CITY OF TORONTO

PASSMORE AVENUE FROM 450 METRES WEST OF MARKHAM ROAD TO MARKHAM ROAD

MUNICIPAL ENGINEERS ASSOCIATION

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT STUDY

ENVIRONMENTAL STUDY REPORT

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EXECUTIVE SUMMARY

A. Introduction

Purpose of Study

The City of Toronto has undertaken a Municipal Class Environmental Assessment (MCEA) Study (the "EA Study") for the review of Passmore Avenue, between Markham Road and 450 metres west of the Markham Road intersection. Middlefield Road at the end of the four lane roadway.

The EA study adheres to the Municipal Class EA Schedule 'C' process under MCEA document dated October 2000, and amended in 2001, 2007 and 2015. This EA Study identifies the problem/opportunity, developing and evaluating a reasonable range of alternative solutions and designs, recommending a preferred solution and design, and providing opportunities for public input. In addition to documenting the Schedule C process, the Environmental Study Report (ESR) includes the rationale and justification for the project; study background; existing conditions within the study area; details about additional studies undertaken, such as geotechnical investigations and the traffic study; potential impacts of the alternatives; and the consultation undertaken with the Project Team (PT), the Technical Advisory Committee (TAC), and the public which led to the identification of the preferred alternative and potential issues to be considered during detailed design.

The EA study considers improvements to Passmore Avenue in this area west of Markham Road including to address the poor pavement structure condition, to possibly widen the roadway to four through lanes (two in each direction) and to urbanize the roadway to match the roadway on either side of the Focus Area within the larger Study Area. In addition the Study will consider turning lanes, improved drainage, and improvements for pedestrians and cyclists.

Study Area

The Study Area is bound by Middlefield Road on the west, Markham Road on the east, McNicoll Avenue on the south and Steeles Avenue on the north. Within the study area, Passmore Avenue intersects with Markham Road, Middlefield Road, Maybrook Drive, State Crown Boulevard and Dynamic Drive. The Traffic study encompassed the larger Study Area to determine any traffic issues to be considered in the study. During the EA, the Archaeological study was extended to assess the potential to extend a proposed sidewalk on the north side of Passmore Avenue beyond the west limit of the Focus Area to State Crown Boulevard. The Focus Area is the portion of Passmore Avenue that is a two lane rural road and not yet improved to four basic lane and not yet improved with an urban cross section from Markham Road westerly for approximately 450 metres, as shown by Area B in **Figure E.1**.

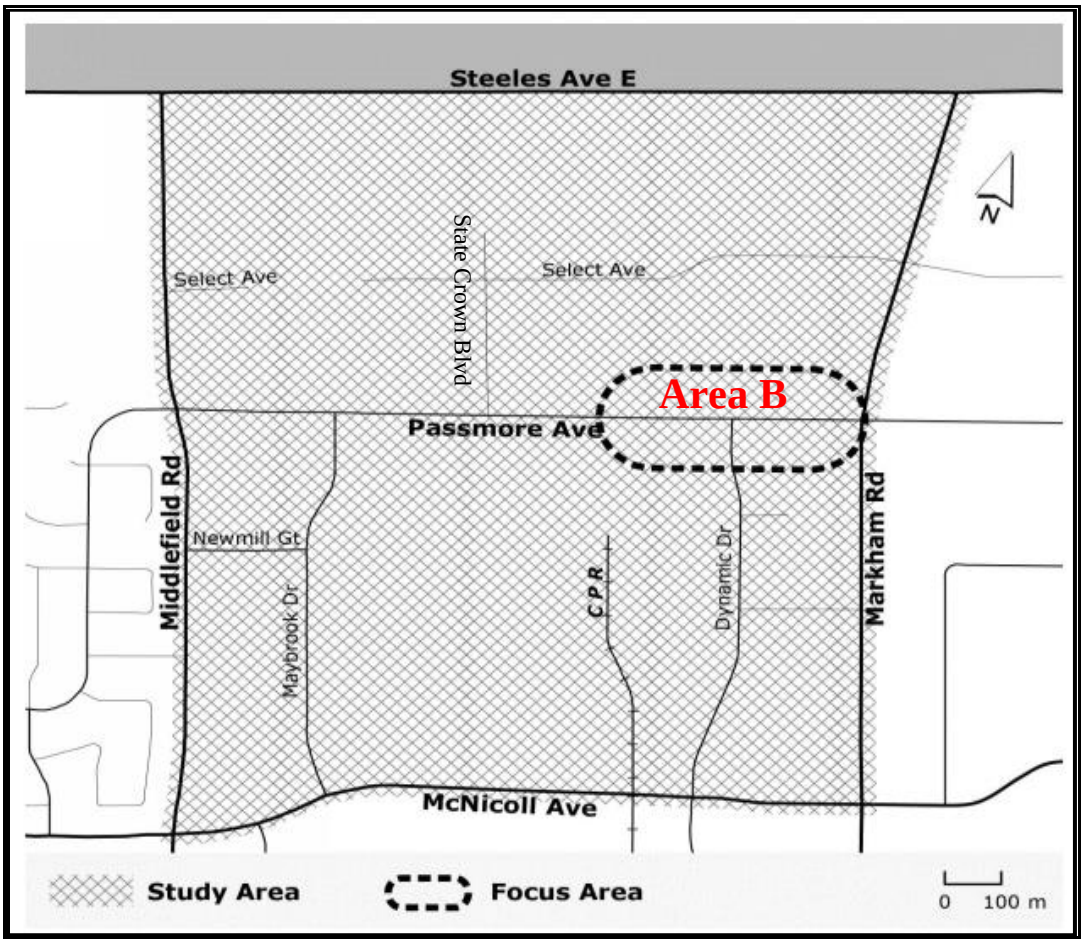

Figure E.1 Study Area and Focus Area

The major objectives of this study were to:

- Confirm and document the need for the proposed road improvements, including all utilities;
- Address existing and potential safety issues along the corridor;
- Establish the preferred alignment;
- Prepare preliminary roadway designs as the basis for estimating project costs and property requirements and identifying appropriate mitigating measures;
- Consider pedestrian and cyclist requirements in terms of on and off-street facilities and timing at intersections;
- Prepare Preliminary Design for the preferred alternative; and
- Prepare an Environmental Study Report (ESR). Filing of which will secure the required environmental approval for the project.

B. Background Information

City of Toronto Official Plan (2015)

The City of Toronto's *Official Plan*, establishes the goals, objectives and policies to manage and direct physical changes and its effects on the social, economic and natural environment of the City of Toronto. The plan establishes the long-term desired land use pattern for lands within the City, coordinates the land use and infrastructure requirements to accommodate anticipated growth, establishes a framework and policy context for decision making in the planning process and conforms to provincial policy statements and provincial plans.

The City of Toronto's *Official Plan* defined the required maximum right-of-way widths for the designated major networks**.** The right-of-way of Passmore Avenue between Middlefield Road to Markham Road is shown as 27m.

City of Toronto's Cycling Network Ten Year Plan (2016)

The City of Toronto's *Cycling Network Ten Year Plan* serves as a comprehensive roadmap and work plan, outlining the City's planned investments in cycling infrastructure over 2016-2025.

The plan identifies opportunities for cycling infrastructure investments in every part of Toronto. It includes recommendations for cycle tracks or bike lanes on fast, busy streets and recommendations for traffic calmed routes with cycling wayfinding on quiet streets.

The *Cycling Network Plan* also includes recommendations for new boulevard trails, adjacent to fast busy streets where cycling may be less comfortable in the roadway.

No cycling infrastructure is proposed for implementation on Passmore Avenue as part of the *Cycling Network Plan.*

C. Public Consultation

As part of the Municipal Class EA process, consultation with stakeholders, including federal departments, provincial ministries, municipalities and agencies, First Nations, utilities, and adjacent landowners, was initiated through the circulation of a Notice of Study Commencement. Each party on the list of stakeholders was contacted for information or comments. The opportunity for these agencies to participate in the project was provided through the distribution of a study announcement, the creation of a Technical Advisory Committee composed of interested agencies and utilities, the scheduling of two formal Public Information Centres (PIC), the placement of this ESR on the Public Record and distribution of a Notice of Study Completion.

Technical Advisory Committee

In addition to the distribution of notices, a Technical Advisory Committee (TAC) was formed to provide input and advice to the project team at key stages during the study and included representatives from various City of Toronto departments and external stakeholders such as the Toronto Transit Commission, Toronto and Region Conservation Authority and the Toronto Police Service. Two meetings were held for the committee members to provide input on the study and to

review and comment on the Public Information Centre material. The first meeting was held on August 19, 2016 while the second meeting was held on November 2, 2016. The meetings were held at the offices of the City of Toronto's Transportation Services.

Public Open House #1

The first public open house (POH) was held on November 29, 2016 and presented the need and justification for the project, the alternative solutions, and evaluation of the alternatives. The POH was advertised to the public on the project website, through flyers, as well as an advertisement that was published in the Scarborough Mirror North newspaper.

There were nine registered members of the public who signed-in to the POH. Most participants were in general concurrence with the recommended solution to widen Passmore Avenue to a four-lane urban cross-section with public realm and active transportation improvements

The majority of people who submitted comments support the widening to four lanes and welcome improved pedestrian improvements as well as addressing current pavement and drainage conditions.

Public Consultation #2

The public was invited to participate in the consultation process through an online consultation until November 17, 2017.

The presentation boards for the public consultation were organized to provide an opportunity for the public to review the summary of studies completed since the first public information centre, the alternative designs considered, evaluation of alternative designs and identifying a preliminary preferred design and the potential benefits, impacts and mitigation measures associated with the preliminary preferred design.

D. Existing Conditions

Passmore Avenue is an east-west collector road in a mixed commercial/industrial area, located in the north-east part of the City of Toronto. The Study Area is bounded by Middlefield Road to the west, Markham Road to the east, McNicoll Avenue to the south and Steeles Avenue East to the north. Passmore Avenue is urbanized with four traffic lanes from the Middlefield Road intersection to approximately 450 metres west of Markham Road. Whereas, the project Focus Area, from the Markham Road intersection to approximately 450m west, is a two lane rural road with limited delineation at the edge of driving lanes and limited drainage ditching. Passmore Avenue is identified in the Official Plan to require a 27m right-of-way. An existing conditions map is presented below, in **Figure E-2**.

Figure E.2 Existing Conditions

E. Alternative Solutions

Alternative Solutions are reasonable, feasible ways of addressing the problem/opportunity statement. Alternative Solutions include the "Do Nothing" alternative. Additional alternative solutions were identified in consultation with the Project Team and the Technical Advisory Committee.

The alternative solutions that were considered are as follows:

Alternative 1: Do Nothing. This alternative would maintain the existing conditions which would not address the poor pavement conditions, caused in part due to poor drainage.

Alternative 2: Reconstruct to Existing Conditions. This alternative would improve the existing pavement structure conditions and maintain the existing right-of-way cross section.

Alternative 3: Reconstruct Passmore Avenue to Two-Lanes with Public Realm and Active Transportation Improvements. This alternative would improve the existing

pavement structure conditions, maintain the existing two lanes, and include public realm and active transportation improvements.

Alternative 4: Reconstruct Passmore Avenue to Four-Lanes with Public Realm and Active Transportation Improvements. This alternative would improve the existing pavement structure conditions, provide an additional two lanes for vehicles and include public realm and active transportation improvements.

The Alternative Solutions were evaluated with respect to their impact on the ***physical, social/cultural, natural,*** **and** ***economic*** environments. The comprehensive evaluation process compares the Alternative Solutions against each other, including a baseline "Do Nothing" option.

The assessment process scored each criterion on a five-point scale, from most to least preferred, and compared alternatives against each other and the baseline. In addition to the environment, main evaluation categories included transportation and engineering. Criteria and indicators within each category were developed in consultation with the Project Team, the Technical Advisory Committee and other stakeholders.Consultation with technical agencies and stakeholders during the study helped identify the "**Preliminary Preferred Solution**" as **Alternative 4: Reconstruct Passmore Avenue to Four-Lanes with Public Realm and Active Transportation Improvements**. The Preliminary Preferred Solution was then confirmed by the Project Team as the Preferred Solution based on the assessment and input at the POH #1.

F. Alternative Designs

Alternative Designs are reasonable, feasible ways of implementing the confirmed Preferred Solution of widening Passmore Avenue to four-lanes. Given the study area and the adjacent land use, the alternative designs were developed to implement different lane widths to review impacts to existing conditions and property impacts. The evaluation criteria identified for the alternative solutions was further refined and the same method of comparative assessment was undertaken.

The following design alternatives were considered:

Alternative 1: Do Nothing: This alternative was carried through for evaluation comparison purposes only**.**

Alternative 4A: 3.3m Through Lanes and 4.2m Curb Lanes: This alternative was developed because these lane widths are currently used on Passmore Avenue beyond the western limits. This alternative provides a total of 15m of roadway from curb to curb and the wide curb lanes satisfies the TTC bus requirements as well as provides additional room for cyclists as a shared use lane. As such, it has the largest footprint of all the alternatives.

Alternative 4B: 3.1m Through Lanes and 3.5m Curb Lanes: This alternative was developed to narrow the roadway to provide additional boulevard space for streetscaping purposes and avoid property impacts near the Markham Road intersection. This alternative provides a total of 13.2m of roadway from curb to curb. The 3.5m curb lanes provides the desirable width for TTC buses for a 60km/h posted speed route.

Alternative 4C: 3.3m Through Lanes and 3.3m Curb Lanes: This alternative also provides a total of 13.2m of roadway from curb to curb, as in Alternative 4B. Consideration was given to this lane configuration to identify and assess impacts to traffic operations.

Based on the evaluation of the alternative design concepts and consultations, **Alternative Design 4B: 3.1m Through Lanes and 3.5m Curb Lanes,** was identified as the preliminary preferred design. Further design alternatives specific to Alternative 4B were developed and evaluated

The two design alternatives are discussed below:

Alternative 4B: North and South Sidewalk: This alternative would provide 2.1m wide sidewalks on both sides of Passmore Avenue. The required grading impacts property and vegetation, with significant impacts on the north side.

Alternative 4B: South Only: This alternative would provide a 2.1m wide sidewalk only on the south side of Passmore Avenue. This alternative minimizes the grading work required and the impacts on vegetation.

Based on the evaluation of Alternative Designs, **Alternative 4B** with south only sidewalk was selected as the Preliminary Preferred Design with refinements and carried forward for further design considerations.

G. Project Description

Recommended Preferred Design

The key elements of the Preferred Design for Passmore Avenue provide the following:

- Widened four lane roadway in the focus area;
- Left turn lane at west leg of Markham Road intersection;
- 2.1m sidewalks along the south side, connecting the existing sidewalk to the west;
- South side boulevard, enhancing the streetscape and landscaping features; and
- Street lighting

Typical Cross-Section

Two typical cross-sections are proposed for Passmore Avenue:

1. A mid-block urban cross-section; and
2. An intersection approach cross-section which includes a 3.0m left-turn lane and 1.5m raised median island.

Common elements to both typical cross-sections include:

- a 27.0m right-of-way,

- 3.1m through lanes,
- 3.5m curb lanes
- 2.45m maximum boulevard and a 2.1m sidewalk on the south side.

It should be noted that the north-side 2.1m sidewalk has been illustrated in the cross-sections, with implementation anticipated to occur in conjunction with future development in this area. Typical mid-block and intersection approach sections are presented in **Figure E.3** and **Figure E.4.**

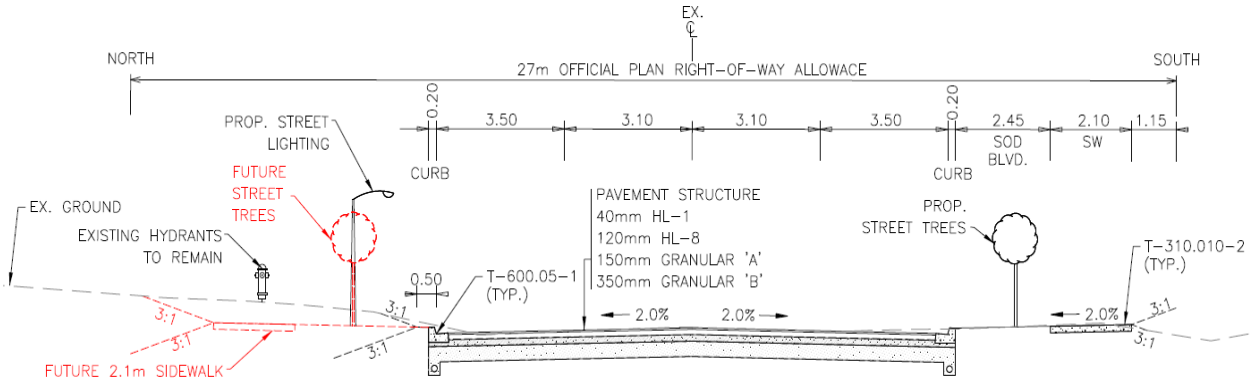

Figure E.3 Passmore Avenue Typical Mid-Block Section

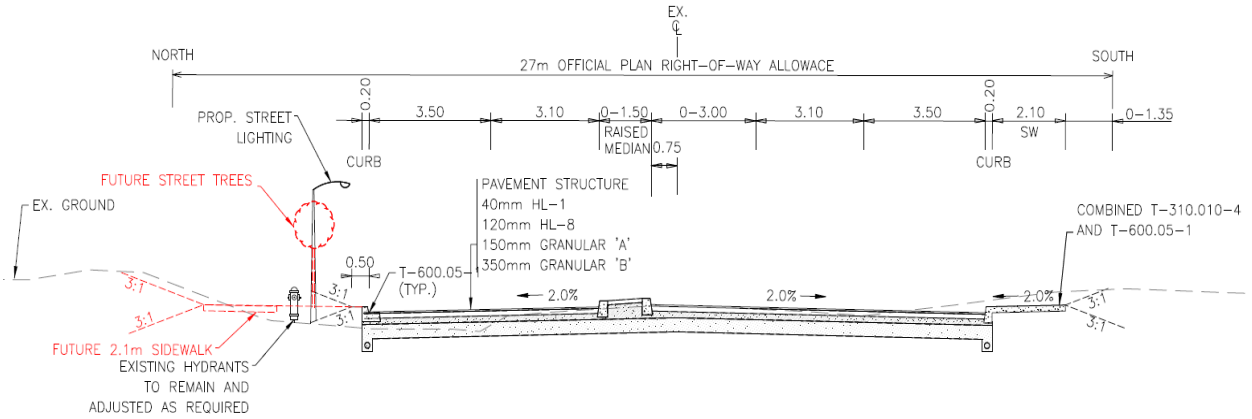

Figure E.4 Passmore Avenue Typical Intersection Approach Section

Pavement Structure Design

Considering the traffic requirements and subgrade conditions, a full depth pavement reconstruction is recommended with the pavement design detailed in Table E-1, below:

Table E-1 Geotechnical Investigation Recommended Pavement Design

Pavement Structure	Reconstruction and New Construction (mm)
HL1 Surface Course	40
HL8 (HS) Binder Course	120
Granular 'A' Base	150
Granular 'B' Type I Subbase	350

Pedestrian & Cyclist Facilities

Provisions for pedestrians have been included in the preferred design for the widening of Passmore Avenue through the use of a 2.1m sidewalk along the south side. The sidewalk is generally separated from the travel lanes by means of a minimum 2.45m wide boulevard which transitions to a curb face sidewalk as it approaches the Markham Road intersection.

The City of Toronto's Cycling Network Plan does not proposed dedicated cycling facilities along Passmore Avenue. Cyclists will continue to use the shared curb lane as per the existing conditions.

Intersections

The preferred design will maintain all existing intersections along Passmore Avenue with the following configurations:

- **Passmore Avenue and Markham Road** – Signalized, exclusive left turn lanes on all approaches, westbound exclusive right turn lane;
- **Passmore Avenue and Dynamic Drive** – Stop-Controlled, no auxiliary turning lanes

Driveway Access

It is anticipated that 13 driveways along Passmore Avenue will be impacted by the widening and will require re-profiling/re-grading to match the proposed road design. Full movement will be maintained at each driveway.

Traffic Signal and Illuminations

The existing signalized intersection at Markham Road will be maintained. The construction of the new cross-walk ramps and the south cross-walk will require the relocation of some of the traffic signal poles and handwells. Temporary traffic control signals will be installed and maintained during the construction phases. Permanent traffic control signals will be installed during the final stages of the project to accommodate the intersection layouts.

There are currently three light standards located along Passmore Avenue between Dynamic Drive and the west limit of the Focus Area, approximately 395 Passmore Avenue.

To ensure adequate and consistent lighting levels along the corridor the preferred alternative design of the four-lane roadway requires seven new light standards, to be located on the north side with 50m spacing between poles, in keeping with existing conditions.

Utilities

Several utilities, both below and above grade, are located along the Passmore Avenue corridor. These include hydro, gas and telecommunication. It is anticipated that most utilities located within the proposed right-of-way for Passmore Avenue may require relocation to implement the proposed widening. Formal definition of utility impacts and relocation strategy will be determined during the detailed design process.

Drainage & Stormwater Management

Under the proposed conditions, Passmore Avenue will be updated to an urbanized, four-lane cross section, improving the profile to allow for minimal longitudinal grades to carry drainage to the catchbasins.

The recommended design for conveyance of the minor system is installation of a storm sewer system consisting of catchbasins, catchbasin leads and maintenance holes to be installed on Passmore Avenue. With the urbanization of surrounding property, roadside ditches will no longer be a viable option for conveyance with exception of the frontage of the 568 Passmore property which will retain the existing ditch until development proceeds and the frontage is urbanized.

The roadway will maintain the existing drainage areas with only minor improvements required to the profile to ensure vertical grades and curvatures are brought up to standard while maintaining the relative high and low points.

Landscaping

The proposed widening of Passmore Avenue provides an opportunity to improve both the aesthetics and ecological conditions of the corridor. The proposed design provides a 2.45m boulevard on the south side, with space provided on the north side for future additional plantings, as needed.

Property Requirements

No permanent property acquisitions will be necessary to widen Passmore Avenue.

Temporary easements will be required along both sides of the Passmore Avenue corridor to facilitate the widening and grading. The preliminary design was prepared with the goal of minimizing the need for property along the Passmore Avenue corridor. A total of 259.2m^2 of temporary easements is required to accommodate the proposed road widening.

Construction Staging

For the duration of construction, a minimum of one traffic lane in each direction will need to be maintained. The minimum lane widths will need to be 3.3m each to ensure TTC bus service is maintained during construction.

Construction staging will likely proceed as follows:

- Relocation of above and underground utilities in conflict with the proposed road widening. This will include relocation of above ground utility plants, and other above and underground utility services and the construction of temporary pavement where necessary;
- Construction of the south side of Passmore Avenue, provide continuous traffic lanes in both directions on the north side of the roadway;
- Reconstruction of the north side of the roadway, shift traffic to the newly constructed pavement, provide continuous traffic lanes in both directions on south side of the roadway;
- Resurface the roadway after reconstruction; and
- Construction of streetscaping and urban design elements on both sides of the roadway where included in the plan.

Property owners and tenants may experience interruption to their property access during construction. To reduce this impact, all property owners are to be notified prior to construction and in advance of work related to their access.

Implementation & Timing

Subject to available funding of the Passmore Avenue improvements and the necessary temporary easement acquisitions needed to implement it, detailed design for the new road could be completed in one year. Delivery of the road construction is anticipated to be completed within two years of the required funding being approved.

Permits & Approvals

As part of the detailed design phase of this project, permits will be required from the following agencies:

- Ministry of Environment and Climate Change (MOECC) – Environmental Compliance Approval for storm sewer construction
- Ministry of Natural Resources and Forestry – Permit to Authorize works with potential to affected listed species or Letter of Advice
- Ministry of Labour - Notice of Project
- Environment Canada – Migratory Birds Convention Act Permit
- City of Toronto - Noise Control By-law Exemption

In addition, the City of Toronto will be required to obtain temporary easements and/or permissions to enter from various property owners throughout the project.

Cost Estimate

The total estimated cost for the widening of Passmore Avenue is $1,634,871, exclusive of costs associated with temporary easement requirements.

This includes full depth reconstruction, utility relocations, traffic signals and illumination, storm sewer and drainage items as well as engineering and contingency costs. The temporary easement acquisition costs are not included in the estimate. These figures are expressed in 2017 dollars and do not carry any escalation allowance for work undertaken in future fiscal periods.

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1.1 INTRODUCTION

The City of Toronto has undertaken a Municipal Class Environmental Assessment (MCEA) Study (EA Study) for the review of Passmore Avenue, between Markham Road and 450 metres west of the intersection to identify potential improvements to address poor pavement conditions, pedestrian and cyclist facilities, widen and urbanize the roadway to match existing conditions. In addition the Study will consider turning lanes, improved drainage, and improvements for pedestrians and cyclists.

The EA study follows a Schedule C process set out in the MCEA parent document, dated October 2000, and amended in 2001, 2007 and 2015. The EA Study includes identification of the problem/opportunity, and development and evaluation of a reasonable range of alternatives to determine the preferred design. Public input opportunities occur at key milestones. In addition, the Environmental Study Report (ESR) documents the rationale for the project; study background; existing conditions; details about additional studies undertaken, such as geotechnical investigations and the traffic study; potential impacts; and the consultation undertaken with the Project Team (PT), the Technical Advisory Committee (TAC), and the public.

1.2 STUDY & FOCUS AREA

The Study Area is bounded from west to east by Middlefield Road and Markham Road, and from north to south by Steeles Avenue and McNicoll Avenue. Within the study area, Passmore Avenue intersects with Markham Road, Middlefield Road, Maybrook Drive, State Crown Boulevard and Dynamic Drive. The Focus Area is Passmore Avenue west approximately 450m from the Markham Road intersection, as shown by Area B in **Figure 1-1**

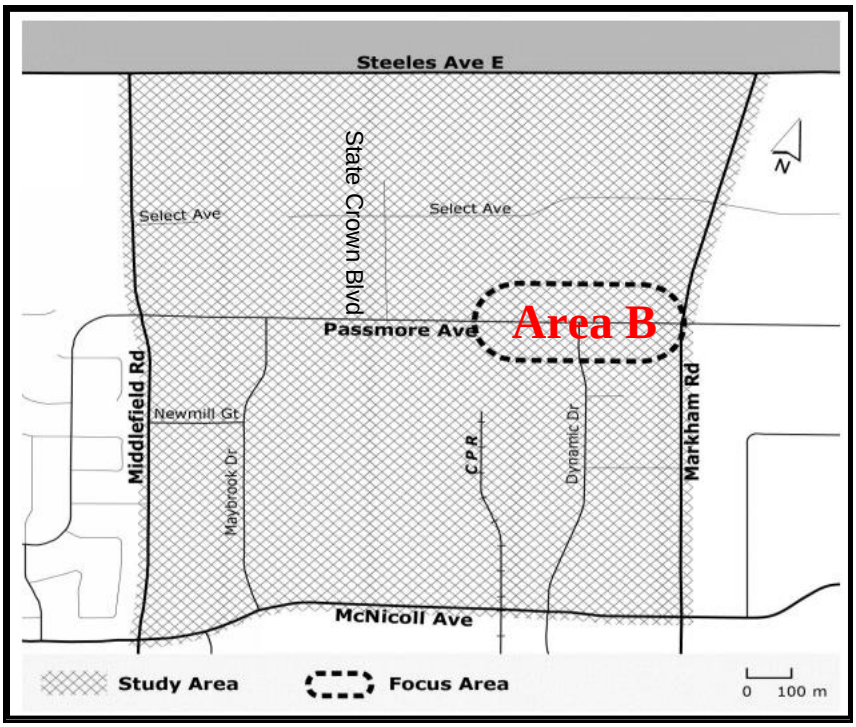


Figure 1-1 Study Area and Focus Area

1.3 PROJECT BACKGROUND

The Passmore Avenue EA Study considered rehabilitation and widening options for the segment from the Markham Road intersection west 450m, to approximately 395 Passmore Avenue. Consideration included public realm improvements, such as new streetscaping, lighting, trees, street furniture, wider sidewalks and boulevard widths.

1.3.1 CITY OF TORONTO OFFICIAL PLAN (2015)

The City of Toronto's *Official Plan*, establishes the goals, objectives and policies to manage and direct physical changes and its effects on the social, economic and natural environment of the City of Toronto. The plan establishes the long-term desired land use pattern for lands within the City, coordinates the land use and infrastructure requirements to accommodate the anticipated growth, establishes a framework and policy context for decision making in the planning process and conforms to provincial policy statements and provincial plans.

The City of Toronto's *Official Plan* defined the required maximum right-of-way widths for the designated major networks**.** The right-of-way of Passmore Avenue between Middlefield Road to Markham Road is shown as 27m.

1.3.2 CITY OF TORONTO CYCLING NETWORK TEN YEAR PLAN (2016)

The City of Toronto's *Cycling Network Plan* serves as a comprehensive roadmap and work plan, outlining the City's planned investments in cycling infrastructure over 2016-2025.

The *Cycling Network Plan* also includes recommendations for new boulevard trails, adjacent to fast, busy streets where cycling may be less comfortable in the roadway.

The plan identifies opportunities for cycling infrastructure investments in every part of Toronto. It includes recommendations for cycle tracks or bike lanes on fast, busy streets and recommendations for traffic calmed routes with cycling wayfinding on quiet streets.

No cycling infrastructure is proposed for implementation on Passmore Avenue as part of the *Cycling Network Plan*.

2 PROBLEM & OPPORTUNITY STATEMENT

Based on the existing pavement conditions of Passmore Avenue in the Study Area, the following Problem and Opportunity Statement was developed:

> Passmore Avenue between Markham Road and approximately 450m west of the intersection requires rehabilitation to address inadequate road surface conditions.
>
> Consideration will be given to opportunities to provide a consistent number of traffic lanes, address drainage and water service infrastructure requirements, improve the public realm to provide greater safety and access to/from the project focus area for all users and encourage transit use, cycling and walking as viable modes of transportation.

3 CONSULTATION

3.1 PROJECT TEAM

The Project Manager of the City of Toronto in this study was Lorna Zappone, Infrastructure Planning, Transportation Services Division. Morrison Hershfield Limited was the lead consultant undertaking the study. John Grebenc and Martin-Pierre Blouin, the Project and Deputy Project Managers, respectively, from Morrison Hershfield Limited managed a multi-disciplinary team that consisted of both Morrison Hershfield Limited and sub-consultants:

- *Morrison Hershfield Limited – Prime Consultant – Environmental Assessments, Roadway Engineering, Traffic Engineering, Drainage Engineering, Natural Environment, Arborist, Contamination*
- *A.M. Archaeological Associates – Archaeology*
- *GeoPro Consulting Limited – Geotechnical and Pavement Engineering*

Staff representing different City of Toronto divisions were involved, as identified below:

- Transportation Services:
    - Traffic Operations
    - Traffic Planning/Right-of-Way Management
    - Cycling Infrastructure and Programs
    - Public Realm (Pedestrian Projects, Beautiful Streets, and Street Furniture)
- City Planning:
    - Community Planning
    - Transportation Planning
    - Heritage Preservation Services
    - Urban Design
- Toronto Water:
    - Water Infrastructure Management
- Parks, Forestry & Recreation:
    - Tree Protection and Plan Review
- Policy, Planning, Finance & Administration:
    - Public Consultation Unit
- Engineering & Construction Services

3.2 TECHNICAL ADVISORY COMMITTEE

Details of the study were presented to and reviewed by a technical advisory committee (TAC). The technical advisory committee was formed to provide input and advice to the project team at key stages during the study and included representatives from various City of Toronto departments and external stakeholders such as the Toronto Transit Commission, Toronto and Region Conservation Authority and the Toronto Police Service.

Two meetings were held for the committee members to provide input on the study and to review and comment on the Public Information Centre material. The first meeting was held on August 19, 2016 while the second meeting was held on November 2, 2016. The meetings were held at the offices of the City of Toronto's Transportation Services.

3.3 AGENCY INVOLVEMENT

Local institutions, utilities, and municipal, provincial and federal government agencies, determined to have a potential interest in the study, were contacted at the project initiation stage through correspondence notifying them of the project commencement. Correspondence included a Feedback Form, cover letter, the notice of commencement, and standard form requesting contact details and level of interest.

A summary of agencies and utilities contacted is included in **Appendix A**.

3.4 PUBLIC INVOLVEMENT

Throughout the study, the public, business operators, and property owners in the study area have had opportunities to make comments, identify concerns and provide additional information. A stakeholder database was formulated for this project from interested members of the public and businesses, as well as property owners. At the conclusion of Phase 3, the project stakeholder list included 100 contacts from local residents, businesses and property owners. A correspondence log was created to document all the phone calls and emails received during the course of the study and is provided in **Appendix B.** The consultation program summarized in the following sections has been designed to comply with the requirements of the Municipal Class Environmental Assessment for a Schedule "C" project.

3.4.1 NOTICE OF STUDY COMMENCEMENT & PUBLIC OPEN HOUSE #1

The first step in the public and agency consultation process was the publication and circulation of the Notice of Study Commencement, a copy of which is provided in **Appendix C**. This was combined with the notice of the first public open house. The notices were advertised in the following locations:

- Scarborough Mirror North (November 14, 2016)
- City's "Get Involved" Website – www.toronto.ca/passmore (November 13, 2016)
- 4,954 flyers delivered by Canada Post (November 14, 2016)
- Email invitations to local Councillors for Ward 41 and 42

The first public open house took place on Tuesday November 29, 2016 at Canlan Ice Sports Scarborough, located at 159 Dynamic Drive. The purpose of the event was to introduce and gather feedback about the Alternative solutions being considered:

- **Alternative 1:** Do Nothing (represents baseline conditions for comparison)
- **Alternative 2:** Reconstruct to Existing Conditions

Alternative 3: Reconstruct to Two-Lanes with Public Realm and Active Transportation Improvements
- **Alternative 4:** Reconstruct and Widen to Four-Lanes with Public Realm and Active Transportation Improvements

Based on the evaluation results, **Alternative 4: Reconstruct and Widen to Four-Lanes with Public Realm and Active Transportation Improvements** was presented as the Preliminary Preferred Solution.

Attendees were invited to view display panels and to provide comments to the Project Team members on any issues of interest or concern. Overall, nine people attended the public event. Most participants were in general concurrence with the recommended solution to widen Passmore Avenue to a four-lane urban cross-section with public realm and active transportation improvements.

People were encouraged to provide written comments during and after the meeting using the comment forms and via email. The materials displayed and provided at the open house were also made available Online on the project webpage: www.toronto.ca/passmore.

The majority of people who submitted comments (eight feedback forms received) also supported the widening to four-lanes and welcome improved pedestrian improvements as well as addressing current pavement and drainage conditions.

The detailed comments have been compiled and documented in the Public Open House #1 Summary Report in **Appendix C.**

3.4.2 PUBLIC CONSULTATION #2 ONLINE

This second phase of public consultation was held online from November 2, 2017 to November 17, 2017. Given that the key stakeholders in the focus area on Passmore Avenue (between Markham Road and State Crown Boulevard) are made up of primarily businesses, the project team decided that an online format of engagement was best suited to encourage businesses to provide feedback at their own convenience versus trying to attend an evening public event. Members of the public were invited to visit the project webpage, view drawings, learn more about the work completed to date, contact staff, and provide feedback via an Online feedback form.

The notices were advertised in the following locations:

- Scarborough Mirror North (November 2, 2017)
- City's "Get Involved" Website – www.toronto.ca/passmore (November 1, 2017)
- 2,481 flyers delivered by Canada Post (November 2, 2017)
- Email invitations to local Councillors for Ward 41 and 42

The purpose of the second public consultation was to gather feedback about the alternative designs considered for the proposed four-lane roadway. Alternative designs identified and evaluated included:

Alternative 1: Do Nothing (represents baseline conditions for comparison)

Alternative 4A: 3.3m Through Lanes and 4.2m Curb Lanes

Alternative 4B: 3.1m Through Lanes and 3.5m Curb Lanes

Alternative 4C: 3.3m Through Lanes and 3.3m Curb Lanes

Based on the evaluation results, **Alternative 4B: 3.3m Through Lanes and 3.5m Curb Lanes,** with south only sidewalk, including other public realm and active transportation improvements, was presented as the Preliminary Preferred Design.

Public input collected between November 2-17, 2017 included four emails and 15 online feedback forms.

Overall many of the people who submitted comments by feedback form or email, supported the proposed designs for a four-lane urban cross-section. Those people with concerns cited cost, safety and traffic diversion as the main reasons.

The detailed comments have been compiled and documented in the Online Public Consultation #2 Summary Report and data from the online feedback forms is provided in **Appendix D**.

3.4.3 PRIVATE PROPERTY OWNERS

The project team notified and contacted private property owners and businesses on Passmore Avenue (between Markham Road and Middlefield Road) to become involved and provide feedback throughout the study.

3.5 FIRST NATIONS ENGAGEMENT

First Nations communities were contacted in accordance with the City's First Nations Consultation Protocol for Environmental Assessments, which was developed in consultation with the MOECC. Specifically, the project team contacted the First Nations at key points in the study process including, Notice of Study Commencement, completion of the Stage 1 Archaeological Assessment and Notice of Completion. The communities contacted included the following:

- Mississaugas of the New Credit First Nation;
- Mississaugas of Scugog Island First Nation;
- Aldervillle First Nation;
- Curve Lake First Nation;
- Kiawartha Nishnawbe First Nation; and
- Hiawartha First Nation

Details of the correspondence, comment tracking and responses are provided in **Appendix E**.

3.6 MCEA CONSULTATION REQUIREMENTS

The Passmore Avenue Environmental Assessment was carried out in accordance with the process set out in the Municipal Engineers Association Municipal Class Environmental Assessment, October 2000 (as amended in 2007, 2011, and 2015). The filing of the ESR completes the planning stage of the project. The ESR is filed in the public record and made available for review for a 30 calendar day review period, and is available for review during normal business hours at the following location:

Goldhawk Park Library

295 Alton Towers Circle

416-396-8964

The ESR is also available in a PDF format on the Passmore EA project website (http://www.toronto.ca/passmore). If no outstanding concerns are brought forward during the review period, the City may proceed to the detail design/construction stage (implementation).

If concerns regarding the project cannot be resolved in discussion with the City of Toronto, a person or party may request that the Minister of the Environment and Climate Change make an order for the project to comply with Part II of the Environmental Assessment Act (referred to as a Part II Order), which addresses Individual Environmental Assessments.

Anyone wishing to request a 'Part II Order' of the Passmore Avenue Class Environmental Assessment Study must submit a written request detailing their comments and/or concerns within the thirty (30) calendar day review period to the following contacts:

The Honourable Chris Ballard

Minister of the Environment & Climate Change

77 Wellesley St. W., Ferguson Block, 11th Fl., Toronto, ON M7A 2T5

And

Ministry of the Environment & Climate Change

Environmental Approvals Branch

135 St. Clair Ave. W., 1st Fl., Toronto, ON M4V 1P5

Copy to:

City of Toronto (Proponent): Robyn Shyllit

Senior Public Consultation Coordinator

Metro Hall, 19th Floor

John Street, Toronto, ON M5V 3C6

4 EXISTING ENVIRONMENT & STUDIES

4.1 ROADWAY

Passmore Avenue is an east-west collector road in a mixed commercial/industrial area, located in the north-east part of the City of Toronto. The Study Area is bounded by Middlefield Road to the west, Markham Road to the east, McNicoll Avenue to the south and Steeles Avenue East to the north. Passmore Avenue is urbanized with four traffic lanes from the Middlefield Road intersection to approximately 450 metres west of Markham Road. Whereas, the project Focus Area, from the Markham Road intersection to approximately 450m west, is a two lane rural road with poor to nonexistent pavement markings at the edge of driving lanes and limited drainage ditching. This area is identified in the Official Plan as a maximum 27m right-of-way. An existing conditions map is presented below.

Figure 4-1 Existing Conditions

4.2 ROAD GEOMETRICS

The existing horizontal and vertical alignments and cross-section of Passmore Avenue in the focus area from east of State Crown Boulevard to Markham Road were reviewed based on the topographic survey information provided by the City of Toronto. The horizontal and vertical alignments were reviewed and compared to the Transportation Association of Canada (TAC)'s *Geometric Design Guide for Canadian Roads* for a design speed of 80 km/h (60 km/hr posted speed).

Specific horizontal elements reviewed include radii and deflection points. The existing vertical elements reviewed include grades and "K" values for both crest and sag curves. All vertical sag curves were assessed based on the minimum "K_{sag}" value for comfort control (illuminated condition). The comfort control was used because there is street lighting present along Passmore Avenue. The minimum criteria is identified in **Table 4-1.**

Table 4-1 Roadway Geometric Criteria

Description	TAC Standard
Classification	
Road Classification	UCU 80
Design Speed (km/h)	80
Posted Speed (km/h)	60
Horizontal Alignments	
NC Normal Crown (-0.02m/m) **R**min (m)	2130
Maximum Deflection	0°30'00" (0.5°)
Vertical Alignments	
Maximum Grade (%)	5
Minimum Grade (%)	0.5
Sag Vertical Curve Kmin.	12
Crest Vertical Curve Kmin.	26
Length of Curve (min) (m)	80
Minimum Stopping Sight Distance (m)	130

4.2.1 HORIZONTAL ALIGNMENT

The existing horizontal alignment of Passmore Avenue is composed of tangents throughout the focus area. All the tangent deflection angles meet the geometric standards as seen in **Table 4-2**. There are no sightline issues related to the existing road horizontal alignment.

Table 4-2 Horizontal Alignment Point of Intersections

Point of Intersection (PI) Station	Deflection Angles
0+888.613	0°06'08.89"
1+065.719	0°09'33.35"
1+286.020	0°15'56.77"

4.2.2 VERTICAL ALIGNMENT

The existing grades within the study area vary from 0.4 % to 3.5%. This falls outside of TAC design standards of minimum desirable grades of 0.5% to maximum desirable grades of 5%. Some deficiencies exist with respect to the vertical curve (crest) geometrics.

There are three vertical curves within the focus area. From west to east, there is a sag curve centered on the 430 Passmore Avenue property which meets the requirements for comfort control. The next curve is a crest curve centered in front of 440 Passmore Avenue which is deficient as it does not meet the minimum K value of 26 so the existing conditions do not provide the minimum required stopping sight distance of 130m. The proposed profile will correct this curve to meet the requirements. The last curve is a sag curve in front of the 568 Passmore Avenue / 159 Dynamic Drive entrances which meets the requirements for comfort control.

4.2.3 CROSS-SECTION

The segment of Passmore Avenue east of State Crown Boulevard to Markham Road is currently a two-lane rural cross-section with partially paved and gravel shoulders on both sides with a maximum right-of-way of 27m per the Official Plan designation.

4.3 GEOTECHNICAL INVESTIGATION

A flexible pavement structure was observed on Passmore Avenue. In general, the condition of the existing flexible pavement on Passmore Avenue from Markham Road to 450 m west of Markham Road is considered to be poor with localized very poor areas. The most significant distresses are extensive moderate to severe alligator cracking; frequent slight to severe longitudinal and transverse cracking; frequent slight to severe edge cracking; frequent slight to moderate edge cracking; frequent slight to severe pavement edge breaks; intermittent slight to moderate wheel

rutting; intermittent slight to moderate patching and slight to moderate distortion. The ride quality of this section is generally considered to be poor. Selected photographs of typical distresses are provided in the report.

The range and average thickness of pavement structure is summarized in **Table 4-3**.

Table 4-3 Existing Pavement Structure

Section	Pavement Structure (mm)		
	Asphalt Concrete Range (Average)	**Granular Base/Subbase Range (Average)**	**Total Thickness (Average)**
BH1	60	640	700
BH2 to BH4	110 - 120 (113)	560 - 570 (563)	670 - 680 (677)
AC1	50	-	-
AC2 to AC9	90 - 130 (115)	-	-

Regarding the surface and pavement drainage, this section of roadway has generally been constructed to a rural cross section (open ditches). The overall surface drainage is generally considered to be poor. Observations along the roadway indicate that pavement surface water generally follows along the existing pavement grades and is being directed to ditches. However, the drainage is impaired by poor grading and surface distresses with unsealed cracks allowing surface water to infiltrate into the underlying pavement and subgrade. At some sections, ditches were observed to be shallow to nonexistent and not free-flowing. Minor ponding has been observed, as shown in **Error! Reference source not found.**. In the interim period, prior to the reconstruction of Passmore Avenue, the ditches should be re-graded and maintained until urbanization of the roadway.

The Geotechnical Investigation report by GeoPro Consulting Limited is included in **Appendix F**.

4.4 TRANSPORTATION

4.4.1 TRAFFIC OPERATIONS

Passmore Avenue being an east-west collector road in a mixed commercial/industrial area has a significantly high percentage of truck traffic though overall traffic volumes are modest. The focus

of this study was not on traffic volumes given the volumes found in the City of Toronto records, so a detailed assessment was not completed. It was determined that the projected 2016 traffic volumes on Passmore Avenue were estimated to be 287 vehicles per hour (vph) eastbound and 391vph westbound during the pm peak hour. The percentage of commercial vehicle traffic is 8% and 6% in the eastbound and westbound directions respectively, relatively higher values but consistent with the commercial/industrial surroundings.

Passmore Avenue at the east limit of the Focus Area at Markham Road is only one lane westbound where traffic can enter from three directions including form a major arterial in Steeles Avenue. This could cause traffic problems and is a potential for collisions due to merging issues such as merging collisions or queuing back into Markham Road traffic. In the eastbound direction at the west limit Passmore Avenue goes from two lanes in front of the FedEx building and tapers down to one lane requiring traffic including the high percentage of truck traffic to merge.

Traffic volumes on Passmore Avenue do not warrant widening to four lanes, given the short segment of Passmore Avenue in Focus Area with low traffic flow to east or west limits of the larger Study Area. However, the following justifications support widening Passmore Avenue from two lanes to four lanes:

- Consistency with four lane Passmore Avenue to west and east of Focus Area.
- Elimination of merging issues from four to two lanes at west limit.
- Accommodation of high truck traffic in the industrial/commercial area.
- Allows for vehicles to turn into driveway accesses while maintaining another open lane for through traffic.
- Account for a better operation for planned, potential or likely future developments within both the Focus Area and larger Study Area:
    - The Lesso Mall development on the south side of Steeles Avenue. This is the large infill west of Walmart
    - The development of a new Hindhu temple at #3270 Markham Road
    - Redevelopment of the Milliken Auto Centre (#95 Select Avenue)
    - Within the Focus Area, the property owner and the property developer for 568 Passmore Avenue, formerly used as a driving range on northwest corner of Passmore Avenue/Markham Road have been in contact with the City regarding redevelopment.
- Alleviate traffic congestion in the larger Study Area including along Steeles Avenue. Traffic growth includes provisions for improvements presently under design for extension of Morningside Drive to Steeles Avenue and widening of Steeles Avenue east of Markham Road to Ninth Line to complete the Donald Cousens Parkway link between City of Toronto and Region of York. This improved route would improve external traffic flows from Highway 401 through Toronto and around the east side of Markham subsequent to reduced capacity along Markham Road north of Highway 7

through "the old Town area". Additional development along this route would then be expected as well with resulting traffic growth.

- Although Passmore Avenue is not in the City's ten year *Cycling Network Plan*, widening to four lanes will help to accommodate bicycle traffic in shared wider curb lanes with vehicular traffic and reduce the chances for conflicts and collisions with vehicular traffic.

4.4.2 COLLISION HISTORY

Collision reports provided by the Toronto Police Service were obtained from the City of Toronto Traffic Safety Unit (TSU). Historical collision data included all reported collision information on Passmore Avenue from Middlefield Road to Markham Road for the years from 2011 to 2015 (five-year history). The collision database included information which consists of the location and time of collision, condition of driver, weather, surface and light conditions and other related data. These have been summarized according to each intersection within the study limit.

There were a total of 27 collisions at Middlefield Road and Passmore Avenue intersection for the five-year period. A review of collisions by impact type indicated that turning movement collisions were the most predominant collision type (41%) followed by rear end related collisions (19%). Further review of the road surface condition indicated that 78% of collisions were reported to have occurred on dry road surfaces and the rest of collisions have occurred on wet road surfaces. Nearly 44% of collisions resulted in personal injury while 56% caused property damage only, there were no fatalities.

There was a total of one collision at Maybrook Drive and Passmore Avenue intersection for the five-year period. This collision occurred in November 2015 on dry road surface. The collision involved minor pedestrian injury.

There was a total of one collision at State Crown Boulevard and Passmore Avenue intersection for the five-year period. This collision occurred in October 2015 on dry road surface. A review of collisions by impact type indicated that the collision happened due to a turning movement. The driver failed to yield right of way and this resulted in property damage.

There were a total of seven collisions at Dynamic Drive and Passmore Avenue intersection for the five-year period. A review of collisions by impact type indicated that turning movement collisions were the most predominant collision type (57%). Further review of the road surface condition indicated that 71% of collisions were reported to have occurred on dry road surfaces and the rest of collisions have occurred on the road surfaces with moisture. Nearly 57% of collisions resulted in personal injury while 43% caused property damage only, there were no fatalities.

There were a total of 39 collisions at Markham Road and Passmore Avenue intersection for the five-year period. A review of collisions by impact type indicated that turning movement collisions (33%) and rear end related collisions (33%) were the most predominant collision types followed by angle collisions (21%). Further review of the road surface condition indicated that 79% of collisions were reported to have occurred on dry road surfaces and the rest of collisions have

occurred on the road surfaces with moisture. Nearly 33% of collisions resulted in personal injury while 67% caused property damage only, there were no fatalities.

The analysis revealed that the main collision type at most intersections within the study area involved "Turning Movements", typically an indication of a failure to yield, poor sight distances or geometric deficiencies. Through the site visit we did not identify this location to have particularly poor sight distances but based on collisions, consideration should be given to widening the road at least east of Dynamic Drive to accommodate the merging and turning vehicles.

No collision information was available at the driveway entrances. Therefore, no conclusion could be made with respect to the safety impact of merge from two to one lane in either direction.

The full Transportation and Traffic Report is found in **Appendix G.**

4.4.3 PEDESTRIAN & CYCLIST FACILITIES

In the study area, along Passmore Avenue from the Middlefield Road intersection there is currently a south side only concrete sidewalk which terminates at the east edge of the FedEx Ground Terminal property (#385 Passmore Avenue). There are no sidewalks within the Passmore Avenue Focus Area.

Currently, bike lanes are not provided on Passmore Avenue and no cycling infrastructure is proposed for implementation on Passmore Avenue as part of the Cycling Network Plan.

4.4.4 TRANSIT

The Toronto Transit Commission (TTC) operates two bus service routes in the Passmore Avenue Focus Area. The TTC's Service Map (October 2017) for the area is shown in **Figure 4-2** Consultation with TTC staff has confirmed that there are no future plans for changes to the service on Passmore Avenue.

The following bus routes operate on Passmore Avenue:

- **Route 42A**: The 42 Cummer bus route operates between Finch Station on Line 1 Yonge-University, the area of Gordon Baker Road and Victoria Park Avenue, the area of McNicoll Avenue and Kennedy Road, and the area of Dynamic Drive and Passmore Avenue, generally in an east-west direction. The 42A (Finch Station-Middlefield/Dynamic) branch operates at all times, seven days a week.
- **Route 102C**: The 102 Markham Road bus route operates between Warden Station on Line 2 Bloor-Danforth, the Centennial College Progress Campus, the area of Markham Road and Steeles Avenue, and the area of Highway 48 (Markham Road) and Castlemore Avenue in the City of Markham, generally in a north-south direction. The 102C (Warden Station-Steeles via Dynamic Drive) branch operates during the peak periods, northbound in the morning and southbound in the afternoon, from Monday to Friday only.

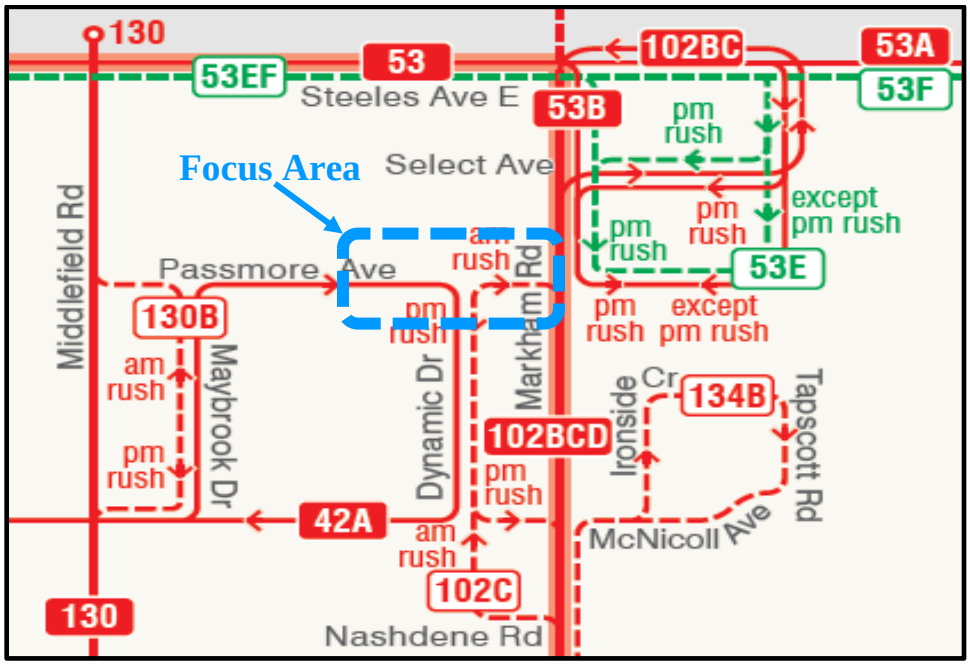


Figure 4-2 TTC Service Map (October 2017)

There is only one designated bus stop in the Focus Area: Stop # 10836 (Passmore Ave. at Dynamic Dr.). This stop is a non-scheduled stop located to the south-west of the Dynamic Drive intersection, in front of 501 Passmore Avenue. The stop is marked by a simple sign and no transit pad as presented in **Figure 4-3.**

The other stops along Passmore Avenue outside of the Focus Area will not be impacted, nor will the stops along Markham Road and on the south-east side of Dynamic Drive intersection.

Figure 4-3 TTC Bus Stop (Passmore Avenue at Dynamic Drive)

4.5 LAND USE

There are a total of 10 properties and 13 driveways located within the Focus Area. The addresses are numbered from west to east and labelled in **Figure 4-4** below.

1. 385 Passmore Avenue, one driveway (second truck access outside Focus Area);
2. 410 Passmore Avenue, one driveway, east of unit;
3. 420 Passmore Avenue; shared driveway (430 Passmore Avenue);
4. 395 Passmore Avenue, two driveways;
5. 430 Passmore Avenue, one plus one shared driveway (420 Passmore Avenue);
6. 501 Passmore Avenue, two driveways;
7. 440 Passmore Avenue, two driveways;
8. 568 Passmore Avenue, one driveway;
9. 159 Dynamic Drive, Canlan Ice Sports Scarborough, one driveway; and
10. 3030 Markham Road, one driveway (vacant lot).

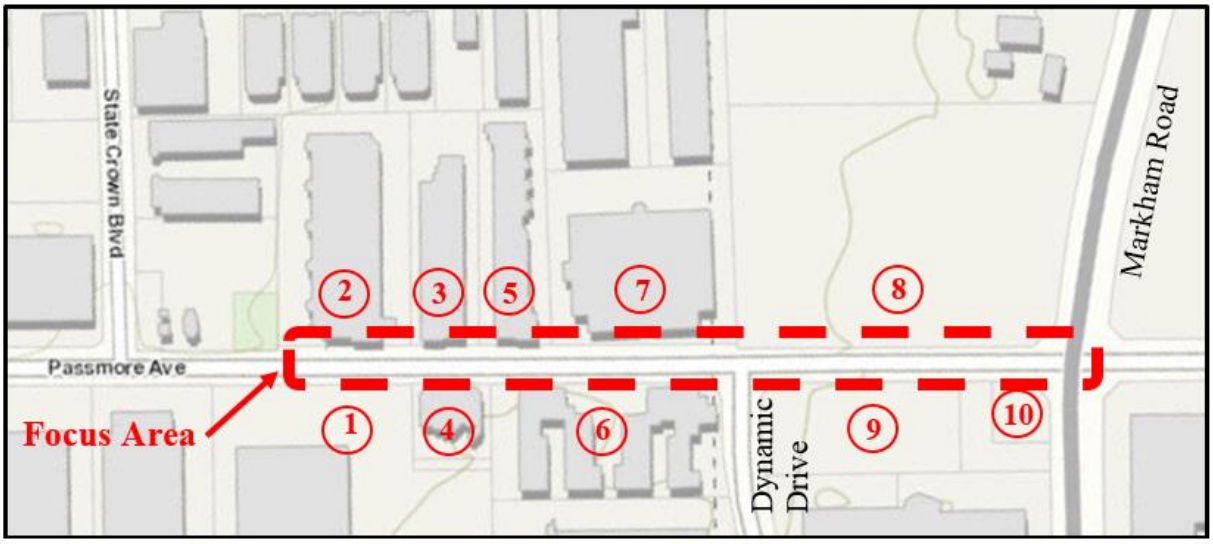


Figure 4-4 Passmore Avenue Focus Area Properties

4.6 MUNICIPAL SERVICES & DRAINAGE

A system map of the Passmore Avenue Focus Area is shown in . The existing drainage pattern follows the profile of the roadway shown in **.** A description of the existing services in the area is provided below.

Passmore Avenue within the Focus Area has a rural cross section with shallow to nonexistent ditches as shown in **Figure 4-6** (Sta.0+835 to Sta.1+120), which leads to poor drainage conditions while deeper and more defined ditches are shown in **Figure 4-7** (Sta.1+120 to 1+320).

Drainage between the west limit of the study and Dynamic Drive is limited to flow off of the roadway due to the cross fall of the road and the runoff infiltrating and flowing along the longitudinal profile of the roadway to the low point at a set of double catchbasins (at Station 0+979). Through a review of the adjacent area topography, it appears that the overland flow path drains along the driveway on the west side of 501 Passmore Avenue to eventually reach a more formal channel just north of McNicoll Avenue and ultimately to Highland Creek.

From Dynamic Drive flow is carried easterly in ditches in the two boulevards (to Station 1+290) to the north ditch where the flow crosses under Passmore Avenue in a shallow cross culvert that outlets to the south ditch, where the flows are then taken into the end of a culvert that connects to the storm system along Markham Road. This low point has been observed to pond during major storm events. The culverts and roadway were repaired during the study but still require improvement. The major overland flows are eventually carried from the low-point of the ditch to the outlet storm sewers at Markham Road.

There is an existing 400mm ductile iron watermain located along the north side of Passmore Avenue and crossing at Dynamic Drive as well as an existing 250mm vitrified clay sanitary sewer located near the centreline of Passmore Avenue. All 3 services enter the Passmore Avenue right-of-way through an easement to the north between 430 and 440 Passmore Avenue. The storm sewer and sanitary sewer continue towards the west, where they enter an easement from the south between 385 and 395 Passmore Avenue. There is no evidence of any other services such as watermains, sanitary sewers and storm sewers along the roadway.

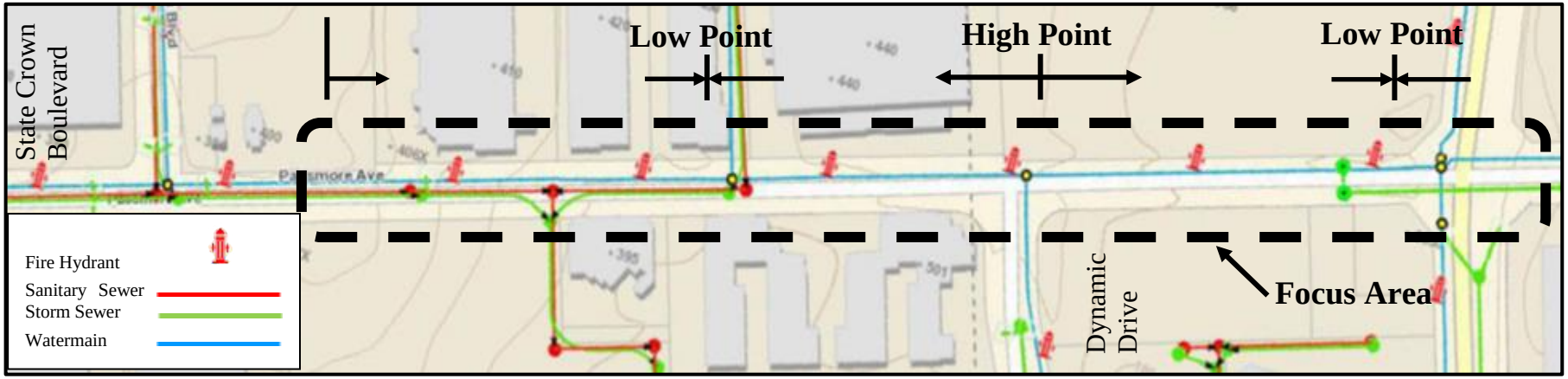


Figure 4-5 Watermain, Sanitary and Storm Water Servicing Map and Surface Drainage

Figure 4-6 Non-Existent Ditches (440 Passmore Avenue)

Figure 4-7 Defined Ditches (568 Passmore Avenue)

4.7 LIGHTING & UTILITIES

The following existing utilities were identified in the Passmore Avenue Focus Area. This information was acquired from site visits, topographic survey and review of record drawings.

4.7.1 STREET LIGHTING

Within the Passmore Avenue Focus Area, there are currently three light standards located on the north side between the west limit and Dynamic Drive, spaced approximately by 50m. The Dynamic Drive intersection is partially illuminated with a light standard located on Dynamic Drive at the south-east corner of the intersection while the Markham Road signalized intersection is also illuminated by luminaires installed on the traffic signal poles. The light standard locations are presented in **Figure 4-8**

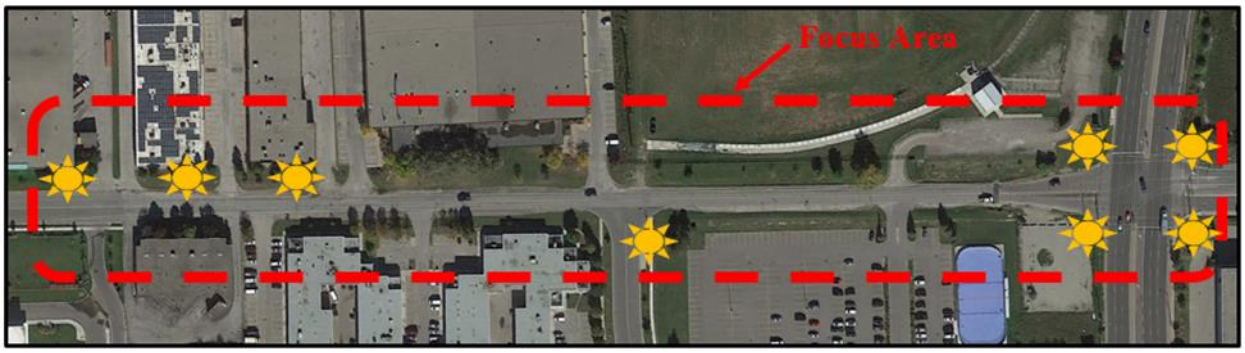


Figure 4-8 Passmore Avenue Existing Light Standard Locations

4.7.2 HYDRO

Toronto Hydro underground hydro infrastructure is located along the south side of Passmore Avenue, approximately 3.0m south of the right-of-way edge. Also on the south, south-east of the Dynamic Drive intersection, is an at-grade hydro vault and raised transformer, shown in **Figure 4-9**. At the west end of the Focus Are, on the north side, is an at-grade vault, shown in **Figure 4-10**.

Figure 4-9 Hydro Vault and Raised Transformer

Figure 4-10 Utility Vault

4.7.3 TELECOMMUNICATIONS

Located near the west limit of the Focus Area are two pedestals: a Bell pedestal on the north side, shown in **Figure 4-11** and a second pedestal, protected by bollards, to the south, shown in **Figure 4-12.**

Figure 4-11 Bell Pedestal

Figure 4-12 Telecommunication Pedestal

4.7.4 NATURAL GAS

Site visits have identified locations for natural gas pipelines: a 150mm intermediate pressure gas main located on the south side, generally 0.90m offset from the right-of-way, servicing both the south and north properties. No surface appurtenances have been identified through the site visit or topographic survey.

4.8 PHASE I ENVIRONMENTAL SITE ASSESSMENT

Morrison Hershfield Limited conducted a Phase I Environmental Site Assessment (ESA) for the Passmore Avenue Study Area. The Phase I ESA is part of the EA Study carried out for the project to develop, identify and evaluate alternative solutions and designs.

The Phase I ESA was completed in general accordance with the November 2001 Canadian Standards Association (CSA) document entitled Phase I ESA, Z768-01 (R2012) and included a records review for the site and the study area, a walkover of the site and study area, evaluation of the available information, and reporting. The purpose of the Phase I ESA is to identify actual and potential site contamination within the study area in order to assist in the preliminary evaluation of the alternatives.

The CSA Phase I ESA was enhanced by including a review of land use and cultural heritage as part of the EA study carried out for the project.

The adjacent lands approximately 100m (north and south) from the centreline of Passmore Road inside of the Focus Area have been used for commercial/light industrial purposes since 1980s until present. The activities carried out at on the Site and the adjacent lands included: automotive and machine shops, meat processing, metalworking machinery manufacturing, sign manufacturing, plastic manufacturing, soap and cleaning compound manufacturing etc. As such, the presence of these facilities in close proximity to the Site is considered an issue of potential environmental concern for the Site. The primary contaminants of concern are metals, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons (PHCs), and volatile organic compounds (VOCs).

In general, the lands within the study area have been used mainly for commercial/light to medium industrial purposes. Although no immediate signs of contaminating activity were noted for the immediate neighbouring properties during the site inspection, there is some potential that the neighbouring land use may have resulted in contamination of the soil and/or groundwater on the Site due to the nature of the activities. In addition, seven aboveground storage tanks (ASTs) were observed approximately 300-400m away from the Site within the study area. However, considering the distance and the local groundwater flow direction, the ASTs are considered as a low risk of potential environmental concern for the Site. The primary contaminants of concern are PAHs, PHCs, and VOCs.

Based on the information obtained and reviewed as part of the Phase I ESA, six potentially contaminating activities (PCAs) were identified in the Focus Area and seven PCAs were identified within the Study Area, beyond the Focus Area. Based on the above findings, a scoped Phase II Environmental Site Assessment (Phase II ESA) was recommended for the PCAs in the Focus Area, in conjunction with the proposed geotechnical and hydrogeological studies to assess the presence/absence of soil and/or groundwater impacts due to potential contamination.

The full report is found in **Appendix H**.

4.9 PHASE II ENVIRONMENTAL SITE ASSESSMENT

Based on the Phase I ESA, Morrison Hershfield Limited conducted a scoped Phase II ESA to study the six PCA sites identified within the Focus Area. The purpose of a Phase II ESA is to determine

the presence or absence of soil and/or groundwater contamination on the property and to that end Morrison Hershfield Limited followed the methodology described in the Canadian Standards Association (CSA) standard Z769-00, Phase II ESA. The scope of work included intrusive subsurface investigations at a total of four boreholes, installation of three monitoring wells, chemical analysis of soil and groundwater, assessment of remedial options, and generation of this report.

Based on the findings of the soil sampling and analysis, the following conclusions are made.

1. Neither of VOCs or PHCs exceeds Table 3 standards in the four soil samples or in the two groundwater samples analyzed for these parameters (Monitoring well MW4 was found to be dry). The soil and groundwater analytical results demonstrate that adjacent industrial land use has not acted as a source of contamination.

2. Only the shallow fill or till layer have Sodium Adsorption Ratio (SAR) and/or Electrical Conductivity (EC) above the Table 3 Industrial/Commercial/Community (ICC) standards, and the elevated level of EC and SAR is attributable to road salt application for the purpose of keeping the roadway safe for traffic under conditions of snow or ice; therefore, in accordance with Section 48(3) of O. Reg. 153/04, EC and SAR are deemed not to be exceeding the MOECC Table 3 ICC standards at the Site. Leaving the salt impacted soil onsite or re-using it for the on-site road development does not pose human health risks to the current or future site receptors (construction and trench workers) or ecological risks if no vegetation is planted onsite.

The following recommendations are made based on the findings of this assessment:

1. No remedial action is required for the EC and SAR impacted soil. The EC and SAR impacted soil can be re-used for the on-site road development.
2. If the salt impacted soil is to be disposed off-site, the soil may only be placed:
    a) A minimum of 1.5 m below the finished grade at the disposal location; and
    b) On non-agricultural property.

The full report is found in **Appendix I**.

4.10 NATURAL ENVIRONMENT

The Focus Area and wider Study Area are both urban with industrial and commercial land use. Field investigations were conducted by Morrison Hershfield Limited biologists on September 6, 2016.

No species at risk were observed during field investigations. However, potential habitat exists within the Study Area for two species of Special Concern. Where vegetation and tree removals or clearing must occur within the breeding bird timing window, the Contractor should retain a qualified Avian Specialist prior to clearing, to screen for breeding birds. If a nest is encountered, works will not continue in the location of the nest until after August 27, or until the contractor has consulted with Environment Canada to determine the need for a permit or approval.

The removal or destruction of any nest of a migratory bird protected under the Migratory Birds Convention Act may require approval from Environment Canada.

The full Natural Heritage Report is found in **Appendix J**.

4.10.1 ARBORIST INVESTIGATION

On August 22, 2016, a tree survey, for all trees within 6m of the right-of-way, was undertaken along Passmore Avenue between Markham Road and east of State Crown Boulevard. The following is a summary of the existing conditions. The Arborist Report is in **Appendix K.**

Area 1 – North Side of Passmore Avenue

- Area comprised of 63 trees in a variety of growing conditions
- Species include *Acer sp.* (Maple), *Gymnocladus sp.* (Kentucky Coffee Tree), *Pinus sp.* (Pine), *Crataegus sp.* (Hawthorn), *Ulmus sp.* (Elm), *Aesculus sp*. (Buckeye), *Gleditsia sp.* (Locust), *Robinia sp.* (Black Locust), *Betula sp.* (Birch), *Amelanchier sp.* (Serviceberry*), Thuja sp.* (Cedar), *Tilia sp.* (Linden), *Picea sp.* (Spruce) and *Quercus sp.* (Oak)
- The majority of these trees are in good to fair condition, less than 10% are damaged/stressed or have structural problems

Area 2 – South Side of Passmore Avenue

- Area comprised of 49 trees in a variety of growing conditions
- Species include *Acer sp.* (Maple), *Gymnocladus sp.* (Kentucky Coffee Tree), *Pinus sp.* (Pine), *Aesculus sp.* (Buckeye), *Gleditsia sp.* (Locust), *Tilia sp.* (Linden), *Picea sp.* (Spruce), *Ginkgo sp.* (Maiden Tree) and *Quercus sp.* (Oak)
- The majority of these trees are in good to fair condition, less than 10% are damaged/stressed or have structural problems

4.11 ARCHAEOLOGY & CULTURAL HERITAGE ENVIRONMENT

No archaeological potential was identified within the Focus Area through the Stage 1 and Stage 2 archaeological assessment, but potential was identified on north side of the Passmore Avenue right-of-way where sidewalk was being considered to be extended to State Crown Boulevard. Upon review the sidewalk extension to State Crown Boulevard has been deferred from the project but may be considered in the future when further Stage 3 Archaeological assessment is required.

The full study is found in **Appendix L**.

5 ALTERNATIVE SOLUTIONS & EVALUATION METHODOLOGY

5.1 DEVELOPMENT OF ALTERNATIVE SOLUTIONS

Alternative Solutions are reasonable, feasible ways of addressing the problem/opportunity statement. Alternative Solutions include the "Do Nothing" alternative. Additional alternative solutions were identified in consultation with the Project Team and the Technical Advisory Committee. The alternative solutions that were considered are as follows:

Alternative 1: Do Nothing. This alternative would maintain the existing conditions which would not address the poor to very poor pavement conditions caused in part due to poor drainage.

Alternative 2: Reconstruct to Existing Conditions. This alternative would improve the existing pavement structure conditions and maintain the existing right-of-way cross section.

Alternative 3: Reconstruct Passmore Avenue to Two-Lanes with Public Realm and Active Transportation Improvements. This alternative would improve the existing pavement structure conditions, maintain the existing two lanes and include public realm and active transportation improvements.

Alternative 4: Reconstruct Passmore Avenue to Four-Lanes with Public Realm and Active Transportation Improvements. This alternative would improve the existing pavement structure conditions, provide an additional two lanes for vehicles and include public realm and active transportation improvements.

5.2 EVALUATION METHODOLOGY

The Alternative Solutions developed to address the Problem and Opportunity Statement were evaluated with respect to their impact on the ***physical, social/cultural, natural,*** **and** ***economic*** environments. The comprehensive evaluation process compares the Alternative Solutions against each other, including a baseline "Do Nothing" option.

The assessment process scored each criterion on a five-point scale, from most to least preferred, and compared alternatives against each other and the baseline as shown in **Figure 5-1**. The evaluation criteria are shown in **Table 5-1**. In addition to the environment, main evaluation categories included transportation and engineering. Criteria and indicators within each category were developed in consultation with the Project Team, the Technical Advisory Committee and other stakeholders.

● **Most Preferred** ● **Preferred** ◐ **Neutral** ◔ **Less Preferred** ○ **Least Preferred**

Figure 5-1 Alternative Solutions Evaluation Scale

Table 5-1 Alternative Solutions Evaluation Criteria

Planning and Policy • Address objectives of the Official Plan • Provide connectivity through direct access • Urban design considerations • Address existing and future development	**Transportation** • Safety • Operations • Accessibility for Ontarians with Disabilities Act (AODA) and City of Toronto Standards • Multimodal provisions • Provision for Emergency Services
Natural Environment • Vegetation, existing trees and wildlife • Opportunities for street tree plantings • Air quality • Climate	**Cultural and Built Heritage** • Cultural heritage landscapes • Built heritage • Potential archaeological impacts
Socio-Economic Environment • Noise Impacts • Property acquisition requirements	**Engineering, Utilities and Costs** • Construction feasibility and staging • Drainage/Stormwater management • Utilities (Relocation/Replacement) • Construction Costs • Operations and Maintenance costs

5.3 EVALUATION OF ALTERNATIVE SOLUTIONS

The evaluation of Alternative Solutions was completed by the Technical Advisory Committee and the Project Team.

The detailed evaluation is shown in **Table 5-2**.

Table 5-2 Alternative Solutions Evaluation

Category	Criteria	Indicator	Alternative 1 Do Nothing		Alternative 2 Reconstruct Passmore Avenue to Existing Conditions		Alternative 3 Reconstruct to Two-Lanes Public Realm, Active Transportation Improvements		Alternative 4 Reconstruct to Four-Lanes Public Realm, Active Transportation Improvements	
LEGEND: ● Most Preferred ◕ Preferred ◐ Neutral ◔ Less Preferred ○ Least Preferred										
Planning and Policy	Official Plan objectives	Compliance with applicable Official Plan policies	○	Does not meet planning objectives for a 27m ROW or OP policies 2.4.1, 2.4.3b, 2.4.14, and 3.1.1 to encourage active transportation initiatives	◐	Can meet planning objectives for a 27m ROW. Does not meet OP policies 2.4.1, 2.4.3b, 2.4.14, and 3.1.1 to encourage active transportation initiatives	●	Meets planning objectives for a 27m ROW and OP policies 2.4.1, 2.4.3b, 2.4.14, and 3.1.1 to encourage active transportation initiatives	●	Meets planning objectives for a 27m ROW and OP policies 2.4.1, 2.4.3b, 2.4.14, and 3.1.1 to encourage active transportation initiatives
	Connectivity	Ability to provide access; improve connectivity within the Focus Area and to the overall Study Area	○	No change to existing conditions – no active transportation facilities at present	○	No change to existing conditions – no active transportation facilities at present	◕	Connectivity improvements for pedestrians and cyclists No change to vehicle connectivity	●	Connectivity improvements for all mode users. Additional lanes provide roadway cross section consistent with existing conditions beyond the Focus Area. May provide congestion relief on Steeles Avenue.
	Urban Design	Potential for improvements (sidewalks, lighting, streetscaping, street trees and furniture)	○	No change to design characteristics	○	No change to design characteristics	●	Ability to provide complete streets (sidewalks, boulevard for street trees, furniture and lighting, where possible)	●	Ability to provide complete streets (sidewalks, boulevard for street trees, furniture and lighting, where possible)
	Existing and future development	Potential to improve access and servicing	○	No change to existing properties; does not accommodate future development on Passmore Avenue	○	Does not accommodate future development on Passmore Avenue	●	Provides opportunities to improve existing site accesses and coordinate new service connections to future developments	●	Provides opportunities to improve existing site accesses and coordinate new service connections to future developments
Transportation	Safety	Ability to improve safety	○	No improvements to safety	◔	New pavement surface provides minor improvements.	◕	Widening eliminates need to merge between configurations. New pavement and sidewalks provide improvements.	●	Widening eliminates need to merge between configurations. New pavement and sidewalks provide improvements.
	Operations	Ability to improve traffic flow, level of service; reduce congestion	○	No increase in roadway capacity. Does not reduce congestion or address expected increased traffic volume from future developments	○	No increase in roadway capacity. Does not reduce congestion or address expected increased traffic volume from future developments	○	No increase in roadway capacity. Does not reduce congestion or address expected increased traffic volume from future developments	●	Improves traffic flow and level-of-service while potentially reducing traffic congestion by providing additional road capacity on Passmore Avenue
	Multimodal provisions	Ability to promote pedestrians/cyclists movements through the study corridor	○	No additional opportunities provided	○	No additional opportunities provided	●	Improves pedestrian access with continuous sidewalk	●	Improves pedestrian access with continuous sidewalk

Table 5-2 Alternative Solutions Evaluation

Category	Criteria	Indicator	Alternative 1 Do Nothing		Alternative 2 Reconstruct Passmore Avenue to Existing Conditions		Alternative 3 Reconstruct to Two-Lanes Public Realm, Active Transportation Improvements		Alternative 4 Reconstruct to Four-Lanes Public Realm, Active Transportation Improvements	
LEGEND: ● Most Preferred ◕ Preferred ◐ Neutral ◔ Less Preferred ○ Least Preferred										
	Accessibility for Ontarians With Disabilities Act (AODA) and City of Toronto Standards	Ability to maintain and/or improve access to adjacent properties	○	No accessibility improvements	○	No accessibility improvements	●	Increases accessibility in the Focus Area through provision of sidewalks.	●	Increases accessibility in the Focus Area through provision of sidewalks.
	Provision for Emergency Services	Ability to maintain, improve emergency services access in the Focus Area	○	No additional opportunities provided	○	No additional opportunities provided	○	No additional opportunities provided	●	Increased capacity significantly improves emergency services access
Natural Environment	Vegetation, existing trees, and wildlife	Potential for disruption of vegetation, existing trees, and wildlife	●	No impacts to vegetation or trees	●	No impacts to vegetation or trees	◐	Reconstruction may impact trees, vegetation	○	Removal and partial replacement of the majority of vegetation and trees along the Focus Area
	Opportunities for street tree plantings	Potential for new tree plantings along the proposed street	○	No new tree plantings	○	No new tree plantings	●	Opportunity for new street tree plantings within the Focus Area	●	Opportunity for new street tree plantings within the Focus Area
	Air Quality	Change in Air Quality	◐	Overall air quality impacts are neutral over the area	◐	Overall air quality impacts are neutral over the area	◐	Overall air quality impacts are neutral over the area	◐	Overall air quality impacts are neutral over the area
	Climate	Change in climate impacts	◐	Overall climate impacts are neutral over the area	◐	Overall climate impacts are neutral over the area	◐	Overall climate impacts are neutral over the area	◐	Overall climate impacts are neutral over the area
Cultural and Built Heritage Environment	Cultural heritage landscapes	Potential for disruption of cultural landscape features	●	No impacts	●	No impacts	○	Potential impacts to cultural heritage landscapes will require mitigation	○	Potential impacts to cultural heritage landscapes will require mitigation
	Built heritage	Potential for disruption of built heritage	●	No impacts	●	No impacts	○	Potential impacts to built heritage will require mitigation	○	Potential impacts to built heritage will require mitigation
	Potential archaeological impacts	Archeological findings (or potential)	●	No archaeological potential identified within the Focus Area	●	No archaeological potential identified within the Focus Area	◐	No archaeological potential identified within the Focus Area	◐	No archaeological potential identified within the Focus Area

Table 5-2 Alternative Solutions Evaluation

Category	Criteria	Indicator	Alternative 1 Do Nothing		Alternative 2 Reconstruct Passmore Avenue to Existing Conditions		Alternative 3 Reconstruct to Two-Lanes Public Realm, Active Transportation Improvements		Alternative 4 Reconstruct to Four-Lanes Public Realm, Active Transportation Improvements	
LEGEND: ● Most Preferred ◕ Preferred ◐ Neutral ◔ Less Preferred ○ Least Preferred										
Socio-Economic Environment	Noise impacts	Ability to minimize ambient noise levels	○	Without pavement reconstruction, noise impacts will worsen as pavement degrades and traffic volumes increase	●	Pavement reconstruction will minimize noise increases	●	Pavement reconstruction will minimize noise increases	◐	Additional lanes would accommodate higher overall traffic volumes at higher speeds.
	Property requirements	Amount of property impacted	●	No impacts to property	●	No impacts to property	○	Property will be required to achieve the Official Plan's required 27m right-of-way	○	Property will be required to achieve Official Plan's required 27m ROW
Engineering, Utilities and Costs	Construction feasibility, staging	Implementation of construction staging plan	●	No staging required	○	Construction will impact traffic as one lane will need to be closed for reconstruction	○	Construction will impact traffic as one lane will need to be closed for reconstruction	◐	Minor traffic impacts – maintain two lanes of traffic while widening lanes
	Drainage/ Stormwater management	Impacts or improvements to existing system and new requirements	○	No impacts or improvements to existing drainage conditions including flooding issues	◐	Opportunity to re-grade ditches as part of pavement structure reconstruction.	●	Improves drainage conditions through new drainage system designed to accommodate stormwater runoff	●	Improves drainage conditions through new drainage system designed to accommodate stormwater runoff
	Utilities (relocation/ replacement)	Potential for impacts to existing utilities	●	No impacts	●	No impacts	◔	Impacts on utilities, requiring relocation and replacement	○	Highest impact on utilities, requiring relocation and replacement
	Construction costs	Complete cost to implement	●	No construction costs	◐	Moderate cost to rebuild Passmore Avenue to two-lanes	◐	Moderate cost to rebuild Passmore Avenue to two-lanes	○	Highest cost to widen Passmore Avenue to four-lanes
	Operations/ Maintenance	Cost of maintenance and operation of solution	○	Operations/maintenance costs will increase as road and pavement condition degrades	○	Operations and maintenance costs will increase as road and pavement condition degrades	●	Reduced maintenance costs with improved conditions on Passmore Avenue	●	Reduced maintenance costs with improved condition of Passmore
Recommendation			**Not recommended**		**Not recommended**		**Not recommended**		**RECOMMENDED**	
			Does not address City's Official Plan policy direction; problem/opportunity statement for a 27m ROW. Does not provide active transportation improvements. Does not address existing pavement, drainage issues. Does not impact natural, cultural and social environments.		Does not address City's Official Plan policy direction; problem/opportunity statement for a 27m ROW. Does not provide active transportation improvements. Addresses existing pavement and drainage issues. Minimal impacts to the natural, cultural and social environments.		Addresses the City's Official Plan policy direction and problem/opportunity statement for a 27m ROW Provides active transportation improvements. Existing pavement, drainage issues will be resolved. Moderate impacts to the natural, cultural and social environments. Mitigation measures needed.		Addresses City's Official Plan policy direction; problem/opportunity statement for a 27m ROW. Provides active transportation improvements; consistent four-lane cross-section to match existing roadway. Existing pavement, drainage issues resolved. Greatest impacts to the natural, cultural and social environments. Mitigation measures needed.	

5.4 SUMMARY EVALUATION OF PREFERRED SOLUTION

Based on the evaluation presented above and input from the Project Team and TAC members, **Alternative 4: Reconstruct Passmore Avenue to Four-Lanes combined with Public Realm and Active Transportation Improvements** was identified as the Preliminary Preferred Solution. The Preliminary Preferred Solution's typical cross-section is shown in **Figure 5-2** which illustrates a configuration with two through lanes, two curb lanes, curbs, boulevards and sidewalks along both sides of Passmore Avenue.

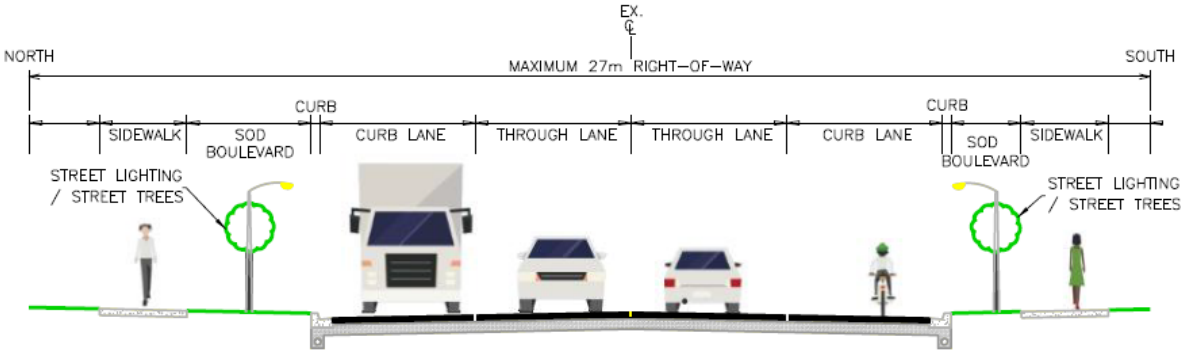


Figure 5-2 Typical Cross Sections

The Preliminary Preferred Solution plan and profile drawing is presented in **Appendix M**.

Table 5-3 below summarizes the evaluation of the preferred solution and elements to be consider further in the development of the Alternative Designs concepts.

Table 5-3 Preferred Solution Summary Evaluation

Planning and Policy ✓ Consistent with City Planning policies and objectives ✓ Improves connectivity	**Transportation** ✓ Provides increased safety and improved operations ✓ Provides consistency in the number of traffic lanes ✓ Increases accessibility and improves pedestrian environment
Natural Environment × Grading will have impact on trees requiring some removals ✓ Opportunities for new tree plantings	**Cultural and Built Heritage** ✓ No impacts to built heritage or cultural heritage landscapes

✓ No significant impact to natural features or wildlife	✓ No archaeological potential identified within the project focus area
Socio-Economic Environment × Acquisition of property would be required to implement a 27m ROW ✓ Reconstruction of roadway is expected to minimize noise level increases, an anticipated result without road surface improvements and due to higher traffic volumes from new developments in the area	**Engineering, Utilities and Costs** ✓ Improvements to drainage and stormwater management system × Property acquisition costs × Highest construction costs × Potential impact to existing utilities ✓ Minor traffic impacts during construction ✓ Widened roadway, active transportation features will increase future operations and maintenance costs

Alternative 4 will provide the following improvements to Passmore Avenue:

- Full depth pavement reconstruction and widening to a four-lane urban cross-section;
- Extension of the existing sidewalk on Passmore Avenue to enhance the pedestrian environment and thereby improve accessibility within the Focus Area;
- Opportunities for new tree plantings, street furniture and street lighting; and
- New storm sewer and stormwater management system to provide quantity and quality control to stormwater runoff from the roadway right-of-way, to meet the City of Toronto's Wet Weather Flow Management Guidelines.

5.5 CONFIRMATION OF THE PREFERRED SOLUTION

The results of the evaluation of the solutions and the identification of the Preliminary Preferred Solution, **Alternative 4: Reconstruct Passmore Avenue to Four-Lanes combined with Public Realm and Active Transportation Improvements**, was presented to the public at the Public Information Centre #1 on November 29, 2016. Following the public consultation event, **Alternative 4** was confirmed as the Preferred Solution.

6 ALTERNATIVE DESIGNS AND EVALUATION METHODOLOGY

6.1 DEVELOPMENT OF ALTERNATIVE DESIGNS

Alternative Designs are reasonable, feasible ways of implementing the Preferred Solution of widening Passmore Avenue to four lanes. The Alternative Designs were developed for different lane width combinations and assessed for their impacts to existing conditions.

The City's *Road Engineering Design Guidelines: 2.0 Lane Widths (June 2017)* was utilized to determine the range of allowable lane widths and restrictions. The document's Table 2.4.1.A is presented in **Figure 6-1.** The table identifies the minimum, target, and maximum widths for through lanes, curb lanes, urban shoulders, turn lanes, and parking lanes. Lane widths are typically only widened beyond the target width if there is space available in the cross section and if there is a requirement to accommodate TTC streetcars, high truck volumes and significant horizontal alignment curves. In the table, the 'x' shows that the influencing design control has no impact on the lane widths and the '+' shows that the influencing design control gives reasoning to provide a lane width wider than the target, up to the maximum lane width.

Table 2.4.1.A Lane Width Dimensions

			Minimum (m)	Target (m)	Maximum (m)	TTC		High Truck Volume	Horizontal Alignment Curves
						TTC Bus Routes	TTC Streetcar Routes		
Through Lane	60km/h or more		3.0	3.0	3.5	x	+[1]	+	+
	50km/h			3.0	3.3				
	40km/h or less			3.0	3.0				
Curb Lane	Shared Curb Lane without Urban Shoulder		3.3	4.3	4.3	+[2]	x	+	+
	Shared Curb Lane with Urban Shoulder or Curb Lane with Dedicated Cycling Facility	60km/h or more	3.0	3.5	3.5				
		50km/h		3.3	3.5				
		40km/h or less		3.3	3.5				
Urban Shoulder			1.2	2.3	2.3				
Two-way Left Turn Lane			3.0	3.0	3.3	x	x	+	+
Dedicated Left Turn Lane			3.0	3.0	3.3	x	x	+	+
Dedicated Right Turn Lane			3.0	3.0	3.3	+	x	+	+
Dedicated Parking Lane			2.0	2.4	2.8	x	x	x	+
Dedicated Cycling Facility			Note 1						

Note 1 – Refer to Ontario Traffic Manual Book 18: Cycling Facilities
[1] Through lanes should be a minimum width of 3.1m on TTC streetcar routes.
[2] Curb lanes should be a minimum width of 3.3m on TTC bus service routes.

Figure 6-1 City of Toronto Lane Width Guidelines

Based on the guidelines, the following design controls described in **Table 6-1** were identified to be applicable to the Passmore Avenue Focus Area and to be considered in the development of alternative designs**.**

Table 6-1 Passmore Avenue Lane Width Design Controls

Design Controls	Rationale
60km/h posted speed	Match existing conditions within the Focus Area and Study Area.
Two through lanes	Lane design to meet through lane width requirements.
Two curb lanes	A curb and gutter system to be provided at pavement edges.
One dedicated left turn lane	Maintain existing eastbound dedicated left turn lane at the Passmore Avenue/Markham Road intersection.
TTC bus route	Considering existing bus route service design to include wider curb lanes, if possible.
No urban shoulder	Maintain existing condition in the focus area, which does not include an urban shoulder.
No dedicated cycling facility	No cycling infrastructure is proposed for implementation on Passmore Avenue as part of the *Cycling Network Plan*.

Based on the above criteria, it was determined that the Passmore Avenue through lanes can vary from 3.0m to 3.5m and the shared curb lanes with no urban shoulders can vary from 3.3m to 4.3m. Three Alternative Designs were developed within these ranges. The City's Official Plan policy direction identifies Passmore Avenue as a maximum 27m right-of-way corridor and as such all the Alternative Designs were developed to fit in this maximum width.

The Alternative Designs considered are described below. The plans are presented in **Appendix N.**

Alternative: Do Nothing: Carried through for comparative evaluation purposes only.

Alternative 4A: 3.3m Through Lanes and 4.2m Curb Lanes:

This alternative was developed because these lane widths are currently used on Passmore Avenue beyond the western limits. This alternative provides a total of 15m of roadway from curb to curb and the wide curb lanes meets the TTC bus requirements and provides additional shared lane space for cyclists. As such, it has the largest footprint of all the alternatives. The typical cross-section is presented in **Figure 6-2.**

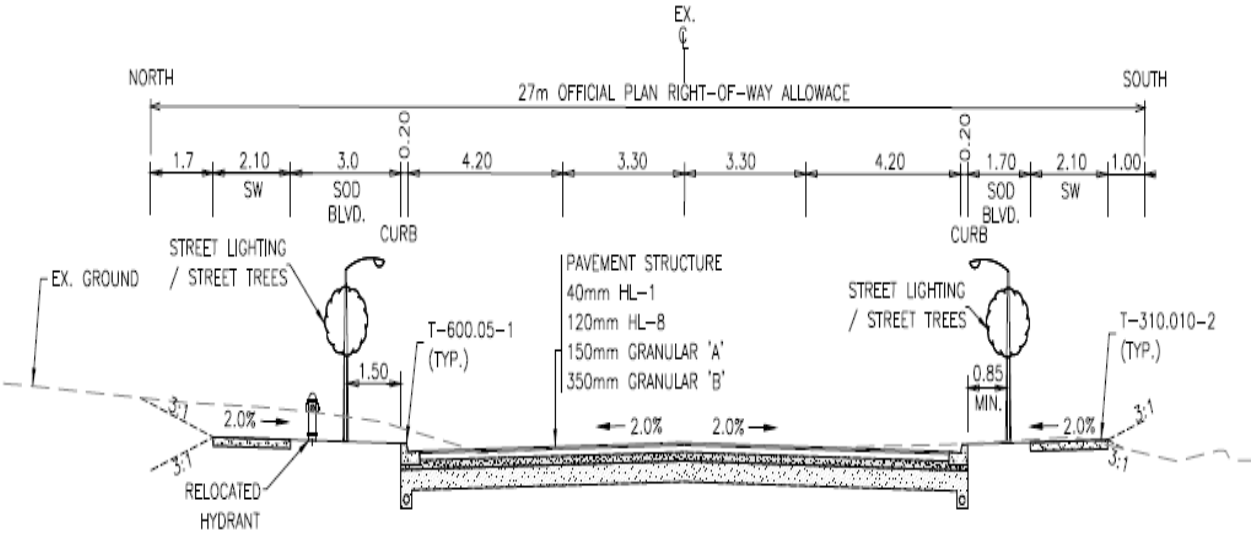


Figure 6-2 Alternative Design 4A: Typical Cross Section

A 3.0m dedicated left-turn lane with 1.5m raised median island is provided at the Passmore Avenue and Markham Road intersection which is developed between Dynamic Drive and Markham Road. The typical cross-section at the Markham Road intersection is presented in **Figure 6-3**.

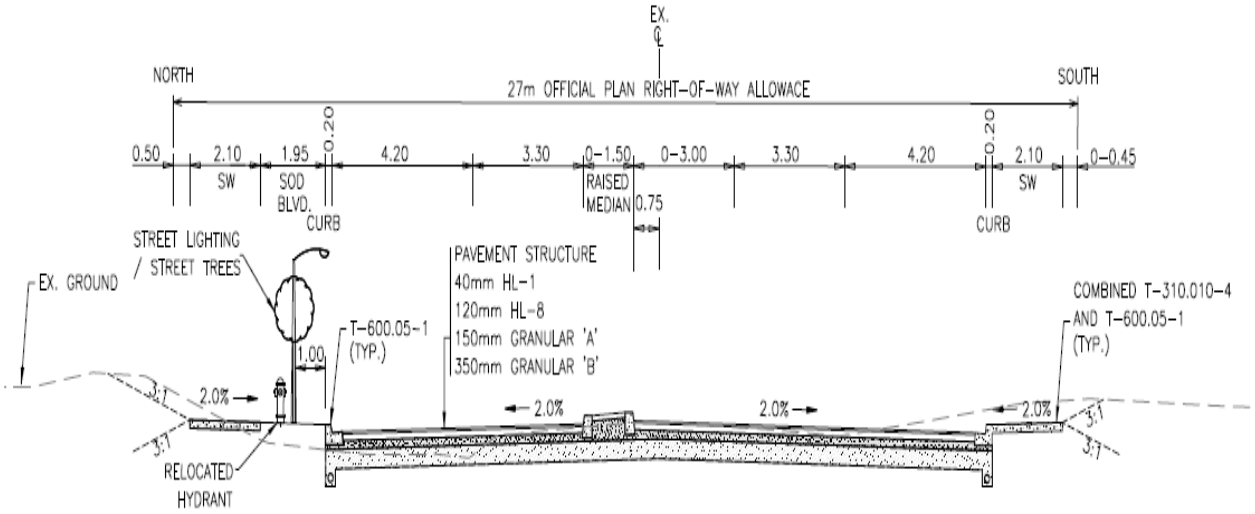


Figure 6-3 Alternative Design 4A: Typical Cross Section at Markham Road

Alternative 4B: 3.1m Through Lanes and 3.5m Curb Lanes:

This alternative was developed to narrow the roadway to provide additional boulevard space for streetscaping purposes and minimize property impacts. This alternative provides a total of 13.2m of roadway from curb to curb. The 3.5m curb lanes provides the desirable width for TTC buses for a 60km/h posted speed route. The typical cross-section is presented in **Figure 6-4.**

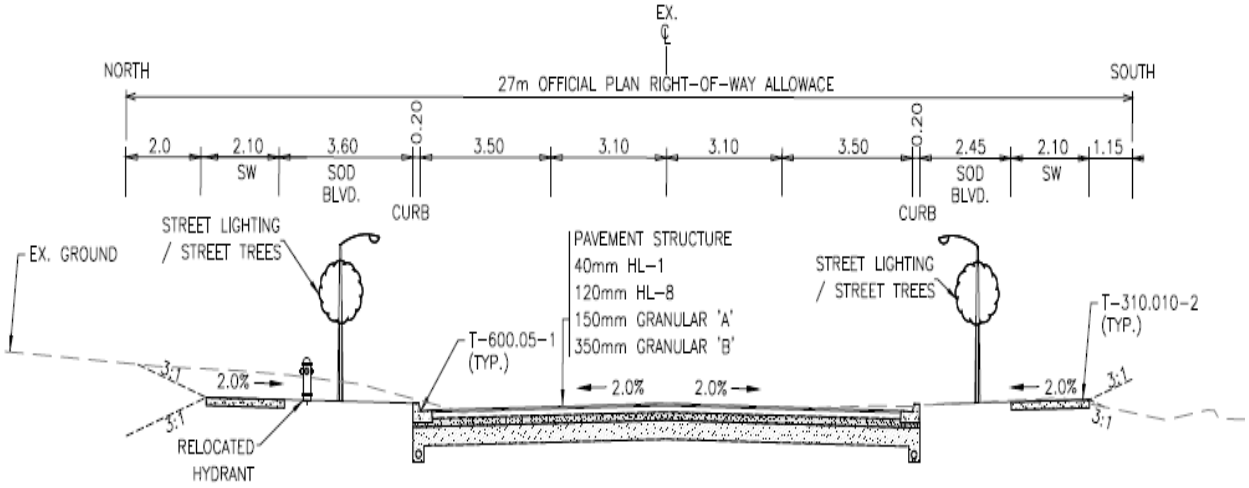


Figure 6-4 Alternative Design 4B: Typical Cross Section

A 3.0m dedicated left-turn lane with 1.5m raised median island is provided at the Passmore Avenue and Markham Road intersection which is developed between Dynamic Drive and Markham Road. The typical cross-section at the Markham Road intersection is presented in **Figure 6-5**

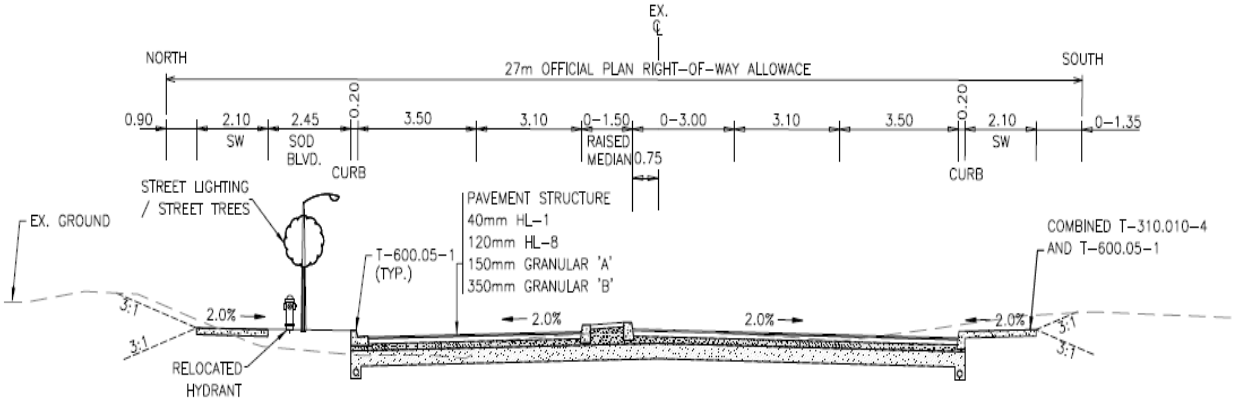


Figure 6-5 Alternative Design 4B: Typical Cross Section at Markham Road

Alternative 4C: 3.3m Through Lanes and 3.3m Curb Lanes:

This alternative was developed to narrow the roadway to provide additional boulevard space for streetscaping purposes and minimize property impacts. This alternative provides a total of 13.2m of roadway from curb to curb. The curb lanes provides the minimum width required for TTC buses for a 60km/h posted speed route. The typical cross-section is presented in **Figure 6-6**.

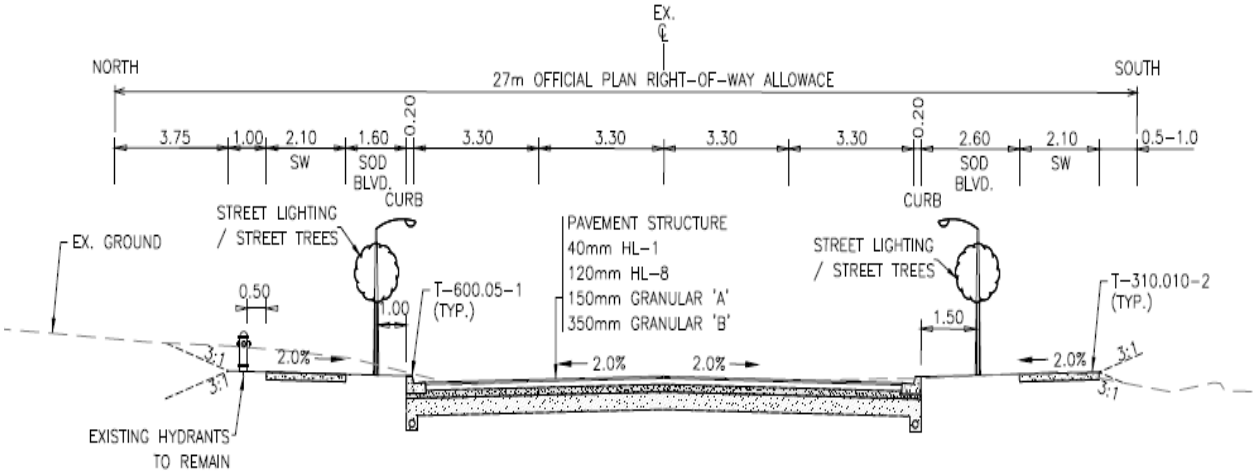


Figure 6-6 Alternative Design 4C: Typical Cross Section

A 3.0m dedicated left-turn lane with 1.5m raised median island is provided at the Passmore Avenue and Markham Road intersection which is developed between Dynamic Drive and Markham Road. The typical cross-section at the Markham Road intersection is presented in **Figure 6-7**.

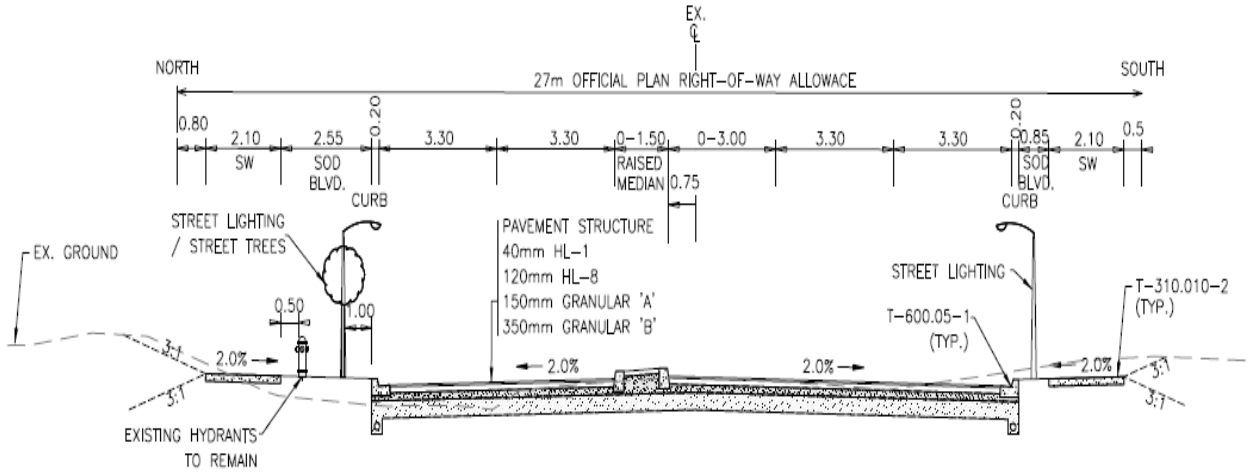


Figure 6-7 Alternative Design 4C: Typical Cross Section at Markham Road

6.2 EVALUATION METHODOLOGY

The Alternative Designs developed to implement the Preferred Solution were evaluated with respect to their impact on the ***physical, social/cultural, natural,*** **and** ***economic*** environments.

The assessment process scored each criterion on a five-point scale, from most to least preferred, and compared alternatives against each other and the baseline as shown in **Figure 6-8**

Figure 6-8 Alternative Designs Evaluation Scale

The Alternative Design evaluation criteria were refined by the Technical Advisory Committee and the Project Team based on the outcome of the Alternative Solutions evaluation**. C**hanges to the criteria are summarized below in **Table 6-2** and **Table 6-3.**

Table 6-2 Changes to the Alternative Solutions Evaluation Criteria

Action	Evaluation Criteria	Rationale
Add to Planning & Policy (Urban Design)	Sidewalks Streetscaping Street Lighting	Separate **urban design elements** to allow for greater differentiation between Alternative Designs
Add to Transportation	TTC Requirements	Evaluate lane width conformance with requirements
Add to Socio-Economic	Temporary Easements	Separate **property acquisition elements** to allow for greater differentiation of impacts
Remove from Planning & Policy	Compliance with Official Plan policies	Preferred Solution addresses Official Plan objectives
Remove from Natural Environment	Air Quality Archaeological Potential Built Heritage Climate Cultural Heritage Landscapes	Four-lane design applicable to all Alternative Designs (no noticeable differences in impacts between alternatives)

Table 6-3 Alternative Designs Evaluation Criteria

Planning and Policy Context • Connectivity • Urban Design – Sidewalks • Urban Design – Streetscaping • Urban Design – Street Lighting	**Transportation** • Safety for all mode users • Operations • TTC Requirements • Accessibility for Ontarians With Disabilities Act, City of Toronto Standards • Multimodal provisions • Provision for Emergency Services
Natural Environment • Vegetation and Existing Trees, Wildlife • New Tree Plantings	**Social-Economic Environment** • Noise Impacts • Permanent property requirements • Temporary Easements
Engineering and Costs • Construction feasibility and staging • Drainage/Stormwater Management • Utilities (relocation/replacement) • Construction costs • Operations and Maintenance costs	

6.3 EVALUATION OF ALTERNATIVE DESIGNS

The evaluation of Alternative Designs followed the same methodology used for the Alternative Solutions. The evaluation of the Alternative Designs is shown in **Table 6-4.**

Table 6-4 ALTERNATIVE DESIGNS EVALUATION

Category	Criteria	Indicator	Alternative 1 Do Nothing		Alternative 4: Full reconstruction, Four-lane urban cross-section, Public Realm & Active Transportation Improvements					
					4A: Two 3.3m and Two 4.2m lanes (lane width total = 15.0m)		**4B: Two 3.1m and Two 3.5m lanes** (lane width total= 13.2m)		**4C: Four 3.3m lanes** (lane width total= 13.2m)	
LEGEND: ● Most Preferred ◕ Preferred ◐ Neutral ◔ Less Preferred ○ Least Preferred										
Planning and Policy	Connectivity	Ability to provide access and/or improve connectivity	○	No change to existing conditions (i.e., no sidewalk connections)	●	New sidewalk extensions connect the existing sidewalk at the west limit of the Focus Area to Markham Road	●	New sidewalk extensions connect the existing sidewalk at the west limit of the Focus Area to Markham Road	●	New sidewalk extensions connect the existing sidewalk at the west limit of the Focus Area to Markham Road
	Urban Design - Sidewalks	Potential to provide, improve, or enhance sidewalks	○	No change to existing conditions (i.e., no sidewalks)	●	Can provide sidewalks on both north and south sides	●	Can provide sidewalks on both north and south sides	●	Can provide sidewalks on both north and south sides
	Urban Design - Streetscaping	Potential to provide or enhance streetscaping and furniture	○	No change to existing conditions (i.e., no streetscape features)	◐	Introduction of boulevards on both sides provide enhanced streetscaping and street furniture	●	Narrower lanes provide potential for greater boulevard width for enhanced streetscaping and street furniture	●	Narrower lanes provide potential for greater boulevard width for enhanced streetscaping and street furniture
	Urban Design – Street Lighting	Potential to provide or enhance lighting	○	No change to existing conditions (i.e., no new street lighting)	●	No existing light standards impacted; installation of new light standards in the Focus Area	●	No existing light standards impacted; installation of new light standards in the Focus Area	●	No existing light standards impacted; installation of new light standards in the Focus Area
Transportation	Safety	Ability to improve safety from existing conditions.	○	No change to existing conditions (including sub-standard vertical curve)	●	Reconstruction includes improved vertical road profile; vertical curves meet minimum stopping sight distances. Wider curb lanes improve truck movements at intersection and accesses.	◕	Reconstruction includes improved vertical road profile; vertical curves meet minimum stopping sight distances. Wider curb lanes improve truck movements at intersection and accesses.	◐	Reconstruction includes improved vertical road profile; vertical curves meet minimum stopping sight distances Does not improve truck movements due to minimum curb lane widths
	Operations	Ability to improve vehicular traffic flow, level of service and reduce congestion	○	Increase in congestion expected over time due to increased traffic volume as a result of nearby future developments	●	Wider outside lanes is desirable for truck traffic and movements including intersection and driveway turns	◕	Wide outside lanes is desirable for truck traffic and movements including intersection and driveway turns	◐	Narrower lanes may hamper some truck flow and turning movements.
	TTC Requirements	Maintains compatibility	◐	Maintains compatibility	●	Meets TTC design vehicle guidelines	●	Meets TTC design vehicle guidelines	●	Meets TTC design vehicle guidelines
	Accessibility for Ontarians With Disabilities Act (AODA) and City of Toronto Standards	Ability to maintain or maximize opportunities for improved access for Ontarians With Disabilities to adjacent properties	○	No access improvements	◐	Increases accessibility in the Focus Area through provision of north and south side sidewalks.	●	Narrower road shortens pedestrian crossing at Markham Road by 1.8 m	●	Narrower road shortens pedestrian crossing at Markham Road by 1.8 m

Table 6-4 ALTERNATIVE DESIGNS EVALUATION

Category	Criteria	Indicator	Alternative 1 Do Nothing		Alternative 4: Full reconstruction, Four-lane urban cross-section, Public Realm & Active Transportation Improvements					
					4A: Two 3.3m and Two 4.2m lanes (lane width total = 15.0m)		**4B: Two 3.1m and Two 3.5m lanes** (lane width total= 13.2m)		**4C: Four 3.3m lanes** (lane width total= 13.2m)	
LEGEND: ● Most Preferred ◕ Preferred ◐ Neutral ◔ Less Preferred ○ Least Preferred										
	Multimodal provisions	Ability to improve or provide opportunities for active transportation (pedestrians and cyclists movement)	○	No Improvements to multimodal travel	●	Improves pedestrian access with continuous sidewalk. Wider curb lanes provide additional room for cyclists to share the road with vehicles	◕	Improves pedestrian access with continuous sidewalk. Wider curb lanes provide additional room for cyclists to share the road with vehicles	◐	Improves pedestrian access with continuous sidewalk. Narrower curb lanes limits opportunity for cyclists to share the road with vehicles
	Provision for Emergency Services	Maintain or improve emergency services access the Focus Area	○	Maintains emergency services access	●	Maintains emergency services access with potential improvement due to widest curb lanes	◕	Maintains emergency services access with potential improvement due to wide curb lanes	◐	Maintains emergency services access with potential improvement due to two through lanes available in each direction.
Natural Environment	Vegetation, existing trees, and wildlife	Potential for disruption of existing trees and vegetation.	●	No impact to existing vegetation	○	Estimate 63 trees to be removed	◐	Estimate 56 trees to be removed	○	Estimate 63 trees to be removed
	Opportunities for street tree plantings	Potential for new tree plantings (Number of trees added)	●	Potential for new tree plantings	◐	Introduction of boulevards on both sides provide tree plantings opportunities (50)	●	Narrower lanes provide potential for additional boulevard width and increased tree plantings (>50)	●	Narrower lanes provide potential for additional boulevard width and increased tree plantings (>50)
Socio-Economic Environment	Noise impacts	Ability to minimize ambient noise levels after construction	○	Noise level increases anticipated (poor pavement condition, new development and higher traffic volumes)	◐	Curb lane traffic is closer to properties	◕	Minor noise reduction (narrower road)	◕	Minor noise reduction (narrower road)
	Permanent Property Acquisition	Minimum permanent property impacts	●	No property impacts	○	701m^2 permanent property acquisition	○	701m^2 permanent property acquisition	○	701m^2 permanent property acquisition
	Temporary Easements	Easements required for grading	●	No easements required	○	588m^2 temporary easements required	◕	322m^2 temporary easements required	◐	543m^2 temporary easements required
Engineering and Utilities	Construction feasibility and staging	Implementation of construction staging plan	●	No construction staging is required	◕	No construction feasibility issues anticipated. The wider road platform is beneficial to construction staging as it allows 2 lanes of through traffic to be maintained for the duration of construction.	◐	No construction feasibility issues anticipated. The wider road platform is beneficial to construction staging as it allows 2 lanes of through traffic to be maintained for the duration of construction.	◔	No construction feasibility issues anticipated. The narrower road platform may require more than 2 stages to allow 2 lanes of through traffic to be maintained for the duration of construction.
	Drainage / Stormwater management	Potential for impacts or improvements to existing	○	No change to existing drainage	◐	Road reconstruction includes a storm sewer system to accommodate existing and future drainage requirements	◕	Impervious area is approximately 810m^2 less which reduces required pipe sizes.	◕	Impervious area is approximately 810m^2 less; reduces required pipe sizes.

Table 6-4 ALTERNATIVE DESIGNS EVALUATION

Category	Criteria	Indicator	Alternative 1 Do Nothing		Alternative 4: Full reconstruction, Four-lane urban cross-section, Public Realm & Active Transportation Improvements					
					4A: Two 3.3m and Two 4.2m lanes (lane width total = 15.0m)		**4B: Two 3.1m and Two 3.5m lanes** (lane width total= 13.2m)		**4C: Four 3.3m lanes** (lane width total= 13.2m)	
LEGEND: ● Most Preferred ◕ Preferred ◐ Neutral ◔ Less Preferred ○ Least Preferred										
		system; increased requirements for new impervious areas								
	Utilities (relocation / replacement)	Potential for impacts to existing utilities	●	No Utility Impacts	○	13 utility features listed are impacted.	◐	12 utility features listed are impacted.	◐	12 utility features listed are impacted.
	Construction costs	Complete cost to implement	●	No construction costs	○	Highest construction costs ($1.9M)	◐	Moderate construction costs ($1.6M)	◐	Moderate construction costs ($1.6M)
	Operations and Maintenance costs	Cost to maintain and operate	○	Approximate maintenance costs of $380K over 30 years assuming initial full depth pavement replacement with asphalt resurfacing every 10 years	◐	Approximate maintenance costs of $360K over 30 years, assuming asphalt resurfacing every 10 years	●	Approximate maintenance costs of $320K over 30 years, assuming asphalt resurfacing every 10 years	●	Approximate maintenance costs of $320K over 30 years, assuming asphalt resurfacing every 10 years
Recommendation			**Not recommended**		**Not recommended**		**RECOMMENDED**		**Not recommended**	
			Does not provide urban design or active transportation improvements. Does not impact the natural or cultural environments Does not impact property. Does not address existing pavement and drainage issues.		Provides urban design and active transportation improvements. Significant impacts to the natural, cultural and social-economic environments. Mitigation measures will need to be applied.		Provides urban design and active transportation improvements. Balances transportation improvements and impacts to the natural, cultural and social-economic environments. Mitigation measures will need to be applied.		Provides urban design and active transportation improvements while narrower curb lanes negatively impact traffic operations. Balances transportation improvements and impacts to the natural, cultural and social-economic environments. Mitigation measures will need to be applied.	

6.4 SUMMARY EVALUATION OF PREFERRED ALTERNATIVE DESIGN

Based on the evaluation presented above and input from the Project Team and TAC members, **Alternative 4B: 3.1m Through Lanes and 3.5m Curb Lanes** was identified as the recommended Preferred Design. The recommended Preferred Design typical cross-section is shown in **Figure 6-9** which illustrates a configuration with two through lanes, two curb lanes, curbs, boulevards and sidewalks along both sides of Passmore Avenue.

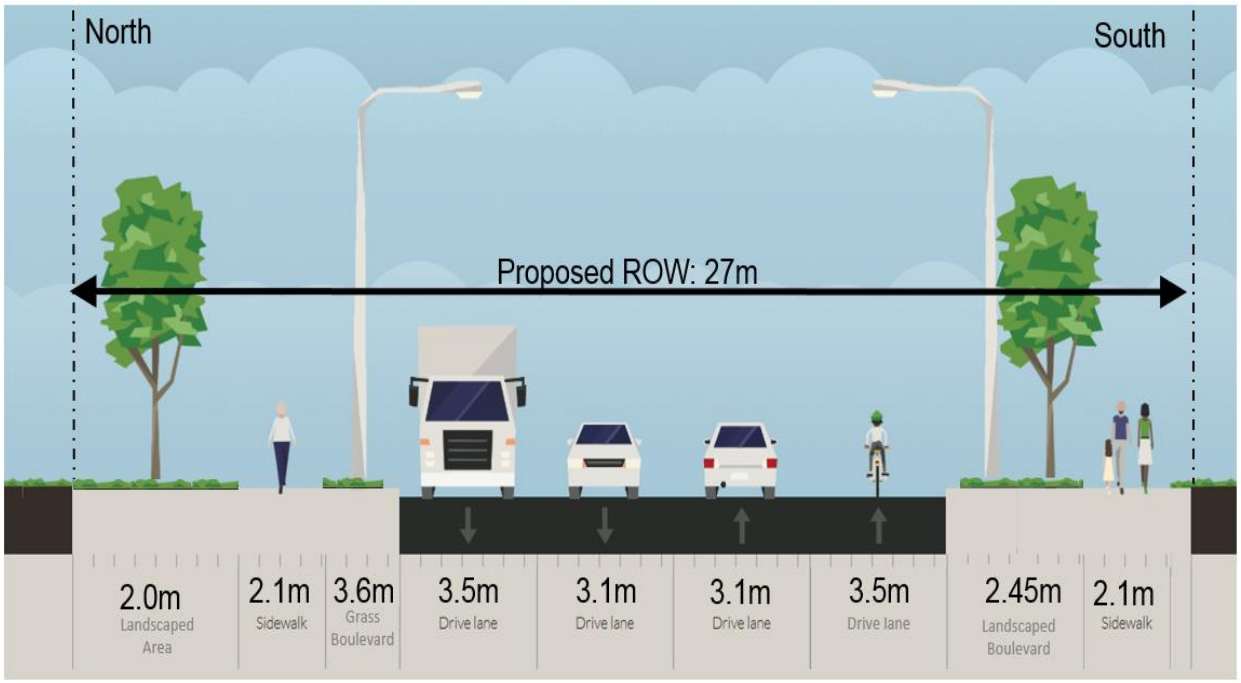


Figure 6-9 Recommended Preferred Design Typical Cross Section

The recommended Preferred Design balances between transportation improvements and impacts to the natural, cultural and social-economic environments. This option addresses City Planning and Policy objectives with respect to improvement to connectivity and urban design elements. Transportation related improvements include better road profile, new pedestrian facilities and wider curb lanes for shared use by cyclists. Other impacts include the need to remove 56 trees, utilities relocations, temporary easement requirements and permanent property acquisition.

6.5 DEVELOPMENT OF SIDEWALK ALTERNATIVE DESIGNS

In light of these impacts the preferred design was further developed and evaluated to consider two design alternatives for 2.1m sidewalk facilities: 1) north and south side; and 2) south side only.

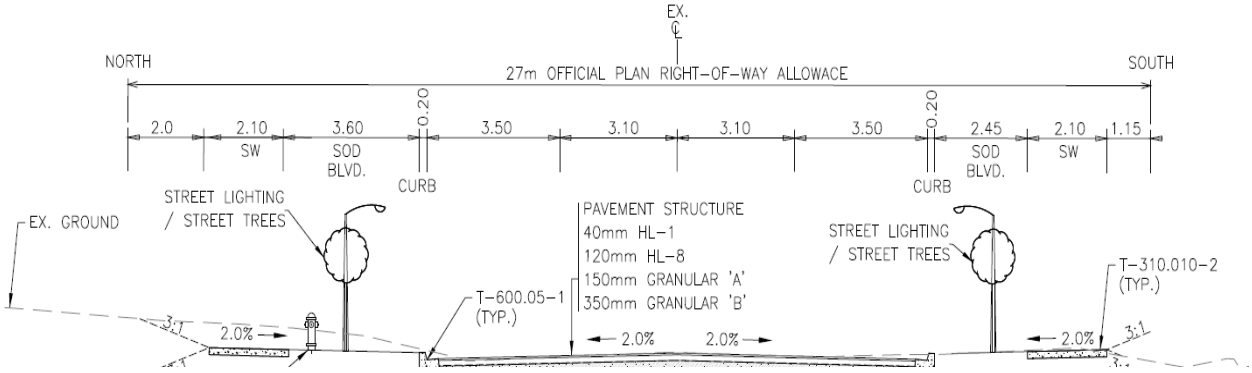


Figure 6-10 Alternative Design 4B: North and South Sidewalk

Typical cross-sections are presented in **Figure 6-10** and **Figure 6-11**

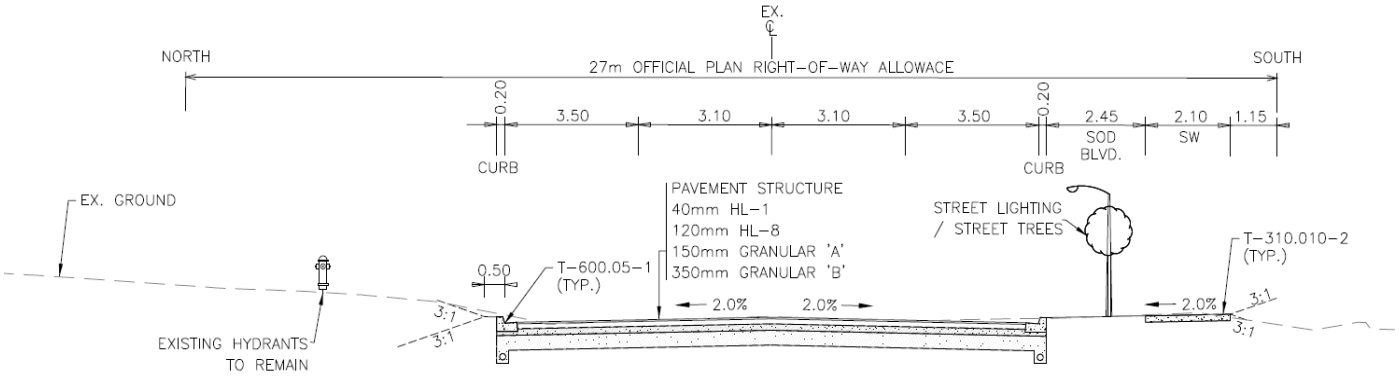


Figure 6-11 Alternative Design 4B: South Only

6.6 EVALUATION METHODOLOGY

The criteria used in the assessment of the alternative solutions and designs was further refined to focus on impacts to such elements as private property, the natural environment and utilities. Each alternative was assessed on its ability (● Most Preferred / ○ Least Preferred) to provide the greatest positive impact and minimize negative impacts using criteria such as increased opportunities to improve connectivity, streetscape and accessibility and reduce impacts to the natural environment, private property and construction impacts, including utilities relocations.

6.7 EVALUATION OF SIDEWALK ALTERNATIVE DESIGNS

The detailed evaluation of these two alternatives is presented below, in **Table 6-5.**

Table 6-5 Alternative 4B Sidewalk Alternative Designs Evaluation

Category	Criteria	Indicators	North and South Sidewalks		South only Sidewalk	
Planning and Policy	Urban Design Sidewalks (connectivity)	Potential to provide, improve, or enhance sidewalks	●	Provide sidewalks on both sides	○	Provide sidewalk on south side only
	Urban Design - Streetscaping	Potential to provide/enhance streetscaping	●	Enhanced streetscape with boulevard on both sides	○	Potentially less enhanced streetscaping
	Accessibility for Ontarians With Disabilities Act (AODA) and City of Toronto Standards	Ability to maintain and/or maximize opportunities for improved access for Ontarians With Disabilities to adjacent properties, in the Focus Area.	●	Maximum opportunity to increase accessibility in the Focus Area through provision of north and south side sidewalks.	○	Increases accessibility in the Focus Area through provision of south side sidewalk.
	Multimodal provisions	Ability to improve pedestrian movements.	●	Improves pedestrian access.	○	Less improvements to pedestrian access.
Natural Environment	Vegetation, trees, and wildlife	Potential impacts to existing trees and vegetation.	○	Estimate 56 trees to be removed	●	Estimate 30 trees to be removed
	Opportunities for street tree plantings	Potential for new tree plantings along the proposed street. Number of trees added	●	Boulevards on both sides provide tree plantings opportunities	○	South side only boulevard may reduce tree plantings opportunities
Socio-Economic Environment	Permanent Property Acquisition	Minimum property impacted	○	701m^2 of permanent property acquisition required	●	No permanent property acquisitions required
	Temporary Easements	Amount of easements required for roadway grading	○	322m^2 of temporary easements required	●	259m^2 of temporary easements required
Engineering and Utilities	Construction feasibility and staging	Implementation of construction staging plan.	○	Additional construction stages; traffic management required to construct both the north and southern boulevard and sidewalk.	●	Fewer construction stages and traffic management required to construct south only boulevard and sidewalk.
	Drainage / Stormwater management	Potential for impacts or improvements to existing system and requirements for a proposed new system including changes to impervious areas	○	Increased impervious area from the northern sidewalk increases storm sewer pipe size required	●	Lack of northern sidewalk reduces amount of impervious areas. Existing north side ditches maintained for conveyance to new storm sewer system.
	Utilities (relocation / replacement)	Potential for impacts to existing utilities.	○	13 utility features are impacted.	●	Eight utility features are impacted.
	Construction costs	Complete cost to construct.	○	Additional construction costs to build north and south sidewalks and boulevards	●	Reduced sidewalk and boulevard provides cost savings (appro.$65K)
	Operations and Maintenance costs	Cost of maintenance and operation of design.	○	Additional maintenance costs	●	Cost savings with less sidewalk and boulevard to maintain
Recommendation			**Not recommended**		**RECOMMENDED**	
			The construction of a sidewalk and boulevard on the north side of Passmore Avenue will increase the connectivity while providing opportunities for additional urban design elements such as street trees. Yet, greater impacts along the north side to existing trees, existing utilities and increased construction costs and temporary easements.		The construction of a sidewalk and boulevard only on the south side will increase the connectivity by extending the existing sidewalk at the west limit of the Focus Area to the Markham Road intersection. Impacts to existing elements along the north side such as existing trees and utilities are avoided. Results in lower construction costs and less temporary easements. Compatible with future development, which may include provision of north sidewalk at 568 Passmore Avenue.	

LEGEND: ● Most Preferred ○ Least Preferred

6.8 SUMMARY EVALUATION OF PREFERRED SIDEWALK DESIGN

The assessment revealed that the construction of a sidewalk on both north and south side of the new roadway will have the greatest impact to improved connectivity, streetscape and accessibility. In contrast, this option results in greater impacts on vegetation, utilities relocation and private property, (permanent property acquisition,), particularly due to grading requirements. **Figure 6-12** below illustrates the preliminary preferred design.

A south only sidewalk and boulevard will minimize those impacts while still being able to provide some improvements to streetscape, accessibility and connectivity through its connection to the existing sidewalk. Impacts to existing elements along the north side such as existing trees and utilities are avoided while exhibiting lower construction costs and less temporary easements. As such, this was determined to be the Preferred Design.

This alternative would defer implementation of the north sidewalk until such future time when development occurs in this area. The design of the roadway widening will be undertaken with consideration for the proposed future implementation of the north sidewalk.

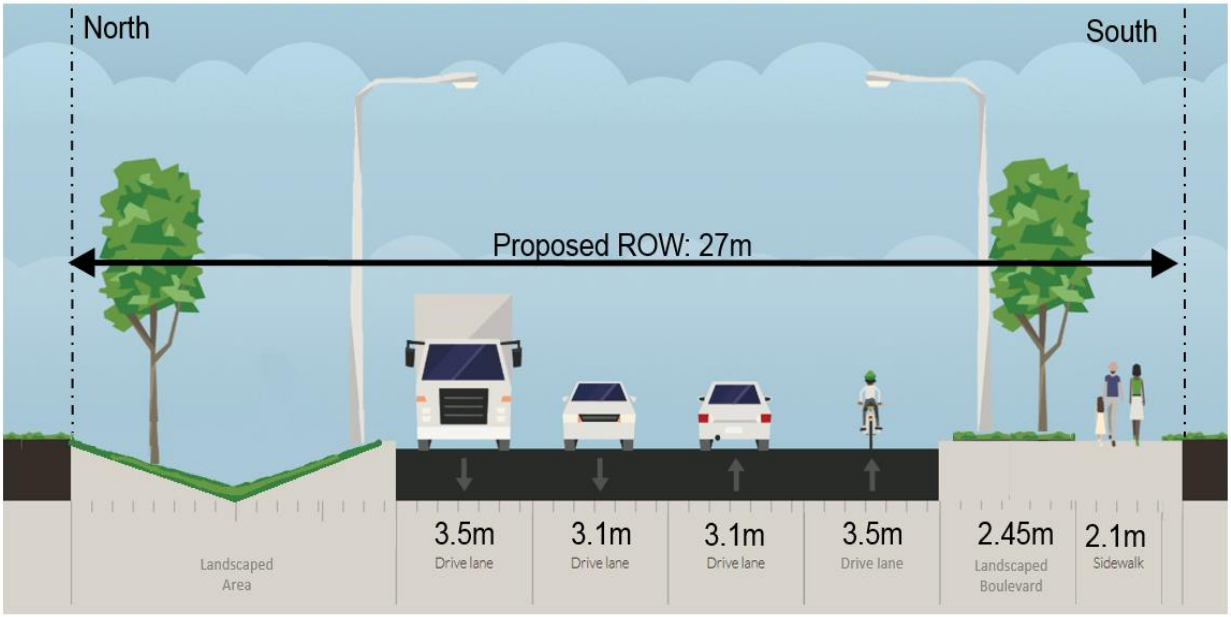


Figure 6-12 Recommended Preferred Sidewalk Design

6.9 CONFIRMATION OF THE PREFERRED DESIGN

The results of the development and evaluation of the alternative cross-section and sidewalk designs and the identification of the recommended Preliminary Preferred Design: **Alternative 4B: 3.1m Through Lanes and 3.5m Curb Lanes, with south only sidewalk** was presented to the public during the second round of public consultation. This second phase of public consultation was held online from November 2, 2017 to November 17, 2017.

Following the public consultation event, **Alternative 4B: with south only sidewalk and boulevard, including other public realm and active transportation improvements** was confirmed as the Preferred Design.

7 DESIGN AND IMPLEMENTATION OF THE PREFERRED DESIGN

Based on the evaluation of Alternative Designs, input from the PT and TAC and consultation with the public, Alternative 4-B with south sidewalk only was identified as the Preliminary Preferred Design and carried forward for further design considerations. The key elements of the Preliminary Preferred Design are as follows:

- Passmore Avenue widened to four lanes from Markham Road to 450m west of Markham Road;
- Left turn lane provided at west leg of Markham Road intersection;
- The provision of a 2.1m sidewalks along the south side connecting the existing sidewalk at the west Focus Area limit to the Markham Road intersection;
- The provision of a boulevard along the south side to enhance the streetscape and landscaping features; and
- Installation of street lighting.

7.1 DESIGN CRITERIA

From Markham Road west approximately 450m, Passmore Avenue is currently a two-lane collector road with a rural cross section. The current posted speed on Passmore Avenue is 60 km/h and will be maintained following the road widening.

To develop the preliminary design for the widening of Passmore Avenue, design criteria for the roadway geometrics were established based on the following:

- City of Toronto - Road Engineering Design Guidelines: 2.0 Lane Widths (June 2017)
- City of Toronto – 0.0 Curb Radii Guidelines (January 2015)
- Transportation Association of Canada (TAC) – Geometric Design Guide for Canadian Roads (June 2017)

TAC guidelines were used to select and assess the horizontal and vertical curve geometry for the recommended design.

The preliminary design criteria for the recommended road design is based on the guideline documents identified above and presented below, in **Table 7-1**

Table 7-1 Passmore Avenue Design Criteria

Description	Existing Conditions	Proposed Design Criteria
Classification		
Road Classification	UCU 80	UCU 80
Design Speed (km/h)	80	80
Posted Speed (km/h)	60	60
Horizontal Alignments		
Maximum Curve NC Normal Crown (-0.02m/m) **R**min (m)	Tangent	2130
Maximum Deflection	0	0°30'00" (0.5°)
Vertical Alignments		
Maximum Grade (%)	3.5	5
Minimum Grade (%)	0.4	0.5
Sag Vertical Curve Kmin.	22	12
Crest Vertical Curve Kmin.	11.2	26
Length of Curve (min) (m)	27.3	80
Minimum Stopping Sight Distance (m)	85	130
Cross Sections		
Through Lane Width (m)	3.75	3.10
Left Turn Lane Width (m)	3.00	3.00
Curb Lane Width (m)	-	3.50
Tangent Section Crossfall (%)	2%	2%
Sidewalk Width (m) (min)	1.50	2.10
Sidewalk Crossfall (%)	2%	2%
Layout		
Minimum Radius of Curbs at Intersections:		
Driveway Entrances (m)	7.5	7.5
Arterial to Collector (m)	15	15
Maximum ROW Width (m)	27.0	27.0

7.2 ROAD GEOMETRICS

7.2.1 HORIZONTAL ALIGNMENT

The existing horizontal alignment of Passmore Avenue will be maintained which is generally tangent throughout the Focus Area.

7.2.2 VERTICAL ALIGNMENT

After identifying the overall vertical profile elements for the existing Passmore Avenue corridor, profile improvements and corridor illumination were recommended. (TAC) – Geometric Design Guide for Canadian Roads was used to assess and select the proposed vertical curve (K) values for the preliminary vertical alignment design.

The proposed new vertical alignment generally follows the existing road profile with some minor variations. These variations include an increase in the road grade to ensure the vertical curves meet the minimum K values and curve lengths as well as to provide a minimum 0.5% grade for improved drainage to the west of the Markham Road intersection. The proposed plan and profile are presented in **Appendix O**.

7.2.3 TYPICAL CROSS-SECTION

Typical cross-sections for the Passmore Avenue corridor were developed based on discussions with City of Toronto staff and on the design criteria presented above**.** The typical sections have been developed to implement the 27.0m maximum right-of-way for Passmore Avenue as identified in the Official Plan.

Typical cross-sections proposed for Passmore Avenue include a mid-block urban cross-section and a 3.0m left-turn lane and 1.5m raised median island at the Markham Road intersection. Common elements to both typical cross-sections include a 27.0m right-of-way, 3.10m through lanes, 3.50m curb lanes with a 2.45m maximum boulevard and a 2.1m sidewalk on the south side. It should be noted that the figures include the 2.1m sidewalk on the north side, identified for future implementation. The typical sections are presented in **Figure 7-1** and **Figure 7-2**.

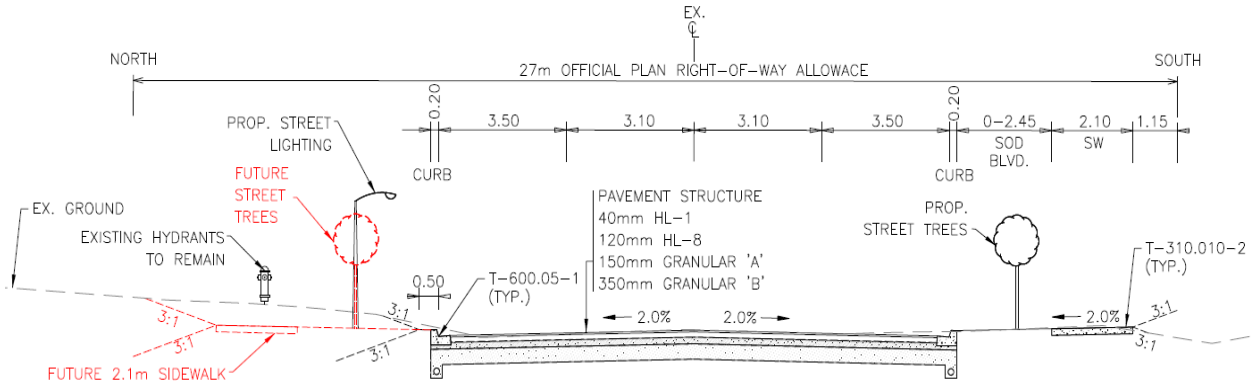


Figure 7-1 Passmore Avenue Mid-Block Typical Section

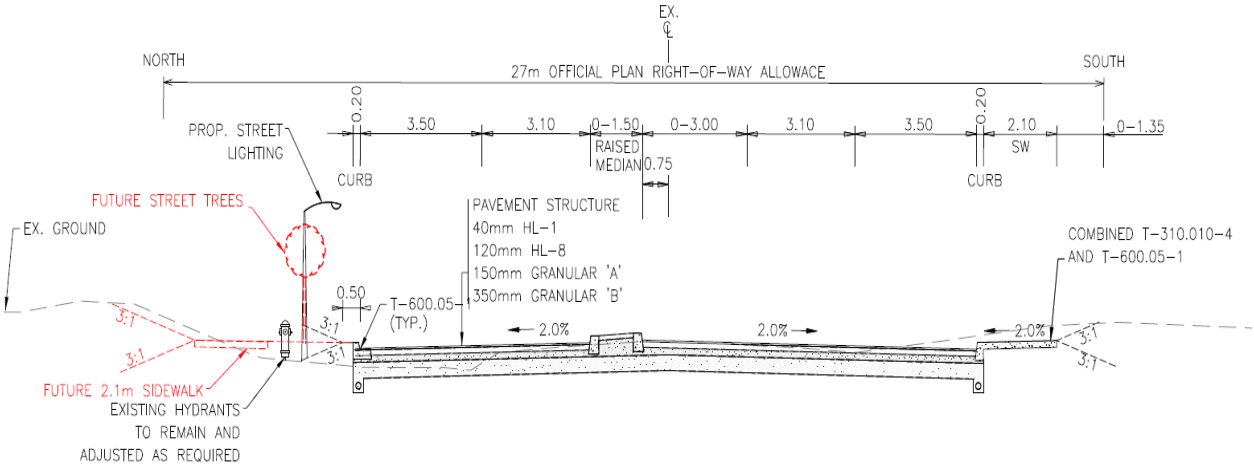


Figure 7-2 Passmore Avenue Intersection Approach Typical Section

7.2.4 PAVEMENT DESIGN

Based on the pavement condition survey, the borehole information, laboratory testing, pavement structural capacity analysis and the assumed traffic, the existing pavement structure from Markham Road to 450m west of Markham Road is currently deficient and does not provide the required pavement structural number to carry the projected 2016 traffic over the 15-year pavement design life. Therefore, a full depth reconstruction in conjunction with drainage and sub-drainage improvements is recommended for the proposed road improvements and the recommended pavement design is provided in **Table 7-2.**

Table 7-2 Passmore Avenue Geotechnical Investigation Recommended Pavement Design

Pavement Structure	Reconstruction and New Construction (mm)
HL1 Surface Course	40
HL8 (HS) Binder Course	120
Granular 'A' Base	150
Granular 'B' Type I Subbase	350

7.3 PEDESTRIAN & CYCLIST FACILITIES

Provisions for pedestrians have been included in the preferred design for the widening of Passmore Avenue through a 2.1m sidewalk along the south side. A 2.1m sidewalk on the north side has been identified for implementation in the future based on the timing of the 568 Passmore Avenue

development. The sidewalk is generally separated from the travel lanes by a maximum 2.45m wide boulevard which transitions to a curb face sidewalk as it approaches Markham Road intersection.

Neither the 10-year Cycling Network Plan nor the widening of Passmore Avenue propose cycling infrastructure. Cyclists will continue to use the shared curb lane, as per the existing conditions.

7.4 INTERSECTIONS

The preferred design will maintain all existing intersections within the focus area, as follows:

- Passmore Avenue and Markham Road – Signalized, exclusive left turn lanes on all approaches, westbound exclusive right turn lane; and
- Passmore Avenue and Dynamic Drive – Stop-Controlled, no auxiliary turning lanes.

7.5 TRANSIT

TTC staff have confirmed that there are no plans at this time for changes to the service on Passmore Avenue in the future. TTC Bus Stop #10836 is currently a non-scheduled stop, located to the south-west of the Dynamic Drive intersection, in front of 501 Passmore Avenue. This transit stop will be maintained. In consultation with TTC it was identified that installation of a 2.4 m by 16 m concrete pad passenger standing area (extending to the new sidewalk) would be included in the design of the widened roadway. Consultation with TTC will continue during detailed design and construction.

7.6 DRIVEWAY ACCESS / RESTRICTIONS

The widening of Passmore Avenue requires re-profiling/re-grading to match the proposed road design which is anticipated to impact 13 driveways, as summarized in **Table 7-3** below.

Table 7-3 Passmore Avenue Driveway/Access Impacts

Address	# of Entrances Impacted	Existing and Proposed Configuration
385 Passmore Avenue*	1	Full Access
395 Passmore Avenue	2	Full Access
410 Passmore Avenue*	1	Full Access
420 Passmore Avenue**	1	Full Access
430 Passmore Avenue**	2	Full Access
440 Passmore Avenue	2	Full Access

Address	# of Entrances Impacted	Existing and Proposed Configuration
501 Passmore Avenue	2	Full Access
568 Passmore Avenue	1	Full Access
159 Dynamic Drive	1	Full Access
3030 Markham Road	1	Full Access
*Locations of tie-in to the existing four-lane configuration (curbs to be replaced).		
** Shared driveway access		

7.7 PROPERTY REQUIREMENTS

The preliminary design was developed with the goal of minimizing property impacts in the project focus area. As such, no permanent property acquisitions are required. The widening and grading of Passmore Avenue will require temporary easements over 259.2m^2 during construction, impacting four private properties. The impacts are summarized in **Table 7-4**.

Table 7-4 Passmore Avenue Property Impacts

Address	Temporary Easement Required (m^2)
395 Passmore Avenue	76.7
501 Passmore Avenue	80.6
159 Dynamic Drive	96.7
3030 Markham Road	5.2

The locations where property requirements have been identified for this project are shown on the plan and profile drawings (**Appendix O**). The property requirements are preliminary only and subject to further review and confirmation during the detailed design.

7.8 LANDSCAPING

The proposed widening of the Passmore Avenue corridor provides an opportunity to improve both the aesthetics and ecological conditions of the corridor. The proposed design provides a 2.45m boulevard on the south side and on the north side of the right-of-way that will also remain for additional plantings as needed. Preliminary tree locations have been shown on the preliminary design drawings.

It is recommended that locally native, non-invasive species suitable for the site's conditions be used throughout the project area.

A landscape plan, consisting of tree preservation plans, tree planting plans and site restoration plans prepared by a qualified, Ontario Association of Landscape Architects, Landscape Architect will be required during the detail design stage and shall conform to the City of Toronto's current standard for street trees within the City's right-of-way.

7.9 ILLUMINATION

There is currently existing illumination along Passmore Avenue between the west limit of the Focus Area and Dynamic Drive, as discussed in Section 4. The preferred design of Passmore Avenue includes new illumination to ensure adequate lighting levels along the four-lane roadway.

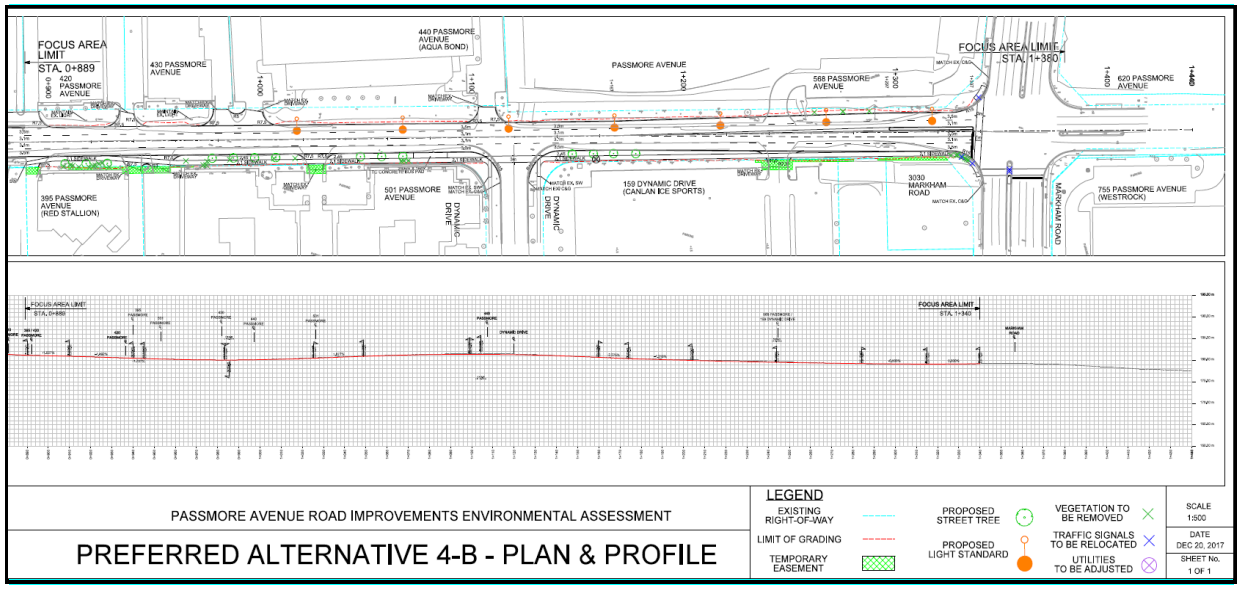


Figure 7-3 Future Lighting Standard Location

The three light standards located in the Focus Area will be maintained, along with the current spacing of 50m between poles. With this spacing, an additional seven light standard poles will be required to span the non-illuminated section of Passmore Avenue. The existing and proposed light standard locations are presented in **Figure 7-3** and illustrated on the Preferred Design sheets.

The need, location and type of illumination (LED or HPS) along the Passmore Avenue corridor will be confirmed through photometric analysis at the detail design stage.

7.10 TRAFFIC SIGNALS

The existing signalized intersection at Passmore Avenue and Markham Road will be maintained. However, construction of new cross-walk ramps and south cross-walk will require the relocation of some of the traffic signal poles and handwells. The proposed intersection configuration and impacts are presented in Error! Reference source not found.

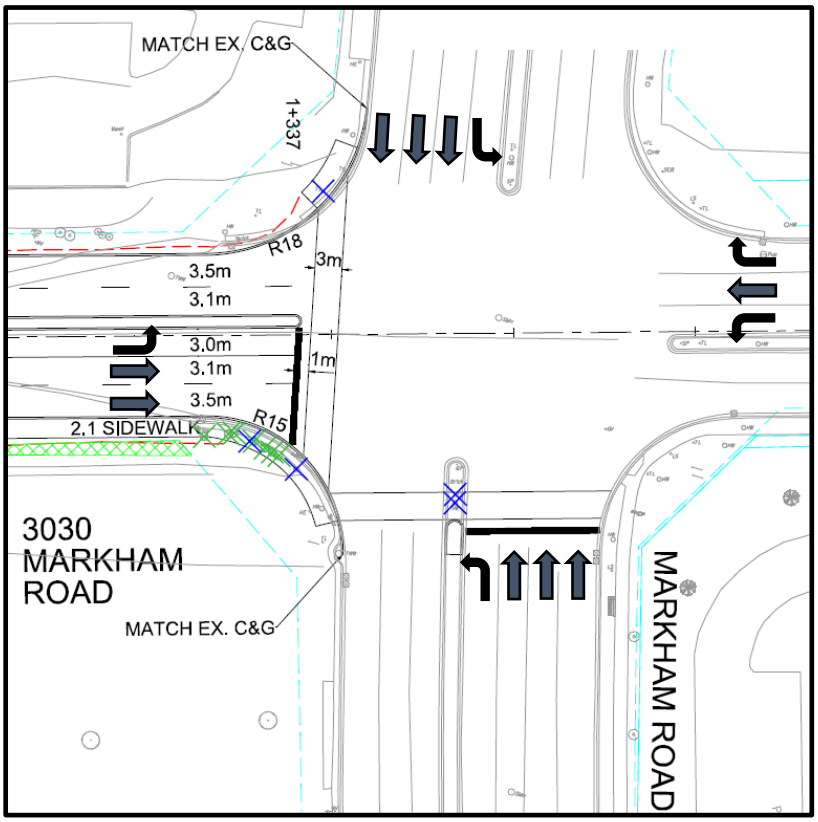


Figure 7-4 Passmore Avenue and Markham Road Proposed Intersection Layout

Temporary traffic control signals will be utilized during construction. Permanent traffic control signals appropriate to the intersection layouts will be installed during the final stages of the project.

7.11 DRAINAGE & STORMWATER MANAGEMENT

The existing drainage conditions in the Focus Area are described in **Section 0.**

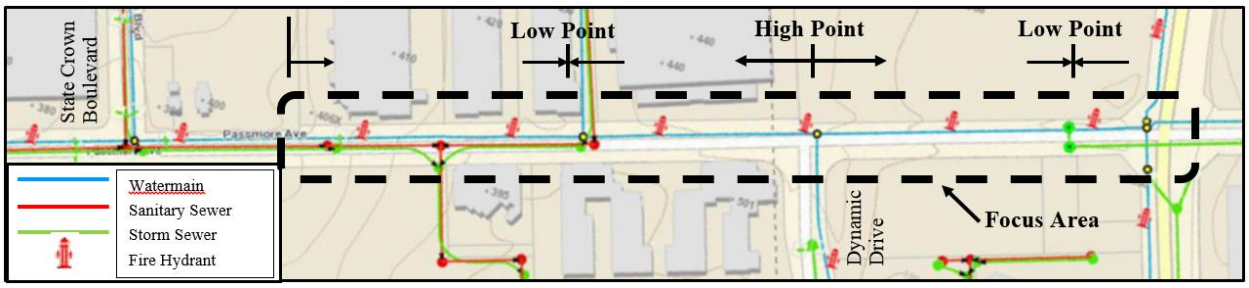
Under the proposed conditions, Passmore Avenue will be urbanized and widened to a four-lane cross section, which requires minor improvements to the profile to allow for minimal longitudinal grades to carry drainage along the roadway to the catch basins. Grading work undertaken will be in support of better drainage for minor and overland flows up to 100-year storm events.

The recommended design for conveyance of the minor system is the installation of a storm sewer system consisting of catch basins, catch basin leads and maintenance holes to be installed on Passmore Avenue. With the urbanization of surrounding property, roadside ditches will no longer be a viable option for conveyance with exception of the frontage of the 568 Passmore property which will retain the existing ditch until development proceeds and the frontage is urbanized.

The roadway will maintain the two existing drainage areas with only minor improvements required to the profile to ensure vertical grades and curvatures are brought up to standard while maintaining the relative high and low points.

7.11.1 DRAINAGE AREA CHARACTERISTICS

The Passmore Avenue right-of-way drainage areas were illustrated in Figure 4-5 and are described below.



Drainage Area #1 – Western Focus Area Limit to Dynamic Drive

This drainage area consists of a sag curve which captures runoff from the west of the focus area to the profile low point at Sta. 0+983, while the eastern portion of the area drains towards the west from the high point at Dynamic Drive.

Drainage Area #2 – Dynamic Drive to Markham Road

This drainage area starts at the high point at the crest curve located at Dynamic Drive and drains towards the east to a low point located at Sta. 1+315. The western edge of Markham Road drains towards the west to the same low-point with a road grade of 0.5% which improves the substandard 0.4% grade that is currently creating ponding issues in this area.

During detailed design, a larger area drainage study should be completed to determine the existing and proposed catchment areas (including road ROW and potential external areas) and imperviousness percentage.

7.11.2 STORMWATER MANAGEMENT CRITERIA

The detailed stormwater management design presented will have to conform to the following reports, guidelines and policies:

- Wet Weather Flow Management Guidelines (City of Toronto, November 2006)
- Design Criteria for Sewers and Watermains (City of Toronto, November 2009)
- Green Streets Technical Guidelines (City of Toronto, November 2017)
- Ontario Ministry of Transportation Drainage Design Manual (MTO, 1997)
- Ontario Ministry of Transportation Highway Drainage Design Standards (MTO, 2008)
- Ontario Ministry of the Environment Stormwater Management Planning and Design Manual (MOE, 2003)

The Passmore Avenue Focus Area is a designated road right-of-way with an area covering approximately 1.3ha. As such, the following criteria should be followed when designing the drainage system:

Water balance

- Retain stormwater on-site, to the extent practicable, to achieve the same level of annual volume of overland runoff allowable from the development site under pre-development conditions.
- As per the City's Wet Weather Flow Management Guidelines (2006), minimum on-site runoff retention requires the site to retain all runoff from a small design rainfall event - typically 5 mm (higher in the future) (in Toronto, storms with 24-hour volumes of 5 mm or less contribute about 50% of the total average annual rainfall volume) - through infiltration, evapotranspiration and rainwater reuse.

Water Quality

- Long-term average removal of 80% of TSS on an annual loading basis from all runoff leaving the site. (Suspended solids removal efficiency is to be calculated based on 100% of the total runoff volume resulted from all storm events that occur in an average year).

Water Quantity and Flooding

- The minor system for Passmore Avenue as a collector road shall be designed to accommodate the runoff from up to and including a 100-year storm with a return period of two years under free flow conditions.
- For the major system, the 100-year storm is the criteria to be followed to provide the necessary level of protection for properties, where feasible, against surface flooding from ponding on streets.
- The allowable flow spread on the urbanized Passmore Avenue Focus Area must leave at least one lane free of water in each direction while preventing any overtopping of the barrier curbs. For a collector road, these conditions must be maintained using a five-year storm event.

7.11.3 STORMWATER MANAGEMENT STRATEGY AND ALTERNATIVES

The proposed widening will require an updated stormwater management strategy that addresses the additional drainage from the increased impervious area. Within the Focus Area, in the 27m right-of-way, Passmore Avenue will be widened from the existing 7.5m paved area to a 17.8m of impervious areas, which comprises four paved lanes, concrete curb and gutters along both sides, the proposed 2.1m sidewalk on the south side and the future 2.1m sidewalk on the north side. The summary of the change in impervious areas is presented in **Table 7-5**.

Table 7-5 Existing and Post-Construction Change in Impervious Areas

	Impervious Area (ha)	Impervious Area (%)
Existing Conditions	0.38	27.8%
Post-Construction Conditions	0.90	65.9%
Increase	0.52	38.1%

7.11.4 LOW IMPACT DEVELOPMENT TECHNIQUES

Implementation of low impact development (LID) techniques to maximize infiltration within the Passmore Avenue ROW is recommended and should be reviewed during detailed design. Advantages of LID techniques include:

- Protection of downstream resources;
- Abatement of pollution;
- Groundwater Recharge;
- Water Quality Improvements;
- Habitat Improvements;
- Reduction of downstream flooding and erosion;
- Conservation of water and energy; and
- Improved aesthetics in streams and rivers.

There are several appropriate LID measures that can be implemented within the Passmore Avenue ROW. Each proposed measure is summarized below. The use/location is to be determined in detailed design.

Bioretention Planters

Bioretention is vegetated practices that temporarily store, treat and infiltrate stormwater runoff. The most important component of this practice is the soil media, which is made up of a specific ratio of sand, fine soils and organic material. The vegetation may consist of either grasses or plants.

The geotechnical investigation has determined that the underlying soils in the Focus Area are primarily sand and silt till and depending on the site constraints, bioretention practices may be designed without a subdrain for full infiltration, with an subdrain for partial infiltration, or with an impermeable liner and subdrain for filtration only (i.e. biofilter).

Bioretention planters have vertical sidewalls and are often narrow and rectangular in shape. The walls allow bioretention planters to maximize the amount of stormwater retention within a small footprint.

Potential locations for bioretention planters within the Passmore Avenue corridor include the boulevards on both sides of the road. The planters can also implement the use of soil cells and additional clearstone storage. The specifics regarding the planter designs should be considered in detailed design and with any development applications.

Boulevard Bioretention

Boulevard bioretention is similar to the bioretention planters except that there are no vertical sidewall planter structures which can reduce construction costs. Potential locations for boulevard bioretention within the Passmore Avenue corridor include the boulevards on both sides of the road.

Bioswale

Bioswales are vegetated open channels that incorporate engineered bioretention soil media and an optional perforated pipe subdrain. Just like the bioretention units above, there are two variations of bioswales based on the type of vegetation: grass and planted.

Potential locations for bioswales includes at the frontage of 568 Passmore Avenue and 3030 Markham Road properties which also could be considered for interim conditions prior to implementation of redevelopment plans for those properties.

Perforated Pipe

Perforated pipe systems are underground stormwater conveyance systems composed of perforated pipes installed in gently sloping granular stone beds lined with geotextile fabric that allows infiltration of runoff into the gravel bed and underlying native soil.

Perforated pipe systems can be used in place of conventional storm sewer pipes where topography, water table depth, and runoff quality conditions are suitable. Within the Passmore Avenue corridor, perforated pipes can be used as a replacement or in conjunction with the required conventional storm sewer.

Permeable Pavement

Permeable pavement can be used in place of conventional asphalt or concrete pavement. These alternatives contain pore spaces or joints that allow stormwater to pass through to a stone base where it is infiltrated into the underlying native soil or temporarily detained.

Different types of permeable pavement include porous asphalt, pervious concrete and permeable interlocking concrete pavers. Within the Passmore Avenue corridor, permeable pavement could be included as a replacement to conventional concrete sidewalks along the south side of the road.

Prefabricated Modules

Prefabricated modules such as precast tree planters or soil support systems contain trees or shrubs, bioretention soil media and a perforated pipe subdrain outlet. They can collect stormwater runoff from roads and sidewalks and treat it using bioretention.

Soil support systems consist of modular cells that provide structural support for paved surfaces without the need for a compacted soil base within the tree root zone.

Each cell can hold a specified volume of soil. Cells can be spread across a wide surface area and stacked on top of each other to a specified depth, creating very large tree root zones and infiltration areas beneath infrastructure, particularly sidewalks. Within the Passmore Avenue corridor, prefabricated modules can be installed within the boulevards and under the sidewalks on both sides of the road.

7.11.5 STORMWATER MANAGEMENT ALTERNATIVES

Given the space constraints for SWM facilities within the roadway right-of-way surface, a number of alternatives have been considered for additional stormwater control. These alternatives are described below and the advantages and disadvantages of each are presented in **Table 7-6.**

Alternative 1 Low Impact Development (LID) SWM on Passmore Avenue:

- LID techniques, as part of the overall SMW strategy, provide positive environmental effects to mitigate impacts on groundwater levels, flooding and stream channel erosions.

Alternative 2 Underground pipe storage and oil grit separators:

- Oversized storm sewer pipes and orifice plates to meet quantity control targets and oil grit separators to meet quality control targets.

Alternative 3 Collaborate with adjacent developers on SWM design:

- A SWM strategy that considers and encompasses drainage from adjacent potential future developments.

Table 7-6 Stormwater Management Alternatives

Description	Advantages	Disadvantages	Recommendation
LID SWM	Can be integrated within the boulevards, sidewalks and landscaped areas.	Limited space within ROW. May not be possible depending on storage requirements.	**Recommended**
	Can provide some quality and quantity control.		

Description	Advantages	Disadvantages	Recommendation
	Facilitates evapotranspiration and infiltration.		
	Some drainage can be managed within the ROW.		
Underground pipe storage and oil grit separators	Attenuate peak/post development flows to existing levels.	Expensive compared to other SWM alternatives. Would not allow for evapotranspiration infiltration to occur.	**Conditionally Recommended** (If LID SWM not feasible)
	Water quality targets can be met through the use of oil grit separators.		
	Drainage can be managed within ROW.		
Collaborate with adjacent developers on SWM design	An economical management strategy.	Proposed development strategy depends on timing of adjacent developments. Would not meet existing drainage and SWM criteria.	**Not recommended**
	SWM ponds would allow for potential evapotranspiration and infiltration.		

The preferred alternative for providing quality and quantity treatment is Alternative 1: LID measures. Alternative 2: underground pipe storage and oil grit separators, is recommended where Alternative 1 is found to be not feasible. Cost-effective analysis may be necessary.

The LID SWM strategy is to be explored during detailed design and implemented to the extent practicable to maximize infiltration within the ROW throughout the focus area. Future development on the north side will need to consider the development of the preferred LID SWM strategy.

7.12 WATERMAINS

The existing 400mm ductile iron watermain located along the north side of Passmore Avenue and crossing at Dynamic Drive will be maintained during the proposed construction. The proposed design limits grading on the north side, which allows the three existing fire hydrants to be maintained.

The extent of grading will be further refined during detailed design and may require the fire hydrants to be adjusted vertically to suit the new grades. All the valve chamber covers are expected to be adjusted to match the new top of pavement elevations.

7.13 SANITARY SEWERS

There is no existing sanitary sewer on Passmore Avenue in the focus area. The existing 250mm vitrified clay sanitary sewer located near the centreline of Passmore Avenue and crossing through easements at 385 Passmore Avenue and 430 Passmore Avenue will be maintained during the proposed construction. All the sanitary manhole covers are expected to be adjusted to match the new top of pavement elevations.

7.14 UTILITIES

The utility impacts noted in the study were determined from information acquired from site visits, topographic surveys and record drawings. The proposed design will limit the grading works on the north side of Passmore Avenue, but it is anticipated that most of the utilities located within the proposed right-of-way for Passmore Avenue may require either adjustments to match the new grades or relocation to implement the proposed widening. Formal definition of utility impacts and relocation strategy will be determined during the detailed design.

Throughout the EA study, the utilities providers that were contacted as part of the notification process are summarized in **Table 7-7**. No communications were received from any of the contacted utilities.

Table 7-7 Contacted Utilities

Utility Contact List	
Allstream	Sun-Canadian pipe Line Company Ltd.
Bell Canada	Tera Span
Cogeco Data Services Inc.	Toronto Hydro
Enbridge Gas Distribution Inc.	Trans Northern Pipe Line
Enbridge Pipeline Inc.	Ontario Power Generation

Utility Contact List	
Imperial Oil	Hydro One
Prestige Telecom	Hydro One Networks Inc.
Rogers Cable Systems	Enwave Energy Corporation

7.14.1 HYDRO

The proposed improvements will require the relocation of a hydro transformer located to the south-east of the Dynamic Drive intersection. The raised transformer is located within the proposed south sidewalk. The options will be reviewed during detailed design and may include relocating the transformer, shifting the sidewalk around the transformer or burying the transformer at grade.

The underground hydro is located along the south side of Passmore Avenue, approximately 3.0m north of the south right-of-way boundary. Further investigations (Levels B and A, if necessary) will be required during the detailed design to verify the depth and location of the hydro cables to ensure there are no conflicts with the curbs and sidewalks.

7.14.2 TELECOMMUNICATION

There are two pedestals located in near the west limit of the Focus Area. One is located on the south side and one on the north side. Neither is anticipated to be impacted by the proposed widening.

Further investigations (Levels B and A, if necessary) will be required during detailed design to verify the depth and location of the underground cables to ensure there are no conflicts with the proposed pavement or storm sewers.

7.14.3 NATURAL GAS

The site visits have identified locates for natural gas pipelines servicing both the south and north properties through a 150mm intermediate pressure gas main located on the south side, generally 0.90m offset from the right-of-way. No surface appurtenances have been identified through the site visit or topographic survey.

Potential impacts would include relocating the gas main due to insufficient cover with the proposed surface along the existing alignments and/or shifting the gas main horizontally to provide sufficient buffer from the sidewalk which would allow access if any excavation or maintenance is required. Given the location of the gas main along the existing south right-of-way, significant impacts are not anticipated.

Further investigations (Levels B and A, if necessary) will be required during the detailed design to verify the depth and location of the gas pipeline to ensure there are no conflicts with the proposed pavement or storm sewers.

7.15 CONSTRUCTION STAGING

During construction, a minimum of two lanes, one in each direction, will need to be maintained for the duration of the construction. The minimum lane widths will need to be 3.3m each to ensure TTC bus service can be maintained.

Construction staging will likely proceed as follows:

- Relocation of above and underground utilities in conflict with the proposed road widening. This will include relocation of above ground utility plants, and other above and underground utility services and the construction of temporary pavement where necessary;
- Construct the south side of Passmore Avenue and provide continuous traffic lanes in both directions on the north side of the roadway;
- Reconstruct the north side of the roadway after the first side is completed while shifting traffic to the newly constructed pavement. A minimum of one lane in each direction will be provided during the roadway reconstruction;
- Resurface the roadway after reconstruction; and
- Construct streetscaping and urban design elements on both sides of the roadway where included in the plan.

Property owners and tenants may experience interruption to their property access during construction. To reduce this impact, all property owners should be notified prior to construction and in advance of work related to their access.

A preliminary staging plan and staging sections implementing the strategy described above will be prepared and included in the functional design report, prior to moving to detailed design.

The detailed construction staging design and traffic management plan will be further developed during the detail design stage of the project.

7.16 IMPLEMENTATION & TIMING

The detail design for the new road could be completed in one year, subject to available funding and the acquisition of temporary easements needed to implement it. Delivery of the road construction is anticipated to be completed within two years.

7.17 PERMITS & APPROVALS

Several permits and approvals will be required from the agencies identified in Error! Reference source not found. In addition, the City of Toronto will be required to obtain temporary easements and/or permissions to enter from various property owners.

Table 7-8 Permits & Approvals

Regulatory Agency	Legislation	Permit/Approval	Comments
Ministry of the Environment and Climate Change	Ontario Water Resources Act	Environmental Compliance Approval	Required for the construction of the storm sewer system.
Ministry of Labour	Construction Projects Regulation (O.Reg. 213/91)	Notice of Project	Required prior to the start of construction.
Environment Canada	Migratory Birds Convention Act	Permit	
City of Toronto	N/A	Road Occupancy Permit	Required for any construction undertaken within the City's ROW.
	Noise Control Bylaw	Exemption	Required to allow construction works outside of normal hours (7 pm to 7 am) and during weekends.

7.18 COST ESTIMATE

The preliminary estimated construction cost for the recommended preferred design is presented in **Table 7-9**. The total estimated cost is $1,634,871, exclusive of costs associated with temporary easement requirements.

Table 7-9 Preliminary Construction Cost Estimate

Component	Cost
Construction	$1,167,765.00
Engineering (20%)	233,553.00
Contingency (20%)	233,553.00
Total Construction Cost	$1,634,871.00

This includes full depth reconstruction, utility relocations, traffic signals and illumination, storm sewer and drainage items as well as engineering and contingency costs. These figures are expressed in 2017 dollars and do not carry any escalation allowance for work undertaken in future fiscal periods. The preliminary cost estimate is provided in **Appendix P**.

8 ENVIRONMENTAL IMPACTS, MITIGATION MEASURES & MONITORING

This section describes the anticipated or potential impacts, both positive and negative, associated with the recommended design to widen Passmore Avenue, including mitigation measures to minimize any adverse effects of the project and recommended monitoring activities. Future work and commitments are also identified in this section.

8.1 TRANSIT

This transit stop will be maintained. In consultation with TTC it was identified that installation of a 2.4m by 16m concrete pad (extending to the new sidewalk) for passenger standing areas would be included in the design of the widened roadway. Consultation with TTC will continue during detailed design.

8.2 NATURAL ENVIRONMENT

8.2.1 TERRESTRIAL HABITAT

Potential impacts to the terrestrial habitat in the project area include loss of/damage to vegetation, disturbance to bird's nests and loss of habitat to other animals. With appropriate mitigation measures, damage can be kept to a minimal level.

The preferred design will involve tree removal and vegetation disturbances along Passmore Avenue.

Recommended mitigation measures to protect terrestrial habitat include the following:

- Use best management practices;
- Advise workers to perform a visual survey of machinery and work area prior to commencing work, as wildlife may be found hiding on, in, or under equipment, rocks, debris piles etc.;
- If any trenches are being filled, visually inspect the trench before filling and release any wildlife that is in the trench;
- Minimize vegetation removal;
- Develop and implement a replanting plan in keeping with the sensitivity of local communities, that is based on native, indigenous species that complement those communities and their ecological functions;
- Trees or shrubs to be removed during construction should be considered with respect to transplanting opportunities within the project area, as feasible regarding slope and exposure characteristics, soil types and moisture regimes, and relative timing considerations;

- Trees being retained should be protected by erecting and maintaining a temporary fence, pruning interfering branches and treating them with approved dressing, and treating any damaged roots or cuts >25mm in diameter with approved dressing;
- The contractor shall not destroy nests and eggs of protected migratory birds during migratory bird nesting season (March 31 to August 27); and
- In the event that vegetation and tree removals or clearing must occur within the breeding bird timing window, the Contractor should retain a qualified Avian Specialist prior to clearing, to screen for breeding birds using methods outlined by Environment Canada.

8.3 CULTURAL ENVIRONMENT

While no cultural resources or areas of archaeological potential remain within the Focus Area, the following recommendations are to be implemented during the construction of Passmore Avenue:

- In the event that deeply buried archaeological remains are encountered on the property during construction activities, the Heritage Operations Unit of the Ministry of Tourism, Culture and Sport (MTCS), be notified immediately at (416) 314-7146 as well as the City of Toronto, Heritage Preservation Services Unit (416) 338-1096.
- In the event that human remains are encountered during construction, immediately contact both the MTCS and the Registrar of Burial Sites, War Graves, Abandoned Cemeteries and Cemetery Closures, of the Ministry of Government and Consumer Services (MGCS), (416) 212-7499.

8.4 SOCIO-ECONOMIC ENVIRONMENT

8.4.1 LAND USE

The preferred preliminary design is consistent with the designated land uses outlined in the *Toronto Official Plan (2015)*. As such, no impacts on land use are anticipated as a result of the proposed road widening.

8.4.2 DRIVEWAY ACCESS/RESTRICTIONS

The widening of Passmore Avenue requires re-profiling/re-grading to match the proposed road design. Impacts are anticipated at 13 driveways, as summarized in **Table 7-3**.

Consultation about driveway design and constraints will be undertaken during detailed design with the impacted individuals/businesses.

8.4.3 PROPERTY REQUIREMENTS

The preliminary design for the widening and grading of Passmore Avenue will require temporary easements over 259.2m2, impacting four private properties, as shown indicated in Section 7.7. These property requirements are preliminary only and subject to further review and confirmation

during detailed design. Consultation with impacted property owners will be undertaken once more detail is known about the road design and constraints.

8.4.4 NOISE

Noise during the construction phase is an issue that should also be addressed. Unlike operational noise, construction noise is temporary in nature depending on the type of work required and its location relative to the noise-sensitive receptors.

The significance of the construction noise impact depends on the number of pieces of equipment, their types, time of operation and their proximity to the receptors in question.

The following is a brief outline of the procedures to be followed in handling construction noise during the detailed design and construction phases:

- Noise sensitive areas will be identified;
- Applicable local municipal noise control by-laws will be identified and obeyed. The by-laws include those enacted under the authority of the *Municipal Act*, the *Environmental Protection Act* or any other Provincial Legislation. Where timing constraints or any other provisions of the municipal by-law may cause hardship to the proponent, an explanation of this will be outlined in a submission to the MOECC and an exemption from such by-law will be sought directly from the area municipality in question;
- "General noise control measures" (not sound level criteria) will be referred to or placed into the contract documents;
- Should the municipality receive any complaint from the public, the municipality staff will verify that the "general noise control measures" agreed to, are in effect. The municipality will investigate any noise concerns, warn the contractor of any problems and enforce its contract;
- If the "general noise control measures" are complied with, but the public still complain about noise, the municipality will require the contractor to comply with the MOE sound level criteria for construction equipment contained in the MOE's Model Municipal Noise Control By-Law. Subject to the results of field investigation, alternative noise control measures will be required, where these are reasonably available; and
- In selecting the appropriate construction noise control and mitigation measures, the municipality will give consideration to the technical, administrative, and economic feasibility of the various alternatives.

The above noted procedures are based on the construction noise provisions set out in Section 8 of the MOE/MTO Noise Protocol.

8.5 LANDSCAPING

A landscape plan, consisting of tree preservation plans, tree planting plans and site restoration plans prepared by a qualified, Ontario Association of Landscape Architects, Landscape Architect

will be required during the detail design stage and shall conform to the City of Toronto's current standard for street trees within the City's right-of-way.

8.6 ILLUMINATION

The need, location and type of illumination (LED or HPS) along the Passmore Avenue corridor will be confirmed through photometric analysis at the detail design stage.

8.7 TRAFFIC SIGNALS

The existing signalized intersection at Passmore Avenue and Markham Road will be maintained. However, construction of new cross-walk ramps and south cross-walk will require the relocation of some of the traffic signal poles and handwells.

Temporary traffic control signals will be utilized during construction. Permanent traffic control signals will be installed during the final stages of the project to accommodate the intersection layouts.

8.8 DRAINAGE & STORMWATER MANAGEMENT

The roadway will maintain the two existing drainage areas with only minor improvements required to the profile to ensure vertical grades and curvatures are brought up to standard while maintaining the relative high and low points.

During detailed design, a larger area drainage study should be completed to determine the existing and proposed catchment areas (including road ROW and potential external areas) and imperviousness percentage.

The LID SWM strategy is to be explored during detailed design and implemented to the extent practicable to maximize infiltration within the ROW throughout the focus area. Future development on the north side will need to consider the preferred LID SWM strategy.

8.8.1 LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT BENEFITS

The use of LIDs can have implications on quality, quantity, erosion and infiltration controls. As discussed in **Section 7.11.4**, to maximize infiltration within the Passmore Avenue ROW LID measures are recommended and should be reviewed during detailed design.

There are several appropriate LID measures that can be implemented within the Passmore Avenue ROW. The benefits of each proposed LID measure is summarized below.

Bioretention Planters

- Water quantity (Flood risk reduction): Moderate benefits
- Water quality (Pollutant removal): High benefits
- Infiltration (Groundwater recharge): High benefits

Boulevard Bioretention

- Water quantity (Flood risk reduction): Moderate benefits
- Water quality (Pollutant removal): High benefits
- Infiltration (Groundwater recharge): High benefits

Bioswale

- Water quantity (Flood risk reduction): Moderate benefits
- Water quality (Pollutant removal): High benefits
- Infiltration (Groundwater recharge): High benefits

Perforated Pipe

- Water quantity (Flood risk reduction): Moderate benefits
- Water quality (Pollutant removal): Moderate benefits
- Infiltration (Groundwater recharge): High benefits

Permeable Pavement

- Water quantity (Flood risk reduction): Moderate benefits
- Water quality (Pollutant removal): Moderate benefits
- Infiltration (Groundwater recharge): High benefits

Prefabricated Modules

- Water quantity (Flood risk reduction): Moderate benefits
- Water quality (Pollutant removal): Moderate benefits
- Infiltration (Groundwater recharge): High benefits

8.8.2 EROSION AND SEDIMENT CONTROL

The widening of Passmore Avenue will require clearing of vegetation, topsoil stripping and earth grading. A detailed erosion and sedimentation control (ESC) plan is required to ensure the adjacent properties and downstream catchments are not negatively impacted by construction activities.

The following ESC measures should be considered for application during the construction phase (non-limited list):

- Sediment traps, dewatering traps;
- Sediment control fencing;
- Check dams;
- Inceptor swales and ditches;
- Temporary stabilization measures of exposed soils (e.g., erosion control matting/blankets, seeding, hydro seeding, and mulches);
- Construction mud matts; and
- Protect surface inlets with filter cloth.

During the detailed design phase, an ESC plan should be developed and tailored to meet the needs of the Passmore Avenue widening site. The *Erosion & Sediment Control Guideline for Urban Construction (December 2006)*, prepared by the Greater Golden Horseshoe Area Conservation Authorities, should be followed to implement appropriate sediment control practices and mitigation measures. Prior to construction, this plan must be submitted to the City of Toronto's Toronto Water department for approval.

Monitoring and inspection of ESC measures is required to ensure the success of the plan. All ESC measures must be monitored regularly by the contractor, ensuring they are in proper working order, until the site has become fully stabilized. The ESC plan must include details of the monitoring and inspection procedures.

8.9 WATERMAINS

The extent of grading will be further refined during detailed design and may require the fire hydrants to be adjusted vertically to suit the new grades. All the valve chamber covers are expected to be adjusted to match the new top of pavement elevations.

Existing 400mm watermain on Passmore Avenue may require a replacement, relocation or a new watermain in the future to service future development at 568 Passmore Avenue if capacity is deemed to be insufficient. To date, the planning for the site development has not moved forward. As such, the future conditions of the site and any associated water demand requirements cannot be identified at this time and will be deferred until such time as the development proceeds through planning process and a preliminary concept is prepared. A potential development at 3030 Markham Road would be serviced by the water system on Passmore Avenue. However, for the same reasons cited above for 568 Passmore Avenue, it will not be considered at this time either.

Given that Passmore Avenue will be undergoing a full depth pavement reconstruction with profile improvements, further investigations will be required during detailed design to verify the depth and location of the watermains to ensure there are no conflicts with the proposed pavement structure or storm sewers.

8.10 SANITARY SEWERS

A new sanitary sewer may be required in the future to service development at 568 Passmore Avenue and 3030 Markham Road. To date, the planning for the site development has not moved forward. As such, the future conditions of the site and any associated sewage demand requirements cannot be identified at this time and will be deferred until such time as the development proceeds through planning process and a preliminary concept is prepared.

Given that Passmore Avenue will be undergoing a full depth pavement reconstruction with profile improvements, further investigations will be required during detailed design to verify the depth and location of the sanitary sewers to ensure there are no conflicts with the proposed pavement structure or the storm sewers.

8.11 UTILITIES

It is anticipated that most of the utilities located within the proposed right-of-way for Passmore Avenue may require either adjustments to match the new grades or relocation to implement the proposed widening. Formal definition of utility impacts and relocation strategy will be determined during the detailed design. All utility information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary.

8.11.1 HYDRO

The proposed improvements will require the relocation of a hydro transformer located to the south-east of the Dynamic Drive intersection. The raised transformer is located within the proposed south sidewalk. The options will be reviewed during detailed design and may include relocating the transformer, shifting the sidewalk around the transformer or burying the transformer at grade.

The underground hydro is located along the south side of Passmore Avenue, approximately 3.0m north of the south right-of-way boundary. Further investigations (Levels B and A, if necessary) will be required during the detailed design to verify the depth and location of the hydro cables to ensure there are no conflicts with the curbs and sidewalks.

8.11.2 TELECOMMUNICATIONS

Given that Passmore Avenue will be undergoing a full depth pavement reconstruction with profile improvements, further investigations (Levels B and A, if necessary) will be required during detailed design to verify the depth and location of the underground cables to ensure there are no conflicts with the proposed pavement or storm sewers.

8.11.3 NATURAL GAS

Given that Passmore Avenue will be undergoing a full depth pavement reconstruction with profile improvements, further investigations (Levels B and A, if necessary) will be required during the detailed design to verify the depth and location of the gas pipeline to ensure there are no conflicts with the proposed pavement or storm sewers.

8.12 GEOTECHNICAL

8.12.1 SUBGRADE PREPARATION

All topsoil, organics, soft/loose and otherwise disturbed soils should be stripped from the subgrade area. The exposed subgrade soils will be disturbed by construction traffic when wet; especially if site work is carried out during periods of wet weather. Under inclement weather conditions, an adequate granular working surface may be required to facilitate construction traffic as well as to minimize subgrade disturbance and to protect its integrity.

Immediately prior to placing the granular subbase, the exposed subgrade should be compacted and then proofrolled with a heavy rubber tired vehicle (such as a loaded gravel truck) in conjunction with inspection by a geotechnical engineer. The subgrade should be inspected for signs of rutting

or displacement. Areas displaying signs of rutting or displacement should be recompacted and retested, or the material should be subexcavated and replaced with well-compacted clean fill materials approved by the geotechnical engineer.

The fill materials may consist of either granular material or local inorganic soils provided that its moisture content is within ±2% of OMC. Fill should be placed and compacted in accordance with TS 501 and the final 300 mm of the subgrade should be compacted to 98% of SPMDD.

8.12.2 REUSE & DISPOSAL OF EXISTING PAVEMENT MATERIALS

The gradation analyses of the selected samples of the existing granular base and subbase materials do not meet the TS 1010 granular A and B Type I gradation specifications with excessive content of fines. Therefore, the existing excavated granular materials could not be reused as subbase/base materials, however, they can be reused as subgrade material to replace soft, wet or otherwise disturbed areas identified during proofrolling, subject to the environmental quality of the granular materials.

Due to the presence of asbestos in the existing asphalt concrete, the existing asphalt concrete should be removed and disposed off-site. The material should be disposed at an approved waste disposal site in accordance with Regulation 347 under the *Environmental Protection Act*.

8.12.3 DRAINAGE

Control of surface water is an important factor in achieving a good pavement service life. Therefore, it is recommend that provisions be made to drain into the new pavement subgrade and its granular layers. It is understood that the proposed road improvements are anticipated to consist of typical urban section (concrete curb/gutter and catch basins). To provide positive drainage across the pavement platform, the surface of pavement should be sloped at a grade of 2% and the pavement subgrade should be sloped at a grade of 3% towards the subdrains. Subdrains should be designed and constructed in accordance with T-216.02-8, Roadway Subdrains, and the subdrain pipe should be connected to a positive outlet.

Where the subgrade is comprised of granular soil of medium to high permeability, sub-drains are not considered necessary. Where the subgrade is composed of silty clay fill or native clayey silt till to sandy silt till, which have a generally low permeability, then sub-drains are recommended.

8.12.4 TRENCHING EXCAVATION & TEMPORARY GROUNDWATER CONTROL

Based on the results of this investigation, the site trenching excavation will be carried out through the existing pavement structure, existing fill materials and the native sand and silt till and silty sand deposits. The trench excavation will be at, above or below the measured groundwater tables depending on the locations.

Groundwater control during excavation within the fill materials and native silty sand soils above the prevailing groundwater tables and glacial till deposits can be handled, as required, by pumping from properly constructed and filtered sumps located within the excavations. However, more significant groundwater seepage should be expected from the cohesionless silty sand deposits

below the prevailing groundwater tables. Depending upon the actual thickness and extent of these soils layers, some form of positive (pro-active) groundwater control or depressurization using well points/eductors may be required to maintain the stability of the base and side slopes of the trench excavations, in addition to pumping from sumps. The groundwater level should be lowered to at least 1m below the excavation base prior to excavating for the site services.

Where excavations are conducted by conventional temporary open cuts, side slopes should not be steeper than one horizontal to one vertical (1H:1V). However, depending upon the construction procedures adopted by the contractor, actual groundwater seepage conditions, the success of the contractor's groundwater control methods and weather conditions at the time of construction, some flattening and/or blanketing of the slopes may be required, especially in looser/softer zones (i.e. in fills or wet sandy/silty deposits) or where localized seepage is encountered. Care should be taken to direct surface runoff away from the open excavations and all excavations should be carried out in accordance with the Occupational Health and Safety Act (OHSA) and Regulations for Construction Projects.

According to OHSA, the native sand and silt till would be classified as Type 2 soil above groundwater table and Type 3 soil below groundwater table. Shallow fill materials and cohesionless silty sand soil would be classified as Type 3 soils above groundwater table and Type 4 soil below groundwater table. Unless supported by shoring or other approved retaining method, the excavations will require minimum side slopes of 3H:1V. In addition, care must be taken during excavation to ensure that adequate support is provided for any existing structures and underground services located adjacent to the excavations.

The excavated material should be placed well back from the edge of the excavation and stockpiling of materials adjacent to the excavation should be prohibited, to minimize surcharge loading near the excavation crest.

8.13 CONSTRUCTION STAGING

The detailed construction staging design and traffic management plan will be further developed during the detail design stage of the project.

Short term construction impacts, such as noise, dust and exhaust emissions are anticipated and would include temporary lane closures. Management plans (for traffic, noise, dust, etc.) will be implemented and monitored during construction to ensure effective mitigation

8.14 SUMMARY OF POTENTIAL IMPACTS & MITIGATION MEASURES

A summary of potential impacts associated with the proposed road widening and proposed mitigation measures is provided in **Table 8-1.**

Table 8-1 Summary of Potential Impacts, Mitigation Measures, Monitoring and Future Actions

Factor	Potential Concern	Anticipated Impact	Proposed Mitigation	Monitoring/Future Work/Contingency
Traffic	Property Access	Driveways/access along Passmore Avenue will be impacted by the widening.	Re-profile/re-grade or relocate impacted driveways to match the proposed road design.	Consultation with impacted property owners about access design/ improvements will be undertaken during detailed design. Access will be maintained or alternate access provided during construction.
Socio-Economic	Construction disturbances	Anticipated short term impacts during construction activities include noise, dust and exhaust emissions and temporary lane closures.	Prepare management plans (for traffic, noise, dust, etc.).	Implement management plans; monitor to ensure effective mitigation of these impacts during construction.
Property	Temporary easements for construction	A total of four properties (259.2m^2) will be impacted to accommodate the proposed road widening.	Coordinate with impacted owners to identify and acquire temporary construction easements.	The temporary easement acquisition process will be initiated, subject to available funding, once

Factor	Potential Concern	Anticipated Impact	Proposed Mitigation	Monitoring/Future Work/Contingency
				the Class EA Study is completed.
Drainage/ Stormwater	Surface runoff and quality of runoff	Increases in runoff volume and mass loading of pollutants as a result of the proposed widening.	LID techniques may be used within the boulevards and sidewalks, where deemed feasible, to provide quantity and quality control. Oil Grit Separators can be used as an end of pipe treatment to provide quality control.	Monitor runoff quality to ensure quality and quantity control effectiveness.
Utilities	Conflict with existing utilities	The existing system of utilities plants will be impacted by the proposed widening.	Impacted utility features will be relocated to implement the proposed widening.	Formal definition of utility impacts and relocation strategy will be determined during the detailed design. All utility information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary.

Factor	Potential Concern	Anticipated Impact	Proposed Mitigation	Monitoring/Future Work/Contingency
Natural Environment	Terrestrial Habitats	Loss of/damage to vegetation, disturbance to bird's nests and loss of habitat to other animals.	Appropriate lengths of silt fencing along the perimeter of minimized, designated work areas to limit construction impacts. No construction activities will be allowed during the active nesting season (the main nesting season is between April 1- July 15; nesting may occur outside of these dates).	Incorporate these requirements in the construction tender package as part of an operational constraint to the contractor.
	Vegetation and vegetation communities	Disturbance and displacement of clearing of trees and vegetation.	All vegetation identified for removal should be assessed for nesting habitat prior to removal. Trees not slated for removal will be protected by erecting and maintaining a temporary fence for tree protection.	A Landscape plan will be developed during the detailed design stage of the project.

Factor	Potential Concern	Anticipated Impact	Proposed Mitigation	Monitoring/Future Work/Contingency
	Sediment and Erosion	Any excavating or cut and fill operations remove vegetation, alter natural drainage pathways and strip away the stable topsoil aggregates which leave exposed soils susceptible to erosion forces.	Conscientious design, installation and maintenance of sediment traps, silt fencing, and check dams. Timely re-vegetation of exposed soils, both for temporary work areas and final grades. Minimized vegetation removal. Specify construction access routes and fuelling areas to avoid watercourse and groundwater contamination and siltation.	Monitoring of these erosion and sedimentation control measures during and after construction will be implemented to ensure their effectiveness.

Factor	Potential Concern	Anticipated Impact	Proposed Mitigation	Monitoring/Future Work/Contingency
Archaeology	Loss of archaeological resources	Impacts to archaeological resources are not anticipated.	If deeply buried archaeological remains are encountered on the property during construction activities, MTCS Heritage Operations Unit, the City of Toronto, Heritage Preservation Services Unit will be notified immediately In the event that human remains are encountered during construction, immediately contact the MTCS and MGCS.	Incorporate notification requirements in the construction tender package as part of an operational constraint to the contractor.