Attachment #2
to Report No. PW-32-21/FN-31-21

HALTON REGION

2022 DEVELOPMENT CHARGES TRANSPORTATION TECHNICAL REPORT

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Executive Summary

EXECUTIVE SUMMARY

In 2011, Halton Region completed the Halton Region Transportation Master Plan – The Road to Change (2011 TMP) to support the implementation of Regional Official Plan Amendment (ROPA) 38/39 based on the Region's Best Planning Estimates (June 2011). The 2011 TMP provides a sustainable and integrated plan that considers all modes of travel (automobile, transit, cycling and walking) to accommodate population and employment growth across Halton Region to 2031, according to the 2011 Best Planning Estimates (BPEs). The 2021 and 2031 population and employment projections for Halton Region, based on the BPEs, are summarized in Table ES1.

Table ES1: Growth Projections 2021-2031

Municipality	Population			Employment		
	2021	2031	Growth (2021 - 2031)	2021	2031	Growth (2021 - 2031)
Burlington	178,847	186,169	7,322	102,846	105,349	2,503
Halton Hills	61,672	91,885	30,213	22,936	41,962	19,026
Milton	161,750	228,084	66,334	81,106	114,330	33,224
Oakville	221,826	246,400	24,574	120,795	128,359	7,564
Halton Region[1]	624,094	752,537	128,443	327,683	390,000	62,317

Source: Halton Region Best Planning Estimates (BPE) as approved by Regional Council July 2011

[1] Totals may not add up due to rounding.

The development capital infrastructure requirements identified in the 2011 TMP served as one of several key inputs into the establishment of Halton Region's 2017 Development Charges By-law. As the 2017 Development Charges By-law expires August 31, 2022, updates to costing and project phasing have been undertaken and are consolidated into this report entitled "2022 Development Charges Transportation Technical Report". The 2022 DC Transportation Technical Report will serve to support the establishment of the 2022 Development Charges By-law and follows the same overall approach as the previous 2012 and 2017 DC Transportation Technical Reports.

Halton Region has updated its capital program for transportation services to 2031 based on changes since the publication of the 2017 DC Transportation Technical Report (September 2016). Changes since that time include:

- Updated transportation demand forecasting model with current travel pattern characteristics (based on 2016 Transportation Tomorrow Survey and 2016 Census);
- Validation of the long-range Transportation Capital Implementation Plan to 2031 (i.e., project scope, timing, and cost) as identified in the 2011 Transportation Master Plan (TMP), including minor timing shifts of previously identified infrastructure projects;
- Updated costing from recently completed and on-going Municipal Class Environmental Assessment (MCEA) Studies;
- Updated Costing from on-going detailed design projects;
- Updated Costing for Master Plan Costed projects (formerly referred to as Benchmarked projects) based on recent regional data and construction tenders, and tenders from neighbouring municipalities; and
- Updates to costing for annual programs and studies, based on industry and regional experience.

The Development and Non-Development Capital Implementation Plan for Halton's Transportation Network and Services to 2031 has been updated to reflect Roads Capital Projects for the period 2023 to 2031 (refer to Figure E1). It should be noted that this technical review excludes projects that will be approved in 2022 (as part of the 2022 Budget) as these are subject to an approved financing plan and any projected funding shortfall will be included in the reserve balances or unfunded capital in the DC study. Any 2022 100% non-growth projects have also been removed as they have no impact on the DC calculation. Projects are classified as follows:

- Reconstruction (no widening)
- Road Widening without Reconstruction
- Road Widening with Reconstruction
- New Alignment
- Traffic Management
- Provincial Freeway Interchanges
- Railway Grade Separations
- Structures (bridges and culverts)
- Studies and Programs

Appendix A presents the Development and Non-Development Capital Implementation Plan for 2023 to 2031; inclusive of phasing and cost (in 2022 dollars). The total cost of the Transportation Capital Implementation Plan is approximately $2.44 Billion. It should be noted that this technical review excludes projects that will be approved in 2022 (as part of the 2022 Budget) as these are subject to an approved financing plan and any projected funding shortfall will be included in the reserve balances in the DC study.

Costs for the Transportation Capital Implementation Plan have been apportioned to Growth/Non-growth and Residential/Non-Residential uses in a manner consistent with the methodologies presented in the 2012 and 2017 DC Transportation Technical Studies.

The allocation of cost to Growth is summarized in Table ES2. Appendix C presents the cost allocation between Post Planning Period, Growth and Non-growth for the 2023-2031 Transportation Capital Implementation Plan.

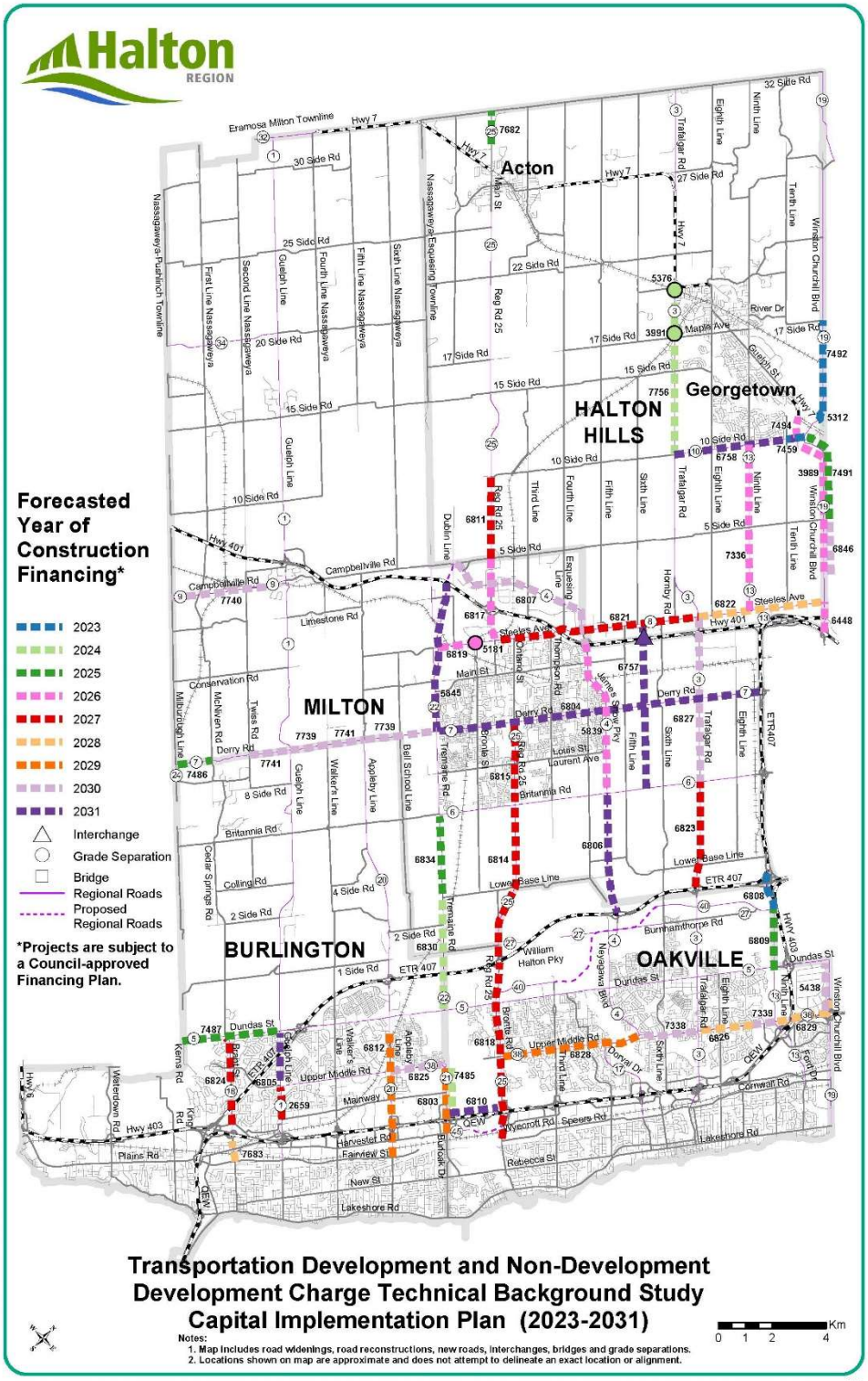
A deduction for post planning period (PPP) capacity has been made for major infrastructure improvements in the last five years (2027 to 2031, inclusive) of the Transportation Capital Implementation Plan. This deduction is proportional to the degree to which the volume to capacity ratio (v/c) on the major improvement in 2031 is less than the average v/c on the associated screenline. Projects identified for the 2027 to 2031 timeframe where the PPP calculation applies are presented in Appendix D.

Table ES 2 – Allocation of Transportation Project Costs to Growth

Project Type	Growth Share (%)	Report Section
Road Reconstruction (no Widening)	0%	7.1
Road Widening (no Reconstruction)	100% with the following deductions: • deduction for existing roadway based on the used value of the existing lanes and the Master Plan* cost of resurfacing • 50% deduction for intersection modifications and additions • 50% deduction for signal modifications • 100% deduction for rehabilitation of bridges, grade separations and culverts • if non-Master Plan costing is used, a 13% deduction is assigned to construction costs	7.2
Road Widening with Reconstruction	100% with the following deductions: • deduction for existing roadway based on the used value of the existing lanes and the Master Plan cost of reconstruction • 50% deduction for engineering and contingency costs • 50% deduction for intersection modifications and additions • 50% deduction for signal modifications • 100% deduction for rehabilitation of bridges, grade separations and culverts • if non-Master Plan costing is used, a 50% deduction is assigned for engineering and design, and a 25% deduction is assigned to construction costs	7.3
New Roads and Alignments	100%	7.4
Traffic Management	50%	7.5
Provincial Freeway Interchanges	100%	7.6
Grade Separations – Widening	100% less deduction for rehabilitation of the existing structure, based on used value of the structure and the Master Plan cost of rehabilitation	7.7.1
Grade Separations – New	100% less BTE based per Table 7	7.7.2
Structures – Widening	100% less deduction for rehabilitation of the existing structure, based on used value of the structure and the Master Plan cost of rehabilitation	7.8.1
Structures – New	100%	7.8.2
Studies and Programs	BTE based on type of study or program	7.9

** Master Plan Costed projects (formerly referred to as Benchmarked projects)*

Figure E1 - Transportation Development and Non-Development Capital Implementation Plan (2023 to 2031)



ID	Regional Municipality of Halton Capital Projects (2023-2031) Project Descriptions	Forecasted Year of Construction Financing
2659	Guelph Line - Widening - 4 to 6 lanes from Mainway to Upper Middle Road (BUR) (Regional Road 1)	2027
6805	Guelph Line - Widening - 4 to 6 lanes from Upper Middle Road to Dundas Street (BUR) (Regional Road 1)	2031
6823	Trafalgar Road - Widening - 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 3)	2027
6827	Trafalgar Road - Widening - 4 to 6 lanes from Britannia Road to Steeles Avenue including Highway 401 Structure (MIL/HHS) (Regional Road 3)	2030
7756	Trafalgar Road - Widening - 2 to 4 lanes from 10 Side Road to Highway 7 (HHS) (Regional Road 3)	2024
3991	Trafalgar Road - Grade Separation at CN Crossing North of Maple Avenue (HHS) (Regional Road 3)	2024
5376	Trafalgar Road - Grade Separation at Metrolinx Crossing South of Highway 7 (HHS) (Regional Road 3)	2024
6806	James Snow Parkway - New 6 lane road from Highway 407 to Britannia Road (MIL) (Regional Road 4)	2031
5839	James Snow Parkway - Widening - 4 to 6 lanes from Highway 401 to Britannia Road (MIL) (Regional Road 4)	2026
6807	James Snow Parkway - Widening - 4 to 6 lanes from Highway 401 to Tremaine Road (MIL) (Regional Road 4)	2030
7487	Dundas Street - Widening - 4 to 6 lanes from Guelph Line to Halton/Hamilton Boundary, including improvements at Brant Street (BUR) (Regional Road 5)	2025
7486	Derry Road - Reconstruction from Milburough Line to McNiven Road (MIL) (Regional Road 7)	2025
7741	Derry Road - Reconstruction from Twiss to Guelph Line, and Derry Road Reconstruction from Walkers Line to Appleby Line (BUR) (Regional Road 7)	2030
7739	Derry Road - Reconstruction from Guelph Line to Walkers Line, and Derry Road Reconstruction from Appleby Line to Tremaine Road (MIL)	2030
6804	Derry Road - Widening - 4 to 6 lanes from Tremaine Road to Highway 407 (MIL) (Regional Road 7)	2031
5181	Steeles Avenue - Grade Separation at CN crossing west of Bronte Street (MIL) (Regional Road 8)	2026
6819	Steeles Avenue - Widening - 2 to 4 lanes from Tremaine Road to Industrial Drive (MIL) (Regional Road 8)	2026
6821	Steeles Avenue - Widening - 4 to 6 lanes from Regional Road 25 to Trafalgar Road (MIL) (Regional Road 8)	2027
6822	Steeles Avenue - Widening - 4 to 6 lanes (with RBL) from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 8)	2028
7740	Campbellville Road - Reconstruction from Milburough Line to Campbell Avenue (MIL) (Regional Road 9)	2030
6758	10 Side Road - Widening - 2 to 4 lanes from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 10)	2031
7459	Winston Churchill Blvd. Roundabout and Realignment (10th Line to WCB) (HHS) (Regional Road 10)	2023
6809	Ninth Line - Widening - 2 to 4 lanes from Dundas Street to Burnhamthorpe Road (OAK) (Regional Road 13)	2025
6808	Ninth Line - Widening - 2 to 4 lanes from Burnhamthorpe Road to Highway 407 (OAK) (Regional Road 13)	2023
7336	Ninth Line - Widening - 2 to 4 lanes from Steeles Avenue to 10 Side Road (HHS) (Regional Road 13)	2026
7683	Brant Street - Reconstruction from Fairview Street to QEW (BUR) (Regional Road 18)	2028
6824	Brant Street - Widening - 4 to 6 lanes from North Service Road to Dundas Street (BUR) (Regional Road 18)	2027
5438	Winston Churchill Boulevard - Widening - 4 to 6 lanes from Dundas Street to Upper Middle Road / QEW (OAK) (Regional Road 19)	2030
6448	Winston Churchill Boulevard - Widening - 4 to 6 lanes from Highway 401 to Steeles Avenue (HHS) (Regional Road 19)	2026
6846	Winston Churchill Boulevard - Widening - 4 to 6 lanes from 2km south of 5 Side Road to 5 Side Road (HHS) (Regional Road 19)	2030
3989	Winston Churchill Boulevard - Widening - 2 to 4 lanes from 2km south of 5 Side Road to potential by-pass (HHS) (Regional Road 19)	2026
7491	Winston Churchill Boulevard - 2 lane Reconstruction from 10 Side Road to 5 Side Road (HHS) (Regional Road 19)	2025
5312	Winston Churchill Boulevard - from Old Pine Crest Road to Credit River (HHS) (Regional Road 19)	2023
7492	Winston Churchill Boulevard - 17 Side Road to Old Pine Crest Road (HHS) (Regional Road 19)	2023
6812	Appleby Line - Widening - 4 to 6 lanes from Fairview Street to Taywood Drive (BUR) (Regional Road 20)	2029
6803	Burloak Drive - Widening - 4 to 6 lanes from Harvester Road to Upper Middle Road (BUR) (Regional Road 21)	2029
7485	Burloak Drive - (CONSTRUCTION ONLY) 4 lane urbanization from north of QEW to Upper Middle Road (BUR) (Regional Road 21)	2024
6830	Tremaine Road - Widening - 2 to 4 lanes from Dundas Street to Lower Base Line (OAK) (Regional Road 22)	2024
6834	Tremaine Road - Widening - 2 to 4 lanes from Lower Base Line to Britannia Road (MIL) (Regional Road 22)	2025
5845	Tremaine Road - Widening - 4 to 6 lanes from Highway 401 to Derry Road (MIL) (Regional Road 22)	2031
6818	Bronte Road - Widening - 4 to 6 lanes from Speers Road to Highway 407 (OAK) (Regional Road 25)	2027
6814	Regional Road 25 - Widening - 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 25)	2027
6815	Regional Road 25 - Widening - 4 to 6 lanes from Britannia Road to Derry Road (MIL) (Regional Road 25)	2027
6817	Regional Road 25 - Widening - 4 to 6 lanes from Steeles Avenue to 5 Side Road (MIL) (Regional Road 25)	2026
6811	Regional Road 25 - Widening - 2 to 4 lanes from 5 Side Road to 10 Side Road (HHS) (Regional Road 25)	2027
7682	Regional Road 25 - Reconstruction from North of Main Street to No. 32 Side Road (HHS) (Regional Road 25)	2025
6825	Upper Middle Road - Widening - 4 to 6 lanes from Appleby Line to Burloak Drive (BUR) (Regional Road 38)	2030
6828	Upper Middle Road - Widening - 4 to 6 lanes from Bronte Road to Neyagawa Boulevard (OAK) (Regional Road 38)	2029
7338	Upper Middle Road - Widening - 4 to 6 lanes from Neyagawa Boulevard to Trafalgar Road (OAK) (Regional Road 38)	2030
6826	Upper Middle Road - Widening - 4 to 6 lanes from Trafalgar Road to Grand Boulevard (OAK) (Regional Road 38)	2028
7339	Upper Middle Road - Widening - 4 to 6 lanes from Grand Boulevard to Ninth Line (OAK) (Regional Road 38)	2030
6829	Upper Middle Road - Widening - 4 to 6 lanes from Ninth Line to Winston Churchill Boulevard (OAK) (Regional Road 38)	2028
6757	"5 1/2 Line" - New 6 lane road from Britannia Road to Steeles Avenue and Interchange at Highway 401 (MIL)	2031
6810	North Service Road - New 4 lanes from Burloak Drive to Bronte Road (OAK)	2031
7494	Norval Bypass (HHS)	2026

Main Report

1 INTRODUCTION

Development Charges (DC) are required to recover growth-related capital costs from development such that "growth pays for growth". In accordance with the Development Charges Act 1997 (DCA), development charges are imposed where the development of land increases the need for capital services. The legislation requires that the Background Study include an analysis for each service of the long-term capital and operating costs for the Region.

The DCA provides that a municipality must determine the following regarding the calculation of the development charge:

- the anticipated amount, type, and location of development;
- the increase in need for service attributable to growth;
- the average quantity and quality of service level attained over the most recent prior 10-year period;
- the increase in capital costs (including oversized capacity);
- the portion of increased capital costs that will benefit growth; and
- the amount of any subsidies or other contributions regarding the capital costs.

Halton Region has updated its capital program for transportation services to 2031 based on changes since the publication of the 2017 DC Transportation Technical Report (September 2016). Changes since that time include:

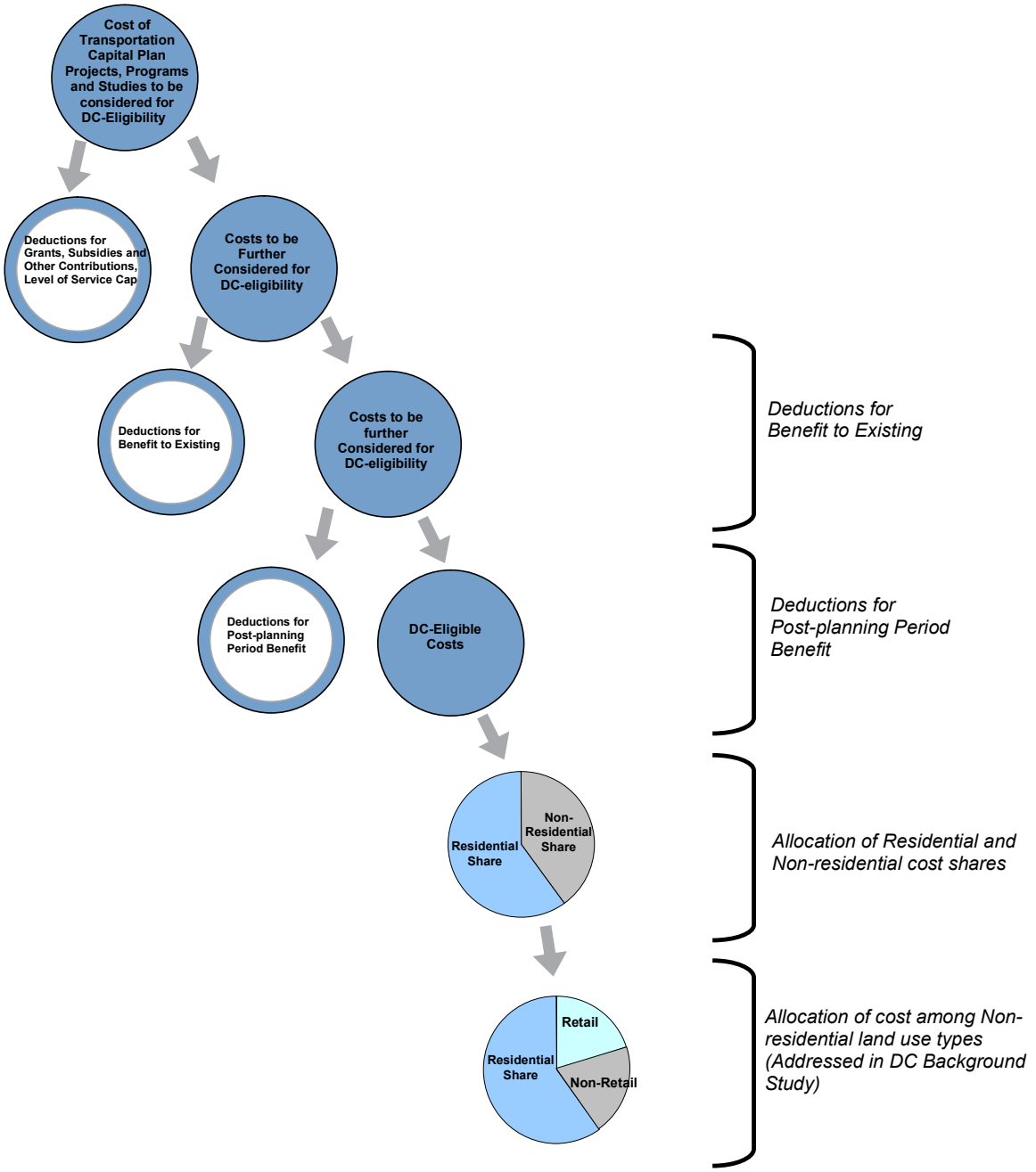
- Updated transportation demand forecasting model with current travel pattern characteristics (based on 2016 Transportation Tomorrow Survey and 2016 Census);
- Validation of the long-range Transportation Capital Implementation Plan to 2031 (i.e., project scope, timing, and cost) as identified in the 2011 Transportation Master Plan (TMP), including minor timing shifts of previously identified infrastructure projects;
- Updated costing from recently completed and on-going Municipal Class Environmental Assessment (MCEA) Studies;
- Updated Costing from on-going detailed design projects;
- Updated Costing for Master Plan Costed projects (formerly referred to as Benchmarked projects) based on recent regional data and construction tenders and tenders from neighbouring municipalities; and
- Updates to costing for annual programs and studies, based on industry and regional experience.

Costs have been apportioned to Post Period Planning, Growth/Non-Growth and Residential/Non-Residential uses in a manner consistent with the methodologies presented in the 2012 and 2017 DC Transportation Technical Reports.

This report provides the background, assumptions and rationale on the cost and timing of transportation improvements to accommodate growth in Halton Region to 2031. The report includes the following sections, which follow the process flow identified in **Figure 1**.

1. Introduction
2. Overview
3. Capital Expenditure Plan
4. Previous 10 Year Service Level
5. Traffic Flow Through Analysis
6. Grants, Subsidies and Developer Contributions
7. Benefit to Existing Development
8. Post Planning Period Capacity
9. Residential/Non-Residential Splits

Figure 1: Study Flow Process



2 OVERVIEW

2.1 Population and Employment

Best Planning Estimates (BPEs), approved by Regional Council on July 13, 2011, were used as the basis for the forecasts of population and employment growth in Halton Region over the next 10 years (to 2031). **Table 1** reflects the population and employment from 2021 to 2031, per the BPEs.

Table 1: Growth Projections 2021-2031

Municipality	Population			Employment		
	2021	2031	Growth (2021 - 2031)	2021	2031	Growth (2021 - 2031)
Burlington	178,847	186,169	7,322	102,846	105,349	2,503
Halton Hills	61,672	91,885	30,213	22,936	41,962	19,026
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Halton Region[1]	624,094	752,537	128,443	327,683	390,000	62,317

Source: Halton Region Best Planning Estimates (BPE) as approved by Regional Council July 2011

[1] Totals may not add up due to rounding.

2.2 Regional Demand Forecasting Model

Halton Region uses a demand forecasting model for its long-term transportation planning. The Halton Region Model has been updated to include the release of the 2016 Transportation Tomorrow Survey (TTS) data and 2016 Census information. The updated model maintains the core functions, procedures, and updated network.

Within the context of the 2022 Transportation DC Technical Report, the model is used for network-wide analysis and overview, including comparison of the network characteristics between 2016 and the 2031 planning horizon.

2.3 Halton Region Transportation Master Plan (2031) – The Road to Change

The Region undertook a Transportation Master Plan in 2011 - the Halton Region Transportation Master Plan (2031) – The Road to Change (2011 TMP). The 2011 TMP developed a sustainable and integrated plan that considered all modes of travel (automobile, transit, cycling and walking) to accommodate growth in Halton Region to the year 2031, as established through Regional Official Plan Amendment (ROPA) 38. The 2011 TMP provides strategies, policies and tools required to meet the Region's transportation needs in a safe and cost-effective manner.

The 2011 TMP was developed in accordance with the requirements of the Municipal Class Environmental Assessment (MCEA) process. Through this process existing problems/opportunities were defined, alternative solutions evaluated, and an optimum transportation system was identified to the year 2031.

The 2011 TMP was initiated by developing a vision statement and a set of guiding principles. The guiding principles that provided the foundation for the development of the master plan are:

- Balanced Needs – provide choice for the travel needs of residents;
- Healthy Communities – support a healthy and active lifestyle;
- Economic Vitality – transportation will be a major contributor to the Region's prosperity;
- Sustainability – balance economic, social, and environmental goals; and
- Well-Maintained Infrastructure – keep the Region's infrastructure in a good state of repair.

The transportation master plan process incorporated a comprehensive public consultation program involving the public at large, Local Municipal staff, technical agencies, and other interested stakeholders.

A key objective of the 2011 TMP was to maximize the use of existing transportation infrastructure, transportation demand management (TDM) and active transportation (AT) (cycling and walking).

The analysis determined that widening the existing regional road network to six lanes (where practical and feasible) will not on its own provide sufficient capacity to maintain current levels of service. In order to accommodate 2031 travel demand, additional capacity must be provided by widening existing roadways and introducing new corridors, active transportation, travel demand management and enhanced municipal and inter-regional (GO) transit services.

An update to the transportation master plan is planned following the completion of the ongoing Halton Integrated Growth Management Study (IGMS) and Regional Official Plan Amendment. This master plan will define the Region's transportation program to 2051.

2.4 Active Transportation

Active Transportation (AT) is defined as travel by non-motorized (i.e., walking, cycling, rollerblading) or lightly motorized (i.e., scooter) means. AT supports the transportation system by reducing the reliance on the automobile and the use of single occupant vehicles; and providing a variety of options for the general public to encourage an active lifestyle.

An Active Transportation Master Plan (ATMP) was completed by Halton Region in accordance with the Municipal Class Environmental Assessment (MCEA) process and was endorsed in principle by Regional Council in 2015 (Staff Report PW17-15). The ATMP process incorporated a comprehensive public consultation program involving the public at large, local municipal staff, technical agencies, and other interested stakeholders. A key outcome of the study was a list of active transportation projects that were part of the 2017 DC Technical Report and are part of the current capital program.

2.5 2023 to 2031 Roads Capital Projects Costing Types

The Roads Capital Projects are costed in the following ways:

- MCEA Study costing – where a project has undergone a MCEA Study or it is an on-going MCEA with preliminary costing information available, the costing is provided by the analysis conducted as part of this study.
- Detailed Engineering – provided where costing has been calculated through a detailed design process.
- Programming and Studies – costs are based on current industry and regional experience.
- Region of Peel – the Region of Peel operates, maintains, and provides costing for works allocated to Winston Churchill Boulevard, per the Boundary Road Agreement.

- Master Plan Costed (formerly referred to as Benchmarked projects) – For projects that have not progressed beyond the transportation master plan stage to a Municipal Class Environmental Assessment or detailed design, a high-level cost estimate is prepared based on a road construction cost by cross-section per kilometre plus associated road related works (i.e., structures, traffic signals). This methodology for costing Master Plan projects is consistent with the 2011 TMP as well as the 2012 and 2017 DC Transportation Technical Studies.

2.6 Key Considerations

Some key considerations reviewed as part of this report are:

2.6.1 Capital Cost Updates

As identified above, capital costing updates were derived from more detailed evaluations (MCEA Study, Detailed Design, Peel Region).

Where a project costing is still derived from unit pricing (Master Plan Costed), the unit costing for this methodology was updated based on recent regional data and construction tenders, and tenders from neighbouring municipalities. Updated land unit rates (per acre) were established using market-based information, which were then applied to the historical land use categories set out in the 2012 Development Charge Technical Study. These unit costs are presented in Appendix A.

The Master Plan cost for a project is derived consistent with the methodology of the 2012 and 2017 DC Transportation Technical Studies.

Each road improvement type has a base cost per kilometre. This base cost is multiplied by the length of the corridor being improved. Additional costs associated with other characteristics of the corridor such as intersection improvements, traffic signals, culvert/bridges, utility relocation, and roadway safety are added to the base cost. Contingency, Engineering Design, Active Transportation and Property are then added to these costs.

The Master Plan costed projects were indexed by 7.7% to adjust the project cost estimate from 2021 dollars to 2022 dollars. Similarly, MCEA costed projects that were completed in 2020, or have an updated cost from ongoing MCEA study or detailed design, were also indexed by 7.7% to adjust the costing from 2021 dollars to 2022 dollars.

There are four projects with cost estimates (MCEA study) from the 2017 DC Technical Study. These projects were indexed by 23% to adjust the cost estimate from 2017 dollars to 2022 dollars.

Thus, the values presented in the Transportation Development & Non-Development Capital Implementation Plan (2023 to 2031), in Appendix A, are all in 2022 dollars.

2.6.2 Roads Capital Project Phasing

As outlined in the 2021 Budget and Business Plan, a selection of projects from the 2020 Allocation Program were reprogrammed to post-2022. These projects have been included in the 2022 Development Charges Transportation Technical study. The 2022 Development Charges Transportation Technical study presented a further opportunity to review the program and phasing of projects from 2023 to 2031 holistically for the Regional Road corridors. The review focused on the timing of improvements and sequential delivery of projects across each corridor to allow for a comprehensive planning approach, taking into consideration their current status. This planning approach to the corridors will have an additional benefit when considering

the staging and implementation of the improvements in order to balance the impacts to travel in the community. This review resulted in minor refinements to the phasing of the projects listed below. Modelling of road network performance in the vicinity of these projects concluded that this reprogramming would not significantly impact capacity in the overall network.

- Regional Road 25 - Widening from 2 to 4 lanes from 5 Side Road to 10 Side Road (Halton Hills) (Regional Road 25) – start year of construction shifted from 2024 to 2027
- Regional Road 25 - Widening from 4 to 6 lanes from Highway 407 to Britannia Road (Milton) (Regional Road 25) – start year of construction shifted from 2026 to 2027
- Bronte Road - Widening from 4 to 6 lanes from Speers Road to Highway 407 (Oakville) (Regional Road 25) – start year of construction shifted from 2025 to 2027
- Steeles Avenue - Widening from 4 to 6 lanes from Regional Road 25 to Trafalgar Road (Milton) (Regional Road 8) – start year of construction shifted from 2024 to 2027
- James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Britannia Road (Milton) (Regional Road 4) – start year of construction shifted from 2023 to 2026
- Tremaine Road - Widening from 4 to 6 lanes from Highway 401 to Derry Road (Milton) (Regional Road 22) – start year of construction shifted from 2025 to 2031

3 CAPITAL EXPENDITURE PLAN

The Capital Expenditure Plan for Halton's Transportation Network and services to 2031 has been updated to reflect Roads Capital Projects for the period from 2023 to 2031. It should be noted that this technical review excludes projects that will be approved in 2022 (as part of the 2022 Budget) as these are subject to an approved financing plan and any projected funding shortfall will be included in the reserve balances in the DC study. Any 2022 100% Non-Growth projects have also been removed as they have no impact on the DC calculation.

This Plan presents the capital projects to be undertaken by the Region by 2031. Projects are classified as follows:

- Reconstruction (no widening)
- Road Widening without Reconstruction
- Road Widening with Reconstruction
- New Alignment
- Traffic Management
- Provincial Freeway Interchanges
- Railway Grade Separations
- Structures (bridges and culverts)
- Studies and Programs

The cost allocation methodology relating to these projects is detailed within Section 7. Within the Studies and Programs classification, the Roads Capital Projects also includes the various operational and planning studies the Region undertakes in order to maintain levels of services within the regional network.

Appendix A presents the Development and Non-Development Capital Implementation Plan, including a project map for 2023 to 2031; inclusive of phasing and cost (in 2022 dollars). The total cost of the Roads Capital Projects is $2.44 Billion.

4 PREVIOUS 10-YEAR SERVICE LEVEL

The DCA requires that the future level of service created by the infrastructure capacity improvement program that generated development charges does not exceed the average level of service that has been provided in the previous ten-year period. The level of service is measured in terms of both Quantity (lane km per capita) and Quality (undepreciated replacement cost, as well as volume/capacity ratios or operating speed on regional roads).

Based on the Service Level analysis for Quantity and Quality, there is no increase in the 10-year service level, as discussed below. The 10-year Service Level review is consistent with the methodologies presented in the 2012 and 2017 DC Transportation Technical Study.

4.1 Service Level - Quantity

The lane km per capita of DC eligible roads was calculated as 1.94 lane km per 1,000 population in 2017 and estimated at 1.86 lane km per 1,000 population for 2021 (with an estimated population of 624,094). The average for the 10-year period is 1.93 lane km per 1,000 population. **Table 2** presents the lane km and population for the past 10 years - from 2012 to 2021.

Table 2: Historical Population and Regional Roadway Lane Kilometres

Year	Lane km's [1]	Population	Lane kms per 1,000 population
2012	980.40	509,929	1.92
2013	1,013.60	519,144	1.95
2014	1,047.60	527,866	1.98
2015	1,080.20	536,287	2.01
2016	1,097.20	565,000	1.94
2017	1,108.91	573,000	1.94
2018	1,115.84	584,000	1.91
2019	1,131.41	598,000	1.89
2020	1,154.42	611,000	1.89
2021 (2)	1,163.43	624,094	1.86
		Average =	1.93

[1] Lane Km are from Halton Region Roads Needs Study

[2] Lane km's and population are estimated for 2021

The DC eligible roads calculation for 2031 is 1.89 lane kilometres per 1,000 population (2031 population of 752,537 and 1,428.4 lane kilometres). This value is lower than the average presented in Table 2 (1.93) for the period 2012 to 2021.

Therefore, there is no Quantity increase over the previous 10-year service level.

4.2 Service Level – Quality (Regional Roadway Network Replacement Value)

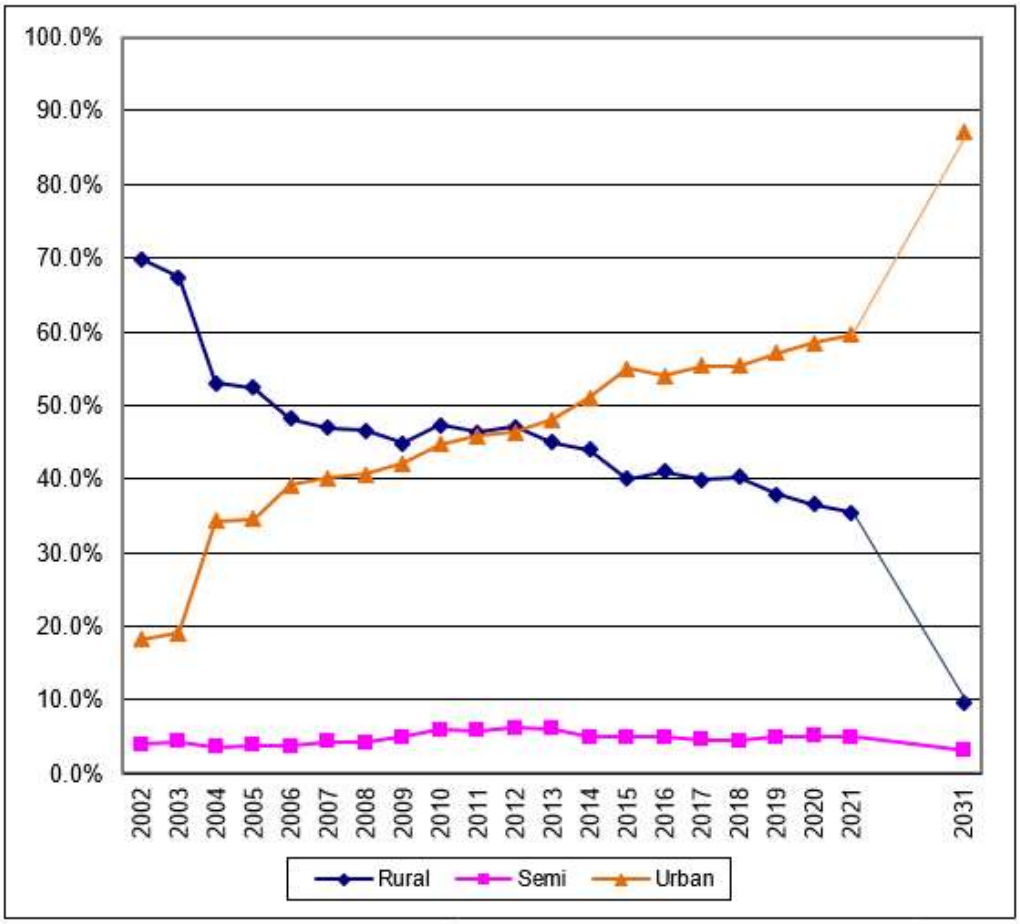
Ontario Regulation 82/98, an amendment to the DCA states in Section 4(1) under Level of Service that:

4. (1) For the purposes of paragraph 4 of subsection 5 (1) of the Act, both the quantity and quality of a service shall be taken into account in determining the level of service and the average level of service. O. Reg. 82/98, s. 4 (1).
(1.1) In determining the quality of a service under subsection (1), the replacement cost of municipal capital works, exclusive of any allowance for depreciation, shall be the amount used. O. Reg. 206/04, s. 1.

This regulation is to ensure the design standards and replacement cost of regional roadways is not exceeded in the 10-year history analysed through the DC process.

As reported in previous DC Technical Reports, the Region is shifting to a more urban municipality where the rural lane kilometres represented about 70% of the network in 2002, to where there is an almost even split between the Region's rural and urban lane kilometres in 2011. By 2031, the urban lane kilometres will make up almost 90% of the region's lane-kilometres. **Figure 2** illustrates the Region's urban / rural lane-kilometre inventory from 2002 to 2021, as well as the forecasted lane-kilometres by 2031.

Figure 2: Comparison of Regional Network Lane-kilometres (2002 to 2031)



The road design characteristics that make up the base costs have not changed. The change is purely a result of increases in unit costing, a market condition, not through any changes by Halton Region to design or materials.

Therefore, the Quality (Replacement Value) has not changed or improved as a result of regional undertakings.

4.3 Service Level – Quality (Additional Measures)

The transportation network was also measured based on the volume/capacity (v/c) ratio and Mean Speed for Provincial, Regional, and Local roads, as well as, Network-wide.

4.3.1 Volume to Capacity Ratio

If the v/c is increasing, it means that the roads are more congested, the operating speed is generally lower, and a typical trip takes longer to accomplish. Hence the service level is lower if the v/c is increasing.

The base year (2016 TTS) performance measures result in a Regional Road Mean v/c of 0.67 and a Total Network (Provincial, Regional and Local) Mean v/c of 0.70, as shown in **Table 3.**

The 2031 road network, with all infrastructure capacity improvements in place, yields a projected Mean v/c of 0.65 and 0.69 for the regional roads and Total Network, respectively. The level of service will essentially remain the same for both networks. Hence, the previous 10-year period service level has not been exceeded.

4.3.2 Mean Speed

The base year (2016 TTS) performance measures result in a Regional Road Mean Speed of 53 km/h and a Total Network (Provincial, Regional and Local) Mean Speed of 51 km/h, as shown in **Table 3.**

The 2031 road network, with all infrastructure capacity improvements in place, yields a projected Mean Speed of 56 km/h and 53 km/h for the regional roads and Total Network, respectively. The level of service will essentially remain the same for both networks. Hence, the previous 10-year period service level has not been exceeded.

4.4 Summary

The 2031 Service Level created by the DC eligible infrastructure improvements has been assessed on both a Quantity and Quality basis and compared to the average service levels in the previous 10-year period.

As discussed above, there are minor changes between 2016 and 2031 which, within the context of the model accuracy, are insignificant.

Overall, the planned capital projects do not result in a tangible increase in service level over the previous 10-year period; therefore, there is no basis for a level of service deduction.

Table 3: Road Jurisdictions (Centroid Connectors Excluded)

	Provincial	Regional	Local	Total
One-way links - 2016				
Total length (km)	146	321	1,146	1,613
Lane km	432	497	1,298	2,227
Mean v/c	0.92	0.67	0.57	0.70
Mean speed (km/h)	55	53	45	51
One-way links – 2031				
Total length (km)	153	361	1,160	1,674
Lane km	519	773	1,351	2,643
Mean v/c	0.87	0.65	0.60	0.69
Mean speed (km/h)	62	56	39	53
One-way links – Change (2016 vs 2031)				
Total length (km)	7	40	14	61
Lane km	87	276	53	416
Mean v/c	-0.05	-0.02	0.02	-0.01
Mean speed (km/h)	7	3	-6	1
One-way links - % Change				
Total length (km)	4.75%	12.43%	1.21%	3.76%
Lane km	20.13%	55.59%	4.05%	18.67%
Mean v/c	-4.97%	-2.50%	4.25%	-1.44%
Mean speed (km/h)	12.08%	6.40%	-12.55%	2.23%

5 TRAFFIC FLOW THROUGH ANALYSIS

Travel on the Regional Road network includes trips that are Internal; Internal/External or Through. "Through" trips are defined as the trips, which travel through the Region without stopping (i.e., both trip origin and destination are outside the Region). Future "through" trips have been produced from the Travel Demand Forecasting Model based on the analysis of origin/destination patterns of the traffic zones that are external to the Region, including zones in the rest of the GTA, Hamilton, Guelph, Waterloo, and Wellington.

The current and future capacity potential of provincial highways in Halton Region relative to the existing and forecasted through trips has been assessed. In general, there is sufficient capacity on the provincial highway system in Halton Region to accommodate "through" trips now and in the future. People travelling between Hamilton and Peel Region, for instance, certainly have the capacity available on provincial highways to make this long-distance trip. In fact, people making "through" trips in the P.M. peak may choose to use Halton Regional roads for part of their trip. Reasons might include incidents or congestion on the provincial highways.

To the extent that some "through" trips use regional roads and hence add to the pressure to improve the regional road network, this effect is more than offset by the larger number of internal or internal/external trips that use the provincial highways and hence reduce the pressure to improve the regional road network.

The function of 407 ETR is considered the same as a provincial highway in accommodating longer distance (through) trips in that the province still owns the corridor and has built "expansion triggers" into the agreement with the private operator to ensure that additional capacity will be provided as growth in travel occurs.

In reviewing the total road network in Halton Region, provincial facilities have or can be expanded to provide sufficient capacity for all "through" trips up to the 2031-planning horizon. The impact that some "through" trips cause by choosing to use regional roads is more than offset by internal and internal/external trips that choose to use provincial facilities and hence reduce the pressure for regional road improvements.

The Region creates the capacity in its road network to accommodate internal and internal/external trips. Some of these trips choose to use the provincial facilities, which create the opportunity for some through trips to use the regional road system. To gauge these effects, a simulation of PM peak hour road use within Halton Region was conducted and the vehicle km for each trip pattern on provincial, regional, and municipal roads is summarized in **Tables 4 through 6**.

Table 4 presents the network statistics for the PM Peak Hour Road Use within Halton Region for the year 2016 Simulation.

Table 5 presents the network statistics for the PM Peak Hour Road Use within Halton Region for the year 2031 Simulation.

On an absolute basis there are 55,383 vehicle.km of "through" trips on regional roads vs. 85,524 vehicle.km of internal Halton trips on provincial roads and 460,863 vehicle.km of trips on Provincial roads where either the trip origin or destination is in Halton Region in 2031. These figures have been highlighted in **Table 5** for ease of reference.

Table 6 presents the change in the network statistics between 2016 and 2031.

Based on the assessment in this section, it is recommended that there be no deduction in DC Charges for "through" trips.

Table 4: PM Peak Hour Road Use within Halton Region – 2016 Simulation

	Trips	Provincial	Regional	Local	Total	Reg+Local
Veh km by Jurisdiction (Excludes centroid connectors)						
Internal	59,633	63,971	149,408	204,866	418,246	354,275
Inbound	32,685	187,213	138,218	106,951	432,382	245,170
Outbound	25,458	173,649	96,108	94,270	364,027	190,378
Through	N/A	485,276	48,742	40,793	574,812	89,535
Total	117,776	910,109	432,477	446,881	1,789,467	879,357
Distribution of veh-km						
Internal	51%	7%	35%	46%	23%	40%
Inbound	28%	21%	32%	24%	24%	28%
Outbound	22%	19%	22%	21%	20%	22%
Through		53%	11%	9%	32%	10%
Total	100%	100%	100%	100%	100%	100%
Mean Travel distance per trip (km)						
Internal		1.1	2.5	3.4	7.0	5.9
Inbound		5.7	4.2	3.3	13.2	7.5
Outbound		6.8	3.8	3.7	14.3	7.5

Table 5: PM Peak Hour Road Use within Halton Region – 2031 Simulation

	Trips	Provincial	Regional	Local	Total	Reg+Local
Veh km by Jurisdiction (Excludes centroid connectors)						
Internal	86,569	85,524	290,058	297,697	673,280	587,756
Inbound	33,142	200,897	142,321	121,734	464,953	264,055
Outbound	31,479	259,966	133,532	126,046	519,543	259,577
Through	N/A	617,011	55,383	83,706	756,101	139,090
Total	151,190	1,163,398	621,295	629,184	2,413,877	1,250,478
Distribution of veh-km						
Internal	57%	7%	47%	47%	28%	47%
Inbound	22%	17%	23%	19%	19%	21%
Outbound	21%	22%	21%	20%	22%	21%
Through		53%	9%	13%	31%	11%
Total	100%	100%	100%	100%	100%	100%
Mean Travel distance per trip (km)						
Internal		1.0	3.4	3.4	7.8	6.8
Inbound		6.1	4.3	3.7	14.0	8.0
Outbound		8.3	4.2	4.0	16.5	8.2

Table 6: PM Peak Hour Road Use Change (2031-2016)

	Trips	Provincial	Regional	Local	Total	Reg+Local
Veh km by Jurisdiction (Excludes centroid connectors)						
Internal	26,936	21,553	140,650	92,831	255,034	233,481
Inbound	457	13,685	4,103	14,783	32,570	18,886
Outbound	6,021	86,317	37,424	31,775	155,516	69,199
Through	N/A	131,735	6,641	42,913	181,289	49,554
Total	33,414	253,289	188,818	182,303	624,410	371,121
Distribution of veh-km						
Internal	81%	9%	74%	51%	41%	63%
Inbound	1%	5%	2%	8%	5%	5%
Outbound	18%	34%	20%	17%	25%	19%
Through		52%	4%	24%	29%	13%
Total	100%	100%	100%	100%	100%	100%
Mean Travel distance per trip (km)						
Internal		-0.1	0.8	0.0	0.8	0.8
Inbound		0.3	0.1	0.4	0.8	0.5
Outbound		1.4	0.5	0.3	2.2	0.8

6 GRANTS, SUBSIDIES AND DEVELOPER CONTRIBUTIONS

The transportation improvement costs must include deductions for any financial considerations through grants, subsidies, or developer contributions. Where contributions have been provided, the cost was subtracted from the gross cost of the project.

Where projects in the Roads Capital Projects involve new or improved interchanges with the provincial freeway system, only costs to be borne by the Region are included in the DC calculation. The sharing of these costs between Existing Development and Growth is as set out in the benefit to existing methodology (Chapter 7).

7 BENEFIT TO EXISTING DEVELOPMENT

The allocation of transportation project costs to Growth and Non-Growth typically varies by project type, and further by component within a project and is consistent with the methodologies presented in the 2012 and 2017 DC Transportation Technical Study.

The following sections describe the methodology to define the Growth and Non-Growth (Benefit to existing – BTE) cost allocation for the project types in the Region's 2023 to 2031 Roads Capital Program.

As presented in Chapter 3, projects are classified as follows:

- Reconstruction (no widening)
- Road Widening without Reconstruction
- Road Widening with Reconstruction
- New Alignment
- Traffic Management
- Provincial Freeway Interchanges
- Railway Grade Separations
- Structures (bridges and culverts)
- Studies and Programs

7.1 Road Reconstruction (No Widening)

Costs of road reconstruction without widening have been allocated as Benefit to Existing, and therefore 100% of the cost has been removed from the DC calculation, as these projects are not considered to involve significant capacity-related improvements.

7.2 Road Widening without Reconstruction

Road widening projects are undertaken to accommodate increased traffic volumes associated with new growth; however, existing lanes are typically resurfaced as part of the widening. As a result, existing residents (Non-Growth) benefit from the renewal of the road surface, as well as improved intersections, signals and other assets that exist in the corridor.

The following sub-sections present the calculation of BTE for existing pavement replacement and other cost components from which there would be a benefit to non-growth.

7.2.1 Value of Resurfacing Existing Pavement

The Benefit to Existing of the resurfacing is considered to be the Used Value of the pavement, which is to be resurfaced to its original (unused) condition. The corresponding benefit to Growth is the cost associated with new lanes, plus any Residual Value remaining in existing roads.

First, the value of resurfacing the existing lanes was calculated as shown in Equation (1).

$$\textit{Value of Resurfacing Existing Lanes} = \textit{MP cost for resurfacing (\$/km)} \times \textit{length of project (km)} \quad (1)$$

To allocate this value between Growth and Non-Growth, the Residual Value of the existing lanes was based on the net book value remaining in the asset per accounting and reporting of Tangible Capital Assets (TCA). More specifically, the current condition of the road surface was determined based on the Region's road asset inventory, and the cumulative depreciation to the proposed year of construction was estimated based on a linear rate of depreciation. The asset's proportions of Residual Value and Used Value were then calculated using Equations (2) and (3).

$$\%\ \textit{Residual Value} = \frac{\textit{Original book value} - \textit{Cumulative Depreciation}}{\textit{Original book value}} \times 100\% \quad (2)$$

$$\%\ \textit{Used Value} = 100\% - \%\ \textit{Residual Value} \quad (3)$$

The BTE of resurfacing the existing lanes was then calculated using Equation *(4)*.

$$BTE_{\textit{Resurfacing Existing Lanes}} = \%\ \textit{Used Value} \times \textit{Value of Resurfacing Existing Lanes} \quad (4)$$

7.2.2 Additional Cost Components

Since roads are widened primarily to accommodate Growth, the Engineering and Contingency costs were allocated entirely to Growth. However, modifications to intersections and signals associated with the widening benefit both Growth and Non-Growth and were allocated 50% BTE.

Where widening work includes rehabilitation of existing bridges, grade separations and culverts, the BTE credit would typically reflect the existing asset value, with TCA-based calculations similar to those done for pavement. However, because the amounts were small relative to the total project cost, BTE of 100% was allocated for simplicity.

For projects where costs were available from more detailed studies (i.e., Municipal Class Environmental Assessment studies), these values were used in place of the Master Plans cost estimates. The costs were broken down into Engineering and Design, Property, Utility Relocates and Construction. Engineering and Design, Property and Utility Relocates were assigned 0% BTE. These factors are consistent with the factors applied where base cost breakdowns were used. Further, Construction costs were assigned 13% BTE, based on the average BTE calculated for widening projects where the Master Plan cost breakdowns were used.

7.2.3 Overall BTE

The resulting BTE for each project was obtained by summing the BTE credit for existing pavement value with the credits for each additional cost component, as described in Equation (5).

$$\begin{aligned} BTE = {} & BTE_{\text{Resurfacing Existing Lanes}} \\ & + BTE_{\text{Intersection Modifications}} \\ & + BTE_{\text{New Signals and Signal Modifications}} \\ & + BTE_{\text{Bridge Rehabilitation}} \\ & + BTE_{\text{Grade Separation Rehabilitation}} \\ & + BTE_{\text{Culvert Rehabilitation}} \end{aligned} \quad (5)$$

where

$BTE_{\text{Resurfacing Existing Lanes}}$	= % Used Value x Value of Resurfacing Existing Lanes (see Eq. 4)
$BTE_{\text{Intersection Modifications}}$	= 50% x Cost of Intersection Modifications
$BTE_{\text{New Signals and Signal Modifications}}$	= 50% x Cost of New Signals and Signal Modifications
$BTE_{\text{Bridge Rehabilitation}}$	= 100% x Cost of Bridge Rehabilitation
$BTE_{\text{Grade Separation Rehabilitation}}$	= 100% x Cost of Grade Separation Rehabilitation
$BTE_{\text{Culvert Rehabilitation}}$	= 100% x Cost of Culvert Rehabilitation

7.3 Road Widening with Reconstruction

Road widening projects are primarily undertaken to accommodate increased traffic volumes associated with new growth. In some cases, the increased development changes the character of the corridor from rural to urban, so road widening projects may be accompanied by reconstruction of the roadway to an urban cross-section. When widening projects include reconstruction of existing lanes, existing residents (Non-Growth) benefit from the renewal of the roadway, intersection improvements, signals, and other assets, as well as the engineering and design associated with reconstruction.

The following sub-sections present the calculation of BTE for existing pavement replacement and other cost components from which there would be a benefit to non-growth from a road widening with reconstruction of the existing lanes.

7.3.1 Value of Reconstructing Existing Pavement and Sub-Base

The Benefit to Existing of the reconstruction of existing lanes is calculated using the methodology previously explained for road widenings in Equation (1). Then, the proportions of Residual and Used Values of the existing lanes were calculated using Equations (2) and (3). The BTE of reconstructing the existing lanes was then calculated using Equation (6).

$$BTE_{\text{Reconstructing Existing Lanes}} = \%\ \text{Used Value} \times \text{Value of Reconstructing Existing Lane} \quad (6)$$

7.3.2 Additional Cost Components

Since projects involving widening with reconstruction benefit both Growth and Non-Growth, the following cost components have been assigned 50% BTE:

- Engineering and Design
- Contingency
- Intersection and Signal Modifications

Where widening work includes rehabilitation of existing bridges, grade separations and culverts, the BTE credit would typically reflect the existing asset value, with TCA-based calculations similar to those done for pavement. However, because the amounts were small relative to the total project cost, BTE credits of 100% were assigned for simplicity.

For projects where costs were available from more detailed studies (i.e., Municipal Class Environmental Assessment studies), these values were used in place of the Master Plan cost estimates. Engineering and Design were assigned 50% BTE, and costs for Property and Utility Relocates were assigned 0% BTE. These factors are consistent with the factors applied where Master Plan costing was used. Further, Construction costs were assigned 25% BTE, based on the average BTE calculated for this project type for projects where the detailed cost breakdown was used.

7.3.3 Overall BTE

The resulting BTE for each project was obtained by summing the BTE credit for existing pavement value with the credits for each additional cost component, as shown in Equation (7).

$$
\begin{aligned}
BTE = {} & BTE_{\text{Reconstructing Existing Lanes}} \\
& + BTE_{\text{Intersection Modifications}} \\
& + BTE_{\text{New Signals and Signal Modifications}} \\
& + BTE_{\text{Bridge Rehabilitation}} \\
& + BTE_{\text{Grade Separation Rehabilitation}} \\
& + BTE_{\text{Culvert Rehabilitation}} \\
& + BTE_{\text{Engineering Design and Contingency}}
\end{aligned} \qquad (7)
$$

where

$BTE_{\text{Reconstructing Existing Lanes}}$ = % Used Value x Value Reconstructing Existing Lanes (see Eq. 6)
$BTE_{\text{Intersection Modifications}}$ = 50% x Cost of Intersection Modifications
$BTE_{\text{New Signals and Signal Modifications}}$ = 50% x Cost of New Signals and Signal Modifications
$BTE_{\text{Bridge Rehabilitation}}$ = 100% x Cost of Bridge Rehabilitation
$BTE_{\text{Grade Separation Rehabilitation}}$ = 100% x Cost of Grade Separation Rehabilitation
$BTE_{\text{Culvert Rehabilitation}}$ = 100% x Cost of Culvert Rehabilitation
$BTE_{\text{Engineering Design and Contingency}}$ = 50% x Cost of Engineering Design and Contingency

7.4 New Alignments

New alignments are constructed to accommodate the increased capacity needs associated with Growth. As such, the costs of new alignment projects were allocated 0% BTE (100% to Growth).

7.5 Traffic Management

The Roads Capital Program 2023-2031 includes several projects in the Traffic Management category, for example:

- Traffic signal (new, modifications)
- New intersections or improvements to existing intersections (i.e., turn lanes)

These projects are required to accommodate the additional traffic created by growth and for existing development. As such, traffic management projects were allocated 50% to Growth and 50% to Existing.

7.6 Provincial Freeway Interchanges

Some projects in the Roads Capital Program may involve the Region's share of costs for new or improved interchanges on the provincial freeway system. These improvements create new access points and reduce congestion at upstream and downstream interchanges. The projects are implemented to provide additional capacity in the road network to serve Growth. An existing road user might benefit from these interchanges (if the trip length is reduced) but the benefit is offset in most cases by the increased traffic congestion created by growth. For new or improved freeway interchanges, the provincial share is typically to accommodate long distance travel and to improve operational issues at existing interchanges, with the Region's share of costs to accommodate transportation pressures due to growth only. The Region attributes the regional share of provincial freeway interchange project costs 100% to Growth.

7.7 Railway Grade Separations

There are 17 existing and planned railway crossings in Halton Region. One of these crossings is of an abandoned line (Steeles Avenue between Regional Road 25 and Ontario Street), ten are already grade separated and five are planned for grade separation by 2031, under the current Regional Roads Capital Projects. The remaining crossing (Guelph Line between McLaren Rd and Campbell Ave) does not currently meet the grade separation warrant by 2031.

Appendix B presents a figure and table depicting the current inventory of railway crossings in Halton Region.

7.7.1 Widening of Existing Railway Grade Separations

Railway grade separations are widened to accommodate increased capacity needs associated with Growth; however, Non-Growth benefits from a renewal of the existing deck of the grade separation structure. The Benefit to Existing of the rehabilitation of the existing grade separation deck structure is calculated using the same methodology as explained for road widenings. For grade separations, the value of the existing deck replacement has been calculated using the Master Plan cost of reconstruction of the deck, as shown in Equation (8).

$$\text{Value of Existing Deck} = \text{MP cost for deck reconstruction (\$/m}^2\text{)} \times \text{existing surface area (m}^2\text{)} \quad (8)$$

Then, the proportions of Residual and Used Values were calculated using Equations *(9)* and *(10)*.

$$\%\ \text{Residual Value} = \frac{\text{Original book value} - \text{Cumulative Depreciation}}{\text{Original book value}} \times 100\% \quad (9)$$

$$\%\ \text{Used Value} = 100\% - \%\ \text{Residual Value} \quad (10)$$

The BTE of reconstructing the existing deck was then calculated using Equation *(11)*.

$$\text{BTE Reconstruction of Existing Deck} = \%\ \text{Used Value} \times \text{Value of Rehabilitating Existing Deck} \quad (11)$$

Since railway grade separations are primarily widened to accommodate Growth, no BTE deductions are allocated for other cost components, such as engineering, design, and construction.

7.7.2 Construction of New Grade Separations

Where there is currently a level crossing in place, construction of a grade-separation benefits Growth by increasing the capacity of the roadway, but also benefits existing development in terms of safety improvement and the elimination for existing road users of the possibility of delays due to train movements. The number of train movements per day times the average annual daily traffic is correlated to a Benefit to Existing for the grade separation.

Consistent with the 2012 and 2017 DC Technical Study methodology for new railway grade separations, the Region allocates a BTE credit to the full grade separation cost according to **Table 7**. The allocation applied at each level rail crossing is based on the actual product (daily train movements times roadway traffic) and a prorating between the ranges.

Appendix B details the calculation of the benefit to existing for proposed grade separations.

Table 7: Grade Separation Benefit to Existing

Daily Train Movements x Daily Roadway Traffic	Benefit to Existing
200,000	5%
400,000	10%
600,000	15%
800,000	20%
1,000,000	25%

7.8 Structures (Bridges and Culverts)

7.8.1 Widening of Existing Structures

The capital roads plan may include rehabilitation and replacement of road-related structures, such as bridges. In cases where the structures are being replaced or installed to allow for roadway capacity increases, such as new roads or road widening, the residual value method has been applied to determine benefit to existing.

7.8.2 Construction of New Structures

New structures are constructed when roads are widened or realigned to accommodate growth. As such, costs of new structures are allocated 100% to Growth.

7.9 Studies and Programs

The Region allocates costs for studies and programs as presented in **Table 8** below.

Table 8: Cost Allocating for Studies and Programs

Studies and Programs	Growth	BTE
Transportation Master Plan	100%	0%
Active Transportation Master Plan	100%	0%
Data Management Group	100%	0%
Transportation Tomorrow Survey	100%	0%
Cordon Counts	100%	0%
Traffic and Screenline Counts	50%	50%
Urban Design Guidelines	100%	0%
Development Charges Transportation Technical Study	100%	0%
Travel Demand Management	50%	50%
Active Transportation Initiatives	50%	50%
Other Growth Related Studies	100%	0%
Operational Improvement and Studies	0%	100%

7.10 Summary of Cost Allocation

Halton Region's allocation of cost to Growth as presented in this chapter is summarised in **Table 9**. **Appendix C** presents the cost allocation between Growth and Non-Growth for the 2023-2031 Roads Capital Projects, per the methodology presented in this chapter.

Table 9: Allocation of Transportation Project Costs to Growth

Project Type	Growth Share (%)	Report Section
Road Reconstruction (no Widening)	0%	7.1
Road Widening (no Reconstruction)	100% with the following deductions: • deduction for existing roadway based on the used value of the existing lanes and the Master Plan* cost of resurfacing • 50% deduction for intersection modifications and additions • 50% deduction for signal modifications • 100% deduction for rehabilitation of bridges, grade separations and culverts • if non-Master Plan costing is used, a 13% deduction is assigned to construction costs	7.2
Road Widening with Reconstruction	100% with the following deductions: • deduction for existing roadway based on the used value of the existing lanes and the Master Plan cost of reconstruction • 50% deduction for engineering and contingency costs • 50% deduction for intersection modifications and additions • 50% deduction for signal modifications • 100% deduction for rehabilitation of bridges, grade separations and culverts • if non-Master Plan costing is used, a 50% deduction is assigned for engineering and design, and a 25% deduction is assigned to construction costs	7.3
New Roads and Alignments	100%	7.4
Traffic Management	50%	7.5
Provincial Freeway Interchanges	100%	7.6
Grade Separations – Widening	100% less deduction for rehabilitation of the existing structure, based on used value of the structure and the Master Plan cost of rehabilitation	7.7.1
Grade Separations – New	100% less BTE based per Table 7	7.7.2
Structures – Widening	100% less deduction for rehabilitation of the existing structure, based on used value of the structure and the Master Plan cost of rehabilitation	7.8.1
Structures – New	100%	7.8.2
Studies and Programs	BTE based on type of study or program	7.9

** Master Plan Costed projects (formerly referred to as Benchmarked projects)*

8 POST-PLANNING PERIOD CAPACITY

Post-planning period (PPP) capacity has been applied where clear upsizing for future benefit is involved. PPP deductions allowed during the current DC update will be recovered in DC updates for the post-2031 period. Correspondingly, the current DC update will recover PPP deductions allowed in earlier DC updates.

8.1 Calculation of Post Planning Period Capacity Deductions

The PPP benefit was determined by consideration of the recommended timing of the project relative to the planning period for the DC Background Study and is consistent with the methodologies presented in the 2012 & 2017 DC Transportation Technical Study.

Post planning period capacity for major infrastructure improvements is calculated only for projects with the last five years (2027 to 2031, inclusive) of the capital improvement plan. This calculation is proportional to the degree to which the v/c on the major improvement in 2031 is less than the average v/c on the associated screenline.

As an example, if a road widening scheduled for 2029 results in a v/c of 0.75 in 2031 and the v/c on the associated screenline in 2031 is 0.85, then a deduction for excess capacity is appropriate. The deduction applied to the project's DC chargeable component would be as shown in Equation (12).

$$\frac{0.85 - 0.75}{0.85} \times 100 = 12\% \qquad (12)$$

Projects identified for the 2027 to 2031 (inclusive) timeframe where the PPP Calculation applies are presented in **Appendix D.**

9 RESIDENTIAL AND NON-RESIDENTIAL SPLITS

9.1 Calculation of Split Based on Number of Trips Associated with New Residents and Employment

In past DCs, Growth-Related DCs were allocated between Residential and Non-Residential land uses based on trips attributed to Population and Employment Growth. Through the 2017 DC Transportation Technical Report jobs in the Work–at-Home (WAH) and No-Fixed-Place-of-Work (NFPOW) category was considered such that jobs generate trips from a "residential" unit as opposed to a non-residential facility. This approach was applied in the 2022 DC Transportation Technical Report consistent with the methodology used in the 2017 DC Transportation Technical Report.

Table 10 summarizes the employment forecast excluding WAH and NFPOW employment, which is the basis for the transportation trip generation and DC employment forecast.

Since the impact on transportation services from WAH employees is generated from the home and the population/unit forecast already includes these individuals, the calculations do not include employees associated with WAH.

For NFPOW employees, the need for service related to these employees has largely been included in the employment forecast by usual place of work (i.e., employment and Gross Floor Area (GFA)) in the retail and accommodation sectors generated from NFPOW construction employment). Furthermore, since these employees have no fixed work address, they cannot be captured in the non-residential gross floor area calculation. Accordingly, NFPOW employees have been removed from the employment forecast and calculation.

Table 10: Calculation of Residential and Non-Residential Growth

Year	Pop. / Empl.	WAH	NFPOW	Total
Residential				
2021	624,094	-	-	624,094
2031	752,537	-	-	752,537
Non Residential				
2021	327,683	(29,206)	(32,625)	265,852
2031	390,000	(35,429)	(39,289)	315,282

Note: Population figure excludes net Census undercount.
Source: 2021-2031 population and employment derived explicitly from the Halton Region Best Planning Estimates, 2011. By Watson & Associates Economists Ltd.

For the period 2021 to 2031, the anticipated levels of growth in Residential and Non-Residential categories are as shown by Equations (13) and (14).

Residential Growth: 752,537-624,094 = 128,443 *(13)*
Non-Residential Growth: 315,282 – 265,852 = 49,430 *(14)*

Table 11 contains the trip rates derived from the Region's travel demand model to represent a mean trip rate for Halton Region for Residential and Non-Residential trips. These trip rates include WAH and NFPOW as generating trips from "Residential".

Table 11: Mean Trip Rates

Trip type	Trip Rate - Residential	Trip Rate - Non-Res
Origins in Halton Region	(2022)	(2022)
Work	0.000	0.560
Home	0.091	0.000
Other	0.157	0.260
Destinations in Halton Region		
Home	0.208	0
Non-Home	0.139	0.142
Total Origins + Destinations	**0.595**	**0.962**

Using the updated trip rates and the growth projections above, as modified, the Residential/Non-Residential split can be calculated as shown in Equation (15). The equation shows that the employment trip rate was adjusted by 10% to better balance trip characteristics between these trip types in the AM and PM conditions.

$$\text{Residential Share} = \frac{(128{,}443 \times 0.595) \times 100}{(128{,}443 \times 0.595) + (49{,}430 \times 0.962 \,/\, 1.1 \text{ AM Peak Factor})} = 63.9\% \qquad (15)$$

Based on the above calculation, the Residential/Non-Residential split is estimated at 64% and 36%, respectively.

Appendix A

Appendix A
Transportation Development & Non-Development
Capital Implementation Plan (2023 to 2031)

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
7567	Miscellaneous R.O.W. Purchases and Road Dedication Engineering & Surveys (REG)	100	100	-	-	-	-	-	-	-	200
7853	Traffic Signal Interconnect (REG)	150	150	150	150	150	150	150	150	150	1,350
7854	Operational Improvements (REG)	200	200	200	200	200	200	200	200	500	2,100
2659	Guelph Line - Widening from 4 to 6 lanes from Mainway to Upper Middle Road (BUR) (Reg. Rd. 1)	850	-	2,498	9,582	17,196	-	-	-	-	30,126
6805	Guelph Line - Widening from 4 to 6 lanes from Upper Middle Road to Dundas Street (Regional Road 1) (BUR)	-	-	-	-	850	2,403	8,443	330	17,230	29,256

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
3991	Trafalgar Rd - Grade Separation at CN Crossing north of Maple Ave (HHS) (Regional Road 3)	70	32,994	-	-	-	-	-	-	-	33,064
5376	Trafalgar Rd - Grade Separation at Metrolinx Crossing south of Hwy 7 (HHS) (Regional Road 3)	70	21,016	-	-	-	-	-	-	-	21,086
6823	Trafalgar Road - Widening from 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 3)	-	5,003	2,203	648	34,851	-	-	-	-	42,705
6827	Trafalgar Road - Widening from 4 to 6 lanes from Britannia Road to Steeles Avenue including Highway 401 Structure (MIL) (Regional Road 3)	-	-	-	9,164	5,030	-	994	65,853	-	81,041
7756	Trafalgar Road Widening from 2 to 4 Lanes from 10 Side Road to Hwy 7 (HHS) (Regional Road 3)	234	60,419	-	-	-	-	-	-	-	60,653
5839	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Britannia Road (MIL) (Regional Road 4)	-	3,916	23,663	30,426	-	-	-	-	-	58,005

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
6806	James Snow Parkway - New 6 lane road from Highway 407 to Britannia Road (MIL) (Regional Road 4)	-	1,100	-	-	4,966	43,277	745	-	36,185	86,273
6807	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Tremaine Road (MIL) (Regional Road 4)	850	-	9,515	31,598	1,179	-	-	67,396	-	110,538
7487	Dundas Street - Widening from 4 to 6 lanes from Guelph Line to Halton/Hamilton Boundary, including improvements at Brant Street (BUR) Regional Road 5	-	192	28,465	-	-	-	-	-	-	28,657
6757	"5 1/2 Line" - New 6 lane road from Britannia Road to Steeles Avenue & Interchange at Highway 401 (MIL)	1,600	-	11,031	-	91,042	-	-	897	78,241	182,811
6804	Derry Road - Widening from 4 to 6 lanes from Tremaine Road to Highway 407 (MIL) (Regional Road 7)	-	-	-	850	-	14,174	11,665	1,968	103,553	132,210
5181	Steeles Avenue - Grade Separation at CN crossing west of Bronte Street (MIL) (Regional Road 8)	-	-	-	20,219	-	-	-	-	-	20,219

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
6819	Steeles Avenue - Widening from 2 to 4 lanes from Tremaine Road to Industrial Drive (MIL) (Regional Road 8)	6,635	12,935	313	32,537	-	-	-	-	-	52,420
6821	Steeles Avenue - Widening from 4 to 6 lanes from Regional Road 25 to Trafalgar Road (MIL) (Regional Road 8)	-	-	18,082	-	64,964	-	-	-	-	83,046
6822	Steeles Avenue - Widening from 4 to 6 lanes (with RBL) from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 8)	850	-	5,566	13,287	763	39,968	-	-	-	60,434
6758	10 Side Road - Widening from 2 to 4 lanes from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 10)	-	-	850	-	4,944	-	23,361	787	35,090	65,032
6808	Ninth Line - Widening from 2 to 4 lanes from Burnhamthorpe Road to Highway 407 (OAK) (Regional Road 13)	15,261	-	-	-	-	-	-	-	-	15,261
6809	Ninth Line - Widening from 2 to 4 lanes from Dundas Street to Burnhamthorpe Road (OAK) (Regional Road 13)	-	1,475	11,919	-	-	-	-	-	-	13,394

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
7336	Ninth Line - Widening from 2 to 4 lanes from Steeles Avenue to 10 Side Road (HHS) Regional Road 13	-	967	-	46,166	-	-	-	-	-	47,133
6824	Brant Street Widening from 4 to 6 lanes from North Service Road to Dundas Street (BUR) (Regional Road 18)	850	-	3,902	26,993	28,059	-	-	-	-	59,804
3989	Winston Churchill Blvd - Widening from 2 to 4 lanes from 2km south of 5 Side Road to potential by-pass (Halton's Share) (HHS) (Regional Rd 19)	800	1,782	-	10,172	-	-	-	-	-	12,754
5438	Winston Churchill Boulevard - Widening from 4 to 6 lanes from Dundas Street to Upper Middle Road/QEW (Halton's Share) (OAK) (Regional Road 19)	304	-	1,266	-	2,955	-	810	5,992	-	11,327
6448	Winston Churchill Boulevard - Widening from 4 to 6 lanes from Highway 401 to Steeles Avenue (Halton's Share) (HHS) (Regional Road 19)	-	-	-	2,742	-	-	-	-	-	2,742
6846	Winston Churchill Boulevard - Widening from 4 to 6 lanes 2km south of 5 Side Road to 5 Side Road (Halton's Share) (HHS) (Regional Road 19)	-	-	797	-	-	-	788	5,156	-	6,741

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
6847	Winston Churchill Boulevard Widening 5-7 lanes from Steeles Avenue to 2 km South of 5 Side Road (Halton's Share) (HHS) (Regional Road 19)	-	-	-	-	-	452	-	-	583	1,035
7494	Norval Bypass (HHS)	2,317	4,282	374	26,677	-	-	-	-	-	33,650
6812	Appleby Line - Widening from 4 to 6 lanes from Fairview Street to Taywood Drive (BUR) (Regional Road 20)	-	-	7,560	-	5,635	759	53,450	-	-	67,404
7689	Appleby Line at Harvester Road (Intersection Improvements) (BUR) (Regional Road 20)	-	-	603	4,019	-	-	-	-	-	4,622
6803	Burloak Drive - Widening from 4 to 6 lanes from Harvester Road to Upper Middle Road (BUR) (Regional Road 21)	-	-	850	4,491	6,041	414	31,481	-	-	43,277
7485	Burloak Drive - (CONSTRUCTION ONLY) 4 lane urbanization from north of QEW to Upper Middle Road (BUR) Regional Road 21	-	3,442	-	-	-	-	-	-	-	3,442

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
6810	North Service Road - New 4 lanes from Burloak Drive to Bronte Road (OAK)	-	-	-	1,100	-	11,762	355	330	79,864	93,411
5845	Tremaine Road - Widening from 4 to 6 lanes from Highway 401 to Derry Road (MIL) (Regional Road 22)	-	-	-	-	-	-	11,558	5,563	78,745	95,866
6830	Tremaine Road - Widening from 2 to 4 lanes from Dundas Street to Lower Base Line (OAK) (Regional Road 22)	28,262	36,402	-	-	-	-	-	-	-	64,664
6834	Tremaine Road - Widening from 2 to 4 lanes from Lower Base Line to Britannia Road (MIL) (Regional Road 22)	8,425	501	27,938	-	-	-	-	-	-	36,864
6811	Regional Road 25 - Widening from 2 to 4 lanes from 5 Side Road to 10 Side Road (HHS) (Regional Road 25)	-	1,123	10,005	485	8,077	-	-	-	-	19,690
6814	Regional Road 25 - Widening from 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 25)	-	-	13,421	964	52,383	-	-	-	-	66,768

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
6815	Regional Road 25 - Widening from 4 to 6 lanes from Britannia Road to Derry Road (MIL) (Regional Road 25)	-	-	4,338	498	23,445	-	-	-	-	28,281
6817	Regional Road 25 - Widening from 4 to 6 lanes from Steeles Avenue to 5 Side Road (MIL) (Regional Road 25)	-	1,119	-	51,567	-	-	-	-	-	52,686
6818	Bronte Road - Widening from 4 to 6 lanes from Speers Road to Highway 407 (OAK) (Regional Road 25)	-	-	22,720	1,050	61,034	-	-	-	-	84,804
6825	Upper Middle Road - Widening from 4 to 6 lanes from Appleby Line to Burloak Drive (BUR) (Regional Road 38)	-	-	850	-	2,367	-	333	16,873	-	20,423
6826	Upper Middle Road - Widening from 4 to 6 lanes from Trafalgar Road to Grand Boulevard (OAK) (Regional Road 38)	-	850	2,564	8,472	326	18,153	-	-	-	30,365
6828	Upper Middle Road - Widening from 4 to 6 lanes from Bronte Road to Neyagawa Boulevard (OAK) (Regional Road 38)	-	850	-	5,798	3,103	850	41,184	-	-	51,785

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
6829	Upper Middle Road - Widening from 4 to 6 lanes from Ninth Line to Winston Churchill Boulevard (OAK) (Regional Road 38)	850	-	3,150	2,000	414	22,160	-	-	-	28,574
7338	Upper Middle Road - Widening from 4 to 6 lanes from Neyagawa Boulevard to Trafalgar Road (OAK) Regional Road 38	-	850	-	2,490	-	16,284	355	17,219	-	37,198
7339	Upper Middle Road - Widening from 4 to 6 lanes from Grand Boulevard to Ninth Line (OAK) Regional Road 38	-	850	-	1,028	-	732	137	7,366	-	10,113
5426	Active Transportation Initiatives (REG)	50	50	50	50	50	50	50	50	50	450
7375	Active Transportation Infill Projects (REG)	223	-	-	-	-	-	-	-	-	223
7928	Active Transportation Master Plan (REG)	372	-	-	-	-	372	-	-	-	744

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
5641	Traffic Signal Controller, timer and signing upgrades - Various Intersections (REG)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,085	1,085	9,170
6854	New Traffic Signals - Development (REG)	1,719	1,719	1,719	1,719	1,719	1,719	1,719	1,719	1,719	15,471
6855	New Signalized Intersections (REG)	1,256	628	1,256	628	1,256	628	1,256	628	1,256	8,792
5196	Travel Demand Management Initiative (REG)	50	50	50	50	50	50	50	50	50	450
5431	Traffic and Screen Line Counts & Studies (REG)	332	157	157	261	157	157	157	157	157	1,692
5444	Transportation Master Plan Study (REG)	1,046	-	-	-	-	1,046	-	-	-	2,092

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
6832	Data Management Group (REG)	157	157	157	157	157	157	157	157	157	1,413
6833	Transportation Tomorrow Survey (REG)	-	-	-	105	-	-	-	-	105	210
6837	Development Charge Background Study (REG)	-	-	-	471	-	-	-	-	471	942
6838	Growth Management Studies (REG)	523	523	523	523	523	523	523	523	523	4,707
6858	Cordon Count Data (REG)	52	52	52	105	52	52	52	52	105	574
7568	MTO Highway Studies (REG)	131	131	131	131	131	131	131	131	131	1,179

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
7569	Urban Design Guidelines (REG)	157	-	-	-	-	-	157	-	-	314
7486	Derry Road - Reconstruction from Milburough Line to McNiven Road (MIL) Regional Road 7	389	-	2,324	-	-	-	-	-	-	2,713
7739	Derry Road Reconstruction from Guelph Line to Walkers Line, and Derry Road Reconstruction from Appleby Line to Tremaine Road (MIL)	-	-	-	-	-	698	-	6,515	-	7,213
7741	Derry Road Reconstruction from Twiss to Guelph Line, and Derry Road Reconstruction from Walkers Line to Appleby Line (BUR)	-	-	-	-	-	497	-	4,892	-	5,389
7740	Campbellville Road Reconstruction from Milburough Line to Campbell Avenue (MIL)	-	-	-	-	-	526	-	4,865	-	5,391
7459	Winston Churchill Blvd. Roundabout and Realignment (10th Line to WCB) (HHS) (Regional Road 10)	2,114	-	-	-	-	-	-	-	-	2,114

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
7683	Brant Street Reconstruction from Fairview Street to QEW (BUR) (Regional Road 18)	-	-	-	567	-	5,297	-	-	-	5,864
5312	Winston Churchill Blvd - from Old Pine Crest Road to Credit River (HHS) (Regional Road 19)	1,215	-	-	-	-	-	-	-	-	1,215
7491	Winston Churchill Boulevard - 2 lane Reconstruction from 10 Side Road to 5 Side Road (Halton's Share) - 2 (HHS) Regional Road 19	500	-	4,397	-	-	-	-	-	-	4,897
7492	Winston Churchill Blvd - 17 Side Road to Old Pine Crest Road - 1 (HHS) Regional Road 19	1,758	-	-	-	-	-	-	-	-	1,758
7682	Regional Road 25 Reconstruction from North of Main Street to No. 32 Side Road (HHS) (Regional Road 25)	384	-	2,138	-	-	-	-	-	-	2,522
7666	Storm Pump Stations (REG)	-	200	-	560	160	175	200	-	129	1,424

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
7671	Storm System Construction (REG)	300	300	-	-	-	-	-	-	-	600
7808	Regional Road Tree Replacement Program (REG)	100	100	-	-	-	-	-	-	-	200
7850	Streetlight Program (REG)	50	100	50	50	50	50	100	50	50	550
7851	Retaining Wall Rehabilitation & Replacement Program - Various Locations (REG)	560	-	-	16	175	-	-	-	-	751
7856	Miscellaneous Capital Works Related to Road Resurfacing (REG)	1,123	1,426	1,244	1,023	944	857	827	1,054	1,005	9,503
7919	Road Resurfacing Capital Program (REG)	11,233	14,263	12,442	10,226	9,438	8,573	8,266	10,538	10,050	95,029

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
7960	Miscellaneous Bridges and Culverts Rehabilitation & Replacement Program (REG)	473	3,313	100	3,707	-	-	-	-	-	7,593
7674	Replacement Noise Attenuation Barriers (REG)	231	2,740	1,310	2,251	-	-	-	-	-	6,532
6885	Vehicle Replacements - Transportation (REG)	41	-	125	-	-	-	-	47	-	213
5644	Region-wide Traffic Operations Study Update (REG)	-	300	-	-	-	-	300	-	-	600
7672	Replacement Noise Attenuation Studies (REG)	50	100	50	100	50	100	50	100	50	650
7675	Storm Sewer Inspections, Studies, and Condition Assessments (REG)	100	100	100	100	100	100	100	100	100	900

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
7844	Transportation Infrastructure Management System (REG)	-	-	150	-	-	150	-	-	150	450
7846	Speed Reduction Education & Enforcement Campaign (REG)	135	135	50	50	50	50	50	50	50	620
7847	Road Needs Study Update (REG)	50	50	50	50	50	50	50	50	50	450
7848	Bridge and Culvert Inspections, Condition Assessments & Evaluation Studies (REG)	50	147	50	153	50	153	50	153	50	856
7849	Traffic Operations & Safety Related Studies (REG)	105	85	85	105	85	85	105	85	85	825
7907	Retaining Wall Inspections, Condition Assessments and Evaluation Studies (REG)	-	40	-	40	-	40	-	40	-	160

UNIQ ID#	PROJECT DESCRIPTION	2023	2024	2025	2026	2027	2028	2029	2030	2031	Gross Cost
7958	Road Weather Information Systems (RWIS) Region-wide (REG)	-	-	-	50	-	-	-	-	50	100
7959	Road Weather Information Systems (RWIS) Inspections & Evaluation Studies (REG)	15	-	-	15	-	-	15	-	-	45
8123	Guiderail Rehabilitation & Replacement Program (REG)	-	75	-	75	-	75	-	-	-	225
	Total ('000):	96,722	220,459	244,553	369,711	436,221	195,099	201,374	229,171	447,769	2,441,079

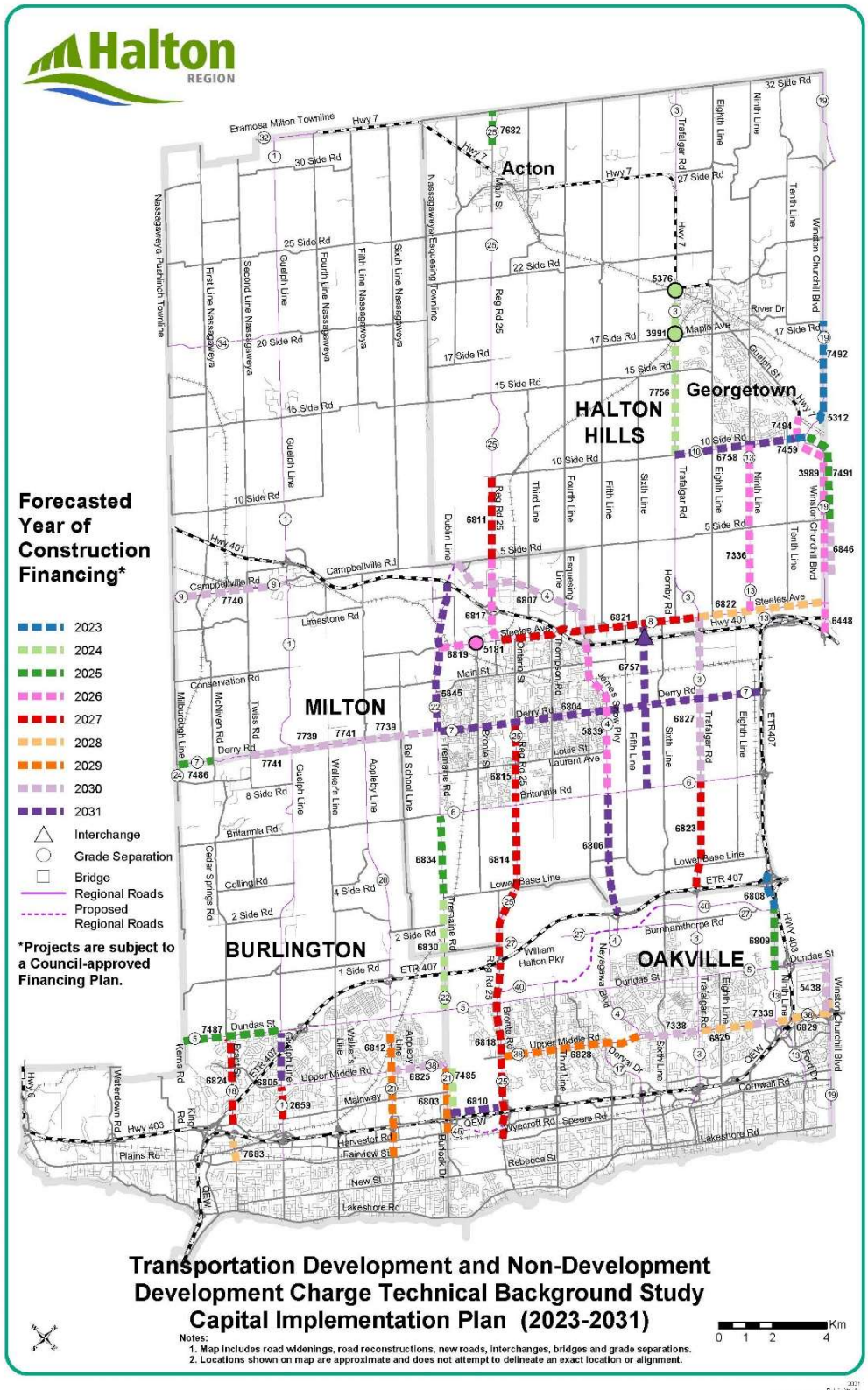
Unit Cost Table

No.	Item	Unit	Unit Price
A	***ROADWORKS & DRAINAGE***		
3	Remove Ex. Asphalt (Partial Depth)	m^2	$4.00
4	Earth Excavation	m^3	$14.00
6	Granular A (150 mm depth)	tonnes	$23.00
7	Granular B (600 mm depth)	tonnes	$20.00
9	Surface Course Asphalt (50 mm depth)	tonnes	$107.00
10	Base Course Asphalt (100 mm depth)	tonnes	$96.00
11	Concrete Splash Pad (0.3 m width, 150 mm depth)	m^2	$88.00
12	Concrete Curb and Gutter (All types)	m	$55.00
13	Sod c/w 100 mm Topsoil	m^2	$8.00
17	300 mm Storm Sewer Laterals	m	$296.00
18	375 - 600 mm Storm Sewer	m	$325.00
21	150 mm Subdrain	m	$34.00
22	Single Catchbasins	ea.	$3,525.00
23	Double Catchbasins	ea.	$5,836.00
24	Storm Maintenance Holes/MHCBs	ea.	$8,944.00
33	Upgrade/Modify Intersections (incl. turn lanes)	ea.	$400,000.00
34	Addition of Single Left/Right Turn Lanes	ea.	$50,000.00
35	Entrance Modifications/Regrading	L.S.	$50,000.00
36	Minor Roadworks & Drainage Items (10% of major roadworks items) (incl. clearing & grubbing, ditching, topsoil stripping, minor earth borrow, breaking into ex. pipe/structure, pavement markings, signage, proof rolling, tack coat, silt fence, tree protection barrier, etc.)		10.0%
B	***STRUCTURES***		
37	Structure Removal/Demolition	ea.	$120,000.00
38	Grade Separation Overpass (road over rail)	m^2	$6,500.00
39	Grade Separation Underpass (road under rail)	m^2	$12,000.00
40	Grade Separation Retaining Walls	m^2	$2,500.00
41	Railway Detour	ea.	$3,000,000.00
42	Bridge over Watercourse Crossing	m^2	$4,500.00
43	Bridge over other roadway	m^2	$4,500.00
44	Bridge Retaining Walls	m^2	$1,500.00

No.	Item		Unit	Unit Price	
C	***LANDSCAPING/MITIGATION***				
45	Deciduous Trees - 50mm caliper (20 m spacing) includes soil, mulch, staking		ea.	$495.00	
D	***ELECTRICAL***				
47	Traffic Signalization (per intersection)		ea.	$300,000.00	
48	Modifications to Ex. Traffic Signalization (per intersection)		ea.	$120,000.00	
49	Street Lighting (per pole)		ea.	$16,000.00	
E	***PROPERTY***				
50	Existing Urban Residential/Commercial Lands (Non-vacant)	(Milton/Halton Hills | Burlington/Oakville)	acre	$3.00M	$4.00M
51	Vacant Urban Lands (Residential, Commercial, etc)	(Milton/Halton Hills | Burlington/Oakville)	acre	$1.20M	$1.50M
52	Flood Plain Lands	(Milton/Halton Hills | Burlington/Oakville)	acre	$0.015M	$0.015M
53	Rural Lands	(Milton/Halton Hills | Burlington/Oakville)	acre	$0.18M	$0.18M
F	***UTILITIES & SERVICES***				
54	Utility Pole (minor)		ea.	$2,000.00	
55	Utility Pole (major)		ea.	$5,000.00	
	Reconstruction Costs (incl. sawcutting, pulverizing, asphalt removal, MH/CB/WV/VCH adjustments, culvert removal, CB removal, curb removal, traffic control, etc.)			10.0%	
G	**LOCAL MUNICIPALITY ITEMS**				
56	Asphalt Path		m^2	$33.00	
57	Concrete Sidewalk		m^2	$72.00	
H	**ADDITIONAL ITEMS & ASSUMPTIONS**				
	Utility Relocation - Urban		km	$150,000.00	
	Utility Relocation - Rural		km	$100,000.00	
	SWM Pond (Cost per kilometre of service area)		km	$40,000.00	
	Contingency			15%	
	Roadway Safety (Urban)		km	$45,000.00	
	Roadway Safety (Rural)		km	$90,000.00	
I	**REHABILITATION OF EXISTING STRUCTURES**				
	Grade Separation Overpass (road over rail)		m^2	$2,200.00	
	Grade Separation Underpass (road under rail)		m^2	$4,000.00	
	Bridge over Watercourse Crossing		m^2	$1,500.00	
	Bridge over other roadway		m^2	$1,500.00	
	Assumptions: Cost to rehabilitate per square meter is 1/3 cost to build new per square meter.				

Summary of Cross Section Base Cost per Kilometre

Treatment	Widening		New Construction		Reconstruction	
	$M	Imp. Type Code	$M	Imp. Type Code	$M	Imp. Type Code
2 lane rural 2m flush median			1.40	R1-N2-2F	1.54	R1-R2-2F
4 lane rural 5 m raised median	1.43	R2-W4-5R	2.40	R2-N4-5R	2.64	R2-R4-5R
4 lane urban 2m flush median	3.57	C2-W4-2F	3.55	C2-N4-2F	3.90	C2-R4-2F
4 lane urban/rural 5m raised median	4.13	C1-W4-5R	3.80	C1-N4-5R	4.18	C1-R4-5R
4 lane urban 5 m raised median	4.13	C3-W4-5R	3.80	C3-N4-5R	4.18	C3-R4-5R
6 lane urban 5m raised median	4.44	C4-W6-5R	4.47	C4-N6-5R	4.92	C4-R6-5R
6 lane urban 2x3.3m raised median	5.32	C5-W6-6.6R	5.17	C5-N6-6.6R	5.68	C5-R6-6.6R
RBL+6 lane urban 2x4.5m raised median	5.70	N1-W6-9R-RBL	5.81	N1-N6-9R-RBL	6.39	N1-R6-9R-RBL
RBL+4 lane urban 6.5m raised median	4.59	N2-W4-6.5R-RBL	4.51	N2-N4-6.5R-RBL	4.96	N2-R4-6.5R-RBL


Halton
REGION
Forecasted Year of Construction Financing*
2023
2024
2025
2026
2027
2028
2029
2030
2031
Interchange
Grade Separation
Bridge
Regional Roads
Proposed Regional Roads
*Projects are subject to a Council-approved Financing Plan.
Acton
Georgetown
HALTON HILLS
MILTON
BURLINGTON
OAKVILLE
Transportation Development and Non-Development Development Charge Technical Background Study
Capital Implementation Plan (2023-2031)
Notes:
1. Map includes road widenings, road reconstructions, new roads, interchanges, bridges and grade separations.
2. Locations shown on map are approximate and does not attempt to delineate an exact location or alignment.
Km
0 1 2 4

ID	Regional Municipality of Halton Capital Projects (2023-2031) Project Descriptions	Forecasted Year of Construction Financing
2659	Guelph Line - Widening - 4 to 6 lanes from Mainway to Upper Middle Road (BUR) (Regional Road 1)	2027
6805	Guelph Line - Widening - 4 to 6 lanes from Upper Middle Road to Dundas Street (BUR) (Regional Road 1)	2031
6823	Trafalgar Road - Widening - 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 3)	2027
6827	Trafalgar Road - Widening - 4 to 6 lanes from Britannia Road to Steeles Avenue including Highway 401 Structure (MIL/HHS) (Regional Road 3)	2030
7756	Trafalgar Road - Widening - 2 to 4 lanes from 10 Side Road to Highway 7 (HHS) (Regional Road 3)	2024
3991	Trafalgar Road - Grade Separation at CN Crossing North of Maple Avenue (HHS) (Regional Road 3)	2024
5376	Trafalgar Road - Grade Separation at Metrolinx Crossing South of Highway 7 (HHS) (Regional Road 3)	2024
6806	James Snow Parkway - New 6 lane road from Highway 407 to Britannia Road (MIL) (Regional Road 4)	2031
5839	James Snow Parkway - Widening - 4 to 6 lanes from Highway 401 to Britannia Road (MIL) (Regional Road 4)	2026
6807	James Snow Parkway - Widening - 4 to 6 lanes from Highway 401 to Tremaine Road (MIL) (Regional Road 4)	2030
7487	Dundas Street - Widening - 4 to 6 lanes from Guelph Line to Halton/Hamilton Boundary, including improvements at Brant Street (BUR) (Regional Road 5)	2025
7486	Derry Road - Reconstruction from Milburough Line to McNiven Road (MIL) (Regional Road 7)	2025
7741	Derry Road - Reconstruction from Twiss to Guelph Line, and Derry Road Reconstruction from Walkers Line to Appleby Line (BUR) (Regional Road 7)	2030
7739	Derry Road - Reconstruction from Guelph Line to Walkers Line, and Derry Road Reconstruction from Appleby Line to Tremaine Road (MIL)	2030
6804	Derry Road - Widening - 4 to 6 lanes from Tremaine Road to Highway 407 (MIL) (Regional Road 7)	2031
5181	Steeles Avenue - Grade Separation at CN crossing west of Bronte Street (MIL) (Regional Road 8)	2026
6819	Steeles Avenue - Widening - 2 to 4 lanes from Tremaine Road to Industrial Drive (MIL) (Regional Road 8)	2026
6821	Steeles Avenue - Widening - 4 to 6 lanes from Regional Road 25 to Trafalgar Road (MIL) (Regional Road 8)	2027
6822	Steeles Avenue - Widening - 4 to 6 lanes (with RBL) from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 8)	2028
7740	Campbellville Road - Reconstruction from Milburough Line to Campbell Avenue (MIL) (Regional Road 9)	2030
6758	10 Side Road - Widening - 2 to 4 lanes from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 10)	2031
7459	Winston Churchill Blvd. Roundabout and Realignment (10th Line to WCB) (HHS) (Regional Road 10)	2023
6809	Ninth Line - Widening - 2 to 4 lanes from Dundas Street to Burnhamthorpe Road (OAK) (Regional Road 13)	2025
6808	Ninth Line - Widening - 2 to 4 lanes from Burnhamthorpe Road to Highway 407 (OAK) (Regional Road 13)	2023
7336	Ninth Line - Widening - 2 to 4 lanes from Steeles Avenue to 10 Side Road (HHS) (Regional Road 13)	2026
7683	Brant Street - Reconstruction from Fairview Street to QEW (BUR) (Regional Road 18)	2028
6824	Brant Street - Widening - 4 to 6 lanes from North Service Road to Dundas Street (BUR) (Regional Road 18)	2027
5438	Winston Churchill Boulevard - Widening - 4 to 6 lanes from Dundas Street to Upper Middle Road / QEW (OAK) (Regional Road 19)	2030
6448	Winston Churchill Boulevard - Widening - 4 to 6 lanes from Highway 401 to Steeles Avenue (HHS) (Regional Road 19)	2026
6846	Winston Churchill Boulevard - Widening - 4 to 6 lanes from 2km south of 5 Side Road to 5 Side Road (HHS) (Regional Road 19)	2030
3989	Winston Churchill Boulevard - Widening - 2 to 4 lanes from 2km south of 5 Side Road to potential by-pass (HHS) (Regional Road 19)	2026
7491	Winston Churchill Boulevard - 2 lane Reconstruction from 10 Side Road to 5 Side Road (HHS) (Regional Road 19)	2025
5312	Winston Churchill Boulevard - from Old Pine Crest Road to Credit River (HHS) (Regional Road 19)	2023
7492	Winston Churchill Boulevard - 17 Side Road to Old Pine Crest Road (HHS) (Regional Road 19)	2023
6812	Appleby Line - Widening - 4 to 6 lanes from Fairview Street to Taywood Drive (BUR) (Regional Road 20)	2029
6803	Burloak Drive - Widening - 4 to 6 lanes from Harvester Road to Upper Middle Road (BUR) (Regional Road 21)	2029
7485	Burloak Drive - (CONSTRUCTION ONLY) 4 lane urbanization from north of QEW to Upper Middle Road (BUR) (Regional Road 21)	2024
6830	Tremaine Road - Widening - 2 to 4 lanes from Dundas Street to Lower Base Line (OAK) (Regional Road 22)	2024
6834	Tremaine Road - Widening - 2 to 4 lanes from Lower Base Line to Britannia Road (MIL) (Regional Road 22)	2025
5845	Tremaine Road - Widening - 4 to 6 lanes from Highway 401 to Derry Road (MIL) (Regional Road 22)	2031
6818	Bronte Road - Widening - 4 to 6 lanes from Speers Road to Highway 407 (OAK) (Regional Road 25)	2027
6814	Regional Road 25 - Widening - 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 25)	2027
6815	Regional Road 25 - Widening - 4 to 6 lanes from Britannia Road to Derry Road (MIL) (Regional Road 25)	2027
6817	Regional Road 25 - Widening - 4 to 6 lanes from Steeles Avenue to 5 Side Road (MIL) (Regional Road 25)	2026
6811	Regional Road 25 - Widening - 2 to 4 lanes from 5 Side Road to 10 Side Road (HHS) (Regional Road 25)	2027
7682	Regional Road 25 - Reconstruction from North of Main Street to No. 32 Side Road (HHS) (Regional Road 25)	2025
6825	Upper Middle Road - Widening - 4 to 6 lanes from Appleby Line to Burloak Drive (BUR) (Regional Road 38)	2030
6828	Upper Middle Road - Widening - 4 to 6 lanes from Bronte Road to Neyagawa Boulevard (OAK) (Regional Road 38)	2029
7338	Upper Middle Road - Widening - 4 to 6 lanes from Neyagawa Boulevard to Trafalgar Road (OAK) (Regional Road 38)	2030
6826	Upper Middle Road - Widening - 4 to 6 lanes from Trafalgar Road to Grand Boulevard (OAK) (Regional Road 38)	2028
7339	Upper Middle Road - Widening - 4 to 6 lanes from Grand Boulevard to Ninth Line (OAK) (Regional Road 38)	2030
6829	Upper Middle Road - Widening - 4 to 6 lanes from Ninth Line to Winston Churchill Boulevard (OAK) (Regional Road 38)	2028
6757	"5 1/2 Line" - New 6 lane road from Britannia Road to Steeles Avenue and Interchange at Highway 401 (MIL)	2031
6810	North Service Road - New 4 lanes from Burloak Drive to Bronte Road (OAK)	2031
7494	Norval Bypass (HHS)	2026

Appendix B

Appendix B- Grade Separation BTE Calculation

RR #	Regional Road	From	To	Rail Owner	Description	Project ID	Figure ID	Constr Start Year	Rail Movement per Day (1)	Peak Hour Volumes (1)	Daily Traffic Volume (1)	Product	BTE
1	Guelph Line	McLaren Road (north)	Campbell Avenue	CP	At-grade	N/A	1	N/A	20	N/A	N/A	N/A	
3	Trafalgar Road	Maple Avenue	Princess Anne Drive	Mx	To be Grade Separated	3991	2	2024	12	1367	9,113	109,360	0.0%
3	Trafalgar Road	No 20 Side Road	Lindsay Court	CN	To be Grade Separated	5376	3	2024	25	1367	9,113	227,833	5.0%
3	Trafalgar Road	Derry Road	South of Highway 401	CP	Grade-separated	N/A	4	N/A	N/A	N/A	N/A	N/A	N/A
4	James Snow Pkwy	Waldie Avenue	Main Street	CP	Grade-separated	N/A	5	N/A	N/A	N/A	N/A	N/A	N/A
4	James Snow Pkwy	Regional Road 25	Third Line	CN	Grade-separated	N/A	6	N/A	N/A	N/A	N/A	N/A	N/A
5	Dundas Street	Appleby Line	Tremaine Road	CN	Grade-separated	N/A	7	N/A	N/A	N/A	N/A	N/A	N/A
6	Britannia Road	Tremaine Road	First Line	CN	Grade-separated	N/A	8	N/A	N/A	N/A	N/A	N/A	N/A
7	Derry Road	Tremaine Road	Bronte Street	CN	Grade-separated	N/A	9	N/A	N/A	N/A	N/A	N/A	N/A
8	Steeles Avenue	Industrial Dr	Bronte Street	CN	Grade-separated	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
8	Steeles Avenue	Tremaine Road	Industrial Dr	CP	To be Grade Separated	6819	11	2026	20	1031	6,873	137,467	5.0%
8	*Steeles Avenue*	*Regional Road 25*	*Ontario Street*		*Abandoned rail line*	N/A	*12*	N/A	N/A	N/A	N/A	N/A	N/A
20	Appleby Line	CN Crossing	South of Dundas Street	CN	Grade-separated	N/A	13	N/A	N/A	N/A	N/A	N/A	N/A
22	Tremaine Road	Steeles Avenue	16 Mile Creek	CP	Grade-separated	N/A	14	N/A	N/A	N/A	N/A	N/A	N/A
22	Tremaine Road	Burnhamthorpe Road	No 2 Side Road	CN	To be Grade Separated	6830	15	2024	29	1221	8,140	236,060	5.0%
38	Upper Middle Road	Appleby Line	Country Club Rd	CN	Grade-separated	N/A	16	N/A	N/A	N/A	N/A	N/A	N/A
N/A	5 1/2 Line	Derry Road	Steeles Ave	CP	New roadway	6757	17	2031	20	N/A	N/A	N/A	0.0%

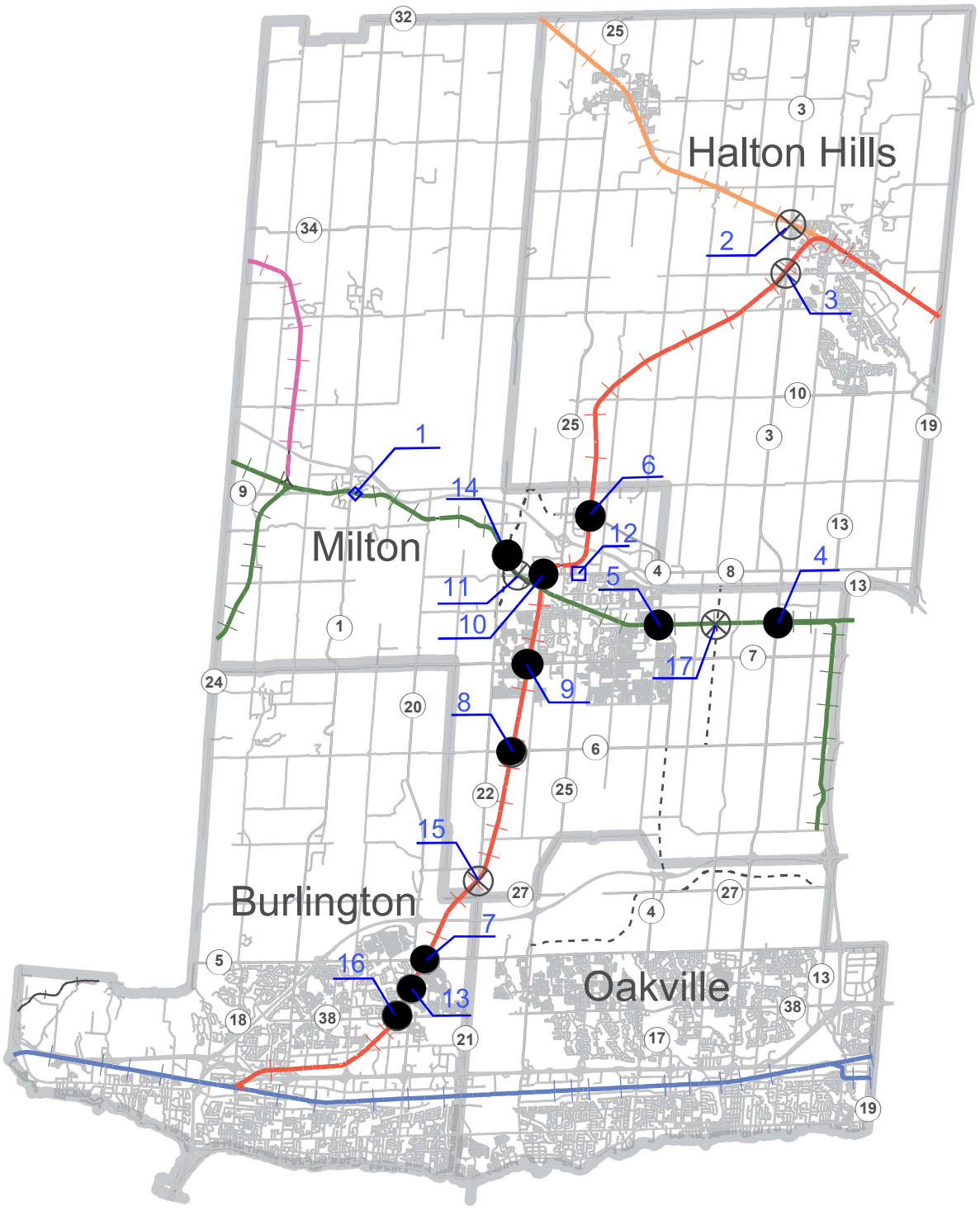
(1) As at construction year

Sample Calculation (Project ID 6830 -Tremaine Road)

PM Peak Hour volume (per model) / 15% (PM Peak percentage of daily volume) x rail movements
= 1307 / 0.15 x 29
= 252,687

Benefit to Existing allocation based on Closest % to the Product of train and vehicular traffic. In this example it is 5%.

Daily Trains x Vehicles	Benefit to Existing Development
200,000	5%
400,000	10%
600,000	15%
800,000	20%
1,000,000	25%



Halton REGION

Legend

- OSR
- CN
- CN CP
- METROLINX
- CP
- GRADE SEPARATION CROSSING (AS AT 2021)
- PROPOSED GRADE SEPARATION (2021-2031)
- PROPOSED ROAD

RAILWAY CROSSINGS

September 2021

Appendix C

Appendix C
Cost Allocation between growth and non-growth for the 2023-2031 Transportation Development & Non-Development Capital Implementation Plan

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
7567	Miscellaneous R.O.W. Purchases and Road Dedication Engineering & Surveys (REG)	0%	100%	0%	64%	36%
7853	Traffic Signal Interconnect (REG)	0%	100%	0%	64%	36%
7854	Operational Improvements (REG)	0%	100%	0%	64%	36%
2659	Guelph Line - Widening from 4 to 6 lanes from Mainway to Upper Middle Road (BUR) (Reg. Rd. 1)	0%	13%	87%	64%	36%
6805	Guelph Line - Widening from 4 to 6 lanes from Upper Middle Road to Dundas Street (Regional Road 1) (BUR)	28%	11%	89%	64%	36%
3991	Trafalgar Rd - Grade Separation at CN Crossing north of Maple Ave (HHS) (Regional Road 3)	0%	13%	87%	64%	36%
5376	Trafalgar Rd - Grade Separation at Metrolinx Crossing south of Hwy 7 (HHS) (Regional Road 3)	0%	14%	86%	64%	36%
6823	Trafalgar Road - Widening from 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 3)	0%	10%	90%	64%	36%
6827	Trafalgar Road - Widening from 4 to 6 lanes from Britannia Road to Steeles Avenue including Highway 401 Structure (MIL) (Regional Road 3)	0%	8%	92%	64%	36%

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
7756	Trafalgar Road Widening from 2 to 4 Lanes from 10 Side Road to Hwy 7 (HHS) (Regional Road 3)	0%	21%	79%	64%	36%
5839	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Britannia Road (MIL) (Regional Road 4)	0%	7%	93%	64%	36%
6806	James Snow Parkway - New 6 lane road from Highway 407 to Britannia Road (MIL) (Regional Road 4)	7%	0%	100%	64%	36%
6807	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Tremaine Road (MIL) (Regional Road 4)	0%	3%	97%	64%	36%
7487	Dundas Street - Widening from 4 to 6 lanes from Guelph Line to Halton/Hamilton Boundary, including improvements at Brant Street (BUR) Regional Road 5	0%	33%	67%	64%	36%
6757	"5 1/2 Line" - New 6 lane road from Britannia Road to Steeles Avenue & Interchange at Highway 401 (MIL)	2%	0%	100%	64%	36%
6804	Derry Road - Widening from 4 to 6 lanes from Tremaine Road to Highway 407 (MIL) (Regional Road 7)	5%	10%	90%	64%	36%
5181	Steeles Avenue - Grade Separation at CN crossing west of Bronte Street (MIL) (Regional Road 8)	0%	0%	100%	64%	36%
6819	Steeles Avenue - Widening from 2 to 4 lanes from Tremaine Road to Industrial Drive (MIL) (Regional Road 8)	0%	14%	86%	64%	36%
6821	Steeles Avenue - Widening from 4 to 6 lanes from Regional Road 25 to Trafalgar Road (MIL) (Regional Road 8)	24%	12%	88%	64%	36%
6822	Steeles Avenue - Widening from 4 to 6 lanes (with RBL) from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 8)	39%	5%	95%	64%	36%
6758	10 Side Road - Widening from 2 to 4 lanes from Trafalgar Road to Winston Churchill Boulevard (HHS) (Regional Road 10)	12%	7%	93%	64%	36%

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
6808	Ninth Line - Widening from 2 to 4 lanes from Burnhamthorpe Road to Highway 407 (OAK) (Regional Road 13)	0%	25%	75%	64%	36%
6809	Ninth Line - Widening from 2 to 4 lanes from Dundas Street to Burnhamthorpe Road (OAK) (Regional Road 13)	0%	13%	87%	64%	36%
7336	Ninth Line - Widening from 2 to 4 lanes from Steeles Avenue to 10 Side Road (HHS) Regional Road 13	0%	25%	75%	64%	36%
6824	Brant Street Widening from 4 to 6 lanes from North Service Road to Dundas Street (BUR) (Regional Road 18)	6%	10%	90%	64%	36%
3989	Winston Churchill Blvd - Widening from 2 to 4 lanes from 2km south of 5 Side Road to potential by-pass (Halton's Share) (HHS) (Regional Rd 19)	0%	30%	70%	64%	36%
5438	Winston Churchill Boulevard - Widening from 4 to 6 lanes from Dundas Street to Upper Middle Road/QEW (Halton's Share) (OAK) (Regional Road 19)	15%	20%	80%	64%	36%
6448	Winston Churchill Boulevard - Widening from 4 to 6 lanes from Highway 401 to Steeles Avenue (Halton's Share) (HHS) (Regional Road 19)	0%	21%	79%	64%	36%
6846	Winston Churchill Boulevard - Widening from 4 to 6 lanes 2km south of 5 Side Road to 5 Side Road (Halton's Share) (HHS) (Regional Road 19)	0%	27%	73%	64%	36%
6847	Winston Churchill Boulevard Widening 5-7 lanes from Steeles Avenue to 2 km South of 5 Side Road (Halton's Share) (HHS) (Regional Road 19)	0%	13%	87%	64%	36%
7494	Norval Bypass (HHS)	0%	0%	100%	64%	36%
6812	Appleby Line - Widening from 4 to 6 lanes from Fairview Street to Taywood Drive (BUR) (Regional Road 20)	0%	27%	73%	64%	36%
7689	Appleby Line at Harvester Road (Intersection Improvements) (BUR) (Regional Road 20)	0%	50%	50%	64%	36%

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
6803	Burloak Drive - Widening from 4 to 6 lanes from Harvester Road to Upper Middle Road (BUR) (Regional Road 21)	21%	28%	72%	64%	36%
7485	Burloak Drive - (CONSTRUCTION ONLY) 4 lane urbanization from north of QEW to Upper Middle Road (BUR) Regional Road 21	0%	13%	87%	64%	36%
6810	North Service Road - New 4 lanes from Burloak Drive to Bronte Road (OAK)	82%	0%	100%	64%	36%
5845	Tremaine Road - Widening from 4 to 6 lanes from Highway 401 to Derry Road (MIL) (Regional Road 22)	3%	18%	82%	64%	36%
6830	Tremaine Road - Widening from 2 to 4 lanes from Dundas Street to Lower Base Line (OAK) (Regional Road 22)	0%	12%	88%	64%	36%
6834	Tremaine Road - Widening from 2 to 4 lanes from Lower Base Line to Britannia Road (MIL) (Regional Road 22)	0%	7%	93%	64%	36%
6811	Regional Road 25 - Widening from 2 to 4 lanes from 5 Side Road to 10 Side Road (HHS) (Regional Road 25)	0%	14%	86%	64%	36%
6814	Regional Road 25 - Widening from 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 25)	7%	12%	88%	64%	36%
6815	Regional Road 25 - Widening from 4 to 6 lanes from Britannia Road to Derry Road (MIL) (Regional Road 25)	0%	16%	84%	64%	36%
6817	Regional Road 25 - Widening from 4 to 6 lanes from Steeles Avenue to 5 Side Road (MIL) (Regional Road 25)	0%	14%	86%	64%	36%
6818	Bronte Road - Widening from 4 to 6 lanes from Speers Road to Highway 407 (OAK) (Regional Road 25)	0%	9%	91%	64%	36%
6825	Upper Middle Road - Widening from 4 to 6 lanes from Appleby Line to Burloak Drive (BUR) (Regional Road 38)	29%	12%	88%	64%	36%

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
6826	Upper Middle Road - Widening from 4 to 6 lanes from Trafalgar Road to Grand Boulevard (OAK) (Regional Road 38)	38%	12%	88%	64%	36%
6828	Upper Middle Road - Widening from 4 to 6 lanes from Bronte Road to Neyagawa Boulevard (OAK) (Regional Road 38)	29%	12%	88%	64%	36%
6829	Upper Middle Road - Widening from 4 to 6 lanes from Ninth Line to Winston Churchill Boulevard (OAK) (Regional Road 38)	71%	11%	89%	64%	36%
7338	Upper Middle Road - Widening from 4 to 6 lanes from Neyagawa Boulevard to Trafalgar Road (OAK) Regional Road 38	19%	9%	91%	64%	36%
7339	Upper Middle Road - Widening from 4 to 6 lanes from Grand Boulevard to Ninth Line (OAK) Regional Road 38	38%	14%	86%	64%	36%
5426	Active Transportation Initiatives (REG)	0%	50%	50%	64%	36%
7375	Active Transportation Infill Projects (REG)	0%	50%	50%	64%	36%
7928	Active Transportation Master Plan (REG)	0%	0%	100%	64%	36%
5641	Traffic Signal Controller, timer and signing upgrades - Various Intersections (REG)	0%	50%	50%	64%	36%
6854	New Traffic Signals - Development (REG)	0%	0%	100%	64%	36%
6855	New Signalized Intersections (REG)	0%	50%	50%	64%	36%
5196	Travel Demand Management Initiative (REG)	0%	50%	50%	64%	36%

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
5431	Traffic and Screen Line Counts & Studies (REG)	0%	50%	50%	64%	36%
5444	Transportation Master Plan Study (REG)	0%	0%	100%	64%	36%
6832	Data Management Group (REG)	0%	0%	100%	64%	36%
6833	Transportation Tomorrow Survey (REG)	0%	0%	100%	64%	36%
6837	Development Charge Background Study (REG)	0%	0%	100%	64%	36%
6838	Growth Management Studies (REG)	0%	0%	100%	64%	36%
6858	Cordon Count Data (REG)	0%	0%	100%	64%	36%
7568	MTO Highway Studies (REG)	0%	0%	100%	64%	36%
7569	Urban Design Guidelines (REG)	0%	0%	100%	64%	36%
7486	Derry Road - Reconstruction from Milburough Line to McNiven Road (MIL) Regional Road 7	0%	100%	0%	64%	36%
7739	Derry Road Reconstruction from Guelph Line to Walkers Line, and Derry Road Reconstruction from Appleby Line to Tremaine Road (MIL)	0%	100%	0%	64%	36%
7741	Derry Road Reconstruction from Twiss to Guelph Line, and Derry Road Reconstruction from Walkers Line to Appleby Line (BUR)	0%	100%	0%	64%	36%

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
7740	Campbellville Road Reconstruction from Milburough Line to Campbell Avenue (MIL)	0%	100%	0%	64%	36%
7459	Winston Churchill Blvd. Roundabout and Realignment (10th Line to WCB) (HHS) (Regional Road 10)	0%	100%	0%	64%	36%
7683	Brant Street Reconstruction from Fairview Street to QEW (BUR) (Regional Road 18)	0%	100%	0%	64%	36%
5312	Winston Churchill Blvd - from Old Pine Crest Road to Credit River (HHS) (Regional Road 19)	0%	100%	0%	64%	36%
7491	Winston Churchill Boulevard - 2 lane Reconstruction from 10 Side Road to 5 Side Road (Halton's Share) - 2 (HHS) Regional Road 19	0%	100%	0%	64%	36%
7492	Winston Churchill Blvd - 17 Side Road to Old Pine Crest Road - 1 (HHS) Regional Road 19	0%	100%	0%	64%	36%
7682	Regional Road 25 Reconstruction from North of Main Street to No. 32 Side Road (HHS) (Regional Road 25)	0%	100%	0%	64%	36%
7666	Storm Pump Stations (REG)	0%	100%	0%	64%	36%
7671	Storm System Construction (REG)	0%	100%	0%	64%	36%
7808	Regional Road Tree Replacement Program (REG)	0%	100%	0%	64%	36%
7850	Streetlight Program (REG)	0%	100%	0%	64%	36%
7851	Retaining Wall Rehabilitation & Replacement Program - Various Locations (REG)	0%	100%	0%	64%	36%

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
7856	Miscellaneous Capital Works Related to Road Resurfacing (REG)	0%	100%	0%	64%	36%
7919	Road Resurfacing Capital Program (REG)	0%	100%	0%	64%	36%
7960	Miscellaneous Bridges and Culverts Rehabilitation & Replacement Program (REG)	0%	100%	0%	64%	36%
7674	Replacement Noise Attenuation Barriers (REG)	0%	100%	0%	64%	36%
6885	Vehicle Replacements - Transportation (REG)	0%	100%	0%	64%	36%
5644	Region-wide Traffic Operations Study Update (REG)	0%	100%	0%	64%	36%
7672	Replacement Noise Attenuation Studies (REG)	0%	100%	0%	64%	36%
7675	Storm Sewer Inspections, Studies, and Condition Assessments (REG)	0%	100%	0%	64%	36%
7844	Transportation Infrastructure Management System (REG)	0%	100%	0%	64%	36%
7846	Speed Reduction Education & Enforcement Campaign (REG)	0%	100%	0%	64%	36%
7847	Road Needs Study Update (REG)	0%	100%	0%	64%	36%
7848	Bridge and Culvert Inspections, Condition Assessments & Evaluation Studies (REG)	0%	100%	0%	64%	36%

Uniq ID#	Project Description	Post-Planning Period Capacity	BTE (Non-Growth)	Growth	Res	Non-Res
7849	Traffic Operations & Safety Related Studies (REG)	0%	100%	0%	64%	36%
7907	Retaining Wall Inspections, Condition Assessments and Evaluation Studies (REG)	0%	100%	0%	64%	36%
7958	Road Weather Information Systems (RWIS) Region-wide (REG)	0%	100%	0%	64%	36%
7959	Road Weather Information Systems (RWIS) Inspections & Evaluation Studies (REG)	0%	100%	0%	64%	36%
8123	Guiderail Rehabilitation & Replacement Program (REG)	0%	100%	0%	64%	36%

Appendix D

Appendix D
Post Planning Period Capacity Calculation

ID	Roadway	Construction Year	SL	SL v/c Peak dir.	Link v/c Peak dir.	PPP Calc.	PPP Credit*
2659	Guelph Line - Widening from 4 to 6 lanes from Mainway to Upper Middle Road (BUR) (Reg. Rd. 1)	2027	32	0.75	0.81	0.00%	0.00%
6805	Guelph Line - Widening from 4 to 6 lanes from Upper Middle Road to Dundas Street (Regional Road 1) (BUR)	2031	44	0.65	0.47	27.69%	27.69%
6823	Trafalgar Road - Widening from 4 to 6 lanes from Highway 407 to Britannia Rd. (MIL) (Regional Road 3)	2027	71	0.81	0.9	0.00%	0.00%
			50	0.54	0.75	0.00%	
6827	Trafalgar Road - Widening from 4 to 6 lanes from Britannia Rd. to Steeles Avenue (MIL/HHS) (Regional Road 3)	2030	55	0.91	0.98	0.00%	0.00%

ID	Roadway	Construction Year	SL	SL v/c Peak dir.	Link v/c Peak dir.	PPP Calc.	PPP Credit*
6806	James Snow Parkway - New 6-lane road from Highway 407 to Britannia Road (MIL) (Regional Road 4)	2031	50	0.54	0.89	0.00%	7.41%
			71	0.81	0.69	14.81%	
6807	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Tremaine Road (MIL) (Regional Road 4)	2030	54	0.53	0.59	0.00%	0.00%
6757	"5 1/2 Line" New 6-lane road & Interchange from Britannia Road. to Steeles Avenue (MIL)	2031	73	0.64	0.67	0.00%	1.95%
			57	0.77	0.74	3.90%	
6804	Derry Road - Widening from 4 to 6 lanes from Tremaine Rd. to Highway 407 (MIL) (Regional Road 7)	2031	16	0.85	0.72	15.29%	5.10%
			17	0.7	0.71	0.00%	
			18	0.57	0.58	0.00%	
6821	Steeles Avenue - Widening from 4 to 6 lanes from Regional Road 25 to Trafalgar Road (MIL) (Regional Road 8)	2027	16	0.57	0.3	47.37%	23.68%
			17	0.7	0.73	0.00%	

ID	Roadway	Construction Year	SL	SL v/c Peak dir.	Link v/c Peak dir.	PPP Calc.	PPP Credit*
6822	Steeles Avenue - Widening from 4 to 6 lanes (with RBL) from Trafalgar to Winston Churchill Boulevard (HHS) (Regional Road 8)	2028	16	0.85	0.3	64.71%	38.90%
			15	0.99	0.63	36.36%	
			74	0.64	0.54	15.63%	
6758	10 Side Road - Widening from 2 to 4 lanes from Trafalgar Rd to Winston Churchill Blvd. (HHS) (Regional Road 10)	2031	20	0.48	0.44	8.33%	11.98%
			74	0.64	0.54	15.63%	
6824	Brant Street Widening from 4 to 6 lanes from North Service Road to Dundas Street (BUR) (Regional Road 18)	2027	32	0.75	0.7	6.67%	5.64%
			44	0.65	0.62	4.62%	
5438	Winston Churchill Boulevard - Widening from 4 to 6 lanes from Dundas Street to Upper Middle Road/QEW (Halton's Share) (OAK) (Regional Road 19)	2030	35	0.82	0.68	17.07%	15.16%
			48	0.83	0.72	13.25%	

ID	Roadway	Construction Year	SL	SL v/c Peak dir.	Link v/c Peak dir.	PPP Calc.	PPP Credit*
6846	Winston Churchill Boulevard Widening 4-6 Lanes from Steeles Ave to 2 km south of Embleton Rd (Halton's Share) (HHS) (Regional Road 19)	2030	58	0.58	0.82	0.00%	0.00%
6812	Appleby Line - Widening from 4 to 6 lanes from Fairview Street to Taywood Drive (BUR) (Regional Road 20)	2029	28	0.51	0.57	0.00%	0.00%
			33	0.5	0.59	0.00%	
			45	0.47	0.47	0.00%	
6803	Burloak Drive - Widening from 4 to 6 lanes from Harvester Rd. to Upper Middle Rd. (BUR) (Regional Road 21)	2029	33	0.5	0.37	26.00%	20.84%
			28	0.51	0.43	15.69%	
6810	North Service Road New 4-lane road from Burloak Drive to Bronte Road (BUR/OAK)	2031	6	1.01	0.18	82.18%	82.18%
5845	Tremaine Road - Widening from 4 to 6 lanes from Highway 401 to Derry Road (MIL) (Regional Road 22)	2031	53	0.64	0.74	0.00%	3.25%
			57	0.77	0.72	6.49%	
6811	Regional Road 25 - Widening from 2 to 4 lanes from 5 Side Road to 10 Side Road (HHS) (Regional Road 25)	2027	65	0.55	0.55	0.00%	0.00%

ID	Roadway	Construction Year	SL	SL v/c Peak dir.	Link v/c Peak dir.	PPP Calc.	PPP Credit*
6815	Regional Road 25 - Widening from 4 to 6 lanes from Britannia Rd to Derry Rd. (MIL) (Regional Road 25)	2027	73	0.64	0.7	0.00%	0.00%
6814	Regional Road 25 - Widening from 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 25)	2027	49	0.53	0.59	0.00%	7.41%
			50	0.54	0.46	14.81%	
6818	Bronte Road - Widening from 4 to 6 lanes from Speers Road to Highway 407 (OAK) (Regional Road 25)	2027	29	0.35	0.64	0.00%	0.00%
			34	0.46	0.84	0.00%	
			46	0.5	0.79	0.00%	
6825	Upper Middle Road - Widening from 4 to 6 lanes from Appleby Line to Burloak Drive (BUR) (Regional Road 38)	2030	24	0.62	0.44	29.03%	29.03%
6826	Upper Middle Road - Widening from 4 to 6 lanes from Trafalgar Road to Grand Boulevard (OAK) (Regional Road 38)	2028	72	0.76	0.47	38.16%	38.16%

ID	Roadway	Construction Year	SL	SL v/c Peak dir.	Link v/c Peak dir.	PPP Calc.	PPP Credit*
6828	Upper Middle Road - Widening from 4 to 6 lanes from Bronte Rd. to Neyagawa Blvd. (OAK) (Regional Road 38)	2029	8	0.58	0.47	18.97%	29.34%
			75	0.68	0.41	39.71%	
6829	Upper Middle Road - Widening from 4 to 6 lanes from Ninth Line to Winston Churchill Blvd. (OAK) (Regional Road 38)	2028	10	0.59	0.17	71.19%	71.19%
7338	Upper Middle Road - Widening from 4 to 6 lanes from Neyagawa Blvd. to Trafalgar Rd. (OAK) (Regional Road 38)	2030	8	0.58	0.47	18.97%	18.97%
7339	Upper Middle Road - Widening from 4 to 6 lanes from Grand Blvd to Ninth Line (OAK) (Regional Road 38)	2030	72	0.76	0.47	38.16%	38.16%

** When the link crosses more than one screenline the average governs the calculation*