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Background Report

Durham Region TMP
Durham Region Transportation Planning Model Documentation

Prepared for the Regional Municipality of Durham
by IBI Group

January 2018

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1 Introduction

Durham Region is updating its Transportation Master Plan (TMP), a strategic planning document designed to define the policies, programs and infrastructure improvements required to plan for Durham Region's future transportation needs.

As part of the TMP update, the Region's travel demand forecasting tool was updated to reflect current conditions and the latest population and employment projections in order to identify transportation infrastructure required to meet Durham Region's future travel needs.

Detailed and accurate travel demand forecasts are a key technical element to support the update of Durham Region's TMP. A key tool used to forecast and assess future year travel conditions to inform the development of the road and transit network is the Durham Region Transportation Planning Model (DRTPM).

The purpose of this report is to summarize the DRTPM development process, identify network assumptions for existing and future network scenarios, and provide an overview of the modelling results.

2 The Durham Model

2.1 Model Development

The DRTPM is a four-stage multimodal transportation demand forecasting model first developed in 2008-2009 by Professor Eric Miller (University of Toronto) and HDR Inc. An update to the Durham Model was completed in 2014 by HDR to calibrate the Model to the 2011 Transportation Tomorrow Survey (TTS) and update the road and transit networks to 2012 conditions. The base year in the model represents a blend of 2011-2012 conditions, as TTS data was collected in fall of 2011 and 2012, but is commonly referred to as 2011.

The Durham Model is described at length in two reports – *DRTPM 2011/2012 Update and Recalibration* (HDR, September 2014) and *DRTPM Model Users' Guide V2* (HDR, October 2015). These reports were used to inform the work undertaken for the Durham Transportation Master Plan update.

In early 2015, unusual modelling results related to the proportion of trips destined to downtown Toronto, and GO Rail trips in particular, were identified. An issue with the modelling framework, which is maintained by the University of Toronto Travel Modelling Group (TMG), was subsequently corrected, but consequently resulted in model parameters that no longer resulted in a well-calibrated Durham Model. HDR, working with TMG and Durham Region, undertook a series of tests and made adjustments to the model parameters to re-calibrate the Model. These adjustments are documented in the *DRM11 Model Review and Testing Memo* dated October 23, 2015.

2.2 Model Coverage and Zone System

The DRTPM covers Durham Region, City of Toronto, York Region and Peel Region. Durham, Toronto and York are disaggregated to the traffic zone level, Peel is disaggregated to groups of traffic zones. Surrounding areas such as Peterborough County, City of Kawartha Lakes, and Northumberland County are represented by aggregated external zones. A summary of the model zone centroids and centroid numbering standard is shown in Exhibit 2.1. The spatial alignment of the Durham traffic zones was developed by Durham Region, which splits the GTA zones into smaller areas, while the traffic zones in Toronto, Peel, and York utilize the 2006 GTA zone system (with Peel's 230 GTA zones grouped into 132 zones). There are a total of 2,073 zone centroids coded in the model which include external zones, GO Rail Stations, and TTC Stations (with park and ride).

Exhibit 2.1: Zones in Durham Model

Area	Number of Zones	Numbering Range
Toronto	625	1 to 625
York	478	1,001 to 1,478
Peel	132	1,501 to 1,730
Durham	725	2,001 to 2,725
External	35	4,000 to 5,000
TTC Park and Ride	16	6,000 to 7,000
GO Rail Park and Ride	62	7,000 to 8,000
Total	2,073	1 to 10,000

Source: DRTPM

2.3 Base Year Network

The 2011 DRTPM road and transit networks were developed by Durham Region starting from a base network maintained by the TMG at the University of Toronto. The networks are coded following the TMG coding standards. The coding standards are outlined in the *Travel Modelling Group 2011 GTHA 2011 EMME Network Coding Standard* report and include node numbering standards, transit route assumptions, volume-delay functions (vdf), etc.

Within Durham Region, the network was updated and refined to reflect 2012 conditions. All roads and facilities outside of Durham Region (e.g. Toronto, York Region and Peel Region) are consistent with the original TMG Base Network.

2.4 Future Networks

Travel demand for two initial future year networks was generated to support the development of final network alternatives:

- **2031 Base Network** representing a low level of infrastructure improvements limited to projects that are both committed and funded; and
- **2031 Enhanced Network** representing a high level of infrastructure improvements in Durham Region including long term plans and projects that have been identified in previous studies including the previous Durham TMP, Durham Development Charge study, Durham Long Term Transit Strategy and The Big Move.

The two networks represent a low and a high level of road and transit investment, respectively, and the preferred network solution falls somewhere in between. A brief summary of the assumptions is shown in Exhibit 2.2. A list of source documents is included in Attachment A.

Exhibit 2.2: Assumptions for 2031 Base and Enhanced Networks

	2031 Base Network	2031 Enhanced Network
Regional / Local Roads	• Roads with construction activities in the Durham Region 2015 Capital Road Program and Nine-Year Forecast • Road widenings in York, Peel, Toronto in most recent capital plans	• 2031 Base Network, plus: - 2028 Development Charge Study Regional Road Network - Road widenings for several local arterials
Provincial Roads	• Improvements listed in MTO Southern Ontario Highways Program 2012 and 2014	• 2031 Base Network, plus: - Future Highway 401 Widenings - Future Highway 401 interchange modifications
Local Transit (Durham Region Transit, York Region Transit; TTC)	• 2018 Base service plan in DRT 2013-2018 Five Year Plan • York Region 2015 10 year roads and transit construction program • Local route changes in Peel and Toronto to accommodate new GTA transit projects	• 2031 Base Network, plus: - 2018 Enhanced service plan in DRT 2013-2018 Five Year Plan - Alternative E in DRT's Long Term Transit Strategy (LTTS) - Local route changes in York, Peel, and Toronto to accommodate new Regional transit projects
Regional Transit (Metrolinx)	• Metrolinx First Wave* Projects, including: - VivaNext Rapidway on Yonge Street and Highway 7 in York Region - GO Rail Richmond Hill extension to Gormley in York Region - Sheppard East RT	• 2031 Base Network, plus: - Metrolinx Next Wave* Projects, including GO Rail Lakeshore East extension to Bowmanville

Source: 2015-2020 Metrolinx Five Year Strategy. Excludes projects outside of the model area (Halton, Hamilton, etc.)

2.4.1 2031 Base Network

The 2031 Base Network represents the minimum level of expected investment meaning that only committed and funded projects are assumed.

Road Network

The upgraded Durham Region road network is based on the Durham 2015 Regional Road Program Capital Budget and Nine-Year (2015-2024) Forecast – with only roads having construction activities within this time frame included. This was the most recent program when the modelling was undertaken. Outside of Durham, the regional base network includes improvements in York Region from their 2015 10 year Roads and Transit Construction program as well as the 2014 Road Widening Schedule in Peel Region. These improvements were included within the 2031 Network provided by York Region.

A full list of Regional road and Provincial Highway expansions are shown in Exhibit 2.3. Many of the projects in Durham's Nine-Year capital plan call for 3, 5, or 7 lane widenings – meaning an equal number of travel lanes in each direction plus a two-way left turn lane. To create a more realistic representation of road capacity, these were coded as 2, 4, and 6 lanes respectively, with per-lane capacities increased to reflect the traffic operations benefits of the two-way left turn lane.

Provincial Highway Network

The 2031 Base Provincial Highway network includes committed and funded projects found in the MTO Southern Ontario Highways Program. The most recent version of this document when the modelling was conducted covers the years 2014-2018 while the base year Durham network is coded to the year 2012. Because of this, both of these documents were used to compile the 2031 Base Network which included the Highway 404 Extension, the full Highway 407 East extension, and other expansions of the Provincial Highway network. A list of these expansions is shown in Exhibit 2.4.

Local Transit Network

The 2031 base Durham Region Transit (DRT) network reflects the most recent base service plan described in the 2013-2018 DRT Five Year Plan. While this covers improvements between 2013 and 2018, this leaves a small gap between 2012 and 2013 given that the base network is from 2012. Beyond the changes in the five year service plan, any routes modified between 2012 and 2013 were also included in the 2031 Base. The largest change between 2012 and 2013 was the addition of the DRT Pulse service. Routes modified are shown in Exhibit 2.5. The following assumptions were used when coding new routes:

- DRT PULSE coded with a headway of 7.5 minutes and a speed of 27 km/hr

- Other local routes coded with 30 minute headway and speed of 20 km/hr

Outside of Durham, local route changes were taken from the network provided by York Region which included those from the York Region 2015 10-Year Roads and Transit Construction Program as well as other route modifications in Peel and Toronto to accommodate Metrolinx First Wave rapid transit projects.

Exhibit 2.3: Regional Road Expansions in 2031 Base Network

Item #	Road	From	To	Description	Const. Year
1	Brock Road #1	Taunton Road	Fifth Concession Road	Widen to 4 lanes	2018
2	Brock Road #1	Fifth Concession Road	N. of Brougham	New 4 lane bypass	2016
9	Simcoe Street #2	Conlin Road	Winchester Road	Widen to 4 lanes	2018
12	Winchester Road #3	Thickson Road	Garrard Road	Widen to 4 lanes	2016
12	Winchester Road #3	Baldwin Street	Thickson Road	Widen to 4 lanes	2019
28	Liberty Street #14	Baseline Road	King Street	Keep at 2 lanes	2021
30	Ritson Road #16	Taunton Road	Conlin Road	Widen to 4 lanes	2021
38	Bayly/Victoria Street #22	Halls Road	Seaboard Gate	Widen to 4 lanes	2016
39	Victoria Street #22	South Blair Street	Thickson Road	New alignment; Widen to 4 lanes	2018
40	Victoria/Bloor Street #22	Thickson Road	Stevenson Road	Widen to 4 lanes	2019
41	Bloor Street #22	Harmony Road	Grandview Street	Widen to 4 lanes	2023
43	Lake Ridge Road #23	Bayly Street	Kingston Road/Dundas Street	Widen to 4 lanes	2020
44	Lake RIdge Road #23	Kingston Road/Dundas Street	Rossland Road	Widen to 4 lanes	2022
48	Consumers Drive #25	Thickson Road	Thornton Road	Extend 2 lanes to Thornton	2017
50	Thickson Road #26	Wentworth Street	CNR Kingston	Widen to 4 lanes	2019
53	Thickson Road #26	Taunton Road	Wincheste Road r	Widen to 4 lanes	2022
56	Rossland Road #28	Rossland Road	Garden Street	Keep at 4 lanes	2016
58	Rossland Road #28	Ritson Road	Harmony Road	Widen to 4 lanes	2021
70	Westney Road #31	Delaney Drive	Rossland Road	Widen to 4 lanes	2016
71	Westney Road #31	Rossland Road	Taunton Road	Widen to 4 lanes	2020

Item #	Road	From	To	Description	Const. Year
72	Westney Road #31	N. Of Fifth Concession	Hwy 7	2 lane bypass	2023
73	Harmony Road #33	Rossland Road	Taunton Road	Widen to 4 lanes	2017
74	Harmony Road #33	Taunton Road	Conlin Road	Widen to 4 lanes	2018
76	Finch Avenue #37	Altona Road	Brock Road	Keep at 2 lanes	2024
78	Whites Road #38	Kingston Road	Finch Avenue	Widen to 6 lanes	2024
82	Thornton Road #52	Champlain Avenue	King Street	Keep at 2 lanes	2022
84	Stevenson Road #53	CPR Belleville	Bond Street	Keep at 4 lanes	2021
85	Stevenson Road #53	Bond Street	Rossland Road	Widen to 4 lanes	2023
88	Regional Road #57	Baseline Road	Regional Highway 2	Widen to 4 lanes	2019
97	Manning Road #58	Garrard Road	Thornton Road	New 2 lane road	2020
99	Gibb Street #59	Stevenson Road	Simcoe Street	Widen to 4 lanes	2021
100	Gibb Street #59	Simcoe Street	Ritson Road	New road and widen to 4 lanes	2024
106	Brock Street - Reg. Hwy. 12	Rossland Road	Taunton Road	Widen to 4 lanes	2017
107	Baldwin Street - Reg. Hiwy. 12	Taunton Road	Garden Street	Widen to 4 lanes	2020

Source: 2015 Durham Region Capital Road Program and Nine-year Forecast

Exhibit 2.4: Provincial Highway Improvements Included in 2031 Base Network

Road	From	To	Description	Timing
MTO Southern Highways Program, 2012-2016				
Hwy 7	Brock Road	Baldwin	2 to 4 lane widening	2013
Hwy 401	Hwy 410	Hurontario	New interchange/widening	2013
Hwy 404	Queensville	Ravenshoe	New four lane highway	2014
Hwy 404	Green Lane	Queensville	New four lane highway	2014
Hwy 407E	Brock Road	Harmony	New four lane highway	2015
Hwy 412	Hwy 401	Hwy 407	New four lane highway	2015
MTO Southern Highways Program, 2014-2018				
Hwy 401	401/403/410 Interchange	Credit River Bridge	HOV expansion	2018
Hwy 401	Holt Road		Interchange reconfiguration	2016
Hwy 401	Lake Ridge		New partial interchange	2016
Hwy 404	Hwy 407	Stouffville Road	HOV expansion	Beyond 2018
Hwy 407E	Harmony	Taunton	New four lane highway	2017
Hwy 407E	Taunton	Highway 35/115	New four lane highway	Beyond 2018
Hwy 418	Hwy 401	Hwy 407	New four lane highway	Beyond 2018
Hwy 410	Hwy 401	Queen	HOV Expansion	Beyond 2018
Hwy 427	Hwy 409	Hwy 407	HOV Expansion	2017
Hwy 427	Hwy 7	Major Mackenzie	New Highway	Beyond 2018

Source: MTO Southern Highways 2012, MTO Southern Highways 2014

Exhibit 2.5: DRT Routes Modified in 2031 Base Network

Route #	Route Name	Remark	New Headway	New Speed
900/900A	PULSE	Add two direction routes for 900 PULSE	7.5	27
910	Whitby GO - Oshawa Centre	Add two direction routes	30	20
922	Bloor - Victoria	Add one way loop route	30	20
101/101d	Industrial	Routing adjustment		
923	Bayly	Routing adjustment		
923	Bayly Victoria	Add two direction routes	30	20
103a	Amberlea/Rouge Hill	Routing adjustment		
103b	Amberlea/Highway 2	Add two direction routes	30	20
105	West Shore/South Rosebank	Combine Route 107 into Route 105		
107	South Rosebank	Remove Route 107		

Route #	Route Name	Remark	New Headway	New Speed
110/110a	Central Pickering	Routing adjustment		
112	Brock Road	Routing adjustment		
114/114b	Dixie	No change		
117	Valley Farm	Routing adjustment		
915	Taunton	Routing adjustment		
109	Rouge Hill Shuttle	Remove Route 109		
112d	Brock-Valley Farm	No change		
114d	Dixie–Sheppard	No change		
116	Sheppard	Remove Route 116		
120	Whites Road	Add two direction routes	30	20
233	Westney	Add two direction routes	30	20
219	Ravenscroft	Routing adjustment		
225/225d	Audley	Replace the two-way loop with one direction Route 225 and Route 204		
916	Rossland	Routing adjustment		
221	Central Ajax	Remove Route 221		
232	Village	Remove Route 232		
201	Central Ajax	Add one way loop route	30	20
203	Harwood North	Add two direction routes	30	20
204	Salem North	Add one direction route	30	20
301	Otter Creek / West Lynde	Routing adjustment		
307	Cochrane / Annes	Add two direction route	30	20
303	Garden	Routing adjustment		
305	Thickson/Garrard	Add two direction route	30	20
309	Garrard	Add two direction route	30	20
302	Brock/Brooklin	Routing adjustment		
305	Thickson	Routing adjustment		
310	Brooklin–UOIT	Add two direction route	30	20
308	Whitby Shores	Routing adjustment		
922	Bloor–Victoria	Replace two direction route to one way loop route		
405a	Simcoe / Harbour	Routing adjustment from existing Route 405		
405b	Simcoe / Downtown	Routing adjustment from existing Route 405		
405c	Simcoe / GO Station	Add two direction route	30	20
401	King	Routing adjustment from existing Route 401		
444	West Industrial	Routing adjustment from existing Route 403		
407a/b	Ritson	Routing adjustment		

Route #	Route Name	Remark	New Headway	New Speed
403	Stevenson	Routing adjustment from existing Route 408		
402	Thornton	Routing adjustment from existing Route 409		
410	Olive–Harmony	Routing adjustment		
916	Rossland	Routing adjustment		
404	College Hill	Remove existing D404		
405	Central Park	Remove existing D405		
406/406b	Dean	Remove existing D406		
411	Grandview	Remove existing D411		
412	Adelaide	Remove existing D412		
413	GO Shuttle	Remove existing D413		
420	Durham College GO	Remove existing D420		
421	Townline	Remove existing D421		
404	Park / Somerville	Add two direction route	30	20
406	Wilson	Add two direction route	30	20
411	Adelaide / Townline	Add two direction route	30	20
412	South Courtice	Add two direction route	30	20
414	Northeast Oshawa	Add two direction route	30	20

Source: DRT 2013-2018 Five Year Plan; 2012 DRT Route Schedule

Non-local Transit Network

The 2031 Base regional transit network only includes the First Wave committed and funded projects described in the 2015-2020 Metrolinx Five Year Strategy. Additionally, modifications to local routes as a result of adding these projects were also included. The following projects in the GTHA were included in the 2031 Base Network:

- Mississauga Highway 403 BRT
- Union Pearson (UP) Express
- Finch West LRT
- Toronto York Spadina Subway Extension (TYSSE)
- Eglinton Crosstown LRT
- Scarborough RT replacement
- Sheppard LRT
- VivaNext Rapidways
- GO Rail Richmond Hill extension

2.4.2 2031 Enhanced Network

The 2031 Enhanced Network represents the high end of anticipated infrastructure improvements with major enhancements especially to local and regional transit networks. This will also include upgraded regional facilities and moderate upgrades to the Provincial Highway network based on recently completed Environmental Assessments (EAs).

Road Network

The 2031 Enhanced Network includes 2031 Base Network improvements as well as road improvements included in the 2028 network within the 2013 Durham Region Development Charge (DC) Background Study, listed in Table E.1 on page E-13 of this document. These road improvements are shown in Exhibit 2.6. Note that this table does not include any improvements already listed as a part of the 2031 Base Network.

The 2031 Enhanced network assumes rapid transit on dedicated corridors as described in the Durham Region Long Term Transit Strategy (LTTS). Including transit lanes and road widenings on these facilities would result in some 8-lane cross-sections which is inconsistent with Durham Region policy for arterial road rights-of-way. In these situations – like on Brock Road, Whites Road, and Highway 2 – roads were widened to a maximum of 4 general purpose lanes (2 per direction) with the additional two lanes in each corridor dedicated to rapid transit. These are also noted in the table.

Provincial Highway Network

Only moderate highway expansion projects in Durham Region are included as a part of the 2031 Enhanced Network. Assumptions are based on recent EAs conducted for Highway 401 in Durham Region. Specifically, these focus on the following sections of Highway 401:

- From Salem Road to Liberty Street: 5 lanes per direction
- From Liberty Street to Highway 35/115: 4 lanes per direction
- East of Highway 35/115: 3 lanes per direction
- Significant interchange modifications at Lake Ridge Road (full interchange), Simcoe Street, Ritson Road, Harmony Road and Waverley Road.

Local Transit Network

The Enhanced DRT network includes the enhanced service plan from the DRT 2013-2018 Five Year Plan as well as the recommended transit network (Alternative E) described in the LTTS. The LTTS calls for a restructuring of routes into an arterial grid which is generally accommodated by service upgrades in the five year plan. The assumptions were used for the different

transit types included in the future base network are listed in Exhibit 2.7 and a list of all modified or added routes is shown in Exhibit 2.8.

For local routes outside of Durham, the base and enhanced networks will be the same. The only exception to this rule will be slight modifications to local routes to provide connections to rapid transit projects included in the Enhanced but not the Base Network.

Exhibit 2.6: Additional Road Improvements in 2031 Enhanced Network

Road	From	To	Description
Road Network Improvements			
Mill Street/Main Street #17	North of CPR	Concession Road 3	New 2 to 3 lane alignment
Bayly Street #22	Brock Road	Westney Road	Widen 5 to 7 lanes
Bayly Street #22	Westney Road	Harwood Avenue	Widen 5 to 7 lanes
Bayly Street #22	Harwood Avenue	Salem Road	Widen 4 to 6 lanes
Bayly Street #22	Shoal Point Road	Seaboard Gate	Widen 4 to 6 lanes
Bayly Street #22	South Blair Street	Thickson Road	New 5 Lane Alignment
Bayly Street #22	Thickson Road	Thornton Road	Widen 2/3 to 5 lanes
Bloor Street #22	Merritt Street	Ritson Road	Widen 4 to 5 lanes
Bloor Street #22	Ritson Road	Farewell Street	Widen 3 to 5 lanes
Bayly Street #22	Prestonvale Road	Courtice Road	Widen 2 to 3 lanes
Consumers Drive (#25)	Thickson Road	Thornton Road	New 2 lane Connection
Thickson Road #26	Consumers Drive	Dundas Street	Widen 5 to 7 lanes
Altona Road #27	Strouds Lane	Finch Avenue	Widen 2 to 3 lanes
Rossland Road #28	Harmony Road	Townline Road	New 3 lane alignment
Rossland Road #28	Brock Road	Sideline 22	New 4 Lane alignment
Rossland Road #28	Sideline 22	Highway 7	New 4 Lane alignment
Liverpool Road #29	Hwy 401	Kingston Road	Widen 5 to 7 lanes
Westney Road #31	Hwy 401	Kingston Road	Widen 5 to 7 lanes
Hopkins Street #36	Consumers Drive	Dundas Street	Widen 2 to 3 lanes
Martin Road #57	King St. (Hwy 2)	Nash Road	Widen 2 to 4 lanes
Adelaide Avenue #58	Townline Road	Trulls Road	New 3 lane bridge and road
Whitevale Road Realignment	Brock Road	Golf Club Road	New 4 lane connection
Whitevale Road Realignment	Golf Club Road	York Durham Line	New 2 lane connection
Toronto Street – Reg Hwy 47	York Durham Line	Goodwood Road	Widen 2 to 4 lanes
Road Network Improvements on Rapid Transit (RT) Corridors			
Brock Road #1	Bayly Street	Finch Avenue	Widen 5 to 7 lanes (2 lanes dedicated to RT)
Brock Road #1	Finch Avenue	Taunton Road	Widen 5 to 7 lanes (2 lanes dedicated to RT)
Brock Road #1	Taunton Road	Fifth Concession	Widen 4 to 6 lanes (2 lanes dedicated to RT)
Brock Road #1	Fifth Concession Road	N. limit of Brougham	Widen 4 to 6 lanes (2 lanes dedicated to RT)

Road	From	To	Description
Taunton Road #4	Pickering-Toronto-Bdry.	Brock Road	Widen 4 to 6 lanes (2 lanes dedicated to RT)
Taunton Road #4	Brock Rd	Brock Street/Baldwin Street	Widen 5 to 7 lanes (2 lanes dedicated to RT)
Whites Road #38	Finch Avenue	Third Concession Road	Widen 2 to 6 lanes (2 lanes dedicated to RT)
Whites Road #38	Third Concession Road	Taunton Road	New 6 lane alignment (2 lanes dedicated to RT)
Whites Road #38	Taunton Road	Whitevale Road	New 6 lane alignment (2 lanes dedicated to RT)
Whites Road #38	Whitevale Road	Highway 7	New 4 lane alignment (2 lanes dedicated to RT)
Whites Road #38	Whitevale Road	Highway 7	Widen 4 to 6 lanes (2 lanes dedicated to RT)
Kingston Road - Reg. Hwy. 2	Pickering-Toronto-Bdry.	Whites Road	Widen 5 to 7 lanes (2 lanes dedicated to RT)
Kingston Road - Reg. Hwy. 2	Whites Road	Notion Road	Widen 5 to 7 lanes (2 lanes dedicated to RT)
Kingston Road - Reg. Hwy. 2	Westney Road	Hwy 412	Widen 5 to 7 lanes (2 lanes dedicated to RT)
Baldwin Street - Reg. Hwy. 12	Taunton Road	Garden Street	Widen 2 to 5 lanes (2 lanes dedicated to RT)

Source: Durham 2013 Development Charge Study; Durham Long Term Transit Strategy (LTTS)
Note: 2031 Enhanced Network also includes improvements from 2031 Base Network

Exhibit 2.7: Assumptions for DRT Routes in 2031 Enhanced Network

SERVICE TYPE	ASSUMPTIONS
Conventional services	• Change existing arterial routes to conventional grid • 20 minute or better headways in urban areas • 60 minute or better headways in rural
Enhanced Conventional Services	• 10 minute headways
Bus rapid Transit (BRT) in median lanes	• 5 minute headways • Exclusive median bus lanes • Speed of 28 km/hr
Light rail transit (LRT) in median lanes	• 5 minute headways • Exclusive median LRT lanes • Speed of 30 km/hr

Exhibit 2.8: DRT routes modified in 2031 Enhanced Network

EMME Line Name	Route	Remark	Headway	Speed
Conventional and Enhanced Conventional Services Recommended in LTTS				
D233	Westney	Extended the existing route to Lake Driveway and increase headway from 20 min to 10 min	10	
D403	Stevenson	Increase headway from 30 min to 10 min	10	
D410B	Harmony	Add a two-direction route from Hwy 7 to Bloor Street, the combined headway is 10 min on this corridor	20	20
D933	Courtice	Add a two-direction route from Baseline Road to Pebblestone Road	10	20
D916B	Rossland	Add a two-direction route from Brock Road to Courtice Road, the combined headway is 10 min on this corridor	20	20
D923	Bayly-Victoria-Bloor	Add a two-direction route from Brock Road to Courtice Road, the combined headway is 10 min on this corridor	10	20
D944	Highway 2	Add a two-direction route from Courtice Road to Hwy 35/115	10	20
D305	Thickson	Increase headway from 30 min to 10 min	10	
D150	Columbus	Add a two-direction route from Brock Rd to Montgomery Avenue	10	20
D290B	Salem North	Add a two-direction route from Hwy 7 to 8th Concession	10	20
D955	Highway 7	Add a two-direction route from Brock Road to Grandview Street	20	20
D290	Salem North	Add a two-direction route from Taunton Road to Hwy 7	20	20
D280	Westney North	Add a two-direction route from Taunton Road to Hwy 407	20	20
BRT and LRT Services Recommended in LTTS				
D990	Taunton LRT	Add two direction route from Whites Road to Simcoe Street, add mode "a" and "l" to transit links	5	30
D991	Highway 2 LRT	Add two direction route from Altona Road to Courtice Road, add mode "a" and "l" to transit links	5	30
D992	Simcoe LRT	Add two direction route from Highway 407 to Bloor Street, add mode "a" and "l" to transit links	5	30
D961	Highway 7 BRT	Add two direction route from Ashburn Road to Simcoe Street, add mode "a" and "q" to transit links	5	28

EMME Line Name	Route	Remark	Headway	Speed
D962	Highway 7 BRT	Add two direction route from York Durham Line to Brock Road, add mode "a" and "q" to transit links	5	28
D963	Taunton BRT	Add two direction route from York Durham Line to Whites Road, add mode "a" and "q" to transit links	5	28
D964	Brock Road BRT	Add two direction route from Bayly Street to Highway 7, add mode "a" and "q" to transit links	5	28
D965	Whites BRT	Add two direction route from Bayly Street to Highway 7, add mode "a" and "q" to transit links	5	28
D966	Brock Street BRT	Add two direction route from Victoria Street to Highway 7/Winchester Road, add mode "a" and "q" to transit links	5	28
D967	Salem BRT	Add two direction route from Rossland Road to Taunton Road, add mode "a" and "q" to transit links	5	28
D968	Harwood BRT	Add two direction route from Westney Road to Kingston Road, add mode "a" and "q" to transit links	5	28
Enhanced Services Recommended in 2018 DRT Five Year Plan				
D101	Industrial	Add reverse loop to the existing one-way loop		
D222	Audley South	Routing adjustment		
D226	Duffins	Remove route		
D226	Westney Harwood South	Add two-way loop routes	30	20
D224	Harwood	Remove route		
D227	Mackenzie-Salem South	Add two-direction routes	30	20
D406	Wilson	Routing adjustment		
D410	Olive-Harmony	Routing adjustment		
D411	Adelaide-Townline	Routing adjustment		
D412	South Courtice	Routing adjustment		
D900	PULSE	Routing adjustment	5	28
D923B	Bayly-Bloor	Routing adjustment		
D501	Aspen Springs	Remove route		
D512	North Bowmanville	Add two-way loop routes	30	20
D514	Liberty	Routing adjustment from existing D502		
D502	Liberty	Remove route		
D513	South Bowmanville	Add two-direction routes	30	20
D203	Hardwood North	Increase frequency from 30 min to 20 min	20	20

EMME Line Name	Route	Remark	Headway	Speed
D233	Westney	Increase frequency from 30 min to 20 min	20	20
D301	Mcquay/Michael	Increase frequency from 30 min to 20 min	20	30
D307	Cochrane/Annes	Increase frequency from 30 min to 20 min	20	20
D309	Garrard	Increase frequency from 30 min to 20 min	20	20
D402	Thornton-UOIT	Increase frequency from 30 min to 20 min	20	20
D410	Olive-Harmony	Increase frequency from 30 min to 20 min	20	23
D405C	Simcoe	Increase frequency from 30 min to 20 min	20	20

Non-Local Transit Network

The enhanced regional transit network includes Next Wave Metrolinx projects from the 2015-2020 plan. This will provide a high level of regional transit capacity allowing relief on the road network. The following projects are included in the 2031 network.

- Downtown Relief Line (eastern section only)
- Yonge North Subway Extensions
- GO Rail Peak Service to Bowmanville (30 minute service) with stations at:
  - Thornton's Corners Station
  - Central Oshawa Station
  - Darlington Station (Courtice)
  - Bowmanville Station

2.5 Network Coding External to Durham Region

For the network beyond Durham Region, York Region, City of Toronto and Peel Region shared their 2031 road and transit network files to support the development of the 2031 networks in the DRTPM.

The networks provided by York Region were coded using the TMG standards and were developed from the same TMG base network used in the DRTPM. However, the networks provided by Peel Region and Toronto did not use the same coding standard and could not be easily imported in to the DRTPM. A review of York Region's 2031 network indicated that the future road and transit

network changes in Peel Region and Toronto were already included in York's network file. Thus, the 2031 network files from York Region were used as the basis for the future network outside of Durham Region.

Exhibit 2.9: Sources for 2031 Base Road Network (links and nodes)

Link/Node Type or location	Min Value	Max Value	Source*
Centroids/Connectors	0	9999	2012 Durham Network
Toronto	10000	19999	2031 York Network
Durham	20000	29999	2012 Durham Network
York	30000	39999	2031 York Network
Peel	40000	49999	2031 York Network
Halton	50000	59999	2012 Durham Network
Hamilton	60000	69999	2012 Durham Network
Niagara	70000	79999	2012 Durham Network
Wellington	85001	86999	2012 Durham Network
Dufferin	87001	87999	2012 Durham Network
Simcoe	88001	89999	2012 Durham Network
Kawartha Lakes	90001	90999	2012 Durham Network
Peterborough	91001	91999	2012 Durham Network
Waterloo	82001	84999	2012 Durham Network
Haldimand	80000	80999	2012 Durham Network
Brant	81001	81999	2012 Durham Network
External Zones Canada	94001	94999	2012 Durham Network
External Zones USA	95001	95999	2012 Durham Network
BRT/LRT	96001	96999	2012 Durham Network
Subway	97000	97999	2031 York Network
GO Rail	98001	98999	2031 York Network
HOV	900000	999999	2031 York Network

*Note that links connecting nodes from different sources (e.g. York Network to/from Durham Network) were taken from the 2012 Durham Network

Exhibit 2.10: Sources for 2031 Base Transit Network

Agency	Source
Durham Region Transit	2012 Durham Network
Viva/York Region Transit	2031 York Network
Toronto Transit Commission	2031 York Network
MiWay	2031 York Network
GO Rail	2012 Durham Network
GO Bus	2012 Durham Network
Other Metrolinx Projects	2031 York Network

3 Model Results

3.1 Population and Employment

For the demand forecasting using the DRTPM, base year and future year land use forecasts allocated by traffic zone were used as summarized in Exhibit 3.1 and Exhibit 3.2.

The planned growth is allocated to various areas in Durham Region, following the framework set forth by the Regional Structure. The major growth areas include Seaton in Pickering, Brooklin in Whitby, Courtice, Bowmanville and Newcastle in Clarington and Regional Urban Growth Centres in Pickering and Oshawa. With the adoption of ROPA 128, previously identified growth areas that were included in the assessments for the Long-Term Transit Study, were removed from the current 2031 forecasts. Thus, the allocation of population and employment in the current 2031 land use forecasts excludes growth in areas such as North Oshawa and Northeast Pickering.

Certain demographic and socio-economic data are also required as input to the DRTPM. For the TMP horizon years, Hemson Consulting provided forecasts at the planning district level for:

- Age structure
- Driver’s license status
- Employment status
- Vehicle distribution
- Workforce distribution
- Student proportions
- Work at home proportions
- Work outside of model area
- Jobs filled by workers living outside of model area
- Full-time and part-time jobs by job type

Exhibit 3.1: Population in Durham and Surrounding Area, 2011 and 2031

Population	2011	2031	Growth	% Growth
Pickering	92,400	188,600	96,200	104%
Ajax	114,100	137,300	23,200	20%
Whitby	127,000	191,900	64,900	51%
Oshawa	155,800	195,100	39,300	25%
Clarington	88,000	139,600	51,600	59%
Scugog	22,600	22,100	-500	-2%
Uxbridge	21,500	23,500	2,000	9%
Brock	11,800	13,800	2,000	17%
Durham Region	**633,100**	**912,000**	**278,900**	**44%**
Downton Toronto (PD1)	235,300	322,000	86,700	37%
Rest of Toronto	2,484,400	2,757,900	273,500	11%
City of Toronto	2,719,700	3,079,900	360,200	13%
York Region	1,073,800	1,497,800	424,000	39%
Peel Region	1,334,600	1,682,000	347,400	26%
Total	**5,761,200**	**7,171,700**	**1,410,500**	**24%**

Exhibit 3.2: Employment in Durham and Surrounding Areas, 2011 and 2031

Employment	2011	2031	Growth	% Growth
Pickering	34,200	80,800	46,600	136%
Ajax	28,800	44,600	15,800	55%
Whitby	38,900	71,400	32,500	84%
Oshawa	50,100	85,400	35,300	70%
Clarington	18,100	36,200	18,100	100%
Scugog	7,700	8,900	1,200	16%
Uxbridge	7,200	8,900	1,700	24%
Brock	3,400	4,400	1,000	29%
Durham Region	**188,400**	**340,500**	**152,100**	**81%**
Downton Toronto (PD1)	483,700	571,300	87,600	18%
Rest of Toronto	1,131,600	1,262,900	131,300	12%
City of Toronto	1,615,300	1,834,200	218,900	14%
York Region	509,700	778,800	269,100	53%
Peel Region	685,600	887,800	202,200	29%
Total	**2,999,000**	**3,841,300**	**842,300**	**28%**

3.2 2031 Base and Enhanced Scenarios

The projected growth in population and employment will result in a corresponding growth in travel demand by residents and employees living and working within the Region. The DRTPM was used to project travel demand to 2031.

Exhibit 3.3 and Exhibit 3.4 provide a high-level summary of key metrics of the 2031 Base and Enhanced travel demand scenarios for the AM and PM peak period, respectively.

Growth in travel demand is comparable to the growth in population and employment. In the AM peak period, trips are projected to grow by 43% and in the PM peak period trips are projected to grow by 55%. These compare to development growth of about 52% (population and employment combined).

Transit trips are growing slightly faster than auto trips, resulting in an increase in transit mode share. However, the absolute increase in auto trips is approximately ten times the increase in transit trips.

With less transit investment in the Base Network, auto trips will grow faster in that scenario. With the substantial transit investment in the Enhanced Network, transit ridership will grow by 63%, and there is a resultant shift in travel demand from auto trips to transit trips. Overall, the Enhanced Network has less auto travel and auto delay while the number of trips made on Durham Region Transit in the morning peak period triples compared to 2011 conditions.

Exhibit 3.3: High-level Summary of Model Results – AM Peak Period

METRIC	2011	2031 BASE			2031 ENHANCED		
		Demand	Growth	% Growth	Demand	Growth	% Growth
Auto Trips (Origin in Durham)	236,900	338,000	101,100	+43%	332,700	95,800	+40%
Transit Trips (Origin in Durham)	28,500	41,200	12,700	+45%	46,800	18,300	+64%
Total Trips (origin in Durham)	265,400	379,300	113,900	+43%	379,500	114,100	+43%
Transit share	10.7%	10.9%	-	+1%	12.3%	-	+15%
Vehicle km travelled (peak hour)	1,075,700	1,466,900	391,200	+36%	1,469,600	393,900	+37%
Vehicle hour travelled (peak hour)	17,200	26,200	9,000	+52%	24,000	6,800	+40%
DRT Boardings	18,300	36,200	17,900	+98%	54,200	35,900	+196%
DRT Passenger km	79,700	177,400	97,700	+123%	305,620	225,920	+283%
DRT Passenger hours	3,000	6,660	6,700	+223%	11,200	8,200	+273%
GO Boardings	17,400	22,900	5,500	+32%	24,000	6,600	+38%

Exhibit 3.4: High-level Summary of Model Results – PM Peak Period

METRIC	2011	2031 BASE			2031 ENHANCED		
		Demand	Growth	% Growth	Demand	Growth	% Growth
Auto Trips (Dest.in Durham)	272,800	421,600	148,800	55%	406,300	133,500	49%
Transit Trips (Dest. in Durham)	23,400	37,200	13,800	59%	38,900	15,500	66%
Total Trips (Dest. in Durham)	296,000	458,700	162,700	55%	445,200	149,200	50%
Transit share	7.9%	8.1%	-	+3%	8.7%	-	+11%
VKT (peak hour)	1,232,300	1,635,100	402,800	33%	1,588,500	356,200	29%
VHT (peak hour)	20,100	29,100	9,000	45%	26,000	5,900	29%
DRT Boardings	18,200	39,400	21,200	116%	45,900	27,700	152%
DRT Passenger km	70,100	150,400	80,300	115%	185,300	115,200	164%
DRT Passenger hours	2,600	5,800	6,700	258%	7,100	4,500	173%
GO Rail Boardings	13,200	15,200	2,000	15%	17,600	4,400	33%

3.3 Development of 2031 Preferred Network

The travel demand forecasts and the resulting network performance, along with sensitivity tests on key network elements, were used in the assessment of network modifications. The individual project reviews were then used to develop the preferred 2031 network.

The lower transit investment under the Base Network would result in lower transit ridership and higher auto use when compared to the Enhanced Network. The limited road network expansion under the Base Network compared to the Enhanced Network would also result in roadway congestion in many areas. Corridors running parallel to Highway 401 would be congested, and the congestion would divert traffic further north to alternative corridors such as Taunton Road, Highway 407 and Highway 7. Overall, the Base Network does not meet the needs for anticipated growth to 2031.

The Enhanced Network results in higher transit mode shares than the Base Network, but not to a significant degree given the greater road capacity also available. Transit levels of capacity is greater than what is required. In particular, many of the higher-order transit corridors identified in the LTTS did not achieve sufficient ridership levels to justify implementation by 2031.

Assessment of these network scenarios served to inform the development of the 2031 Preferred Network that represents a hybrid of the two scenarios in terms of road, transit, and active transportation networks. An overview of the 2031 preferred network is presented in Exhibit 3.5.

Exhibit 3.5: Overview of 2031 Preferred Network

	2031 Preferred Network
Regional / Local Roads	• 2031 Base Network - Roads with construction activities in the Durham Region 2015 Capital Road Program and Nine-Year Forecast • Plus - Expansion of key corridors for high-occupancy vehicle lanes (e.g., sections of Taunton Road and Bayly Street / Victoria Street / Bloor Street) - Road expansions for network connectivity (e.g. Consumers Drive extension)
Provincial Roads	• 2031 Base Network: - Improvements listed in MTO Southern Ontario Highways Program 2012 and 2014 • Plus - Highway 401 widening and interchange improvements
Durham Region Transit	• 2031 Base Network: - 2018 Base service plan in DRT 2013-2018 Five Year Plan • Plus - 2018 Enhanced service plan in DRT 2013-2018 Five Year Plan - Highway 2 RT - Simcoe RT - Network of High Frequency Transit routes - Local routes to connect to RT and other Regional transit projects
Metrolinx	• 2031 Base Network: - Metrolinx First Wave* Projects, including: VivaNext Rapidway on Yonge Street and Highway 7 in York Region; GO Rail Richmond Hill extension to Gormley in York Region; Sheppard East RT • Plus - GO Rail Lakeshore East extension to Bowmanville

A more detailed description of the development of the preferred road and transit networks can be found in the Road Network Development Report and the Higher-Order Transit Strategy Development Report, respectively.

The recommended transit and road network are presented Maps 1A and 1B (2031 Higher-Order Transit Network) and Maps 4A and 4B (2031 Road Expansion Projects) in the Durham Transportation Master Plan Final Report.

Exhibit 3.6: High-level Summary of Model Results – AM Peak Period

METRIC	2011	2031 BASE			2031 PREFERRED		
		Demand	Growth	% Growth	Demand	Growth	% Growth
Auto Trips (Origin in Durham)	236,900	338,000	101,100	+43%	333,200	96,300	41%
Transit Trips (Origin in Durham)	28,500	41,200	12,700	+45%	46,300	17,800	62%
Total Trips (origin in Durham)	265,400	379,300	113,900	+43%	379,500	114,100	43%
Transit share	10.7%	10.9%	-	+1%	12.2%		14%
Vehicle km travelled (peak hour)	1,075,700	1,466,900	391,200	+36%	1,469,900	394,200	37%
Vehicle hour travelled (peak hour)	17,200	26,200	9,000	+52%	23,900	6,700	39%
DRT Boardings	18,300	36,200	17,900	+98%	54,200	35,900	196%
DRT Passenger km	79,700	177,400	97,700	+123%	287,200	207,500	260%
DRT Passenger hours	3,000	6,660	6,700	+223%	10,700	7,700	257%
GO Boardings	17,400	22,900	5,500	+32%	23,900	6,500	37%

Exhibit 3.7: High-level Summary of Model Results – PM Peak Period

METRIC	2011	2031 BASE			2031 PREFERRED		
		Demand	Growth	% Growth	Demand	Growth	% Growth
Auto Trips (Dest.in Durham)	272,800	421,600	148,800	55%	403,100	130,300	48%
Transit Trips (Dest. in Durham)	23,400	37,200	13,800	59%	41,400	18,000	77%
Total Trips (Dest. in Durham)	296,000	458,700	162,700	55%	444,500	148,500	50%
Transit share	7.9%	8.1%	-	+3%	9.3%		18%
VKT (peak hour)	1,232,300	1,635,100	402,800	33%	1,574,900	342,600	28%
VHT (peak hour)	20,100	29,100	9,000	45%	25,700	5,600	28%
DRT Boardings	18,200	39,400	21,200	116%	45,900	27,700	152%
DRT Passenger km	70,100	150,400	80,300	115%	181,300	111,200	159%
DRT Passenger hours	2,600	5,800	6,700	258%	7,100	4,500	173%
GO Rail Boardings	13,200	15,200	2,000	15%	17,900	4,700	36%

3.4 Sensitivity Analyses

3.4.1 2031 Base with Highway 401 widening

The widening of Highway 401 has been identified in previous Environmental Assessments; however, funding for the widening has not yet been committed by the Province through the Southern Ontario Highways program. For the purposes of the transportation modelling, the Highway 401 widening was assumed in the 2031 Enhanced Network, but not the 2031 Base Network.

To test the impacts of the Highway 401 widening, a sensitivity analysis was conducted where the assumed Highway 401 widening in the Enhanced Network was added to the Base Network. That is, Highway 401 was widened to 10 lanes easterly from Salem Road to Liberty Street and to 8 lanes from Liberty Street to Highway 35/115.

A more detailed discussion of the traffic impacts of the Highway 401 widening is documented in the Roads Network Development Report. In summary, the sensitivity analysis indicated that without the widening, Highway 401 is highly congested. The widening provides additional east-west capacity but also attracts new traffic to the corridor. With the widening, auto traffic is drawn to the highway from parallel corridors in the range +1,400 to +2,000 peak direction, peak hour auto trips. Through Pickering and Ajax (west of Salem Road), capacity constraints will persist with or without the widening.

3.4.2 2031 Enhanced without GO Extension to Bowmanville

The extension of GO Rail to Central Oshawa and further east to Bowmanville has significant transportation and mobility benefits. Currently, GO Rail's Lakeshore East line terminates at Oshawa GO Station on Bloor Street at Thornton Road. The Big Move (2008) identified the potential easterly extension of the Lakeshore East line to Bowmanville in the 15-year plan. In June 2016, the Province announced funding to expand GO Rail service to Bowmanville on the CP rail line by 2024 with four new stations: Thornton's Corners, Central Oshawa, Courtice and Bowmanville.

To assess the impacts of the GO Rail extension, a series of network alternatives were tested. Four alternative networks were modelled as variations of the 2031 Enhanced Network: Lakeshore East terminates at existing Oshawa Station (Do Nothing), Extension of Lakeshore East to Bowmanville via Central Oshawa (equivalent of 2031 Enhanced Network), Extension via CN line, and Extension of Lakeshore East to Central Oshawa only.

A discussion of the GO rail extension to Bowmanville and the implications to the road network is documented in the Roads Network Development Report.

In summary, extending to Bowmanville results in 1,700 (7.5%) additional in GO Rail trips which would otherwise be travelling by automobile.

3.4.3 Beyond 2031 Demand

The current Regional Official Plan allocates growth to 2031. In order to establish road network needs beyond 2031, a preliminary forecast of the "full build-out" of anticipated future development areas was developed by Regional staff. These land use forecasts, as shown in Exhibit 3.8, are intended for use in this preliminary assessment of travel demand Beyond 2031 only as they do not account for intensification within the existing urban areas.

The forecasts include 2056 population and employment in the Future Growth Areas identified in the Growing Durham study, which formed the background work to prepare Regional Official Plan Amendment 128 (the Region's Growth Plan Conformity exercise). The forecasts used in the Beyond 2031 analysis also includes the urban expansion areas of northeast Pickering and parts of north Oshawa, Whitby and Courtice that were included in the Council-adopted ROPA 128 but not included in the OMB approved ROPA 128 in January 2013. Outside of Durham, the 2041 municipal totals from the Provincial Growth Plan were used to factor up population and employment for the municipalities within the GTA. Outside of the GTA, the growth between 2031 and 2041 for the "Outer Ring" municipalities was used to factor up population and employment for the external zones in the model.

Exhibit 3.8: Population and Employment Growth Beyond 2031

	Population 2031	Employment 2031	Future Growth Areas Population 2056	Future Growth Areas Employment 2056	Population 2056	Employment 2056
Ajax	137,300	44,600	-	-	137,300	44,600
Brock	13,800	4,400	-	-	13,800	4,400
Clarington	139,600	36,200	128,800	19,700	268,400	55,900
Oshawa	195,100	85,400	19,800	11,200	215,000	96,600
Pickering	188,600	80,800	61,300	19,800	249,800	100,600
Scugog	22,100	8,900	-	-	22,100	8,900
Uxbridge	23,500	8,900	-	-	23,500	8,900
Whitby	191,900	71,400	19,300	5,600	211,200	77,000
Durham	**912,000**	**340,500**	**229,200**	**56,300**	**1,141,100**	**396,800**
Growth					+25%	+17%

The Beyond 2031 population and employment forecasts and the 2031 proposed road network were used to develop travel demand for the Beyond 2031 scenario.

Travel demand is expected to increase by 25% region-wide as shown in Exhibit 3.9. The growth in travel demand is concentrated in the new urban areas north of Highway 7 as well as in Clarington. The northern parts of Pickering and Whitby have significant stretches of east-west corridors that are at capacity.

Additional capacity improvements will be required to accommodate growth beyond 2031.

Exhibit 3.9: Beyond 2031 Travel Demand (AM Peak Period)

METRIC		2031 BASE	BEYOND 2031	
			Demand	% Diff
Auto Trips (Destination in Durham)	Peak Period	338,040	423,500	+25%
Transit Trips (Destination in Durham)	Peak Period	41,230	52,300	+27%
Total Trips (Destination in Durham)	**Peak Period**	**379,270**	**475,800**	**+25%**
Transit share (on 2031 Network)	Peak Period	10.9%	11.0%	+2%

4 Summary

The DRTPM was used as a tool to assist in the development of the recommended road and transit networks for 2031. The Road Network Development Report and the High-Order Transit Network Development Report document the assumptions, travel demand forecasts, network alternatives and findings in developing an integrated transportation system to meet the needs of Durham Region to the year 2031 and beyond.

Attachment A - Resources

Region of Durham, Works Department, 2015 Regional Road Program Capital Budget and Nine Year Forecast, February 11, 2015 **(2015 Capital Road Program and Nine Year Forecast)**

Regional Municipality of Durham, Durham Region Transit, Long Term Transit Strategy Final Report, March 2010 (**Durham LTTS)**

Durham Region Transit 2013-2018 Five Year Transit Plan, October 2013 (**DRT 2013-2018 Five Year Plan)**

Metrolinx, The Big Move, November 2008 (**The Big Move)**

Metrolinx, 2015-2020 Five Year Strategy, September 2014 (**Metrolinx Five Year Strategy)**

MTO Southern Ontario Highways Program, 2012-2016 (**MTO Southern Highways 2012)**

MTO Southern Ontario Highways Program, 2014-2018 (**MTO Southern Highways 2014)**

Region of Durham, Regional Development Charge Background Study, March 19 2013 (**Durham 2013 DC Study)**

Durham Region Transportation Master Plan Consolidation, November 2005 (**Durham 2005 TMP)**

York Region 2031 Base Network (**York 2031 Network)**

City of Toronto 2031 Based Network (**Toronto 2031 Network)**

York Region 2015 10 year Roads and Transit Capital Construction Program, February 26, 2015

Peel Region 2014 Road Widening Schedule, November 5, 2013