VILLAGE OF CUMBERLAND

Capital Planning Studies

Roads Master Plan

23 November 2007

Submitted by:

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TABLE OF CONTENTS

APPENDICES

DRAWINGS

1.0 INTRODUCTION

1.1 General

The Village of Cumberland is experiencing a period of significant growth with several large residential subdivisions and commercial development currently under construction or in the planning and design stages. This development is expected to continue and result in a population increase from approximately 2500 to 12,000 over the next 20 years. As a result of this growth and aging of the existing assets, significant improvements will be required to the existing municipal infrastructure.

As a first step in determining its requirements, the Village has initiated capital planning studies which will develop master plans for improving the following components of the infrastructure:

- Water
- Sanitary sewer
- Stormwater drainage
- Roads
- Parks

This report contains the proposed master plan for road improvements. Recommendations for development cost charges (DCC) which may be used to finance implementation of the road improvements for increased capacity will be documented separately.

1.2 Study Approach

The initial task of the study was to create a base plan of the Village and the main access roads. This plan was then used to establish a Primary Road Network consisting of:

- Arterial roads – providing access to and from the village.
- Collector roads – providing access to and from residential and commercial areas, arterial roads and the village centre.

The proposed Primary Road Network was reviewed with Village staff prior to finalizing,

As a result of the anticipated development, there will be an increase in traffic which will accelerate deterioration and exacerbate the inadequacies of the existing road network. In order to identify a road maintenance and improvement program for the next 20 years, all roads in the Primary Road Network were evaluated and improvements were identified based on the following criteria:

- Maintenance requirements, based on the results of a condition survey.

- Traffic growth.
- Geometric standards.
- Need to define roads in the Primary Road Network.

Proposed improvements were reviewed with Village staff and, where appropriate, review comments were incorporated into the study.

The improvements were rationalized and prioritized in order of importance, and cost estimates were developed for each improvement in order to establish the Roads Plan.

As part of a separate study, the road improvement program will be evaluated to determine which of the proposed improvements can be attributed to the ongoing development. Once this had been determined, an appropriate DCC funding allocation for road improvements will be established based on the estimated cost of the improvements and the estimated population growth.

1.3 Acknowledgements

MCSL expresses its appreciation to the Village of Cumberland for the cooperation they provided throughout the assignment. It is also grateful to the Comox-Strathcona Regional District for the supply of reference material.

2.0 BASE PLAN

A 1:4000 base plan was prepared based on a compilation of data received primarily from the following sources:

- MCSL Courtenay Project No. 2211- 46824-0, Trilogy Properties / Cumberland Interchange Lands, showing cadastral and utilities (sanitary sewer, storm drainage and water).
- Nadir Mapping Corporation Ref. No. 96-1871, showing roads.

In addition, information was obtained from the following sources:

- 46893 Lots (Coal Valley): Dwg file showing roads and property lines.
- Comox Parkway to Nanaimo Apr. 30, 2007: MCSL Dwg.file, used to identify minor roads in the vicinity of the Inland Island Parkway, e.g., Small Road, Grant Road, Minto Road, etc.
- Maps A, B and C from the Village of Cumberland Official Community Plan (OCP).
- Village of Cumberland:
  - Zoning – Schedule B2-1-7-17-2006.pdf
  - Storm and Sewer Map.pdf
  - Storm check map_1055PS48x36.pdf
  - Sewer check map_1055PS48x36.pdf

  - Water check map_1055PS48x36.pdf
- Comox Strathcona Regional District, I Map: Consisting of aerial photographs which were used to confirm the location of various features identified during site reconnaissance but not shown on the primary sources, e.g., BMX track.

The base plan was used to facilitate preparation of the drawings included with this Report. Frozen layers contained on the digital version of the base plan showing information, such as existing drainage, underground services and utilities will be available to prepare the larger scale detailed design drawings in the future.

3.0 PRIMARY ROAD NETWORK

3.1 Existing Conditions

The existing primary road network is shown on *Drawing No. 21208-4-01*, included with this report. Access to the village is provided by two arterial routes, described as follows:

- Access from the Courtenay / Comox area and the Inland Island Highway is provided by the Comox Valley Parkway and Cumberland Road.
- Access from the Royston area is provided by Royston Road and lower Dunsmuir Ave.

Once traffic has entered the village by either of these routes, there is a lack of a clearly defined road network to indicate which routes should be followed in order to access the village centre, Comox Lake and other facilities. However, the majority of traffic traveling to and from Cumberland Road tends to use either 4th Street or Union Road in order to access the village centre.

3.2 Proposed Network

The recommended Primary Road Network is shown on *Drawing No. 21208-4-02*. No change is envisaged to the arterial routes described in *Section 3.1, Existing Conditions.* However, the addition of several major new development projects, most notably Trilogy Properties, Coal Valley Development and Slegg Lumber, will have a significant impact on traffic movements and create the need for a network of collector roads. These are described as follows:

- Union Road is expected to become a major collector road and will be used increasingly by traffic traveling to/from the Trilogy development and the Cumberland Road arterial. Access from Trilogy to the village centre will typically be along Royston Road and the lower end of Dunsmuir Avenue.

- In the Coal Valley development, Kendal Road has been identified as a collector road feeding Cumberland Road arterial.

- Egremont Road has been selected as a collector road providing access to and from the Coal Valley development and the village centre.

- Ulverston Ave., Bruce St. and 7th St. have all been identified as local collector roads providing access between Ulverston Station, Conniston Junction and other subdivisions and the two arterial routes.

- Comox Lake Road and Bevan Road have also been included in the Primary Road Network because of their importance in providing access to a prime recreational area and the local landfill, respectively.

Drawing No. 21208-4-02 also shows a future north – south collector, which will typically follow the existing Small Road alignment and connect Comox Valley Parkway with Royston Road. The drawing also shows a conceptual layout for a future collector which would link Coal Valley Phase 5 and 6 to Bevan Road.

4.0 CONDITION SURVEY

A condition survey was carried out in order to evaluate the condition of the primary road network. The survey included a visual condition survey and a subsurface investigation.

The survey represents only a broad assessment of conditions. A more detailed asphalt condition survey and geotechnical assessment with engineering interpretation will be required in order to facilitate the detailed design of those sections selected for improvement. This work will be scheduled for a future date, at which time consideration could be given to subdividing some of the sections into shorter lengths.

The results of the condition survey were subsequently evaluated together with the improvements recommended to accommodate traffic growth *(ref. Section 6)* and the geometric improvements required to improve safety *(ref. Section 7),* in order to establish an overall road improvement program.

4.1 Visual Condition Survey

A visual inspection was made of all roads included in the primary network in order to assess the physical characteristics and visual condition of the pavement. Photographs which illustrate existing conditions are included in *Appendix A, Photo Inventory* and the location of each photo is shown on *Drawing No. 21208-4-03*.

For ease of reference, the Primary Road Network was divided into 20 sections, typically with a similar length. The sections are shown on *Drawing No. 21208-4-04* and were selected on the assumption that conditions throughout the length of each section would

be relatively consistent. Sections 3, 19 and 20 were subsequently found to have varying conditions along their length and were subdivided.

In a full scale condition survey, the measurement of pavement characteristics and evaluation of data has the following prime objectives:

- To check if the intended function and expected performance are being achieved
- To provide information on planning rehabilitation of the existing pavement
- To provide information for improving technology of design, construction and maintenance.

The evaluation can typically include the following:

- Structural capacity
- Physical deterioration or distress
- User related factors such as rider comfort, safety and appearance
- User related costs and benefits associated with varying serviability and rehabilitation methods

However, for the limited evaluation carried out as part of this study, the condition survey was limited to physical deterioration and distress, safety and appearance and consisted of two parts:

- Visual survey
- Subsurface investigation

The survey represents the first step towards formalizing a road improvement program for the Village of Cumberland and records the type of distress, together with its extent, severity and location, and the drainage conditions. Results for each section were recorded and overall ratings determined for both the pavement and drainage condition. Pavement was rated on a scale of A to F, where A was excellent and F is failure. Drainage was rated on a scale of 1 to 3, with 1 being good and 3 being poor. Using these ratings as a basis, a recommended action was determined ranging from A, consisting of basic routine maintenance, to F, involving complete reconstruction of the affected section. In addition, each improvement was prioritized in order of importance and assigned a year for completion, as shown on the Roads Master Plan *(ref. Section 8)*.

The results are summarized on *Table 4.1: Results of Visual Condition Survey* and Visual Condition Survey Forms, completed in the field for each section, are included in *Appendix B, Visual Condition Survey*.

Table 4.1: Results of Visual Condition Survey

Section	Road	From	To	Pavement Condition *	Drainage Condition **
1	Dunsmuir	Egremont	2nd. St	E	1
2	Dunsmuir	2nd.St	4th.St	C	1
3a	Dunsmuir	4th.St	7th.St	B	1
3b	Dunsmuir	4th.St	7th.St	D	2
4	Dunsmuir	7th.St	Ulverston	B	3
5	4th.St	Dunsmuir	Windemere	C	1
6	4th.St	Windemere	Cumberland	C	2
7	Cumberland	4th.St	Hope St.	B	3
8	Cumberland	Hope St.	Union	E	3
9	Cumberland	Union	Small	A	1
10	Ulverston	7th.St	Chicane	A	1
11	Ulverston	Chicane	Dunsmuir	N/A	1
12	7th.St	Ulverston	Dunsmuir	D	3
13	Egremont	Dunsmuir	Ulverston	E	3
14	Egremont	Ulverston	Coal Valley	A	1
15	Bruce St.	Ulverston	Hope St.	A	1
16	Bruce St.	Hope St.	Cumberland	C	2
17	Comox Lake	Dunsmuir	Comox Lake	C	2
18	Bevan	Cumberland	Landfill	C	3
19a	Union	Dunsmuir	Cumberland	B	2
19b	Union	Dunsmuir	Cumberland	A	1
20a	Royston			C	2
20b	Royston	Union	Small	A	1

*Denotes rating A to F, where
A = Excellent
B = Good
C = Fair
D = Poor
E = Very poor
F = Failure

**Denotes rating 1 to 3, where
1 = Good
2 = Fair
3 = Poor

4.2 Subsurface conditions

The purpose of the subsurface investigation was to obtain a summary of asphalt thickness and the thickness and nature of the existing road structure and upper subgrade, at select locations.

Twenty-five (25) test holes were selected at the locations shown on *Drawing 21208-4-03*. Test Hole 13 was subsequently deemed unnecessary and deleted as it was found to be located in an area of relatively new construction. Asphalt cores were taken at all other locations and auger drilling was carried out at 8 locations. Auguring scheduled for Test Hole Nos. 8 and12 could not be advanced due to construction activities and traffic lane closure.

- Field work was carried out by Levelton Engineering Ltd. (Levelton) and their report is included in *Appendix C, Levelton Report dated July 4, 2007.* The results are summarized in *Table 4.2: Summary of Subsurface Investigation*. In Table 4.2, the original rating system used by Levelton has been revised, so that 1 denotes "good" and 3 denotes "poor," in order to be consistent with the convention adopted elsewhere in this report.

Table 4.2: Summary of Subsurface Investigation

Section	Test Hole Location	Asphalt		Subgrade	
		Rating	Revised Rating	Rating	Revised Rating
1	1	1	3	2	2
	2	2	2		
2	3	2	2	2	2
3a	4	2	2		
4	5	2.5	1.5	1	3
	6	2	2		
5	7	2	2	2	2
6	8	2.75	1.25		
7	9	2.75	1.25		
	10	2	2	2	2
8	11	2.75	1.25		
	12	2	2		
9	13	N/A	N/A		
12	14	2	2	1	3
16	15	2	2		
13	16	1	3		
14	17	2.75	1.25		
17	18	2	2		
	19	2.75	1.25		
18	20	2	1.25		
	21	2	1.25		
	22	1.5	2.5		
19a	23	2	2	2	2
19b	24	2.75	1.25		
20a	25	2.75	1.25		

Key points are as follows:

- There are more asphalt lifts in Sections 4 and 8, suggesting overlays have been necessary due to poor subsurface conditions.
- Poor subgrade conditions prevail in Section 8.

5.0 IMPROVEMENTS DUE TO ROAD CONDITIONS

The results of the visual condition survey and subsurface condition survey, shown on Tables 4.1 and 4.2, were evaluated together and where necessary, the original recommendations shown on the Visual Condition Survey Form were modified to take the results of the subsurface investigation into account. The combined results and recommendations for improvements, are shown on Table 5.1: Summary of Condition Survey. Those sections requiring more than routine maintenance have been highlighted.

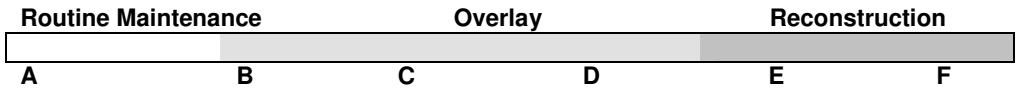
In addition to the improvements recommended for the Primary Road Network, the Ulverston Road / Mill Street intersection has been identified by Cumberland staff as a dangerous intersection, which could be improved by eliminating the acute intersection angle and making it a 90° intersection

.

Section	Photos	Visual Condition									Subsurface Condition						Recommendation
		Pavement*						Drainage**			Asphalt**			Subgrade**			
		A	B	C	D	E	F	1	2	3	1	2	3	1	2	3	
1	1,2					X		X				X	X		X		F
2	3,4,5,			X				X				X			X		C
3a	-		X					X			-	-	-	-	-	-	A
3b	6,7,8				X				X			X					D
4	9,10		X							X		X				X	D
5	11,12,13			X				X				X			X		B
6	14,17			X					X		X						B
7	16		X							X	X	X			X		A
8	18,19,19a					X				X	X	X					F
9	20	X						X									A
10	21	X						X			-	-	-	-	-	-	A
11	22,22a										-	-	-	-	-	-	A Under construction
12	24,25				X					X		X				X	E
13	29,30,31					X				X			X				F
14	32	X						X			X					X	A
15	26	X						X			-	-	-	-	-	-	A
16	27,28			X					X			X					B
17	34,35			X					X		X	X					C generally; !0% E
18	36,37			X						X		XX	X				B generally; 10% E
19a	38		X						X		X	X			X		B generally; 10%E
19b	39	X						X			-	-	-	-	-	-	A
20a	-			X					X		X						D
20b	40,41	X						X			-	-	-	-	-	-	A

Table 5.1: Summary of Condition Survey

* Denotes rating: (A) = Excellent, (F) =Failure
** Denotes rating: (1) = Good, (2) = Fair, (3) = Poor
*** Not advanced beyond asphalt layer



Routine maintenance consists of sealing and patching

6.0 TRAFFIC RELATED IMPROVEMENTS

The potential impact on village roads resulting from traffic generated by the Trilogy development is described in the Cumberland Interchange Lands – Transportation Planning Study prepared by Bunt & Associates. This report indicates:

- Union Road will attract significantly more traffic as part of the extended street network when Trilogy lands are full developed. Specifically, it will remain a two lane collector but will require improvements to the intersections at both end points in order to increase capacity.
- West of Union Road, Cumberland Road will remain a two lane arterial road.
- Royston Road and Dunsmuir Avenue will remain as two lane arterial roads.
- A new partial interchange on Highway 19 is proposed at Royston Road.

If built, the partial interchange at Royston Road will generate increased traffic on Royston Road and lower Dunsmuir Avenue.

The most significant changes in traffic resulting from the proposed residential and commercial development are shown on *Table 6.1: Forecast Traffic Growth Due To Trilogy Development,* which shows the existing and future Annual Average Daily Traffic (AADT) volumes for those road segments which are most affected. *(Note: AADT is the total volume of vehicle traffic in both directions of a road for a year, divided by 365 days).* Future ADT volumes are generated by the Trilogy development and background traffic and represent the estimated volumes in year 2025. Table 6.1 also provides an estimate of truck traffic growth on Cumberland Road and Dunsmuir Avenue.

Table 6.1: Forecast Traffic Growth Due To Trilogy Development

Section	Road	From	To	AADT (vpd)		Trucks (% increase)
				2005	2025	
1	Dunsmuir	Egremont	2nd St	1200	6000	
2	Dunsmuir	2nd St	4th.St	1200	6000	
3a	Dunsmuir	4th.St	7th St	1200	6000	
3b	Dunsmuir	4th.St	7th.St	1200	6000	
4	Dunsmuir	7th.St	Ulverston	1200	8000	10
5	4th.St	Dunsmuir	Windemere	N/A		
6	4th.St	Windemere	Cumberland	N/A		
7	Cumberland	4th.St	Hope St.	5400	11200	15
8	Cumberland	Hope St.	Union	5400	11200	
9	Cumberland	Union	Small	5400	11200	
10	Ulverston	7th.St	Chicane	N/A		
11	Ulverston	Chicane	Dunsmuir	N/A		
12	7th.St	Ulverston	Dunsmuir	N/A		
13	Egremont	Dunsmuir	Ulverston	N/A		
14	Egremont	Ulverston	Coal Valley	N/A		
15	Bruce St.	Ulverston	Hope St.	N/A		

Section	Road	From	To	AADT (vpd)		Trucks (% increase)
				2005	2025	
16	Bruce St.	Hope St.	Cumberland	N/A		
17	Comox Lake	Dunsmuir	Comox Lake	N/A		
18	Bevan	Cumberland	Landfill	N/A		
19a	Union	Dunsmuir	Cumberland	1100	5400	15
19b	Union	Dunsmuir	Cumberland	1100	5400	15
20a	Royston			1200	5000	15
20b	Royston	Union	Small	1200	5000	15

A traffic study illustrating the potential impact of the Coal Valley Development on the Primary Road Network was not available at the time of this study.

7.0 GEOMETRIC IMPROVEMENTS

7.1 Cross Sections

Based on discussion with Village staff, it is our understanding that Council encourages the use of the following typical road cross sections, wherever possible:

- Type I - Main Street
- Type II - Main Access
- Type III - Country Road

As a result of further discussion with staff, Type II – Main Access cross section was modified locally for a short section of Dunsmuir Avenue from 7th Street to the end of the park, close to the BMX track, and on either side of 4th Street / Cumberland Road intersection.

The typical cross sections are shown on *Figures 7.1 to 7.4, Typical Cross Sections* and, in conjunction with staff, one was assigned to each section of the Primary Road Network, as illustrated on *Drawing 21208-4-02, Proposed Primary Road Network*.

It is anticipated that as improvements are implemented, the roads will be developed in general conformance with the proposed cross sections. Nevertheless, these should be revisited during the detailed design stage, and refined, where appropriate, to allow for features, such as:

- Additional commuter bike lanes.
- Substitution of swales for curb, gutter and sidewalk in areas where the road gradient exceeds 4%.

7.2 Intersections

Intersections on the proposed Primary Road Network will require improvement in order to:

- Improve capacity of the intersection.
- Improve safety.
- Provide better definition of the road network.

In general, it is recommended that roundabouts are constructed at strategic locations in order to make these improvements. Typically, roundabouts are less intrusive than signalized intersections, will keep traffic flowing better than "T" intersections for the forecast traffic volumes in Cumberland, and can be landscaped in a manner consistent with the environmentally friendly typical cross sections.

4th Street / Cumberland Road: Many accidents have occurred at this intersection and improvements are required to improve safety. The following options were considered:

- Option 1 – Roundabout
- Option 2 – Signalized "T" Intersections.

These are shown on *Figures 7.5 and 7.6,* respectively. In the case of Option 1, Ulverston Road is closed off so that the roundabout only includes roads which are part of the Primary Road Network. Provision can be made for the closed off portion to be utilized by emergency vehicles and snow removal equipment.

Option 1 is the preferred approach and has been used for the purposes of costing in this report. It is consistent with other intersection improvements proposed for the Village and makes a clear visual statement that one has left a rural environment and arrived in the Village of Cumberland. Since the intersection is located on the main entrance to Cumberland, this improvement should be given the highest priority.

Dunsmuir Avenue: Roundabouts are for both ends of the downtown section of Dunsmuir Avenue as shown on *Figures 7.7 and 7.8* and will lend definition to the primary road network in the downtown core.

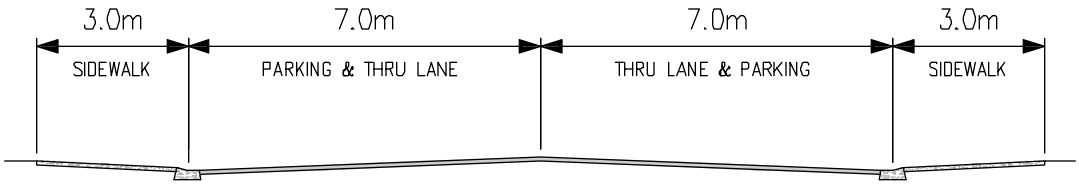
The node formed by the roundabout proposed at west end of Dunsmuir Avenue will help define Egremont Road as a collector road *(ref. Section 7.3)*, and, with appropriate signage, provide better direction to the recreational area of Comox Lake *(ref. Section 7.3)*. Improvements at this intersection are considered a high priority. Both roundabouts should incorporate traffic signs which provide clear directions into and out of the village via the primary routes.

Union Road: Roundabouts are proposed at either end of Union Road as shown on *Figures 7.9 and 7.10*. They will provide increased capacity at the intersection and provide better definition between the rural and urban areas. A signalized intersection is shown as another option for the intersection of Union Road with Cumberland Road, on

Figure 7.11 and could be a preferred option if traffic growth is significantly more than currently projected and threatened to exceed the capacity of a roundabout.

7.3 Defining Roads in the Primary Road Network

In some instances, geometric improvements are warranted in order to identify the roads as part of the primary road network. In particular, Egremont Road and 7th Street should be developed to their ultimate cross section as soon as possible in order to encourage their use as local collector roads and relieve traffic from other roads.



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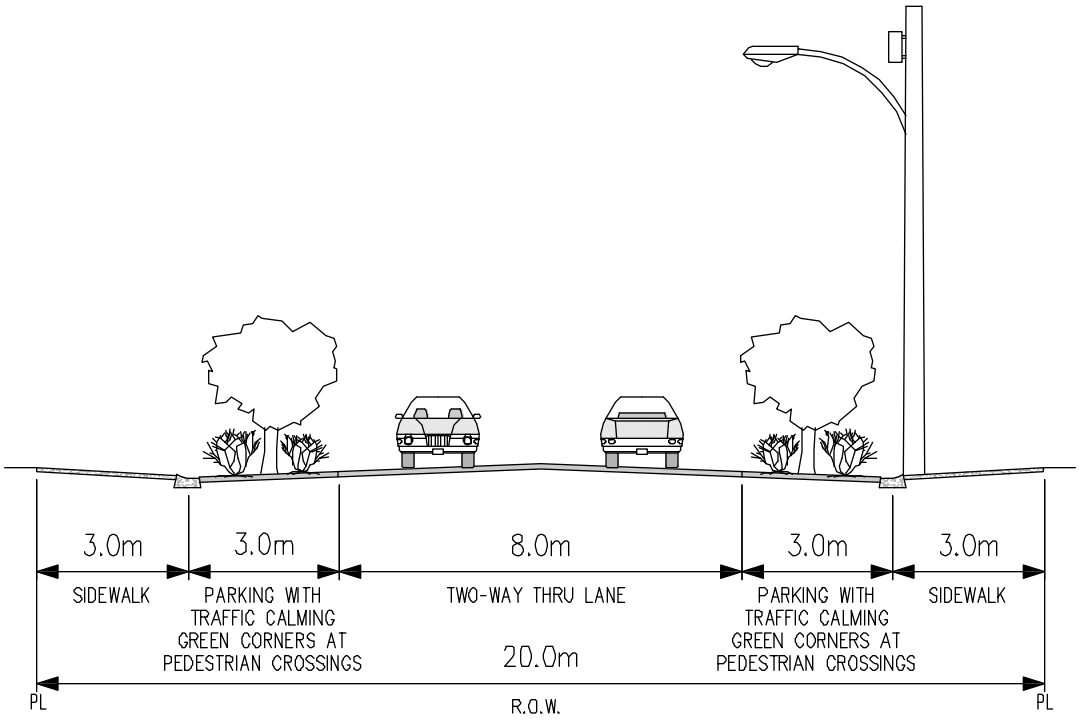
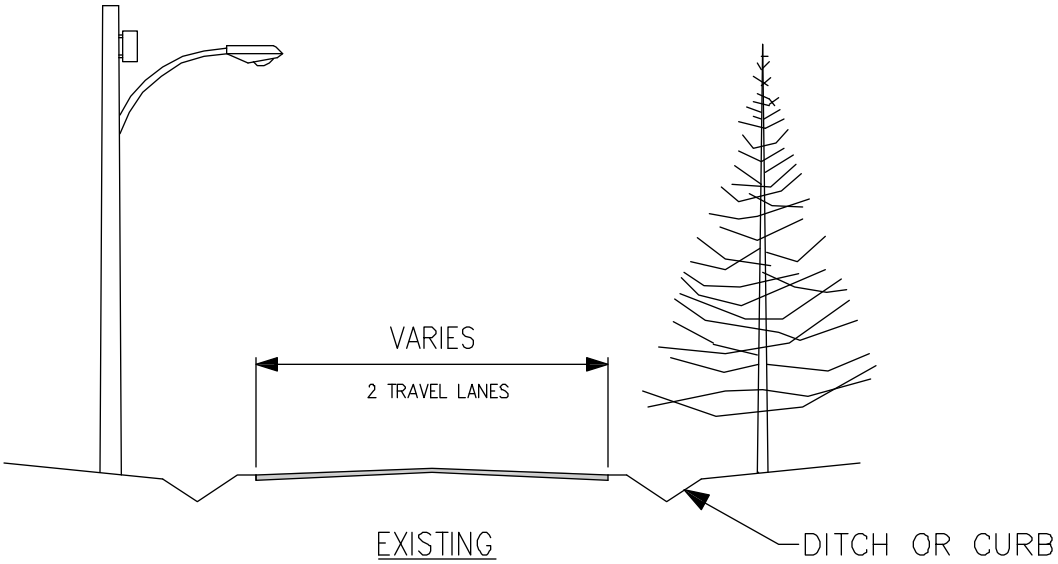


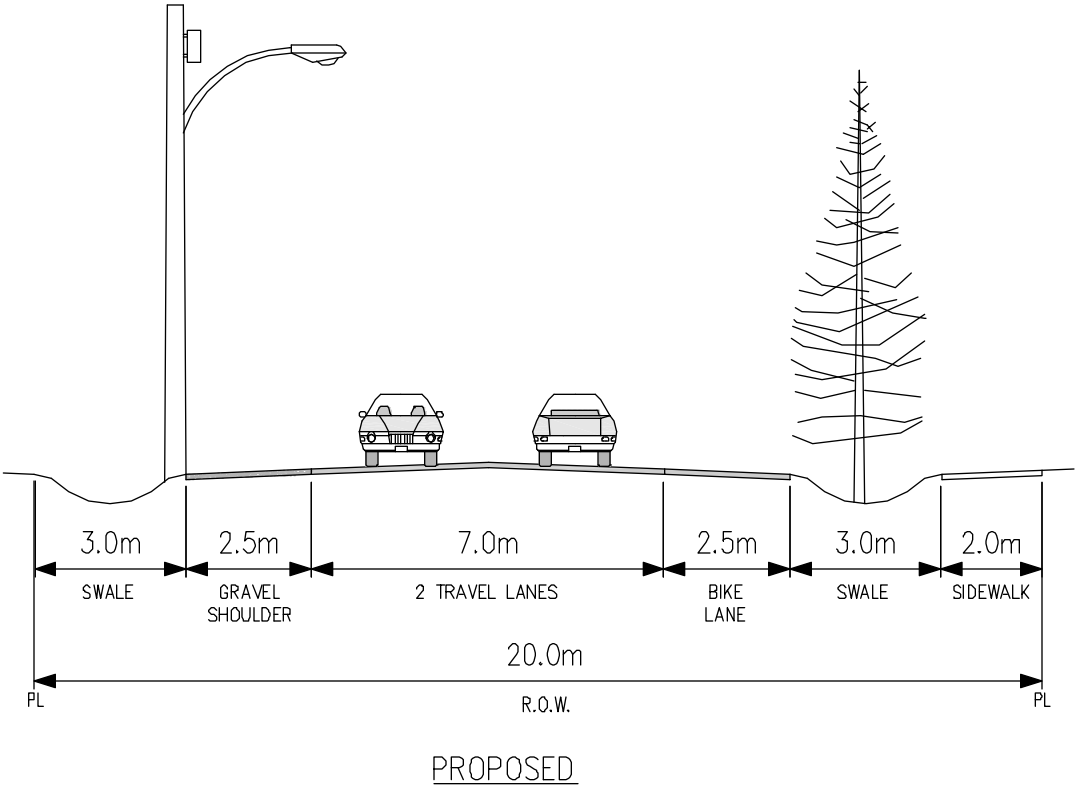
PROPOSED

Applies to the following roads:

- Dunsmuir Avenue from Egremont Road to 7th Street
- 4th Street from Dunsmuir Avenue to Windemere Avenue

Figure 7.1 - Typical Cross Section: Type I - Main Street

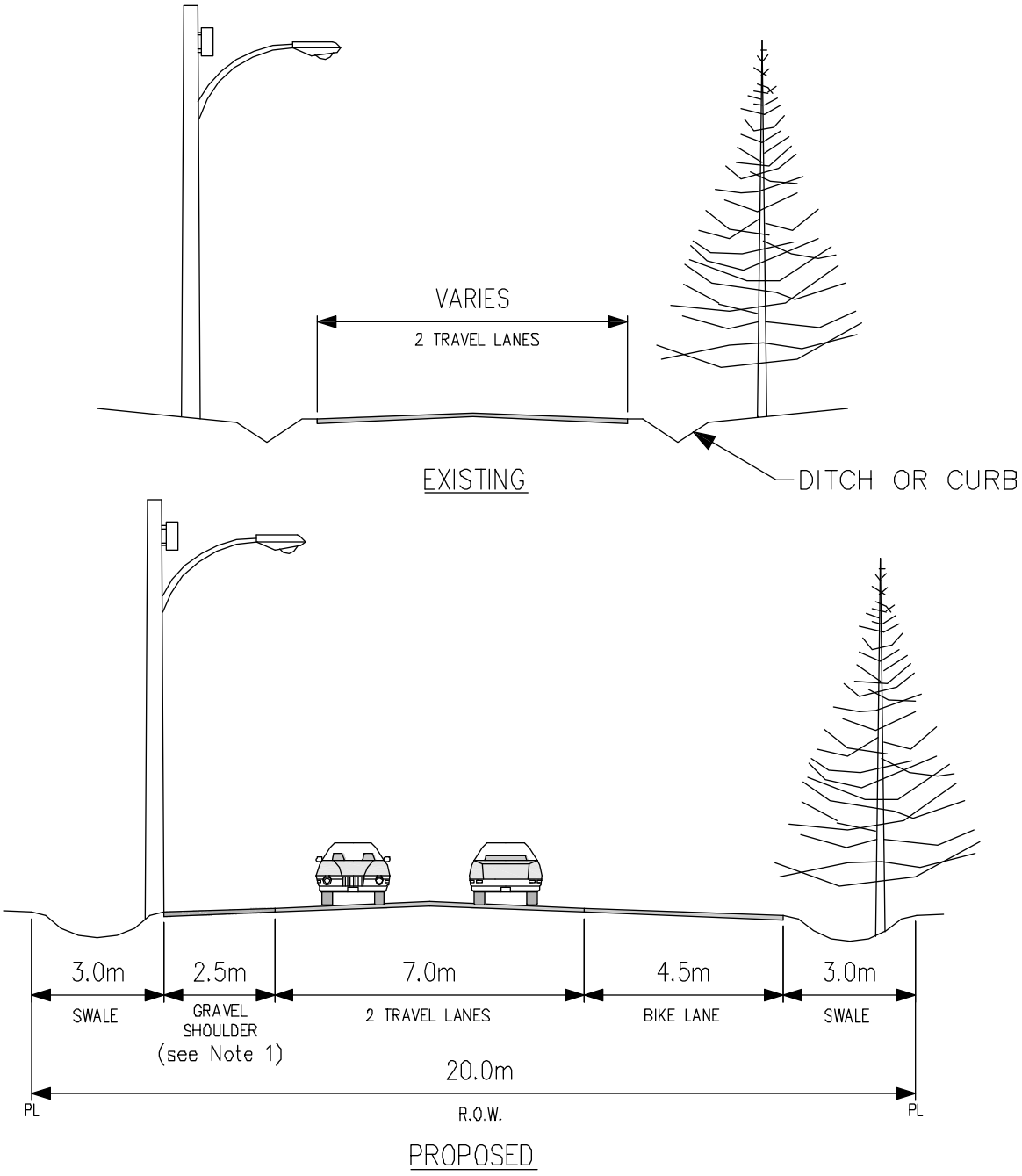




Applies to the following roads:

- 4th Street from Windemere Avenue to Cumberland Road
- Dunsmuir Avenue from 7th Street to the end of the park (BMX track)
- Cumberland Road from 4th Street to Bruce Street

Figure 7.2 - Typical Cross Section: Type IIa - Main Access Road



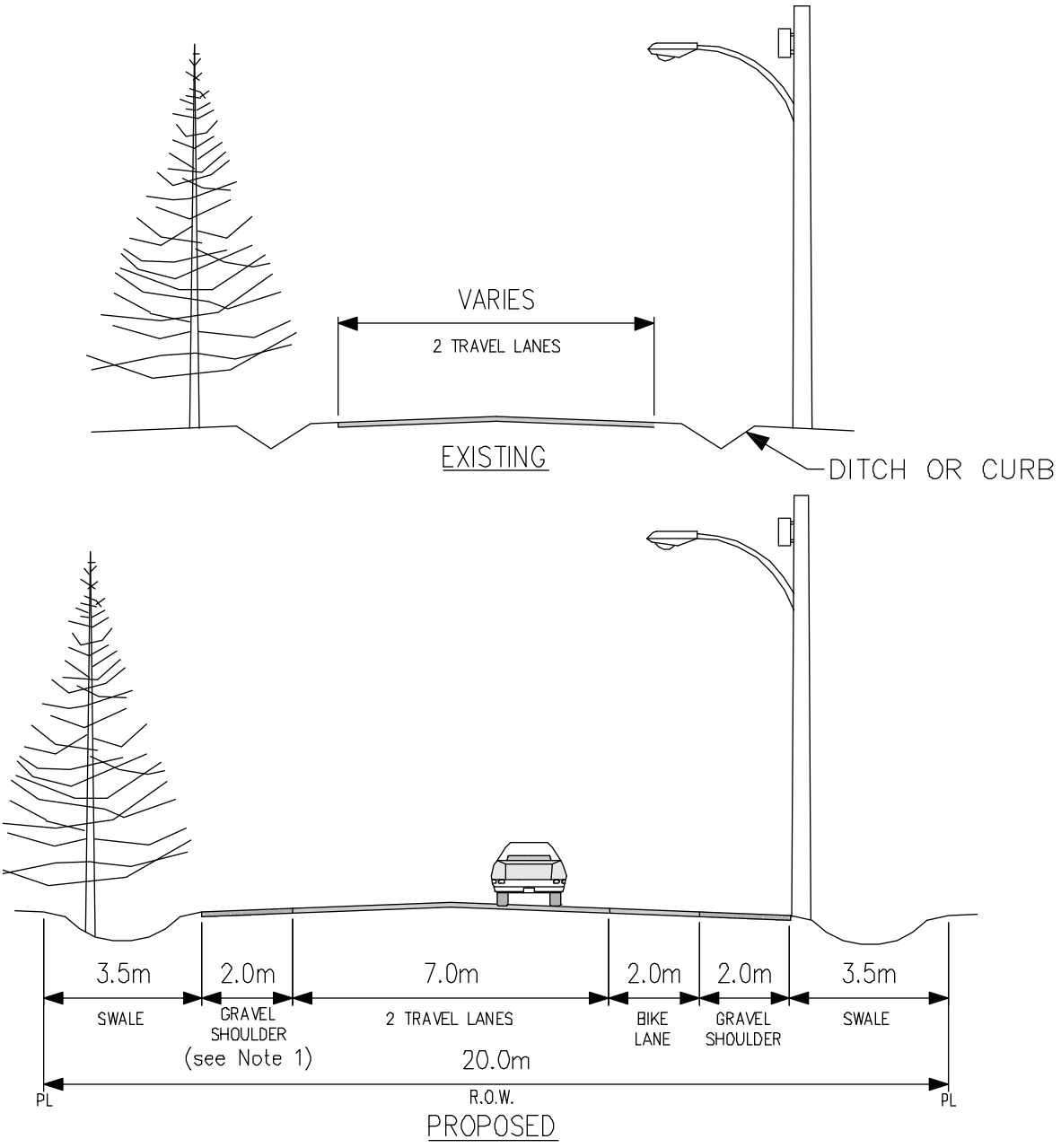
Applies to the following roads:

- Egremont Road (see Note 2)
- Dunsmuir Avenue from the end of the park (BMX track) to Ulverston Road
- Royston Road from Ulverston Road to Union Road

Notes:

1. Pave gravel shoulder to create additional commuter bike lane, as required.
2. Substitute with curb and gutter plus sidewalks where grade exceeds 4%.

Figure 7.3 - Typical Cross Section: Type IIb - Main Access Road



Applies to the following roads:

- Bevan Road from Cumberland Road to landfill (See Note 2)
- Royston Road from Union Road to Small Road
- Union Road
- Cumberland Road from Bruce Street to Union Road
- Bruce Street from Mill Street to Cumberland Road (See Note 3)
- Ulverston Road from 7th Street to the chicane (See Note 3)
- 7th Street from Dunsmuir Avenue to Ulverston Road (See Note 3)

Notes:

1. Pave gravel shoulder to create additional commuter bike lane, as required.
2. Pave gravel shoulder to create additional bikelane in urban area.
3. Could use a 9m pavement with curb and gutter, if bike lane is not required.

Figure 7.4 - Typical Cross Section: Type III - Country Road

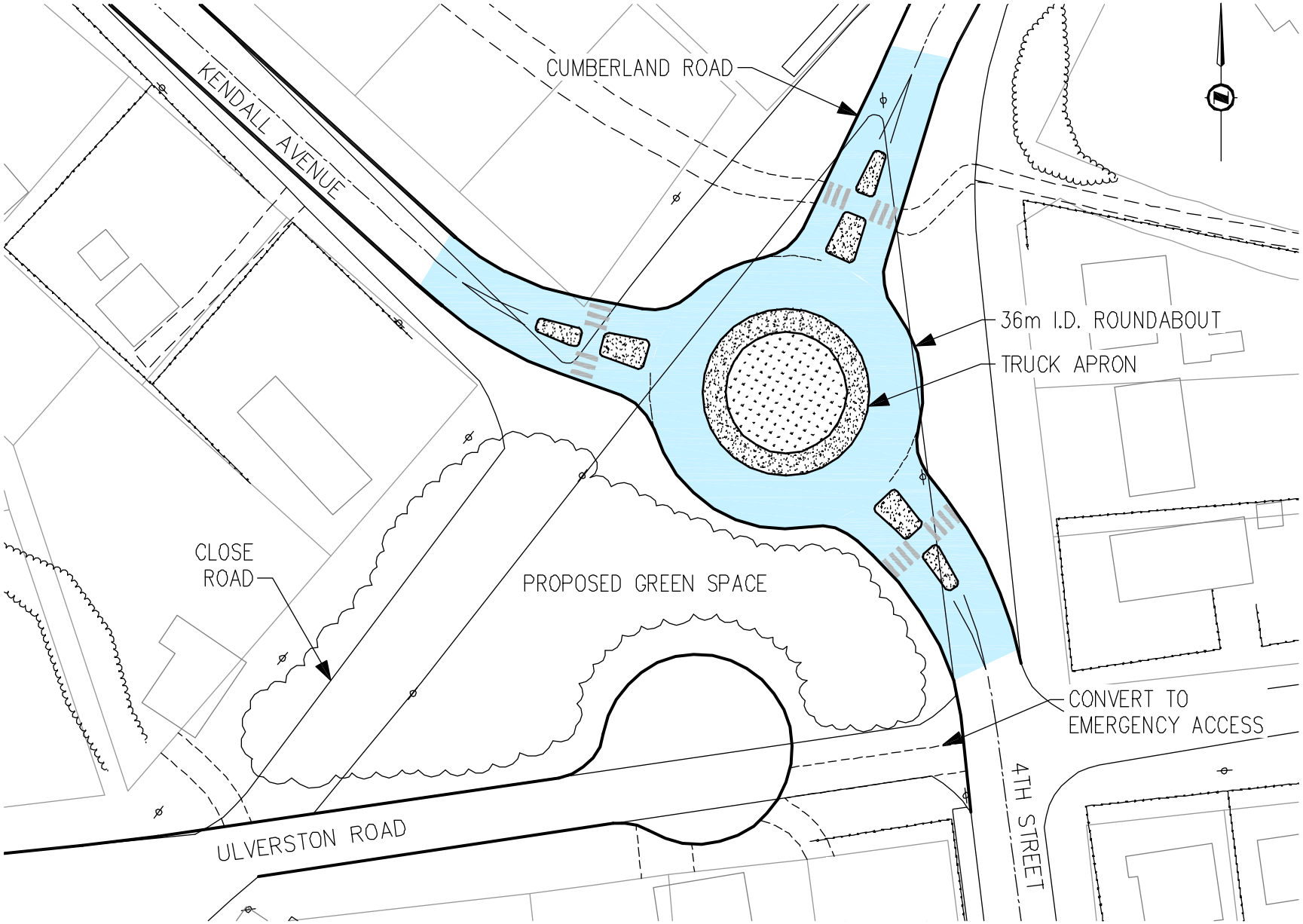


Figure 7.5 - Proposed Road Improvements
Cumberland Road / 4th Street Intersection, Option 1

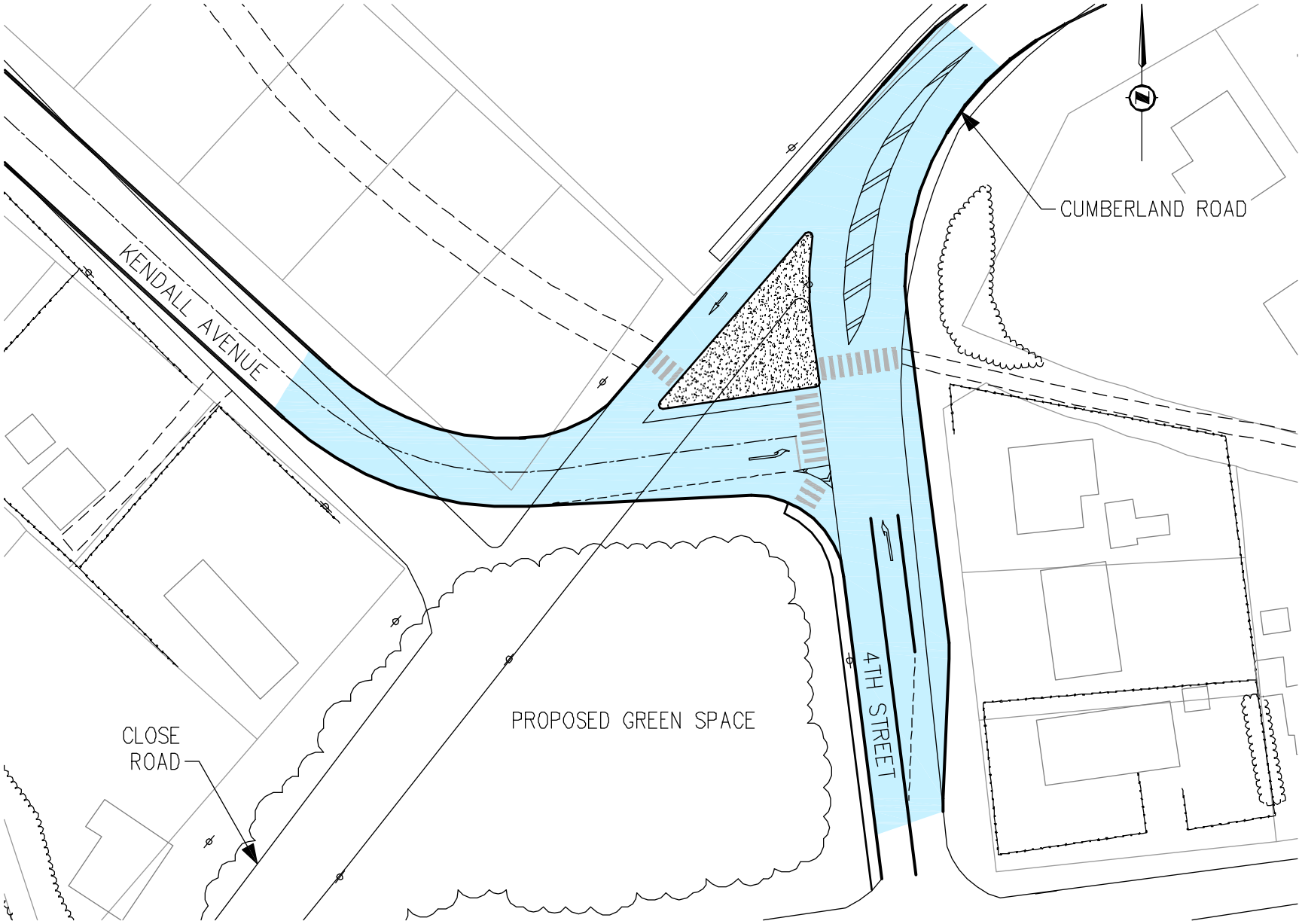


Figure 7.6 - Proposed Road Improvements
Cumberland Road / 4th Street Intersection, Option 2

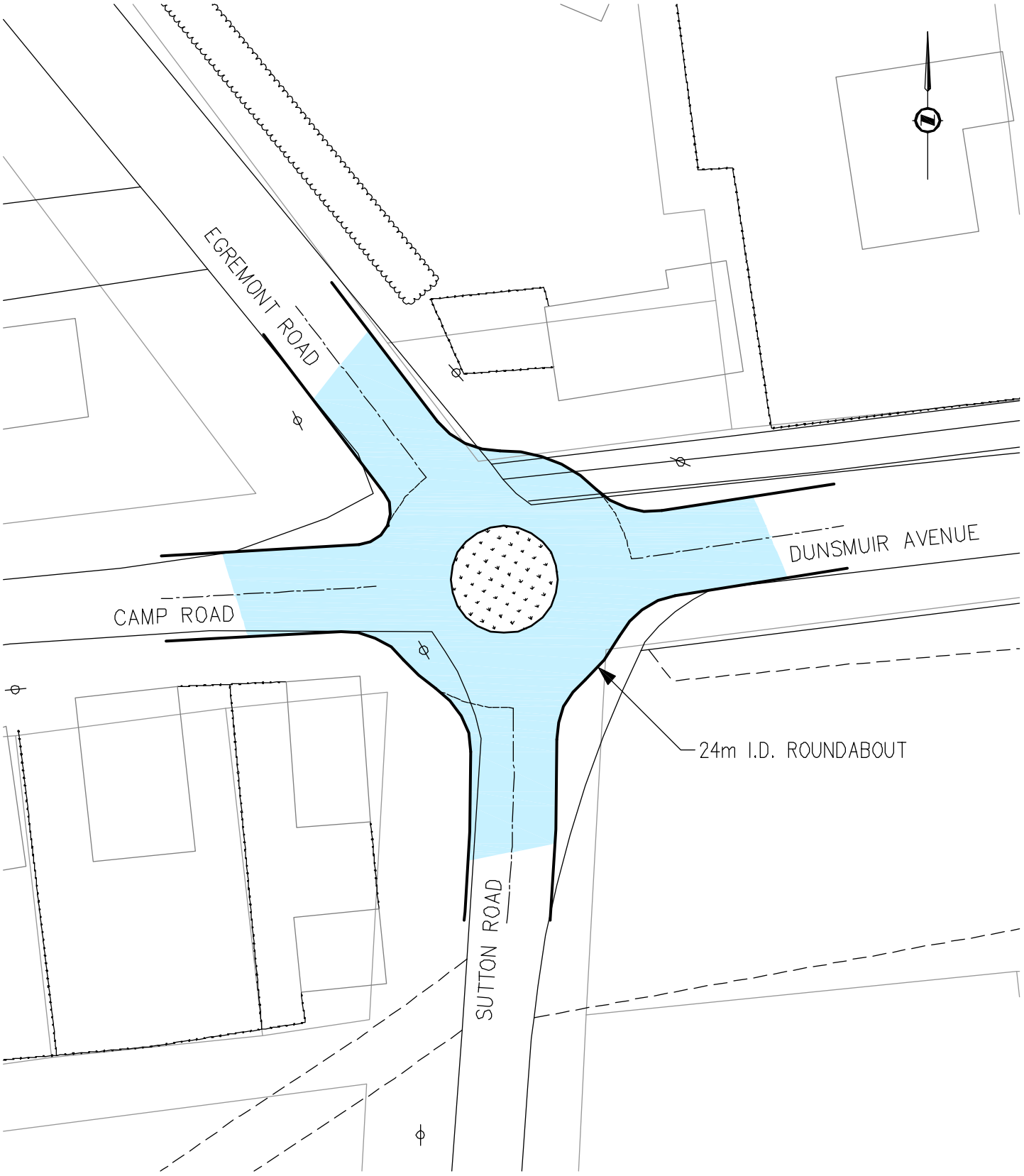
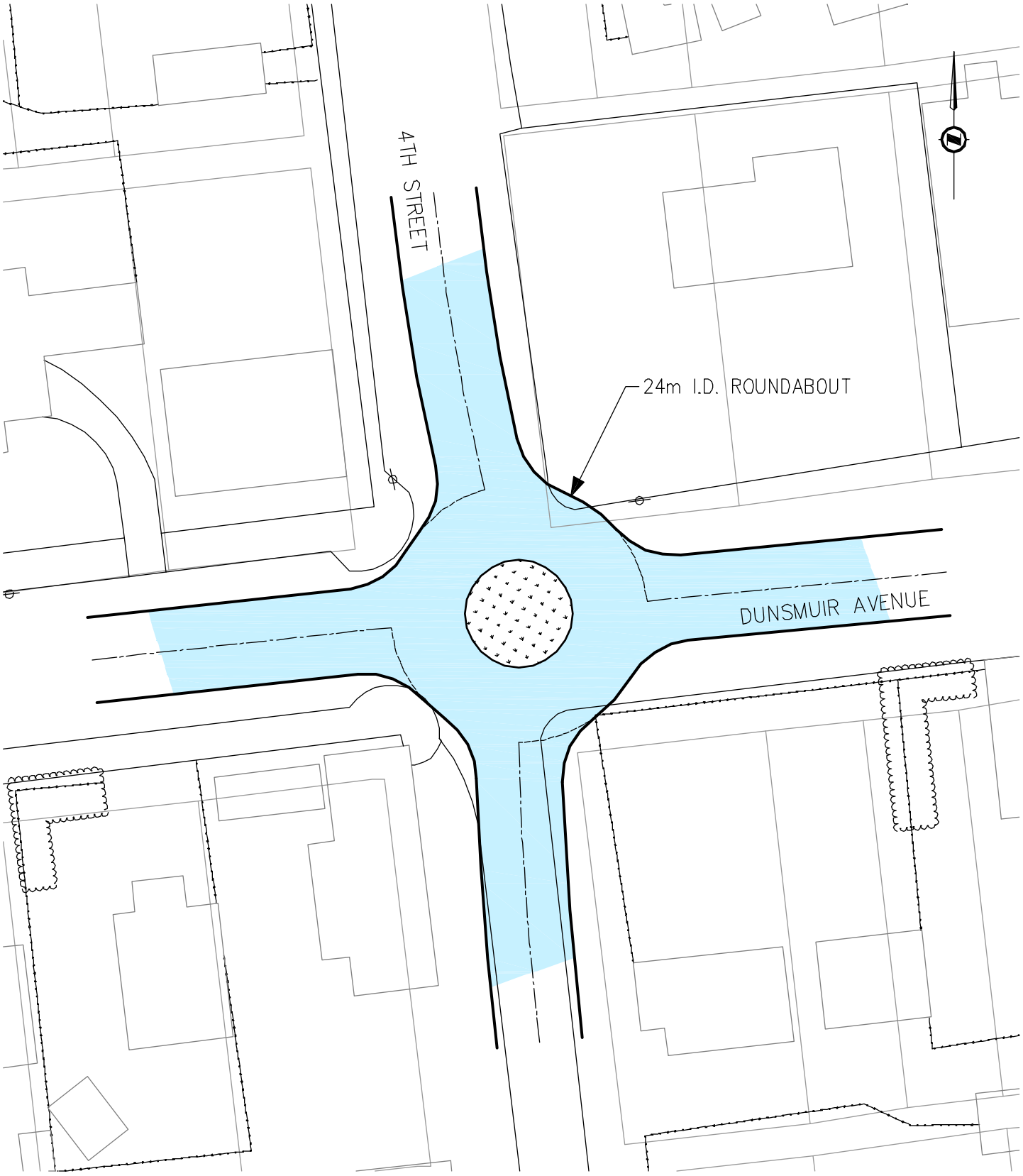
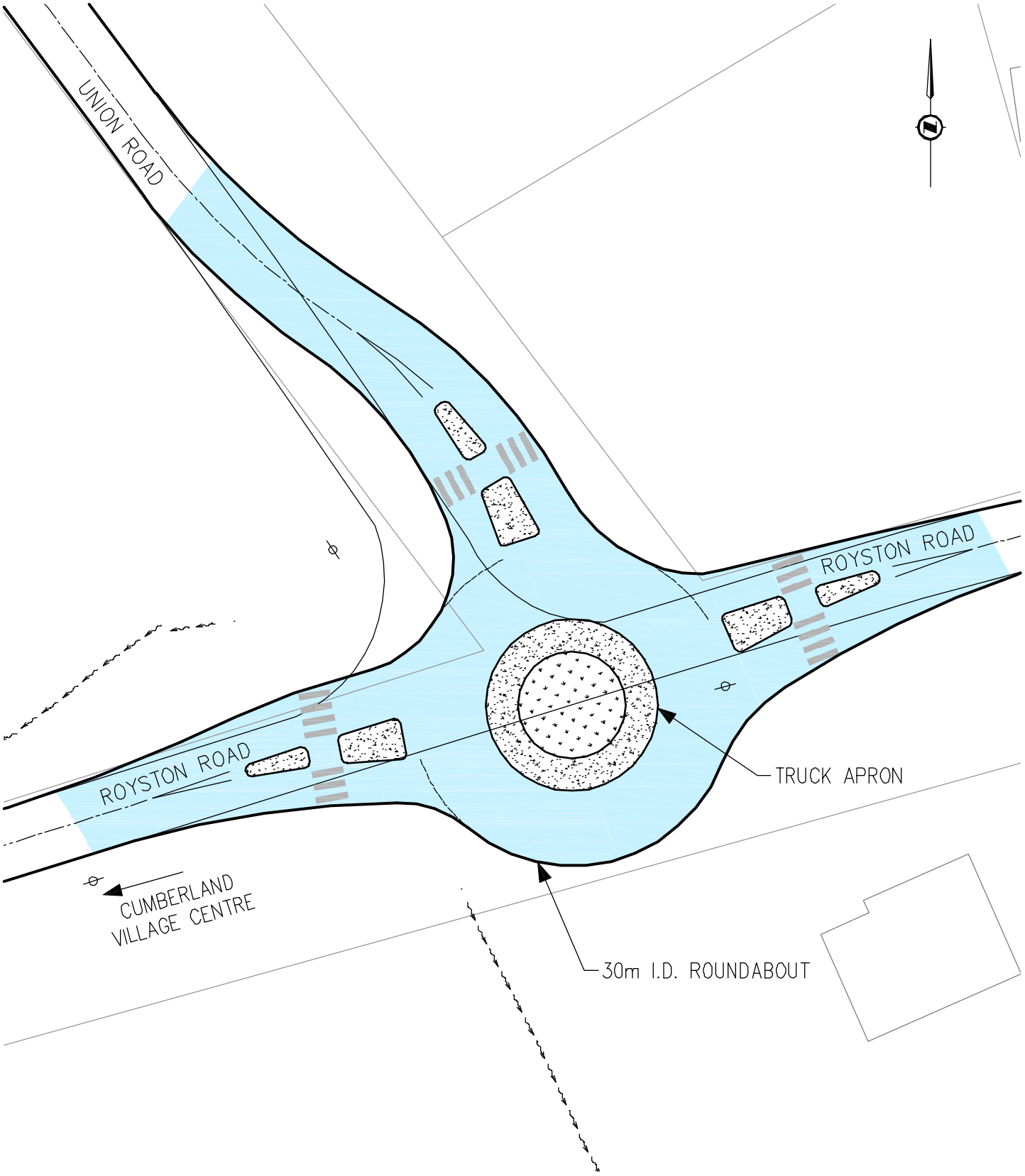


Figure 7.7 - Proposed Road Improvements
Dunsmuir Avenue / Egremont Road Intersection



SCALE : 1:500
0 5 10 15 20 m
(ALL DIMENSIONS ARE IN METRES)

Figure 7.8 - Proposed Road Improvements
Dunsmuir Avenue / 4th Street Intersection



SCALE : 1:500
0 5 10 15 20 m
(ALL DIMENSIONS ARE IN METRES)

Figure 7.9 - Proposed Road Improvements
Dunsmuir Avenue / Union Road Intersection

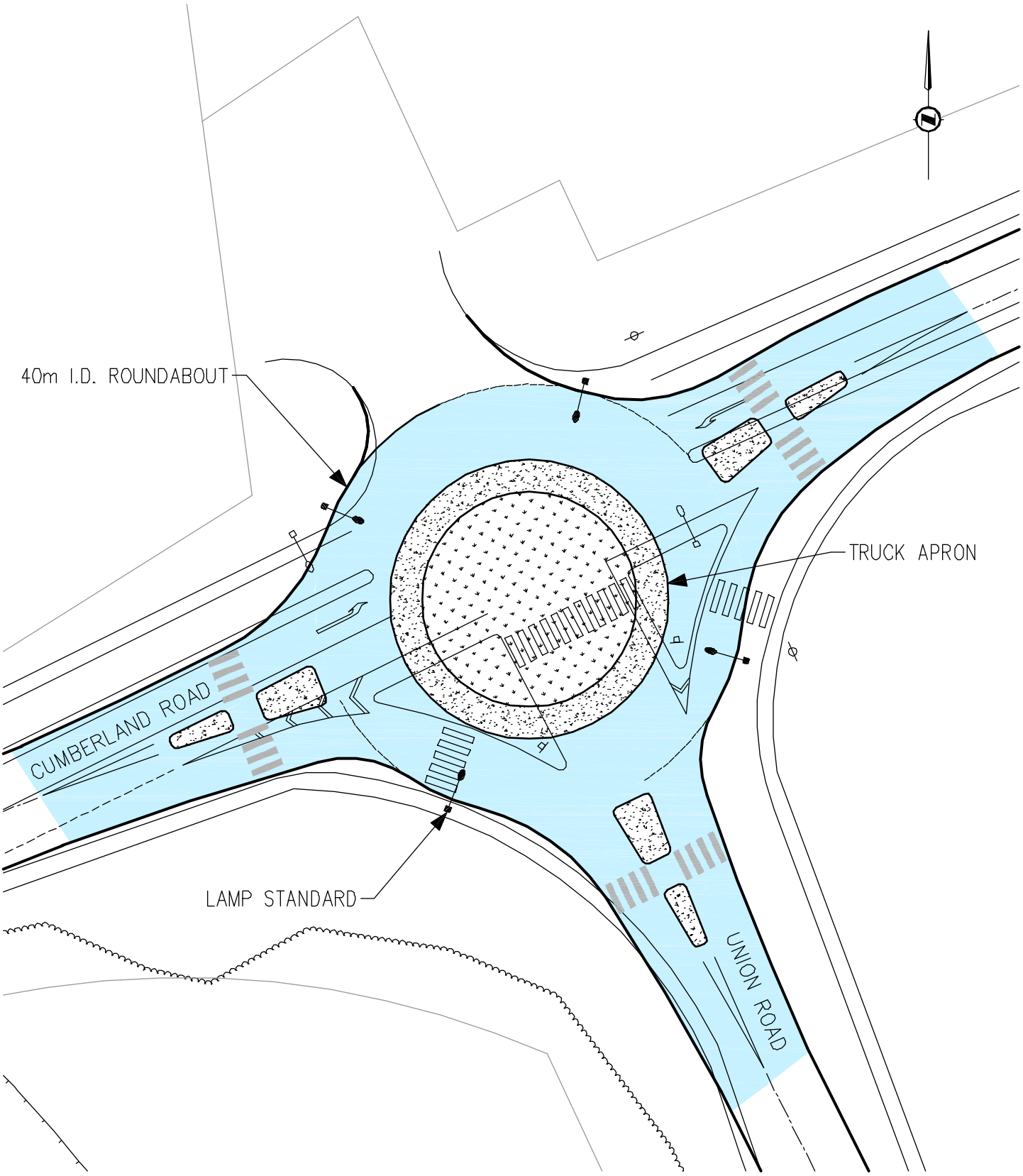


Figure 7.10 - Proposed Road Improvements
Cumberland Road / Union Road Intersection - Option 1

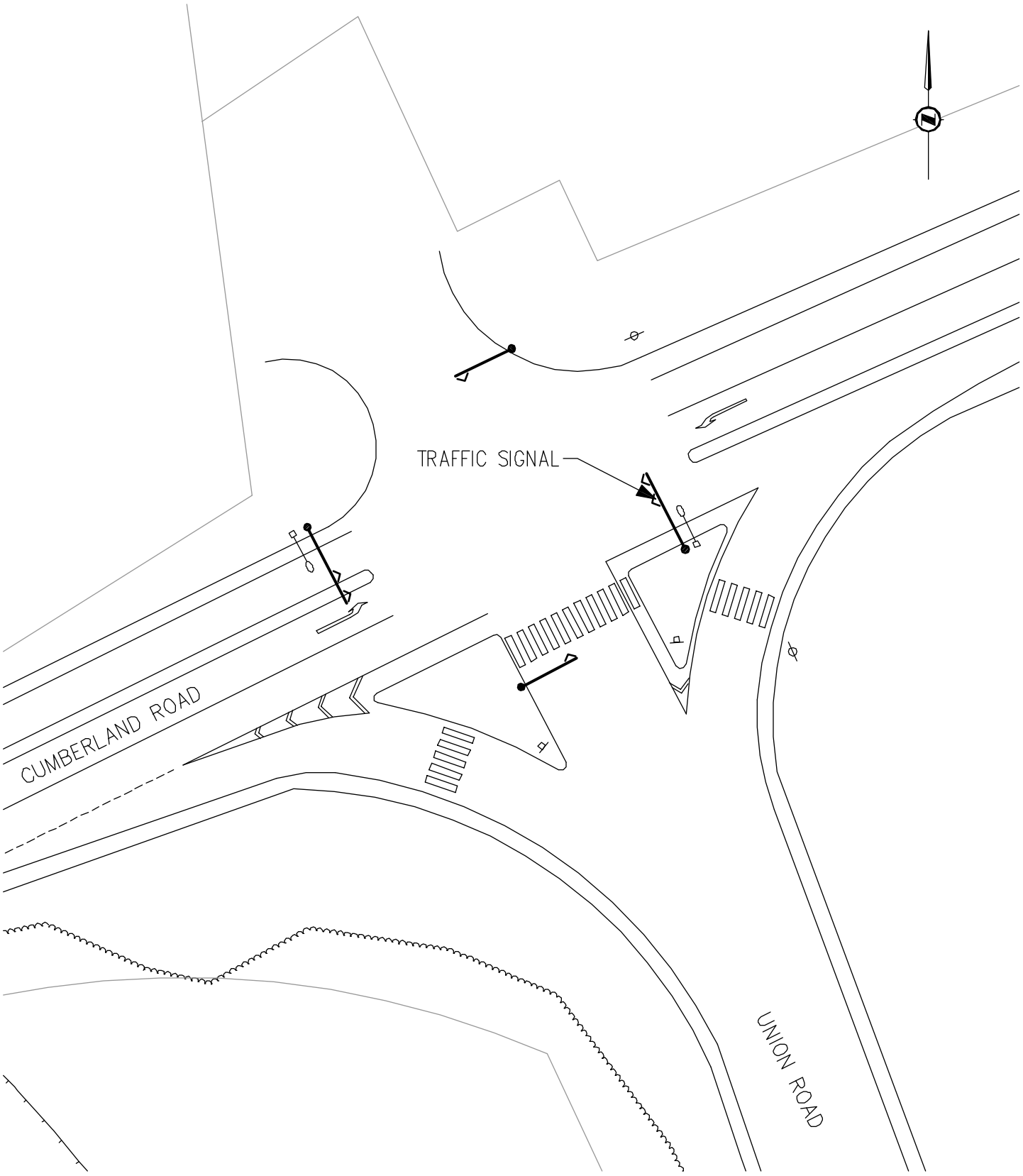


Figure 7.11 - Proposed Road Improvements
Cumberland Road / Union Road Intersection - Option 2

8.0 ROADS MASTER PLAN

8.1 Capital Cost Estimates

The estimated capital costs for engineering and construction of the proposed improvements to each section of road in the Primary Road Network were prepared to a level of accuracy appropriate for conceptual planning purposes. The costs are summarized on *Table 8.1: Estimated Cost of Road Improvements.*

The costs estimates were prepared using:

- Proposed improvements and cross sections outlined in this report.
- 2007 Canadian dollars.
- Unit prices obtained from tender results for recent similar projects.
- A 30% contingency to reflect the level of accuracy.
- A 10% allowance for engineering costs during design and construction.
- A separate contingency allowance of 80% for the cost for the 4th Street / Cumberland Road Roundabout to reflect the extra cost required to overcome poor soil conditions at this location.

A summary of unit costs per metre run for each type of improvement, together with breakdowns of these costs, are presented in *Addendum D: Table D1 and Table D2*, respectively.

Table 8.1: Estimated Cost of Road Improvements

Section	Road	From	To	Improvement	X-Section Type	Length (m)	Cost per metre run	Estimated Cost
1	Dunsmuir	Egremont	2nd. St	F	I	360	$1,760	$ 634,000
				Roundabout	N/A	N/A	-	$ 200,000
2	Dunsmuir	2nd.St	4th.St	C	I	260	$316	$ 82,000
				Roundabout	N/A		-	$ 250,000
3a	Dunsmuir	4th.St	7th.St	A	Existing	390	$36	$ 14,000
				C	I	390	$316	$ 123,000
3b	Dunsmuir	4th.St	7th.St	D	I	390	$470	$ 183,000
4	Dunsmuir	7th.St	End of Park	D	II a	120	$760	$ 92,000
	Dunsmuir	End of Park	Ulverston	D	II b	670	$690	$ 463,000
5	4th.St	Dunsmuir	Windemere	B	Existing	280	$48	$ 14,000
				C	I	280	$316	$ 88,000
6	4th.St	Windemere	Cumberland	B	Existing	190	$48	$ 10,000
				Roundabout	N/A	N/A	-	$ 450,000
7	Cumberland	4th.St	Hope St.	A	Existing	670	$18	$ 12,000
				C	II a	670	$775	$ 520,000
8	Cumberland	Hope St.	Union	F	III	740	$870	$ 644,000
9	Cumberland	Union	Small	A	Existing	840	$18	$ 16,000
				C	III	840	$570	$ 479,000
10	Ulverston	7th.St	Chicane	A	Existing	500	$18	$ 9,000
				C	III	500	$570	$285,000
11	Ulverston	Chicane	Dunsmuir	A	Existing	360	$18	$ 7,000
				C	III	360	$570	$206,000
12	7th.St	Ulverston	Dunsmuir	E	III	340	$575	$196,000
13	Egremont	Dunsmuir	Ulverston	F	II a	400	$1,115	$ 446,000
14	Egremont	Ulverston	Coal Valley	A	Existing	240	$18	$ 5,000
				C	II a	240	$775	$186,000
15	Bruce St.	Ulverston	Hope St.	A	III	320	$18	$ 6,000

Section	Road	From	To	Improvement	X-Section Type	Length (m)	Cost per metre run	Estimated Cost
				C	III	320	$570	$ 183,000
16	Bruce St.	Hope St.	Cumberland	C *	III	230	$570	$ 131,000
17	Comox L.(Sutton)	Dunsmuir	1st. Bend	10% E 90% C	III	20 190	$540 $570	$ 11,000 $ 109,000
	Comox L.	1st. Bend	Comox Lake	10% E 90% C	III	350 3,150	$540 $570	$ 189,000 $ 1,800,000
18	Bevan	Cumberland	Landfill	10% E 90% B	III	300 2,600	$540 $48	$ 162,000 $ 125,000
	Bevan	Cumberland	Landfill	A	III	2,900	$18	$ 53,000
19a	Union	Dunsmuir	Cemetery	C *	III	1,010	$570	$ 576,000
				Roundabout	N/A	N/A	-	$ 250,000
19b	Union	Cemetery	Cumberland	A	Existing	210	$18	$ 4,000
				C	III	210	$570	$ 120,000
				Roundabout	N/A	N/A	-	$ 300,000
20a	Royston	Ulverston	Union	D	II b	260	$690	$ 180,000
20b	Royston	Union	Small	A	Existing	580	$18	$ 11,000
				C	III	580	$570	$ 331,000

Denotes routine maintenance on existing road width.

- Re-ranked from B to C to allow for future deterioration

Table 8.1: Estimated Cost of Road Improvements (Continued)

8.2 Priorities

Road improvement priorities were determined based on the following criteria:

- Condition of existing road
- Traffic growth
- Safety and Capacity of Intersections
- Need to encourage traffic to use the proposed primary network.

The proposed master plan for road improvements up to year 2025 is shown on *Table 8.2: Master Plan for Road Improvements*. Roads which are not considered high priority will require routine maintenance before the recommended improvements are carried out and the proposed cross-section is achieved. Table 8.2 makes provision for this maintenance.

Improvements to 4th Street / Cumberland Road intersection, the Dunsmuir Avenue / Egremont downtown Dunsmuir Avenue and Egremont Road intersection are ranked as the highest priorities.

Improvements to Sutton Road, part of Section 17, are packaged with construction of the roundabout at Dunsmuir Avenue and Egremont Road. The remainder of Section 17, from Sutton Road to Comox Lake, is considered a lower priority.

The proposed master plan assumes that construction of Section11, Ulverston Road between Union Road and the existing traffic calming, will be completed during 2008.

Table 8.2: Master Plan for Road Improvements

Priority	Section	Road	From	To	Improvement	Year	Cost ($)	Remarks
1	6	4th.St	Windemere	Cumberland	Roundabout	2009	450,000	
2	1	Dunsmuir	Egremont	2nd. St	Roundabout	2010	200,000	
	1	Dunsmuir	Egremont	2nd. St	F	2010	634,000	
	13	Egremont	Dunsmuir	Ulverston	F	2010	446,000	
	17	Sutton	Dunsmuir	First bend	C ; 15% E	2010	120,000	
3	3a	Dunsmuir	4th.St	7th.St	A	2011	14,000	Routine Maintenance
	5	4th.St	Dunsmuir	Windemere	B	2011	14,000	Routine Maintenance
	6	4th.St	Windemere	Cumberland	B	2011	10,000	Routine Maintenance
	9	Cumberland	Union	Small	A	2011	16,000	Routine Maintenance
	19b	Union	Cemetery	Cumberland	A	2011	4,000	Routine Maintenance
	18	Bevan	Cumberland	Landfill	A	2011	53,000	Routine Maintenance
4	12	7th.St	Ulverston	Dunsmuir	E	2012	196,000	
5	20b	Royston	Union	Small	A	2012	11,000	Routine Maintenance
	7	Cumberland	4th.St	Hope St.	A	2012	12,000	Routine Maintenance
6	8	Cumberland	Hope St.	Union	F	2013	644,000	
7	2	Dunsmuir	2nd.St	4th.St	C	2014	82,000	
	2	Dunsmuir	2nd St	4th St.	Roundabout	2014	250,000	
8	19a	Union	Dunsmuir	Cemetery	Roundabout	2015	180,000	
	20a	Royston	Ulverston	Union	D	2015	180,000	
9	10	Ulverston	7th.St	Chicane	A	2016	9,000	Routine Maintenance
	11	Ulverston	Chicane	Dunsmuir	A	2016	7,000	Routine Maintenance
	14	Egremont	Ulverston	Coal Valley	A	2016	5,000	Routine Maintenance
	15	Bruce St.	Ulverston	Hope St.	A	2016	6,000	Routine Maintenance
10	16	Bruce St.	Hope St.	Cumberland	C	2016	131,000	
11	4	Dunsmuir	7th.St	Ulverston	D	2017	555,000	
12	3b	Dunsmuir	4th.St	7th.St	D	2018	183,000	
	3a	Dunsmuir	4th.St	7th.St	C; 10% E	2018	123,000	
13	5	4th.St	Dunsmuir	Windemere	C	2019	88,000	

Priority	Section	Road	From	To	Improvement	Year	Cost ($)	Remarks
	6	4th.St	Windemere	Cumberland	C	2019	10,000	
14	18	Bevan	Cumberland	Landfill	C;10% E	2020	287,000	
15	17	Comox Lk.	First Bend	Comox Lk	C; 10% E	2021	1,989,000	
16	19a	Union	Dunsmuir	Cemetery	C	2022	576,000	
17	7	Cumberland	4th.St	Hope St.	C	2022	520,000	
18	14	Egremont	Ulverston	Coal Valley	C	2022	186,000	
19	10	Ulverston	7th.St	Chicane	B-C	2023	285,000	
	11	Ulverston	Chicane	Dunsmuir	B-C	2023	206,000	
	15	Bruce St.	Ulverston	Hope St.	B-C	2023	183,000	
20	9	Cumberland	Union	Small	C	2024	479,000	
	19b	Union	Cemetery	Cumberland	Roundabout	2024	300,000	
	19b	Union	Cemetery	Cumberland	B-C	2024	120,000	
22	20b	Royston	Union	Small	C	2025	331,000	

Assumes construction of Section 11, Ulverston Road from Chicane to Royston Road is completed in 2008.

Table 8.2: Master Plan for Road Improvements (Continued)

9.0 CLOSURE

We trust the preliminary information contained in this report meets your present needs. Further geotechnical investigation, topographical survey, and refinement of the cross sections and cost estimates will be required as part of the future design stage of each improvement.

Should you require any additional information, please do not hesitate to contact our office.

Respectfully Submitted:

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