



The Regional Municipality of York

**HIGHWAY 407 INTERCHANGE IMPROVEMENTS
CONSTRUCTION FEASIBILITY, FINANCIAL & TRAFFIC
ANALYSES AT DONALD COUSENS PARKWAY & NINTH
LINE: THE BUSINESS CASE**

DRAFT REPORT

JANUARY 2008

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1. INTRODUCTION

Highway 407 was planned as a 400-series highway to serve as a by-pass of Highway 401 and to serve as a major east-west corridor across the emerging municipalities north of Toronto. Planning and land acquisition for Highway 407 adjacent to the existing hydro corridor was undertaken during the 1960s and 1970s. Design was initiated during the 1980s and early 1990s, with a short section being completed and becoming operational in the late 1980s in the west, including the upgrading of Highway 7 to six lanes through the Town of Richmond Hill. In addition, a number of advance structures (i.e., crossing road overpasses) and ramps were constructed between Highway 427 to Highway 400.

In the early 1990s, the provincial government initiated a public-private partnership to facilitate construction of the highway. The highway opened in 1997 between Highway 410 and Highway 404. In 1999, as part of the Province of Ontario's privatization efforts, Highway 407 was sold to a private consortium that assumed responsibility to operate and collect tolls, with obligations to construct and complete seven interchanges on the existing facility.

The provincial government maintained the ability to build a transitway facility within the Highway 407 right of way and is presently conducting an environmental assessment and preliminary design for the section through York Region from Highway 400 to Kennedy Road. A number of background studies have been completed for a 407 Transitway, including a Property Protection Study for the entire highway corridor.

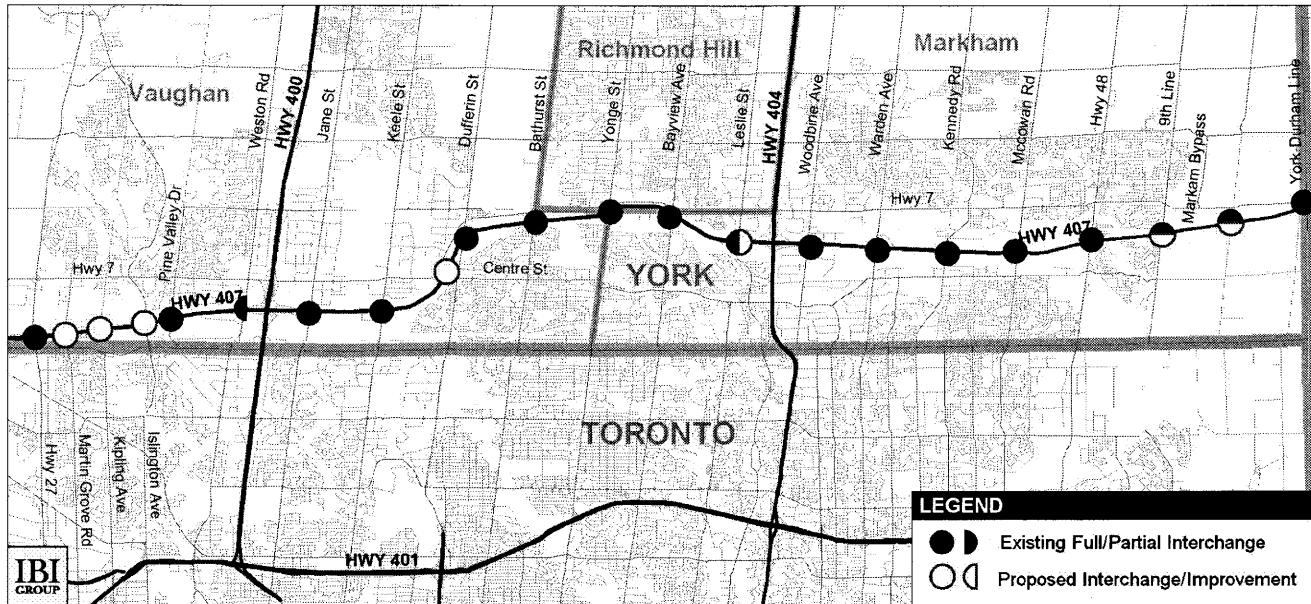
The purpose of this study is to prepare a business case for potential new interchanges or interchange improvements along Highway 407 in York Region at the locations shown in Exhibit 1-1. These interchange improvements have been proposed to address congestion along the Highway 7-407 Corridor and other key roads in the vicinity as well as safety concerns.

The initial step was to identify feasible interchange improvements including additional ramps that meet stakeholder functional requirements in order to proceed with the estimation of traffic volumes and the development of a business case. This report:

- Recommends preferred feasible interchange ramp configurations for the Donald Cousens Parkway (formerly known as the New Markham Bypass) and Ninth Line options, including discussion of the development, assessment and screening of alternative functional design concepts and associated capital costs including land requirements.
- For each of the feasible interchange ramp configurations and interdependent combinations,:
 - Estimates the marginal Highway 407 traffic and toll revenue impacts of each recommended feasible interchange improvement;
 - Estimates the net local traffic impacts on significant surrounding arterial roads; and

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Exhibit 1-1: Potential Interchange Improvement Study Locations



- Incorporates the capital cost estimates developed in the construction feasibility analysis and assumed operating and maintenance costs, and conducts a net present value financial analysis based on a five-year payback condition.

The Highway 407 traffic and financial analyses of the feasible options are conducted for the 2011, 2021 and 2031 horizon years representing both projected morning peak hour and annual results.

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2. CONSTRUCTION FEASIBILITY & COSTS

The following steps were used to recommend a preferred feasible interchange improvement configuration for each location, which were then developed in further detail in order to prepare appropriate construction cost estimates for use in the financial analysis of the business case:

- Collect information in order to establish existing conditions utilizing available materials such as: Highway 407 and Transitway planning and detail design documents; municipal documents, including previous studies, Official Plans, and Transportation Master Plans; MTO and Region of York mapping and property plans; and site visits;
- Establish the design basis for the potential interchange improvements (i.e. design criteria, stakeholder requirements with respect to traffic operations, operations and maintenance, and infrastructure);
- Establish an evaluation framework to apply in assessing the potential number of alternative interchange improvement concepts that may be presented at any interchange location (i.e., 407 ETR impacts, arterial road impacts, 407 Transitway impacts, environmental impacts, property, cost-effectiveness);
- Identify and map for each interchange location, constraints and considerations, providing a basis for developing interchange improvement concepts (i.e., geometric requirements, physical Highway 407 infrastructure constraints, proposed 407 Transitway, hydro/utilities corridors, development and property issues, environmental issues, etc.);
- Develop alternative interchange improvement concepts utilizing the established design basis and the identified constraint mapping;
- Screen and evaluate potential interchange improvement concepts at each location by applying the established evaluation framework; and
- Recommend an interchange improvement concept(s) at each location, where feasible.

The Region of York and the Town of Markham had previously initiated prior studies of additional ramps at Donald Cousens Parkway (i.e. Markham Bypass) and Ninth Line. These studies had investigated and recommended interchange improvement concepts at each location. The findings of those studies were reviewed and adopted for this study.

For each recommended interchange improvement concept, the concept was developed in greater detail, in order to develop appropriate construction and property costs. The following subsections summarize the findings for each proposed interchange improvement location.

2.1 Donald Cousens Parkway Ramp Option

At present, the Donald Cousens Parkway, previously named the Markham Bypass, does not extend south from Highway 407. The Region of York has prepared and submitted an Individual Environmental Assessment (EA) for the southern extension of the Markham Bypass, from Highway 407 to Morningside Avenue, which includes the missing northbound ramps (i.e., ramp S to E and ramp S to W). While the Donald Cousens Parkway southerly extension is still awaiting Ministry of

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Environment approval, the recommended design concept in the EA was an MTO standard Parclo A-4 interchange configuration, and the design concept was adopted for the purposes of this study.

The recommended interchange improvements, the addition of ramp S to E and ramp S to W, were developed in sufficient detail based on available data in order to prepare appropriate construction cost estimates for use in the business case analysis. The developed construction cost estimates were \$5.7 million and \$3.4 million for ramp S to E and ramp S to W respectively. To be noted, no property costs were assumed, as the environmental assessment indicated that any grading requirements beyond the proposed 36 metre right-of-way would eventually be graded to match the Donald Cousens Parkway construction.

2.2 Ninth Line Ramp Option

With the recent and planned growth in the southeast area of the Town of Markham and the elimination of community traffic concerns due to the construction of the Ninth Line Bypass of the Hamlet of Box Grove, the Town recognized that additional capacity would be required at the Highway 407/Ninth Line interchange, specifically the provision of access for northbound traffic (i.e. the missing ramp S to E and ramp S to W). In response, the Town of Markham retained an engineering consultant to review if there were more economical Highway 407 ramp access options than those concepts previously included in the Environmental Assessment Report and the Conceptual Preliminary Design Report for Highway 407 / Transitway, from Markham Road Easterly to Highway 7 East of Brock Road (February 1997). The findings of this review were submitted in a report to the Town's General Committee on October 17, 2005.

The study that reviewed the Highway 407 ramp access options identified and assessed alternative interchange improvement concepts and recommended completing a standard Parclo A-4 interchange configuration. As such, the findings of the study were adopted for the purposes of this study.

The recommended interchange improvements, the addition of ramp S to E and ramp S to W, were developed into sufficient detail based on available data in order to prepare appropriate construction cost estimates for use in the business case analysis. The developed construction cost estimates were \$2.5 million and \$3.5 million for ramp S to E and ramp S to W, respectively. No property costs were assumed, as it is understood that the construction of the four-lane arterial and associated grading requirements south of the interchange would be the responsibility of the local development initiatives.

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3. TRAFFIC & FINANCIAL ANALYSES OF FEASIBLE OPTIONS

The following describes the financial, traffic, environmental, and land impacts of each feasible option identified in Section Two. The York Region Travel Demand Forecasting Model was applied to develop 2011, 2021 and 2031 morning peak hour traffic and toll revenue forecasts based on York Region's "thirty-percent" land use intensification scenario. Each scenario horizon includes York Region's program assumptions for future road and transit improvements as well as the completion of the Highway 407 East Extension to Highway 35/115 by 2013.

A toll forecasting algorithm was incorporated within the York Region Model and runs were made under a range of toll rates on Highway 407 from 20 to 30 cents per kilometre. An optimal rate was derived for each year and was then used to develop traffic and revenue estimates for the base, do-nothing case and with each interchange improvement (the build case). The traffic and revenue impacts of new interchange improvements are represented by the net differences between the base and build cases.

The total change in toll revenue from the construction of a new interchange will come from two sources. One will be that generated from new users of Highway 407, of which all of the revenue impacts will be positive. The other will be that generated from existing users, of which the revenue impacts could be positive or negative; that is, existing users may access Highway 407 at a different location when a new interchange improvement is constructed, potentially increasing or decreasing their travel on Highway 407 and therefore toll revenue.

As the model represents car traffic only, the impacts of additional truck traffic were factored into the results using observed existing relationships of traffic volumes, vehicle-kilometres of travel and revenue (given higher toll rates) at existing, analogous interchanges.

The vehicle-trips, vehicle-kilometres and revenue were then expanded from the morning peak hour to, first, the full day based upon factors derived using observed origin-destination volumes from existing, analogous interchanges. Generally, the ratio of the total daily volumes to the peak hour was calculated and applied as a factor. However, the origin-destination values used to derive the factors depended on whether the option was a two-movement partial interchange ramp improvement (i.e., to and from east or west), or a single-movement partial interchange ramp improvement (e.g., south to east) to account for the different peak hour-to-day characteristics at each type. For the single-movement partial ramp improvements at Ninth Line and Donald Cousens Parkway (south to east and south to west) options, the ratio used the origin to east and origin to west totals from the analogous interchanges (here, taken as the average of the Kennedy Road, McCowan Road and Markham Road ratios).

To expand to the full year, it was assumed that there would be 251 weekdays and 114 weekend days per year with the weekend day assumed to be half of a weekday.

Together with the estimated construction and land acquisition costs developed in Section Two and anticipated annual operating and maintenance costs, the forecast toll revenues are used to complete a five-year net present value analysis for each feasible option. This consists of the present value of five years of toll revenue net of the capital and annual operating and maintenance costs. This is conservative in terms of financial performance in that it does not take into account revenues from beyond the first five years. Annual operating and maintenance costs include toll system and pavement costs. Constant 2007 dollars are used. A 2008 base year (extrapolated from the modelled years) and five percent discount rate are assumed. Detailed year-by-year five-year net present value results for all options are provided in Appendix A.

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Traffic impacts in 2011 on adjacent local roads and Highway 407 ramps are assessed within the study area of each potential interchange qualitatively and in terms of the net change in traffic relative to the base case.

3.1 Donald Cousens Parkway South to West Ramp Option

3.1.1 TRAFFIC

For the purposes of this analysis, it is assumed that the Donald Cousens Parkway extension south of Highway 407 would be completed by 2011. The traffic impacts provided represent the impacts of opening the ramp after this facility is in operation, isolating the impacts of the ramp from those of the Donald Cousens Parkway south extension.

With the Donald Cousens Parkway south extension in place but prior to the implementation of this option (i.e., the base case), this road would be used to access the Ninth Line interchange from the north in addition to the continued illegal U-turns currently observed at Ninth Line. U-turns on the Parkway itself would also likely occur as on Ninth Line.

The provision of a ramp allowing traffic movements from the south to the west would lead to increases in northbound traffic on Donald Cousens Parkway south of Highway 407 and to decreases in both directions of travel north of Highway 407. Southbound traffic volumes south of Highway 407 would not be affected. Exhibit 3-1 shows the net change in traffic volumes for the 2011 morning peak hour.

As the new interchange would then accommodate traffic accessing Highway 407 from the south, there would be a net increase in northbound traffic on the Donald Cousens Parkway south of Highway 407 from traffic accessing it from the south. There would be a net decrease in northbound traffic north of Highway 407 from traffic that would have continued up to east-west facilities such as Highway 7 and Sixteenth Avenue now using the new interchange and Highway 407. There would be a net decrease in southbound traffic north of Highway 407 because traffic accessing Highway 407 from the south would no longer have to approach from the north via Reesor Road and Highway 7 or, based on the experience at Ninth Line, travelling northbound on the Parkway and making an illegal U-turn.

Traffic using the new interchange would be mostly local from the south, as local traffic would receive the greatest travel time savings benefits from the new interchange ramp. In the earlier years, it would come to/from the residential areas between Steeles Avenue East and Finch Avenue East, however it would also come from the Box Grove area immediately south between Steeles Avenue East and Highway 407 as this area develops. This traffic would be taking advantage of the improved accessibility to Highway 407.

Northbound traffic volumes on Reesor Road, which is currently used to access Highway 407 from the north at the Parkway, would also decrease somewhat. However, with the Parkway south extension in place, the Parkway would be the primary means of accessing Highway 407 from the north and would be impacted more. There would also be some decreases in northbound traffic on Ninth Line from users accessing Highway 407 from the north by making an illegal U-turn diverting to the new interchange ramp.

Northbound traffic volumes on Markham Road and the York-Durham Line, the two parallel facilities with south-to-west ramps to Highway 407, would decrease marginally south of Highway 407 with the new interchange ramp in place, consistent with the northbound increase on the Donald

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Cousens Parkway south of Highway 407, as traffic diverts to the new interchange ramp. The impact on these facilities would be marginal given their distances from the interchange (about three kilometres).

Northbound through travel from areas further south of the interchange (i.e., non-local traffic from south of Finch Avenue East) to areas north of it (i.e., Markham) that would have used the Donald Cousens Parkway without the new interchange ramp would re-route to Reesor Road and Ninth Line due to the increased northbound volumes on the Donald Cousens Parkway.

As shown below in Exhibit 3-2, the introduction of a new ramp would lead to a net increase of about 210 vehicle-trips on Highway 407 in the morning peak hour in 2011. The diversion of east-west traffic heading westbound from the Donald Cousens Parkway to the new ramp and Highway 407 would generally result in some decreases on the adjacent parallel facilities of Highway 7 and Fourteenth Avenue west of the Donald Cousens Parkway, improving the level of service on them. There would be slight decreases on Highway 407 itself east of the Parkway from travellers who had backtracked to the York-Durham Line interchange prior to implementation of the new interchange ramp. These travellers would access the new ramp via Fourteenth Avenue, which would experience a modest increase in traffic east of the Parkway.

The increase in traffic on the Donald Cousens Parkway south extension noted above would be about 35% in 2011, leading to some reduction in level of service/increase in delay on this facility, although not approaching capacity.

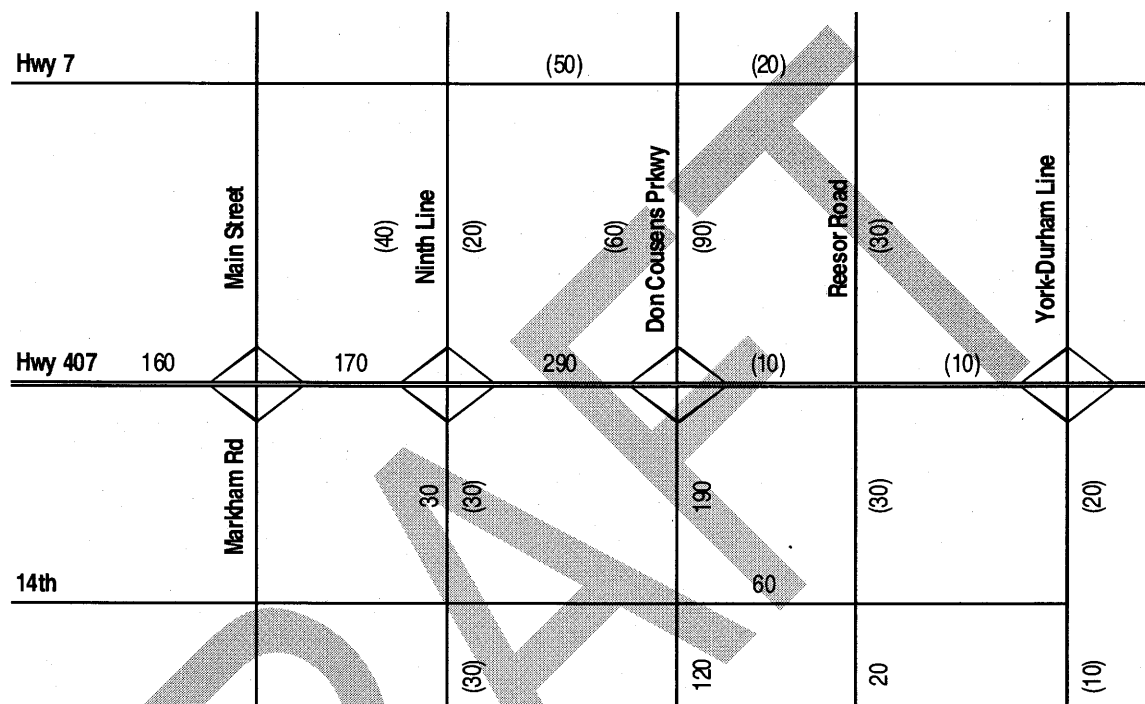
Exhibit 3-1 also shows the net change on the new interchange ramp as well as the impacts on the adjacent Markham Road, Ninth Line and York-Durham Line ramps for the 2011 morning peak hour. The new interchange ramps would draw about 400 vehicles from new users, those diverted from the adjacent ramps and those who previously approached from the north.

The construction of these ramps would eliminate the U-turn movements that would likely occur after construction of the Parkway extension from northbound traffic noted above. All geometric elements of the design presented in Section 2 meet established safety standards.

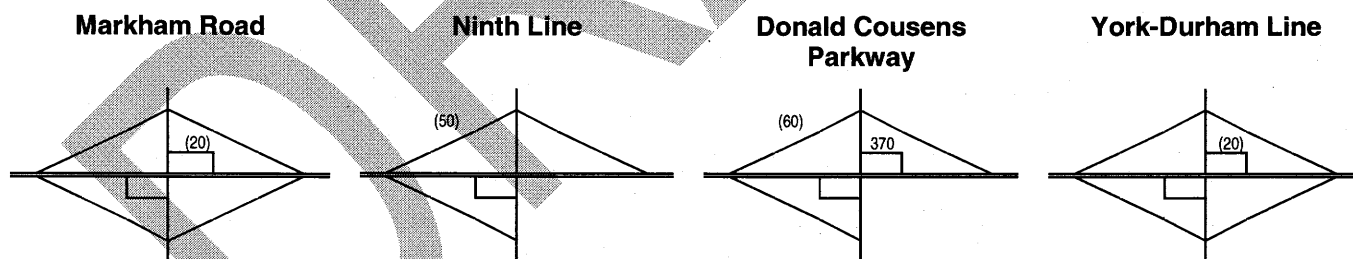
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**Exhibit 3-1: Donald Cousens (South to West Ramp) Area Net Change in Traffic Volumes,
 2011 AM Peak Hour**

A. Area Roads



B. Area Ramps



Note: Schematic representation of area roads and ramps only. Shows passenger car traffic only. Bracketed numbers refer to net decrease in traffic volumes.

3.1.2 FINANCIAL

The estimated morning peak hour and annual change in vehicle-trips, vehicle-kilometres and toll revenue are presented in Exhibit 3-2. Increases in all are expected from 2011 onward, with an additional \$1.3 million in annual revenue expected in 2011 and \$6.2 million expected in 2031. As shown in Exhibit 3-3, taking into account the \$3.4 million in capital costs as well as annual operating and maintenance costs, the implementation of this ramp in 2008 would result in a positive five-year net present value of \$1.8 million, with a value of \$2.9 million if implemented in 2011.

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Exhibit 3-2: Donald Cousens (South to West Ramp) Highway 407 Traffic & Revenue Net Increase Forecasts

Time Period	Net Change In	Year		
		2011	2021	2031
Morning Peak Hour	Vehicle-trips	210	320	630
	Vehicle-kilometres	2,700	6,400	9,800
	Revenue ²	\$600	\$1,700	\$2,800
Annual ¹	Vehicle-trips (M)	0.5	0.7	1.4
	Vehicle-kilometres (M)	6.0	14.3	21.8
	Revenue (M) ²	\$1.3	\$3.8	\$6.2

Note: Shows net increases relative to base, do-nothing case. Includes passenger car and truck traffic.

¹ Based on an average of existing peak hour to weekday factors for Kennedy Road, McCowan Road, and Markham Road interchanges (existing characteristics at the Donald Cousens Parkway were not considered applicable in the future), and 251 weekdays and 114 weekend days per year with a weekend day (i.e., Saturdays, Sundays and holidays) assumed to be half a weekday. Further adjustments were made to each ramp to account for the fact the corresponding reverse movement ramp already exists.

² Year 2007 dollars.

Exhibit 3-3: Donald Cousens (South to West Ramp) Five-Year Net Present Value by Year of Construction

Year Constructed	Five-Year NPV (millions) ¹
2008	\$1.8
2011	\$2.9
2021	\$6.3
2031	\$10.1

Note: Net present value using 2008 as base year. Year 2008 results extrapolated from modelled years. Revenue includes first five years after year of construction. Costs include construction (ramps and toll systems), property and annual operating and maintenance. The cost of constructing the Donald Cousens Parkway south extension is not included. Discount rate of five percent is assumed.

¹ Year 2007 dollars.

3.2 Donald Cousens Parkway South to East Ramp Option

3.2.1 TRAFFIC

As with the Donald Cousens South to West Ramp option, for the purposes of this analysis, it is assumed that the Donald Cousens Parkway extension south of Highway 407 would be completed by 2011. The traffic impacts provided represent the impacts of opening the ramp after this facility is in operation, isolating the impacts of the ramp from those of the Donald Cousens Parkway south extension. With the Donald Cousens Parkway south extension in place but prior to the implementation of this option (i.e., the base case), the road would be used to access the Ninth Line interchange from the north in addition to the continued illegal U-turning currently observed at Ninth Line. U-turns on the Parkway itself would also likely occur as on Ninth Line.

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As shown below in Exhibit 3-4, the introduction of a new south to east ramp would lead to a net increase of about 20 vehicle-trips on Highway 407 in the morning peak hour in 2011. Given the very low volumes involved, there would be no notable traffic impacts from the implementation of this option in the earlier years. Impacts in later years would be fairly analogous to those of the Donald Cousens South to West Ramp option presented above but would still be very modest in terms of magnitude. It should be noted that the actual peak hour for this ramp would occur in the afternoon, with volumes on it about four times higher than the morning.

3.2.2 FINANCIAL

The estimated morning peak hour and annual change in vehicle-trips, vehicle-kilometres and toll revenue are presented in Exhibit 3-4. Modest increases in all are expected from 2011 onward, with an additional \$0.7 million in annual revenue expected in 2011 and \$3.0 million expected in 2031. As shown in Exhibit 3-5, taking into account the \$5.7 million in capital costs as well as annual operating and maintenance costs, the implementation of this ramp in 2008 would result in a negative five-year net present value of -\$4.0 million, with a value of -\$2.5 million if implemented in 2011. If implemented in isolation, this ramp would reach a neutral investment status sometime around 2020.

Exhibit 3-4: Donald Cousens (South to East Ramp) Highway 407 Traffic & Revenue Net Increase Forecasts

Time Period	Net Change In	Year		
		2011	2021	2031
Morning Peak Hour	Vehicle-trips	20	40	90
	Vehicle-kilometres	300	900	1,400
	Revenue ²	\$100	\$200	\$400
Annual ¹	Vehicle-trips (M)	0.1	0.3	0.7
	Vehicle-kilometres (M)	2.2	6.7	10.5
	Revenue (M) ²	\$0.7	\$1.5	\$3.0

Note: Shows net increases relative to base, do-nothing case. Includes passenger car and truck traffic.

¹ Based on an average of existing peak hour to weekday factors for Kennedy Road, McCowan Road, and Markham Road interchanges (existing characteristics at the Donald Cousens Parkway were not considered applicable in the future), and 251 weekdays and 114 weekend days per year with a weekend day (i.e., Saturdays, Sundays and holidays) assumed to be half a weekday. Further adjustments were made to each ramp to account for the fact the corresponding reverse movement ramp already exists.

² Year 2007 dollars.

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Exhibit 3-5: Donald Cousens (South to East Ramp) Five-Year Net Present Value by Year of Construction

Year Constructed	Five-Year NPV (millions) ¹
2008	-\$4.0
2011	-\$2.5
2021	\$0.3
2031	\$3.7

Note: Net present value using 2008 as base year. Year 2008 results extrapolated from modelled years. Revenue includes first five years after year of construction. Costs include construction (ramps and toll systems), property and annual operating and maintenance. The cost of constructing the Donald Cousens Parkway south extension is not included. Discount rate of five percent is assumed.

¹ Year 2007 dollars.

3.3 Ninth Line Ramps from South Option

3.3.1 TRAFFIC

For the purposes of this analysis, it is assumed that the Donald Cousens Parkway extension south of Highway 407 would not be completed by 2011. It was assumed that both ramps (i.e., south to west and south to east) would be constructed at the same time because of the convenience of constructing them together and minimising interruptions to area residents.

The provision of ramps allowing traffic movements from the south to the east and west would lead to increases in northbound traffic on Ninth Line south of Highway 407 and to decreases in both directions of travel north of Highway 407. Exhibit 3-6 shows the net change in traffic volumes for the 2011 morning peak hour.

As the new interchange ramps would then accommodate traffic accessing Highway 407 from the south, there would be a significant net increase in northbound traffic on Ninth Line south of Highway 407 from traffic accessing it from the south. There would be a net decrease in northbound traffic north of Highway 407 from traffic that would have continued up to east-west facilities such as Highway 7 and Sixteenth Avenue now using the new interchange ramps and Highway 407. There would be a net decrease in southbound traffic north of Highway 407 because traffic accessing Highway 407 from the south would no longer have to approach from the north, which is currently typically accomplished by travelling northbound on Ninth Line and making an illegal U-turn. Southbound traffic volumes south of Highway 407 would increase marginally due to the reduced congestion north of it.

Traffic using the new interchange ramps would be mostly local from the south, as local traffic would receive the greatest travel time savings benefits from the new ramps. In the earlier years, traffic would come to/from the residential areas to the immediate southwest (down to Finch Avenue East) of the interchange, however it would also come from the immediate southeast as this Box Grove area develops. This traffic would be taking advantage of the improved accessibility to Highway 407.

Northbound traffic volumes on Markham Road, the parallel facility to the west with a south-to-west ramp to Highway 407, south of Highway 407 would decrease with the new interchange ramps in place, consistent with the northbound increase on Ninth Line south of Highway 407, as local traffic

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diverts to the new ramps. The impacts on the York-Durham Line, the next major parallel facility to the east with a south-to-west ramp, would be minor given the distance (over four kilometres away). Northbound traffic volumes on Reesor Road, which is currently used to access Highway 407 from the north at the Donald Cousens Parkway, would also decrease somewhat due to re-routing to the new ramps. These travellers would access the interchange via Fourteenth Avenue, which would experience a modest increase in traffic east of Ninth Line.

Northbound through travel from areas further south of the interchange (i.e., non-local traffic from south of Finch Avenue East) that would have used Ninth Line without the new interchange ramps would re-route to Markham Road and Reesor Road due to the increased northbound volumes on Ninth Line and the reduced volumes on these facilities as noted above.

As shown below in Exhibit 3-7, the introduction of new ramps would lead to a net increase of about 210 vehicle-trips on Highway 407 in the morning peak hour in 2011. The diversion of east-west traffic to the new ramps and Highway 407 would generally result in decreases on the adjacent parallel facilities of Highway 7 and Fourteenth Avenue (mostly to the west of Ninth Line), improving the level of service on them. As with the Donald Cousens Parkway option, there would be slight decreases on Highway 407 itself east of the Ninth Line from travellers who had backtracked to the York-Durham Line interchange to travel westbound prior to implementation of the new ramps. These travellers would access the new interchange via Fourteenth Avenue, which would experience a modest increase in traffic east of the Ninth Line.

The increases in traffic on Ninth Line noted above would be about 30% in 2011, leading to some reduction in level of service/increase in delay on this facility, although not approaching capacity.

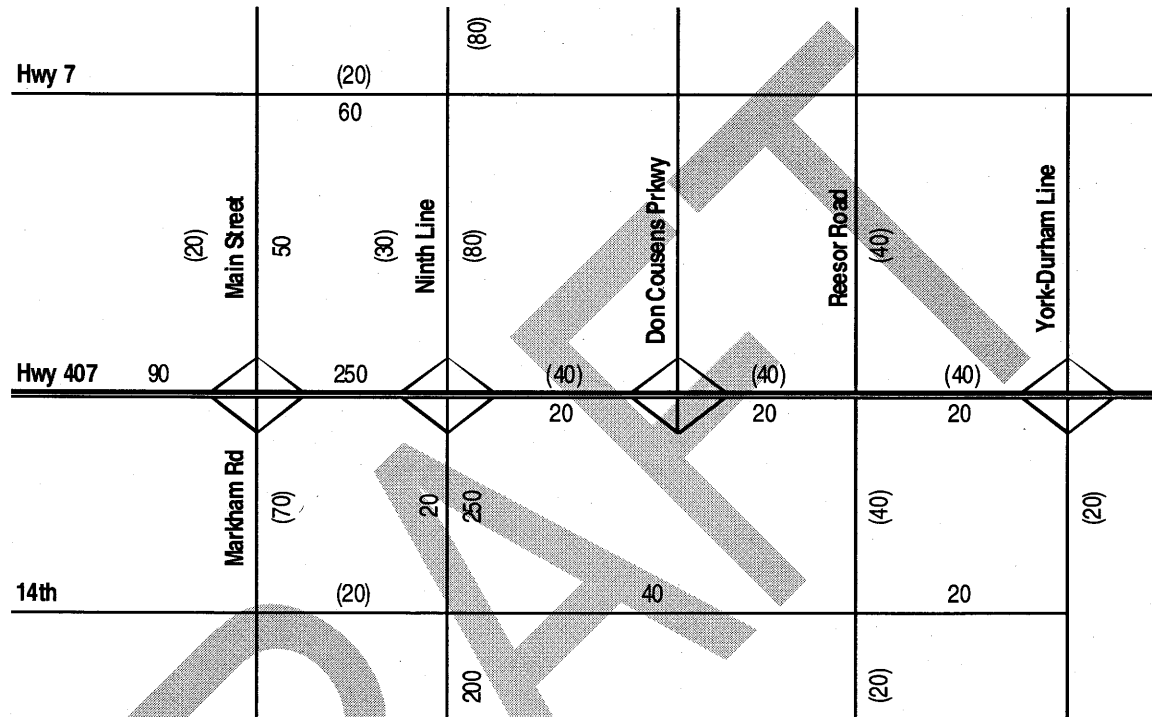
Exhibit 3-6 also shows the net change on the new interchange ramps as well as the impacts on the adjacent Markham Road and York-Durham Line ramps for the 2011 morning peak hour. The new westbound interchange ramp would draw about 500 vehicles from new users, those diverted from the adjacent ramps and those who previously approached from the north. Again, given the proximity, the Markham Road ramp volumes would decrease by about 150 vehicles, while the York-Durham Line ramps would experience only minor impacts.

The construction of these ramps would eliminate the U-turn movements currently observed from northbound traffic noted above. All geometric elements of the design presented in Section 2 meet established safety standards.

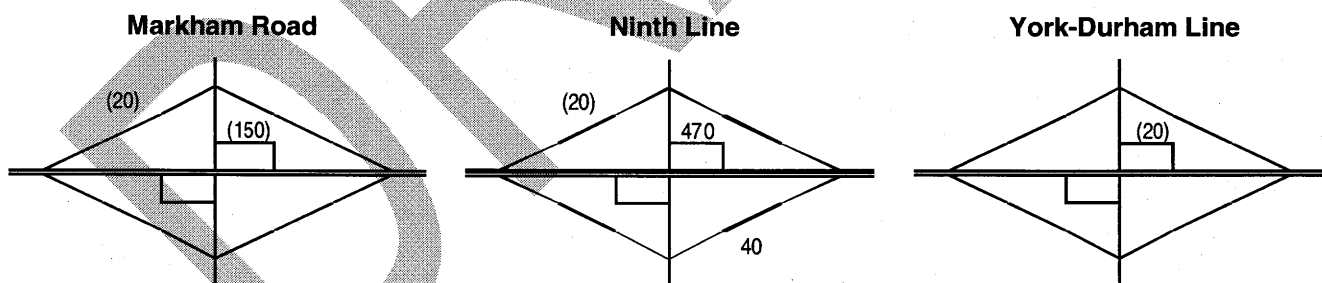
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Exhibit 3-6: Ninth Line (from South) Area Net Change in Traffic Volumes, 2011 AM Peak Hour

A. Area Roads



B. Area Ramps



Note: Schematic representation of area roads and ramps only. Shows passenger car traffic only. Bracketed numbers refer to net decrease in traffic volumes.

3.3.2 FINANCIAL

The estimated morning peak hour and annual change in vehicle-trips, vehicle-kilometres and toll revenue are presented in Exhibit 3-7. Increases in all are expected from 2011 onward, with an additional \$2.1 million in annual revenue expected in 2011 and \$8.8 million expected in 2031. As shown in Exhibit 3-8, taking into account the \$6.0 million in capital costs as well as annual operating and maintenance costs, the implementation of these ramps in 2008 would result in a positive five-year net present value of \$1.5 million, with a value of \$3.4 million if implemented in 2011.

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Exhibit 3-7: Ninth Line (Ramps from South) Highway 407 Traffic & Revenue Net Increase Forecasts

Time Period	Net Change In	Year		
		2011	2021	2031
Morning Peak Hour	Vehicle-trips	210	460	700
	Vehicle-kilometres	3,100	6,800	10,300
	Revenue ²	\$700	\$1,800	\$3,000
Annual ¹	Vehicle-trips (M)	0.6	1.4	2.1
	Vehicle-kilometres (M)	8.7	19.4	30.0
	Revenue (M) ²	\$2.1	\$5.1	\$8.8

Note: Shows net increases relative to base, do-nothing case. Includes passenger car and truck traffic.

¹ Based on an average of existing peak hour to weekday factors for Kennedy Road, McCowan Road, and Markham Road interchanges, and 251 weekdays and 114 weekend days per year with a weekend day (i.e., Saturdays, Sundays and holidays) assumed to be half a weekday. Further adjustments were made to each ramp to account for the fact the corresponding reverse movement ramp already exists.

² Year 2007 dollars.

Exhibit 3-8: Ninth Line (Ramps from South) Five-Year Net Present Value by Year of Construction

Year Constructed	Five-Year NPV (millions) ¹
2008	\$1.5
2011	\$3.4
2021	\$7.9
2031	\$13.1

Note: Net present value using 2008 as base year. Year 2008 results extrapolated from modelled years. Revenue includes first five years after year of construction. Costs include construction (ramps and toll systems), property and annual operating and maintenance. Discount rate of five percent is assumed.

¹ Year 2007 dollars.

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4. IMPLEMENTATION CONSIDERATIONS

4.1 Potential Risks & Concerns

Based on the data assembled and the limitations of the study, two potential risks have been identified, including:

- Construction cost estimates were based on readily available material and not subject to detailed analysis, unique third party and 407 ETR requirements, and site investigations. Order of magnitude costs were prepared with a 30% contingency, deemed appropriate for this level of detail;
- Property cost assumptions were necessary and no allowance was made for any potential property contamination issues;

4.2 Timing & Coordination

Given that the 407 ETR is presently planning and designing the Highway 407 widening in the vicinity, the immediate concern is the required timing and coordination of both the Donald Cousens Parkway and Ninth Line initiatives, offering potential cost and traffic impact benefits. The following steps are required to be completed as soon as possible to meet the 407 ETR deadlines:

- Region of York Council directs staff to proceed with negotiations with the 407 ETR; and,
- Negotiations proceed with the 407 ETR to construct these ramps, including their review of the financial business case, resulting in a Memorandum of Understanding outlining roles and responsibilities.

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5. SUMMARY OF FINDINGS

A conceptual design and construction feasibility analysis was completed for each of the potential interchange ramp improvements. The findings include:

- **Donald Cousens Parkway** – The design concept from the Region's individual EA (still pending) for this option was adopted and developed into sufficient detail to prepare construction cost estimates of \$3.4 million and \$5.7 million for the south to west and south to east ramps, respectively. No property acquisition costs were assumed; and
- **Ninth Line** – The design concept from the Town of Markham's Conceptual Preliminary Design Report for Highway 407/Transitway for this option was adopted and developed into sufficient detail to prepare construction cost estimates of \$3.5 million and \$2.5 million for the south to west and south to east ramps, respectively. No property acquisition costs were assumed;

The feasible options were carried forward for further analysis from a traffic and financial performance perspective. Various individual ramps and combinations thereof were analysed based on the probable timing, ease of construction, and interaction effects of ramps in close proximity serving overlapping markets. The year-by-year construction and five-year net present value analysis results are shown in Appendix A.

The findings are summarised below with the five-year net present values by year of construction summarised in Exhibit 5-1:

- **Donald Cousens Parkway Individual South to West Ramp** – Local traffic conditions would not be adversely affected, with net increases of about 35% by 2011 in northbound traffic on the Donald Cousens Parkway south extension. Net increases in travel on Highway 407 would result in a positive investment status if constructed in 2008;
- **Donald Cousens Parkway Individual South to East Ramp** – Local traffic conditions would not be adversely affected, with very modest net increases in northbound traffic on the Donald Cousens Parkway south extension. Net increases in travel on Highway 407 would result in a net positive investment status if constructed after 2020;
- **Ninth Line Ramps from South** – Local traffic conditions would not be adversely affected, with net increases of about 30% by 2011 in northbound traffic on Ninth Line south of Highway 407. Net increases in travel on Highway 407 would result in a positive investment status if constructed in 2008; and
- Alternative combinations of the Ninth Line and Donald Cousens Parkway ramps can be considered subject to further negotiations and discussions between York Region and 407ETR.

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Exhibit 5-1: Summary of Five-Year Net Present Value by Year of Construction for New Ramps (\$ millions of year 2007 dollars)

Year Constructed	Ninth Line South to West Ramp	Ninth Line South to East Ramp	Ninth Line Ramps from South	Don Cousens South to West Ramp	Don Cousens South to East Ramp	Don Cousens Ramps from South
2008	2.1	-0.6	1.5	1.8	-4.0	-2.1
2011	3.1	0.4	3.4	2.9	-2.5	0.4
2021	6.0	1.9	7.9	6.3	0.3	6.6
2031	8.9	4.1	13.1	10.1	3.7	13.8

APPENDIX A

FEASIBLE OPTION FIVE-YEAR NET PRESENT VALUE RESULTS

Five-Year Net Present Values in Millions of 2007 Dollars

Year Constructed	Ninth Line South to West Ramp	Ninth Line South to East Ramp	Ninth Line Ramps from South	Don Cousens South to West Ramp	Don Cousens South to East Ramp	Don Cousens Ramps from South
2008	2.1	-0.6	1.5	1.8	-4.0	-2.1
2009	2.4	-0.3	2.1	2.2	-3.5	-1.3
2010	2.7	0.0	2.8	2.5	-3.0	-0.4
2011	3.1	0.4	3.4	2.9	-2.5	0.4
2012	3.4	0.6	4.0	3.2	-2.1	1.1
2013	3.7	0.8	4.4	3.6	-1.8	1.7
2014	4.0	0.9	4.8	3.9	-1.6	2.3
2015	4.3	1.0	5.2	4.3	-1.3	2.9
2016	4.6	1.1	5.6	4.6	-1.1	3.5
2017	4.9	1.2	6.0	4.9	-0.9	4.1
2018	5.1	1.3	6.5	5.3	-0.6	4.7
2019	5.4	1.5	6.9	5.6	-0.3	5.3
2020	5.7	1.7	7.4	6.0	0.0	6.0
2021	6.0	1.9	7.9	6.3	0.3	6.6
2022	6.3	2.1	8.4	6.7	0.6	7.3
2023	6.6	2.3	8.9	7.0	1.0	8.0
2024	6.9	2.5	9.4	7.4	1.3	8.7
2025	7.2	2.7	9.9	7.8	1.6	9.4
2026	7.5	3.0	10.4	8.2	1.9	10.1
2027	7.8	3.2	10.9	8.5	2.3	10.8
2028	8.1	3.4	11.5	8.9	2.6	11.5
2029	8.3	3.7	12.0	9.3	3.0	12.3
2030	8.6	3.9	12.5	9.7	3.3	13.0
2031	8.9	4.1	13.1	10.1	3.7	13.8