



Dharma Developments

ORVILLE STREET DEVELOPMENT

TRANSPORTATION BRIEF

OCTOBER 2007



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1. INTRODUCTION

This Transportation Brief (TB) relates to the proposed Orville Street Development by Dharma Developments, located in the Southeast quadrant of the Stittsville Main Street/Orville Street intersection.

The TB has followed the prescribed process for studies of this nature in accordance with the City of Ottawa Transportation Impact Assessment Guidelines (October 2006).

2. PROPOSED DEVELOPMENT

2.1 Site Location

The location of the proposed development is indicated on EXHIBIT 1 –SITE LOCATION. The proposed development is located on vacant land in the southeast quadrant of the Stittsville Main Street/Orville Street intersection.

2.2 Land Uses

The proposed development will consist of residential and commercial components situated on separate lots in the southeast quadrant of the Stittsville Main Street/ Orville Street intersection. The main residential component of the development is located at 4 Orville Street and will consist of 38 units contained within 19 stacked townhouses. The proposed commercial component will consist of two buildings located at the rear of the existing lots of 1531, 1535 and 1539 Stittsville Main Street. Each of the two buildings will contain office space on the ground floor with apartments on the second floor.

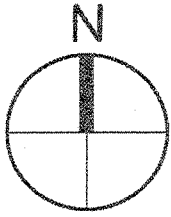
The details of the land uses proposed within each component of the development are indicated on EXHIBIT 2 – PROPOSED DEVELOPMENT and are as follows:

Residential Lot:

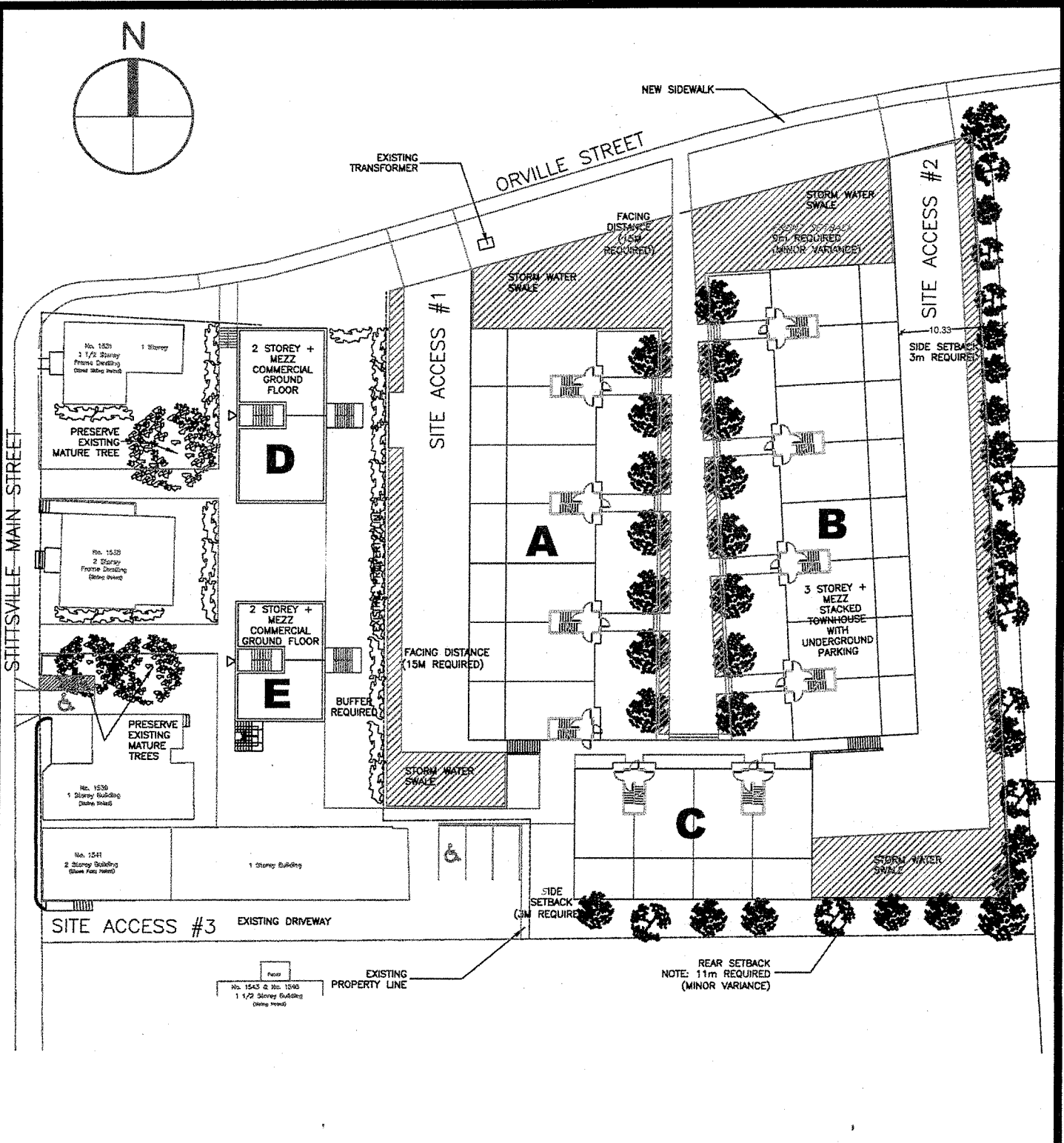
- Building Block A – 14 units (7stacked townhouses)
- Building Block B – 16 units (8 stacked townhouses)
- Building Block C – 8 units (4 stacked townhouses)

Commercial Lot:

- Building D:
 - Office – 1,593 ft²
 - Apartments – 3 units



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ORVILLE STREET DEVELOPMENT
TRANSPORTATION BRIEF
EXHIBIT 2
PROPOSED DEVELOPMENT

DATE	SCALE	DWG. NO.
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- Building E:
 - Office – 1,098ft²
 - Apartments – 2 Units

2.3 Site Access and Parking

There are two access driveways to the site proposed along Orville Street, as indicated on Exhibit 2. These access points will allow full movements access to/ from Orville Street and will each function as an unsignalized intersection with stop control on the site access approach.

Site access driveway #1 will provide access to an underground parking garage on the commercial lot and the individual underground parking garages for the stacked townhouses within Building Block 'A'. The proposed underground parking garage serving Buildings 'D' and 'E' will contain 17 compact parking spaces and 14 standard parking spaces. Each stacked town house within Building Block 'A' will contain an underground parking garage with two parking spaces, one for each of the units within the townhouse.

Site access driveway #2 will provide access to the underground parking garages for the stacked townhouses within Building Blocks 'B' and 'C'. Each stacked town house in Building Block 'B' will have a parking garage containing two parking spaces, one for each of the units within the townhouse. Parking for Building Block 'C' will consist of an underground parking garage containing 8 parking spaces, one for each of the units within the Building Block.

Visitor parking will be provided in the commercial parking garage outside of work hours.

There is also an existing access driveway (Site access #3) along Stittsville Main Street that will provide access to three surface parking spaces on the commercial lot. Full movements access to/ from Stittsville Main Street will be provided at this location.

A new concrete sidewalk will be provided along the site frontage on Orville Street and will connect to the existing sidewalk along Stittsville Main Street. Pedestrian pathways located between the existing buildings on the commercial lot will provide additional access to the commercial components of the development.

3. TRANSPORTATION NETWORK

3.1 Existing Road Network

3.1.1 STITTSVILLE MAIN STREET

Stittsville Main Street is a two-lane undivided arterial road under the jurisdiction of the City of Ottawa, with a posted speed limit of 50 km/h. Stittsville Main Street is the only north-south arterial road in Stittsville and provides the main connection between Fernbank Road to the south and Hazeldean Road to the north.

3.1.2 ORVILLE STREET

Orville Street is a two-lane undivided local road under the jurisdiction of the City of Ottawa with a posted speed limit of 40 km/h.

3.1.3 ABBOTT STREET

Abbott Street is a two-lane undivided road under the jurisdiction of the City of Ottawa with a posted speed limit of 40 km/h in the vicinity of Stittsville Main Street. Abbott Street is classified as a collector road west of Stittsville Main Street and as a major collector to the east.

3.1.4 CARLETON CATHCART STREET

Carleton Cathcart Street is a two-lane undivided local road under the jurisdiction of the City of Ottawa with a speed limit of 50 km/h.

3.1.5 EXISTING LANE CONFIGURATIONS

TABLE 1 – EXISTING LANE CONFIGURATIONS, indicates the type of traffic control and lane configurations at each of the intersections within the study area.

**TABLE 1
EXISTING LANE CONFIGURATIONS**

Intersection	Traffic Control	Lane Configurations ¹			
		EB	WB	NB	SB
Stittsville Main Street/Orville Street	Unsignalized	-			
Stittsville Main Street/Abbott Street	Signalized				
Stittsville Main Street/Carleton Cathcart Street	Signalized				

Notes:

1. Channelized right-turn lane.

APPENDIX 1 – PHOTOS, presents photographs of the existing road network adjacent to the proposed site.

3.2 Existing Bicycle Network

Stittsville Main Street and Abbott Street are designated as Spine or City-wide Cycling Routes in the draft report of the Ottawa Cycle Plan (OCP), prepared by the City of Ottawa in March 2005. The spine system will consist of cycling routes designed to provide direct links between major nodes

throughout the City. Both Stittsville Main Street and Abbott Street have shared vehicle/bicycle lanes.

Orville Street is designated as a community cycling route in the OCP. There are no specific facilities for cyclists along Orville Street.

3.3 Existing Pedestrian Network

Concrete sidewalks are provided along both sides of Stittsville Main Street. As well, there is a concrete sidewalk provided along one side of Abbott Street. There are no specific facilities provided for pedestrians along Orville Street.

3.4 Existing Transit Service

The section of Stittsville Main Street adjacent to the proposed site is serviced by OC Transpo Route #s 96 and 263. Route #96 is an all-day transit service between the Goulbourn Recreation Centre and the Hurdman transit station, via downtown Ottawa. Route #263 is a rural express route offering weekday morning and afternoon peak period service from Fallowfield Road, south of Stittsville, to Hurdman transit station via downtown Ottawa. Both of these routes can be accessed via bus stops on either side of Stittsville Main Street at the Stittsville Main Street/ Orville Street intersection.

3.5 Existing Traffic Volumes

Existing Traffic volumes along the Stittsville Main Street corridor have been derived from traffic counts recorded in 2006 by the City of Ottawa and Geospace Research Associates at the following intersections:

- Stittsville Main Street/Abbott Street (City)
- Stittsville Main Street/Orville Street (Geospace)
- Stittsville Main Street/Carleton Cathcart Street (City)

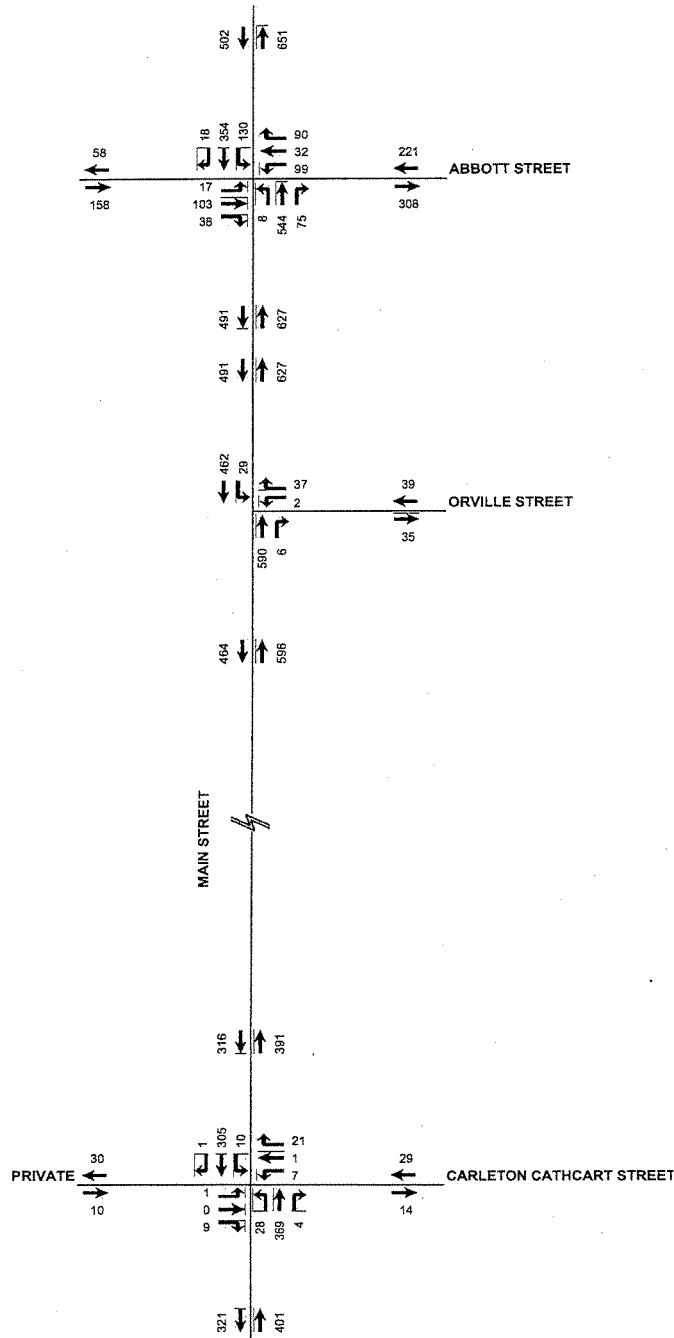
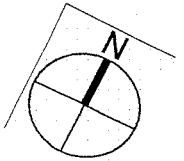
The Site Traffic Assessment report for the Proposed Apartment Development, Orville Street, prepared by McIntosh Perry Consulting Engineers in June 2002, recommends that an annual traffic growth rate of 2% be used in forecasting future background traffic volumes along Stittsville Main Street. Representative 2007 traffic volumes have been derived from the data above by applying the annual background traffic growth rate of 2% to the arterial and collector road traffic volumes.

EXHIBIT 3A – EXISTING (2007) TRAFFIC, AM PEAK HOUR and EXHIBIT 3B – EXISTING (2007) TRAFFIC, PM PEAK HOUR, present details of the 2007 representative traffic volumes for the intersections indicated above during the weekday morning and afternoon peak hours.

Details of the existing traffic data indicated above are included in APPENDIX 2 – TRAFFIC DATA.

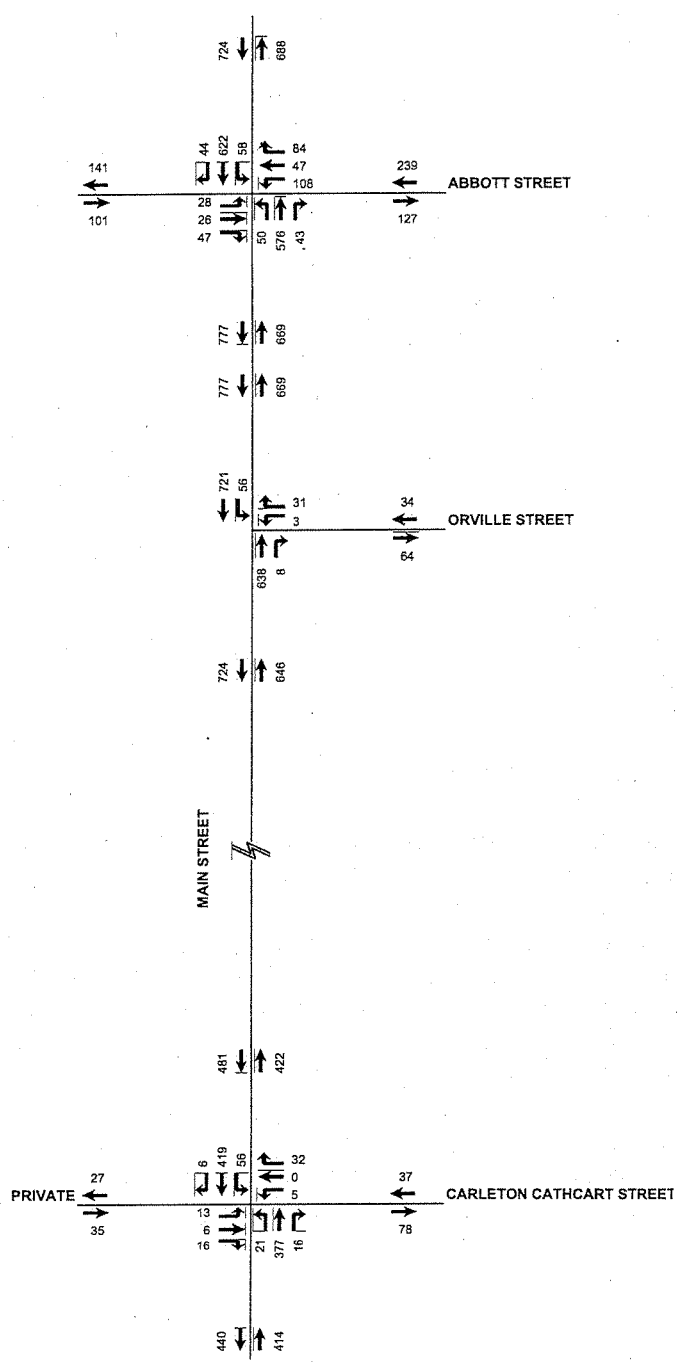
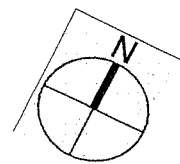
3.6 Site Visit

A site visit was made on April 17, 2007 in the afternoon peak period to observe traffic operations in the study area. In particular, the existing traffic conditions at the Stittsville Main Street/ Orville Street intersection were observed closely during the afternoon peak hour between (4:30pm - 5:30pm). During that time 54 veh/h were observed making the southbound left turn at the intersection while 2



**ORVILLE STREET DEVELOPMENT
TRANSPORTATION BRIEF**
EXHIBIT 3A
EXISTING (2007) TRAFFIC
AM PEAK HOUR

DATE 4/20/2006	SCALE -	PROJECT NO. 12073
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**ORVILLE STREET DEVELOPMENT
TRANSPORTATION BRIEF**
EXHIBIT 3B
EXISTING (2007) TRAFFIC
PM PEAK HOUR

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4/20/2006	-	12073

veh/h were observed at the critical westbound left-turn movement. These volumes correspond closely to the volumes recorded for these movements during the traffic count conducted by Geospace Research associates in June, 2006, presented in Exhibit 3B.

There were no significant delays to traffic observed at the intersection during the site visit. Left-turning traffic experienced delays of less than 10 seconds throughout the peak hour, which suggests that the intersection is operating at a high Level of Service. As well, with the minimal delays experienced by traffic, there was very little queuing observed on the approaches to the intersection.

3.7 Collision Records

A review of historical collision records has been carried out for the study area. The City of Ottawa Transportation Impact Assessment Guidelines (October 2006) indicate that further analysis may be warranted when there have been either 33 or more total collisions reported at a particular location or at least six collisions for any one movement, over a three year period.

TABLE 2 – REPORTED COLLISIONS ALONG STITTSVILLE MAIN STREET presents a summary of the total collisions recorded in the study area during the period between January 1, 2004 and December 31, 2006.

TABLE 2

REPORTED COLLISIONS ALONG STRANDHERD DRIVE

Location	# of Reported Collisions (January 1, 2004 to December 31, 2006)
Stittsville Main Street/ Abbott Street intersection	9
Stittsville Main Street – Abbott Street to Orville Street	4
Stittsville Main Street/ Orville Street intersection	3
Stittsville Main Street/ Carleton Cathcart Street	3

Based on the above, the locations investigated in this study fall well below the City’s warrant for further analysis with respect to total reported collisions. As well, there were no discernible collision patterns apparent in the study area.

APPENDIX 3 – COLLISION DATA, presents the detailed collision records for the study area.

3.8 Transportation Demand Management

The City of Ottawa has included Transportation Demand Management (TDM) in the official transportation policies of the City of Ottawa Official Plan (May 2003) and is committed to implementing TDM measures on a City-wide basis in an effort to reduce the automobile dependence of Ottawa residents, particularly during the weekday peak travel periods. TDM

initiatives are aimed at encouraging individuals to use non-auto modes of travel during the peak periods.

The proposed development conforms to the City's TDM principles and in particular, the policies defined in Section 4.3 of the Official Plan, by providing easy access to non-auto modes of travel with an internal network of sidewalks and direct connections to the pedestrian and transit facilities along Stittsville Main Street.

4. TRAFFIC ANALYSES

4.1 Trip Generation

Traffic Generation associated with the proposed Orville Street development has been estimated based on data included in the publication, "Trip Generation", 7th Edition, 2003, published by the Institute of Transportation Engineers (ITE), Washington.

4.1.1 STACKED TOWNHOUSES

ITE Land Use Code 230 "Residential townhouse/ Condominium" has been referenced for trip generation data.

- **Morning Peak Hour**

Traffic Generation = T, where

$\ln(T) = 0.80 \ln(X) + 0.26$, where

X = # of units

Directional Distribution = 17% Entering; 83% Exiting

- **Afternoon Peak Hour**

Traffic Generation = T, where

$\ln(T) = 0.82 \ln(X) + 0.32$, where

X = # of units

Directional Distribution = 67% Entering; 33% Exiting

4.1.2 OFFICE

Land Use Code 710 "General Office Building" has been referenced for trip generation data.

- **Morning Peak Hour**

Average vehicle trip rate per 1,000ft² GFA = 1.55

Directional Distribution = 88% Entering; 12% Exiting

- **Afternoon Peak Hour**

Average vehicle trip rate per 1,000ft² GFA = 1.49

Directional Distribution = 17% Entering; 83% Exiting

4.1.3 APARTMENT

ITE Land Use Code 220 "Apartment" has been referenced for trip generation data.

- **Morning Peak hour**

Average vehicle trip rate per unit = 0.51

Directional Distribution = 20% Entering; 80% Exiting

- **Afternoon Peak Hour**

Average vehicle trip rate per unit = 0.62

Directional Distribution = 65% entering; 35% Exiting

4.1.4 RESIDENTIAL DEVELOPMENT AT 37 ORVILLE STREET

The parcel of land at 37 Orville Street is being developed by another developer and will consist of three 20 unit apartment buildings. At present, one of the three buildings has been constructed. It has been assumed therefore that traffic generated by these 20 units is included in the traffic counts recorded in 2006. Future traffic generated by the 40 units still to be built has been estimated using data included in ITE Land Use Code 221 "Low-Rise Apartment".

- **Morning Peak Hour**

Traffic Generation = T, where

$\ln(T) = 0.82 \ln(X) + 0.23$, where

X = # of units

Directional Distribution = 21% Entering; 79% Exiting

- **Afternoon Peak Hour**

Traffic Generation = T, where

$\ln(T) = 0.88 \ln(X) + 0.16$, where

X = # of units

Directional Distribution = 65% Entering; 35% Exiting

TABLE 3 – TRIP GENERATION SUMMARY, presents details of the total traffic generation estimated for each land use component of the proposed development by Dharma Developments, as well as the traffic generated by the apartment building development at 37 Orville Street.

TABLE 3
TRIP GENERATION SUMMARY

Land Use	# of Units/ Gross Floor Area (ft ²)	Trip Generation (veh/h)					
		AM Peak Hour			PM Peak Hour		
		Total	Entering	Exiting	Total	Entering	Exiting
Dharma Developments – 4 Orville Street							
Stacked Townhouses	38 units	24	4	20	27	18	9
Apartments	4 units	2	0	2	2	1	1
Office	2,691 ft ²	4	4	0	4	1	3
Total – 4 Orville Street		30	8	22	33	20	13
37 Orville Street (other developer)		26	5	21	30	20	10
Total		56	13	43	63	40	23

APPENDIX 4 – TRIP GENERATION DATA presents extracts from the ITE Manual.

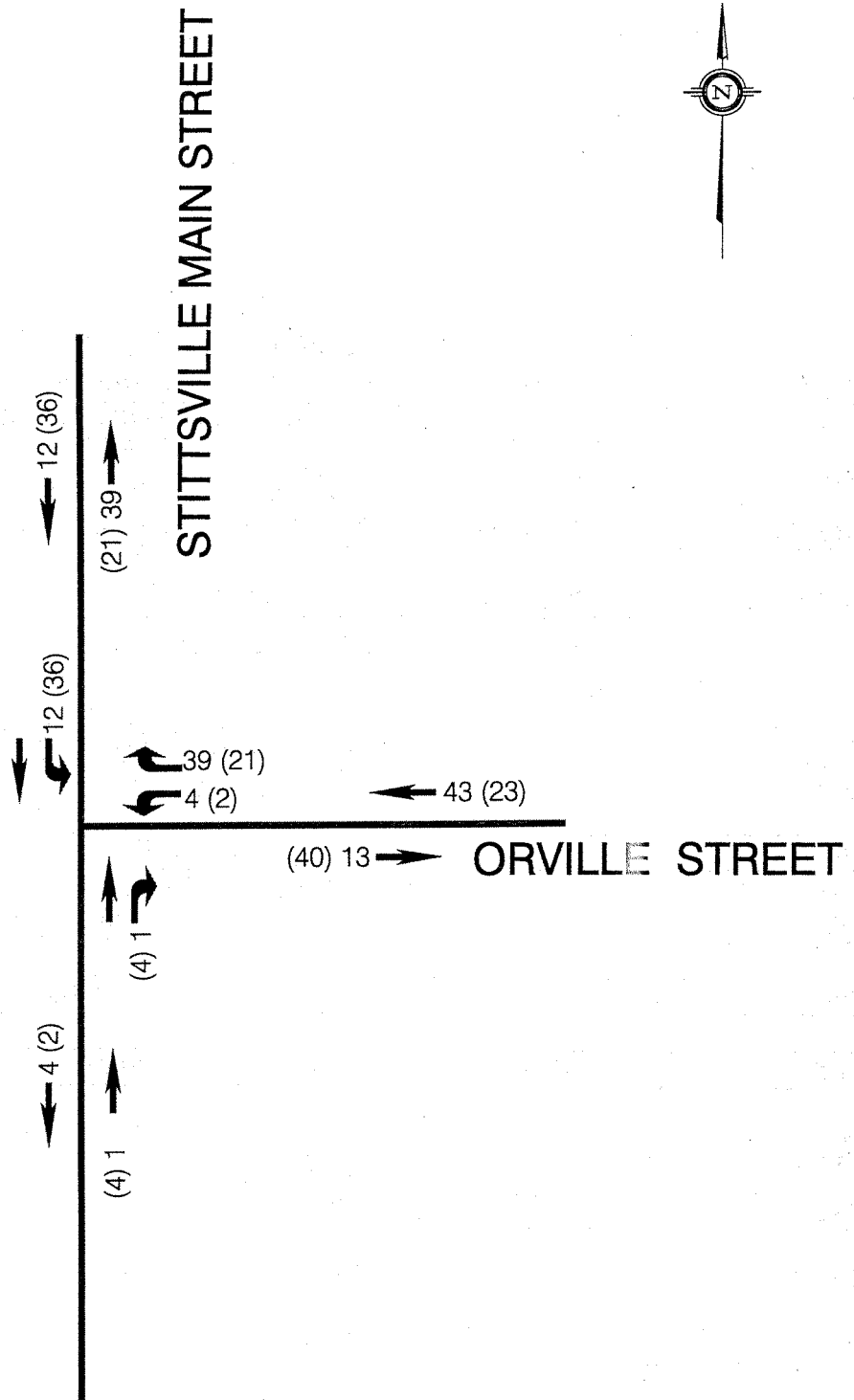
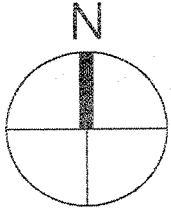
4.2 Traffic Distribution

The site generated traffic presented in table 3, has been assigned to the adjacent road network according to the following distribution:

- 90% to/ from the north
- 10% to/from the south

These distribution factors have been derived based on the existing distribution of traffic at the Stittsville Main Street/ Orville Street intersection.

EXHIBIT 4 – SITE GENERATED TRAFFIC, AM PEAK HOUR (PM PEAK HOUR), presents the total site generated traffic volumes along Orville Street, representing traffic generated by both the Dharma Developments site and the apartment building development at 37 Orville Street, during the weekday morning and afternoon peak hours.



Notes:

The traffic volumes presented in this exhibit represent the estimated traffic generated by the future development proposals at 4 Orville Street (Dharma Developments) and 37 Orville Street (other developer).



ORVILLE STREET DEVELOPMENT
 TRANSPORTATION BRIEF
 EXHIBIT 4
 SITE GENERATED TRAFFIC - AM PEAK HOUR
 (PM PEAK HOUR)

DATE	SCALE	DWG. NO.
22-04-07	N.T.S.	01

4.3 Intersection Capacity Analyses

The intersection capacity of a **traffic signal controlled** intersection, is commonly expressed by the manner in which an intersection functions in terms of the "Level of Service" it provides.

In qualitative terms, the Level of Service defines operational conditions within a traffic stream and their perception by motorists. A level-of-service definition generally describes these conditions in terms of such factors as delay, speed and travel time, freedom to manoeuvre, traffic interruptions, safety, comfort and convenience. Level of Service can also be related to the ratio of the volume: capacity (v/c) which is simply the relationship of the traffic volume (either measured or forecast) to the capability of the intersection or road section to accommodate a given traffic volume. This capability varies depending on the factors described above.

Levels of Service are given letter designations from A to F. Level of Service "A" represents the best operating conditions and Level of Service "E" represents the level at which the intersection or an approach to the intersection is carrying the maximum traffic volume that can, practicably, be accommodated. Level of Service F indicates that the intersection is operating beyond its theoretical capacity.

The City of Ottawa has developed criteria as part of the Transportation Impact Assessment Guidelines, which directly relate the volume to capacity (v/c) ratio of a signalized intersection to a Level of Service designation. These criteria are as follows:

LEVEL OF SERVICE CRITERIA – SIGNALIZED INTERSECTIONS

Level of Service	Volume to Capacity (v/c) Ratio
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	> 1.00

The intersection capacity analysis technique provides an indication of the Level of Service for each movement at the intersection under consideration and for the intersection as a whole. The overall v/c ratio for an intersection is defined as the sum of equivalent volumes for all critical movements at the intersection divided by the sum of capacities for all critical movements.

The capacity of an **unsignalized** intersection can also be expressed in terms of the "Level of Service" it provides. For an unsignalized intersection, the Level of Service is defined in terms of the average movement delays at the intersection. This is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line, this includes the time required for a vehicle to travel from the last – in – queue position to the first – in – queue position. The average delay for any particular minor movement at the unsignalized intersection is a function of the capacity of the approach and the degree of saturation.

The Highway Capacity Manual 2000 (HCM), prepared by the Transportation Research Board, includes the following Levels of Service criteria for unsignalized intersections, related to average movement delays at the intersection.

LEVEL OF SERVICE CRITERIA - UNSIGNALIZED INTERSECTIONS

Level of Service	Delay Range (sec/veh)
A	<10
B	>10 and <15
C	>15 and <25
D	>25 and <35
E	>35 and <50
F	>50

The unsignalized intersection capacity analysis technique included in the HCM and used in the current study, provides an indication of the Level of Service for each movement of the intersection under consideration. By this technique, the performance of the unsignalized intersection can be compared under varying traffic conditions, using the Level of Service concept in a qualitative sense. One unsignalized intersection can be compared with another unsignalized intersection using this concept. Level of Service "E" represents the capacity of the movement under consideration and generally, in large urban areas, Level of Service "D" is considered to represent an acceptable operating condition (Level of Service "E" is considered an acceptable operating condition for planning purposes for intersections located in Ottawa's Urban Core – the downtown and its vicinity). Level of Service "F" indicates that the movement is operating beyond its design capacity.

Intersection capacity analyses have been undertaken for the major intersections within the study area for the weekday morning and afternoon peak hours, under existing (2007) traffic conditions. The analysis has incorporated existing traffic signal timing plans provided by the City of Ottawa.

TABLE 4 – INTERSECTION CAPACITY ANALYSIS, EXISTING (2007) TRAFFIC, presents the results of the intersection capacity analyses conducted under existing traffic conditions.

TABLE 4
INTERSECTION CAPACITY ANALYSIS
EXISTING (2007) TRAFFIC

Intersection	Level of Service (v/c ratio)												
	Overall	Approach											
		EB			WB			NB			SB		
		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak Hour													
Sittsville Main/ Abbott	A (0.44)	(0.05)	(0.29)	(0.32)	(0.07)	(0.19)	(0.01)	(0.49) ¹	(0.08)	(0.31) ¹	(0.34)		
Stittsville Main/ Orville	B (0.35)²	-		(0.08)			-	(0.35)		(0.03)		-	
Stittsville Main/ Carleton Cathcart	A (0.23)	(0.02)		(0.02)	(0.05)		(0.05)	(0.33) ¹		(0.02) ¹	(0.27)		
PM Peak Hour													
Sittsville Main/ Abbott	C (0.75)	(0.05)	(0.11)	(0.21)	(0.07)	(0.13)	(0.33) ¹	(0.71)	(0.06)	(0.27)	(0.83) ¹		
Stittsville Main/ Orville	C (0.38)²	-		(0.09)			-	(0.38)		(0.06)		-	
Stittsville Main/ Carleton Cathcart	A (0.27)	(0.08)		(0.01)	(0.04)		(0.04) ¹	(0.34)		(0.10)	(0.37) ¹		

Notes:

1. Critical movements used to calculate the overall intersection v/c ratio
2. Maximum v/c ratio stated.

Details of the intersection capacity analyses summarized above are included in APPENDIX 5 – INTERSECTION CAPACITY ANALYSES.

5. FINDINGS AND CONCLUSIONS

Based on the above, the main findings and conclusions of this Transportation Brief are as follows:

- **Stittsville Main Street/ Abbott Street**

The results of the intersection capacity analyses indicate that the intersection is presently operating at acceptable Levels of Service (LOS "A" and "C" respectively) during the weekday morning and afternoon peak hours. There is sufficient capacity available at this intersection to accommodate the traffic volumes generated by the future development on Orville Street.

- **Stittsville Main Street/ Carleton Cathcart Street**

The results of the analyses indicate that the intersection is presently operating at a high Level of Service (LOS "A") during both the weekday morning and afternoon peak hours. There is sufficient capacity available at this intersection to accommodate the traffic volumes generated by the future development on Orville Street.

- **Stittsville Main Street/ Orville Street**

The results of the analyses indicate that the intersection is presently operating at acceptable levels of Service (LOS "B" and LOS "C" respectively) during the weekday morning and weekday afternoon peak hours. The westbound left turn is the critical movement at the intersection and is presently experiencing delays of approximately 13 to 15 seconds during these peak hours. This is well within the range of delay that is considered acceptable at unsignalized intersections. Also, the traffic volumes associated with this movement are very light with only 2 veh/h and 3 veh/h making the left turn during the morning and afternoon peak hours respectively. This is due to the fact that the dominant travel direction for traffic in the area is to/from the north along Stittsville Main Street. As illustrated in Exhibit 4, the future development along Orville Street is estimated to generate an additional 4 vehicles during the morning peak hour and 2 vehicles during the afternoon peak hour at the critical westbound left-turn movement. This is not considered to be a significant increase and can be adequately accommodated at the intersection without experiencing considerable delays.

The other critical movement at the intersection is the southbound left-turn, which will experience a traffic volume increase of 12 veh/h during the morning peak hour and 36 veh/h during the afternoon peak hour, due to the proposed developments along Orville Street. The analysis of existing traffic conditions suggest that the movement is presently operating at a high level of service with minimal delay experienced by left-turning vehicles and negligible queue lengths on the approach. These conditions have been confirmed on-site as described in Section 3.6 above. It is considered therefore, that there is sufficient capacity available at the intersection to accommodate the increase in traffic volumes at this movement.

In summary, the overall conclusion of this Transportation Brief is that the traffic generated by the proposed Orville Street Development by Dharma Developments can be safely accommodated on the adjacent road network.