APPENDIX A

Traffic Study Report, Mayfield Road EA
iTrans Consulting, December 2003

Table of Contents

1. INTRODUCTION

1.1 BACKGROUND AND STUDY PURPOSE

This report documents the traffic study undertaken for the need and justification component of the Class Environmental Assessment for Mayfield Road between Heart Lake Road and Airport Road. Mayfield Road is a boundary road between City of Brampton and Town of Caledon within the Region of Peel. The traffic study was undertaken by iTRANS and Stantec with the assistance and input from public works and planning staff from the Region of Peel.

Exhibit 1 illustrates the study area for the needs assessment undertaken for Mayfield Road.

The need for improvements and additional roadway capacity in the Mayfield Road corridor in the City of Brampton had been previously identified in earlier studies, including the ***Mayfield Road Environmental Assessment and Preliminary Design Study (Hurontario Street to Heart Lake Road)***, the ***Mayfield Road Corridor Feasibility Study (Hurontario Street to Dixie Road)***, and the Region of Peel Official Plan. These studies recommended the widening of Mayfield Road from its current 2-lane cross section to 4 lanes. The Mayfield Road EA study also identified lands to be protected for an ultimate 6-lane cross section between Hurontario Street and Heart Lake Road. The above-mentionned studies were reviewed to extract relevant traffic data, forecasts, analyses, and recommendations.

As part of the Environmental Assessment for Mayfield Road between Heart Lake Road and Airport Road, this study reassesses the transportation need and justification for improvements to Mayfield Road (between Heart Lake Road and Dixie Road) based on updated information. The study also provides the needs assessment for Mayfield between Dixie Road and Airport Road, a section which has not been studied before.

1.2 TRAFFIC ANALYSIS APPROACH

In carrying out the needs assessment, iTRANS with the assistance of Regional staff has prepared traffic forecasts for the study area for the years 2007, 2012, and 2027. Traffic analyses were then undertaken at the link and intersection level for years 2012 and 2021 under various future road network scenarios.

1. 2012 traffic on the existing 2 lanes of Mayfield to address the problem identification, and
2. 2012 traffic with Mayfield Road widened to 4 lanes and intersection improvements to confirm that the problem can be addressed.

3. 2027 traffic on Mayfield Road to confirm ultimate road network and lane configurations

Although 2007 forecasts were prepared, the needs assessment focused on the 10 year and 25 year horizons.

2. REGIONAL AND STUDY AREA CONTEXT

2.1 GROWTH IN THE REGION AND CITY OF BRAMPTON

In the vicinity of the Study Area, substantial growth is projected to occur in the City of Brampton and in Peel Region, as shown in **Tables 1 and 2. Table 1** shows the 2011 and 2021 population forecasts; while **Table 2** shows the employment forecasts compared with 2001 levels. Population and employment growth on a city-wide context has been projected at 30-50% from 2001 to 2011 and 50-80% from 2001 to 2021 for the City of Brampton.

Table 1
Projected Population Growth

	2001	2011	2021	10-year Growth	20-year Growth
Peel Region	1,043,300	1,206,900	1,327,900	16%	27%
City of Brampton	369,000	481,000	553,000	30%	50%
Town of Caledon	50,000	65,000	84,000	30%	68%

Source: Region of Peel Official Plan (May 2001)

Table 2
Projected Employment Growth

	2001	2011	2021	10-year Growth	20-year Growth
Peel Region	520,400	648,200	720,300	25%	38%
City of Brampton	146,000	216,000	257,000	48%	76%
Town of Caledon	17,000	25,000	32,000	47%	88%

Source: Region of Peel Official Plan (May 2001)

With this as the basis, goals and objectives for the future transportation network have been identified in the Region of Peel Official Plan (May 2001). Regional Road Right-of-

Way Requirements of the Official Plan (refer to Schedule F) identified a 50-m right-of-way for Mayfield Road along its entire length across the Region of Peel. The 50-m right-of-way will protect for the future widening of Mayfield Road to accommodate the growth in Brampton, Caledon, and in the Region.

2.2 BACKGROUND STUDIES

There are a number of related studies completed in the vicinity of the study area. These are briefly discussed as follows in regard to the transportation analysis and need for improvements to Mayfield Road:

Mayfield Road Corridor Feasibility Study (Highway 10 to Dixie Road), 1999

In establishing the need for improvements to Mayfield Road, the analysis in this study prepared by Giffels addressed several factors including road capacity and road safety.

The study analyzed existing 1998 and future 2008 daily travel demands and peak hour turning movement volumes. The future transportation analyses were based on detailed link and intersection traffic analyses along Mayfield Road. For the collision analysis, a detailed review of collisions between 1992 and 1997 was undertaken.

Based on the traffic and collision analyses, the study recommended widening Mayfield Road from Hurontario Street to east of Dixie Road from 2 to 4 lanes within 10 years. At the intersection of Mayfield Road and Heart Lake the study also recommended a channelized eastbound right turning lane. However, the study also recommended the re-evaluation of the need for 4 lanes east of Heart Lake Road based on the anticipated completion of the Highway 410 Extension in 2006.

Mayfield Road Class Environment Assessment and Preliminary Design Study (Hurontario Street to Heart Lake Road), November 2002

Stantec prepared a Schedule "C" Class Environment Assessment and Preliminary Design Study for Mayfield Road, from Hurontario Street to Heart Lake Road. The study reviewed the Corridor Feasibility Study and used updated traffic forecasts from the Region of Peel to form the need and justification for widening Mayfield Road. The study documented forecast 2011 volumes in the range of 1,700-1,800 vehicles per hour during the AM and PM peak periods. Stantec used these results and recommended a 4 lane cross section with turning lane improvements at signalized intersections to accommodate the 2011 forecast volumes.

3. TRANSPORTATION ANALYSIS

A transportation analysis for the Study Area was carried out which relied on the previous studies as well as on updated information. The tasks included:

- A review of existing traffic conditions
- Analyses of midblock road links and key intersections
- An assessment of existing transportation deficiencies and local traffic issues
- An assessment of the safety performance for Mayfield Road
- The preparation of travel demand forecasts for the 2007, 2012, and 2027 planning horizons
- An assessment of future corridor travel demands and deficiencies
- The identification of road improvements to accommodate future travel demands

3.1 EXISTING ROAD NETWORK

The existing road network in the study area is illustrated in **Exhibit 2** and described below:

Mayfield Road is an east-west arterial road under the jurisdiction of the Region (Regional Road 14). Mayfield Road has a two-lane paved cross section with gravel shoulders and a posted speed of 80km/h. Within the study area, Mayfield Road intersects with five north-south roads (Heart Lake Road, Dixie Road, Bramalea Road, Torbram Road and Airport Road) all of which form signalized intersections. These intersections are approximately spaced at 1.3-1.4 km intervals along Mayfield Road. In the vicinity of Bramalea Road and Airport Road, the posted speed on Mayfield Road decreases to 60 km/h.

The Ministry of Transportation has planned for the northerly extension of Highway 410, which will also intersect Mayfield Road between Heart Lake Road and Dixie Road. This extension will include a full interchange and has a scheduled completion date of 2006.

Heart Lake Road is a two-lane north-south arterial road under the jurisdiction of the City of Brampton south of Mayfield Road and under the jurisdiction of the Town of Caledon north of Mayfield Road. Posted at 80 km/h, Heart Lake Road is currently carrying significant volumes to and from Highway 410 between Bovaird Drive and Mayfield Road. Once Highway 410 extension is constructed, Heart Lake Road is planned to be a major collector road, which will continue to carry local traffic; while, the Highway 410 extension will carry through traffic currently using Heart Lake Road.

Dixie Road is an 80 km/h, two-lane north-south arterial road, under the jurisdiction of the Region (Regional Road 4). Dixie Road is also subject of a future EA study from Bovaird Drive to Mayfield Road.

Bramalea Road is a two-lane north-south arterial road, which intersects with Mayfield Road east of Dixie Road. The 80km/h road is under the jurisdiction of the City of Brampton south of Mayfield Road and under the jurisdiction of the Town of Caledon north of Mayfield Road.

Torbram Road is a two-lane north-south arterial road, which intersects with Mayfield Road east of Bramalea Road. The 80km/h road is under the jurisdiction of the City of Brampton south of Mayfield Road and under the jurisdiction of the Town of Caledon north of Mayfield Road.

Airport Road is a two lane north-south regional arterial road (Regional Road 7), which intersects with Mayfield Road 1.360km east of Torbram Road. Airport Road is also posted at 80 km/h and is planned to be widened from 2 to 4 lanes between Countryside Drive and Mayfield Road in 2006.

3.2 EXISTING TRAFFIC

3.2.1 Weekday AM and PM Peak Hour Traffic Volumes

Recent turning movement counts were provided by the Region of Peel to develop representative existing traffic volumes in the Study Area. **Table 1** summarizes the sources and dates of the traffic count data used in the study.

Table 1
Traffic Counts – Date and Source

Location	Date	Peak Hour	
		AM	PM
Mayfield Road / Heart Lake Road	Thursday November 1, 2001	7:15 – 8:15	4:30 – 5:30
Mayfield Road / Dixie Road	Thursday September 13, 2001	7:15 – 8:15	5:00 – 6:00
Mayfield Road / Bramalea Road	Friday September 20, 2001	7:15 – 8:15	4:45 – 5:45
Mayfield Road / Torbram Road	Friday September 20, 2001	7:15 – 8:15	4:45 – 5:45
Mayfield Road / Airport Road	Wednesday July 28, 1999	7:00 – 8:00	4:45 – 5:45

As shown in Table 1, the AM and PM peak hours correspond to the hours of 7:15 – 8:15am and 4:45 – 5:45pm.

The existing weekday AM and PM peak hour turning movement volumes on Mayfield Road are shown in **Exhibit 3.** Existing volumes show that the peak direction during the AM and PM peak hour, respectively, is eastbound and westbound. Peak direction peak hour volumes in the AM range from 560 vehicles per hour (west of Airport) to 820 vehicles per hour (east of Heart Lake Road). During the PM peak, volumes range from 440 vehicles per hour (west of Airport) to 835 vehicles per hour (west of Dixie Road). Existing volumes west of Heart Lake Road are higher ranging from 1,000 to 1,200 vehicles per hour.

3.2.2 AADT Volumes

Existing and historical Annual Average Daily Traffic (AADT) volumes on Mayfield Road were also provided by the Region from 1992 to 2001. The historical data are provided in **Appendix A**, while, **Table 2** presents the 2001 AADT volumes on Mayfield Road.

Table 2
Existing 2001 AADT on Mayfield Road

Location	Eastbound AADT	Westbound AADT	Two-Way AADT
1.3 km West of Heart Lake Road	7,310	9,640	16,950
0.7 km West of Dixie Road	5,980	7,080	13,060
0.7 km East of Dixie Road	5,230	5,430	10,660
0.5 km East of Torbram Road	4,200	4,130	8,330
1.1 km East of Airport Road	4,730	5,090	9,820

As shown in Table 2, AADT volumes on Mayfield Road generally decrease from west to east in the eastbound direction and increase from east to west in the westbound direction. In terms of both directions, the two-way AADT also decreases from west to east reflecting the role and function of Mayfield Road as a commuter route carrying traffic from the current urban envelope of Brampton (west of Heart Lake Roads) towards the rural areas of northeast Brampton and across the Peel boundary to York Region and the rest of the GTA.

3.2.3 Historical Growth

Historical growth was determined based on ten years of historical AADT volumes from 1992 to 2001, which were provided by the Region of Peel. AADT volumes along Mayfield Road have consistently increased particularly near the intersections of Heart Lake Road and Dixie Road. In 1992, volumes between Heart Lake Road and Dixie Road were 4,031 vehicles for eastbound traffic and 3,684 vehicles for westbound traffic. Volumes measured in 2001 showed an increase to 5,983 vehicles for eastbound and 7,077

vehicles for westbound, which is an approximate growth of 48% for eastbound traffic and 92% for westbound traffic over ten years (or approximately 4% and 8% per year, respectively).

Large volume increases along Mayfield Road also occurred west of Heart Lake Road where in 1992 eastbound traffic was measured at 4,866 and westbound was 4,642. These values increased to 7,308 vehicles for eastbound traffic and 9,641 vehicles for westbound, which is an approximate growth rate of 50% for eastbound traffic and 108% for westbound traffic over ten years (or approximately 5% and 8% per year, respectively).

3.2.4 Truck Percentages

Truck percentages were obtained through the most recent Peel Region Cordon Count data available. Both the 1998 and 2001 Cordon Count data were used to determine the percentage of trucks along this section of Mayfield Road. Analysis of the Cordon Count data indicates that there are approximately 7-12% trucks over the 15-hour period from 5:30am to 8:30pm.

Peak hour truck percentages were also obtained through the available AM and PM peak hour turning movement count data provided by the Region. Truck percentages ranged as high as 5-10% on Mayfield and 35% for specific turning movements. The high truck percentages indicate that Mayfield Road and the intersecting north-south roads are key truck routes serving the existing mineral aggregate resources located west and north of the study area in Wellington County and Caledon. The high percentages also account for the high development and construction activity in north and north east Brampton (south and south east of the study area).

Based on the above truck percentages, Mayfield is currently carrying approximately 30-60 trucks during the AM and PM peak hours.

3.3 EXISTING LEVEL OF SERVICE

3.3.1 Intersection Analysis

The operations of the study area intersections were analyzed on the basis of the existing turning movement volumes indicated in **Exhibits 3 and 4**, and on the basis of the existing intersection lane configurations shown in **Exhibit 2**.

Analysis of the existing level of service for signalized intersections was analyzed using Synchro 5.0, which is based on the ***2000 Highway Capacity Manual*** (HCM) methodology. The intersection analysis considers two separate measures of performance:

- the volume to capacity ratio (V/C) for each turning movement

- the level of service, LOS, for each turning movement (which is based on the average control delay per vehicle)

Synchro 5 or the HCM methodology does not provide an overall v/c ratio for the intersection. For signalized intersections analyzed, this report documents the maximum v/c ratios and the overall intersection levels of service. **Table 3 and Exhibits 5 and 6** summarize the existing levels of service and volume to capacity ratios on Mayfield Road.

Table 3
Existing Level of Service at Signalized Intersections along Mayfield Road

Signalized Intersection	Time Period	V/C (1)	LOS (2)
Mayfield Road and Heart Lake Road	AM Peak	0.82	D
	PM Peak	0.95	C
Mayfield Road and Dixie Road	AM Peak	0.71	D
	PM Peak	0.87	C
Mayfield Road and Bramalea Road	AM Peak	0.75	D
	PM Peak	0.79	D
Mayfield Road and Torbram Road	AM Peak	0.74	D
	PM Peak	0.73	C
Mayfield Road and Airport Road	AM Peak	0.75	C
	PM Peak	0.79	C

(1) V/C – maximum volume / capacity ratio for the critical movement and not the average for the intersection
(2) LOS – overall intersection level of service

A discussion of the level of service analysis results is provided below:

Mayfield Road and Heart Lake Road

This signalized intersection is currently operating at a Level of Service (LOS) of D during the AM peak hour and a LOS of C during the PM peak hour. For the AM peak hour, the intersection operation is due to southbound through and right vehicles sharing the same lane. Large queues are also forming as a result of heavy eastbound through and right volumes.

Mayfield Road and Dixie Road

This signalized intersection is currently operating at a LOS of D during the AM peak hour and a LOS of C during the PM peak hour. The lower level of service in the AM peak hour is due to high volumes of southbound through and right turn vehicles sharing one lane.

Mayfield Road and Bramalea Road

This signalized intersection is currently operating at a LOS of D for both the AM and PM peak hours. The operations reflect through queues/delays for eastbound vehicles during the AM peak hour and westbound vehicles in the PM peak hour.

Mayfield Road and Torbram Road

This signalized intersection is currently operating at a LOS of D during the AM peak hour and a LOS of C during the PM peak hour. The lower level of service in the AM peak hour is due to high volumes of eastbound through vehicles.

Mayfield Road and Airport Road

This signalized intersection is currently operating at a LOS of C for both the AM and PM peak hours.

3.3.2 Link / Midblock Analysis

For the link analysis, a theoretical link capacity of 900 vehicles per hour per lane was applied to the existing volumes to assess a volume to capacity (v/c) ratio for each link of Mayfield Road. Based on the link analysis, Mayfield Road west of Heart Lake Road and between Heart Lake Road and Dixie Road are currently experiencing delays and congestion based on attaining existing v/c ratios greater than 0.90.

3.4 EXISTING NEED FOR MAYFIELD ROAD IMPROVEMENTS

Based on the existing volumes and operations on Mayfield combined with the planned extension of Highway 410 intersecting with Mayfield Road and the imminent widening of Mayfield Road west of Heart Lake Road, there would an existing need to improve Mayfield Road at least between Heart Lake Road and Dixie Road. Within the study area, these two intersections and the link between Heart Lake Road and Dixie Road carry the highest traffic volumes among the other roads and intersections between Dixie Road and Airport Road.

3.5 FUTURE TRAFFIC CONDITIONS

To determine the future need for Mayfield Road improvements, and the future analysis of lane requirements, travel demand forecasts were prepared for this study for the 2007, 2012 and 2027 horizon years (reflecting 5, 10, and 25 year growth). Two approaches to

travel demand forecasting were utilized to develop turning movement volume forecasts on Mayfield Road at each study area intersection.

3.5.1 Projected Growth Rates and Turning Movement Forecast Approach

Historic and existing turning movement counts and AADT's were entered into a regression analysis by Peel Region for each intersection to determine a compounded growth rate for the 2007, 2012, and 2027 horizons. The result of this analysis suggests that the growth rate on average falls approximately in the 1-4% per year compounded over the 5, 10 and 25 year horizon periods for all of the intersections within the study area. Given the expected future development throughout north Brampton and south Caledon, a 4% per year compounded growth rate was applied to existing volumes to calculate the 2007 and 2012 traffic growth. A lower compounded growth rate of 2.5% was applied after 2012 to calculate the 2027 traffic forecasts.

Using supplemental Brampton population and employment forecasts for 2007, 2011 to 2027, an additional analysis was undertaken whereby expected residential and employment development in the immediate area was determined and trips were generated over the same horizon period. These trips have been assigned to the corridor and added to the background traffic growth for each horizon year to obtain the total traffic for each intersection.

The forecast turning movement volumes prepared by the Region did not take into account the diversion expected with the Highway 410 Extension. The diversion of trips was developed using the Regional Transportation Model by simulating future conditions with and without the Highway 410 Extension. The percent difference between the traffic volumes with and without Highway 410 Extension was then applied to the Region's turning movement forecasts. The modeling approach is further discussed below.

3.5.2 Transportation Model Approach and Assumed Road Network Assumptions

For the 2007, 2012 and 2027 planning horizon, a modeling approach was also conducted by the Region and iTRANS to determine corridor growth along Mayfield Road and to model the diversion of extending Highway 410. Inputs into the model include land use forecasts and road network assumptions for each year. Since the model only analyzed 2009, 2021, and 2031, these three years were used to confirm growth rates and develop diversions to be applied to the 2007, 2012 and 2027 planning horizon. The model road network reflects planned, committed and proposed roadway improvements for the regional and municipal road system.

Scenarios with and without the Highway 410 extension and with a two, four and six-lane Mayfield Road were assessed with the following base road network assumptions summarized in **Table 4**.

Table 4
Transportation Model Base Road Network Assumptions in the Study Area

Road	From	Number of Lanes		
		2009	2021	2031
Mayfield Road	West of Heart Lake	4	4	6
Mayfield Road	Heart Lake Road to Dixie Road	4	4	6
Mayfield Road	Dixie Road to Airport Road	2	4	6
Mayfield Road	East of Airport	2	4	6
Heart Lake Road	North and south of Mayfield	4	4	4
Highway 410	North and south of Mayfield	4	4	6
Dixie Road	North and south of Mayfield	4	4	4
Bramalea Road	North and south of Mayfield	2	4	4
Torbram Road	North and south of Mayfield	2	4	4
Airport Road	North and south of Mayfield	4	4	4

Note: Number of midblock lanes only, intersections within the section may comprise more lanes at the approaches

Although the Mayfield Road widening is not a committed road improvement in the ten-year capital budget, the assessment of the 2007, 2012 and 2027 future road network with Mayfield widened was completed to assess the need and justification for the widening and the associated lane requirements.

3.5.3 Final Turning Movement and Link Forecasts

The following summarizes the steps that were taken to obtain the final 2007, 2012, and 2027 AM and PM peak hour forecast volumes for Mayfield Road from using existing volumes, projected growth rates, and the Regional Transportation Model.

- Peak hour link adjustment factors were calculated from the with and without Highway 410 Extension scenarios.
- Adjustment factors were applied to the Region's turning movement forecasts at the link level.
- The turning movement forecasts were then balanced to match the new link volumes to reflect the change in travel patterns due to the extension.
- The reasonableness and balancing of the estimated volumes at each intersection were checked and appropriate manual adjustments were made.

Exhibits 7 through 10 illustrate the link traffic forecasts on Mayfield Road compared with link capacity thresholds; while, **Exhibits 11 through 14** show the 2012 and 2027 turning movement forecasts at the study area intersections.

3.5.4 Future Traffic Analysis without Mayfield Road Improvements

As stated previously, the needs assessment focused on the longer term 2012 and 2027 planning horizons given that 2007 is only 4 years away.

Based on the link forecasts presented in **Exhibits 7 through 10**, it is evident that there will be capacity deficiencies on Mayfield Road well before the 10-year horizon. Being that the theoretical capacity of 1,000 vehicles per hour can be conservatively low for a rural arterial (since over 1,000 vehicles west of Heart Lake Road have been observed), additional intersection analyses using Synchro were also conducted to confirm the capacity deficiencies. **Table 5** and **Exhibits 15 and 16** summarize the intersection operations analysis for 2012 traffic assigned to the existing road network (ie. Mayfield at 2 lanes).

Table 5
2012 Overall Level of Service at Intersections (Existing Road Network)

Signalized Intersection	Time Period	V/C (1)	LOS (2)
Mayfield Road and Heart Lake Road	2012 AM Peak	1.66	F
	2012 PM Peak	1.27	F
Mayfield Road and Dixie Road	2012 AM Peak	1.49	F
	2012 PM Peak	1.91	F
Mayfield Road and Bramalea Road	2012 AM Peak	1.18	E
	2012 PM Peak	1.12	D
Mayfield Road and Torbram Road	2012 AM Peak	1.10	D
	2012 PM Peak	0.98	C
Mayfield Road and Airport Road	2012 AM Peak	1.30	F
	2012 PM Peak	1.61	F

(1) V/C – maximum volume / capacity ratio for critical movement and not the average for the intersection
(2) LOS – overall level of service

As shown in **Table 5** and in **Exhibits 15 and 16**, all intersections on Mayfield Road between Heart Lake Road and Airport Road would be experiencing LOS F and have v/c ratios greater than 1.0 during both AM and PM peak hours.

Based on the results of the 2012 analysis, intersection analyses of 2027 forecasts on the existing road network were not required to assess the need for Mayfield Road improvements. However, 2027 intersection analysis was conducted to determine the ultimate lane requirements for any future widening of Mayfield Road.

The analysis of 2012 forecasts volumes on existing Mayfield Road confirm that traffic levels will exceed the capacity of a 2-lane arterial road (1,000 vph). By 2012, vehicles will have limited alternative routes to travel east-west across eastern Brampton to access the rest of the GTA. Although constrained by the 2 lanes, vehicles including trucks on Mayfield Road will continue to grow based on developments proceeding faster than expected and other routes being already at capacity as well.

3.5.5 Future Traffic Analysis with Mayfield Road Improvements

Based on the intersection analysis presented in **Table 5**, lane improvements were added to the existing network to develop a recommended 2012 road network. Synchro analysis was conducted using the 2012 traffic forecast and the recommended lane configurations shown in **Exhibits 11 and 12**.

Table 6 summarizes the overall level of service at the signalized intersections, based on 4 lanes between Heart Lake Road and Dixie Road and retaining the existing 2 lanes east of Dixie Road. The results of the Synchro analysis are also illustrated in **Exhibits 17 and 18**.

Table 6
2012 Overall Level of Service at Intersections (with Improvements)

Signalized Intersection	Time Period	V/C (1)	LOS (2)
Mayfield Road and Heart Lake Road	2012 AM Peak	0.99	D
	2012 PM Peak	0.86	C
Mayfield Road and Dixie Road	2012 AM Peak	0.86	C
	2012 PM Peak	0.79	C
Mayfield Road and Bramalea Road	2012 AM Peak	0.96	C
	2012 PM Peak	0.94	C
Mayfield Road and Torbram Road	2012 AM Peak	0.91	C
	2012 PM Peak	0.93	C
Mayfield Road and Airport Road	2012 AM Peak	0.94	C
	2012 PM Peak	0.91	D

(1) V/C – maximum volume / capacity ratio for critical movement and not the average for the intersection
(2) LOS – overall level of service

Although the analysis predicts that two lanes will be adequate for Mayfield Road east of Dixie Road by 2012, it is likely that the two-lane capacity will be exceeded shortly thereafter, based on forecast volumes exceeding a link capacity threshold of 1,000 vehicles per hour.

Construction of a continuous four-lane cross-section within the next 10 years would, therefore, be based on arguments relating to four-lane continuity, long-term maintenance and operating costs, and the "throwaway costs" and disruption associated with future widening construction.

A similar analysis with 2027 traffic forecasts assigned to Mayfield Road was also performed to determine the ultimate lane requirements. The volumes in **Exhibits 13 and 14** were analyzed using Synchro for the recommended lane configurations also shown in **Exhibits 13 and 14. Table 7 and Exhibits 19 and 20** summarize the levels of service and the volume to capacity ratios.

Table 7
2027 Overall Level of Service at Intersections (With Improvements)

Signalized Intersection	Time Period	V/C [1]	LOS [2]
Mayfield Road and Heart Lake Road	2027 AM Peak	0.95	C
	2027 PM Peak	0.96	C
Mayfield Road and Dixie Road	2027 AM Peak	0.99	D
	2027 PM Peak	0.82	B
Mayfield Road and Bramalea Road	2027 AM Peak	0.91	C
	2027 PM Peak	0.91	C
Mayfield Road and Torbram Road	2027 AM Peak	0.92	C
	2027 PM Peak	0.97	C
Mayfield Road and Airport Road	2027 AM Peak	0.96	C
	2027 PM Peak	0.96	C

(3) V/C – maximum volume / capacity ratio for critical movement
(4) LOS – overall level of service

As shown in **Table 7**, the widening of Mayfield Road to 6 lanes would be required to maintain acceptable levels of service and v/c ratios by 2027. If 4 lanes were retained to year 2027 east of Dixie Road, link and intersection capacity deficiencies will occur as volumes are forecast to reach approximately 2,000 vehicles per hour. Widening to 6 lanes will not need to be carried out east of Dixie Road until year 2020 / 2021; however, the section between Heart Lake Road and Dixie Road should be considered for widening to 6

lanes earlier in conjunction with the need for a 6-lane Highway 410 / Mayfield interchange structure.

3.5.6 Recommended Lane Improvements on Mayfield Road

Although recommended lane configurations were analyzed and presented above, they represent the minimum lane improvements on Mayfield Road to accommodate the projected traffic volumes while providing acceptable levels of service. Taken into account Region of Peel policy for exclusive right turn lanes at all improved intersections, **Exhibits 21 and 22** illustrate the recommended lane configurations on Mayfield Road, respectively, for 2012 and 2021, based on the Synchro analysis and the Region policy.

3.5.7 Queuing and Storage Requirements

Exhibits 23 summarize the critical peak hour storage lengths required by 2012 and 2027 forecast turning movement volumes at all turning lanes on Mayfield Road. The storage requirements are based on the worst case scenario of 95th percentile queues estimated by the Synchro analysis and queues estimated using the Greenshield method (Table B7-4 of the *Geometric Design Manual for Ontario Highways*). Some of the storage lengths calculated for left and right turning lanes may be shorter than the minimum length requirement based on the 80-100 km/h design speed. For these cases, the required deceleration length should be the governing factor for the design of these turning lanes. A minimum storage length of 30 m has been shown for these turning lanes.

3.5.8 Need and Timing for Six Lanes

Using the 2007, 2012 and 2027 AM and PM peak hour link forecasts east and west of the proposed Highway 410 interchange with Mayfield Road, the following graphs in **Exhibits 24, 25, and 26** were prepared to identify the need and timing for providing six lanes on the Highway 410 interchange structure. Based on the peak and off peak direction volumes during the AM and PM, year 2015-2017 has been identified as the trigger year that six lanes may be needed on Mayfield Road. This timing is based on available 10-year traffic forecasts from the Highway 410 Extension PDR and 10-year and 20-year forecasts prepared for this study.

4. SUMMARY OF NEEDS ASSESSMENT

iTRANS has assessed the short term and long term need for improvements on Mayfield Road and determined the ultimate lane requirements based on the 2012 and 2027 planning horizons.

The midblock future lane requirements for Mayfield Road are summarized below in **Tables 8a and 8b** while the recommended future lane configurations at the study area intersections were illustrated in the **Exhibits 21 and 22**.

Table 8a
Recommended Number of Lanes on Mayfield Road (Based on Horizon Years)

From	To	Recommended Number of Lanes		
		2007	2012	2027
West of Heart Lake Road		4	4	6
Heart Lake Road	Highway 410	4	4	6
Highway 410	Dixie Road	4	4	6
Dixie Road	Bramalea Road	2	2/4	6
Bramalea Road	Torbram Road	2	2/4	6
Torbram Road	Airport Road	2	2/4	6
East of Airport Road		2	2/4	6

Table 8b
Recommended Timing of Lanes Required on Mayfield Road

From	To	Timing of Lanes Required	
		4 Lanes	6 Lanes
Heart Lake Road	Highway 410	2006	2015-17
Highway 410	Dixie Road	2006	2015-17
Dixie Road	Bramalea Road	2012	2020-21
Bramalea Road	Torbram Road	2012	2020-21
Torbram Road	Airport Road	2010	2020-21

The recommendations are based on a review of available data and reports and updated modeling using the Region of Peel Transportation Model and forecasts prepared by Region of Peel. The model was used to confirm appropriate traffic growth between 2007, 2012, and 2027 and to determine the diversion onto the Highway 410 Extension by comparing link volumes with and without the extension. The predicted diversion between the "with" and without extension scenarios were then applied to the Regions turning movement forecasts to derive the final forecast volumes on Mayfield Road.

Although the analysis predicts that two lanes will be adequate for Mayfield Road east of Dixie Road until 2012, it is likely that the two-lane capacity will be exceeded shortly thereafter, based on forecast volumes exceeding a link capacity threshold of 1,000 vehicles per hour.

Construction of a four-lane cross-section within the next 10 years would, therefore, be based on arguments relating to four-lane continuity, long-term maintenance and operating costs, and the "throwaway costs" and disruption associated with future widening construction.

A four-lane Mayfield Road would address east-west road network continuity and north-south connectivity in the City of Brampton considering that Mayfield Road west of Heart Lake Road is proposed to be at least 4 lanes and that the extension of Highway 410 and the Mayfield Road interchange would attract more through volumes along this corridor, thus further increasing the volumes on Mayfield Road.

The needs assessment analysis for Mayfield Road between Heart Lake Road and Airport Road also identified the need to protect for 6 lanes ultimately through the corridor. Based on the forecasts prepared for this study, 6 lanes between Heart Lake Road and Dixie Road would be recommended by 2015-2016; while, 6 lanes between Dixie Road and Airport Road would be recommended by 2020-2021.

5. SAFETY PERFORMANCE REVIEW

The following chapters document the comprehensive safety review of the existing conditions of Mayfield Road between Heart Lake Road and Airport Road. The scope of the safety review followed the same study area for Mayfield Road as the traffic analysis (**Exhibit 1**).

After reviewing the collision history of each intersection and road segment, a site investigation was performed to review existing conditions. A potential 4-lane cross-section on Mayfield Road was considered along each segment, in terms of the expected impact on safety performance.

5.1 OFFICE INVESTIGATION

iTRANS conducted an office review of the data provided prior to undertaking a site investigation. The office investigation aims to bring a preliminary understanding of the area, the collision history and their causes, as well as the traffic movements at those areas. The trends and patterns of collisions and related potential causes, in conjunction with the traffic operations, road geometry and adjacent land use provide the investigators with a list of concerns to consider during the site visit. These concerns are combined with issues observed and measured during the site investigation. An understanding of these issues will provide the background for selecting countermeasures.

The office investigation began with an examination of the collision history of the road segments and intersections. The following information was reviewed during the office investigation:

- 3 years of collision reports from 2000 to 2002
- Aerial photos of Mayfield Road
- Turning movement counts at each intersection:
  - Year 2001 counts at Heart Lake Road, Dixie Road, and Airport Road
  - Year 2000 counts at Bramalea Road and Torbram Road

Based on this information, collision diagrams were prepared for the intersections and road segments (**Exhibits 26, 27 and 28**). The Region cautioned that the collision reports for 2001 and 2002 might not be complete, as the Region continues to receive reports from other jurisdictions for these years of data.

From the collision diagrams, summary tables were developed to determine possible trends, such as collision location, time of day, and environmental collisions. A summary of the collision history of the entire corridor is provided in **Table 9**. Specific findings for

each intersection are provided in Section 5.3. Collisions on road segments are considered in Section 5.4.

Table 9: Summary of Reported Collisions along Mayfield Road from Heart Lake Road to Airport Road (2000 to 2002)

Location	Total	Injury	PDO	Collision types
Heart Lake Road	8	3	5	Rear-end Angle Left-turn
Dixie Road	12	3	9	Rear-end Angle Left-turn
Bramalea Road	3	1	2	Rear-end Angle Lost-control
Torbram Road	2	0	2	Rear-end Left-turn
Airport Road	10	3	7	Rear-end Angle
Road Segment	19	9	10	Lost-control Rear-end Animal
TOTAL	**54**	**19**	**35**	

5.2 CORRIDOR SUMMARY

The overall collision analysis findings for the entire corridor are:

- 48% of collisions during peak periods (6 to 9 a.m. and 3 to 6 p.m.) (26 of 54)
- 31% of collisions are rear-end (16 of 54)
- 22% of collisions are left-turn (12 of 54)
- Majority of collisions not caused by environmental conditions (72% during daylight, 76% during clear weather, 67% with dry road surface)
- 65% of collisions occur at intersections (35 of 54)
- No fatal collisions from 2000 to 2002

5.3 INTERSECTION SUMMARY

5.3.1 Heart Lake Road at Mayfield Road

There were a total of 8 collisions reported for the three-year period (**Exhibit 25**). A collision summary by type is shown in **Table 10**. Of the 8 collisions, there were 3 injury collisions and no fatalities.

Table 10: Collision Summary by Type – Heart Lake Road at Mayfield Road

Collision Type	Total Collisions	NB	SB	EB	WB
Rear-end	3	1	0	2	0
Angle	2	2 SB/WB			
Left-turn	3	0		3 EB/WB	

It can be noted that 2 of the 3 rear-end collisions at this intersection occurred under wet road conditions. Other possible factors contributing to the rear-end collisions may include the combination of signal timing and the dilemma zone. A dilemma zone is defined by the National Cooperative Highway Research Program (NCHRP) as follows, "Drivers are in the dilemma zone if, when they see the yellow indication, they lack adequate distance to stop before the intersection but are too far away to enter the intersection before the red indication".

The angle collisions may indicate an issue with sight distances, signal head visibility, or driver awareness of the intersections.

The left-turn collisions may be the result of left-turning vehicles using small gaps, or using the intergreen phase to complete their maneuver. Also, it may be the case that the sight distance from the stop bar for the westbound left-turn is reduced when a vehicle is positioned in the opposing left-turn lane. Weather conditions do not appear to be a factor for this collision type.

5.3.2 Dixie Road at Mayfield Road

There were a total of 12 collisions reported for the three-year period, including 3 injury collisions (**Exhibit 26**). A collision summary by type is shown in **Table 11**.

Table 11: Collision Summary by Type – Dixie Road at Mayfield Road

Collision Type	Total Collisions	NB	SB	EB	WB
Rear-end	3	0	0	0	3
Angle	3	2 EB/NB, 1 SB/EB			
Left-turn	5	1 NB/EB, 3 NB/SB, 1 EB/WB			
Right-turn	1	0	1	0	0

The westbound rear-end collisions all occurred around the P.M. peak period (between 3:30 and 5:45 pm). This may indicate congestion and queuing at this intersection. The angle collisions may indicate an issue with sight distances, signal head visibility, or driver awareness of the intersections.

Similar to the Heart Lake Road intersection, the left-turn collisions may be an indication of small gaps for left-turning vehicles, or that left-turning motorists are using the intergreen phase to complete their maneuver. Weather conditions do not appear to be a factor for this collision type.

The right-turn collision at this intersection involved a southbound tractor-trailer making a wide right turn onto Mayfield Road, and a passenger vehicle in the "No Zone" to the right of the tractor-trailer.

5.3.3 Bramalea Road at Mayfield Road

There were a total of 3 collisions reported for the three-year period (**Exhibit 27**). A collision summary by type is shown in **Table 12**. One of the collisions resulted in injury.

Table 12: Collision Summary by Type – Bramalea Road at Mayfield Road

Collision Type	Total Collisions	NB	SB	EB	WB
Rear-end	1	0	0	0	1
Angle	1	NB/WB			
Lost-control	1	WB left-turn			

No common trends are apparent from the collision diagrams and the number of collisions does not seem significantly high.

5.3.4 Torbram Road at Mayfield Road

There were a total of 2 PDO collisions reported for the three-year period (**Exhibit 27**). A collision summary by type is shown in **Table 13**.

Table 13: Collision Summary by Type – Torbram Road at Mayfield Road

Collision Type	Total Collisions	NB	SB	EB	WB
Rear-end	1	0	0	1	0
Left-turn	1	NB left struck vehicle stopped at stop bar on west leg			

Similar to the intersection with Bramalea Road, no common trends are apparent from the collision diagrams and the number of collisions does not seem significantly high.

5.3.5 Airport Road at Mayfield Road

There were a total of 10 collisions reported for the three-year period (**Exhibit 28**). A collision summary by type is shown in **Table 14**. Of the ten collisions, three resulted in injury.

Table 14: Collision Summary by Type – Airport Road at Mayfield Road

Collision Type	Total Collisions	NB	SB	EB	WB
Rear-end	5	1	2	2	0
Angle	3	2 NB/EB		1 SB/EB	
Left-turn	1	0	0	WB/EB	
Right-turn	1	SB right-turn struck by WB vehicle			

As previously discussed, the rear-end collisions may indicate congestion or queuing at this intersection. There may also be poor signal head visibility or high operating speeds contributing to these collisions.

The angle collisions may indicate an issue with sight distances, signal head visibility, or driver awareness of the intersections. The left-turn collision prompts the reviewers to investigate the intergreen time, left-turn lane offset, and intersection alignment. The right-turn collision may have involved a vehicle turning right on a red signal.

5.4 ROAD SEGMENTS

Of the 19 collisions that occurred on the road segments of this corridor, 7 were lost-control collisions, 4 were rear-end, 4 were animal, 2 were left-turn collisions at driveways, 1 was a right-turn collision at a driveway, and 1 was an on-road debris collision. Nine of the segment collisions resulted in injury.

These collisions are insufficient to establish trends for each segment. However, the entire corridor will be reviewed to determine if any improvements may be made to increase safety.

Lost-control collisions may be the result of poor weather and road surface conditions. These collisions are not easily prevented; however, it may be possible to make improvements to the facility to reduce the severity of losing control.

Rear-end collisions on road segments may be the result of vehicles slowing to turn into driveways, causing traffic behind them to slow or stop. Rear-end collisions may also be related to queues forming at intersections.

Animal collisions are often found in a rural setting such as Mayfield Road. Driver awareness is often the most effective countermeasure to these collisions.

The left- and right-turn collisions are related to driveways along the road segments. This may indicate a lack of awareness of the driveways (i.e., hidden driveways), or drivers attempting to turn in a gap that is too small to complete the movement (i.e., the turning driver misjudges the approaching speed of a vehicle).

5.5 SUMMARY OF ISSUES FOR FIELD INVESTIGATION

Upon completion of the office investigation, a list of concerns to further examine was compiled prior to visiting Mayfield Road. Due to the low frequency of collisions occurring on Mayfield Road, there are few site-specific trends identified through the office investigation. For the purposes of the site visit, issues for review have been summarized here based on the collision types observed. The items have been grouped by type of roadway element. Note that these lists are preliminary and that on-site observations are likely to introduce new factors that influence collisions that are not identifiable though an office investigations only.

5.5.1 Lane Configuration and Road Surface

- Lane configuration and continuity
- Road surface conditions
- Pavement markings

5.5.2 Signs and Signals

- Signal head visibility
- Signage, potential driver distractions
- Dilemma zone, intergreen period
- Congestion or queuing
- Gap size

5.5.3 Geometry and Sight Distance

- Horizontal and vertical curves
- Sight distances to intersections and driveways
- Left-turn lane offset
- Intersection alignment and sightlines

5.5.4 Road Segments

- Posted speed limits
- General operating speeds
- Shoulder type and width
- Guide rails
- Sideslopes
- Clear zone

5.6 FIELD INVESTIGATION

The field investigation was conducted on the afternoon of February 19, 2003. The weather was cold and partly sunny. First, the corridor was driven from Heart Lake Road to Airport Road. Next, each intersection was carefully reviewed based on the findings of

the office investigation, and also to gain a better understanding of the current operations of the intersections.

It should be noted that a nighttime investigation was not conducted due to the low number of nighttime collisions.

The following sections document the observations made while on site. These observations will lead to the recommendations made in Section 4.

5.6.1 Lane Configuration and Road Surface

The existing lane configurations were shown in **Exhibit 2**. In terms of safety, the existing lane configurations at intersections and along the road segments appear to be adequate, based on observations made during the site investigation. There are no lane shifts through intersections, or lane drops that may contribute to collisions. This is also reflected in the collision history of the corridor.

Most collisions along this corridor occur with dry road surface. Some polishing and wearing of the pavement surface was noted along the corridor.

5.6.2 Signs and Signals

Signal heads at all intersections are adequately visible to approaching traffic. Amber time appears adequate at all intersections for the observed operating speeds along this corridor (i.e., dilemma zone does not appear to be an issue at these intersections).

Street name signs at the intersections have letter height of approximately 10 cm. For most directions, these signs are mounted on the shoulder in advance of the intersection. There are also typically street name signs for both streets on one corner of each intersection. Signs with larger letter heights, and placed in more prominent locations would provide better guidance to drivers.

Queuing was observed WB at the intersection of Heart Lake Road and Mayfield Road. The proposed widening to 4-lanes should reduce queue lengths and possibly reduce rear-end collisions at this intersection.

5.6.3 Geometry and Sight Distance

During the site visit, the sightlines for left-turning vehicles were investigated. Intersection alignment and sightlines currently provide drivers with sufficient sight distance to make appropriate decisions.

5.6.4 Road Segments

The posted speed limit is 80 km/h from Heart Lake Road to approximately 100 metres west of Bramalea Road, where the posted speed limit becomes 60 km/h. The speed limit increases to 80 km/h approximately 100 metres east of the eastern high school parking lot access. Approximately 150 metres west of Airport Road, the speed limit is reduced to 60 km/h.

Operating speeds were observed to be generally higher than the posted speed. Precise speed measurements were not taken.

Along Mayfield Road, the shoulder typically consists of 20 cm wide pavement right of the lane edge line, and a 1.5 to 2 metre gravel surface. Beyond the shoulder, the roadside varies from recoverable ditches to steep sideslopes that lead into marshy areas. There are guide rails at most vertical sag locations. However, some of these are damaged, or are not long enough to prevent a vehicle from traveling beyond the guide rail, as shown in **Exhibit 30**.

Exhibit 30: Eastbound on Mayfield Road – Guide rails

There is a line of utility poles along the south side of Mayfield Road for the length of this study area. The poles are approximately 10 metres from the shoulder lane line.

Pavement markings along the corridor and at intersections are faded. This includes painted arrows in turn lanes at intersections.

There were no excessive distractions (e.g., frequent billboards or commercial signage) noted along the corridor. For the most part, the surrounding land use is open field, with

some residences and a high school. Snow fences were observed on the north side of Mayfield Road along certain segments.

Mayfield Road has a number of vertical curves between Heart Lake Road and Airport Road. There are horizontal curves just west of Heart Lake Road, between Bramalea Road and Torbram Road, and just east of Airport Road. It was noted that the demarcation of these horizontal curves could be improved.

Sight distances to the intersection crowns are somewhat impeded by the vertical curves on Mayfield Road at Airport Road and Heart Lake Road. As noted above, the signal heads at each intersection are visible to all approaches. Two driveways were noted that might be considered "hidden driveways" but not marked as such, between Heart Lake Road and Dixie Road.

Mayfield Road is not illuminated.

5.6.5 School zone

The high school located on the northeast corner of Mayfield Road and Bramalea Road has two accesses to Mayfield Road, just east of Bramalea. There is a dedicated left-turn lane for eastbound vehicles and a dedicated right-turn lane between the two driveways. The western access is signed as an entrance only, and the eastern access is signed as an exit only. (NOTE: The following Sign Names and Numbers are in accordance with the Ontario Traffic Manual, Book 1A and Book 6, July 2001.)

Currently, there are a number of signs related to this school zone. West of Bramalea Road, the speed limit is reduced to 60 km/h; there is a "School Bus Turning" sign, a street name sign for Torbram Road, and a yellow and green "School Area" sign (Wc-1). Currently, the street name sign blocks the view of the School Area sign. Just east of Bramalea Road, a Community Safety Zone starts. This zone ends just east of the eastern high school access. The appropriate signage is posted at both the beginning and end of the Community Safety Zone (Rc-9).

Similarly for westbound vehicles, east of the eastern access to the school, motorists are proceeding through a horizontal curve and presented with similar information. One significant difference is that the "School Bus Turning" sign is not present; instead, there is a "School Bus Stop Ahead" sign (Wc-26). Also, there is an information sign for the Mayfield Recreation Complex, with an arrow pointing to the right. This sign is located east of the exit-only high school access, which drivers may assume is the correct access for the Recreation Complex, though it is not.

This is a significant amount of information for a motorist to observe and react to. Although there were no reported collisions related directly to the high school accesses, it

may be beneficial to provide clearer guidance in this school zone, particularly because of the number of young drivers likely to be in the area.

5.7 RECOMMENDATIONS BASED ON SAFETY REVIEW

5.7.1 Proposed 4-lane Cross-section

The proposed 4-lane cross-section is not need on the basis of the existing safety performance. However, it is recognized that a four-lane cross-section between Heart Lake Road and Dixie Road may reduce queuing at the intersections and improve operations, therefore potentially reducing rear-end and intersection collisions.

A Two-Way Left-Turn Lane was also considered during the field investigation from Dixie Road to Airport Road. Due to the current driveway spacing, it is felt that a Two-Way Left-Turn Lane (TWLTL) would not reduce a significant amount of traffic conflicts. In addition, a TWLTL type of cross-section may encourage higher speed or passing manoeuvres.

5.7.2 Shoulder and Roadside Improvements

The number of lost-control collisions along this corridor suggests that shoulder and roadside improvements may increase safety by aiding errant vehicles to regain control and safely recover to the roadway. Some suggested improvements for the entire corridor include shoulder treatments and roadside improvements.

Increasing the paved surface of the shoulders to 0.5 metres (partially paved) will provide more stable recovery area for errant vehicles. This additional width may also provide a place for vehicles to avoid rear-end collisions, and will provide a semi-turning lane for vehicles turning right into driveways. The Region may wish to consider using a surfacing material of different appearance for the shoulder than the type of material used on the travel lanes. This dissimilar appearance will help drivers to differentiate between the travel lanes and shoulder.

The roadside along Mayfield Road could be improved, again to help errant vehicles to recover safely to the travelled way. The first of such improvements should be upgrading the existing roadside furniture and appurtenances to current standards. As noted during the field investigation, a number of the existing cable guide rails are damaged. Also, a number of the existing guide rails in vertical sag locations should be extended to further prevent vehicles from leaving the right-of-way.

Other suggested roadside improvements would involve ensuring an adequate clear zone and recoverable slopes. The Region is encouraged to use the design parameters set out in

the *AASHTO Roadside Design Guide 2002* (Chapter 3). These improvements could be scheduled with future roadway improvements.

Shoulder rumble strips do not appear to be warranted at this time along this corridor; the reported collisions to not indicate drowsy or inattentive drivers leaving the roadway. For the most part, the run-off-road collisions are the result of poor weather conditions.

5.7.3 Pavement Surface and Pavement Markings

The Region may consider certain pavement surface treatments along Mayfield Road to reduce the number of poor weather conditions, such as anti-icing treatments or increasing the road surface friction. It was noted during the site investigation that some portions of Mayfield Road appear to have a polished surface. Increasing the surface friction may reduce poor weather collisions and rear-end collisions.

Additional snow fencing may also reduce the number of winter-weather collisions (e.g., lost control collisions). Some snow fencing was observed during the site visit along the north side of Mayfield Road.

As noted during the site investigation, pavement markings along Mayfield Road are faded. It is recommended that these markings be maintained regularly, or repainted after any resurfacing projects.

5.7.4 Signage

It is recommended for all street name signs at intersections to be placed on existing overhead signal arms. This prominent location improves the conspicuity of the sign. In addition, the letter size should be increased, and the font should have upper and lower case letters, to match the guidelines in OTM Book 1, Appendix 1-A. Advance signage may still be provided, however it is recommended that the current signs be replaced with signs with bigger font.

Chevron signs should be placed on the curve between Bramalea Road and Torbram Road for both directions of travel.

To increase awareness of certain driveways that may be considered hidden, it is recommended that post-mounted delineators be provided to demarcate the driveway openings along Mayfield Road.

5.7.5 School Zone

As discussed in Section 3, there is a significant amount of information for drivers as they approach the intersection with Bramalea Road and the high school. The following are suggestions to improve guidance and reduce driver confusion.

The type of information given on the current signs could be made clearer by providing consistency of signs. It is suggested that the existing signage be modified to provide the following signs:

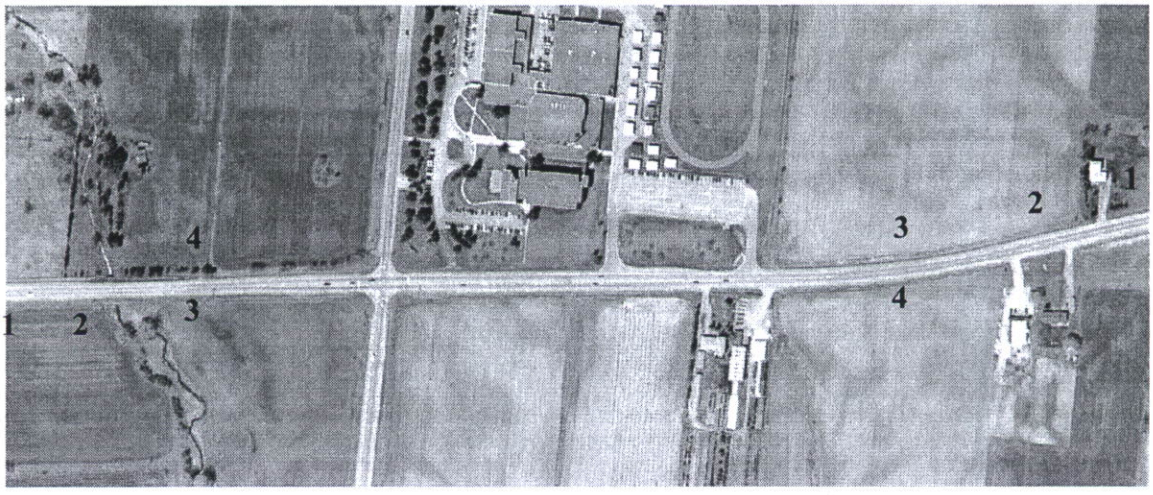
1. 60 km/h posted speed limit
2. "School Area" (Wc-1 or Wc-101)
3. Community Safety Zone (Rc-9) Begins (tab)
4. Community Safety Zone (Rc-9) Ends (tab)

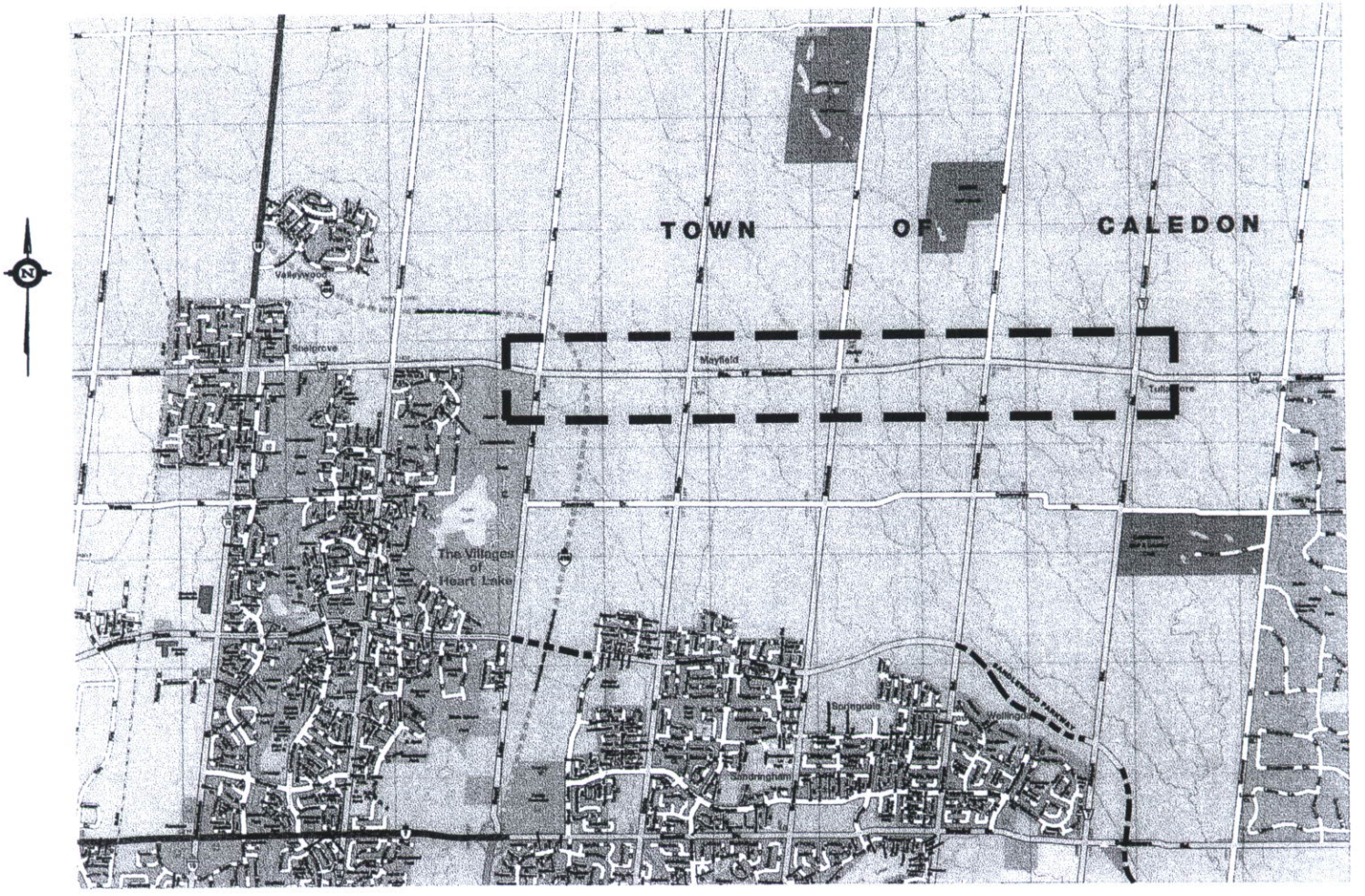
The Region may wish to extend the existing Community Safety Zone further west, to encompass the intersection of Bramalea Road and Mayfield Road.

The order of signs is quite important in this area, especially given the Community Safety Zone. **Exhibit 31** illustrates suggested positioning for the above signage. Exact sign locations should be determined using the guidelines set out in the *Ontario Traffic Manuals*.

The existing information signage for the Mayfield Recreation Complex should be moved closer to the entrance-only (western) access to the high school. Or, if the sign is intended to direct motorists to Bramalea Road, then the sign may be placed closer to the intersection, after the school accesses.

Exhibit 31: Suggested positioning of signage for School Zone (Bramalea Road)





Legend

- Proposed Roads
- Proposed Highways
- Study Area

Not to Scale

Exhibit 1
Study Area

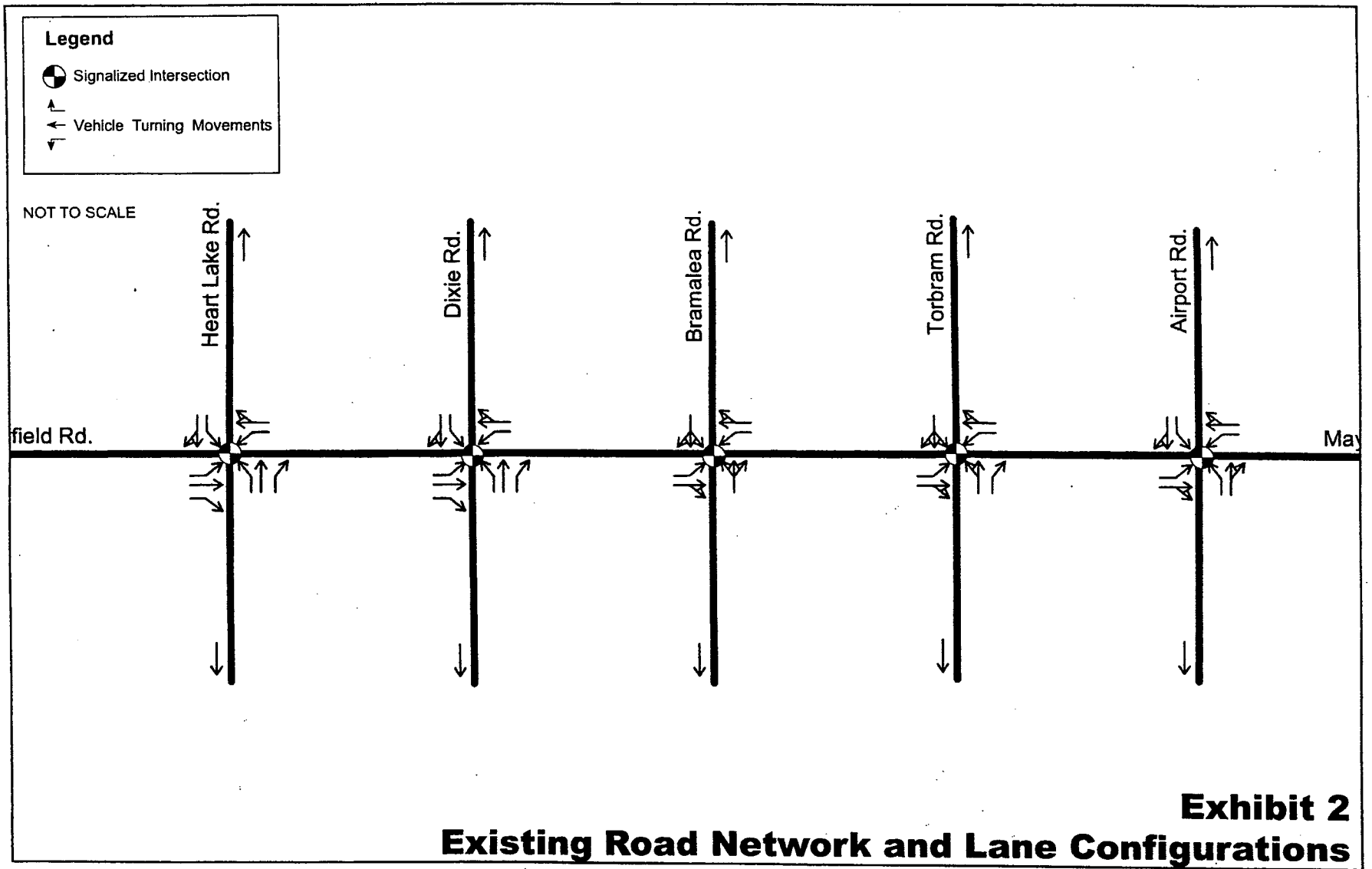


Exhibit 2

Existing Road Network and Lane Configurations

2/25/2003

iTRANS

2001 Mayfield Road - AM Peak Hour Volumes

Existing Lane Configurations

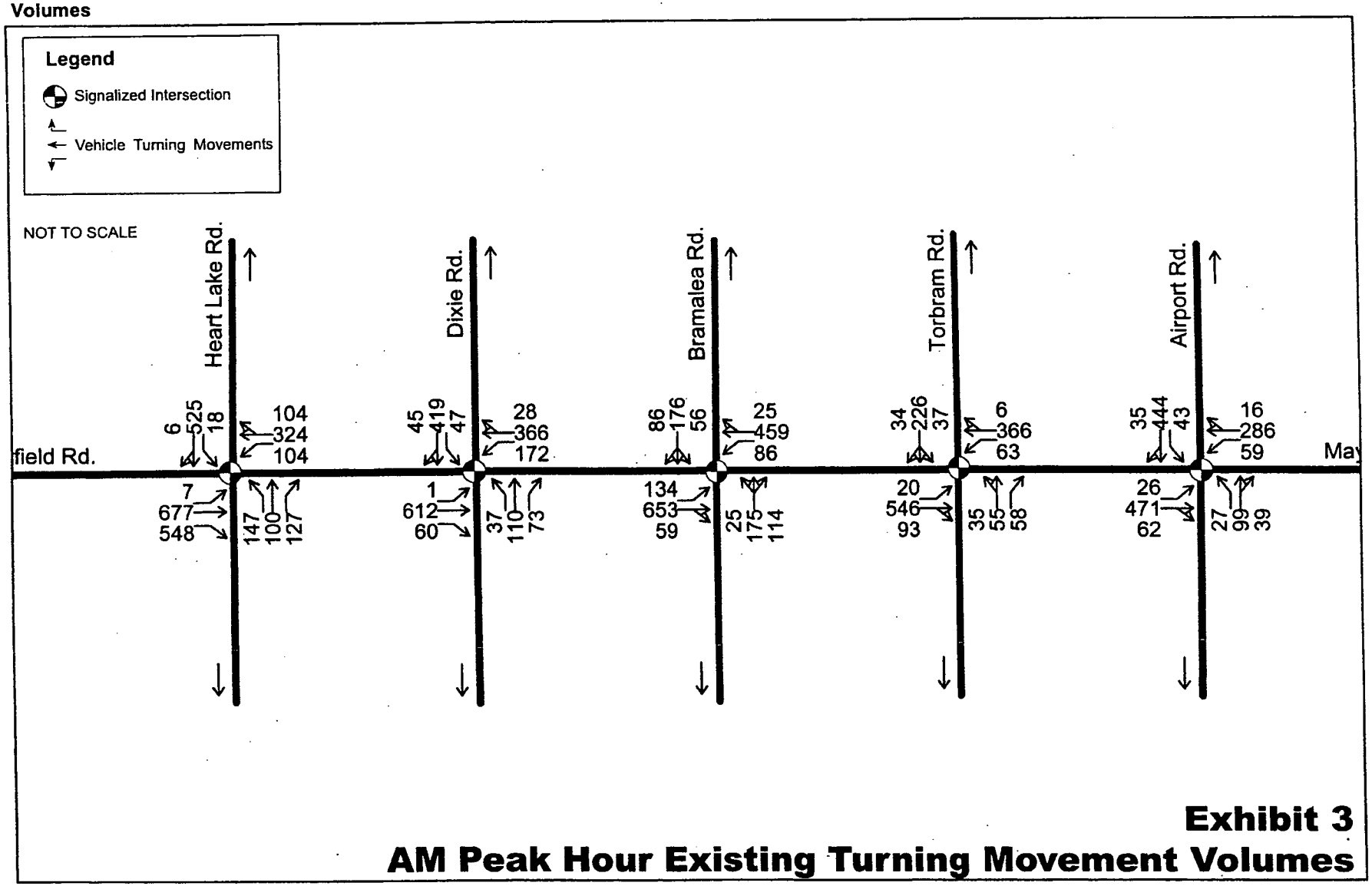


Exhibit 3

AM Peak Hour Existing Turning Movement Volumes

2/25/2003

iTRANS

2001 Mayfield Road - PM Peak Hour Volumes

Existing Lane Configuration

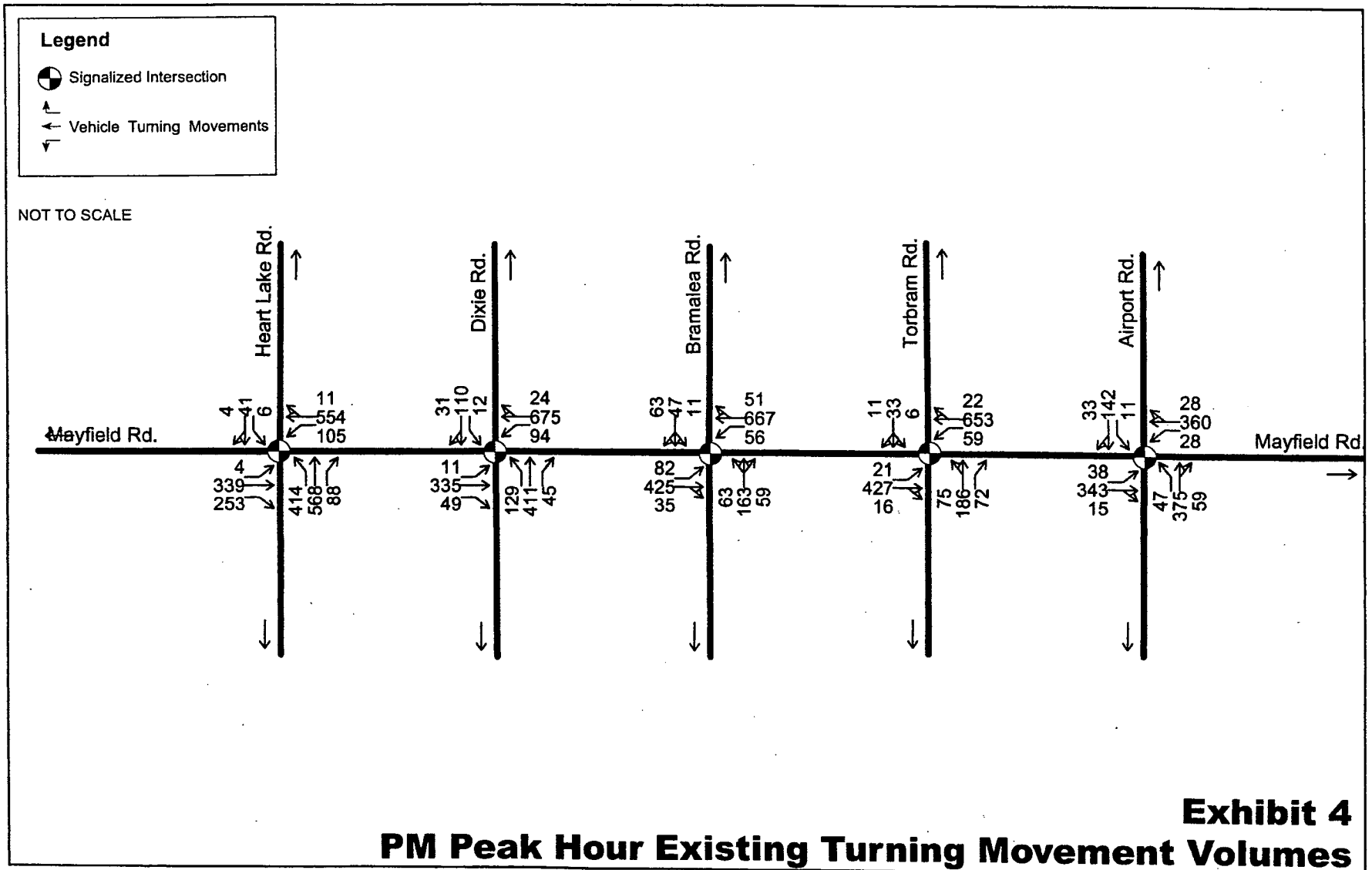


Exhibit 4

PM Peak Hour Existing Turning Movement Volumes

2/25/2003

iTRANS

2001 Mayfield Road - AM Peak Hour
Volume to Capacity Ratios

Existing Lane Configurations

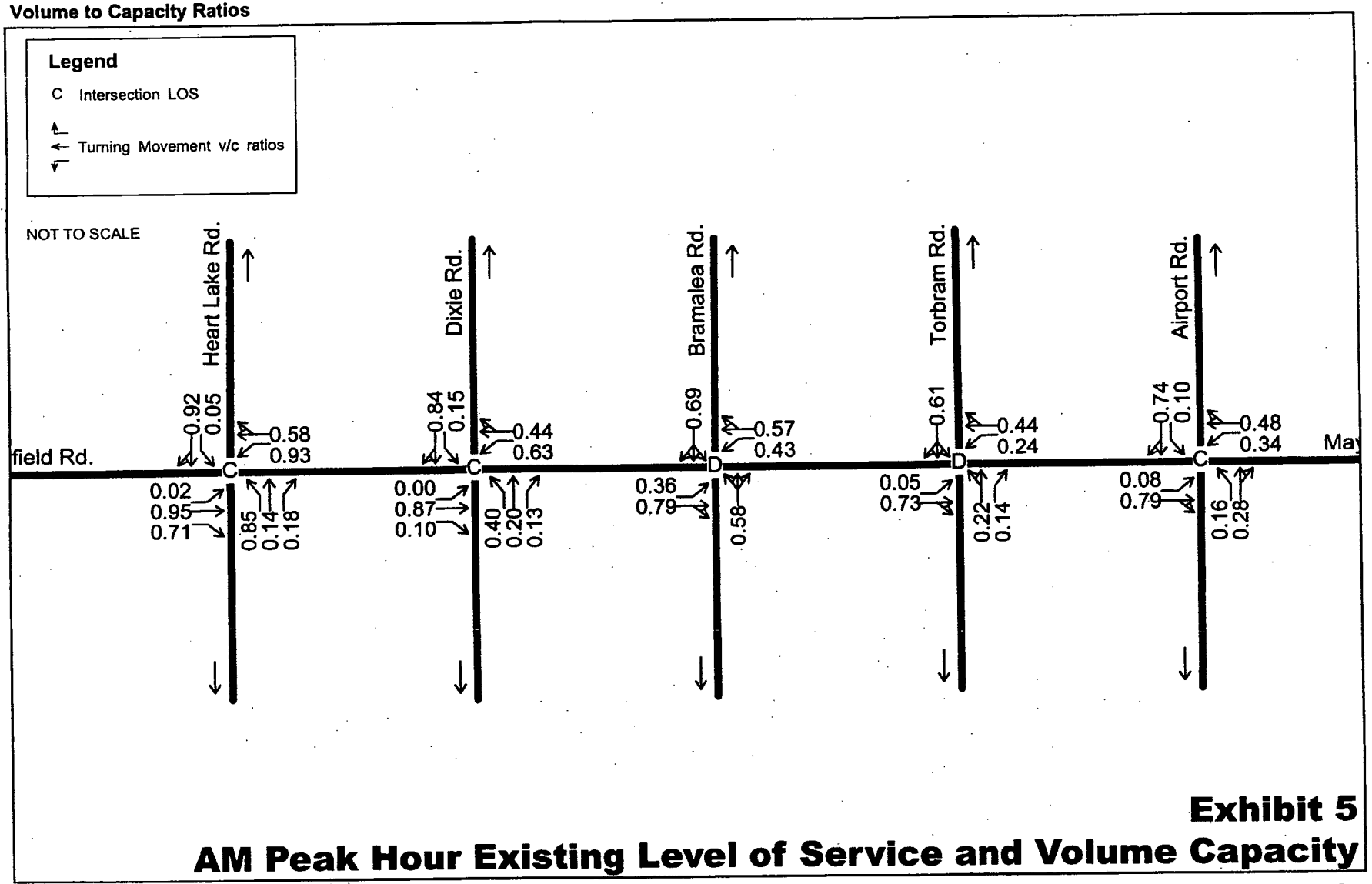


Exhibit 5

AM Peak Hour Existing Level of Service and Volume Capacity

2/25/2003

iTRANS

2001 Mayfield Road - PM Peak Hour
Volume to Capacity Ratios

Existing Lane Configuration

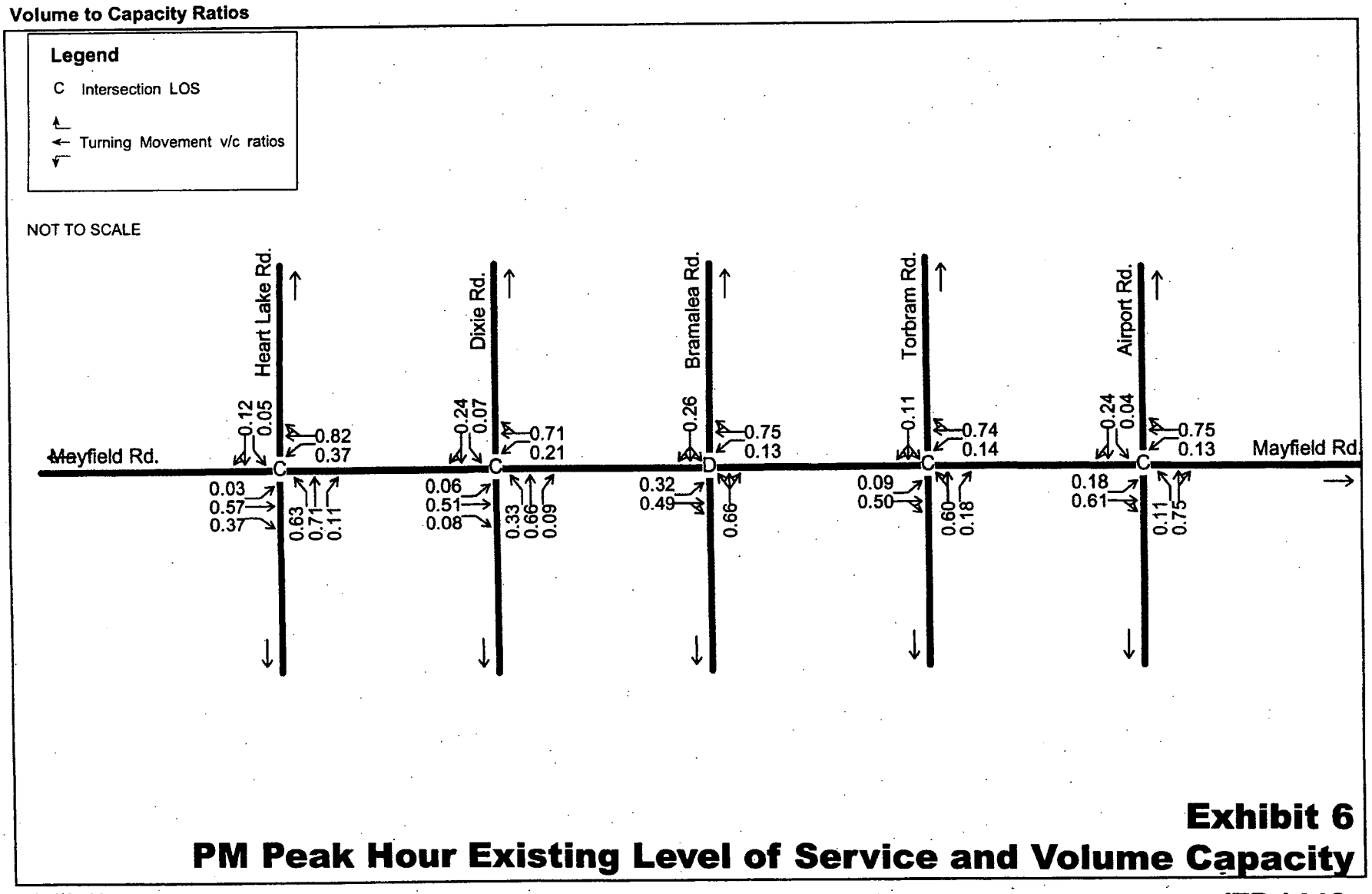


Exhibit 6

PM Peak Hour Existing Level of Service and Volume Capacity

2/25/2003

iTRANS

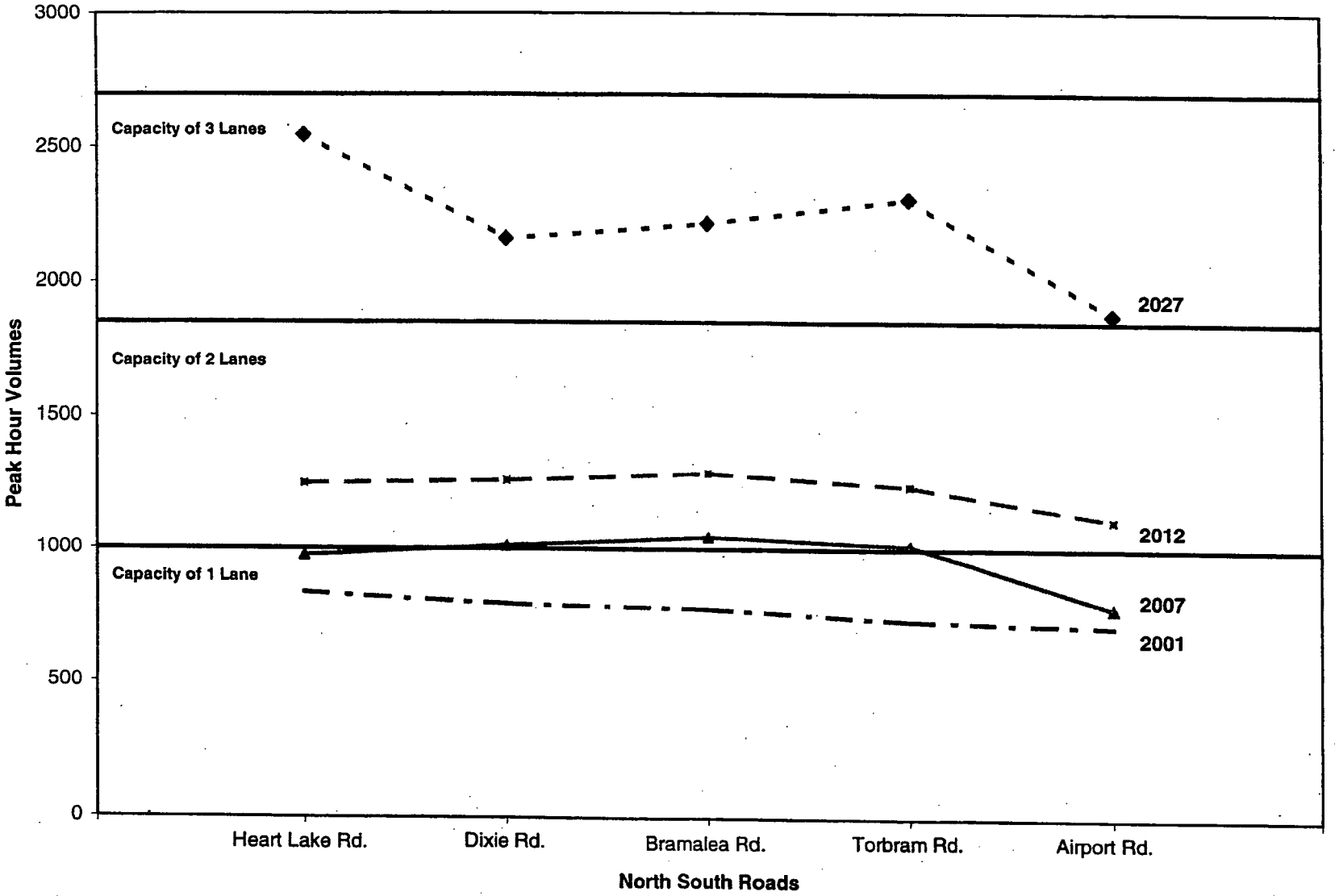


Exhibit 7

Forecast Link Volumes for PM Westbound Traffic

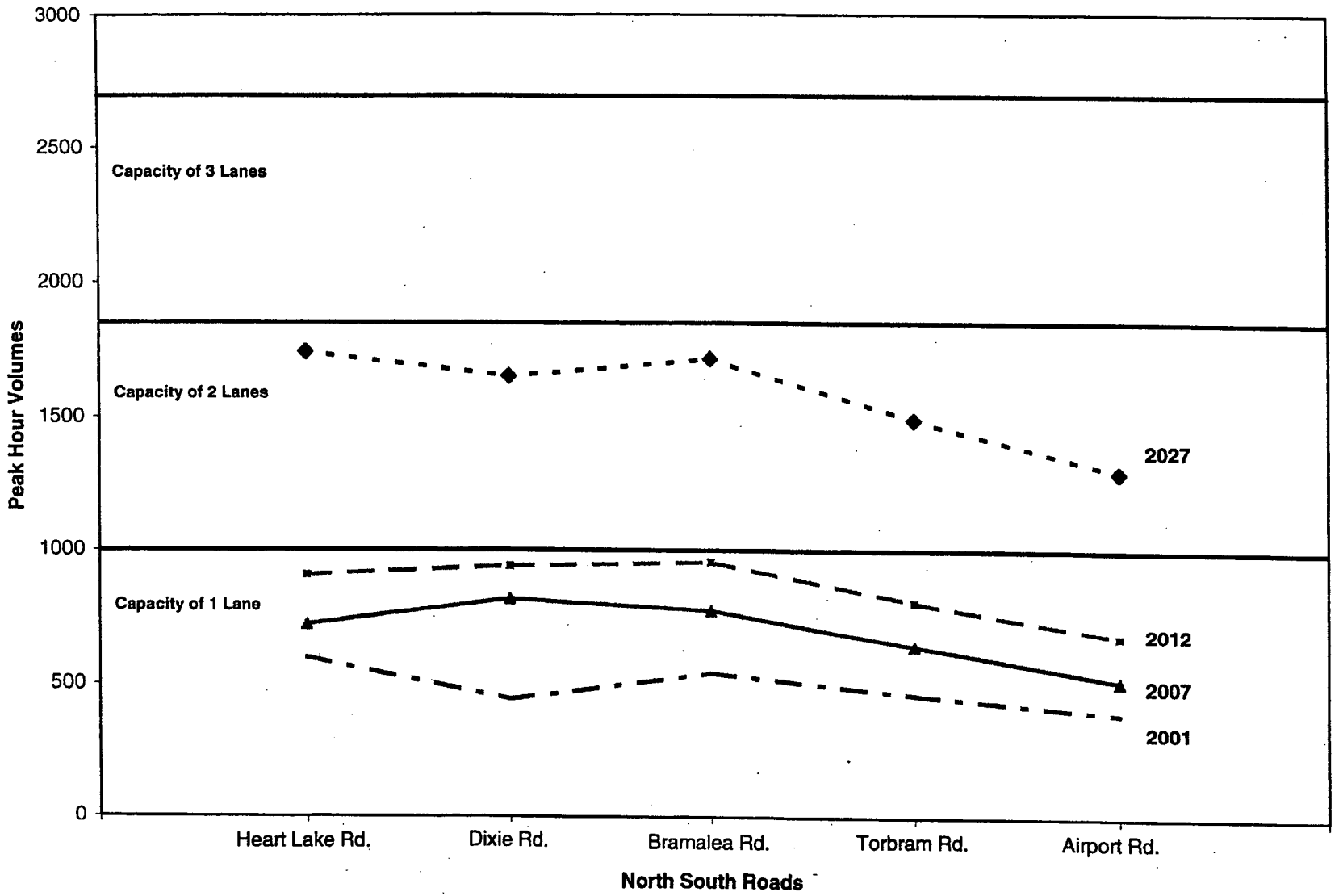


Exhibit 8

Forecast Link Volumes for PM Eastbound Traffic

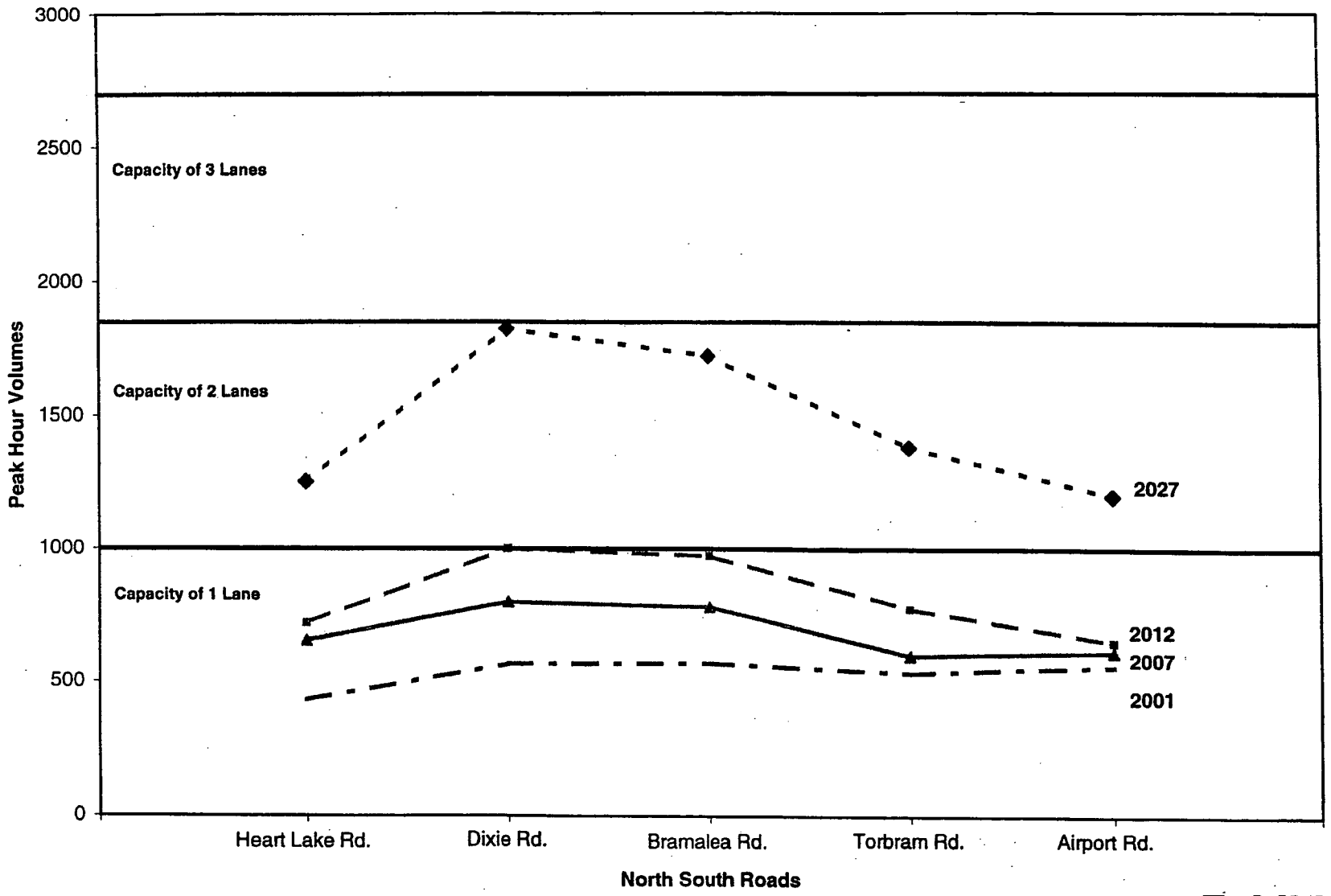


Exhibit 9

Forecast Link Volumes for AM Westbound Traffic

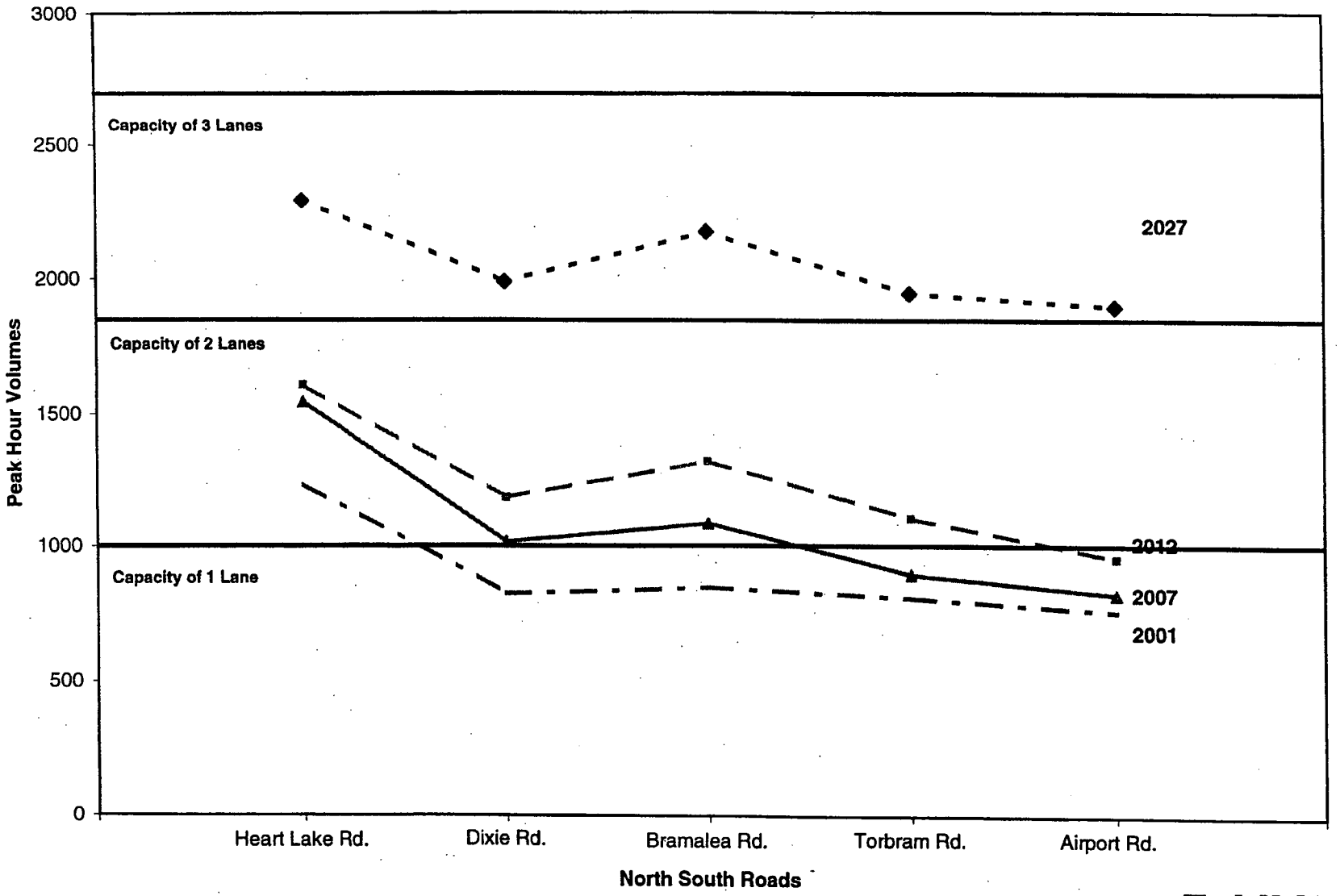


Exhibit 10

Forecast Link Volumes for AM Eastbound Traffic

2012 Mayfield Road - AM Peak Hour Volumes

Recommended Lane Configuration

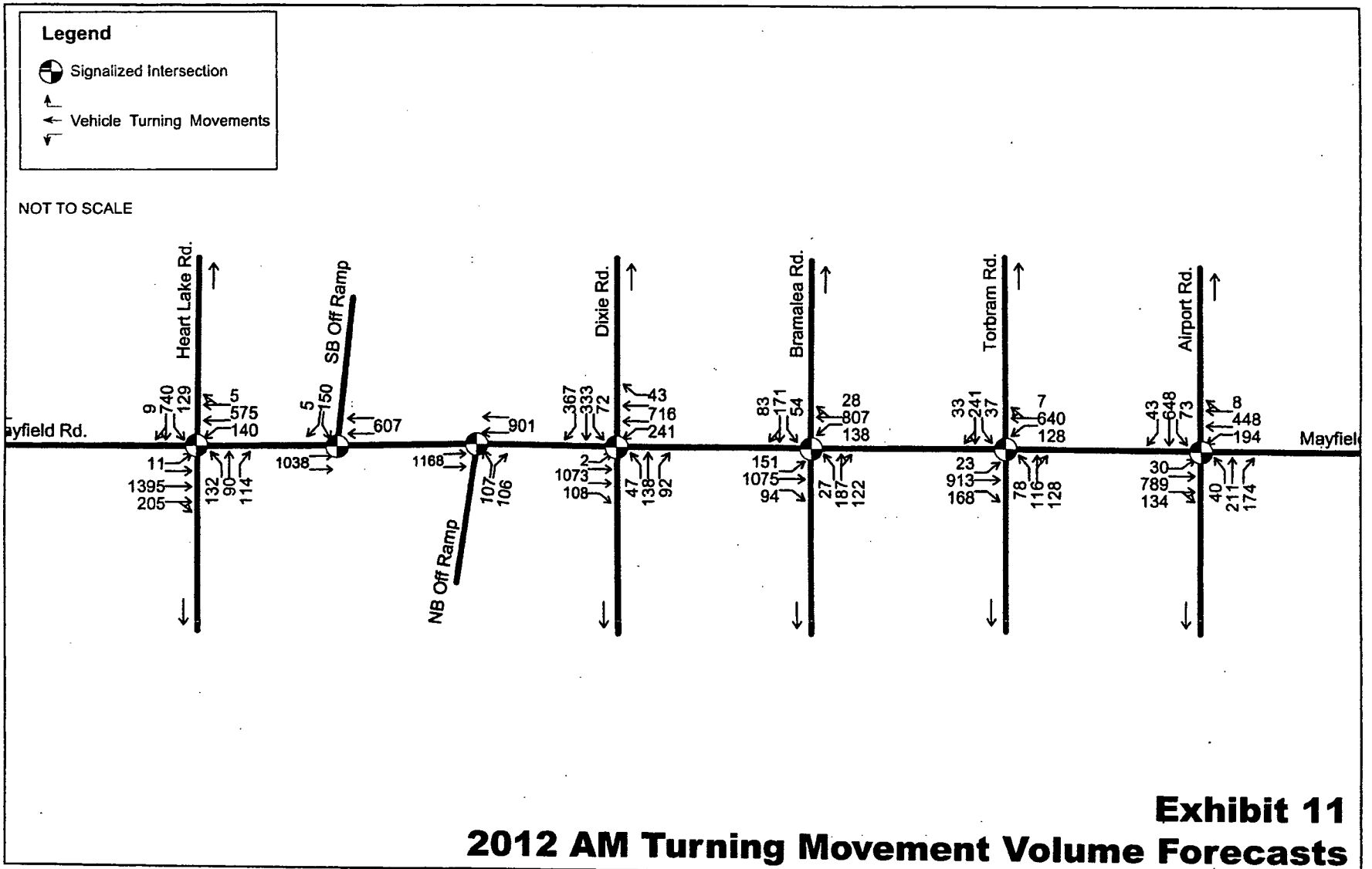


Exhibit 11

2012 AM Turning Movement Volume Forecasts

2/21/03

iTRANS

2012 Mayfield Road - PM Peak Hour Volumes

Recommended Lane Configuration

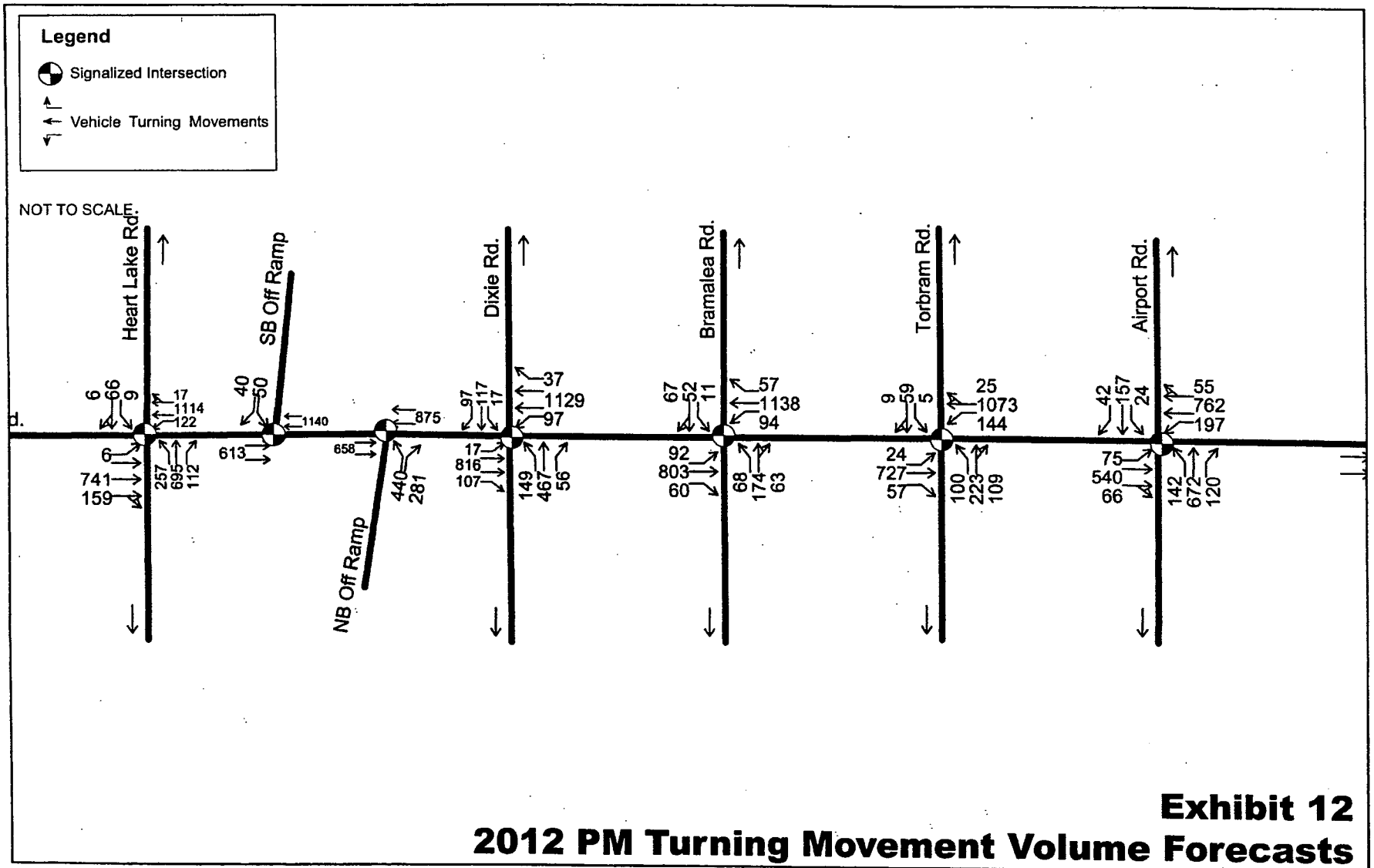


Exhibit 12

2012 PM Turning Movement Volume Forecasts

2/21/2003

iTRANS

2027 Mayfield Road - AM Peak Hour Volumes

Recommended Lane Configuration

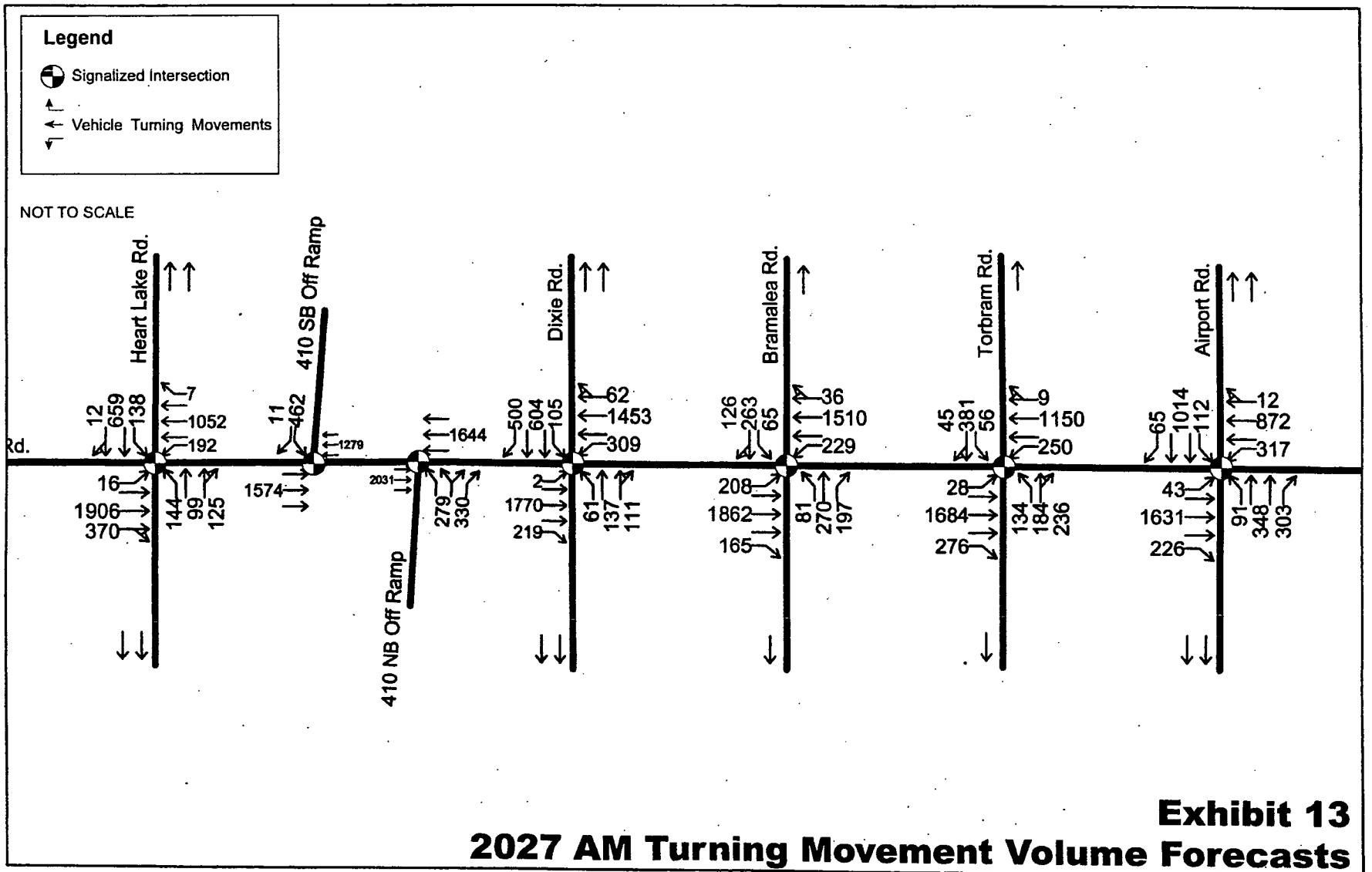


Exhibit 13

2027 AM Turning Movement Volume Forecasts

3/10/2003

iTRANS

2027 Mayfield Road - PM Peak Hour Volumes

Recommended Lane Configuration

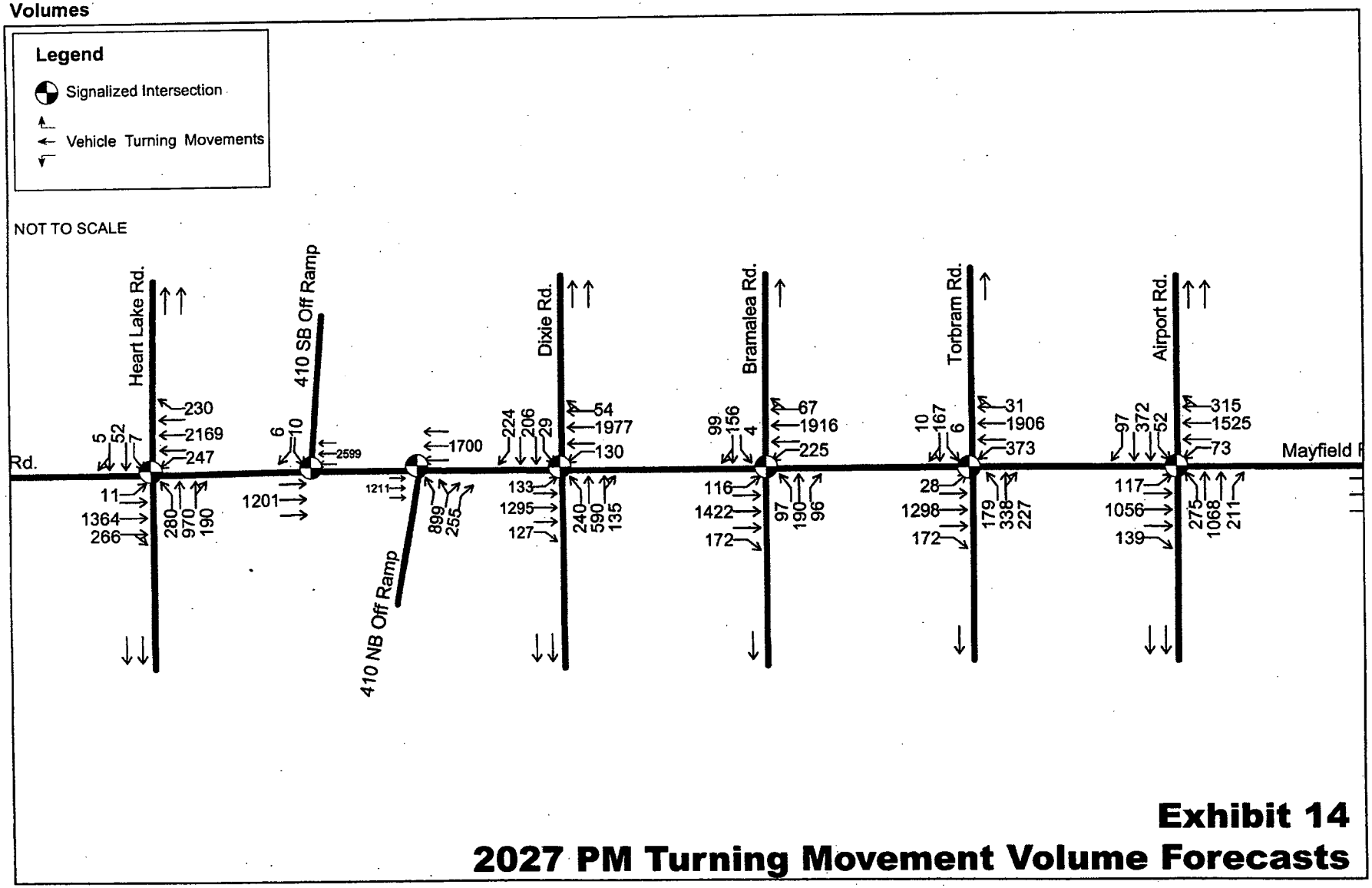


Exhibit 14

2027 PM Turning Movement Volume Forecasts

1/14/2004

iTRANS

2012 Mayfield - AM Peak Hour
Volume to Capacity Ratios

Exsisting Lane Configuration

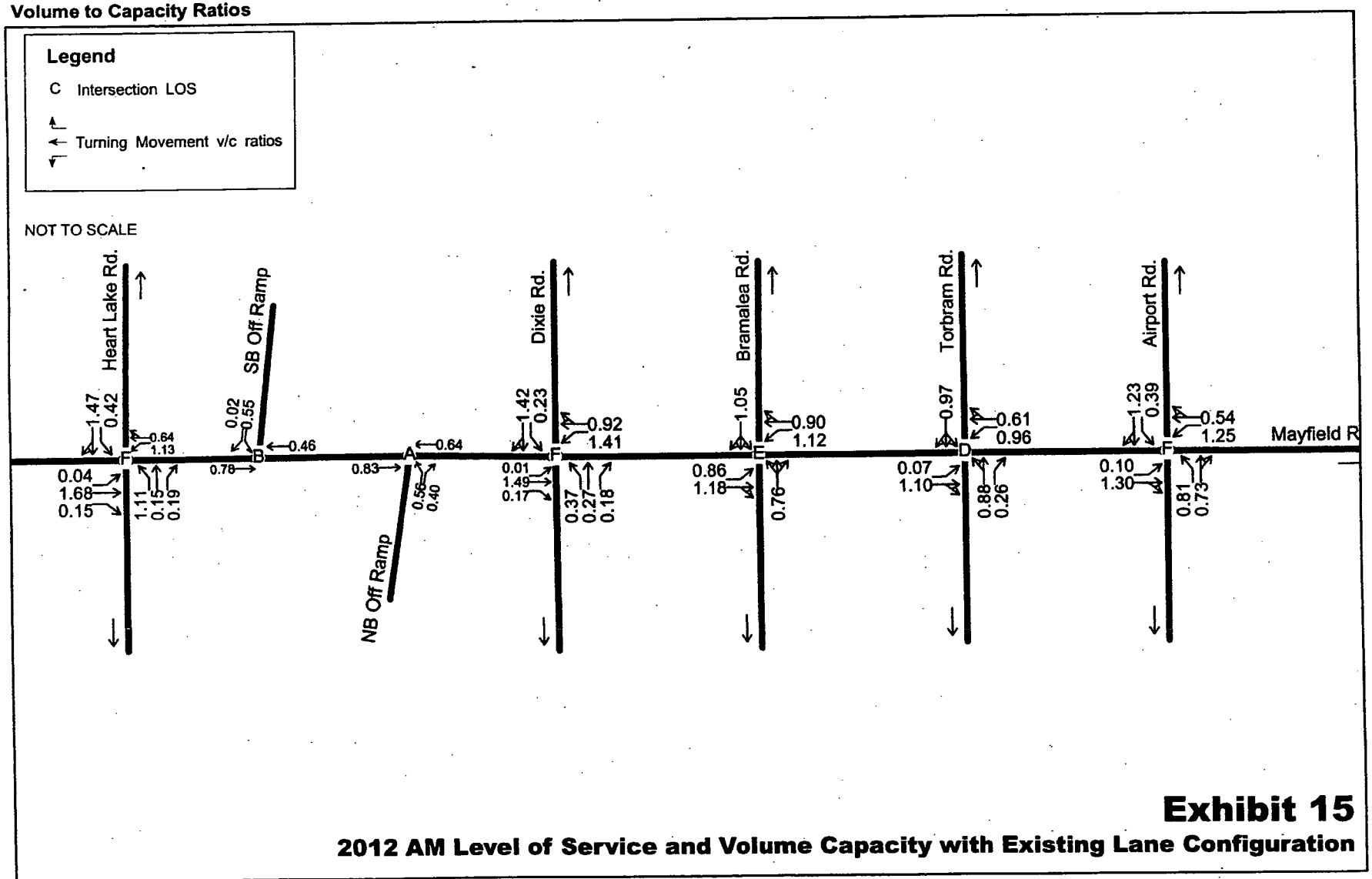


Exhibit 15

2012 AM Level of Service and Volume Capacity with Existing Lane Configuration

2/25/2003

iTRANS

2012 Mayfield Road - PM Peak Hour
Volume to Capacity Ratios

Exsisting Lane Configuration

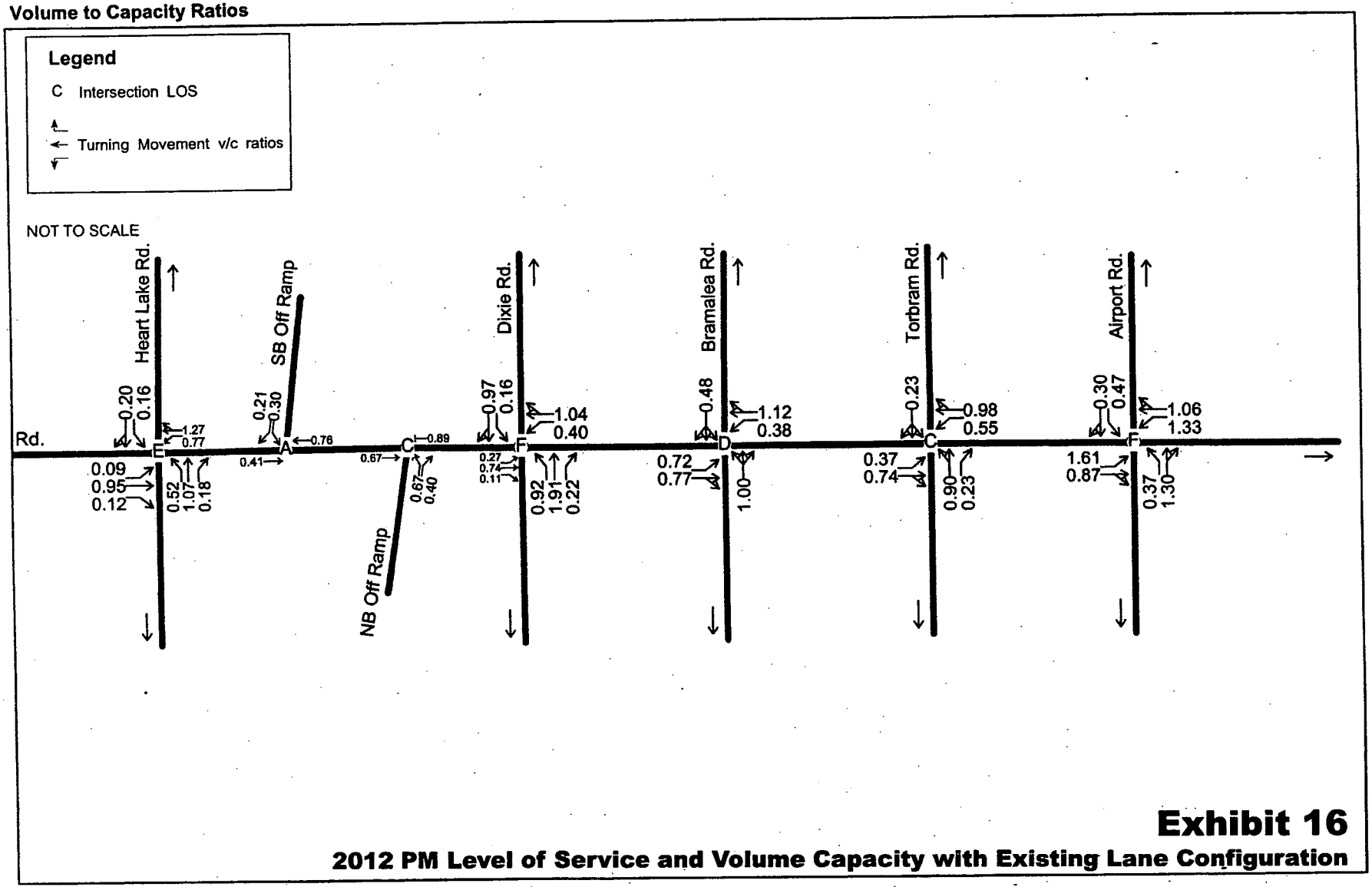


Exhibit 16

2012 PM Level of Service and Volume Capacity with Existing Lane Configuration

2/25/2003

iTRANS

2012 Mayfield Road - AM Peak Hour
Volume to Capacity Ratios

Recommended Lane Configuration

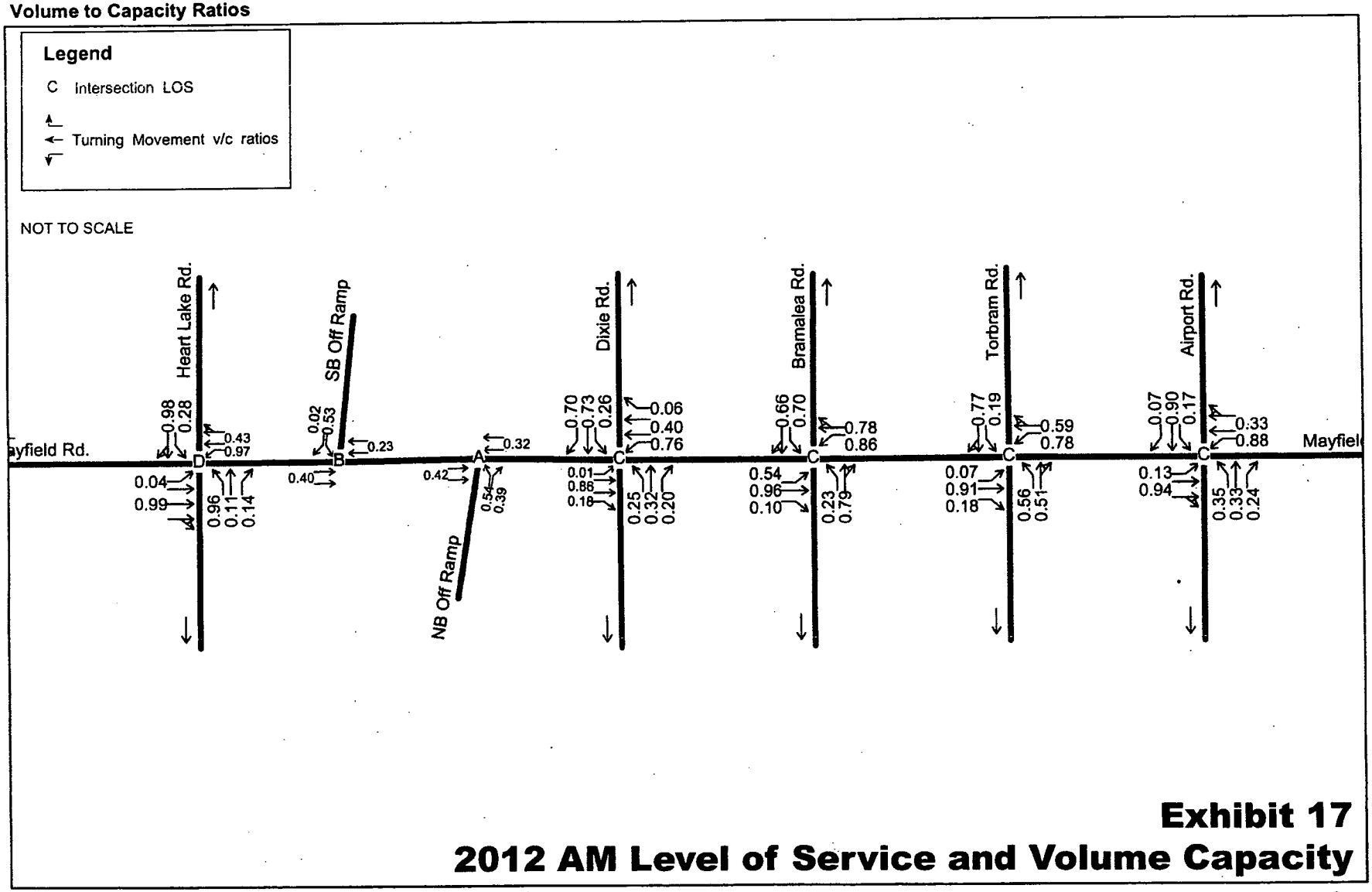


Exhibit 17

2012 AM Level of Service and Volume Capacity

2/21/03

iTRANS

2012 Mayfield Road - PM Peak Hour
Volume to Capacity Ratios

Recommended Lane Configuration

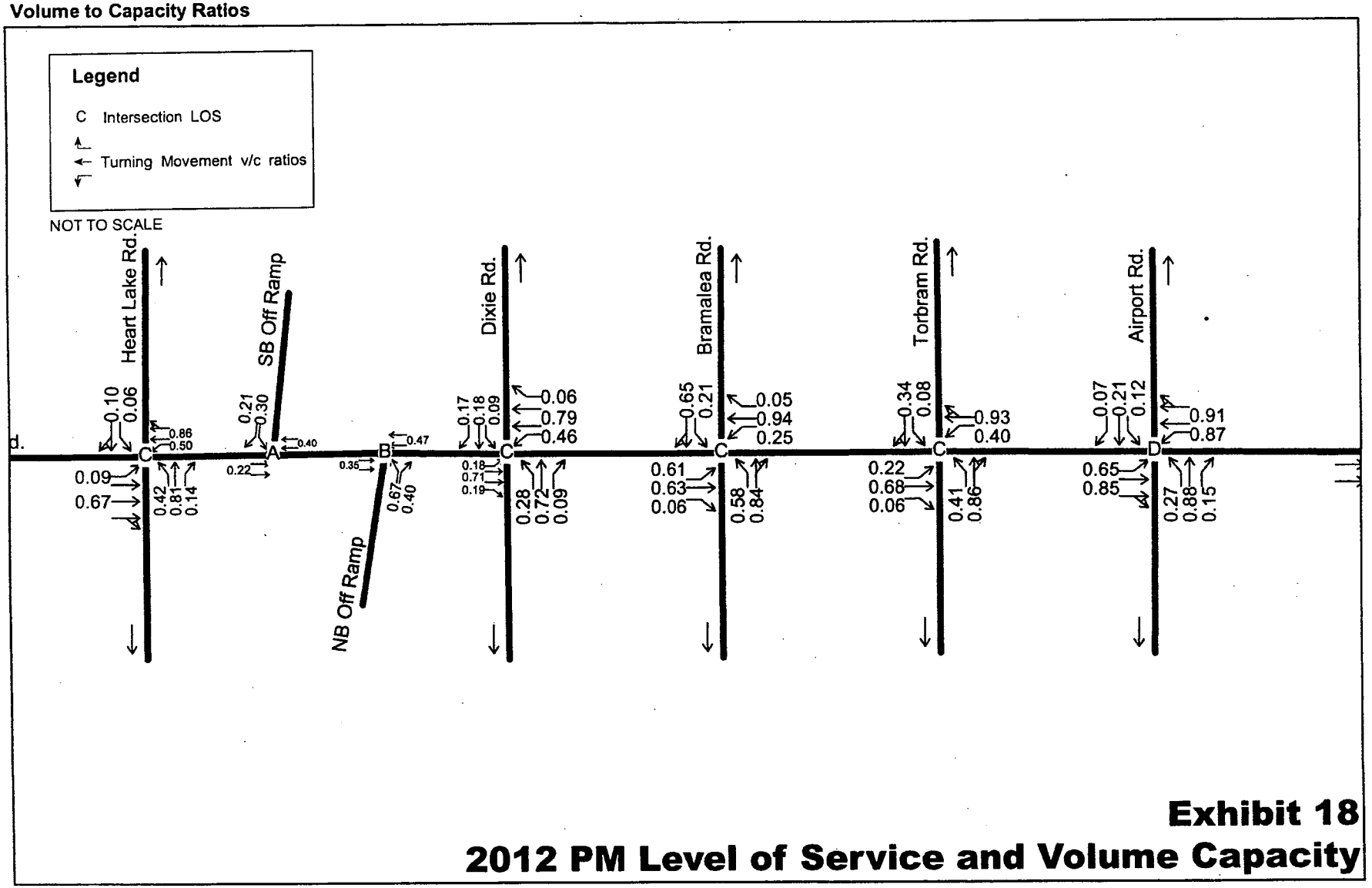


Exhibit 18

2012 PM Level of Service and Volume Capacity

2/21/2003

iTRANS

2027 Mayfield Road - AM Peak Hour
Volume to Capacity Ratios

Recommended Lane Configuration

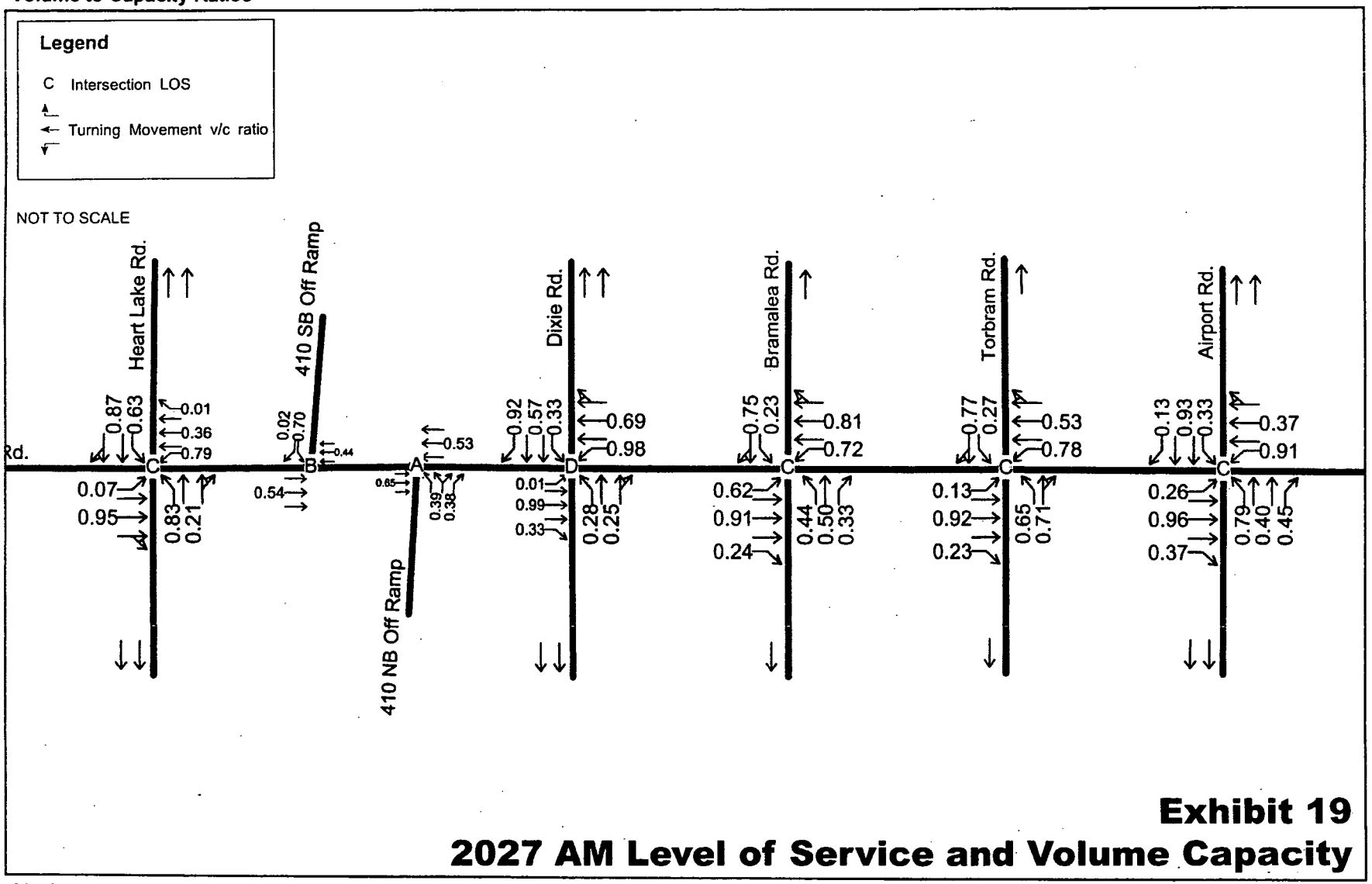


Exhibit 19
2027 AM Level of Service and Volume Capacity

3/10/2003

iTRANS

2027 Mayfield Road - PM Peak Hour
Volume to Capacity Ratios

Recommended Lane Configuration

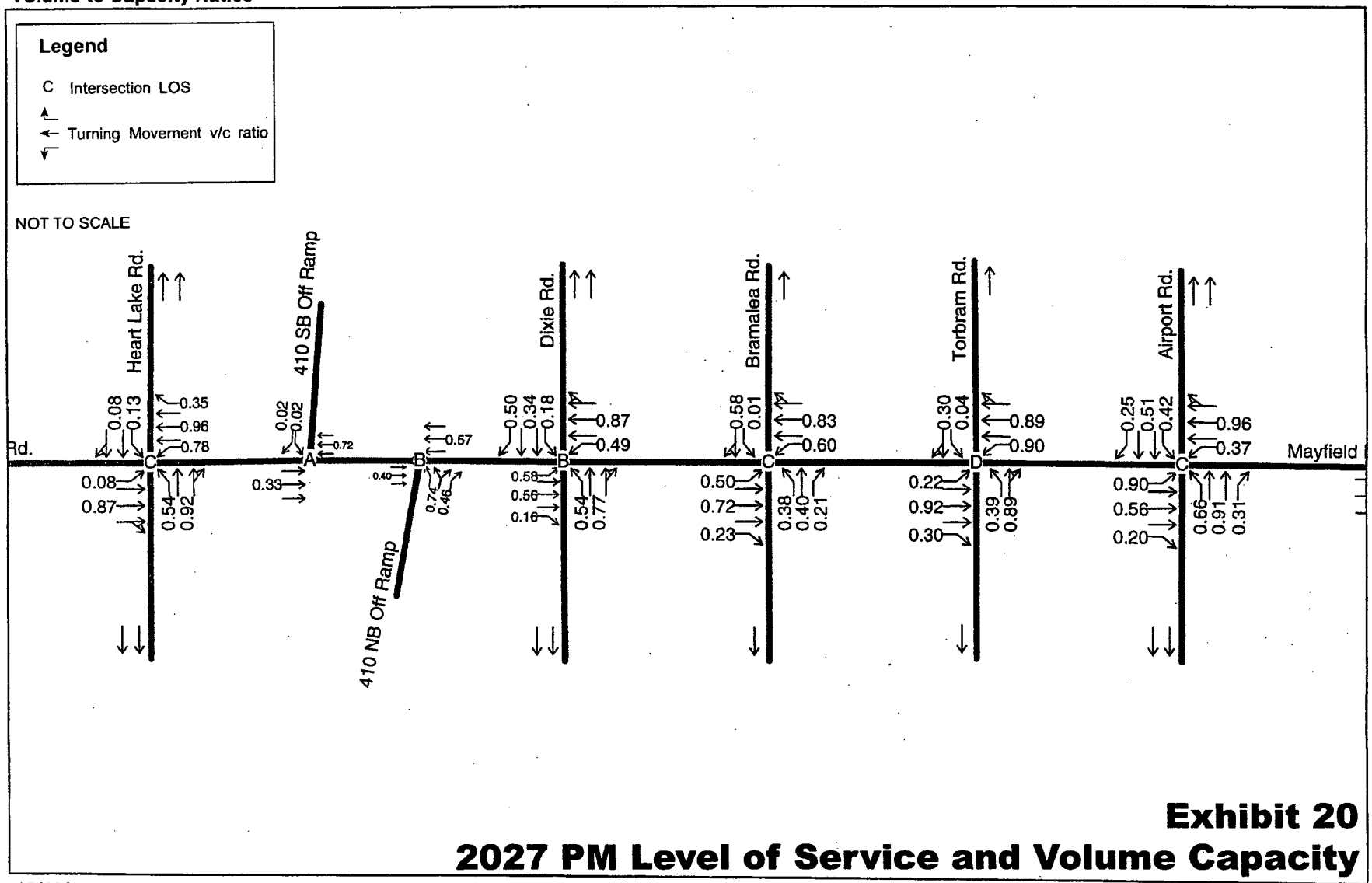


Exhibit 20

2027 PM Level of Service and Volume Capacity

12/10/2003

iTRANS

Mayfield Road
Lane Diagram

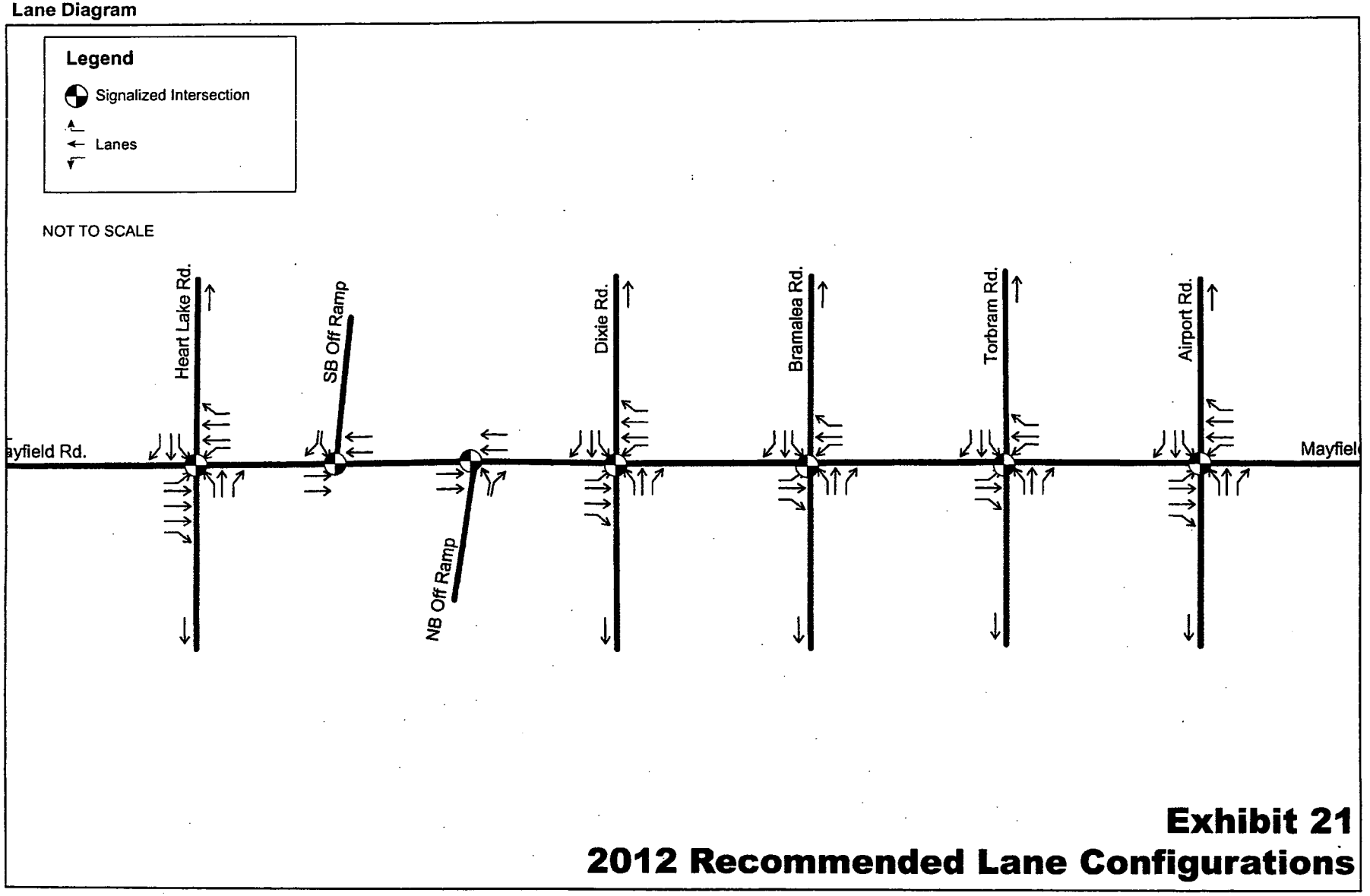


Exhibit 21
2012 Recommended Lane Configurations

iTRANS

Mayfield Road
Lane Diagram

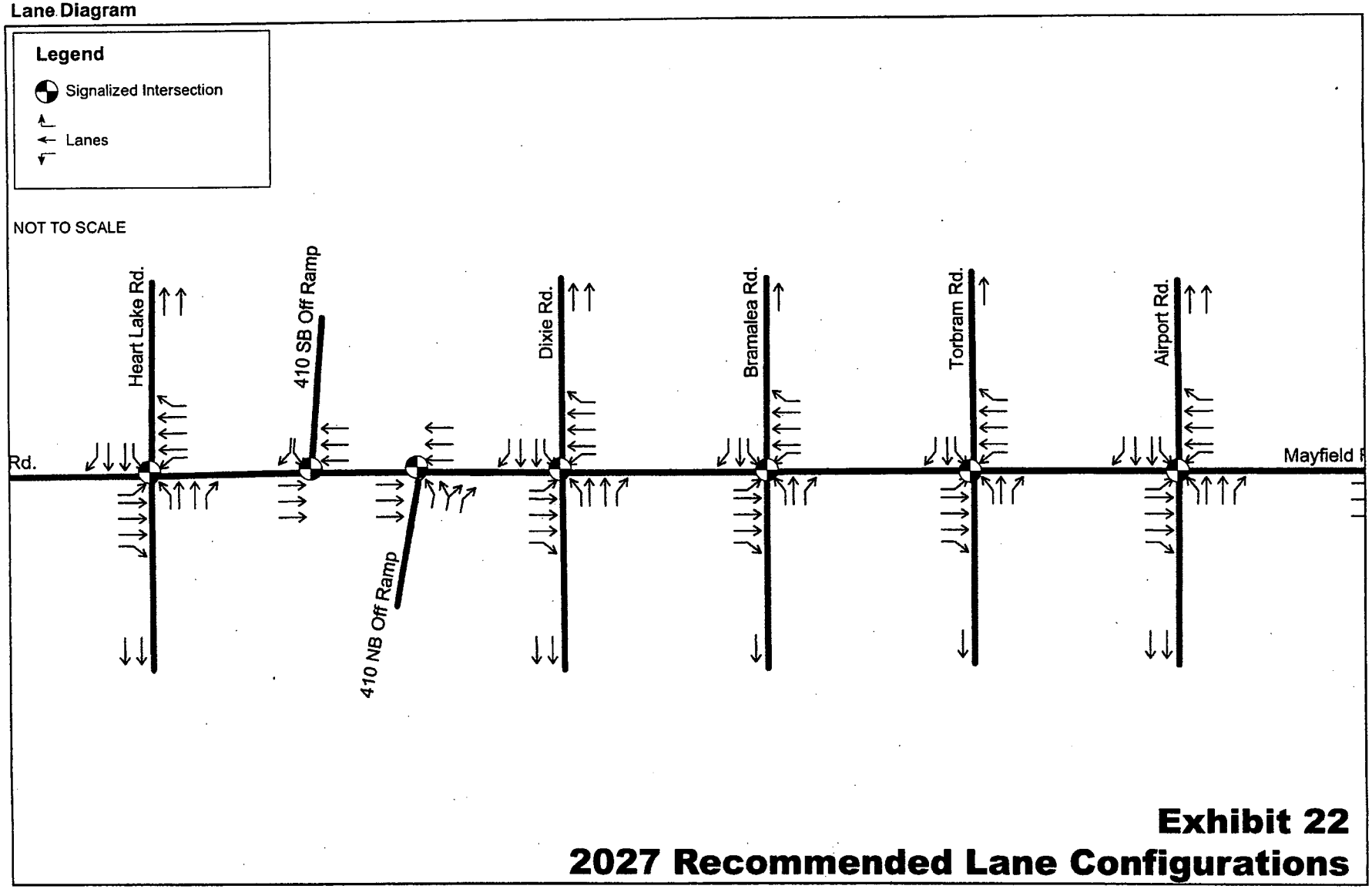


Exhibit 22
2027 Recommended Lane Configurations

1/14/2004

iTRANS

All in metres

Mayfield Road at Heart Lake Road

	NBLT	NBRT	SBLT	SBRT	EBLT	EBRT	WBLT	WBRT
2012	60	30	35	30	30	100	60	30
2027	75	60	55	30	30	100	75	77

Mayfield Road at Dixie Road

	NBLT	NBRT	SBLT	SBRT	EBLT	EBRT	WBLT	WBRT
2012	35	30	30	85	30	30	85	30
2027	65	50	30	140	50	70	100	30

Mayfield Road at Bramalea Road

	NBLT	NBRT	SBLT	SBRT	EBLT	EBRT	WBLT	WBRT
2012	35	50	35	40	115	30	100	30
2027	45	50	35	40	115	40	100	30

Mayfield Road at Torbram Road

	NBLT	NBRT	SBLT	SBRT	EBLT	EBRT	WBLT	WBRT
2012	40	56	30	56	30	42	100	30
2027	45	56	30	56	30	42	100	30

Mayfield Road at Airport Road

	NBLT	NBRT	SBLT	SBRT	EBLT	EBRT	WBLT	WBRT
2012**	135	60	95	50	150	50	150	50
2027	135	70	95	50	150	50	150	77

** Storage Lengths as per Airport Road Capital Project # 01-4035

Exhibit 23

2012 and 2027 Storage Requirements

iTRANS

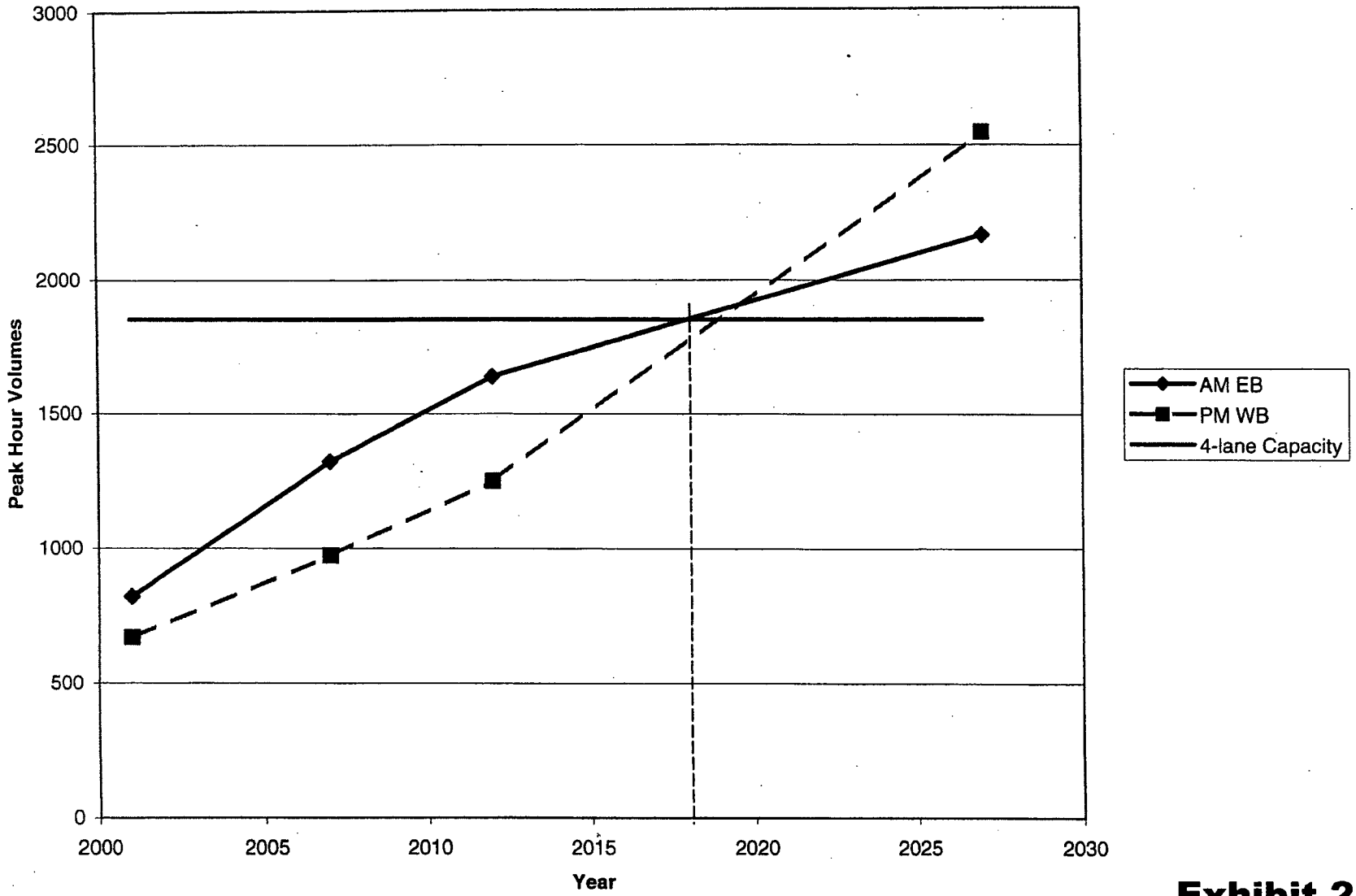


Exhibit 24

Mayfield Volumes between Heart Lake Road and Hwy 410
Determining Timing for 6-Lane Hwy 410/Mayfield Structure

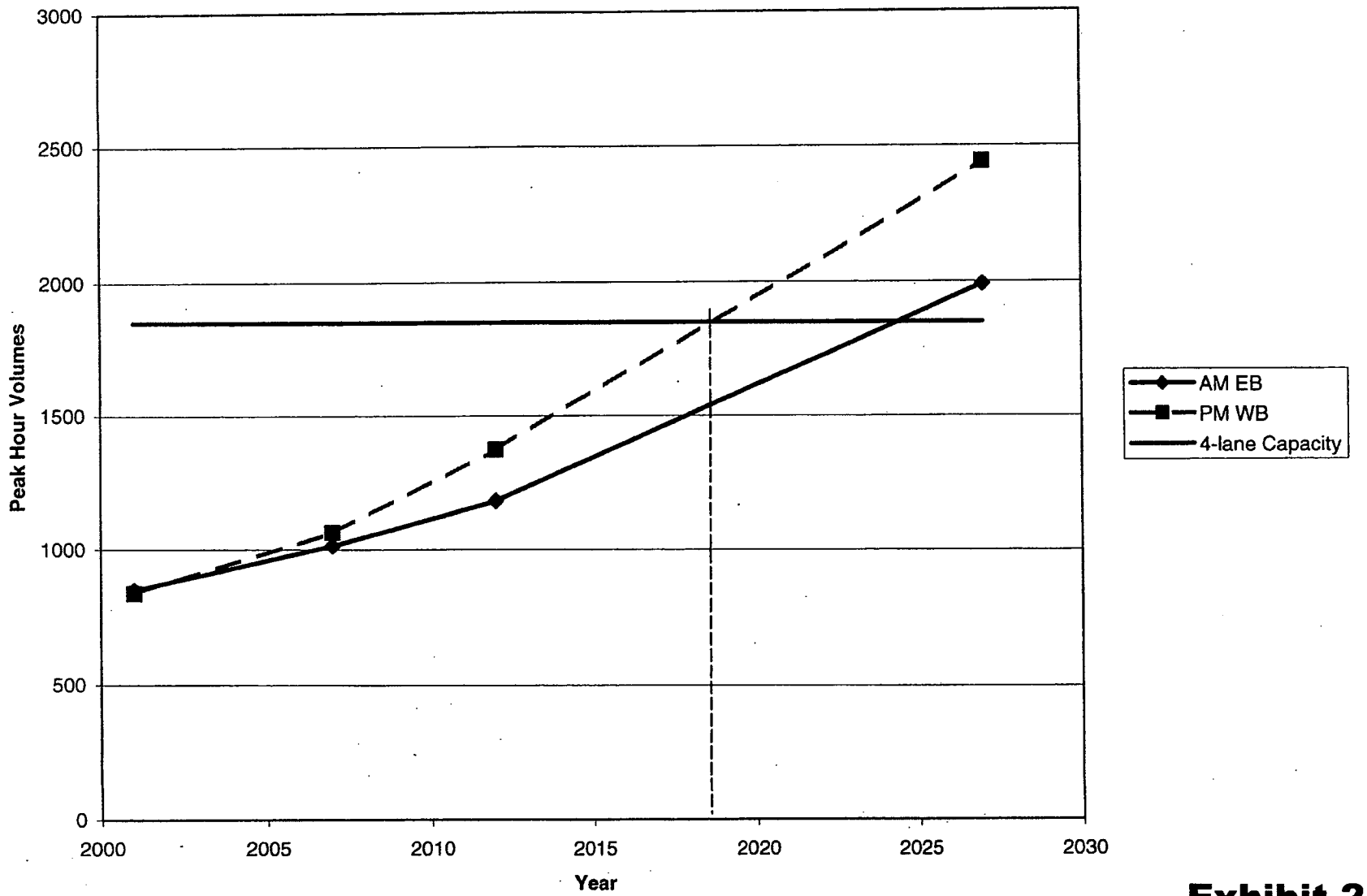


Exhibit 25

Mayfield Volumes between Hwy 410 and Dixie Road
Determining Timing for 6-Lane Hwy 410/Mayfield Structure

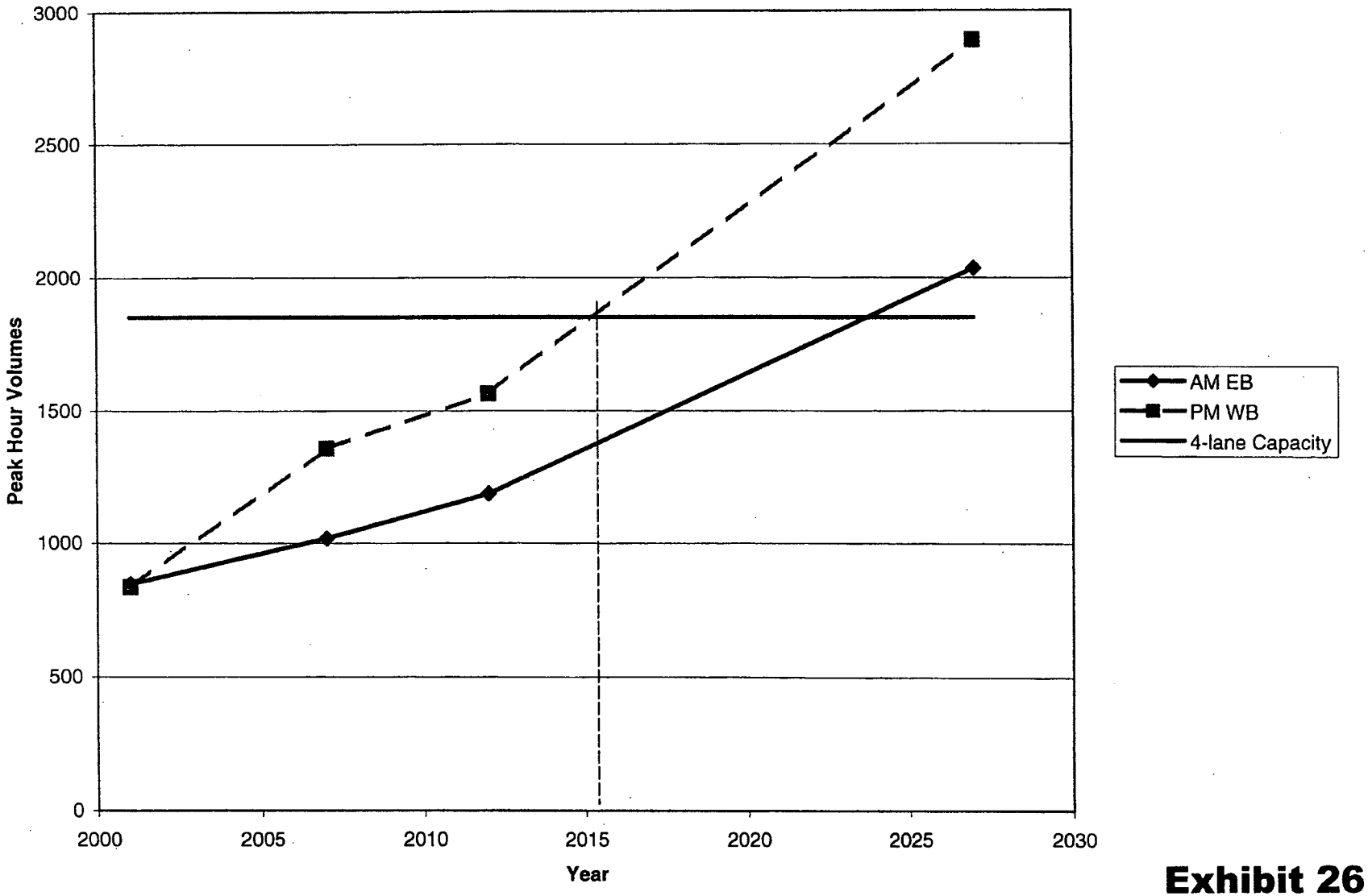


Exhibit 26

Mayfield Volumes Through Hwy 410

Determining Timing for 6-Lane Hwy 410/Mayfield Structure

APPENDIX B

Notice of Study Commencement

don't have a place to call home.

The initiative spans across the country with the goals of alleviating homelessness and raising awareness of the issue at the local level. Peel's goal is to top Ottawa's 2001/2002 total sales of 2,000 toques. The success of this campaign will determine the future funding of 'Raising the Roof' projects in the Region of Peel.

"Eighty per cent of the funds we raise will go toward a youth employment initiative," said Yamashita. "We hope to train a dozen or so youth in carpentry skills for building furniture that will be used in youth housing initiatives planned by the Region."

Snow Storm B&B Rate

Lesley Burns of Country Host B&B Network has announced again this year that she is pleased to extend a Snow Storm Bed and Breakfast rate to fellow local businesses and their employees.

A very special rate of $35 or $39 per single applies Sunday to Thursday, (and Friday and Saturday only when vacant). This rate is available to local business people on days when the weather is poor for travelling home and includes a continental quick breakfast.

Country Host asks that anyone needing a room to avoid travelling during a snow storm or poor weather, should try to phone by 3 p.m. to enquire about the closest B&B location. Country Host B&B Network can be reached by (519) 942 0686.

than 38,000 people are on a waiting list for social housing in Peel. The number of daily applicants has doubled over the past year. Most applicants will wait up to 10 years for an available unit.

Children are victims of poverty in Peel in significant numbers. A total of 2,565 children were in Peel's homeless and emergency shelters in 2001 -- a 35 per cent rise from the year before.

impact on the community. Peel plans to tap into new federal housing programme funds to build more units in the next five years.

The Peel Homeless Youth Network is comprised of committed individuals and representatives of more than 40 agencies in Peel that serve young people and provide programmes and

Public Notice

Notice of Study Commencement

Class Environmental Assessment
Mayfield Road (Regional Road 14)
From Heart Lake Road to Airport Road

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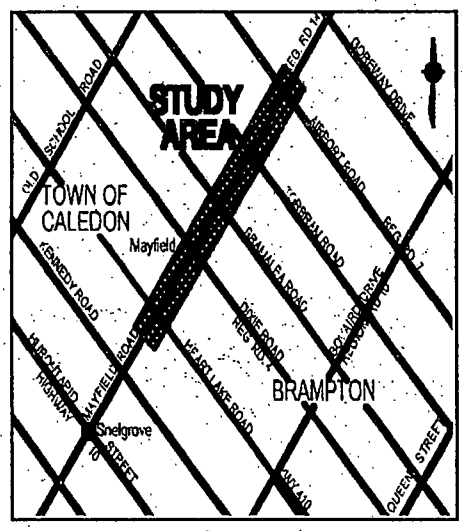

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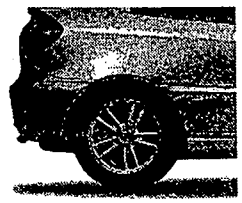
Mr. Binu Korah
Project Manager
Regional Municipality of Peel
10 Peel Centre Drive, 4th Floor
Brampton, ON L6T 4B9
Phone: 905-791-7800, Ext. 4463
Fax: 905-791-1442
Email: korahb@region.peel.on.ca

Mr. Garry Leveck, P. Eng.
Project Manager
Stantec Consulting Ltd.
49 Frederick Street
Kitchener, ON N2H 6M7
Phone: 519-585-7316
Fax: 519-579-6733
Email: gleveck@stantec.com

Region of Peel
Working for you

10 Peel Centre Dr. Brampton



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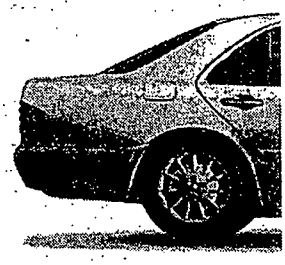

WHA SPECIAL

This is your opportunity a Mercedes-Benz. For t reduced prices on our re they're disappearing fast,

Merce
230 Mu

Retail prices listed are cash prices for specific Savings on similar vehicles may vary. Offer end

602 10370/4

of her prize-winning story at the
tificates from (left) store manager
placed second overall in Canada,
m 283 other children.

is now

uthor

he were asked to compose a story on
n- the 'If I were' theme in 100 words
p- or less. The winning selections are
on published in book form, and the
as book is being sold for $2.99 per
ed copy, with net proceeds donated
ite to Canadian schools, selected
on through a draw from all schools of
ift students entering the contest.
in Michelle has won or placed in
se several other library or communi-
ay ty writing contests, and even once
won a writing contest organized
13 by a cookie company.

Public Notice

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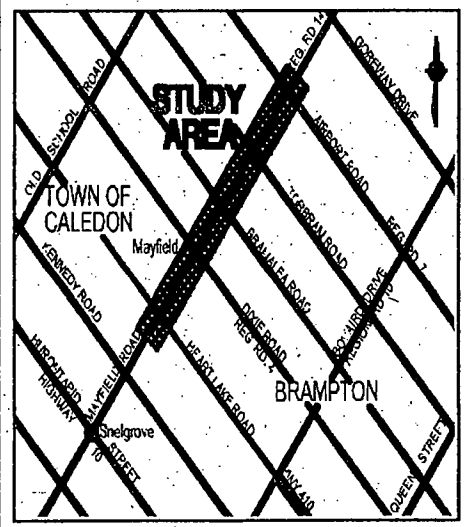

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Email: gleveck@stantec.com

Region of Peel
Working for you

10 Peel Centre Dr. Brampton

Teddy tossers

The Brampton Battalion recently held a Teddy Toss between periods of one of their hockey games. Fans were invited to bring, or purchase at the arena, a stuffed toy that they then threw on the ice after the second period. The response was so overwhelming, more than two van loads of toys were collected for the Peel Regional Police Toys for Tots program. Showing some of what was collected are, from left, Const. James Lidstone, youth volunteer Brent Hughes and Const. Jason Lachappelle.

Photo by George Beshiri

Public Notice

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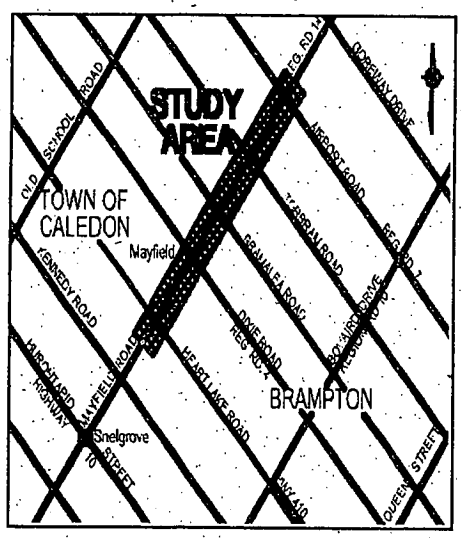

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Region of Peel
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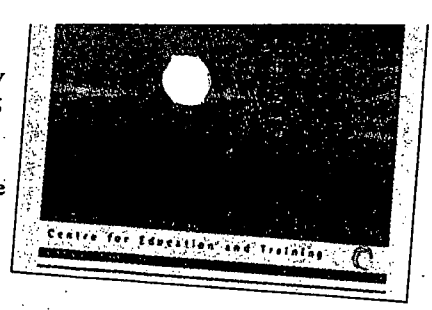
This guide highlights Winter day and e[illegible]g programs for adults offered by the Centre for Education and Training and Community Education, Peel District School Board.

If you did not receive your copy, please call (905) 949-0049 ext. 2294.



Centre for Education and Training

PEEL DISTRICT SCHOOL BOARD

Public Notice

Notice of Study Commencement

Class Environmental Assessment
Mayfield Road (Regional Road 14)
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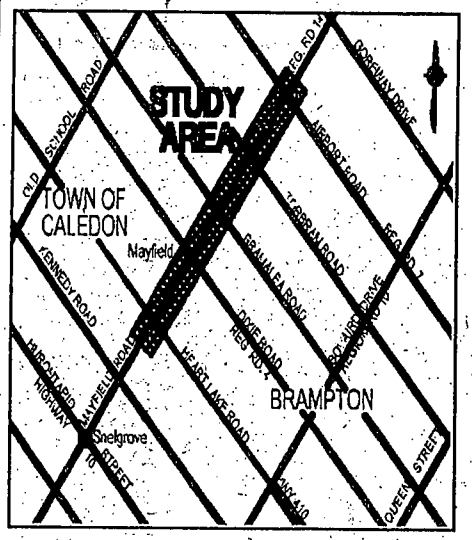

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Project Manager
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10 Peel Centre Drive, 4th Floor
Brampton, ON L6T 4B9
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Region of Peel
Working for you

10 Peel Centre Dr. Brampton

THE BRAMPTON GUARDIAN WEDNESDAY 11, 2002

December 23, 2002
File: 602 10370 / 37

Tel: (519) 585-7444
Fax: (519) 579-6733
dhallman@stantec.com

Town of Caledon
185 Old King Road
Bolton, ON L7E 5R5

Attention: C. Seglins, Mayor

Dear Madam:

Reference: Region of Peel - Mayfield Road Improvements
Between Heart Lake Road and Airport Road
Class Environmental Assessment and Preliminary Design Study

The Region of Peel has initiated a study to examine roadway widening/improvement options on Mayfield Road (Regional Road 14), between Heart Lake Road and Airport Road. Mayfield Road forms the municipal boundary between the City of Brampton and the Town of Caledon.

Accelerated growth and traffic volumes in the City of Brampton and the Town of Caledon result in the need for functional improvements within this roadway corridor. Stantec Consulting Ltd. has been engaged by the Region of Peel to complete a Schedule "C" Class Environmental Assessment to examine improvement options within this 5.5 kilometre corridor. The study will be completed in accordance with the Municipal Engineers' Association document entitled "Municipal Class Environmental Assessment, June 2000".

An initial Public Information Centre will be scheduled early in 2003, to obtain comments from the public regarding this study (notice attached). In addition, we are contacting various government agencies, community groups, utility commissions and other regulatory authorities to receive input to the study. We therefore request your initial comments on the possible improvements to Mayfield Road, which will be taken into account in the selection of a preferred design. In view of the time frame associated with this project, we request that your comments be forwarded to the undersigned no later than **January 30, 2003**.

We enclose a copy of the Notice of Study Commencement, which includes a key plan indicating the location of the study area. Please identify any known issues/constraints which you feel are important to the overall development of this Class Environmental

Reference: Mayfield Road Improvements, Between Heart Lake Road and Airport Road Class Environmental Assessment and Preliminary Design Study

Assessment Study. We recognize that this project may not be of any consequence to the policies and/or mandate of your agency. Should this be the case, we would appreciate your response accordingly, either by return correspondence or by returning a copy of this letter, dated and signed in the area provided.

We thank you in advance for your cooperation in this matter, and we look forward to your assistance in the identification of preferred improvements to this roadway corridor. If you have any questions and/or comments prior to a written submission, please contact either of the following Project Team members:

Mr. Binu Korah,
Project Manager
Region of Peel
10 Peel Centre Drive, 4th Floor
Brampton, Ontario L6T 4B9
Phone: 905-791-7800, Ext. 4463
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Phone: 519-585-7316
Fax: 519-579-6733
Email: gleveck@stantec.com

Sincerely,

STANTEC CONSULTING LTD.

Dave Hallman, P.Eng.
Managing Principal, Transportation

Attachment

c. Mr. Binu Korah, Region of Peel

This project does not appear to have any consequence to the policies and/or mandate of this agency. Therefore, this agency will not be providing any input and will not be participating in the study.

Date:_____ Name: _____

Title: _____

Address: _____

_____

Public Notice

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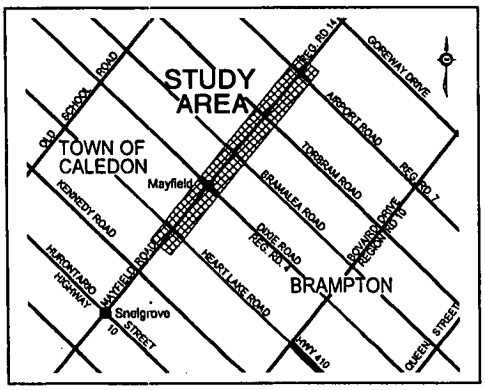

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Email: gleveck@stantec.com

NOTICE OF STUDY COMMENCEMENT AGENCY MAILING LIST
DEC 23/02

Mr. John Budz, District Manager
Ministry of Environment
Halton-Peel District Office
1182 North Shore Blvd. E.
Burlington, ON L7R 3Z9

Mr. Gerry Sheerin,
Hydro Electric Commission of Ontario
7676 Woodbine Avenue, Suite 250
Markham, ON L3R 2N2

Mr. Clifford G. Clark, Director,
Environmental Health
Region of Peel, Health Department
199 County Court Blvd.
Brampton, ON L6W 4P3

Ms. Sharon Mittmann,
City of Brampton,
Planning and Building Department
2 Wellington Street West
Brampton, ON L6Y 4R2

Mr. Carl Brawley,
City of Brampton
2 Wellington Street West
Brampton, ON L6Y 4R2

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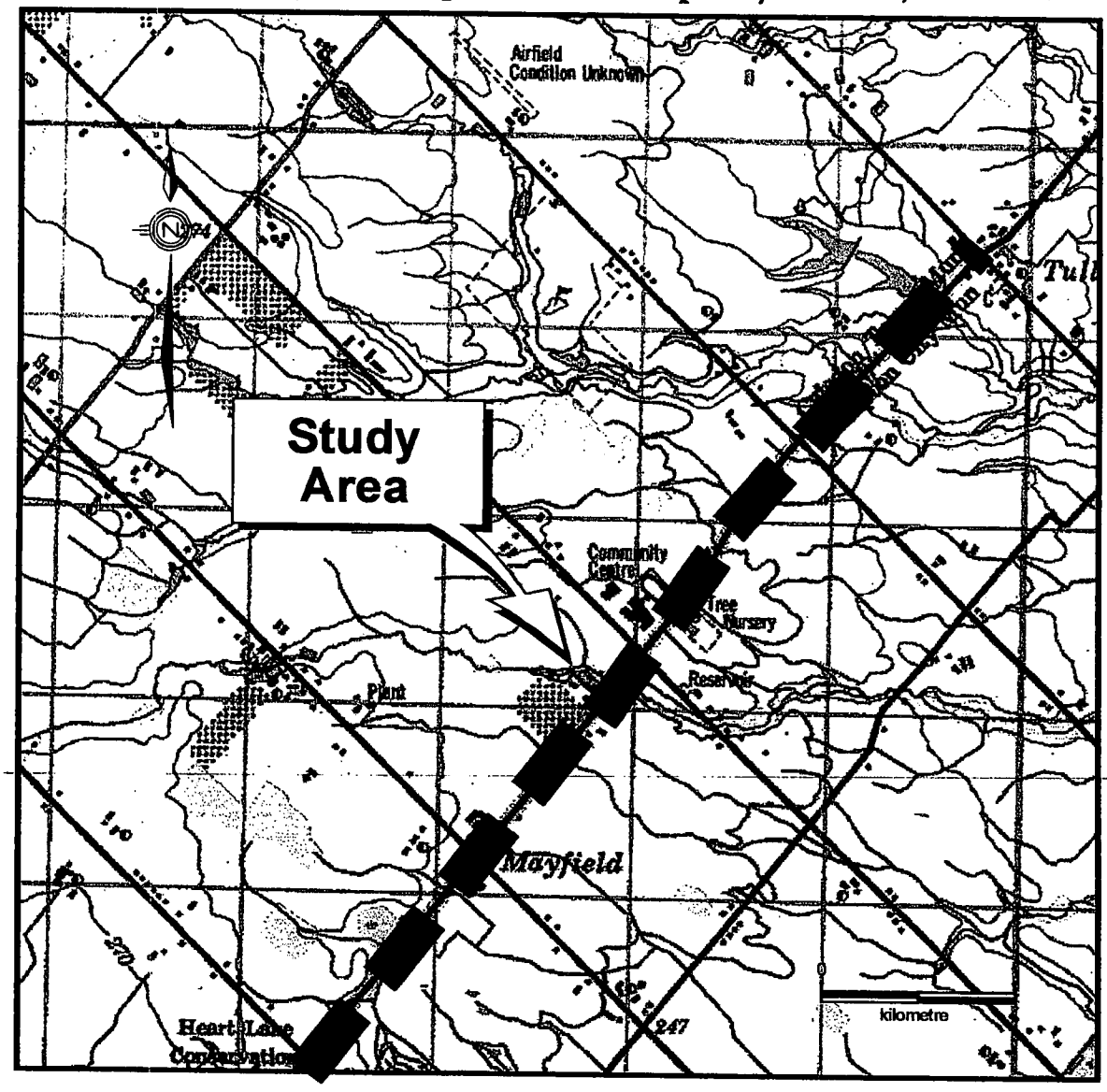
APPENDIX C

Archaeological Assessment Stage 1, August 2003, and Heritage Impact Assessment, February 2003 Mayfield Road Widening, Mayer Heritage Consultants Inc.

Archaeological Assessment (Stage 1)
Mayfield Road Widening, (Heart Lake Road to Airport Road)
City of Brampton, Regional Municipality of Peel, Ontario



Mayer
Heritage
Consultants Inc.

Cultural Heritage Assessments and Archaeological Mitigative Excavations

Archaeological Assessment (Stage 1)
Mayfield Road Widening (Heart Lake Road to Airport Road) City of Brampton/Town of Caledon, Regional Municipality of Peel, Ontario

Submitted to

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Archaeological Consulting Licence Number 2002-056
Contract Information Form Number 2002-056-057
Corporate Project Number 02-081

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Field Director	Paul J.C. O'Neal
Graphics	Chris Veenema

Acknowledgments

Preparation of this report was facilitated by the assistance of the following individuals and their agencies:

- ***David Hallman***, Stantec Consulting Ltd.
- ***Robert von Bitter***, Archaeological Data Co-ordinator, Ontario Ministry of Culture.

Archaeological Assessment (Stage 1)
Mayfield Road Widening (Heart Lake Road to Airport Road)
City of Brampton, Regional Municipality of Peel, Ontario

Introduction

Among other matters, the *Planning Act R.S.O. 1990*, establishes that the protection of features of archaeological interest is a matter of provincial concern. As such, an archaeological resource assessment (Stage 1 background research and Stage 2 general survey) was conducted as a standard condition of approval for the proposed widening of Mayfield Road between Heart Lake Road and Airport Road, Regional Municipality of Peel, Ontario (Figure 1).

This assessment was conducted in order to determine if any direct and/or indirect impacts would occur by proposed construction activities on archaeological resources that might be present. Archaeological resources consist of artifacts (Aboriginal stone tools, pottery and subsistence remains as well as Euro-Canadian objects), subsurface settlement patterns and cultural features (post moulds, trash pits, privies, and wells), and sites (temporary camps and special purpose activity areas, plus more permanent settlements such as villages, homesteads, grist mills and industrial structures).

Stage 1 Background Research

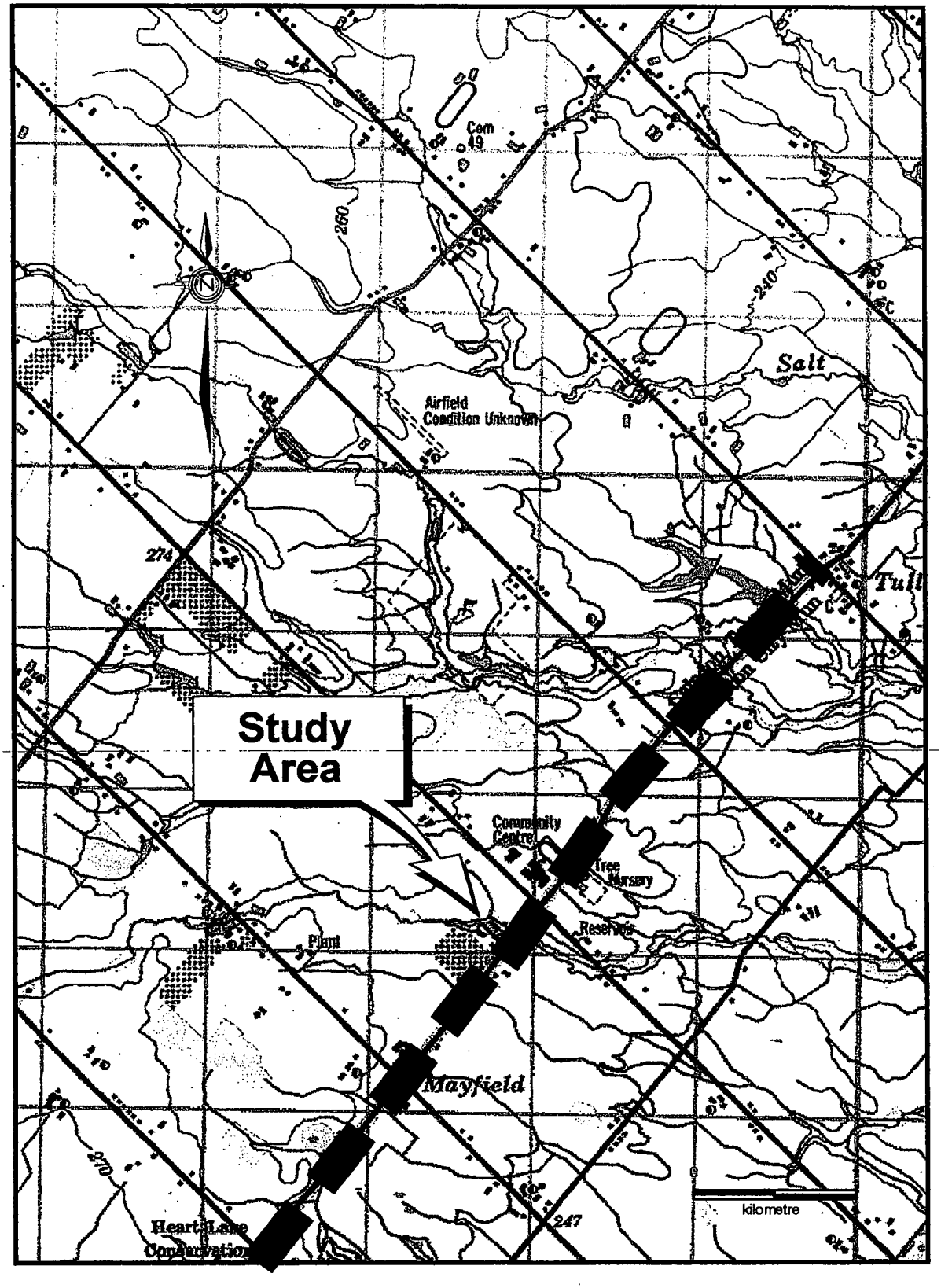
Stage 1 background research was conducted in order to complete the following tasks:

- amass all of the readily available information on any previous archaeological surveys in the area;
- determine the locations of any registered and unregistered sites; and
- develop an historical framework for assigning levels of potential significance to any new sites discovered during fieldwork.

The framework for assigning levels of potential archaeological significance is drawn from provincial guidelines (Weiler 1980). The necessary information includes the identification and evaluation of any feature that has one or more of the following attributes:

- *it has the potential through archaeological exploration, survey or fieldwork to provide answers to substantive questions (i.e. relate to particular times and places) about events and processes that occurred in the past and therefore add to our knowledge and appreciation of history;*
- *it has the potential through archaeological exploration, survey and fieldwork to contribute to testing the validity of general anthropological principles, cultural change and ecological adaptation, and therefore to the understanding and appreciation of our man-made heritage; or*
- *it is probable that various technical, methodological, and theoretical advances are likely to occur during archaeological investigation of a feature, alone or in association with other features, and therefore contribute to the development of better scientific means of understanding and appreciating our man-made heritage (Weiler 1980:8)*

Figure 1: Location of the Study Area.



Natural Environment

The study area is within the Peel Plain (Chapman and Putnam 1984). The *Soil Survey of Peel County* (Hoffman and Richards, 1990) indicates the surface soil type varies while the subject area has variable drainage with variable topography. The study area crosses two tributaries of Etobicoke Creek.

Potential for Archaeological Resources

Archaeological potential is defined as the likelihood of finding archaeological sites within a study area. For planning purposes, determining archaeological potential provides a preliminary indication that significant sites might be found within the study area, and consequently, that it may be necessary to allocate time and resources for archaeological survey and mitigation. In predicting the locations of archaeological sites, the *Primer on Archaeology, Land Use Planning and Development in Ontario* (Ministry of Culture 1997:12-13) states that undisturbed lands, or those with minimal disturbance, such as cultivated fields, within 300 metres of a primary water source or 200 metres of a secondary or tertiary water source are considered to have archaeological potential. Other criteria can include location on elevated ground or near distinctive or unusual landforms, and the presence of well-drained sandy soils.

Based upon a published synthesis of Aboriginal cultural occupations (Wright 1968), Table 1 is a general outline of the cultural history of southwestern Ontario that is applicable to the study area. Ellis and Ferris (1990) provide greater detail of the distinctive characteristics of each time period and cultural group. The Ministry of Culture archaeological database coordinator (von Bitter 2003) indicated that there are twenty-seven previously registered archaeological sites within 2,000 metres of the study area (Table 2).

Table 1: General Cultural Chronology for Southwestern Ontario.

PERIOD	*GROUP*	*TIME RANGE*	*COMMENTS*
Early Paleo-Indian	Fluted Projectiles	9500 - 8500 B.C.	big game hunters
Late Paleo-Indian	Hi-Lo Projectiles	8500 - 7500 B.C.	small nomadic groups
Early Archaic	---	7800 - 6000 B.C.	nomadic hunters and gatherers
Middle Archaic	Laurentian	6000 - 2000 B.C.	territorial settlements
Late Archaic	Lamoka	2500 - 1700 B.C.	polished ground stone tools
"	Broadpoint	1800 - 1400 B.C.	---
"	Crawford Knoll	1500 - 500 B.C.	---
"	Glacial Kame	*circa* 1000 B.C.	burial ceremonialism
Early Woodland	Meadowood	1000 - 400 B.C.	introduction of pottery
"	Red Ochre	1000 - 500 B.C.	---
Middle Woodland	Western Basin/Saugeen	400 B.C. - A.D. 500	long distance trade networks
"	Princess Point	A.D. 500 - 800	incipient agriculture
Late Woodland	Glen Meyer	A.D. 800 - 1300	transition to village life
"	Uren	A.D. 1300 - 1350	large villages with palisades
"	Middleport	A.D. 1300 - 1400	wide distribution of ceramic styles
"	Neutral/Huron	A.D. 1400 - 1650	tribal warfare
Early Contact	Mississauga plus others	A.D. 1700 - 1875	tribal displacement
Late Contact	Euro-Canadian	A.D. 1800 - present	European settlement

Figure 2: Mayfield Road Looking East From Heart Lake Road

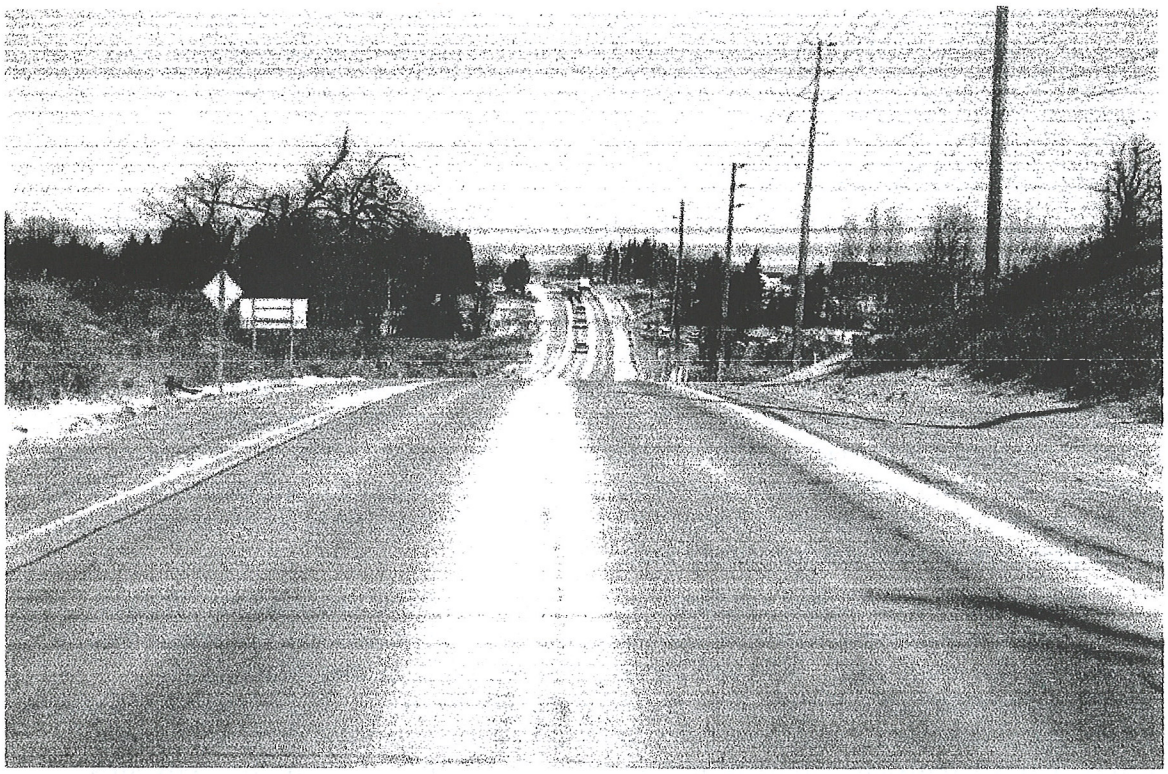
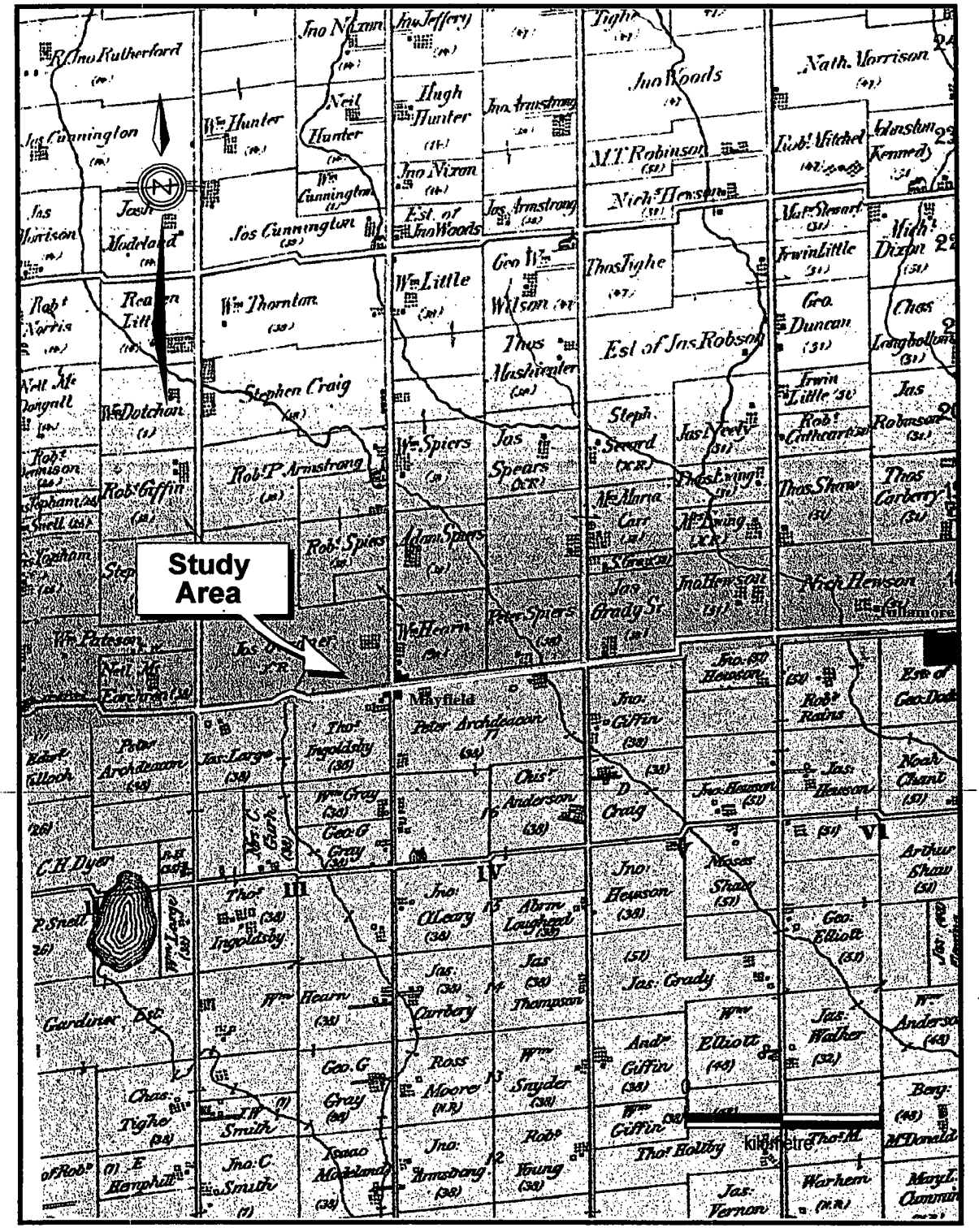


Figure 3: Mayfield Road Looking West To Dixie Road at Mayfield

Figure 4: Site Location on Historic Atlas.



Over their thousands of years of occupation in the general region, Aboriginal people, have left behind, to a greater or lesser degree, physical evidence of their lifeway activities and settlements at many locations. The earliest possible human occupation was during the Paleo-Indian period (*circa* 9000 to 7000 B.C.) wherein small groups of nomadic peoples hunted big game along the shorelines of glacial lakes. These people were few in number and their small, temporary campsites are relatively rare.

People during the Archaic period (*circa* 7000 to 1000 B.C.) were still primarily nomadic hunters but also established territorial settlements, gathered seasonally available resources, and introduced burial ceremonialism. Late Archaic period sites are more numerous and can be quite large due to repeated annual visits.

Sites of the Woodland period (*circa* 1000 B.C. to A.D. 1650) are usually the most numerous because the population levels in southwestern Ontario had significantly increased. The manufacture of ceramic pottery vessels for storage and cooking was introduced along with the establishment of long distance trading networks, horticulture, warfare and large palisaded villages.

Table 2: Registered Archaeological Sites within 2,000 metres of the Study Area.

REGISTRATION #	*NAME*	*TYPE*	*CULTURAL AFFILIATION*
AkGw-156	---	Station, knapping	Aboriginal
AkGw-157	---	Station, knapping	Aboriginal
AkGw-162	---	Findspot	Aboriginal
AkGw-163	---	Findspot	Aboriginal
AkGw-164	---	Findspot	Aboriginal
AkGw-165	---	Findspot	Aboriginal
AkGw-13	655339 Ontario	Homestead	Euro-Canadian
AkGw-14	Allison	Findspot	Aboriginal
AkGw-15	Clearbrook	Homestead	Euro-Canadian
AkGv-158	Countryside	Findspot	Early Archaic
AkGw-185	---	Findspot	Late Archaic
AkGw-186	---	Findspot	Aboriginal
AkGw-188	---	Findspot	Aboriginal
AkGw-189	---	Findspot	Aboriginal
AkGw-190	---	Findspot	Aboriginal
AkGw-191	---	Findspot	Aboriginal
AkGw-192	---	Findspot	Aboriginal
AkGw-207	---	Findspot	Aboriginal
AkGw-205	---	Findspot	Aboriginal
AkGw-206	---	Findspot	Early Woodland
AkGw-107	Elias Snell Pioneer Homestead	Homestead	Euro-Canadian
AkGw-91	O'Leary	Homestead	Euro-Canadian
AkGw-92	Sprindale 1	Findspot	Middle-Late Archaic
AkGw-142	Shaw 1	Homestead	Euro-Canadian
AkGw-143	Shaw II	Homestead	Euro-Canadian
AkGw-2	Heart Lake	Campsite	Aboriginal

Figure 5: Mayfield Road Looking East From Bramalea Road

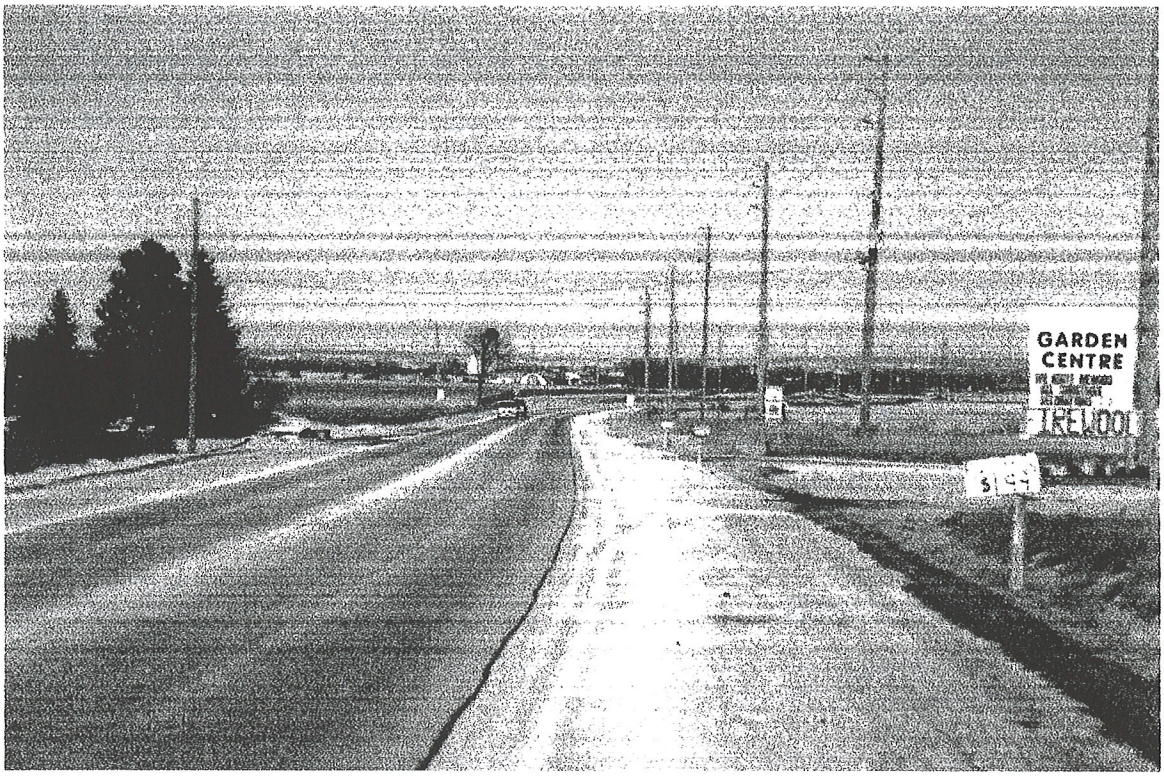
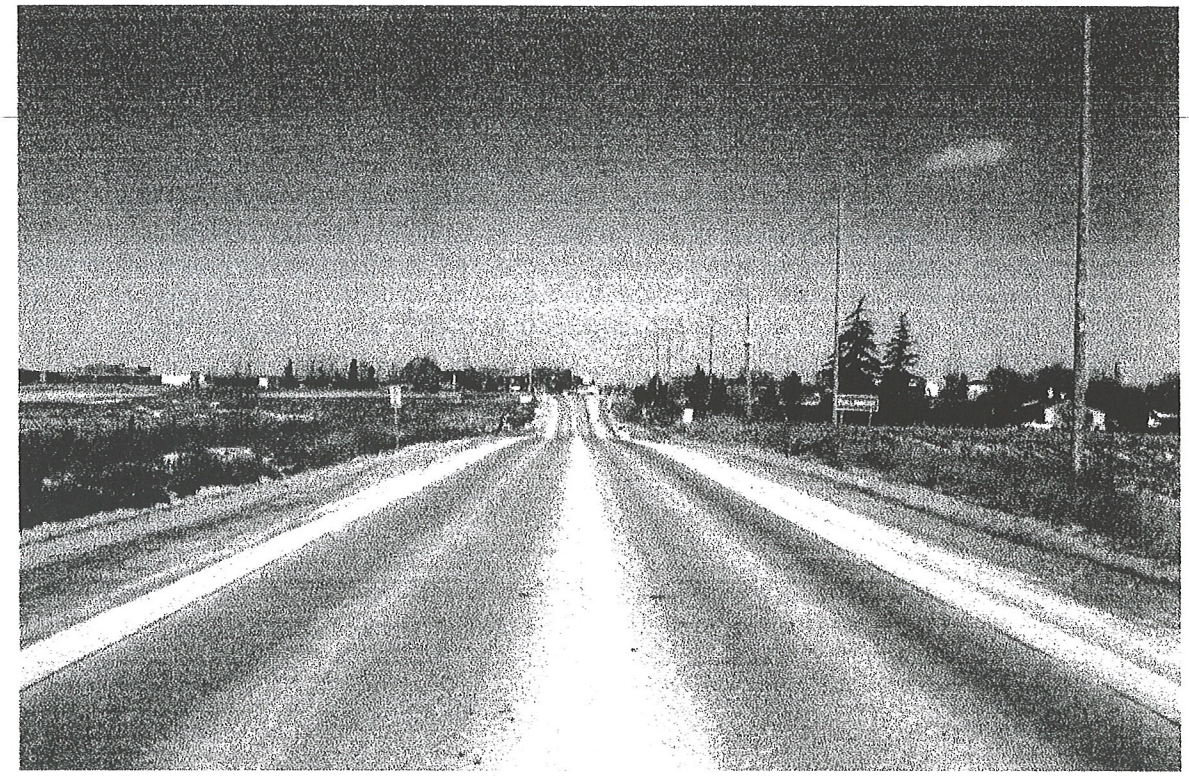


Figure 6: Mayfield Road Looking East to Airport Road at Tullamore



Sites of the Contact period (*circa* A.D. 1650 to 1900) include Aboriginal and Euro-Canadian residences and industries. *Tremaine's 1859 Map of the County of Peel* shows the study area as unowned. J.H. Walker & Miles's 1877 map of Chinguacousy Township in the *Illustrated Historical Atlas of the County of Peel* indicates no owners of the land being surveyed. Structures are indicated on the right-of-way at both the corners of the Towns of Mayfield and Tullamore within the current study area. The absence of other structures on this map, however, does not necessarily mean that one or more structures were not present at that time, earlier or later.

Visual Inspection

A visual inspection of the 7-kilometre long study corridor was undertaken on January 22nd, 2003. The road-widening project will only affect the existing roadway and shoulders, which have been impacted during the original construction of Mayfield Road. Therefore, the study area exhibits low potential for the discovery of pre-contact Aboriginal and Euro-Canadian archaeological resources.

RECOMMENDATIONS

The following recommendations are provided for consideration by Stantec Consulting Ltd. and by the Ministry of Culture:

1. Additional assessment or mitigative measures are not warranted because the study area exhibits low potential for the recovery of archaeological resources. The Ministry of Culture is requested to issue a letter recommending clearance of the archaeological condition attached to this development.

2. Although every reasonable effort was made to locate all archaeological resources, it is possible that some remain to be discovered within the study area. Should deeply buried archaeological material be found during construction, the Ministry of Culture in London (519-675-7742) and Mayer Heritage Consultants Inc. in London (519-472-8100 or 800-465-9990) should be immediately notified.

3. As on virtually any property in southern Ontario, it is possible that Aboriginal or Euro-Canadian burials could be present within the study area. In the event that human remains are encountered during construction, the proponent should immediately contact both the Ministry of Culture, and the Cemeteries Regulation Unit of the Ontario Ministry of Consumer and Commercial Relations in Toronto (416-326-8392), as well as the appropriate municipal police, the local coroner, and Mayer Heritage Consultants Inc.

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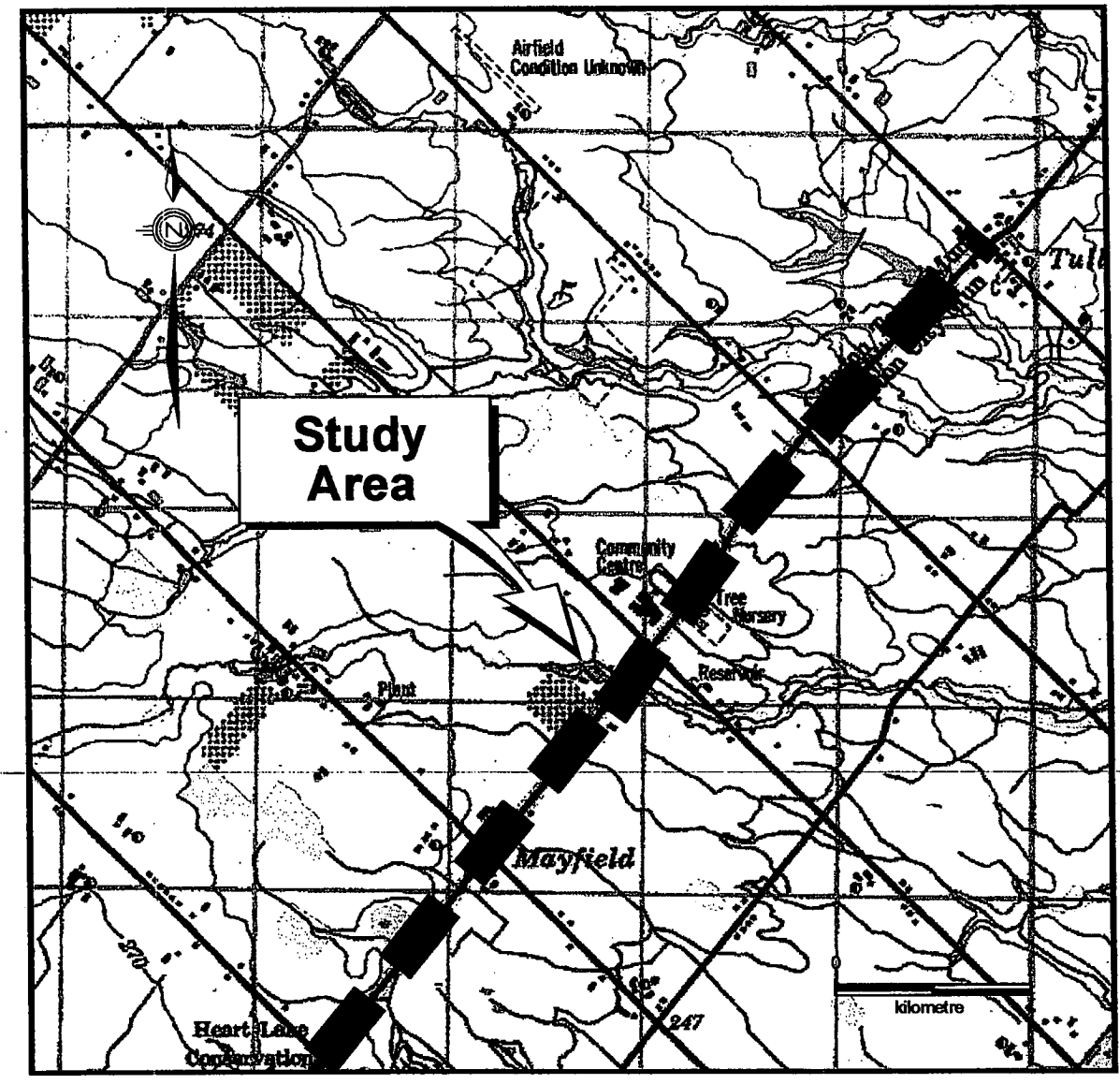
Heritage Impact Assessment
Mayfield Road Widening, (Heart Lake Road to Airport Road)
City of Brampton, Regional Municipality of Peel, Ontario



Mayer
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Cultural Heritage Assessments and Archaeological Mitigative Excavations

Heritage Impact Assessment
Proposed Widening of Mayfield Road
(from Heart Lake Road to Airport Road)
City of Brampton/Town of Caledon, R.M. of Peel, Ontario

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Corporate Project Number: 02-081

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Preparation of this report was facilitated by the assistance of Dave Hallman, Stantec Consulting Ltd.

Executive Summary

In support of the proposed widening of Mayfield Road, from Heart Lake Road to Airport Road, Mayer Heritage Consultants Inc. conducted on January 22, 2003, a Heritage Impact Assessment. This was done to determine if any sites/structures/facilities existed which might be impacted by this construction project.

Mayfield Road is an existing two-lane paved road with gravelled shoulders. It is bounded on both sides by farmland and a number of rural residences and commercial enterprises.

The whole of the route in the study area, together with short extensions at the east and west ends of the study area, and short (100m) portions of the intersecting roads at Mayfield Road were photographed. There is a small number of older buildings that may be impacted by this road project. One such house is at Mayfield. At Tullamore, there is an early shed-like building and a cemetery that could be impacted.

It is recommended that should it be the case that these structures and facilities could be impacted, further study on each of these be conducted.

Heritage Impact Assessment
Proposed Widening of Mayfield Road
Regional Road 14
(from Heart Lake Road to Airport Road)
Regional Municipality of Peel

INTRODUCTION

At the request of the Stantec Consulting Ltd. Acting for the Regional Municipality of Peel, a heritage impact assessment was conducted on the proposed widening of Mayfield Road from Heart Lake Road eastward to Airport Road (Figure 1). The objective of the field survey was to identify sites/structures/facilities of potential historic or heritage significance over the whole of the route, including short portions beyond the east and west limits of the Mayfield Road study area west of Heart Lake Road and east of Airport Road. Also included were short portions of each road intersecting with Mayfield Road within the limits of the study area.

The Regional Municipality of Peel is coordinating environmental studies under the *Class Environmental Assessment for Municipal Roads* process. As part of these studies, the heritage impact assessment field survey was conducted by Mayer Heritage Consultants Inc. on January 22, 2003. J. Trevor Hawkins served as Principal Investigator and Elizabeth Leeson served as Heritage Research Assistant. The assessment techniques and reporting procedures follow the requirements of the Ontario Heritage Act R.S.O. 1990, c337.

STUDY METHODS

Background Research

Background research was conducted for the proposed Mayfield Road widening in order to:

- develop a heritage/historical framework for assigning potential heritage significance to any site/structure/facility noted during the fieldwork; and
- make recommendations for further study of any such noted site/structure/facility.

Relevant archival material and published reference sources were accessed from the documentation supplied and the corporate library of Mayer Heritage Consultants Inc. in London, Ontario.

Figure 1: Location of the Study Area.

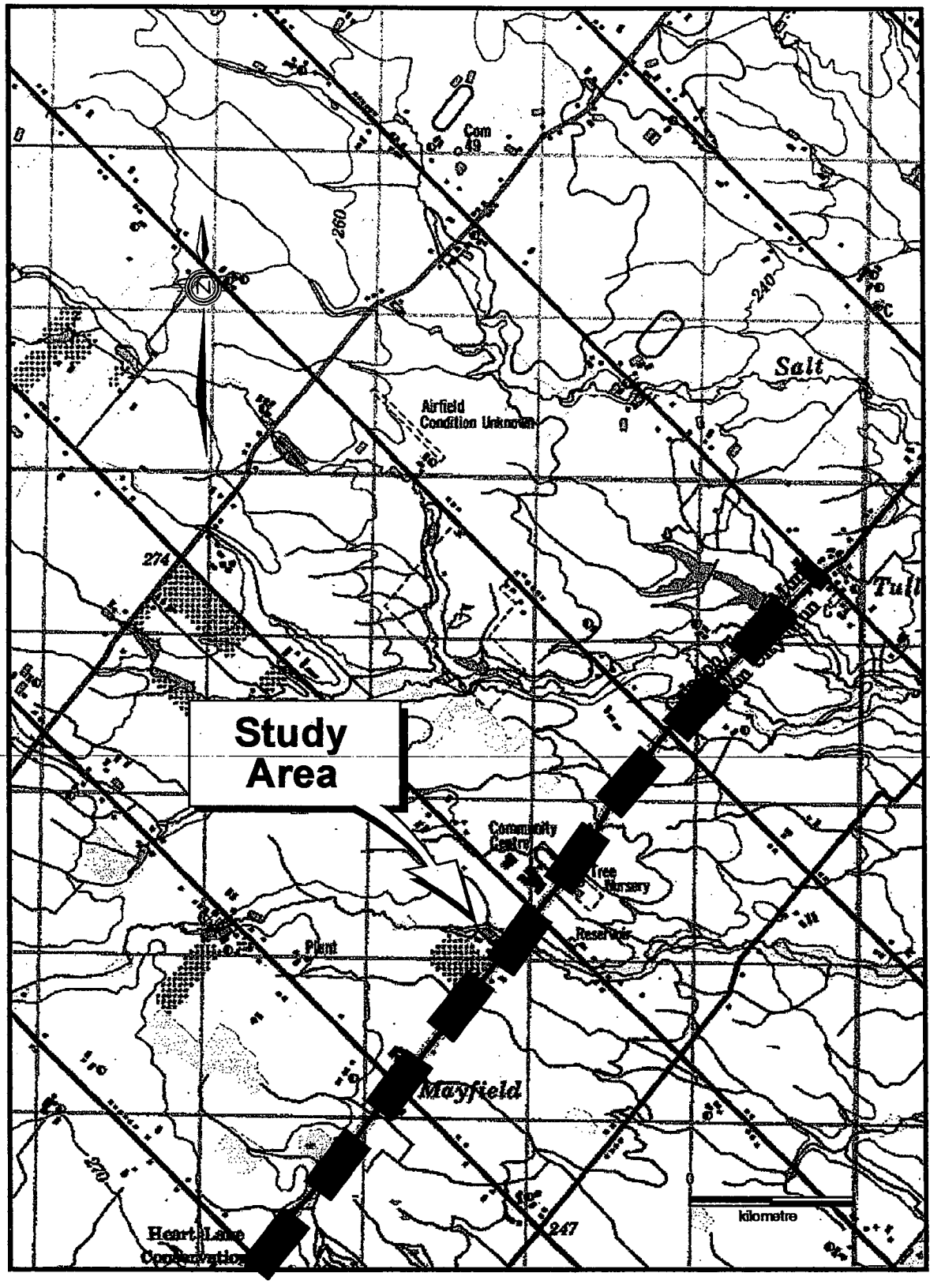


Figure 2: Site Location on Historic Atlas.

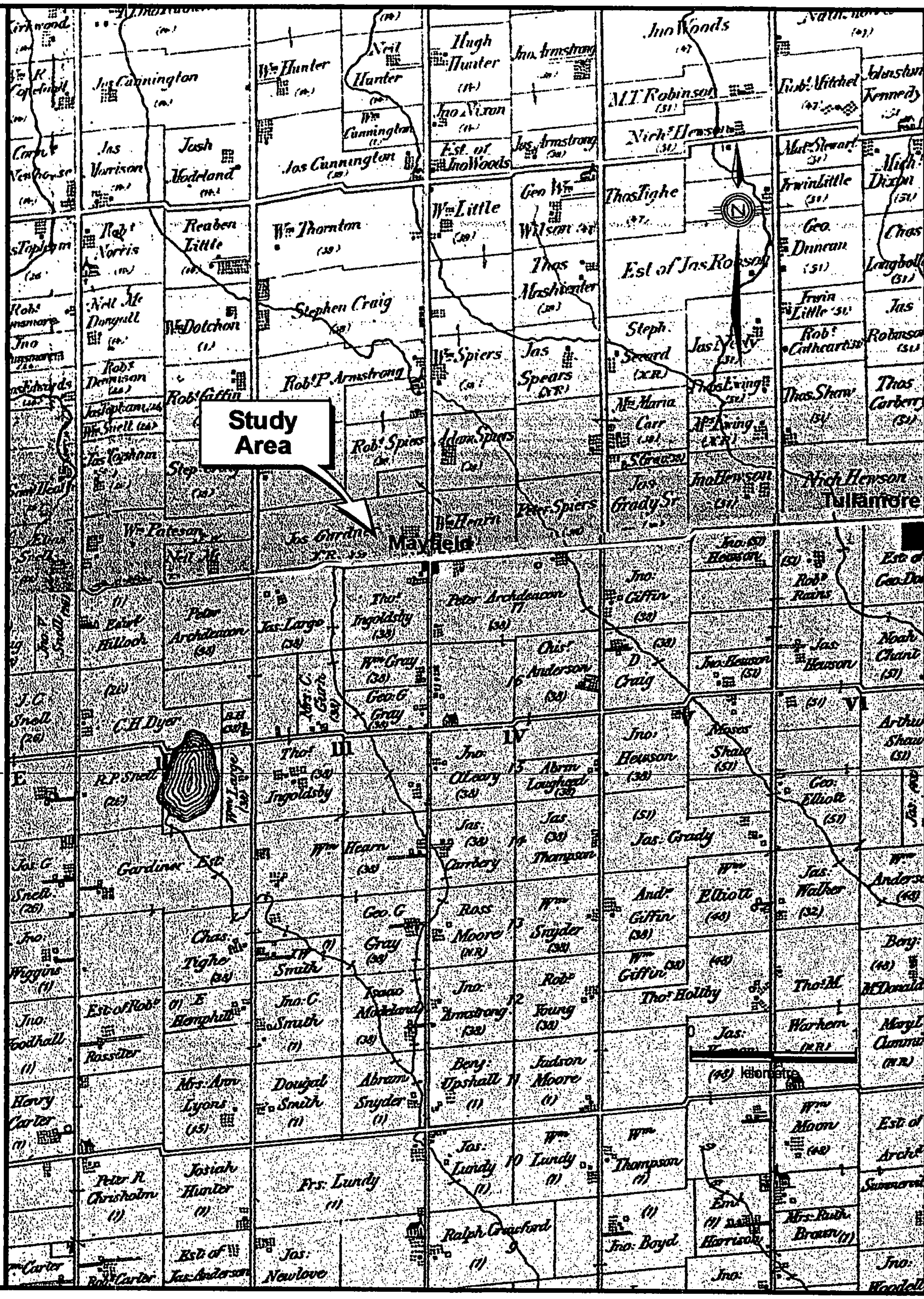
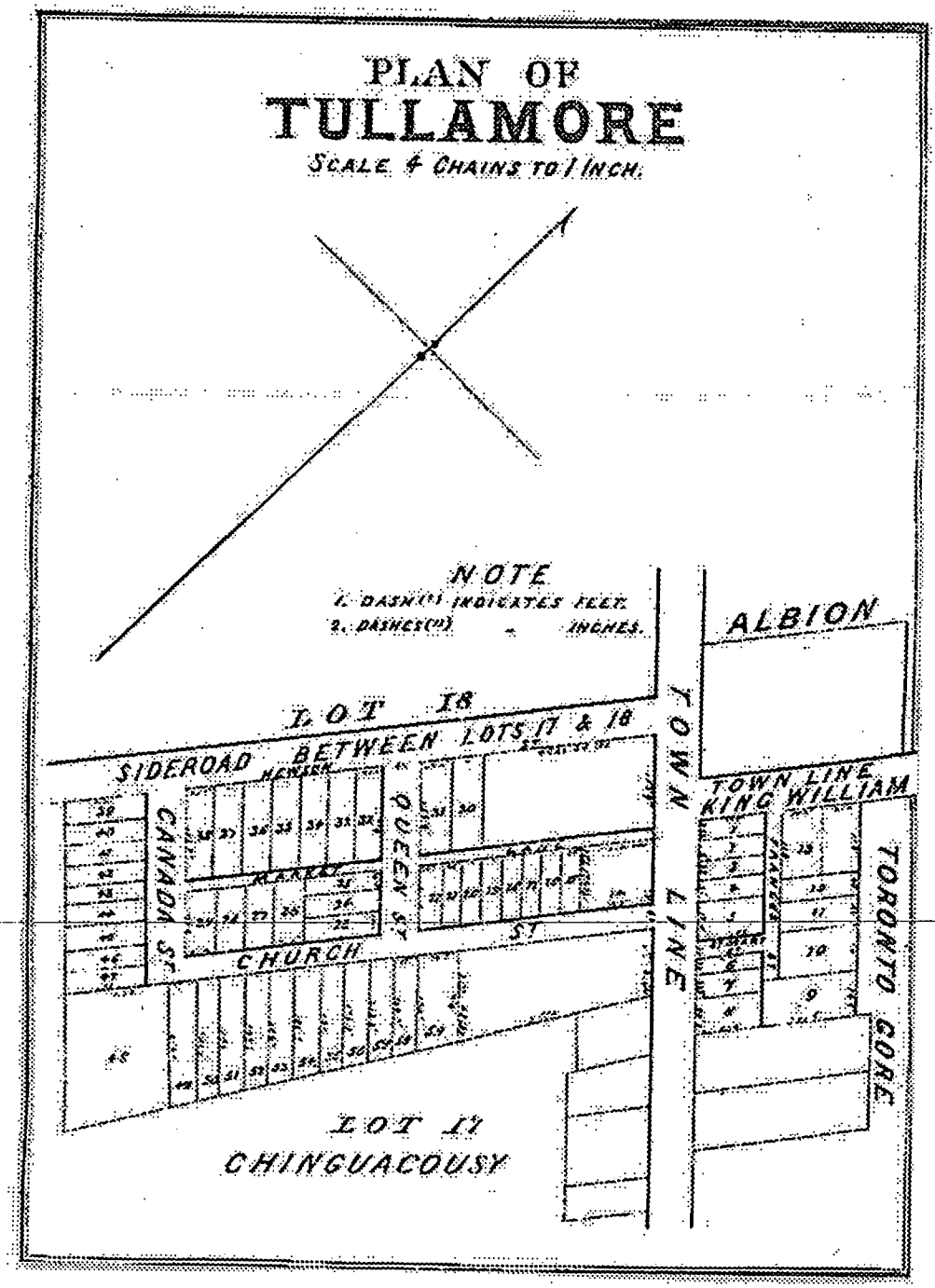


Figure 3: Plan of Tullamore



RESULTS

3.1 Background Research

3.1.1 *Potential for Heritage Resources*

The study area for this survey consists primarily of that stretch of Mayfield Road extending from Heart Lake Road to Airport Road. Added to this is another 1 kilometre (approximately) comprised of short extensions at the east and west ends of the Mayfield Road within the primary study area and along the intersecting roads.

Mayfield Road is part of the Regional Municipality of Peel Regional Road system. Earlier studies considered those portions of the road extending from Highway 10 to Kennedy Road and from Kennedy Road to Heart Lake Road. Mayfield Road is a paved two-lane bi-directional road with no median separation.

The early historical map does not show any structures located adjacent to mayfield Road except at Mayfield and at Tulllamore. Such structures that might have been in place but not noted on the early atlas map are no longer extant. The whole of the area to be occupied by the Mayfield Road widening has been subjected to extensive surface and subsoil disturbance by way of the installation of infrastructure (drains, utilities, etc.) and road/right-of-way improvements. It can reasonably be inferred from these extensive surface and underground disturbances that any early sites/facilities/structures that may have existed within these affected portions of the right-of-way have long been demolished.

3.1.2 *Field Survey*

The field survey was conducted in two parts. In the first part, the Mayfield Road route was surveyed by automobile in both an east/west direction and a west/east direction. In the second part, the route was travelled in an easterly direction with forays into each of the intersecting roads as each was encountered. Stops and pedestrian excursions were made at various points into the right-of-way and to view adjacent properties or access routes. The survey was extended slightly to the east and to the west of the primary Mayfield Road study area, and to the north or south of Mayfield Road along each road intersecting with Mayfield Road. Photographs were taken and field notes including the photograph log were made.

Mayfield Road at Heart Lake Road - The survey began on Mayfield Road some 150 metres west of Heart Lake Road (Photograph 1). Heart Lake Road is accessed directly from Mayfield Road (Photographs 2 and 3). The intersection of Mayfield Road with Heart Lake Road can be seen looking east on Mayfield Road in Photograph 1 and from the west in Photograph 4. Likewise, Photograph 2 depicts Heart Lake Road intersecting with Mayfield Road from the north and Photograph 3 shows Mayfield Road as viewed looking south along Heart Lake Road.

From the Heart Lake Road intersection, Mayfield Road continues (Photograph 5) toward Dixie Road. Gently rolling farm land is seen along this road on both sides with the exception of the North Brampton water reservoir and pumping facility not far past the Mayfield Road and Heart Lake Road intersection. Mayfield Road is a paved two-lane bi-directional road here with no median separation. The shoulders are gravelled (Photograph 5).

Mayfield Road and Dixie Road Intersection – It is at this intersection that the cross-roads community of Mayfield is located. Photograph 6, looking east along Mayfield Road toward Dixie Road intersection shows the extent of the farmland in the general vicinity. Photograph 7 shows Mayfield Road looking north from Dixie Road. Photograph 8 shows the Mayfield Road intersection from a southern vantage point on Dixie Road. Mayfield Road can be seen looking west at the Dixie Road intersection again in Photograph 9.

Mayfield, one-hundred and twenty-five years ago had a population of approximately fifty people. There was a general store and post office, a blacksmith shop, a hotel and a brick school house. There were no churches in the community. The hotel was located on the south-west corner, the general store on the south-east corner of the intersection. None of these structures remains today.

Older residences are present along Mayfield Road just past this intersection. Photograph 10 shows 4524 Mayfield Road, a white asbestos shingled house with green roof (Photograph 10). The residence is likely to be impacted by the road widening project as it sits very close to the road. Further study on this building should be conducted if this is the case.

Likewise, further east on Mayfield Road is 4615 Mayfield Road, a rusticated concrete block house, painted brown with brown shingles (Photograph 11). This building appears to be the residence of an early rural automotive garage, circa 1920s. It is similar in appearance to one to be found on Old Derry Road in Meadowvale Village. While it is set back sufficiently far from the road that the building itself will not be impacted, but the access lane to the facility will be. This facility should be the subject of further investigation, if it is to be impacted.

The two-lane road can be seen again, looking east along Mayfield Road, west of Bramalea Road, toward Ken Speirs Orchards on the left of the photograph (Photograph 12).

Bramalea Road Intersection – The Bramalea Road can be seen looking east along Mayfield Road (Photograph 13). Mayfield Secondary School can be seen at the left of the photograph partially hidden by the trees. Photograph 14 is looking north on Bramalea Road toward Mayfield Road and Mayfield Secondary School, approximately 50 feet from the pavement, can be seen on the right of the photograph (Photograph 14). Photograph 15 shows the view seen when looking south along Bramalea Road toward Mayfield Road

(Photograph 15). Photograph 16 looks west along Mayfield Road toward the Bramalea Road intersection (Photograph 16). Again, the graveled shoulders can be seen with turning lanes into the Secondary School and on to Bramalea Road.

Torbram Road Intersection - Photograph 17 shows Mayfield Road looking east as the road curves left just past Mayfield Secondary School (Photograph 17). Photograph 18 shows Mayfield Road looking east as the road curves to the right just past the Mayfield Garden Centre (Photograph 18). Again, the absence of buildings along Mayfield Road can be seen. Looking east along Mayfield Road toward Torbram Road (Photograph 19), farmland can be distinguished. Photograph 20 depicts a northern view along Torbram Road toward the Mayfield Road intersection. The graveled shoulders and absence of buildings can be seen in this photograph (Photograph 20). A similar view is seen looking south on Torbram Road toward Mayfield Road in Photograph 21. Photograph 22 shows Mayfield Road looking west toward the Torbram Road intersection. Hydro lines, farmlands and a left-hand turning lane can be seen along Mayfield Road (Photograph 22).

Airport Road Intersection - As one approaches Airport Road from the east on Mayfield Road (Photograph 23), a sign reading "Tullamore" can be seen on the right hand side of the photograph. Again, farmland, graveled shoulders and gently rolling hills are seen as well as some modern homes to the right of the photograph along this section of Mayfield Road (Photograph 23). Photograph 24 shows the intersection, looking north along Airport Road. A white stucco house can be seen on the right of the photograph and a brown vertical board building on the left of the photograph (Photograph 24). The white stucco house on Airport Road, south of Mayfield Road, can be seen in Photograph 29. Also, on Airport Road south of Mayfield Road, the brown vertical board building can be seen in photograph 27. Photograph 25 shows the intersection, looking south on Airport Road, with a modern gas station and convenience store on the right hand side (Photograph 25). Photograph 26 shows the Airport Road intersection as seen looking west from just east of the intersection on Mayfield Road. The road curving to the right can be seen clearly in this photograph (Photograph 26). Photograph 28 shows a small cemetery on Airport Road just south of Mayfield Road. Photograph 29 shows a unique wood barn on the northeast corner of Mayfield Road and Airport Road. Further back, Photograph 30 depicts two other buildings, one a house and an additional barn again at the corner of Mayfield Road and Airport Road (Photograph 30).

There were obviously great hopes for Tullamore to develop as a large community (Figure 3). There was a hotel here, as well as a number of stores and a post office. There was a blacksmith shop, a waggon shop, harness shop and a cabinet factory. The school employed two teachers. These early commercial enterprises were located on all four corners of the intersection.

There are two structures/facilities remaining today from these earlier times that are of concern. The first is the board clad building on the west side of Airport Road just south of Mayfield Road. It sits close to the right-of-way and should be investigated and documented further if it is to be impacted. The cemetery which is located just to the

south of this building could also be impacted if a new right-of-way encroaches upon it. Similarly, it too would then require further investigation.

It has been suggested that an earlier study of Tullamore may have completed, but this has not yet been confirmed. Access to such a report would be of assistance.

4.0 CONCLUSIONS

There is a small number of structures or facilities that bear further investigation if any or all of them is to be impacted by the road widening project. These include, as noted, the residence on the north side of Mayfield Road at Mayfield, the garage related concrete block residence on the south side of Mayfield Road, and the board building and cemetery at Tullamore on Airport Road. The somewhat unique barns located on the north-east corner of Mayfield Road and Airport Road are located well back from the right-of-way and are unlikely to be impacted.

5.0 RECOMMENDATIONS

It is recommended that the four noted structures/facilities should each be the subject of further study if it is determined after the widening parameters are established, that any or all of these are to be impacted..

Should deeply buried archaeological material be found on the property during development, the Ministry of Culture in London (519 675-7742) and Mayer Heritage Consultants Inc. (800 465-9990) should be notified immediately in order that the situation might be assessed and appropriate measures be instituted.

As on virtually any property in southern Ontario, it is possible that Aboriginal or Euro-Canadian burials could be present. In the event that human remains are encountered during construction, the proponent should immediately contact both the Ministry of Culture and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Consumer and Commercial Relations (416 326-8392) as well as the appropriate municipal police, the local Medical Officer of Health, and Mayer Heritage Consultants Inc.

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1990 ***The Heritage Act, R.S.O. 1990***. Queen's Printer, Toronto.

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1881 ***Historical Atlas of Waterloo County, Ontario, Illustrated***. Reprinted by Walker and Miles (1877-Wellington County and 1881-Waterloo County).

Appendix "A"

Photographic Documentation

Photograph 1: Looking east along Mayfield Road toward the Heart Lake Road intersection.

Photograph 2: Looking north along Heart Lake Road toward the Mayfield Road intersection.

Photograph 3: Looking south along Heart Lake Road toward the Mayfield Road intersection.

Photograph 4: Looking west along Mayfield Road toward the Heart Lake Road intersection.

Photograph 5: Looking east to the brow of the hill along Mayfield Road, just east of Heart Lake Road.

Photograph 6: Looking east along Mayfield Road toward the Dixie Road intersection (formerly the town of Mayfield).

Photograph 7: Looking north along Dixie Road toward the Mayfield Road intersection. White stucco house is seen on the left of the photograph.

Photograph 8: Looking south along Dixie Road toward the Mayfield Road intersection.

Photograph 9: Looking west along Mayfield Road toward the Dixie Road intersection (formerly the town of Mayfield).

Photograph 10: Looking east at 4524 Mayfield Road. White asbestos shingled house with green roof.

Photograph 11: Looking east at 4615 Mayfield Road. Rusticated concrete block house, painted brown with brown shingles.

Photograph 12: Looking east along Mayfield Road, west of Bramalea Road, toward Ken Speirs Orchards on the left side of the photograph.

Photograph 13: Looking east along Mayfield Road toward the Bramalea Road intersection. Mayfield Secondary School can be seen on the left just past the trees.

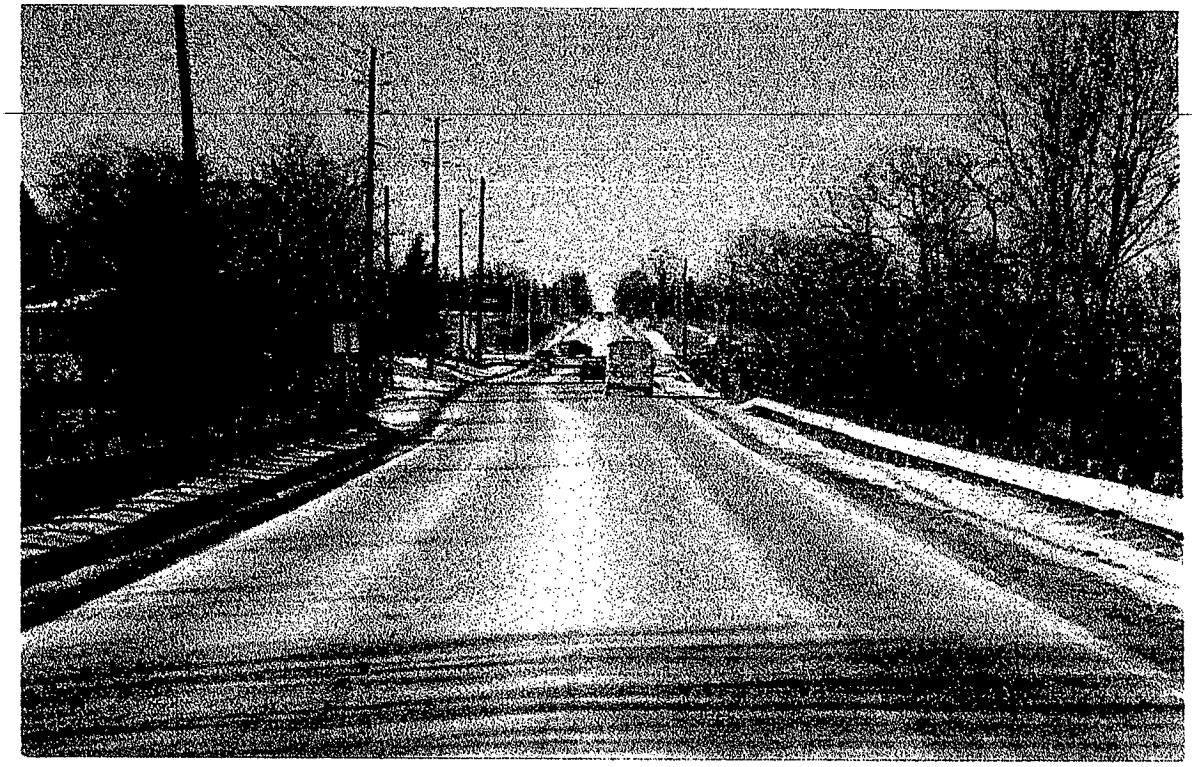
Photograph 14: Looking north along Bramalea Road toward the Mayfield Road intersection. Mayfield Secondary School is on the right of the photograph.

Photograph 15: Looking south along Bramalea Road toward the Mayfield Road intersection.

Photograph 16: Looking west along Mayfield Road toward the Bramalea Road intersection.

Photograph 1: Looking east along Mayfield Road toward the Heart Lake Road intersection.

Photograph 2: Looking north along Heart Lake Road toward the Mayfield Road intersection.



Photograph 17: Looking east along Mayfield Road as the road curves left just past Mayfield Secondary School.

Photograph 18: Looking east along Mayfield Road as the road curves right just past Mayfield Garden Centre.

Photograph 19: Looking east along Mayfield Road toward Torbram Road intersection.

Photograph 20: Looking north along Torbram Road toward the Mayfield Road intersection.

Photograph 21: Looking south along Torbram Road toward the Mayfield Road intersection.

Photograph 22: Looking west along Mayfield Road toward Torbram Road intersection.

Photograph 23: Looking east along Mayfield Road toward Airport Road (formerly the town of Tullamore).

Photograph 24: Looking north along Airport Road toward Mayfield Road.

Photograph 25: Looking south along Airport Road toward Mayfield Road.

Photograph 26: Looking west along Mayfield Road toward Airport Road.

Photograph 27: Vertical board building on Airport Road, south of Mayfield Road.

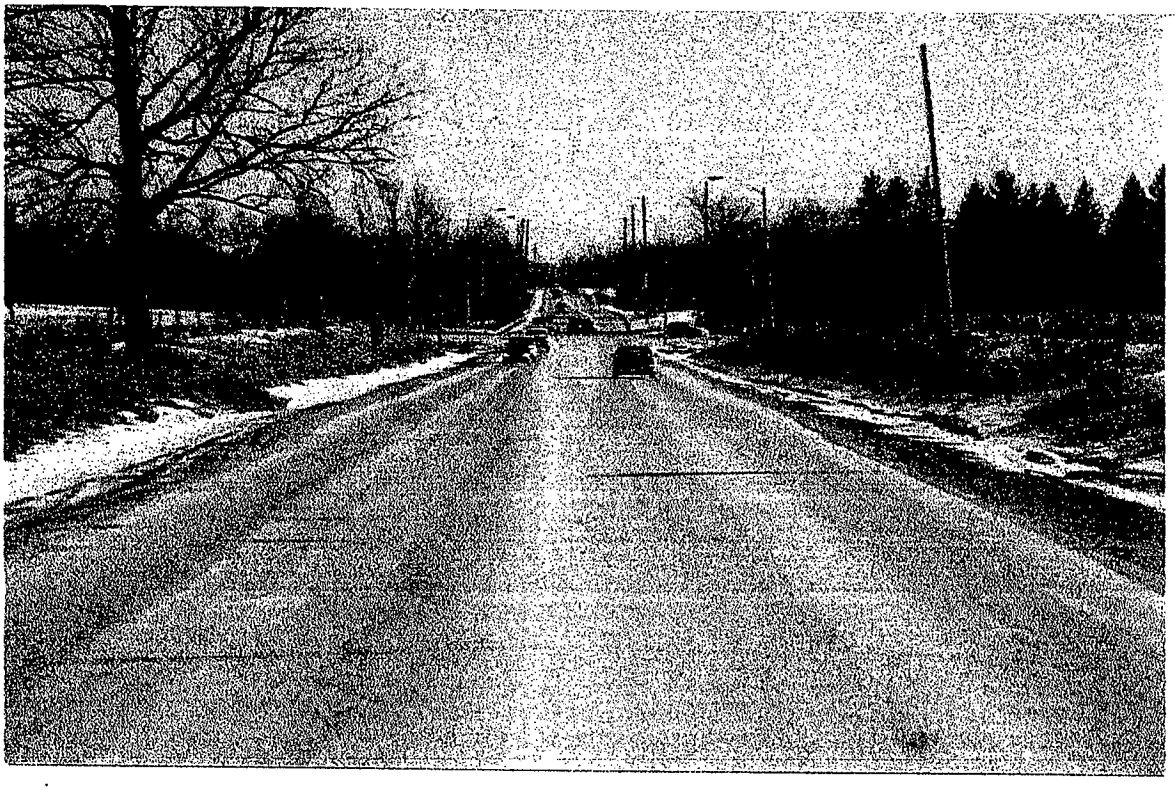
Photograph 28: Cemetery on Airport Road, south of Mayfield Road.

Photograph 29: White stucco house on Airport Road, south of Mayfield Road.

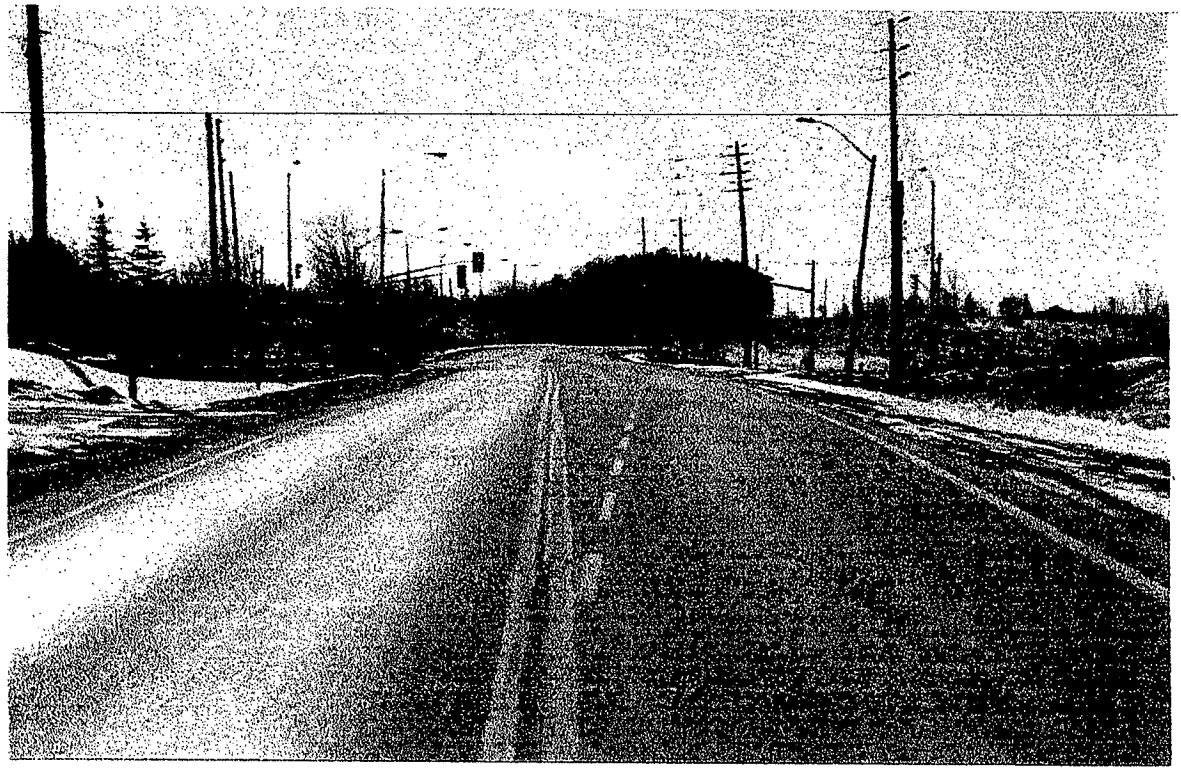
Photograph 30: Barn on northeast corner of Mayfield Road and Airport Road.

Photograph 31: Barns in the field of the northeast corner of Mayfield Road and Airport Road.

Photograph 3: Looking south along Heart Lake Road toward the Mayfield Road intersection.

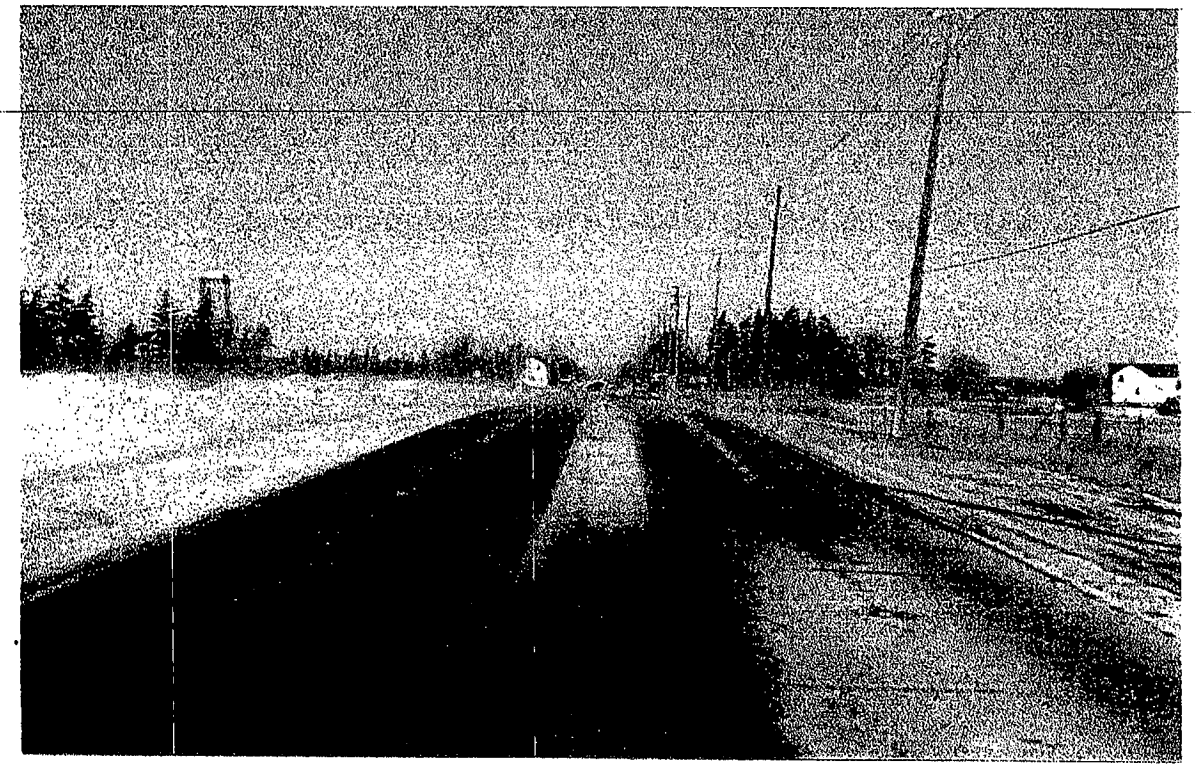


Photograph 4: Looking west along Mayfield Road toward the Heart Lake Road intersection.



Photograph 5: Looking east to the brow of the hill along Mayfield Road, just east of Heart Lake Road.

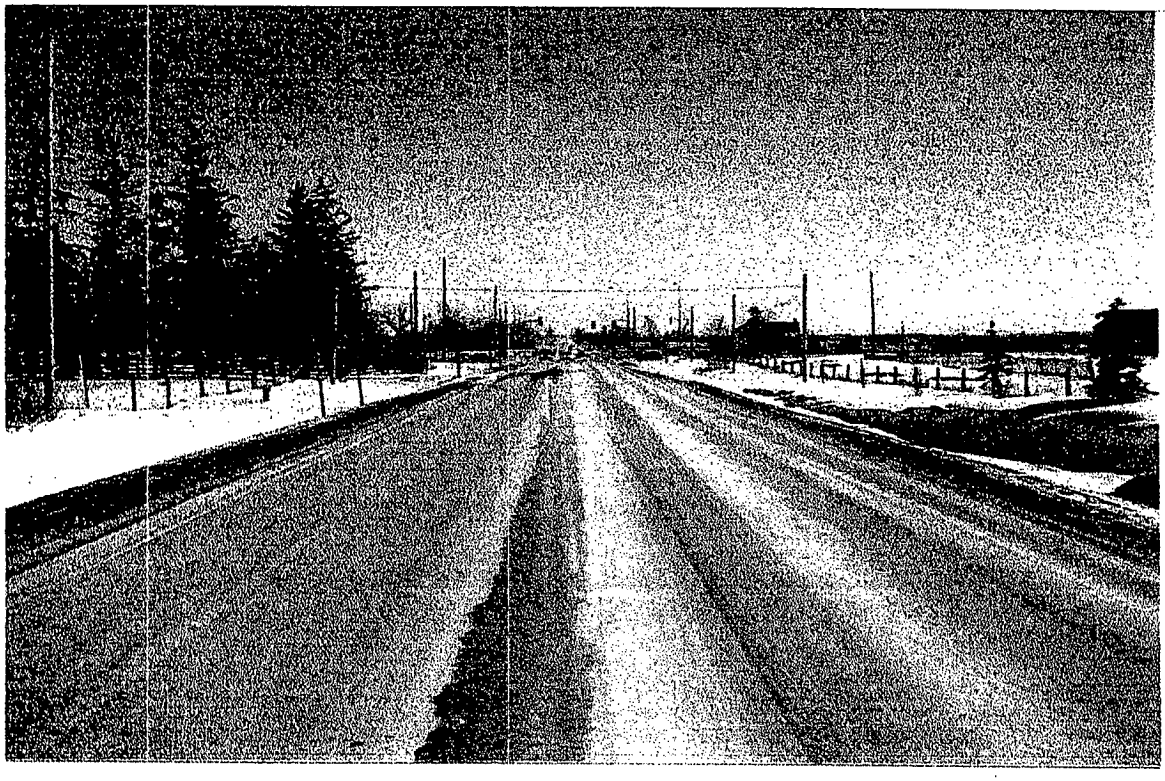
Photograph 6: Looking east along Mayfield Road toward the Dixie Road intersection (formerly the town of Mayfield).



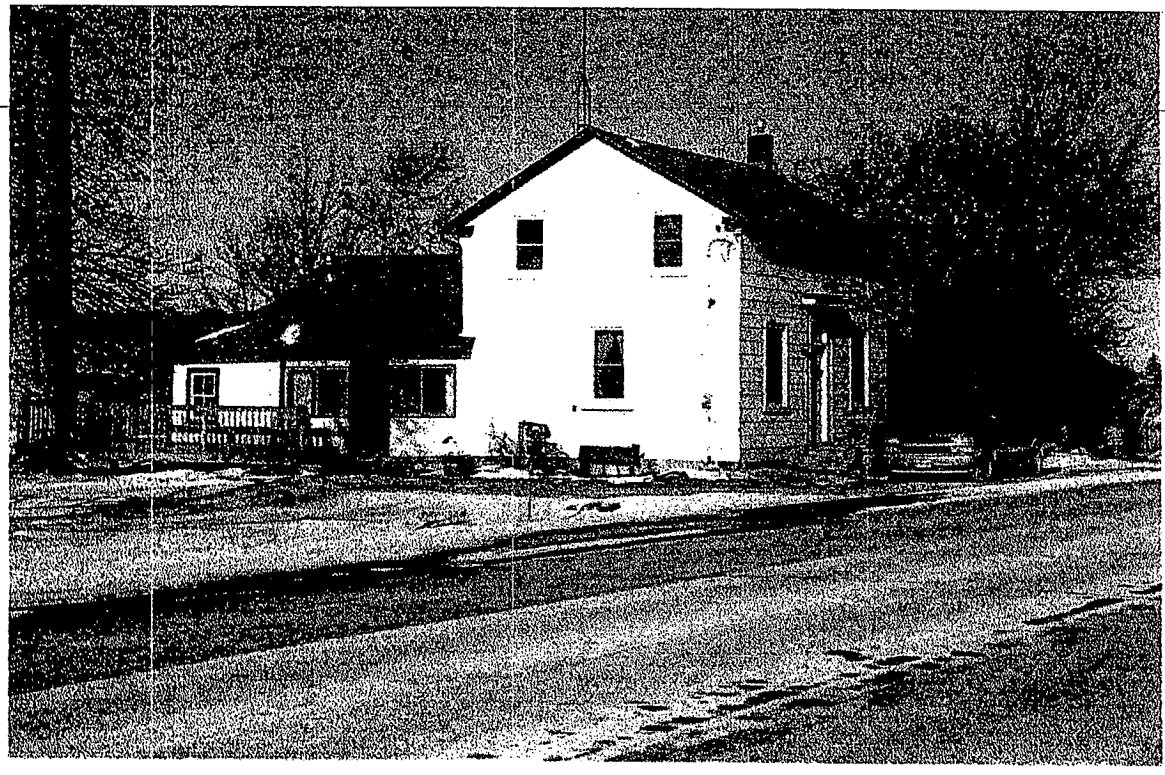
Photograph 7: Looking north along Dixie Road toward the Mayfield Road intersection. White stucco house is seen on the left of the photograph.

Photograph 8: Looking south along Dixie Road toward the Mayfield Road intersection.

Photograph 9: Looking west along Mayfield Road toward the Dixie Road intersection (formerly the town of Mayfield).



Photograph 10: Looking east at 4524 Mayfield Road. White asbestos shingled house with green roof.



Photograph 11: Looking east at 4615 Mayfield Road. Rusticated concrete block house, painted brown with brown shingles.

Photograph 12: Looking east along Mayfield Road, west of Bramalea Road, toward Ken Speirs Orchards on the left side of the photograph.

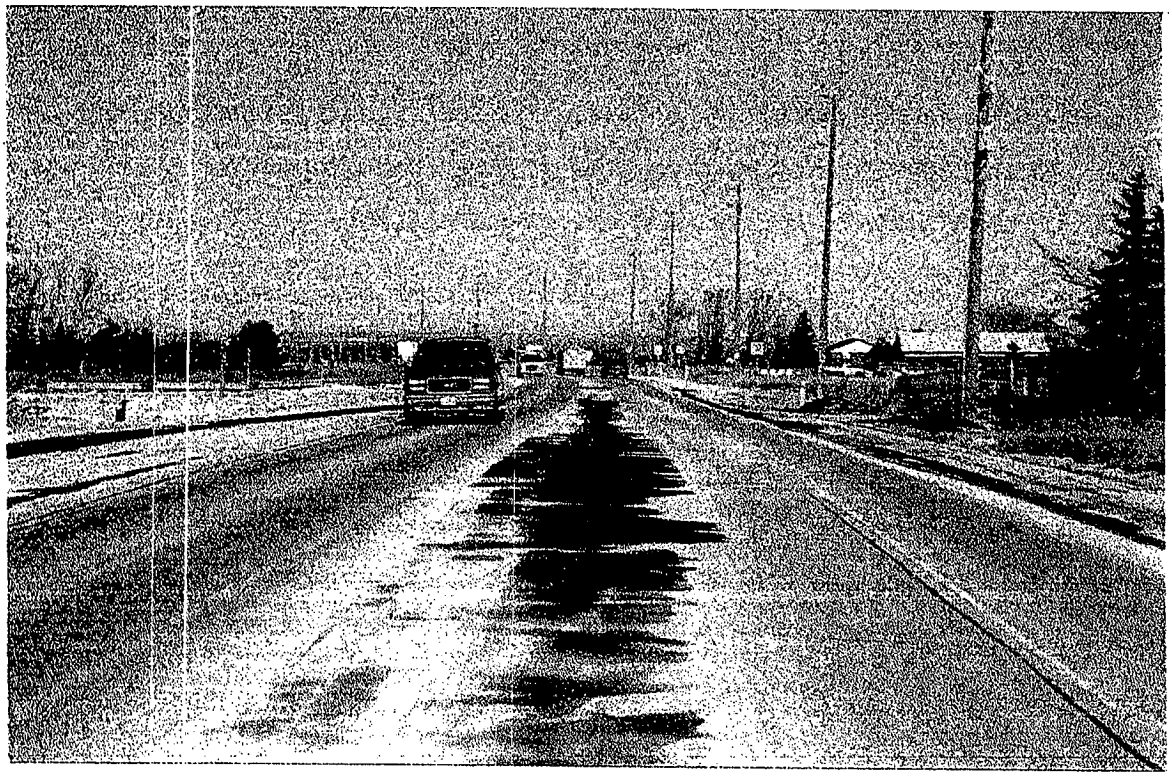
Photograph 13: Looking east along Mayfield Road toward the Bramalea Road intersection. Mayfield Secondary School can be seen on the left just past the trees.

Photograph 14: Looking north along Bramalea Road toward the Mayfield Road intersection. Mayfield Road Secondary School is on the right of the photograph.

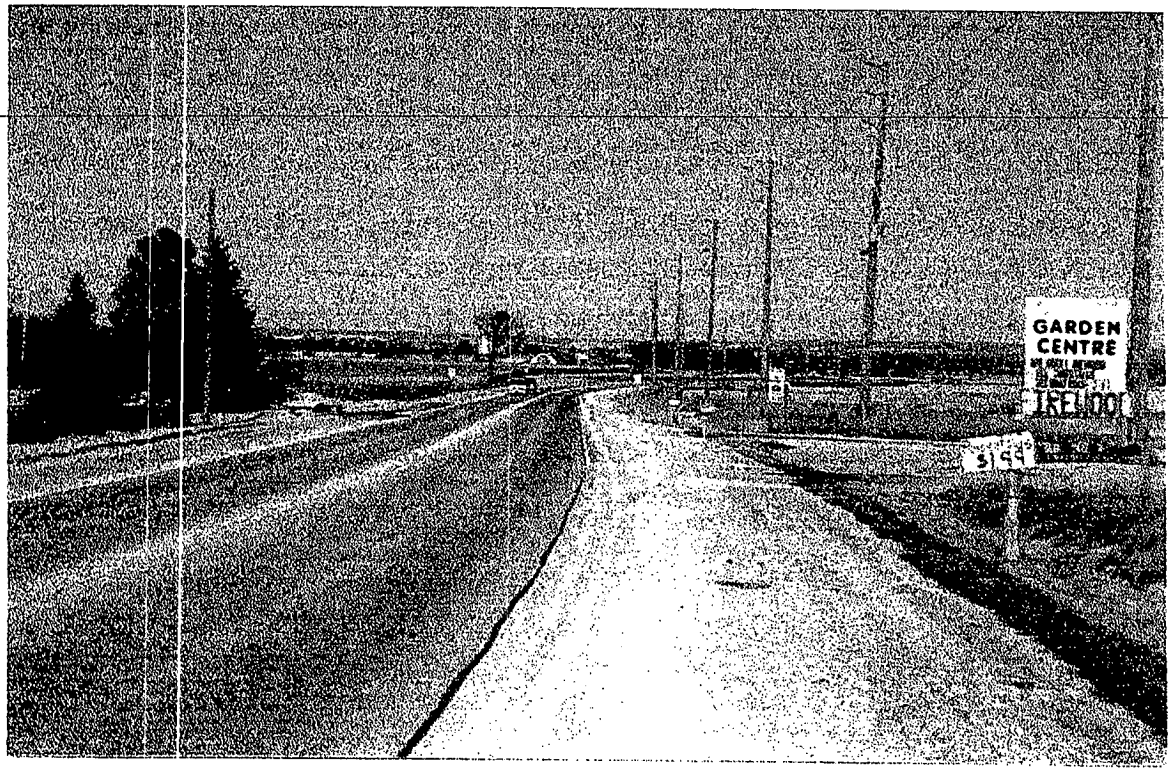
Photograph 15: Looking south along Bramalea Road toward the Mayfield Road intersection.

Photograph 16: Looking west along Mayfield Road toward the Bramalea Road intersection.

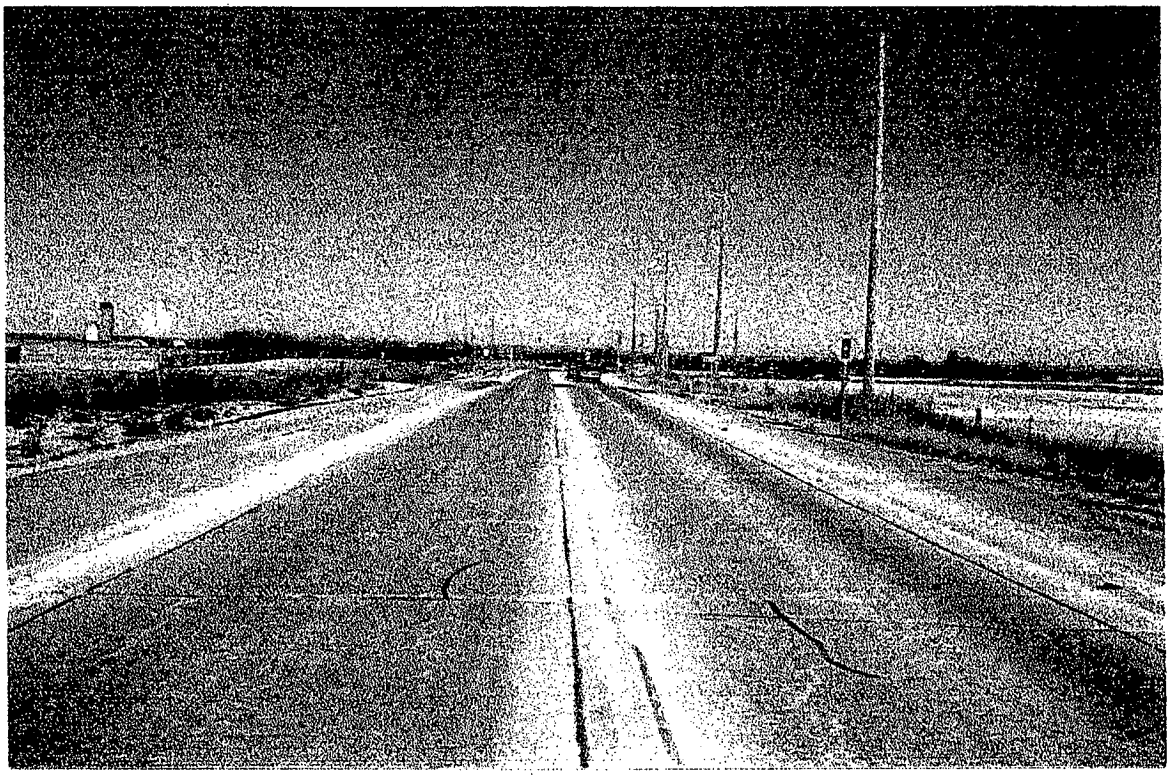
Photograph 17: Looking east along Mayfield Road as the road curves left just past Mayfield Secondary School.



Photograph 18: Looking east along Mayfield Road as the road curves right just past Mayfield Garden Centre.

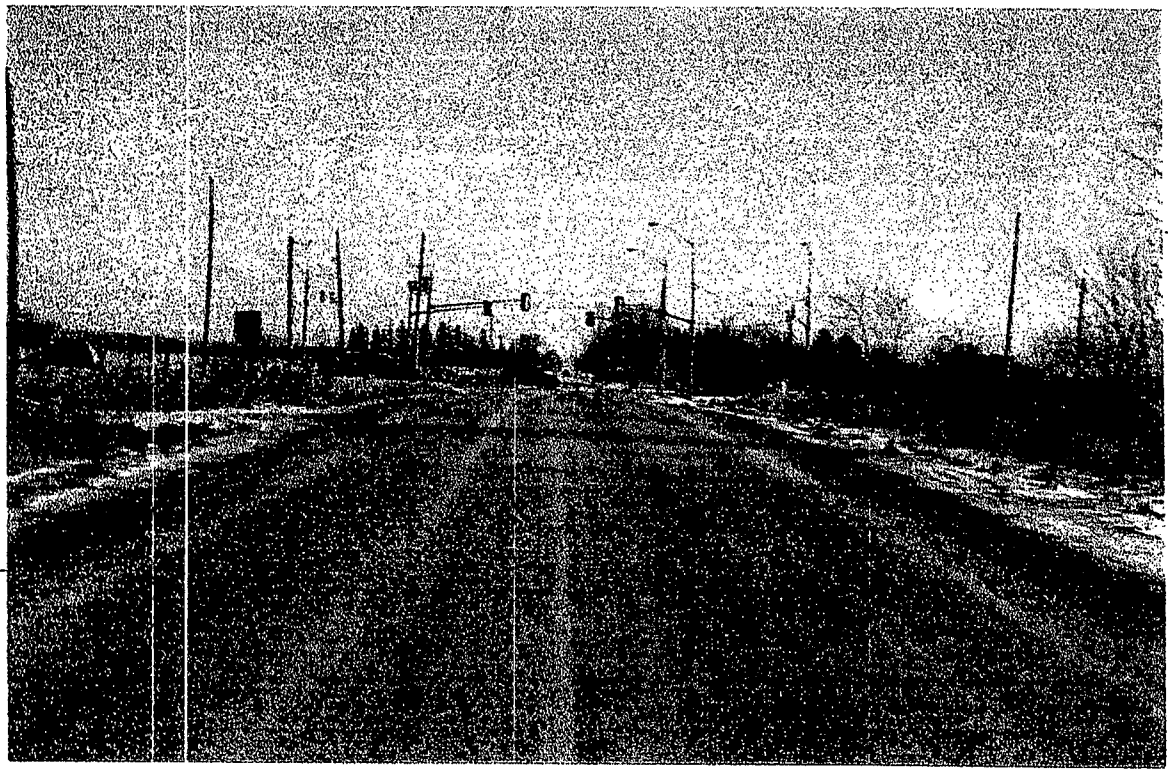


Photograph 19: Looking east along Mayfield Road toward Torbram Road intersection.

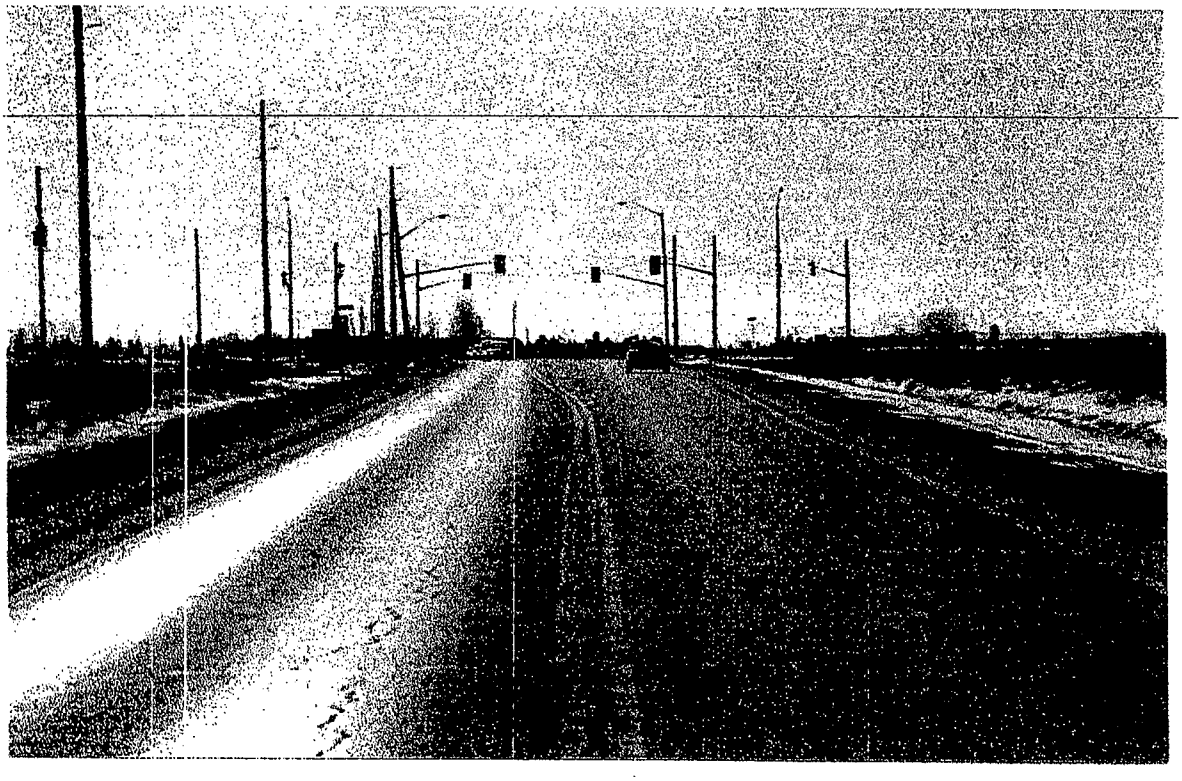


Photograph 20: Looking north along Torbram Road toward the Mayfield Road intersection.

Photograph 21: Looking south along Torbram Road toward the Mayfield Road intersection.

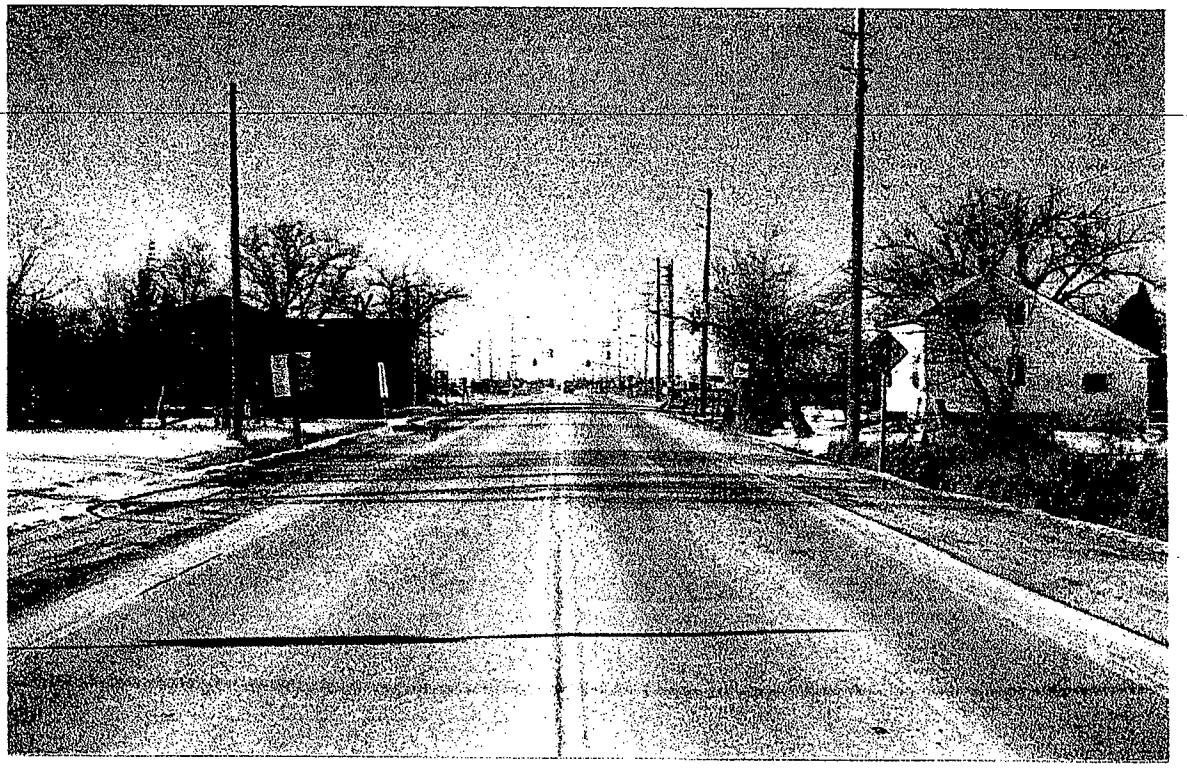


Photograph 22: Looking west along Mayfield Road toward Torbram Road intersection.

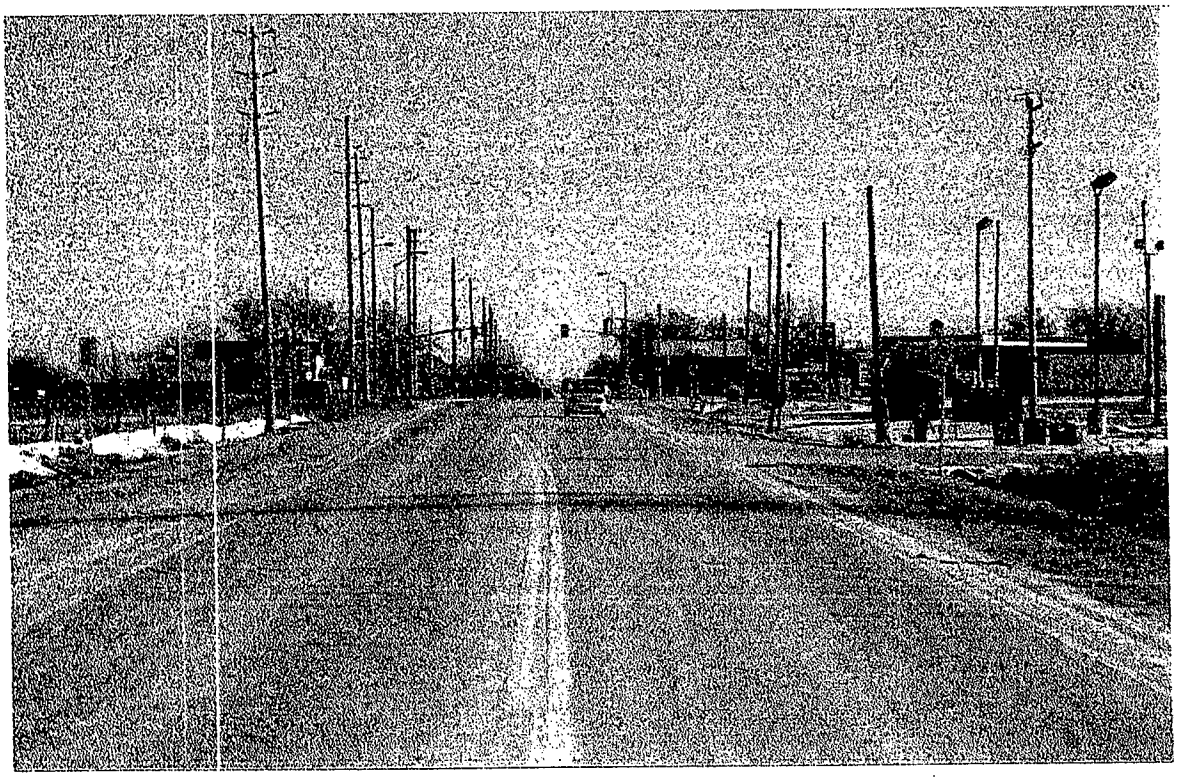


Photograph 23: Looking east along Mayfield Road toward Airport Road (formerly the town of Tullamore).

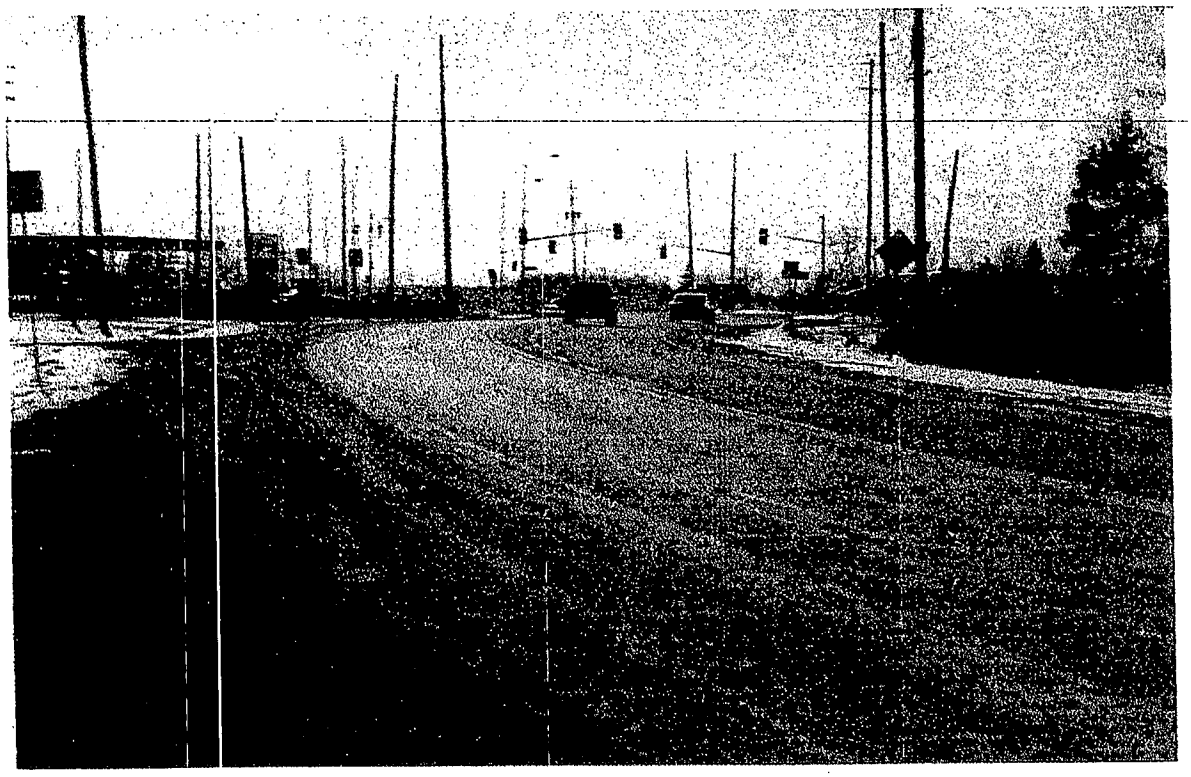
Photograph 24: Looking north along Airport Road toward Mayfield Road.



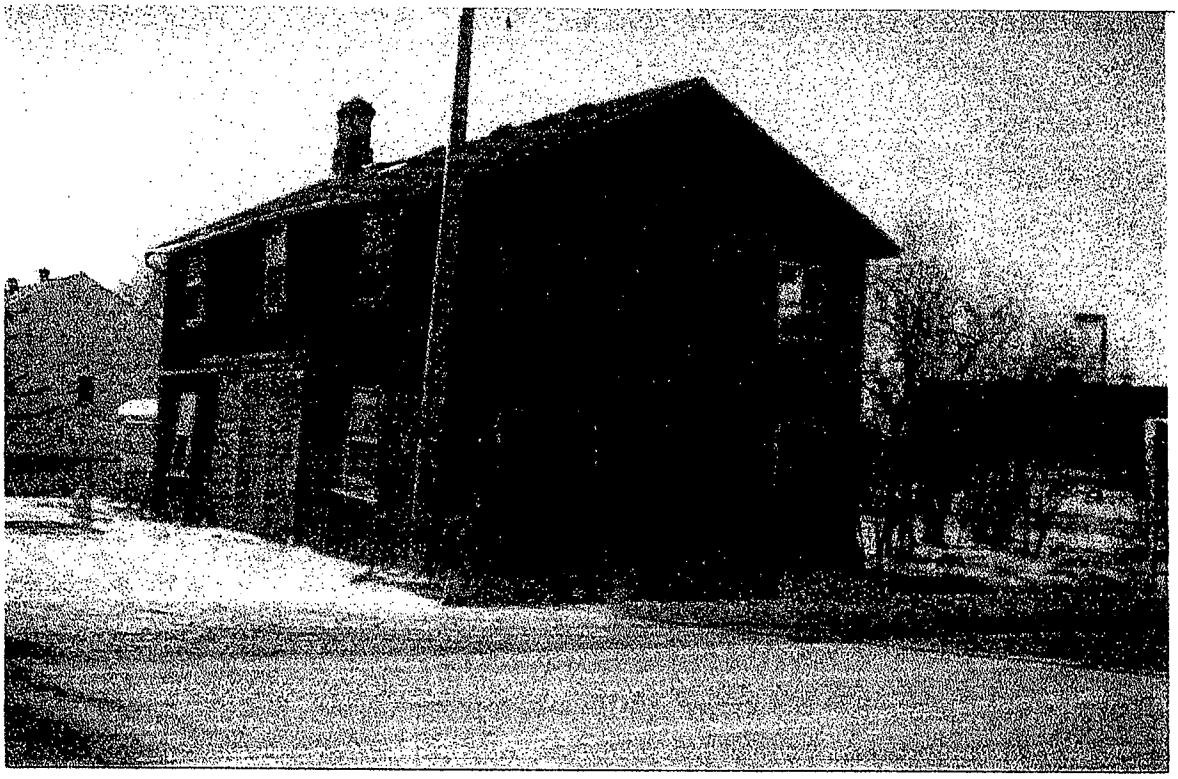
Photograph 25: Looking south along Airport Road toward Mayfield Road.



Photograph 26: Looking west along Mayfield Road toward Airport Road.



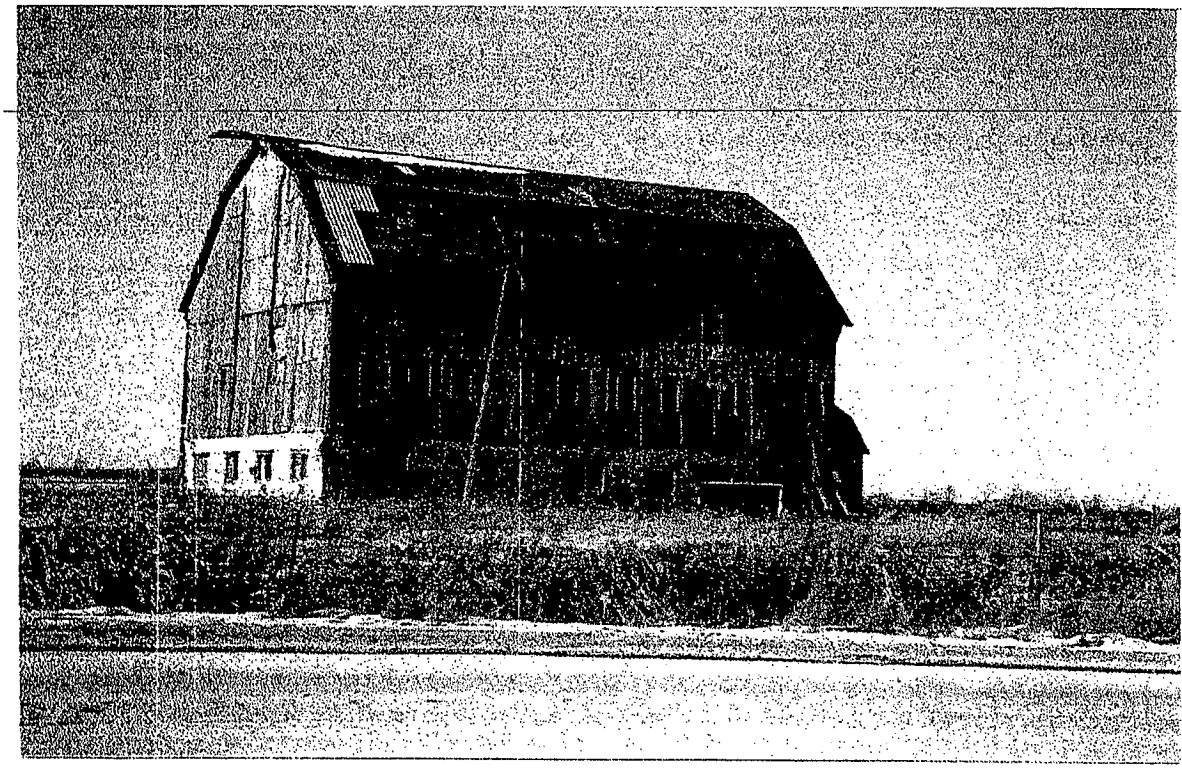
Photograph 27: Vertical board building on Airport Road, south of Mayfield Road.



Photograph 28: Cemetery on Airport Road, south of Mayfield Road.

Photograph 29: White stucco house on Airport Road, south of Mayfield Road.

Photograph 30: Barn on northeast corner of Mayfield Road and Airport Road.



Photograph 31: Barns in the field of the northeast corner of Mayfield Road and Airport Road.

Appendix "B"

Principal Investigator

J. Trevor Hawkins - Architectural Heritage Researcher

J. Trevor Hawkins, Ph.D. received a Bachelor of Arts (B.A.) degree in 1962, a Master of Arts (M.A.) degree in 1964, and a Doctor of Philosophy (Ph.D) degree in psychology in 1967, all from The University of Western Ontario where he served for some years as Assistant Professor and Adjunct Professor. Dr. Hawkins served as "O" Division Regional Psychologist, Royal Canadian Mounted Police, interviewing, counseling, and providing Post Traumatic Stress Debriefing to members. He has also worked in private industry earning three professional designations, and has operated his own companies in the graphics, communications, and heritage fields.

He has served concurrently as a consultant in the area of organizational behavior and with respect to written communications and public presentation. He has co-authored with the late Robert G. Mayer of Mayer Heritage Consultants Inc. a number of position papers on archaeology/heritage and a number of articles published in *Arch Notes* by the Ontario Archaeological Society and in the *Annual Archaeological Report Ontario* series published by the Ontario Heritage Foundation. Dr. Hawkins has also edited and prepared for publication, a number of books in the education field.

Dr. Hawkins is currently the Director and General Manager of Mayer Heritage Consultants Inc. He has acted for many years as principal investigator on archaeological/heritage projects. In addition, he has, with respect to many other heritage studies, been responsible variously for the heritage investigation, and the writing of text, as well as for documentary photography and the compilation, editing, and continuity of the data, text and graphic images. Among his heritage projects are the following:

- **The Blue Water Bridge** (Second Span), Point Edward, Ontario. Dr. Hawkins contributed to the documentation of the early history of the bridge property, documenting the existence of the various buildings and lake-port facilities that had been earlier located on the property, and collecting personal reminiscences of two gentlemen who had worked on the construction of the original bridge and on the maintenance of the bridge since that time. This report was prepared for the Blue Water Bridge Authority. Dr. Hawkins has presented seminars for the Aamjiwnaang First Nation concerning their quest for National Historic Site designation at Point Edward, Ontario.
- **Nith River Bridge** This bridge at New Hamburg was known as the Bender Truss Bridge. During his heritage investigation, Dr. Hawkins solved for the engineers, the mystery of the Bender Truss Bridge. The Bender in the name referred, neither to a Bender truss design, nor to the designer of an unusual suspension bridge, but to the fact that this steel truss bridge was at the foot of the hill known locally as Bender Hill because it passed the Bender farm.
- **Mill Creek Bridge** This very early stone bridge (*circa* 1837) in Cambridge can no longer be seen from the roadway as it has a concrete/asphalt cover over the original structure.
- **Springbank Pedestrian Bridge** This cable stayed suspension bridge, located in London, Ontario, has now been replaced by a steel truss bridge. The suspension

APPENDIX D

Natural Environmental Technical Report, December 2003, Mayfield Road Class EA

Mayfield Road
Class Environmental Assessment
Heart Lake Road to Airport Road

Natural Environment Technical Report

Prepared for:
Stantec Consulting Limited
49 Frederick Street
Kitchener, Ontario
N2H 6M7

Prepared by:
Natural Resource Solutions Inc.
279 Weber Street North, Unit 15
Waterloo, ON
N2J 3H8

Project No. 413

December 2003

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

TABLE OF CONTENTS

Figure

Tables

Appendix

1.0 Introduction

The Town of Caledon and the City of Brampton have been experiencing accelerated growth and an increase in traffic volumes, specifically on Mayfield Road. Based on this, the Region of Peel has undertaken a Schedule "C" Class Environmental Assessment (EA) for the section of Mayfield Road between Heart Lake Road and Airport Road.

In August 2002, the Region of Peel awarded the Class Environmental Assessment (EA) and Preliminary Design Study for Mayfield Road to Stantec Consulting Ltd. The proposed undertaking includes the widening of Mayfield Road from Heart Lake Road to Airport Road.

Stantec Consulting Ltd. retained the services of Natural Resource Solutions Inc. (NRSI) on behalf of the Region of Peel to integrate biological assessment and environmental analyses into the EA process. This work began in the fall of 2002 and continued into the summer of 2003 as part of the Mayfield Road Class EA study. The focus was on the identification, review and assessment of natural environment features within the Mayfield Road corridor.

This report has been written as an appendix to the Environmental Study Report (ESR) prepared by Stantec Consulting Ltd. The objectives of this technical report are to address the natural environment component requirements to the Municipal Class EA process as follows:

- Document existing natural environmental features within the study area for the undertaking;

- Evaluate from an environmental perspective, the various alternatives proposed for carrying out the undertaking;

- Recommend from an environmental perspective, the preferred alternative for carrying out the undertaking;

- Determine the potential impacts to the natural environmental features from the construction and operation of the preferred alternative;

- Where appropriate, formulate mitigation measures and recommendations to reduce or eliminate the identified impacts; and

- Where appropriate, recommend appropriate monitoring to evaluate the accuracy of impact predictions and to ensure protection of the natural environmental features.

1.1 Study Area

The Ministry of Transportation completed a Class Environmental Assessment (Class EA) Study for the proposed Highway 410 Extension (from Bovaird Drive to Highway 10 (Main Street) in 1989, which transects the current study area between Heart Lake Road and Dixie Road. The Environmental Assessment Report (EAR) was updated in 1995 and approved by the Minister of the Environment in 1997. Therefore, the limits of the Highway 410/Mayfield interchange do not form part of the current Class EA, as the Highway 410 extension project has been previously approved.

This report describes the existing natural environment (Section 3.0) for the entire study area from Heart Lake Road to Airport Road, including the area of the Hwy 410/Mayfield Road interchange, however, does not include it in the analysis of the alternatives or the impact analysis in Sections 4.0 and 5.0 respectively.

Please refer to the Environmental Study Report prepared by Cole, Sherman and Associates (1999) for details regarding the environmental impacts associated with the section of Mayfield Road that will be affected by the Highway 410 interchange.

2.0 Study Approach

Preliminary tasks for undertaking the natural environment component of the Mayfield Road Class EA study were identified and initiated in fall 2002. The general approach of our study included: contact with resource management agencies; the collection and review of background information; site inspections and inventories; data summation and analyses; impact identification and assessment; formulation of mitigation measures and recommendations; and consolidation of all data into a technical report.

2.1 Collection and Review of Background Information

Existing secondary source file material pertaining to the natural environmental features of the study area was obtained from the Ontario Ministry of Natural Resources (OMNR) Aurora District office, the Toronto Regional Conservation Authority (TRCA), the Royal Ontario Museum (ROM), the Region of Peel Planning Department, and the Town of Caledon.

2.1.1 Agency Contacts

The OMNR, TRCA, ROM and the Town of Caledon were contacted for first-hand information on the study area, particularly for background file material and documents regarding planning and policy issues surrounding the environmental designations within the study area. The following agency contacts were made:

- TRCA: June Murphy, Gary Wilkens, Noah Gaetz and Aileen Barcley for data on natural environmental features (i.e. ANSIs and ESAs, wetland evaluations, fisheries, floristic and wildlife inventories, stream designations (i.e. municipal agricultural drains), information on rural clean water program and vulnerable, threatened or endangered (VTE) species.

- OMNR: Mark Heaton, Biologist, Aurora District for fisheries and VTE species.

- ROM: Erling Holm, Assistant Curator for updated site occurrences from the Ontario redside dace database (threatened status in Ontario).

- Town of Caledon: Geoff Hebbert and Craig Campbell for information regarding whether the creeks in the study area are classified as municipal agricultural drains.

Background information in the form of historical fisheries collection records were obtained from the MNR, Aurora District and the TRCA. These records revealed that redside dace, a provincially threatened cyprinid species has historically occupied headwater reaches of the West Humber River watershed. This was confirmed by cross-checking the study area with the database that Erling Holm (ROM) has developed for redside dace in Ontario. Please refer to Appendix I for historical fish sampling data.

A *Recovery Strategy For Redside Dace in Canada, 2002 – 2007 (Draft)* was prepared by the Redside Dace Recovery Team (RDRT) in 2003. The redside dace is a small colourful cyprinid that requires cool, clear flowing water with riffle-pool sequences and overhanging bank vegetation for its survival (RDRT 2003). In Canada, the redside dace is found only in southern Ontario and is most frequently found in small streams flowing into western Lake Ontario (RDRT 2001).

In 1987, COSEWIC (Committee on the Status of Endangered Wildlife in Canada) updated the national status of the redside dace from vulnerable to special concern (Parker et al. 1988). Status reports on the redside dace will be reviewed in 2004 by COSEWIC that may result in a new designation for redside dace (MNR, personal communication with Alan Dextrase 2003). In Ontario, the redside dace was designated as a threatened species in 2000 due to loss of habitat and deteriorating water quality. The RDRT (2003) identifies at least nine potential threats to redside dace populations left remaining in Ontario. The two

most predominant threats are urban development and agricultural activities. Siltation and removal of bank cover in urban and rural headwater areas are important limiting factors directly related to the decline of redside dace populations (RDRT 2003).

The TRCA and the Town of Caledon were contacted to determine whether the creeks located within the study area have been designated as municipal agricultural drains. Although the majority of the streams or section of streams within the study area function as agricultural drains, they have not been officially designated as municipal agricultural drains (Town of Caledon, personal communication with Craig Campbell 2003). Therefore, these streams were not classified under the Municipal Drain Class Authorization System initiated in 1999 by Fisheries and Oceans Canada and the South-Western Conservation Authorities.

At one tributary of the West Humber River (located east of Torbram Road), a Livestock Access Restriction Project was completed in 1996 (TRCA, personal communication with Aileen Barcley 2003). This project was partially funded by the Metro Rural Clean Water Program in conjunction with the TRCA and was supported by the landowner. This project entailed the erection of fencing (800m on the north side and 500m on the south side of Mayfield Road) to restrict cattle access to the creek and provide an alternative source of water for the cattle.

2.2 Site Inspection and Inventories

Detailed site inspections and inventories were conducted within the study area on various dates from February through August, 2003. The study area included the existing Mayfield Road right-of-way from Heart Lake Road, eastward to the intersection with Airport Road, as well as adjacent lands within approximately 200m of the right-of-way.

2.2.1 *Vegetation and Floristics*

The existing natural vegetation and features were documented, delineated and mapped using qualitative sampling methods. Natural features included vegetation communities and wetland areas.

2.2.2 *Wildlife and Wildlife Habitats*

Background information on wildlife species known from the area was recorded and supplemented with limited observations of wildlife, which were recorded during the field visits. Based on the vegetation communities in the study area, the likelihood of wildlife species known from the background information being found in the study area was determined. It is probable that wildlife species within the study area are the same as those recorded for a previous study completed by Natural Resource Solutions Inc. for Stantec Consulting Ltd. This study evaluated a Mayfield Road widening west of Heart Lake Road in 2002.

2.2.3 *Aquatic Environment and Fisheries*

Aquatic biologists visited the study area on July 29 and August 8, 2003. During the site visits, the aquatic environment, including surface watercourses and fisheries were investigated and documented.

Each surface water feature was assessed for a distance of at least 100m (where accessible) on either side of the Mayfield Road right-of-way to document the aquatic habitat conditions within the watercourses along the proposed alignment. Because of the historical occurrences of the provincially threatened redside dace, exploratory fish sampling was undertaken. Where sufficient water was present on July 29, 2003, a backpack electro-shocker was used to sample the fish community. Assessment of the habitat conditions of the watercourses was also completed. A subsequent site visit was made on August 8, 2003 to observe flow conditions and complete habitat assessments for the remaining watercourses.

3.0 Existing Natural Environment Conditions

This report deals with the study area of the Mayfield Road right-of-way from Heart Lake Road to Airport Road. The natural environment features within this area are described below and are illustrated on Figure J11-J15.

3.1 Designated Environmental Areas

The Heart Lake wetland complex is located within the study area for the Mayfield Road widening as shown on Figure J11-J15. This wetland complex has been evaluated in 1985 and 2000 by the Ministry of Natural Resources and found to be provincially significant. Significant features of the wetland are its large size (87ha) and diverse wetland habitats including thicket swamps, deciduous swamps, marshes, two bogs, and two kettle lakes. This wetland supports one regionally rare species (few flowered sedge, *Carex tenuiflora*) and 42 locally significant species (MNR 2000).

Portions of the wetland have also been designated as an Environmentally Sensitive Area (ESA), a regional life science Area of Natural and Scientific Interest (ANSI) known as the Heart Lake Forest and Bog and a regional earth science ANSI, the Brampton Buried Esker.

This wetland has also been identified in the Region of Peel Official Plan as a Core Area of the Greenlands System (Region of Peel 2001).

The Heart Lake Conservation Area, owned by the Toronto Region Conservation Authority, contains part of the wetlands and adjacent forested lands to the south of Mayfield Road.

A small area to the north of Mayfield Road between Heart Lake Road and Dixie Road is designated as 'Environmental Constraint Policy Area' by the Town of Caledon. The Town of Caledon also shows this area as 'Environmental Policy

Area' in the *Mayfield West Land Use Plan*, but not only includes the small vegetated area to the north of Mayfield Road, but also the channel that extends to the north and flows through this area.

The TRCA has designated several fill regulated areas which are directly associated with several of the watercourses that traverse Mayfield Road throughout the study area. Please refer to Table 1 for these areas.

3.2 Vegetation and Floristics

The area surrounding Mayfield Road, between Heart Lake and Airport Roads, is primarily agricultural land; however old field habitats, hedgerows and landscaped areas are also common. The slopes along the side of the road vary from flat to steep, mostly dominated by herbaceous plant species typical of old field habitats such as wild carrot, goldenrod, grasses, raspberry, red osier dogwood, and thistle species.

The most significant natural feature in this portion of the study area is the Heart Lake provincially significant wetland and associated upland forest communities. This provincially significant wetland is part of the Heart Lake Wetland complex that stretches north and south of Mayfield Road and beyond Heart Lake Road into the Heart Lake Conservation Area. The wetland is dominated by a complex of marsh and upland communities, and portions of it are also designated as both life and earth science Areas of Natural and Scientific Interest (ANSI) (OMNR 2000). The location of the wetland and other vegetation communities is shown on Figure J11-J15.

Vascular Plants

A total of 117 vegetation species were recorded on site visits completed February 20, July 31, and August 8, 2003. Out of the species recorded, 41 (35%) are non-native to Ontario. A list of all the vegetation species is included in Appendix I.

Vegetation Communities

The study area is mostly flat, with some rolling topography, typical of southern Ontario's agricultural areas. The vast majority of the area is active agricultural land, but some remnant natural vegetation areas exist. The hedgerows are predominantly Norway spruce and pine species. The landscaped areas are associated with buildings, and contain a variety of trees, such as willow species, apple, honey locust and pines. In some locations individual trees line the road. The natural habitat communities are described below and shown in Figure J11-J15.

Dry-Moist Old Field Meadow (ELC Code: CUM1-1)

Most areas along Mayfield Road, as well as some other, larger areas, are old field meadow. These areas are mainly made up of a variety of grasses and herbaceous species, with some shrubs dispersed throughout. Certain areas contain common buckthorn.

Mineral Cultural Woodland (ELC Code: CUW1)

A few small cultural woodlands are found dispersed through the study area. Buckthorn, apple trees and a variety of other species are found in these areas.

Fresh – Moist Poplar Deciduous Forest (ELC Code: FOD8-1)

Trembling aspen are interspersed with low willow species and red osier dogwood, in an area within the Heart Lake Wetland Complex, south of Mayfield Road.

Dry-Fresh White Cedar Mixed Forest (ELC Code: FOM4)

An area within the Heart Lake wetland complex is composed mostly of white cedar and white ash. Sugar maple and red maple are also found within this area.

Fresh – Moist Sugar Maple – Hemlock Mixed Forest (ELC Code: FOM6-1)
An upland ridge, located within the Heart Lake wetland complex, north of Mayfield Road, is dominated by sugar maple and hemlock. White ash and white elm, together with a variety of other species, complete the species composition.

Fresh – Moist White Cedar – Hardwood Mixed Forest (ELC Code: FOM7)
The majority of the forested area around the cattail marsh in the northern lobe of the Heart Lake wetland complex is white cedar with white ash, and a mixture of other species, such as black cherry, basswood, American beech, yellow birch, and sugar maple.

Broad-leaved Sedge Mineral Meadow Marsh (ELC Code: MAM2-6)
A small wetland pocket within the Heart Lake Wetland Complex is dominated by tussock sedge.

Cattail Mineral Shallow Marsh (ELC Code: MAS2-1)
Low pockets along Mayfield Road are mostly dominated by cattail species, both common and narrow-leaved. Grasses and sedges are also present.

Landscape Trees
A number of landscape trees are found along the roadside, which may be impacted by the road widening. Many are found within hedgerows.

3.3 Wildlife

Incidental wildlife observations were made during field visits to the study area. Background information and habitat preferences were documented to determine the potential wildlife community in the study area. Lists of wildlife species including birds, mammals, reptiles and amphibians are included in Appendix I. No significant species of wildlife were observed during the field visits or were documented in the background information.

3.4 Aquatic Environment and Fish Habitat

There are eleven surface watercourses within the study area, which includes tributaries of the Etobicoke Creek and the West Humber River watersheds. These tributaries flow from north to south traversing Mayfield Road from Heart Lake Road to Airport Road. For the purposes of this report, the creeks will be referred to as Creek One through Eleven numbered from west to east along Mayfield Road (refer to Figure J11-J15). Table 1 gives an overview of the habitat characteristics and conditions found along the creek corridors immediately upstream and downstream of the road right-of-way.

3.4.1 Etobicoke Creek Watershed

Creeks One through Five are headwater tributaries of Etobicoke Creek. Etobicoke Creek has been included as a Core Area within the Greenlands System for the Region of Peel (Region of Peel Official Plan 2001). All five creeks are intermittent unnamed drainage channels that appear to flow in the wetter months collecting the runoff from the lands on the north side of Mayfield Road.

Creek One appears to drain and be associated with a wetland feature (portion of the Heart Lake Wetland Complex) located upstream (north) of Mayfield Road and then re-enters a wetland on the south side of Mayfield Road. During both field visits in July and August, there was no defined channel or appreciable flow, although standing water was present at the culvert on both sides of Mayfield Road. There may be ground water linkages present north of Mayfield Road (Cole, Sherman & Associates 1999). The channel was choked with aquatic and terrestrial vegetation and sampling of the vernal pools was not possible due to the highly dense vegetation reducing visibility. No other aquatic habitat features were present. The portion of channel (in association with a small vegetation area) upstream of Mayfield Road has

Table 1: Overview of the watercourse crossings found within the study area (Heart Lake Road to Airport Road).

Watercourse No. and Drainage	Channel Type	Flow Characteristics [1]	Riparian Features	Adjacent Land-use	Instream Habitat	TRCA Fill Regulated Area
Creek One Etobicoke Creek	Intermittent	No flow, standing water at culvert	> 5m, marsh and some meadow upstream	70% wetland and 30% meadow	Limited, pools at culvert, channel choked with vegetation	fill regulated extension area
Creek Two Etobicoke Creek	Intermittent, no defined channel	Dry	Absent	100% crop	Absent, plowed through	No
Creek Three Etobicoke Creek	Intermittent	No flow, standing water	Absent	100% crop	Absent, plowed through	No
Creek Four Etobicoke Creek	Intermittent	No flow, standing water in large pool downstream	< 5m, terrestrial vegetation	50% farm and pasture 50% crop	Absent, suspended waste from cattle	No
Creek Five Etobicoke Creek	Intermittent, no defined channel	Dry	Absent	100% crop	Absent, plowed through	No
Creek Six West Humber River	Intermittent	Minor flow	< 5m, terrestrial vegetation	100% crop	Limited, small riffle area and pools	fill regulated extension area
Creek Seven West Humber River	Permanent	Good flow	> 5m downstream (and absent upstream (lawn)	50% residential 40% crop 10% meadow	Riffle/pools, woody debris, undercut banks, aquatic vegetation and boulder/cobbles	fill regulated area
Creek Eight West Humber River	Intermittent	No flow, standing water	< 5m, terrestrial vegetation	50%crop 25% meadow 25% developed	Limited, Minor boulder and cobble	fill regulated extension area (downstream)
Creek Nine West Humber River	Intermittent	No flow, standing water	Absent	100% crop	Limited, Minor boulder and cobble, ploughed through	fill regulated extension area (downstream)
Creek Ten West Humber River	Permanent	Beaver dam approx. 75m on downstream side	> 5m, trees and shrubs	75% crop 25% meadow	Riffle/pools, woody debris, undercut banks, aquatic vegetation and boulder/cobbles	fill regulated area
Creek Eleven West Humber River	Permanent	No flow, standing water	> 5m, meadow	70% meadow 30% crop	Limited, small pools and channel choked with vegetation	fill regulated extension area

[1] Observations were made during the July and August 2003 field visit.

been included in an area designated as 'Environmental Policy Area' in the Mayfield West Land Use Plan. This tributary has been previously referred to as "Tributary 11" in the *Environmental Study Report* prepared by Cole, Sherman and Associates Ltd. (1999) for the Ministry of Transportation Highway 410 Extension where the MNR classified this creek as an ephemeral tributary with no fish or fish habitat (MTO 2000).

Creeks Two, Three and Five are agricultural drainage systems that were dry during field investigations. The adjacent land-use is agricultural crops and all three creeks lack a riparian buffer and therefore are susceptible to being plowed through. No aquatic habitat features are present.

Creek Four located immediately to the east of the Mayfield Road intersection with Dixie Road, flows through farm land. There was no flow observed in the channel during the field visits but standing water was present in vernal pools located at the culvert. The water quality is highly degraded as a direct result of run-off from a cattle manure pile directly associated with the channel on the north side of Mayfield Road. Downstream of Mayfield Road a large pool is present, however, there was a large amount of suspended waste, the water colour was brown and there was a fowl odour, which is likely the result of the farming practices directly upstream. Aquatic habitat conditions are highly degraded and no in-situ fish habitat was present.

3.4.2 West Humber River Watershed

Creeks Six to Eleven are headwater tributaries of the West Humber River. Three of the six creeks (Creeks Six, Eight, and Nine) flow on an intermittent and seasonal basis as evidenced by the absence of flow during field observatios for this study. However the MNR considers Creek 8 to be a permanently flowing coldwater stream supporting Type I and II habitat, including the redside dace near the downstream confluence with Creek 7. Creeks Seven and Ten are permanent watercourses that provide good quality fish habitat and were sampled using a backpack electro-shocking unit. Creek Eleven is a permanent watercourse but does not provide quality fish habitat.

Creeks Six and Eight are agricultural drainage systems that were dry during the initial site visit in July, but vernal pools were noted during a subsequent site visit in August. The water was likely the result of a recent precipitation event. Creek Six adjacent land-use is crops and Creek Eight is bordered by a school and soccer fields to the north, and greenhouse and crops to the south. Both creeks have < 5m buffer along the channel consisting of terrestrial grasses and shrubs. No in-situ fish habitat was present.

Creek Seven flows through residential private property on the north side of Mayfield Road where the lawn is mowed to the waters edge thus providing no buffer to the creek. As a result of signage and a fence that restricted access, no sampling was conducted upstream of Mayfield Road. On the south side of Mayfield Road the creek meanders within the boundaries of an adequate vegetative buffer comprised of shrubs and trees. Adjacent land-use activities are agricultural crops. Aquatic habitat consisted of pool-riffle-run sequences, boulder, instream vegetation, woody debris and undercut banks. The channel width ranged from 0.40 to 3.0m and the water depth ranged from 0.20 to 1.0m. The substrate included sand, gravels, small cobble, and boulder, which are utilized by non-specialist fish species (i.e. creek chub) for spawning purposes. A mixture of fine sediments was also present within the depositional pool areas (i.e. muck, silt and clay). The water clarity was good and the current was slow to moderate. The water temperature was 23°C and the air temperature was 28°C on July 29th. The following table provides the sampling results for Creek Seven. A total of 534 fish were sampled within a 100 linear metre reach of stream located downstream of Mayfield Road and throughout the culvert.

Table 2: Fish community sampled at Creek Seven located immediately to the west of Bramalea Road (July 29, 2003).

Scientific Name	Common Name
Catostomus commersoni	white sucker
Etheostoma nigrum	johnny darter
Micropterus salmoides	largemouth bass
Rhinichthys atratulus	blacknose dace
Semotilus atromaculatus	creek chub

Although not found during our sampling efforts, historical records indicate that brook trout have been sampled from this tributary (in the Campbells Cross area), and local residents have also observed trout in the upstream reaches of this tributary (TRCA 1998).

Creek Nine is an agricultural drainage system that likely flows during wetter months. The channel had standing water within the creek channel during the field observations. This system is completely confined within crop land, where it is plowed through as a result of no riparian buffer. No in-situ fish habitat was present.

Creek Ten flows through a well established riparian zone on the north and south side of Mayfield Road. The creek corridor meanders through a low lying area several metres below the roadway. Adjacent land-use activities are primarily agricultural crops. Aquatic habitat consisted of pool-riffle-run sequences, boulder, instream vegetation, woody debris, undercut banks and backwater areas. The channel width ranged from 0.80 to 5.0m and the water depth ranged from 0.25 to 1.5m. The substrate consisted of a mixture of sand, gravel, small cobble, and boulder, and fine sediments were also present within the depositional pool areas (i.e. muck, silt and clay). The water clarity was generally fair with more turbid conditions downstream of the culvert and the current was slow. A significant beaver dam is located approximately 80m downstream of the road culvert. The water temperature was 18°C and the air temperature was 27°C on July 29th. This water temperature is

considered cool water, which may indicate ground water input upstream of the study area. Table 3 provides the sampling results for Creek Ten. A total of 294 fish were sampled within a 75m reach.

Table 3: Fish community sampled at Creek Ten located to the east of Torbram Road (July 29, 2003).

Scientific Name	Common Name
Ambloplites rupestris	rock bass
Catostomus commersoni	white sucker
Etheostoma caeruleum	rainbow darter
Etheostoma flabellare	fantail darter
Etheostoma nigrum	johnny darter
Lepomis gibbosus	pumpkinseed
Micropterus salmoides	largemouth bass
Notropis cornutus	common shiner
Pimephales notatus	bluntnose minnow
Pimephales promelas	fathead minnow
Rhinichthys atratulus	blacknose dace
Semotilus atromaculatus	creek chub

A Livestock Access Restriction Project partially funded by the Metro Rural Clean Water Program in conjunction with the TRCA and supported by the landowner was completed at Creek Ten in 1996 (Barcley, personal communication 2003). This project entailed the erection of fencing to restrict cattle access to the creek and provide an alternative source of water for the cattle. A total of 800m of fencing was raised on the north side and 500m on the south side of Mayfield Road. Since 1996, a small area has been made available to the cattle for drinking due to calf dehydration concerns. No vegetation was planted.

No redside dace were captured at either Creeks Seven or Ten during field sampling efforts, although the fish community found at Creek Ten in particular, represents a diverse fish assemblage. The common shiner and creek chub are among the twelve species that were found. The redside dace is known to utilize the nests of the

aforementioned species for spawning activity to increase egg survivorship. Observations noted at Creek Seven and Ten indicate that current habitat conditions are adequate for the redside dace life stage requirements (i.e. the majority of its food source are terrestrial insects that occupy overhanging riparian vegetation like grasses, shrubs and small trees). Thus, the current habitat provides a potential for the provincially threatened redside dace species to re-establish a population or to migrate upstream into the reaches of Creek Seven and Ten. Although the redside dace was not captured during the sampling exercise, these sections of creek should be treated as having the habitat present to potentially sustain a redside dace population.

Creek Eleven is a permanent watercourse that appears to convey minor flow year round from upstream ponds located north of Mayfield Road. Meadow and crop land borders the creek channel on both sides of the road providing more than 5m of riparian buffer. The creek channel was choked with aquatic vegetation (i.e. cattails and duckweed) and terrestrial grasses on August 8, 2003. Due to poor instream visibility, the vernal pools at the culvert were not sampled. This portion of creek is very limited in terms of opportunities for fish habitat.

To summarize, the aquatic habitats in the study area corridor vary in their sensitivity to disturbance from the proposed undertaking. Resilience to disturbance is based partially on the permanence of flow, flow dependencies on groundwater contributions, and the existing level of disturbance.

The five headwater reaches of Etobicoke Creek are intermittent agricultural drainage systems, with the exception of Creek One which is closely associated with a wetland. Habitat viability is poor due to the lack of flow and high degree of disturbance from rural land uses. As a result, these surface water features have a low potential for supporting aquatic life.

Of the six headwater tributaries of the West Humber River, two creeks, Creeks Seven and Ten are intact, ecologically functioning headwater systems. They are characterized by a diverse fish species assemblage providing good instream habitat for critical life stages (i.e. spawning) for a variety of fish species including redside dace. Due to the potential for and presence of cool water habitat at Creeks Seven and Ten respectively, aquatic habitat conditions and historical presence of the redside dace and brook trout, these reaches will be treated as critical and sensitive fish habitat.

The remaining four tributaries of the West Humber River are considered to be of a lower quality than previously mentioned tributaries due to their either intermittent flows, adjacent agricultural activities, the general lack of a riparian corridor and or limited aquatic habitat present. It is likely that these watercourses do not support a fishery or may be seasonally utilized by species that are more tolerant of disturbances and poor habitat conditions.

3.5 Summary of Constraints

Terrestrial Vegetation

- The provincially significant Heart Lake wetland complex is within the limits of the Highway 410/Mayfield Road interchange. The impacts associated with construction of the 410 interchange has been studied and reported on in two reports prepared by MTO, *Highway 410 Extension from Bovaird Drive to Highway 10 (Main Street)* (Cole, Sherman & Associates 1999) and *Highway 410 Extension from Bovaird Drive to Highway 10 (Main Street)* (Ontario Ministry of Transportation 2000). The current EA study does not address the area impacted by the highway 410 interchange.

Wildlife

- There are no significant wildlife species found within the area of the proposed road widening.

Aquatic

- Nine tributaries of the Etobicoke Creek and West Humber River watersheds are intermittent systems (with the exception of Creek Eleven which is permanent), with no direct fish habitat value and are not considered to be significant, nor highly sensitive aquatic environments. Standard mitigation measures should be practiced at these locations to limit any immediate or downstream impacts.

- Two tributaries of the West Humber River are ecologically functioning headwater reaches. One is coolwater habitat (Creek Ten) based on temperature monitoring and fish community sampling and the other (Creek Seven) has coolwater potential with historical occurrences of brook trout. In addition , MNR requires that Creek 8 be managed as a permanently flowing coldwater stream. These creeks have the potential for redside dace (VTE species) due to existing habitat conditions and historical occurrences. It is considered significant and sensitive in terms of the level of protection for the existing habitat features.

- Specific considerations include the protection of:
    - Riparian vegetation and overhanging vegetation (canopy) to maintain cool water temperatures, buffering capacity for the stream, fish habitat, and feeding opportunities for fish.
    - Instream fish habitat such as substrate, woody debris and undercut banks. This poses a constraint to any instream work or channel modifications.
    - Water clarity. Best management practices should be utilized for sediment and erosion control to reduce the impacts of runoff and siltation on the creek systems.
    - Stormwater management should include Level 1 quality control for protection of sensitive fish species in the streams.

4.0 Analysis of Alternatives

One alternative was developed for the widening of Mayfield Road from Heart Lake Road to Airport Road. In order to provide similar impacts in both the Town of Caledon to the north and the City of Brampton to the south, the proposed alternative provides for a symmetrical widening throughout the entire portion of Mayfield Road, thus neither favouring a north or south road widening. Therefore, the proposed widening was compared to a "do nothing" approach to assess the various natural environment impacts associated with the project.

For the purposes of environmental analysis, the study area includes the Mayfield Road right-of-way and the adjacent lands approximately 200m north and south of Mayfield Road from Heart Lake Road intersection, eastward to the Airport Road intersection. However, it excludes the limits of the Highway 410/Mayfield interchange, located just east of Heart Lake Road. Please refer to the Environmental Study Report prepared by Cole, Sherman and Associates (1999) for details regarding the environmental impacts associated with the Highway 410/Mayfield Road interchange.

4.1 Approach

Natural Resource Solutions provided a summary of the natural environment features and the constraints to the project study team. This information identified any significant constraints to the road-widening project early in the process so that emphasis could be placed on the development of the preferred alternative and the details of the design to avoid or mitigate impacts.

The proposed plan was compared to the natural features in the study area to determine potential impacts that could arise from the construction and operation of the road widening.

For the purposes of evaluating the natural environment impacts associated with the two alternatives, Mayfield Road is divided into two road sections, which is based on the proposed lane widening and the type of road edge treatment.

4.2 Evaluation of Alternatives

4.2.1 Heart Lake Road to Dixie Road

Agricultural fields abut the road in most areas, but cultural meadows and some landscaped areas are located in this stretch of Mayfield Road as well. No rare species are known within the current study area.

There are two watercourse crossings in this section of Mayfield Road.

Terrestrial and Wetland Impacts

Do Nothing Approach

The natural features on either side of Mayfield Road would not be impacted by any construction, and would remain as they are. The natural features along side the road are predominantly cultural meadows (old fields) and landscaped areas with individual trees and hedgerows.

Proposed Alternative

The proposed symmetrical widening of Mayfield Road would impact the terrestrial features. The road widening would cause the removal of cultural meadow habitats and individual trees associated with landscaped areas and hedgerows along the road. However, no significant species are known from these areas. The curb and gutter approach proposed for this section of road will allow the storm water to be collected with some treatment provided before being released into the natural areas.

There are few terrestrial features in this portion of the study area. No significant species of plants or vegetation communities are found within the area of road

widening. No significant species of wildlife or significant wildlife habitats are known to this area. As the road is widened, the ability of wildlife to cross this road becomes more difficult.

Aquatic Impacts

Do Nothing Approach

There are two headwater tributaries of Etobicoke Creek located between Heart Lake Road and Dixie Road. These aquatic features and their associated stream banks would not be impacted by the "do nothing" approach and would remain as they are.

Proposed Alternative

Throughout this portion of Mayfield Road, there are two surface watercourses that will be affected by the road improvements. They are un-named tributaries of Etobicoke Creek, which are referred to as Creeks Two and Three.

Creeks Two and Three are intermittent agricultural drainage swales. Both creeks lack a riparian buffer and are exposed to routine agricultural practices. No aquatic habitat features were documented.

The road widening would occur approximately on equal sides of the existing road centreline (symmetrical widening). In order to widen the road to six lanes along this stretch, culvert extensions will be required on both sides of the road. There is minimal aquatic habitat value associated with these drainage channels due to the intermittency of flow, the lack of defined channels and the adjacent agricultural practices. These tributaries are not considered highly significant or sensitive to the proposed road widening.

4.2.2 Dixie Road to Airport Road

Mayfield Road crosses eight creeks in this section of the study area. Cultural meadows and/or marsh communities are associated with many of these streams.

Cultural meadows and landscaped areas of individual trees or hedgerows are found from Dixie Road to Airport Road. Portions of Mayfield Road in this area are located beside steep embankments. One such area is located approximately half-way between Torbram Road and Airport Road. A cattle access restriction project was undertaken here along the banks of Creek Ten.

Terrestrial and Wetland Impacts

Do Nothing Approach

The "do nothing" approach would clearly not impact the natural features found adjacent to Mayfield Road. The cultural meadows, landscaped areas and marsh habitats associated with some of the creeks would remain as they are.

Proposed Alternative

The road widening would cause the encroachment into some marsh communities associated with the creeks that flow under Mayfield Road. The marsh communities vary between cattail dominated communities and those dominated by a variety of grasses and sedges. Cultural meadows found adjacent to the road would either be removed completely, or significantly reduced in size. Many landscaping trees would need to be felled. In this area, a four-lane road is proposed with a gravel shoulder and associated ditch. Storm water from the road will be conveyed via grassed swales (roadside ditches), which provide water quality control, prior to entering the natural areas directly. No significant flora or fauna are known from this area, nor are any significant wildlife habitats.

Aquatic Impacts

Throughout this portion of Mayfield Road, there are eight surface watercourses: two tributaries of Etobicoke Creek and six tributaries of the West Humber River. The two tributaries of Etobicoke Creek and three tributaries of the West Humber River are considered to be ephemeral drainage systems with no in-situ fish habitat. Of the remaining three tributaries, two creeks of the West Humber River

are permanent watercourses supporting a diverse fishery and the other tributary of the West Humber River is permanent, however, fish habitat is not evident.

Do Nothing Approach

All creeks and aquatic habitat features would not be impacted by the "do nothing" approach and would remain as they are.

Proposed Alternative

Creeks Four to Nine (with exception of Creek Seven) are intermittent warmwater drainage channels that contribute seasonal flow to the Etobicoke Creek and West Humber River watersheds. The creek channels were dry during field investigations; however, a number of tributaries had standing water at the road-side culverts. Also, Creek Eleven flows on a permanent basis that appears to originate from the ponds upstream of Mayfield Road, however, no in-situ fish habitat is present. TRCA has also designated Creeks Six and Eleven and the downstream portions (south side of Mayfield Road) of Creeks Eight and Nine as 'fill regulated extension' areas. These tributaries are not considered highly significant or sensitive to the proposed road improvements based on either their lack of perennial flow, poorly defined channels or instream characteristics. Although fish habitat potential is limited for these creeks, it is important to maintain flow conveyance and opportunities via culvert extensions for these tributaries.

Creeks Seven and Ten are ecologically functioning headwater tributaries of the West Humber River, which support a diverse fish community. Both creeks have been designated as fill regulated areas by the TRCA. Creek Seven has coolwater potential and has had historical occurrences (unconfirmed) of brook trout upstream of the study area and redside dace downstream of the study area. Creek Ten is coolwater habitat and has historical occurrences of redside dace (provincially threatened species) populations. Refer to Appendix I, historical fish

sampling data. These two creeks are considered significant aquatic habitats and sensitive to the proposed road widening.

The proposed road widening would occur approximately on equal sides of the existing road centreline (symmetrical widening). In order to widen the road to four lanes along this stretch, and allow for a wide gravel shoulder, extensions to the existing concrete box culverts will be necessary. In-water work to re-construct culvert footings beneath the stream bed may be necessary. In addition, the disturbances to the creek valleys associated with culvert extensions, specifically, the loss of riparian vegetation associated with channel banks may constitute a harmful alteration, destruction and disruption (HADD) of fish habitat under Section 35 (2) of the Federal Fisheries Act. This policy requires that there be "no net loss" of fish habitat and thus an appropriate compensation plan would be required to attain a fisheries act authorization in order to proceed with proposed road widening. Discussions with the TRCA are required to address acceptable mitigation and/or compensation measures.

Standard road mitigation measures will be required such as sediment and erosion control methods (Best Management Practices) during construction. Site restoration would occur through grading and vegetation plantings post construction, to stabilize the banks and provide shoreline cover outside the culvert walls.

4.3 Summary of the Natural Environment Evaluation

The proposed alternative was compared to "do nothing" alternative to evaluate and determine potential impacts to the natural environment features in the study area. The "do nothing" alternative had no impacts to the natural environment. Based on a review by the study team and the public, the proposed alternative that widens the road to six lanes from Heart Lake Road to Dixie Road (with curb and gutter) and to four lanes from Dixie Road to Airport Road (with gravel shoulder and ditches) was chosen as the preferred alternative.

The preferred alternative would encroach into some marsh communities associated with the creeks that flow under Mayfield Road. Cultural meadows found adjacent to the road would either be removed completely, or significantly reduced in size. Landscape trees would also be lost.

Ten tributaries occur within the study area, of which, only two are considered significant and sensitive to the proposed road widening. Although no instream work is anticipated, in-water work associated with the construction of culvert footing extensions at three creek crossings may represent a HADD under the federal Fisheries Act. A meeting with the TRCA review team is recommended prior to final design to discuss the aquatic features within the study area and an appropriate approach to mitigation and/or compensation for the impacts associated with road widening activities.

The impact analysis in terms of economics, construction, hydraulics, on-going maintenance and aesthetic requirements for the road widening is outlined in the main ESR document prepared by Stantec Ltd. The natural environment issues related to the direct and indirect impacts of the preferred alternative are addressed below in Section 5.0.

5.0 Impact Analysis and Mitigation of the Preferred Alternative

5.1 Description of the Preferred Alternative

The proposed alternative was chosen to be the preferred alternative. The details of this alternative are described and shown in the main report prepared by Stantec Ltd.

Heart Lake Road to Dixie Road

This alternative includes a general symmetrical six lane road widening with curb and gutter edge treatment on both sides of the road and turning lanes at the Heart Lake Road and Dixie Road intersections.

Dixie Road to Airport Road

The section of Mayfield Road from Dixie Road to Airport Road will be widened to four lanes with gravel shoulder and ditches on both the north and south sides of Mayfield Road. The gravel shoulder width will allow for the passage of farm vehicles. The ultimate widening of this section to six lanes is undetermined at this time.

5.2 Approach to Impact Assessment

The preferred alternative was compared to the existing natural features in order to determine the potential impacts of the proposed project. This included direct and indirect impacts. Mitigation measures to reduce or eliminate impacts are given in Section 6.0.

5.2.1 Direct Impacts

Direct impacts include "footprint" impacts that result in the removal or direct disturbance of a natural feature, habitat or species. Possible direct impacts that were evaluated included:

- impacts to core areas/significant corridors;

- vegetation loss;
- significant species of fauna or flora and their habitats;
- fisheries; and
- surface watercourses.

The following table was used to summarize the potential impacts of the preferred alternative.

Table 4: Assessment of the natural environment impacts for the Preferred Alternative.

Type of Impact	Heart Lake Road to Dixie Road	Dixie Road to Airport Road
Impacts to Core Areas, Significant Corridors	None	Encroachment into two West Humber River tributary valleys. This area consists of natural vegetation and manicured lawn found directly along the creek corridor.
Vegetation Loss	Some cultural meadow areas and landscape trees would need to be removed.	Cultural meadows, landscape trees and small marsh communities would be impacted by the road widening.
Significant Species	None	Redside dace cyprinid species (provincially threatened) has historically and recently occurred in West Humber River tributaries.
Aquatic	Two intermittent un-named tributaries of Etobicoke Creek. - No in-situ fish habitat present, therefore no direct impacts.	Two intermittent un-named tributaries of Etobicoke Creek and Four un-named tributaries of the West Humber River. - No in-situ fish habitat present, therefore no direct impacts. Two perennial tributaries of the West Humber River with diverse fishery. - No instream work is anticipated. Impacts to redside dace habitat may be associated with the removal of riparian vegetation and the input of sediment to the creek.

Surface Watercourses	Two intermittent un-named tributaries of Etobicoke Creek. - Maintain flow conveyance through culvert extensions therefore no direct impacts.	Two intermittent un-named tributaries of Etobicoke Creek and Four un-named tributaries of the West Humber River. - Maintain flow conveyance through culvert extensions therefore no direct impacts. Two perennial tributaries of the West Humber River with diverse fishery. -Several metres of the creek channel will be covered with an additional loss of riparian vegetation associated with the channel banks from the culvert extensions.

Heart Lake Road to Dixie Road

The direct impacts associated with this section of Mayfield Road widening include a loss or reduction of agricultural land and cultural meadows, and a loss of landscape trees. Each of these is discussed below.

Widening of Mayfield Road to six lanes in this section will remove some agricultural land and cultural meadow vegetation. The removal of this vegetation is not significant.

The clearing of treed areas will be limited as much as possible and mitigation measures for preserving trees are included in Section 6.0.

There are no significant watercourses in this portion of the study area. There are two ephemeral tributaries to Etobicoke Creek that are ill-defined drainage swales to the north and south of Mayfield Road and flow during localized runoff events. These drainage swales are not considered direct fish habitat and therefore no direct impacts are anticipated. Flow conveyance will be maintained through extensions of the existing culverts.

The loss of the landscape trees from this section is not significant. Trees will be replanted with native species following the construction of Mayfield Road.

Dixie Road to Airport Road

The direct impacts associated with widening Mayfield Road from Dixie to Airport Road include encroachment and loss of vegetation associated with two tributaries of the West Humber River, potential impacts to redside dace habitat, loss or reduction of agricultural land and cultural meadows, a loss of landscape trees, and of small marsh communities associated with some of the creeks. Each of these is discussed below.

The loss of vegetation associated with the creek corridors is a significant impact. The fill required to widen Mayfield road will be extensive, particularly at Creek Ten due to its steep creek valley slopes. Refer to Table 1 for the fill regulated areas designated by the TRCA.

Several methods of reducing the footprint impact of the road widening were considered including different methods of side slopes and treatment of the road edge. The following table outlines the different road edge treatments that were considered during the preliminary design in order to reduce the impacts on vegetation, and stream and valley corridors.

Table 5: Comparison of road edge treatments on the natural environment.

Road Edge Treatment	Impact on Natural Features
Gravel Shoulder and Ditch	This treatment generally impacts less natural area than the curb and gutter based on a 2:1 or 3:1 slope. The ditch provides protection to the vegetation and natural features from contaminants such as oil and sediment entering from road runoff.
Curb and Gutter	The curb and gutter generally requires less area than the gravel shoulder and ditch. It provides protection against road runoff directly entering natural areas.

The desire to maintain a rural appearance to this section of Mayfield Road and to allow for passage of farm vehicles has resulted in the gravel shoulder with ditch to being the preferred road edge treatment.

The loss of the landscape trees in this section is not significant. Many of the trees are non-native species, which are not desirable species due to their introduced status and invasive character. Trees will be replanted with native species along Mayfield Road once construction has been completed.

Potential impacts to significant species in this section include the threatened redside dace, which is known to inhabit reaches connected with Creeks Seven and Ten of the West Humber River watershed. The construction of the extensions for the concrete structures, specifically excavation required to pour the concrete footings may involve in-water work and therefore may constitute a harmful alteration, destruction or disruption (HADD) of fish habitat. Further discussion with the TRCA is recommended to address appropriate mitigation measures and to determine whether compensation will be required.
There are eight tributaries to Etobicoke Creek and the West Humber River in this section of Mayfield Road, of which five are intermittent and three (tributaries to

the West Humber River) are permanent. The five intermittent tributaries (Creeks Four, Five, Six, Eight and Nine) are poorly defined drainage channels that generally flow during localized runoff events. In addition, Creek Eleven appears to maintain a minor base flow from ponds located north of Mayfield Road. These drainage channels are not considered significant nor deemed fish habitat and therefore there are no fisheries related direct impacts. Flow conveyance will be maintained through extensions of the existing culverts thus providing future fishery opportunities.

The two tributaries of the West Humber River (Creeks Seven and Ten) are ecologically functioning headwater reaches. One is coolwater habitat (Creek Ten) based on temperature monitoring and fish community sampling and the other (Creek Seven) has coolwater potential with historical occurrences of brook trout. Both creeks have the potential for redside dace (VTE species) due to existing habitat conditions and historical occurrences. It is considered significant and sensitive in terms of the level of protection for the existing habitat features.

Specific considerations include the protection of:

- Riparian vegetation and overhanging vegetation (canopy) to maintain cool water temperatures, buffering capacity for the stream, fish habitat, and feeding opportunities for fish.
- Instream fish habitat such as substrate, woody debris and undercut banks. This poses a constraint to any instream work or channel modifications.
- Water clarity. Best management practices should be utilized for sediment and erosion control to reduce the impacts of runoff and siltation on the creek system.

Mitigation measures regarding sediment and erosion control to be used in the construction of the culvert extensions are provided in Section 6.0.

5.2.2 *Indirect Impacts*

Indirect impacts are associated with changes in site conditions such as drainage. For the purposes of the analysis of potential indirect impacts, the discussion is divided to the following:

- Sediment and erosion
- Stormwater management

Sediment and Erosion

During the widening of Mayfield Road, areas of bare soil will be exposed. It is possible that during rainfall events, sediment-laden runoff from the construction area could enter watercourses. In order to ensure that runoff from the construction site does not impact the tributaries of Etobicoke Creek and the West Humber River, sediment and erosion control measures will be required during construction.

Sediment and erosion control measures will be required during the construction of all culvert extensions that convey flow to tributaries of Etobicoke Creek and the West Humber River. This will ensure that runoff from the construction area does not directly enter the watercourses and impact the watersheds downstream. Sediment barriers should be installed along the edge of the construction area to protect the natural areas, which will be retained. Options for this mitigation measure should be included in the tender documents for the contractor to select from and/or elaborate on. Refer to Section 6.0 for details regarding mitigation.

Sediment and erosion control measures should be installed prior to any site clearing or grading. Sediment barriers, rock check dams and straw bales are all examples of sediment control methods, which could be employed. At a minimum, erosion/sediment control should meet the standards outlined in Ontario Provincial Standard Specification (OPSS) 577, *Construction Specification for Temporary Erosion and Sediment Control Measures*, a copy of which is appended to this report (see Appendix II).

Stormwater Management

There are no stormwater management (SWM) ponds proposed as part of this study. Two SWM facilities (ponds) are proposed along Mayfield Road within the Highway 410 Extension interchange right-of-way. Please refer to the MTO Pre-Design Report (May 2000) for details regarding the specific locations and treatment.

Between Dixie Road and Heart Lake Road, it is proposed to install curb and gutter and storm sewers. The high point on Mayfield Road in this area is at the Highway 410 interchange. Within the interchange, drainage will be accommodated by the MTO design. The short stretch between the interchange and Heart Lake Road is proposed to be outletted into the existing ditches such that the existing drainage patterns will be maintained.

Between the Highway 410 interchange and Dixie Road, it is proposed to outlet the storm sewer near Dixie Road into the Dixie Road ditch. Existing drainage from Mayfield Road flows into the existing drainage courses which flow southerly toward Dixie Road.

From Dixie Road to Airport Road, ditches are proposed to be maintained by outletting to the existing drainage courses. Due to the relatively small increase in drainage due to the additional pavement, the ditch drainage should be acceptable for stormwater management. The TRCA has indicated that the MOE standard ditch width of 3/4m flat bottom should be used.

6.0 Mitigation Recommendations

The following recommendations are provided to mitigate negative impacts to the terrestrial and aquatic features in the study area. Specific monitoring recommendations are provided below in Section 7.0.

During construction, sediment and erosion control will be a concern. Best management practices will be developed and employed to ensure that excessive amounts of sediment are not released into the aquatic habitat. A detailed comprehensive sediment and erosion control plan is required to be prepared by the engineer prior to any construction. Sediment and erosion control measures must be installed prior to, and maintained during construction. This plan will also detail measures to be employed on a day to day basis, and emergency response measures in case of a sediment release will detail how monitoring will be completed. Areas of bare soil should be re-vegetated with native species as soon as feasible to prevent erosion of soils.

Appropriate timing of culvert extension activities is an important mitigation measure. Etobicoke Creek is managed as warmwater and the West Humber is managed as coolwater riverine habitat. As such, it will be necessary to adopt a construction window that reflects the importance of the creeks to support and provide for the respective fishery. An instream construction window of June 30 to March 30 will be respected for the tributaries of Etobicoke Creek and June 30 to September 15 for Creeks 7, 10 and 11 of the West Humber River. The remaining three tributaries of the West Humber River are intermittent and provide limited fish habitat and thus it is recommended that construction for these tributaries be completed in the dryer months, also respecting the June 30 to September 15 window. These dates are consistent with timing routinely recommended by the MNR, Aurora District and the TRCA. Dates that are more specific will need to be negotiated based on agency knowledge of species-specific timing of spawning activities. Additional details regarding standard

mitigation measures for road improvement projects, including culvert extensions is provided in Appendix II. Restoration work at the creeks in the Humber River watershed should follow the Humber River Watershed Fisheries Management Plan DRAFT (January 1998) management options.

In areas where construction sites or roadways are located in proximity to wetland features or watercourses, the use of minor grading to direct surface runoff away from the aquatic habitats is recommended. This generally consists of the slope leading to a very shallow swale created by a low ridge of topsoil. The vegetated swale is configured to direct surface runoff along the swale back away from the edge.

Maintenance and refuelling of machinery during construction should occur at a designated location away from the creeks or other natural features.

In treed areas where clearing will be undertaken, it is recommended that the clearing be minimized as much as possible and care be taken to preserve trees where feasible. Existing areas of natural vegetation are to be retained wherever possible. In order to maximize the retention of trees and other areas of vegetation, the following recommendations are provided:

- trees and other areas of vegetation to be retained should be identified and delineated with temporary fencing located beyond the dripline of trees to ensure that vehicle movement or material storage does not disrupt vegetation (especially tree root zones); and
- any limbs or roots of trees to be retained that get damaged during construction should be pruned using appropriate arboricultural techniques.

Any areas of bare soil that arise should be graded and re-vegetated with native species as soon as possible to avoid gullying and erosion probems.

7.0 Monitoring Recommendations

The following monitoring recommendations are provided for pre, post and during construction activities.

7.1 Prior to Construction

- Preparation of landscape plans for wetland edges, setbacks and vegetated berms.

- On-site inspections of the following to ensure proper installation:
  - sediment and erosion control measures; and
  - tree saving measures, such as fences installed beyond the dripline of trees to be retained.

7.2 During Construction

- Regular monitoring of the above measures to ensure maintenance and effectiveness, and repaired/replaced as necessary.

- Pruning of any limbs or roots (of trees to be retained) disrupted during construction.

- Fuelling and maintenance of machinery to be done at designated location away from any wetland areas and watercourses.

- Storage of machinery and material, fill, etc. to be done in designated areas.

- Equipment movement through natural areas and setbacks to be controlled.

7.3 Post Construction

- Plantings along roadside and watercourses to consist of a mixture of native woody tree and shrub species with native groundcover.

- Effective stormwater management.

7.4 Construction Monitoring

Given the nature of this undertaking it is not considered necessary to have a full-time biologist on site to supervise construction. Many of the routine, day-to-day construction activities do not require supervision by a biologist. However, there are certain key aspects of construction where it is considered imperative to have a supervising biologist on site. These include:

- During initial placement of environmental protection features such as settling ponds, silt fences, vegetation fences or any other features required to ensure day-to-day protection of natural environment features;

- In the event of a spill or any other event which has the potential to cause significant damage to the natural environment;

- Upon completion of the construction project when all cleanup and restoration activities have been completed; and

- During the planting of any vegetation required as mitigation or compensation for fish habitat impacts or tree loss to ensure that planting is carried out correctly.

Following each site inspection, the inspecting biologist should provide the site engineer with a written report that identifies any observed deficiencies and give

recommendations for correction of these deficiencies. During the next inspection visit, the biologist should confirm that the required corrections have been made.

7.5 Operational Monitoring

Once the project is constructed, operational monitoring should occur to ensure that the mitigation and/or compensation measures incorporated in the project construction are functioning effectively. At a minimum, a biologist should visit the site during the first growing season following construction to ensure that:

- Planted vegetation has become established and die off is not occurring. Watering/tending of new vegetation should be undertaken as required. If vegetation does not survive, it should be replaced and with subsequent tending and monitoring;

- Erosion and sedimentation is being controlled such that suspended sediment runoff to the local watercourses is limited;

- Any mitigation or compensation measures implemented with respect to aquatic habitat are functioning effectively and as planned; and

- Impact predictions in the EA with respect to aquatic and terrestrial impacts are confirmed and no additional unanticipated impacts are occurring.

The results of this monitoring event should be documented in a brief report, which should be submitted to the following agencies for their review and acceptance:

- TRCA - Toronto Regional Conservation Authority;
- DFO - Fish Habitat Management; and
- MNR - Aurora District Office.

8.0 Conclusions

The widening and re-alignment options for Mayfield Road between Heart Lake Road and Airport Road were reviewed and compared to existing terrestrial, wetland and aquatic features in the vicinity. Key biological features in the study area include ten watercourses, two of which may support the threatened redside dace species.

The proposed alignment alternative was assessed relative to its potential for impacts compared to the "do nothing" approach. The proposed road widening alternative was the preferred option.

Detailed analysis of impacts associated with the preferred alternative was undertaken. Tree and vegetation loss along the widened right-of-way and the construction of culvert extensions associated with two watercourse crossings were identified as potential impacts. Recommendations regarding sediment and erosion control measures for mitigating impacts on watercourses were provided. In terms of potential fish habitat impacts, in-water work may be necessary at two significant and sensitive locations for the extensions of the culvert footings. This may constitute a HADD under the federal Fisheries Act, and thus the possibility of appropriate compensation was identified. Monitoring recommendations were also provided.

9.0 References

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APPENDIX I

VASCULAR PLANTS OBSERVED IN THE STUDY AREA AND WILDLIFE SPECIES REPORTED FROM THE VICINITY OF THE SUBJECT PROPERTY:

BIRDS
MAMMALS
AMPHIBIANS AND REPTILES
FISH

MAMMALS REPORTED IN THE STUDY AREA

Common Name	Scientific Name	Background Data	SRANK	COSEWIC	MNR
Eastern Chipmunk	*Tamias striatus*	X	S5		
Woodchuck	*Marmota monax*	X	S5		
Muskrat	*Ondatra zibethicus*	X	S5		
Raccoon	*Procyon lotor*	X	S5		
Striped Skunk	*Mephitis mephitis*	X	S5		
White-tailed Deer	*Odocoileus virginianus*	X	S5		

REPTILES AND AMPHIBIANS REPORTED IN THE VICINITY OF THE STUDY AREA

Common Name	Scientific Name	Background Data	SRANK	COSEWIC	MNR
Wood Frog	*Rana sylvatica*	X	S5		
Northern Leopard Frog	*Rana pipiens*	X	S5	NAR	NIAC
Green Frog	*Rana clamitans melanota*	X	S5		
Common Snapping Turtle	*Chelydra serpentina serpentina*	X	S5		
Midland Painted Turtle	*Chrysemys picta marginata*	X	S5		

LIST OF BIRDS KNOWN FROM THE STUDY AREA

SRANK	COSEWIC	MNR	Background Data	Common Name	Scientific Name	Foraging Guild	Nest Site	Habitat Preference
				HERONS				
S5B,SZN			AN	Great Blue Heron	*Ardea herodias*	F, AM, I, R	C, TR	SL
				GEESE				
S5B,SZN			X	Canada Goose	*Branta canadensis*	V	SH	GL
				DUCKS				
S5B,SZN			PO	Mallard	*Anas platyrhynchos*	V, I, AM, G	GR	SL, WT
				HAWKS AND EAGLES				
S5B,SZN	NAR	NIAC	CO	Red-tailed Hawk	*Buteo jamaicensis*	R, SM	TR	M, ED
				PLOVERS				
S5B,SZN			PO	Spotted Sandpiper	*Actitis macularia*	I	GR	SH
S5B,SZN			X	American Woodcock	*Scolopax minor*	IV	GR	SG
				DOVES				
S5B,SZN			PO	Mourning Dove	*Zenaida macroura*	S	TR	OP, ED
				CUCKOOS				
S4B,SZN			X	Black-billed Cuckoo	*Coccyzus erythropthalmus*	I	TR	SB
				KINGFISHERS				
S5B,SZN			PO	Belted Kingfisher	*Ceryle alcyon*	F	BU	L, R
				WOODPECKERS				
S5			PO	Downy Woodpecker	*Picoides pubescens*	IE	CA	OW
S5B,SZN			PO	Northern Flicker	*Colaptes auratus*	IE	CA	OW
				FLYCATCHERS				
S5B,SZN			PO	Eastern Wood-peewee	*Contopus virens*	IA	TR	OW
S5B,SZN			X	Willow Flycatcher	*Empidonax traillii*	IA	TR	SB, SG
S5B,SZN			PO	Least Flycatcher	*Empidonax minimus*	IA	TR	OW, SG
S5B,SZN			PR	Great Crested Flycatcher	*Myriarchus crinitus*	IA	CA	M
S5B,SZN			PO	Eastern Kingbird*	*Tyrannus tyrannus*	IA	TR	OP
				SWALLOWS				
S5B,SZN			CO	Bank Swallow	*Riparia riparia*	IA	BU	OP
S5B,SZN			PO	Barn Swallow	*Hirundo rustica*	IA	B, CL	OP, WT, L
				JAYS				
S5			PO	Blue Jay	*Cyanocitta cristata*	I, S, FR, B	TR	M, ED
				CROWS				
S5B,SZN			PO	American Crow	*Corvus brachyrhynchos*	V, GR, SC, B	TR	OP, M, ED, L, WM, SI
				CHICKADEES				
S5			PO	Black-capped Chickadee	*Poecile atricapillus*	I, S, FR	CA	M, ED, SG, SB
				NUTHATCHES				
S5B,SZN			PO	Red-breasted Nuthatch	*Sitta canadensis*	FR, I	CA	M
S5			PO	White-breasted Nuthatch	*Sitta carolinensis*	FR, I	CA	M
				WRENS				
S5B,SZN			PR	House Wren	*Troglodytes aedon*	I	CA	SB, OW, B
				THRUSHES				
S5B,SZN			MGR	Hermit Thrush	*Catharus guttatus*	I	GR	M, B, SG
S5B,SZN			PO	Wood Thrush	*Hylocichla mustelina*	I	TR	M
S5B,SZN			PO	American Robin	*Turdus migratorius*	I, IV, FR	TR, BU	OW, OP, GL, SG
				MIMIDS				
S5B,SZN			PO	Gray Catbird	*Dumetella carolinensis*	I	TR	SB, ED

		WAXWINGS				
S5B,SZN	PO	Cedar Waxwing	*Bombycilla cedrorum*	FR, I	TR	OW, SB
		STARLINGS				
SE	PO	European Starling	*Sturnus vulgaris*	I, FR	CA, NB, B	D, OP
		VIREOS				
S5B,SZN	PO	Warbling Vireo	*Vireo gilvis*	I	TR	OW, ED
S5B,SZN	PO	Red-eyed Vireo	*Vireo olivaceus*	I	TR	M, SG
		WOOD WARBLERS				
S4B,SZN	MGR	Blue-winged Warbler	*Vermivora pinus*	I	GR	SB, ED
S5B,SZN	PR	Yellow Warbler	*Dendroica petechia*	I	TR	SB
S5B,SZN	MGR	Magnolia Warbler	*Dendroica magnolia*	I	TR	M, OW, ED, OP
S5B,SZN	MGR	American Redstart*	*Setophaga ruticilla*	IA	TR	OW, SG
S5B,SZN	MGR	Ovenbird	*Seiurus aurocapillus*	I	GR	M
S5B,SZN	PO	Common Yellowthroat	*Geothlypis trichas*	I	GR	WT, OP
		CARDINALS				
S5	PO	Northern Cardinal	*Cardinalis cardinalis*	S, FR	TR	SB, ED
		SUMMER FINCHES				
S5B,SZN	MGR	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S, FR	TR	M, SG, ED
		SPARROWS				
S5B,SZN	PO	Field Sparrow	*Spizella pusilla*	I, S, FR	TR, GR	SB, ED, SG, OP
S5B,SZN	PO	Song Sparrow	*Melospiza melodia*	I, S, FR	GR, TR	SB, ED
		BLACKBIRDS				
S4B,SZN	X	Bobolink	*Dolichonyx oryzivorus*	S, GR	GR	GL, OP
S5B,SZN	PR	Red-winged Blackbird	*Agelaius phoeniceus*	S, GR	V	WT, OP
S5B,SZN	PO	Eastern Meadowlark	*Sturnella magna*	I, GR	GR	GL, OP
S5B,SZN	PO	Common Grackle	*Quiscalus quiscula*	GR, I, IV	C, TR	OP, WT, OW
S5B,SZN	PO	Brown-headed Cowbird	*Molothrus ater*	I, GR	P	OP
		ORIOLES				
S5B,SZN	PO	Northern Oriole	*Icterus galbula*	I	TR	OP, OW
		WINTER FINCHES				
S5B,SZN	PO	American Goldfinch	*Carduelis tristis*	S, I	TR	ED, OP, SB, SG

LEGEND

FORAGING GUILD

AI aquatic insects
AM amphibians
B birds, nestlings or eggs
F fish
FR fruits
GR grains
I terrestrial insects
IA flying insects
IE insects excavated from tree
IV invertebrates
N flower nectar
R rodents
S seeds
SA sap
SC scavenger
SM small mammals
V vegetation

NEST SITE

B building
BU burrow
C colonial
CA cavity
CL cliff ledge
FL floating
GR ground
NB nest boxes
P parasitic
PL platform
SH shoreline, close to water
TR tree
V in vegetation
A abandoned nests

HABITAT PREFERENCE

B burntlands
D developed areas
ED edge, hedgerows, scattered trees
GL grassland
L lakes, ponds, calm water
M mature dense woodland
OP open field
OW open woodland
R rivers, streams, flowing water
SB shrubland, thickets
SG second growth, immature woods
SH shoreline
SL shallow water
WM wet meadows
WT wetlands - swamps, marshes, bogs, fens

VASCULAR PLANTS OBSERVED IN THE STUDY AREA

	EQUISETACEAE	HORSETAIL FAMILY
	Equisetum arvense	Field Horsetail
	ASPLENIACEAE	SPLEENWORT FAMILY
	Onoclea sensibilis	Sensitive Fern
	THELYPTERIDACEAE	BEECH FERN FAMILY
	Thelypteris palustris	Marsh Fern
	PINACEAE	PINE FAMILY
	Larix laricina	Tamarack
+	*Picea abies*	Norway Spruce
	Picea glauca	White Spruce
	Pinus resinosa	Red Pine
	Pinus strobus	White Pine
+	*Pinus sylvestris*	Scots Pine
	Tsuga canadensis	Eastern Hemlock
	CUPRESSACEAE	CYPRESS FAMILY
	Thuja occidentalis	White Cedar
	TYPHACEAE	CATTAIL FAMILY
	Typha angustifolia	Narrow-leaved Cattail
	Typha latifolia	Common Cattail
	POACEAE	GRASS FAMILY
+	*Bromus inermis ssp. inermis*	Smooth Brome Grass
+	*Hordeum jubatum*	Foxtail Barley
	Phalaris arundinacea	Reed Canary Grass
	Phragmites communis	Common Reed
	Poa spp.	Grass
	CYPERACEAE	SEDGE FAMILY
	Carex stricta	Stiff Sedge
	ARACEAE	ARUM FAMILY
	Arisaema triphyllum	Jack-in-the-pulpit
	LILIACEAE	LILY FAMILY
	Trillium erectum	Purple Trillium, Stinking Benjamin
	Trillium grandiflorum	Common Trillium
	SALICACEAE	WILLOW FAMILY
	Populus balsamifera	Balsam Poplar
	Populus deltoides	Cottonwood
	Populus tremuloides	Trembling Aspen

+	*Salix babylonica*	Weeping Willow
+	*Salix fragilis*	Crack Willow
	Salix spp.	Willow
	BETULACEAE	BIRCH FAMILY
	Betula alleghaniensis	Yellow Birch
	Betula papyrifera	White Birch
	FAGACEAE	BEECH FAMILY
	Quercus macrocarpa	Bur Oak
	ULMACEAE	ELM FAMILY
	Ulmus americana	White Elm
+	*Ulmus pumila*	Siberian Elm
	URTICACEAE	NETTLE FAMILY
	Urtica dioica ssp. gracilis	American Stinging Nettle
	ARISTOLOCHIACEAE	BIRTHWORT FAMILY
	Asarum canadense	Wild Ginger
	POLYGONACEAE	BUCKWHEAT FAMILY
+	*Rumex crispus*	Curly Dock
	CHENOPODIACEAE	GOOSEFOOT FAMILY
+	*Chenopodium album*	Lamb's-quarters, Pigweed
	BRASSICACEAE	MUSTARD FAMILY
+	*Alliaria officinalis*	Garlic Mustard
	Lepidium densiflorum	Common Pepper-grass
	GROSSULARIACEAE	GOOSEBERRY FAMILY
	Ribes cynosbati	Prickly Gooseberry
	Ribes sp.	Currant
	ROSACEAE	ROSE FAMILY
	Aruncus dioicus	Dioecious Goat's-beard
	Crataegus spp.	Hawthorn
+	*Crataegus monogyna*	English Hawthorn
	Fragaria virginiana	Common Strawberry
+	*Malus domestica*	Apple
	Potentilla sp	Cinquefoil species
	Prunus serotina	Wild Black Cherry
	Prunus virginiana	Chokecherry
	Rubus idaeus	Red Raspberry
	Rubus occidentalis	Black Raspberry
	Sorbus americana	Mountain-ash
	FABACEAE	PEA FAMILY
	Gleditsia triacanthos	Honey Locust
	Lathyrus odoratus	Sweet Pea