5.0 ANALYSIS AND EVALUATION

5.1 Introduction

The analysis and evaluation of the Alternatives to the Undertaking (Alternative Planning Solutions) and Preliminary Design Alternatives for the Preferred Planning Solution are described in the following chapter.

5.2 Evaluation Process

The generation and evaluation of the alternatives was a two-phased process as shown in **Figure 5-1, Evaluation Process**. These phases include:

- **Phase 1**: Alternatives examined during the transportation needs assessment stage are "Alternatives To" the undertaking or "Planning Solutions". The assessment and selection of the Preferred Planning Solution is presented in Section 5.4.
- **Phase 2**: Alternatives examined during the subsequent Preliminary Design stage are "Alternative Methods" of completing the undertaking or "Preliminary Design Alternatives". The assessment and selection of the Technically Preferred Alternatives (TPA's) is presented in Section 5.5.

In accordance with the Class EA process, the assessment and evaluation of planning and preliminary design alternatives must be traceable, replicable and understandable. It must recognize public and agency input, as well as Ministry standards and requirements. In order to satisfy these requirements, the assessment and evaluation methodology for this project consisted of the following key steps:

- Development of the long-list of reasonable alternatives;
- Identification of the long-list of assessment factors and sub-factors and the relative importance of each;
- Screening out of alternatives which do not achieve the basic project requirements and/or do not comply with Ministry standards/requirements, where applicable;
- Identification of the benefits and potential impacts for the short-listed alternatives carried forward;
- Evaluation of short-listed alternatives using a recognized evaluation technique;
- Ranking of alternatives and then selection of the preferred alternative based on the evaluation results; and
- Opportunities for public involvement/consultation throughout the process regarding assessment factors/sub-factors, planning alternatives, design alternatives and the technically preferred design alternative.

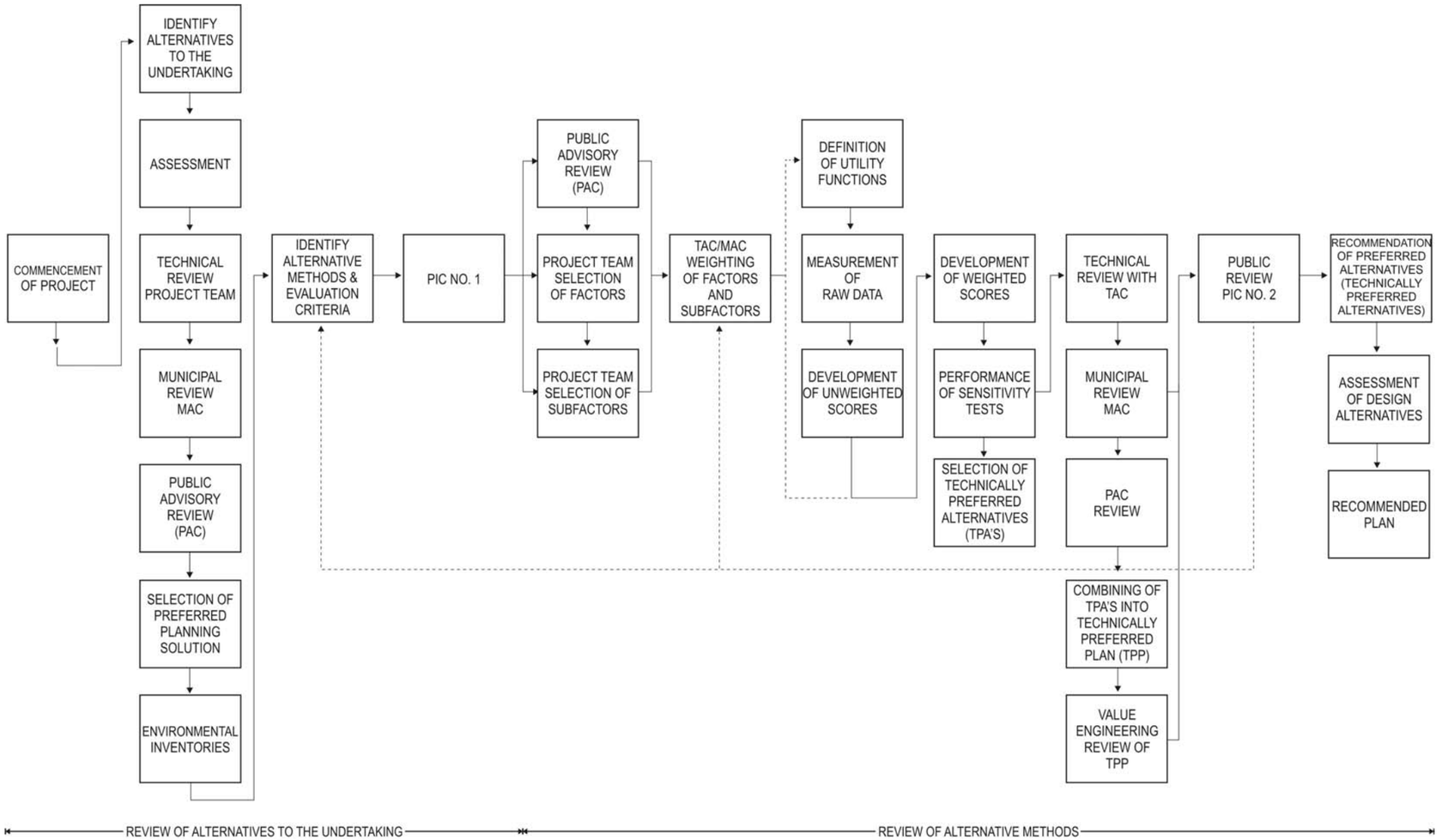
The Technically Preferred Alternatives, in several mutually exclusive areas of the project, were then combined to produce the Technically Preferred Plan (TPP). The selected TPP was then refined to address concerns brought forward by agencies and the public and presented as the Recommended Plan. The Recommended Plan includes the preferred interchange locations and types, median width, service roads, cross road alignments, road closures and property requirements.

The Recommended Plan and the analysis and evaluation of the refinements were shown to the public at PIC No. 3 and are described in **Section 5.6**.

5.3 Evaluation Methodology

This section documents in detail the formal evaluation approaches used in this study for selecting a Technically Preferred Alternative(s) (TPA). Two approaches were utilized; namely qualitative and quantitative evaluation methodologies. The differences in these methodologies and the rationale for selecting one for a specific group of alternatives to be evaluated, are described in the succeeding sections.

Figure 5-1 Evaluation Process



5.3.1 Qualitative Assessment

There are numerous methods available for the assessment and evaluation of alternatives, each with a variety of advantages and disadvantages. However, where there are a limited number of alternatives to be compared or few measurable differences between the alternatives, then the qualitative method is typically chosen as the evaluation methodology. The use of simple qualitative and narrative assessments is an accepted methodology for the evaluation of alternatives where there are few alternatives and there is substantial agreement for the study recommendations. In this study the TAC, MAC and PAC were committees that reviewed the groups of alternatives being evaluated and endorsed when the qualitative approach would be followed.

For each group of alternatives being compared a long-list of assessment factors and sub-factors were considered for each set of alternatives. Then those factors and sub-factors, which had meaningful differences among the alternatives, were carried forward for use in the evaluation.

For the qualitative approach the long list of criteria (including factors and sub-factors) allow for the identification of all benefits and impacts. The alternatives were evaluated by relative comparison to each other, using the rating scale and symbols.

The selection of the preferred alternative, when using the qualitative assessment, was based on the number of sub-factors and the importance of the sub-factors rated as "good".

Table 5-1
Rating Symbols

Relative Rating	Symbol
Good in comparison	✓
Neutral in comparison	–
Poor in comparison	✖

5.3.2 Quantitative Analysis

For the evaluation of alternatives where there are a large number of alternatives and/or a large number of competing criteria, a more comprehensive approach is followed. This is because it is difficult to distinguish between the alternatives when the number of competing trade-offs increases i.e. the complexity of the comparison increases. As an initial step, the long-list of assessment factors and sub-factors are reviewed for each set of alternatives. Only those factors and sub-factors which vary among the alternatives i.e. where there are measurable differences among alternatives and thus influence the evaluation, are detailed in the assessment tables and subsequently carried forward.

This systematic process includes the following steps:

- Development of criteria;
- Collection of data;
- Weighting criteria;
- Rating alternatives;
- Selection of Technically Preferred Alternative (TPA);
- Sensitivity testing;
- Public review; and
- Recommendations and presentation of a Recommended Plan.

5.3.2.1 Long List of Criteria

For the quantitative approach, the long list of sub-factors are established for each of these main factor categories to allow for the identification of all benefits and impacts. The relative measured effect of each criterion is also subsequently defined to ensure that the significance of each criterion (factor group or sub-factor) is recognized in the evaluation process.

Sub-factors are measurable criteria under a factor group. For example, under the category/factor group "Traffic and Transportation" sub-factors relate to measurable transportation differences among alternatives. Using the Traffic and Transportation factor group as an example, sub-factors may relate to safety or traffic operations measures to allow for the identification of all benefits and impacts. The relative measured effect of each criterion is

defined to ensure that the significance is recognized in the evaluation process.

The evaluation criteria were classified into two levels. These levels included factors, or factor groups, which identified primary categories. As an initial step the evaluation criteria were grouped into these broad categories, or factors to describe the study specific engineering and environmental concerns. Six factors were selected which were used for each evaluation. Within each of these categories, factor groups, are sub-criteria, described as sub-factors, which define the measure and the relative differences of magnitude of impact or benefit. The factor groups include:

- Traffic and Transportation
- Natural Environment
- Social and Cultural Environment
- Economic Environment
- Land Use and Property
- Cost

Within each of these global factor groups, sub-factors are identified to describe and measure the impact of alternatives. The sub-factors were developed from a long list created by the TAC and MAC and from public input. Where there were no measurable differences between alternatives, and it is agreed that the alternatives are generally equal with respect to this criteria, then no sub-factor is carried forward. When the TAC and MAC considered the impacts double counted among one or more criteria then only one criterion was selected to be carried forward.

While the long list of factors and sub-factors were the starting point for the evaluation, one or more factors/sub-factors could be not carried forward if it was determined that there was not a meaningful and measurable difference.

The screening of sub-factors not carried forward is illustrated in **Table 5-2**. To be carried forward the criteria (sub-factor) had to:

- Be a measure of a meaningful difference among alternatives;
- Capture a measurable difference among alternatives;
- Not "double count" the effect that was measured under another sub-factor; or
- Describe a difference in the natural or social environment that the TAC considered necessary to be included in the decision-making process.

Therefore, the selection of the sub-factors was made so that they relate to the goal of the study, are comprehensive enough to describe all aspects of the project's natural and social environment, and do not double count criteria.

The benefit to incorporating two levels of evaluation criteria (global factors and local sub-factors) is the prevention of the unbalancing of the evaluation (that could occur by adding more criteria under one area). Weights are assigned to the global factors to eliminate any possibility of skewing the results by selecting a large number of sub-factors in one particular factor group. Therefore, aggregating the sub-factor under global factor groups ensures the results of the evaluation are not distorted by including more sub-factors in one area, such as Transportation, because the TAC and MAC has prioritized the global factor groups relative to each other.

Table 5-2 provides the Long List of Factor, Sub-factor and Unit of Measurement used in the Quantitative Assessment for each set of preliminary design alternatives. Complete definitions of all sub-factors is included in **Appendix T**.

Once the factors and corresponding sub-factors had been established for a specific evaluation group of alternatives, their magnitude of importance had to be established to prioritize it in relation to the other factors/sub-factors. This was accomplished by assigning weights to each criteria as described the succeeding section.

5.3.2.2 Weighting of Criteria

Under each of the six general factor groups there were a number of sub-factors selected under which measurements were made to define differences in the alternatives. These sub-factors, under one of the applicable six factors, were the individual descriptors for the evaluation.

The members of the Technical Advisory Committee (TAC) consisted of transportation engineers, planners and environmental planners, including two (2) representatives from the Ministry of Natural Resources. The members of the Municipal Advisory Committee (MAC) represented elected

officials, municipal staff and emergency services personnel. These two committees were responsible for completing separate weighting exercises which provided independent perspectives of the relative importance of criteria for each specific evaluation.

Each member assigned percentage weights to each factor and sub-factor based on their opinion of the relative importance of each. Their individual weights were then averaged to determine the TAC or MAC "average weight" for each criterion (i.e. factors and sub-factors). The MAC weighted the global factors only, utilizing the outcome of the TAC weighting of the sub-factors i.e. relying on specialists opinions to rank the technical measures.

This evaluation approach is based on the "Weighted Additive Method" which focuses on the differences of the alternatives, addresses the complexity of the base data collected, and provides a traceable decision-making process. The quantitative assessment was applied to all the interchange sets of alternatives, the Campbell Drive Short Term Road Network analysis and the refinements to the Recommended Plan (Miller/Anderson extension).

Table 5-2
Screening of Long List of Factors and Sub-Factors

Legend
√=Carried Forward x=Not Carried Forward

Factors	Sub-Factor	Measurement	White Lake Rd.	Campbell Drive		County Road 508	County Road 6	O'Brien Road	Bruce Street	Miller Anderson Service Road
				Short Term	Long Term					
Traffic and Transportation	Level of Service on Highway 17	A, B, C, D, E, F	x	x	x	x	x	x	x	x
	Ability to stage construction	yes/no	x	√	x	√	√	x	x	x
	Out-of-way travel	km	x	√	x	x	x	x	x	√
	Ability to accommodate snowmobiles	yes/no	√	x	x	x	x	x	x	x
	Safety of interchange type (Bullnose location)	yes/no or high/med/low	x	x	√	x	√	x	√	x
	Ability to accommodate bus interface	yes/no or high/med/low	√	x	√	√	√	√	√	x
	Number of conflict points	no.	√	x	√	√	√	√	√	x
	Interchange design consistency	yes/no or high/med/low	√	x	√	√	√	x	√	x
	Cross Road safety (degree of curvature)	degree	x	x	x	√	x	x	x	x
	Bicycle safety (crossing of freeflow ramp)	yes/no	√	x	√	x	√	x	√	x
	Intersection delay	minutes	√	x	√	√	√	√	√	x
	Inner loop radii design standards Parclo A – 90 m rural Parclo A – 75 m rural Parclo A – 50 m urban Parclo B – 90 m rural Parclo B – 80 m urban Diamond – N/A	A, B, C	√	x	√	√	√	√	√	x
	Outer loop radii design standards Parclo A – 200 m Parclo B – 250 m Diamond – 200 m	AB	x	x	x	x	x	x	x	x
	Potential for wrong way movements	yes/no	√	x	√	√	√	√	√	x

Table 5-2
Screening of Long List of Factors and Sub-Factors

Legend
√=Carried Forward x=Not Carried Forward

Factors	Sub-Factor	Measurement	White Lake Rd.	Campbell Drive		County Road 508	County Road 6	O'Brien Road	Bruce Street	Miller Anderson Service Road
				Short Term	Long Term					
Traffic and Transportation	Emergency closing at bridge	yes/no	x	x	√	√	√	x	√	x
	Number of decision points on Highway 17	no.	√	x	√	√	√	√	√	x
	Accommodates major freeflow movements	no.	√	x	√	√	√	√	√	x
	Ability to accommodate future expansion of interchange	yes/no	x	x	x	x	x	x	x	x
	Design Consistency of Ramp Terminal	yes/no	x	x	x	√	x	x	x	x
	Number of stops/turns for County Road traffic	number	x	x	x	x	x	x	x	√
	Improved east-west traffic for McNab-Braeside Twp	Yes/no	x	x	x	x	x	x	x	√
Natural Environment	Upland natural habitat	ha	x	x	√	√	√	x	√	x
	Lowland natural habitat	ha	x	x	x	x	√	x	x	x
	Ravine crossing	ha	x	x	x	x	√	√	x	x
	VTE species habitat (Vulnerable Threatened Endangered)	ha	x	x	x	x	x	x	x	x
	Provincially significant plant species	yes/no	x	x	x	x	x	x	x	x
	Regionally significant plant species	yes/no	x	x	x	x	x	x	x	x
	Provincially significant wetlands (Class 1, 2, or 3)	ha	x	x	x	x	x	x	x	x
	Evaluated wetlands (Class 4, 5, 6 or 7)	ha	x	x	x	x	x	x	x	x
	Specimen trees	yes/no	x	x	x	x	x	x	x	x
	Areas of Natural Scientific Interest (ANSI)	ha	x	x	x	x	x	x	x	x

Table 5-2
Screening of Long List of Factors and Sub-Factors

Legend
√=Carried Forward x=Not Carried Forward

Factors	Sub-Factor	Measurement	White Lake Rd.	Campbell Drive		County Road 508	County Road 6	O'Brien Road	Bruce Street	Miller Anderson Service Road
				Short Term	Long Term					
Natural Environment	Agreement forest	ha	x	x	x	x	x	x	x	x
	Woodland improvement area	ha	x	x	x	x	x	x	x	x
	Impact on interior forest	yes/no	x	x	√	x	x	x	x	x
	Impact on wildlife corridor	yes/no	x	x	x	x	√	x	x	x
	Deer yard impact	yes/no	x	x	√	x	x	x	x	x
	Stormwater runoff (1 h 100 yr design storm)	m^3	√	√	√	√	√	√	√	x
	Potential changes to groundwater	yes/no	x	x	x	x	x	x	x	x
	Loss of floodplain storage	yes/no	x	x	x	x	x	x	x	x
	Cold water fish habitat impacted	m^3	x	x	x	x	x	x	x	x
	Cool water fish habitat impacted	m^3	x	√	x	x	√	x	x	x
	Warm water fish habitat impacted	m^3	x	x	x	x	x	√	x	√
	Aggregate area	ha	x	x	x	x	x	x	x	x
	Length of creek crossing (culvert lengths)	m	x	x	x	x	x	x	x	x
	Loss of woodlot vegetation	ha	x	x	x	x	x	x	x	√
	Length of creek realignment	m	x	x	x	x	x	x	x	√
	Stormwater runoff increase	m^2	x	x	x	x	x	x	x	√
Social and Cultural Environment	Residences with less than 5 dBA increases	no.	x	√	√	√	√	√	√	√
	Residences with 0-5 dBA decreases	no.	x	x	x	x	x	x	x	x
	Residences with 5.1-10 dBA increases	no.	x	x	x	x	x	x	x	x
	Residences with 5.1-10 dBA decreases	no.	x	x	x	x	x	x	x	x

Table 5-2
Screening of Long List of Factors and Sub-Factors

Legend
√=Carried Forward x=Not Carried Forward

Factors	Sub-Factor	Measurement	White Lake Rd.	Campbell Drive		County Road 508	County Road 6	O'Brien Road	Bruce Street	Miller Anderson Service Road
				Short Term	Long Term					
Social and Cultural Environment	Archaeological potential	ha	x	√	√	x	√	√	√	√
	Historical structures/ sites impacted	ha	x	x	x	x	x	x	x	x
	Impact on Recreational Facilities	yes/no	x	x	x	√	x	x	x	x
	Community disruption (traffic past public school/existing residences)	high/med/low	x	√	x	x	x	x	x	√
	Conformance with planning documents	yes/no	x	√	x	x	x	√	x	√
	Out of way travel	yes/no	x	x	x	x	x	√	x	x
	Residences with visual intrusion	no.	x	√	√	√	√	√	√	√
	Traffic attracted to existing community	high/med/low	x	√	x	x	x	x	x	x
	Community Safety (accommodates emergency services)	yes/no	x	√	x	x	x	x	x	x
Economic Environment	Additional travel distance (quarries/businesses)	km	x	√	x	x	x	x	x	√
	Out-of-way travel for farm machinery	km	x	√	x	x	x	x	x	
	Active farm units impacted	ha	x	√	√	x	√	√	√	√
	Rental farm units impacted	ha	x	x	√	x	x	x	√	x
	Potential agricultural business acquisitions	no.	x	x	x	x	x	x	x	x
	Tile drainage affected	yes/no	x	x	x	x	x	x	x	x
	Business acquisitions	no.	x	x	x	√	x	x	x	√
	Forestry businesses impacted	ha	x	x	x	x	x	x	x	x
	Jackson Lane Business Park out-of-way travel	km	x	x	x	x	x	x	x	x
	Accommodates future development	yes/no	x	√	x	x	x	√	x	x

Table 5-2
Screening of Long List of Factors and Sub-Factors

Legend
√=Carried Forward x=Not Carried Forward

Factors	Sub-Factor	Measurement	White Lake Rd.	Campbell Drive		County Road 508	County Road 6	O'Brien Road	Bruce Street	Miller Anderson Service Road
				Short Term	Long Term					
Economic Environment	Mineral Aggregate	yes/no	x	x	x	x	√	x	x	x
Land Use and Property	Class 1, 2, 3 and 4 property required	ha	x	√	√	√	√	√	√	√
	Class 5, 6, 7 and 0 property required	ha	x	x	x	x	√	x	x	√
	Properties with grade changes to driveways	no.	x	√	√	x	x	x	x	x
	Commercial property required	ha	√	√	x	√	x	√	x	x
	Airport property required	ha	x	x	x	x	x	x	x	x
	Industrial property required	ha	x	x	√	x	x	√	x	x
	Residential property required	ha	x	√	x	x	x	x	x	x
	Residential Acquisitions	no.	x	x	√	x	√	x	x	x
	Institutional property required	ha	x	x	x	x	x	x	x	x
	Railway crossing required	ha	x	x	x	x	x	x	x	x
	Agricultural property required	ha	x	√	√	x	x	x	x	x
	Rural property required	ha	x	x	√	√	√	√	√	√
	Suburban property required	ha	x	x	x	√	x	x	x	√
	Mineral aggregates	ha	x	x	x	x	x	x	x	x
	Environmental Protection	ha	x	x	x	x	x	x	x	√
	Future development property required	ha	x	x	x	x	x	x	x	x
Cost	Life Cycle Cost	$/million	√	√	√	√	√	√	√	√

5.3.2.3 Selection of Technically Preferred Alternatives

When using the "Weighted Additive Method", overall scores are assigned to each alternative, the alternatives ranked in order of preference and then the option with the highest score is selected as the "Technically Preferred Alternative" (TPA) to complete the evaluation.

5.3.2.4 Sensitivity Testing

It should be recognized that the scope of the evaluation and determination of weights for the evaluation criteria are a matter of personal and professional judgement. Accordingly, it is considered essential to conduct sensitivity testing to determine the effect of changing weights assigned to each criterion.

To test how sensitive the outcome of the evaluation is with respect to the assigned weights (i.e. would the result have changed if different weights were used) a sensitivity-testing program was undertaken. This results in greater confidence in the selection process and reduces the potential that the average weights bias the outcome of the evaluation.

Often, there is a diversity of opinion within the group of evaluations in what weights are appropriate for a factor or sub-factors. When an average weight is used to capture the preferences of the group it loses valuable information on the range of values, or perspectives, of the group.

For this study a series of independent tests were undertaken following the weighting exercise. These tests were undertaken to assess how sensitive the outcome was with respect to the weights assigned by the team. These tests considered the spectrum of opinions in the group by considering the highest or lowest weights (opinion of importance) proposed by any one team member. The tests were undertaken by placing greater or less emphasis on a factor and redistributing the weight to the other factors using the average values of the TAC or MAC. In fact, a separate test was be completed for each factor using the highest weight given by anyone in the group as well as the lowest weight to assess how sensitive the outcome was with respect to that factor as an independent variable.

Following this methodology a series of tests were completed varying the weight for each factor. The series of tests included:

- Average TAC Weight.
- Average MAC Weight.
- Highest Weight in a factor group by any TAC/MAC member.
- Lowest Weight in a factor group by any TAC/MAC member.

Following this series of tests the results were reviewed to assess whether the preferred alternative changed when the weights were varied.

Using this information alone is not the only justification for selecting a particular alternative, but it provides a level of confidence in the selection and the ability to assess trade-offs i.e. the sensitivity testing program provided the committees a tool to rationalize the decision when making a technical recommendation.

This information was presented to the TAC and MAC, and used in the decision-making process before a technically preferred alternative was recommended to be carried forward.

5.4 Analysis of Alternative Planning Solutions

Alternative Planning Solutions represent other ways or methods of addressing the problems identified in **Section 2.3**. Based on the assessment of the Planning Solutions or of "Alternatives to the Undertaking", those judged to satisfy the problem are carried forward and will form the "Transportation Undertaking". The selected "Transportation Undertaking" is deemed to provide the best overall balance between the transportation engineering, design principles/objectives and environmental impacts, as described below.

In developing transportation planning alternatives, a number of general principles and objectives are applied:

- Provide for the efficient movement of people and goods to meet the needs of the travelling public as a whole, by maximizing opportunities for access and mobility;
- Address the identified transportation problems and opportunities and maximize the opportunity to satisfy existing and future provincial travel demand;
- Reflect sound engineering judgment, site specific transportation engineering and/or environmental constraints, transportation demand, capacity of existing and future transportation facilities, traffic

composition, trip length, population density and land development, and travel habits of the overall transportation system users, in meeting or exceeding current provincial design standards and practices;

- Ensure compatibility with the existing and future provincial and municipal transportation systems and system needs, and improve the level of service, safety and operation for the provincial transportation system users;
- Ensure consistency with other transportation facilities in the vicinity to ensure rational and predictable behaviour of users;
- Ensure the technical feasibility of construction, operation and maintenance;
- Minimize the environmental impacts and the use of non-renewable natural resources such as aggregate;
- Minimize property requirements and impacts on adjacent properties;
- Avoid directing large volumes of long-distance provincial traffic through residential/developed areas;
- Maximize opportunities to increase safety; and
- In consideration of all the above, provide the maximum benefit for the lowest cost (considering construction, maintenance and operation costs).

Provincial transportation alternatives consider the location, type and complexity of the project. It should be noted that the assessment of broader transportation strategies, such as mass transit initiatives or other transportation modes, are more appropriately considered for larger network links in the overall provincial transportation system. Their application over the 30 km section of Highway 17, accommodating local and commuter traffic, is extremely limited.

The following "Alternatives to the Undertaking", Alternative Planning Solutions, were identified and evaluated in this study. A more detailed description of the alternatives can be found in **Appendix N**.

- **The "Do Nothing" Alternative -** maintains the status quo of transportation system infrastructure with no significant actions taken to manage demand, expand infrastructure or improve operations.
- **Transportation Systems Management (TSM) -** includes the use of technology and other traffic operational strategies to increase the efficiency of the existing transportation facilities.
- **Transportation Demand Management (TDM) -** includes the use of methods to reduce travel demand such as work at home, car pooling, etc.
- **New and/or improved municipal and private road alternatives -** Municipal or private roads may be alternatives to address transportation problems and opportunities.
- **New and/or improved air, rail, transit and water based alternatives -** Other (non-provincial) modes, such as air, rail, transit and water transportation may be alternatives.
- **New and/or improved provincial transportation facility alternatives -** Provincial highway (and transitway, ferry boat and related maintenance and operations facilities) alternatives are Group A, B, and/or C projects as defined under the Class EA document, such as expansion of the existing highway to a controlled access freeway.

A qualitative evaluation process was utilized for "Alternatives to the Undertaking", or Alternative Planning Solutions, as the alternatives and evaluation criteria were limited in number. Transportation Demand Management (TDM) was not considered because of its extremely limited application in the Highway 17 study area. The remaining alternatives were assessed using the following evaluation factors:

- Transportation
- Land Use
- Economic
- Environmental

The results of the evaluation are summarized in **Table 5-3, Assessment of Alternative Planning Solutions.**

Following the evaluation, each of the alternatives was assessed against the following selection criteria:

- Does the alternative realistically address all of the problem statements? or

Does the alternative, when used in combination with other alternatives, make a significant contribution towards realistically addressing all of the problem statements?

Table 5-3
Assessment of Alternative Planning Solutions

Criteria	Planning Solutions				
	Alternatives to the Undertaking				New/Improved Provincial Transportation Facility (The Undertaking)
	Do Nothing	Transportation Systems Management (TSM)	Divert to Other Roadways	Alternative Modes of Travel	Twin Highway 17 as Controlled Access Facility with Select Interchange Locations
Transportation	✖	✖	✖	-	✓
Land Use	✖	-	✖	✓	✓
Economic	✖	-	✖	✓	✓
Environmental	✓	-	✖	-	✓
Preliminary Recommendation	Not Carried Forward	Not Carried Forward	Not Carried Forward	Not Carried Forward	Carried Forward

✖ Poor in Comparison - Neutral in Comparison ✓ Good in Comparison

Only those alternatives which satisfy at least one of the above criteria are carried forward. Only **New/Improved Provincial Transportation Facilities** satisfied the selection criteria and was carried forward as the preferred Transportation Undertaking.

Based on an evaluation of these alternatives, a "New and/or Improved Provincial Transportation Facility" was selected as the preferred planning solution and was carried forward as the preferred Transportation Undertaking. This was presented to the public at PIC No. 1. Based on the comments receive by municipalities and the public there was support for this study recommendation.

5.5 Preliminary Design Alternatives (Alternative Methods)

Following the assessment of Alternative Planning Solutions, Preliminary Design Alternatives were generated for consideration by the TAC, MAC and the public. Alternative designs for implementing the recommended planning alternative were developed when more than one method of implementing the proposed improvements were available. This applied for the Highway 17 cross section, cross roads, grade separations, alignments, service roads and interchanges. The results of the analysis and evaluation of the Preliminary Design Alternatives are summarized in **Section 5.7**. The following sections describe individual evaluations i.e. median alternatives, cross road alternatives and interchanges. The detailed evaluations are further described in the technical appendices.

5.5.1 Median Alternatives

This section summarizes the analysis and evaluation of the most appropriate cross section, width of median and median type for the future freeway, considering the balance of cost and performance for available alternatives. The analysis assesses both safety and environmental impacts. For a detailed discussion of the analysis and evaluation of median cross section alternatives refer to **Appendix O, Analysis and Evaluation of Median Alternatives**.

A median is defined as the portion of a divided highway separating the travelled ways of traffic. For a freeway, such as Highway 17, it would be measured as the horizontal distance between the edge of eastbound and westbound median-side lanes. The median is comprised of the shoulder, rounding, sideslopes, ditches and roadside terrain. The roadside terrain between the eastbound and westbound lanes includes a 10 m clear zone, an area defined as free of hazards, that allows vehicles to recover where there is no physical protection i.e. barrier. Where the median width exceeds 20 m there is an opportunity to either provide a greater clear zone or green space.

Four median cross section alternatives were developed for evaluation. These are described below and shown on **Figure 5-2**:

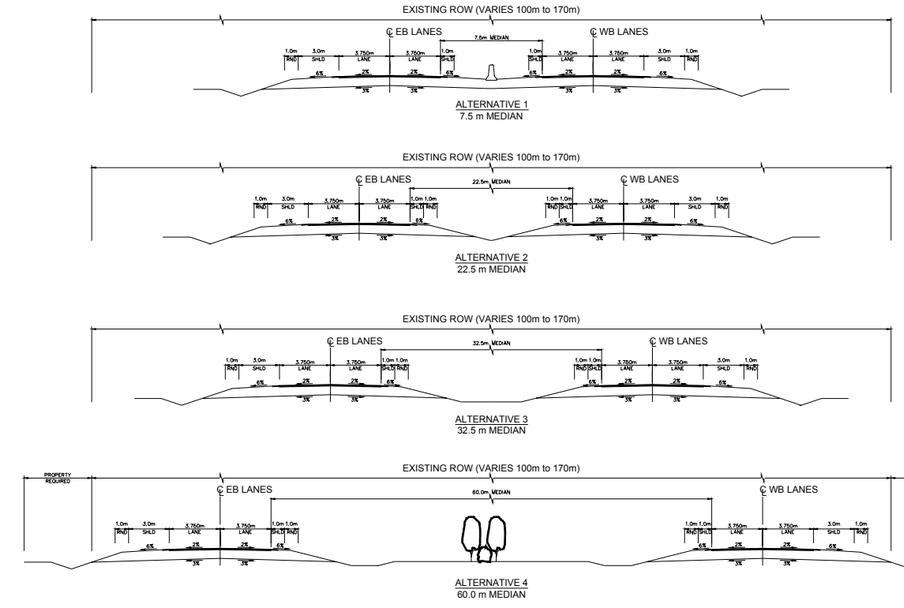
Alternative 1 (7.5 m median including a concrete tall-wall barrier) eliminates all potential median cross over type collisions, but requires a closed drainage system as well as a concrete barrier which increases capital cost.

Alternative 2 (22.5 m median) has potential for median cross over type collisions. An advantage to this alternative is that it provides flexibility for future 6-laning without warranting a median barrier or affecting interchanges. The clear zone would be 22.5m.

Alternative 3 (32. 5 m median) has a low potential for median cross over type accidents as it widens the recovery area to over 30 m, a North American benchmark for rural freeways. This alternative also provides flexibility for future 6-laning without warranting a median barrier or hour-glassing at interchanges. It also provides design consistency by matching the Highway 17 median design to the east of Arnprior. The clear zone would generally be 32.5 m except where selective plantings may occur.

Alternative 4 (60 m median) has the potential for the lowest incidence of median cross over type collisions. This alternative also provides flexibility for future 6-laning without warranting a median barrier or hour-glassing at interchanges. However, this alternative requires an increase in capital cost for additional property and increased structures, or structure length, at interchanges.

Figure 5-2 Median Alternatives



A qualitative comparison was undertaken for the median cross section alternatives due to a few number of alternatives and evaluation criteria. The alternatives were compared considering the following factors:

- Transportation and safety;
- Natural environment;
- Social and cultural environment;
- Land use and property; and
- Cost.

Under each of these factors the alternatives were assessed where sub-factors differed among the group of alternatives being assessed. The detailed evaluation is shown in **Appendix O, Median Alternatives**. The results are summarized in **Table 5-4.**

Table 5-4
Evaluation Summary of Median Alternatives

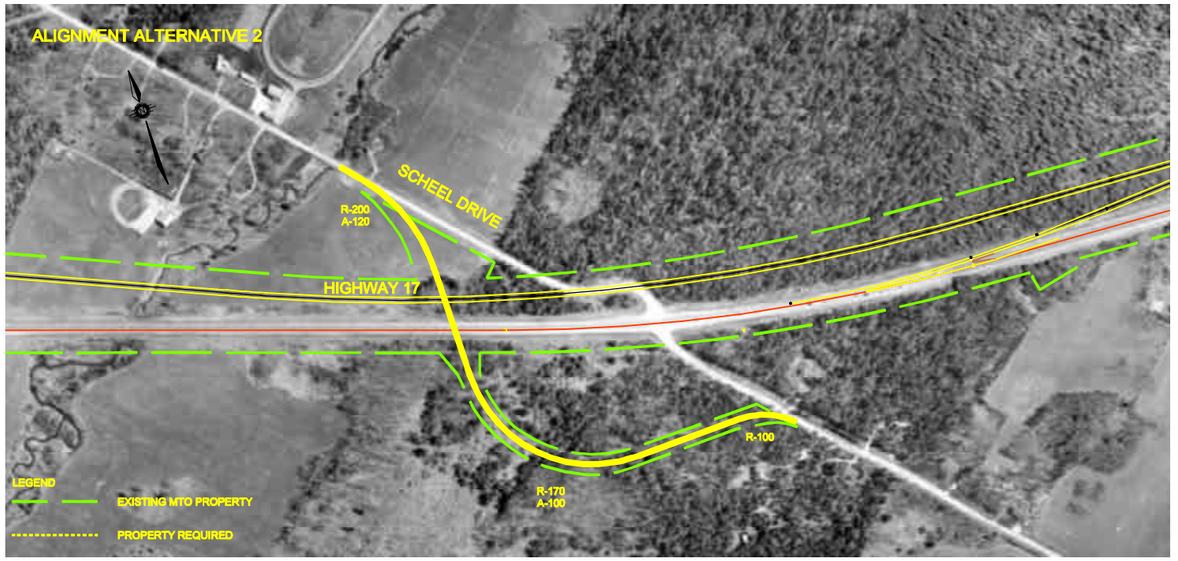
Factor	1 Jersey Barrier 7.5 m Median	2 22.5 m Median	3 32.5 m Median	4 60 m Median
Transportation and Safety	-	-	✓	-
Natural Environment	×	✓	✓	-
Social and Cultural	-	-	✓	-
Land Use and Property	-	✓	✓	×
Cost	×	✓	✓	-
Recommendation			**Carried Forward**	Carried Forward*
* Where property generally available				

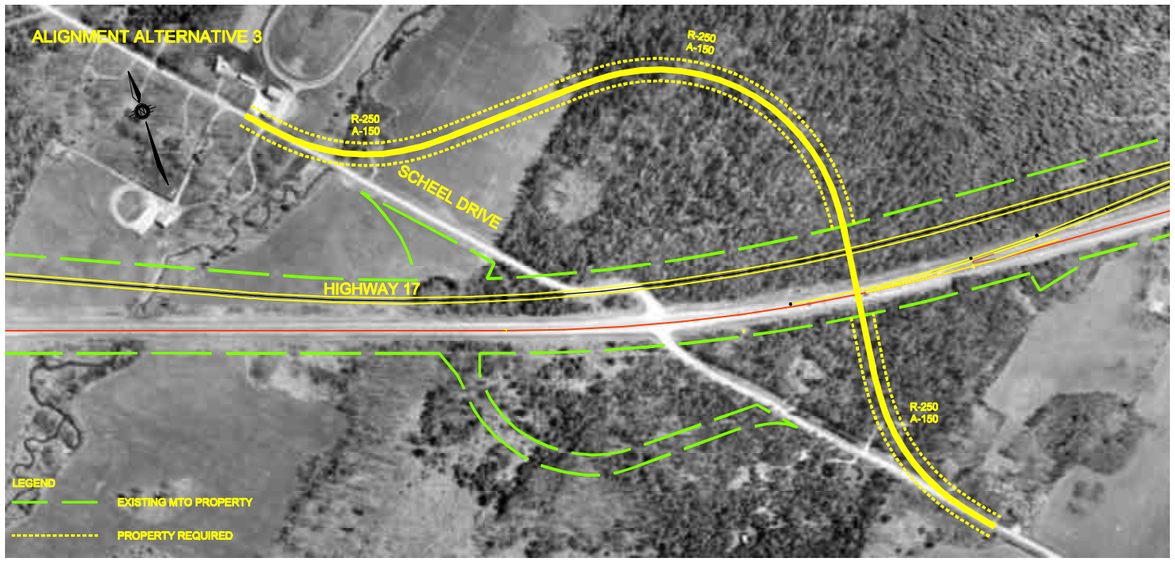
Based on the technical assessment of the median alternatives it is recommended that the 32.5 m median be carried forward as the minimum horizontal separation of opposing lanes of traffic. This alternative generally minimizes environmental impacts by staying within property previously purchased for the freeway. It also provides a high level of safety and design consistency with the sections of freeway under construction to the east. Where property is generally available, or where only small widenings are required, it was also recommended that greater median widths, larger than 32.5 m, should be implemented to increase safety, allow greenspace and facilitate avoidance of large rock outcrops.

5.5.2 Cross Roads Alternatives

This analysis and evaluation exercise established the horizontal alignments for cross roads prior to establishing the type of bridge that would be selected. Refer to **Appendix P, Cross Road Analysis and Evaluation.** The cross roads where alternative horizontal alignments were considered are shown on **Figures 5-3** to **5-6**.







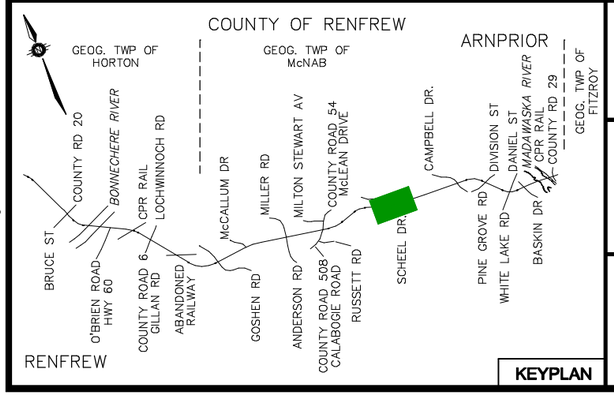


FIGURE 5-3

SCHEEL DRIVE
SIDE ROAD HORIZONTAL ALIGNMENTS

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

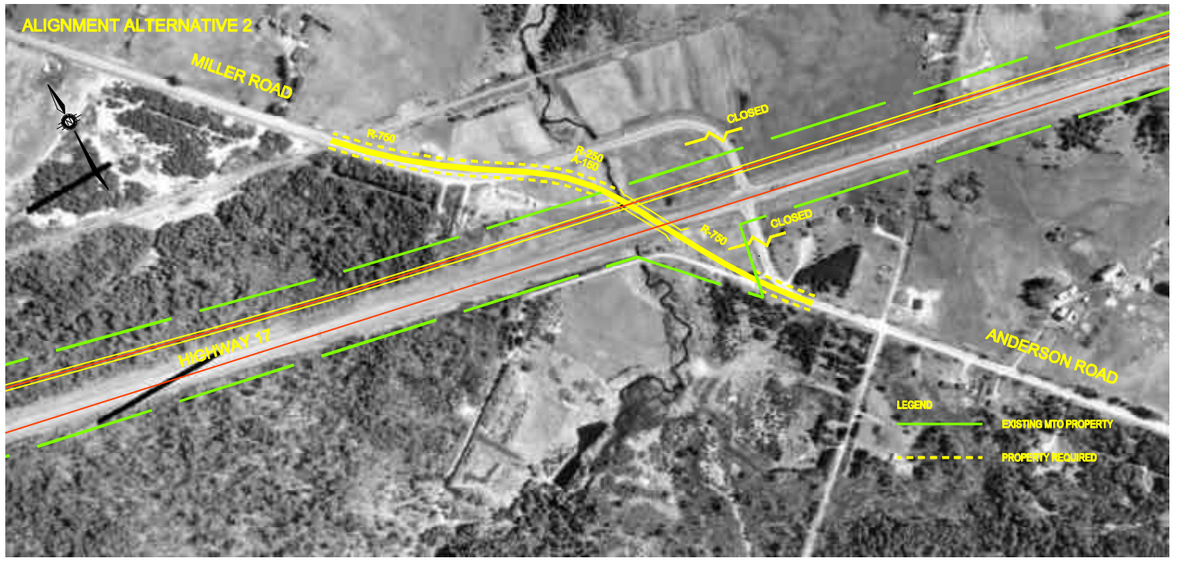
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Horizontal

Ministry of Transportation

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TRANSPORTATION AND VALUE ENGINEERS

02-SCHEEL SIDEROAD.dwg – Wed, 3 Dec 2003 – 14:30







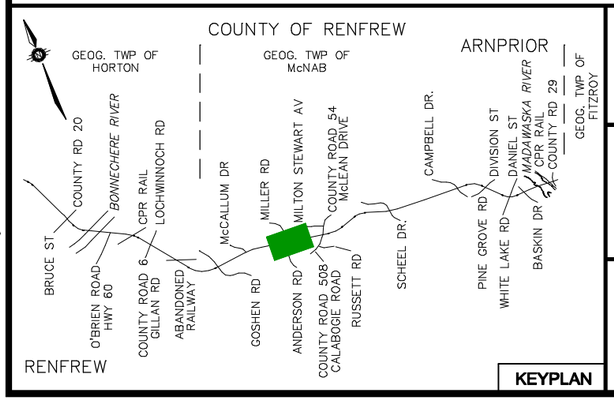


FIGURE 5-4

MILLER/ANDERSON ROAD
SIDE ROAD HORIZONTAL ALIGNMENT

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

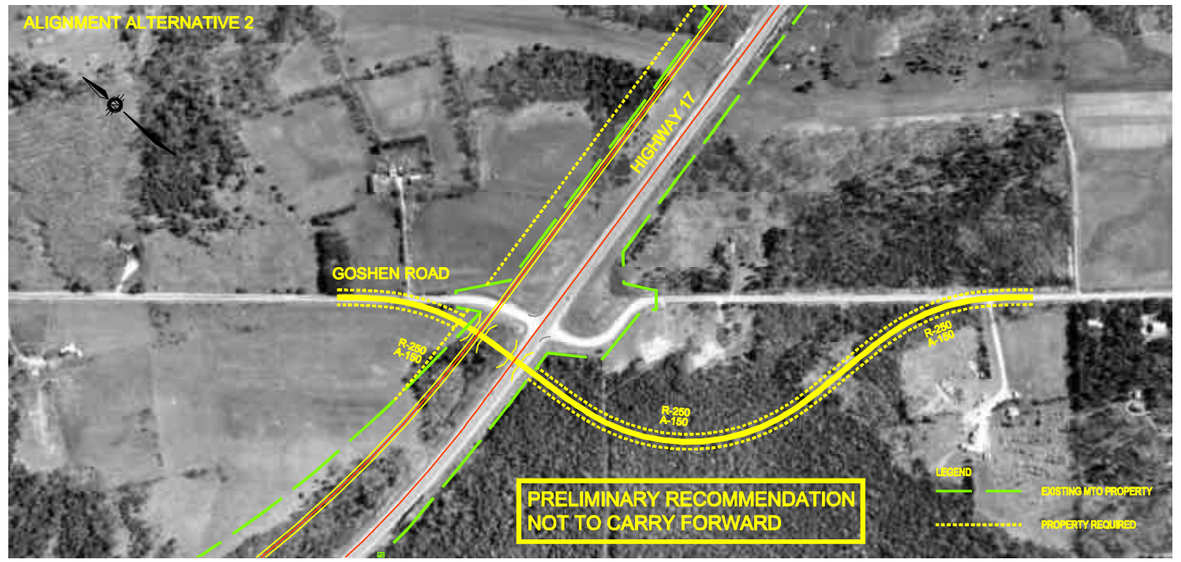
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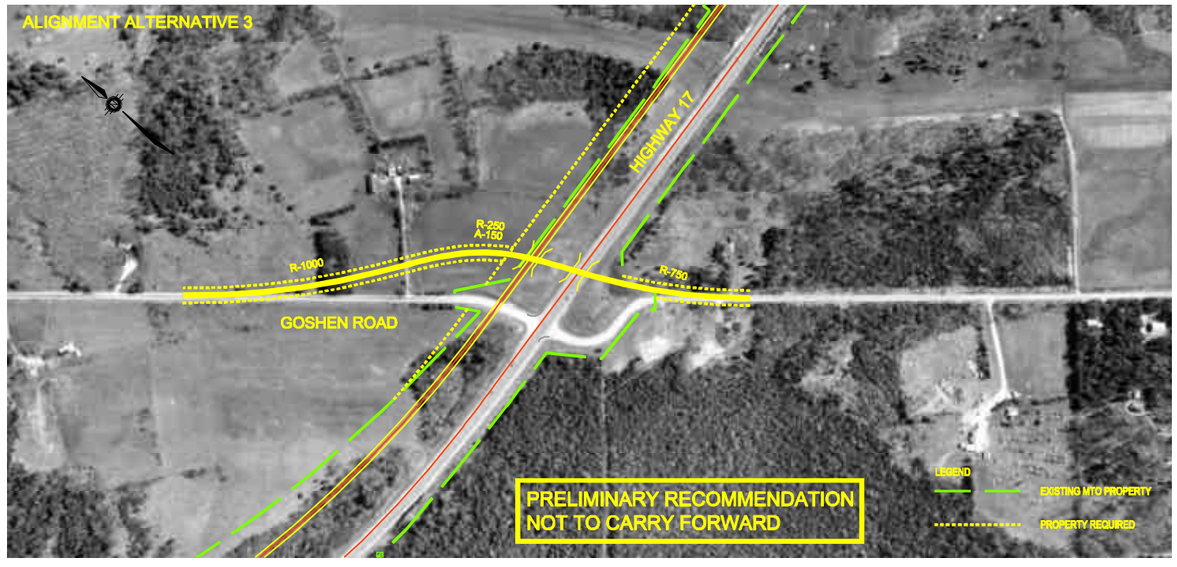
Ministry of Transportation

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TRANSPORTATION AND VALUE ENGINEERS

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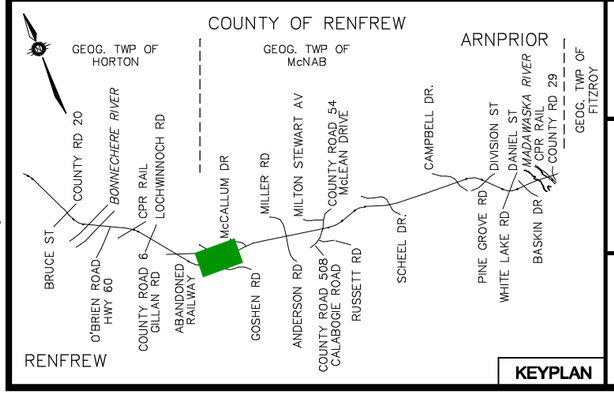


FIGURE 5-5

GOSHEN ROAD
SIDE ROAD HORIZONTAL ALIGNMENTS

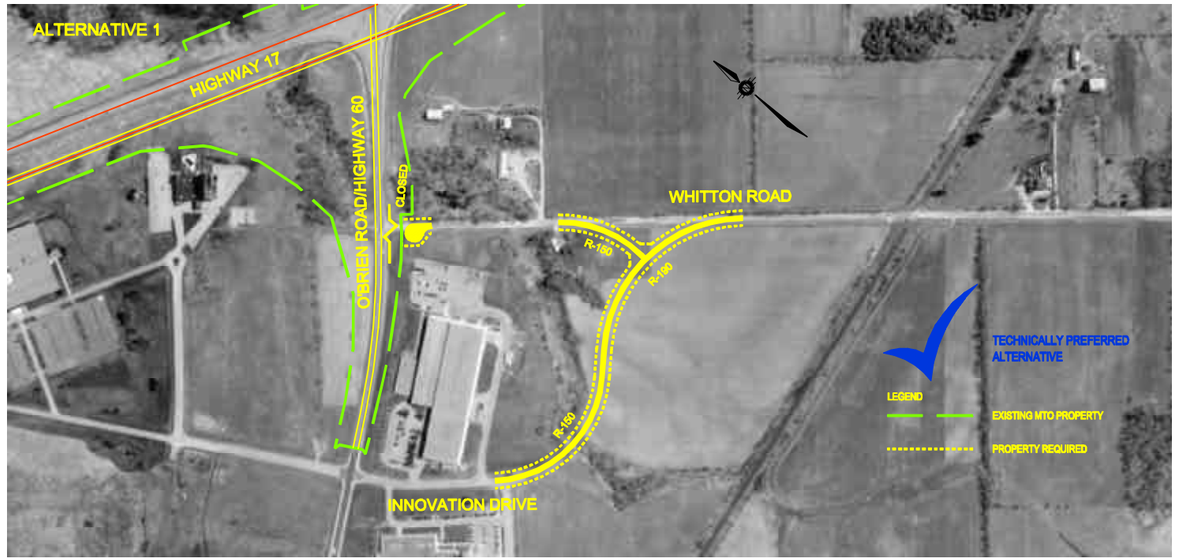
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

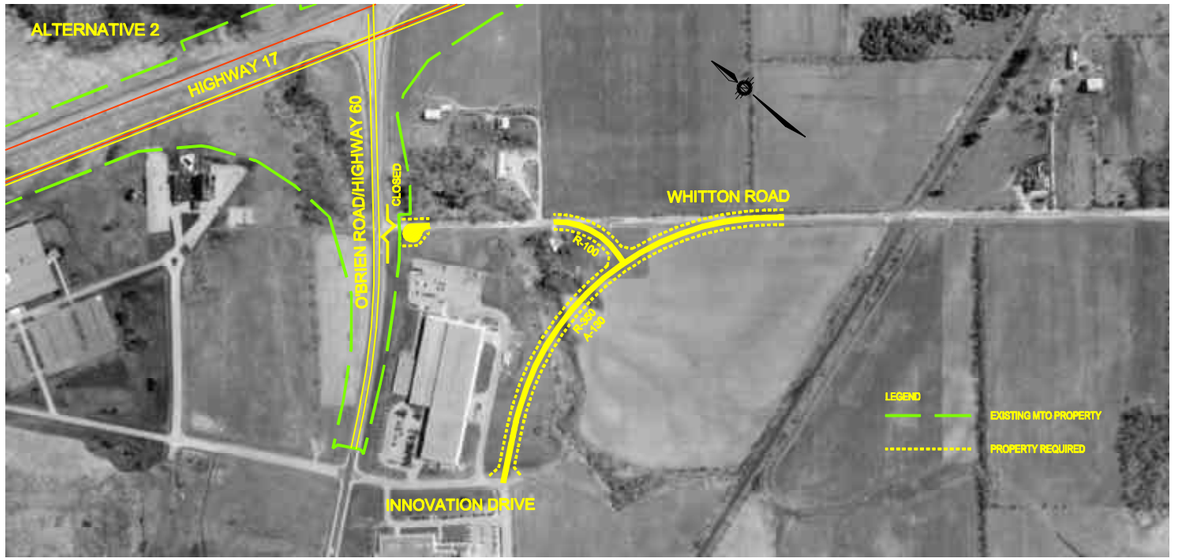
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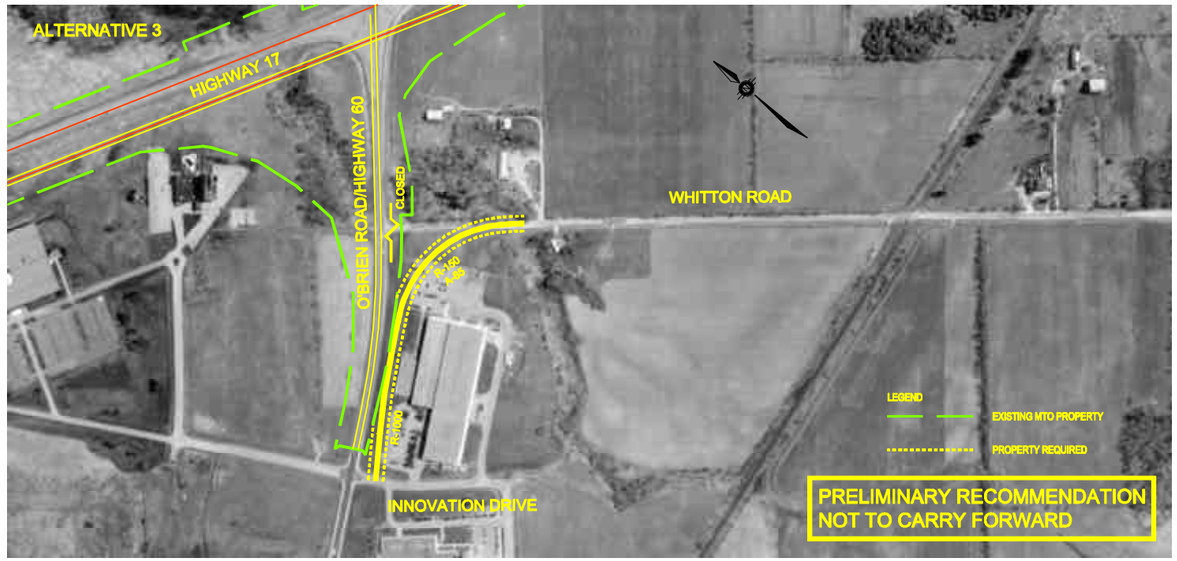
Ministry of Transportation

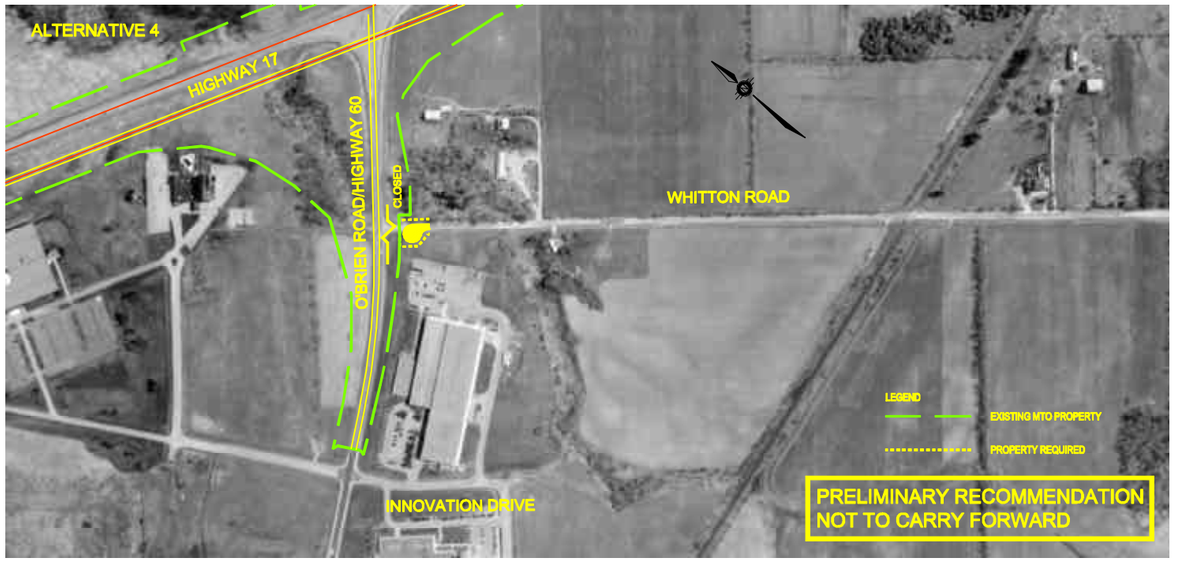
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TRANSPORTATION AND VALUE ENGINEERS

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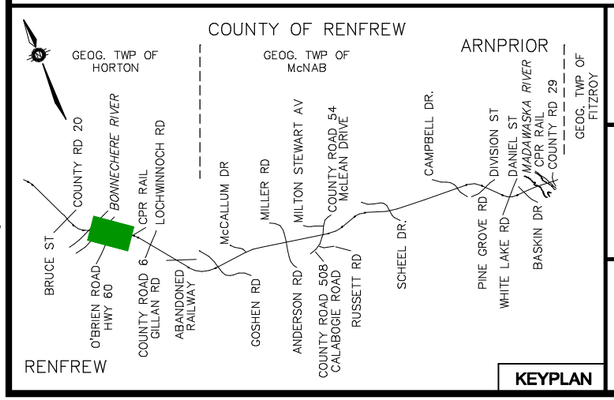


FIGURE 5-6

WHITTON ROAD
SIDE ROAD HORIZONTAL ALIGNMENTS

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
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SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

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TRANSPORTATION AND VALUE ENGINEERS

05--Whitton siderood.dwg -- Wed, 3 Dec 2003 -- 14:42

Table 5-5
Analysis and Evaluation of Cross Road and Side Road Alternatives

Cross Road	Alternatives	Carried Forward	Not Carried Forward	Technically Preferred Alternative
Scheel Drive	• 1 – long skewed underpass, tangent Scheel Dr.	✓		✓
	• 2 – shorter skewed underpass	✓		
	• 3 – perpendicular underpass		x	
Miller Road/Anderson Road	• 1 – long skewed multispan underpass, tangent alignment on Miller Road	✓		✓*
	• 2 – skewed multispan underpass, curvalinear road alignment	✓		
	• 3 – perpendicular underpass, curvalinear road alignment		x	
Goshen Road Overpass	• 1 – tangent alignment	✓		✓
	• 2 – curvalinear alignment to the south		x	
	• 3 – curvalinear alignment to the north		x	
Whitton Road Connection	• 1 – connect Whitton Road to Innovation Drive as continuous roadway	✓		✓**
	• 2 – connect Whitton Road to Innovation Drive at T-intersection	✓		
	• 3 – connect Whitton Road to Innovation Drive at T-intersection 30m from O'Brien Road		x	
	• 4 – close Whitton Road at O'Brien Road		x	

*** Miller/Anderson Road was subsequently recommended to be eliminated by incorporating a service road to the County Road 508 interchange.**

**** Whitton Road realignment was only necessary if the interchange.configuration impacted the existing intersection. The final recommended interchange design did <u>not</u> require Whitton Road to be relocated.**

The analysis and evaluation of cross road alignments, as described in **Table 5-5,** recommended the following alignments:

- Scheel Drive: Tangent alignment on skew angle crossing Highway 17 was recommended;
- Miller/Anderson: Tangent alignment on skew angle crossing Highway 17;
- Goshen Road: Tangent alignment on skew angle crossing Highway 17;
- Whitton Road: Continuous local road connection of Whitton road to Innovation Drive.

5.5.3 Vertical Alignment Alternatives for Cross Roads

This set of analyses determined whether the cross roads would go over or under the highway. There are 11 grade separations within the study area as shown on **Figures 5-7** to **5-9**. The cross roads and resultant recommendations are listed as follows:

- Baskin Drive Overpass*
- White Lake Road Underpass**
- Division Street Underpass**
- Campbell Drive Underpass**
- Scheel Drive Underpass**
- County Road 508/54 Underpass**
- Miller/Anderson Roads Underpass**
- Goshen Road Overpass*
- County Road 6 Underpass**
- O'Brien Road Overpass*
- Bruce Street Underpass**

* cross road goes under the highway
** cross road goes over the highway

The detailed analysis and evaluation of vertical alignment alternatives is presented in **Appendix Q**.

5.5.4 Analysis and Evaluation of Interchange Alternatives

This section describes the generation of interchange alternatives and the analysis and evaluation process.

With the 1969 Planning Study, and the 1971-72 Road Closing Plans as starting points, alternatives were generated at all existing and potential road crossing locations within the study area. A coarse screening evaluation was then undertaken, as described in **Appendix S**, to reduce the number of alternatives for detailed analysis and evaluation. This was done by eliminating alternatives with unacceptable characteristics or impacts which cannot be mitigated.

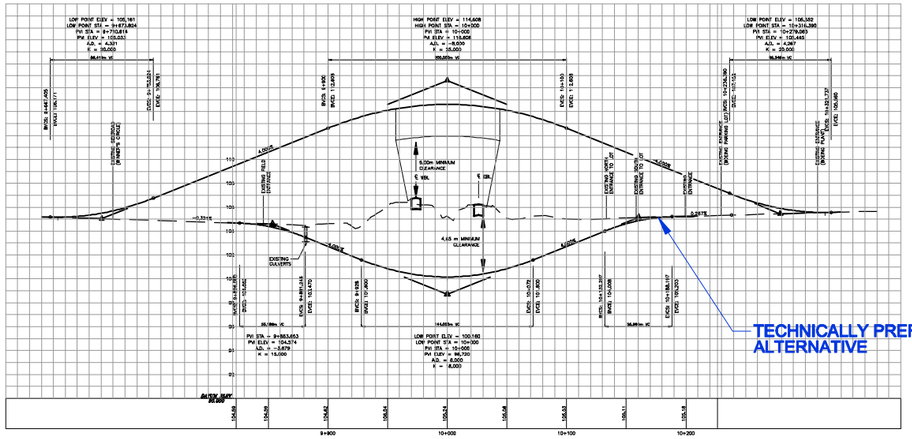
In parallel with the coarse screening, an **Interchange Needs Analysis**, as described in **Appendix R**, was conducted at three new interchange locations . These locations were not previously identified, but were suggested by local municipalities as part of the public consultation program. Finally, a detailed quantitative evaluation was carried out and the selected "Technically Preferred Alternative" (TPA) was reviewed by the municipalities and public. Refinements were made to the TPA based on public input. These refinements were carried forward into the "Recommended Plan". These steps are described in the succeeding sections.

5.5.4.1 Generation of Interchange Alternatives

Following the selection of a 32.5 m median for the future freeway, described in **Section 5.5.1**, alternatives for all road crossing locations were generated considering the following:

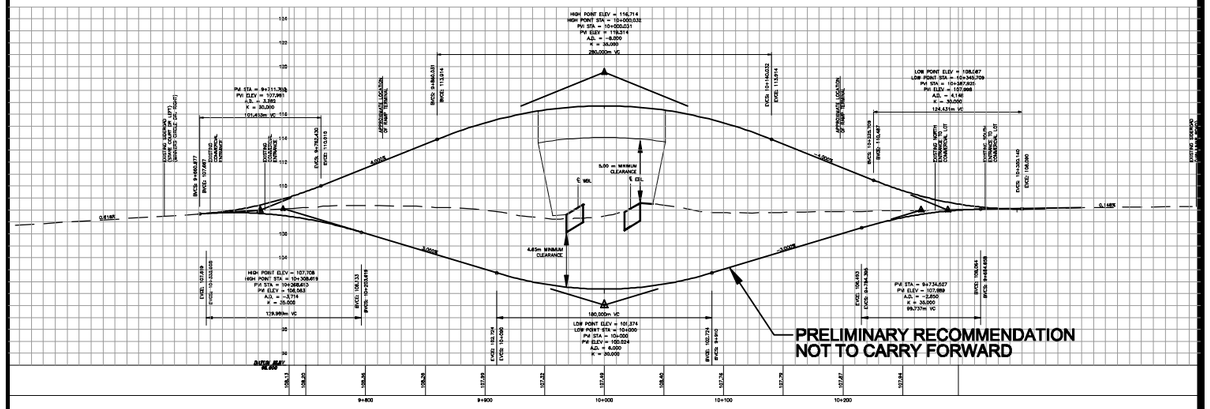
- Approved road closings and property protected for interchanges or grade separations in the 1971-72 Road Closing Plans;
- Municipal requests for new interchange locations;
- Existing and future traffic volumes;
- Emergency vehicle access routes;
- Future land use and development plans;
- Loss of direct highway access with implementation of freeway, additional travel times, circuitous travel patterns; and
- MTO freeway design standards, policies and procedures.

BASKIN DRIVE
GRADE SEPARATION ALTERNATIVES



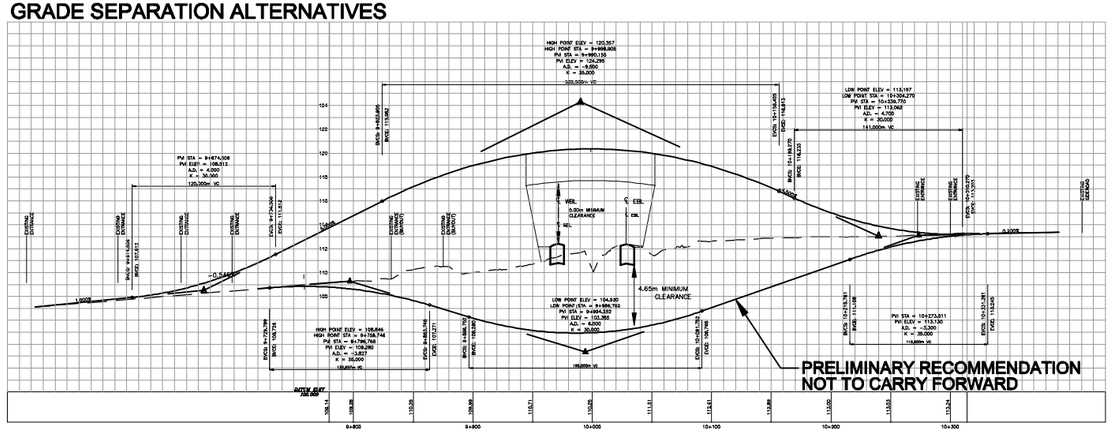
DESIGN SPEED - 60km/h

WHITE LAKE RD/DANIEL ST
GRADE SEPARATION ALTERNATIVES



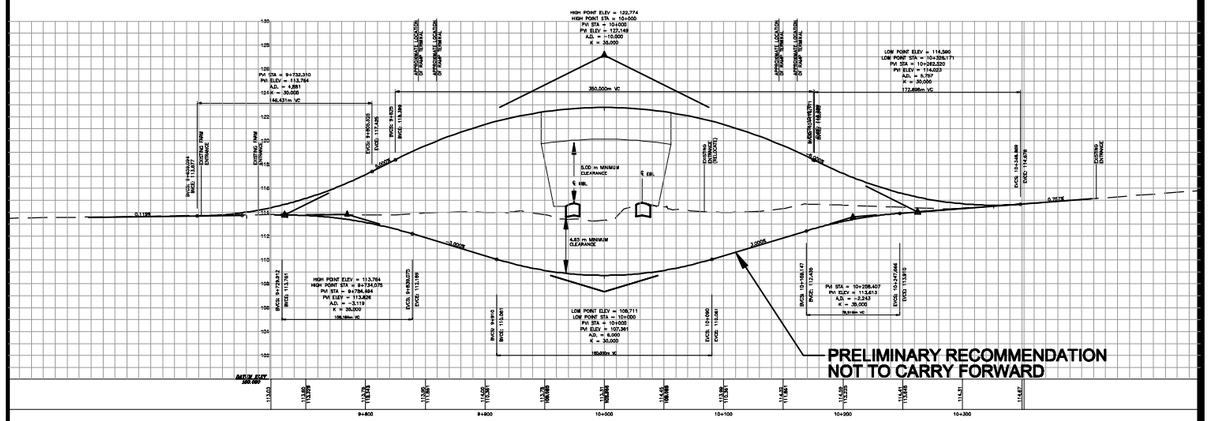
DESIGN SPEED - 80km/h

PINE GROVE RD/DIVISION ST
GRADE SEPARATION ALTERNATIVES



DESIGN SPEED - 80km/h

CAMPBELL DRIVE
GRADE SEPARATION ALTERNATIVES



DESIGN SPEED - 80km/h

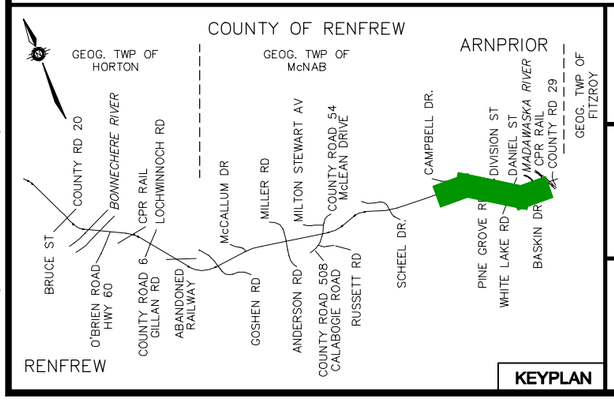


FIGURE 5-7

BASKIN DRIVE/WHITE LAKE ROAD/DIVISION STREET/CAMPBELL DRIVE VERTICAL ALIGNMENT ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

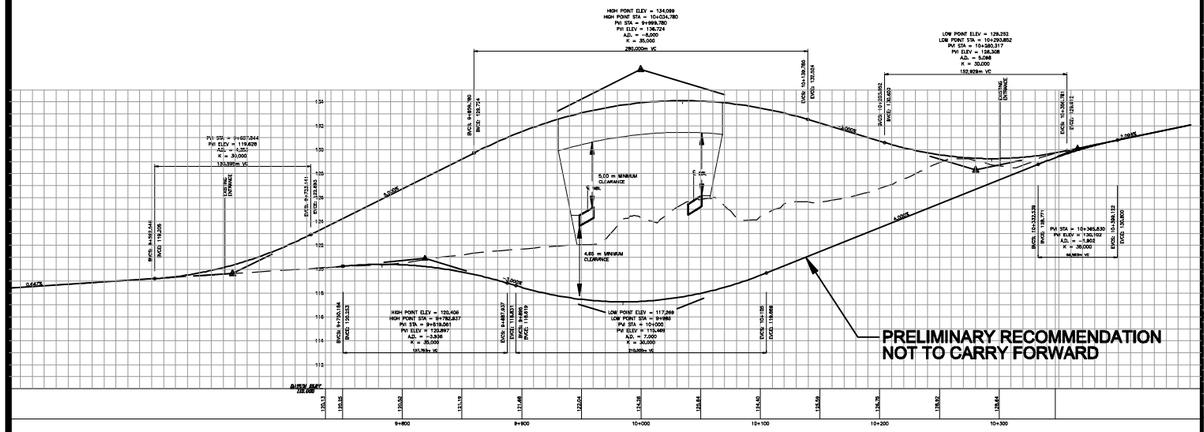
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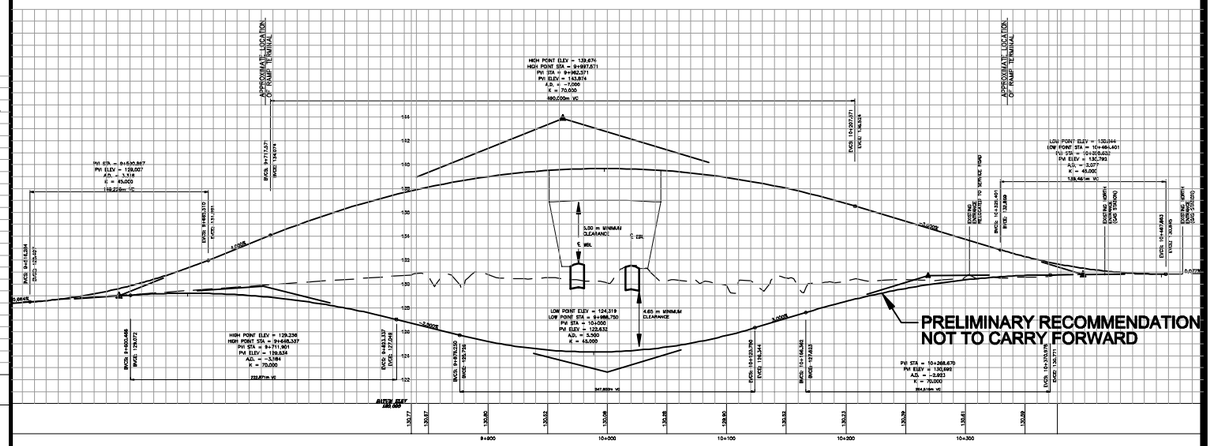
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SCHEEL DRIVE
GRADE SEPARATION ALTERNATIVES



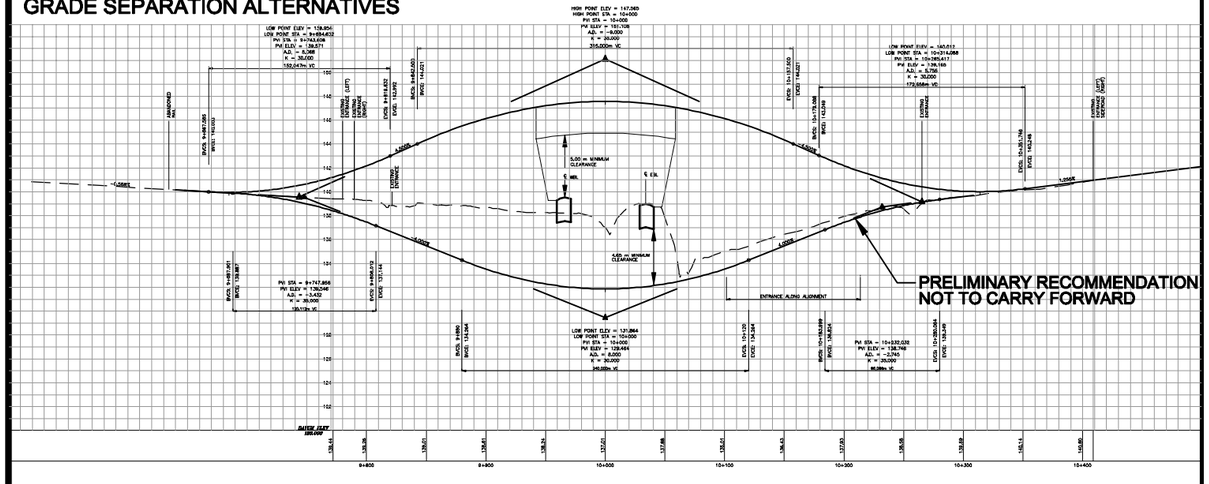
DESIGN SPEED - 80km/h

COUNTY RD 508/COUNTY RD 54
GRADE SEPARATION ALTERNATIVES



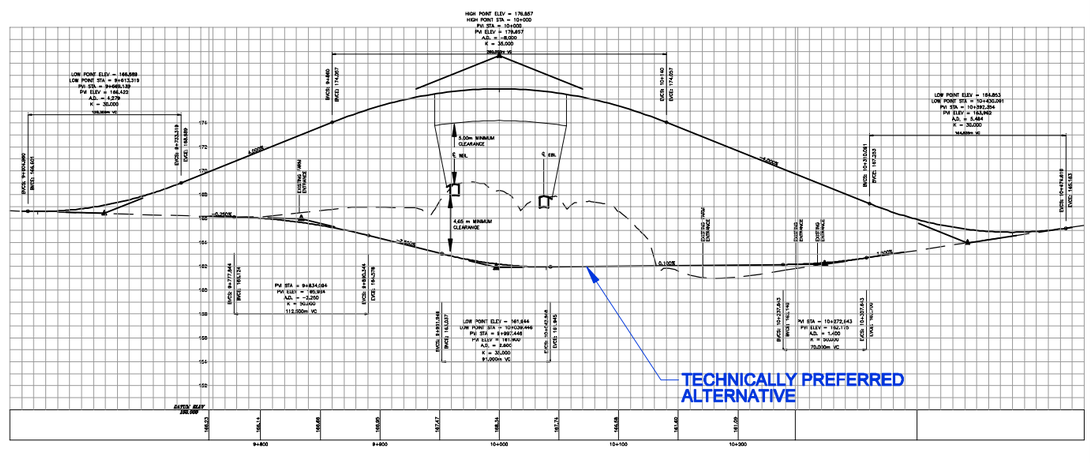
DESIGN SPEED - 100km/h

MILLER RD/ANDERSON RD
GRADE SEPARATION ALTERNATIVES



DESIGN SPEED - 80km/h

GOSHEN ROAD
GRADE SEPARATION ALTERNATIVES



DESIGN SPEED - 80km/h

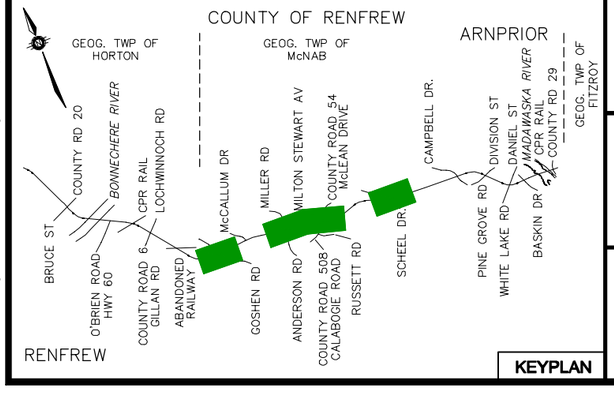


FIGURE 5-8

SCHEEL DRIVE/COUNTY ROAD 508/MILLER/ANDERSON ROAD/GOSHEN ROAD
VERTICAL ALIGNMENT ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
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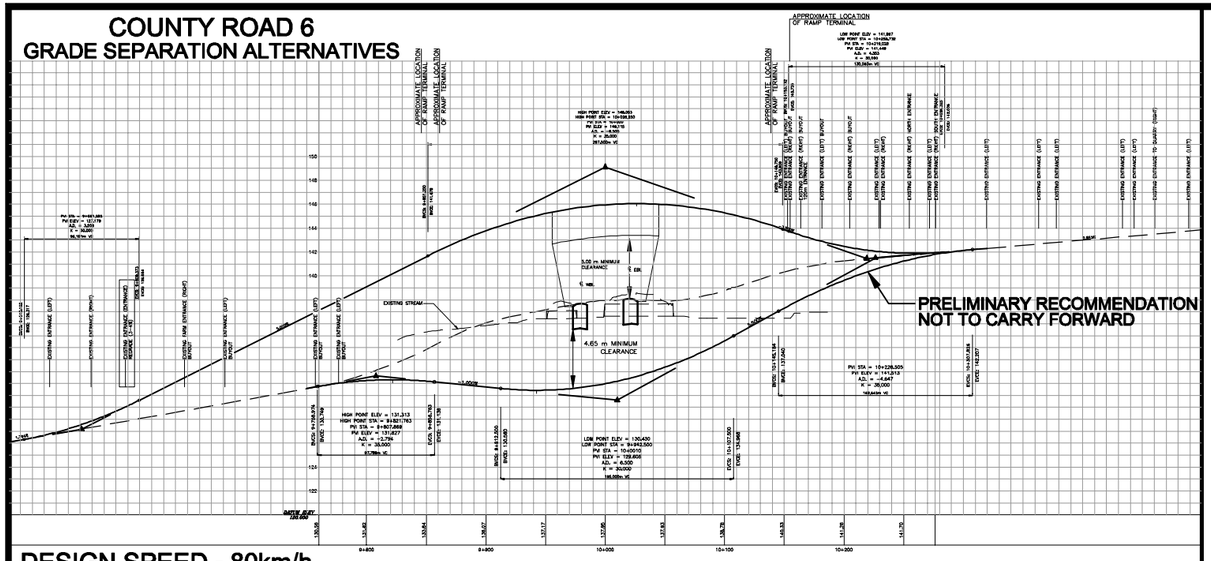
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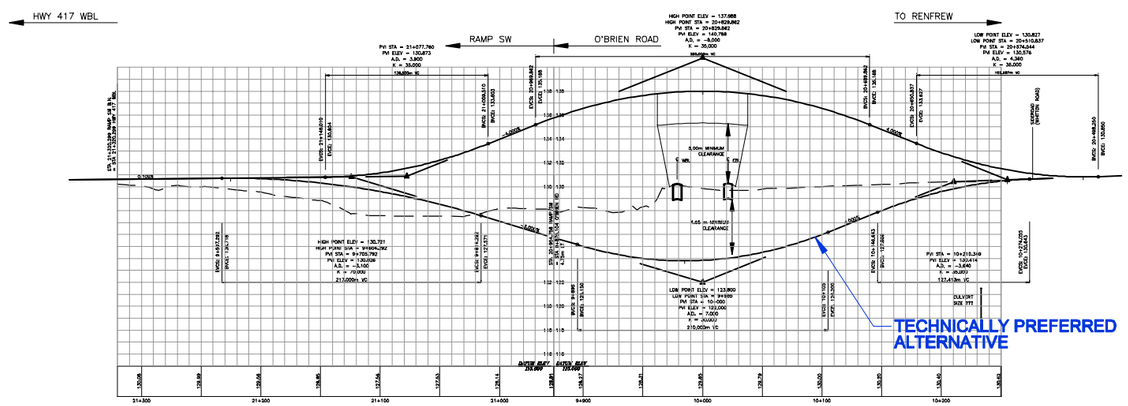
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COUNTY ROAD 6
GRADE SEPARATION ALTERNATIVES



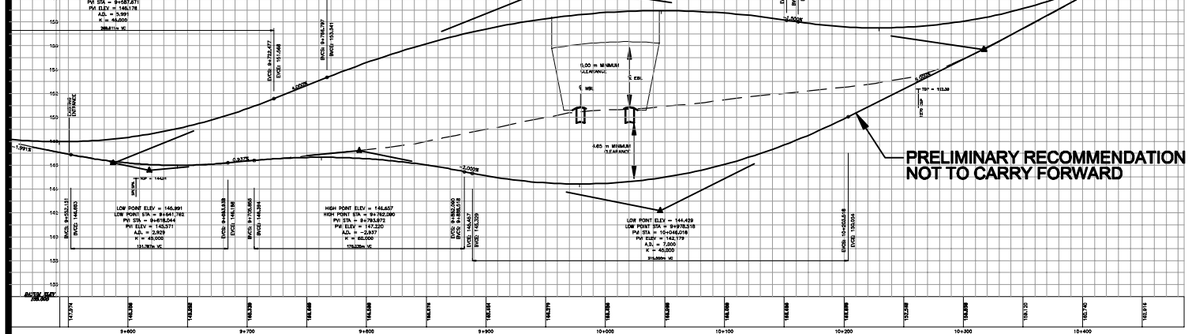
DESIGN SPEED - 80km/h

O'BRIEN ROAD
GRADE SEPARATION ALTERNATIVES



DESIGN SPEED - 80km/h

BRUCE STREET
GRADE SEPARATION ALTERNATIVES



DESIGN SPEED - 100km/h

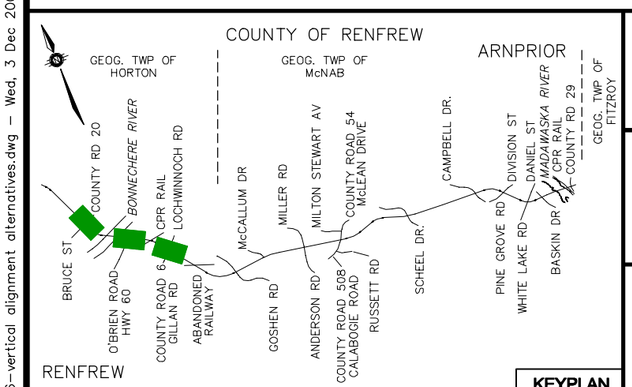


FIGURE 5-9

COUNTY ROAD 6/O'BRIEN ROAD/BRUCE STREET VERTICAL ALIGNMENT ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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5.5.4.2 Interchange Needs Analysis

At the initiation of the study, local municipalities and members of the public requested that new interchanges be considered at the following locations:

- Baskin Drive;
- Campbell Drive; and
- County Road 6 (Lochwinnoch Road/Gillan Road).

These interchange locations were in addition to those previously identified by MTO at White Lake Road, County Road 508, O'Brien Road (Highway 60) and Bruce Street (County Road 20).

This Section provides a summary of the needs analysis which determined whether to include these three additional interchange locations. The complete details of this analysis are found in **Appendix R, Interchange Needs Analysis.**

The analysis included a review of all issues related to the existing road network and considered the need for Highway 17 access at Baskin Drive, Campbell Drive and County Road 6. Natural, economic and social environments were all considered as they relate to the overall operation of the road network. Specifically, the analysis was conducted to:

- Document the issues (i.e. cross road accessibility, increased travel time) identified by the public and external agencies.
- Categorize the issues as low, medium, or high priority as they relate to the necessity to provide access to Highway 17 via an interchange.
- If the overall priority for an interchange is low, identify and comment on other alternatives (no interchange, flyover/underpass, service road) to address the issues.
- Recommend whether an interchange is economically viable.

The detailed issues and analyses are contained in **Appendix R**. A summary of the results of the analysis is provided in **Table 5-6, Summary of Interchange Need Analysis**.

Table 5-6
Summary of Interchange Needs Analysis

Cross Road	Interchange Need Short-term 0-20 yrs	Interchange Need Long term 20 yrs+	Rationale
Baskin Drive East	No	No	• Increased future traffic volumes can be accommodated at the Baskin Drive/Daniel Street intersection via the White Lake Road (Daniel Street)/Highway 17 interchange. • Future industrial development planned in the southeast quadrant of the Baskin Drive East/Highway 17 intersection can be serviced by the White Lake Road interchange and a service road to Baskin Drive • The increase in residential development along Baskin Drive can be serviced by the White Lake Road (Daniel Street)/Highway 17 interchange. • Constructing an interchange at Baskin Drive would not be feasible from a safety and operational viewpoint because the current intersection spacing along Highway 17 between Baskin Drive and White Lake Road is only 800 metres. An interchange will be constructed at White Lake Road.
Campbell Drive	Yes*	Yes	• The existing road network in the Township results in Campbell Drive functioning as a collector/arterial road, attracting trips from the northwest. Future development, north and south of Highway 17, in the Township of McNab-Braeside, adjacent to Campbell Drive, will increase traffic patterns and volumes. Therefore, it is recommended that an interchange be protected to accommodate this future growth/expansion. • Commercial vehicles accessing Highway 17 from quarries located north of Highway 17 are an issue that will need to be mitigated as part of the recommended plan.* • The technical recommendation is to protect for an ultimate interchange to support long-range community growth and a short term interchange to mitigate trucking impacts to the community.
County Road 6 (Lochwinnoch Road/Gillan Road)	Yes	Yes	• Delays to fire response time are estimated to be in the order of 6 minutes when the vehicle must wait for a train (10,000 ft) to clear the tracks. • Out-of-way travel for aggregate trucks is a supporting issue for an interchange in both the short-term and long-range. • An interchange supports future community growth and development in Horton Township. With the future freeway, it is estimated that long-term growth will continue to include the expansion of Renfrew and Horton towards the freeway. This growth supports protecting County Road 6 for a future interchange. • The property acquisition in short-term will ensure protection for a long-term interchange. • There have been municipal requests for an interchange (Horton Township, Renfrew County).

* Following the second PIC the study recommendation was revised to accelerate the timing of the interchange to mitigate the deleterious effects of truck traffic on the local community.

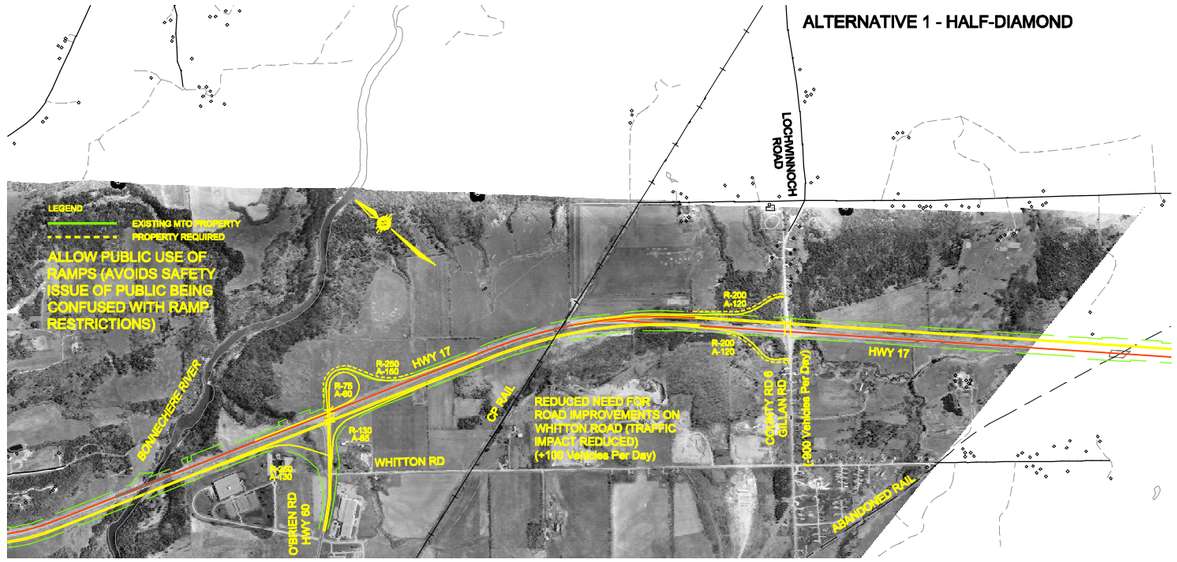
Based on the Interchange Needs Analysis, interchange alternatives were carried forward for further review at Campbell Drive (long term) and County Road 6.

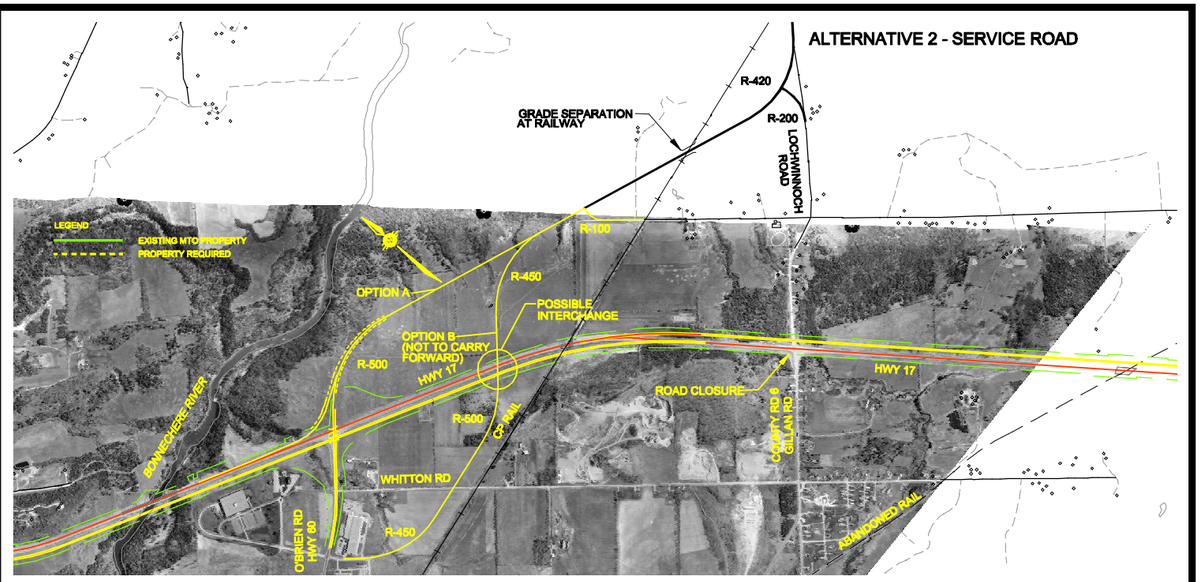
5.5.4.2.1 County Road 6 Fire Protection Issues

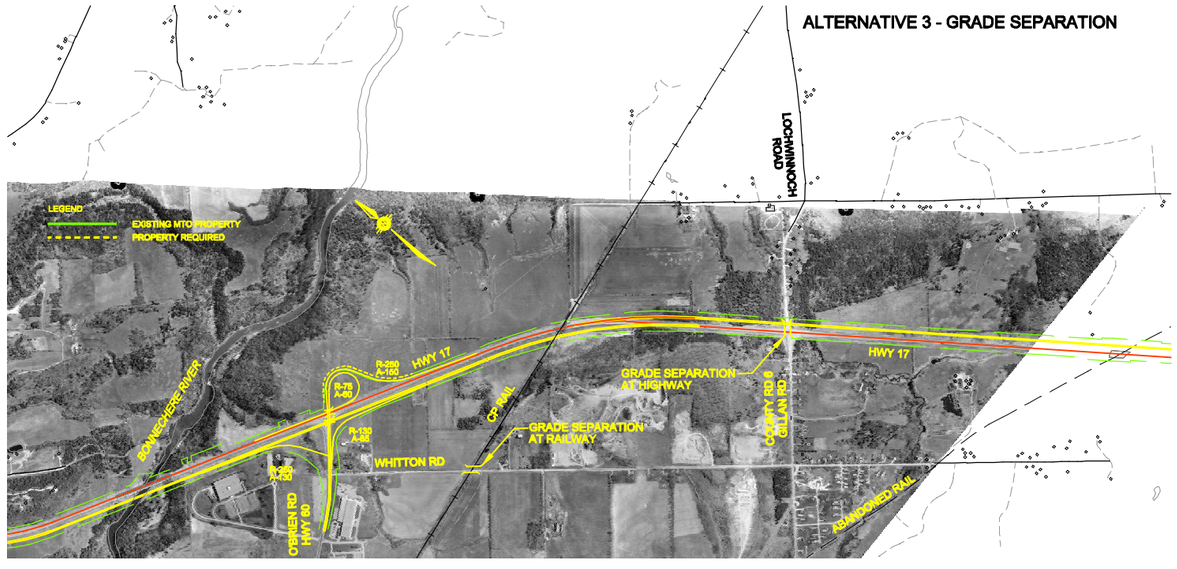
Part of the County Road 6 interchange needs analysis involved the assessment of the fire protection issues raised by the Township of Horton and the Horton Fire Department. Existing conditions provide the Township's Fire Department with an unimpeded route via Highway 17 across the Bonnechere River and the Ottawa Valley Railway (OVR) to County Road 6 and the southeast portion of the Township. The road and non-road alternatives are shown on **Figure 5-10**. The analysis of the Fire Protection alternatives is provided in **Table 5-7, County Road 6 Fire Protection Analysis and Evaluation.**

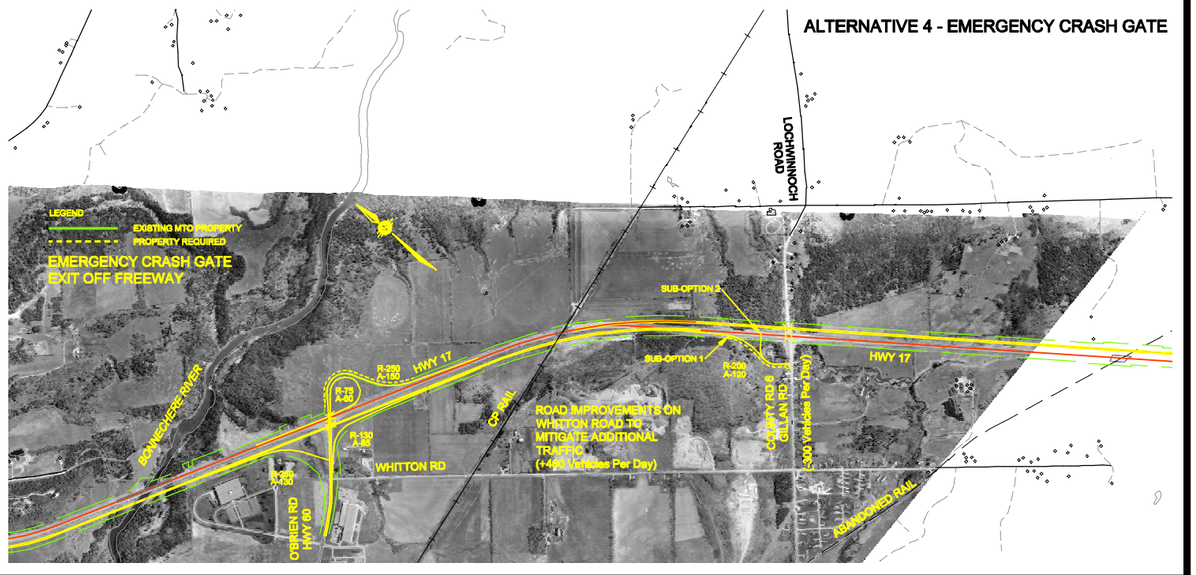
Table 5-7
County Road 6 Fire Protection Analysis and Evaluation

Alternative	Carried Forward (✓ ✗)	Rationale
		for users on the existing road network. It is also consistent with a recommendation for a long range interchange at County Road 6.
Service Road Alternatives Option A and B	✗	Not carried forward, does not meet existing emergency response times.
Partial Interchange (Half Diamond)	✗	Not carried forward because of high natural environmental impacts in northwest quadrant.
Whitton Road Grade Separation at CPR	✗	Not carried forward because of high cultural environmental impact along Whitton Road, i.e. existing cemeteries.
Shared Fire Service (Horton Township/Town of Renfrew)	✗	Not carried forward because it requires a long term financial commitment to support Horton Township by the Town of Renfrew.
1-800 Number Emergency Contact to Train Driver	✗	Not carried forward because the rail authority cannot provide 100% reliability.
New Fire Station	✗	Substantial long range operation and capital costs to Township of Horton.
Emergency Crash Gates	✗	Not carried forward because of long term maintenance requirements i.e. snow removal and operational concerns for accessing east half of the Township of Horton.
Full Interchange	✓ (Carried Forward)	Recommended to be carried forward because it maintains the reliability of emergency fire vehicle access/ existing emergency response times. It also minimizes out-of-way travel









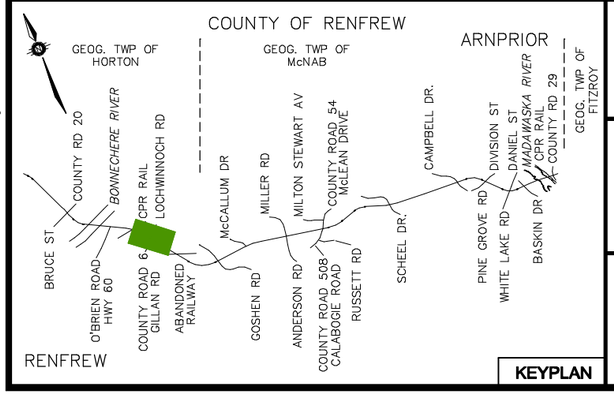


FIGURE 5-10

COUNTY ROAD 6
FIRE PROTECTION ISSUES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

NCE
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07-COUNTY RD 6 FIRE PROTECTION.dwg – Wed, 3 Dec 2003 – 14:53

5.5.4.3 Coarse Screening of Interchange Alternatives

This section provides a summary of the coarse screening level of evaluation of alternatives for Highway 17 interchanges. The description of the detailed evaluation is contained in **Appendix S – Interchanges, Coarse Screening Report**.

This assessment forms part of the formal EA process which requires that the assessment of alternatives be undertaken in a manner that is both traceable and transparent. The coarse screening reviewed all of the alternatives which were developed, and eliminated those alternatives with significant negative impacts in comparison to the other alternatives carried forward. Alternatives may be recommended for elimination from further consideration because they:

- Exhibit impacts that cannot be mitigated;
- Exhibit clearly inferior characteristics when compared to other competing alternatives; and
- Exhibit significant inherent negative impacts upon the natural and social environments such as land use planning, property, cost, etc. in comparison to the other alternatives being considered.

The coarse screening evaluation consisted of the following criteria:

Transportation:

- Do the geometric features of the alternative meet current standards?
- How well does it accommodate the traffic needs?
- What are the operational characteristics and impacts on the highway or local road network?

Land Use/Property/Social/Natural Environment:

- What are the impacts on existing property ownership in the area?
- How will the alternative impact approved land use plans?
- How does the alternative impact existing businesses in the interchange area?
- How does the alternative impact other features of the social environment?
- How does the alternative impact any natural areas/woodlots or other natural environmental features?

A summary of the alternatives carried forward and those eliminated is provided in **Tables 5-8, Results of Coarse Screening Evaluation of Interchange Alternatives**.

Table 5-8
Results of Coarse Screening Evaluation of Interchange Alternatives

Crossroad	Alternative	Carried Forward	Not Carried Forward
White Lake Road / Baskin Drive Interchange	• 1 – Parclo A2		x
	• 2 – Parclo A2, 45m loop	✓	
	• 3 – Parclo A4, 45m loop	✓	
	• 4 – Parclo B2		x
	• 5 – Parclo B4		x
	• 6 - Diamond	✓	
	• 7 – Parclo A4 with collector lane		x
	• 8 – Parclo A4 with collector lane, 10.5m median		x
	• 9 – Parclo A4 with realigned collector road		x
	• 10 – south service road		x
	• 11 – realigned White Lake Rd. with collector		x
Campbell Drive	• 1A – road closure with service road	✓	
	• 1B – flyover with service road	✓	
	• 2 – grade separation	✓	
	• 3 – Parclo A2	✓	
	• 4 – Parclo A4	✓	
	• 5 – Parclo A2, 90 m loops	✓	
	• 6 – Parclo A4, 90 m loops	✓	
	• 7 – Parclo B2	✓	
	• 8 – Parclo B4	✓	
	• 9 - Diamond	✓	
	• 10 – Half Diamond, ramps to/from west	✓	
	• 11 – Parclo AB	✓	
	• 12A – Service road to Staye Court	✓	
	• 12B – Service road to Staye Court and flyover	✓	
Scheel Drive	• 1 – long skewed underpass, tangent Scheel Dr.	✓	
	• 2 – shorter skewed underpass	✓	
	• 3 – perpendicular underpass		x

Table 5-8
Results of Coarse Screening Evaluation of Interchange Alternatives

Crossroad	Alternative	Carried Forward	Not Carried Forward
County Road 508	• 1A – Parclo A2	✓	
	• 1B – Parclo A2, 90 m loops	✓	
	• 2A – Parclo A4	✓	
	• 2B – Parclo A4, 90m loops	✓	
	• 3 – Parclo B2		x
	• 4 – Parclo B4		x
	• 5 - Diamond		x
	• 6 – Parclo A4/Diamond	✓	
	• 7 – Parclo A4/Diamond, 90m loop	✓	
	• 8 – Parclo A4, interchange moved east	✓	
	• 9 – Parclo A4, 90 m loop, interchange moved east	✓	
County Road 6	• 1 - Flyover	✓	
	• 2 – Service road connection to Goshen Road		x
	• 3A – Parclo A2, 75 m loops	✓	
	• 3B – Parclo A2, 55 m loops	✓	
	• 4A – Parclo A4, 75 m loops	✓	
	• 4B – Parclo A4, 55 m loops	✓	
	• 5 – Parclo A2, 90 m loops	✓	
	• 6 – Parclo A4, 90 m loops	✓	
	• 7 – Parclo B2	✓	
	• 8 – Parclo B4	✓	
	• 9A – Diamond, protect 90m loop	✓	
	• 9B – Diamond, protect 55m loop	✓	
	• 10 - Service Road to O'Brien Road	✓	
O'Brien Road	• 1 – Parclo A2, 75 m loops		x

Table 5-8
Results of Coarse Screening Evaluation of Interchange Alternatives

Crossroad	Alternative	Carried Forward	Not Carried Forward
Interchange	• 2 – Parclo A2, 55 m loops	✓	
	• 3 – Parclo A2/A4, 75 m loops		x
	• 4 – Parclo A2/A4, 55 m loops	✓	
	• 5 – Parclo B2		x
	• 6 – Parclo B2/B4		x
	• 7 – Diamond		x
	• 8 – Trumpet, 75 m loop	✓	
	• 9 – Trumpet/Diamond, 75m loop	✓	
	• 10 – Trumpet, 90 m loop	✓	
	• 11 – Trumpet/Diamond, 90m loop	✓	
Bruce Street Interchange	• 1 – Parclo A2	✓	
	• 2 – Parclo A4	✓	
	• 3 – Parclo B2	✓	
	• 4 – Parclo B4	✓	
	• 5 - Diamond	✓	
	• 6 – Parclo A4, existing alignment		x
	• 7 – Parclo B4, existing alignment		x
	• 8 – Diamond, existing alignment		x
	• 9 – Parclo A2, 90 m loops	✓	
	• 10 – Parclo A4, 90 m loops	✓	
	• 11 – Parclo A4, 90 m loop and 75m loop	✓	

The recommendations summarized in **Table 5-8** on alternatives to be carried forward were presented at the first series of Public Involvement Centres for public review and comment. Modifications were made to the recommendations based on comments received, and the results were endorsed by the Technical Advisory and Municipal Advisory Committees. The short-listed alternatives were then carried forward for more detailed analysis and evaluation described in **Section 5.5.5**.

5.5.5 Analysis and Evaluation of Interchange Preliminary Design Alternatives

The evaluation methodology utilized to compare the interchange alternatives focuses on the differences between alternatives, addresses the complexity of the base data and provides a traceable decision-making process.

This systematic approach is based on the "Weighted Additive Method", and is consistent with MTO and MOE practices for the evaluation of alternatives. It uses an analytical approach that measures scores based on a mathematical relationship, i.e. the degree of subjectivity by the TAC and MAC is minimized. It is a traceable process that allows the TAC, MAC, PAC and public an opportunity to assess trade-offs involved in the evaluation, and use this information in the decision-making process.

The weighted additive method is generally suited for situations with numerous alternatives, or where there is the likelihood of substantial trade-offs between criteria. The following sections provide an overview of the analysis and evaluation of the interchange design alternatives. **Appendix T, Technical Report on the Analysis and Evaluation of the Interchange Alternatives** provides the complete documentation of the findings. The process includes the following steps:

1. Development of a "long list" of evaluation criteria with public and agency input;
2. Meetings with TAC to prepare a "short list" of evaluation criteria for each group of alternatives;
3. Collection of data (e.g. environmental inventories);
4. Establishment of social utility functions, to relate impacts to preferences;
5. Weighting of evaluation criteria by TAC and the MAC;
6. Rating of alternatives;
7. Selection of the Technically Preferred Alternatives;
8. Sensitivity Testing; and
9. Public review at PIC No. 2.

5.5.5.1 White Lake Road/Daniel Street

The interchange area falls within the urban limits of the Town of Arnprior. The lands around White Lake Road are commercial with the exception of the Airport use in the southeast quadrant (this extends all the way through to Baskin Drive south of Highway 17). At Baskin Drive, lands in the northwest quadrant are commercial, and lands in the northeast quadrant are residential.

The interchange alternatives are shown on **Figure 5-11**. The selection of the TPA is based on the ranking or score of the highest White Lake Road interchange alternative, as well as a review of the trade-offs involved among the highest rated options. The outcome of the evaluation and the sensitivity testing program is described in the succeeding section.

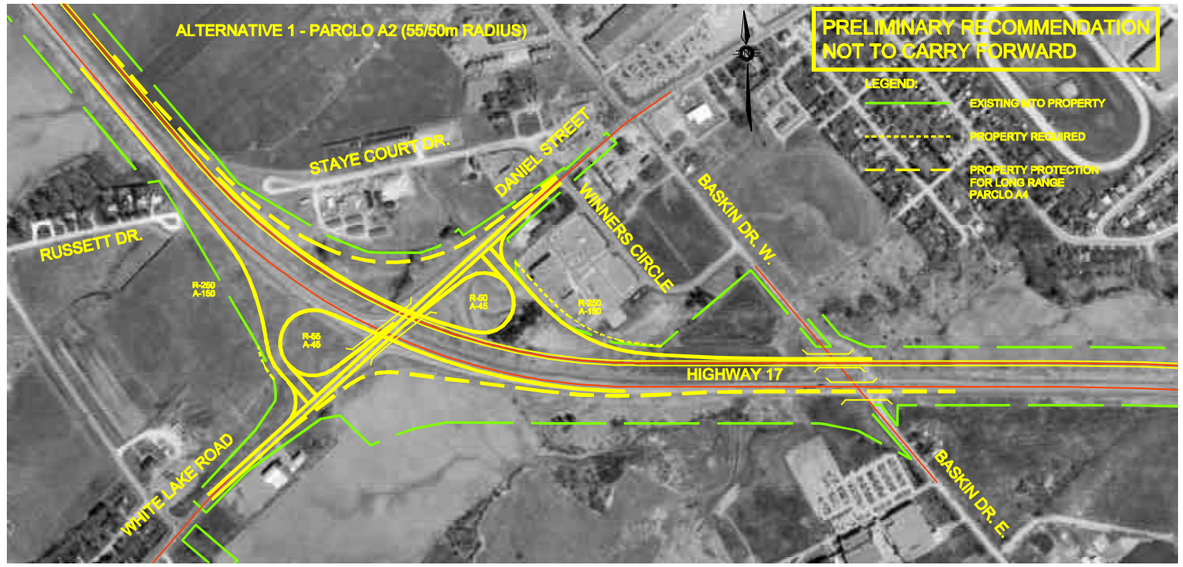
The TAC and MAC weights for the White Lake Road interchange are shown on **Figure 5-12.** The results of the analysis for the Alignment Alternatives are shown on **Figure 5-13 - Rating of Alternatives**. The Parclo A4 interchange design was rated highest by both the TAC and MAC Committees.

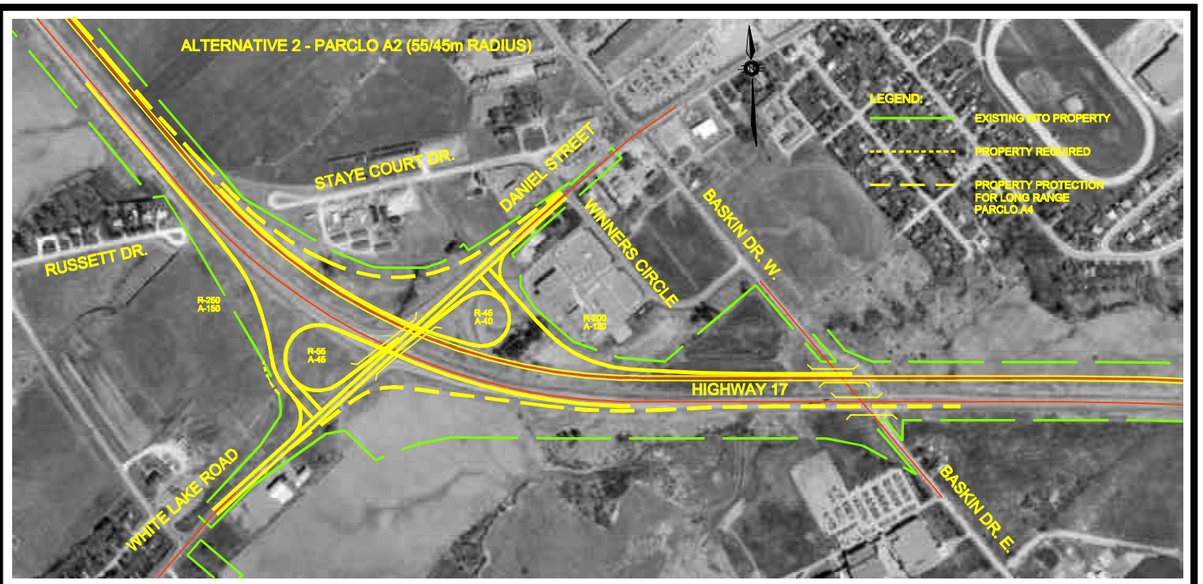
Sensitivity Testing

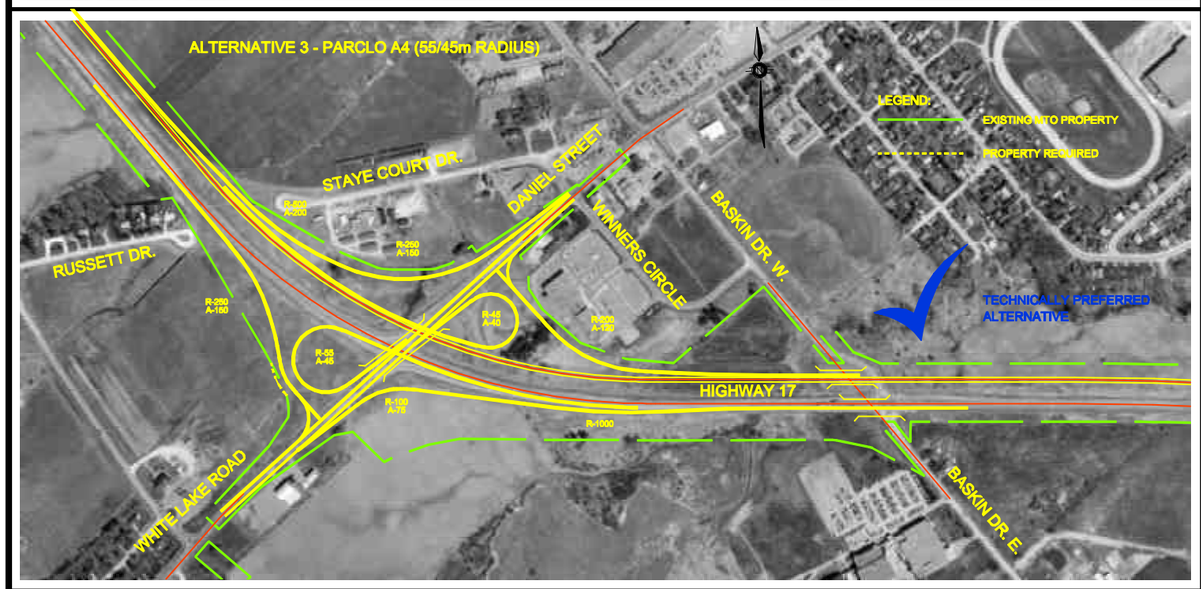
A sensitivity-testing program was also undertaken to assess the trade-offs involved in the evaluation. The purpose of the sensitivity-testing program was to determine whether the outcome of the evaluation was sensitive to changes in weight. The results of the Sensitivity-testing are shown on **Table 5-9 White Lake Road Interchange Sensitivity Testing Program** and illustrate that the Parclo A4 design was generally the preferred alternative but there was a trade-off when considering cost and the natural environment.

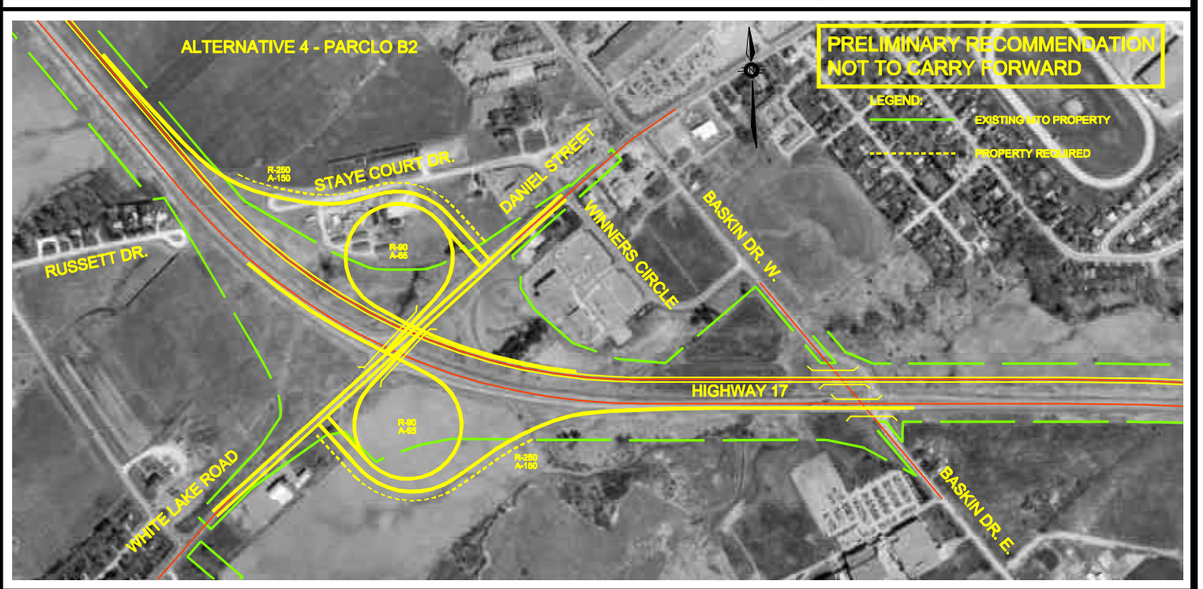
Technically Preferred Alternative

The TPA for the White Lake Road interchange is the Parclo A4. The analysis identified Alternative 3 Parclo A4 as the highest ranked. The sensitivity-testing program did provide confidence in the option, as providing the best balance of transportation characteristics while recognizing the impacts to the environmental features. This alternative was endorsed by the TAC and the MAC.









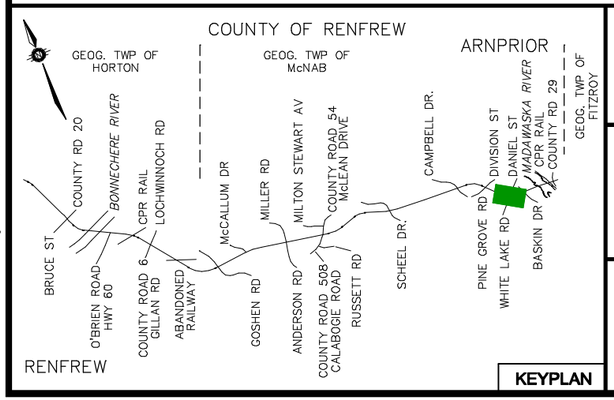


FIGURE 5-11A

WHITE LAKE ROAD INTERCHANGE ALTERNATIVES

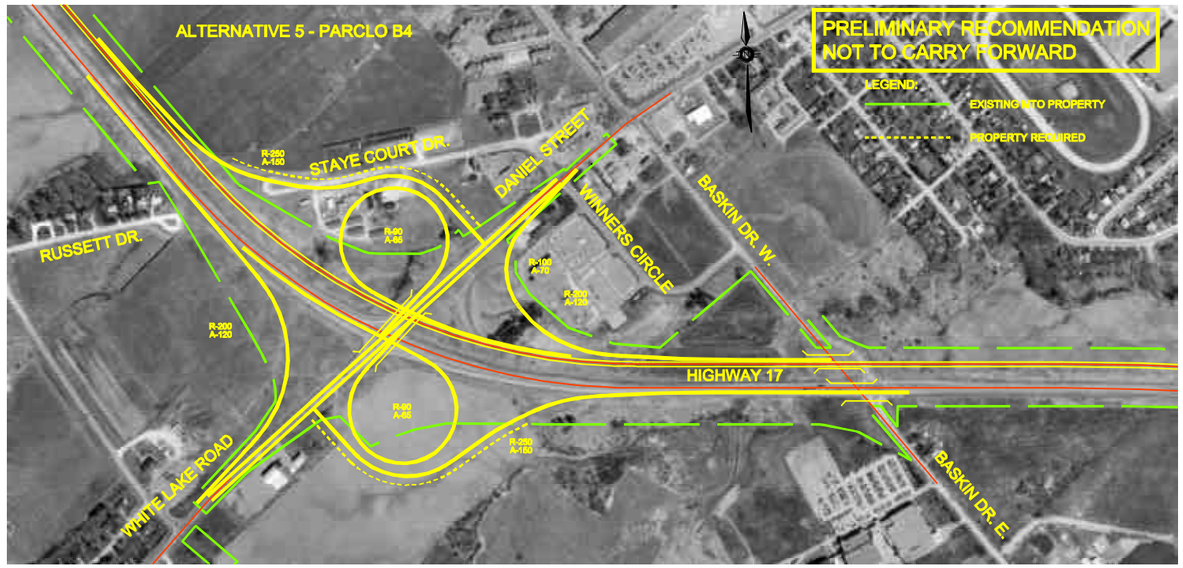
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

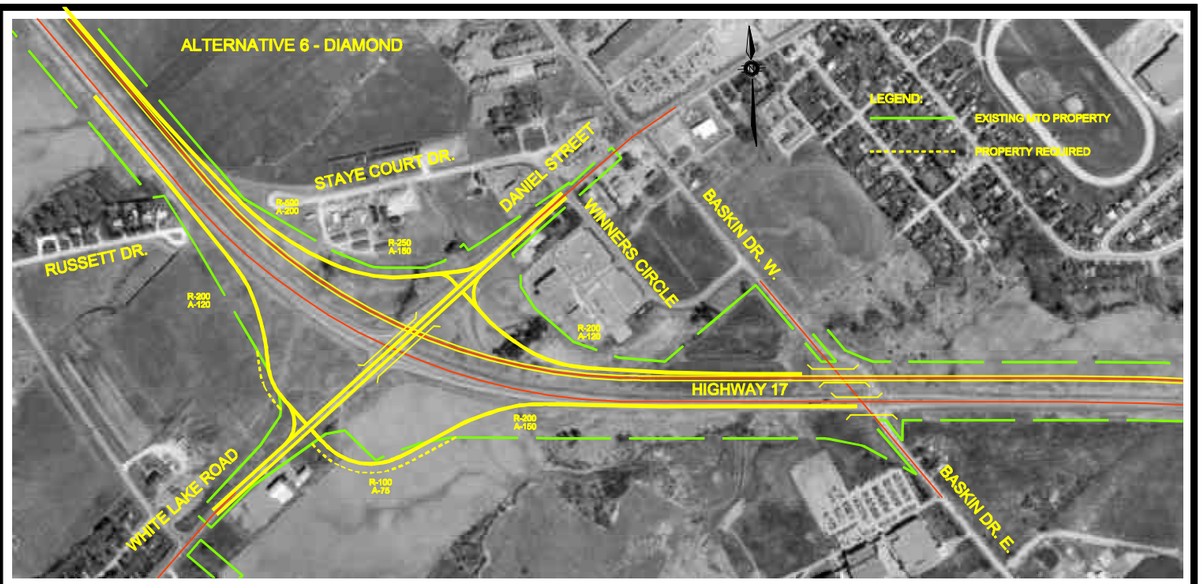
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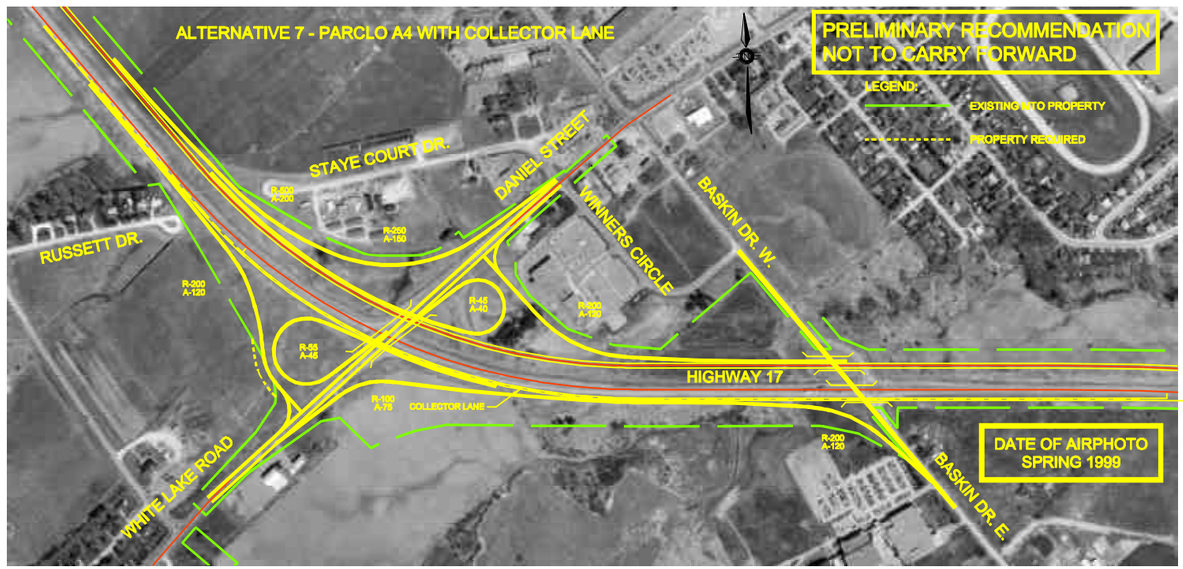
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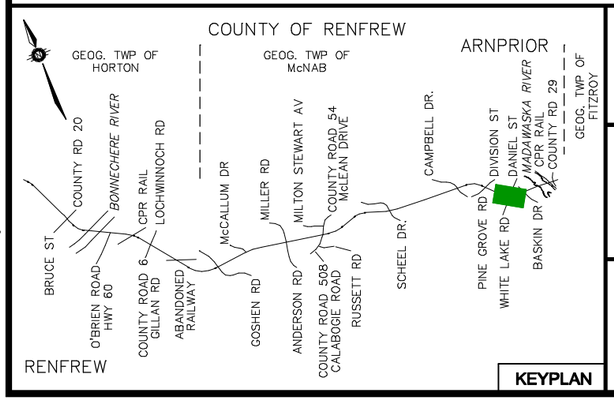


FIGURE 5-11B

WHITE LAKE ROAD INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

12.5m 0 25m
Horizontal

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TRANSPORTATION AND VALUE ENGINEERS

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Figure 5-12 White Lake Road Interchange Weights

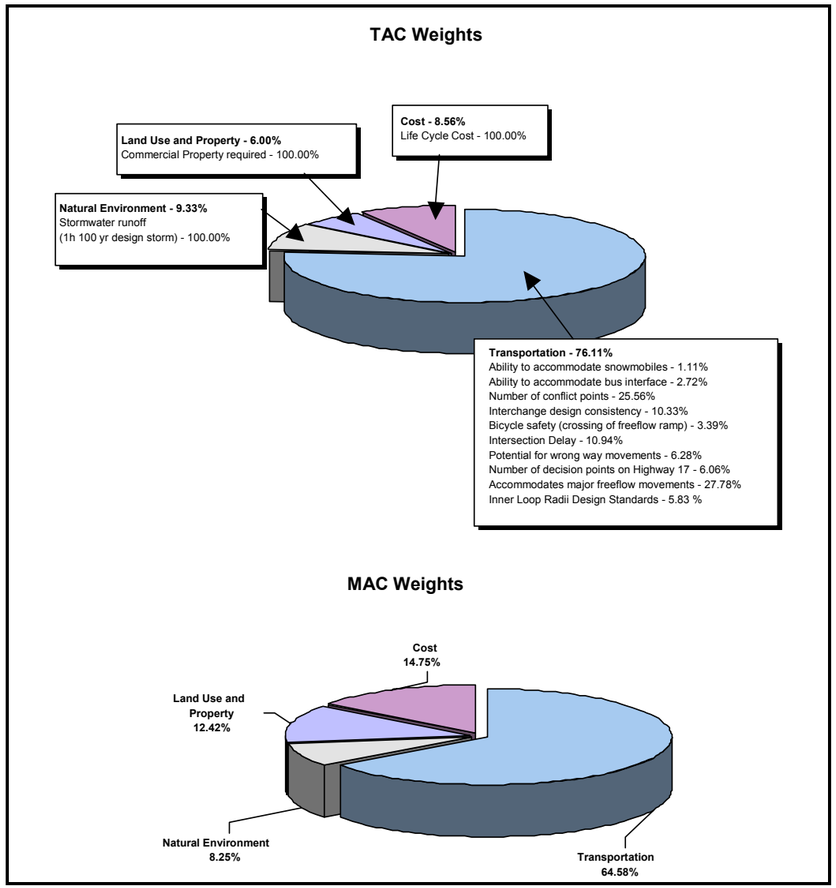


Figure 5-13 White Lake Road Interchange Ranking of Alternatives

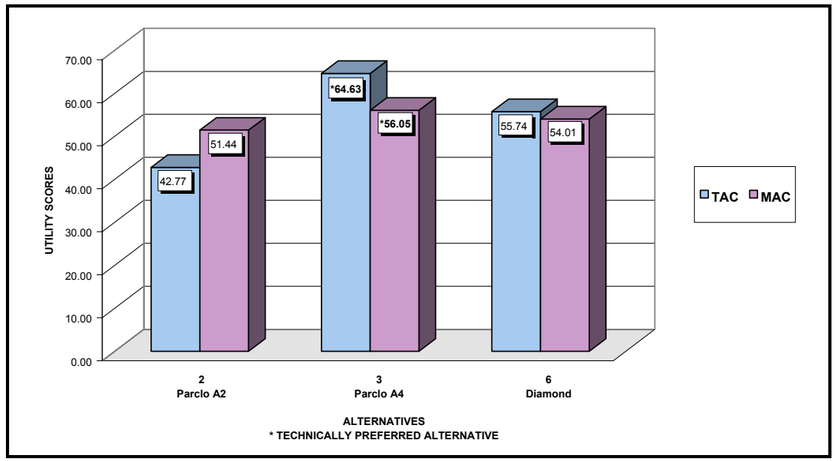


Table 5-9
White Lake Road/Daniel Street Interchange Summary of Sensitivity Tests

WHITE LAKE ROAD INTERCHANGE
SUMMARY OF SENSITIVITY TESTS

FACTORS	RATING	WEIGHT	ALTERNATIVES 2 Parclo A2	3 Parclo A4	6 Diamond
Technical Advisory Committee			3	1	2
Municipal Advisory Committee			3	1	2
1.0 TRAFFIC AND TRANSPORTATION	High	97.0%	3	1	2
	Low	25.0%	1	3	2
2.0 NATURAL ENVIRONMENT	High	35.0%	2	3	1
	Low	0.0%	3	1	2
3.0 SOCIAL/CULTURAL ENVIRONMENT	High	N/A	N/A	N/A	N/A
	Low	N/A	N/A	N/A	N/A
4.0 ECONOMIC ENVIRONMENT	High	N/A	N/A	N/A	N/A
	Low	N/A	N/A	N/A	N/A
5.0 LAND USE & PROPERTY	High	20.0%	2	1	3
	Low	0.0%	3	1	2
6.0 COST	High	20.0%	3	2	1
	Low	0.0%	3	1	2

5.5.5.2 Campbell Drive Short Term Network

Short term options that could preceed an ultimate interchange were considered at Campbell Drive.

The short alternatives include:

- Closure of Campbell (1997 Road Closing Plan) with a service road to Division Street;
- Grade separation; or
- Grade separation and a service road to either Division Street or Staye Court, in conjunction with a grade separation of Division Street to the east. .

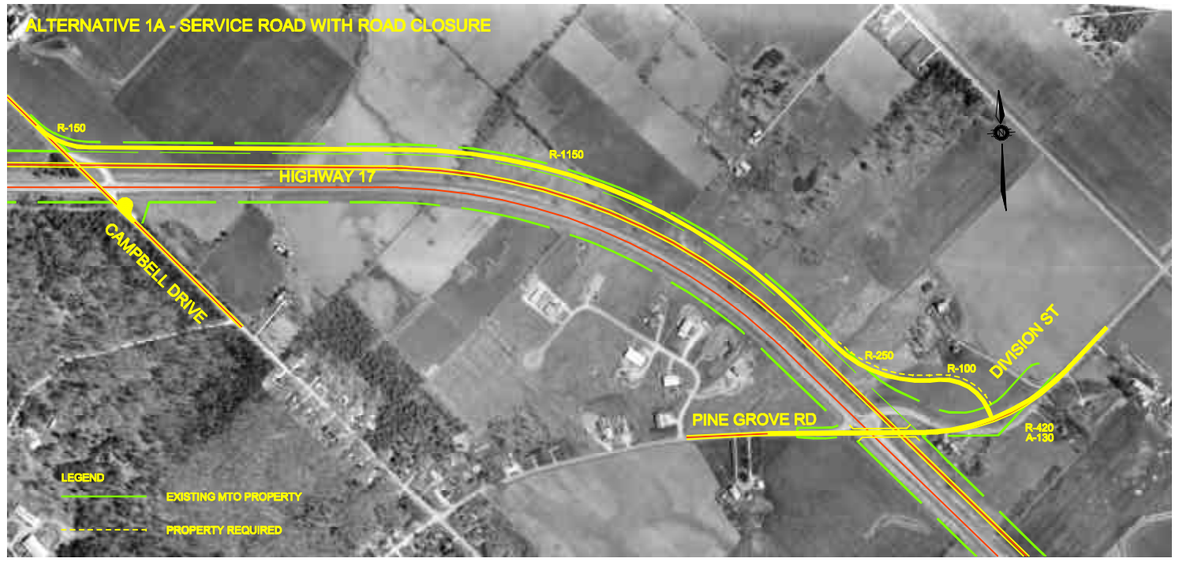
The alternatives carried forward from the coarse screening of alternatives are shown on **Figure 5-14 Campbell Drive Short Term Network Alternatives**. **Section 5.5.3.3** describes the interchange alternatives for the long range plan at Campbell Drive. The TAC and MAC Weights and the resultant rating of alternatives are shown on **Figures 5-15**, **Campbell Drive Short Term Network Weights** and **5-16 Campbell Drive Short Term Ranking of Alternatives,** respectively**.**

Sensitivity Testing

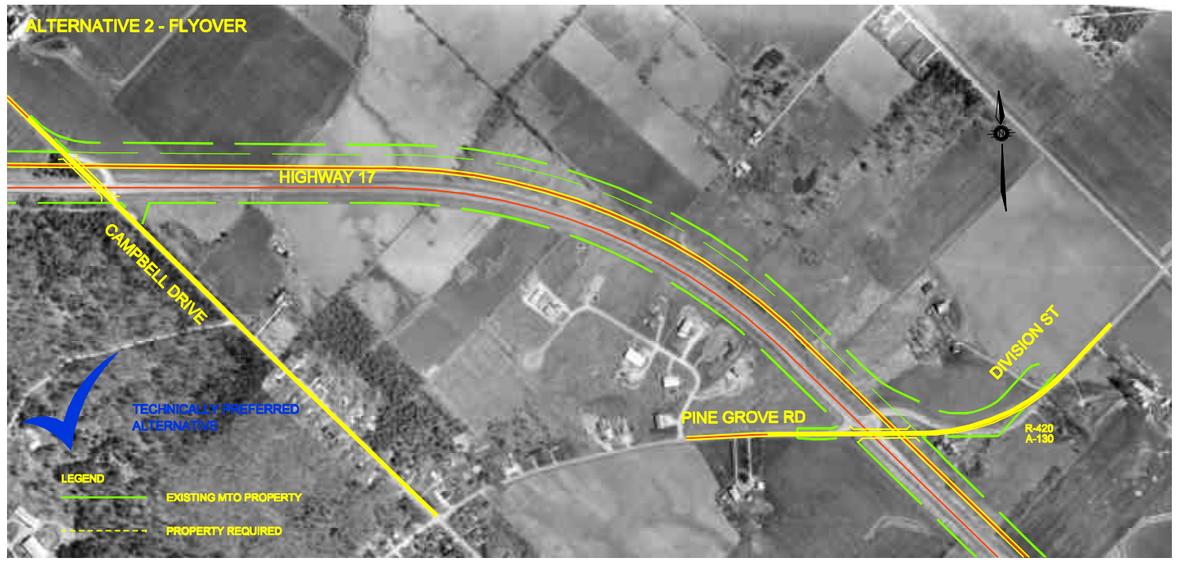
A sensitivity-testing program was undertaken to assess the trade-offs involved in the evaluation. The purpose of the sensitivity-testing program was to determine whether the outcome of the evaluation was sensitive to changes in weight. The results of the Sensitivity-testing are shown on **Table 5-10 Campbell Drive Short Term Network Sensitivity Testing Program**. The sensitivity testing program illustrated that the evaluation was not sensitive to the range of weights considered.

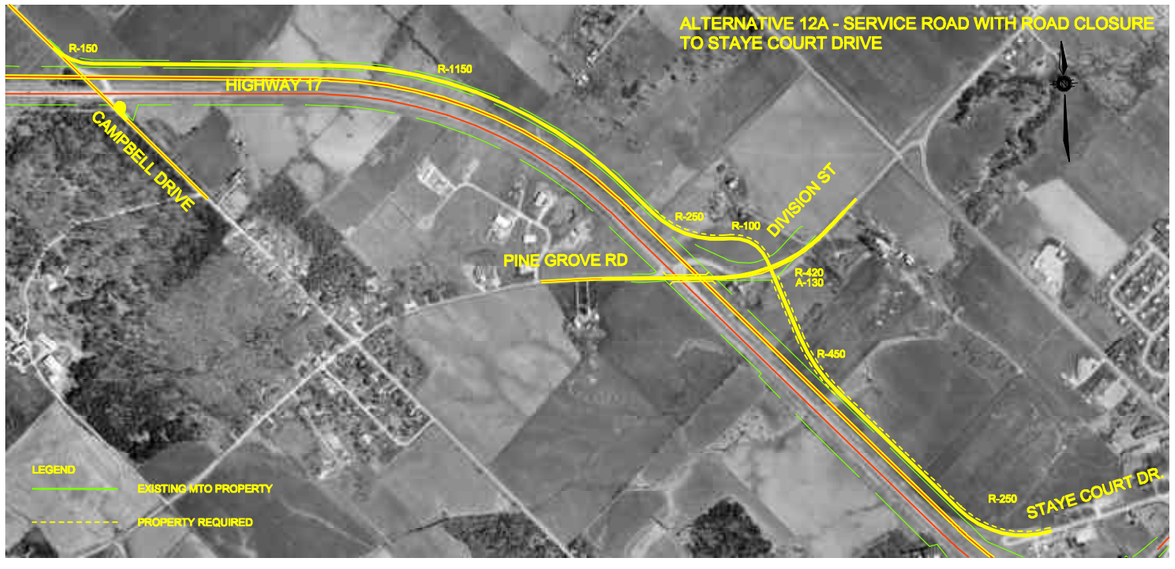
Technically Preferred Alternative

The TPA for the Campbell Drive Short Term Service Road is Alternative 2 – Grade Separation. The analysis identified Alternative 2 as the highest ranked and the sensitivity tests showed that the evaluation was not sensitive to the weight assigned to evaluation criteria. The sensitivity-testing program did provide confidence in the option, as providing the best balance of transportation characteristics, while recognizing the impacts to the environmental features. This alternative was endorsed by the TAC and the MAC. **Following the second PIC the TAC and MAC subsequently recommended the partial interchange be built now to mitigate any detrimental effect on the Pine Grove community from trucking activity.**









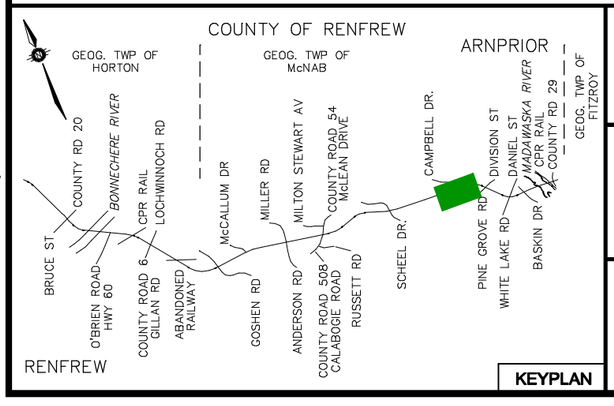


FIGURE 5-14

CAMPBELL DRIVE SHORT TERM NETWORK ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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Figure 5-15 Campbell Drive Short Term Network Weights

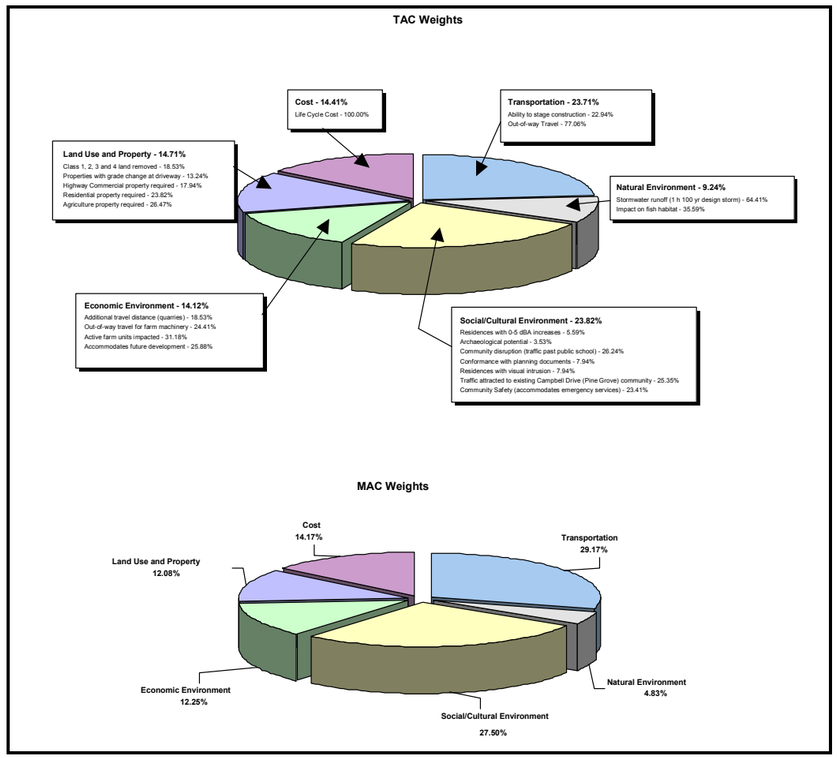


Figure 5-16 Campbell Drive Short Term Network Ranking of Alternatives

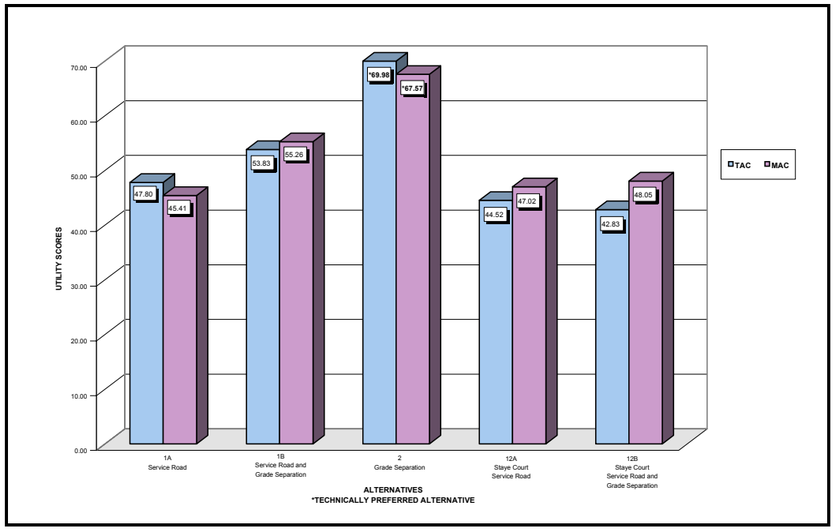


Table 5-10
Campbell Drive Short Term Network Sensitivity Tests

CAMPBELL DRIVE INTERCHANGE - SHORT TERM
SUMMARY OF SENSITIVITY TESTS

			ALTERNATIVES				
FACTORS	RATING	WEIGHT	1A Service Rd.	1B Service Rd and Grade Separation	2 Grade Separation	12A Staye Ct. Service Rd.	12B Staye Ct. Service Road and Grade Separation
Technical Advisory Committee			3	2	1	4	5
Municipal Advisory Committee			5	2	1	4	3
1.0 TRAFFIC AND TRANSPORTATION	High	60.00%	5	2	1	4	3
	Low	10.0%	2	3	1	4	5
2.0 NATURAL ENVIRONMENT	High	40.00%	3	2	1	4	5
	Low	0.0%	5	2	1	3	4
3.0 SOCIAL/CULTURAL ENVIRONMENT	High	40.0%	5	2	1	3	4
	Low	5.0%	3	2	1	4	5
4.0 ECONOMIC ENVIRONMENT	High	25.0%	5	2	1	4	3
	Low	5.0%	3	2	1	4	5
5.0 LAND USE & PROPERTY	High	25.0%	3	2	1	4	5
	Low	5.0%	5	2	1	3	4
6.0 COST	High	30.0%	2	4	1	3	5
	Low	5.0%	4	2	1	5	3

5.5.5.3 Campbell Drive Long Term Interchange

The Campbell Drive interchange was identified as a long term need at this location. The footprint of the interchange configuration is an important planning tool to minimize conflicts with future development proposals.

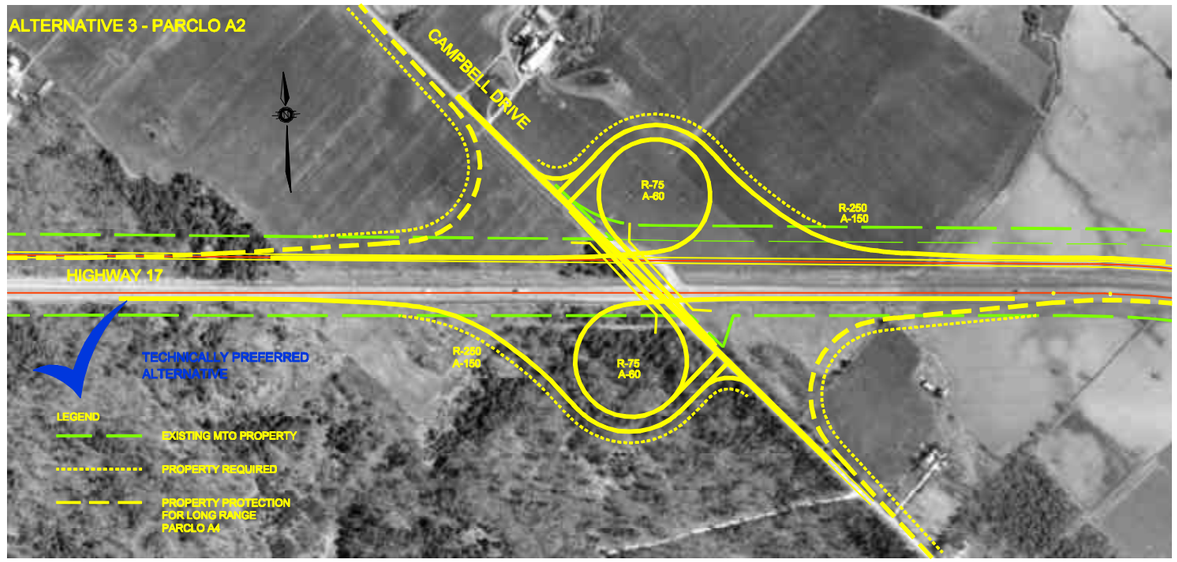
The alternatives carried forward from the coarse screening of alternatives are shown on **Figure 5-17 Campbell Drive Interchange Alternatives**. The TAC and MAC weights, and the resultant rating of alternatives are shown on **Figures 5-18 , Campbell Drive Interchange Weights** and **5-19 Campbell Drive Interchange Ranking of Alternatives,** respectively**.**

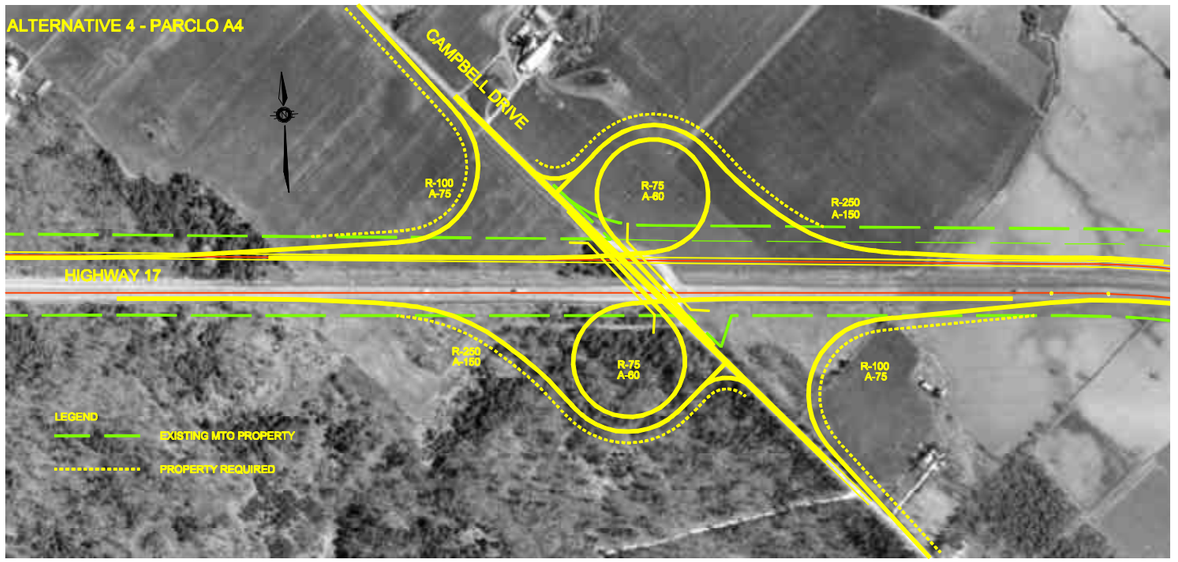
Sensitivity Testing

The purpose of the sensitivity-testing program was to determine whether the outcome of the evaluation was sensitive to changes in weight. The results of the Sensitivity-testing are shown on **Table 5-11 Campbell Drive Interchange Sensitivity Testing Program**. The sensitivity testing program illustrated the Parclo A2 design generally as the highest rated alternative, with trade-offs with the natural or economic environments.

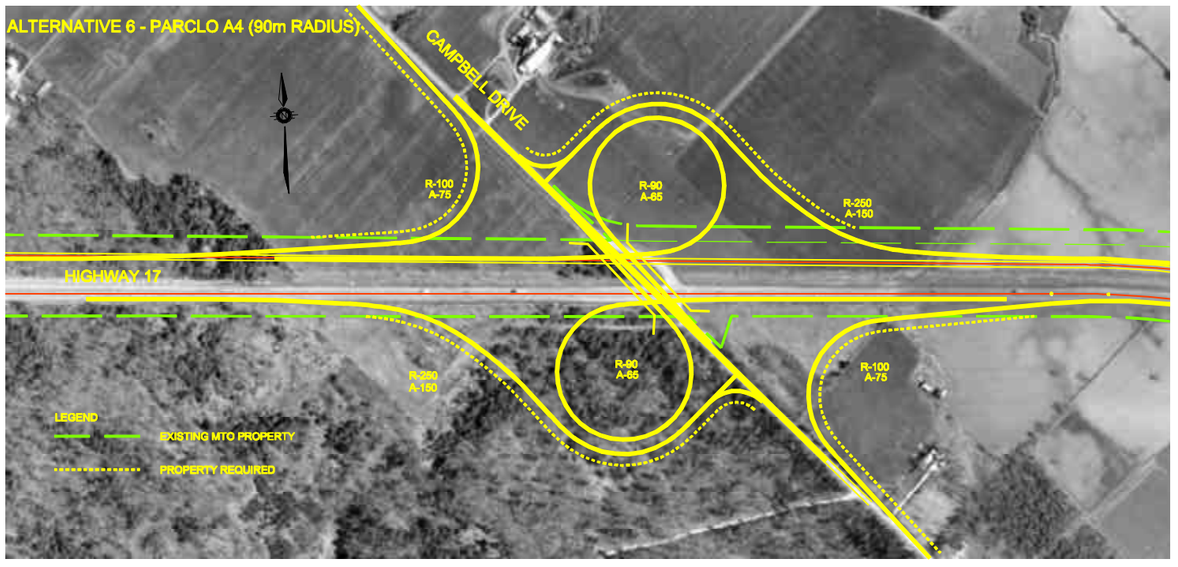
Technically Preferred Alternative

The TPA for the Campbell Drive Interchange is Alternative 3 – Parclo A2 interchange. The analysis identified Alternative 3 as the highest ranked alternative. The sensitivity-testing program did provide confidence in the option as providing the best balance of transportation characteristics while recognizing the impacts to the environmental features. This alternative was endorsed by the TAC and the MAC.









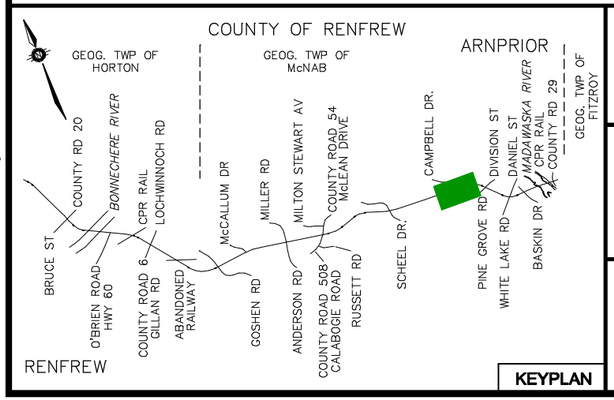


FIGURE 5-17A

CAMPBELL DRIVE LONG TERM INTERCHANGE ALTERNATIVES

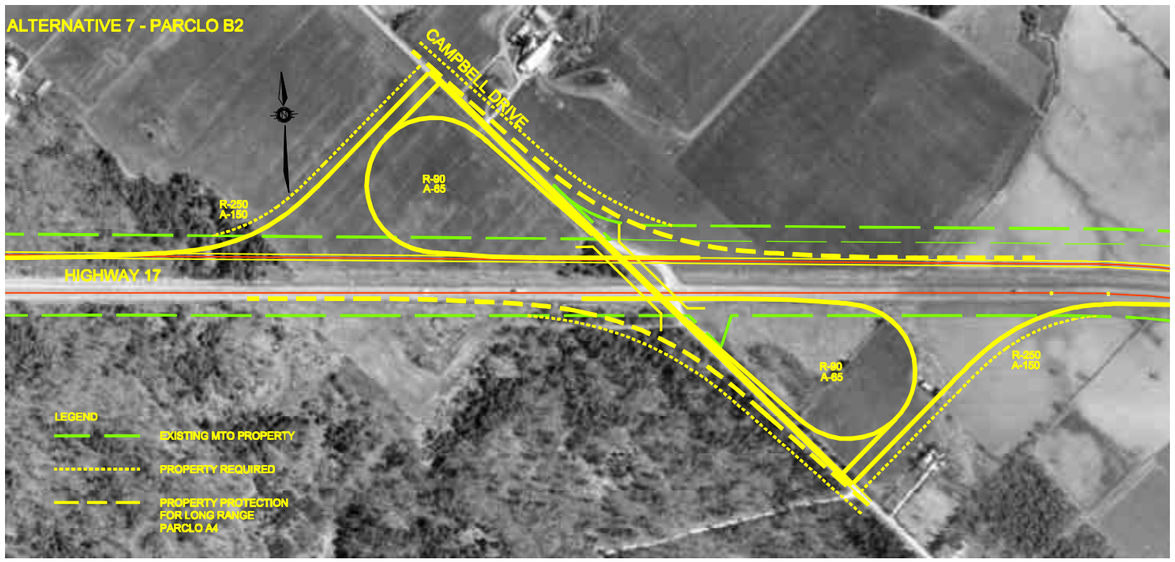
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

NCE
TRANSPORTATION AND VALUE ENGINEERS

10-CAMPBELL LONG TERM INT.dwg – Thu, 4 Dec 2003 – 17:46









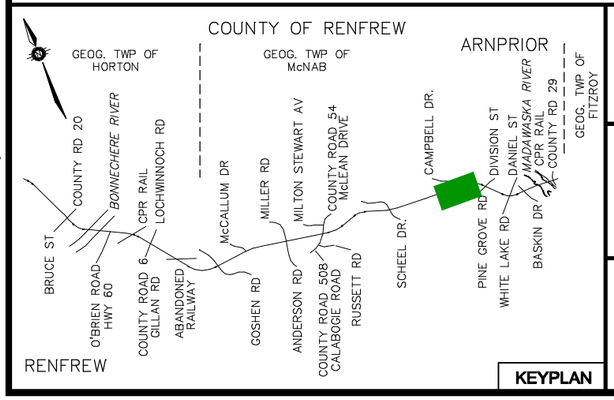


FIGURE 5-17B

CAMPBELL DRIVE LONG TERM INTERCHANGE ALTERNATIVES

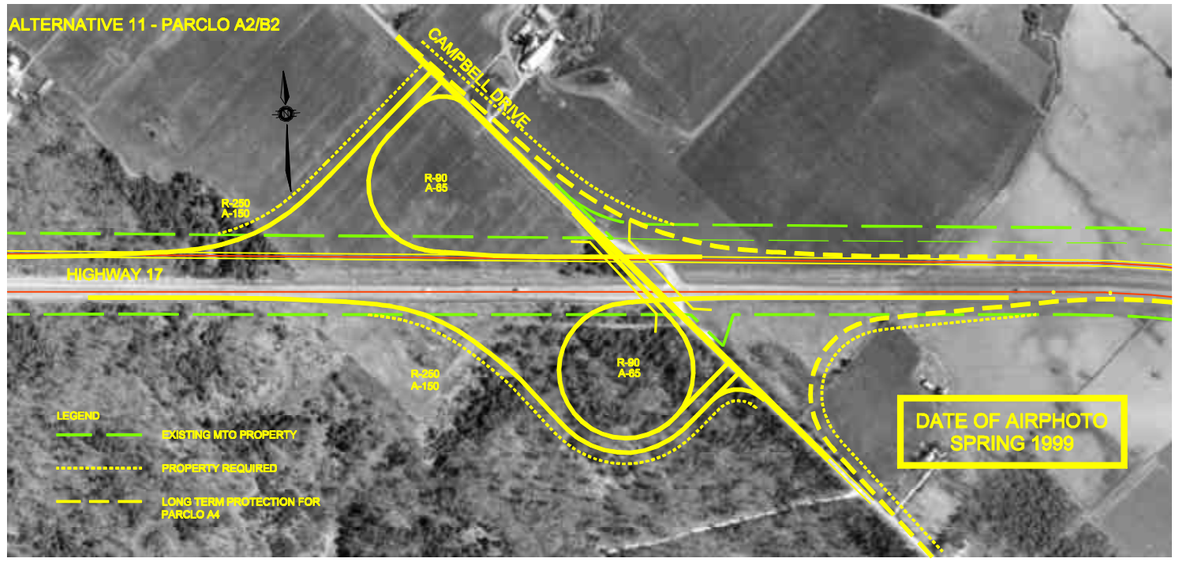
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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10—CAMPBELL LONG TERM INT.dwg — Thu, 4 Dec 2003 — 17:46



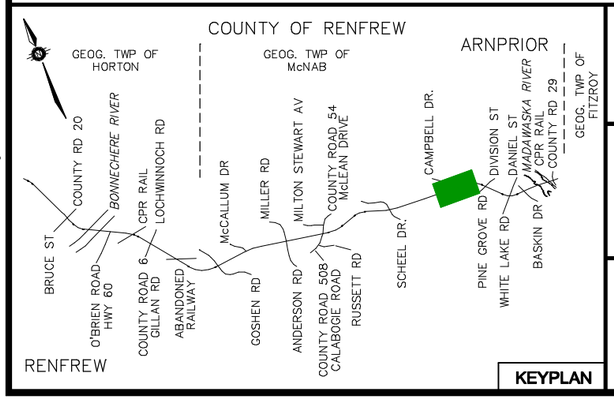


FIGURE 5-17C

CAMPBELL DRIVE LONG TERM INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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10-CAMPBELL LONG TERM INT.dwg – Thu, 4 Dec 2003 – 17:46

Figure 5-18 Campbell Drive Long Term Interchange Weights

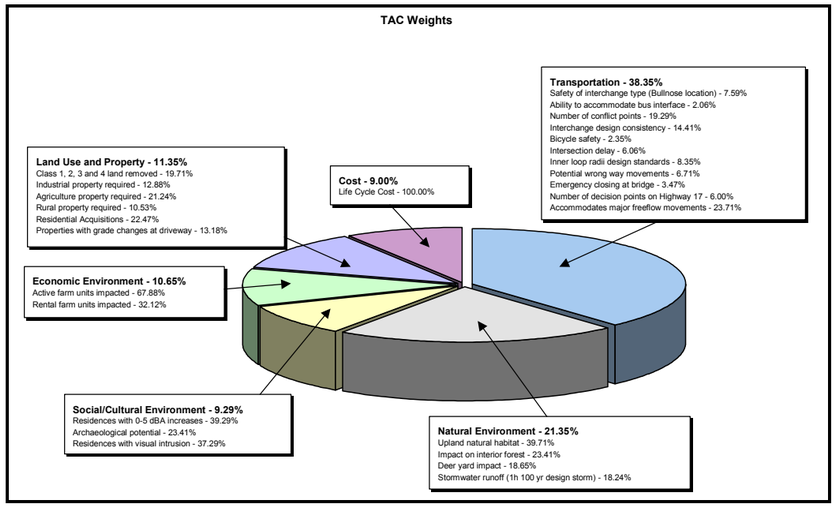


Figure 5-19 Campbell Drive Long Term Interchange Ranking Of Alternatives

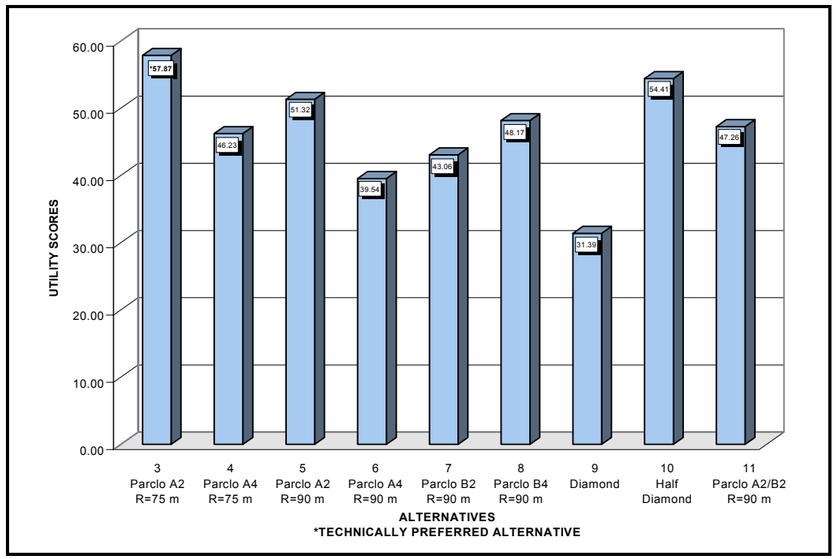


Table 5-11
Campbell Drive Long Term Interchange Sensitivity Tests

CAMPBELL DRIVE INTERCHANGE - LONG TERM
SUMMARY OF SENSITIVITY TESTS

FACTORS	RATING	WEIGHT	ALTERNATIVES 3 Parclo A2 R=75 m	4 Parclo A4 R=75 m	5 Parclo A2 R=90 m	6 Parclo A4 R=90 m	7 Parclo B2 R=90 m	8 Parclo B4 R=90 m	9 Diamond	10 Half Diamond	11 Parclo A2/B2 R=90 m
Technical Advisory Committee			1	6	3	8	7	4	9	2	5
1.0 TRAFFIC AND TRANSPORTATION	High	77.00%	4	3	1	2	9	5	8	6	7
	Low	5.0%	3	7	6	9	1	5	8	2	4
2.0 NATURAL ENVIRONMENT	High	80.00%	3	4	6	9	1	2	8	5	7
	Low	3.0%	2	5	3	6	9	7	8	1	4
3.0 SOCIAL/CULTURAL ENVIRONMENT	High	30.0%	1	7	3	8	5	6	9	2	4
	Low	0.0%	1	4	5	8	7	3	9	2	6
4.0 ECONOMIC ENVIRONMENT	High	30.0%	3	7	6	8	5	4	9	1	2
	Low	1.0%	1	5	2	7	8	4	9	3	6
5.0 LAND USE & PROPERTY	High	30.0%	1	6	3	8	5	7	9	2	4
	Low	0.0%	1	5	3	8	7	4	9	2	6
6.0 COST	High	20.0%	2	7	4	8	6	5	9	1	3
	Low	0.0%	1	4	2	7	8	3	9	5	6

5.5.5.4 County Road 508

The County Road 508 interchange in located in the central portion of the study area where four municipal roadways converge, including: Milton Stewart Avenue; County Road 54; Russet Road and County Road 508.

The interchange alternatives are shown on **Figure 5-20** The TAC and MAC weights and the resultant rating of alternatives are shown on **Figure 5-21** , **County Road 508 Interchange Weights** and **5-22, County Road 508 Interchange Ranking of Alternatives**, respectively**.**

Sensitivity Testing

The purpose of the sensitivity-testing program was to determine whether the outcome of the evaluation was sensitive to changes in weight. The results of the Sensitivity-testing are shown on **Table 5-12 County Road 508 Interchange Sensitivity Testing Program**. The sensitivity testing exercise illustrated that the evaluation was sensitive to the range of weights, or opinions of individuals, in the TAC and MAC committees. Generally Alternative 6 (Parclo A4/diamond) and Alternative 8 (Parclo A4) were high rated options with trade-offs considering the natural or social environment.

Technically Preferred Alternative

The TPA for the County Road 508 is Alternative 8 – Parclo A4 interchange, 75 m inner loops on a new alignment. The analysis identified Alternative 8 as the highest ranked alternative by the TAC and second highest rated option by the MAC. Based on discussions between the two committees it was recommended to carry forward Alternative 8 as the TPA. The sensitivity-testing program did provide confidence in the option, as providing the best balance of transportation characteristics while recognizing the impacts to the environmental features. This alternative was endorsed by the TAC and the MAC.









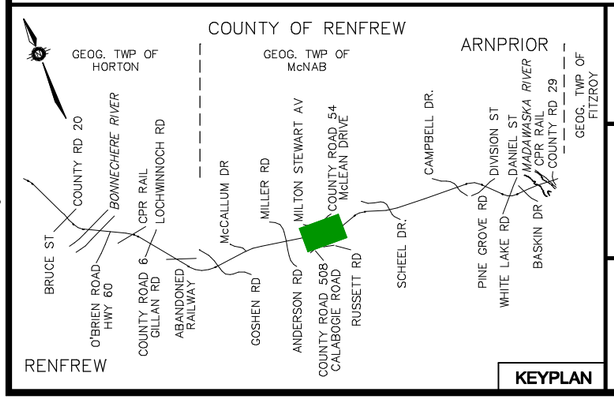


FIGURE 5-20A

COUNTY ROAD 508 INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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11-COUNTY RD 508 INT.dwg – Thu, 4 Dec 2003 – 17:58









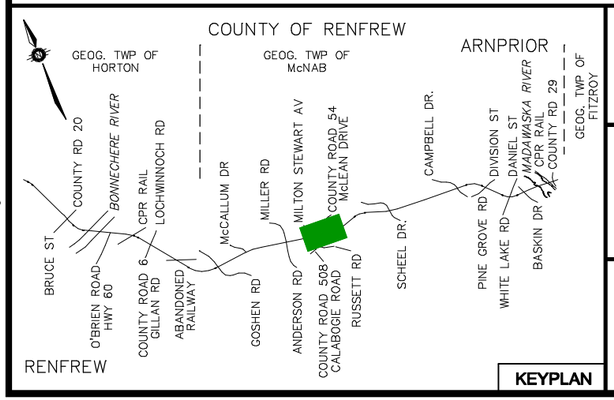


FIGURE 5-20B

COUNTY ROAD 508
INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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TRANSPORTATION AND VALUE ENGINEERS

11-COUNTY RD 508 INT.dwg – Thu, 4 Dec 2003 – 17:58







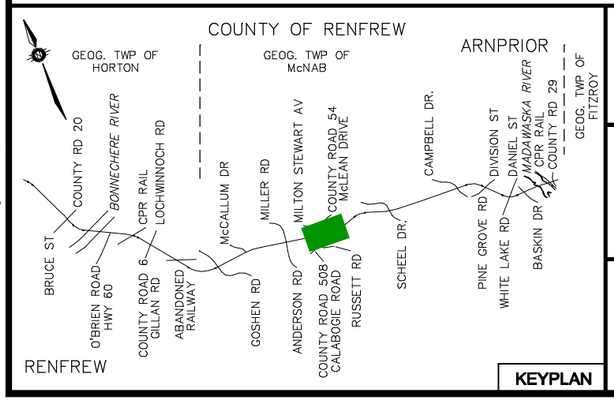


FIGURE 5-20C

COUNTY ROAD 508
INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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11-COUNTY RD 508 INT.dwg – Thu, 4 Dec 2003 – 17:58

Figure 5-21 County Road 508 Interchange Weights

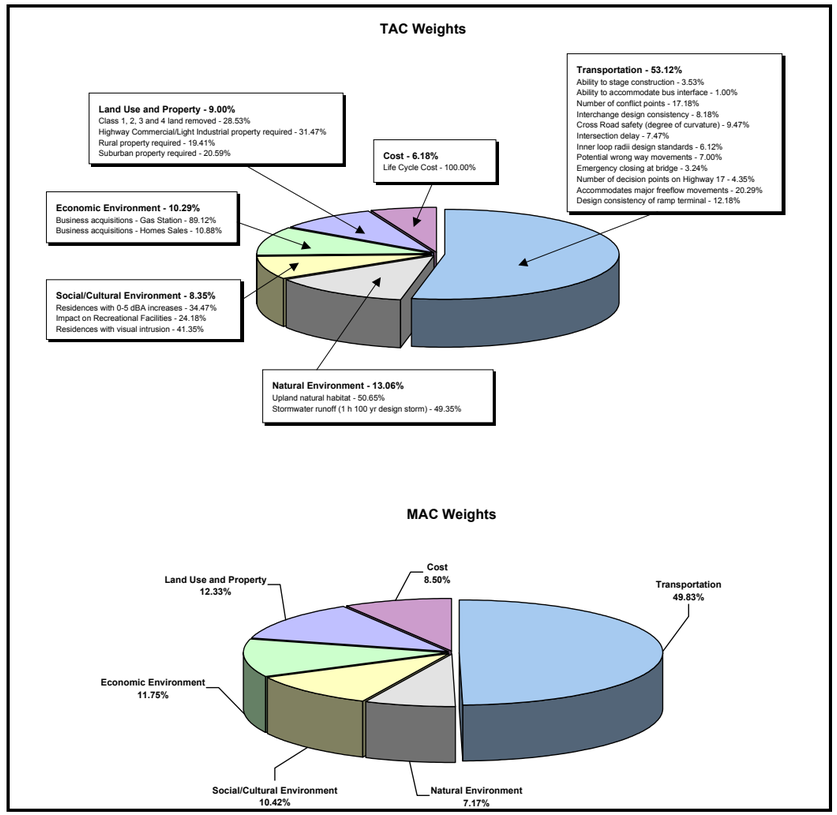


Figure 5-22 County Road 508 Interchange Ranking Of Alternatives

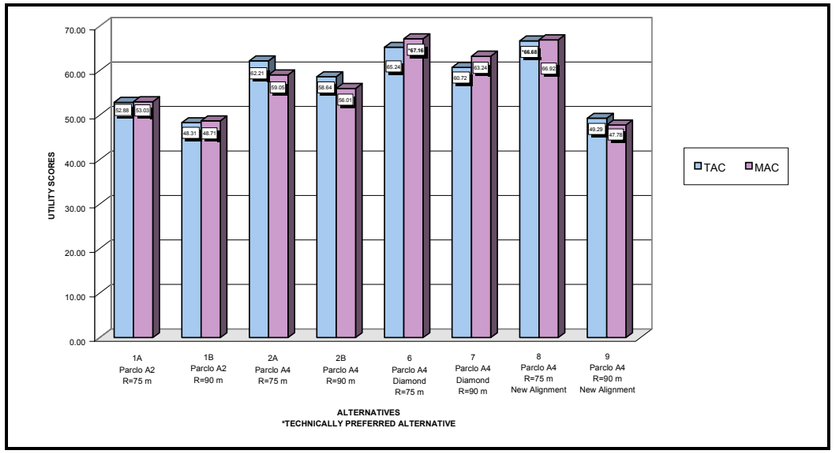


Table 5-12
County Road 508 Sensitivity Tests

COUNTY ROAD 508 INTERCHANGE
SUMMARY OF SENSITIVITY TESTS

FACTORS	RATING	WEIGHT	ALTERNATIVES 1A Parcle A2 R=75m	1B Parcle A2 R=90m	2A Parcle A4 R=75m	2B Parcle A4 R=90m	6 Parcle A4 Diamond R=75	7 Parcle A4 Diamond R=90	8 Parcle A4 R=75 new align.	9 Parcle A4 R=90 new align.
Technical Advisory Committee			6	8	3	5	2	4	1	7
Municipal Advisory Committee			6	7	4	5	1	3	2	8
1.0 TRAFFIC AND TRANSPORTATION	High	73.0%	7	8	3	2	5	6	1	4
	Low	20.0%	3	5	6	7	1	2	4	8
2.0 NATURAL ENVIRONMENT	High	50.0%	1	4	3	7	2	5	6	8
	Low	5.0%	7	8	3	5	2	4	1	6
3.0 SOCIAL/CULTURAL ENVIRONMENT	High	15.0%	6	7	4	5	1	2	3	8
	Low	2.0%	7	8	3	5	2	4	1	6
4.0 ECONOMIC ENVIRONMENT	High	20.0%	6	8	4	5	2	3	1	7
	Low	5.0%	6	8	1	4	3	5	2	7
5.0 LAND USE & PROPERTY	High	20.0%	4	7	3	6	1	5	2	8
	Low	0.0%	7	8	3	4	2	5	1	6
6.0 COST	High	10.0%	6	7	4	5	1	3	2	8
	Low	0.0%	7	8	2	4	3	5	1	6

5.5.5.5 County Road 6

There are numerous residences on Lochwinnoch Road (County Road 6) north of Highway 17, and on both sides of Gillan Road (County Road 6) south of Highway 17. The surrounding area is wooded or agricultural.

The natural environment at this location has been categorized as one of the most environmentally significant in the study area including a crossing of Deil's Creek.

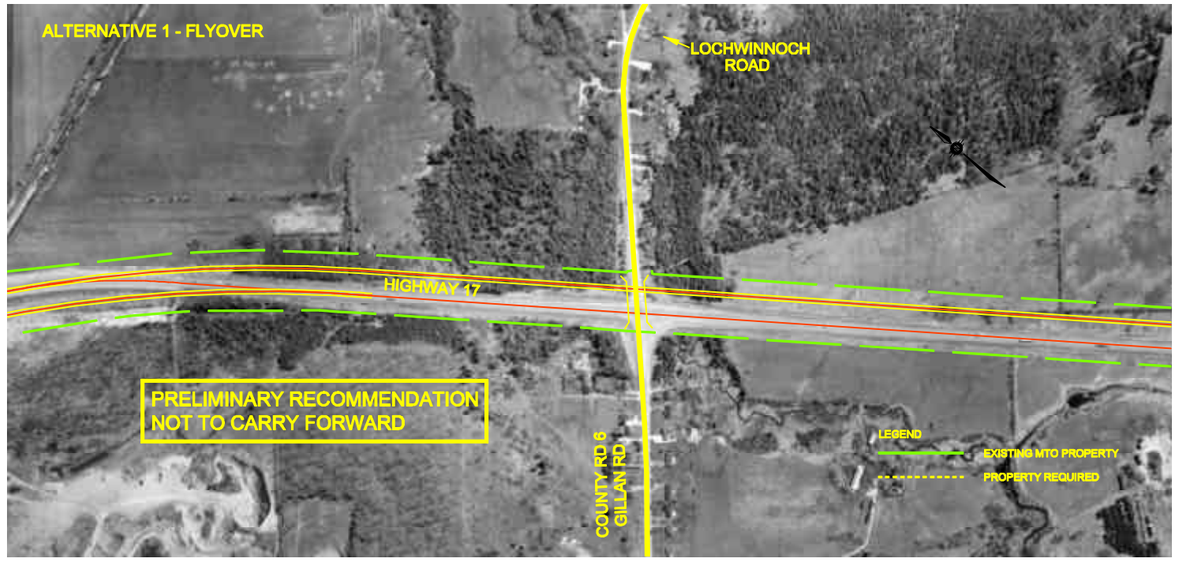
The road alternatives at this location consist of a flyover grade separation, a service road north of Highway 17, and several interchange alternatives. These are shown on **Figure 5-23**. The TAC and MAC weights and the resultant rating of alternatives are shown on **Figures 5-24**, **County Road 6 Interchange Weights** and **5-25, County Road 6 Interchange Ranking of Alternatives**, respectively**.**

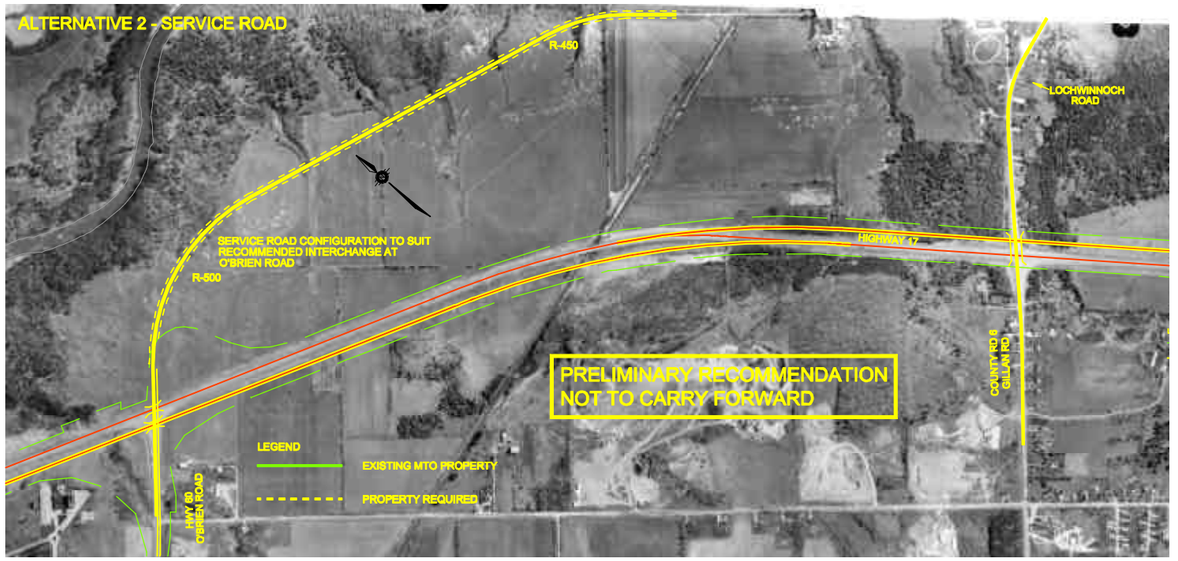
Sensitivity Testing

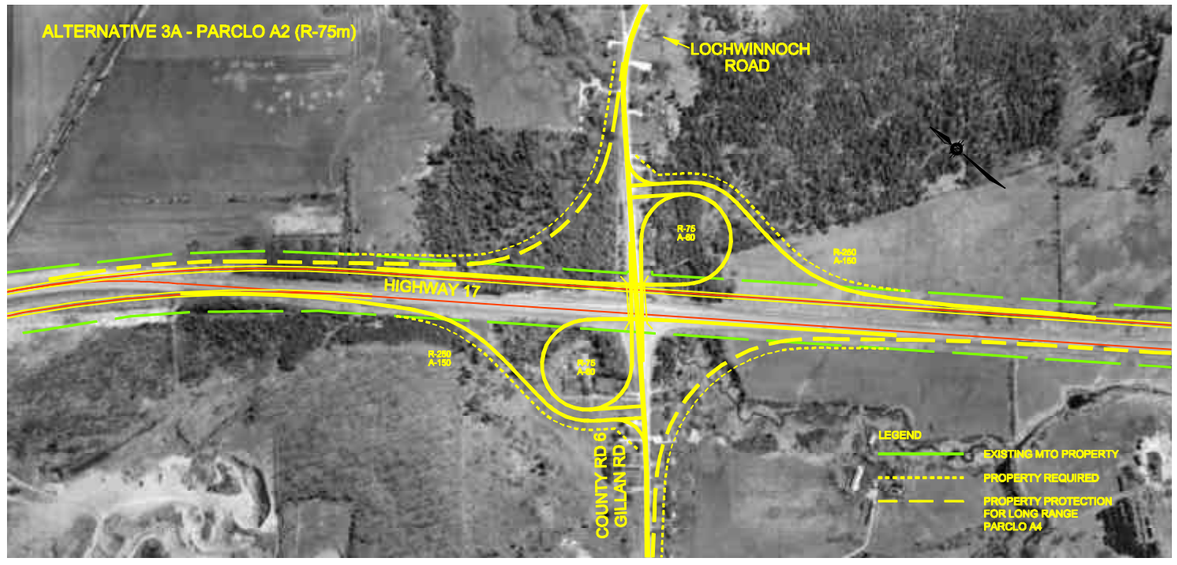
The purpose of the sensitivity-testing program was to determine whether the outcome of the evaluation was sensitive to changes in weight. The results of the Sensitivity-testing are shown on **Table 5-13, County Road 6 Interchange Sensitivity Testing Program**. The sensitivity testing program confirmed that the exercise was not sensitive to the range of weights considered by the TAC and MAC.

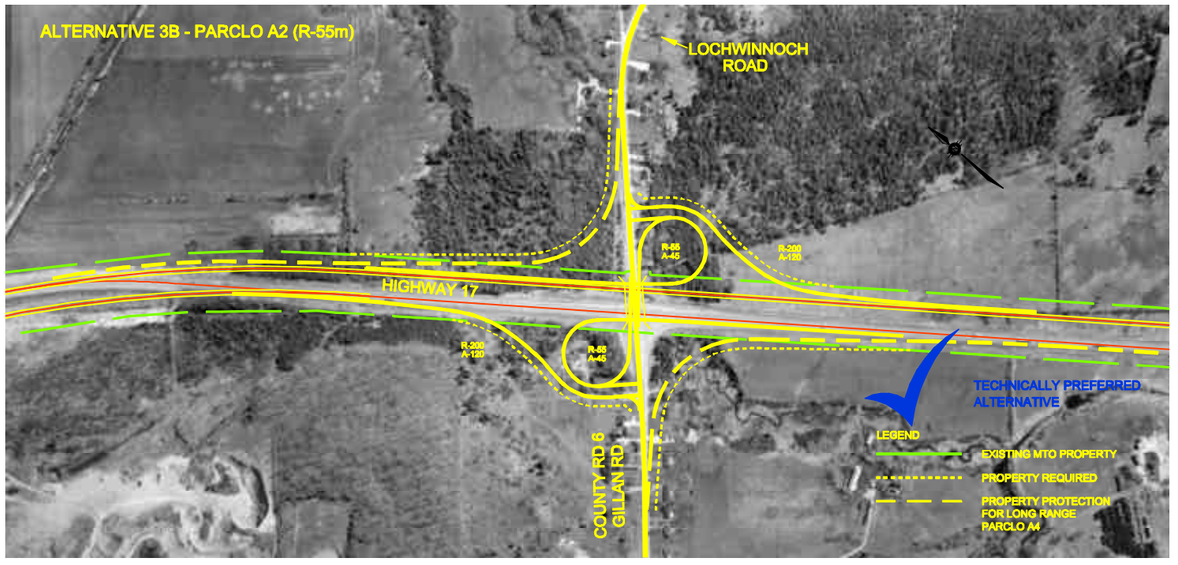
Technically Preferred Alternative

The TPA for the County Road 6 is Alternative 3B – Parclo A4, 55 m inner loops on a new alignment. The analysis identified Alternative 3B as the highest ranked alternative, and the sensitivity tests showed that the evaluation was not sensitive to the weight assigned to evaluation criteria. The sensitivity-testing program did provide confidence in the option, as providing the best balance of transportation characteristics while recognizing the impacts to the environmental features. This alternative was endorsed by the TAC and the MAC.









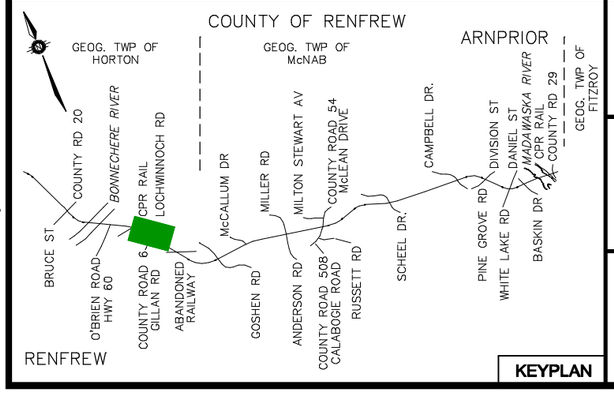


FIGURE 5-23A

COUNTY ROAD 6
INTERCHANGE ALTERNATIVES

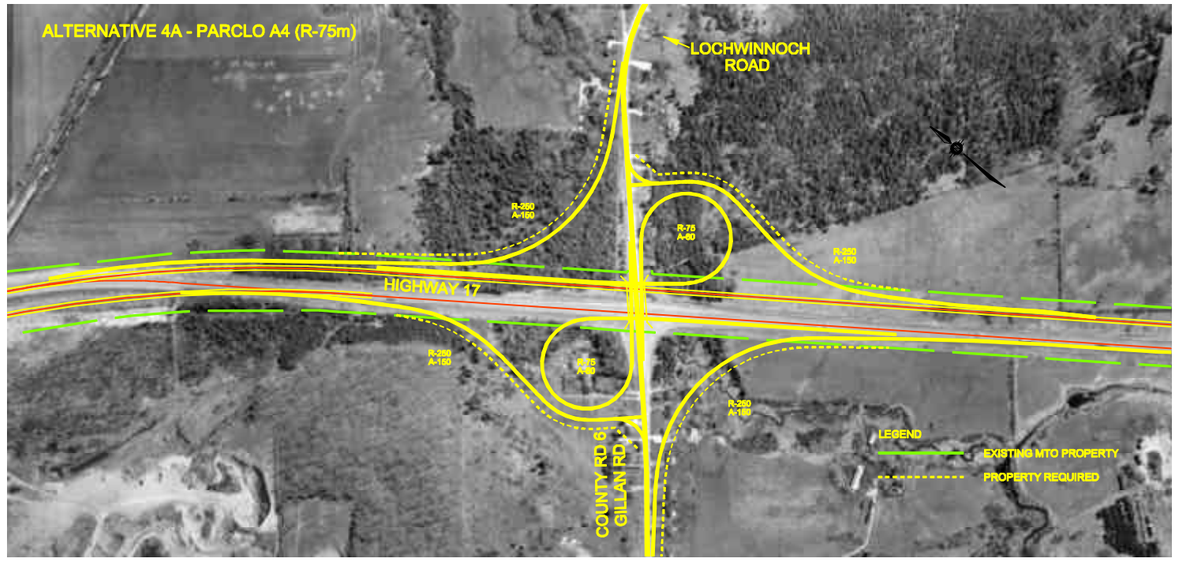
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

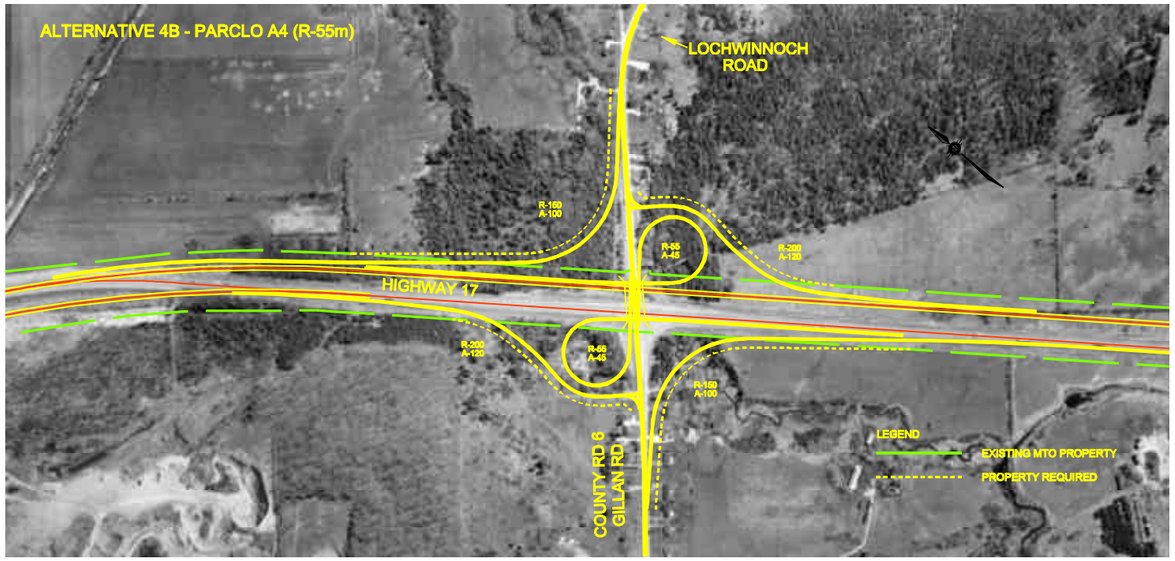
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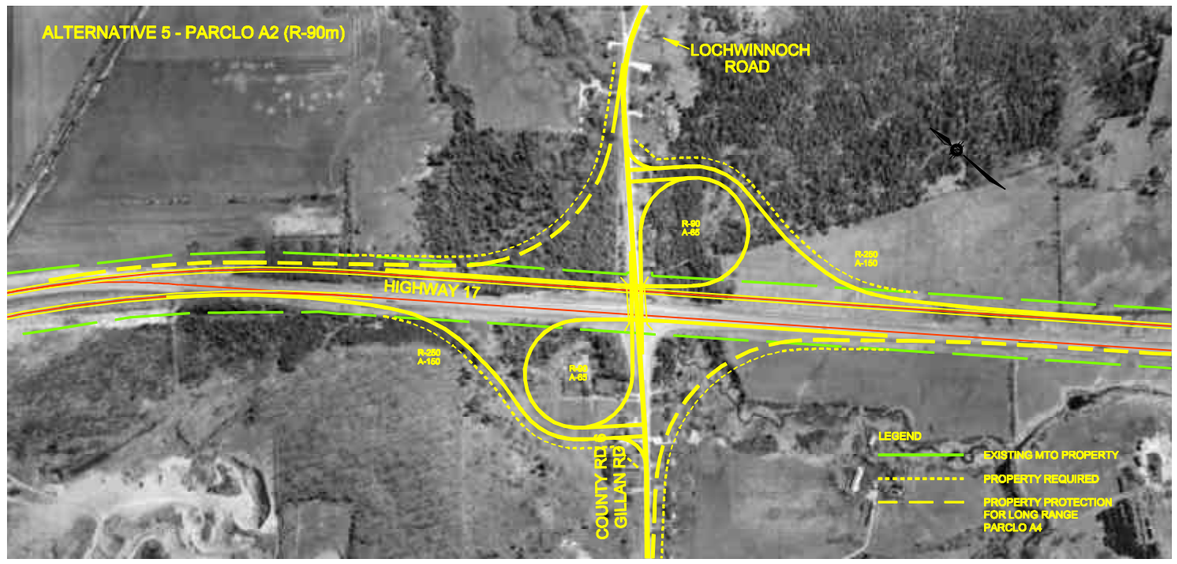
Ministry of Transportation

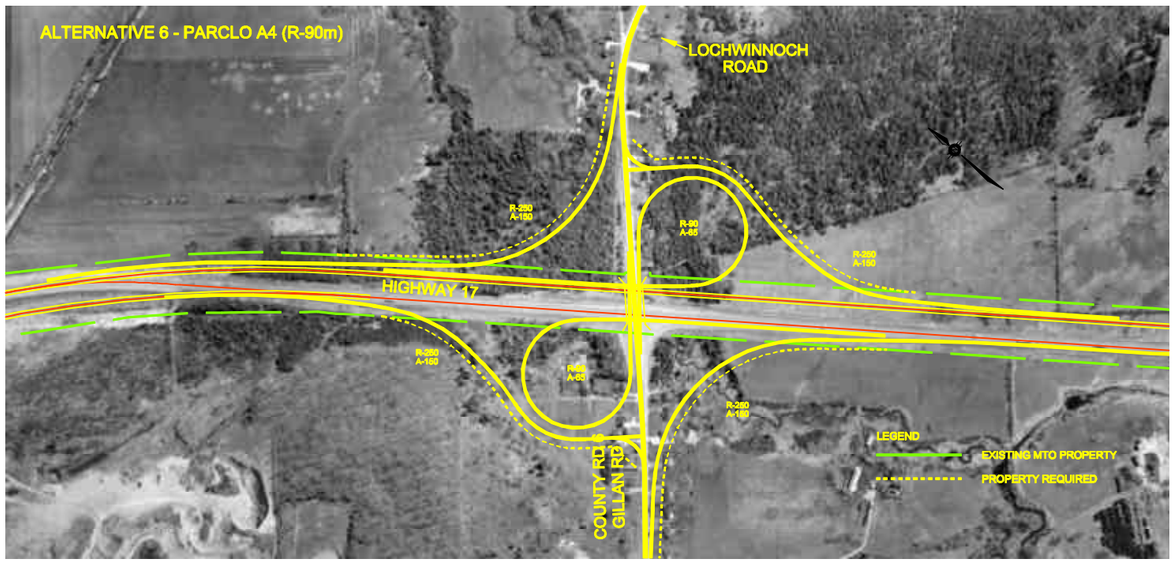
NCE
TRANSPORTATION AND VALUE ENGINEERS

12—COUNTY RD 6 INT.dwg – Thu, 4 Dec 2003 – 18:07









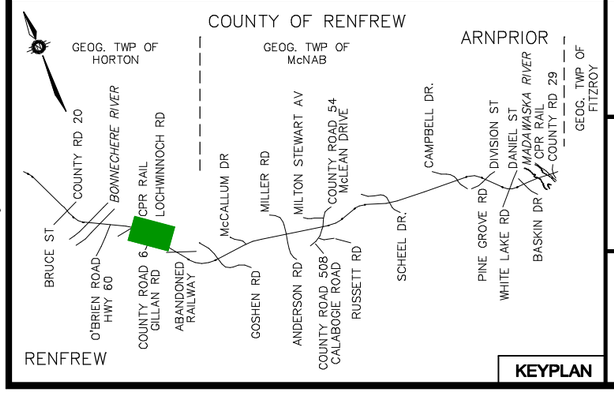


FIGURE 5-23B

COUNTY ROAD 6
INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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TRANSPORTATION AND VALUE ENGINEERS

12--COUNTY RD 6 INT.dwg -- Thu, 4 Dec 2003 -- 18:07









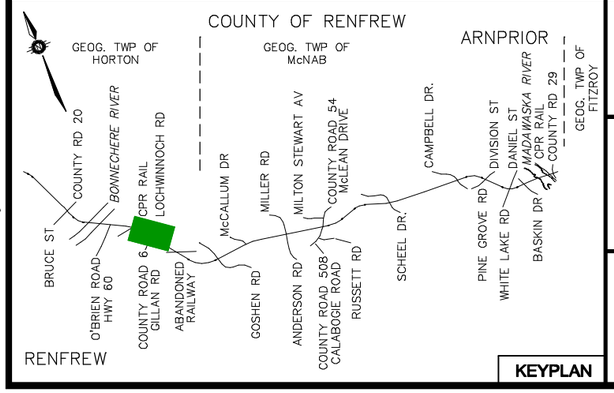


FIGURE 5-23C

COUNTY ROAD 6
INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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Figure 5-24 County Road 6 Interchange Weights

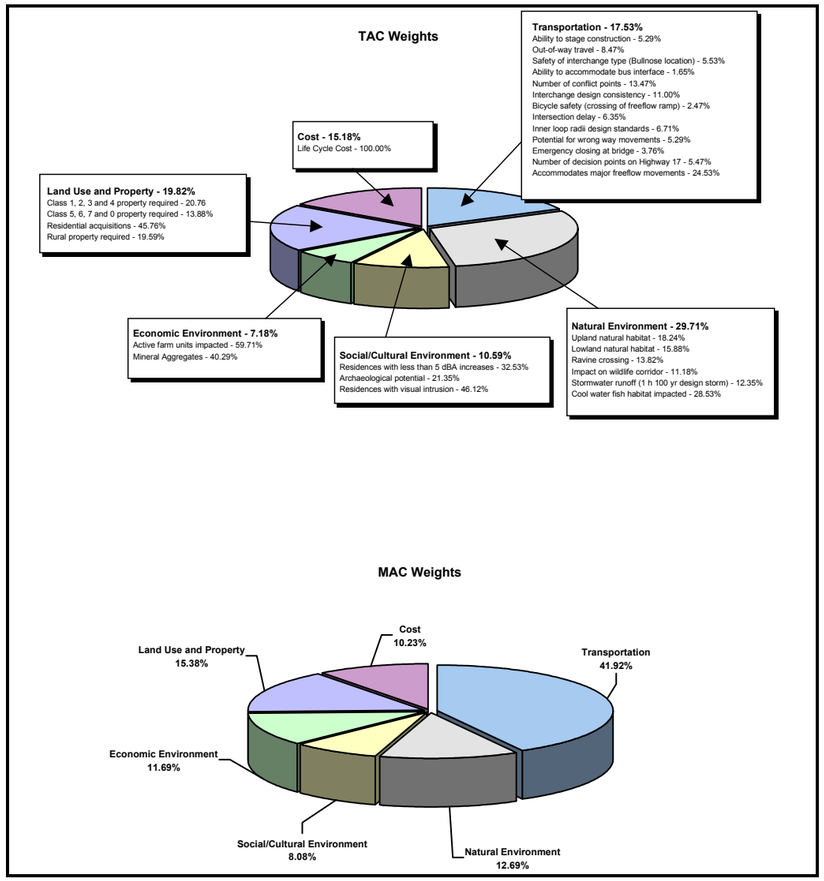


Figure 5-25 County Road 6 Interchange Ranking of Alternatives

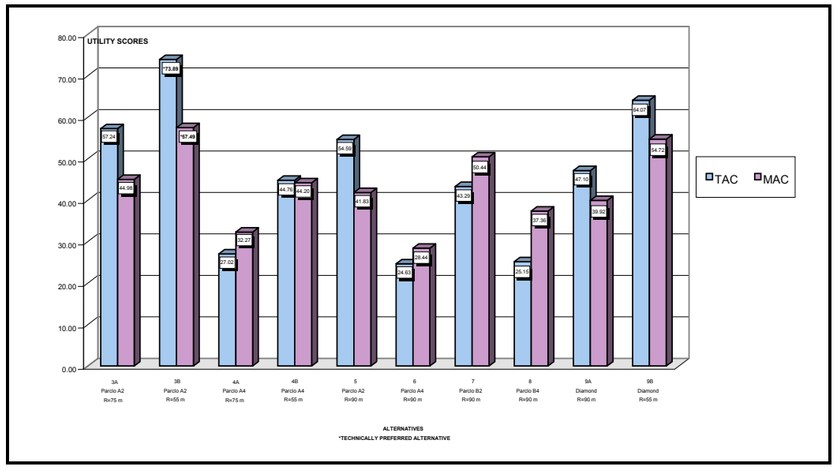


Table 5-13
County Road 6 Interchange Sensitivity Test

COUNTY ROAD 6 INTERCHANGE
SUMMARY OF SENSITIVITY TESTS

FACTORS	RATING	WEIGHT	ALTERNATIVES 3A Parcio A2 R=75 m	3B Parcio A2 R=55 m	4A Parcio A4 R=75 m	4B Parcio A4 R=55 m	5 Parcio A2 R=90 m	6 Parcio A4 R=90 m	7 Parcio B2 R=90 m	8 Parcio B4 R=90 m	9A Diamond R=90 m	9B Diamond R=55 m
Technical Advisory Committee			3	1	8	6	4	10	7	9	5	2
Municipal Advisory Committee			4	1	9	5	6	10	3	8	7	2
1.0 TRAFFIC AND TRANSPORTATION	High	60.0%	4	1	9	5	6	10	3	8	7	2
	Low	0.0%	3	1	8	6	4	10	7	9	5	2
2.0 NATURAL ENVIRONMENT	High	100.0%	2	1	8	5	3	7	9	10	6	4
	Low	0.0%	5	1	9	7	6	10	3	8	4	2
3.0 SOCIAL/CULTURAL ENVIRONMENT	High	25.0%	4	1	9	7	3	8	6	10	5	2
	Low	0.0%	3	1	8	5	4	10	7	9	6	2
4.0 ECONOMIC ENVIRONMENT	High	20.0%	3	1	9	5	6	10	4	8	7	2
	Low	0.0%	3	1	8	6	4	9	7	10	5	2
5.0 LAND USE & PROPERTY	High	40.0%	3	1	8	6	4	10	7	9	5	2
	Low	0.0%	3	1	8	7	4	9	6	10	5	2
6.0 COST	High	30.0%	3	1	8	7	4	10	6	9	5	2
	Low	0.0%	4	1	8	5	3	9	7	10	6	2

5.5.5.6 O'Brien Road/Whitton Road

In the southwest quadrant of the interchange area the Renfrew Inn and the National Archives of Canada are in proximity to Highway 17. In the southeast quadrant there is a residential property fronting onto the north side of Whitton Road and an industrial park south of Whitton Road. The remaining area in the southeast quadrant is zoned industrial and the lands north of Highway 17 are zoned rural.

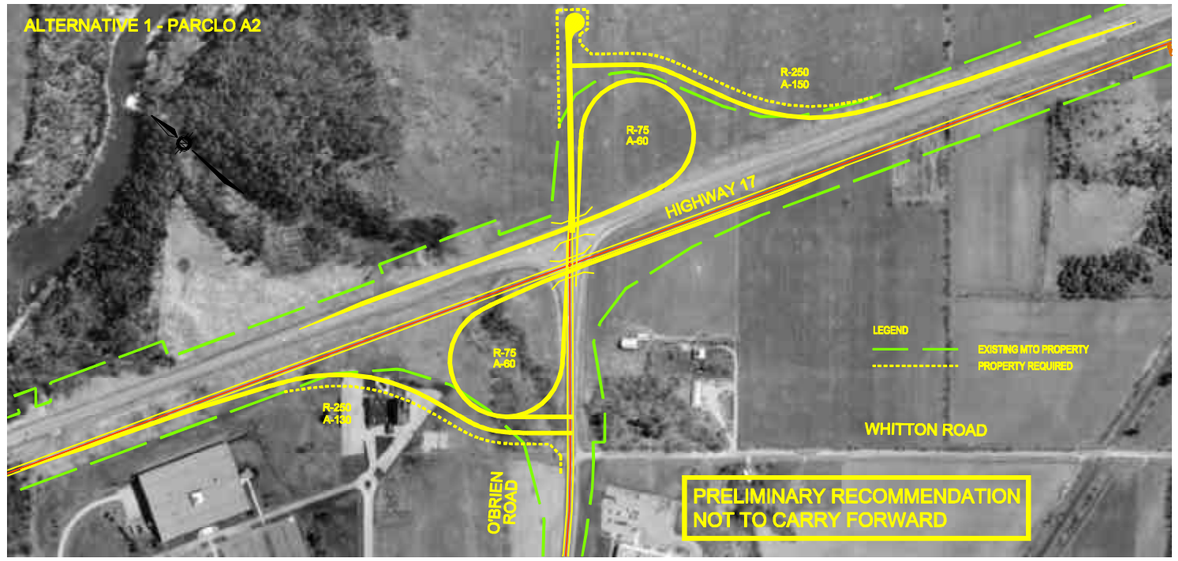
There are several interchange alternatives at this location. These are shown on **Figure 5-26**. For those options which impact the Whitton Road intersection , the interchange configuration includes the recommended relocation of Whitton Road which was described in **Section 5.5.2**. The TAC and MAC weights and the resultant rating of alternatives, are shown on **Figures 5-27**, **O'Brien Road Interchange Weights** and **5-28, O'Brien Road Interchange Ranking of Alternatives.**

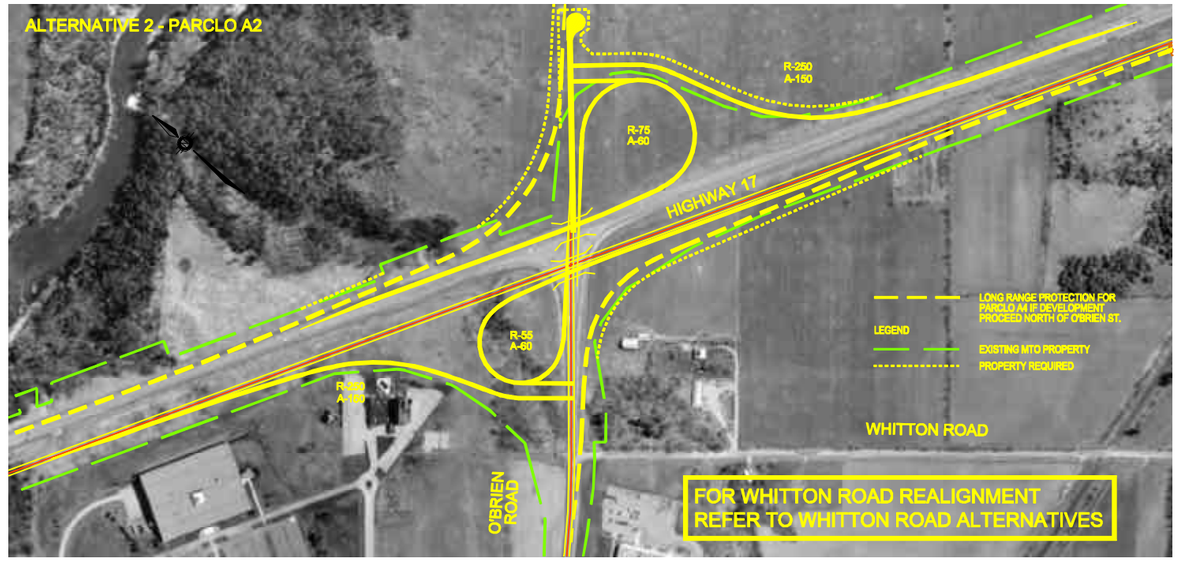
Sensitivity Testing

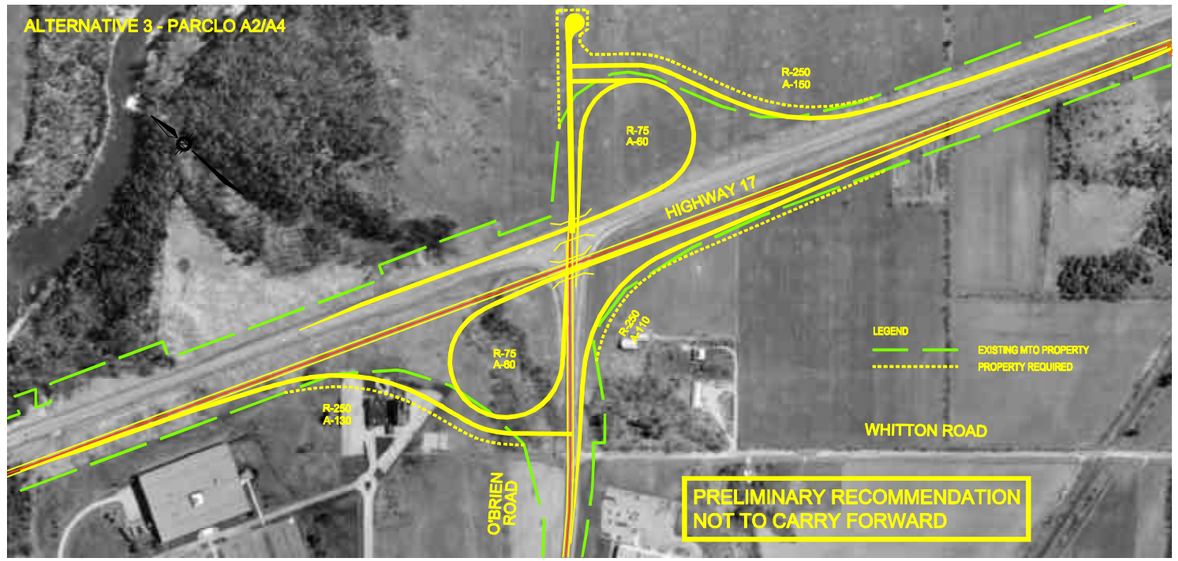
The purpose of the sensitivity-testing program was to determine whether the outcome of the evaluation was sensitive to changes in weight. The results of the Sensitivity-testing are shown on **Table 5-14, O'Brien Road Interchange Sensitivity Testing Program**. The results of the testing program illustrated that the evaluation was generally not sensitive to the range of weights of persons on the TAC or MAC.

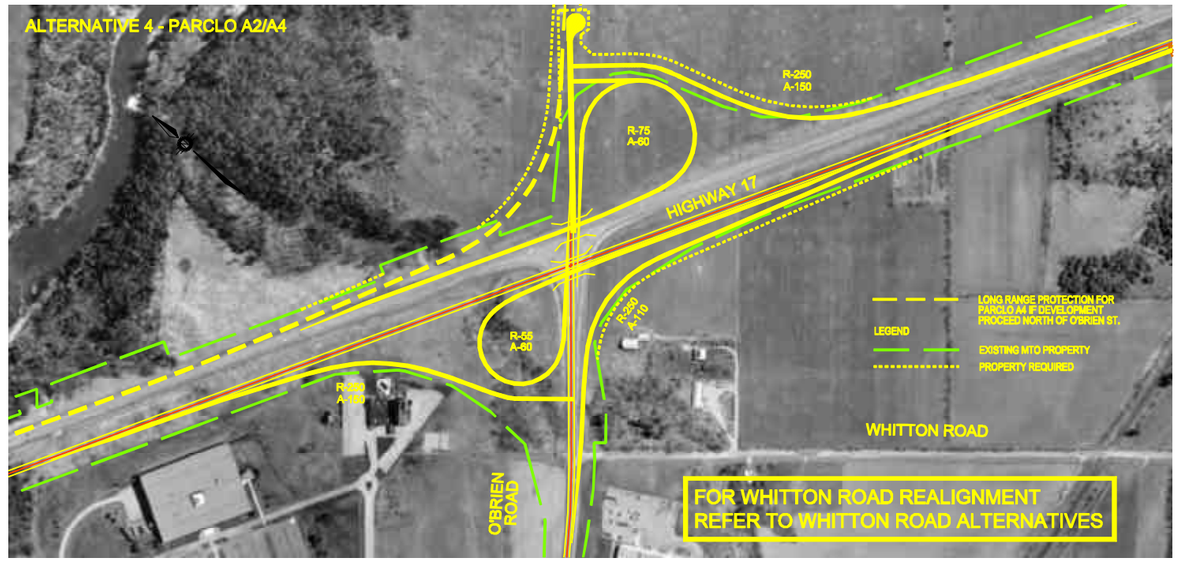
Technically Preferred Alternative

The TPA for O'Brien Road is Alternative 8 – a Trumpet/Diamond, 75 m inner loop. The analysis also identified Alternative 8 as the highest ranked alternative and the sensitivity tests showed that the evaluation was not sensitive to the weight assigned to evaluation criteria. The sensitivity-testing program did provide confidence in the option, as providing the best balance of transportation characteristics while recognizing the impacts to the environmental features. This alternative was endorsed by the TAC and the MAC.









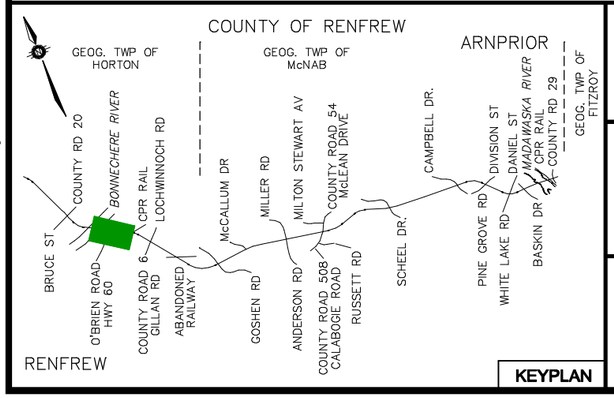


FIGURE 5-26A

O'BRIEN ROAD
INTERCHANGE ALTERNATIVES

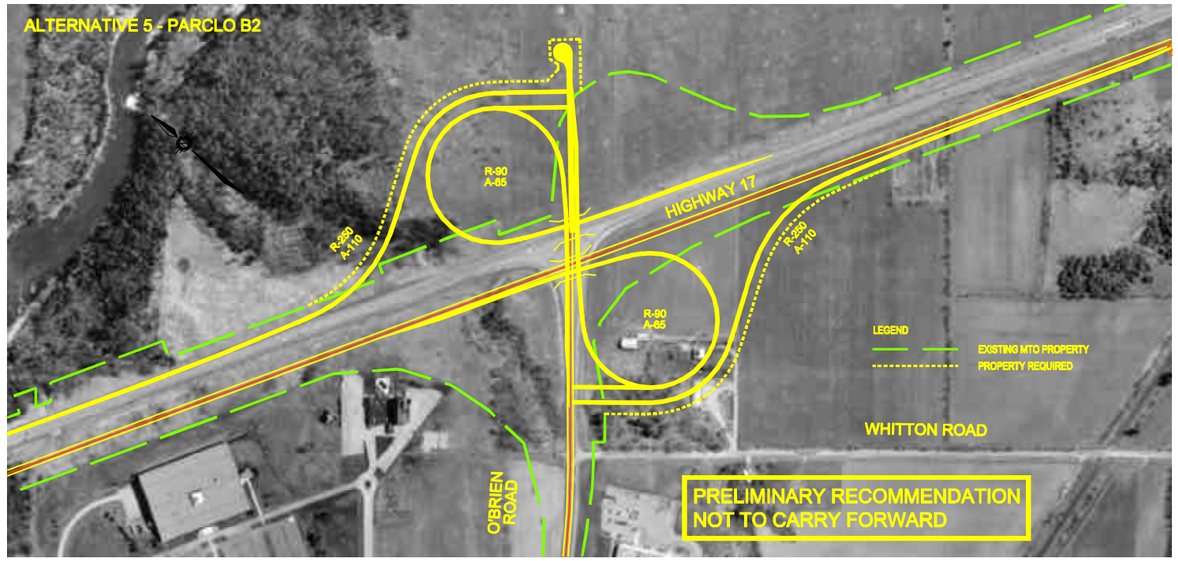
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

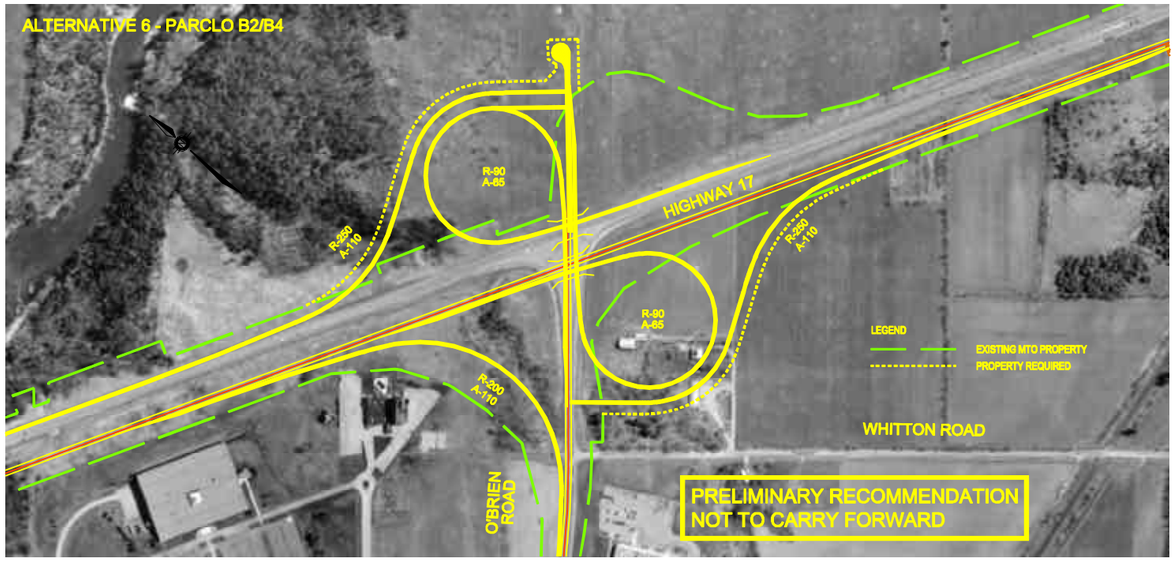
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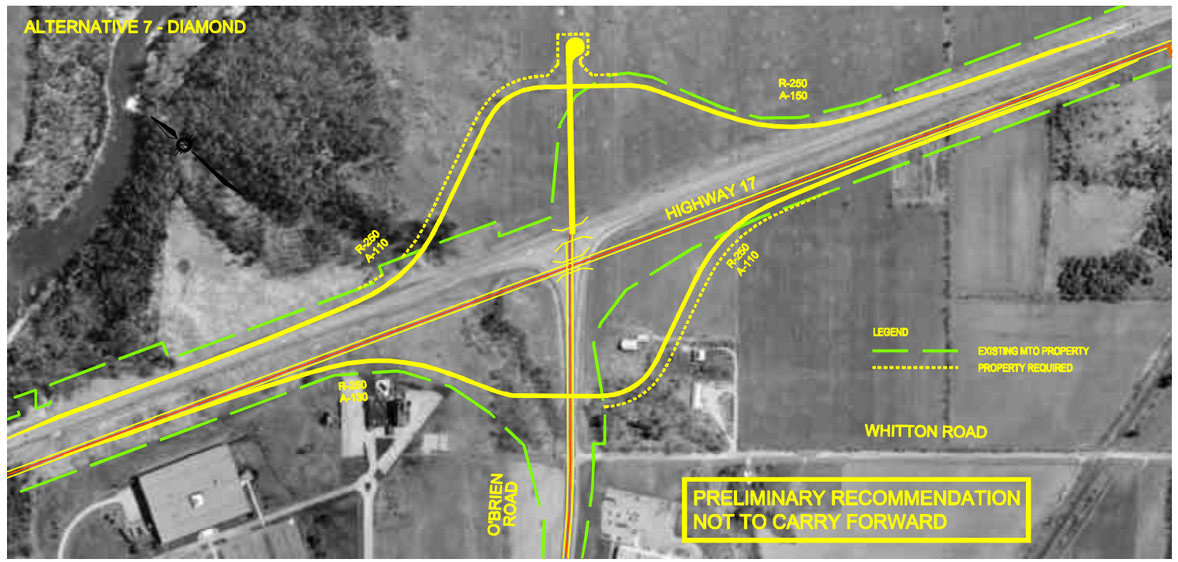
Ministry of Transportation

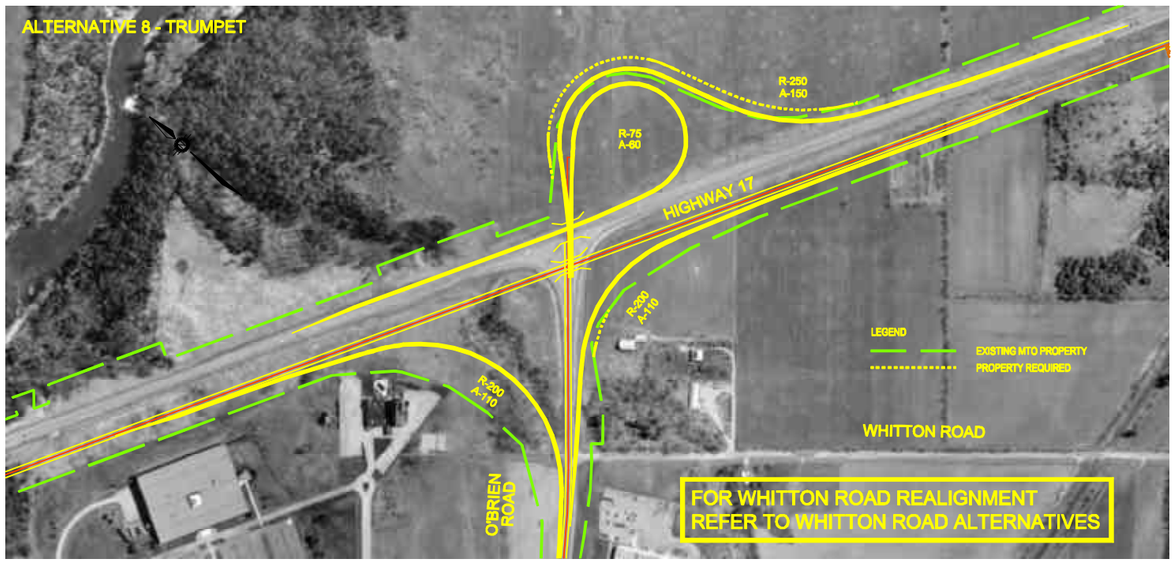
NCE
TRANSPORTATION AND VALUE ENGINEERS

13-OBRIEN RD-WHITTON RD INT.dwg – Thu, 4 Dec 2003 – 18:18









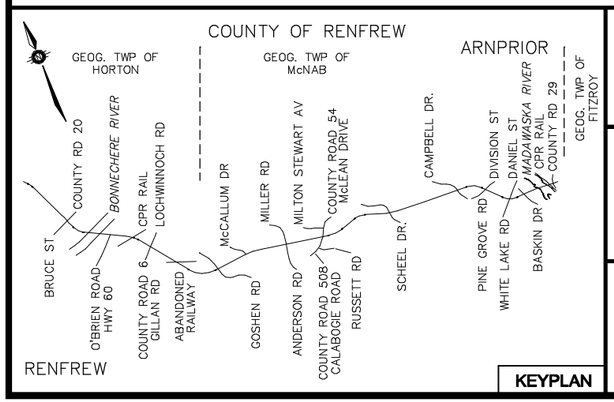


FIGURE 5-26B

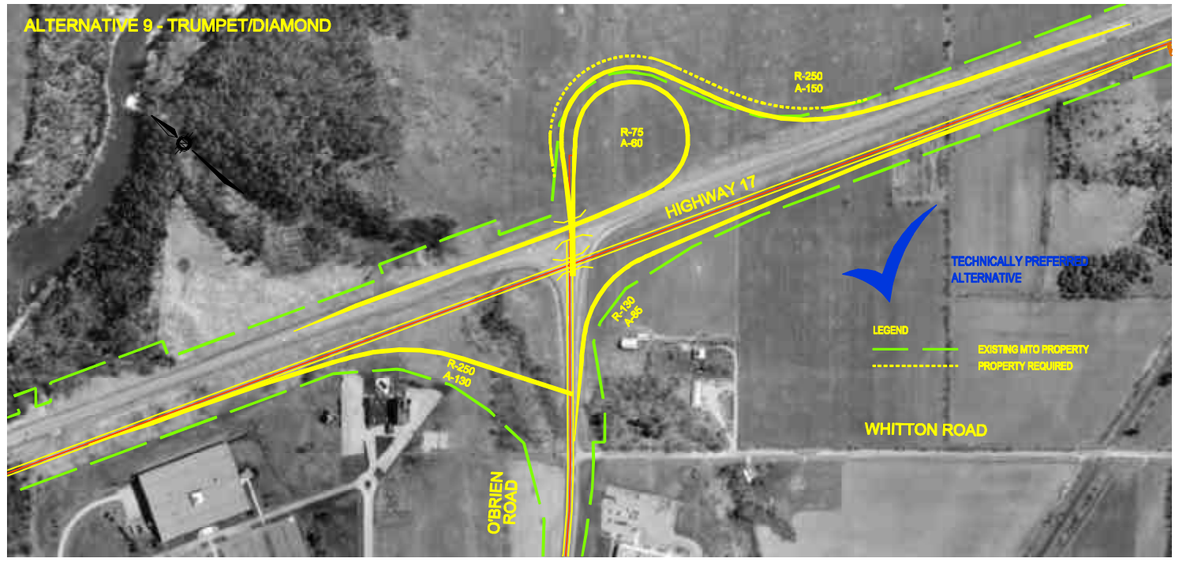
O'BRIEN ROAD
INTERCHANGE ALTERNATIVES

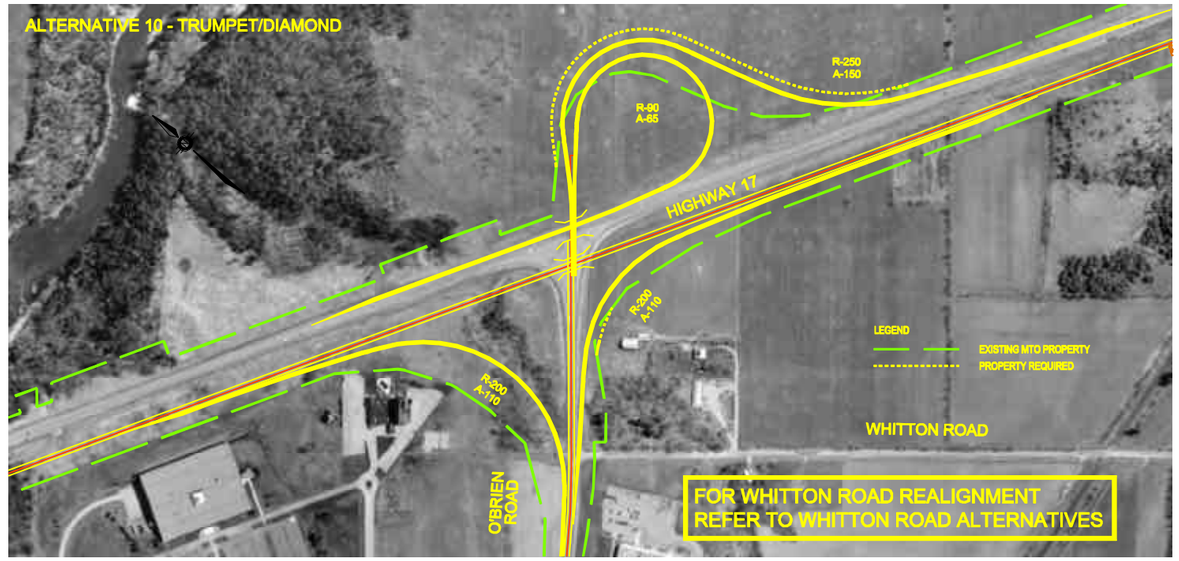
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

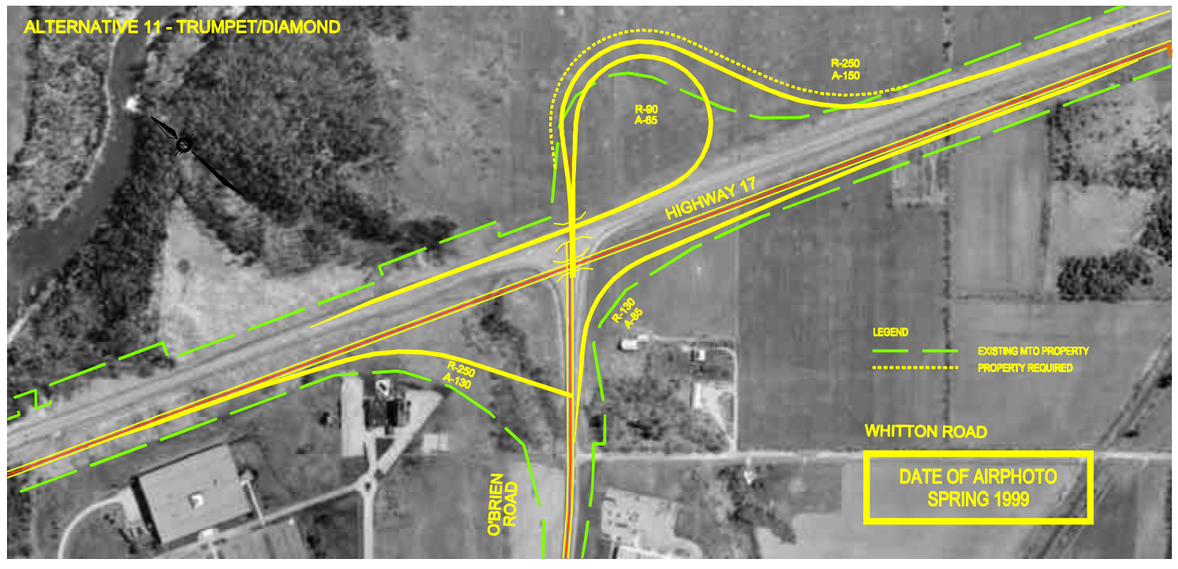
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Ministry of Transportation

NCE
TRANSPORTATION AND VALUE ENGINEERS







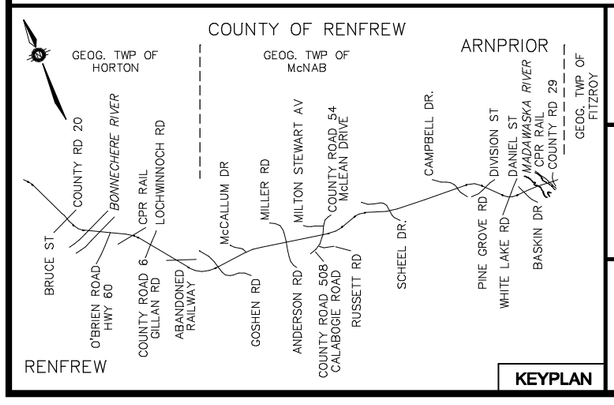


FIGURE 5-26C

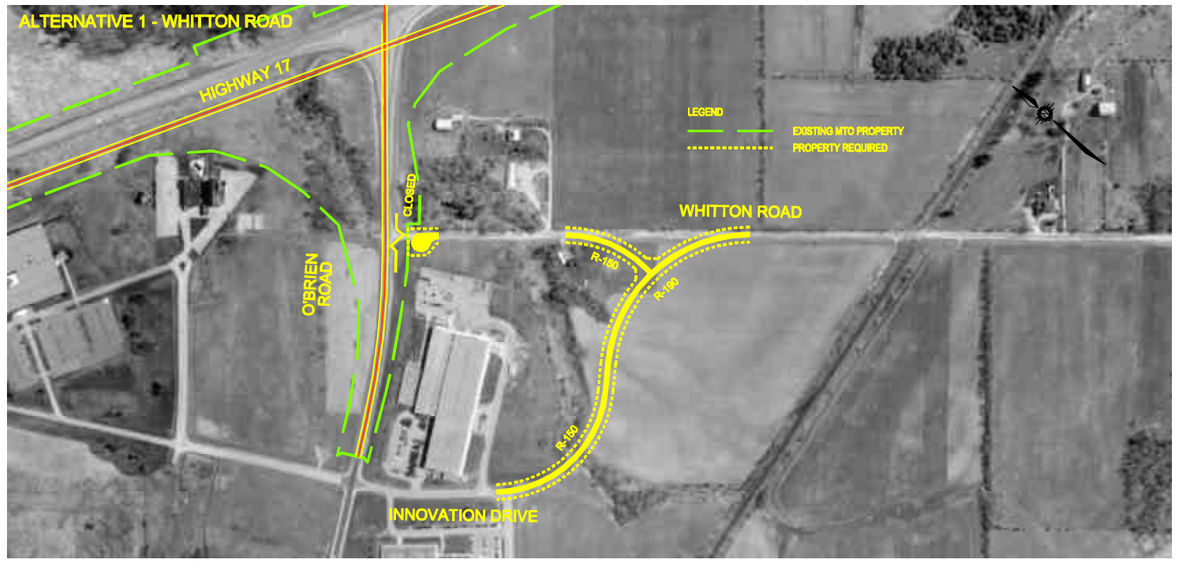
O'BRIEN ROAD
INTERCHANGE ALTERNATIVES

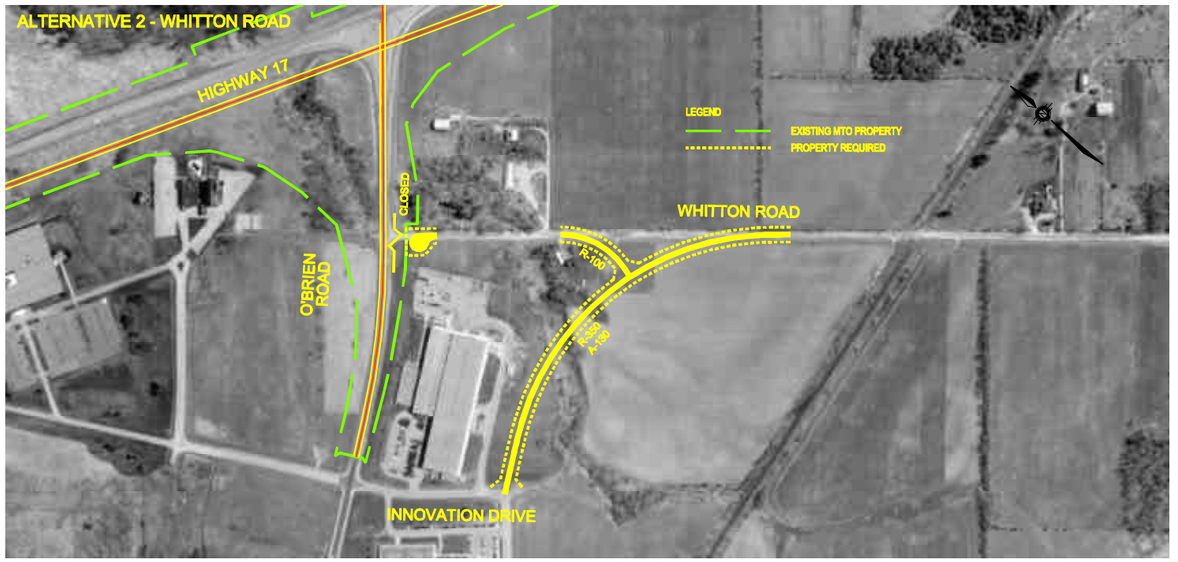
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

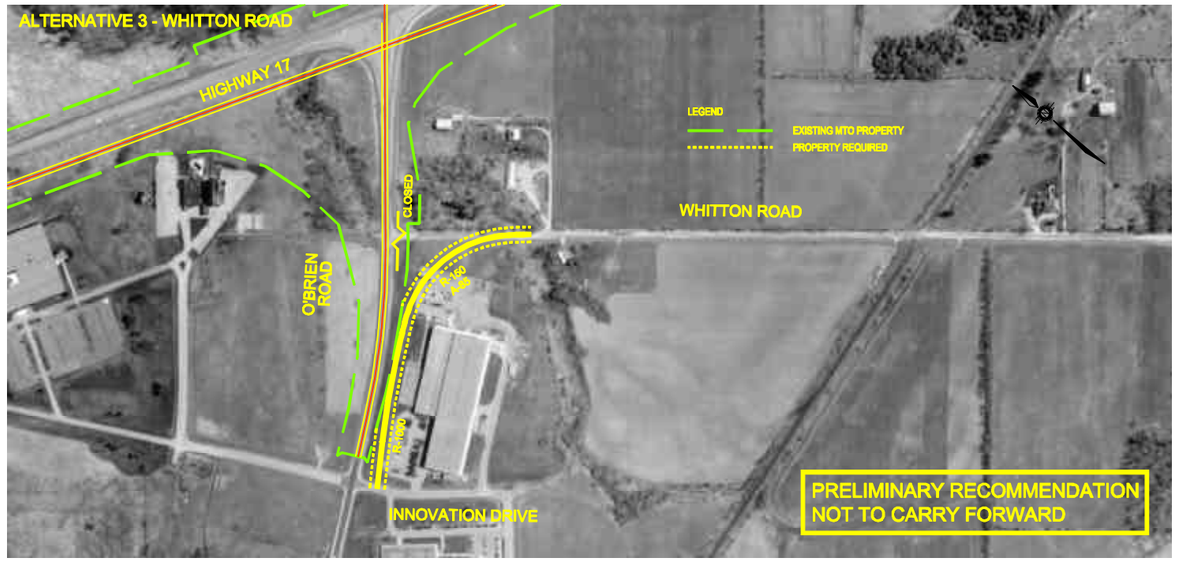
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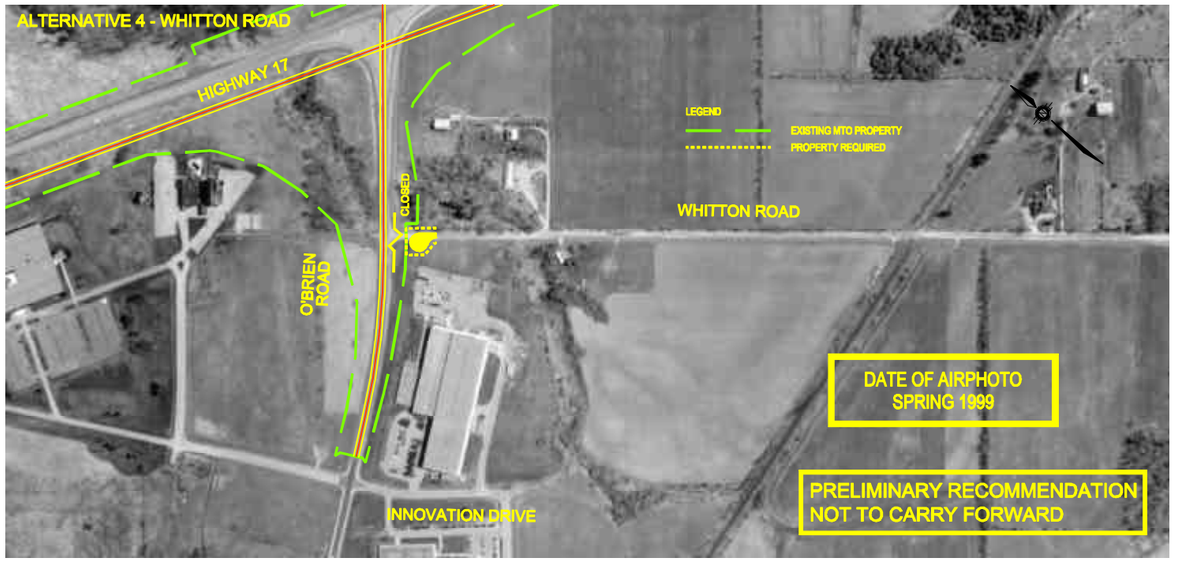
Ministry of Transportation

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TRANSPORTATION AND VALUE ENGINEERS









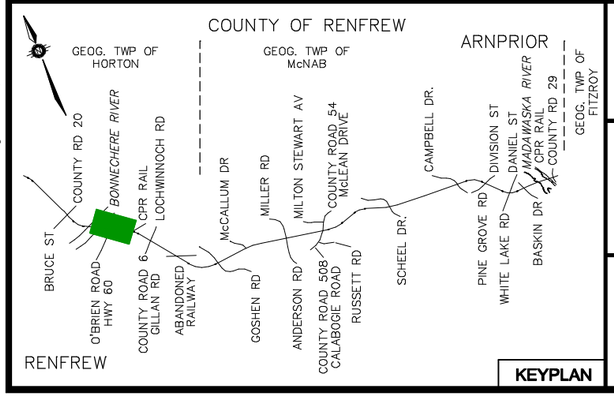


FIGURE 5-26D

WHITTON ROAD
INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

NCE
TRANSPORTATION AND VALUE ENGINEERS

13-OBRIEN RD-WHITTON RD INT.dwg – Thu, 4 Dec 2003 – 18:18

Figure 5-27 O'Brien Road and Whitton Road Interchange Weights

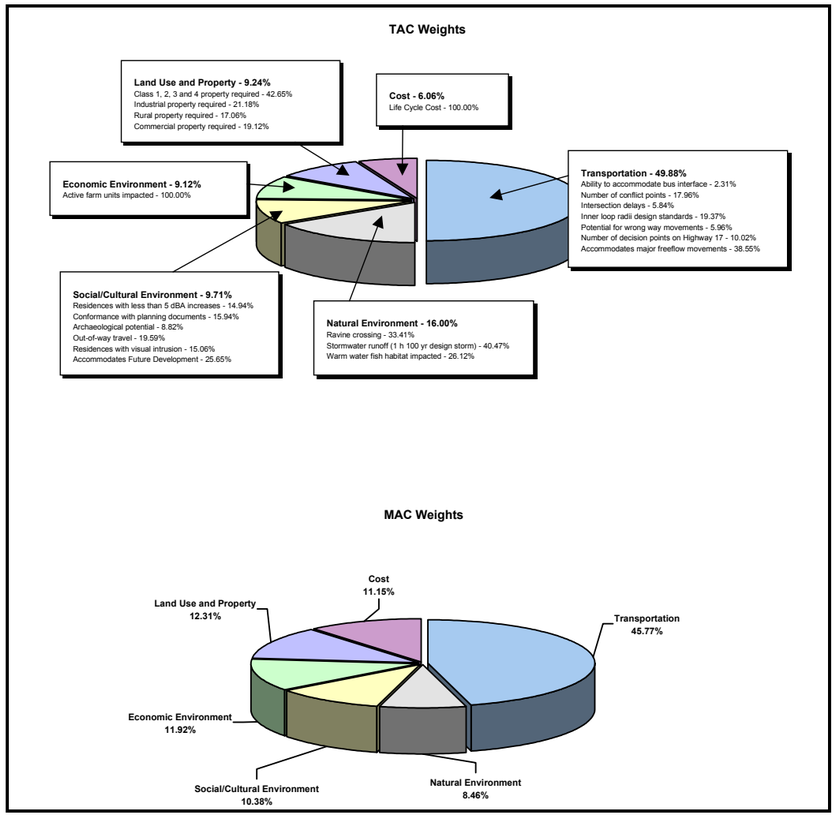


Figure 5-28 O'Brien Road and Whitton Road Interchange Ranking of Alternatives

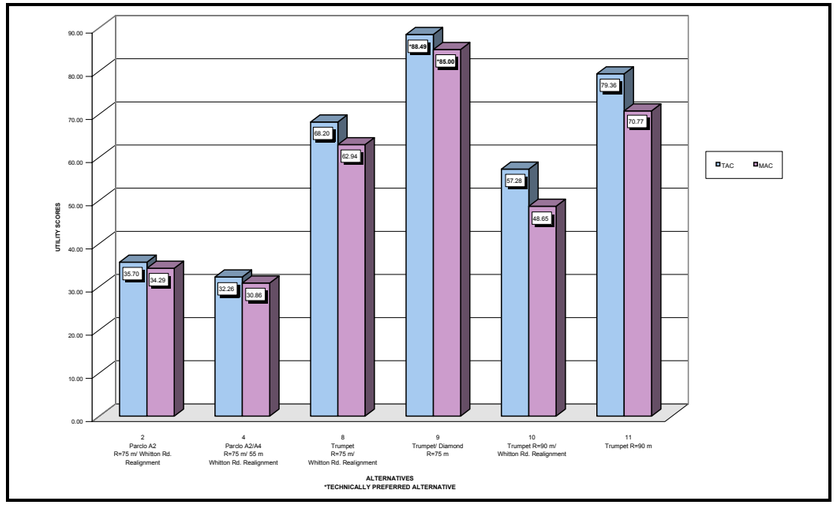


Table 5-14
O'Brien Road and Whitton Road Interchange Sensitivity Test

O'BRIEN ROAD/WHITTON ROAD INTERCHANGE
SUMMARY OF SENSITIVITY TESTS

			ALTERNATIVES					
FACTORS	RATING	WEIGHT	2 Parclo A2 R=75 m/ Whitton Rd. realign.	4 Parclo A2/A4 R=75/55 m Whitton Rd. realign.	8 Trumpet R=75 m/ Whitton Rd. realign.	9 Trumpet/ Diamond R=75 m	10 Trumpet R=90 m/ Whitton Rd. realign.	11 Trumpet R=90 m
Technical Advisory Committee			5	6	3	1	4	2
Municipal Advisory Committee			5	6	3	1	4	2
1.0 TRAFFIC AND TRANSPORTATION	**High**	75.0%	6	5	3	1	4	2
	Low	20.0%	3	6	4	1	5	2
2.0 NATURAL ENVIRONMENT	**High**	80.0%	3	6	4	2	5	1
	Low	2.0%	6	5	3	1	4	2
3.0 SOCIAL/CULTURAL ENVIRONMENT	**High**	20.0%	5	6	3	1	4	2
	Low	0.0%	5	6	3	1	4	2
4.0 ECONOMIC ENVIRONMENT	**High**	15.0%	5	6	3	1	4	2
	Low	0.0%	5	6	3	1	4	2
5.0 LAND USE & PROPERTY	**High**	20.0%	5	6	3	1	4	2
	Low	0.0%	6	5	3	1	4	2
6.0 COST	**High**	15.0%	5	6	3	1	4	2
	Low	0.0%	6	5	3	1	4	2

5.5.5.7 Bruce Street

The land use around the Bruce Street interchange is largely agricultural in nature. The most significant constraint is a wooded natural area surrounding a residence in the southwest quadrant. The service road connection to Castleford Road in the southeast quadrant will require relocation out of the interchange area.

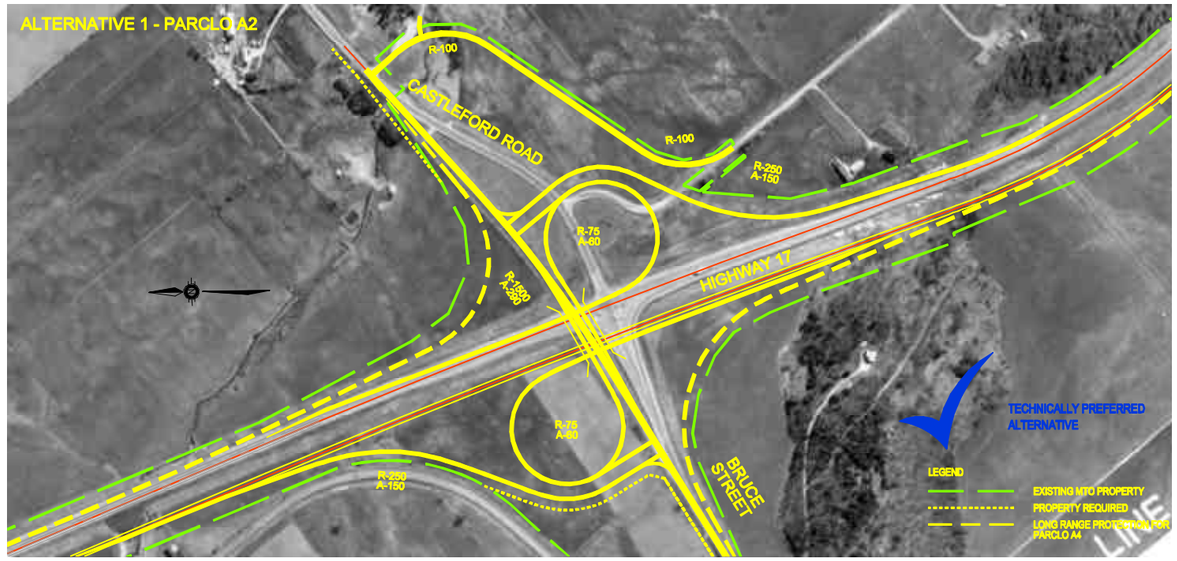
There are several interchange alternatives at this location. These are shown on **Figure 5-29**. The TAC and MAC weights and the resultant rating of alternatives are shown on **Figures 5-30**, **Bruce Street Interchange Weights** and **5-31, Bruce Street Interchange Ranking of Alternatives,** respectively**.**

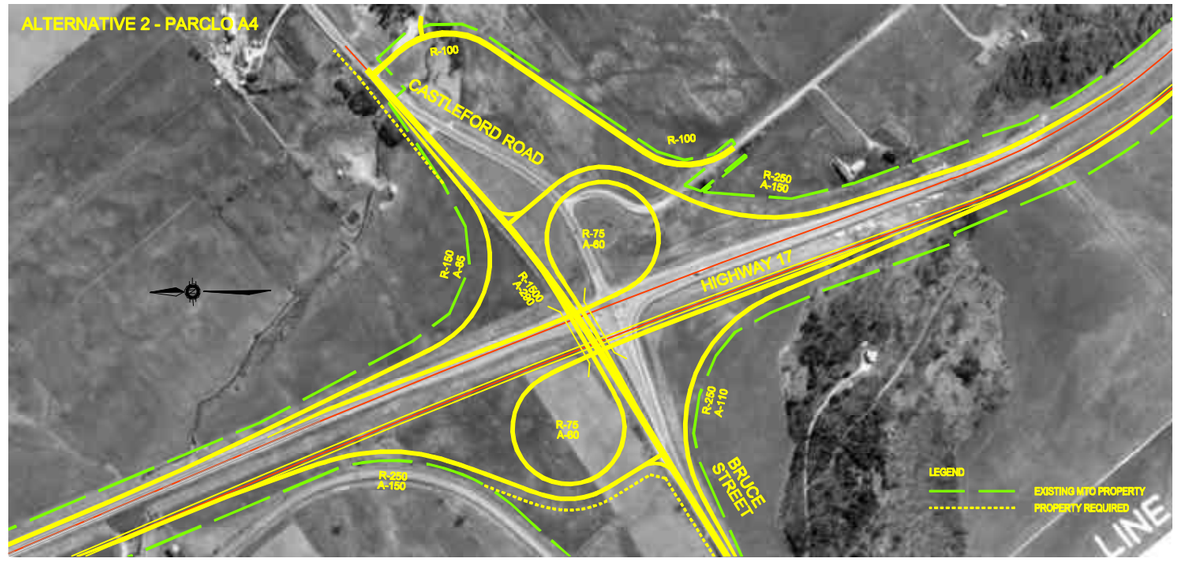
Sensitivity Testing

The purpose of the sensitivity-testing program was to determine whether the outcome of the evaluation was sensitive to changes in weight. The results of the Sensitivity-testing are shown on **Table 5.15, Bruce Street Interchange Sensitivity Testing Program**. The results of the testing program illustrated that the evaluation was generally not sensitive to this range of weights of persons on the TAC or MAC.

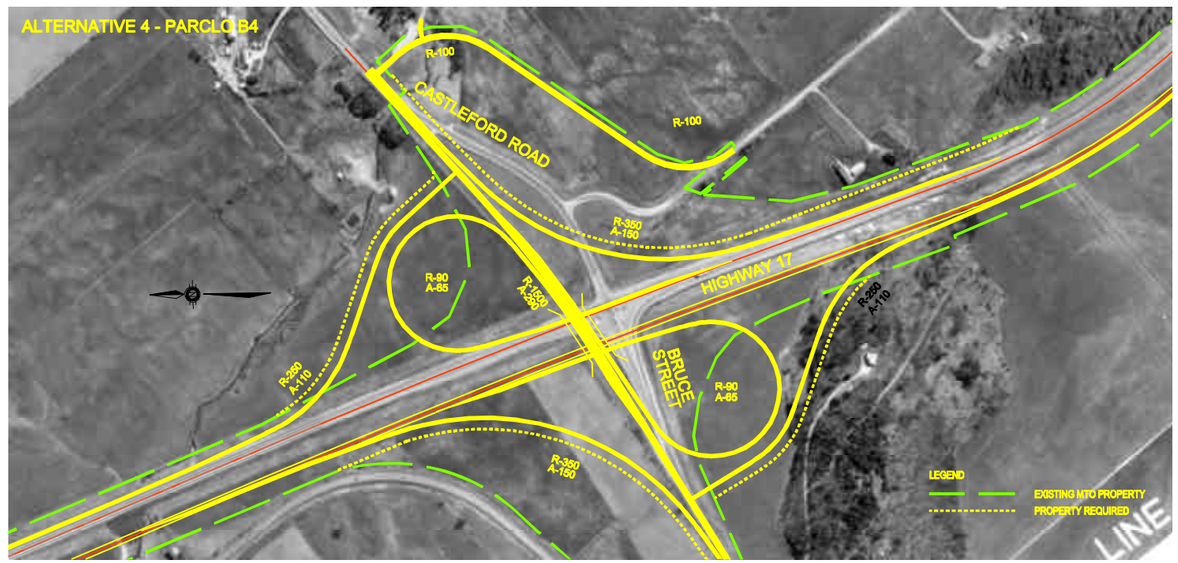
Technically Preferred Alternative

The TPA for Bruce Street is Alternative 1 – Parclo A2, 75 m inner loop. The analysis identified Alternative 1 as the highest ranked alternative and the sensitivity tests showed that the evaluation was not sensitive to the weight assigned to evaluation criteria. The sensitivity-testing program did provide confidence in the option, as providing the best balance of transportation characteristics while recognizing the impacts to the environmental features. This alternative was endorsed by the TAC and the MAC.









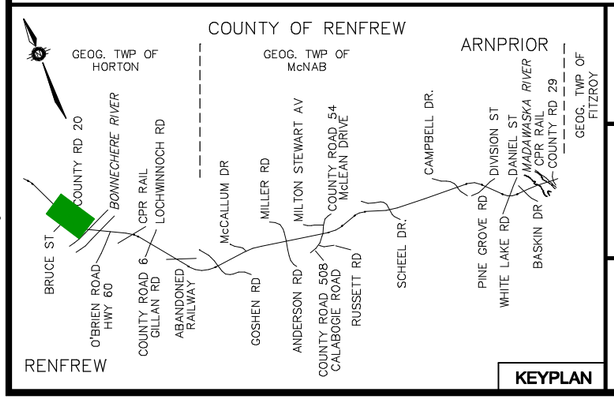


FIGURE 5-29A

BRUCE STREET INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
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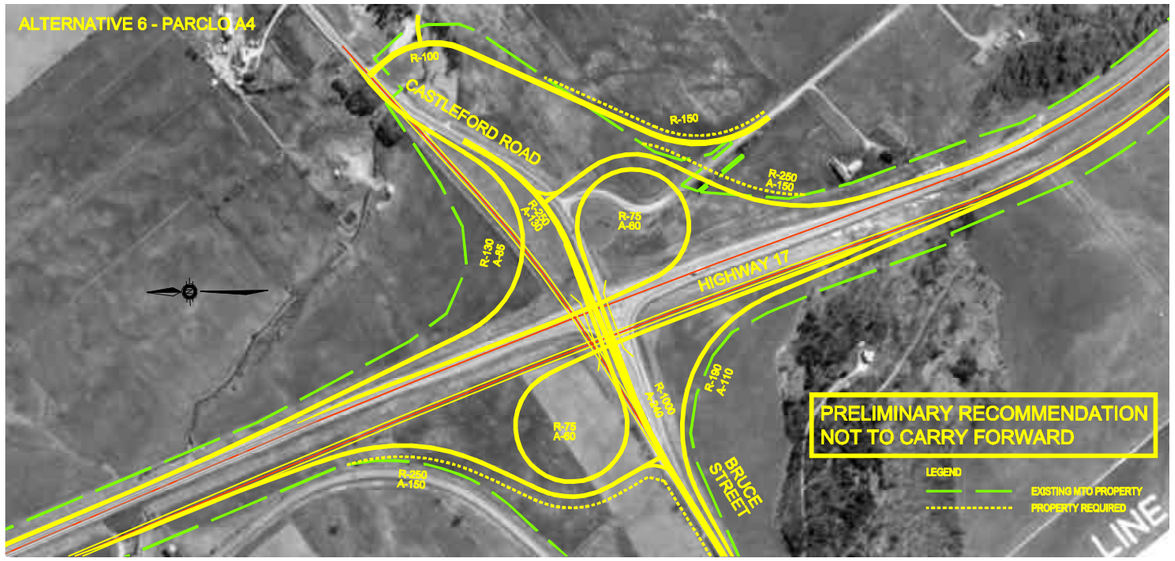
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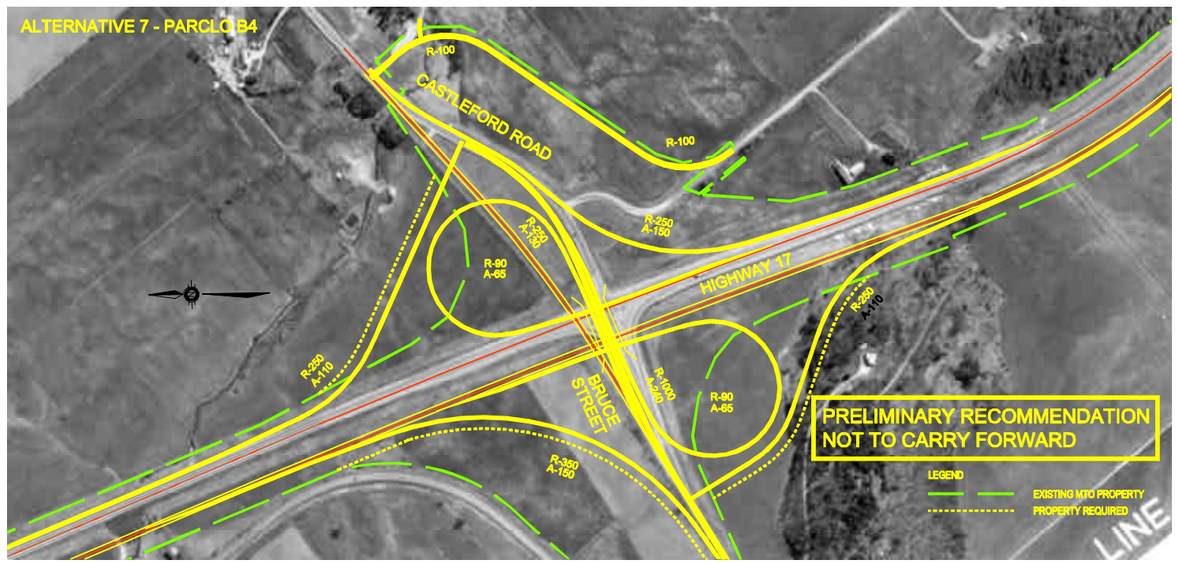
Ministry of Transportation

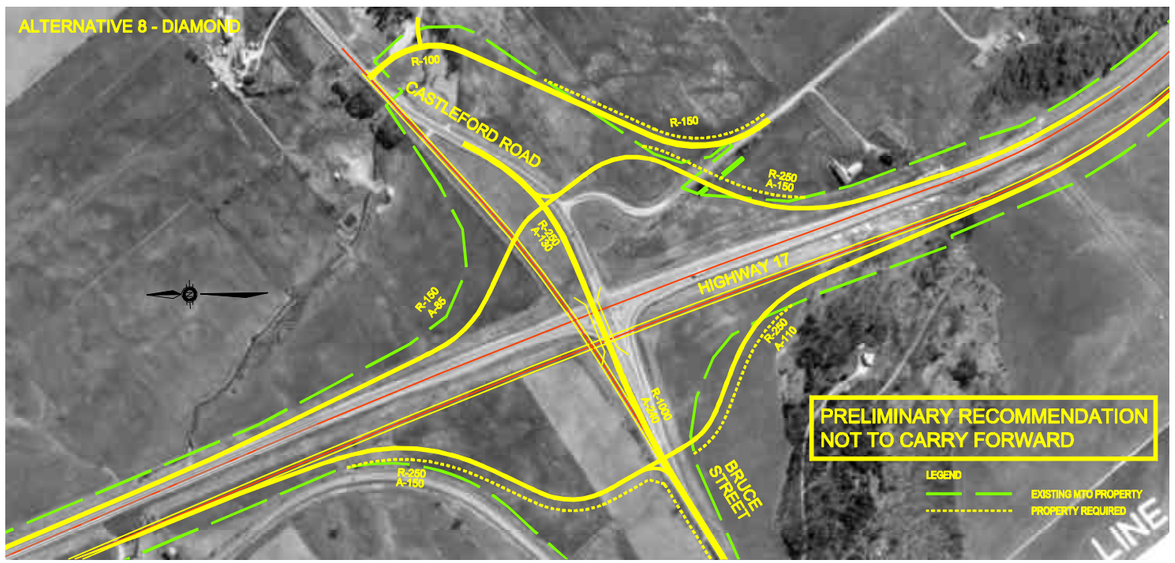
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14-Bruce STREET INT.dwg – Thu, 4 Dec 2003 – 18:26









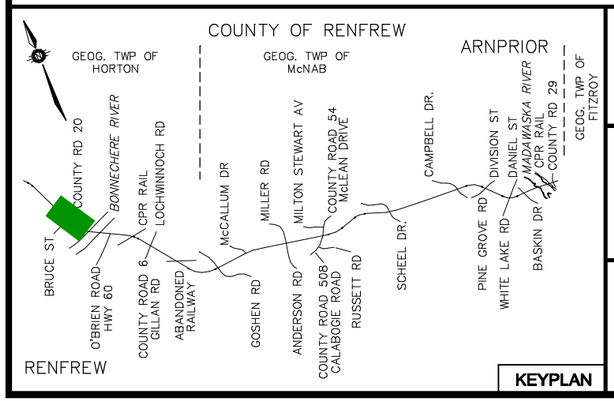


FIGURE 5-29B

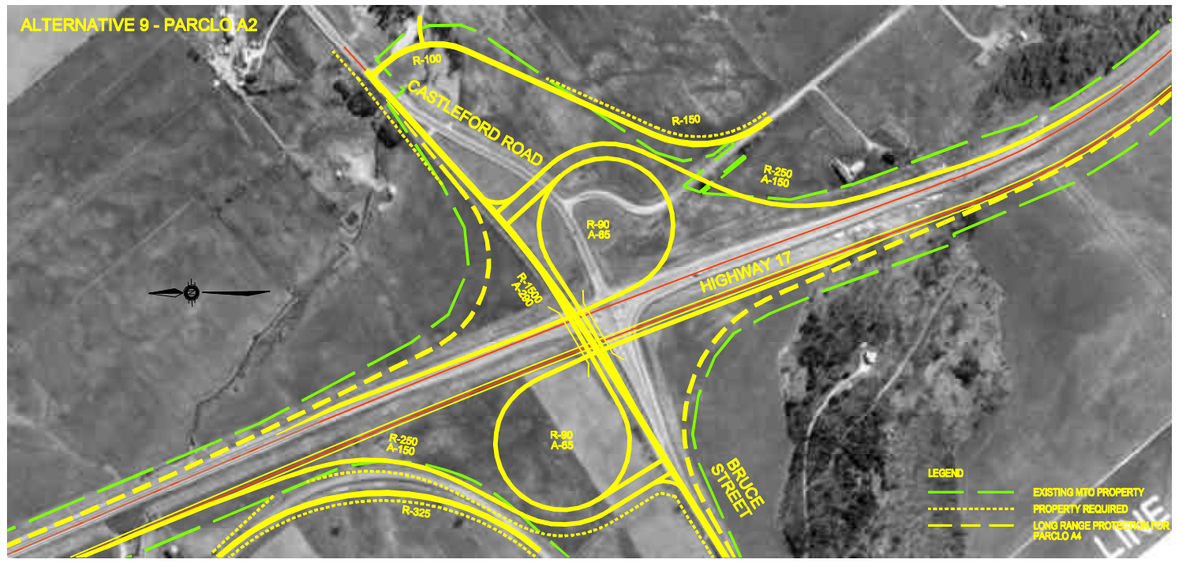
BRUCE STREET INTERCHANGE ALTERNATIVES

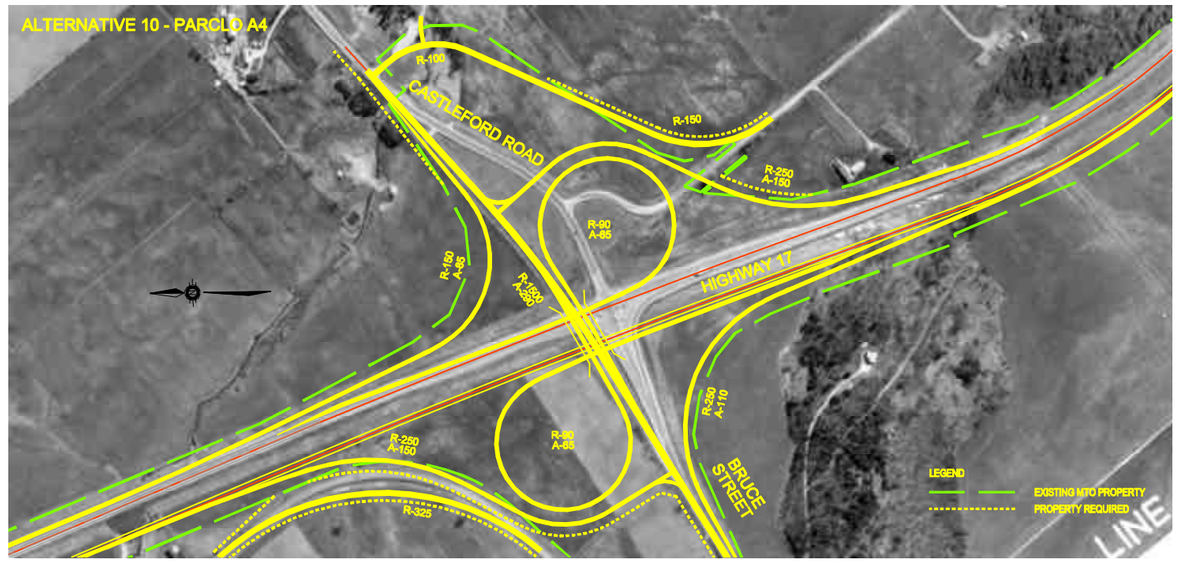
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

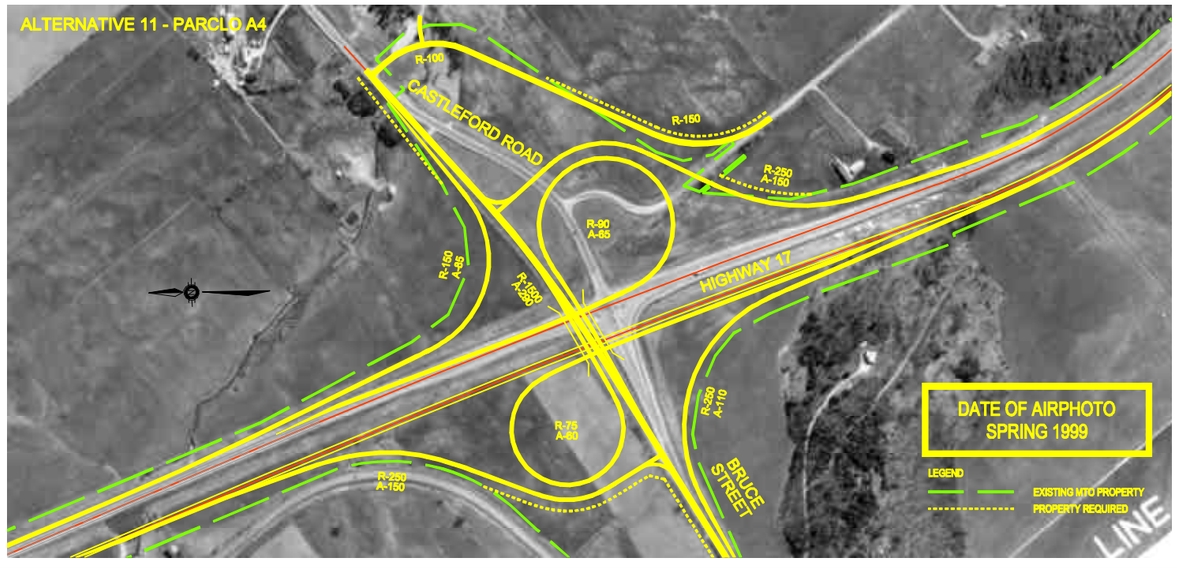
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NCE
TRANSPORTATION AND VALUE ENGINEERS







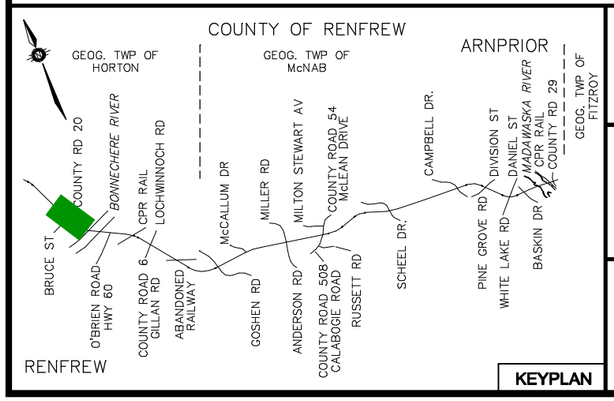


FIGURE 5-29C

BRUCE STREET INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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Figure 5-30 Bruce Street Interchange Weights

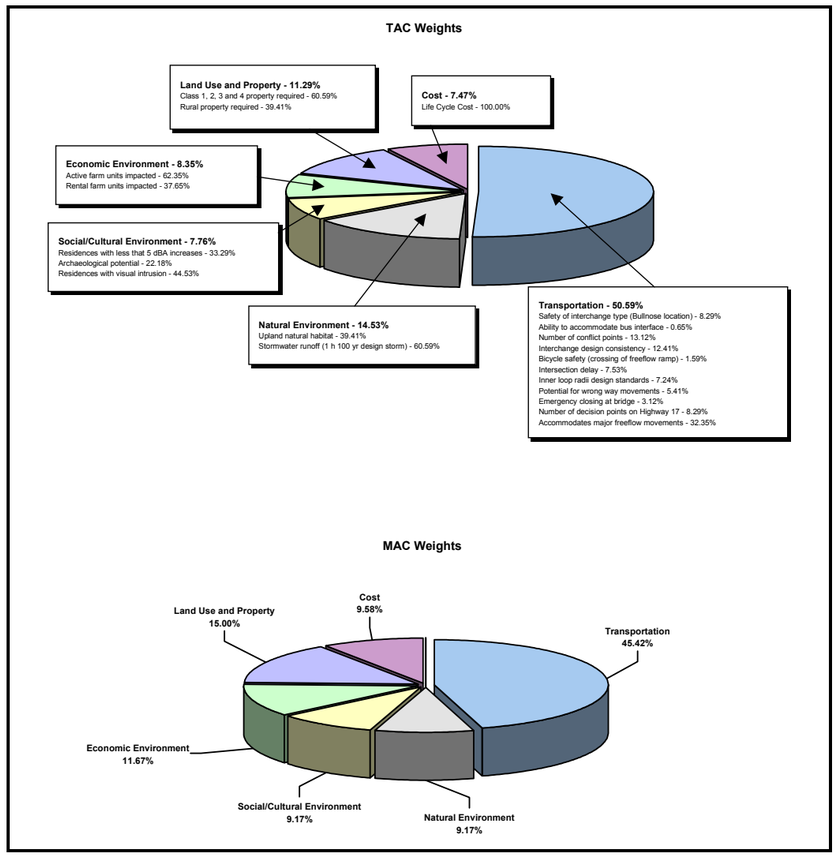


Figure 5-31 Bruce Street Interchange Ranking of Alternatives

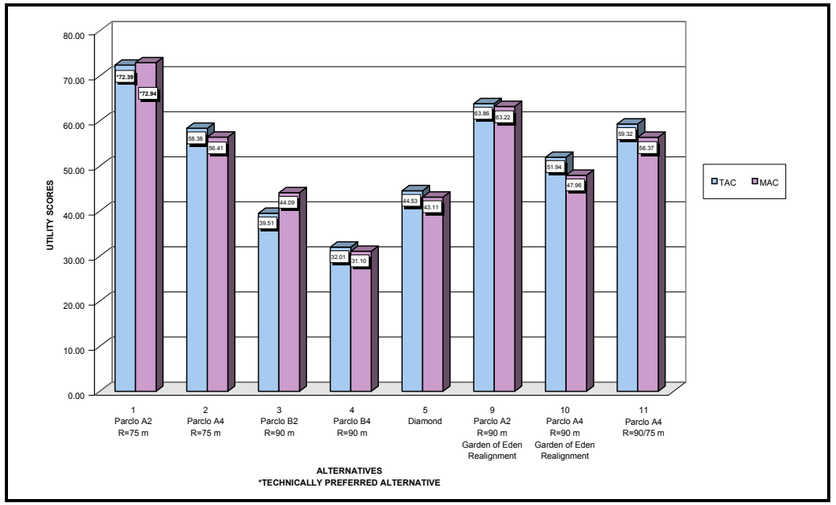


Table 5-15
Bruce Street Interchange Sensitivity Tests

BRUCE STREET INTERCHANGE
SUMMARY OF SENSITIVITY TESTS

FACTORS	RATING	WEIGHT	ALTERNATIVES 1 Parclo A2 R=75 m	2 Parclo A4 R=75 m	3 Parclo B2 R=90 m	4 Parclo B4 R=90 m	5 Diamond	9 Parclo A2 R=90 m Garden of Eden realign.	10 Parclo A4 R=90 m Garden of Eden realign.	11 Parclo A4 R=90/75 m
Technical Advisory Committee			1	4	7	8	6	2	5	3
Municipal Advisory Committee			1	3	6	8	7	2	5	4
1.0 TRAFFIC AND TRANSPORTATION	High	80.0%	5	3	8	7	6	4	2	1
	Low	5.0%	1	5	2	7	4	3	8	6
2.0 NATURAL ENVIRONMENT	High	60.0%	1	4	6	8	2	3	7	5
	Low	5.0%	1	4	7	8	6	2	5	3
3.0 SOCIAL/CULTURAL ENVIRONMENT	High	15.0%	1	4	7	8	6	2	5	3
	Low	0.0%	1	4	7	8	6	2	5	3
4.0 ECONOMIC ENVIRONMENT	High	20.0%	1	4	7	8	6	2	5	3
	Low	0.0%	1	4	7	8	6	2	5	3
5.0 LAND USE & PROPERTY	High	30.0%	1	3	5	8	6	2	7	4
	Low	0.0%	1	4	7	8	6	2	5	3
6.0 COST	High	20.0%	1	4	6	8	5	2	7	3
	Low	0.0%	1	4	7	8	6	2	5	3

5.6 Refinements to the Technically Preferred Plan

The TAC and MAC gave consideration to the public comments received at the second PIC. These public and agency concerns were used to develop refinements to the TPP. The alternatives were developed for each area of concern and were subsequently evaluated and presented to the public at PIC No. 3, refer to **Appendix U**.

The description of the localized areas of concern, and the refinements considered, are described in the following sections.

5.6.1 Cross Road Profiles

Cross road profiles were identified by local residents as an area of concern regarding the proposed travel speed on the underpass structures at several locations. At Campbell Drive, Scheel Drive and Miller/Anderson the design speed of the cross roads was reduced to 80 km/h, from 100 km/h. The alternatives are shown on **Figure 5-32.** These alternatives were shown to the TAC, MAC and the public at the third PIC with the preferred alternative being 80 km/h.

5.6.2 White Lake Road/Baskin Drive Service Road

Alignment Alternatives

White Lake Road/Baskin Drive Service Road alignment alternatives were carried forward for consideration to address concerns regarding out-of-way travel to the Boeing plant, and future development identified by property owners and the Town of Arnprior. The White Lake Road to Baskin Drive Service Road alternatives are illustrated on **Figure 5-33.**

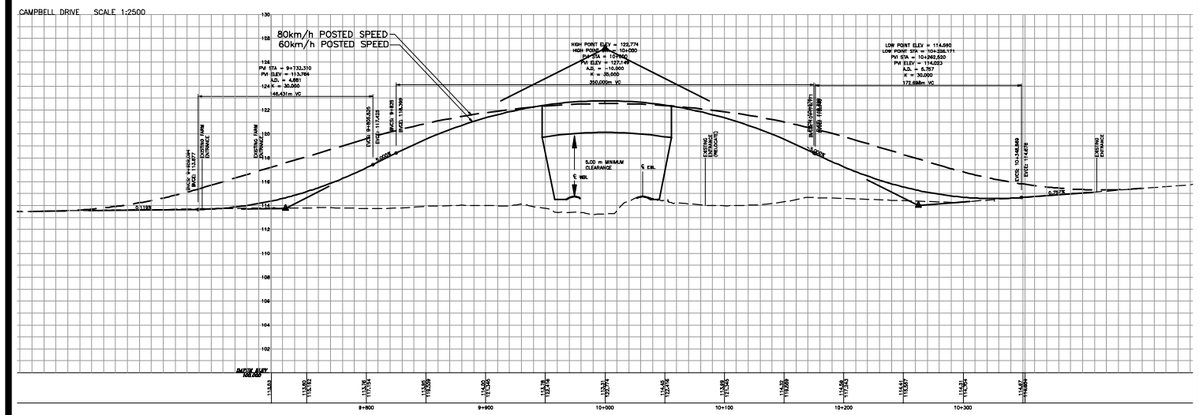
Four service road alignment options were developed. Two options were considered but not carried forward due to reduced access to properties south of Highway 17 at a coarse screening stage. The coarse screening was endorsed by the TAC and MAC.

The two short listed alignments were considered by the Town of Arnprior in consultation with the land owner. Based on these discussions, the Town recommended Alternative 1 and it was carried as a study recommendation.

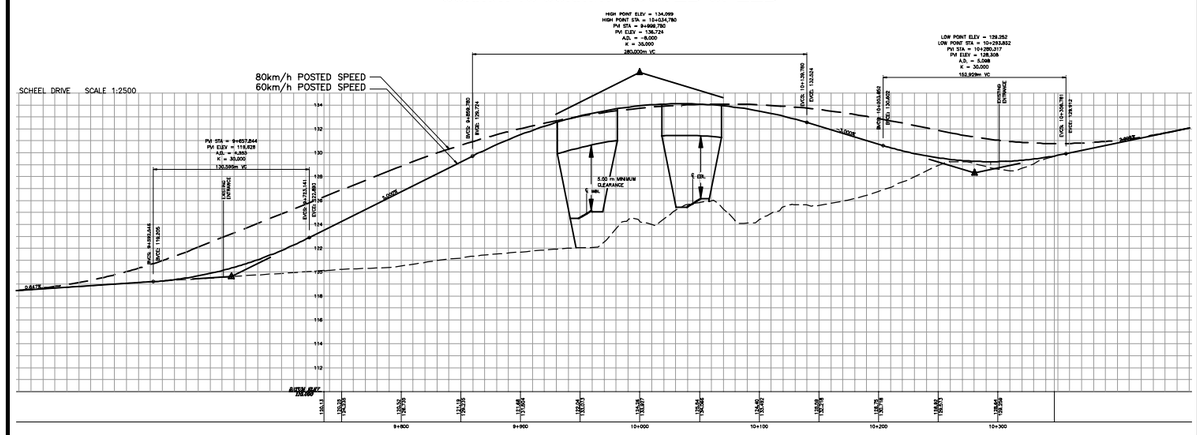
Baskin Drive Intersection Alternatives

Two Baskin Drive/Service Road intersection locations were also considered. Options 1 and 2, which will both affect the Boeing Plant parking lot. Option 2 is recommended to improve safety and visibility at the Baskin Drive intersection. This will require reconstruction of a portion of the Boeing parking lot and a possible land exchange to accommodate a relocation of parking. Boeing has endorsed this recommendation. The location of the Baskin Drive intersection was discussed with Boeing Canada and supported by the land owner.

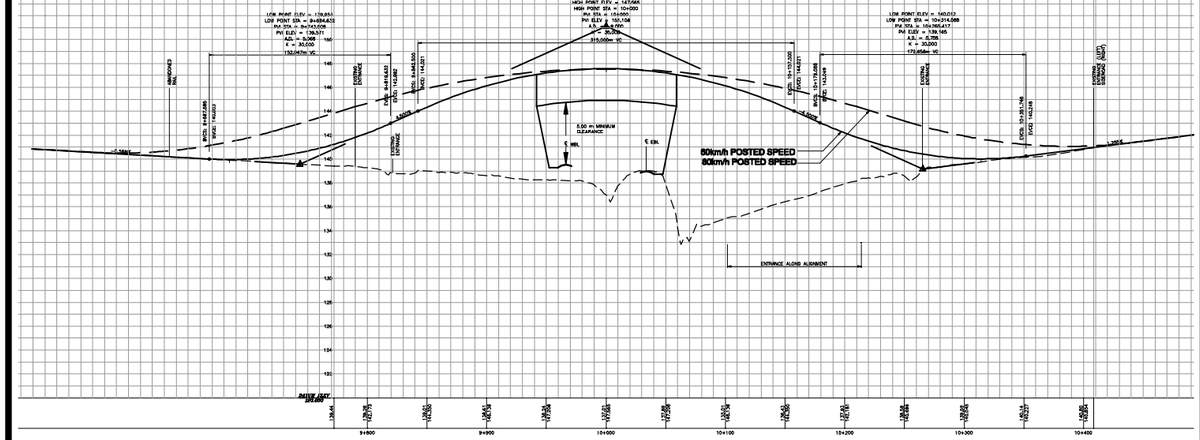
MILLER/ANDERSON ROAD
80km/h vs 60km/h POSTED SPEED



SCHEEL DRIVE
80km/h vs 60km/h POSTED SPEED



CAMPBELL DRIVE
80km/h vs 60km/h POSTED SPEED



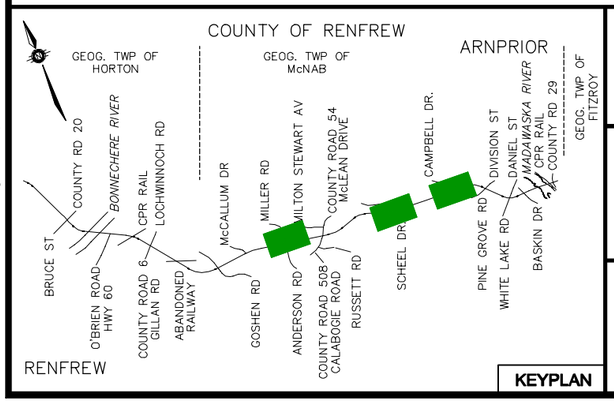


FIGURE 5-32

CROSS ROAD PROFILE ALTERNATIVES

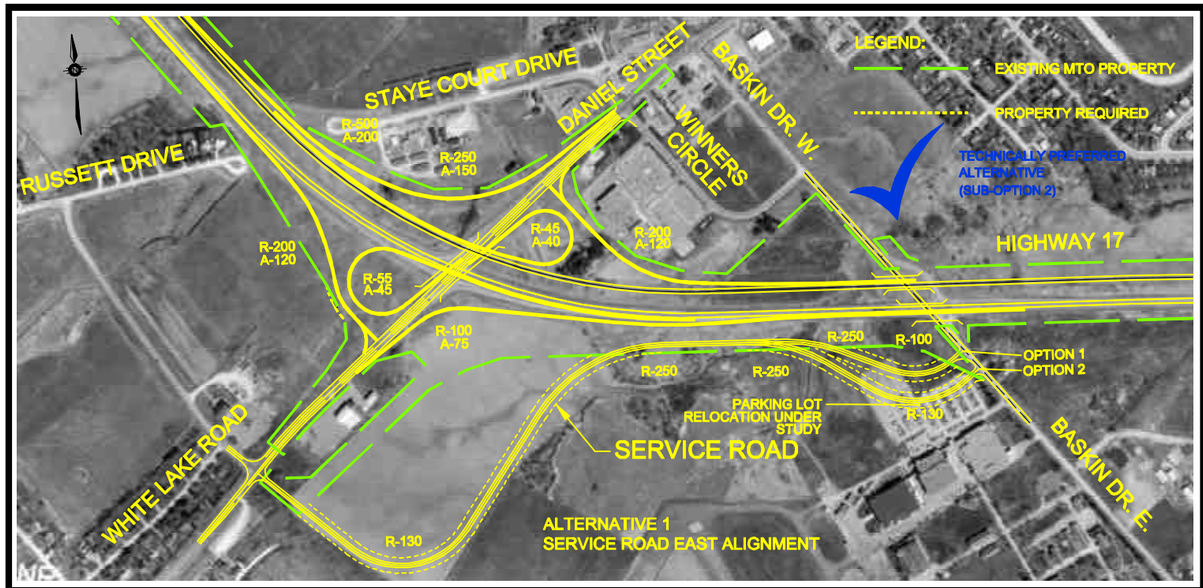
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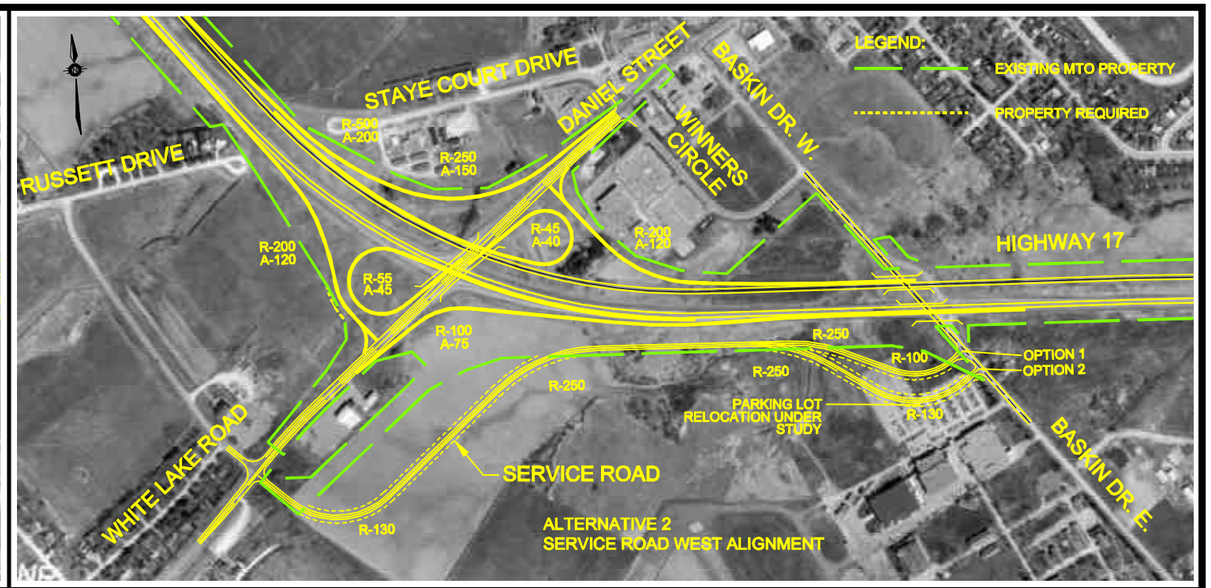
Ministry of Transportation

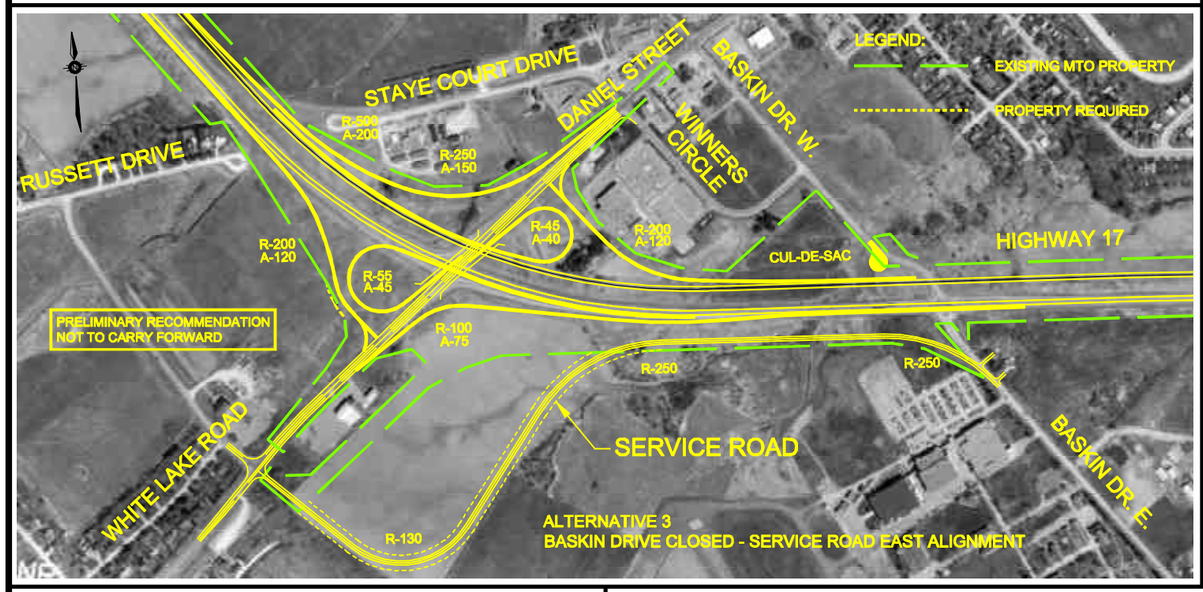
HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

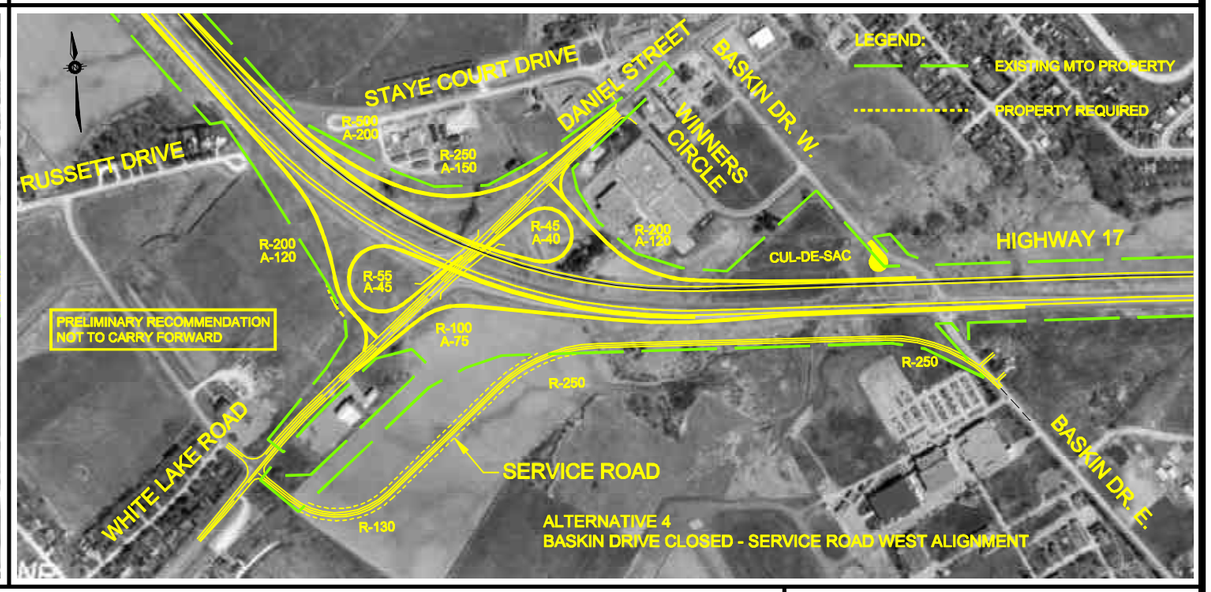
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15-CROSS ROAD PROFILES.dwg – Thu, 4 Dec 2003 – 18:29









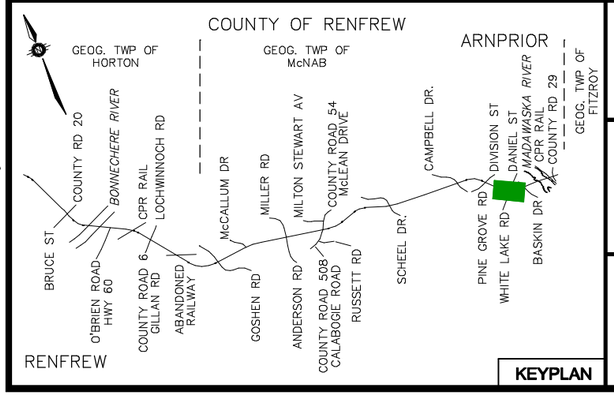


FIGURE 5-33

WHITE LAKE ROAD/BASKIN DRIVE SERVICE ROAD ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
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SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

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16--WHITE LAKE SERVICE RD.dwg -- Thu, 4 Dec 2003 -- 18:31

5.6.3 Campbell Drive Interchange

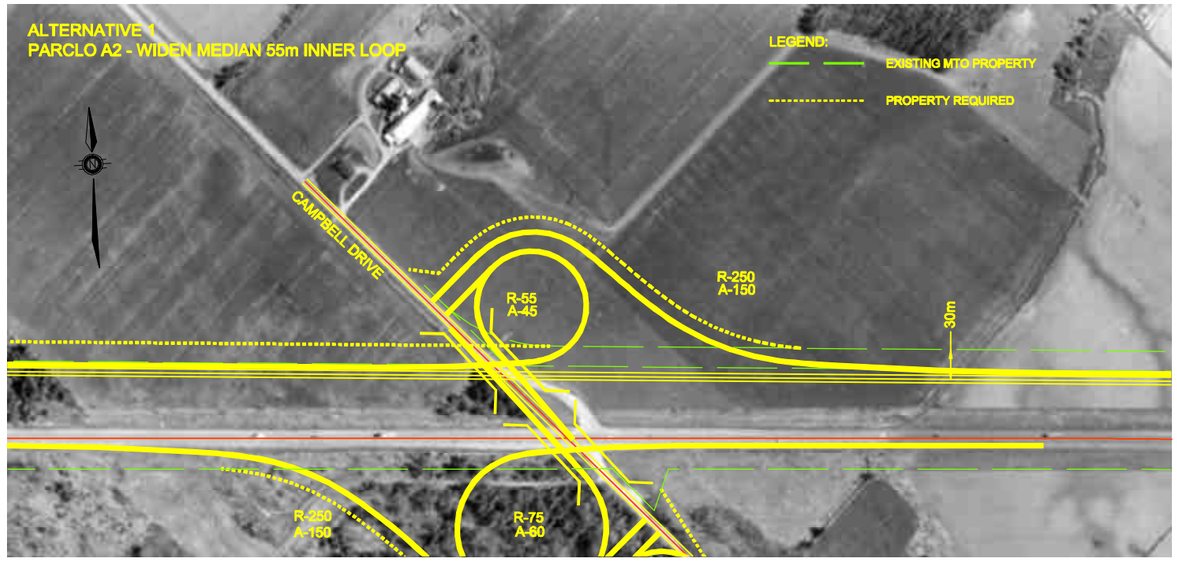
The Campbell Drive Interchange was initially identified as a long term need. However, community concern regarding truck traffic through the Pine Grove community, and the Town of Arnprior resulted in the TAC and MAC recommending the partial interchange be accelerated to a short-term need. This recommendation was shown to the adjacent property owners at PIC No. 3.

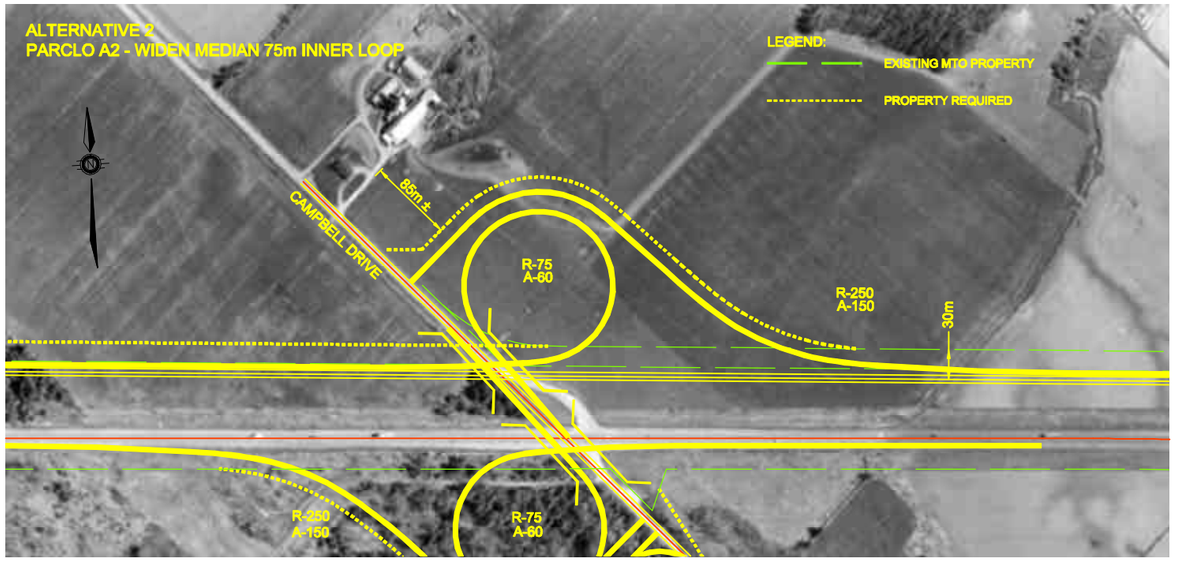
The interchange configuration resulted in several competing elements. For instance, the large skew angle of the crossing with the highway better suited the use of a wider median that allowed twin bridge structures. However, the wider median design resulted in greater loss of farmland, smaller radii on the ramps and greater severance of the deeryard. Three options were considered to reduce the effects on the adjacent lands and it was recommended that a Parclo A2 with narrower 32.5 m median and 75 m inner loops be recommended. The trade-offs with this decision were marginally greater costs for the bridge structure but reduced environmental effects (deer yard and farmland) and improved safety (larger ramp radii). The Campbell Drive Interchange Alternatives are shown on **Figure 5-34**. The assessment of alternatives is shown on **Table 5-16, Campbell Drive Interchange Analysis and Evaluation**.

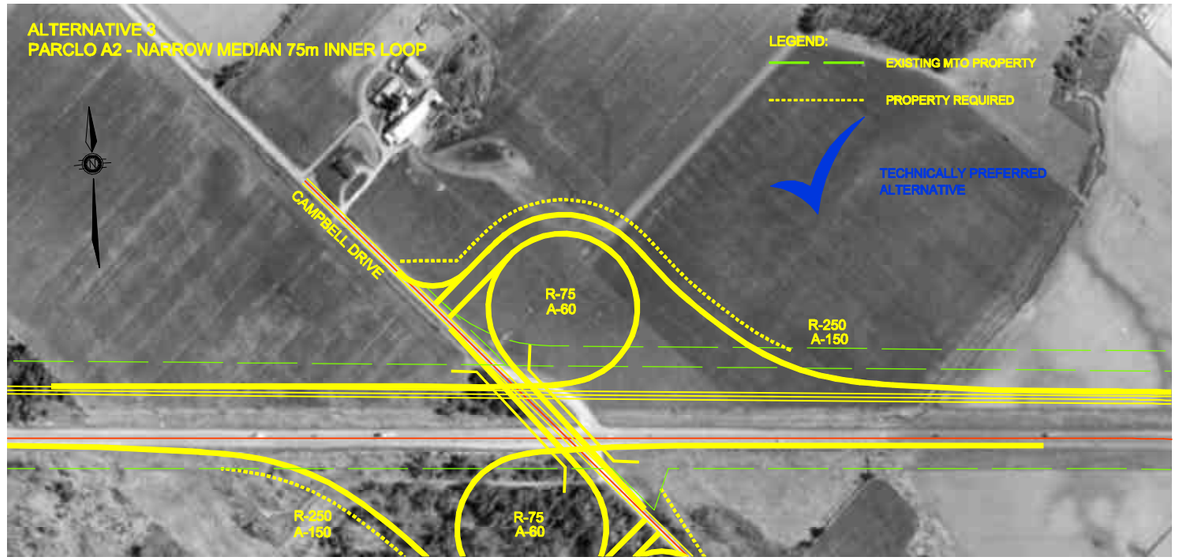
Table 5-16
Campbell Drive Interchange Summary of Evaluation

Factors	Alternative 1 55 m Inner Loop Wide Median	Alternative 2 75 m Inner Loop Wide Median	Alternative 3 75 m Inner Loop Narrow Median
Traffic and Transportation	✖	✓	✓
Natural Environment	—	—	✓
Social/Cultural Environment	✓	✖	✓
Economic Environment	✓	✖	✓
Land Use and Property	Not applicable	Not applicable	Not applicable
Cost	—	—	—
RECOMMENDATION	NOT CARRIED FORWARD	NOT CARRIED FORWARD	**CARRIED FORWARD**

✓ **Good in Comparison** — **Neutral** ✖ **Poor in Comparison**







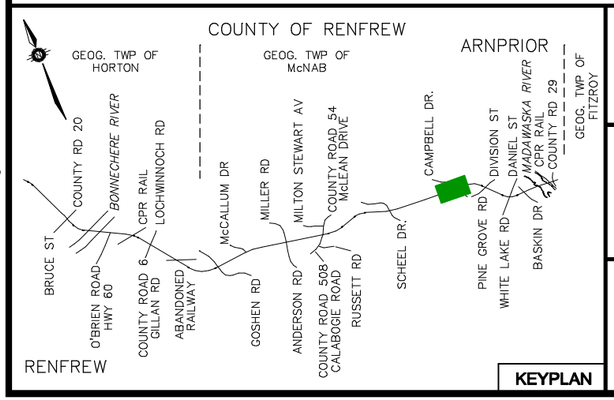


FIGURE 5-34

CAMPBELL DRIVE
INTERCHANGE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

12.5m 0 25m
Horizontal

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17-CAMPBELL DRIVE.dwg – Thu, 4 Dec 2003 – 18:34

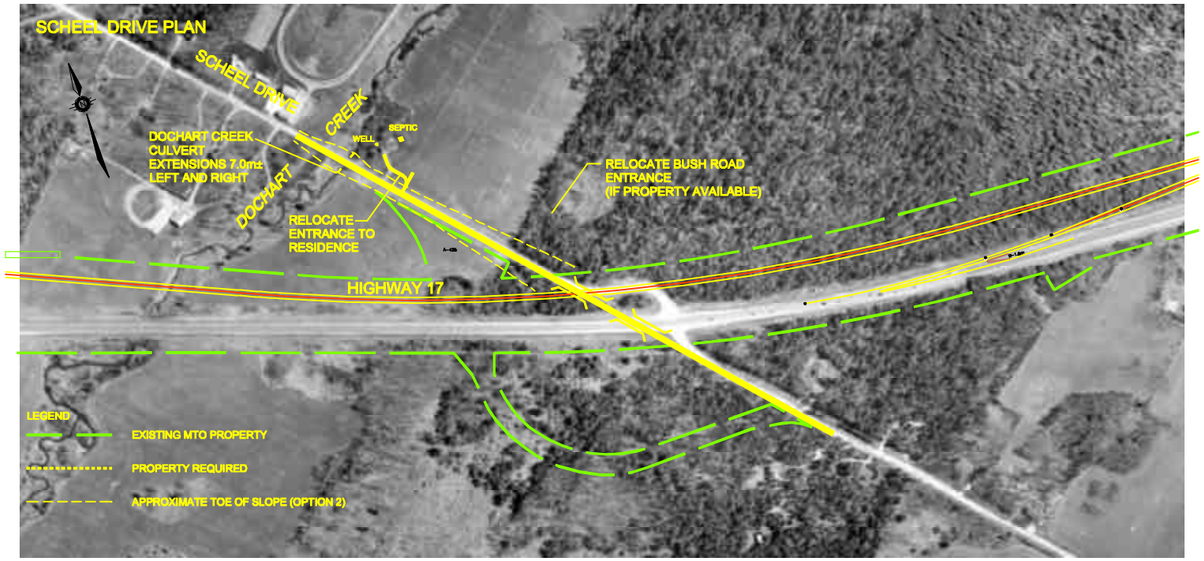
5.6.4 Scheel Drive Profile Alternatives

Alternatives were developed to reduce embankment impacts to an adjacent residence (northeast quadrant) and Dochart Creek aquatic habitat. Scheel Drive Profile alternatives at the Highway 17 underpass were carried forward for consideration to address landowner concerns regarding driveway and entrance impacts. Also, the roadway profile in the vicinity of Dochart Creek affected the area of fish habitat because of the need to extend the existing culvert to accommodate higher fill slopes.

Two options were developed and are shown on **Figure 5-35, Scheel Drive Profile** Alternatives. These alternative include: Option 1: Flat Alignment at Dochart Creek and Option 2: Rolling Alignment at Dochart Creek (Preferred). The analysis and evaluation of the profile alternative are shown on **Table 5-17**.

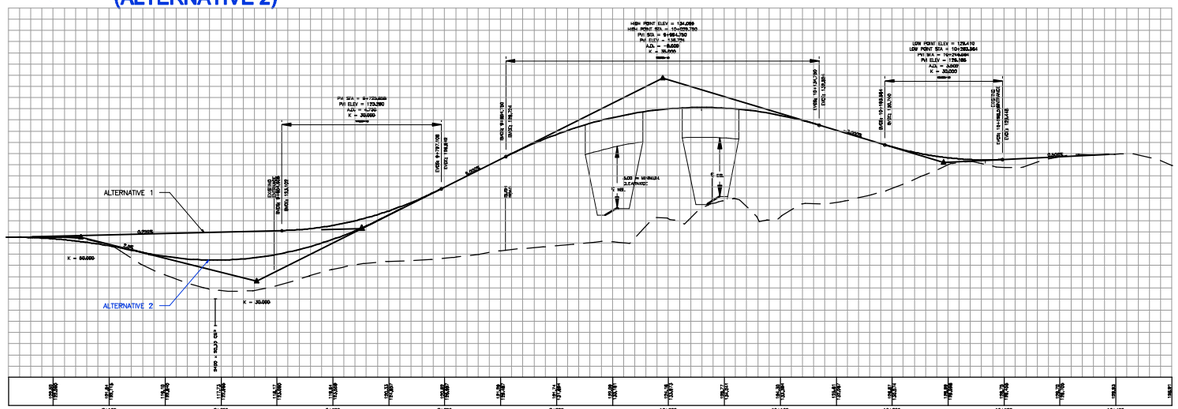
Table 5-17
Scheel Drive Profile Summary of Analysis

Factors	Option 1 Flat Alignment at Dochart Creek	Option 2 Rolling Alignment at Dochart Creek
Traffic and Transportation	Both the same.	Both the same.
Natural Environment	✖	✓
Social Environment	✖	✓
Economic Environment	—	—
Land Use and Property	—	—
Cost	✖	✓
RECOMMENDATION	NOT CARRIED FORWARD	**CARRIED FORWARD**
✓ **Good in Comparison**	— **Neutral**	✖ **Poor in Comparison**



SCHEEL DRIVE PROFILE

TECHNICALLY PREFERRED ALTERNATIVE (ALTERNATIVE 2)



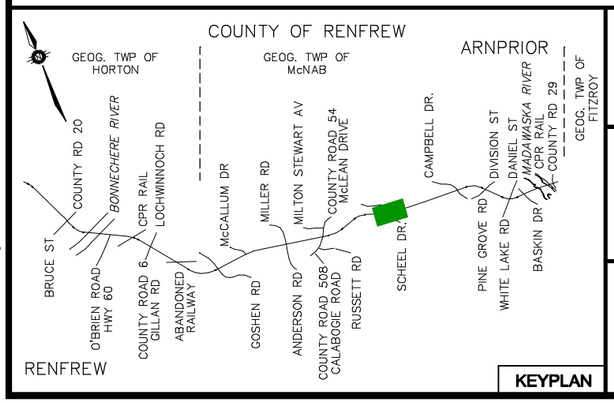


FIGURE 5-35

SCHEEL DRIVE PROFILE ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

NCE
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18—SCHEEL DRIVE.dwg – Thu, 4 Dec 2003 – 18:38

5.6.5 County Road 508/54 Sideroad Realignment

Sideroad realignment alternatives were considered to address turning radii and sightline definciencies inherent with the original 1972 plan. The original plan included 25 m radii on the service road, which are below a design speed of 40 km/h. The recommendation is to improve the sideroad geometry for Russett Road and Milton Stewart Road to meet current MTO, County and Township standards. This will improve safety and facilitate truck and emergency vehicle turning movements. This change also reflects the change in land use that has occurred since 1972. The municipal office, commercial businesses, and emergency services will rely on these municipal roads.

Alternative 2 was developed to increase the design speed and improve safety of the sideroads. The alternatives included Alternative 1: 1972 Road Closing Plan (minimum radius R=25 m) and Alternative 2: Sideroad Realignment (minimum radius R=130 m (Preferred)) and are shown on **Figure 5-36, County Road 508 Service Road Alternative.** The summary of the analysis and evaluation is shown on **Table 5-18, County Road 508 Side Road Alternatives.**

Table 5-18
County Road 508 Side Road Alternatives

Factors	Alternative 1 1972 Road Closing Plan	Alternative 2 Sideroad Realignment
Traffic and Transportation	✘	✓
Natural Environment	Not Applicable	Not Applicable
Social Environment	—	—
Economic Environment	—	—
Land Use and Property	—	—
Cost	—	—
RECOMMENDATION	NOT CARRIED FORWARD	**CARRIED FORWARD**
✓ **Good in Comparison**	— **Neutral**	✘ **Poor in Comparison**





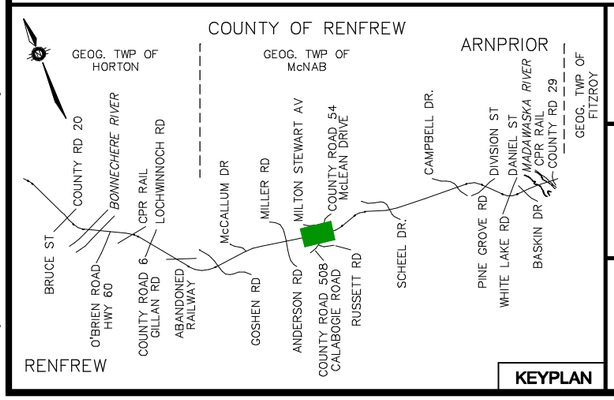


FIGURE 5-36

COUNTY ROAD 508
SERVICE ROAD ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

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19-County 508 Service Rd Alternatives.dwg – Thu, 4 Dec 2003 – 18:41

5.6.6 Miller Road Extension

5.6.6.1 Service Road Alternatives

The community was concerned that the originally proposed flyover would increase truck traffic in their neighbourhood. Alternatives were considered to address those concerns. A Value Engineering Review of the Technically Preferred Plan, by an independent technical review team, also identified considerable merit in examining other alternatives to providing a flyover at Miller/Anderson Roads.

Alternatives were developed to consider the following:

- Reduce costs by not constructing a structure;
- Reduce residential and business buyouts;
- Reduce traffic rerouted by flyover (truck traffic from quarries);
- Improve visibility of children waiting for the school bus on approaches to flyover; and
- Providing an east-west community link for local traffic north of Highway 17.

The Public Advisory Committee was an advocate for investigating alternative road solutions.

Four options were developed that included:

- Alternative 1 – Grade Separation (Original 1972 Plan)
- Alternative 2 – Close Anderson Road at Highway 17 and connect Miller Road to Laventure (Not Carried Forward)
- Alternative 3 – Close Anderson Road at Highway 17 and connect Miller Road to Laventure Road with Partial Realignment
- Alternative 4 – Miller Road Extension (North Side of Highway 17) – (Preferred Alternative)
- Alternative 5 – Use existing unopened Road allowance to provide local road network connection to Milton Stewart Avenue

The alternatives listed above are illustrated on **Figure 5-37**. The findings of the analysis and evaluation of the alternatives is shown on **Figures 5-38** and **5-39**.

The summary of the sensitivity tests are found in **Table 5-19 Miller Road Extension Summary of Sensitivity Tests**. Alternative 4 – Miller Road Extension was the preferred alternative with the highest ranking and it consistently scored the highest for all the sensitivity tests. The recommended alternative is to extend Miller Road to connect to the County Road 508 interchange along the north side of Highway 17. This alternative was also supported by the public at PIC No. 2.

Table 5-19
Miller Road Extension Summary of Sensitivity Tests

FACTORS	RATING	ALTERNATIVES				
		WEIGHT	1 Grade Separation	3 Laventure Road Partial Realignment	4 Miller Road Extension	5 Existing Road Network
TAC			**4**	**2**	**1**	**3**
1.0 TRAFFIC AND TRANSPORTATION	High	60.0%	3	2	1	4
	Low	0.0%	4	3	1	2
2.0 NATURAL ENVIRONMENT	High	20.0%	4	2	1	3
	Low	0.0%	4	2	1	3
3.0 SOCIAL/ CULTURAL ENVIRONMENT	High	45.0%	4	2	1	3
	Low	20.0%	4	2	1	3
4.0 ECONOMIC ENVIRONMENT	High	10.0%	4	2	1	3
	Low	0.0%	4	2	1	3
5.0 LAND USE & PROPERTY	High	25.0%	4	2	1	3
	Low	0.0%	3	2	1	4
6.0 COST	High	30.0%	4	2	1	3
	Low	0.0%	3	2	1	4

5.6.6.2 Miller Road Connection to County Road 54

The community voiced concerns regarding truck traffic from the north travelling south over a new Highway 17 flyover. Consequently, a possible north service road was proposed from Miller Road extending east to the County Road 54/508 interchange. The solution is to construct a new County road adjacent to Highway 17 that links Miller Road easterly to County Road 54. This permits truck traffic to by-pass the existing communities, as described in **Section 5.6.6.1**. This solution was presented to the public at PIC No. 2 and 3.

Alternate roadway configurations for the connection of the Miller Service Road to County Road 54 were assessed in response to the owner of a commercial business, located on Milton Stewart Avenue adjacent to Highway 17, regarding impacts to their business by removing frontage or removing the majority of their land holding.

Five alternatives were reviewed, refer to **Figure 5-40, Miller Road Connection Alternatives.** A summary of the analysis and evaluation of the alternatives is shown on **Table 5-20, Evaluation Summary - Miller Service Road Connection to County Road 54**.

Table 5-20
Evaluation Summary – Miller Service Road Connection At County Road 54

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Transportation and Safety	✓	✓	✘	—	—
Social Environment	✓	✘	✓	✘	✘
Land Use and Property	✘	—	—	—	✘
Cost	—	—	—	—	—
Recommendation	Carry Forward	Do not carry forward	Do not carry forward	Do not carry forward	Do not carry forward

✓ **Good in Comparison** — **Neutral** ✘ **Poor in Comparison**

A preferred alignment was selected considering several corridors. The preferred corridor, Alternative 1, generally followed the north edge of the Highway 17 right-of-way.

Impacts to the nursery business by the service road are unavoidable. Consequently, it was recommended to concentrate any detrimental impacts to one single property. In doing so, this will avoid community disruption impacts to several residential properties. This solution contains impacts to one site, and allows mitigation in the form of financial compensation, including a buyout of the business or relocation to a more desirable site. Surplus property, if available, can be offered to the nursery owner if he chooses to relocate his business.

A complete discussion of the analysis and evaluation is included in **Appendix V**.









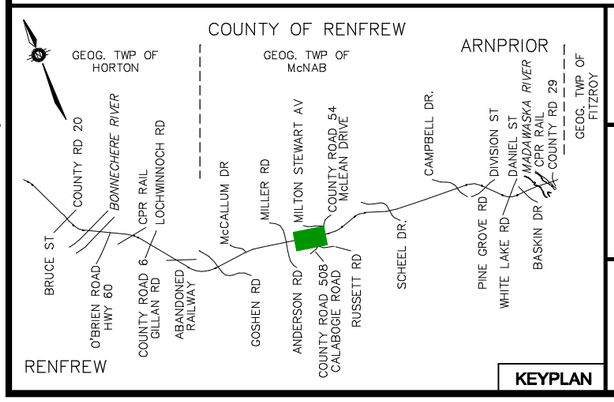


FIGURE 5-37A

MILLER ROAD EXTENSION ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

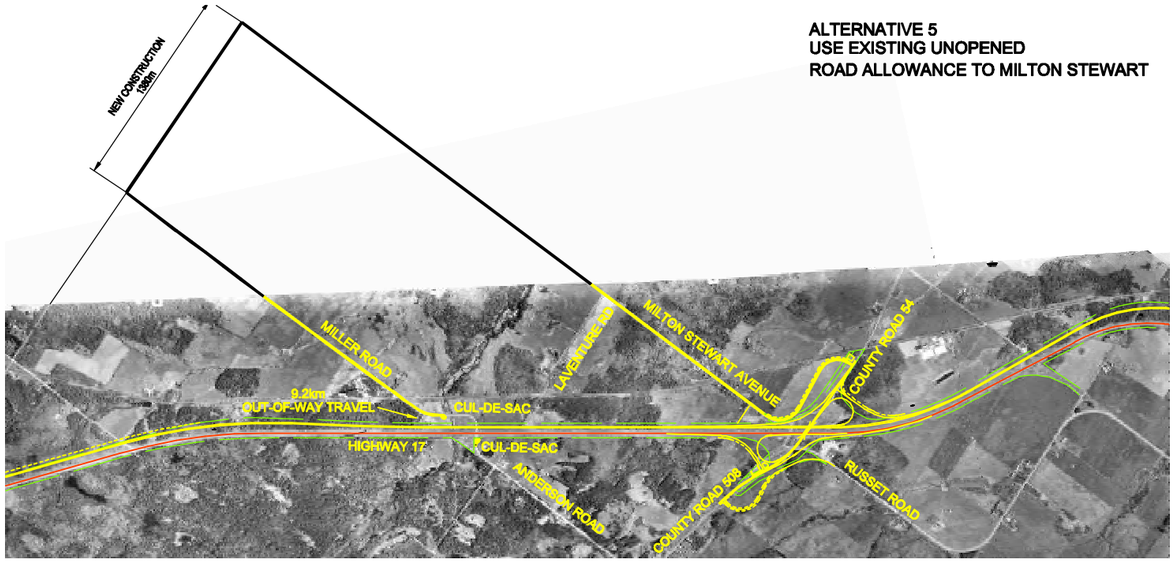
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Horizontal

Ministry of Transportation

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20--miller rd extension alternatives.dwg -- Thu, 4 Dec 2003 -- 18:47

ALTERNATIVE 5
USE EXISTING UNOPENED
ROAD ALLOWANCE TO MILTON STEWART



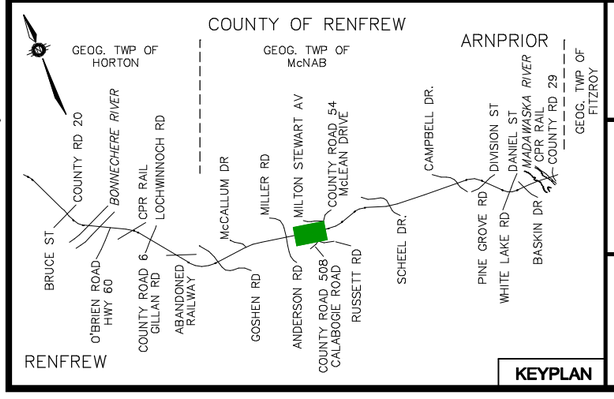


FIGURE 5-37B

MILLER ROAD
EXTENSION ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

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20-miller rd extension alternatives.dwg – Thu, 4 Dec 2003 – 18:47

Figure 5-38 TAC Weights– Miller Road Extension

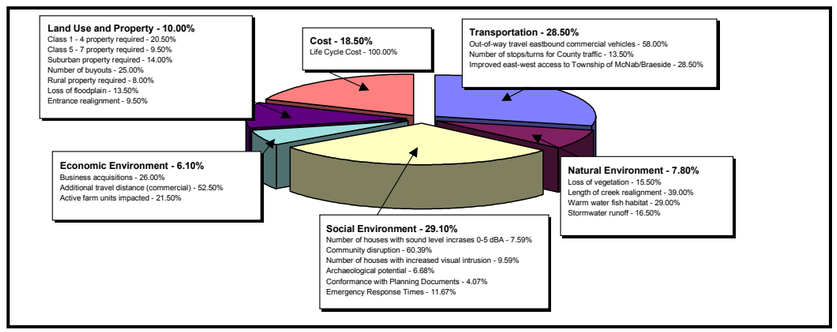
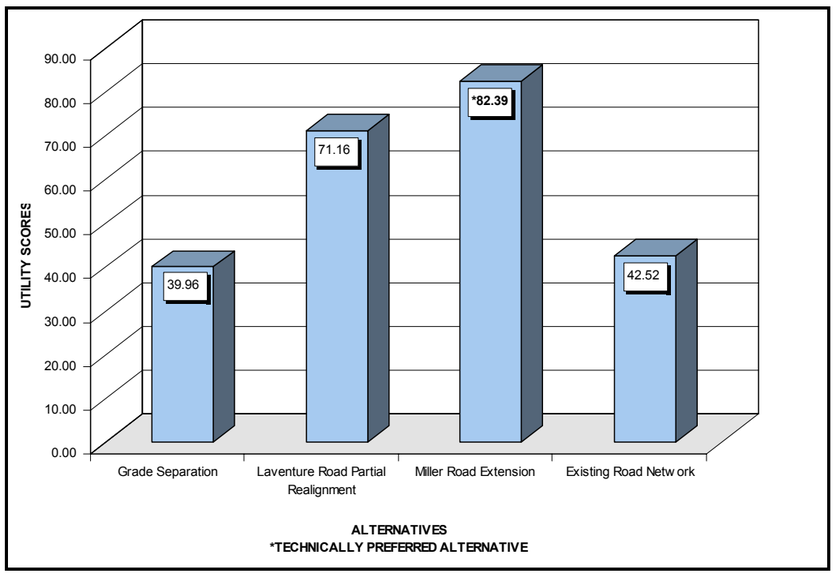
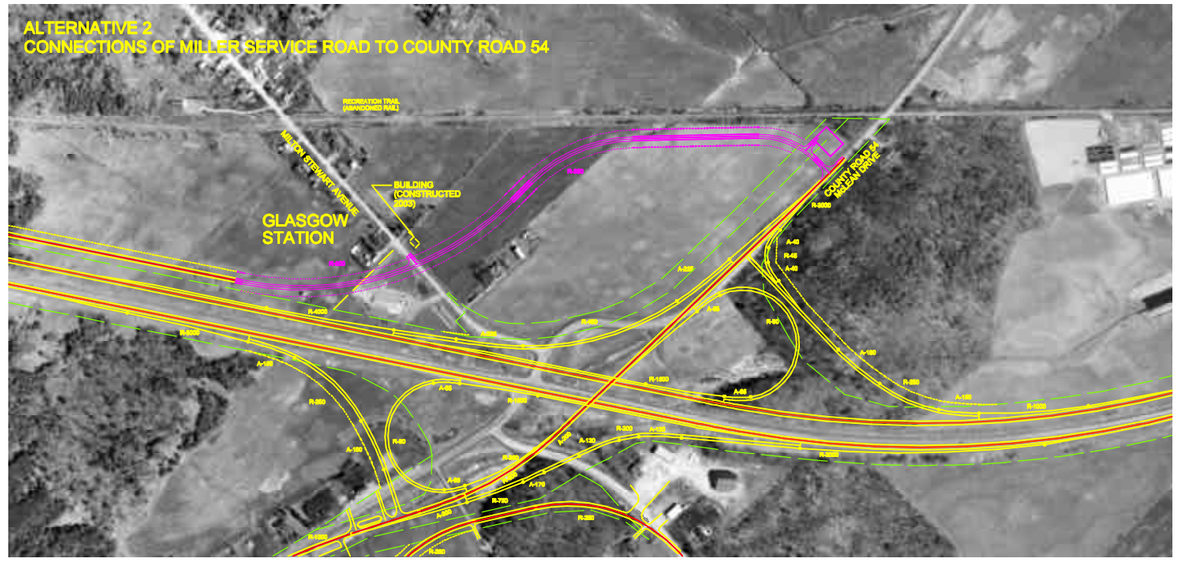


Figure 5-39 Ranking of Alternatives – Miller Road Extension











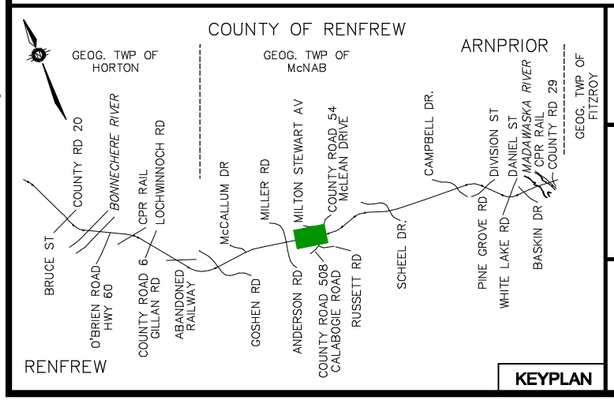


FIGURE 5-40A

MILLER ROAD
CONNECTION ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

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25--MILLER rd CONNECTION alternatives.dwg -- Thu, 4 Dec 2003 -- 18:52



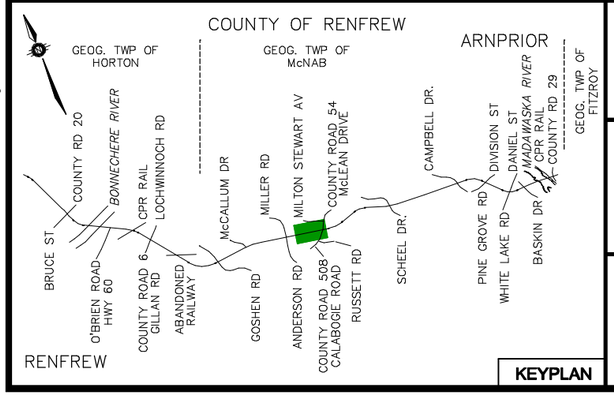


FIGURE 5-40B

MILLER ROAD
CONNECTION ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

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25-MILLER rd CONNECTION alternatives.dwg – Thu, 4 Dec 2003 – 18:52

5.6.7 McCallum Drive Road Closing

A widened median for Highway 17 in the vicinity of McCallum Drive was recommended to provide improved safety. The right-of-way widening requires additional property from a single-family residence on McCallum Drive. The property owner was concerned that the proximity of the house to the westbound lanes will have a detrimental impact and requested a south side twinning be considered.

McCallum Drive Road Closing alternatives considered twinning the highway to the north (original design) or to the south. These were investigated to consider cost and property impact trade-offs. The alternatives are shown on **Figure 5-41**.

Based on this analysis and discussions with the adjacent landowner, the recommended alternative is to twin the highway to the north, purchase the residential property, and provide additional landscaping and berming to reduce visual impacts to the remaining residents on McCallum Drive. The original TPP was modified, as Alternative 1, to include the acquisition of the entire property based on consultation with the landowner. This will also provide an area for a turning basin as McCallum Drive will become a cul-de-sac at Highway 17. The assessment of alternatives is shown on **Table 5-21**.

Table 5-21
McCallum Drive Alternatives Summary of Analysis and Evaluation

Factors	Alternative 1 Proposed North Side Property	Alternative 2 New Alignment South Side
Traffic and Transportation	Not Applicable	Not Applicable
Natural Environment	—	—
Social Environment	✖	—
Economic Environment	Not Applicable	Not Applicable
Land Use and Property	✓	✖
Cost	✓	✖
RECOMMENDATION	**CARRIED FORWARD**	NOT CARRIED FORWARD
✓ **Good in Comparison**	— **Neutral**	✖ **Poor in Comparison**



ALTERNATIVE 2
TWIN HIGHWAY 17 ON SOUTH SIDE



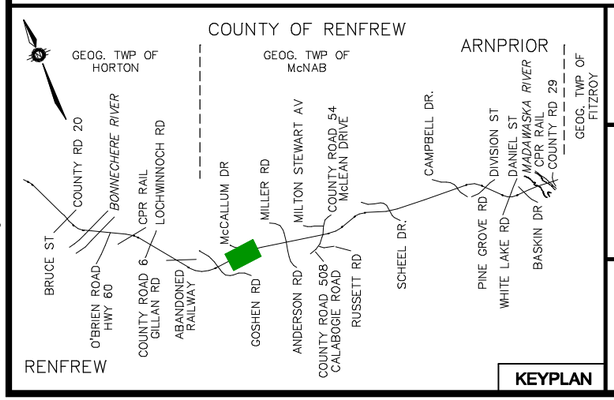


FIGURE 5-41

McCALLUM DRIVE
ROAD CLOSING ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: 12.5m 0 25m
Horizontal

Ministry of Transportation

NCE
TRANSPORTATION AND VALUE ENGINEERS

21-MCCALLUM DRIVE.dwg – Fri, 30 Jan 2004 – 9:23

5.6.8 Deil's Creek Realignment at County Road 6

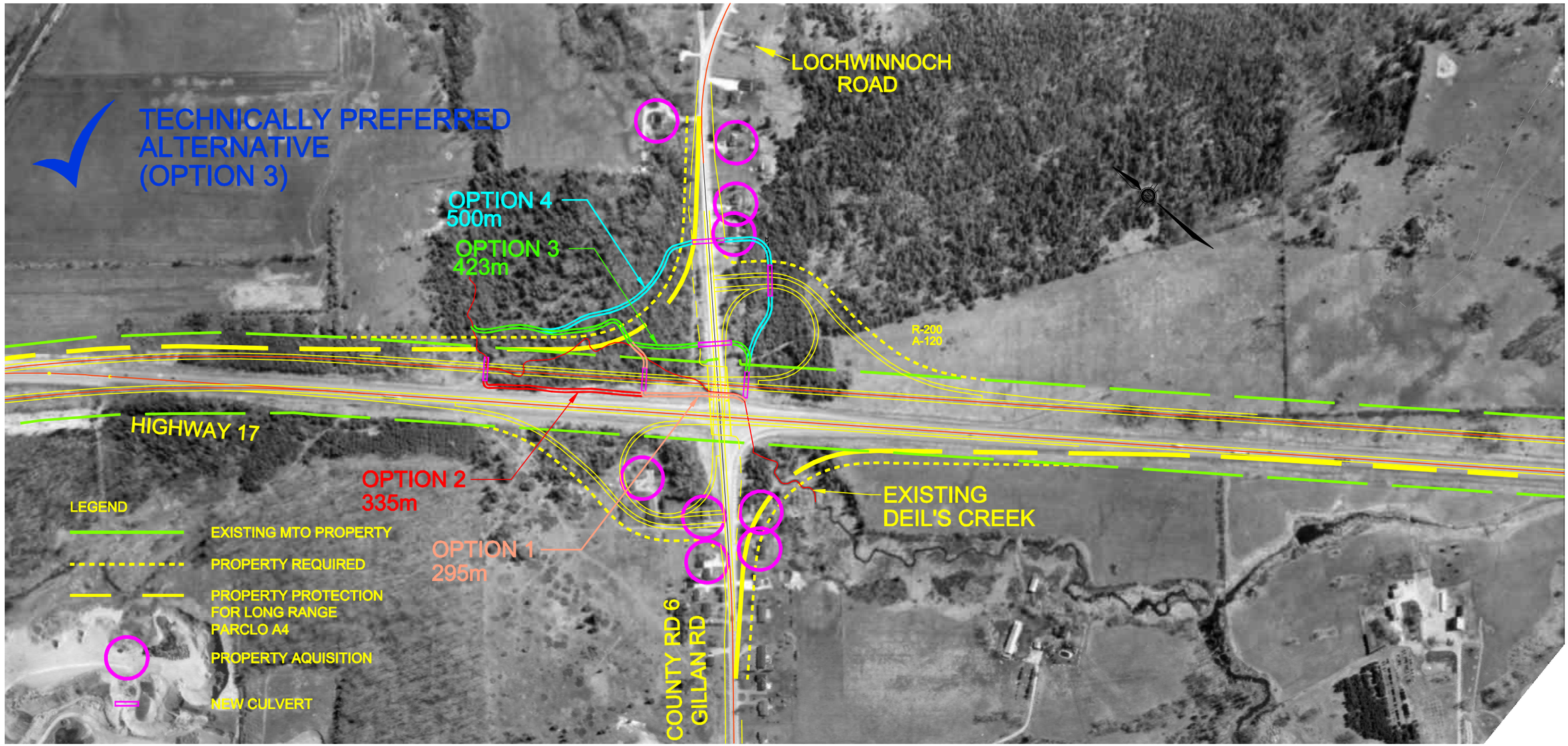
The twinning of Highway 17, and a new interchange at County Road 6 will require the realignment of Deil's Creek. Based on the natural habitat significance of the creek, as determined during the inventory phase of the study, it was recognized there was sensitivity to the location and length of the creek realignment. As such, several creek alignment alternatives were considered that reflected the range of available solutions.

The recommended alternative minimizes the length of creek realignment and maintains vegetation cover along the watercourse. This recommendation includes consideration for the construction of a long range on-ramp in the northwest quadrant i.e. the alignment will not need to be relocated in the future when, and if, the long range N-W ramp is constructed. This refinement will minimize fish habitat disruption to a one-time occurrence. The realignment options are shown on **Figure 5-42**. The results of the analysis and evaluation are summarized in **Table 5-22.**

Table 5-22
Deil's Creek Summary of Analysis and Evaluation

Factors	Alternatives			
	Option 1	Option 2	Option 3	Option 4
Traffic and Transportation	✖	✖	✓	✓
Natural Environment	✓	—	—	✖
Social Environment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Economic Environment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Land Use and Property	✓	✓	—	✖
Cost	✓	✓	—	✖
RECOMMENDATION	NOT CARRIED FORWARD (due to guiderail hazard and impact to water quality)	NOT CARRIED FORWARD (due to guiderail hazard and impact to water quality)	**CARRIED FORWARD**	NOT CARRIED FORWARD

✓ **Good in Comparison** — **Neutral** ✖ **Poor in Comparison**



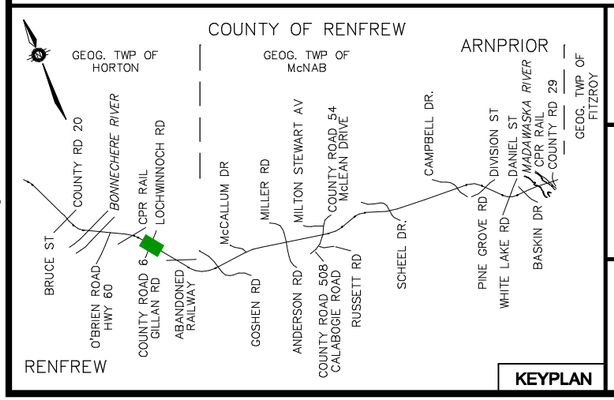


FIGURE 5-42

DEIL'S CREEK REALIGNMENT ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

12.5m 0 25m
Horizontal

Ministry of Transportation

NCE
TRANSPORTATION AND VALUE ENGINEERS

23-DEIL'S CREEK.dwg – Thu, 4 Dec 2003 – 18:57

5.6.9 Bonnechere Bridge Location

Freeway twinning alignment alternatives were considered in the vicinity of the Bonnechere River bridge (from O'Brien Road to Bruce Street) where the original south twinning resulted in large fill slopes on the south side of the highway between the river and Bruce Street.

The three options are shown on **Figure 5-43, Bonnechere River Bridge Alignment and Cross Section Alternatives** and included:

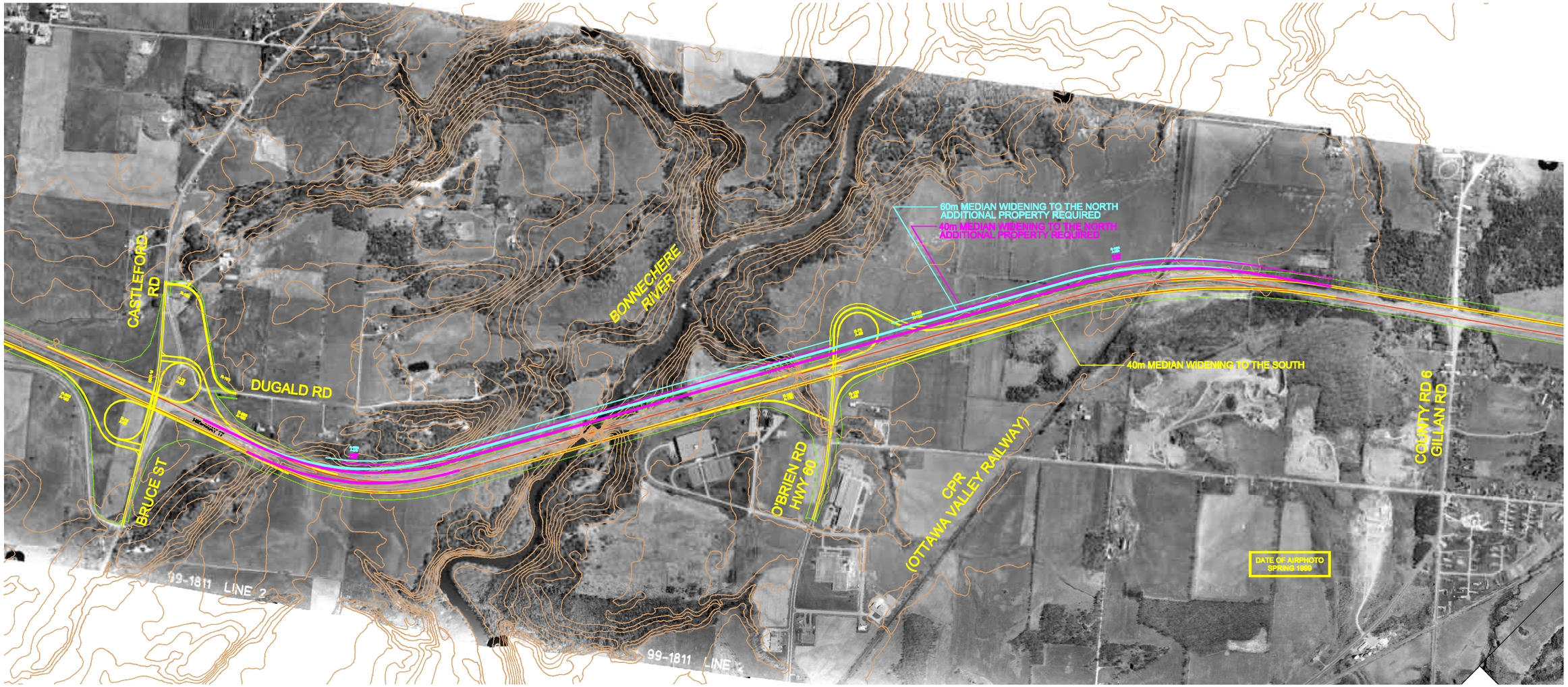
Option 1: 40 m Median Widening to the South (Preferred Alternative)
Option 2: 40 m Median Widening to the North
Option 3: 60 m Median Widening to the North

The results of the analysis recommended retaining the south twinning of the highway in this section. The north side twinning options resulted in greater natural habitat impacts to the Bonnechere valley ravine, and in higher construction costs.

The results of the analysis and evaluation are summarized in **Table 5-23, Bonnechere River Crossing – Summary of Analysis and Evaluation.** The preferred alternative is Option 1 – South Twinning.

Table 5-23
Bonnechere River Crossing – Summary of Analysis and Evaluation

Factors	Alternative 1 South Twinning (Steel I girders)	Alternative 2 North 40 m Median CPCI 2300	Alternative 3 North 60 m Median CPCI 1900
Traffic and Transportation	All considered equal	All considered equal	All considered equal
Natural Environment	✓	–	×
Social/Cultural Environment	✓	–	×
Economic Environment	✓	–	–
Land Use and Property	✓	✓	×
Cost	✓	✓	×
RECOMMENDATION	**CARRIED FORWARD**	NOT CARRIED FORWARD	NOT CARRIED FORWARD
✓ **Good in Comparison**	– **Neutral**	× **Poor in Comparison**	



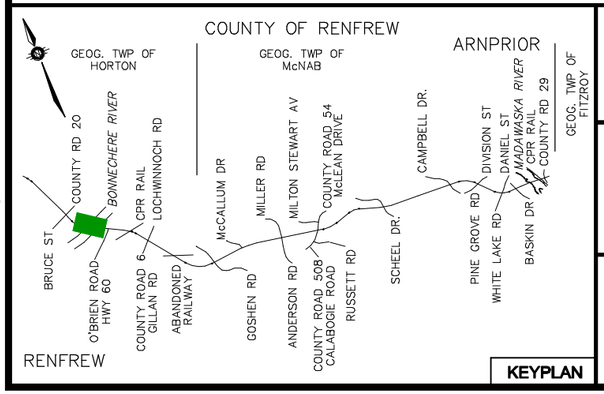


FIGURE 5-43

BONNECHERE RIVER BRIDGE ALIGNMENT ALTERNATIVES

HIGHWAY 17 TWINNING, COUNTY ROAD 29 to 3.0 km WEST OF BRUCE STREET
PRELIMINARY DESIGN/ ENVIRONMENTAL ASSESSMENT STUDY
WP 647-92-00

SCALE: N.T.S.

Ministry of Transportation

NCE
TRANSPORTATION AND VALUE ENGINEERS

24-BONNECHERE.dwg – Thu, 4 Dec 2003 – 19:01

5.7 Summary of Study Recommendations

Following the analysis and evaluation exercises the preferred alternatives were combined to produce an overall plan referred to as the Technically Preferred Plan (TPP). See **Figure 5-44**. The TPP was shown to the public on March 19th and 20th, 2003 at the second PIC.

Following PIC No.2, there were concerns identified by the public that were considered in greater detail as refinements to the TPP. The analysis and evaluation of the refinements are described in **Section 5.6**. Any out standing concerns such as those identified by the adjacent landowners and are presented as Refinements to the TPP. The Recommended Plan and the results of the analysis of Refinements to the TPP, were shown to the public June 25th and 26th, 2003 at the third PIC. The Recommended Plan is described in detail in **Chapter 6.0.**

Tables 5-24 and **5-25, Summary of Technically Preferred Alternatives**, present the preferred alternatives carried forward following the detailed evaluation.

Figure 5-44 Selection Process for Study Recommendations

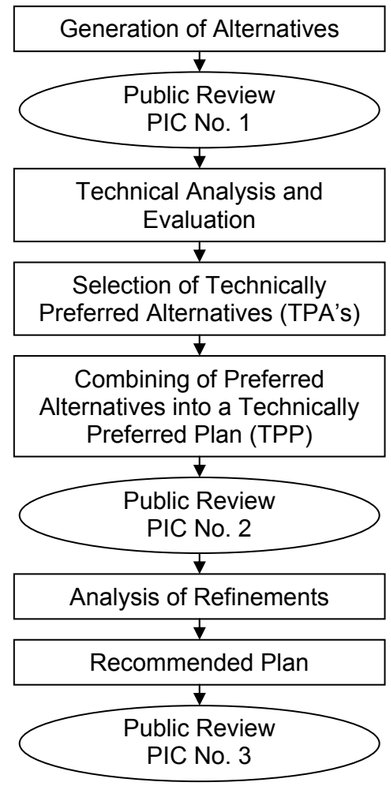


Table 5-24
Summary of Technically Preferred Alternatives
Phase 1 County Road 29 to Scheel Drive

Preliminary Design Category	Location				
Location	**Baskin Drive**	**White Lake Road**	**Division Street**	**Campbell Drive**	**Scheel Drive**
Median Alternatives	32.5 m median throughout. Wider median where property is available.				
Cross Road Analysis				Design speed reduced to 80 km/h.	Tangent alignment on skew angle. Design speed reduced to 80 km/h to reduce impacts on Dochart Creek and driveways.
Vertical Alignment Analysis for Cross Roads	Overpass with sidewalk west side	Underpass with sidewalk, west side	Underpass 2.0 m shoulders	Underpass 2.0 m shoulders	Underpass 2.0 m shoulders
Interchange Analysis	No interchange recommended due to highway safety concerns.	Parclo A4 75/45 m inner loop radii.		Short term need identified. Parclo A2 75 m inner loop radii.	
Service Road Analysis	White Lake Road to Baskin Drive south side service road to mitigate access requirements to Boeing and airport industrial area.			No service road	

Table 5-25
Summary of Technically Preferred Alternatives
Phase 2 Scheel Drive to 3 km west of Bruce Street

Location	County Road 508	Miller/ Anderson Roads	McCallum Drive	Goshen Road	County Road 6 (Gillan Road/ Lochwinnoch Road)	O'Brien Road	County Road 20 (Bruce Street)
Median Alternatives	32.5 m median through out. Wider median where property is available.						
Cross Road Alternatives	Realign to reduce skew	Design Speed reduced to 80 km/h. Tangent alignment on skew angle.		Tangent alignment on skew angle.		Continuous local road connection of Whitton Road to Innovation Drive.	
Vertical Alignment Alternatives for Cross Roads	Underpass	No underpass, new service road	Road closure	Overpass	Underpass 2.5 m shoulders	Overpass	Underpass
Interchange Needs Analysis	Parclo A4, 90 m inner loop radii on a new alignment				Short term need identified, Parclo A2 55 m inner loop radii. (75 m inner loop in northwest quadrant if property available)	Trumpet/ Diamond 75 m inner loop radii	Parclo A2, 75 inner loop radii
Service Road		New service road from Miller Rd to Milton Stewart Avenue					
Horizontal Alignment	Improved radii for Milton Stewart and Russett Road sideroads	Milton Stewart Avenue to connect to Miller Road at Tee intersection	Twinning to the north				
Other TPAs					Deil's Creek alignment Option 3		