

MUNICIPAL SERVICE STANDARD SPECIFICATIONS



MUNICIPAL SERVICE STANDARD SPECIFICATIONS

Town of Westville

October 2014

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1. DRAWING SPECIFICATION

1.1 General

- .1 The purpose of this section is to standardize the preparation and delivery of all hardcopy and digital drawings submitted to the Town of Westville for approval.

1.2 Design Drawings

- .1 The engineering design drawing shall include, but are not necessarily limited to:
 - .1 Plan
 - .2 Profile
 - .3 Details as required (project specific)
 - .4 Overall plan
- .2 The presentation of the plan and profile views of the engineering design drawing shall be as follows:
 - .1 Units: All drawings submitted for approval shall be prepared using metric units.
 - .2 Scale: The plan shall be drawn to a scale of 1:500 (metric). The profile shall be drawn with a horizontal scale of 1:500 and a vertical scale of 1:50 unless otherwise approved by the Town of Westville.
 - .3 Title Block: The title block, located on the right side of the sheet shall include a key plan, legend, notes, revisions, dates, scales, drawing number, approving signatures, drawing title, and company name.
 - .4 Sheet size: The drawing size shall be Arch D (604mm x 914mm) or as otherwise approved by the Town of Westville.
 - .5 North arrow: Drawing plan view to include a grid north arrow in the upper right corner. Where possible, the plan view should be orientated so that direction of north points to the top half of the sheet.



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- .6 Key plan: All drawings shall contain a key plan on each sheet indicating the section of the project covered by the sheet.
- .7 Stations: The plan and profile view stations shall be aligned vertically at one end of the sheet. Stations should increase from left to right and when possible, from lowest elevation to highest elevation. When it is not possible to achieve both increasing stations and increasing elevation from left to right, then the requirement for increasing stations will take precedence.
- .3 Details to be included as necessary or as directed by the Town Engineer.
- .4 Plan: The plan of the engineering design drawing shall include:
 - .1 The existing and proposed location and horizontal alignment of:
 - .1 The water distribution system including all valves, water service laterals, hydrants, hydrant branches, tees, bends and appurtenances (i.e. chambers, reducers, couplings), and pipe with the length, size, material and class.
 - .2 Sprinkler and large diameter water service pipes (>50 mm) with the length, size, material and class, to the street lines.
 - .3 The wastewater sewers, storm water sewers, manholes, and culverts, with offsets from the water main.
 - .4. All other public services and their appurtenances including any underground power, telecommunication system, or gas lines.
 - .2 The street and its dimensions and name.
 - .3 Curbs and gutters, sidewalks, and driveways.
 - .4 The boundary lines of each lot, lot numbers and property identification (PID) numbers if available.
 - .5 The chainage at 10m intervals with labels every 50m along the centerline of the street, and the chainage of all intersecting street center lines.
 - .6 Any control monuments and bench marks that are within the area of the plan.
 - .7 Limits of the construction.
 - .8 At least two points of known chainage on the centerline of the street, to be related to the Nova Scotia Coordinate Survey System (ATS77).



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- .9 Match Lines: Where a water main extends over more than one drawing sheet corresponding match lines with labels shall be provided with sufficient overlap on each drawing to include all information on fronting properties.

- .5 Profile: The profile of the engineering design drawing shall include the existing and proposed location and vertical alignment of:
 - .1 The water system, including length, size, material and class of pipe, and the chainage and size of all fittings corresponding directly to the plan. Pipe shall be shown as a two-dimensional figure indicating pipe invert and outlet.
 - .2 The proposed centerline street grade. Where the water line is offset from the street centre line, the elevation of the water main must maintain the minimum depth of cover with consideration for the street cross slope.
 - .3 The finished grade above the water main where the water line is not under a street.
 - .4 The wastewater and storm water sewers, including pipe inverts at manholes (inlet/outlet), manhole cover elevations and catch basin lead invert information. Show all water, wastewater and storm water main/culvert crossings in profile.
 - .5 Any other underground services and appurtenances.

- .6 The engineering design drawing shall be stamped and signed by a Professional Engineer currently registered to practice in Nova Scotia.

- .7 Format: The format of design drawing submission shall be:
 - .1 Hard copy on 20 lb (minimum) bond paper.
 - .2 Digital design drawing files shall be delivered in an electronic format compatible with AutoCAD or Autodesk Civil 3D. The minimum requirement for CAD file submission (for final design drawings only) shall include the plan portion of the drawing to facilitate GIS updating. This CAD file shall include the location of proposed pipes, hydrants, valves, services, and any water system appurtenances. In addition to the



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water system, the CAD file shall include any proposed buildings (outline) and property parcels.

- .3 All drawings shall also be submitted in .pdf format.

1.3 Record Drawings

- .1 The record drawing shall include all information on the “Design Drawing” as per subsection 1.2, revised to reflect the “As Constructed” information. As a minimum the field coordinates of the following shall be obtained for the purpose of producing Record Drawings:

- .1 valves
- .2 hydrants
- .3 finish grade
- .4 pipe elevations
- .5 curb stops
- .6 catch basins
- .7 manholes (tops and inlet / outlet inverts)
- .8 storm water system inlet / outlet elevations

- .2 Additional information which must be included on the record drawings includes:

- .1 Swing ties from permanent above ground fixtures (i.e. buildings, power poles, hydrants) to locate main line valves, manholes, catch basins, large service and sprinkler valves, and other servicing appurtenances.
- .2 The location of all service laterals from main to property boundary.
- .3 Dimensions to locate tees, bends, and other below ground fixtures.
- .4 Hydrant leads to include measurement from:
 - .1 centre of hydrant valve to centre of hydrant.
 - .2 centre of hydrant valve to main.
- .5 Start and end of rock profile (if any).
- .6 Start and end of insulation (if any).
- .7 Start and end of water main encasement pipes (if any).
- .8 The location of restrained joints / pipe.



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- .3 Format: The format of the record information submission shall be electronic format as per Section 1.4 - Electronic Submission.

1.4 Electronic Submission

- .1 General
 - .1 The purpose of this section is to identify the technical requirements for electronic information supplied to the Town of Westville.
- .2 Geo-Referencing
 - .1 All work shall be referenced using the Nova Scotia Coordinate Survey System (ATS77).
 - .2 Map Projection: The Nova Scotia Modified Transverse Mercator projection and grid system (MTM Zone 4 and Zone 5) shall be used for referencing data.
 - .3 Datum: The horizontal datum for all coordinates shall be ATS77 adjustment.
 - .4 Units: All coordinates and dimensions shall be supplied in metric units.
- .3 Coordinate Accuracy
 - .1 Measurements and distances shall be collected to an accuracy of +/-50mm.
 - .2 Real world coordinates shall be shown correctly with no front end truncation of the coordinate values.
- .4 Delivery Format
 - .1 Digital record drawing files shall be delivered in a format compatible with AutoCAD or Civil 3D. If drawing files contain images and/or externally referenced drawing files (XREFS) the use of AutoCAD's "SHEET SET" or "ETRANSMIT" is desirable for assembling a usable CAD submittal package. Include any plot style files (STB or CTB) for plotting purposes.
 - .2 In addition to digital CAD files, record drawing sheets shall be submitted in .pdf format.



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- .5 Delivery Media
 - .1 CD or DVD media, clearly labelled with the project name, project phase, date, and consultant's name.
- .6 Layer Names
 - .1 Provide a list of all layer names used within the CAD drawing file to the Town of Westville for identification of features within the file.

2. STREET SPECIFICATIONS

2.1 General

- .1 In all respects, the criteria set out by the Transportation Association of Canada (TAC) shall serve as the basic guidelines for road design in the Town of Westville.

2.2 Street Types

- .1 Streets to be constructed as an urban cross-section type shall:
 - .1 Contain standard curb and gutter, as shown on SD-1 and SD-3
 - .2 Be paved with a minimum of 75mm hot-mix asphalt (see Section 2.8 below).
 - .3 Have an area behind the curb of 3m (to the right-of-way line) filled with material not exceeding 100mm in any direction and graded 2% to the top of the curb.
- .2 Streets to be constructed as an rural cross-section type shall:
 - .1 Contain roadside ditches on each side of the road, as shown on SD-2.
 - .2 Be paved with a minimum of 75mm hot-mix asphalt (see Section 2.8 below).
 - .3 Have a 1.6m wide gravel road shoulder.

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- .3 Extensions of existing roads are to maintain the same cross-section type as the existing road.

2.3 Street Classifications

- .1 The Town of Westville street classification and basic criteria shall be as follows:

Type	Designation	Right-of-Way Width	Pavement Width
Urban Cross-section	Collector & Local	15.24m	6.72m
	Cul-de-sac	Minimum Radius of 19.5m from Centre of Bulb to edge of right-of-way	Minimum Radius of 15m from Centre of Bulb to Face of Curb
Rural Cross-section	Collector & Local	20m	6m
	Cul-de-sac	Minimum Radius of 19.8m from Centre of Bulb to edge of right-of-way	Minimum Radius of 13m from Centre of Bulb to edge of road shoulder.

2.4 Design Speed

- .1 In general, a design speed of 50 km/hr will be used for all subdivision streets unless a higher speed is deemed to be required by the Town of Westville.



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2.5 Street Layout

- .1 Streets must be laid out where reasonably possible in prolongations of other streets, either within the same subdivision or in adjacent subdivisions.
- .2 Temporary Turn-arounds:
 - .1 A street is not permitted to terminate as a "dead-end" and shall terminate with a cul-de-sac as shown on SD-4.
 - .2 For streets that shall be extended in the future, as approved by the Town Engineer, a temporary turn-around is to be installed at the end of the street developed as shown on SD-5.
- .3 Intersections:
 - .1 The minimum distance between intersections within a subdivision of local streets shall be 75m measured centreline to centreline.
 - .2 All intersecting streets must intersect at an angle of 90-degrees +/- 10 degrees for a minimum distance of 30m from the intersection measured from respective centrelines.
 - .3 The minimum distance between offset intersections shall be 60m.

2.6 Street Sub-grade:

- .1 All clearing and grubbing operations, including the removal of rock, shall be undertaken to the full extent of the street right-of-way. All rocks, trees, stumps and other organic matter removed during the clearing and grubbing operations shall be transported entirely from the site.
- .2 The top 300mm of the proposed sub-grade shall be compacted to 98% standard proctor and graded with a 2% crown along the center line at an elevation of a minimum of 338mm below the finished grade of the street.
- .3 Where rock exists to the sub-grade, it shall be fractured to 300 mm (12 in) below sub-grade and graded.



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- .4 All slopes in cut and fill sections shall be constructed outside the street right-of way and shall be a minimum of 3:1 horizontal to vertical or as otherwise required for less stable material.
- .5 Rock cuts shall be a minimum of 1:4 or as otherwise required. All overhanging and/or loose rocks shall be removed and, in areas where a minimum of 1:4 cannot be obtained, slope protection shall be required.
- .6 Except as specified in Section 2.6.2, in fill sections, all fill material shall be compacted in uniform layers of 300mm and compacted to 95% standard proctor density. It shall be evenly distributed to ensure proper mixing of rocks and fill materials so that proper compaction and consolidation can be achieved. Under no circumstances shall rock migration, creating voided areas, be permitted around underground structures or elsewhere. No rock fill exceeding 300mm in any dimension shall be placed within the top 600mm of sub-grade elevation.
- .7 Under stable conditions, the base course gravel shall consist of Type-2 and Type-1 material in compacted minimum layers of 200mm and 100mm respectively, compacted to 100% standard proctor density, and graded with a 2% crown along the centre line of the street.
- .8 The required depth of base course gravels is directly dependent on the conditions of the sub-grade. Therefore, the specific design shall be determined by a Professional Geotechnical Engineer licensed to practice in the Province of Nova Scotia prior to placement and paving.
- .9 The gradation of Type-2 and Type-1 gravel materials shall be as follows:

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.1 Type-1:

Sieve Size, μm	Percent Passing
20,000	100
14,000	50 - 85
5,000	20 - 50
160	5 - 12
80	3 - 8

.2 Type-2:

Sieve Size, μm	Percent Passing
80,000	100
56,000	70 - 100
28,000	50 - 80
14,000	35 - 65
5,000	20 - 50
160	3 - 10
80	0-7

- .10 All records of sieve analysis for all road sub-grade materials are to be submitted to the Town Engineer for review.
- .11 All records of compaction testing completed by a qualified testing company and in accordance with all applicable CSA standards and standards of the Nova Scotia Department of Transportation & Infrastructure Renewal are to be submitted to the Town Engineer for review.



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2.7 Street Grades

- .1 The maximum allowable grade of any street shall be 8%. Where topographic conditions warrant, and upon written approval from the Town Engineer, may exceed 8% but in no case shall it exceed 10%.
- .2 The minimum allowable grade of any street shall be 0.5%.
- .3 Where two streets intersect, the streets shall intersect at right-angles and the maximum grade shall be 2% from at least 15m from the intersection.

2.8 Street Asphalt & Surfaces

- .1 All streets shall be surfaced with asphaltic concrete paving conforming to this specification.
- .2 Asphalt Materials & Mixes: to Province of Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance Division 4, Section 4, and type indicated.
- .3 Written certification from the Design Engineer, including applicable testing and inspection reports, that the asphaltic concrete paving supplied and installed conforms to this specification is to be submitted to the Town Engineer for review.
- .4 Asphaltic concrete installed on gravel grade shall be Type B Asphalt at a minimum thickness of 75mm.
- .5 Asphaltic concrete installed as resurfacing shall be Type D Asphalt at a minimum thickness of 25mm.
- .6 All manholes, catch basins, frames and valves boxes shall be adjusted to match the finished surface of asphalt concrete paving.



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- .7 Sodding shall be placed from the back of the curb to the right-of-way line at 2% to the top of the curb.

2.9 Street Signage

- .1 Street signs showing street names shall be placed at all intersections.
- .2 Sign posts shall be 50mm galvanized breakaway traffic posts, 3m long.
- .3 Posts are to be installed using V-Loc sign bases complete with wedges supplied by J. J. MacKay of New Glasgow, Nova Scotia.
- .4 Street name signs shall be 150mm deep extruded aluminum with reflective white letters on green, top-mounted with Unistrut caps style 28A.

3.0 SANITARY SEWER SPECIFICATIONS

3.1 General

Sanitary sewer systems shall conform to the specifications and design criteria herein.

3.2 Design Requirements - Gravity Systems

- .1 The sanitary sewer system shall be designed for peak flow based on:
 - .1 Peak domestic sewage flow calculated by the following equation:

$$Q(d) = \frac{PqM}{86.4} + IA + SN$$

where:

Q(d) = peak domestic sewage flow (including extraneous flow) in L/sec.



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- P = design population, in thousands
q = average daily per capita domestic flow in L/cap-d. (exclusive of extraneous flows)
M = peaking factor as derived from the greater of:

$$M = 1 + \frac{14}{4 + P^{0.5}} \quad \text{or} \quad M = \frac{5}{P^{0.2}}$$

The minimum permissible peaking factor shall be 2.0.

- I = unit of peak extraneous flow (0.28 L/sec per hectare with the area based on inflow generated from within 50m on both sides of the road within the new serviced areas).
A = tributary area in gross hectares.
S = unit of manhole inflow allowance for each manhole in sag location (0.4 L/sec per manhole).
N = number of manholes in sag locations.

- .2 For individual commercial and institutional users, the sewage flow rates in the table below are to be used for design.



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Sewage Flows (Average Daily)

Type of Establishment		Flow (L/day)
Residential	Private Dwelling	340 per person
	Apartment Building	340 per person
Transient Dwelling	Hotels	340 per bedroom
	Lodging Houses / Tourist Homes	270 per bedroom
	Motels / Tourist Cabins	300 per bedroom (restaurant extra)
	<i>Does not include process water or cafeteria</i>	
Camps	Campsite	500 per campsite
	Trailer Camps	340 per person
	Children's Camps	230 per person
	Labour Camps	230 per person
Restaurants	Average Type	225 per seat + 100 per employee
	Bar / Lounge	25 per patron
	Short Order / Drive-in Service	25 per patron
	24 hour	225 per seat
Clubhouses	Residential Type	340 per person
	Non-residential Type	160 per person
	Golf Club - General	40 per member
	Golf Club with Bar & Restaurant	40 per member + 115 per seat



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Sewage Flows (Average Daily)

Type of Establishment		Flow (L/day)
Institutions	Hospitals	950 per bed
	Other	450 per resident
Schools	Basic	50 per person
	With Cafeteria	70 per person
	With Cafeteria & Showers	90 per person
	With Cafeteria, Showers & Laboratories	115 per person
	Boarding	340 per person
Theatres	Indoor Theatre	25 per seat
	Drive-in Theatre	25 per car
Automobile Service Stations	No Car Washing	20 per car served
	Car Washing	340 per car washed
Miscellaneous	Stores, Shopping Centres & Offices	6 per m ²
	Factories (8 hour shifts)	115 per person
	Self-service Laundries	1,800 per machine
	Bowling Alleys	900 per alley
	Swimming Pools & Beaches	70 per person
	Fairgrounds	25 per person
	Assembly Halls	35 per seat



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Sewage Flows (Average Daily)

Type of Establishment	Flow (L/day)
Airports	15 per passenger
Churches - General	25 per seat
Churches - with Kitchens	35 per seat
Beauty Parlours	200 per seat
Barber Shops	75 per seat
Hockey Rinks	15 per seat
Day Care Centres	115 per child
Liquor Licence Establishments	115 per seat
Mobile Home Parks	1,350 per space
Nursing Homes	450 per resident
Senior Citizen Homes	600 per apartment
Recreational Vehicle Park	180 per space

- .3 Peak Factor: When using the above unit demands, maximum day and peak rate factors must be developed. For establishments in operation for only a portion of the day, such as schools, shopping plazas, etc., the water usage should also be factored accordingly.
- .2 Sanitary Sewer Main:
 - .1 The sanitary sewer main shall be PVC SDR 35 pipe material with locked-in rubber gasket joints.
 - .2 The minimum size of pipe to be used for sanitary sewer main lines shall be 200mm diameter.



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.3 All pipe shall be laid at a uniform vertical grade and horizontal alignment in a compacted Type C5 Clear Stone bedding placed in an undisturbed or approved trench bottom.

.1 Type C5 Clear Stone:

Sieve Size, mm	Percent Passing
28	100
20	90 - 100
10	0 - 40
5	0 - 10

.2 All records of sieve analysis for all pipe bedding materials are to be submitted to the Town Engineer for review.

.4 Stone bedding along the sides of the pipe shall be installed and compacted in such a way as not to alter the alignment or grade of the pipe. Bedding shall extend to 300mm above top of pipe for full trench width.

.5 Further backfilling shall be placed in layers to achieve a 95% standard Proctor density and shall be carried out in a manner which ensures that no rock migration will occur around manhole structures. Refer to standard drawing SD-6.

.6 When manhole and water main structures are located within 300mm of each other, this area must be backfilled and compacted using Type-1 or Type C5 Clear Stone.

.7 All pipe shall be laid in accordance with Nova Scotia Road Builders Association Standard Specifications for Municipal Service, Section 33 31 00 sub-section 3.3.

.8 When a new sanitary sewer main line is to be connected to an existing sanitary sewer main line at mid-span between existing manholes (e.g. at a new street intersection), the existing pipe of the existing sanitary sewer main line is to be replaced with new between the existing immediate preceding and existing immediate subsequent manholes.

.1 If the condition of the existing sanitary sewer main line can be demonstrated to be in good and functional condition by way of



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inspection by a qualified company in accordance with the Nova Scotia Road Builders Association Standard Specifications for Municipal Services, Section 33 31 00 sub-sections 3.8 and 3.9, at the sub-divider's own expense, and approved by the Town Engineer, the existing sanitary sewer main line may be maintained for use.

- .9 All sanitary sewer mains shall have a minimum grade of 1%.
 - .10 Sanitary sewer flow velocities shall be a minimum of 0.6 m/s and a maximum of 4.5m/s.
 - .11 Detailed calculations of sanitary sewer flows are to be submitted to the Town Engineer for review prior to approval and construction.
- .3 Location:
- .1 All sanitary sewer pipes and appurtenances shall be located within a street right-of-way along the centre of the street for all new streets.
 - .2 Sanitary sewer pipes may be installed within an easement granted in favour of the Town if deemed to not be feasible to install within a street right-of-way and written approval is obtained from the Town Engineer.
- .3 Depth:
- .1 In general, all sanitary sewer pipes shall be installed at a sufficient depth to provide service by gravity flow to all proposed lots within the proposed subdivision and provide service to adjoining lands.
 - .2 The minimum depth of sanitary sewer pipes shall be 1.8m.
 - .4 Refer to standard drawing SD-6 for common trench requirements.
- .4 Manholes:
- .1 All manholes shall be standard ASTM C-478 and shall have precast or cast-in-place concrete bases.
 - .2 All manholes shall have a minimum diameter of 1050mm.
 - .3 All manholes shall be constructed using pre-cast concrete sections and "O"-ring gasketed joints.
 - .4 Grade rings shall be a minimum of 150mm thick.
 - .5 Manhole covers shall be IMP R10.



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- .6 Manholes shall be installed at all changes in grade or alignment, at all intersections, and at intervals not exceeding 120m.
- .7 Installation of manholes shall be in accordance with the Nova Scotia Road Builders Association Standard Specifications for Municipal Services, Section 33 39 00 sub-section 3.3.
- .8 Internal drop precast concrete manholes shall be sized to ensure a minimum width of 1050mm for inside edges of internal drop to the opposite inside wall of the manhole.
- .5 Sanitary Sewer Laterals:
 - .1 All sanitary sewer laterals shall be PVC SDR 28 pipe material with locked-in rubber gasket joints and laid at a minimum grade of 2%, graded uniformly to the sanitary sewer main line in a compacted Type C5 Clear Stone pipe bed and backfilled in accordance with standard drawings SD-9.
 - .2 All sanitary sewer laterals shall have clean-outs installed at the street right-of-way lines.
 - .3 Sanitary sewer lateral connections to the sanitary sewer main line shall be made using properly engineered saddles or tees.
 - .4 The depth of sanitary sewer laterals shall be not less than 1.2m at the right-of-way and shall have sufficient depth to be capable of servicing the basement level of a dwelling by gravity feed unless otherwise approved by the Town Engineer.
 - .5 All sanitary sewer laterals shall be capped at the street right-of-way and a 50mm x 100mm wooden marker shall be erected at the end of the lateral indicating depth of bury and marked "SEWER" and painted RED.
- .6 Groundwater Movement:
 - .1 The Design Engineer shall assess the possible change in groundwater movement caused by the use of pervious bedding material and shall be responsible for the design of corrective measures to prevent localised flooding as a result of this groundwater movement.
 - .2 Trench relief drains shall be incorporated in the design at valley locations.



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3.3 Design Requirements - Pumping Stations & Force Mains

.1 Pumping Stations & Force Mains:

- .1 Pumping stations and force mains represent a long-term financial burden to the Town of Westville in terms of operating and maintenance costs and eventual replacement of system components. Designs are to preclude the need for pumping stations. Pumping stations will be permitted only when a gravity system is not physically possible or when the life cycle costs of a gravity sewer are shown to be greater than those of a pumping station.
- .2 The type of sewage pumping station should be selected on the basis of such considerations as reliability and serviceability; operation and maintenance factors; relationship to existing stations/equipment; sewage characteristics; flow patterns and discharge; and long-term capital, operating and maintenance costs.
- .3 Pumping stations and force mains, where necessary, shall be designed and constructed in accordance with engineering best practices and shall conform to the standards and specifications of the East River Pollution Abatement System.

.2 Force Mains for Private Dwellings:

- .1 Where existing topography dictates a need to service a dwelling unit utilizing a force main, the force main service shall be entirely upon the private property, connect to a gravity service lateral at the right-of-way line.

3.4 Inspection & Testing

.1 Inspection:

- .1 The subdivider shall not bury any pipe or appurtenances until they have been inspected by the designated representative of the Design Engineer.
- .2 Inspections shall be performed by a qualified company in accordance with the Nova Scotia Road Builders Association Standard Specifications for Municipal Services, Section 33 31 00 sub-sections 3.8 and 3.9.



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- .2 Testing:
 - .1 Testing of sanitary sewer mains and force mains shall be performed by a qualified testing company in accordance with the Nova Scotia Road Builders Association Standard Specifications for Municipal Services, Section 33 31 00 sub-section 3.6 in the presence of the Town Engineer or his designate.
 - .2 The Town Engineer is to be provided 48 hours notice of when each testing is to be conducted.
 - .3 Test results shall be submitted to the Town Engineer for review.
 - .4 The Design Engineer shall provide written certification that the sanitary sewer system is installed as designed and is complete and operational.

4. WATER DISTRIBUTION SYSTEM SPECIFICATIONS

4.1 General

- .1 This section specifies the requirements for a central water distribution system which consists of water mains, service laterals and appurtenances which is designed to carry and distribute an adequate supply of potable water for domestic, institutional, commercial, industrial, and fire protection purposes.
- .2 Reference standards and organizations supported by these specifications include:
 - .1 *Water Supply for Public Fire Protection*, Fire Underwriters Survey - Insurance Advisory Organization (IAO)
 - .2 The National Fire Protection Association (NFPA)
 - .3 American Waterworks Association (AWWA)
 - .4 Canadian Standards Association (CSA)
 - .5 National Building Code of Canada (NBCC)
 - .6 Nova Scotia Building Code (NSBC)
 - .7 National Plumbing Code of Canada (NPCC)
 - .8 Underwriters Laboratories of Canada (ULC)



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- .3 All water systems shall conform to all requirements established by the Nova Scotia Department of Environment. No system shall be constructed until the design has been approved by the Town of Westville and the Nova Scotia Department of Environment.
- .4 Water quality is monitored by the Town of Westville and the system must be designed such that quality is maintained and distributed to the to the customers at an adequate pressure to supply their needs.

4.2 Design Requirements

- .1 Water distribution systems shall be designed to accommodate fire flows plus maximum daily demand unless otherwise approved by the Town Engineer.
- .2 Hydraulic analysis of any system shall be carried out by the Design Engineer using the Hydraulic Grade Line for that particular serviceable area.
- .3 Minimum & Maximum Pressure:
 - .1 Water distribution systems shall be designed and sized such that during a fire flow condition, a residual positive pressure of 150 kPa (20 psi) is maintained at all points in the water distribution system.
 - .2 For any water system extension, it is desirable to maintain a minimum residual water pressure of 275 kPa (40 psi) at all points along the distribution mains within the water distribution system during maximum hourly demand conditions.
 - .3 Maximum water pressure during minimum demand periods shall not exceed 620 kPa (90 psi).
 - .4 Detailed calculations of water distribution system are to be submitted to the Town Engineer for review prior to approval and construction.
- .4 Looping & Dead Ends:
 - .1 The water distribution system is to be looped as frequent as street and / or easement layouts permit.



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- .2 Where dead-ends of water mains are required, the water pipe shall have a negative slope to the loop section of the water distribution system to prevent accumulation of debris within dead end sections.

- .5 Minimum Sizes:
 - .1 The minimum size of water distribution system main lines for looped lines shall be 150mm diameter.
 - .2 The minimum size of water distribution system main lines for dead-ended lines shall be 200mm diameter.
 - .3 Over-sizing of water main lines to accommodate the water supply of future off-site development may be required as instructed by the Town Engineer.

- .6 Location:
 - .1 All water distribution system main lines and appurtenances shall be located within a street right-of-way.
 - .2 Water distribution system main lines may be installed within an easement granted in favour of the Town if deemed to not be feasible to install within a street right-of-way and written approved is obtained from the Town Engineer.
 - .3 Depth:
 - .1 The minimum depth of water distribution system main line pipes shall be 1.5m.
 - .4 Refer to standard drawing SD-6 for common trench requirements.

- .7 Valves:
 - .1 All water distribution system main line valves shall be resilient seat valves complete with valve boxes to finished grade with covers marked "WATER".
 - .2 Valve locations:
 - .1 At locations required to adequately isolate sections of the water system as approved by the Town Engineer.
 - .2 Four (4) valves per cross-section; one (1) per leg of a cross.
 - .3 Three (3) valves per tee section; one (1) per leg of a tee.



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.4 One (1) per 150m.

.8 Main Line Pipe Material:

- .1 PVC DR18
- .2 Ductile Iron Class 52

.9 Pipe Bedding:

- .1 All pipe shall be laid at a uniform vertical grade and horizontal alignment in a compacted Type C5 Clear Stone bedding placed in an undisturbed or approved trench bottom.
 - .1 Type C5 Clear Stone:

Sieve Size, mm	Percent Passing
28	100
20	90 - 100
10	0 - 40
5	0 - 10

- .2 All records of sieve analysis for all pipe bedding materials are to be submitted to the Town Engineer for review.
- .3 Stone bedding along the sides of the pipe shall be installed and compacted in such a way as not to alter the alignment or grade of the pipe. Bedding shall extend to 300mm above top of pipe for full trench width.
- .4 Further backfilling shall be placed in layers to achieve a 95% standard Proctor density and shall be carried out in a manner which ensures that no rock migration will occur around manhole structures. Refer to standard drawing SD-6.
- .5 When manhole and sanitary sewer main structures are located within 300 mm of each other, this area must be backfilled and compacted using Type-1 or Type C5 Clear Stone.
- .6 All pipe shall be laid in accordance with Nova Scotia Road Builders Association Standard Specifications for Municipal Service, Section 33 11 00 sub-section 3.3.



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- .10 Changes in Direction:
- .1 Any change in direction which is in excess of the pipe joint deflection tolerance shall require a suitable thrust block in accordance with standard drawings SD-13.
 - .2 Gradient restraint anchor blocks shall be provided for pipes installed at grades steeper than 16%.
 - .3 Fittings are required at all changes of vertical or horizontal direction greater than the pipe manufacturer's tolerance for pipe deflection in joints.
 - .3 Approved thrust restraint shall be provided for all valves on PVC pipe larger than 150mm in diameter.
 - .4 Thrust blocks shall be provided for service lateral connections greater than 100mm in diameter.
- .11 Fire Hydrants:
- .1 Fire hydrants shall be McAvity M-67, 1.5m bury.
 - .2 Maximum spacing of fire hydrants shall not exceed 150m.
 - .3 Install fire hydrants at the following locations:
 - .1 At high points of the water distribution system main line profile.
 - .2 At low points of the water distribution system main line profile.
 - .3 At all intersections of streets.
 - .4 At the end of dead-end streets or cul-de-sacs greater than 90m in length.
- .12 Service Laterals:
- .1 All service laterals shall be installed at a minimum depth of 1.5m.
 - .2 All service laterals shall be installed in a separate trench from the water distribution main line pipe to the street right-of-way.
 - .3 Service laterals shall be connected at 90-degrees to the water distribution main line pipe and made with brass corporation stops to ASTM B62, compression type.
 - .4 A single service lateral is to be provided to each existing and / or potential future lots which could be created under the zoning in effect at the time of installation of services.
 - .5 Size:



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- .1 Minimum 20mm diameter for lengths up to 55m.
- .2 Minimum 25mm diameter for lengths exceeding 55m.
- .6 Pipe Material:
 - .1 Type K Copper.
 - .2 MUNICIPEX.
- .7 Backflow Prevention Devices:
 - .1 Backflow prevention devices are required on new services.
- .8 All service laterals shall be capped at the street right-of-way and a 50mm x 100mm wooden marker shall be erected at the end of the lateral indicating depth of bury and marked "WATER" and painted BLUE.

- .13 Groundwater Movement:
 - .1 The Design Engineer shall assess the possible change in groundwater movement caused by the use of pervious bedding material and shall be responsible for the design of corrective measures to prevent localised flooding as a result of this groundwater movement.
 - .2 Trench relief drains shall be incorporated in the design at valley locations.

- 4.3 Testing & Disinfection:
 - .1 Testing of the water distribution system shall be carried out to ensure that the system is properly installed and watertight.
 - .2 The testing and disinfection of the water distribution system shall be performed by a qualified testing company in accordance with the Nova Scotia Road Builders Association Standard Specifications for Municipal Services, Section 33 11 00 sub-section 3.9 and 3.10.
 - .3 Test results shall be submitted to the Town Engineer for review.
 - .4 The Design Engineer shall provide written certification that the water distribution system is installed as designed and is complete and operational.



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5. STORM WATER MANAGEMENT

5.1 General

- .1 This section specifies the requirements for a storm drainage system.
- .2 A storm drainage system is a system which receives, carries, and regulates storm water flows in response to rain and snow which includes overland flow, sub-surface flow, and snow melt.
- .3 Design objectives that are all required to be satisfied for the design of storm drainage systems within the Town of Westville are as follows:
 - .1 To prevent loss of life, protect infrastructure, and property from damage due to a major storm event.
 - .2 To provide for safe and convenient use of streets, properties, and other improvements following storm events.
 - .3 To preserve natural watercourses and minimize the long term effect of development on receiving watercourses and groundwater.
 - .4 Convey storm water from upstream and on-site sources and to mitigate adverse effects of such flow on downstream properties.
- .4 All storm drainage systems shall satisfy all requirements of the Nova Scotia Department of Environment, in addition to these specifications herein, and shall not be constructed until the design has been approved by both the Town Engineer and Nova Scotia Department of Environment.

5.2 Design Approach

- .1 Storm Drainage Systems:
 - .1 A *Minor Drainage System* consists of ditches, swales, driveway culverts, subsurface interceptor drains, curb and gutter, catch basins, pipes, and laterals.



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- .2 A *Major Drainage System* consists of ditches, roadways / streets, roadway / street culverts, open channels, detention / retention ponds, floodplains, and natural watercourses.

- .2 Downstream Drainage Systems:
 - .1 All downstream drainage systems must have sufficient capacity to receive and carry storm water discharge from the proposed storm drainage system in addition to its natural rate of discharge.
 - .2 An investigation of the downstream system shall be carried out by the Design Engineer from the outfall location of the proposed storm drainage system to a point sufficiently downstream that will demonstrate no adverse impacts on downstream lands such as erosion and / or flooding.
 - .3 The effect on downstream development will be assessed by the Design Engineer based on this investigation. Mitigative measures may be required to alleviate and adverse downstream impacts.

- 5.3 Design Storm Frequencies
 - .1 Minor Systems:
 - .1 Driveway culverts and other minor drainage systems shall be designed based on a design storm frequency of 1 in 5 years, except high value commercial and business areas.
 - .2 High value commercial and business areas shall be designed based on a design storm frequency of 1 in 10 years.

 - .2 Major Systems:
 - .1 Roadways / streets, roadway / street cross culverts, and other major drainage systems shall have a combined capacity of the major drainage system and minor drainage system and shall be based on a design storm frequency of 1 in 100 years.
 - .2 For design purposes the capacity of a natural watercourse including a flood plain or any drainage system where a minor drainage system is not provided, shall be based on a design storm frequency of 1 in 100 years.



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5.4 Meteorological Data

- .1 Meteorological data will vary depending on the design methodology used. All meteorological data must be supplied by Atmospheric Environment Service, Environment Canada, or other similar government agency approved by the Town Engineer.

5.5 Design Methodology

- .1 The Design Engineer shall indicate the design methodology used.
- .2 Techniques generally accepted are:
 - .1 Rational Method: The Rational Method can be used for the calculation of peak runoff rates for drainage basins up to and including 260 hectares (640 acres) in area. It may be used for preliminary design of systems serving larger areas.
 - .3 Storage Facilities:
 - .1 Storm water storage facilities (e.g. detention basins) shall be designed to accommodate a design storm frequency of 1 in 100 years.
 - .2 An overflow spillway that discharges into a major storm drainage system or a watercourse capable of receiving such flows is to be incorporated into storm water storage facilities to accommodate storm events exceeding a design storm frequency of 1 in 100 years.
 - .3 Information must be supplied to the Town Engineer regarding maintenance and safety issues of a storm water storage facility complete with long term maintenance and life cycle costs.

5.6 Design Requirements

- .1 Location:
 - .1 No storm drainage is to be carried on, through, or over private property within a subdivision.
 - .2 All storm drainage shall be carried by either an unconfined natural watercourse, excavated ditch, or piped storm drainage system.



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- .3 All excavated ditches and storm sewers within a subdivision shall be located either within a right-of-way or on an easement in favour of the Town of Westville. The minimum width of an easement is 6 meters (20 ft).
 - .4 Where subdivision storm drainage flows or is directed onto abutting land other than through a natural watercourse, a right of way or easement in favour of the Town of Westville must be provided.
 - .5 Where a need is identified by the Design Engineer to accommodate future upstream development, and where no future road reserve is available, a drainage right-of-way or an easement in favour of the Town of Westville must be provided.
 - .6 Natural watercourses shall not be carried in roadside ditches or piped storm drainage systems within street right-of-ways.
- .2 Discharge to Adjacent Properties:
- .1 All storm drainage shall be self contained within the subdivision boundaries, except natural run-off from undeveloped areas.
 - .2 All run-off from the developed limits of a subdivision must be directed to either a natural watercourse or storm drainage system owned by the Nova Scotia Department of Transportation and Infrastructure Renewal or the Town of Westville.
 - .3 Discharge of run-off to adjacent properties other than in a natural watercourse, where approved by the Nova Scotia Department of Environment, is prohibited unless the developer obtains consent in writing from the adjacent property owner(s), and drainage easements are provided in favour of the Town of Westville. The written consent must be filed with the Town and filed in the Registry of Deeds along with the appropriate easements.
- .3 Buried Storm Drainage Systems:
- .1 Storm sewer pipes shall be designed to carry, without surcharging, the peak rate of storm flow.
 - .2 Velocities:
 - .1 The minimum design velocity for storm sewers shall be 0.6m/s.



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- .2 Consideration shall be given to initial minimum cleansing velocity for phased development.
- .3 The maximum design velocity for storm sewer shall be 4.6m/s for pipes up to and including 760mm in diameter.
- .4 The maximum design velocity for storm sewer pipes greater than 760mm in diameter shall be 6.1m/s.

- .3 Pipe Size:
 - .1 The minimum diameter for a storm sewer main shall be 300mm (12").
 - .2 The minimum diameter for a catch basin lead shall be 250mm.
 - .3 Pipe sizes shall not decrease in the downstream direction unless approved by the Town Engineer.

- .4 Depths:
 - .1 The minimum depth for a storm sewer main located within the road right of way is 1.5m.
 - .2 The minimum depth for storm or clear water laterals at the property line is 1.2m.

- .5 Manholes:
 - .1 Manholes within a storm sewer storm drainage system shall be installed at all changes in grade or alignment at all intersections and at intervals not exceeding 120m.
 - .2 The minimum internal diameter of a manhole shall be 1050mm.

- .6 Service Laterals:
 - .1 All laterals from the main to the property line shall be provided by the developer or owner and shall have a minimum grade of 2%.
 - .2 The depth of laterals shall not be less than 1.2m within the right-of-way.
 - .3 Laterals for future development shall be brought to the property line, capped, and a marker stake 50 x 100 mm (2"x4") placed with the depth of the lateral indicated and be marked "STORM".



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- .7 Catch Basins:
 - .1 Catch basins shall be installed at the curb of the street and shall be adequately spaced to prevent ponding on the street and to prevent water from entering on or flowing in the travel lanes during storm events corresponding to the design of the minor system.
 - .2 In no case shall the spacing of the catch basins exceed 100m.
 - .3 Catch basin leads shall be connected to a storm drainage main at a manhole.

- .8 Inlets:
 - .1 Vertical grates shall be installed at all inlets.

- .9 Outfalls:
 - .1 The design of outfalls shall take into consideration such factors as public safety, erosion control, appearance, etc.
 - .2 Horizontal grates shall be installed at outfalls.

- .4 Ditches/Open Channel Drainage System:
 - .1 Roadway ditches shall conform to the standard cross section for local subdivision roads, and shall have adequate capacity for the 1 in 100 years storm.
 - .2 Velocities:
 - .1 The maximum velocity during a 1 in 100 years storm event in ditches or open channels shall not exceed the values which will cause erosion.
 - .3 Culverts:
 - .1 All culvert sizes shall be indicated on Design Drawings.
 - .2 The minimum size for any culvert shall be 450mm in diameter.
 - .3 The minimum depth of bury for any culvert is 500mm.
 - .4 Culverts shall be designed for the 1 in 100 year peak flow with a headwater depth not greater than the diameter of the pipe.
 - .5 Roadway and driveway culverts generally do not require grating.



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- .6 Storm sewer outfalls and culverts greater than 26m in length require inlet and outlet grating.
- .7 All culverts shall be reinforced concrete pipe to ASTM C76-M or *CAN/CSA A257.2*, as defined in the Standard Municipal Services Specifications unless alternate types are approved by the Town Engineer.
- .5 Minor Drainage System Connections:
 - .1 Roof Drains:
 - .1 Roof drains shall discharge on the ground surface directing water away from the building and shall not be connected to a storm drainage system or foundation drainage system.
 - .2 Foundation Drains:
 - .1 Where a buried storm drainage system exists, foundation drains will normally be connected to the main by laterals.
 - .2 The invert of the lateral at the property line must be at least 600mm above the top of the main at the point of connection.
 - .3 Where a buried storm drainage system does not exist, Section 9.14 of the National Building Code of Canada, latest revision, shall apply.
 - .4 Under no circumstance shall foundation drains direct storm water to the street surface, sidewalk or adjacent property.
 - .5 Foundation drain pipes shall be clearly identified with color code.
- .6 Retention Structures and Detention Structures:
 - .1 For safety purposes storm water retention structures and detention structures must be enclosed by a 2m high chain link fencing system approved by the Town Engineer.
- 5.7 Erosion and Sediment Control
 - .1 An Erosion and Sediment Control Plan shall be provided in compliance with Provincial regulations and a copy submitted to the Town Engineer.



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- .2 The plan shall address measures during construction of roads, services and houses, as well as long term measures after the completion of development.
- .3 During construction, surface water flows across the construction site must be minimized.
- .4 The Erosion and Sediment Control Plan, as well as control measures taken, shall comply with the latest edition of the Erosion and Sedimentation Control Handbook for Construction Sites as prepared by the Nova Scotia Department of the Environment.
- .5 Long term environmental protection measures to be addressed in the subdivision design may include, but are not limited to:
 - .1 Protection of wetlands and waterways in accordance with Nova Scotia Department of Environment Guidelines.
 - .2 Minimization of erosion and sediment transport.
 - .3 Protection of outfall areas.
 - .4 Utilization of wetland areas for filtration of storm water run-off minimization of disruption to natural watercourse.

5.8 Submissions

- .1 The following documents are to be submitted to the Town Engineer for review for approval and prior to construction:
 - .1 A plan of the overall watershed area of the downstream drainage system and / or associated watercourse including the proposed development that illustrates the delineation of the associated drainage areas within the watershed.
 - .2 A storm water management plan shall apply to the entire area of land to be subdivided.
 - .3 A drainage plan to address all drainage patterns within the Subdivision area and shall prescribe a method for the proper drainage and collection of storm water based on the full development of the area.



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- .4 A grading plan to address the conveyance of all surface runoff from the developed subdivision area to a stable outlet or established drainage area in accordance with the specifications herein.
 - .5 Details of function and construction of retention structures and / or detention structures incorporated within the storm drainage system.
 - .6 Detailed calculations illustrating the design methodology utilized, demonstrating the performance of the storm drainage system and the satisfaction of the objectives outlined herein, and compliance with the specifications herein and to requirements of Nova Scotia Environment.
- .2 All documents shall be completed and sealed by a Professional Engineer licensed to practice in the Province of Nova Scotia and shall be subject to the approval of Nova Scotia Environment and the Town Engineer.
 - 3. All drawings shall comply with the requirements of Section 1. Drawing Specifications.

6. SIDEWALK, CURB AND GUTTER, AND BOULEVARDS

6.1 General

- .1 Sidewalk, curb and gutter, and boulevards shall conform to the specifications and design criteria herein.

6.2 Sidewalk

- .1 All sidewalks shall be in accordance with standard detail SD-14.
- .2 The width of all sidewalks shall be 1500mm unless otherwise approved by the Town Engineer in accordance with sound engineering practices.
- .3 The sidewalk shall be separated from the back of the street curb by a minimum 900mm sodded boulevard.



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- .4 Pedestrian ramps shall be installed at all intersections having a minimum of 1200mm low-back curb and a 300mm taper on both ends.
- .5 Gravel base shall be 150mm thick Type-1 gravel compacted to 100% standard Proctor density and shall extend 150mm outside of each edge of the concrete sidewalk.
- .6 Sidewalk slabs for residential sidewalks shall be a minimum of 100mm thick.
- .7 Sidewalk slabs servicing driveways shall be 150mm reinforced concrete.
- .8 Sidewalk slabs within 3m of any street corner shall be 150mm reinforced concrete.
- .9 All driveway ramps shall conform to standard detail SD-15.
 - .1 Driveway ramps shall be provided at each lot.
- .10 Construction Joints:
 - .1 All sidewalk slab construction joints shall be dowelled using 20M rebar a minimum of 450mm long extending a minimum of 150mm into each side of the construction joint.
 - .2 Dowels shall be in the centre of the slab thickness at a maximum spacing of 300mm centre to centre.
 - .3 Construction joints are to be constructed using pre-moulded, non-extruded bituminous impregnated fibre-board, 12mm thick, installed 6mm below the surface of the concrete and at locations as follows:
 - .1 Where fresh concrete is to be poured against previously poured concrete.
 - .2 Where sidewalk abuts curbs.
 - .3 Around all structures abutting the sidewalks (poles, catch basins, etc.).



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- .11 Control Joints:
 - .1 Control joints shall be formed by saw cutting or by use of a jointing tool.
 - .2 Control joints shall be constructed at right-angles to the edge of the sidewalk.
 - .3 Saw cuts shall be made one-quarter of the depth of the section and extend along the entire exposed face.
 - .4 Saw cutting shall be completed within 24 hours of the concrete achieving final set.

- .12 Concrete:
 - .1 Minimum 28 day Compressive Strength: 32MPa.
 - .2 Air content: 5% to 7%
 - .3 Maximum Water / Cementing Material Ratio: 0.45
 - .4 Minimum Cementitious Content: 350kg/m³
 - .5 Slump: 60mm to 100mm
 - .6 Testing:
 - .1 A testing company shall be employed by the sub-divider to advise on quality control regarding all aspects of protection, mixing, transporting, placing, and finishing of the cast-in-place concrete.
 - .2 The testing company shall perform all strength, mix, and consistency tests including taking of samples and production of test specimens.
 - .3 The technical representative of the testing company shall be in full time attendance during concreting operations, and no mixing or placement works shall be undertaken in his absence.
 - .4 Test results shall be sent directly to the Town Engineer for review.
 - .5 A minimum of three (3) 100mm x 200mm cylinders are required for compressive strength testing of cast-in-place concrete for all of:
 - .1. Each day's pour.
 - .2. Each change of concrete supplier.
 - .3. Each 100m³ of concrete or fraction thereof.
 - .4. Additional test specimens shall be taken as necessary to verify concrete quality.



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- .6 At least one (1) slump test shall be performed with each compression test.
 - .7 At least one (1) air entrainment test shall be performed with each compression test.
 - .8 All concrete tests shall be performed in accordance with the requirements of CAN/CSA-A23.2.
 - .9 Concrete testing laboratories and technical representatives performing concrete cylinder preparation and strength tests shall be certified by the Canadian Standards Association.
- .13 Surface Finish:
- .1 All joints shall be rounded using a 6mm radius edging tool.
 - .2 Sidewalk surfaces shall be struck-off with a strike board and floated.
 - .3 The finished surface shall not vary more than 3mm under a 3m straight edge and shall be lightly broomed transversely to produce a textured, non-slip surface.
 - .4 All pedestrian ramps shall be of an exposed aggregate finish.
- 6.3 Curb and Gutter
- .1 All curb and gutter shall be in accordance with standard detail SD-3.
 - .2 Gravel base shall be 150mm thick Type-1 gravel compacted to 100% standard Proctor density and shall extend 150mm outside of each edge of the concrete curb and gutter.
 - .3 Construction Joints:
 - .1 Construction joints are to be constructed using pre-moulded, non-extruded bituminous impregnated fibre-board, 12mm thick, installed 6mm below the surface of the concrete and at locations as follows:
 - .1 Where fresh concrete is to be poured against previously poured concrete.
 - .2 Where sidewalk abuts curbs.



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- .4 Control Joints:
 - .1 Control joints shall be formed by saw cutting or by use of a jointing tool.
 - .2 Control joints shall be constructed at right-angles to the edge of the sidewalk.
 - .3 Saw cuts shall be made one-quarter of the depth of the section and extend along the entire exposed face.
 - .4 Saw cutting shall be completed within 24 hours of the concrete achieving final set.

- .5 Concrete:
 - .1 Minimum 28 day Compressive Strength: 32MPa.
 - .2 Air content: 5% to 7%
 - .3 Maximum Water / Cementing Material Ratio: 0.45
 - .4 Minimum Cementitious Content: 350kg/m³
 - .5 Slump: 60mm to 100mm
 - .1 Lower slump may be required when a slip-form machine is used to place concrete.
 - .6 Testing:
 - .1 A testing company shall be employed by the sub-divider to advise on quality control regarding all aspects of protection, mixing, transporting, placing, and finishing of the cast-in-place concrete.
 - .2 The testing company shall perform all strength, mix, and consistency tests including taking of samples and production of test specimens.
 - .3 The technical representative of the testing company shall be in full time attendance during concreting operations, and no mixing or placement works shall be undertaken in his absence.
 - .4 Test results shall be sent directly to the Town Engineer for review.
 - .5 A minimum of three (3) 100mm x 200mm cylinders are required for compressive strength testing of cast-in-place concrete for all of:
 - .1 Each day's pour.
 - .2 Each change of concrete supplier.
 - .3 Each 100m³ of concrete or fraction thereof.



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- .4 Additional test specimens shall be taken as necessary to verify concrete quality.
- .6 At least one (1) slump test shall be performed with each compression test.
- .7 At least one (1) air entrainment test shall be performed with each compression test.
- .8 All concrete tests shall be performed in accordance with the requirements of CAN/CSA-A23.2.
- .9 Concrete testing laboratories and technical representatives performing concrete cylinder preparation and strength tests shall be certified by the Canadian Standards Association.

6.4 Boulevards and Landscaping

- .1 Boulevards are referred to as the areas between the sidewalk and the curb and gutter reserved for utility and municipal infrastructure and the areas and shall be landscaped.
- .2 The minimum width of a boulevard shall be 900mm.
- .3 Boulevards shall be landscaped with topsoil and sod.
- .4 The set-back distance from the right-of-way line and the back edge of the sidewalk shall be landscaped with topsoil and sod.

7. EASEMENTS

7.1 General

- .1 Service mains installed outside of the street right-of-way shall be facilitated through the provision of an easement having a minimum width of 6m.



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7.2 Grading and Appurtenances

- .1 The total width and length of the easement shall be graded in such a way as to control surface drainage.
- .2 All manholes, water chambers, and valves shall be adjusted such the tops of each are a minimum of 0.5m above finished grade.

8. SODDING & LANDSCAPING

8.1 General

- .1 All sodding and landscaping shall conform to the specifications and design criteria herein.

8.2 Topsoil

- .1 Excavated and/or fill areas shall be evenly graded and compacted to 100 mm below finished grade.
- .2 Topsoil shall be medium loam capable of supporting good agricultural growth and have a pH of 5.5 to 7.5 and minimum thickness when placed of 100mm.
- .3 Land lime and fertilizer shall be applied using separate applications and evenly cultivated throughout the depth of the topsoil at the following application rate.
 - .1 Lime: 50kg/100m².
 - .2 Fertilizer: 15kg/100m².
- .4 Topsoil shall be compacted to 12mm of finished grade, then the top 25mm shall be loosened by raking or cultivating.



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8.3 Sod

- .1 Sod shall be nursery sods of not less than 40% Kentucky Blue Grass, free of weeds, and with no surface soil visible when mowed to height of 50mm.
- .2 Sod shall be placed with staggered joints perpendicular to slope in a close knitted pattern.
- .3 There shall be no open areas and sods shall match evenly into existing conditions.
- .4 Sodding on slopes greater than 1:2, the sods shall be secured with wooden pegs.
- .5 Sodding on slopes greater than 1:3, the sods shall be secured with poultry mesh in strips from top to bottom of slopes and then pegged.
- .6 Sod shall be rolled to consolidate and remove irregularities in grade.
- .7 Sod shall be watered within 4 hours of placement, to obtain moisture penetration into top 100mm of topsoil.
- .8 Sod will be accepted upon completion of the third mowing provided that:
 - .1 Growth is properly established,
 - .2 Area is free of bare and dead spots and without weeds, and
 - .3 No surface soil is visible when grass has been cut to a height of 50 mm.
- .9 Areas sodded in the fall will be accepted the following spring, one month after start of growing season, provided that acceptance conditions 11.9, a), b), and c) are fulfilled.



**MUNICIPAL SERVICE STANDARD
SPECIFICATIONS**

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9. UTILITIES

9.1 General

- .1 The design for utility service to be placed within the street right-of-way shall incorporate the requirements of the individual utility and follow the criteria and all material specified shall be CSA approved material.

9.2 Utility Poles

- .1 Utility poles shall be centred within the standard minimum boulevard.
- .2 Guy wires for utility poles shall be placed within the boulevard or the set-back distance between the street right-of-way and the edge of the sidewalk with a sidewalk brace.
- .3 Where applicable, all poles shall be set adjacent to lot property lines.

9.3 Overhead Service Wires

- .1 All overhead service wires shall have a minimum clearance over the street right-of-way of 5.5m.

9.4 Underground Services

- .1 All primary underground services for a street shall be located under the boulevard and under crosswalks when crossing the streets.
- .2 All primary underground services shall in conduit, encased in concrete, and marked with warning tape.
- .3 All secondary underground services shall be in conduit, bedded in sand, and marked with warning tape.



**MUNICIPAL SERVICE STANDARD
SPECIFICATIONS**

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- .4 All fixtures at grade associated with servicing shall identify the utility owner.

9.5 Street Lighting

- .1 Street lighting is provided by the Town of Westville in residential areas by Nova Scotia Power Inc.
- .2 Street lights are placed on every second utility pole, or a standard spacing of 100m.



**MUNICIPAL SERVICE STANDARD
SPECIFICATIONS**

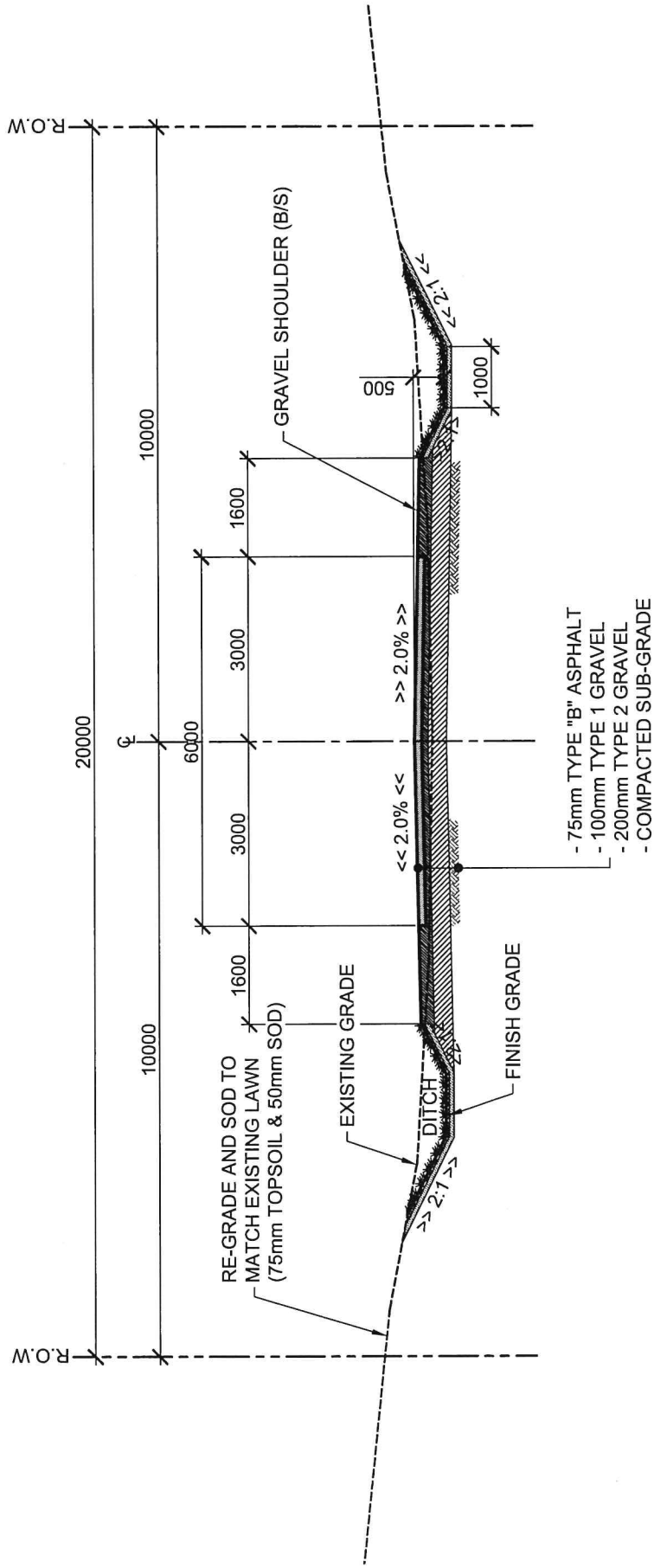
Page 45

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10. LIST OF STANDARD DETAILS

- SD-1 Residential Street Detail
- SD-2 Rural Street Detail
- SD-3 Curb and Gutter Detail
- SD-4 Cul-de-sac Details
- SD-5 Temporary Turn-around Details
- SD-6 Common Trench Detail
- SD-7 Pre-cast Manhole Detail
- SD-8 Pre-cast Manhole with Inside Drop Detail
- SD-9 Sanitary Sewer Lateral Detail
- SD-10 Water Service Connection Detail
- SD-11 Pre-cast Catch Basin Detail
- SD-12 Hydrant Detail
- SD-13 Thrust Block Details
- SD-14 Curb and Gutter and Sidewalk Detail
- SD-15 Sidewalk Driveway Ramp Detail
- SD-16 Concrete Joints and Asphalt Milling Details

TOWN OF WESTVILLE
DESIGN & CONSTRUCTION DETAILS



RURAL STREET DETAIL

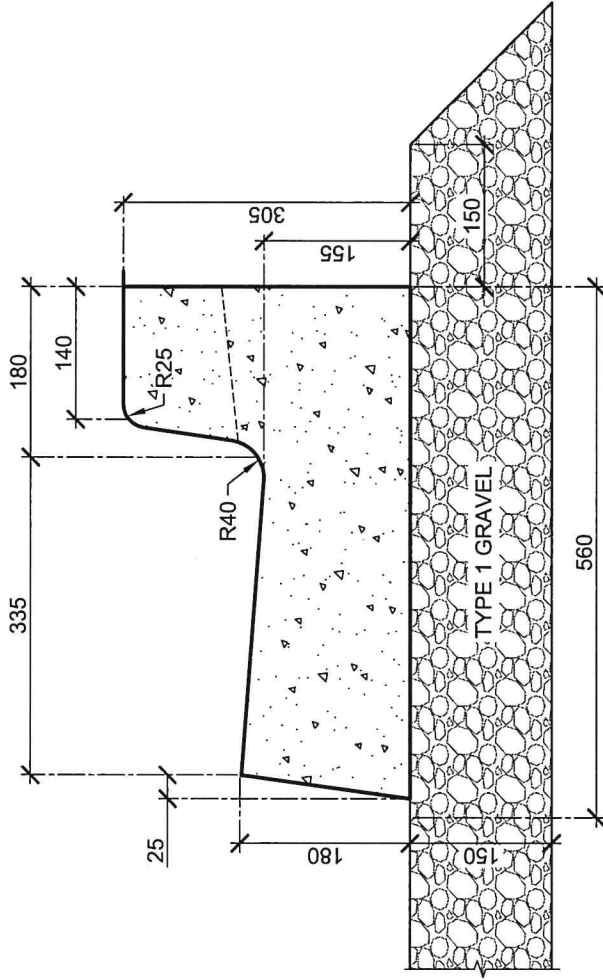
SCALE = 1 : 100



Figure No.	
0	ISSUED
SEPT, 2014	

SD-2

TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



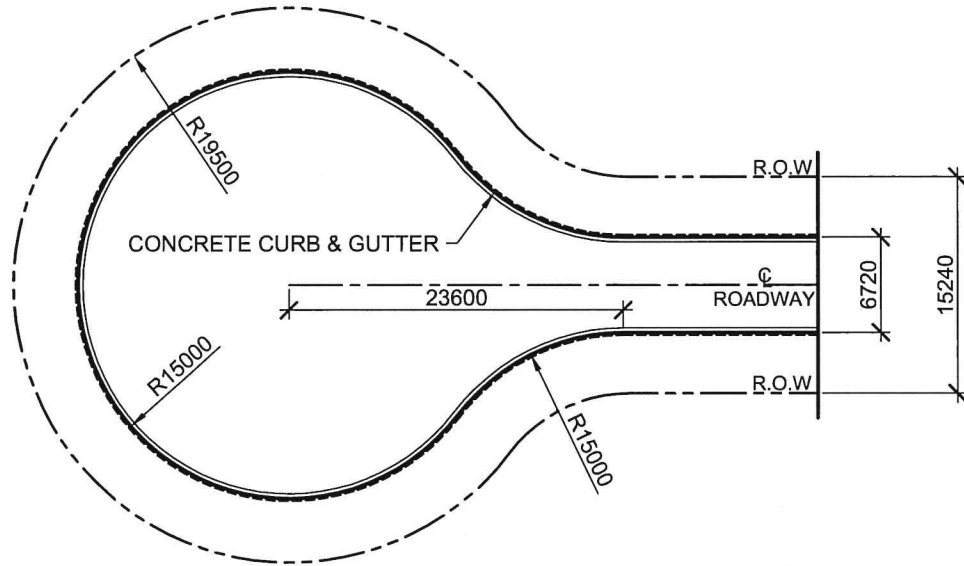
CURB & GUTTER DETAIL

N.T.S



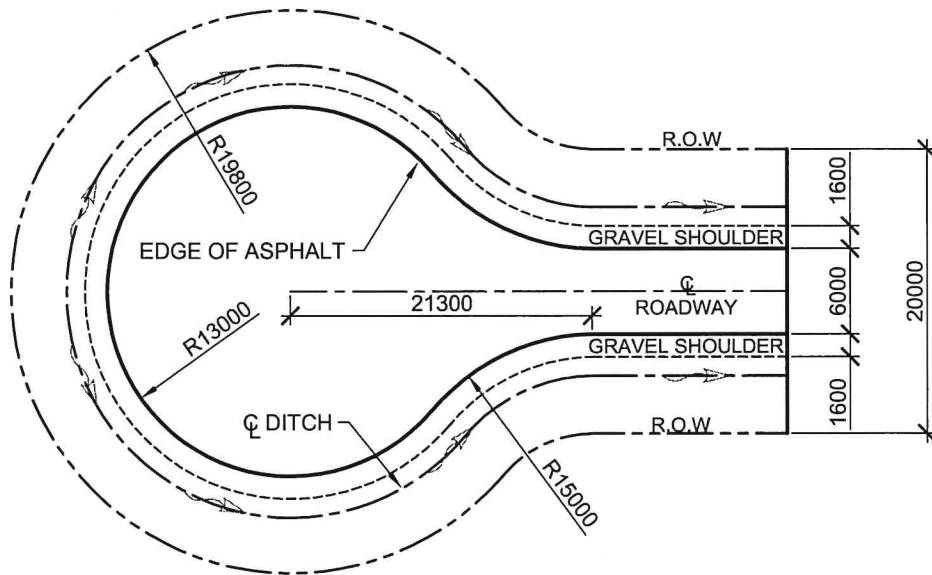
		ISSUED	Figure No.
0		SEPT, 2014	SD-3

TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



URBAN CUL-DE-SAC DETAIL

SCALE = 1 : 500



RURAL CUL-DE-SAC DETAIL

SCALE = 1 : 500

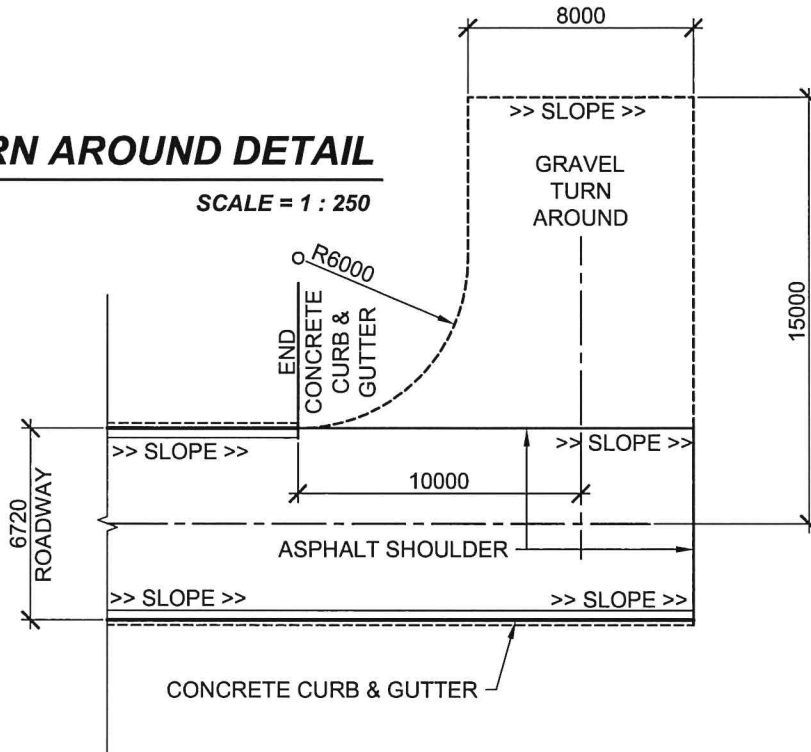


0	ISSUED	
	SEPT, 2014	Figure No. SD-4

TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS

URBAN TURN AROUND DETAIL

SCALE = 1 : 250



RURAL TURN AROUND DETAIL

SCALE = 1 : 250

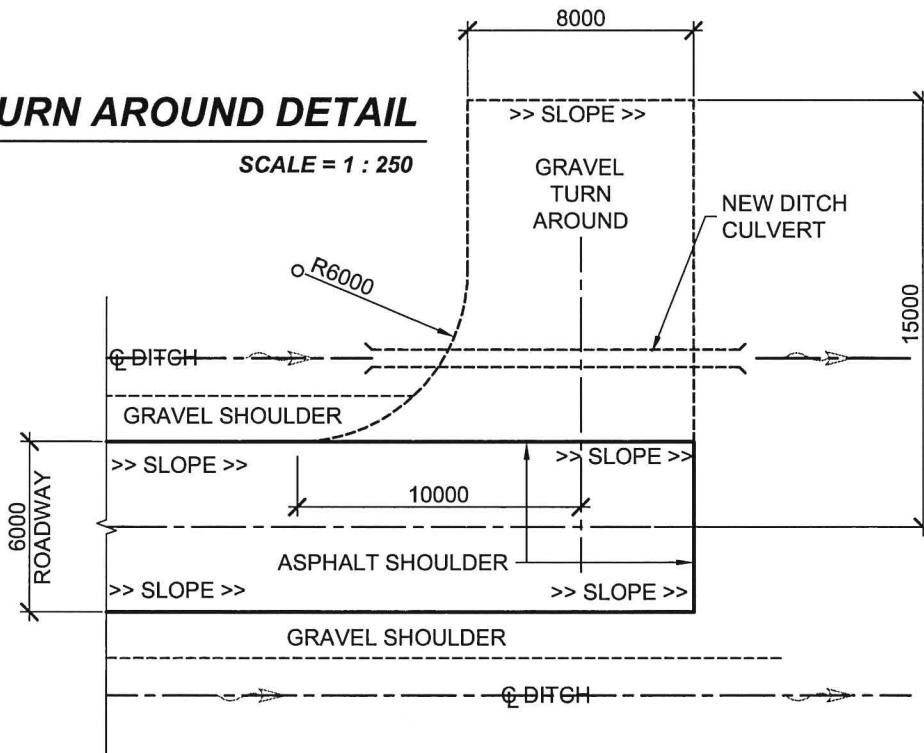
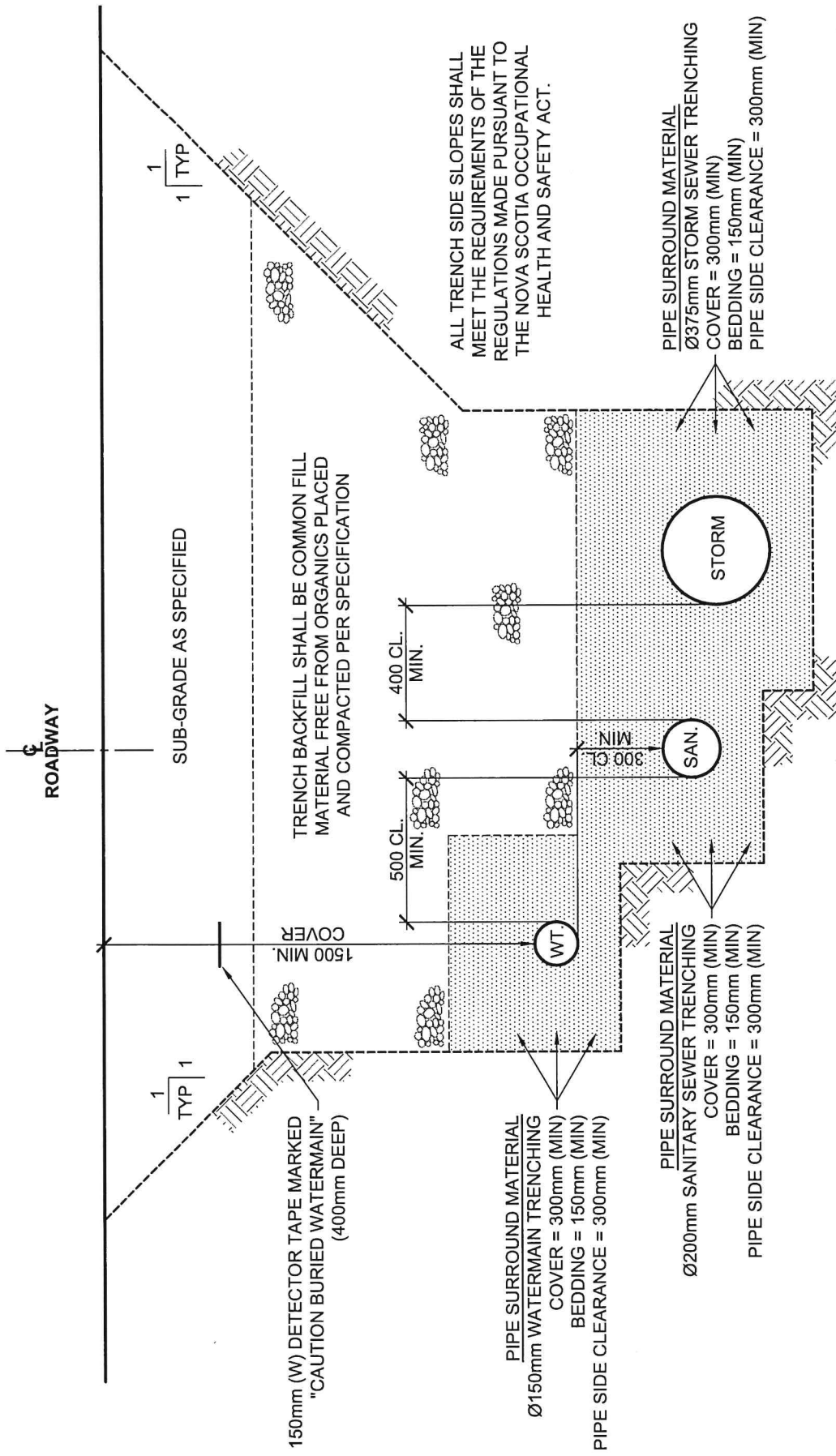


			Figure No.
0	ISSUED	SEPT, 2014	SD-5

TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



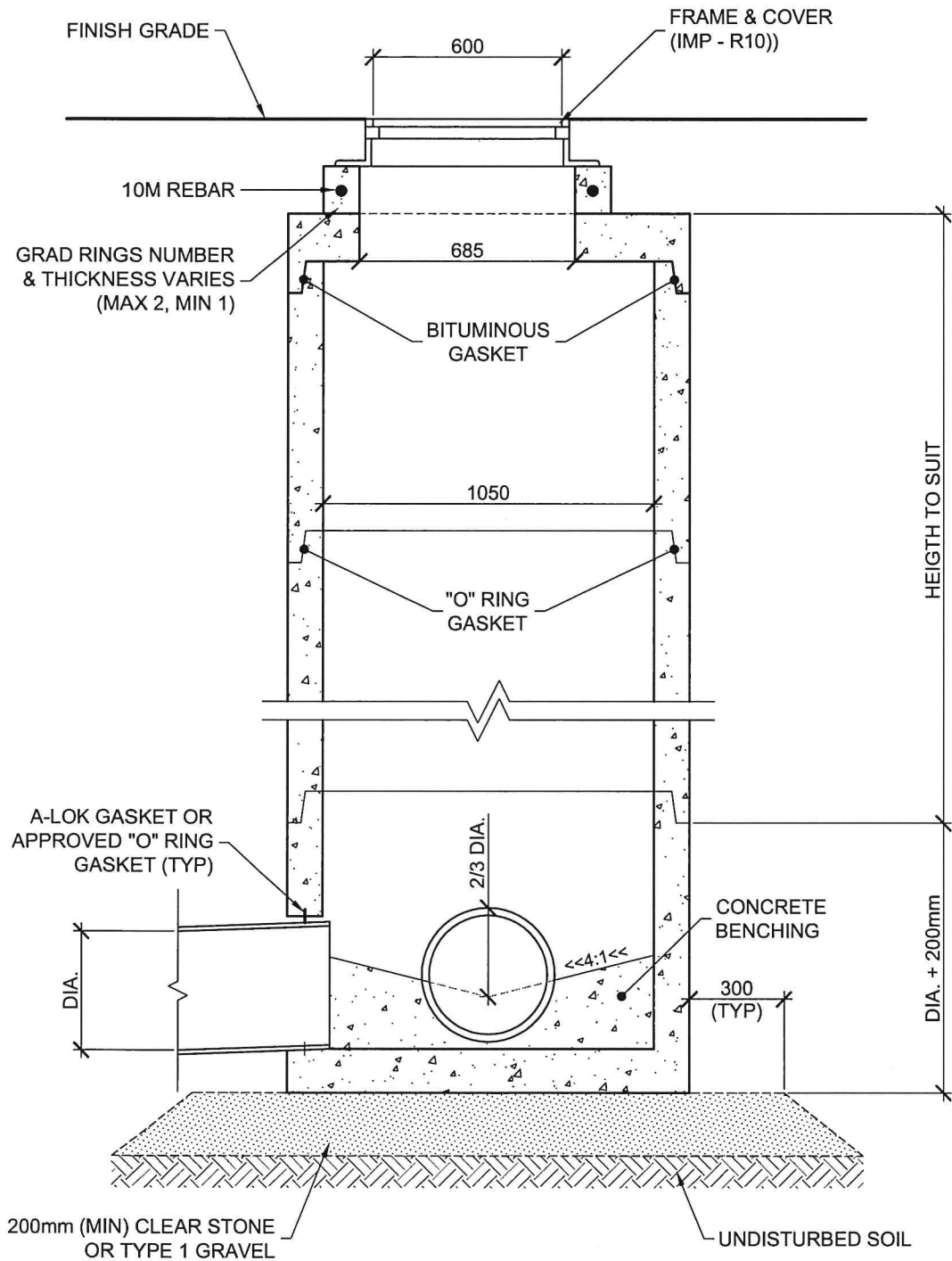
COMMON TRENCH DETAIL

SCALE = 1 : 20

		ISSUED	SEPT, 2014
0			

Figure No.
SD-6

TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



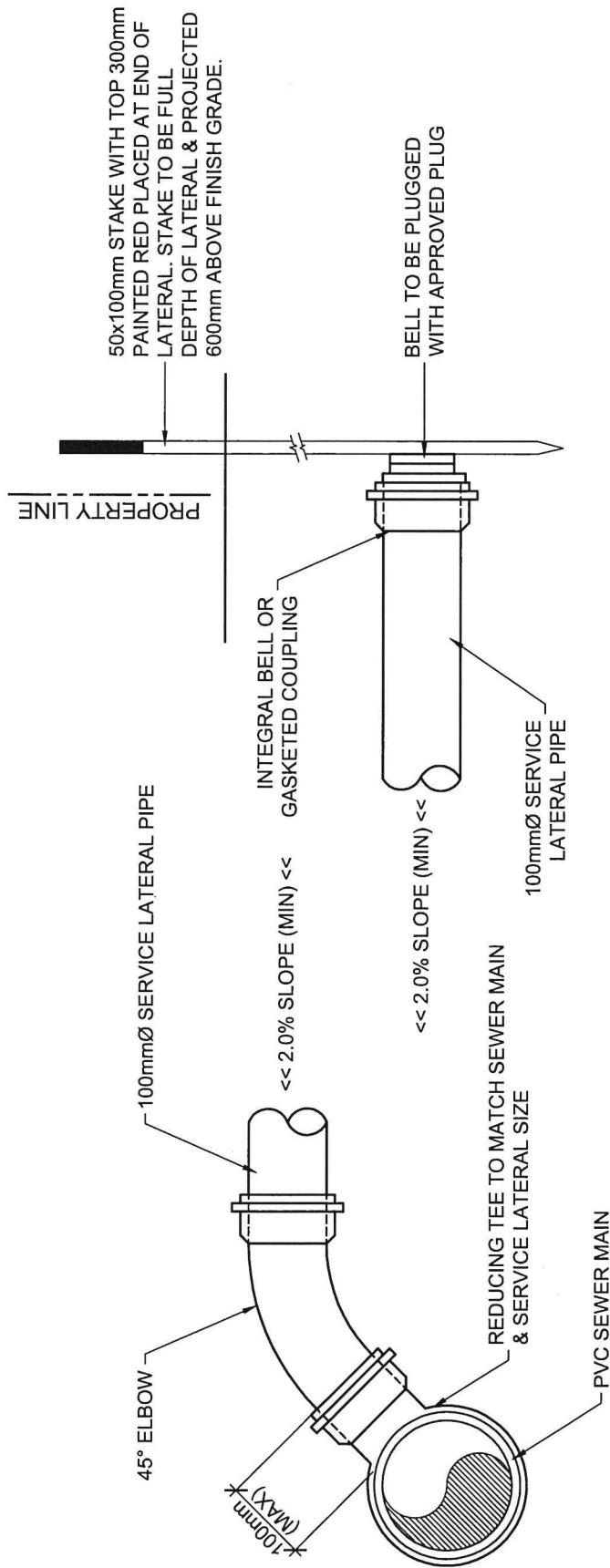
PRE-CAST MANHOLE DETAIL

SCALE = 1 : 20



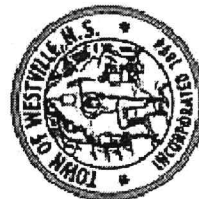
0	ISSUED	SEPT, 2014	Figure No. SD-7
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TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



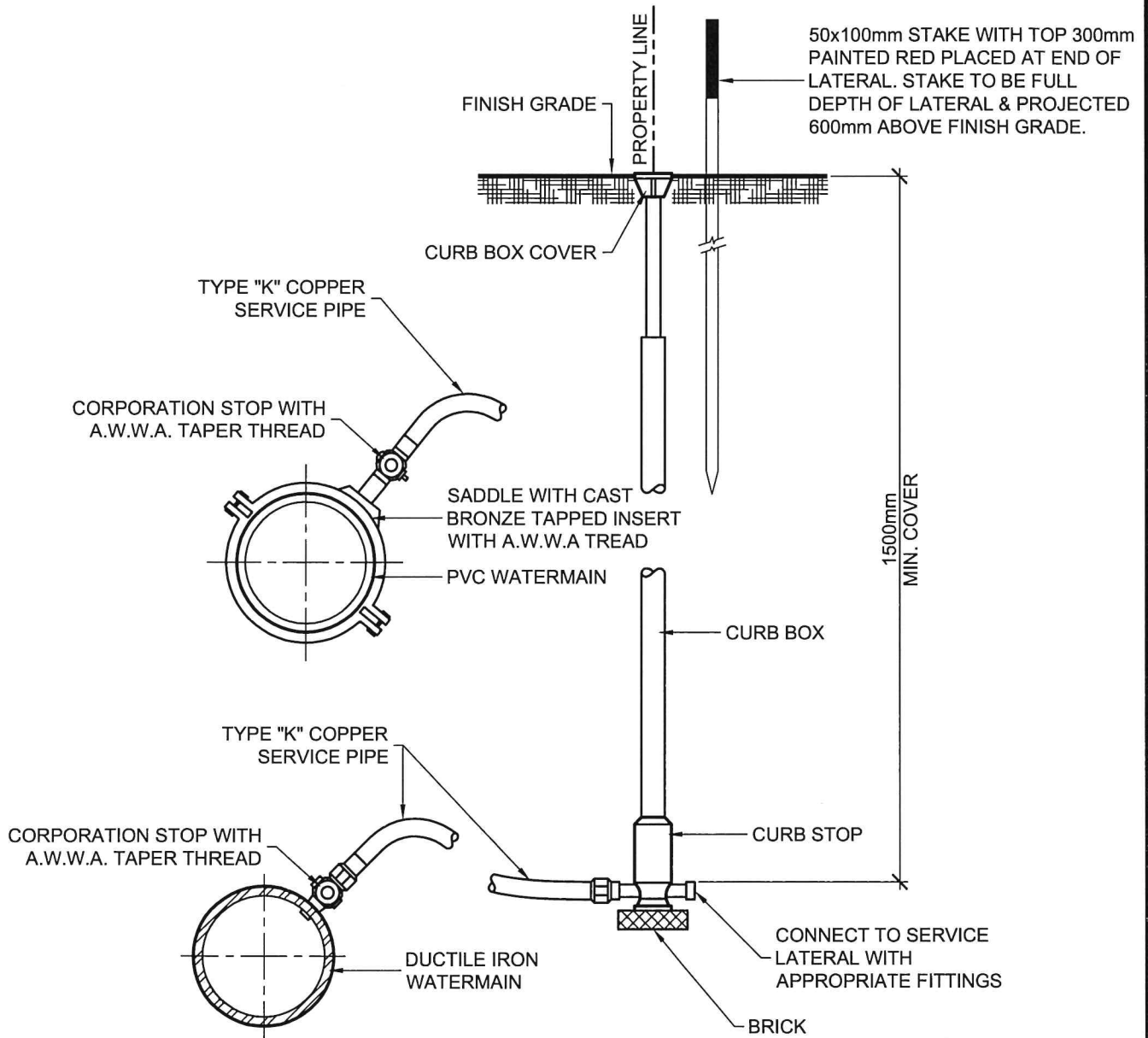
SANITARY SEWER LATERAL DETAIL

N.T.S



0	ISSUED	SEPT, 2014	Figure No. SD-9
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TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



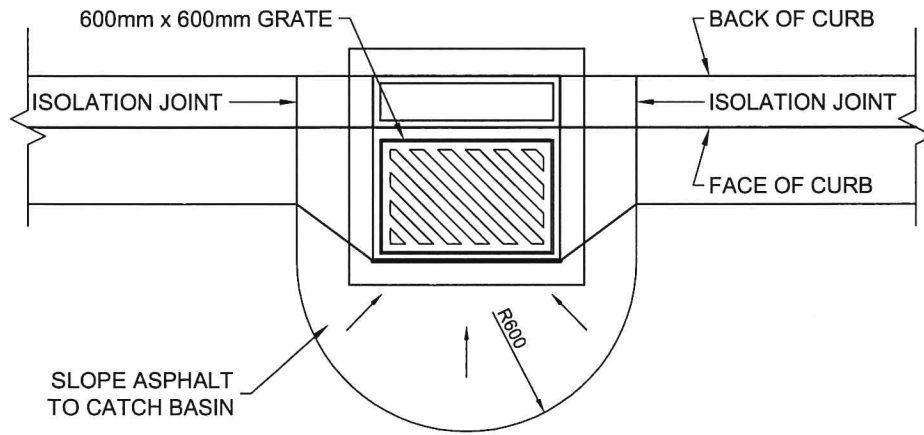
WATER SERVICE CONNECTION DETAIL

N.T.S



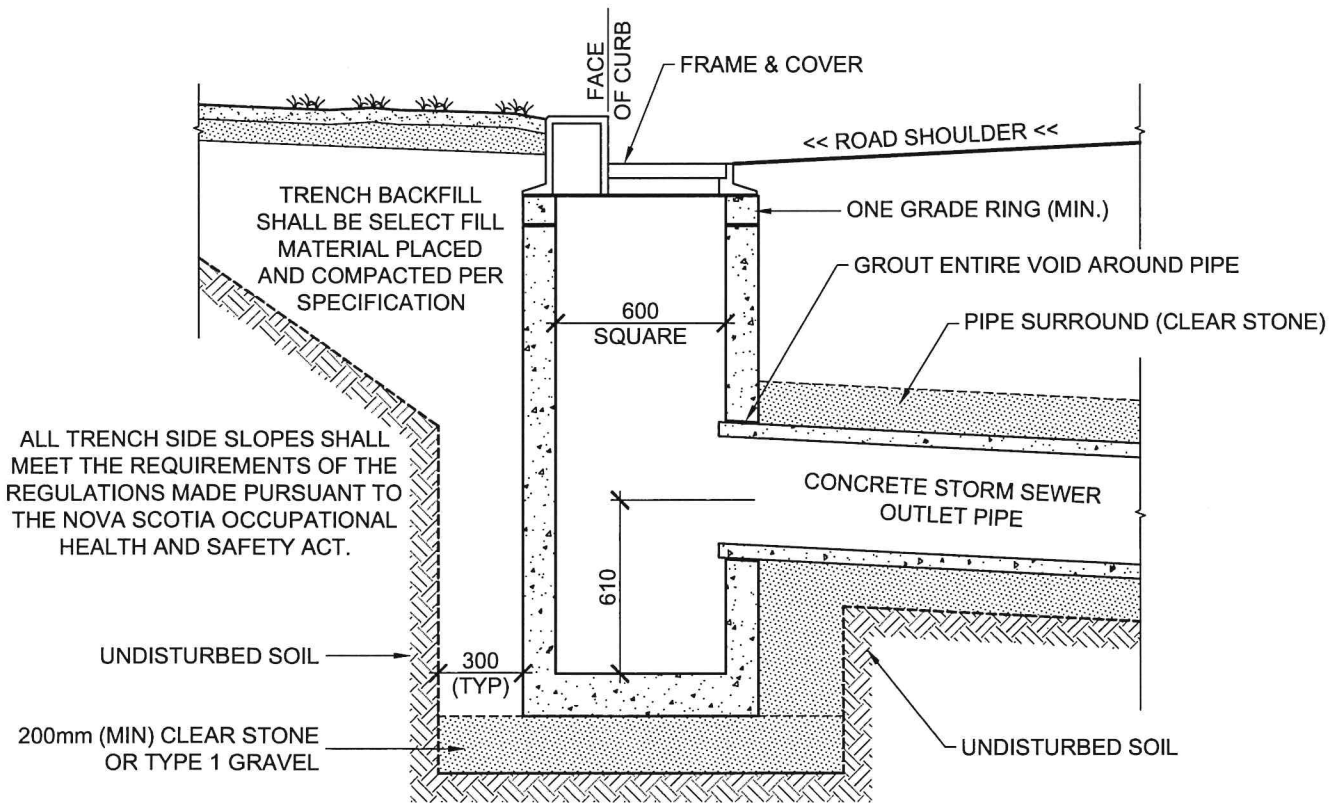
			Figure No.
0	ISSUED	SEPT, 2014	SD-10

TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



CATCH BASIN / CURB DETAIL

SCALE = 1 : 25



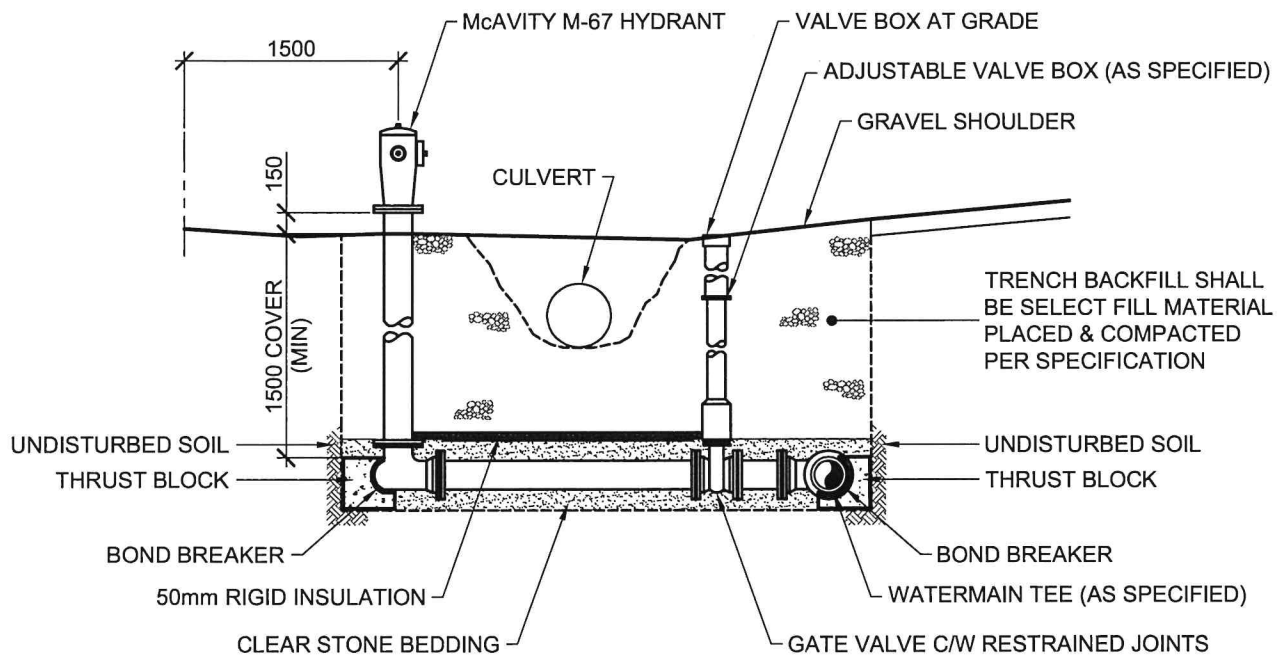
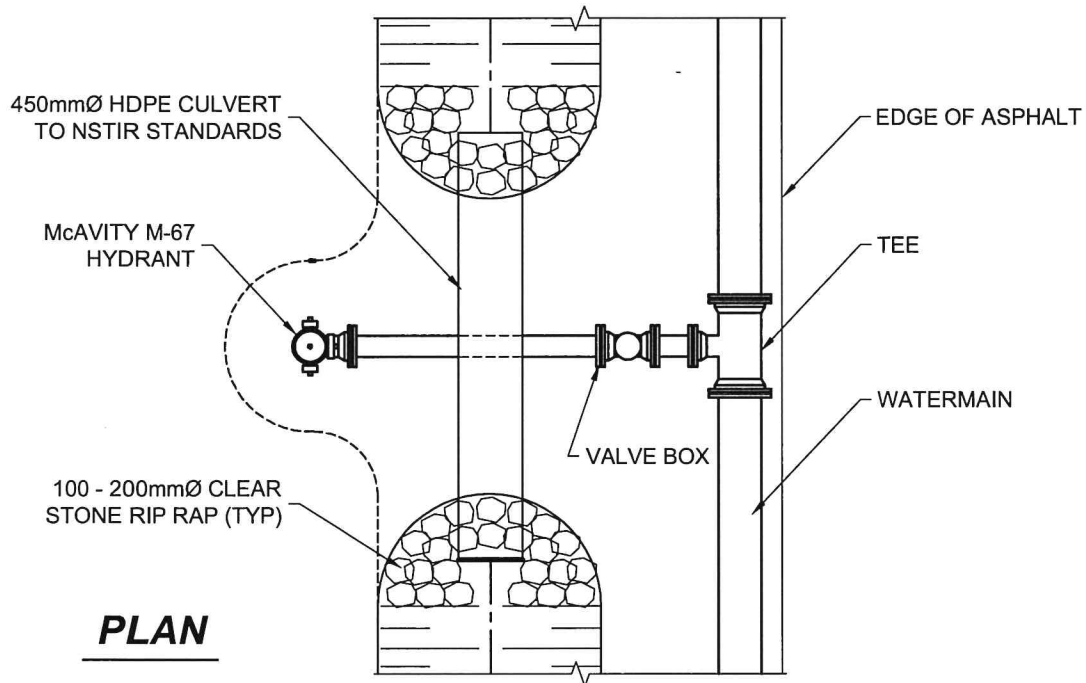
PRE-CAST CATCH BASIN DETAIL

SCALE = 1 : 25



			Figure No.
0	ISSUED	SEPT, 2014	SD-11

TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



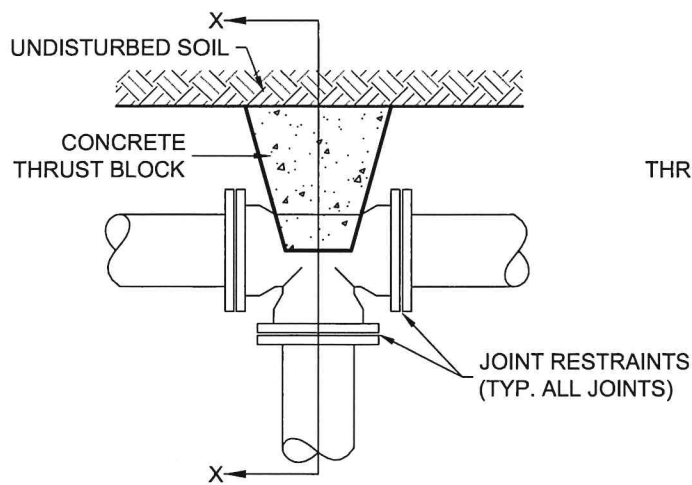
HYDRANT DETAIL

SCALE = 1 : 50

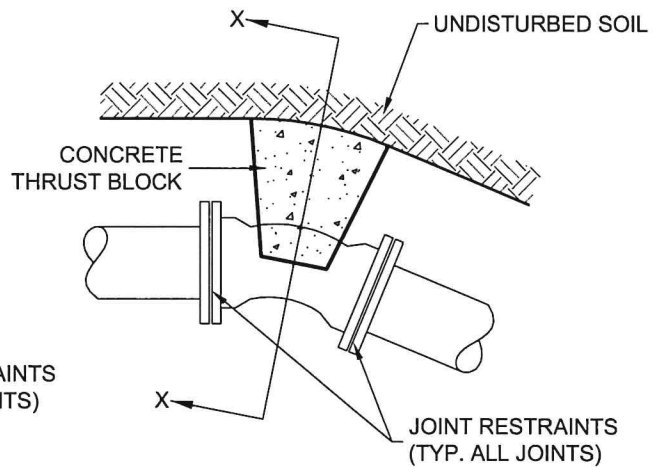


			Figure No.
0	ISSUED	SEPT, 2014	SD-12

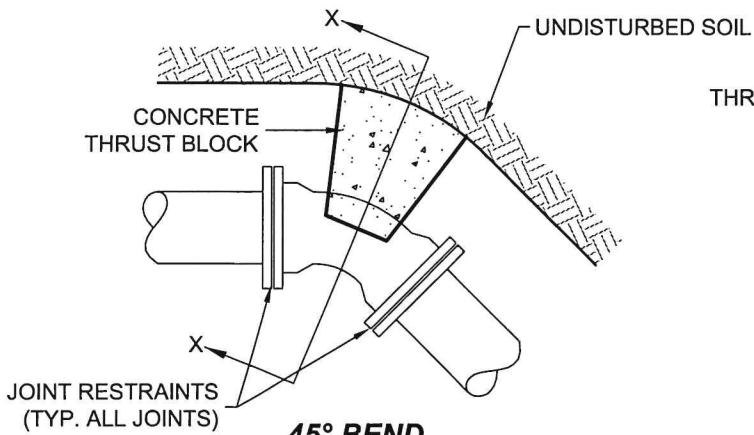
TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



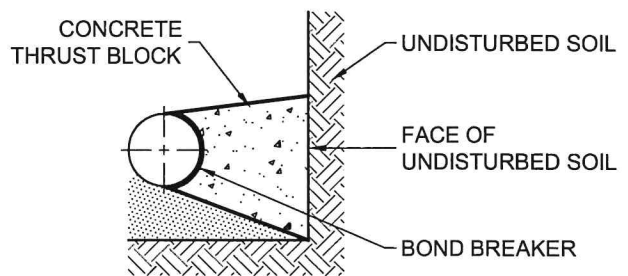
TEE



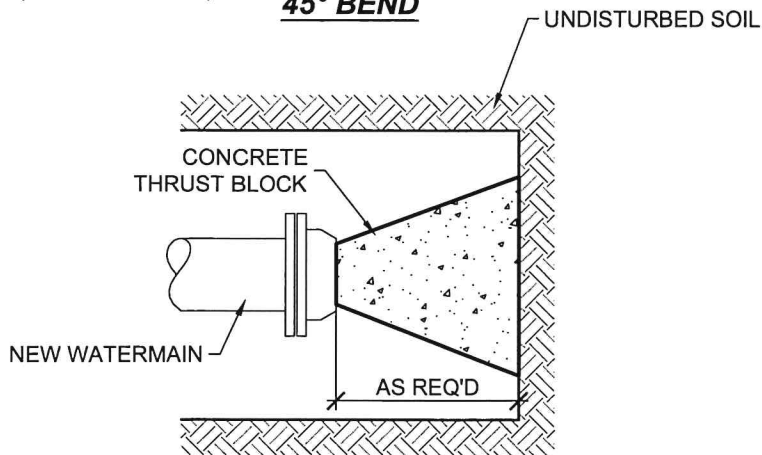
11.25° & 22.5° BENDS



45° BEND



SECTION X - X



PLAN - CAPPED END

FITTING DIA. (mm)	AREA OF BEARING (m ²)		
	CAPPED END	45° BEND	22.5° & 11.25° BEND
100	0.17	0.10	0.09
150	0.23	0.14	0.12
200	0.42	0.29	0.21
250	0.60	0.42	0.30
300	0.80	0.50	0.40
450	1.70	0.90	0.5

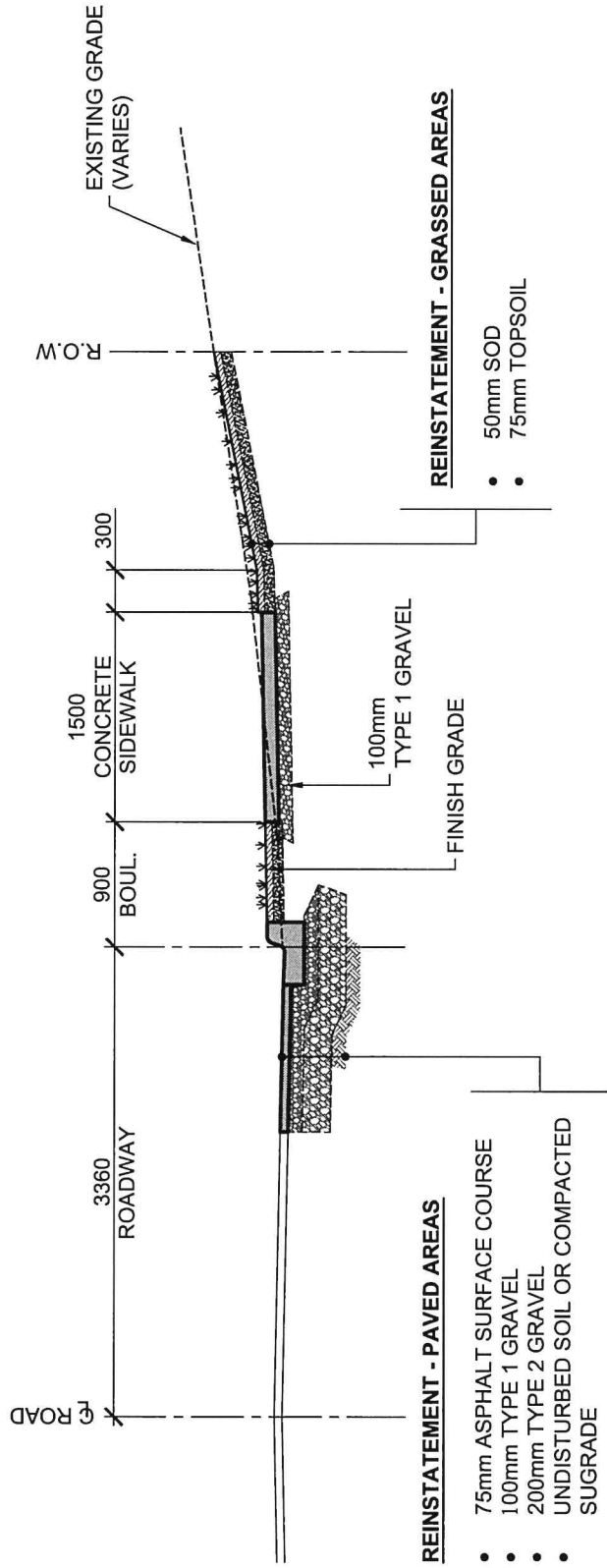
THRUST BLOCK DETAILS

N.T.S



		Figure No.
0	ISSUED	SD-13
		SEPT, 2014

TOWN OF WESTVILLE
DESIGN & CONSTRUCTION DETAILS



SHOULDER, CURB & SEPARATE SIDEWALK DETAIL

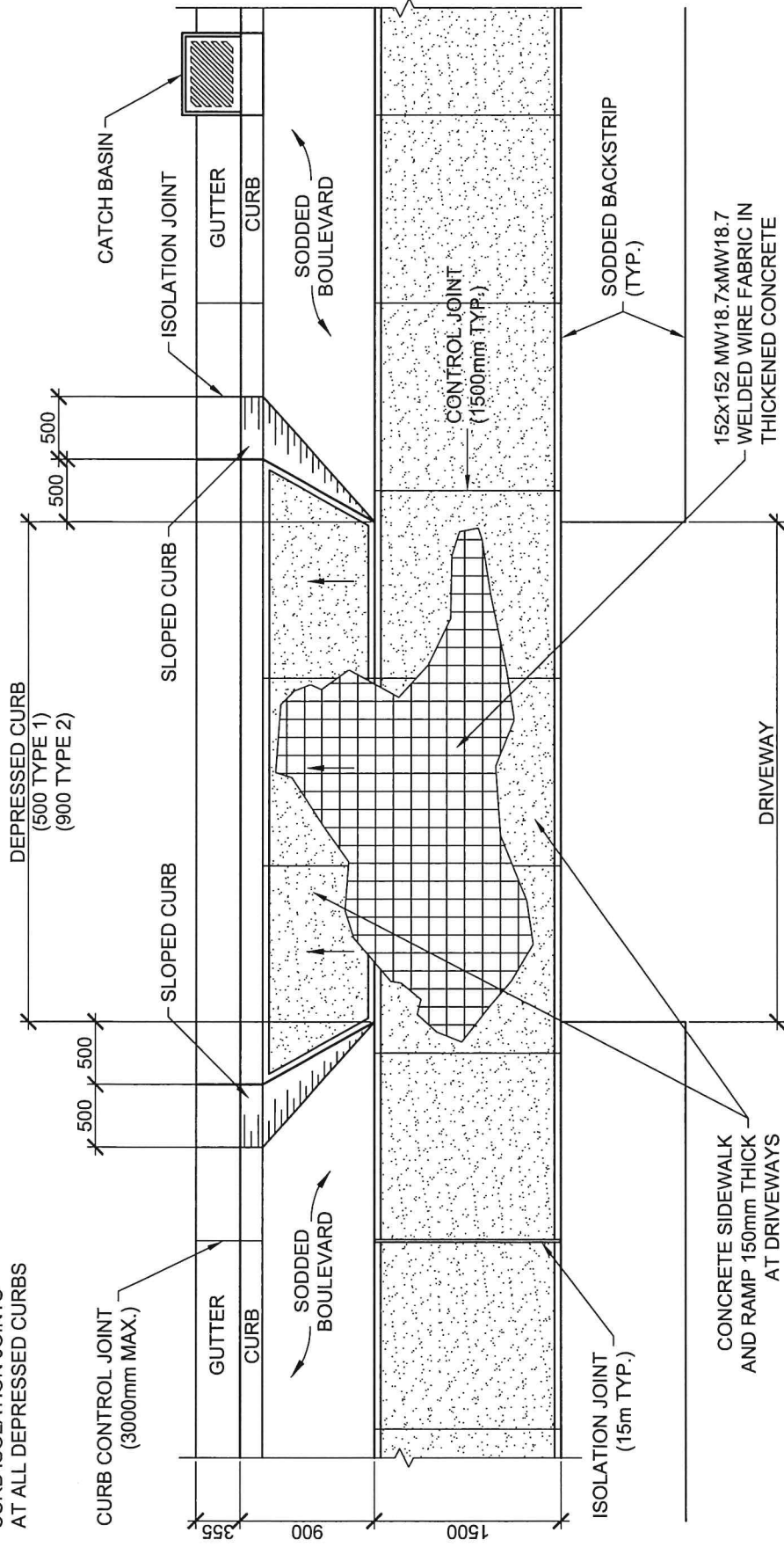
SCALE = 1 : 50



0	ISSUED	SEPT, 2014	Figure No. SD-14
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TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS

NOTE:
CURB ISOLATION JOINTS
AT ALL DEPRESSED CURBS



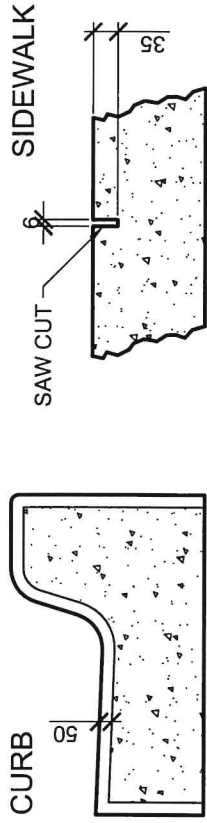
CURB / RAMP / SIDEWALK AT DRIVEWAY DETAIL

SCALE = 1 : 50



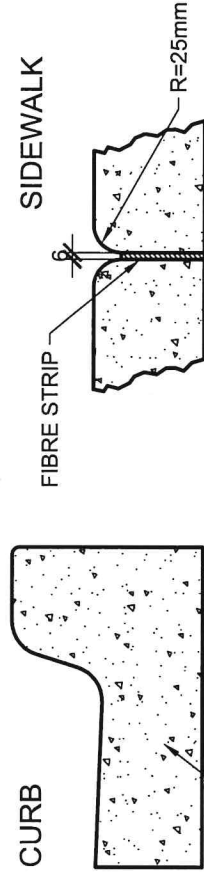
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0	ISSUED	
		SEPT, 2014

TOWN OF WESTVILLE DESIGN & CONSTRUCTION DETAILS



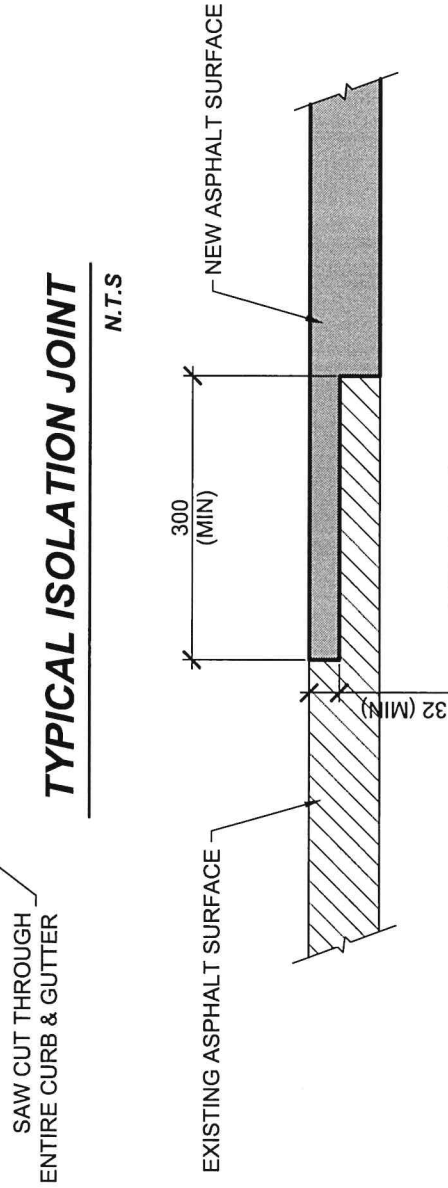
TYPICAL CONTROL JOINT

N.T.S



TYPICAL ISOLATION JOINT

N.T.S



MILLING DETAIL

N.T.S



0	ISSUED	SEPT, 2014	Figure No. SD-16
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