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HIGHWAY 401 IMPROVEMENTS
PLANNING AND PRELIMINARY DESIGN STUDY
FROM 1.0 KM WEST OF HIGHWAY 4 (COL. TALBOT ROAD) EASTERLY TO 1.0 KM EAST OF HIGHBURY AVENUE
G.W.P. 476-89-00

CITY OF LONDON
COUNTY OF MIDDLESEX

CLASS ENVIRONMENTAL ASSESSMENT GROUP "B"

TRANSPORTATION ENVIRONMENTAL STUDY REPORT

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January 2004

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EASTERLY TO 1.0 KM EAST OF HIGHBURY AVENUE

City of London
County of Middlesex

Prepared for the Ministry of Transportation by:
URS Canada Inc.

Prepared and Reviewed by:

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Project Manager

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January 2004

THE PUBLIC RECORD

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1.0 THE TRANSPORTATION ENVIRONMENTAL STUDY REPORT

A Transportation Environmental Study Report (TESR) for Highway 401 was filed on the public record in November 2002. In response to stakeholder comments, the TESR was withdrawn to further review impacts associated with this project and to examine additional designs for the Highway 401 / Highway 4 (Col. Talbot Road) interchange, including an underpass for Highway 401 at Glanworth Drive.

This Transportation Environment Study Report (TESR) has been prepared in compliance with the requirements of the Class Environmental Assessment (Class EA) for Provincial Transportation Facilities (2000). This project is classified as a Group B project under the Class EA.

The TESR includes a description of the project need and justification, alternatives that were considered to resolve identified problems, specific and net environmental effects of the recommended solution and committed mitigation measures and monitoring measures associated with Ministry of Transportation (MTO) Group Work Project (G.W.P. 476-89-00).

Detailed background information, including supporting background study reports, is contained in the environmental study file. The Project Manager and/or Environmental Planner are available to discuss this information and can be contacted as follows:

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1.1 Summary Description of the Undertaking

This report outlines the problem statement, the need and justification, alternative solutions to the problem, alternative designs and the evaluation of those designs leading to a recommended design for the improvements and widening of Highway 401 from Highway 4 (Col. Talbot Road) to Highbury Avenue.

This project is intended to address the deficiencies and needs for improvements related to traffic operation, capacity and safety on this section of Highway 401 (refer to Section 1.2). The associated improvements include modifications to interchanges at Highway 4 (Col. Talbot Road), Wellington Road and Highbury Avenue, including new structures and improved ramp geometrics, widening Highway 401 to improve capacity and improvements to illumination and drainage. Ultimately, these improvements aim to enhance the transportation network's ability to move people and goods safely, quickly and efficiently along this section of Highway 401.

Alternatives were developed for the entire length of the study area from 1.0 km west of Highway 4 (Col. Talbot Road) easterly to 1.0 km east of Highbury Avenue. These alternatives were analyzed for their impacts to the natural, social, economic, and cultural environments and transportation. The impacts were evaluated based on differences of the impacts (and benefits) to select a technically preferred alternative that achieves the best overall balance of transportation engineering and environmental impacts including input received throughout the consultation process.

A Transportation Environmental Study Report (TESR) for Highway 401 was filed on the public record in November 2002. In response to stakeholder comments, the TESR was withdrawn to further review impacts associated with this project and to examine additional designs for the Highway 401 / Highway 4 (Col. Talbot Road) interchange, including an underpass for Highway 401 at Glanworth Drive.

Based on the evaluation of alternatives, the following improvements are proposed to this section of the Highway 401 corridor:

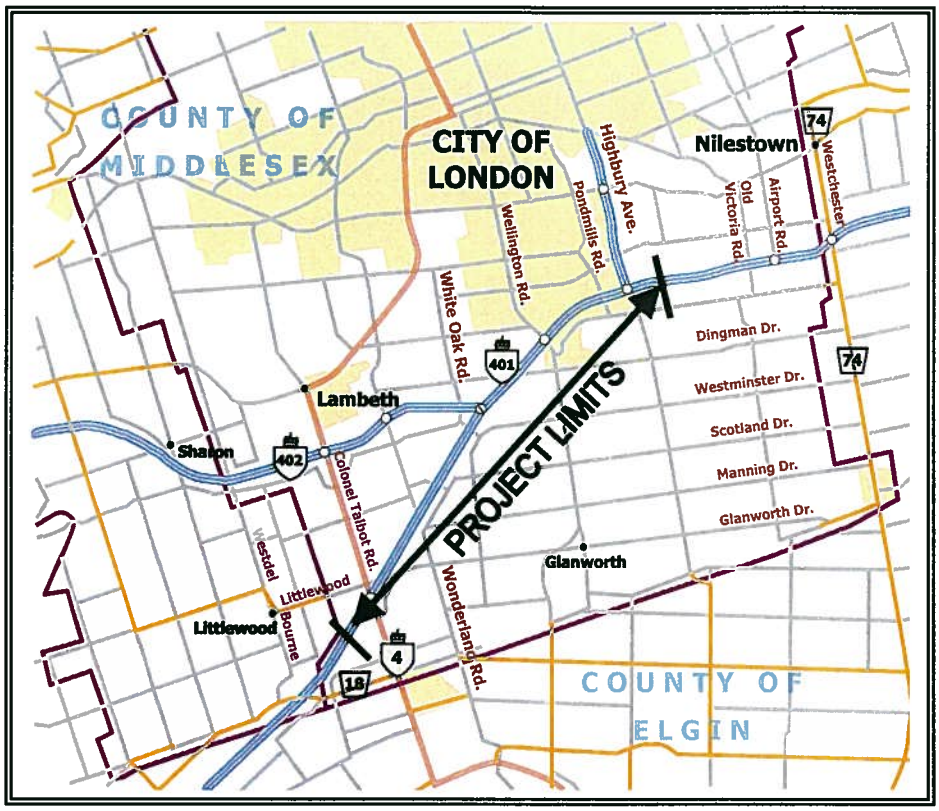
- Highway 4 (Col. Talbot Road) to Highway 402 – widen Highway 401 to a 6 lane cross-section by 2021;
- Highway 402 to Wellington Road – widen Highway 401 to a 6 lane cross-section by 2006 and 8 lanes by 2021;
- Wellington Road to Highbury Avenue – widen Highway 401 to an 8 lane cross-section by 2021;
- Highway 4 (Col. Talbot Road) Interchange - a Parclo A-4 interchange design with a new Glanworth Drive alignment over Highway 401;
- Wellington Road Interchange - a Parclo A-4 interchange design;
- Highbury Avenue interchange - a Parclo A-4 interchange design;
- Illumination and drainage improvements throughout the study area.

The rationale for the selection of the preferred alternatives is provided in Section 4.3 of this report.

1.1.1 Study Area

The study area extends along the Highway 401, from 1.0 km west of Highway 4 (Col. Talbot Road) and 401 interchange, easterly 14.4 km, to 1.0 km east of Highbury Avenue and Highway 401 interchange. Within these limits, Highway 401 represents a major highway connection traversing the County of Middlesex and City of London. The highway is largely bounded by industrial development to the east, and agricultural lands to the west section of the project area. The study area for this project is shown in Figure 1.

FIGURE 1 STUDY AREA



1.2 Project Justification and Purpose

The purpose of this project is to undertake a Planning and Preliminary Design Study to address short, medium and long-term needs of Highway 401 from 1.0 km west of Highway 4 (Col. Talbot Road) easterly to 1.0 km east of Highbury Avenue to address the problems associated with traffic operations, capacity and safety. Problems on this section of Highway 401 can be defined under four categories as summarized below:

Traffic Operations

As currently constructed, Highway 401 will not continue to operate at an acceptable level of service in future years within the project limits. Traffic is expected to increase in the future requiring additional lanes.

Three locations along Highway 401 were revealed to have existing operational problems (weaves):

- Highway 4 (Col. Talbot Road) interchange S-W to E-S ramps;
- Highway 4 (Col. Talbot Road) interchange N-E to W-N ramps; and
- Wellington Road interchange S-W to E-S ramps.

Currently, this section of Highway 401 operates well during peak travel periods. In the future, traffic volumes will continue to increase causing congestion along Highway 401.

Short-term (2001 to 2006)

Traffic operations are projected to deteriorate to a poor level of service as early as 2006. Additional capacity is required on Highway 401 between Highway 402 and Wellington Road.

Medium-term (2006 to 2011)

With short-term improvements in place, no other traffic improvements are required during this period.

Long-term (by 2021)

Traffic operations are expected to deteriorate to a poor level of service throughout the project limits. Additional capacity is required between Highway 4 (Col. Talbot Road) and Highbury Avenue.

Future capacity requirements on Highway 401 mainline are outlined as follows:

Location	Existing Capacity	Future Capacity Required
Highway 401 from Highway 4 (Col. Talbot Road) to Highway 402	4 lanes	2021 – 6 lanes
Highway 401 from Highway 402 to Wellington Road	4 lanes	2006 – 6 lanes, 2021 – 8 lanes
Highway 401 from Wellington Road to Highbury Avenue	6 lanes	2021 – 8 lanes

Safety

A 1.0 km section of main line Highway 401 demonstrates a collision rate that slightly exceeds the provincial average in the vicinity Highway 4 (Col. Talbot Road). Another segment of Highway 401 between Wellington Road and Highbury Avenue has a collision rate which is below the provincial average. However, the combination of several geometric deficiencies along this segment of Highway 401 make this area prone to collisions in the future. Although the collision analysis undertaken for this project does not support a need for action, collision statistics in combination with other analysis (capacity and geometrics) suggest the need for improvements at all interchanges along Highway 401.

Geometrics

Based on geometric assessments and roadside safety, vertical curves have been found to be substandard at various locations within the project limits.

The following interchanges have one or more ramps with geometric elements (horizontal and vertical alignments, speed change lane lengths and tapers) that do not meet current design standards:

- Highway 4 (Col. Talbot Road)
- Wellington Road
- Exeter Road
- Highbury Avenue

Illumination

There is currently no mainline illumination within the project limits. Existing illumination within the project limits is found at the following locations:

- Highway 401 and Highway 402 interchange
- Highway 401 and Wellington Road interchange
- Highway 401 and Exeter Road – Wellington Road north exit ramp
- Highway 401 and Highbury Avenue interchange

Upgrades to existing illumination are warranted within the project limits.

1.3 Short-Term Improvements at the Highway 4 (Col. Talbot Road) Interchange

The following related projects have been recently completed within the study area:

Highway 401 and Highway 4 (Col. Talbot Road) Interim Improvements

Following the withdrawal of the TESR for Highway 401, the announcement of a new 'Advanced Border Processing Centre' on Littlewood Drive, west of Colonel Talbot Road raised concerns about the safety of the existing interchange/configuration of local roads. In consultation with local landowners, and City of London officials, the Ministry has developed interim improvements for the Highway 4 (Col. Talbot Road) interchange, which include a new ramp in the northeast quadrant of the existing interchange that ties into Glanworth Drive.

Since the Ministry proposal had no significant environmental or property impacts, the interim improvements were classified as a Group 'C' undertaking under the Class Environmental Assessment for Provincial Transportation Facilities. Long-term improvements for this interchange, which are a part of this TESR, are classified as a Group 'B' undertaking under the Class Environmental Assessment for Provincial Transportation Facilities.

Highlights of the interim improvements include:

- The realignment of the Highway 401 westbound ramp to tie into Glanworth Drive;
- Traffic signals and illumination at Highway 4 (Col. Talbot Road) and the realigned Highway 401 westbound ramp / Glanworth Drive / Littlewood Drive intersection;
- Illumination at the Highway 4 / Burtwistle Lane intersection;
- Speed reduction from 80 km/h to 70 km/h through the interchange area; and
- Enhanced signing through the entire interchange area.

Construction of the interim improvements was completed in November 2003.

Future Wonderland Road Interchange

A Municipal Class Environmental Assessment was undertaken for a future interchange at Wonderland Road and Highway 401 including the extension of Wonderland Road. The proponent of this undertaking was the City of London. An Environmental Study Report (ESR) for Wonderland Road was filed (by the City of London) on the public record in December 2002. Design and construction of the interchange can commence upon availability of funding.

2.0 ONTARIO ENVIRONMENTAL ASSESSMENT PROCESS

This environmental assessment study is being undertaken to meet the requirements of a Group "B" project under the Class Environmental Assessment for Provincial Transportation Facilities (2000). Under the Class EA, Group B projects include highway and freeway improvements which provide an increase in traffic capacity and / or access and comprise such improvements as widening, interchange improvement, major alignment shifts and other analogous improvements.

The sequence of key events (activities) and study phases are summarized in Figure 2.

2.1 Study Process

The study process used is divided into five major steps:

1) Review Transportation Needs Assessment
2) Generate, Evaluate and Select Preferred Planning Alternatives
3) Generate and Assess Preliminary Design Alternatives
4) Evaluate and Select Preferred Preliminary Design Alternative
5) Develop Preferred Preliminary Design Alternative

The study process provided opportunities for periods of public and external ministry and agency input and review at key stages during the project, as well as for a continuous approach to the technical work involved. Refer to **Figure 3** for an overview of the study process.

2.2 Consultation

There are five features that are key to a successful planning study / Environmental Assessment. The five features include:

- Consultation with affected parties;
- Consideration of reasonable alternatives;
- Consideration of all aspects of the environment (i.e. natural, social, economic, cultural and technical);
- Systematic evaluation of net environmental effects; and,
- Clear and complete documentation of the planning process.

(Source: Interim Guidelines on Environmental Assessment Planning and Approval, Ministry of Environment, 1989).

The consultation process developed for this study assisted in achieving each of these key features.

One of the intentions of this study was to ensure that, from the earliest stages of planning, decisions were made after considering environmental impacts. Consultation with affected parties was an essential component of the planning process and provided a mechanism to define and respond to issues.

As mentioned, the first key feature to successful planning involves early consultation with affected parties. The study was organized so that affected parties were:

- Involved throughout the study at appropriate times;
- Provided access to information;
- Provided sufficient time to respond to questions and data requests; and,
- Encouraged to participate in an issue identification/resolution process.

FIGURE 2 STUDY SCHEDULE

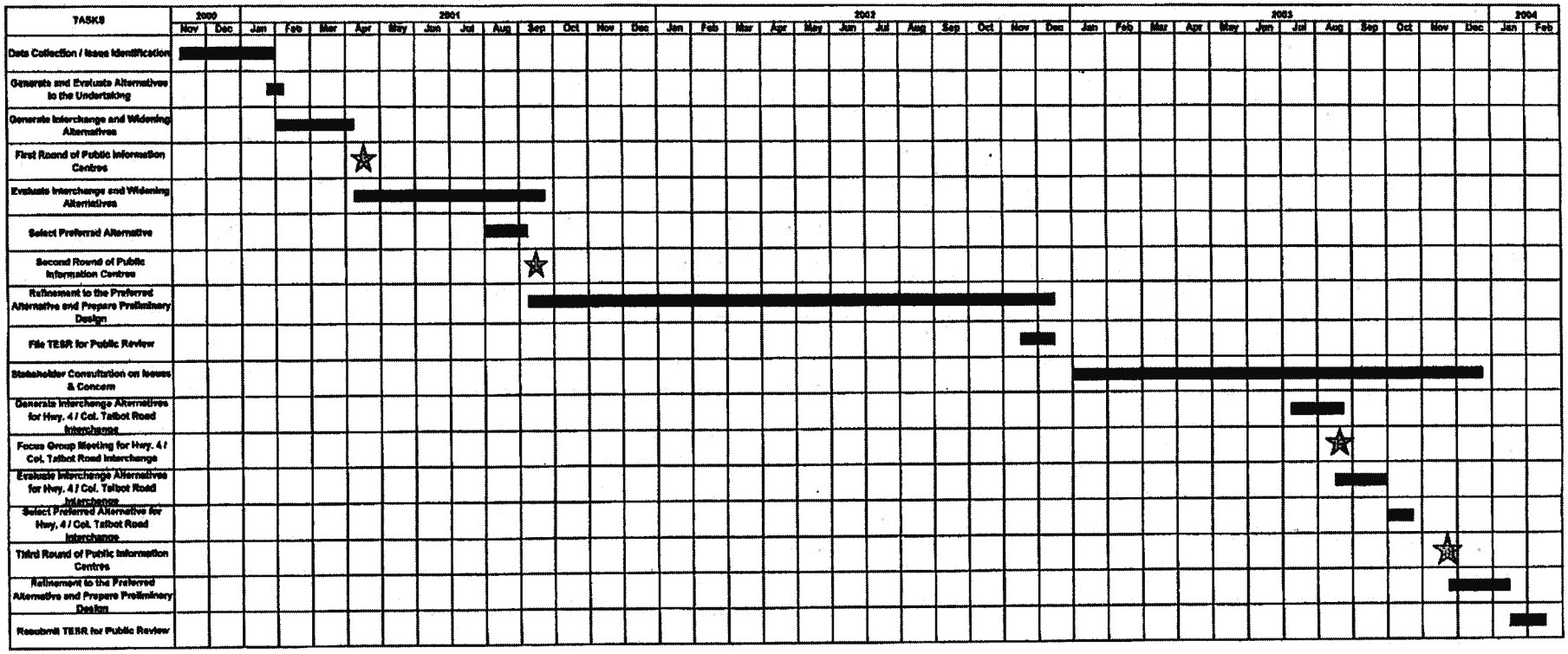
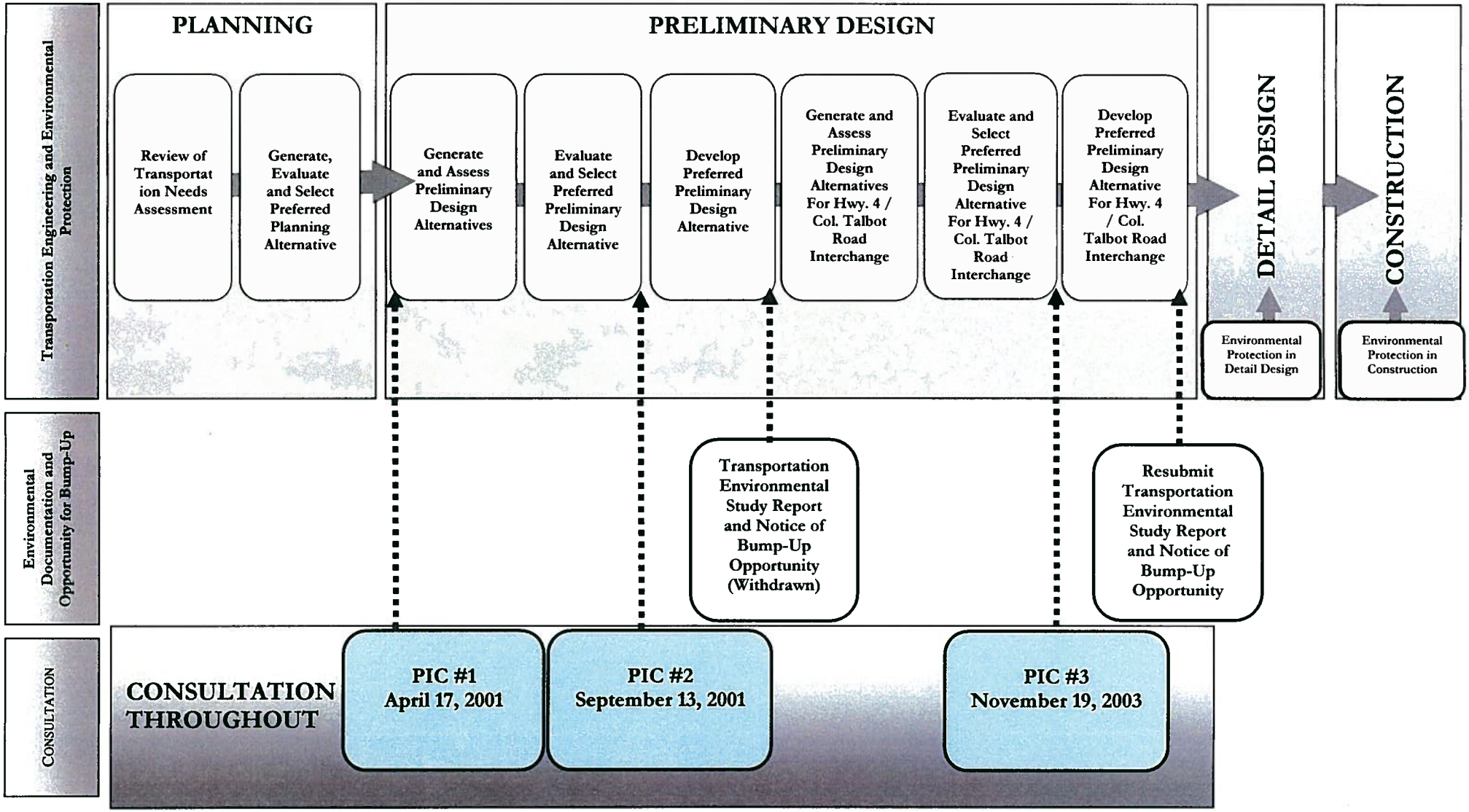


FIGURE 3 STUDY PROCESS



The public and various government agencies were provided the opportunity to review and comment on the alternatives, evaluation method and identify concerns and comment on the proposed mitigation measures. The following section outlines the consultation process implemented for this undertaking.

External and public consultation took place as follows:

- Initial letters, dated January 8, 2001 were distributed to those on the external and agency list including government agencies, ministries, municipalities and interest groups.
- "Notice of Study Commencement" was placed in the London Free Press newspaper January 11, 2001 and in the L'Express newspaper March 13, 2001.
- Start up meeting held on November 16, 2000 with the City of London staff.
- Meeting held on February 22, 2001 with staff from the City of London.
- Meeting held on March 8, 2001 with London Police and OPP (London).
- Meeting held on March 22, 2001 with staff from the City of London.
- Notice of First Public Information Centre was placed in the London Free Press newspaper on April 10, 2001 and in the L'Express newspaper on April 11, 2001.
- Invitation letters were distributed to those on the project mailing list including government agencies, ministries, municipalities, interest groups and property owners/tenants.
- First Public Information Centre (PIC) was held on April 17, 2001.
- Telephone conversations with various local residences and institutions in Summer / Fall 2001 to discuss potential property impacts associated with the proposed improvements.
- Telephone conversations with Gentex on August 16, 2001 and August 20, 2001 to discuss potential property impacts and plans for future expansion.
- Invitation letters were distributed to those on the project mailing list including those individuals who signed up at the first PIC, affected property owners/tenants, government agencies, ministries, municipalities and interest groups.
- Notice of Second Public Information Centre was placed in the London Free Press newspaper on September 5, September 8, 2001 and in the L'Express newspaper on September 5, 2001.
- Second Public Information Centre (PIC) was held on September 13, 2001.
- An information package was courier to property owners directly impacted by the proposed improvements in September 2001.
- Meeting with the Upper Thames River Conservation Authority and Kettle Creek Conservation Authority on December 17, 2001.
- Telephone conversation with the Ministry of Natural Resources on February 13, 2002.
- Focus Group Meeting held on August 20, 2003 with property and business owners in the vicinity of the Highway 401 / Highway 4 (Col. Talbot Road) interchange, City of London engineering staff, municipal politicians, and representatives from the local agricultural community.
- Invitation letters and brochures were sent directly to those people on the project team's external team mailing list, including government agencies and ministries, municipalities, interest groups, those individuals who signed up at the previous PICs and individuals who requested to be added to the mailing list.
- Notice of Third Public Information Centre was placed in the London Free Press newspaper on November 17, 2003 and in the L'Express newspaper on November 12, 2003.
- Third Public Information Centre (PIC) was held on November 19, 2003.

2.2.1 External/Agency Participation

The External Team was comprised of government ministries and agencies including:

- Ministry of Environment - Southwestern Region
- Ministry of Economic Development and Trade

- Ministry of Citizenship, Cultural and Recreation
- Ministry of Municipal Affairs and Housing
- Ministry of Natural Resources
- Ontario Native Affairs Secretariat
- Ministry of Agriculture, Food and Rural Affairs
- City of London Fire Department
- Ministry of Health
- Hydro One Networks Inc. Environmental Services and Approvals
- Ontario Power Generation
- Upper Thames River Conservation Authority
- Ontario Provincial Police – London District
- London Police Department

At the start of the study, External Team members were contacted by mail and asked to respond to the following questions:

- Does your Ministry or Agency have an interest in the study?
- Who will act as your Ministry's or Agency's spokesperson and our contact?
- Does your Ministry or Agency have any relevant background information?
- Does your Ministry of Agency have any comments or concerns?

A summary of issues and concerns raised by the external ministries and agencies is outlined in Table 1.

TABLE 2.1 ISSUES/CONCERNS RAISED BY THE EXTERNAL TEAM

External Agency	Comment	Action / Response
Canadian Coast Guard *Letter: March 25th, 2002*	Response to inquiry regarding the navigability of Dingman Creek (letter dated February 19th, 2002).	Coast Guard advised that the section of Dingman Creek at Highway 401 is considered a navigable waterway, as such an application for approval under section 5(1) of the Navigable Waters Protection Act is required. Approval will be sought during detail design.
Ontario Native Affairs Secretariat *Letter: Aug. 29,2001*	Response to initial notification letter. Noted that local First Nations should be contacted	Comment noted, no local First Nation within the project limits
Ministry of Agriculture Food and Rural Affairs *Letter: Jan 22,2001*	Response to initial notification letter. Provided project contact information. OMAFRA not opposed in principle to the project and noted that the west portion of the project limits comprise prime agricultural lands OMAFRA requests that: ❑ Proposed work near agricultural lands occur within the existing ROW to the extent possible and impacts to farmland should be minimized; ❑ Impacts to prime agricultural land should be avoided or disruption should be minimized and that post construction prime lands are returned to productive agricultural use; ❑ Disruption of agricultural infrastructure should be avoided or minimized to the extent possible.	Comments and contact noted. Impacts to agricultural lands and operation are addressed in the evaluation of alternatives. Potential impacts will be minimized to the extent possible. Temporary disruption impacts of agricultural operations during construction of the highway will be mitigated by replacement of fences which area removed during construction. Areas used on a temporary basis for construction will be restored to current conditions in consultation with the affected agricultural operator.
Ministry of Tourism, Culture and Recreation *Letter: April 10,2001*	Response to initial notification letter. Provided project contact information. If there are potential impacts to heritage areas, a heritage assessment should be undertaken. If significant heritage or archaeological remains are identified, negative impacts will have to be mitigated by either avoidance or excavation.	Comments and contact noted. A Stage 1 Archaeological Assessment and Built Heritage Resource Assessment were conducted for this project. Pertinent reports documenting existing conditions, potential impacts, proposed mitigation measures and future work will be filed with MTCR and are included in this TESR.

External Agency	Comment	Action / Response
	Requested to continue to be involved in this project.	
Ministry of Municipal Affairs and Housing *Letter: April 24,2001*	Provided project contact information. Noted that current provincial policy on land use planning matters in Ontario is the "Provincial Policy Statement" and that Planning Act requirements apply for planning approval regarding official plan amendments and zoning bylaw amendments.	Comments and contact noted. Planning Act approval will not be required for this undertaking.
Ministry of the Environment	Response to initial notification letter. Provided project contact information Provided well records for the Highway 401 / Highway 4 (Col. Talbot Road) interchange area.	Contact noted.
Ministry of Natural Resources	Response to initial notification letter. Provided project contact information	Contact noted.
Upper Thames River Conservation Authority	Response to initial notification letter. Provided project contact information	Contact noted.
Ontario Cycling Association	Did not wish to participate in this study.	Comment noted
O.P.P. / London Police Meeting: March 8, 2001	Provided accident information regarding Highway 402 interchanges and comments regarding operational conditions and safety concerns along this section of the Highway 401 corridor. Specific comments include: ❑ The section of Highway 401 between Highway 4 and Highway 402 does not provide the opportunity for emergency vehicles to turnaround, resulting in an increase in response time to incidents. The addition of a Wonderland Avenue Interchange would improve response times for emergency vehicles. ❑ An express-collector system would be desirable to separate through truck traffic from local "London" traffic. ❑ Widening Highway 401 would improve operations. ❑ OPP suggested that all alternatives considered should maintain or add rumble strips along both edges of pavement. ❑ A paved outside shoulder should be provided along the entire project limits to provide a safe area of refuge for motorists and police vehicles in case of emergencies. ❑ The concrete median barrier should be extended west of the project limits to Windsor. Six lanes for Highway 401 to Windsor should be considered to accommodate the high truck volumes along the corridor, and to improve operations.	Comments noted ❑ A Municipal Class Environmental Assessment is being undertaken for a future interchange at Wonderland Road and Highway 401 including the extension of Wonderland Road. The proponent of this undertaking is the City of London. ❑ Comment noted. Not within scope of this study. ❑ Widening Highway 401 is proposed to improve capacity and operations. ❑ Comment noted. Use of ruble strips will be addressed during detail design. ❑ Comment noted. Paved shoulders will be provided as per current MTO geometric design standards. ❑ Comment noted. Is outside of the project limits and thus beyond the scope of this study.
Upper Thames River and Kettle Creek Conservation Authorities Meeting: December 17, 2001	❑ Provided information and comments on natural features in the study area and stormwater management issues including the following specific comments: ❑ The provision for a low flow channel at Dingman Creek while maintaining the natural character of the stream would be a benefit. ❑ Opportunities for increased stormwater	Comments noted. Natural conditions and proposed mitigation measures are outlined in this TESR (Section 5.2) and documented in separate natural environment and drainage and hydrology reports (forwarded to the Conservation Authorities for their information).

External Agency	Comment	Action / Response
	treatment throughout the highway corridor should be examined. ❑ Small rock check damns rather than straw-bale check damns are preferred from a sediment control perspective. ❑ With respect to mitigation for vegetation loss, opportunities for replanting should be examined.	

External Team Meetings

An External Team meeting was arranged prior to the first Public Information Centre on April 17, 2001. The objective of the meeting was to update the External Team on the project activities undertaken and the project schedule, discuss problems and opportunities along the Highway 401 corridor, as well as discuss the preliminary alternatives under consideration. No members of the External Team attended the meeting.

Another External Team meeting was held prior to the second Public Information Centre on September 13, 2001. The objective of this meeting was to provide an opportunity to discuss the analysis and evaluation of alternatives and the recommended preferred alternative. No members of the External Team attended the meeting.

A Focus Group Meeting, comprised of property and business owners in the vicinity of the Highway 401 / Highway 4 (Col. Talbot Road) interchange, City of London engineering staff, municipal politicians, and representatives from the local agricultural community, was held on August 20, 2003. The objective of this meeting was to present long-term alternatives for the Highway 401 / Highway 4 (Col. Talbot Road) interchange, including a Glanworth bridge over Highway 401, and to identify outstanding issues and concerns related to the interchange.

2.2.2 Public Participation

A mailing list of interested individuals was established at the commencement of the study and continuously updated throughout the study. The purpose of this list was to ensure that individuals who stated an interest in the study were kept informed of upcoming events and the project's progress. The list was first developed from the City of London's property assessment roles and included all property owners within the corridor.

A notice of study commencement was published in local newspapers notifying area residents of the project and requesting them to contact the Project Team if they require information and/or to be placed on the mailing list.

The public was formally involved in the decision making process through a series of Public Information Centres (PICs) held at two major decision points:

- Preliminary Alternatives / Proposed Evaluation Method and Criteria
- Analysis and Evaluation of Alternatives

Notification of these PICs was provided for in the following ways:

- Advertisements in local newspapers;
- Letters mailed to individuals on the Project Team mailing list;
- Letters couriered to individuals directly impacted by the recommended alternatives; and,
- Letters mailed directly to external and municipal representatives.

The PICs were designed as drop-in centres where members of the public could discuss the project on an individual basis with Project Team representatives.

First Public Information Centre

The first Public Information Centre (PIC) was held on April 17, 2001 at the Ramada Inn – Somerset Ballroom in the City of London from 2:00 p.m. to 5:00 p.m. and from 7:00 p.m. to 9:00 p.m.

The purpose of the PIC was to focus on the identification of project needs, reasonable alternatives and the proposed evaluation method. The PIC also provided the public an opportunity to review and comment on the following:

- Project Limits;
- Study Schedule;
- Class Environmental Assessment Process;
- Study Purpose and Problem Statement;
- Existing Conditions;
- Proposed Planning Alternatives;
- Proposed Interchange Alternatives; and
- Proposed Evaluation Method and Criteria.

A total of 50 members of the public chose to sign the visitor's register for the PIC. Fourteen written comments were received. The following table summarizes the major issues and concerns raised by the public during the PIC and the appropriate response/mitigation to the issues.

TABLE 2.2 ISSUES/CONCERNS RAISED AT THE FIRST PUBLIC INFORMATION CENTRE

ISSUES/CONCERNS	RESPONSE/MITIGATION
Poor traffic operations and safety improvements at Highway 4 (Col. Talbot Road).	Alternatives were developed to address traffic operations and safety, including extension of the acceleration and deceleration lanes at Highway 4 (Col. Talbot Road).
Increased noise levels.	A noise impact assessment was conducted to determine the level of impact on noise sensitive receivers. Based on the results of the assessment, there will be no significant increase in noise levels (i.e. greater than 5 dBA) as a result of the widening.
High traffic flow on Decker Road.	Traffic signals will be incorporated in the preliminary design of the preferred alternative at Wonderland Road interchange to improve traffic operations and to reduce traffic on Decker Road.
Disagree with closing Morrison Road.	Due to the number of concerns raised on the closure of Morrison Road, the preferred alternative was refined to allow Morrison Road to remain open.
Traffic signals would increase congestion on Highway 4 (Col. Talbot Road).	Traffic signals will be incorporated in the preliminary design of the preferred alternative at Highway 4 (Col. Talbot Road) interchange, as appropriate.
High water tables and drainage impacts.	A groundwater assessment was part of this study. No significant impacts to areas of high water table and ground water recharge and discharge areas are anticipated. Potential impacts to specific wells will be examined during detail design.
Storm water quality and quantity to address water run off	A storm water quality and quantity plan has been developed to address water run off from Highway 401.
Property impacts.	Property acquisition and compensation will be restricted to those properties required for the widening of the highway, including interchange reconstruction. In situations where a property is required, compensation is based on the market value of the property. Market value is determined at the time of purchase by a property appraisal report. Other ancillary costs are negotiated on a case by case basis. Additional modifications will be made when preparing the preliminary

ISSUES/CONCERNS	RESPONSE/MITIGATION
	design of the preferred alternative to reduce property impacts. Nuisance impacts to properties not directly affected are addressed by mitigation measures, such as landscaping and construction restrictions.

Second Public Information Centre

The second Public Information Centre (PIC) was held on September 13th, 2001at the Ramada Inn – Somerset Ballroom in the City of London from 2:00 p.m. to 5:00 p.m. and from 7:00 p.m. to 9:00 p.m.

The purpose of the second Public Information Centre (PIC) was to present the results from the first Public Information Centre, present the analysis and evaluation of alternatives and the preferred alternatives. The PIC also provided the public an opportunity to review and comment on the following:

1. Project Limits;
2. Study Schedule;
3. Class Environmental Assessment Process;
4. Study Purpose and Problem Statement;
5. Summary of Issues and Concerns Raised During the First Public Information Centre;
6. Analysis and Evaluation of Alternatives;
7. Preferred Alternatives; and
8. What's Next.

A total of 50 members of the public chose to sign the visitor's register for the PIC. Seven written comments were received. The following table summarizes the major issues and concerns raised by the public during the PIC and the appropriate response/mitigation to the issues.

TABLE 2.3 ISSUES/CONCERNS RAISED AT THE SECOND PUBLIC INFORMATION CENTRE

ISSUES/CONCERNS	RESPONSE/MITIGATION
Noise impact evaluation	A noise assessment was conducted for this study. The existing (year 1999) noise levels along Highway 401 from Highway 4 (Col. Talbot Road) to Highbury Avenue ranged from 72.6 dBA to 57.4 dBA and the future undertaking (year 2021) noise levels were estimated to increase ranging from 74.9 dBA to 60.3 dBA. Based on the results, it was determined that noise mitigation is not warranted (in accordance with the Ministry of Environment/Ministry of Transportation noise protocol) as the increase in noise levels resulting from these improvements were less than 5 dBA.
High traffic flow on Decker Road.	Traffic signals will be incorporated in the preliminary design of the preferred alternative at Wonderland Road interchange to improve traffic operations and to reduce traffic on Decker Road.
Impact to business entrances along Highway 4 (Col. Talbot Road)	The exact location and configuration of a new entrance to Gentek from Colonel Talbot Road will be determined in consultation with the City of London and the Ministry of Transportation during the detail design phase. Improvements to the Highway 4 (Col. Talbot Road) interchange have been identified for the mid-term planning horizon of this study (2011).
Impacts to Utilities on Glanworth Drive	It is anticipated that utilities on Glanworth Drive would be unaffected by the preferred interchange alternative. Utility relocates will be addressed during the detail design phase of this study in consultation with affected utility companies.
Improvements to the left-turn lane (northbound) from Highway 4 (Col. Talbot Road) to Burtwistle Lane needed	Further consideration of extending the left turn lane from Colonel Talbot Road to Burtwistle Lane (south) will be examined during the detail design stage.

ISSUES/CONCERNS	RESPONSE/MITIGATION
Cleaning the Fourine drain is needed	Maintenance concerns regarding Fourine Drain have been forwarded to the City of London Transportation and Works Department for further consideration.
Impacts to Dingman Creek drain	Impacts to Dingman Creek have been reviewed as part of this study. The recommended improvements and mitigation measures are discussed in Section 5.2 of this report.
Replacement of fences along Highway 401	Where fence are impacted by the proposed improvements, they will be repaired / replaced to their original condition. Comments regarding the installation of new fences along Highway 401 between White Oak Road and Highway 402 have been forwarded to the Ministry of Transportation Works Department for further consideration.
Operations at the "6-way corner"- Littlewood Road and Colonel Talbot Road	A new interchange layout has been recommended at Highway 401 and Highway 4 (Col. Talbot Road) as a mid-term improvement (2011). The new interchange will eliminate concerns at Littlewood Road, and will provide a superior level of operations along Highway 4 (Col. Talbot Road) and ramps.

Third Public Information Centre

The third Public Information Centre (PIC) was held on November 19, 2003 at the CAW Local 150 Auditorium in the City of London from 3:00 p.m. to 8:00 p.m.

The purpose of the PIC was to update the public on the progress of this study, the evaluation of alternatives and the recommended alternatives, including long-term interchange alternatives at Highway 4 (Col. Talbot Road) with a Glanworth bridge over Highway 401. The PIC also provided the public an opportunity to review and comment on the following:

1. Project Limits
2. Study Background
3. Problem Statement
4. Interim Improvements
5. Overview of the Class EA Process
6. Study Schedule
7. Future Highway 401 Lane Requirements
8. Evaluation Summaries for Interchange Alternatives
9. Summary of Issues and Concerns Raised
10. Alternatives Considered at the Highway 4 / Col. Talbot Road Interchange
11. Evaluation Criteria
12. Evaluation Summary of Highway 4 (Col. Talbot Road)
13. What's Next

A total of 21 members of the public chose to sign the visitor's register for the PIC. Three written comments were received. The following table summarizes the major issues and concerns raised by the public during the PIC and the appropriate response/mitigation to the issues.

TABLE 2.4 ISSUES/CONCERNS RAISED AT THE THIRD PUBLIC INFORMATION CENTRE

ISSUES/CONCERNS	RESPONSE/MITIGATION
The interim improvements provide safer traffic conditions; and the temporary signals on Col. Talbot (at Littlewood) are slowing traffic speeds through the Highway 401 / Col. Talbot Road interchange area.	Comment noted. Support for the interim improvements and the temporary signals on Col. Talbot Road at Littlewood Drive is appreciated.
Concern regarding the speed of the	With respect to the speed of traffic on the Highway 401 westbound exit

ISSUES/CONCERNS	RESPONSE/MITIGATION
trucks exiting westbound Highway 401; need to make traffic existing Highway 401 aware of the 30 km/h ramp speed limit.	ramp, the ramp is signed at a 30 km/h speed limit. An electronic sign showing a 30 km/h ramp advisory speed was positioned in advance of the ramp along Highway 401 on a temporary basis to make westbound travelers destined to Highway 4 / Col. Talbot Road aware of the posted speed. There is also an advisory sign posted on the ramp indicating that there are traffic signals ahead.
Concern regarding the lack of illumination at the intersection of Glanworth Drive and the E-NS ramp; suggest installing traffic lights or beacons on top of the stop sign.	The design of this intersection meets current Ministry of Transportation standards. However, in light of concerns raised, the Ministry of Transportation will review illumination issues associated with the interim interchange design.
Agree with the interim improvements (new E-N/S ramp and intersection).	Comment noted. Support for the interim improvements (new E-N/S ramp and intersection) is appreciated.
Need to accommodate agricultural vehicles to Wonderland Road via Tempo Road and Glanworth Drive if Orr Drive is closed.	Comment noted. The recommended plan will facilitate this movement.
Concern regarding the movement of wide and slow moving vehicles through the project limits.	The proposed interchange design includes a centre paved median along Highway 4 / Col. Talbot Road, shoulders on both bridges and signalized intersections at Tempo Road and Littlewood Drive, which will help facilitate the movement of agricultural equipment through the interchange.
Lengthening the left turn lane into Burtwistle Lane would accommodate safer left turns.	We also note your suggestion to lengthen the left turn lane into Burtwistle Lane. Your suggestion will be taken into consideration in the detail design phase, which will be scheduled when a construction date is announced.
Need for improved illumination through the Highway 401 / Highway 4 (Col. Talbot Road) interchange area.	High mast illumination will be provided when the new interchange is constructed. Conventional lighting will be provided at signalized intersections.
The E-S ramp at the Highway 4 (Col Talbot Road) interchange should be closed to eliminate the weaving condition on Highway 401.	The Ministry of Transportation will monitor traffic operations at this ramp and will make changes, if warranted.
Need for improved illumination at the Glanworth Drive structure.	Comment noted. In light of concerns raised, the Ministry of Transportation will review the need and opportunity for illumination enhancements through this area.
Need for the City of London to construct an acceleration lane on Col. Talbot Road north of Highway 401 to reduce truck interference with car passage.	Col. Talbot Road north of Littlewood Drive is under the jurisdiction of the City of London and your comment will be forwarded to the City of London for further consideration.
Concern with the closure of Orr Drive, particularly during construction when the Tempo Rd. detour is in place. This condition will cause slow moving agricultural vehicles normally using Orr Drive to mix with detour traffic.	Comment noted. Further consideration regarding the closure of Orr Drive will be examined during the detail design stage.
Either Alternative 1 or 2 is acceptable for the Highway 401 /	Comment noted. High mast illumination will be provided when the new interchange is constructed.

ISSUES/CONCERNS	RESPONSE/MITIGATION
Col. Talbot Road long-term improvements, however, tower lighting is required.	
Future improvements to Highway 401 and Wonderland Road should be accelerated.	Please note that this is a City of London initiative and is subject to the availability of funding.
Stop signs at Highway 401 and Col. Talbot Road (interim improvements) are too small, and require bold text to prevent vehicles from entering one-way traffic.	Please note that the signing meets Ministry of Transportation standards. However, in light of concerns raised, the Ministry of Transportation will review the need and opportunity for signing enhancements through this area.
Will a new bridge be required for the short-term improvements to Highway 401 and Wellington Road?	A new Wellington Road bridge over Highway 401 will be constructed to the east side of the existing bridge.

3.0 TRANSPORTATION NEEDS ASSESSMENT

3.1 Statement of Problem and Opportunity

The purpose of this section is to outline the existing and projected transportation problems and opportunities in the study area. The problems addressed in this study are related to the deficiencies in the capacity of the transportation network, roadside safety, structural and interchange improvements for Highway 401 from Highway 4 (Col. Talbot Road) to Highbury Avenue to accommodate forecasted commuter and commercial travel needs.

The study also addresses the opportunity to identify a plan for resolving the short and medium problems while protecting the Ministry of Transportation's long-term strategic goals for the movement of people and goods through the City of London.

The transportation problems and opportunities were identified from the following sources:

- Transportation Network Plans;
- Ministry of Transportation's Traffic Data Inventories (i.e.; AADT, SADT, WADT, traffic counts);
- Municipal Intersection Collision Records;
- Municipal Road AADT Data (1990-1998) City of London;
- City of London Official Plan; and,
- County of Middlesex Official Plan.

3.1.1 Problem

Existing Conditions

Highway 401 is currently a six lane controlled access freeway from east of Highbury Avenue interchange to the Wellington Road interchange. From the Wellington Road interchange westerly to beyond the Highway 4 (Col. Talbot Road) interchange, Highway 401 has a four lane cross-section.

Future Conditions

Traffic operations are projected to deteriorate to a poor level of service as early as 2006. As traffic volumes continue to increase, congestion on Highway 401 will occur. This will lead to increased driver frustration, potential for collisions, trip delays and associated waste of energy resources, increased costs of moving goods and significant diversion of traffic to adjacent roads. Structures will also need to be widened or replaced to accommodate mainline improvements.

Future capacity requirement on Highway 401 mainline is outlined as follows:

Highway 401 Segment	Existing Traffic Volumes (2001 AADT)	Existing Capacity	Project Future Traffic Volumes (2006 / 2021 AADT)	Future Capacity Required
Highway 4 (Col. Talbot Road) to Highway 402	31,900	4 lanes	2006 – 37,600 2021 - 54,000	2021 – 6 lanes
Highway 402 to Wellington Road	46,800	4 lanes	2006 – 53,700 2021 – 75,750	2006 – 6 lanes, 2021 – 8 lanes
Wellington Road to Highbury Avenue	54,450	6 lanes	2006 – 62,150 2021 - 85,500	2021 – 8 lanes

Under future conditions, traffic operations on most interchange ramps within the project limits will be at or approaching unacceptable level of service. These ramps include:

- Highbury Avenue S-E;
- Highbury Avenue N-E;
- Highbury Avenue N-W;
- Highbury Avenue W-N/S;
- Highbury Avenue E-N/S;
- Wellington Road S-E;
- Wellington Road W-N/S;
- Wellington Road N-W;
- Wellington Road E-N;
- Highway 402 W-E;
- Highway 402 E-W; and
- Highway 4/Colonel Talbot Road W-S.

3.1.2 Opportunity

Transportation improvements are required along Highway 401 from Highway 4 (Col. Talbot Road) to Highbury Avenue to address transportation network deficiencies associated with forecasted commuter travel needs.

In recognition of increased traffic and transportation needs along the Highway 401 corridor, this area was assessed to define and designate the property or right-of-way that may be required for the transportation improvements prior to it being developed.

3.2 Alternatives to the Undertaking

The purpose of the undertaking is to resolve the deficiencies associated with Highway 401. Consistent with the Class Environmental Assessment for Provincial Transportation Facilities (2000), alternatives to the undertaking were examined to determine which alternatives were considered reasonable. For this study, the judgement of reasonableness was based on the ability of the alternative to resolve the transportation problems identified, or to take advantage of an opportunity. In total, six types of alternatives to the undertaking were assessed to determine the most reasonable approach to addressing the identified problems and opportunities.

1) Do nothing

The "do nothing" alternative maintains the status quo of transportation infrastructure and services, with no significant changes or actions being taken to either manage demand, expand infrastructure, or improve operations. Traffic is expected to continue to increase. To "do nothing" would result in a further deterioration of the level of service. This in turn would result in an increase in travel time, congestion, collisions, and fuel wastage. The negative consequences of the "Do Nothing" approach clearly suggest that actions must be taken in order to address the existing and projected deficiencies of Highway 401. As such, this was not considered an acceptable alternative.

2) Road Improvements (Existing Transportation Facilities) Excluding Highway 401

There are very few parallel arterial road networks that would provide diversion for Highway 401 through-traffic due to the distances of these other roads from Highway 401. Improvements and/or widening of arterial roads would not provide sufficient additional capacity for through-traffic to be significantly diverted from Highway 401. Therefore, road improvements (excluding Highway 401) were not considered an acceptable alternative.

3) Non-Roadway Improvements (Rail, Air, Transit) / Improve or Introduce New Facilities

This alternative involved improving existing or introducing new types of modes other than road users. This alternative did not address improvements to the traffic operations and capacity problems, geometrics and would be very expensive to construct. Highway 401 serves a diverse nature of trips. Although rail and transit expansion would provide a more competitive choice of travel modes for some users, such improvements would not significantly reduce vehicle trips. This alternative alone would not be able to address travel demand and was therefore eliminated from further consideration.

4) Transportation Demand Management

Managing transportation demand includes the implementation of measures to sufficiently reduce, shift, or eliminate transportation demand, such that improved transportation infrastructure /operation within the study is not required. This alternative would not significantly improve or eliminate any of the identified deficiencies and was not considered an acceptable alternative.

5) Construction of a New Road Corridor

This alternative would improve capacity problems but would not address safety or geometric concerns. This alternative would result in significantly high natural, social, economic and cultural impacts and would have considerably high costs. Therefore, this alternative was eliminated from further consideration.

6) Roadway Improvements to Highway 401

Improvements to Highway 401 mainline and interchanges at Highway 4 (Col. Talbot Road), Wellington Road, Exeter Road and Highbury Avenue address the problems associated with traffic operations, capacity, geometrics, safety and illumination concerns in the study area. This alternative would result in minor natural, social, economic and cultural impacts that are mitigatable. Therefore, this alternative was recommended for further consideration.

Highway 401 is an important transportation corridor contributing to transportation services between Detroit and Toronto. Through the study area, conditions warrant improvements to traffic capacity and operations. The assessment of alternatives to the undertaking concluded that the "do nothing" alternative, management of travel demand, the use of road and non-road based alternatives are not acceptable measures to resolve existing and potential problems in the study area. Improving the traffic carrying capacity, geometrics and safety is the most desirable means of resolving the deficiencies. As such, roadway improvements to Highway 401 was identified as the best solution and carried forward for further consideration.

4.0 PRELIMINARY DESIGN

The overall objective of generating a reasonable range of alternatives was to eliminate alternatives that did not satisfy components of technical considerations. To accomplish this, a multi-step process was employed:

Step 1: Identify Significant Study Area Features

Step 2: Generate Preliminary Design Alternatives

Step 3: Evaluate and Select the Preferred Alternative

Based on the evaluation of alternatives to the undertaking, alternative methods of carrying out the undertaking were examined along Highway 401 from 1 km west of Highway 4 (Col. Talbot Road) to 1 km east of Highbury Avenue to the year 2021.

HIGHWAY 401 MAINLINE (2001 – 2006):

This section of Highway 401 within the project limits is anticipated to operate well during peak travel periods until 2006. Roadside safety, illumination and drainage features are improvements required to reflect current Ministry Standards.

Highway 401 requires widening from four lanes to six lanes between Highway 402 to east of Wellington Road.

Location	2001 AADT	2006 AADT
Highway 402 to Highway 4 (Colonel Talbot Road)	31,900	37,600

HIGHWAY 401 MAINLINE (BY 2021):

Traffic operations are projected to deteriorate to a poor level of service as early as 2006. As traffic volumes continue to increase, congestion on Highway 401 will occur. This will lead to increased driver frustration, potential for collisions, trip delays and associated waste of energy resources, increased costs of moving goods and significant diversion of traffic to adjacent roads. Structures will also need to be widened or replaced to accommodate mainline improvements.

Highway 401 requires widening from four lanes to six lanes from Highway 4 (Col. Talbot Road) to Highway 402 and six lanes to eight lanes between Highway 402 to Highbury Avenue.

Location	2001 AADT	2006 AADT	2021 AADT
Highway 402 to Highway 4 (Colonel Talbot Road)	31,900	37,600	54,000
Highbury Avenue Wellington Road	54,450	62,150	85,500
Wellington Road Highway 402	46,800	53,700	75,750

Highway 401 Existing Interchanges:

The interchanges within the project limits (Highway 4 (Col. Talbot Road), Wellington Road, Exeter Road and Highbury Avenue) warrant improvements to address traffic operation issues and to reflect current Ministry Standards.

4.1 Study Area Constraints

In order to generate a reasonable range of alternatives, all significant features within the study area limits were identified to determine the sensitive areas within the proposed alignment options and the potential for impact on these areas from the proposed widening alternatives.

Identifying significant features involved the collection of primary and secondary source data derived from surveys, field studies, published and unpublished literature, government sources and consultation with agencies and the public. The data collected was grouped in the following categories:

- Natural Environment;
- Socio-Economic Environment;
- Cultural Environment;
- Technical Considerations.

4.1.1 Natural Environment

The natural environment information was obtained from reviews of existing documents, air photo interpretation, surveys and field investigations (i.e., aquatic habitat and fisheries, hydrogeological assessment, wildlife and vegetation communities) undertaken in May 2001.

The following sections summarize the natural features within the study area. Detailed descriptions are included in the Natural Environment stand alone report prepared by Gartner Lee Limited *Natural Environment Assessment – Highway 401 Existing Conditions Report, July 2001 (Final Draft).*

4.1.1.1 Hydrogeology

The surficial geological mapping shows that most of the highway corridor is underlain by silty clay to clayey silt till or other fine grained deposits (silts or clays) of varying thickness. Most wells in this area (30 wells) obtain their water supply from discrete sand and gravel layers within the overburden although there are records of a few shallow bored wells completed into the overburden. This area is considered to have a relatively low susceptibility to groundwater contamination as there is a relatively thick confining layer of fine grained till soil protecting the underlying sand and gravel aquifers. Shallow, large diameter bored wells are however, more susceptible to interference.

The area between Scotland Drive and one kilometer southwest of Westminster Road (three wells) and between 500 m northeast of Westminster Road and Dingman Creek (two wells) are considered to be low to moderately hydrogeologically sensitive as they are underlain by lacustrine or pond deposits composed of silty sand to fine sand. Wells in this area range in depth from 16 m to 62 m. They are completed in sand and gravel layers or the bedrock. A 16 m deep dug well (MOE well 3642) in the area penetrates 12 m of clay overlying the gravel aquifer. This confining layer typically provides adequate protection of aquifers.

The area from one kilometer northeast of Scotland Drive to one-quarter kilometer southwest of Westminster Road (four wells) and the area from 375 m to 500 m northeast of Westminster Road (one well) is considered to be hydrogeologically sensitive. These areas are underlain by porous sand to sand and gravel which are considered to have a high susceptibility to contamination. Sand and gravel extraction operations have been active in the sandy deposits north of Scotland Drive. An abandoned pit in this area (Lot 20, Concession 5) has sand pit faces from 3 m to 8 m high (OGS, 1982). This area tends to have wells completed in sand and gravel deposits at depths greater than 40 m and overlain by fine grained tills or non-water bearing sand and gravel layers. In this area, there are two wells within 500 m of the current highway alignment. Records indicate that they are shallow wells with total depths of 6 m (MOE well 8180) and 8 m (MOE well 3644). The shallower 6 m well has a 2.4 m thick clay layer overlying the fine sand aquifer. The 8 m deep well is located slightly northeast of the Westminster Road/Highway 401 crossing and is

a shallow drilled well penetrating sand and gravel from surface. These wells are considered to be hydrogeologically sensitive.

A number of municipal wells drilled by the Public Utilities Commission (PUC) are located adjacent to White Oak Road (south of Highway 401). These are generally deeper wells deriving their supply from sand and gravel layers more than 40 m below ground surface. The aquifers are all overlain by at least 15 m (and more commonly over 35 m) of clay or fine grained till providing protection from surface contamination. Most of this area has been included in an area interpreted to have a low susceptibility to construction impacts from a groundwater recharge perspective.

The areas of surface sand and gravel in the vicinity of Westminster Drive are considered to be hydrogeologically sensitive whereas the areas of till soil at surface are considered to have low susceptibility to contamination. The sands and gravels are considered sensitive from a recharge and discharge perspective. Those low lying areas adjacent to Dingman Creek are likely to be in discharge areas where the groundwater table is near or at surface. The upland areas are considered to have high recharge potential. Paving of these areas would potentially reduce the amount of recharge.

Four expired "Permit-To-Take-Water" permits were located within 3.5 km of the current highway alignment. Two permits were for industrial use, one for municipal and one for commercial use. Three of the permits were for drilled wells and one was for a surface water source. The maximum amount of water permitted for each of the four sites ranged from 360,000 L/day to 65,462 L/day. There are currently no "Permit-To-Take-Water" within 3.5 km of the highway alignment. Of the two permits within 500 m of the highway corridor, one was a surface water source (91-P-0013) and the other was a groundwater source (78-P-1095).

Two deep (drilled) wells were encountered in the north-east quadrant of Highway 401 and Highway 4 during the interim improvements, and these wells have been abandoned in accordance with Ministry of the Environment guidelines.

A total of 40 wells are estimated to lie within 500 m of the current highway alignment between Highway 4 (Col. Talbot Road) and the west side of Wellington Road.

4.1.1.2 Fisheries and Aquatic Environment

In total, eight watercourses were identified as being potentially impacted within the study area. A general summary of watercourse conditions has been provided in Table 4.1. Of the eight watercourses, Murray Drain is crossed of two locations (refer to **Figure 4**). In addition to the crossings, one area of encroachment was also identified as an area potentially affected by interchange modification (Orr Drain). The remaining area of potential concern (right-of-way encroachment on Murray Drain, west of Wellington St.) identified through desktop analysis, was visually assessed in the field, at which time, it was determined that the watercourse was outside of the affected footprint area. The eight watercourses affected are as follows:

1. Fourine Drain (*within interchange foot print, not crossed by Hwy 401*)
2. Courtney Drain
3. Number 1 Highway Drain
4. C B Smith Drain
5. Bannister-Johnson Drain
6. Dingman Creek
7. Murray Drain (at two locations)
8. Elliot-Laidlaw Drain

TABLE 4.1 FISH AND AQUATIC HABITAT OF ASSESSED WATERCOURSES WITHIN THE HIGHWAY 401 STUDY AREA

Watercourse Name	Fish Present/ Absent	Drain Classification (DFO 2001)	Flow Condition (May 3-4, 2001)	Assessed Sensitivity	Adjacent Lands
Fourine Drain	Not Sampled	C	Not Sampled *Standing Water	Low-Moderate	Interchange and Agriculture
Courtney Drain	Present	C	Poor Flow – Standing Water	Low-Moderate	Woodlot and Agriculture
Number 1 Highway Drain	Absent	F	Poor Flow – Standing Water	Low	Agriculture
C B Smith Drain	Absent	F	Poor Flow – Standing Water	Low	Agriculture
Bannister-Johnson Drain	Present	F	Poor Flow – Standing Water	Low-Moderate	Agriculture
Dingman Creek	Present	C	Good Flow	Low-Moderate	Agriculture
Murray Drain	Present	C	Poor Flow – Standing Water	Low-Moderate	Interchange and Industrial
Elliot-Laidlaw Drain	Present	C	Good Flow	Low-Moderate	Interchange and Industrial

*Based on KCCA Drain Classification Assessment (pers. comm. 2001)

- **Fourine Drain – Station 1**

Fourine Drain is a watercourse that does not cross Highway 401within the project limits. The majority of the Highway 4 (Col. Talbot Road) interchange drains south-east towards the Fourine Drain.

This watercourse originates at the Highway 4 (Col. Talbot Road) and Highway 401 interchange, where it flows south for approximately 6 kilometers before reaching its confluence with Dodd Creek. The Kettle Creek Conservation Authority (KCCA) has classified this watercourse as a Class C drain (C. Cooper, *pers comm.*), which designates the wetted channel as permanent, with warm water, containing baitfish. This classification was derived at a downstream location below Highway 401. Although this watercourse is managed as a Class C drain, we suspect that the area affected within the footprint is typically ephemeral due to the nature of the surrounding drainage which, is mainly agricultural surface water runoff and roadside conveyance.

Current aquatic habitat appears to have been significantly altered in the past by land use practices and by the existing interchange. Available fish records provided by KCCA do not indicate any significant or sensitive fish species. Furthermore, the predicted ephemeral characteristics of the headwater reach of Fourine Drain would limit fish and fish habitat potential.

Based on air photo interpretation and predicted ephemeral characteristics of this system through desk top analysis, along with available background information provided by KCCA (C. Cooper, *pers comm.*) field surveys were not collected based on poor habitat potential within the project limits.

- **Courtney Drain – Station 2**

Courtney Drain flows in a westerly direction for approximately 7 kilometers, from its origin at Wonderland Road, to its confluence with Dodd Creek, within the Kettle Creek watershed. This watercourse flows under Highway 401 through an open bottom concrete culvert.

This system has been classified as a Class C Drain, therefore, flow within the channel has been determined to be permanent, with warm water, containing baitfish (C. Cooper *pers comm.*). Flow conditions during the sampling period were poor, with minimal visible movement (May 3, 2001). Water depth throughout the channel, both up stream and downstream of the 401, were shallow with mean depths of 0.08m and 0.10m respectively. The greatest

water depths were observed within the ROW, directly upstream and downstream of the culvert crossing, as well as within the culvert.

Substrate composition in this watercourse was dominated by clay, over lain with fine silt and silty-clay, with sparse gravel and cobble in the upstream reach. Downstream, channel form became more channelized, with areas of thick cattail growth and heavier silt accumulations.

Adjacent land use upstream was wooded with trees and shrubs for the entire station length. Downstream of the 401, adjacent lands were typically in oldfield succession, with agricultural encroachment approximately 70 meters downstream of the Highway 401.

The study reaches, upstream and downstream of the highway, generally exhibit a flat morphology with low gradient. Within the ROW the channel form is significantly different, displaying a deeply cut and defined narrow channel with hummocky banks. In these deepened areas we suspect that water will be present year round providing a standing water refuge area. However, despite the applied drain classification, we anticipate, based on field observations, that downstream connectivity with the headwater reaches of Courtney Drain will be lost, limiting fisheries potential.

Bank stability in the assessed reach was moderately stable. Bank erosion and scouring were observed along the entire high waterline throughout the upstream reach. Downstream bank stability has been improved due to herbaceous vegetation establishment.

Fish sampling at this station on May 3, 2001, produced 3 species: white sucker, brook stickleback, and creek chub; all which were captured within the ROW. These species are commonly found throughout the study watershed and do not represent a significant fisheries resource. Although flows may diminish in this watercourse, standing water areas within the culvert and pools may provide limited refuge for fish during dry periods. Habitat and fisheries potential are limited due to poor connectivity and the anticipated ephemeral nature of the system in the study area.

- **Number 1 Highway Drain – Station 3**

Number 1 Highway Drain is intersected by the 401 approximately 50 meters downstream from its headwater origin. At the upstream origin, the drainage originates from a corrugated steel tile drain at the toe of an elevated agricultural field. This watercourse is a headwater branch of Krasnicki Drain, which flows into Dingman Creek south of Highway 402, approximately 5 kilometers downstream.

Survey results on May 3, 2001, revealed poor flowing, shallow water with average water depths of 0.06m, up and downstream of the culvert. This drainage has been classified by the Upper Thames River Conservation Authority (UTRCA) as a Class F Municipal Agricultural Drain (1999). Based on field surveys and UTRCA Drainage Classification data, this tributary is ephemeral within the study area.

Substrate composition of this drain was dominated by clay, overlaid by fine silts and sand. Abundant grasses and cattails also filled portions of the channel. Stream morphology of this watercourse was flat with a moderate gradient. Angular rip rap stone has been placed at the culvert inlet and immediately below the downstream culvert outlet for approximately 30 meters. A poured concrete base has been placed at the culvert outflow invert. Following the riprap, a gabion basket structure has been placed in stream for grade control in this section. Below the gabion basket, the drain is a uniformly flat, heavily channelized and comprised of cattail throughout.

Upstream riparian vegetation is comprised of grasses and herbaceous plants. Adjacent land use was entirely agricultural. A secondary road intersects the headwater origin at its tile outflow, immediately outside the upstream ROW.

Banks were moderately stable, with areas of greatest degradation observed below the armored downstream section. In this section, steep grades, combined with high flows have created erosion and scouring downstream of the gabion basket structure. Heavy erosion was also present upstream at the tile outflow.

No fish were captured within the study reach on May 3, 2001, despite sampling effort. Based on the absence of fisheries data collected and the UTRCA Drainage Classification, it is unlikely that this watercourse supports a fisheries resource within the study area, based on it's poor habitat potential.

- **C B Smith Drain – Station 4**

C B Smith Drain is a small tributary to the Dingman Creek watershed. It is intersected by Highway 401 in the vicinity of it's headwater origin. At this location, the watercourse flows under Highway 401, through an open bottom concrete culvert before reaching its confluence with Dingman Creek approximately 3 kilometers downstream.

At the time of survey (conducted on May 3, 2001), this watercourse exhibited poor flows. The low flow channel within the streambed was shallow, averaging 5 centimeters in depth. This drain has been classified by UTRCA as a Class F Municipal Agricultural Drain (1999). Based on surveyed flows and UTRCA Drainage Classification data, it is certain that this tributary is ephemeral within the study area.

Substrates within the channel were dominated by clay, overlaid by fine silts and sand. Abundant grasses and cattails also filled portions of the channel. Stream morphology of this watercourse was flat with a low gradient.

Upstream riparian vegetation is comprised of grasses and sparse woody shrubs. A secondary road and residential property border the adjacent ROW lands upstream of Highway 401. Downstream, adjacent land use is agriculture. In this area a secondary roadway crosses the watercourse approximately 25 meters downstream. At the secondary crossing the watercourse flows through a old open bottom culvert where it continues downstream through a channelized section adjacent to agricultural land.

Bank stability in the assessed reach was moderately stable, with areas of greatest bank degradation observed in the vicinity of Highway 401 culvert crossing. In this area, high amounts of bank erosion and scouring were observed. The remaining banks were moderately stable with areas of slumping and erosion at stress points along the assessed channel length.

No fish were collected within the study reach on May 3, 2001, despite collection efforts. Based on the absence of fisheries data collected and the UTRCA Drainage Classification, it is unlikely that this watercourse supports a fisheries resource within the study area, due to it's limited fisheries potential.

- **Bannister-Johnson Drain – Station 5**

Bannister-Johnson Drain is a small tributary to Dingman Creek. This watercourse is intersected by Highway 401, where it flows through an open bottom concrete culvert before reaching its confluence approximately 4 kilometers downstream.

During the survey on May 3, 2001, observed flows were poor. Water was observed throughout the study area, with average water depths of 0.06m. This watercourse has been classified by UTRCA as a class F Municipal Agricultural Drain within the study area. However, this classification has been given with discretion, as isolated water has been observed at Highway 401 culvert and permanent water has been observed to varying degrees downstream of the 401 (UTRCA 1999). Based on surveyed flow results and UTRCA Drainage Classification, it is certain that this tributary is typically ephemeral within the study area, with limited fisheries potential.

Substrate composition observed within the study area was dominantly comprised of clay with pockets of fine silts, sand and gravel. Areas of standing water also displayed dense filamentous algae growth. Channel morphology was typically flat and channelized with minimal pool and riffle areas. One large pool area was recorded downstream of Highway 401, below a perched corrugated steel culvert with a height of 0.31m, which permitted tractor access to adjacent agriculture lands. This pool represented the only significant habitat unit and cover area in the study reach.

Riparian vegetation consists of grassy banks with herbaceous vegetation and sporadic, sparse woody shrubs. The adjacent land use, both upstream and downstream, is agricultural land.

The bank stability within the assessed area is moderate to poorly stable. Several areas of slumping and erosion were observed at stress points along the channel length. Heavy erosion was also observed at the inlet and outlet of the secondary downstream culvert crossing.
During fish sampling conducted on May 3, 2001 no fish were collected. Downstream of the highway, 4 species were captured; creek chub, brook stickleback, central mudminnow, and fathead minnow, all which were isolated in the plunge pool below the perched secondary culvert. These species are commonly found throughout the study watershed and do not represent a significant fisheries resource. Although flows may diminish in this watercourse, standing water areas within the culvert and pools may provide limited refuge for these fish during dry periods. Habitat and fisheries potential are limited due to poor connectivity and the ephemeral nature of the system.

- **Dingman Creek – Station 6**

Dingman Creek is the only major waterbody within the study area. It flows under a small concrete span bridge with two instream support structures, dividing the stream into three channel sections. Depositional evidence suggests that all three channels function during high flow events; however, base flow conditions only utilize the western most channel section.

This watercourse is a permanent flowing warm water system. It is the primary drainage path for surrounding watercourses; therefore, it receives large inputs of surface water from adjacent drainage's within the study area. Water flows were good at the time of survey. Water clarity was high with clear, uncolored water. Stream morphology upstream was comprised of a sequence of long deep pools and flats cut through clay lenses. Downstream morphologic conditions followed a more typical riffle pool sequence. Average wetted widths were 5.0 to 6.0m with water depths averaging 0.30m.

Upstream substrates were mainly comprised of clay, over laid with fine silts, sand, and cobble. Moderate instream structure was present throughout the assessed reach. Areas of overhanging bank vegetation and shrubs created scour areas in the clay substrates, providing deepened pools and excellent habitat for fish. Downstream substrates were more typical of a riffle pool sequence. Clay lenses were dominant in some areas; however, greater amounts of cobble, gravel and sand existed in this reach. Instream cover was moderate throughout the downstream reach. Deepened pools with overhanging shrubs and undercut banks represented the majority of habitat potential. Pool habitat in both reaches averaged 0.40 to 0.60m in depth.

Riparian vegetation is composed of thick grasses with areas of dense shrub growth. The upstream channel is confined in a valley by a road embankment to the east and agricultural land to the west. Downstream, the channel remains bordered by the road berm with active horse pasture to the west. Pasture areas have been fenced off to limit access to the stream.

Bank stability over the assessed reach is moderate to poorly stable. Slumping banks were evident along the entire reach, exhibiting heavy erosion and scouring at stress points. Through much of the assessed area, the bank formation has developed a "hummocky" contour due to past and current bank slumping and erosion.

Fish sampling during the field assessment on May 3, 2001, found 8 species; common shiner, white sucker, bluntnose minnow, creek chub, Johnny darter, sunfish sp., blacknose dace, and central stoneroller. These species commonly occur within the Thames River Watershed and have been frequently recorded in past fish sampling in Dingman Creek (UTRCA 1999). Other species records listed by regulatory agencies within the Dingman Creek watershed include central mudminnow and brook stickleback, which were not captured during sampling. Based on past fisheries records and those collected by GLL field staff, the fish community of Dingman Creek can be classified as a warm water baitfish system.

- **Murray Drain – Station 7**

Murray Drain at the Wellington Street interchange is crossed by Highway 401, Wellington Street and two interchange ramps. Previous channel modifications and diversions have left Murray Drain in a highly modified and

degraded environmental state. The watercourse at this location continues to flow south-west from Wellington Street, for approximately 2 kilometers, before reaching its confluence with Dingman Creek.

This watercourse is a permanent warm water system, classified as a Class C Agricultural Municipal Drain (UTRCA 1999). Water flows were poor at the time of survey, and appeared to be standing, as there was no visible flow. Clarity was poor with turbid, brown colored water. Stream morphology upstream and downstream was entirely channelized. Cross-sectional profiles of the channel were typically concave to trapezoidal likely from dredging for ditch maintenance. The long deepened channels were cut through clay substrates, heavily over laid by silty clay substrates and algae. Average wetted widths were 3.0 to 4.0 meters with depths averaging 0.30m.

Substrates upstream and downstream were composed of clay, over laid with fine silts. Moderate instream structure was present throughout the assessed reach. Areas of overhanging herbaceous bank vegetation provide near shore habitat for resident minnow species. The deepened channel also provides refuge habitat for fish species during dry periods. Deepened pools with overhanging herbaceous shrubs represented the majority of habitat potential.

Riparian vegetation consists of grassy banks with herbaceous vegetation and sporadic, small woody shrubs. The adjacent land use, both upstream and downstream, is ROW within the Wellington Street interchange.

Bank stability over the assessed reach was moderate to poor. Slumping banks were evident along the entire reach, exhibiting points of erosion and scouring at stress points during high water flows.

Fish sampling during the field assessment on May 3, 2001, found 3 species; creek chub, fathead minnow, and brook stickleback. These species commonly occur within the Thames River Watershed and are often found in degraded warmwater habitats within an urban setting. Based on fish records collected by GLL field staff, the fish community of Murray Drain at Wellington Street can be classified as a permanent warm water baitfish system. Although this system is expected to provide year round habitat to common baitfish, current habitat quality is poor with limited fisheries potential.

- **Murray Drain – Station 8**

Murray Drain is intersected by Highway 401 for a second time, just east of the Wellington Street interchange. At this location, the watercourse functions as a municipal drain that collects surface runoff from surrounding industrial lots. Past channel modifications and surface water diversions have left Murray Drain in a highly modified and degraded environmental state. The watercourse at this location intermittently flows to the south for approximately 4 kilometers, before reaching its confluence with Dingman Creek

This watercourse is a permanent warm water system, and is classified as a Class C Municipal Agricultural Drain by UTRCA (1999). The assessed channel length at this station was short, approximately 30 meters upstream and downstream, due to industrial fencing which inhibited entrance by field staff. Water flows were poor at the time of survey (May 4, 2001), and appeared to be standing. Clarity was poor with turbid, brown colored water. Stream morphology upstream and downstream was entirely channelized. Average wetted widths were 2.0 to 3.0 meters with shallow depths averaging 7.0 centimeters. Although this drain is classified as a permanent system, areas within the assessed reach, immediately downstream of Highway 401 culvert appeared to be intermittent. At this location, connectivity was lost due to a lack of flow, sediment accumulation and thick cattail growth which appeared to inhibit downstream flow movement.

Substrates upstream and downstream were composed of clay, over laid with fine silts. Instream structure was minimal throughout the assessed reach. Sparse areas of overhanging herbaceous bank vegetation and instream vegetation (cattails) provided the only source of habitat for resident minnow species. The deepened channel area within the culvert is anticipated to provide refuge habitat for fish species during dry periods.

Riparian vegetation consists of grassy banks with sparse herbaceous vegetation and sporadic outcroppings of cattails and reeds. The adjacent land use, both upstream and downstream, is ROW bordered by heavily developed industrial land.

Bank stability over the assessed reach was moderately stable. Slumping banks were evident at the culvert inlet and outlet, exhibiting erosion and scouring at stress points during high water flows.

Fish sampling during the field assessment on May 4, 2001, identified a single species of brook stickleback, which was captured just inside the culvert. This species commonly occurs within the Thames River Watershed and is often found in degraded warmwater habitats, within an urban setting. Based on fish records collected by GLL field staff, the fish community of Murray Drain east of Wellington Street, can be classified as a warm water baitfish system. Although this system provides year round habitat to common baitfish in standing water areas, current habitat quality is poor. Therefore, due to past land use degradation, current fisheries potential at this site is limited to its current state.

- **Elliot-Laidlaw Drain – Station 9**

Elliot-Laidlaw Drain is crossed by Highway 401 immediately west of the Highbury Avenue interchange. This drainage flows through an open bottom concrete culvert. Below Highway 401, the watercourse continues to flow through a confined drainage area for approximately 2 kilometers, before reaching its confluence with Dingman Creek.

This watercourse is a permanent flowing warm water system. It is the primary downstream drainage path for Pond Mills, a lentic system north of Highway 401 through Westminster Ponds and Pond Mills Conservation Area. Water flows were good at the time of survey. Water clarity was high with clear, uncolored water. Stream morphology upstream was comprised of deep pools and deep flats and riffle/cascades cut through clay lenses. Downstream morphologic conditions followed in a riffle pool sequence that was engineered, due to the presence of riprap and terra fix construction materials. Since its apparent alteration, the downstream channel has naturalized well. Average wetted widths ranged from 1.0 to 2.0m with depths averaging 0.16m in riffle sections and depths ranging from 0.60 to 1.20m in pool areas.

Upstream substrates are mainly comprised of clay, over laid with fine silts, sand, and cobble. Abundant instream structure are present throughout the assessed reach. Areas of overhanging bank vegetation and shrubs, deep pools, and undercut banks provided excellent habitat areas for inhabiting fish species. Downstream substrates were more typical of a riffle pool sequence. Large amounts of cobble, gravel and sand exist in this reach, along with gabion basket bank revetments and terra fix substrates. Instream cover is moderate throughout the downstream reach. Deepened pools with overhanging shrubs and undercut banks represent the majority of habitat potential. Pool habitat in both reaches average 60 to 120 centimeters in depth.

Riparian vegetation is composed of thick grasses with areas of dense shrub growth. The upstream channel is confined in a valley by industrial land to the west and the Highbury Avenue interchange to the east. Downstream, the channel is highly confined and bordered by industrial land.

Bank stability over the assessed reach is moderate to poor. Slumping banks were evident along the entire upstream reach, exhibiting heavy erosion and scouring at stress points. Much of the assessed upstream area, displayed a "hummocky" bank formation due to past and current bank slumping and erosion. Downstream erosion was minimal due to bank stabilization materials used. High water scouring was visible both up and downstream.

Fish sampling during the field assessment on May 4, 2001, found 5 species; common shiner, white sucker, creek chub, Iowa darter, and fathead minnow. These species commonly occur within the Thames River Watershed. Based on past fisheries records and those collected by GLL field staff, the fish community of Elliot-Laidlaw Drain can be classified as a warm water baitfish system. Fisheries potential at this site is low, and is limited to its current state due to adjacent land use.

Pond at the Southeast Quadrant of Glanworth Drive / Highway 401

During consultation with the property owner at the southeast quadrant of Highway 401 and Glanworth Drive, it was identified that the pond provides the primary source of water to the well. The pond has also been stocked with fish.

Pond at Burtwistle Lane / Highway 4

A stormwater management pond servicing the Ultramar property exists on the west side of Burtwistle Lane. The primary function of the pond is for treating surface run-off from Ultramar.

Pond East of Col. Talbot Road North of Highway 401

A retention pond is located at the northeast quadrant of the Highway 401 / Col. Talbot Road interchange, associated with Gentek Building Products Limited.

4.1.1.3 Terrestrial Environment

Vegetation (uplands and Wetlands)

This section describes the vegetation communities occurring at the interchange locations and along the highway ROW. This section of Highway 401 passes through a landscape that is predominantly agricultural with occasional small isolated woodlots, that is typical of southwestern Ontario. The aquatic and terrestrial features are presented in **Figure 4.**

Highbury Avenue

The interchange is a "Parclo A-4" configuration where the right-of-way (ROW) is maintained by MTO. A number of ornamental trees have been planted within the cloverleaf, in particular White Spruce (*Picea glauca*), Sugar Maple (*Acer saccharum*) and European White Birch (*Betula pendula*). The surrounding land use is agricultural or urban with no well established natural vegetation. A medium-aged hedgerow of Red Ash (*Fraxinus pennsylvanica*) and Carolina Poplar (*Populus x canadense*) runs parallel to Highway 401 on the northeast side of the interchange. Another row of planted Norway Maple (*Acer platanoides*), Carolina Poplar and Crack Willow (*Salix x rubens*) is present on the northwest side. Cultural old field occurs to the west.

Wellington Road

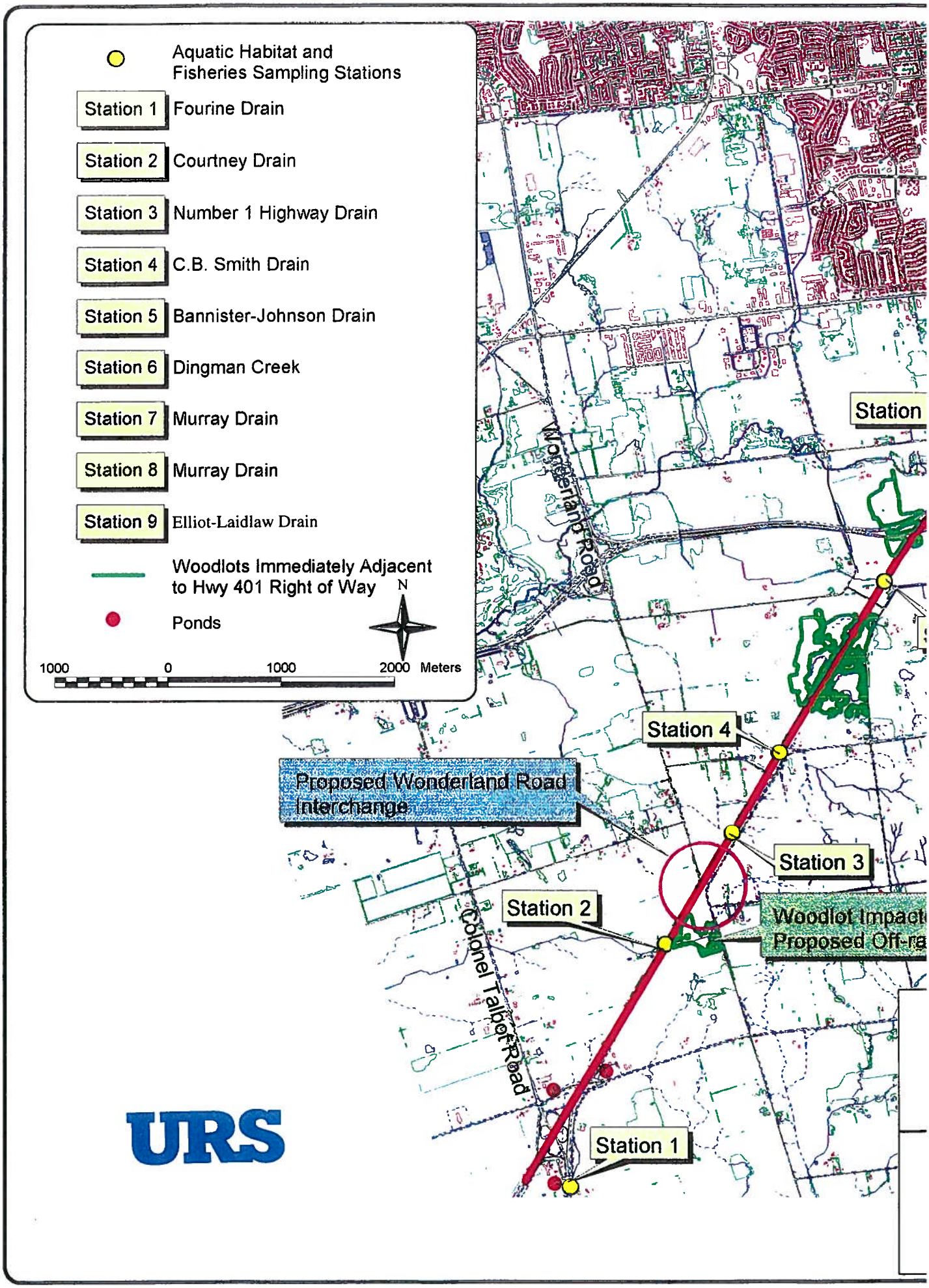
This interchange is a modified cloverleaf configuration, and is mostly open grass maintained by MTO with a few scattered plantings of White Spruce and Sugar Maple. The surrounding lands are mostly urban but cultural old field occurs immediately adjacent to the ROW on the northwest side of the interchange. Thickets of Gray Dogwood (*Cornus foemina*), Hawthorn (*Crataegus* spp.), and Nannyberry (*Viburnum lentago*) are scattered. A dense planted willow (*Salix* spp) hedgerow occurs on the northeast side of the interchange. A cultural thicket occurs under the transmission line to the northeast.

Highway 4 (Col. Talbot Road)

The Colonel Talbot Road interchange is a cloverleaf configuration and is situated in an open agricultural setting. A few ornamental trees have been planted within the maintained cloverleaf and young discontinuous hedgerows mark the boundary of the ROW. A small Common Buckthorn (*Rhamnus cathartica*) thicket with some Silver Maple occurs at the northeast side of the interchange.

Vegetation in the Right-of-Way and Immediately Adjacent

On either side of the highway within the ROW, vegetation is typically disturbed meadow dominated by non-native grasses with a variety of native and non-native forbs. Shrub thickets composed of such species as Staghorn Sumac (*Rhus typhina*) and Gray Dogwood can be found fringing the ROW at some locations. Cattail (*Typha* spp.) marsh is commonly found lining the drainage ditches within the ROW. Road maintenance involves regular mowing of the ROW which maintains field conditions and prevents woody vegetation from getting established.


Aquatic Habitat and
Fisheries Sampling Stations
Station 1 Fourine Drain
Station 2 Courtney Drain
Station 3 Number 1 Highway Drain
Station 4 C.B. Smith Drain
Station 5 Bannister-Johnson Drain
Station 6 Dingman Creek
Station 7 Murray Drain
Station 8 Murray Drain
Station 9 Elliot-Laidlaw Drain
Woodlots Immediately Adjacent
to Hwy 401 Right of Way
Ponds
N
1000 0 1000 2000 Meters
Wonderland Road
Colonel Talbot Road
Proposed Wonderland Road
Interchange
Station
Station 4
Station 3
Station 2
Station 1
Woodlot Impact
Proposed Off-ra
URS

Within the study area, Highway 401 largely extends through agricultural fields. There are only a few locations where natural vegetation occurs outside and adjacent to the ROW. The only designated natural area in the study area is a small portion of the *Westminster Ponds/Pond Mills Wetland Complex*, a Provincially Significant Wetland (PSW) located approximately 600 m east of Highbury Avenue. The natural areas adjacent to the ROW, including the PSW, are described below.

- **Westminster Drive (Highway 401 Sta. 18+900 to 19+850)**

At this location, wooded areas occur on either side of the Highway 401 just west of Westminster Drive.

On the north side a variable successional woodland/thicket exists. The canopy is dominated by Trembling Aspen (*Populus tremuloides*) and Manitoba Maple (*Acer negundo*) and the understorey is characterized by Common Buckthorn and Manitoba Maple. Vegetation is relatively disturbed here. To the west of this woodland/thicket, between the pond and the ROW limit, exists a narrow thicket characterized by Common Buckthorn, Choke Cherry (*Prunus virginiana*) and American Elm.

Much of the south side of the ROW is lined with Common Lilac (*Syringa vulgaris*) hedgerows with some American Elm, Apple and Common Buckthorn. A small woodlot at the east end is a dominated by American Elm, with some Bitternut Hickory (*Carya cordiformis*), Red Ash and Silver Maple (*Acer saccharinum*).

- **Highway 402 (Highway 401 Sta. 20+500 to 21+000)**

At the junction of Highways 401 and Highway 402 exist three fragments of mature upland deciduous woodlot on the north side of the ROW. East of Highway 402, the woodlot is dominated by White Ash (*Fraxinus americana*) and American Basswood (*Tilia americana*), while the other two units are dominated by Sugar Maple occurring with some Black Cherry (*Prunus serotina*) and American Beech (*Fagus grandifolia*). However, the western most unit has been heavily cut over in winter 2000. It appears that approximately 60% of the large trees have been removed. The central forest unit contains a relatively rich ground flora.

On the south side of the ROW is a small isolated triangular woodlot similar to the woodlot units described above for the north side of the ROW.

- **Highway 402 (Highway 401 Sta. 21+100 to 21+400)**

On the south side of the ROW where the Highway 402 off ramp joins Highway 401 is a scrubby woodlot dominated by Trembling Aspen and American Elm, with an understorey of Common Buckthorn. Further to the south is a conifer plantation of Norway Spruce (*Picea abies*), Red Pine (*Pinus resinosa*) and White Cedar (*Thuja occidentalis*)

- **Dingman Road (Highway 401 Sta. 22+050 to 22+500)**

A deciduous thicket exists just east of Dingman Road on the north side of the ROW. Dominant species include Gray Dogwood and Dotted Hawthorn (*Crataegus punctata*), with occasional small trees (up to 10 m height) of American Elm.

- **East of Highbury Avenue (Highway 401 Sta. 27+350 to 27+575)**

A mature upland Sugar Maple-White Ash deciduous forest community occurs on the north side of the ROW just east of Highbury Avenue. It is situated immediately adjacent to the Westminster Ponds/Pond Mills Wetland Complex, a PSW, located to the east and north of this upland forest community.

- **Westminster Ponds and Wetland Complex (Highway 401 Sta. 27+575 to 27+850)**

A small portion of the Westminster Ponds/Pond Mills Wetland Complex (Provincially Significant Wetland) is situated adjacent to the north side of the ROW limit. Vegetative communities include a Red Maple-American Elm swamp community and a Cattail marsh-open water pond community.

Highway 401 Sta. 27+550 to 27+850

At the extreme eastern edge of the study area, on the south side of the ROW, is a medium-aged upland deciduous woodlot contiguous with a deciduous swamp community. The upland woodlot has a somewhat broken canopy and is dominated by Sugar Maple, White Ash and American Elm. The swamp is dominated by American Elm and Red Maple (*Acer rubrum*), with Red Ash in the understorey. These wooded communities are generally higher in quality than most of the wooded areas in the study area.

4.1.1.4 Wildlife

Breeding Birds

Surveys were conducted in eight locations along the study area. A total of 37 species were recorded as possible breeders within 100 m on either side of Highway 401. Most of these species were not within the ROW but in the forest, thicket or old field habitat immediately adjacent to the ROW. The noise and motion of traffic causes most birds to avoid setting territories within the ROW. Some birds were noted in the ROW. Red-winged Blackbirds breed in small pockets of cattail marsh in the ditches. Song Sparrow and Eastern Kingbird were the only other species observed within the ROW.

The locations with the greatest number of species were in the vicinity of the proposed Wonderland Road interchange, on the south side of Highway 401 (17 species), and the wooded areas on the north and south sides of Highway 401 between Scotland Drive and Westminster Drive (20 species). The relatively high number of species reflects the variety of habitat types (forest/thicket, field, open water) at these locations. Most of the species recorded (e.g., American Robin, Song Sparrow, Red-winged Blackbird) are considered common. However, a couple of interesting species were noted, including Wood Thrush (*Hylocicla mustelina*), which is considered an indicator of forest interior habitat. This species was heard calling from a relatively large woodlot approximately 100 m from the northern ROW limit, between Scotland Drive and Westminster Drive. In addition, a Green Heron (*Butorides striatus*), an indicator of swamp habitat, was recorded flying over the deciduous thicket east of Dingman Road on the north side of Highway 401. At the other survey locations, between 5 and 8 common species were recorded.

Other Wildlife Observations

There are several ponds and wetland communities situated adjacent to the ROW within the study area that provide some amphibian breeding and living habitat. Leopard Frog (*Rana pipiens*) and Green Frog (*Rana clamitans*) were observed in the cattail marsh-open water pond in the Westminster Ponds/Pond Mills Wetland Complex. At the Highway 402/401 junction, an Eastern Red-backed Salamander (*Plethodon cinereus*) was observed under a log in the central forest unit in the median of Highway 402. A Green Frog was noted in the ROW ditch on the east side of Highway 402 and a Spring Peeper (*Pseudacris crucifer*) was heard calling in the wooded area on the west side of Highway 402, north of the Highway 401 ROW.

The only mammals observed in the study area were Gray Squirrel (*Sciurus carolinensis*) and Eastern Chipmunk (*Tamias striatus*) in some of the woodlots. The Highway 401 forms a significant barrier to wildlife. Mortality is typically high for mammals or herpetofauna attempting to cross the highway, due to the presence of median barriers.

4.1.2 Socio-Economic Environment

The following sources were used to inventory the social environment:

- Official Plan for the County of Middlesex;
- City of London Official Plan;
- Aerial Photography ;
- Field Investigations undertaken in November 2000.

4.1.2.1 Land Use

The study area is located within the City of London in the County of Middlesex. The current population for the City of London is approximately 360,100 with an estimated future population expected to grow to approximately 431,900 in 2016.

The predominant land use within the study area from Highway 4 (Col. Talbot Road) to Dingman Road is agricultural with some scattered rural residences. From Wellington Road to Highbury Avenue there are a variety of industrial and commercial businesses located along the highway.

Residential

Residential development along the Highway 401 corridor is generally comprised of scattered rural residences. There are approximately 8 residences adjacent to the highway. A majority of the residences are located at the Highway 4 (Col. Talbot Road) interchange and in the vicinity of the proposed Wonderland Road interchange.

The residences along the highway are considered to be older and established farm complexes consisting of single family detached dwellings and barns.

Community/Recreation/Institutional/Park Features

There are two institutional features located within the highway corridor. The first feature is the Tempo Presbyterian Church located on the southeast quadrant of Highway 401 and Highway 4 (Col. Talbot Road). The church is presently closed and has been since December 2000. There are no plans to re-open it in the future.

The second feature is the OPP Station located on the northwest quadrant of Highway 401 and Wellington Road, south of Exeter Road.

Agricultural

The adjacent land use along Highway 401 within the study area is predominantly agricultural. The study area includes soil capability classes ranging from Class 1 to 7 and organic soils. The majority of land is composed of Class 1 soils throughout the study area.

There are approximately 14 agricultural operations that are adjacent to Highway 401 from Highway 4 (Col. Talbot Road) to Highbury Avenue. The prominent types of agricultural operations are field crops with few parcels of livestock production, including cattle, hog and poultry.

Commercial/Industrial Uses

Within the study area limits there are 32 industrial/commercial businesses, all of which do not have direct access to the highway. The following types of businesses are described in Table 4.2.

TABLE 4.2 COMMERCIAL/INDUSTRIAL BUSINESSES

Business Type	Location/Activity
Retail	• Costco Wholesale located on the southwest side of Highway 401 and Wellington Road. • Shopping Mall located on the southwest side of Highway 401 and Wellington Road south of Exeter Road.
Manufacturing	• Gentek Building Products Limited located on the northeast side of the Glanworth Drive and Highway 4 (Col. Talbot) Road intersection. • Scrapwood Recycling located on the southeast side of Highway 401 and Glanworth Drive. • Pipeline Commercial located on Burtwistle Lane on the southwest side of Highway 401 and Highway 4 (Col. Talbot) Road. • Sterling Trucks located on the southwest side of Highway 401 and Wellington Road. • Wilton Grove Centre located on the south side of Highway 401 and Wilton Grove Road east of Wellington Road. • Windsor Factory Supply Limited located on the south side of Highway 401 and Wilton Grove Road west of Wellington Road. • London Mack located on the south side of Highway 401 and Wilton Grove Road east of Wellington Road. • Nestle located on the south side of Highway 401 on Wilton Grove Road between Wellington Road and the CN Railway. • Lamko Tool & M& W Inc. located on the north side of Highway 401 between Wellington Road and the CN Railway. • Uhaul Self Storage located on the north side of Highway 401 between Wellington Road and the CN Railway. • Laidlaw located on the north side of Highway 401 between Wellington Road and the CN Railway. • Hydro One located on the north side of Highway 401 between the CN Railway and Pond Mills Road. • Gentek located on the south side of Highway 401 just east of the CN Railway. • Loomis located on the south side of Highway 401 west of Pond Mills Road. • Hostess/Fritos located on the south side of Highway 401 west of Pond Mills Road. • Toromount located on the south side of Highway 401 west of Pond Mills Road. • London Compressed Air Equipment located on the south side of Highway 401 west of Pond Mills Road. • Northern Marketing located on the north side of Highway 401 west of Pond Mills Road. • KMZ Windows located on the north side of Highway 401 west of Pond Mills Road.
Transport and Related	• Advanced Border Crossing Processing Centre (ABC) on the north side of Littlewood Drive, west of Highway 4 (Col. Talbot Road). • Canadian Auto Workers Local 1520 located on Tempo Road on the southeast side of Highway 401 and Highway 4 (Col. Talbot) Road interchange. • Penske Truck Rental & Leasing located on the north side of Highway 401 between Wellington Road and the CN Railway. • Ryder Transportation Services located on the south side of Highway 401 west of Pond Mills Road. • Peterbilt Transport located on the northwest side of Highway 401 and

Business Type	Location/Activity
	Highbury Avenue interchange. • Daily Transport located on the southwest side of Highway 401 and Highbury Avenue interchange. • International Carrier Truck Centre located on the southwest side of Highway 401 and Highbury Avenue interchange.
Auto and Related	• Ultramar Canada Incorporated Gas Station located on Burtwistle Lane at the southwest quadrant of Highway 401 and Highway 4 (Col. Talbot) Road. • Petro Canada located on the southeast side of Highway 401 and Wellington Road • Toshiba Car Retail located on the north side of Highway 401 west of Pond Mills Road.
Tourism	• Best Western Stoneridge Inn & Conference Centre located on Burtwistle Lane on the southwest quadrant of the Highway 401 and Highway 4 (Col. Talbot) Road interchange. • Ramada Inn located on the northeast quadrant of Highway 401 and Wellington Road interchange south of Exeter Road.

4.1.2.2 Railway Crossings

There is one railway crossing located within the study area limits. The CN Talbot Subdivision crossing passes under Highway 401 between Wellington Road and Highbury Avenue.

4.1.2.3 Utilities

There are numerous hydro crossings of Highway 401 throughout the study limits. A set of three (3) hydro transmission towers run parallel to Highway 401 between Highbury Avenue and Wellington Road interchange.

Bell Canada cables are located along the westside of the Highway 401 right-of-way from Highway 4 (Col. Talbot) Road to Wellington Road and along the eastside of Tempo Road and Glanworth Drive right-of-way. The cables continue to run along the westside of the Highway 401 right-of-way from Wellington Road to Highbury Avenue and along the westside of Wellington Road right-of-way.

Union Gas high pressure lines cross under Highway 401 within the southwest right-of-way at Pond Mills Road, Westminster Drive, White Oak Road and Glanworth Drive.
Hydro London is located throughout the study area and has poles which are generally located adjacent to the right-of-way. Aerial hydro crossings over Highway 401 at Scotland Drive, White Oak Road, Dingman Drive, Exeter Road and Pond Mills Road.

4.1.2.4 Aggregate

There is one aggregate (gravel pit) and recycling operation within the study area. The ARROC Aggregate & Recycling facility is located on Scotland Drive and White Oak Road.

4.1.2.5 Aesthetics

Within the Highway 401 corridor there are negligible landscape components which provide aesthetic views. The majority of the landscape adjacent to the right-of-way is characterized as old fields, plantations and small tree clusters/or linear hedgerows.

Areas containing significant vegetation communities are located south of the Wellington Road Interchange, Dingman Creek which is surrounded by mature woodlots and the Pond Mills Wetland Complex located south of the Highbury Avenue Interchange.

Sensitive viewer groups within the Highway 401 corridor include residences, commercial and institutional uses adjacent to the highway. The locations of the sensitive viewer groups were determined to be the residences, commercial and institutional uses that directly abut or are adjacent to the highway. In total, approximately 8 residences, 7 commercial uses and 2 institutional uses (OPP Station, Tempo Presbyterian Church) were considered to be sensitive viewer groups.

4.1.2.6 Noise

Noise analysis was performed using STAMSON v5.03, a computerized noise model advocated by the Ministry of Environment (MOE), ORNAMENT with available road and traffic data. The following factors were taken into account in the analysis:

1. Road-receiver geometry;
2. Road gradient;
3. Ground absorption;
4. Traffic volume and percentage of trucks; and,
5. Vehicle speed.

Noise sensitive receivers within the study area were defined as scattered rural residences, commercial and industrial uses adjacent to the highway (within 600 metres as per the MTO / MOE Noise Protocol). Approximately 24 noise sensitive receivers were identified along the corridor within the study area limits including 18 residences, 4 commercial businesses (Peterbilt Transport, Penske Truck Rental & Leasing, Ramada Inn and Best Western Inn), OPP Station and a church. Details on the impact assessment are provided in section 5.2.2.2. Refer to Appendix C for the Noise Assessment Report.

4.1.2.7 Property Waste & Contamination

The following properties were identified along the right-of-way with the potential for contaminated soils:

Highway 4 (Col. Talbot Road)

- Ultramar gas station on Burtwistle Lane, southwest quadrant of the Highway 401 / Highway 4 (Col. Talbot Road) interchange.
- Former farm buildings, including a silo in the northwest quadrant of the Highway 401 / Highway 4 (Col. Talbot Road) interchange.
- Gentek Building products (light industrial) located on the northeast side of Highway 4 (Col. Talbot Road) and Glanworth Drive;
- Scrapwood recycling yard south of Highway 401 east of Glanworth Drive.

Highway 402 Interchange

- Farm buildings located west of the interchange;
- Farm buildings located west of Dingman Drive.

Wellington Road Interchange

- A retail plaza and restaurant located northwest of the interchange;
- "Costco" retail outlet located southwest of the interchange;
- A former furniture store, now empty and a multi-tenant retail plaza located southeast of the interchange;
- A vacant industrial property, formerly Pfizer, located southeast of the interchange across Wilton Grove Road;
- A former Northern Telecom plant that is now occupied by "Sterling Trucks" dealership and repair facility and a Petro-Canada truck stop facility located southeast of the interchange across Wilton Grove Road. The Petro-Canada truck stop is equipped with underground bulk fuel storage tanks;
- A London Hydro transformer located adjacent to the south side of the ROW;
- Northern Telecom property located on the south side of the ROW;

- An O.P.P. station and Ramada Inn located between Exeter Road and the ROW northeast of the interchange. Adjacent to the Ramada Inn at the southeast corner of Exeter Road and Wellington Road is a Shell gas station;
- North of Exeter Road and east of Bessemer Road is a vacant commercial/industrial property and Ontrac Equipment Service, a heavy equipment servicing facility. An aboveground storage tank (AST) was observed at Ontrac;

Between Wellington Road and Highbury Avenue

- A Nestle ice cream plant located south of the ROW;
- U-haul self storage located north of the ROW;
- Lamko Tool and Mould Inc. production facility located north of the ROW;
- Penske Truck rental and leasing facility located north of the ROW between, an AST was observed on this site;
- Laidlaw Bus Lines Yard located north of the ROW, a fuelling area with underground storage tanks (USTs) was observed at this facility;
- A CN Rail Corridor crossing beneath the ROW;
- Toshiba manufacturing facility north of the ROW;
- Ryder truck rental south of the ROW, a fuelling area with USTs was observed on this site;
- Loomis Courier depot located south of the ROW;
- A Hostess – Frito Lay production plant located south of the ROW;
- Toromont Equipment Sales and Service located south of the ROW;
- An un-named recycling facility located north of the ROW;
- KML Windows production facility located north of the ROW;
- Peterbilt Trucks parts and service depot located north of the ROW, a vehicle fuelling area with USTs was observed at this facility;
- London Compressed Air, an office and sales facility located south of the ROW;
- Daily warehouse and shipping facility located south of the ROW.

Highbury Avenue Interchange

- Carrier Truck Service located southwest of the eastbound Highway 401 to Highbury Avenue off-ramp. A fuelling area with USTs was observed at this location;
- A new "Flying J" truck stop at the southeast quadrant of the Highway 401 / Highbury Avenue interchange. This facility has a restaurant area and a retail fuel area with USTs.

4.1.3 Cultural Environment

Archaeological Resources

A Stage 1 Archaeological Investigation was undertaken in July 2001. Field reviews were undertaken on July 13th, 2001 to determine the precontact and historic archaeological potential of the study area. Based on records of the Ontario Archaeological Site Database, one site has been documented in the study area. The Exeter Road Site (AfHh-80) is located in the vicinity of the Highway 401 – Wellington Road interchange. No cultural or temporal affiliations have been assigned to this site. In addition, five sites have been documented within 1 kilometer of this section of Highway 401 as outlined in Table 4.3.

Table 4.3: Registered Archaeological Sites within 1 km of the Study Area

Borden No.	Site Name	Cultural-Temporal Affiliation	Site Type
AfHh-2	Pond Mills	Middle Woodland – Late Woodland (Middle Iroquois)	Camp Village
AfHh-47	No name	Undetermined Precontact	Unknown

AfHh-73	Bradley Avenue	Middle Woodland	Camp
AfHh-80	Exeter Road	Undetermined Precontact	Isolated Find
AfHh-87	Wallace-Laidlaw	Early Archaic Late Woodland	Camp
AfHo-192	Buchanan TS	Undetermined Precontact	Camp

With respect to archaeological potential, given the physiographic character of the region and the presence of significant areas of undisturbed agricultural land, the Highway 4 (Col. Talbot Road), Highbury Road and Wellington Road interchange areas are considered to exhibit archeological potential. With respect to Highway 401 mainline, from Highbury Avenue to Exeter Road this area has largely been developed and lands are extensively disturbed, as such this area exhibits low archaeological potential.

Built Heritage Resources

A built heritage and cultural landscape assessment was undertaken in July 2001. Field reviews were undertaken on July 14th, 2001. There are no structures located in the study area designated under the Ontario Heritage Act, however, based on field investigations, five built heritage features and nineteen cultural landscape units have been identified as follows:

Table 4.4: Built Heritage Features

BHF	Feature Type	Municipal Inventory	Location
1	House		Colonel Talbot Road and Glanworth Drive
2	Barn		6272 Colonel Talbot Road
3	Silo		Southwest quadrant of Highway 4 (Col. Talbot Road) / Highway 401 interchange
4	Church	Priority 1	6706 Burtwistle Lane
5	House	Priority 1	6694 Burtwistle Lane

Table 4.5: Cultural Landscape Units

CLU	Feature Type	Municipal Inventory	Location
1	Roadscape		Highway 4, Colonel Talbot Road
2	Farm Complex	Priority 1	6188 Colonel Talbot Road
3	Farm Complex	Priority 1	6283 Colonel Talbot Road
4	Roadscape		Littlewood Drive
5	Barn Complex		7031 Littlewood Drive
6	Farm Complex		6787 Colonel Talbot Road
7	Farm Complex	Priority 1	6820 Colonel Talbot Road
8	Roadscape		Tempo Road
9	Roadscape		Wonderland Road
10	Roadscape		Scotland Road
11	Roadscape		Decker Road
12	Farm Complex		4511 Scotland Road
13	Farm Complex	Priority 1	4436 Scotland Road
14	Roadscape		Manning Road
15	Farm Complex	Priority 1	4492 Manning Drive
16	Farm Complex		4412 Manning Drive
17	Roadscape		Exeter Road
18	Roadscape		Wellington Road
19	Roadscape		Wilton Grove Road

4.2 Generation of Preliminary Design Alternatives

The development of alternative methods for improvements to Highway 401 was completed in a rationale manner in two phases, (1) alternatives for widening Highway 401 and (2) alternatives for improving Highway 4 (Col. Talbot Road), Wellington Road and Highbury Avenue interchanges including new structures and improved ramp geometrics.

4.2.1 Mainline Highway 401

To improve operations and relieve congestion, consideration was given to widening Highway 401 to address short and long-term needs to year 2021.

Short Term Improvements

- Widen Highway 401 from 4 lanes to 6 lanes between Highway 402 to Wellington Road interchange

Long Term Improvements

- Widen Highway 401 from 4 lanes to 6 lanes between Highway 4 (Col. Talbot Road) to Highway 402
- Widen Highway 401 from 6 lanes to 8 lanes between Highway 402 to Highbury Avenue interchange

In addition to improving traffic operations, capacity and safety on Highway 401 mainline, the interchanges within the project limits warrant improvements to address traffic operational conditions and to reflect current Ministry Standards.

4.2.2 Highway 4 (Col. Talbot Road)

Alternatives for the Highway 4 (Col. Talbot Road) / Highway 401interchange are provided in Appendix D. The following alternatives were developed for the Highway 4 (Col. Talbot Road) interchange prior to withdrawing the TESR in November 2002:

Alternative 1

Realignment of Glanworth Drive, reconfigure interchange ramps to a Parclo A-4 configuration and replace the Highway 4 (Col. Talbot Road) and Glanworth Drive structures.

Alternative 2

Realignment of Glanworth Drive, realign Tempo Road, reconfigure interchange ramps to a "Parclo A-4" configuration, replace the Highway 4 (Col. Talbot Road) structure and close the Glanworth Drive structure.

Alternative 3

Reconfigure interchange ramps to a "diamond" configuration, and replace the Highway 4 (Col. Talbot Road) and Glanworth Drive structures.

Alternative 4

Realignment of Glanworth Road and Tempo Road, reconfigure interchange ramps to a "Parclo B" configuration, construct the Highway 4 (Col. Talbot Road) structure on a straight alignment and replace the Glanworth Drive structure.

Based on comments received by Project Team representatives, modifications to Alternative 2 and Alternative 4 were suggested to minimize impacts. These alternatives are described as follows:

Alternative 2A

Same as Alternative 2, with Tempo Road realigned opposite Burtwistle Lane at a signalized intersection.

Alternative 4B

Similar to Alternative 4, with a "Parclo A" configuration on the north side of Highway 401, Tempo Road realigned opposite Burtwistle Lane at a signalized intersection, and the Glanworth Drive structure closed.

The following alternatives were developed for the Highway 4 (Col. Talbot Road) interchange subsequent to withdrawing the TESR in November 2002:

Alternative 1

Parclo A – 4 interchange, with a new Glanworth Drive crossing over Highway 401, and realigned north of Gentek Building Products Limited.

Alternative 1A

Parclo A – 4 (modified) interchange, with Glanworth Drive crossing over Highway 401 connecting with Littlewood Drive, and the E-N/S ramp realigned north of Gentek Building Products Limited.

Alternative 2

Parclo A north side and Parclo B south side, with a new Glanworth Drive crossing over Highway 401, realigned north of Gentek Building Products Limited.

Alternative 3

Parclo A north side and Diamond south side, with a new Glanworth Drive crossing over Highway 401, realigned north of Gentek Building Products Limited.

4.2.3 Wellington Road

Alternatives for the Wellington Road / Highway 401interchange are provided in Appendix D. The following alternatives were developed for the Wellington Road Interchange.

Alternative 1

Reconfigure interchange ramps and replace the Wellington Road structure to accommodate highway widening.

Alternative 2

Reconfigure interchange ramps and replace the Wellington Road structure to accommodate highway widening.

4.2.4 Highbury Avenue

The following alternatives were developed for the Highbury Avenue interchange.

Alternative 1

Reconfigure interchange ramps and replace the Highbury Avenue structure.

Alternative 2

Reconfigure interchange ramps and replace the Highbury Avenue structure.

4.3 Evaluation and Selection of Preferred Alternative

This section summarizes the evaluation undertaken to assist the Project Team in the selection of the preferred alternatives. The complete analysis and evaluation of alternatives is provided in Appendix D of this report. The following summarizes the rationale for the selection of the preferred alternative. All alternatives were evaluated by comparing the natural, social, economic, cultural environments as well as technical considerations and costs.

Criteria used in the analysis and evaluation of alternative were presented at the first Public Information Centre and are outlined as follows:

ENVIRONMNETAL COMPONENT	CRITERIA
Natural Environment	• Effect on Fish and Aquatic Habitat • Effect on Terrestrial Habitat and Vegetation • Effect on Wetlands • Effect on Greenways and Open Space Linkages • Effect on Groundwater / Surface Water • Effect on Naturally Significant Areas • Effect on Agricultural Lands (soils)
Social Environment	• Aesthetics • Noise • Community Effects (residential, institutional, recreational and community features, and out-of-way travel)
Economic Environment	• Effects on Commercial/Industrial uses • Effect on Agricultural Operations • Property Waste and Contamination
Cultural Environment	• Effect on Archaeological Resources • Effect on Heritage Resources
Transportation	• Traffic Operations • Traffic Safety • Construction Impacts • Compatibility with Local Road System • Cost

4.3.1 Mainline Highway 401

Subsequent to consultation with Project Team representatives and government agencies, the widening of Highway 401 symmetrically on both sides of the existing centreline was identified as the preferred alternative as it can be implemented within the existing highway right-of-way thereby minimizing adverse environmental impacts and reducing construction costs.

4.3.2 Highway 4 (Col. Talbot Road)

Originally six alternatives were developed and evaluated. Alternative 2A, a Parclo A-4 interchange design including the closure of Glanworth Drive, was selected as the preferred alternative because it maximizes traffic operations while minimizing property and cost requirements. This alternative was preferred because it resulted in low natural, social, economic and cultural impacts.

The key advantages of this alternative included:

- Maintains free-flow moves onto Highway 401;
- Eliminates weaving sections along Highway 401;
- Improves ramp geometry to meet desirable MTO standards;
- Provides improved sight distance over the structure;
- Consolidates the number of intersections along Highway 4 (Col. Talbot Road);
- Improves access to businesses along Burtwistle Lane by providing traffic signals on Highway 4;
- Least costly to build; and
- Does not disrupt any local residences or businesses.

During the review period for the TESR in October 2002, concerns were raised regarding the recommended closure of Glanworth Drive. The TESR was withdrawn to further review the concerns.

Subsequent to withdrawing the TESR in November 2002, it was determined that Glanworth Drive would remain open in the long-term scenario.

Four new alternatives (Alternatives 1, 1A, 2 and 3) were developed and evaluated.

All alternatives result in relatively minor impacts to the natural environment. However, Alternative 1A is slightly preferred from a fisheries and aquatic habitat perspective. Alternatives 2 and 3 are the least preferred in all environmental and technical factors.

Alternative 1 is preferred from a social, cultural and transportation perspective. Relative to Alternative 1, Alternative 1A is slightly preferred with respect to agricultural and commercial access considerations, however the differences are not significant. Alternative 1A is more expensive to construct relative to Alternative 1 due to the increased structural span of Glanworth Drive over Highway 401.

The benefits to traffic operations and cost savings associated with Alternative 1 outweigh the relatively minor natural and economic benefits associated with Alternative 1A. As such, Alternative 1 is preferred.

Refer to **Figure 5** for the Summary Evaluation of Highway 4 (Col. Talbot Road) Interchange alternatives. The complete analysis and evaluation of alternatives is provided in Appendix D.

4.3.3 Wellington Road

Two alternatives were developed and evaluated. Alternative 1, a "Parclo A-4" interchange design was recommended as the preferred alternative because it maximizes capacity by providing free flow ramps onto Highway 401 while producing lower or similar natural, social, economic and cultural impacts. Alternative 1 results in minor impacts to the O.P.P property and one business. However these impacts were eliminated through refinements during preliminary design.

The key advantages of the preferred alternative include:

- Maximizes capacity by maintaining free-flow moves onto Highway 401, providing superior operations for high volume Ramp North-East;
- Eliminates a weaving section on Highway 401 westbound;
- Improves ramp geometry to meet desirable MTO standards;
- Eliminates operational concerns with combined Exeter/Wellington Road South off ramp.

Refer to **Figure 6** for the Summary Evaluation of Wellington Road Interchange alternatives. The complete analysis and evaluation of alternatives is provided in Appendix D.

4.3.4 Highbury Avenue

Two alternatives were developed and evaluated. Both Alternatives 1 and 2 resulted in similar low natural, social, economic and cultural impacts. However, Alternative 1, a "Parclo A-4" interchange design was recommended as the preferred alternative because it resulted in better traffic operations. The key advantages of the preferred alternative include:

- Maintains existing interchange configuration;
- Maintains free-flow moves onto Highway 401 and maximizes interchange capacity;
- Ramp geometry improved to meet desirable MTO standards.

Refer to **Figure 7** for the Summary Evaluation of Highbury Avenue Interchange alternatives. The complete analysis and evaluation of alternatives is provided in Appendix D.

CATEGORY – SUMMARY OF EVALUATION

FACTOR	IMPORTANCE	ALTERNATIVE 1 PARCLO A-4	ALTERNATIVE 1A PARCLO A-4/ (MODIFIED)	ALTERNATIVE 2 PARCLO A/ PARCLO B	ALTERNATIVE 3 PARCLO A/ DIAMOND	COMMENTS
1 NATURAL ENVIRONMENT	Low	②	❶	③	④	Alternative 1A is the most preferred as it has very small effects on fish habitat, the terrestrial environment and the least potential to impact water wells. Alternative 1 is the second choice, as it has only some impact on fish and terrestrial wildlife habitat. Alternative 3 is the least preferable, as it results in low to moderate impacts on wetland habitat and includes the loss of a small amount of a fish-stocked pond. Alternative 2 is marginally better. Although Alternative 2 results in the loss of less wetland habitat, it does result in a greater degree of fish habitat disturbance than Alternative 3. **THEREFORE, ALTERNATIVE 1A IS PREFERRED.**
2 SOCIAL ENVIRONMENT	High	❶	❶	③	④	All alternatives result in similar minor impacts to the aesthetic quality of the existing landscape associated with removal of the vegetation cover required for the additional interchange ramps. Alternatives 2 and 3 result in the displacement of one residence, which also has an adverse effect on the aesthics of the existing landscape. Alternatives 2 and 3 also affect community mobility due to the closure and cul-se-sac of Tempo Road resulting in out-of-way travel. **THEREFORE, ALTERNATIVES 1 AND 1A ARE EQUALLY PREFERRED.**
3 ECONOMIC ENVIRONMENT	Medium	②	❶	③	④	Alternative 1A results in the lowest impacts to the economic environment. Alternative 3 results in the highest impacts to the economic environment relative to the other alternatives associated with impacts to commercial property and agricultural operations. Alternatives 1 and 2 result in similar impacts to agriculture and operations, however, Alternative 2 results in higher impacts to businesses and properties with potential for contamination. **THEREFORE, ALTERNATIVE 1A IS PREFERRED.**
4 CULTURAL ENVIRONMENT	Medium	❶	❶	②	②	Alternatives 1 and 1A result in no impacts to the cultural environment, where as Alternatives 2 and 3 impact a known heritage feature (Tempo Presbyterian Church). **THEREFORE, ALTERNATIVES 1 AND 1A ARE PREFERRED.**
5 TRANSPORTATION & ENGINEERING	High	❶	②	④	③	Alternative 1 is preferred for traffic operations based on the interchange configuration, which would be consistent with driver's expectation. However, Alternatives 2 and 3 will be slightly less complex to stage and construct relative to Alternatives 1 and 2. Alternatives 1, 2 and 3 are equally preferred since all have similar cost. Although, Alternative 1 is slightly more complex to stage and construct, this alternative is preferred as it improves the overall interchange operations at the lowest relative cost. **THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.**

Summary of Evaluation:

All alternatives result in relatively minor impacts to the natural environment. However, Alternative 1A is slightly preferred from a fisheries and aquatic habitat perspective. Alternatives 2 and 3 are the least preferred in all environmental and technical factor areas.

Alternative 1 is preferred from a social, cultural and transportation perspective. Relative to Alternative 1, Alternative 1A is slightly preferred with respect to agricultural and commercial access considerations, however the differences are not significant. Alternative 1A is more expensive to construct relative to Alternative 1 due to the increased structural span of Glanworth Drive over Highway 401.

The benefits to traffic operations and cost savings associated with Alternative 1 outweigh the relatively minor natural and economic benefits associated with Alternative 1A. As such, Alternative 1 is preferred.

OVERALL, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.

RANKING OF ALTERNATIVES

❶ ⟶ ④

Most Preferred Least Preferred

All factors were considered to be of equal importance for the purposes of this evaluation.

Summary Evaluation of Highway 4 (Col. Talbot Road) Interchange Alternatives

FIGURE 5

URS

Highway 401 Improvements
Planning & Preliminary Design Study
From 1.0 km West of Highway 4 Easterly to 1.0 km East of Highbury Avenue

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 NATURAL ENVIRONMENT	❶	❶	Alternative 1 is preferred, from a terrestrial perspective, but the difference between Alternative 1 and Alternative 2 is minimal. Alternative 2 impacts to aquatic resources are much more substantial affecting significantly more channel length than Alternative 1. However, the channel has poor habitat value through the interchange. Therefore, the smallest amount of anticipated impact to the natural environment is with Alternative 1. Alternatives 1 & 2 are equally preferred since there is negligible difference between the level of environmental sensitivity for both alternatives. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
2 SOCIAL ENVIRONMENT	②	❶	Both alternatives result in similar low impacts to the social environment except that Alternative 1 results in slightly higher impacts to a community institutional facility (OPP Station). THEREFORE, ALTERNATIVE 2 IS SLIGHTLY PREFERRED.
3 ECONOMIC ENVIRONMENT	❶	②	Both alternatives result in low impacts to the economic environment. Alternative 2 results in slightly higher impacts because it will disrupt more agricultural and commercial property and impact property with the potential for contamination. THEREFORE, ALTERNATIVE 1 IS SLIGHTLY PREFERRED.
CULTURAL ENVIRONMENT	❶	❶	There are no cultural features in the vicinity of the proposed interchange. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
5 TRANSPORTATION & ENGINEERING	❶	②	Alternative 1 will result in superior traffic operations. THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.

Summary of Evaluation:

Alternative 1 is preferred or equal to Alternative 2 in all areas except for the social environment since it results in a minor impact on the OPP Station. This impact will not significantly affect OPP operations.

THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.

RANKING OF ALTERNATIVES

❶ ⟶ ②

Most Preferred Least Preferred

**All factors were considered to be of equal importance for the purposes of this evaluation.*

Summary Evaluation of Wellington Road Interchange Alternatives

FIGURE 6

URS

Highway 401 Improvements
Planning & Preliminary Design Study
From 1.0 km West of Highway 4 Easterly to 1.0 km East of Highbury Avenue
G.W.P. 476-89-00

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 NATURAL ENVIRONMENT	❶	❶	Both alternatives result in low impacts to the natural environment. Although, Alternative 2 has slightly lower impacts to fish habitat and no impacts to the terrestrial environment compared to Alternative 1, the differences are insignificant. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
2 SOCIAL ENVIRONMENT	❶	❶	Both alternatives result in the same low impacts to the social environment. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED
3 ECONOMIC ENVIRONMENT	❶	❶	Both alternatives result in the same low disruption impacts to agricultural and commercial property and operations. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
4 CULTURAL ENVIRONMENT	❶	❶	There are no cultural features in the vicinity of the proposed interchange. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
5 TRANSPORTATION & ENGINEERING	❶	②	Alternative 1 provides better traffic operations because of the free-flow movement onto Highway 401 and higher interchange capacity as well as being consistent with driver's expectations. THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.

Summary of Evaluation:

All alternatives result in similar low impacts to all factors, however Alternative 1 provides for better traffic operations and is therefore preferred.

THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.

RANKING OF ALTERNATIVES

❶ ⟶ ②

Most Preferred Least Preferred

**All factors were considered to be of equal importance for the purposes of this evaluation.*

Summary Evaluation of Highbury Avenue Interchange Alternatives

FIGURE 7

URS

Highway 401 Improvements
Planning & Preliminary Design Study
From 1.0 km West of Highway 4 Easterly to 1.0 km East of Highbury Avenue
G.W.P. 476-89-00

5.0 DETAILED DESCRIPTION OF THE PREFERRED ALTERNATIVE

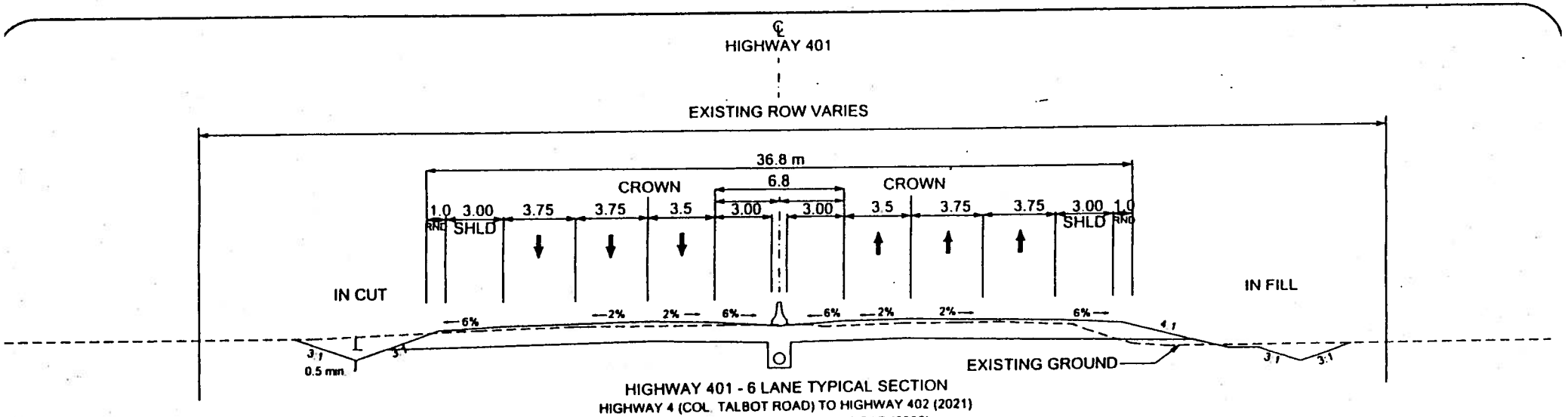
5.1 Major Features of the Proposed Improvements

The following improvements are proposed to this section of the Highway 401 corridor:

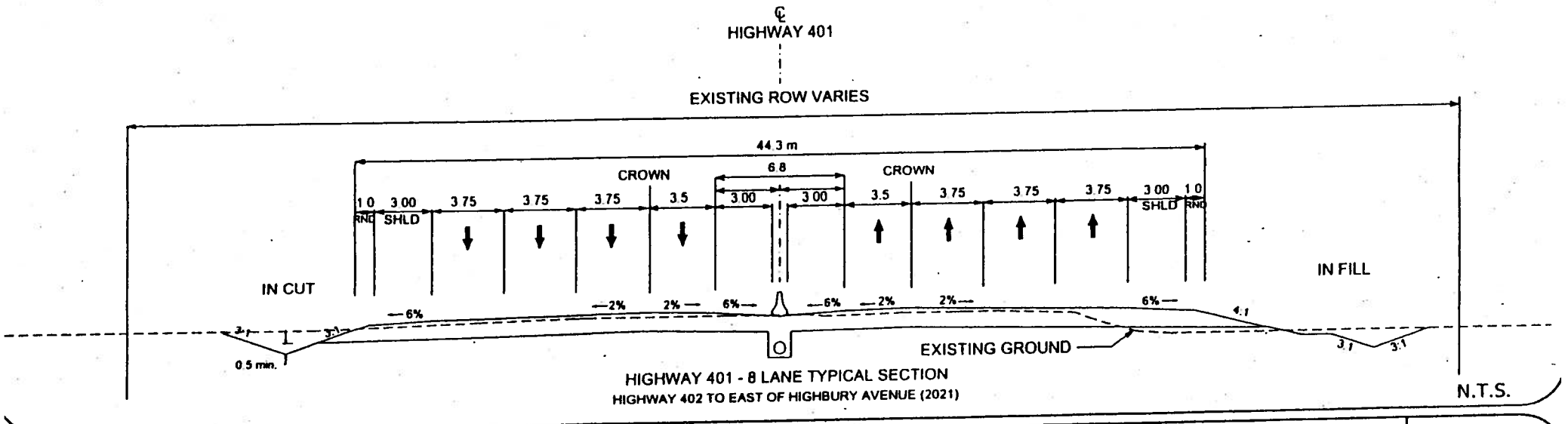
- Highway 4 (Col. Talbot Road) to Highway 402 – widen Highway 401 to a 6 lane cross-section by 2021 (refer to **Figure 8**);
- Highway 402 to Wellington Road – widen Highway 401 to a 6 lane cross-section by 2006 and 8 lanes by 2021 (refer to **Figure 8**);
- Wellington Road to Highbury Avenue – widen Highway 401 to an 8 lane cross-section by 2021 (refer to **Figure 8**);
- Highway 4 (Col. Talbot Road) Interchange - a Parclo A-4 interchange design with a new Glanworth Drive alignment over Highway 401 by 2021 (refer to **Figure 9**);
- Wellington Road Interchange - a Parclo A-4 interchange design by 2006 (refer to **Figure 10**);.
- Highbury Avenue interchange - a Parclo A-4 interchange design by 2021 (refer to **Figure 11**);
- Illumination and drainage improvements throughout the study area.

The rationale for the selection of the preferred alternatives is provided in Section 4.3 of this report. The following sections outline the environmental issues, future consultation and mitigation measures associated with the proposed improvements.

A Municipal Class Environmental Assessment was undertaken for a future interchange at Wonderland Road and Highway 401 including the extension of Wonderland Road. The proponent of this undertaking was the City of London. An Environmental Study Report (ESR) for Wonderland Road was filed (by the City of London) on the public record in December 2002. Design and construction of the interchange can commence upon availability of funding.



HIGHWAY 401 - 6 LANE TYPICAL SECTION
HIGHWAY 4 (COL. TALBOT ROAD) TO HIGHWAY 402 (2021)
HIGHWAY 402 TO WELLINGTON ROAD (2006)



HIGHWAY 401 - 8 LANE TYPICAL SECTION
HIGHWAY 402 TO EAST OF HIGHBURY AVENUE (2021)

N.T.S.

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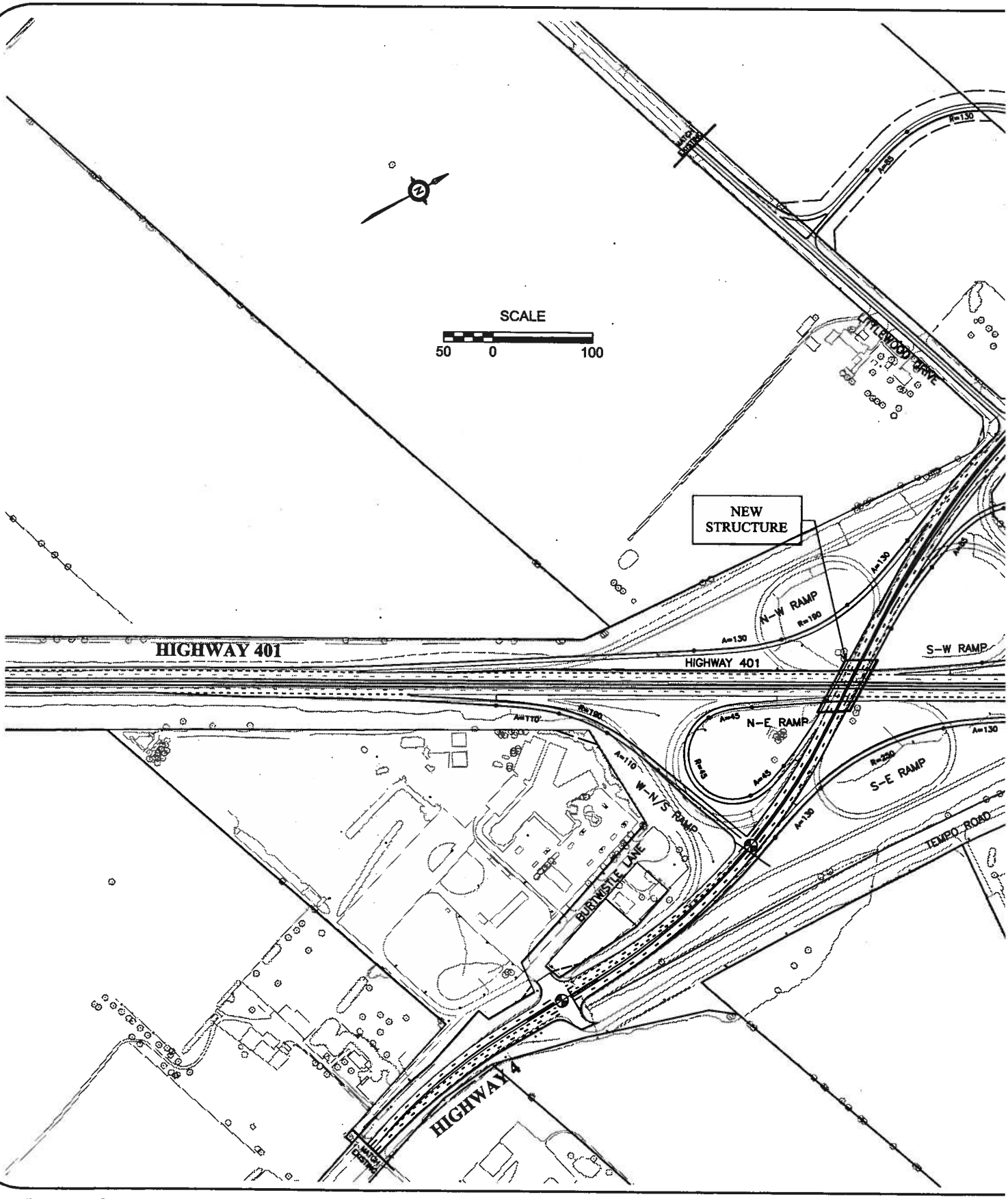
HIGHWAY 401 IMPROVEMENTS
Planning & Preliminary Design Study
From 1.0 km West of Highway 4 to 1.0 km East of Highbury Avenue
G.W.P. 476-89-00

PROPOSED HIGHWAY 401
TYPICAL CROSS SECTIONS

FIGURE
8



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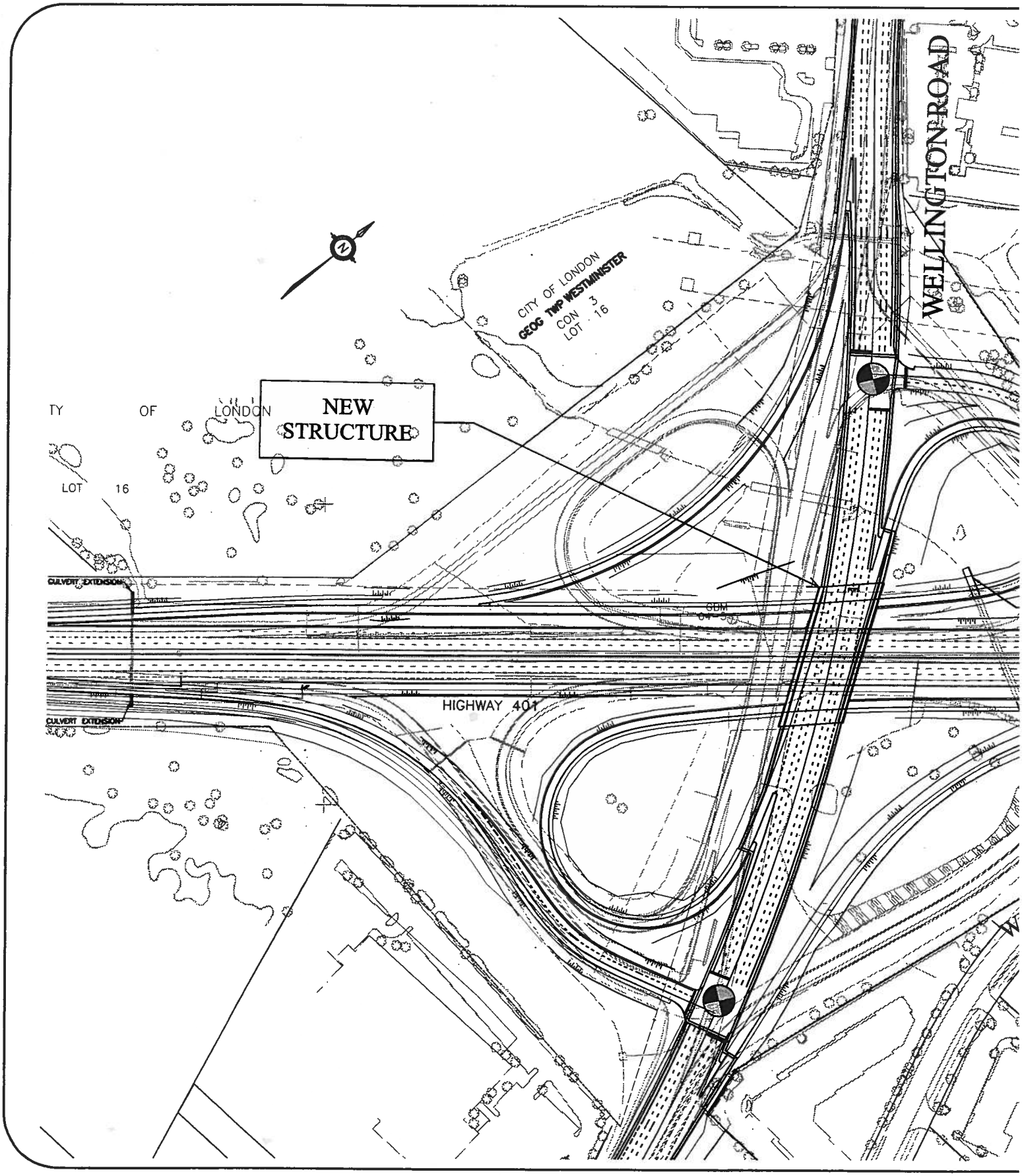
HIGHWAY 401 IMPROVEMENTS
PLANNING STUDY
Highway 4 Easterly to Highbury Avenue
G.W.P. 476-89-00



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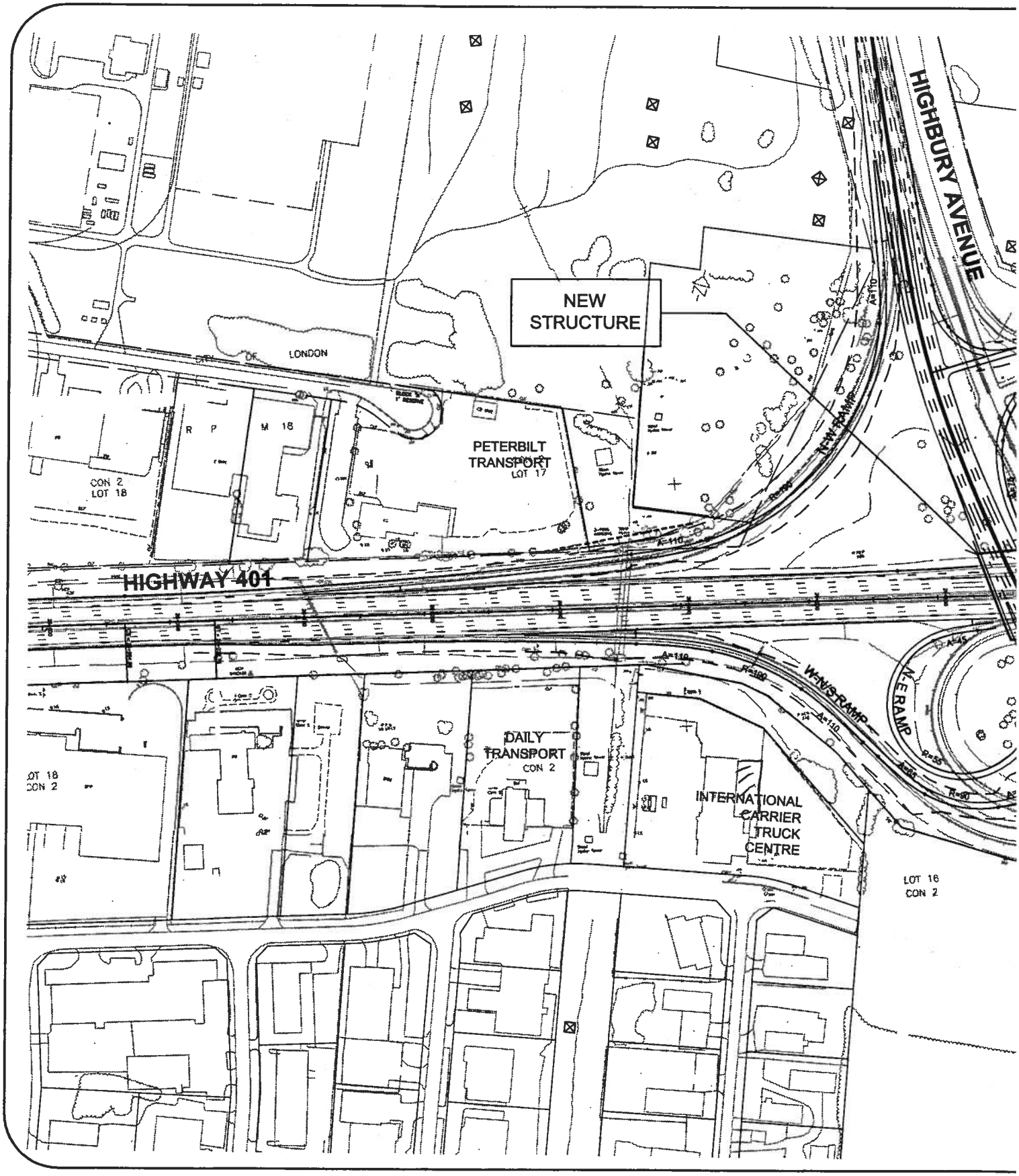
HIGHWAY 401 IMPROVEMENTS
PLANNING STUDY
Highway 4 Easterly to Highbury Avenue
G.W.P. 476-89-00



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HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

Highway 4 Easterly to Highbury Avenue

G.W.P. 476-89-00

5.2 Environmental Issues and Commitments

This section identifies the impacts produced by the preferred alternative on the environmental features and the proposed measures for mitigation.

5.2.1 Natural Environment

The potential environmental impacts on fisheries and aquatic habitat, terrestrial and wildlife areas, and groundwater at interchange locations have been assessed as described in the following sections.

5.2.1.1 Hydrogeology

The areas of surface sand and gravel soils in the central portion of the study area are highly susceptible to contamination and have the greatest potential for groundwater recharge and discharge. This includes the area from about 1 km northeast of Scotland Drive to one-quarter kilometre southwest of Westminster Road and the area at about 375 m to 500 m northeast of Westminster Road. The remaining area to the south and north of the specified chainage area consists of finer grained till soil and has a relatively low susceptibility to contamination.

Most wells in the study area adjacent to the current alignment of Highway 401 are completed in deep sand and gravel aquifers and are overlain by relatively thick clay and till deposits. Anticipated impacts are low. A number of private properties located along Highway 401 are assumed to have wells, which supply water for domestic purposes. Well records were reviewed, as were air photos to define the potential locations of these wells relative to the highway project. Unfortunately, water well records are not complete for every property and therefore, it was not possible to define the number of wells that are at risk from highway construction and operations without a well survey. The numbers of properties with wells were grouped according to whether they occur in areas of low permeability or high permeability soils throughout the highway corridor. Only those properties fronting onto Highway 401 were included as these are considered to be of greatest concern. A total of 10 wells were identified, of which 9 are in the low permeability till soils and are typically founded in deep aquifers, while 1 is found in the high permeability soils. In addition, Well #6392 and #3644 are also located adjacent to the highway in this area (refer to the Gartner Lee Limited Natural Environment Assessment Report).

It is recommended that prior to road construction, a well survey be completed. This would include taking water samples at selected locations determined during field investigations and, where possible, measurements of background water levels in wells directly adjacent the highway construction activities. In particular, water samples will be extracted from wells found in high permeability soils (i.e. well #8180) as well as wells located directly adjacent to the Highway 401 right-of-way (i.e. well #6392 and #3644) (refer to the Gartner Lee Limited Natural Environment Assessment Report). This would provide baseline information against which possible future well interference complaints could be measured.

5.2.1.2 Fisheries and Aquatic Habitat

Nine (9) watercourse crossings were present along the Highway 401 alignment (discussed later in the section). All nine watercourses were considered to be warm water systems. Two (2) of which are considered to be permanent watercourses (Dingman Creek, and Elliot-Laidlaw Drain), with the remaining seven (7) watercourses considered as ephemeral roadside drains. No "Species of Concern" species were identified in the field or through desktop analysis within the project area as defined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2000).

Anticipated environmental impacts to aquatic habitat include providing appropriate mitigation, to be undertaken during the construction phase are discussed by crossing in this section. Fish species identified in the field and through background data collection are all commonly found in the Thames River watershed. All species are typical warmwater fish species that are commonly encountered in an urban setting and are tolerant of a variety of environmental conditions. None are considered significant or sensitive to construction activities.

Table 5.1A: Summary of Aquatic Habitat Impacts and Mitigation Measures

Crossing	Watercourse	Chainage / Location	Existing Culvert Length (m)	Proposed Culvert Length (m)	Net Effect (m)	Total Habitat Length Impacted (m)	Existing Crossing Conditions	Habit
1a	Fourine Drain	Hwy 4 – Tempo Rd.	No Culvert	34.0	+34.0	141.0	• Ephemeral flows • Mainly roadside and agricultural conveyance • Potential for standing water areas at the culverts • Fishing was not undertaken	• Standing wa culvert may habitat durir • Potential sea • Roadside an conveyance
1b	Fourine Drain	Hwy 4 – Tempo Rd.	No Culvert	26.0	+26.0			
1c	Fourine Drain	Hwy 4 – Tempo Rd.	36.6	36.6	0.0			
1d	Fourine Drain	Hwy 4 – Tempo Rd.	75.0	156.0	+81.0			
2a	Courtney Drain	16+290	80.76	104.0	+23.24	99.24	• Ephemeral flows • Channel narrow and deeply incised within ROW • Hummocky grass stream banks • Potential for standing water areas • Mainly agricultural and roadside runoff conveyance	• Habitat pote ephemeral f • Pool areas ir refuge habit when flows • Mainly roads conveyance • Few isolatec ROW • Seasonal fisl
2b	Courtney Drain	Wonderland Rd.	30.0	50.0	+20.0			
2c	Courtney Drain	Realigned Manning Rd.	No Culvert	36.0	+36.0			
2d	Courtney Drain	Manning Rd.	20.0	Culvert Removal	0.0			
2e	Courtney Drain	Realigned Morrison Rd.	No Culvert	40.0	+40.0			
3	Number 1 Highway Drain	17+501	52.28	56.0	+3.72	3.72	• Ephemeral flows • Fish passage barriers upstream and downstream of 401 • Mainly agricultural and roadside runoff conveyance • Originates from tile drain 80m upstream of 401 • Instream concrete and riprap upstream and downstream of culvert	• No fish • No fish habi • Roadside an conveyance
4	C B Smith Drain	18+433	57.54	60.5	+2.94	2.94	• Ephemeral flows • Receives agricultural and roadside runoff • Heavy stream bank erosion in ROW • Grass and algae instream	• No fish • No fish habi • Roadside an conveyance
5	Bannister-Johnson Drain	20+267	57.74	61.0	+3.26	3.26	• Ephemeral flows • Fish passage barrier (perched CSP) downstream of the 401 • Isolated pool below perched culvert • Stream bank erosion upstream and downstream of the culvert • Grass and algae instream	• Fish found w only surveye perched culv the 401 • Roadside an conveyance • Pool areas n habitat durir • Seasonal fisl

Table 5.1B: Summary of Aquatic Habitat Impacts and Mitigation Measures

Crossing	Watercourse	Chainage / Location	Existing Culvert Length (m)	Proposed Culvert Length (m)	Net Effect (m)	Total Habitat Length Impacted (m)	Existing Crossing Conditions	
6	Dingman Creek	21+983	30.0*	65.0*	+35.0*	35.0*	• Permanent Flow • Riffle/pool habitat sequence • Variable substrate composition • Moderate to poor stream bank stability • Good instream habitat quality	• Feed habi • Ider com
7a	Murray Drain	Wellington St.	17.5	17.5	0.0	-8.3	• Ephemeral flow • Channel recently dredged • Channelized drain • Deep channel with flat morphology • No instream cover or structure • Standing water	• Wat area duri not • War pres • Roa • Sea
7b	Murray Drain	Wellington St.	42.5	52.0	+9.5			
7c	Murray Drain	Wellington St.	34.7	28.0	-6.7			
7d	Murray Drain	Wellington St.	64.6	76.0	+11.4			
7e	Murray Drain	Wellington St.	80.5	124.0	+43.5			
7f	Murray Drain	Wellington St.	66.0	Culvert Removal	-66.0			
8	Murray Drain	24+944	74.0	74.0	0.0	0.0	• Ephemeral flow • Refuge water in culvert • Channelized drain • Channel overgrown with reeds and cattails • Channel within ROW is heavily degraded from sedimentation	• Star prov dry exis • Sea
9	Elliot-Laidlaw Drain	26+350	77.8	96.0	+18.2	18.2	• Permanent flow • Riffle/pool habitat sequence • Severe bank erosion upstream, moderate bank erosion downstream • Constructed channel downstream • Good habitat availability	• Fee hab • Ide com • Goc ban

Note: * *Dingman Creek, Concrete 3 span rigid beam bridge*

* *Culvert replacement, implementing a smaller culvert, results in decreased of total habitat area impacted (6.7m) from existing culvert c*

Culvert lengths based on long term (2021) requirements: 6 lanes from west of Hwy 4 to Hwy 402, 8 lanes from Hwy 402 to east of Hig

Potential watercourse impacts have been summarized in Table 5.1 and are discussed below, according to the preferred interchange options and mainline widening.

Based on field observations and information provided, the proposed Highway 401 widening and preferred interchange options will effect eight of the nine water crossings. No culvert modifications are anticipated at the Murray Drain (crossing 8). Of the eight watercourses impacted, two permanently flowing waterbodies (Dingman Creek and Elliot-Laidlaw Drain) may require specific mitigation/compensation options, based on Fisheries Act requirements, to be determined in consultation with the Ministry of Natural Resources. The remaining ephemeral drainage systems are not expected to require Fisheries Act approval due to their natural ephemeral flow characteristics. Therefore, general mitigation requirements, as described below, will provide necessary habitat protection as instream construction activities will typically be in the dry. A telephone meeting was held with the Ministry of Natural Resources (MNR) on February 13th, 2002. MNR concurred with the natural environment assessment and an agreement was reached for approval in principle regarding proposed mitigation measures (refer to Appendix A for correspondence).

Crossing 1-Fourine Drain

At this location, Fourine Drain is not impacted by the proposed highway modifications. General construction mitigation measures are recommended to manage potential watercourse impacts from adjacent construction activities.

Crossing 2-Courtney Drain

Courtney Drain is directly impacted at the Highway 401 crossing. In total, 23 m of existing channel will be impacted by the culvert extension (refer to Table 5.1A). Anticipated impacts to this system are low, due to the ephemeral characteristics of the drain, which limit aquatic habitat and fish potential. General instream construction mitigation measures are recommend for this watercourse, with an instream construction window from July 1 to March 31, due to the potential seasonal presence of baitfish.

Crossing 3-Number 1 Highway Drain

This drain is directly impacted at the Highway 401 crossing. The proposed culvert extension would require an extension of 3.72m to the existing culvert. Since Number 1 Highway Drain is an ephemeral F Type drainage, construction impacts are not anticipated to be harmful provided general instream mitigation measures are implemented. Specific timing windows are not required, as instream works should be done in the dry due to take advantage of the natural ephemeral characteristics of the watercourse.

Crossing 4-C B Smith Drain

C B Smith Drain is directly impacted at the Highway 401 crossing. This proposed culvert extension would impact approximately 2.94m of existing channel (refer to Table 5.1A). Since this drainage is an ephemeral F Type drain, construction impacts are not anticipated to be harmful provided general instream mitigation measures are implemented. Specific timing windows are not required, as instream works should be done in the dry due to take advantage of the natural ephemeral characteristics of the watercourse.

Crossing 5-Bannister-Johnson Drain

This watercourse is directly impacted at the Highway 401 crossing. The proposed extension of the existing culvert would impact approximately 3.36 m of existing channel. Since the Bannister-Johnson Drain drainage is an ephemeral F Type drain, construction impacts are not anticipated to be harmful provided general instream mitigation measures are implemented. Specific timing windows are not required, as instream works should be done in the dry to take advantage of the natural ephemeral characteristics of the watercourse.

Crossing 6-Dingman Creek

Dingman Creek is intersected at Highway 401 by a 3-span ridged frame beam bridge. Approximately 35.0m of existing channel will be impacted by the proposed extension (refer to Table 5.1B). Impacts to habitat include the loss of riparian grasses, the alteration of stream bank and channel form from the extension of the bridge footing on the west side of the crossing, as well as the disturbance of existing substrates (course sand, gravel, and cobble). In addition, the potential loss of existing instream habitat features (upstream pool and downstream riffle) may occur as the result of construction activities. This section is expected to provide habitat for spawning and rearing of the resident forage fish species. Restoration of instream habitat features should be specified during the detail design phase. Compensation may be required for the alterations to the existing habitat. In the event compensation is required in consultation with MNR, several degraded sections within the survey area on Dingman Creek have been identified as potential site enhancement opportunities (bank stabilization). Therefore, standard mitigation measures are recommended within a specific timing window (July 1 to March 31).

Crossing 7-Murray Drain

At this location, Murray Drain is directly impacted by the proposed modifications to the Wellington Road interchange (refer to Table 5.1B). The preferred alternative would result in approximately 8.3 m of channel impacted by the addition of culvert length within the interchange area. The removal of the existing eastbound on-ramp culvert located west of Wilton Grove Road will result in the realignment of approximately 130m of channel. The proposed impacts to Murray Drain at this location are low, due to the ephemeral flow characteristics of the drain, which limit aquatic habitat and fish potential, as well as the current habitat conditions which have already been extremely altered. Opportunities exist to improve the channel conditions with the relocation. General instream construction mitigation measures are recommended for this watercourse, with an instream construction window from July 1 to March 31, due to the presence of baitfish.

Crossing 8-Murray Drain

At this location, Murray Drain is not impacted by the proposed highway modifications. General construction mitigation measures are recommended to manage potential watercourse impacts from adjacent construction activities.

Crossing 9-Elliot-Laidlaw Drain

Elliot-Laidlaw drain is directly impacted by the modifications of the Highbury Avenue interchange. At this location, approximately 18.2 m of existing channel is impacted by the proposed culvert extension (refer to Table 5.1B). The anticipated impacts include the loss of riparian grasses, the alteration of stream bank and channel form, as well as the disturbance of existing substrates (course sand, gravel, and clay). In addition, the potential loss of existing instream habitat features (upstream pool and downstream riffle) may occur as the result of construction activities. The habitat is expected to provide for spawning and rearing of the resident forage species. The detail designs for this crossing should include restoration of the instream habitat features. Compensation may be required for the alterations to the existing habitat. In the event compensation is required in consultation with MNR, several degraded sections within the study area have been identified for potential site enhancement opportunities (bank stabilization). Therefore, standard mitigation measures are recommended within a specific timing window (July 1 to March 31).

Pond at Southeast Quadrant of Glanworth Drive / Highway 401

During consultation with the property owner at the southeast quadrant of Highway 401 and Glanworth Drive, it was identified that the pond provides the primary source of water to the well. The pond has also been stocked with fish. Mitigation measures include realigning Glanworth Drive slightly west in order to avoid impacting the pond. Additional mitigation measures are described below.

General Mitigation Measures

Based on the following general mitigation measures, operational constraints (in the form of special provisions) will be developed during detail design and included in the contract:

- An Environmental Inspector with a natural channel or biological background and construction experience should be employed for all instream works on permanent watercourses to ensure that mitigation and compensation measures are implemented as designed.
- Areas for refueling of machinery will be located well away from any watercourse or drainage ditch.
- Sediment and erosion controls will be implemented throughout the construction area, maintained frequently and in response to storm events. These controls will consist of sediment fences, check dams in swales and restoration of exposed soils with vegetative cover within 45 days of the start of work. On steeper slopes, geotextiles should be used to enhance slope stability and the growth of the vegetation. An Environmental Inspector should be employed to monitor the success of the sediment and erosion control methods used and to provide guidance on maintenance requirements. Sediment and erosion controls will remain in place and maintained until such time as the vegetation has taken sufficiently to provide adequate protection for the watercourses.
- Restoration will take place within 45 days of the start of grading and disruption of soil, as weather conditions permit. The schedule for the completion of construction should coincide with a seasonally appropriate time to allow for the successful growth of vegetation.
- All construction debris and litter will be removed frequently. Stockpiles will not be permitted within the regulatory floodplain. All stockpiles will be removed upon completion of the works and the site restored under the location, as appropriate.
- Sediment laden water in the working area must be first pumped to a temporary sediment control basin or through a filter bag or dense vegetation prior to outletting to the floodplain or road side ditches. Additional measures such as straw bales or check dams may be required depending on the site specific conditions and as determined in the field by the Environmental Inspector. Dissipaters should be available to spread the pumped water out through the discharge zone.
- Flow through the watercourses where instream works are taking place shall be maintained and without excessive sedimentation or erosion. Flows may be diverted by piping or damming and pumping for short duration. In the event temporary channel bypass measures are required in areas known to contain fish species, all fish should be removed and transplanted upstream of construction activities prior to channel dewatering.
- Instream construction activities will be conducted in the "dry" summer season on watercourses identified as ephemeral drainages. This will limit the potential for sediment transport during construction activities. Watercourses that have been identified as containing permanent flows and / or baitfish populations should have specific construction timing windows applied (July 1 to March 31) to eliminate potential effects on fish spawning activity.

Pond at Burtwistle Lane / Highway 4

This pond is not impacted by the proposed interchange modification. General construction mitigation measures are recommended to manage potential impacts from adjacent construction activities.

Pond East of Col. Talbot Road North of Highway 401

This pond is not impacted by the proposed improvements. General construction mitigation measures are recommended to manage potential impacts from adjacent construction activities.

5.2.1.3 Terrestrial and Wildlife

No wildlife or plant species were identified as species of concern, in the field or through desktop analysis, within the project area (COSEWIC 2000).

No ANSIs or ESAs are located within or adjacent to the study area. As mentioned above, the Westminster Pond/Pond Mills Wetland Complex, a PSW is located adjacent to the north side of the ROW, but is outside of the ROW and at the eastern edge of the study area. No known occurrences of vulnerable threatened and endangered (VTE) species exist within the study area, according to the NHIC database, and none were observed during field investigations. Based on observations of conditions, there is low potential for VTE species.

Most of the woodlots potentially affected by the proposed road developments are early successional and highly disturbed by non-native invasive plant species, particularly Common Buckthorn and Garlic Mustard (*Alliaria petiolata*). Therefore most of the woodlots are considered low in quality from an ecological standpoint. The highest quality woodlots were those located at the Highway 402/401 junction and those east of Highbury Avenue, including the portion of PSW adjacent to the north side of the ROW. Although fragmented, these units contain mature forest habitat with a good diversity of native plant species.

5.2.1.4 Vegetation

Lane widening can be entirely accommodated within the existing ROW therefore no natural vegetation loss is required beyond the ROW. The PSW at the east end of the study area will be unaffected by proposed upgrades. There will be loss of the disturbed field vegetation and possibly some shrub thicket within the ROW.

The only vegetation to be removed at the three interchanges consists of ornamental tree plantings, mowed grass and hedgerow which are all low functioning from a natural habitat perspective. Where appropriate, barrier fencing will be placed along the drip line of trees to be retained to avoid incidental impacts.

5.2.1.5 Wildlife

The immediate roadside edge is largely avoided by many species of vertebrate wildlife because of noise, vibration and disturbance. The widening of the highway in the long term will reduce the distance between the highway and the wooded areas which may extend the edge effect further into the adjacent forest, thereby pushing the wildlife in. The impact to breeding birds is considered insignificant, at least in terms of amount of habitat loss. It is expected that the amount of traffic will increase resulting in somewhat greater noise generation. This, combined with an enlarged gap between the habitat on either side of the road, will make crossing more difficult. Since the vegetation outside the ROW is retained, there is no loss of wildlife habitat. Mortality to wildlife may increase with a wider highway carrying a greater volume of traffic. The culverts through Dingman Creek will continue to offer opportunities for wildlife to pass safely under the highway.

5.2.2 Socio-Economic Environment

5.2.2.1 Aesthetics

The proposed improvements to Highway 401 results in minor changes to the existing aesthetic quality of the vegetation cover along the study corridor. The following measures will be used to mitigate the aesthetic qualities of the highway through this area:

- Maintaining/enhancing and keeping vegetation removals to a minimum.
- Undertaking post-construction landscape planning and berming.

5.2.2.2 Noise

Based on the noise assessment undertaken for this study, there will be no significant noise impacts experienced by the residents and businesses adjacent to the highway as a result of road improvements to Highway 401. Sound level increases will be imperceptible since all of the recommended improvements result in less than a 5 dBA increase.

Therefore, based on the MTO / MOE Noise Protocol, noise mitigation is not required (refer to Appendix C for the Noise Assessment Report).

Construction Noise

Noise from construction activity, such as bulldozers and dump trucks, has the potential to be noticeable, particularly if construction occurs outside of normal weekday construction periods. Noticeable noise effects from heavy equipment are typically limited to within a few hundred metres of the construction site. As a result, noise effects will be most noticeable in the areas where the residences are in close proximity to the road.

Various mitigation measures are available to minimize noise impacts during construction, including:

- Maintenance of mufflers and other noise reduction devices on heavy equipment;
- Enforce construction codes of practice and local municipal noise by-laws and codes to provide means of limiting excessively noisy operations and equipment. If required, noise by-law exemptions will be obtained prior to construction;
- Specify hours of operation during construction;
- Monitor complaints on construction noise and investigate.

5.2.2.3 Residential

A total property taking of approximately 0.72 ha of residential property is required from two property owners at the southeast quadrant of the Highway 4 (Col. Talbot Road) interchange to accommodate the realignment of Tempo Road.
There are low impacts to community mobility for residents in the vicinity of Highway 4 (Col. Talbot Road) due to the realignment of Tempo Road and closure of Glanworth Drive. Local residences may experience a maximum out-of-way travel of 800 m.

5.2.2.4 Property Waste and Contamination

Based on the waste and contamination and excess material assessment conducted, none of the properties identified are impacted by the proposed improvements to Highway 401. Further, no environmental concerns were observed within the right-of-way. Numerous active farming operations are present along the right-of-way, but no specific issues of potential environmental concern were typically noted at the farm properties. However, farming operations typically include vehicle maintenance and refueling, historical waste disposal and fertilizer, herbicide and pesticide storage. Where farm properties are to be acquired that include the farm buildings (as opposed to fields) then the properties should be assessed on a case by case basis.

5.2.2.5 Agricultural

There will be a minor agricultural property taking along the Highway 401 right-of-way. The proposed improvements will not significantly impact agricultural operations since no agricultural buildings will be affected.

Where a temporary property taking of agricultural land is required to accommodate construction, fences removed during construction will be replaced and land will be restored to current conditions in consultation with the affected agricultural operator.

5.2.2.6 Commercial/Industrial

A total property taking of approximately 0.3 ha from commercial/industrial businesses abutting Highway 401 right-of-way will be required. These impacts are not considered significant since business operations are not greatly affected, therefore mitigation is not necessary.

There were safety concerns with the Glanworth Drive / Littlewood Road intersection and commercial access. Commercial access will be improved in the interim by providing traffic signals and illumination at the reconfigured intersection of Highway 4 and Littlewood Road. Under the long term scenario, direct access may be provided from the realigned Glanworth Drive. Details on access are to be determined during detail design in consultation with the City of London.

5.2.3 Cultural Environment

5.2.3.1 Archaeological Resources

The Stage 1 archaeological assessment for the proposed improvements to this section of the Highway 401 corridor and associated interchanges has determined that one archaeological site – Exeter Road (AfHh-80) has been registered within the Highway 401 – Wellington Road interchange area.

Based on the study area's proximity to water and historic land use patterns, there is potential for the identification of pre-contact and historic archaeological resources within the agricultural lands abutting the Highway 4 (Colonel Talbot Road) and Highbury Avenue interchange areas. It is therefore recommended that:

1.) Lands Beyond the limits of the existing disturbed right-of-way of Highway 401 or secondary roads, at Highway 4 (Colonel Talbot Road) and Highbury Avenue interchanges will be subject to a Stage 2 archaeological assessment.

2.) Lands beyond the limits of the existing disturbed Exeter Road westbound lane off-ramp at the Wellington Road interchange will be subject to a Stage 2 archaeological assessment.

3.) Additional lands beyond the limits of construction required for the construction of temporary interchanges, parking lots, stormwater management facilities, staging areas, storage areas, access road etc., will be subject to archaeological assessment prior to construction.

4.) In the event that deeply buried archaeological remains are encountered during construction activities, the office of the Regulatory and Operations Group, Ministry of Tourism, Culture and Recreation (MTCR) will be notified immediately.

5.) In the event that human remains are encountered during construction, both MTCR and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ministry of Consumer and Commercial Relations will be notified immediately.

5.2.3.2 Built Heritage Features

Historic research has revealed that roads within the study area have origins in nineteenth century survey and settlement. Field investigations were conducted in July 2001, the result of which identified 5 built heritage feature and 19 cultural landscape units.

Although the study area has been substantially altered by previous development, proposed interchange and roadway improvements to Highway 401 have the potential to introduce physical, visual, audible elements that are not in keeping with the original setting. The nature of impacts on built heritage feature and cultural landscape units are visual in nature (i.e. visual intrusion as a result of expanding the highway closer to built heritage features and the removal of vegetative screening) and are not expected to be significant. To mitigate negative aesthetic impacts within the Highway 401 corridor, a landscape plan will be developed during the detail design phase of this project.

A summary of commitments for mitigation to address specific concerns with the preferred alternatives is listed in Table 5.2.

5.3 Future Consultation and Commitments

The following is a summary of future environmental process, technical work, and consultation to be undertaken in subsequent stages.

5.3.1 Agency Consultation

During the detail design phase of this project, the Ontario Ministry of Natural Resources (MNR) and the Federal Department of Fisheries and Oceans will be consulted regarding the Harmful Alternation, Disruption or Destruction of fish habitat associated with the proposed improvements (approvals under Section 35 of the Federal Fisheries Act). Detailed mitigation measure and/ or fish habitat compensation will be determined at that time.

The Canadian Coast Guard has advised that Dingman Creek in the vicinity of Highway 401 is considered a navigable waterway, as such an application for approval under section 5(1) of the Navigable Waters Protection Act will be required for this undertaking. During the detail design phase of this project, the Canadian Coast Guard will be consulted regarding authorization under the Navigable Waters Protection Act.

During the detail design phase of this project, the City of London will be consulted in order to present and obtain comments on the detail design, recommended plan and construction staging issues. Issues regarding commercial access will be finalized during the detail design phase of this project.

5.3.2 Public Consultation

During detail design a Public Information Centre may be held (if necessary) to present the proposed improvements and detailed mitigation measures. Furthermore, Gentek will be consulted regarding a change to their access. A relocated entrance to Gentek will be designed in consultation with Gentek, the City of London and MTO.

5.3.3 Design and Construction Report / TESR Addendum

Design and Construction Report

During detail design, a Design and Construction Report will be prepared to provide information for compliance and monitoring purposes and to document existing conditions, potential impacts and mitigation measures. This report will also document how the commitments to future work identified in this Transportation Environmental Study Report have been addressed.

TESR Addendum

The Class Environmental Assessment for Provincial Transportation Facilities (2000) requires that where significant changes to the proposed improvements outlined in the Transportation Environmental Study Report (TESR) are identified, a TESR Addendum must be prepared. The TESR Addendum would be made available for a minimum 30-day public and agency review period including a bump-up opportunity. It should be noted that only the changes outlined in the TESR Addendum would be eligible for a bump-up.

TESR Review

If there is a sufficient time lag (five years or greater) between submission of the original TESR and commencement of construction, a TESR Review is required. The TESR Review would consider environmental and design changes that have taken place since the original TESR submission. If significant changes have occurred, a TESR Addendum will be prepared.

5.3.4 Environmental / Technical Work

The following summarizes the future additional environmental and technical study to be undertaken at subsequent design stages of this project for the purpose of identifying / confirming existing conditions, assessing impacts and

developing detailed mitigation measures / compensation strategies. Additional details of this work is outlined ni Section 5.2.

Natural Environment

- Complete a well survey, including taking water samples and measurements of background water levels in wells directly adjacent to highway construction activities;
- Supplemental fisheries and aquatic habitat assessment, including developing mitigation measures and compensation plans (where required) and verify approval requirements (i.e. authorization under Federal Fisheries Act) in consultation with the MNR.

Socio-Economic Environment

- Prepare a detailed landscaping plan;
- Develop noise control measures associated with construction activities for inclusion in contract documentation and obtain any noise by-law exemptions where required;
- Undertake supplemental property contamination assessment for properties identified as having potential for contamination;

Cultural Environment

- Conduct Stage 2 archaeological assessments on appropriate lands and conduct archaeological assessments prior to construction, where required;

5.3.5 Project Specific Class EA Process Monitoring

During the planning and design stage, MTO ensures compliance with the Class EA process before MTO issues "environmental clearance" for project implementation.

During construction, MTO ensures that external notification and consultations are consistent with any commitments that may have been made earlier. Following construction, monitoring will ensure that any follow-up information is provided to external agencies as per any outstanding environmental commitments.

5.3.6 Implementation of Environmental Monitoring Framework

During construction, MTO or its agent ensures that the implementation of the mitigating measures and key design features are consistent with the contract. Inspections will be undertaken throughout project implementation to ensure that measures outlined in the contract are undertaken appropriately / effectively as follows:

Inspection by Construction Staff

Construction is subject daily to general on-site inspection to ensure the execution of the environmental component of the work and to deal with environmental problems that develop during construction. This is the primary method for compliance monitoring.

Site Visits by Environmental Staff

Construction projects with significant mitigating measures/concerns are subject to periodic site visits by consultant environmental staff. The timing and frequency of such site visits are determined by the schedule of construction operations, the sensitivity of environmental concerns and the development of any unforeseen environmental problems during construction. MTO staff will be available should difficulties arise.

5.4 Summary of Environmental Effects and Mitigation

A summary of environmental effects and proposed mitigation measures is provided in Table 5.2

TABLE 5.2: SUMMARY OF ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies (includes MTO)	ID #	Details/Mitigation
1.0	**Groundwater** Impacts to existing wells and groundwater discharge / recharge areas being affected.	MNR/MTO/ Property Owners	101 102	▪ Prior to construction a well survey will be completed including the monitoring of wells adjacent to the highway to establish baseline conditions for possible interference claims; ▪ If well interference occurs from highway construction, potential mitigation measures may include; the provision for an alternative temporary or permanent water supply, well deepening, or well replacement.
2.0	**Aquatic Features** Protection and enhancement of fish and aquatic habitats and species.	TRCA/MNR/MTO	 201 202 203	The following general mitigation measures, operational constraints (in the form of special provisions) will be developed during detail design and included in the contract: ▪ Glanworth Drive will be realigned at Highway 401 slightly to the west in order to avoid impacting the pond on the property at the southeast corner of Highway 401 and Glanworth Drive. ▪ An Environmental Inspector with a natural channel or biological background and construction experience should be employed for all instream works on permanent watercourses to ensure that mitigation and compensation measures are implemented as designed. ▪ Areas for refueling of machinery will be located well away from any watercourse or drainage ditch. ▪ Sediment and erosion controls will be implemented throughout the construction area, maintained frequently and in response to storm events. These controls will consist of sediment fences, check dams in swales and restoration of exposed soils with vegetative cover within 45 days of the start of work. On steeper slopes, geotextiles should be used to enhance slope stability and the growth of the vegetation. An Environmental Inspector should be employed to monitor the success of the sediment and erosion control methods used and to provide guidance on maintenance requirements. Sediment and erosion controls will remain in place and maintained until such time as the vegetation has taken sufficiently to provide adequate protection for the watercourses.

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies (includes MTO)	ID #	Details/Mitigation
2.0	**Aquatic Features (cont'd)** Protection and enhancement of fish and aquatic habitats and species.	TRCA/MNR/MTO	204	▪ Restoration will take place within 45 days of the start of grading and disruption of soil, as weather conditions permit. The schedule for the completion of construction should coincide with a seasonally appropriate time to allow for the successful growth of vegetation.
			205	▪ All construction debris and litter will be removed frequently. Stockpiles will not be permitted within the regulatory floodplain. All stockpiles will be removed upon completion of the works and the site restored under the location, as appropriate.
			206	▪ Sediment laden water in the working area must be first pumped to a temporary sediment control basin or through a filter bag or dense vegetation prior to outletting to the floodplain or road side ditches. Additional measures such as straw bales or check dams may be required depending on the site specific conditions and as determined in the field by the Environmental Inspector. Dissipaters should be available to spread the pumped water out through the discharge zone.
			207	▪ Flow through the watercourses where instream works are taking place shall be maintained and without excessive sedimentation or erosion. Flows may be diverted by piping or damming and pumping for short duration. In the event temporary channel bypass measures are required in areas known to contain fish species, all fish should be removed and transplanted upstream of construction activities prior to channel dewatering.
			208	▪ Instream construction activities will be conducted in the "dry" during the summer season on watercourses identified as ephemeral drainages. This will limit the potential for sediment transport during construction activities. Watercourses that have been identified as containing permanent flows and / or baitfish populations should have specific construction timing windows applied (July 1 to March 31) to eliminate potential effects on fish spawning activity.

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies (includes MTO)	ID #	Details/Mitigation
	Aquatic Features (cont'd) Protection and enhancement of fish and aquatic habitats and species.		209	**The following summarizes specific mitigation measures at watercourse crossings in the study area, refer to Section 5.2.1 for details.** **Crossing 1-Fourine Drain** ▪ General instream construction mitigation measures ▪ Instream construction window from July 1 to March 31 **Crossing 2-Courtney Drain** ▪ General instream construction mitigation measures ▪ Instream construction window from July 1 to March 31 **Crossing 3-Number 1 Highway Drain** ▪ General instream construction mitigation measures ▪ No specific timing window, work will be undertaken in the dry to take advantage of the natural ephemeral characteristics of the watercourse. **Crossing 4-C B Smith Drain** ▪ General instream construction mitigation measures ▪ No specific timing window, work will be undertaken in the dry to take advantage of the natural ephemeral characteristics of the watercourse. **Crossing 5-Bannister-Johnson Drain** ▪ General instream construction mitigation measures ▪ No specific timing window, work will be undertaken in the dry to take advantage of the natural ephemeral characteristics of the watercourse. **Crossing 6-Dingman Creek** ▪ The Ontario Ministry of Natural Resources (MNR) and the Federal Department of Fisheries and Oceans will be consulted regarding the Harmful Alternation, Disruption or Destruction of fish habitat associated with the proposed improvements (approvals under Section 35 of the Federal Fisheries Act). Detailed mitigation measure and/ or fish habitat compensation will be determined at that time. ▪ General mitigation measures will also be employed ▪ Instream construction window from July 1 to March 31

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies (includes MTO)	ID #	Details/Mitigation
2.0	**Aquatic Features (cont'd)** Protection and enhancement of fish and aquatic habitats and species.	TRCA/MNR/MTO		**Crossing 7-Murray Drain** ▪ General instream construction mitigation measures ▪ Instream construction window from July 1 to March 31 **Crossing 8-Murray Drain** At this location, Murray Drain is not impacted by the proposed highway modifications. General construction mitigation measures are recommended to manage potential watercourse impacts from adjacent construction activities. **Crossing 9-Elliot-Laidlaw Drain** ▪ The Ontario Ministry of Natural Resources (MNR) and the Federal Department of Fisheries and Oceans will be consulted regarding the Harmful Alternation, Disruption or Destruction of fish habitat associated with the proposed improvements (approvals under Section 35 of the Federal Fisheries Act). Detailed mitigation measure and/ or fish habitat compensation will be determined at that time. ▪ General mitigation measures will also be employed ▪ Instream construction window from July 1 to March 31
3.0	**Terrestrial Features** Vegetation protection and restoration.	MNR/MTO/Property Owners	301 302	▪ Tree Protection Barriers will be erected along edge of vegetation removal areas to prevent incidental or accidental disturbance to retained vegetation. ▪ Stockpiled soil and other materials should be located outside of vegetated areas.
4.0	**Erosion Control** To minimize the potential for erosion of newly exposed cut and fill slopes.	MNR/MTO	401 402	▪ Limit the time, slopes are exposed prior to stabilization to 45 days from commencement of grading. Use erosion blankets on steeper slopes to enhance slope stability; ▪ Employ sediment fences and check dams where appropriate.
5.0	**Aesthetics** Impacts to vegetative screening along lot frontages.	MTO/Property Owners	501 502	▪ Maintain/enhancing and keeping the vegetation removals to a minimum ▪ Undertaking post-construction landscape planting with specific attention to lands in the vicinity of built heritage and cultural landscape features (refer to Section 4.1.3) where removals are required.
6.0	**Air Quality**	MTO	601 602	▪ Open burning will not be permitted ▪ Application of calcium chloride flakes and/or water to reduce dust

ID #	Environmental Element/Concern and Potential Impact	Concerned Agencies (includes MTO)	ID #	Details/Mitigation
7.0	**Agricultural**	MTO	701 702	▪ Replace fences removed during construction; ▪ Areas used for temporary basis for construction will be restored to current conditions in consultation with the affected agricultural operator.
8.0	**Noise** Construction related noise.	MTO	801 802 803	▪ Maintain equipment, particularly mufflers; ▪ Enforce construction codes of practice and local municipal by-laws for noise to provide means of limiting excessively noisy operations and equipment. If required, a by-law exemption will be obtained prior to construction; ▪ Specify hours of operation during construction.
9.0	**Management of Excess Material**	MTO	901	▪ Disposal of excess material is controlled by a special provision in the contract.
10.0	**Heritage Resources**	MTO	1001	▪ Tree lines, fence lines and hedgerows will be retained along Highway 401 where possible. New tree and vegetation plantings will replace any removed to maintain the roadside character
11.0	**Archaeological Resources**	MTO	1101 1102	▪ A Stage Archaeological Assessment will be conducted during detail design for: ❖ Lands Beyond the limits of the existing disturbed right-of-way of Highway 401 or secondary roads, at Highway 4 (Colonel Talbot Road), and Highbury Avenue interchanges will be subject to a Stage 2 archaeological assessment. ❖ Lands beyond the limits of the existing disturbed Exeter Road westbound lane off-ramp at the Wellington Road interchange will be subject to a Stage 2 archaeological assessment. ❖ Additional lands beyond the limits of construction required for the construction of temporary interchanges, parking lots, stormwater management facilities, staging areas, storage areas, access road etc., will be subject to archaeological assessment prior to construction. ▪ In the event that deeply buried archaeological remains are encountered during construction activities, the office of the Regulatory and Operations Group, Ministry of Tourism, Culture and Recreation (MTCR) will be notified immediately.
12.0	**Navigable Waters Protection**		1201	▪ Approvals under Section 5(1) of Navigable Waters Protection Act will sought prior to construction. During detail design, the Canadian Coast Guard will be consulted as appropriate.

APPENDIX A

Correspondence and Minutes of Meeting

Fisheries and Oceans Canada
Pêches et Océans Canada

Coast Guard
Garde côtière

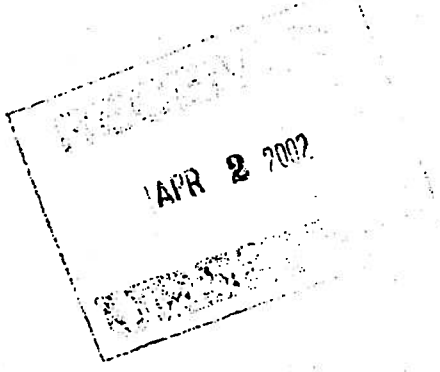
Central & Arctic Region
Région du Centre et de l'Arctique

201 N. Front Street, Suite 703
Sarnia, Ontario
N7T 8B1

Your file Votre référence

Our file Notre référence
8200-02-6270

March 25, 2002



Ontario Ministry of Transportation
c/o Cole, Sherman & Associates Ltd
75 Commerce Valley Drive East
Thornhill, ON L3T 7N9

Attention: Tyler Drygas

Dear Sir:

RE: Navigability Enquiry of Dingman Creek, Highway 401, City of London, County of Middlesex, Province of Ontario.

Receipt is acknowledged of your correspondence dated February 19, 2002 in connection with the above noted work.

Following a review of our records, please be advised that the waters of Dingman Creek at the above location are **navigable**. Consequently, an application for approval is required.

Coast Guard's review of the proposal will be made under the Navigable Waters Protection Act. Enclosed is an Application Guide which will assist you in making an application under the Navigable Waters Protection Act .

Should you have any questions, please contact the undersigned at (519) 383-1862.

Yours truly,

Mark Wright
A/NWP Inspections Officer
Navigable Waters Protection

MW/dmp
Encl

Canada

URS

Cole Sherman

February 19, 2002
Our Ref.: CN29900176.00

Mr. Rick McLean
Canadian Coast Guard
Supervisor of Inspection
Navigable Waters Protection Division
201 N. Front Street, Suite 703
Sarnia, Ontario
N7T 8B1

Dear Mr. McLean:

RE: **Highway 401 Improvements Planning Study**
From 1.0 km West of Highway 4 Easterly to 1.0 km East of Highbury Avenue
City of London, County of Middlesex
Preliminary Design / Class Environmental Assessment Group 'B' Project
G.W.P. 476-89-00

URS Cole Sherman was retained by the Ontario Ministry of Transportation (MTO) to undertake a Planning and Preliminary Design Study to address short, medium and long-term needs of Highway 401 from 1.0 km west of Highway 4 easterly to 1.0 km east of Highbury Avenue in the City of London, County of Middlesex (refer to the attached map).

Within the project limits, Highway 401 crosses Dingman Creek (refer to the attached map and photograph). Please advise if this section of Dingman Creek is considered a navigable waterway (thereby requiring formal approval under sub-section 5(1) of the Navigable Waters Protection Act). If so, could you please provide us with clearance requirements for this crossing.

A reply before March 8th, 2002 would be appreciated. If you require additional information, please feel free to contact us.

Yours truly,
URS COLE, SHERMAN & ASSOCIATES LTD.

Tyler Drygas
Environmental Planner

cc: D. Regan - MTO
S. Wagter - MTO
T. Sorochinsky – URS
Art

URS Cole, Sherman & Associates Ltd
75 Commerce Valley Drive East
Thornhill, Ontario, Canada L3T 7N9
Tel: 905.882.4401
Fax: 905.882.4399

Ontario Native Affairs Secretariat

421 S. James St.
Suite 101
Thunder Bay ON P7E 2V6

Tel.: (807) 473-3132
Fax.: (807) 473-3153

Secrétariat des affaires autochtones de l'Ontario

421, rue S. James
Bureau 101
Thunder Bay ON P7E 2V6

Tél.: (807) 473-3132
Téléc.: (807) 473-3153

Ontario

August 29, 2001

Mr. Tim Sorochinsky
Project Manager
Cole Sherman & Associates Ltd.
75 Commerce Valley Drive East
THORNHILL, Ontario
L3T 7N9

Dear Mr. Sorochinsky:

Re: Highway 401 Improvements Planning Study GWP 476-89-00

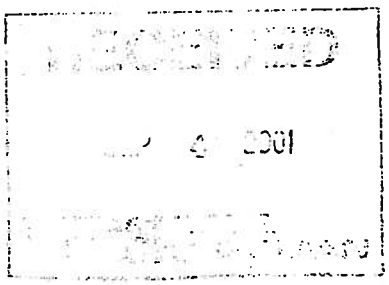
Thank you for your letter dated August 24, 2001, informing us of the above noted information.

We trust that you have been in contact with any First Nations in the area and that they have been notified about the issues under consideration and their opportunities to participate in the process.

Yours truly,

Mary Carl
Associate Negotiator
Thunder Bay

/lst



Ministry of
Agriculture, Food
and Rural Affairs

667 Exeter Road
London, Ontario.
N6E 1L3

Ministère de
l'Agriculture, de l'Alimentation
et des Affaires rurales

Tel: (519) 873-4085
Fax: (519) 873-4062

Ontario

AGRICULTURAL LAND USE

January 22, 2001

Tim Sorochinsky, P.Eng.
Project Manager
Cole, Sherman & Associates Limited
75 Commerce Valley Drive East
Thornhill, Ontario
L3T 7N9

Dear Mr. Sorochinsky:

Re: Improvements to Highway # 401
From 1.0 Km west of Highway # 4 easterly to 1 Km east of Highbury Avenue
Future Wonderland Road Interchange
Preliminary Planning and Design Study
City of London

In response to your recent request, staff have reviewed the above-noted matter according to the provincial policies regarding agricultural land as found in the **Provincial Policy Statement** (PPS) and offer the following technical comments.

It is understood that, subject to the final outcome of the study, the Ministry of Transportation is proposing the following work:

- Widen the existing corridor to a 6 or 8 lane cross-section from just west of Highway # 402 to just east of Wellington Road,
- Modify the existing interchanges at Highway # 4 (Colonel Talbot Road), Wellington Road, and Highbury Avenue; and,
- Determine the impacts and provide design alternatives for a future interchange at Wonderland Road.

Please be advised that, given the public benefits of this proposed undertaking, OMAFRA is not opposed in principle to this project. A quick review of information regarding the area would indicate that some of the lands abutting Highway # 401, especially within the western

portion of the project study area would be considered prime agricultural lands as per the PPS. The concerns of this Ministry in a matter such as this undertaking are focused on the impact of this project on both prime agricultural lands and on any agricultural infrastructure within the study area. This ministry would request that:

i) All proposed work near agricultural lands occur within the existing right-of-way to the greatest extent possible; where additional lands beyond the existing right-of-way are required, the amount of land removed from agricultural production should be minimized,

ii) Any impact on prime agricultural lands during construction will be avoided or, if unavoidable, disruption should be minimized to the greatest extent possible. Any work on prime agricultural land required as a result of this project needs to be conducted according to appropriate construction standards so that the land is returned to productive agricultural uses, and,

iii) Any disruption of agricultural infrastructure such as field tiles, drainage ditches, culverts, field entrances and fences will be avoided or, if disruption is unavoidable, minimized to the greatest extent possible and appropriately repaired.

Please be advised that the above-noted comments do not represent an overall provincial position on this matter and that there may be comments or concerns of other ministries or agencies that should be considered.

If you have any questions or concerns regarding these comments, please feel free to call me at the above-noted number.

Sincerely,

John Turvey,
Rural Planner

cc: David Cooper, OMAFRA, Guelph
Donna Sharp Mundie, OMAFRA, Guelph
Susan Wagter, MTO, London

Ministry of Tourism, Culture and Recreation
Ministère du Tourisme, de la Culture et des Loisirs

Ontario

Heritage & Libraries Branch
Heritage Operations Unit
55 Centre Street, London, Ontario N6J 1T4
(519) 675-7742; Fax: 675-7777

April 10, 2001

To: Tim Sorochinsky, Project Manager
Cole, Sherman & Associates Limited
75 Commerce Valley Drive East
Thornhill, Ontario L3T 7N9

RE: Highway 401 Improvements from 1 km West of Highway 4 Easterly to 1 km East of Highbury Avenue, City of London, County of Middlesex, Preliminary Design / Class Environmental Assessment, G.W.P. 476-89-00

Thank you for your letter of April 6 regarding the above-mentioned project. A principal concern of this office is the adverse effects that undertakings such as the above mentioned might have on cultural heritage resources. If there are areas of heritage potential that will be impacted by this project, then our office would recommend that a heritage assessment be conducted as part of the EA. If significant heritage or archaeological remains are identified, then any negative impacts will have to be mitigated by either avoidance or excavation.

Consequently, our office would wish to continue to be involved in this project. In particular, it would be useful to be provided with detailed information and maps, outlining the extent and type of land disturbance anticipated and the extent of previous disturbance within the study area. With this information I will be able to determine what portions of the project, if any, may exhibit potential for impacting heritage resources, and thus would require an assessment to inventory all heritage resources present, and determine what mitigation work, if any, may be required.

I trust that this information is of assistance. Should you wish to discuss this further, please do not hesitate to contact me.

Sincerely,

John MacDonald, for
Holly Martelle
Heritage Planner
Southwestern Ontario

Ontario

Ministry of Municipal Affairs and Housing

Ministère des Affaires municipales et du Logement

Municipal Services Office-Southwestern
659 Ex[illegible] Road, 2nd Floor
Londo[illegible] N6E 1L3
519/87[illegible]020
Fax: 519/873-4018
Toll Free: 1-800-265-4736

Bureau des services aux municipalités - région du Sud-Ouest
659 Exeter Road, 2[illegible]e
London ON N6E
(519) 873-4020
Télécopieur : (519) 873-4018
Sans frais : 1 800 265-4736

April 24, 2001.

Mr. Tim Sorochinsky, P. Eng.,
Project Manager
Cole, Sherman & Associates Ltd.,
75 Commerce Valley Drive East
Thornhill ON L3T 7N9

RE: **Highway 410 Improvements Planning Study**
City of London, County of Middlesex
Preliminary Design/Class Environmental Assessment Group "B" Project

Dear Mr. Sorochinsky:

Thank you for your recent circulation of the Notice of the External Agency meeting and Public Information Centre for the Hwy. 401 Improvements Planning Study.

It is understood that the purpose of this undertaking is to identify deficiencies and address needs for improvements related to traffic operation, capacity and safety of the Highway 401 corridor, specifically 1 km west of Highway 4 easterly to 1 km east of Highbury Avenue in the City of London, County of Middlesex.

Please be advised that the areas of focus for this office of this Ministry includes matters dealing with municipal government, finance and administration as well as land use planning and development issues covered under the Planning Act.

Section 2 of the Planning Act speaks to matters of "provincial interest" and directs that "in exercising any authority that affects a planning matter, the council of a municipality, a local board, a planning board, a minister of the Crown and a ministry, board, commission or agency of the government, including the Municipal Board, shall **have regard to** policy statements issued" under Section 3 of the Act. The current provincial policy on land use planning matters in Ontario is the "Provincial Policy Statement" (PPS).

The PPS speaks to issues such as the promotion of efficient, cost-effective development and land use patterns and the proper consideration of the various resources of this province as well as matters dealing with public health and safety. We would be happy to provide you with a copy of this document for your review.

Of course, the requirements of the Planning Act apply to applications for planning approvals under this legislation including official plan amendments and zoning bylaw amendments among others. From our review of this particular matter, it is appears that no such approvals are being sought in this case.

However, this project may have implications with respect to those matters covered by the PPS as noted above and it is our recommendation to you that these policies should be given consideration in your review of this undertaking.

Finally, it is important to remember that our comments on this undertaking should not be considered as approval for any other related applications under the Planning Act that may be required or that may be related to or result from this project.

Please keep this office informed of any and all developments that occur following the Public Information meeting. If you have any questions regarding these comments, please feel free to call me at (519) 873-4025 or toll-free at 1-800-265-4736.

Sincerely,

William Pol, RPP, MCIP
Municipal/Planning Advisor

Ontario Native Affairs Secretariat

421 S. James St.
Suite 101
Thunder Bay ON P7E 2V6

Tel.: (807) 473-3132
Fax.: (807) 473-3153

Secrétariat des affaires autochtones de l'Ontario

421, rue S. James
Bureau 101
Thunder Bay ON P7E 2V6

Tél.: (807) 473-3132
Téléc.: (807) 473-3153

Ontario

April 17, 2001

Mr. Tim Sorochinsky
Project Manager
Cole Sherman & Associates Ltd.
75 Commerce Valley Drive East
THORNHILL, Ontario
L3T 7N9

Dear Mr. Sorochinsky:

Re: Hwy 401 Improvements Planning Study

Thank you for your letter dated April 6, 2001, informing us of the above noted information.

We trust that you have been in contact with any First Nations in the area and that they have been notified about the issues under consideration and their opportunities to participate in the process.

Yours truly,

Mary Carl
Associate Negotiator
Thunder Bay

/lst

Ontario
Ministry of Transportation

HIGHWAY 401 IMPROVEMENTS
FROM 1 KM WEST OF HIGHWAY 4 EASTERLY TO 1 KM EAST OF HIGHBURY AVENUE
CITY OF LONDON, COUNTY OF MIDDLESEX
G.W.P. 476-89-00

URS COLE, SHERMAN

STAKEHOLDER CONTACT INFORMATION FORM

PLEASE FAX BACK AS SOON AS POSSIBLE TO: (905) 882-4399

1.) Does your organization wish to participate in this study and continue to receive notices of project activities and information as this study progresses?

☒ Yes ☐ No

2.) If your organization wishes to participate in this study, please provide who will act as the Project Team's contact. Please be sure to include the contact's name, title, department, full organization name and mailing address.

NAME: BILL ARMSTRONG

TITLE: ENVIRONMENTAL PLANNER

DEPARTMENT: TECHNICAL SUPPORT - SOUTHWESTERN REGION

ORGANIZATION: MINISTRY OF THE ENVIRONMENT

MAILING ADDRESS: 2ND FLOOR 659 EXETER RD. LONDON ON. N6E 1L3

PHONE NUMBER: (519) 873-5013

FAX: (519) 873-5020

E-MAIL ADDRESS: bill.armstrong@ene.gov.on.ca

Your information and comments will be kept on file for use during the study. Please submit this form to:

Submitted By: _____

_____

_____

Tim Sorochinsky, P.Eng.,
Project Manager
Cole, Sherman & Associates Ltd.
75 Commerce Valley Drive East
Thornhill, Ontario, L3T 7N9
Fax: (905) 882-4399
E-mail: tim_sorochinsky@urscorp.com

Ontario
Ministry of Transportation

HIGHWAY 401 IMPROVEMENTS
FROM 1 KM WEST OF HIGHWAY 4 EASTERLY TO 1 KM EAST OF HIGHBURY AVENUE
CITY OF LONDON, COUNTY OF MIDDLESEX
G.W.P. 476-89-00

URS COLE, SHERMAN

STAKEHOLDER CONTACT INFORMATION FORM

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☑ Yes ☐ No

2.) If your organization wishes to participate in this study, please provide who will act as the Project Team's contact. Please be sure to include the contact's name, title, department, full organization name and mailing address.

NAME: JOHN TURVEY

TITLE: RURAL PLANNER

DEPARTMENT:

ORGANIZATION: MINISTRY OF AGRICULTURE, FOOD & RURAL AFFAIRS

MAILING ADDRESS: 667 EXETER ROAD, LONDON, ON, N6E 1L3

PHONE NUMBER: (519) 873-4085

FAX: (519) 873-4062

E-MAIL ADDRESS: john.turvey@omafra.gov.on.ca

Your information and comments will be kept on file for use during the study. Please submit this form to:

Submitted By: John Turvey

Tim Sorochinsky, P.Eng.,
Project Manager
Cole, Sherman & Associates Ltd.
75 Commerce Valley Drive East
Thornhill, Ontario, L3T 7N9
Fax: (905) 882-4399
E-mail: tim_sorochinsky@urscorp.com

Ontario Native Affairs Secretariat

421 S. James St.
Suite 101
Thunder Bay ON P7E 2V6

Tel.: (807) 473-3132
Fax.: (807) 473-3153

Secrétariat des affaires autochtones de l'Ontario

421, rue S. James
Bureau 101
Thunder Bay ON P7E 2V6

Tél.: (807) 473-3132
Téléc.: (807) 473-3153

Ontario

January 16, 2001

Mr. Tim Sorochinsky
Project Manager
URS Cole, Sherman & Assoc. Ltd.
75 Commerce Valley Drive East
THORNHILL, Ontario
L3T 7N9

Dear Mr. Sorochinsky:

Re: Highway 401 Improvements

Thank you for your letter dated January 8, 2001, informing us of the above noted information.

We trust that you have been in contact with any First Nations in the area and that they have been notified about the issues under consideration and their opportunities to participate in the process.

Yours truly,

Mary Carl
Associate Negotiator
Thunder Bay

Ontario
Ministry of Transportation

HIGHWAY 401 IMPROVEMENTS
FROM 1 KM WEST OF HIGHWAY 4 EASTERLY TO 1 KM EAST OF HIGHBURY AVENUE
CITY OF LONDON, COUNTY OF MIDDLESEX
G.W.P. 476-89-00

URS COLE, SHERMAN

STAKEHOLDER CONTACT INFORMATION FORM

PLEASE FAX BACK AS SOON AS POSSIBLE TO: (905) 882-4399

1.) Does your organization wish to participate in this study and continue to receive notices of project activities and information as this study progresses?

☑ Yes ☐ No

2.) If your organization wishes to participate in this study, please provide who will act as the Project Team's contact. Please be sure to include the contact's name, title, department, full organization name and mailing address.

NAME: William Pol

TITLE: Municipal / Planning Advisor

DEPARTMENT: Municipal Services Office - Southwestern

ORGANIZATION: Ministry of Municipal Affairs & Housing

MAILING ADDRESS: 659 Exeter Road, 2nd Flr., London ON N6E 1L

PHONE NUMBER: 519-873-4025 or 1-800-265-4736

FAX: 519-873-4018

E-MAIL ADDRESS: William.Pol@mah.gov.on.ca

* Please Remove Diana Jardine from Mailing List.

Your information and comments will be kept on file for use during the study. Please submit this form to:

Submitted By: [signature]

Tim Sorochinsky, P.Eng.,
Project Manager
Cole, Sherman & Associates Ltd.
75 Commerce Valley Drive East
Thornhill, Ontario, L3T 7N9
Fax: (905) 882-4399
E-mail: tim_sorochinsky@urscorp.com

Ontario
Ministry of Transportation

HIGHWAY 401 IMPROVEMENTS
FROM 1 KM WEST OF HIGHWAY 4 EASTERLY TO 1 KM EAST OF HIGHBURY AVENUE
CITY OF LONDON, COUNTY OF MIDDLESEX
G.W.P. 476-89-00

URS COLE, SHERMAN

STAKEHOLDER CONTACT INFORMATION FORM

PLEASE FAX BACK AS SOON AS POSSIBLE TO: (905) 882-4399

1.) Does your organization wish to participate in this study and continue to receive notices of project activities and information as this study progresses?

☐ Yes ☒ No

2.) If your organization wishes to participate in this study, please provide who will act as the Project Team's contact. Please be sure to include the contact's name, title, department, full organization name and mailing address.

NAME: _____

TITLE: _____

DEPARTMENT: _____

ORGANIZATION: _____

MAILING ADDRESS: _____

PHONE NUMBER: _____

FAX: _____

E-MAIL ADDRESS: _____

Your information and comments will be kept on file for use during the study. Please submit this form to:

Submitted By: Nena Snyder
Ont. Cycling Assoc.
1185 Eglinton Ave. E M3C 3C6

Tim Sorochinsky, P.Eng.,
Project Manager
Cole, Sherman & Associates Ltd.
75 Commerce Valley Drive East
Thornhill, Ontario, L3T 7N9
Fax: (905) 882-4399
E-mail: tim_sorochinsky@urscorp.com

6-3

Ontario
Ministry of Transportation

HIGHWAY 401 IMPROVEMENTS
FROM 1 KM WEST OF HIGHWAY 4 EASTERLY TO 1 KM EAST OF HIGHBURY AVENUE
CITY OF LONDON, COUNTY OF MIDDLESEX
G.W.P. 476-89-00

URS COLE, SHERMAN

STAKEHOLDER CONTACT INFORMATION FORM

PLEASE FAX BACK AS SOON AS POSSIBLE TO: (905) 882-4399

1.) Does your organization wish to participate in this study and continue to receive notices of project activities and information as this study progresses?

☑ Yes ☐ No

2.) If your organization wishes to participate in this study, please provide who will act as the Project Team's contact. Please be sure to include the contact's name, title, department, full organization name and mailing address.

NAME: HOLLY MARTELLE

TITLE: ARCHAEOLOGIST / HERITAGE PLANNER

DEPARTMENT: HERITAGE OPERATIONS UNIT

ORGANIZATION: MIN. OF CITIZENSHIP, CULTURE & RECREATION

MAILING ADDRESS: 55 CENTRE ST., LONDON ONT. N6J 1T4

PHONE NUMBER: (519) 675-7742

FAX: (519) 675-7777

E-MAIL ADDRESS: holly.martelle@mczcr.gov.on.ca

Your information and comments will be kept on file for use during the study. Please submit this form to:

Submitted By: _____

_____

_____

Tim Sorochinsky, P.Eng.,
Project Manager
Cole, Sherman & Associates Ltd.
75 Commerce Valley Drive East
Thornhill, Ontario, L3T 7N9
Fax: (905) 882-4399
E-mail: tim_sorochinsky@urscorp.com

December 15th, 2000
Our Ref.: CN29900176

«Address»

Dear «Name»:

Re: Highway 401 Improvements
From 1 km west of Highway 4 easterly to 1 km east of Highbury Avenue
Preliminary Design / Class Environmental Assessment, Group 'B' Project
G.W.P. 476-89-00

Cole, Sherman & Associates Ltd. has been retained by the Ontario Ministry of Transportation (MTO) to undertake a Planning and Preliminary Design Study to address short, medium and long-term needs of Highway 401 from 1 km west of Highway 4 easterly to 1 km east of Highbury Avenue in the City of London, County of Middlesex. This study is composed of the following two parts.

PART A: Highway 401 from 1.0 km west of Highway 4 easterly to 1 km east of Highbury Road

The purpose of this study is to identify deficiencies and address needs for improvements related to traffic operation, capacity and safety for this section of the Highway 401 corridor. Reasonable alternatives to address the required improvements will be identified and evaluated to determine the most appropriate solution. Preliminary alternatives include:

- Modifications to interchanges at Highway 4, Wellington Road and Highbury Avenue; and
- Widening the existing corridor to a 6 or 8 lane cross section from just west of Highway 402 to just east of Wellington Road.

Process
This study will follow the approved planning process for a Group B project under the Class Environmental Assessment for Provincial Transportation Facilities (2000). The opportunity for public input will be provided throughout the course of the project.

PART B: Future Wonderland Road interchange at Highway 401

The purpose of this study is to determine the impacts associated with preliminary design alternatives for a future interchange at Wonderland Road and the associated modifications / improvements to Wonderland Road.

Process
This study will follow the approved planning process for a Group B project under the Class Environmental Assessment for Provincial Transportation Facilities (2000) as well as a Schedule C project under the Municipal Class Environmental Assessment.

A Transportation Environmental Study Report (TESR) will be prepared to include Part A and Part B and will be available for review and comment upon completion of the study.

Two Public Information Centres are scheduled for the project. The first Public Information Centre (PIC) is anticipated to be held in the Spring of 2001, and will focus on the identification of project needs, reasonable

alternatives and proposed evaluation method. The second PIC is expected to take place in the Fall of 2001 with the purpose of presenting the evaluation of alternatives and the preferred alternative.

Notices advising of the time and location of the PICs and of the availability of the TESR for review will be published in local newspapers.

Comments and information regarding this project are being collected to assist the Ministry of Transportation in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the project and may be included in project documentation.

Please complete the attached Stakeholder Contact Information form to indicate whether your organization wishes to participate in this study and who will act as our contact. Please fax the Stakeholder Contact Information form to the attention of the undersigned as soon as possible.

The purpose of this letter is to notify your office of project start-up and to obtain the appropriate contact information from your organization. In order to assist us in our planning process, would you also please indicate if the above project would affect the delivery of your organization's programs or services.

A reply by January 26th, 2001 would be appreciated. Should you require further information regarding this request, please feel free to contact the undersigned.

Thank you for your cooperation and assistance.

Yours truly,

COLE, SHERMAN & ASSOCIATES LTD.

Tim Sorochinsky, P. Eng.
Project Manager

cc: Dennis Regan
Susan Wagter

Att.

Government List

Address	Name
"Dr. Ron Griffiths EA Coordinator Southwestern Region Ministry of the Environment London Regional Office 659 Exeter Road, 2nd Floor London, Ontario N6E 1L3"	Dr. Griffiths
"Mr. Jim Richardson Acting Director Ministry of the Environment London Regional Office 659 Exeter Rd London, ON N6E 1L3"	Mr. Richardson
"Mr. Ken Rovinelli, Manager Development and Contract Engineering Management Board Secretariat 777 Bay Street, 15th Floor Toronto, Ontario M5G 2E5"	Mr. Rovinelli
"Mr. Neil Ferris Heritage Planner Archaeology & Heritage Planning Ministry of Citizenship, Cultural and Recreation 55 Centre Street London, Ontario N6J 1T4"	Mr. Ferris
"Mrs. Diana Jardine, Director Plans Administration Branch Ministry of Municipal Affairs and Housing 777 Bay Street, 14th Floor Toronto, Ontario M5G 2E5"	Mrs. Jardine
"Mr. Alec Denys District Manager Ministry of Natural Resources Aylmer District Office 353 Talbot Street West Aylmer, Ontario N5H 2S5"	Mr. Denys
"Mr. Bill Taylor, Associate Negotiator Negotiations Branch, Thunder Bay Office Ontario Native Affairs Secretariat 421 S. James Street, Suite 101 Thunder Bay, Ontario P7E 2V6"	Mr. Taylor

Address	Name
"Mr. Donald Hudson, Clerk County of Middlesex 399 Ridout St. N. London, Ontario N6A 2P1"	Mr. Hudson
"Mr. Denis Merrall Director of Emergency Services and Transportation County of Middlesex 399 Ridout St. N. London, Ontario N6A 2P1"	Mr. Merrall
"Mr. Steve Evans Director of Planing and Economic Development County of Middlesex 399 Ridout St. N. London, Ontario N6A 2P1"	Mr. Evans
"Mr. Jeff Malpass, Clerk City of London 300 Dufferin Ave., Box 5035 London, Ontario N6A 4L9"	Mr. Malpass
"Mr. Victor Cote Director of Planning City of London 300 Dufferin Ave., Box 5035 London, Ontario N6A 4L9"	Mr. Cote
"Mr. John Jardine Director of Engineering City of London 300 Dufferin Ave., Box 5035 London, Ontario N6A 4L9"	Mr. Jardine
"Mr. David Hodgins Fire Chief City of London 300 Dufferin Ave., Box 5035 London, Ontario N6A 4L9"	Mr. Hodgins
"Mr. Rod Trevors Sergeant Traffic Management Unit 601 Dundas Street London, Ontario N6B 1X1"	Mr. Trevors

"Chief A. Gramolini
London Police Department
601 Dundas Street
London, Ontario
N6B 1X1"

Mr. Gramolini

"Mr. E. David Hodgins
Fire Chief
London Fire Services
400 Horton Street East
London, Ontario
N6B 1L7"

Mr. Hodgins

April 6, 2001
Our Ref.: CN29900176

«Address»

Dear «Name»:

RE: Highway 401 Improvements Planning Study
From 1 km West of Highway 4 Easterly to 1 km East of Highbury Avenue
City of London, County of Middlesex
Preliminary Design / Class Environmental Assessment Group 'B' Project
G.W.P. 476-89-00

As you are aware Cole, Sherman & Associates Ltd. was retained by the Ontario Ministry of Transportation (MTO) to undertake a Planning and Preliminary Design Study to address short, medium and long-term needs of Highway 401 from 1 km west of Highway 4 easterly to 1 km east of Highbury Avenue in the City of London, County of Middlesex.

The purpose of this study is to identify deficiencies and address needs for improvements related to traffic operation, capacity and safety on this section of the Highway 401 corridor. Reasonable alternatives to address the required improvements will be identified and evaluated to determine the most appropriate solution.

Preliminary alternatives include:

- Modifications to interchanges at Highway 4, Wellington Road and Higbury Avenue; and
- Widening the existing corridor to improve capacity throughout the study area.

This study will follow the approved planning process for a Group B project under the Class Environmental Assessment for Provincial Transportation Facilities (2000).

The City of London is concurrently planning for a future interchange at Wonderland Road. This study will follow the approved planning process for a Group B project under the Class Environmental Assessment for Provincial Transportation Facilities (2000) as well as a Schedule C project under the Municipal Class Environment Assessment.

We have arranged a meeting with external agencies to provide an opportunity to discuss the project, the alternatives under consideration and the proposed evaluation criteria.

The External Agency meeting will be held on:

Tuesday April 17, 2001
1:00 p.m. - 2:00 p.m.
Ramada Inn – Somerset Ballroom
817 Exeter Road, City of London

Immediately following this meeting is the first Public Information Centre (PIC). This PIC was arranged as a drop-in centre and will be held from 2:00 p.m. to 5:00 p.m. and 7:00 p.m. to 9:00 p.m.

The second PIC is expected to take place in the Fall of 2001 with the purpose of presenting the evaluation of alternatives and the preferred alternatives.

The purpose of this letter is to notify your office of the upcoming meeting and Public Information Centre.

Should you require further information about the project, please feel free to contact the undersigned.

Yours very truly,
COLE, SHERMAN & ASSOCIATES LIMITED

Tim Sorochinsky, P.Eng.
Project Manager

cc: Dennis Regan – MTO
Susan Wagter – MTO
Shane Maguire – City of London

April 6, 2001
Our Ref.: CN29900176

Dear Sir/Madam:

RE: Highway 401 Improvements Planning Study
From 1 km West of Highway 4 Easterly to 1 km East of Highbury Avenue
City of London, County of Middlesex
Preliminary Design / Class Environmental Assessment Group 'B' Project
G.W.P. 476-89-00

Cole, Sherman & Associates Ltd. has been retained by the Ontario Ministry of Transportation (MTO) to undertake a Planning and Preliminary Design Study to address short, medium and long-term needs of Highway 401 from 1 km west of Highway 4 easterly to 1 km east of Highbury Avenue in the City of London, County of Middlesex (See attached map). This study is composed of the following two parts.

PART A: Highway 401 from 1.0 km west of Highway 4 easterly to 1 km east of Highbury Avenue

The purpose of this study is to identify deficiencies and address needs for improvements related to traffic operation, capacity and safety for this section of the Highway 401 corridor. Reasonable alternatives to address the required improvements will be identified and evaluated to determine the most appropriate solution.

Preliminary alternatives include:
- Modifications to interchanges at Highway 4, Wellington Road and Highbury Avenue; and
- Widening the existing corridor to improve capacity throughout the study area.

This study will follow the approved planning process for a Group B project under the Class Environmental Assessment for Provincial Transportation Facilities (2000). The opportunity for public input will be provided throughout the course of the project.

A Transportation Environmental Study Report (TESR) will be prepared for Part A and will be available for review and comment upon completion of the study.

PART B: Future Wonderland Road interchange at Highway 401

The purpose of this study is to determine the impacts associated with preliminary design alternatives for a future interchange at Wonderland Road and the associated modifications / improvements to Wonderland Road.

This study will follow the approved planning process for a Group B project under the Class Environmental Assessment for Provincial Transportation Facilities (2000) as well as a Schedule C project under the Municipal Class Environmental Assessment.

An Environmental Study Report (ESR) will be prepared for Part B and will be available for review and comment upon completion of the study.

Two Public Information Centres are scheduled for the project. The first Public Information Centre (PIC) has been arranged for the public to provide input and discuss the project and the alternatives under consideration with representatives form the Project Team. This information centre will focus on the identification of project needs, reasonable alternatives and the proposed evaluation method.

The first PIC has been arranged as a drop-in centre and will be held on:

Tuesday April 17, 2001
2:00 p.m. - 5:00 p.m. and 7:00 p.m. - 9:00 p.m.
Ramada Inn – Somerset Ballroom
817 Exeter Road, City of London

The second PIC is expected to take place in the Fall of 2001 with the purpose of presenting the evaluation of alternatives and the preferred alternatives.

The purpose of this letter is to notify you of the upcoming Public Information Centre and encourage you to attend the Information Centre and to provide us with your views and comments so that they can be addressed early in the study.

Comments and information regarding this project are being collected to assist the Ministry of Transportation in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Protection Privacy Act. With the exception of personal information, all comments will become part of the public record.

Yours very truly,
COLE, SHERMAN & ASSOCIATES LIMITED

Tim Sorochinsky, P.Eng.
Project Manager

Cc: Dennis Regan – MTO
Susan Wagter – MTO
Shane Maguire – City of London

URS

Cole Sherman

August 24, 2001
Our Ref.: CN29900176

Dr. Ron Griffiths, EA Coordinator
Southwestern Region
Ministry of the Environment
London Regional Office
659 Exeter Road, 2nd Floor
London, Ontario
N6E 1L3

Dear Dr. Griffiths:

RE: Highway 401 Improvements Planning Study
From 1.0 km West of Highway 4 Easterly to 1.0 km East of Highbury Avenue
City of London, County of Middlesex
Preliminary Design / Class Environmental Assessment Group 'B' Project
G.W.P. 476-89-00

As you are aware, URS Cole Sherman was retained by the Ontario Ministry of Transportation (MTO) to undertake a Planning and Preliminary Design Study to address short, medium and long-term needs of Highway 401 from 1.0 km west of Highway 4 easterly to 1.0 km east of Highbury Avenue in the City of London, County of Middlesex (See attached brochure).

The purpose of this letter is to invite you to the External Team Meeting and the second Public Information Centre.

We have arranged a meeting with external agencies to provide an opportunity to discuss the analysis and evaluation of alternatives and the recommend preferred alternative.

The External Agency meeting will be held on:

Thursday September 13, 2001
1:00 p.m. – 2:00 p.m.
Ramada Inn – Churchill Ballroom (Rooms A & B)
817 Exeter Road, London

Immediately following this meeting is the second Public Information Centre (PIC). This PIC is arranged as a drop-in centre and will be held from 2:00 p.m. to 5:00 p.m. and 7:00 p.m. to 9:00 p.m.

Yours very truly,
COLE, SHERMAN & ASSOCIATES LIMITED

Tim Sorochinsky, P.Eng.
Project Manager
email: tim_sorochinsky@urscorp.com

cc: Dennis Regan – MTO
Susan Wagter – MTO
Shane Maguire – City of London

Cole, Sherman & Associates Limited
75 Commerce Valley Drive East
Thornhill, Ontario, Canada L3T 7N9
Tel: 905.882.4401
Fax: 905.882.4399

URS
Cole Sherman

August 24, 2001
Our Ref.: CN29900176

Dear Sir/Madam:

RE: Highway 401 Improvements Planning Study
From 1.0 km West of Highway 4 Easterly to 1.0 km East of Highbury Avenue
City of London, County of Middlesex
Preliminary Design / Class Environmental Assessment Group 'B' Project
G.W.P. 476-89-00

URS Cole Sherman was retained by the Ontario Ministry of Transportation (MTO) to undertake a Planning and Preliminary Design Study to address short, medium and long-term needs of Highway 401 from 1.0 km west of Highway 4 easterly to 1.0 km east of Highbury Avenue in the City of London, County of Middlesex (See attached brochure).

The purpose of this letter is to invite you to the second Public Information Centre and to encourage you to provide us with your views and comments so that they can be addressed as the project progresses.

The PIC will be structured as a drop-in centre and will be held on:

Thursday September 13, 2001
2:00 p.m. – 5:00 p.m. and 7:00 p.m. – 9:00 p.m.
Ramada Inn – Churchill Ballroom (Rooms A & B)
817 Exeter Road, London

If you have any comments please feel free to contact us.

Yours very truly,

COLE, SHERMAN & ASSOCIATES LIMITED

Tim Sorochinsky, P.Eng.
Project Manager
email: tim_sorochinsky@urscorp.com

cc: Dennis Regan – MTO
Susan Wagter – MTO
Shane Maguire – City of London

Cole, Sherman & Associates Limited
75 Commerce Valley Drive East
Thornhill, Ontario, Canada L3T 7N9
Tel: 905.882.4401
Fax: 905.882.4399

URS COLE, SHERMAN
a member of the URS group of companies

MINUTES OF MEETING

PROJECT NAME:	Hwy 401 Preliminary Design TPM *From 1km west of Highway 4 to 1km east of Highbury Avenue, London* G.W.P. 476-89-00	**MEETING No.**	1
PROJECT No.	CN29900176	**DATE:**	December 17th, 2001
LOCATION:	MTO Southwestern Region, Boardroom 3B	**TIME:**	10:00 a.m.

PRESENT:

Rob Lindsay	- Kettle Creek Conservation Authority
Vannitha Chanthavong	- Kettle Creek Conservation Authority
Mark Snowsell	- Upper Thames Conservation Authority
Dennis Regan	- MTO SW Planning and Design
Aden Corcoran	- MTO SW Planning and Design
Susan Wagter	- MTO Environmental
Deborah Martin-Downs	- Gartner Lee
Tim Sorochinsky	- URS Cole Sherman
Liza Gervais	- URS Cole Sherman
Tyler Drygas	- URS Cole Sherman

PURPOSE: Meeting with Conservation Authorities

Items	Description	Action by:

1. **Overview of the Project**

Engineering Component

T. Sorochinsky briefly introduced the study and outlined the project limits (Highway 401, from 1.0 km west of Highway 4 / Highway 401 interchange, easterly 14.4 km, to 1.0 km east of Highbury Avenue / Highway 401 interchange).

Recommended improvements are as follows:

Cole, Sherman & Associates Limited
75 Commerce Valley Drive East
Thornhill, Ontario L3T 7N9
tel. 905-882-4401 fax. 905-882-4399
www.colesherman.com

- Highway 402 to Wellington Road – widen Highway 401 from 4 to 6 lanes evenly on both sides of the existing centreline by 2006;
- Wellington Road Interchange - a Parclo A-4 interchange design by 2006;
- Highway 4 (Col. Talbot Road) Interchange - a Parclo A-4 interchange design including the closure of Glanworth Drive by 2011;
- Highway 4 (Col. Talbot Road) to Highway 402 – widen Highway 401 from 4 to 6 lanes evenly on both sides of the existing centreline by 2021;
- Highway 402 to Highbury Avenue – widen Highway 401 from 6 to 8 lanes evenly on both sides of the existing centreline by 2021;
- Highbury Avenue interchange - a Parclo A-4 interchange design by 2021;
- A new interchange at Wonderland Road (a City of London initiative), timing to be determined.

2. Natural Environment Component

D. Martin-Downs outlined the natural environment review undertaken for this study which included:

- An assessment of watercourses;
- An assessment of woodlots;
- A vegetation review for each of the interchange areas;
- A breeding bird investigation (undertaken in June 2000);
- A review of the physiography and soils of the study area based on secondary sources.

D. Martin-Downs outlined the hydrogeologically sensitive areas in the Highway 401 corridor. Key natural features in the study area include:

- Westminster / Pond Mills wetland located north of Highbury Ave. at the north project limit;
- Woodlots at interchange areas (comprised of generally common species);
- Eight watercourses - comprised of seven drains and one permanent stream (Dingman Creek).

D. Martin-Downs outlined the key findings of watercourses in the study area based field investigations undertaken in May 2001 as follows:

Station 1: ephemeral stream - poor habitat potential;
Station 2: Courtney Drain – ephemeral stream with fish (sukers, stickleback and creek chubb);
Station 3: Number 1 Highway Drain – ephemeral stream with no fish;
Station 4: CB Smith Drain – ephemeral stream with no fish;

Station 5: Bannister Johnson Drain – ephemeral stream, no fish caught during field investigations, MNR has data on fish species downstream;

Station 6: Dingman Creek – permanent stream with ripple – pool features with fish (common species). Widening of Highway 401 at his location will impact the stream bottom and banks;

Station 7: Murray Drain - permanent stream with fish (common species). A channel relocation will be required to accommodate the proposed works. D. Martin-Downs noted that no harmful effects to habitat are expected due to the poor habitat condition and that relocation would provide opportunities to improve the channel;

Station 8: Murray Drain – permanent stream with no fish;

Station 9: Elliot Laidlaw Drain – permanent stream with warmwater species (no game fish). Increase in culvert length will result in the disruption of the stream bed.

D. Martin-Downs noted that impacts to fish habitat and the need for formal approval under the Federal Fisheries Act will be discussed with MNR as per the MTO / MNR fisheries protocol. URS / GLL

M. Snowsell (UTCA) noted that the provision for a low flow channel at Dingman Creek while maintaining the natural character of the stream would be a benefit.

M. Snowsell provided information regarding natural features as well as studies and information pertinent to the study area as follows:

- Dingman Creek subwatershed study (outlining potential enhancements);
- Subwatershed report card for Dingman Creek (in progress);
- Forest City Industrial Park located southeast of Highway 401 / Highbury Avenue - examining stormwater management issues for the area;
- The City of London is reviewing alternatives for relocating part of the Murray Drain west of Wellington Road to run parallel to Highway 401;
- A beaver population exists at the upper reaches of the Murray Drain system creating impacts on water levels along the channel.

M. Snowsell noted concerns regarding potential impacts to groundwater in the vicinity of Station 4. KCCA noted that Elgin County has a no net loss of trees policy. Where tree removal is anticipated, it would be beneficial to replace elsewhere.

The Project Team noted that clearing would be undertaken within the existing highway right-of-way. D. Martin-Downs noted that potential impacts to permeable soils would be examined further at a later design

stage. At that time, a well survey will be undertaken and pre-construction levels will be measured.

Natural environment reports will be provided to the Conservation Authorities for their information upon MTO review. URS / GLL

3. **Stormwater Management Component**

The study limits occur within two watershed areas (Upper Thames and Kettle Creek). L. Gervais noted that there are 25 culverts within the project limits, most of which will require extensions. L. Gervais noted that due to the topography of the study area, the drainage areas are insufficient to sustain stormwater management ponds. Stormwater treatment will be provided by means of widened grass swales. A total suspended substance removal level of 60% will be provided under the stormwater management plan for this undertaking. Standard erosion and sediment control measures are proposed and will be included in study documentation.

Extensions to six major culverts will be required to accommodate the proposed improvements. No culvert replacements will be required. The sediment buildup at Dingman Creek has been identified as a potential maintenance concern.

M. Snowsell (UTCA) noted that opportunities for increased treatment throughout the highway corridor should be examined as part of this study and noted that the rationale for proposed stormwater management treatment measures needs to be well documented.

Representatives from the Kettle Creek Conservation Authority noted that no works are planned with the project limits.

4. **Mitigation Measures**

The Project Team will be seeking an agreement in principle for the proposed works. No formal approvals are required from the Conservation Authorities.

Representatives from the Conservation Authorities (CAs) noted that small rock check damns rather than straw-bale check damns are preferred from a sediment control perspective. The CAs noted concerns with the monitoring of sediment and erosion control measures. The Project Team noted that grades are a factor in the selection of sediment control measures. A special provision specifying measures and environmental monitoring will be included in contract documents. It was noted that MTO performs spot checks to ensure measures are appropriately carried out.

Items	Description	Action by:
	The Project Team agreed that watercourses in the study area are not sensitive fisheries. MNR will be consulted regarding the harmful alteration disruption or destruction (HADD) of fish habitat under the Fisheries Act.	URS / GLL
	R. Lindsay noted that with respect to mitigation for vegetation loss, opportunities for replanting should be examined. The Project Team noted that tree planting will be considered where removals are required outside of the existing highway right-of-way.	
	Final Natural Sciences and Drainage and Hydrology reports will be forwarded to the Conservation Authorities in late January 2002.	

Submitted by: Tyler Drygas

Distribution:
Those Present,
Distribution List.

MINUTES OF MEETING

PROJECT NAME:	Hwy 401 Planning Study *WP 476-89-00 - From 1km West of Highway 4 to 1km East of Highbury Avenue, London.* W.P. 476-89-00	**MEETING No.**	OPP-1
PROJECT No.	CN29900176	**DATE:**	March 8, 2001
LOCATION:	OPP Exeter Road	**TIME:**	10:00 a.m.
PRESENT:	John Remillard - OPP Bob Cottingham - OPP Rod Trevors - London Police Michael McMahon - London Police Tim Sorochinsky - URS Cole Sherman Nick Karakis - URS Cole Sherman		
PURPOSE:	Meeting with OPP and London Police		

Items **Description** **Action by:**

1. Review of Project Scope

T. Sorochinsky provided a summary of the project limits and purpose. The planning study limits extend from 1km west of Highway 4 to 1km East of Highbury Avenue. The project limits are within the County of Middlesex and in the City of London. The purpose of the planning study is to investigate midterm and ultimate widening requirements along the corridor. Our preliminary review of traffic data has identified a need for a six lane cross-section from 1 km west of Highway 4 to Highway 402, eight lanes from Highway 402 to 1km east of Highbury. A ten lane "core-collector" system will be reviewed as an option from Highway 402 to east of Highbury Avenue.

2. Mainline Traffic Concerns

- The section of Highway 401 between Highway 4 and Highway 402 does not provide the opportunity for emergency vehicles to turnaround, resulting in an increase in response time to incidents. The addition of a Wonderland Avenue Interchange would improve response times for emergency vehicles.
- An express-collector system would be desirable to separate through truck traffic from local "London" traffic.
- Widening Highway 401 to 6 lanes within the project limits would improve operations.
- Motorists have been observed using both inside and outside shoulders as passing lanes.
- High truck volumes are noted along this section of Highway 401. OPP indicated that a 30% truck volume is a reasonable assumption. OPP suggested that this number approaches 50% at night (9:00 p.m.). All ramps and ramp intersections should be designed to accommodate trucks.
- Trucks have been noted to use the passing lane at Exeter Road in anticipation of the lane drop west of Exeter.

3. Interchange Considerations

OPP noted that a majority of incidents occur at the interchanges. The following is a summary of OPP observations and recommendations:

Highway 4

- Numerous accidents have been noted on Highway 4 north of Littlewood Drive in the vicinity of Auto Haulaway, located approximately 1km north of Littlewood Drive. Truck movements in and out of Auto Haulaway have triggered many accidents. Many complaints from motorists have been received. OPP recommends widening Highway 4 to four through lanes north of Highway 401.
- The E-S Ramp and S-W Ramp share a short weaving area. This results in vehicles merging onto Highway 401 at slow speeds.
- Many vehicles have been observed exiting Highway 401 on the E-S ramp, followed by a U-turn just south of the Highway 4 interchange.
- There is a blind spot on the E-N ramp where motorists merge with northbound Highway 4 traffic.
- Traffic that exits on the W-N ramp encounters problems when merging with northbound traffic on Highway 4. OPP noted that the

problem is a combination of poor signing for the entrance ramp to Highway 401, substandard horizontal and vertical curves, and substandard sight distances.

- A similar design as the Highbury interchange would be desirable (Parclo A-4) with provision for accommodating high truck turning volumes.

Exeter Road

- The Exeter/Wellington exit is not signed very well, causing confusion for motorists, resulting in many sudden lane changes.
- Two fatal accidents have occurred at Exeter/Wellington Rd. N. split due to motorists trying to make a last minute lane change. An officer's vehicle was recently hit while stopped near the Exeter/Wellington split.
- Vehicles (mostly trucks) park along the paved shoulder on Exeter westbound, in front of Tim Hortons.
- OPP suggested that consideration should be given to improve the geometry of the Exeter ramp, or close the Exeter ramp altogether.
- OPP indicated that it is likely that some of the services currently provided by the Exeter detachment will likely be moved to other locations in the future. No other future plans for the site were identified.

Wellington Road

- Signing should be added indicating that Wellington Road leads to downtown London.
- Traffic queues have been observed on the Wellington Road E-N ramp as a result of motorists slowing down to find a gap in Wellington traffic, so that they could make a left turn onto Exeter Road.
- Approximately 70 accidents per year occur at the intersection of Wellington Road and Exeter Road.
- Traffic congestion is a problem south of the Wellington Road interchange at Costco, located at the north west corner of Wellington Road and Roxburgh Road.
- OPP noted that the vertical curve along Wellington Road over Highway 401 creates problems for motorists.
- Motorists using the Wellington Road E-S ramp experience difficulty merging with Wellington Road traffic. OPP noted that the problem is a result of a short merge lane located on the crest.

Highbury Avenue

- OPP noted no major problems at this interchange; accidents are mostly weathered related.

4. Other Improvements

The following is a summary of other improvements suggested:

- OPP suggested that all alternatives considered should maintain or add rumble strips along both edges of pavement.
- A paved outside shoulder should be provided along the entire project limits to provide a safe area of refuge for motorists and police vehicles in case of emergencies.
- The concrete median barrier should be extended west of the project limits to Windsor. Six lanes for Highway 401 to Windsor should be considered to accommodate the high truck volumes along the corridor, and to improve operations.

Submitted by: Nick Karakis

Distribution:

Those Present	
Dennis Regan	- MTO Planning & Design
Pat Vojin	- MTO Traffic
Susan Wagter	- MTO Environmental
Mike Bricks	- URS Cole Sherman
Kim Nystrom	- URS Cole Sherman
Chris Pascos	- URS Cole Sherman
Len Kozachuk	- URS Cole Sherman

URS

Minutes of Meeting

Project:	**Highway 401 Preliminary Design Study G.W.P. 476-89-00**	Meeting No.	
Project No.	33013962	Date:	August 20th, 2003
Location:	CAW Local 1520 Boardroom, Tempo Road	Time:	1:00 pm
Purpose:	***Focus Group Meeting***		
	Presentation of Long Term Alternatives for the Highway 401 / Highway 4 (Col. Talbot Road) Interchange		

Present:		
	Eugene Morrison	- Local resident
	Bill Van Dam	- Ford Motors – St. Thomas Assembly Plant
	Kathy Fountain	- Gentek Building Products
	Kirk Thompson	- Can-Am RV / Local Resident
	Steve Peters	- MPP Elgin Middlesex London
	Don Cook	- Mapleview Farms / Local Resident
	Rob Backes	- Local resident
	Jay Burtwistle	- Local resident / farmer
	John Johnson	- Best Western Stoneridge Inn
	Hope Johnson	- Best Western Stoneridge Inn
	Gerry Zsoldos	- Ultramar Stoneridge Inn
	Skip McMahon	- Ambassador Bridge / Canada Transit Co.
	Justin Lawrence	- City of London – Transportation Division
	Dennis Regan	- MTO Planning & Design
	Ron Lewis	- MTO Traffic Operations Supervisor
	John Small	- MTO Environmental
	Tim Sorochinsky	- URS Canada Inc.
	Tyler Drygas	- URS Canada Inc.

Items	Description
1	**Introduction**

D. Regan provided an overview of the project background and outlined the interim improvements planned for construction in September 2003. Highlights of the interim improvements include:

- The realignment of the Highway 401 westbound ramp to tie into Glanworth Drive;

URS Canada Inc.
75 Commerce Valley Drive East
Markham, ON Canada L3T 7N9
Tel: 905.882.4401
Fax: 905.882.4399
www.urs.ca

Items **Description**

- Traffic signals and illumination at Highway 4 (Col. Talbot Road) and the realigned Highway 401 westbound ramp/ Glanworth Drive/Littlewood Dr. intersection;
- Illumination at the Highway 4/Burtwistle Lane intersection;
- Speed reduction from 80 km/h to 70 km /h; and
- Enhanced signing through the entire interchange area.

2 **Long Term Improvements to the Highway 401 / Highway 4 (Col. Talbot Road) Interchange**

T. Sorochinsky provided a brief background to the study. The focus of this study is to examine and address medium – long-term transportation needs for the study area (Highway 4 easterly to Highbury Avenue). The purpose of this focus group meeting is to discuss issues and concerns pertaining to the alternative designs under consideration for the Highway 401 / Highway 4 (Col. Talbot Road) Interchange.

Attendees were provided a package containing the alternative design under consideration in advance of the meeting. Tim provided an overview of the key design characteristics and highlighted the general advantages and disadvantages for each alternative. Tim outlined the evaluation criteria (i.e. natural, social, economic, cultural and transportation) proposed to be used in the evaluation of alternatives.

3 **Discussion**

The following outlines the questions (Q) and comments raised by attendees during the focus group meeting and the Project Team's reply (*R*):

Q: Will the interim improvements be affected by the Province's hold on capital spending?

R: No, construction will commence in September 2003.

Q: What is the timeline for construction of the interim improvements?

R: Construction is expected to extend for a period of 35 construction days (completion in mid-October, 2003).

Items	Description

Q: E. Morrison noted that there has been a lack of notification for public meetings held for this study.

R: Comment noted.

Q: When will the TESR be submitted for public and agency review?

R: It is anticipated that the TESR will be made available for public and agency review in December 2003.

Q: Regardless of the proposed interchange improvements, will the bridges need to be replaced?

R: Yes, structural replacement is necessary to accommodate the long term widening of Highway 401.

Q: G. Zsoldos of Ultramar noted equal preference for Alternatives 1 and 1a. Alternative 3 is undesirable as it impacts an on-site surface water retention pond and the heritage structures. Alternative 2 is undesirable as truck noise and lights from the eastbound Highway 401 off ramp would negatively impact the hotel.

R: Comments noted.

Q: E. Morrison noted that all alternatives are acceptable as Glanworth Drive is maintained, however Alternative 1a is preferable from a local operation perspective.

R: Comments noted.

Q: S. McMahon (Ambassador Bridge) noted that an option which does not sever Ambassador bridge property is preferable. There are no concerns with a connection around the processing station.

R: Comments noted.

Q: S. McMahon noted concerns with queuing on the Highway 401 westbound off ramp.

R: Queuing is not expected to be an issue, given that the proposed ramp is significantly longer than the existing ramp for all alternatives. The ramp will include detector loops for

Items	Description
	traffic signal control. Additional lanes can be added to the ramp as warranted by future traffic volumes.
	Q: MTO should consider a full cloverleaf design.
	R: The existing condition is a full cloverleaf design. This design has operational concerns associated with substandard geometry, which includes short weaving sections between ramps and tight curves.
	Q: Gentek noted safety concerns with the Glanworth / Littlewood intersection and access to Gentek.
	R: Comments noted. Access to Gentek will be improved in the interim by providing traffic signals and illumination at the reconfigured intersection of Highway 4 (Col. Talbot)/Glanworth and Littlewood. Under the long term scenarios, access to Gentek will be provided from Realigned Glanworth Drive.
	Q: S. Peters, MPP noted that MTO may be overly accommodating the Ambassador Bridge company at the expense of local community impacts. It was noted that pre-processing operations may change over time (i.e. decrease in operations) and that an interchange solution may not address future needs.
	R: The re-examination of the long term interchange design is a result of concerns raised by the local agricultural community and the City of London and is not a result of pre-processing operations. Operational concerns with this interchange currently exist and will become more pronounced as traffic volumes increase in the future. MTO will consider the advantages and disadvantages of the interchange alternatives with respect to the natural environment, social environment, economic environment, cultural environment and technical considerations based on existing information, information provided by the focus group and projected conditions in selecting the preferred alternative. *The Ambassador Bridge concurred that the needs of all parties involved need to be equally addressed.*
	Q: What is the priority for construction relative to other interchanges in the study area (i.e. Wellington and

Items	Description

Highbury)? Highway 4 should be given top priority now to address all safety concerns.

R: Given that the Federal Government has allocated funding for the Wellington Road interchange through the Border Infrastructure Program, the Wellington Road interchange will be the first constructed. The sequence for the implementation of other interchange improvements has not been determined. The timing of construction will be based on the availability of funding, and on other priorities across Southwestern Ontario.

Q: What type of illumination is proposed for the Tempo Road intersection in the interim?

R: Partial illumination will be implemented in the interim. High mast illumination will be implemented for the entire interchange as part of the long-term improvements.

Q: A highly visible interchange is needed. The current condition is poorly illuminated. Full illumination is needed.

R: *High mast illumination will be implemented as part of the long term improvements. Since the ramp locations proposed in the alternatives are different from the existing condition, installation and subsequent removal of high mast poles is not technically or economically desirable.*

Q: Has MTO identified preliminary costs for the alternatives under consideration?

R: No, costing will be undertaken as part of the evaluation process. Generally, alternatives with less ramp/road and structural requirements are the least expensive.

Q: What will the speed limit be reduced to in the interim?

R: Given that the area will be designated as a construction zone, the posted speed will be reduced to 70 km/h across the structure.

Q: Local property owners need to be kept apprised of this project as it proceeds.

R: Comment noted. All Focus Group participants will receive

Items	Description
	notification of the future public information centre and when the Transportation Environmental Study Report (TESR) is available for public review.
	Q: Can Glanworth Drive be designed as an underpass at Highway 401?
	R: An underpass versus an overpass was considered. There are no advantages to an underpass at this location given the extensive Highway 401 structural work that would be involved, limitations for farm vehicles and potential impact to surface and groundwater.
	Q: MTO should ensure that the proposed design provides suitable clearances for agricultural implements.
	R: Comment noted. Such design details are typically address during the next stage of the study (detail design). MTO will ensure that specific design details are addressed at that time.
	Q: Why are changes to the N-W ramp required?
	R: Long term improvements to the N-W ramp are required to accommodate the reconfiguration of other ramps in the interchange, and to accommodate future higher traffic volumes.
	Q: Why is MTO proposing to change the alignment of Glanworth Drive since it operates well?
	R: Realignment will facilitate the staging of constructions. Construction of a new bridge for Glanworth Drive over Highway 401 will allow the existing bridge to remain open during construction.
	Q: MTO should consider merging the Glanworth Drive with the Highway 401 westbound ramp.
	R: This option was reviewed, however it results in an unacceptable weave between Glanworth and westbound off ramp traffic making a left turn to go south along Highway 4. The resulting geometry cannot accommodate future traffic volumes. This option would not provide a safe access to Gentek.

Items	Description

What's Next

Subsequent to the Focus Group Meeting, the following activities will be carried out:

- Refine alternatives based on comments received;
- Continue to consult with the public and agencies for input in the assessment of the Highway 4 / Col. Talbot Road Interchange alternatives;
- Complete the evaluation and select a technically preferred alternative;
- Hold a Public Information Centre to present study findings and the technically preferred alternative;
- Develop a preliminary design plan for the technically preferred alternative;
- Identify environmental impacts and develop mitigation to minimize impacts.

Following the Public Information Centre, the Transportation Environmental Study Report (TESR) will be updated and placed on the Public Record for the 30-day review period. Notification of the TESR submission will be provided at that time.

The meeting adjourned at 3:30 p.m.

A copy of the 'Evaluation Criteria' and 'What's Next' display board will be forwarded to those in attendance.

Submitted by: _____

Tyler Drygas, Environmental Planner
URS Canada Inc.

Distribution: *Attendees*

APPENDIX B

Public Information Centre Summary Reports

Ontario

Ontario
Ministry of Transportation

URS COLE, SHERMAN

HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

From 1 km West of Highway 4
Easterly to 1 km East of Highbury Avenue
City of London, County of Middlesex
G.W.P. 476-89-00

PUBLIC CONSULTATION ROUND #1 SUMMARY REPORT

APRIL 2001

URS COLE, SHERMAN

TABLE OF CONTENTS

1.0 INTRODUCTION

A Public Information Centre was held regarding improvements to address existing and future traffic operating capacity, safety, structural and interchange improvements for Highway 401 from 1 km west of Highway 4 easterly to 1 km east Highbury Avenue. The Information Centre provided the public an opportunity to review and discuss the project with representatives of the Project Team.

The Information Centre was held on:

Tuesday April 17th, 2001
2:00 p.m. to 5:00 p.m. and 7:00 p.m. to 9:00 p.m.
Ramada Inn – Somerset Ballroom
817 Exeter Road, City of London

Representatives of URS Cole, Sherman & Associates, Ministry of Transportation and City of London staffed the Public Information Centre.

2.0 PURPOSE

The purpose of the Public Information Centre (PIC) was to focus on the identification of project needs, reasonable alternatives and the proposed evaluation method. The PIC also provided the public an opportunity to review and comment on the following:

1. Project Limits
2. Study Schedule
3. Class Environmental Assessment Process
4. Study Purpose and Problem Statement
5. Existing Conditions
6. Proposed Planning Alternatives
7. Proposed Interchange Alternatives
8. Proposed Evaluation Method and Criteria
9. What's Next

3.0 PUBLIC NOTIFICATION

Prior to the PIC, the following measures were carried out in order to make details of the information centre known to study area residents and interested members of the public:

1. An Ontario Government Notice (Notice of Public Information Centre) was placed in the following newspapers:

   - London Free Press – Tuesday April 10, 2001
   - L'Express – Wednesday April 11, 2001

2. Letters were directly sent to those people on the Project Team's External Team mailing list, including government agencies and ministries, municipalities, interest groups and individuals who requested to be added to the mailing list. The City of London Planning & Development Department also provided a list of property owners and tenants located in the project limits. (see Appendix A for letters).

3. Handouts were available at the PIC for individuals who were interested in the project.

4.0 PRE PIC MEETINGS

Municipal Team Meeting

A Municipal Team meeting was held on February 22, 2001 at the City of London Boardroom. The purpose of the meeting was to provide a project overview, discuss the status of the proposed Wonderland Road interchange and the first Public Information Centre.

External Team Meeting

An External Team meeting was held on March 22, 2001 at the MTO Southwestern Region Offices- Field Room, City of London. The purpose of the meeting was to discuss the project schedule and status report, review Highway 401 mainline widening and interchange alternatives, review Wonderland Road interchange and discuss the format for the upcoming Public Information Centre.

5.0 DISPLAY MATERIAL

The following display material was presented at the Public Information Centre (see Appendix C):

- Welcome to the PIC / Purpose of the PIC;
- Study Area;
- Background/Study Process;
- Environmental Assessment Process;
- Overview of the Class EA Process;
- Study Schedule;
- Problem Statement;
- Future Highway 401 Lane Requirements;
- Typical Cross-sections of Highway 401 Widening;
- Existing/Future Operational Conditions at Highway 4 (Col. Talbot Road) Interchange;
- Interchange Alternatives at Highway 4 (Col. Talbot Road);
- Existing/Future Operational Conditions at Wellington Road Interchange;
- Interchange alternatives at Wellington Road;
- Mainline Alternative Highbury Avenue to Exeter Road;
- Existing/Future Operational Conditions at Highbury Avenue Interchange;
- Interchange Alternatives at Highbury Avenue;
- Evaluation Process and Criteria; and,
- What's Next.

Display boards on the Proposed Wonderland Road was also provided.

- Study Area indicating Proposed Wonderland Road Interchange;
- Background/Study Process;
- Environmental Assessment Process;
- Study Schedule;
- Problem Statement;
- Proposed Interchange Alternatives;
- Evaluation Process and Criteria; and,
- What's Next.

6.0 ATTENDANCE/ SUMMARY OF COMMENTS

A total of 50 members of the public chose to sign the visitor's register for the Public Information Centre.

In addition to verbal comments, the Project Team encouraged visitors to express, in writing, all concerns or comments they had regarding the information presented. To date, fourteen (14) written comments have been received.

In general, most people recognized the need for the improvements including the addition of the Wonderland Road Interchange.

The following summarizes the comments, issues and concerns raised at the PIC:

• Traffic operations and safety improvements at Highway 4	6
• Increased noise levels	5
• Traffic flow on Decker Road	2
• Disagree with closing Morrison Road	2
• Traffic signals would increase congestion on Highway 4	2
• High water tables and drainage impacts	2
• Accessibility from Decker Road to Highway 401	1
• Property impacts	1
• Traffic signals incorporated into detail design for Wonderland Road	1
• Storm water quality and quantity to address water run off from Highway 401 to Wonderland Road	1

Ontario
Ministry of Transportation

URS
Cole Sherman

HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

From 1.0 km West of Highway 4
Easterly to 1.0 km East of Highbury Avenue
City of London, County of Middlesex
G.W.P. 476-89-00

PUBLIC CONSULTATION ROUND #2
SUMMARY REPORT

SEPTEMBER 2001

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APPENDICES

1.0 INTRODUCTION

A Public Information Centre was held regarding improvements to address the short, medium and long term needs of Highway 401 from 1.0 km west of Highway 4 easterly to 1.0 km east Highbury Avenue. This study has identified the deficiencies and needs for improvements related to traffic operation, capacity and safety on this section of the Highway 401 corridor to the year 2021.

The Information Centre provided the public an opportunity to review and discuss the project with representatives of the Project Team.

The Information Centre was held on:

Thursday September 13th, 2001
2:00 p.m. to 5:00 p.m. and 7:00 p.m. to 9:00 p.m.
Ramada Inn – Somerset Ballroom
817 Exeter Road, City of London

Representatives of URS Cole Sherman, Ministry of Transportation and City of London staffed the Public Information Centre.

2.0 PURPOSE

The purpose of the Public Information Centre (PIC) was to present the results from the first Public Information Centre, present the analysis and evaluation of alternatives and the preferred alternatives. The PIC also provided the public an opportunity to review and comment on the following:

1. Project Limits
2. Study Schedule
3. Class Environmental Assessment Process
4. Study Purpose and Problem Statement
5. Summary of Issues and Concerns Raised During the First Public Information Centre
6. Analysis and Evaluation of Alternatives
7. Preferred Alternatives
8. What's Next

3.0 PUBLIC NOTIFICATION

Prior to the PIC, the following measures were carried out in order to make details of the information centre known to study area residents and interested members of the public:

1. An Ontario Government Notice (Notice of Public Information Centre) was placed in the following newspapers:

- London Free Press – Wednesday September 5, 2001 and Saturday September 8, 2001
- L'Express – Wednesday September 5, 2001

2. Invitation letters and brochures were directly sent to those people on the Project Team's External Team mailing list, including government agencies and ministries, municipalities, interest groups, those individuals who signed up at the first PIC and individuals who requested to be added to the mailing list. The City of London Planning & Development Department also provided a list of property owners and tenants located in the project limits. (see Appendix A for letters).

3. Courier packages were sent to property owners that were directly affected.

4. Information packages were available at the PIC for individuals who were interested in the project.

4.0 PRE PIC MEETINGS

External Team Meeting

An External Team meeting was offered on September 13, 2001 prior to the Public Information Centre at the Ramada Inn, City of London. The purpose of the meeting was to discuss the analysis and evaluation of alternatives and the preferred alternatives. No agencies chose to attend.

5.0 DISPLAY MATERIAL

The following display material was presented at the Public Information Centre (see Appendix C):

- Welcome to the PIC / Purpose of the PIC;
- Study Area;
- Background/Study Process;
- Environmental Assessment Process;
- Overview of the Class EA Process;
- Study Schedule;
- Problem Statement;
- Summary of Issues and Concerns Raised During the First Public Information Centre;
- Evaluation Summary of Highway 4 (Col. Talbot Road);
- Highway 4 (Col. Talbot Road) Preferred Alternative (Mid-term);
- Evaluation Summary of Wellington Road;
- Wellington Road Preferred Alternative (Short-term);
- Typical Section of Wellington Road;
- Evaluation Summary of Highbury Avenue;
- Highbury Avenue Preferred Alternative (Long-term 2021);
- Summary of Improvements; and,
- What's Next.

Display boards for the Proposed Wonderland Road interchange was also provided.

- Study Area;
- Background/Study Process;
- Environmental Assessment Process;

- Study Schedule;
- Problem Statement;
- Evaluation Summary of Wonderland Road;
- Wonderland Road Preferred Alternative; and,
- What's Next.

6.0 ATTENDANCE/SUMMARY OF COMMENTS

A total of 50 members of the public chose to sign the visitor's register for the Public Information Centre.

In addition to verbal comments, the Project Team encouraged visitors to express, in writing, all concerns or comments they had regarding the information presented. To date, seven (7) written comments have been received.

The following summarizes the comments, issues and concerns raised at the PIC:

• Noise impact evaluation	2
• Business entrances along Highway 4 (Col. Talbot Road)	1
• Consideration of core-collector lanes through London	1
• Impacts to Dingman Creek drain	1
• Clean out the Fournie drain	1
• Replacement of fences along Highway 401	1
• Safety improvements on Highway 4 (Col. Talbot Road)	1
• Improvements to the left-turn lane (northbound) from Highway 4 (Col. Talbot Road) to Burtwisle Lane	1
• Road sign at the corner of Littlewood Road and Highway 401 impairs view of oncoming traffic	1
• Property acquisition	1

Ontario

URS

HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

From 1.0 km West of Highway 4
Easterly to 1.0 km East of Highbury Avenue
City of London, County of Middlesex
G.W.P. 476-89-00

PUBLIC CONSULTATION ROUND #3
SUMMARY REPORT

NOVEMBER 2003

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APPENDICIES

1.0 INTRODUCTION

A Public Information Centre (PIC) was held to update the public on the progress of the Highway 401 Improvements Study from 1.0 km west of Highway 4 easterly to 1.0 km east of Highbury Avenue, and to present and seek public input on the recommended plan for improvements to Highway 401 and associated interchanges, prior to resubmitting the Transportation Environmental Study Report (TESR).

The PIC provided the public an opportunity to review and discuss the project with representatives of the Project Team.

The Information Centre was held on:

Wednesday November 19th, 2003
3:00 p.m. to 8:00 p.m.
CAW Local 1520 - Auditorium
6688 Tempo Road, London

Representatives of URS Canada Inc., and the Ministry of Transportation staffed the Public Information Centre.

2.0 PURPOSE

The purpose of the PIC was to update the public on the progress of this study, the evaluation of alternatives and the recommended alternatives. The PIC also provided the public an opportunity to review and comment on the following:

1. Project Limits
2. Study Background
3. Problem Statement
4. Interim Improvements
5. Overview of the Class EA Process
6. Study Schedule
7. Future Highway 401 Lane Requirements
8. Evaluation Summaries for Interchange Alternatives
9. Summary of Issues and Concerns Raised
10. Alternatives Considered at the Highway 4 / Col. Talbot Road Interchange
11. Evaluation Criteria
12. Evaluation Summary of Highway 4 (Col. Talbot Road)
13. What's Next

3.0 PUBLIC NOTIFICATION

Prior to the PIC, the following measures were carried out in order to make details of the PIC known to study area residents and interested members of the public:

1. An Ontario Government Notice (Notice of Public Information Centre) was placed in the following newspapers:

- London Free Press – Wednesday November 12, 2003
- L'Express – Monday November 17, 2003

2. Invitation letters and brochures were sent directly to those people on the Project Team's External Team mailing list, including government agencies and ministries, municipalities, interest groups, focus group, those individuals who signed up at the previous PICs and individuals who requested to be added to the mailing list (see Appendix A for letters).

3. Information packages were available at the PIC for individuals who were interested in the project.

4.0 PRE PIC MEETINGS

Focus Group Meeting

A Focus Group meeting, comprised of property and business owners in the vicinity of the Highway 401 / Highway 4 (Col. Talbot Road) interchange, City of London engineering staff, municipal politicians and representatives from the local agricultural community, was held on August 20, 2003 to discuss alternative long-term designs and to identify any outstanding issues and concerns related to this interchange. Following this meeting, the long-term alternative designs were evaluated and a preferred alternative was selected for the Highway 401 / Highway 4 (Col. Talbot Road) interchange.

5.0 DISPLAY MATERIAL

The following display material was presented at the Public Information Centre (see Appendix C):

- Welcome to the PIC / Purpose of the PIC;
- Study Area;
- Study Background;
- Problem Statement;
- Interim Improvements;
- Interim Improvements at Highway 4 / Col. Talbot Rd. Interchange;
- Overview of the Class EA Process;
- Study Schedule;
- Environmental Assessment Process;
- Future Highway 401 Lane Requirements;
- Typical Cross Sections;
- Wellington Road Preferred Alternative (Short Term);
- Evaluation Summary of Wellington Road;
- Highbury Avenue Preferred Alternative (Long Term 2021);
- Evaluation Summary of Highbury Avenue;
- Summary of Issues and Concerns Raised at the Second Public Information Centre (September 13, 2001);
- Supplemental Stakeholder Consultation;
- Summary of Issues and Concerns Raised at the Focus Group Meeting;
- Future Operational Conditions at Highway 4 (Col. Talbot Road) Interchange;
- Alternative 1 – Parclo A-4 Interchange;

- Alternative 1A – Parclo A-4 (Modified) Interchange;
- Alternative 2 – Parclo A north side & Parclo B south side;
- Alternative 3 – Parclo A north side & Diamond south side;
- Evaluation Criteria;
- Evaluation of Highway 4 (Col. Talbot Road);
- Construction Staging Plan;
- What's Next.

6.0 ATTENDANCE/SUMMARY OF COMMENTS

A total of 21 members of the public chose to sign the visitor's register for the PIC.

In addition to verbal comments, the Project Team encouraged visitors to express, in writing, all concerns or comments they had regarding the information presented. To date, three (3) written comments have been received.

The following summarizes the comments, issues and concerns raised at the PIC:

• The interim improvements provide safer traffic conditions; the temporary signals on Col. Talbot(at Littlewood) are slowing traffic speeds through the Highway 401 / Col. Talbot Road interchange area.	2
• The E-S ramp at the Highway 4 (Col Talbot Road) interchange should be closed to eliminate the weaving condition on Highway 401.	2
• Need for improved illumination at the Glanworth Drive structure.	2
• Agree with the Interim Improvements (new E-N/S ramp and intersection).	1
• Concern regarding the speed of the trucks exiting westbound Highway 401.	1
• Concern regarding the lack of illumination at the intersection of Highway 401 and Littlewood Drive (suggest installing traffic lights or beacons on top of the stop sign).	1
• Need to make traffic exiting Highway 401 aware of the 30 km/h ramp speed limit.	1
• Need to accommodate agricultural vehicles to Wonderland Road via Tempo Road and Glanworth Drive if Orr Drive is closed.	1
• Concern regarding the movement of wide and slow moving vehicles through the project limits.	1
• Lengthening the left turn lane into Burtwistle Lane would accommodate safer left turns.	1
• Need for improved illumination at the Tempo Road / Highway 4 (Col. Talbot Road) intersection to facilitate safer left turns.	1
• Need for the City of London to construct an acceleration lane on Col. Talbot Road north of Highway 401 to reduce truck interference with car passage.	1
• Concern with the closure of Orr Drive, particularly during construction when the Tempo Rd. detour is in place. This condition will cause slow moving agricultural vehicles normally using Orr Drive to mix with detour traffic.	1
• Either alternative 1 or 2 is acceptable for the Highway 401 / Col. Talbot Road long-term improvements, however, tower lighting is required.	1

• Stop signs at Highway 401 and Col. Talbot Road (interim improvements) are too small, and require bold text to prevent vehicles from entering one-way traffic.	1
• Future improvements to Highway 401 and Wonderland Road should be accelerated.	1
• Will a new bridge be required for the short-term improvements to Highway 401 and Wellington Road?	1

APPENDIX C

Noise Assessment Report

SS WILSON ASSOCIATES
Consulting Engineers

DRAFT

REPORT NO. WA00-75-1

NOISE IMPACT STUDY
HIGHWAY 401
PRELIMINARY DESIGN/CLASS ENVIRONMENTAL ASSESSMENT
HIGHWAY 401 IMPROVEMENTS
FROM 1KM WEST OF HIGHWAY 4 EASTERLY
TO 1 KM EAST OF HIGHBURY AVENUE
G. W. P. 476-89-00
CITY OF LONDON
ONTARIO

SUBMITTED TO:

URS COLE, SHERMAN & ASSOCIATES LTD.
75 COMMERCE VALLEY DRIVE EAST
THORNHILL, ONTARIO
L3T 7N9

PREPARED BY:

TAREK ZAYED, P.ENG.
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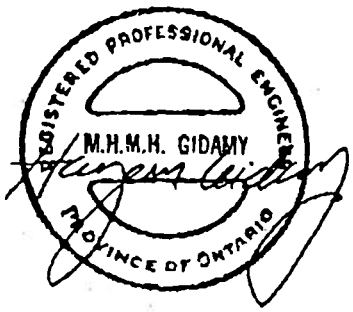
APPROVED BY:

HAZEM GIDAMY, P.ENG.
PRINCIPAL



JULY 17, 2002

SSWA INC. 15 Wertheim Court, Suite 211, Richmond Hill, Ontario, L4B 3H7
Tel: (905) 707-5800 Fax: (905) 707-5801

NOISE IMPACT STUDY
HIGHWAY 401
PRELIMINARY DESIGN/CLASS ENVIRONMENTAL ASSESSMENT
HIGHWAY 401 IMPROVEMENTS
FROM 1 KM WEST OF HIGHWAY 4 EASTERLY
TO 1 KM EAST OF HIGHBURY AVENUE
G. W. P. 476-89-00
CITY OF LONDON
ONTARIO

INDEX

EXECUTIVE SUMMARY

This Noise Report has been prepared to address the noise impacts associated with the proposed improvements to the mainline Highway 401 and the interchanges at Highway 4 (Col. Talbot Road), Wellington Road and Highbury Avenue within the study area. Figure 1 shows the location and limits of the study area.

The criteria used in this study are based on the MOEE/MTO Noise Protocol and on the MTO Quality & Standards Directive A-1.

Road and traffic data were supplied by the Prime Consultants, URS Cole, Sherman & Associates Ltd. for the existing (Year 1999) and future (Year 2021) conditions.

Twenty receptors were selected to represent the noise-sensitive areas that may be potentially impacted by the proposed undertaking. Figures 2.1 to 2.9 show the locations of the selected receptors.

Several alternative improvement schemes were considered for the interchanges within the study area. These alternatives were evaluated based on differences of the impacts (and benefits) in order to select technically preferred improvement schemes. The noise impact assessment of the former was previously carried out by this firm, while the assessment of the latter is the subject of this Study.

The ambient noise levels predicted for the existing conditions (Year 1999) are in the range of 59 dBA to 73 dBA as listed in Table 1.

Table 2 lists the predicted future project sound levels (in the range of 61 dBA to 75 dBA) and includes the relevant comparisons with the applicable criteria.

Based on the results listed in Table 2, the future project sound levels are predicted to slightly exceed the existing ambient levels, but not to exceed the Provincial warrant for consideration of noise control measures.

Table 3 includes a summary of the noise impact assessment at all the selected receptors within the study area, where the impact is predicted to be acoustically insignificant (in the range of 2-3 dBA).

This Study also includes sections documenting the measures necessary to deal with the noise impact during the construction process and setting sound level limits for the protection of the construction personnel.

1.0 INTRODUCTION

The services of SS Wilson Associates were retained by URS Cole, Sherman & Associates Ltd. to prepare an Environmental Noise Impact Assessment Study as part of the Preliminary Design/Class Environmental Assessment Study for the traffic associated with the proposed improvements to Highway 401 from 1 km west of Highway 4 interchange easterly 14.4 km to 1 km east of Highbury Avenue within the County of Middlesex and in the City of London, Ontario.

Interchanges within the study area include:

- Highway 4 (Co. Talbot Road)
- Highway 402
- Wellington Road
- Highbury Avenue

Figure 1 shows the location of the study area.

The objectives of this study are as follows:

- To predict the Existing (Year 1999) and the Future with the undertaking (Year 2021) sound levels at all the noise sensitive locations within the study area.
- To assess the noise impacts and the potential for mitigation at all noise sensitive locations, which may be subject to increase in traffic noise levels greater than 5 dBA. The evaluation will be based on the MOEE/MTO Protocol for noise impacts and will include details on the proposed noise control measures; where warranted.
- To document the measures, which may be considered to minimize the noise and vibration impacts generated by any pile driving or other noise and/or vibration producing operations that may be required as part of the subject undertaking.

Within the study limits, Highway 401 pavement varies from 6 through lanes east of the Wellington Road Interchange to 4 lanes west of the Wellington Road Interchange. Paved shoulders and a median with a concrete median barrier are also present throughout the project limits.

This study represents a joint effort with the Consulting Engineering Firm URS Cole, Sherman & Associates Ltd., who provided the necessary traffic data and overall project direction.

2.0 SOUND LEVEL CRITERIA

The applicable sound level criteria for this project is described below.

2.1 *MOEE/MTO Noise Protocol*

The MOEE/MTO Noise Protocol is a joint effort of both the Ministry of the Environment and Energy (MOEE) and the Ministry of Transportation (MTO) as outlined in the document titled "A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments", February 1986. It primarily applies to Provincial Highway undertakings such as Freeways and King's Highways.

With regards to the specific sound level criteria, the following statements are quoted from the Protocol:

1. The objective for outdoor sound levels is the higher of the Leq 55 dBA or the existing ambient. The significance of a noise impact will be quantified by using this objective in addition to the change in noise level above the ambient.

2. The noise impact on noise-sensitive land uses (i.e., residential) will be determined for outdoor spaces.

3. Mitigation will attempt to achieve levels as close to, or lower than, the objective level as is technically, economically, and administratively feasible.

4. The following Table summarises the degree of mitigation effort to be applied for various noise level increases:

SUMMARY OF MITIGATION EFFORT

CHANGE IN NOISE LEVEL ABOVE AMBIENT	MITIGATION EFFORT (IN ACCORDANCE WITH NOISE PROTOCOL)
0 – 5 dBA > 5 dBA	- None - Investigate noise control measures on R.O.W. - If project cost is not significantly affected introduce noise control measure within R.O.W. - Noise control measures where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers. - Mitigate to ambient, as administratively, economically and technically feasible.

2.2 *MTO Quality & Standards Directive A-1*

The MTO Quality & Standards (QST) Directive A-1 Noise Policy and Acoustic Standards for Provincial Highways documents the MTO policy for investigation and controlling of Provincial Highway noise and its effects on adjacent noise sensitive areas.

With regards to specific sound level criteria, the following statements are quoted from the QST Directive A-1:

1. When setting priorities for retrofit and determining impacts for highways, traffic volume shall be 1/24 of the higher of the average Annual Daily Traffic (AADT) volume or Summer Average Daily Traffic (SADT) volume.

   While it is acceptable to use AADT where SADT is not available, every effort should be made to determine SADT.

2. Vehicle speeds used in the evaluation of impacts shall be the posted speed limits.

3. Land uses listed below, by themselves do not qualify as Noise Sensitive Areas (NSA's):

   - Apartment balconies above ground floors;
   - Educational facilities (except dormitories with Outdoor Living Areas (OLA's));
   - Churches;
   - Cemeteries;
   - Parks and picnic areas which are not inherently part of a NSA;
   - Day care centres;
   - All commercial;
   - All industrial.

4. Future noise levels from the proposed undertaking shall be based on traffic projections 10 years after completion of the undertaking. Where traffic projections 10 years after completion are not available, the best available data may be used.

5. To determine impact, a comparison shall be made between the "do nothing" alternative 10 years in the future and noise levels with the undertaking at the same date. In both cases, future traffic volumes should be used. The significance of a noise impact will be calculated by comparing these two sound levels.

6. The significance of a noise impact will be qualified by using the Objective 55 dBA in addition to the change in noise level above the ambient sound level

Appendix A includes copies of the MOEE/MTO Noise Protocol and the MTO QST Directive A-1. Copies of the same are included in the MTO Environmental Office Manual, Technical Areas – Noise, EO-V-1000-00, May 15, 1992.

3.0 TRAFFIC DATA

All traffic data have been provided by URS Cole, Sherman & Associates Ltd. The SADT/AADT traffic volumes for the existing ambient are based on the year 1999, while the SADT/AADT traffic volumes for the year 2021 were provided for the Future project conditions. Appendix B includes the traffic data used in the noise analysis.

4.0 SELECTED RECEPTORS

Twenty receptor locations (denoted R1 to R15 and R20 to R24) have been selected to represent the outdoor spaces of the residential, institutional and commercial properties along the subject corridor of Highway 401. The selection of these receptors was based on our review of the project drawings and on consultation with staff of URS Cole, Sherman & Associates Ltd.

The following gives a brief description of the selected twenty four receptor locations noted above:

R1: Commercial building (Peterbilt Transport), west of Highbury Avenue and north of Highway 401.

R2: Commercial building (Penske Truck Rental & Leasing), west of CN Rail and north of Highway 401.

R3: House, east of Wellington Road, south of Highway 401 and north of Wilton Grove Road.

R4: OPP Building, east of Wellington Road, north of Highway 401 and south of Exeter Road.

R5: Motel (Ramada Inn), east of Wellington Road and north of Highway 401.

R6: House, east of Dingman Drive and north Highway 401.

R7: House, west of Dingman Drive, east of ramp to Highway 402 and north of Highway 401.

R8: House, west of Highway 402 ramps, east of Westminster Drive and north of Highway 401.

R9: House, west of Highway 402 ramps, east of Westminster Drive and north of Highway 401.

R10: Church building, north of Westminster Drive and south of Highway 401.

R11: House, south of Westminster Drive and Highway 401.

R12: House, north of Highway 401, between Westminster Drive and Scotland Drive.

R13: House, east of Scotland Drive and south of Highway 401.

R14: House, west of Scotland Drive and south of Highway 401.

R15: House, east of Scotland Drive and north of Highway 401.

R20: House, east of Col. Talbot Road, north of Glanworth Drive and Highway 401.

R21: House, at corner of Col. Talbot Road and Littlewood Drive and north of Highway 401.

R22: House, south of Littlewood Drive, west of Col. Talbot Road and north of Highway 401.

R23: House, west of Highway 4, east of Burtwistle Lane and south of Highway 401.

R24: Motel (Best Western), west of Burtwistle Lane and south of Highway 401.

Figures 2.1 to 2.9 show the locations of the selected receptors.

Receptors R16 to R19 are adjacent to a future interchange at Wonderland Road and Highway 401. A separate Noise Report was prepared by this firm (Report No.: WA00-75-2, Noise Impact Study, Highway 401 Improvements Planning Study, Highway 401 and Wonderland Interchange, G. W. P. 476-89-00, City of London, Ontario) to address the noise impact associated with this undertaking proposed by the City of London.

5.0 SOURCES OF AMBIENT NOISE

Ambient noise used in the context of this report is the Existing (year 1999) sound levels at the selected receptor locations without the additional noise generated by the proposed undertaking.

The Existing (year 1999) ambient sound levels are established in this study using the MOEE prediction model "ORNAMENT", which is acceptable to the MTO (QST Directive A-1).

The presently dominant source of ambient noise in the study area is the existing vehicular traffic on Highway 401 and the various intersecting streets. In the future, these sources of noise will still be the dominant source of ambient noise in the study area.

Table 1 lists the predicted Existing (year 1999) ambient sound levels, which range from 59 dBA to 73 dBA. Appendix D includes sample sound level calculations for the Existing (Year 1999) ambient sound levels.

6.0 ALTERNATIVE IMPROVEMENT SCHEMES

Several interchange alternative improvement schemes were considered for this undertaking at Highway 4 (Co. Talbot Road), Wellington Road and Highbury Avenue.

For mainline Highway 401, the improvements entail widening from 4 to 6 lanes and from 6 to 8 lanes to improve capacity and upgrading its illumination and drainage.

For the interchanges in the study area, the improvements include modifications to their design, including new structures and improved ramp geometrics.

The noise analysis of the interchange alternative improvement schemes is presented in Appendix E.

7.0 PREFERRED IMPROVEMENT SCHEMES

Based on the evaluation of the alternatives, the following improvements are proposed to this section of the Highway 401 corridor:

- Highway 4 (Col. Talbot Road) to Highway 402 – widen Highway 401 to 6 lanes symmetrically on both sides of the existing centreline by 2021;
- Highway 402 to Wellington Road – widen Highway 401 to 6 lanes evenly on both sides of the existing centreline by 2006 and 8 lanes by 2021;
- Wellington Road to Highbury Avenue – widen Highway 401 to 8 lanes evenly on both sides of the existing cetreline by 2021;
- Highway 4 (Col Talbot Road) Interchange – a Parclo A-4 interchange design including the closure of Glanworth Drive by 2021;
- Wellington Road Interchange – a Parclo A-4 interchange design by 2006;
- Highbury Avenue Interchange – a Parclo A-4 interchange design by 2021;
- Illumination and drainage improvements throughout the study area.

8.0 NOISE IMPACT METHODOLOGY

Road traffic sound levels in this study have been predicted using the technique developed by the U.S. Federal Highway Administration (FHWA) enhanced by the Ministry of Transportation and the Ministry of the Environment and Energy.

The U.S. FHWA model was jointly revised by the MTO and the MOEE to incorporate procedures for the calculation of additional attenuation due to ground (the additional attenuation is due to the type of ground cover; for example hard, soft, ...etc and also due to the terrain configuration or topographic features). The computerized version of the ORNAMENT model, STAMSON version 5.04 was used for calculating the sound levels throughout the study area. The technical data of the ORNAMENT model used and the various adjustments implemented are summarized in Appendix C.

The calculations are primarily based on the Summer Average Daily Traffic volumes (SADT) for highways, Annual Average Daily Traffic volumes (AADT) for roadways, percentages of medium and heavy trucks, posted speed limits, road to receptor distance, elevation differential between the road and the receptor, roadway gradient, pavement type, the type of ground cover between the road and the receptor in question.

A multi-segment analysis for the selected receptor locations (R1 to R15 and R19 to R24) was used to account for the difference in highways, roads and ramps elevations.

Based on the MTO Directives, the equivalent sound levels in dBA; Leq corresponding to the average hourly volume of traffic based on the SADT for highways and the AADT for roadways was used, i.e. (24h) in dBA.

The traffic data supplied by URS Cole, Sherman & Associates Ltd. and used in the sound level calculations are included in Appendix B.

The Future with the undertaking (Year 2021) sound levels have been predicted at all the selected receptor locations (R1 to R15 and R19 to R24). Appendix D also includes sample sound level calculations for the Future with the undertaking conditions.

The environmental noise impact assessment in this study is based on the excess of the Future with the undertaking above the Existing ambient sound levels, as well as on the absolute future with the undertaking sound levels as compared to the Provincial Objective of 55 dBA.

The noise assessment in this study pertains to the preferred improvement scheme referenced in Section 7.0. The assessment of the alternative improvement schemes referenced in Section 6.0, was carried-out in a separate

study, which was previously prepared by this firm on May 31, 2001. Appendix E includes a copy of the May 31, 2001 noise study.

9.0 NOISE IMPACT ASSESSMENT

The impact is assessed primarily for Outdoor Living Areas (OLA's) and is based on the following:

- The relative change in predicted future sound levels with the undertaking above or below the predicted existing ambient sound levels.
- The absolute sound levels (i.e. Future with the undertaking) at the receptors of concern relative to the objective sound level criterion of Leq 55 dBA.

All the predicted sound levels (i.e. Existing and Future with the undertaking) are expressed as Leq (24h) dBA.

Table 2 shows the Existing ambient and the Future with the undertaking sound levels as well as the excesses above the Existing ambient levels and above the Leq 55 dBA criterion at the selected residential/institutional receptor locations (i.e. R1 to R15 and R20 to R24). This table also shows the acoustical significance of the Future project levels above the Existing ambient and the need if any, for noise control measures. Figures 3.1 and 3.2 illustrate the numerical data listed in Table 2.

Table 3 summarizes the noise impact for the entire study area. The summary shows the significance of the noise impact due to the proposed undertaking as well as the opportunity and type of noise control measures, if warranted.

From the results presented in Tables 2 and 3 noted above, the following is concluded:

(i) All the future project sound levels are predicted to have excesses over the existing ambient levels in the range of 2-3 dBA. Such excesses are considered to be acoustically insignificant and are mainly attributed to the forecasted increases in the Highway 401 future traffic volumes over the existing conditions.

According to the MOEE/MTO Noise Protocol, the predicted excesses of the future project sound levels over the existing ambient levels do not exceed 5 dBA and therefore, consideration of noise control measures is not warranted.

(ii) All the future project sound levels are predicted to have significant (i.e. more than 5 dBA) to very significant (i.e. more than 10 dBA) excesses over the Government Leq 55 dBA sound level objective. However, the noise impacts associated with these predicted excesses are significantly lessened by the presence of high ambient sound levels mainly due to the

existing traffic conditions on Highway 401 and to a lesser extent to the traffic on the intersecting streets and interchange ramps. Therefore, the proposed undertaking is not envisaged to significantly alter the excesses of the prevalent ambient noise above the Leq (24h) 55 dBA Objective.

The sound level assessment at receptors R16 to R19 (Highway 401/Wonderland Road interchange) was carried-out in a separate Noise Report prepared by this firm (as noted in Section 4.0).

10.0 CONSTRUCTION NOISE

In addition to the noise emitted by the operation of vehicles on the proposed undertaking, noise during the construction phase is an issue that should also be addressed.

Unlike operational noise, construction noise is temporary in nature depending on the type of work required and its location relative to the noise-sensitive receptors.

The significance of the construction noise impact depends on the number of pieces of equipment, their types, type and time of operation and their proximity to the receptors in question.

This section covers the requirements for control of construction noise produced by the Contractor's Operations. With the exception of any exemptions from municipal noise control by-laws that may be indicated elsewhere in the Contract, these requirements do not relieve the Contractor of other obligations imposed by statute or by municipal by-law.

The following is a brief outline of the procedures to be followed in handling construction noise during the construction phase:

a. The Contractor to note the location of the residences as shown in Figures 2.1 to 2.11.

b. Noise constraints in noise sensitive areas are as follows:

NOISE SENSITIVE AREA LIMITS WITHIN THE CONTRACT LIMITS	
CONSTRAINT	CONSTRAINT DETAILS
Equipment Maintenance	Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components, and the lubrication of moving parts.
Equipment Operation	Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
Rock Drilling, Blasting and Crushing Operations/Pile Driving Operation	These operations shall be limited to 07:00-19:00 hours. Drilling to be carried out with hydraulic drills with dust collectors.
Blasting Operations	The contractor shall conduct pre-blast survey to determine the extent of the air concussion and ground borne vibration levels so that the levels do not exceed the following: 120 dBA Linear on a peak level detector for air concussion and a peak particle velocity of 10mm/sec for the ground borne vibration as predicted and/or measured at the closest residential dwelling. In the event of the potential for exceedances of the above limits, the contractor shall be responsible for conducting pre-blast surveys within the homes of concern to document the condition of the house including structural and plaster cracks that is prior to and following each blast that may exceed the stated limits.
Pile Driving Operations	The contractor shall attempt to minimize the noise/vibration impacts at sensitive receptors due to pile driving operations. In the event of persistent complaints, the contractor shall apply alternative control measures wherever technically feasible in an attempt to further reduce these impacts.

c. The Contractor shall obtain a copy of the most recent noise control by by-law from the Municipality and enforce all the by-law provisions for this contract. A copy of the City of London By-Law (PW-4 Consolidated May 9, 1994) is included in Appendix F.

d. Any initial complaint from the public will require verification by MTO that the general noise control measures agreed to are in effect; MTO will investigate any noise concerns, warn the contractor of any problems, and enforce its contract.

e. Notwithstanding compliance with the "general noise control measures", a persistent complaint will require a contractor to comply with MOEE sound level criteria for construction equipment contained in the MOEE Model Municipal Noise Control By-Law. Subject to the results of field investigation, alternative noise control measures will be required, where these are reasonably available.

11.0 OCCUPATIONAL HEALTH & SAFETY – NOISE

No employee on the project shall be exposed to the following sound levels without the use of appropriate hearing protectors and/or noise control measures:

- Leq (8h) of 85 dBA (the average acoustic energy measured at the employees ears level over a work period of 8 hours. Further adjustments to the 85 dBA level would be necessary if the employee would work over 8 hours in any one day).

- Impulse noise due to some equipment such as Pile Drivers shall not exceed 140 dB Linear Peak for single impulses.

- Appropriate hearing protectors shall be selected in accordance with the applicable CSA Standards.

TABLES

TABLE 1
PREDICTED EXISTING AMBIENT SOUND LEVELS

RECEPTOR	PREDICTED EXISTING SOUND LEVEL, Leq (24h)
R1	73 dBA
R2	69 dBA
R3	63 dBA
R4	68 dBA
R5	64 dBA
R6	63 dBA
R7	66 dBA
R8	64 dBA
R9	66 dBA
R10	67 dBA
R11	59 dBA
R12	60 dBA
R13	65 dBA
R14	61 dBA
R15	63 dBA
R20	59 dBA
R21	65 dBA
R22	60 dBA
R23	66 dBA
R24	70 dBA

TABLE 2
ROADWAY ENVIRONMENTAL NOISE IMPACT ASSESSMENT
HIGHWAY 401 IMPROVEMENTS
FROM 1KM WEST OF HIGHWAY 4 EASTERLY
TO 1KM EAST OF HIGHBURY AVENUE
CITY OF LONDON, ONTARIO

Receptor Code	Existing (Year 1999) dBA	Future Undertaking (Year 2021) dBA	Government Leq Sound Level Objective dBA	Excess Criteria for mitigation dBA	Future Undertaking (Year 2021) Minus Existing (Year 1999)	Significance of the Change due to the Future Undertaking (Year 2021) Minus Existing (Year 1999)	Future Undertaking (Year 2021) Minus Government Leq Sound Level Objective	Noise Control measures As per Protocol
R1	72.6	74.9	55	5	2	Insignificant	20	Not required
R2	69.4	71.7	55	5	2	Insignificant	17	Not required
R3	62.6	65.0	55	5	2	Insignificant	10	Not required
R4	67.7	70.1	55	5	2	Insignificant	15	Not required
R5	64.1	66.8	55	5	3	Insignificant	12	Not required
R6	62.5	64.8	55	5	2	Insignificant	10	Not required
R7	66.4	68.9	55	5	3	Insignificant	14	Not required
R8	64.0	65.7	55	5	2	Insignificant	11	Not required
R9	65.9	68.6	55	5	3	Insignificant	14	Not required
R10	66.5	69.4	55	5	3	Insignificant	14	Not required
R11	58.7	60.7	55	5	2	Insignificant	6	Not required
R12	60.1	63.0	55	5	3	Insignificant	8	Not required
R13	64.9	67.1	55	5	2	Insignificant	12	Not required
R14	61.3	63.5	55	5	2	Insignificant	9	Not required
R15	63.4	65.6	55	5	2	Insignificant	11	Not required
R20	59.4	61.8	55	5	2	Insignificant	7	Not required
R21	65.1	67.3	55	5	2	Insignificant	12	Not required
R22	60.1	62.5	55	5	2	Insignificant	8	Not required
R23	65.8	67.5	55	5	2	Insignificant	13	Not required
R24	70.0	72.8	55	5	3	Insignificant	18	Not required

Impact Assessment Rating :

0 to < 3 dB change : Insignificant
=>3 to < 5 dB change : Noticeable
=> 5 to < 10 dB change. Significant
=> 10 dB change : Very Significant

Table 3
SUMMARY OF NOISE IMPACT ASSESSMENT
FOR THE PROPOSED HIGHWAY 401 IMPROVEMENTS

AREA	NO. OF PROPERTIES AFFECTED						OPPORTUNITY FOR NOISE CONTROL	TYPE OF MITIGATION	RATIONALE/COMMENTS
	0-5 dBA DECREASE	5-10 dBA DECREASE	>10 dBA DECREASE	0-5 dBA INCREASE	5-10 dBA INCREASE	>10 dBA INCREASE			
R1				4			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R2				4			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R3				3			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R4				1			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R5				1			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R6				2			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R7				1			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R8				2			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R9				1			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R10				1			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R11				3			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R12				1			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R13				1			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R14				2			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R15				2			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R20				2			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R21				3			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R22				3			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R23				2			N/A	N/A	Excess < 5 dBA – mitigation not warranted
R24				1			N/A	N/A	Excess < 5 dBA – mitigation not warranted

FIGURES

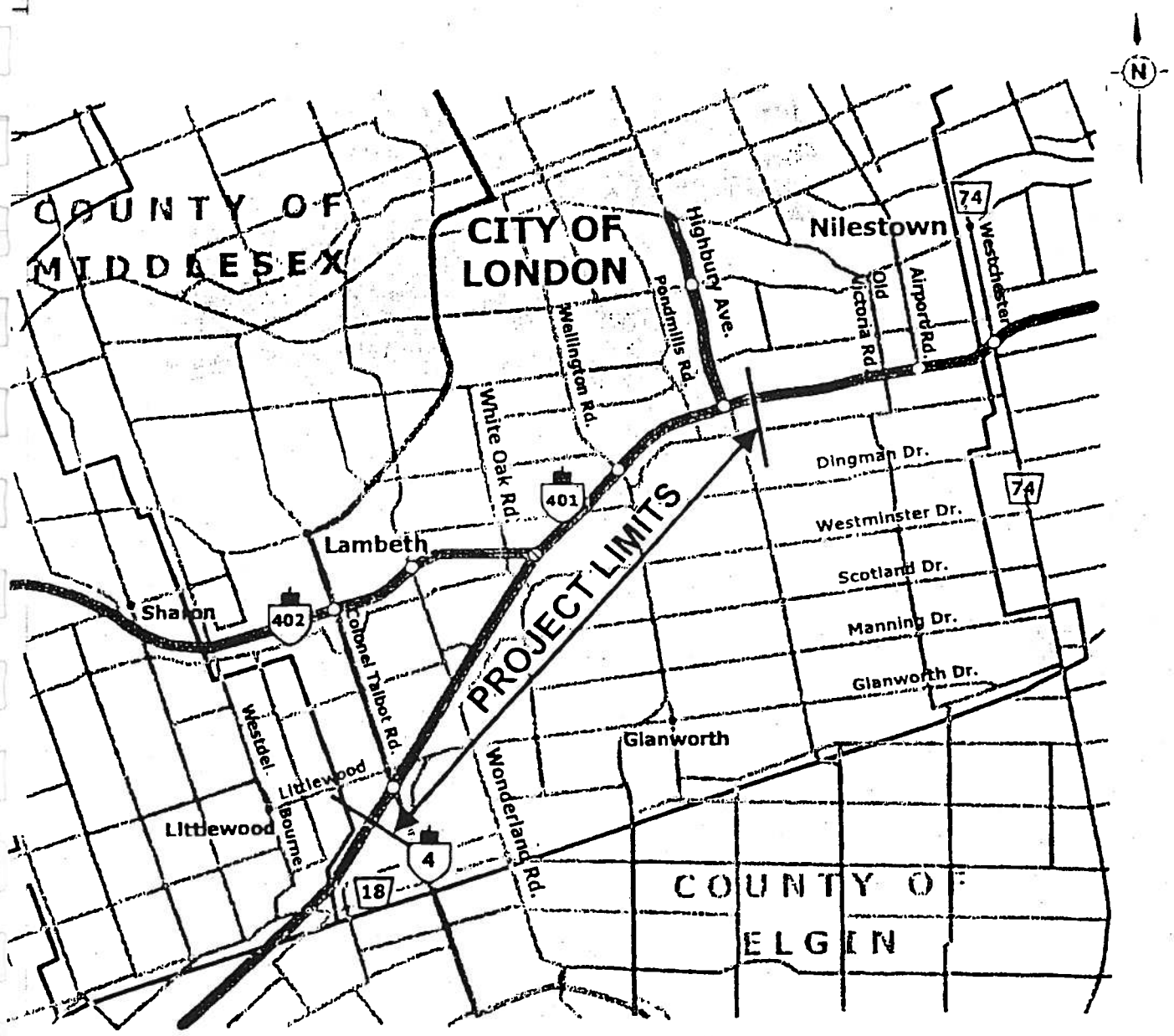


FIGURE 1
THE LOCATION OF THE STUDY AREA

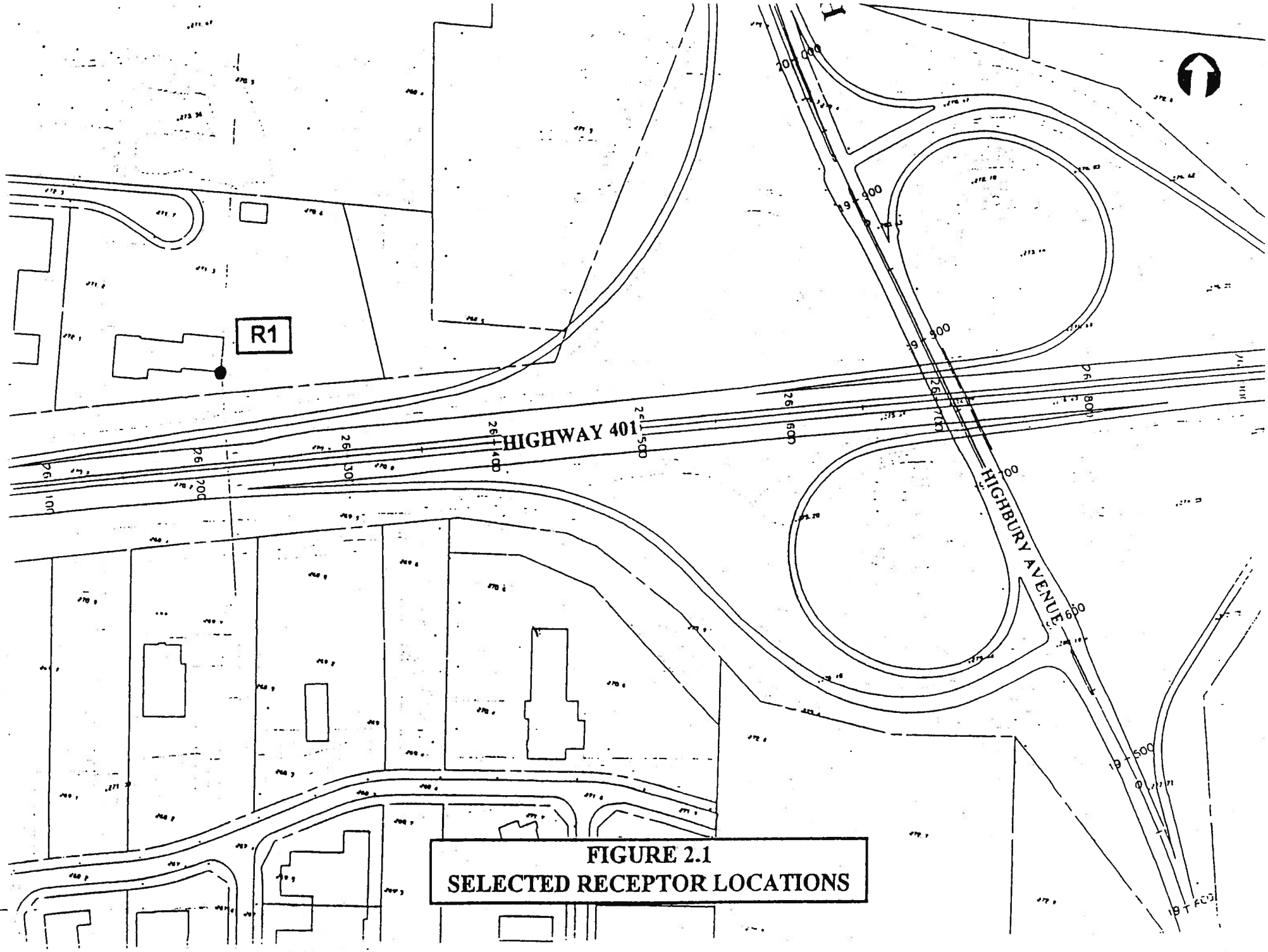


FIGURE 2.1
SELECTED RECEPTOR LOCATIONS

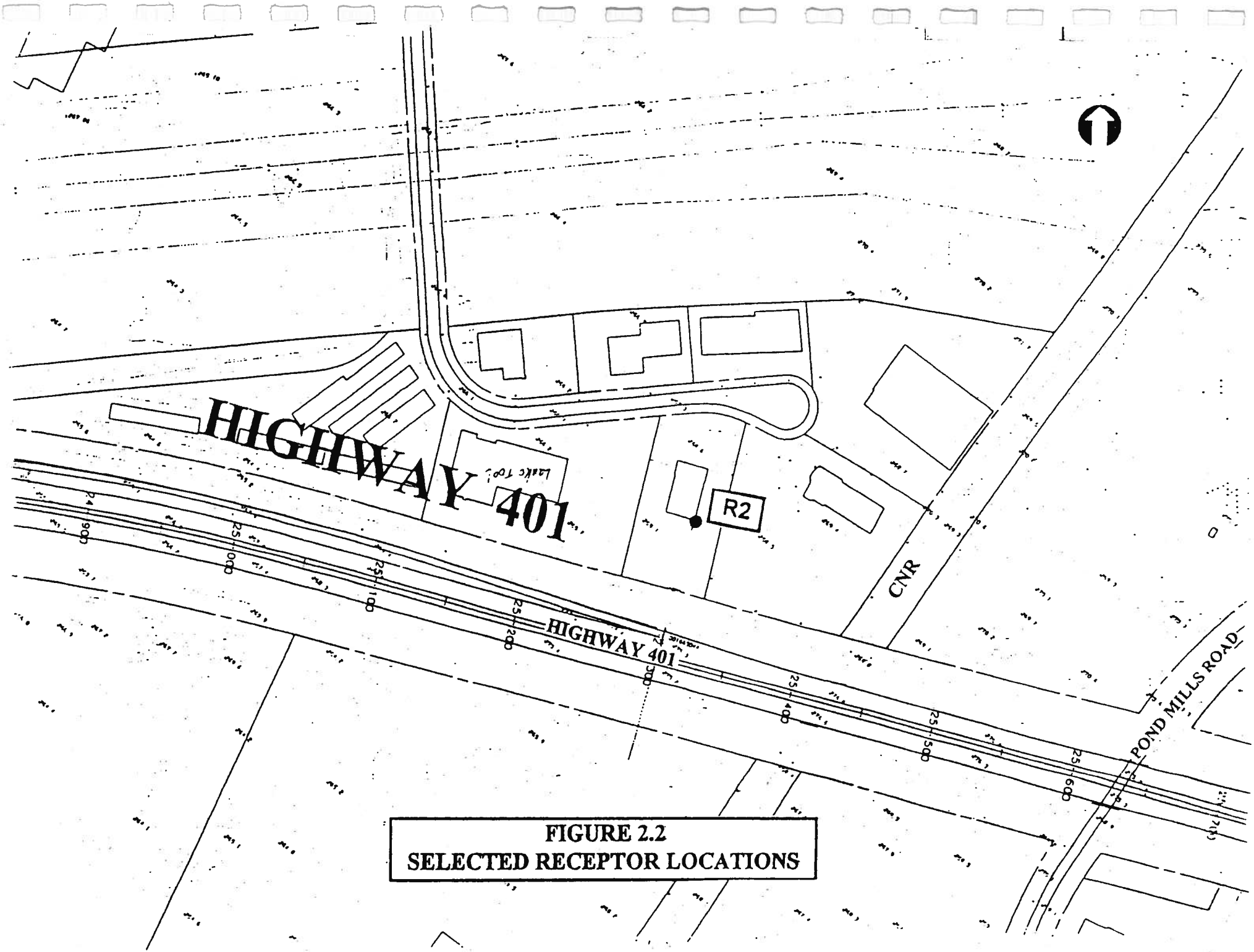


FIGURE 2.2
SELECTED RECEPTOR LOCATIONS

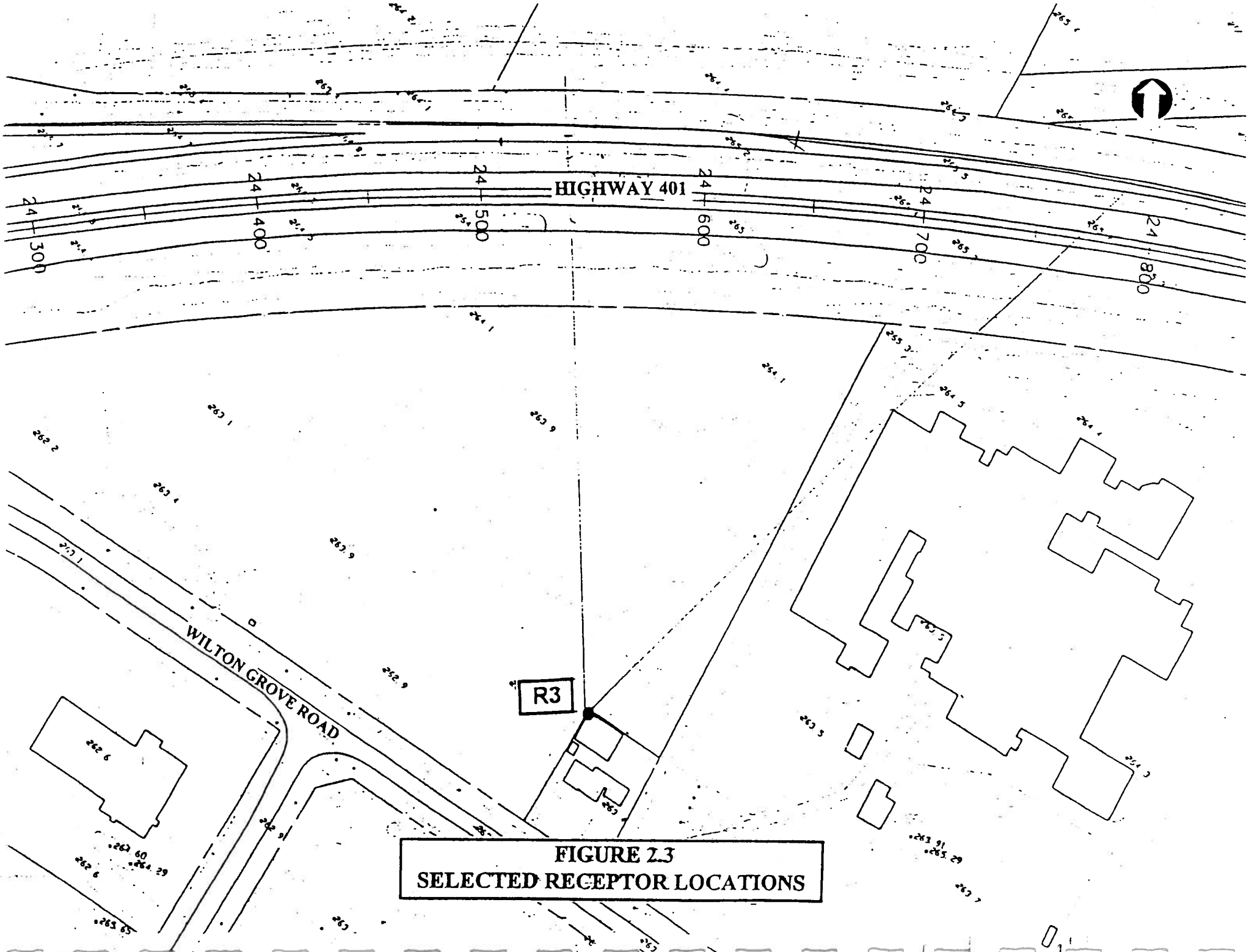


FIGURE 2.3
SELECTED RECEPTOR LOCATIONS

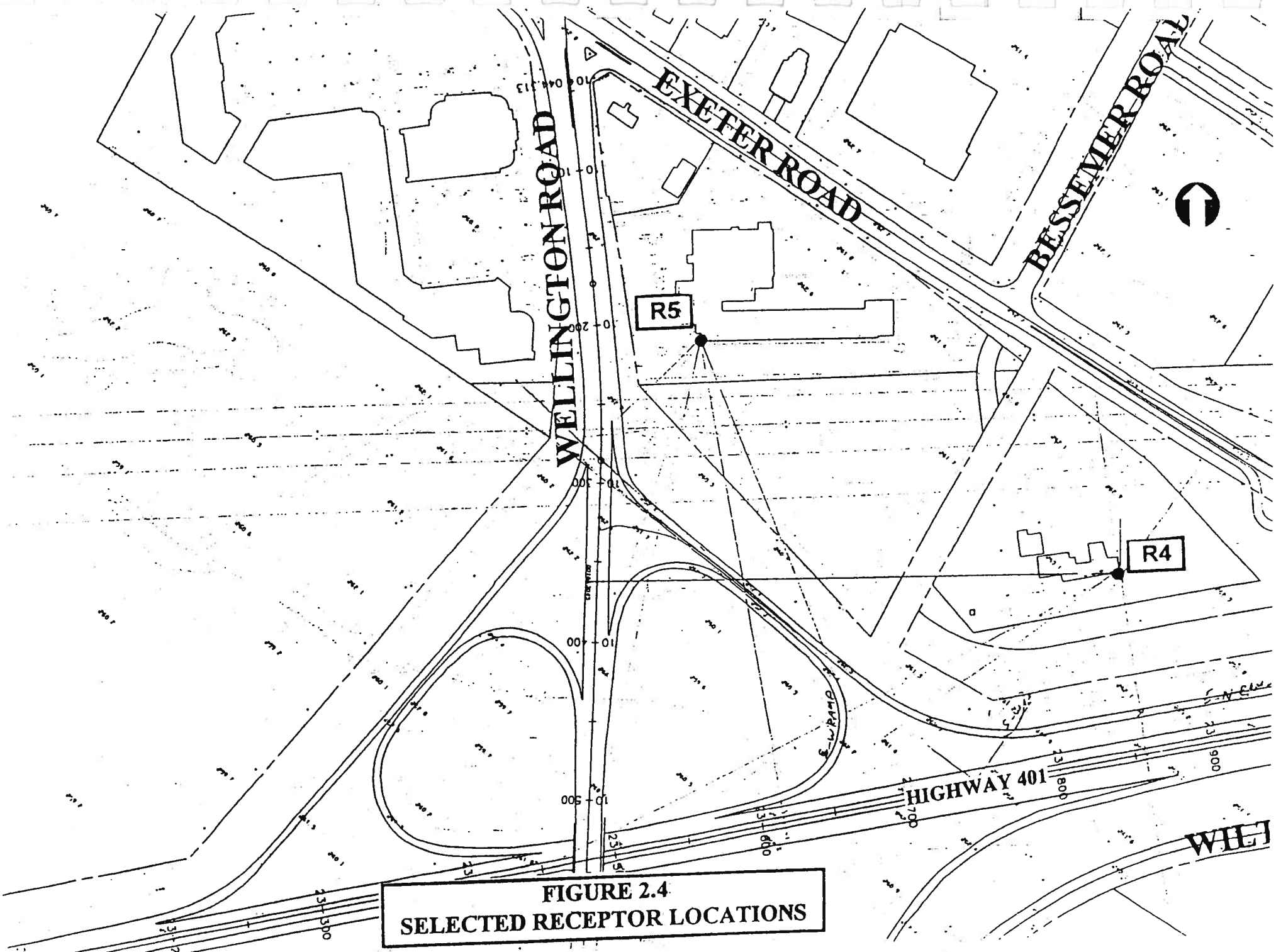


FIGURE 2.4
SELECTED RECEPTOR LOCATIONS

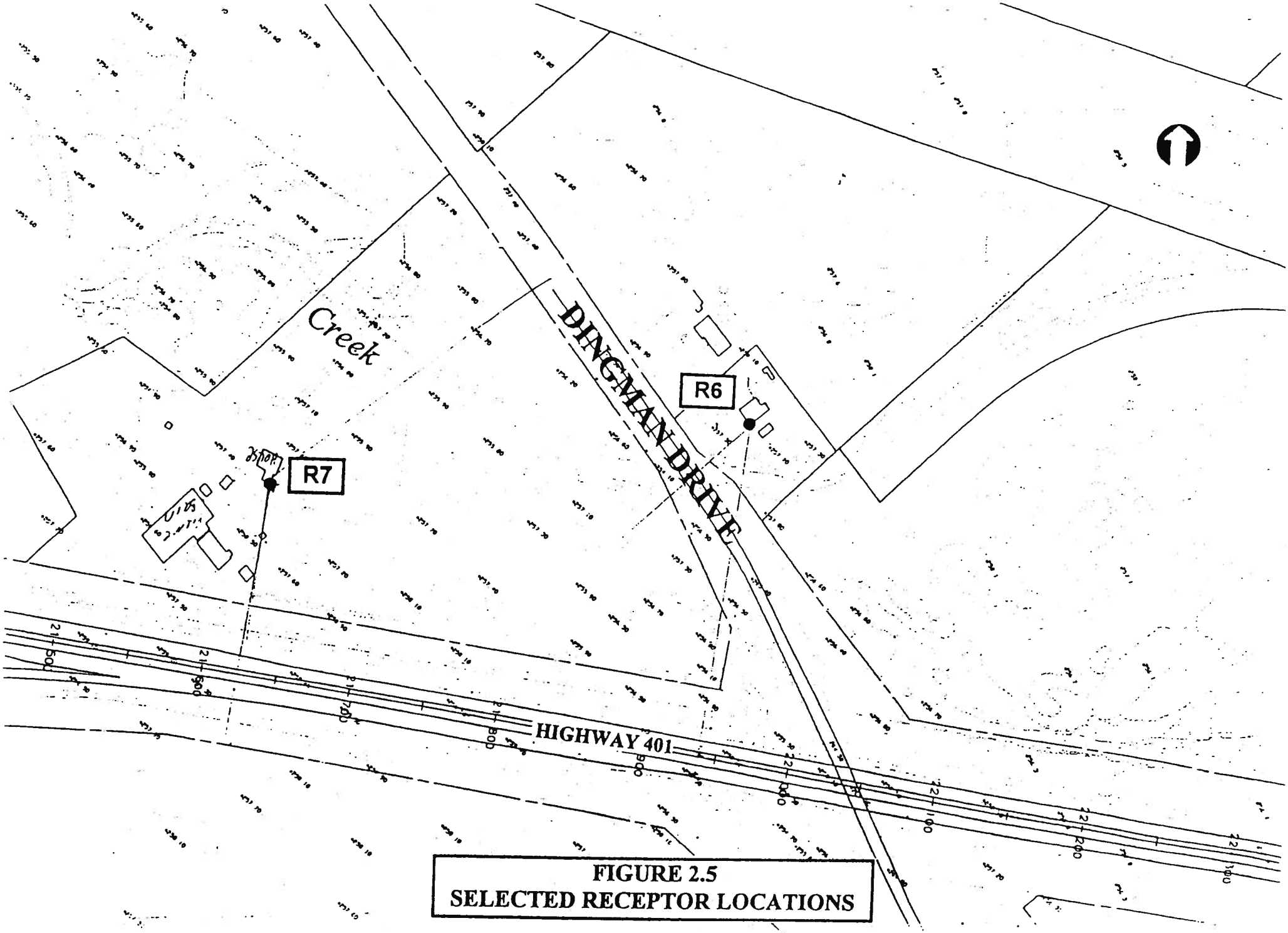


FIGURE 2.5
SELECTED RECEPTOR LOCATIONS

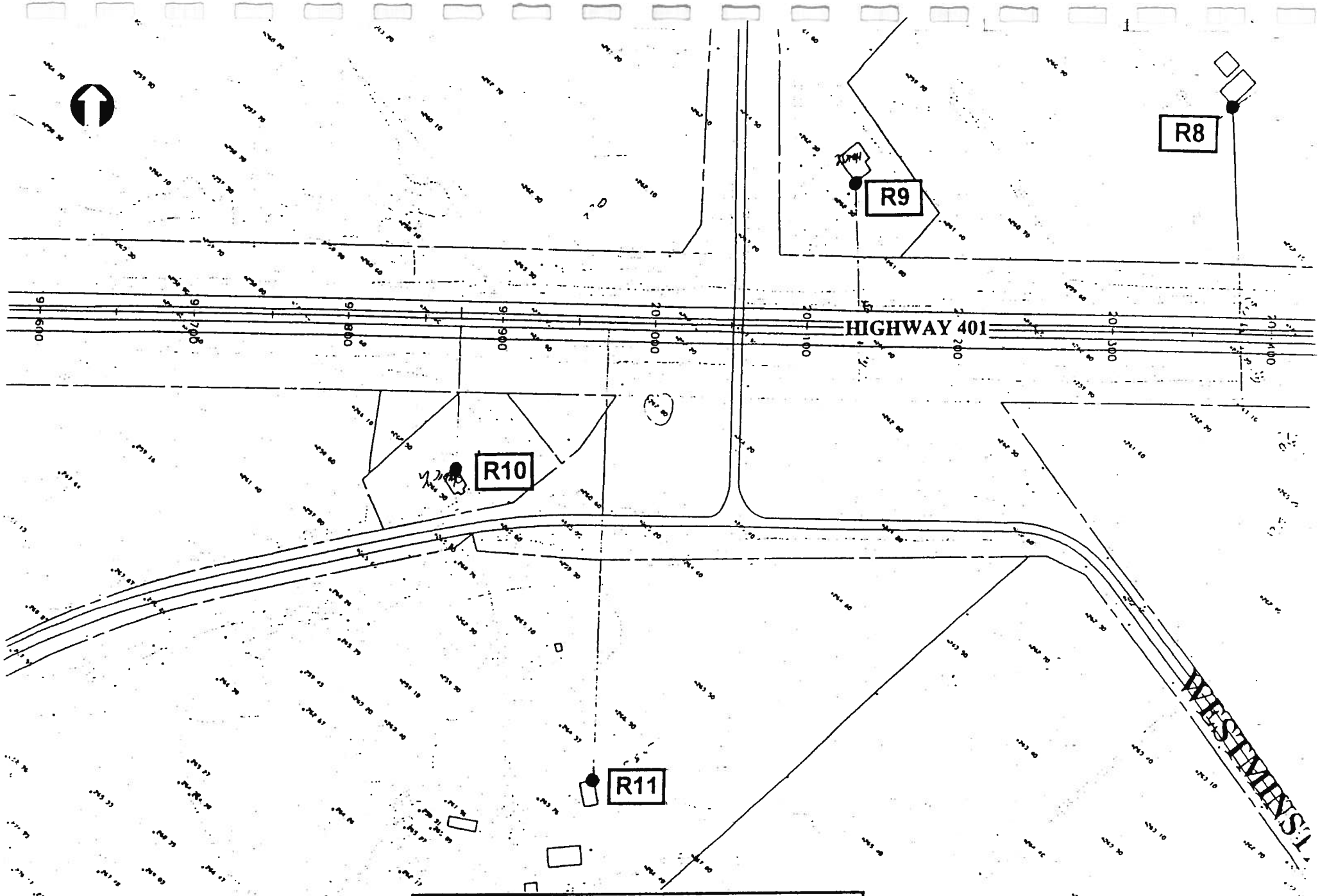


FIGURE 2.6
SELECTED RECEPTOR LOCATIONS

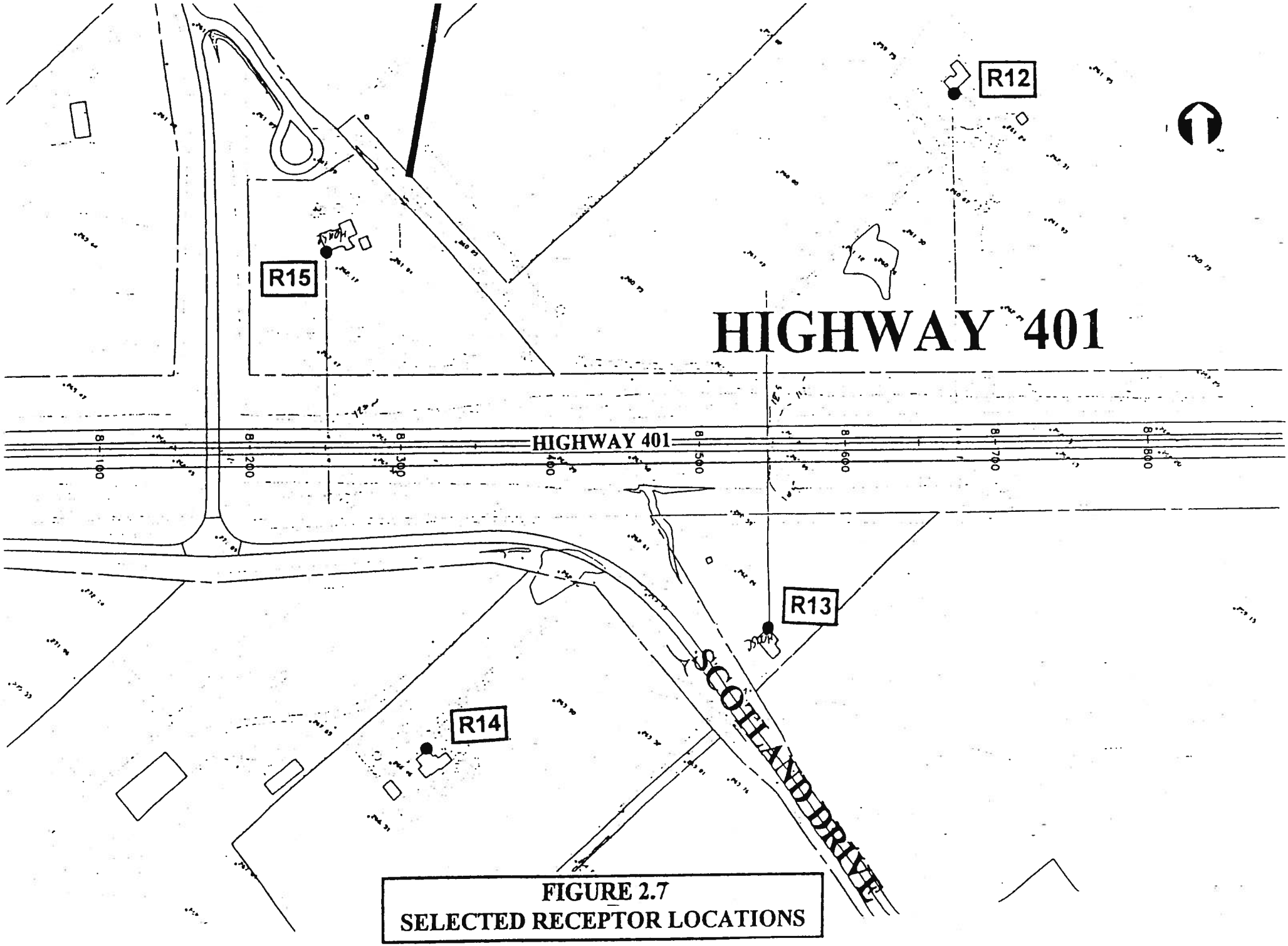


FIGURE 2.7
SELECTED RECEPTOR LOCATIONS

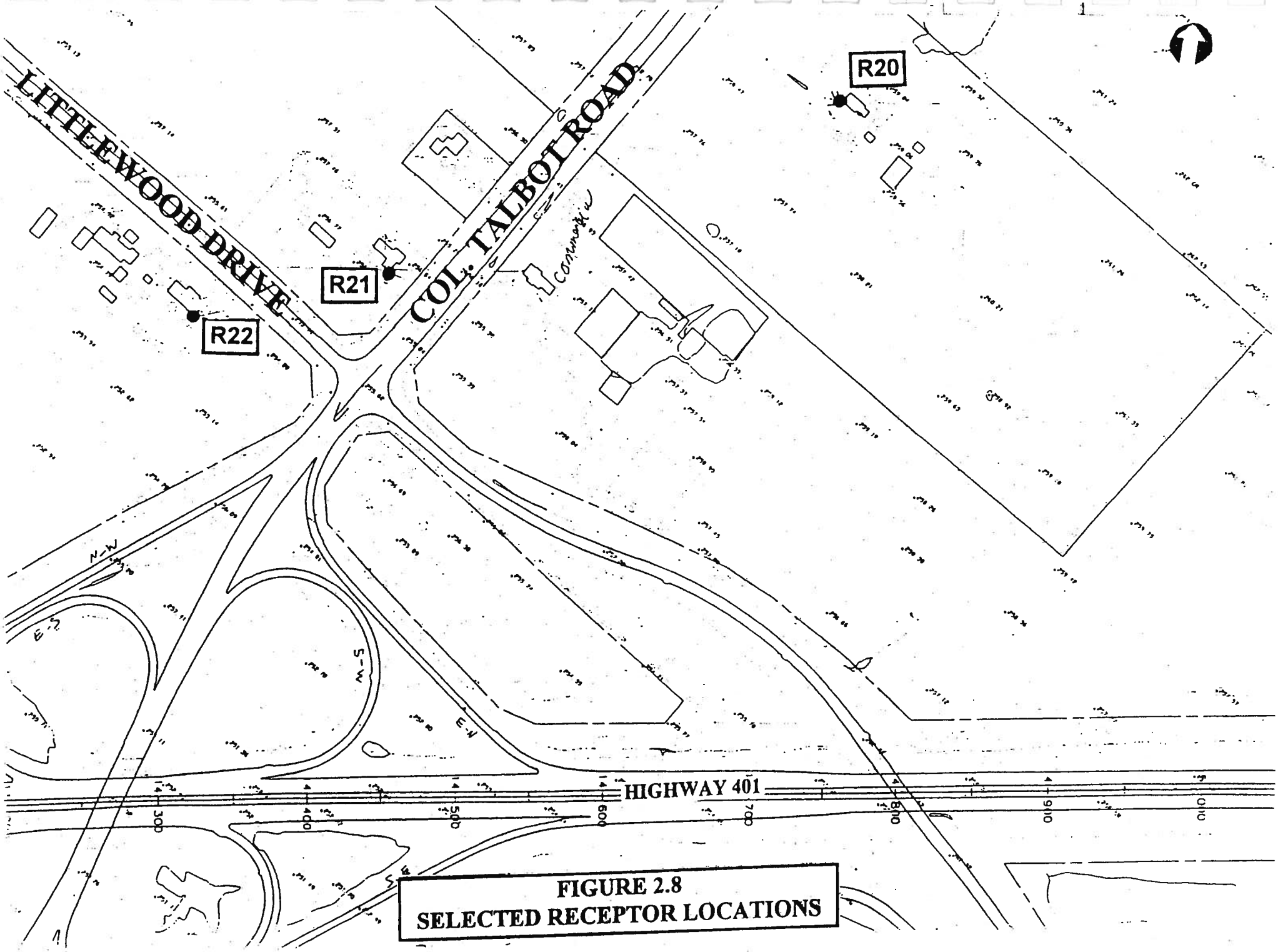


FIGURE 2.8
SELECTED RECEPTOR LOCATIONS

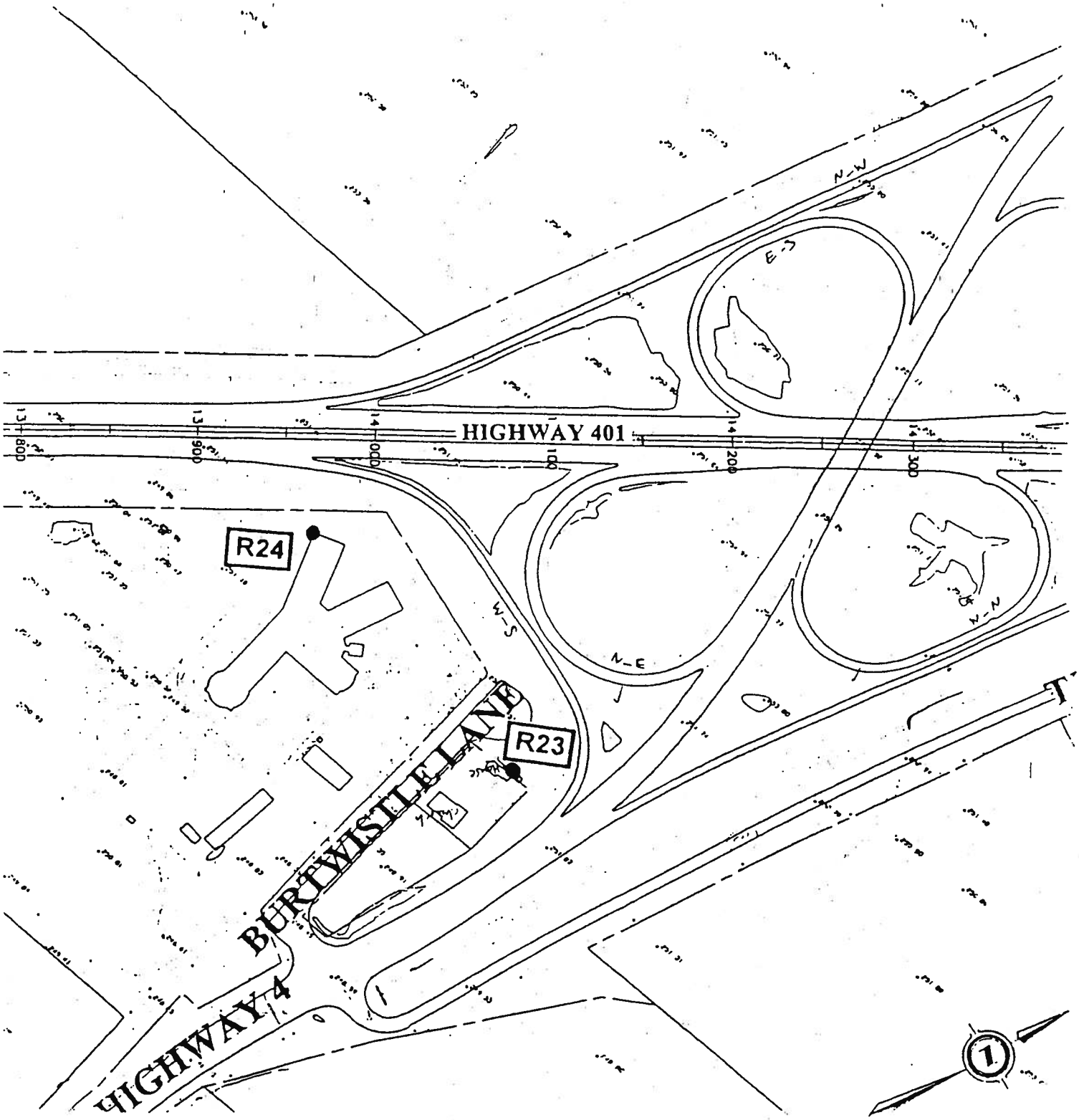


FIGURE 2.9
SELECTED RECEPTOR LOCATIONS

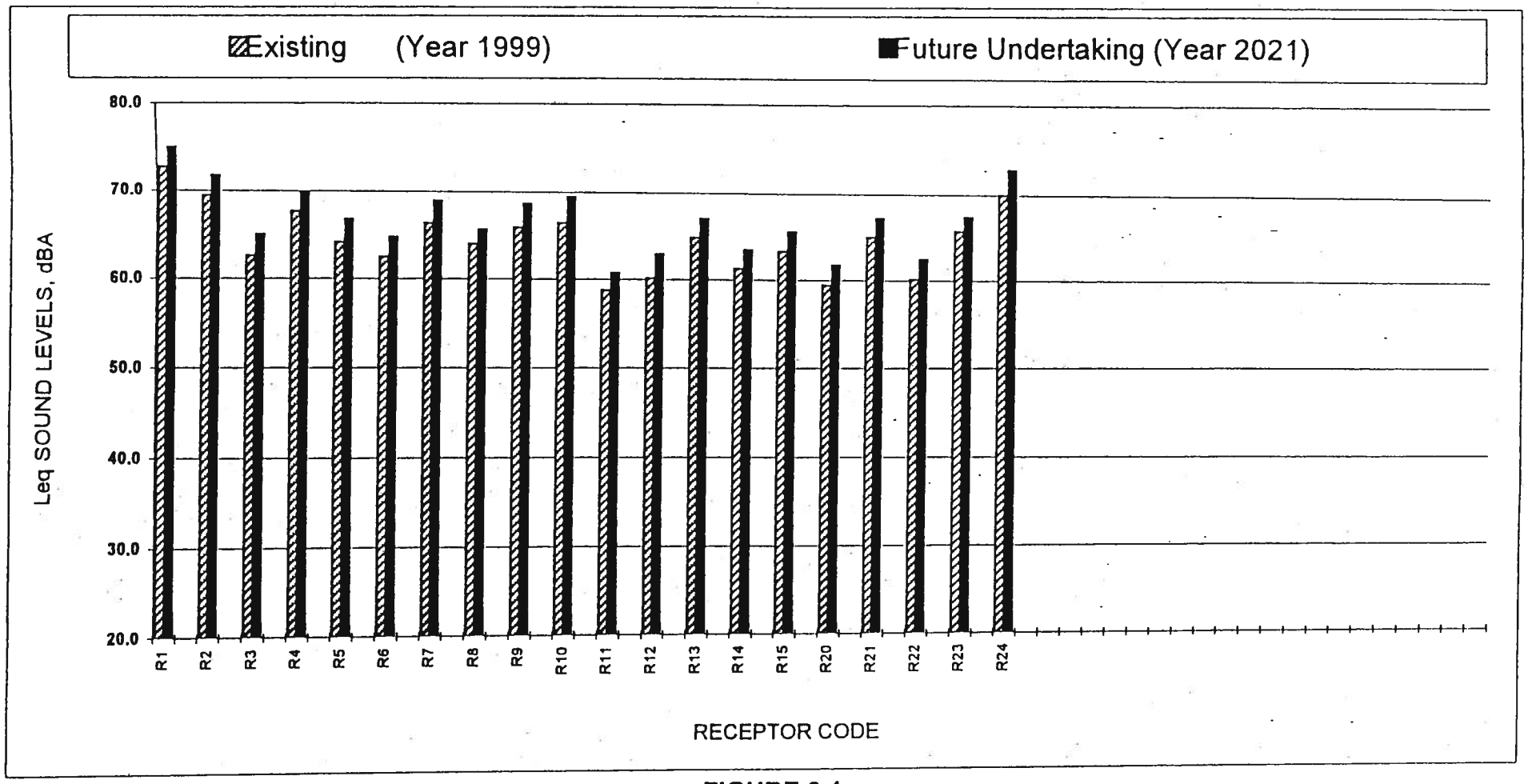
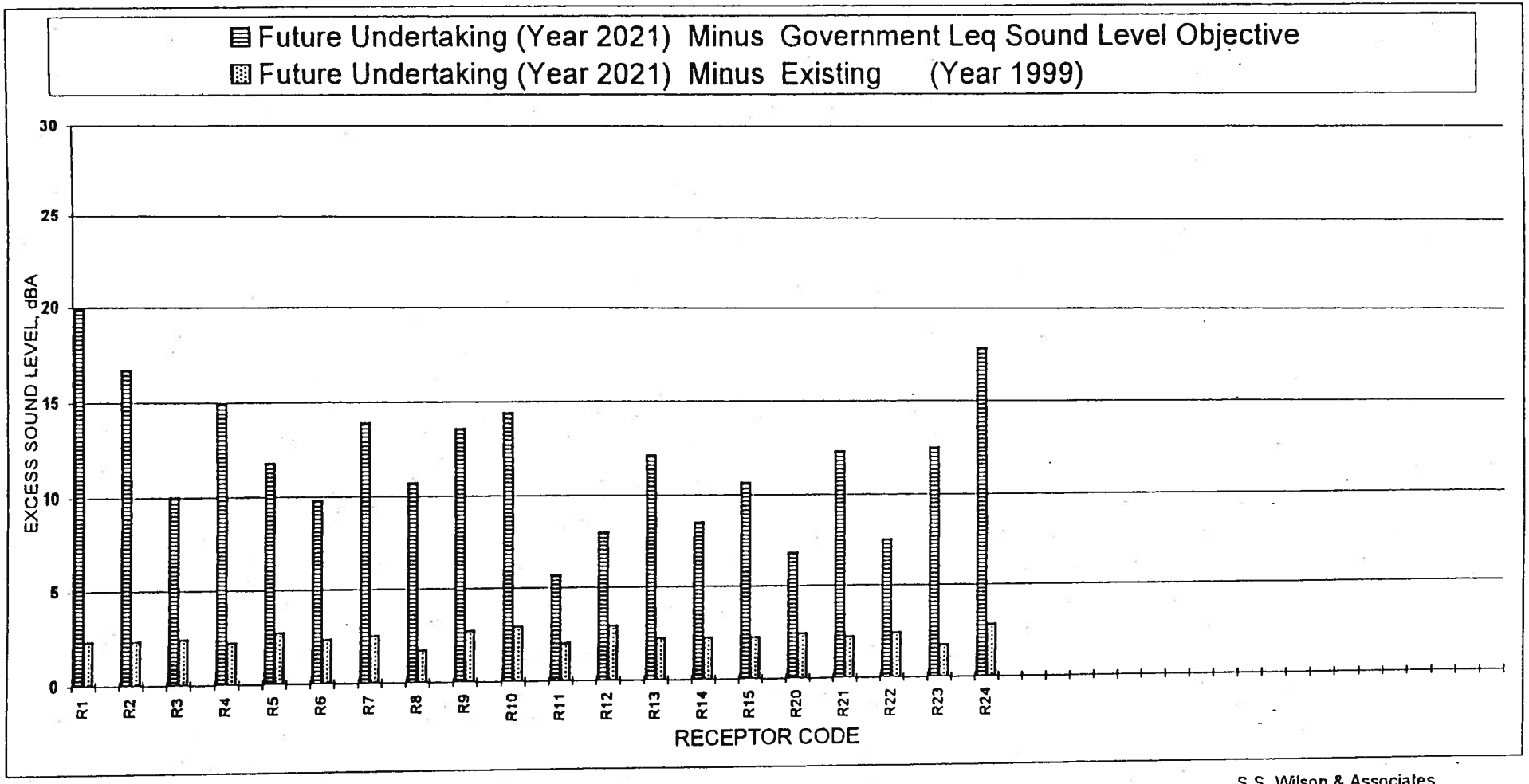


FIGURE 3.1

ROADWAY ENVIRONMENTAL NOISE IMPACT ASSESSMENT
HIGHWAY 401 IMPROVEMENTS
FROM 1KM WEST OF HIGHWAY 4 EASTERLY
TO 1KM EAST OF HIGHBURY AVENUE
CITY OF LONDON, ONTARIO



S.S. Wilson & Associates

Notes To Table :

- Positive excess level Indicates increase in future sound levels.
- Negative excess level Indicates decrease in future sound levels.

FIGURE 3.2

ROADWAY ENVIRONMENTAL NOISE IMPACT ASSESSMENT
HIGHWAY 401 IMPROVEMENTS
FROM 1KM WEST OF HIGHWAY 4 EASTERLY
TO 1KM EAST OF HIGHBURY AVENUE
CITY OF LONDON, ONTARIO

APPENDIX A

MOEE/MTO NOISE PROTOCOL AND MTO QST DIRECTIVE A-1

A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highway's Environmental Assessments

This Protocol contains areas of policy agreement between the Ministries of Transportation and Communications, and Environment for dealing with noise concerns during the preparation, review and evaluation of environmental assessments for Provincial Highway undertakings.

As common understandings are resolved for any outstanding issues, these will be added to the Protocol by formal agreement.

D.P. Caplice
Assistant Deputy Minister
Operations Division
Ministry of Environment

J.R. Barr
Assistant Deputy Minister
Engineering and Construction
Ministry of Transportation
and Communications

FEBRUARY
1986

1. Retrofit barriers The MTC policy for retrofit of existing freeways with sound will remain in effect and unchanged.

2. Scope of Protocol

This protocol applies to the MTC Capital Construction Program for all classes of MTC Provincial roads, both urban and rural. The policy for each situation may require different noise control measures and further, that an assessment of the feasibility of providing noise control measures includes technical and economic considerations.

3. Definition of Noise Sensitive Areas

To be clearly defined, as guided by the One-Stage Procedural Guidelines and the specific definitions of "residential areas" and "quiet zones" found in the municipal noise control by-laws, approved by MOE under the Environmental Protection Act.

4. Establishing Existing and Future Noise Levels

Presently used prediction methodologies and measurement procedures are satisfactory. Any future changes, in noise prediction methodologies or measurement procedures, shall be compatible with those of both MOE and MTC.

Staff of MTC and MOE together shall set a standard for ambient noise levels in rural areas where predictions cannot be done.

5. Impact Assessment

Noise impacts for all MTC Provincial roads will be predicted based on traffic projections ten years after completion, or best available data when 10-year projections are not available.

The study area shall be defined using the smaller of one of the two following methods; using 5 decibel contour lines extending from the source to the point where there is no increase above the ambient level, or a distance of 600 m from the source.

The noise impact on noise-sensitive land uses will be determined for outdoor spaces.

All reference to 65 dBA as a "target" and 70 dBA as a "maximum" will be removed from MTC directives A-1 and B-94. Further, reference to a 70 dBA maximum should be removed from the Provincial Policy. The objective for outdoor sound levels is the higher of the Leq 55 dBA or the existing ambient. The significance of a noise impact will be quantified by using this objective in addition to the change in noise level above the ambient.

Mitigation will attempt to achieve levels as close to, or lower than, the objective level as is technically, economically, and administratively feasible.

6. Noise Control Measures

The attached Table summarizes the degree of mitigation effort to be applied for various noise level increases.

On right-of-way mitigation measures will be identified, considered and implemented where warranted.

Mitigation measures within the right-of-way include: barriers, berms, vertical and horizontal alignments, pavement surfaces, etc.

Where noise increases above the ambient do not exceed 5 dBA no mitigation is required.

Where noise increases above the ambient exceed 5 dBA MTC will:
- investigate noise control measures within the right-of-way
- if project costs are not significantly affected and where averaged over first row receivers, a minimum attenuation of 5 dBA can be achieved, MTC will introduce the selected measures within the right-of-way.

Where a freeway is to be expanded through an existing residential area that has been included on the retrofit priority list, noise attenuation measures should be considered as part of the freeway expansion project when the MTC policy for Retrofit of Existing Freeways can be satisfied.

7. Documentation

MTC will increase its E.A. documentation with respect to the feasibility of all potential mitigation measures within the right-of-way. The feasibility of each measure would be evaluated by such factors as effectiveness and technical and economic feasibility.

8. Construction Noise

The following is a brief outline of the procedures to be followed in handling construction noise during the Environmental Assessment process and during the construction phase. Commitment to the following shall be made in all E.A. Documents:

(a) Noise sensitive areas will be identified;

(b) Applicable municipal noise control by-laws will be identified and obeyed. Where timing constraints, or any other municipal by-law may cause hardship to MTC, an explanation of this will be outlined in the EA document, and an exemption from such by-law will be sought directly from the municipality in question.

(c) General noise control measures (not sound level criteria) will be referred to, or placed into MTC contract documents;

(d) Any initial complaint from the public will require verification by MTC that the general noise control measures agreed to are in effect; MTC will investigate any noise concerns, warn the contractor of any problems, and enforce its contract;

(e) Notwithstanding compliance with the "general noise control measures", a persistent complaint will require a contractor to comply with MOE sound level criteria for construction equipment contained in the MOE Model Municipal Noise Control By-Law. Subject to the results of field investigation, alternative noise control measures will be required, where these are reasonably available; and

(f) In selecting the appropriate construction noise control and mitigation measures, MTC will give consideration to the technical, administrative, and economic feasibility of the various alternatives.

9. Miscellaneous

(a) All future technical documents referred to in this agreement and prepared to become part of the Protocol shall be jointly approved by MOE and MTC. These include:

- o ambient levels in Rural Areas where predictions cannot be done;
- o general construction noise control measures; and
- o any other alterations to this Protocol.

(b) As the intent of this Protocol will be followed during their preparation, joint MOE/MTC approval is not required for MOE or MTC procedural/operational documents such as:

- o internal directives;
- o contract documents; and
- o E.A. procedural/technical guidelines.

TABLE 1: SUMMARY OF MITIGATION EFFORT

CHANGE IN NOISE LEVEL ABOVE AMBIENT	MITIGATION EFFORT
0 - 5 dBA	- None
> 5 dBA	- Investigate noise control measures on R.O.W. - If project cost is not significantly affected introduce noise control measure within R.O.W. - Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers. - Mitigate to ambient, as administratively, economically, and technically feasible.

Ministry of Transportation

MAR 0 4 1992

ENVIRONMENTAL OFFICE

MINISTRY DIRECTIVE

Program: Quality & Standards

Directive: A-1

Issuing Authority: Deputy Minister

Date of Issue: 78 07 10 Effective Date: 92 03 01 Revised Date: 92 02 21

TO: Assistant Deputy Ministers, Executive Directors, Regional Directors, Directors, District Engineers, Regional Managers, Office Managers

SUBJECT: Noise Policy and Acoustic Standards for Provincial Highways

ALTERNATIVE INDEX LISTING(S):

Noise Barrier Policy
Provincial Highways Noise Policy
Residential Noise Policy
Acoustic Policy

003292 100256 ----
MTO ENVIRONMENTAL OFFICE
MANAGER
2ND FLOOR, WEST BUILDING
DOWNSVIEW, ONTARIO
M3M 1J8

REFERENCE:

This directive cancels and supersedes Provincial Highways Directive A-1 (87 08 24)

Provincial Highways Directive B-94, "Noise Assessment and Abatement Program - Ministry Responsibilities" (90 01 31)

Provincial Roads Directive B-116
"(a) Noise Barrier Technical Committee (NBTC)
(b) Noise Barrier Design Liaison Committee (NBDLC)" (81 05 08)

Municipal Transportation Roads Directive B-11, "Subsidy of Noise Control Measures on Municipal Roads" (88 06 30)

Provincial Highways Directive B-55, "Highway Improvements Associated with Land Development" (83 08 26)

Provincial Roads Directive B-61, "Cost Effective Analysis of Environmental Protective Measures" (79 11 20)

Environmental Assessment Act, R.S.O. 1990

Environmental Protection Act, R.S.O. 1990

A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments. February, 1986

Guidelines on noise and new residential development adjacent to freeways, Ministry of Housing, April, 1979

Contract Design Estimating and Documentation Manual

Environmental Office Manual, Technical Areas - Noise

Environmental Office, Environmental Assessment Policy Section

PURPOSE:

To document Ministry policy for investigation and controlling of Provincial Highway noise and its effect on adjacent noise sensitive areas.

To update warrants for noise control measures.

BACKGROUND:

Legislation

The Environmental Protection Act, R.S.O. 1990 is binding on the Crown. Subsection 1.(c) defines sound as a contaminant. Section 13 prohibits the emission of a contaminant into the natural environment that may have adverse environmental effects and, as such, imposes some obligations on MTO to limit the emission of noise from highways.

The Environmental Assessment Act, R.S.O. 1990 (Amended 1989), requires the Ministry to predict possible environmental impacts resulting from an undertaking, and to define the actions necessary to mitigate these. These include impacts and mitigation from construction and highway traffic generated noise.

Government Policy

On February 8, 1977, the Ministries of Housing (now Ministry of Municipal Affairs) and Transportation and Communications (now Ministry of Transportation) jointly released a policy statement regarding noise associated with major freeways. On May 29, 1979, the Ministry of Housing released a supplementary guideline for noise on behalf of the Government.

In addition, in February 1986, the Ministries of Environment and Transportation (and Communications) signed "A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments". This Protocol applies to the MTO Capital Construction Program for all classes of MTO Provincial Highways, both urban and rural.

It is the policy of the Government to address highway noise when planning, designing and constructing highways. Where the noise level generated by use of a highway exceeds acceptable standards for adjacent noise sensitive areas, MTO will consider improvements designed to attenuate the noise. Similarly, to avoid future noise problems, developers must design new residential areas in an acoustically sensitive manner in accordance with the guidelines issued by the Ministries of Municipal Affairs and

Environment and in consultation with the affected municipality.

In keeping with Government policy, MTO developed a Retrofit Noise Barrier Program to alleviate noise impacts on existing noise sensitive areas adjacent to existing freeways.

POLICY:

This directive and the appendices attached hereto describe policy which must be adhered to for identifying noise sensitive land uses, predicting noise levels, determining impacts and providing for mitigation in a variety of different situations.

For ease of reference, the directive has been separated into a number of Appendices as follows:

Appendix One	-	Definitions
Appendix Two	-	Construction Noise Process
Appendix Three	-	Highway Construction Projects (Excluding Retrofit)
Appendix Four	-	Retrofit of Existing Freeways
Appendix Five	-	New Residential Development Adjacent to Freeways
Appendix Six	-	New Residential Development Adjacent to Designated Freeways

IMPLEMENTATION: 92 03 01

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Appendix One - Definitions

For ease in reading this appendix, text in italics is defined elsewhere in the definitions.

Acoustical Barriers

These include walls, berms and combinations of the two which are effective in reducing sound levels.

Adjacent

The term *adjacent* defines those *NSA*'s lying near *Ministry highway* rights-of-way, although not necessarily contiguous to them. An intervening land use may be located between the source and *receiver*, if that land use is such that its zoning or official plan designation is anticipated to prevent a change in the future to a use which, in itself, will be a barrier to noise.

Aesthetics

Aesthetics is a recognition of the sensitivity of the interaction between the *highway* and the surrounding landscape.

Ambient/Existing *Noise Level*

This is the all-encompassing noise associated with a given environment, usually consisting of a composite of sounds from many sources. It is also the *noise level* prior to construction of an *undertaking*. Where a facility exists, *ambient* will include the noise presently emitting from it.

Candidate Site

This includes *NSA's* which meet the criteria for inclusion on the Candidate Sites for Noise Barrier Retrofit List. This does not necessarily mean that the site will satisfy all warrants for noise barrier construction.

Decibel Scale

A linear numbering scale used to define a logarithmic amplitude scale, thereby compressing a wide range of amplitude values to a small set of numbers. This system is used to compress sound pressure levels. The scale is often weighted using the "A" weighting frequency adjustments because it most closely approximates the frequency response of the average human ear.

Environmental Report

This includes all reports prepared in compliance with Environmental Assessment Act requirements and submitted to the Ministry of the Environment for acceptance, approval, informational or monitoring purposes and the public record. These include Environmental Assessment Reports, Environmental Study Reports, Environmental Status Statements, and Design and Construction Reports.

First Row Receiver

This term shall be defined as all those *adjacent* receivers where *noise level* differences are imperceptible (within 3 dBA) from the noisiest receiver.

Freeway

For this directive *freeway* is defined as an existing completed, partially developed (staged) or proposed divided *highway* with full control of access, grade separated intersections. It is recognized that this definition may include some *highways* that are not officially designated as *freeways*.

Highway

For this directive *highway* is defined as any road under the jurisdiction of the *Ministry*.

Ministry

For this directive *ministry* is defined as the Ministry of Transportation.

Mitigation Measure

These include walls, berms, adjustment to horizontal and vertical alignments and pavement types which are designed to result in reduced *noise levels* in *NSA's*.

Noise Level

a) *Noise levels* are the 24 hour equivalent sound level (L_{eq} 24 hr) expressed on the A-weighted *decibel scale* (dBA).

b) Noise predictions will be calculated using the United States Federal Highway Administration (FHWA) Noise Prediction Model. The following computerized models are accepted by the Environmental Office:
   - STAMINA 2.0,
   - Stamson (Versions 3.0 and 4.1 only),

   or other versions subsequently approved for use by the Environmental Office.

c) When setting priorities for retrofit and determining impacts for *highways*, traffic volume shall be 1/24 of the higher of the Average Annual Daily Traffic (AADT) volume or Summer Average Daily Traffic (SADT) volume.

d) Vehicle speeds used in the evaluation of impacts shall be the posted speed limits.

e) Commercial vehicle percentage shall be those available from Regional Traffic Sections. Where unknown, the percentage for *freeways* can be assumed to be 20% (15% heavy trucks and 5% medium trucks). For all other classes of *highways*, the percentage is 13% (8% heavy trucks and 5% medium trucks).

Noise Level (continued)

f) Receivers shall be located in the outdoor living area.

Noise Sensitive Areas (NSA) for Retrofit

a) *NSA's* shall be interpreted to mean areas that are either:
- *Adjacent* to existing *freeways* and are existing residential areas where approvals were received under the Planning Act prior to February 8, 1977. Except as noted below, residential developments approved after the announcement in 1977 of the policy for noise and new residential developments adjacent to *freeways* do not qualify;
- *Adjacent* to new *freeways* and are existing residential developments where approvals were received under the Planning Act prior to the designation of the proposed *freeway* route under the Public Transportation and Highway Improvement Act; or
- *Adjacent* to expanding *freeways* and are existing residential developments where approvals were received under the Planning Act prior to the implementation of the *highway* expansions and where noise control measures were not required at the time of *highway* construction.

b) The majority of the residences in the area must be zoned as residential and taxed as principal residences to ensure that funds are directed to areas of greatest need (i.e. principal residences).

c) There is no minimum number of residences that define a *NSA*. Therefore, all noise sensitive land uses, regardless of size or location (urban or rural), should be assessed for application of noise control measures.

d) Discretion should be exercised for situations where there is a potential for the zoning to be changed from a noise sensitive land use to a non-sensitive land use.

e) *NSA's* must have an *OLA* associated with the residential unit.

f) The following land uses, with *OLA's* associated with them would qualify as NSA's under the above criteria:
- Private homes such as single family residences;
- Townhouses;
- Multiple unit buildings, such as apartments with *OLA's* for use by all occupants; and
- Hospitals, nursing homes for the aged, where there are *OLA's* for the patients.

Land uses listed below, by themselves do not qualify as *NSA's*:
- Apartment balconies above ground floor;
- Educational facilities (except dormitories with *OLA's*);
- Churches;
- Cemeteries;
- Parks and picnic areas which are not inherently part of a *NSA*;
- Day care centres;

Noise Sensitive Areas for Retrofit (Continued)

- All commercial;
- All industrial.

Noise Sensitive Areas For Highway Construction

The Environmental Assessment Act, where applicable, requires that noise impacts and potential mitigative measures be assessed. These areas shall be interpreted to mean all *NSA's* as defined for Retrofit (excluding the requirement that the *highway* be a *freeway*), as well as institutional and specific definitions of "residential areas" and "quiet areas" found in municipal noise control bylaws approved by the MOE under Section 138 of the Environmental Protection Act.

Outdoor Living Area (OLA)

The OLA is defined as an area at ground level, *adjacent* to a *NSA* and accommodating outdoor living activities. This area may be situated on any side of the *NSA*. The usual distance from the dwelling unit wall is 3 m. The vertical height is 1.2 metres above the existing ground surface. Where unknown, the side closest to the *highway* should be assumed. Paved areas for multiple dwelling residential units may not be defined as an *OLA*.

Retrofit Barrier Site

This includes barrier *candidate sites* which satisfy all warrants for construction and therefore qualify for inclusion on the capital construction program when priorities dictate and funds become available.

Undertaking

As defined by Subsection 1.(o)(i) of the Environmental Assessment Act:

> "an enterprise or activity or a proposal, plan or program in respect of an enterprise or activity by or on behalf of Her Majesty in right of Ontario, by a public body or public bodies or by a municipality or municipalities, or".

Appendix Two - Construction Noise Process

1. General

The following policies apply to all highway projects.

2. Environmental Assessment Process

a) NSA's shall be identified during the project planning stage.

b) Potential noise impacts of construction equipment on NSA's shall be identified. These might include impacts resulting from hours or type of operation or proximity of equipment.

c) Potential mitigation of noise impacts from construction equipment should be identified. These might include measures such as timing constraints, setbacks of certain operations from NSA's, or quieter equipment.

d) In selecting the appropriate construction noise control measures, the Ministry will evaluate the technical and economic feasibility of the various alternatives.

e) Municipal noise control bylaws shall be reviewed for requirements which may cause hardship to the Ministry or its contractor when implementing a project. This can be a particular problem when the need for night construction work is identified.

f) In certain situations, a contract may require work that is in contravention of a municipal noise control bylaw. In these cases the Regional Environmental Unit will ensure that an exemption for the contractor is obtained from the municipality prior to construction. If the exemption is not obtained, the construction project may not proceed in a manner that is in contravention of the bylaw. Notwithstanding this requirement, it is always the contractors responsibility to be aware of bylaws and abide by them.

3. Environmental Assessment Documentation

a) Where an environmental report is required, the following shall be documented:
- NSA's
- identification of municipal noise control bylaws
- an explanation of any hardships to the Ministry caused by municipal noise control bylaws
- construction noise complaint process. (See section 4)

b) Environmental reports shall state that, where work is done by contract, enforcement of noise control bylaws is the responsibility of the municipality. Where work is done by day labour or equipment rental, the Ministry shall ensure its operations comply.

4. Contract Preparation

a) General construction measures, setbacks from NSA's, timing constraints, or specific scheduling of construction activities including pre-construction of noise barriers, where required and where practical, will be included in the contract documents. The NSA's must be identified in the contract package using SP 199F33.

b) When known prior to contract preparation, the details of any exemption from any municipal noise control bylaw will be outlined in the contract documents using SP 199F31.

c) Special Provisions 199F31 and 199F33, which are to be placed in contract documents will be taken from the Contract Design Estimating and Documentation (CDED) Manual.

5. Construction Noise Complaint Process

a) Any initial complaint from the public will require verification by the Ministry that all noise control measures to be applied are in effect. The Ministry will investigate any noise concerns, advise the contractor of any problems, and enforce its contract.

b) Notwithstanding compliance with any noise control measures identified in the contract documents, a persistent complaint will require the Ministry to undertake a field investigation to determine noise level emissions. Where noise level emissions, for that construction equipment in use, exceed the sound level criteria for construction equipment contained in the MOE Model Municipal Noise Control Bylaw, the Ministry shall require the contractor to comply with the sound level criteria where quieter alternative equipment is reasonably available. When this occurs, the Ministry shall pay the contractor for costs incurred. Where a quieter alternative is not reasonably available, the equipment in use will be accepted.

NOTE: Neither the MOE Model Municipal Noise Control Bylaw nor noise emission levels are required in the contract package.

Appendix Three - Highway Construction Projects (Excluding Retrofit)

1. General

This policy is based on the "MOE/MTC Protocol for Dealing with Noise Concerns During the Preparation, Review, and Evaluation of Provincial Highways Environmental Assessments".

Where a highway construction project is proposed through or adjacent to an existing or draft approved residential area, the Ministry shall investigate the feasibility of attenuating noise where impacts are significant (> 5 dBA). The objective shall be to reduce noise levels, where warranted, to as close to 55 dBA or pre-construction ambient as is technically or economically feasible.

The following warrants and policies apply to projects which require Environmental Assessments (i.e. A and B projects).

2. Study Area

To determine the area of impact from road traffic noise, the smallest study area should be defined using one of the following methods:

a) using 5 decibel contour lines extending from the source to a NSA where there is no increase above the ambient sound level, or;

b) a NSA where there is no increase above the ambient sound level, or;

c) a perpendicular distance of 600 m from the closest edge of pavement.

3. Impact Assessment

a) Within the study area, noise impacts will be determined for outdoor living areas of identified NSA's.

b) Wherever possible, existing and future ambient noise levels should be predicted. However, where noise levels cannot be predicted reliably, a suitable ambient noise level should be chosen for each project and where questionable supported by measurements. These assumptions must be verified with the MOE.

c) Future noise levels from the proposed undertaking shall be based on traffic projections 10 years after completion of the undertaking. Where traffic projections 10 years after completion are not available, the best available data may be used.

d) To determine impact, a comparison shall be made between the "do nothing" alternative 10 years in the future and noise levels with the undertaking at the same date. In both cases, future traffic volumes should be used. The significance of a noise impact will be calculated by comparing these two sound levels.

Impact Assessment (Continued)

e) The significance of a noise impact will be qualified by using the objective of 55 dBA in addition to the change in noise level above the ambient sound level.

f) Documentation in environmental assessment reports should include the following:

i) a description of the NSA's (usually identifying discrete receiver locations) including maps as appropriate;

ii) the name of the noise prediction model used;

iii) results of existing ambient and future noise level predictions at NSA's for each route alternative; and

iv) for comparison of alternatives and assessment of impacts, grouping of each NSA subject to increases of 0 to 5.0 dBA, 5.1 to 10.0 dBA, > 10.1 to 15.0 dBA, and > 15.1 dBA. Similar groupings documenting sound level reductions may be helpful. (i.e. -5.0 to -0.1 dBA)

4. Mitigation

a) Where a new or expanding highway adjacent to a noise sensitive land use is predicted to result in a noise level increase of 5 dBA or less, 10 years after completion, there is no need as part of the environmental assessment to implement noise control measures as the impact is considered to be slight. However, if warranted, it may be considered for inclusion on the Candidate Sites for Noise Barrier Retrofit List.

b) Where a new or expanding highway adjacent to a noise sensitive land use will result in a noise level increase of greater than 5 dBA, 10 years after completion, the Ministry shall investigate noise control measures within the highway right-of-way.

c) Noise control measures, where applied will be designed to achieve levels as close to, or lower than, the objective level of 55 dBA or pre-construction ambient noise levels as is technically or economically feasible.

d) Noise control measures where applied, should be cost effective and achieve a minimum attenuation of 5 dBA averaged over the first row receivers.

e) Noise control measures, where applied, should be erected at the time of road construction or shortly thereafter.

f) When designing noise control measures, input on aesthetic treatments should be sought from the Landscape Architecture Unit of the Maintenance Operations Office.

g) Where construction or expansion of a highway is planned through an area designated as a noise sensitive land use on an approved Official Plan, but where no specific development proposals have received draft approval, non-structural noise controls

Mitigation (Continued)

should be sought, eg: control of vertical and horizontal alignment, to minimize noise impacts provided that significant increases in initial project costs or subsequent maintenance costs will not be incurred.

h) Retrofit noise barriers should be constructed as part of another capital construction project only where there is a significant cost savings or where a serious construction problem is avoided and as guided by the candidate list.

i) Documentation in environmental reports should include a discussion of mitigation measures including need, cost/effectiveness, applicability to the project and construction timing. The practicability of each measure should be evaluated by such factors as effectiveness and technical and economic feasibility.

Appendix Four - Retrofit of Existing Freeways

1. General

This policy is based on the principle that existing NSA's exposed to high noise levels due to their proximity to a freeway should receive some consideration.

It is not the intent of the retrofit program to provide noise barriers at all sites on the Candidate Sites for Noise Barrier Retrofit List. Some sites may not be constructed for a number of reasons such as the inability to achieve perceptible attenuation, excessive costs to provide mitigation for a few homes, or physical limitations.

Implementation of this policy is dependent upon budget allocations and subject to prioritization of candidate sites.

2. Selection of Candidate Sites

a) The Ministry shall consider retrofit noise control measures for existing freeways where NSA's receive noise levels in excess of 60 dBA L_{eq} (24 hr), if such measures can reduce the noise levels by at least 5 dBA averaged in the first row.

b) A cost/benefit analysis will be carried out for all candidate sites and will be used to establish a priority listing. The analysis will account for the absolute sound level, noise barrier insertion loss, number of NSA's and the barrier cost.

c) Sites will be selected for inclusion on the multi-year capital construction program primarily on a priority basis.

d) Office responsibilities for highway noise control are described in directive PHY B-94.

e) Retrofit barriers should be scheduled as part of another capital construction project only where there is a significant cost savings or where a serious construction problem is avoided. Only sites which are already on the multi-year capital construction program should be considered for possible inclusion with another project.

3. Mitigation Standards

a) The objective is to reduce noise levels as much as is technically and economically practicable towards the provincial noise level objective of 55 dBA.

b) Noise barriers must achieve a minimum barrier insertion loss of 5 dBA averaged in the first row NSA's.

c) Noise barrier retrofit sites approaching or exceeding 70 dBA, should be designed to provide additional attenuation, where technically feasible, and not economically prohibitive (i.e. initial project and subsequent maintenance costs).

d) When designing noise control measures, input on aesthetic treatments should be

sought from the Landscape Architecture Unit of Maintenance Operations Office. Consideration should be given to aesthetic impacts when considering increases in barrier height.

4. Parallel Barriers

When it can be shown that a barrier will cause detrimental noise reflections to the opposing side of the highway, then the parallel sites should be constructed at the same time. Otherwise, barriers should be built in priority sequence. To reduce reflections, consideration should be given to specifying the use of absorptive noise barrier materials.

5. Reconstruction/Maintenance of Barriers

a) Previously constructed Ministry noise walls, privacy fences, and additional walls on existing berms, will be reprioritized when the following criteria are met:

   i) an existing barrier did not achieve a 5 dBA attenuation averaged over first row NSA's;
   ii) there is a serious existing problem;
   iii) there is ongoing public concern;
   iv) a new barrier could reduce noise levels by an additional 3 dBA (over existing conditions) averaged over first row NSA's; and
   v) all other warrants can be met.

b) When a barrier is to be completely rebuilt it shall be designed and constructed to current Ministry standards for noise barriers.

   Prior to reconstruction, an acoustical analysis must be conducted to determine the most effective location and height of the new barrier. In addition, initial project costs and subsequent maintenance cost implications must be considered.

c) Where visually justified, and funds are available, consideration should be given to improving aesthetically undesirable features in existing barriers. These improvements could include, but are not limited to screening by vegetation, painting and texturing of barrier panels.

6. Non-Barrier Noise Control Measures

Each MTO region is encouraged to consider all forms of noise control measures within the Rights-of-Way when assessing a problem and is allowed the flexibility to make recommendations concerning this type of measure based on the specific circumstances associated with the project.

7. Noise Predictions

All acoustical design advice reports used to assist in noise barrier design shall be considered valid for only two years following the date of issue.

Appendix Five - New Residential Development Adjacent to Freeways

The interministerial "Guidelines on noise and new residential development adjacent to freeways" is based on the principle that those who develop land adjacent to existing or planned noise generators should accept responsibility for achieving a minimum standard of environmental quality for future residents.

The developer of residential land adjacent to a freeway shall be responsible for ensuring that noise levels in the OLA are consistent with the provincial objective of 55 dBA.

Within MTO, the coordination of comments and development of policy regarding private land developers are the responsibility of the Transportation Corridor Management Office (TCMO).

a) Primary responsibility for enforcement of the Guidelines lies with municipalities through their powers under the Planning Act. The same policy normally will apply to both municipal and provincial freeways.

The Ministry of the Environment monitors and reviews municipal development control actions, provides advice on request to both the developer and municipality, and may object if its advice is not followed. The Ministry of Municipal Affairs approves these development applications or delegates this authority to upper tier municipalities.

b) The role of Ministry Regional staff will normally be confined to providing information on matters such as location of highways, projected traffic volumes and composition, and construction scheduling. This may include commenting on consultants' reports as to the accuracy of the information on which they are based.

c) Where the Ministry of Municipal Affairs or delegated municipality requires, as a condition of approval, that the developer erect an acoustical barrier along an existing freeway, this work shall be subject to Provincial Highways Directive B-55 "Highway Improvements Associated with Land Development", as applicable. In most cases, such barriers should be located on the developer's land rather than on the freeway R.O.W.

d) Barriers built by developers normally will be permitted, where feasible, on Ministry R.O.W. where there is a significant acoustical benefit compared to a barrier located in the developer's lands, or where there are significant engineering limitations on the developer's land.

e) Where a barrier, or barrier portion which is funded by a developer is erected on Ministry property, the Ministry shall ensure that its standards (acoustical, design and engineering) are met through approval of the design and monitoring of construction. The Ministry would assume direct responsibility for barrier maintenance. Meeting the MTO requirements does not absolve the proponent of the need to meet additional standards imposed by the approving authority for the residential development.

f) Where the Ministry of Municipal Affairs, or delegated Municipality requires a cost contribution or land dedication for an acoustical barrier along a proposed freeway, the TCMO will provide input on behalf of the Ministry.

g) Where noise problems arise from the lack of, or poorly planned, designed, constructed or maintained barriers built by developers, the Ministry shall not assume the responsibility for noise control. This is, and should remain the responsibility of the approving, delegating and reviewing agencies. (i.e. Municipalities, Ministries of Municipal Affairs and Environment)

APPENDIX B

TRAFFIC DATA

LOCATION HWY 401 (WEST OF HWY 4)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	30550	58950	58950
No. Of Lanes	4	4	6
% Of Trucks	30	30	30
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	100km/h	100km/h	100km/h
Gradient Of Road	N/A	N/A	N/A
R.O.W.	≈ 92m	≈ 92m	≈ 92m

LOCATION HWY 401 (BETWEEN HWY 4 AND THE RAMPS FROM HWY 402)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	31100	60450	60450
No. Of Lanes	4	4	6
% Of Trucks	30	30	30
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	100km/h	100km/h	100km/h
Gradient Of Road	0.1% - 2%	0.1% - 2%	0.1% - 2%
R.O.W.	N/A	N/A	N/A

LOCATION HWY 401 (FROM HWY 402 RAMPS TO WELLINGTON ROAD)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	47350	84750	84750
No. Of Lanes	4	4	6
% Of Trucks	30	30	30
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	100km/h	100km/h	100km/h
Gradient Of Road	0.2% - 0.8%	0.2% - 0.8%	0.2% - 0.8%
R.O.W.	≈ 92m	≈ 92m	≈ 92m

LOCATION HWY 401 (FROM WELLINGTON ROAD TO HIGHBURY AVE.)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021..)	FUTURE CONDITIONS (YEAR 2021..)
SADT	55550	95800	95800
No. Of Lanes	6	6	8
% Of Trucks	30	30	30
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	100km/h	100km/h	100km/h
Gradient Of Road	0.1% - 2.8%	0.1% - 2.8%	0.1% - 2.8%
R.O.W.	≈92m	≈92m	≈92m - 102m

LOCATION HWY 401 (EAST OF HIGHBURY AVE.)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	52250	89950	89450
No. Of Lanes	6	6	8
% Of Trucks	30	30	30
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	100km/h	100km/h	100km/h
Gradient Of Road	0.1% - 2%	0.1% - 2%	0.1% - 2%
R.O.W.	≈92m	≈92m	≈92m

LOCATION N-W Ramp (HWY 401 / HIGHBURY AVENUE)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	6350	9150	9150
No. Of Lanes	1	1	1
% Of Trucks	11	11	11
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	70 km/h	70 km/h	60 km/h
Gradient Of Road	0.4% - 2%	0.4% - 2%	0.4% - 2%
R.O.W.	N/A	N/A	N/A

LOCATION E-S (HWY 401 / HIGHBURY AVENUE)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT			
No. Of Lanes			
% Of Trucks			
Ratio Of Medium to Heavy Trucks			
Day/Night Traffic Split			
Posted Speed Limit			
Gradient Of Road			
R.O.W.			

LOCATION ~~E-N~~ Ramp(HWY 401 / HIGHBURY AVENUE)
E-N/S

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	8750	13750	13750
No. Of Lanes	1	1	2
% Of Trucks	38	38	38
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	50 km/h	50 km/h	40 km/h
Gradient Of Road	N/A	N/A	N/A
R.O.W.	N/A	N/A	N/A

LOCATION S-W Ramp (HWY 401 / HIGHBURY AVENUE)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	1100	2700	2700
No. Of Lanes	1	1	1
% Of Trucks	10	10	10
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	40km/h	40km/h	40km/h
Gradient Of Road	N/A	N/A	N/A
R.O.W.	N/A	N/A	N/A

LOCATION S-E (HWY 401 / HIGHBURY AVENUE)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	2750	5050	5050
No. Of Lanes	1	1	1
% Of Trucks	10	10	10
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	50km/h	50km/h	60km/h
Gradient Of Road	N/A	N/A	N/A
R.O.W.	N/A	N/A	N/A

LOCATION N-E Ramp(HWY 401 / HIGHBURY AVENUE)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	4450	6450	6450
No. Of Lanes	1	1	1
% Of Trucks	17	17	17
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	30km/h	30km/h	40km/h
Gradient Of Road	1.4% - 3%	1.4% - 3%	1.4% - 3%
R.O.W.	N/A	N/A	N/A

LOCATION W-N/S Ramp (HWY 401 / HIGHBURY AVENUE)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	6450	10500	10500
No. Of Lanes	1	1	1
% Of Trucks	15	15	15
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	50 km/h	50 km/h	40 km/h
Gradient Of Road	0.1% - 3.1%	0.1% - 3.1%	0.1% - 3.1%
R.O.W.	N/A	N/A	N/A

LOCATION EXETER ROAD RAMP

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F.D.N. CONDITIONS (YEAR)	FUTURE CONDITIONS (YEAR)
SADT			
No. Of Lanes			
% Of Trucks			
Ratio Of Medium to Heavy Trucks			
Day/Night Traffic Split			
Posted Speed Limit			
Gradient Of Road			
R.O.W.			

MASTER FORMS LOCATION

Traffic Data included in
E-N Ramp (Hwy 401/Wellington Road & Exeter Road)

LOCATION N-W Ramp (HWY 401 / WELLINGTON ROAD)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	5050	7450	7450
No. Of Lanes	1	1	1
% Of Trucks	7	7	7
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	50 km/h	50 km/h	60 km/h
Gradient Of Road	0.2% - 4%	0.2% - 4%	0.2% - 4%
R.O.W.	N/A	N/A	N/A

LOCATION E-S Ramp (HWY 401 / WELLINGTON ROAD)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	2100		
No. Of Lanes	1		
% Of Trucks	7		
Ratio Of Medium to Heavy Trucks	N/A		
Day/Night Traffic Split	N/A		
Posted Speed Limit	30 km/h		
Gradient Of Road	0.6% - 3.5%		
R.O.W.	N/A		

LOCATION E-N Ramp (HWY 401 / WELLINGTON ROAD) + Exeter Road

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	10600	17200	17200
No. Of Lanes	2	2	2
% Of Trucks	9	9	9
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	30 km/h	30 km/h	40 km/h
Gradient Of Road	N/A	N/A	N/A
R.O.W.	N/A	N/A	N/A

MASTER FORMS LOCATION

E-N/S

LOCATION S-W Ramp (HWY 401 / WELLINGTON ROAD)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	2100	3000	3000
No. Of Lanes	1	1	1
% Of Trucks	8	8	8
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	30 km/h	30 km/h	40 km/h
Gradient Of Road	0.3% - 4.5%	0.3% - 4.5%	0.3% - 4.5%
R.O.W.	N/A	N/A	N/A

LOCATION S-E Ramp (HWY 401 / WELLINGTON ROAD)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	2750	3950	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	8	8	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	60 km/h	60 km/h	60 km/h
Gradient Of Road	0.3% - 0.8%	0.3% - 0.8%	0.3% - 0.8%
R.O.W.	N/A	N/A	N/A

LOCATION N-E Ramp (HWY 401 / WELLINGTON ROAD)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	9900	14600	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	7	7	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	30 km/h	30 km/h	40 km/h
Gradient Of Road	0.7% - 3.6%	0.7% - 3.6%	0.7% - 3.6%
R.O.W.	N/A	N/A	N/A

LOCATION W-NS Ramp (HWY 401 / WELLINGTON ROAD)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1994)	F-D-N CONDITIONS (YEAR 2021..)	FUTURE CONDITIONS (YEAR 2021..)
SADT	6600	9600	9600
No. Of Lanes	1	1	1
% Of Trucks	11	11	11
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	50 km/h	50 km/h	40 km/h
Gradient Of Road	0.4% - 2.3%	0.4% - 2.3%	0.4% - 2.3%
R.O.W.	N/A	N/A	N/A

MASTER FORMS LOCATION

LOCATION W-E Ramp (HWY 401 / HWY 402)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1991)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	10100	19000	19000
No. Of Lanes	2	2	2
% Of Trucks	30	30	30
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	Not Posted	100 km/h	100 km/h
Gradient Of Road	N/A	N/A	N/A
R.O.W.	N/A	N/A	N/A

LOCATION E-W Ramp (HWY 401 / HWY 402)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1991)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	9050	15600	15600
No. Of Lanes	2	2	2
% Of Trucks	30	30	30
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	Not Posted	100km/h	100km/h
Gradient Of Road	N/A	N/A	N/A
R.O.W.	N/A	N/A	N/A

LOCATION E-S Ramp (HWY 401 / HWY 4)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	3450	5750	
No. Of Lanes	1	1	
% Of Trucks	9	9	
Ratio Of Medium to Heavy Trucks	N/A	N/A	
Day/Night Traffic Split	N/A	N/A	
Posted Speed Limit	30km/h	30km/h	
Gradient Of Road	0.2% - 4.8%	0.2% - 4.8%	
R.O.W.	N/A	N/A	

LOCATION E-N Ramp (HWY 401 / HWY 4)

E-N/S

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	700	1200	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	14	14	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	30km/h	30km/h	N/A
Gradient Of Road	0.1% - 2%	0.1% - 2%	N/A
R.O.W.	N/A	N/A	N/A

LOCATION S-W Ramp (HWY 401 / HWY 4)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	850	1450	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	14	14	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	30km/h	30km/h	N/A
Gradient Of Road	N/A	N/A	N/A
R.O.W.	N/A	N/A	N/A

LOCATION W-S Ramp (HWY 401 / HWY 4)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021...)	FUTURE CONDITIONS (YEAR 2021...)
SADT	1150	1950	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	9	9	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	40km/h	40km/h	N/A
Gradient Of Road	1.2% - 3%	1.2% - 3%	N/A
R.O.W.	N/A	N/A	N/A

LOCATION N-E Ramp (HWY 401 / HWY 4)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	550	950	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	9	9	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	30 km/h	30 km/h	N/A
Gradient Of Road	0.1% - 4.5%	0.1% - 4.5%	N/A
R.O.W.	N/A	N/A	N/A

LOCATION N-W Ramp (HWY 401 / HWY 4)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	1800	3000	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	9	9	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	50km/h	50km/h	N/A
Gradient Of Road	0.2% - 3%	0.2% - 3%	N/A
R.O.W.	N/A	N/A	N/A

RAMP LOCATION

LOCATION W-N Ramp (HWY 401 / HWY 4)

W-N/S

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	1250	2100	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	14	14	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	30 km/h	30 km/h	N/A
Gradient Of Road	0.1% - 4.6%	0.1% - 4.6%	N/A
R.O.W.	N/A	N/A	N/A

LOCATION S-E Ramp (HWY 401 / HWY 4)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
SADT	2100	3450	N/A
No. Of Lanes	1	1	N/A
% Of Trucks	14	14	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	60 km/h	60 km/h	N/A
Gradient Of Road	1.6% - 2.2%	1.6% - 2.2%	N/A
R.O.W.	N/A	N/A	N/A

MASTER FORMS LOCATION

LOCATION HWY 4 (INTERSECTION WITH HWY 401)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
~~SADT~~ AADT	15650	25750	25750
No. Of Lanes	2	2	4
% Of Trucks	14	14	14
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	80km/h	80km/h	N/A
Gradient Of Road	0.6% - 3.5%	0.6% - 3.5%	N/A
R.O.W.	≈ 35m	≈ 35m	≈ 43m

LOCATION TEMPO ROAD(EAST OF HWY 4)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	500	850	850
No. Of Lanes	2	2	2
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	N/A	N/A	N/A
Gradient Of Road	N/A	N/A	N/A
R.O.W.	≈ 30m	≈ 30m	≈ 30m

LOCATION ~~SERVICE ROAD (EAST OF HWY 4)~~ Glanworth Drive

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	1050	1700	1700
No. Of Lanes	2	2	2
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	90km/h	90km/h	N/A
Gradient Of Road	0.5% - 4%	0.5% - 4%	0.5% - 4%
R.O.W.	≈ 30m - 55m	≈ 30m - 55m	≈ 30m - 55m

LOCATION ~~WANDERLAND ROAD~~ Wonderland Road

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	2500	N/A	N/A
No. Of Lanes	2	2	2
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	80km/h	80km/h	80km/h
Gradient Of Road	N/A	N/A	N/A
R.O.W.	≈30m-55m	≈30m-55m	≈30m-55m

LOCATION (BOSTWICK ROAD) Scotland Drive

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	200	350	350
No. Of Lanes	2	2	2
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	80km/h	80km/h	80km/h
Gradient Of Road	0.1% - 5%	0.1% - 5%	0.1% - 5%
R.O.W.	≈50m	≈50m	≈50m

LOCATION ALLCE ROAD (EAST OF BOSTWICK ROAD)

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT			
No. Of Lanes			
% Of Trucks			
Ratio Of Medium to Heavy Trucks			
Day/Night Traffic Split			
Posted Speed Limit			
Gradient Of Road			
R.O.W.			

MASTER FORMS LOCATION

LOCATION (WHITE OAKS SIDE ROAD) Westminster Drive

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	1050	1750	1750
No. Of Lanes	2	2	2
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	60 km/h	60 km/h	60 km/h
Gradient Of Road	1% - 5%	1% - 5%	1% - 5%
R.O.W.	N/A	N/A	N/A

LOCATION DINGMAN CREEK ~~ROAD~~ Drive

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	3100	5150	5150
No. Of Lanes	2	2	2
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	80 km/h	80 km/h	80 km/h
Gradient Of Road	0.2% - 5%	0.2% - 5%	0.2% - 5%
R.O.W.	N/A	N/A	N/A

LOCATION WELLINGTON ROAD

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1998)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	37900	55650	55650
No. Of Lanes	2	2	4
% Of Trucks	8	8	8
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	60 km/h	60 km/h	40 km/h
Gradient Of Road	0.2% - 4%	0.2% - 4%	0.2% - 4%
R.O.W.	≈ 38m	≈ 38m	≈ 46m

LOCATION WILTON GROVE ROAD

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	8750	14550	14550
No. Of Lanes	2	2	2
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	N/A	N/A	N/A
Gradient Of Road	N/A	N/A	N/A
R.O.W.	≈ 30m	≈ 30m	≈ 30m

LOCATION POND MILLS ROAD

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	7650	11000	11000
No. Of Lanes	2	2	2
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	N/A	N/A	N/A
Gradient Of Road	N/A	N/A	N/A
R.O.W.	≈ 30m	≈ 30m	≈ 30m

LOCATION HIGHBURY AVENUE

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 1999)	F-D-N CONDITIONS (YEAR 2021)	FUTURE CONDITIONS (YEAR 2021)
AADT	22050	33850	33850
No. Of Lanes	4	4	4
% Of Trucks	N/A	N/A	N/A
Ratio Of Medium to Heavy Trucks	N/A	N/A	N/A
Day/Night Traffic Split	N/A	N/A	N/A
Posted Speed Limit	80/100 km/h	80/100 km/h	N/A
Gradient Of Road	0.9% - 3.3%	0.9% - 3.3%	0.9% - 3.3%
R.O.W.	≈ 35m	≈ 35m	≈ 35m

APPENDIX C

MOEE'S ORNAMENT NOSIE PREDICTION MODEL

APPENDIX A

GENERAL PROCEDURES AND ADJUSTMENTS

1.1 MOE ROAD TRAFFIC NOISE PREDICTION TECHNIQUE

The road traffic noise assessment method is based on a model originally developed by the U.S. Federal Highway Administration in 1978 as modified by the Ontario Ministry of the Environment (MOE) to suit the provincial requirements.

The analytical model predicts hourly Leq due to road traffic. It is modular in structure and thereby lends itself to applications requiring detailed analysis.

The variables required for the road traffic assessment include the following: road traffic volume per hour, percentages of automobiles, medium trucks and heavy trucks, average speed of traffic flow, roadway gradient, source to receiver distance(s), type of ground cover, road element size and shielding applicable.

The details of the model could be found in the publication "Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT)[1]", Ministry of the Environment, October 1989.

The applicable procedures are summarized in the following paragraphs. Sample calculations are included in this report for a typical receiver location.

1.1.1. Predicted sound level data are generally based on two daily periods or the full 24 hour period as requested by the MOE for specific sources:

07:00 to 23:00 hours
23:00 to 07:00 hours

1.1.2. Roadway traffic volumes (AADT) split:

Regional Roads	Provincial Highways
07:00 to 23:00 hours = 91%	07:00 to 23:00 hours = 85%
23:00 to 07:00 hours = 9%	23:00 to 07:00 hours = 15%

1.1.3. Reference Hour Sound Level:

$$Leq_{ref} = 10 \log \sum_{i=1}^{3} \{K_R \; P_i \; 10^{\frac{(L_0)_i}{10}}\} - 10 \log S + 2.76$$

$$(L_0)_{AUTOMOBILE} = 38.1 \log(S) - 2.4$$

$$(L_0)_{MEDIUM\,TRUCK} = 33.9 \log(S) + 16.4$$

$$(L_0)_{HEAVY\,TRUCK} = 24.6 \log(S) + 38.5$$

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[1] The computerized version of this model is 'STAMSON 5.04'.

where Leq_{ref} the reference hourly sound level;
K_g the road gradient adjustment factor for heavy trucks;
P_i the percentage of i^{th} vehicle class, expressed as fraction of the total volume;
$(L_0)_i$ the reference energy mean emission level of i^{th} vehicle class;
S the posted speed limit in km/h.

1.1.4. Adjustments to Reference Level (dB)

- Traffic Volume:

Adjustment = $10 \log (V/V_{ref}) = 10 \log (V/40)$
where V is the total traffic volume.

- Distance:

Adjustment = $10 \log (D_{ref}/D)^{1+\alpha}$
where D_{ref} is reference distance of 15 m.
α is ground absorption coefficient.

$\alpha = 0$ for reflective surfaces (hard ground)

$\alpha = 0.66$ for absorptive surfaces (soft ground)
where $h_{eff} \leq 3$ m

$\alpha = 0.75(1-(h_{eff}/25))$ for absorptive surfaces
where $3 < h_{eff} \leq 25$ m

$\alpha = 0$ for absorptive surfaces
where $h_{eff} > 25$ m

$h_{eff} = s + p + t + r$
where h_{eff} is the total effective height.

- Road Segment

Non-Reflective Surface :

$$Adjustment = 10 \log \left\{ \frac{1}{\pi} \int_{\Phi_1}^{\Phi_2} \cos^{\alpha} \Phi \, d\Phi \right\}$$

Reflective Surface :

$$Adjustment = 10 \log \left\{ \frac{\Phi_2 - \Phi_1}{\pi} \right\}$$

where f_1 is the negative angle of view;
f_2 is the positive angle of view.

1.1.5. Typical Receiver and Source Heights:

Outdoor Living Areas (OLA) = 1.5 m

Second Storey Bedroom = 4.5 m

Source Height = 0.5 m where $P_{HT} < 0.01$

Source Height = $\sqrt[4]{100\ P_{HT}}$ where $0.01 \leq P_{HT} \leq 0.30$

Source Height = 2.4 m where $P_{HT} > 0.30$

where P_{HT} is the percentage of heavy trucks, unadjusted by the gradient factor, expressed as a fraction of the total volume.

1.2 BARRIER CALCULATION MODEL

1.2.1. Barrier attenuation is calculated using optical diffraction theory.

1.2.2. Attenuation for road traffic noise is calculated at 500 Hz for an incoherent infinite line source.

1.2.3. The barrier prediction model is based on the following:

$$Barrier\ Atenuation = 0\ dB, \qquad for\ (N_0)_i \cos\phi \leq -0.1916$$

$$Barrier\ Attenuation = 10\log\{\frac{1}{\Phi_2 - \Phi_1}\int_{\Phi_1}^{\Phi_2}\frac{\tan^2\sqrt{2\pi|N_0|_i\cos\phi}}{\sqrt{10}\ 2\pi|N_0|_i\cos\phi}\,d\Phi\},$$

for $-0.1916 \leq (N_0)_i \cos f \leq 0$

$$Barrier\ Attenuation = 10\log\{\frac{1}{\Phi_2 - \Phi_1}\int_{\Phi_1}^{\Phi_2}\frac{\tanh^2\sqrt{2\pi(N_0)_i\cos\phi}}{\sqrt{10}\ 2\pi(N_0)_i\cos\phi}\,d\Phi\},$$

for $0 \leq (N_0)_i \cos f \leq 5.03$

$$Barrier\ Attenuation = 20\ dBA \qquad for\ (N_0)_i \cos\phi \geq 5.03$$

where N_0 is Fresnel Number, $N_0 = 2.915 \times$ (P.L.D.)

APPENDIX D

SAMPLE SOUND LEVEL CALCULATIONS

MSON 5.0 SUMMARY REPORT Date: 18-07-2002 12:51:10
STRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

ename: r5hext.te Time Period: Day/Night 16/8 hours
cription: R5 - Existing Levels (Highway 401)

id data, segment # 1: HWY 401- EB (day/night)

traffic volume	: 12962/6480	veh/TimePeriod *
lium truck volume	: 1389/694	veh/TimePeriod *
y truck volume	: 4166/2083	veh/TimePeriod *
ed speed limit	: 100	km/h
id gradient	: 3	%
pavement	: 1	(Typical asphalt or concrete)

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	:	27775
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.50
Heavy Truck % of Total Volume	:	22.50
Day (16 hrs) % of Total Volume	:	66.67

for Segment # 1: HWY 401- EB (day/night)

glei Angle2	: -90.00 deg	15.00 deg
d depth	: 0	(No woods.)
of house rows	: 0 / 0	
rface	: 1	(Absorptive ground surface)
eiver source distance	: 315.00 / 315.00	m
eiver height	: 1.20 / 4.50	m
pography	: 1	(Flat/gentle slope; no barrier)
ference angle	: 0.00	

e 2

d data, segment # 2: HWY 401- WB (day/night)

traffic volume	: 12962/6480	veh/TimePeriod	*
ium truck volume	: 1389/694	veh/TimePeriod	*
vy truck volume	: 4166/2083	veh/TimePeriod	*
ted speed limit	: 100 km/h		
d gradient	: 3 %		
d pavement	: 1 (Typical asphalt or concrete)		

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	:	27775
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.50
Heavy Truck % of Total Volume	:	22.50
Day (16 hrs) % of Total Volume	:	66.67

a for Segment # 2: HWY 401- WB (day/night)

le1 Angle2	: -90.00 deg	15.00 deg
d depth	: 0	(No woods.)
of house rows	: 0 / 0	
face	: 1	(Absorptive ground surface)
eiver source distance	: 300.00 / 300.00 m	
eiver height	: 1.20 / 4.50 m	
ography	: 1	(Flat/gentle slope; no barrier)
erence angle	: 0.00	

ult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	55.10	55.10
HWY 401- WB	2.18	55.45	55.45
Total			58.29 dBA

ılt summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	56.55	56.55
HWY 401- WB	2.18	56.88	56.88
Total			59.73 dBA

Leq FROM ALL SOURCES (DAY): 58.29
(NIGHT): 59.73

SON 5.0 SUMMARY REPORT Date: 18-07-2002 12:52:20
STRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

name: r5hfut.te Time Period: Day/Night 16/8 hours
ription: R5 - Future Levels (Highway 401)

data, segment # 1: HWY 401- EB (day/night)

traffic volume	: 22354/11176	veh/TimePeriod *
um truck volume	: 2395/1197	veh/TimePeriod *
y truck volume	: 7185/3592	veh/TimePeriod *
ed speed limit	: 100	km/h
gradient	: 3	%
pavement	: 1	(Typical asphalt or concrete)

fers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	:	47900
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	7.50
Heavy Truck % of Total Volume	:	22.50
Day (16 hrs) % of Total Volume	:	66.67

for Segment # 1: HWY 401- EB (day/night)

el Angle2	: -90.00 deg	10.00 deg
depth	: 0	(No woods.)
f house rows	: 0 / 0	
ace	: 1	(Absorptive ground surface)
iver source distance	: 315.00 / 315.00	m
iver height	: 1.20 / 4.50	m
graphy	: 1	(Flat/gentle slope; no barrier)
rence angle	: 0.00	

data, segment # 2: HWY 401- WB (day/night)

```
 traffic volume  : 22354/11176 veh/TimePeriod  *
ium truck volume :  2395/1197  veh/TimePeriod  *
 y truck volume  :  7185/3592  veh/TimePeriod  *
ed speed limit   :   100 km/h
d gradient       :     3 %
  pavement       :     1 (Typical asphalt or concrete)
```

efers to calculated road volumes based on the following input:

```
 24 hr Traffic Volume (AADT or SADT):  47900
 Percentage of Annual Growth         :   0.00
 Number of Years of Growth           :   0.00
 Medium Truck % of Total Volume      :   7.50
 Heavy Truck  % of Total Volume      :  22.50
 Day (16 hrs) % of Total Volume      :  66.67
```

for Segment # 2: HWY 401- WB (day/night)

```
el   Angle2            : -90.00 deg   10.00 deg
 depth                 :      0       (No woods.)
of house rows          :      0 / 0
face                   :      1       (Absorptive ground surface)
iver source distance   : 300.00 / 300.00 m
iver height            :   1.20 / 4.50   m
ography                :      1       (Flat/gentle slope; no barrier)
rence angle            :   0.00
```

ult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	57.19	57.19
HWY 401- WB	2.18	57.54	57.54
Total			60.38 dBA

lt summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	58.65	58.65
HWY 401- WB	2.18	58.98	58.98
Total			61.83 dBA

L Leq FROM ALL SOURCES (DAY): 60.38
(NIGHT): 61.83

```
AMSON 5.0          SUMMARY REPORT          Date: 18-07-2002 12:53:23
 STRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

lename: r5rext.te              Time Period: Day/Night 16/8 hours
-cription: R5 - Existing Levels (Ramps & Others)

ad data, segment # 1: E-N/S RAMP (day/night)
-------------------------------------------
. traffic volume    :  6431/3215   veh/TimePeriod  *
dium truck volume  :   159/79     veh/TimePeriod  *
 ry truck volume   :   477/238    veh/TimePeriod  *
 ted speed limit   :     40 km/h
ad gradient        :      3 %
 d pavement        :      1 (Typical asphalt or concrete)

Refers to calculated road volumes based on the following input:

  24 hr Traffic Volume (AADT or SADT):  10600
  Percentage of Annual Growth        :   0.00
  Number of Years of Growth          :   0.00
  Medium Truck % of Total Volume     :   2.25
  Heavy Truck  % of Total Volume     :   6.75
  Day (16 hrs) % of Total Volume     :  66.67

 a for Segment # 1: E-N/S RAMP (day/night)
-----------------------------------------
gle1   Angle2           : -55.00 deg   20.00 deg
 d depth                :      0       (No woods.)
 of house rows          :      0 / 0
rface                   :      1       (Absorptive ground surface)
 eiver source distance  :  90.00 / 90.00  m
 eiver height           :   1.20 / 4.50   m
pography                :      1       (Flat/gentle slope; no barrier)
ference angle           :   0.00
```

e 2

d data, segment # 2: N-W RAMP (day/night)

traffic volume	: 3131/1565	veh/TimePeriod	*
lium truck volume	: 59/29	veh/TimePeriod	*
vy truck volume	: 177/88	veh/TimePeriod	*
ted speed limit	: 50	km/h	
d gradient	: 4	%	
d pavement	: 1	(Typical asphalt or concrete)	

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	:	5050
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	1.75
Heavy Truck % of Total Volume	:	5.25
Day (16 hrs) % of Total Volume	:	66.67

a for Segment # 2: N-W RAMP (day/night)

gle1 Angle2	: -45.00 deg	0.00 deg	
d depth	: 0	(No woods.)	
of house rows	: 0 / 0		
face	: 1	(Absorptive ground surface)	
eiver source distance	: 65.00 / 65.00	m	
eiver height	: 1.20 / 4.50	m	
ography	: 1	(Flat/gentle slope; no barrier)	
ference angle	: 0.00		

data, segment # 3: WELLINGTON (day/night)

```
 traffic volume  : 31381/3487  veh/TimePeriod  *
ium truck volume :  1057/117   veh/TimePeriod  *
 / truck volume  :  1671/186   veh/TimePeriod  *
ed speed limit   :    60 km/h
d gradient       :     4 %
 pavement        :     1 (Typical asphalt or concrete)
```

efers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT):  37900
 Percentage of Annual Growth        :   0.00
 Number of Years of Growth          :   0.00
 Medium Truck % of Total Volume     :   3.10
 Heavy Truck  % of Total Volume     :   4.90
 Day (16 hrs) % of Total Volume     :  90.00
```

for Segment # 3: WELLINGTON (day/night)

```
el   Angle2            : -90.00 deg   90.00 deg
 depth                 :      0       (No woods.)
of house rows          :      0 / 0
face                   :      1       (Absorptive ground surface)
 iver source distance  :  60.00 / 105.00 m
.iver height           :   1.20 / 4.50   m
ography                :      1       (Flat/gentle slope; no barrier)
 rence angle           :   0.00
```

sult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
E-N/S RAMP	1.61	48.00	48.00
N-W RAMP	1.51	45.68	45.68
WELLINGTON	1.49	62.54	62.54
Total			62.78 dBA

sult summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
E-N/S RAMP	1.61	48.77	48.77
N-W RAMP	1.51	46.27	46.27
WELLINGTON	1.49	52.88	52.88
Total			54.94 dBA

AL Leq FROM ALL SOURCES (DAY): 62.78
(NIGHT): 54.94

MSON 5.0 SUMMARY REPORT Date: 18-07-2002 12:54:02
STRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

ename: r5rfut.te Time Period: Day/Night 16/8 hours
cription: R5 - Future Levels (Ramps & Others)

d data, segment # 1: E-N/S RAMP (day/night)

traffic volume	: 10435/5217	veh/TimePeriod *
ium truck volume	: 258/129	veh/TimePeriod *
y truck volume	: 774/387	veh/TimePeriod *
ed speed limit	: 40	km/h
d gradient	: 3	%
d pavement	: 1	(Typical asphalt or concrete)

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	:	17200
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	2.25
Heavy Truck % of Total Volume	:	6.75
Day (16 hrs) % of Total Volume	:	66.67

for Segment # 1: E-N/S RAMP (day/night)

le1 Angle2	: -55.00 deg	10.00 deg
depth	: 0	(No woods.)
f house rows	: 0 / 0	
face	: 1	(Absorptive ground surface)
iver source distance	: 130.00 / 130.00	m
iver height	: 1.20 / 4.50	m
ography	: 1	(Flat/gentle slope; no barrier)
erence angle	: 0.00	

: 2

l data, segment # 2: N-W RAMP (day/night)
---
traffic volume : 4619/2309 veh/TimePeriod *
.um truck volume : 87/43 veh/TimePeriod *
ry truck volume : 261/130 veh/TimePeriod *
:ed speed limit : 60 km/h
l gradient : 4 %
l pavement : 1 (Typical asphalt or concrete)

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7450
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.75
Heavy Truck % of Total Volume : 5.25
Day (16 hrs) % of Total Volume : 66.67

a for Segment # 2: N-W RAMP (day/night)
---
le1 Angle2 : -50.00 deg 0.00 deg
l depth : 0 (No woods.)
of house rows : 0 / 0
face : 1 (Absorptive ground surface)
eiver source distance : 65.00 / 65.00 m
eiver height : 1.20 / 4.50 m
ography : 1 (Flat/gentle slope; no barrier)
erence angle : 0.00

d data, segment # 3: WELLINGTON (day/night)

r traffic volume : 46078/5120 veh/TimePeriod *
dium truck volume : 1553/173 veh/TimePeriod *
y truck volume : 2454/273 veh/TimePeriod *
sted speed limit : 60 km/h
ad gradient : 4 %
i pavement : 1 (Typical asphalt or concrete)

Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 55650
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.10
Heavy Truck % of Total Volume : 4.90
Day (16 hrs) % of Total Volume : 90.00

for Segment # 3: WELLINGTON (day/night)

el Angle2 : -90.00 deg 90.00 deg
d depth : 0 (No woods.)
of house rows : 0 / 0
rface : 1 (Absorptive ground surface)
eiver source distance : 50.00 / 105.00 m
eiver height : 1.20 / 4.50 m
pography : 1 (Flat/gentle slope; no barrier)
erence angle : 0.00

sult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
E-N/S RAMP	1.61	46.79	46.79
N-W RAMP	1.51	49.15	49.15
WELLINGTON	1.49	65.52	65.52
Total			65.68 dBA

sult summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
E-N/S RAMP	1.61	47.72	47.72
N-W RAMP	1.51	49.76	49.76
WELLINGTON	1.49	54.55	54.55
Total			56.42 dBA

AL Leq FROM ALL SOURCES (DAY): 65.68
(NIGHT): 56.42

```
MSON 5.0          SUMMARY REPORT          Date: 18-07-2002 12:58:30
TSTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

ename: r10hext.te              Time Period: Day/Night 16/8 hours
scription: R10 - Existing Levels (Highway 401)

d data, segment # 1: HWY 401- EB (day/night)
  ----------------------------------------
  traffic volume  :  7257/3628  veh/TimePeriod  *
dium truck volume :   778/389   veh/TimePeriod  *
vy truck volume   :  2333/1166  veh/TimePeriod  *
  ed speed limit  :   100 km/h
d gradient        :     2 %
d pavement        :     1 (Typical asphalt or concrete)

 fers to calculated road volumes based on the following input:

  24 hr Traffic Volume (AADT or SADT):  15550
  Percentage of Annual Growth        :   0.00
  Number of Years of Growth          :   0.00
  Medium Truck % of Total Volume     :   7.50
  Heavy Truck  % of Total Volume     :  22.50
  Day (16 hrs) % of Total Volume     :  66.67

 a for Segment # 1: HWY 401- EB (day/night)
 ------------------------------------------
gle1   Angle2           : -90.00 deg  90.00 deg
 d depth                :      0      (No woods.)
 of house rows          :      0 / 0
rface                   :      1      (Absorptive ground surface)
ceiver source distance  :  85.00 / 85.00  m
 eiver height           :   1.20 / 4.50   m
 ography                :      1      (Flat/gentle slope; no barrier)
ference angle           :   0.00
```

e 2

d data, segment # 2: HWY 401- WB (day/night)

traffic volume	7257/3628	veh/TimePeriod *
ium truck volume	778/389	veh/TimePeriod *
vy truck volume	2333/1166	veh/TimePeriod *
ted speed limit	100 km/h	
d gradient	2 %	
d pavement	1 (Typical asphalt or concrete)	

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	15550
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.50
Heavy Truck % of Total Volume	22.50
Day (16 hrs) % of Total Volume	66.67

a for Segment # 2: HWY 401- WB (day/night)

le1 Angle2	-90.00 deg	90.00 deg
d depth	0	(No woods.)
of house rows	0 / 0	
face	1	(Absorptive ground surface)
eiver source distance	100.00 / 100.00 m	
eiver height	1.20 / 4.50 m	
ography	1	(Flat/gentle slope; no barrier)
erence angle	0.00	

ult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	64.08	64.08
HWY 401- WB	2.18	62.91	62.91
Total			66.54 dBA

ult summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	64.99	64.99
HWY 401- WB	2.18	63.90	63.90
Total			67.49 dBA

AL Leq FROM ALL SOURCES (DAY): 66.54
(NIGHT): 67.49

MSON 5.0 SUMMARY REPORT Date: 18-07-2002 12:59:02
ISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

ename: r10hfut.te Time Period: Day/Night 16/8 hours
cription: R10 - Future Levels (Highway 401)

d data, segment # 1: HWY 401- EB (day/night)

traffic volume	7257/3628	veh/TimePeriod *
ium truck volume	778/389	veh/TimePeriod *
vy truck volume	2333/1166	veh/TimePeriod *
ted speed limit	100	km/h
d gradient	2	%
d pavement	1	(Typical asphalt or concrete)

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	15550
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.50
Heavy Truck % of Total Volume	22.50
Day (16 hrs) % of Total Volume	66.67

a for Segment # 1: HWY 401- EB (day/night)

le1 Angle2	-90.00 deg	90.00 deg
d depth	0	(No woods.)
of house rows	0 / 0	
face	1	(Absorptive ground surface)
eiver source distance	85.00 / 85.00	m
eiver height	1.20 / 4.50	m
ography	1	(Flat/gentle slope; no barrier)
erence angle	0.00	

i data, segment # 2: HWY 401- WB (day/night)

r traffic volume : 7257/3628 veh/TimePeriod *
dium truck volume : 778/389 veh/TimePeriod *
y truck volume : 2333/1166 veh/TimePeriod *
sted speed limit : 100 km/h
ad gradient : 2 %
i pavement : 1 (Typical asphalt or concrete)

Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	15550
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.50
Heavy Truck % of Total Volume	22.50
Day (16 hrs) % of Total Volume	66.67

a for Segment # 2: HWY 401- WB (day/night)

le1 Angle2 : -90.00 deg 90.00 deg
i depth : 0 (No woods.)
of house rows : 0 / 0
:face : 1 (Absorptive ground surface)
eiver source distance : 100.00 / 100.00 m
eiver height : 1.20 / 4.50 m
pography : 1 (Flat/gentle slope; no barrier)
erence angle : 0.00

sult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
.HWY 401- EB	2.18	64.08	64.08
HWY 401- WB	2.18	62.91	62.91
Total			66.54 dBA

lt summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	64.99	64.99
.HWY 401- WB	2.18	63.90	63.90
Total			67.49 dBA

AL Leq FROM ALL SOURCES (DAY): 66.54
(NIGHT): 67.49

MSON 5.0 SUMMARY REPORT Date: 18-07-2002 13:00:00
STRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

ename: r22hext.te Time Period: Day/Night 16/8 hours
cription: R22 - Existing Levels (Highway 401)

d data, segment # 1: HWY 401- EB (day/night)

traffic volume	7129/3564	veh/TimePeriod *
lium truck volume	764/382	veh/TimePeriod *
y truck volume	2291/1146	veh/TimePeriod *
ed speed limit	100	km/h
d gradient	2	%
d pavement	1	(Typical asphalt or concrete)

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	15275
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.50
Heavy Truck % of Total Volume	22.50
Day (16 hrs) % of Total Volume	66.67

for Segment # 1: HWY 401- EB (day/night)

gle1 Angle2	-10.00 deg	90.00 deg
l depth	0	(No woods.)
of house rows	0 / 0	
rface	1	(Absorptive ground surface)
iver source distance	305.00 / 305.00	m
iver height	1.20 / 4.50	m
pography	1	(Flat/gentle slope; no barrier)
ference angle	0.00	

d data, segment # 2: HWY 401- WB (day/night)

traffic volume	7129/3564	veh/TimePeriod *
lium truck volume	764/382	veh/TimePeriod *
vy truck volume	2291/1146	veh/TimePeriod *
ted speed limit	100 km/h	
d gradient	2 %	
d pavement	1 (Typical asphalt or concrete)	

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	15275
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	7.50
Heavy Truck % of Total Volume	22.50
Day (16 hrs) % of Total Volume	66.67

a for Segment # 2: HWY 401- WB (day/night)

le1 Angle2	-10.00 deg	90.00 deg
d depth	0	(No woods.)
of house rows	0 / 0	
face	1	(Absorptive ground surface)
eiver source distance	290.00 / 290.00 m	
eiver height	1.20 / 4.50 m	
ography	1	(Flat/gentle slope; no barrier)
erence angle	0.00	

ult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	52.46	52.46
HWY 401- WB	2.18	52.82	52.82
Total			55.65 dBA

ult summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	53.91	53.91
HWY 401- WB	2.18	54.25	54.25
Total			57.09 dBA

TAL Leq FROM ALL SOURCES (DAY): 55.65
(NIGHT): 57.09

```
MSON 5.0          SUMMARY REPORT          Date: 18-07-2002 13:00:40
ISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

ename: r22hfut.te              Time Period: Day/Night 16/8 hours
cription: R22 - Future Levels (Highway 401)


d data, segment # 1: HWY 401- EB (day/night)
-----------------------------------------------
 traffic volume  : 13756/6877  veh/TimePeriod  *
ium truck volume :  1474/737   veh/TimePeriod  *
vy truck volume  :  4421/2210  veh/TimePeriod  *
ted speed limit  :   100 km/h
d gradient       :     2 %
d pavement       :     1 (Typical asphalt or concrete)

efers to calculated road volumes based on the following input:

 24 hr Traffic Volume (AADT or SADT):  29475
 Percentage of Annual Growth        :   0.00
 Number of Years of Growth          :   0.00
 Medium Truck % of Total Volume     :   7.50
 Heavy Truck  % of Total Volume     :  22.50
 Day (16 hrs) % of Total Volume     :  66.67

a for Segment # 1: HWY 401- EB (day/night)
-----------------------------------------------
le1   Angle2           : -10.00 deg   90.00 deg
d depth                :      0       (No woods.)
of house rows          :      0 / 0
face                   :      1       (Absorptive ground surface)
eiver source distance  : 308.00 / 308.00 m
eiver height           :   1.20 / 4.50   m
ography                :      1       (Flat/gentle slope; no barrier)
erence angle           :   0.00
```

data, segment # 2: HWY 401- WB (day/night)

```
traffic volume  : 13756/6877  veh/TimePeriod  *
m truck volume  :  1474/737   veh/TimePeriod  *
y truck volume  :  4421/2210  veh/TimePeriod  *
ted speed limit :   100 km/h
d gradient      :     2 %
 pavement       :     1 (Typical asphalt or concrete)
```

efers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT):  29475
Percentage of Annual Growth        :   0.00
Number of Years of Growth          :   0.00
Medium Truck % of Total Volume     :   7.50
Heavy Truck  % of Total Volume     :  22.50
Day (16 hrs) % of Total Volume     :  66.67
```

for Segment # 2: HWY 401- WB (day/night)

```
el   Angle2           : -10.00 deg   90.00 deg
 depth                :      0       (No woods.)
of house rows         :      0 / 0
face                  :      1       (Absorptive ground surface)
iver source distance  : 293.00 / 293.00 m
eiver height          :   1.20 / 4.50   m
ography               :      1       (Flat/gentle slope; no barrier)
rence angle           :   0.00
```

ult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
HWY 401- EB	2.18	55.25	55.25
WY 401- WB	2.18	55.60	55.60
Total			58.44 dBA

lt summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
WY 401- EB	2.18	56.69	56.69
HWY 401- WB	2.18	57.03	57.03
Total			59.87 dBA

AL Leq FROM ALL SOURCES (DAY): 58.44
(NIGHT): 59.87

MSON 5.0 SUMMARY REPORT Date: 18-07-2002 13:01:34
STRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

ename: r22rext.te Time Period: Day/Night 16/8 hours
cription: R22 - Existing Levels (Ramps & Others)

d data, segment # 1: N-W RAMP (day/night)

traffic volume : 10321/5159 veh/TimePeriod *
ium truck volume : 420/210 veh/TimePeriod *
y truck volume : 1260/630 veh/TimePeriod *
ed speed limit : 40 km/h
d gradient : 5 %
d pavement : 1 (Typical asphalt or concrete)

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 18000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.50
Heavy Truck % of Total Volume : 10.50
Day (16 hrs) % of Total Volume : 66.67

for Segment # 1: N-W RAMP (day/night)

gle1 Angle2 : -20.00 deg 10.00 deg
depth : 0 (No woods.)
f house rows : 0 / 0
face : 1 (Absorptive ground surface)
river source distance : 180.00 / 180.00 m
river height : 1.20 / 4.50 m
ography : 1 (Flat/gentle slope; no barrier)
ference angle : 0.00

2

data, segment # 2: S-W RAMP (day/night)

raffic volume	5157/2578	veh/TimePeriod *
m truck volume	128/64	veh/TimePeriod *
truck volume	383/191	veh/TimePeriod *
d speed limit	40 km/h	
gradient	4 %	
pavement	1 (Typical asphalt or concrete)	

ers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	8500
Percentage of Annual Growth	0.00
Number of Years of Growth	0.00
Medium Truck % of Total Volume	2.25
Heavy Truck % of Total Volume	6.75
Day (16 hrs) % of Total Volume	66.67

for Segment # 2: S-W RAMP (day/night)

21 Angle2	-15.00 deg	15.00 deg
depth	0	(No woods.)
house rows	0 / 0	
ace	1	(Absorptive ground surface)
iver source distance	165.00 / 165.00 m	
iver height	1.20 / 4.50 m	
graphy	1	(Flat/gentle slope; no barrier)
rence angle	0.00	

data, segment # 3: HWY 4 (day/night)

traffic volume	: 114402/20188 veh/TimePeriod	*
ium truck volume	: 7183/1268 veh/TimePeriod	*
y truck volume	: 11440/2019 veh/TimePeriod	*
ted speed limit	: 80 km/h	
d gradient	: 4 %	
pavement	: 1 (Typical asphalt or concrete)	

efers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	: 156500	
Percentage of Annual Growth	: 0.00	
Number of Years of Growth	: 0.00	
Medium Truck % of Total Volume	: 5.40	
Heavy Truck % of Total Volume	: 8.60	
Day (16 hrs) % of Total Volume	: 85.00	

for Segment # 3: HWY 4 (day/night)

el Angle2	: -90.00 deg	90.00 deg
depth	: 0	(No woods.)
of house rows	: 0 / 0	
face	: 1	(Absorptive ground surface)
eiver source distance	: 115.00 / 115.00 m	
eiver height	: 1.20 / 4.50 m	
ography	: 1	(Flat/gentle slope; no barrier)
erence angle	: 0.00	

sult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
N-W RAMP	1.80	43.37	43.37
S-W RAMP	1.61	39.02	39.02
HWY 4	1.71	67.95	67.95
Total			67.97 dBA

sult summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
N-W RAMP	1.80	44.44	44.44
S-W RAMP	1.61	39.99	39.99
HWY 4	1.71	64.45	64.45
Total			64.51 dBA

AL Leq FROM ALL SOURCES (DAY): 67.97
(NIGHT): 64.51

```
AMSON 5.0          SUMMARY REPORT          Date: 18-07-2002 13:02:11
'STRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

ilename: r22rfut.te              Time Period: Day/Night 16/8 hours
 cription: R22 - Future Levels (Ramps & Others)

 d data, segment # 1: N-W RAMP (day/night)
  ----------------------------------------
  traffic volume   :  1720/860   veh/TimePeriod  *
iium truck volume  :    70/35    veh/TimePeriod  *
 y truck volume    :   210/105   veh/TimePeriod  *
  ed speed limit   :    40 km/h
ad gradient        :     5 %
 d pavement        :     1 (Typical asphalt or concrete)

 efers to calculated road volumes based on the following input:

  24 hr Traffic Volume (AADT or SADT):    3000
  Percentage of Annual Growth        :    0.00
  Number of Years of Growth          :    0.00
  Medium Truck % of Total Volume     :    3.50
  Heavy Truck  % of Total Volume     :   10.50
  Day (16 hrs) % of Total Volume     :   66.67

  for Segment # 1: N-W RAMP (day/night)
  -------------------------------------
le1   Angle2           : -60.00 deg   90.00 deg
  depth                :       0      (No woods.)
 f house rows          :       0 / 0
rface                  :       1      (Absorptive ground surface)
eiver source distance  : 110.00 / 110.00 m
 iver height           :    1.20 / 4.50   m
pography               :       1      (Flat/gentle slope; no barrier)
ference angle          :    0.00
```

data, segment # 2: S-W RAMP (day/night)

traffic volume	:	880/440	veh/TimePeriod *
um truck volume	:	22/11	veh/TimePeriod *
y truck volume	:	65/33	veh/TimePeriod *
ed speed limit	:	40 km/h	
l gradient	:	4 %	
l pavement	:	1 (Typical asphalt or concrete)	

fers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT)	:	1450
Percentage of Annual Growth	:	0.00
Number of Years of Growth	:	0.00
Medium Truck % of Total Volume	:	2.25
Heavy Truck % of Total Volume	:	6.75
Day (16 hrs) % of Total Volume	:	66.67

a for Segment # 2: S-W RAMP (day/night)

le1 Angle2	:	-35.00 deg	30.00 deg
d depth	:	0	(No woods.)
of house rows	:	0 / 0	
face	:	1	(Absorptive ground surface)
eiver source distance	:	165.00 / 165.00 m	
eiver height	:	1.20 / 4.50 m	
ography	:	1	(Flat/gentle slope; no barrier)
erence angle	:	0.00	

d data, segment # 3: HWY 4 (day/night)

: traffic volume : 18823/3322 veh/TimePeriod *
lium truck volume : 1182/209 veh/TimePeriod *
y truck volume : 1882/332 veh/TimePeriod *
ed speed limit : 80 km/h
ad gradient : 4 %
pavement : 1 (Typical asphalt or concrete)

Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 25750
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 5.40
Heavy Truck % of Total Volume : 8.60
Day (16 hrs) % of Total Volume : 85.00

t for Segment # 3: HWY 4 (day/night)

le1 Angle2 : -90.00 deg 90.00 deg
l depth : 0 (No woods.)
of house rows : 0 / 0
rface : 1 (Absorptive ground surface)
eiver source distance : 115.00 / 15.00 m
eiver height : 1.20 / 4.50 m
pography : 1 (Flat/gentle slope; no barrier)
erence angle : 0.00

sult summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
N-W RAMP	1.80	45.09	45.09
S-W RAMP	1.61	34.56	34.56
HWY 4	1.71	60.11	60.11
Total			60.26 dBA

ult summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
N-W RAMP	1.80	46.08	46.08
S-W RAMP	1.62	35.61	35.61
HWY 4	1.71	70.44	70.44
Total			70.46 dBA

AL Leq FROM ALL SOURCES (DAY): 60.26
(NIGHT): 70.46

APPENDIX E

NOISE ANALYSIS OF ALTERNATIVE IMPROVEMENT SCHEMES

SS WILSON ASSOCIATES
Consulting Engineers

17 PAGES BY FAX

May 31, 2001

Mr. Tim Sorochinsky, P.Eng.
URS Cole, Sherman
75 Commerce Valley Drive East
Thornhill, Ontario
L3T 7N9

BY FAX ONLY: (905) 882-4399

Dear Mr. Sorochinsky,

Re: Environmental Noise Assessment
GWP 476-89-00
Highway 401 Improvements
From Highway 4 Easterly To Highbury Avenue
City of London, Ontario
Our File No.: WA00-75

This letter pertains to the environmental noise assessment of the proposed improvements to Highway 401 from Highway 4 easterly to Highbury Avenue, in the City of London, Ontario. Figure 1 shows the location of the study area.

Twenty four receptor locations (denoted R1 to R24) have been selected to represent the outdoor spaces of the residential, institutional and commercial properties along the subject corridor of Highway 401.

The following gives a brief description of the selected twenty four receptor locations noted above:

R1: Commercial building (Peterbilt Transport), west of Highbury Avenue and north of Highway 401.

R2: Commercial building (Penske Truck Rental & Leasing), west of CN Rail and north of Highway 401.

R3: House, east of Wellington Road, south of Highway 401 and north of Wilton Grove Road.

R4: OPP Building, east of Wellington Road, north of Highway 401 and south of Exeter Road.

R5: Motel (Ramada Inn), east of Wellington Road and north of Highway 401.

R6: House, east of Dingman Drive and north Highway 401.

R7: House, west of Dingman Drive, east of ramp to Highway 402 and north of Highway 401.

R8: House, west of Highway 402 ramps, east of Westminster Drive and north of Highway 401.

R9: House, west of Highway 402 ramps, east of Westminster Drive and north of Highway 401.

R10: Church building, north of Westminster Drive and south of Highway 401.

R11: House, south of Westminster Drive and Highway 401.

R12: House, north of Highway 401, between Westminster Drive and Scotland Drive.

R13: House, east of Scotland Drive and south of Highway 401.

R14: House, west of Scotland Drive and south of Highway 401.

R15: House, east of Scotland Drive and north of Highway 401.

R16: House, east of Manning Drive, south of Morrison Road and Highway 401.

R17: House, east of Manning Drive, south of Morrison Road and Highway 401.

R18: House, west of Wonderland Road and south of Highway 401.

R19: House, west of Wonderland Road and south of Highway 401.

R20: House, east of Col. Talbot Road, north of Glanworth Drive and Highway 401.

R21: House, at corner of Col. Talbot Road and Littlewood Drive and north of Highway 401.

R22: House, south of Littlewood Drive, west of Col. Talbot Road and north of Highway 401.

R23: House, west of Highway 4, east of Burtwistle Lane and south of Highway 401.

R24: Motel (Best Western), west of Burtwistle Lane and south of Highway 401.

Figures 2.1 to 2.11 show the locations of the selected receptors.

All sound levels are calculated using the computerised version (STAMSON V.5.03) of the Ministry of Environment (MOE) noise prediction model, ORNAMENT and the road and traffic data supplied by URS Cole, Sherman.

According to the MOE/MTO Noise Protocol, the significance of a noise impact will be quantified by using the objective for outdoor sound levels (i.e. the higher of the existing ambient or Leq 55 dBA) in addition to the change in noise level above the future without the undertaking (commonly known as the Future-Do-Nothing, F-D-N) ambient.

Also according to the MOE/MTO Noise Protocol, noise mitigation is generally warranted when the future project levels exceed by more than 5 dBA the F-D-N ambient levels.

In this study, we have been directed by the Prime Consultant, URS Cole, Sherman to use the existing ambient instead of the F-D-N ambient for noise assessment purposes. This approach will result in a more conservative assessment since the F-D-N levels are based on higher traffic volumes than the existing ambient levels.

Table 1 lists the predicted existing (year 1999) and the future with the undertaking (year 2021) sound levels, the excesses of the future project levels over the existing levels and over the Government sound levels Objective of Leq 55 dBA, the significance of the predicted excesses over the existing levels, and the need, if any to consider noise control measures as pre the MOE/MTO Noise Protocol.

The following conclusions are made based on the data included in Table 1:

(i) All the future project sound levels are predicted to have excesses over the existing ambient levels in the range of 2-5 dBA. Such excesses are considered to be acoustically insignificant to noticeable and are mainly attributed to the forecasted increases in the Highway 401 future traffic volumes over the existing conditions.

(ii) The future project sound levels at receptor locations R5 and R6 (Highway 401 interchange with Wellington Road) and R20 to R24 (Highway 401 interchange with Highway 4) are acoustically similar (i.e. within ± 1 dBA) for all the future interchange alternatives. This implies that from an acoustical point of view, the above noted Highway 401 future interchange alternatives are similar, since the contributions of vehicular traffic noise on the Highway 401 and Highway 4 lanes dominate the acoustical environment of the surrounding areas.

(iii) According to the MOE/MTO Noise Protocol, the predicted excess of the future project sound levels over the existing ambient levels do not exceed 5 dBA and therefore, do not warrant the consideration of noise control measures.

(iv) All the future project sound levels are predicted to have significant (i.e. more than 5 dBA) to very significant (i.e. more than 10 dBA) excesses over the Government Leq 55 dBA sound level objective. However, the noise impacts associated with these predicted excesses are significantly lessened by the presence of high ambient sound levels mainly due to the existing traffic conditions on Highway 401 and to a lesser extent to the traffic on the intersecting streets and interchange ramps.

The sound level assessment at receptor locations R17 to R19 (Highway 401/Wonderland Road interchange) will be carried out once the future traffic data of this interchange location are made available.

Should any of the road and/or traffic data parameters supplied by URS Cole, Sherman for this undertaking change, then all sound level calculations should be revised to reflect such changes and validate this environmental noise analysis.

I trust the above noise analysis will by of assistance to you.

Should you have any questions, please call the undersigned at (905) 707-5800.

Yours truly,

Tarek Zayed, P.Eng.
Project Engineer

GC01-13-WA00-75-401 Improvement Study
V Y

SS WILSON ASSOCIATES

TABLE 1

ROADWAY ENVIRONMENTAL NOISE IMPACT ASSESSMENT
HIGHWAY 401 IMPROVEMENTS
FROM HIGHWAY 4 EASTERLY TO HIGHBURY AVENUE
CITY OF LONDON
WA00-75

Receptor Code	ALTERNATIVE NO.	Existing (Year 1999) Leq dBA	Future Undertaking (Year 2021)Leq dBA	Government Leq Sound Level Objective dBA	Excess Criteria for mitigation dBA	Future Undertaking (Year 2021)Leq Minus Existing (year 1999) Leq	Significance of the Change due to the Future Undertaking (Year 2021)Leq Minus Existing (year 1999) Leq	Future Undertaking (Year 2021)Leq Minus Government Leq Sound Level Objective	Noise Control measures As per Protocol
R1		72.6	74.9	55	5	2	Insignificant	20	Not required
R2		69.4	71.7	55	5	2	Insignificant	17	Not required
R3		62.6	65.0	55	5	2	Insignificant	10	Not required
R4-A1	ALTERNATIVE NO. 1	67.3	69.7	55	5	2	Insignificant	15	Not required
R4-A2	ALTERNATIVE NO. 2	67.3	69.7	55	5	2	Insignificant	15	Not required
R5-A1	ALTERNATIVE NO. 1	62.9	67.0	55	5	4	Noticeable	12	Not required
R5-A2	ALTERNATIVE NO. 2	62.9	67.2	55	5	4	Noticeable	12	Not required
R6		62.5	64.8	55	5	2	Insignificant	10	Not required
R7		66.4	68.9	55	5	3	Insignificant	14	Not required
R8		64.0	65.7	55	5	2	Insignificant	11	Not required
R9		65.9	68.6	55	5	3	Insignificant	14	Not required
R10		66.4	71.0	55	5	5	Noticeable	16	Not required
R11		58.7	60.7	55	5	2	Insignificant	6	Not required
R12		60.1	63.0	55	5	3	Insignificant	8	Not required
R13		64.9	67.1	55	5	2	Insignificant	12	Not required
R14		61.3	63.5	55	5	2	Insignificant	9	Not required
R15		63.4	65.6	55	5	2	Insignificant	11	Not required
R16		57.4	60.3	55	5	3	Insignificant	5	Not required
R20-A1	ALTERNATIVE NO. 1	58.0	60.6	55	5	3	Insignificant	6	Not required
R20-A2	ALTERNATIVE NO. 2	58.0	60.4	55	5	2	Insignificant	5	Not required
R20-A3	ALTERNATIVE NO. 3	58.0	60.4	55	5	2	Insignificant	5	Not required
R20-A4	ALTERNATIVE NO. 4	58.0	60.4	55	5	2	Insignificant	5	Not required
R21-A1	ALTERNATIVE NO. 1	66.2	68.4	55	5	2	Insignificant	13	Not required
R21-A2	ALTERNATIVE NO. 2	66.2	68.4	55	5	2	Insignificant	13	Not required
R21-A3	ALTERNATIVE NO. 3	66.2	68.4	55	5	2	Insignificant	13	Not required
R21-A4	ALTERNATIVE NO. 4	66.2	68.3	55	5	2	Insignificant	13	Not required
R22-A1	ALTERNATIVE NO. 1	61.0	63.5	55	5	3	Insignificant	9	Not required
R22-A2	ALTERNATIVE NO. 2	61.0	63.7	55	5	3	Insignificant	9	Not required
R22-A3	ALTERNATIVE NO. 3	61.0	63.5	55	5	3	Insignificant	9	Not required
R22-A4	ALTERNATIVE NO. 4	61.0	63.5	55	5	3	Insignificant	9	Not required
R23-A1	ALTERNATIVE NO. 1	65.1	67.4	55	5	2	Insignificant	12	Not required
R23-A2	ALTERNATIVE NO. 2	65.1	67.4	55	5	2	Insignificant	12	Not required
R23-A3	ALTERNATIVE NO. 3	65.1	67.4	55	5	2	Insignificant	12	Not required
R23-A4	ALTERNATIVE NO. 4	65.1	67.6	55	5	3	Insignificant	13	Not required
R24-A1	ALTERNATIVE NO. 1	70.1	72.8	55	5	3	Insignificant	18	Not required
R24-A2	ALTERNATIVE NO. 2	70.1	72.8	55	5	3	Insignificant	18	Not required
R24-A3	ALTERNATIVE NO. 3	70.1	72.9	55	5	3	Insignificant	18	Not required
R24-A4	ALTERNATIVE NO. 4	70.1	72.8	55	5	3	Insignificant	18	Not required

Impact Assessment Rating :

0 to < 3 dB change : Insignificant
=>3 to < 5 dB change : Noticeable

=> 5 to < 10 dB change: Significant
=> 10 dB change : Very Significant

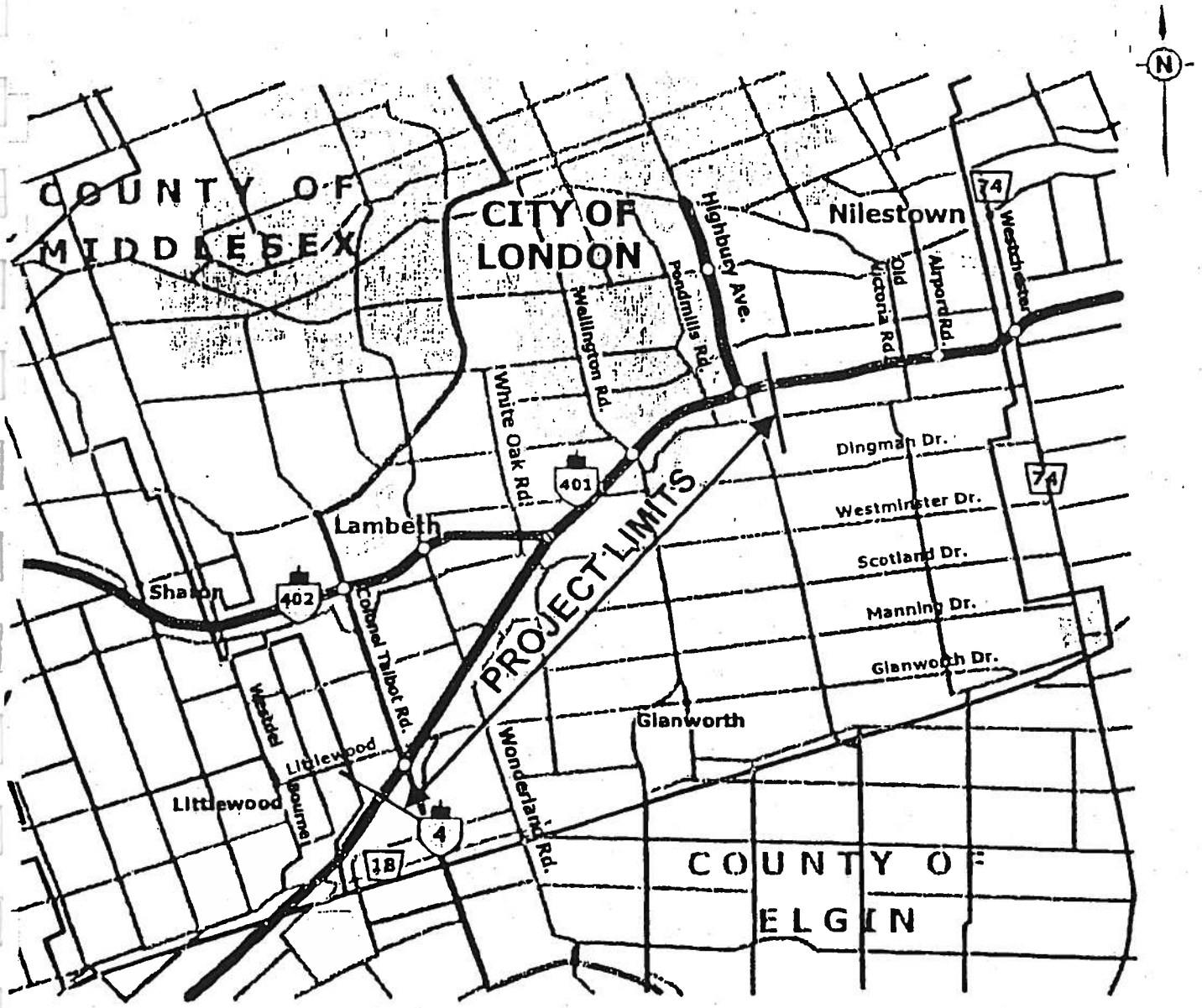

FIGURE 1
THE LOCATION OF THE STUDY AREA

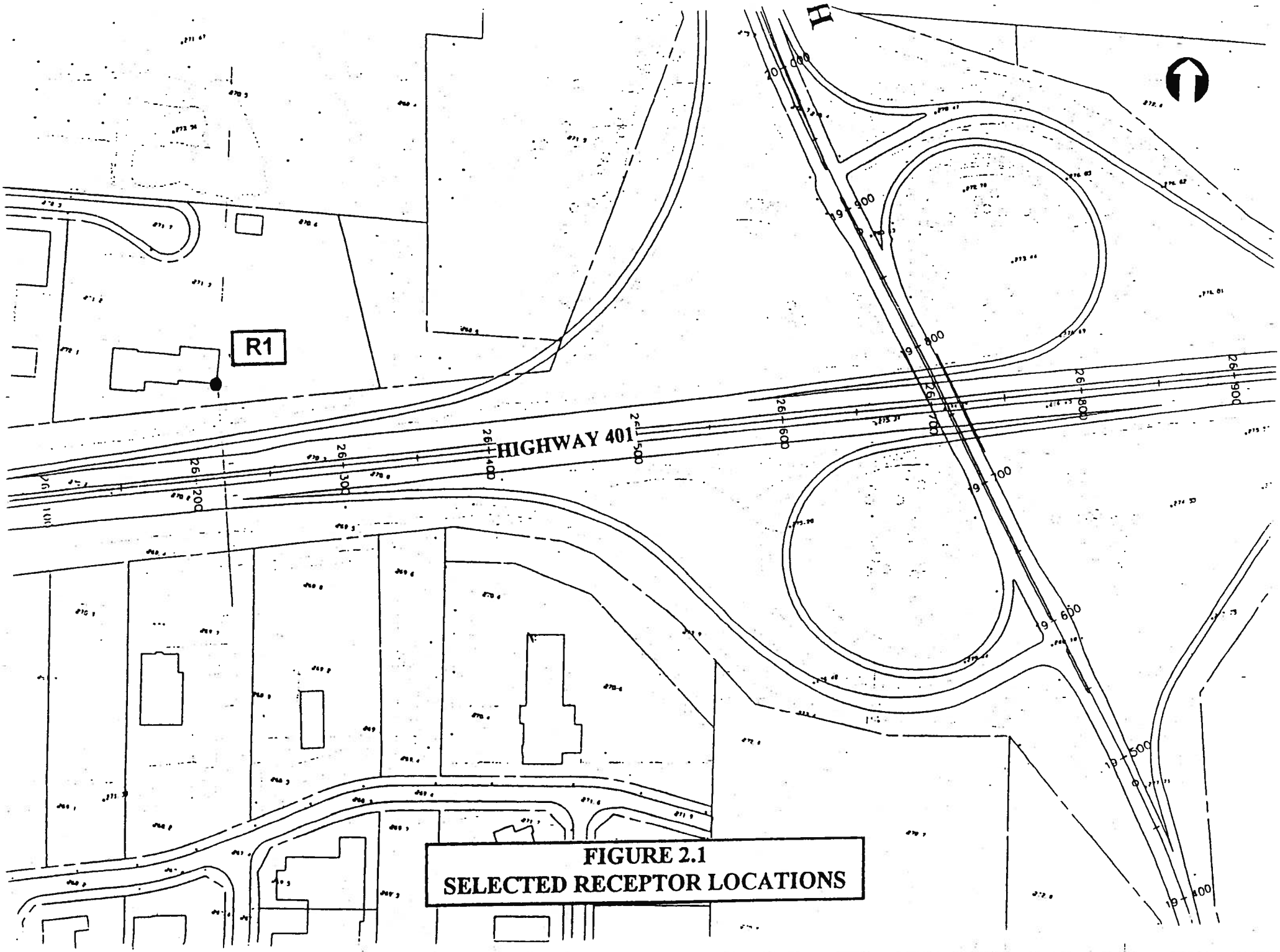

FIGURE 2.1
SELECTED RECEPTOR LOCATIONS

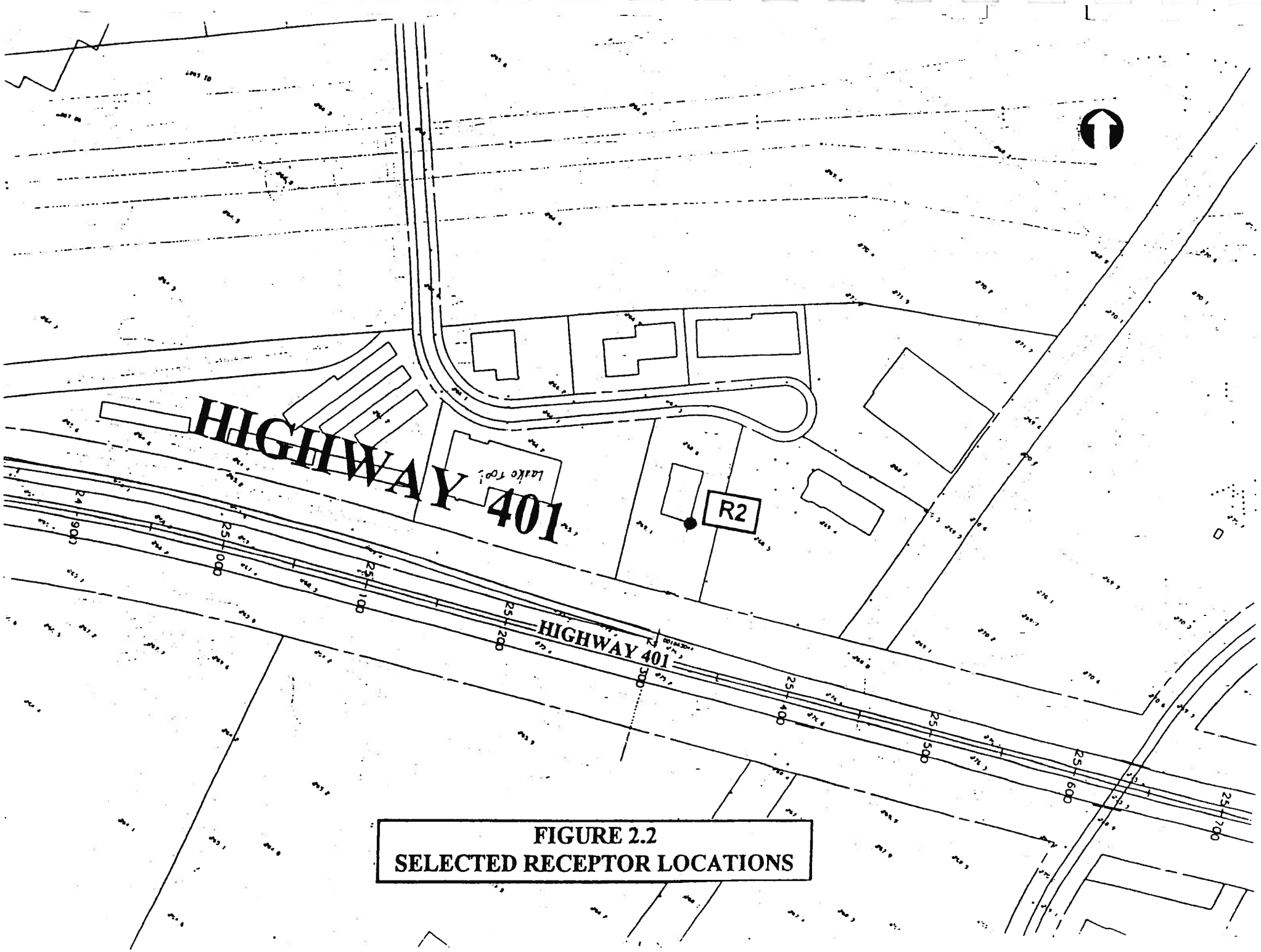

FIGURE 2.2
SELECTED RECEPTOR LOCATIONS

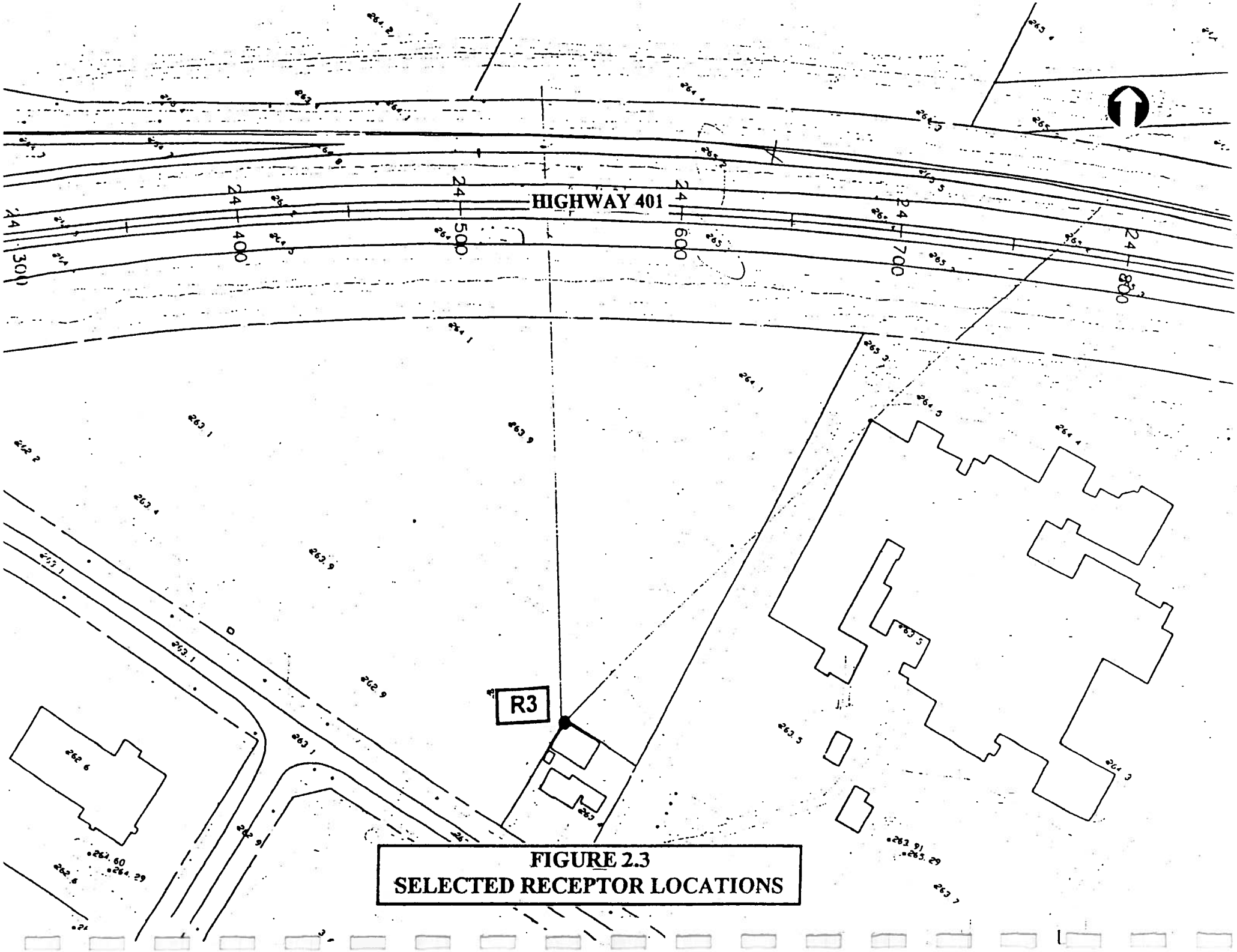

FIGURE 2.3
SELECTED RECEPTOR LOCATIONS

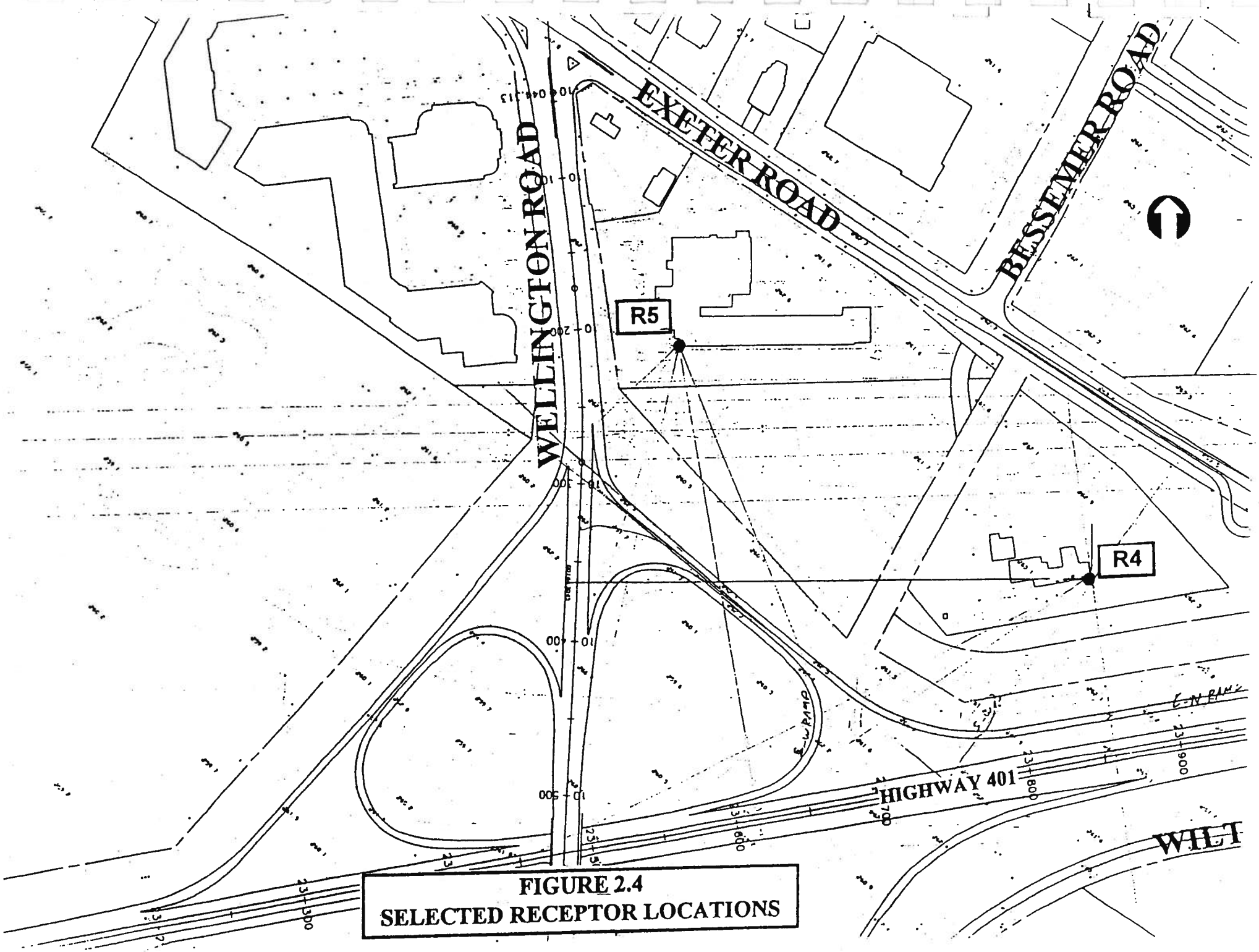

FIGURE 2.4
SELECTED RECEPTOR LOCATIONS

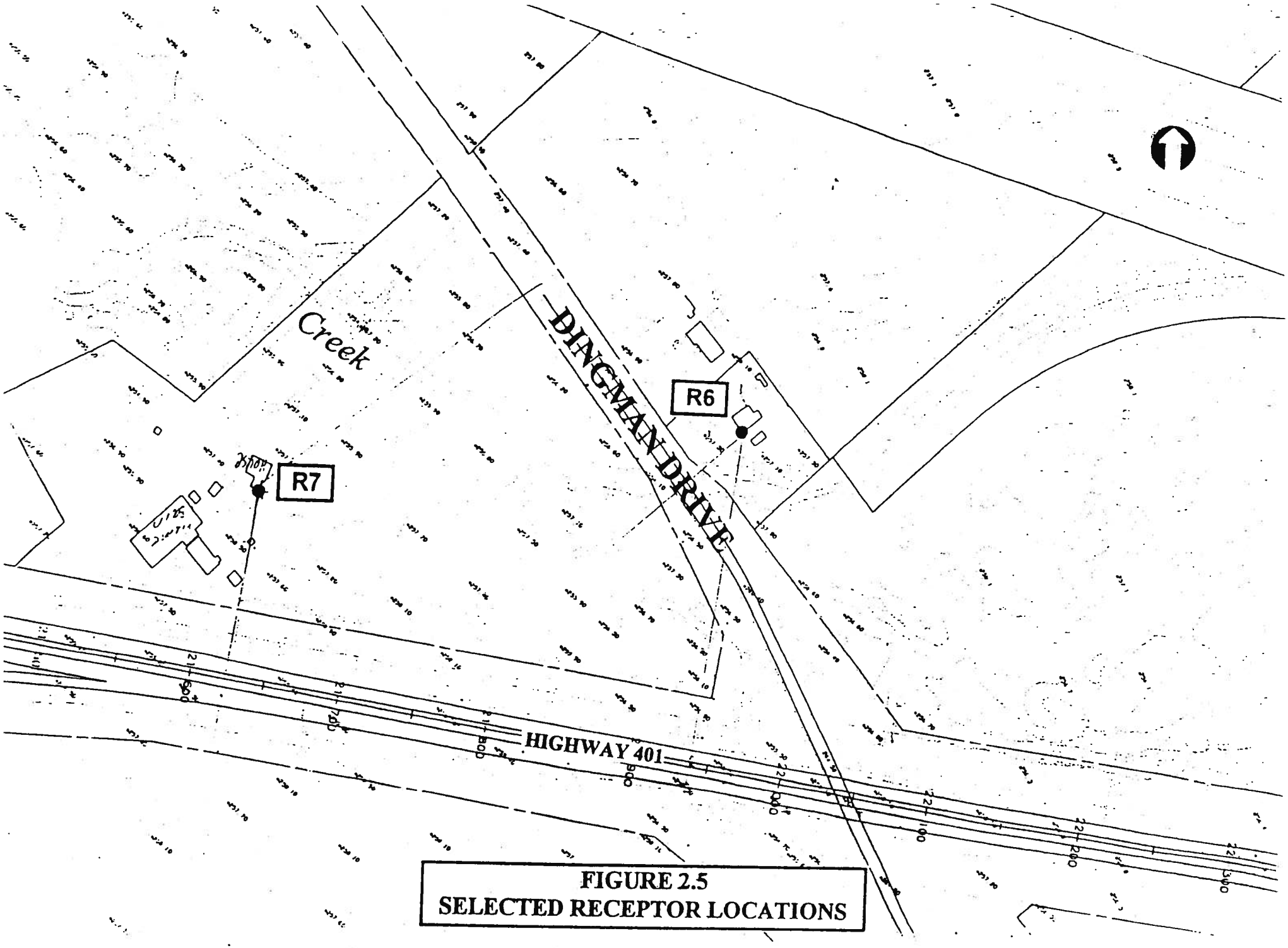

FIGURE 2.5
SELECTED RECEPTOR LOCATIONS

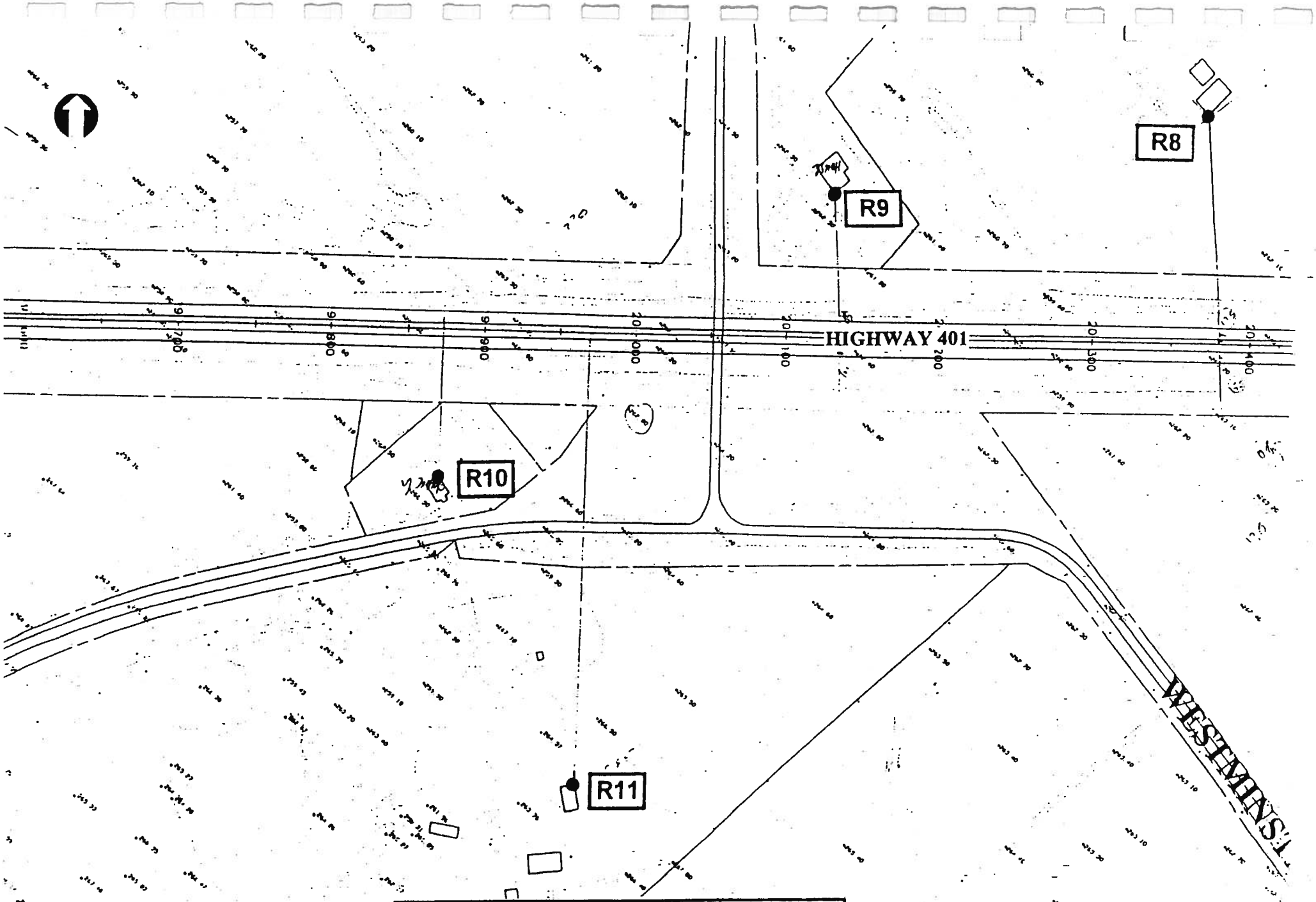

FIGURE 2.6
SELECTED RECEPTOR LOCATIONS

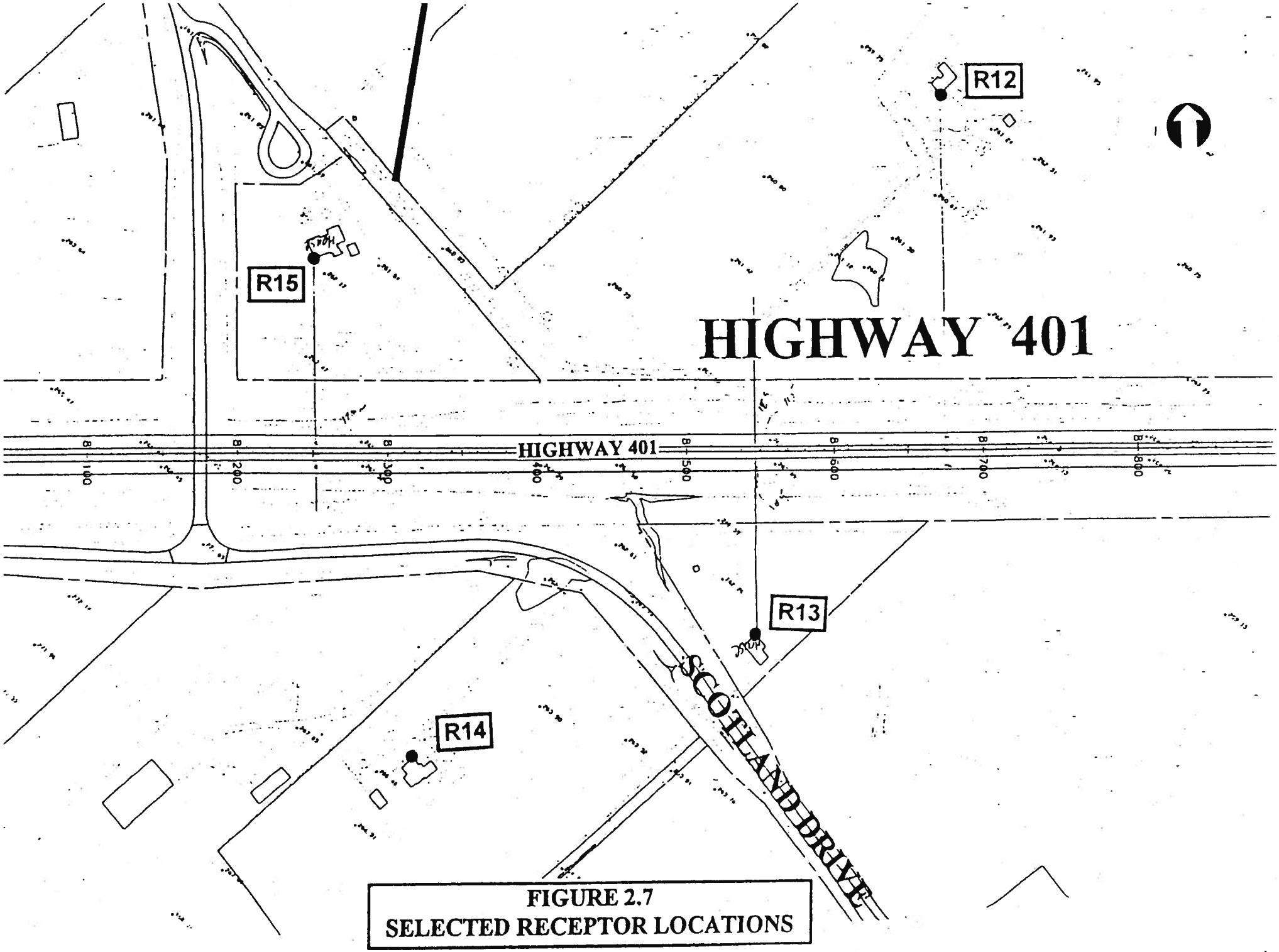

FIGURE 2.7
SELECTED RECEPTOR LOCATIONS

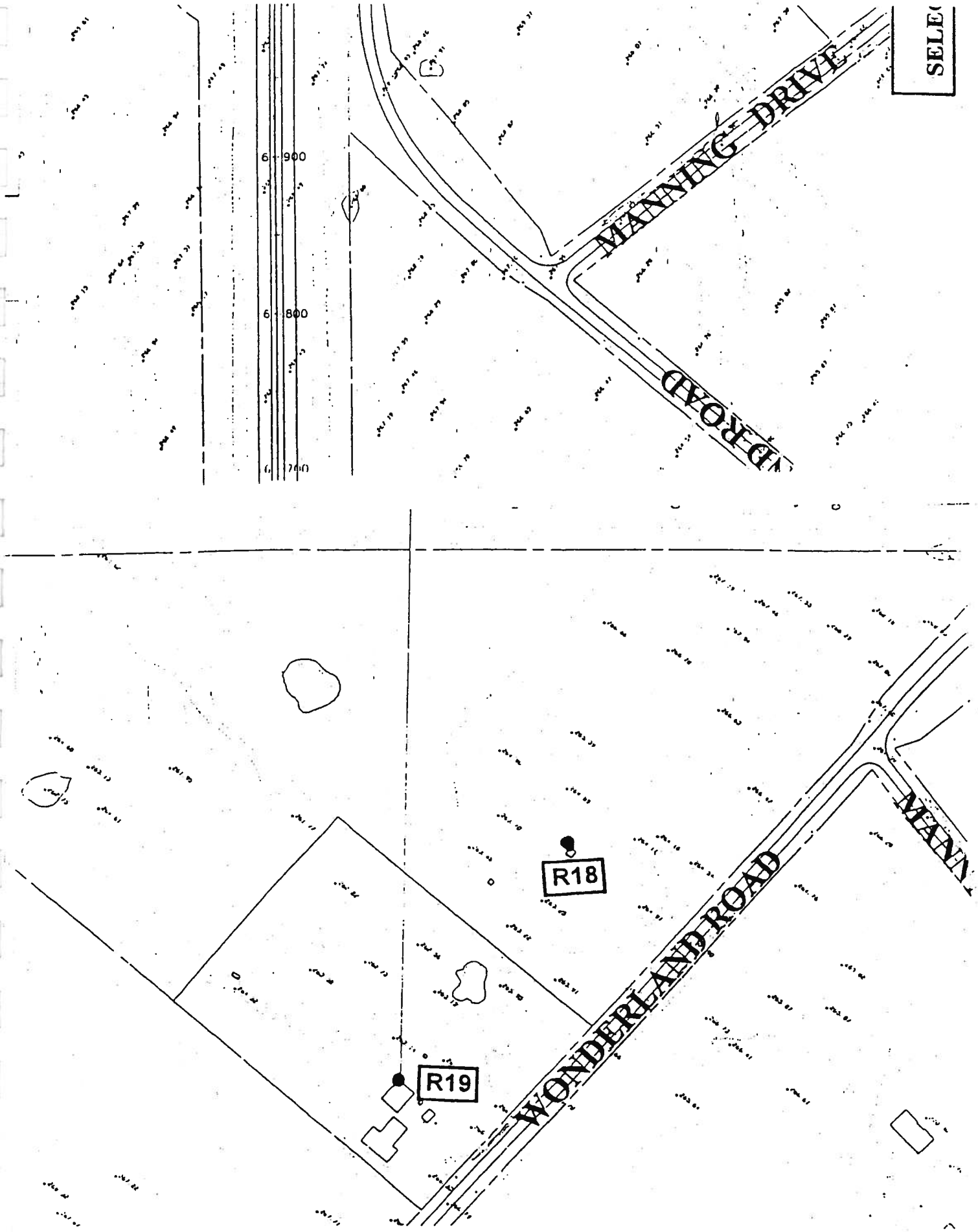

FIGURE 2.9
SELECTED RECEPTOR LOCATIONS

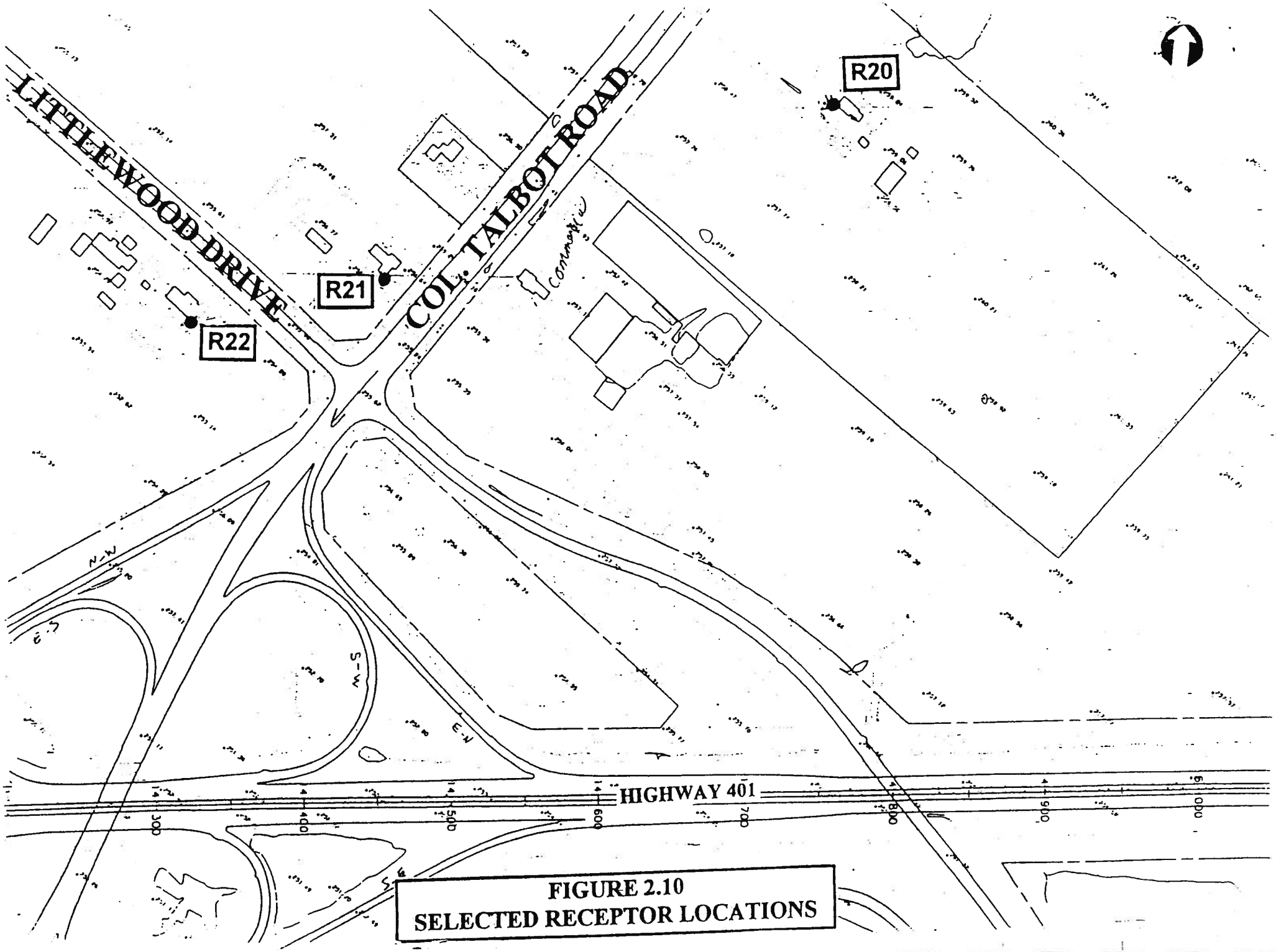

FIGURE 2.10
SELECTED RECEPTOR LOCATIONS

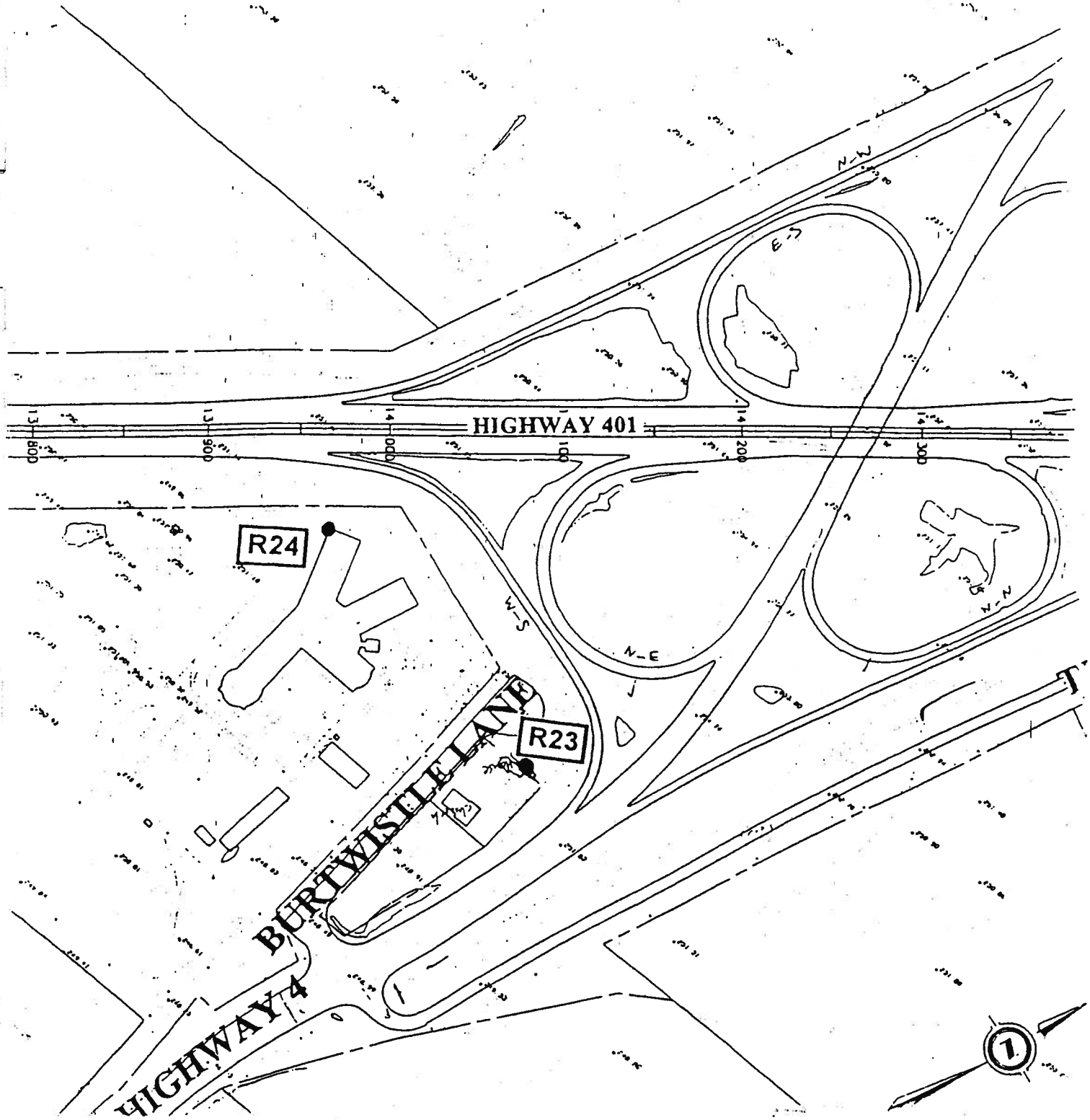

FIGURE 2.11
SELECTED RECEPTOR LOCATIONS

APPENDIX F

NOISE BY-LAW OF CITY OF LONDON

Noise Control By-law

PW - 4 Consolidated May 9, 1994

This by-law is printed under and by authority
of the Council of the City of London, Ontario, Canada

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London
CANADA

PUBLIC WELFARE

By-law PW-4
A by-law to provide for the
REGULATION OR PROHIBITION OF UNUSUAL NOISES

BY-LAW INDEX

Part 1
NOISES - PROHIBITED

Part 2
EXEMPTIONS

WHEREAS it is deemed expedient and necessary to regulate or prohibit unusual noises, or noises likely to disturb the inhabitants of the City of London;

THEREFORE the Municipal Council of The Corporation of the City of London enacts as follows:

SHORT TITLE
NOISE CONTROL BY-LAW

Part 1
NOISES - PROHIBITED

1.1 Likely to disturb - unusual - prohibited

No person shall ring any bell, blow or sound any horn or cause the same to be rung, blown, or sounded, shout or create, cause or permit any unusual noises, or noises likely to disturb the inhabitants.

1.2 Likely to disturb - unusual - set out

For the purpose of and not so as to limit the generality of section 1.1 of this by-law, the noises or sounds set out in sections 1.3 to 1.16 inclusive of this by-law shall be deemed to be unusual noises or noises likely to disturb the inhabitants.

1.3 Horn - siren - bell - on vehicle - when not required

The sounding of any bell, horn, siren or other signal device on any motor vehicle, motorcycle, bicycle, or other vehicle of whatsoever kind except when required by by-law is prohibited.

1.4 Horn - siren - bell - duration - unreasonable

The sounding of any such bell, horn, siren, or signal device for an unnecessary or unreasonable period of time is prohibited.

1.5 Radio - loud speaker - other - annoying - disturbing

The sound or noise from or created by any radio or phonograph, public address system, sound equipment, loud speaker, or similar device or devices, or any musical or sound producing instrument of whatever kind, when such device or instrument is played or operated in such a manner or with such volume:

(a) as to annoy or disturb the peace, quiet, comfort or repose of any individual in any dwelling house, apartment house, hotel or any other type of residence; or

(b) in the case of a device or instrument located in any commercial building or structure, as to be plainly audible upon the public streets at a distance of 8 metres (25 feet) from the building or structure in which such device or instrument is located, is prohibited.

1.6 Animal - bird - disturbing peace - quiet

Any sound made by any animal or bird which disturbs the peace, quiet, comfort or repose of any individual in any dwelling house, apartment house, hotel or any other type of residence is prohibited.

1.7 Vehicle - rattling - in disrepair - maladjusted

The grating, grinding or rattling noises or sound caused by condition of disrepair or maladjustment of any motor vehicle, motorcycle, or other vehicle whatsoever or part or accessory thereof is prohibited.

1.8 Vehicle - load - improperly secured

The noise created by driving any vehicle bearing material, articles or things which are loaded upon such vehicle in such manner as to create such noise is prohibited.

1.9 Whistle - air - steam - use - restricted

The blowing of any steam or air whistle attached to or used in connection with any stationary boiler or other machine or mechanism, except for the purpose of giving notice to workmen of the time to commence or cease work, or as a warning danger is prohibited.

1.10 Exhaust - discharge - without muffler

The discharge into the open air of the exhaust of any steam engine, stationary internal combustion engine, motor vehicle or motorcycle, except through a muffler or other device which effectively prevents loud or explosive noises is prohibited.

1.11 Construction - excavation - 6 p.m. to 7 a.m.

Any noise arising between the hour of 6:00 o'clock p.m. of any day and 7:00 o'clock a.m. of the next following day from any excavation or construction work whatsoever, including the erection, demolition, alteration or repair of any building authorized by the Corporation is prohibited, except in case of urgent necessity and then under a permit from the Building Inspector.

1.12 Quiet zone - noises - unreasonable - unnecessary

Any unreasonable and/or unnecessary noise in the vicinity of any school, hospital or court while the same is in session is prohibited, provided conspicuous signs are displayed in or upon the streets adjoining any such school or court, indicating that such noises are prohibited in the vicinity.

1.13 Loud speaker - horn - other - advertising

The noise or sound created by the use or operation of any drum, horn, bell, radio or mechanical loudspeaker, or other instrument or device or sound-producing, or sound transmitting instrument or apparatus for the purpose of advertising or for attracting attention to any performance, show or sale or display of goods, wares or merchandise or which projects noise or sound into any street or other public place is prohibited.

1.14 Loud speaker - other - in vehicle - use - restricted

The noise or sound created by the use or operation of any radio or mechanical loudspeaker or amplifier or other instrument or device or sound-producing, sound-reproducing, or sound transmitting instrument or apparatus in or upon any vehicle is prohibited except for such time and under such conditions as the Chief of Police may prescribe.

1.15 Firearms - discharge - exception - peace officers

The noise or sound caused by the discharge of any gun or other firearm, air gun and spring-gun or any class or type thereof is prohibited, provided that this shall not apply to peace officers in the performance of their duties.

1.16 Power equipment - use - time restrictions

Between the hours of 10:00 o'clock p.m. of any day and 7:00 o'clock a.m. of the next following day, Sunday to Saturday, and 10:00 o'clock p.m. Saturday until 9:00 o clock a.m. Sunday, the noise or

sound created by the use or operation of the following power equipment is prohibited:

(a) a lawnmower;

(b) a chain-saw; or

(c) any other such noise-generating tool or device.

1.17 Highways - prohibitions - exceptions

The prohibitions imposed by the following sections do not apply to streets to which the *Highway Traffic Act* applies:

(a) section 1.3 (relating to the sounding of certain noise generating devices on vehicles);

(b) section 1.7 (relating to vehicle noises arising from vehicles not in a proper state of repair);

(c) section 1.10 (relating to vehicle discharge noises other than through a noise muffling device); and

(d) section 1.14 (relating to devices for broadcasting amplified sound from vehicles).

Part 2
EXEMPTIONS

2.1 Public celebration - election - gathering - authorized

None of the provisions of this by-law shall apply to the use in a reasonable manner of any apparatus or mechanism for the amplification of the human voice or of music in a public park or any other commodious space in connection with any public election meeting, public celebration or other lawful gathering, provided written permission of the Chief of Police has first been obtained.

2.2 Parade - band - authorized

None of the provisions of this by-law shall apply to any military or other band or of any parade operating under written permission first obtained from the Chief of Police.

2.3 Tradesman - plying call - legitimacy - moderation

None of the provisions of this by-law shall apply to any newsboy, pedlar, hawker or petty tradesman plying his calling legitimately and moderately.

2.4 Emergency vehicle - police - fire - on duty

None of the provisions of this by-law shall apply to any vehicle of the police or fire department or any ambulance or any public service or emergency vehicle while answering a call.

2.5 Radio - private - motor vehicle - conditions

None of the provisions of this by-law shall apply to any sound from any private radio in a motor vehicle, installed for the sole benefit or entertainment of the operator and occupants of such vehicle when same is not audible at a distance of 8 metres (25 feet) from such vehicle.

2.6 Railway - operations - under Railway Act

None of the provisions of this by-law shall apply to any sound arising from the operation of any railway which operates under the *Railway Act* of Canada or from any plant or work in connection with any such railway.

2.7 Public convenience - necessity

None of the provisions of this by-law shall apply to any case of public convenience or necessity.

2.8 Salvation Army

None of the provisions of this by-law shall apply to the operations of the Salvation Army as heretofore carried on.

Part 3
ENFORCEMENT

3.1 Fine - for contravention

Any person who contravenes any provision of this by-law is, upon conviction, guilty of an offence and is liable to any penalty as provided in the *Provincial Offences Act*.

3.2 Continuation - repetition - prohibited - by order

The court in which the conviction has been entered and any court of competent jurisdiction thereafter, may make an order prohibiting the continuation or repetition of the offence by the person convicted, and such order shall be in addition to any other penalty imposed on the person convicted.

Part 4
SEVERABILITY

4.1 Validity

It is declared that notwithstanding that any section or sections of this by-law, or parts thereof, may be found by any court of law to be bad or illegal or beyond the power of the Council to enact, such section or sections or parts thereof shall be deemed to be severable and that all other sections or parts of this by-law are separate and independent therefrom and enacted as such.

Part 5
REPEAL - ENACTMENT

5.1 By-law - previous

By-law P.W.-198-222 and all of its amendments are hereby repealed.

5.2 Effective date

This by-law comes into force and takes effect on July 15, 1994.

PASSED in Open Council on November 15, 1993.

T. C. Gosnell
Mayor

K. W. Sadler
City Clerk

First Reading - November 15, 1993
Second Reading - November 15, 1993
Third Reading - November 15, 1993

APPENDIX D

Analysis and Evaluation of Alternatives

Evaluation Criteria

Evaluation criteria proposed to be used in the evaluation of highway interchange and local road alternatives are provided as follows:

ENVIRONMNETAL COMPONENT	CRITERIA
Natural Environment	• Effect on Fish and Aquatic Habitat • Effect on Terrestrial Habitat and Vegetation • Effect on Wetlands • Effect on Greenways and Open Space Linkages • Effect on Groundwater / Surface Water • Effect on Environmentally Significant Areas • Effect on Agricultural Lands (soils)
Social Environment	• Aesthetics • Noise • Community Effects (residential, institutional, recreational and community features, and out-of-way travel)
Economic Environment	• Effects on Commercial/Industrial uses • Effect on Agricultural Operations • Property Waste and Contamination
Cultural Environment	• Effect on Archaeological Resources • Effect on Heritage Resources
Transportation	• Traffic Operations • Traffic Safety • Construction Impacts • Compatibility with Local Road System • Cost

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HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

From 1.0 km West of Highway 4
Easterly to 1.0 km East of Highbury Avenue
G.W.P. 476-89-00

Preliminary Design
Class Environmental Assessment, Group 'B'

ANALYSIS AND EVALUATION OF HIGHWAY 4 ALTERNATIVES

ANALYSIS AND EVALUATION OF HIGHWAY 4 ALTERNATIVES PRIOR TO WITHDRAWING THE TESR IN NOVEMBER 2002

The following tables outline the analysis and evaluation that was used to assist the Project Team in the selection of the preferred alternative. The tables identify the results of the analysis by measure for each of the criteria and provide summaries of the trade-offs made against each factor to select a preferred alternative.

Originally four alternatives were developed and evaluated. Alternative 2 resulted in comparatively similar low impacts to the natural, social and economic environment as Alternative 3 but offered more technical benefits and was selected as the preferred alternative.

Based on comments received by Project Team representatives, modifications to Alternative 2 and Alternative 4 were suggested to lessen the environmental impacts, thereby creating Alternative 2A, Alternatives 4A and 4B.

Alternative 2A is recommended as the preferred alternative because it maximizes traffic operations while minimizing property and cost requirements. The preferred alternative resulted in low natural, social, economic and cultural impacts.

CATEGORY - NATURAL ENVIRONMENT

	FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	COMMENTS
1	FISHERIES & AQUATIC HABITAT	❶	②	❶	③	Preferred alternatives are 1 and 3 as fish and aquatic habitat are not affected. Alternative 2 impacts are minimal, followed by substantial impacts to aquatic habitat in Alternative 4. Although large areas of habitat are affected in this alternative, habitat and fisheries sensitivities are low.
2	TERRESTRIAL ENVIRONMENT	③	③	②	❶	Alternative 4 is preferred as terrestrial habitat is not affected. Alternatives 1 and 2 have the same anticipated impact level, which is slightly greater than the anticipated impacts to terrestrial habitat in Alternative 3. Effects are minimal with all alternatives as the impacted habitat has low sensitivity.
3	GROUNDWATER	④	③	❶	②	Alternative 3 is preferred, as it is anticipated to effect the least number of wells. Alternatives 1, 2 and 4 effect a slightly higher number of wells. Well and groundwater sensitivity is low to moderate with all alternatives due to the potential presence of sand substrates increasing the sensitivity of the wells to contamination.
4	SURFACE WATER	❶	❶	❶	❶	None of the alternative impact surface water or preclude opportunities for storm water management.
	CATEGORY SUMMARY	③	②	❶	④	

Summary of Effects on the Natural Environment

Alternative 3 is most preferred from a fisheries and groundwater standpoint. From a terrestrial perspective, Alternative 3 is second in preference, as Alternative 4 produces no impact to terrestrial habitat. Although Alternative 4 is preferred based on terrestrial factors, anticipated impacts to Alternative 3 are minimal due to the low sensitivity of the affected areas. The overall sensitivity of the natural environment affected within the footprint is typically low, therefore, the difference between the alternatives is negligible, but Alternative 3 results in the smallest net impact to the natural environment.

THEREFORE, ALTERNATIVE 3 IS THE PREFERRED ALTERNATIVE.

CATEGORY - SOCIAL ENVIRONMENT

	FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	COMMENTS
1	AESTHETICS	④	②	❶	③	Alternative 3 results in low impacts to the existing landscape and to sensitive viewer groups. Alternatives 1 & 4 will require removal of more vegetation cover to accommodate the new interchange as well as impact more sensitive viewer groups than Alternatives 2 &3.
2	NOISE	❶	❶	❶	❶	All alternatives result in low impacts (less than 5 dBA increase).
3	RESIDENTIAL	③	❶	❶	②	Alternatives 2 & 3 will not affect any residences since changes to the existing interchange will be made within the right-of-way. Alternatives 1 & 4 result in similar property affects but Alternative 4 will disrupt fewer residences than Alternative 1.
4	COMMUNITY EFFECTS	②	②	❶	❶	Alternatives 1 & 2 results in low impacts to community mobility since certain properties will be affected by the closure of Littlewood Drive and Tempo Road. None of the alternatives effect community features.
5	COMPATIBILITY WITH FUTURE LAND USE	❶	❶	❶	❶	None of the alternatives impact land dedicated to future use.
	CATEGORY SUMMARY	④	②	❶	③	

Summary of Effects on the Social Environment

All alternatives result in relatively low impacts to the social environment. All alternatives result in similar low to moderate impacts to the aesthetic quality of the existing landscape since removal of the vegetation cover will be required due to the additional interchange ramps. Impacts on residences are minimal since small portions of individual properties will be required for the new interchanges and so few residences will be disrupted. Alternatives 1 & 2 affect community mobility due to the closure of Littlewood Drive and Tempo Road and local residences will experience a maximum out-of-way travel of 800 m.

THEREFORE, ALTERNATIVE 3 IS SLIGHTLY PREFERRED.

CATEGORY – ECONOMIC ENVIRONMENT

	FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	COMMENTS
1	AGRICULTURAL	❶	②	❶	③	Alternatives 1 & 3 result in no impacts on agricultural land. Alternatives 2 & 4 result in impacts on agricultural land and operations although Alternative 4 result in greater impacts since more land is required and more operations are disrupted
2	COMMERCIAL / INDUSTRIAL USES	④	③	❶	②	Alternative 3 results in no impacts to businesses. Alternatives 2 & 4 result in similar low disruptive impacts on businesses and access since the entrances are disrupted. Alternative 1 results in the greatest impacts on businesses since it disrupts more operations and more land is required.
3	SPECIAL POLICY AREAS	❶	❶	❶	❶	None of the alternatives will have an affect on Provincial or Federal initiatives for future land use.
4	PROPERTY WASTE & CONTAMINATION	❶	❶	❶	②	Alternative 4 has potentially high subsurface impacts to the Ultramar Gas Station because of the presence of fuel and low impacts to the silo/barn because of fuel handling storage and fertilizer residue.
	CATEGORY SUMMARY	③	②	❶	④	

Summary of Effects on the Economic Environment

All alternatives result in similar low impacts to the economic environment. Alternative 4 will result in greater impacts to agricultural land than the other alternatives since more agricultural property and more operations will be disrupted. Alternatives 1, 2 & 4 result in impacts to commercial property and operations, however, Alternative 1 will have greater impacts since more property is required and more operations will be disrupted.

THEREFORE, ALTERNATIVE 3 IS THE PREFERRED ALTERNATIVE.

CATEGORY – CULTURAL ENVIRONMENT

	FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	COMMENTS
1	ARCHAEOLOGICAL RESOURCES	❶	❶	❶	❶	None of the alternatives impact known archaeological resources.
2	HERITAGE RESOURCES	❶	❶	❶	②	Alternative 4 will impact an abandoned church located on Burtwistle Road (Tempo Presbyterian church) because it displaces a portion of the property.
	CATEGORY SUMMARY	❶	❶	❶	②	

Summary Effects on the Cultural Environment

Alternatives 1, 2 & 3 result in no impacts to the cultural environment where as Alternative 4 impacts a known heritage feature (Tempo Presbyterian church).

THEREFORE, ALTERNATIVES 1, 2 & 3 ARE PREFERRED.

CATEGORY – TRANSPORTATION AND ENGINEERING

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	COMMENTS
1 TRAFFIC OPERATIONS	②	❶	③	④	All alternatives eliminate many of the existing geometric deficiencies. Alternatives 1 & 2 provide free-flow moves onto Highway 401, eliminating the need for left turn movements along Highway 4/Col. Talbot Road or provides improved operations integrating two adjacent roadways with interchange ramps at signalized intersections.
2 CONSTRUCTION IMPACTS	❶	❶	②	③	Interchange ramps in Alternatives 1 & 2 can be staged with minor closures and detours. Alternatives 3 & 4 will require multiple stages to construct, since the proposed ramps alignments conflict with existing ramp alignments.
3 COST	③	❶	❶	②	Alternatives 2 &3 have the lowest cost.
CATEGORY SUMMARY	②	❶	③	④	

Summary of Effects on Transportation and Engineering

Interchange operations are preferred in Alternatives 1 & 2, as free flow moves onto Highway 401 to better serve traffic patterns around the interchange. Alternatives 2 & 3 have the lowest cost. Alternative 2 introduces higher out of way travel due to the closure of Glanworth Drive. The closure of Glanworth Drive will result in a minor 160 m out of way travel time for through traffic (1000 vehicles per day). Alternative 2 does provide overall improved operations by integrating two adjacent roadways with interchange ramps at signalized intersections.

THEREFORE, ALTERNATIVE 2 IS THE PREFERRED ALTERNATIVE.

CATEGORY – SUMMARY OF EVALUATION

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	COMMENTS
1 NATURAL ENVIRONMENT	③	②	❶	④	Alternative 3 is most preferred from a fisheries and groundwater standpoint. From a terrestrial perspective, Alternative 3 is second in preference, as Alternative 4 produces no impact to terrestrial habitat. Although Alternative 4 is preferred based on terrestrial factors, anticipated impacts to Alternative 3 are minimal due to the low sensitivity of the affected areas. The overall sensitivity of the natural environment affected within the footprint is typically low, therefore, the difference between the alternatives is negligible, but Alternative 3 results in the smallest net impact to the natural environment. **THEREFORE, ALTERNATIVE 3 IS THE PREFERRED ALTERNATIVE.**
2 SOCIAL ENVIRONMENT	④	②	❶	③	All alternatives result in relatively low impacts to the social environment. All alternatives result in similar low to moderate impacts to the aesthetic quality of the existing landscape since removal of the vegetation cover will be required due to the additional interchange ramps. Impacts on residences are minimal since small portions of individual properties will be required for the new interchanges and so few residences will be disrupted. Alternatives 1 & 2 affect community mobility due to the closure of Littlewood Drive and Tempo Road and local residences will experience a maximum out-of-way travel of 800 m. **THEREFORE, ALTERNATIVE 3 IS SLIGHTLY PREFERRED.**
3 ECONOMIC ENVIRONMENT	③	②	❶	④	All alternatives result in similar low impacts to the economic environment. Alternative 4 will result in greater impacts to agricultural land than the other alternatives since more agricultural property and more operations will be disrupted. Alternatives 1, 2 & 4 result in impacts to commercial property and operations, however, Alternative 1 will have greater impacts since more property is required and more operations will be disrupted. **THEREFORE, ALTERNATIVE 3 IS THE PREFERRED ALTERNATIVE.**
4 CULTURAL ENVIRONMENT	❶	❶	❶	②	Alternatives 1, 2 & 3 result in no impacts to the cultural environment where as Alternative 4 impacts a known heritage feature (Tempo Presbyterian church). **THEREFORE, ALTERNATIVES 1, 2 & 3 ARE PREFERRED.**
5 TRANSPORTATION & ENGINEERING	②	❶	③	④	Interchange operations are preferred in Alternatives 1 & 2, as free flow moves onto Highway 401 to better serve traffic patterns around the interchange. Alternatives 2 & 3 have the lowest cost. Alternative 2 introduces higher out of way travel due to the closure of Glanworth Drive. The closure of Glanworth Drive will result in a minor 160 m out of way travel time for through traffic (1000 vehicles per day). Alternative 2 does provide overall improved operations by integrating two adjacent roadways with interchange ramps at signalized intersections. **THEREFORE, ALTERNATIVE 2 IS THE PREFERRED ALTERNATIVE.**

Summary of Evaluation:

Alternative 4 is not preferred in any factor however, Alternative 3 is preferred in all factors but transportation and engineering. Alternative 2 is second to Alternative 3 in all but transportation and engineering where it is preferred.

Alternative 2 is significantly better than Alternative 3 in terms of traffic operations because it better serves traffic patterns around the interchange, provides better free-flow movement onto Highway 401 and integrates adjacent roadways with interchange ramps at signalized intersections. From a natural, social and economic perspective, the differences between Alternatives 2 & 3 are not significant since Alternative 2 affects slightly more fish and wildlife habitat and affects community mobility due to the closure of Littlewood Drive and Tempo Road. The significant benefits to traffic operations associated with Alternative 2 outweigh the low natural, social and economic environment impacts.

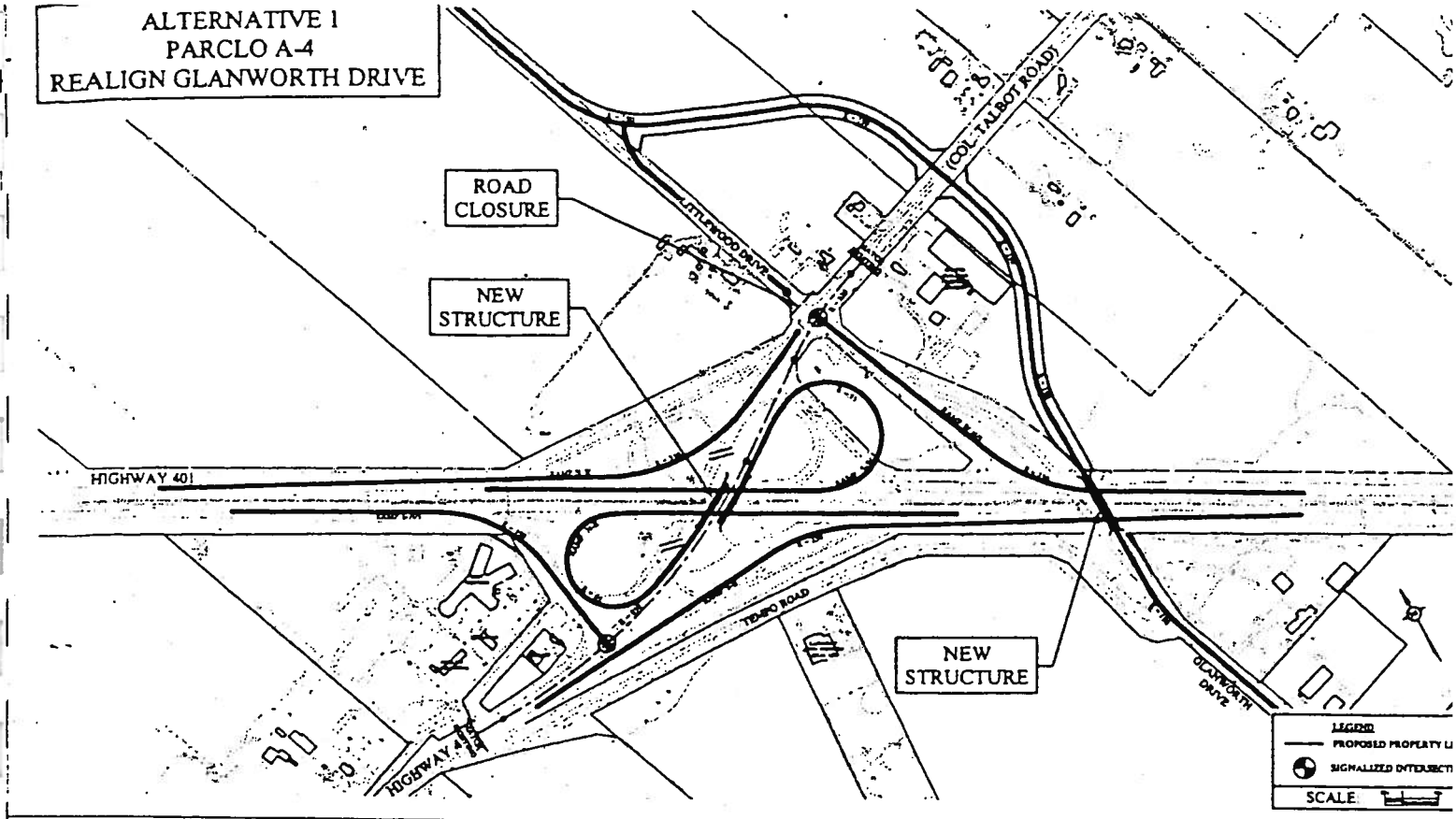
OVERALL, ALTERNATIVE 2 IS THE PREFERRED ALTERNATIVE.

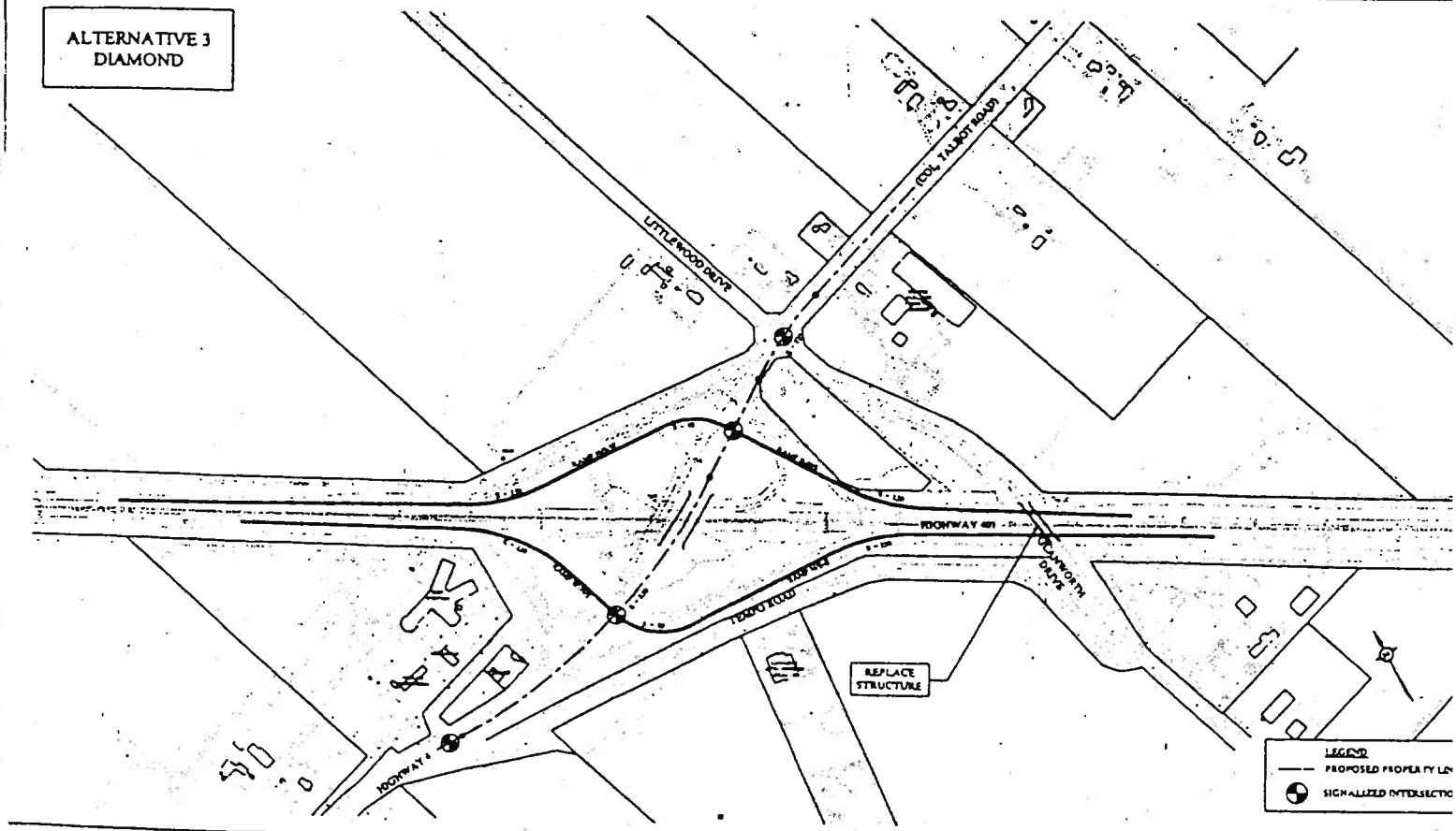
RANKING OF ALTERNATIVES

❶ → ④

Most Preferred Least Preferred

All factors were considered to be of equal importance for the purposes of this evaluation.





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HIGHWAY 401 IMPROVEMENTS PLANNING S
HIGHWAY 4 EASTERLY TO HIGHBURY AVENUE

FACTOR/Indicator	Alternative 2A Parclo A4	Alternative 4B Parclo A /B	Comment
NATURAL ENVIRONMENT			
Effect on Aquatic Habitat	✓		Alternative 4B has a moderate impact to fish species and aquatic habitat because it requires relocation of 300m of tributary. Alternative 2A is preferred since it has lower impacts to fish species and aquatic habitat.
Effect on Terrestrial Habitat		✓	Alternative 4B is preferred, as terrestrial habitat is not affected.
SOCIAL ENVIRONMENT			
Effect on Residents	✓		Alternative 4B results in the displacement of 1 residence along Burtwistle Lane. Additional property is required across the frontage of an additional resident on the east side of Highway 4, south of re-aligned Tempo Road
Effect on Community Features	✓		Alternative 4B results in the displacement of a church (currently not in service).
ECONOMIC ENVIRONMENT			
Impact to businesses access	✓	✓	Both alternatives will have minor impacts to business access.
CULTURAL ENVIRONMENT			
Effect on Archaeological and Heritage resources	✓		Alternative 4B results in the displacement of a church, which is classified as a heritage structure
TRANSPORTATION & ENGINEERING			
Interchange Operations	✓		• Free-flow moves onto highway results in higher interchange capacity in Alternative 2A, • Possibility of wrong way movements on 2 ramps in Alternative 2A, 1 ramp in Alternative 4B, • High speed traffic must exit freeway on an inner loop, • Parclo A-4 interchange configuration consistent with driver's expectations.
Degree to which existing geometric deficiencies are eliminated	✓	✓	• Both alternatives result in a substandard spacing of a tee intersection to ramp terminals; • Both alternatives satisfy horizontal, vertical and sight distance requirements for 100 km/h design speed along Highway 4/Col. Talbot Road • Alternative 4B provides a slightly better "physical fit" across Highway 401.
Area road network access & operations	✓	✓	• Both alternatives address the problem of commercial vehicles entering/leaving Burtwistle Lane. Alternative 2A provides traffic signal control at Burtwistle Lane, while Alternative 4B connects Burtwistle Lane at the ramp terminal. • In Alternative 2A, a sight distance of 260m is provided at Burtwistle Drive. In Alternative 4B, Burtwistle Road intersects Highway 4 on the crest, limiting the available sight distance to 185m. MTO's GDM recommends a sight distance of 220m for passenger vehicles turning right.
Construction Impacts	✓		Alternative 4B is slightly preferred to Alternative 4B since it has a lower level of construction complexity compared to Alternative 4B.
Cost	✓		Alternative 4B is approximately 20% more expensive than Alternative 2A, requiring an additional expenditure of $1.4M. Alternative 2A requires 0.7 ha of property from 2 land owners; Alternative 4B requires 3.6 ha of property from 5 land owners.

FACTOR/Indicator	Alternative 2A Parcio A4	Alternative 4B Parcio A /B	Comment

SUMMARY OF TRADE-OFFS

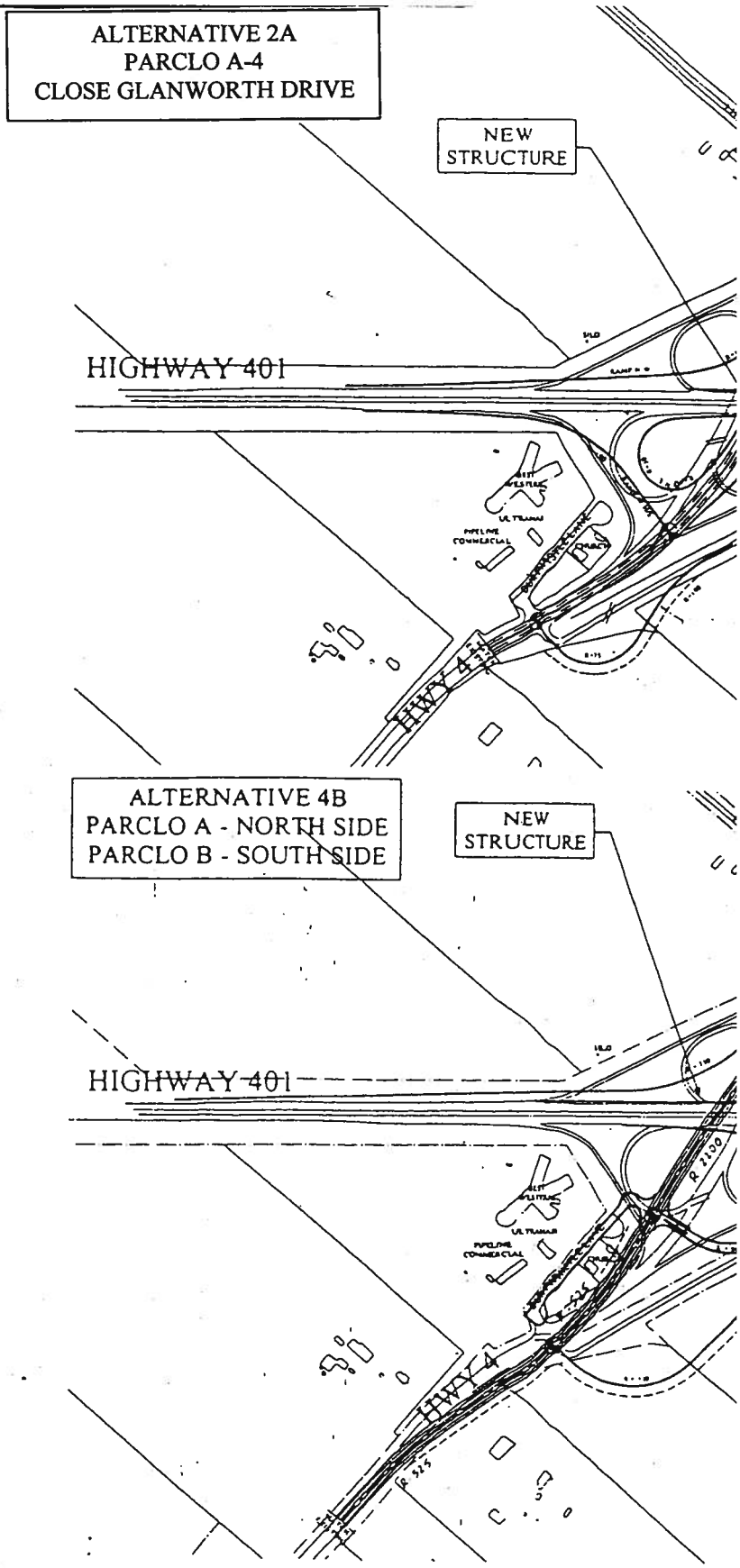
Alternatives 2A and 4B are equally preferred in terms of Natural and Economic Environments.

Alternative 2A is slightly preferred in terms of Social and Cultural factors, as Alternative 4B results in the displacement of one residence (currently vacant) and one church which is currently not in operation.

In terms of interchange operations, Alternative 2A is preferred as it provides a slightly higher capacity, provides a configuration which is consistent with driver expectations, and is less expensive to construct. Both alternatives satisfy minimum MTO geometric standards, and provide relatively similar transportation benefits. Both alternatives address the problem of commercial vehicle access to and from Burnwistle Lane. Alternative 2A provide greater sight distance to Burnwistle Lane.

In summary, both alternatives are equal in terms of Natural and Economic factors. Alternative 2A is slightly preferred over Alternative 4B in terms of Social, Cultural and Transportation factors.

Alternative 2A is the preferred alternative as it provides for a geometric design which satisfies MTO standards at an optimal cost, with minimal property requirements.



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HIGHWAY 401 IMPROVEMENTS PLANNING

HIGHWAY 4 EASTERLY TO HIGHBURY AVENUE

Interim Improvements

Following the withdrawal of the TESR for Highway 401, the announcement of a new 'advanced border processing centre' on Littlewood Drive, west of Colonel Talbot Road raised concerns about the safety of the existing interchange/configuration of local roads. In consultation with local landowners, and City of London officials, the Ministry has developed interim improvements for the Highway 4 (Col. Talbot Road) interchange, which include a new ramp in the northeast quadrant of the existing interchange that ties into Glanworth Drive.

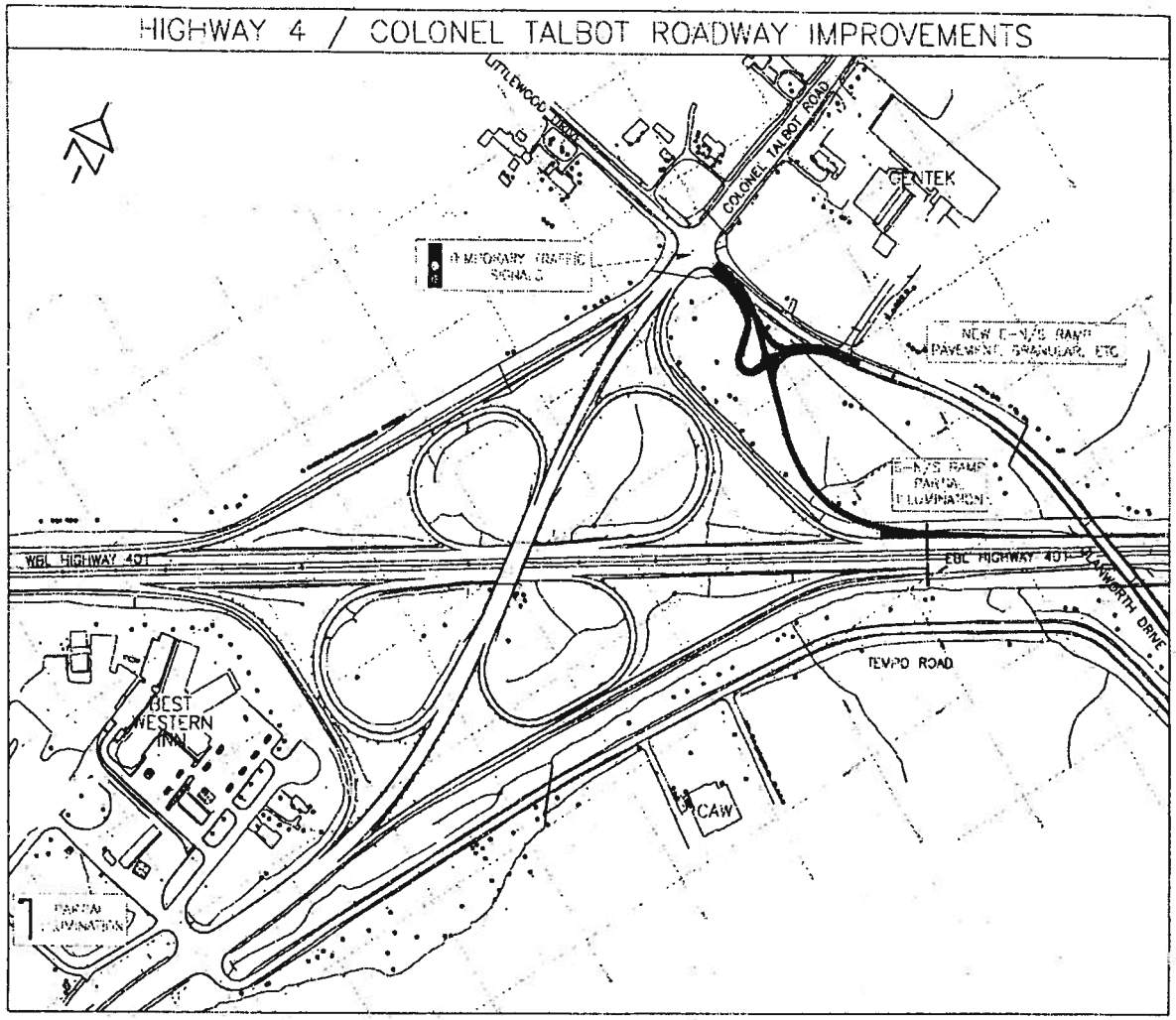
Since this proposal will have no significant environmental or property impacts, the interim improvements have been classified as a Group 'C' undertaking under the Class Environmental Assessment for Provincial Transportation Facilities.

Highlights of the interim improvements include:

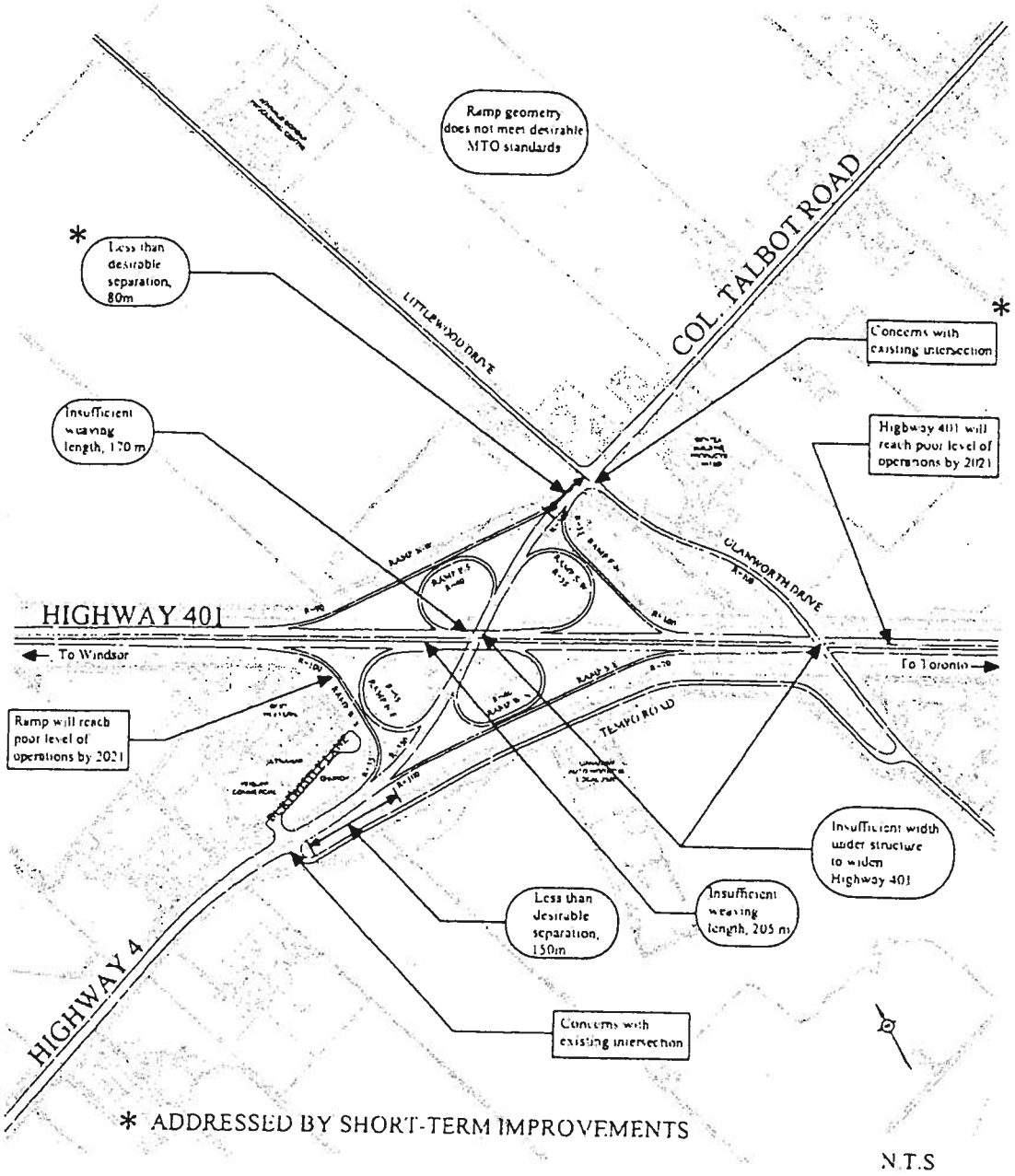
- The realignment of the Highway 401 westbound ramp to tie into Glanworth Drive;
- Traffic signals and illumination at Highway 4 (Col. Talbot Road) and the realigned Highway 401 westbound ramp / Glanworth Drive / Littlewood Drive intersection;
- Illumination at the Highway 4 / Burtwistle Lane intersection;
- Speed reduction from 80 km/h to 70 km/h; and
- Enhanced signing through the entire interchange area.

Construction of the interim improvements commenced in September 2003 and was completed in November 2003. A plan of the interim improvements is presented on the following board.

Interim Improvements at Highway 4 / Col. Talbot Rd. Interchange



Future Operational Conditions at Highway 4 (Col. Talbot Road) Interchange



ANALYSIS AND EVALUATION OF HIGHWAY 4 ALTERNATIVES SUBSEQUENT TO WITHDRAWING THE TESR IN NOVEMBER 2002

A Transportation Environmental Study Report (TESR) for Highway 401 was filed on the public record in November 2002. In response to stakeholder comments, the TESR was withdrawn to further review impacts associated with this project and to examine additional designs for the Highway 401 / Highway 4 (Col. Talbot Road) interchange, including an underpass for Highway 401 at Glanworth Drive.

The following tables outline the analysis and evaluation that was used to assist the Project Team in the selection of the preferred alternative. The tables identify the results of the analysis by measure for each of the criteria and provide summaries of the trade-offs made against each factor to select a preferred alternative.

Evaluation of Highway 4 (Col. Talbot Road) (Cont'd)

CATEGORY – ECONOMIC ENVIRONMENT

FACTOR	ALTERNATIVE 1 PARCLO A-4	ALTERNATIVE 1A PARCLO A-4/ (MODIFIED)	ALTERNATIVE 2 PARCLO A/ PARCLO B	ALTERNATIVE 3 PARCLO A/ DIAMOND	COMMENTS
1 AGRICULTURAL	②	❶	②	②	All alternatives have similar impacts to agricultural land. However, Alternative 1A provides better operations for farm vehicles along Glanworth Drive given that the roadway is tangent crossing over Highway 401 and minimizes severance of agricultural parcels of land
2 COMMERCIAL / INDUSTRIAL USES	②	❶	③	④	Alternative 1A results in the least disruption to businesses and access since Glanworth Drive and Burtwistle Lane alignments will generally be maintained. Alternatives 1, 2 and 3 result in the greatest impacts on commercial property and access. For Alternatives 1, 2 and 3, a commercial entrance will require modification. For Alternatives 2 and 3, two commercial entrances will need adjustment
3 SPECIAL POLICY AREAS	❶	❶	❶	❶	None of the alternatives will have an affect on Provincial or Federal initiatives for future land use.
4 PROPERTY WASTE & CONTAMINATION	❶	❶	②	②	Alternatives 2 and 3 have a high potential to impact the Ultramar Gas Station because of the presence of subsurface fuel storage tanks and the silo/barn because of fertilizer residue.
CATEGORY SUMMARY	②	❶	③	④	

Summary of Effects on the Economic Environment

Alternative 1A results in the lowest overall impacts to the economic environment. Alternative 3 results in the highest impacts to the economic environment relative to the other alternatives associated with commercial property and agricultural operations. Alternatives 1 and 2 result in similar impacts to agriculture and operations, however, Alternative 2 results in higher impacts to businesses and properties with potential for contamination.

THEREFORE, ALTERNATIVE 1A IS PREFERRED.

CATEGORY – CULTURAL ENVIRONMENT

FACTOR	ALTERNATIVE 1 PARCLO A-4	ALTERNATIVE 1A PARCLO A-4/ (MODIFIED)	ALTERNATIVE 2 PARCLO A/ PARCLO B	ALTERNATIVE 3 PARCLO A/ DIAMOND	COMMENTS
1 ARCHAEOLOGICAL RESOURCES	❶	❶	❶	❶	None of the alternatives impact known archaeological resources
2 HERITAGE RESOURCES	❶	❶	②	②	Alternatives 2 and 3 will displace an abandoned church located on Burtwistle Road (Tempo Presbyterian Church)
CATEGORY SUMMARY	❶	❶	②	②	

Summary Effects on the Cultural Environment

Alternatives 1 and 1A result in no impacts to the cultural environment where as Alternatives 2 and 3 impact a known heritage feature (Tempo Presbyterian Church).

THEREFORE, ALTERNATIVES 1 AND 1A ARE PREFERRED.

Evaluation of Highway 4 (Col. Talbot Road)

CATEGORY – NATURAL ENVIRONMENT

FACTOR	ALTERNATIVE 1 PARCLO A-4	ALTERNATIVE 1A PARCLO A-4/ (MODIFIED)	ALTERNATIVE 2 PARCLO A/ PARCLO B	ALTERNATIVE 3 PARCLO A/ DIAMOND	COMMENTS
1 FISHERIES & AQUATIC HABITAT	②	❶	③	②	Alternative 1A is the preferred alternative as it does not impact the stocked fishpond and has minimal effects on fish habitat. Alternative 2 is least preferable as it impacts the fishpond and crosses the main watercourse more frequently. Alternatives 1 and 3 do not impact the fourine drain (considered to be potential fish habitat) but do impact the stocked fishpond
2 TERRESTRIAL ENVIRONMENT	②	❶	②	③	Alternative 1A is the preferred alternative as it does not impact wetland vegetation and has the smallest number of trees lost. Alternative 3 is least preferable because it involves the loss of the most amount of wetland habitat. Upland habitats are equally minimally impacted.
3 GROUNDWATER	②	❶	③	③	Alternative 1A is preferred as it is less likely to impact one large diameter well. Other differences in well numbers affected are minimal.
4 SURFACE WATER	②	❶	②	③	Alternative 1A will not impact surface water. However, Alternatives 1 and 2 both impact the surface water retention pond located in the SE quadrant of Glanworth Drive and Highway 401. Alternative 3 will impact the retention pond at Glanworth Drive/Highway 401 and in addition the Ultramar's on-site surface water retention pond
CATEGORY SUMMARY	②	❶	③	④	Alternative 1A is preferred followed by Alternatives 1, 2 and 3. Overall, the effects to the environment are minimal, with the potential effect to the pond, which provides a water supply to a dug well being the greatest potential effect.

Summary of Effects on the Natural Environment

Alternative 1A is preferred as it has very small effects on fish habitat, the terrestrial environment and the least potential impact to water wells. Alternative 1 is the next preferred alternative, as it has only some impact on fish and terrestrial wildlife habitat. Alternative 3 is the least preferable, as it results in low to moderate impacts on wetland habitat and includes the loss of a small amount of a fish-stocked pond. Alternative 2 is only marginally better, than Alternative 3. While Alternative 2 does not result in the loss of so much wetland habitat, it does involve a greater degree of fish habitat disturbance than Alternative 3.

THEREFORE, ALTERNATIVE 1A IS PREFERRED.

CATEGORY – SOCIAL ENVIRONMENT

FACTOR	ALTERNATIVE 1 PARCLO A-4	ALTERNATIVE 1A PARCLO A-4/ (MODIFIED)	ALTERNATIVE 2 PARCLO A/ PARCLO B	ALTERNATIVE 3 PARCLO A/ DIAMOND	COMMENTS
1 AESTHETICS	❶	❶	②	②	Alternatives 1 and 1A result in the lowest impacts to the existing landscape and to sensitive viewer groups. Alternatives 2 and 3 result in higher aesthetic impacts, as Highway 4 and Burtwistle Lane are realigned closer to the businesses located in the SW quadrant of the interchange. In addition, the Tempo Presbyterian Church and a residence on Burtwistle Lane will be displaced, thereby affecting existing views and character of the area.
2 NOISE	❶	❶	❶	❶	All alternatives result in low impacts (less than 5 dBA increase).
3 RESIDENTIAL	❶	❶	②	②	Alternatives 1 and 1A will not displace any residences since most improvements will be accommodated within the existing right-of-way. However, Alternatives 2 and 3 will displace one residence located on Burtwistle Lane.
4 COMMUNITY EFFECTS	❶	❶	②	②	Alternatives 2 and 3 result in the closure of Tempo Road and Tempo Road becoming a cul-de-sac, resulting in reduced community mobility and a maximum out-of-way travel of 1000 metres.
5 COMPATIBILITY WITH FUTURE LAND USE	❶	❶	❶	❶	None of the alternatives impact any known plans for future land uses.
CATEGORY SUMMARY	❶	❶	③	④	

Summary of Effects on the Social Environment

All alternatives result in similar minor impacts to the aesthetic quality of the existing landscape associated with removal of the vegetation cover required for the additional interchange ramps. Alternatives 2 and 3 result in the displacement of one residence, which also has an adverse effect on the aesthetics of the existing landscape. Alternatives 2 and 3 also affect community mobility due to the closure and cul-se-sac of Tempo Road resulting in out-of-way travel.

THEREFORE, ALTERNATIVES 1 AND 1A ARE EQUALLY PREFERRED.

Evaluation of Highway 4 (Col. Talbot Road) (Cont'd)

CATEGORY – TRANSPORTATION AND ENGINEERING					
FACTOR	ALTERNATIVE 1 PARCLO A-4	ALTERNATIVE 1A PARCLO A-4/ (MODIFIED)	ALTERNATIVE 2 PARCLO A/ PARCLO B	ALTERNATIVE 3 PARCLO A/ DIAMOND	COMMENTS
1 TRAFFIC OPERATIONS	❶	②	④	③	All alternatives result in improved traffic operations through the interchange. Alternatives 1 and 1A provide free-flow moves onto Highway 401 and provide higher traffic volume capacity than Alternatives 2 and 3. Furthermore, Alternative 1 is preferred relative to Alternative 1A since the E-N/S Ramp terminus in Alternative 1A is located 240 m away from the actual interchange, potentially confusing drivers, which may effect traffic operations. Alternatives 2 and 3 provide partial free-flow moves onto Highway 401, however, there is potential for wrong way movements on some ramps. For Alternative 2, high speed traffic traveling eastbound along Highway 401 must exit the freeway on a loop. Alternatives 2 and 3 result in a smoother alignment for Highway 4 / Col Talbot Road. Alternative 2 requires two traffic signals, while Alternatives 1, 1A and 3 require three traffic signals.
2 CONSTRUCTION IMPACTS	②	②	❶	❶	Alternatives 2 and 3 are slightly preferred to Alternatives 1 and 1A, since they have a lower level of construction complexity.
3 COST	❶	②	❶	❶	Alternatives 1, 2 and 3 are equally preferred since all have similar cost. The cost estimate for Alternatives 1, 2 and 3 is $ 8.56 million, $8.58 million and $8.62 million, respectively. Alternative 1A has the highest cost at $9.21 million.
CATEGORY SUMMARY	❶	②	④	③	

Summary of Effects on Transportation and Engineering

Alternative 1 is preferred in terms of traffic operations, based on the interchange configuration, which would be consistent with driver's expectation. However, Alternatives 2 and 3 will be slightly less complex to stage and construct relative to Alternatives 1 and 1A. Alternatives 1, 2 and 3 are equally preferred in terms of cost. Although, Alternative 1 is slightly more complex to stage and construct, this alternative is preferred as it improves the overall interchange operations at the lowest relative cost.

THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.

Evaluation Summary of Highway 4 (Col. Talbot Road)

CATEGORY – SUMMARY OF EVALUATION						
FACTOR	IMPORTANCE	ALTERNATIVE 1 PARCLO A-4	ALTERNATIVE 1A PARCLO A-4/ (MODIFIED)	ALTERNATIVE 2 PARCLO A/ PARCLO B	ALTERNATIVE 3 PARCLO A/ DIAMOND	COMMENTS
1 NATURAL ENVIRONMENT	Low	②	❶	③	④	Alternative 1A is the most preferred as it has very small effects on fish habitat, the terrestrial environment and the least potential to impact water wells. Alternative 1 is the second choice, as it has only some impact on fish and terrestrial wildlife habitat. Alternative 3 is the least preferable, as it results in low to moderate impacts on wetland habitat and includes the loss of a small amount of a fish-stocked pond. Alternative 2 is marginally better. Although Alternative 2 results in the loss of less wetland habitat, it does result in a greater degree of fish habitat disturbance than Alternative 3. **THEREFORE, ALTERNATIVE 1A IS PREFERRED.**
2 SOCIAL ENVIRONMENT	High	❶	❶	③	④	All alternatives result in similar minor impacts to the aesthetic quality of the existing landscape associated with removal of the vegetation cover required for the additional interchange ramps. Alternatives 2 and 3 result in the displacement of one residence, which also has an adverse effect on the aesthics of the existing landscape. Alternatives 2 and 3 also affect community mobility due to the closure and cul-se-sac of Tempo Road resulting in out-of-way travel. **THEREFORE, ALTERNATIVES 1 AND 1A ARE EQUALLY PREFERRED.**
3 ECONOMIC ENVIRONMENT	Medium	②	❶	③	④	Alternative 1A results in the lowest impacts to the economic environment. Alternative 3 results in the highest impacts to the economic environment relative to the other alternatives associated with impacts to commercial property and agricultural operations. Alternatives 1 and 2 result in similar impacts to agriculture and operations, however, Alternative 2 results in higher impacts to businesses and properties with potential for contamination. **THEREFORE, ALTERNATIVE 1A IS PREFERRED.**
4 CULTURAL ENVIRONMENT	Medium	❶	❶	②	②	Alternatives 1 and 1A result in no impacts to the cultural environment, where as Alternatives 2 and 3 impact a known heritage feature (Tempo Presbyterian Church) **THEREFORE, ALTERNATIVES 1 AND 1A ARE PREFERRED.**
5 TRANSPORTATION & ENGINEERING	High	❶	②	④	③	Alternative 1 is preferred for traffic operations based on the interchange configuration, which would be consistent with driver's expectation. However, Alternatives 2 and 3 will be slightly less complex to stage and construct relative to Alternatives 1 and 2. Alternatives 1, 2 and 3 are equally preferred since all have similar cost. Although, Alternative 1 is slightly more complex to stage and construct, this alternative is preferred as it improves the overall interchange operations at the lowest relative cost. **THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.**

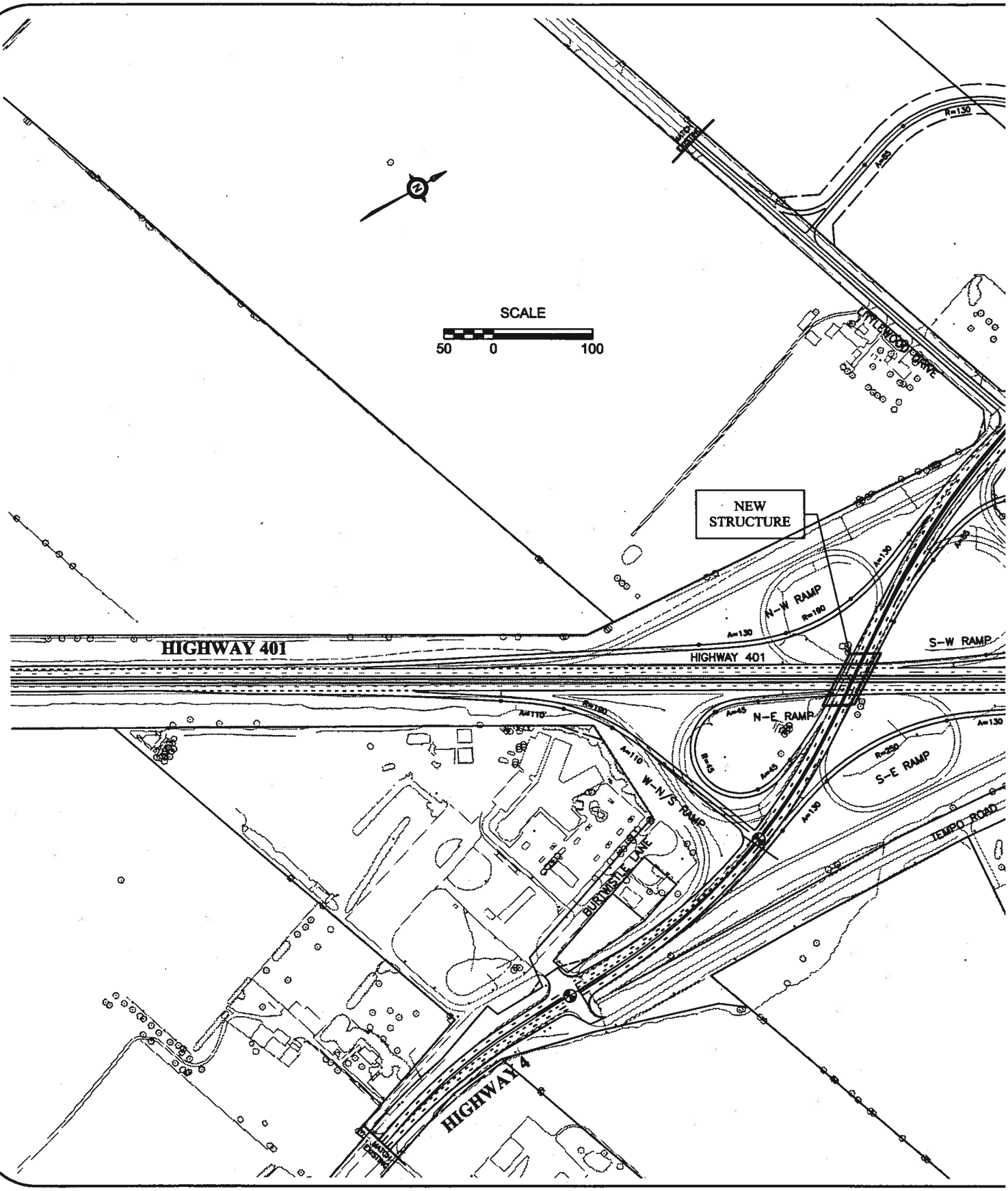
Summary of Evaluation:

All alternatives result in relatively minor impacts to the natural environment. However, Alternative 1A is slightly preferred from a fisheries and aquatic habitat perspective. Alternatives 2 and 3 are the least preferred in all environmental and technical factor areas.

Alternative 1 is preferred from a social, cultural and transportation perspective. Relative to Alternative 1, Alternative 1A is slightly preferred with respect to agricultural and commercial access considerations, however the differences are not significant. Alternative 1A is more expensive to construct relative to Alternative 1 due to the increased structural span of Glanworth Drive over Highway 401.

The benefits to traffic operations and cost savings associated with Alternative 1 outweigh the relatively minor natural and economic benefits associated with Alternative 1A. As such, Alternative 1 is preferred.

OVERALL, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE



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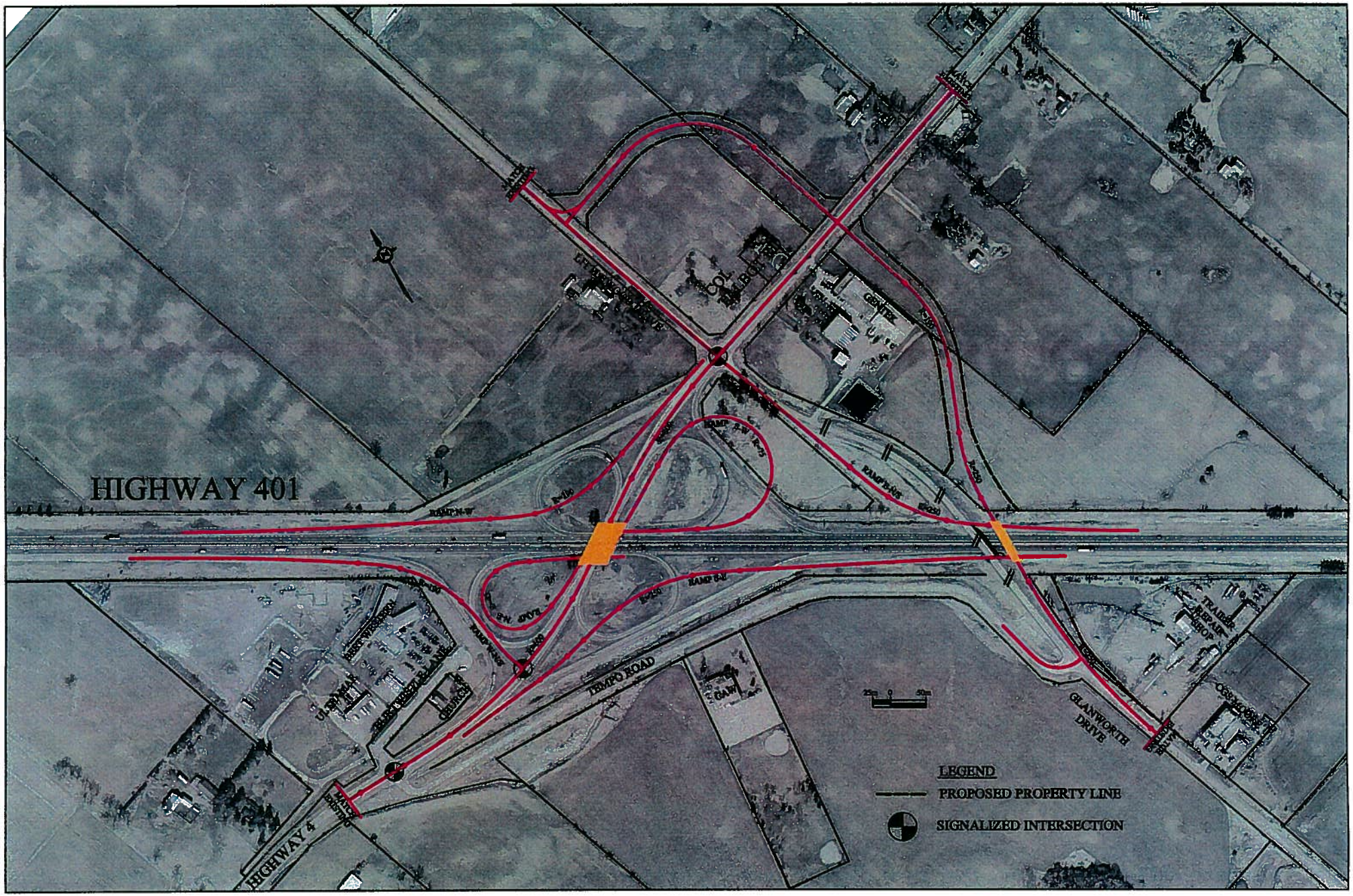
HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

Highway 4 Easterly to Highbury Avenue

G.W.P. 476-89-00

Alternatives



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Alternative 1 - Parclo A - 4 Interchange

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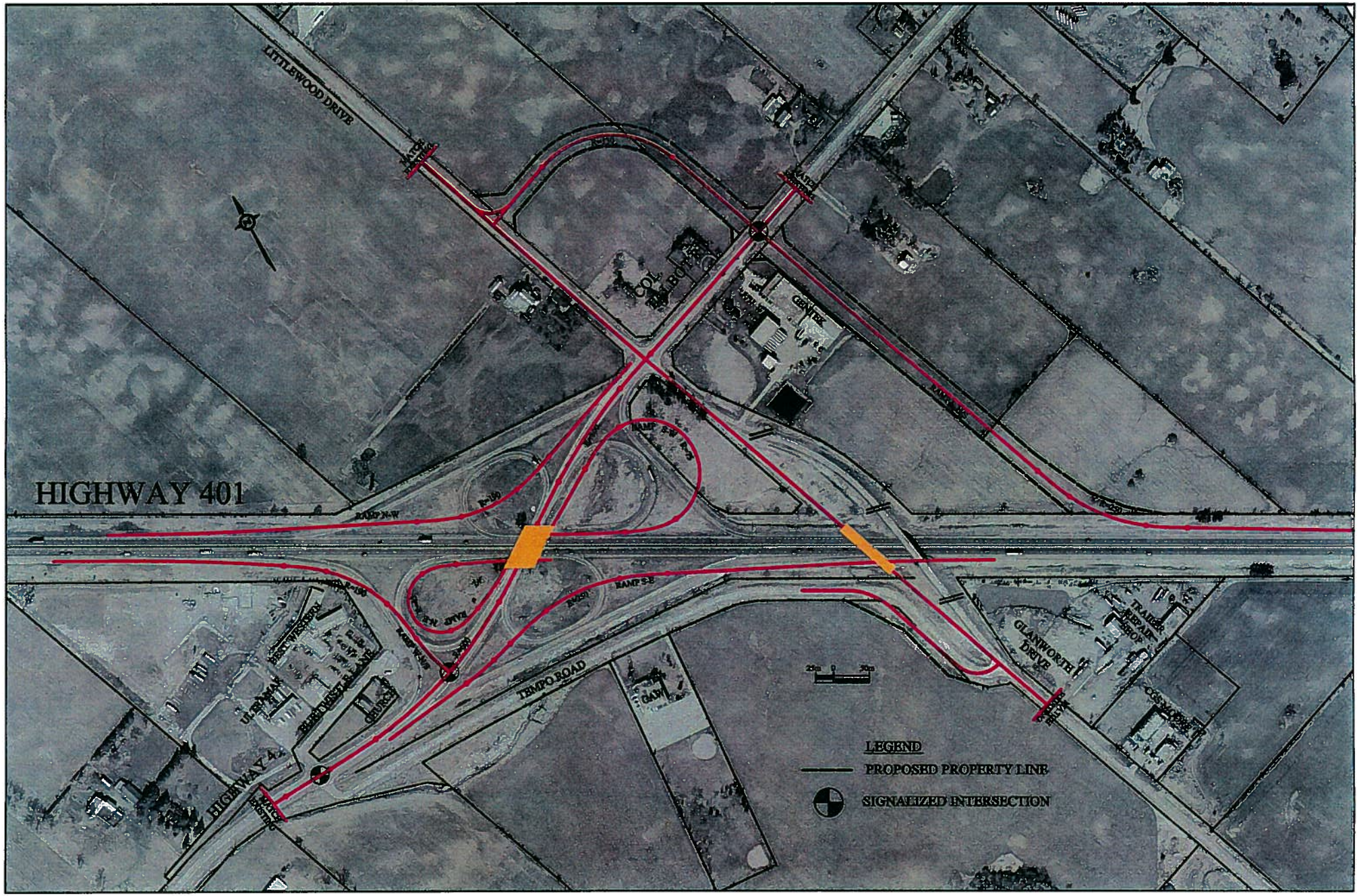
Alternatives



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Alternative 1A - Parclo A - 4 (Modified) Interchange

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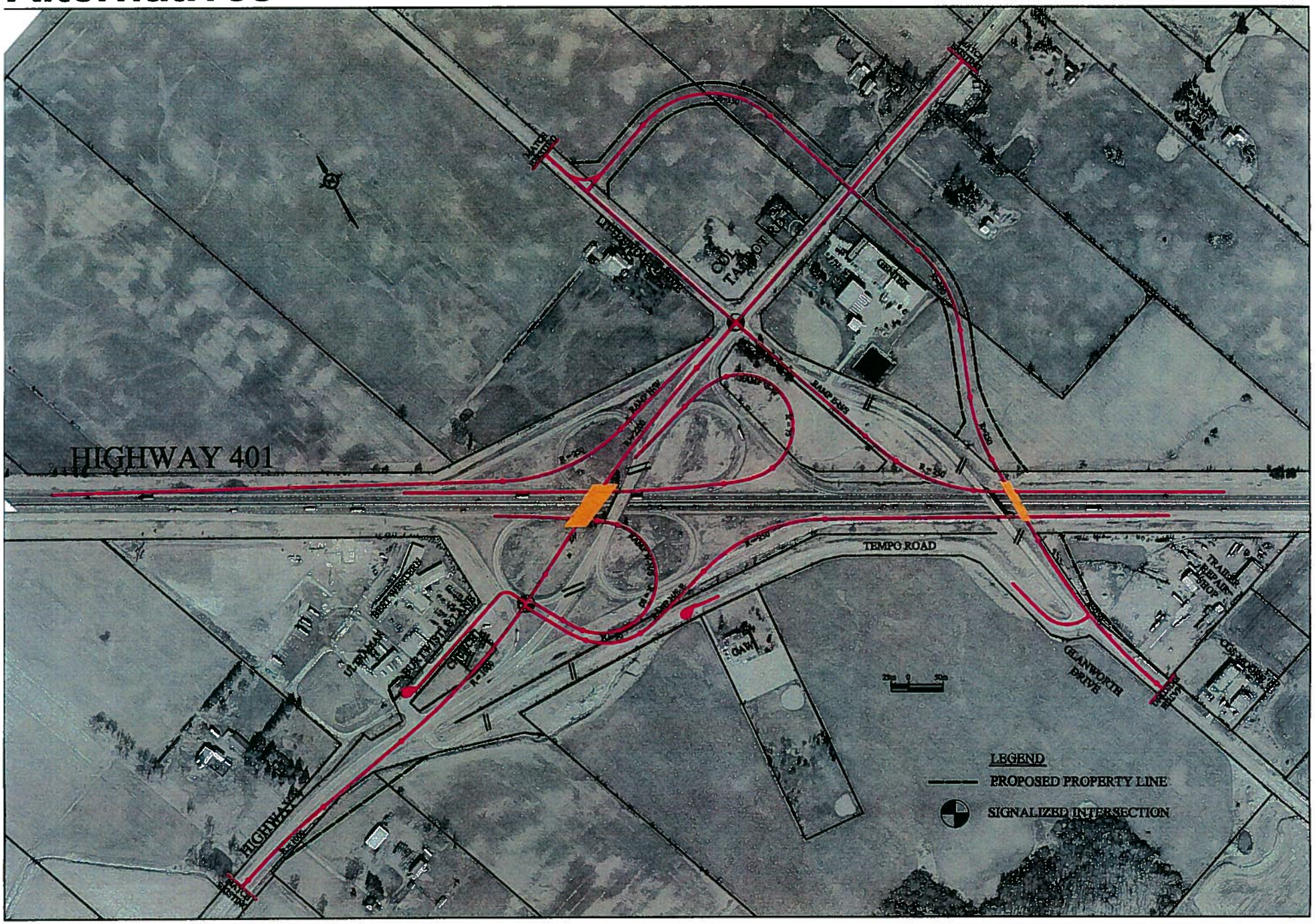
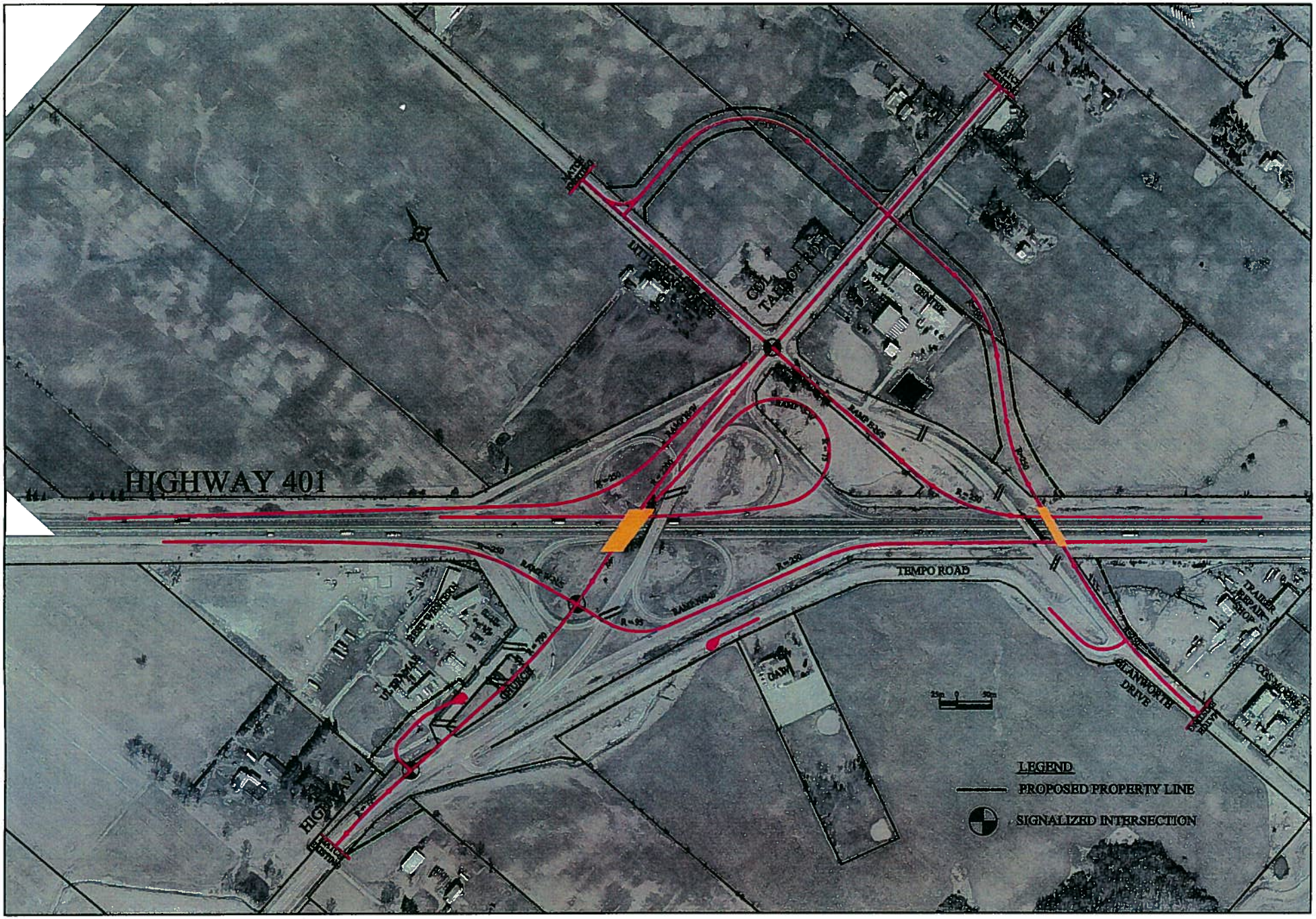
Alternatives



Ontario Alternative 2 - Parclo A north side & Parclo B south side URS

Alternatives



Ontario Alternative 3 - Parclo A north side & Diamond south side URS

Ontario

URS

Cole Sherman

HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

From 1.0 km West of Highway 4
Easterly to 1.0 km East of Highbury Avenue
G.W.P. 476-89-00

Preliminary Design
Class Environmental Assessment, Group 'B'

ANALYSIS AND EVALUATION OF WELLINGTON ROAD ALTERNATIVES

Evaluation Summary of Wellington Road

Two alternatives were developed and evaluated. Alternative 1 is recommended because it maximizes capacity by providing free flow ramps onto Highway 401 while producing lower or similar natural, social, economic and cultural impacts.

The following summarizes the advantages and disadvantages of Alternative 1.

Advantages:

- Maximizes capacity by maintaining free-flow moves onto Highway 401, providing superior operations for high volume Ramp North-East;
- Eliminates a weaving section on Highway 401 westbound;
- Improves ramp geometry to meet desirable MTO standards;
- Eliminates operational concerns with combined Exeter/Wellington Road South off ramp.

Disadvantages:

- Minor impact to the O.P.P property and one business (these impacts were eliminated through preliminary design).

Please contact a Project Team Representative if you would like a copy of the detailed evaluation package.

CATEGORY – NATURAL ENVIRONMENT			
FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 FISHERIES & AQUATIC HABITAT	❶	②	Alternative 1 is preferred as there is significantly less channel length affected by ROW expansion, along with fewer permanent channel crossings. Alternative 2 affects substantially more channel distance along with an additional crossing to crossings have low significance and sensitivity.
2 TERRESTRIAL ENVIRONMENT	②	❶	Alternative 2 is preferred as it affects slightly less vegetation and habitat area. Alternative 1 has a slightly greater area of impact (minimal), however, sensitivity of habitat and vegetation within the footprint is low.
3 GROUNDWATER	❶	❶	Same level of impacts are anticipated for both alternatives. Impacts are minimal due to low sensitivity and permeability of clay, clayey silt till. No groundwater affects are anticipated.
4 SURFACE WATER	❶	❶	No impacts to private/municipal water intakes. Limited opportunities exist to provide storm water management in Alternative 1 due to existing drains running through the interchange.
CATEGORY SUMMARY	❶	❶	

Summary of Effects on the Natural Environment

Alternative 1 is preferred, from a terrestrial perspective, but the difference between Alternative 1 and Alternative 2 is minimal. Alternative 2 impacts to aquatic resources are much more substantial affecting significantly more channel length than Alternative 1. However, the channel has poor habitat value through the interchange. Therefore, the smallest amount of anticipated impact to the natural environment is with Alternative 1. Alternatives 1 & 2 are equally preferred since there is negligible difference between the level of environmental sensitivity for both alternatives.

THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.

CATEGORY – SOCIAL ENVIRONMENT			
FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 AESTHETICS	❶	❶	None of the alternatives impact the aesthetic quality of the existing right-of-way since there is negligible vegetation cover. Both alternatives result in similar low impacts to sensitive viewer groups.
2 NOISE	❶	❶	All alternatives result in low impacts (less than 5 dBA).
3 RESIDENTIAL	❶	❶	None of the alternatives impact residential property.
4 COMMUNITY EFFECTS	②	❶	Both alternatives result in low impacts to the Hydro Corridor within the right-of-way. Alternative 1 results in slightly higher impacts to a community institutional facility (OPP Station) since a small portion of the property is required to accommodate the new interchange.
5 COMPATIBILITY WITH FUTURE LAND USE	❶	❶	None of the alternatives impact land dedicated to future land use.
CATEGORY SUMMARY	②	❶	

Summary of Effects on the Social Environment

Both alternatives result in similar low impacts to the social environment except that Alternative 1 results in slightly higher impacts to a community institutional facility (OPP Station).

THEREFORE, ALTERNATIVE 2 IS SLIGHTLY PREFERRED.

CATEGORY – ECONOMIC ENVIRONMENT

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 AGRICULTURAL	❶	②	Alternative 1 will have no impacts on agricultural land or operations, however, Alternative 2 will require a small portion of agricultural land and disrupt two agricultural operations
2 COMMERCIAL / INDUSTRIAL USES	❶	②	Both alternatives will have low impacts on commercial businesses although Alternative 2 disrupts more commercial property and business operations.
3 SPECIAL POLICY AREAS	❶	❶	None of the alternatives will have an affect on Provincial or Federal initiatives for future land use.
4 PROPERTY WASTE & CONTAMINATION	❶	②	Alternative 2 results in potentially low impacts for property contamination because of chemical handling in former industrial buildings.
CATEGORY SUMMARY	❶	②	

Summary of Effects on the Economic Environment

Both alternatives result in low impacts to the economic environment. Alternative 2 results in slightly higher impacts because it will disrupt more agricultural and commercial property and impact property with the potential for contamination.

THEREFORE, ALTERNATIVE 1 IS SLIGHTLY PREFERRED.

CATEGORY – CULTURAL ENVIRONMENT

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 ARCHAEOLOGICAL RESOURCES	❶	❶	None of the alternatives impact known archaeological resources.
2 HERITAGE RESOURCES	❶	❶	None of the alternatives impact heritage resources.
CATEGORY SUMMARY	❶	❶	

Summary Effects on the Cultural Environment

There are no cultural features in the vicinity of the proposed interchange.

THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.

CATEGORY – TRANSPORTATION AND ENGINEERING

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 TRAFFIC OPERATIONS	❶	②	Alternative 1 provides free-flow moves onto highway, and results in highest interchange capacity. The potential impact of two Highway 401 entrance ramps could be mitigated by merging the two entrance ramps together, providing one entrance ramp onto Highway 401. In Alternative 2, high speed traffic must exit freeway on an inner loop. Double left turn lanes will be required for the north to east volume.
2 CONSTRUCTION IMPACTS	❶	❶	Both alternatives can be constructed in fewer stages and with less disruption to traffic.
3 COST	❶	❶	Both Alternatives 1 & 2 have simular costs.
CATEGORY SUMMARY	❶	②	

Summary of Effects on Transportation and Engineering

Alternative 1 will result in superior traffic operations.

THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.

CATEGORY – SUMMARY OF EVALUATION			
FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 NATURAL ENVIRONMENT	❶	❶	Alternative 1 is preferred, from a terrestrial perspective, but the difference between Alternative 1 and Alternative 2 is minimal. Alternative 2 impacts to aquatic resources are much more substantial affecting significantly more channel length than Alternative 1. However, the channel has poor habitat value through the interchange. Therefore, the smallest amount of anticipated impact to the natural environment is with Alternative 1. Alternatives 1 & 2 are equally preferred since there is negligible difference between the level of environmental sensitivity for both alternatives. **THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.**
2 SOCIAL ENVIRONMENT	②	❶	Both alternatives result in similar low impacts to the social environment except that Alternative 1 results in slightly higher impacts to a community institutional facility (OPP Station). **THEREFORE, ALTERNATIVE 2 IS SLIGHTLY PREFERRED.**
3 ECONOMIC ENVIRONMENT	❶	②	Both alternatives result in low impacts to the economic environment. Alternative 2 results in slightly higher impacts because it will disrupt more agricultural and commercial property and impact property with the potential for contamination. **THEREFORE, ALTERNATIVE 1 IS SLIGHTLY PREFERRED.**
4 CULTURAL ENVIRONMENT	❶	❶	There are no cultural features in the vicinity of the proposed interchange. **THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.**
5 TRANSPORTATION & ENGINEERING	❶	②	Alternative 1 will result in superior traffic operations. **THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.**
Summary of Evaluation: Alternative 1 is preferred or equal to Alternative 2 in all areas except for the social environment since it results in a minor impact on the OPP Station. This impact will not significantly affect OPP operations. **THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.**			

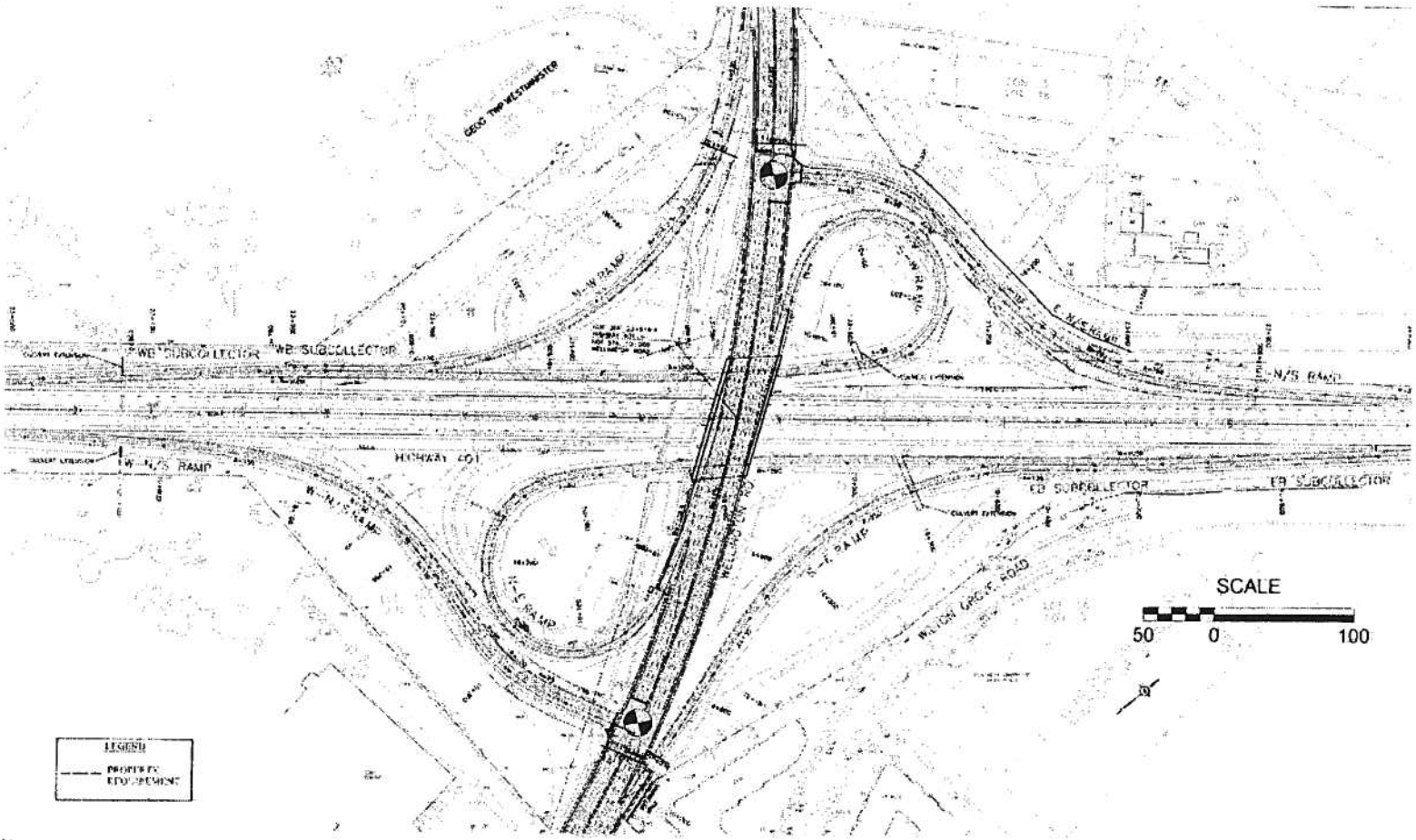
RANKING OF ALTERNATIVES

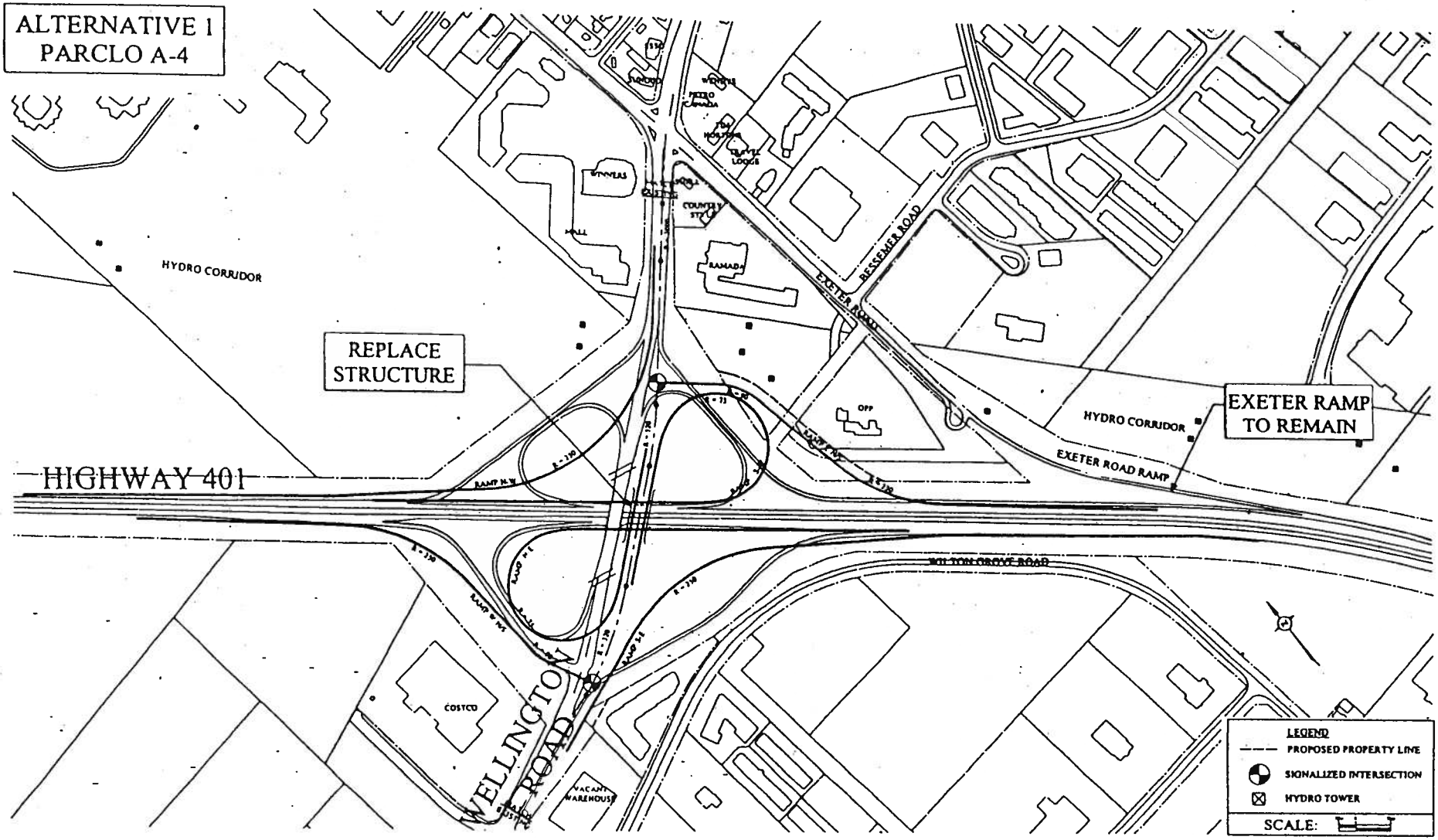
❶ → ②

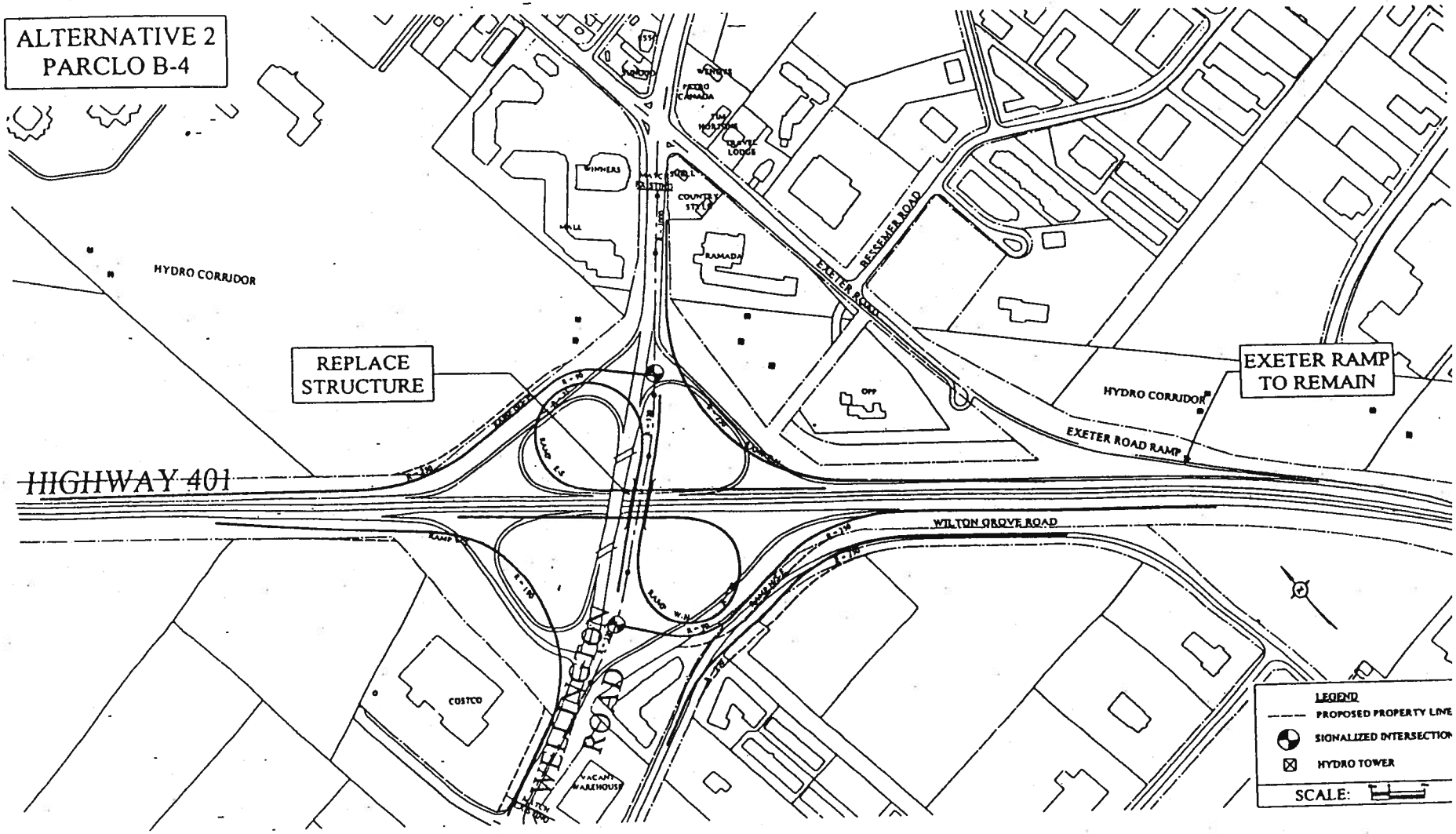
Most Preferred Least Preferred

All factors were considered to be of equal importance for the purposes of this evaluation.

Wellington Road Preferred Alternative (Short Term)




ALTERNATIVE 1
PARCLO A-4
HYDRO CORRIDOR
REPLACE STRUCTURE
HIGHWAY 401
RAMP N-W
RAMP W-N
RAMP S-E
RAMP E-S
EXETER ROAD
RESSEMER ROAD
EXETER ROAD RAMP
HYDRO CORRIDOR
EXETER RAMP TO REMAIN
BOLTON GROVE ROAD
WELLINGTON ROAD 50
COSTCO
VACANT WAREHOUSE
OPP
RAMADA
LEGEND
PROPOSED PROPERTY LINE
SIGNALIZED INTERSECTION
HYDRO TOWER
SCALE:



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G.W.P. 476-89-00
HIGHWAY 401 IMPROVEMENTS PLANNING STUDY
HIGHWAY 4 EASTERLY TO HIGHBURY AVENUE

INTERCHANGE ALTERNATIVES AT WELLINGTON ROAD

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Cole Sherman

HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

From 1.0 km West of Highway 4

Easterly to 1.0 km East of Highbury Avenue

G.W.P. 476-89-00

Preliminary Design

Class Environmental Assessment, Group 'B'

ANALYSIS AND EVALUATION OF HIGHBURY AVENUE ALTERNATIVES

ANALYSIS AND EVALUATION OF HIGHBURY AVENUE ALTERNATIVES

The following tables outline the analysis and evaluation that was used to assist the Project Team in the selection of the preferred alternative. The tables identify the results of the analysis by measure for each of the criteria and provide summaries of the trade-offs made against each factor to select a preferred alternative.

Two alternatives were developed and evaluated. Alternative 1 is recommended because it resulted in better traffic operations. Both alternatives resulted in similar low natural, social, economic and cultural impacts.

Evaluation Summary of Highbury Avenue

Two alternatives were developed and evaluated. Alternative 1 is recommended because it resulted in better traffic operations. Both alternatives resulted in similar low natural, social, economic and cultural impacts.

The following summarizes the advantages and disadvantages of Alternative 1.

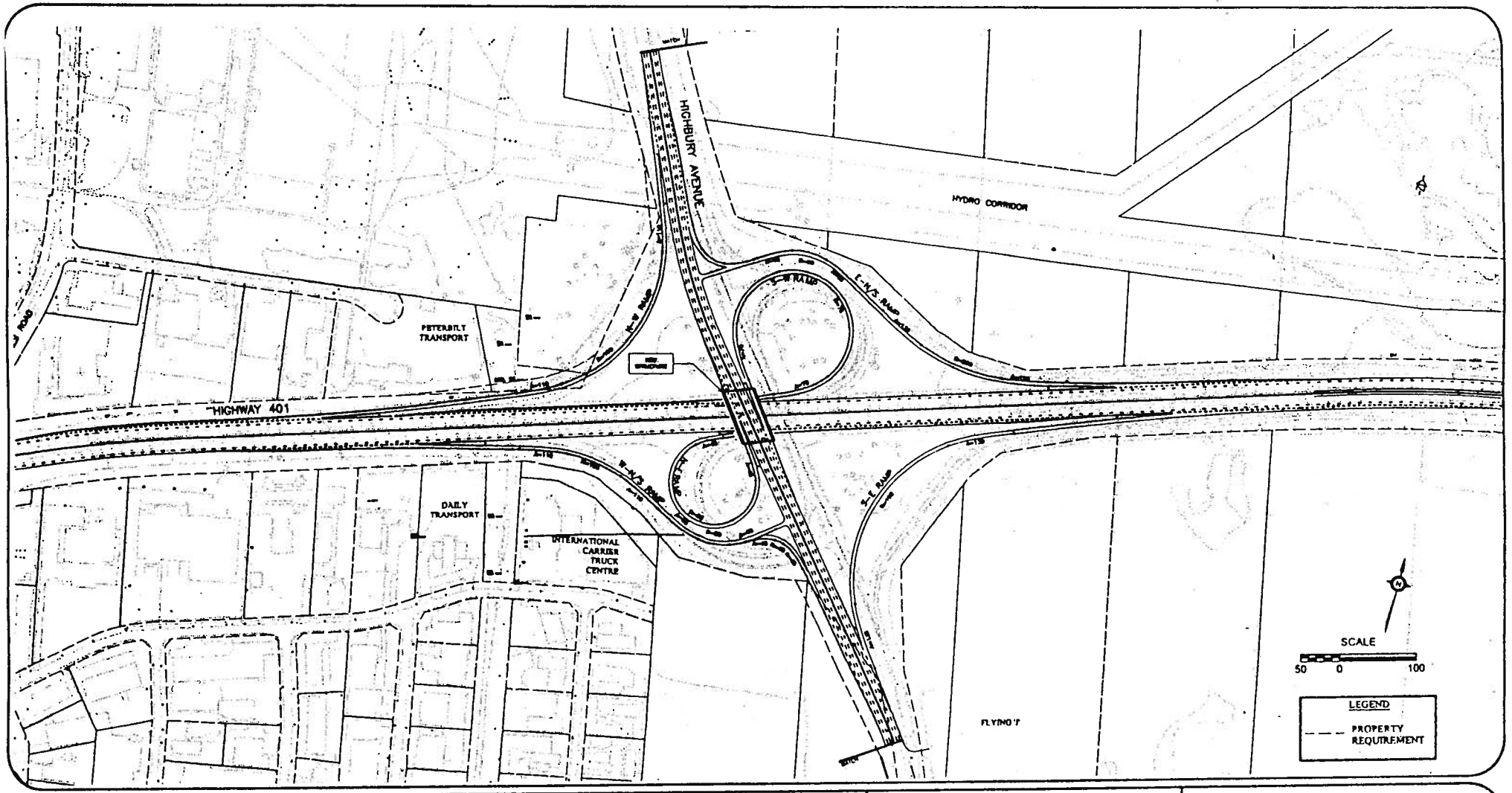
Advantages:

- Maintains existing interchange configuration;
- Maintains free-flow moves onto Highway 401 and maximizes interchange capacity;
- Ramp geometry improved to meet desirable MTO standards.

Disadvantages:

- The preferred alternative results in a 15% higher cost;
- Minor impacts to natural, social and economic environments.

Please contact a Project Team Representative if you would like a copy of the detailed evaluation package.



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HIGHWAY 401 IMPROVEMENTS
PLANNING STUDY
Highway 4 Easterly to Highbury Avenue
G.W.P. 476-89-00

Highbury Avenue
Preferred Alternative
(Long Term 2021)

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CATEGORY – NATURAL ENVIRONMENT			
FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 FISHERIES & AQUATIC HABITAT	0	0	Both alternatives impact the channel length within the expanded ROW. The impact to habitat and fisheries are minimal provided no culvert extension is required for both alternatives.
2 TERRESTRIAL ENVIRONMENT	0	0	Alternative 2 is preferred as there are no anticipated impacts to the terrestrial environment. Alternative 1 impacts are also very minimal affecting a very small area of wildlife habitat with low significance.
3 GROUNDWATER	0	0	Both alternatives produce the same anticipated impact. Impacts are minimal due to low sensitivity and permeability of clay to clayey silt tills and are not anticipated to affect groundwater.
4 SURFACE WATER	0	0	None of the alternatives impact surface water.
CATEGORY SUMMARY	0	0	

Summary of Effects on the Natural Environment

Both alternatives result in low impacts to the natural environment. Although, Alternative 2 has slightly lower impacts to fish habitat and no impacts to the terrestrial environment compared to Alternative 1, the differences are insignificant.

THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.

CATEGORY – SOCIAL ENVIRONMENT			
FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 AESTHETICS	0	0	Both alternatives result in the same low impacts to the existing landscape within the vicinity of the right-of-way and to two sensitive viewer groups.
2 NOISE	0	0	Both alternatives result in low impacts (less than 5 dBA).
3 RESIDENTIAL	0	0	None of the alternatives impact residential property.
4 COMMUNITY EFFECTS	0	0	Both of the alternatives result in the same low impacts to the Hydro Corridor since small portions of property is required to accommodate the new interchange.
5 COMPATIBILITY WITH FUTURE LAND USE	0	0	None of the alternatives impact land dedicated to future land use.
CATEGORY SUMMARY	0	0	

Summary of Effects on the Social Environment

Both alternatives result in the same low impacts to the social environment.

THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.

CATEGORY – ECONOMIC ENVIRONMENT

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 AGRICULTURAL	❶	❶	Both alternatives result in the same low disruption impacts to agricultural land and operations.
2 COMMERCIAL / INDUSTRIAL USES	❶	❶	Both alternatives will result in the same amount of commercial property disruptions and affect the same number of business operations.
3 SPECIAL POLICY AREAS	❶	❶	None of the alternatives will have an affect on Provincial or Federal initiatives for future land use.
4 PROPERTY WASTE & CONTAMINATION	❶	❶	Both alternatives have potentially moderate to high impacts due to the presence of fueling stations and chemical handling (Flying J, industrial buildings – Daily Transport, International Carrier Truck Centre) located on site.
CATEGORY SUMMARY	❶	❶	

Summary of Effects on the Economic Environment

Both alternatives result in the same low disruption impacts to agricultural and commercial property and operations.

THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.

CATEGORY – CULTURAL ENVIRONMENT

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 ARCHAEOLOGICAL RESOURCES	❶	❶	None of the alternatives impact known archaeological resources.
2 HERITAGE RESOURCES	❶	❶	None of the alternatives impact heritage resources.
CATEGORY SUMMARY	❶	❶	

Summary Effects on the Cultural Environment

There are no cultural features in the vicinity of the proposed interchange.

THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.

CATEGORY – TRANSPORTATION AND ENGINEERING

FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 TRAFFIC OPERATIONS	❶	②	Alternative 1 provides free-flow moves onto highway, and results in highest interchange capacity. The potential impact of two Highway 401 entrance ramps could be mitigated by merging the two entrance ramps together, providing one entrance ramp onto Highway 401. Alternative 1 has a configuration that is consistent with driver's expectations. A Parclo A-4 interchange already exists. Accident rates at the existing interchange are below the provincial average.
2 CONSTRUCTION IMPACTS	❶	❶	Both alternatives can be constructed with minimum disruption to traffic.
3 COST	❶	❶	Both alternatives have similar costs.
CATEGORY SUMMARY	❶	②	

Summary of Effects on Transportation and Engineering

Alternative 1 provides better traffic operations because of the free-flow movement onto Highway 401 and higher interchange capacity as well as being consistent with driver's expectations.

THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.

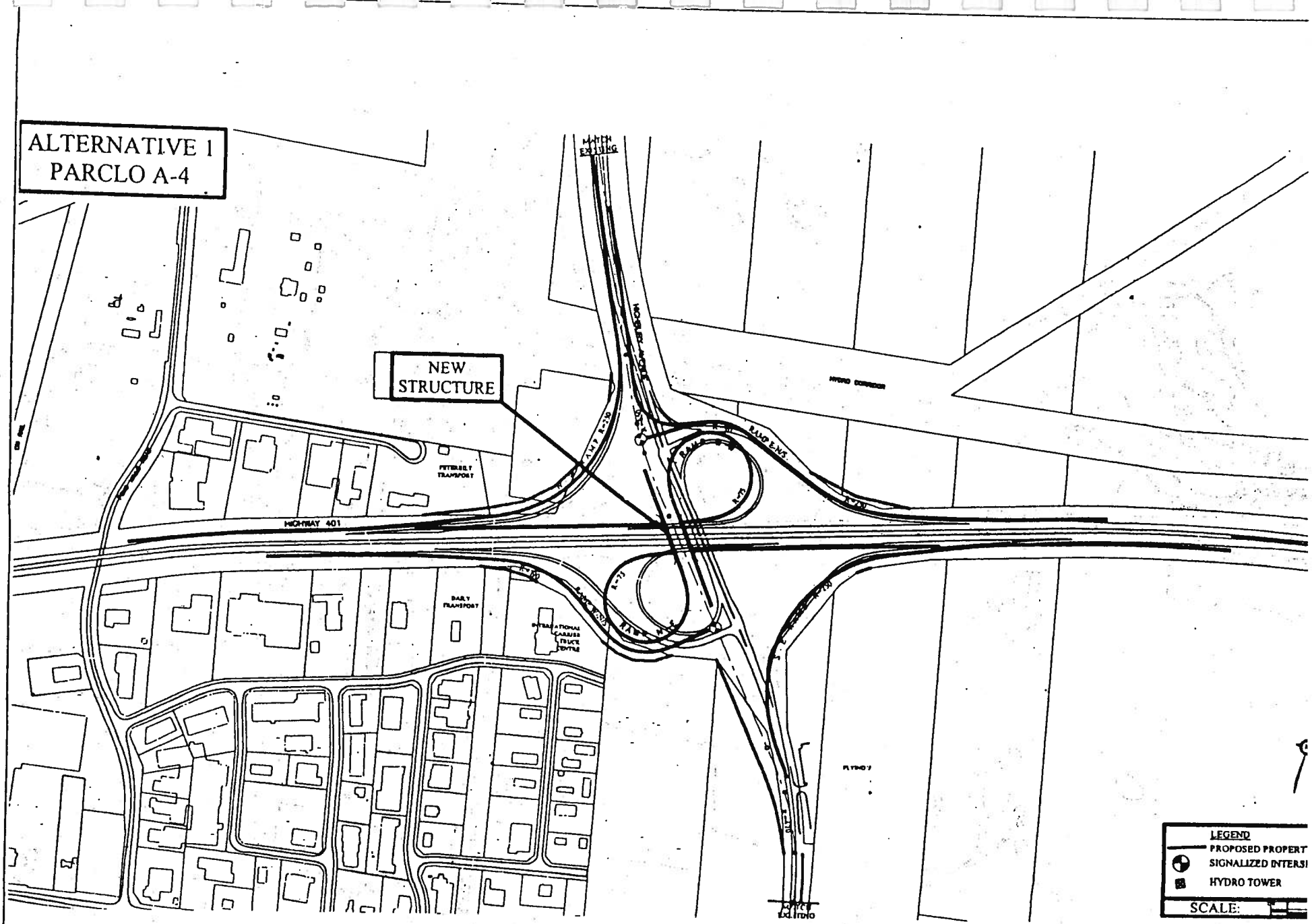
CATEGORY – SUMMARY OF EVALUATION			
FACTOR	ALTERNATIVE 1	ALTERNATIVE 2	COMMENTS
1 NATURAL ENVIRONMENT	❶	❶	Both alternatives result in low impacts to the natural environment. Although, Alternative 2 has slightly lower impacts to fish habitat and no impacts to the terrestrial environment compared to Alternative 1, the differences are insignificant. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
2 SOCIAL ENVIRONMENT	❶	❶	Both alternatives result in the same low impacts to the social environment. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
3 ECONOMIC ENVIRONMENT	❶	❶	Both alternatives result in the same low disruption impacts to agricultural and commercial property and operations. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
4 CULTURAL ENVIRONMENT	❶	❶	There are no cultural features in the vicinity of the proposed interchange. THEREFORE, BOTH ALTERNATIVES ARE EQUALLY PREFERRED.
5 TRANSPORTATION & ENGINEERING	❶	②	Alternative 1 provides better traffic operations because of the free-flow movement onto Highway 401 and higher interchange capacity as well as being consistent with driver's expectations. THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.
Summary of Evaluation: All alternatives result in similar low impacts to all factors, however Alternative 1 provides for better traffic operations and is therefore preferred. THEREFORE, ALTERNATIVE 1 IS THE PREFERRED ALTERNATIVE.			

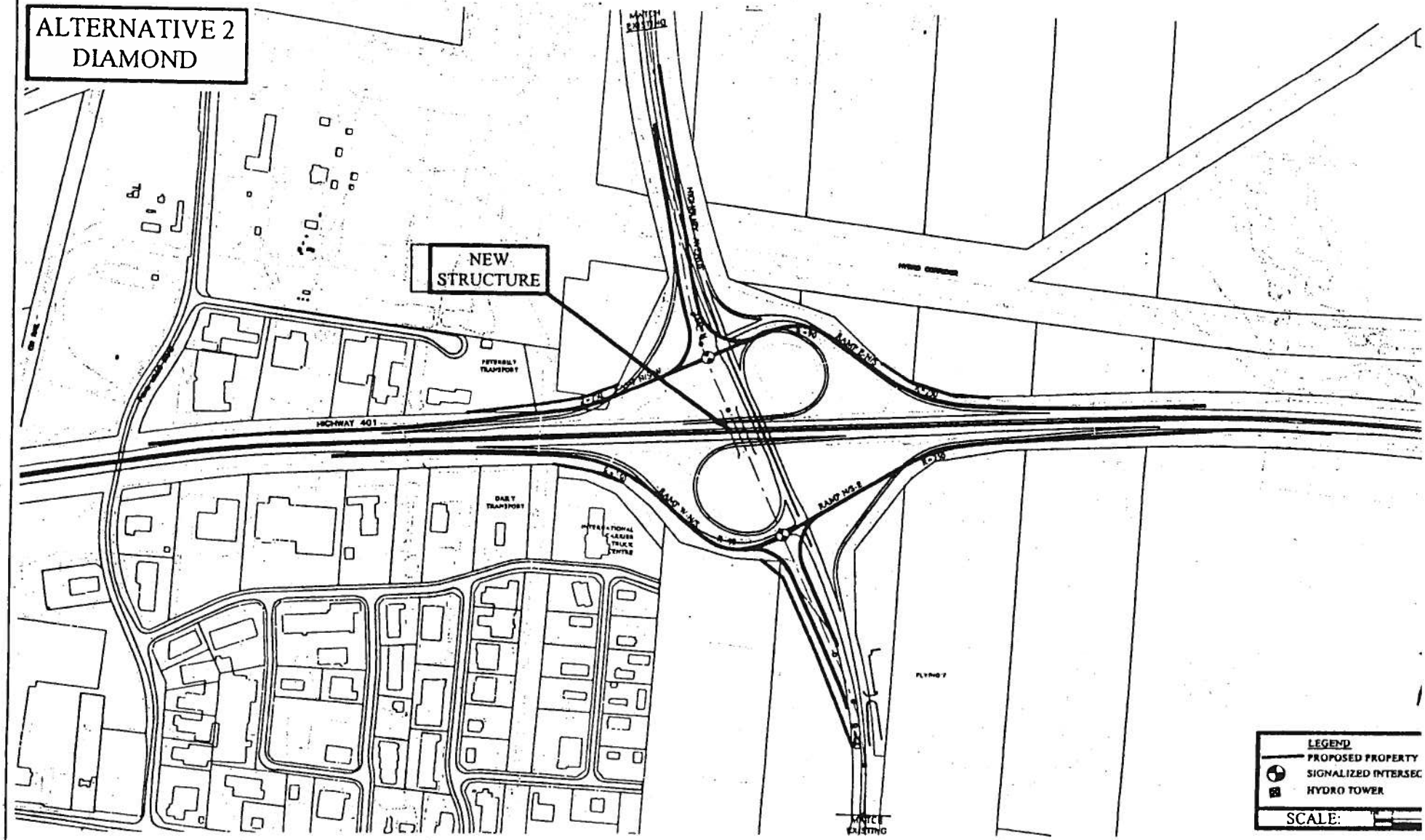
RANKING OF ALTERNATIVES

❶ ⟶ ②

Most Preferred Least Preferred

All factors were considered to be of equal importance for the purposes of this evaluation.


ALTERNATIVE 1
PARCLO A-4
NEW
STRUCTURE
HIGHWAY 401
LEGEND
PROPOSED PROPERT
SIGNALIZED INTERS
HYDRO TOWER
SCALE:



Ontario

G.W.P. 476-89-00
HIGHWAY 401 IMPROVEMENTS PLANNING STUDY

INTERCHANGE ALTERNATIVES AT HIGHBURY AVENUE

UPS COLE, SPRAM