



AREA SERVICING PLAN (3RD SUBMISSION)

June 2013

407 West Employment Area, North Oakville West

PREPARED FOR:



PREPARED BY:



D14-013-28

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Appendix A: Water Modeling Results
Appendix B: Wastewater Drainage Plans and Design Sheets
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1.0 Introduction

This Area Servicing Plan (ASP) has been prepared for Bentall Kennedy (Canada) LP on behalf of bclMC Realty Corp., who have significant ownership in the 407 West Employment Area in North Oakville West. The 407 West Employment Area is the area bounded by Dundas Street on the south, Tremaine Road on the west, Highway 407 ETR on the north and Bronte Road on the east. This is an area identified for future urban development by the Regional Municipality of Halton (Region) and the Town of Oakville (Town) in Official Plan Amendment OPA 198. The majority of the Secondary Plan for North Oakville West (OPA 289) was approved by the OMB on December 4, 2009; there is an area of the lands which are still under appeal and generally consist of the lands between Bronte Road and the natural heritage area (14 Mile Creek) to the west of Bronte Road. The approved Secondary Plan requires the completion of the Master Servicing Plan to confirm infrastructure requirements.

This report has been prepared as a component of the North Oakville West Secondary Plan (NOWSP). This report is the work of MMM Group Limited (MMM), however, in certain instances as referenced in the report, utilizes research and input from other available sources. This report is intended to satisfy the Secondary Plan requirement for the preparation of a Master Servicing Plan. Subsequent to the approval of the North Oakville West Secondary Plan (NOWSP) the Region has asked that the name Master Servicing Plan be replaced with Area Servicing Plan to avoid confusion with the Regional Water and Wastewater Master Plan. The Report has therefore been prepared to address the requirements of the Secondary Plan (Master Servicing Plan) and the Area Servicing Plan (ASP).

This report addresses the servicing issues by providing conceptual frameworks for the extension and development of water and wastewater systems. To facilitate orderly development of its infrastructure, the Region of Halton recently prepared an update to its Halton Water and Wastewater Master Plan. The Region's report entitled "Sustainable Halton Water and Wastewater Master Plan" – September 2011, has served as a starting point for the review of the Secondary Plan servicing requirements.

The purpose of this ASP is to apply the Region's proposed servicing concept to the specific Secondary Plan land use proposal and to suggest refinements that are required to each to facilitate orderly development. As noted above, this report satisfies the requirements in the approved Secondary Plan. It satisfies the requirements of the ASP Terms of Reference prepared by the Region of Halton.

The specific purposes of this report are to provide:

- Detailed information on proposed land uses.
- Detailed information on system demands (water) and flows (wastewater).
- A specific plan for implementing the Region's Master Plan in and around the 407 West Employment Area.
- A discussion of the impact that the proposed development of the 407 West Employment will have on planned Regional Infrastructure in terms of proposed capacity and timing.

1.1 Proposed Development

The 407 West Employment Area along with the Sixteen Hollow Area form the North Oakville West Secondary Plan. This study evaluates only the 407 West Employment Area (Area bound by RR25 (Bronte Road), Hwy 407, Tremaine Rd., and Dundas St.). The study area contains, for the most part, proposed

employment lands as well as a significant Natural Heritage System. The Land Use Concept Plan, shown as Exhibit 1.1, was prepared by MMM based on more detailed study but is generally consistent with the NOWSP Master Plan. The total site area of the development lands and natural areas is approximately 251 hectares (620 ac). The total developable area is approximately 155 hectares (383 ac) or approximately 60% of the total site area.

To evaluate both vertical infrastructure (pumping stations, reservoirs, treatment plants) and linear infrastructure, the anticipated equivalent population values were considered. It is anticipated that the majority of the development in the study area will consist of employment uses, including General/Light Employment, Office Development and related Service/Commercial uses. The equivalent population for the proposed land use is 125 cap/ha. This value is based on the Equivalent Population Density for Light Industrial land use, as specified in the Halton Design Standards.

As noted in the Planning Rationale Report, for each of the criteria, the more conservative land use (commercial or industrial) has been used in the calculation for all development to allow for maximum flexibility for development of these lands and to ensure that all the future and existing infrastructure to be utilized by this development is adequate. This does not represent the anticipated development mix of commercial and industrial properties, which will be determined through site-specific development applications and subject to further detailed design. It should be noted that the more conservative land use (commercial or industrial) may differ depending on the criteria; therefore some calculations will assume all of the developable land is to be industrial and others will assume that all of the developable land is to be commercial.

AREA SERVICING PLAN FOR
407 WEST EMPLOYMENT AREA

LAND USE PLAN

LEGEND

- 407 WEST EMPLOYMENT AREA
- EXISTING PROPERTY LINE
- SUBJECT PROPERTY
- SERVICE AREA (SERVICE/RETAIL/OFFICE)
- LIGHT EMPLOYMENT
- GENERAL EMPLOYMENT
- EMPLOYMENT (SPECIFIC USE TBD)
- OPEN SPACE
- STORMWATER MANAGEMENT
- PLANNED 407 TRANSITWAY

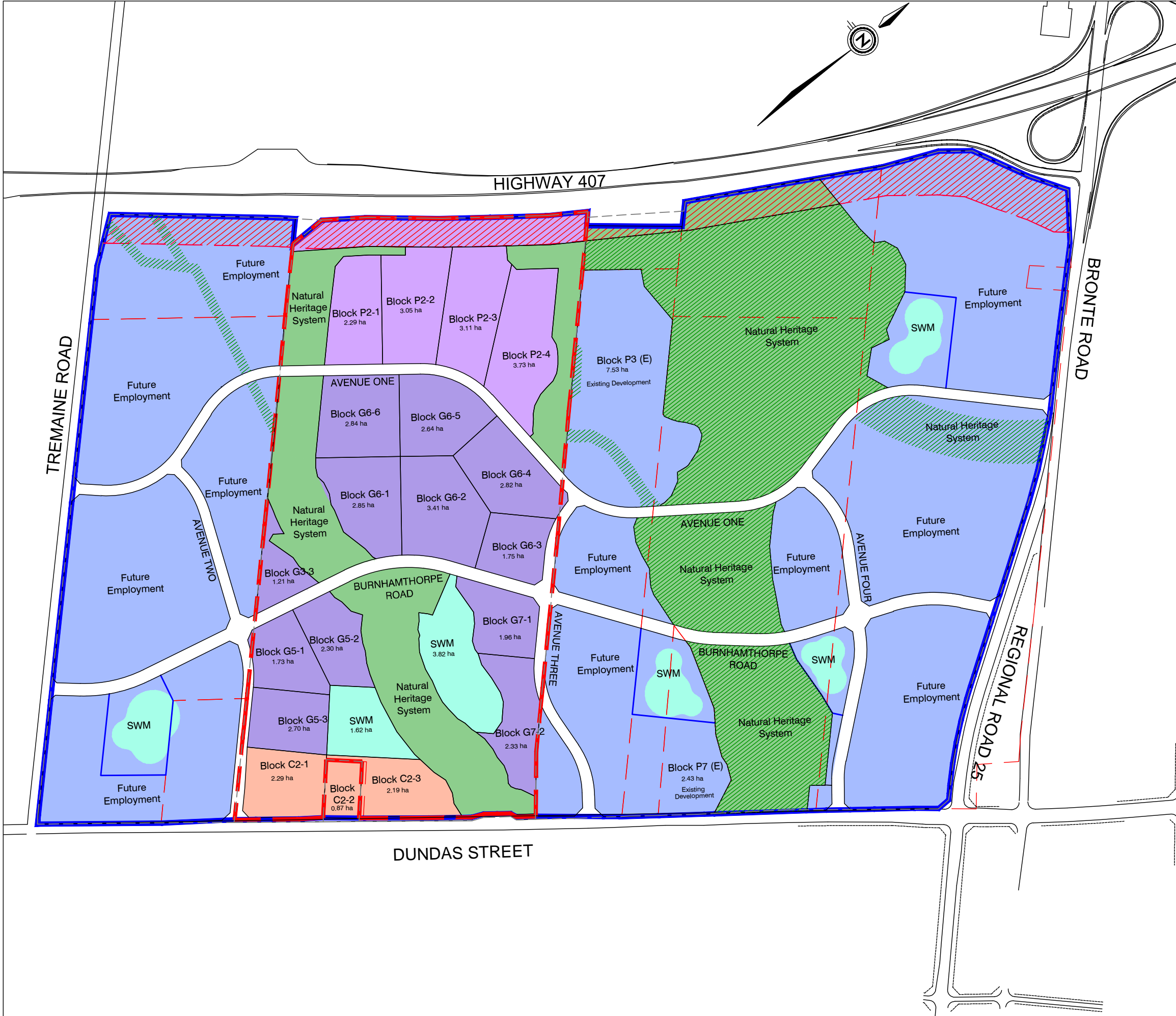
SITE STATISTICS

TOTAL SITE AREA: 251.0 Ha
EMPLOYMENT AREA: 140.70 Ha
OPEN SPACE: 68.3 Ha
STORMWATER MANAGEMENT AREA: 14.0 Ha
PLANNED 407 TRANSITWAY: 12.3 Ha
ROAD AREA: 15.7 Ha

FOR THE PURPOSES OF OUR CONCEPTUAL
SERVICING ANALYSIS, CONSERVATIVE LAND USE
ASSUMPTIONS HAVE BEEN MADE FOR THE ENTIRE
407 WEST EMPLOYMENT AREA



Client	Prepared by
	
Date	Project No.
JUNE 2013	1409222.001
EXHIBIT 1.1	



1.2 Timing and Phasing

It is anticipated that the 407 West Employment Area will begin initial phases of development in 2014 with occupancy in 2015. The development will likely be phased with the first phase adjacent to Dundas Street and future phases extending northward due to proximity to Regional Infrastructure.

1.3 Consultation with the Region of Halton

At the outset of this study, the Region of Halton was consulted with respect to its proposed infrastructure plans as generally set out in its report “Sustainable Halton Water and Wastewater Master Plan”.

1.4 Interim Servicing

This Report has been prepared to provide the Region of Halton with a plan for the overall servicing of the 407 West Employment Area in a comprehensive fashion. The Region’s Master Plan and investigations by the Study Team identify that there may be opportunities to service early stages of the Employment Area through interim measures, particularly along Dundas Street West.

Some of the major infrastructure required to service the 407 West Employment Lands have been identified as Development Charge (DC) funded projects. The majority of these projects will be completed in advance of development or occupancy of the 407 West Employment Lands, however, there may be the need for front-end funding for some regional projects or interim servicing arrangements to allow for development of the 407 West Employment Area for the initial phases of development.

If necessary to accommodate seamless development between phases, additional interim servicing arrangements should be investigated.

1.5 Report Organization

This Report has been organized as follows:

1.0 Introduction

This chapter defines the purpose of the report and describes the Study Area and the proposed development.

2.0 Water

This chapter reviews the proposed water infrastructure required to service the Study Area. The review applies the Halton Master Plan Concept to the 407 West Employment Area Land Use Plan and recommends refinements to the servicing plan.

3.0 Wastewater

This chapter reviews the proposed wastewater infrastructure required for the Study Area. The review applies the Halton Master Plan Concept to the 407 West Employment Area Land Use Plan and recommends refinements to the servicing plan.

4.0 Timing

This chapter discusses the timing requirements for regional water and wastewater projects to facilitate the development of the 407 West Employment Area.

2.0 Water

2.1 Region's Water & Wastewater Master Plan Update – September 2011

The Region's 'Sustainable Halton Water and Wastewater Master Plan' dated September 2011 set out a strategy for the long term and orderly development of the Region's infrastructure. This report was prepared in response to the new Growth Plan (ROPA 38) and Phasing (ROPA 39). In the case of water, this report addressed supply, pressure districts, storage and distribution. This report also addresses timing. It provided conceptual information on the location of proposed infrastructure; however, this is subject to more detailed review when considering the servicing corridors available through the road network that is proposed as part of the Land Use Plan for the 407 West Employment Area.

This ASP report has been prepared to develop on and complement the Region's plans by providing more specific information on how it can be implemented in the context of the specific plans for the 407 West Employment Area. Therefore, to provide appropriate context, the Region's Plan as it relates to the 407 West Employment Area is summarized in this section.

2.1.1 Supply

Historically, water supply for South Halton has come from three main sources; the Burlington Water Purification Plant, the Oakville Water Purification Plant, and wells within Milton (to service specific areas of Milton).

The 2002 Master Plan concluded that the long-term growth of Halton would require the construction in stages of a new water treatment plant that will have an ultimate capacity of 220 ML/d. The first stage of this new plant (Burloak) is now complete and commissioned.

This new supply is critical to meet the Region's medium and long-term growth projections for both the 407 West Employment Area and the Region as a whole.

2.1.2 Pressure Districts

The subject lands are located within the Oakville pressure district identified as Zone 3 or O-3. Zone 3 in Oakville includes all lands with an elevation of 128 to 166m. The zone boundary is generally parallel to Sixteen Mile Creek on the east, along Highway 407 to the north, along Tremaine Road to the west, and generally in between Upper Middle Road and the Q.E.W. to the south as shown on Exhibit 2.1.

Supply for Zone 3 is currently via a booster pumping station at Eighth Line and Upper Middle Road and the Kitchen Reservoir and Pump Station at Regional Road 25 and Upper Middle Road. Storage is provided at the Moore Reservoir on Sixth Line north of Burnhamthorpe Road (north of Dundas Street).

The Region of Halton has recently constructed a 1200mm watermain on Dundas Street from Tremaine Road to Bronte Road. This watermain will directly supply the 407 West Employment Area. In the future, the supply to Zone 3 will be augmented via a 1200mm watermain connection on Dundas Street from 400m east of Bronte Road to Neyagawa Boulevard. This supply will be connected to the existing Zone 3 water supply (Moore Reservoir on Sixth Line) via the existing 600mm watermain on Dundas Street connecting to

the existing Sixth Line main which links the Eighth Line Water Booster Pumping Station (WBPS) with the Moore Reservoir. The 407 West Employment Area will also receive supply from the Burlington Zone B3 via a 900mm watermain on Dundas Street from Appleby Line to Tremaine Road.

2.1.3 Storage

Storage for Oakville Zone 3 is currently provided at the R.J. Moore Reservoir on Sixth Line. Until 2002, Zone 3 also provided the storage for Zone 4, where it was pumped to Zone 4 on an as required basis. In 2002, an elevated storage tank was constructed in Zone 4 on Trafalgar Road north of Burnhamthorpe Road.

The existing storage available in Oakville Zone 3 and the Headon reservoir in Burlington which is connected to the supply system adjacent to the 407 West Employment Area is sufficient for long term build-out of the 407 West Employment Area as well as all other lands serviced by Zone 3.

2.1.4 Distribution

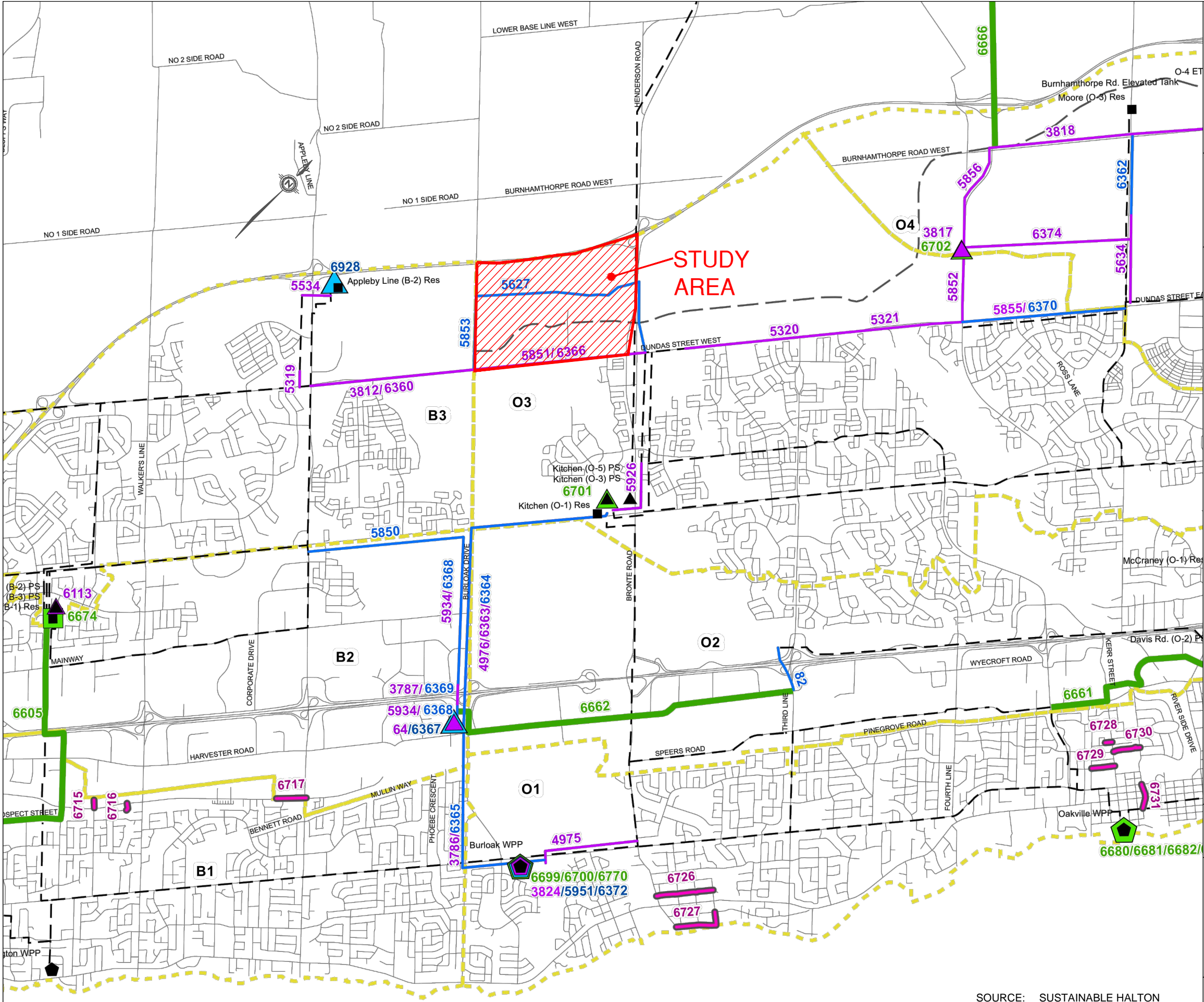
Development in Oakville is currently serviced via a series of trunk watermain that connect sources of supply, pumping, and storage to a local distribution network.

To support growth, the Region proposes a series of new trunk watermain that interconnect with and expand the existing system and connect to the new proposed sources of supply, pumping and storage as described above. The 407 West Employment Area will connect to the existing Zone 3 system at Dundas Street and Bronte Road, at Dundas Street and Tremaine Road where it connects to the Burlington Zone B3 system and internally through the 407 West Employment Area (Regional Project #5627) between Tremaine Road and Bronte Road. Water service will be distributed to the local network from the Dundas Street and the internal regional watermain.

2.1.5 Region's Timing and Development Charge Projects

Exhibit 2.2 summarizes the Region's proposed timing and cost (from the Sustainable Halton Water and Wastewater Master Plan) for the completion of the water system construction required to service the 407 West Employment Area and other interdependent areas of Oakville and Milton.

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AREA SERVICING PLAN FOR
407 WEST EMPLOYMENT AREA

REGIONAL WATER PLAN

Legend

Existing Infrastructure

- Water Pumping Station
- Water Well
- Water Standpipe
- Water Reservoir
- Water Purification Plant
- Elevated Water Tower
- Existing Watermain

Previously Approved Infrastructure

- Water Pumping Station
- Water Well
- Water Purification Plant
- Water Reservoir
- Watermain (Proposed/Upgrade Infrastructure)

Proposed/Upgrade Infrastructure

- Water Pumping Station
- Water Well
- Water Purification Plant
- Water Reservoir
- Watermain
- Distribution-Built Boundary Watermain

Funded Infrastructure

- Water Pumping Station
- Water Reservoir
- Watermain (Proposed/Upgrade Infrastructure)

Other

- Existing Interregional connections
- Existing Milton Groundwater Servicing
- Existing Central Milton Groundwater Service Area Boundary
- Water Pressure Zones
- Proposed Lake Base Service Area

Scale		NTS	
Client		Prepared by	
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		EXHIBIT 2.1	

SOURCE: SUSTAINABLE HALTON
WATER AND WASTEWATER
MASTER PLAN, AECOM 2013

Exhibit 2.2 – Region's Water Projects

Project	Development Charge Cost	Region's ID #'s	Estimated In-Service Date
Supply			
Additional Zone 3 Pump at Washburn Reservoir	\$999,962	6113	2013
Appleby Booster Pump Station	\$10,274,000	6928	2015
Sub-Total	\$11,273,962		
Transmission			
900mm WM on Dundas Street - Appleby Line to Tremaine Road	\$13,136,000	3812/6360	2013
1200mm WM on Dundas Street – Tremaine Road to Bronte Road	\$8,088,000	5851/6366	2013
1200mm WM from Kitchen Res/BPS to Bronte Road and North to West Oak Trail	\$7,094,000	5926	2012
Sub-Total	\$28,318,000		
Local			
600mm WM on Tremaine Road - Dundas Street to approx. 950m North	\$1,330,000	5853	w/ Development*
600mm WM through North Oakville Lands - Tremaine Road to Bronte Road	\$7,238,000	5627	w/ Development*
Sub-Total	\$8,568,000		
TOTAL	\$48,159,962		

*Subject to Financing

Projects and costs shown in Exhibit 2.2 have been taken from the Sustainable Halton Water and Wastewater Master Plan, and confirmed with the Region. Some of the works described will also provide service to other areas of Halton.

The infrastructure described above will be constructed on an as-required basis for each phase of development. For example, the 600mm watermain on Tremaine Road from Dundas Street to the proposed new East-West Road within the 407 West Employment Area will not be constructed until the proposed development plan proceeds. In many instances, works such as the treatment plants, storage, and pumping stations will be constructed incrementally. In the case of linear infrastructure, it will be extended incrementally to provide local service connectivity and looping.

2.2 Expected Water Demand

In this section, water demands under various conditions have been assessed using the design criteria that the Region has utilized in the Master Plan and supplemented with the Region's Design Criteria as required. To develop the estimated demands, the system design criteria is first set out and then applied to the proposed development statistics from Exhibit 1.1.

The flow demand, storage volume requirements, and pumping station capacities are similar to those used by the Region in developing the Master Plan. Any difference in the demand estimated in the Master Plan is due to an increase of undevelopable natural heritage areas throughout the 407 West Employment Area.

Exhibit 2.3 sets out the system unit demands. Exhibit 2.4 summarizes the Water System Design Criteria.

Exhibit 2.3 – System Unit Demands

	Residential L/cap/day	Commercial m³/ha/day	Industrial m³/ha/day	Institutional m³/ha/day
Average Day Demand	314	26.00	17.63	10.94
Maximum Day Peaking Factor	1.9	1.9	1.9	1.9
Peak Hour Peaking Factor	3.00	3.00	3.00	3.00

Exhibit 2.4 – Water System Design Criteria

Component	Condition/Description	Criteria
Pumping Stations	With adequate zone storage available	Maximum day flow to zone and all subsequent zones
	Without adequate storage available	The greater of peak hour flow or maximum day plus fire to the zone and the maximum day flow to all subsequent higher zones
Storage	Balancing storage	25% of maximum day demand
	Fire storage	Largest expected fire zone (based on land use)
	Total	125% of Balancing + Fire (allows for 25% Emergency Storage)
Fire flow	Minimum flow (single family residential)	5,500 L/min for 2 hours @ minimum 140 kPa (20 psi)
	Minimum flow (industrial/commercial/institutional)	15,000 L/min for 3 hours @ minimum 140 Pa (20 psi)
System pressure	Normal operating conditions	280 kPa (40 psi) to 700 kPa (100 psi)

Exhibit 2.5 summarizes the projected demands under various conditions for the 407 West Employment Area at build-out by applying the above criteria to the development statistics described in Exhibit 1.1. Commercial land use demands have been applied to the entire site to provide a conservative estimate and to allow for flexibility with respect to the ultimate land use mix.

Exhibit 2.5 – Flow Demands: Linear Infrastructure (407 West Employment Area Land Use Plan Population Projections)

	Residential (ML/d)	Commercial (ML/d)	Industrial (ML/d)	Institutional (ML/d)	Total (ML/d)
Average Day Demand	0.0	4.1	0.0	0.0	5.3
Maximum Day	0.0	7.7	0.0	0.0	10.1
Peak Hour	0.0	12.2	0.0	0.0	16.0

2.3 Region's Concept Plan Applied to the 407 West Employment Area

One of the important purposes of this report is to apply the Region's Master Plan Update water distribution concept to the approved North Oakville West Secondary Plan for the 407 West Employment Area. As stated at the outset of this Report, the Report's purpose is to adapt the Region's servicing concept to the approved Secondary Plan, not to modify it. As a result of this principle, and because the estimated demand based upon the approved Secondary Plan is similar to the demand assumed by the Region, no changes are recommended to the Region's proposed supply, pumping, or storage system network.

The development of a community plan has however created the opportunity, and in fact the need, for a 'plan specific' trunk water main distribution network to be developed to replace the generic one that the Region applied in the absence of a Secondary Plan.

The proposed ASP water distribution network is illustrated in Exhibit 2.6. To address environmental sensitivities and minimize impact, all mains are proposed to be located on existing or proposed road allowances.

The proposed ASP water distribution system is essentially the same as the distribution from the Region's Master Plan Update (MPU) with minor changes based on the outcome of land uses proposed by the approved Secondary Plan. The following key elements of the proposed distribution network that are the same as the Region's MPU water system include:

- The recently constructed 1200mm PD3 supply main on Dundas Street from Bronte Road to Tremaine Road (Region Project # 5851/6366); and
- The 600mm PD3 watermain on Tremaine Road from Dundas Street to the proposed East-West Collector through the 407 West Employment Area (Region Project #5853).

Changes to the network to respond to the proposed Land Use Plan and road pattern include the following minor changes to the Region's MPU.

- A slight relocation of the east-west 600mm watermain to better match the proposed road alignment (Region Project # 5627).

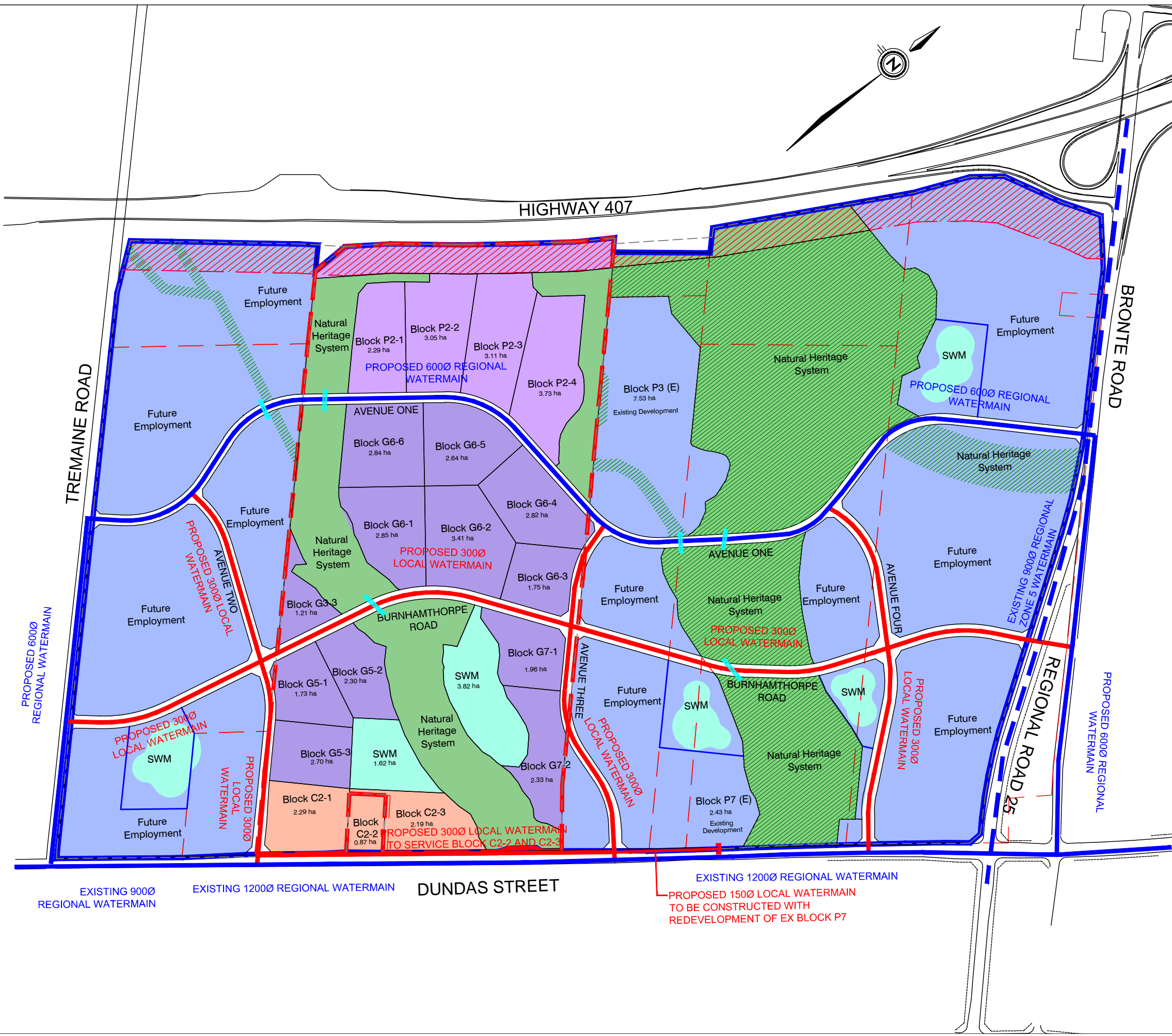
Finally, to maintain required fire flows and adequate pressure during all phases of development, the local north-south watermain should connect to the 1200mm diameter watermain on Dundas Street.

The proposed changes to the distribution system will have no change to the development charge projects.

2.4 Water Distribution Modelling Analysis

The Region of Halton provided a copy of the Region's Water Distribution Model dated August 12, 2008 to assist MMM in modelling the proposed Area Servicing Plan watermain system. The following recommendations are based on the update of the Region's model to include the proposed ASP watermain system shown in Figure 2.6.

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AREA SERVICING PLAN FOR 407 WEST EMPLOYMENT AREA

WATER DISTRIBUTION PLAN

LEGEND

- 407 WEST EMPLOYMENT AREA
- EXISTING PROPERTY LINE
- SUBJECT PROPERTY
- SERVICE AREA (SERVICE/RETAIL/OFFICE)
- LIGHT EMPLOYMENT
- GENERAL EMPLOYMENT
- EMPLOYMENT (SPECIFIC USE TBD)
- OPEN SPACE
- STORMWATER MANAGEMENT
- PLANNED 407 TRANSITWAY
- EXISTING REGIONAL WATERMAIN
- PROPOSED REGIONAL WATERMAIN
- PROPOSED LOCAL WATERMAIN
- FUTURE CULVERT CROSSING

FOR THE PURPOSES OF OUR CONCEPTUAL SERVICING ANALYSIS, CONSERVATIVE LAND USE ASSUMPTIONS HAVE BEEN MADE FOR THE ENTIRE 407 WEST EMPLOYMENT AREA



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Date		Project No.	
JUNE 2013		1409222.001	
		EXHIBIT 2.6	

2.4.1 Water Distribution Modelling Results for Peak Hour and Maximum Day

The proposed ASP system was incorporated into the Region of Halton's Water Distribution Model to determine if the proposed ASP water system would be adequate to service the 407 West Employment Area. Exhibit 2.7 summarizes the results of the distribution modelling. Copies of the Peak Hour and Maximum Day model results have been included in Appendix A.

Exhibit 2.7 – Results of Water Distribution Modelling for Proposed ASP Water System

	Peak Hour	Maximum Day
Minimum HGL	190.19 m	196.15 m
Node for Minimum HGL	WJ-1152-O	NO-247
Maximum HGL	190.89 m	196.20 m
Node for Maximum HGL	NO-245,246,251,252, WJ-3114-O, & WJ-3116-O	NO-245,246,251,252, WJ-150-O, WJ3114-O, & WJ-3116-O
Minimum System Pressure (psi)	40.99 psi	48.58 psi
Node for Minimum System Pressure	NO-239	NO-239
Maximum System Pressure (psi)	62.39 psi	69.94 psi
Node for Maximum System Pressure	NO-252	NO-252

The results of the distribution modelling show that the proposed ASP water system will provide adequate flow and pressure to all locations in the ultimate development condition. It should be noted that the maximum headloss in the proposed system is only 0.08m during a maximum day demand and 0.18m during a peak hour demand. The low headloss in the overall system indicates that the watermain sizes are adequately sized and that increasing the watermain sizes from the existing 1200/600mm trunk watermain and the 300mm distribution watermain is not required.

During the initial phases of development, all attempts will be made to provide full looping of the internal water distribution systems; this may require interim or temporary watermain. In cases where looping is not possible, a regular flushing program will be required at all dead ends.

2.4.2 Water Distribution Modelling Results for Maximum Day plus Fire

The proposed ASP system was also modelled to determine if the proposed water distribution system could meet the Region's fire requirements of 5,500 L/minute for residential development and 15,000 L/minute for commercial/institutional/industrial development.

The results of the maximum day plus fire modelling indicate that the fire flow of 15,000 L/minute (250L/s) at a residual pressure of 20 psi is available at all nodes within the 407 West Employment Area. Therefore, it can be concluded that the proposed ASP water system is adequately sized for the maximum day plus fire demands. All office towers and large scale industrial buildings will likely require boosters to provide proper fire protection; this needs to be evaluated at the detailed design stage on a case-by-case basis.

2.5 Additional Design Considerations

2.5.1 Local Service Watermains

The 407 West Employment Area Land Use Plan proposes developments that front onto external roads such as Dundas Street, Tremaine Road, and Bronte Road where Regional DC watermains are proposed. These proposed developments will require water services and in some cases may require local watermains to service these developments. The ASP primarily addresses the watermain sizes for the transmission and major distribution watermains. Local distribution mains have been preliminarily sized in the study but will need to be addressed in more detail through the Functional Servicing Reports supporting the various Draft Plans of Subdivision and will be in accordance with the Region's published standards for water connections. Each proposed building will need to be evaluated at the detailed design stage to determine if a booster is required for that development to meet the water demand and fire service requirements.

2.5.2 Mitigation Measures for Single Feed Watermain Supplies

The ultimate water distribution is a well-designed network of interconnected watermains with multiple loops to ensure security and flexibility in servicing the full build out of the proposed Area Servicing Plan. While it is a priority to loop systems where possible and as soon as the opportunity is available, it will be necessary to service development areas with single feed watermains during various phases of development until the future watermain loops can be constructed. The phasing will likely move to the north from Dundas Street West, which may create circumstances where there are single feed, dead-end watermains. During the interim condition of single feed watermains, a regular flushing practice will be required to maintain water quality. The frequency of the flushing program will be determined in conjunction with the Region of Halton and the Town of Oakville.

2.5.3 Mitigation Measures for Watermain Crossings of Watercourses and Natural Heritage

In order to provide a robust water distribution system with complete looping, it will be necessary for the watermain to cross watercourses and the Natural Heritage System (NHS). Wherever possible, the watermain alignment will be kept within the proposed Right-of-Way (ROW) and will go over the culvert structure or hung on a bridge structure if a bridge is utilized.

In circumstances where going over the culvert or hanging the watermain on a bridge is not possible, the watermain will be installed using a trenchless technology such as jack and bore or directional drilling below the watercourse or natural feature preferably within ROW. The watermain should be installed using a steel liner or another acceptable form of protective casing, with the launching and receiving pits positioned as far as practically possible from the watercourse or natural feature. All crossings should be a minimum of 2.2m below the watercourse or natural feature and must follow all geotechnical recommendations.

Where the culvert or bridge structure requires piles or other deep foundations and the use of trenchless construction is not feasible within the ROW, the watermain alignment will be moved outside of the ROW to a point where it will not influence the structure foundation. The launching and receiving pits will be located as far as practically possible from the watercourse or natural feature. The alternative alignments and profiles of the proposed water distribution system with respect to the crossings are shown on Drawings P1-13.

The crossing of any Redside Dace habitat watercourse will require review and approval from the Ministry of Natural Resources (MNR) prior to the construction of the crossing infrastructure. Each crossing permit will have specific requirements from the MNR; however for the crossings within the 407 West Employment Lands, it should be expected that the following will be required:

- Construction will be during the permissible Redside Dace in-water construction window of July 1st to September 15th
- Construction will utilize trenchless construction methods
- Utilities will be installed at a depth of at least 2m below the bottom of a Redside Dace habitat watercourse
- A specific contingency plan will need to be prepared for each crossing to address all concerns of the construction methodology proposed
- All disturbed soils will need to be stabilized using a methodology approved by the MNR
- Erosion and Sediment control measures will remain in place until final restoration has been completed.

3.0 Wastewater

3.1 Region's Water & Wastewater Master Plan

In developing its Water and Wastewater Master Plan, the Region considered a wide variety of possible strategies to service the expected growth with respect to both treatment and conveyance. The conclusions of the Region's work with respect to treatment and conveyance (including conveyance options) as it affects the 407 West Employment Area are summarized in the following sections.

3.1.1 Treatment

Wastewater treatment for Oakville is provided at three Wastewater Treatment Plants (WWTP). These plants are Mid-Halton, Oakville South East, and Oakville South West. The recommended alternative in the Master Plan proposed that all wastewater treatment for growth in Oakville and Milton be at the Mid-Halton WWTP.

The first phase of Mid-Halton WWTP was constructed in 1991 with a rated capacity of 20,000 m³/d. It was subsequently re-rated to 25,000m³/d. The Region completed an expansion of the plant to 50,000 m³/d in 2003 and has subsequently completed the next expansion to 75,000 m³/d in order to service anticipated growth within Milton and Oakville.

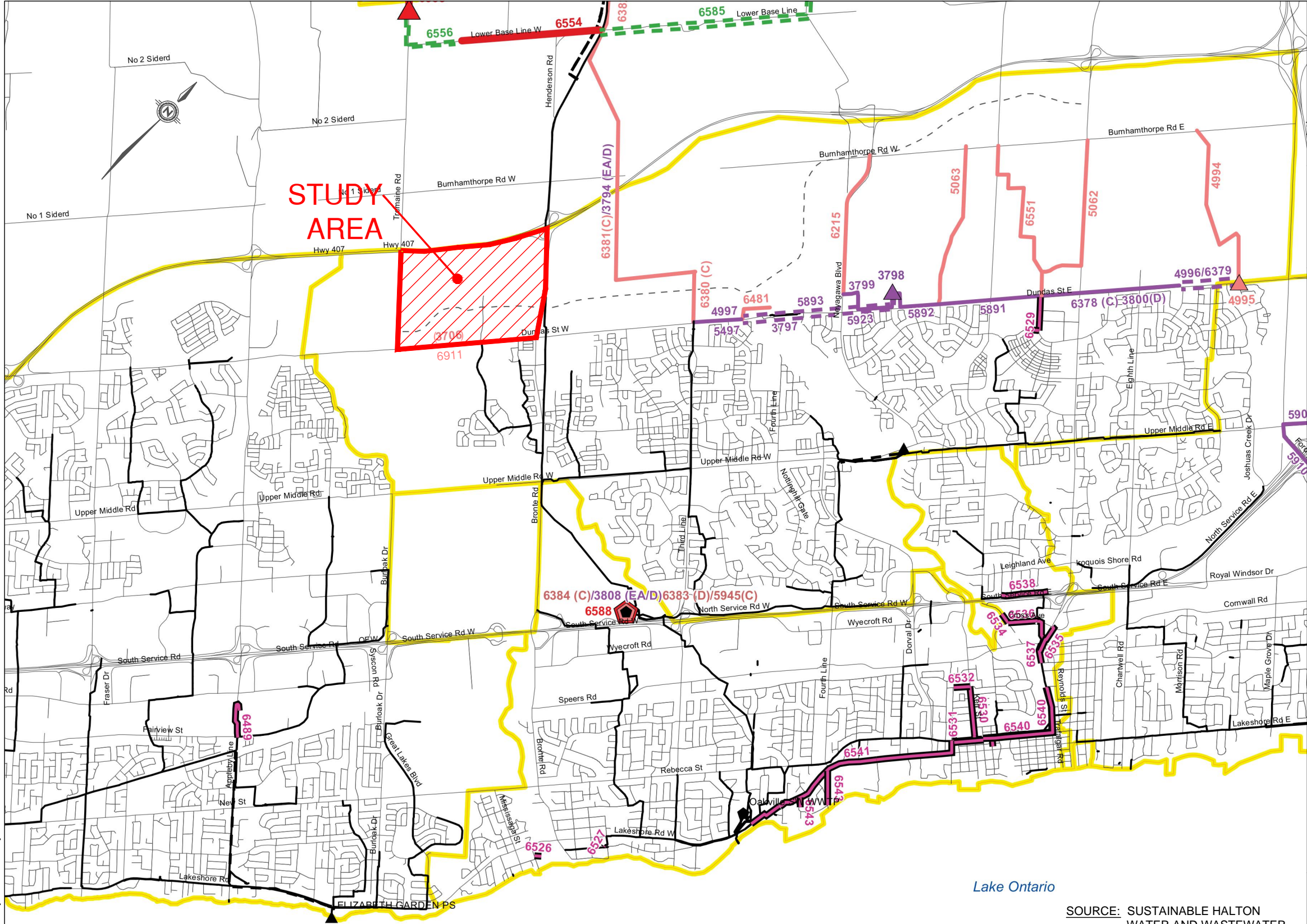
The Region has planned the Mid-Halton Wastewater plant and has sufficient land to allow it to be expanded in an orderly and predictable fashion. These expansions would be timed so that the capacity is available when required by development throughout the region. Expansion of capacity will trigger the need for various other changes or improvements such as biosolids handling and a new outfall (not required until growth beyond the Halton Urban Structure Plan (HUSP)).

3.1.2 Collection System

Exhibit 3.1 is a representation of the portion of the Region's proposed wastewater collection and pumping system that are intended to service the 407 West Employment Area, the lands to their east and a portion of the expected growth in Milton.

The 407 West Employment Area generally slopes from north to south and towards the centre of the lands, approximately 180m to the east of Colonel William Parkway at Dundas Street. The Master Plan provides for a series of local sewers that will drain from north to south connecting to a new Trunk Sewer System on Dundas Street. The Region's Master Plan does not show the sewers within the 407 West Employment Area. One of the purposes of this report is to apply the Master Plan concept to the Land Use Plan road and development scheme and recommend a specific plan for the sewer system. At Dundas Street, a trunk system which directs the flows to the existing system at Colonel William Parkway is proposed. The existing system will intercept flow and divert it south towards the Mid-Halton Plant in a manner that minimizes impact to the existing residents of the Town of Oakville.

More specifically, the lands to the west of the western natural heritage area and east of Tremaine Road will be conveyed south by an internal wastewater sewer along an internal Avenue Two to the Trunk Sewer on Dundas Street West which will then connect to the existing wastewater system at Colonel William Parkway.



AREA SERVICING PLAN FOR
407 WEST EMPLOYMENT AREA

REGIONAL WASTEWATER PLAN

Legend

Existing Infrastructure

- ▲ Wastewater Pumping Station
- ◆ Wastewater Treatment Plant
- Wastewater Main
- - - Wastewater Forcemain

Previously Approved Infrastructure

- ▲ Wastewater Pumping Station
- ◆ Wastewater Treatment Plant
- Wastewater Main
- Distribution-Built Boundary Wastewater main

Proposed/Upgrade Infrastructure

- ▲ Wastewater Pumping Station
- ◆ Wastewater Treatment Plant
- Proposed Alignment - Wastewater Main
- - - Wastewater Forcemain

Funded Infrastructure

- ▲ Wastewater Pumping Station
- ◆ Wastewater Treatment Plant
- Wastewater Main
- - - Wastewater Forcemain

□ WWTP Drainage Area

▨ Proposed Lake Base Service Area

SOURCE: SUSTAINABLE HALTON
WATER AND WASTEWATER
MASTER PLAN, AECOM 2011.
UPDATED PER DIRECTION
FROM REGION OF HALTON

Scale		NTS	
Client		Prepared by	
Date		Project No.	
JUNE 2013		1409222.001	
		EXHIBIT 3.1	

The external area from the lands west of Tremaine Road can connect to the system at the future Burnhamthorpe Road, Avenue One or on Dundas Street West. The wastewater flows from the lands between the two natural heritage areas will be conveyed south along an internal Avenue Three and discharged to the existing wastewater system on the south side of Dundas Street at Colonel William Parkway. The lands east of the 14 Mile Creek NHS and west of Bronte Road will be conveyed south along Avenue Four and will connect to the Trunk Sewer on Dundas Street West which will then discharge to the existing system at the south side of Dundas Street at Colonel William Parkway. The trunk sewer and downstream system on Colonel William Parkway has been designed to accommodate an external area of 362 hectares and an equivalent residential population of 8,145 people. Please refer to the design calculations and drainage plan for the Bronte Creek Community completed by Stantec in Appendix B.

There is the possibility for the flows from a portion of the lands between the 14 Mile Creek NHS and Bronte Road to discharge to the existing system at Valleyridge Drive. The Region of Halton has advised that the sewers on Valleyridge Drive were designed to accommodate an external area of 80 hectares with an equivalent population of 10,000 people. As shown on Exhibit 3.6, the 407 West Employment Area lands that would be tributary to this sewer have an area of approximately 40 hectares and an equivalent population of 4,500 people. This alternative servicing option would require extending the existing sewer to Dundas Street and would eliminate the need for a sewer on Dundas crossing the 14 Mile Creek NHS. This is shown on Exhibit 3.6 as an alternative wastewater sewer alignment.

The existing system eventually discharges to the Mid-Halton WWTP and PS. No upgrades to the existing wastewater sewers are anticipated to accommodate future development. The need for a local or regional pumping station appears not to be required.

3.1.3 Region's Timing and Development Charge Projects

Exhibit 3.2 summarizes the Region's proposed timing for the completion of the wastewater construction related to the subject lands and in many cases also for other development areas, particularly areas in North Oakville East and Milton.

Exhibit 3.2 – Region's Wastewater Projects

Project	Development Charge Cost	Region's ID #'s	Estimated In-Service Date
Local			
600mm WWM crossing Dundas Street and 600mm WWM on Dundas Street from Colonel William Parkway to approx. 900m West	\$4,005,000	6911 (old ID 3706)	w/ Development*
TOTAL	\$4,005,000		

* Subject to Financing

Projects and costs shown in Exhibit 3.2 have been taken from the Sustainable Halton Water and Wastewater Master Plan prepared by AECOM dated September 2011. The estimated project timing has been provided by the Region of Halton.

3.2 Expected Sewage Generation

In this section sewage generated in the 407 West Employment Area Land Use Plans has been assessed and compared to the Master Plan. The design criteria that the Region has utilized in the Master Plan are used in this analysis. To develop the estimated sewage generation, the system design criteria is first set out and then applied to the proposed development statistics from Exhibits 1.1.

The Region of Halton wastewater system criteria is as follows:

Exhibit 3.3 – Average Day Wastewater Flow

Land Use	Unit	Collection System	Treatment
Residential	L/cap/d	275	365
Commercial	m ³ /ha/d	24.75	26.00
Industrial	m ³ /ha/d	34.38	17.63
Institutional	m ³ /ha/d	10.94	10.94

The modified Harmon Peaking Factor equation is used to determine the peak flows for the collection system. The average day wastewater flow criteria for wastewater treatment include an allowance for infiltration. An infiltration allowance of 0.286 L/s/ha is added to the peak system flows for designing the collection system.

The treatment capacity flow generated by the 407 West Employment Area is illustrated in Exhibit 3.4. Commercial land use demands have been applied to the entire site to provide a conservative estimate and to allow for flexibility with respect to the ultimate land use mix.

Exhibit 3.4 – Generated WWTP Flows: 407 West Employment Area Land Use Plan Projections

	Residential ML/d	Commercial ML/d	Industrial ML/d	Institutional ML/d	Total ML/d
Average Daily Flow	0.0	4.1	0.0	0.0	4.0

Pumping stations and sewers are designed based upon peak flows. Flows will increase as various sub-catchment areas are connected to the Trunk Sewer. Exhibit 3.5, which follows, estimates the peak flow to the existing wastewater sewer on Colonel William Parkway. This is the full flow from the 407 West Employment Area.

The difference in the peak flows between the Region's projections and from those generated from the 407 West Employment Area Land Use Plan combined with the proposed increase in pipe slope in some instances will impact the sizing of the Dundas Street trunk sewer by one pipe size in some locations. Industrial land use demands have been applied to the entire site to provide a conservative estimate and to allow for flexibility with respect to the ultimate land use mix.

Exhibit 3.5 – Peak Generated Collection System at Colonel William Parkway Trunk Sewer: 407 West Employment Area Only

	Residential L/s	Commercial L/s	Industrial L/s	Institutional L/s	Total L/s
Average Flow	0.0	0.0	62.3	0.0	56.3
Peaking Factor	4.3	4.3	2.662	4.3	
K	0.80	0.80	0.80	0.80	0.80
Infiltration	0.0	0.0	44.8	0.0	45.5
Total	0.0	0.0	177.5	0.0	167.4

3.3 Region's Concept Plan Applied to the 407 West Employment Area

The proposed wastewater sewer system to service the 407 West Employment Area is described in this section. The system and the proposed drainage boundaries are illustrated on Exhibit 3.6.

Dundas Street Wastewater Sewer

As discussed in Section 3.1, the Region proposes that all wastewater flows from the 407 West Employment Area drain to a trunk sewer system along Dundas Street. As plans were being developed for the 407 West Employment Area, alternative locations for this wastewater sewer were considered. At this stage it has been determined that Dundas Street would be a feasible alignment for the wastewater sewer.

The Master Plan recommends that the Dundas Street gravity sewer directing flows from the entire 407 West Area to the gravity sewer on Dundas Street and ultimately to the existing wastewater sewer on Colonel William Parkway. This study generally supports that conclusion.

A preliminary design has been undertaken for the trunk sewer on Dundas Street, which is presented on the attached drawings, P1-P13.

Internal Collection Systems

In order to convey wastewater drainage from the subject lands to the Dundas wastewater sewer collection system, various alternative system layouts were evaluated. The common elements of the system layouts were:

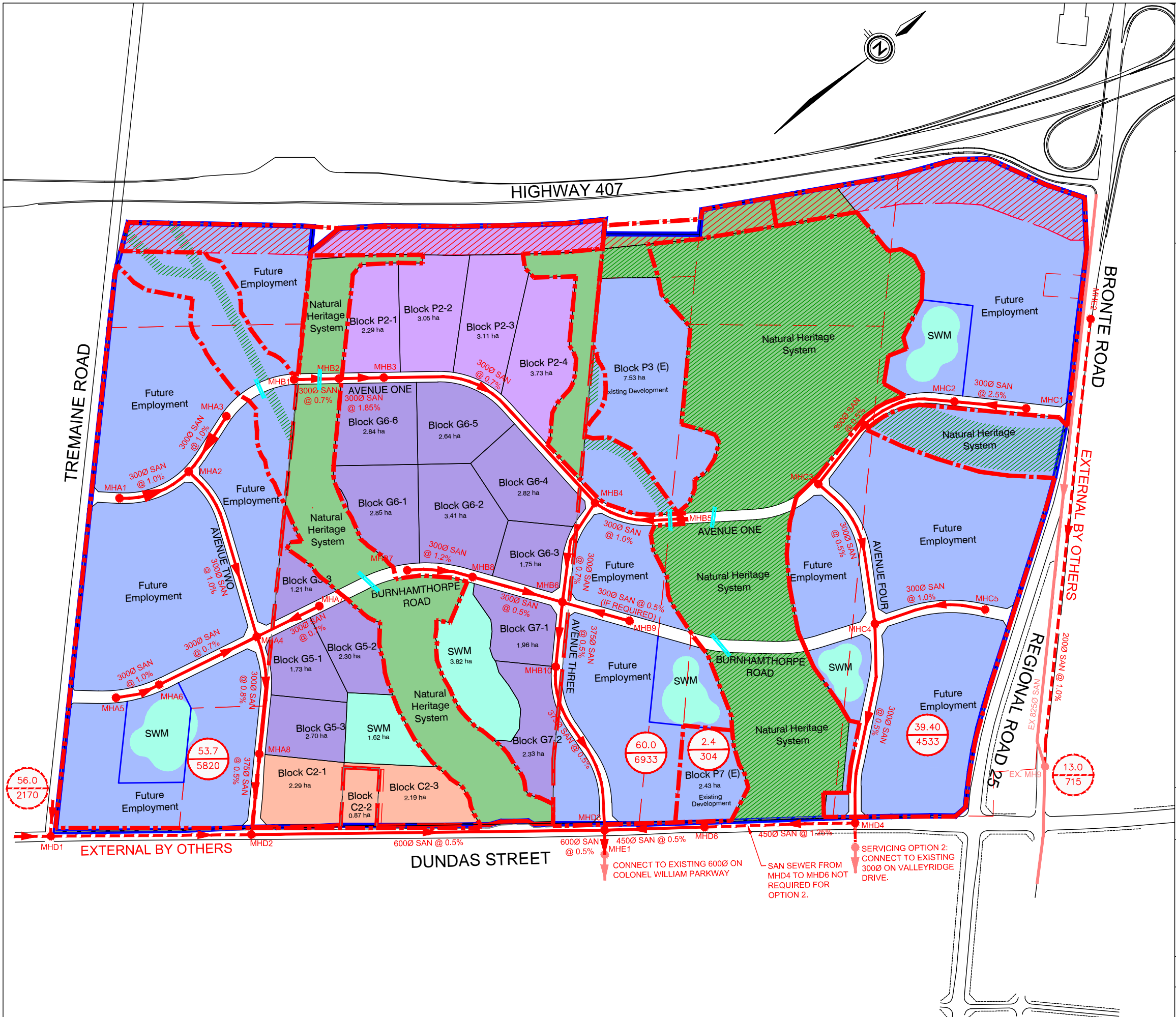
- all wastewater sewers are located on proposed road alignments; and
- all crossings of watercourses on natural features follow proposed road alignments.

A number of factors were considered that would influence the proposed alternatives. The factors include environmental features, existing topography, proposed road patterns, stormwater management facilities, and the relative ease of wastewater sewer construction.

While Exhibit 3.6 shows the preferred alignment for the internal wastewater sewers, there is flexibility in the location of these wastewater sewers and the corresponding drainage boundaries. Potential options of for the wastewater collection system as shown in Drawings P1-13. The sizing of the Dundas Street wastewater sewer has considered this flexibility and as such will allow the plan to evolve as it moves forward over time. The costs for local wastewater sewers are not considered to be DC recoverable.

A local or regional pumping station does not appear to be required.

FILE NAME: X:\DIV10\14-09222\MUN\ASP-FSS Exhibits\EX3.6-Fig8.2_Wastewater Drainage Plan.dwg_EX 3.6



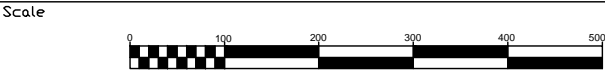
AREA SERVICING PLAN FOR 407 WEST EMPLOYMENT AREA

WASTEWATER DRAINAGE PLAN

LEGEND

- 407 WEST EMPLOYMENT AREA
- EXISTING PROPERTY LINE
- SUBJECT PROPERTY
- SERVICE AREA (SERVICE/RETAIL/OFFICE)
- LIGHT EMPLOYMENT
- GENERAL EMPLOYMENT
- EMPLOYMENT (SPECIFIC USE TBD)
- OPEN SPACE
- STORMWATER MANAGEMENT
- PLANNED 407 TRANSITWAY
- SANITARY SEWER
- SANITARY MANHOLE
- SANITARY DRAINAGE BOUNDARY
- ALTERNATIVE SANITARY SEWER ALIGNMENT
- EXTERNAL SANITARY SEWER (B.O.)
- EXISTING SANITARY SEWER
- 39.40
4533
- 13.0
715
- EXTERNAL TRIBUTARY AREA (Ha)
- EXTERNAL TRIBUTARY POPULATION
- FUTURE CULVERT CROSSING

FOR THE PURPOSES OF OUR CONCEPTUAL
SERVICING ANALYSIS, CONSERVATIVE LAND USE
ASSUMPTIONS HAVE BEEN MADE FOR THE ENTIRE
407 WEST EMPLOYMENT AREA



Client	Prepared by
	
Date	Project No.
JUNE 2013	1409222.001
EXHIBIT 3.6	

External Drainage Areas

Several other tributary areas have been given consideration in the design of the wastewater sewers in the 407 West Employment Area.

The adjacent Tremaine-Dundas Secondary Plan Area, City of Burlington will discharge wastewater flows to the Dundas Trunk system. A Secondary Plan is currently being prepared by the Region to determine the preferred land use concept for the area. At present there are 3 land use options proposed which include approximately 56 hectares of developable land and varying populations. For the purpose of this study the most conservative option of entirely residential was used to evaluate the downstream wastewater sewer. This option has the highest population of the three (2,170). The wastewater flows generated by the Tremaine-Dundas Community are shown in Exhibit 3.7.

Exhibit 3.7 – Peak Generated Collection System Flows to Dundas Trunk Sewer: Tremaine-Dundas Community

	Residential L/S	Commercial L/S	Industrial L/S	Institutional L/S	Total L/S
Average Flow	6.9	0.0	0.0	0.0	6.9
Peaking Factor	3.56	4.3	4.3	4.3	
K	1.0	1.0	1.0	1.0	1.0
Infiltration	16.4	0.0	0.0	0.0	16.4
Total	41.0	0.0	0.0	0.0	41.0

The Region of Halton has expressed concerns relating to the servicing of the lands on the east side of Old Bronte Road, north of Dundas. This area includes approximately 13 hectares of existing residential development with an equivalent population of 715 people, and is currently serviced by septic systems. In servicing these lands in the future, it is expected that wastewater flows cannot be conveyed to the trunk sewer on Grand Oak Trail, as this would require a crossing of the Natural Heritage System to the east. As such, it is proposed that a new wastewater sewer be constructed on Old Bronte Road connecting to the existing 825mm trunk sewer on Old Bronte Road north of Dundas. Construction of this local sewer will have to be coordinated with the Region of Halton. The wastewater flows generated by the existing Old Bronte Road residential development are shown in Exhibit 3.8.

Exhibit 3.8 – Peak Generated Collection System Flows to Dundas Trunk Sewer – Existing Old Bronte Road Residential Development

	Residential L/S	Commercial L/S	Industrial L/S	Institutional L/S	Total L/S
Average Flow	2.3	0.0	0.0	0.0	2.3
Peaking Factor	3.89	4.3	4.3	4.3	
K	1.0	1.0	1.0	1.0	1.0
Infiltration	4.1	0.0	0.0	0.0	4.1
Total	12.9	0.0	0.0	0.0	12.9

It is expected that the Sixteen Hollow Lands to the east of the 407 West Employment Lands will be serviced by the existing wastewater sewer located at approximately Third Line and Dundas Street West and will not impact any of the sewers utilized by the 407 West Employment Lands.

3.4 Sewer Sizing and Technical Analysis

Flows and sewer sizes were developed using Regional design criteria. Detailed design sheets are provided in Appendix B. The existing system along Colonel William Parkway from Dundas Street West to the south limit of the Bronte Creek Community has been designed to accommodate 362 ha of development with an equivalent population of 8,145. The design sheet and drainage plan for the Bronte Creek Community are available in Appendix B.

The Bronte Creek Community design sheets have been used to assist with the analysis of the proposed development of the 407 West Employment Area. The proposed 407 West Employment Area and the external contributors (Tremaine Neighbourhood and the Old Bronte Road properties) that contribute to the Colonel William Parkway collect from a total area of 228 hectares and an equivalent population of 20,474 people with a combined wastewater flow of approximately 215 L/s at the Colonel William Parkway and Dundas Street West manhole and 240 L/s at the south limit of the Bronte Creek Community. In contrast, the Bronte Creek Community analysis completed by Stantec shows a total flow contribution of approximately 180 L/s at the Colonel William Parkway and Dundas Street West manhole and 210 L/s at the south limit of the Bronte Creek Community. This does represent an increase of approximately 35 L/s at the Colonel William Parkway and Dundas Street West manhole, and 30 L/s at the south limit of the Bronte Creek Community; however, at no point is the capacity of any leg of sewer greater than 75%. It should also be noted that the wastewater generation values used for both the Tremaine Subdivision and the 407 West Employment Area are the highest values possible. This wastewater analysis is truly a worst-case scenario.

Conceptual Plan-Profiles of the Wastewater Sewer design are provided in Appendix C.

3.5 Mitigation Measures for Wastewater Crossings of Watercourses and Natural Heritage

In order to provide a service connection to Blocks P1 and P3, it will be necessary for the wastewater sewer to cross watercourses and the Natural Heritage System (NHS) at two locations. Wherever possible, the wastewater sewer alignment will be kept within the proposed Right-of-Way (ROW) and will go over the culvert structure.

In circumstances where a bridge will be used or where going over the culvert is not possible, the wastewater sewer will be installed using a trenchless technology such as jack and bore or directional drilling below the watercourse or natural feature preferably within ROW. The sewer should be installed using a steel liner or another acceptable form of protective casing, with the launching and receiving pits positioned as far as practically possible from the watercourse or natural feature. All crossings should be a minimum of 2.2m below the watercourse or natural feature and must follow all geotechnical recommendations. This will have a carry through effect of lowering the entire wastewater sewer system and therefore needs to be taken into consideration during the early stages of detail design.

Where the culvert or bridge structure requires piles or other deep foundations and the use of trenchless construction is not feasible within the ROW, the wastewater sewer alignment will be moved outside of the

ROW to a point where it will not influence the structure foundation. The launching and receiving pits will be located as far as practically possible from the watercourse or natural feature. The alternative alignments and profiles of the proposed water distribution system with respect to the crossings are shown on Drawings P1-13.

The crossing of any Redside Dace habitat watercourse will require review and approval from the Ministry of Natural Resources (MNR) prior to the construction of the crossing infrastructure. Each crossing permit will have specific requirements, however for the crossings within the 407 West Employment Lands, it should be expected that the following will be required:

- Construction will be during the permissible Redside Dace in-water construction window of July 1st to September 15th;
- Construction will utilize trenchless construction methods;
- Utilities will be installed at a depth of at least 2m below the bottom of a Redside Dace habitat watercourse;
- A specific contingency plan will need to be prepared for each crossing to address all concerns of the construction methodology proposed;
- All disturbed soils will need to be stabilized using a methodology approved by the MNR; and
- Erosion and Sediment control measures will remain in place until final restoration has been completed.

4.0 Timing

4.1 General

To accommodate planned long-term growth, effective timing and phasing of infrastructure construction is key in providing cost effectiveness, while ensuring that adequate capacity exists as it is required.

Fixed infrastructure such as plants and pumping stations may be constructed incrementally, typically in a modular format. By contrast, linear infrastructure such as pipes and manholes must be completed from point A to B, where B outlets to the treatment system or connects to the supply system.

4.2 Water

In this section, information is provided with respect to the water demands to assist the Region in timing the staging of its infrastructure construction. As noted earlier, for most elements, this information must be combined with similar information from other communities in the Region.

4.2.1 Demand

The water demand created by the North Oakville West Secondary Plan and specifically the 407 West Employment Area requires various elements of infrastructure to be in place. These elements are:

- Water Treatment
- Pumping Station(s)
- Storage
- Distribution

The capacity requirements of the water treatment and pumping systems are determined based on the maximum daily flow. The required water treatment and pumping system upgrades to facilitate development of the 407 West Employment Area is anticipated to be in place as part of the Residential DC Project Program. Once these projects are complete, the Region should confirm that no further upgrades to the treatment and pumping facilities are required for development of the 407 West Area as well as other communities within the Region of Halton.

4.2.2 Timing of Infrastructure Elements

In this section of the ASP, the timing of the various elements of the water system is generally discussed. In the case of many of the elements of the water infrastructure such as storage, pumping, and major distribution, it will be necessary for the Region to run its water model and to understand the timing of the development of other areas of the Region.

Treatment

- Many of the required projects to increase the supply are currently underway and are anticipated to be completed prior to development of the 407 West Employment Area.

Water Distribution (mains and pumping)

- The water distribution system for the 407 West Employment Area will require the construction of the regional trunk watermain (Region Project #s 5851/6366 & 3812/6360) along Dundas Street prior to development. These projects were recently completed for the portion of watermain between Bronte Road and Tremaine Road.
- The internal Zone 3 trunk watermain (Region Projects #s 5853 & 5627) will be constructed incrementally as part of the development as the 407 West Employment lands proceed.
- Appropriate major loops will form the backbone of an incrementally growing distribution system.

Storage

- It is anticipated that there is currently sufficient storage in Zone 3 to accommodate development of the 407 West Employment Area as well as full build-out of Zone 3.
- The need for storage is a function of the rate of development in the overall service area and should be reviewed by the Region on a regular basis to confirm that adequate storage remains available.
- The timing of storage system expansion must be determined in conjunction with the timing of distribution and pumping system capacity expansion. These elements can be implemented on a 'stepped' basis if required.

4.3 Wastewater

In this section, information is provided with respect to wastewater generation to assist the Region in timing the staging of its infrastructure construction. For some infrastructure, such as expansion to the Mid-Halton Plant, the need is a function of growth in all areas of Halton, including the 407 West Employment Area. For the others such as the Dundas Street wastewater sewer, it is a function exclusively of the timing of the development of the 407 West Employment Area.

4.3.1 System Flows

The wastewater generation developed by the Secondary Plan similarly requires various elements of infrastructure to be in place. These elements are:

- Wastewater Treatment
- Pumping
- Collection

The capacity requirements of the WWTP are determined based on the Average Daily Flow (including inflow and infiltration) while the pumping stations and collection systems are determined from the peak flow plus infiltration. The timing of flows generated from the 407 West Employment Area is considered generally in line with the projections of the Region. Any required upgrades to the WWTP are anticipated to be completed prior to development of the 407 West Employment Area.

4.3.2 Timing of Infrastructure Elements

In this section of the ASP, the timing of the various elements of the wastewater system is discussed. Unlike the water system, it is generally possible to predict infrastructure requirements based upon expected flows and the location of development.

Treatment

- The Region has already identified a need for increased wastewater treatment capacity.
- The Region is proceeding with an EA for the next expansion of the Mid-Halton WWTP.
- The actual expansion of the Mid-Halton WWTP and the advancement of future expansions should continue to be a priority.

Collection and Pumping

- Construction of the Dundas Street trunk sewer (Region Project # 6651) is required early to facilitate the development of the 407 West Employment Area, this project is anticipated to be completed in advance of the proposed 2015 occupancy.
- No pumping is anticipated to be required for development of the 407 West Employment Area.
- The timing of the development collection system north from Dundas Street will be driven by the timing of development of the 407 West Employment Area.

4.4 Phasing Principles

In this section, information is provided with respect to development phasing, and its impact on the municipal services. The phasing will likely progress north from Dundas Street and will vary from east to west across the 407 West Employment Area, as the various owners will develop at different rates. This situation will evidently result in the incomplete construction of municipal servicing systems. This could potentially lead to servicing issues; however phasing will be organized in such a way to mitigate these issues, and interim measures will be implemented as necessary.

Water

- Watermains will be primarily installed within the municipal right of ways. Where this is not possible, servicing easements will be arranged as necessary.
- Redundant feeds and looped systems will be provided to the greatest extent possible to ensure a robust water distribution network.
- Where necessary, temporary interim watermains will be constructed to provide watermain looping.
- Where looping is not possible, a regular flushing program will be instituted by the developer to eliminate stagnant water. The flushing program will be coordinated with and approved by the Region of Halton and Town of Oakville prior to commencing the flushing program.

Wastewater

- Wastewater sewers will be primarily installed within municipal right-of-ways. Where this is not possible, servicing easements will be arranged as necessary.
- It is possible that wastewater and/or stormwater sewers may be constructed in advance of downstream infrastructure, in conjunction with road construction. In this event, plugs will be used at future outlet points for the sewers and surface drainage will accumulate in the sewers. The accumulated stormwater in the pipes will be collected in the downstream manholes and pumped to temporary stormwater management ponds on a regular basis. The pumping program will be coordinated with and approved by the Region of Halton and Town of Oakville prior to commencing.

5.0 Conclusions

5.1 General

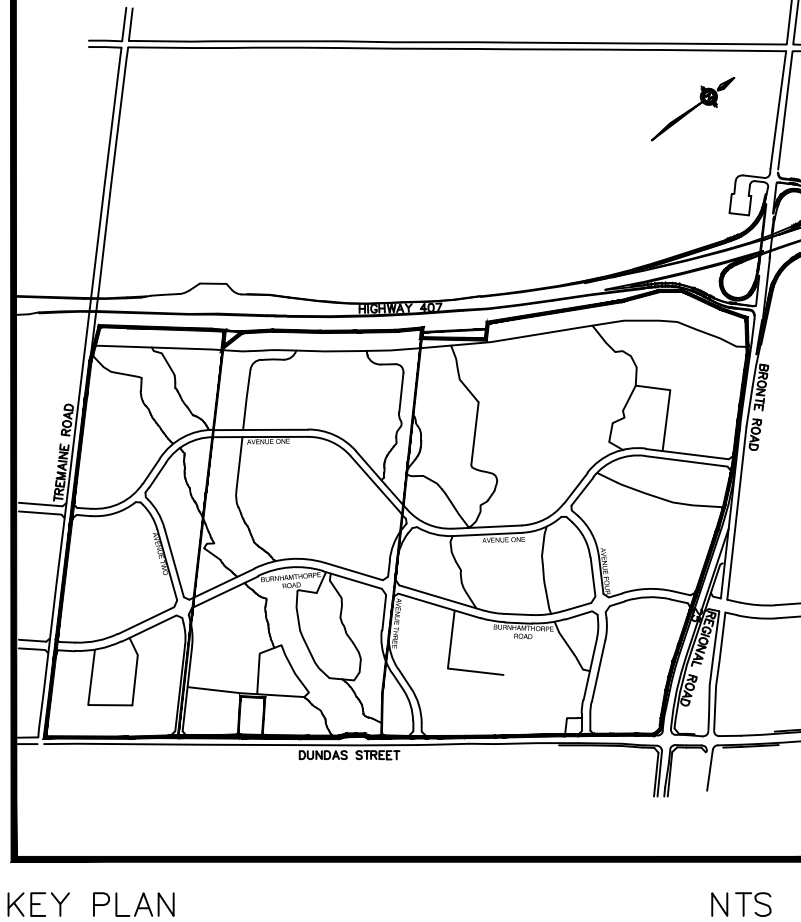
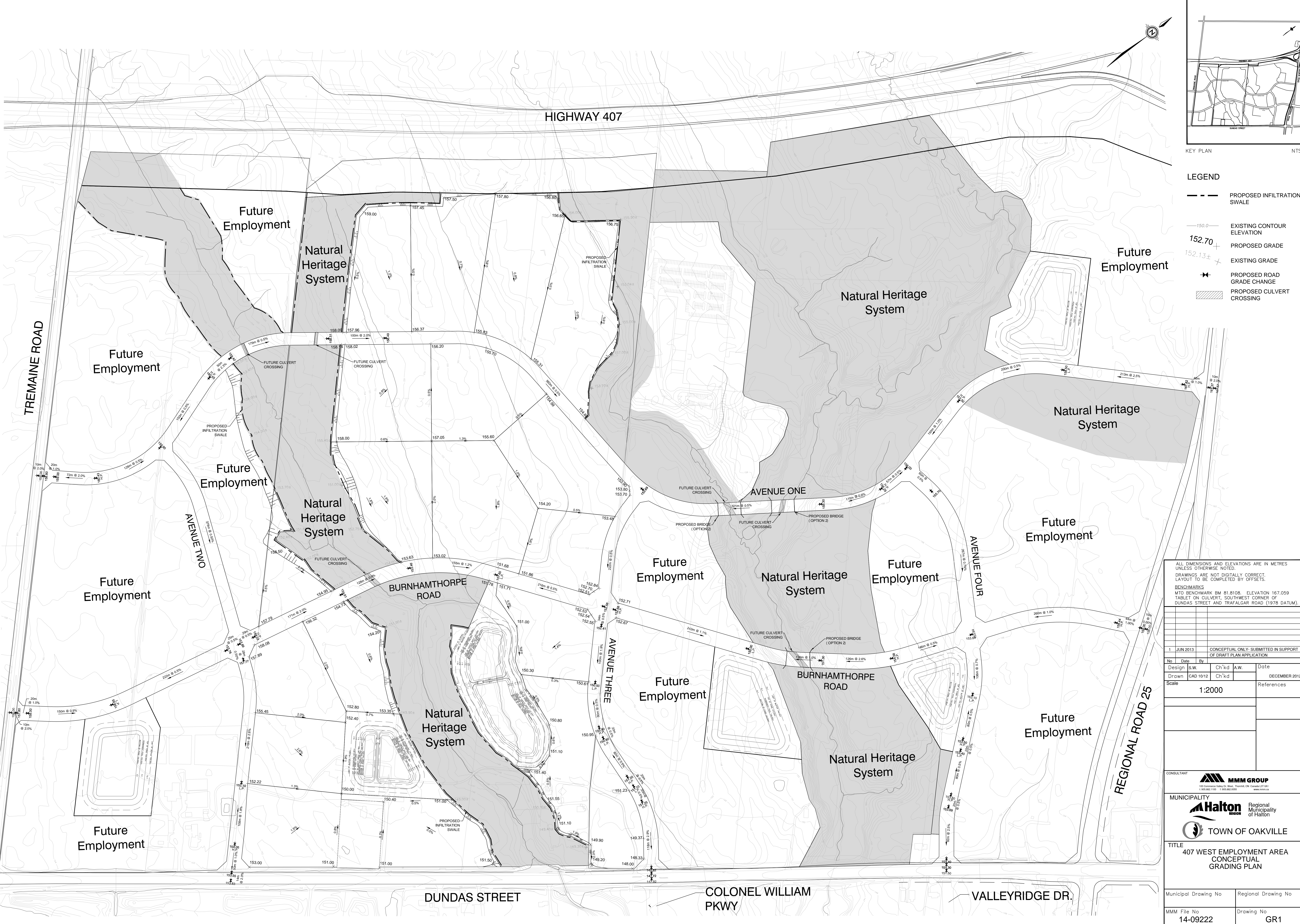
- The proposed development is of a form and quantity similar to what was anticipated by The Region of Halton while completing its “Water and Wastewater Master Plan”.
- This report provides the Region data to assist in determining the sizing of and timing of required regional infrastructure.
- The conclusions reached for servicing the 407 West Employment Area Land Use Plan in this ASP are consistent with the Region’s Master Plan.

5.2 Water

- The construction of the PD3 watermain along Dundas Street has been completed.
- The local major water distribution system can be expanded incrementally.
- The development can occur on an incremental basis.

5.3 Wastewater

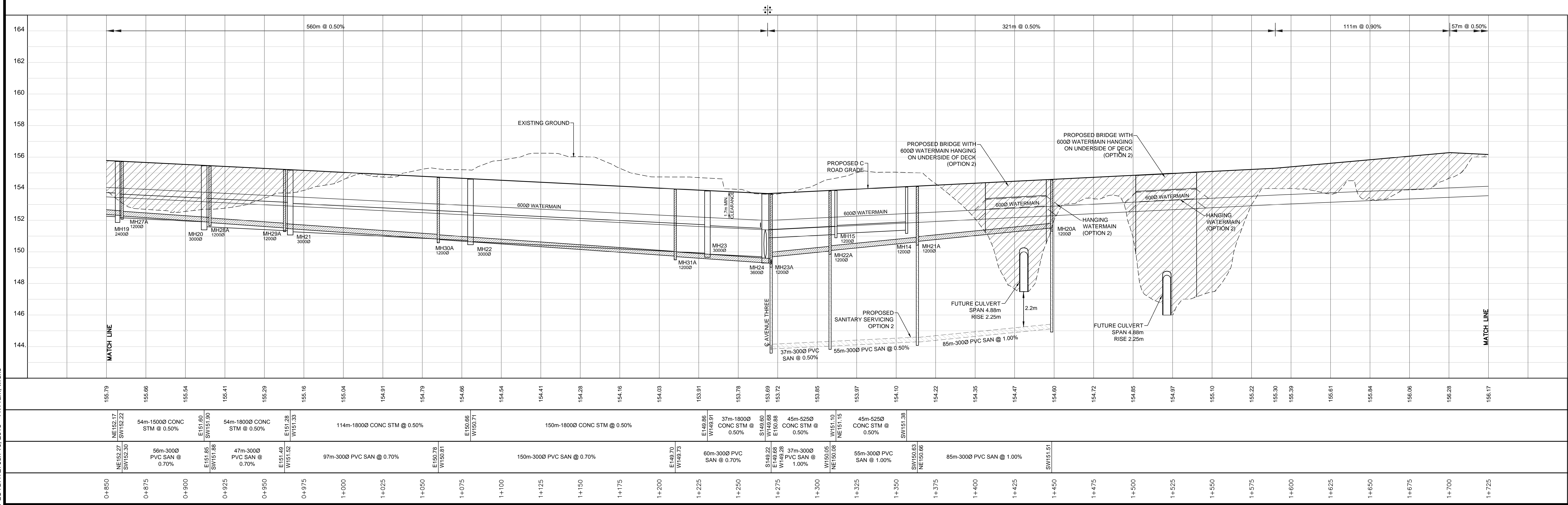
- The regional wastewater sewers can be provided in conjunction with the development of the 407 West Employment Area, they are anticipated to be completed in 2013, well in advance of the proposed 2015 occupancy date.
- There is an increase in the proposed wastewater flows from the 407 West Employment Area and contributing external lands to the Colonel William Parkway wastewater sewer compared to the Bronte Creek Community analysis, however all of the effected sewers remain below 75% of full flow capacity.
- Linear infrastructure can be constructed on an incremental basis as required for development of the 407 West Employment Area as well as external lands.



- LEGEND**
- PROPOSED INFILTRATION SWALE
 - 150.0 EXISTING CONTOUR ELEVATION
 - 152.70+ PROPOSED GRADE
 - 152.13± EXISTING GRADE
 - ✦ PROPOSED ROAD GRADE CHANGE
 - ▨ PROPOSED CULVERT CROSSING

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED. DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS. BENCHMARKS MTO BENCHMARK BM 81.8108, ELEVATION 167.059 TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).				

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PLOT DATE: Jun 10, 2013 11:11 AM WPGS



ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.

DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.

BENCHMARKS
MTO BENCHMARK BM 81.8108. ELEVATION 167.059
TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

1	JUN 2013	CONCEPTUAL ONLY - SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION			
No.	Date	By			
Design	S.W.	Ch'kd	A.W.	Date	
Drawn	CAD 10/12	Ch'kd		DECEMBER 2012	
Scale	1:1000 Horiz.	20	10	5	25
	1:100 Vert.	5	2.5	1.25	7.5

CONSULTANT

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MUNICIPALITY

Halton Regional Municipality of Halton

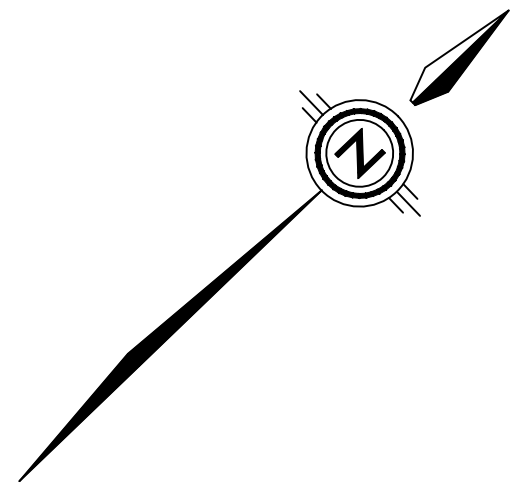
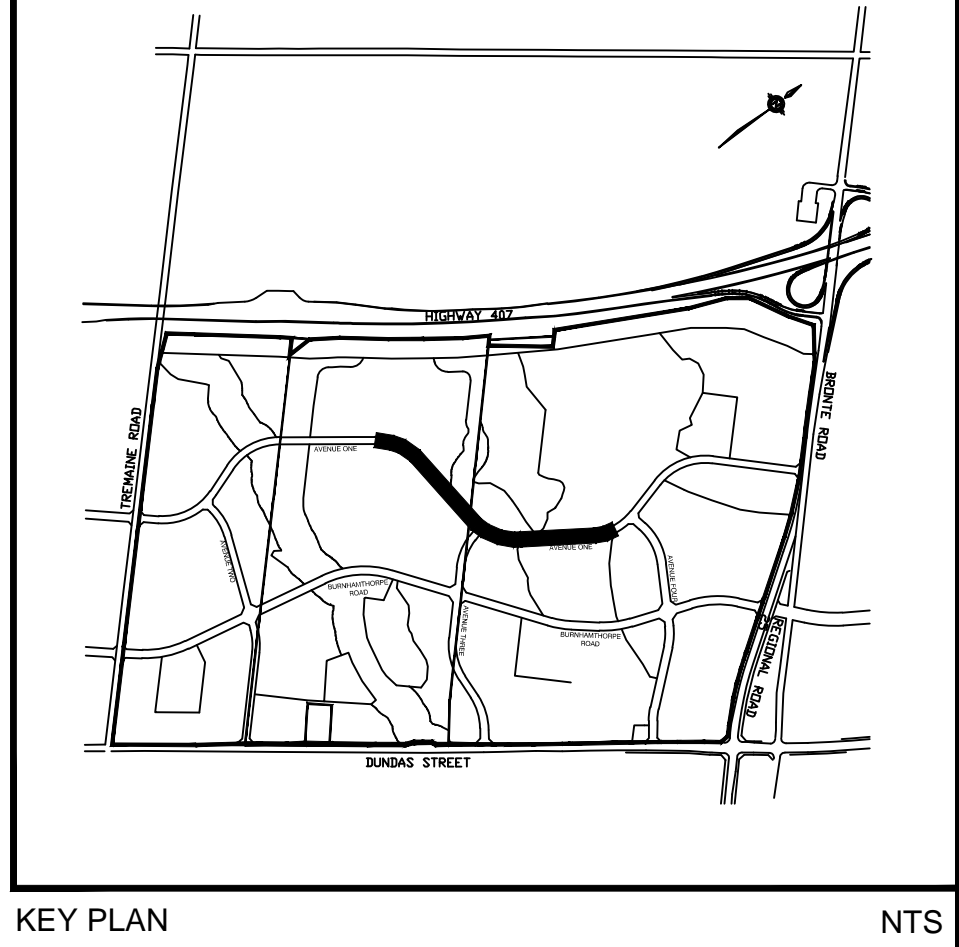
TOWN OF OAKVILLE

TITLE

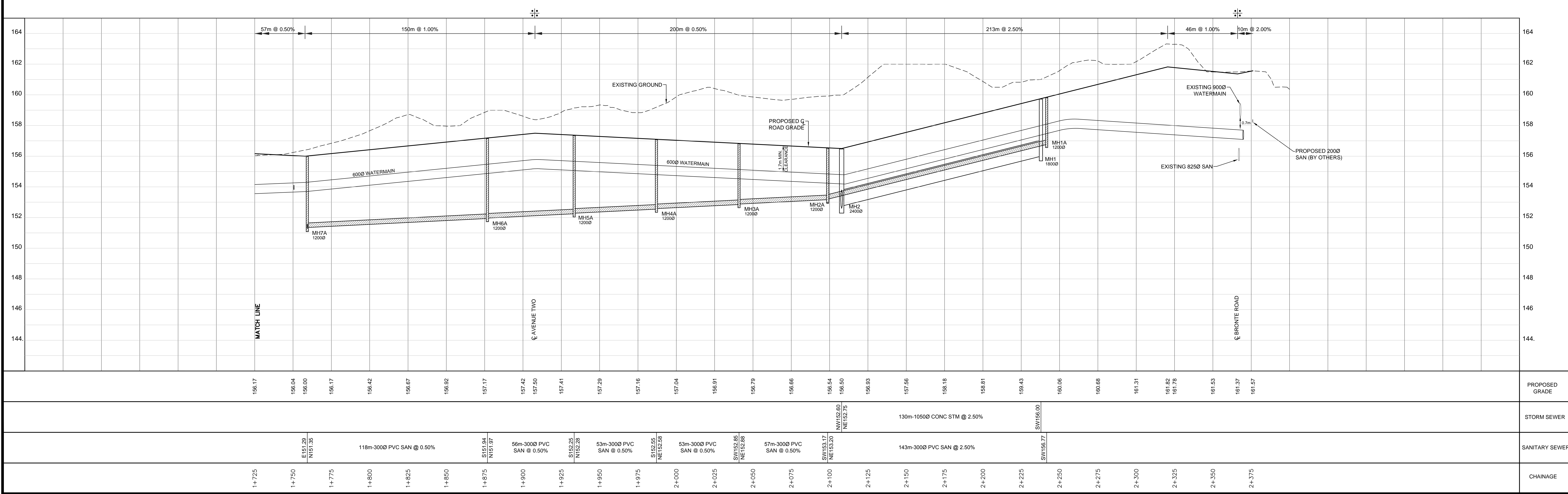
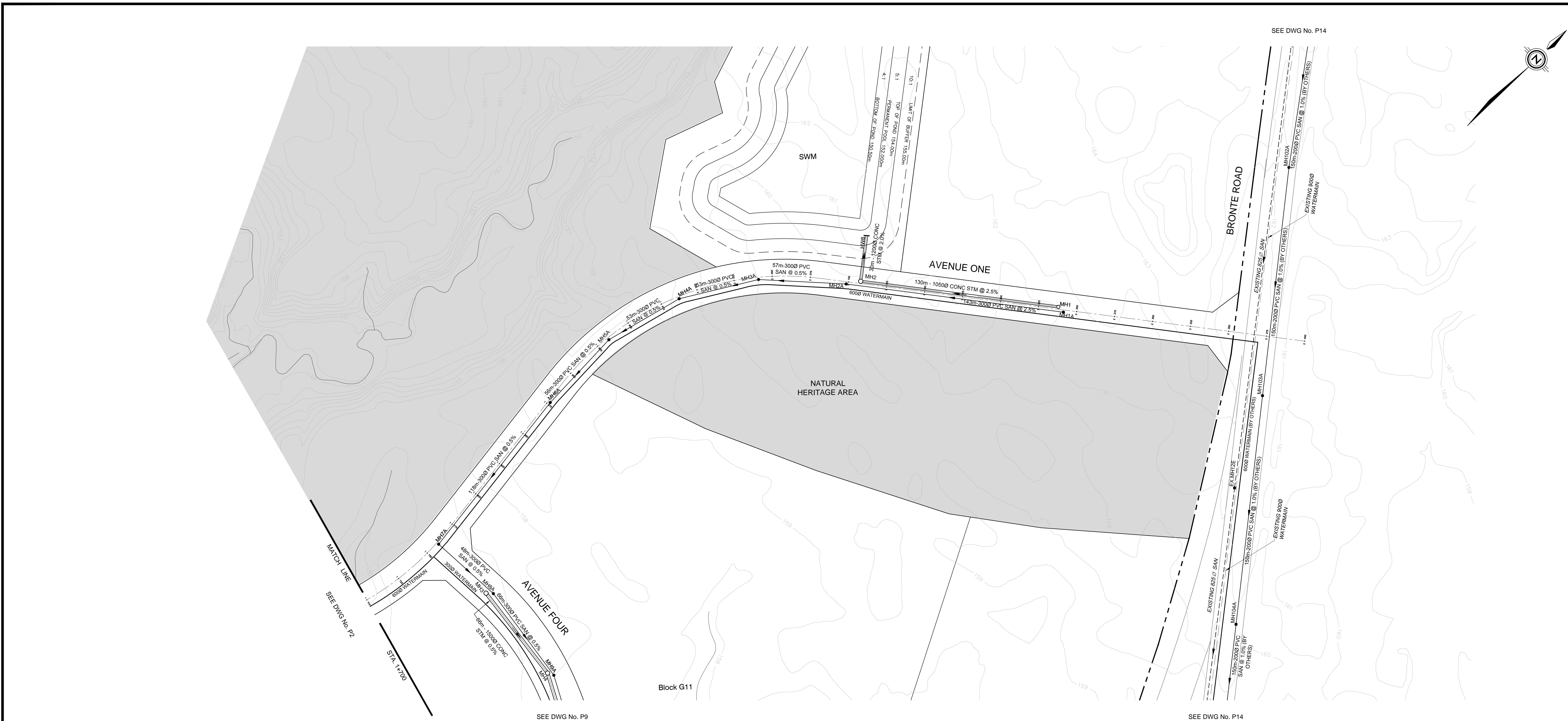
**407 WEST EMPLOYMENT AREA
CONCEPTUAL
PLAN AND PROFILES
AVENUE ONE
STA 0+850 TO STA 1+725**

Municipal Drawing No	Regional Drawing No
MMM File No 14-09222	Drawing No P2

- LEGEND
- 407 WEST PLAN AREA
 - PROPERTY LINE
 - PROPOSED INFILTRATION SWALE
 - SANITARY SEWER
 - SANITARY MANHOLE
 - STORM SEWER
 - STORM MANHOLE
 - WATERMAIN
 - 150.0--- EXISTING CONTOUR ELEVATION



FILENAME: X:\DIV\014-09222\MUN\Profiles\09222-P1-P3_Avenue One.dwg
PLOTDATE: Jun 10, 2013 - 11:11am, wrois



KEY PLAN

NTS

LEGEND

- 407 WEST PLAN AREA
- PROPERTY LINE
- PROPOSED INFILTRATION SWALE
- SANITARY SEWER
- SANITARY MANHOLE
- STORM SEWER
- STORM MANHOLE
- WATERMAIN
- EXISTING CONTOUR ELEVATION

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.

DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.

BENCHMARKS

MTD BENCHMARK BM 81.8108. ELEVATION 167.059

TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

No	Date	By	Design	S.W.	Chkd	A.W.	Date
1	JUN 2013						DECEMBER 2012

Scale: 1:1000 Horiz, 1:100 Vert

CONSULTANT

MMM GROUP

100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 9A1

1-905-881-1100 F-905-881-0050

www.mmm.ca

MUNICIPALITY

Halton REGION

Regional Municipality of Halton

TOWN OF OAKVILLE

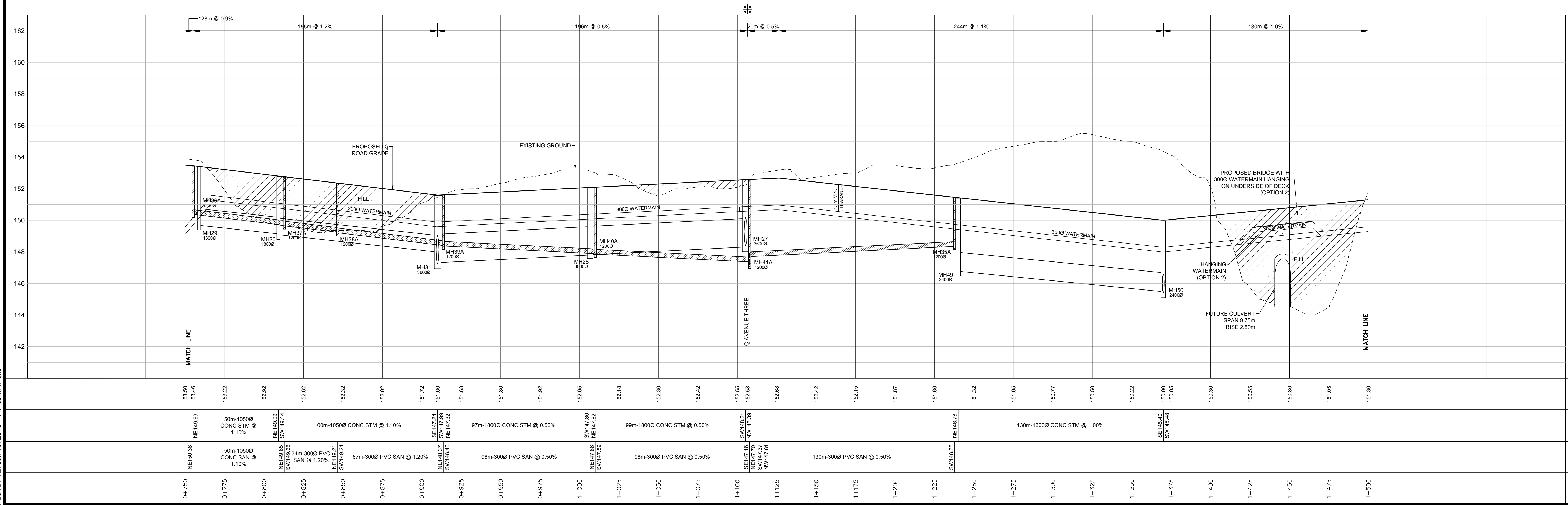
TITLE

407 WEST EMPLOYMENT AREA CONCEPTUAL PLAN AND PROFILES AVENUE ONE

STA 1+725 TO STA 2+400

Municipal Drawing No	Regional Drawing No
14-09222	P3

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PLOTDATE: JUN 10 2013 11:15:58 AM WPCS



PROPOSED GRADE
STORM SEWER
SANITARY SEWER
CHAINAGE

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.
DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.

BENCHMARKS
MTO BENCHMARK BM 81.8108. ELEVATION 167.059
TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

1	JUN 2013	CONCEPTUAL ONLY - SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION			
No.	Date	By			
Design	S.W.	Ch'kd	A.W.	Date	
Drawn	CAD 10/12	Ch'kd		DECEMBER 2012	
Scale	1:1000 Horiz.	20	10	5	25
	1:100 Vert.	5	2.5	1.25	6.25

References

CONSULTANT

MMM GROUP
100 Commercial Valley Dr. Mississauga, Ontario L4T 1A1
(905) 276-1100 F: 905 282 2800 www.mmm.ca

MUNICIPALITY

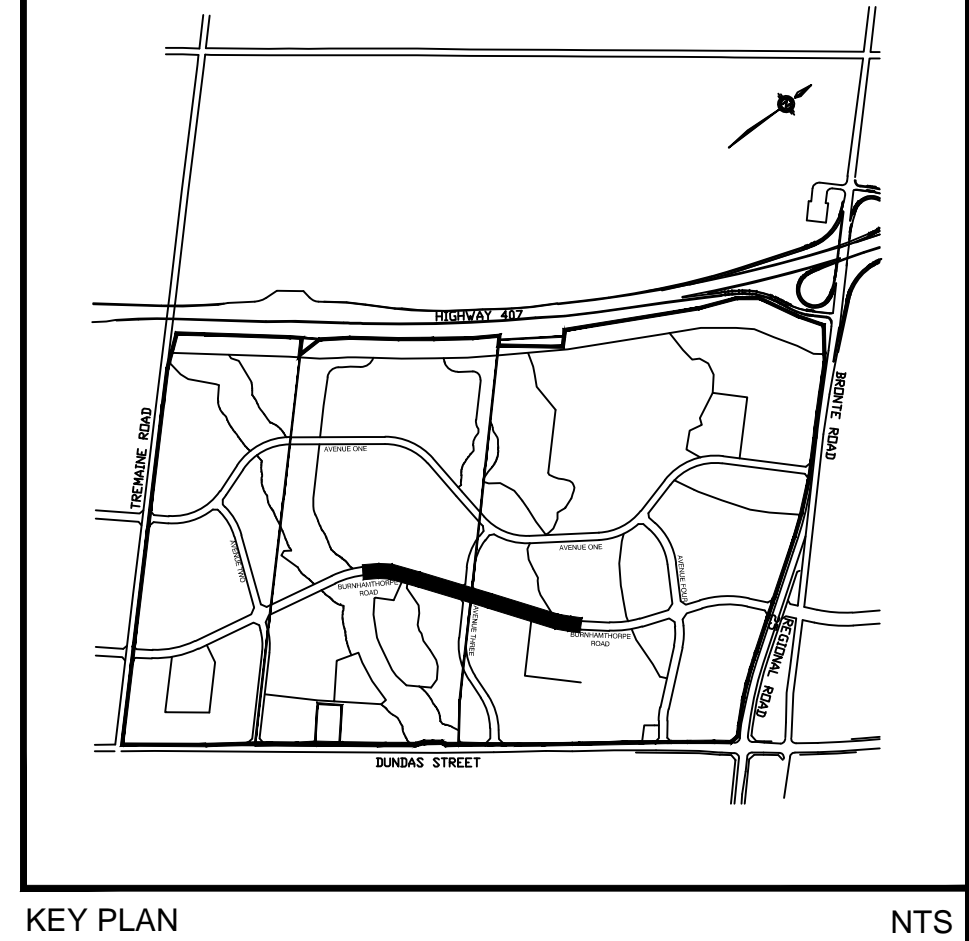
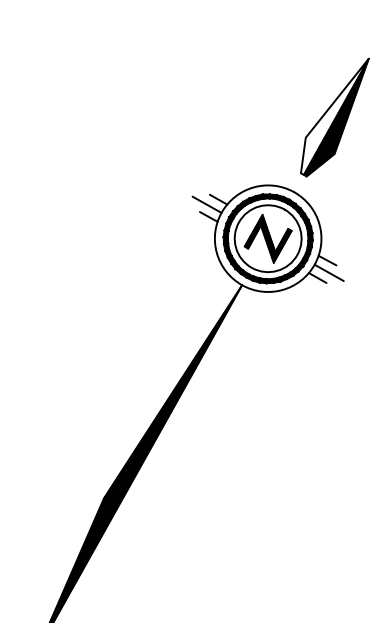
Halton Regional Municipality of Halton

TOWN OF OAKVILLE

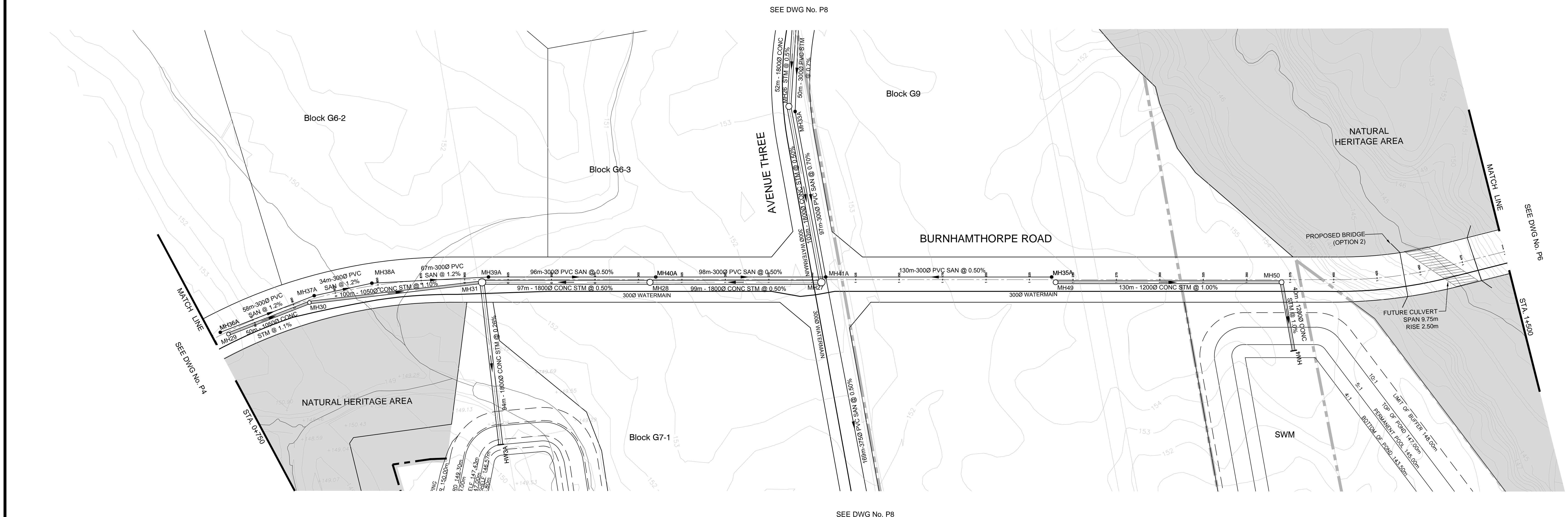
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**407 WEST EMPLOYMENT AREA
CONCEPTUAL
PLAN AND PROFILES
BURNHAMTHORPE ROAD
STA 0+750 TO STA 1+500**

Municipal Drawing No	Regional Drawing No
MMM File No 14-09222	Drawing No P5



- LEGEND
- 407 WEST PLAN AREA
 - - - PROPERTY LINE
 - - - PROPOSED INFILTRATION SWALE
 - - - SANITARY SEWER
 - SANITARY MANHOLE
 - STORM SEWER
 - STORM MANHOLE
 - WATERMAIN
 - - - EXISTING CONTOUR ELEVATION

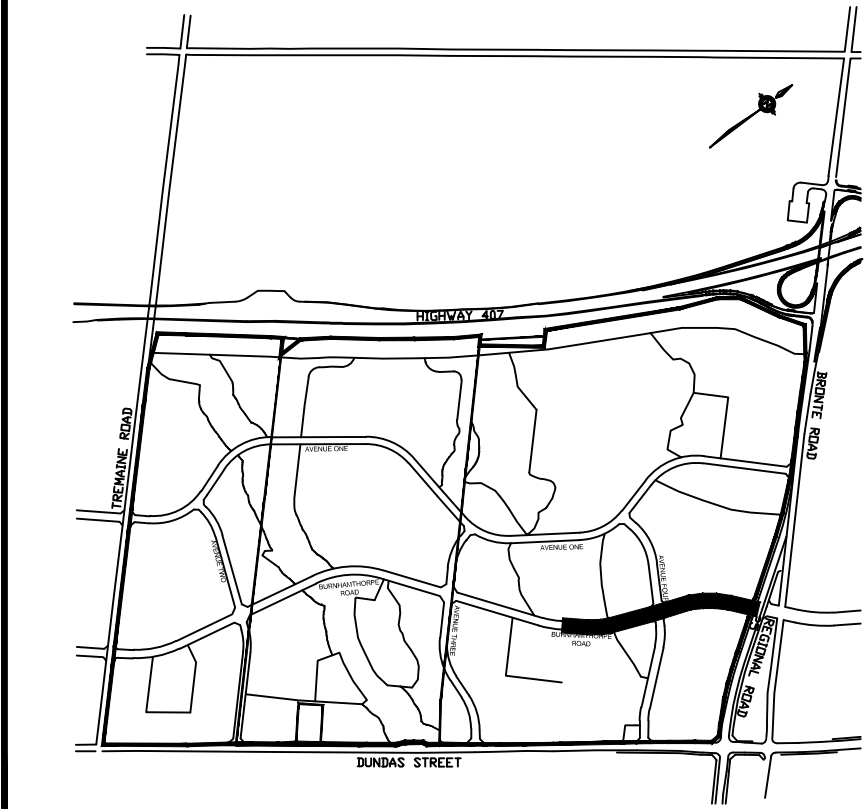
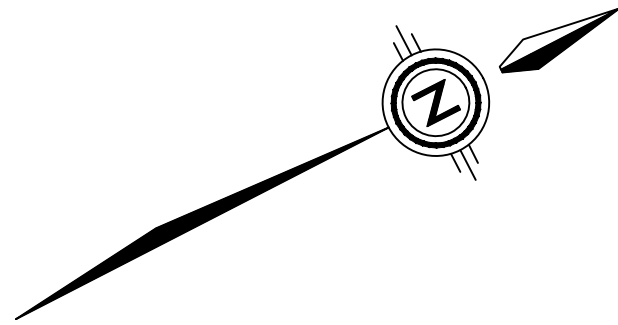
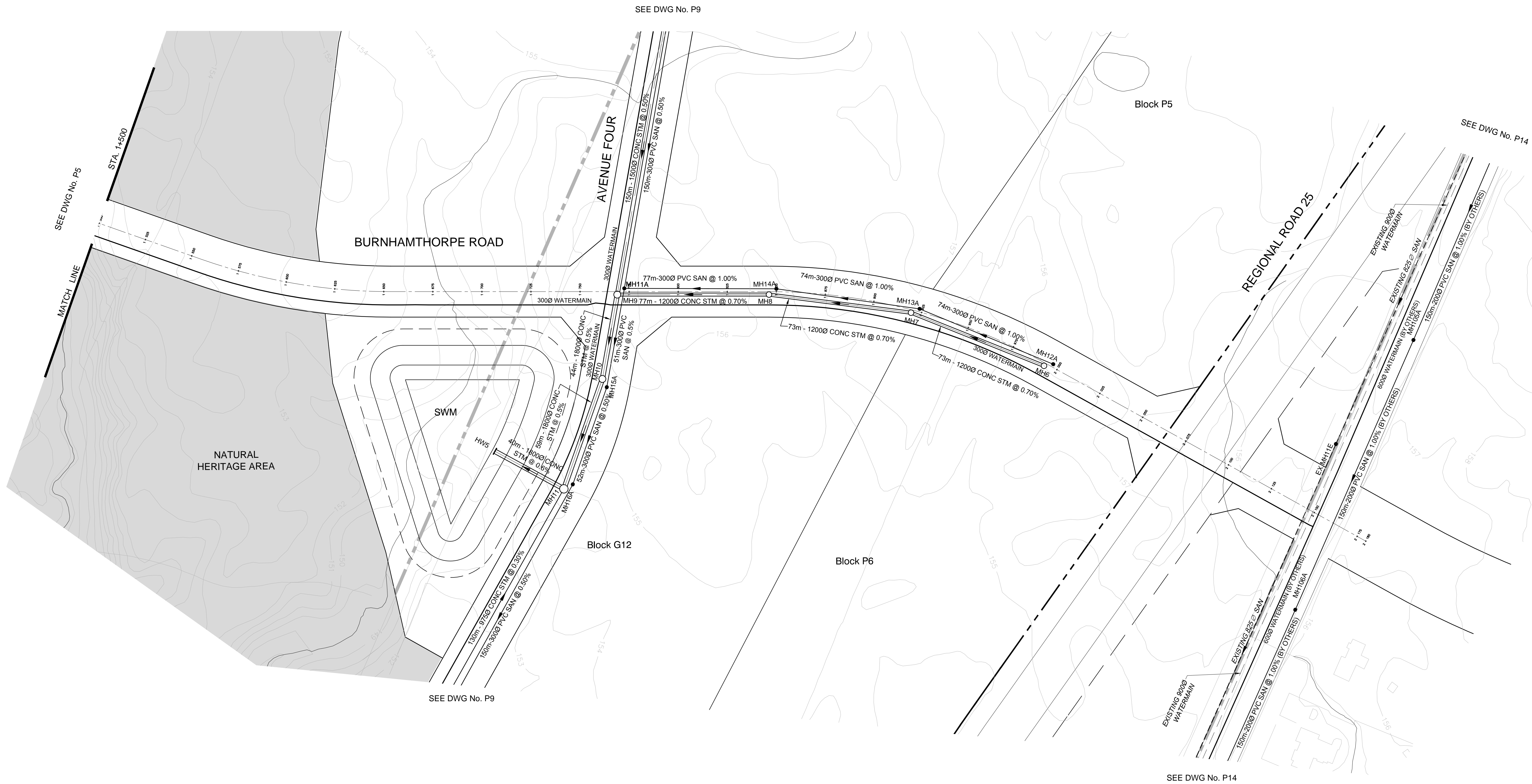


SEE DWG No. P8

SEE DWG No. P8

SEE DWG No. P6

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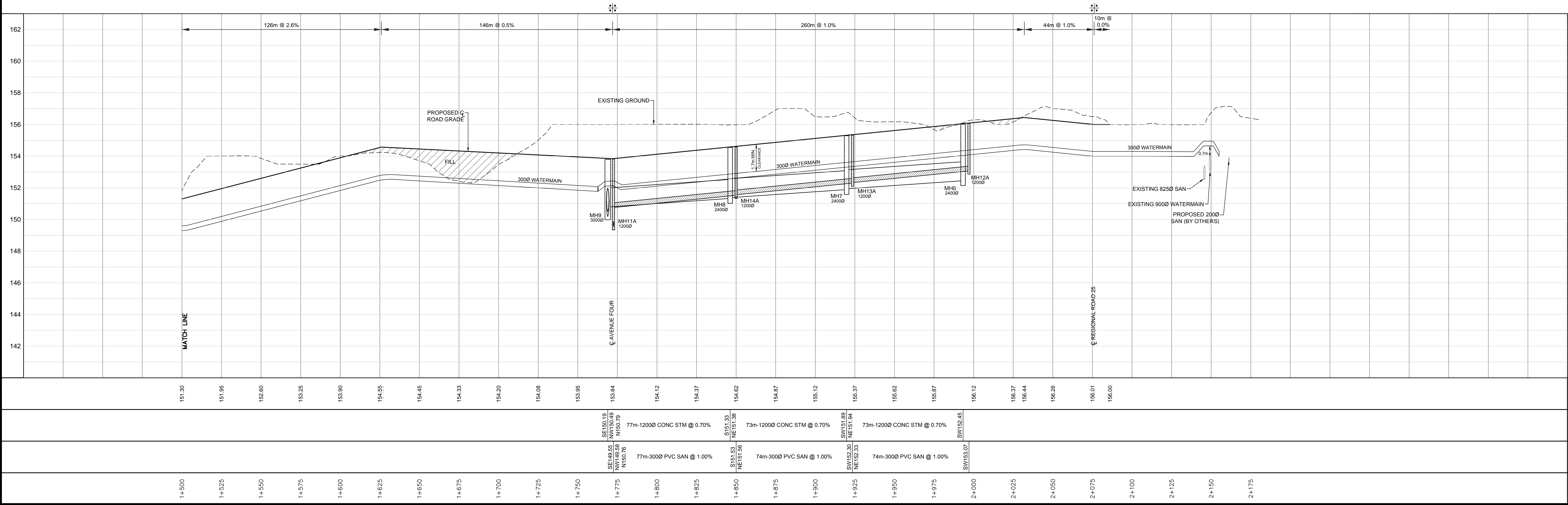


KEY PLAN

NTS

LEGEND

- 407 WEST PLAN AREA
- PROPERTY LINE
- PROPOSED INFILTRATION SWALE
- SANITARY SEWER
- SANITARY MANHOLE
- STORM SEWER
- STORM MANHOLE
- WATERMAIN
- 150.0--- EXISTING CONTOUR ELEVATION



ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.
DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.
BENCHMARKS
MTO BENCHMARK BM 81.8108. ELEVATION 167.059
TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

No.	Date	By
1	JUN 2013	

Design	S.W.	Ch'kd	A.W.	Date
Drawn	CAD 10/12	Ch'kd		DECEMBER 2012

Scale: 1:1000 Horiz. 1:100 Vert.

CONSULTANT: **MMM GROUP**
100 Commerce Valley Dr. Mississauga, Ontario L4T 1A1
Tel: 905.271.1100 Fax: 905.272.2000 www.mmm.ca

MUNICIPALITY: **Halton Region**
Regional Municipality of Halton

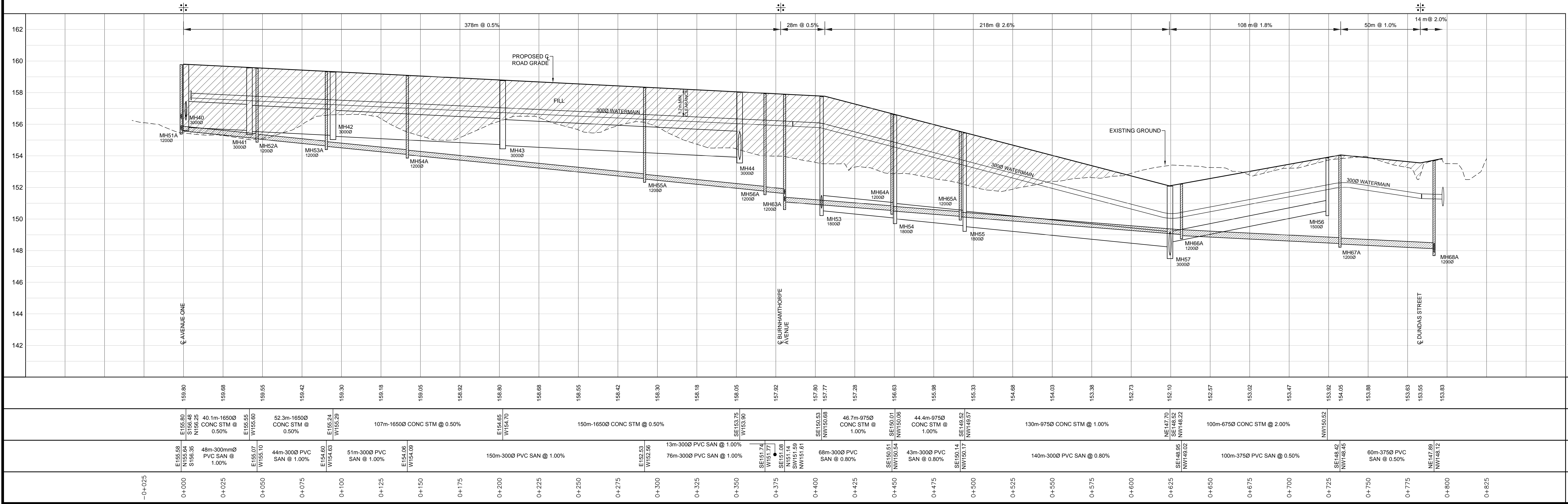
TOWN OF OAKVILLE

TITLE	
407 WEST EMPLOYMENT AREA CONCEPTUAL PLAN AND PROFILES BURNHAMTHORPE ROAD STA 1+500 TO STA 2+175	

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Municipal Drawing No	Regional Drawing No

CHAINAGE	
MMM File No 14-09222	Drawing No P6

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PROPOSED GRADE
STORM SEWER
SANITARY SEWER
CHAINAGE

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.
DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.
BENCHMARKS
MTO BENCHMARK BM 81.8108. ELEVATION 167.059
TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

No.	Date	By	Design	S.W.	Ch'kd	A.W.	Date
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1:100	Vert.						

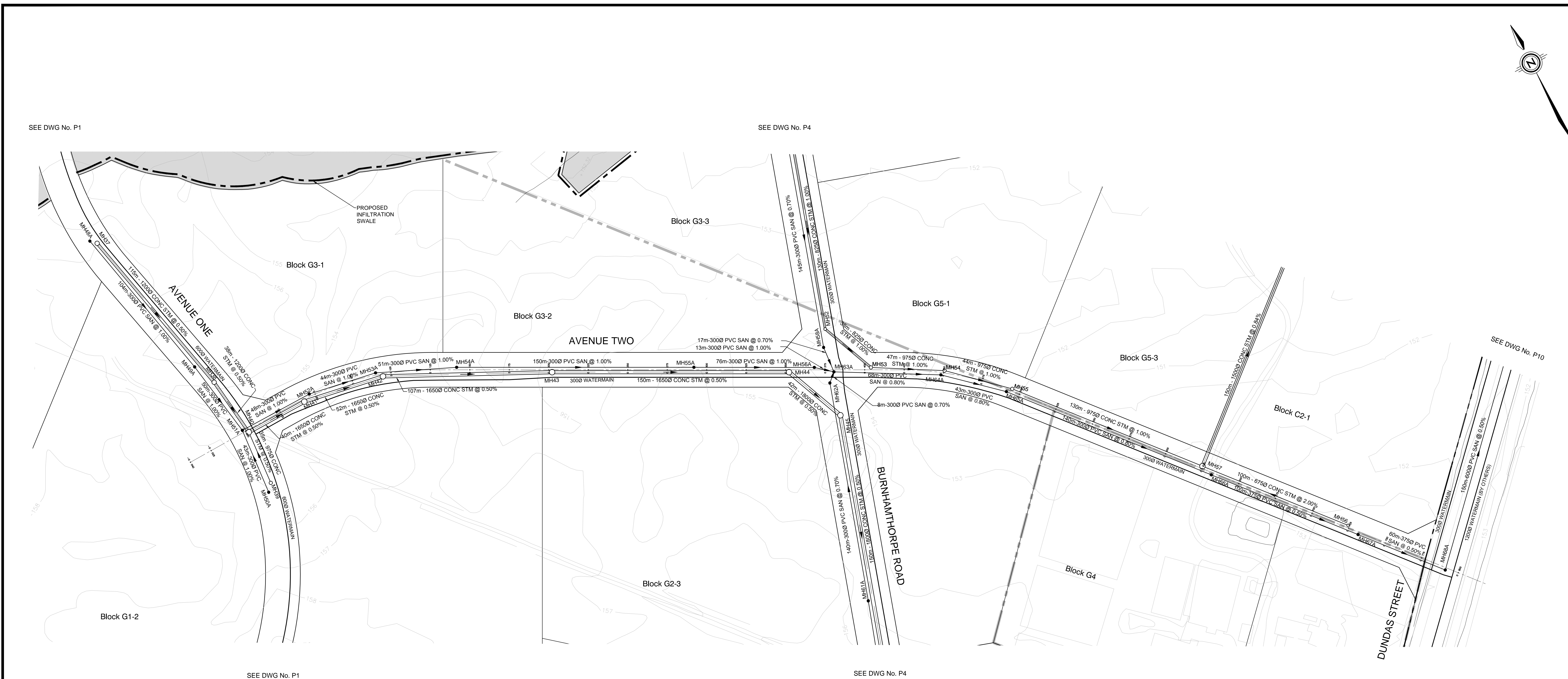
CONSULTANT
MMM GROUP
100 Commercial Valley Dr. Mississauga, Ontario L4X 1A1
Tel: 905-271-1100 Fax: 905-271-1101 www.mmm.ca

MUNICIPALITY
Halton Region
Regional Municipality of Halton

TOWN OF OAKVILLE

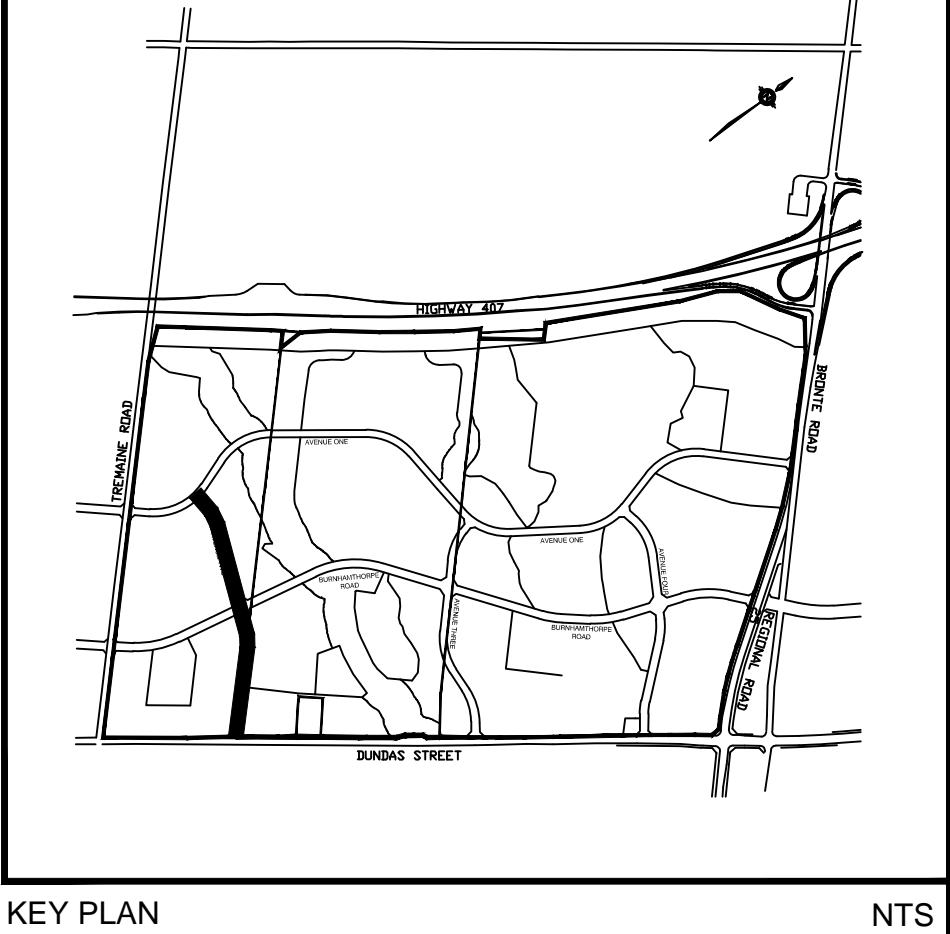
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**407 WEST EMPLOYMENT AREA
CONCEPTUAL
PLAN AND PROFILES
AVENUE TWO
STA 0+000 TO STA 0+825**

Municipal Drawing No	Regional Drawing No
MMM File No 14-09222	Drawing No P7

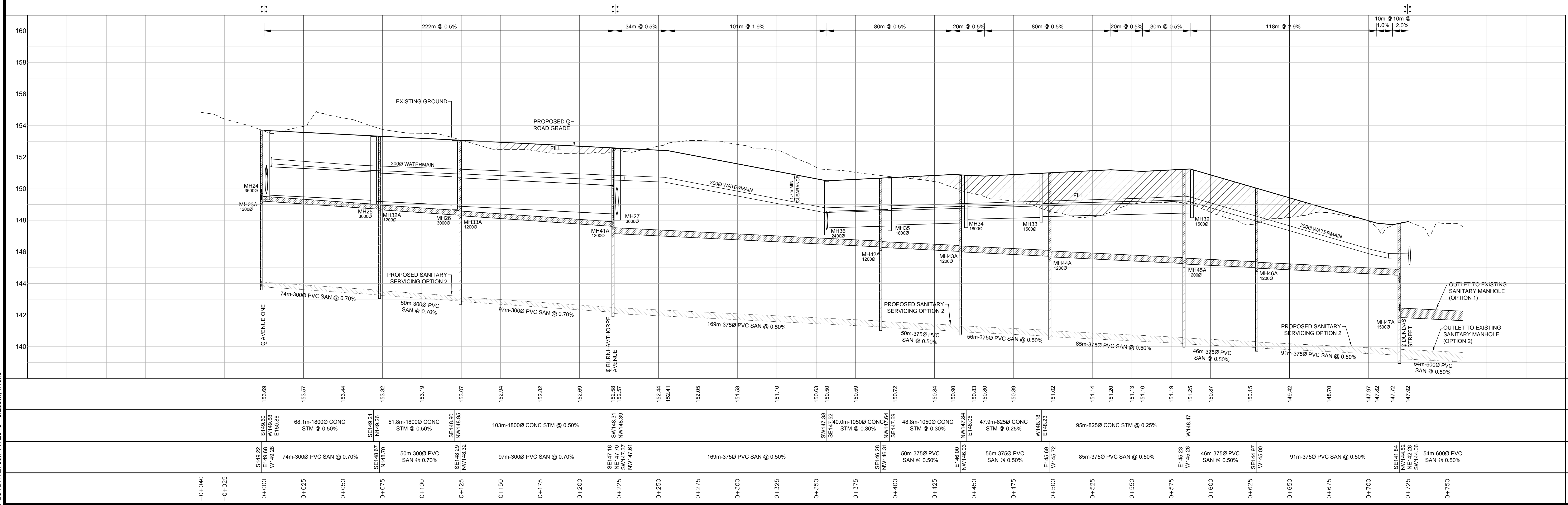


LEGEND

- 407 WEST PLAN AREA
- PROPERTY LINE
- PROPOSED INFILTRATION SWALE
- SANITARY SEWER
- SANITARY MANHOLE
- STORM SEWER
- STORM MANHOLE
- WATERMAIN
- 150.0 --- EXISTING CONTOUR ELEVATION



FILE NAME: X:\01\014-09222\MUNIP\rollcall\0222-P8-AVENUE THREE.dwg
PLOT DATE: JUN 11, 2013 9:22am



ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.
DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.
BENCHMARKS
MTO BENCHMARK BM 81.8108. ELEVATION 167.059
TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

No.	Date	By
1	JUN 2013	CONCEPTUAL ONLY - SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION

Design	S.W.	Ch'kd	A.W.	Date
Drawn	CAD 1012	Ch'kd		DECEMBER 2012

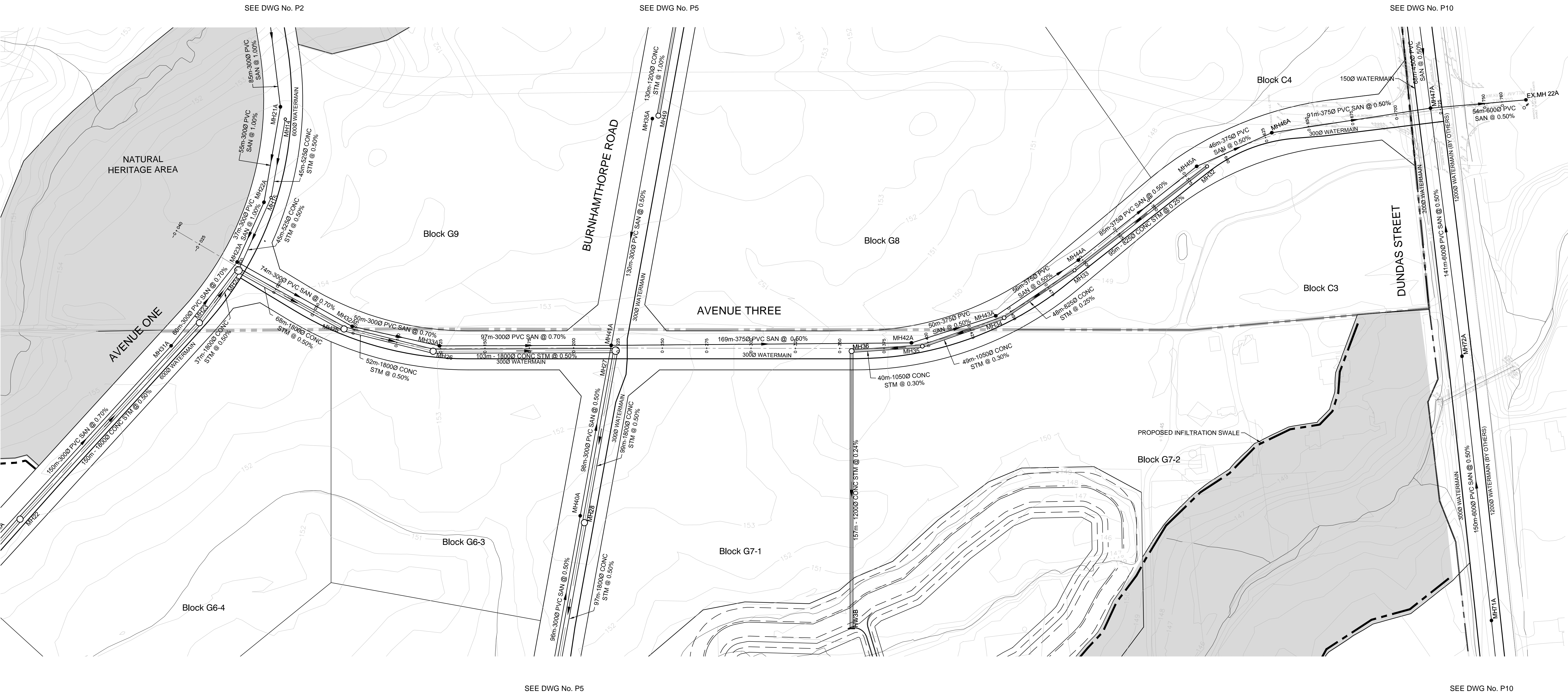
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CONSULTANT: **MMM GROUP**
180 Commercial Valley Dr. Mississauga, Ontario L4X 1L1
905-276-1100 F: 905-282-2800 www.mmm.ca

MUNICIPALITY: **Halton Region** Regional Municipality of Halton

TITLE: **407 WEST EMPLOYMENT AREA CONCEPTUAL PLAN AND PROFILES AVENUE THREE**
STA 0+000 TO STA 0+750

Municipal Drawing No	Regional Drawing No
MMM File No 14-09222	Drawing No P8



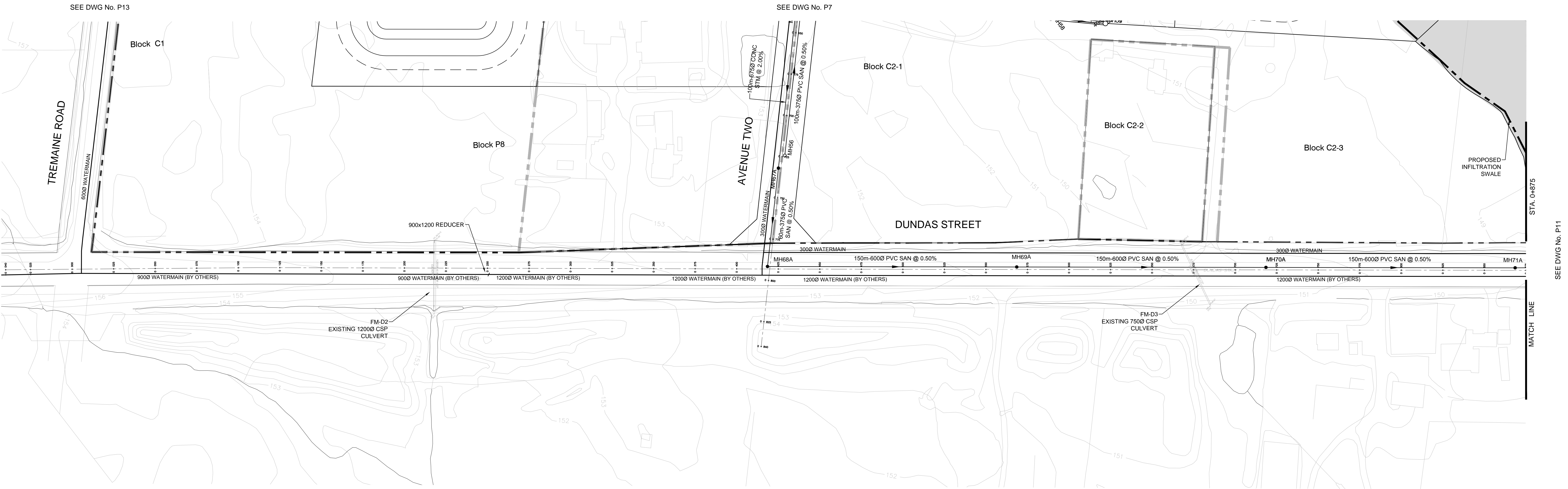
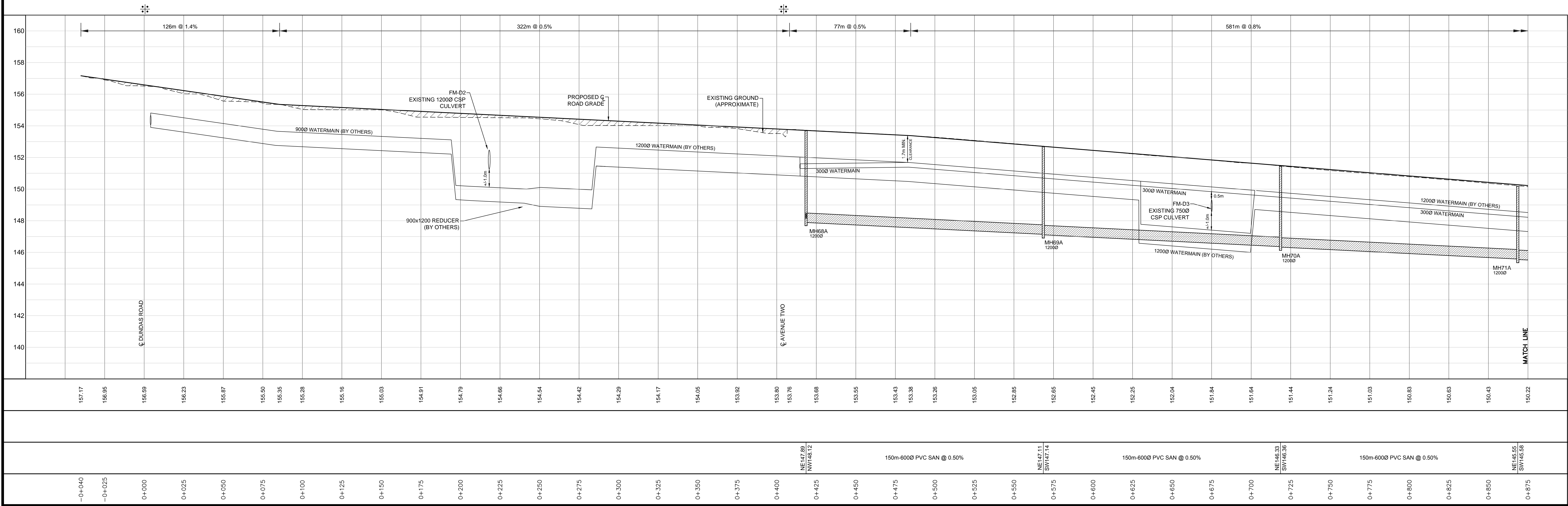
KEY PLAN

NTS

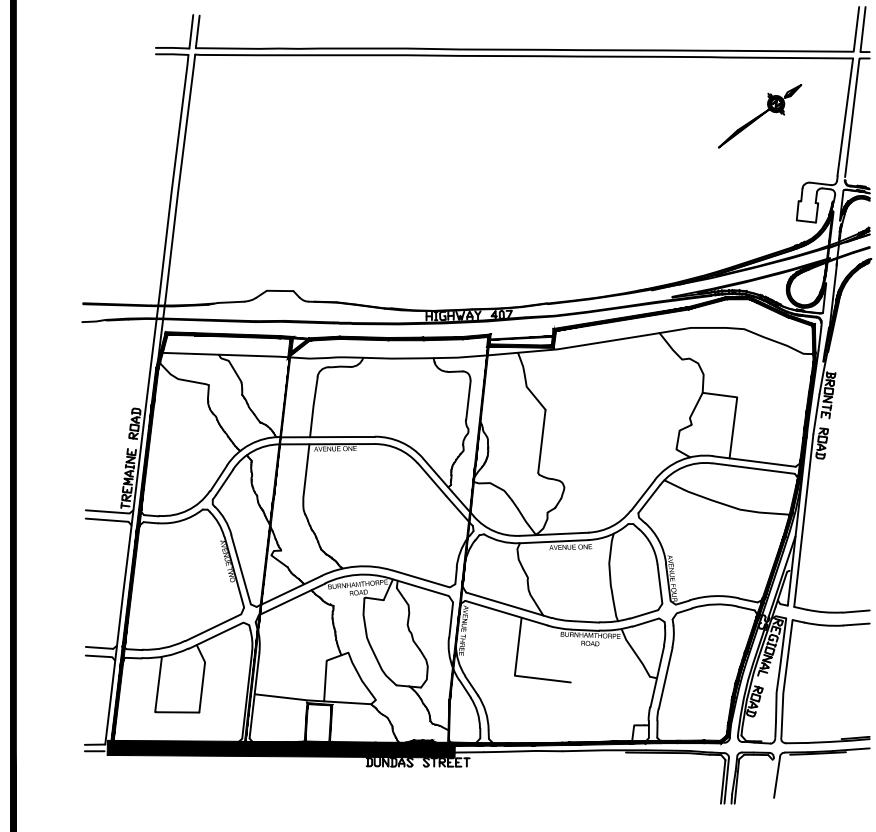
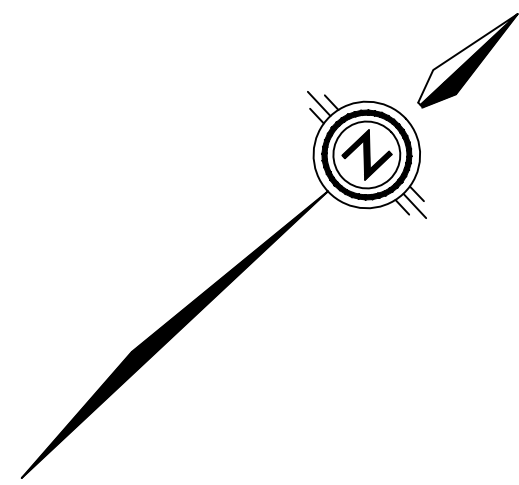
LEGEND

- 407 WEST PLAN AREA
- PROPERTY LINE
- PROPOSED INFILTRATION SWALE
- SANITARY SEWER
- SANITARY MANHOLE
- STORM SEWER
- STORM MANHOLE
- WATERMAIN
- 150.0 --- EXISTING CONTOUR ELEVATION

FILENAME: X:\01\014-09222\MM\Profiles\9222-P10-P12 DUNDAS STREET.dwg
PLOT DATE: Jun 10, 2013 11:25am WPCS



DUNDAS STREET PROPOSED WORKS ARE CONCEPTUAL ONLY. DESIGN BY OTHERS.

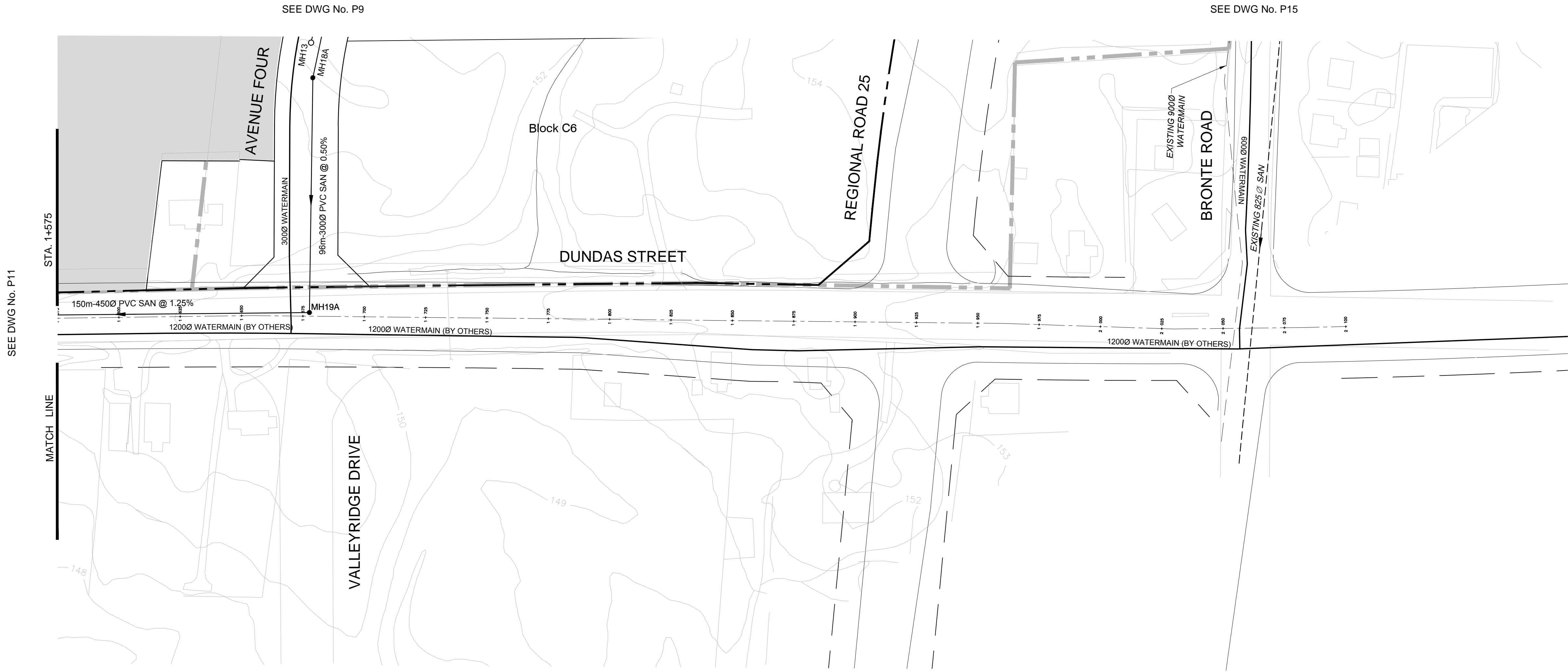
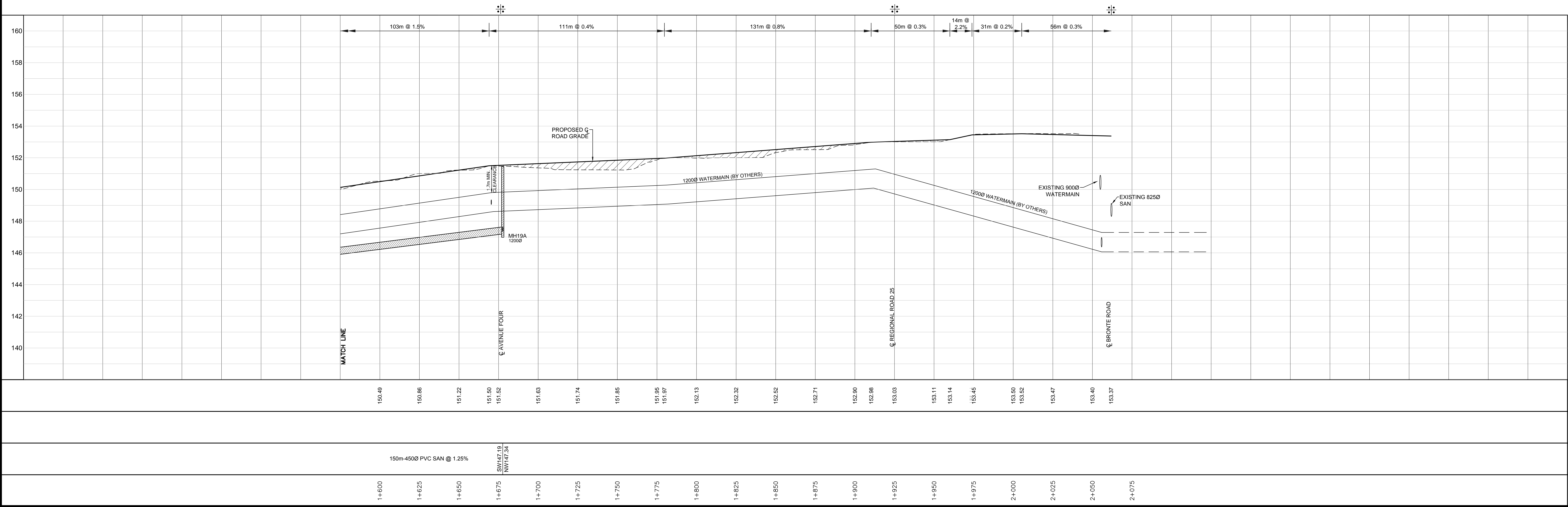


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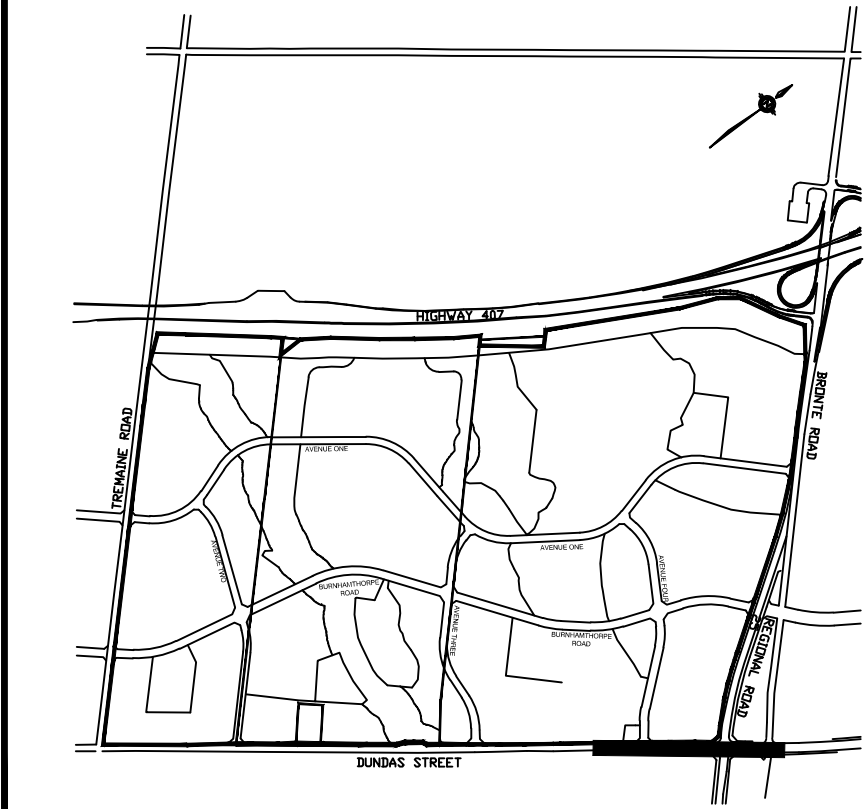
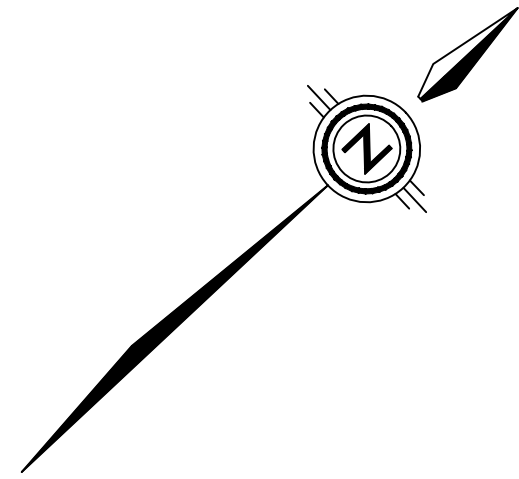
- LEGEND**
- 407 WEST PLAN AREA
 - PROPERTY LINE
 - - - PROPOSED INFILTRATION SWALE
 - - - SANITARY SEWER
 - SANITARY MANHOLE
 - STORM SEWER
 - STORM MANHOLE
 - WATERMAIN
 - - - 150.0 EXISTING CONTOUR ELEVATION

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED. DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS. BENCHMARKS MTO BENCHMARK BM 81.8108. ELEVATION 167.059 TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).			
1	JUN 2013	CONCEPTUAL ONLY. SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION	
No.	Date	By	
Design	S.W.	Ch'kd	A.W.
Drawn	CAD 10/12	Ch'kd	
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1:100 Vert.	0 5 10 15 20		
CONSULTANT			
MUNICIPALITY			
TOWN OF OAKVILLE			
TITLE			
407 WEST EMPLOYMENT AREA CONCEPTUAL PLAN AND PROFILES DUNDAS STREET STA 0+000 TO STA 0+875			
Municipal Drawing No		Regional Drawing No	
MMM File No		Drawing No	
14-09222		P10	

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PLOTDATE: Jun 10, 2013 11:27am WPCS



DUNDAS STREET PROPOSED
WORKS ARE CONCEPTUAL ONLY.
DESIGN BY OTHERS.



KEY PLAN NTS

- LEGEND**
- 407 WEST PLAN AREA
 - PROPERTY LINE
 - PROPOSED INFILTRATION SWALE
 - SANITARY SEWER
 - SANITARY MANHOLE
 - STORM SEWER
 - STORM MANHOLE
 - WATERMAIN
 - 150.0--- EXISTING CONTOUR ELEVATION

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES
UNLESS OTHERWISE NOTED.

DRAWINGS ARE NOT DIGITALLY CORRECT.
LAYOUT TO BE COMPLETED BY OFFSETS.

BENCHMARKS
MTO BENCHMARK BM 81.8108. ELEVATION 167.059
TABLET ON CULVERT, SOUTHWEST CORNER OF
DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

No.	Date	By
1	JUN 2013	

Design	S.W.	Ch'kd	A.W.	Date
Drawn	CAD 10/12	Ch'kd		DECEMBER 2012

Scale	Horiz.	Vert.	References
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CONSULTANT

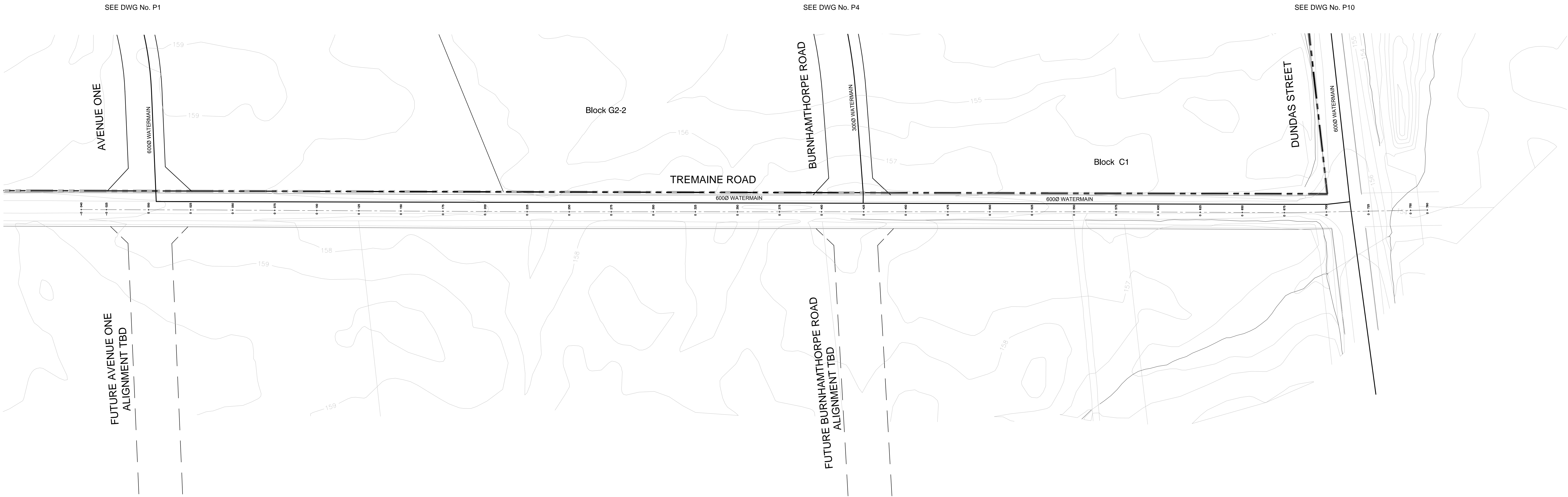
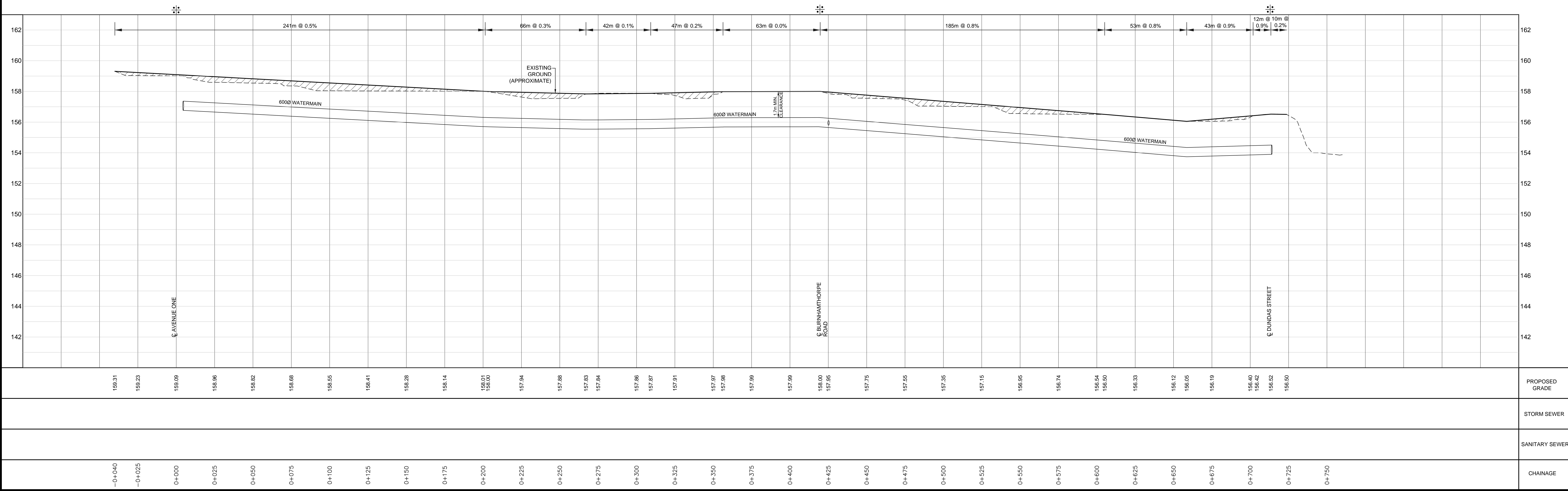
MMM GROUP
100 Commercial Valley Dr. Mississauga, Ontario L4T 1A1
Tel: (905) 276-1100 Fax: (905) 276-1101 www.mmm.ca

MUNICIPALITY
Halton Regional Municipality of Halton
TOWN OF OAKVILLE

TITLE
**407 WEST EMPLOYMENT AREA
CONCEPTUAL
PLAN AND PROFILES
DUNDAS STREET
STA 1+575 TO STA 2+075**

Municipal Drawing No	Regional Drawing No
14-09222	P12

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PLOTDATE: Jun 10, 2013 11:28am, wjwss



KEY PLAN

NTS

LEGEND

- 407 WEST PLAN AREA
- PROPERTY LINE
- PROPOSED INFILTRATION SWALE
- SANITARY SEWER
- SANITARY MANHOLE
- STORM SEWER
- STORM MANHOLE
- WATERMAIN
- EXISTING CONTOUR ELEVATION

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.
DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.
BENCHMARKS
MTO BENCHMARK BM 81.8108. ELEVATION 167.059
TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

No.	Date	By
1	JUN 2013	

Design	S.W.	Ch'kd	A.W.	Date
Drawn	CAD 10/12	Ch'kd		DECEMBER 2012

Scale	Horiz.	Vert.	References
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CONSULTANT

MMM GROUP
100 Commerce Valley Dr. Mississauga, Ontario L4T 1A1
Tel: 905-881-1100 Fax: 905-882-2000 www.mmm.ca

MUNICIPALITY

Halton Regional Municipality of Halton

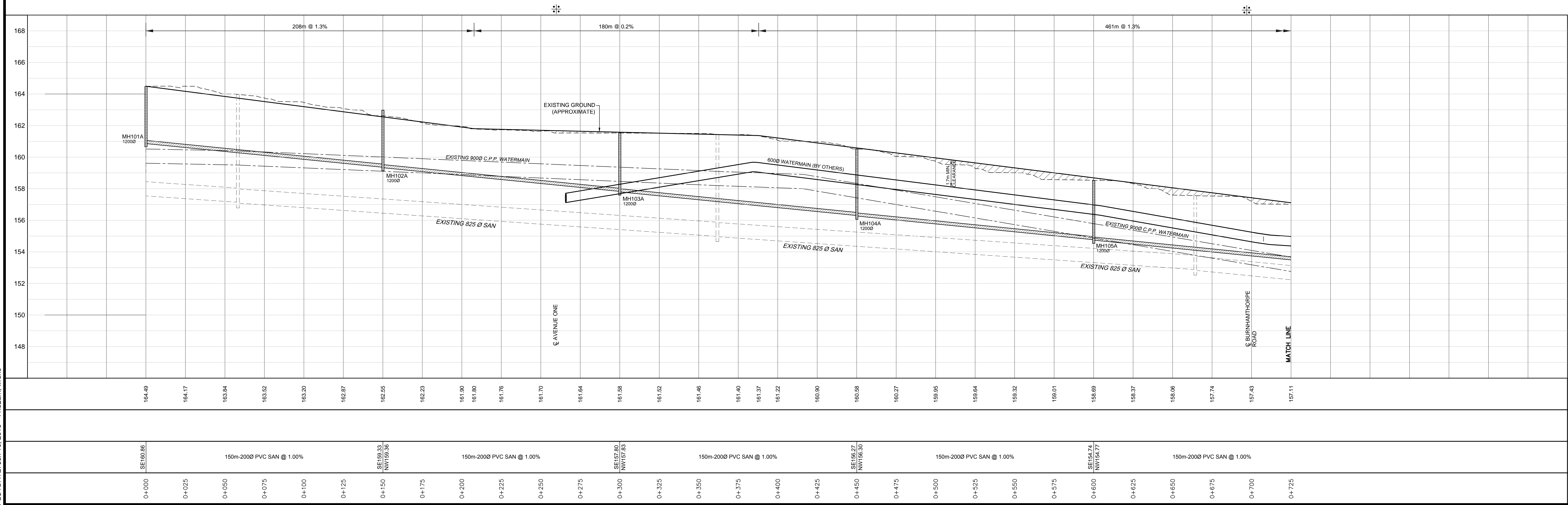
TOWN OF OAKVILLE

TITLE

407 WEST EMPLOYMENT AREA
CONCEPTUAL
PLAN AND PROFILES
TREMAINE ROAD
STA 0+000 TO STA 0+750

Municipal Drawing No	Regional Drawing No
MMM File No 14-09222	Drawing No P13

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PLOTDATE: Jun 10, 2013 11:32am WPCS



PROPOSED GRADE
STORM SEWER
SANITARY SEWER
CHAINAGE

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.
DRAWINGS ARE NOT DIGITALLY CORRECT. LAYOUT TO BE COMPLETED BY OFFSETS.
BENCHMARKS
MTO BENCHMARK BM 81.8108. ELEVATION 167.059
TABLET ON CULVERT, SOUTHWEST CORNER OF DUNDAS STREET AND TRAFALGAR ROAD (1978 DATUM).

No.	Date	By
1	JUN 2013	CONCEPTUAL ONLY. SUBMITTED IN SUPPORT OF DRAFT PLAN APPLICATION

Design	S.W.	Ch'kd	A.W.	Date
Drawn	CAD 10/12	Ch'kd		DECEMBER 2012

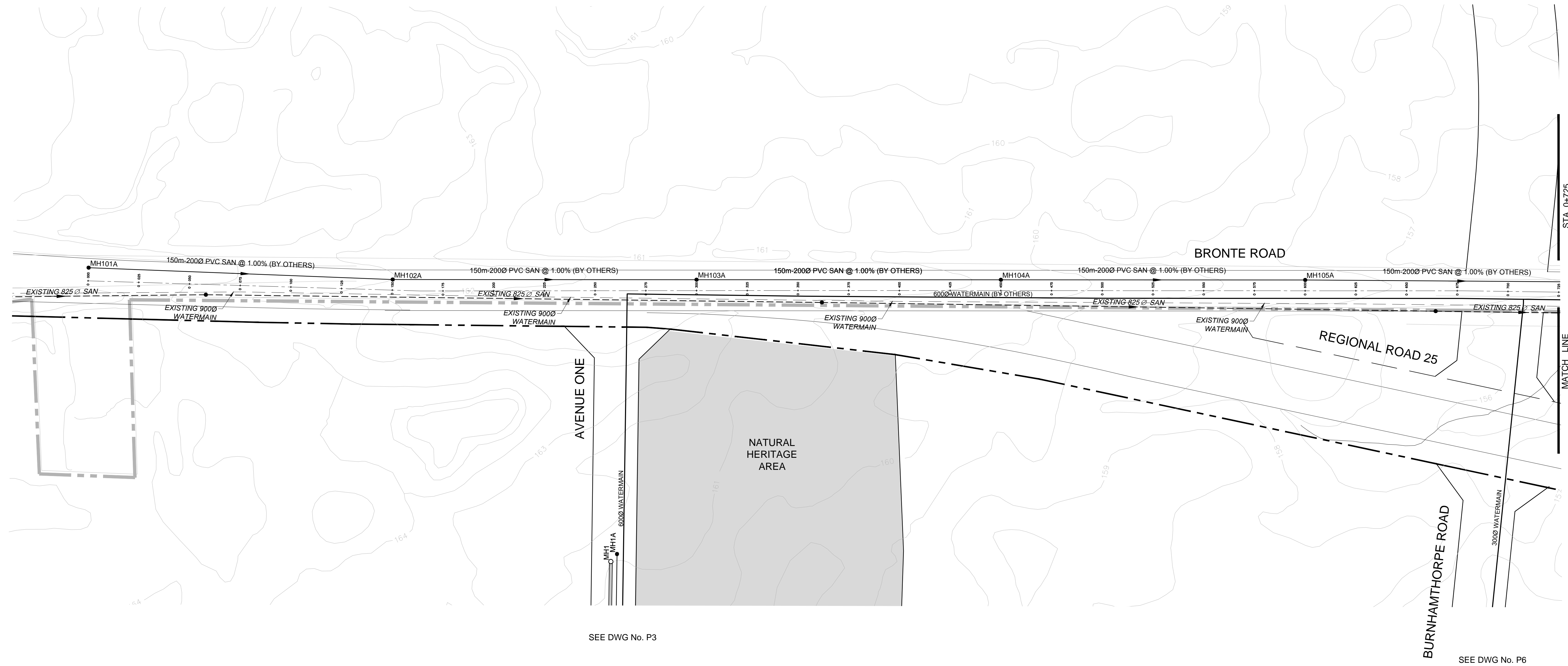
Scale
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CONSULTANT
MMM GROUP
100 Commerce Valley Dr. Mississauga, Ontario L4T 1A1
905-881-1100 F: 905-882-8800 www.mmm.ca

MUNICIPALITY
Halton Regional Municipality of Halton
TOWN OF OAKVILLE

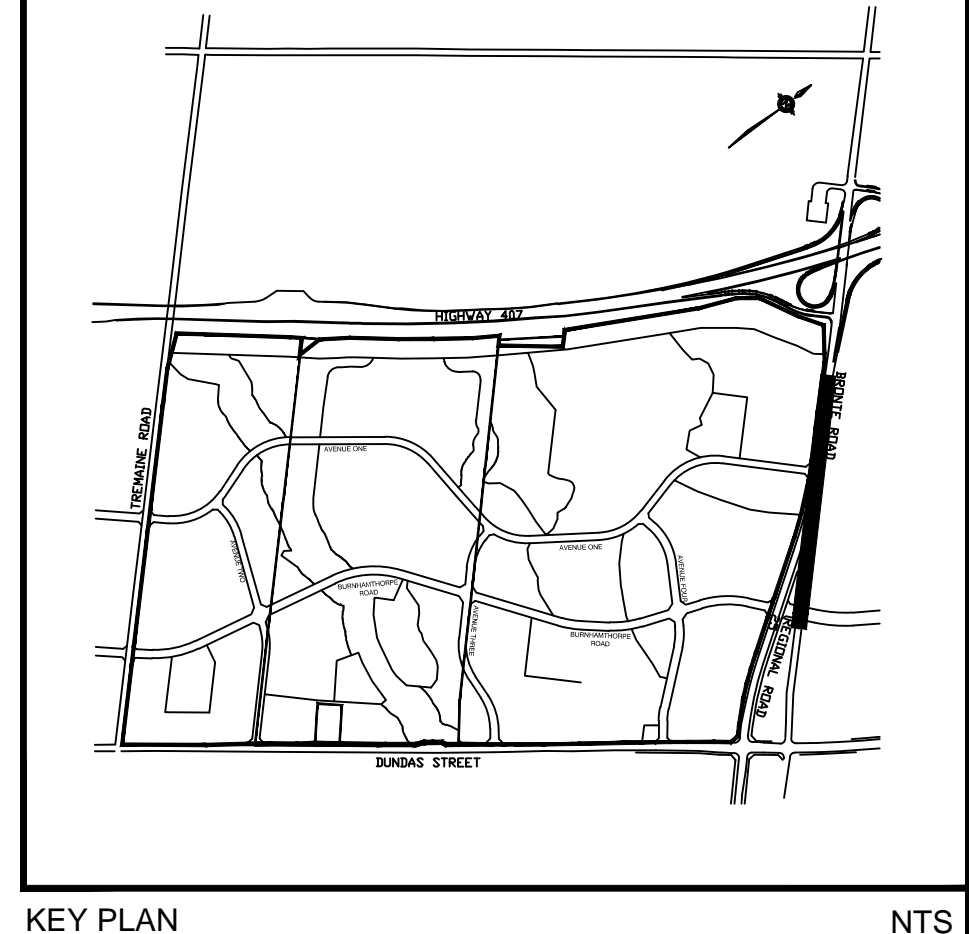
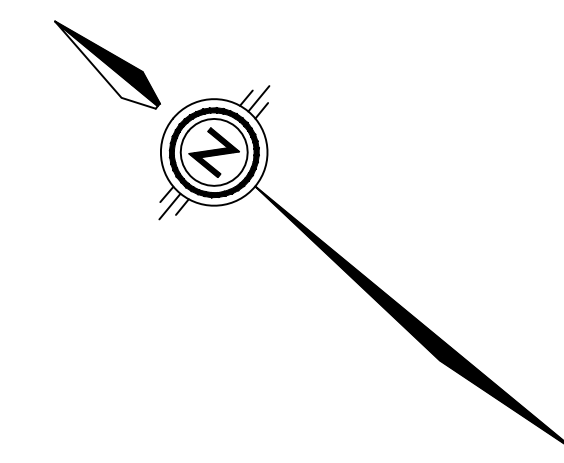
TITLE
407 WEST EMPLOYMENT AREA
CONCEPTUAL PLAN AND PROFILES
BRONTE ROAD
STA. 0+040 TO STA 0+725

Municipal Drawing No	Regional Drawing No
MMM File No 14-09222	Drawing No P14

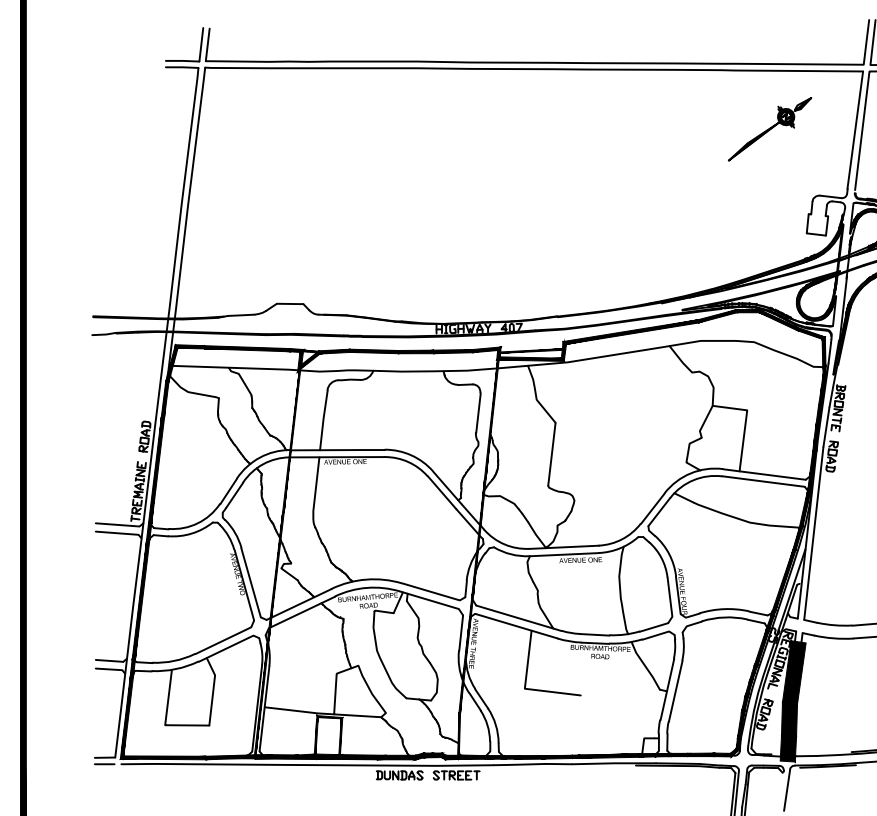
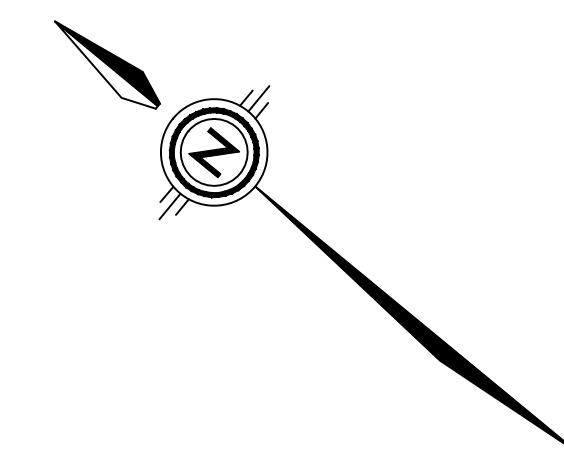


SEE DWG No. P15

SEE DWG No. P6



- LEGEND
- 407 WEST PLAN AREA
 - PROPERTY LINE
 - PROPOSED INFILTRATION SWALE
 - SANITARY SEWER
 - SANITARY MANHOLE
 - STORM SEWER
 - STORM MANHOLE
 - WATERMAIN
 - 150.0 --- EXISTING CONTOUR ELEVATION

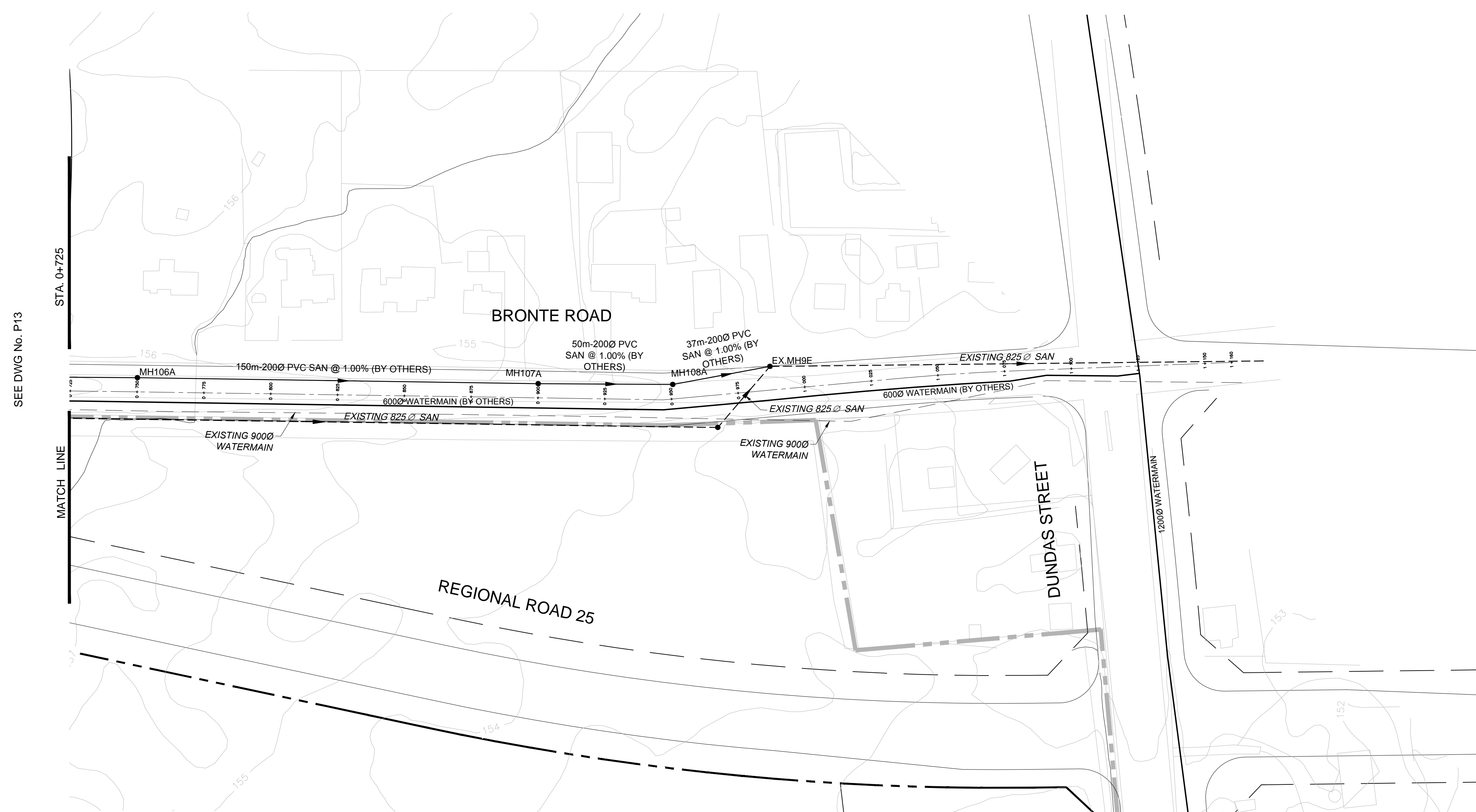


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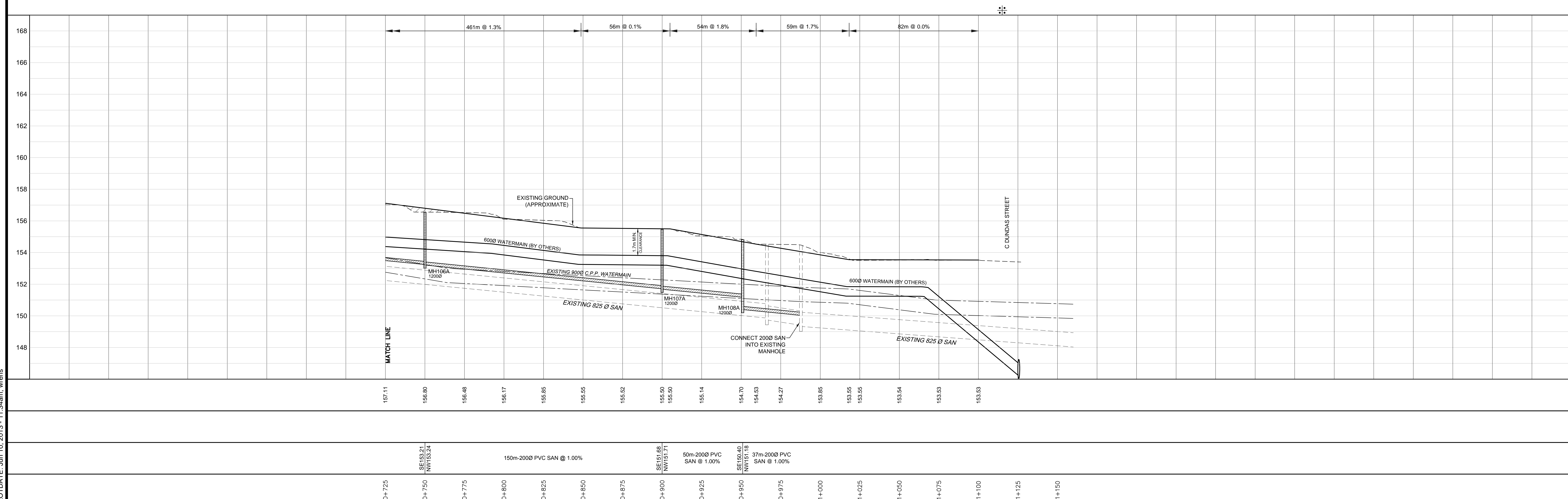
NTS

LEGEND

-
- 407 WEST PLAN AREA
 - PROPERTY LINE
 - PROPOSED INFILTRATION SWALE
 - SANITARY SEWER
 - SANITARY MANHOLE
 - STORM SEWER
 - STORM MANHOLE
 - WATERMAIN
 - EXISTING CONTOUR ELEVATION



SEE DWG No. P12



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PLOTDATE: Jun 10 2013 - 11:34am wrens

FILENAME: X:\DIV10
PLOTDATE: Jun 10, 2001

[illegible]

MMM GROUP
100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
T: 905.882.1100 F: 905.883.0655 WWW.MMM.CO

MUNICIPALITY

 **Halton**
REGION

Regional
Municipality
of Halton

 TOWN OF OAKVILLE

TITLE
407 WEST EMPLOYMENT AREA
CONCEPTUAL
PLAN AND PROFILES
BRONTE ROAD
STA 0+725 TO STA 1+150

Municipal Drawing No	Regional Drawing No
MMM File No 14-09222	Drawing No P15

407 West Employment Lands

14-09222

Water Analysis

Maximum Daily Flow - Pipe Report

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)	Status	Total Forward Flow (ML)	Total Reverse Flow (ML)	Total Net Flow (ML)	Flow Reversal Count
NO-2064	NO-239	NO-238	201.06	600	120	26.99	0.1	0	0.02	Open				0
NO-2065	NO-238	NO-237	397.08	600	120	17.32	0.06	0	0.01	Open				0
NO-2066	NO-237	NO-236	177.95	300	120	3.18	0.04	0	0.01	Open				0
NO-2067	NO-236	NO-235	149.93	300	120	-5.96	0.08	0.01	0.04	Open				0
NO-2068	NO-237	NO-228	485.08	600	120	14.14	0.05	0	0.01	Open				0
NO-2069	NO-227	NO-250	456.73	600	120	19.89	0.07	0.01	0.01	Open				0
NO-2070	NO-222	NO-227	91.03	600	120	24.81	0.09	0	0.02	Open				0
NO-2071	NO-235	NO-240	179	300	120	-2.86	0.04	0	0.01	Open				0
NO-2072	NO-240	NO-241	137.52	300	120	-9.3	0.13	0.01	0.09	Open				0
NO-2073	NO-235	NO-234	259.63	300	120	-6.29	0.09	0.01	0.04	Open				0
NO-2075	NO-235	NO-230	667.9	300	120	3.2	0.05	0.01	0.01	Open				0
NO-2076	NO-228	NO-229	76.77	300	120	3.92	0.06	0	0.02	Open				0
NO-2077	NO-229	NO-230	145.77	300	120	-0.45	0.01	0	0	Open				0
NO-2078	NO-230	NO-231	261.63	300	120	-1.82	0.03	0	0	Open				0
NO-2080	NO-247	NO-224	357.76	300	120	-4.9	0.07	0.01	0.03	Open				0
NO-2081	NO-223	NO-224	197.08	300	120	-1.23	0.02	0	0	Open				0
NO-2082	NO-227	NO-223	180.27	300	120	4.92	0.07	0.01	0.03	Open				0
NO-2083	NO-224	NO-225	253.2	300	120	-6.44	0.09	0.01	0.05	Open				0
NO-2088	WJ-3116-O	NO-251	257.6	1,200.00	130	-7.95	0.01	0	0	Open				0
NO-2089	NO-246	NO-252	239.94	1,200.00	130	-37.43	0.03	0	0	Open				0
NO-2090	NO-225	NO-245	162.33	300	120	-12.3	0.17	0.02	0.15	Open				0
NO-2091	NO-231	NO-246	235.73	300	120	-12.63	0.18	0.04	0.16	Open				0
NO-2092	NO-234	WJ-3114-O	155.42	300	120	-11.16	0.16	0.02	0.13	Open				0
NO-2093	NO-230	NO-247	318.32	300	120	4.56	0.06	0.01	0.02	Open				0
NO-2094	NO-224	NO-248	122.04	300	120	0.31	0	0	0	Open				0
NO-2095	NO-249	NO-248	302.87	300	120	8.41	0.12	0.02	0.08	Open				0
NO-2096	NO-249	WJ-3046-O	417.52	600	120	31.46	0.11	0.01	0.03	Open				0
NO-2097	NO-250	NO-228	576.83	600	120	-3.97	0.01	0	0	Open				0
NO-2098	NO-251	NO-245	164.44	1,200.00	130	-7.95	0.01	0	0	Open				0
NO-2099	NO-252	WJ-1150-O	144.25	1,200.00	130	-37.43	0.03	0	0	Open				0
NO-2100	NO-239	NO-241	433.99	600.00	120	-26.99	0.1	0.01	0.02	Open				0
NO-2101	NO-241	WJ-70-O	444.61	600.00	120	-36.3	0.13	0.02	0.04	Open				0
NO-2102	NO-245	NO-253	370.30	300.00	120	1.14	0.02	0	0	Open				0
NO-2103	NO-253	NO-246	365.89	300.00	120	-1.41	0.02	0	0	Open				0
NO-2104	NO-246	NO-254	241.64	150.00	120	2.01	0.11	0.04	0.16	Open				0
WM-10406-O	WJ-3046-O	NO-222	137.39	600	120	31.46	0.11	0	0.03	Open				0
WM-10408-O	NO-245	NO-246	733.46	1,200.00	130	-21.39	0.02	0	0	Open				0
WM-10410-O	WJ-3114-O	WJ-1150-O	139.97	1,200.00	130	47.18	0.04	0	0	Open				0
WM-10416-O	WJ-3116-O	NO-249	294.55	600	120	39.87	0.14	0.01	0.05	Open				0

407 West Employment Lands**14-09222****Water Analysis****Maximum Daily Flow - Junction Report**

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
NO-222	6.65	160	196.17	51.42
NO-223	6.16	159	196.17	52.83
NO-224	0	157.8	196.17	54.54
NO-225	5.85	152	196.18	62.8
NO-227	0	159.7	196.17	51.85
NO-228	6.25	152.4	196.17	62.22
NO-229	4.37	152	196.16	62.78
NO-230	0	151.3	196.16	63.78
NO-231	10.81	149	196.16	67.05
NO-234	4.86	153	196.18	61.39
NO-235	0	153.5	196.17	60.66
NO-236	9.14	155	196.17	58.52
NO-237	0	156	196.17	57.1
NO-238	9.67	157	196.17	55.69
NO-239	0	162	196.18	48.59
NO-240	6.44	155	196.17	58.53
NO-241	0	156	196.19	57.13
NO-245	0	153.8	196.2	60.28
NO-246	0	148	196.2	68.52
NO-247	9.46	153	196.16	61.35
NO-248	8.72	157	196.17	55.68
NO-249	0	158	196.19	54.29
NO-250	23.86	155	196.16	58.52
NO-251	0	154	196.2	59.99
NO-252	0	147	196.2	69.95
NO-253	2.55	151	196.2	64.26
NO-254	2.01	147	196.16	69.89
WJ-1150-O	0	152	196.2	62.84
WJ-3046-O	0	159	196.18	52.85
WJ-3114-O	0	152	196.2	62.84
WJ-3116-O	0	157	196.2	55.73

407 West Employment Lands**14-09222****Water Analysis****Peak Daily Flow - Pipe Report**

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)	Status	Total Forward Flow (ML)	Total Reverse Flow (ML)	Total Net Flow (ML)	Flow Reversal Count
NO-2064	NO-239	NO-238	201.06	600	120	43.06	0.15	0.01	0.05	Open				0
NO-2065	NO-238	NO-237	397.08	600	120	27.79	0.1	0.01	0.02	Open				0
NO-2066	NO-237	NO-236	177.95	300	120	4.95	0.07	0.01	0.03	Open				0
NO-2067	NO-236	NO-235	149.93	300	120	-9.48	0.13	0.01	0.09	Open				0
NO-2068	NO-237	NO-228	485.08	600	120	22.84	0.08	0.01	0.02	Open				0
NO-2069	NO-227	NO-250	456.73	600	120	30.92	0.11	0.01	0.03	Open				0
NO-2070	NO-222	NO-227	91.03	600	120	38.74	0.14	0	0.04	Open				0
NO-2071	NO-235	NO-240	179	300	120	-4.62	0.07	0	0.03	Open				0
NO-2072	NO-240	NO-241	137.52	300	120	-14.79	0.21	0.03	0.22	Open				0
NO-2073	NO-235	NO-234	259.63	300	120	-9.99	0.14	0.03	0.1	Open				0
NO-2075	NO-235	NO-230	667.9	300	120	5.14	0.07	0.02	0.03	Open				0
NO-2076	NO-228	NO-229	76.77	300	120	6.2	0.09	0	0.04	Open				0
NO-2077	NO-229	NO-230	145.77	300	120	-0.7	0.01	0	0	Open				0
NO-2078	NO-230	NO-231	261.63	300	120	-2.83	0.04	0	0.01	Open				0
NO-2080	NO-247	NO-224	357.76	300	120	-7.66	0.11	0.02	0.06	Open				0
NO-2081	NO-223	NO-224	197.08	300	120	-1.89	0.03	0	0	Open				0
NO-2082	NO-227	NO-223	180.27	300	120	7.83	0.11	0.01	0.07	Open				0
NO-2083	NO-224	NO-225	253.2	300	120	-10.12	0.14	0.03	0.11	Open				0
NO-2088	WJ-3116-O	NO-251	257.6	1,200.00	130	-33.03	0.03	0	0	Open				0
NO-2089	NO-246	NO-252	239.94	1,200.00	130	-79.49	0.07	0	0	Open				0
NO-2090	NO-225	NO-245	162.33	300	120	-19.36	0.27	0.06	0.36	Open				0
NO-2091	NO-231	NO-246	235.73	300	120	-19.9	0.28	0.09	0.37	Open				0
NO-2092	NO-234	WJ-3114-O	155.42	300	120	-17.67	0.25	0.05	0.3	Open				0
NO-2093	NO-230	NO-247	318.32	300	120	7.28	0.1	0.02	0.06	Open				0
NO-2094	NO-224	NO-248	122.04	300	120	0.56	0.01	0	0	Open				0
NO-2095	NO-249	NO-248	302.87	300	120	13.21	0.19	0.05	0.18	Open				0
NO-2096	NO-249	WJ-3046-O	417.52	600	120	49.24	0.17	0.03	0.07	Open				0
NO-2097	NO-250	NO-228	576.83	600	120	-6.76	0.02	0	0	Open				0
NO-2098	NO-251	NO-245	164.44	1,200.00	130	-33.03	0.03	0	0	Open				0
NO-2099	NO-252	WJ-1150-O	144.25	1,200.00	130	-79.49	0.07	0	0.01	Open				0
NO-2100	NO-239	NO-241	433.99	600.00	120	-43.06	0.15	0.02	0.05	Open				0
NO-2101	NO-241	WJ-70-O	444.61	600.00	120	-57.85	0.2	0.04	0.09	Open				0
NO-2102	NO-245	NO-253	370.30	300.00	120	1.52	0.02	0	0	Open				0
NO-2103	NO-253	NO-246	365.89	300.00	120	-2.5	0.04	0	0.01	Open				0
NO-2104	NO-246	NO-254	241.64	150.00	120	3.18	0.18	0.09	0.37	Open				0
WM-10406-O	WJ-3046-O	NO-222	137.39	600	120	49.24	0.17	0.01	0.07	Open				0
WM-10408-O	NO-245	NO-246	733.46	1,200.00	130	-53.9	0.05	0	0	Open				0
WM-10410-O	WJ-3114-O	WJ-1150-O	139.97	1,200.00	130	116.15	0.1	0	0.01	Open				0
WM-10416-O	WJ-3116-O	NO-249	294.55	600	120	62.46	0.22	0.03	0.11	Open				0

407 West Employment Lands**14-09222****Water Analysis****Peak Daily Flow - Junction Report**

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
NO-222	10.5	160	190.83	43.82
NO-223	9.72	159	190.81	45.22
NO-224	0	157.8	190.81	46.93
NO-225	9.24	152	190.84	55.21
NO-227	0	159.7	190.82	44.24
NO-228	9.87	152.4	190.81	54.6
NO-229	6.9	152	190.81	55.17
NO-230	0	151.3	190.81	56.16
NO-231	17.07	149	190.81	59.44
NO-234	7.68	153	190.85	53.81
NO-235	0	153.5	190.83	53.06
NO-236	14.43	155	190.81	50.91
NO-237	0	156	190.82	49.5
NO-238	15.27	157	190.83	48.09
NO-239	0	162	190.84	41
NO-240	10.17	155	190.83	50.94
NO-241	0	156	190.86	49.56
NO-245	0	153.8	190.9	52.74
NO-246	0	148	190.9	60.98
NO-247	14.94	153	190.79	53.72
NO-248	13.77	157	190.81	48.07
NO-249	0	158	190.86	46.72
NO-250	37.68	155	190.81	50.91
NO-251	0	154	190.9	52.45
NO-252	0	147	190.9	62.41
NO-253	4.02	151	190.89	56.71
NO-254	3.18	147	190.81	62.28
WJ-1152-O	0	152	190.2	54.3
WJ-3046-O	0	159	190.84	45.26
WJ-3114-O	0	152	190.9	55.3
WJ-3116-O	0	157	190.9	48.19

407 West Employment Lands**14-09222****Water Analysis****Fire Flow Report**

ID	Static Demand (L/s)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (psi)	Available Flow @Hydrant (L/s)	Available Flow Pressure (psi)
NO-222	10.5	43.82	190.83	250	40.23	1,099.35	20.01
NO-223	9.72	45.22	190.81	250	38.27	601.29	20
NO-224	0	46.93	190.81	250	41.56	787.64	20.01
NO-225	9.24	55.21	190.84	250	48.54	755.51	20.01
NO-227	0	44.24	190.82	250	40.63	1,093.55	20.01
NO-228	9.87	54.6	190.81	250	50.89	1,309.27	20.02
NO-229	6.9	55.17	190.81	250	49.75	907.88	20.01
NO-230	0	56.16	190.81	250	50.84	931.07	20.01
NO-231	17.07	59.44	190.81	250	51.67	732.41	20.01
NO-234	7.68	53.81	190.85	250	47.4	753.1	20.01
NO-235	0	53.06	190.83	250	48.08	928.77	20.01
NO-236	14.43	50.91	190.81	250	44.33	720.98	20
NO-237	0	49.5	190.82	250	45.84	1,195.82	20.01
NO-238	15.27	48.09	190.83	250	44.45	1,177.61	20.01
NO-239	0	41	190.84	250	37.43	1,012.41	20.01
NO-240	10.17	50.94	190.83	250	44.78	752.07	20.01
NO-241	0	49.56	190.86	205	46.9	1,337.75	20.02
NO-245	0	52.74	190.9	250	49.96	1,719.11	20.03
NO-246	0	60.98	190.9	250	58.25	2,006.53	20.04
NO-247	14.94	53.72	190.79	250	43.69	554.22	20
NO-248	13.77	48.07	190.81	250	40.86	630.47	20
NO-249	0	46.72	190.86	250	43.5	1,298.18	20.02
NO-250	37.68	50.91	190.81	250	47.1	1,230.36	20.01
NO-251	0	52.45	190.9	250	49.66	1,703.51	20.03
NO-252	0	62.41	190.9	250	59.69	2,063.96	20.04
NO-253	4.02	56.71	190.89	250	47.9	608.22	20
NO-254	3.18	62.28	190.81	250	-358.87	72.80	20
WJ-1150-O	0	55.3	190.9	250	52.59	1,853.23	20.03
WJ-3046-O	0	45.26	190.84	250	41.72	1,139.51	20.01
WJ-3114-O	0	55.3	190.9	250	52.61	1,861.59	20.03
WJ-3116-O	0	48.19	190.9	250	45.39	1,558.75	20.02

AREA SERVICING PLAN FOR 407 WEST EMPLOYMENT AREA

WATER ANALYSIS PLAN

LEGEND

- 407 WEST EMPLOYMENT AREA
- EXISTING PROPERTY LINE
- SUBJECT PROPERTY
- SERVICE AREA (SERVICE/RETAIL/OFFICE)
- LIGHT EMPLOYMENT
- GENERAL EMPLOYMENT
- EMPLOYMENT (SPECIFIC USE TBD)
- OPEN SPACE
- STORMWATER MANAGEMENT
- PLANNED 407 TRANSITWAY
- EXISTING REGIONAL WATERMAIN
- PROPOSED REGIONAL WATERMAIN
- PROPOSED LOCAL WATERMAIN
- WATER ANALYSIS NODE
- FUTURE CULVERT CROSSING

FOR THE PURPOSES OF OUR CONCEPTUAL
SERVICING ANALYSIS, CONSERVATIVE LAND USE
ASSUMPTIONS HAVE BEEN MADE FOR THE ENTIRE
407 WEST EMPLOYMENT AREA

Scale



Client



Bentall
Kennedy

Prepared by



Date

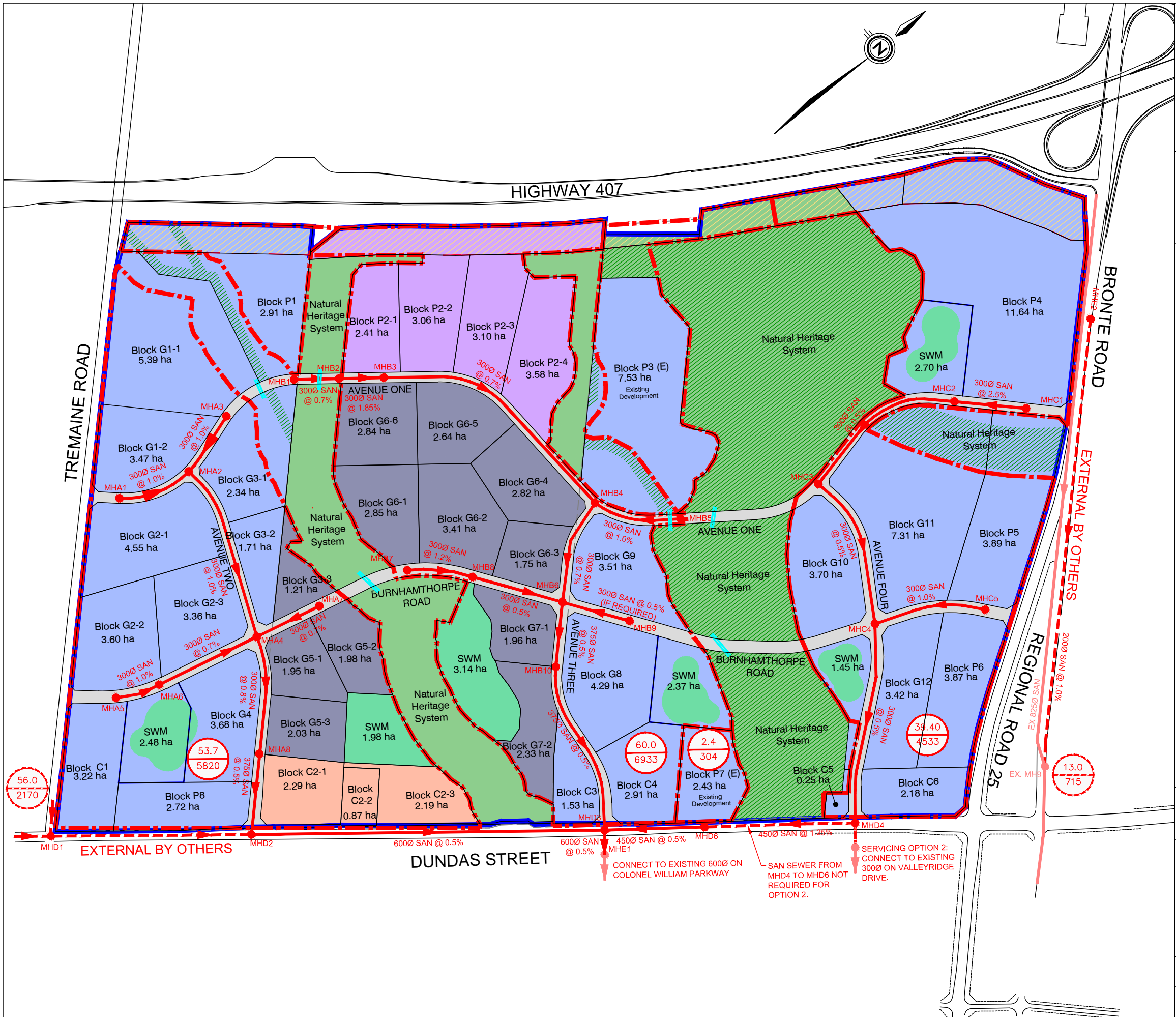
JUNE 2013

Project No.

1409222.001

EXHIBIT A1

FILE NAME: X:\DIV10\14-09222\MUN\ASP-FSS Exhibits\APP B1-6.1_Wastewater Analysis Plan.dwg_EX B1



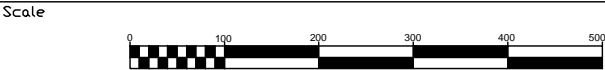
AREA SERVICING PLAN FOR 407 WEST EMPLOYMENT AREA

WASTEWATER ANALYSIS PLAN

LEGEND

- 407 WEST EMPLOYMENT AREA
- EXISTING PROPERTY LINE
- SUBJECT PROPERTY
- SERVICE AREA (SERVICE/RETAIL/OFFICE)
- LIGHT EMPLOYMENT
- GENERAL EMPLOYMENT
- EMPLOYMENT (SPECIFIC USE TBD)
- OPEN SPACE
- STORMWATER MANAGEMENT
- PLANNED 407 TRANSITWAY
- SANITARY SEWER
- SANITARY MANHOLE
- SANITARY DRAINAGE BOUNDARY
- ALTERNATIVE SANITARY SEWER ALIGN
- EXTERNAL SANITARY SEWER (B.O.)
- EXISTING SANITARY SEWER
- 39.40
4533
- 13.0
715
- EXTERNAL TRIBUTARY AREA (Ha)
- EXTERNAL TRIBUTARY POPULATION
- FUTURE CULVERT CROSSING

FOR THE PURPOSES OF OUR CONCEPTUAL
SERVICING ANALYSIS, CONSERVATIVE LAND USE
ASSUMPTIONS HAVE BEEN MADE FOR THE ENTIRE
407 WEST EMPLOYMENT AREA



Date
JUNE 2013

Project No.
1409222.001

EXHIBIT B1

THE REGIONAL MUNICIPALITY OF HALTON

SANITARY DESIGN SHEET

PROJECT No.: 14-09222
PROJECT NAME: 407 West Employment Area
CONSULTANT: MMM Group

DATE PRINTED: 12-Jun-13
DATE REVISED: 11-Dec-12
DESIGNED BY: SW
CHECKED BY: AW

Street	Manhole		Length in metres	Tributary Area (Hectares)												Tributary Population										Q Average L/s	K Average	Peaking Factor M	Q Peak Dry L/s	Total Infil- tration L/s	Q Total L/s	SEWER					REMARKS								
	From	To		Increment						Accumulated						Increment					Accumulated											Size (mm)	Slope (m/m)	Q (L/s)	V (m/s)										
				Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Total	Res.	Comm.	Ind.	Inst.	Total										Full Flow	Act. Flow									
Avenue 1-Avenue 2-Burnhamthorpe Road-Dundas Street																																													
Block G1-2	PLUG	A1				3.47			3.47						3.47			434			434			434		434																			
Avenue 1	A1	A2	140			0.00		0.31	0.31					0.31	3.78			0			0			434		434	1.381	0.80	4.005	4.42	1.08	5.50	300	0.010	96.701	1.37	0.71								
Block G1-1	PLUG	A3				5.39			5.39					5.39			674			674			674		674																				
Avenue 1	A3	A2	140			0.00		0.31	0.31					5.39	5.70			0			0			674		674	2.144	0.80	3.904	6.70	1.63	8.33	300	0.010	96.701	1.37	0.79								
Block G2-1	PLUG	A2				4.55			4.55					4.55			569			569			569		569																				
Block G3-1	PLUG	A2				2.34			2.34					2.34			293			293			293		293																				
Block G3-2	PLUG	A2				1.71			1.71					1.71			214			214			214		214																				
Avenue 2	A2	A4	380			0.00		0.84	0.84					17.46	18.91			0			0			2183		2183	6.947	0.80	3.556	19.76	5.41	25.17	300	0.010	96.701	1.37	1.15								
Block G2-2	PLUG	A5				3.60			3.60					3.60			450			450			450		450																				
Block C1	PLUG	A5				3.22			3.22					3.22			403			403			403		403																				
Burnhamthorpe Road	A5	A6	35			0.00		0.35	0.35					6.82	7.17			0			0			853		853	2.713	0.80	3.844	8.34	2.05	10.39	300	0.010	96.701	1.37	0.86								
Block G2-3	PLUG	A6				3.36			3.36					3.36			420			420			420		420																				
Burnhamthorpe Road	A6	A4	225			0.00		0.59	0.59					10.18	11.12			0			0			1273		1273	4.050	0.80	3.730	12.09	3.18	15.27	300	0.007	80.906	1.14	0.86								
Block G3-3	PLUG	A7				1.21			1.21					1.21			151			151			151		151																				
Block G5-2	PLUG	A7				1.98			1.98					1.98			248			248			248		248																				
Burnhamthorpe Road	A7	A4	145			0.00		0.38	0.38					3.19	3.57			0			0			399		399	1.269	0.80	4.023	4.08	1.02	5.10	300	0.007	80.906	1.14	0.60								
Block G5-1	PLUG	A4				1.95			1.95					1.95			244			244			244		244																				
Block G5-3	PLUG	A4				2.03			2.03					2.03			254			254			254		254																				
Avenue 2	A4	A8	250			0.00		0.55	0.55					34.81	38.13			0			0			4351		4351	13.849	0.80	3.300	36.57	10.90	47.47	300	0.008	86.492	1.22	1.26								
Block G4	PLUG	A8				3.68			3.68					3.68			460			460			460		460																				
Block C2-1	PLUG	A8				2.29			2.29					2.29			286			286			286		286																				
Block P8	PLUG	A8				2.72			2.72					2.72			340			340			340		340																				
Avenue 2	A8	D2	170			0.00		0.37	0.37					43.50	47.19			0			0			5438		5438	17.307	0.80	3.211	44.46	13.50	57.95	375	0.005	123.977	1.12	1.10								
External 1	TO	D1		56.00		0.00			56.00	56.00					56.00	2170				2170	2170				2170																				
Dundads Street	D1	D2	420			0.00		1.26	1.26	56.00				0.00			0			0	2170				2170	6.907	1.00	3.558	24.57	16.38	40.95	450	0.005	201.600	1.27	0.96									
Block C2-2	PLUG	D2				0.87			0.87					0.87			109			109			109		109																				
Block C2-3	PLUG	D2				2.19			2.19					2.19			274			274			274		274																				
Dundas Street	D2	D3	735			0.00		2.21	2.21	56.00				46.56	109.71			0		2170			5820		7990	25.431	0.91	3.051	70.54	31.38	101.92	600	0.005	434.172	1.54	1.24									
														0.00																															

THE REGIONAL MUNICIPALITY OF HALTON

SANITARY DESIGN SHEET

PROJECT No.: 14-09222
PROJECT NAME: 407 West Employment Area
CONSULTANT: MMM Group

DATE PRINTED: 12-Jun-13
DATE REVISED: 11-Dec-12
DESIGNED BY: SW
CHECKED BY: AW

Street	Manhole		Length in metres	Tributary Area (Hectares)												Tributary Population										Q Average L/s	K Average	Peaking Factor M	Q Peak Dry L/s	Total Infil- tration L/s	Q Total L/s	SEWER					REMARKS
	From	To		Increment						Accumulated						Increment					Accumulated																
				Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Total	Res.	Comm.	Ind.	Inst.	Total												
Avenue 1-Avenue 3-Burnhamthorpe Road																																					
Block P1	PLUG	B1				2.91			2.91			2.91			2.91			364		364			364		364												
Avenue 1	B1	B2	95			0.00		0.21	0.21			2.91		0.21	3.12			0		0			364		364	1.158	0.80	4.041	3.74	0.89	4.64	300	0.007	80.906	1.14	0.60	
Avenue 1	B2	B3	95			0.00		0.21	0.21			2.91		0.42	3.33			0		0			364		364	1.158	0.80	4.041	3.74	0.95	4.70	300	0.020	136.756	1.93	0.79	
Block P2-1	PLUG	B3				2.29			2.41			2.29			2.29			286		286			286		286												
Block P2-2	PLUG	B3				3.05			3.06			3.05			3.05			381		381			381		381												
Block P2-3	PLUG	B3				3.11			3.11			3.11			3.11			389		389			389		389												
Block P2-4	PLUG	B3				3.73			3.58			3.73			3.73			466		466			466		466												
Block G6-5	PLUG	B3				2.64			2.64			2.64			2.64			330		330			330		330												
Block G6-6	PLUG	B3				2.84			2.84			2.84			2.84			355		355			355		355												
Avenue 1	B3	B4	550			0.00		1.21	1.21			20.57		1.63	22.20			0		0			2571		2571	8.184	0.80	3.498	22.90	6.35	29.25	300	0.007	80.906	1.14	1.05	
Block P3	PLUG	B5				7.53			7.53			7.53			7.53			941		941			941		941												
Avenue 1	B5	B4	185			0.00		0.41	0.41			7.53		0.41	7.94			0		0			941		941	2.996	0.80	3.817	9.15	2.27	11.42	300	0.010	96.701	1.37	0.88	
Block G6-4	PLUG	B4				2.82			2.82			2.82			2.82			353		353			353		353												
Block G9	PLUG	B4				3.51			3.51			3.51			3.51			439		439			439		439												
Avenue 3	B4	B6	225			0.00		0.50	0.50			34.43		2.53	36.96			0		0			4304		4304	13.698	0.80	3.305	36.21	10.57	46.79	300	0.007	80.906	1.14	1.20	
Block G6-1	PLUG	B7				2.85			2.85			2.85			2.85			356		356			356		356												
Burnhamthorpe Road	B7	B8	145			0.00		0.38	0.38			2.85		0.38	3.23			0		0			356		356	1.134	0.80	4.046	3.67	0.92	4.59	300	0.012	105.930	1.50	0.66	
Block G6-2	PLUG	B8				3.41			3.41			3.41			3.41			426		426			426		426												
Block G6-3	PLUG	B8				1.75			1.75			1.75			1.75			219		219			219		219												
Burnhamthorpe Road	B8	B6	195			0.00		0.51	0.51			8.01		0.88	8.89			0		0			1001		1001	3.187	0.80	3.800	9.69	2.54	12.23	300	0.005	68.378	0.97	0.72	
Block G7-1	PLUG	B6				1.96			1.96			1.96			1.96			245		245			245		245												
Avenue 3	B6	B10	135			0.00		0.30	0.30			44.40		3.71	48.11			0		0			5550		5550	17.665	0.80	3.203	45.26	13.76	59.02	375	0.005	123.977	1.12	1.11	
Block G7-2	PLUG	B10				2.33			2.33			2.33			2.33			291		291			291		291												
Block G8	PLUG	B10				4.29			4.29			4.29			4.29			536		536			536		536												
Block C3	PLUG	B10				1.53			1.53			1.53			1.53			191		191			191		191												
Block C4	PLUG	B10				2.91			2.91			2.91			2.91			364		364			364		364												
Avenue 3	B10	D3	365			0.00		0.80	0.80			55.46		4.51	59.97			0		0	0		6933		6933	22.065	0.80	3.111	54.91	17.15	72.06	375	0.005	123.977	1.12	1.18	
Avenue One-Avenue Four-Burnhamthorpe Road-Dundas Street																																					
Block P4	PLUG	C1				11.64			11.64			11.64			11.64			1455		1455			1455		1455												
Avenue 1	C1	C2	150			0.00		0.33	0.33			11.64		0.33	11.97			0		0			1455		1455	4.631	0.80	3.689	13.67	3.42	17.09	300	0.025	152.897	2.16	1.36	
Avenue 1	C2	C3	95			0.00		0.21	0.21			11.64		0.54	12.18			0		0			1455		1455	4.631	0.80	3.689	13.67	3.48	17.15	300	0.005	68.378	0.97	0.80	
Block G10	PLUG	C3				3.70			3.70			3.70			3.70			463		463			463		463												
Block G11	PLUG	C3				7.31			7.31			7.31			7.31			914		914			914		914												
Avenue 4	C3	C4	330			0.00		0.86	0.86			22.65		1.40	24.05			0		0			2831		2831	9.012	0.80	3.464	24.97	6.88	31.85	300	0.005	68.378	0.97	0.95	
Block P5	PLUG	C5				3.89			3.89			3.89			3.89			486		486			486		486												
Block P6	PLUG	C5				3.87			3.87			3.87			3.87			484		484			484		484												
Burnhamthorpe Road	C5	C4	235			0.00		0.61	0.61			7.76		0.61	8.37			0		0			970		970	3.087	0.80	3.808	9.41	2.39	11.80	300	0.010	96.701	1.37	0.88	
Block G12	PLUG	C4				3.42			3.42			3.42			3.42																						

THE REGIONAL MUNICIPALITY OF HALTON

SANITARY DESIGN SHEET

PROJECT No.: 14-09222
PROJECT NAME: 407 West Employment Area
CONSULTANT: MMM Group

DATE PRINTED: 12-Jun-13
DATE REVISED: 11-Dec-12
DESIGNED BY: SW
CHECKED BY: AW

Street	Manhole		Length in metres	Tributary Area (Hectares)												Tributary Population										Q Average	K Average	Peaking Factor M	Q Peak Dry L/s	Total Infil- tration L/s	Q Total L/s	SEWER					REMARKS
	From	To		Increment						Accumulated						Increment					Accumulated																
				Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Total	Res.	Comm.	Ind.	Inst.	Total												
Existing - By Others																																					
Colonel William Parkway	E1	23A		0.00					0.00	56.00	0.00	140.71	0.00	16.49	213.20	0					0	2170	0	17589	0	19759	62.890	0.86	2.658	143.23	60.97	204.21	600	0.017	800.573	2.83	2.38
Colonel William Parkway	23A	22A		0.09					0.09	56.09	0.00	140.71	0.00	16.49	213.29	0					0	2170	0	17589	0	19759	62.890	0.86	2.658	143.24	61.00	204.24	600	0.017	800.573	2.83	2.38
Colonel William Parkway	22A	21A		0.11					0.11	56.20	0.00	140.71	0.00	16.49	213.40	0					0	2170	0	17589	0	19759	62.890	0.86	2.658	143.26	61.03	204.29	600	0.017	800.573	2.83	2.38
Fut. Phase 6	Plug 4	20A		4.88					4.88	4.88	0.00	0.00	0.00	0.00	4.88	659					659	659	0	0	659	2.098	1.00	3.910	8.20	1.40	9.60	200	0.005	23.192	0.74	0.70	
Colonel William Parkway	21A	20A		0.08					0.08	56.28	0.00	140.71	0.00	16.49	213.48	0					0	2170	0	17589	0	19759	62.890	0.86	2.658	143.27	61.05	204.32	600	0.017	800.573	2.83	2.38
Colonel William Parkway	20A	19A		0.00					0.00	61.16	0.00	140.71	0.00	16.49	218.36	0					0	2829	0	17589	0	20418	64.987	0.86	2.643	147.84	62.45	210.29	600	0.004	363.254	1.28	1.35
Colonel William Parkway	19A	18A		0.00					0.00	61.16	0.00	140.71	0.00	16.49	218.36	0					0	2829	0	17589	0	20418	64.987	0.86	2.643	147.84	62.45	210.29	600	0.004	363.254	1.28	1.35
Colonel William Parkway	18A	17A		0.00					0.00	61.16	0.00	140.71	0.00	16.49	218.36	0					0	2829	0	17589	0	20418	64.987	0.86	2.643	147.84	62.45	210.29	600	0.004	363.254	1.28	1.35
Colonel William Parkway	17A	16A		0.00					0.00	61.16	0.00	140.71	0.00	16.49	218.36	0					0	2829	0	17589	0	20418	64.987	0.86	2.643	147.84	62.45	210.29	600	0.004	363.254	1.28	1.35
Fut. Phase 5B	Plug 3	148A		8.84					8.84	8.84	0.00	0.00	0.00	0.00	8.84	796					796	796	0	0	796	2.534	1.00	3.862	9.78	2.53	12.31	200	0.005	23.192	0.74	0.75	
Colonel William Parkway	148A	147A		0.59					0.59	9.43	0.00	0.00	0.00	0.00	9.43	32					32	828	0	0	0	828	2.635	1.00	3.851	10.15	2.70	12.85	200	0.005	23.192	0.74	0.76
Colonel William Parkway	147A	141A		0.34					0.34	9.77	0.00	0.00	0.00	0.00	9.77	19					19	847	0	0	0	847	2.696	1.00	3.845	10.37	2.79	13.16	200	0.005	23.192	0.74	0.77
Street A	145A	144A		0.76					0.76	0.76	0.00	0.00	0.00	0.00	0.76	42					42	42	0	0	0	42	0.134	1.00	4.329	0.58	0.22	0.80	200	0.012	35.929	1.14	0.43
Street A	144A	143A		0.73					0.73	1.49	0.00	0.00	0.00	0.00	1.49	40					40	82	0	0	0	82	0.261	1.00	4.266	1.11	0.43	1.54	200	0.014	38.808	1.24	0.54
Street A	143A	142A		0.19					0.19	1.68	0.00	0.00	0.00	0.00	1.68	10					10	92	0	0	0	92	0.293	1.00	4.253	1.25	0.48	1.73	200	0.015	40.170	1.28	0.56
Street A	142A	141A		0.37					0.37	2.05	0.00	0.00	0.00	0.00	2.05	20					20	112	0	0	0	112	0.356	1.00	4.230	1.51	0.59	2.09	200	0.030	56.809	1.81	0.80
Colonel William Parkway	141A	16A		0.00					0.00	11.82	0.00	0.00	0.00	0.00	11.82	0					0	959	0	0	0	959	3.052	1.00	3.812	11.63	3.38	15.02	250	0.005	42.050	0.86	0.79
Colonel William Parkway	16A	15A		0.00					0.00	72.98	0.00	140.71	0.00	16.49	230.18	0					0	3788	0	17589	0	21377	68.039	0.87	2.623	154.99	65.83	220.82	600	0.004	363.254	1.28	1.36
Colonel William Parkway	15A	14A		0.00					0.00	72.98	0.00	140.71	0.00	16.49	230.18	0					0	3788	0	17589	0	21377	68.039	0.87	2.623	154.99	65.83	220.82	600	0.004	363.254	1.28	1.36
Colonel William Parkway	14A	13A		0.00					0.00	72.98	0.00	140.71	0.00	16.49	230.18	0					0	3788	0	17589	0	21377	68.039	0.87	2.623	154.99	65.83	220.82	600	0.004	363.254	1.28	1.36
Colonel William Parkway	13A	Ex. 11A		0.00					0.00	72.98	0.00	140.71	0.00	16.49	230.18	0					0	3788	0	17589	0	21377	68.039	0.87	2.623	154.99	65.83	220.82	600	0.003	341.867	1.21	1.28
Fut. Phase 5A	Plug 2	106A		7.30					7.30	7.30	0.00	0.00	0.00	0.00	7.30	548					548	548	0	0	548	1.744	1.00	3.953	6.90	2.09	8.98	200	0.004	20.744	0.66	0.63	
Street A	118A	117A		0.34					0.34	0.34	0.00	0.00	0.00	0.00	0.34	19					19	19	0	0	19	0.060	1.00	4.383	0.27	0.10	0.36	200	0.018	44.004	1.40	0.42	
Street A	117A	116A		0.23					0.23	0.57	0.00	0.00	0.00	0.00	0.57	13					13	32	0	0	0	32	0.102	1.00	4.350	0.44	0.16	0.61	200	0.011	34.399	1.09	0.42
Street A	116A	115A		0.75					0.75	1.32	0.00	0.00	0.00	0.00	1.32	41					41	73	0	0	0	73	0.232	1.00	4.279	0.99	0.38	1.37	200	0.012	35.929	1.14	0.50
Street A	115A	114A		0.65					0.65	1.97	0.00	0.00	0.00	0.00	1.97	36					36	109	0	0	0	109	0.347	1.00	4.233	1.47	0.56	2.03	200	0.013	37.396	1.19	0.57
Street A	114A	113A		0.47					0.47	2.44	0.00	0.00	0.00	0.00	2.44	26					26	135	0	0	0	135	0.430	1.00	4.206	1.81	0.70	2.50	200	0.011	34.399	1.09	0.59
Street A	113A	112A		0.24					0.24	2.68	0.00	0.00	0.00	0.00	2.68	13					13	148	0	0	0	148	0.471	1.00	4.193	1.98	0.77	2.74	200	0.012	35.929	1.14	0.63
Street A	112A	111A		0.18					0.18	2.86	0.00	0.00	0.00	0.00	2.86	10					10	158	0	0	0	158	0.503	1.00	4.184	2.10	0.82	2.92	200	0.010	32.798	1.04	0.61
Street A	111A	106A		0.22					0.22	3.08	0.00	0.00	0.00	0.00	3.08	12					12	170	0	0	0	170	0.541	1.00	4.173	2.26	0.88	3.14	200	0.025	51.859	1.65	0.86
Fut. Phase 5A	Plug 1	106A		1.97																																	

THE REGIONAL MUNICIPALITY OF HALTON

SANITARY DESIGN SHEET
OPTION 2

PROJECT No.: 14-09222
PROJECT NAME: 407 West Employment Area
CONSULTANT: MMM Group

DATE PRINTED: 12-Jun-13
DATE REVISED: 11-Dec-12
DESIGNED BY: SW
CHECKED BY: AW

Street	Manhole		Length in metres	Tributary Area (Hectares)												Tributary Population										Q Average L/s	K Average	Peaking Factor M	Q Peak Dry L/s	Total Infil- tration L/s	Q Total L/s	SEWER					REMARKS			
	From	To		Increment						Accumulated						Increment					Accumulated																			
				Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Total	Res.	Comm.	Ind.	Inst.	Total															
Avenue 1-Avenue 2-Burnhamthorpe Road-Dundas Street																																								
Block G1-2	PLUG	A1				3.47			3.47						3.47				434					434																
Avenue 1	A1	A2	140			0.00		0.31	0.31						3.47				0					434		434	1.381	0.80	4.005	4.42	1.08	5.50	300	0.010	96.701	1.37	0.71			
Block G1-1	PLUG	A3				5.39			5.39						5.39				674					674																
Avenue 1	A3	A2	140			0.00		0.31	0.31						5.39				0					674		674	2.144	0.80	3.904	6.70	1.63	8.33	300	0.010	96.701	1.37	0.79			
Block G2-1	PLUG	A2				4.55			4.55						4.55				569					569																
Block G3-1	PLUG	A2				2.34			2.34						2.34				293					293																
Block G3-2	PLUG	A2				1.71			1.71						1.71				214					214																
Avenue 2	A2	A4	380			0.00		0.84	0.84						17.46				0					2183		2183	6.947	0.80	3.556	19.76	5.41	25.17	300	0.010	96.701	1.37	1.15			
Block G2-2	PLUG	A5				3.60			3.60						3.60				450					450																
Block C1	PLUG	A5				3.22			3.22						3.22				403					403																
Burnhamthorpe Road	A5	A6	35			0.00		0.35	0.35						6.82				0					853		853	2.713	0.80	3.844	8.34	2.05	10.39	300	0.010	96.701	1.37	0.86			
Block G2-3	PLUG	A6				3.36			3.36						3.36				420					420																
Burnhamthorpe Road	A6	A4	225			0.00		0.59	0.59						10.18				0					1273		1273	4.050	0.80	3.730	12.09	3.18	15.27	300	0.007	80.906	1.14	0.86			
Block G3-3	PLUG	A7				1.21			1.21						1.21				151					151																
Block G5-2	PLUG	A7				1.98			1.98						1.98				248					248																
Burnhamthorpe Road	A7	A4	145			0.00		0.38	0.38						3.19				0					399		399	1.269	0.80	4.023	4.08	1.02	5.10	300	0.007	80.906	1.14	0.60			
Block G5-1	PLUG	A4				1.95			1.95						1.95				244					244																
Block G5-3	PLUG	A4				2.03			2.03						2.03				254					254																
Avenue 2	A4	A8	250			0.00		0.55	0.55						34.81				0					4351		4351	13.849	0.80	3.300	36.57	10.90	47.47	300	0.008	86.492	1.22	1.26			
Block G4	PLUG	A8				3.68			3.68						3.68				460					460																
Block C2-1	PLUG	A8				2.29			2.29						2.29				286					286																
Block P8	PLUG	A8				2.72			2.72						2.72				340					340																
Avenue 2	A8	D2	170			0.00		0.37	0.37						43.50				0					5438		5438	17.307	0.80	3.211	44.46	13.50	57.95	375	0.005	123.977	1.12	1.10			
External 1	TO	D1		56.00		0.00			56.00	56.00					56.00	2170				2170	2170			2170																
Dundads Street	D1	D2	420			0.00		1.26	1.26	56.00					0.00				0					2170		0	2170	6.907	1.00	3.558	24.57	16.38	40.95	450	0.005	201.600	1.27	0.96		
Block C2-2	PLUG	D2				0.87			0.87						0.87				109					109																
Block C2-3	PLUG	D2				2.19			2.19						2.19				274					274																
Dundas Street	D2	D3	735			0.00		2.21	2.21	56.00					46.56				0					2170		5820		7990	25.431	0.91	3.051	70.54	31.38	101.92	600	0.005	434.172	1.54	1.24	
															0.00																									

THE REGIONAL MUNICIPALITY OF HALTON

PROJECT No.: 14-09222

PROJECT NAME: 407 West Employment Area

CONSULTANT: MMM Group

DATE PRINTED: 12-Jun-13

DATE REVISED: 11-Dec-12

DESIGNED BY: SW

CHECKED BY: AW

SANITARY DESIGN SHEET

OPTION 2

Street	Manhole		Length in metres	Tributary Area (Hectares)												Tributary Population										Q Average L/s	K Average	Peaking Factor M	Q Peak Dry L/s	Total Infil- tration L/s	Q Total L/s	SEWER					REMARKS
	From	To		Increment						Accumulated						Increment					Accumulated											Size (mm)	Slope (m/m)	Q (L/s)	V (m/s)		
				Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Total	Res.	Comm.	Ind.	Inst.	Total										Full Flow	Act. Flow	
Avenue 1-Avenue 3-Burnhamthorpe Road																																					
Block P1 Avenue 1	PLUG B1	B1 B2	95			2.91 0.00			2.91 0.21				2.91 0.21			2.91 3.12		364 0		364 0			364 364		364 364	1.158	0.80	4.041	3.74	0.89	4.64	300	0.007	80.906	1.14	0.60	
Avenue 1	B2	B3	95			0.00			0.21	0.21			2.91		0.42	3.33		0		0			364		364	1.158	0.80	4.041	3.74	0.95	4.70	300	0.020	136.756	1.93	0.79	
Block P2-1	PLUG	B3				2.29			2.41				2.29			2.29		286		286			286		286												
Block P2-2	PLUG	B3				3.05			3.06				3.05			3.05		381		381			381		381												
Block P2-3	PLUG	B3				3.11			3.11				3.11			3.11		389		389			389		389												
Block P2-4	PLUG	B3				3.73			3.58				3.73			3.73		466		466			466		466												
Block G6-5	PLUG	B3				2.64			2.64				2.64			2.64		330		330			330		330												
Block G6-6	PLUG	B3				2.84			2.84				2.84			2.84		355		355			355		355												
Avenue 1	B3	B4	550			0.00		1.21	1.21				20.57		1.63	22.20		0		0			2571		2571	8.184	0.80	3.498	22.90	6.35	29.25	300	0.007	80.906	1.14	1.05	
Block P3 Avenue 1	PLUG B5	B5 B4	185			7.53 0.00			7.53 0.41				7.53 0.41			7.53 7.94		941 0		941 0			941 941		941 941	2.996	0.80	3.817	9.15	2.27	11.42	300	0.010	96.701	1.37	0.88	
Block G6-4	PLUG	B4				2.82			2.82				2.82			2.82		353		353			353		353												
Block G9 Avenue 3	PLUG B4	B4 B6	225			3.51 0.00			3.51 0.50				3.51 0.50			3.51 36.96		439 0		439 0			439 4304		439 4304	13.698	0.80	3.305	36.21	10.57	46.79	300	0.007	80.906	1.14	1.20	
Block G6-1 Burnhamthorpe Road	PLUG B7	B7 B8	145			2.85 0.00			2.85 0.38				2.85 0.38			2.85 3.23		356 0		356 0			356 356		356 356	1.134	0.80	4.046	3.67	0.92	4.59	300	0.012	105.930	1.50	0.66	
Block G6-2	PLUG	B8				3.41			3.41				3.41			3.41		426		426			426		426												
Block G6-3	PLUG	B8				1.75			1.75				1.75			1.75		219		219			219		219												
Burnhamthorpe Road	B8	B6	195			0.00			0.51	0.51			8.01		0.88	8.89		0		0			1001		1001	3.187	0.80	3.800	9.69	2.54	12.23	300	0.005	68.378	0.97	0.72	
Block G7-1 Avenue 3	PLUG B6	B6 B10	135			1.96 0.00			1.96 0.30				1.96 0.30			1.96 48.11		245 0		245 0			245 5550		245 5550	17.665	0.80	3.203	45.26	13.76	59.02	375	0.005	123.977	1.12	1.11	
Block G7-2	PLUG	B10				2.33			2.33				2.33			2.33		291		291			291		291												
Block G8	PLUG	B10				4.29			4.29				4.29			4.29		536		536			536		536												
Block C3	PLUG	B10				1.53			1.53				1.53			1.53		191		191			191		191												
Block C4 Avenue 3	PLUG B10	B10 D3	365			2.91 0.00			2.91 0.80				2.91 0.80			2.91 59.97		364 0		364 0	0		364 6933		364 6933	22.065	0.80	3.111	54.91	17.15	72.06	375	0.005	123.977	1.12	1.18	
Block P7 Dundas Street	PLUG D6	D6 D3	210			2.43 0.00			2.43 0.63				2.43 0.63			2.43 3.06		304 0		304 0			304 304		304 304	0.967	0.80	4.076	3.15	0.88	4.03	450	0.005	201.600	1.27	0.48	
Colonel William Parkway	D3	E1	55			0.00			0.14	0.14	56.00	0.00	104.45	0.00	12.44	172.89		0		0	2170	0	13056	0	15226	48.463	0.87	2.772	116.84	49.45	166.28	600	0.005	434.172	1.54	1.44	
Avenue One-Avenue Four-Burnhamthorpe Road-Dundas Street																																					
Block P4 Avenue 1	PLUG C1	C1 C2	150			11.64 0.00			11.64 0.33				11.64 0.33			11.64 11.97		1455 0		1455 0			1455 1455		1455 1455	4.631	0.80	3.689	13.67	3.42	17.09	300	0.025	152.897	2.16	1.36	
Avenue 1	C2	C3	95			0.00			0.21	0.21			11.64		0.54	12.18		0		0			1455		1455	4.631	0.80	3.689	13.67	3.48	17.15	300	0.005	68.378	0.97	0.80	
Block G10	PLUG	C3				3.70			3.70				3.70			3.70		463		463			463		463												
Block G11	PLUG	C3				7.31			7.31				7.31			7.31		914		914			914		914												
Avenue 4	C3	C4	330			0.00			0.86	0.86			22.65		1.40	24.05		0		0			2831		2831	9.012	0.80	3.464	24.97	6.88	31.85	300	0.005	68.378	0.97	0.95	
Block P5 Block P6	PLUG PLUG	C5 C5				3.89 3.87			3.89 3.87				3.89 3.87			3.89 3.87		486 484		486 484			486 484		486 484												
Burnhamthorpe Road	C5	C4	235			0.00			0.61	0.61			7.76		0.61	8.37		0		0			970		970	3.087	0.80	3.808	9.41	2.39	11.80	300	0.010	96.701	1.37	0.88	
Block G12	PLUG	C4				3.42			3.42				3.42			3.42		428		428			428		428												
Block C5	PLUG	C4				0.25			0.25				0.25			0.25		31		31			31		31												
Block C6	PLUG	C4				2.18			2.18				2.18			2.18		273		273			273		273												
Avenue 4	C4	D4	420			0.00			1.09	1.09			36.26		3.10	39.36		0		0			4533		4533	14.426	0.80	3.284	37.90	11.26	49.16	300	0.005	68.378	0.97	1.06	
Dundas Street	D4	EX. VALLEY- RIDGE	55			0.00			0.17	0.17			36.26	0.00	3.27	39.53		0		0			4533		4533	14.426	0.80	3.284	37.90	11.30	49.21	450	0.013	318.758	2.00	1.40	

THE REGIONAL MUNICIPALITY OF HALTON

SANITARY DESIGN SHEET

OPTION 2

PROJECT No.: 14-09222

PROJECT NAME: 407 West Employment Area

CONSULTANT: MMM Group

DATE PRINTED: 12-Jun-13

DATE REVISED: 11-Dec-12

DESIGNED BY: SW

CHECKED BY: AW

Street	Manhole		Length in metres	Tributary Area (Hectares)												Tributary Population										Q Average	K Average	Peaking Factor M	Q Peak Dry L/s	Total Infil- tration L/s	Q Total	SEWER					REMARKS		
	From	To		Increment						Accumulated						Increment					Accumulated											Size (mm)	Slope (m/m)	Q (L/s)	V (m/s)				
				Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Road	Total	Res.	Comm.	Ind.	Inst.	Total	Res.	Comm.	Ind.	Inst.	Total										Full Flow	Act. Flow			
Existing - By Others																																							
Colonel William Parkway	E1	23A		0.00					0.00	56.00	0.00	104.45	0.00	12.44	172.89	0					0	2170	0	13056	0	15226	48.463	0.87	2.772	116.84	49.45	166.28	600	0.017	800.573	2.83	2.21		
Colonel William Parkway	23A	22A		0.09					0.09	56.09	0.00	104.45	0.00	12.44	172.98	0					0	2170	0	13056	0	15226	48.463	0.87	2.772	116.85	49.47	166.32	600	0.017	800.573	2.83	2.21		
Colonel William Parkway	22A	21A		0.11					0.11	56.20	0.00	104.45	0.00	12.44	173.09	0					0	2170	0	13056	0	15226	48.463	0.87	2.772	116.86	49.50	166.36	600	0.017	800.573	2.83	2.21		
Fut. Phase 6	Plug 4	20A		4.88					4.88	4.88	0.00	0.00	0.00	0.00	4.88	659					659	659	0	0	659	2.098	1.00	3.910	8.20	1.40	9.60	200	0.005	23.192	0.74	0.70			
Colonel William Parkway	21A	20A		0.08					0.08	56.28	0.00	104.45	0.00	12.44	173.17	0					0	2170	0	13056	0	15226	48.463	0.87	2.772	116.87	49.53	166.39	600	0.017	800.573	2.83	2.21		
Colonel William Parkway	20A	19A		0.00					0.00	61.16	0.00	104.45	0.00	12.44	178.05	0					0	2829	0	13056	0	15885	50.561	0.87	2.753	121.64	50.92	172.56	600	0.004	363.254	1.28	1.27		
Colonel William Parkway	19A	18A		0.00					0.00	61.16	0.00	104.45	0.00	12.44	178.05	0					0	2829	0	13056	0	15885	50.561	0.87	2.753	121.64	50.92	172.56	600	0.004	363.254	1.28	1.27		
Colonel William Parkway	18A	17A		0.00					0.00	61.16	0.00	104.45	0.00	12.44	178.05	0					0	2829	0	13056	0	15885	50.561	0.87	2.753	121.64	50.92	172.56	600	0.004	363.254	1.28	1.27		
Colonel William Parkway	17A	16A		0.00					0.00	61.16	0.00	104.45	0.00	12.44	178.05	0					0	2829	0	13056	0	15885	50.561	0.87	2.753	121.64	50.92	172.56	600	0.004	363.254	1.28	1.27		
Fut. Phase 5B	Plug 3	148A		8.84					8.84	8.84	0.00	0.00	0.00	0.00	8.84	796					796	796	0	0	796	2.534	1.00	3.862	9.78	2.53	12.31	200	0.005	23.192	0.74	0.75			
Colonel William Parkway	148A	147A		0.59					0.59	9.43	0.00	0.00	0.00	0.00	9.43	32					32	828	0	0	828	2.635	1.00	3.851	10.15	2.70	12.85	200	0.005	23.192	0.74	0.76			
Colonel William Parkway	147A	141A		0.34					0.34	9.77	0.00	0.00	0.00	0.00	9.77	19					19	847	0	0	847	2.696	1.00	3.845	10.37	2.79	13.16	200	0.005	23.192	0.74	0.77			
Street A	145A	144A		0.76					0.76	0.76	0.00	0.00	0.00	0.00	0.76	42					42	42	0	0	42	0.134	1.00	4.329	0.58	0.22	0.80	200	0.012	35.929	1.14	0.43			
Street A	144A	143A		0.73					0.73	1.49	0.00	0.00	0.00	0.00	1.49	40					40	82	0	0	82	0.261	1.00	4.266	1.11	0.43	1.54	200	0.014	38.808	1.24	0.54			
Street A	143A	142A		0.19					0.19	1.68	0.00	0.00	0.00	0.00	1.68	10					10	92	0	0	92	0.293	1.00	4.253	1.25	0.48	1.73	200	0.015	40.170	1.28	0.56			
Street A	142A	141A		0.37					0.37	2.05	0.00	0.00	0.00	0.00	2.05	20					20	112	0	0	112	0.356	1.00	4.230	1.51	0.59	2.09	200	0.030	56.809	1.81	0.80			
Colonel William Parkway	141A	16A		0.00					0.00	11.82	0.00	0.00	0.00	0.00	11.82	0					0	959	0	0	959	3.052	1.00	3.812	11.63	3.38	15.02	250	0.005	42.050	0.86	0.79			
Colonel William Parkway	16A	15A		0.00					0.00	72.98	0.00	104.45	0.00	12.44	189.87	0					0	3788	0	13056	0	16844	53.613	0.88	2.728	129.01	54.30	183.32	600	0.004	363.254	1.28	1.28		
Colonel William Parkway	15A	14A		0.00					0.00	72.98	0.00	104.45	0.00	12.44	189.87	0					0	3788	0	13056	0	16844	53.613	0.88	2.728	129.01	54.30	183.32	600	0.004	363.254	1.28	1.28		
Colonel William Parkway	14A	13A		0.00					0.00	72.98	0.00	104.45	0.00	12.44	189.87	0					0	3788	0	13056	0	16844	53.613	0.88	2.728	129.01	54.30	183.32	600	0.004	363.254	1.28	1.28		
Colonel William Parkway	13A	Ex. 11A		0.00					0.00	72.98	0.00	104.45	0.00	12.44	189.87	0					0	3788	0	13056	0	16844	53.613	0.88	2.728	129.01	54.30	183.32	600	0.003	341.867	1.21	1.25		
Fut. Phase 5A	Plug 2	106A		7.30					7.30	7.30	0.00	0.00	0.00	0.00	7.30	548					548	548	0	0	548	1.744	1.00	3.953	6.90	2.09	8.98	200	0.004	20.744	0.66	0.63			
Street A	118A	117A		0.34					0.34	0.34	0.00	0.00	0.00	0.00	0.34	19					19	19	0	0	19	0.060	1.00	4.383	0.27	0.10	0.36	200	0.018	44.004	1.40	0.42			
Street A	117A	116A		0.23					0.23	0.57	0.00	0.00	0.00	0.00	0.57	13					13	32	0	0	32	0.102	1.00	4.350	0.44	0.16	0.61	200	0.011	34.399	1.09	0.42			
Street A	116A	115A		0.75					0.75	1.32	0.00	0.00	0.00	0.00	1.32	41					41	73	0	0	73	0.232	1.00	4.279	0.99	0.38	1.37	200	0.012	35.929	1.14	0.50			
Street A	115A	114A		0.65					0.65	1.97	0.00	0.00	0.00	0.00	1.97	36					36	109	0	0	109	0.347	1.00	4.233	1.47	0.56	2.03	200	0.013	37.396	1.19	0.57			
Street A	114A	113A		0.47					0.47	2.44	0.00	0.00	0.00	0.00	2.44	26					26	135	0	0	135	0.430	1.00	4.206	1.81	0.70	2.50	200	0.011	34.399	1.09	0.59			
Street A	113A	112A		0.24					0.24	2.68	0.00	0.00	0.00	0.00	2.68	13					13	148	0	0	148	0.471	1.00	4.193	1.98	0.77	2.74	200	0.012	35.929	1.14	0.63			
Street A	112A	111A		0.18					0.18	2.86	0.00	0.00	0.00	0.00	2.86	10					10	158	0	0	158	0.503	1.00	4.184	2.10	0.82	2.92	200	0.010	32.798	1.04	0.61			
Street A	111A	106A		0.22					0.22	3.08	0.00	0.00	0.00	0.00	3.08	12					12	170	0	0	170	0.541	1.00	4.173	2.26	0.88	3.14	200	0.025	51.859	1.65	0.86			
Fut. Phase 5A	Plug 1	106A		1.97					1.97	1.97	0.00	0.00	0.00	0.00	1.97	108					108	108	0	0	108	0.344	1.00	4.234	1.46	0.56	2.02	200	0.032	58.672	1.87	0.			

Minimum Dia. = 200 mm
Mannings "n"= 0.013
Minimum Velocity = 0.6 m/s
Minimum Grade = 0.5 %
Avg. Domestic Flow = 275 l/c/d (365 l/c/d used for 600mm Trunk Sewer)
Infiltration = 0.286 l/s/ha
Max. Peaking Factor= 4.5
Min. Peaking Factor= 2.0
Maximum Velocity = 3 m/s

SANITARY SEWER DESIGN SHEET
The Regional Municipality of Halton

As per Bronte Creek Community Phase 4
Design prepared by Stantec

Project: Bronte Creek Community Phase 4
Project No: 1606 21160
Date: November, 2007
Designed by: M.K.
NOMINAL PIPE SIZE USED

Sanitary Trunk Sewer

STREET	FROM MH	TO MH	RESIDENTIAL							COMMERCIAL/INDUSTRIAL/INSTITUTIONAL					FLOW CALCULATIONS						PIPE DATA				
			AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENISTY (P/ha)	DENSITY (P/unit)	POP	ACC. RES. POP.	AREA (ha)	ACC. AREA (ha)	EQUIV. POP. (p/ha)	FLOW RATE (l/s/ha)	ACC. EQUIV. POP.	INFILTRATION (l/s)	TOTAL ACC. POP.	PEAKING FACTOR	RES. FLOW (l/s)	COMM. FLOW (l/s)	TOTAL FLOW (l/s)	DIA. (mm)	SLOPE (%)	Q FULL (l/s)	V FULL (m/s)	V ACT (m/s)
Colonel William Parkway	EXT	23A	362	362	0	22.5		8145	8145	0	0	0	0	0	103.5	8145	3.04	78.9	0.0	182.4	600	1.70	800.2	2.83	2.29
Colonel William Parkway	23A	22A	0.09	362.09	0			0	8145	0	0	0	0	0	103.6	8145	3.04	78.9	0.0	182.4	600	1.70	800.2	2.83	2.29
Colonel William Parkway	22A	21A	0.11	362.20	0			0	8145	0	0	0	0	0	103.6	8145	3.04	78.9	0.0	182.5	600	1.70	800.2	2.83	2.29
Fut. Phase 6	Plug 4	20A	4.88	4.88	0	135		659	658.8	0	0	0	0	0	1.4	658.8	3.91	8.2	0.0	9.6	200	0.50	23.2	0.74	0.70
Colonel William Parkway	21A	20A	0.08	362.28	0			0	8145	0	0	0	0	0	103.6	8145	3.04	78.9	0.0	182.5	600	1.70	800.2	2.83	2.29
Colonel William Parkway	20A	19A	0	367.16	0			0	8803.8	0	0	0	0	0	105.0	8803.8	3.01	84.3	0.0	189.3	600	0.35	363.1	1.28	1.30
Colonel William Parkway	19A	18A	0	367.16	0			0	8803.8	0	0	0	0	0	105.0	8803.8	3.01	84.3	0.0	189.3	600	0.35	363.1	1.28	1.30
Colonel William Parkway	18A	17A	0	367.16	0			0	8803.8	0	0	0	0	0	105.0	8803.8	3.01	84.3	0.0	189.3	600	0.35	363.1	1.28	1.30
Colonel William Parkway	17A	16A	0	367.16	0			0	8803.8	0	0	0	0	0	105.0	8803.8	3.01	84.3	0.0	189.3	600	0.35	363.1	1.28	1.30
Fut. Phase 5B	Plug 3	148A	8.84	8.84	0	90		796	795.6	0	0	0	0	0	2.5	795.6	3.86	9.8	0.0	12.3	200	0.50	23.2	0.74	0.75
Colonel William Parkway	148A	147A	0.59	9.43	0	55		32	828.05	0	0	0	0	0	2.7	828.05	3.85	10.2	0.0	12.8	200	0.50	23.2	0.74	0.76
Colonel William Parkway	147A	141A	0.34	9.77	0	55		19	846.75	0	0	0	0	0	2.8	846.75	3.85	10.4	0.0	13.2	200	0.50	23.2	0.74	0.76
Street A	145A	144A	0.76	0.76	0	55		42	41.8	0	0	0	0	0	0.2	41.8	4.33	0.6	0.0	0.8	200	1.20	35.9	1.14	0.47
Street A	144A	143A	0.73	1.49	0	55		40	81.95	0	0	0	0	0	0.4	81.95	4.27	1.1	0.0	1.5	200	1.40	38.8	1.23	0.60
Street A	143A	142A	0.19	1.68	0	55		10	92.4	0	0	0	0	0	0.5	92.4	4.25	1.3	0.0	1.7	200	1.50	40.1	1.28	0.64
Street A	142A	141A	0.37	2.05	0	55		20	112.75	0	0	0	0	0	0.6	112.75	4.23	1.5	0.0	2.1	200	3.00	56.8	1.81	0.86
Colonel William Parkway	141A	16A	0	11.82	0			0	959.5	0	0	0	0	0	3.4	959.5	3.81	11.6	0.0	15.0	250	0.50	42.0	0.86	0.78
Colonel William Parkway	16A	15A	0	378.98	0			0	9763.3	0	0	0	0	0	108.4	9763.3	2.97	92.1	0.0	200.5	600	0.35	363.1	1.28	1.32
Colonel William Parkway	15A	14A	0	378.98	0			0	9763.3	0	0	0	0	0	108.4	9763.3	2.97	92.1	0.0	200.5	600	0.35	363.1	1.28	1.32
Colonel William Parkway	14A	13A	0	378.98	0			0	9763.3	0	0	0	0	0	108.4	9763.3	2.97	92.1	0.0	200.5	600	0.35	363.1	1.28	1.32
Colonel William Parkway	13A	Ex. 11A	0	378.98	0			0	9763.3	0	0	0	0	0	108.4	9763.3	2.97	92.1	0.0	200.5	600	0.31	341.7	1.21	1.26
Fut. Phase 5A	Plug 2	106A	7.3	7.30	0	75		548	547.5	0	0	0	0	0	2.1	547.5	3.95	6.9	0.0	9.0	200	0.40	20.7	0.66	0.64
Street A	118A	117A	0.34	0.34	0	55		19	18.7	0	0	0	0	0	0.1	18.7	4.38	0.3	0.0	0.4	200	1.80	44.0	1.40	0.42
Street A	117A	116A	0.23	0.57	0	55		13	31.35	0	0	0	0	0	0.2	31.35	4.35	0.4	0.0	0.6	200	1.10	34.4	1.09	0.42
Street A	116A	115A	0.75	1.32	0	55		41	72.6	0	0	0	0	0	0.4	72.6	4.28	1.0	0.0	1.4	200	1.20	35.9	1.14	0.55
Street A	115A	114A	0.65	1.97	0	55		36	108.35	0	0	0	0	0	0.6	108.35	4.23	1.5	0.0	2.0	200	1.30	37.4	1.19	0.63
Street A	114A	113A	0.47	2.44	0	55		26	134.2	0	0	0	0	0	0.7	134.2	4.21	1.8	0.0	2.5	200	1.10	34.4	1.09	0.64
Street A	113A	112A	0.24	2.68	0	55		13	147.4	0	0	0	0	0	0.8	147.4	4.19	2.0	0.0	2.7	200	1.20	35.9	1.14	0.67
Street A	112A	111A	0.18	2.86	0	55		10	157.3	0	0	0	0	0	0.8	157.3	4.18	2.1	0.0	2.9	200	1.00	32.8	1.04	0.64
Street A	111A	106A	0.22	3.08	0	55		12	169.4	0	0	0	0	0	0.9	169.4	4.17	2.3	0.0	3.1	200	2.50	51.8	1.65	0.91
Fut. Phase 5A	Plug 1	106A	1.97	1.97	0	55		108	108.35	0	0	0	0	0	0.6	108.35	4.23	1.5	0.0	2.0	200	3.20	58.6	1.87	0.87
Street B	106A	101A	0.18	12.53	0			0	825.25	0	0	0	0	0	3.6	825.25	3.85	10.1	0.0	13.7	200	0.40	20.7	0.66	0.71
Colonel William Parkway	104A	103A	0.98	0.98	0	55		54	53.9	0	0	0	0	0	0.3	53.9	4.31	0.7	0.0	1.0	200	1.10	34.4	1.09	0.49
Colonel William Parkway	103A	102A	0.33	1.31	0	55		18	72.05	0	0	0	0	0	0.4	72.05	4.28	1.0	0.0	1.4	200	1.00	32.8	1.04	0.51
Colonel William Parkway	102A	101A	0.15	1.46	0	55		8	80.3	0	0	0	0	0	0.4	80.3	4.27	1.1	0.0	1.5	200	1.00	32.8	1.04	0.53
Colonel William Parkway	101A	100A	0.19	14.18	0	55		10	916	0	0	0	0	0	4.1	916	3.82	11.1	0.0	15.2	200	0.40	20.7	0.66	0.72
Colonel William Parkway	100A	Ex. 12A	0.41	14.59	0	55		23	938.55	0	0	0	0	0	4.2	938.55	3.82	11.4	0.0	15.6	200	0.49	22.9	0.73	0.79
Colonel William Parkway	Ex. 12A	Ex. 11A	0	14.59	0			0	938.55	0	0	0	0	0	4.2	938.55	3.82	11.4	0.0	15.6	200	0.91	31.3	1.00	0.99
Colonel William Parkway	Ex. 11A	Ex. 10A	0	393.57	0			0	10701.8	0	0	0	0	0	112.6	10701.8	2.93	99.6	0.0	212.2	600	0.55	455.1	1.61	1.58

Avg. Domestic Flow = 275 l/c/d A
Avg. Employment Land Flow = 410 l/c/d B
EXT. Area at Colonel William Parkway = 362 ha C
EXT. Population at Colonel William Parkway = 5461 employees D
EXT. Density at Colonel William Parkway = 15.1 emp./ha
Equalent Density at 275 l/c/d = ((D * B) / A) / C 22.5 emp./ha