REGIONAL MUNICIPALITY OF OTTAWA-CARLETON REPORT
MUNICIPALITÉ RÉGIONALE D'OTTAWA-CARLETON RAPPORT

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Your File/V/Réf.

DATE 22 November 1996

TO/DEST. Co-ordinator, Planning and Environment Committee

FROM/EXP. Planning and Development Approvals Commissioner

SUBJECT/OBJET **REGIONAL OFFICIAL PLAN REVIEW - PROPOSED REGIONAL DEVELOPMENT STRATEGY: SELECT LINK ANALYSIS AND SOUTHEAST GROWTH ANALYSIS**

DEPARTMENTAL RECOMMENDATION

That Planning and Environment Committee receive this report for information.

BACKGROUND

At their joint meeting on 30 September 1996, the Planning and Environment and Transportation Committees adopted the following motions.

1. "That staff be directed to employ Dillon Engineering (the Region's Transportation Master Plan Consultants) to perform a Select Link Analysis (SLA) on the proposed transportation network in order to more accurately allocate transportation costs;

   and be it further resolved that the results be reported back to both the Transportation and the Planning and Environment Committees for consideration prior to Council's deliberation of the Development Strategy Principles."

2. "For the purposes of determining road capacity, the future requirement for new and upgraded roads, and the allocation of costs to the most appropriate source of future road usage, local roads such as Hawthorne Road, which provide substantive links to the growth areas, be included in modelling for the Regional Development Strategy and associated phasing recommendations."

Attached as Annex "A" is the report prepared by Dillon Consulting which describes the assumptions, methodology, and results pertaining to their execution of the Select Link Analysis.

Attached as Annex "B" is a staff report which deals with the road network in the vicinity of Leitrim and the transportation system capacity which is currently available to service growth there. Growth potential has been analysed whether it were to occur immediately or be phased in over a number of years, both with and without the capacity of lower tier roads, such as Hawthorne Road (Hunt Club to Leitrim) taken into consideration.

The information included in Annexes "A" and "B" was made available to Regional Councillors at a briefing held at 3:00 p.m., on 4 November 1996.

At the meeting of Regional Council on 13 November 1996, at which the Regional Development Strategy was approved, the following motion was adopted:

"Resolved that the Select Link Analysis Report be referred back to the Planning and Environment Committee to consider the Select Link Analysis."

Select Link Analysis

The principal consequences of the Select Link Analysis and the review of transportation infrastructure costs per dwelling unit is illustrated in Table A below. This Table not only reflects the road costs distributed in accordance with the Select Link Analysis but also reflects the two methods used for distributing transit infrastructure costs.

The first method assigned transit costs on the basis of the ratio of new dwelling unit growth in each of the growth areas to total growth, while the second method allocated the costs on the basis of the ratio of new transit trips per growth area to total new transit trips.

Table A
Estimated Costs per Additional Dwelling Unit, 1996-2021
(water and wastewater, transit and road infrastructure)

Area	New Units 1996-2021	Total Water and Wastewater Costs ($M 1996)	Per Unit Water and Waste-water Costs	Total Transpor-tation Costs ($M 1996) (Transit Costs ∝ Dwelling Units)	Per Unit Transpor-tation Costs	Per Unit Total Costs	Rank	Total Transpor-tation Costs ($M 1996) (Transit Costs ∝ Transit Trips)	Per Unit Transpor-tation Costs	Per Unit Total Costs	Rank
Gloucester SUC	8,000	23.3	$2,900	104.8	13,100	16,000	6	105.5	13,200	16,100	6
Nepean SUC	17,500	37.8	$2,200	230.2	13,200	15,300	5	210.6	12,000	14,200	5
Kanata+ Stittsville	21,800	54.9	$2,500	218.1	10,000	12,500	4	216.2	9,900	12,400	3
Leitrim	2,500	8.2	$3,300	22.5	9,000	12,300	3	23.3	9,300	12,600	4
Orleans EUC	15,300	22.5	$1,500	136.9	8,900	10,400	2	126.1	8,200	9,700	2
Inside Greenbelt	72,000	68.0	$900	431.7	6,000	6,900	1	462.5	6,400	7,400	1

Note: Figures are approximate and may not add up because of rounding. They do not include common infrastructure such as water and wastewater plants; per unit costs rounded to nearest $100; costs do not include works built or under construction as of 1996; water and wastewater facilities located entirely inside the Greenbelt are attributed only to this area although they may serve a region-wide function.

The following results are considered to be most significant:

1. Transportation costs are generally lower than shown in the RDS Report dated 16 September 1996, because road utilization (and hence cost) has been assigned to trips generated in the rural areas and outside the Region.

2. Regardless of the method used for transit infrastructure cost allocation, "Inside the Greenbelt" continues to have the lowest infrastructure costs. Dwelling unit costs "Inside the Greenbelt" are approx. 66% to 76% of the cost per dwelling unit in the cheapest of the suburban growth centres, Orléans.

3. Again, regardless of the method used for transit infrastructure cost allocation, Orléans has the lowest cost per dwelling unit of the suburban growth centres. This is largely due to two principal factors, i.e., the investments that have occurred in infrastructure there over the past several years where, for example, $160M has been invested by the Provincial/Regional Governments in transportation infrastructure over the 10 year period 1986-96 and, secondly, the adoption of a level of development (15,300 dwelling units) that avoids triggering costly transportation facilities such as the widening of Highway 17 or the Ottawa River Parkway (East).

4. Leitrim is no longer the location of highest infrastructure cost. Leitrim, at $12,300/$12,600 per dwelling unit is now ranked third/fourth among the six growth areas, depending on which of the transit infrastructure cost allocations is considered.

5. Depending on which transit infrastructure cost allocation method is considered, Leitrim and Kanata/Stittsville alternate with each other in the third/fourth ranking position.

6. Gloucester South Urban Centre is now the most costly location for development, at a cost of approx. $16,000 per dwelling unit, just $700/$1,900 more expensive per dwelling unit than Nepean’s South Urban Community, which now ranks fifth. The main reason for Nepean's increased cost is that externally generated trips in the southwest are predominantly carried by Highway 416, and the roadway improvements in South Nepean are primarily due to trips generated by South Nepean development. The costs in Gloucester increase primarily due to the current lack of transportation infrastructure and the more equitable distribution of costs between Leitrim and River Ridge.

In view of the influence of the number of dwelling units attributed to each growth area (the denominator effect), based on this analysis, it would be more reasonable to categorise "Inside the Greenbelt" as the lowest cost location, Orléans, Leitrim and Kanata/Stittsville as joint second lowest areas, and both parts of the South Urban Centre to be joint highest cost areas.

Local Road Capacity

In response to the second motion about the utilization of local road capacity, staff have reflected elements of the local road system in the modelling of future needs and in the determination of existing capacity available for future growth, such as is shown below for Leitrim.

Leitrim Growth

Annex "B" shows that the existing road capacity available at the Leitrim screenline could support development of between 3,300 and 2,300 dwelling units (with/without Hawthorne Road included for capacity purposes), if the development could be put in place instantaneously. Continued growth in background traffic generated by urban development in Ottawa-Carleton's rural area and outside Ottawa-Carleton will use up existing capacity over time.

The more likely scenario is for development phased over a 10/15 year period. This would result in a development range of between 1,900 and 1,450 dwelling units (with/without Hawthorne Road being included in the road network for capacity purposes).

Should there be a desire to initiate earlier development in Leitrim, i.e., at Phase 1, provision must be made for the installation of piped services for water/wastewater with an initial investment of $8-12M. It is estimated that, with Hawthorne Road included in the potential capacity, a Phase 1 development of 1,500 dwelling units in Leitrim could occur.

CONSULTATION

During the execution of the Select Link analysis, meetings and discussions were held with members of the Development Industry and their consultants. The two methods for dealing with transitway costs arose from these discussions.

FINANCIAL IMPLICATIONS

The information from the Select Link Analysis will be used in conjunction with the Regional Development Strategy Principles, in developing phasing policies which minimize future development costs.

CONCLUSION

The select link analysis, by taking account of trips generated in the rural areas and outside the Region has provided a result which differs in part from the previous analysis. The select link analysis has confirmed that "Inside the Greenbelt" has the lowest infrastructure costs. However, it shows that Orléans, Leitrim and Kanata/Stittsville have lower infrastructure costs than the South Urban Community in Gloucester and Nepean using the distribution of trips based on the RDS dwelling unit distribution. The assignment of these trips (and by implication the costs of new roads assigned to each area) is a small part of the total Regional Official Plan/Master Plan process. In staff's opinion, this additional information is not contrary to principles in the joint Planning and Environment/Transportation Committee report. In fact, it reinforces the overall conclusion that the utilization of existing infrastructure is the most cost effective growth option, and this supports growth inside the Greenbelt. However, the information should be taken into consideration in developing detailed phasing policies which will come later in the overall process.

In the Draft Regional Official Plan, which will be available at the end of January 1997, staff will bring forward for adoption phasing policies based on the Regional Development Strategy Principles, as adopted by Regional Council on 13 November 1996, and the results of the Select Link Analysis as reported above.

Approved by
N. Tunnacliffe, MCIP, RPP

BR/md

Attach. (2)

PLANNING OUR REGION

PLAN-IT TOGETHER
OTTAWA-CARLETON
REGIONAL PLAN REVIEW

TRANSPORTATION MASTER PLAN

SELECT LINK ANALYSIS

Ottawa-Carleton
A PARTNERSHIP IN PROGRESS

Prepared by: M. M. Dillon Limited
Prepared for: Regional Municipality of Ottawa-Carleton
Environment and Transportation Department
October 1996

1.0 BACKGROUND

The identification of a preferred Regional Development Strategy (RDS) involved an examination of various distributions for future growth in population and employment. Infrastructure requirements (water, wastewater, and transportation) necessary to support these distributions were identified and cost estimates developed for each distribution. Evaluation criteria, based on the approved Community Vision, were developed and used to compare the overall impact of each land use distribution. These criteria were grouped into the following categories:

- Caring Communities
- Economy
- Environment

Having identified a preferred land use distribution through a comparison of impacts associated with the various criteria, the costs of development within each development area within the RMOC were identified. The costs were characterized on the basis of costs per dwelling unit. The areas were identified as:

- Inside Greenbelt
- Orleans
- Leitrim
- South Urban Centre (Gloucester)
- South Urban Centre (Nepean)
- Kanata and Stittsville

The cost allocations were calculated on the basis of an assignment of identified infrastructure to each of the growth areas. The assignment of roadway infrastructure to the growth areas was primarily based on an intuitive identification of area of influence for each roadway investment. Public review of the RDS resulted in criticism of this approach as it appeared to be too subjective.

At the joint meeting of the Transportation and Planning and Environment Committees held on September 30, 1996 direction was given that the roadway cost allocations for each development area be recalculated on the basis of a select link analysis and that Dillon Consulting carry out this work.

2.0 METHODOLOGY

2.1 The Travel Forecasting Methodology Utilized

The identification of roadway requirements was accomplished by modeling changes in land use. The model that was utilized was the TRANS Transportation Demand Model. The TRANS forecasting model uses the EMME/2 software. This computer based model generates travel demand based on a distribution of population and employment. Land use

is reflected by assigning population and employment to each of 258 sub-areas which represent homogenous development within the Region. The TRANS forecasting model then generates person travel demand between each of these areas based on currently observed travel characteristics. The travel demand between each of these areas is assigned to the transit and roadway systems, based on achieving the shortest travel time between origins and destinations. Demand is subsequently adjusted to reflect the impacts of travel demand management (TDM), transportation systems management (TSM), pedestrian demand and cycling demand.

In assessing impacts associated with various land uses the model was first adjusted to reflect the revised population and employment distributions associated with a particular land use alternative. This demand was loaded on a digital version of the existing transit and roadway network.

The impact of land use and/or network changes was assessed using "screenline" analysis. A screenline is an imaginary line that corresponds to natural or man-made barriers through which all travel to and from an area must pass. The Ottawa River, Rideau River, rail lines, and Queensway are examples of such barriers. **Figure 1** describes the screenlines used in the Transportation Master Plan. Demand on all roadways associated with a particular screenline is then compared to the available capacity of the screenline. After adjusting for pedestrian and cycling demand and the impact of TDM and TSM, the screenline demand is examined to determine if it exceeded 90% of the screenline capacity. Alternative measures for increasing the capacity to achieve a 90% utilization were identified and reflected in the model. The demand was then assigned to the revised networks and screenline were re-analyzed. When all screenlines were found to be operating in the vicinity of 90% of capacity an optimum solution was determined.

2.2 What is Select Link Analysis ?

One of the capabilities of the TRANS forecasting model is that it can determine the origin of each trip assigned at any point in the network. It is also possible to identify the origin of new trips at any point in the network. In order to determine the utilization of a particular roadway segment resulting from growth in a particular area, the zones that make up an area are grouped into a district. The select link analysis results can therefore be organized to reflect the utilization of a particular roadway segment associated with new development from a growth area such as Kanata or Leitrim.

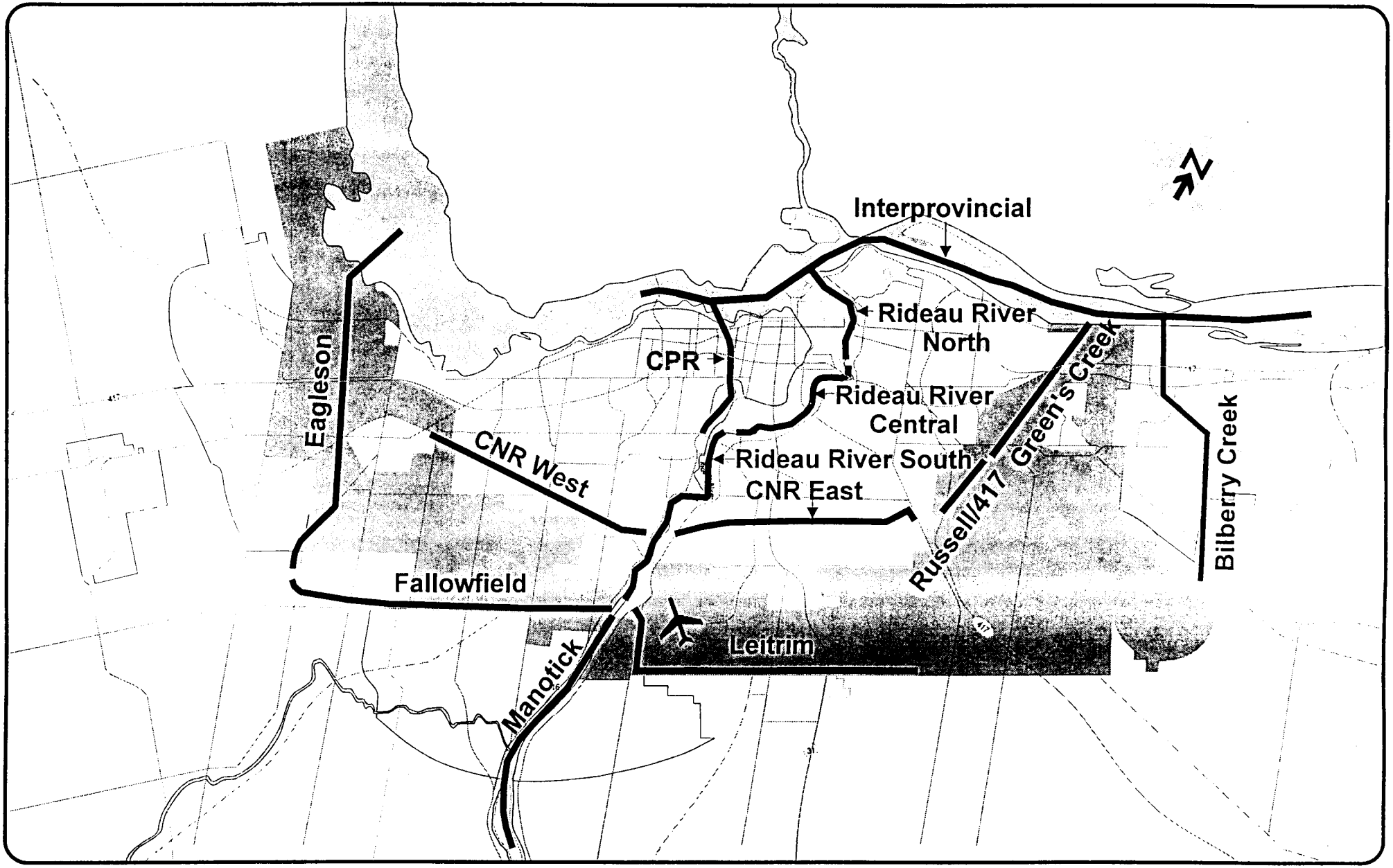

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Figure 1
Transportation Master Plan
Screenlines

Ottawa-Carleton

3.0 SELECT LINK ANALYSIS IN SUPPORT OF THE RDS

3.1 Basic Assumptions

The land use scenario that was modeled is the 2021 land use scenario recently approved at the joint meeting of Planning and Environment and Transportation Committees. The district system utilized is shown in **Figure 2**. The districts correspond to the growth areas as follows:

Growth Area	District
Inside the Greenbelt	4, 5, and 6
Kanata	15
Stittsville	16
South Urban Centre (Nepean)	12
South Urban Centre (Gloucester-River Ridge)	10
Leitrim	9
Orleans and Cumberland	7
Rural Area (RMOC)	8,11,13,14, and 17
Outside the RMOC	1, 2, 3

Roadway requirements were identified to satisfy residual demand that cannot be satisfied as a result of applying demand management, system management, and application of increased modal share for walking, cycling and transit. The screenline analysis was reviewed and all roadway capacity (regional and local) was reflected in the needs identification.

Two methods for assigning transit infrastructure costs were tested. In the first method, costs were assigned on the basis of the proportion of new dwelling units per growth area to total new dwelling units.

The second method reflected the amount of transit trips attributed to each of the growth areas and allocated the transit infrastructure costs on the basis of the ratio of the new transit trips per growth area to the total new transit trips. The second method thus reflected not only the size of each growth area (number of dwelling units) but, more importantly, the transit share (modal choice) assumed for each growth area.

Both transit cost distribution methods applied to the urban growth areas all of which would be within the Urban Transit Area.

Both methods reflect the utilization of public transit facilities with varying degrees of equitability while recognizing the fact that transit travel depends on the availability of the entire system.

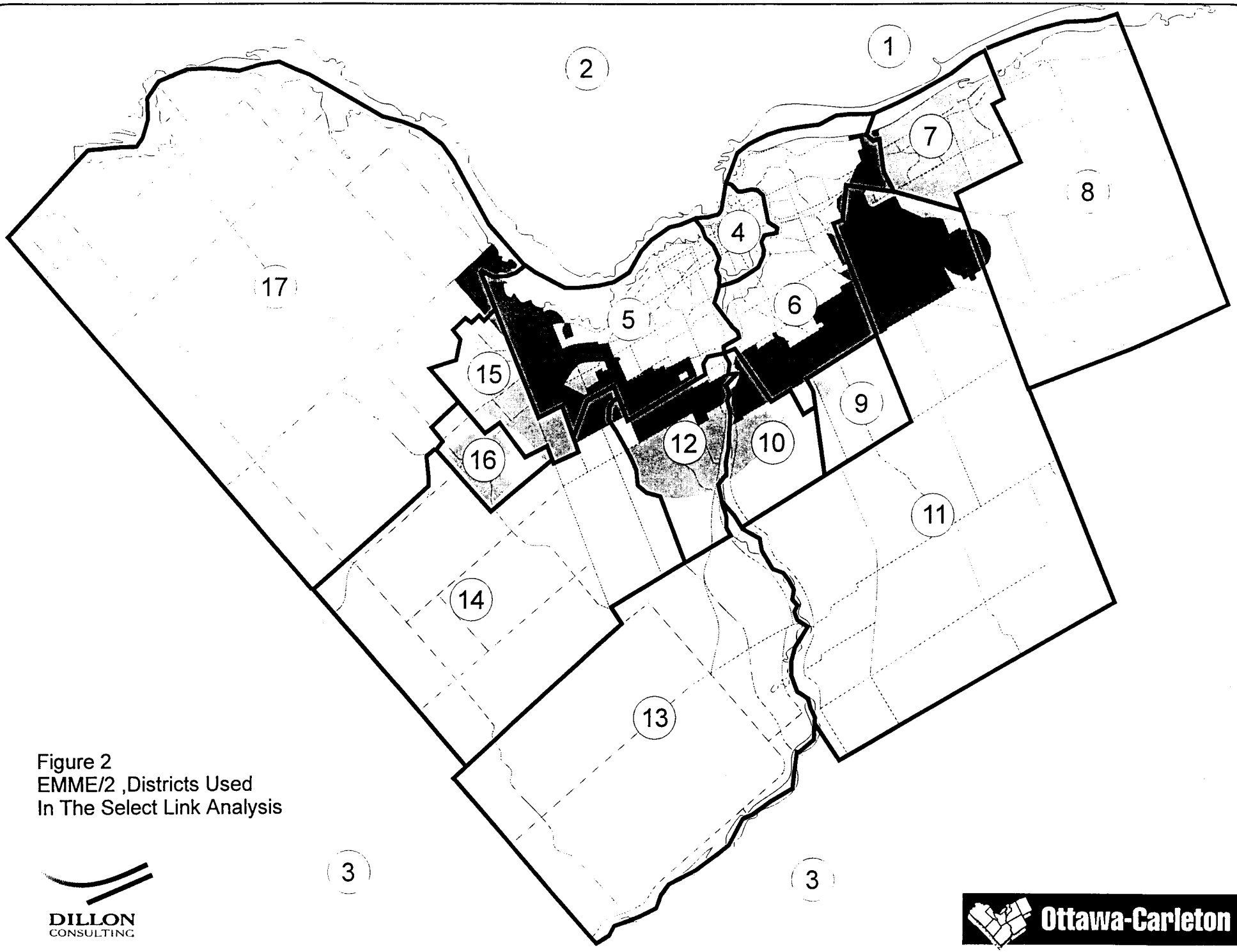

Figure 2
EMME/2 ,Districts Used
In The Select Link Analysis

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3.2 Select Link Analysis Assumptions

The select link analysis undertaken by Dillon Consulting made use of the TRANS Transportation Demand Model with the assistance of RMOC staff.

The select link analysis was carried out on those roadway links that are new or modified to accommodate travel generated as a result of growth associated with the 2021 preferred land use scenario. No analysis was carried out on existing roadways for which no modifications were identified.

Only growth in traffic between the years 1996 and 2021 was used to apportion infrastructure costs. This growth occurs as a result of :

- new demand generated from growth in the urban centres;
- new demand generated from growth in areas inside the Greenbelt; and
- new demand generated as a result of growth in the rural areas and outside the RMOC.

Traffic generated by new developments which make use of existing infrastructure was not identified nor were costs assigned for utilization of existing infrastructure.

Each new or modified roadway link was analyzed in segments that were homogeneous. For example, if a new roadway had varying cross sections then a separate select link analysis was carried out for each characteristic segment. The cost of each segment was then apportioned on the basis of new p.m. peak hour demand generated by each of the contributing areas of increase divided by the total new traffic on that segment.

In general, peak directional usage was used for the apportionment. This reflects the fact that new roadway capacity was generally determined on the basis of peak directional flow. When the difference in flow between both directions was less than 10% the flow in both directions attributable to new demand on the link was utilized for apportionment. As well, if the model assigned 100% of peak directional demand to one district then the flow from both directions was used for apportionment.

This apportionment methodology identifies usage as a result of growth outside the Region as well as growth inside the Region.

4.0 RESULTS

The select link analysis results were summarized in a series of tables that reflect the usage of each new or modified roadway link introduced to support the RDS for each growth area. The utilization of each roadway as a percentage of demand generated by each area (District) on each new or modified roadway link was determined from the select link analysis. These area percentages were then applied to the cost of each new or modified roadway. The costs attributable to each area from all roadway changes were summed to identify the total roadway costs for each area (District). The summary tables are included

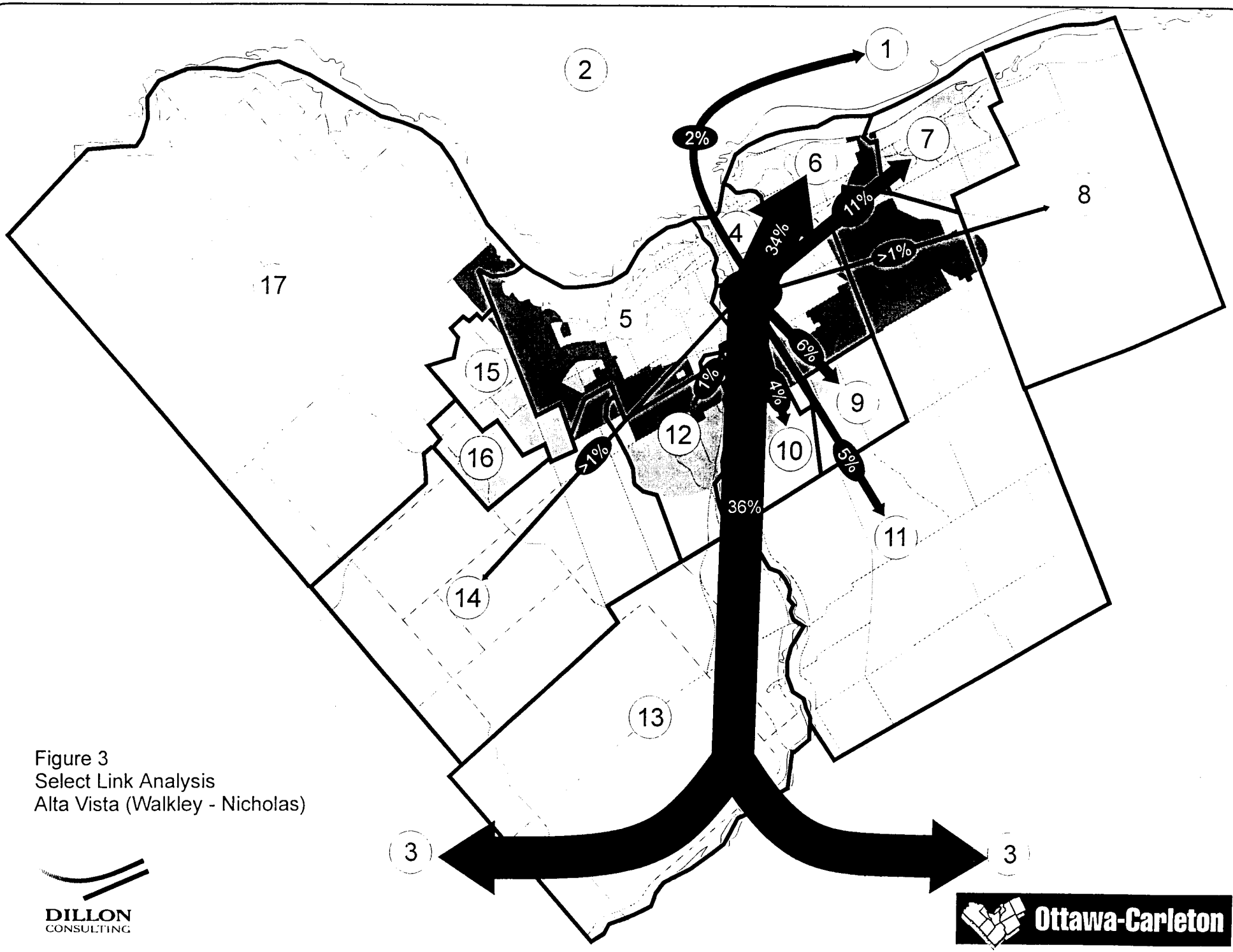

Figure 3
Select Link Analysis
Alta Vista (Walkley - Nicholas)

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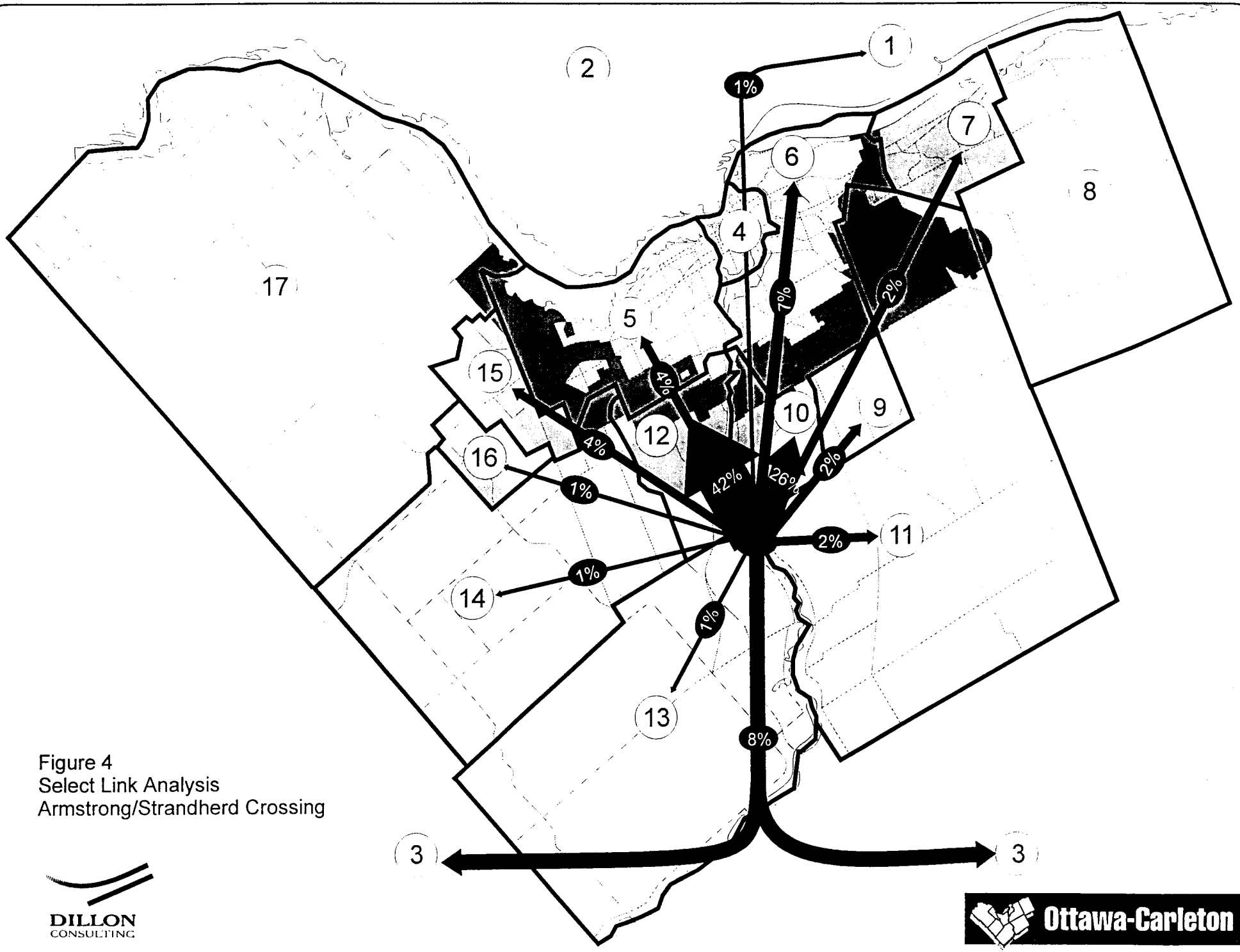

Figure 4
Select Link Analysis
Armstrong/Strandherd Crossing

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in **Appendix A**. Transit costs attributable to each district were developed by apportioning transit infrastructure costs on the basis of new dwelling units in the growth area inside the Urban Transit Area as a percentage of total new dwelling units in the Urban Transit Area. Transit costs were added to the roadway costs attributable to each growth area providing a total transportation capital cost for each area (these costs do not reflect transit vehicle or operating costs).

Figures 3 and 4 illustrate the select link analysis for the following roadway segments:

- Alta Vista Parkway south of the Queensway; and
- The Armstrong/Strandherd Bridge

Table 1 identifies the roadway costs attributable to new travel generated by the various areas within and outside the Region.

Table 1
Roadway Infrastructure Costs Attributable to RMOC Growth Areas

District	Area	Total Cost (millions of dollars)
1	Quebec/external	**4.5**
2	Quebec	**2.7**
3	Ontario/external	**104.7**
4	Central Area	**13.7**
5	Ottawa West/Nepean	**18.2**
6	Ottawa East/South	**70.7**
7	Orléans	**67.0**
8	Cumberland Rural	**7.0**
9	Leitrim	**11.1**
10	River Ridge	**68.2**
11	Osgoode	**12.9**
12	Nepean South	**150.2**
13	Rideau	**1.8**
14	Goulbourn	**9.6**
15	Kanata	**102.0**
16	Stittsville	**16.4**
17	West Carleton	**10.4**
	Total Cost	**671.1**

Table 2 identifies the distribution of transit infrastructure costs among the various areas of urban growth based on the proportion of new dwelling units per growth area to total growth.

Table 3 identifies the distribution of transit infrastructure costs among the various areas of urban growth based on the ratio of new transit trips per growth area to the total of new transit trips.

Table 4 summarizes the costs of transit and roadway infrastructure by dwelling unit in each of the growth areas and reflects both transitway costing methodologies. The costs are compared with the previous dwelling unit costs identified.

Table 2
Transit Infrastructure Costs Attributable to RMOC Growth Areas
Distributed on the Basis of Dwelling Unit Growth

Area	Total Cost (millions of dollars)
Inside Greenbelt	329.1
Orléans	69.9
Leitrim	11.4
South Urban Centre (Gloucester-River Ridge)	36.6
South Urban Centre (Nepean)	80.0
Kanata/Stittsville	99.7

Table 3
Transit Infrastructure Costs Attributable to RMOC Growth Areas
Distributed on the Basis of Transit Trip Growth

Area	Total Cost (millions of dollars)
Inside Greenbelt	359.9
Orléans	59.1
Leitrim	12.2
South Urban Centre (Gloucester)	37.3
South Urban Centre (Nepean)	60.4
Kanata/Stittsville	97.8

Table 4
Total Transportation Costs per Dwelling Unit

Growth Area	New Dwelling Units	Previous Costs per Dwelling Unit	Revised Costs per Dwelling Unit	
			Transit Infrastructure Costs ∝ Dwelling Unit Growth	Transit Infrastructure Costs ∝ Transit Trip Growth
Inside Greenbelt	72,000	$6,600	$6,000	$6,400
Orleans	15,300	$13,300	$8,900	$8,200
Leitrim	2,500	$15,200	$9,000	$9,300
Kanata/Stittsville	21,800	$11,000	$10,000	$9,900
River Ridge	8,000	$11,100	$13,100	$13,200
Nepean South	17,500	$12,500	$13,200	$12,000

Costs per dwelling unit rounded to nearest $100

5.0 CONCLUSIONS

Regardless of the method for attributing transit infrastructure costs, the transportation costs associated with servicing new growth continue to be lowest for areas inside the Greenbelt. Orleans has the second lowest cost per dwelling unit. This reflects the fact that growth was limited to avoid major roadway expansion such as the Ottawa River Parkway extension and the widening of Highway 17. Leitrim has the third lowest costs, reflective of the relatively low impact that the 2,500 units have in relation to external and through traffic. Kanata/Stittsville costs per dwelling unit are the fourth lowest. The methodology for distributing transit infrastructure costs has an impact on the ranking of both parts of the South Urban Centre. When transit infrastructure costs are apportioned relative to dwelling unit growth, River Ridge is marginally cheaper than Nepean South which becomes the most expensive location for development. The alternative transit cost distribution method where costs are distributed in proportion to transit trips reverses this order and results in River Ridge being the most expensive location by a reasonably large amount.

It is important to note that the costs per dwelling unit are reflective of both the dwelling unit distribution and the infrastructure requirements identified to serve this distribution. Changing the distribution of dwelling units will change infrastructure requirements, impacts and costs.

Transportation Master Plan
Infrastructure Requirements

11/20/96

WEST - Kanata & Stittsville		length	#	Area Cost Share %																	total
Facility	Limits	km		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	m$
RDS-Roads																					
Campeau	Terry Fox-March	2.7	100		1%		0%	1%	1%	0%			0%					97%		0%	8.5
Carling	March-Herzberg	1.4	101		0%	2%	6%	30%	7%	4%	0%	1%	3%	1%	19%	2%	3%	16%	6%		1.2
Carling	Herzberg-Moodie	4.3	102/103	0%	1%	0%	6%	27%	6%	4%	0%	0%	2%	0%	10%	1%		41%		2%	8.0
Castlefrank	Bridge over Highway 417	1.0	104		0%		0%	0%	0%	0%			0%					98%		0%	8.9
Cedarveiw	Hope Side Rd-HuntClub	2.2	105			3%									85%			9%	1%	1%	7.9
Eagleson	Terry Fox-Stonehaven	2.1	106			1%		3%	2%	1%		0%	1%	0%	6%	2%	8%	68%	8%		7.6
Hazeldean	Regional Rd 5-Terry Fox	4.4	107			36%													47%	16%	15.3
Highway 417	Castlefrank-Highway 416	7.5	108			29%												67%	2%	2%	13.7
Hope Side Rd	Eagleson-Richmond	2.0	109			4%												84%	7%	5%	6.7
Hope Side Rd	Richmond-Moodie	2.0	110			3%											0%	85%	6%	5%	6.4
Hope Side Rd	Moodie-Cedarview	2.0	111			3%		7%										79%	6%	5%	6.9
Katimavik	Castlefrank-Eagleson	1.0	112			2%											18%	18%	22%	41%	3.4
March	Solandt-Regional Rd 9	4.9	113			5%												73%		22%	13.6
March	Herzberg-Terry Fox	3.3	114		0%	0%	1%	12%	2%	0%		0%	1%	0%	6%	1%	1%	75%	1%		6.1
Terry Fox	Eagleson-Winchester	3.6	115			3%		1%	1%				6%	1%	48%	4%	26%	3%	7%		16.4
Terry Fox	Winchester-Highway 417	2.3	116			8%		0%					4%	0%	22%	1%	18%	14%	32%	0%	7.5
Terry Fox	Highway 417-Richardson SR	2.4	117/118		1%	2%	1%	2%	3%	1%		0%	1%		7%	0%	2%	70%	5%	4%	11.9
Terry Fox	Richardson SR-March	3.8	119		1%	2%	1%	2%	3%	1%		0%	1%		7%	0%	2%	70%	5%	4%	12.0
		53.4		0%	0%	8%	1%	3%	1%	0%	0%	0%	1%	0%	12%	1%	5%	53%	9%	6%	161.9

WEST - Kanata & Stittsville		length	#	total	Area Cost Share M$																
Facility	Limits	km		m$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
RDS-Roads																					
Campeau	Terry Fox-March	2.7	100	8.5		0.0		0.0	0.1	0.1	0.0			0.0					8.2		0.0
Carling	March-Herzberg	1.4	101	1.2		0.0	0.0	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.1	
Carling	Herzberg-Moodie	4.3	102/103	8.0	0.0	0.1	0.0	0.5	2.2	0.5	0.3	0.0	0.0	0.1	0.0	0.8	0.1		3.2		0.1
Castlefrank	Bridge over Highway 417	1.0	104	8.9		0.0		0.0	0.0	0.0	0.0			0.0					8.8		0.0
Cedarveiw	Hope Side Rd-HuntClub	2.2	105	7.9			0.2									6.7			0.7	0.1	0.1
Eagleson	Terry Fox-Stonehaven	2.1	106	7.6			0.1		0.2	0.1	0.1		0.0	0.1	0.0	0.5	0.1	0.6	5.2	0.6	
Hazeldean	Regional Rd 5-Terry Fox	4.4	107	15.3			5.6													7.2	2.5
Highway 417	Castlefrank-Highway 416	7.5	108	13.7			4.0												9.1	0.3	0.3
Hope Side Rd	Eagleson-Richmond	2.0	109	6.7			0.3												5.7	0.5	0.3
Hope Side Rd	Richmond-Moodie	2.0	110	6.4			0.2											0.0	5.5	0.4	0.3
Hope Side Rd	Moodie-Cedarview	2.0	111	6.9			0.2		0.5										5.4	0.4	0.3
Katimavik	Castlefrank-Eagleson	1.0	112	3.4			0.1											0.6	0.6	0.7	1.4
March	Solandt-Regional Rd 9	4.9	113	13.6			0.7												9.9		3.0
March	Herzberg-Terry Fox	3.3	114	6.1		0.0	0.0	0.0	0.7	0.1	0.0		0.0	0.0	0.0	0.4	0.1	0.0	4.6	0.0	
Terry Fox	Eagleson-Winchester	3.6	115	16.4			0.5		0.1	0.1				1.0	0.2	7.8	0.7	4.3	0.5	1.1	
Terry Fox	Winchester-Highway 417	2.3	116	7.5			0.6		0.0					0.3	0.0	1.7	0.1	1.4	1.0	2.4	0.0
Terry Fox	Highway 417-Richardson SR	2.4	117/118	11.9		0.2	0.3	0.1	0.3	0.4	0.1		0.0	0.1		0.8	0.0	0.2	8.3	0.6	0.5
Terry Fox	Richardson SR-March	3.8	119	12.0		0.2	0.3	0.1	0.3	0.4	0.1		0.0	0.1		0.8	0.0	0.2	8.4	0.6	0.5
		53.4		161.9	$0.0	$0.5	$13.1	$0.9	$4.7	$1.7	$0.7	$0.0	$0.1	$1.8	$0.3	$19.8	$1.1	$7.5	$85.2	$15.0	$9.4

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SOUTHWEST - Nepean		length	#	Area Cost Share %																total
Facility	Limits	km		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	m$
RDS-Roads																					
Fallowfield	Strandherd-Highway 16	8.1	200		2%	0%	4%	5%	36%	8%					45%						25.7
Greenbank	Jockvale-Malvern	2.1	201		1%	1%	0%	16%							71%		0%	10%	1%	1%	9.2
Greenbank	Fallowfield-HuntClub	4.2	202			2%							4%	8%	87%						8.3
Highway 16	Woodroffe-Merivale	3.6	203			35%			1%		0%	1%	9%	4%	47%		2%				11.3
Highway 16	Merivale-Fisher	7.0	204			10%							0%	0%	89%		0%				14.9
Jockvale	Jock River-Greenbank	0.7	205			1%		5%							76%		0%	14%	2%	1%	2.5
Merivale	Slack-Amberwood	1.0	206			13%							3%	0%	83%						6.0
Strandherd	Fallowfield-Jockvale	3.4	207	1%	0%	8%	0%	4%	7%	2%	0%	2%	26%	2%	42%	1%	1%	4%	1%	0%	18.1
Strandherd	Greenbank-Woodroffe	2.3	208	1%	0%	8%	0%	4%	7%	2%	0%	2%	26%	2%	42%	1%	1%	4%	1%	0%	8.3
Strandherd	Woodroofe-Rideau River	1.4	209	1%	0%	8%	0%	4%	7%	2%	0%	2%	26%	2%	42%	1%	1%	4%	1%	0%	5.1
Woodroffe	Strandherd-Fallowfield	3.6	210			3%			0%			0%	4%	3%	90%		1%				12.0
Woodroffe	Fallowfield-Slack	2.5	211			2%							0%	1%	97%						16.0
Woodroffe	Sportsplex-Baseline	2.5	212			4%			3%	0%		1%	11%	1%	78%		1%	1%	0%		10.0
		42.8		0%	0%	7%	1%	3%	8%	2%	0%	0%	8%	2%	66%	0%	1%	2%	0%	0%	147.5

SOUTHWEST - Nepean		length	#	total	Area Cost Share M$																
Facility	Limits	km		m$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
RDS-Roads																					
Fallowfield	Strandherd-Highway 16	8.1	200	25.7		0.6	0.0	1.0	1.2	9.2	2.1					11.6					
Greenbank	Jockvale-Malvern	2.1	201	9.2		0.1	0.0	0.0	1.4							6.5		0.0	0.9	0.1	0.1
Greenbank	Fallowfield-HuntClub	4.2	202	8.3			0.1							0.3	0.6	7.2					
Highway 16	Woodroffe-Merivale	3.6	203	11.3			3.9			0.1		0.0	0.1	1.1	0.5	5.4		0.3			
Highway 16	Merivale-Fisher	7.0	204	14.9			1.6							0.0	0.0	13.3		0.1			
Jockvale	Jock River-Greenbank	0.7	205	2.5			0.0		0.1							1.9		0.0	0.4	0.0	0.0
Merivale	Slack-Amberwood	1.0	206	6.0			0.8							0.2	0.0	5.0					
Strandherd	Fallowfield-Jockvale	3.4	207	18.1	0.1	0.0	1.4	0.0	0.7	1.2	0.4	0.1	0.3	4.7	0.3	7.6	0.1	0.3	0.7	0.1	0.0
Strandherd	Greenbank-Woodroffe	2.3	208	8.3	0.1	0.0	0.6	0.0	0.3	0.6	0.2	0.0	0.1	2.2	0.2	3.5	0.1	0.1	0.3	0.1	0.0
Strandherd	Woodroofe-Rideau River	1.4	209	5.1	0.0	0.0	0.4	0.0	0.2	0.3	0.1	0.0	0.1	1.3	0.1	2.1	0.0	0.1	0.2	0.0	0.0
Woodroffe	Strandherd-Fallowfield	3.6	210	12.0			0.4			0.0			0.0	0.4	0.4	10.8		0.1			
Woodroffe	Fallowfield-Slack	2.5	211	16.0			0.3							0.0	0.2	15.5					
Woodroffe	Sportsplex-Baseline	2.5	212	10.0			0.4			0.3	0.0		0.1	1.1	0.1	7.8		0.1	0.1	0.0	
		42.8		147.5	$0.2	$0.7	$9.9	$1.0	$3.9	$11.8	$2.9	$0.1	$0.7	$11.4	$2.4	$98.0	$0.3	$0.9	$2.7	$0.4	$0.2

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SOUTHEAST: Gloucester-Letrium, River Ridge		length	#	Area Cost Share %																total
Facility	Limits	km		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	m$
RDS-Roads																					
Alta Vista Parkway	Walkley-Nicholas	5.5	400	2%		36%		0%	34%	11%	0%	6%	4%	5%	1%		0%				66.0
Airport Parkway	Brookfield-Airport	6.4	401			7%		0%	62%	0%		5%	23%	1%	1%						18.5
Armstrong/Strandherd	Bridge over Rideau River	0.4	402/403	1%	0%	8%	0%	4%	7%	2%	0%	2%	26%	2%	42%	1%	1%	4%	1%	0%	20.0
Armstrong	Rideau River-River Rd	0.4	402/403	1%	0%	8%	0%	4%	7%	2%	0%	2%	26%	2%	42%	1%	1%	4%	1%	0%	1.7
Armstrong	River Rd-Bowesville	5.9	402/403	1%	0%	8%	0%	4%	7%	2%	0%	2%	26%	2%	42%	1%	1%	4%	1%	0%	19.9
Armstrong	Bowesville-Highway 31	4.3	402/403	1%	0%	8%	0%	4%	7%	2%	0%	2%	26%	2%	42%	1%	1%	4%	1%	0%	4.5
Bowesville	Armstrong-Airport Parkway	4.5	407			14%							73%	3%	9%	0%	0%				10.4
Bronson	Heron-Sunnyside	1.6	408			7%		1%	55%	2%	0%	2%	27%		7%						5.8
Conroy	Walkley-HuntClub	2.4	409			20%		2%	17%			13%	17%	11%	15%		0%	3%	1%		12.8
Conroy	Hunt Club-Highway 31	3.4	410			23%		0%	12%			16%	23%	13%	12%		0%				6.3
Hawthorne	Hunt Club-Russell	1.8	411			17%		1%	15%			10%	21%	6%	29%			1%	0%		4.6
Highway 31	Mitch Owens-Armstrong	4	412			63%						4%		34%							5.9
Highway 31	Armstrong-Conroy	2.5	413			23%			8%			33%	17%	10%	9%		0%				3.7
Hunt Club	Hawthorne-Highway 417	1.3	414	3%		18%			41%	38%	1%			0%							7.0
Limebank	Armstrong-Leitrim	2	415			1%							99%								7.1
Limebank	Leitrim-River	2.7	416			1%							99%								9.1
River Rd	Limebank-Hunt Club	1.6	417			6%							89%		5%		0%				5.8
		50.7		1%	0%	20%	0%	1%	22%	5%	0%	5%	26%	5%	12%	0%	0%	1%	0%	0%	209.1

SOUTHEAST: Gloucester-Letrium, River Ridge		length	#	total	Area Cost Share M$															
Facility	Limits	km		m$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
RDS-Roads																					
Alta Vista Parkway	Walkley-Nicholas	5.5	400	66.0	1.3		23.9		0.1	22.3	7.4	0.2	3.7	2.7	3.6	0.6		0.1			
Airport Parkway	Brookfield-Airport	6.4	401	18.5			1.4		0.0	11.5	0.0		1.0	4.2	0.2	0.1					
Armstrong/Strandherd	Bridge over Rideau River	0.4	402/403	20.0	0.1	0.0	1.5	0.0	0.7	1.3	0.5	0.1	0.3	5.2	0.4	8.4	0.2	0.3	0.8	0.1	0.1
Armstrong	Rideau River-River Rd	0.4	402/403	1.7	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.4	0.0	0.7	0.0	0.0	0.1	0.0	0.0
Armstrong	River Rd-Bowesville	5.9	402/403	19.9	0.1	0.0	1.5	0.0	0.7	1.3	0.5	0.1	0.3	5.2	0.4	8.3	0.2	0.3	0.8	0.1	0.1
Armstrong	Bowesville-Highway 31	4.3	402/403	4.5	0.0	0.0	0.3	0.0	0.2	0.3	0.1	0.0	0.1	1.2	0.1	1.9	0.0	0.1	0.2	0.0	0.0
Bowesville	Armstrong-Airport Parkway	4.5	407	10.4			1.5							7.6	0.3	0.9	0.0	0.0			
Bronson	Heron-Sunnyside	1.6	408	5.8			0.4		0.0	3.2	0.1	0.0	0.1	1.5		0.4					
Conroy	Walkley-HuntClub	2.4	409	12.8			2.5		0.3	2.2			1.7	2.2	1.4	2.0		0.0	0.4	0.1	
Conroy	Hunt Club-Highway 31	3.4	410	6.3			1.4		0.0	0.8			1.0	1.5	0.8	0.8		0.0			
Hawthorne	Hunt Club-Russell	1.8	411	4.6			0.8		0.0	0.7			0.4	1.0	0.3	1.4			0.1	0.0	
Highway 31	Mitch Owens-Armstrong	4	412	5.9			3.7						0.2		2.0						
Highway 31	Armstrong-Conroy	2.5	413	3.7			0.9			0.3			1.2	0.6	0.4	0.3		0.0			
Hunt Club	Hawthorne-Highway 417	1.3	414	7.0	0.2		1.3			2.8	2.6	0.0			0.0						
Limebank	Armstrong-Leitrim	2	415	7.1			0.1							7.0							
Limebank	Leitrim-River	2.7	416	9.1			0.1							9.0							
River Rd	Limebank-Hunt Club	1.6	417	5.8			0.3							5.2		0.3		0.0			
		50.7		209.1	$1.8	$0.0	$41.9	$0.0	$2.2	$46.9	$11.3	$0.4	$10.1	$54.5	$9.9	$26.0	$0.4	$0.9	$2.3	$0.4	$0.1

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EAST - Gloucester, Cumberland		length	#	Area Cost Share %																	total
Facility	Limits	km		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	m$
RDS-Roads																					
BBHBP	Walkley-Navan	2.2	300			27%				68%	5%										1.7
BBHBP ext	Navan-Trim	6.9	301			23%				76%	1%										5.6
Cyrville	Innes-St Laurent	2.9	302	1%		31%				56%	9%	0%	0%	1%	1%						16.5
Highway 17	Cyrville-Montreal	4.0	303			42%			51%	6%	0%										9.0
Innes	Highway 417-Blair	1.5	304			27%				65%	8%										2.9
Innes	Orleans-Jeanne D'Arc	2.5	305			27%				72%	0%										8.6
Innes	Jeanne D'Arc-Trim	4.4	306	0%		27%				70%	3%										15.9
Mer Bleue	BBHBP-Innes	1.0	307							87%	13%										3.5
Navan	BBHBP ext-BBHBP	1.5	308			19%				73%	7%										5.4
StJoseph	Jeanne d'Arc-Ring Road	2.1	309			43%				54%	3%										6.8
St Joseph	Tenth line-Trim	1.7	310		2%	56%			4%	7%	29%	0%		1%			0%				5.9
Trim	Innes-Highway 17	3.7	314	0%	10%	46%	7%	3%	17%	7%	8%			0%	0%			1%			13.4
Walkley	Highway 417-Base Line	0.5	312			18%				77%	4%										1.8
Walkley	Base Line-BBHBP	2.0	313			18%				77%	4%										4.5
		36.9		0%	1%	32%	1%	0%	7%	51%	6%	0%	0%	0%	0%		0%	0%			101.5

EAST - Gloucester, Cumberland		length	#	total	Area Cost Share M$																
Facility	Limits	km		m$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
RDS-Roads																					
BBHBP	Walkley-Navan	2.2	300	1.7			0.5				1.2	0.1									
BBHBP ext	Navan-Trim	6.9	301	5.6			1.3				4.2	0.0									
Cyrville	Innes-St Laurent	2.9	302	16.5	0.2		5.2				9.2	1.5	0.0	0.1	0.2	0.1					
Highway 17	Cyrville-Montreal	4.0	303	9.0			3.8			4.6	0.6	0.0									
Innes	Highway 417-Blair	1.5	304	2.9			0.8				1.9	0.2									
Innes	Orleans-Jeanne D'Arc	2.5	305	8.6			2.3				6.2	0.0									
Innes	Jeanne D'Arc-Trim	4.4	306	15.9	0.0		4.3				11.2	0.4									
Mer Bleue	BBHBP-Innes	1.0	307	3.5							3.0	0.5									
Navan	BBHBP ext-BBHBP	1.5	308	5.4			1.0				4.0	0.4									
StJoseph	Jeanne d'Arc-Ring Road	2.1	309	6.8			2.9				3.7	0.2									
St Joseph	Tenth line-Trim	1.7	310	5.9		0.1	3.3			0.2	0.4	1.7	0.0		0.1			0.0			
Trim	Innes-Highway 17	3.7	314	13.4	0.0	1.4	6.2	1.0	0.4	2.3	0.9	1.1			0.0	0.0			0.1		
Walkley	Highway 417-Base Line	0.5	312	1.8			0.3				1.4	0.1									
Walkley	Base Line-BBHBP	2.0	313	4.5			0.8				3.5	0.2									
		36.9		101.5	$0.3	$1.5	$32.8	$1.0	$0.4	$7.1	$51.3	$6.4	$0.1	$0.1	$0.3	$0.2		$0.0	$0.1		

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INSIDE GREENBELT		length	#	Area Cost Share %																total
Facility	Limits	km		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	m$
RDS-Roads																					
Baseline	Richmond-Greenbank	2.3	500			27%		8%						0%	18%	1%	2%	38%	2%	3%	9.4
Bronson	Laurier-Wellington	0.5	501	16%		2%	80%											3%			13.5
Coventry	Lola-St Laurant	0.4	502	0%		13%			55%	29%	3%			0%							1.4
Hunt Club	Highway 416-CNR	8.1	503			19%		22%							5%		1%	47%	3%	3%	11.0
Hunt Club	CNR-Hwy 16	0.6	504/505	1%	0%	9%	1%	20%	14%	1%	0%	2%	30%	1%	4%			15%	1%	1%	0.4
Hunt Club	Hwy 16-Bowesville	1.1	506			6%		26%					2%		42%		0%	22%	1%	1%	1.5
Hunt Club	Bowesville-Airport Parkway	2.7	507			4%		12%	28%				1%		36%	0%	0%	16%	1%	1%	3.7
Hunt Club	Airport Parkway-Bank	0.9	508/509	1%	1%	8%	3%	9%	39%	5%	0%	5%	2%	0%	18%	0%	0%	8%	0%	0%	1.4
River Rd	McArthur-Montreal	0.2	5110	1%		16%			53%	25%	4%			1%							1.1
Scott	Churchill-Island Pk Dr	1.0	512			26%		20%							14%		2%	38%	1%		1.7
Scott	CPR-Empress	1.0	513			15%		44%					0%		24%		1%	15%			5.3
Riverside	Hogs Back-Heron	0.5	514			14%		4%	16%			2%	26%	0%	35%		1%	1%	1%		0.7
		22.5		4%	0%	14%	21%	14%	6%	1%	0%	0%	1%	0%	12%	0%	1%	23%	1%	1%	51.1

INSIDE GREENBELT		length	#	total	Area Cost Share M$															
Facility	Limits	km		m$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
RDS-Roads																					
Baseline	Richmond-Greenbank	2.3	500	9.4			2.6		0.7						0.0	2	0.1	0.2	3.6	0.2	0.3
Bronson	Laurier-Wellington	0.5	501	13.5	2.2		0.2	10.8											0.3		
Coventry	Lola-St Laurant	0.4	502	1.4	0.0		0.2			0.8	0.4	0.0			0.0						
Hunt Club	Highway 416-CNR	8.1	503	11.0			2.1		2.4							0.5		0.1	5.2	0.4	0.3
Hunt Club	CNR-Hwy 16	0.6	504/505	0.4	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0			0.1	0.0	0.0
Hunt Club	Hwy 16-Bowesville	1.1	506	1.5			0.1		0.4					0.0		0.6		0.0	0.3	0.0	0.0
Hunt Club	Bowesville-Airport Parkway	2.7	507	3.7			0.2		0.4	1.1				0.0		1.3	0.0	0.0	0.6	0.0	0.0
Hunt Club	Airport Parkway-Bank	0.9	508/509	1.4	0.0	0.0	0.1	0.0	0.1	0.5	0.1	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0
River Rd	McArthur-Montreal	0.2	5110	1.1	0.0		0.2			0.6	0.3	0.0			0.0						
Scott	Churchill-Island Pk Dr	1.0	512	1.7			0.4		0.3							0.2		0.0	0.6	0.0	
Scott	CPR-Empress	1.0	513	5.3			0.8		2.3					0.0		1.3		0.0	0.8		
Riverside	Hogs Back-Heron	0.5	514	0.7			0.1		0.0	0.1			0.0	0.2	0.0	0.3		0.0	0.0	0.0	
		22.5		51.1	$2.2	$0.0	$7.0	$10.8	$6.9	$3.1	$0.8	$0.1	$0.1	$0.4	$0.0	$6.3	$0.1	$0.3	$11.7	$0.7	$0.7

ANNEX "B"

POTENTIAL FOR RESIDENTIAL GROWTH IN LEITRIM REFLECTING CURRENT TRANSPORTATION CONDITIONS

LEITRIM SCREENLINE

	1996 Volumes		1996 Capacity	
Links	Vehs/hr	PCUs/hr	Vehs/hr	PCUs/hr
Highway 31	650	750	1,500	1,625
Albion Road	500	550	1,000	1,075
Hawthorne Road	350	400	900	1,000
Total	1,500	1,700	3,400	3,700

Spare Capacity @ LOS "E"

1. Hawthorne Included = 2,000 x .9 = 1,800 PCUs
2. Hawthorne Excluded = 1,400 x .9 = 1,250 PCUs

Assume that every 100 dwelling units have 50% Singles and 50% Townhomes.

PCUs per 100 DUs into Leitrim in PM Peak Hour = 50 x .66 + 50 x .55 = 61 PCUs.

Assume 90% of trips are from the north, east and west and cross the Leitrim Screenline, i.e., 55 PCUs per 100 DUs.

CONCLUSION

If all the development in Leitrim were to occur in one year (1996-97), it would be possible for the existing road system to support between 3,300 and 2,300 dwelling units, depending on whether the Hawthorne Road spare capacity is included in the calculation or not.

It is not realistic to assume that the development of Leitrim could occur all in the next year and that the available spare transportation capacity should be totally consumed by traffic generated solely in Leitrim.

The more likely scenario is that development in Leitrim, if begun in the next few years, would be phased over a number of years. Under such assumptions, what would be the number of dwelling units that could be supported by the existing road system, allowing for both traffic generated by Leitrim growth and background traffic growth on the road system due to growth in the rural areas of south Gloucester and Osgoode, along with growth external to RMOC?

With an assumed background traffic growth of 3.5% per annum, every year traffic will grow by 50 to 60 PCUs per hour in the p.m. peak. With an assumed development rate in Leitrim of 150 DUs per annum beginning in 1997, an additional 80 PCUs per hour would be added to the road network at the Leitrim screenline, for a total of 130/140 PCUs/hr/annum (growth + background traffic - without/with Hawthorne Road).

Therefore, the number of years and the number of dwelling units in Leitrim before the current spare capacity would be exhausted:

With Hawthorne Road	1,800/140 = 12.85 years
No. of DUs	12.85 x 150 = 1,900 DUs
Without Hawthorne Road	1,250/130 = 9.6 years
No. of DUs	9.6 x 150 = 1,450 DUs