

**CORPORATION OF THE TOWNSHIP OF ESQUIMALT  
SUBDIVISION AND DEVELOPMENT CONTROL BYLAW**

**SCHEDULE 'C'**

**DESIGN AND CONSTRUCTION SPECIFICATIONS**

**ROADWAYS**

**INDEX**

		<b><u>NO. OF PAGES</u></b>
R	STANDARDS FOR STREET CONFIGURATIONS	2
R-1	DESIGN OF ROADS AND SIDEWALKS	7
R-2	CONSTRUCTION OF ROADS AND SIDEWALKS	11
R-3	STANDARD DRAWINGS INDEX	1
R1-R19	STANDARD DRAWINGS	19
	APPENDIX INDEX	1
	APPENDIX 1 - 9, DISTRICT OF SAANICH SPECIFICATION	53

**CORPORATION OF THE TOWNSHIP OF ESQUIMALT**  
**SUBDIVISION AND DEVELOPMENT CONTROL BYLAW**

**SCHEDULE 'C'**

**DESIGN AND CONSTRUCTION SPECIFICATIONS**

**ROADWAYS**

**R**

**1.0 Standards for Street Configurations**

- 1.01 Major and collector streets are to be continued without jogs through the area being subdivided. Collector streets shall have a minimum width of 20 m. Major streets shall have a minimum width of 25 m.
- 1.02 Local streets shall conform in alignment to existing adjacent streets, where practical, and shall have a minimum width of 20 m.
- 1.03 Cul-de-sac streets shall be provided at the closed end with an area designated to permit safe and adequate space for turning of motor vehicles. A landscaped island shall be made in the turning area. Maximum slope on a cul-de-sac is 5%.
- 1.04 The minimum property line radius of turning areas at the end of cul-de-sac streets shall be 15 m.
- 1.05 Intersecting street boundaries shall be rounded to a 6 m radius curve.
- 1.06 Jogs in street alignment at intersections shall be permitted, provided the distances between centre lines at the jog is a minimum of 80 m., unless it is impractical to comply because of the existing street configuration.
- 1.07 Where bends occur in an existing street alignment, the angle shall be replaced by a curve.
- 1.08 Streets are to be laid out with due regard to the topography so as to avoid flat or excessive grades. The maximum allowable road grade is 12%. The minimum allowable road grade is 0.5%.
- 1.09 Intersecting streets shall meet substantially at right angles. In no case shall streets intersect at an angle of less than 70 degrees.

1.10 Street classification is as follows:

Road Type	Minimum Right-of-Way	Service Function	Principles of Intersection and Access control
Provincial Arterial	30m	Carrying of inter-regional traffic. New arterial should offer optimum mobility for through traffic, with minimum service to adjacent lands.	New arterial should intersect with secondary highways but minimize intersections with other roads. Access to adjacent properties should be minimized.
Major Roads (Provincial Secondaries/ Major Municipal streets)	25m	Carrying of major traffic flows within the community. Ensuring protection of neighbourhoods from through traffic. Access to adjacent properties should not interfere with the primary function of moving through traffic.	Where appropriate, should intersect with the Provincial Highway. Intersections with other secondary highways and collector roads are acceptable. Minimize direct access to adjacent property and connections to local roads.
Collector	20m	Providing for distribution of moderate traffic volumes within neighbourhoods and providing access to adjacent properties.	Should intersect with secondary highways, collectors and local roads. Some direct access to adjacent property is permissible.
Local	15m	Providing access to adjacent properties and carrying light volumes of traffic between points of origin and the collector road system.	Should intersect only with collectors and local roads. Constitute main providers of access to adjacent properties.

**CORPORATION OF THE TOWNSHIP OF ESQUIMALT**  
**SUBDIVISION AND DEVELOPMENT CONTROL BYLAW**

**SCHEDULE 'C'**

**DESIGN OF ROADS AND SIDEWALKS**

R-1

**1.0 Scope**

1.01 This specification shall govern the design of all roads, sidewalks, and appurtenances within the Municipality of Esquimalt. This specification should be read in conjunction with the latest version of the District of Saanich Material Specifications as appended.

**2.0 Classification and Width**

2.01 Prior to design, the Municipal Engineering Department shall classify and stipulate widths for the particular road under consideration.

	Road Width	Design Speed km/h	Water Control	Shoulders Boulevard
Local Street	10.0 m	50	Concrete curb and gutter	2.5 m
Collector	12.0 m	50	Concrete curb and gutter	2.5 m
Major Road	14.0 m	50	Special design	2.5 m

**3.0 Vertical Alignment**

3.01 The vertical alignment of the road shall be set to serve adjacent properties with access driveways at a grade not steeper than 15% and conforming to the requirements as shown in Standard Drawing R-8.

3.02 The length of a vertical curve shall be calculated using Standard Drawing R-9.

3.03 Vertical Control

Maximum grade - Local	12.0%	
Maximum grade - Collector		12.0%
Minimum grade	0.5%	
Minimum grade at curb returns	0.5%	
Maximum grade on turn around at cul-de-sac	5.0%	
Maximum grade at local	5.0%	for 15 m tangent approach to collector length back from intersecting road edge.
Maximum grade at local or	3.0%	for 15 m tangent collector approach to major length back from intersecting road edge.
Normal Crown	2.0%	

- 3.04 Crossfall - the practice of crossfalling a road is acceptable at intersections and where required because of topographical features.
- 3.05 Superelevation - horizontal curves on local roads shall not be super elevated. Collector and arterial roads shall be superelevated in keeping with the good engineering practices.
- 3.06 Transition - the length of a transition from a normal cross-sectioned road to a section of road where there is superelevation shall in no case be less than 45 metres for every 4% grade change.
- 3.07 Extensions - evidence that vertical alignments are satisfactorily extendable for at least 50 m will be required.

#### 4.0 Horizontal Alignment

- 4.01 The horizontal alignment of the road shall be centred in the road allowance. Typical locations of services for new local and collector roads are shown on Standard Drawings R-3 and R-4.
- 4.02 Centerline chainage stations shall be referenced and dimensioned from an identifiable iron pin.
- 4.03 Minimum radius of curve and maximum superelevation:

	Design Speed km/h	Minimum Radius	Maximum Centerline Elevation
Local Street	50	90 m*	Normal Crown
Collector	50	100 m	0.06
Major Road	Special Design		

\*Subject to the approval of the Municipal Engineer, curves on crescent shaped local roads may be reduced to a minimum centerline radius equal to 30 m.

- 4.04 A horizontal curve shall be fully described showing: internal angle, radius, tangent length, and arc.
- 4.05 Curb returns of 8 m radius are required for local road intersections. Curb returns located on bus routes and on roads within industrial and commercial districts require a 10 m or larger radius to facilitate trucks and bus traffic.
- 4.06 When a new local road with curbs intersects an existing road without curbs, the curb returns shall not be constructed. However, curb returns shall be constructed at the intersection of two curbed roads.

## 5.0 Cross Section

5.01 The cross section of roads shall be designed in accordance with the dimensions and requirements shown on the following Standard Drawings:

PAVEMENT WIDTH	DWG. NO.	SERVICE LEVEL
8.5 m local road	R-1	1
10 m local road	R-1	2
12 m collector road	R-2	2
14 m major road	R-2	2

5.02 Reference to or details of the cross-section dimensions and requirements must be shown on each design drawing submitted.

5.03 The toe of a fill slope or top of a cut slope shall not encroach on private property. The containment of these slopes within the road allowance may require the design of a retaining wall or the widening of the right-of-way to contain the cut or fill slope.

5.04 Where cut slopes are to be made into ground seepage zones or where the extent of the slope would generate surface runoff, curtain drains shall be required at the base of the slopes and connected to the road drainage system or other suitable point of discharge.

## 6.0 Geometric Layout of Turn-arounds

6.01 The design of the turn-around shall conform to Standard Drawing R-5. The dimensions may be increased to meet traffic and vehicular requirements, or where the turn-around is skewed. Under special circumstances the Municipal Engineer may permit a temporary turn-around type of design.

6.02 The design of a temporary turn-around shall conform to Standard Drawing R-7.

## **7.0 Curb, Gutter and Sidewalks**

- 7.01 Mountable concrete curb and gutter shall conform to Standard Drawing R-10.
- 7.02 Non-mountable concrete curb and gutter shall conform to Standard Drawing R-12.
- 7.03 Asphalt water control shall be a minimum 50 mm high by 300 mm wide.
- 7.04 Concrete invert gutter shall conform to Standard Drawing R-10.
- 7.05 Mountable curbs and non-mountable curb returns shall be specified for residential streets and non-mountable curbs elsewhere, except as required by the Municipal Engineer.
- 7.06 Sidewalks, where required, are normally located adjacent to the curb and shall be 1.5 m wide. Sidewalks are to be crossfalled towards the road at 2%.
- 7.07 Gutters having widths less than those shown on Standard Drawings R-10 and R-12 may be permitted subject to the Municipal Engineer's approval.
- 7.08 Integrated Survey monuments shall be installed in curbs as required by the Municipal Engineer. These are to be tied in to the Provincial Integrated Survey by a B.C. Land Surveyor at the developer's expense.

## **8.0 Catch Basins**

- 8.01 Catch basins shall be constructed as shown on Regional Municipal Specification Standard Drawings SD-10 and D-11.
- 8.02 Double catch basins should be installed at locations of high runoff and sag curves.
- 8.03 Catch basins shall be located at the higher end of the curb returns of intersections, at the lowest point of the sag vertical curves, and at a spacing not greater than the following:

MAXIMUM SPACING OF CATCH BASINS	
ROAD WIDTH	SPACING
10.0 m	75 m
12.0 m	70 m
14.0 m	60 m

On roads with superelevation crossfall the maximum spacing shall be one half of the above figures. Adequate allowance shall be made to handle runoff from turn-arounds.

Exceptions to the above maximum spacing of catch basins may be allowed, where paving is to be installed on existing streets and where houses are drained in a manner satisfactory to the Municipal Engineer.

## 9.0 Appurtenances

- 9.01 a) The Consulting Engineer shall detail on the design drawing the location of all retaining walls, guardrails, handrails and fences. These structures shall be designed in keeping with good engineering practices;
- b) The design of barricades, chain link fence and sidewalk handrails shall conform to Standard Drawings R-14, R-17, R-18 and R-19.
- 9.02 Utility Poles - the Consulting Engineer shall indicate utility poles which require relocating prior to road construction and he shall confirm with the appropriate utility representatives the feasibility of their relocation prior to design completion.
- 9.03 Underground Wiring and Gas Mains - the Consulting engineer shall indicate on their design drawing the designs supplied by B.C. Hydro or B.C. Telephone for all underground wiring and gas mains which require relocation or are proposed including the connection to properties.
- 9:04 Survey monuments shall be installed as per Ministry of Environment and Municipality of Esquimalt specifications.

10.0 Structural Design of Roads

10.01 All road base and paving design shall be in accordance with District of Saanich Material Specifications Appendix 1 to 7 inclusive.

10.02 The minimum compacted gravel base and asphalt pavement thickness requirements for various road classifications are shown on the following Standard Drawings.

R/W Minimum Width	Pavement Width	Drawing No.	Service Level
15m R/W	8.5m Local Road	R-1	1
20m R/W	10m Local Road	R-2	2
20m R/W	12m Collector	R-2	2
25m R/W	14m Major Road	R-2	2

**CORPORATION OF THE TOWNSHIP OF ESQUIMALT**  
**SUBDIVISION AND DEVELOPMENT CONTROL BYLAW**

**SCHEDULE 'C'**

**CONSTRUCTION OF ROADS AND SIDEWALKS**

R-2

**1.0 Scope**

1.01 This specification shall govern the construction of roads, sidewalks, and appurtenances within the Municipality of Esquimalt.

**2.0 Clearing**

2.01 The full width of the roadway and shoulders will be cleared of timber and bush which will be removed. Any trees on existing road rights-of-way will not be removed unless approved by the Municipal Engineer. All topsoil and turf will be removed from at least 2.5 m clear of the curbs. Sufficient topsoil must be retained on site for 100mm of topsoil on the boulevard. Surplus topsoil which may have to be removed from an existing road allowance is the property of the City and shall be deposited at a stock pile site approved by the Municipal Engineer.

2.02 The remaining portion of road allowance will be cleared of stumps, rubble, loose rock and rough graded to the satisfaction of the Consulting Engineer. Finished grading, seeding of grass and rolling adjacent to any road construction on established boulevards or where otherwise required by the Consulting Engineer shall be done upon completion of all construction.

**3.0 Setting of Grades**

3.01 Grade hubs will be set at not more than 10 m intervals on tangents and 5m intervals on curves on both sides of the road and at the same chainage points. Hubs will be located so that they are not disturbed by the construction equipment.

3.02 On horizontal curves the increased or decreased arc shall be calculated to compensate for the radius so that the hubs on both sides of the road will bear the same centre line chainage.

- 3.03 Where the road is to be superelevated it may be necessary to calculate the difference in elevation due to the offset of the hub to enable the sub-grade to be graded. Care should be taken to ensure that this compensated elevation is not used when the concrete curbs are being formed.
- 3.04 Sturdy hubs of sufficient length to give firm footing shall be used with nails driven in the top for fine alignment, and suitably identified which chainage, cut or fill, and offset to curb face. Cut or fill information will face the hub and will be related to the elevation of the top of curb.
- 3.05 Cross heads may be erected at a suitable height at every station, clearly marked for the amount of cut or fill required to finish grade. Cuts or fills should be adjusted to even vertical intervals above required grade. Grades should be checked with a boning rod by sighting across these cross heads.
- 3.06 Alternate methods of layout and construction may be used providing the curbs or centreline are within 15mm of the design elevation and 30mm of the design horizontal alignment.

#### **4.0 Subgrade Construction**

- 4.01 Where clay or other material is acceptable to the Consulting Engineer for constructing a compacted subgrade in fills, the subgrade is constructed over the native ground up to the bottom of the base course.
- 4.02 The subgrade, in cuts, is the native ground lying below the gravel base course.
- 4.03 The subgrade, will be constructed of clay or granular material placed in layers not exceeding 150mm and compacted to 95% of the laboratory density obtained by following A.S.T.M. Specification 698, Method C, or latest revision thereof with exception of the top 300mm which shall be compacted to 100%. The fill section shall conform to Standard Drawing R-1 and R-2.
- 4.04 In cuts, the top 300mm of the subgrade will be compacted to 100% of the laboratory density obtained by following A.S.T.M. Specification 698, Method C, or latest revision thereof, when required by the Consulting Engineer. The cut section shall conform to Standard Drawings R-1 and R-2.
- 4.05 The toe of the fill slope or the top of a cut slope shall not extend outside the right-of-way. The containment of these slopes may require the construction of retaining walls, rip-rap, or the right-of-way could be widened.

- 4.06 Where the Consulting Engineer deems native ground material to be unsatisfactory, excavation will be required to such depths as he may direct.
- 4.07 No topsoil, trees, stumps or any organic matter will be buried in the subgrade, sub-base or base course.
- 4.08 Rock shall be excavated to depths shown on Standard Drawings R-1 and R-2.

## **5.0 Base Course and Granular Fill**

- 5.01 Where clay or other material is unacceptable to the Consulting Engineer for constructing a compacted subgrade in cuts or fills, acceptable granular materials will be placed between the subgrade and base course. Select granular material from road cuts or 80mm minus pit run gravel either being acceptable to the Municipal Engineer may be used as fill material.
- 5.02 The fill be constructed of clay or granular material placed in layers not exceeding 150mm and compacted to 95% of the laboratory density obtained by following A.S.T.M. Specification 698, Method C, or latest revision thereof with exception of the top 300mm which shall be compacted to 100%. The fill section shall conform to Standard Drawings R-1 and R-2.
- 5.03 Granular surfacing, base course and fill preparation shall conform to District of Saanich Specification appended to these Specifications.
- 5.04 In addition to the requirements of Appendix 2 the field density of soils shall be determined by A.S.T.M. designation D2922, determining density of soil and soil aggregate in place by nuclear methods (shallow depth).

For spot checks, the following methods are also acceptable:

A.S.T.M. Designation D 1556 - Density of soils in place by sand cone method.

A.S.T.M. Designation D 2167 - Density of soils in place by rubber balloon method.

- 5.05 No base course gravel shall be placed until all underground services have been installed unless otherwise approved by the Consulting Engineer.

- 5.06 The 80mm crushed pit run as described in District of Saanich Specification Appendix 2, Section 2.02 may be specified by the Consulting Engineer for the road base course and/or sub-base, on slopes of large embankments, on areas of poor sub-grades, and special conditions where increased stability is required.

## **6.0 Sidewalks, Curbs and Gutters and Catch Basins**

- 6.01 Concrete - concrete shall conform to the requirements outlined in District of Saanich Specification Appendix 8 as appended to these Specifications.

- 6.02 Concrete sidewalks, curb and gutter, and driveway crossings will be constructed in accordance with the following Standard Drawings:

Curb and Gutter - Mountable	R-10
Curb and Gutter - Non Mountable	R-12
Curb, Gutter and Sidewalk - Combined	R-13
Sidewalk - Concrete	R-13
Walkway - Concrete	R-14

The type of construction to be used and the location will be as shown on the construction design drawings or as directed by the Consulting Engineer.

### 6.03 Extruded Curb and Gutter

- a) The Contractor will be given the option of constructing extruded curb and gutter. Prior to use, the specifications for the extrusion equipment shall be submitted for written approval from the Consulting Engineer. Automatic grade and line control will be required.
- b) Extruded concrete shall be finished as shown in the applicable drawings, with a surface grade brush finish; a dense uniform surface will be required on curb and gutter.

### 6.04 Placing of Concrete

- a) After mixing, the concrete shall be transported rapidly to the job site, and shall be delivered as close as possible to the point of deposit. Rehandling of concrete will not be permitted.
- b) Concrete operations shall be continuous until the section, panel, or scheduled pour is completed. Should the operation be unavoidably interrupted, full depth construction joints shall be formed at the proper locations as herein specified.

- c) The concrete shall be placed in such a manner as to prevent separation of the ingredients. Special care shall be taken to place the concrete against the forms, particularly in corners, in order to prevent voids, rough areas, and honey combing.
- d) The concrete shall be placed to the full specified depth. After spreading, the concrete shall be struck-off and compacted by means of an approved screed. Vibrators or vibrating screens are recommended and shall be operated at a minimum of 5000 cycles per minute. The technique and use of vibrators or vibrating screens shall be at the discretion of the Consulting Engineer.
- e) Freshly placed concrete shall be protected in an approved manner against damage from the elements, and construction operations harmful to concrete.

#### 6.05 Trowelling and Brushing Finish

- a) After placing, the concrete shall be adequately worked with wood and steel trowels to a smooth finish with the required edges neatly rounded. Excessive trowelling is to be avoided.
- b) The use of grid tampers or "Bird Cages" will not be allowed.
- c) If there is evidence of concrete bleeding, finishing shall cease until the excess water has evaporated to the satisfaction of the Consulting Engineer. Failure to comply with the above will result in complete replacement of the sections involved.
- d) Brush finish shall be applied with a nylon bristle brush approved by the Consulting Engineer. The brushing shall be carried out in accordance with applicable drawings and in such a manner and at such a time as to *minimize* the depth and quantity of brush marks. All surplus water must be removed from the bristles before brushing commences. No mortar coat or water wash shall be used.
- e) Catch basin gutter grates shall be removed while finishing the adjacent gutter, and replaced following completion of finishing.
- f) After trowelling, the surface grade along the lip of gutter shall be checked by the Contractor with straight edges, to an accuracy of plus or minus 10mm in 3 metres. The maximum allowable variation across the gutter shall be 3mm.

## 6.06 Forms

### 6.06.1 Construction of Formwork

Forms shall be of metal or timber properly seasoned and free from warps or other defects. The type and section of the metal forms shall require the approval of the Municipal Engineer. **The face of curb forms shall be removable without disturbing back and gutter forms.**

The forms shall be smooth and clean on the surface(s) next to the concrete and shall be oiled with Parvelube No. 30 or approved equal.

The forms shall be rigidly held true to the established lines and grades.

### 6.06.2 Stripping of Forms

- a) Face of curb forms shall be removed after the initial set. Adequate care shall be taken in removing forms to avoid spoiling or marring the concrete. Such patching as may be necessary shall be started immediately after removal of the forms.
- b) Immediately after form removal and/or patching, the exposed surfaces shall be sprayed with the membrane curing material.

## 6.07 Joints

### 6.07.1 Contraction Joints

- a) Contraction joints shall be cut at every 3 metres by means of a marking tool or other approved method. Joints shall not be less than 30mm in depth and 7mm in width.
- b) The edges of the joint shall be rounded off with an edger having the arc of a circle of 7mm radius.
- c) Contraction joints in a monolithic sidewalk must extend through the full width of the sidewalk and curb and gutter.
- d) Contraction joints at catch basins shall be cut through the full width of the sidewalk in line with both outside edges of the catch basin gutter frame.

### 6.07.2 Expansion Joints

Lateral expansion joints are required at the beginning and end of every corner. The joint shall consist of an approved mastic preformed material, 13mm by 90mm cross-section, laid plumb and straight, 7mm below the finished sidewalk grade.

6.07.3 Surface Joints - Surface joints 13mm in depth and 7mm in width will be cut in sidewalk sections only every 3 metres in between the contraction joints. The edge of the joint shall be rounded off with an edger having an arc or a circle of 7mm radius.

6.07.4 Sawed Joints - Saw cuts as specified are to be made with a special concrete saw capable of producing a true straight joint of constant depth as required.

6.07.5 Breaking Out - All breakout shall end at a contraction, expansion or surface joint. The edge of a surface joint is to be sawn to a depth of 22mm minimum, while contraction joints may be neatly hand chiselled.

6.07.6 Obstructions

- a) The contractor will be required to carefully fit, cut and mark a surface joint in the sidewalk around all openings, iron covers, manholes, vaults, valves or metre boxes, lamp standards, hydrants, poles and other surface installations. The surface joint must be neatly tooled to the satisfaction of the Consulting Engineer.
- b) Expansion joints material, 13mm thick and the full depth of the sidewalk, shall be placed around the base of all poles, hydrants, and where the work abuts existing buildings or other structures, including existing sidewalks.

6.08 Reinforcing

6.08.1 General

- a) Reinforcing shall be clean and free from defects, kinks, loose rust or mill scale at the time the concrete is placed. Any coatings of hardened mortar shall be removed from the steel.
- b) Bar reinforcing shall meet A.S.T.M. Specification A184 and A.S.T.M. Specification A304, intermediate grade new billet deformed steel and C.S.A. standard 930.12m.
- c) Cold-drawn steel wire shall meet the requirements of A.S.T.M. Specification A82 and the wire mesh shall meet the requirements of A.S.T.M. Specification A185 and C.S.A. standard 930.3.

6.08.2

Reinforced Driveway Crossings

- a) In separate sidewalk, combined sidewalk, and curb and gutter, a single layer of 150mm by 150mm by 10/10 gauge wire mesh, in a minimum concrete depth of 150mm, as shown on Standard Drawing R-13 shall be placed at public lanes, apartments, and commercial driveways. The mesh shall extend to the full width of the crossing.
- b) In separate curb and gutter, two 10m reinforcing bars, as shown on Standard Drawings R-10, R-11 and R-12, shall be placed at apartments and commercial driveways.

6.08.3 Reinforcing in Fill Areas

Where the sidewalk, curb and gutter, combined sidewalk curb and gutter, is constructed on more than 300mm of fill, or where poor soil conditions are evident, reinforcing steel shall be used.

- a) In separate curb and gutter, two 10m reinforcing bars shall be placed, as shown on Standard Drawings R-10, R-11 and R-12.
- b) In separate sidewalk, a single layer of 150mm by 150mm by 10/10 gauge wire mesh shall be placed as shown on Standard Drawing R-13.
- c) In combined sidewalk, curb and gutter, a single layer of 150mm by 150mm by 10/10 gauge wire mesh shall be placed as shown on Standard Drawing R-13.

6.08.4 Placing of Reinforcement

Reinforcing mesh shall be rolled or otherwise straightened to make a perfectly flat surface before placing. The mesh or bar reinforcing shall be supported above the compacted gravel base so as to ensure a 50mm cover of concrete. The manner of supporting the reinforcing shall be approved by the Consulting Engineer. Overlapping of mesh reinforcing shall be a minimum of 300mm, and shall be wired together. Overlapping of bar reinforcing shall be thirty (30) bar diameters and shall be wired together.

- 6.08.5 Reinforcing Markings - All sections containing reinforcing shall be marked at their extreme limits with a marking tool showing the letter R and arrow pointing in direction of reinforcing. This letter shall be 4 cm high.

## 6.09 Protection of Work

- 6.09.1 Covering - the Contractor shall supply and place all tarpaulins, or other necessary materials to protect the work from rain, dust, frost or other similar weather action, for such time as the Engineer may consider necessary. Failure of the Consulting Engineer to order protection does not relieve the Contractor of the responsibility.
- 6.09.2 Barricades - The Contractor shall also barricade the work and keep all humans, animals, and vehicles off the work for a period of five (5) days after the finishing of the concrete has been completed. Any damage occurring to the work during this five (5) day period regardless of origin shall be repaired by the Contractor to the satisfaction of the Consulting Engineer within one (1) month after notice is given to the Contractor.
- 6.09.3 Pedestrian and Vehicular Access - The Contractor shall ensure that the property owners are warned at least one day prior to the pouring of concrete and that alternate pedestrian access is provided. With respect to commercial properties, access must be maintained as directed by the Consulting Engineer. Inconvenience to the public shall be minimized.

## 6.10 Catch Basins

- a) Construction of catch basins in the locations shown on the design drawing shall be undertaken prior to the construction of curbs.
- b) Mountable concrete curb will have two 10m reinforcing bars placed as shown in Standard Drawing R-11 behind catch basins.
- 6.11 Curb and Gutter Transitions - Where dissimilar sections join, a uniform gutter grade shall be maintained and a suitable transition effected by adjusting the height of the curb within one metre.

## 7.0 Asphalt Paving

- 7.01 Asphaltic Materials - Asphaltic materials shall conform with the requirements in Appendix 1 - Asphaltic Materials.
- 7.02 Surface Preparation for Asphalt Paving - The surface for asphalt paving shall be prepared in accordance with District of Saanich Specification Appendix 3 - Surface Preparation for Asphalt Paving.

- 7.03 Asphaltic Concrete Paving - Asphaltic Concrete Paving shall be placed in accordance with District of Saanich Specification Appendix 4 - Asphaltic Concrete Paving.
- 7.04 Surface Treatment - Aggregate Seal Coats, Sand Seal Coats, Fog Seal Coats and Slurry Seal Coats shall be placed in accordance with Appendix 5 - Surface Treatments.
- 7.05 Inspection and Testing - All asphalt paving shall be tested by a qualified laboratory in accordance with District of Saanich Specification Appendix 6 - Inspection and Testing and District of Saanich Specification Appendix 7 - Asphalt Methods of Test. The testing laboratory shall be retained by the Consulting Engineer and shall send reports to the Municipal Engineer within 10 days of the test commencement. A minimum of one set of three (3) asphalt cores per 500 tonnes of pavement or at least one set per day of paving is to be taken by the approved testing laboratory. Test results are to be made available to the Municipal Engineer.

## **8.0 Appurtenances**

- 8.01 Retaining walls, guardrails, handrails, fences and barricades shall be installed in accordance with the design drawing and these specifications.
- 8.02 Handrails shall be used on retaining walls with greater than 0.5 m drop.

## **9.0 Traffic Control and Street Identification**

- 9.01 All signs and pavement markings shall be installed by the Municipality at the expense of the applicant.

## **10.0 Cul-de-sac Islands**

- 10.01 The cul-de-sac islands shall be constructed as detailed on standard drawing #R6.
- 10.02 A minimum of 200mm of top soil to be placed in the areas designated for landscaping with a minimum 1% grade upward from the curb.
- 10.03 Within the specified landscaped area eight junipers of two different varieties and two dwarf trees are to be planted. The stock is to originate from five gallon pots and is to be both hardy and disease free. Planting material is to be fertilized at time of installation.

- 10.04 Subsequent to planting, the entire landscaped area is to be covered by a blanket of landscape filter fabric and then surfaced with 50mm of fine screened bark mulch.
- 10.05 The applicant is responsible for fertilizing, watering, weeding, and other related maintenance for a period of one year subsequent to subdivision approval by the Approving Officer.

**11.0 Cleaning up**

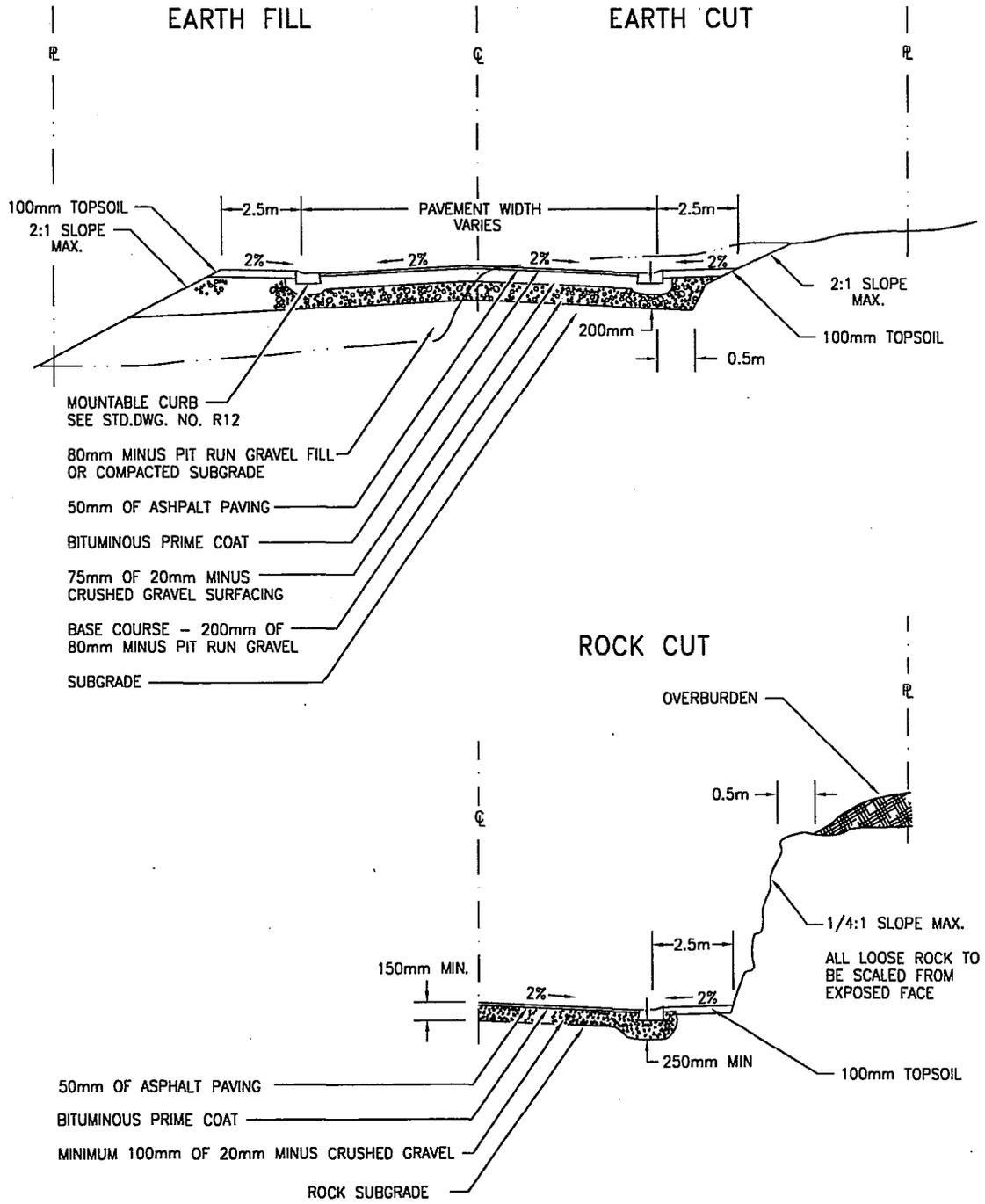
- 11.01 All surplus material, tools, temporary structures, debris, dirt and rubbish shall be promptly removed by the Contractor immediately following completion of the construction work.
- 11.02 The site shall also be left clean and tidy to the satisfaction of the Municipal Engineer.

**CORPORATION OF THE TOWNSHIP OF ESQUIMALT**  
**SUBDIVISION AND DEVELOPMENT CONTROL BYLAW**  
**SCHEDULE 'C'**  
**DESIGN AND CONSTRUCTION SPECIFICATIONS**

**ROADS — STANDARD DRAWINGS**

- R-1 Typical Section — Local Road — Service Level 1
- R-2 Typical Section — Collector and Major Road — Service Level 2
- R-3 Typical Location of Services — Cul-de-sac, 15 m R/W and 18m R/W
- R-4 Typical Location of Services 25 m R/W and 20 R/W
- R-5 Typical Cul-de-Sacs Detail
- R-6 Cul-de-Sac Island Details
- R-7 Temporary Turn-Around Details
- R-8 Driveway Grades
- R-9 Vertical Curves for Minimum Stopping Distance
- R-10 Mountable Curb and Invert Gutter
- R-11 Mountable Curb — Curb Reinforcing at Catch Basins
- R-12 Non Mountable Curb and Gutter
- R-13 Sidewalk — Concrete
- R-14 Foot Path Construction
- R-15 Sidewalk Driveway Crossing
- R-16 Sidewalk Corner Ramp (Sidewalk adjacent to curb)
- R-17 Barricades
- R-18 Sidewalk Handrails
- R-19 Standard Road Closure

# 15m, 18m & 20m ROAD ALLOWANCE



NOTE: DEPTHS OF SURFACING AND BASE GRAVELS ARE MINIMUM AND IN SOME CASES WILL HAVE TO BE INCREASED TO PROVIDE A STABLE ROAD BED.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TYPICAL SECTION  
LOCAL ROAD  
SERVICE LEVEL 1



TOWNSHIP OF ESQUIMALT  
ENGINEERING DEPARTMENT

DATE : NOV 1992

SCALE : N.T.S.

APPROVED

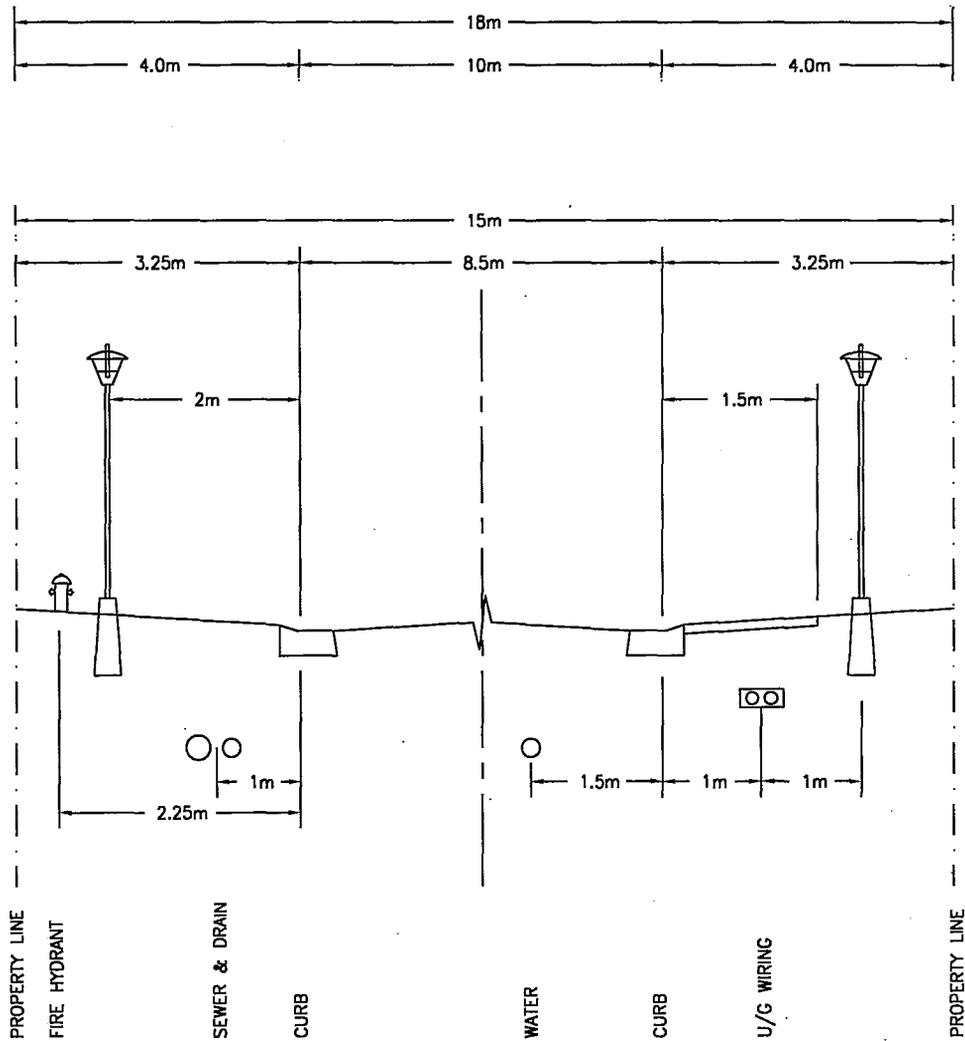
FILE NO. : 10.1.2.17

BY :

DWG.NO.

R1





SERVICES TO BE LOCATED IN THE POSITIONS SHOWN IN DRAWING.

SEWERS & DRAINS

- MAY BE IN THE SAME TRENCH IF THERE IS A MINIMUM 150mm LATERAL CLEARANCE BETWEEN THE OUTSIDE COUPLINGS OR BELLS OF THE PIPES AND IF THE ELEVATIONS ARE SIMILAR.
- MUST BE 1.0m CLEAR OF POLES.

WATER

- MUST BE 1.5m CLEAR OF UNDERGROUND HYDRO.
- MUST BE 3.0m CLEAR OF SEWER.
- MUST BE 1.0m CLEAR OF LAMP STANDARD BASES.

HYDRANTS

- MUST BE 3.0m CLEAR OF ANY UTILITY POLES AND LAMP STANDARDS.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS.

TYPICAL LOCATION OF SERVICES  
CUL-DE-SAC, 15m R/W  
AND 18m R/W



TOWNSHIP OF ESQUIMALT  
ENGINEERING DEPARTMENT

DATE : NOV 1992

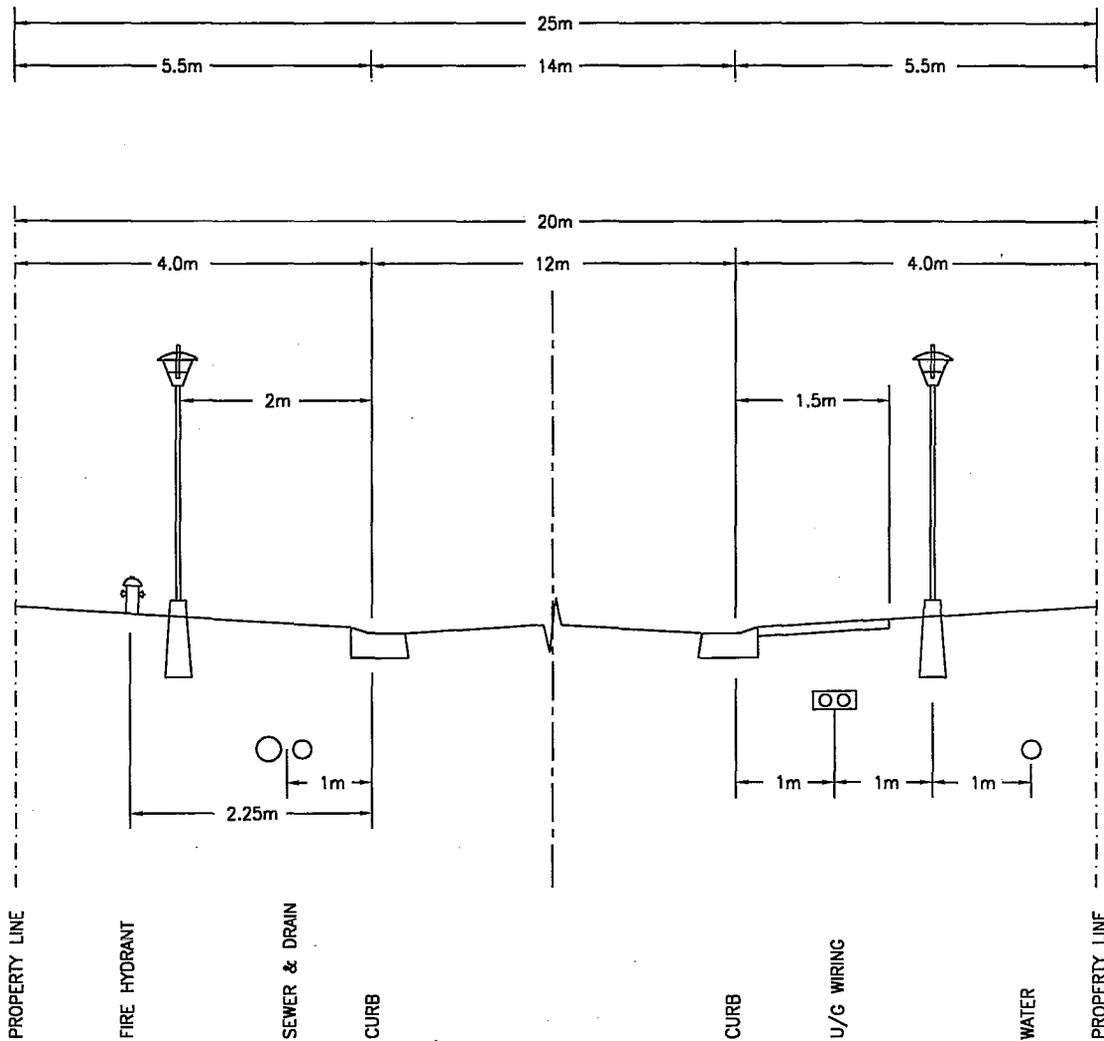
SCALE : N.T.S.

APPROVED  
BY :

FILE NO. : 10.1.2.17

DWG.NO.

R3



SERVICES TO BE LOCATED IN THE POSITIONS SHOWN IN DRAWING.

**SEWERS & DRAINS**

- MAY BE IN THE SAME TRENCH IF THERE IS A MINIMUM 150mm LATERAL CLEARANCE BETWEEN THE OUTSIDE COUPLINGS OR BELLS OF THE PIPES AND IF THE ELEVATIONS ARE SIMILAR.
- MUST BE 1.0m CLEAR OF POLES.

**WATER**

- MUST BE 1.5m CLEAR OF UNDERGROUND HYDRO.
- MUST BE 3.0m CLEAR OF SEWER.
- MUST BE 1.0m CLEAR OF LAMP STANDARD BASES.

**HYDRANTS**

- MUST BE 3.0m CLEAR OF ANY UTILITY POLES AND LAMP STANDARDS.

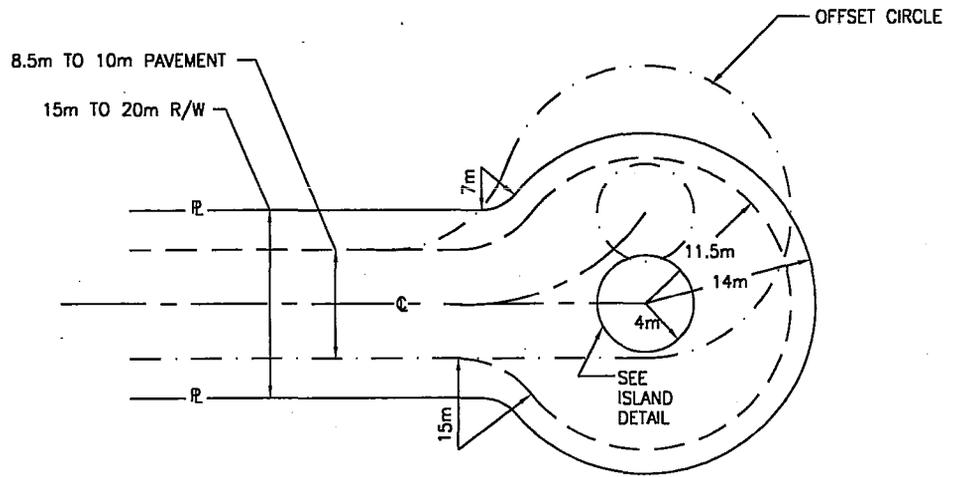
REFER TO SPECIFICATIONS FOR FURTHER DETAILS.

TYPICAL LOCATION OF SERVICES  
25m R/W AND 20m R/W



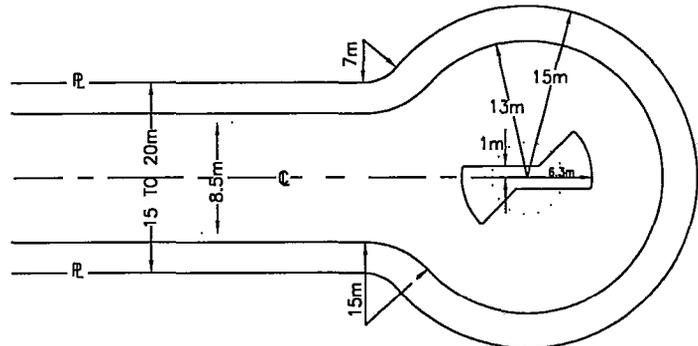
TOWNSHIP OF ESQUIMALT  
ENGINEERING DEPARTMENT

DATE : NOV 1992	SCALE : N.T.S.	DWG.NO.
APPROVED BY :	FILE NO. : 10.1.2.17	R4



TYPE 1

FOR LANDSCAPE DETAIL SEE R6



TYPE 2

NOTES

- 1 THESE STANDARDS APPLY TO TURN-AROUNDS ON RESIDENTIAL ROADS FOR SINGLE FAMILY DWELLINGS.
- 2 CHAINAGE FOR PROFILE TO BE ALONG CENTRE LINE. SHOW SPOT ELEVATIONS FOR TOP OF CURBS AS WELL AS CENTRE LINE PROFILE.
- 3 FOR CUL-DE-SAC ISLAND DETAIL REFER TO STD. DWG. NO. R6 DWELLINGS.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TYPICAL CUL-DE-SAC  
DETAIL

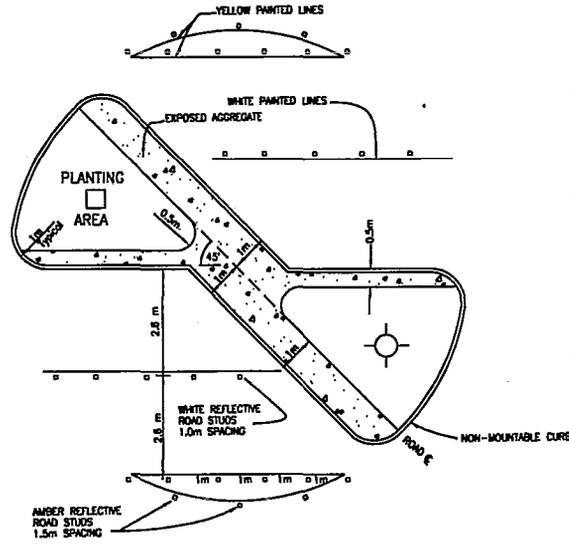


TOWNSHIP OF ESQUIMALT  
ENGINEERING DEPARTMENT

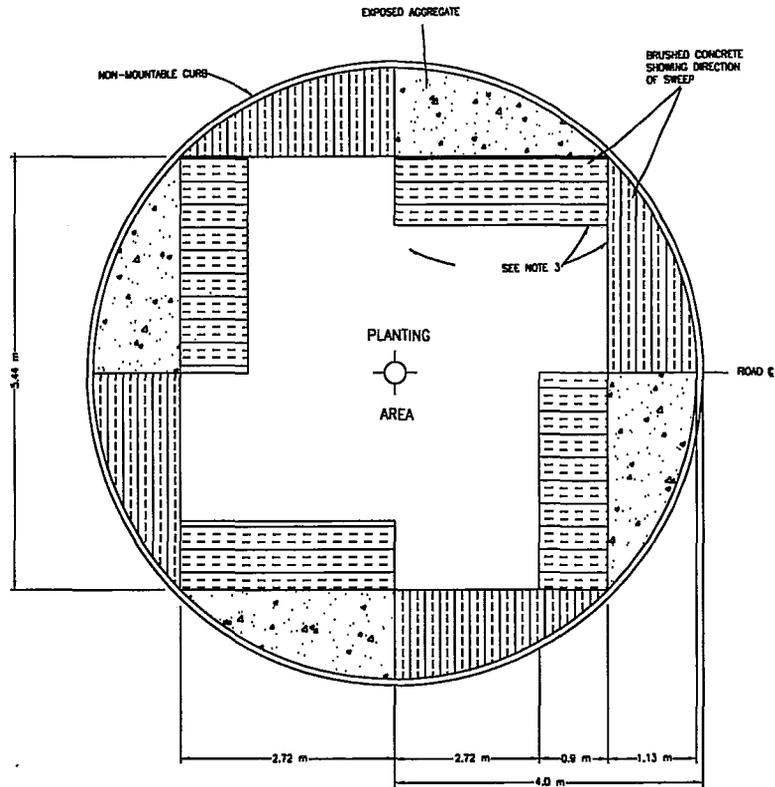
DATE: NOV 1992	SCALE: N.T.S.	DWG. NO. <b>R5</b>
APPROVED By: _____	FILE NO. 10.1.2.17	

**NOTES**

- 1 WHEN POST TOP LUMINAIRE IS TO BE USED STANDARD BASE TO BE CONSTRUCTED AS PER STANDARD DRAWING TOGETHER WITH NECESSARY UNDERGROUND WIRING.
- 2 WATERING FACILITY - SUPPLY AND INSTALL 19 mm HOSE- BIB HOUSE IN A STANDARD METER BOX.
- 3 PARTITION MATERIAL TO BE 50mm x 100mm STANDARD CONSTRUCTION GRADE CEDAR, STAINED DARK BROWN.
- 4 ALL AGGREGATE TO BE 20mm MINUS 3mm EXPOSURE.
- 5 MINIMUM CONCRETE DEPTH TO BE 100mm
- 6 PAINT LINES OR REFLECTIVE STUDS WILL BE INSTALLED TO DELINEATE PARKING SPACES.



- - TYPICAL KIOSK LOCATION
- ⊙ - TYPICAL LUMINAIRE LOCATION



REFER TO SPECIFICATIONS FOR FURTHER DETAILS

**CUL-DE-SAC ISLAND DETAILS**



**TOWNSHIP OF ESQUIMALT**  
ENGINEERING DEPARTMENT

DATE: NOV 1992

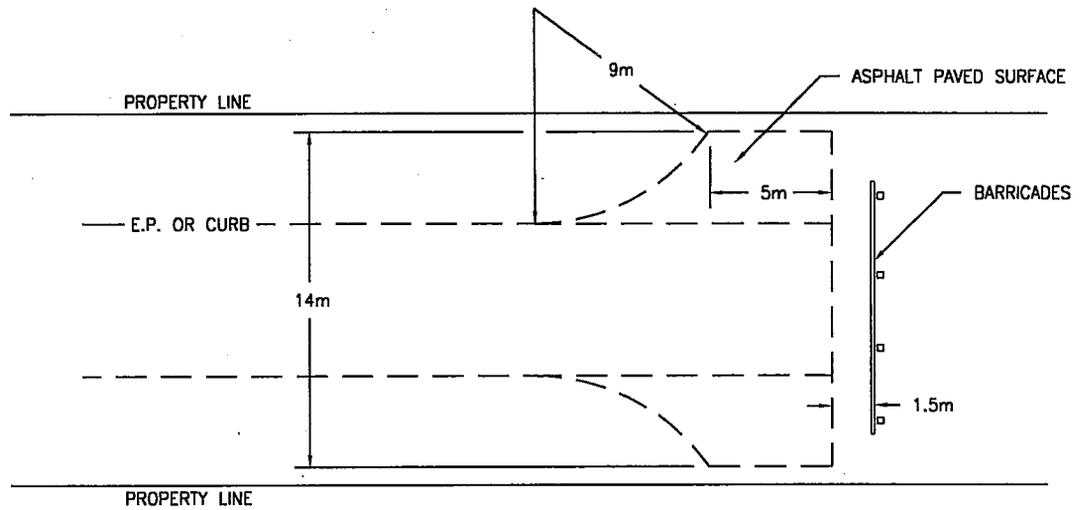
SCALE: N.T.S.

APPROVED BY:

FILE NO. 10.1.2.17

DWG. NO.

**R6**



HAMMERHEAD TYPE

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

TEMPORARY TURNAROUND  
DETAILS



TOWNSHIP OF ESQUIMALT

ENGINEERING DEPARTMENT

DATE : NOV 1992

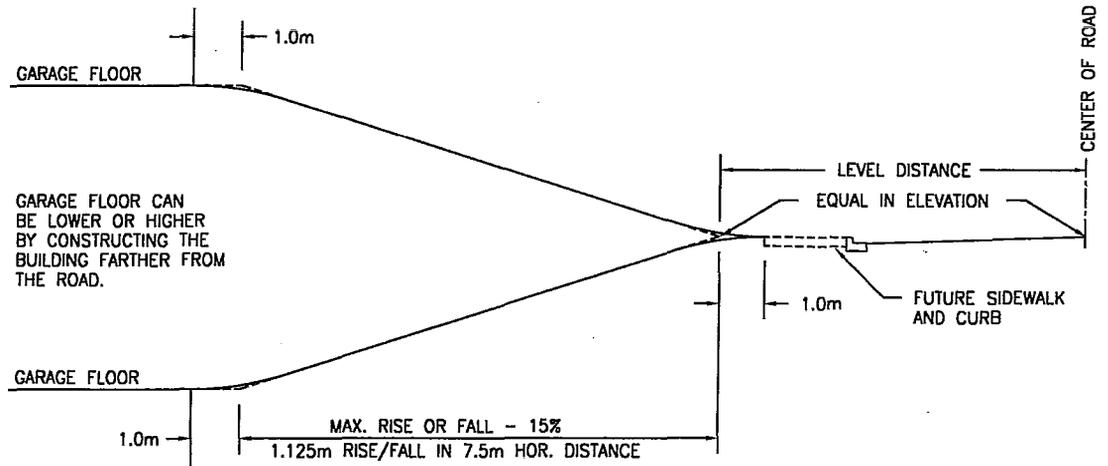
SCALE : N.T.S.

DWG.NO.

APPROVED  
BY :

FILE NO. : 10.1.2.17

R7



GARAGE FLOOR CAN BE LOWER OR HIGHER BY CONSTRUCTING THE BUILDING FARTHER FROM THE ROAD.

**NOTES**

1. TO ALLOW FOR FUTURE ROAD WIDENING AND SIDEWALK CONSTRUCTION, THE DRIVEWAY AND FINISHED BOULEVARD GRADE MUST BE AT THE SAME ELEVATION AS THE CENTER OF THE EXISTING ROAD SURFACE AT THE FOLLOWING LEVEL DISTANCE FROM THE PAVEMENT CENTERLINE:

	<u>MINIMUM LEVEL DISTANCE</u>
□ RESIDENTIAL ROADS	7.5m
□ COLLECTOR ROADS	8.5m
□ MAJOR ROADS	TO BE DETERMINED BY MUNICIPAL ENGINEER

2. THE MAXIMUM GRADE OF DRIVEWAY IS 15% (1.125m RISE OR FALL IN 7.5m).
3. WHERE THE CENTER OF AN EXISTING ROAD SURFACE IS MORE THAN 1.5m OFF THE CENTER OF THE ROAD ALLOWANCE, MEASURE THE LEVEL DISTANCE FROM THE CENTER OF THE ROAD ALLOWANCE.
4. EXCEPTIONS TO THESE STANDARDS WILL BE ALLOWED ONLY AT THE DISCRETION OF THE MUNICIPAL ENGINEER.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

**DRIVEWAY GRADES**

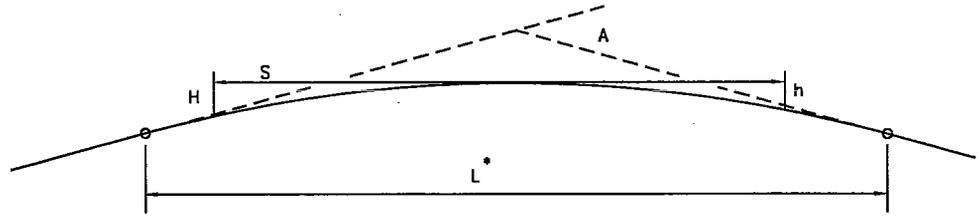


**TOWNSHIP OF ESQUIMALT**

ENGINEERING DEPARTMENT

DATE : NOV 1992	SCALE : N.T.S.	DWG.NO.
APPROVED BY :	FILE NO. : 10.1.2.17	R8

# CREST CURVES



DESIGN SPEED (km/h)	STOPPING SIGHT DISTANCE (m)		CREST, K (m)	
	(a) MINIMUM	(b) DESIRABLE	(c) COLLECTOR AND MAJOR ROADS	(d) RESIDENTIAL ROADS
50	65	65	7	10
60	85	90	15	20
70	110	120	22	35

\* L IN METERS SHOULD NOT BE LESS THAN DESIGN SPEED IN KILOMETERS PER HOUR

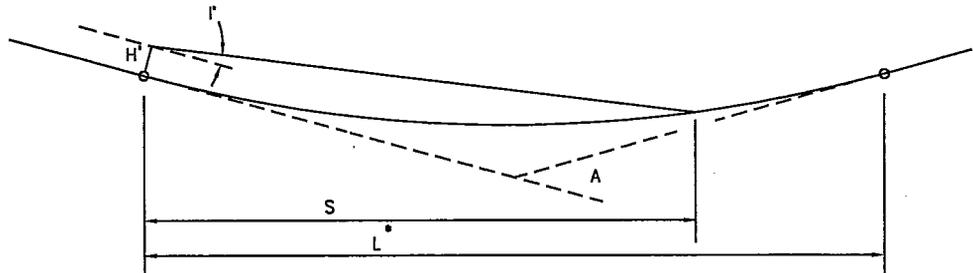
- (a) BASED ON FIXED PERCEPTION REACTION TIME OF 2.5 s.
- (b) BASED ON VARIABLE PERCEPTION REACTION TIME OF 2.5 s AT 40km/h TO 3.5 s AT 140km/h
- (c) BASED ON FIXED PERCEPTION REACTION TIME AND TAIL LIGHT HEIGHT OF 380mm
- (d) BASED ON VARIABLE PERCEPTION REACTION TIME AND OBJECT HEIGHT OF 150mm

### LEGEND

- L - LENGTH OF VERTICAL CURVE IN METERS
- A - ALGEBRAIC DIFFERENCE IN GRADE PERCENT
- S - STOPPING SIGHT DISTANCE IN METERS
- H - HEIGHT OF DRIVERS EYE 1.05m
- H' - HEIGHT OF HEAD LAMPS 0.6m
- h - HEIGHT OF OBJECT
- r - ANGLE OF LIGHT BEAM UPWARD FROM THE PLANE OF THE VEHICLE

$$L = KA$$

# SAG CURVES



DESIGN SPEED (km/h)	STOPPING SIGHT DISTANCE (m)	SAG, K (m) MINIMUM	
		WITHOUT STREET LIGHTING	WITH STREET LIGHTING
50	65	11	6
60	85	20	10
70	110	25	15

\* L IN METERS SHOULD NOT BE LESS THAN DESIGN SPEED IN KILOMETERS PER HOUR  
CENTRIPETAL ACCELERATION  $0.3m/s^2$

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

## VERTICAL CURVES FOR MINIMUM STOPPING SIGHT DISTANCE



TOWNSHIP OF ESQUIMALT

ENGINEERING DEPARTMENT

DATE : NOV 1992

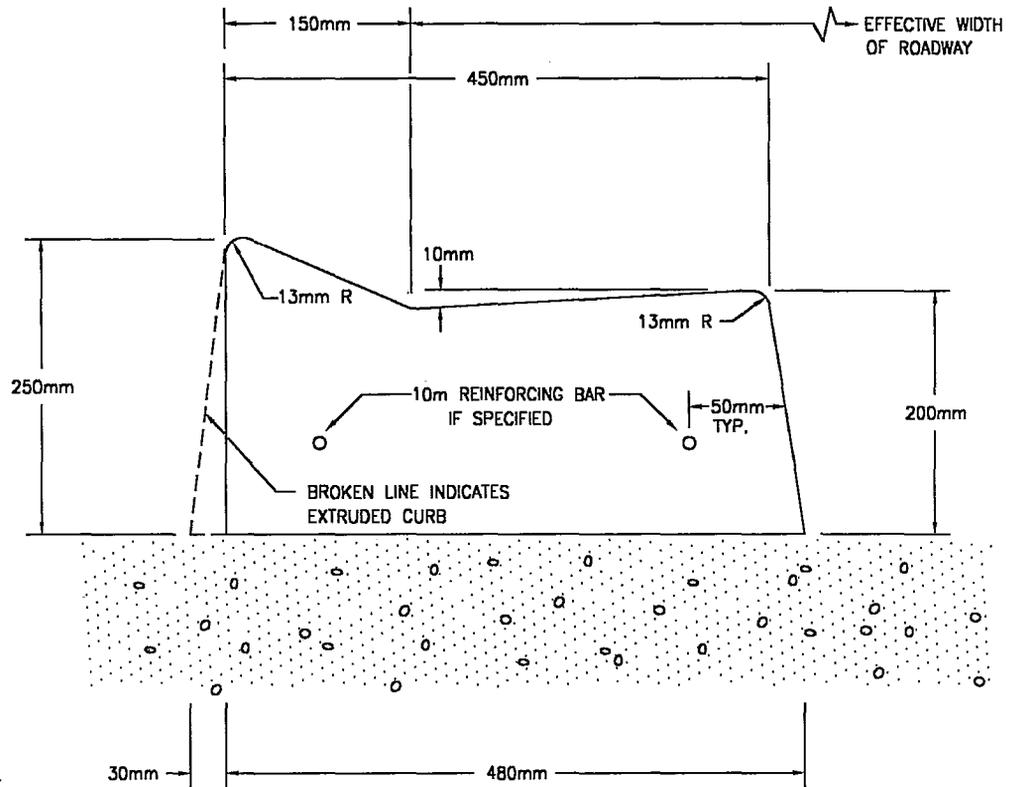
SCALE : N.T.S.

DWG.NO.

APPROVED  
BY :

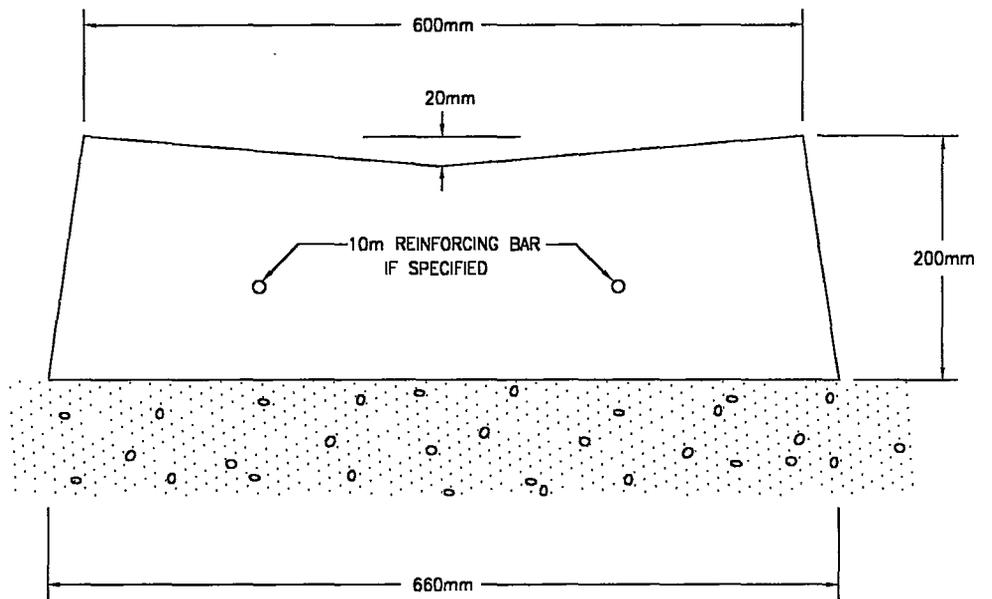
FILE NO. : 10.1.2.17

R9



### MOUNTABLE CURB (WIDE SECTION)

REFER TO STANDARD DRAWING R11 FOR REINFORCING AT CATCH BASINS



### INVERT GUTTER

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

## MOUNTABLE CURB (WIDE SECTION) & INVERT GUTTER



TOWNSHIP OF ESQUIMALT

ENGINEERING DEPARTMENT

DATE : NOV 1992

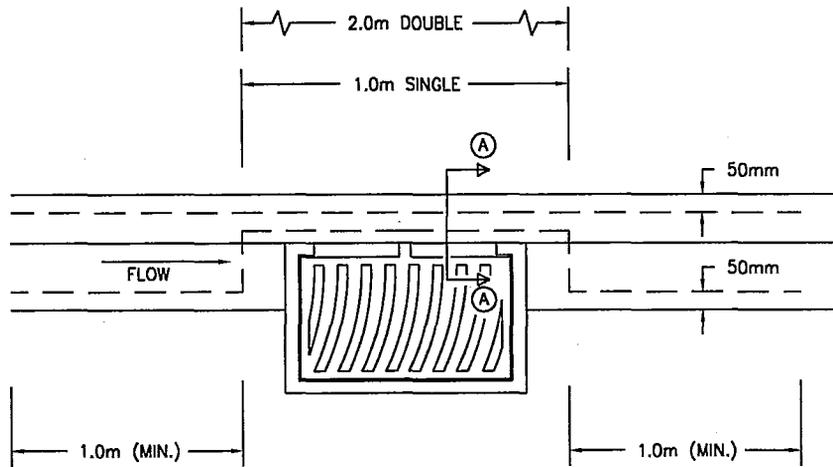
SCALE : N.T.S.

DWG. NO.

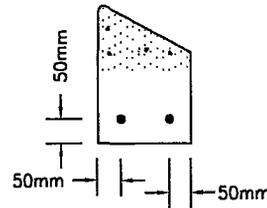
APPROVED  
BY :

FILE NO. : 10.1.2.17

R10



CURB REINFORCING AT CATCH BASINS



SECTION A-A

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

MOUNTABLE CURB  
CURB REINFORCING  
AT CATCH BASINS



TOWNSHIP OF ESQUIMALT  
ENGINEERING DEPARTMENT

DATE : NOV 1992

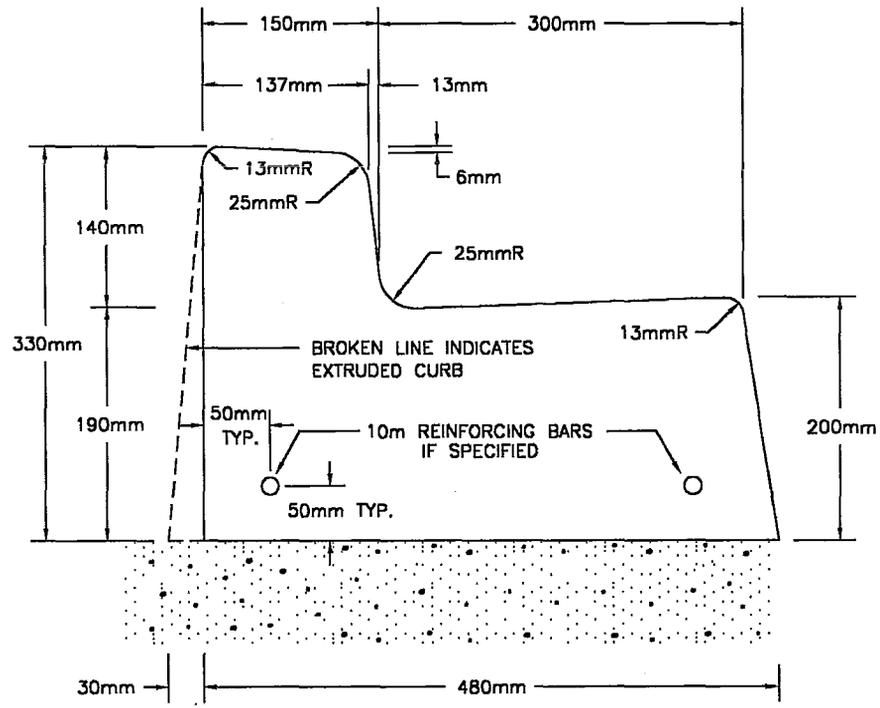
SCALE : N.T.S.

APPROVED  
BY :

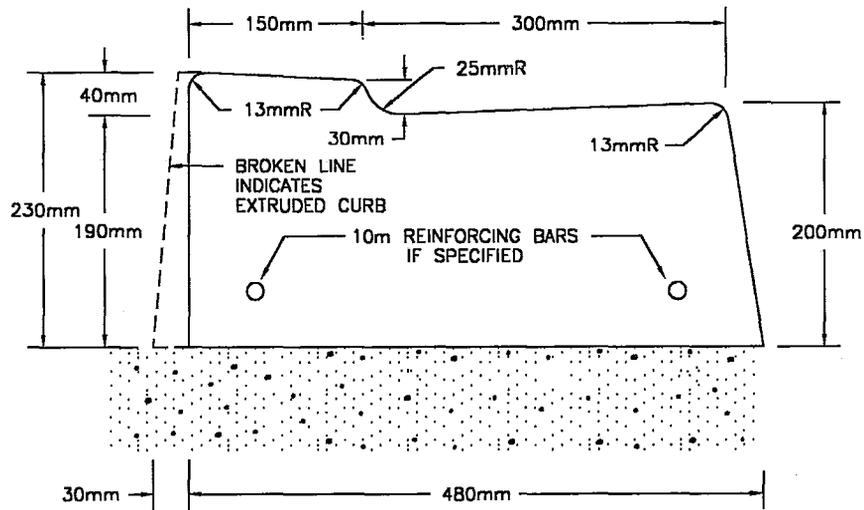
FILE NO. : 10.1.2.17

DWG. NO.

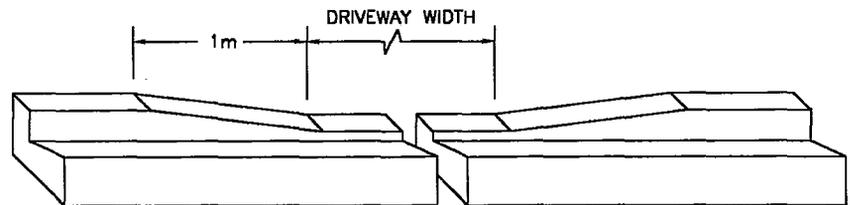
R11



**NON-MOUNTABLE**



**REINFORCED DRIVEWAY CROSSING**



REFER TO SPECIFICATIONS FOR FURTHER DETAILS

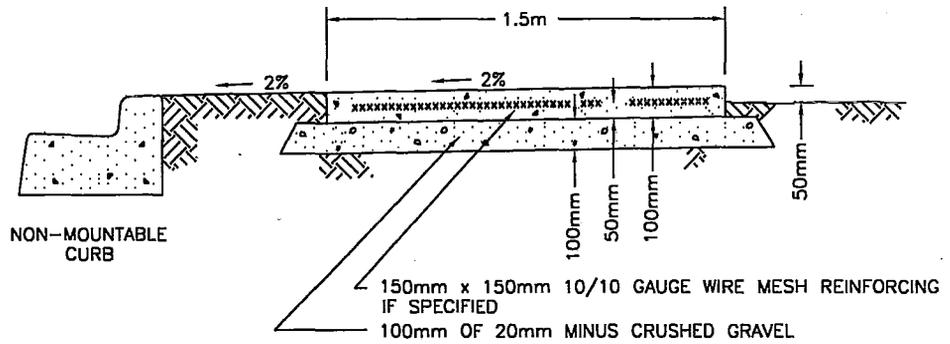
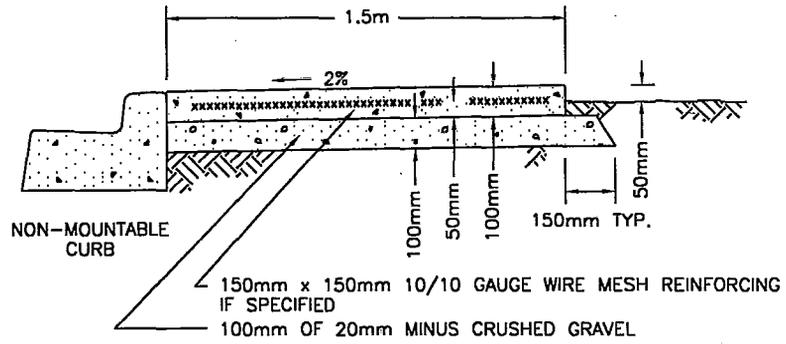
**NON-MOUNTABLE  
CURB & GUTTER**



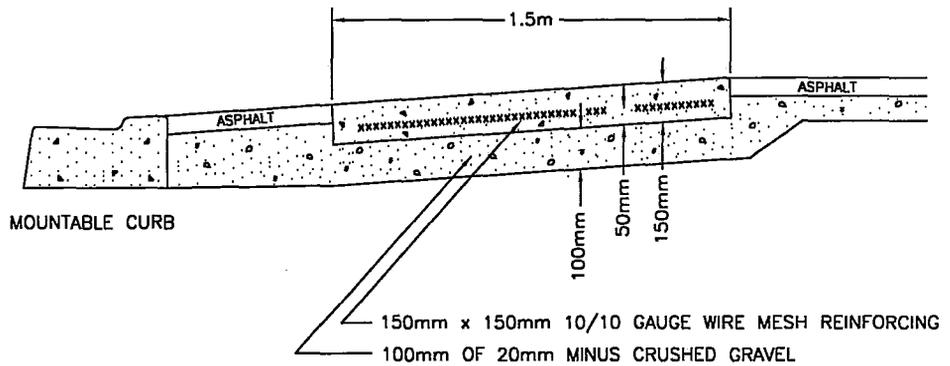
**TOWNSHIP OF ESQUIMALT**  
ENGINEERING DEPARTMENT

DATE : NOV 1992	SCALE : N.T.S.	DWG.NO.
APPROVED BY :	FILE NO. : 10.1.2.17	<b>R12</b>

## SIDEWALK ABUTTING CURB



## SEPARATED SIDEWALK



## REINFORCED DRIVEWAY CROSSING

### NOTES:

1. REMOVE ALL SOD & ORGANIC MATERIALS FROM PROPOSED SIDEWALK LOCATION APPLY APPROVED WEED KILLER LIBERALLY PRIOR TO INSTALLATION OF GRAVEL IN EXCAVATION. BACKFILL ANY LOW AREAS WITH PITRUN SAND OR GRAVEL.
2. WHERE PRACTICAL KEEP SIDEWALK APPROXIMATELY 50mm ABOVE NATURAL GROUNDS.
3. GRADING & SEEDING IS REQUIRED FOR REMAINING LANE WIDTH.

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

SIDEWALK-CONCRETE



TOWNSHIP OF ESQUIMALT

ENGINEERING DEPARTMENT

DATE : NOV 1992

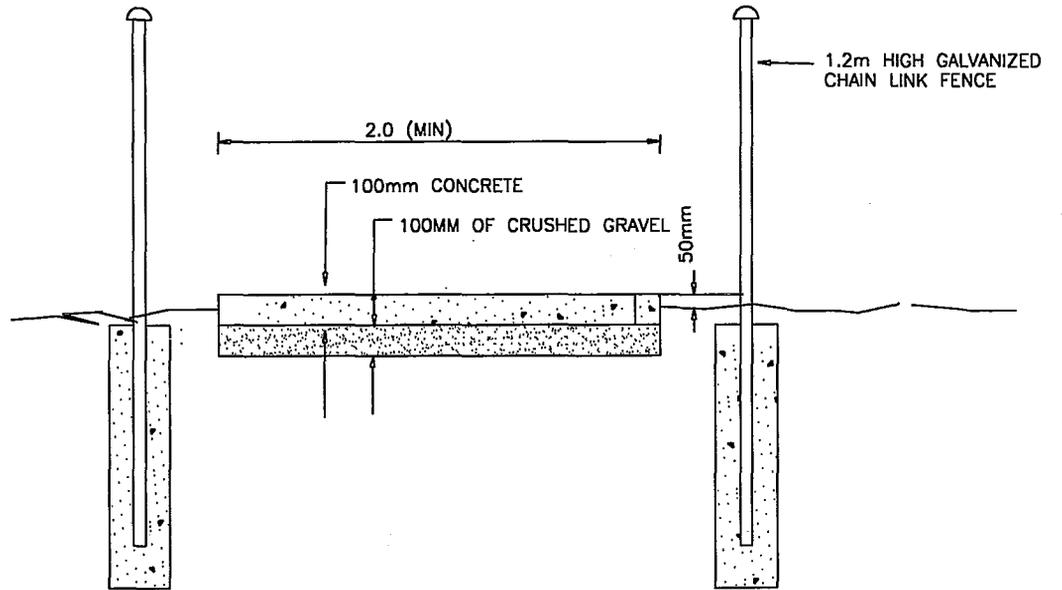
SCALE : N.T.S.

DWG. NO.

APPROVED BY :

FILE NO. : 10.1.2.17

R13



NOTES

- 1 FENCE SHALL BE CONSTRUCTED IN ACCORDANCE WITH FENCE MANUFACTURERS RECOMMENDATIONS
- 2 TERMINAL POSTS SHALL BE SCHEDULE 40 NOM. 60mm OD, LINE POSTS 48mm OD, TOP RAIL 35mm OD AND TENSION BARS 5mm x 19mm.
- 3 POSTS TO BE SET ON MAX 2.5m CENTERS, WITH MINIMUM 750mm SET IN CONCRETE AND MIN 150mm AROUND POST, TOPSOIL ABOVE CONCRETE
- 4 CHAIN LINK MESH SHALL BE 50mm WITH 3.55mm WIRE TO ASTM A392 CLASS I, GALVANIZED, INSTALLED ON TRAFFIC SIDE OF FENCE.
- 5 ALL FENCING MATERIALS SHALL BE GALVANIZED

FOOT PATH CONSTRUCTION



TOWNSHIP OF ESQUIMALT

ENGINEERING DEPARTMENT

DATE : NOV 1992

SCALE : N.T.S.

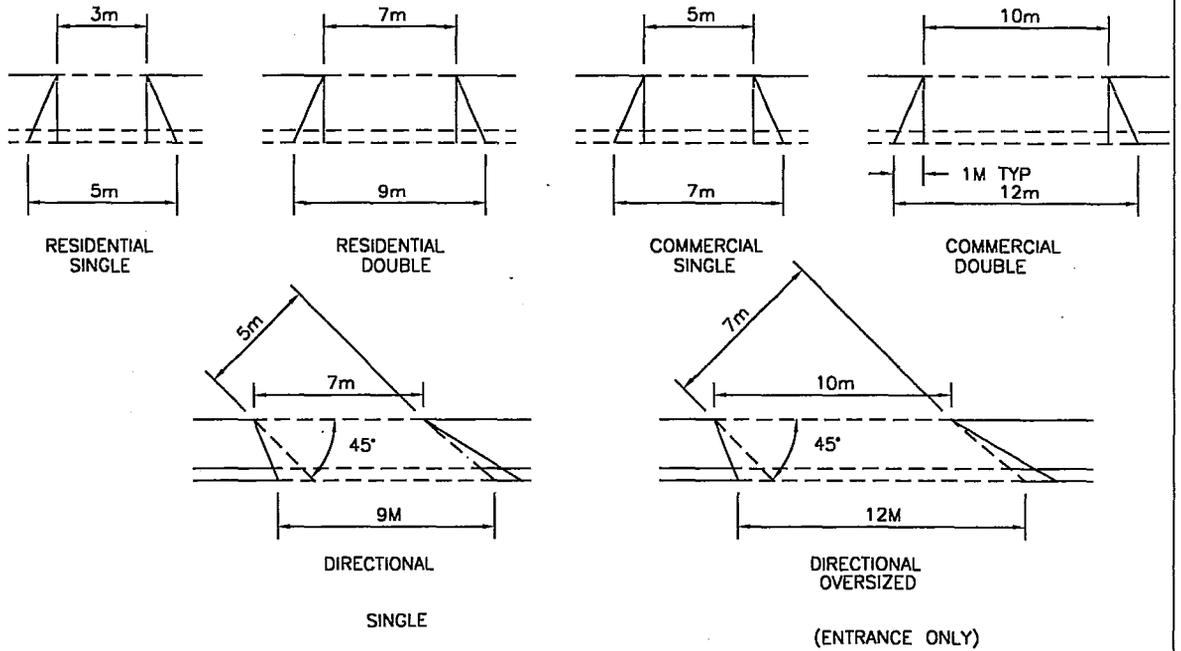
DWG.NO.

APPROVED  
BY :

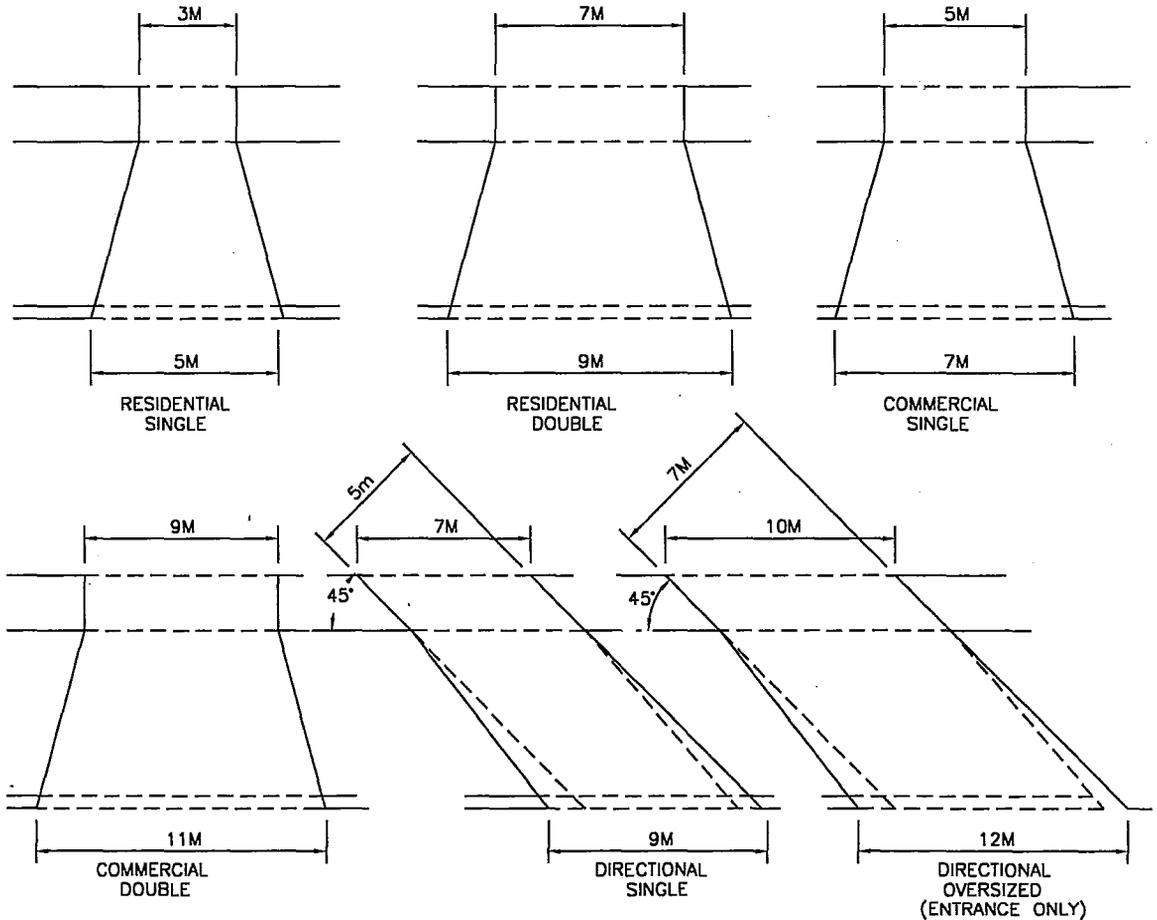
FILE NO. : 10.1.2.17

R14

# MONOLITIC SIDEWALK CROSSING



# SEPARATE SIDEWALK CROSSINGS



REFER TO SPECIFICATIONS FOR FURTHER DETAILS

# SIDEWALK DRIVEWAY CROSSING



TOWNSHIP OF ESQUIMALT  
ENGINEERING DEPARTMENT

DATE : NOV 1992

SCALE : N.T.S.

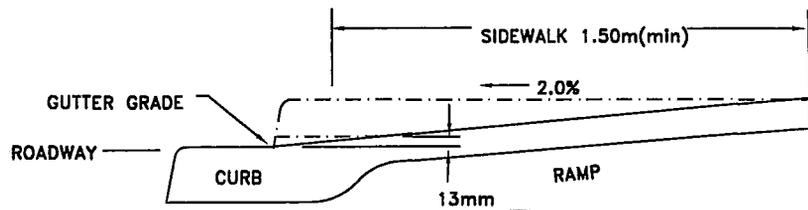
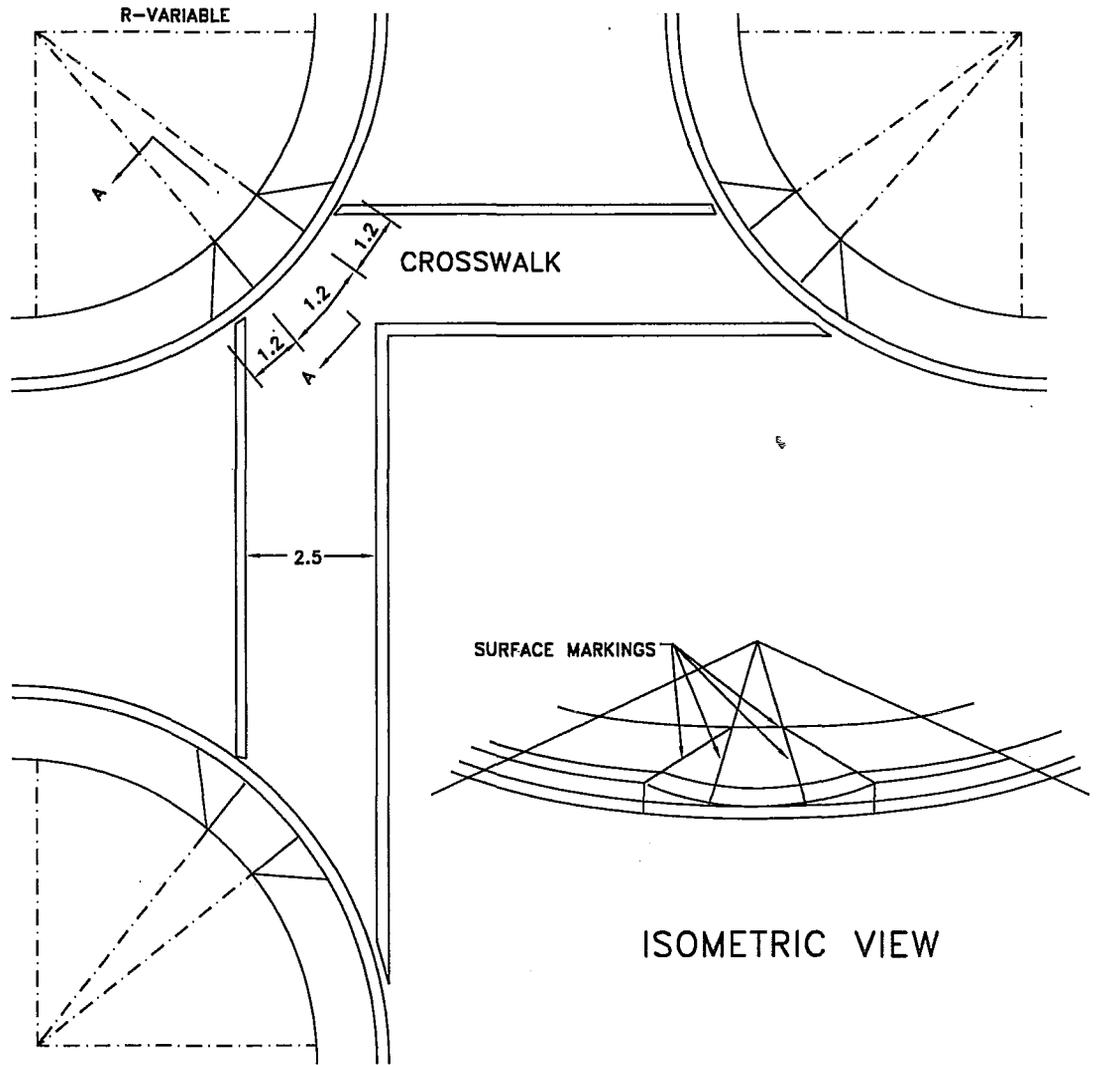
DWG.NO.

APPROVED BY :

FILE NO. : 10.1.2.17

R15

# PLAN



## SECTION A-A

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

### SIDEWALK CORNER RAMP



## TOWNSHIP OF ESQUIMALT

### ENGINEERING DEPARTMENT

DATE : NOV 1992

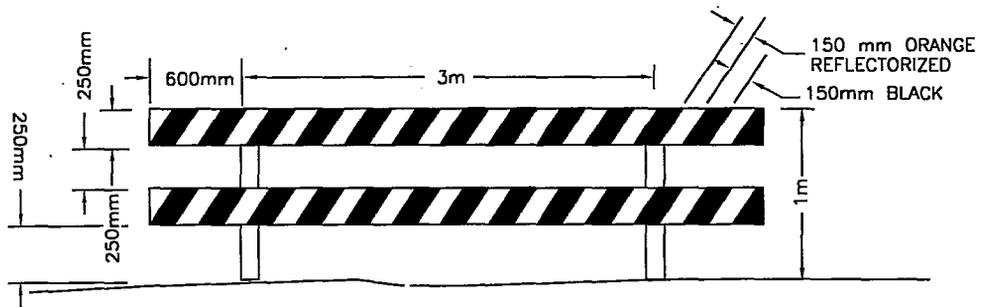
SCALE : N.T.S.

DWG.NO.

APPROVED BY :

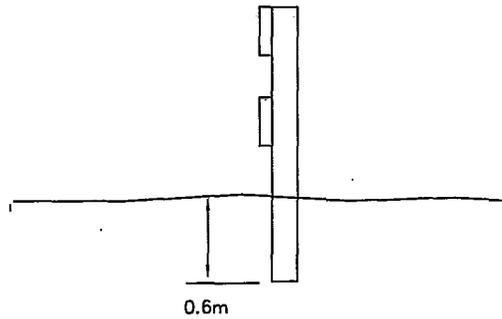
FILE NO. : 10.1.2.17

# R16



CROSSBAR 50MM X 250MM NOMINAL  
SUPPORT 90MM X 90MM NOMINAL

SIDE VIEW



NOTE: BARRICADE LENGTH SHOULD BE EQUAL TO OR GREATER THAN  
PAVEMENT WIDTH  
CHECKER BOARD SIGN TO BE INSTALLED AS REQUIRED

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

BARRICADES



TOWNSHIP OF ESQUIMALT

ENGINEERING DEPARTMENT

DATE : NOV 1992

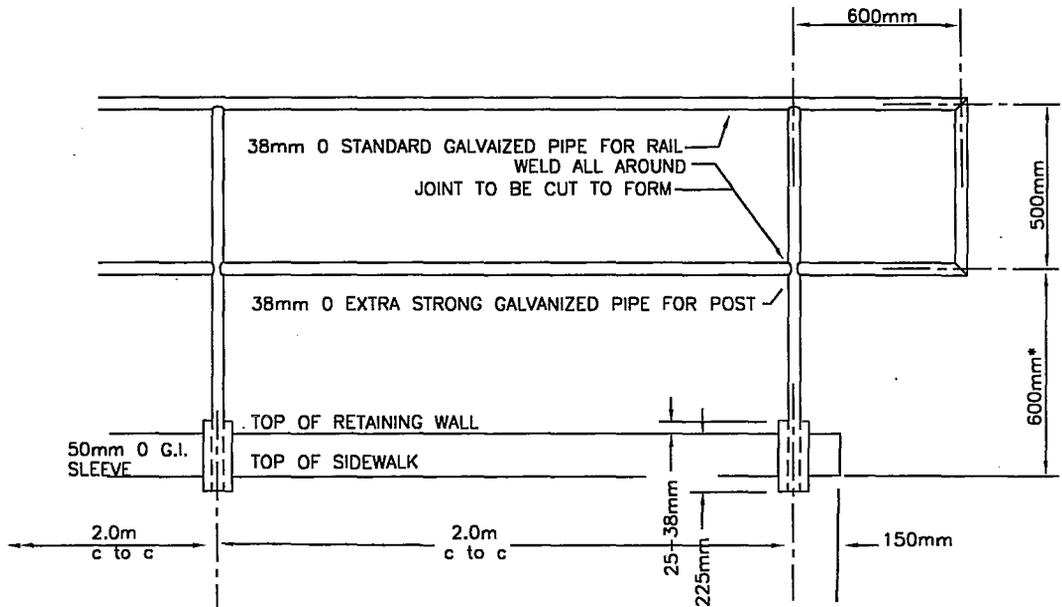
SCALE : N.T.S.

DWG.NO.

APPROVED  
BY :

FILE NO. : 10.1.2.17

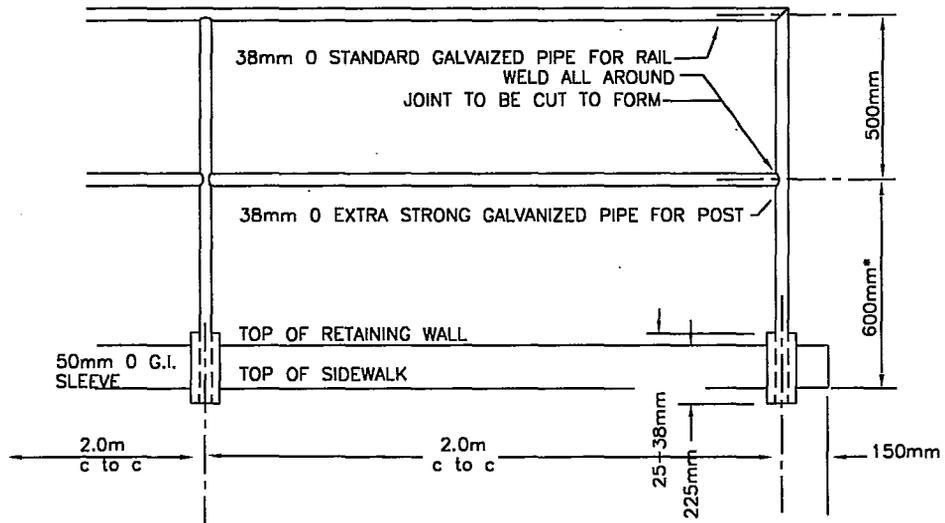
R17



NOTES

PIPE SIZES ARE NOMINAL

\* MEASUREMENT FROM TOP OF SIDEWALK OR TOP OF RETAINING WALL WHERE NO SIDEWALK EXISTS  
ALL WELDED JOINTS TO BE COATED WITH GALVACON OR EQUIVALENT.



REFER TO SPECIFICATIONS FOR FURTHER DETAILS

SIDEWALK HANDRAILS



TOWNSHIP OF ESQUIMALT

ENGINEERING DEPARTMENT

DATE : NOV 1992

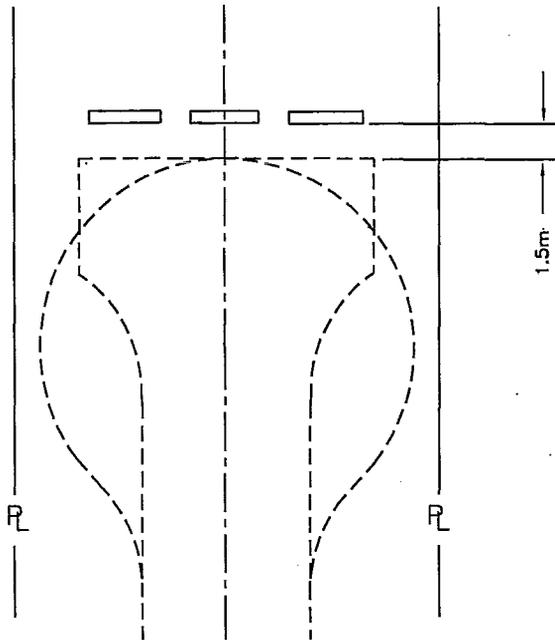
SCALE : N.T.S.

DWG.NO.

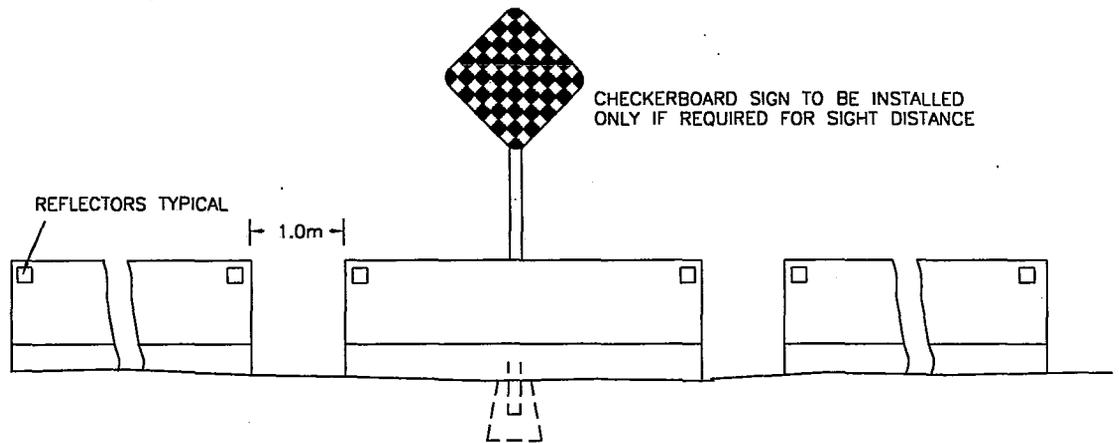
APPROVED  
BY :

FILE NO. : 10.1.2.17

R18



TYPICAL BARRICADE LOCATION N.T.S.

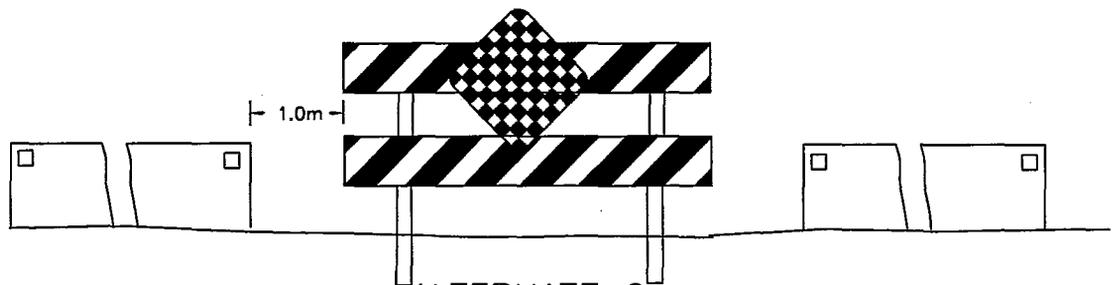


ALTERNATE 1

( MUST BE APPROVED BY FIRE CHIEF )

NOTE: THE ROAD FACE OF ALL CONCRETE BARRIERS TO BE PAINTED WITH REFLECTIVE YELLOW PAINT

BREAK-AWAY BARRICADE



ALTERNATE 2

REFER TO SPECIFICATIONS FOR FURTHER DETAILS

STANDARD ROAD CLOSURE



TOWNSHIP OF ESQUIMALT

ENGINEERING DEPARTMENT

DATE : NOV 1992

SCALE : N.T.S.

DWG.NO.

APPROVED BY :

FILE NO. : 10.1.2.17

R19