

**SUBDIVISION AND DEVELOPMENT
SERVICING STANDARDS**

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REVISION REGISTER				
Revision No.	Date	Revision Section	Revision Page	Description of Revision
1	April 15, 2021	Section 2, 3, 4, 5, 6, 7 & 8	13, 14, 31, 34, 36, 42, 63, 68, 71, 73 & 74	Major update and additions and changes, including but not limited to driveway, culverts & panhandle driveways

SECTION 1 - GENERAL REQUIREMENTS

1. GENERAL

1.1. Interpretation

“**Applicant**” means a person applying for the approval of a subdivision, a development permit, or other documents, whether as the owner, or an authorized agent for the owner, of the property proposed to be developed.

“**Council**” means the Council of the Town of Oliver.

“**Developer**” means the owner or agent of the owner of land in respect of which a subdivision or development application has been submitted to the Town.

“**Director**” means the Director of Operations appointed by council to direct the operations of the public works department or a person designated by the Director to act in his or her absence.

“**Gradient or Grade**” expressed as a percentage is determined by dividing the vertical height from the lowest to highest elevation on the parcel by the horizontal distance between the lowest and highest point.

“**Owner**” means the registered Owner of the site being developed or his duly authorized agent.

“**Professional Engineer**” means a person who is registered or duly licensed as such under the provisions of the Engineers and Geoscientists Act of British Columbia.

“**Proven Supply**” means that a supply of potable water is available and proven with respect to quality, volume, delivery and continuity of supply from an on-site groundwater system, or a source requiring a water license from the Provincial approving authorities or a community water system.

“**Town**” means the Town of Oliver.

1.2. Professional Design and Review

- 1.2.1. These Subdivision and Development Servicing Standards are to be used as a guide and represent the minimum requirements for subdivision and development service design. These standards are not intended to be a substitute for sound engineering knowledge and experience.
- 1.2.2. In spite of these standards, the Developer and their Professional Engineer remain fully responsible for the design and construction of the infrastructure and utilities according to good engineering standards adequate to address the specific needs and site conditions of their project.
- 1.2.3. If criteria are not covered in these standards, then the design criteria shall be in accordance with good engineering practice, as determined by consultation with the Professional Engineer and the Director.
- 1.2.4. All applications for development shall include a letter of commitment from the applicant in the format set out in SCHEDULE C, that a Professional Engineer has been engaged to carry out all necessary design works and undertake all field services for the development.
- 1.2.5. The applicant shall engage a Professional Engineer to carry out all necessary field reviews and inspections during the construction of works and services required as a condition of development approval. The Professional Engineer shall submit a letter of commitment by engineer in the format set out in SCHEDULE C certifying that the works and services will be carried out in compliance with the Subdivision and Development Servicing Bylaw and the approved plans, drawings and supporting documents submitted in support of the development application.

1.3. Alternative Standards

- 1.3.1. The Professional Engineer is encouraged to seek innovative and superior solutions where appropriate. A consultant who wishes to adopt criteria not specifically included in or variant from those within this design standard shall justify the proposed change in a letter/ report prepared, signed and sealed by a Professional Engineer. Submissions must demonstrate that the proposed change is equivalent to or better than these standards.

1.4. Revisions to the Design Specifications

- 1.4.1. The criteria and design parameters contained in this manual are subject to constant review and re-evaluation and the Director may initiate revisions or additions to these criteria as and when deemed necessary.

1.5. Subdivision Application

- 1.5.1. The applicant may request a Preliminary Layout Approval for any proposed subdivision.

- 1.5.2. Every application for Preliminary Layout Approval shall contain the following information:

- a) Applicant's name and postal address;
- b) Owner's name and postal address, if different from applicant;
- c) Legal description and civic address of the parcel proposed for development;
- d) Proposed use of each parcel after development;
- e) Existing use of property, zoning, and Official Community Plan designation; and
- f) Whether the proposed development will be completed in phases.

- 1.5.3. Each application shall be accompanied by the following:

- a) Three copies of a subdivision plan clearly indicating:
 - The scale of the plan and the direction of North;
 - The location, dimensions, areas and boundaries of all existing and proposed parcel(s);
 - Full legal description of the parcel(s) proposed for development and all adjacent properties;
 - Location and dimensions of any existing buildings and their setbacks from existing and proposed property lines;
 - The arrangement of the parcels of land in relation to any roads which will be created or eliminated by the subdivision, showing the widths, and connections of the roadways;
 - Utility and other right-of-way located and identified;
 - The location of water courses, ravines, steep slopes and other pertinent topographical features; and

- The boundaries of each phase if the proposed development is to be completed in phases.
- b) One copy of the subdivision plan reduced to ledger (11" x 17").
- c) Evidence that the applicant is the owner of the land or has been authorized by the owner to make a development application.
- d) A current copy of the Certificate of Title of the property.
- e) Copies of all relevant charges registered on the title of the subject property (covenants, rights-of-way, easements).
- f) All applicable application fees.
- g) Where a development requires the extension of a road or municipal services, the Director may also require:
 - A topographic survey of the overall development area, extending a minimum of 50 m beyond the subject parcel with 1 m contours;
 - A preliminary road alignment and parcel concept plan showing how development lands, and lands beyond the development boundaries, will be serviced;
 - A drainage plan showing the flood plain, existing drainage courses, and conceptually how drainage will be accommodated through the site;
 - A development servicing concept plan showing the preliminary sizes and alignments of watermains, sanitary and storm sewers. The direction of sanitary sewage and storm drainage flows should also be shown;

2. DRAWING STANDARDS

2.1. Requirements

- 2.1.1. These requirements pertain to the preparation of drawings for: sanitary sewers, storm sewers, water, gas, underground power, telephone, cablevision, street lighting, roads, curbs and gutters, sidewalks, culverts, and other permanent structures.
- 2.1.2. Where no standard is defined for the preparation of a drawing to portray a particular service, structure, or other items, instructions and requirements may be obtained by discussion with the Director, or his appointed representative.
- 2.1.3. All drawings shall bear the seal of a Professional Engineer.

2.2. Design Drawings

2.2.1. Design drawings must be approved by the Director prior to the commencement of construction or installation of any works or services. Together with the submission of design drawings to the Director for approval, the applicant shall provide copies of written approvals from Provincial and Federal government agencies which have jurisdiction related to the works and services proposed.

2.2.2. A sample of a prepared plan/ profile sheet and Standard Drawings are available by contacting the Town. The sheets shall generally conform to:

- a) Sheet size of 914 mm x 610 mm (Arch D sheet size);
- b) Title Block located along the right side of the sheet;
- c) North arrow close to the top right hand side of the sheet;

2.2.3. Drawing conventions for AutoCAD are available from the Town.

2.3. Record Drawings

2.3.1. Record plans are to be completed and approved by the Director before securities are released. Record drawings are to be submitted within six (6) weeks of the completion of works and services on the approved design drawings.

2.3.2. The record drawing package shall include:

- a) 2 sets of sealed paper prints;
- b) 1 set of AutoCAD files; and,
- c) 1 set digital Adobe (.pdf) files.

2.4. Service Cards

2.4.1. A service card shall be provided for each lot in the format as shown in the Standard Drawings. The service card provides dimensions for each service from the closest property corner.

2.5. Documentation to Support Application for Final Approval

2.5.1. Supporting documents to an application for final approval and acceptance of the works and services by the Town shall include:

- a) completion certificate;
- b) record drawings consistent with the requirements of 2.3;
- c) service cards consistent with the requirements of 2.4;
- d) copies of all approvals from regulatory agencies;
- e) copies of materials and quality control test reports;
- f) copies of infrastructure test reports confirming compliance with these standards;
- g) video inspection reports including video on a CD of sanitary and storm sewers;
- h) copies of approved shop drawings; and
- i) operation and maintenance manuals.

SECTION 2 - ROADWAYS AND WALKWAYS

1. DESIGN CRITERIA

1.1. Standards

1.1.1. All road designs shall utilize information contained in the current edition of the Transportation Association of Canada Geometric Design Guide for Canadian Roads. Applicable standards for roadway classification are tabulated in Table 2-1.

Table 2-1 Roadway Classification and Design Standards

Road Classification	Right-of-way Width (m)	Asphalt Surface Width (m)	Curb Type	Sidewalks (m)
Local Residential (low traffic volume)	18.0	8.5	Mountable concrete	1.5 one side *
Local Residential	18.0	10.0	Mountable concrete	1.5 one side
Minor Collector, or Local Commercial	20.0	12.0	Barrier (standard) concrete	1.5 one side
Arterial Road and Major Collector	22.0	14.0	Barrier (standard) concrete	Minimum 1.5 both sides, wider sidewalks may be required by Director
Industrial Road	20.0	8.0	Drainage ditches	Paved shoulder*
Rural Road	20.0	7.5**	Asphalt curb and ditches as required	Paved shoulder*
Primitive Trail	4.0	n/a	n/a	1.0 gravel
Pedestrian Trail	4.0	n/a	n/a	1.5 concrete or asphalt
Pedestrian/ Cycling Shared Trail	6.0	n/a	n/a	3.0 concrete or asphalt

**At the discretion of the Director*

*** vehicle traffic only, may also be widened for paved sidewalk surface*

1.2. Cul-de-Sac

1.2.1. Cul-de-sac bulbs shall be used to terminate “no exit” roads as detailed in the Standard Drawings. The following shall apply:

- a) A maximum cul-de-sac length for roads shall not exceed 150 m unless a secondary emergency vehicle access is provided at least halfway to the end of the cul-de-sac, in which case a length of up to 300m is acceptable; and,
- b) Cul-de-sac roads, designed to permit safe and adequate space for the turning of motor vehicles.

1.3. Design Speed

1.3.1. The design speeds to be used for roadways shall be as in Table 2-2.

Table 2-2 Road Design Speed

Standard Drawing No.	Road Classification	Design Speed
R-3	Arterial & Major Collector	70 km/hr
R-2	Collector, Minor Arterial or Local Commercial	60 km/hr
R-1A, R-1B, R-4, R-5	Local Residential, Industrial, Rural and Bare Land Strata	50 km/hr

1.4. Horizontal Alignment

1.4.1. The horizontal centreline alignment of the road will be located on the centreline indicated on the Standard Drawing, unless approved otherwise by the Director. The minimum required centreline radius for various superelevation rates for each classification of roadways are described in Table 2-3.

Table 2-3 Minimum Centreline Radius

Standard Drawing No.	Road Classification	Horizontal Curve Radii (m)*			
		Superelevation (m/m)			
		None	0.02	0.04	0.06
R-3	Arterial & Major Collector	N/A	230	200	190
R-2	Collector, Minor Arterial or Local Commercial	160	140	130	N/A
R-1A, R-1B, R-4, R-5	Local Residential, Industrial, Rural and Bare Land Strata	95	N/A	N/A	N/A

*Note: Radius may be reduced at the discretion of the Director

1.5. Vertical Alignment

1.5.1. The vertical alignment of a road shall be designed such that driveway grades to adjacent properties shall be in accordance with 1.14.

- a) The minimum longitudinal gradient at the gutter line shall be 0.50% for all classifications of roads.
- b) The minimum longitudinal gradient around cul-de-sacs shall be 0.75%.
- c) The maximum longitudinal gradient of cul-de-sac bulbs shall be 5%.
- d) When the road grade to a cul-de-sac is negative (downhill), the longitudinal gradient of the first 50 m of roadway uphill from the cul-de-sac bulb shall not exceed 5%.
- e) The maximum longitudinal gradient (downhill) for the remainder of the cul-de-sac shall not exceed 8.0%.
- f) When the road grade to a cul-de-sac is positive (uphill), the longitudinal gradient shall not exceed 10.0%.
- g) The length of a transition from a normal crowned road cross section to a section of road where there is superelevation or cross-fall shall, in no case, be less than 70 m for a 50km/h design speed.
- h) Minimum and maximum road centreline grades shall conform to Table 2-4 based on the classification of the road.

Table 2-4 Road Grades

Standard Drawing No	Road Classification	Minimum Grade	Maximum Grade
R-3	Arterial & Major Collector	0.5%	10.0%
R-2	Collector & Minor Arterial or Local Commercial	0.5%	8.0%
R-1A, R-1B, R-5	Local Residential or Rural	0.5%	10.0%
R-4	Industrial	0.5%	8.0%
R-6	Cul-de-Sac (entry downhill)	0.5%	8.0%
R-6	Cul-de-Sac (entry uphill)	0.5%	10.0%
R-6	Cul-de-Sac (bulbs)	0.5%	5.0%
	Lane	0.5%	8.0%
	Multi-Use Pathway	0.5%	15.0%

Note: Maximum grades are to be reduced by 1.0% for each (or part of each) 30 m that the centreline radius is less than 150 m.

1.6. Vertical Curves

1.6.1. Vertical curves shall be designed to provide safe stopping sight distances. Minimum stopping sight distance is the least distance required to bring the vehicle to a stop under prevailing vehicle and climatic conditions. Vertical curves shall be provided at all grade changes greater than 1.0%. Vertical curve length is calculated by the equation:

$$L = KA;$$

Where:

L = Length of the vertical curve in metres;

K = A constant related to lines and geometry of a parabolic curve; and

A = Algebraic difference in grades in percent.

1.6.2. The length (L) shall not be less than the design speed in kilometres per hour.

1.6.3. Minimum K values (in metres) for vertical curve design shall be as described in Table 2-5.

Table 2-5 Minimum K Values for Vertical Curve Design

Standard Drawing No	Road Classification	Crest Curve Minimum	Sag Curve	
			With Lighting	No Lighting
R-3	Arterial & Major Collector	22	15	25
R-2	Collector & Minor Arterial or Local Commercial	15	10	20
R-1A, R-1B, R-4, R-5	Local Residential, Rural, Industrial	8	6	11

1.7. Intersections

1.7.1. In the design of all road intersections, including those with lanes and pathways, the applicant's Professional Engineer shall give consideration to providing adequate decision sight and stopping distances for conflicting traffic streams involving pedestrians, bicycles and/or vehicles.

1.7.2. Intersections shall be designed as follows:

- a) Intersecting roads shall meet substantially at right angles (between 70 degrees and 110 degrees);
- b) Jogs in roadway alignment at intersections shall be avoided except where the distance between centrelines is sufficient to ensure traffic safety.
- c) Intersections having more than four intersecting legs shall not be permitted;
- d) A property line cut-off of 4.0 m x 4.0 m for local roads and 5.0 m x 5.0 m for collector and arterial roads shall be at all intersections. For intersections of varying classes of road, the higher classification road shall determine the cut-off.

1.8. Intersection Grades

1.8.1. Approach grades for a crest curve of minor roads at intersections to major roads shall not exceed 75% of the maximum grade allowed for that road classification. The minor road shall be designed to intersect the major road with a vertical curve of minimum length required for that road classification. The vertical curve shall terminate at the projected curb line of the major road using K values as described in Table 2-6.

Table 2-6 Intersection Curves

Standard Drawing No.	Intersecting Road	Minimum K Value (in metres)	
		Crest Curve	Sag Curve
R-2	Collector, Minor Arterial or Local Commercial	7	(1)
R-1A, R-1B, R-4, R-5	Local, Residential, Rural, Industrial	4	(1)

⁽¹⁾ Approach grades for a sag curve of minor roads at intersections to major roads shall be designed to provide a maximum gradient of 3.0% at a point 15 m from the projected curb line of the major road.

1.9. Reverse Curves

1.9.1. If reverse curves are required in a roadway alignment, the Director may require that they be separated by means of tangents of sufficient length to allow superelevation rotation.

1.10. Cross-fall

1.10.1. Minimum road cross-fall shall be 2%, and maximum road cross-fall shall be 3%.

1.11. Curb Returns

1.11.1. Curb return radii shall conform to the following minimums and be based on the classified Roadway:

Local Residential	8.0 m
Collector, Minor Arterial or Local Commercial	10.0 m
Arterial & Major Collector	12.0 m
Industrial	14.0 m

1.11.2. Curb returns located on roads within industrial and commercial districts may require a larger radius to facilitate truck traffic and bus traffic, and where angular deflections occur in a roadway alignment, the Director may require that the angle be replaced by a curve of suitable radius.

1.12. Wheelchair Ramps

1.12.1. Wheelchair ramps shall be provided at all intersections on roads provided with sidewalks. Wheelchair ramps shall be constructed consistent with the Standard Drawings.

1.13. Pathways and Fences

1.13.1. Pathways shall be provided where the Director deems them to be necessary to provide access through a development to schools, parks, playgrounds, commercial areas or other community facilities, or for the safe and efficient circulation of pedestrian and bicycle traffic.

1.13.2. The Town may require pathways to be chain link fenced complete with privacy slats for their full length on both sides. The minimum height shall be 1.5 m but may vary at the discretion of the Director according to individual situations and the height requirements of the Municipal Zoning Bylaw.

1.14. Driveways and Crossovers

1.14.1. Each property shall only have one driveway access, unless there is a demonstrated need and approval is obtained from the Director. At the discretion of the Director, at the time of subdivision, a registered covenant may be required describing requirements for access. The driveway shall be located to access the lane or road of the lower classification when a lot abuts a lane or road of different classification.

1.14.2. At the discretion of the Director, access to large parking areas shall be by curb returns rather than a driveway letdown. The Director may require deceleration and acceleration lanes for access off major roads for safety reasons and to minimize disruption to traffic flows.

1.14.3. Driveway access grades shall be designed to permit the appropriate vehicular access for the zone, without “bottoming-out” or “hanging-up”. From edge of pavement or back of curb to property line, the driveway grade shall not exceed 5%

for the first 6 m. For the next 10 m on private property, the maximum allowable driveway grade is 15% if accessing a local road. This maximum on site grade is 10% if accessing a collector or arterial road.

CROSS - OVER	COMMERCIAL	RESIDENTIAL	LANES
Minimum Width	4.5m	3.0m	5.0m
Maximum Width	12.0m	7.0m	5.0m
Thickness of Concrete	0.20m	0.14m	0.20m
Thickness of Asphalt	62.5mm	50mm	50mm
Concrete Reinforcement	15M @ 300 o/c Each Way	None Required	-

1.14.4. The edge of any driveway shall be located a minimum of 2 m from hydrants, poles, street lights, street signs or boulevard trees.

1.14.5. Drainage Culverts:

- a) Culverts are to follow the design grade of the drainage swale;
- b) Culverts shall be a minimum grade of 1.3%;
- c) Culverts shall be inset a minimum 50mm into the drainage swale;
- d) Under written approval of the Director or Operations, additional culvert lengths maybe installed along the frontage of the property;
- e) Minimum cover over the culverts shall be 300mm;
- f) Single family residential driveways;
 - Minimum culvert widths shall be 4.00m for single driveways;
 - Maximum culvert widths shall be 8.00m for single driveways;
- g) All other Driveways;
 - Minimum culvert widths shall be 8.00m
 - Maximum culvert widths shall be 14.00m

1.14.6. Generally driveways:

- a) Surface water from driveways on private property must be contained on-site, unless otherwise approved in writing by the Director;
- b) The finished elevation of the driveway at the road property line shall not vary more than 150 mm from the elevation of the centreline of the existing road, unless otherwise approved in writing by the Director; and,

1.14.7. Single family residential driveway:

- a) Minimum driveway widths shall be 3.0m;
- b) Maximum driveway widths shall be 7.0m;
- c) Minimum acceptable driveway surface shall be compacted all weather gravel surface;
- d) Driveway access roads must have a minimum of 9.0 m centreline radius on all curves;
Turnaround facilities are to be provided for any dead-end access driveway fronting an arterial or collector road;

1.14.8. All other driveways:

- a) Minimum driveway width shall be 6.0 m;
- b) Maximum driveway width shall be 12.0m;
- c) Minimum acceptable driveway surface shall be hot mix asphaltic concrete;
- d) Driveway access roads must have a minimum of 12.0 m centreline radius on all curves;
- e) Turnaround facilities are to be provided for any dead-end access driveway;

Panhandle Lots

1.14.9. Panhandle lots are generally not permitted, however if required to efficiently develop a parcel of land they shall conform to current council policy and the minimum widths for driveway access to any road from a residential development shall be in accordance with Table 2-7 **Error! Reference source not found.:**

Table 2-7 Panhandle Lot Driveways

Number of Residential Units Served	Length of Panhandle Driveway	Minimum Unobstructed Driveway Pavement Width	Minimum Property Width of Driveway
1	40 m or less	3.5 m	4.5 m
1	over 40 m	3.5 m widened to 5.0 m at one point every 30.0 m	5.0 m
2	any length	3.5 m widened to 5.0 m at one point every 30.0 m	6.0 m
3 or more	any length	5.0 m	6.0 m

- 1.14.10. A panhandle must be accomplished by neighbouring lots each contributing to a panhandle and registering reciprocal easements and maintenance agreements in a format acceptable to the Approving Officer.
- 1.14.11. A panhandle must be paved at a width of not less than the minimum unobstructed travel width listed in the above table, tied into existing asphalt at the public roadway and extended for a distance of 30m or the full length of the panhandle, whichever is less.
- 1.14.12. Gateposts or signs located on the driveway property but not within the minimum unobstructed travel width, within 2m of the public street right of way, showing the house numbers of the panhandle lots are to be installed by the sub-divider and maintained by the owners of the panhandle.
- 1.14.13. A total of 4 off-street parking stalls shall be required per residential unit, 2 to satisfy bylaw requirements and 2 for sufficient visitor parking in lieu of street frontage. Where the driveway provides an unobstructed travel width of 5m or more, consideration will be given to visitor parking on the driveway.
- 1.14.14. An applicant for panhandle lot must present a proposed site plan showing the house location, parking stalls and sufficient room to turn vehicles around without the need to back onto a public road.
- 1.14.15. A panhandle lot created in a residential zone must be fenced by the developer on all sides which abut a lot that exists prior to the subdivision. The fence must be of a privacy type no openings, and built to the maximum height allowed under the Town of Oliver Zoning Bylaw. The fence is to be maintained by future owners of the panhandle lot(s).
- 1.14.16. No overhead utility services are to be installed on a panhandle driveway.
- 1.14.17. Concurrent with the approval of a panhandle subdivision, a covenant under Section 215 of the Land Title Act shall be registered against the subdivided lots ensuring compliance with the above conditions, in perpetuity.
- 1.14.18. To ensure that necessary works are carried out by the developer, a cash deposit may be required under the Subdivision and Development Services Bylaw.
- 1.14.19. The above guidelines are provided by the Subdivision Approving Officer for public guidance only and may be varied or supplemented as needed to address specific site conditions.

1.15. Road Right-of-Way Requirements

- 1.15.1. The tops of road cuts and the toes for road fills that are outside of the standard road right-of-way widths shall be identified and legally protected by additional road right-of-way dedication or statutory right-of-way.
- 1.15.2. For low volume local roads servicing less than 10 lots and are dead end roads (no through traffic), the Director may reduce the required right-of-way width from 18m to 16.5m where there is adequate provision for on-site parking and sidewalks are not required.

1.16. Mail Boxes

- 1.16.1. Where required by Canada Post, a concrete base shall be constructed for future mail boxes in the location specified by Canada Post and approved by the Director. Where required pullout and pedestrian facilities are to be provided. Canada Post shall be contacted for location and design guidelines.

1.17. Street Names and Traffic Signs

- 1.17.1. Street name signs and traffic signs required as a result of constructing or improving roads shall be provided by the Town at the expense of the Developer. Street names shall be assigned by the Town, in accordance with Civic Addressing Bylaw 1320.

1.18. Appurtenances

- 1.18.1. The applicant's Professional Engineer shall detail on the design drawings the location of all proposed traffic islands, retaining walls, guardrails, and permanent barricades. These structures shall be designed in accordance with good engineering practices. The top of escarpments, rock cuts, and retaining walls constructed on or adjacent to proposed roadways shall have railings or handrails.
- 1.18.2. The design should show the location of all traffic signs, street signs, and other traffic control devices required to be placed in the road allowance.
- 1.18.3. Drawings must show all utility poles, ducts, junction boxes and pipelines. The Professional Engineer shall indicate those utilities such as poles and guy wires which require relocating prior to road construction, and shall confirm with the utility the feasibility of their relocation prior to design completion. For

underground systems, design drawings shall show the location of underground wiring, and appurtenances including the service connections to properties.

1.19. Boulevards

1.19.1. Upon completion of road, curb, gutter and sidewalk construction, boulevards shall be shaped, graded and landscaped as shown on the Standard Drawings. Unless otherwise approved, boulevards shall be graded to drain to the curb and gutter at a minimum slope of 2% and a maximum slope of 10%.

1.19.2. Native material and 100 mm depth of approved landscape material shall be placed flush with the top of curb or back of walk and shaped to conform with general lot grading.

1.20. Boulevard Landscaping and Appurtenances

1.20.1. The Town reserves the right to request that boulevards be landscaped complete with automatic irrigation systems. Where boulevard landscaping and irrigation is required the applicant shall prepare a landscaping and irrigation design drawing for the Town to review. The landscaping and irrigation works shall not be contracted until design drawings have been approved by Director.

1.20.2. All landscaping material shall be compatible with the climatic conditions in the Town. Where, in the opinion of the Director, the landscape design requires the expertise of a Landscape Architect, the applicant shall engage a Landscape Architect, to prepare the landscape and irrigation design and specifications for review by the Town.

1.20.3. Boulevard trees are required at all common property lines where a street light, fire hydrant or transformer is not proposed and where indicated on the Standard Drawings.

1.20.4. Species of boulevard trees shall be approved by the Director and selected on the basis of:

- a) site soil characteristics;
- b) tolerance to the climatic conditions of the Town;
- c) diversity in relation to other boulevard trees in the vicinity.

1.20.5. The caliper of a boulevard tree shall not be less than 50 mm. Where vandalism is considered to be a potential problem, the Town may require a larger caliper size.

1.21. Pavement Structure

1.21.1. The minimum pavement structure to be used for roadways shall be as in Table 2-8.

Table 2-8 Minimum Pavement Structures

Standard Drawing No.	Road Classification	Sub-base (Pitrun) mm	Crushed Granular Base (mm)	Hot Mix Asphalt (mm)
R-3	Arterial & Major Collector	Structural Design shall be project specific		
R-2	Collector & Minor Arterial or Local Commercial	300	150	75
R-4	Industrial	300	100	62.5
R-1A, R-1B, R-5, R-6	Local Residential, Rural & Cul-de-Sac	300	100	50
	Lanes	300	100	50
	Pathways	150	100	50

1.21.2. For overlays of existing pavements surfaces, the Transportation Association of Canada procedure for structural design of overlays of existing pavements, as published in "The Pavement Management Guide", shall be used.

2. MATERIALS

2.1. Roadway Sub-grade Fill

2.1.1. Roadway sub-grade fill material shall be free of rock detrimental to proper compaction and free of organic or other deleterious matter. Fill material shall be compacted to a minimum of 95% Standard Proctor Density (SPD). Fill material shall be moisture re-conditioned to within 3% of its optimum moisture content, as determined by the Standard Test Methods for Moisture-Density Relations of Soils and Soils-Aggregate Mixtures at the time compaction is undertaken.

2.2. Rock Fill

2.2.1. Rock fill shall be any material containing more than 15% by volume of rock larger than 150 mm diameter, to a maximum of 300 mm diameter. Rock may be used for subgrade fill only with the approval of the Director.

2.3. Granular Sub-base Course

2.3.1. Granular sub-base shall conform to the gradation limits as described in Table 2-9 when tested in accordance with ASTM C136.

Table 2-9 Granular Sub-Base Gradation Limits

USBC Sieve Size	Percent by Weight Passing
75 mm	100%
25 mm	50 – 85%
0.015 mm	0 – 16%
0.075 mm	0 – 8%

2.4. Crushed Granular Base Course

2.4.1. Crushed base course shall be composed of inert, durable aggregate, and free from soft or disintegrated pieces, wood wastes, roots, organic material or other deleterious materials. The gradation shall be within the limits presented in Table 2-10 when tested to ASTM C-136 and C-117, using the designated sieve sizes, and to have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

Table 2-10 Crushed Base Gradation Limits

USBC Sieve Size	Percent by Weight Passing
25 mm	100%
19 mm	80 - 95%
9.50 mm	50 - 80%
4.75 mm	35 - 65%
2.36 mm	25 - 50%
1.18 mm	15 - 35%
0.3 mm	5 - 20%
0.075 mm	3 - 8%

2.4.2. A minimum of 60% of the material retained on a 4.75 mm sieve shall have at least two fractured faces as determined by particle count.

2.5. Asphalt Cement

2.5.1. Asphalt Cement shall conform to the British Columbia Ministry of Transportation and Infrastructure Class 1 Medium Mix.

2.5.2. Prior to placement of any asphalt, Marshall mix design information prepared by a Materials Testing Firm shall be submitted to the Director confirming compliance with the BC MOTI Class 1 medium mix criteria.

2.5.3. The asphalt content of hot mix asphalt which is produced in accordance with the approved Marshall design shall be maintained within plus or minus 0.3% of the approved design asphalt content.

2.6. Primer and Tack Coat

2.6.1. Asphalt primer shall be anionic emulsified asphalt, slow setting (SS-1) and shall be diluted with clean water at two (2) parts emulsion to one (1) part water for application, and thoroughly mixed by pumping. The diluted asphalt emulsion shall be applied at a rate of 2 litres per square metre. The prepared granular base shall be clean and free of “float” prior to application of primer. Allow primer to absorb and cure for at least 24 hours prior to paving. Traffic shall not be permitted onto primed areas.

2.6.2. Bituminous tack coat shall be undiluted SS-1H or SS-1 asphalt emulsion, and shall be applied at a rate not greater than 0.5 litres per square metre to a clean pavement surface, and provide for adequate curing time prior to placing asphalt paving mixtures. The temperature of the material shall be maintained between 30°C and 40°C at the time of application.

2.6.3. Liquid asphalt for prime coat or tack coat shall be applied when surface and weather conditions are favourable and when the ambient air temperature is above 10 ° Celsius and rising.

2.7. Concrete

2.7.1. Concrete shall conform to CSA CAN3-A23.1, Latest Edition; the mix design shall include the following:

- a) Minimum compressive strength 32 MPa at 28 days;
- b) Maximum aggregate size 19 mm for hand-formed; 10 mm for extruded;
- c) Slump - 80 mm for hand-formed; 25 mm for extruded;
- d) Air entrainment 6% - 8%.

2.8. Curing Compound

2.8.1. Curing compound of liquid type conforming to ASTM C-309 containing a fugitive dye shall be spray-applied at a rate recommended by the manufacturer.

2.9. Driveway Approaches

2.9.1. Base for driveway approaches shall consist of a minimum of 300 mm depth of granular sub-base where native materials are unsuitable for sub-base and 100 mm depth of granular base placed on compacted sub-grade. Approaches shall be paved to provide 50 mm hot mix asphalt.

3. EXECUTION

3.1. Clearing

3.1.1. The road right-of-way shall be cleared of all trees, stumps, logs, roots, and any other deleterious material. In addition, buildings, fences, culverts, or any other structures within the roadway shall also be removed. Trees may be left within the

roadway only where they do not conflict with utility services and where they are not deemed a hazard at the discretion of the Director.

3.2. Roadway Excavation and Embankment

- 3.2.1. All material in embankments shall be placed in level layers not exceeding 300 mm un-compacted depth in successive uniform layers. Each layer shall be compacted to 95% Standard Proctor Density.

3.3. Sub-grade Preparation

- 3.3.1. Prior to placement of the granular sub-base, the upper 300 mm of the sub-grade is to be compacted to 100% of Standard Proctor density. Sub-grade preparation shall extend a minimum of 600 mm out from back of curb or sidewalk on either side of the road.

3.4. Proof Rolling

- 3.4.1. Upon completion of the sub-grade preparation, the sub-grade shall be proof rolled with a loaded single axle truck with a rear axle load of 8165 kg.
- 3.4.2. Any soft or wet areas shall be excavated and backfilled with select granular subbase compacted to 100% Standard Proctor density.

3.5. Sub-base Gravel

- 3.5.1. Granular sub-base shall be placed in maximum 150mm lifts and compacted to 98% Standard Proctor Density.

3.6. Compaction of Crushed Granular Base Gravels

- 3.6.1. Granular base gravels shall be placed in maximum 150 mm lifts and compacted to 100% Standard Proctor density. The finished surfaces shall be within +/- 15 mm of the design grade and cross-section.

3.7. Paving Requirements

- 3.7.1. Paving shall not be undertaken during snow, heavy rain, temperatures below 5° Celsius or other unsuitable conditions. Asphaltic concrete shall not be placed on a frozen or rutted base.
- 3.7.2. The minimum acceptable density of the completed pavement shall be not less than 97% of the laboratory compacted Marshall Density.

3.8. Tie-Ins to Existing Pavement

- 3.8.1. Tie-ins to existing pavement shall be made by cutting back the existing pavement to sound material as necessary to produce a neat, vertical face with a straight edge. Prior to placing asphaltic concrete, exposed faces and other abutting structures shall be painted with liquid asphalt and heated to 66° Celsius.

3.9. Placing and Finishing Concrete

- 3.9.1. Concrete shall be prepared, delivered, and placed in conformance with CSA CAN3-A23.1-M90 (Latest Edition) "Concrete Materials and Methods of Concrete Construction". The surface of the curb, gutter and sidewalk shall be finished prior to final set by brushing to provide a uniform non-skid finish. Both edges of the sidewalk shall be trowelled smooth to a width of 50 mm and rounded to a radius of 12 mm.
- 3.9.2. Curb, gutter and sidewalk contraction joints shall be made at a maximum of 3 m intervals.
- 3.9.3. 15 mm thick expansion strips shall be installed through the full depth of the sidewalk and the entire width at the beginning and end of every curb return, on both sides of crossovers and against walls and structures, and 9 m on centre elsewhere. A 6 mm rounded edge shall run along each side of the joint.

3.10. Materials Testing

- 3.10.1. The developer shall retain an independent materials testing firm to carry out comprehensive testing to frequencies defined below, for each stage of construction of roads and services. The Professional Engineer shall review all test data.
- 3.10.2. For Roadwork embankment and sub-grade construction:

- a) Standard Proctor (ASTM D-698) - one test for each soil type incorporated; and,
- b) Moisture and density tests – one test per 500 square metres

3.10.3. For Trench Backfill:

- a) Density tests – one test per lift per 120 lineal metres of trench.

3.10.4. For Sub-Base and Base Course Construction:

- a) Gradation analysis - one test per 1000 cubic metre or 2200 tonnes of material delivered to the site;
- b) Moisture - density relationship (Standard Proctor) - ASTM D-698, one test per class of material for each 1000 cubic metres, or 2200 tonnes delivered to site; and,
- c) Compaction testing - one test per 500 square metres of road per lift, to include dry density and moisture content.

3.10.5. For Hot Mix Asphalt Pavement Production and Placement:

- a) Asphalt content and gradation of extracted aggregate - one test per production period, where a production period is defined as that part of the working day either before or after 12:00 noon local time. In a full working day, the times of test shall be not less than two hours apart; and,
- b) Marshall analysis of hot mix asphalt - one per work week per mix type.

3.10.6. For Concrete:

- a) Unit weight of the placed concrete, slump and air content tests and casting of test cylinders.
- b) One test consisting of three standard cylinders for each 175 m of curb and gutter or sidewalk installed.
- c) In no case, however, will there be less than one test for concrete placed in one day.
- d) One cylinder shall be tested at seven days, and two at twenty-eight days.

3.11. Boulevard Tree Planting

- 3.11.1. The planting hole shall be a minimum of three times wider than the root ball. In low permeability soil types, i.e. clay or compacted soils, the diameter of the hole shall be 5 times the diameter of the root ball.

3.11.2. Root guard shall be installed parallel to sidewalks, and or curb and gutter in accordance with the Standard Drawings.

3.11.3. Prior to planting, preparations of the root ball shall include:

- a) Removal of top ring of wire baskets;
- b) If wrapped with natural burlap, the top half shall be removed; and,
- c) Synthetic burlap, treated burlap, nylon twine and nylon ties shall be completely removed.

3.11.4. The tree shall be planted such that the trunk flare is exposed and above finished grade.

3.11.5. Staking is necessary to provide support against strong winds:

- a) For trees up to 3 m in height, two stakes are required in the prevailing wind direction;
- b) For trees greater than 3 m in height, three (3) stakes at 45 degree spacing up gradient in the prevailing wind direction are required.

3.11.6. Following planting, dead, diseased or broken branches shall be removed by pruning. Additionally, co-dominant branches shall be removed such that no branch is greater in diameter than one half of the trunk size.

SECTION 3 - WATER SYSTEMS

1. DESIGN CRITERIA

1.1. Standards

1.1.1. All standards not specifically described in this Section shall be in accordance with appropriate AWWA standards or as directed by the Director.

1.2. Water Distribution Mains

1.2.1. Water distribution mains shall be sized to carry the peak hourly flow rate or the maximum daily flow rate plus the fire flow rate, whichever is the greater. Mains shall be sized using the Hazen-William formula with "C" equal to 120 and maximum flow velocity for:

- (a) Peak hourly demand rate of 2.0 m per second;
- (b) Fire flow plus the maximum day demand of 4.0 m per second.

1.3. Per Capita Water Demands

1.3.1. For residential areas, the daily domestic demand criteria for purposes of designing water distribution systems shall be:

- (a) Average Day: 1000 litres/day/capita;
- (b) Maximum Day: 2500 litres/day/capita; and,
- (c) Peak Hour/Maximum Day Ratio: 1.5:1.

1.4. Population Equivalent

1.4.1. For other than residential uses, demand criteria shall be selected to suit the particular circumstances subject to the approval of the Director or population equivalents derived from Table 3-1.

Table 3-1 Population Equivalents

Land Use	Population Density
Detached, duplex or multi residential w/ 3 or more bedrooms	2.5 people/unit
Multi Residential w/ 2 or fewer bedrooms	2.0 people/unit
General/Town Commercial	90 people/hectare
Institutional	50 people/hectare
Industrial	90 people/hectare

1.5. Fire Flow Requirements

- 1.5.1. The minimum required fire flows for different land uses is provided in Table 3-2. All fire flows are to be available to the furthest distance within the site from the service location and/ or at the point of highest elevation.

Table 3-2 Minimum Fire Flow Requirements

Zone	Minimum Fire Flow
Single Family/Mixed Residential	60 L/s
Medium Density Residential/Light Industrial and Service Commercial	90 L/s
Core Area Commercial, Institutional and High Density Residential	150 L/s
Industrial	200 L/s

1.6. Service Pressures

- 1.6.1. Waterworks shall be designed to provide service pressures:

- (a) Minimum at Peak hourly demand of 310 kPa (45 psi);
- (b) Maximum static of 1030 kPa (150 psi);
- (c) Minimum residual at maximum day domestic plus fire flow of 140 kPa (20 psi).

- 1.6.2. The minimum pressures shall be measured or calculated at the top floor elevation of the highest proposed structure and an allowance made for pressure loss in the service line to the structure.

- 1.6.3. Reservoir level shall be assumed at mid-point for calculation of minimum pressures and full for calculation of maximum static pressures.

1.7. Grades

- 1.7.1. Watermains shall generally be at grades parallel to the road centreline. The minimum grade for a main shall be 0.10% and the maximum grade shall be 20% unless provision is made for pipe anchors.
- 1.7.2. Watermains shall be designed with a rising grade wherever possible to minimize high points in the main. Where a high point is unavoidable an air release valve is required.

1.8. Minimum Pipe Size

- 1.8.1. The minimum pipe size for all watermains shall be:
- a) 150 mm diameter in single family and mixed residential areas;
 - b) 200 mm diameter in medium/high density residential, commercial and institutional areas;
 - c) 250 mm diameter in industrial areas;
 - d) 100 mm in low density residential areas on cul-de-sacs, where no further extensions are possible, and only downstream of the last fire hydrant.

1.9. Alignment of Watermains

- 1.9.1. Watermains shall be normally designed to follow a straight alignment between intersections. Curved alignments may be accepted provided that the pipe alignment is at a parallel offset with an established boundary and the radius of curvature is not less than 60 m or twice the minimum radius of curvature recommended by the pipe manufacturer, whichever is the greater. Pre-manufactured bends to the same standards as the mainline pipe may be utilized to achieve the design radius.
- 1.9.2. The maximum desirable length of any unlooped watermain is 150 m. Unlooped watermains exceeding 150 m in length may be accepted by the Director if it can be demonstrated that looping is not practical.
- 1.9.3. No gas main, electric or telephone duct or other utility line shall be installed in the same trench with watermains.

1.10. Depth of Cover

- 1.10.1. The depth of the watermain shall be sufficient to provide all services with a minimum cover of 1.5 m to the top of the service anywhere within the right-of-way. The minimum cover required over the crown of the water main is 1.5 m.

1.11. Spacing and Location of Fire Hydrants

- 1.11.1. Fire hydrants shall be located, in general, at road intersections and at maximum spacing of 150 m in single family and mixed residential areas and 90 m in medium/high density residential, general/town commercial, institutional and industrial areas.
- 1.11.2. Additional onsite fire hydrants may be required to meet the requirements of the Building Code.
- 1.11.3. Except at intersections, hydrants should be located on the projection of the property line dividing two lots. In selecting the location of a hydrant, the probable route of the firefighting equipment shall be considered.
- 1.11.4. A hydrant shall not be located within 3 m of a utility pole, pad mounted transformer or light standard, within 1.5 m horizontally of underground service pipes or open ditches, or within 1 m of the curb line or back of sidewalk.

1.12. Line Valves

- 1.12.1. Line valves in residential areas shall be located at a maximum spacing of 250 m in a continuous line and shall generally be located so that not more than 2 hydrants or 50 dwelling units will be without water service in the event of any one water break. In commercial, institutional and industrial areas, line valve spacing shall not be greater than 120 m and be located such that not more than one hydrant will be out of service when the line valve is closed.
- 1.12.2. Each tee shall have a minimum two line valves and each cross shall have a minimum three line valves. Valve locations should be in a cluster at the intersection of the mains. Isolation valves shall be provided at each end of a statutory right-of-way.
- 1.12.3. A line valve may be required on a new water main near each point of connection to existing mains.

1.13. Blow Offs

- 1.13.1. Permanent blow offs shall be installed at all permanent dead-ends as shown on the Standard Drawings.

1.14. Thrust Restraints

- 1.14.1. Concrete thrust blocking shall be provided at all fittings (i.e. bends, tees, reducers, caps and blow-offs) and on hydrants as shown in the Standard Drawings. Calculations for thrust block design may be requested by the Director.
- 1.14.2. Where thrust blocks are impractical, adequate restraining devices are an acceptable alternative. If joint restraints are proposed to be used as an alternative to concrete thrust blocks, the applicant shall provide detailed design information for each application, from the restraint manufacturer and endorsed by the pipe manufacturer. Where joint restraints are proposed, restraint capacity calculations may be requested by the Director.

1.15. Service Connections

- 1.15.1. The diameter of water services shall be determined by the Professional Engineer and is subject to approval of the Director, and in no case shall the diameter be less than 19 mm.
- 1.15.2. Water services shall be installed to the property line of each lot in accordance with the Standard Drawings.
- 1.15.3. Water services shall not be installed under driveways where possible, and when not possible, the water service is to follow W-01B.

1.16. Tie-ins to Existing Watermains

- 1.16.1. Connection of a new pipe to an existing watermain generally shall be done by wet tap (hot tap.) Hot tap connections including details of materials required, shall be clearly indicated on the design drawings.

1.17. Watermain Location and Right-of-Way Requirements

- 1.17.1. Watermains shall, to the greatest extent practical, be located in the road right-of-way on offsets consistent with the Standard Drawings. On side-hill roads, the watermain shall, where possible, be located on the cut side of the centreline of the road.
- 1.17.2. Where a main cannot be located within a road right-of-way due to topographic or other design constraints, the main shall be located in a statutory right-of-way

registered in favour of the Town not less than 6.0 m in width. Additional statutory right-of-way may be required where:

- a) Another utility is located in the same right-of-way;
- b) The depth of the infrastructure requires a wider right-of-way for maintenance;
- c) Services are provided to adjacent properties.

1.17.3. Where a statutory right-of-way is the access route for operations and maintenance of infrastructure, the right-of-way shall be sufficiently wide to accommodate the proposed infrastructure and have a surface structure sufficient to support all intended maintenance vehicles. The maximum allowable grade for a gravel surfaced maintenance access is 12% and for paved surface accesses is 15%.

1.18. Reservoirs, Pump Stations, Pressure Reducing Stations, and Meter Chambers

1.18.1. The applicant shall submit a pre-design report that addresses the design requirements to the Director. The Town will proceed with a detailed design at the applicant's cost upon acceptance of the pre-design concepts.

2. MATERIALS

2.1. Pipe and Fittings

- 2.1.1. Pipe for watermains shall be compliant with AWWA standards for ductile iron or polyvinyl chloride (PVC). Alternative equal products may be accepted on written approval by the Director.
- 2.1.2. PVC pipe joints shall be wall thickened and sleeve reinforced bell and spigot ends with formed groove for the elastomeric gasket seal.
- 2.1.3. Ductile iron pipe shall have the pressure class specified and approved by the Director. Pipe shall be supplied with push-on joints and pipe shall be cement mortar lined. All pipe shall be polyethylene encased, unless otherwise approved by the Director based upon a comprehensive soil analysis submitted by the applicant demonstrating that encasement is not required.
- 2.1.4. Fittings shall be ductile iron for use with ductile iron or PVC pipes and shall be designed for a minimum pressure of 1720 kPa (250 psi).

2.2. Buried Gate Valves

- 2.2.1. Buried gate valves shall be iron body, resilient seated valves with non-rising stem, O-ring stem seal, suitable for a minimum operating pressure of 1720 kPa (250 psi).
- 2.2.2. Valves shall be equipped with a 50 mm square operating nut and tie-lugs where restraining is required. Stem extensions will be required on all valves installed at greater than minimum cover. Valves shall open counter clockwise.

2.3. Valve Boxes

- 2.3.1. Valve boxes shall be Nelson or Robar type with anchored flanges approximately 100 mm from the top of the box. The box shall be flush with the finished surface.

2.4. Hydrants

- 2.4.1. All hydrants shall be Terminal City compression type, complete with 2 - 63 mm ports and 1 - 114 mm pumper port. Threads shall conform to the British Columbia Fire Hose Thread specifications. Hydrants shall be painted yellow above the ground line. Drain outlets shall be provided except in areas of high groundwater. Depth of bury shall be a minimum of 1.5 m. Hydrant extensions shall be installed as required to suit the final boulevard grade. Hydrants shall be equipped with a standard BC pentagon operating nut and shall open counter clockwise.
- 2.4.2. Hydrant lead pipe shall be a minimum of 150 mm diameter. At the discretion of the Director, a concrete wing wall shall be installed at hydrants adjacent to road cut slopes. In areas where road ditches exist, a culvert and a 3 m wide gravelled pad across the ditch shall be provided for access to the hydrant.

2.5. Service Connection Materials, Saddles, and Service Fitting

- 2.5.1. All pipe for underground services 50 mm in diameter and smaller shall be PEX tubing DR9 complete with stainless steel inserts. Pipe for services 100 mm and larger diameters shall be the same as specified for watermain pipe.
- 2.5.2. Service fittings shall be compression type suitable for 1035 kPa (150 psi) working pressure.
- 2.5.3. Service saddles, corporation stop and curb stop are to be as shown on the standard drawings.

2.6. Concrete

- 2.6.1. All concrete shall at a minimum have a 28-day compressive strength of 25 MPa for thrust blocks and other appurtenances.
- 2.6.2. Cement shall be Portland cement and shall be normal type unless dictated otherwise by soil conditions.

2.7. Granular Bedding and Backfill Material in the Pipe Zone

- 2.7.1. Pipe bedding shall be sand or crushed gravel conforming to the gradation limits set out in Table 3-3.
- 2.7.2. Through areas of high groundwater conditions, crushed gravel and 19mm (3/8") drain rock shall be used for pipe bedding.
 - a) When cover above drain rock is less than 1.0m of cover, then geotextile fabric is required between the backfill and between the drain rock.
 - b) When soil conditions are too saturated, then larger crushed rock is required below bedding area of pipe with 3/8" drain rock bedding the area.
- 2.7.3. Granular Pipe Bedding and Surround Aggregate in the pipe zone shall conform to the following specifications:
 - a) Class 'A' Pipe Bedding is where the pipe is bedded in a continuous monolithic cradle of concrete as per the design drawings.
 - b) Class 'B' Pipe Bedding shall be imported sand or crush gravel meeting the gradation in Table 3-3.
 - c) Class 'C' Pipe Bedding is native material sourced onsite, which meets the gradation for Class 'B' Pipe Bedding sand.

Table 3-3 Class 'B' Pipe Bedding Gradation Limits

Sieve Designation	Percent By Weight Passing	
	Sand	Crushed Gravel
19.0 mm	100	90 – 100
12.5 mm	100	65 – 85
4.75 mm	35 - 100	25 – 50
2.36 mm	20 - 70	10 – 35
1.18 mm	13 - 50	6 – 26
0.60 mm	8 - 35	3 – 17
0.30 mm	5 - 25	--
0.15 mm	2 - 15	--
0.075 mm	0 - 6	0 – 5

3. EXECUTION

3.1. Alignment and Grade

3.1.1. All pipes shall be laid to the design lines and grades within the following tolerances:

- a) Horizontal tolerance of plus or minus 50 mm from specified alignment.
- b) Vertical tolerance of plus or minus 25 mm from specified grade.

3.2. Granular Bedding and Backfill in Pipe Zone

3.2.1. The pipe zone is considered as being the depth of trench between the trench bottom and a level 300 mm above the top of the pipe.

3.2.2. The pipe zone backfill shall be hand placed and compacted to a density of 95% Standard Proctor Density in layers not exceeding 150 mm using hand tampers.

3.3. Tie-ins to Existing Watermains

3.3.1. Connection of a new pipe to an existing watermain shall be undertaken under the supervision of the Town. Only Town staff may operate valves and curb stops on the existing watermains. A minimum of 72 hours' notice to construct a tie-in is to be provided to the Town.

3.4. Materials Testing

3.4.1. Material quality and compaction testing shall be conducted on aggregates, bedding sand and trench backfill and shall include, but not be limited to, density analysis of utility pipe zone and trench zone backfill to confirm compliance with these standards. The frequency of tests shall be as described in SECTION 2 - Roadways and Walkways, Item 3.10.

3.5. Leakage Tests

3.5.1. Following final trench backfilling, leakage tests shall be performed on all installed piping according to the latest editions AWWA Standards.

3.5.2. The Director is to be provided a minimum of 48 hours' notice of a leakage test. The test is to be undertaken under the supervision of the developer's engineer and may be witnessed by a staff member of the Town.

- 3.5.3. The section to be tested shall be filled with water and all air expelled from the piping for at least 24 hours prior to testing. By pumping water into the test section, the pressure within the piping shall be increased to the pressure rating of the main or at least 1 1/2 times the operating pressure at the point of testing, whichever is greater. This pressure shall be maintained constantly in the pipe within ± 35 kPa (5 psi) throughout the duration of the test, by the addition of make-up water. The duration of the test shall be a minimum of 2 hours. Hydrant leads shall be open at the hydrant such that the hydrant is placed under test. The quantity of water pumped into the test section to maintain the specified pressure over the period of the test shall be considered to be the leakage. Water mains will not be accepted until the leakage is less than the maximum allowable leakage determined from the following formula:

$$L = \frac{NDP^{1/2}}{262,000} \text{ where;}$$

L =the allowable leakage (L/hr)

N=the number of joints in the test section

D=the nominal diameter of the pipe (mm)

P=the average test pressure during the leakage test (kPa)

- 3.5.4. Should any test result be leakage greater than that specified above, the source of the leakage shall be located and the defect repaired or replaced and the section retested until a satisfactory test is obtained.

3.6. Flushing

- 3.6.1. The pipe is to be flushed clean of dirt and other foreign materials. Water for flushing will be made available by the Town through an appropriate backflow prevention device.

3.7. Disinfection

- 3.7.1. On completion of the flushing operation, distribution mains and services shall be disinfected by chlorination. Chlorination procedures shall conform to AWWA C601, latest edition. No pills, powders or solids shall be placed in the main during installation or for chlorination purposes. Chlorination shall be applied by the continuous feed method.

- 3.7.2. After flushing, the chlorine solution shall be injected at a measured rate such as to fill the main with a 50 mg/L available free chlorine concentration.
- 3.7.3. All appurtenances shall be operated in this solution to disinfect them. Appropriate measures shall be provided to prevent the disinfectant solution from flowing into existing water supply system. The disinfecting solution shall remain in the main for 24 hours and shall have a free chlorine residual of not less than 25 mg/L at the end of the 24 hour period.
- 3.7.4. After completion of chlorination, chlorinated water is to be flushed from the system until the chlorine concentration in the remaining water as measured at the flush point, is less than 0.3 mg/L free chlorine residual.
- 3.7.5. Two consecutive bacteriological samples taken 24 hours apart are required to be submitted to an accredited laboratory for total and fecal coliform analysis. The applicant's engineer will assess the bacteriological test results and advise the Director of pass or fail. Failure of the bacteriological tests will require the water main to be flushed and re-chlorinated prior to bacteriological retesting.
- 3.7.6. On notification to the Director of satisfactory bacteriological test results, tie-ins to the existing water mains may proceed.
- 3.7.7. A log of all test results, disinfection procedures, and bacteriological test results is to be included in the completion document package.

SECTION 4 - SANITARY SEWERS

1. DESIGN CRITERIA

1.1. Contributing Population

1.1.1. Sanitary sewers shall be designed to convey the peak sewage flow from the fully developed population of the upstream contributing area.

1.1.2. Sewage flows shall be calculated on the basis of population equivalents derived from Table 4-1.

Table 4-1 Population Equivalents

Land Use	Population Density
Detached, duplex or multi residential w/ 3 or more bedrooms	2.5 people/unit
Multi Residential w/ 2 or fewer bedrooms	2.0 people/unit
General/Town Commercial	90 people/hectare
Institutional	50 people/hectare
Industrial	50 people/hectare

1.1.3. For land uses not included in Table 4-1, a residential unit equivalency calculation or other design flow derivation methodology will require approval of the Director.

1.2. Design Sewage Flows

1.2.1. A design average sewage flow of 350 Litres/capita per day shall be used.

1.2.2. A peaking factor calculated using the Harmon Formula shall be applied to the average flow as follows:

$$\text{Peak Factor} = 1 + \frac{14}{4 + P^{1/2}}$$

where P is the equivalent population in thousands. The peak factor shall not be less than 2.5.

1.2.3. The design sewage flow will include an allowance for infiltration (I and I). An infiltration rate of 5000 litres per hectare per day is to be used. Where the groundwater table elevation is in the pipe zone, an infiltration allowance of 8000 litres per day per hectare is to be used.

1.3. Gravity Sewer

1.3.1. Pipe sizes shall be selected so that sewers flow 2/3 full for 250 mm diameter and smaller, or 3/4 full for pipes greater than 250 mm diameter, at peak design flow.

1.3.2. The size of gravity sewers shall be determined by the Manning's formula:

$$Q = \frac{AR^{0.667}S^{0.5}}{n}$$

Where: Q=flow capacity (m³/sec)
 A=cross sectional area (m²)
 R=hydraulic radius (m)
 S=slope m/m
 n=roughness coefficient;
 0.11 for PVC pipe and 0.013 for concrete pipe

1.4. Minimum Velocity and Grades

1.4.1. Using the Manning's formula, minimum grades to provide a minimum velocity of 0.60m/sec are summarized in Table 4-2.

Table 4-2 Pipe Sizes and Minimum Grades

Pipe Dia.	Min. Grade
100 mm	2.00%
150 mm	1.00%
200 mm	0.5%
250 mm	0.3%
300 mm	0.3%
375 mm	0.23%
450 mm	0.18%

1.4.2. In terminal segments of a gravity sewer lateral, the minimum grade from Table 4-2 shall be doubled.

1.5. Minimum Pipe Size

1.5.1. Gravity sewers shall be at least 200 mm diameter. Terminal segments where future extension is not practical, gravity sewers may be reduced to 150mm diameter.

1.6. Alignment of Sanitary Sewer Mains

- 1.6.1. Sewer mains shall generally be designed to follow a straight alignment between manholes. Curved alignments within a road right-of-way are approvable provided the pipe grade is at least 50% greater than the specified minimum in Table 4-2 and the pipe alignment is parallel to the road centreline. In these cases, the radius of curvature shall be not less than 60 m, or twice the minimum radius recommended by the pipe manufacturer, whichever is the greater.

1.7. Design Depths and Minimum Cover

- 1.7.1. Gravity sewers are designed to provide gravity service to basement grades of all residential units or lots. Where gravity service to basement elevations is not feasible, Director's approval of alternative criteria is required.
- 1.7.2. A minimum of 1.2m of cover is to be provided over gravity sewers and service connections.

1.8. Manholes

- 1.8.1. Manholes shall be installed at a maximum spacing of 100 m and at the following locations:
 - a) End of each line;
 - b) All changes in grade except as permitted for curved sewers;
 - c) At all changes in alignment, except as permitted for curved sewers;
 - d) At the beginning and end of pipe curvature for curvilinear sewers;
 - e) All changes in pipe size;
 - f) All pipe junctions except for 100 mm service connections;
 - g) Where future connections are proposed.
- 1.8.2. The sanitary manhole rim elevation in off road areas shall be designed to be above the surrounding ground so that infiltration from ponding will not occur.
- 1.8.3. The crown of the incoming pipe is to be at the same elevation as the crown of the outgoing pipe where a change in pipe diameter occurs through a manhole.
- 1.8.4. The hydraulic drop through a manhole shall be:
 - a) no less than a 25 mm drop where the inlet is at 180 degrees to the outlet pipe;
 - b) no less than 50 mm for all other conditions.

- 1.8.5. An internal or external drop shall be installed where the elevation of the inlet invert is 600 mm, or greater, above the invert elevation of the centre of the manhole channel.

1.9. Service Connections

1.9.1. Sanitary sewer services shall:

- a) Be installed to the property line in accordance with the Standard Drawings;
- b) Have an inspection chamber installed 300 mm outside the property line;
- c) Have a minimum 2.0% pipe grade for a 100 mm service and 1.0% for a 150 mm service;
- d) Be installed 3.0 m from the lowest (elevation) lot corner;
- e) Connect to the gravity sewer main above spring line.
- f) Sanitary services shall not be installed under driveways unless protected.
- g) No trees are to be planted within 3 meters of a Sewer Cleanout.

- 1.9.2. Generally lots will be permitted only one connection unless site conditions warrant additional connections or where a single service is not practical. Separate service connections shall be installed for each dwelling unit of a duplex, townhouse or row house developments for individual ownership.

- 1.9.3. A service connection entering a manhole shall have its invert elevation at the crown of the highest main entering the manhole. The service connection shall discharge in the same direction as the benched flow in the sanitary sewer main.

1.10. Forcemains

- 1.10.1. Forcemains shall be designed to have a minimum velocity of 0.75m/sec. Forcemains shall have a minimum grade of 0.50% and designed to minimize high points.

- 1.10.2. Forcemains shall be designed on the basis of a Hazen-Williams “C Factor” value of 120 for PVC pipe.

- 1.10.3. An automatic air relief and vacuum valve, suitable for sewage service and enclosed in an insulated manhole, shall be placed at high points in the force main and at other locations as required to prevent “air locking”.

1.10.4. A manhole into which a forcemain is designed to discharge shall be of PVC construction to minimize corrosion related deterioration.

1.11. Sanitary Sewer Lift Stations

1.11.1. The objective of the Town is to minimize the number of Town operated and maintained sewage lift stations. Comprehensive assessments of options not involving lift stations are required to demonstrate that a lift station is the only practical option to provide sanitary sewer service to the proposed development.

1.11.2. The Town will proceed with the detailed design of all required lift station(s) at the applicant's expense upon review of the assessment of options and acceptance that a lift station is the only practical servicing option.

2. MATERIALS

2.1. Pipe and Fittings

2.1.1. Gravity sewer and service pipe shall be polyvinyl chloride (PVC), coloured green and having a DR value of 35 or less. Sanitary sewer pipe and fitting joints shall be jointed with a rubber gasket or other preformed, factory-manufactured gasket or an approved equivalent material.

2.1.2. Sanitary forcemain pipe may be:

- a) Standard Cement Mortar lined ductile iron pipe. Ductile Iron pipe joints shall be rubber gasket for push-on bell and spigot type joints and/or mechanical pipe joints or approved equal.
- b) Polyvinyl Chloride (PVC) pressure pipe conforming to AWWA Standard C900 and having a DR value of 25 or less. PVC pipe shall have a ductile iron pipe outside diameter for compatibility with push on Tyton fittings.
- c) High Density Polyethylene (HDPE) pipe with a DR value determined by using a design pressure not less than 150% of the maximum forcemain operating pressure. HDPE forcemain will be ductile iron pipe size and fuse jointed.

2.2. Manholes

- 2.2.1. Sanitary sewer manholes shall be precast concrete manhole sections, having a minimum inside diameter 1050 mm. Precast concrete lids shall have a minimum 760 mm opening
- 2.2.2. Precast concrete lids, adjusting rings, and concrete spacer rings (grade rings) shall be designed for H-20 loading.
- 2.2.3. Concrete for precast manhole bases, barrel and lids shall have a minimum compressive strength of 25 MPa at 28 days and be sulfate resistant, i.e. Type 50 cement or equivalent.
- 2.2.4. Manhole rungs shall be 20 mm diameter steel, hot dipped galvanized after bending, or an approved aluminium alternate, at 300 mm on centre, cast into the wall of the manhole section, or where specified, set in 30 mm diameter holes filled with epoxy cement.
- 2.2.5. Precast manhole base liners shall be one piece consisting of unlayered and homogeneous fibreglass reinforced plastic with full flow channels with side walls to the crown of the pipe, watertight gasket bells graded and aligned to comply with design. The inner surface of liner benching shall have an anti-skid surface and the outer surface of liner shall be sand coated and is to have sufficient steel spirals bonded to the fibreglass reinforced plastic to assure a continuous physical connection to the concrete base.

2.3. Manhole Frames and Covers

- 2.3.1. Covers and frames shall be cast iron having a minimum 610 mm clear opening and designed for H-20 loading. The cover shall have a weight of 50 kg and the frame shall be of the round base pattern having a weight of 80 kg. Bearing faces of the cover to frame shall be machined for a non-rocking fit. The cover shall have 2 - 25 mm diameter lifting holes. The lid shall be embossed with "Sanitary Sewer".

3. EXECUTION

3.1. Pipe Installation

3.1.1. All pipes must be laid to the design lines and grades within the following tolerances:

- a) Horizontal deviation from the approved alignment shall not exceed 10 mm and the rate of deviation shall not exceed 40 mm in 10 m; and,
- b) Vertical deviation from design grade varies with the grade and shall not exceed the values shown in Table 4-3.

Table 4-3 Sanitary Sewer Main Vertical Tolerance Limits

Grade	Max. Departure From Design Elevation	Max. Rate of Deviation
Over 5%	30 mm	20 mm in 10 m
2% to 5%	15 mm	10 mm in 10 m
Less than 2%	6 mm	10 mm in 10 m*

3.2. Manholes

3.2.1. Pre-cast manhole bases shall be pre-benched. Manhole joints shall be made watertight using joint gaskets. Precast riser sections to be set plumb with joints and gaskets. Internal parging is required for all joints.

3.3. Service Connections

3.3.1. Service connections shall be capped, and tested with the mains.

3.3.2. A 50 x 100 mm marker stake shall be set with the bottom flush with the invert of the end of the service connection and against the cap and with the top projecting a minimum of 1 m above the ground surface. Marker stakes shall be painted "red", and the depth from top of stake to the invert of pipe shall be clearly marked on the stake with a contrasting colour stencilled letters and numbers.

3.4. Cleaning and Flushing

3.4.1. Prior to testing, the sanitary sewer pipe shall be cleaned by flushing, or by the use of mechanical equipment as necessary to remove all foreign material from the pipe.

- 3.4.2. Under no circumstances will flush water or any foreign material enter “in service” components of the Town’s sanitary sewer system.

3.5. Leakage Tests of Gravity Sewers

- 3.5.1. Gravity sewers shall be tested by a low pressure air test. The test pressure will be in the range of 17.3 kPa (2.5 psi) to 24.2 kPa (3.5 psi) except where the sanitary sewer main being tested is below the groundwater table. Where the sanitary sewer is below the groundwater table the test pressure is increased by the maximum height of the water table measured to the pipe centre line and expressed as kPa (psi) units.
- 3.5.2. The section of pipeline under test shall be gradually pressurized to 27.6 kPa (4 psi). Time will be allowed for the air temperature to stabilize (not less than 5 minutes).
- 3.5.3. The air test time is measured for the pressure drop 6.9 kPa (1 psi) from 24.2 kPa (3.5 psi) to 17.3 kPa (2.5 psi.) If the time measured equals or exceeds the specified time from Table 4-4, the test is considered satisfactory.
- 3.5.4. If the time measured does not equal or exceed the specified time from Table 4-4, the test fails. The sewer main is repaired and re-tested.

Table 4-4 Air Test Times

Pipe Diameter (mm)	Time
100	2 min. 32 sec.
150	3 min. 50 sec.
200	5 min. 06 sec.
250	6 min. 22 sec.
300	7 min. 39 sec.
375	9 min. 35 sec.
450	11 min. 34 sec.

3.6. Forcemain Testing

- 3.6.1. Forcemains shall be tested at 1.5 times the maximum operating pressure in the test section. The maximum allowable leakage is as per SECTION 3 - Water Systems, 3.5.

3.7. Video Inspection

- 3.7.1. Prior to paving, a video inspection of all gravity sewers is to be undertaken. The picture shall be a continuous 500 line resolution showing the full circumference of the pipe.
- 3.7.2. Video inspections will be undertaken between manholes with a written report in log form providing:
- (a) deficiencies including open joints, cracks, oval pipes, and debris.
 - (b) areas of ponding with measurements of length in meters and depth in millimeters.
 - (c) all service connections.

Photographs will be provided of all items referenced in the inspection log.

3.8. Acceptable Ponding

- 3.8.1. Acceptable ponding in gravity sewers as measured by the video inspection is summarized in Table 4-5. Ponding in excess of acceptable values presented in Table 4-5 is to be addressed by sewer main repairs. The success of the repairs is to be confirmed by re-video inspection.

Table 4-5 Acceptable Ponding in Gravity Sewers

Main Size (mm dia.)	Maximum Acceptable Ponding (measured over 5m length)
100 to 200 mm	10 mm
250 to 300 mm	15 mm
greater than 300 mm	20 mm

SECTION 5 – STORMWATER MANAGEMENT

1. GENERAL

1.1. Design Philosophy

1.1.1. The “conventional approach” to stormwater management comprising pipes sized for peak flows discharging to some form of natural watercourse is not acceptable except where soil or other site conditions represent a constraint to onsite stormwater management strategies. Guiding principles to the Town’s design approaches to stormwater management are:

- a) Stormwater is a resource;
- b) Design should consider the full spectrum of rainfall events as described in the Stormwater Planning Guidebook of 2002 (the Guidebook);
- c) To the greatest extent practical, stormwater infiltration infrastructure shall not be concentrated in one location on a site recognizing that predevelopment rainfall infiltrated over the complete site;
- d) Conventional stormwater infrastructure comprising piped systems should be designed to minimize risks of property damage by runoff from an extreme rainfall event; and,
- e) Stormwater discharges to natural drainage cannot result in increased erosion. Sediments as a result of erosion represent the most significant potential adverse impact on receiving watercourses in the Town.

1.2. Onsite Stormwater Management Detention and Infiltration

1.2.1. Except where soil conditions are not suitable and/or where stormwater infiltration may contribute to instability, stormwater infrastructure shall be designed to:

- a) Collect, store and infiltrate to groundwater stormwater resulting from a rainfall event having a return frequency of up to 5 years for single family residential areas; or,
- b) Infiltrate runoff from storms having a return frequency of up to 10 years for all other land use categories. This infiltration infrastructure will be owned, operated and maintained by the “property owner”. Acceptable stormwater infiltration infrastructure includes:

- drywells
- rain tank infiltration systems
- perforated storm drainage
- pervious surfaces, i.e. pervious asphalt and grass crete
- rain gardens
- perforated storm sewers
- storage for reuse by irrigation

1.3. Soil Condition Constrained Onsite Stormwater Management Detention and Infiltration

1.3.1. Where soil conditions and/or stability as described in an assessment report prepared by a geotechnical engineer restrict stormwater infiltration rates, the following restricted onsite infiltration system capacity design criteria is applicable. The Guidebook describes stormwater management strategies for the complete spectrum of rainfall events. Fundamental to defining tiers of rainfall events is the Mean Annual Rainfall (MAR) which is defined as the maximum rainfall event that occurs once per year on average. Consistent with methodologies described in the Guidebook, the MAR for Oliver has been determined to be 24 mm per day. Consistent with the Guidebook, stormwater design criteria applicable to developments where stormwater infiltration capacity is constrained by geotechnical criteria are presented as follows;

- a) For rainfall events up to but less than 50% of a MAR (Tier A Event in the Guidebook), stormwater management works shall be provided to infiltrate, evapotranspire and/or reuse runoff with the objective being that there will be no “piped to discharge” stormwater from a Tier A Event;
- b) For rainfall events greater than or equal to 50% of a MAR but less than a MAR (Tier B Event in the Guidebook), runoff control comprising detention facilities shall be provided to store runoff for subsequent release to infiltrative works provided for a Tier A event; and,
- c) For rainfall events that equal or exceed a MAR, conventional piped systems for stormwater collection and conveyance to discharge shall be provided. Piped systems shall be designed for runoff anticipated to arise from a short duration rainfall event having a return period of 10 years. Overland flood routes shall be identified to convey stormwater from a short duration rainfall event having a return period of 100 years (refer to Standard Drawings) representing a threat to public safety or property damage.

1.4. Design Where Onsite Infiltration is not Feasible due to Soil Conditions or Slope Stability

1.4.1. Where a site assessment prepared by a geotechnical engineer concludes that stormwater infiltration is not feasible for slope stability and/or soil characteristic criteria, stormwater management infrastructure shall be provided utilizing “conventional piped” systems. Generally, the storm drainage system shall comprise two components, the minor and major systems. The minor system will consist of an underground piped system designed to collect and discharge a 10 year return period flow for all types of residential, industrial, commercial, and institutional. The major system will consist of surface flood routes, roadways, roadway culverts, swales, watercourses and storm water management facilities designed to convey the 100 year return period flow. In special conditions where surface flood paths cannot be established, pipe systems for the minor system may be enlarged to accommodate the major system flow.

1.4.2. Where onsite infiltration is not feasible and a piped system is proposed, stormwater treatment works shall be provided sized for fifty percent (50%) of the runoff from a short duration rainfall event having a return period of 2 years. Stormwater treatment systems shall comprise “best management practices” as described in the Stormwater Planning Guidebooks and designed to remove suspended solids, floatables and/or hydrocarbons.

1.5. Environmental Protection

1.5.1. Subdivisions and developments shall comply with applicable provincial and federal standards and regulations including:

- a) Riparian Area Regulations;
- b) Land Development Guidelines for Protection of Aquatic Habitat.

1.5.2. No natural drainage course shall be deterred or diverted without the approval of the Ministry of the Environment. No new stormwater outfalls to natural watercourses will be accepted without the approval from federal and provincial agencies having jurisdiction.

1.6. Stormwater Management Plan

1.6.1. A Stormwater Management Plan is required for all developments comprising a subdivision or sites having an area greater than 0.2 ha (0.5 acre). The stormwater management plan shall include the following.

- a) Description of existing site conditions and proposed development;
- b) Description of existing drainage patterns and stormwater infrastructure including:
 - catchment areas including any upstream lands;
 - alignments and locations of drainage works, surface watercourses and wetlands with environmental classification;
 - surface water flow paths;
 - stormwater infrastructure including pipes, manholes, outfalls, etc.
- c) Description of proposed stormwater management plan including:
 - contours (not greater than 1.0 m intervals);
 - proposed stormwater infrastructure including retention facilities, infiltration systems, pipe systems and appurtenances, treatment systems, stormwater discharges and locations, open ditches;
 - overland flood routes;
 - pre and post development flows;
 - mitigation measures as may be warranted related to natural drainage courses;
 - erosion and sediment control plan.

1.7. Erosion and Sediment Control Plan

1.7.1. An erosion and sediment control plan is required having the purpose of preventing the release of silt, sand, concrete or any other deleterious substances to a drainage system including but not limited to ditches, storm sewers, watercourses and ravines. The works as described in the erosion and sediment control plan shall be functional and remain in place for the course of construction and to the end of the maintenance period at which point work will be accepted by the Town. All erosion and sediment control works shall be designed and located to allow for convenient operation and maintenance.

1.8. Major Floods and Overland Flood Routing

1.8.1. Major floods generally resulting from a rainfall event having a return frequency greater than a 10 year event and representing a stormwater flow in excess of $0.05 \text{ m}^3/\text{sec}$ shall be designed as follows:

- a) Overland flood routes for major runoff events are normally provided in the road cross section and in natural drainage courses. Other acceptable routing of major floods include grassed or riprapped swales located parallel to a dedicated road within the right-of-way or within a public pathway;
- b) Where a road is designed as the overland flood route, the maximum depth of stormwater is 200 mm. The hydraulic grade line of the major flood within a road section shall be at least 300 mm lower than the designated minimum building floor elevation on adjacent properties;
- c) Intersection designs should recognize the major flood route function of the road and be designed to safely pass the major flood flow;
- d) The piped system designed for the minor runoff event may be oversized to accommodate major flows. A design submission detailing capacity calculations for the oversized minor system shall be submitted to the Director for approval;
- e) Flooding of private property is not acceptable except in specifically design flood passage works in statutory right-of-way in favour of the Town;
- f) Overland flood routes for major storm events are required for all sag points in a road and for all down slope cul-de-sacs.

1.8.2. Overland flood routes complete with calculations of runoff anticipated to result from a 100 year rainfall event shall be detailed on the development design drawings and stormwater management plan.

2. DESIGN CRITERIA

2.1. Runoff Analysis

2.1.1. Stormwater management infrastructure shall be designed to accommodate post development stormwater using an approved hydrologic/hydraulic model or the Rational Method. For development where the contributing area is 10 ha or less, the Rational Method may be used to complete peak runoff. Stormwater management programs shall be used for analysing larger catchments and for the design of storage facilities.

2.2. Stormwater Modelling

2.2.1. The selection and appropriate application of modelling software is a decision of the Professional Engineer. Justification for the selected software shall be submitted to the Director for approval. Generally, computer models shall have the capability to:

- a) Generate hydrographs;
- b) Route hydrographs through a network of pipes, open channels and storage works providing volumes and hydraulic grade lines; and,
- c) Simulate both minor and major runoff events and illustrate interrelationships.

2.2.2. To document the design rationale used to develop the hydrologic model and to standardize the presentation of model results, the design reports shall include an appropriate section which shall indicate the following:

- a) Type and version of computer model used;
- b) Summary of all parameters and specific simulation assumptions used;
- c) Design storms used, to be clearly documented and plotted;
- d) A summary of peak flows for each system component;
- e) Inflow and outflow hydrographs for storage facilities;
- f) Predicted hydraulic grade lines throughout drainage system under conditions governing the design;
- g) Volumetric runoff coefficient and unit peak flow (peak flow divided by area) summarized for each catchment.

2.2.3. The report documentation shall include:

- a) A plan showing sub-catchment areas, watershed boundary (including upstream catchments) and the drainage system;
- b) A plan identifying the specific land uses modelled for each development condition analysed;
- c) Stage-area and storage-discharge curves for detention ponds and the layout (including sizing) of pond control devices;
- d) The functional layout and sizing of any flow control/diversion structure and the tabular/graphical plots of inflow and outflow hydrographs;
- e) Tables summarizing the above described performance related parameters.

2.3. Rational Method

2.3.1. Peak stormwater flows from drainage areas of 10 ha or less may be derived by the Rational Method described as follows:

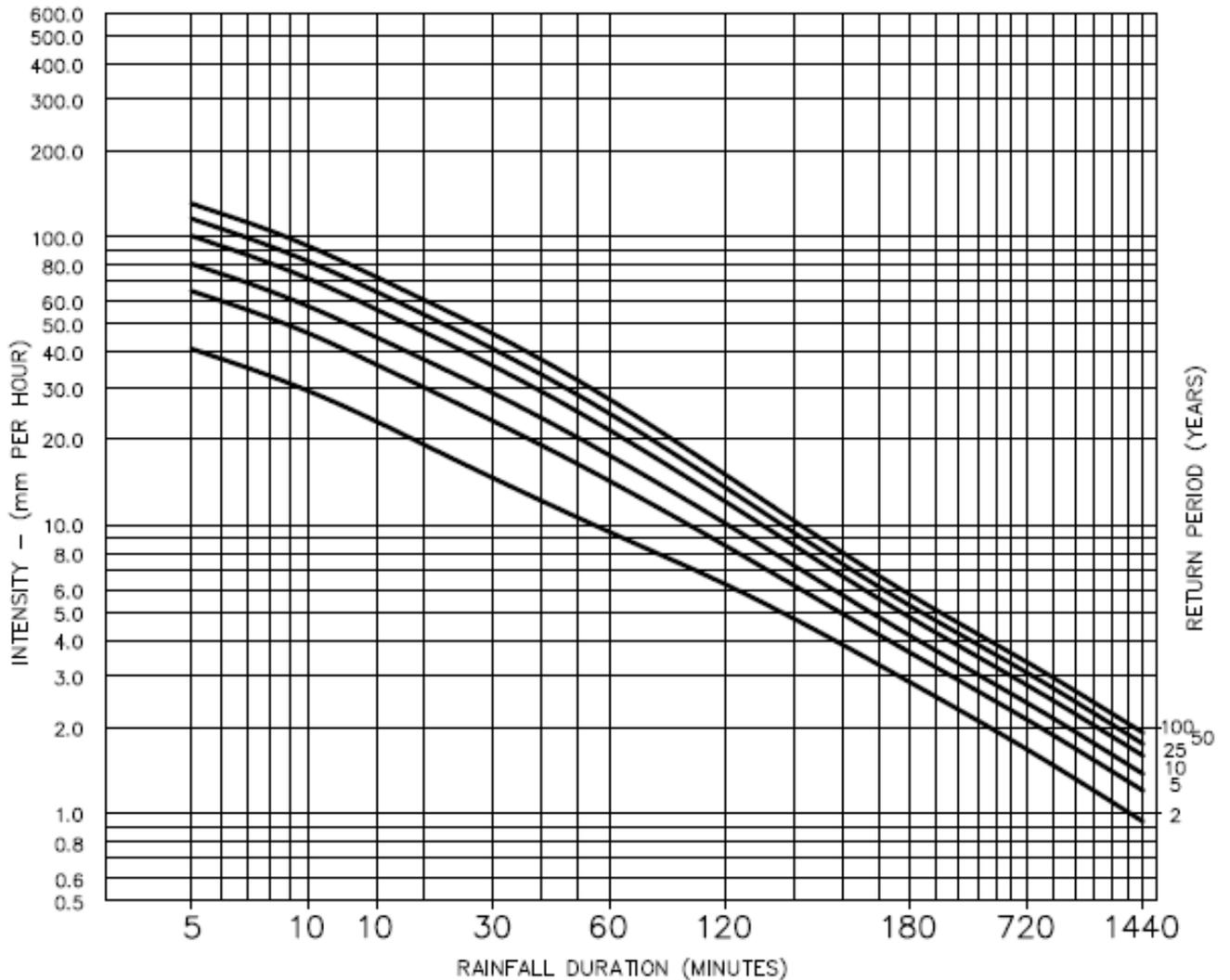
$$Q = KCIA,$$

Where:

Q	=	Flow in m ³ /s;
K	=	Constant to establish units of compatibility (.00278);
C	=	Dimensionless runoff coefficient;
I	=	Rainfall intensity in mm/ hr; and
A	=	Runoff area in hectares.

2.3.2. The value of the design rainfall intensity (I) for the Rational Formula is selected from the appropriate Intensity Duration Frequency (IDF) curve contained in Figure 5.1, with a duration chosen to coincide with the Time of Concentration (T_c).

Figure 5.1 Rainfall Intensity, Duration, Frequency Design Curves



BASED ON RECORDING RAIN GAUGE DATA FOR THE PERIOD OF 1953 TO 2002
(45 YEARS) – PENTICTON AIRPORT

LATITUDE 49° 28'N, LONGITUDE 119° 36'W, ELEVATION 344m

2.3.3. The time of concentration is the time required for runoff from the farthest point within the drainage basin to reach the design reference point. The time of concentration comprises two components as per the following formula:

$$T_c = T_i + T_t$$

Where: T_c = Time of concentration in minutes;
 T_i = Inlet or overland flow time in minutes;
 T_t = Travel time in sewers, ditches or other overland flow systems in minutes,

2.3.4. Minimum values for several development types are summarized in Table 5-1.

Table 5-1 Minimum Inlet Time

Land Use	10 Year Return Frequency (minutes)	100 Year Return Frequency (minutes)
Single Family	15	10
Multi Family	10	5
Commercial/Industrial/ Institutional	5	5

2.3.5. Where the travel distance measured from the farthest point within the drainage area to the design reference point exceeds 300 m, the inlet time may be calculated however the result cannot be less than values presented in the preceding table.

2.3.6. The travel time in the drainage system (T_t) may be calculated using open channel or pipe flow equations for the selected pipe, channel or other conveyance system. Calculations shall be provided for inlet time (T_i) and travel time (T_t) used for design purposes.

2.3.7. Runoff coefficients for storm sewer design using the Rational Method shall not be less than the values specified in Table 5- where impervious surface reduction is not a development site planning objective. Runoff resulting from an extreme rainfall event, i.e. 100 year return period will be greater than a rainfall event having a lower return period. Accordingly, Table 5- provides a separate set of runoff coefficients for use with storms having a return period of up to a 25 year return period event.

2.3.8. Where the Rational Method is being applied to mixed land use within a drainage area, a weighted average 'C' value should be used and can be calculated from the following formula:

$$C_{avg} = \frac{\sum A_i C_i}{\sum A}$$

Where; A_i = Area with the same type of land use correlated to C_i in hectares;
 C_i = Dimensionless runoff coefficient; and
 A = Sum of all areas in hectares.

2.3.9. The Town encourages design methodologies having the objective of reducing impervious surfaces and providing retention to reduce peak flows. In these instances, alternative runoff coefficients from values presented in Table 5-2 may be acceptable with appropriate technical support documentation.

Table 5-2 Runoff Coefficients

Description of Area	≤ 25 Year Event	100 Year Event
Agricultural	0.1	0.15
Roofs or Pavement	0.95	1.00
Natural Grass	0.1	0.15
Commercial – Neighbourhood	0.60	0.65
Commercial – Downtown	0.80	0.85
Industrial – Light	0.65	0.70
Industrial – Heavy	0.75	0.80
Single Family resident	0.40	0.45
Multi Family Low Density Residential	0.60	0.65
Apartment Residential	0.70	0.75
Institutional	0.70	0.75
Parks	0.15	0.20

2.4. Capacity Assessment of Pipes and Channels

2.4.1. The capacity of pipes and channels under gravity flow conditions shall be determined by the Manning's formula. Roughness coefficients for use in the Manning's formula are presented in Table 5-3.

Table 5-3 Manning's Formula Roughness Coefficients

Pipe or Channel Material	Roughness Coefficient
Concrete Pipe	0.013
PVC Pipe	0.011
Corrugated Metal Pipe	0.024 - 0.033
Smooth Asphalt	0.012
Asphalt or Concrete Paving	0.014
Packed Clay	0.030
Light Turf	0.200
Dense Turf	0.350
Dense Shrubbery	0.400

2.4.2. A minimum velocity of 0.60 m/sec is to be provided in all storm sewer mains at the design flow using the Manning's formula. Storm sewers 450 mm and smaller in diameter shall be sized for the required design capacity flowing 3/4 full or less. Storm sewers 525 mm and larger in diameter may be sized for the design capacity under full flow conditions.

2.4.3. There are no maximum allowable velocities or grades. Erosion, abrasion, anchorage and energy dissipation are design factors to be considered when pipe velocities exceed 4 m/ sec.

2.5. Minimum Pipe Diameters

2.5.1. Minimum pipe diameters for components of a piped storm drainage system are per Table 5-4.

Table 5-4 Minimum Drainage Pipe Diameters

Component	Minimum Pipe Diameter
Storm Sewers Main	250 mm
Culverts	450 mm for crossing roads 300 mm for crossing driveways
Catch Basin Leads	200 mm for single catch basin 250 mm for double catch basin
Service Connections	100 mm for residential 150 mm for commercial/industrial

2.5.2. Where a storm sewer accepts runoff through an inlet structure in an open ditch, the minimum storm sewer size is 300 mm. Generally, storm sewers shall not decrease in size downstream of the inlet point.

2.6. Alignment of Storm Sewer Mains

2.6.1. Refer to 1.6 of SECTION 4 - Sanitary Sewers.

2.7. Depth of Cover

2.7.1. The minimum depth of cover provided over storm sewers and services within a road cross section as shown in the Standard Drawings. Within statutory rights of way where no storm water services are proposed, the minimum cover shall be 0.60m.

2.8. Manholes

2.8.1. Manholes shall be installed at a maximum spacing of 120 m and in the following locations:

- a) Upstream ends of storm sewer mains;
- b) All changes in grade;
- c) All changes in alignment, except as permitted for curved storm sewers;
- d) At the beginning and end of pipe curvature for curvilinear storm sewers;
- e) All changes in pipe size;
- f) All pipe junctions except for 100 mm and 150 mm service connections;
- g) Where future connections are proposed; and,
- h) Every catch basin lead connection.

2.9. Manhole Hydraulics

2.9.1. Crown elevations of inlet sewers shall not be lower than the crown elevation of outlet sewers. The minimum drop in invert elevations across manholes are as follows:

- a) Straight run: 10 mm drop;
- b) Deflections up to 45 degrees: 30 mm drop; and,
- c) Deflections 45 to 90 degrees: 50 mm drop.

2.9.2. Internal and exterior drop structures at manholes are not acceptable. Invert differences in elevation within a manhole of up to 0.45 m are acceptable. Steepening of inlet grades and/or vertical curves in inlets to storm manholes if the grade of the storm sewer is increasing through the vertical curve ending at a manhole, are options to provide invert elevation differences not exceeding 0.45m.

2.10. Drainage Drywells

2.10.1. Where drainage drywells are proposed as stormwater infiltration infrastructure, the required drainage drywell wall surface areas shall be determined using Darcy's Empirical Law as follows:

$$Q = A K i$$

Where:

Q = Design flow in m³/s;

A = Cross-sectional area of soil through which flow takes place in m²;

K = Coefficient of permeability of receiving soils in m/s;

i = Hydraulic gradient within proximity to the drywell.

2.10.2. Typical values for the Coefficient of Permeability, K, are presented in Table 5-2.

Table 5-2 Typical Values for Coefficient of Permeability

Typical Soil	Relative Permeability	Typical Value of K, m/s
Coarse Gravel	High Permeability	over 10 ⁻³
Sand, Fine Sand	Medium Permeability	10 ⁻³ to 10 ⁻⁵
Silty Sand, Dirty Sand	Low Permeability	10 ⁻⁵ to 10 ⁻⁷
Silt	Very Low Permeability	10 ⁻⁷ to 10 ⁻⁹
Clay	Practically Impervious	Less Than 10 ⁻⁹

2.10.3. Upon determination of the required drywell surface area using Darcy's Law, a safety factor of 2 shall be applied.

2.10.4. Drainage drywells shall, unless otherwise approved by the Director, be located in the road boulevard or within other lands dedicated to the Town for the purpose of drainage disposal.

2.10.5. The depth of the drywell will vary in accordance with the design flow and soil characteristics. Drainage drywells shall be constructed as shown on the applicable Standard Drawings.

2.11. Catch Basins

2.11.1. Catch basins shall be constructed as shown on the applicable Standard Drawings. Double catch basins with curb inlets shall be provided at all sag points.

2.11.2. Catch basins shall be located at a maximum spacing of 75 m along the drainage path, at all intersections in such a manner to minimize interference with crosswalks and, where possible, shall be located upstream of crosswalks. Catch basins shall not be installed in wheelchair ramps, crosswalks or driveways. Also, catch basins shall be located at all low points or spaced at intervals such that not more than 10% of the gutter flow reaching each inlet will pass on to the next inlet downstream.

2.11.3. Catch basin spacing is to provide sufficient inlet capacity to intercept the design stormwater flow. The capacity of a single catch basin (in sump conditions) can be calculated using the orifice formula:

$$Q = kCA\sqrt{2gh}$$

Where:

Q	=	Inlet capacity in m ³ /s;
k	=	Clogging factor (0.60);
C	=	Orifice coefficient (0.80);
A	=	Open area (0.68 m ² for Dobney B-23 grate);
g	=	Gravitational acceleration (9.81 m/s ²); and,
h	=	Depth of ponding in metres.

2.11.4. Lawn basins are required on boulevards and private properties where necessary to prevent ponding or flooding of sidewalks, boulevards, driveways, buildings and private properties.

2.12. Catch Basin Leads

2.12.1. The minimum diameter of catch basin leads shall be as per Table 5-. Additional requirements related to catch basin leads are:

- a) Minimum grade shall be 2%;
- b) For PVC catch basin leads, the minimum cover shall be 0.90m within a roadway;
- c) In all cases, the minimum cover on a catch basin lead shall not be less than 0.60 m.

2.13. Service Connections

2.13.1. Storm sewer service connections to individual properties shall be provided only where required for foundation or stability reasons as determined necessary by a geotechnical assessment. In these circumstances, the storm sewer connection would be designed to accept groundwater from a foundation perimeter drain system and/or roof drainage. The function and details of the storm sewer connection shall be addressed by the geotechnical assessment.

2.13.2. Where storm sewer services are proposed:

- a) Service connections shall be in accordance with the Standard Drawing for a sanitary sewer service;
- b) An inspection chamber is to be installed 300mm from the property line on all storm services;
- c) The minimum storm service size is 150mm and the minimum grade, 1%;
- d) Storm services, where required, shall be installed at a 2.0 m offset from the lower property corner and be installed in a common trench with the sanitary sewer service.

2.14. Alternative Infiltration Systems

2.14.1. Alternative infiltration systems that are acceptable to the Town are listed following:

- a) Perforated storm sewers. A proposal to construct perforated storm sewers shall be accompanied by a geotechnical report confirming that soils are suitable for stormwater disposal and that discharged stormwater will not adversely impact adjacent properties and/or other infrastructure within the road cross section;
- b) Rain tank retention and disposal system. These systems represent acceptable infrastructure for the infiltration of stormwater. Rain tank systems are most appropriate as an onsite system for runoff disposal prior to runoff onto municipal streets. Where a rain tank system is proposed as municipal infrastructure, the system must be located in the road boulevard area and be designed consistent with the Standard Drawings;
- c) Rain gardens and biofiltration swales. These systems generally comprise a roadside ditch or swale containing soil or decorative rock where the objective is stormwater attenuation and infiltration. Where rain gardens and/or bioswales may be proposed as stormwater management infrastructure, they are to be operated and maintained by the Town;

- A modified typical road cross section may be required to provide additional right-of-way width to accommodate the proposed bioswale;
- Bioswales and rain gardens are most applicable to low volume residential streets;
- The minimum depth of a swale shall be 150 mm and the maximum depth 500 mm. The swale surface shall be low maintenance comprising decorative rock on landscape fabric.
- Minimum swale grade shall be 1.30%.

2.15. Stormwater Attenuation and Detention

2.15.1. Stormwater attenuation and detention works represent preferred technology to the alternative of larger pipes. To the greatest extent practical stormwater detention infrastructure is to be designed as onsite works not operated and maintained by the Town. Applicable onsite technology options include surface storage, i.e. parking lots, swales, and basins and subsurface tanks, pipes, etc.

2.15.2. Where stormwater detention infrastructure is proposed to be operated and maintained by the Town, accessibility, safety and minimal long term operation and maintenance requirements represent primary design requirements. Any proposed stormwater detention structure shall be presented to the Director for review and comment prior to detailed design.

2.16. Storm Sewer Main Location and Right-of-Way Requirements

2.16.1. Storm sewers shall, to the greatest extent practical, be located in the road right-of-way on offsets consistent with the Standard Drawings.

2.16.2. Where a storm sewer cannot be located within a road right-of-way, a statutory right-of-way a minimum of 6m in width, is required.

3. MATERIALS

3.1. General

3.1.1. MATERIALS related sections of Part 2, SECTION 4 - Sanitary Sewers are applicable to storm drainage infrastructure.

4. EXECUTION

4.1. General

4.1.1. Workmanship related sections of Part 3, SECTION 4 - Sanitary Sewers are applicable to storm drainage infrastructure with the following exceptions:

- a) Except where a geotechnical assessment indicates otherwise, stormwater manholes do not have to be watertight;
- b) Except where a geotechnical assessment indicates risks associated with leakage from storm drainage infrastructure, storm sewers do not have to be tested for leakage.

SECTION 6 – LIGHTING

1. GENERAL

1.1. Permit Fees to Be Paid By Applicant

- 1.1.1. The Applicant shall be responsible for obtaining all required electrical permits, arranging for all electrical inspections for the works and paying all fees for such permits. A copy of the permits is to be submitted to the Town at the time of application for final approval.

2. DESIGN CRITERIA

2.1. Levels of Illumination

- 2.1.1. The levels of illumination in average lux and uniformity ratios shall be as presented in Table 6-1.

Table 6-1 Illumination Requirements

<i>Part 1 – Minimum Level of Illumination in Average Lux</i>			
Road	Residential	Industrial	Commercial
Arterial Roads	10.0	13.0	17.0
Collector Road	6.0	10.0	13.0
Local Roads	4.0	7.0	9.0
Pathways	4.0		
Lanes	4.0	2.0	2.0
<i>Part 2 – Uniformity Ratios* (Average : Minimum)</i>			
Road	Uniformity (Average : Minimum)		
Arterial	3 : 1		
Collector	4 : 1		
Local	5 : 1		
Pathways	4 : 1		

**Uniformity ratios and minimum illumination values are based on a maintenance factor of 0.75.*

2.2. Electrical Service

- 2.2.1. Not less than 8 street lights including allowances for future extension shall be connected to a metered electrical service.

- 2.2.2. The connection to Fortis BC will be made into the power base of a lamp standard as shown on the Standard Drawings. While the Town would prefer to have the electrical connection made inside a street light power base, the Town recognizes that Fortis and the Electrical Inspector have to approve the electrical service and meter location. Fortis and/or the Electrical Inspector may not approve a metered electrical service to a lamp standard power base in which case an alternate service design will be acceptable.
- 2.2.3. In areas with overhead power, it is the responsibility of the applicant to determine the proposed pole locations and opportunities for street lights. Similarly, where the underground electrical distribution system is required, it shall be the responsibility of the applicant to coordinate and make arrangements for the underground electrical distribution system with Fortis BC. Design drawings for the underground electrical distribution system shall be submitted to the Town for approval together with all other design drawings for other development services as required.

2.3. Applicable Codes and Regulations

- 2.3.1. The British Columbia Electrical Code, the most recent edition, and standards of Fortis, the electrical utility, shall be applicable to the design, construction and operation of the street lighting system. It shall be the responsibility of the applicant to:
- a) Make all necessary applications for service to Fortis and pay all applicable application fees;
 - b) Make all necessary arrangements with Fortis for the electrical service connection, energization of the street light circuit and commissioning;
 - c) Make necessary applications and pay applicable fees for an Electrical Permit issued pursuant to the BC Electrical Code;
 - d) Construct the works in accordance with the requirements of the issued Electrical Permit;
 - e) Provide, prior to energizing the street lighting, a Certificate of Inspection from the Electrical Inspector or equivalent declaration by the electrical contractor.

3. MATERIALS

3.1. General

- 3.1.1. Electrical materials used in the street lighting system shall be new and shall be approved by and bear the label of the Canadian Standards Association.

3.2. Street Light Poles

- 3.2.1. Poles shall be as shown on the Standard Drawing and shall be a minimum 11 gauge octagonal steel anchor base type with 2.5 m davit and a minimum height of 8.0 m for local roadways and 9.0 m for collector and arterial roadways as shown on the Standard Drawings. Poles shall be complete with anchor bolts, nuts and nut covers, handhole and water tight cover assembly, grounding stud and fuse, and terminal block assembly as shown on the Standard Drawing. Poles shall be factory hot dipped galvanized coat in accordance with CAN/CSA-S16.1 and CAN/CSA-G164.

3.3. Conductors

- 3.3.1. All conductors shall be copper and not less than No. 8 AWG stranded. Where the Town considers that there is a risk of theft of the street lighting wiring, the Director may require that aluminum conductors be installed.
- 3.3.2. All insulated conductors shall be colour coded. White shall be used for the neutral conductor.
- 3.3.3. Conductors run in rigid PVC conduit or in the interior of street light poles shall be wire type as listed in Table 19 of the Canadian Electrical Code for use in raceways (wet location). Adequate slack shall be provided in the pole to permit removal of connected wires and fusing through the handhole for maintenance.

3.4. Conduit

- 3.4.1. Rigid PVC conduit shall be acceptable provided that it bears a CSA Certification label and all fittings shall be CSA Certified. PVC conduit shall be installed in strict accordance with the Manufacturer's recommendation, using CSA certified cement. The conduit shall not be bent in the field. Only factory bends shall be acceptable. The minimum conduit size shall be 50 mm diameter.

3.5. Luminaries and Lamps

- 3.5.1. Luminaries shall be G.E. Evolve ERL1-0-05-B3-40-D-GRAY-R complete with cut off optics and photo cells, for residential roads and G.E. Evolve ER17-0-07-B3-40-D-GRAY-R on commercial, collector and arterial roads, or as otherwise approved by the Director. Photocells shall be Intermatic LC4521C or equivalent. There shall be one photocell per head.

3.6. Junction Boxes

- 3.6.1. Junction boxes shall be PVC or concrete. PVC boxes with street lids shall be used in sidewalk areas only. Concrete boxes with street lids shall be used in all areas subject to vehicle traffic. Concrete lids may be used in areas not subject to vehicle traffic.

3.7. Pole Bases

- 3.7.1. Precast concrete bases for poles shall be as shown on the Standard Drawing SL-2 and SL-3.

3.8. Fusing

- 3.8.1. There shall be one in-line (cartridge type) fuse per street light, located within each pole and accessible through the hand hole.

3.9. Ornamental Lighting

- 3.9.1. The Director may require ornamental lighting, banner arms, basket hangers, and internal irrigation.

4. EXECUTION

4.1. Installation

- 4.1.1. Conduits shall be installed in accordance with the Standard Drawings at a constant depth and on the alignment shown on the approved construction drawings. Conduits under existing paved roads, driveways or sidewalks shall be installed by tunnelling, unless the Director gives his express written consent for open trench construction. Service line conductors and all other electrical components shall be

installed in conformance with the standard drawings in the B.C. Electrical Code. Conduits shall be buried in a trench with not less than 0.60 m of cover provided. Warning tape shall be provided over the conduit as per the Electrical Code.

- 4.1.2. In all trenches, the conduit shall be snaked slightly to permit expansion and contraction.
- 4.1.3. All ducts shall be sand bedded.
- 4.1.4. Bases shall be constructed and installed as shown on the Standard Drawings. The standards shall be erected plumb, using shims if required.
- 4.1.5. Luminaries shall be securely fastened to the lighting poles and oriented to produce the required light distribution.

SECTION 7 - ELECTRICAL, COMMUNICATIONS, AND GAS

1. GENERAL

1.1. Construction In Accordance With Utility Company Requirements

- 1.1.1. Electrical, Telephone and Cablevision services shall be installed in accordance with the requirements of the Fortis, Telus, if applicable, the cablevision company intended to service the development and the Electrical Inspector of Electrical Energy of the Province of B.C. Natural gas distribution works, if applicable, will be installed by Fortis BC Gas in accordance with approved design drawing prepared by Fortis.

1.2. Underground Electrical Systems

- 1.2.1. Underground systems shall include the supply and installation of all necessary conduits, wiring, transformers, service runs and connections for a complete and fully operative underground electrical system designed by the Fortis and approved by the Director and the Inspector of Electrical Energy of the Province of B.C.

1.3. Underground Telephone and Cablevision

- 1.3.1. Underground telephone and cablevision shall include the supply and installation of all necessary conduits, wiring, service runs and connections for a complete and fully operative underground telephone system designed by Telus and the cablevision company serving the development and approved by the Director.

1.4. Gas Distribution System

- 1.4.1. Where the proposed development is to be served by a natural gas distribution system, the distribution system shall be designed by Fortis BC Gas and shall be approved by the Director prior to the construction. The system or extension shall be installed following installation of sewer and watermains and prior to the installation of curb, gutters and asphalt. Rehabilitation of boulevards shall be the responsibility of the applicant.

2. DESIGN CRITERIA

2.1. Horizontal Location

- 2.1.1. Horizontal location of underground ducting and gas main piping shall be as shown on the Standard Drawings. Systems shall be laid out with due regard for other utilities, and shall have the approval of the Director as well as the utility company involved. Where overhead distribution is specified, pole locations and any anchor easements shall be approved by both the Director and the appropriate utility company. Care shall be taken to eliminate any aerial trespass.
- 2.1.2. Water service and sanitary service shall be installed on one side of the property and other utilities located on the opposite side where possible.

2.2. Vertical Location

- 2.2.1. All conduit and gas main piping to have a minimum of 750 mm cover or to the depths specified by the local authority, whichever is greater.

2.3. Detailed Design

- 2.3.1. Details of design such as vertical and horizontal location of service boxes, size and type of conduits and gas mains, kiosk dimensions and ducting and all wiring details shall be as outlined in the specifications and drawings provided by Fortis, Telus, Eastlink, and Fortis BC Gas.

3. MATERIALS

3.1. Fortis

- 3.1.1. All materials used in the underground or overhead electrical distribution system shall be as specified by Fortis.

3.2. Telus

- 3.2.1. All materials used in the telecommunications system shall be as specified by the Telus.

3.3. Cablevision

- 3.3.1. All materials used in the cablevision system shall be as specified by Eastlink.

4. EXECUTION

4.1. Underground Installation

4.1.1. Installation requirements such as trenching, installation of ducting and backfilling shall be according to specifications supplied by the appropriate utility company.

4.2. Clean-up

4.2.1. After installation of all underground ducting service boxes, kiosks, etc. the boulevard area shall be shaped to grade and all debris shall be removed.

SECTION 8 – STANDARD DRAWINGS

Section C – General

- C-1 Symbols for Utilities and Services
- C-2 Standard Format for Plan/Profile Drawing
- C-3 Encasement and Carrier Pipe Detail
- C-4 Service Card Utilities and Services
- C-5 Typical Trench Section
- C-6 Typical Pipe Bedding and Backfill within the Pipe Zone
- C-7 Typical Lot Service Locations

Section R – Roads

- R-1A Typical Local Residential Road Section Low Traffic Volume Segment
- R-1B Typical Local Residential Road Section
- R-2 Collector Minor Arterial or Local Commercial Road Section
- R-3 Typical Arterial Road and Major Collector
- R-4 Typical Industrial Road Section
- R-5 Typical Road Cross Section Rural Street
- R-6 Residential Cul-De-Sac
- R-7 Typical Curb Types
- R-8 Typical Wheelchair Ramp, Curb Radius and Corner Cut
- R-8B Typical Wheelchair Ramp, with Tactile Strip
- R-9 Sidewalk Cross-Over & Finishing Details
- R-10 Typical Tree Planting Detail Softscape
- R-11 Typical Boulevard Tree Planting
- R-12 Standard Street Sign and Base
- R-13 ‘Bench-Block’ Wall with Handrail Detail

Section W – Waterworks

- W-1 Typical Domestic Water Service
- W-1B Typical Domestic Water Service for Traffic Areas and Driveways
- W-2 Below Grade Blow Off Assembly
- W-3 Typical Fire Hydrant Assembly
- W-4 Typical Above Ground Self-Draining Standpipe
- W-5 Typical Thrust Block Details
- W-6 Typical Valve Box Details
- W-7 Typical Air Release Valve Installation
- W-8 Typical 75mm Rural Irrigation Service
- W-9 Typical Low Pressure Irrigation Service from Canal
- W-10 Watermain Relocation

Section W – Waterworks Continued

W-11	Typical Inside Water Meter Installation
W-12	Typical Inside 38mm and 50mm Water Meter Installation
W-13	Frost Proof 19mm and 25mm Meter Pit for Non-Traffic Areas
W-13B	Frost Proof 38mm and up Meter Pit for Non-Traffic Areas
W-14	Frost Proof 38mm and 50mm Meter Vault for Non-Traffic Areas
W-15	150mm or 200mm Meter Station
W-16	Frost Proof 38mm and up meter pit for Non-Traffic Areas
W-17	Reclaimed water main Installation Information for Non-Traffic Areas
W-18	Domestic Irrigation for Boulevard Irrigation

Section S – Sanitary Sewer

S-1	Typical Sewer Manhole
S-2	Typical Exterior Drop Manhole
S-3	Typical Sanitary Sewer Service Connection
S-4	Inspection Chamber Detail
S-5	Service Connection Detail in a Cul-de-Sac
S-6	Manhole Frame & Cover Details
S-7	Typical Fire Hydrant Assembly for Reclaimed Water
S-8	Typical Manhole Benching
S-9	Typical Pressure Sewer Service
S-10	Typical Air Release and Air Vacuum Valve for Sewer Forcemains

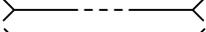
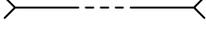
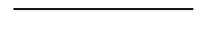
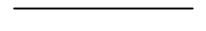
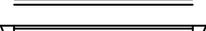
Section D – Drainage Systems

D-1	Rainfall Intensity – Duration – Frequency Design Curves
D-2	Overland Flow Time Curves
D-3	Sanitary or Storm Sewer Connections to main where manholes are required.
D-4	Catch Basin Assembly Standard Type
D-5	Catch Basin Assembly – Curb Inlet Type
D-6	Drainage Drywell
D-7	Storm Tank Drywell
D-8	Catch Basin Assembly Curb-Mountable Curb
D-9	Double Catch Basin Assembly Curb-Mountable Curb
D-10	Typical Storm Inlet and Outlet Structure
D-11	Typical Storm Headwall Grillage
D-12	Typical Storm Outlet Structure Backflow Preventers
D-13	Typical Culvert End Section

Section SL – Lighting

- SL-1 Typical Street Light
- SL-2 Street Light Anchor Base Type A Poles
- SL-3 Street Light Anchor Base Type B Poles
- SL-4 Power Base Details
- SL-5 Power Base Panel Location Details
- SL-6 Power Base Wiring Detail with Metered Electrical Service
- SL-7 Handhold Wiring Schematic – 120V Street Light

LEGEND

	CMP CULVERT PROPOSED
	CMP CULVERT EXISTING
	STORM PROPOSED
	STORM EXISTING
	WATER PROPOSED
	WATER EXISTING
	WATER SERVICE PROPOSED
	WATER SERVICE EXISTING
	SANITARY PROPOSED
	SANITARY EXISTING
	SANITARY SERVICE PROPOSED
	SANITARY SERVICE EXISTING
	SANITARY FORCEMAIN PROPOSED
	SANITARY FORCEMAIN EXISTING
	EDGE OF ASPHALT PROPOSED
	EDGE OF ASPHALT EXISTING
	CURB & GUTTER PROPOSED
	CURB & GUTTER EXISTING
	DRIVEWAY LETDOWN PROPOSED
	DRIVEWAY LETDOWN EXISTING

LEGEND

	POWER POLE EXISTING
	POWER POLE PROPOSED
	LIGHT STANDARD EXISTING
	LIGHT STANDARD PROPOSED
	LIGHT POST
	POLE ANCHOR
	JUNCTION BOX
	IRON PIN
	SURVEY HUB
	TEST PIT
	CURB STOP EXISTING
	CURB STOP PROPOSED
	VALVE EXISTING
	VALVE PROPOSED
	HYDRANT EXISTING
	HYDRANT PROPOSED
	STANDPIPE EXISTING
	STANDPIPE PROPOSED
	REDUCER
	IRRIGATION BOX
	SPRINKLER
	STORM MANHOLE EXISTING
	STORM MANHOLE PROPOSED
	CATCHBASIN EXISTING
	CATCHBASIN PROPOSED
	STORM DRYWELL
	CULVERT INLET/OUTLET
	SANITARY MANHOLE EXISTING
	SANITARY MANHOLE PROPOSED
	CLEANOUT EXISTING
	CLEANOUT PROPOSED
	LIFT STATION EXISTING
	LIFT STATION PROPOSED
	SEPTIC TANK EXISTING
	CAP
	TREE/SHRUB

TOWN OF OLIVER

SYMBOLS FOR
UTILITIES AND SERVICES

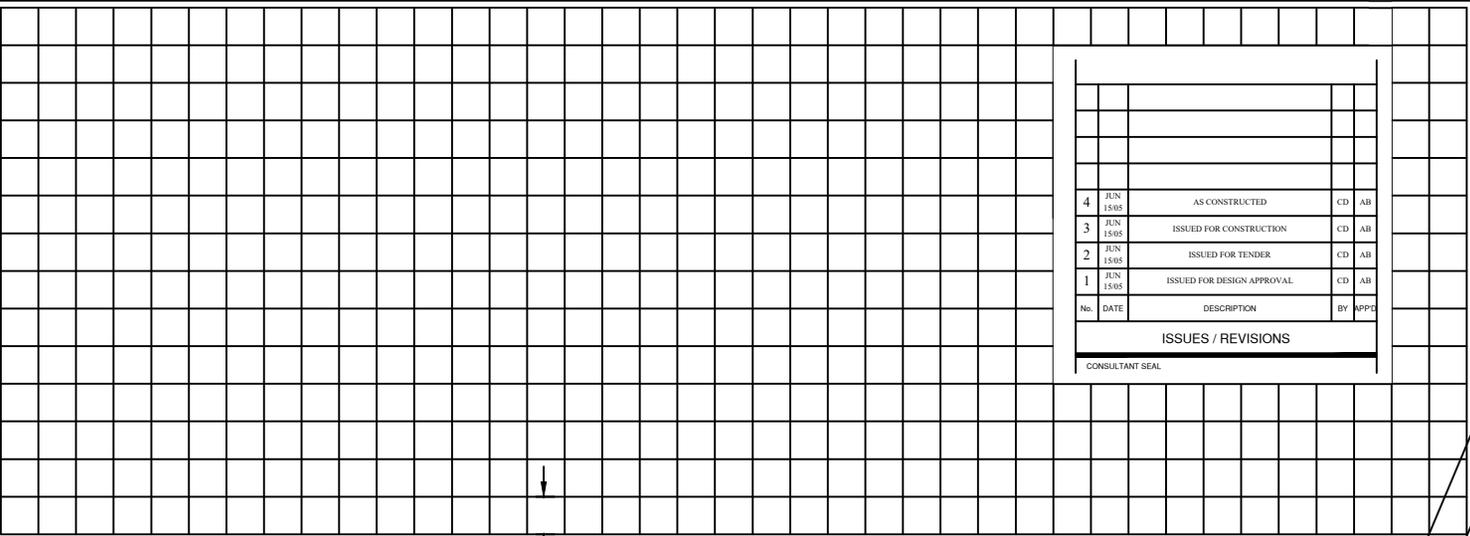


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
C-1	1

STANDARD FORMAT
FOR PLAN/PROFILE DRAWING

TOWN OF OLIVER

23" (584mm)



No.	DATE	DESCRIPTION	BY	APPD
4	JUN 15/05	AS CONSTRUCTED	CD	AB
3	JUN 15/05	ISSUED FOR CONSTRUCTION	CD	AB
2	JUN 15/05	ISSUED FOR TENDER	CD	AB
1	JUN 15/05	ISSUED FOR DESIGN APPROVAL	CD	AB

ISSUES / REVISIONS

CONSULTANT SEAL

No.	DATE	DESCRIPTION	BY	APPD
1				
2				
3				
4				

ISSUES / REVISIONS

GRID 280mm x 780mm

STREET ROAD PLAN PROFILE
START STATION _____
END STATION _____

SCALE	H-1:500 V-1:50
DESIGN BY	AB
DRAWN BY	CD
DATE	MONTH YEAR
PROJECT REFERENCE No.	306-000
ACAD FILE	R3\306-000.DWG
DRAWING No.	306-000-00
SHEET	1 OF 1
REVISION	1

TOWN OF OLIVER

PROJECT NAME
PHASE _

STREET

REVISION No. 2.5mm HIGH TEXT
REVISION 1.5mm HIGH TEXT

TOWN OF OLIVER LOGO



TOWN OF OLIVER

PROJECT NAME
PHASE _

STREET ROAD PLAN PROFILE
START STATION _____
END STATION _____

SCALE	H-1:500 V-1:50
DESIGN BY	AB
DRAWN BY	CD
DATE	MONTH YEAR
PROJECT REFERENCE No.	306-000
ACAD FILE	R3\306-000.DWG
DRAWING No.	306-000-00
SHEET	1 OF 1
REVISION	1

3.5mm HIGH TEXT
5mm HIGH TEXT

10mm HIGH TEXT

34.5" (876mm)

PAPER SIZE 24" x 36" (610mm x 914mm)



DWN. BY: JOSEPH

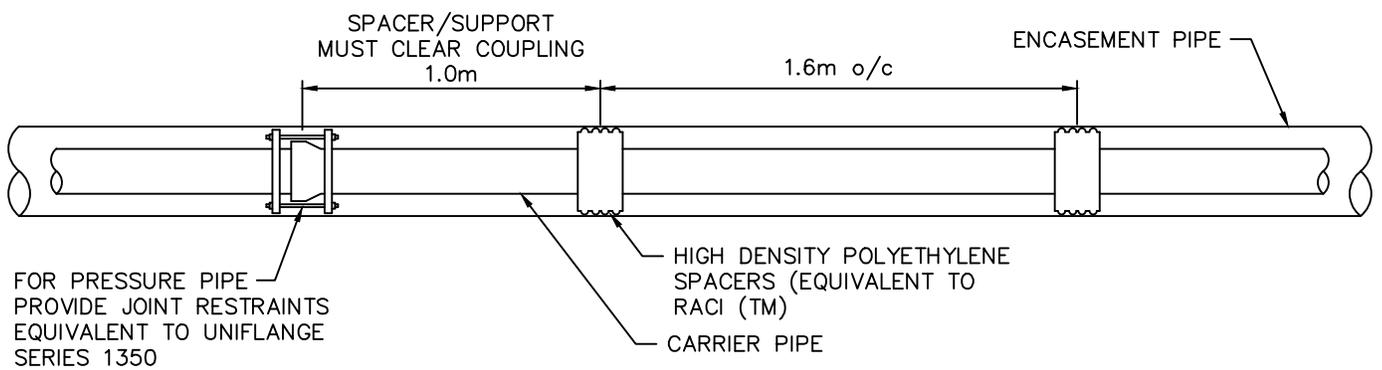
CHK. BY: SHAWN

DATE: FEB 2014

SCALE: NTS

DWG. NO.: C-2

REV.:



NOTES:

1. SEE SPECIFICATIONS FOR DETAILED INFORMATION RELATING TO MATERIALS AND INSTALLATION PROCEDURES FOR ENCASEMENT PIPE AND CARRIER PIPE.
2. CARRIER PIPE JOINTS SHALL BE SET 1000mm BEYOND THE ENDS OF THE ENCASEMENT PIPE.
3. SPACERS SHALL BE DOUBLED AT ENDS OF THE ENCASEMENT PIPE
4. ENCASEMENT PIPE ENDS SHALL BE SEALED WITH EPDM RUBBER END SEALS c/w STAINLESS STEEL BAND CLAMPS TO PIPES

TOWN OF OLIVER

ENCASEMENT AND
CARRIER PIPE DETAIL



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
C-3	1



TOWN OF OLIVER WATER AND SEWER SERVICE CONNECTION RECORD CARD



FOLIO # _____

ADDRESS _____

LOT _____ PLAN _____

LEGAL DESCRIPTION _____

THE ACCURACY AND COMPLETENESS OF INFORMATION SHOWN ON THIS DRAWING IS NOT GUARANTEED. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO LOCATE AND ESTABLISH THE PRECISE LOCATION OF ALL EXISTING INFRASTRUCTURE WHETHER SHOWN OR NOT. THE TOWN OF OLIVER, ITS EMPLOYEES AND AGENTS WILL NOT BE RESPONSIBLE OR LIABLE FOR LOSS OR DAMAGE SUFFERED BY THE USER OF THE INFORMATION SHOWN ON THE DRAWING.

REFERENCE RECORD DRAWING _____

LEGEND

- SEWER MAIN
- SEWER SERVICE
- MANHOLES
- CLEANOUT
- WATER MAIN
- WATER SERVICE
- VALVES
- ⊙ HYDRANTS
- CURB STOPS
- ⌈ END CAP
- GAS MAIN
- UNDERGROUND ELECTRIC

SERVICE CARD NUMBER _____ DATE (M/Y) _____ BY _____

SEWER	
INSTALLATION DATE:	
SIZE (mm)	
TYPE	
LENGTH (m)	
INV ELEVATION AT PROPERTY LINE (m)	
DEPTH AT PROPERTY LINE (m)	
DISTANCE FROM MH TO FITTING AT MAIN (m)	
RISER (Y/N)	
BENDS °	
FITTING AT MAIN	

WATER	
INSTALLATION DATE:	
SIZE (mm)	
TYPE	
DISTANCE FROM MAIN TO CURB STOP (m)	
DEPTH AT PROPERTY LINE (m)	

DATE OF LAST REVISION	
-----------------------	--

TOWN OF OLIVER

SERVICE CARD
UTILITIES AND SERVICES

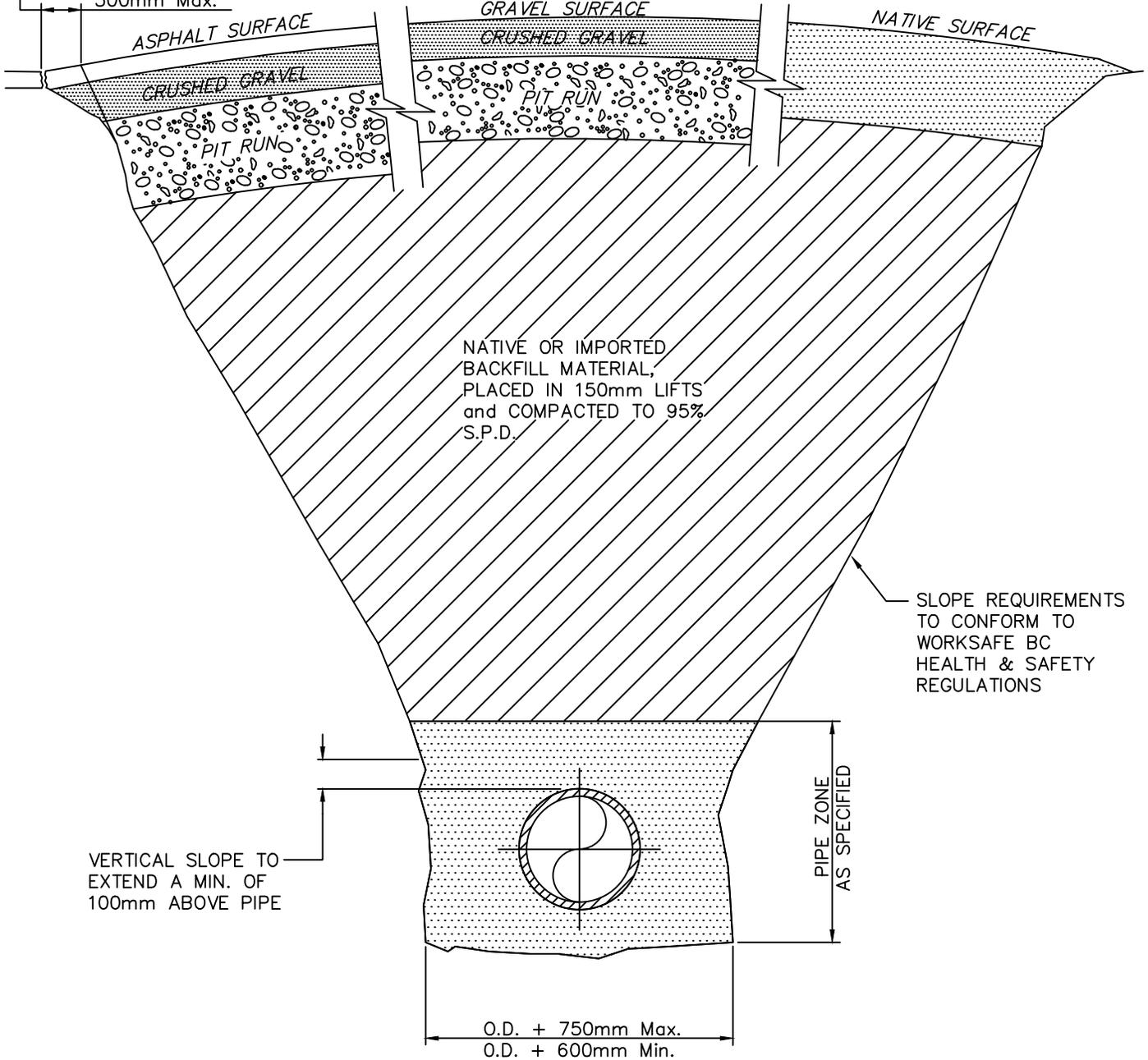


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
C-4	1

ASPHALT TIE

AFTER THE INSTALLATION OF ROAD BASES, SAWCUT EXISTING ASPHALT BACK FROM EXCAVATION EDGE, COMPACT CRUSHED GRAVEL BASE COURSE & SUBBASE TO 100% S.P.D. AND PAINT CUT EDGE OF ASPHALT WITH AN APPROVED BITUMINOUS BONDING AGENT PRIOR TO ASPHALT PLACEMENT.

300mm Min.
500mm Max.



TOWN OF OLIVER

TYPICAL TRENCH SECTION

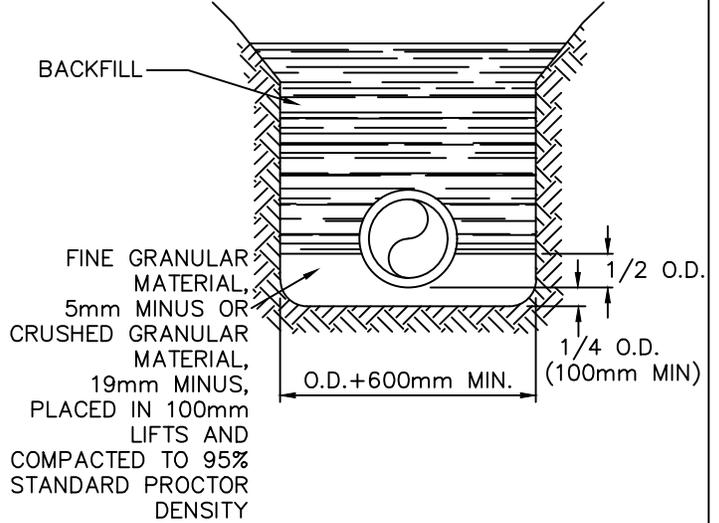
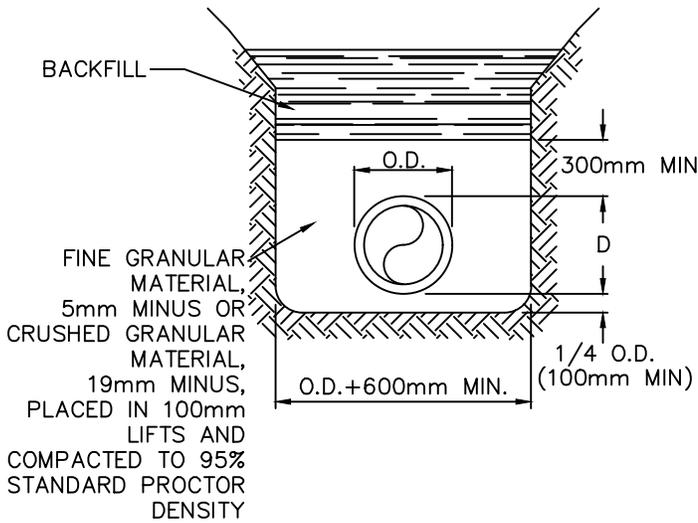


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
C-5	1

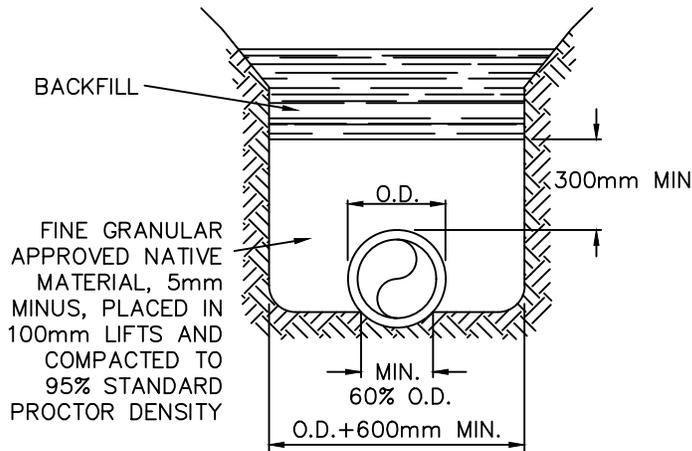
CLASS "B" BEDDING

FOR PVC PIPE AND NON-REINFORCED CONCRETE

FOR ALL OTHER PIPE



CLASS "C" BEDDING

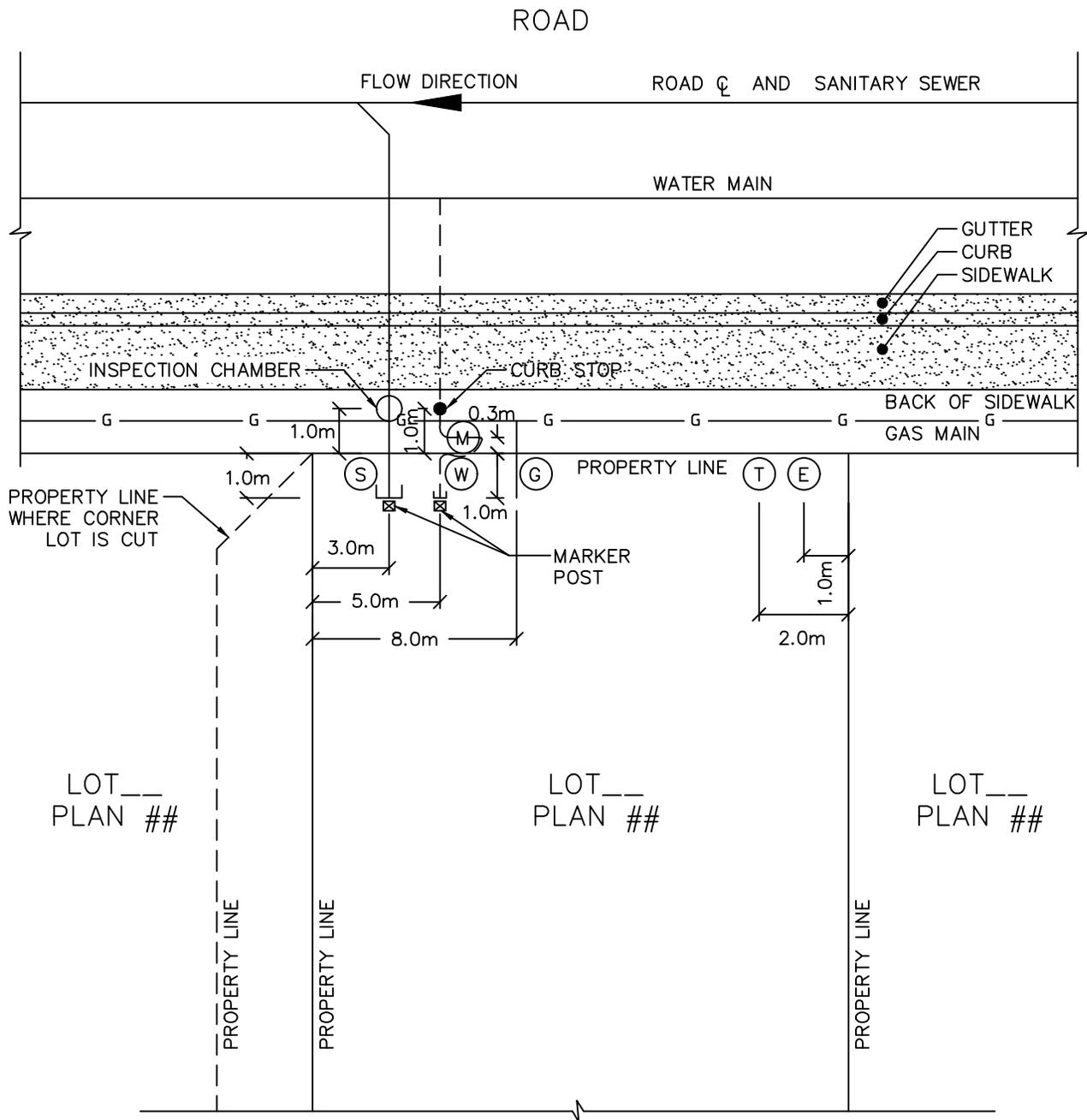


TOWN OF OLIVER

TYPICAL PIPE BEDDING AND BACKFILL
WITHIN THE PIPE ZONE



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
C-6	1



- Ⓢ - SANITARY SERVICE
- Ⓦ - WATER SERVICE
- Ⓜ - WATER METER PIT
- ⓔ - ELECTRICAL SERVICE
- Ⓣ - TELECOMMUNICATION SERVICE
- ⓖ - GAS SERVICE

TOWN OF OLIVER

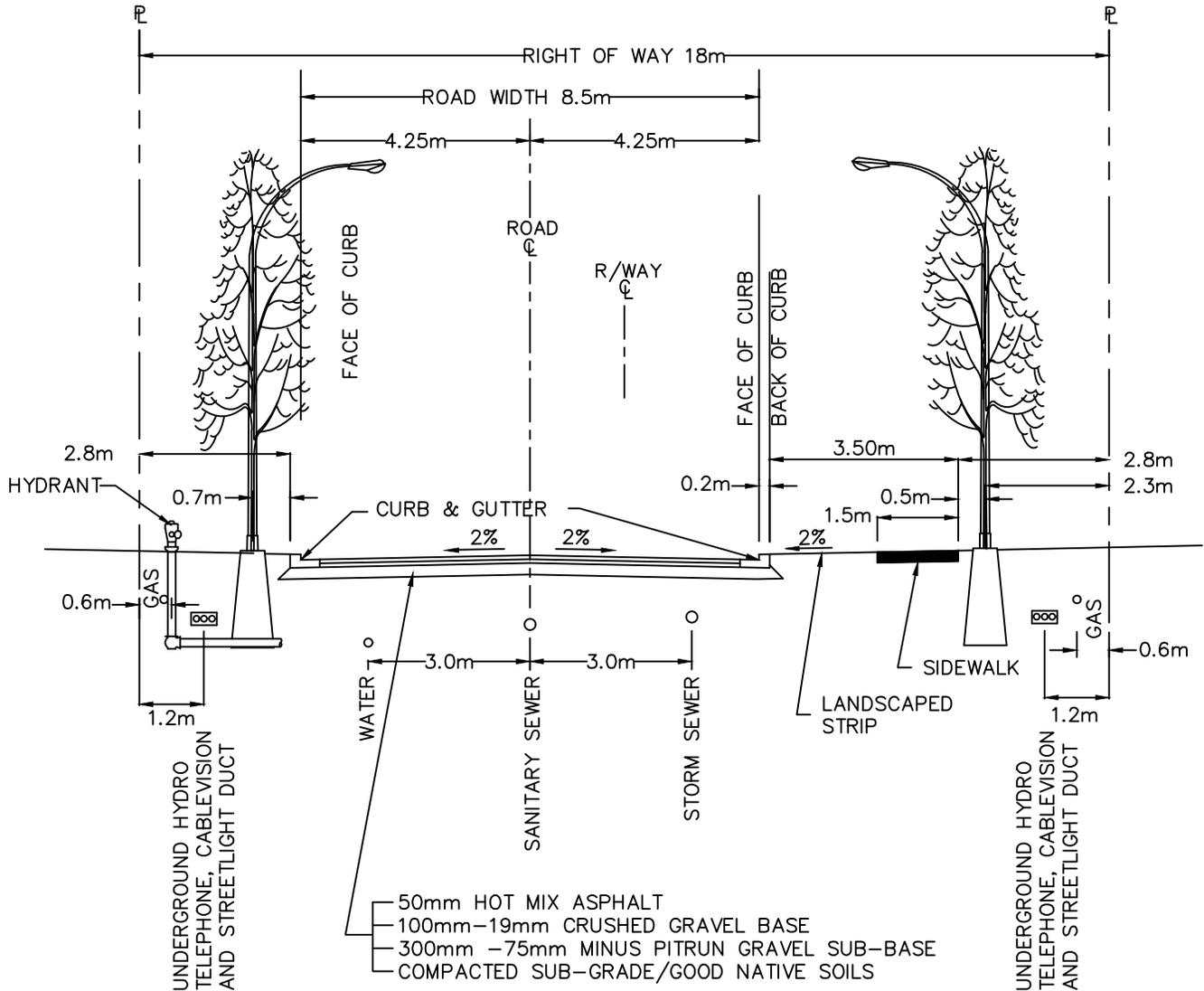
TYPICAL LOT SERVICES LOCATIONS



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
C-7	1

NOTES:

- 1) THE STRUCTURAL ROAD ELEMENTS SHOWN ARE MINIMUM REQUIREMENTS FOR CONSTRUCTION ON NATIVE GRANULAR SOILS TO SUBGRADE.
- 2) GEOTECHNICAL ASSESSMENT REQUIRED FOR ROAD STRUCTURE ON NON GRANULAR NATIVE SOILS.
- 3) DIMENSIONS OR CONDITIONS MAY VARY WITHIN ORIGINAL IMPERIAL MEASURED OR EXISTING RIGHTS-OF-WAY. RETROFIT WITHIN EXISTING RIGHTS-OF-WAY



WHERE NATIVE SOILS ARE SUITABLE FOR GRAVEL SUB-BASE, PROVIDE MIN 150mm OF CRUSHED GRAVEL BASE

MINIMUM COVER FROM FINISHED GRADE

WATER	-----	1.50m
STORM	-----	1.00m
SANITARY	-----	1.20m
ELECTRICAL	-----	1.10m
GAS	-----	0.80m
TELUS/CABLE	-----	0.80m

TOWN OF OLIVER

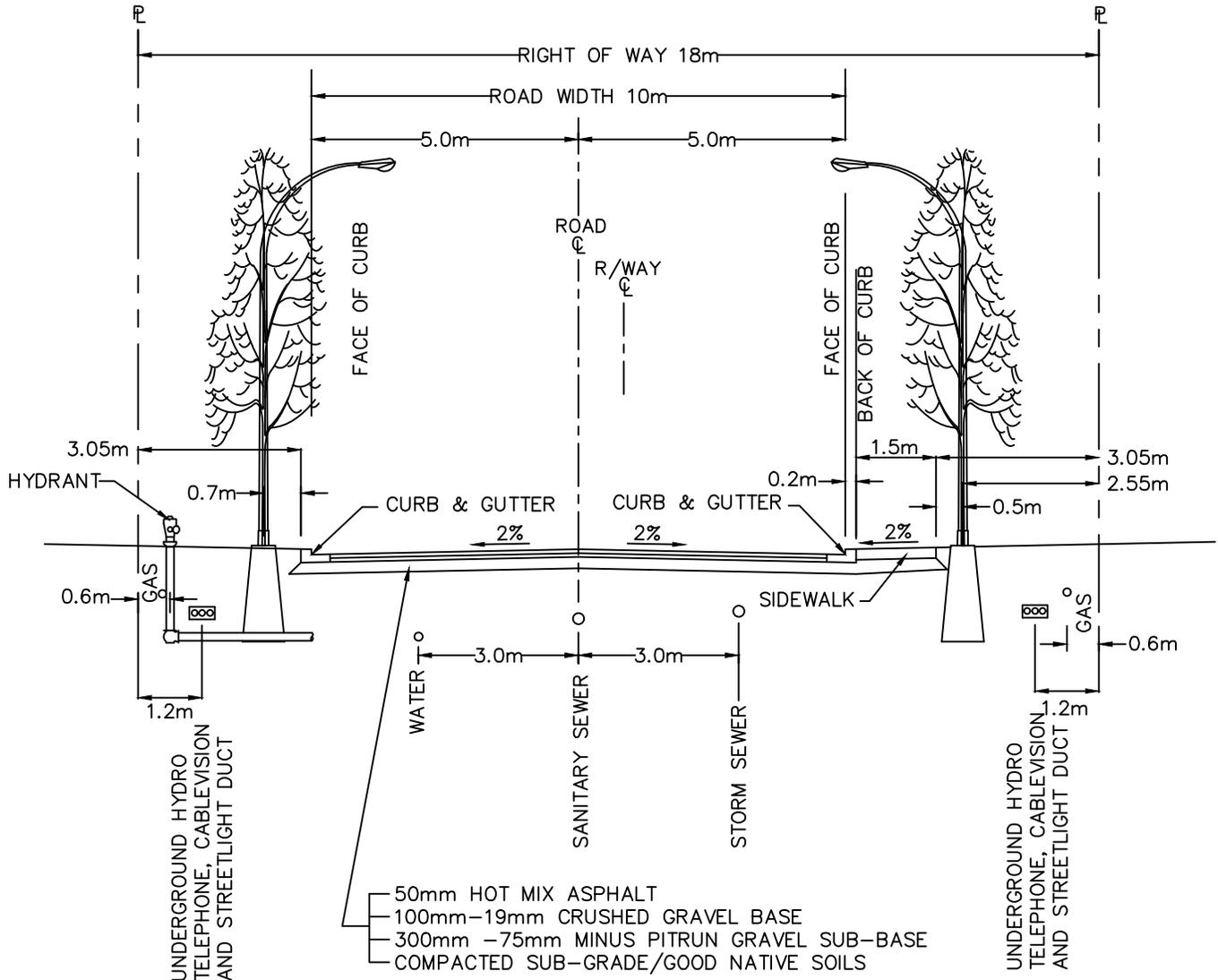
TYPICAL LOCAL RESIDENTIAL
ROAD SECTION
LOW TRAFFIC VOLUME SEGMENT



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-1A	1

NOTES:

- 1) THE STRUCTURAL ROAD ELEMENTS SHOWN ARE MINIMUM REQUIREMENTS FOR CONSTRUCTION ON NATIVE GRANULAR SOILS TO SUBGRADE.
- 2) GEOTECHNICAL ASSESSMENT REQUIRED FOR ROAD STRUCTURE ON NON GRANULAR NATIVE SOILS.
- 3) DIMENSIONS OR CONDITIONS MAY VARY WITHIN ORIGINAL IMPERIAL MEASURED OR EXISTING RIGHTS-OF-WAY. RETROFIT WITHIN EXISTING RIGHTS-OF-WAY



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WATER	-----	1.50m
STORM	-----	1.00m
SANITARY	-----	1.20m
ELECTRICAL	-----	1.10m
GAS	-----	0.80m
TELUS/CABLE	-----	0.80m

TOWN OF OLIVER

TYPICAL LOCAL RESIDENTIAL
ROAD SECTION

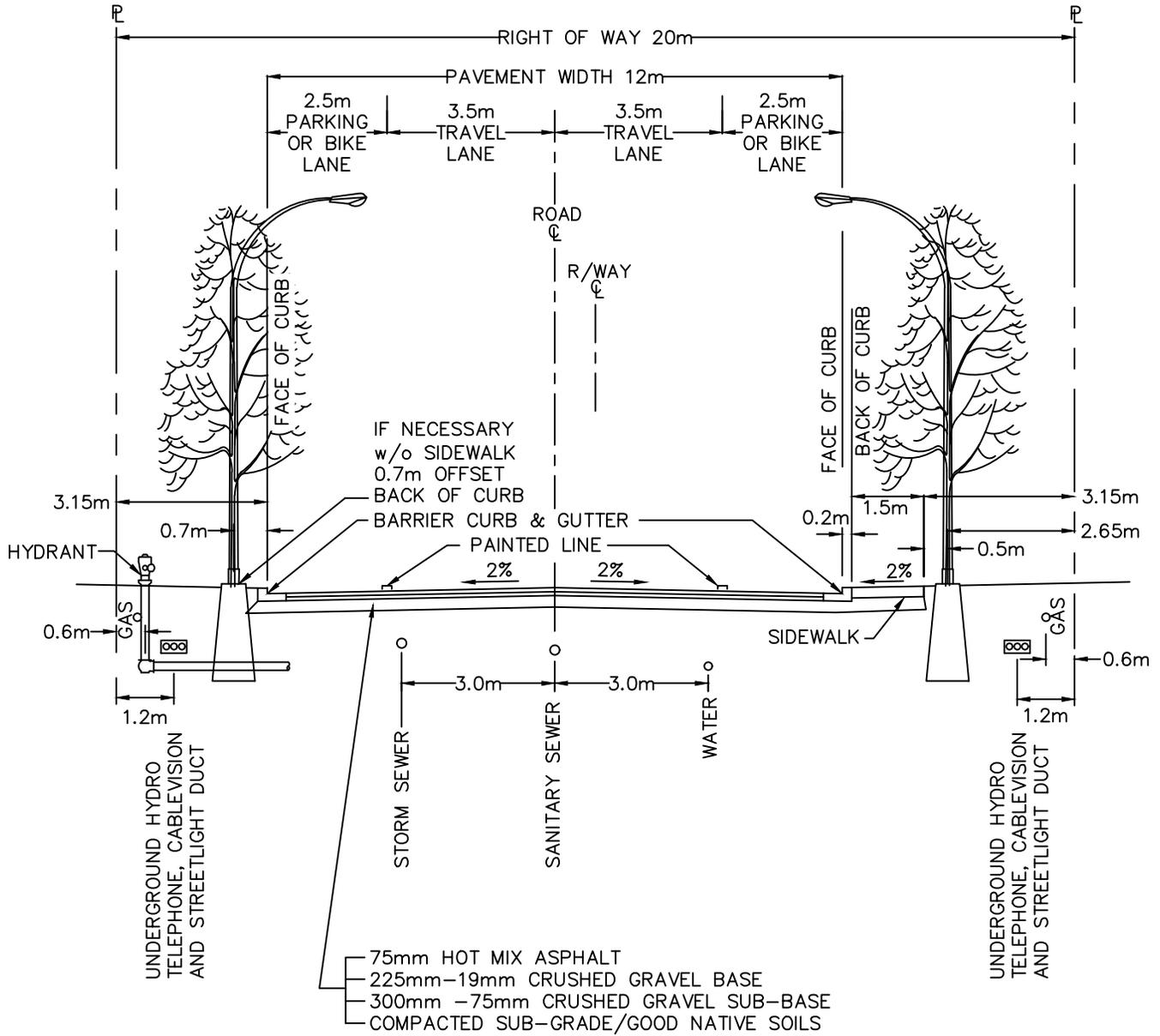


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-1B	1

NOTES:

1) THE STRUCTURAL ROAD ELEMENTS SHOWN ARE THE MINIMUM REQUIREMENTS. COMPACTED DESIGN THICKNESS MUST BE ENGINEERED WHEN POOR SUBGRADE MATERIAL IS ENCOUNTERED.

2) DIMENSIONS OR CONDITIONS MAY VARY WITHIN ORIGINAL IMPERIAL MEASURED OR EXISTING RIGHTS-OF-WAY. RETROFIT WITHIN EXISTING RIGHTS-OF-WAY



MINIMUM COVER FROM FINISHED GRADE

WATER	-----	1.50m
STORM	-----	1.00m
SANITARY	-----	1.20m
ELECTRICAL	-----	1.10m
GAS	-----	0.80m
TELUS/CABLE	-----	0.80m

BIKE LANE MAY BE REQUIRED ON STREETS IDENTIFIED IN THE "OLIVER & AREA TRAILS MASTER PLAN"

TOWN OF OLIVER

COLLECTOR
MINOR ARTERIAL OR LOCAL COMMERCIAL
ROAD SECTION



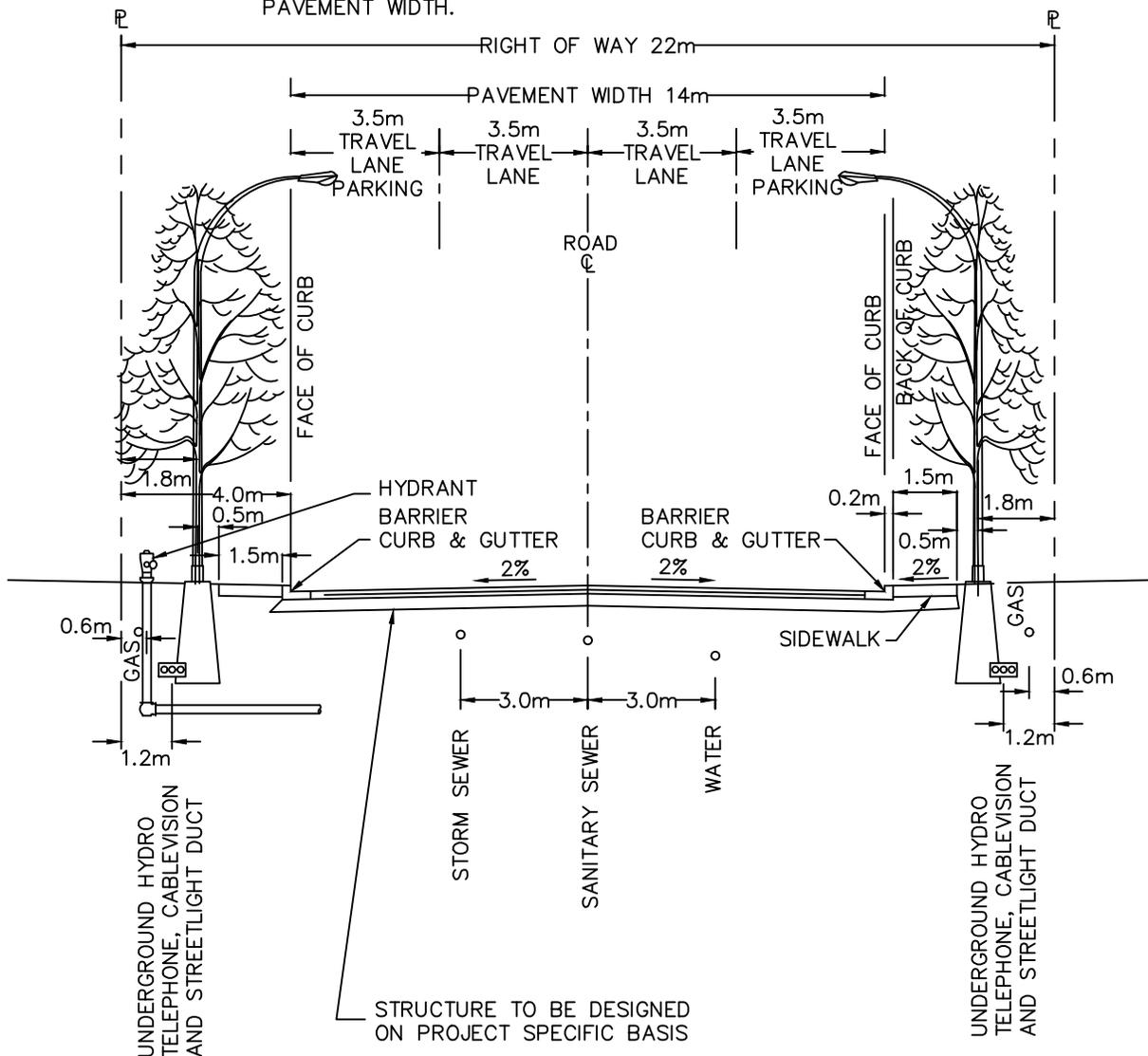
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-2	1

NOTES:

1) THE STRUCTURAL ROAD ELEMENTS SHOWN ARE THE MINIMUM REQUIREMENTS. COMPACTED DESIGN THICKNESS MUST BE ENGINEERED WHEN POOR SUBGRADE MATERIAL IS ENCOUNTERED.

2) DIMENSIONS OR CONDITIONS MAY VARY WITHIN ORIGINAL IMPERIAL MEASURED OR EXISTING RIGHTS-OF-WAY. RETROFIT WITHIN EXISTING RIGHTS-OF-WAY

3) SEE BY-LAW TEXT REGARDING SPECIAL PROVISIONS FOR PAVEMENT WIDTH.



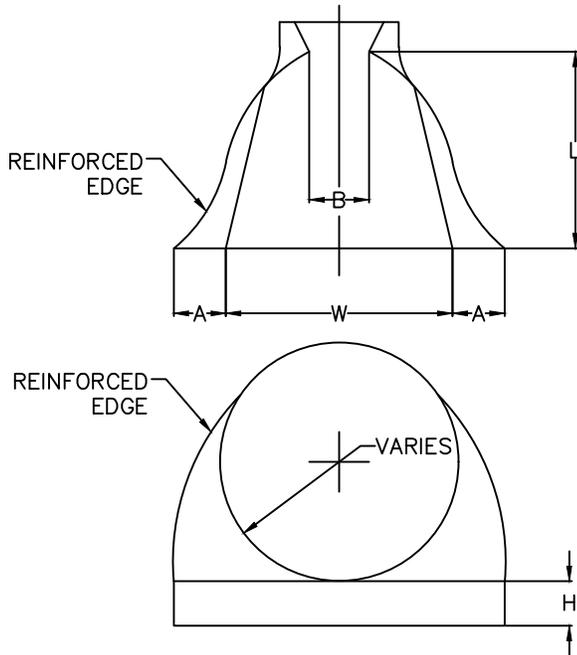
MINIMUM COVER FROM FINISHED GRADE

WATER	-----	1.50m
STORM	-----	1.00m
SANITARY	-----	1.20m
ELECTRICAL	-----	1.10m
GAS	-----	0.80m
TELUS/CABLE	-----	0.80m

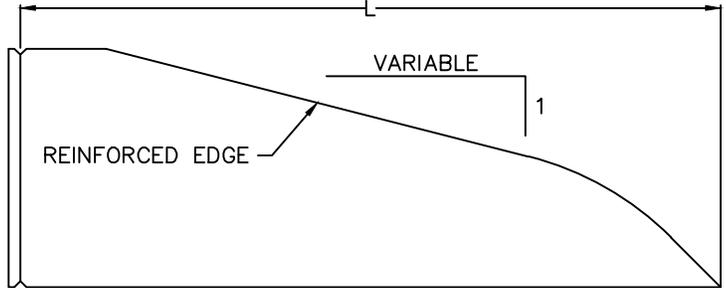
TOWN OF OLIVER
 TYPICAL ARTERIAL ROAD
 AND
 MAJOR COLLECTOR



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-3	1



END SECTIONS (DIMENSIONS IN mm)					
PIPE ϕ	A	B	H	L	W
400 ϕ	175	200	150	660	760
500 ϕ	230	300	150	915	1065
900 ϕ	355	480	230	1525	1830

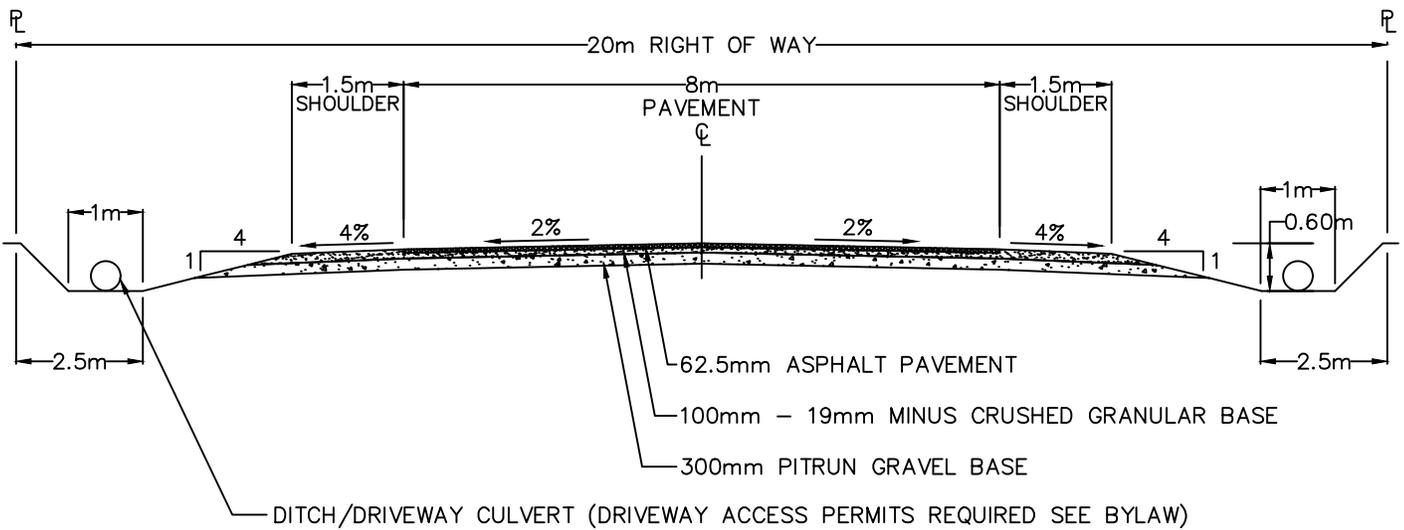


NOTE

- ALL CULVERTS ARE TO INCLUDE END SECTIONS

TYPICAL CULVERT END SECTION

SCALE - N.T.S.



NOTE

- CONCRETE CURB, GUTTER, AND SIDEWALK IS REQUIRED ON ONE SIDE IF LOCATED ON TRAIL NETWORK

TYPICAL ROAD CROSS SECTION (WITH DRAINAGE DITCHES)

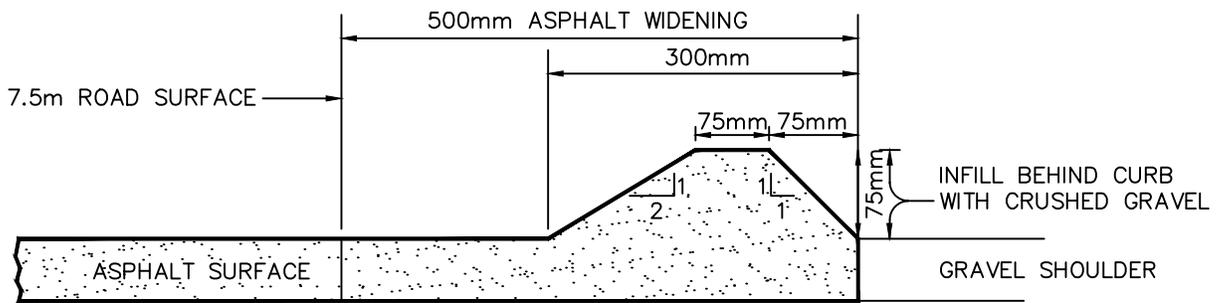
H-1:100
V-1:100

TOWN OF OLIVER

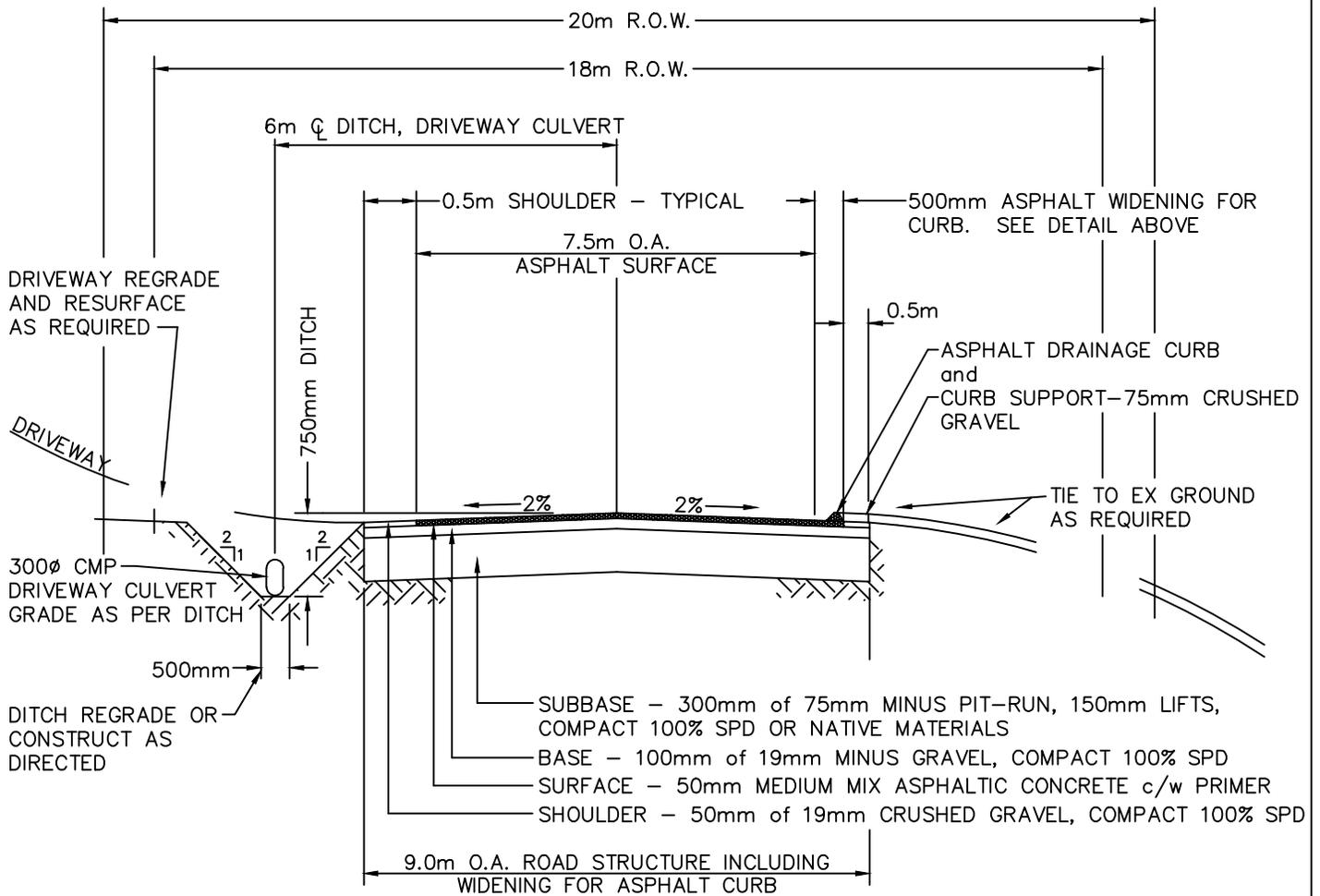
TYPICAL INDUSTRIAL ROAD SECTION



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-4	1



DETAIL – ASPHALT DRAINAGE CURB (INTEGRAL)



NOTE

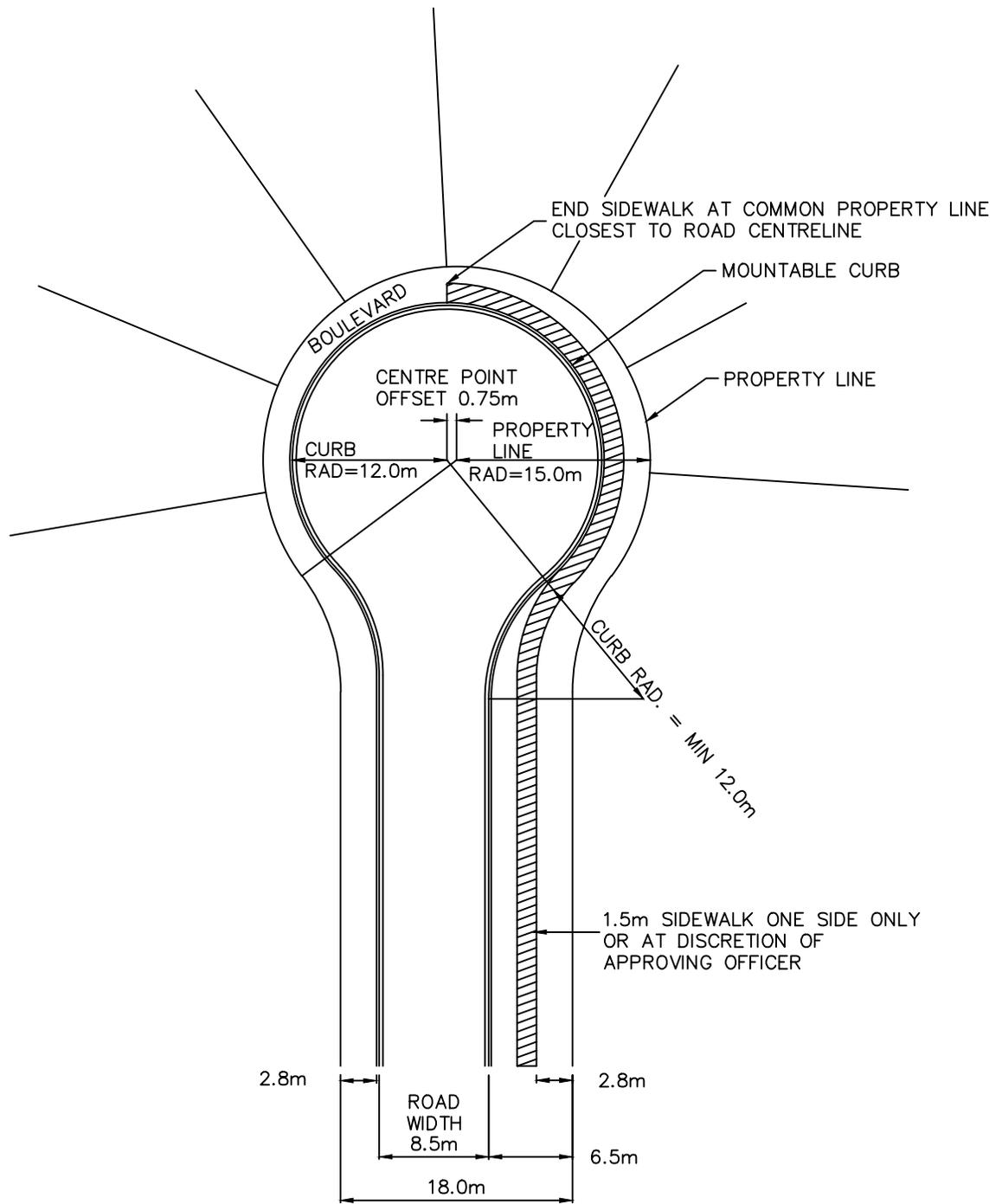
- SIDEWALK (PAVED, MARKED ASPHALT SURFACE) MAY BE REQUIRED IF LOCATED ON TRAIL NETWORK
- DITCHES AND CURBS TO BE CONSTRUCTED AS DIRECTED AND MAY BE CONSTRUCTED ON ONE OR BOTH SIDES.
- DITCHES SHALL BE A MINIMUM SLOPE OF 1.3%
- ROAD SECTION TO BE USED FOR NEW OR RECONSTRUCTION

TOWN OF OLIVER

TYPICAL ROAD CROSS SECTION
RURAL STREET



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-5	1

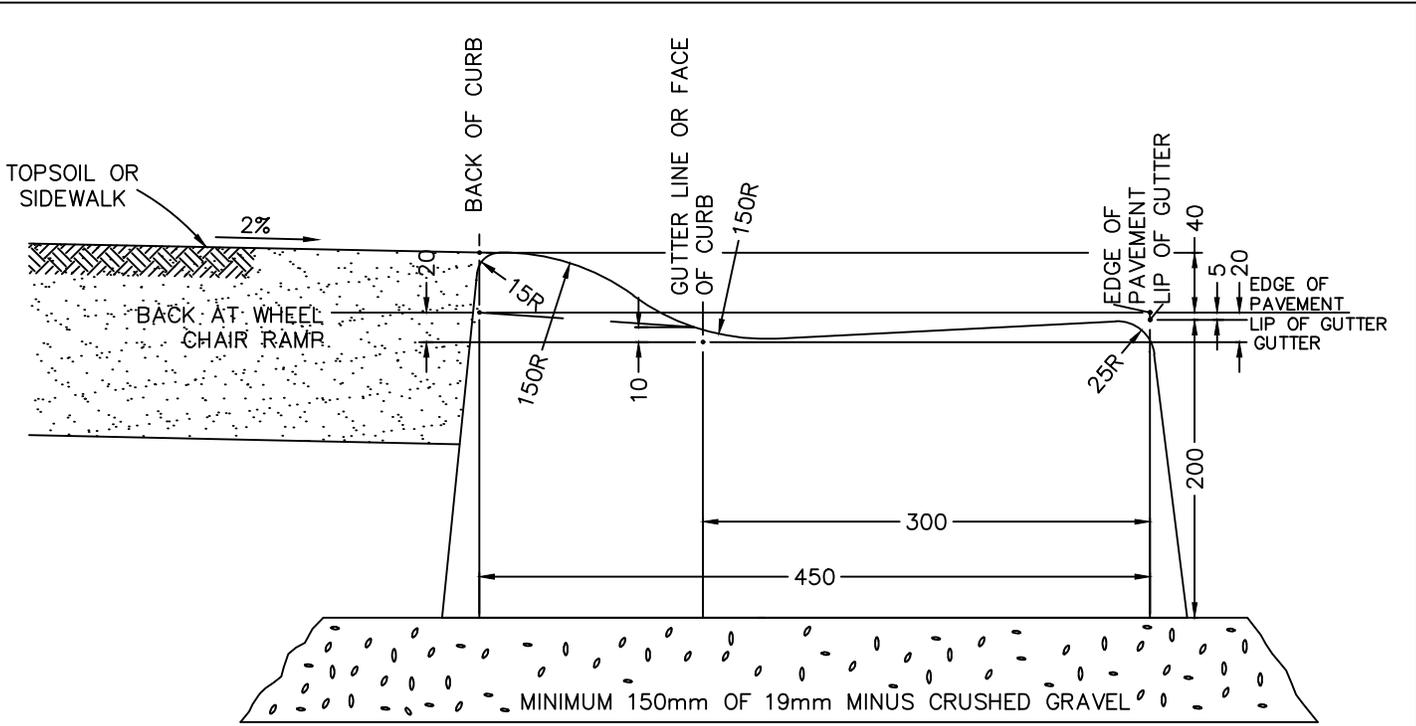


TOWN OF OLIVER

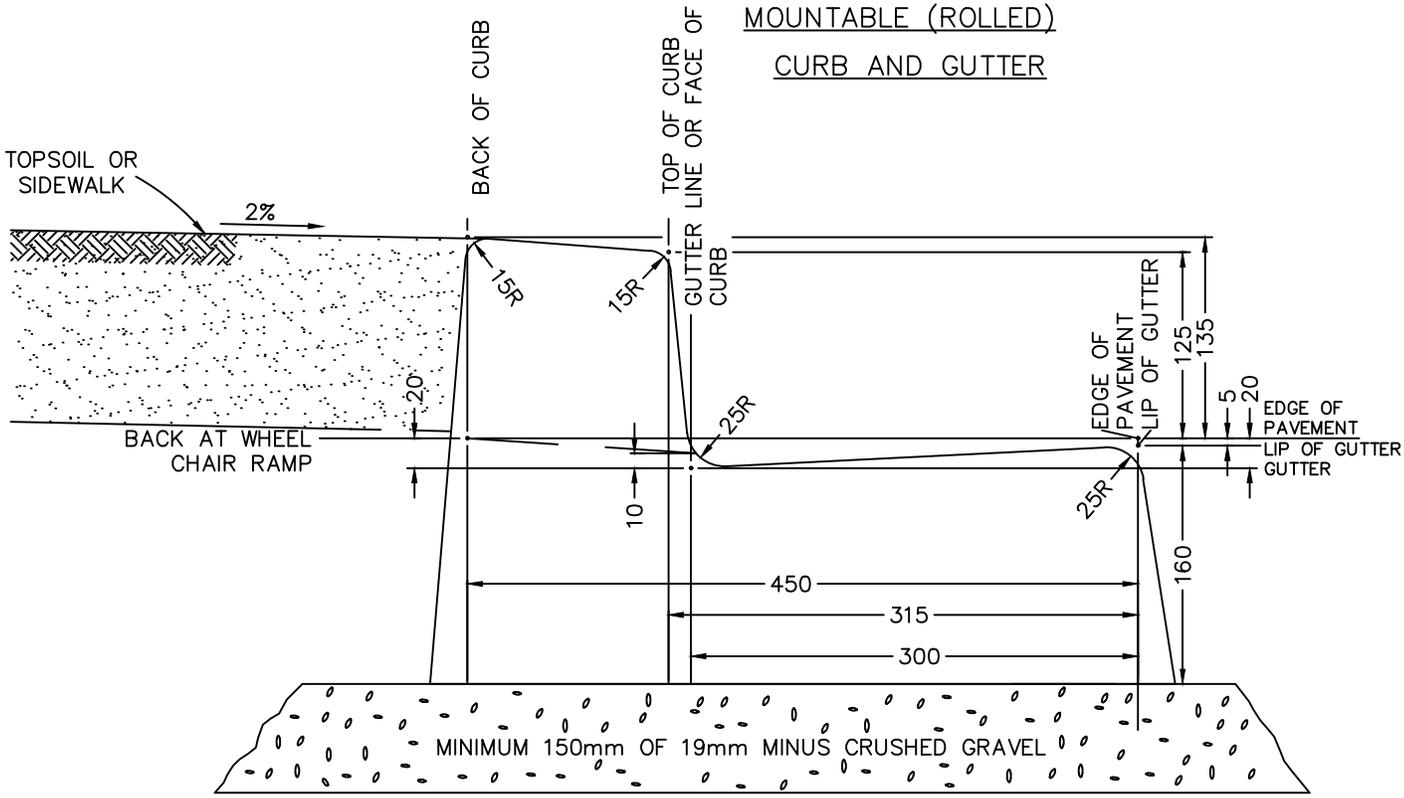
RESIDENTIAL CUL-DE-SAC



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-6	1



MOUNTABLE (ROLLED)
CURB AND GUTTER



NOTE: ALL COMPACTION TO MINIMUM 100%
OF OPTIMUM DRY DENSITY

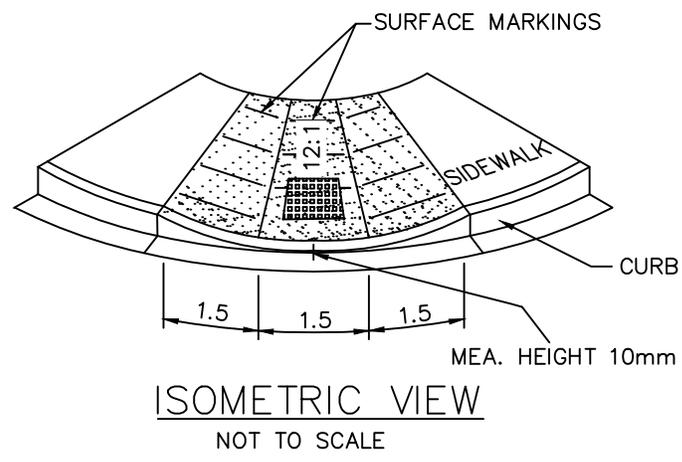
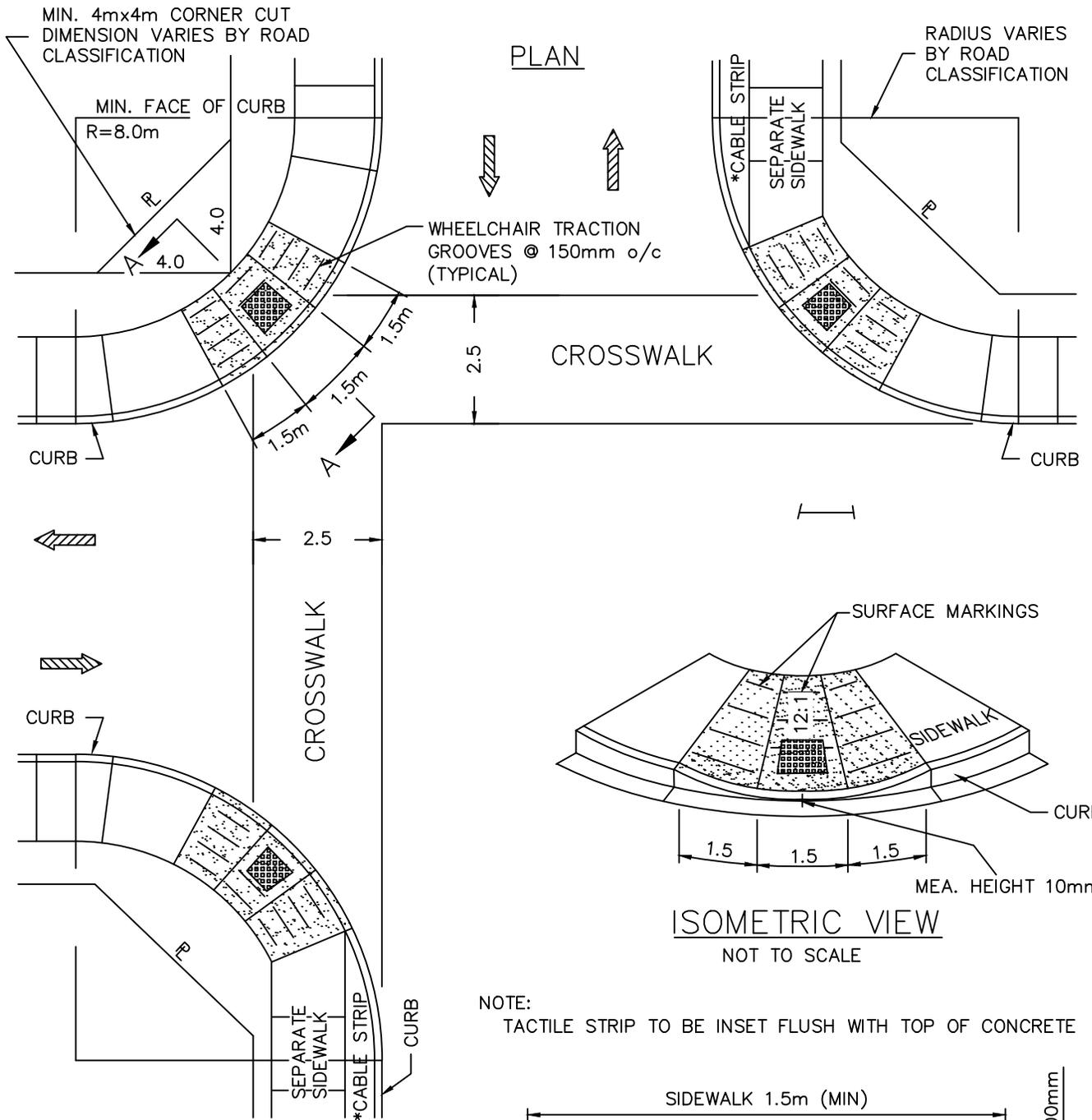
BARRIER (STANDARD)
CURB AND GUTTER

TOWN OF OLIVER

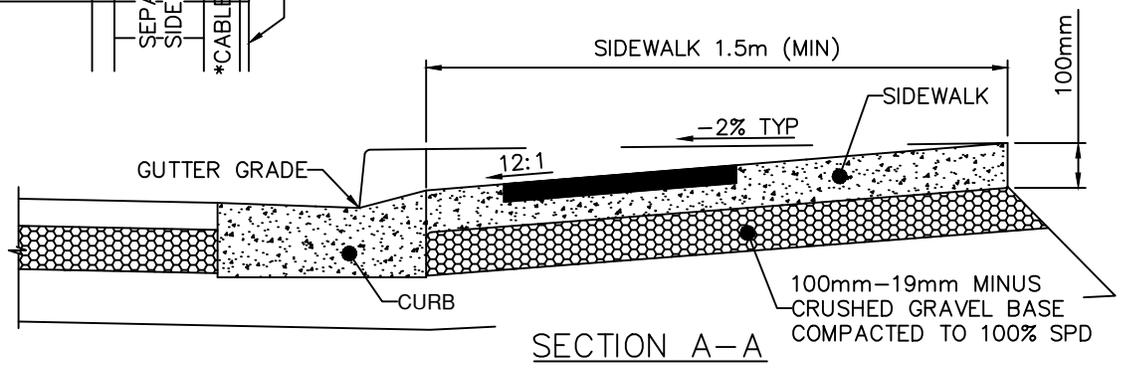
TYPICAL CURB TYPES



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-7	1

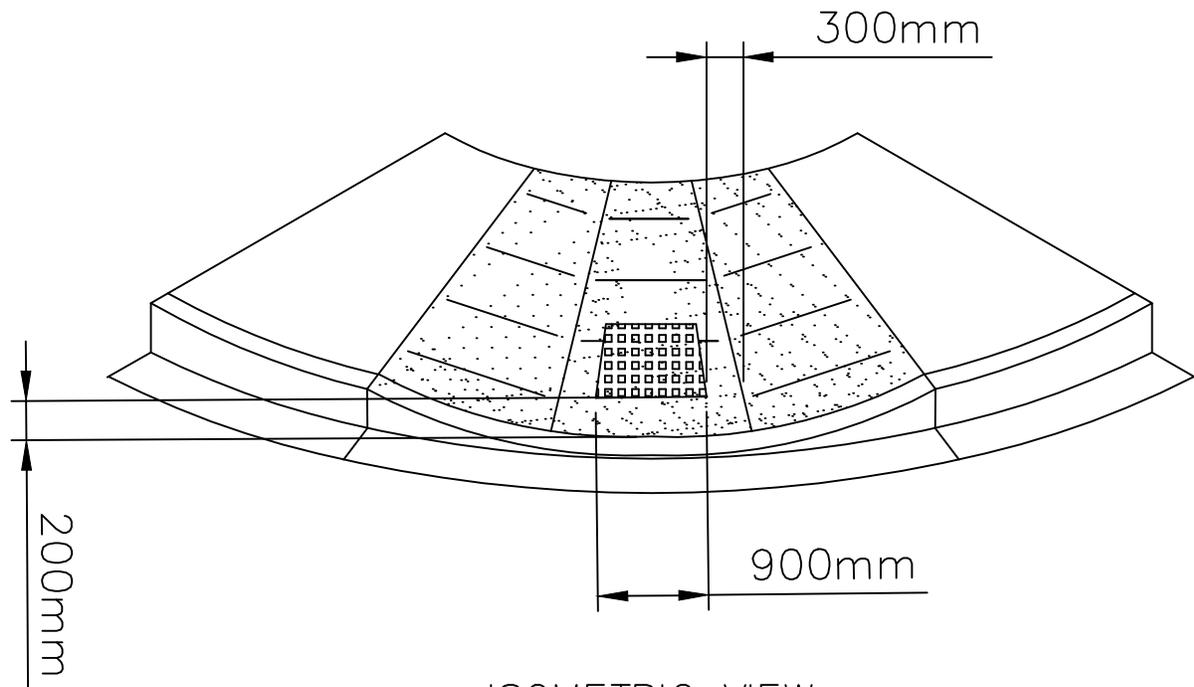


NOTE:
TACTILE STRIP TO BE INSET FLUSH WITH TOP OF CONCRETE

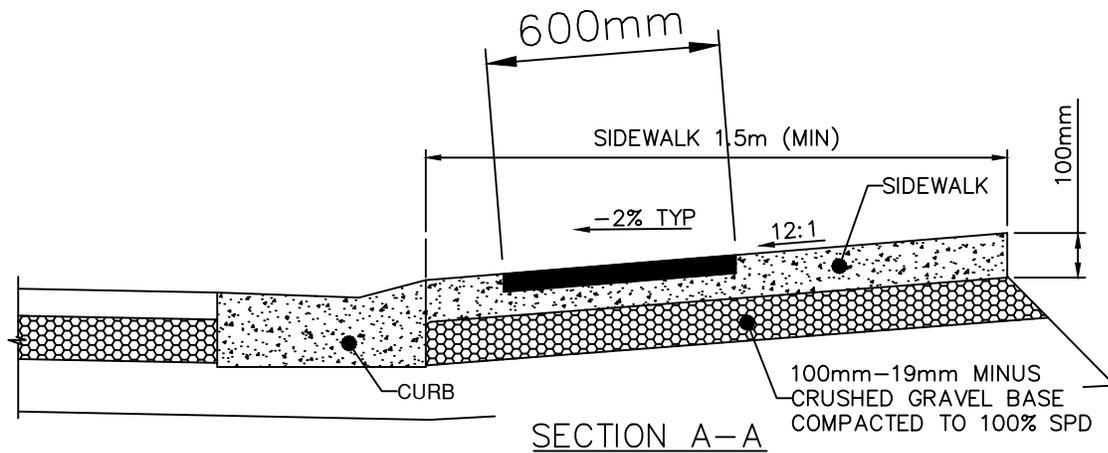


* CABLE STRIP ONLY REQUIRED WHEN SPECIFIED

TOWN OF OLIVER				DWN. BY: JOSEPH	
TYPICAL WHEELCHAIR RAMP, CURB RADIUS AND CORNER CUT				CHK. BY: SHAWN	
				DATE: MARCH 2021	
				SCALE: N.T.S.	
		DWG. NO.: R-8		REV.: 1	



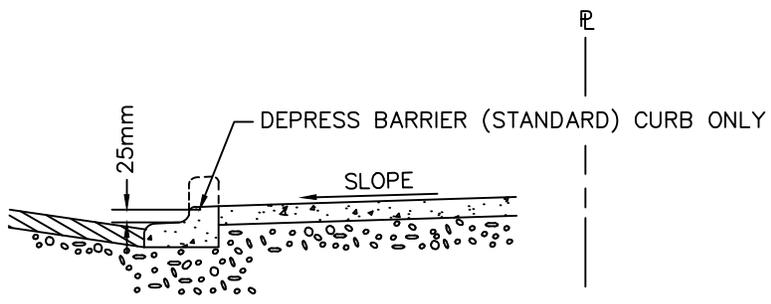
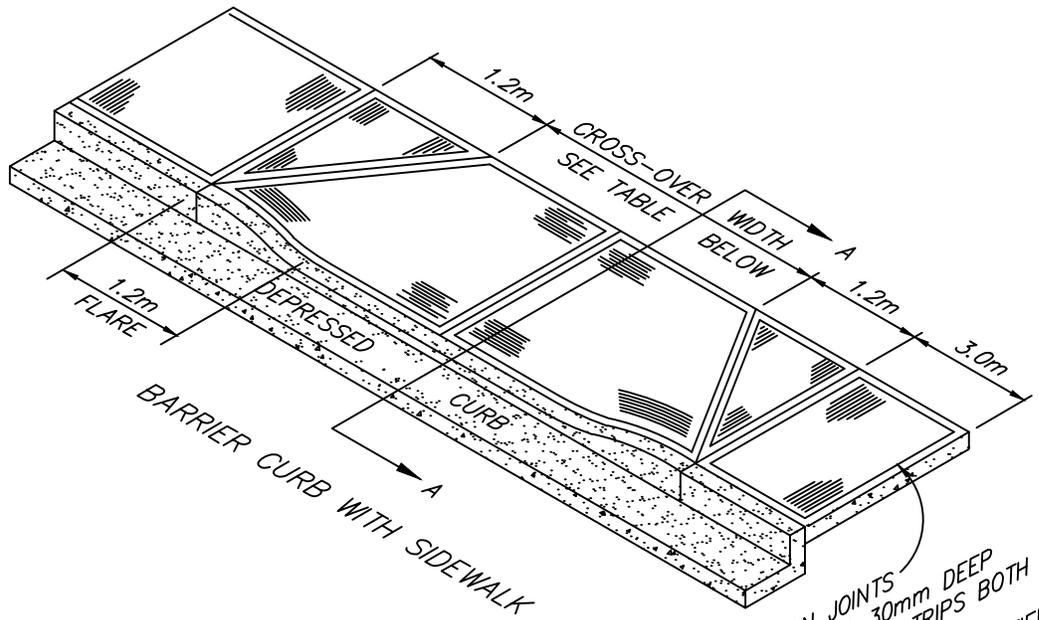
ISOMETRIC VIEW
NOT TO SCALE



TOWN OF OLIVER
TYPICAL WHEELCHAIR RAMP,
WITH TACTILE STRIP



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-8B	1



SECTION A - A

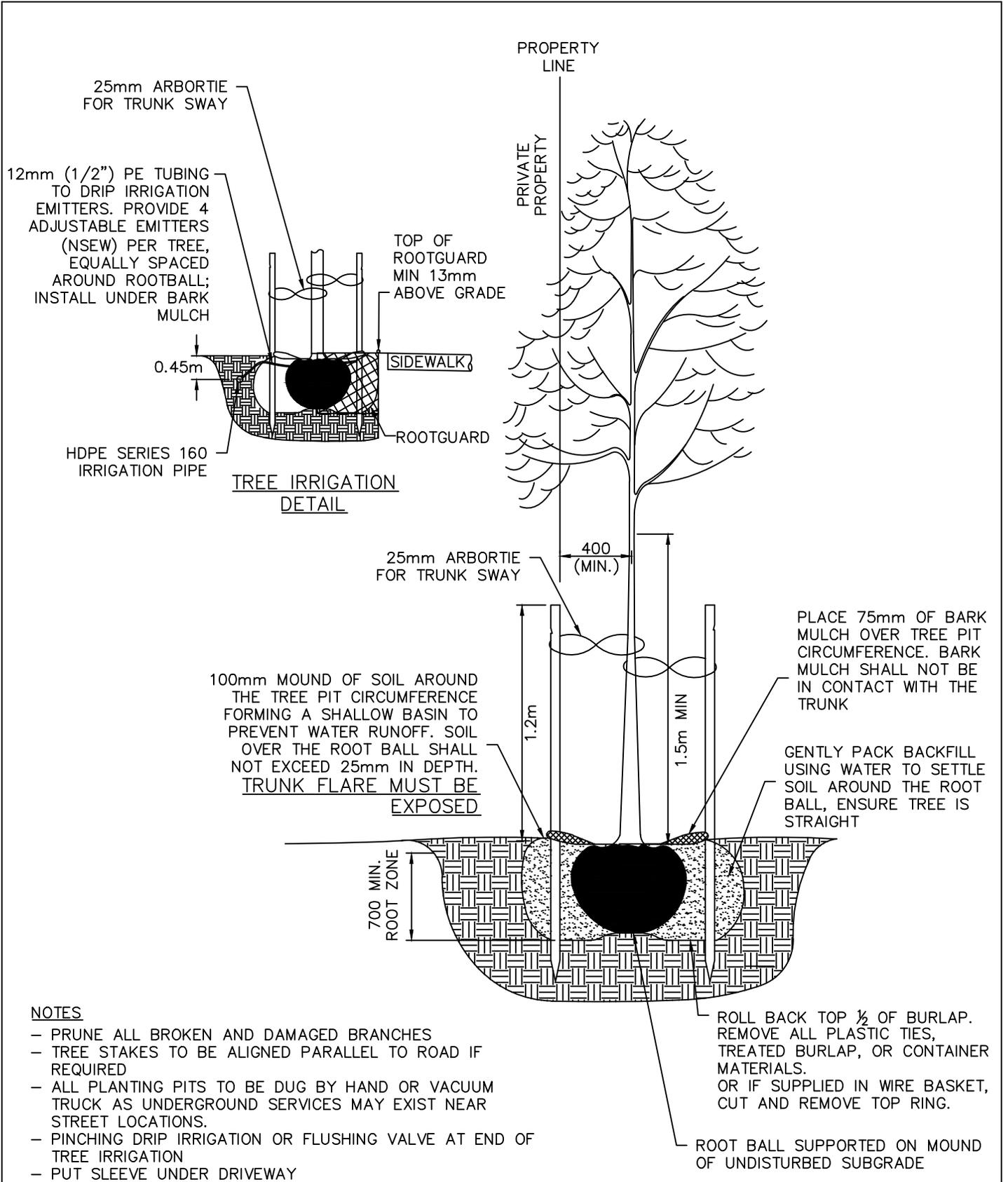
- MINIMUM DISTANCES OR EQUAL CLEARANCE
REQUIRED FROM TOP OF FLARE TO:
- A) SIDE PROPERTY LINE = 0.3m
 - B) FLANKING PROPERTY LINE AT CORNERS = 10m
 - C) BETWEEN CROSS-OVERS = 1.0m
 - D) HYDRANTS OR STREET SIGNS = 1.0m

CROSS - OVER	COMMERCIAL	RESIDENTIAL	LANES
MIN. WIDTH	6.7m	4.0m	5.0m
MAX. WIDTH	9.0m	9.0m	5.0m
THICKNESS OF CONC.	190mm	140mm	190mm
REINFORCING	15M @ 300 o/c EACH WAY	NONE REQ'D	-

TOWN OF OLIVER
SIDEWALK CROSS-OVER
& FINISHING DETAILS



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-9	1

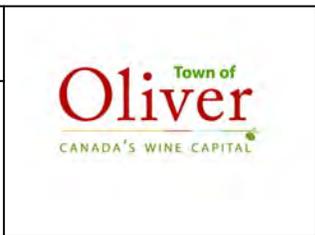


NOTES

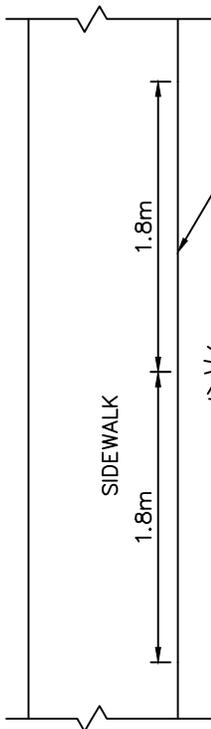
- PRUNE ALL BROKEN AND DAMAGED BRANCHES
- TREE STAKES TO BE ALIGNED PARALLEL TO ROAD IF REQUIRED
- ALL PLANTING PITS TO BE DUG BY HAND OR VACUUM TRUCK AS UNDERGROUND SERVICES MAY EXIST NEAR STREET LOCATIONS.
- PINCHING DRIP IRRIGATION OR FLUSHING VALVE AT END OF TREE IRRIGATION
- PUT SLEEVE UNDER DRIVEWAY

TOWN OF OLIVER

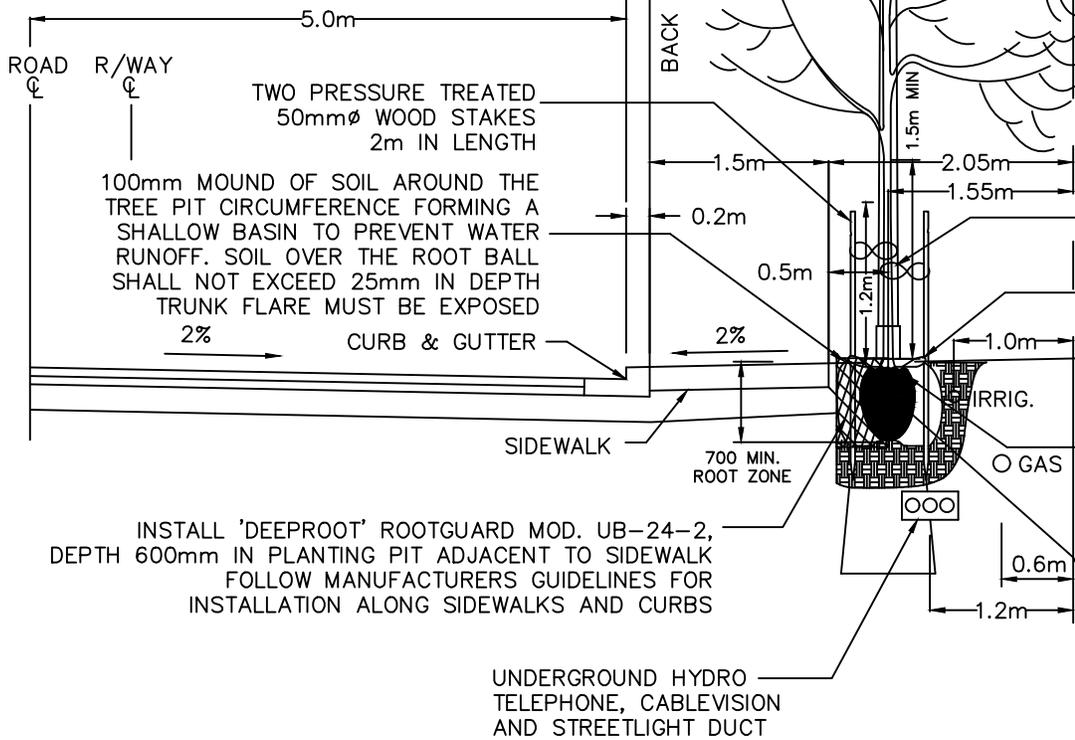
TYPICAL TREE PLANTING DETAIL
SOFTSCAPE



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-10	1



PLAN



PROPERTY LINE

NOTES

- PRUNE ALL BROKEN AND DAMAGED BRANCHES.
- IF REQUIRED TREE STAKES TO BE ALIGNED PARALLEL TO ROAD.
- ALL PLANTING PITS SHOULD BE DUG BY HAND OR VACUUM TRUCK AS UNDERGROUND SERVICES MAY EXIST NEAR STREET LOCATIONS.
- TREE CALIPER SHALL BE MINIMUM 50mm DEPENDING ON LOCATION
- REMOVE POT STAKE AND TAPE AROUND TRUNK IF APPLICABLE.
- CONTACT PUBLIC WORKS HORTICULTURIST FOR PRUNING.

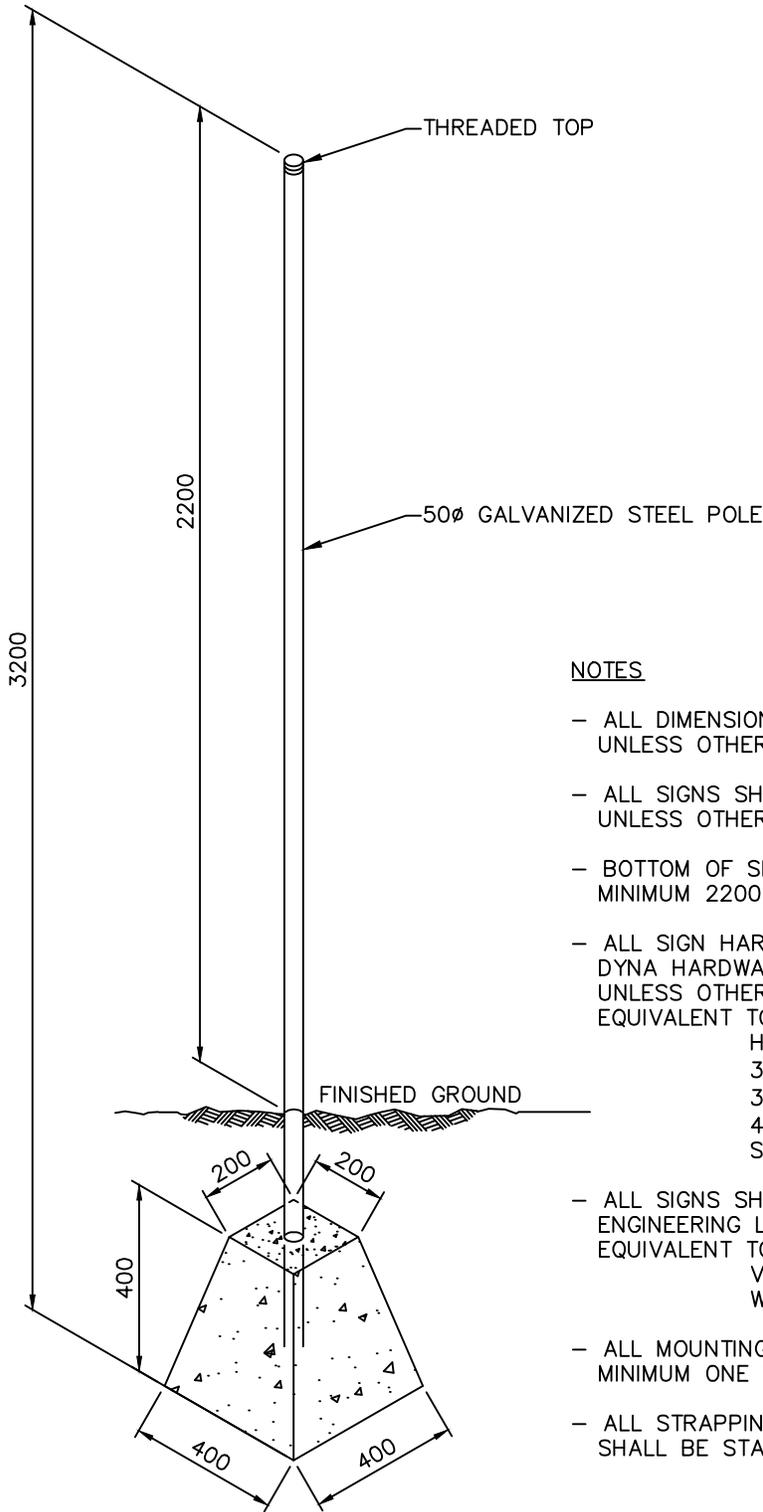
- 25mm ARBORTIE FOR TRUNK SWAY
- PLACE 75mm OF BARK MULCH OVER TREE PIT CIRCUMFERENCE. BARK MULCH SHALL NOT BE IN CONTACT WITH THE TRUNK
- ROLL BACK TOP 1/2 OF BURLAP. REMOVE ALL PLASTIC TIES, TREATED BURLAP, OR CONTAINER MATERIALS. OR IF SUPPLIED IN WIRE BASKET, CUT & REMOVE TOP RING.
- ROOT BALL SUPPORTED ON MOUND OF UNDISTURBED SUBGRADE ROOTS MUST BE EXPOSED

TOWN OF OLIVER

TYPICAL BOULEVARD TREE PLANTING



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-11	1



NOTES

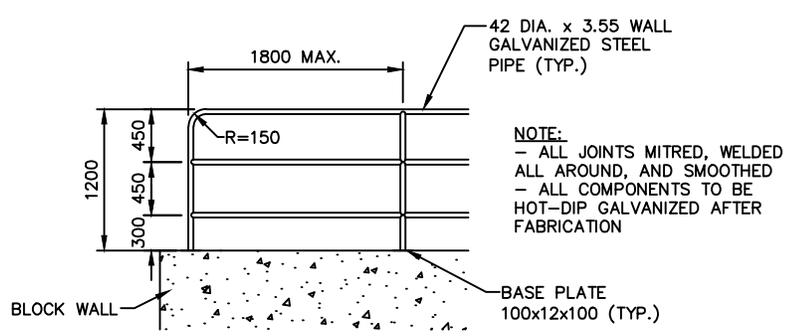
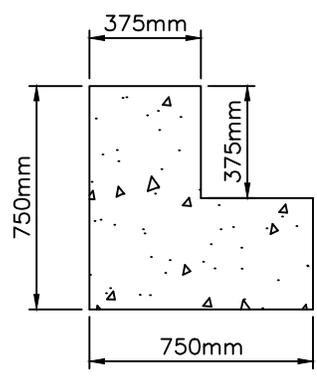
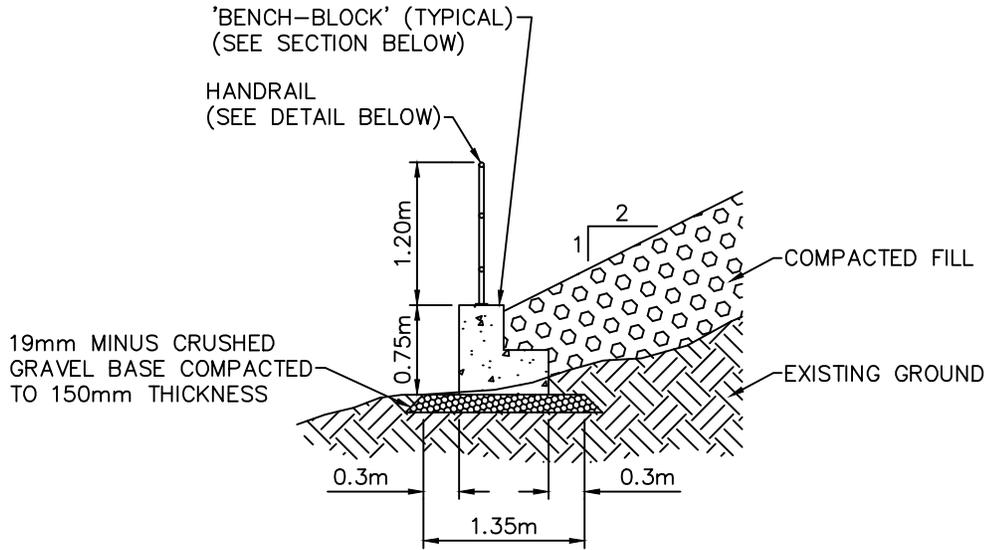
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
- ALL SIGNS SHALL BE HIGH INTENSITY GRADE UNLESS OTHERWISE NOTED.
- BOTTOM OF SIGN SHALL BE MINIMUM 2200 ABOVE FINISHED GROUND.
- ALL SIGN HARDWARE SHALL BE STAINLESS STEEL DYNA HARDWARE ENGINEERING LTD. UNLESS OTHERWISE NOTED.
EQUIVALENT TO THE FOLLOWING PART NUMBERS:
HS-1-SS - SIGN TO POST BRACKET
3-CA90 (SS) - SIGN CROSS PIECE
3-RA238 (SS) - POST TOP MOUNT
4-CA45 (SS) - SIGN HOLDER
SS-10CC7 AND SS-10CC8 BRACKE
- ALL SIGNS SHALL BE MOUNTED WITH DYNA HARDWARE ENGINEERING LTD. UNLESS OTHERWISE NOTED.
EQUIVALENT TO THE FOLLOWING PART NUMBERS:
VN-38ALBK - VANDAL RESISTANT NUTS
WA-38NL1 - NYLON WASHERS
- ALL MOUNTING BRACKETS SHALL INCLUDE MINIMUM ONE VANDAL RESISTANT NUT PER BRACKET.
- ALL STRAPPING, MOUNTS AND BUCKLES, WHERE REQUIRED, SHALL BE STAINLESS STEEL.

TOWN OF OLIVER

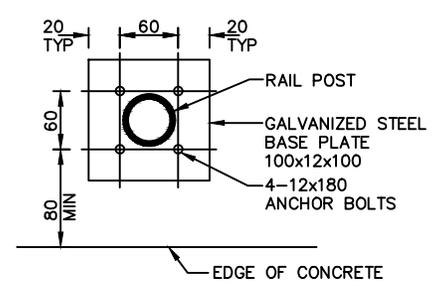
STANDARD STREET SIGN AND BASE



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-12	1



HANDRAIL DETAIL
(NTS)

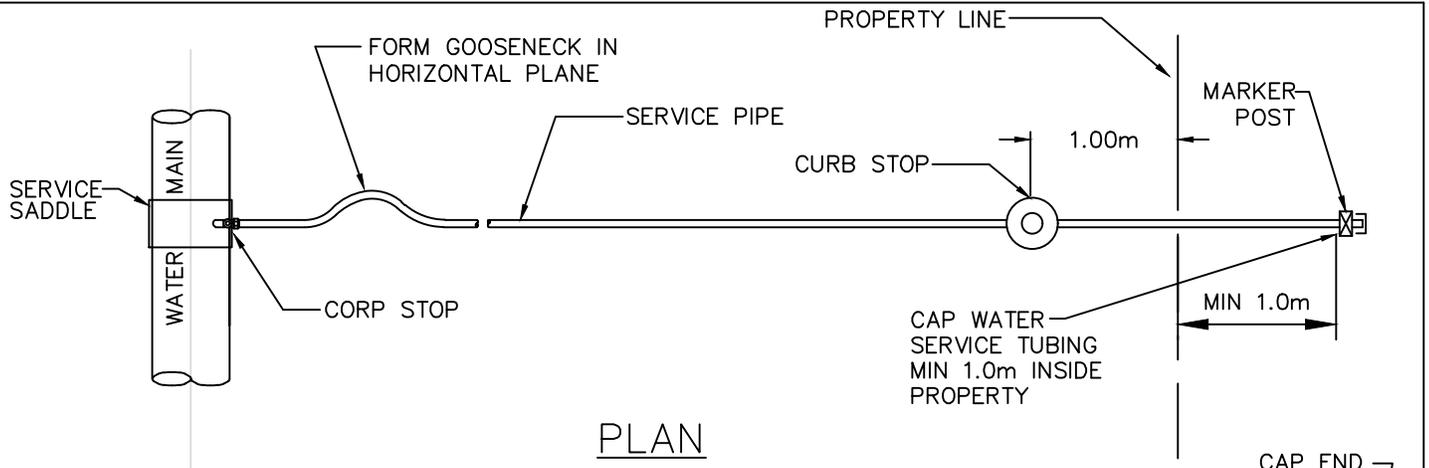


HANDRAIL MOUNTING
DETAIL
(NTS)

TOWN OF OLIVER
'BENCH-BLOCK' WALL
WITH
HANDRAIL DETAIL



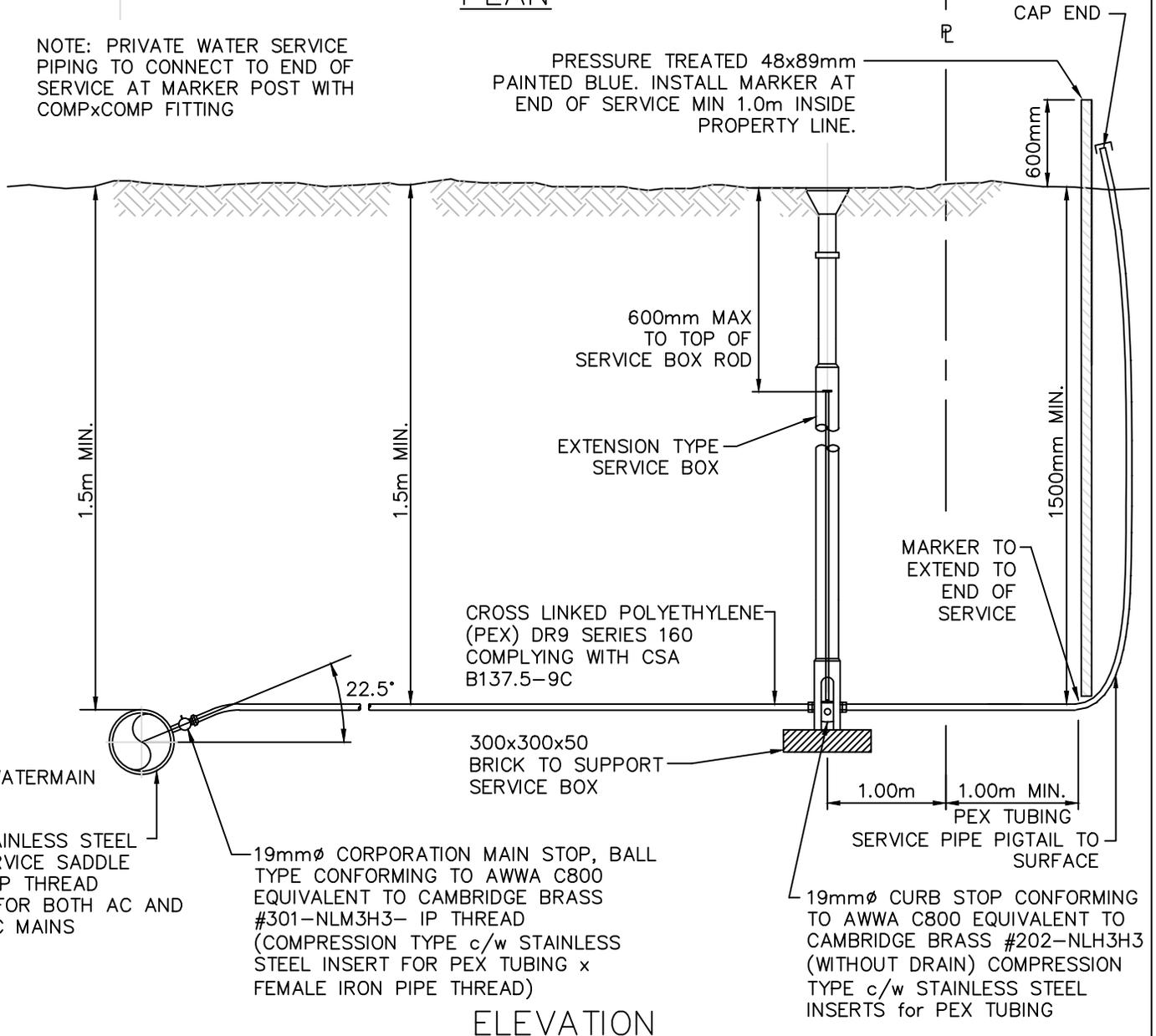
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
R-13	1



PLAN

NOTE: PRIVATE WATER SERVICE PIPING TO CONNECT TO END OF SERVICE AT MARKER POST WITH COMPxCOMP FITTING

PRESSURE TREATED 48x89mm PAINTED BLUE. INSTALL MARKER AT END OF SERVICE MIN 1.0m INSIDE PROPERTY LINE.



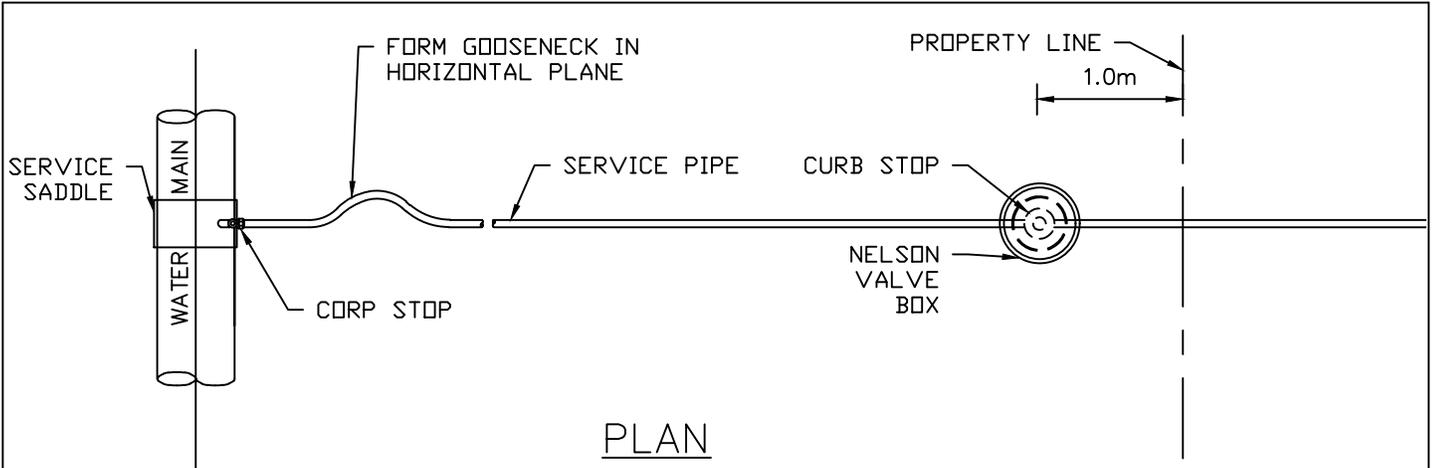
ELEVATION

TOWN OF OLIVER

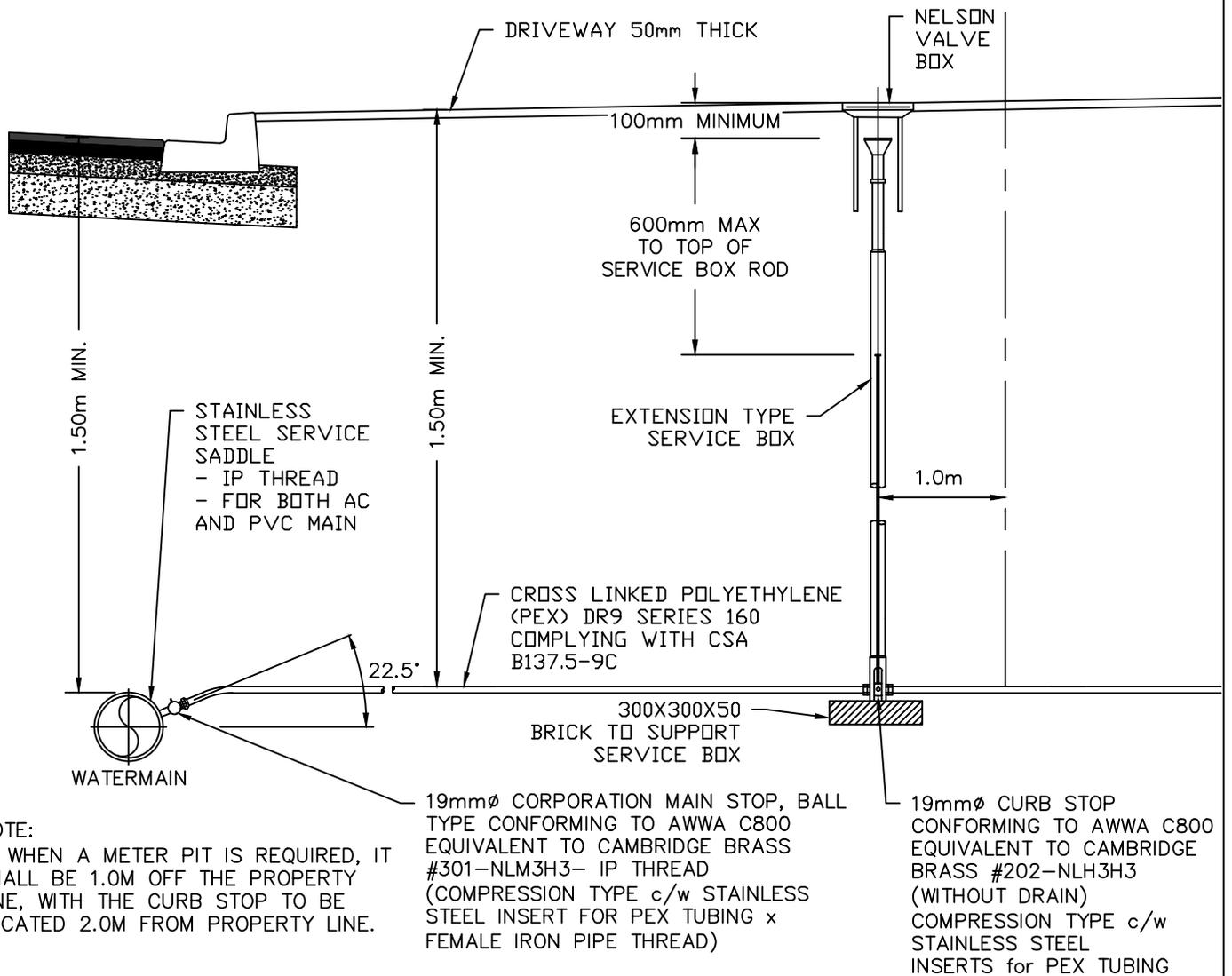
TYPICAL DOMESTIC WATER SERVICE



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: JUNE 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-1	1



PLAN



ELEVATION

NOTE:

1) WHEN A METER PIT IS REQUIRED, IT SHALL BE 1.0M OFF THE PROPERTY LINE, WITH THE CURB STOP TO BE LOCATED 2.0M FROM PROPERTY LINE.

19mmØ CORPORATION MAIN STOP, BALL TYPE CONFORMING TO AWWA C800 EQUIVALENT TO CAMBRIDGE BRASS #301-NLM3H3- IP THREAD (COMPRESSION TYPE c/w STAINLESS STEEL INSERT FOR PEX TUBING x FEMALE IRON PIPE THREAD)

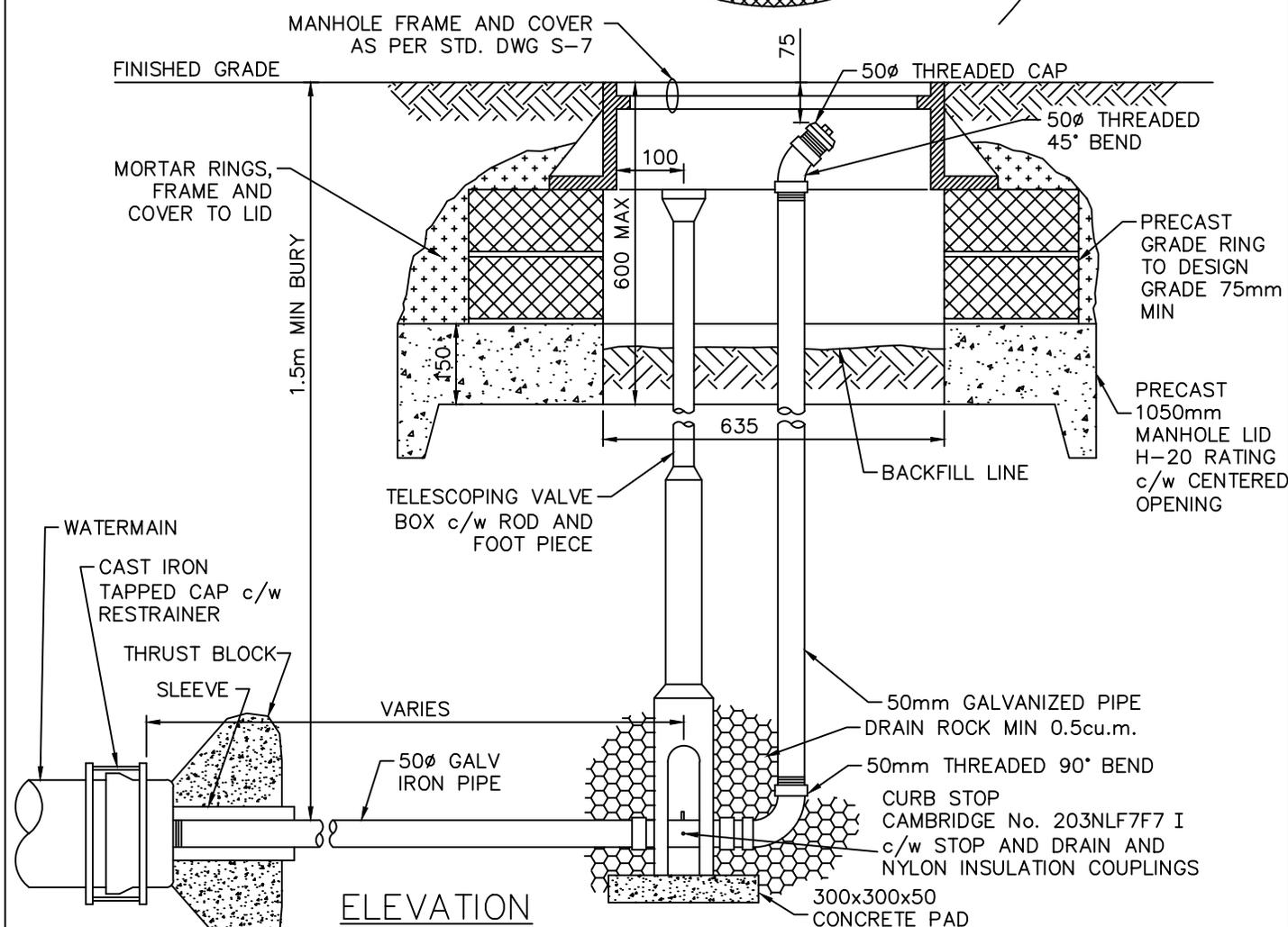
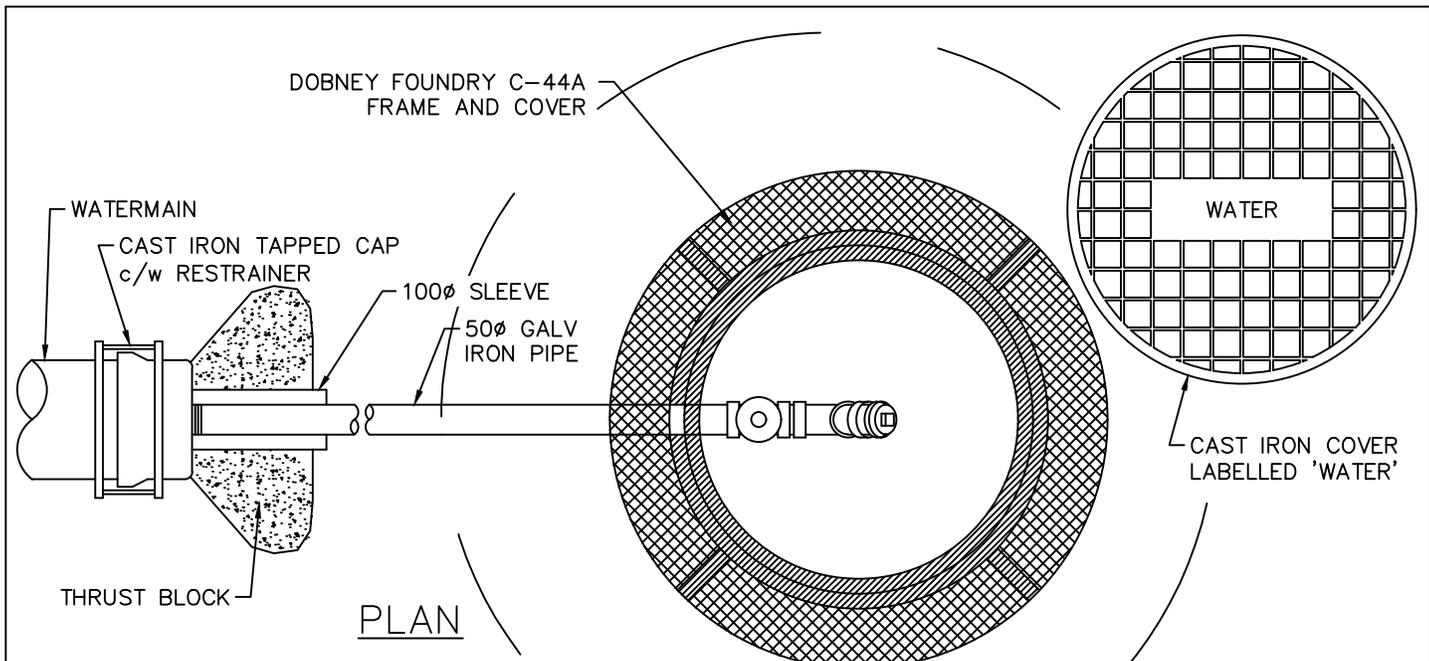
19mmØ CURB STOP CONFORMING TO AWWA C800 EQUIVALENT TO CAMBRIDGE BRASS #202-NLH3H3 (WITHOUT DRAIN) COMPRESSION TYPE c/w STAINLESS STEEL INSERTS FOR PEX TUBING

TOWN OF OLIVER

TYPICAL DOMESTIC WATER SERVICE FOR TRAFFIC AREAS AND DRIVEWAYS



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.: W-1B	REV.: 1

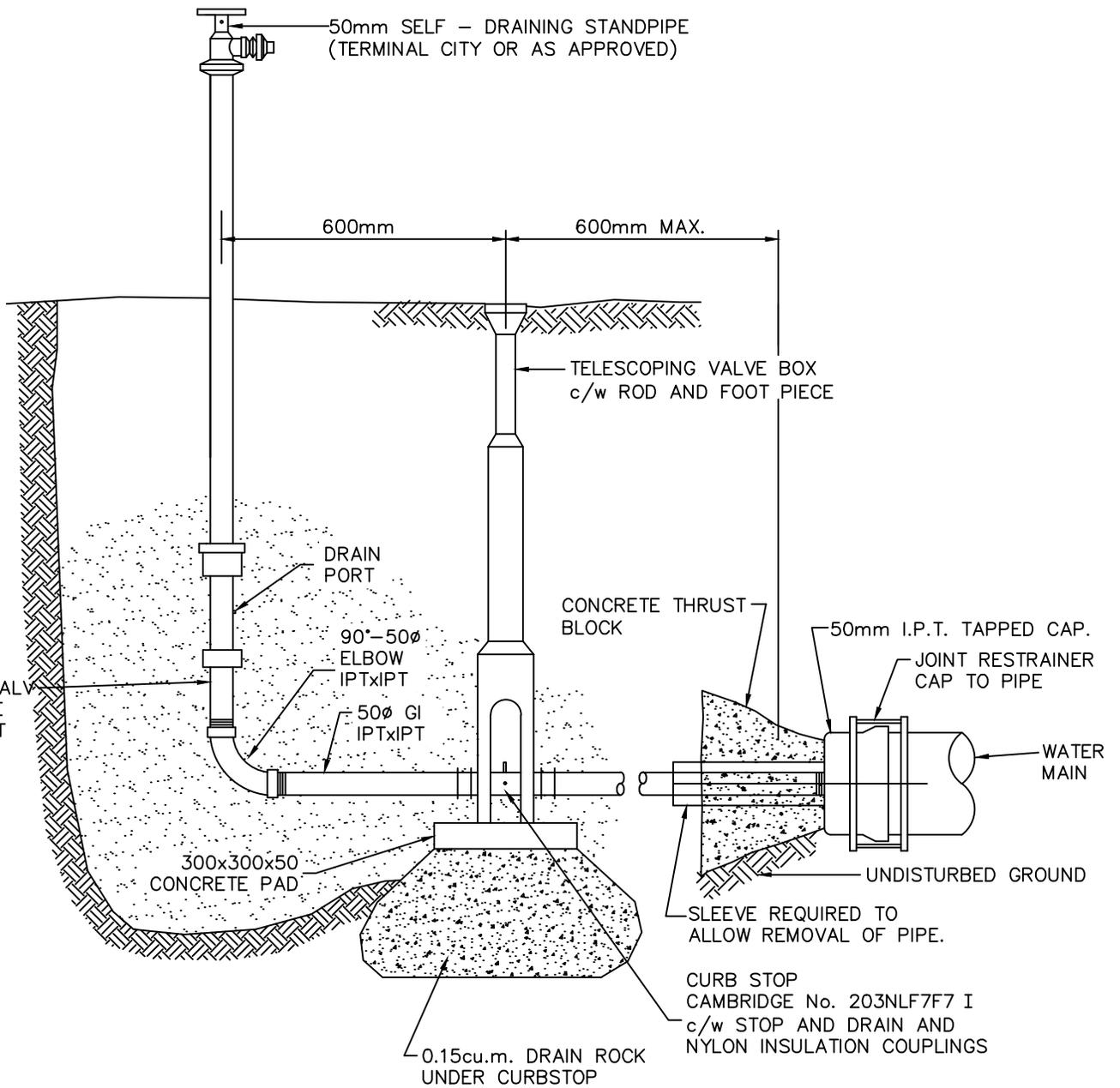


TOWN OF OLIVER

BELOW GRADE BLOW OFF ASSEMBLY



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-2	1

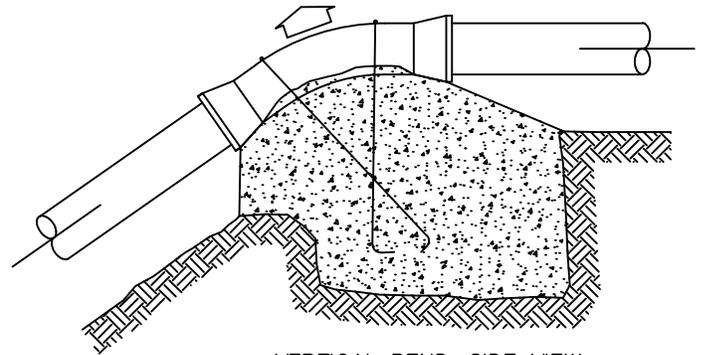
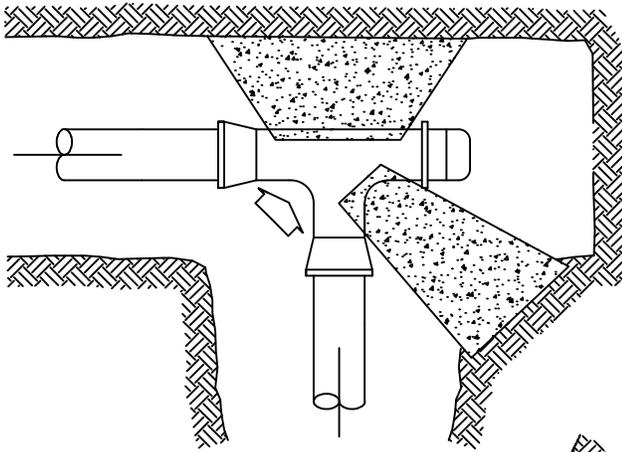
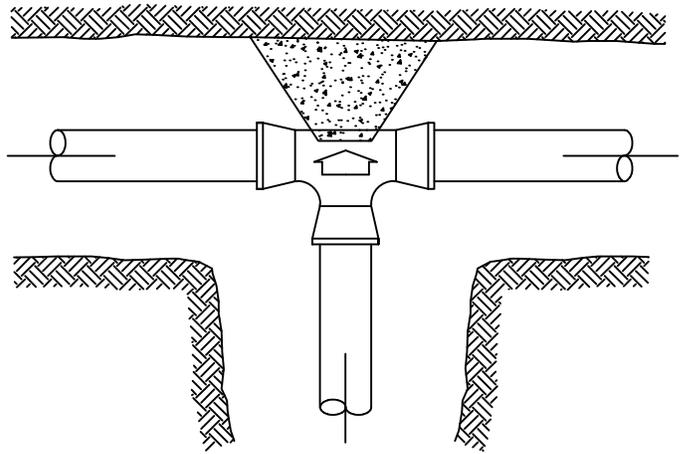
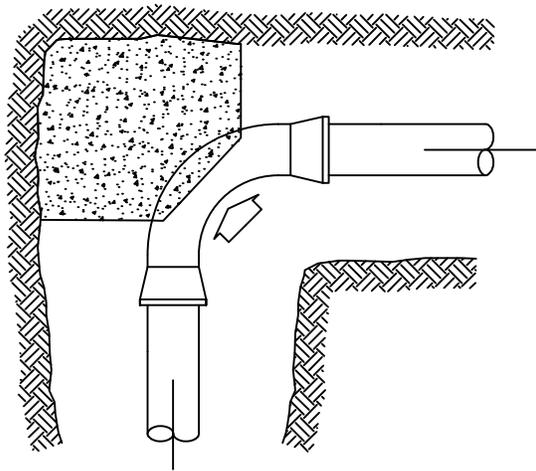


TOWN OF OLIVER

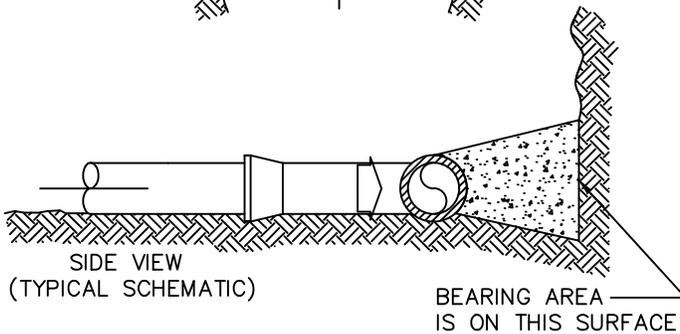
TYPICAL ABOVE GROUND
SELF-DRAINING STANDPIPE



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-4	1



VERTICAL BEND—SIDE VIEW



NOTES:

- DENOTES THRUST DIRECTION
- CONCRETE STRENGTH - 25 MPa @ 28 DAYS
- BEARING AREAS BASED ON 1050 KPa TEST PRESSURES
- FOR GREATER TEST PRESSURES INCREASE BEARING AREA BY RATIO TP/1050
- ALL THRUST BLOCK BEARING AREAS ON UNDISTURBED GROUND.
- BEARING AREA BASED ON SOFT CLAY (0.048 MPa OR 1000 LBS/FT²)
- INSTALL 6mil POLY BETWEEN CONCRETE AND FITTING

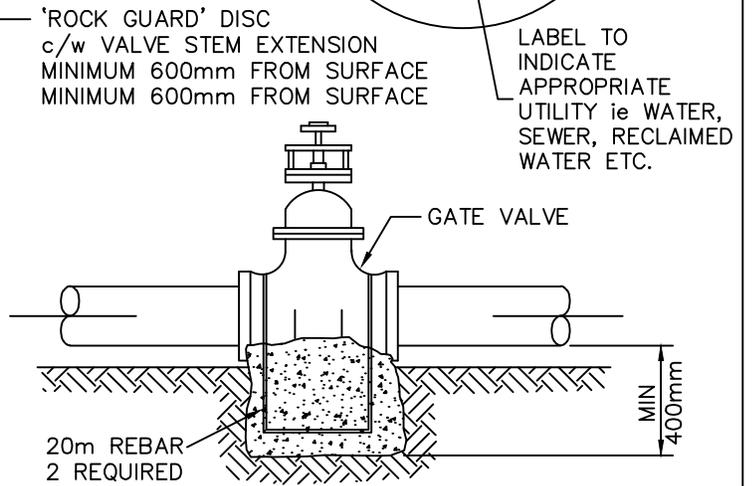
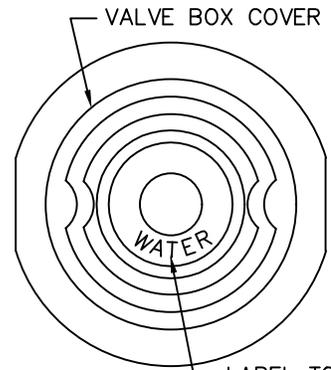
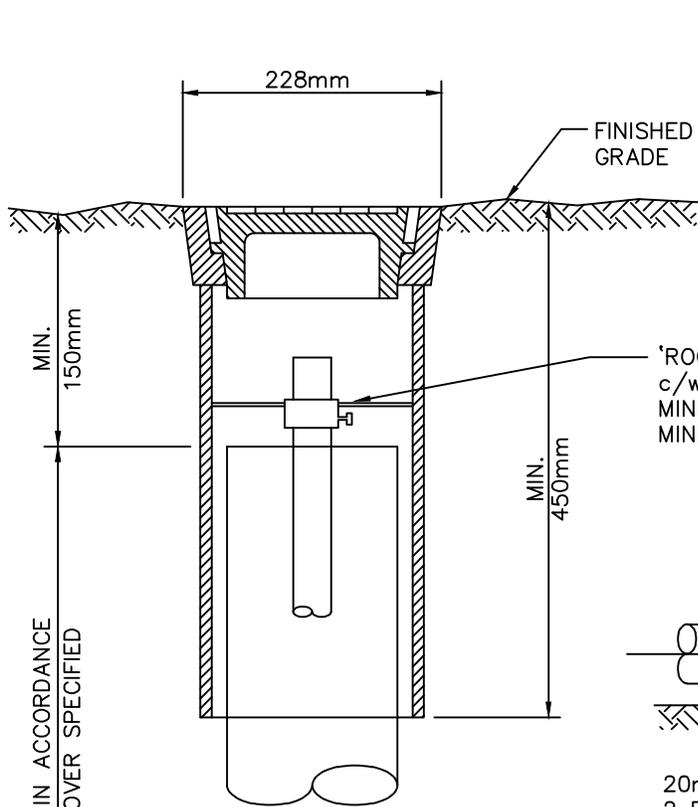
THRUST BLOCK BEARING AREA IN m ²				
PIPE SIZE	TEES/ DEAD ENDS	90° BENDS	45° BENDS & VERTICAL BEND	22 1/2° BEND & SMALLER
100	0.2	0.3	0.15	0.1
150	0.4	0.6	0.30	0.15
200	0.7	1.0	0.55	0.30
250	1.2	1.6	0.9	0.45
300	1.6	2.2	1.2	0.60

TOWN OF OLIVER

TYPICAL THRUST BLOCK DETAILS

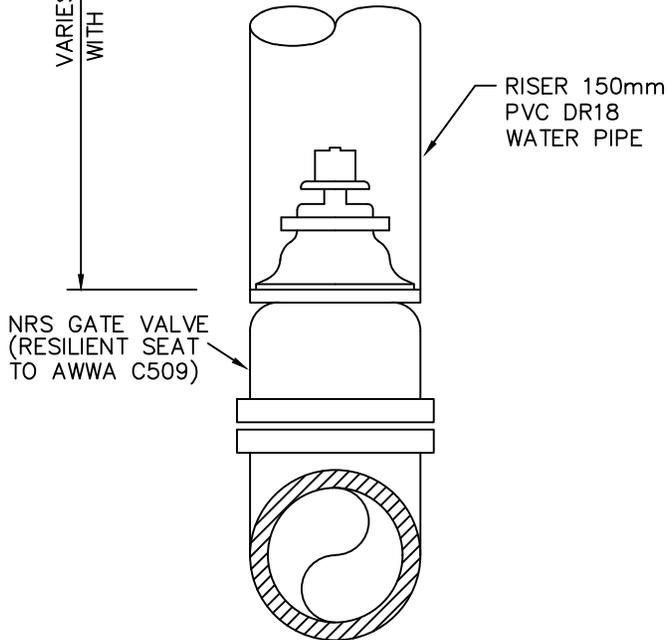


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-5	1

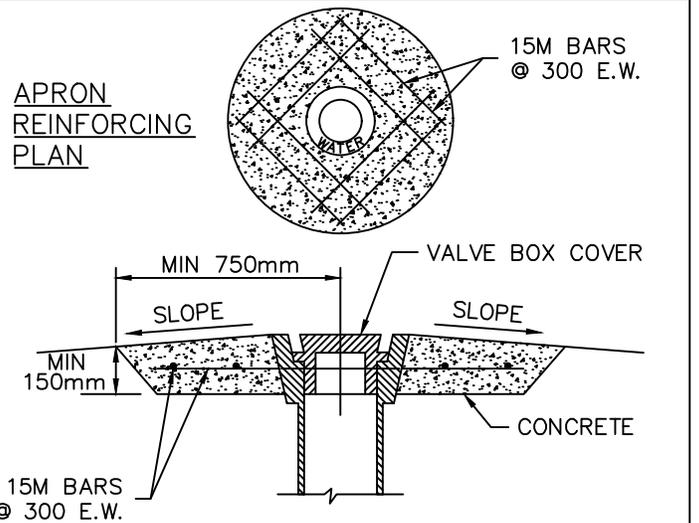


VALVE ANCHORAGE DETAIL

(250mm VALVES and LARGER or WHERE SPECIFIED)



SECTION N.T.S.



CONCRETE APRON DETAIL FOR UNPAVED AREAS

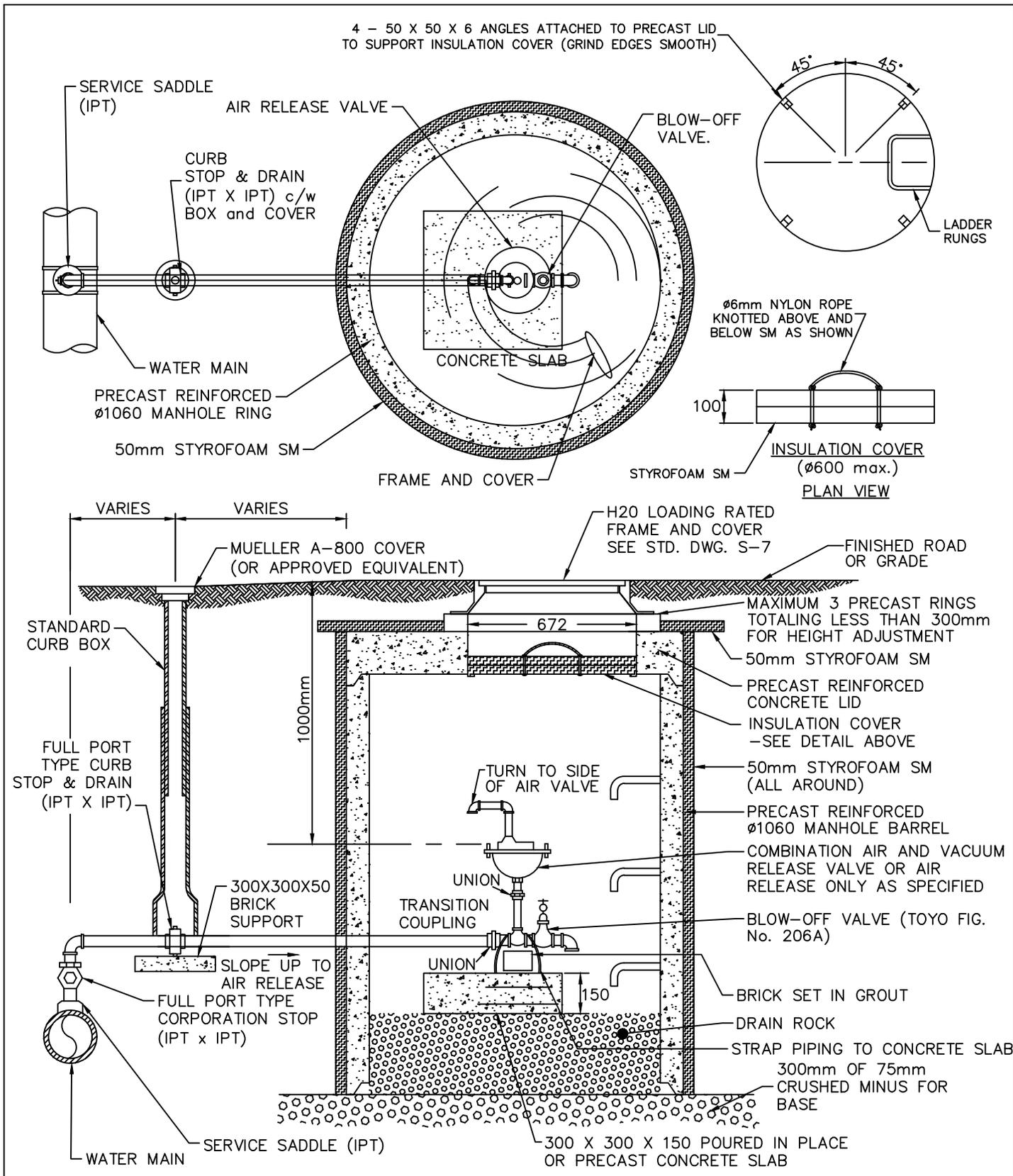
(WHERE SPECIFIED)

TOWN OF OLIVER

TYPICAL VALVE BOX DETAILS

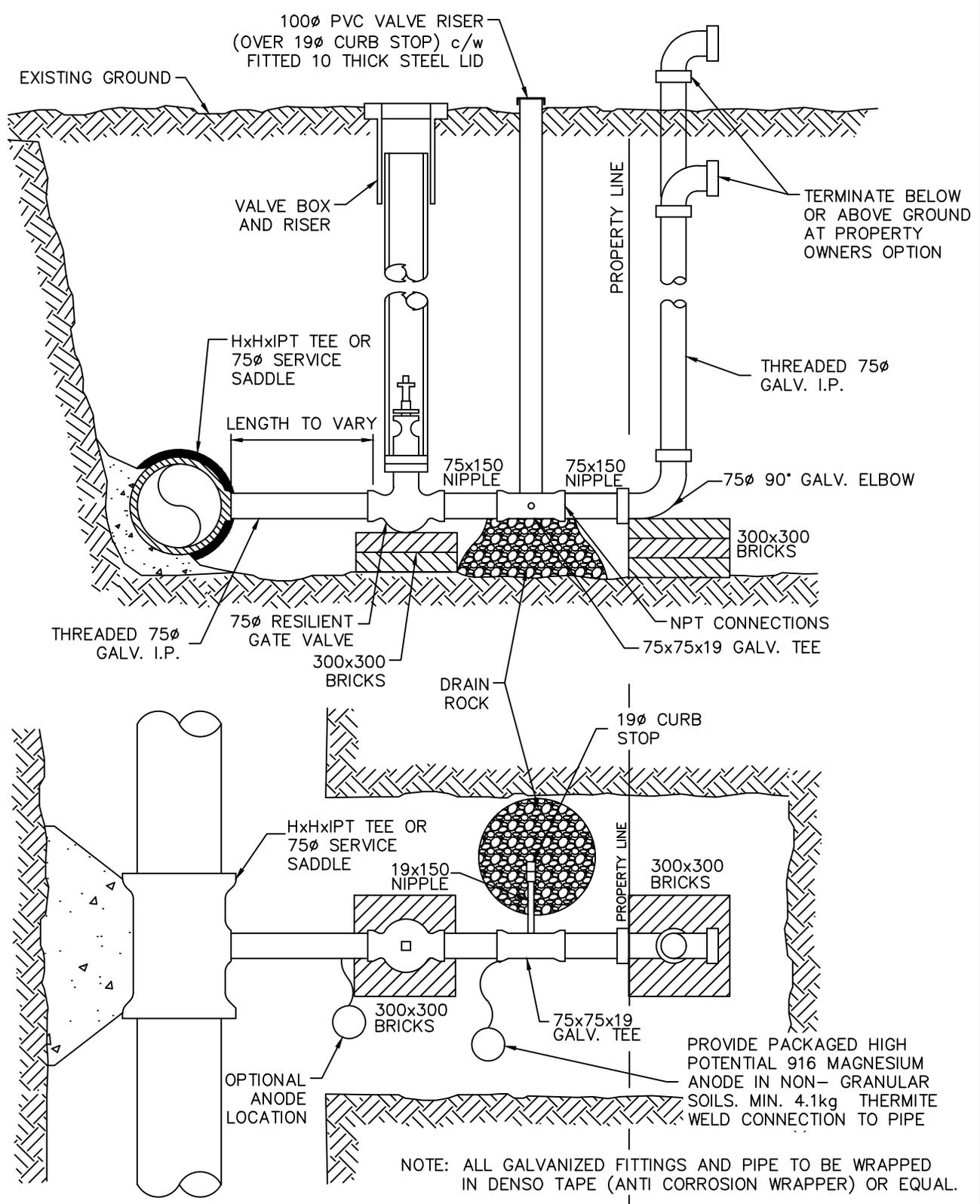


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-6	1



NOTE: ALL PIPING AND FITTINGS TO BE BRASS AND OF SAME SIZE AS SPECIFIED AIR RELEASE VALVE

TOWN OF OLIVER				DWN. BY: JOSEPH	
TYPICAL AIR RELEASE VALVE INSTALLATION				CHK. BY: SHAWN	
		DATE: MARCH 2021			
		SCALE: N.T.S.			
		DWG. NO.: W-7	REV.: 1		

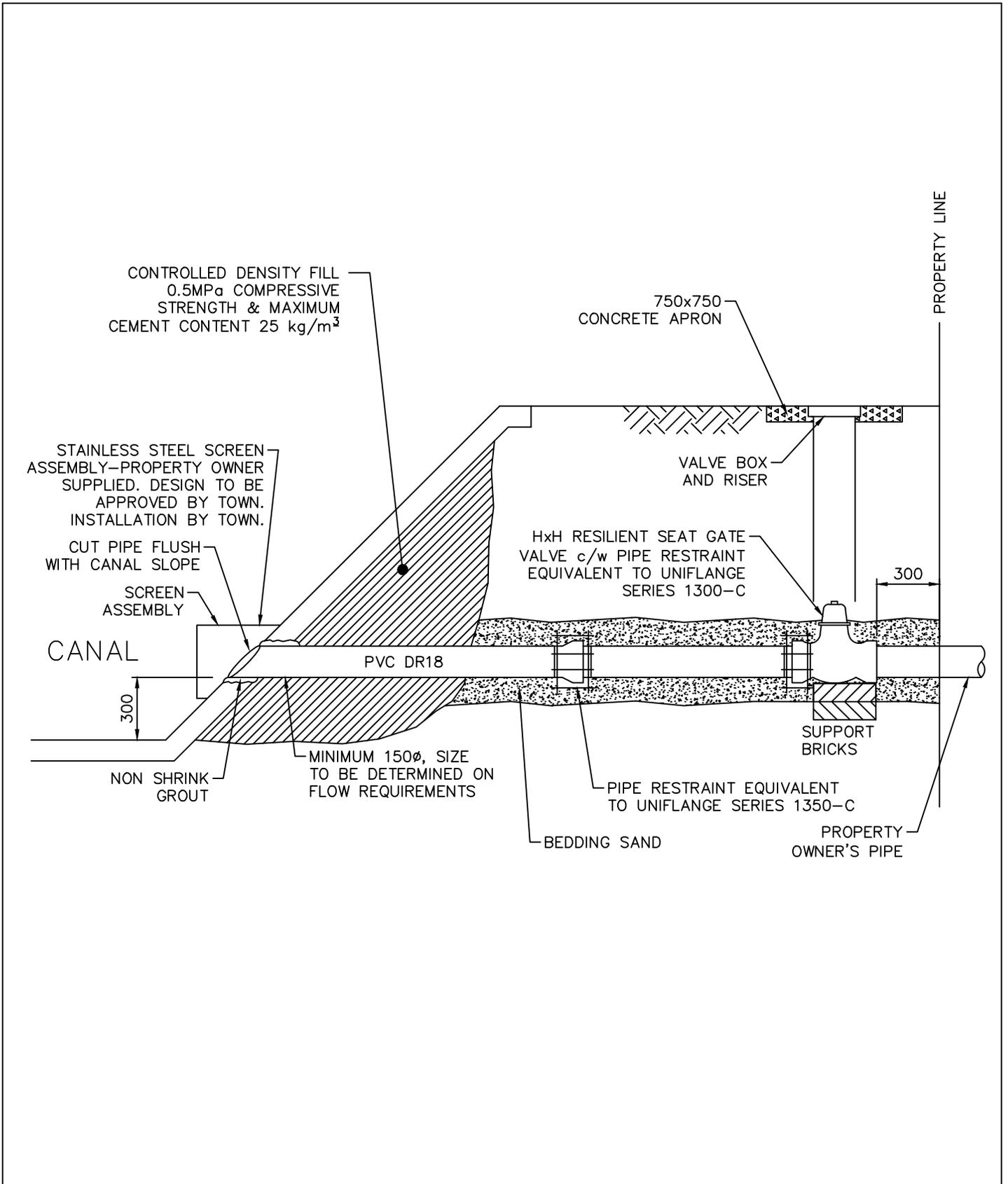


TOWN OF OLIVER

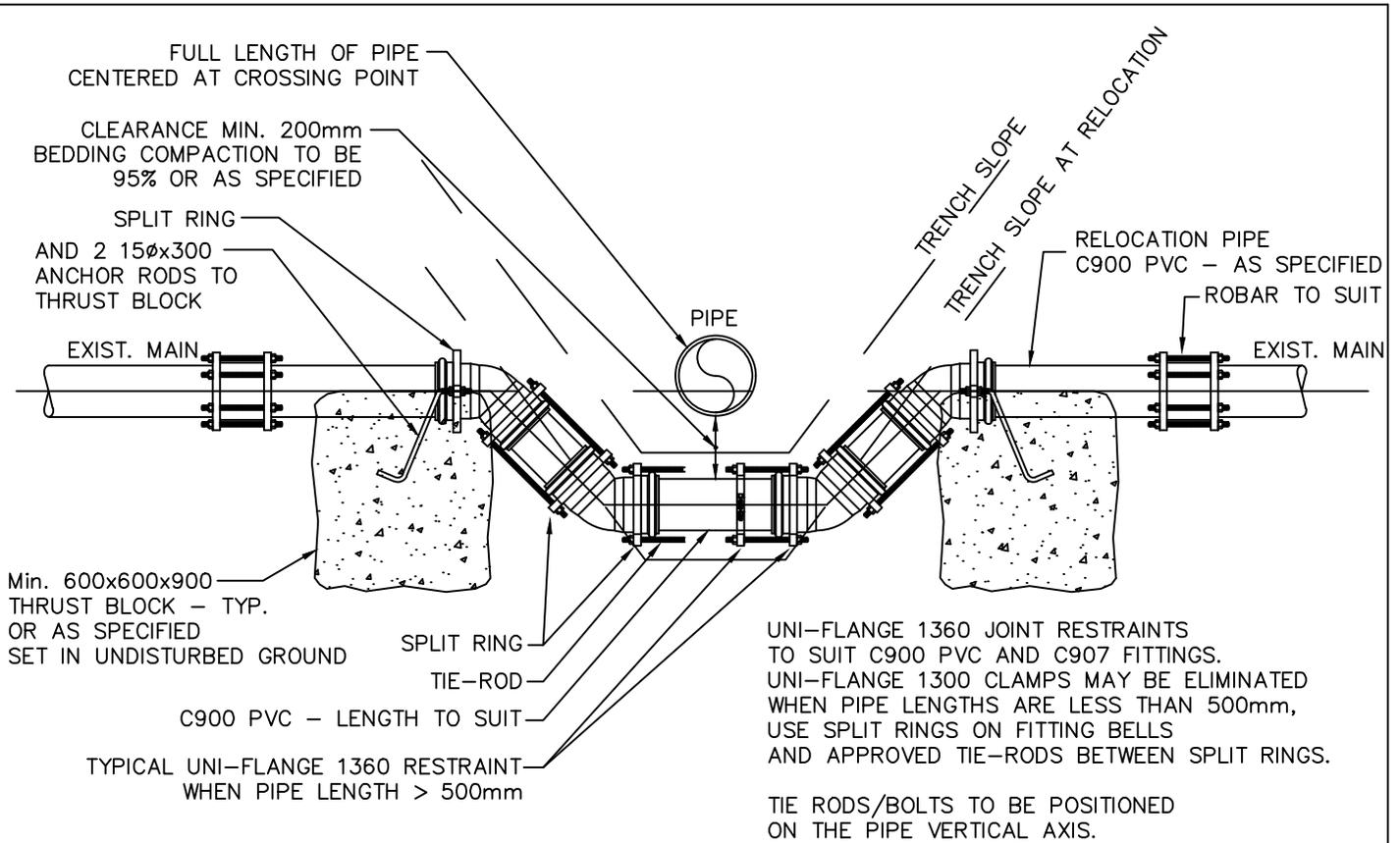
TYPICAL 75 ϕ
RURAL IRRIGATION SERVICE



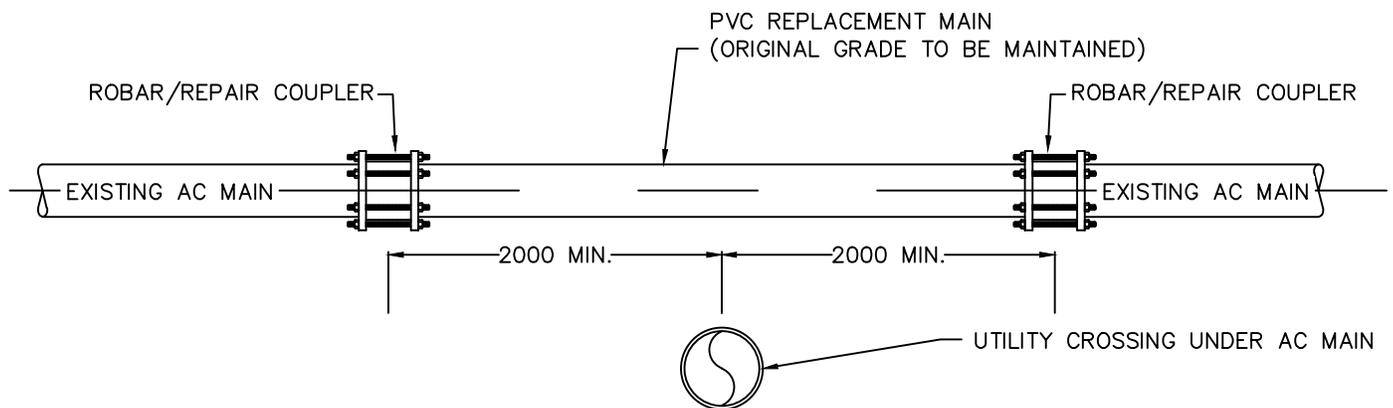
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-8	1



TOWN OF OLIVER			DWN. BY: JOSEPH	
TYPICAL LOW PRESSURE IRRIGATION SERVICE FROM CANAL			CHK. BY: SHAWN	
		DATE: MARCH 2021		
		SCALE: N.T.S.		
		DWG. NO.:	REV.:	
		W-9	1	



RELOCATION UNDER UTILITY



REPLACEMENT OVER UTILITY

NOTES

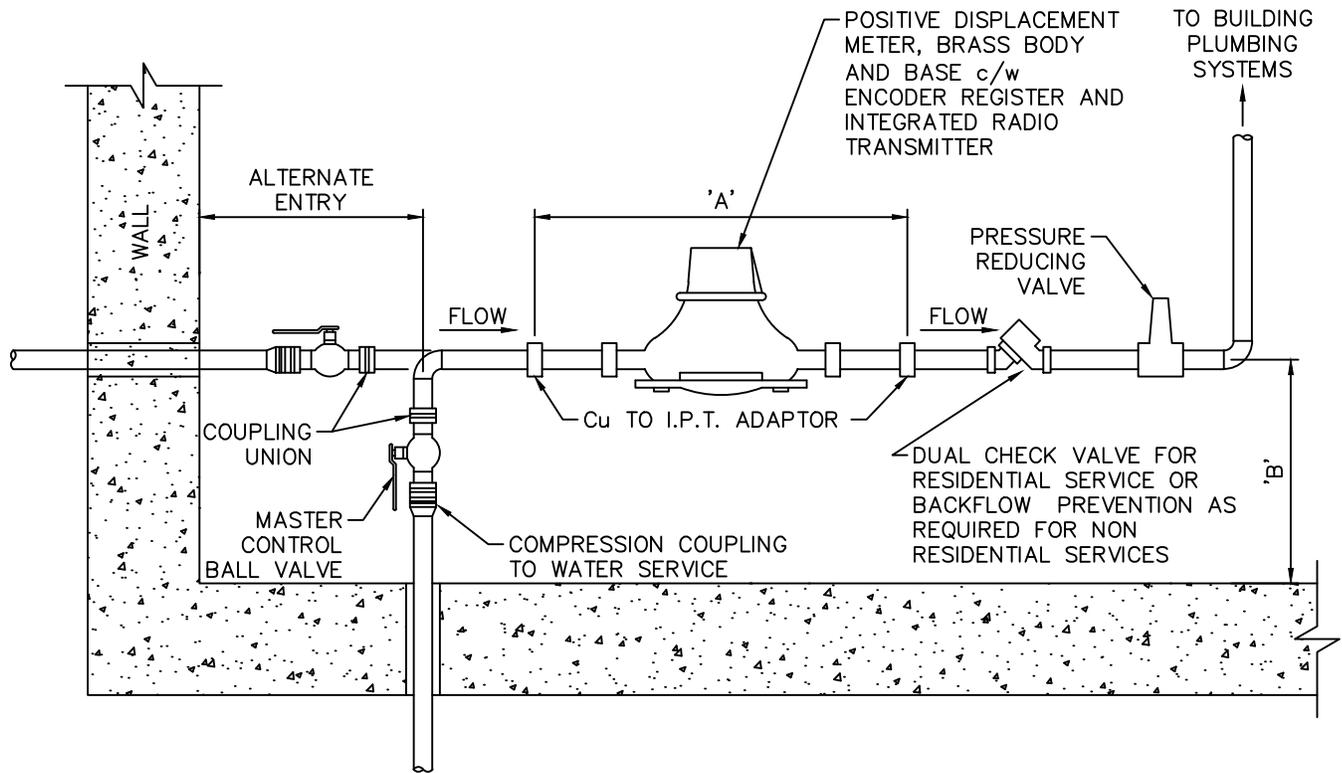
1. ALL RELOCATION PIPE AND FITTINGS TO BE C900/C907 PVC AND MEET OR EXCEED EXISTING MAIN CLASS.
2. ALL RESTRAINERS TO BE UNI-FLANGE SERIES 1300/1360 FOR C900/C907 PIPE AND FITTINGS OR APPROVED EQUAL.
3. THRUST BLOCKS MAY BE ELIMINATED, BY RESTRAINING EXISTING PIPE JOINTS, AS DIRECTED AND APPROVED BY ENGINEER.
4. WHEN TYING TO EXIST A.C. MAINS THRUST BLOCKS MUST BE USED.
5. UNSHRINKABLE FILL OF MAX. 0.40MPa MAY BE USED IN RELOCATION ZONE WHEN APPROVED BY ENGINEER.

TOWN OF OLIVER

WATERMAIN RELOCATION



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-10	1



TYPICAL METER SETTING USING COPPER PIPE

METER SIZE	'A' mm	'A' MAX mm	'B' MAX mm	MANUFACTURER
16mmx19mm	318	318	318	NEPTUNE T-10 c/w E-CODER R900i
19mm	362	362	362	NEPTUNE T-10 c/w E-CODER R900i
25mm	413	413	413	NEPTUNE T-10 c/w E-CODER R900i

NOTES

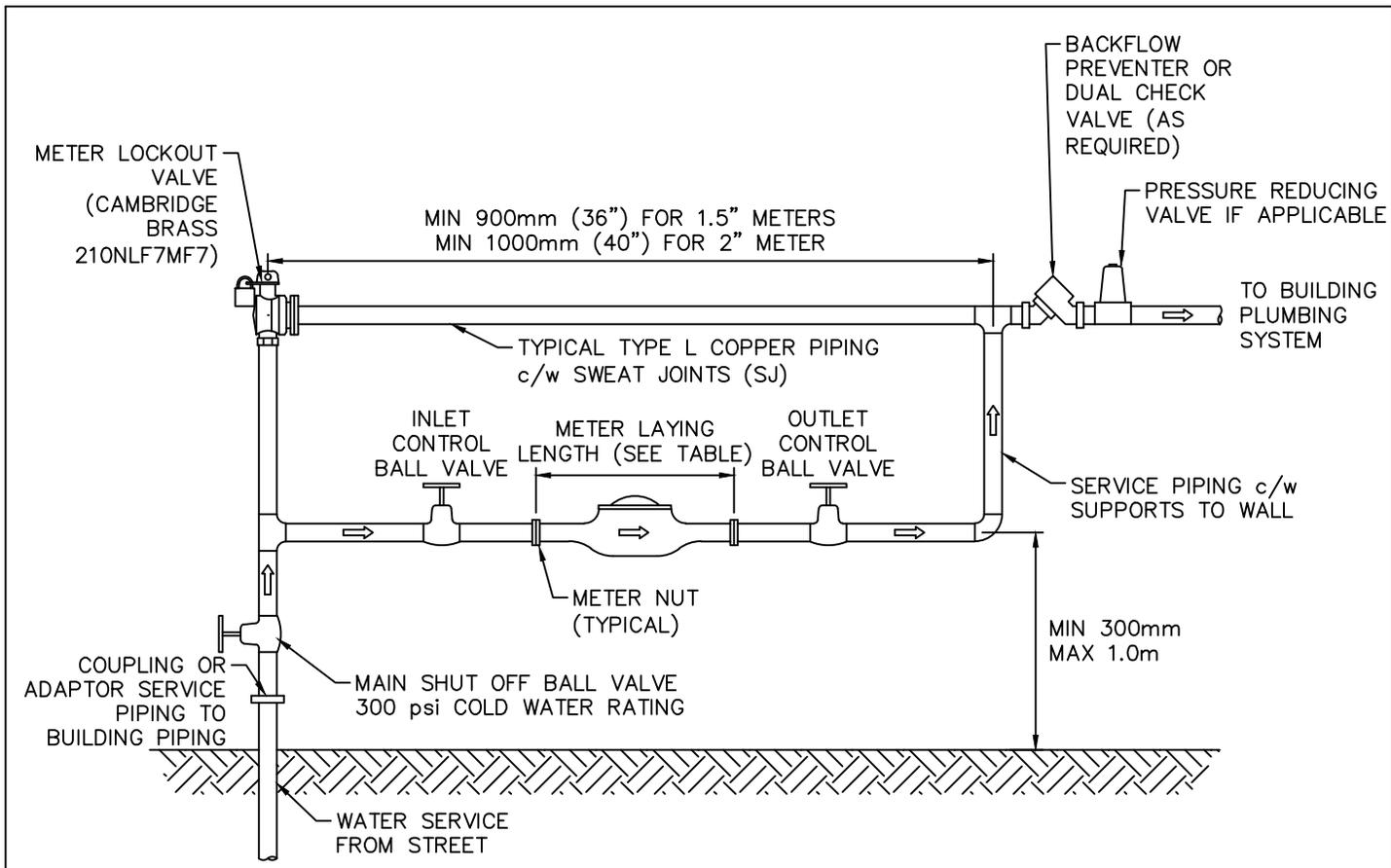
1. PIPING ON EACH SIDE OF METER MUST BE ADEQUATELY SUPPORTED.
2. PIPING FOR METER MUST BE ON A HORIZONTAL PLANE.
3. MINIMUM DISTANCE OF 300mm BETWEEN ANY WALL AND A METER.
4. THE AREA 600mm IN FRONT OF THE METER SHALL BE FREE OF OBSTRUCTION TO ALLOW FOR CONVENIENT READING AND SERVICING OF THE METER.
5. METERS MUST BE INSTALLED IN THE MECHANICAL ROOM AND WITHIN REASONABLE DISTANCE OF A FLOOR DRAIN. IN NO CASE SHALL A METER BE INSTALLED IN A BATHROOM OR BEDROOM.
6. THE MASTER CONTROL BALL VALVE AND DUAL CHECK VALVE SHALL CONFORM TO THE B.C. PLUMBING CODE.
7. INSTALLATION OF FLASHING OR METAL SHEETING IN THE AREA OF THE METER IS NOT PERMITTED IN ORDER TO AVOID INTERFERENCE WITH THE RADIO TRANSMITTER.
8. WATER METERS SHALL BE PURCHASED FROM TOWN OF OLIVER.

TOWN OF OLIVER

TYPICAL INSIDE
WATER METER INSTALLATION



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-11	1



SERVICE SIZE	METER SIZE (LAYING LENGTH)	ACCEPTABLE MANUFACTURER
38mm (1.5")	1.5" (321mm)	NEPTUNE T-10 R900i
50mm (2")	2" (388mm)	NEPTUNE T-10 R900i

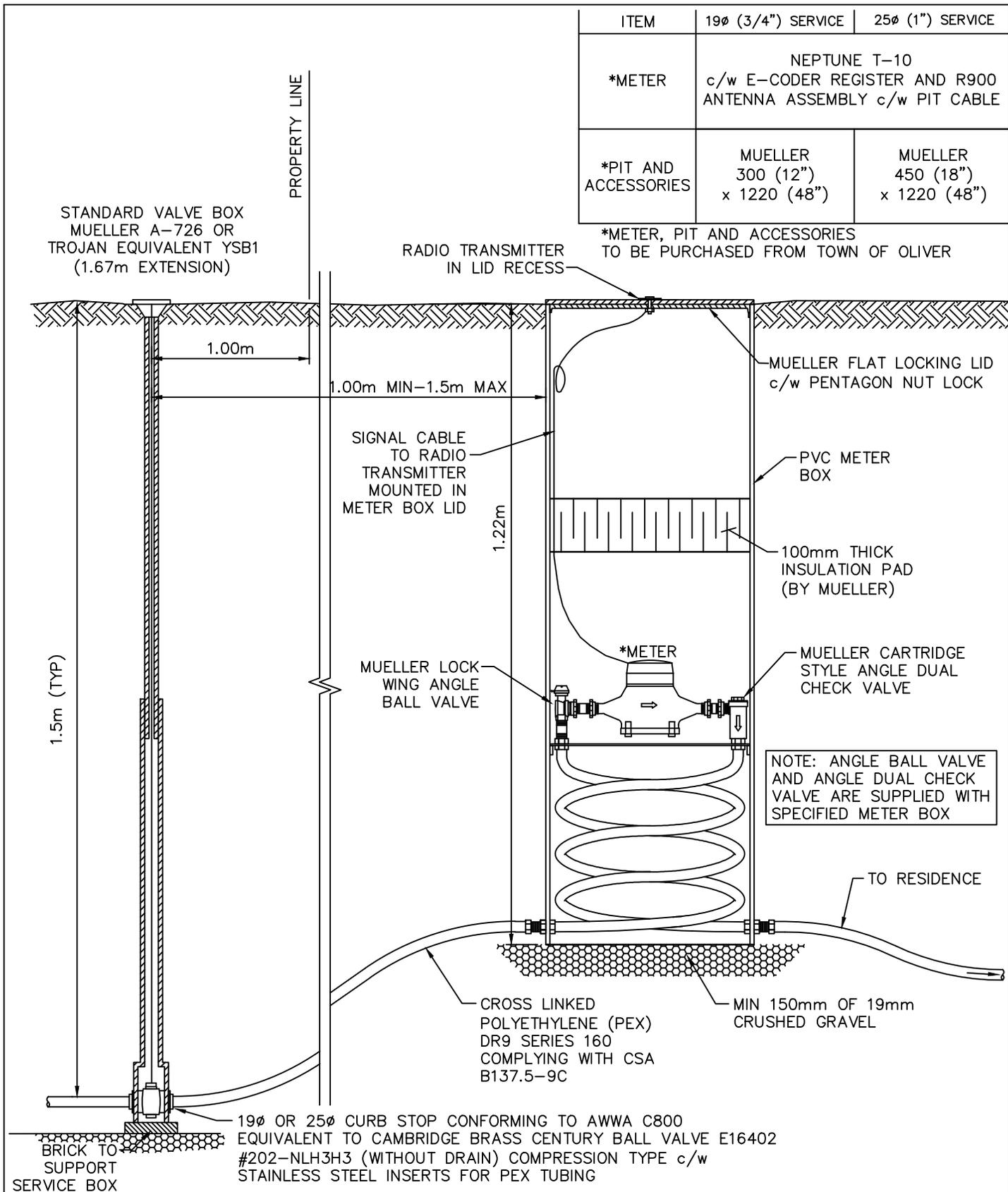
NOTES

1. PIPING ON EACH SIDE OF METER MUST BE ADEQUATELY SUPPORTED.
2. PIPING FOR METER MUST BE ON A HORIZONTAL PLANE.
3. MINIMUM DISTANCE OF 300mm BETWEEN ANY WALL AND A METER.
4. THE AREA 600mm IN FRONT OF THE METER SHALL BE FREE OF OBSTRUCTION TO ALLOW FOR CONVENIENT READING AND SERVICING OF THE METER.
5. METERS MUST BE INSTALLED IN THE MECHANICAL ROOM AND WITHIN REASONABLE DISTANCE OF A FLOOR DRAIN. IN NO CASE SHALL A METER BE INSTALLED IN A BATHROOM OR BEDROOM.
6. THE MAIN SHUT OFF BALL VALVE AND DUAL CHECK VALVE SHALL CONFORM TO THE B.C. PLUMBING CODE.
7. INSTALLATION OF FLASHING OR METAL SHEETING IN THE AREA OF METER IS NOT PERMITTED IN ORDER TO AVOID INTERFERENCE WITH THE RADIO TRANSMITTER.
8. THE METER BYPASS AND LOCKOUT VALVE MAY BE DELETED.
9. WATER METERS SHALL BE PURCHASED FROM TOWN OF OLIVER.

TOWN OF OLIVER		DWN. BY: JOSEPH	
TYPICAL INSIDE 38mm (1.5") AND 50mm (2") WATER METER INSTALLATION		CHK. BY: SHAWN	
		DATE: MARCH 2021	
		SCALE: N.T.S.	
		DWG. NO.: W-12	REV.: 1

ITEM	19ø (3/4") SERVICE	25ø (1") SERVICE
*METER	NEPTUNE T-10 c/w E-CODER REGISTER AND R900 ANTENNA ASSEMBLY c/w PIT CABLE	
*PIT AND ACCESSORIES	MUELLER 300 (12") x 1220 (48")	MUELLER 450 (18") x 1220 (48")

*METER, PIT AND ACCESSORIES
TO BE PURCHASED FROM TOWN OF OLIVER



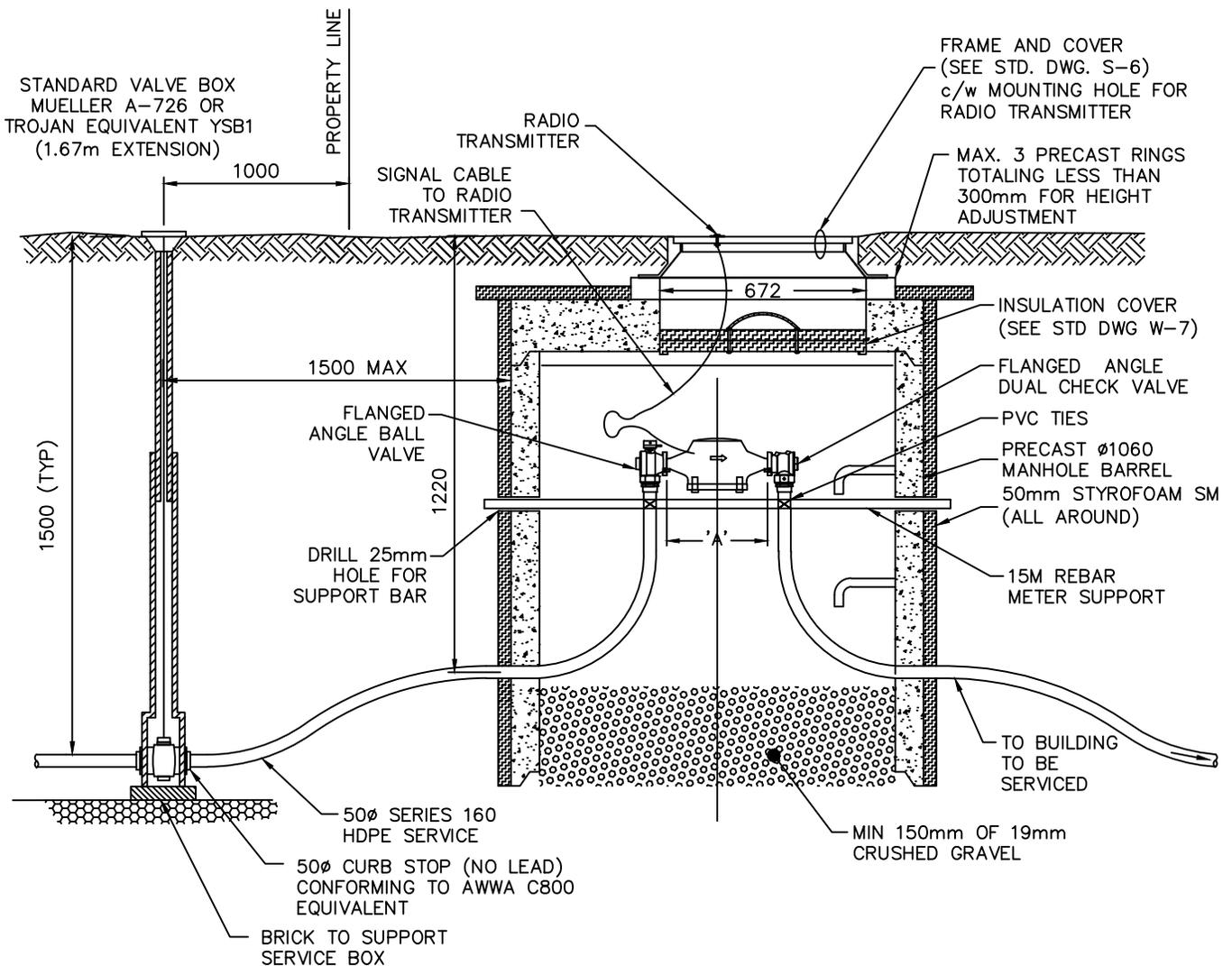
NOTE: ANGLE BALL VALVE
AND ANGLE DUAL CHECK
VALVE ARE SUPPLIED WITH
SPECIFIED METER BOX

TOWN OF OLIVER		DWN. BY: JOSEPH	
		CHK. BY: SHAWN	
FROSTPROOF 19mm AND 25mm METER PIT FOR NON TRAFFIC AREAS		DATE: MARCH 2021	
		SCALE: N.T.S.	
		DWG. NO.: W-13	REV.: 1

ITEM	38ø (1½") SERVICE	50ø (2") SERVICE	50ø (2") SERVICE
METER TYPE (NOTE 1)	STANDARD	STANDARD	or COMPOUND
METER	NEPTUNE T-10	NEPTUNE T-10	NEPTUNE TRU/FLO
REGISTER	NEPTUNE E-CODER c/w PIT PAD	NEPTUNE E-CODER c/w PIT PAD	NEPTUNE E-CODER c/w PIT PAD 2 REQUIRED
UNITS	CUBIC METRES	CUBIC METRES	CUBIC METRES
RADIO READ	NEPTUNE R900 ANTENNA ASSEMBLY c/w PIT CABLE		
LAYING LENGTH ('A' MIN)	330 mm	432 mm	387 mm

NOTES:

- WATER METER AND RADIO TRANSMITTER SHALL BE PURCHASED FROM THE TOWN OF OLIVER
- REFER TO DESIGN DRAWINGS FOR METER SIZE TYPE
- ANGLE BALL VALVE AND ANGLE DUAL CHECK VALVE ARE SUPPLIED WITH SPECIFIED METER BOX

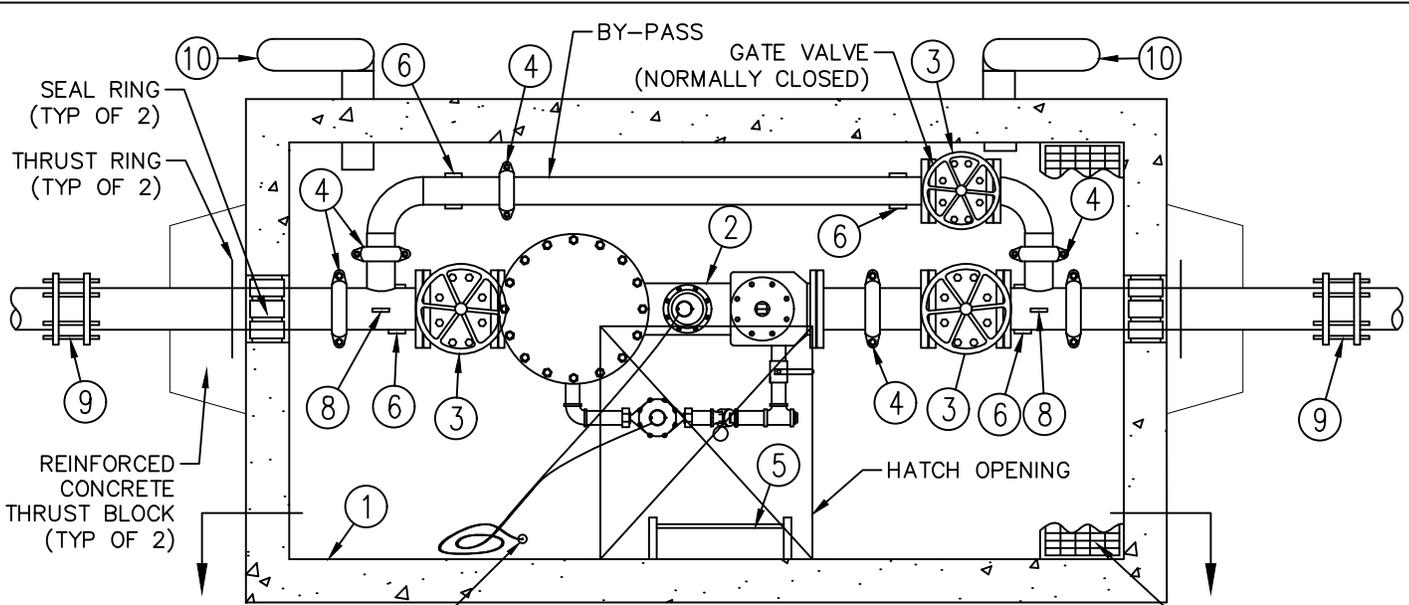


TOWN OF OLIVER

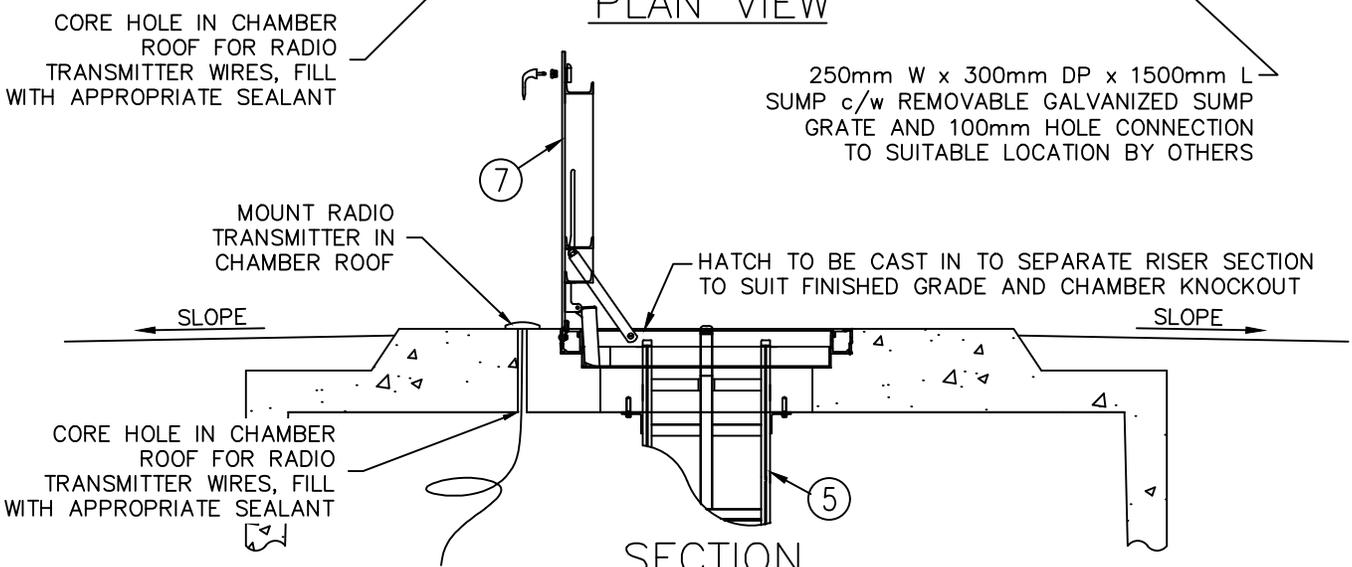
FROSTPROOF
38mm and 50mm METER VAULT
FOR NON TRAFFIC AREAS



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: DEC 2020	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-14	1



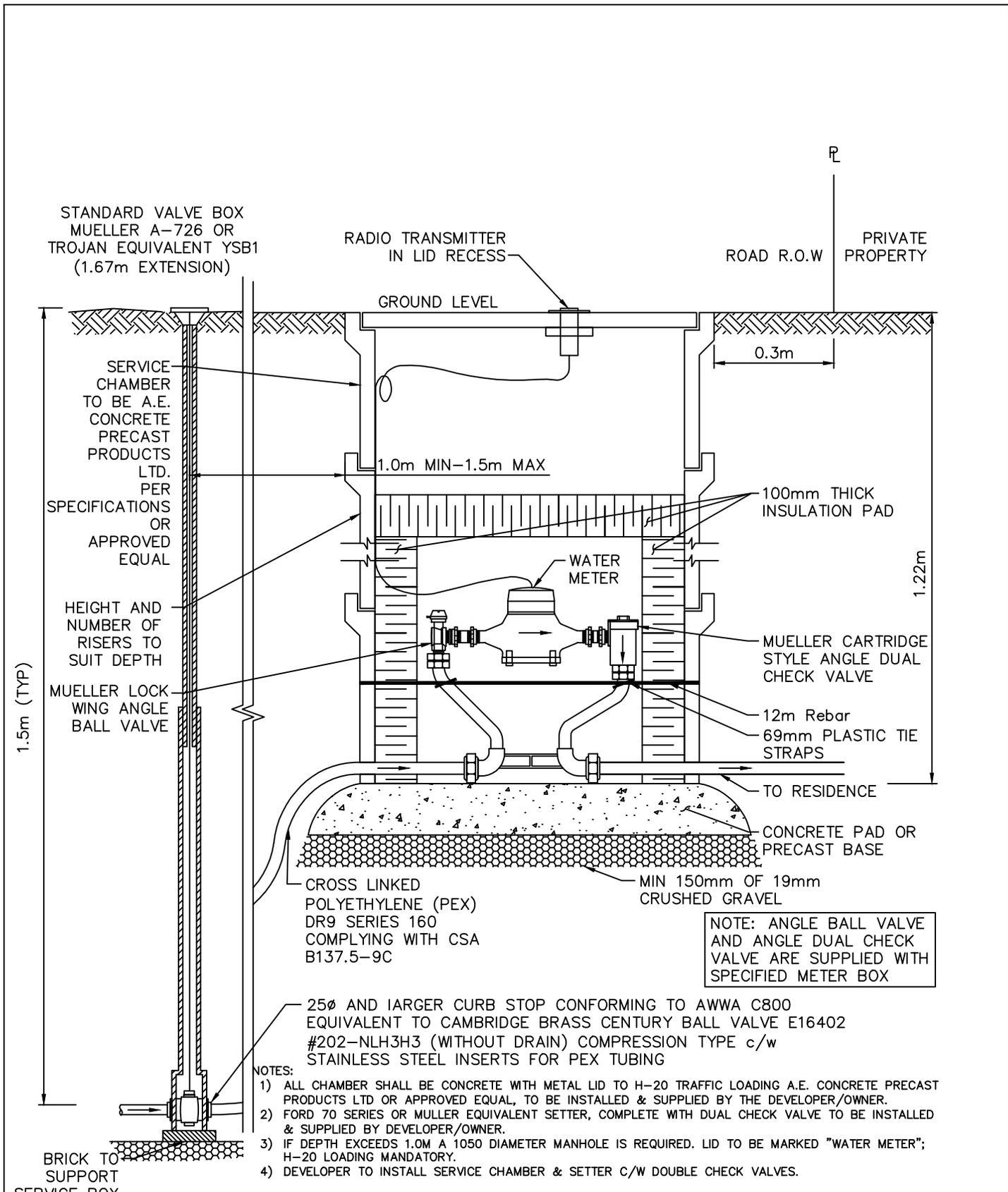
PLAN VIEW



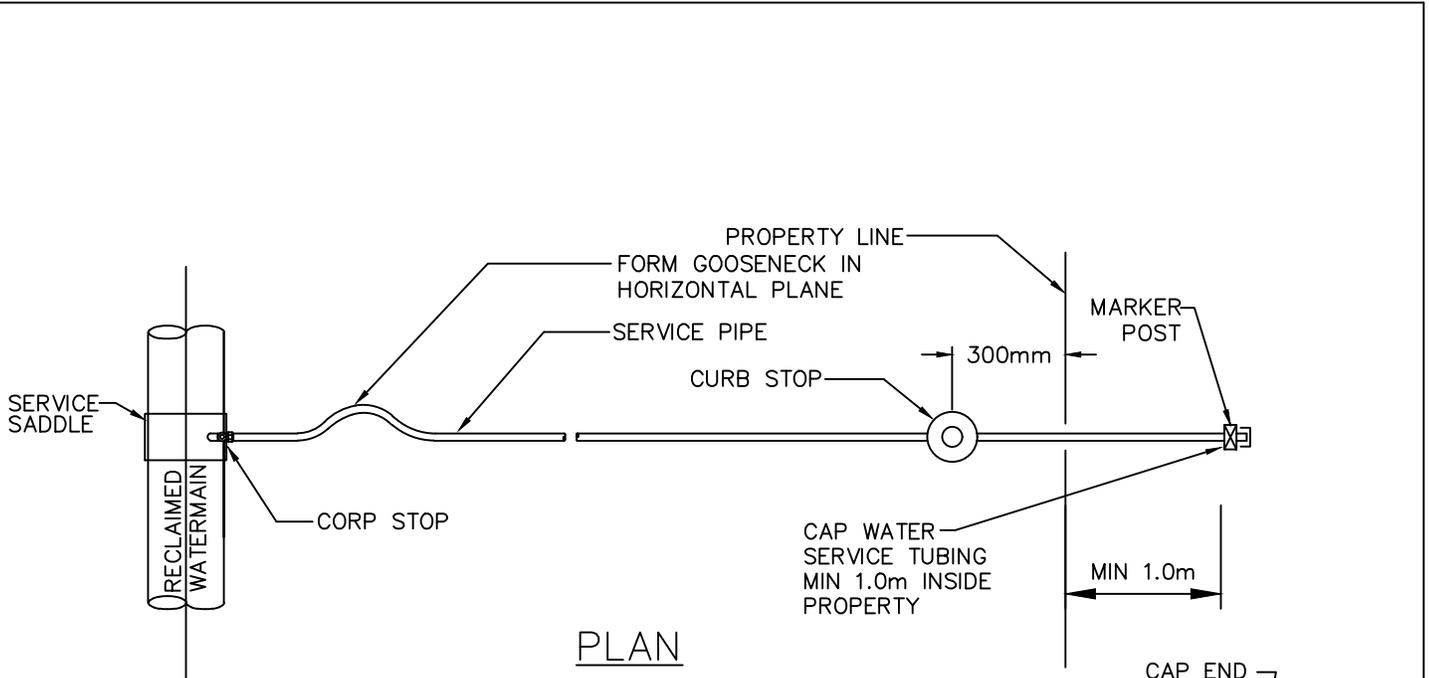
ITEM	DESCRIPTION
1	A.E. CONCRETE PRECAST CONCRETE #3152 VAULT, H2O LOADING RATED INSIDE DIMENSIONS: 3000mm L x 1500mm W x 2000mm H VAULT INTERIOR SHALL BE SMOOTH FINISH THROUGHOUT WITH WHITE PAINT ON WALLS AND CEILING FOR CLEANLINESS AND IMPROVED VISIBILITY
2	NEPTUNE HIGH PERFORMANCE PROTECTUS III FIRE SERVICE METER WITH STRAINER AND LO-FLOW BYPASS
3	RESILIENT WEDGE NON-RISING STEM GATE VALVE c/w HANDWHEEL
4	VICTAULIC GROOVED COUPLING
5	ALUMINUM LADDER AND SAFETY POST
6	ADJUSTABLE GALVANIZED STEEL PIPE SUPPORT
7	900mm x 900mm SINGLE LEAF ALUMINUM HATCH, H2O LOADING RATED
8	100Ø PRESSURE GAUGE ASSEMBLY
9	ROBAR TRANSITION PIPE COUPLING
10	100Ø VENT PIPES, EPOXY COATED c/w BIRD SCREEN

NOTES:
 1. ALL FABRICATED PIPE FITTINGS AND VENTS SHALL BE SCHEDULE No.40 STEEL AND COATED AND LINED WITH EPOXY IN CONFORMANCE WITH AWWA C-210 OR C-213 STANDARDS, MEETING NSF-61 APPROVAL.
 2. STAINLESS STEEL HEX BOLTS AND HEX NUTS c/w STAINLESS STEEL WASHERS USED THROUGHOUT ASSEMBLY.

TOWN OF OLIVER		DWN. BY: JOSEPH
150mm OR 200mm METER STATION		CHK. BY: SHAWN
		DATE: MARCH 2021
		SCALE: N.T.S.
		DWG. NO.: W-15
		REV.: 1



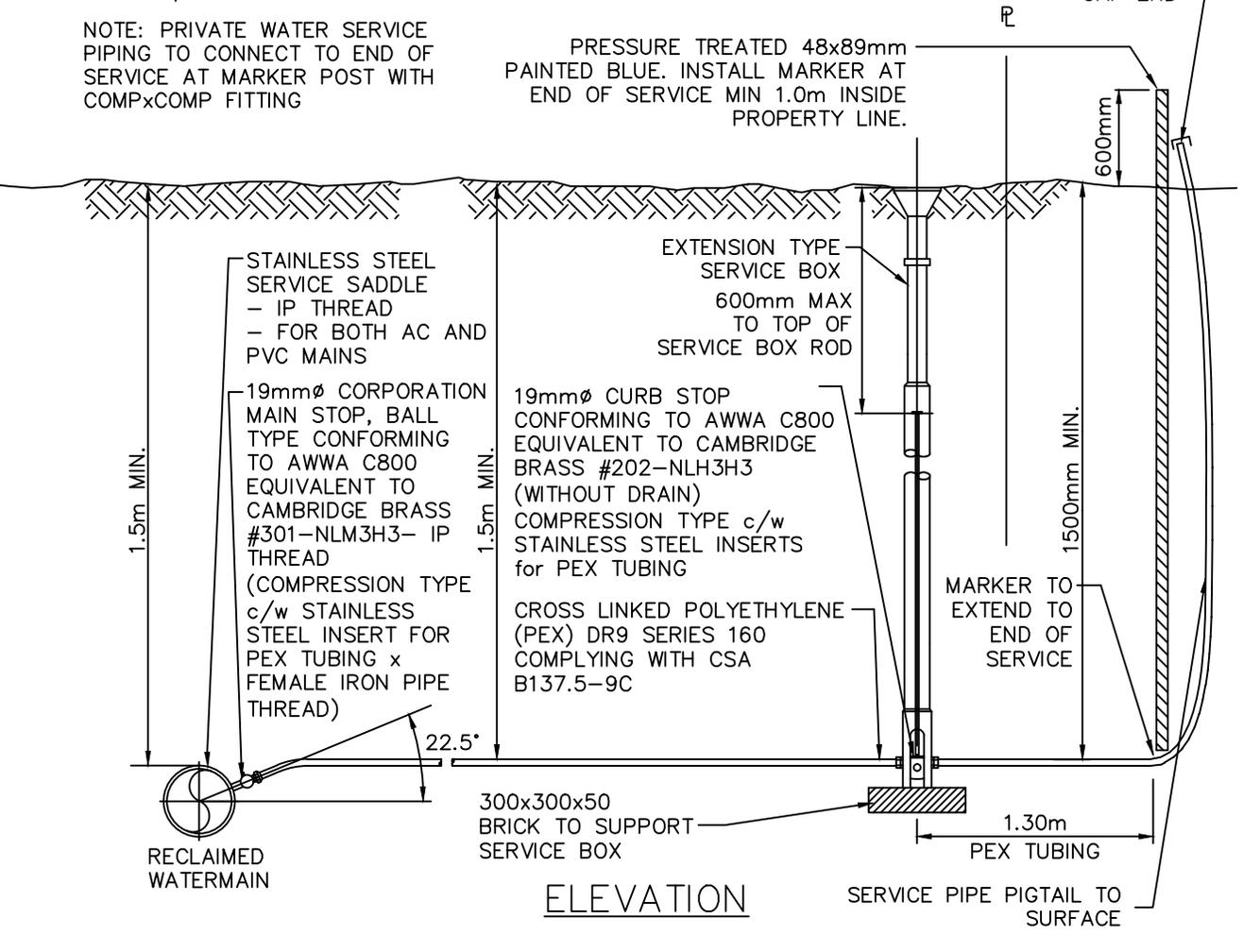
TOWN OF OLIVER		DWN. BY: JOSEPH	
		CHK. BY: SHAWN	
FROSTPROOF 38mm AND UP METER PIT FOR NON-TRAFFIC AREAS		DATE: MARCH 2021	
		SCALE: N.T.S.	
		DWG. NO.: W-16	REV.: 1



PLAN

NOTE: PRIVATE WATER SERVICE PIPING TO CONNECT TO END OF SERVICE AT MARKER POST WITH COMPxCOMP FITTING

PRESSURE TREATED 48x89mm PAINTED BLUE. INSTALL MARKER AT END OF SERVICE MIN 1.0m INSIDE PROPERTY LINE.

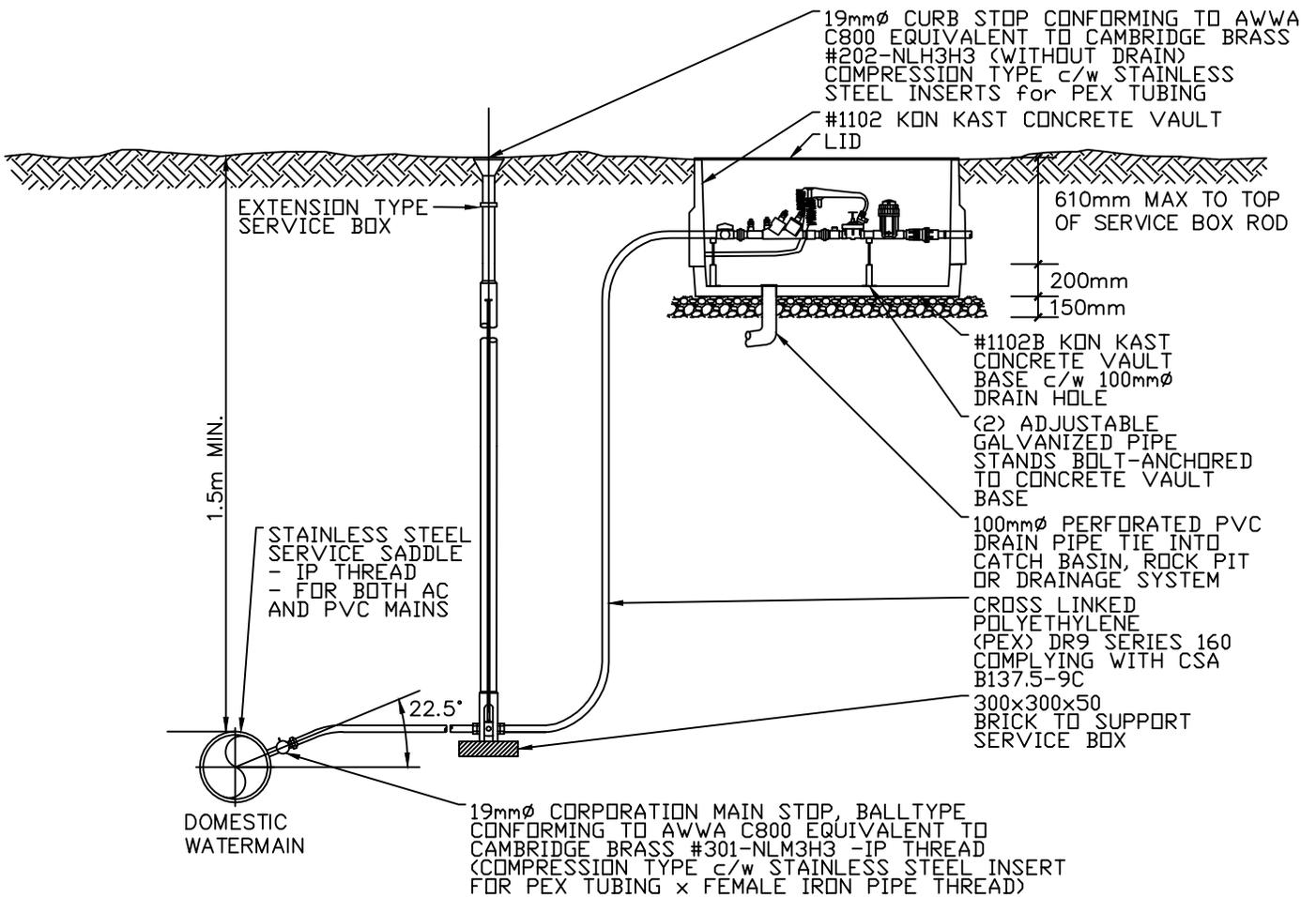
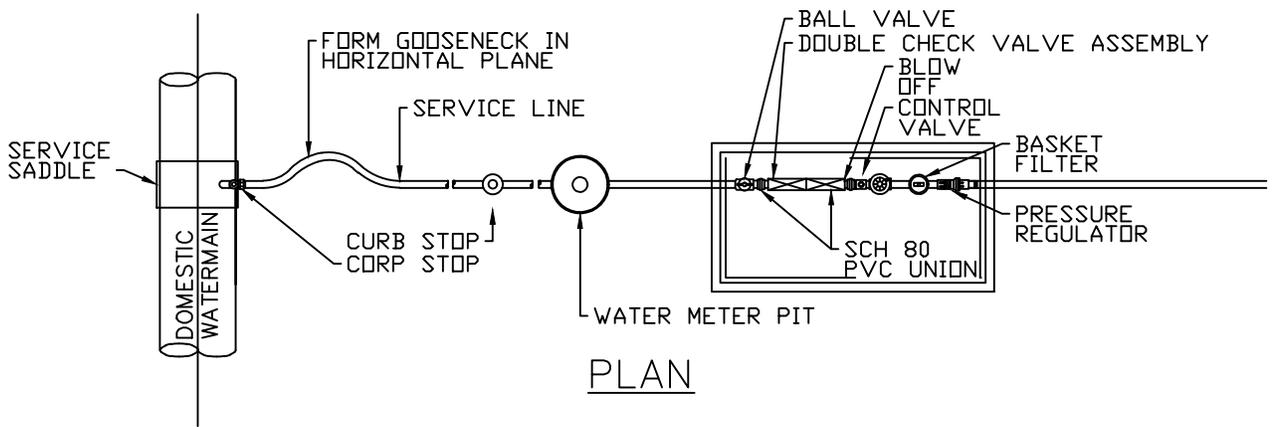


ELEVATION

TOWN OF OLIVER
 RECLAIMED WATER MAIN
 INSTALLATION INFORMATION
 FOR NON-TRAFFIC AREAS



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-17	1



NOTE:

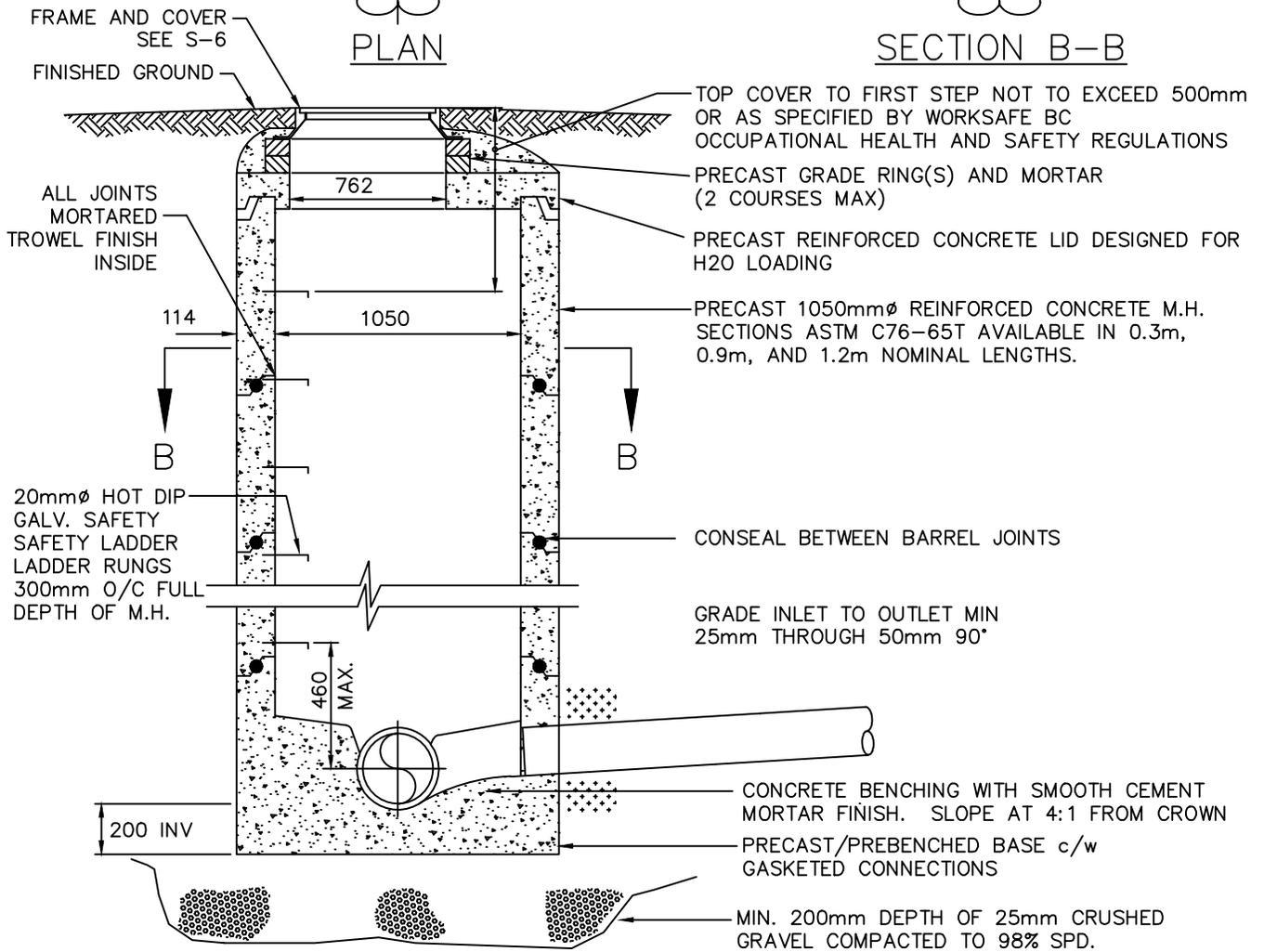
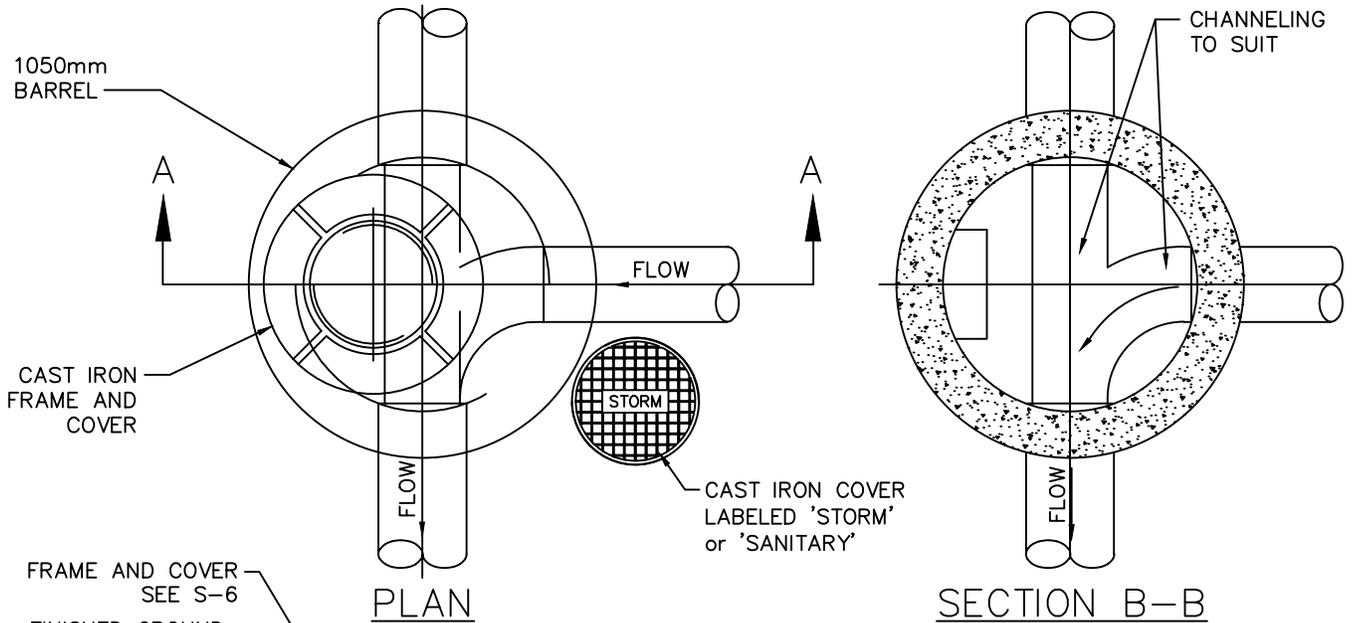
- 1) PLAN VIEW SHOWS PREFERRED METHOD FOR LAYOUT FOR DOMESTIC WATER IRRIGATION, MULTIPLE IRRIGATION BOXES SCHEMATICS MUST BE APPROVED BY DIRECTOR OF OPERATIONS.
- 2) A DOUBLE CHECK VALVE ASSEMBLY BACKFLOW PREVENTER IS A MINIMUM REQUIREMENT.
- 3) A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER AND ABOVE GROUND KIOSK WILL BE REQUIRED FOR IRRIGATION WHEN ADDITION OF CHEMICALS OR FERTIGATION IS NEEDED.

TOWN OF OLIVER

DOMESTIC IRRIGATION
FOR BOULEVARD IRRIGATION



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
W-18	1

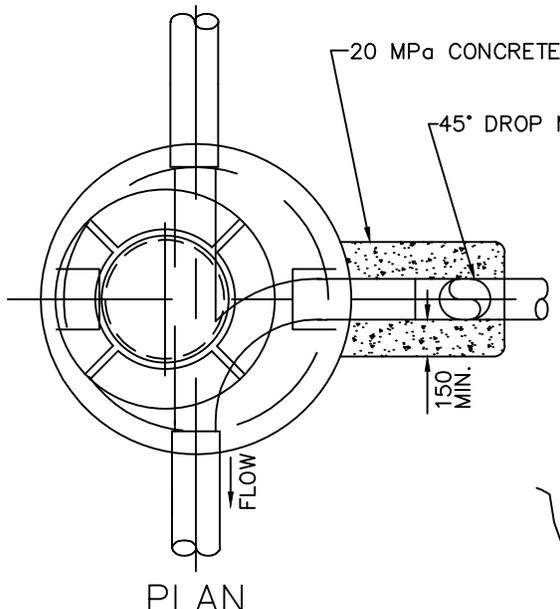


TOWN OF OLIVER

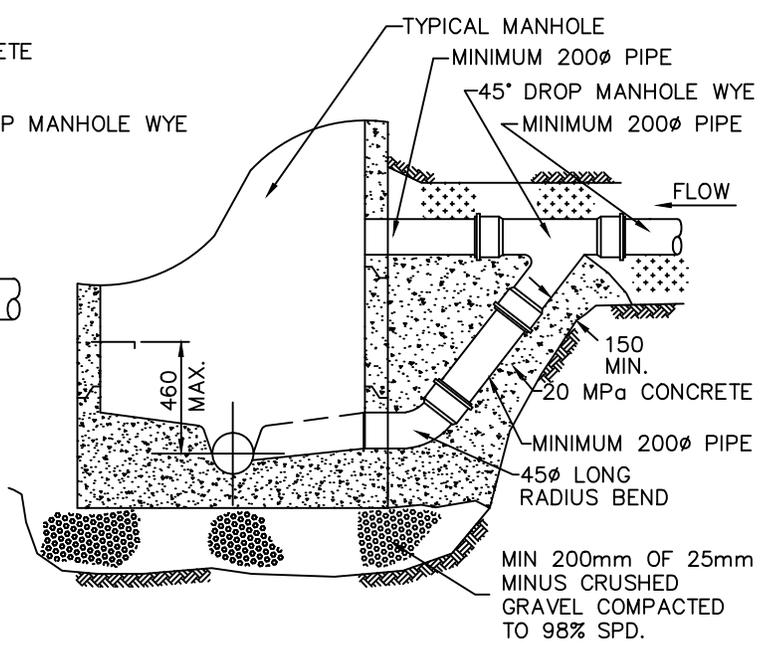
TYPICAL SEWER MANHOLE



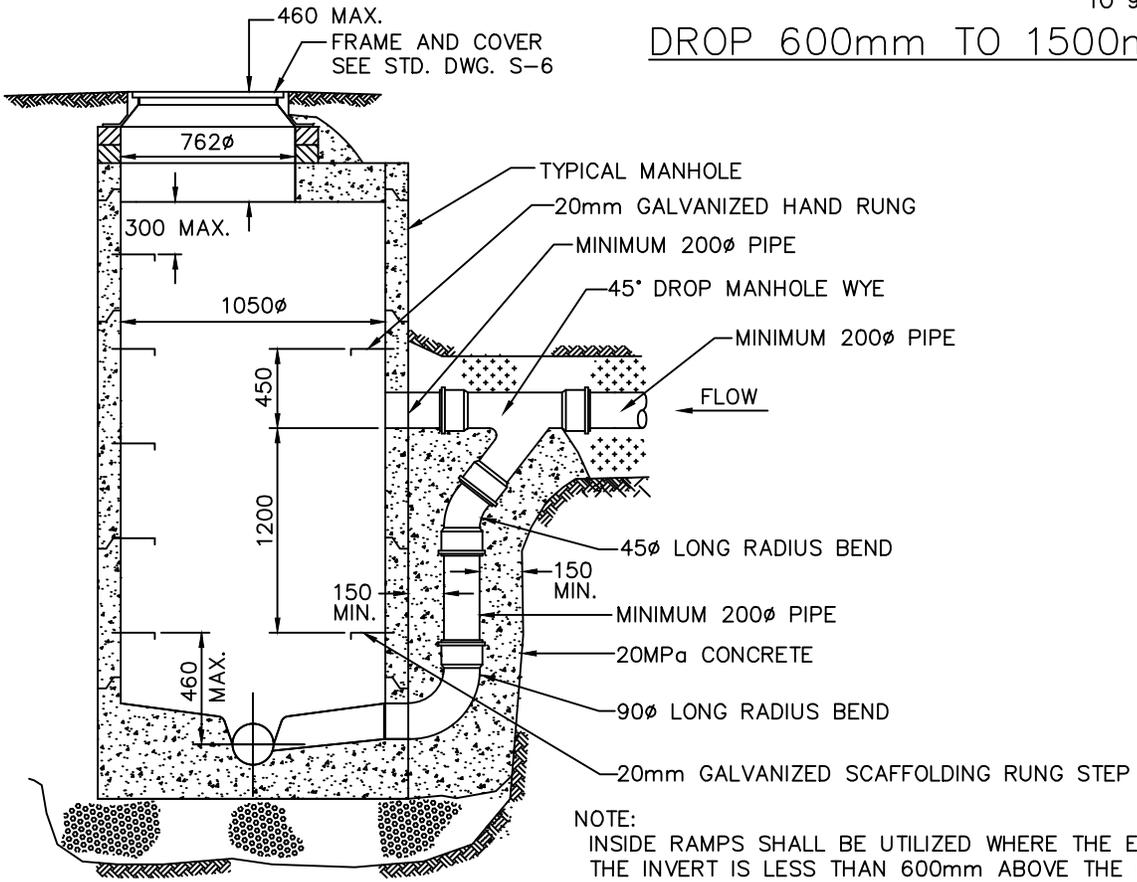
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-1	1



PLAN



DROP 600mm TO 1500mm



NOTE:
INSIDE RAMPS SHALL BE UTILIZED WHERE THE ELEVATION OF THE INVERT IS LESS THAN 600mm ABOVE THE INVERT OF THE CENTER OF THE MANHOLE.

DROP GREATER THAN 1500mm

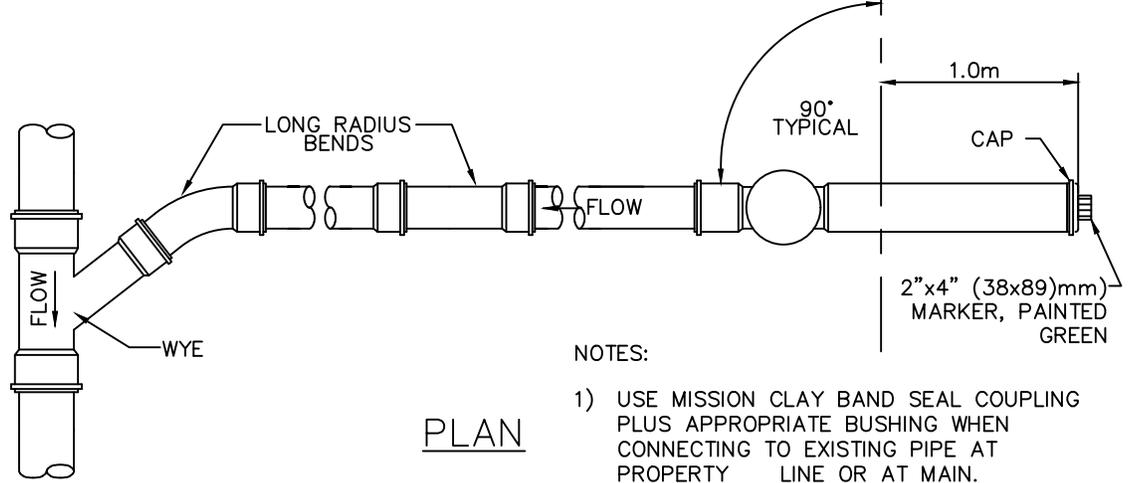
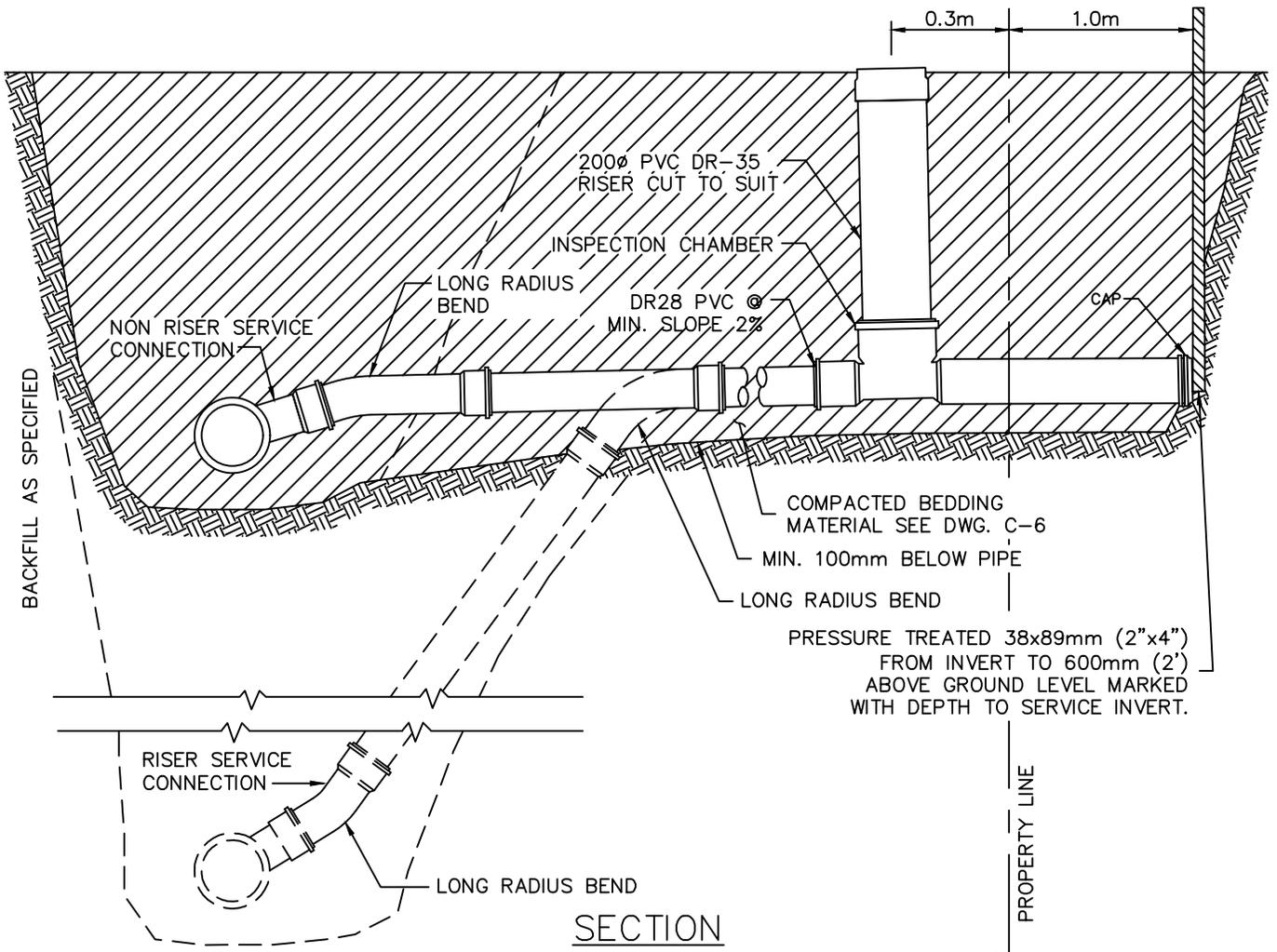
UPDATED DEC 2020
UPDATED DEC 2010
UPDATED APRIL 2004

TOWN OF OLIVER

TYPICAL EXTERIOR DROP MANHOLE



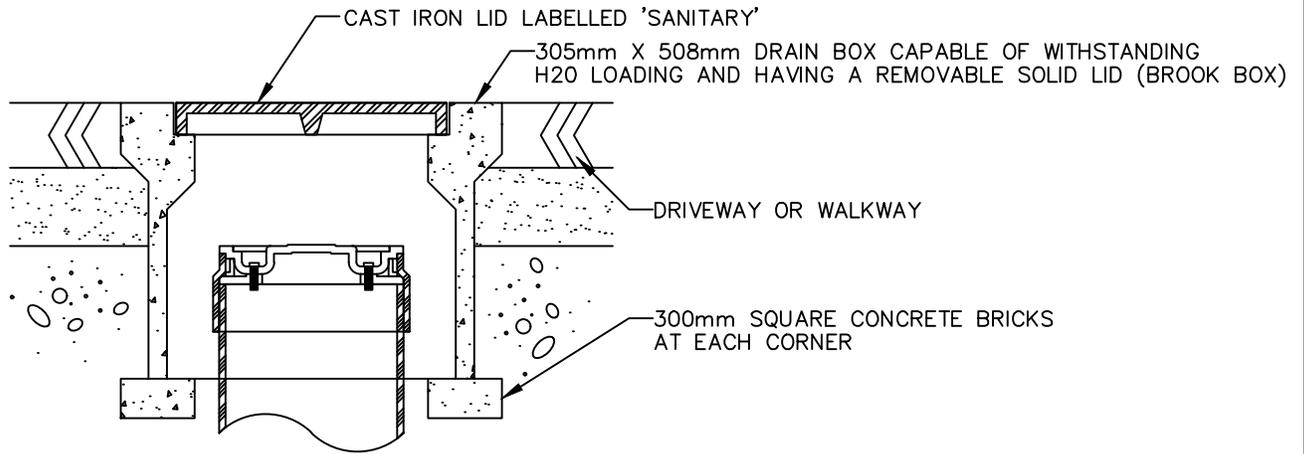
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-2	1



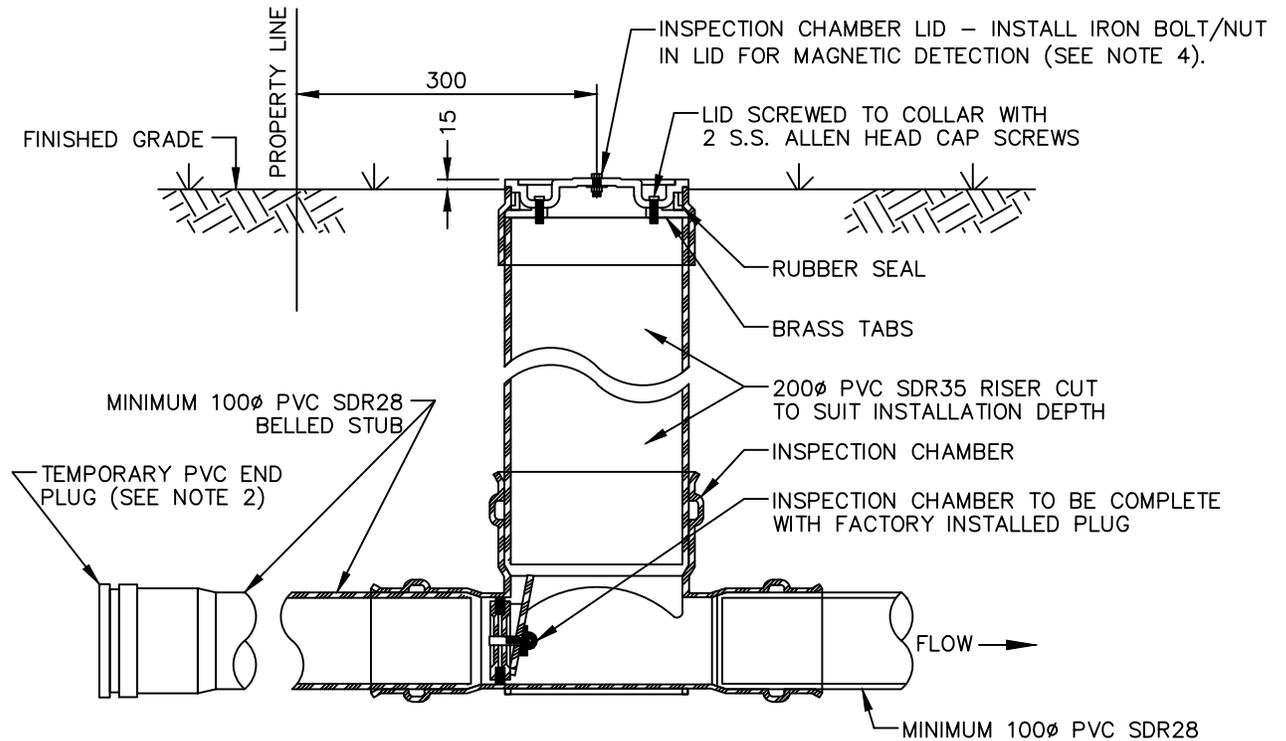
NOTES:

- 1) USE MISSION CLAY BAND SEAL COUPLING PLUS APPROPRIATE BUSHING WHEN CONNECTING TO EXISTING PIPE AT PROPERTY LINE OR AT MAIN.
- 2) BEDDING BACKFILL SEE DWG. C-6
- 3) NO TREES SHALL BE PLANTED WITHIN 3 METERS FROM INSPECTION CHAMBER.

<p>TOWN OF OLIVER</p> <p>TYPICAL SANITARY SEWER SERVICE CONNECTION</p>		<p>DWN. BY: JOSEPH</p> <p>CHK. BY: SHAWN</p> <p>DATE: MARCH 2021</p> <p>SCALE: N.T.S.</p> <p>DWG. NO.: S-3</p> <p>REV.: 1</p>
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INSTALLATION IN DRIVEWAY



INSTALLATION IN BOULEVARD

NOTES:

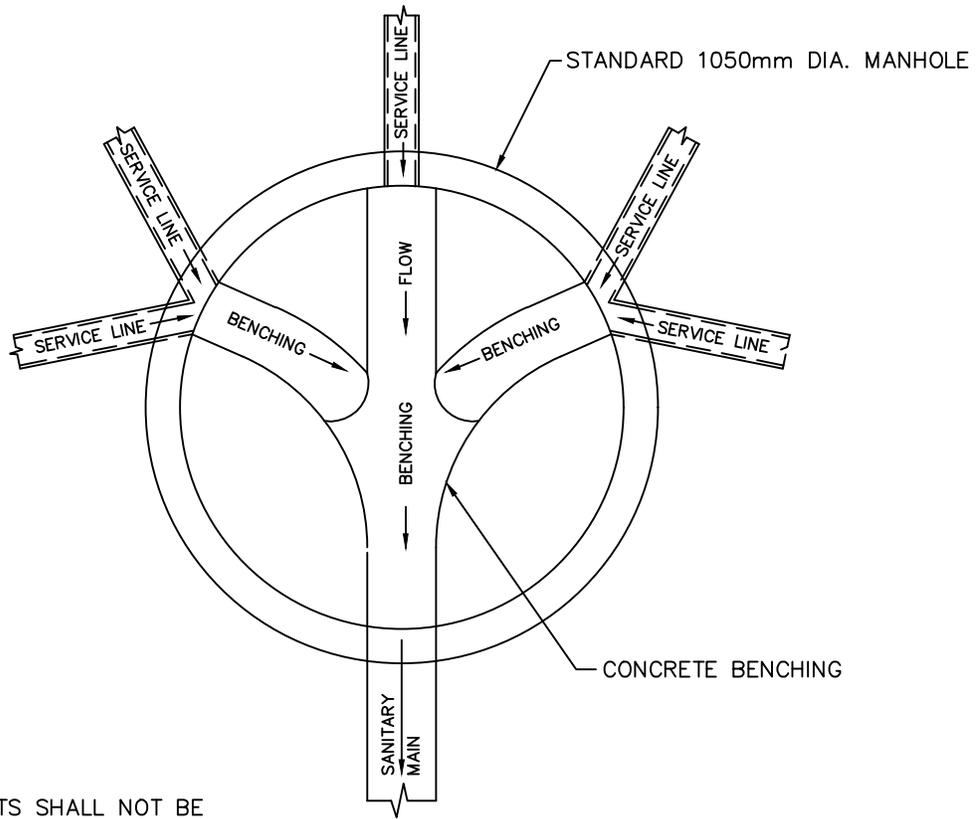
- 1) INSPECTION CHAMBER TO BE A MANUFACTURED FITTING AND APPROVED BY TOWN PRIOR TO INSTALLATION
- 2) PAINT UPSTREAM BELL AND END PLUG RED, FOR A MINIMUM OF 500mm BELOW BELL, AT TIME OF INSTALLATION
- 3) REFER TO SPECIFICATION DRAWING S-3 TYPICAL 100mm SANITARY SEWER SERVICE
- 4) PAINT INSPECTION CHAMBER LID AND RISER RED (MIN 500mm)

TOWN OF OLIVER

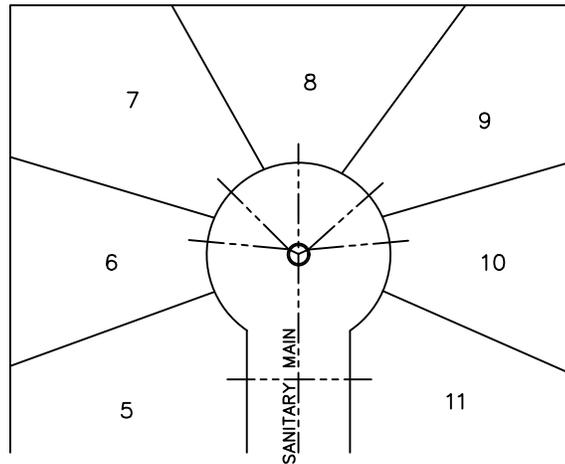
INSPECTION CHAMBER
DETAIL



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-4	1



NOTE:
 SERVICE INLETS SHALL NOT BE
 GREATER THAN 300mm ABOVE
 OUTLET PIPE INVERT



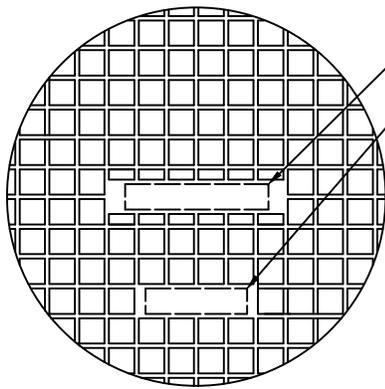
TYPICAL SITE PLAN

TOWN OF OLIVER

SERVICE CONNECTION DETAIL
 IN A CUL-DE-SAC

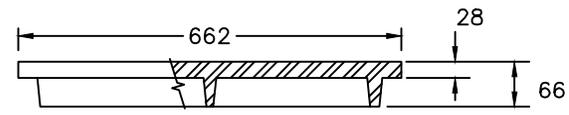


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-5	1

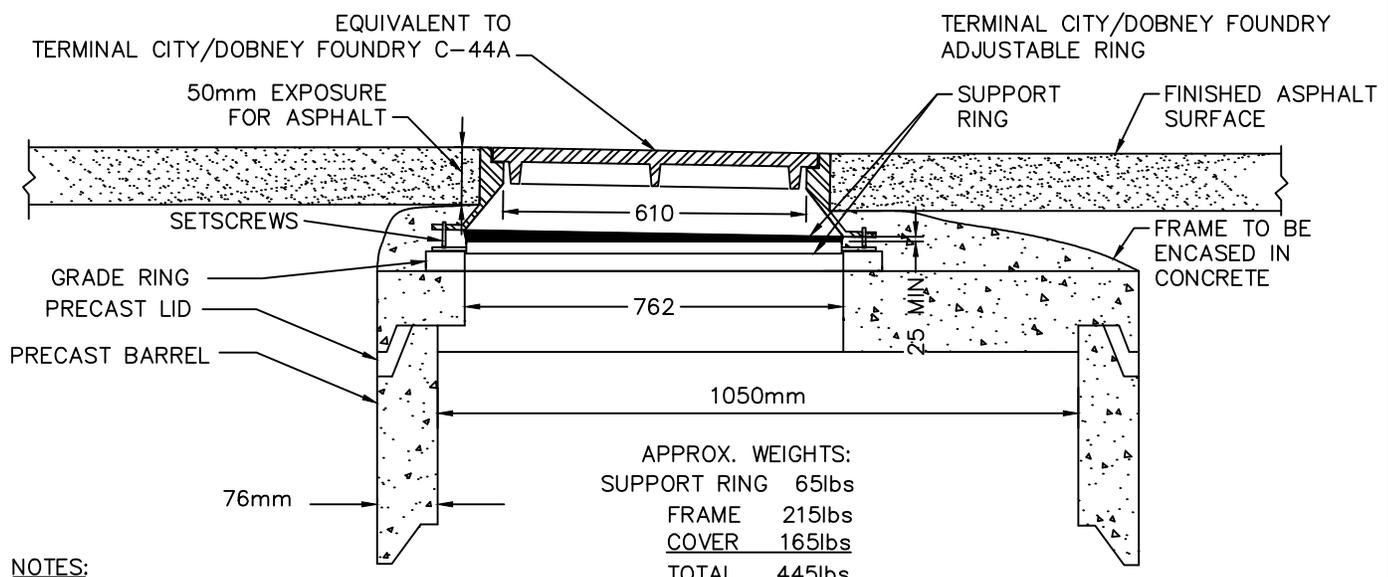


LABEL: "STORM" OR "SANITARY"

LABEL: "SEWER"

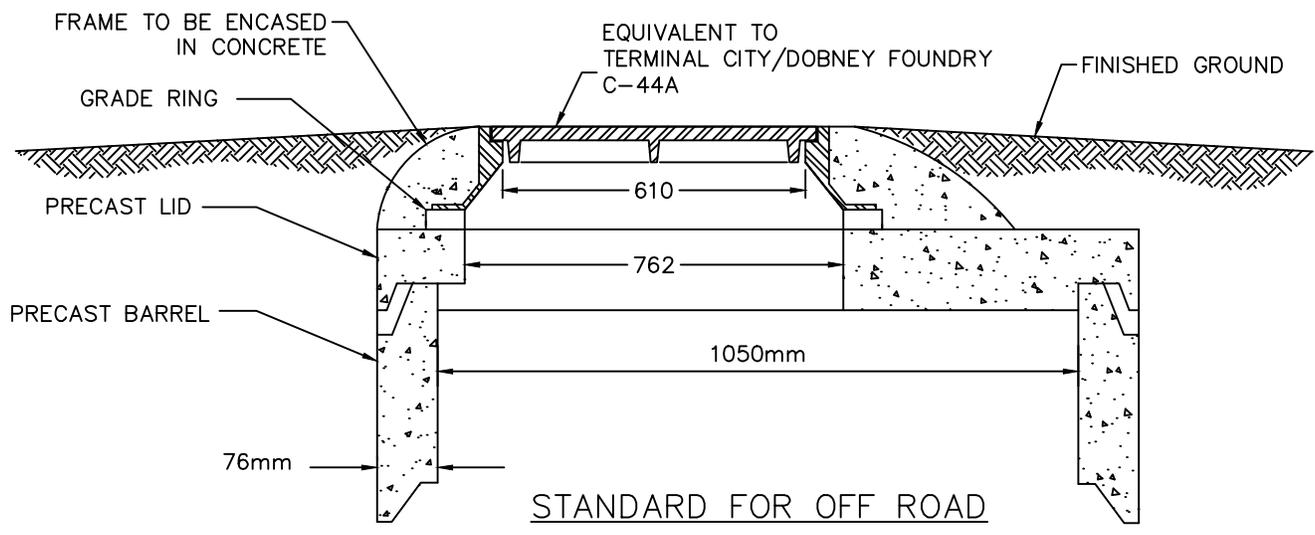


COVER



NOTES:
COVER, FRAME, AND PRECAST
CONCRETE LID TO BE
DESIGNED FOR H2O LOADING

ADJUSTABLE FOR ROADWAY



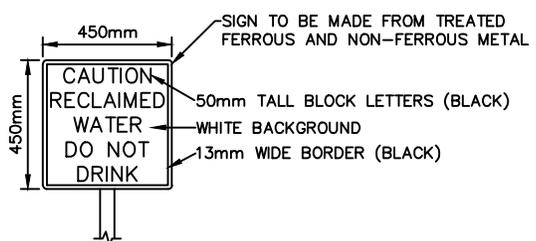
STANDARD FOR OFF ROAD

TOWN OF OLIVER

MANHOLE FRAME & COVER
DETAILS

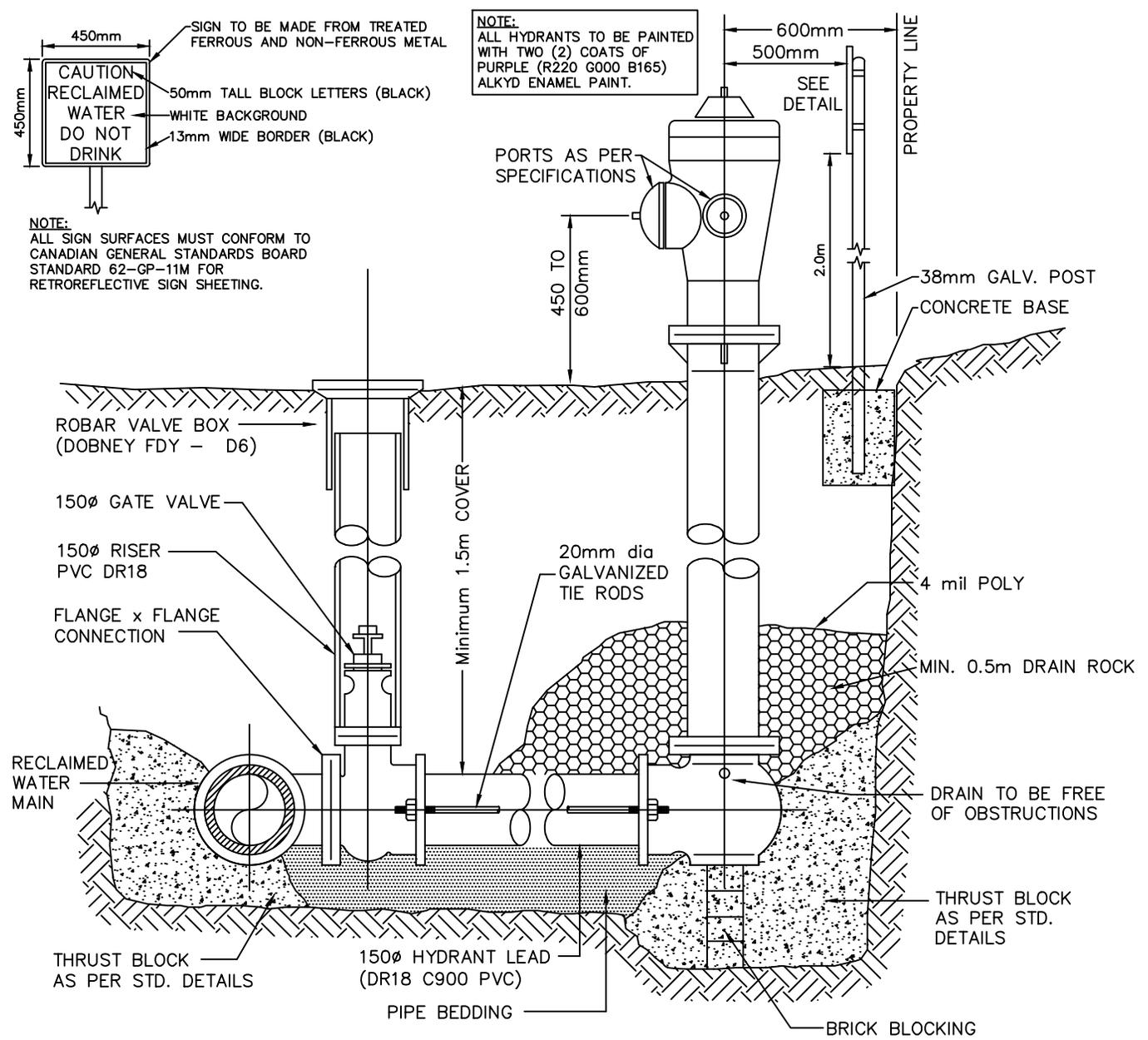


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-6	1



NOTE:
ALL SIGN SURFACES MUST CONFORM TO CANADIAN GENERAL STANDARDS BOARD STANDARD 62-GP-11M FOR RETROREFLECTIVE SIGN SHEETING.

NOTE:
ALL HYDRANTS TO BE PAINTED WITH TWO (2) COATS OF PURPLE (R220 G000 B165) ALKYD ENAMEL PAINT.

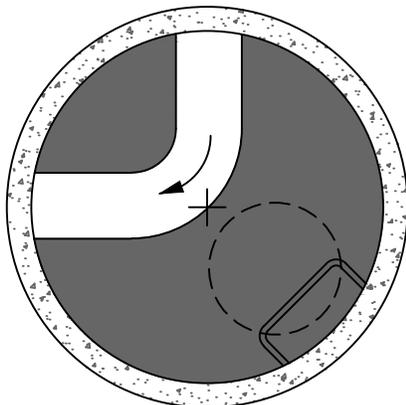


1. FIRE HYDRANTS SHALL BE 150Ø COMPRESSION TYPE AND EACH SHALL CONTAIN
 - a) 1 PUMPER PORT :- 117mm O.D. (4.625 inch) - 6 THREADS PER INCH
 - b) 2 -(2 1/2") 65.5mm OUTLETS B.C. FIRE HOSE THREAD STANDARDS
2. MANUFACTURER TERMINAL CITY C71-P
3. HYDRANT TO BE PAINTED PURPLE AS SPECIFIED IN DETAIL.
4. HYDRANT TO BE INSTALLED WITH PUMPER PORT FACING STREET.
5. HYDRANTS NOT IN USE MUST BE KEPT 'BAGGED' WITH SUITABLE BURLAP OR BLACK POLY.
6. PROVIDE SUITABLE SUPPORT TO THE HYDRANT TO MAINTAIN PLUMBNESS DURING SET UP OF THRUST BLOCK.

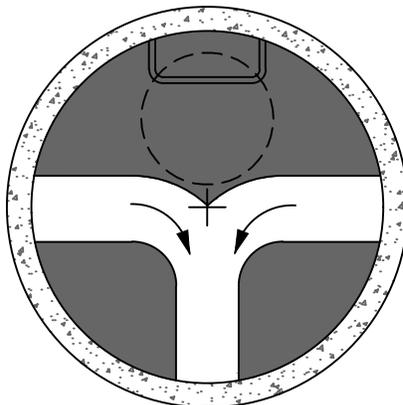
TOWN OF OLIVER
TYPICAL FIRE HYDRANT
ASSEMBLY FOR
RECLAIMED WATER



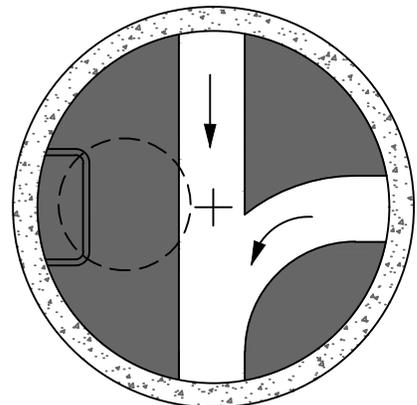
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-7	1



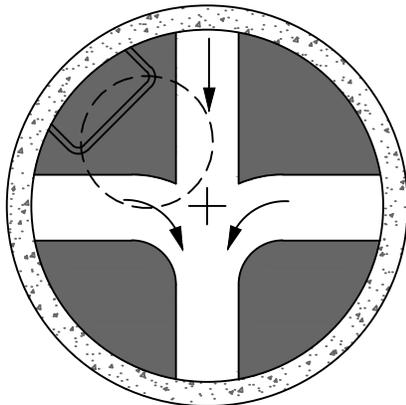
1. RIGHT ANGLE BEND



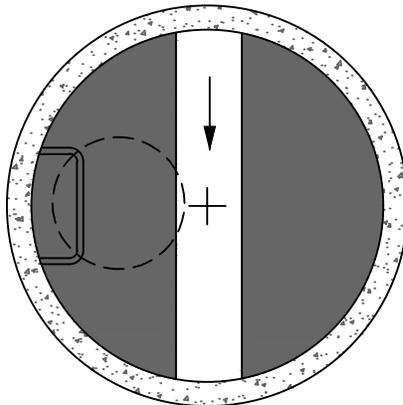
2. TEE CONNECTION



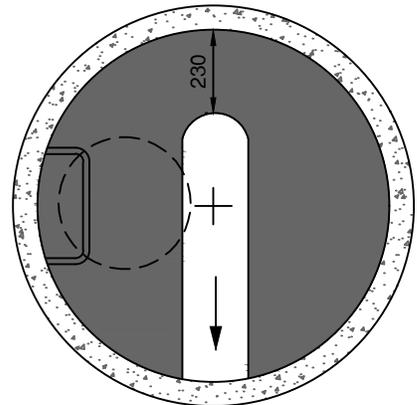
3. THREE WAY JUNCTION



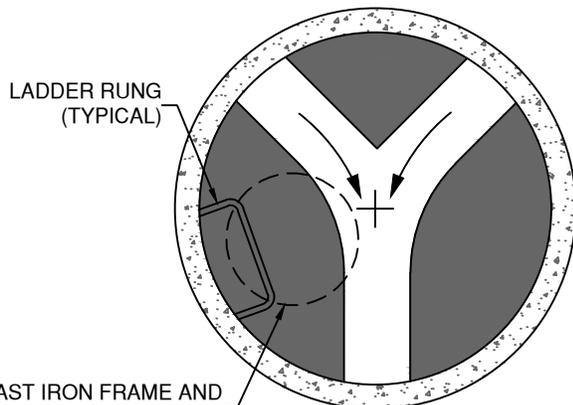
4. FOUR WAY JUNCTION



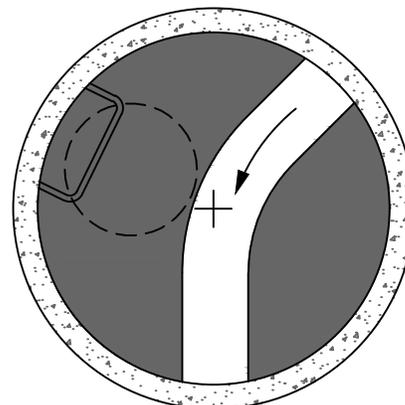
5. STRAIGHT THROUGH



6. DEAD END



7. WYE CONNECTION



8. 45° BEND

NOTES:

1. ALL CHANNELS SHALL BE TROWEL FINISHED. BENCHING (SHADED AREAS) SHALL BE BROOM FINISHED.
2. MANHOLE RUNG LOCATIONS SHALL BE AS SHOWN UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS.



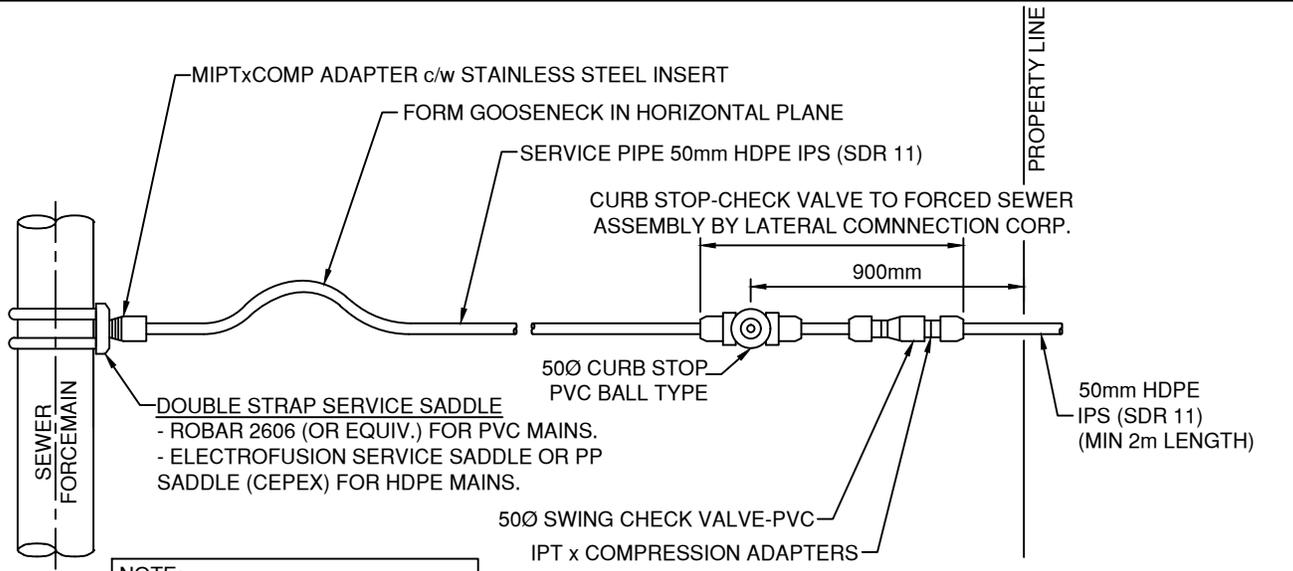
CAST IRON COVER LABELLED 'SANITARY' OR 'STORM'

TOWN OF OLIVER

TYPICAL
MANHOLE BENCHING



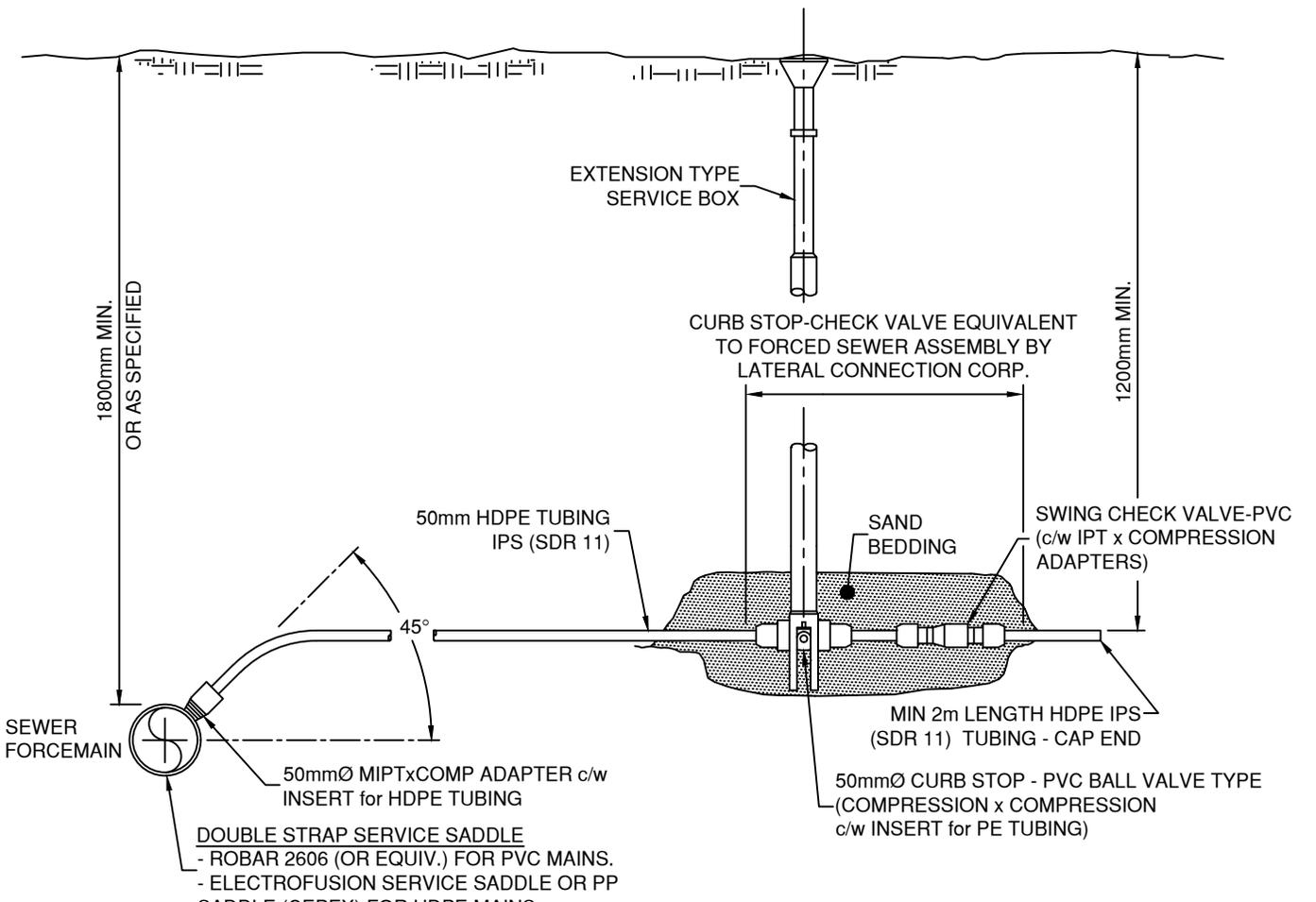
DWN. BY: TT	
CHK. BY: SU	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-8	1



NOTE:
STAINLESS STEEL SERVICE SADDLE-DOUBLE STRAP 50mm IPT

NOTE:
ALL PIPING AND FITTINGS TO BE BRASS OR BRONZE

PLAN



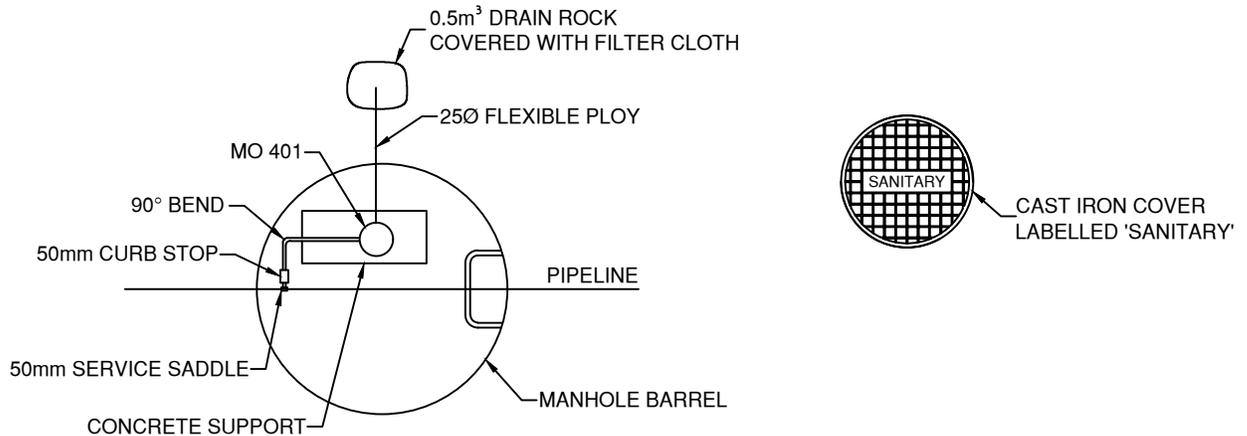
ELEVATION

TOWN OF OLIVER

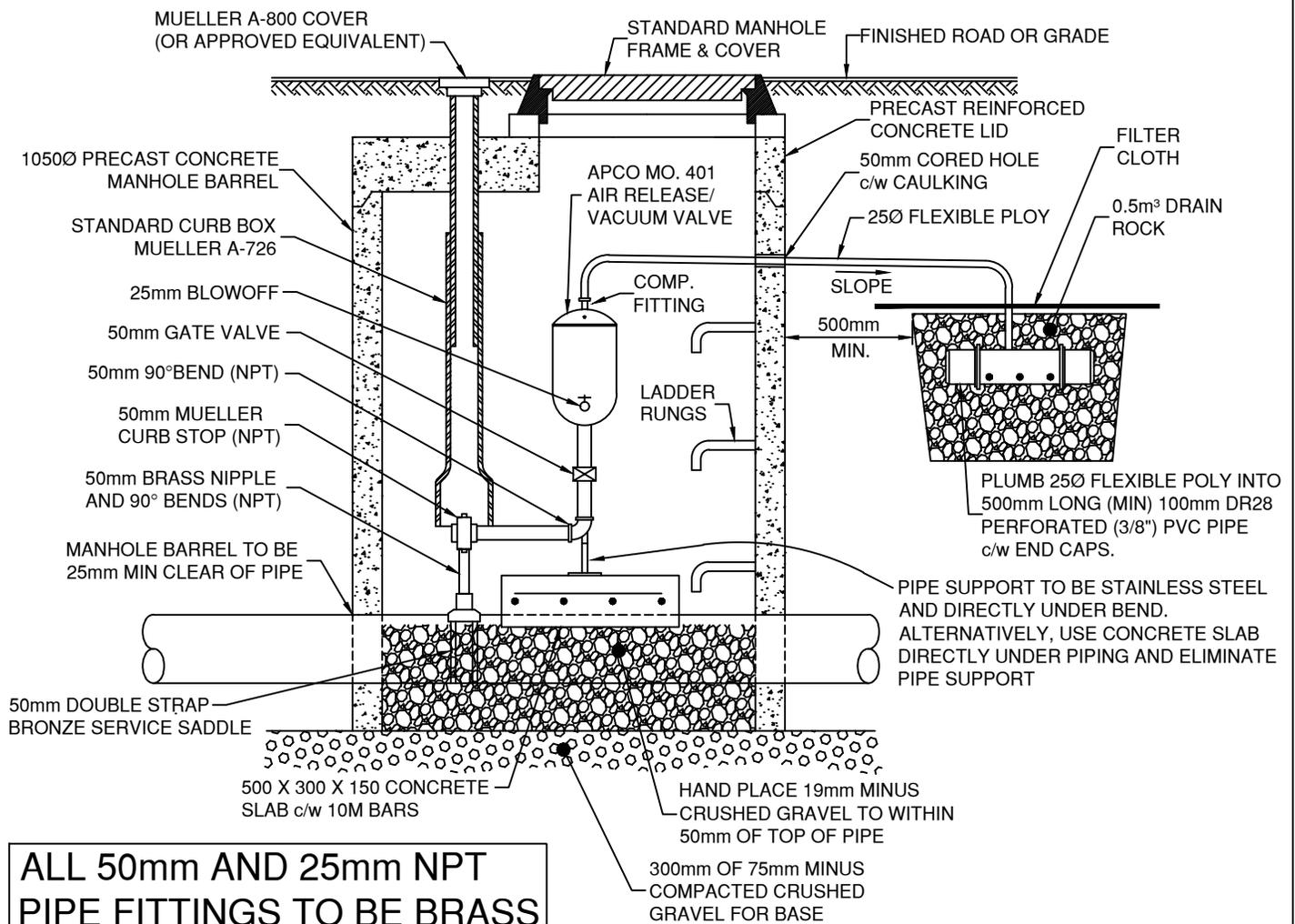
TYPICAL PRESSURE SEWER SERVICE



DWN. BY: TT	
CHK. BY: SU	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-09	1



SCHEMATIC OF PIPING LAYOUT-PLAN

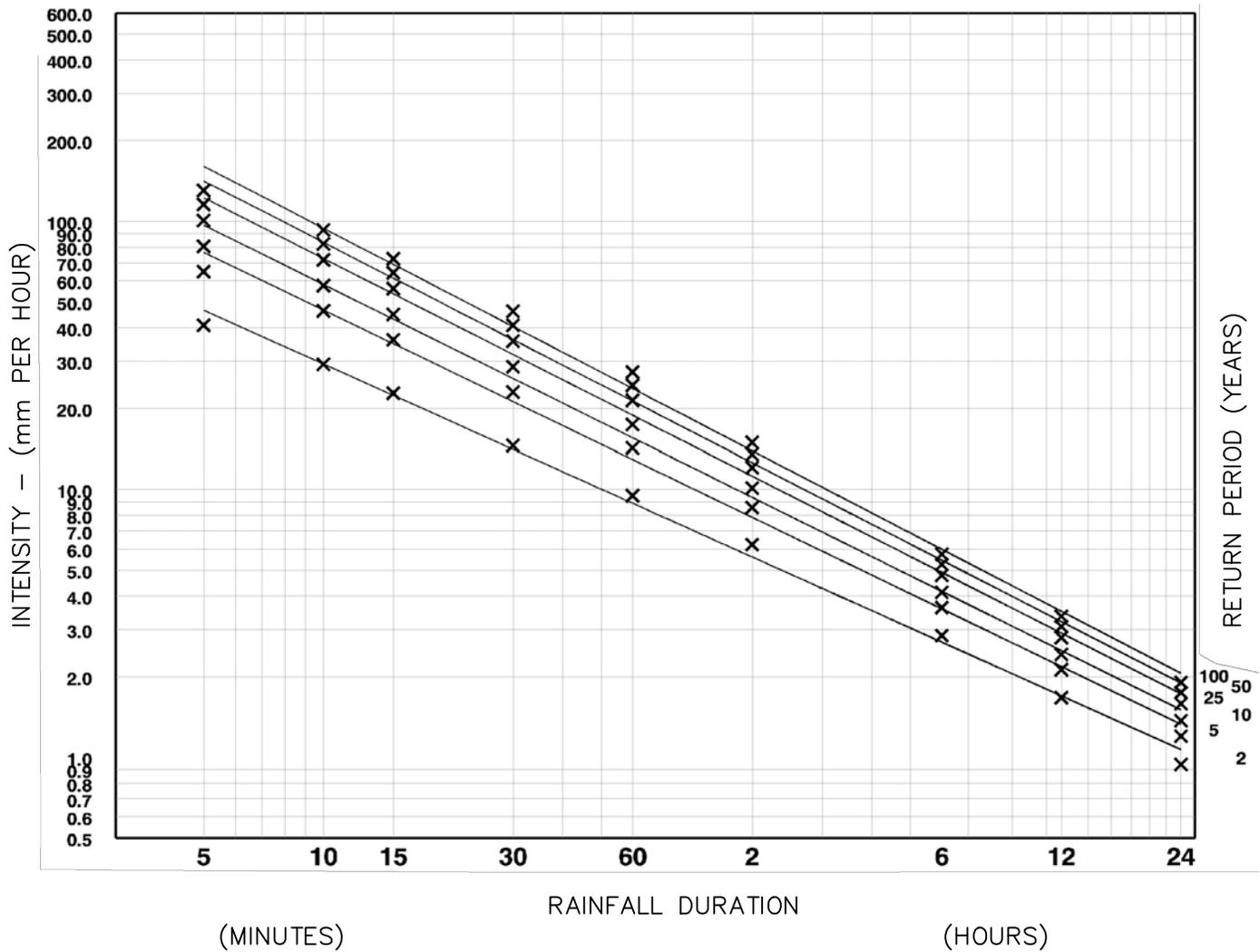


TOWN OF OLIVER

TYPICAL AIR RELEASE
AND AIR VACUUM VALVE
FOR SEWER FORCEMAINS



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
S-10	1



BASED ON RECORDING GAUGE DATA FOR THE PERIOD OF 1953 TO 2002 (45 YEARS) – PENTICTON AIRPORT

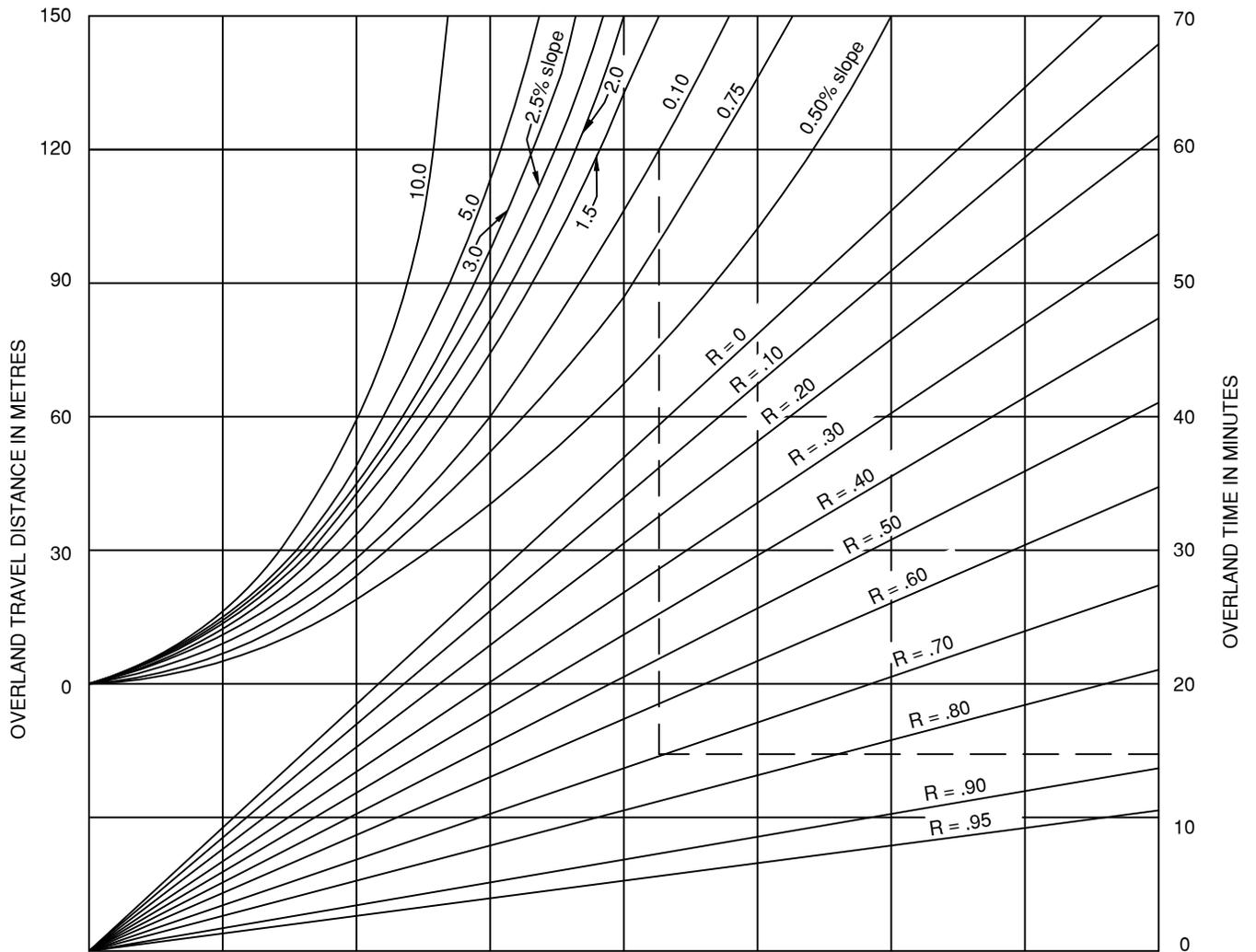
LATITUDE 49° 28'N, LONGITUDE 119° 36'W, ELEVATION 344m

TOWN OF OLIVER

RAINFALL
INTENSITY – DURATION – FREQUENCY
DESIGN CURVES



DWN. BY: TT	
CHK. BY: SU	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.: D-1	REV.: 1



OVERLAND FLOW CURVES FOR ESTIMATING FLOW TIMES.

TOWN OF OLIVER

OVERLAND FLOW
TIME CURVES



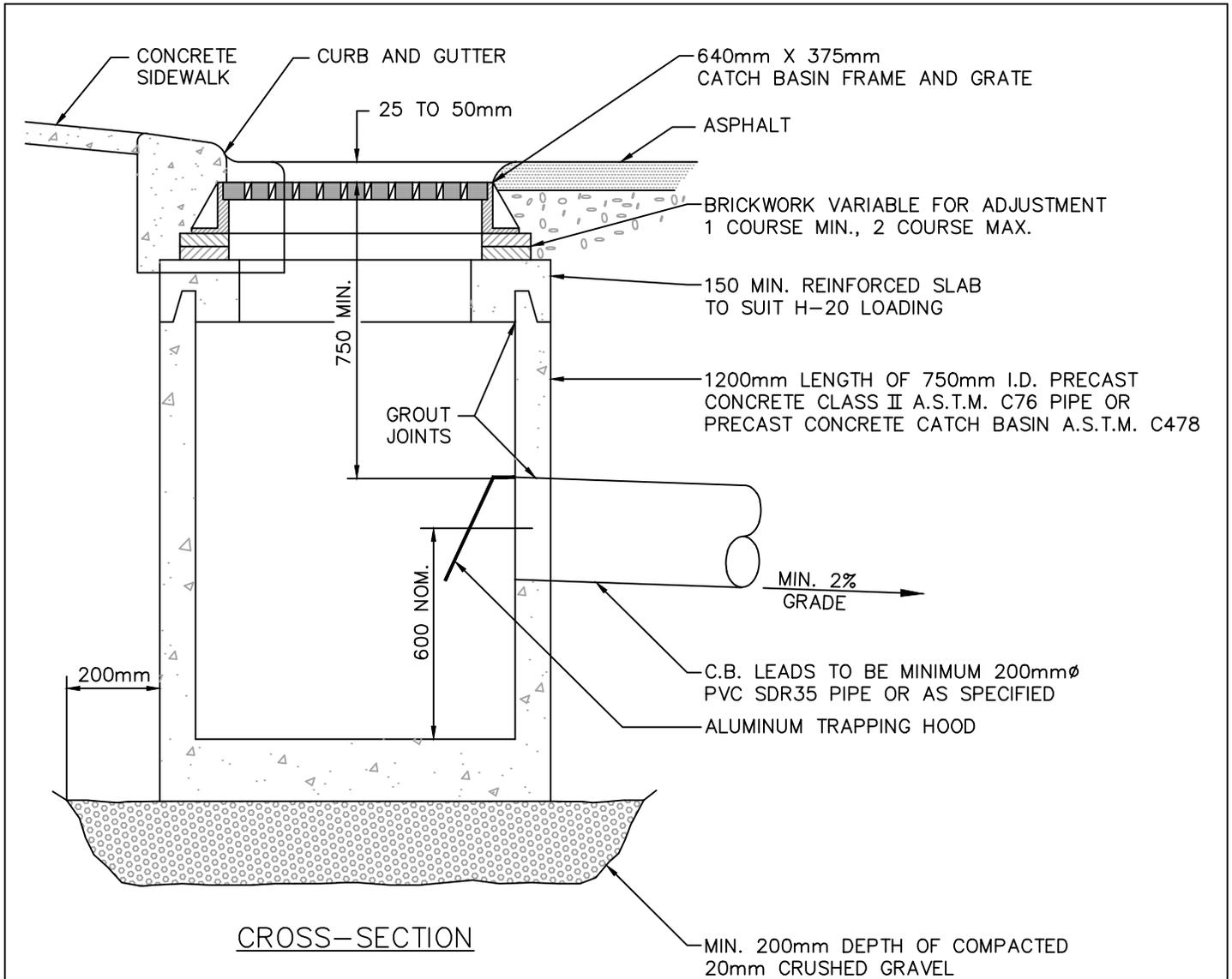
DWN. BY: TT	
CHK. BY: SU	
DATE:	MARCH 2021
SCALE:	N.T.S.
DWG. NO.:	REV.:
D-2	

SIZE OF SERVICE (mm)

	100	150	200	250	300	380	450	530	600
150	+		///	///	///	///	///	///	///
200	+			///	///	///	///	///	///
250	+				///	///	///	///	///
300	+					///	///	///	///
375	+						///	///	///
450	+	+						///	///
530	+	+	+	+					///
600	+	+	+	+	+				
675	+	+	+	+	+				
760	+	+	+	+	+				

THE ABOVE ARE GUIDELINES ONLY AND FOR CONNECTIONS TO EXISTING MAINS THE TYPE AND CONDITION OF EXISTING PIPE MAY DETERMINE WHEN A MANHOLE IS REQUIRED

TOWN OF OLIVER SANITARY OR STORM SEWER CONNECTIONS TO MAIN WHERE MANHOLES ARE REQUIRED		DWN. BY: JOSEPH
		CHK. BY: SHAWN
		DATE: MARCH 2021
		SCALE: N.T.S.
		DWG. NO.: D-3
		REV.: 1



CASTING SPECIFICATIONS

THE CASTINGS SHALL BE TRUE TO PATTERN AND FREE FROM CRACKS, GAS HOLES, FLAWS, AND EXCESSIVE SHRINKAGE. SURFACES OF THE CASTINGS SHALL BE FREE FROM BURNT SAND AND SHALL BE REASONABLY SMOOTH. RUNNERS, RISER, FINS, AND OTHER CAST ON PIECES SHALL BE REMOVED.

- FRAME MATERIAL SPECIFICATION
CAST IRON A.S.T.M. A-48 CLASS 20
- GRATE MATERIAL SPECIFICATION
DUCTILE IRON A.S.T.M. A-445 OR CAST STEEL -Grade 60-90 (TABLE II A.S.T.M. DESIGNATION A-148)

APPROVED PATTERNS

MANUFACTURER	DESIGNATION	
	GRATE	FRAME
DOBNEY FOUNDRY CO. Ltd. SURREY & PENTICTON B.C.	B-18 B-19A Mod	B-19 B-19A
MINIMUM WEIGHTS	68 kg	86 kg

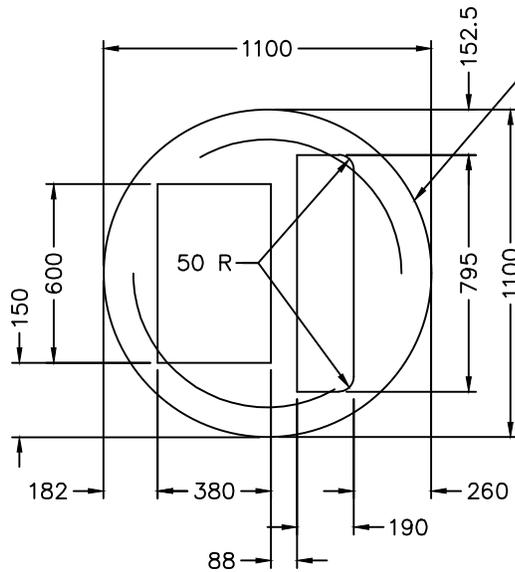
NOTE: -Grates Available in Both Left and Right Hand Patterns
-Entire catchbasin assembly may be precast

TOWN OF OLIVER

CATCH BASIN ASSEMBLY
STANDARD TYPE

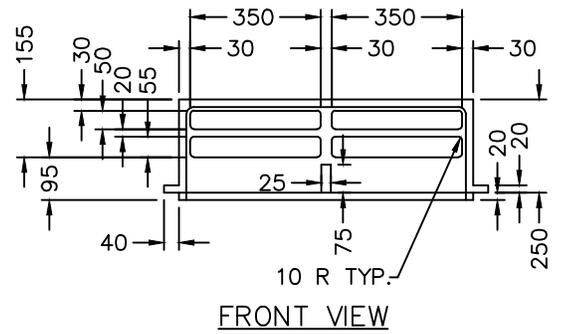


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
D-4	1

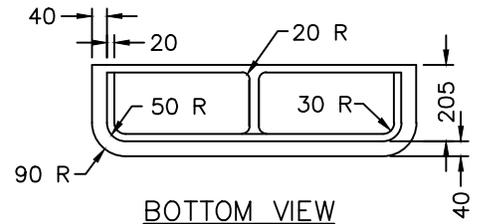


CONCRETE LID PLAN

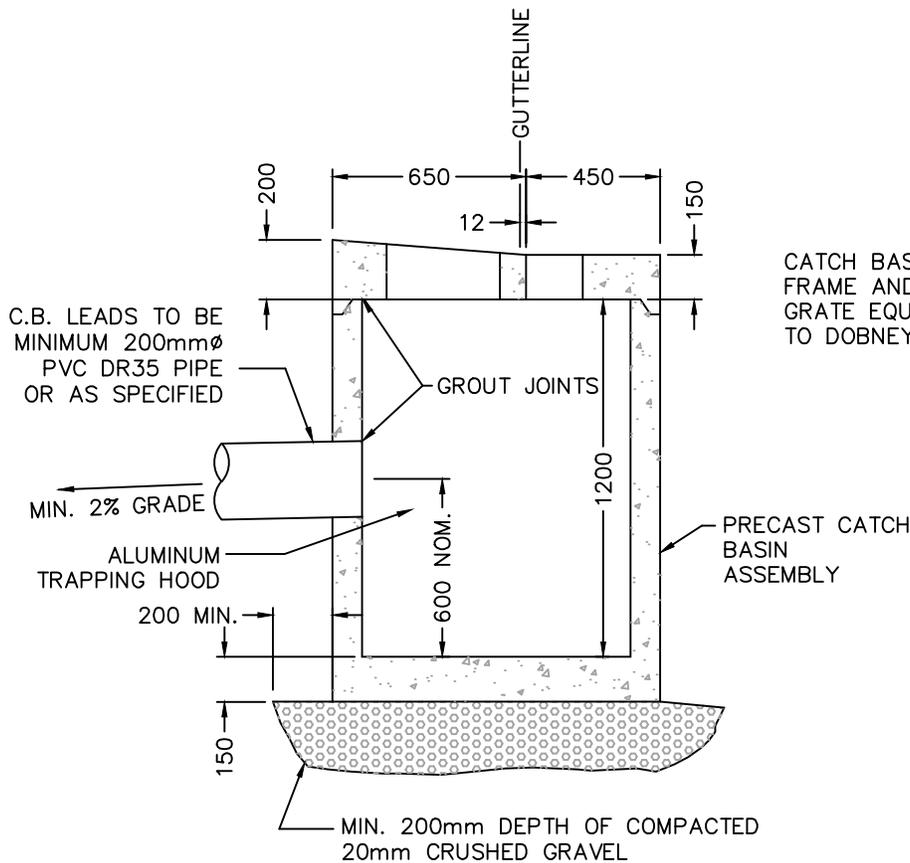
PRECAST CONCRETE LID REINFORCED TO CARRY H-20 LOADING



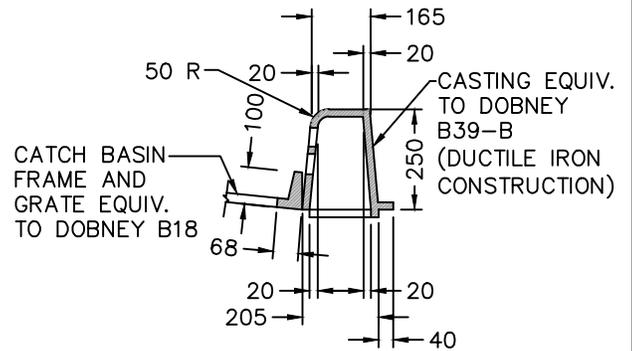
FRONT VIEW



BOTTOM VIEW



CROSS-SECTION



CROSS-SECTION

SIDE INLET

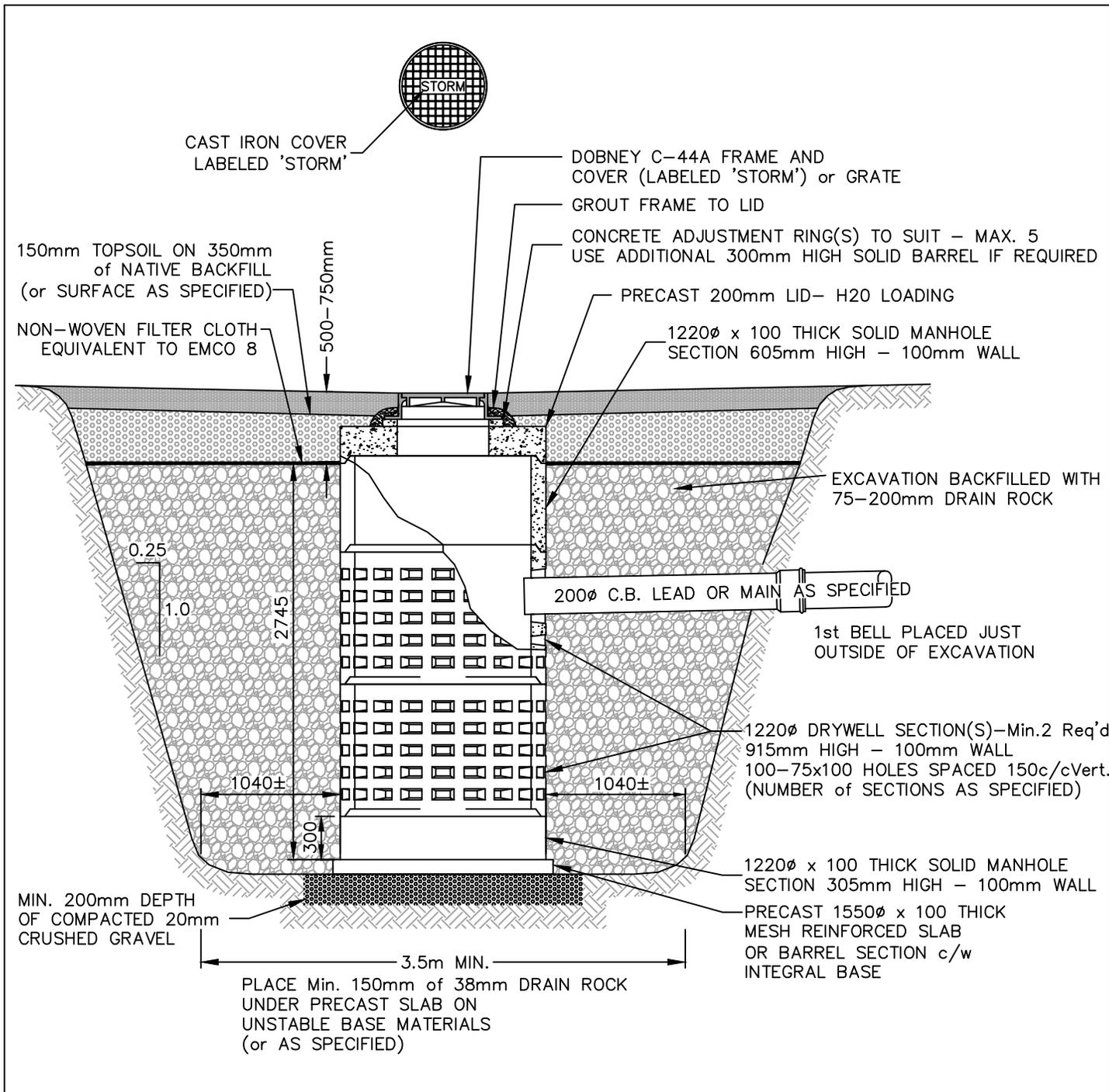
FOR MoT STANDARD:
CB FRAME AND GRATE EQUIV.
TO DOBNEY B19A MODIFIED

TOWN OF OLIVER

CATCH BASIN ASSEMBLY
CURB-INLET TYPE



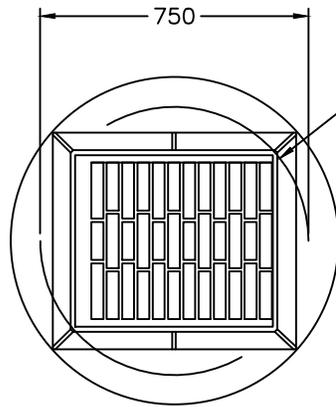
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
D-5	1



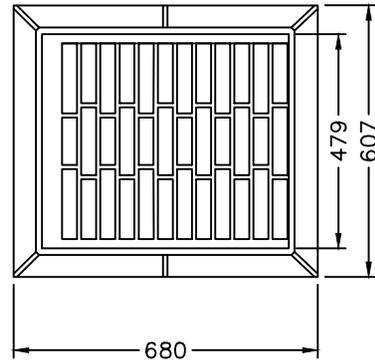
NOTES:

1. THE NUMBER OF DRYWELL SECTIONS WILL DEPEND UPON THE AREA BEING DRAINED AND THE SOIL CONDITIONS. THE NUMBER OF DRYWELL SECTIONS SHALL BE AS SPECIFIED ON THE DRAWINGS OR SPECIFICATIONS FOR EACH DRYWELL.
2. WHEN UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED THE EXCAVATION SLOPE MAY BE MODIFIED. WHEN "FLOWING" SANDS OR GRAVELS ARE ENCOUNTERED, THE EXCAVATION SHALL BE LINED WITH FILTER CLOTH TO PREVENT THE MIGRATION OF NATIVE SOILS INTO THE DRAIN ROCK.

TOWN OF OLIVER		DWN. BY: JOSEPH	
DRAINAGE DRYWELL		CHK. BY: SHAWN	DATE: MARCH 2021
		SCALE: N.T.S.	
		DWG. NO.: D-6	REV.: 1

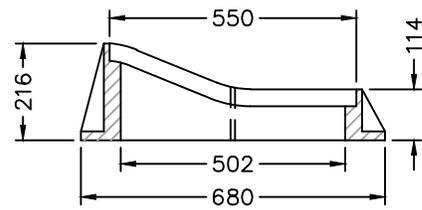
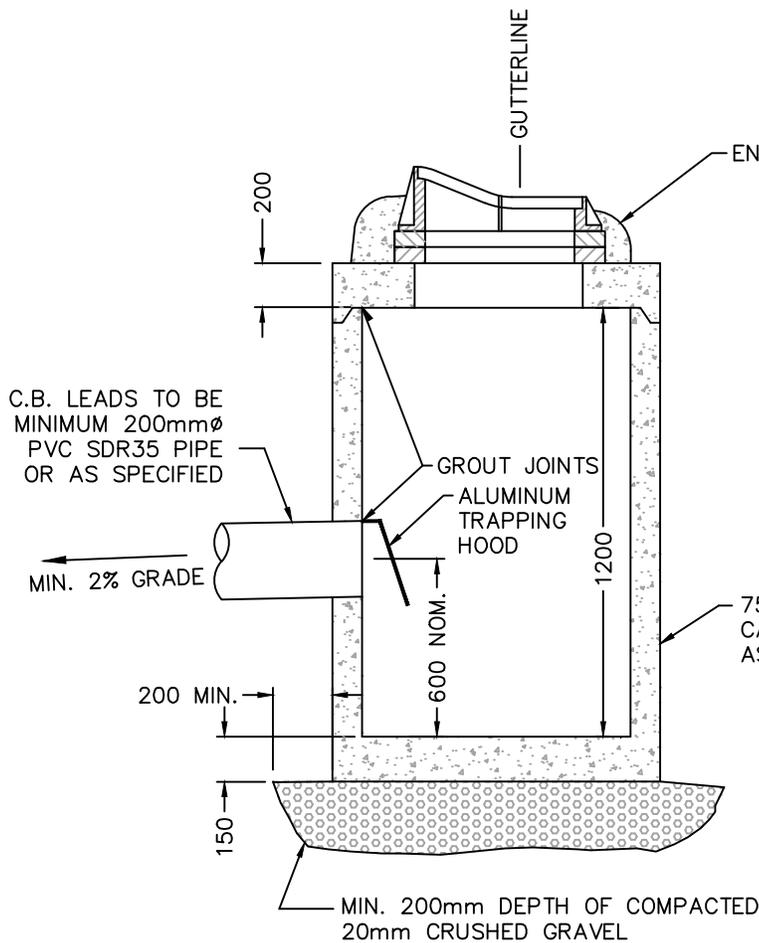


PRECAST CONCRETE LID REINFORCED TO CARRY H-20 LOADING



680mmx0.03=20.4

CONCRETE LID PLAN



CROSS-SECTION

SIDE INLET

CROSS-SECTION

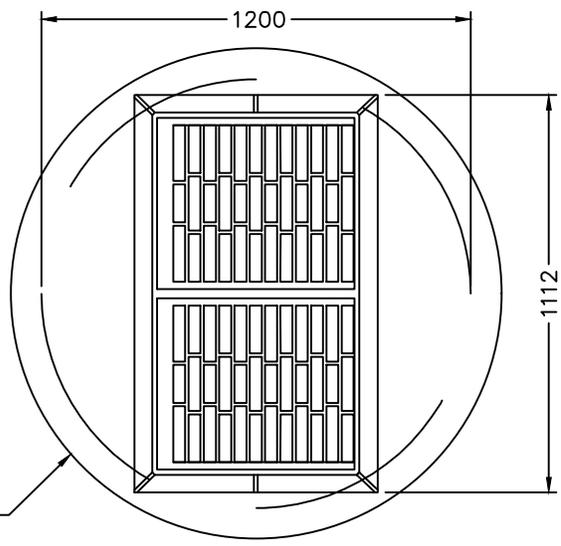
NOTE:
 *MATERIAL: DUCTILE IRON GRADE 60-40-14
 *ALLOWANCE TO BE MADE FOR MACHINING THE BEARING SURFACES
 *INSTALL ON H-20 CONCRETE LID OVER 750mm INSIDE DIAMETER MANHOLE BARREL.

TOWN OF OLIVER

CATCH BASIN ASSEMBLY
 CURB - MOUNTABLE CURB

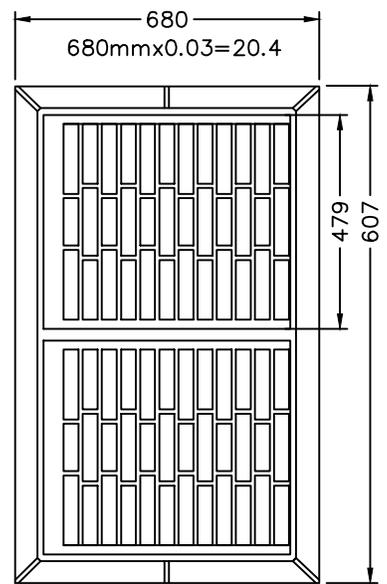


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
D-8	1



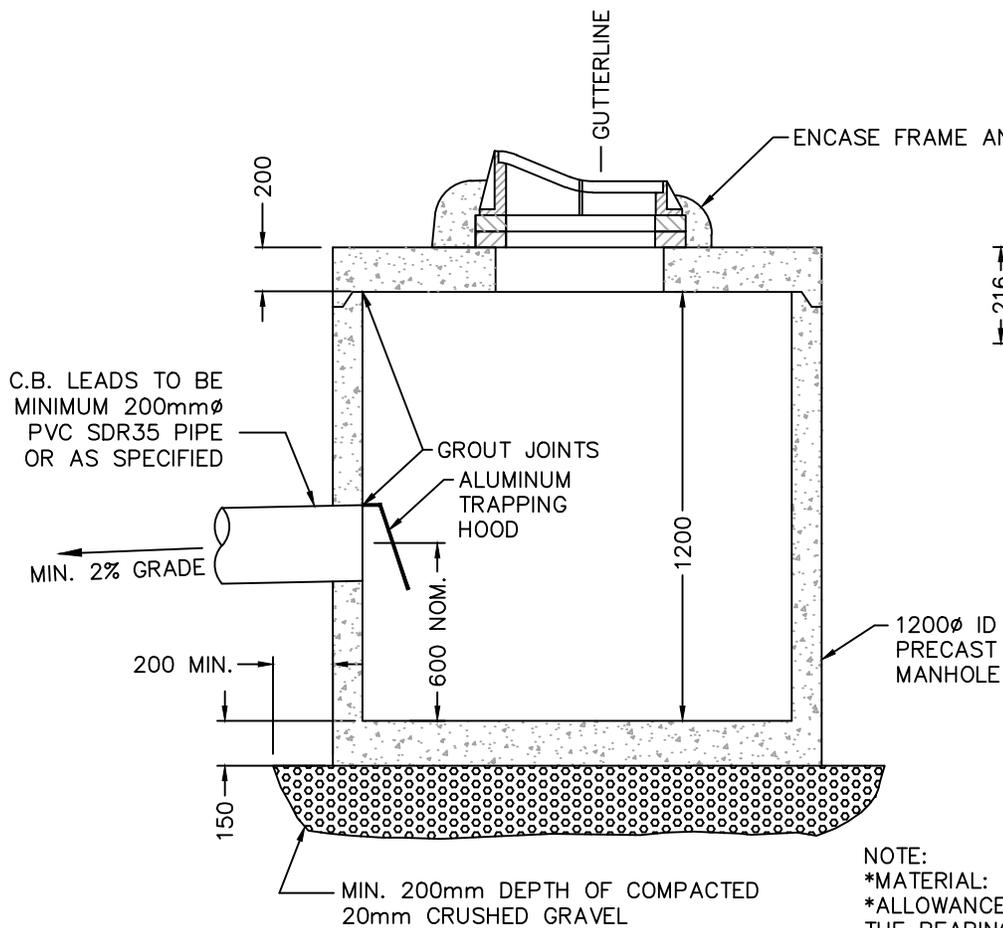
PRECAST CONCRETE LID
REINFORCED TO CARRY
H-20 LOADING

CONCRETE LID PLAN



CROSS-SECTION

SIDE INLET



CROSS-SECTION

750mmx0.024=18

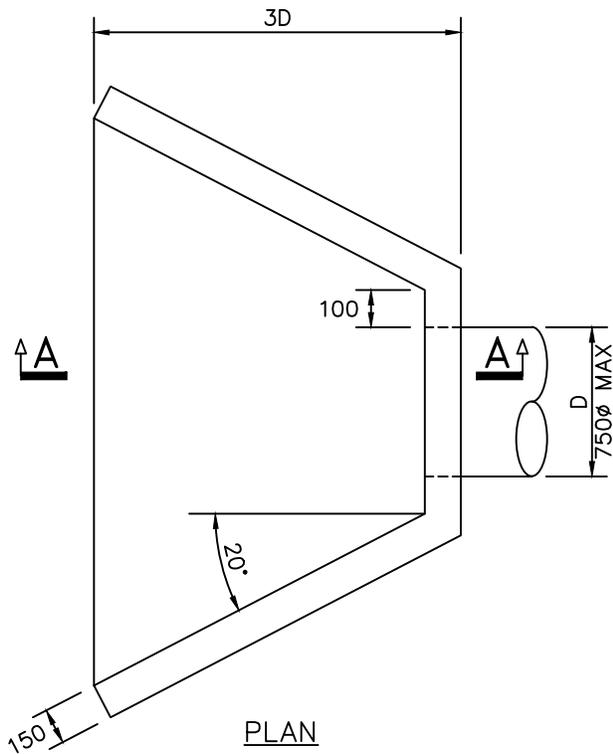
NOTE:
 *MATERIAL: DUCTILE IRON GRADE 60-40-14
 *ALLOWANCE TO BE MADE FOR MACHINING THE BEARING SURFACES
 *INSTALL ON H-20 CONCRETE LID OVER 1200mm INSIDE DIAMETER MANHOLE BARREL.

TOWN OF OLIVER

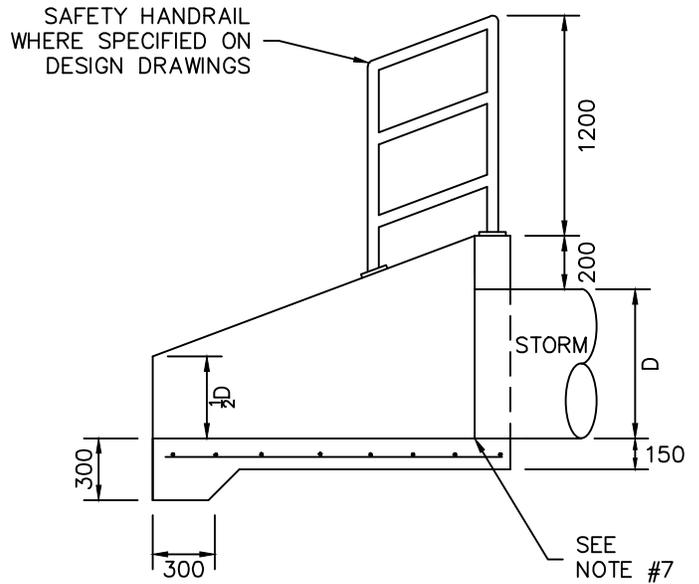
DOUBLE CATCH BASIN ASSEMBLY
CURB - MOUNTABLE CURB



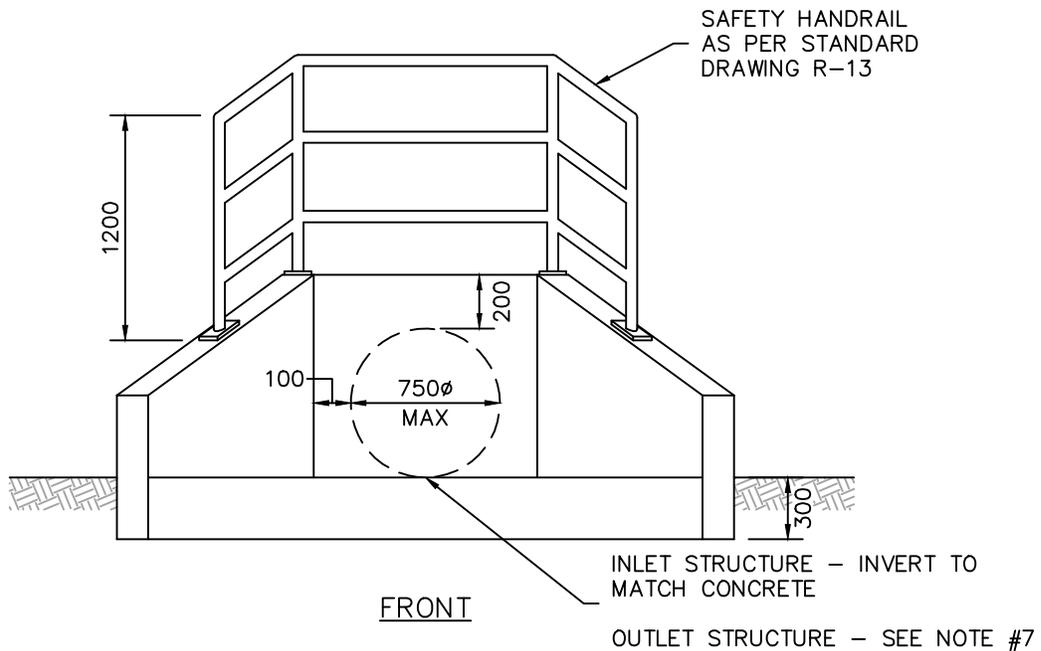
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
D-9	1



PLAN



SECTION A-A



FRONT

NOTES:

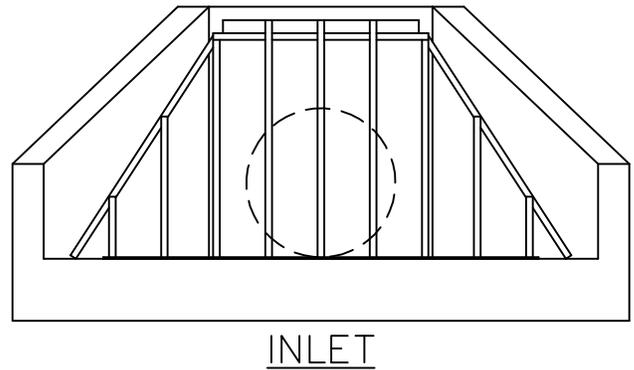
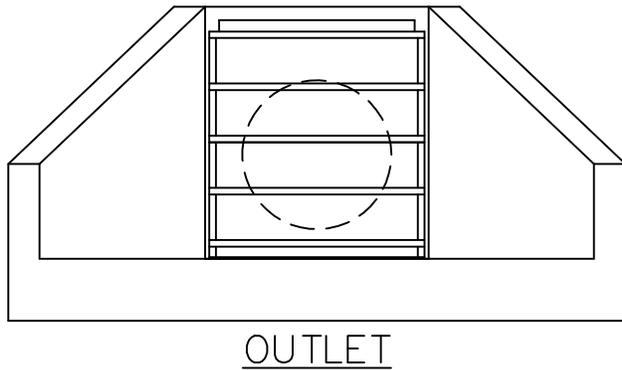
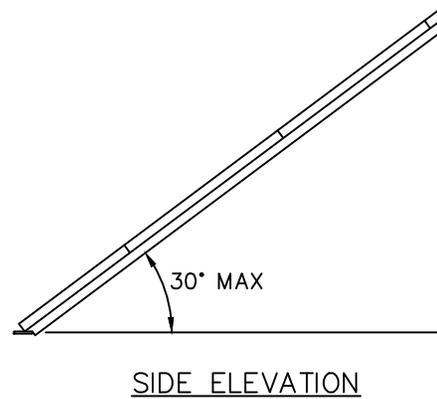
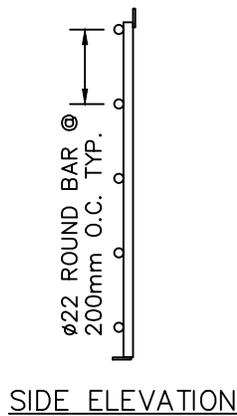
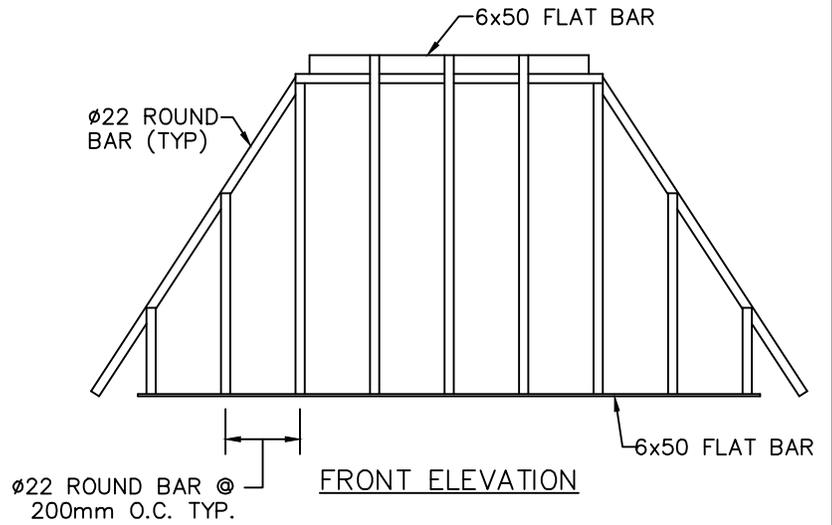
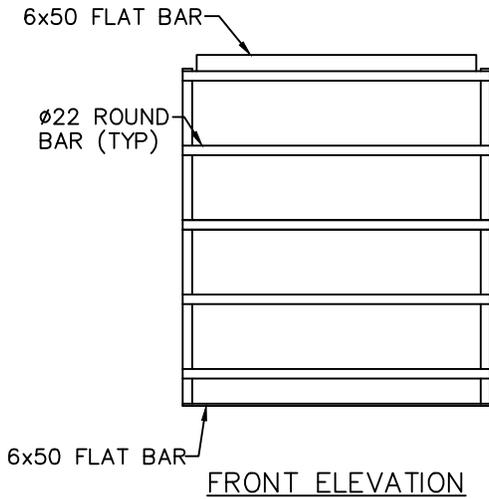
1. 10mm CHAMFER ON ALL EXPOSED EDGES.
2. EXPOSED SURFACE TO BE RUBBED TO GIVE A NEAT AND SMOOTH APPEARANCE.
3. ALL CONCRETE TO BE REINFORCED WITH 10M @ 200 E.W., ALL REINFORCING SPLICES TO 40 BAR DIAMETERS.
4. CONCRETE 25mPa @ 28 DAYS, EXPOSURE CLASS F-1.
5. INSTALL SAFETY HANDRAIL WHERE VERTICAL DROPS EXCEED 0.6m OR WHERE SPECIFIED.
6. INSTALL HEADWALL INLET/OUTLET GRILLAGE SIMILAR TO DRAWING D-10.
7. FOR OUTLET STRUCTURES ONLY - PROVIDE CLEARANCE BELOW STORM PIPE OPENING FOR FLAP GATE BACKFLOW PREVENTER MOUNTING FLANGE WHERE SPECIFIED ON DESIGN DRAWINGS, SEE STANDARD DRAWING D-11.

TOWN OF OLIVER

TYPICAL STORM
INLET/OUTLET STRUCTURE



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
D-10	1



NOTES:

1. INSTALL SAFETY HANDRAIL WHERE VERTICAL DROPS EXCEED 0.6m OR WHERE SPECIFIED ON DESIGN DRAWINGS. REFER TO STANDARD DRAWING R-13.
2. ALL STEEL COMPONENTS TO BE HOT DIPPED GALVANIZED AFTER FABRICATION.
3. SAFETY GRILLAGE TO BE WELDED AT ALL JOINTS AND CONNECTIONS EXCEPT AT ANCHOR BOLTS.

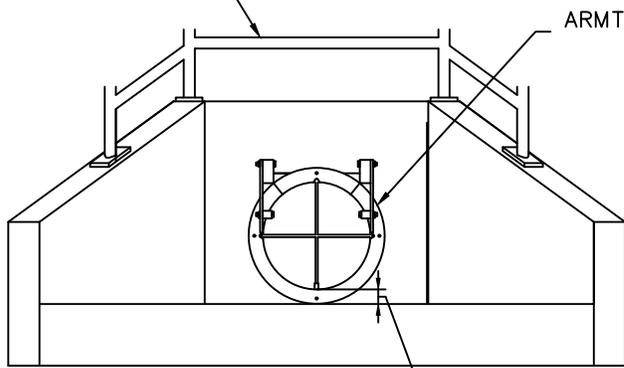
TOWN OF OLIVER

TYPICAL STORM
HEADWALL GRILLAGE



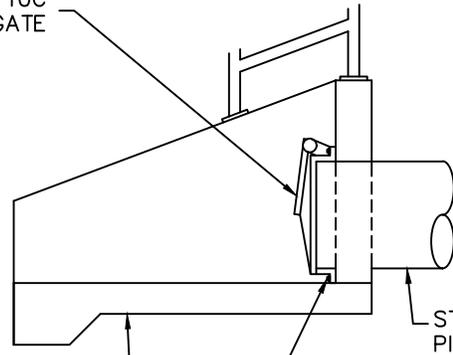
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
D-11	1

SAFETY HANDRAILING
AS PER STANDARD
DRAWING R-13



ARMTEC MODEL 10C
FLAP GATE

PROVIDE CLEARANCE
FOR FLAP GATE
BACKFLOW PREVENTER
MOUNTING FLANGE

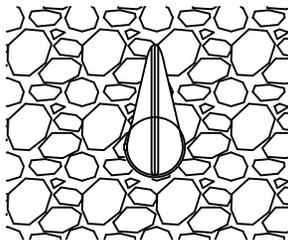


STORM
PIPE

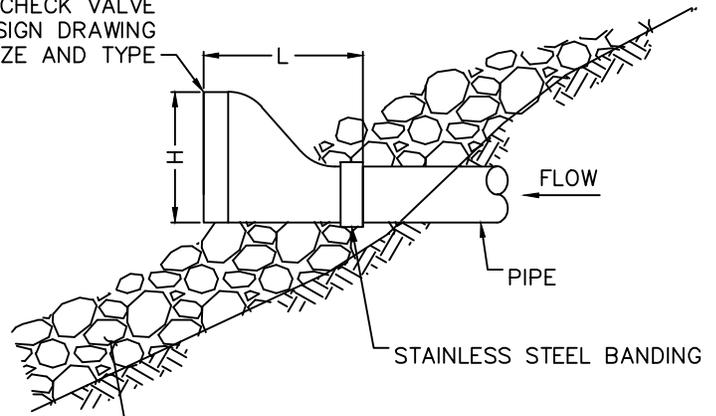
BOLT TO CONCRETE
HEADWALL

OUTLET STRUCTURE PER
TOWN OF OLIVER
STD DWG D-9

FLAP GATE BACKFLOW PREVENTER



TIDEFLEX SERIES 35-1
CHECK VALVE
REFER TO DESIGN DRAWING
FOR VALVE SIZE AND TYPE



FLOW

PIPE

STAINLESS STEEL BANDING

100mm TO 300mm RIP-RAP TIGHTLY PLACED
NO GAPS GREATER THAN 25mm.
INFILL WITH 19mm CRUSHED GRAVEL

CHECK VALVE BACKFLOW PREVENTER

NOTE

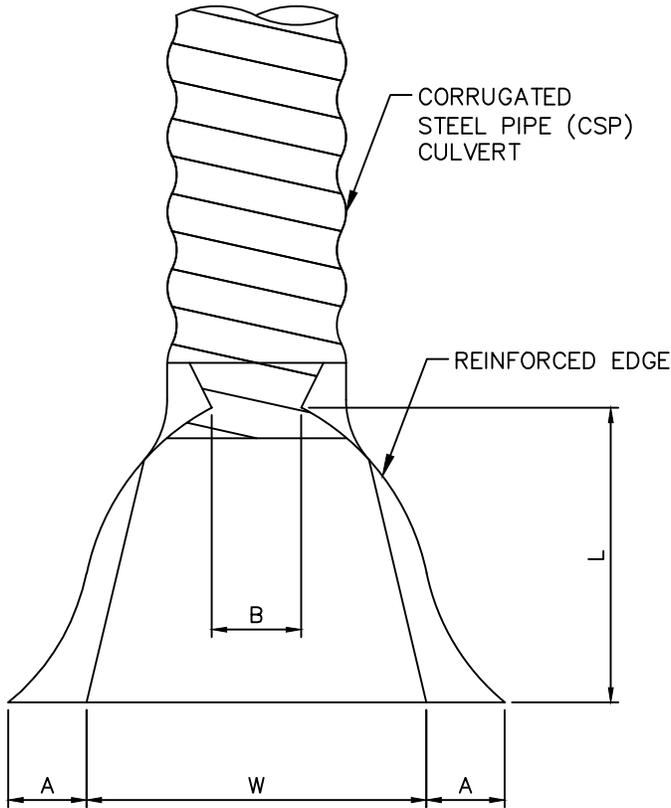
TIDEFLEX OUTLET MAY REQUIRE SECURING
TO HEADWALL OR CONCRETE STRUCTURE.

TOWN OF OLIVER
TYPICAL STORM
OUTLET STRUCTURE
BACKFLOW PREVENTERS

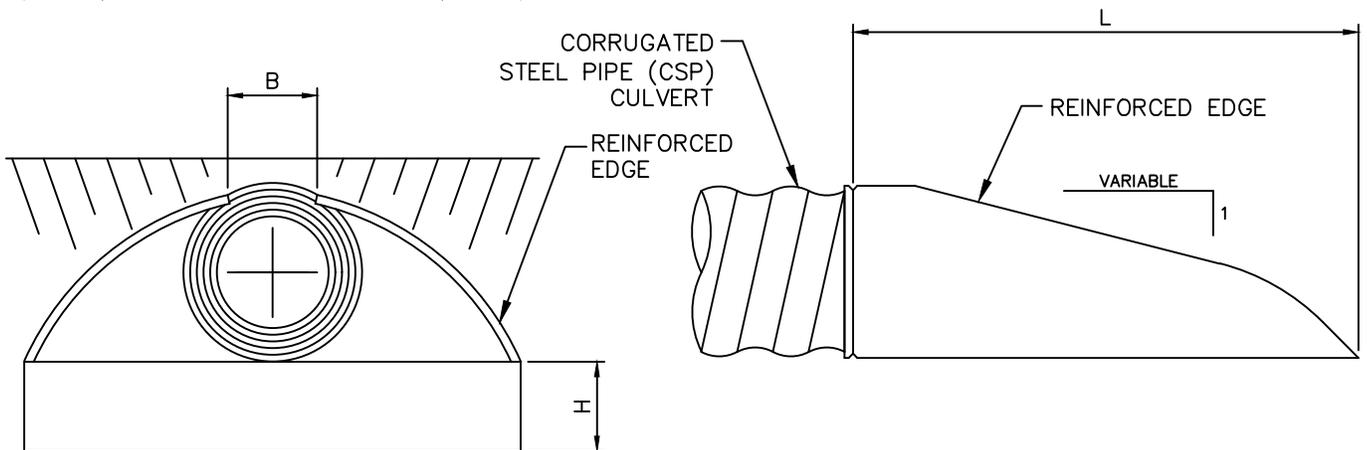


DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
D-12	1

END SECTIONS (DIMENSIONS IN mm)					
PIPE ϕ	A	B	H	L	W
300 ϕ	150	150	150	530	610
400 ϕ	175	200	150	660	760
450 ϕ	200	255	150	785	915
500 ϕ	230	300	150	915	1065
600 ϕ	255	330	150	1040	1220



NOTE:
ALL CULVERTS ARE TO INCLUDE END SECTIONS.



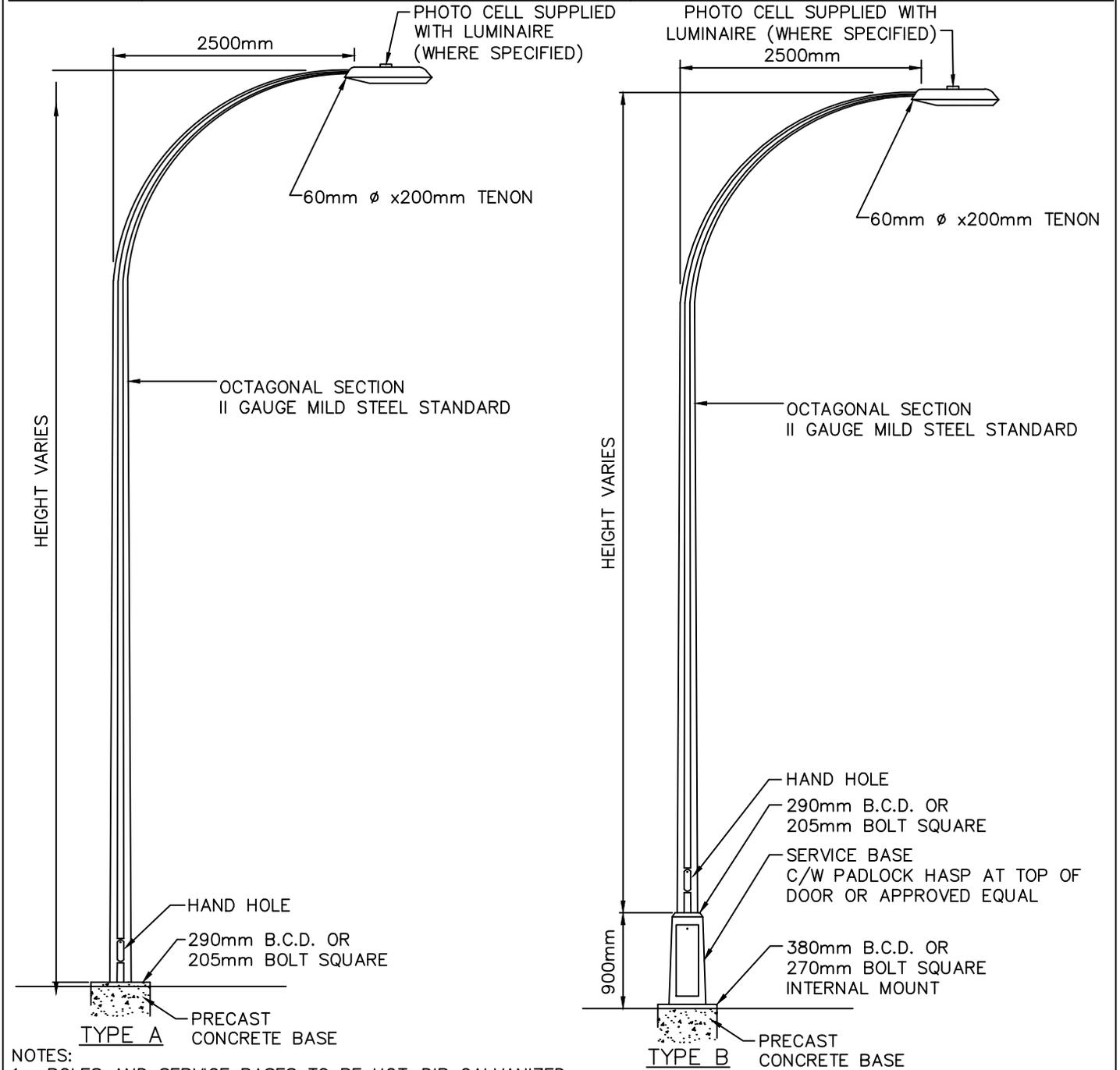
TOWN OF OLIVER

TYPICAL CULVERT END SECTION



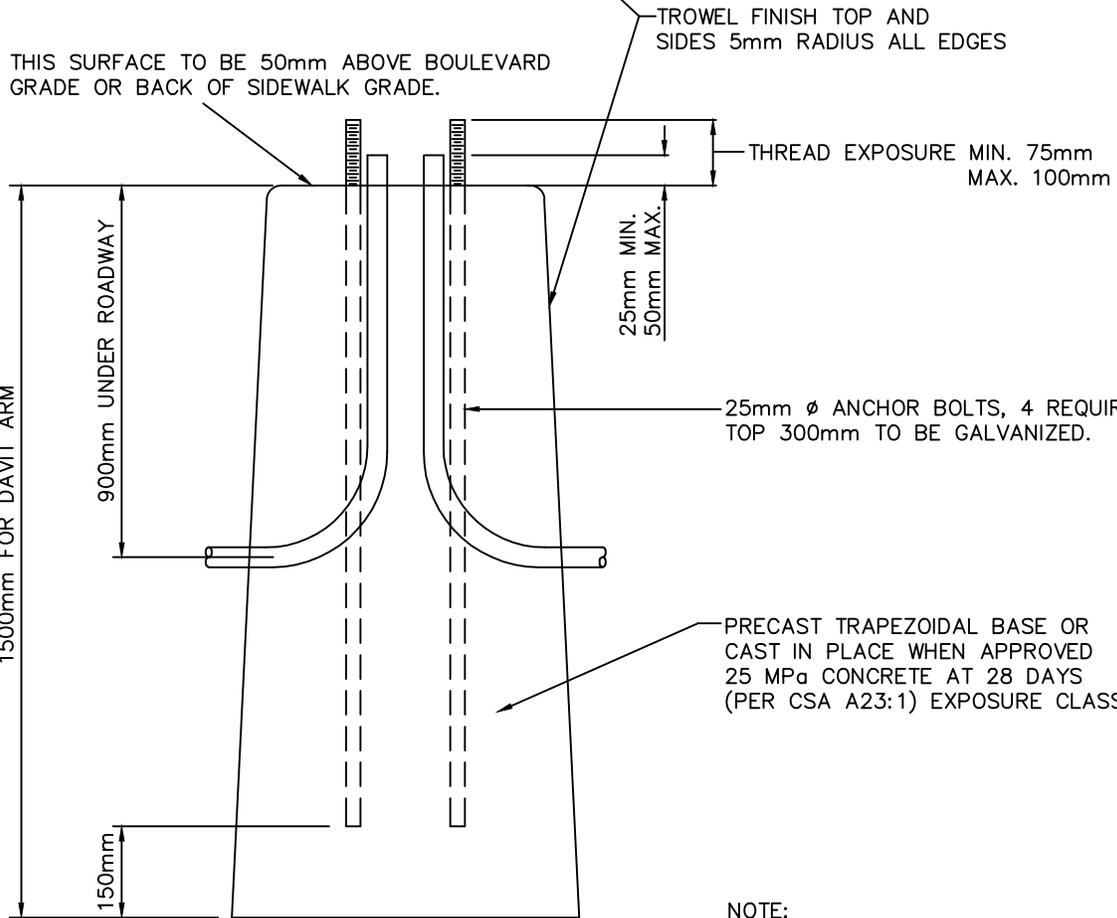
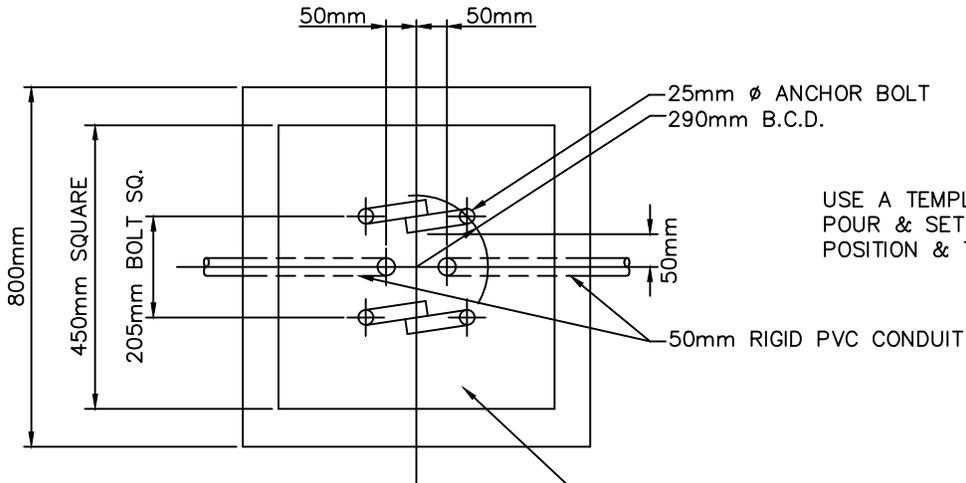
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
D-13	1

	RESIDENTIAL	COMMERCIAL/ARTERIAL
HEIGHT	8.0m	9.0m
LAMP	LED	LE
LUMINAIRE	GE EVOLVE c/w cut off optics & photo cell	GE EVOLVE c/w cut off optics & photo cell



- NOTES:
1. POLES AND SERVICE BASES TO BE HOT-DIP GALVANIZED.
 2. BASE BOLT COVERS TO BE USED ON TYPE 'B' POLES ONLY.
 3. RESIDENTIAL AREAS HAVE A REQUIREMENT OF \geq THAN 0.5 LUMINANCE (38W TO 58 W LED).
 4. ARTERIAL/COMMERCIAL AREAS HAVE A REQUIREMENT OF \geq THAN 0.9 LUMINANCE (60W TO 76W LED).

TOWN OF OLIVER			DWN. BY: JOSEPH	
TYPICAL STREET LIGHT			CHK. BY: SHAWN	
		DATE: MARCH 2021		
		SCALE: N.T.S.		
		DWG. NO.:	REV.:	
		SL-1	1	

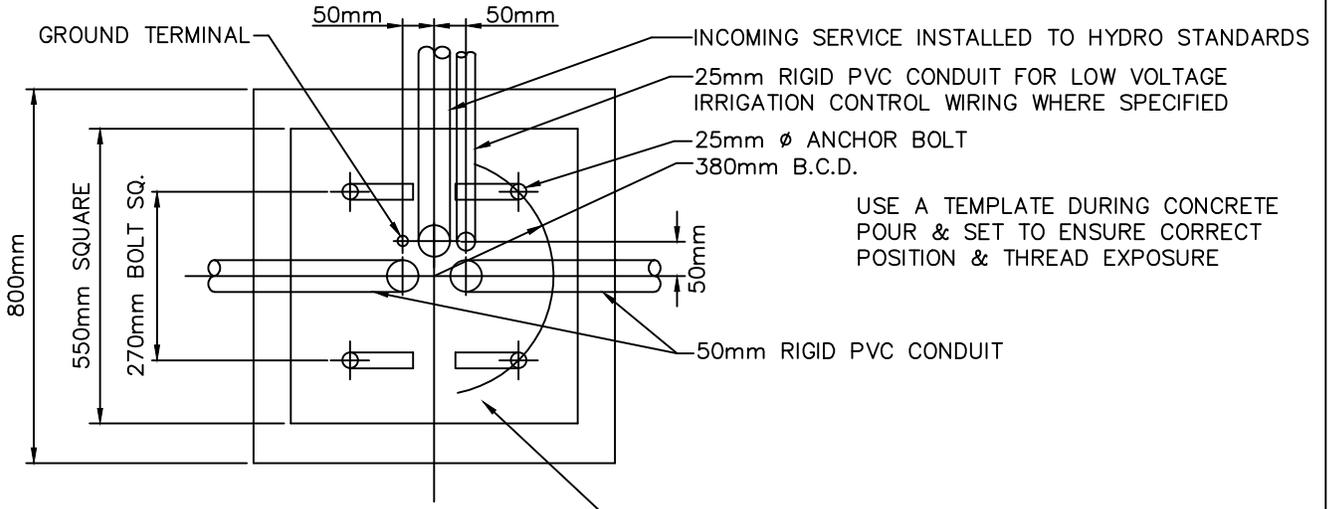


NOTE:
 OIN ADVERSE SOIL CONDITIONS ENGINEER
 SHALL CONFIRM ADEQUACY OF BASE

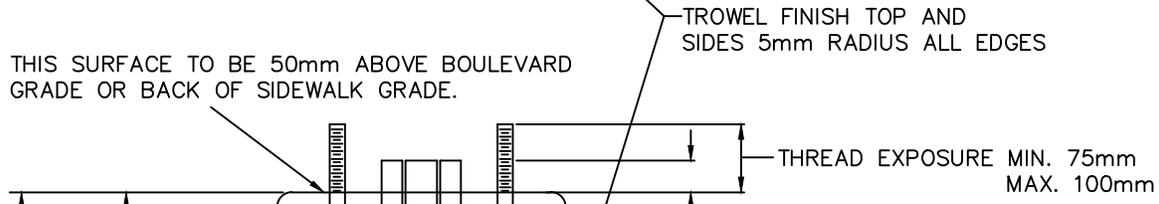
TOWN OF OLIVER
 STREET LIGHT ANCHOR BASE
 FOR TYPE A POLES



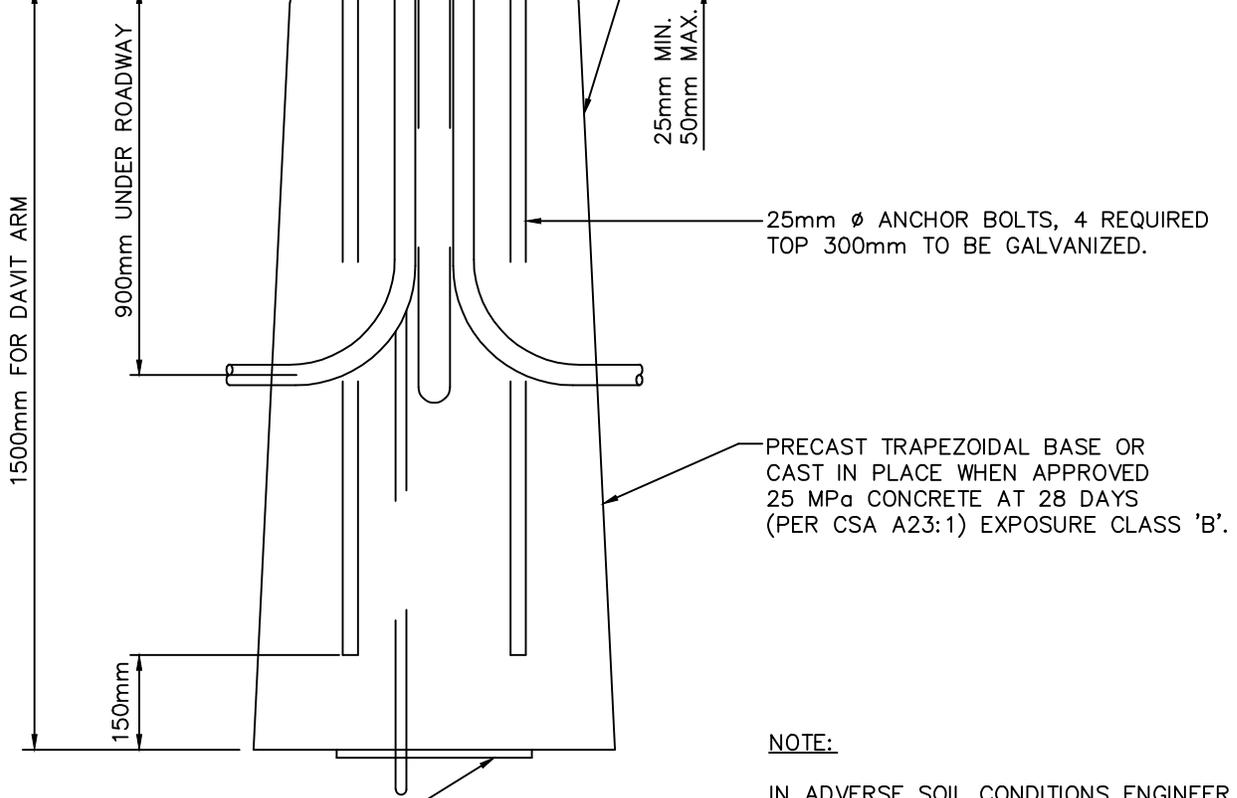
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
SL-2	1



USE A TEMPLATE DURING CONCRETE POUR & SET TO ENSURE CORRECT POSITION & THREAD EXPOSURE



THIS SURFACE TO BE 50mm ABOVE BOULEVARD GRADE OR BACK OF SIDEWALK GRADE.



NO.6 STRANDED GROUND WIRE TO A COPPERWELD PLATE ELECTRODE HAVING NOT LESS THAN 0.2m² OF SURFACE AREA AND SHALL BE NOT LESS THAN 1.5mm IN THICKNESS.

NOTE:

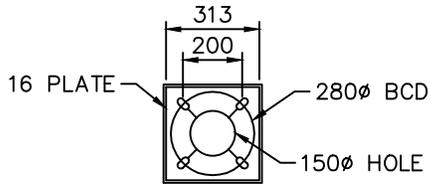
IN ADVERSE SOIL CONDITIONS ENGINEER SHALL CONFIRM ADEQUACY OF BASE

TOWN OF OLIVER

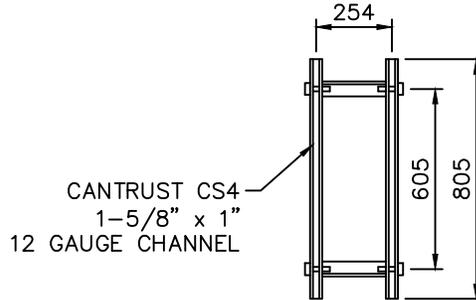
STREET LIGHT ANCHOR BASE
FOR TYPE B POLES



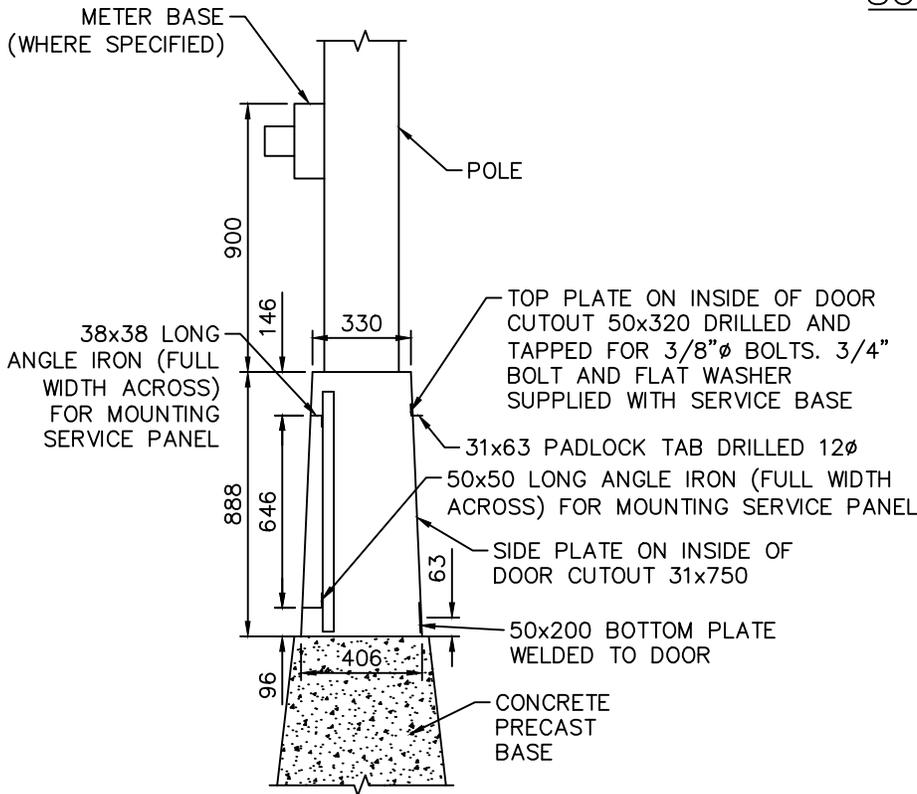
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
SL-3	1



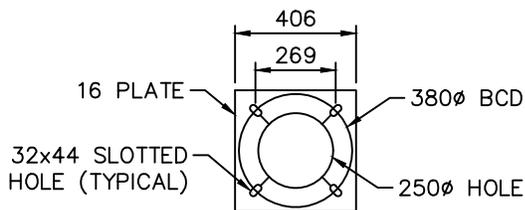
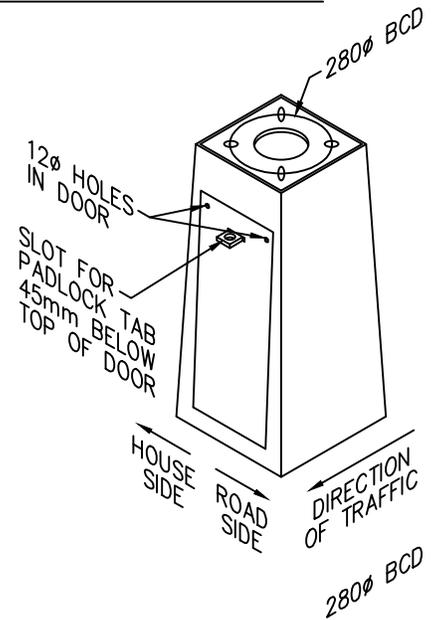
TOP VIEW



SERVICE PANEL SUPPORT CHANNELS



ELEVATION



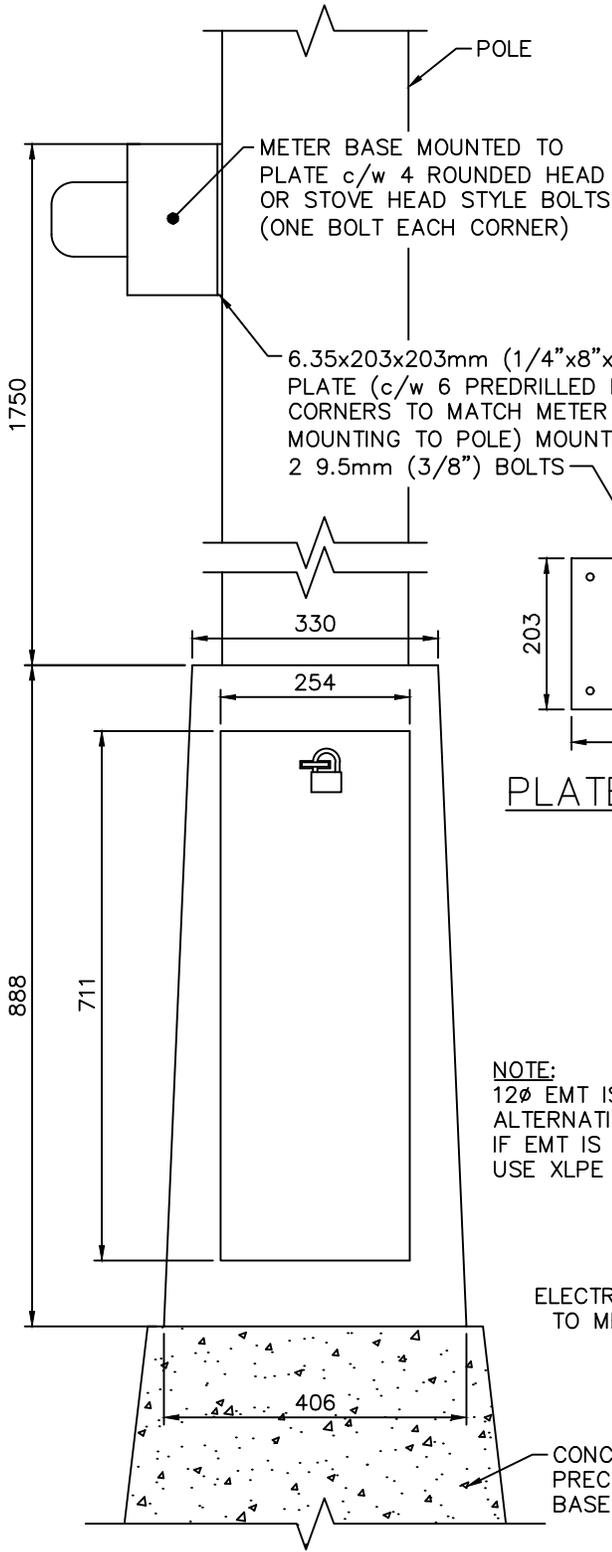
BOTTOM VIEW

TOWN OF OLIVER

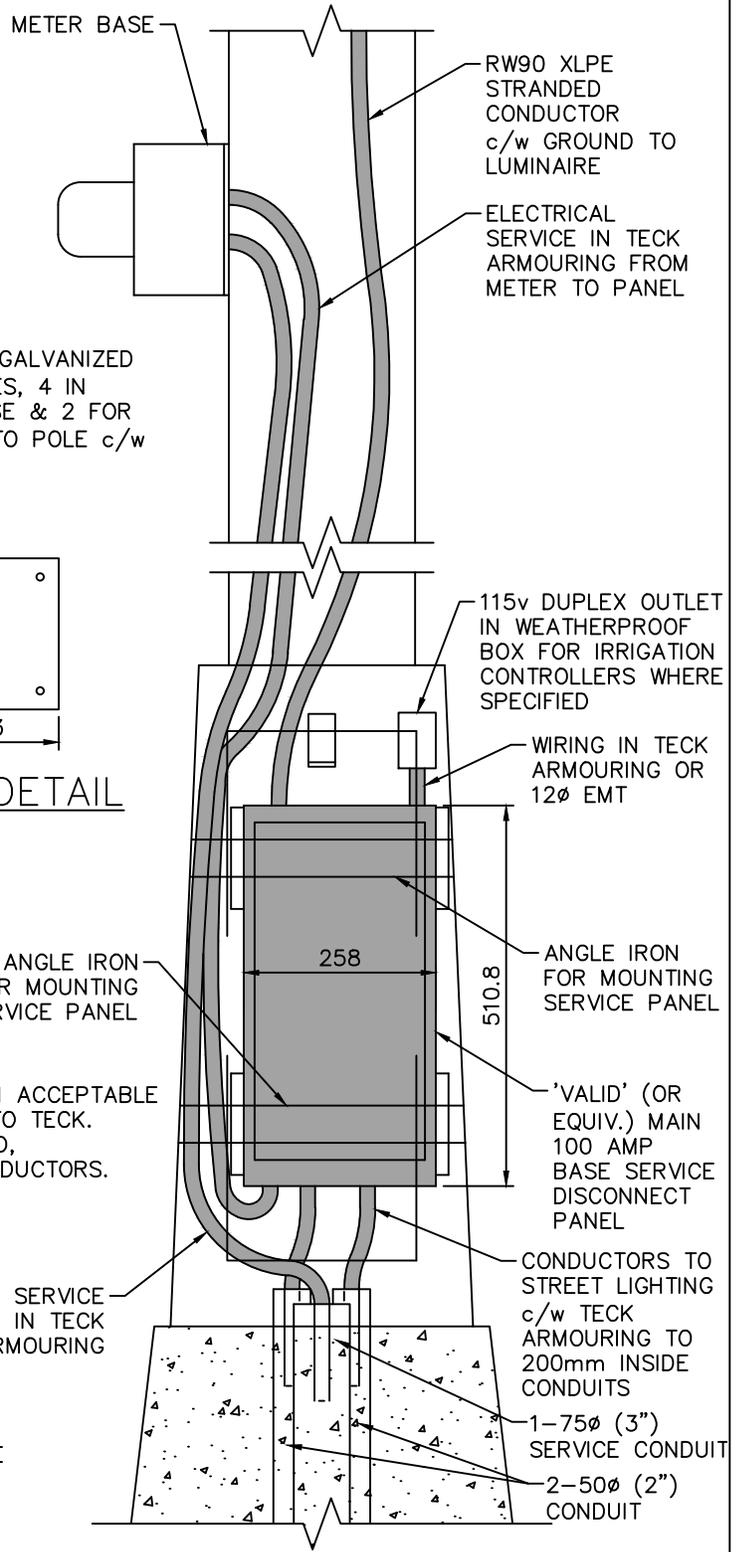
POWER BASE WIRING DETAIL
WITH METERED ELECTRICAL SERVICE



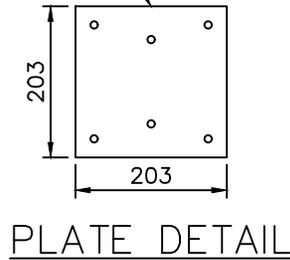
DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
SL-4	1



ELEVATION (PANEL CLOSED)



ELEVATION (PANEL OPEN)



NOTE:
12ø EMT IS AN ACCEPTABLE ALTERNATIVE TO TECK.
IF EMT IS USED,
USE XLPE CONDUCTORS.

TOWN OF OLIVER

POWER BASE PANEL
LOCATION DETAILS



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
SL-5	1

NO.14, RW90 XLPE
STRANDED CONDUCTORS
c/w GROUND TO LUMINAIRE

CONDUCTORS TO BE COPPER AND SIZED
ACCORDING TO CANADIAN ELECTRICAL CODE
WITH MINIMUM SIZE NO. 6 STRANDED

NO.12 RW-90 TO BE USED
IN TRAFFIC SIGNAL POLES

FUSE HOLDER - BUSS
HEB. - AA c/w BUSS
1A051A BOOTS & 5
AMP. FUSE

"HANDHOLE"

NO. 8 STRANDED GND. WIRE

SOLDERLESS INSULATED
CONNECTORS
TAPED WITH BLACK PVC
TAPE AFTER INSTALLATION

BONDING STUD LOCATED IN
POLE 10mm-16 UNC, c/w NUT &
2 CADMIUM PLATED FLAT WASHERS

NO. 8 STRANDED
GREEN BONDING
CONDUCTOR

IN TRAFFIC SIGNAL POLE BASES, NO
SPLICES ARE ALLOWED. ALL SPLICES
TO BE IN JUNCTION BOXES

CONDUCTORS TO BE RW90 or
TWU-40 MIN. NO. 6 MAX. 2
CURRENT CARRYING
CONDUCTORS IN CONDUIT



ABOVE NOTE DOES NOT APPLY
TO ALL TRAFFIC SIGNAL POLES

SEE POLE & DWGS. FOR SERVICE
BASE SPECS. THIS WILL BE NECESSARY
WHEN MORE THAN 2 CONDUITS ENTER
A POLE

GROUND ELECTRODE ONLY REQUIRED AT MAIN
SERVICE. ONLY BONDING REQUIRED AT EACH POLE

TOWN OF OLIVER

HANDHOLE WIRING SCHEMATIC
120V STREET LIGHT



DWN. BY: JOSEPH	
CHK. BY: SHAWN	
DATE: MARCH 2021	
SCALE: N.T.S.	
DWG. NO.:	REV.:
SL-7	1

SECTION 9 – APPROVED PRODUCTS LIST

SECTION 10 - STANDARD DOCUMENTS

SCHEDULE A- STANDARD DEVELOPMENT AGREEMENT DOCUMENT

THIS AGREEMENT made this ____ day of _____ A.D., 20 ____.

BETWEEN: THE CORPORATION OF THE TOWN OF OLIVER, a body corporate, duly incorporated under the laws of the Province of British Columbia, having an office at 601 – 1st Avenue, Town of Oliver, Province of British Columbia,

(hereinafter called the “Town”)

OF THE FIRST PART

AND:

(hereinafter called the "Owner")

OF THE SECOND PART

WHEREAS:

- A. The Owner is the registered owner or holder of a Registered Right to Purchase lands and premises situate, lying and being in the Corporation of the Town of Oliver, Province of British Columbia, and more particularly known and described as:

(hereinafter called the "Land");

- B. The Owner wishes to subdivide or develop the Land, or part thereof, in the manner shown on a Plan of Subdivision or Building Permit Application which has been submitted by the Owner to the Director or Building Inspector of the Town of Oliver for approval, a copy of which such plan is attached hereto as Schedule "One (1)", and is hereinafter called the "Subdivision Plan" or “Building Permit Plan”;

- C. The Owner is desirous of entering into this Agreement with the Town pursuant to the provisions of Section 940 of the Local Government Act, in order to obtain approval from the

Director of the Subdivision Plan or Building Inspector for the Building Permit prior to completion of the construction and installation on the Land and offsite of all works and services required by the Town.

NOW THIS AGREEMENT WITNESSETH that in consideration of the premises and of the mutual covenants and agreements herein contained, the parties hereto covenant and agree as follows:

1. In this Agreement, unless the context otherwise requires:

“Work” shall be construed to mean and include all works, services, roads and any other improvement required to be constructed and erected or installed, both on and off the Land, by the Owner under provisions of this Agreement.

“Complete” or “Completion” or any variation of these words, when used with respect to the work referred to herein, shall mean completion of the work, or a part thereof as the context requires, in accordance with the provisions of this Agreement and to the satisfaction of the Town’s Director when so certified by him in writing.

“Director” shall mean the Director for the Town of Oliver or his deputy.

“Contractor” shall mean and include contractors and sub-contractors employed by the Owner, directly or indirectly, in the construction and installation of the work.

“Building Inspector” means the Building Inspector for the Town of Oliver.

2. The Owner covenants and agrees to construct and install on the Land and off-site as the case may be, in accordance with the plans and specifications initialled by each of the parties hereto for identification, the following work:

- .1 Drainage works and services;
- .2 Sanitary sewerage works and services;
- .3 Waterworks and services;
- .4 Boulevards;
- .5 Curbs, gutters and sidewalks;
- .6 Roadworks including lanes;
- .7 Street lighting; and
- .8 Underground electrical, telephone and cablevision works;

Each of the parties hereto acknowledge having in its or his possession a true copy of the aforesaid plans and specifications (herein called the "Approved Engineering Plans"), and

- acknowledge and agree that the Approved Engineering Plans are hereby incorporated into and made part of this Agreement and are attached as Schedule "Two (2)".
3. All work shall be carried out by the Owner or his contractors in accordance with the Approved Engineering Plans, and in accordance with the provisions of the Subdivision and Development Servicing Bylaw of the Town of Oliver and as amended from time to time.
 4. The cost of all work herein shall be borne by the Owner.
 5. The Owner shall obtain and provide to the Town, upon request, and free of charge true copies of all contracts and sub-contracts entered into by the Owner or its contractors relating to the work.
 6. The decision of the Town's Director shall be final and binding on all parties hereto in determining whether or not the work or any part thereof has been carried out and completed in accordance with the provisions of this Agreement and the Subdivision and Development Servicing Bylaw.
 7. When the Owner is satisfied that he has caused the work to be completed, and prior to final approval or permit, he shall submit to the Town Director final as-built drawings comprising two (2) sets of prints sealed by a Professional Engineer, one (1) set of AutoCAD files (latest release) and one (1) set of digital Adobe (pdf) files.
 8. The Owner shall cause all work herein to be carried out and completed not later than the ____ day of _____, 20__ (hereinafter called the "Completion Date").
 9. Prior to obtaining approval of the Subdivision by the Director or Building Permit by the Building Inspector, the Owner:
 - .1 Shall pay all arrears of property taxes charged against the Land by the Town; and
 - .2 Shall pay all current assessed property taxes levied against the Land by the Town.
 10. The Owner further covenants and agrees to pay to the Town, prior to commencement of the subdivision or development, charges for the inspection of the works in the amount of _____, (\$ _____) as determined by the Town.
 11. Prior to approval of the Subdivision Plan by the Director or the Building Permit by the Building Inspector, and as security for the due and proper performance by the Owner of all his covenants and agreements herein contained, the Applicant shall deposit with the Town an unconditional, irrevocable Letter of Credit drawn on a chartered bank in Canada for a term of

not less than twelve (12) months, in the amount of _____ (\$ _____), which is equal to One Hundred and Twenty-five percent (125%) of the cost of constructing and providing all of the work required to be constructed and installed by the Owner under the terms of this Agreement, and as shown on the approved engineering plans. An estimate of cost of the work shall be prepared and sealed by the Owner's Professional Engineer. The estimate shall be submitted for review and approval of the Director.

The Owner agrees that if the work or any part thereof is not completed in accordance with the provisions of this Agreement by the Completion Date, or if the Owner shall be in default of any of his covenants herein contained, and such default shall continue for a period of fourteen (14) days after notice thereof has been given as per paragraph 15 by the Town to the Owner, the Town may call for and receive the funds secured by the Letter of Credit and the Town may complete the work at the cost of the Owner and deduct from any fund held by the Town as security hereunder, the cost of such completion, and the balance of the deposit, if any, shall be returned to the Owner less any administration fees levied by the Town.

If there are insufficient funds on deposit with the Town under the Letter of Credit, then the Owner shall pay such deficiency to the Town immediately upon receipt of the Town's bill for completing the work. It is understood and agreed that the Town may do such work either by itself, or by contractors employed by the Town. Any bill rendered by the Town to the Owner under the provisions of this paragraph, shall be regarded as charges for work done or service provided under the provisions of the Local Government Act and may in addition to any other remedy available to the Town, be collected in the same manner and with the like remedies as ordinary taxes upon Land and improvements are collected under the said Act.

12. The Town will consent to reduction in the amount secured by the Letter of Credit, or cash, from time to time, and in accordance with the following:
 - .1 The percentage of the credit reduction will be equal to the percentage of the cost of the work done as determined by the Town Director;
 - .2 No reduction will be allowed for any amount less than 10% of the total cost of the construction of the work;
 - .3 Notwithstanding .1 and .2 herein, the Town will not refund an amount whichever is the lesser of 10% of the total cost of the constructing the work or \$50,000.00 until the expiry of one (1) year following the full and final completion of all the work; and,
 - .4 Upon the expiry of the aforesaid one (1) year period, and provided that the Owner is not then in default under any of his covenants herein contained, and upon final approval of the work by the Town Director, the Town will as soon as possible, reduce the remaining security to zero (nil).

13. The Owner covenants and agrees to indemnify and save harmless the Town and its servants, agents and employees from and against all actions, proceedings, costs, damages, expenses, claims and demands whatsoever and by whomsoever brought or made against the Town or its said servants, agents and employees, resulting directly or indirectly from the construction or installation of the work.
14. In consideration of due and proper performance by the Owner of his covenants herein contained, the Town covenants and agrees to permit the Owner to carry out and perform the work.
15. Any demand or notice required or permitted to be given under the provisions of this agreement shall be in writing and may be given by mailing such notice by prepaid registered post to the party concerned at the address for such party first above-recited, and any such notice or demand mailed as aforesaid shall be deemed to have been received by the party to whom it is addressed on the second business day after the date of posting thereof.
16. The Owner acknowledges and agrees that immediately upon issuance by the Town Director of his certification stating that the work has been completed, all right, title and interest in and to the work shall immediately pass to and vest in the Town, but nothing herein contained shall derogate from the obligation of the Owner to maintain the work for a period of one (1) year following completion as aforesaid.
17. It is understood and agreed that the Town has made no representations, covenants, warranties, guarantees, promises or agreements (oral or otherwise) with the Owner other than those contained in this Agreement.
18. Wherever the singular or masculine is used herein, the same shall be construed as meaning the plural, feminine or body corporate or politic where the context or the parties so require.
19. This Agreement and the terms, covenants and conditions herein contained shall enure to the benefit of and be binding upon the parties hereto and their respective heirs, executors, administrators, successors and assigns.

IN WITNESS WHERE OF the parties hereto have executed this Agreement at the Town of Oliver, Province of British Columbia, the day and year first above written.

THE CORPORATION OF
THE TOWN OF OLIVER

)

)

)

)

)

Mayor:

)C/S

)

)

)

)

Corporate Officer:

)

)

)

)

)

Owner:

C/S

)(if a corporation)

)

)

)

)

Owner:

)

**SCHEDULE B– STANDARD STATUTORY
RIGHT-OF-WAY DOCUMENT**

LAND TITLE ACT

FORM C

(Section 219.9)

Province of
British Columbia

GENERAL INSTRUMENT - Part 1 *(This area for Land Title Office Use)* Page 1 of 3 pages

1. APPLICATION: *(Name, address, phone no. and signature of applicant, applicants solicitor or agent)*

The Corporation of the Town of Oliver

P.O. Box 638

Oliver, B.C. V0H 1T0 _____, Administrator Phone (250) 498-3404

2. PARCEL IDENTIFIER(S) AND LEGAL DESCRIPTION(S) OF LAND: *

(PID)(LEGAL DESCRIPTION)

3. NATURE OF INTEREST:*

DESCRIPTION DOCUMENT REFERENCE PERSON ENTITLED TO INTEREST

(Page and Paragraph)

Statutory Right of Way Entire Instrument pages 2-3 Town of Oliver

4. TERMS: Part 2 of this instrument consists of (select one only)

(a) Filed Standard Charge Terms D.F. No.

(b) Express Charge Terms x Annexed as Part 2

(c) Release There is no Part 2 of this instrument

A selection of (a) includes any additional or modified terms referred to in Item 7 or in a schedule annexed to this instrument. If (c) is selected, the charge described in Item 3 is released or discharged as a charge on the land described in Item 2.

5. TRANSFEROR(S):*

6. TRANSFEREE(S): *(including occupation(s), postal address(es) and postal code(s))**

THE CORPORATION OF THE TOWN OF OLIVER,

P.O. Box 638

Oliver, B.C. V0H 1T0

7. ADDITIONAL OR MODIFIED TERMS: *

N/A

8. EXECUTION(S):** This instrument creates, assigns, modifies, enlarges, discharges or governs the priority of the interest(s) described in Item 3 and the Transferor(s) and every other signatory agree to be bound by this instrument, and acknowledge(s) receipt of a true copy of the filed standard charged terms, if any.

Execution Date

Officer Signature(s) Party(ies) Signature(s)
by its authorized signatory:

OFFICER CERTIFICATION:

Your signature constitutes a representation that you are a solicitor, notary public or other person authorized by the *Evidence Act*, R.S.B.C. 1979, c. 116, to take affidavits for use in British Columbia and certifies the matters set out in Part 5 of the *Land Title Act* as they pertain to the execution of this instrument.

*If space insufficient, enter "SEE SCHEDULE" and attach schedule in Form E.

** If space insufficient, continue executions on additional page(s) in Form D.

THIS INDENTURE made the ____ day of _____, 20__.

BETWEEN:

(hereinafter called the "Grantor")

OF THE FIRST PART

AND:

CORPORATION OF THE TOWN OF OLIVER

(hereinafter called the "Grantee")

OF THE SECOND PART

WHEREAS the Grantor is the registered owner or is entitled to become the registered owner of an estate in fee simple of ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the Corporation of the Town of Oliver, in the Province of British Columbia, and being more particularly known and described as:

(hereinafter called the "Lands of the Grantor")

AND WHEREAS the Grantor and Grantee have agreed to enter into this agreement pursuant to the Land Title Act, R.S.B.C. 1996, Chapter 250 and amendments thereto;

AND WHEREAS it is necessary for the operation and maintenance of the Grantee's undertaking, hereinafter described, to install and maintain a system of sewerage works, and/or waterworks, and/or drainage works, including all pipes, valves, fittings, buildings and facilities in connection therewith and/or hydro-electric works including all wires, poles, conduits and other facilities in connection therewith;

(hereinafter called the "Works")

The Grantor has agreed to permit the construction by the Grantee of the aforementioned works on a portion of the said Land and to grant for that purpose the right-of-way hereinafter described;

NOW THEREFORE THIS INDENTURE WITNESSETH that in consideration of the sum of _____ Dollars (\$) of lawful money of Canada, now paid by the Grantee to the Grantor (the receipt and sufficiency of which is hereby acknowledged by the Grantor), and in consideration of the covenants and conditions hereinafter contained to be observed and performed by the Grantee and for other valuable consideration:

1.0 THE GRANTOR DOTH HEREBY:

1.1 Grant, convey, confirm and transfer, in perpetuity, unto the Grantee the full, free and uninterrupted right, licence, liberty, privilege, permission and right-of-way to lay down, install, construct, operate, maintain, inspect, repair, replace and otherwise establish one or more systems of Works upon, over, under and across that part of the Land of the Grantor as shown on right-of-way Plan Number _____ (hereinafter called the "Right-of-Way").

1.2 Covenant and agree to and with the Grantee that for the purposes aforesaid and upon, over, under and across the Right-of-Way the Grantee shall for itself and its servants, agents, workmen, machinery, vehicles and materials be entitled at all time to enter, use, pass and re-pass, labour, construct, erect, install, dig, carry away soil or other surface or subsurface materials, clear of all trees, growth, buildings or obstruction now or hereafter in existence, as may be necessary, useful, or convenient in connection with the operations of the Grantee in relation to the Works;

1.3 Grant, convey, confirm and transfer unto the Grantee for itself and its servants, agents, workmen, contractors and all other licensees of the Grantee, together with machinery, vehicles, equipment and materials the right at all reasonable times to enter upon and to pass and re-pass over such of the Lands of the Grantor as may reasonably be required for the purpose of ingress to and egress from the Right-of-Way;

2.0 THE GRANTOR HEREBY COVENANTS TO AND AGREES WITH THE GRANTEE, as follows:

2.1 That the Grantor will not, nor permit any other person, to erect, place, install or maintain any building, structure, mobile home, concrete driveway or patio, on, over or under any portion of the Right-of-Way so that it in any way interferes with or damages or prevents access to, or

- is likely to cause harm to Works authorized hereby to be installed in or upon the Right-of-Way;
- 2.2 That the Grantor will not do nor knowingly permit to be done any act or thing which will interfere with or injure the said Works, and in particular, will not carry out any blasting on or adjacent to the Right-of-Way without the consent in writing of the Grantee, provided that such consent shall not be unreasonably withheld;
- 2.3 That the Grantor will not substantially diminish the soil cover over any of the Works installed in the Right-of-Way, and in particular, without in any way limiting the generality of the foregoing, will not construct open drains or ditches along or across any Works installed in the Right-of-Way;
- 2.4 That the Grantor will from time to time and at all times upon every reasonable request, and at the cost of the Grantee do and execute or cause to be made, done or executed all such further and other lawful acts, deeds, things, devices, conveyances and assurances in law whatsoever for the better, assuring unto the Grantee of the rights hereby granted;
- 3.0 THE GRANTEE HEREBY COVENANTS TO AND AGREES WITH THE GRANTOR, as follows:
- 3.1 That the Grantee will not bury any debris or rubbish of any kind in excavations or backfill, and will remove shoring and like temporary structures as backfilling proceeds;
- 3.2 That the Grantee will thoroughly clean all lands to which it has had access hereunder of all rubbish and construction debris created or placed thereon by the Grantee, and will leave such lands in a neat and clean condition;
- 3.3 That the Grantee will, as soon as weather and soil conditions permit, and so often as it may exercise its right of entry hereunder to any of the lands of the Grantor, replace the surface soil as nearly as may be reasonably possible to the same condition as it was prior to such entry, in order to restore the natural drainage to such lands;
- PROVIDED, HOWEVER, that nothing herein contained shall require the Grantee to restore any trees or other surface growth, but the Grantee shall leave such lands in a condition which will not inhibit natural regeneration of such growth;
- 3.4 That the Grantee will, as far as reasonably possible, carry out all work in a proper and workmanlike manner so as to do as little injury to the Lands of the Grantor as possible;

- 3.5 That the Grantee will make good at its own expense all damage or disturbance which may be caused to the surface soil of the Lands of the Grantor in the exercise of its rights hereunder;
- 3.6 That, the Grantee will, as far as reasonably possible, restore any fences, lawns, flower beds, at its cost as nearly as may be reasonably possible to the same condition that they were in prior to any entry by the Grantee upon the Lands.
- 4.0 THE PARTIES HERETO EACH HEREBY COVENANT TO AND AGREE WITH THE OTHER, as follows:
- 4.1 The said Works referred to above, together with all pipes, manholes, valves, conduits, wires, casings, fittings, lines, meters, appliances, facilities, attachments or devices used in connection therewith shall constitute the Works;
- 4.2 Notwithstanding any rule of law or equity to the contrary, the Works brought on to, set, constructed, laid, erected in, upon or under the Right-of-Way by the Grantee shall at all times remain the property of the Grantee, notwithstanding that the same may be annexed or affixed to the freehold and shall at any time and from time to time be removable in whole or in part by the Grantee;
- 4.3 In the event that the Grantee abandons the Works or any part thereof the Grantee may, if it so elects, leave the whole or any part thereof in place;
- 4.4 That no part of the title in fee simple to the soil shall pass to or be vested in the Grantee under or by virtue of these presents and the Grantor may fully use and enjoy all of the Lands of the Grantor subject only to the rights and restrictions herein contained;
- 4.5 If at the date hereof the Grantor is not the sole registered owner of the Lands of the Grantor, this agreement shall nevertheless bind the Grantor to the full extent of his interest therein, and if he shall acquire a greater or the entire interest in fee simple this Agreement shall likewise extend to such after-acquired interests;
- 4.6 Where the expression "Grantor" includes more than one person, all covenants herein on the part of the Grantor shall be construed as being several as well as joint;
- 4.7 This agreement shall endure to the benefit of and be binding upon the parties hereto and their respective heirs, administrators, executors, successors and assigns, as the case may be; and wherever the singular or masculine is used, it shall be construed as if the plural or the feminine or neuter, as the case may be, had been used; where the parties or the context hereto so require

and the rest of the sentence shall be construed as if the grammatical and terminological changes thereby rendered necessary had been made.

**SCHEDULE C – CONFIRMATION OF
PROFESSIONAL ASSURANCE**

**CONFIRMATION OF
PROFESSIONAL ASSURANCE**

***CONFIRMATION OF "COMMITMENT BY OWNER
AND COMMITMENT BY ENGINEER"
RE: DESIGN AND FIELD REVIEW OF CONSTRUCTION
BY A REGISTERED PROFESSIONAL ENGINEER***

The Corporation of the Town of Oliver
P.O Box 638
6150 Main Street
Oliver, B.C. V0H 1T0

Attention: Town Director

Dear Sir/Madam:

Re:
(Description and Address of Subdivision or Development)

Part 1 – Commitment by Owner

The undersigned has retained as my/our Professional Engineer, _____, P. Eng. of the firm _____ (the "Professional Engineer"), to undertake and/or co-ordinate and review all design and "field reviews" required for this Project. It is understood that he/she will take all such steps as regulated under the Provincial Statute for his/her profession and by the definition of "field reviews" hereinafter set forth, to ascertain that the design will comply and construction of the project will substantially conform in all material respects with the provisions of The Town of Oliver Subdivision and Development Servicing Bylaw No. 1300, 2012, and other applicable Permits, Bylaws, Acts and Regulations which apply to the Project. This representative will ascertain that only qualified personnel are retained to carry out tests, inspect or carry out design work, detailing or "field reviews." as defined by others.

As used herein, "field reviews" shall mean such reviews of the work at the project site and at fabrication locations, where applicable, as the "Consultant", in his/her professional discretion, considers to be necessary in order to ascertain that the work substantially conforms in all material respects to the plans and supporting documents "accepted" by the Town of Oliver. This will include keeping records of all site visits and any corrective actions taken as a result thereof.

The undersigned has given a contractual mandate to the "Professional Engineer" to review reports of other testing and inspection agencies and disciplines where necessary, comment on their acceptability, determine the corrective action to take if unacceptable, and maintain a detailed record of every such report and comments. The "Professional Engineer" will automatically submit a monthly summary progress report to the Town Director including all field reports and change orders.

APRIL 23, 2021

TERMINATION: The Owner will notify the Town Director in writing 30 days prior to any intended termination of or by the "Professional Engineer". It is understood that work on the above project will cease as of the effective date of such termination, until such time as a new appointment is made, and a "Stop Work Order" shall be posted upon the said project by the Town.

Witness Name (Print)

Owner's Name (Print)

Witness Signature

By: _____
(Owner or Owner's Appointed Agent) Signature

Address (Print)

Date: _____

Occupation

Title of Agent (if applicable)

Address (Print)

The Corporate Seal of _____

was hereunto affixed in the presence of:

The above must be signed by the Owner or his/her appointed Agent. The signature must be witnessed. If the Owner is a company, the corporate seal of the company must be affixed to the document in the presence of its duly authorized officers. The officers must also sign, setting forth their positions in the company.

Part 2 – Commitment by Engineer

The undersigned Professional Engineer acknowledges that he/she has been retained to undertake the project design to comply and certify the construction of the project will substantially conform in all material respects with Bylaws as set out above and will submit letters of Confirmation of Professional Design Assurance from others, as needed, for the approval of the subdivision or development. Furthermore, the "Professional Engineer" hereby covenants that he/she or his/her firm presently carries professional errors and omissions insurance in the amount of _____.

Name of Professional (Print)

Signature of Professional (Professional Engineer)

Date: _____

Consulting Firm Name (if applicable)

Mailing Address (Print)

Phone: _____

Email: _____

Professional Seal

**SCHEDULE D– PROFESSIONAL FIELD
REVIEW AND COMPLIANCE FORMS**

ASSURANCE OF PROFESSIONAL FIELD REVIEW AND COMPLIANCE

The Corporation of the Town of Oliver
35016 – 97th Street, Box 638
Oliver, B.C. V0H 1T0

Attention: Town Director

Dear Sir:

Re:

(Description and Address of Development)

This is to advise that I am a Professional Engineer licensed to practice in the Province of British Columbia and was retained by the Owner to undertake and coordinate all field reviews and inspections required with respect to this project. As used herein, "field reviews" shall mean such reviews of the work at the project site and at fabrication locations where applicable as the Professional Engineer, in his professional discretion, considered to be necessary in order to ascertain that the work substantially conformed in all material aspects to the plans and drawings accepted by the Town of Oliver.

The following aspects have been reviewed by me or under by direction and have been found to comply with the engineering drawings and plans submitted and accepted by the Town Director.

1.0 Storm Drainage System including, but not restricted to, the following:

- .1 the location, alignment, size and grade of all pipes and culverts;
- .2 the spacing of manholes and catch basins;
- .3 the construction of drywells;
- .4 materials used for pipes, manholes, catch basins, service connections, inlet and outlet structures;
- .5 materials used for pipe bedding and backfilling of trenches; and
- .6 workmanship in the construction and installation of all materials.

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2.0 Sanitary Sewer System including, but not restricted to, the following:

- .1 location, alignment, size and grade of all pipes;
- .2 location and spacing of manholes;
- .3 materials used for pipes, manholes, service connections, inspection chambers and other appurtenances;
- .4 materials used for pipe bedding and backfilling of trenches; and
- .5 workmanship in the construction and installation of all materials.

3.0 Water Distribution System including, but not restricted to, the following:

- .1 location, alignment, size and grade of all pipes;
- .2 location and spacing of valves and hydrants;
- .3 materials used for pipes, fittings, gate valves, valve boxes, hydrants, service connections, corporation stops, curb stop and boxes, air valves;
- .4 materials used for pipe bedding and backfill of trenches; and
- .5 workmanship in the construction and installation of all materials.

4.0 Roads including, but not restricted to, the following:

- .1 alignment, width and grade of all roads;
- .2 materials used for preparation or road bases and road surfaces; and
- .3 workmanship in the installation of materials.

5.0 Curb and Gutter, Sidewalks, Boulevards and Boulevard Trees including, but not restricted to, the following:

- .1 width and grade of sidewalks and boulevards;
- .2 alignment and grade of curbs and gutters;
- .3 materials used for preparation of sub-grades concrete, boulevard trees, and irrigation; and
- .4 workmanship in the installation of materials.

6.0 Street Lighting, Electrical and Communications Wiring including, but not restricted to, the following

- .1 number and spacing of street light poles and luminaires;
- .2 materials used for street lighting, electrical and communications wiring;
- .3 materials used for backfilling of trenches; and
- .4 workmanship in the installation of materials.

7.0 Geotechnical and site grading works including, but not restricted to the following:

- .1 lot grading;
- .2 slope construction;
- .3 retaining walls;
- .4 workmanship and the installation of materials.

I certify that the foregoing areas substantially comply in all material respects with the plans and supporting documents, including all amendments thereto, which supported the application for subdivision or development approval File No. _____ which were "accepted" by the Town of Oliver.

In addition, significant revisions to the accepted plans and supporting documents have been submitted to the Town in order to depict, as nearly as possible, given my "field reviews" as defined herein, the services as finally designed and built.

Name of Professional Engineer (Print)

(PROFESSIONAL SEAL)

Signed

Date

Address (Print)

Phone

Attached hereto you will find the appropriate "field review" assurance from each of the associated Professional consultants, who are registered in the Province of British Columbia as members in good standing of the Association of Professional Engineers.

***ASSURANCE OF PROFESSIONAL FIELD REVIEW
AND COMPLIANCE***

Re: _____
_____ (Project Name and Address)

This is to assure that I/We provided "field reviews" as defined herein of all engineering work including checklist items 1.0 to 6.0 inclusive except as specifically noted below.

EXCEPTIONS –

Name (Print) _____

**(PROFESSIONAL
SEAL)**

Signed _____

Date: _____

(Print) Address
Representing

**SCHEDULE E- CONSTRUCTION
COMPLETION CERTIFICATE**

APRIL 23, 2021

CONSTRUCTION COMPLETION CERTIFICATE

1.0 PROJECT DESCRIPTION

Project:
Owner:
Engineer:
Contractor:
Description:

Drawings:

2.0 SUBSTANTIAL COMPLETION

2.1 By Consulting Engineer

I, P. Eng., of the firm _____ hereby certify that the works have been installed according to the plans and specifications and as of _____ are substantially complete and may be used for the purpose intended.

Project Engineer

Signing Officer

P. Eng. SealDate

Deficiencies to be rectified before approval is granted and Final Construction Completion Certificate issued:

2.2 By Town of Oliver

Approval granted on
Authorized Signatory

3.0 CONSTRUCTION COMPLETION CERTIFICATE

3.1 By Consulting Engineer

I hereby certify that the deficiency items listed on this certificate have now been corrected and that construction completion be granted.

Project Engineer

Signing Officer

P. Eng. SealDate

3.2 By Town of Oliver

Construction of the above described project is now complete and this Construction Completion Certificate is hereby issued.

Approved on , ,
Authorized Signatory

Maintenance Period Expiry Date.