homes, townhouses and small apartment buildings.

2.3. Pedestrian Conflict Classifications

High

- Areas with significant numbers of pedestrians expected to be on sidewalks, walkways or crossing the streets during darkness. Examples are downtown office areas, near theaters, concert halls, stadiums, and transit terminals.

Medium

- Areas where lesser numbers of pedestrians utilize the streets at night. Typical are downtown office areas, blocks with libraries, apartments, neighborhood shopping, industrial, older city areas, and streets with transit lines.

Low

- Areas with very low volumes of night pedestrian usage. These can occur in any of the cited roadway classifications but may be typified by suburban single-family streets, very low-density residential developments, and rural or semi-rural areas.

Guidelines for possible conflict classifications, based on one hour pedestrian counts of a typical street block or 200 meter section, are as follows:

High – Over 100

Medium – 11 to 100

Low – 10 or fewer

These volumes represent the total number of pedestrians walking on both sides of the street plus those crossing the street at non-intersection locations.

3. Street Lighting Design

The objective in designing street lighting is to provide a uniform distribution of lighting at a level that is adequate for the intended use of the roadway. Roadway lighting shall be designed using the values found in the IESNA Reference Guide and abbreviated in the following table:

Table 1
Illuminance Method Lighting Design Criteria for Roadways

Road Classification	Area Classification	Pedestrian Area Classification	Average Maintained Illuminance (lux)	Illuminance Uniformity Ratio E_{avg}/E_{min}
Arterial	Commercial	High	17	3:1
	Intermediate	Medium	13	
	Residential	Low	9	
Collector	Commercial	High	12	4:1
	Intermediate	Medium	9	
	Residential	Low	6	
Local	Commercial	High	9	6:1
	Intermediate	Medium	7	
	Residential	Low	4	

Notes:

*All other Road Classifications not identified above will be considered on an individual basis in accordance with Township Requirements.

**Intersections shall have an illumination equal to the sum of the current design levels of the intersecting roadways.

A photometric layout will be required and must include the following information:

- a) A summary table of the illumination and uniformity values resulting from the design in accordance with parameters indicated in the above table (i.e. average, average to minimum, etc.). In addition to the above noted requirements, the table must show the Light Loss Factor (LLF) used when calculating the proposed lighting levels. Lighting drawings and photometric analysis including statistical data shall be designed/reviewed/approved by a professional electrical engineer.
- b) In the longitudinal direction, the distance between grid lines should be one-tenth (1/10) of the spacing between luminaires, or 5.0 m, whichever is smaller. At intersections the grid spacing is 2.0 m throughout the calculation area.
- c) When establishing the spacing of street lighting within a residential subdivision, consideration must be given for the placement of a street light adjacent to the location of community mail boxes.
- d) In determining the position of a light standard, the designer shall take into consideration the location of driveways, living room windows and other aspects of a

particular site. The objective is to provide a sense of security and to minimize spill and other disturbances to residential properties.

- e) Street lighting standards are to be installed on lot lines no closer than 3.0 m from the access side of pad mount transformers, 1.0 m from the non-access side, and 2.0 meters from any driveway or hydrant location.
- f) The proposed street lighting layout shall be submitted to the Township Public Works and Planning Departments for approval prior to commencement of any installation. The designer shall submit to the Electrical Distribution Operating Authority a copy of the layout prior to construction to confirm voltage, method of control protection and the power supply to each light standard.
- g) The Developer's Consulting Engineer shall be responsible for the review/approval of any required shop drawings submitted by the Contractor/supplier for verification or compliance to the lighting design and Township specifications.
- h) Design shall specify type of pole, conduit, luminaire, lamp wattage, and size of conductor being used. Details shall be provided for pole installation and luminaire(s) wiring.
- i) Designer shall specify on drawings the location of transformers, means of disconnects, power and control centers and other related infrastructure.
- j) Pole spacing shall be supported by detailed photometric calculations. Maximum spacing shall not exceed 50 m.
- k) The engineer shall include specification sheets on luminaires, arms, and poles to be installed as part of submission.
- l) The Developer shall provide all labour, equipment, material and supervision necessary to complete street lighting in all respects as shown on the approved drawings and specifications.
- m) The Developer shall provide one complete spare (pole, arm, luminaire) for every ten (10) installed units.

4. Luminaires

In residential areas luminaires are to be coach style. Post top and cobra head configurations will not normally be considered in residential areas, but may be considered in special areas or lighting situations or retrofit applications.

The same product must be used throughout the development, with appropriate variations in height, spacing or wattage to meet required illumination levels

Luminaires shall be King Luminaire, one of the following models or approved equivalent:

- K601 Empress
- K822 Cape Coral

Colour shall be semi-gloss or flat black.

The distribution pattern shall be IES Type II or III with full cutoff optics to reduce light pollution and meet IDA recommendations.

Cobra head luminaires (where approved) shall be:

CREE LED CBXSPR-A-O-2-F-C-*-U-S-R7-Y 42W, or

CREE LED XSP-B-HT-2ME-A-40K-*-UL-SV-R 53W.

Poles, arms and luminaires shall match the subdivision theme and colour.

Luminaires shall meet the following minimum requirements:

a) Electrical

- all electrical components CSA approved
- LM79/LM80 Compliant
- operating voltage shall be 120 to 277 volts
- LED with a CCT of 4000K
- Wattage shall be 42W or 53W
- Each luminaire shall be controlled by a dusk to dawn photoelectric cell
- lamp wattage variation for +/- 5% line voltage variation
- Class H insulation (180° C)
- 60 Hz
- Minimum temperature (-35° C)
- Maximum temperature (65° C)
- power factor not less than 0.90
- ground terminal or lug

b) Mechanical

- tool-less access for lamp and driver service
- die cast aluminum housing
- polycarbonate or acrylic lense
- stainless steel hardware
- twist lock time delayed photocell controller

c) Marking

- exterior nameplate indicating manufacturer, catalogue number, wattage
- interior label indicating LED optics position for various light distributions
- interior label indicating supply voltage, frequency, input current, lamp voltage
- interior driver label with wiring diagram

5. Poles, Arms and Bollards

- a) Poles shall be Stresscrete, one of the following spun concrete models or approved equivalent:

- Talisman
- Classic

Colour permeated throughout with etched finish. Colours shall be one of:

- E11 Eclipse Black
- E51 Aztec Jade
- E80 Vintage Brown
- E90 Saluki Bronze

Poles shall be direct bury type and shall have a height of 9.14 metres above grade and 1.5 to 2.0 metres below grade. They shall be designed to support the loadings imposed by the selected luminaire and arm for the local wind conditions. Access handholes shall be oriented toward the street.

- b) Arms shall be Stresscrete, one of the following models or approved equivalent:

- Style 170 - Victorian Scroll Arm
- Colour and finish shall match luminaire.
- 1.2 or 1.8 metre length to place luminaire at or near curbline.
- All hardware, fittings and anchors shall be stainless steel.

- c) Bollards, where required, shall be the same style and colour as the poles. Lighted bollards shall comply with the applicable electrical and mechanical specifications as the luminaires.

6. Cabling

All cables required for street lights will be supplied and installed by the Developer (including the cable from transformer to the power panel). All wiring and electrical components shall be CSA approved and installed in accordance with current ESA requirements including Bulletin 30-13-0 (January 2016) and any subsequent revisions.

The supply conductor is to be installed in the same trench as the underground electrical distribution system wherever possible. The supply conductor shall be a 1-2C #6AWG + GND, Cu, RWU90. Maximum voltage drop shall not exceed 5% at the end of each circuit. A maximum of 8 luminaires shall be permitted on each streetlight circuit.

The luminaire riser conductor shall be RW90 or TWH, #12 AWG + GND stranded copper. Each luminaire shall be fused by means of an in-line 10 amp fuse located inside the pole access opening. The in-line fuse shall be C.S.A. approved and installed with the line supply conductor connected to the female receptacle and the luminaire (load) conductor connected to the male plug of the connector.

7. Power Panel Pedestal

Power panels shall be provided to control and protect street light circuits.

Individual power panels shall consist of a weatherproof load centre, approved by the Electrical Distribution Operating Authority, complete with a 60 amp, 2-pole main circuit breaker, a 40 amp single pole circuit breaker for each streetlight circuit, and a lockable, hinged, access cover.

Supply conductors from the transformer to the power panel shall be stranded copper + ground, RWU90 placed inside PVC conduit.

8. Street Light Energization Procedure

The Township requires the following procedure with regard to the commissioning of streetlights:

1. The Engineer is required to inspect all equipment and works associated with streetlight construction including but not limited to underground wiring, streetlight pole and installation, luminaire and installation, fuses and connections.
2. Once the streetlight construction is complete, the Electrical Engineer is required to provide a Letter of Certification stating that the consultant has reviewed and inspected the streetlight equipment and installation and certifies that the system has been supplied and constructed in general accordance with the design and drawings.
3. The ESA Certificate of Inspection shall be attached to the above noted Certification.
4. The "As-Built" drawings shall also be attached to the above noted Certification.

Appendix D

Sewage Pumping Station Design Guide

**THE PUMP STATION DESIGN GUIDE
IS AVAILABLE AS A SEPARATE DOCUMENT.**

Appendix E

Approved Product and Equipment List

Township of Clearview
Product Specification Index
Oct. 3, 2016

<u>Product Description</u>
IPEX Blue Brute PVC Piping System_Water
Clow Curb Box
Bibby Main Line Valve Box
Cambridge Brass Curb Stop_Model 202 Non Draining
Cambridge Brass Main Stop_Model 302
Bell Joint Restraint_PV-LOK Series D-PWP
Romac Grip Ring
Sigma Ductile Iron MJ Fittings
Clow Resilient Wedge Gate Valve
Cambridge Brass SS Service Saddle
Robar SS Tapping Sleeve_6606 Series
Kupferle # 77 Flushing Hydrant
Sample Station_Test Tap_Regal Waterworks
Service Tubing_IPEX Gold 901
Hydrant_Mueller_Century
<u>Sanitary Sewer</u>
IPEX Ring Tite PVC Piping System_Sanitary
Sewer Service Saddle_Concord D-50 (for use on Ultra Rib_Creemore)
No Flow In Flow Polyethylene Manhole Insert

BLUE BRUTE® PIPING SYSTEMS

Blue Brute is one of the most well known names in municipal water supply, as it has built up an enviable reputation for performance and reliability over the years. Blue Brute pipe and fittings eliminate the threat of corrosion, while providing reliable long-term service. While Blue Brute pipe is compatible with iron fittings, IPEX recommends the use of Blue Brute fittings as they are made to match the pipe, and eliminate the “Achilles heel” of many systems – corroding iron fittings.

It is advisable to specify pipe and fittings from the same manufacturer in order to ensure a completely matched system. Only by specifying Blue Brute fittings can you ensure that the fittings have the same long term strength as the pipe itself.



Applications:

Municipal water distribution systems and fire lines.

Irrigation, sewage forcemains, industrial lines.

Gasket Options For Contaminated Soils

Blue Brute pipe and fittings have removable gaskets. This allows oil resistant (nitrile) gaskets to be easily substituted when installing piping systems in contaminated soils. Please refer to Section 2 – Chemical Permeation and Resistance for more information on this topic.

Standards:

Blue Brute Pipe:

AWWA C900, CSA B137.3 certified, FM 1612 approved, UL 1285 listed, NSF 61 certified, Certified to NQ 36240-250



Blue Brute Fittings:

AWWA C907, CSA B137.2 (100mm – 300mm) certified, AWWA C900, CSA B137.3 (250mm – 300mm) certified, FM 1612 listed, UL 1285 listed



BLUE BRUTE® PIPING SYSTEMS

Short Form Specifications

General

Blue Brute pipe shall be certified to CSA B137.3 "Rigid Polyvinyl Chloride PVC Pipe for Pressure Applications" and shall conform to AWWA C900 "Polyvinyl Chloride (PVC) Pressure Pipe, 4" – 12" for Water Transmission and Distribution." Blue Brute DR25 pipe shall have a pressure class/rating of 1120 kPa (165 psi). DR18 pipe shall have a pressure class/rating of 1620 kPa (235 psi). DR14 pipe shall have a pressure class/rating of 2100 kPa (305 psi).

Material

Blue Brute pipe shall be made from PVC compound conforming to ASTM D1784 cell class 12454.

Product

Pipe shall be suitable for use at maximum hydrostatic working pressure equal to the pressure class/rating at 23°C (73°F). Laying lengths shall be 6.1 metres (20 feet). Pipe shall have cast-iron outside diameters. Each length of pipe must be proof-tested at two times the pressure class.

Joining

The gasket shall be carefully fitted to the bell groove if not already factory installed. Both bell and spigot shall be clean and free of debris before approved lubricant is applied. The pipe and/or fittings shall be joined by pushing the spigot into the bell to the depth line marked on the spigot. When pipe has

been cut in the field, the end shall be made square and beveled to a 15° chamfer. All insertion lines should be re-drawn, according to the IPEX Pressure Pipe Installation Guide.

Molded Fittings

Blue Brute fittings shall conform to AWWA C907 "Polyvinyl Chloride (PVC) Pressure Fittings for Water (4" through 12")" and be certified to CSA B137.2 "PVC Injection Molded Gasketed Fittings for Pressure Applications." They shall also be UL Listed and FM approved.

Fabricated Fittings

Fabricated fittings shall be made from segments of AWWA C900 PVC pipe. Segments are bonded together and may be over-wrapped with fibreglass-reinforced polyester. The pressure class must match the pipe. The fittings must meet the requirements of CSA B137.3.

Lubricant

Pipe must be assembled with IPEX non-toxic, water soluble lubricant listed by the National Sanitation Foundation.

Color Coding

Water pipe and fittings shall be color coded blue.

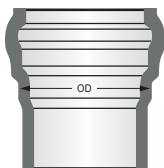
Dimensions:

Blue Brute pipes and fittings are manufactured with cast-iron outside diameters (CIOD), which means that they are compatible with much of the existing infrastructure of older

iron pipes. This means that no special transition fittings are needed with Blue Brute.

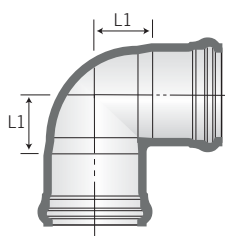
		DR 25 Class 165 AWWA pressure class 165 psi CSA pressure rating 1 130 kPa						DR 18 Class 235 AWWA pressure class 235 psi CSA pressure rating 1 620 kPa						DR 14 Class 305 AWWA pressure class 305 psi CSA pressure rating 2 130 kPa					
Size		Avg. ID		Min. Wall Thickness		Avg. OD		Avg. ID		Min. Wall Thickness		Avg. OD		Avg. ID		Min. Wall Thickness		Avg. OD	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
4	100	4.42	112	0.192	4.88	4.80	122	4.27	108	0.267	6.78	4.80	122	4.11	104	0.343	8.71	4.80	122
6	150	6.35	161	0.276	7.01	6.90	175	6.13	155	0.383	9.73	6.90	175	5.91	149	0.493	12.52	6.90	175
8	200	8.33	212	0.362	9.20	9.05	230	8.05	204	0.502	12.80	9.05	230	7.76	198	0.646	16.42	9.05	230
10	250	10.21	260	0.444	11.30	11.10	282	9.87	250	0.616	15.70	11.10	282	9.51	242	0.793	20.14	11.10	282
12	300	12.15	309	0.527	13.41	13.20	335	11.73	297	0.733	18.62	13.20	335	11.31	287	0.943	23.95	13.20	335

BLUE BRUTE® PIPING SYSTEMS



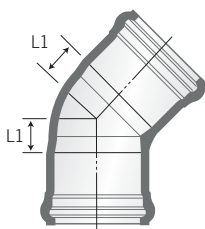
Bell OD for Joint Restraint Selection

Size		Minimum		Maximum	
in	mm	in	mm	in	mm
4	100	5.44	138	5.61	142
6	150	7.84	199	8.03	204
8	200	10.29	261	10.55	268
10	250	12.63	322	12.96	329
12	300	15.07	383	15.46	393
14	350	17.28	439	17.73	450
16	400	19.64	448	20.17	512



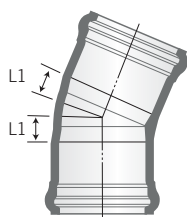
90° Elbow

Size		L1	
in	mm	in	mm
4	100	2.6	67
6	150	4.3	108
8	200	5.5	140



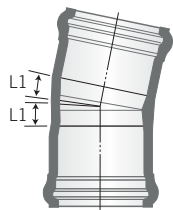
45° Elbow

Size		L1	
in	mm	in	mm
4	100	1.3	33
6	150	1.8	46
8	200	2.2	56
10	250	2.7	70
12	300	3.2	82



22-1/2° Elbow

Size		L1	
in	mm	in	mm
6	150	1.0	25
8	200	1.1	28
10	250	1.7	43
12	300	1.9	48



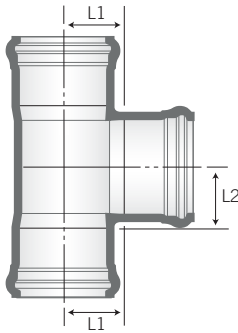
11-1/4° Elbow

Size		L1	
in	mm	in	mm
4	100	3.0	75
6	150	0.8	20
8	200	0.9	23

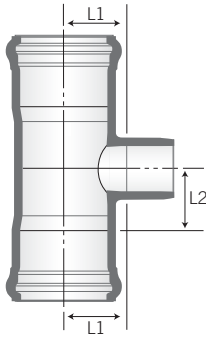
Note: Other DR's and sizes up to 48" (1200mm) are available on request.

BLUE BRUTE® PIPING SYSTEMS

Tee



Size		L1		L2	
in	mm	in	mm	in	mm
4 x 4 x 4	100 x 100 x 100	2.6	67	2.6	67
6 x 6 x 4	150 x 150 x 100	4.0	102	3.3	87
6 x 6 x 6	150 x 150 x 150	4.3	108	4.3	108
8 x 8 x 4	200 x 200 x 100	5.1	130	3.6	91
8 x 8 x 6	200 x 200 x 150	5.3	136	4.7	120
8 x 8 x 8	200 x 200 x 200	5.6	143	5.8	148
10 x 10 x 4	250 x 250 x 100	6.7	171	6.7	171
10 x 10 x 6	250 x 250 x 150	6.7	171	6.7	171
10 x 10 x 8	250 x 250 x 200	6.7	171	6.7	171
10 x 10 x 10	250 x 250 x 250	6.7	171	6.7	171
12 x 12 x 4	300 x 300 x 100	7.7	195	7.7	195
12 x 12 x 6	300 x 300 x 150	7.7	195	7.7	195
12 x 12 x 8	300 x 300 x 200	7.7	195	7.7	195
12 x 12 x 10	300 x 300 x 250	7.7	195	7.7	195
12 x 12 x 12	300 x 300 x 300	7.7	195	7.7	195



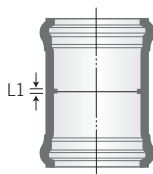
Hydrant Tee

Size		L1		L2	
in	mm	in	mm	in	mm
10 x 10 x 6	250 x 250 x 150	7.0	178	6.7	171
12 x 12 x 6	300 x 300 x 150	8.1	206	7.7	195



Reducing Adapter Spigot x Bell

Size		L1		L2	
in	mm	in	mm	in	mm
6 x 4	150 x 100	5.6	141	4.3	108
8 x 6	200 x 150	6.5	165	5.7	145
10 x 8	250 x 200	7.0	178	5.8	147
12 x 10	300 x 250	7.9	202	6.6	167



Coupling

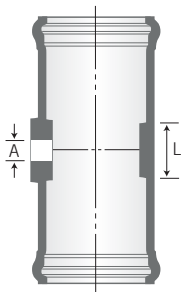
(available w/o center stop as a Repair Coupling)

Size		L1	
in	mm	in	mm
4	100	0.2	5
6	150	0.3	8
8	200	0.3	7
10*	250	0.5	13
12*	300	0.5	13

* One-piece machined coupling.

Note: 3/4" (20mm) Taps to 2" (50mm). Taps: AWWA Thread

BLUE BRUTE® PIPING SYSTEMS

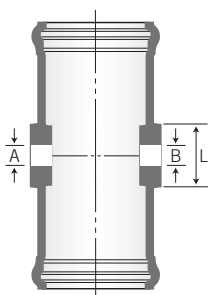


Single Tapped Coupling

Size		A		L1	
in	mm	in	mm	in	mm
4 x 4 x 3/4	100 x 100 x 20	3/4	20	2.0	50
4 x 4 x 1	100 x 100 x 25	1	25	2.0	50
6 x 6 x 3/4	150 x 150 x 20	3/4	20	3.0	76
6 x 6 x 1	150 x 150 x 25	1	25	3.0	76
6 x 6 x 1-1/4	150 x 150 x 32	1-1/4	32	3.0	76
6 x 6 x 1-1/2	150 x 150 x 40	1-1/2	40	3.0	76
8 x 8 x 3/4	200 x 200 x 20	3/4	20	3.0	76
8 x 8 x 1	200 x 200 x 25	1	25	3.0	76
8 x 8 x 1-1/4	200 x 200 x 32	1-1/4	32	3.0	76
8 x 8 x 1-1/2	200 x 200 x 40	1-1/2	40	3.0	76
8 x 8 x 2	200 x 200 x 50	2	50	3.0	76
10 x 10 x 3/4*	250 x 250 x 20	3/4	20	3.0	76
10 x 10 x 1*	250 x 250 x 25	1	25	3.0	76
12 x 12 x 3/4*	300 x 300 x 20	3/4	20	3.0	76
12 x 12 x 1*	300 x 300 x 25	1	25	3.0	76

* One-piece machined coupling.

Note: 3/4" (20mm) Taps to 2" (50mm). Taps: AWWA Thread

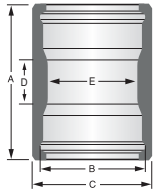


Double Tapped Coupling

Size		A		B		L	
in	mm	in	mm	in	mm	in	mm
6 x 3/4 x 3/4	150 x 20 x 20	3/4	20	3/4	20	3.0	76
6 x 1 x 3/4	150 x 25 x 20	3/4	20	1	25	3.0	76
6 x 1 x 1	150 x 25 x 25	1	25	1	25	3.0	76
6 x 1-1/4 x 3/4	150 x 32 x 20	3/4	20	1-1/4	32	3.0	76
6 x 1-1/4 x 1	150 x 32 x 25	1	25	1-1/4	32	3.0	76
6 x 1-1/2 x 3/4	150 x 40 x 20	3/4	20	1-1/2	40	3.0	76
6 x 1-1/2 x 1	150 x 40 x 25	1	25	1-1/2	40	3.0	76
6 x 2 x 3/4	150 x 50 x 20	3/4	20	2	50	3.0	76
6 x 2 x 1	150 x 50 x 25	1	25	2	50	3.0	76
8 x 3/4 x 3/4	200 x 20 x 20	3/4	20	3/4	20	3.0	76
8 x 1 x 3/4	200 x 25 x 20	3/4	20	1	25	3.0	76
8 x 1 x 1	200 x 25 x 25	1	25	1	25	3.0	76
8 x 1-1/4 x 3/4	200 x 32 x 20	3/4	20	1-1/4	32	3.0	76
8 x 1-1/4 x 1	200 x 32 x 25	1	25	1-1/4	32	3.0	76
8 x 1-1/2 x 3/4	200 x 40 x 20	3/4	20	1-1/2	40	3.0	76
8 x 1-1/2 x 1	200 x 40 x 25	1	25	1-1/2	40	3.0	76
8 x 2 x 3/4	200 x 50 x 20	3/4	20	2	50	3.0	76
8 x 2 x 1	200 x 50 x 25	1	25	2	50	3.0	76

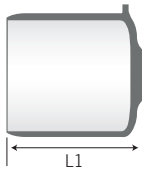
Note: 3/4" (20mm) Taps to 2" (50mm). Taps: AWWA Thread

BLUE BRUTE® PIPING SYSTEMS



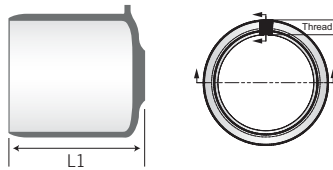
High Deflection Coupling

Size		L1	
in	mm	in	mm
10	250	3.5	89
12	300	3.5	89



Plug

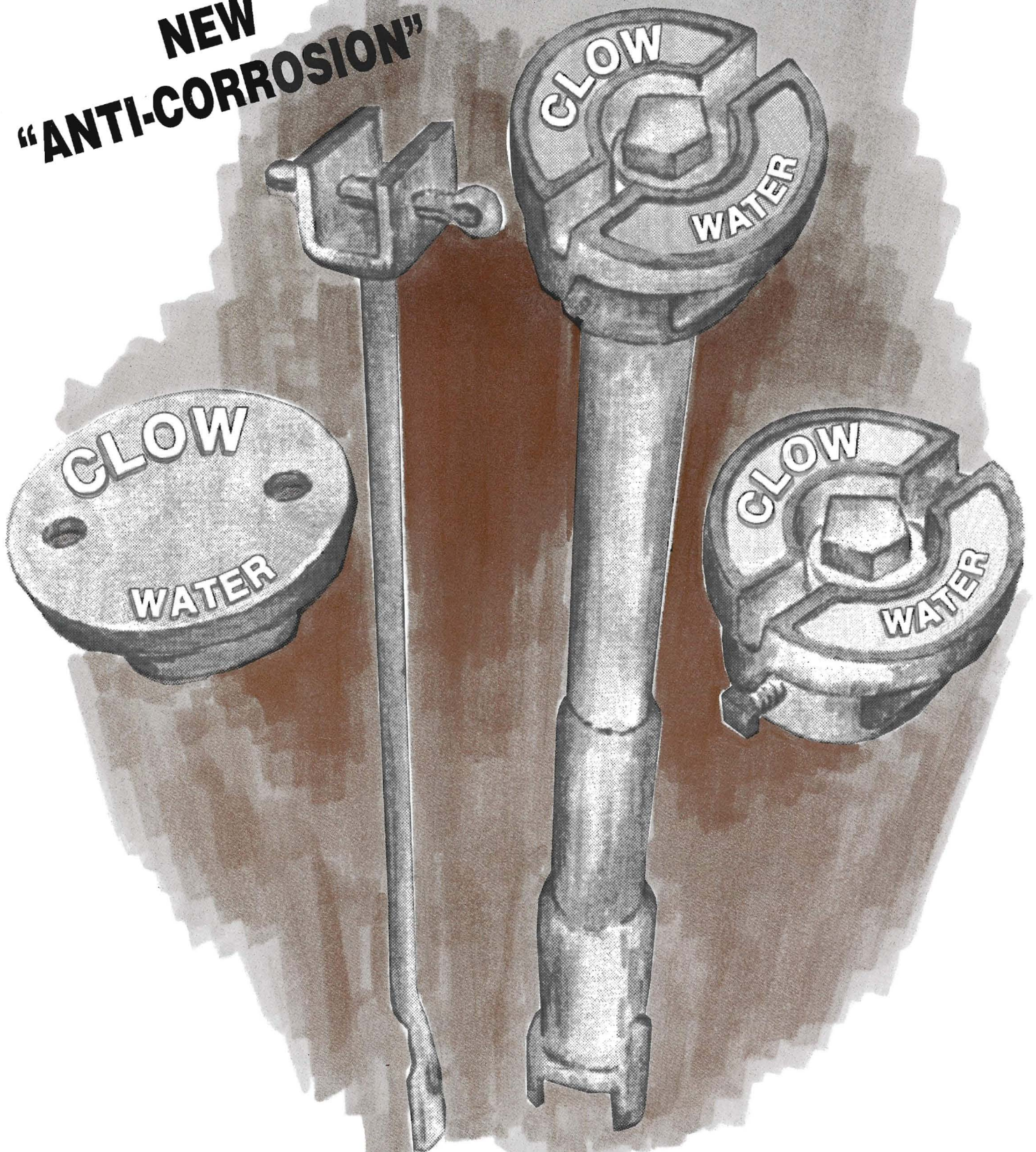
Size		L1	
in	mm	in	mm
4	100	6.5	164
6	150	7.8	198
8	200	9.1	231
10	250	10.2	258
12	300	9.8	249



Tapped Plug (IPS Threads)

Size		L1	
in	mm	in	mm
4 x 3/4	100 x 20	6.5	164
4 x 1	100 x 25	6.5	164
4 x 1-1/2	100 x 40	6.5	164
4 x 2	100 x 50	6.5	164
6 x 3/4	150 x 20	7.8	198
6 x 1	150 x 25	7.8	198
6 x 1-1/2	150 x 40	7.8	198
6 x 2	150 x 50	7.8	198
8 x 3/4	200 x 20	9.1	231
8 x 1	200 x 25	9.1	231
8 x 1-1/2	200 x 40	9.1	231
8 x 2	200 x 50	9.1	231

NEW
"ANTI-CORROSION"



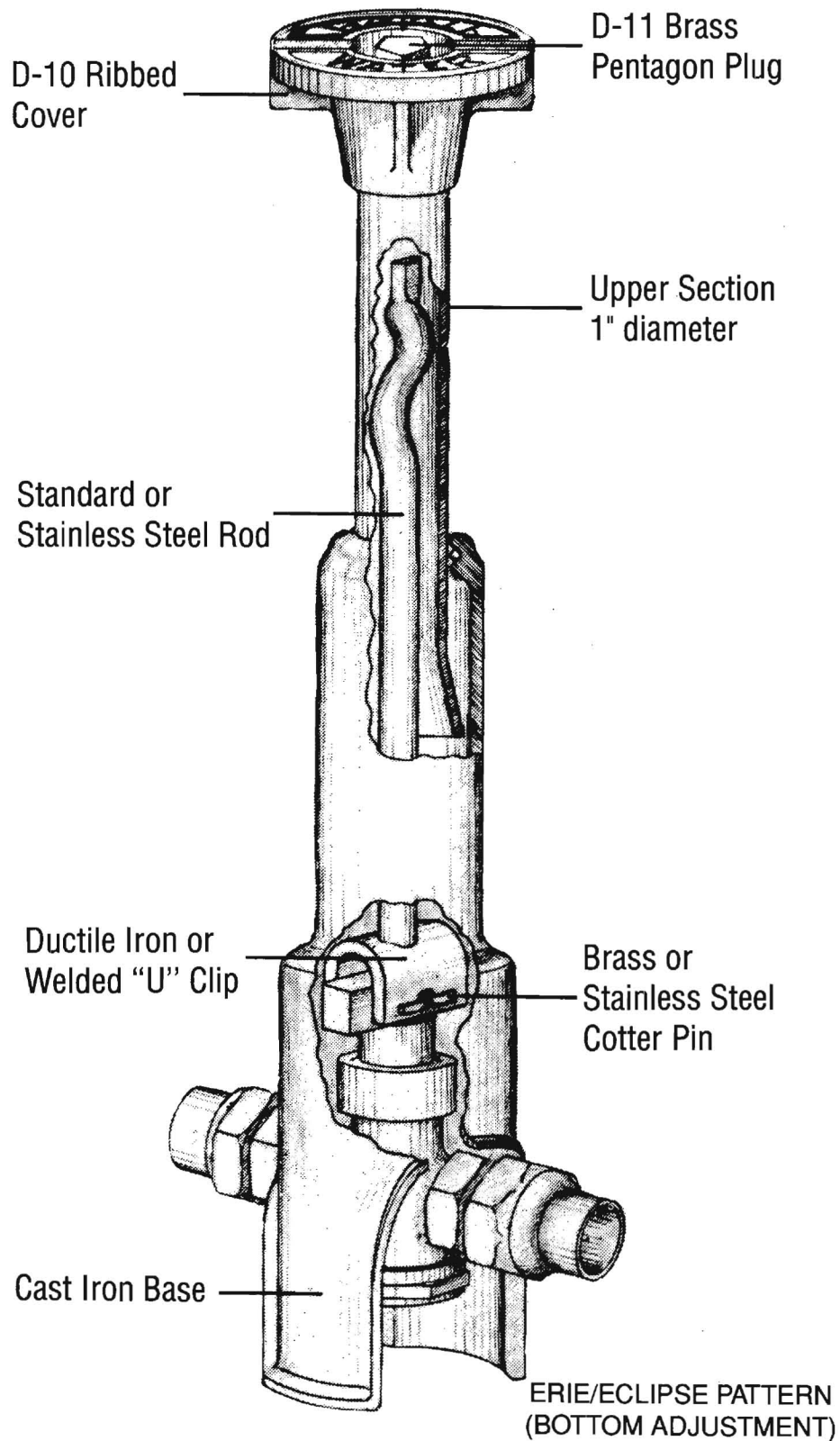
CONCORD

CURB BOXES, TOOLS and ACCESSORIES

CLOW
CLOW CANADA

CLOW CANADA

NOW AVAILABLE WITH ANTI-CORROSION
STAINLESS UPPER SECTION AND EPOXY FINISH



D-1 Cast iron Base
— for 1/2", 5/8", 1" Services

D-2 Cast Iron Base
— for 1 1/4", 1 1/2", 2" Services

CURB BOX LIDS

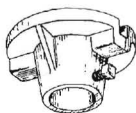
D-10



D-10 Regular ribbed cover and brass pentagon plug.

D-10A Ribbed repair cover c/w set screw and brass pentagon plug.

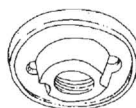
D-10A



D-10D 1 1/4" ribbed cover and brass pentagon plug.

D-10DR 1 1/4" ribbed repair cover with set screw and brass pentagon plug.

D-10F

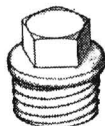


D-10F Flat cover with 1" brass thread.

NOTE: Brass hexagon plugs available on all models if specified.

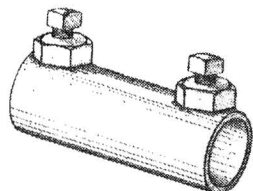
CURB BOX PARTS

D-11



D-11 Brass pentagon or hexagon plug (specify)
Frost ring washer
Brass or stainless steel cotter pin
Base for D-1, D-6, cast iron
Base for D-1P, D-6P, polyethylene
Base for D-2, D-7, cast iron
Base for D-8, cast iron.

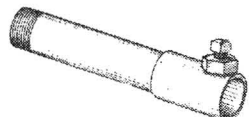
D-17



D-17 Standard repair coupling with two set screws.

D-17F Repair coupling with one female end threaded and one end with set screw.

D-18

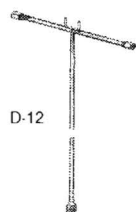


D-18 Extensions 1" male end threaded and female end with set screw.
Fixed length—1" pipe.
6, 12, 18, 24, 30, 36, 42, 48 inches.

D-18A Same as above—1 1/4" pipe fully adjustable within each length.

SHUT OFF KEYS

D-12



D-12 Combination Key
For flat lids, pentagon or hexagon plugs
Standard sizes: 30", 48", 60", 72"
Longer sizes available upon request.

D-13



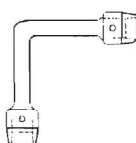
D-13 Standard Key
Standard sizes: 30", 48", 60", 72"
Longer sizes available upon request.

D-14 Service Box Cleaners
Eliminates digging up box to reach curb stop.

D-14



D-19



D-19 Double Key
5" x 5" or 10" x 10"
Fits pentagon and hexagon plug.

STATIONARY RODS FOR SERVICE BOXES

T-5	9/16"	Std. Rod c/w Welded "U" Clip and Brass Cotter Pin.
T-4	1/2"	Type 304 Stainless Steel Rod c/w Welded "U" Clip. Brass or Stainless Steel Cotter Pin.
T-2	5/8"	Std. Rod c/w Ductile "U" Clip and Brass Cotter Pin.
T-8	5/8"	Std. Rod c/w Welded "U" Clip and Brass Cotter Pin.

SIZES AVAILABLE

WEIGHTS (LBS)

SIZE NO.	EXT IN FT. MIN-MAX	ROD LENGTH	WITH ROD		WITHOUT ROD		
			D-1	D-2	D-1	D-1P	D-2
1	1½-2½	12"	11	19	10	3	17
2	2-3	12"	12	20	11	4	18
3	2½-3½	12"	13	21	12	5	18
4	3-4	24"	14	22	13	6	19
5	3½-4½	24"	15	23	13	6	19
6	4-5	36"	16	24	14	7	19
7	4½-5½	36"	17	26	14	7	20
8	5-6	48"	18	27	15	8	21
9	5½-6½	48"	19	32	15	8	26
10	6-7	60"	20	34	16	8	27
11	6½-7½	60"	21	35	17	10	28
12	7-8	72"	22	36	18	11	29
13	7½-8½	72"	23	37	19	12	30
14	8-9	84"	24	38	20	13	31
15	8½-9½	84"	25	39	21	14	32
16	9-10	96"	26	40	22	15	33
17	9½-10½	96"	27	41	23	16	34
18	10-11	96"	28	42	24	17	35

When Ordering Specify:

- 1) Model Number
- 2) Depth of bury
- 3) Type and length of stationary rod from charts above.



HEAD OFFICE

1757 Burlington Street East
P.O. Box 2849
Hamilton, Ont. L8N 3R5
Tel: (905) 548-9604
Fax: (905) 548-6885

WESTERN CANADA

P.O. Box 1000
801 Smelter Ave. S.E.
Medicine Hat, AB T1A 7H1
Tel: (403) 527-3553
Fax: (403) 527-7454

EASTERN CANADA

P.O. Box 700
Saint John, NB E2L 4B3
Tel: (506) 633-2541
Fax: (506) 634-8936

REGULAR STYLE

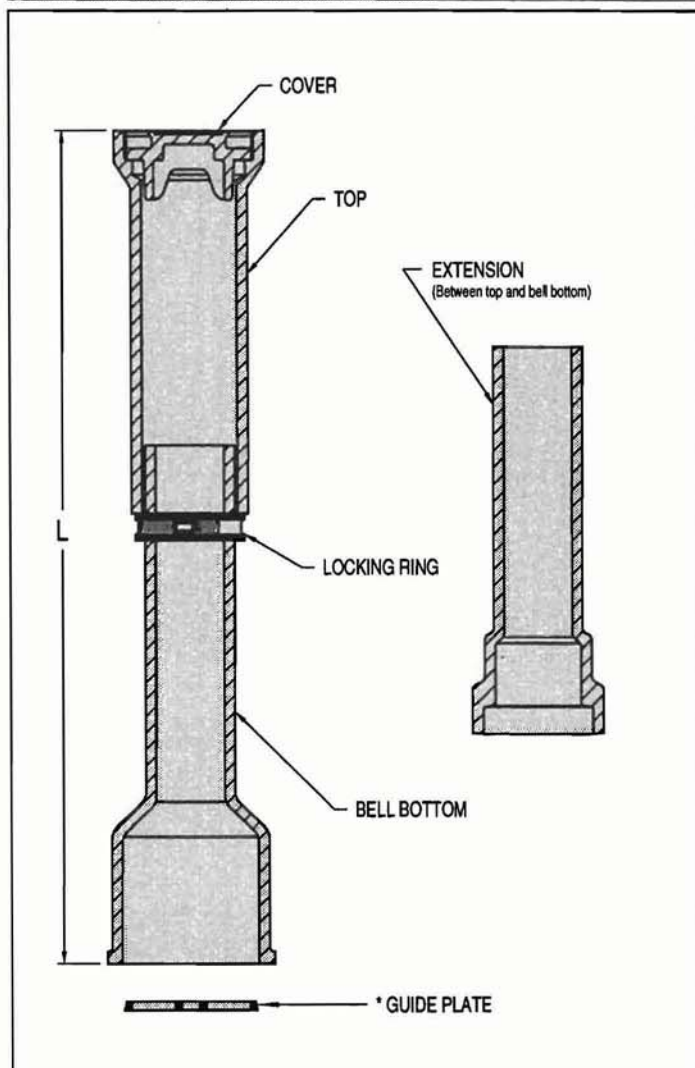


Fig.#	Nominal length (L)	Minimum maximum extension	Weight	Nominal length (L)	Minimum maximum extension	Weight
VB2000	5.0	3.6 - 5.2	126	1.5	1.05 - 1.55	57
VB2100	6.0	4.6 - 6.2	132	1.8	1.35 - 1.85	60
VB2200	7.0	5.6 - 7.2	147	2.1	1.65 - 2.15	67
VB2300	8.0	6.0 - 8.6	181	2.4	1.80 - 2.55	82
VB2400	9.0	6.6 - 9.6	209	2.7	1.95 - 2.85	95
VB2500	10.0	8.6 - 10.6	224	3.0	2.55 - 3.15	102
VB2600	11.0	9.6 - 11.6	252	3.3	2.70 - 3.45	115
VB2700	12.0	10.0 - 12.6	267	3.6	3.00 - 3.75	121
Feet, inches			lb	M.		
						kg

DEEP STYLE

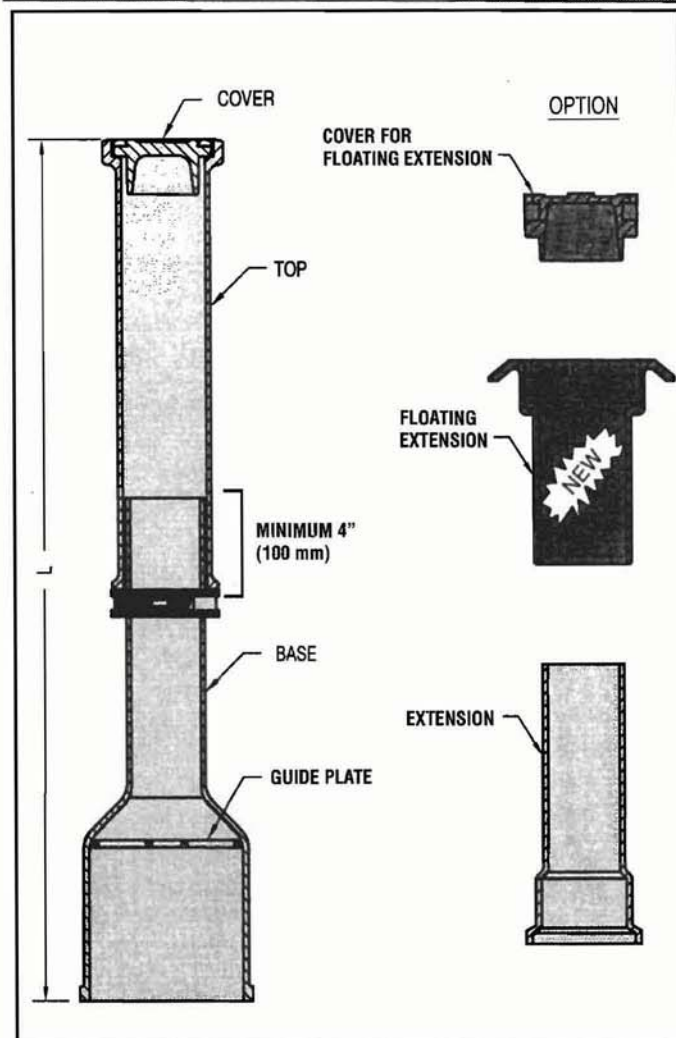


Fig.#	Nominal length (L)	Minimum maximum extension	Weight	Nominal length (L)	Minimum maximum extension	Weight
VB2000M	5.0	3.9 - 5.5	151	1.5	1.15 - 1.65	69
VB2100M	6.0	4.9 - 6.5	157	1.8	1.45 - 1.95	71
VB2200M	7.0	5.9 - 7.5	172	2.1	1.75 - 2.25	78
VB2300M	8.0	6.3 - 8.9	207	2.4	1.90 - 2.35	94
VB2400M	9.0	6.9 - 9.9	236	2.7	2.05 - 2.95	107
VB2500M	10.0	8.9 - 10.9	250	3.0	2.35 - 3.30	114
VB2600M	11.0	9.9 - 11.9	279	3.3	2.95 - 3.60	127
VB2700M	12.0	10.3 - 12.9	293	3.6	3.10 - 3.90	133
Feet, inches			lb	M.		
						kg

*The guide plate is necessary in order to centre the bell bottom part of the valve box on the valve.

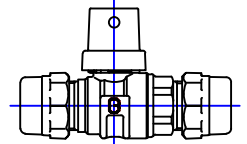


www.bibby-ste-croix.com

RANSOM INDUSTRIES

BIBBY-STE-CROIX

Cambridge Brass
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Fax: (519) 621-8674
<http://www.cambridgebrass.com>

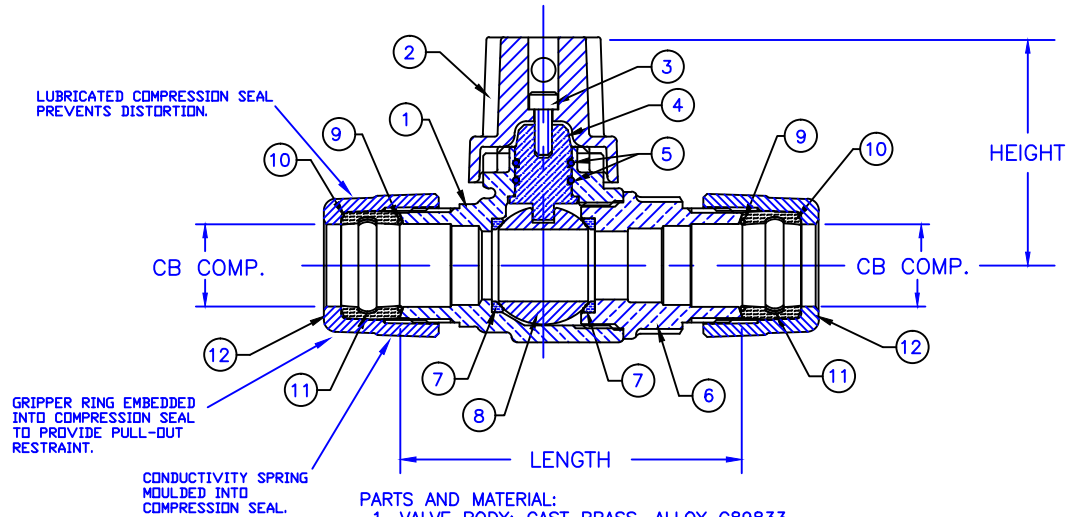


MODEL NO. 202NL

CB COMPRESSION x CB COMPRESSION

CURB STOP – BALL STYLE

FOR COPPER OR PLASTIC TUBING (CTS)



PARTS AND MATERIAL:

1. VALVE BODY: CAST BRASS, ALLOY C89833
2. CAP: CAST BRASS, ALLOY C83600
3. CAP SCREW: STAINLESS STEEL, TYPE 304
4. STEM: STAINLESS STEEL, TYPE 303
5. O-RING: NITRILE RUBBER
6. ENDBODY: CAST BRASS, ALLOY C89833
7. SEATS: TEFLON
8. BALL: CAST BRASS, ALLOY C89833
9. CONDUCTOR SPRING: BRASS
10. COMPRESSION SEAL: NITRILE RUBBER
11. GRIPPER: STAINLESS STEEL, TYPE 302
12. TAILNUT: CAST BRASS, ALLOY C83600

FEATURES

- CONFORMS TO AWWA C800 (ASTM B584 UNS C89833 FOR BRASS PARTS IN CONTACT WITH POTABLE WATER)
- CONFORMS TO ANSI/NSF 372 (COMPLIANT WITH US Safe Drinking Water Act. PL 111-380)
- CONFORMS TO ANSI/NSF 61-8
- BODY AND NUTS PROVIDE WRENCH FLATS FOR INSTALLATION
- 300PSI WORKING PRESSURE

ORDERING INFORMATION:

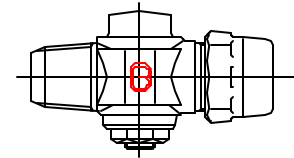
FULL 360 ROTATION = ADD "R" TO END OF CATALOG NO.
HANDLE = ADD "H" TO END OF CATALOG NO.

Cambridge Brass considers the information in this submittal form to be correct at the time of publication. Item and option availability, including specifications, are subject to change without notice.

VALVE SIZE	CATALOG NO.	CB COMP.	CB COMP.	LENGTH	HEIGHT	APPROX. WT. LBS.
3/4"	202NL-H3H3	3/4"	3/4"	3.75"	2.50"	2.5
3/4"	202NL-H3H4	3/4"	1"	4.00"	2.50"	3.2
1"	202NL-H4H3	1"	3/4"	4.00"	2.50"	3.2
1"	202NL-H4H4	1"	1"	4.42"	2.68"	3.9
1 1/4"	202NL-H5H5	1 1/4"	1 1/4"	6.56"	3.31"	9.8
1 1/2"	202NL-H6H6	1 1/2"	1 1/2"	6.56"	3.31"	9.3
2"	202NL-H7H7	2"	2"	6.83"	3.61"	12.5

Submitted by:

Cambridge Brass
P.O. Box 249
140 Orion Place
Cambridge, Ontario
Canada N1R 5V1
Tel: (519) 621-5520
Fax: (519) 621-8674
http://www.cambridgebrass.com

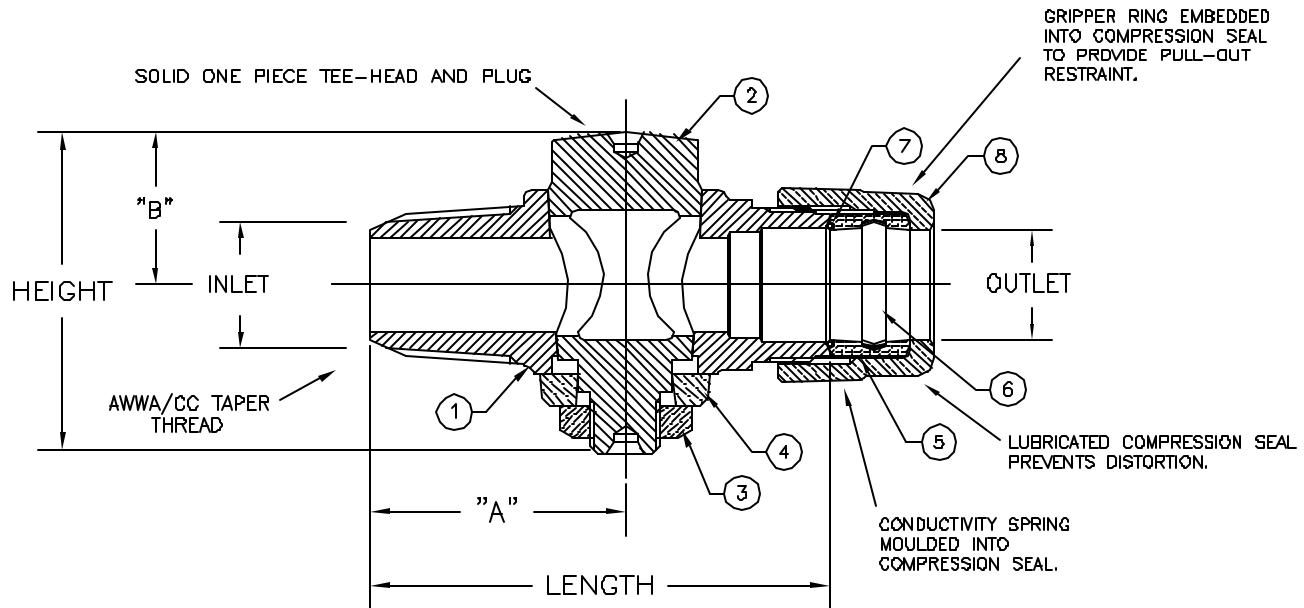


MODEL NO. 302NL

AWWA (CC) x CB COMPRESSION

CORPORATION MAIN STOP
PLUG STYLE

AWWA/CC TAPER THREAD INLET x CB COMPRESSION
FOR COPPER OR PLASTIC TUBING (CTS) OUTLET



PARTS AND MATERIAL:

1. VALVE BODY: CAST BRASS, ALLOY C89833
2. TAPERED PLUG: CAST BRASS, ALLOY C89833
3. STOP NUT: CAST BRASS, ALLOY C83600
4. WASHER: CAST BRASS, ALLOY C83600
5. COMPRESSION SEAL: NITRILE RUBBER
6. GRIPPER: STAINLESS STEEL, TYPE 302
7. CONDUCTOR SPRING: BRASS
8. TAILNUT: CAST BRASS, ALLOY C83600

FEATURES:

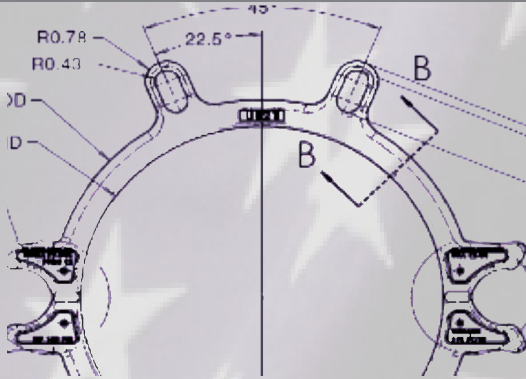
- MANUFACTURED IN COMPLIANCE WITH AWWA STANDARD C800-05 (ASTM B-584, UNS NO C89833).
- CSA CLASSIFIED TO ANSI/NSF STANDARD 61-8.
- BODY PROVIDES LARGE, RUGGED WRENCH FLATS FOR PROPER INSTALLATION.
- 100 PSI WORKING PRESSURE.
- FULL 360 DEGREE ROTATION.

Cambridge Brass considers the information in this submittal form to be correct at the time of publication. Item and option availability, including specifications, are subject to change without notice.

VALVE SIZE	CATALOG NO.	INLET AWWA (CC)	OUTLET CB COMP.	HEIGHT	LENGTH	"A"	"B"	APPROX. WT. LBS.
3/4"	302NL-A3H3	3/4"	3/4"	2.54"	3.69"	2.06"	1.21"	1.7
1"	302NL-A4H4	1"	1"	2.75"	4.22"	2.41"	1.30"	2.9

Submitted by:

PV-LOK™ MODEL D-PWP DOMESTIC SERRATED BELL JOINT RESTRAINT FOR AWWA C900/905 PVC PIPE



Features & Advantages:

Domestic PV-LOK™ Series D-PWP restrainer incorporates a series of machined serrations that effectively engage the PVC pipe walls to provide positive joint security and full support of the pipe. The machined serrations maximize restraint during increased line pressures such as those resulting from surge pressures and water hammers. The series D-PWP incorporates two PV-LOK clamping rings and a series of restraining rods & nuts that tie the two rings together and secure the PVC bell and spigot pipe joint.

**M
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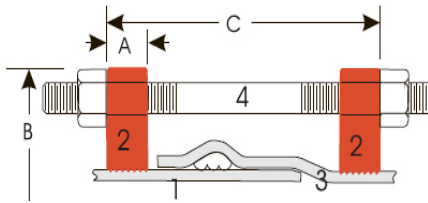
Sample Specification:

Restraint devices for bell and spigot joints of PVC pipe shall consist of two split retainer rings incorporating a series of machined (not “as cast”) serrations. One clamping ring shall be installed on the spigot pipe, and with the necessary restraining rods and nuts, connected to a second clamping ring located on the pipe barrel immediately behind the gasket bell. Restraint devices shall incorporate a series of machined serrations that provide positive restraint, exact fit and full support of the pipe wall. The restraint device shall provide the necessary bolts and nuts to complete the PVC pipe bell assembly. Devices shall carry a 2:1 minimum safety factor, based on the rated pressure of the pipe, and meet or exceed the recognized testing for restrained joints on PVC pressure pipe and offer factory certification and independent test results. Restraint devices for securing PVC pipe bell assemblies shall be SIGMA PV-LOK™ Series D-PWP or approved equal.

Material:

- Clamping ring is manufactured of high strength ductile iron in accordance with ASTM A536, grade 65-45-12.
- Side clamping bolts and hex nuts are manufactured of high strength, medium carbon alloy steel in accordance with AWWA/ANSI A21.11/C111 and zinc plated for corrosion resistance (sizes 4-12”). Carbon Steel, Grade 5 (sizes 14-36”).
- Hex nuts are high strength steel in accordance with ASTM A449 and zinc plated to B633, Type III Sc.1 for corrosion resistance.
- Restraining rods and hex nuts are of high strength, low alloy steel in accordance with AWWA/ANSI C111/A21.11 and provide a minimum 45,000 psi yield and 60,000 psi tensile strength.

PV-LOK™ Series D-PWP for Bell Joint Restraint (CIOD)

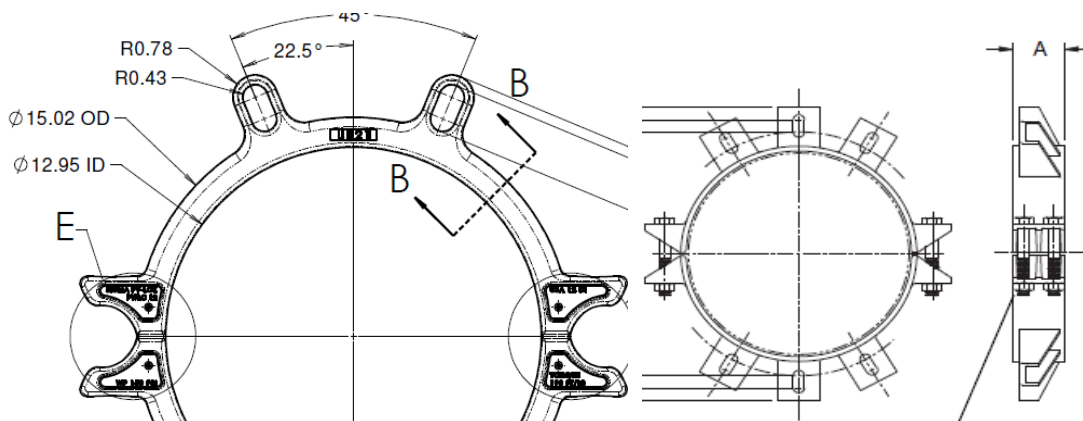


1. Plain End Pipe
2. Restrainer Clamp
3. Bell End Pipe
4. Restraining Rod

Dimensions in Inches, Weights in Pounds:

Pipe Size	Item #	C900 PVC PIPE OD	A	B	C (max)	Restraining Rods		Nuts for Res Rods		Clamping Bolts		
						No.	Size	No.	Size	No.	Size	Min Torque
4"	D-PWP-C4	4.80"	1.14"	10.5"	13"	2	3/4" x 15"	4	3/4"	4	5/8" x 4"	90 FT-LB
6"	D-PWP-C6	6.90"	1.14"	12.48"	13"	2	3/4" x 18"	4	3/4"	4	5/8" x 4"	90 FT-LB
8"	D-PWP-C8	9.05"	1.63"	14.92"	13"	2	3/4" x 18"	4	3/4"	4	3/4" x 5"	150 FT-LB
10"	D-PWP-C10	11.10"	1.50"	16.75"	16"	4	3/4" x 24"	8	3/4"	4	7/8" x 5"	150 FT-LB
12"	D-PWP-C12	13.20"	1.50"	19.27"	22"	4	3/4" x 24"	8	3/4"	4	7/8" x 5"	150 FT-LB
14"	D-PWP-C14	15.30"	4.0"	22.5"	24"	6	3/4" x 30"	12	3/4"	8	7/8" x 7"	150 - 200 FT-LB
16"	D-PWP-C16	17.40"	4.0"	24.5"	28"	6	3/4" x 30"	12	3/4"	8	7/8" x 7"	150 - 200 FT-LB
18"	D-PWP-C18	19.5"	5.0"	26.6"	28"	8	3/4" x 30"	16	3/4"	8	1" x 7"	175 - 225 FT-LB
20"	D-PWP-C20	21.6"	5.0"	29.18"	28"	8	3/4" x 36"	16	3/4"	8	1 1/8" x 5 1/2"	200 - 250 FT-LB
24"	D-PWP-C24	25.8"	5.0"	33.875"	28"	12	3/4" x 36"	24	3/4"	8	1 1/8" x 5 1/2"	225 - 275 FT-LB
30"	D-PWP-C30	32.0"	7.0"	40.875"	38"	12	1" x 48"	24	1"	12	1 1/8" x 9"	250 - 300 FT-LB
36"	D-PWP-C36	38.3"	7.0"	48.25"	38"	12	1" x 48"	24	1"	12	1 1/8" x 9"	250 - 300 FT-LB

- Domestic PV-LOKS are rated for a working pressure equal to rated pressure of the PVC Pipe to which they are assembled
- Domestic PV-LOKS are FM approved for 150 psi (sizes 4-10")
- For calculation of clearance for a pipe in casing, add a minimum of 1 1/2" to the "B" dimension mentioned in the above table



Installation Instructions (4-36"):

1. Assemble the plain-end PVC pipe into the bell according to the pipe manufacturer's recommendations
2. Assemble the Series PWP clamping rings on the spigot pipe (approx. 2 inches behind the insertion mark on the pipe) and immediately behind the pipe bell end. Tighten the side clamping bolts to recommended torque.
3. Insert the restrainer rods provided and snug the retaining nuts against the restrainer ears (against the flat surface). Do not over-tighten retaining nuts, approximately one turn with a wrench.

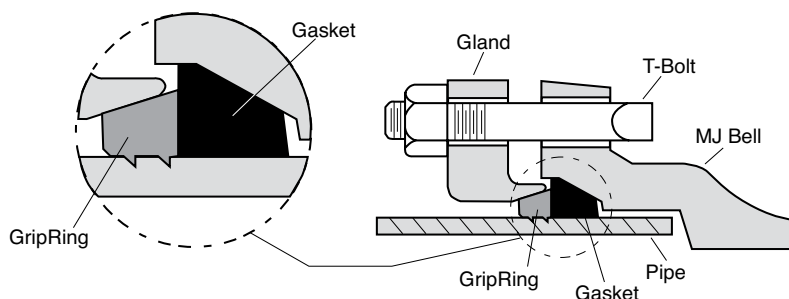
GripRing™ Pipe Restrainer

¹ for use on Ductile Iron, C-900, and IPS size PVC

The GripRing's articulating wedge action provides the restraint required for virtually any pressure.

A ROMAC ORIGINAL

GripRing™
US Patent #: 5335946



Certified to
NSF/ANSI 61-G

- **Full circumferential pipe restraint.**
This spreads the restraining forces more evenly than restrainers using radial bolts or pads.
- **Easy to install.**
The GripRing™ uses standard mechanical joint gasket and T-bolts. There are no radial bolts or pads for the installer to forget to tighten. When the T-bolts on the gland are tightened, the GripRing restraint system is engaged.
- **Rated to full working pressure of pipe.**
GripRing pipe restrainers may be used at the full rated capacity of the pipe, including an allowance for pressure surges.
- **Built-in stop to prevent damage to pipe.**
The "gap" in each GripRing is designed to completely close before a pipe can be excessively stressed.
- **The GripRing flexes to accommodate deflection allowed in a Mechanical Joint.**
Restrains under the misalignment conditions often found in the field.
- **The gland is painted yellow to avoid confusion.**
Since the gland used with the GripRing restraint system is similar in looks to a standard MJ gland, it is painted yellow. The inspector can easily see that a restrainer has in fact, been used.

GRIPRING™ PIPE MATERIAL COMPATIBILITY CHART

Pipe Material	Ring Color	Working Pressure	Comments
² Ductile Iron - AWWA C151	Black	350	
Cast Iron - Obsolete Std.	Black	350	OD is same as DI, C151.
² PVC - D.I. Size, AWWA C900	Black	Rating of pipe	Class 235 & 305.
PVC - "Class Pipe", ASTM D 2241	Red	Rating of pipe	4"-8" Class 160-200. 10" & 12" Class 200 only.
PVC - ASTM D 1785	Red	Rating of pipe	4"-8" Class Sched. 40-80. 10" & 12" Sched. 80 only.
PVC Molecularly Oriented (C909)	-	-	GripRing is not for use on C909 pipe.

For pipe and classes not listed in the compatibility chart above, contact Romac Industries.

¹Consult GripRing Pipe Material Compatibility Chart.

²UL Listed & FM Approved



GripRing™ Accessory Pack

Material Specifications

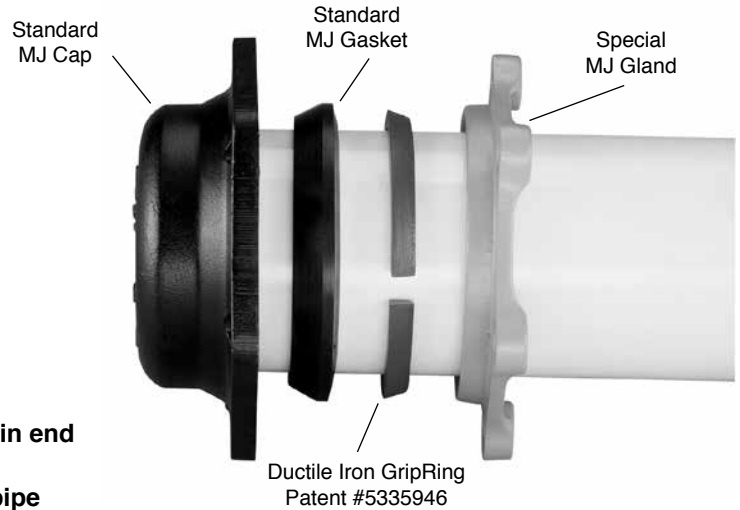
GripRing: Hardened ductile iron. GripRing is painted red for IPS, and black for D.I. and C-900.

Gland: Ductile iron per ASTM A 536, Grade 65-45-12. Gland is painted yellow.

Gasket: SBR per ASTM D 2000 MBA 710, compounded for water and sewer service. Other compounds available on request.

T-bolts and Nuts: 3/4" UNC T-bolts, heavy hex nuts, high strength, low alloy steel per AWWA C111. Stainless steel and R-Blue available upon request.

Not for use on polyethylene pipe, steel pipe, plain end mechanical joint fittings, Molecularly Oriented Polyvinylchloride (PVC) AWWA C909-02. See pipe material compatibility chart for details.



DUCTILE IRON and C-900									
ACCESSORY PACK (Gland, GripRing, Gasket, Bolts and Nuts)						GLAND and GRIPRING ONLY			
NOM. PIPE SIZE	CATALOG NUMBER	BOLTS QUANTITY: SIZE	WEIGHT (lbs.)	LIST PRICE		NOM. PIPE SIZE	CATALOG NUMBER	WEIGHT (lbs.)	LIST PRICE
				STANDARD B&N	R-BLUE ¹ B&N				
4"	4" GRAP-DI	4: 3/4" x 3 1/2"	8#	\$68.23	\$81.34	4"	4" GR-DI	4#	\$45.77
6"	6" GRAP-DI	6: 3/4" x 4"	11#	79.32	95.88	6"	6" GR-DI	6#	52.42
8"	8" GRAP-DI	6: 3/4" x 4"	14#	113.08	129.64	8"	8" GR-DI	8#	80.25
10"	10" GRAP-DI	8: 3/4" x 4"	18#	162.00	184.08	10"	10" GR-DI	11#	120.69
12"	12" GRAP-DI	8: 3/4" x 4"	20#	221.32	246.85	12"	12" GR-DI	13#	175.06

PVC-IRON PIPE SIZE (IPS)									
ACCESSORY PACK (Gland, Ring, Gasket, Bolts and Nuts)						GLAND and RING ONLY			
NOM. PIPE SIZE	CATALOG NUMBER	BOLTS QUANTITY: SIZE	WEIGHT (lbs.)	LIST PRICE		NOM. PIPE SIZE	CATALOG NUMBER	WEIGHT (lbs.)	LIST PRICE
				STANDARD B&N	R-BLUE ¹ B&N				
4"	4" GRAP-IP	4: 3/4" x 3 1/2"	8#	\$78.00	\$91.11	4"	4" GR-IP	4#	\$55.72
6"	6" GRAP-IP	6: 3/4" x 4"	11#	94.68	111.24	6"	6" GR-IP	6#	67.74
8"	8" GRAP-IP	6: 3/4" x 4"	14#	132.83	149.39	8"	8" GR-IP	9#	99.99
10"	10" GRAP-IP	8: 3/4" x 4"	18#	230.60	252.68	10"	10" GR-IP	12#	189.23
12"	12" GRAP-IP	8: 3/4" x 4"	20#	244.62	266.70	12"	12" GR-IP	14#	198.80

To Order: Specify catalog number.

1 R-BLUE Bolts and Nuts, see page 9-3 for more information.

C153 DUCTILE IRON MECHANICAL JOINT FITTINGS

C153 DUCTILE IRON MECHANICAL JOINT FITTINGS

BASIC SPECIFICATIONS

- SIZES:**
- 2" - 64"
- MATERIAL:**
- Ductile Iron ASTM A536, Grade 65-45-12, 60-42-10 or 70-50-05.
- PRESSURE:**
- 350 PSI Water Working Pressure 2" - 24".
 - 250 PSI Water Working Pressure 30" - 48".
 - 150 PSI Water Working Pressure 54" - 64".
- TESTING:**
- In accordance with ANSI/AWWA C153/A21.53.
 - In accordance with UL - FM requirements.
 - All fittings are hydrostatically tested in accordance with SIGMA Quality Management Standard.
 - All fittings are heat coded to ensure traceability and verification of metallurgical properties in accordance with the prevailing standards and SIGMA Quality Management Standards.
- LAYING LENGTH:**
- Short body design - straight section of body deleted to provide a compact and lighter fitting without reducing strength or flow characteristics.
 - In accordance with ANSI/AWWA C153/A21.53.
- DEFLECTION:**
- Maximum allowable deflection for MJ Joint on a full length pipe is as mentioned below:
 1. 3" - 4" = 8 Degrees
 2. 6" = 7 Degrees
 3. 8" - 12" = 5 Degrees
 4. 14" - 48" = 3 Degrees
- CEMENT LINING:**
- Double cement lined in accordance with ANSI/AWWA C104 / A21.4.
- COATING:**
- Interior of fitting is seal coated (asphaltic material) in accordance with ANSI AWWA C104/A21.4 and NSF61 approved.
 - Exterior of fitting is seal coated (asphaltic material) in accordance with ANSI/AWWA C153/A21.53 and NSF approved.
- GASKETS:**
- SBR in accordance with ANSI/AWWA C111/A21.11.
 - Also available in EPDM, NBR and CR.
- T-BOLTS:**
- Low Alloy corrosion resistant high strength steel in accordance with ANSI/AWWA C111/A21.11.
- APPROVALS:**
- 3"-16" Underwriters Laboratories listed and Factory Mutual Approved.
- STANDARDS:**
- Certified to NSF61 Standard including Annex G.
 - ANSI/AWWA C153/A21.53 for Compact Ductile Iron Fittings 2"-64" for water and other liquids.
- INSTALLATION:**
- Per ANSI/AWWA C600 and C111 using DIP conforming to C150/C151 and PVC pipe conforming to C900/C905.

CLOW CANADA

50 - 300 R/W VALVE NRS M.J. ENDS
GENERAL DIMENSIONS

PROJECT

OWNER

CONTRACTOR

DISTRIBUTOR

CONSULTANT

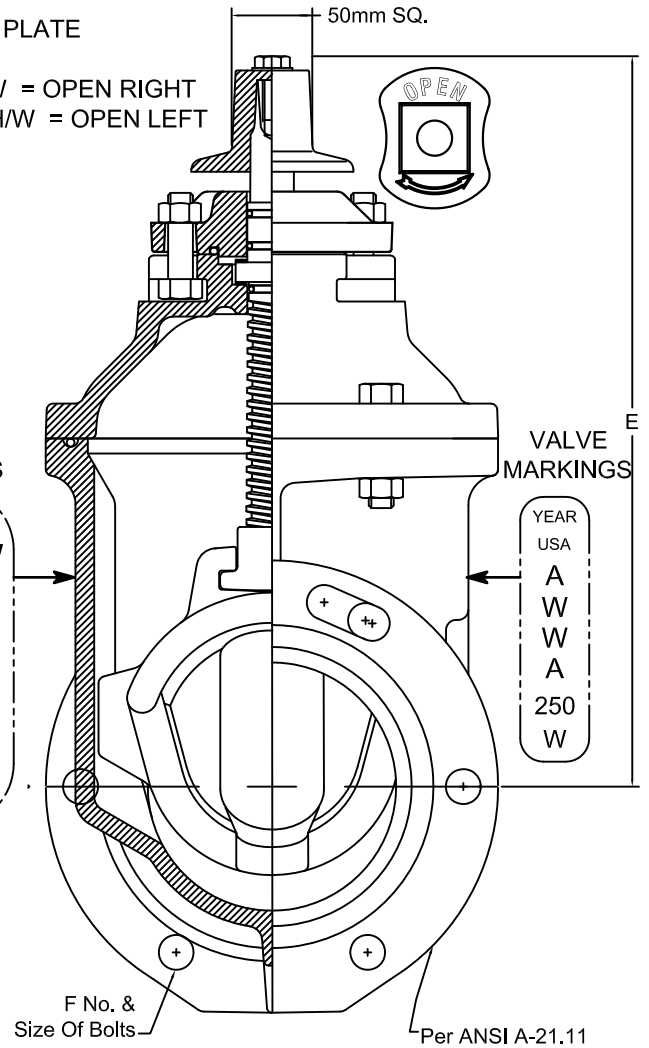
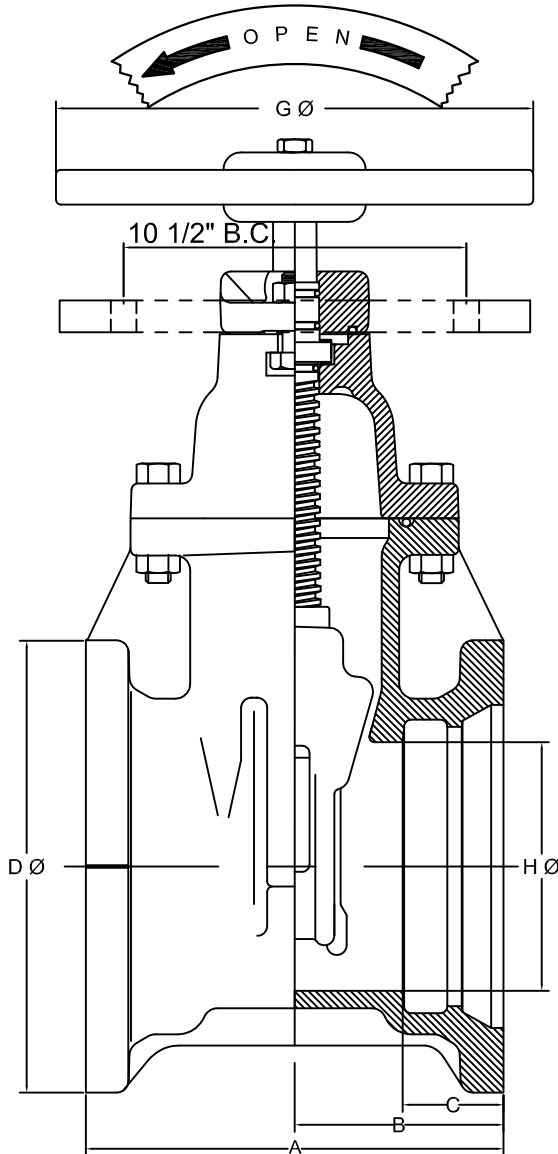
CLOW FIGURE F6100

CLOW MODEL 2640 AWWA C509 FULL WALL CAST IRON

CLOW MODEL 2639 AWWA C509 FULL WALL DUCTILE IRON

OPTIONAL

- 1) HANDWHEEL
- 2) 2" OP. NUT & PI PLATE
- 3) 2" OP. NUT
- 4) RED NUT or H/W = OPEN RIGHT
- 5) BLACK NUT or H/W = OPEN LEFT

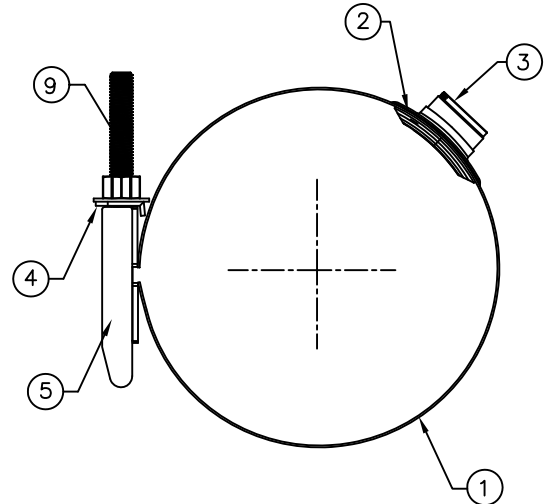
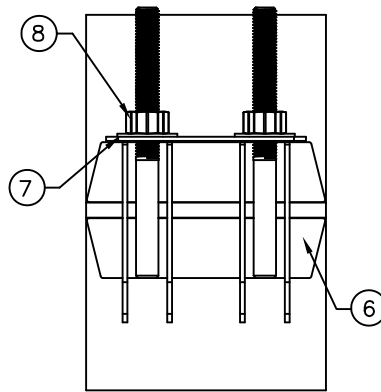
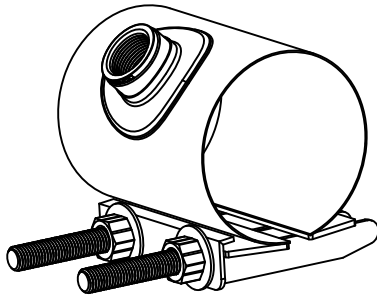


METRIC DIMENSIONS

VALVE SIZE	A	B	C	D	E	F	G	H	NUMBER OF TURNS	WEIGHT W/2" NUT	WEIGHT W/ HW	WEIGHT PI PLATE
50	210	105	62.5	115	275	4 -5/8"	185	50	6 1/2	—	—	—
62.5	—	—	—	—	—	—	—	—	—	—	—	—
75	215	108	62.5	195	315	4 -5/8"	250	75	10	—	—	—
100	240	120	62.5	230	375	4 -3/4"	250	110	13 1/2	87 lbs	93 lbs	103 lbs
150	265	130	62.5	290	480	6 -3/4"	300	160	19 1/2	136 lbs	145 lbs	152 lbs
200	335	165	62.5	350	572	6 -3/4"	350	210	25 1/2	206 lbs	218 lbs	222 lbs
250	395	195	62.5	400	670	8 -3/4"	450	260	31 1/2	352 lbs	371 lbs	368 lbs
300	405	200	67	455	760	8 -3/4"	450	310	37 3/4	480 lbs	500 lbs	496 lbs

SUBMITTAL INFORMATION

Stainless Steel Single Piece Saddle—(8403/8405/8407 series)



PARTS AND MATERIAL:

1. Saddle Body:

18-8 type 304 Stainless Steel

Size 4" - 20 Gauge

Size 6"- 8" - 20 gauge (3/4" to 1" outlets)
- 18 gauge (1 1/4" to 2" outlets)

Size 10" & 12" - 18 gauge

Size 4" - 12" - 6" width (3/4" to 1" outlets) } 8403
- 8" width (1 1/4" to 2" outlets)

Size 4" - 8" - 6" width (3/4" to 1" outlets) } 8407
- 8" width (1 1/4" to 2" outlets)
Size 10" - 12" - 8" width (3/4" to 2" outlets)

2. Gasket:

Gaskets are made from EPDM meets ASTM D2000 STANDARD & NSF 61

3. Stainless Taps:

18-8 type 304 Stainless Steel

Outlet Sizes - 3/4" to 2" AWWA (CC) or FIP

4. Lifter Bar:

18-8 type 304 Stainless Steel

5. Finger Bracket:

18-8 type 304 Stainless Steel

6. Side Bar:

18-8 type 304 Stainless Steel

7. Washer:

18-8 type 304 Stainless Steel

8. Nuts:

5/8-11 Stainless Steel heavy hex nuts coated to prevent galling

9. Studs:

18-8 Stainless Steel, 5/8" roll NC thread

FEATURES: - All componenets are made of 18-8 type Stainless Steel

- Fully Passivated for corrosion resistance
- Lifter bar design-no loose parts for assembly
- Saddle size and outlet information clearly marked on each saddle
- Size from 4" to 12" (12.74-13.21) one piece design
- Rated for 250 PSI working pressure
- 18 gauge material used for 8405 series saddle body all over range
- 4" to 8" sizes available for 8405 series with 6" width in small outlets & 8" width in large outlets
- Alterantive gasket materials (NBR, SBR) are available upon request
- Ring gasket and pad gasket options are available upon request
- Bolt torque not to exceed 60 ft. lbs.

Cambridge Brass considers the information in this submittal form to be correct at the time of publication.
Item and option availability, including specifications, are subject to change without notice.

SHEET 1 OF 2

Cambridge Brass
P.O. Box 249, 140 Orion Place
Cambridge, Ontario
Canada N1R 5V1
Tel: (519) 621-5520
Fax: (519) 621-8674
<http://www.cambridgebrass.com>



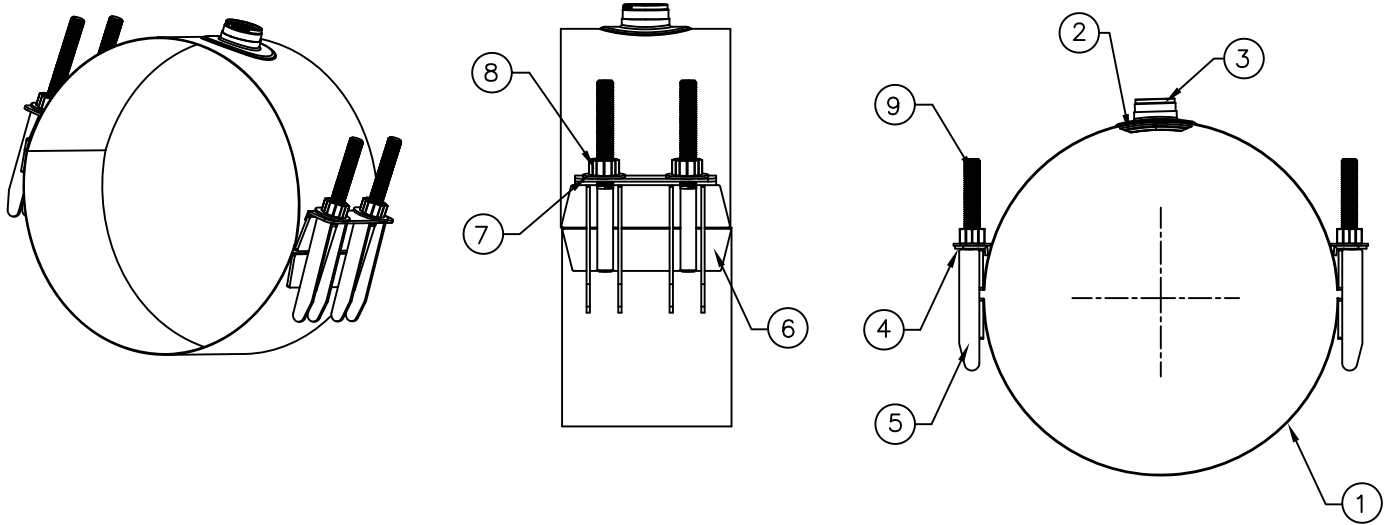
21

FILE: SUBMITTAL/SADDLE.DWG
REV. A - JSP, AUGUST, 2013

SUBMITTED BY:

SUBMITTAL INFORMATION

Stainless Steel Two Piece Saddle—(8403/8407 series)



PARTS AND MATERIAL:

- | | |
|--------------------|---|
| 1. Saddle Body: | 18-8 type 304 Stainless Steel |
| | Size 12" & Larger - 18 Gauge |
| | Size 12" & Larger - 6" width (3/4" to 1" outlets)] 8403 |
| | - 8" width (1 1/4" to 2" outlets)] |
| | Size 12" & Larger - 8" width (3/4" to 2" outlets)] 8407 |
| 2. Gasket: | Gaskets are made from EPDM meets ASTM D2000 STANDARD & NSF 61 |
| 3. Stainless Taps: | 18-8 type 304 Stainless Steel |
| | Outlet Sizes - 3/4" to 2" AWWA (CC) or FIP |
| 4. Lifter Bar: | 18-8 type 304 Stainless Steel |
| 5. Finger Bracket: | 18-8 type 304 Stainless Steel |
| 6. Side Bar: | 18-8 type 304 Stainless Steel |
| 7. Washer: | 18-8 type 304 Stainless Steel |
| 8. Nuts: | 5/8-11 Stainless Steel heavy hex nuts coated to prevent galling |
| 9. Studs: | 18-8 Stainless Steel, 5/8" roll NC thread |

- FEATURES:** - All componenets are made of 18-8 type Stainless Steel
- Fully Passivated for corrosion resistance
 - Lifter bar design-no loose parts for assembly
 - Saddle size and outlet information clearly marked on each saddle
 - Size from 12" (14.00-14.47) and larger two piece design
 - Rated for 250 PSI working pressure
 - Alterantive gasket materials (NBR, SBR) are available upon request
 - Ring gasket and pad gasket options are available upon request
 - Bolt torque not to exceed 60 ft. lbs.

Cambridge Brass considers the information in this submittal form to be correct at the time of publication.
Item and option availability, including specifications, are subject to change without notice.

SHEET 2 OF 2

Cambridge Brass
P.O. Box 249, 140 Orion Place
Cambridge, Ontario
Canada N1R 5V1
Tel: (519) 621-5520
Fax: (519) 621-8674
<http://www.cambridgebrass.com>



22
FILE: SUBMITTAL/SADDLE.DWG
REV. A - JSP, AUGUST, 2013

SUBMITTED BY:



ROBAR INDUSTRIES LTD.

SUBMITTAL INFORMATION

ROBAR 6606 STAINLESS STEEL TAPPING SLEEVE

USE

Robar 6600 series Tapping Sleeves are used for "WET" or "HOT" tap applications to make a branch outlet off a main supply line. Can be used on all types of pipe except for Concrete Cylinder Pipe.

Tapping Sleeves are available in "Lifter Bar" or "Bolt Bracket" style and have the option of having a SS flange, epoxy coated Carbon steel flange or a MJ flange.

MATERIALS

Shell &
Outlet Pipe

T-304 Stainless Steel, fully passivated
Schd 10 SS, for size on size - 11 gauge pipe

Flange

T-304 Stainless Steel as per AWWA C-207 class D
option - Epoxy Coated Carbon Steel, 150 lb
Option - MJ flange, stainless steel or carbon steel

Fasteners

5/8"NC T-304 Stainless Steel. Nuts coated with anti-galling compound.

Gaskets

Ring Seal - Nitrile (NBR)
Liner - Styrene Butadiene Rubber (SBR) compound. Meets ASTM D2000 standard. Other materials available.

Test Plug

3/4" NPT Stainless Steel

PRESSURE

When following Robar installation instructions correctly the tapping sleeves will handle working pressures up to 150 PSI. Contact Robar for higher working pressures.

SIZES AVAILABLE

4" - 30" available. Contact Robar for larger diameters.

Effective: 01/23/2015

ROBAR IND LTD. - BRITISH COLUMBIA

Phone: 604-591-8811

Toll Free: 800-663-6553

Fax: 604-591-5288

LES PRODUITS INDUSTRIELS ROBAR INC. - QUEBEC

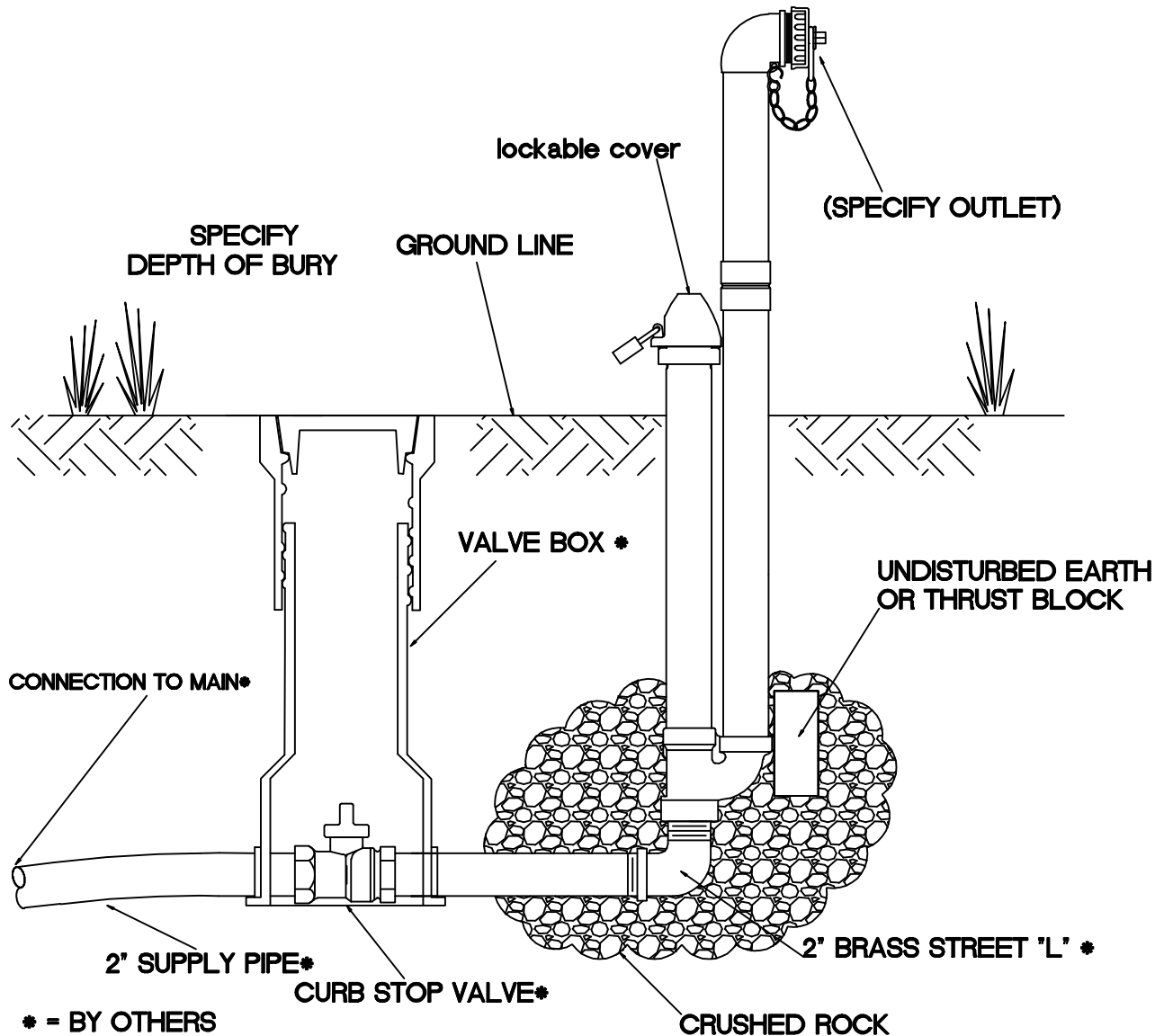
Phone: 450-441-7525

Toll Free: 800-315-9525

Fax: 450-441-4894

Website: www.robarindustries.com / E-mail: waterworks@robarindustries.com

MAINGUARD # 77 BLOW-OFF HYDRANT



Post Hydrant shall be non-freezing, self draining type with a _____' bury. These hydrants will be furnished with a 2" FIP horizontal, vertical or 2" MJ inlet. A non-turning operating rod and shall open left. Bronze operating mechanism and aluminum plunger design, and be servicable from above grade with no digging. The outlet shall also be bronze and be 2½" NST or smaller. Hydrants shall be lockable to prevent unauthorized use as manufactured by Kupferle Foundry Co. St. Louis Mo. or approved equal.

Inlet Pressure (psi)	Flow Rate (gpm)
75	675
100	742
125	800
150	856

DRAWN
F.M.
APPROVED

DATE
1-10-13
MAT'L

THIS DRAWING IS THE PROPERTY OF THE KUPFERLE FOUNDRY COMPANY. IT IS NOT TO BE USED OR DUPLICATED WITHOUT PERMISSION OF THE OWNER.

ECLIPSE
Since 1887



KUPFERLE FOUNDRY COMPANY

2511 NORTH 9TH STREET, ST. LOUIS, MO 63102
314-231-8738 800-231-3900 FAX 314-231-2820
<http://www.hydrants.com>

DATE	REVISION	PART NO. #77 MAINGUARD POST HYDRANT	SHEET 1 OF 1
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Test Tap

Water Sample Station

The most serviceable and most operator friendly Sample Station available



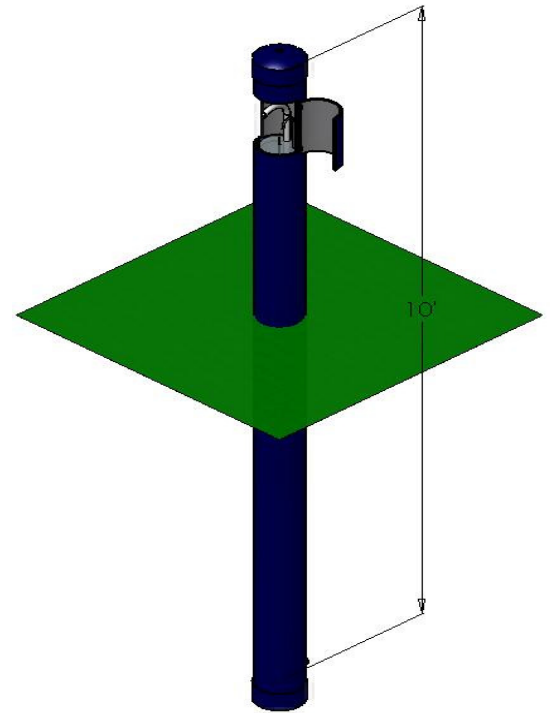
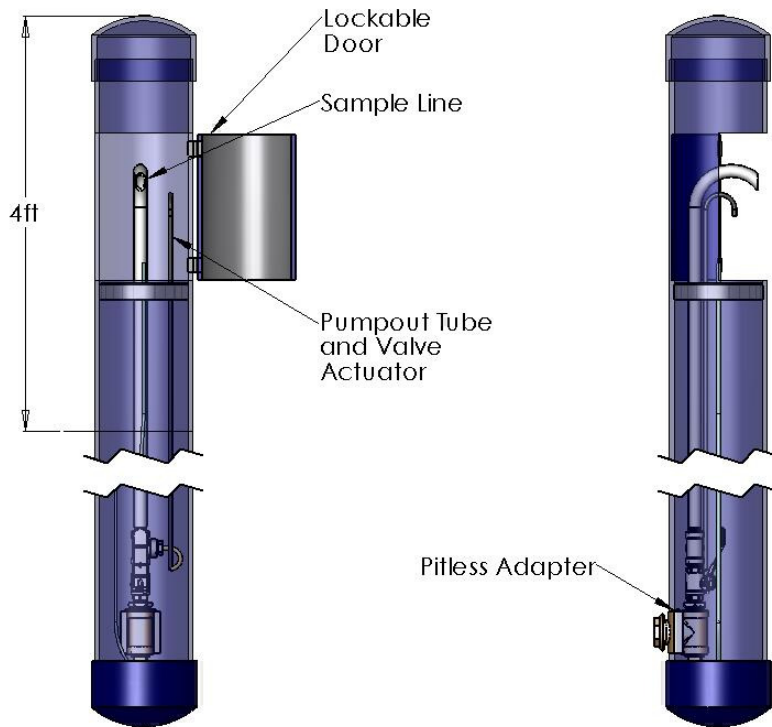
Faster Samples - No Site Contamination



Designed for Canadian Winters

Test Tap

Water Sample Station



- All stations are mounted in a lockable PVC enclosure.
- All sample station components are removable from the enclosure without digging and the use of any tools.
- Enclosure is water tight and made from PVC that is extremely durable and corrosion proof. The enclosure protects internal components from corrosive soil and ground water.
- Sample stations are constructed using an all stainless steel water way, the #1 hygienic material, thus reducing false positives.
- Sample stations are equipped with a 3/8 inch pump out tube to prevent freezing and bacteria growth.
- Sample stations available for any burial depth.
- Unit is very easy to flush at full bore than throttle down to a laminar flow to fill sample bottles without splashing.
- The sample station is operated by simply lifting on the pump out tube to turn on the water. Raise or lower tube to throttle flow.



Optional attachment allows operators to super chlorinate and pressure test water main. After a five min component switch out, the operator is ready for samples.

Contact Regal Waterworks Today

Tel: 905-857-9877
Cell: 705-718-9877
Fax: 905-857-3541
Email: regalwaterworks@yahoo.ca

NEW PRODUCT SHOWCASE

The **NEW** Standard in Water Service Tubing

Gold901™ is a lightweight, easy to install, 200 psi rated water service tubing that can be used on both the municipal and private-side of a project.

Gold901 is manufactured to Copper Tube Size (CTS) from High-Density Polyethylene (HDPE) and is third-party certified and listed to AWWA C901, CSA B137.1, NQ 3660-950 and NSF 61.

Gold901 is conveniently available in both coils and reels and is available in 3/4" to 2".

Features

Non-corroding

Resistant to corrosive soils, aggressive water, stray electrical currents and moist environments

Lightweight

A 200 foot coil of 3/4" Gold901 weighs 20 lbs

Sequential Markings

Every 2 or 5 feet

Superior Flow

Hazen Williams
C-Factor = 150

High Pressure

Rated at 200 psi at 73°F
(1380 kPa at 23°C)

Standards



B137.1



NSF-61



AWWA
C901



NQ
3660-950



Products are manufactured by IPEX Inc.
Gold901™ is a trademark of IPEX Branding Inc.

Product Selection Chart

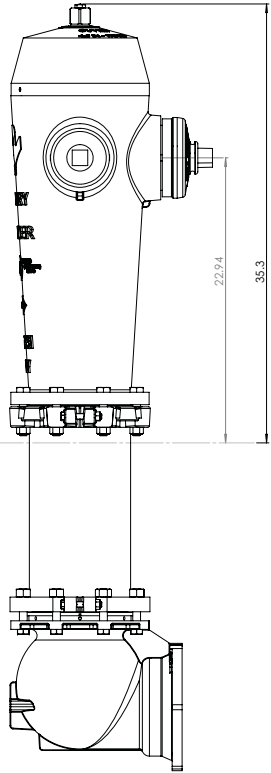
Nominal Pipe Size inches	mm	Coil Length feet	Product Code	O.D. Average (in)	I.D. Average (in)	Min. Radius of Bend (in)
3/4	20	100	121402	0.875	0.671	19
		200	121403			
		400	121404			
		500	121405			
		3000	121406			
1	25	100	121407	1.125	0.863	23
		150	121408			
		200	121409			
		300	121410			
		500	121411			
		1000	121412			
1-1/4	32	100	121414	1.375	1.055	30
		300	121415			
1-1/2	40	100	121416	1.625	1.245	34
		250	121417			
		400	121418			
		1000	121419			
2	50	100	121420	2.125	1.629	44
		200	121421			
		500	121422			

NOTE: Custom coil and reel sizes may be available upon request.

IPEX Inc.

Toll Free: (866) 473-9462

www.ipexinc.com

[illegible]

VISION	NUMBER
B	HYD-CEN
	SHEET 1 OF 1



< STANDARDS >



CSA
B182.2



ASTM
F679



NQ 3624-
130/135

introduction

Ring-Tite® piping systems are SDR35 and SDR28 sewer pipes and fittings manufactured to demanding ASTM, BNQ and CSA standards. Ring-Tite joints can withstand well in excess of both the ASTM and CSA requirements.

PRODUCT AVAILABILITY

SDR28	4", 5" and 6" (100 mm, 125 mm & 150 mm)
SDR35	4" through 60" (100 mm – 1500 mm)
SDR41	10" through 60" (250 mm – 1500 mm)

Short-Form Specification

General

Main line sewers will be PVC SDR35 sewer pipe and shall be in compliance with ASTM D 3034 or ASTM F679 and third party certified to CSA B182.2. Sewer laterals will be PVC SDR28 sewer pipe and shall be third party certified by CSA as above.

Material

PVC Poly(Vinyl Chloride) used in the manufacturing of Ring-Tite Gasketed Sewer Pipe complies with ASTM D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds, having a cell classification of 12454 or 12364.

Gasket materials used in the manufacturing of Ring-Tite Gasketed Sewer Pipe complies with the following requirements:

ASTM F477 "Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe" for low-head applications, or

ASTM F913 "Standard Specification for Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe"

Extruded Pipe

Extruded Ring-Tite Gasketed Sewer Pipe conforms to the following standards:

ASTM D2412 "Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading"

ASTM D3034 "Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings"

ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals"

ASTM F679 "Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings"

Lubricant

All Ring-Tite Gasketed Sewer Pipe must be assembled using PVC pipe lubricant.

Markings

Ring-Tite Gasketed Sewer Pipes are marked as prescribed in the above applicable standards to indicate size of the pipe, material designation, compliance to standard, and manufacturer's name or trademark.

Colour Coding

Ring-Tite Gasketed Sewer Pipe is colour-coded green for SDR35 and white for SDR28 & SDR41.

Joints

Sealing gaskets must meet the requirements of ASTM D3034 or ASTM F679, CSA B182.2. In addition, the pipe joints must be able to withstand a minimum hydrostatic pressure of 345 kPa (50 psi) without leakage.

Pipe Stiffness

The minimum ring stiffness shall be 320 kPa (46 psi) for SDR35 pipe and 625 kPa (90 psi) for SDR 28. This stiffness will be determined using the test methods prescribed by ASTM D3034 and ASTM F679.

Fittings

Injection-molded gasketed PVC fittings shall meet the requirements of ASTM 3034 and ASTM F1336 and shall be certified to CSA B182.1 or CSA B182.2. Fabricated fittings must conform to ASTM F1336 and CSA B182.2

Dimensions

SDR35								SDR28					
Size		Average ID		Min. Wall Thickness		Average OD		Average ID		Min. Wall Thickness		Average OD	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
4	100	3.97	100.94	0.12	3.06	4.21	107.06	3.91	99.42	0.15	3.82	4.21	107.06
5	135	5.32	135.08	0.16	4.09	5.64	143.26	5.24	133.02	0.20	5.12	5.64	143.26
6	150	5.92	150.29	0.18	4.55	6.28	159.39	5.83	148.01	0.22	5.69	6.28	159.39
8	200	7.92	201.16	0.24	6.10	8.40	213.36	—	—	—	—	—	—
10	250	9.90	251.46	0.30	7.62	10.50	266.70	—	—	—	—	—	—
12	300	11.79	299.36	0.36	9.07	12.50	317.50	—	—	—	—	—	—
15	375	14.43	366.42	0.44	11.10	15.30	388.62	—	—	—	—	—	—
18	450	17.63	447.87	0.53	13.57	18.70	475.01	—	—	—	—	—	—
21	525	20.79	527.99	0.63	16.00	22.05	559.99	—	—	—	—	—	—
24	600	23.39	594.00	0.71	18.00	24.80	630.00	—	—	—	—	—	—
27	675	26.36	669.42	0.80	20.29	27.95	710.00	—	—	—	—	—	—
30	750	30.17	766.36	0.91	23.22	32.00	812.80	—	—	—	—	—	—
36	900	36.11	917.22	1.09	27.79	38.30	972.80	—	—	—	—	—	—
42	1,050	41.95	1,065.72	1.27	32.29	44.50	1,130.30	—	—	—	—	—	—
48	1,200	47.89	1,216.56	1.45	36.87	50.79	1,290.30	—	—	—	—	—	—
54	1,350	54.27	1,378.49	1.64	41.77	57.55	1,462.00	—	—	—	—	—	—
60	1,500	58.08	1,475.48	1.76	44.71	61.61	1,564.90	—	—	—	—	—	—

Ring-Tite fittings are injection molded in most configurations up to 375mm (15") nominal diameter. Larger sizes are fabricated from sections of pipe.

Installation

Please consult with our PVC Sewer Pipe and Fittings Installation Guide for complete installation information including:

- Receiving and Handling Pipe Shipments
- Trench Preparation
- Lowering Pipe and Fittings into Trench
- Assembling IPEX Joints
- Curvature of the Pipeline
- Cutting and Chamfering the Pipe

The guide is available at www.ipexna.com

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the world's largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems
- PVC, CPVC, PP, PVDF, PE, ABS, and PEX pipe and fittings

Products are manufactured by IPEX Inc.

Ring-Tite® is a trademark of IPEX Branding Inc.

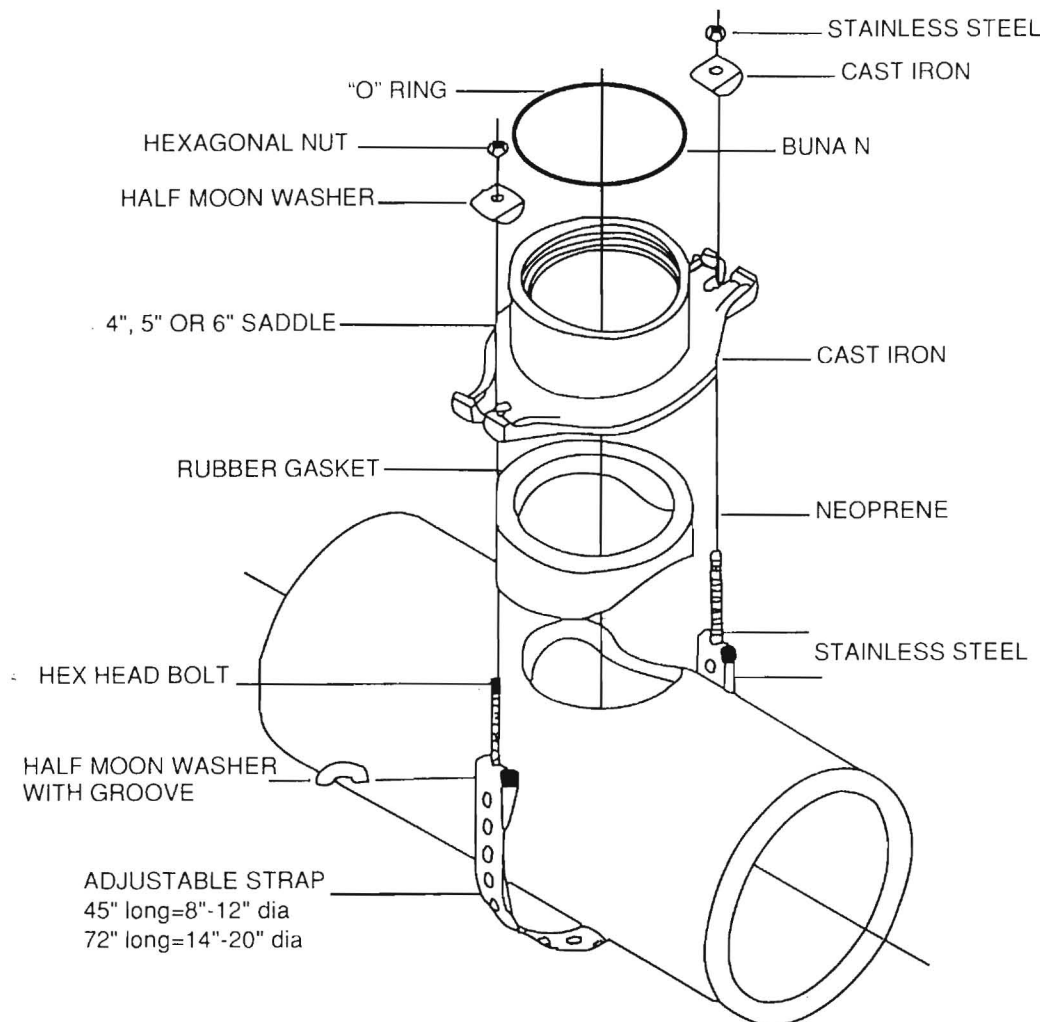
This literature is published in good faith and is believed to be reliable. However, it does not represent and/or warrant in any manner the information and suggestions contained in this brochure. Data presented is the result of laboratory tests and field experience.

A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice.

CONCORD D-50 SEWER SADDLES

When connecting 4", 5" or 6" AC or PVC building sewer pipes to AC, concrete or PVC mains 8" to 20".

- Larger sizes available upon request.
- Each Saddle fits a wide range of pipe O.D.'s. A small inventory can therefore service **all** your installation needs.



1. The length of the stainless steel strap, assembled without welding, is determined by the nominal size of the sewer pipe main.
2. For a perfect seal, it is important to choose the proper "O" ring for building sewer pipe. By knowing the O.D. check the table below and choose the "O" ring you need.

	4"		" O " RING	5"		"O" RING	6"		"O" RING
	MIN.	MAX.		MIN.	MAX.		MIN.	MAX.	
OUTSIDE	4.200	4.240	13/32	5.280	5.320	13/32	6.260	6.290	13/32
DIAMETER	4.500	4.590	1/4	5.560	5.650	1/4	6.620	6.650	1/4

3. IMPORTANT

Excess strap should not be cut off. Fold 5" excess strap inward toward and against main to form a secure pocket for the T-head bolt. Failure to fold strap inward may cause the strap to tear in installation. It is unnecessary to apply a torque load above 30 foot-pounds.

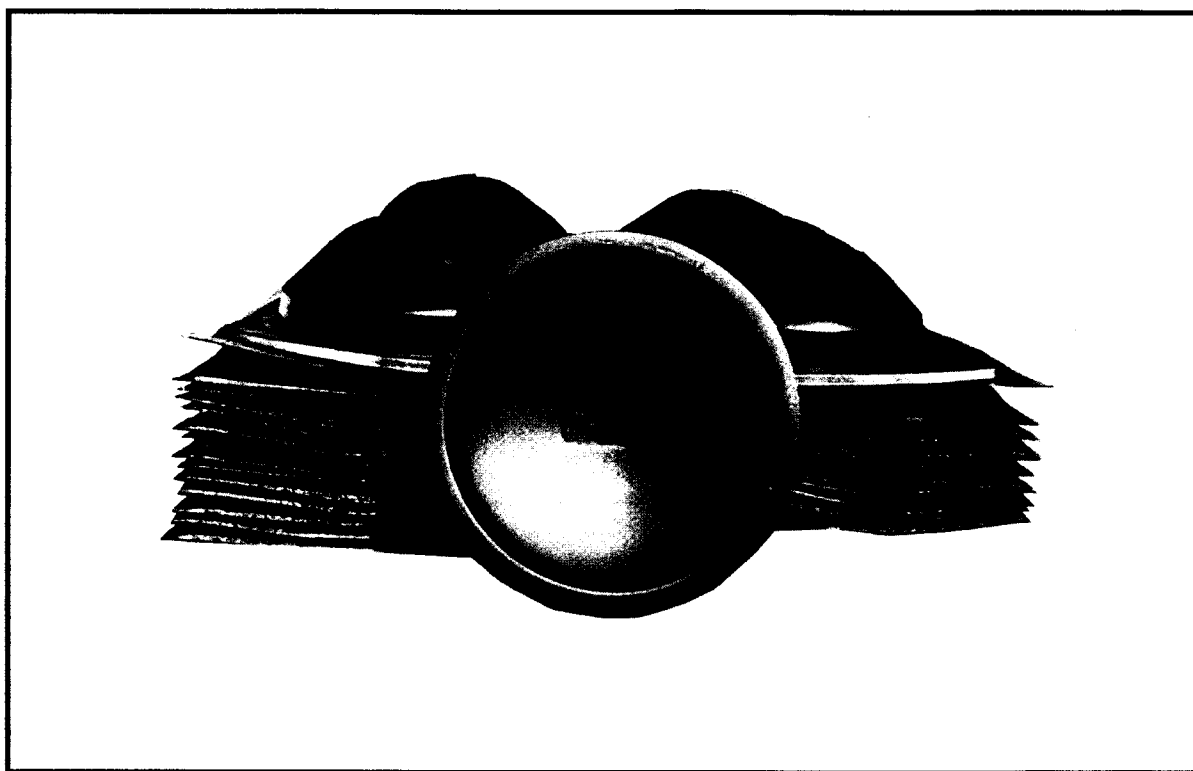
CLOW
CLOW CANADA

HEAD OFFICE
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EASTERN CANADA
P.O. Box 700
Saint John, NB E2L 4B3
Tel: (506) 633-2541
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Flow In Flow™



AN ECONOMICAL SOLUTION TO A COSTLY PROBLEM.

**P.O. BOX 700933
SAN ANTONIO, TX 78270-0933**

**Email: noflowin@flash.net
www.noflowinflow.com**

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**OFFICE: 830-634-3029
FAX: 830-634-3308**



**PLANT: 210-651-9618
800-616-3569**



PLANT FAX: 210-651-6219

INTRODUCTION

One of the most important problems facing the 21st Century is water conservation. The water and sewer industry will be called upon to find new solutions to old problems to insure that water is treated and used efficiently.

During rainy weather, an average manhole contributes from 3,000 to 12,000 gallons per day of rain water, to the treatment systems.

The NO FLOW INFLOW dish is made to your requirements from virtually indestructible material to offer a simple to install, long lasting product that eliminates sheet flow of rain water into the sanitary sewer system. Added advantages are the elimination of debris and dirt and reduction of manhole odors and manhole cover rattle noise.

BENEFITS

- 10 year warranty on the body of the in flow dish. (.187 Material Thickness)
- Ventilation by valve or vent hole.
- Manufactured of ultra high density, high molecular weight polyethylene.
- MARLEX HXM 50100 . . . extra high molecular weight Hexene copolymer

SPECIFICATIONS

- The dish is made of ultra high density polyethylene copolymer material that meets ASTM specifications designation D 1248, Class A, Category 5, Type 111 with a minimum impact brittleness temperature of -180°F. The thickness shall be uniform 1/8" or greater. This material is corrosion proof from all gasses associated with waste water collection systems.
- The lift strap is made of a 1 inch wide woven polypropylene web and is attached to the bowl of the dish by a wide head stainless steel 3/16" rivet and a stainless steel 3/4" backup washer. All cut edges are sealed to insure against raveling.

- Ventilation is provided by a vent hole and/or a valve located on the side of the bowl. The hole or valve allows a maximum release of 5 gallons of water per 24 hours and is not effected by debris that might collect in the bottom of the dish. Sewer gas is vented at one P.S.I. or less.
- The gasket is made of closed cell neoprene and is attached by a pressure sensitive adhesive to the weight bearing surface of the dish.

MARLEX HXM 50100 . . . EXTRA HIGH MOLECULAR WEIGHT HEXENE COPOLYMER

CUSTOMER BENEFITS

- An excellent balance of stress cracking resistance, stiffness and melt strength make this resin an ideal candidate for large blow molded items and thermoformed parts.

This resin has . . . • Good melt Strength

. . . and produces molded parts with . . . • Excellent stress cracking resistance
• Good Rigidity • Excellent impact strength even at low temperatures

SUGGESTED APPLICATIONS

Blow Molded items such as . . . • 55-gallon shipping containers • Gasoline tanks
• Agricultural chemical tanks

. . . and thermoformed items such as . . . • 55-gallon shipping containers
• Gasoline tanks • Agricultural chemical tanks • Pallets
• Cattle Feeders • Large formed parts • Boats

PROPERTIES

NOMINAL PHYSICAL PROPERTIES OF MARLEX HXM 50100

PROPERTY	ASTM	ENGLISH		METRIC	
		UNITS	VALUE	UNITS	VALUE
Density	D1505	lbs/ft ³	59.4	g/cc	0.950
ESCR, Condition A, F ₅₀	D1505	h	800	h	800
Tensile Strength	D638				
2" (50.8mm) per min	Type IV	psi	3800	MPa	26.1
Brittleness Temperature	D746	°F	<-180	°C	<-118

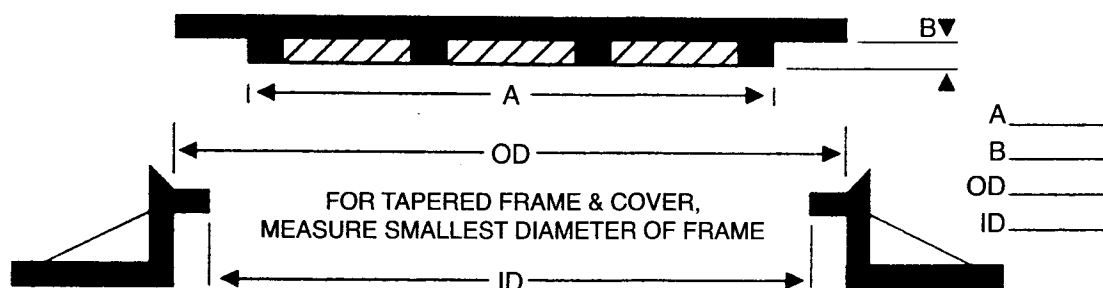
INSTALLATION

The manhole frame shall be cleaned of all dirt and debris before placing the manhole insert on the rim.

The manhole insert shall be fully seated around the manhole frame rim to prevent water from infiltrating between the cover and the manhole frame rim.

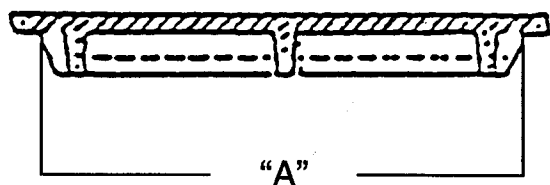
ORDERING

To insure proper fit, dishes are manufactured to specific measurements provided by the purchaser. These measurements are obtained according to the following diagrams.



CHECK or CIRCLE the cover design (side view) for this manhole cover.

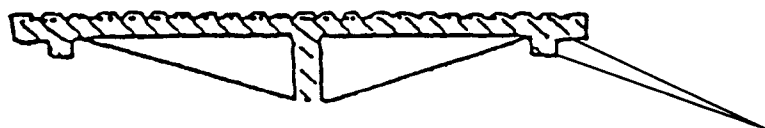
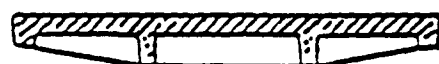
STYLE "B"



"A" Measurement is the diameter between these two points, (NOT THE OVERALL DIAMETER OF THE COVER)

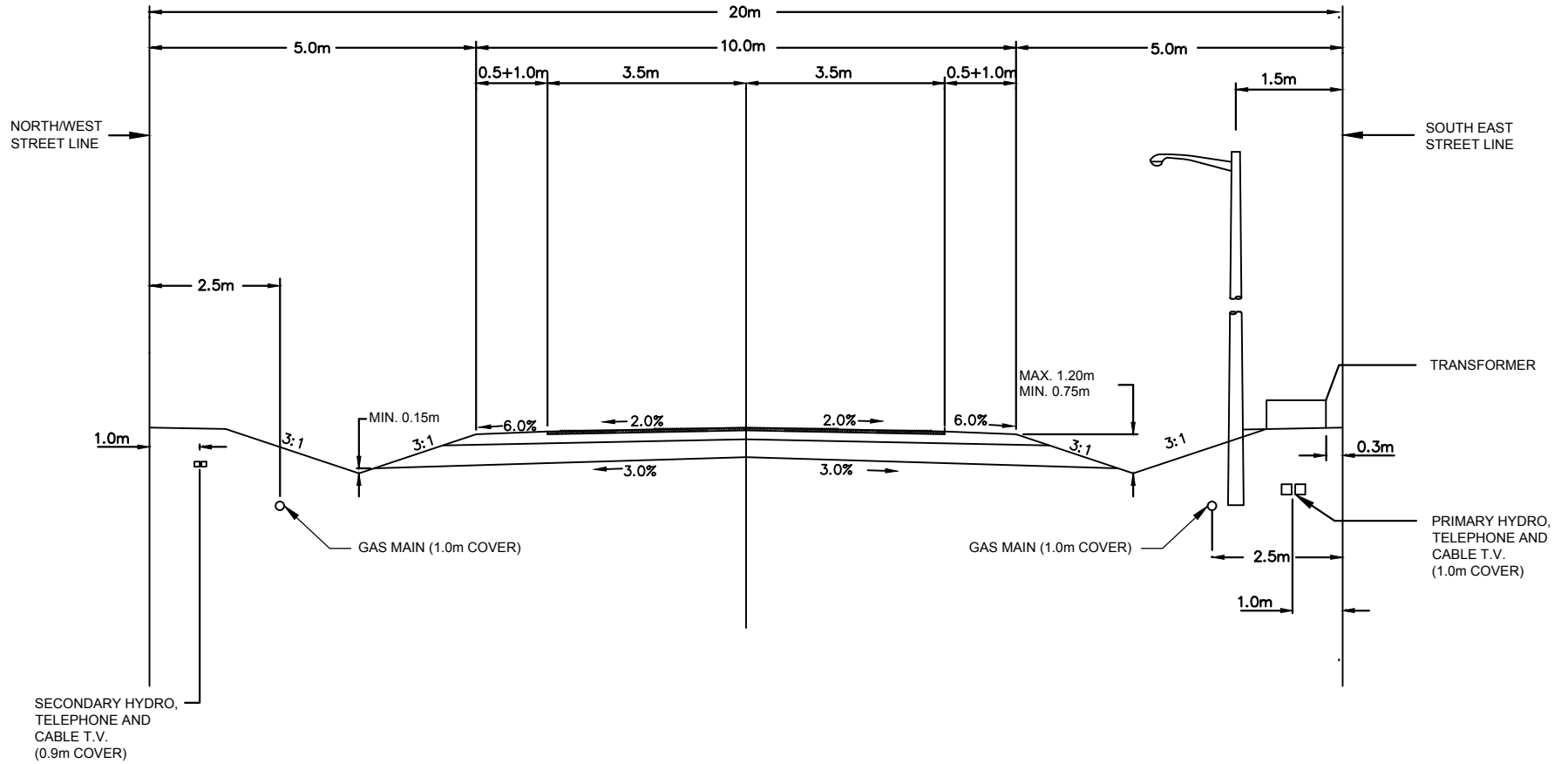
STYLE "A"

(No "A" or "B" measurements)



"B" Measurement is found between these two points (NOT THE OVERALL THICKNESS OF THE COVER)

Appendix F
Standard Drawings



NOTE:

ROAD

- 40mm HL3 SURFACE COURSE ASPHALT
- 40mm HL4 BASE COURSE ASPHALT
- 150mm GRANULAR 'A'
- 300mm GRANULAR 'B' MIN OR AS PER
- GEOTECHNICAL RECOMMENDATION

BOULEVARD

- 75mm TOPSOIL AND NURSERY SOD

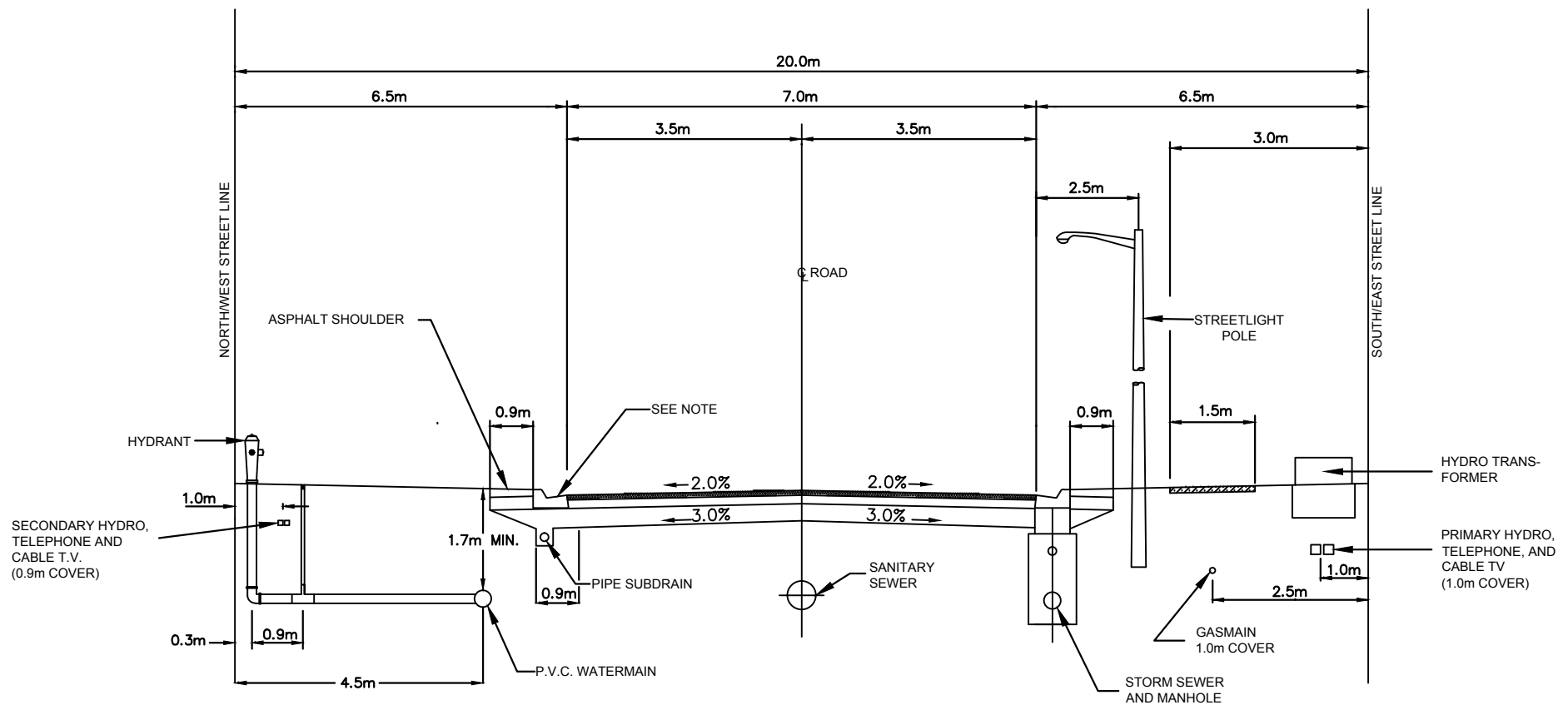
TOWNSHIP OF CLEARVIEW

Figure Title

STANDARD 9.0m ROAD - 20m R.O.W. (OPEN DITCH)

No.	Issue / Revision	Date	Auth.

Drawn R.J. BURNSIDE	Approved	DWG. No. STD-R1A
Scale N.T.S.	Date 16/12/12	



NOTES:

ROAD	-40mm HL3 SURFACE COURSE ASPHALT -40mm HL4 BASE COURSE ASPHALT -150mm GRANULAR 'A' -300mm GRANULAR 'B' (MIN) OR AS PER GEOTECHNICAL RECOMMENDATIONS
SHOULDER	-50mm HL4 ASPHALT -150mm GRANULAR 'A'
BOULEVARD SIDEWALKS	-75mm TOPSOIL AND NURSERY SOD - 150MM GRANULAR 'A' BASE - 125MM CONCRETE 30 MPA (150MM AT DRIVEWAYS)
MINIMUM RADII	-CUL DE SAC 13.0m -RETURN 10.0m
CURB	-600.100 RESIDENTIAL -600.010 COMMERCIAL, INDUSTRIAL, MULTI-RESIDENTIAL

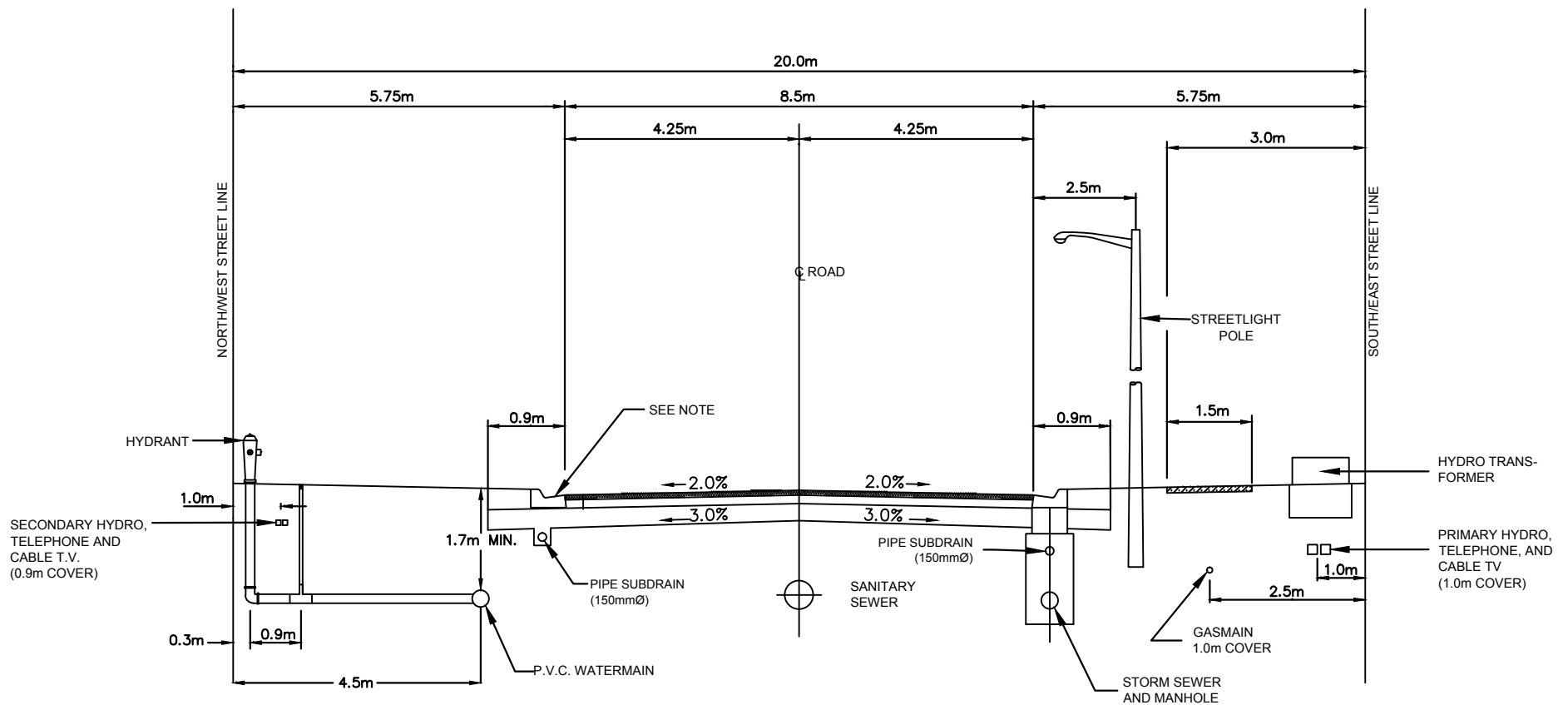
TOWNSHIP OF CLEARVIEW

Figure Title

**STANDARD 7.0m ROAD - 20m R.O.W.
(GUTTER - WITH SERVICE LOCATIONS)**

No.	Issue / Revision	Date	Auth.

Drawn R.J. BURNSIDE	Approved	STD-R2
Scale N.T.S.	Date 16/12/12	



NOTES:

ROAD	-40mm HL3 SURFACE COURSE ASPHALT -40mm HL4 BASE COURSE ASPHALT -150mm GRANULAR 'A'
SIDEWALKS	-300mm GRANULAR 'B' (MIN) OR AS PER GEOTECHNICAL RECOMMENDATIONS -150MM GRANULAR 'A' BASE -125MM CONCRETE 30 MPA (150MM AT DRIVEWAYS)
BOULEVARD MINIMUM RADII	-75MM TOPSOIL AND NURSERY SOD -CUL DE SAC 13.0m -RETURN 10.0m
CURB	-600.100 RESIDENTIAL -600.010 COMMERCIAL, INDUSTRIAL, MULTI-RESIDENTIAL

TOWNSHIP OF CLEARVIEW

Figure Title

**STANDARD 8.5m ROAD - 20m R.O.W.
(CURB & GUTTER)
WITH SERVICE LOCATIONS**

Drawn
R.J. BURNSIDE

Approved

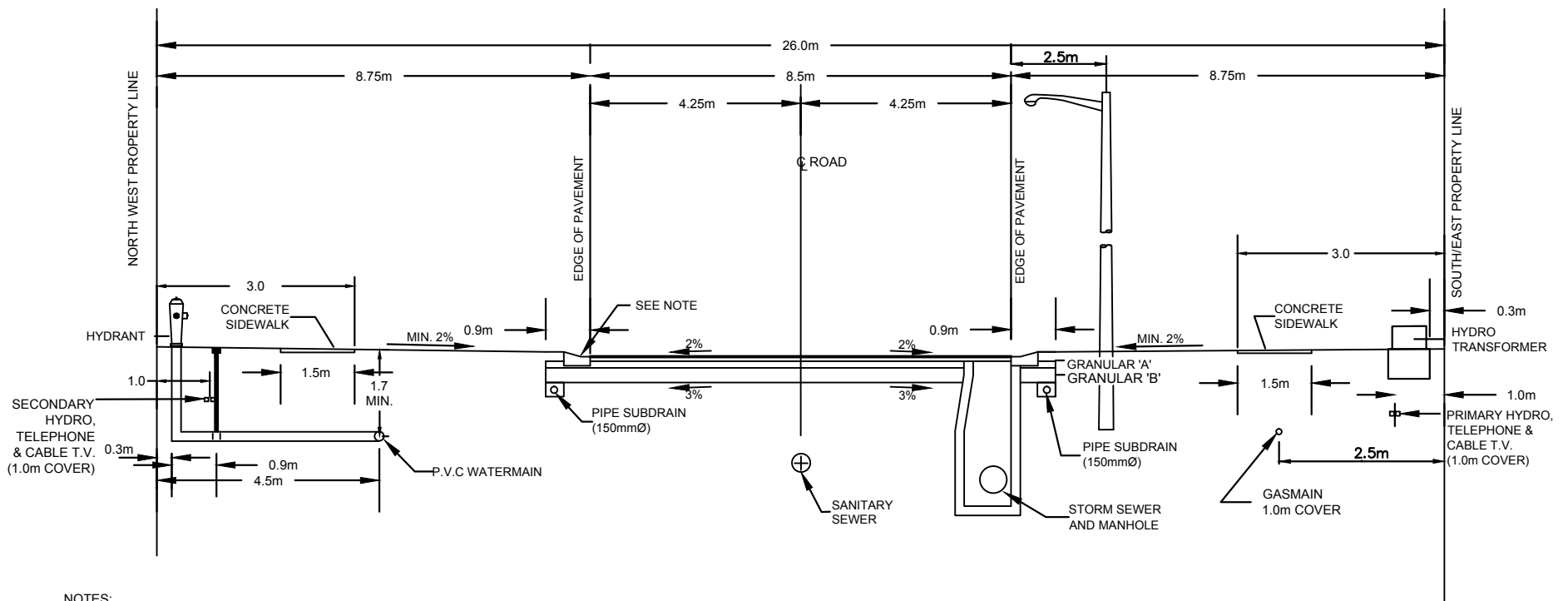
DWG. No.

Scale
N.T.S.

Date
16/12/12

STD-R3

No.	Issue / Revision	Date	Auth.



NOTES:
ROAD

- 40mm HL3 SURFACE COURSE ASPHALT
- 40mm HL4 BASE COURSE ASPHALT
- 150mm GRANULAR 'A'
- 300mm GRANULAR 'B' (MIN) OR AS PER GEOTECHNICAL RECOMMENDATIONS

SIDEWALKS

- 150mm GRANULAR 'A' BASE
- 125mm CONCRETE 30 MPa (150mm AT DRIVEWAYS)

BOULEVARDS

- 75mm TOPSOIL & NURSERY SOD

MINIMUM RADII

- CUL DE SAC 13.0m
- RETURN 10.0m

CURB

- 600.100 RESIDENTIAL
- 600.010 COMMERCIAL, INDUSTRIAL, MULTI-RESIDENTIAL

ROAD SECTION APPLIES TO:
BASED ON TOWNSHIP OF CLEARVIEW
STANDARD (STD-R3)

TOWNSHIP OF CLEARVIEW

Figure Title

**STANDARD 8.5m ROAD - 26m R.O.W.
(CURB & GUTTER)
WITH SERVICE LOCATIONS**

Drawn

R.J. BURNSIDE

Approved

DWG. No.

STD-R4

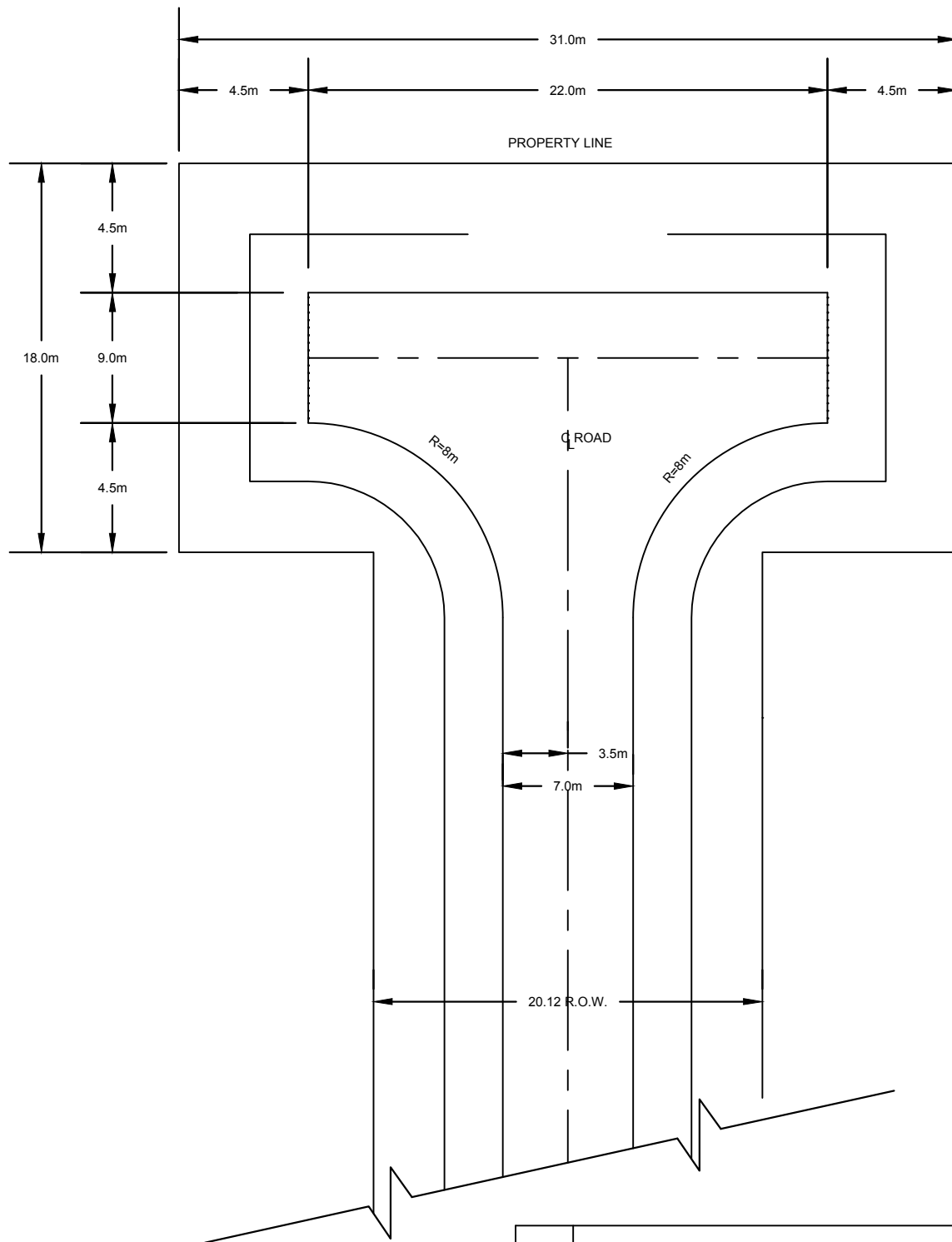
Scale

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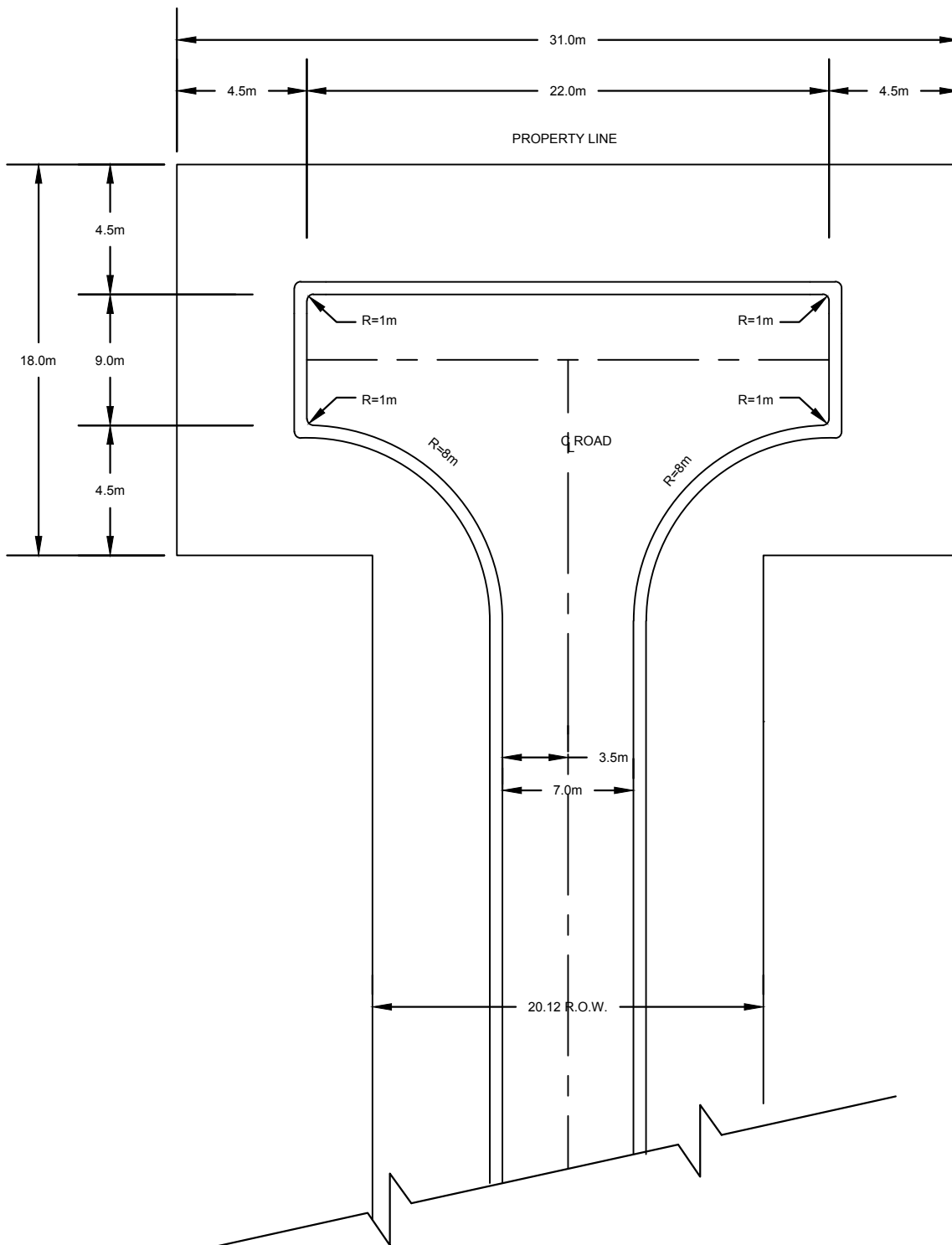
Date

16/12/12

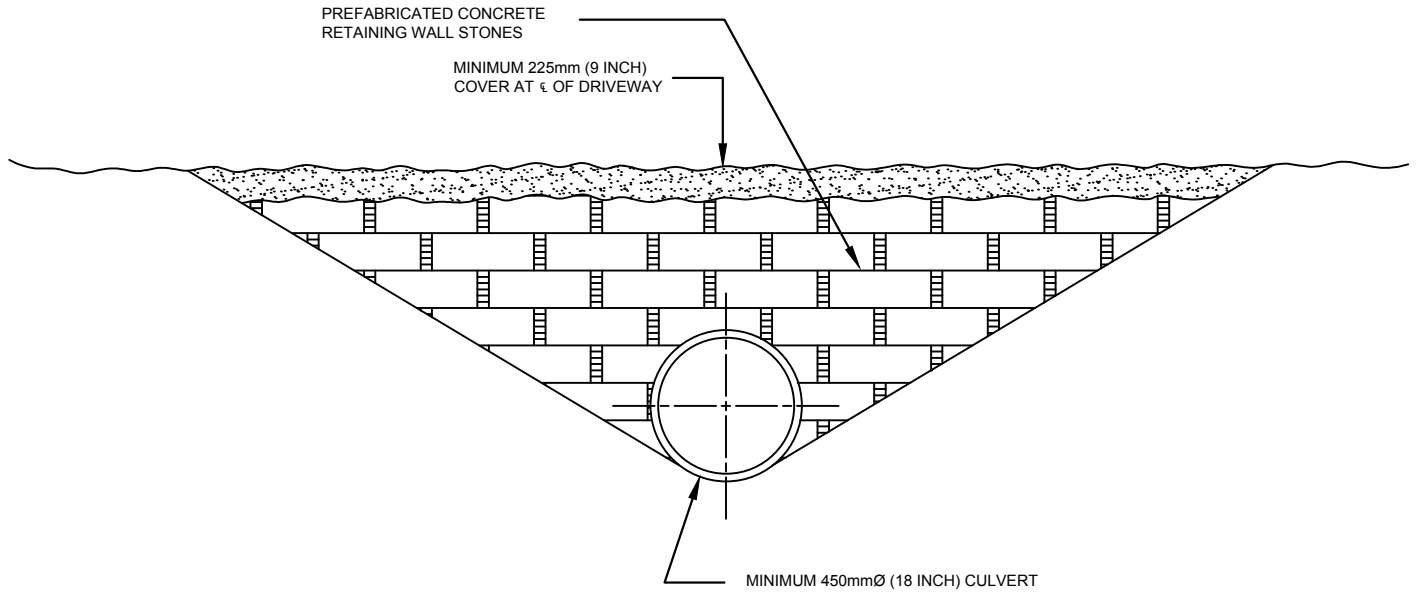
No.	Issue / Revision	Date	Auth.



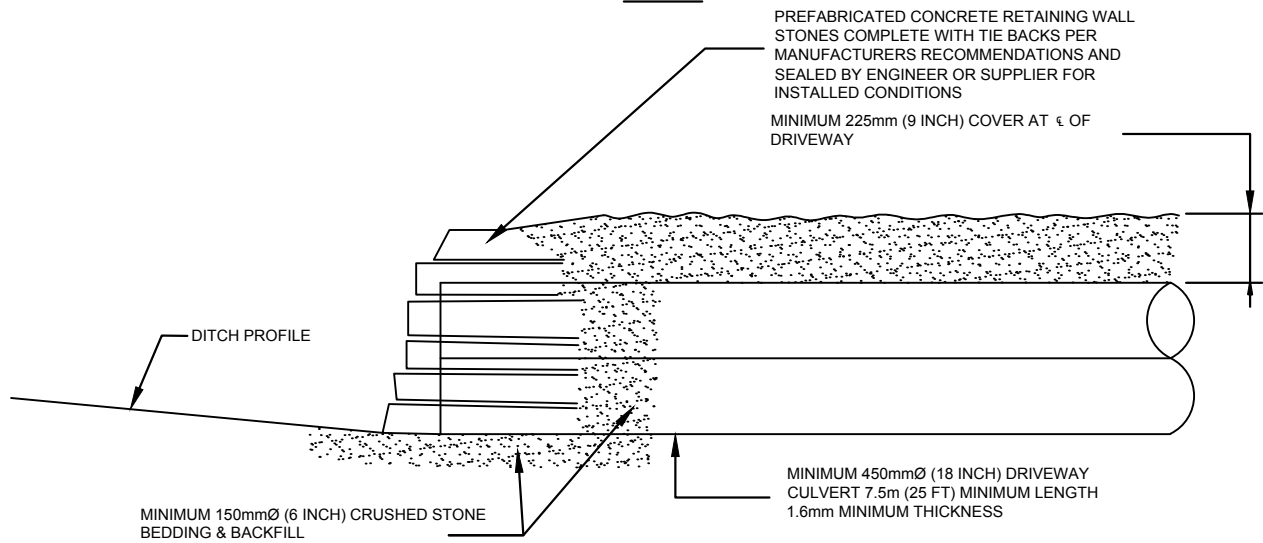
No.	Issue / Revision	Date	Auth.
TOWNSHIP OF CLEARVIEW			
Figure Title STANDARD TURNING BASIN 7.0m ROAD - 20m R.O.W. (OPEN DITCH)			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
STD-R5A			



No.	Issue / Revision	Date	Auth.
TOWNSHIP OF CLEARVIEW			
Figure Title STANDARD TURNING BASIN 7.0m ROAD - 20m R.O.W. (CURB AND GUTTER)			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
STD-R5B			



END VIEW

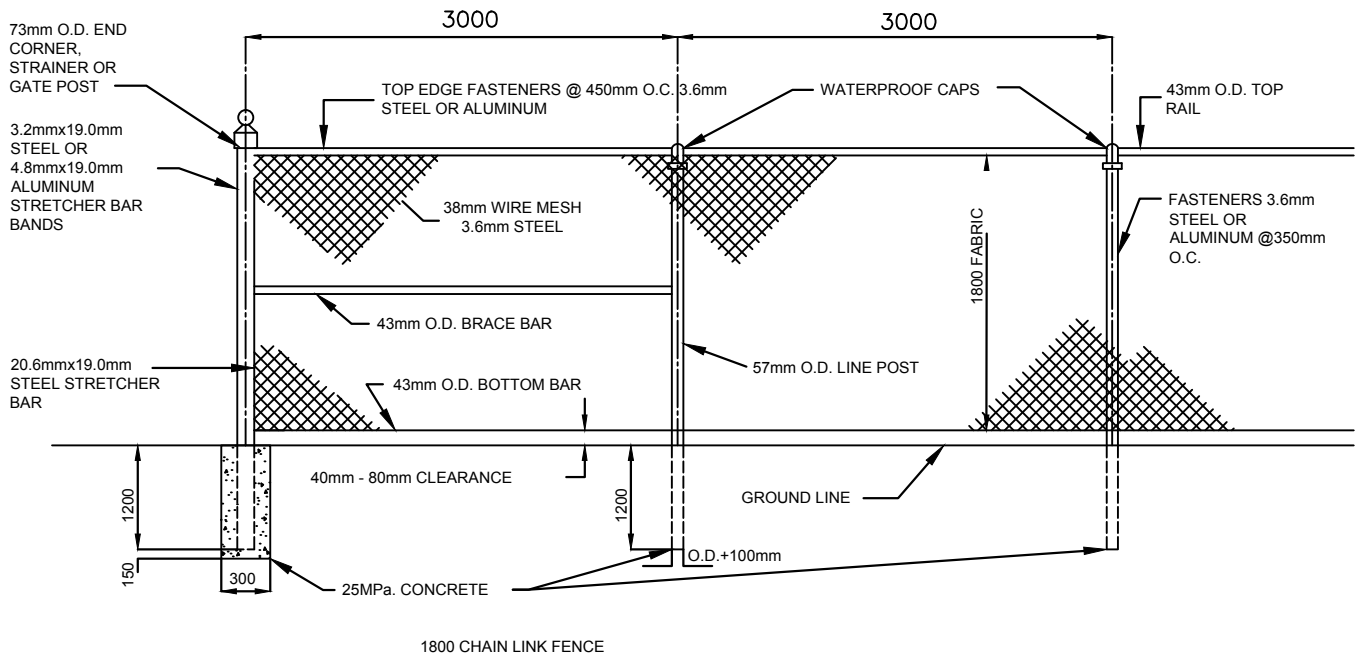
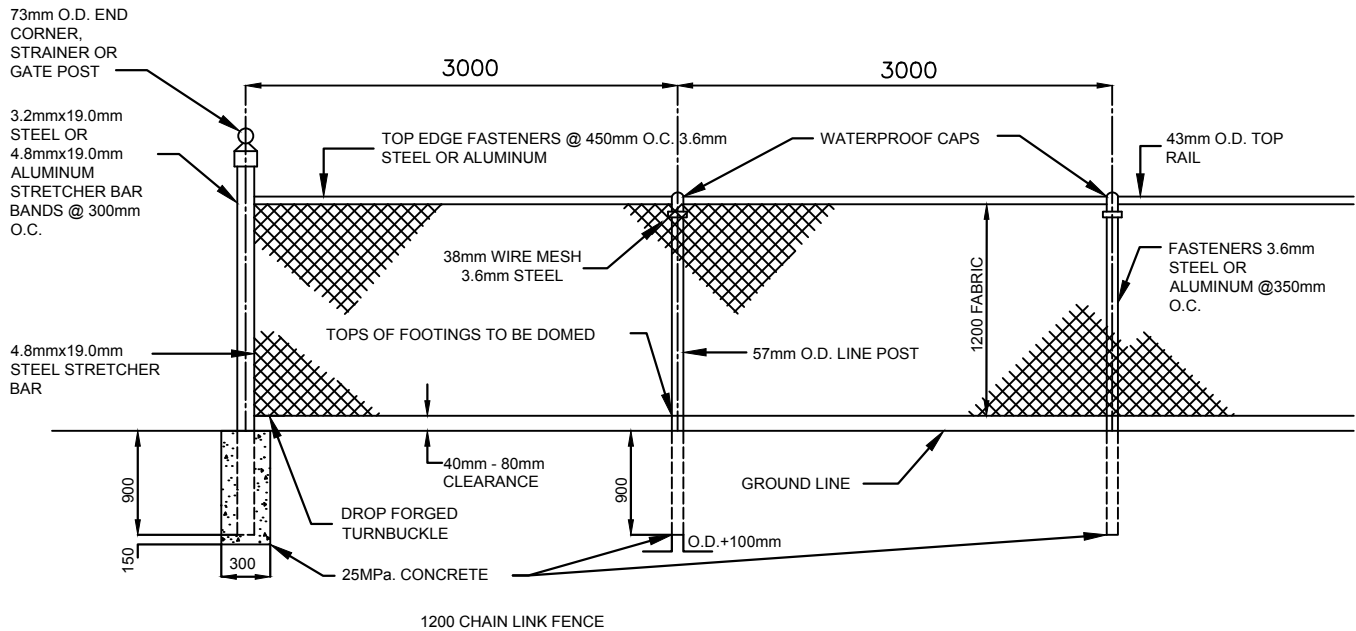


LONGITUDINAL SECTION

NOTES:

1. NO DRIVEWAY OR CULVERT SHALL BE LOCATED CLOSER THAN 1.5m TO ANY WATER VALVE, CURB STOP, LOT LINE, TRANSFORMER OR STREET LIGHT.
2. RETAINING WALLS GREATER THAN 1 METER IN HEIGHT, ABOVE INVERT OF PIPE SHALL HAVE TIE-BACKS

No.	Issue / Revision	Date	Auth.
<p>TOWNSHIP OF CLEARVIEW</p> <p>Figure Title</p> <p>CULVERT END WALL DETAIL (50 KPH ZONE OR LESS)</p>			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
			STD-D1

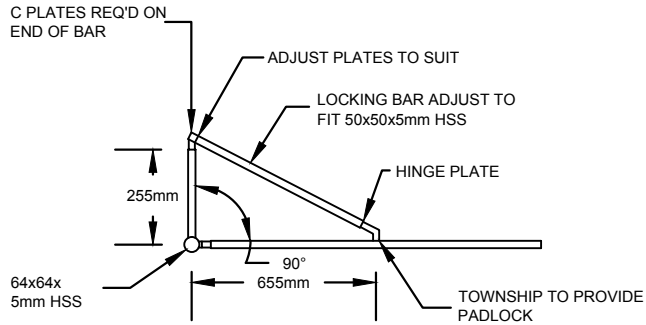


NOTES:

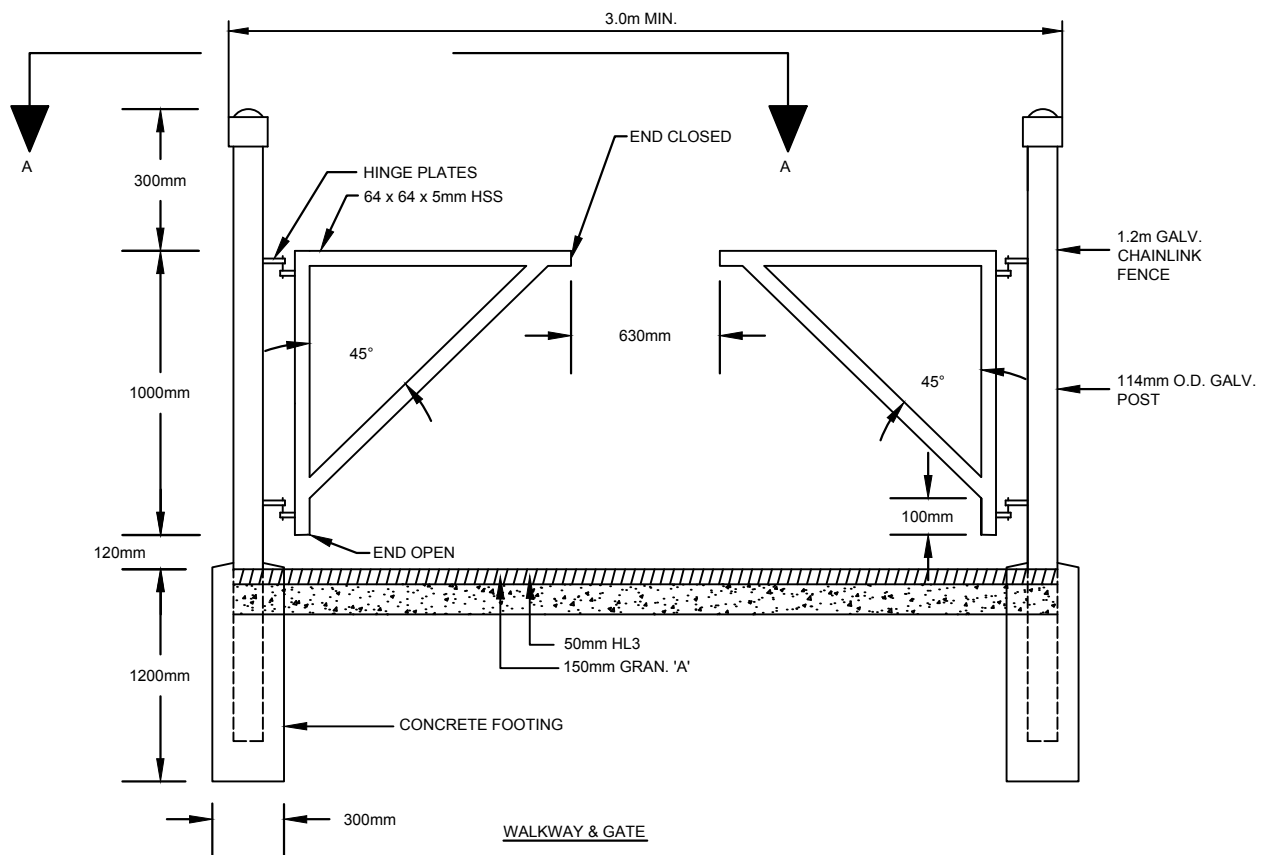
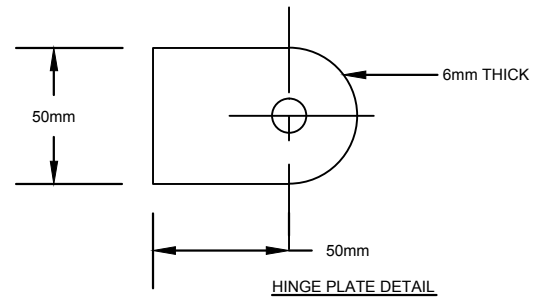
- ALL FABRIC SHALL BE 3.6mm KNUCKLED AT TOP AND BOTTOM AND ONE OF THE FOLLOWING MATERIALS
 - STEEL WIRE, HOT DIP GALVANIZED AFTER WEAVING
 - STEEL WIRE, ELECTRO GALVANIZED BEFORE WEAVING
- ALL POST AND RAILS SHALL BE GALVANIZED STEEL PIPE "STANDARD WEIGHT", CONFORMING TO CURRENT SPECIFICATIONS FOR BLACK & HOT DIPPED ZINC COATED (GALVANIZED) WELDED AND SEAMLESS PIPE. FOR ORDINARY USES, ASTM. DESIGNATION A 120
- ALL REQUIRED FITTINGS AND HARDWARE SHALL BE OF A SUITABLE ALUMINUM ALLOY OR OF A STEEL DUCTILE IRON. ASTM. SPECIFICATIONS (A 152)
- MINIMUM REQUIREMENTS FOR ZINC COATING

FABRIC AND WIRE	0.5kg/m ²
POST AND RAILS	0.5kg/m ²
FRAMES AND BRACES	0.5kg/m ²
CAST FITTINGS	0.6kg/m ²
OTHER FITTINGS	0.6kg/m ²

No.	Issue / Revision	Date	Auth.
<h2 style="text-align: center;">TOWNSHIP OF CLEARVIEW</h2>			
<p>Figure Title</p> <h3 style="text-align: center;">CHAIN LINK FENCE</h3>			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
			STD-P1



DETAIL A-A

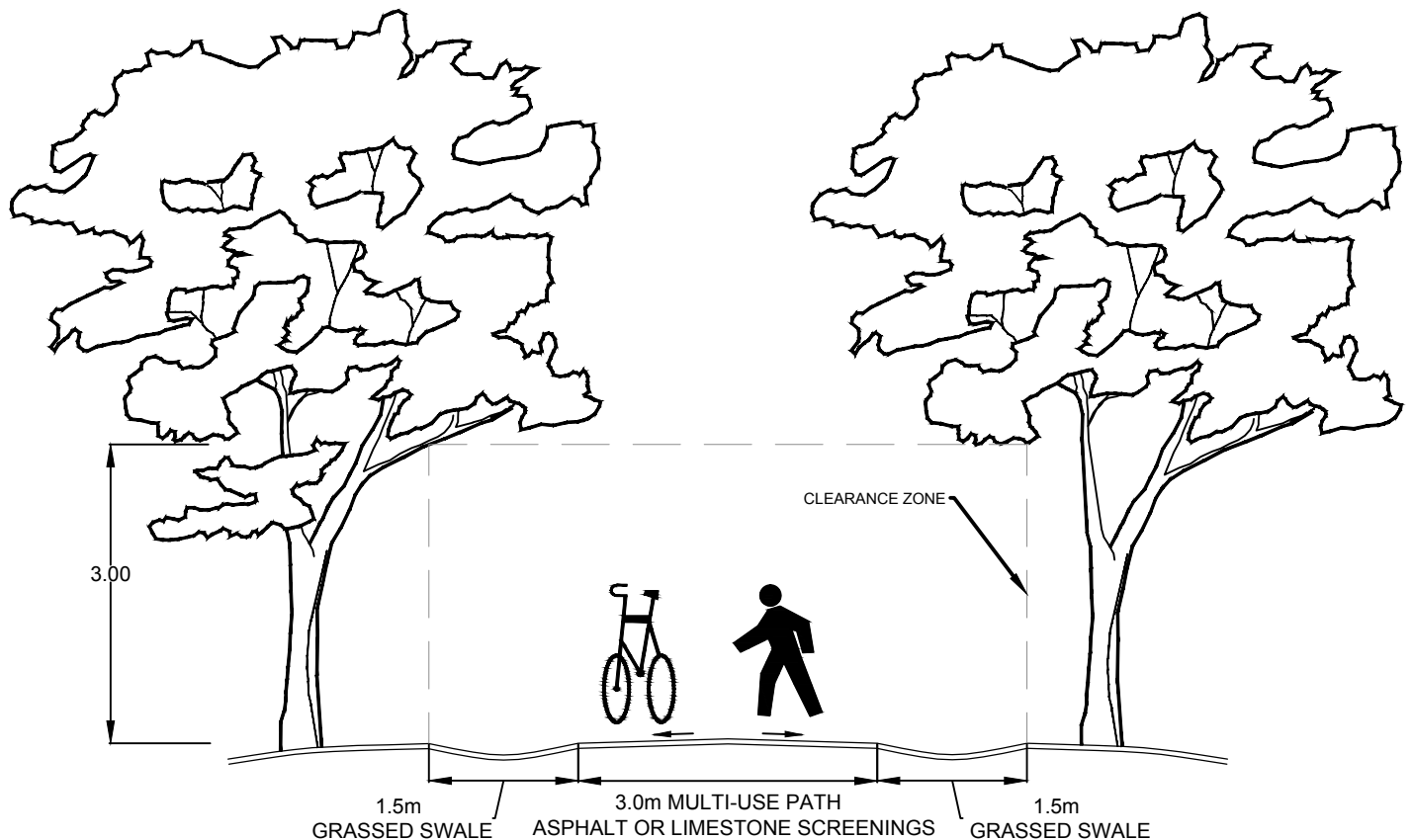


WALKWAY & GATE

NOTES:

- ALL JOINTS WELDED
- GATES TO BE PREMANUFACTURED AND HOT DIPPED GALVANIZED
- FENCE AS PER OPSD 900.01
- HINGE PINS 19mm Ø STAINLESS BOLTS WITH LOCK NUTS WELDED.

No.	Issue / Revision	Date	Auth.
TOWNSHIP OF CLEARVIEW			
Figure Title WALKWAY GATE DETAIL			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	STD-WG1
		16/12/12	



CLEARING WIDTH	6.0m
CLEARING HEIGHT	3.0m
DESIRABLE GRADES	0.5% - 3%

1. PATHS SHALL BE GRADED TO DIRECT FLOW TOWARDS SWALES AND AVOID PONDING AND OVERLAND FLOW ROUTES.
2. SECURITY LIGHTING, WHERE REQUIRED, SHALL BE THE SAME TYPE AS THE SUBDIVISION STREET LIGHTING AND SHALL MEET ALL TOWNSHIP STREET LIGHTING STANDARDS.
3. WALKWAYS TO BE ASPHALT SURFACE INCLUDING URBAN PARKS AND AROUND STORM WATER MANAGEMENT PONDS. LIMESTONE SCREENING SURFACE WILL BE CONSIDERED IN RURAL TYPE AREAS

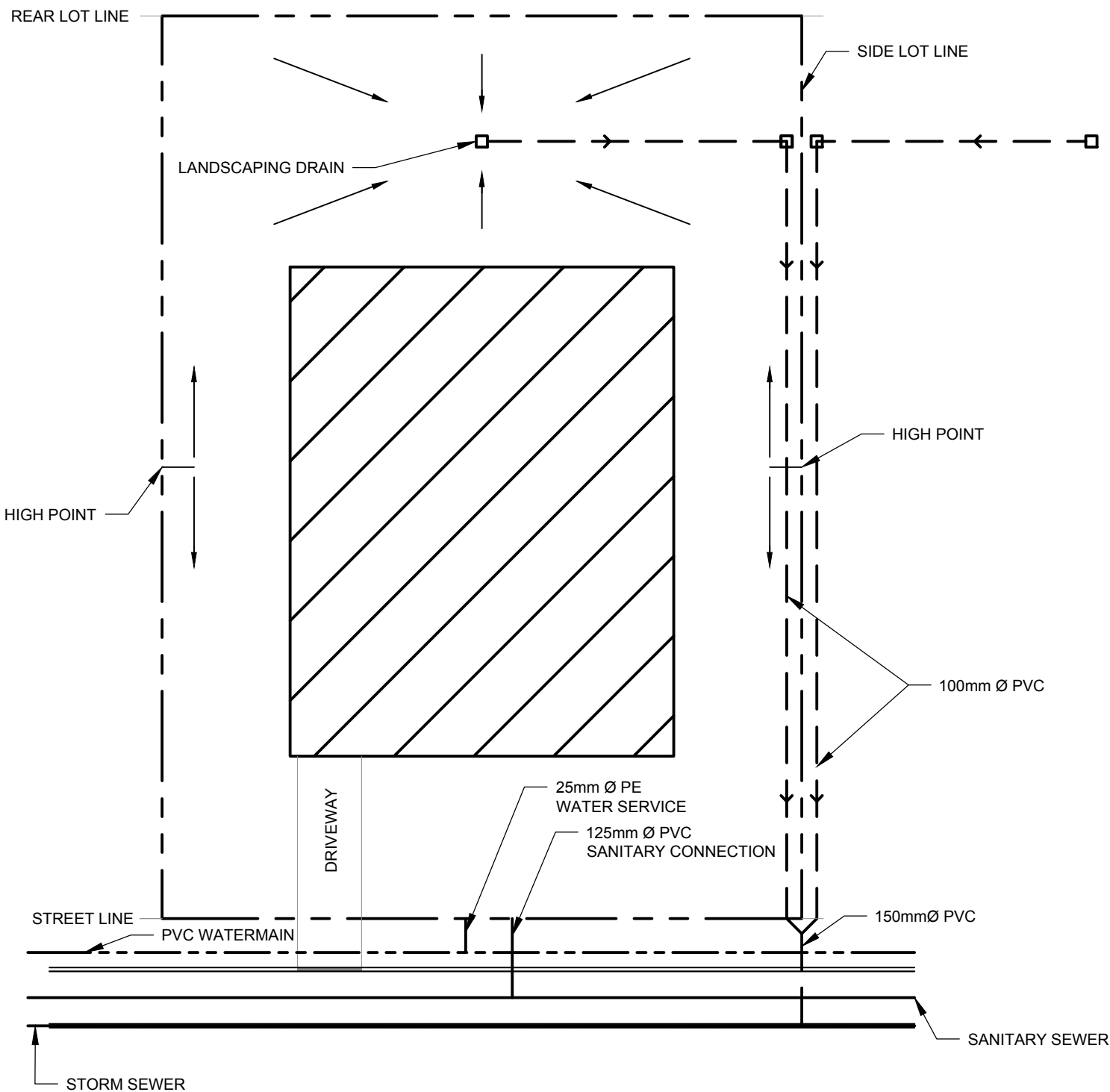
ASPHALT PATHS

1. PATH SURFACE TO BE A HL3 WITH A DEPTH OF 50mm
2. BASE SHALL BE 150mm OF GRANULAR "A", COMPACTED TO 98% STANDARD PROCTOR DENSITY

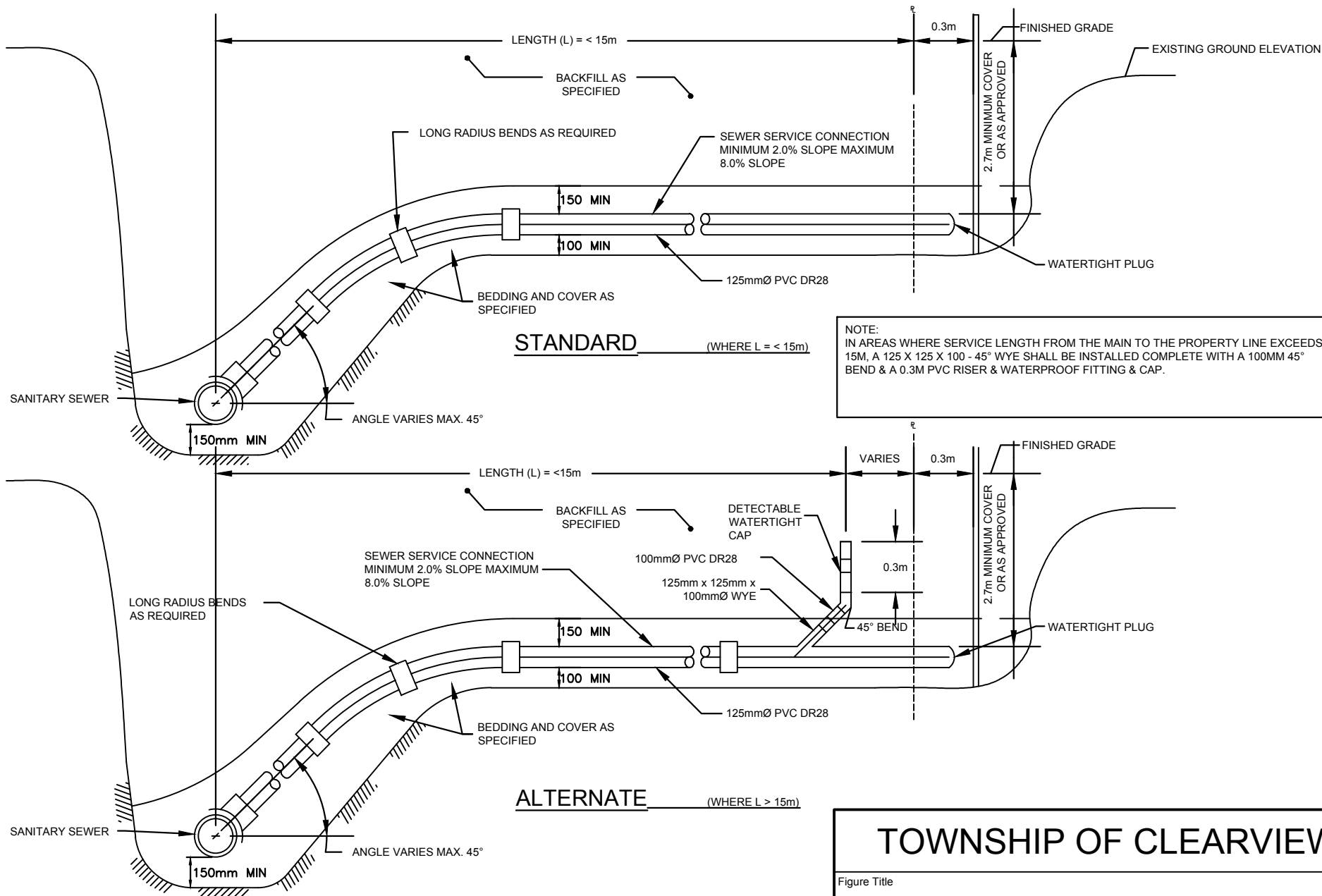
LIMESTONE SCREENINGS

1. PATH SURFACE TO BE A 50mm LIMESTONE SCREENINGS MATERIAL
2. BASE SHALL BE 150mm OF GRANULAR "A", COMPACTED TO 98% STANDARD PROCTOR DENSITY

No.	Issue / Revision	Date	Auth.
<h2 style="text-align: center;">TOWNSHIP OF CLEARVIEW</h2> <p>Figure Title</p> <h3 style="text-align: center;">WALKWAY DETAIL (PARKS)</h3>			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
			STD-WW1



No.	Issue / Revision	Date	Auth.
TOWNSHIP OF CLEARVIEW			
Figure Title SPLIT LOT DRAINAGE			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	STD-STM1
		16/12/12	



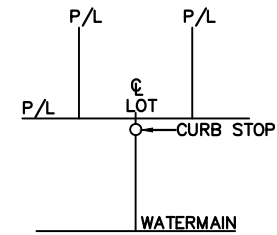
TOWNSHIP OF CLEARVIEW

Figure Title

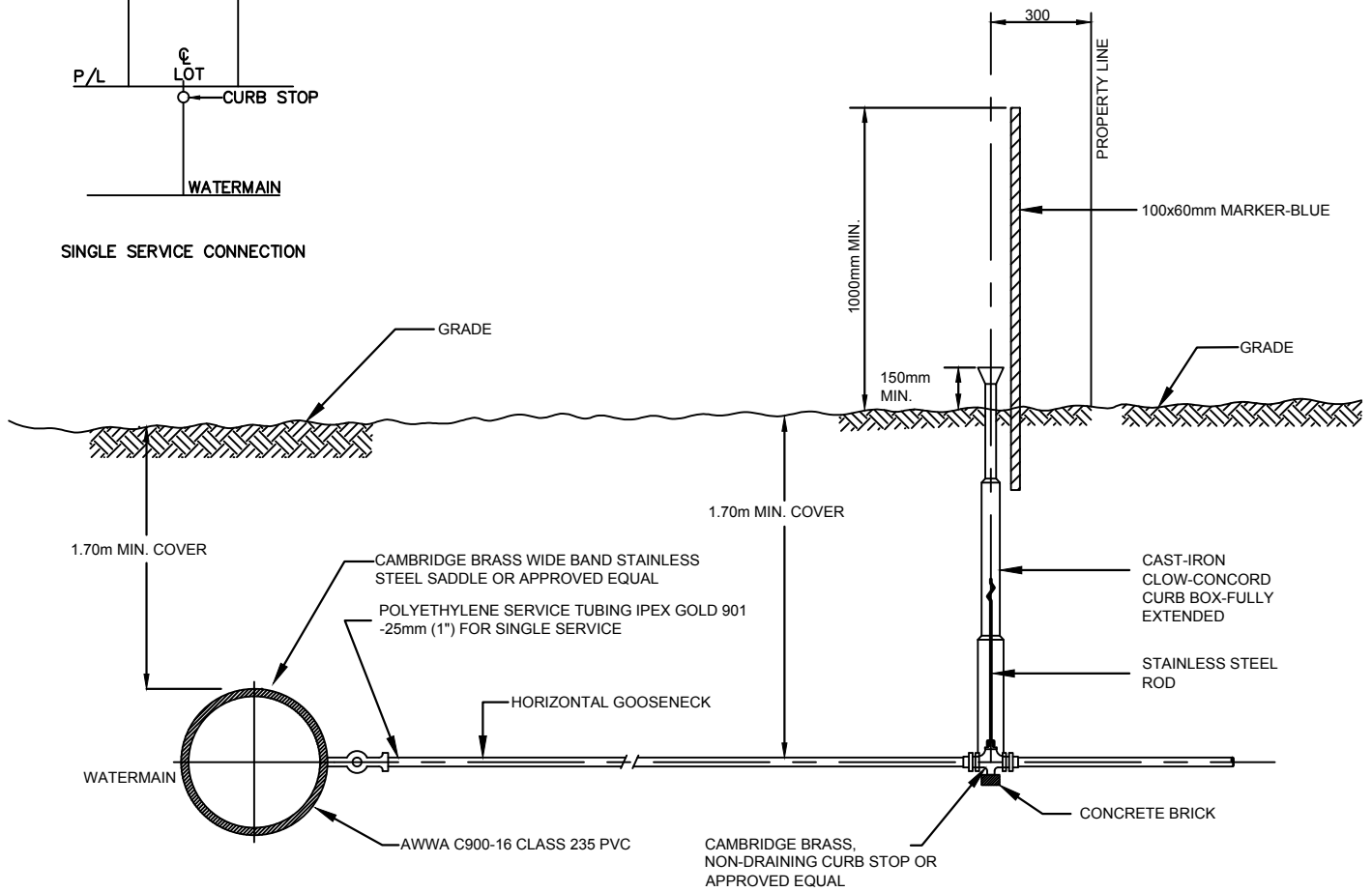
SEWER SERVICE CONNECTION DETAILS

No.	Issue / Revision	Date	Auth.

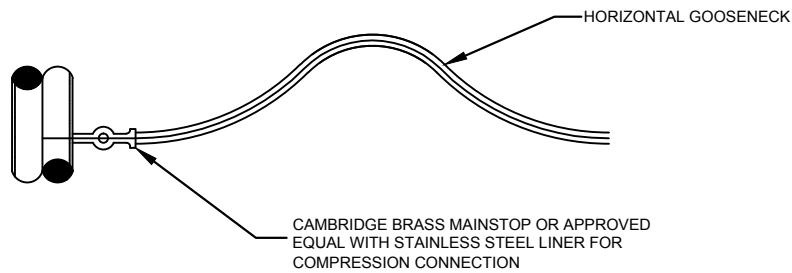
Drawn R.J. BURNSIDE	Approved	DWG. No. STD-SAN1
Scale N.T.S.	Date 16/12/12	



SINGLE SERVICE CONNECTION

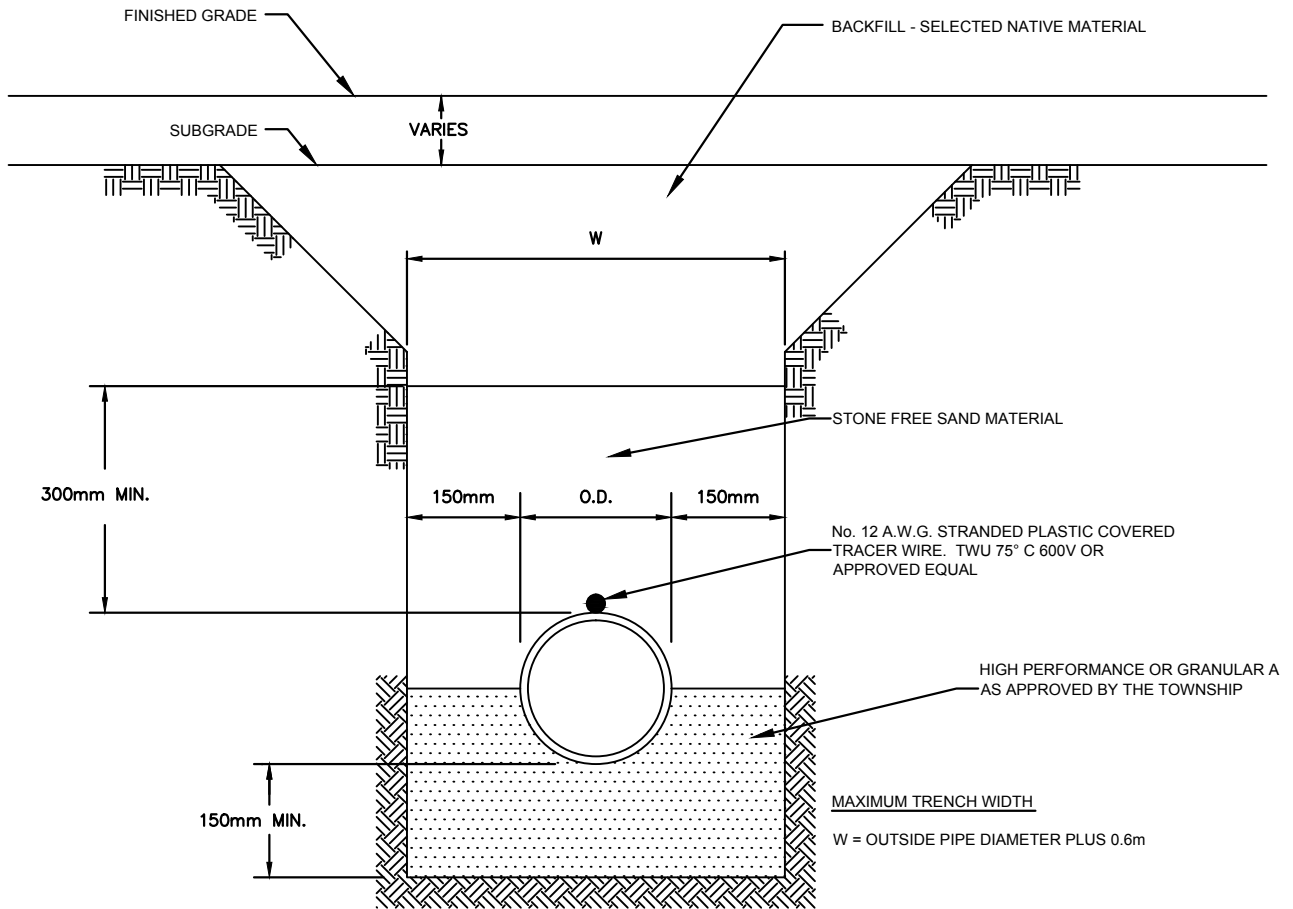


SECTION VIEW



PLAN VIEW

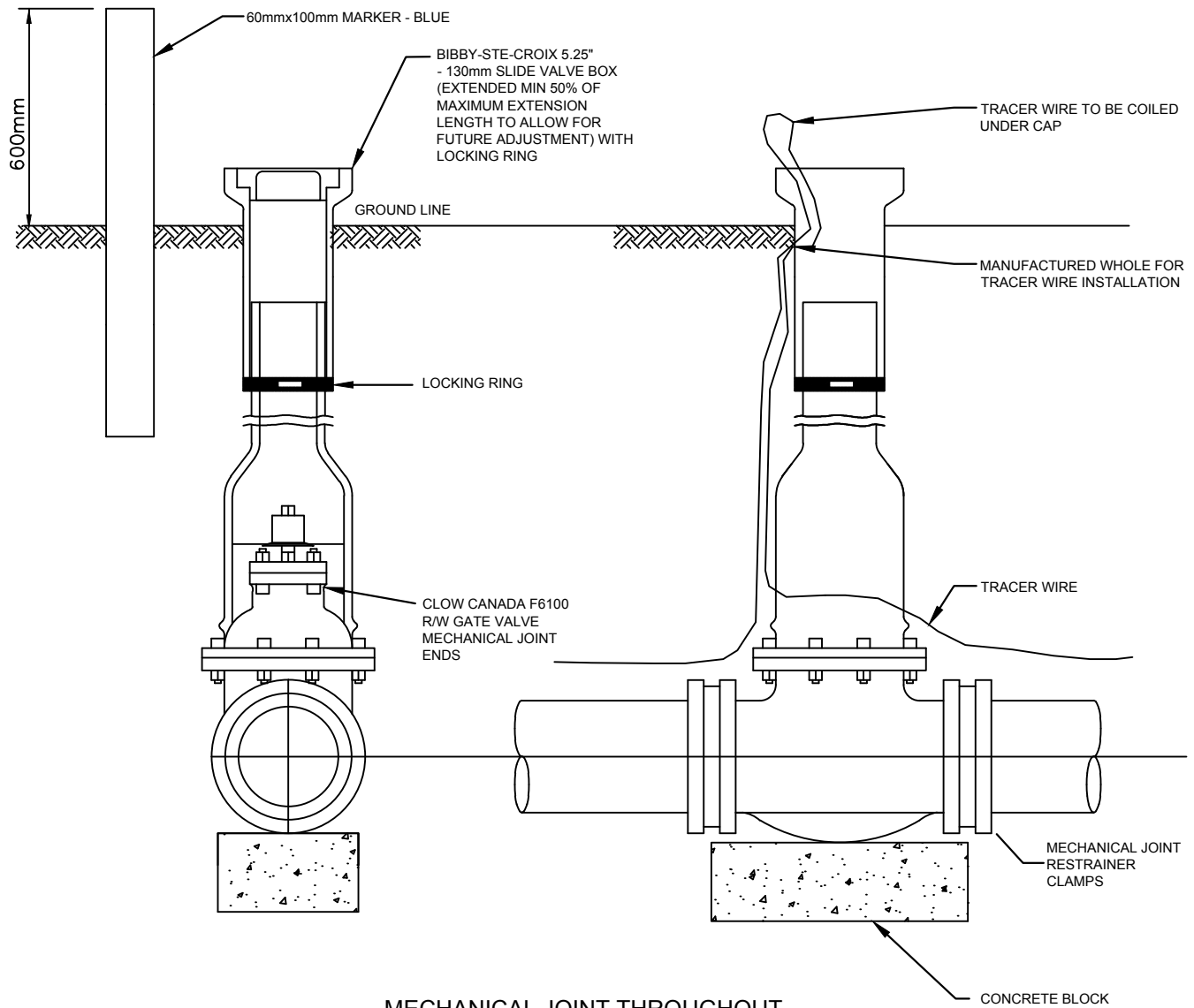
No.	Issue / Revision	Date	Auth.
TOWNSHIP OF CLEARVIEW			
Figure Title WATER SERVICE CONNECTION DETAIL			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	STD-W1
		16/12/12	



GENERAL NOTES:

1. COMPACTION OF BACKFILL WILL BE REQUIRED IN DRIVEWAYS AND UNDER TRAVELED PORTIONS OF THE ROADWAY
2. BACKFILL FOR ROAD CROSSINGS WILL BE COMPACTED GRANULAR 'B'
3. TRACER WIRE INSTALLATION FOR NON METALLIC WATERMAIN
 -ALL CONNECTIONS MUST BE WATERPROOF.
 -SPlicing OF TRACING WIRE IS NOT ALLOWED UNLESS SPECIFIED OR APPROVED BY THE ENGINEER.
 -TRACER WIRE CONTINUITY OF CURRENT MUST BE TESTED AND VERIFIED BY CLEARVIEW TOWNSHIP BETWEEN CADWELD LOCATIONS.

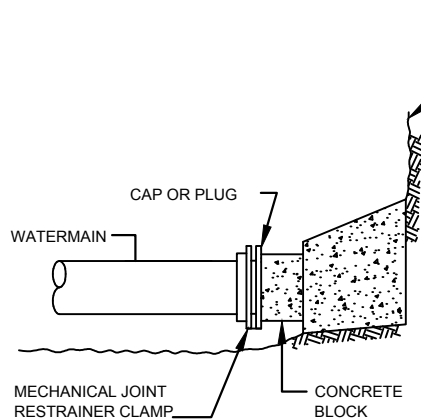
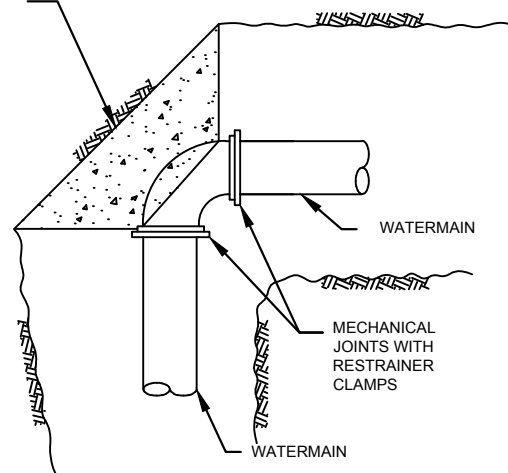
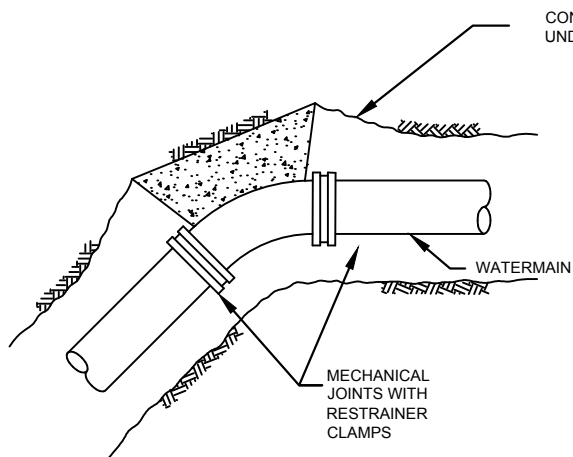
No.	Issue / Revision	Date	Auth.
TOWNSHIP OF CLEARVIEW			
Figure Title			
WATERMAIN BEDDING DETAIL (OPEN CUT)			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
STD-W2			



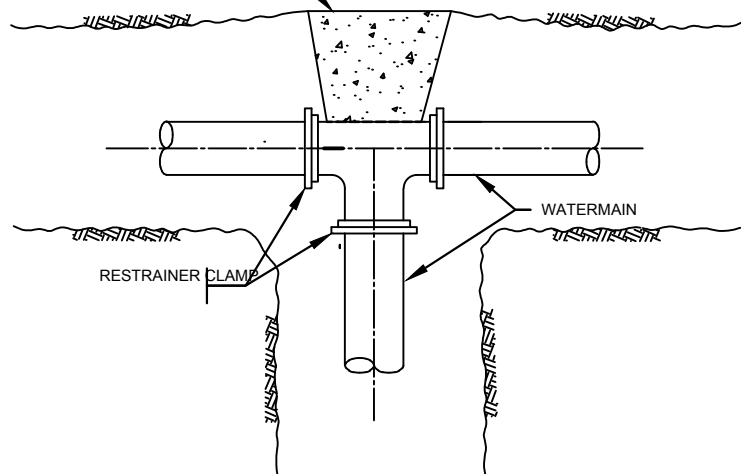
NOTES:

- CONCRETE BLOCK TO BE MINIMUM SIZE 200mmx200mmx100mm (8"x8"x4")
- VALVE BOX LOCKING RING TO BE USED WHEN VALVE BOX IS INSTALLED IN THE CONCRETE SIDEWALK OR CURB.
- CLOW CANADA F6100 R/W GATE VALVE MECHANICAL JOINT ENDS TO BE FUSION EPOXY - NSF 61 AND AWWA C550

No.	Issue / Revision	Date	Auth.
<h2 style="text-align: center;">TOWNSHIP OF CLEARVIEW</h2>			
<p>Figure Title</p> <h3 style="text-align: center;">GATE VALVE AND EXTENDABLE VALVE BOX</h3>			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
			STD-W3



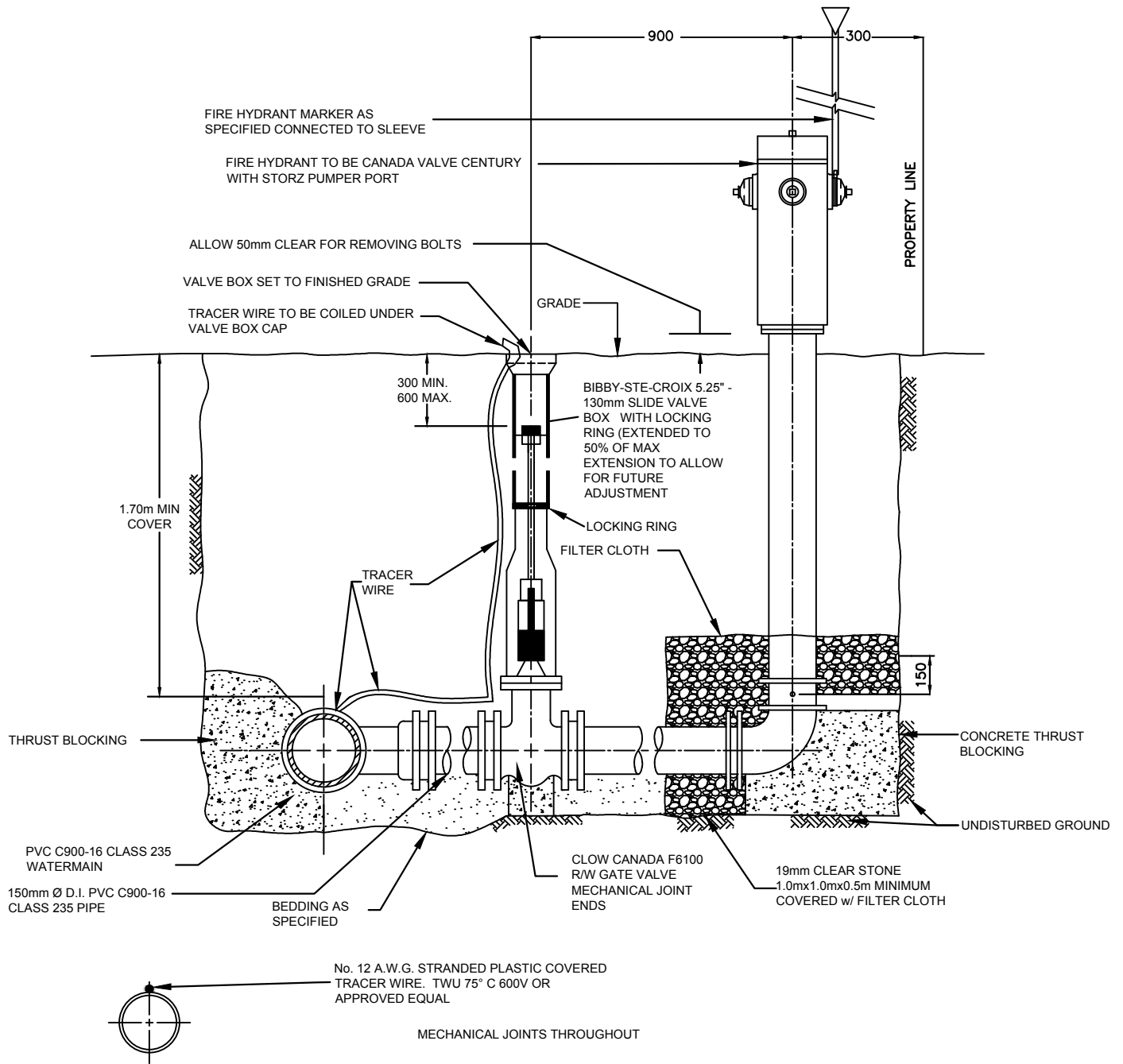
CONC. THRUST BLOCK AGAINST UNDISTURBED GROUND



NOTE:

- ALL THRUST BLOCK PROTECTION SHALL COMPLY WITH OPSD 1103.010 FOR HORIZONTAL BENDS.
- ALL THRUST BLOCK PROTECTION SHALL COMPLY WITH OPSD 1103.020 FOR VERTICAL BENDS.
- ALL CONCRETE TO BE 20 MPa.
- THRUST BLOCK SIZE AS PER OPSD 1103.010.
- POLYETHYLENE BOND BREAKER TO BE USED BETWEEN CONCRETE AND PIPE/FITTINGS.
- ALL SEGMENTS OF WATERMAIN SHALL BE RESTRAINED AT LEAST 10m ON EACH SIDE OF THE THRUST BLOCK WHERE DEFLECTION ANGLE IS MORE THAN $11 \frac{1}{4}$ DEGREES.

No.	Issue / Revision	Date	Auth.
<h2 style="margin: 0;">TOWNSHIP OF CLEARVIEW</h2>			
<p>Figure Title</p> <h3 style="margin: 0;">CONCRETE THRUST BLOCK DETAIL</h3>			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	<h2 style="margin: 0;">STD-W4</h2>
		16/12/12	



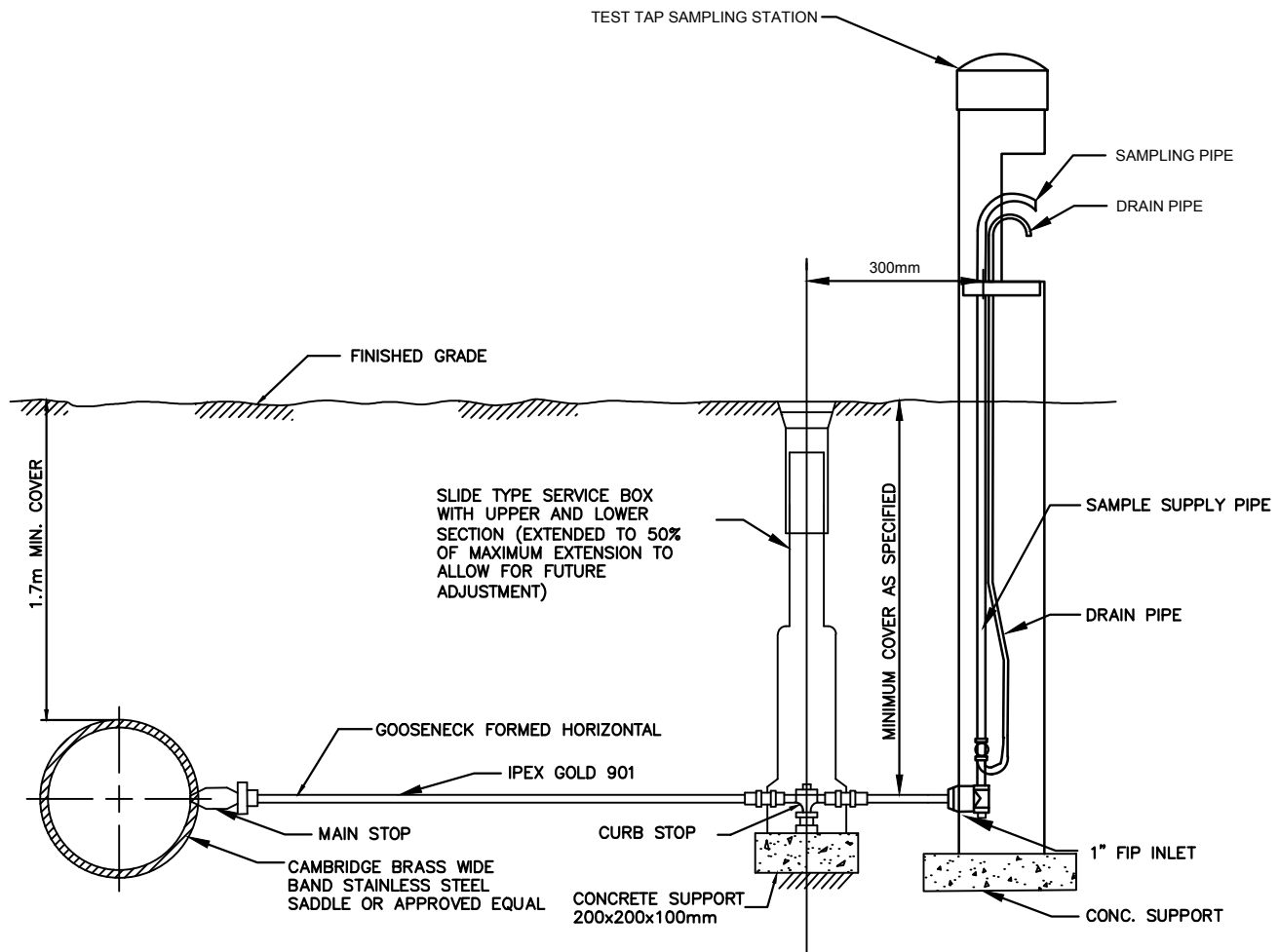
TRACER WIRE INSTALLATION FOR NON-METALLIC WATER MAIN

- ALL CONNECTIONS MUST BE WATERPROOFED.
- SPLICING OF TRACING WIRE IS NOT ALLOWED UNLESS SPECIFIED OR APPROVED BY THE ENGINEER AND SHALL BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS
- TRACER WIRE CONTINUITY OF CURRENT MUST BE TESTED AND VERIFIED BY THE ENGINEER BETWEEN CADWELD LOCATIONS.

NOTE:

- VALVE EXTENSION REQUIRED WHEN DISTANCE FROM TOP OF VALVE TO FINISHED GRADE IS GREATER THAN 1.70m.
- THRUST BLOCKS SHALL BE 20 MPa CONCRETE AS PER O.P.S.D. 1103.010. AND O.P.S.D. 1103.020.
- ALL HYDRANTS ARE SELF-DRAINING UNLESS OTHERWISE SPECIFIED.
- HYDRANT LATERALS SHALL BE PVC C900-16 CLASS 235.
- RESTRAINER CLAMPS TO BE PROVIDED ON BOTH SIDES OF ALL MECHANICAL JOINTS.

No.	Issue / Revision	Date	Auth.
<h2 style="text-align: center;">TOWNSHIP OF CLEARVIEW</h2>			
<p>Figure Title</p> <h3 style="text-align: center;">VALVE AND HYDRANT DETAIL</h3>			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
			STD-W5



- SAMPLING STATIONS SHALL HAVE A 1/2" 316 STAINLESS STEEL WATERWAY. (NO LEAD)
- SAMPLING STATIONS SHALL BE EQUIPPED WITH A 3/8" 316 STAINLESS STEEL VENT TUBE. THIS IS USED TO PUMP STANDING WATER FROM UNIT AFTER USE, PREVENTING FREEZING AND BACTERIA GROWTH.
- THE ENCLOSURE SHALL BE MADE FROM SCHEDULE 40 PVC PIPE WITH A LOCKABLE ACCESS DOOR.
- THE ENCLOSURE SHALL PROTECT ALL COMPONENTS FROM CORROSIVE SOIL AND GROUND WATER.
- AFTER THE WATER IS TURNED OFF AT THE CURBSTOP, ALL WORKING PARTS SHALL BE REMOVABLE WITHOUT DIGGING OR THE USE OF ANY TOOLS.
- SAMPLING STATIONS WILL BE EQUIPPED WITH A 1" FIP INLET FOR THE CONNECTION TO THE WATERMAIN.
- STANDARD TEST TAP IS DESIGNED FOR A 1.8 METER (6 FEET) BURY AND A 1.2 METER (4 FEET) PEDESTAL. (ALTERNATE LENGTHS AVAILABLE)

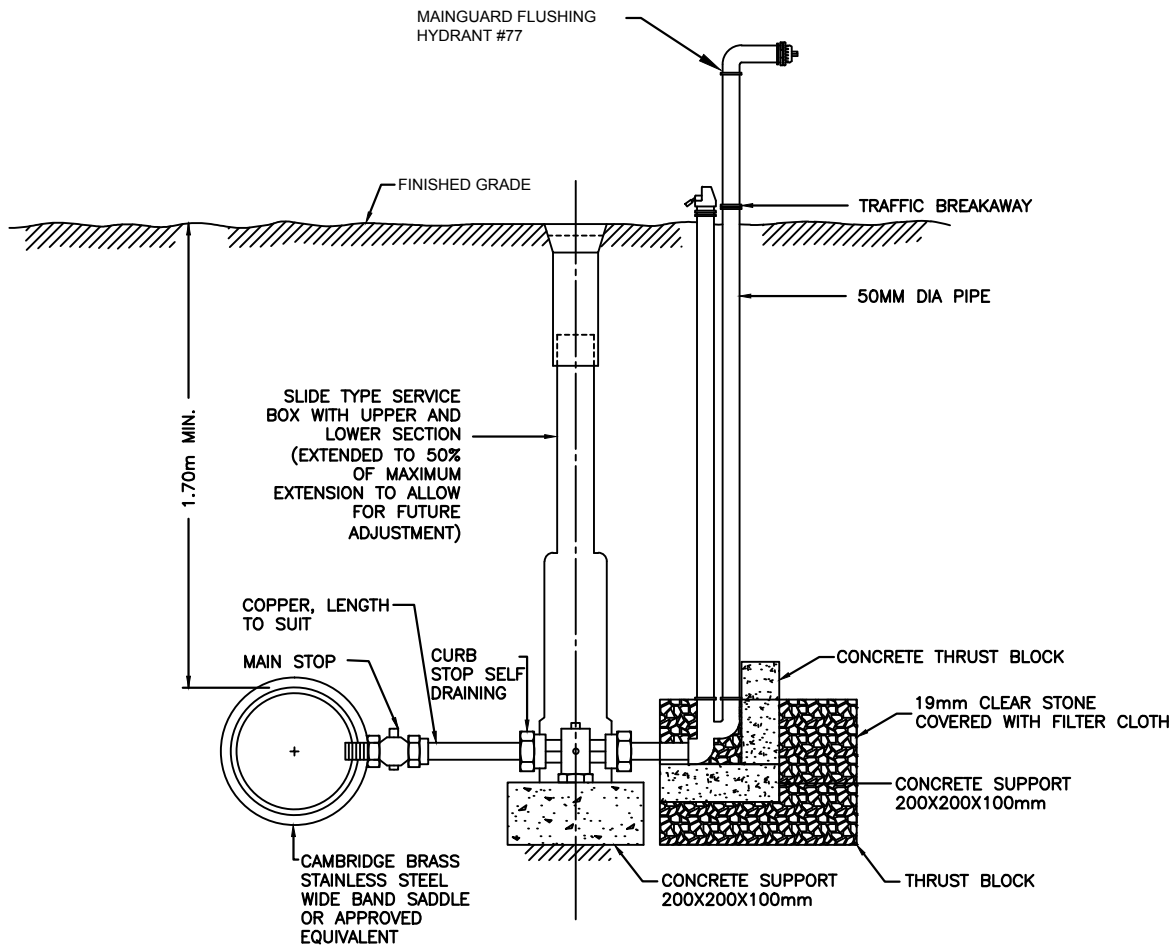
TYPICAL INSTALL FROM WATERMAIN TO TEST TAP SAMPLING STATION

1" MAINSTOP, 1" DOMESTIC PIPE TO A 1" CURBSTOP, 1" DOMESTIC PIPE TO TEST TAP.

NOTES

1. THE TEST TAP SHALL REST ON A CONCRETE SLAB. 30cm x 30cm PATIO SLAB IS ACCEPTABLE.
2. THE CURBSTOP SHALL REST ON A CONCRETE SLAB. SMALL PATIO SLAB IS ACCEPTABLE.
3. ALL FITTINGS (MAINSTOP, CURBSTOP, ETC.) TO BE NO LEAD

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<h2 style="text-align: center;">TOWNSHIP OF CLEARVIEW</h2>			
<p>Figure Title</p> <h3 style="text-align: center;">TEST TAP SAMPLING STATION DETAIL</h3>			
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GENERAL NOTES:

1. BLOW OFF CONNECTIONS TO PLASTIC WATERMAINS TO BE MADE USING SERVICE SADDLES OR FACTORY MADE TEES.
2. VALVE EXTENSION REQUIRED WHEN DISTANCE FROM TOP OF VALVE TO FINISHED GRADE IS GREATER THAN 1.70m.
3. THRUST BLOCKS SHALL BE 20 MPa CONCRETE AS PER O.P.S.D. 1103.01
4. ALL HYDRANTS ARE SELF-DRAINING UNLESS OTHERWISE SPECIFIED.
5. ALL CONNECTIONS MUST BE WATERPROOFED.

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Figure Title 2 INCH BLOW-OFF FLUSHING HYDRANT			
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GENERAL NOTES:

- 1. ALL MEASUREMENTS ARE IN METRES, PIPE SIZES IN MILLIMETERS, UNLESS OTHERWISE NOTED.
- 2. ALL EXISTING UTILITIES AND SERVICES TO BE LOCATED ON SITE BY THE CONTRACTOR PRIOR TO CONSTRUCTION. LOCATION OF EXISTING SERVICES ARE NOT GUARANTEED. THE CONTRACTOR IS REQUIRED TO NOTIFY THE VARIOUS UTILITY COMPANIES 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY WORK.
- 3. ALL RELEVANT ONTARIO PROVINCIAL STANDARDS SPECIFICATIONS (OPSS), ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD), AND THE TOWNSHIP OF CLEARVIEW'S STANDARDS SHALL APPLY TO THIS CONTRACT.
- 4. THE ORDER OF PRECEDENCE OF STANDARD DRAWINGS IS FIRSTLY TOWNSHIP OF CLEARVIEW STANDARD DRAWINGS (STD), AND SECONDLY ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD).
- 5. MAINTENANCE HOLE SAFETY PLATFORMS SHALL CONFORM TO OPSD 404.020.
- 6. MAINTENANCE HOLE TOPS (FRAMES) AND CATCHBASIN (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF ASPHALT IS PLACED. (SEE ROAD NOTES 10, 11, 12, 13 & 14)
- 7. A ROAD OCCUPANCY PERMIT IS REQUIRED FROM THE ENGINEERING DEPARTMENT PRIOR TO THE COMMENCEMENT OF WORK WITHIN ANY TOWNSHIP RIGHT-OF-WAY.
- 8. NATIVE MATERIAL SUITABLE FOR BACKFILL SHALL BE COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY, UNLESS OTHERWISE NOTED. ENGINEERING FILL (ON LOTS), SHALL BE COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
- 9. GRANULAR MATERIAL AND BEDDING MATERIAL SHALL BE PLACED IN LAYERS 150mm IN DEPTH AND COMPACTED TO 100% (ROAD GRAN 'A' & GRAN 'B') OR 100% (PIPE BEDDING AND COVER) STANDARD PROCTOR MAXIMUM DRY DENSITY OR AS DIRECTED BY THE GEOTECHNICAL CONSULTANT.
- 10. UTILITY CROSSING, WHERE REQUIRED, AND ANY EXISTING STRUCTURES SHALL BE PROPERLY SUPPORTED. ALL UTILITY CROSSINGS TO BE REVIEWED BY THE TOWNSHIP OF CLEARVIEW
- 11. DRIVEWAY ACCESS TO OCCUPIED RESIDENCES SHALL BE RESTORED AT THE END OF EACH WORKING DAY.
- 12. CONTRACTOR SHALL COORDINATE HIS WORK SUCH THAT HE DOES NOT INTERFERE WITH WORK BEING UNDERTAKEN BY A UTILITY COMPANY.
- 13. ALL GRADING MUST CONFORM TO THE TOWNSHIP OF CLEARVIEW LOT GRADING POLICIES CURRENTLY IN EFFECT.

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ROADS NOTES:

1. CURB AND GUTTER TO BE BARRIER CURB AS PER OPSD-600.010 (COMMERCIAL, RESIDENTIAL, MULTI-RESIDENTIAL) OR MOUNTABLE AS PER OPSD-600.100 (RESIDENTIAL) IN ALL ROADS. CURBS TO BE SINGLE STAGE ONLY.
2. ROAD WORKS TO CONFORM TO STD-R3 OR STD-R1 FOR 20m R.O.W OR STD-R4 FOR A 26.0M R.O.W.
3. ROADS SHALL BE KEPT CLEAN DURING CONSTRUCTION AT THE CONTRACTOR'S EXPENSE.
4. SIDEWALKS TO COMPLY WITH OPSD 310.010 AND ARE TO BE 1.5 METERS WIDE. MINIMUM THICKNESS AS FOLLOWS:
 - RESIDENTIAL DRIVEWAY 150mm
 - COMMERCIAL/INDUSTRIAL DRIVEWAY 200mm (REINFORCEMENT AS PER OPSS IF REQUIRED)
 - WHEN NO DRIVEWAY IS PRESENT, 125mm.
5. NATIVE SUBGRADE SHALL HAVE A CROSSFALL OF 3% AND THE MATERIAL SHALL BE APPROVED BY A GEOTECHNICAL CONSULTANT WITH THE REVIEW OF A PROOF ROLL WITH A LOADED TANDEM AXLE DUMP TRUCK AND IS SUBJECT TO APPROVAL BY THE TOWNSHIP OF CLEARVIEW.
6. ALL CURB RADII TO BE MINIMUM OF 10.0 METRES AT THE EDGE OF ASPHALT.
7. NATIVE SUBGRADE TO BE COMPACTED TO MINIMUM 98% STANDARD PROCTOR MAXIMUM DRY DENSITY AND SHALL BE TESTED BY THE GEOTECHNICAL CONSULTANT.
8. THE ROAD AND CROSS SECTION SHALL INCORPORATE 150mm DIA. SUBDRAIN WITH FACTORY INSTALLED FILTER FABRIC (OPSD 216.021) AS REQUIRED.
9. GRADE AND CROSS FALL ADJUSTMENT OF MAINTENANCE HOLE AND CATCHBASIN FRAMES SHALL BE MADE USING PRODUCTS SPECIFICALLY MANUFACTURED FOR THAT PURPOSE. CAST IRON ADJUSTMENT UNITS SHALL BE USED FOR ALL MAINTENANCE HOLE AND CATCH BASIN GRATES TO BE SET AT PROPER GRADES FOR SURFACE COURSE ASPHALT ONLY. ALL OTHER ADJUSTMENTS UNITS FOR ALL MAINTENANCE AND CATCHBASIN FRAME AND GRATES SHALL BE CONCRETE (PER OPSD 704.010). ALL MAINTENANCE, CATCH BASINS, ETC SHALL HAVE MINIMUM OF 150mm TO A MAX OF 300MM OF ADJUSTMENT TO ALLOW FOR FUTURE ADJUSTMENT UP OR DOWN.
10. ADJUSTMENT UNITS SHALL BE CERTIFIED TO MEET ALL PERTINENT OPS, CSA, ASTM, AND MTO-DSM LIST, OR OTHER INDUSTRY GUIDELINES FOR MATERIALS, PERFORMANCE AND USE AS APPLICABLE.
11. ADJUSTMENTS UNITS AND JOINTS SHALL BE SEALED AND OR PARGED IN COMPLIANCE WITH MANUFACTURERS SPECIFICATIONS AND GUIDELINES.
12. MORTAR SHALL BE USED FOR LEVELING OF PRECAST UNITS ONLY, THE THICKNESS OF MORTAR SHALL BE 10mm TO FILL ALL VOIDS CREATED BY IRREGULARITIES IN THE PRECAST UNITS TO ENSURE AN EVEN SURFACE ONLY.
13. NON-COMPRESSIBLE BACKFILL SHALL BE USED DURING REBUILDING, ADJUSTING, OR ANY OTHER APPLICABLE CATCHBASIN OR MAINTENANCE HOLES WORKS.
14. DRIVEWAY APRONS TO BE CONSTRUCTED
 - i) RESIDENTIAL - MIN. 50mm HL3 ON MIN. 200mm GRAN.'A'
 - ii) COMMERCIAL - MIN. 50mm HL3 ON MIN. 250mm GRAN.'A' AND MIN 300 GRANULAR B
15. UNDERGROUND CONDUIT:

THE CONTRACTOR SHALL SUPPLY AND INSTALL 100mm "HEAVY-WALLED" RIGID PVC CONDUIT, SCEOTRE/CANRON TYPE 2 OR APPROVED EQUIVALENT AS PER CSA STANDARDS C22. NO.212.2 ALL COUPLINGS, ELBOWS, ETC. SHALL BE BONDED WITH ADHESIVES RECOMMENDED BY THE CONDUIT MANUFACTURER IN A MANNER THAT PREVENTS THE ENTRY OF MOISTURE AND BACKFILL MATERIAL, ETC. THE CONDUIT SHALL BE INSTALLED IN LOCATIONS, AS NOTED ON THE CONTRACT DRAWINGS, AT A MINIMUM DEPTH OF 0.6M BELOW FINISHED GRADE. BACKFILL SHALL CONFORM TO THE REQUIREMENTS OF O.P.S.S. FORM 1010, GRANULAR 'A' AND GRANULAR 'B' TYPE 1 AND SHALL BE COMPACTED TO 100% MAXIMUM DRY DENSITY. EARTH BACKFILL SHALL BE COMPACTED TO 98% MAXIMUM DRY DENSITY.
16. A 400N TEST STRENGTH NYLON ROPE "FISH LINE" SHALL BE PLACED WITHIN EACH RUN OF CONDUIT WITH 1.5m OF EXCESS ROPE LEFT COILED WITHIN THE CHAMBERS AT EACH END OF THE CONDUIT.
17. CONCRETE ELECTRICAL HANDHOLES:

HANDHOLES SHALL INCLUDE CAST IRON COVERS, SONO TUBES AND CONCRETE. THE INSIDE DIAMETER SHALL BE 0.46m. OAKS PRECAST OR APPROVED EQUIVALENT HANDHOLES THAT CONFORM TO OPSD 2112.02 MAY BE USED. CAST IN PLACE HANDHOLES MUST HAVE INSIDE CHAMBER SONO TUBE REMOVED WHEN CONCRETE HAS HARDENED. THE NUMBER AND ORIENTATION OF CHAMBER ENTRY SLEEVES SHALL BE IN ACCORDANCE WITH THE CONTRACT DRAWINGS. THE TOP OF THE JUNCTION BOX SHALL BE SET TO AN ELEVATION THAT CONFORMS TO THE SURROUNDING ELEMENTS (E.G. CURBS, SIDEWALK, ETC.). ALL HANDHOLES SHALL HAVE LIDS FASTENED AND LIFT RINGS REMOVED.
18. EACH CHAMBER SHALL PROVIDE FOUR (4) SPARE AND CAPPED ENTRY SLEEVES SPACED EVENLY AT NINETY DEGREE INTERVALS AROUND THE CIRCUMFERENCE OF THE CHAMBER IN ADDITION TO THE ENTRY POINTS FOR THE ROAD CROSSING CONDUITS.
19. DURING INSTALLATION OF UNDERGROUND CONDUIT AND CONCRETE ELECTRICAL HANDHOLES FOR THE TRAFFIC SIGNALS, A REPRESENTATIVE FROM THE TOWNSHIP OF CLEARVIEW PUBLIC WORKS DEPARTMENT IS TO BE PRESENT.

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SANITARY NOTES:

1. SANITARY GRAVITY SEWER SHALL BE PVC (CLASS DR35 OR DR28) OR CONCRETE PIPE, WITH RUBBER GASKET JOINTS WHICH CONFORM TO C.S.A. B-182.2,3,4. CONCRETE SANITARY SEWERS SHALL HAVE A MINIMUM STRENGTH OF 65 N/m/mm CONFORMING TO C.S.A. STANDARD A257.2-1982, CLASS 50-D (PREVIOUSLY C.S.A. STANDARD A257.2-1974, CLASS II).
2. SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD-802.010, (GRAN. 'A' OR HIGH-PERFORMANCE EMBEDMENT MATERIAL) FOR FLEXIBLE PIPES AND OPSD-802.030 OR 802.031 CLASS B (GRAN. 'A' OR HIGH-PERFORMANCE BEDDING MATERIAL) FOR RIGID PIPE UNLESS OTHERWISE APPROVED BY THE TOWNSHIP OF CLEARVIEW.
3. PRECAST SANITARY MAINTENANCE HOLES SHALL CONFORM WITH OPSD 701.010 (1200mm) OR 701.011(150mm), WITH FRAME & COVER OPSD 401.010 TYPE 'A' AND SOLID RECTANGULAR RUNGS, OPSD 405.020.
4. SANITARY MAINTENANCE HOLE BENCHING AS PER OPSD 701.021.
5. SANITARY SERVICE CONNECTIONS (SEE TOWNSHIP OF CLEARVIEW STANDARD STD-SAN1)
 - A) SANITARY LATERAL CONNECTION TO BE LOCATED 2.5m RIGHT OF ϵ OF LOT
 - B) LOCATION OF LATERAL TO BE MARKED AT PROPERTY LINE WITH A 60x100mm WOOD MARKER, PAINTED GREEN, AND EXTENDING FROM THE SERVICE INVERT TO 300mm ABOVE GROUND LEVEL.
 - C) PIPE TO BE MINIMUM 125mm PVC DR28, RUBBER GASKET TYPE JOINTS AND SHALL CONFORM TO CSA (B-182.2,3,4)(COLOURED) FOR A RESIDENTIAL HOUSE AND MINIMUM 150mm PVC DR28 FOR INDUSTRIAL, AND COMMERCIAL DEVELOPMENT.
 - D) MINIMUM DEPTH OF LATERAL AT PROPERTY LINE SHALL BE 2.7m MEASURED FROM THE SEWER OBVERT TO FINISHED GROUND SURFACE ELEVATION UNLESS OTHERWISE NOTED.
 - E) ALL CONNECTIONS TO NEW SANITARY MAINS SHALL BE PRE-MANUFACTURED, FABRICATED TEES, CONNECTIONS TO EXISTING SANITARY SEWER SHALL BE MADE WITH APPROVED FACTORY MADE TEES OR INSERT-A-TEES IN STRICT ACCORDANCE TO MANUFACTURERS GUIDELINES.
 - F) MINIMUM PIPE SLOPE TO BE 2.0% MAXIMUM 8.0% AS PER OPSD-1006.020.
6. MAXIMUM DEFLECTION FROM COMBINED LIVE AND DEAD LOADING SHALL NOT EXCEED C.S.A., O.P.S. OR MANUFACTURERS RECOMMENDED SPECIFICATIONS.
7. MAINTENANCE HOLE TOPS (FRAMES) AND CATCH BASIN (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF ASPHALT IS PLACED. A MINIMUM OF 150MM TO A MAXIMUM OF 300MM OF ADJUSTMENT UNITS SHALL BE PROVIDED. ALL ADJUSTMENT SHALL BE IN ACCORDANCE WITH STANDARD DETAIL. REFER TO ROAD NOTES 10, 11, 12,13 AND 14.
8. MINIMUM COVER 2.8m OVER TRUNK AND LOCAL SEWERS.

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STORM NOTES:

1. STORM SEWER TO BE PVC (CLASS DR35 OR DR28)PIPE OR REINFORCED CONCRETE PIPE (MIN. CLASS 65-D). PIPE MATERIAL FOR REINFORCED CONCRETE TO HAVE A MINIMUM STRENGTH OF 65 N/m/mm AND BE CERTIFIED TO C.S.A. STANDARD A247.2-1982M CLASS 65-D (PREVIOUSLY C.S.A. STANDARD A257.2-1974, CLASS II). PVC MATERIAL TO BE CERTIFIED TO C.S.A. STANDARDS 182.2 AND 182.4, UNLESS OTHERWISE NOTED.
2. STORM SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD-802.010 (GRAN 'A' OR HIGH-PERFORMANCE EMBEDMENT MATERIAL) FOR FLEXIBLE PIPES AND OPSD-802.030 OR 802.031 CLASS B (GRAN'A' OR HIGH-PERFORMANCE BEDDING MATERIAL) FOR RIGID PIPE UNLESS OTHERWISE APPROVED BY THE TOWNSHIP.
3. PRECAST STORM MAINTENANCE HOLES SHALL CONFORM WITH OPSD 701.010 (1200mm) OR 701.011 (1500mm) WITH FRAME & COVER OPSD 401.010 TYPE 'A' AND SOLID RECTANGULAR RUNGS, OPSD 405.020.
4. CATCHBASIN LEADS TO BE 0.7% MIN. GRADE, 250mm FOR SINGLE CATCHBASIN AND 300mm FOR DOUBLE CATCHBASIN.
5. ALL REAR YARD CATCHBASIN LEADS TO HAVE:
 - A) GRANULAR 'A' BEDDING TO OBVERT OF SEWER.
 - B) 100mm THICK 10MPa CONCRETE SLAB TO BE PLACED 300mm ABOVE OBVERT OF SEWER AND OVER FULL WIDTH OF SEWER ALONG SIDE LOT LINE.
6. MAINTENANCE HOLE BENCHING SHALL CONFORM WITH OPSD 701.021.
7. CATCH BASIN MAINTENANCE HOLES SHALL HAVE A 300mm SUMP AND NO BENCHING
8. PIPE JOINTS TO CONFORM TO CSA STANDARDS (B-182.2,3,4 AND A257.3).
9. MAINTENANCE HOLE TOPS (FRAMES) AND CATCH BASIN (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF ASPHALT IS PLACED. A MINIMUM OF 150mm TO A MAXIMUM OF 300mm OF ADJUSTMENT UNITS SHALL BE PROVIDED. ALL ADJUSTMENT SHALL BE IN ACCORDANCE WITH STANDARD DETAIL. REFER TO ROAD NOTES 10, 11, 12,13 AND 14.
10. ALL CONNECTIONS TO THE STORM MAIN SHALL BE MADE WITH A STORM MAINTENANCE HOLE OR APPROVED FACTORY TEE CONNECTION AS PER OPSD-708.01 OR 708.03.
11. STORM SEWER TO BE MINIMUM 300mm DIAMETER WITH JOINTS CONFORMING TO C.S.A. STANDARD A257.3.
12. NO FLEXIBLE PIPE SEWERS WILL BE INSTALLED WITH A DEPTH OF COVER GREATER THAN 6 METRES UNLESS SPECIFICALLY APPROVED BY THE TOWNSHIP PUBLIC WORKS DEPARTMENT
13. ALL PIPE HANDLING INSTALLATIONS SHALL BE IN STRICT COMPLIANCE WITH MANUFACTURERS INSTALLATION GUIDES AND THE O.C.P.A. OR UNIBELL GUIDELINES.
14. WHERE FROST SUSCEPTIBLE SOILS ARE ENCOUNTERED AND THE OBVERT OF THE STORM SEWER IS LESS THAN A DEPTH OF 1.5m FROM THE FINISHED ASPHALT SURFACE, THE FOLLOWING MEASURES ARE TO BE APPLIED:
 - A) WHERE THE SUBGRADE CONSISTS OF HIGHLY FROST SUSCEPTIBLE SOILS THE SUBGRADE SHALL BE REPLACED WITH NON-FROST SUSCEPTIBLE SOILS TO A DEPTH OF 1.2m OVER THE ENTIRE ROAD PLATFORM.
 - B) WHERE THE SUBGRADE CONSISTS OF MODERATELY FROST SUSCEPTIBLE SOILS THE SUBGRADE REPLACEMENT SHALL BE TAPERED AT A SLOPE OF 10 HORIZONTAL: 1 VERTICAL, FROM THE STORM SEWER TRENCH TO THE EDGE OF THE ROAD PLATFORM.

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WATERMAIN NOTES:

1. A) WATERMAIN MATERIAL TO BE PVC (CLASS 235, DR-18) AND, SHALL SATISFY AWWA C900-16 SPECIFICATION. DIAMETER TO BE AS INDICATED ON THE DRAWINGS. ALL FITTINGS TO BE DUCTILE IRON, MECHANICAL JOINT WITH SACRIFICIAL NUTS ON EVERY OTHER BOLT.
B) MINIMUM RESIDENTIAL SERVICE TO BE 25mm PE IPEX GOLD 901
2. A) WATERMAIN SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD 802.010 (GRANULAR 'A' OR HIGH PERFORMANCE EMBEDMENT MATERIAL) FOR FLEXIBLE PIPES AS OPSD 802.030 OR 802.031 CLASS 'B' (GRANULAR 'A' OR HIGH PERFORMANCE BEDDING MATERIAL, GRANULAR 'A' OR SELECT NATIVE COVER MATERIAL) FOR RIGID PIPE UNLESS OTHERWISE APPROVED BY THE TOWNSHIP OF CLEARVIEW.
B) SERVICES 25mm TO 50mm IN DIAMETER SHALL BE EMBEDDED IN SAND OR 'A' GRAVEL 100mm ABOVE AND BELOW TO CONFORM TO OPSS 1004.05
3. CONTRACTOR SHALL INFORM THE TOWNSHIP OF CLEARVIEW A MINIMUM OF 48 HOURS IN ADVANCE OF THEIR INTENTIONS TO COMMENCE WORK.
4. CONTRACTOR TO BE RESPONSIBLE FOR INSTALLATION AND MATERIALS TO INSTALL ONE INITIAL TIE-IN REQUIRED TO FACILITATE THE TESTING OF THE NEWLY INSTALLED DISTRIBUTION SYSTEM PRIOR TO CONNECTION TO THE EXISTING SYSTEM. WATERMAIN TO BE PRESSURE TESTED, SWABBED AND CHLORINATED BY THE CONTRACTOR, UPON SUCCESSFUL TEST RESULTS. THE FINAL TIE-IN TO BE COMPLETED BY CONTRACTOR WITH TOWNSHIP OF CLEARVIEW SUPERVISION AND ASSISTANCE WITH OPERATING THE EXISTING WATER SYSTEM FOR A WATER SYSTEM SHUT OFF. RISER PIPES ARE TO BE INSTALLED AS PER STANDARD, AND REMOVED AS DIRECTED. SWABBING / TESTING SCHEDULE TO BE SUPPLIED BY THE CONTRACTOR TO THE TOWNSHIP OF CLEARVIEW TO REVIEW AND APPROVE.
5. THE CONTRACTOR IS RESPONSIBLE FOR THE SWABBING, PRESSURE TESTING, CHLORINATION AND FLUSHING OF THE NEW WATERMAINS. ANY ADDITIONAL SWABBING, PRESSURE TESTING, CHLORINATION AND FLUSHING BEYOND THE INITIAL PROCEDURE WILL BE AT THE CONTRACTORS EXPENSE AND AT THE DISCRETION OF THE TOWNSHIP OF CLEARVIEW. THE CONTRACTOR SHALL MAKE ALL CONNECTIONS TO THE EXISTING WATERMAINS INCLUDING EXCAVATION, BACKFILLING, AND MATERIALS AS REQUIRED, UNDER TOWNSHIP OF CLEARVIEW SUPERVISION. CONTRACTOR TO USE TOWNSHIPS WATERMAIN COMMISSIONING PROCEDURE.
6. ALL NEW SERVICE BOXES TO BE LOCATED ON PROPERTY LINE AND OUT OF THE DRIVEWAYS AND SIDEWALKS.
7. NO WATERMAIN IS TO BE LAID ON FILL UNTIL THE DENSITY REPORT HAS BEEN SUBMITTED TO AND APPROVED BY THE ENGINEER. FILL TO BE PLACED TO 0.6m MINIMUM ABOVE THE TOP OF THE WATERMAIN GRADED AND COMPACTED AS PER OPSS 501. TESTS SHALL BE TAKEN ALONG THE CENTER LINE OF THE WATERMAIN AND 2.5m EITHER SIDE OF THE WATERMAIN AT A MAXIMUM INTERVAL OF 30m FOR EACH 0.6m LIFT. ALL TEES, HORIZONTAL BENDS, AND BRANCH VALVES IN FILL AREAS TO BE TIED WITH TIE RODS IN ADDITION TO CONCRETE BLOCKING ACCORDING TO NOTE 8.
8. A) THRUST BLOCKING: CONCRETE THRUST BLOCKS ARE TO BE INSTALLED AT ALL TEES, BENDS, ENDS OF MAINS AND CONNECTIONS 100mm AND LARGER AS PER OPSD 1103.010 AND 1103.020 AND TOWNSHIP STANDARD DRAWING STD-W4. AT ALL THRUST BLOCK LOCATIONS RESTRAINING DEVICES ARE REQUIRED IN ADDITION TO STANDARD CONCRETE THRUST BLOCKING.
B) ALL SEGMENTS OF THE FITTING AND THE WATERMAIN AT THE THRUST BLOCK LOCATION SHALL BE RESTRAINED AT LEAST 10M EACH SIDE OF THE THRUST BLOCK WHERE THE DEFLECTION ANGLE AT THE THRUST BLOCK IS MORE THAN $11 \frac{1}{4}^{\circ}$. TIE RODS AND CLAMPS SHALL BE GIVEN TWO COATS OF BITUMASTIC PAINT.
C) IMPORTED GRANULAR FILL (OPSD GRANULAR "A" OR EQUIVALENT) IS TO BE USED BEHIND THE THRUST BLOCK AND FOR A MINIMUM DISTANCE OF 2m EACH SIDE OF THE THRUST BLOCK. THIS IMPORTED GRANULAR FILL IS TO BE COMPACTED TO A MINIMUM OF 100% STANDARD PROCTOR MAXIMUM DRY DENSITY. PRIOR TO CONSTRUCTION OF THE THRUST BLOCKS THE CONTRACTOR SHALL OBTAIN THE WRITTEN APPROVAL OF THE BACKFILL FROM A QUALIFIED GEOTECHNICAL ENGINEER.
9. CONTRACTOR TO PERFORM CONSTRUCTION SUCH THAT WATER SERVICE IS MAINTAINED AT ALL TIMES.
10. TRACING WIRE TO BE INSTALLED ON TOTAL LENGTH OF PVC WATERMAIN (#12 TWU STRANDED COPPER FOR OPEN CUT CONSTRUCTION OR #8 TWU FOR DIRECTIONAL BORING INSTALLATION), BROUGHT TO SURFACE AT ALL WATER VALVE BOXES AND COILED UNDER THE VALVE BOX CAPS.
11. WHERE WATER SERVICES CONFLICT WITH OTHER UTILITIES, DEFLECT SERVICE SO AS TO PROVIDE A MIN. 0.5m CLEARANCE. MAINTAIN MIN. DEPTH OF COVER AT ALL TIMES.
12. SERVICE CONNECTIONS SHALL BE PLACED AT A MINIMUM SEPARATION OF 1.0m AND A MINIMUM OF 0.6 FROM JOINTS. (ENDS OF PIPE).
13. A) FIRE HYDRANTS TO BE CANADA VALVE CENTURY PREMIER TYPE WITH STORZ PUMPER TO THE TOWNSHIP OF CLEARVIEW SPECIFICATIONS. ALL PIPE FITTINGS, TEES ETC. TO BE DUCTILE IRON CEMENT LINED MECHANICAL JOINT FITTINGS FOR PVC WATERMAINS 150mm TO 200mm DIAMETER. RESTRAINING AND THRUST BLOCK PROTECTION WILL BE REQUIRED ON ALL MECHANICAL JOINTS. HYDRANTS TO BE RESTRAINED TO MAINLINE TEE.
B) FIRE HYDRANTS TO BE OFFSET 0.3m FROM ANY PROPERTY LINE, AND 1.5m FROM ANY DRIVEWAY.
14. MINIMUM DEPTH OF COVER OVER WATERMAIN TO BE 1.7 METERS.
15. WHERE 25mm SERVICE CANNOT MAINTAIN 1.7m DUE TO ELEVATIONS OF UTILITIES, THE CONTRACTOR SHALL INSTALL 4.0m OF 100mm PVC SDR28 LINER A MINIMUM OF 0.5m BELOW THE UTILITY.
16. WHERE WATERMAIN CONFLICTS WITH SEWER PIPES, DEFLECT WATERMAIN OVER SEWERS. DO NOT USE BENDS IF POSSIBLE. PROVIDE A MINIMUM OF 0.5 METERS CLEARANCE BETWEEN WATERMAIN AND SEWERS. MAINTAIN MINIMUM DEPTH OF COVER OF 1.7m AT ALL TIMES.
17. MINIMUM HORIZONTAL SEPARATION BETWEEN WATERMAIN AND SEWERS TO BE 2.5 METERS.
18. ALL VALVES TO BE RESILIENT CLOW CANADA F6100 SEAT GATE VALVES.
19. VALVES IN EXCESS OF 1.7m IN DEPTH SHALL REQUIRE A VALVE STEM EXTENSION.
20. RISER PIPES ARE TO BE INSTALLED AS PER STANDARD, AND REMOVED AS DIRECTED.

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EROSION AND SEDIMENT CONTROL NOTES

1. PRIOR TO CONSTRUCTION ADVISE TOWNSHIP AND CONSERVATION AUTHORITY OF STAFF RESPONSIBLE FOR SITE SEDIMENT CONTROL SUPERVISION, INSPECTION AND MAINTENANCE, INCLUDING AFTER HOUR CONTACTS AND PROVIDE WRITTEN INSPECTION AND MAINTENANCE SCHEDULE OF SEDIMENT CONTROL DEVICES
2. INSTALL ALL SEDIMENT CONTROL DEVICES AS IDENTIFIED ON THE APPROVED EROSION CONTROL PLAN PRIOR TO COMMENCEMENT OF TOPSOIL STRIPPING OR EARTHWORKS OPERATIONS
3. ENSURE TOPSOIL, STRIPPING, GRADING AND UNDERGROUND WORKS CONFORM TO APPROVED GRADING, SERVICING AND EROSION CONTROL PLAN;
4. CONTRACTOR TO CONDUCT REQUIRED WEEKLY INSPECTION, MAINTENANCE AND REPORTING OF SEDIMENT CONTROLS TO THE TOWNSHIP AND CONSERVATION AUTHORITY AND STABILIZE SITE AS REQUIRED THROUGHOUT SITE CONSTRUCTION SCHEDULE
5. CONSTRUCTION AREAS THAT EXCEED 30 DAYS OF INACTIVITY SHALL BE STABILIZED BY SEEDING. THIS IS TO INCLUDE STOCKPILES OF FILL AND TOPSOIL
6. EROSION AND SEDIMENT CONTROLS TO BE DESIGNED IN ACCORDANCE WITH TOWNSHIP AND CONSERVATION AUTHORITY STANDARDS.
7. ALL SEDIMENT CONTROL BASINS SHALL BE IN ACCORDANCE WITH NVCA DRAWING BSD - 23A
8. ALL SEDIMENT CONTROL FENCES SHALL BE IN ACCORDANCE WITH NVCA DRAWING BSD - 23 DRAFT
9. ROCK CHECK DAMS SHALL BE IN ACCORDANCE WITH NVCA DRAWING BSD - 24 DRAFT
10. MUD MATS TO BE USED AT ALL CONSTRUCTION ENTRANCES AND EXIT LOCATIONS AND BE A MINIMUM 20M IN LENGTH AND 5M IN WIDTH. THE PAD SHALL BE A MINIMUM OF 450MM THICK, CONSTRUCTED WITH 50MM DIAMETER CLEAR STONE IN THE FIRST 10M OF THE PAD EXTENDED FROM THE STREET. THE REMAINDER OF THE PAD SHALL BE CONSTRUCTED WITH 150MM DIAMETER STONE
11. CONTRACTOR TO MAINTAIN ALL ROADS AFFECTED BY CONSTRUCTION FREE OF SEDIMENT BY SWEEPING AS NECESSARY OR AS DIRECTED BY THE CONTRACT ADMINISTRATOR OR TOWNSHIP
12. CONTRACTOR TO IMPLEMENT APPROPRIATE DUST CONTROL MEASURES TO PREVENT EXCESSIVE DUST ON SITE OR MIGRATION OF DUST TO ADJACENT PROPERTIES
13. ALL DISTURBED AREAS ARE TO BE REINSTATED TO THEIR ORIGINAL CONDITION OR BETTER AS DETERMINED BY THE TOWNSHIP OF CLEARVIEW.
14. ALL SILT CONTROL AND EROSION PROTECTION DEVICES ARE TO BE IN PLACE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETE, AND THE GRASS HAS ESTABLISHED GROWTH; SUBJECT TO APPROVAL BY THE TOWNSHIP OF CLEARVIEW.

No.	Issue / Revision	Date	Auth.
TOWNSHIP OF CLEARVIEW			
Figure Title			
STANDARD NOTES - EROSION AND SEDIMENT CONTROL			
Drawn	R.J. BURNSIDE	Approved	DWG. No.
Scale	N.T.S.	Date	16/12/12
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