MORRISON HERSHFIELD

REPORT - FINAL

Teston Road Area Transportation Improvements Individual Environmental Assessment

Transportation System Technical Report # 3

Presented to:

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1. INTRODUCTION

The Regional Municipality of York (York Region) has retained Morrison Hershfield (MH) to conduct an Individual Environmental Assessment (IEA) for transportation improvements in the Teston Road area.

The purpose of this report is to summarize how the preferred alternative design will meet the future transportation needs and addresses the goals and objectives of the project.

This report includes an examination of alternative alignments and cross-sections, structural alternatives for the GO Rail and Don River valley crossings and further evaluation of potential environmental impacts.

Several intersections along the Teston Road are projected to be at or above capacity, and therefore, additional intersection modifications such as lane configurations, right turn channelization, and intersection planning/timing were explored in this report to further improve intersection Level of Service (LOS) along the corridor.

2. SUMMARY OF ALTERNATIVES TO THE UNDERTAKING FROM REPORT #2

The problems and opportunities (P&O) identified in the Transportation System Technical Report (TSTR) #1 provided the foundation for the generation of alternatives to the undertaking. Additionally, the Teston Road IEA Terms of Reference (TOR) provided guidance on the range of alternatives to be considered.

TSTR #2 documented the process undertaken to identify, generate, and evaluate alternatives to the undertaking and the selection of the preferred alternative.

The selection of a preferred alternative was undertaken in a multi-step process. The qualitative and quantitative analysis identified Alternative 4 (Alternative 10 in the TSTR #2) as the preferred alternative.

As shown in **Figure 1**, Alternative 4 includes a new 4-lane Teston Extension between Keele Street and Dufferin Street with active transportation and potential for transit service.

A recap of the above-mentioned work was presented during the first online Open House from July 26, 2021 to August 16, 2021.

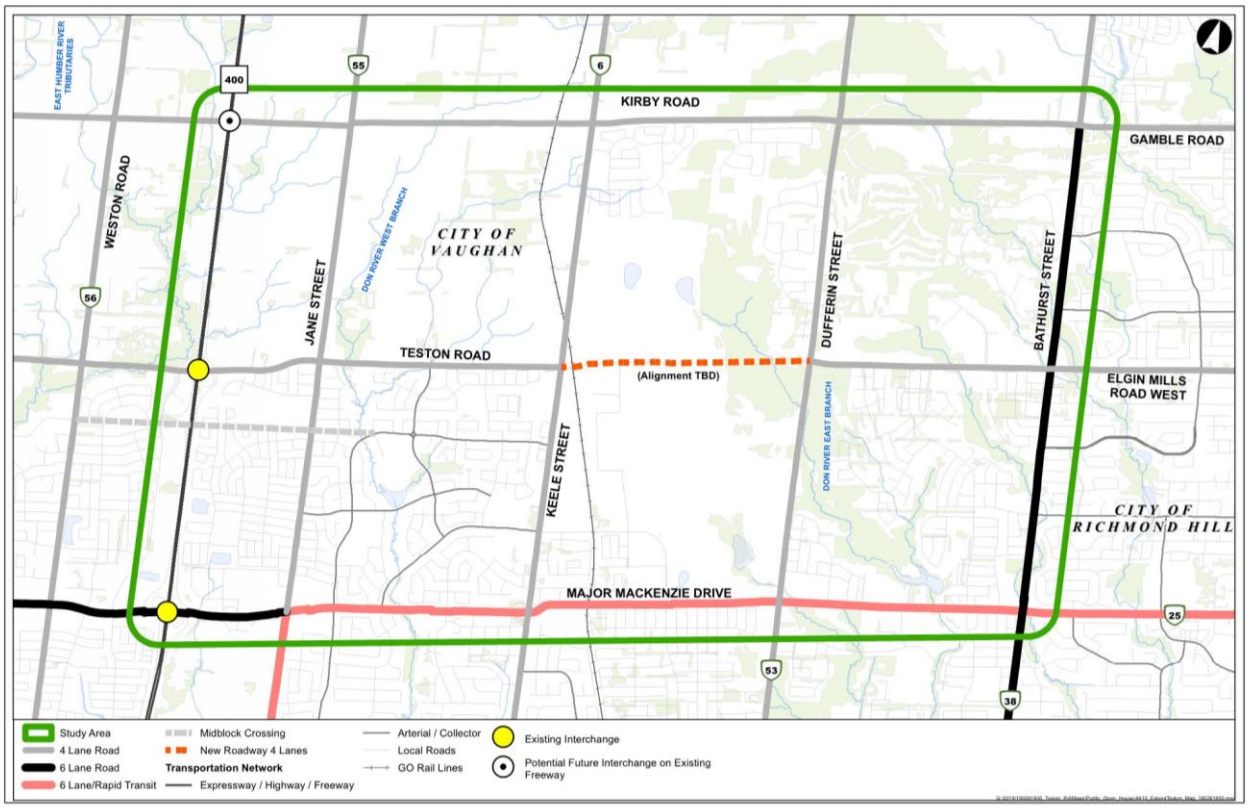


Figure 1: Preferred Alternative To The Undertaking (Alternative 4)

3. PRELIMINARY STUDY AREA

Based on the results of the evaluation of alternatives, the Preliminary Study Area was refined to ensure that a range of Alternative Corridors could be considered. The Preliminary Study Area is bounded by Kirby Road to the north, Bathurst Street to the east, Major Mackenzie Drive West to the south, and Keele Street to the west.

This Study Area allows for new roadway corridor alternatives between Keele Street and Dufferin Street in the area of Teston Road as well as Teston Road widening alternatives between Dufferin Street and Bathurst Street which are also to be considered per the IEA Terms of Reference.

The Preliminary Study Area is outlined in **Figure 2**. The study area does not limit the potential to examine environmental effects outside of its boundaries.

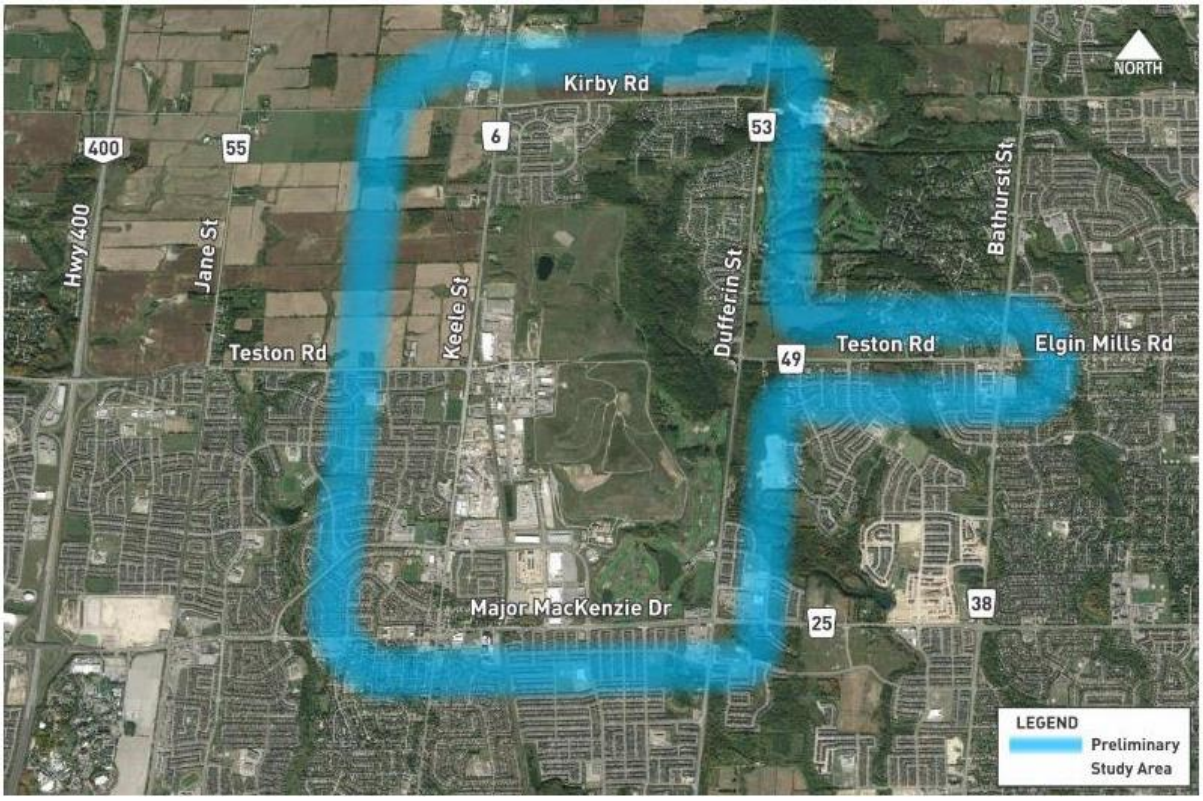


Figure 2: Preliminary Study Area

4. ALTERNATIVE CORRIDORS

Prior to the second online Open House, from November 29, 2021 to December 20, 2021, a long list of alternative corridors for the preferred alternative to the undertaking (a Teston Road extension, or potentially another connecting roadway between Keele Street and Dufferin Street) was developed by the Roadway Design team for screening. The list included the twelve (12) alternative corridors shown in **Figure 3**.

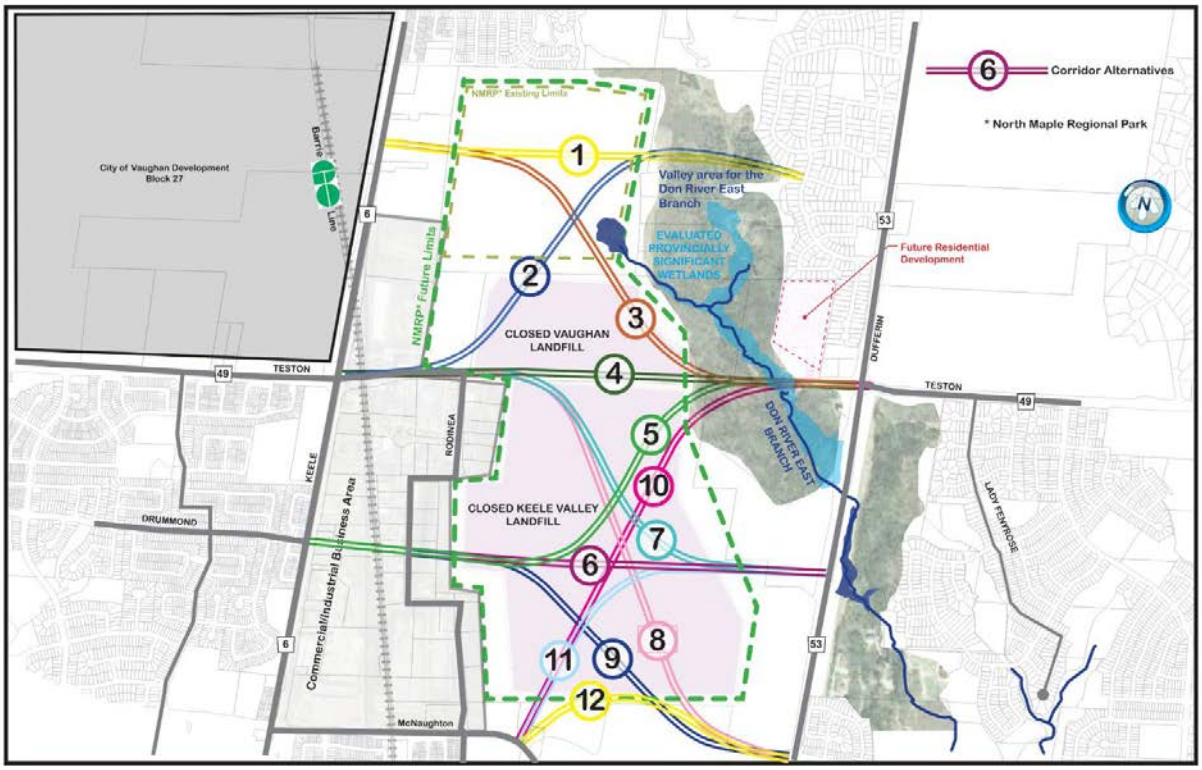


Figure 3: Alternative Corridors

The twelve corridors were screened against natural, cultural, socio-economic and transportation factors to determine the most favorable corridor alternative. The screening led to the selection of Corridor Alternative 4 which connects Keele Street to Dufferin Street at the existing intersections of Teston Road. This connection provides the most direct east-west continuity.

The other corridor alternatives did not provide a direct east-west connection and most options had equal if not greater potential environmental effects compared to Corridor Alternative 4.

5. ALTERNATIVE ALIGNMENTS

5.1 Long List of Alternative Alignments

As part of the second Open House, based on the recommended alternative corridor (Alternative Corridor 4), the study team also presented a list of eight alternative alignments (A through H) for the widening of Teston Road between Dufferin and Bathurst (Refer to **Figure 4)**.

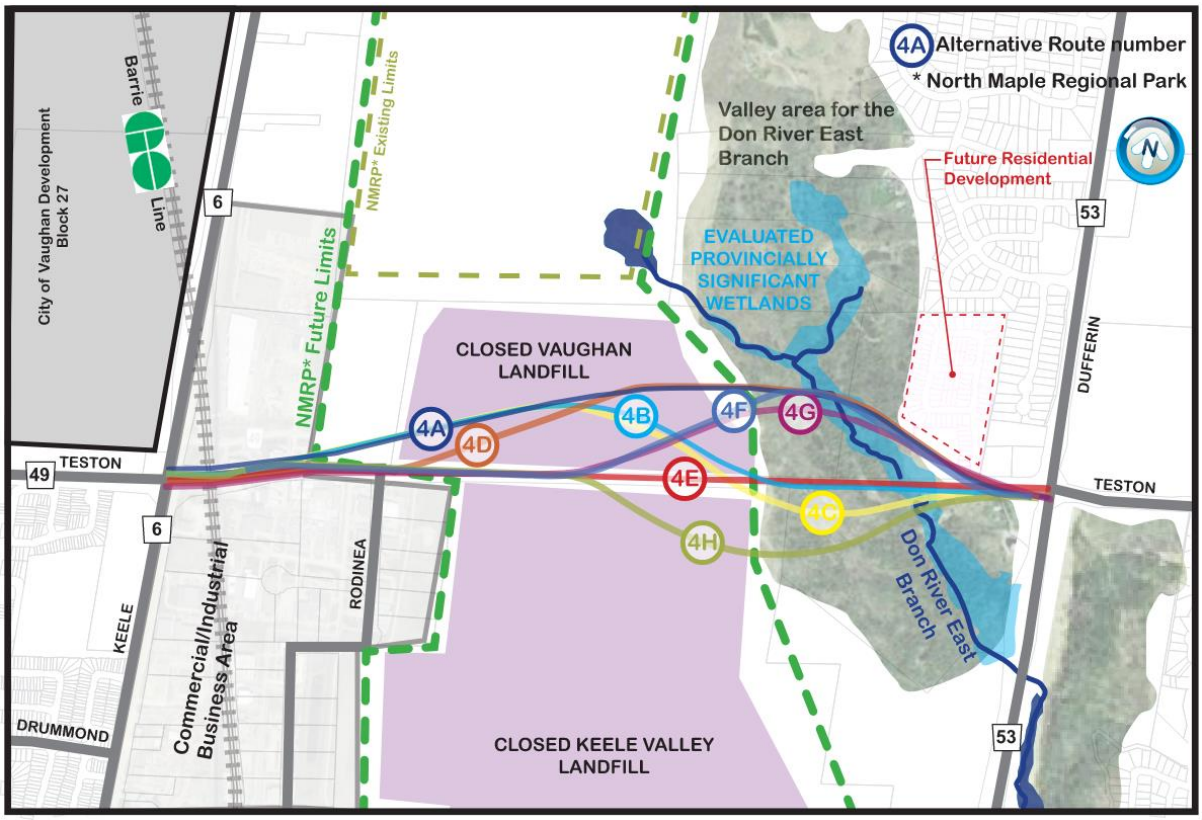


Figure 4: Long List of Alternative Alignments

Table 1 summarizes the pros and cons of each alternative alignment.

Table 1: Long List of Alternative Alignments Screening

Alignment Alternatives	Discussion	Action
Alternative 4-A	• Minimizes valley crossing distance and potential environmental footprint • Desirable horizontal geometry • Avoids Keele Valley Landfill (KVL) and avoids conflicts with Vaughan Twp. landfill monitoring systems • Higher encroachment on former private and Vaughan Twp. landfills and on proposed North Maple Regional Park (NMRP) – Phase 2	Carried Forward

	• Higher disturbance to existing and the future Teston Sands subdivision developments west of Dufferin	
Alternative 4-B	• Longer valley crossing distance and larger potential environmental footprint • Allows for valley crossing on a tangent • Avoids KVL and avoids conflicts with Vaughan Twp landfill monitoring systems • Higher encroachment on former private and Vaughan Twp. landfills and proposed NMRP – Phase 2 • Avoids impacting future Teston Sands subdivision property lots	Carried Forward
Alternative 4-C	• Longer valley crossing distance and larger potential environmental footprint • Less desirable S-curve alignment • Avoids KVL and avoids conflicts with Vaughan Twp. landfill monitoring systems • Higher encroachment on former private and Vaughan Twp. landfills and proposed NMRP – Phase 2 • Avoids impacting future Teston Sands subdivision property lots	Not Carried Forward
Alternative 4-D	• Minimizes valley crossing distance and footprint • Good horizontal geometry • Avoids KVL, former private landfill and mostly avoids conflicts with former Vaughan Twp. landfill monitoring systems • Higher encroachment on former Vaughan Twp. landfill and proposed NMRP – Phase 2 • Higher disturbance to existing and the future Teston Sands subdivision developments west of Dufferin	Carried Forward
Alternative 4-E	• Longer valley crossing distance and larger potential environmental footprint but makes most use of existing roads to the east and west resulting in less footprint impact. • Allows for valley crossing on a tangent (best horizontal geometry overall) • Avoids significant encroachment on Keele Valley, former Vaughan Twp., and former private landfills • Potential conflicts with former Vaughan Twp landfill monitoring systems • Minimizes encroachment on proposed NMRP – Phase 2 • Avoids impacting future Teston Sands subdivision property lots	Carried Forward
Alternative 4-F	• Minimizes valley crossing distance and potential footprint • Less desirable horizontal geometry (i.e., tight radius curve at the valley crossing) • Avoids significant encroachment on Keele Valley and former private landfills • Some encroachment on former Vaughan Twp. landfill and on proposed NMRP – Phase 2 • Potential conflict with former Vaughan Twp. landfill monitoring systems • Higher disturbance to existing and the future Teston Sands subdivision developments west of Dufferin	Not Carried Forward

Alternative 4-G	• Minimizes valley crossing distance and potential footprint • Better horizontal geometry (i.e., larger curves) vs. Alt. 4F • Avoids significant encroachment on Keele Valley and former private landfills • Some encroachment on former Vaughan Twp. landfill and on proposed NMRP – Phase 2 • Potential conflict with former Vaughan Twp. landfill monitoring systems • Higher disturbance to existing and the future Teston Sands subdivision developments west of Dufferin • Additional impacts to the east of Dufferin compared to other alternatives.	Carried Forward
Alternative 4-H	• Longer valley crossing distance and larger potential environmental footprint • Less desirable curved alignment for bridge crossing • Higher encroachment on KVL • Avoids significant encroachment on former Vaughan Twp. and former private landfills • Potential conflicts with former Vaughan Twp landfill monitoring systems • Minimizes encroachment on proposed NMRP – Phase 2 • Avoids impacting future Teston Sands subdivision property lots	Not Carried Forward

As evident in **Table 1,** Alternative 4C has a potentially larger environmental footprint, longer crossing, and, as an S curve, encroaches on the private landfill and the NMRP. Alternative 4F has no benefit over 4G and less desirable geometry. Alternative 4H has a potentially larger environmental footprint and longer crossing, less desirable curved alignment for the bridge, and high encroachment on the Keele Valley Landfill. These options were screened out due to the noted shortfalls.

The remaining alternatives were 4A, 4B, 4D, 4E and 4G.

5.2 Short List of Alternative Alignments

The short-list of five Alternatives and the Future Do Nothing Alternative were evaluated against 52 different criteria under Natural Environment, Land Use and Socio-economic Environment, Cultural Environment and Transportation (Refer to **Figure 5**).

Alternative 4-E was chosen as the Recommended Alternative based on a review and ranking of the 52 criteria. This alternative provided the greatest benefit to transportation and comparable impacts relative to the other alternatives. Alternatives 4-B and 4-G were carried forward as fallback options. The additional analysis of 4-B and 4-G was presented at the third Open House from March 21, 2022 to April 11, 2022.

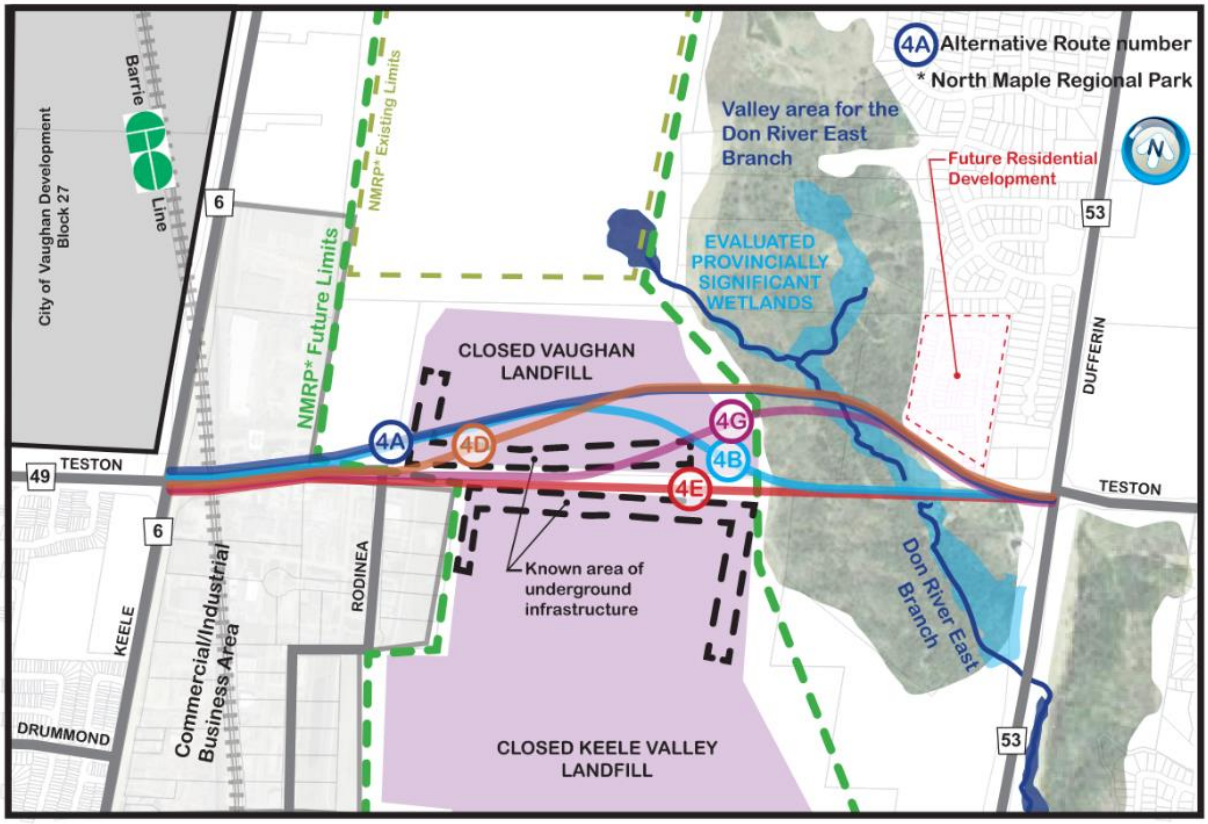


Figure 5: Short List of Alternative Alignments

6. DESIGN ALTERNATIVES

As shown in **Figure 6**, the study team identified the following four distinct project sections, each with its own unique design challenges that would require solutions:

- Section 1 includes the Keele Street and Teston Road intersection easterly to Rodinea Road. This section includes the GO rail crossing and a closed private landfill;
- Section 2 is the area of the road that would pass between the former Vaughan Township and Keele Valley landfills;
- Section 3 includes the Don River tributary valley crossing; and
- Section 4 is the existing two-lane section of Teston Road between Dufferin Street and Bathurst Street.

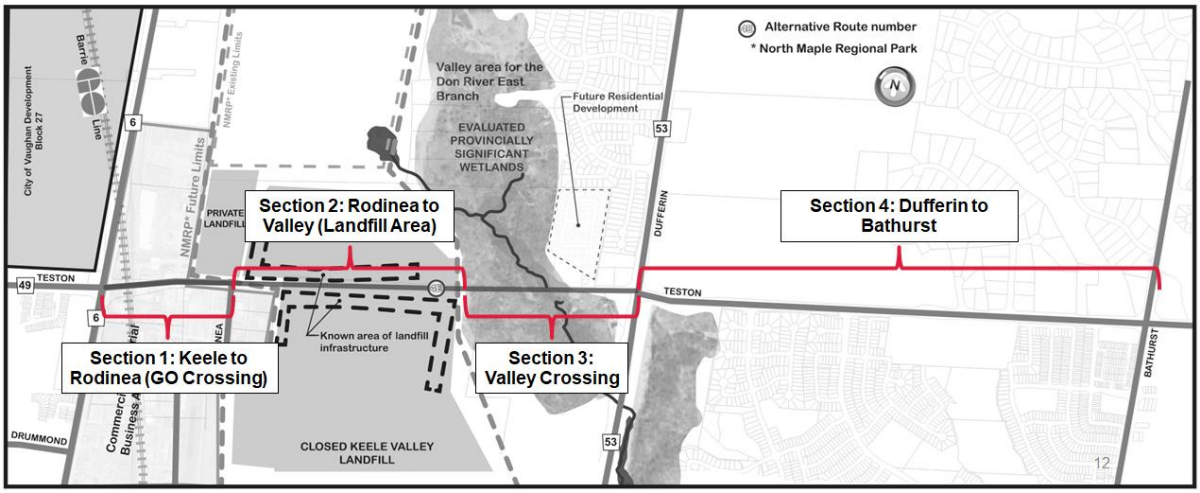


Figure 6: Four Distinct Project Sections

The four sections of Design Alternatives were separated based on their corresponding land use features and the design constraints in each area.

6.1 Section 1 – Keele Street to Rodinea Road

Section 1 includes the Keele Street and Teston Road intersection and is generally comprised of industrial lands. The section includes an existing at-grade rail crossing for the Barrie GO line just 80 metres east of the intersection and a closed private landfill.

The Design Alternatives for Section 1 required several considerations including:

- Designing an at-grade crossing or grade separation for the GO rail crossing
- Realigning Teston Road or Keele Street
- Constructing a road-over-rail or a road-under-rail crossing if grade separation is chosen

During the initial review of grade separation alternatives, it was determined that road-under-rail options would be screened out as these would be much more costly, more difficult to construct and maintain, and would be more disruptive to rail service during construction. All of the grade-separated alternatives generated for this section are road-over-rail options.

There were four alternatives generated for this section for a Grade-Separated GO Rail Crossing along with the Future Do-Nothing alternative.

6.1.1 Section 1 Alternative 1

As shown in **Figure 7**, this alternative includes the GO Rail overpass and keeps both Keele Street and Teston Road on their existing alignments. While this alternative would have a smaller construction footprint and maintains the Keele Street alignment, it would impact several of the driveways for the nearby commercial properties. It also keeps a less desirable alignment for Teston Road which features what is known as a reverse curve or two curves back-to-back which curve in the opposite direction.

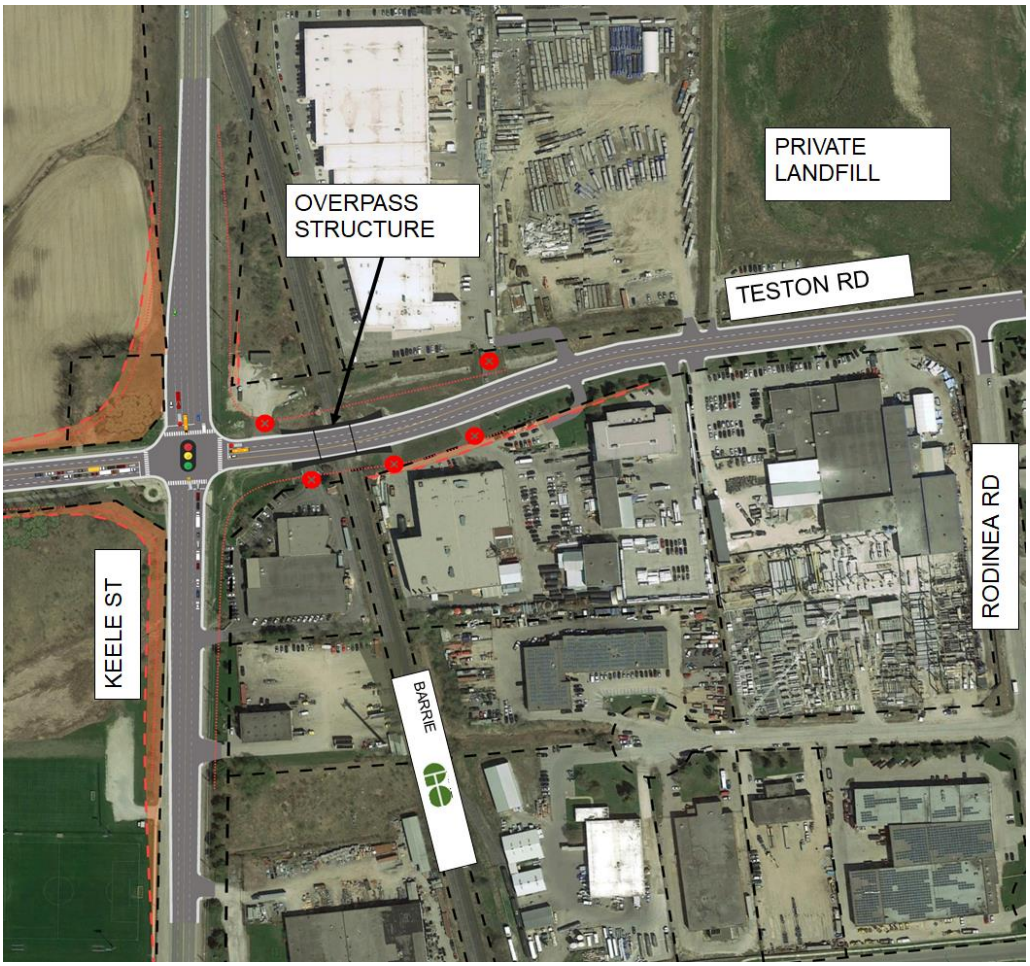


Figure 7: Section 1 - Alternative 1

6.1.2 Section 1 Alternative 2

As shown in **Figure 8**, Section 1 Alternative 2 includes a GO Rail overpass and shifts Teston Road slightly to the north from its current alignment while keeping Keele Street the same.

This alternative also has a relatively small construction footprint, though larger than Alternative 1, and removes the reverse curve, but it still impacts several driveways for the nearby commercial properties.

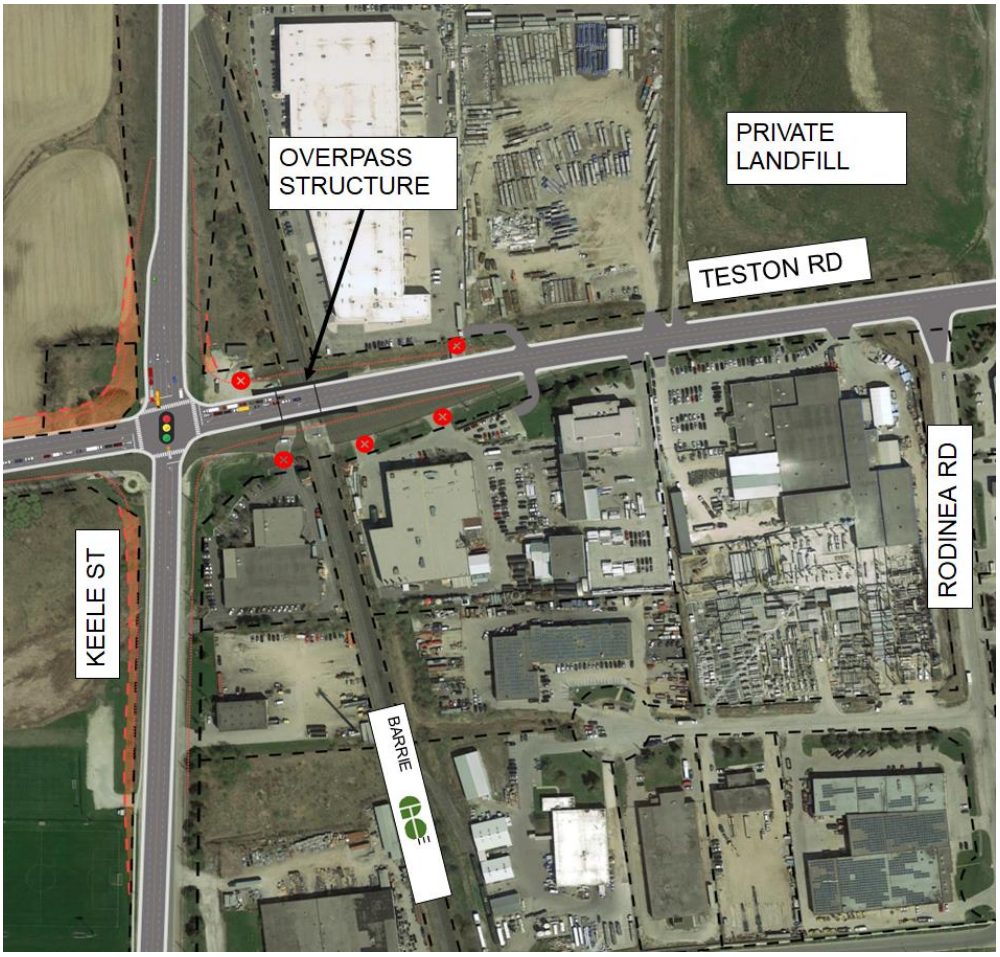


Figure 8: Section 1 - Alternative 2

6.1.3 Section 1 Alternative 3

As shown in **Figure 9**, Section 1 Alternative 3 includes a GO Rail overpass and shifts Keele Street westerly while maintaining the existing Teston Road alignment.

This alternative does maintain access to all property through use of an access road under the overpass structure, however, it has a high impact on the property to the northwest of the intersection and also impacts the City of Vaughan's Maple Reservoir Park to the southwest. It would also have a

higher cost and large construction footprint versus the first two alternatives and does not address the reverse curve along Teston Road.

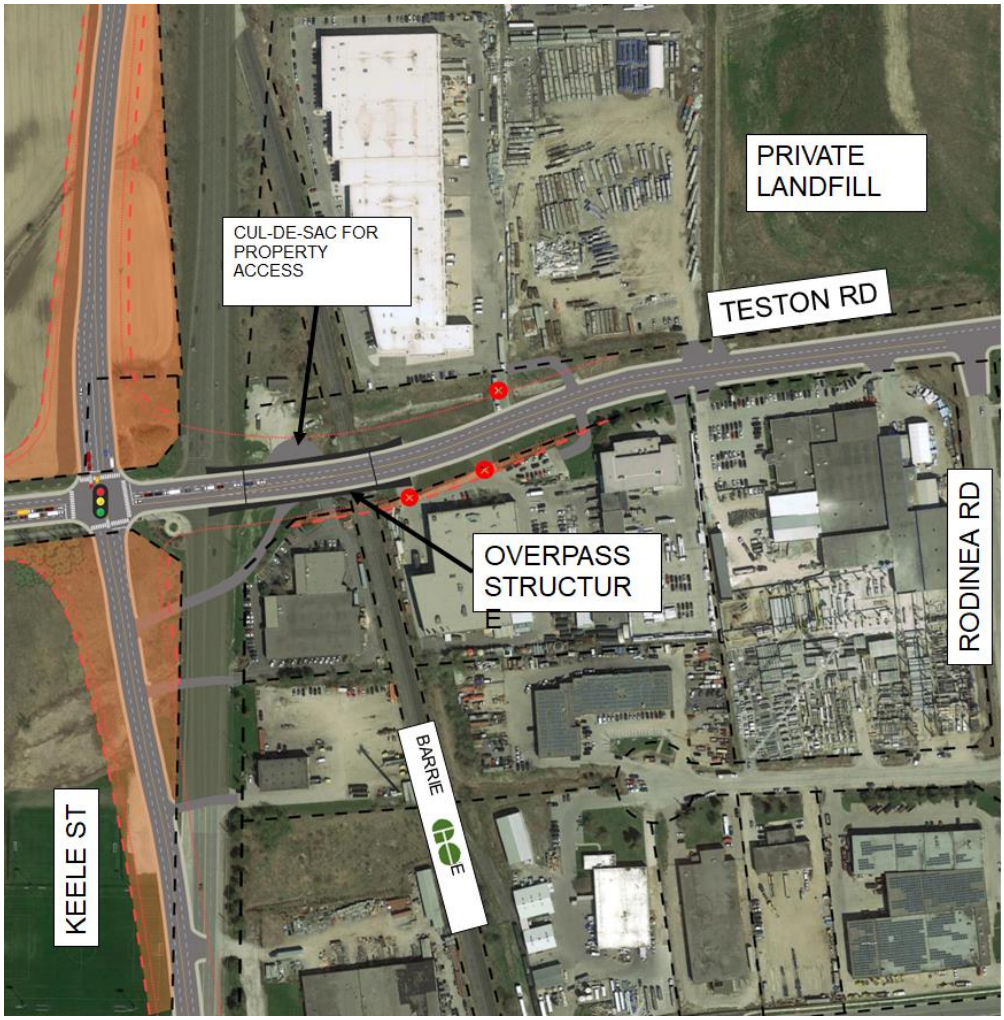


Figure 9: Section 1 - Alternative 3

6.1.4 Section 1 Alternative 4

As shown in **Figure 10**, Section 1 Alternative 4 includes a GO rail overpass and shifts Keele Street westerly and Teston Road northerly. This alternative also maintains access to all properties through use of an access road under the overpass structure. It also eliminates the reverse curve on Teston Road. Like Alternative 3, it has a high impact on the property to the northwest of the intersection and impacts the City of Vaughan's park to the southwest. It would also have a higher cost and large construction footprint versus the first two alternatives.

Figure 10: Section 1 - Alternative 4

Based on a review of warrants, design constraints, and challenges within this section, York Region recommends proceeding in the interim with an At-Grade GO Rail Crossing with an improved Teston Road Alignment, shifting Teston Road to the northeast of Keele Street.

Proceeding now with an at-grade crossing will have no impacts on property and all accesses can be maintained. The IEA is also recommending the long-term property protection for a grade-separated GO Rail Crossing.

To determine the recommendation for the future grade separation, the team evaluated the different grade separated alternatives presented and recommended that Alternative 2 be carried forward for implementation when grade separation is warranted. This is because this alternative would perform well from a transportation perspective while also having less impacts on property, development areas, and the recreational facility in the southwest.

6.2 Section 2 – Rodinea Road to Valley

Section 2 is the section of road that passes between the former Vaughan Township landfill to the north and the Keele Valley landfill to the south, from Rodinea Road to the west side of the valley area.

Section 2 includes three landfills: a closed private landfill, the closed former Vaughan Township Landfill and the closed Keele Valley Landfill. All landfills have associated monitoring wells and infrastructure that contribute to the design constraints.

Two basic roadway cross sections were generated initially. The first cross section is a full width section that is the standard design for new roads within York Region. The second is a smaller cross section that will allow the roadway to pass between the landfills and avoid the landfills to the north and south.

Two active transportation variations to each of these cross-sections are being considered.

6.2.1 Section 2 Full Width Cross Section

As shown in **Figure 11**, the full width cross section features a 36-metre right-of-way, active transportation on both sides of the roadway, and a combination of 3.5- and 3.3-metre lanes, two in each direction. It also features boulevards for a wider separation from pedestrians and utility zones. The active transportation could feature either a multi-use path on each side or a separated sidewalk and cycle track.

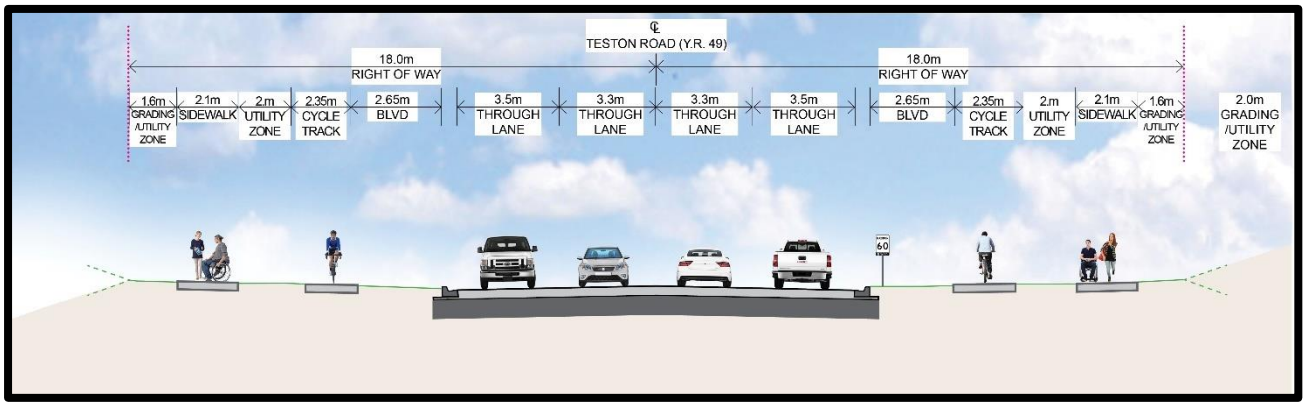


Figure 11: Section 2 - Full Width Cross Section

6.2.2 Section 2 Constrained Cross Sections

As shown in **Figure 12**, the constrained cross sections also feature a combination of 3.5- and 3.3-metre lanes, again with two lanes in each direction. However, the boulevards and utility zones have been reduced or eliminated to reduce the total width of the cross section. This will allow the roadway to fit in between the landfill infrastructure while still maintaining the

same lanes and active transportation facilities. The active transportation elements could feature either a multiuse path on each side or a separated sidewalk and cycle track.

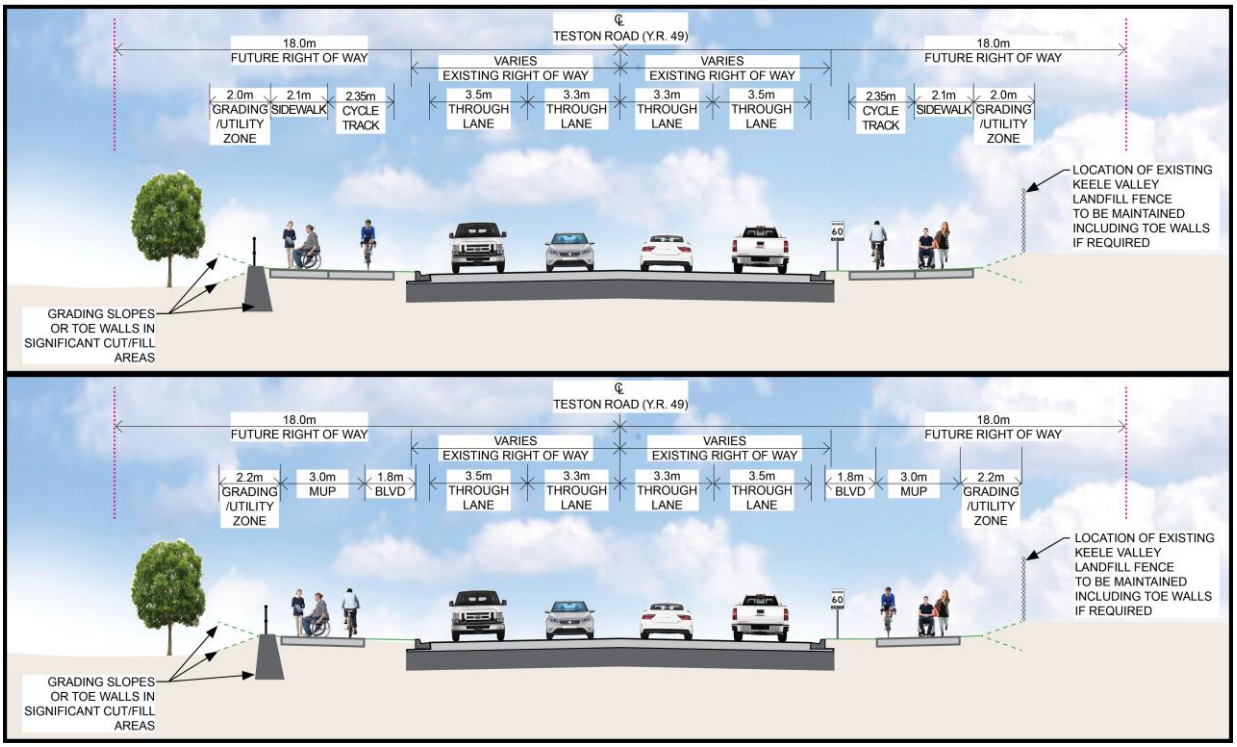


Figure 12: Section 2 - Constrained Cross Sections

The aerial mapping of Section 2 provides context to the constraints in this area. The proposed road with the constrained cross section is shown in **Figure 13**. The area is surrounded by industrial sites and landfill infrastructure to the north and south. The northwestern portion contains the private landfill and associated access road. Directly north the Vaughan Township landfill includes several well monitoring sites in addition to an access road and additional infrastructure. To the south there is an industrial property as well as the Keele Valley Landfill which contains similar monitoring wells to the Vaughan landfill in addition to access roads. It is important to understand that there is a large difference in elevation between the north and south landfill sites. The road is anticipated to be built on top of the narrow strip of raised elevation, adding to the justification for the constrained cross section.

Due to the constraints in this section, the full-width cross-section will be used where feasible, and the constrained cross-section will be used where required. Long term protection for a full-width cross-section will be made in areas where the constrained cross-section is recommended.

Figure 13: Section 2 - Constrained Cross Sections Plan

6.3 Section 3 – Valley to Dufferin Street

Section 3 is associated with the valley of the East Don River tributary. The surrounding area is forested and includes significant natural habitat. The valley also possesses significant elevation changes which results in design challenges.

Section 3 pertains to the crossing of the valley from east of the landfills across to Teston Road and Dufferin Street intersection. This section features four alternatives including a single span bridge, a double span bridge, and a triple span bridge, along with the Do-Nothing alternative.

6.3.1 Section 3 Alternative 1

As shown in **Figure 14**, the single-span bridge features a structure at about 80 metres long and approximately 14 metres high at the tallest point. The remainder of the valley crossing includes embankments along the length. The existing tributary of the East Don River would pass under the structure and the structure would be wide enough to accommodate flooding from a regional storm, such as what happened with Hurricane Hazel. The span is wide enough to permit wildlife passage as well as recreational opportunities such as trails. However, given it has the shortest span of the alternatives, the area for passage underneath is the smallest. There is also limited space for vegetation to grow under the structure. While the embankments can be revegetated, this alternative does have the largest footprint.

This alternative would have the lowest construction cost.

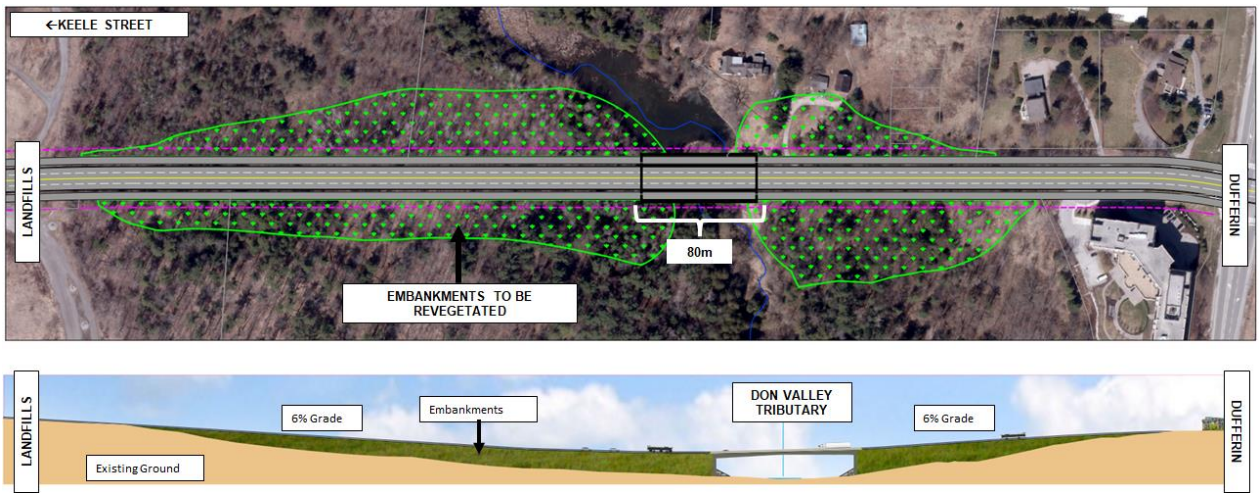


Figure 14: Section 3 – Single Span Bridge

6.3.2 Section 3 Alternative 2

As shown in **Figure 15**, the double-span bridge alternative features a structure that is about 160 metres in total length and approximately 14 metres high at the tallest point. This alternative would also have embankments along the remaining length of the valley. With double the span of Alternative 1, there are greater opportunities for wildlife passage and recreational opportunities. There is some potential for vegetation to continue to grow under the structure, however this may be limited due to shade from the structure. The embankments would also be revegetated in this alternative, though its overall construction footprint is lower than that of Alternative 1.

This alternative would have a construction cost between Alternatives 1 and 3.

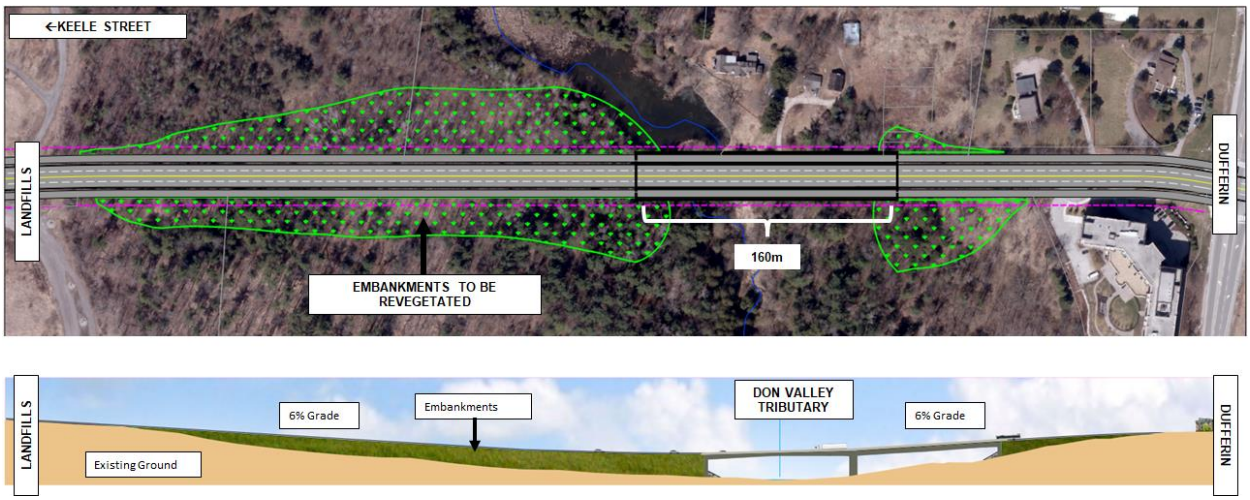


Figure 15: Section 3 – Double Span Bridge

6.3.3 Section 3 Alternative 3

As shown in **Figure 16**, the triple-span bridge alternative features a structure that is about 240 metres in total length and is approximately 21 metres high at the tallest point. This alternative would also have embankments along the remaining length of the valley. With triple the span of Alternative 1 there are even greater opportunities for wildlife passage and recreational opportunities under the structure. Like Alternative 2 there is some potential for vegetation to grow under the structure.

This alternative would have the highest construction cost.

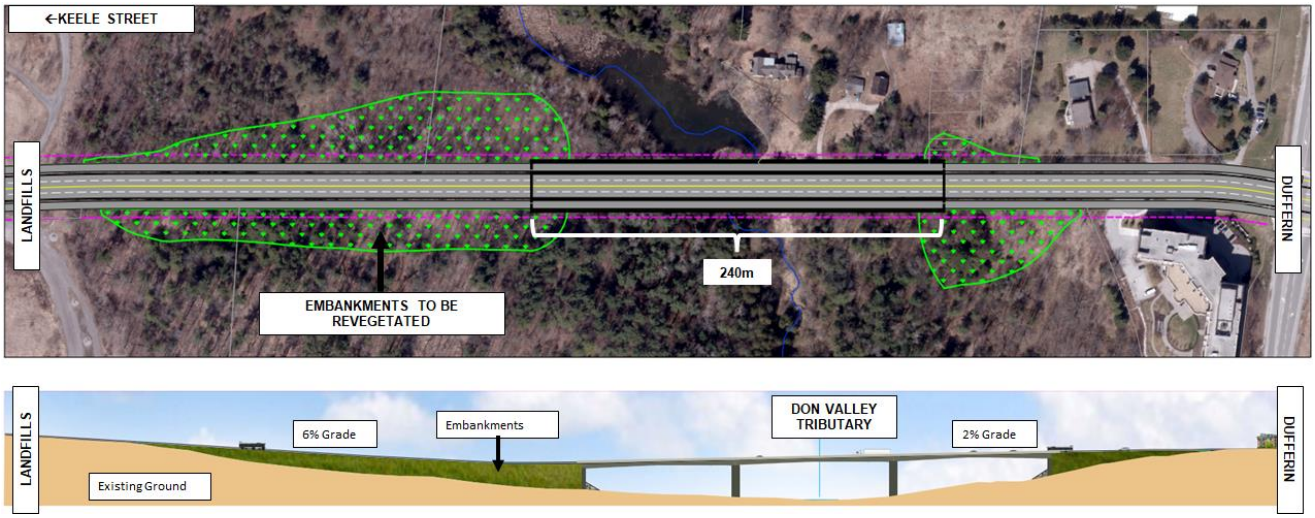


Figure 16: Section 3 – Triple Span Bridge

Upon evaluation of the various bridge alternatives along with the do-nothing alternative, the single span bridge is recommended. While all alternatives will have impacts to the valley from both temporary construction impacts and permanent impacts, the longer structures are more complex to construct, more expensive, and do not offer many additional benefits to travellers or to land use and the socio-economic environment.

The design for this section of the project will include integration of public amenities such as existing or planned trails, parks, or natural areas, and will ensure a context-sensitive and sustainable design solution. It will also include revegetation of the embankments and additional investigations will be undertaken to limit the extent of the embankments where feasible.

6.4 Section 4 – Dufferin Street to Bathurst Street

Section 4 comprises existing Teston Road from Dufferin Street to Bathurst Street and is dominated by residential development. This area already has an active two-lane road with a wide paved median and supporting infrastructure.

If this Environmental Assessment is approved by the Ministry of Environment, Conservation, and Parks, and Teston Road is connected between Keele Street and Dufferin Street, Teston Road east of Dufferin Street would require additional lane capacity.

This IEA is also proposing the widening of Teston Road to four lanes between Dufferin Street and Bathurst Street. An aerial view of the existing conditions of this section are shown in **Figure 17**.

Figure 17: Section 4 – Dufferin to Bathurst

4.1 m of widening is required to expand the existing roadway. Widening alternatives include:

- Widen equally on each side of the existing road
- Widen on the south side only
- Widen on the north side only
- Future Do-Nothing – Keep the road as two lanes

6.4.1 Section 4 Alternative 1

As shown in **Figure 18**, widening equally on both sides of the existing road would require the addition of approximately two metres on each side of the roadway. This minimizes grading impacts on both the north and south side of Teston Road. It also avoids impacts to the existing hydro poles on the south side of the road and avoids the need to extend an existing culvert located just west of Saul Court.

This alternative increases the complexity of construction staging, given only a small amount of roadway needs to be added on each side of the existing road.

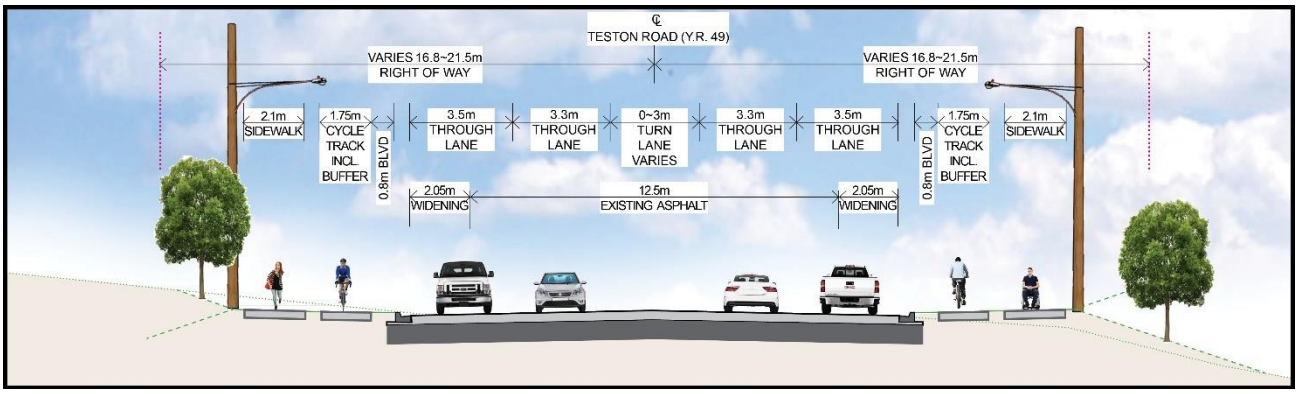


Figure 18: Section 4 – Alternative 1

6.4.2 Section 4 Alternative 2

As shown in **Figure 19**, Widening on the south side of the existing road would require the addition of four metres to the south. This would have minimal impacts to the north of Teston Road and is easier to construct, however, it may impact the existing hydro pole on the south side and would require lengthening of the existing culvert.

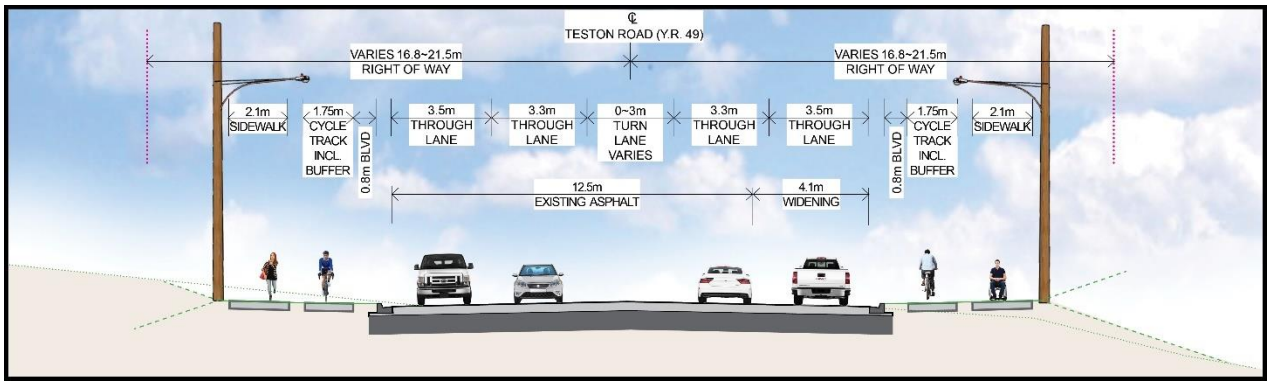


Figure 19: Section 4 – Alternative 2

6.4.3 Section 4 Alternative 3

As shown in **Figure 20**, widening on the north side of the existing road would require the addition of four metres to the north. This would have minimal impacts to the south of Teston Road and is easier to construct than widening on both sides. It also avoids the hydro poles on the south side.

North widening also would require lengthening of the existing culvert and may result in impact to the wetland in this area.

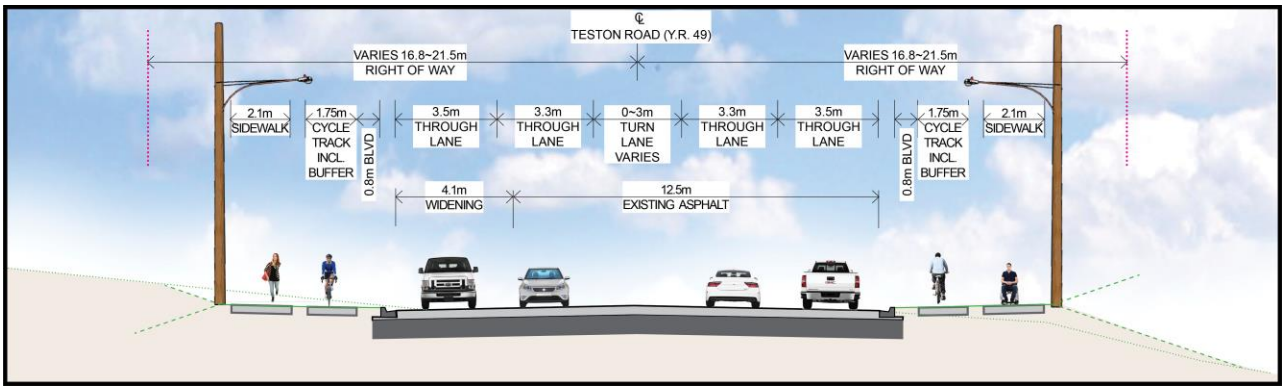


Figure 20: Section 4 – Alternative 3

Widening on both sides of the existing road is the recommended alternative for Section 4. This is because it has the least impacts on the environmental and socio-economic effects while also performing the best from a transportation perspective. This alternative is more complex to construct but this is largely a temporary condition and will require construction staging to be designed to reduce impacts to users.

6.5 Preliminary Design

In summary, subject to the feedback received during the third Open House, the study team developed a preliminary design of the recommended alternatives for each section. This includes an at-grade rail crossing with an improved alignment of Teston Road in Section 1, along with long-term property protection for grade separation; use of the constrained cross section in Section 2 to avoid the landfill infrastructure and use of the full width cross section throughout the remaining sections; a single span bridge structure with span length of approximately 80 metres for Section 3 and widening of the existing Teston Road equally on both sides from Dufferin Street to Bathurst Street.

7. INTERSECTION DESIGN

The Teston Road extension will require intersection improvements at all key signalized and unsignalized intersections within the Preliminary Study Area.

As shown in **Figure 21**, the intersection design for the Teston Road extension fits within a 36m right-of-way. The approach allows for two 3.3m center lanes, two 3.5m curb lanes, a 3.0m left turn lane with a 1.4m median.

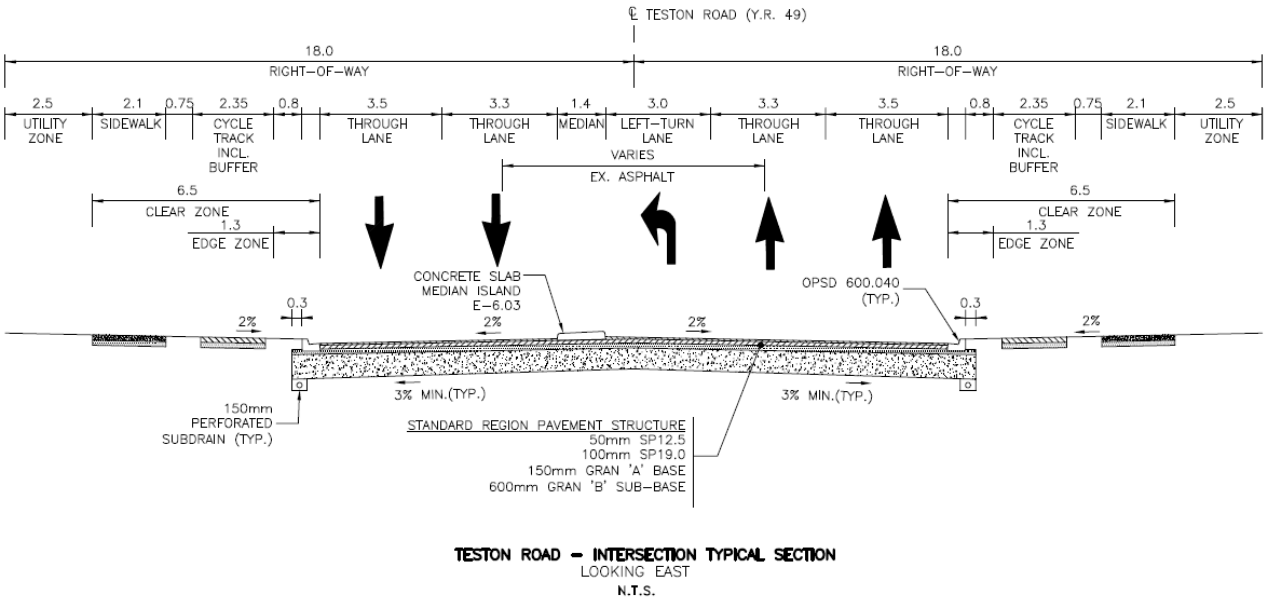


Figure 21: Proposed Intersection Cross-Section

7.1 New Intersection at 1600 Teston Road

In 2018, C.F. Crozier & Associates Inc. (Crozier) was retained by Teston Sands Inc. to undertake a Traffic Impact Study (TIS) in support of an Official Plan Amendment, Zoning By-Law Amendment and Draft Plan of Subdivision for a proposed residential development located at 1600 Teston Road, in the City of Vaughan.

The proposed development consists of a residential subdivision. The subject lands have an area of 6.5 hectares and will include a total of 91 single-family detached houses. The development will be accessible via a proposed residential street from the extension of Teston Road, west of Dufferin Street.

The proposed residential development is expected to generate 74 trips during the weekday a.m. peak hour and 97 trips during the weekday p.m. peak hour (shown in **Figure 22**); however, the analysis contained within this report did not consider the long-term plans for the Teston Road extension. As such, conservatively high turning

movement counts (TMC) to/from the 1600 Teston Road Access Road were estimated during the AM peak hour for the purpose of this study.

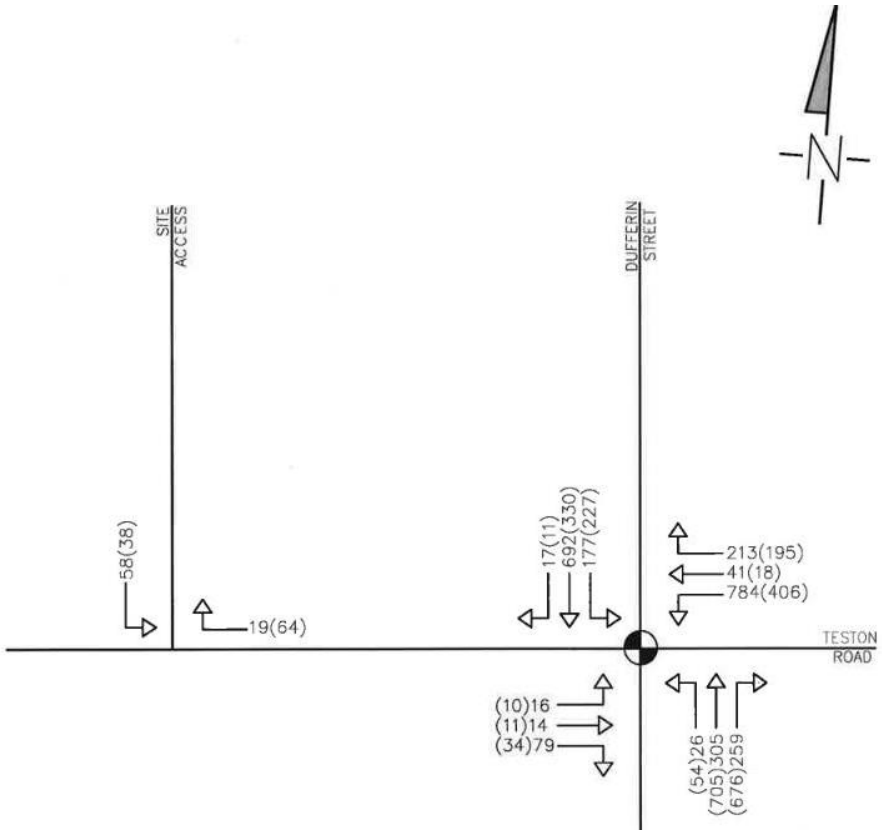


Figure 22: 2022 Estimated AM Peak Hour Traffic Volumes at 1600 Teston Road by Crozier

7.2 New Intersection at the Future North Maple Regional Park

The NMRP sits south of Kirby Road between Keele Street and Dufferin Street on the former Avondale Compost lands. It is currently roughly 81 hectares of parklands with walking trails, soccer fields, as well as washrooms and other amenities. Phase 1 of the park was opened in 2019.

The City of Vaughan has plans to increase the size of the park through a phased planning approach. The expected final size of the park will be roughly 365 hectares and will cover the former sites of the Vaughan and Keele Valley Landfills. The plan also includes integration with a Teston Road “missing link” between Keele Street and Dufferin Street. As such, an access road was proposed along Teston Road (east of Rodinea Road) to access the future NMRP.

The associated traffic volumes at the future NMRP are not available. While this intersection may not warrant signals, the City will most likely want (at least) to feature pedestrian actuated signals.

Multiple existing access points to/from landfill areas will be maintained in the near to medium term.

8. TRAFFIC ANALYSIS OF RECOMMENDED DESIGN

Analysis of the 2041 Recommended Design (i.e., four lane Teston Road) was undertaken to determine traffic control and lane requirements at the following key intersections within the study area:

- Teston Road and Keele Street..... Signalized
- Teston Road and Rodinea Road..... Unsignalized
- Teston Road and Future North Maple Regional Park..... Unsignalized
- 1600 Teston Road Access Road ..... Unsignalized
- Teston Road and Dufferin Street ..... Signalized
- Teston Road and Lady Fenyrose Avenue..... Unsignalized
- Teston Road and Via Romano Boulevard..... Signalized
- Teston Road and Quail Run Boulevard..... Unsignalized
- Teston Road and Torah Gate ..... Unsignalized
- Teston Road and Bathurst Street..... Signalized

There are four signalized and six unsignalized intersections along Teston Road within the Preliminary Study Area. As mentioned in TSTR #1, link and intersection traffic volumes were estimated using existing TMCs, the existing (2016) and the future (2041) EMME models. The York Region EMME models (comparing the 2016 model vs. the 2041 model) were used to estimate the growth rate between existing and future traffic conditions.

Projected AM peak hour TMCs (shown in **Figure 23**) were developed for the 2041 Recommended Design based on trip patterns in the 2041 EMME model.

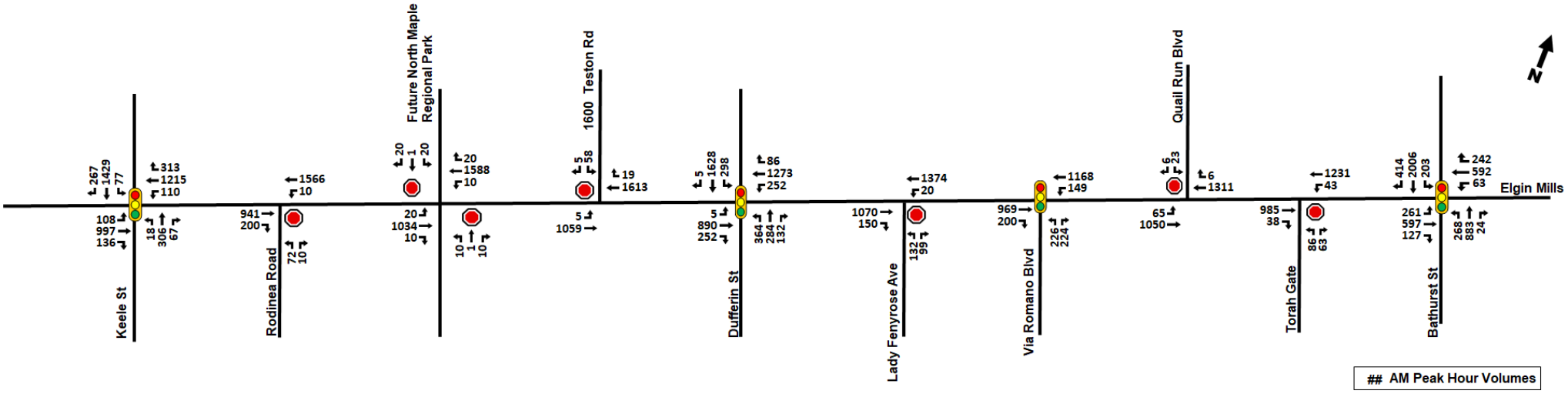


Figure 23: Projected AM Peak Hour Traffic Volumes (2041) for Alternative Design

8.1 Signal Warrant Analysis

A detailed signal warrant analysis was completed for five[1] unsignalized intersections along Teston Road within the Preliminary Study Area. This analysis considered the specific traffic circulation/turning movement changes generated by the Teston Road extension and widening from the 2041 EMME model. The 8-hour turning movement data at these intersections was projected to the 2041 horizon year. Where 8-hour turning movement data was not available, signal warrant analysis was completed based on the morning and afternoon peak hours.

Signal warrant analysis was completed using Justifications 1, 2 and 3 in Book 12 of the OTM and a summarized in **Table 2**. Detailed signal warrant analysis sheets are included in **Appendix A**.

If any justification is 100% fulfilled, a signal is warranted. It should be noted that Justification 3 is considered to be fulfilled if Justifications 1 and 2 are at least 80% satisfied.

Table 2: Signal Warrant Analysis Summary (2041 Horizon Year)

Location	Justification 1 Warrant %	Justification 2 Warrant %	Justification 3 Warrant %	Warranted ?
Teston Rd and Rodinea Rd	29%	91%	50%	No
1600 Teston Rd Access Road	19%	59%	0%	No
Teston Rd and Lady Fenyrose Ave	46%	90%	50%	No
Teston Rd and Quail Run Blvd	8%	18%	0%	No
Teston Rd and Torah Gate	33%	57%	0%	No

The analysis revealed that traffic signals are not warranted at any of above mentioned unsignalized intersections by the year 2041.

However, the City of Vaughan has requested the installation of traffic signals at the intersections of Teston Road and Rodinea Road, as well as at Teston Road and Lady Fenyrose Avenue, in order to improve pedestrian access to transit. MH proposes to keep the side-street stop control at the Rodinea Road and Teston Road intersection but in discussion with York Region propose to signalize the Teston Road and Lady Fenyrose Avenue intersection. Due to the current absence of parks or significant pedestrian activity in the area, the decision regarding signalization of the Rodinea Road and Teston Road intersection (and/or a nearby future North Maple Regional Park access road) could be postponed to detailed design.

8.2 Methodology/Assumptions

The following tools were used to evaluate the operational performance of intersections within the Preliminary Study Area and to compute the 95th percentile queues for the horizon year 2041:

[1] Traffic volumes at the future NMRP are not available.

Synchro: Synchro uses equations to determine the LOS, delay, and queue and does not consider spillback from insufficiently long turning bays.

SimTraffic: In SimTraffic, the queues are determined by noting the maximum back of queue for every two-minute period. The average and the standard deviation is then determined for all of the two-minute queues. The reported "Average Queue" is simply the average of the two-minute queues and the "'95th Percentile Queue" is the average queue plus 1.65 standard deviations.

The SimTraffic model was run for 10 minutes of seeding time and an hour of recording time. An average of five runs is reported in this report.

8.2.1 Synchro Analysis

A performance evaluation was conducted using Synchro for the study area intersections for the 2041 horizon year. Analysis was completed for the weekday morning peak hour. The signal timings were optimized in Synchro. To improve network performance the following localized intersection improvements (e.g., traffic signal improvements, channelization, etc.) were considered:

The Keele Street and Teston Road intersection is currently signalized and consists of two northbound and two southbound through lanes, one dedicated left turn lane at both north and south directions, and one dedicated southbound right turn lane on Keele Street. On Teston Road, there is one eastbound and one westbound through lane, one dedicated left turn lane at both eastbound and westbound approaches, and one dedicated eastbound right turn lane.

There are no recommended improvements along Keele Street identified in the York Region TMP.

The only improvement required for Teston Road is the widening to two eastbound and westbound through lanes along with one dedicated westbound right turn lane. The existing Cycle length of 150 seconds was optimized to 130 seconds.

The Dufferin Street and Teston Road intersection is currently signalized and consists of one northbound and one southbound through lane, one dedicated left turn lane at both northbound and southbound approaches, and one dedicated northbound right turn lane on Dufferin Street. On Teston Road, there is one eastbound and one westbound through lane with one dedicated left turn lane at each of the eastbound and westbound approaches.

The 2022 York Region TMP Update includes revised widening limits of Dufferin Street between Major Mackenzie Drive and Teston Road, from two to four lanes.

Under the ultimate condition, Dufferin Street at Teston Road will be converted to two northbound through and two southbound though lanes, two dedicated left turn lanes, and one dedicated right turn lane for both the northbound and

southbound directions. As per the TMP, Dufferin Street north of Teston Road will transition from four lanes to two lanes to match existing conditions.

Teston Road will be converted to two eastbound and two westbound lanes, two dedicated left turn lanes at the westbound direction and one dedicated right turn lane at both east and west directions. The existing Cycle length of 140 seconds was optimized to 130 seconds.

The Bathurst Street and Teston Road intersection is currently signalized and consists of two northbound and two southbound through lanes, one dedicated left turn lane and one dedicated right turn lane for both the northbound and southbound directions on Bathurst Street. On Teston Road, there are one eastbound and one westbound through lane with one dedicated left turn lane and one dedicated right turn lane on each eastbound and westbound approaches.

Although the 2022 York Region's TMP Update includes widening of Bathurst Street between Highway 7 and Kirby Road from four to six lanes by 2051, this particular section is not currently covered by the Region's DC bylaw, which only extends up to 2041. As a result, traffic analysis assumes that two northbound and two southbound through lanes along Bathurst Street will remain unchanged by the horizon year of 2041.

Under the ultimate condition, two dedicated northbound left turn lanes will be implemented on Bathurst Street. The only improvement required for Teston Road is to widen from one eastbound and one westbound through lane to two lanes. The existing Cycle length of 150 seconds will remain unchanged.

Figure 24 and **Table 3** displays the results of this analysis. Detailed Synchro reports are provided in **Appendix B**.

Table 3: 2041 Critical Intersection Summary (Synchro) – AM Peak Hour

Intersections	Movements	Delay (s)	LOS	v/c Ratio	95th Queue (m)
Teston / Keele (Signalized)	WBT	56	E	0.97	#207
	SBT	53	D	0.96	#234
	Overall	**40**	**D**	**0.97**	**-**
Teston / Rodinea (Unsignalized)	NBL	182	F	0.94	38
	Overall	**5**	**A**	**0.94**	**-**
Teston / 1600 Teston Road (Unsignalized)	SBL	449	F	1.43	45
	Overall	**10**	**A**	**1.43**	**-**
Teston / Dufferin (Signalized)	EBT	74	E	0.98	#162
	Dual WBL	94	F	0.91	#58
	WBT	76	E	1.03	#226
	Dual NBL	112	F	1.03	#82
	Dual SBL	93	F	0.93	#66
	SBT	61	E	1.02	#275
	Overall	**67**	**E**	**1.03**	**-**
Teston / Lady Fenyrose Avenue (Unsignalized)	NBL	389	F	1.56	81
	Overall	**19**	**C**	**1.56**	**-**
	SBLR	106	F	0.47	14

Intersections	Movements	Delay (s)	LOS	v/c Ratio	95th Queue (m)
Teston / Quail Run Boulevard (Unsignalized)	**Overall**	**2**	**A**	**0.47**	**-**
Teston / Torah Gate (Unsignalized)	NBL	219	F	1.08	46
	Overall	**8**	**A**	**1.08**	**-**
Teston / Bathurst (Signalized)	EBL	151	F	1.17	#132
	Dual NBL	161	F	1.14	#77
	SBT	72	E	1.06	#385
	Overall	**57**	**E**	**1.17**	**-**

- indicates that the 95th percentile queue exceeds capacity and cannot be processed by a single cycle. The value shown is the total queue length over two cycles, which accounts for spillover between cycles.

The results of traffic analysis indicate that all intersections are expected to operate at LOS E or better during the morning peak hour by the year 2041. Numerous failing (i.e., LOS F) turning movements were reported along with several locations reporting critical movements exceeding the v/c ratio thresholds.

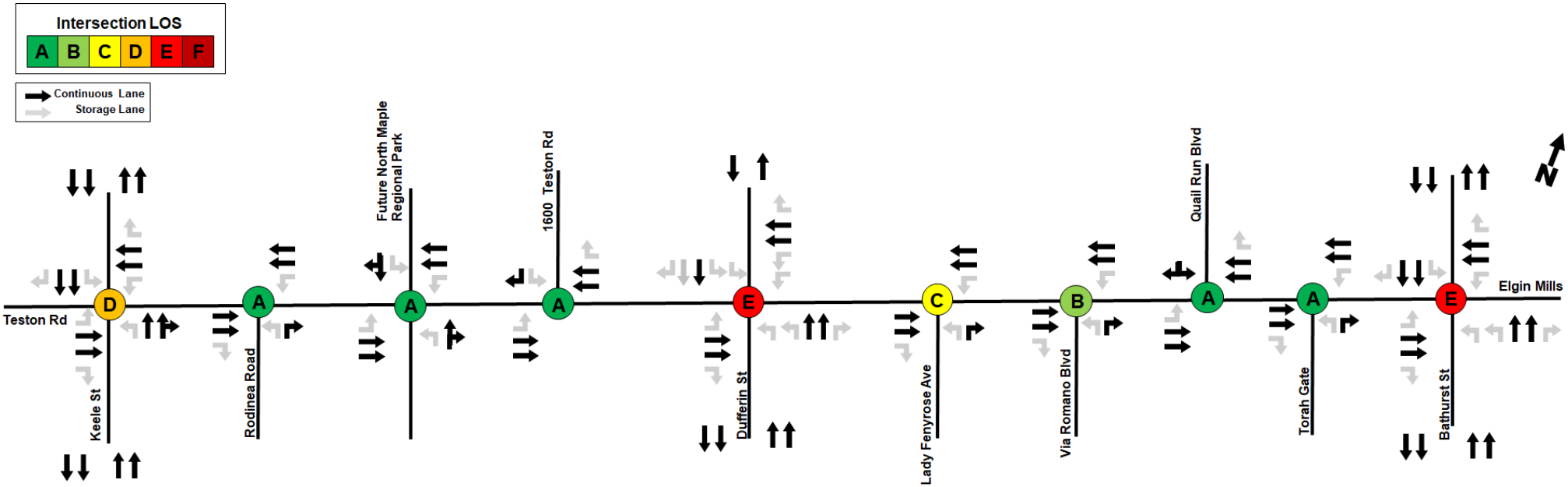


Figure 24: Future AM Peak Hour Intersection Operational Performance (2041) for Recommended Design

8.2.2 SimTraffic Analysis

Since the 95th percentile queue from Synchro indicates that the traffic volume modeled exceeds capacity, further investigations were carried out in SimTraffic to estimate realistic queues. The traffic model was run in SimTraffic for ten minutes of seeding time followed by one hour of simulation time.

Table 4 below shows results from SimTraffic for the intersections along Teston Road during the morning peak hour. The Detailed Synchro/SimTraffic reports are provided in **Appendix B**.

Queues exceeding the modelled storage length and vehicle delays greater than 80 seconds are noted in red.

Table 4: 2041 Intersection Summary (SimTraffic) – AM Peak Hour

Intersections	Movements	Delay (s)	Avg. Queue (m)	95th Queue (m)	Max. Queue (m)	Available Storage (m)
Teston / Keele (Signalized)	EBL	53	23	45	58	195
	EBT	39	89	127	145	>500
	EBR	22	20	39	49	>500
	WBL	66	33	70	82	80m to rail crossing
	WBT	39	120	163	178	80m to rail crossing
	WBR	15	34	64	78	80m to rail crossing
	NBL	476	23	54	54	120
	NBTR	29	34	57	64	>500
	SBL	124	116	356	325	115
	SBT	221	458	817	789	>900
	SBR	104	211	451	325	80
	Overall	**95**	-	-	-	-
Teston / Rodinea (Unsignalized)	NBL	31	13	26	33	85
	NBR	5	2	6	8	85
	Overall	**7**	-	-	-	-
Teston / 1600 Teston Road (Unsignalized)	SBL	147	23	66	75	Not Available
	SBR	19	5	41	61	Not Available
	Overall	**14**	-	-	-	-
Teston / Dufferin (Signalized)	EBL	170	74	282	319	<100m to 1600 Access Rd
	EBT	310	342	581	525	<100m to 1600 Access Rd
	EBR	87	177	422	325	<100m to 1600 Access Rd
	Dual WBL	260	110	256	266	120
	WBT	145	228	361	361	>500
	WBR	10	45	210	248	160
	Dual NBL	577	214	350	312	35
	NBT	23	140	410	445	>500
	NBR	12	13	30	38	85
	Dual SBL	315	256	443	325	80
	SBT	249	642	1.1km	1.1km	480
	SBR	67	243	648	700	480
	Overall	**236**	-	-	-	-
Teston / Lady Fenyrose Avenue	NBL	84	34	67	70	70
	NBR	14	14	41	65	70

Intersections	Movements	Delay (s)	Avg. Queue (m)	95th Queue (m)	Max. Queue (m)	Available Storage (m)
(Unsignalized)	**Overall**	**9**	-	-	-	-
Teston / Via Romano Boulevard (signalized)	EBT	10	36	64	76	350
	EBR	6	13	25	33	80
	WBL	31	24	44	48	150
	WBT	11	44	71	84	600
	NBL	26	33	56	72	75
	NBR	13	18	34	41	75
	Overall	**13**	-	-	-	-
Teston / Quail Run Boulevard (Unsignalized)	SBLR	35	5	13	17	95
	Overall	**3**		-		
Teston / Torah Gate (Unsignalized)	NBL	39	15	31	38	95
	NBR	6	7	14	21	95
	Overall	**5**		-		
Teston / Bathurst (Signalized)	EBL	529	227	379	302	120
	EBT	42	202	497	420	180
	EBR	29	22	45	56	120
	Dual WBL	83	19	38	46	30
	WBT	66	75	104	107	275
	WBR	25	34	64	85	125
	Dual NBL	734	217	351	321	85
	NBT	26	175	433	485	270
	NBR	10	4	48	76	40
	Dual SBL	336	217	437	325	60
	SBT	360	1.2km	2.1km	1.7km	500
	SBR	282	287	447	325	80
	Overall	**234**		-		

The 95th percentile vehicle queues from the SimTraffic analysis indicate that no storage or capacity issues are expected at unsignalized intersections along Teston Road by the year 2041.

The SimTraffic analysis indicate the delay/queuing issues at three out of four signalized intersections (Teston Road/Bathurst Street, Teston Road/Dufferin Street, and Teston Road/Keele Street) during the morning peak hour.

As mentioned above, there is an existing at-grade rail crossing for the Barrie GO line just 80 metres east of the Keele Street and Teston Road intersection. The 95th percentile vehicle queues from the SimTraffic analysis indicate that queuing on the westbound approach is expected to spill back to the rail crossing. As such, the future grade separation at this location should be investigated during the Detail Design.

For the Teston Road and Dufferin Street, and Teston Road and Bathurst Street intersections, significant southbound traffic volumes result in poor operations at these intersections: LOS E. Simulated average delays of up to 236 seconds and 95th percentile queues of up to 2.1km cause congestion on the approaches leading up to these intersections. It is worth noting that traffic operational issues at these intersections cause road congestion that extend beyond upstream intersections.

9. CONCLUSION

- Currently, Teston Road (York Region Road 49) is an east-west arterial road with a 4-lane cross section (between Highway 400 and Keele Street) and a 2-lane cross section (from Keele Street to Rodinea Road and from Dufferin Street to Bathurst Street). There is a discontinuity along Teston Road between Keele Street and Dufferin Street.

- At the first Open House a Recommended Alternative to the Undertaking was presented. The assessment led to Alternative 4 (Alternative 10 in the TSTR #2) being carried forward. Alternative 4 included a new four lane Teston Road connection between Keele Street and Dufferin Street with active transportation and potential for transit service.

- At the second Open House a long list of 12 alternative corridors for the Teston Road extension was presented. The twelve corridors were screened against natural, cultural, socio-economic and transportation factors to determine the most favorable corridor alternative. The screening led to the selection of Corridor Alternative 4 which connects Keele Street to Dufferin Street at the existing intersections of Teston Road.

- Also at the second Open House, the study team presented a list of eight alternative alignments (A through H) for the widening of Teston Road. Alternative 4-E was chosen as the recommended alternative based on a review and ranking of the 52 criteria.

- Subject to the feedback received during the third Open House, the study team developed a preliminary design of the recommended alternatives for each section. This includes an at-grade rail crossing with an improved alignment of Teston Road in Section 1, along with long-term property protection for grade separation; use of the constrained cross section in Section 2 to avoid the landfill infrastructure and use of the full width cross section throughout the remaining sections; a single span bridge structure with span length of approximately 80 metres for Section 3 and widening of the existing Teston Road equally on both sides from Dufferin Street to Bathurst Street.

- Analysis of the 2041 Recommended Design was undertaken to determine traffic control and lane requirements at the key intersections within the study area.

    - The signal warrant analysis revealed that traffic signals are not warranted at any of unsignalized intersections by the year 2041. The City of Vaughan has requested the installation of traffic signals at the intersections of Teston Road and Rodinea Road, as well as at Teston Road and Lady Fenyrose Avenue, in order to improve pedestrian access to transit. MH proposes to keep the side-street stop control at the Rodinea Road and Teston Road intersection but in discussion with York Region propose to signalize the Teston Road and Lady Fenyrose Avenue intersection. Due to the current absence of parks or

significant pedestrian activity in the area, the decision regarding signalization of the Rodinea Road and Teston Road intersection (and/or a nearby future North Maple Regional Park access road) could be postponed to detailed design.

- The results of Synchro analysis indicate that all signalized intersections are expected to operate at LOS E or better during the morning peak hour by the year 2041. Numerous failing (i.e., LOS F) turning movements were reported along with several locations reporting critical movements exceeding the v/c ratio thresholds.

- The SimTraffic analysis indicates delay/queuing issues at three out of four signalized intersections (Teston Road/Bathurst Street, Teston Road/Dufferin Street, and Teston Road/Keele Street) during the morning peak hour.

- There is an existing at-grade rail crossing for the Barrie GO line just 80 metres east of the Keele Street and Teston Road intersection. The 95th percentile vehicle queues from the SimTraffic analysis indicate that queuing on the westbound approach is expected to spill back to and beyond the rail crossing. As such, the future grade separation at this location should be investigated during the Detail Design.

- For the Teston Road and Dufferin Street, and Teston Road and Bathurst Street intersections, significant southbound traffic volumes result in poor operations at these intersections: LOS E. Simulated average delays of up to 236 seconds and 95th percentile queues of up to 2.1km cause congestion on the approaches leading up to these intersections. It is worth noting that traffic operational issues at these intersections cause road congestion that extend beyond upstream intersections.

- The increase in travel demands associated with future growth will continue to reduce the operating performance of the transportation network in the area unless additional transportation capacity and improved transportation network efficiency are provided, particularly in the north-south direction along Dufferin Street and Bathurst Street.

- It should be noted that there are no further opportunities to improve the signal timings at the Teston Road/Keele Street, Teston Road/Dufferin Street, and Teston Road/Bathurst Street intersections. The future volumes support the widening of Bathurst Street and Dufferin Street to six lanes; however, widening arterial roads that are currently four-lanes wide to six lanes could only be implemented when HOV lanes are warranted, and the road could be widened in accordance with policy direction from Regional Council.

- In summary, detailed intersection design is to be developed during detailed design.

APPENDIX A: Signal Warrant Analysis

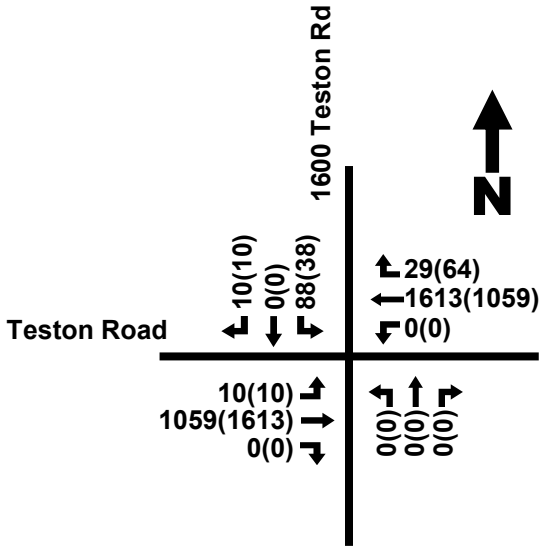
Signal Warrant Analysis (Justification 7) - Teston Road/1600 Teston Road

Major Street:	Teston Road
Minor Street:	1600 Teston Road
Comments:	

Number of Major Road Through Lanes (1-way):	2
Traffic Flow Conditions:	Restricted
Type of Intersection:	T
Pedestrians Crossing Major Road:	0

Warrant 1 - Minimum Vehicle Volume			
A - All Approaches		**Sectional %**	**Entire %**
Warrant Value:	900	**156%**	**19%**
Actual Approach Volume:	1406		
B - Minor Street (Both Approaches)		**Sectional %**	
Warrant Value:	255	**19%**	
Actual Approach Volume:	49		

Warrant 2 - Delay to Cross Traffic			
A - Major Street (Both Approaches)		**Sectional %**	**Entire %**
Warrant Value:	900	**151%**	**59%**
Actual Approach Volume:	1357		
B - Traffic Crossing Major Street		**Sectional %**	
Warrant Value:	75	**59%**	
Total Crossing Volume:	44		



##	AM Peak Hour Volumes
(##)	PM Peak Hour Volumes

Warrant Criteria:	**Single Warrant**	**Are signals warranted?**
Projected peak hour traffic volumes:	120%	**NO**

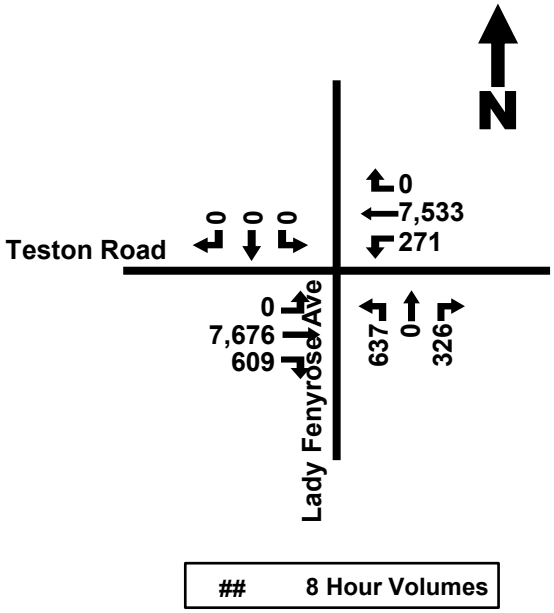
Signal Warrant Analysis (Justification 1, 2 & 3) - Teston Road/Lady Fenyrose Ave

Major Street:	Teston Road
Minor Street:	Lady Fenyrose Ave
Comments:	

Number of Major Road Through Lanes (1-way):	2
Traffic Flow Conditions:	Restricted
Type of Intersection:	T

Warrant 1 - Minimum Vehicle Volume			
A - All Approaches		**Sectional %**	**Entire %**
Warrant Value:	900	**100%**	**46%**
Average Approach Volume:	900		
B - Minor Street (Both Approaches)		**Sectional %**	
Warrant Value:	255	**46%**	
Average Approach Volume:	118		

Warrant 2 - Delay to Cross Traffic			
A - Major Street (Both Approaches)		**Sectional %**	**Entire %**
Warrant Value:	900	**100%**	**90%**
Average Approach Volume:	900		
B - Traffic Crossing Major Street		**Sectional %**	
Warrant Value:	75	**90%**	
Average Approach Volume:	67		



Warrant Criteria:	**Single Warrant**	**Combined Warrant**	**Are signals warranted?**
Existing 8-hour traffic volumes:	100%	80%	**NO**

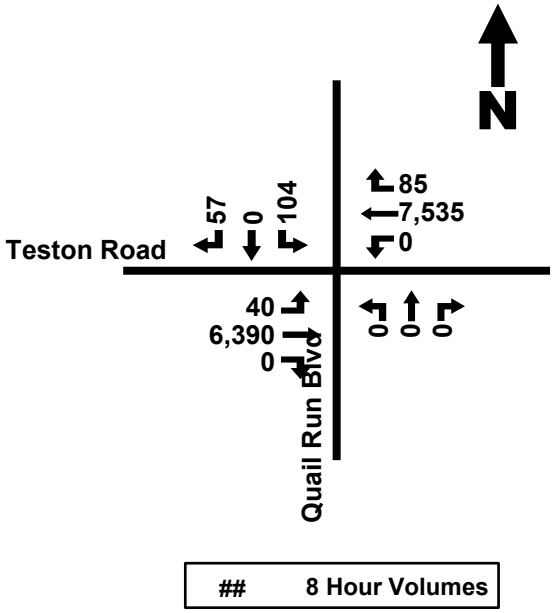
Signal Warrant Analysis (Justification 1, 2 & 3) - Teston Road/Quail Run Blvd

Major Street:	Teston Road
Minor Street:	Quail Run Blvd
Comments:	

Number of Major Road Through Lanes (1-way):	2
Traffic Flow Conditions:	Restricted
Type of Intersection:	T

Warrant 1 - Minimum Vehicle Volume			
A - All Approaches		**Sectional %**	**Entire %**
Warrant Value:	900	**100%**	**8%**
Average Approach Volume:	900		
B - Minor Street (Both Approaches)		**Sectional %**	
Warrant Value:	255	**8%**	
Average Approach Volume:	20		

Warrant 2 - Delay to Cross Traffic			
A - Major Street (Both Approaches)		**Sectional %**	**Entire %**
Warrant Value:	900	**100%**	**18%**
Average Approach Volume:	900		
B - Traffic Crossing Major Street		**Sectional %**	
Warrant Value:	75	**18%**	
Average Approach Volume:	13		



Warrant Criteria:	**Single Warrant**	**Combined Warrant**	**Are signals warranted?**
Existing 8-hour traffic volumes:	100%	80%	**NO**

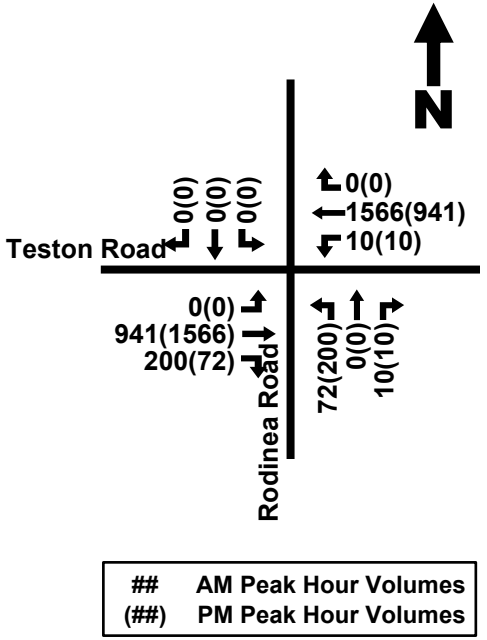
Signal Warrant Analysis (Justification 7) - Teston Road/Rodinea Road

Major Street:	Teston Road
Minor Street:	Rodinea Road
Comments:	

Number of Major Road Through Lanes (1-way):	2
Traffic Flow Conditions:	Restricted
Type of Intersection:	T
Pedestrians Crossing Major Road:	0

Warrant 1 - Minimum Vehicle Volume			
A - All Approaches		**Sectional %**	**Entire %**
Warrant Value:	900	**156%**	**29%**
Actual Approach Volume:	1400		
B - Minor Street (Both Approaches)		**Sectional %**	
Warrant Value:	255	**29%**	
Actual Approach Volume:	73		

Warrant 2 - Delay to Cross Traffic			
A - Major Street (Both Approaches)		**Sectional %**	**Entire %**
Warrant Value:	900	**147%**	**91%**
Actual Approach Volume:	1327		
B - Traffic Crossing Major Street		**Sectional %**	
Warrant Value:	75	**91%**	
Total Crossing Volume:	68		



Warrant Criteria:	**Single Warrant**	**Are signals warranted?**
Projected peak hour traffic volumes:	120%	**NO**

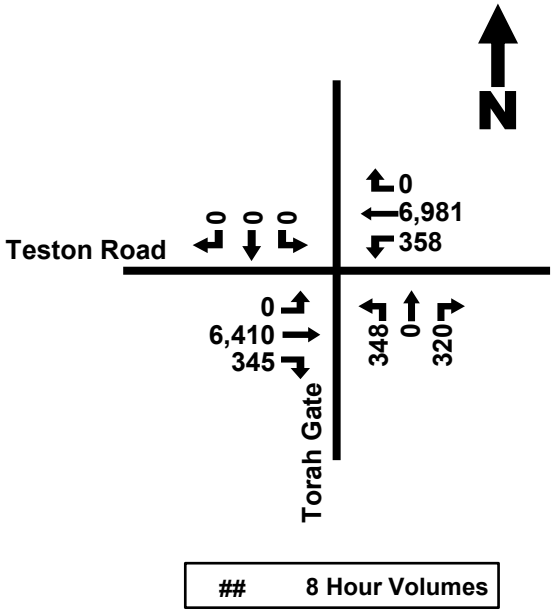
Signal Warrant Analysis (Justification 1, 2 & 3) - Teston Road/Torah Gate

Major Street:	Teston Road
Minor Street:	Torah Gate
Comments:	

Number of Major Road Through Lanes (1-way):	2
Traffic Flow Conditions:	Restricted
Type of Intersection:	T

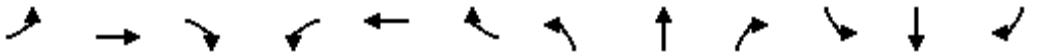
Warrant 1 - Minimum Vehicle Volume			
A - All Approaches		**Sectional %**	**Entire %**
Warrant Value:	900	**100%**	**33%**
Average Approach Volume:	900		
B - Minor Street (Both Approaches)		**Sectional %**	
Warrant Value:	255	**33%**	
Average Approach Volume:	84		

Warrant 2 - Delay to Cross Traffic			
A - Major Street (Both Approaches)		**Sectional %**	**Entire %**
Warrant Value:	900	**100%**	**57%**
Average Approach Volume:	900		
B - Traffic Crossing Major Street		**Sectional %**	
Warrant Value:	75	**57%**	
Average Approach Volume:	43		



Warrant Criteria:	**Single Warrant**	**Combined Warrant**	**Are signals warranted?**
Existing 8-hour traffic volumes:	100%	80%	**NO**

APPENDIX B: 2041
Synchro/SimTraffic Results



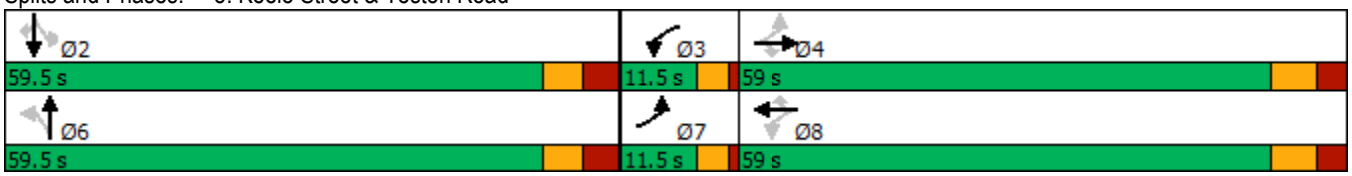
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	997	136	110	1215	313	18	306	67	77	1429	267
Future Volume (vph)	108	997	136	110	1215	313	18	306	67	77	1429	267
Satd. Flow (prot)	1738	3288	1555	1209	3017	1361	1601	3122	0	1772	3544	1601
Flt Permitted	0.075			0.149			0.073			0.489		
Satd. Flow (perm)	137	3288	1532	189	3017	1361	123	3122	0	909	3544	1601
Satd. Flow (RTOR)			71			313		25				156
Confl. Peds. (#/hr)			2	2					4	4		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	11%	5%	51%	21%	20%	14%	8%	38%	3%	3%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	997	136	110	1215	313	18	373	0	77	1429	267
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4		4	8		8	6			2		2
Detector Phase	7	4	4	3	8	8	6	6		2	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	10.0	30.0	30.0		30.0	30.0	30.0
Minimum Split (s)	11.5	36.5	36.5	11.5	36.5	36.5	37.5	37.5		37.5	37.5	37.5
Total Split (s)	11.5	59.0	59.0	11.5	59.0	59.0	59.5	59.5		59.5	59.5	59.5
Total Split (%)	8.8%	45.4%	45.4%	8.8%	45.4%	45.4%	45.8%	45.8%		45.8%	45.8%	45.8%
Yellow Time (s)	3.0	4.5	4.5	3.0	4.5	4.5	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	3.0	3.0	1.0	3.0	3.0	3.5	3.5		3.5	3.5	3.5
Lost Time Adjust (s)	-3.0	-2.5	-2.5	-3.0	-2.5	-2.5	-2.5	-2.5		-2.5	-2.5	-2.5
Total Lost Time (s)	1.0	5.0	5.0	1.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	Max	Max	None	Max	Max	Max	Max		Max	Max	Max
Act Effct Green (s)	68.4	54.0	54.0	68.6	54.1	54.1	54.5	54.5		54.5	54.5	54.5
Actuated g/C Ratio	0.53	0.42	0.42	0.53	0.42	0.42	0.42	0.42		0.42	0.42	0.42
v/c Ratio	0.54	0.73	0.20	0.61	0.97	0.42	0.35	0.28		0.20	0.96	0.35
Control Delay	29.2	35.8	12.6	30.1	56.2	4.3	49.2	23.8		25.8	52.9	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	29.2	35.8	12.6	30.1	56.2	4.3	49.2	23.8		25.8	52.9	11.6
LOS	C	D	B	C	E	A	D	C		C	D	B
Approach Delay		32.7			44.5			24.9			45.5	
Approach LOS		C			D			C			D	
Queue Length 50th (m)	13.3	111.2	10.0	13.9	158.3	0.0	3.1	30.3		12.4	185.0	17.5
Queue Length 95th (m)	28.8	136.2	23.4	24.5	#206.8	17.0	12.4	42.0		23.9	#234.4	37.6
Internal Link Dist (m)		1511.9			475.3			1787.5			1510.9	
Turn Bay Length (m)	300.0		300.0	300.0		300.0	300.0			300.0		300.0
Base Capacity (vph)	201	1365	677	181	1255	749	51	1323		381	1485	761
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.54	0.73	0.20	0.61	0.97	0.42	0.35	0.28		0.20	0.96	0.35

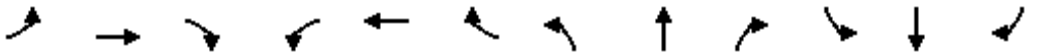
Intersection Summary
Cycle Length: 130

Actuated Cycle Length: 130	
Natural Cycle: 120	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 40.4	Intersection LOS: D
Intersection Capacity Utilization 115.2%	ICU Level of Service H
Analysis Period (min) 15	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Keele Street & Teston Road





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	890	252	252	1273	86	364	284	132	298	1628	5
Future Volume (vph)	5	890	252	252	1273	86	364	284	132	298	1628	5
Satd. Flow (prot)	1825	3650	1633	3404	3650	1445	3541	3259	1458	3219	3349	1633
Flt Permitted	0.120			0.950			0.950			0.950		
Satd. Flow (perm)	231	3650	1633	3404	3650	1445	3541	3259	1440	3219	3349	1613
Satd. Flow (RTOR)			150			86			132			101
Confl. Bikes (#/hr)									1			1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	0%	0%	4%	0%	13%	0%	12%	12%	10%	9%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	890	252	252	1273	86	364	284	132	298	1628	5
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases		4		3	8		1	6		5	2	
Permitted Phases	4		4			8			6			2
Detector Phase	4	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	7.0	10.0	10.0	7.0	30.0	30.0	7.0	30.0	30.0
Minimum Split (s)	33.0	33.0	33.0	11.5	33.0	33.0	11.5	37.0	37.0	11.5	37.0	37.0
Total Split (s)	37.4	37.4	37.4	11.6	49.0	49.0	14.0	67.0	67.0	14.0	67.0	67.0
Total Split (%)	28.8%	28.8%	28.8%	8.9%	37.7%	37.7%	10.8%	51.5%	51.5%	10.8%	51.5%	51.5%
Yellow Time (s)	4.5	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
All-Red Time (s)	2.5	2.5	2.5	1.0	2.5	2.5	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	-3.0	-2.0	-2.0	-3.0	-2.0	-2.0	-3.0	-2.0	-2.0	-3.0	-2.0	0.0
Total Lost Time (s)	4.0	5.0	5.0	1.0	5.0	5.0	1.0	5.0	5.0	1.0	5.0	7.0
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	None	Max	Max	None	Max	Max	None	Max	Max
Act Effct Green (s)	33.4	32.4	32.4	10.6	44.0	44.0	13.0	62.0	62.0	13.0	62.0	60.0
Actuated g/C Ratio	0.26	0.25	0.25	0.08	0.34	0.34	0.10	0.48	0.48	0.10	0.48	0.46
v/c Ratio	0.08	0.98	0.49	0.91	1.03	0.16	1.03	0.18	0.17	0.93	1.02	0.01
Control Delay	41.2	73.6	19.9	94.2	76.0	6.7	111.9	19.9	3.6	92.8	61.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	73.6	19.9	94.2	76.0	6.7	111.9	19.9	3.6	92.8	61.4	0.0
LOS	D	E	B	F	E	A	F	B	A	F	E	A
Approach Delay		61.7			75.1			60.1			66.1	
Approach LOS		E			E			E			E	
Queue Length 50th (m)	1.0	119.7	21.1	33.6	~183.5	0.0	~51.2	21.4	0.0	39.6	~232.3	0.0
Queue Length 95th (m)	4.7	#161.9	46.9	#57.9	#225.8	11.1	#82.0	30.2	10.5	#66.1	#274.6	0.0
Internal Link Dist (m)		529.9			440.1			1320.0			1496.2	
Turn Bay Length (m)	300.0		300.0	300.0		300.0	300.0		300.0	300.0		
Base Capacity (vph)	59	909	519	277	1235	545	354	1554	755	321	1597	798
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.98	0.49	0.91	1.03	0.16	1.03	0.18	0.17	0.93	1.02	0.01

Intersection Summary
Cycle Length: 130

Actuated Cycle Length: 130
Natural Cycle: 115
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 67.0 Intersection LOS: E
Intersection Capacity Utilization 113.9% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

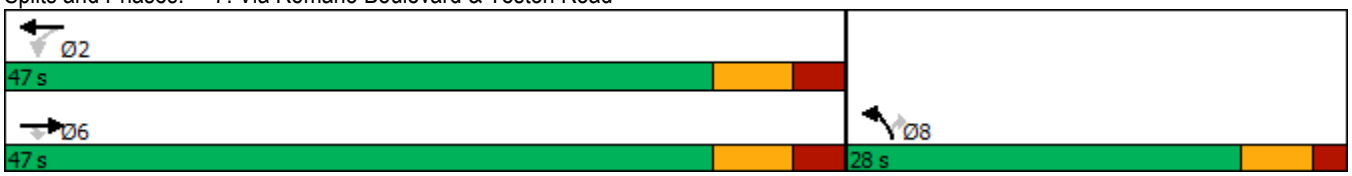
Splits and Phases: 6: Dufferin Street & Teston Road

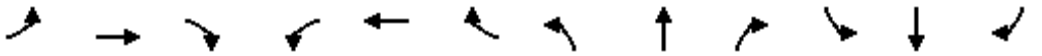
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	969	200	79	1168	120	119
Future Volume (vph)	969	200	79	1168	120	119
Satd. Flow (prot)	3444	1512	1789	3579	1738	1601
Flt Permitted			0.260		0.950	
Satd. Flow (perm)	3444	1480	490	3579	1736	1580
Satd. Flow (RTOR)		200				110
Confl. Peds. (#/hr)		1	1		1	1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	188%	100%	188%	188%
Heavy Vehicles (%)	6%	8%	2%	2%	5%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	969	200	149	1168	226	224
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	6			2	8	
Permitted Phases		6	2			8
Detector Phase	6	6	2	2	8	8
Switch Phase						
Minimum Initial (s)	30.0	30.0	30.0	30.0	10.0	10.0
Minimum Split (s)	37.5	37.5	37.5	37.5	28.0	28.0
Total Split (s)	47.0	47.0	47.0	47.0	28.0	28.0
Total Split (%)	62.7%	62.7%	62.7%	62.7%	37.3%	37.3%
Yellow Time (s)	4.5	4.5	4.5	4.5	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	2.0	2.0
Lost Time Adjust (s)	-2.5	-2.5	-2.5	-2.5	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	Max	Max	None	None
Act Effct Green (s)	42.2	42.2	42.2	42.2	15.3	15.3
Actuated g/C Ratio	0.63	0.63	0.63	0.63	0.23	0.23
v/c Ratio	0.45	0.20	0.49	0.52	0.57	0.51
Control Delay	8.0	1.7	15.1	8.7	29.1	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	1.7	15.1	8.7	29.1	15.8
LOS	A	A	B	A	C	B
Approach Delay	7.0			9.4	22.5	
Approach LOS	A			A	C	
Queue Length 50th (m)	28.0	0.0	8.5	36.0	25.2	11.9
Queue Length 95th (m)	52.6	7.6	30.3	66.5	43.9	29.1
Internal Link Dist (m)	353.0			322.9	1007.9	
Turn Bay Length (m)		80.0	300.0		300.0	
Base Capacity (vph)	2151	999	306	2235	594	612
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.20	0.49	0.52	0.38	0.37

Intersection Summary

Cycle Length: 75	
Actuated Cycle Length: 67.5	
Natural Cycle: 70	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 10.4	Intersection LOS: B
Intersection Capacity Utilization 77.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 7: Via Romano Boulevard & Teston Road



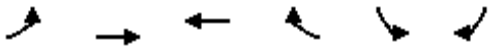


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	261	597	127	63	592	242	268	883	24	203	2006	414
Future Volume (vph)	261	597	127	63	592	242	268	883	24	203	2006	414
Satd. Flow (prot)	1738	3544	1350	1772	3510	1432	3190	3476	1570	1772	3579	1617
Flt Permitted	0.208			0.364			0.950			0.309		
Satd. Flow (perm)	378	3544	1331	679	3510	1385	3187	3476	1520	573	3579	1585
Satd. Flow (RTOR)			109			145			65			181
Confl. Peds. (#/hr)	16		1	1		16	5		14	14		5
Confl. Bikes (#/hr)			1			1			1			2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	3%	21%	3%	4%	14%	11%	5%	4%	3%	2%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	261	597	127	63	592	242	268	883	24	203	2006	414
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8		1	6			2	
Permitted Phases	4		4	8		8			6	2		2
Detector Phase	7	4	4	8	8	8	1	6	6	2	2	2
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	10.0	7.0	30.0	30.0	30.0	30.0	30.0
Minimum Split (s)	11.0	43.0	43.0	43.0	43.0	43.0	11.0	40.0	40.0	40.0	40.0	40.0
Total Split (s)	11.0	54.0	54.0	43.0	43.0	43.0	12.0	96.0	96.0	84.0	84.0	84.0
Total Split (%)	7.3%	36.0%	36.0%	28.7%	28.7%	28.7%	8.0%	64.0%	64.0%	56.0%	56.0%	56.0%
Yellow Time (s)	3.0	4.5	4.5	4.5	4.5	4.5	3.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	3.5	3.5	3.5	3.5	3.5	1.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Total Lost Time (s)	1.0	5.0	5.0	5.0	5.0	5.0	1.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max	Max	Max	Max	Max
Act Effct Green (s)	51.8	47.8	47.8	36.8	36.8	36.8	11.0	91.0	91.0	79.0	79.0	79.0
Actuated g/C Ratio	0.35	0.32	0.32	0.25	0.25	0.25	0.07	0.61	0.61	0.53	0.53	0.53
v/c Ratio	1.17	0.52	0.25	0.38	0.68	0.54	1.14	0.42	0.03	0.67	1.06	0.45
Control Delay	151.2	43.1	10.0	54.0	55.3	23.6	160.6	15.9	0.0	39.0	71.6	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	151.2	43.1	10.0	54.0	55.3	23.6	160.6	15.9	0.0	39.0	71.6	13.2
LOS	F	D	A	D	E	C	F	B	A	D	E	B
Approach Delay		67.5			46.6			48.6			59.8	
Approach LOS		E			D			D			E	
Queue Length 50th (m)	~71.8	75.7	3.7	15.5	83.8	24.1	~47.9	69.7	0.0	43.2	~345.1	40.2
Queue Length 95th (m)	#132.4	94.5	18.9	30.7	104.6	52.0	#77.2	83.8	0.0	78.4	#385.4	65.9
Internal Link Dist (m)		587.4			946.1			1547.9			1707.4	
Turn Bay Length (m)	300.0		300.0	300.0		300.0	300.0		300.0	300.0		300.0
Base Capacity (vph)	223	1166	511	173	896	461	235	2125	954	303	1899	926
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.51	0.25	0.36	0.66	0.52	1.14	0.42	0.03	0.67	1.06	0.45

Intersection Summary

Cycle Length: 150
Actuated Cycle Length: 148.8
Natural Cycle: 145
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 56.8 Intersection LOS: E
Intersection Capacity Utilization 114.2% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Bathurst Street & Teston Road/Elgin Mills Road West



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	1059	1613	19	58	5
Future Volume (Veh/h)	5	1059	1613	19	58	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	1059	1613	19	58	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1632				2152	806
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1632				2152	806
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				0	98
cM capacity (veh/h)	394				41	325

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2
Volume Total	5	530	530	806	806	19	58	5
Volume Left	5	0	0	0	0	0	58	0
Volume Right	0	0	0	0	0	19	0	5
cSH	394	1700	1700	1700	1700	1700	41	325
Volume to Capacity	0.01	0.31	0.31	0.47	0.47	0.01	1.43	0.02
Queue Length 95th (m)	0.3	0.0	0.0	0.0	0.0	0.0	44.7	0.4
Control Delay (s)	14.3	0.0	0.0	0.0	0.0	0.0	449.0	16.3
Lane LOS	B						F	C
Approach Delay (s)	0.1			0.0			414.7	
Approach LOS							F	

Intersection Summary			
Average Delay	9.5		
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	941	111	10	1566	72	10
Future Volume (Veh/h)	941	111	10	1566	72	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	941	200	10	1566	72	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			1141		1744	470
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1141		1744	470
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		6	98
cM capacity (veh/h)			608		76	540

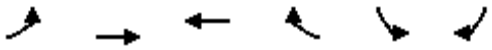
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	470	470	200	10	783	783	72	10
Volume Left	0	0	0	10	0	0	72	0
Volume Right	0	0	200	0	0	0	0	10
cSH	1700	1700	1700	608	1700	1700	76	540
Volume to Capacity	0.28	0.28	0.12	0.02	0.46	0.46	0.94	0.02
Queue Length 95th (m)	0.0	0.0	0.0	0.4	0.0	0.0	37.5	0.4
Control Delay (s)	0.0	0.0	0.0	11.0	0.0	0.0	181.8	11.8
Lane LOS				B			F	B
Approach Delay (s)	0.0			0.1			161.0	
Approach LOS							F	

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1070	150	12	1374	80	60
Future Volume (Veh/h)	1070	150	12	1374	80	60
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1070	150	20	1374	132	99
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				377		
pX, platoon unblocked					0.82	
vC, conflicting volume			1220		1797	535
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1220		1538	535
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		0	80
cM capacity (veh/h)			567		84	490

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	535	535	150	20	687	687	132	99
Volume Left	0	0	0	20	0	0	132	0
Volume Right	0	0	150	0	0	0	0	99
cSH	1700	1700	1700	567	1700	1700	84	490
Volume to Capacity	0.31	0.31	0.09	0.04	0.40	0.40	1.56	0.20
Queue Length 95th (m)	0.0	0.0	0.0	0.8	0.0	0.0	80.6	5.7
Control Delay (s)	0.0	0.0	0.0	11.6	0.0	0.0	388.6	14.2
Lane LOS				B			F	B
Approach Delay (s)	0.0			0.2			228.1	
Approach LOS							F	

Intersection Summary			
Average Delay	18.6		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	65	1050	1311	4	14	4
Future Volume (Veh/h)	65	1050	1311	4	14	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	65	1050	1311	6	23	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		347				
pX, platoon unblocked					0.92	
vC, conflicting volume	1317				1966	656
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1317				1873	656
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				55	99
cM capacity (veh/h)	521				51	408

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1
Volume Total	65	525	525	656	656	6	29
Volume Left	65	0	0	0	0	0	23
Volume Right	0	0	0	0	0	6	6
cSH	521	1700	1700	1700	1700	1700	62
Volume to Capacity	0.12	0.31	0.31	0.39	0.39	0.00	0.47
Queue Length 95th (m)	3.2	0.0	0.0	0.0	0.0	0.0	13.8
Control Delay (s)	12.9	0.0	0.0	0.0	0.0	0.0	105.6
Lane LOS	B						F
Approach Delay (s)	0.8			0.0			105.6
Approach LOS							F

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	985	38	43	1231	86	63
Future Volume (Veh/h)	985	38	43	1231	86	63
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	985	38	43	1231	86	63
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			1023		1686	492
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1023		1686	492
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		0	88
cM capacity (veh/h)			674		79	522

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	492	492	38	43	616	616	86	63
Volume Left	0	0	0	43	0	0	86	0
Volume Right	0	0	38	0	0	0	0	63
cSH	1700	1700	1700	674	1700	1700	79	522
Volume to Capacity	0.29	0.29	0.02	0.06	0.36	0.36	1.08	0.12
Queue Length 95th (m)	0.0	0.0	0.0	1.5	0.0	0.0	46.4	3.1
Control Delay (s)	0.0	0.0	0.0	10.7	0.0	0.0	219.3	12.8
Lane LOS				B			F	B
Approach Delay (s)	0.0			0.4			132.0	
Approach LOS							F	

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:50	6:50	6:50	6:50	6:50	6:50
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	12541	12680	12718	12715	12413	12608
Vehs Exited	11564	11647	11554	11584	11447	11558
Starting Vehs	1114	1093	1135	1168	1084	1118
Ending Vehs	2091	2126	2299	2299	2050	2175
Travel Distance (km)	42235	42455	42342	42161	42118	42262
Travel Time (hr)	1661.7	1693.7	1824.7	1814.8	1671.8	1733.3
Total Delay (hr)	921.5	947.1	1081.1	1073.2	932.2	991.0
Total Stops	26503	25098	27789	27886	27615	26975
Fuel Used (l)	3674.9	3718.9	3805.1	3791.8	3673.8	3732.9

Interval #0 Information Seeding

Start Time	6:50
End Time	7:00
Total Time (min)	10

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	12541	12680	12718	12715	12413	12608
Vehs Exited	11564	11647	11554	11584	11447	11558
Starting Vehs	1114	1093	1135	1168	1084	1118
Ending Vehs	2091	2126	2299	2299	2050	2175
Travel Distance (km)	42235	42455	42342	42161	42118	42262
Travel Time (hr)	1661.7	1693.7	1824.7	1814.8	1671.8	1733.3
Total Delay (hr)	921.5	947.1	1081.1	1073.2	932.2	991.0
Total Stops	26503	25098	27789	27886	27615	26975
Fuel Used (l)	3674.9	3718.9	3805.1	3791.8	3673.8	3732.9

5: Keele Street & Teston Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Denied Del/Veh (s)	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.4
Total Delay (hr)	1.6	11.2	0.9	1.7	14.9	1.1	2.5	2.7	0.5	2.7	94.2	7.7
Total Del/Veh (s)	52.8	39.0	22.4	65.6	38.5	14.7	475.9	29.3	22.5	124.4	220.9	104.0

5: Keele Street & Teston Road Performance by movement

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.2
Total Delay (hr)	141.7
Total Del/Veh (s)	95.3

6: Dufferin Street & Teston Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.4	0.1	0.3	1.4	0.1	0.0	0.0	0.0	0.0	0.1	0.0
Denied Del/Veh (s)	0.0	1.7	1.0	4.6	4.3	2.7	0.2	0.1	0.2	0.3	0.2	0.2
Total Delay (hr)	0.1	78.9	6.2	16.9	48.3	0.2	63.9	1.9	0.5	27.7	120.6	0.1
Total Del/Veh (s)	169.8	309.7	86.9	260.2	145.0	10.4	576.6	23.2	12.3	314.7	249.3	67.0

6: Dufferin Street & Teston Road Performance by movement

Movement	All
Denied Delay (hr)	2.4
Denied Del/Veh (s)	1.6
Total Delay (hr)	365.4
Total Del/Veh (s)	235.7

7: Via Romano Boulevard & Teston Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.3	0.0	0.0	0.4	0.4	0.1
Total Delay (hr)	2.6	0.3	1.2	3.3	1.7	0.8	10.0
Total Del/Veh (s)	10.4	5.8	30.7	11.4	26.4	13.0	13.1

8: Bathurst Street & Teston Road/Elgin Mills Road West Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	25.4	5.1
Denied Del/Veh (s)	0.3	0.0	0.2	0.5	0.2	0.4	0.3	0.2	0.2	48.4	45.1	43.4
Total Delay (hr)	34.5	7.5	1.0	1.5	10.9	1.8	58.7	6.6	0.1	18.8	203.1	32.6
Total Del/Veh (s)	528.6	41.9	29.1	83.2	66.1	25.3	733.5	25.6	9.7	336.1	359.6	281.8

8: Bathurst Street & Teston Road/Elgin Mills Road West Performance by movement

Movement	All
Denied Delay (hr)	33.4
Denied Del/Veh (s)	21.1
Total Delay (hr)	377.0
Total Del/Veh (s)	233.8

14: Teston Road & 1600 Teston Road Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.0	4.8	2.8	0.0	2.6	0.0	10.2
Total Del/Veh (s)	11.3	15.9	7.0	8.6	147.4	18.7	14.2

16: Rodinea Rd & Teston Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.5	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	1.6	0.4	0.0	2.6	0.6	0.0	5.3
Total Del/Veh (s)	5.4	7.6	19.5	6.7	31.3	4.9	6.9

28: Lady Fenyrose Avenue & Teston Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	0.2	0.0
Total Delay (hr)	1.6	0.3	0.1	1.3	3.0	0.4	6.7
Total Del/Veh (s)	5.6	7.2	17.9	3.8	83.6	14.0	9.0

29: Teston Road & Quail Run Boulevard Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Delay (hr)	0.2	0.8	0.4	0.0	0.2	0.0	1.6
Total Del/Veh (s)	11.6	2.7	1.2	1.2	34.7	9.7	2.5

32: Teston Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.2	0.1	0.0
Total Delay (hr)	0.2	0.0	0.1	1.5	0.9	0.1	2.9
Total Del/Veh (s)	1.0	0.7	11.7	4.8	38.7	5.9	4.6

Total Network Performance

Denied Delay (hr)	36.3
Denied Del/Veh (s)	10.2
Total Delay (hr)	954.8
Total Del/Veh (s)	250.3

Intersection: 5: Keele Street & Teston Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	TR	L
Maximum Queue (m)	58.3	145.4	143.1	48.5	82.0	177.6	162.5	78.0	54.2	52.6	64.0	324.9
Average Queue (m)	23.3	84.4	88.9	19.8	33.2	119.5	107.1	33.7	22.9	26.3	34.0	116.0
95th Queue (m)	45.4	124.2	127.0	39.1	69.9	163.4	149.5	63.9	53.6	44.5	57.3	356.1
Link Distance (m)		1519.1	1519.1			472.5	472.5			1791.9	1791.9	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	300.0			300.0	300.0			300.0	300.0			300.0
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 5: Keele Street & Teston Road

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (m)	788.8	784.9	325.0
Average Queue (m)	451.9	457.8	211.4
95th Queue (m)	811.2	817.3	451.0
Link Distance (m)	1514.0	1514.0	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			300.0
Storage Blk Time (%)	42	45	
Queuing Penalty (veh)	33	119	

Intersection: 6: Dufferin Street & Teston Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	L	T
Maximum Queue (m)	319.2	523.0	525.2	325.0	105.9	266.4	355.6	361.4	248.2	301.7	312.4	444.7
Average Queue (m)	73.6	336.4	342.4	177.0	70.2	110.0	224.2	228.1	45.1	208.8	213.7	140.3
95th Queue (m)	281.7	576.1	581.1	421.5	124.1	256.3	358.1	361.1	209.6	342.0	350.1	409.7
Link Distance (m)		524.1	524.1				434.4	434.4				1322.2
Upstream Blk Time (%)		9	10									
Queuing Penalty (veh)		50	58									
Storage Bay Dist (m)	300.0			300.0	300.0	300.0			300.0	300.0	300.0	
Storage Blk Time (%)	0	42	44	0			7	9		9	15	13
Queuing Penalty (veh)	0	2	112	0			16	7		13	22	47

Intersection: 6: Dufferin Street & Teston Road

Movement	NB	NB	SB	SB	SB	SB	SB
Directions Served	T	R	L	L	T	T	R
Maximum Queue (m)	273.7	38.1	109.0	325.0	1099.8	1097.7	699.8
Average Queue (m)	36.2	12.8	76.5	255.5	639.4	641.7	243.3
95th Queue (m)	151.6	28.9	122.7	442.7	1126.3	1124.8	647.8
Link Distance (m)	1322.2				1500.5	1500.5	1500.5
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)		300.0	300.0	300.0			
Storage Blk Time (%)					45		
Queuing Penalty (veh)					133		

Intersection: 7: Via Romano Boulevard & Teston Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	T	T	R	L	T	T	L	R
Maximum Queue (m)	72.0	76.2	32.6	47.5	75.8	83.7	72.0	40.6
Average Queue (m)	35.7	36.1	12.6	24.4	39.1	43.9	32.8	18.1
95th Queue (m)	63.0	64.3	25.1	43.8	66.4	70.5	56.4	33.5
Link Distance (m)	356.4	356.4			330.1	330.1		1013.8
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0	300.0			300.0	
Storage Blk Time (%)		0						
Queuing Penalty (veh)		0						

Intersection: 8: Bathurst Street & Teston Road/Elgin Mills Road West

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	T
Maximum Queue (m)	302.0	420.0	394.3	55.7	46.0	102.9	106.9	84.8	309.8	320.7	484.8	430.5
Average Queue (m)	226.5	201.5	139.0	22.2	19.3	71.4	74.5	33.8	212.8	217.4	174.7	135.3
95th Queue (m)	379.2	496.5	388.2	45.3	38.1	100.2	103.8	63.6	342.2	351.3	433.1	347.5
Link Distance (m)		582.7	582.7			951.2	951.2				1552.4	1552.4
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	300.0			300.0	300.0			300.0	300.0	300.0		
Storage Blk Time (%)	34	5							9	19	9	1
Queuing Penalty (veh)	100	13							38	83	23	0

Intersection: 8: Bathurst Street & Teston Road/Elgin Mills Road West

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	T	T	R
Maximum Queue (m)	75.5	324.9	1727.3	1726.8	325.0
Average Queue (m)	4.2	217.2	1236.1	1241.4	286.9
95th Queue (m)	47.9	437.4	2070.2	2066.6	447.0
Link Distance (m)			1711.8	1711.8	
Upstream Blk Time (%)			29	29	
Queuing Penalty (veh)			0	0	
Storage Bay Dist (m)	300.0	300.0			300.0
Storage Blk Time (%)			44	47	
Queuing Penalty (veh)			88	196	

Intersection: 14: Teston Road & 1600 Teston Road Access

Movement	EB	EB	EB	WB	SB	SB
Directions Served	L	T	T	R	L	R
Maximum Queue (m)	21.9	104.6	105.9	1.3	75.0	60.6
Average Queue (m)	1.1	16.6	18.0	0.0	22.6	4.6
95th Queue (m)	11.7	79.8	85.2	0.9	66.0	40.8
Link Distance (m)		1027.6	1027.6			933.2
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	50.0			20.0	90.0	
Storage Blk Time (%)		8			5	
Queuing Penalty (veh)		0			0	

Intersection: 16: Rodinea Rd & Teston Road

Movement	EB	WB	NB	NB
Directions Served	R	L	L	R
Maximum Queue (m)	5.4	9.0	33.6	8.0
Average Queue (m)	0.3	1.1	13.4	1.3
95th Queue (m)	2.4	5.9	25.9	5.6
Link Distance (m)				812.3
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)	50.0	50.0	90.0	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 28: Lady Fenyrose Avenue & Teston Road

Movement	EB	WB	WB	NB	NB
Directions Served	R	L	T	L	R
Maximum Queue (m)	4.0	13.8	2.4	70.5	64.7
Average Queue (m)	0.3	3.3	0.1	33.5	14.4
95th Queue (m)	2.6	11.1	1.7	67.4	40.8
Link Distance (m)			356.4		983.9
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)	90.0	60.0		70.0	
Storage Blk Time (%)				5	0
Queuing Penalty (veh)				5	0

Intersection: 29: Teston Road & Quail Run Boulevard

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (m)	25.7	17.3
Average Queue (m)	8.2	4.6
95th Queue (m)	19.4	12.2
Link Distance (m)		677.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	300.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 32: Teston Road

Movement	EB	EB	WB	NB	NB
Directions Served	T	R	L	L	R
Maximum Queue (m)	1.3	2.6	22.0	38.2	20.9
Average Queue (m)	0.0	0.1	5.0	14.5	6.6
95th Queue (m)	0.9	1.6	15.0	30.8	14.2
Link Distance (m)	209.9			267.7	267.7
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)		90.0	45.0		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 1162

Intersection: 5: Keele Street & Teston Road

Phase	2	3	4	6	7	8
Movement(s) Served	SBTL	WBL	EBTL	NBTL	EBL	WBTL
Maximum Green (s)	52.0	7.5	51.5	52.0	7.5	51.5
Minimum Green (s)	30.0	7.0	10.0	30.0	7.0	10.0
Recall	Max	None	Max	Max	None	Max
Avg. Green (s)	52.0	7.6	52.4	52.0	7.7	52.3
g/C Ratio	NA	-0.01	NA	NA	-0.01	NA
Cycles Skipped (%)	0	7	0	0	7	0
Cycles @ Minimum (%)	0	7	0	0	15	0
Cycles Maxed Out (%)	100	81	100	100	78	100
Cycles with Peds (%)	0	0	7	11	0	0

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Intersection: 6: Dufferin Street & Teston Road

Phase	1	2	3	4	5	6	8
Movement(s) Served	NBL	SBT	WBL	EBTL	SBL	NBT	WBT
Maximum Green (s)	10.0	60.0	7.6	30.4	10.0	60.0	42.0
Minimum Green (s)	7.0	30.0	7.0	10.0	7.0	30.0	10.0
Recall	None	Max	None	Max	None	Max	Max
Avg. Green (s)	10.0	60.0	7.6	30.4	10.0	60.0	42.0
g/C Ratio	NA	NA	NA	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	0	0	0
Cycles Maxed Out (%)	100	100	100	100	100	100	100
Cycles with Peds (%)	0	0	0	0	0	0	0

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Intersection: 7: Via Romano Boulevard & Teston Road

Phase	2	6	8
Movement(s) Served	WBTL	EBT	NBL
Maximum Green (s)	39.5	39.5	22.0
Minimum Green (s)	30.0	30.0	10.0
Recall	Max	Max	None
Avg. Green (s)	40.4	40.4	15.7
g/C Ratio	NA	NA	NA
Cycles Skipped (%)	0	0	0
Cycles @ Minimum (%)	0	0	13
Cycles Maxed Out (%)	100	100	17
Cycles with Peds (%)	0	0	0

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Intersection: 8: Bathurst Street & Teston Road/Elgin Mills Road West

Phase	1	2	4	6	7	8
Movement(s) Served	NBL	SBTL	EBTL	NBT	EBL	WBTL
Maximum Green (s)	8.0	76.0	46.0	88.0	7.0	35.0
Minimum Green (s)	7.0	30.0	10.0	30.0	7.0	10.0
Recall	None	Max	None	Max	None	None
Avg. Green (s)	8.3	78.0	46.0	88.0	7.0	35.0
g/C Ratio	NA	NA	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0	0	0
Cycles @ Minimum (%)	0	0	0	0	100	0
Cycles Maxed Out (%)	100	100	100	100	100	100
Cycles with Peds (%)	0	13	4	48	0	58

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0