





LAKEVIEW VILLAGE

FUNCTIONAL SERVICING REPORT

LAKEVIEW
COMMUNITY PARTNERS LIMITED

JANUARY 2020

LAKEVIEW

COMMUNITY PARTNERS LIMITED

TACC CONSTRUCTION

Greenpark

CCI DEVELOPMENT

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TABLE OF CONTENTS

TABLE OF CONTENTS

FIGURES & DRAWINGS

APPENDICES

Executive Summary

This is the second submission of the Functional Servicing Report (FSR) for the Lakeview Community Partners Limited (LCPL) lands. The subject lands are located on the former 177-acre site of the Lakeview Generating Station, a coal fired power plant that operated from 1962 to 2005. Following the closure of the plant and eventual decommissioning of the site, Ontario Power Generation (OPG) sold the lands through a competitive bidding process to the Lakeview Community Partners consortium in 2018. The purchase and sale agreement for these lands includes a provision which will ensure the conveyance of 27.24 ha, 67.31 ac of the OPG lands to the City of Mississauga.

This report provides functional servicing design and stormwater management information in support of proposed Official Plan Amendment, Zoning By-Law Amendment and Draft Plan of Subdivision application for the subject lands. This report fulfils DARC 18-20Z submission requirements and addresses City of Mississauga comments related to grading, servicing, drainage, stormwater management and LID measures for the subject site. The servicing and development strategies presented in this report have been developed in conjunction with the greater consulting team and should be considered in conjunction with their work.

Servicing of the site will be provided through connections to existing infrastructure and through several proposed municipal right-of-ways (ROWs) across the subject lands. Watermain connections to existing infrastructure will be provided to the west and north of the site. Sanitary servicing will be provided through the sewers in the proposed ROWs, which will connect to existing infrastructure on Lakeshore Road East via a proposed sanitary forcemain. Minor system stormwater flows on the subject lands will be capture into the proposed storm sewer network, while major system flows will be conveyed overland by the proposed ROWs.

The proposed Lakeview Village development will incorporate a number of sustainable features that will attract international market attention and will help the City of Mississauga achieve their goal of creating “a model sustainable creative community on the waterfront, all built to world-leading standards for urban and green design”.

Rendering of the Waterfront Trail

INTRODUCTION

1

Introduction

1.1 SCOPE

This report provides functional servicing design and stormwater management information in support of proposed Zoning By-Law Amendment applications and Draft Plan of Subdivision for the subject lands. This report fulfils the ZBA submission requirements and addresses the City of Mississauga's preliminary comments related to grading, servicing, drainage, stormwater management and LID measures.

The proposed development will proceed under Rezoning and Plan of Subdivision processes. Subsequent site plan applications for the private blocks will be submitted once the process is further advanced and a detailed design submission for the subdivision components will be produced upon approval of the Draft Plan. The design information presented in this report considers the following guidelines:

- City of Mississauga Engineering Standard Drawings Manual
- Credit Valley Conservation Authority Stormwater Management Criteria Document (August 2012)
- Draft Ministry of the Environment and Climate Change LID SWM Guidance Manual (2017)
- Regional Municipality of Peel PW Design Specifications and Procedures
- Stormwater Management Planning and Design Manual by the Ministry of Environment and Climate Change; (March 2003)
- Ontario Building Code (2012)

The strip of waterfront lands abutting Lake Ontario are not part of this application but have been considered with respect to the related grading and servicing constraints.

The Lakeview Sustainability Strategy report provides a more detailed commentary on the sustainable opportunities and possibilities for this project. The report also looks at the financial impact of this strategy on the City of Mississauga and provides a roadmap to ensure implementation of the strategy is achieved. The sustainability study focuses on adding value and economics to the Lakeview Village project by targeting sustainable issues such as energy, water, waste management, environment, mobility, smart technologies and human well-being.

1.2 SUPPORTING STUDIES

The servicing and development strategies presented in this report have been developed in conjunction with the greater consulting team and should be considered in conjunction with their work. The following studies are included in the appendices:

- Preliminary Geotechnical Investigation – Exp Services Inc. (August 2018)
- Preliminary Geotechnical Investigation - DS Consulting Report (December 2019)
- Shoreline Hazard Assessment - Baird (December 2019)
- Water and Wastewater Servicing Analysis – Region of Peel (May 2018)
- Arborist Report – Beacon Environmental (February 2019)
- Street Hierarchy and Right-of-Way Study - TMIG (January 2020)
- Sustainability Strategy – TMIG (December 2019)
- Lakeview Waterfront Connection Project – Applewood and Serson Creeks Design Brief – TRCA, GHD (December 2015)
- CVC Living by the Lake Action Plan (December 2018)
- Lakeview Village – Development Master Plan (September 2018)
- Water Distribution Analysis Memo – TMIG (January 2020)
- Transportation Considerations Report – TMIG (January 2020)
- Wind and Thermal Comfort Assessment – RWDI (October 2018)
- Air Quality and Noise Land-Use Feasibility Assessment – RWDI (October 2018)

1.3 SITE DESCRIPTION

The subject property is approximately 71 hectares (175.45 acres) and is located in the City of Mississauga. The study area for the overall FSR includes the properties along Rangeview Road, north of the OPG lands. The site is bounded by:

- Lakeshore Road to the north,
- Lake Ontario to the south,
- the Lakeview / G.E. Booth Wastewater Treatment Plant to the east and Douglas Kennedy Park and Lakefront Promenade Park to the west.

Figure 1 illustrates the location of the site. The legal description of the site is Part of Lots 7, 8 and 9, Concession 3, south of Dundas Street Part of Water Lot in front of Lot 7, Part of water lot location hy28, hy77, and hy116 (Geographic Township of Toronto, County of Peel), City of Mississauga, Regional Municipality of Peel.

The subject lands are located on the former 177-acre site of the Lakeview Generating Station, a coal fired power plant that operated from 1962 to 2005. Following the closure of the plant and eventual decommissioning of the site, Ontario Power Generation (OPG) sold the lands through a competitive bidding process to the Lakeview Community Partners consortium in 2018. The purchase and sale agreement for these lands includes a provision which will ensure the conveyance of 67.31 ac of the OPG lands to the City of Mississauga.

Due to the former use of the site, soil investigations and remediation efforts as well as exploratory excavation and demolition of the original foundation structures have been underway since the purchase was completed. Generally, the site slopes from east to west and north to south, draining to the lake.

Aerial view of the existing Lakeview Village lands

View from Lakefront Promenade Park with the Lakeview Village site across the water

EXISTING CONDITIONS

2

EXISTING CONDITIONS

2.1 LAND USE & TOPOGRAPHY

The site was formerly used by OPG for coal-fired power generation, a switchyard, and other industrial uses. The plant was operational from 1962 until 2005, at which point it was decommissioned and demolished. Currently, the site is covered in low lying vegetation and some remnant roads, sports fields, parking areas, and the remaining concrete foundation / sub-surface cooling ducts. Throughout the site there are multiple monitoring wells used to monitor the environmental conditions / quality of the groundwater.

Topographical surveys of the subject lands have been completed by JD Barnes in 2017 and 2018. The site generally falls from Lakeshore Road to Lake Ontario with a maximum grade change of approximately 10m.

Figure 3 illustrates the existing site features, topography and drainage patterns.

2.2 SHORELINE

Lands adjacent to Lake Ontario are regulated by the Credit Valley Conservation Authority (CVC). Limits of the Regulated Area are shown on Draft Plan. The development will require new storm sewers discharging directly to Lake Ontario. All works within the regulated area will include appropriate shoreline protection, restoration and E&SC measures required. Based on comments received, CVC and Provincial approvals will be required for the proposed shoreline alterations and will obtained through the detailed design process.

W.F. Baird and Associates completed a site-specific and detailed technical shoreline hazard assessment for Lakeview Village in January 2019. The Baird report determined that the Lakeview Village shoreline is an "artificial shoreline" in accordance with the CVC Lake Ontario Shoreline Hazards report (2005) and the OMNR Technical Guide (2001). Existing coastal works will be upgraded in accordance with accepted engineering practice and the protection works standard, however the overall configuration of the shoreline will be maintained.

The Baird shoreline hazard assessment is comprised of 100-year flood level plus an allowance for wave uprush, ice action, and the effects of climate change. The methodology used to determine the shoreline hazard limit is described in detail in the Baird report. The shoreline erosion hazard limit is shown on the Draft Plan and grading plans. A minimum floodproofing standard elevation of 77.0m has been established for the Lakeview Village area. The 100-year monthly mean lake level is 75.86m.

CVC has accepted the shoreline and hazard assessment.

2.3 SOIL CONDITIONS

The Preliminary Geotechnical Investigation by Exp indicates that the soil stratigraphy of the subject property generally consists of fill underlain by native deposits of clayey silt, clayey silt till, sandy silt till, silt till and silt overlying shale bedrock. This report also establishes the long-term groundwater table at a range of about 3 to 4m below existing grade. For the purposes of this investigation it is assumed that any remediation work which may be required to deal with potential contamination will be completed prior to earthworks and servicing. DS Consulting has confirmed that the depth of bedrock ranges from 3

The DS Consulting report in Appendix A provides a detailed discussion of geotechnical site conditions. The reports state that the site is located in the Iroquois Plain and that the soil stratigraphy in this area is generally characterized by clay till overlain by sand. Underlying bedrock comprises shale and limestone of the Georgian Bay Formation. The overburden consisted of sand with gravel, sandy silt, sandy clay with gravel, clay with sand or clay, underlain by native clay to clay with sand to clay with gravel. The overburden was underlain by slightly to highly weathered shale bedrock. Depth of bedrock ranged from 3m to 20.0m below existing grade and certain areas may require rock-breaking equipment for excavation.

Exp Services Inc. has prepared a detailed environmental remediation program. This program consists primarily of conventional excavation and disposal of impacted materials at approved facilities and the completion of Risk Assessments, as per Ontario Regulation 153/04, as amended. A significant quantity of the existing concrete foundation has been and will continue to be removed, which provides opportunities to construct the site with engineered fill suitable for construction and for low-impact development stormwater management measures / restoration.

Exp Services Inc. has been coordinating with the MECP regarding the record-of-site-condition (RSC) process in a staged approach based on development phasing and soil remediation strategies.

Please refer to Appendix A for further information.

2.4 EXISTING DRAINAGE

Topographical surveys of the subject site were completed by JD Barnes in 2017 and 2018. Generally, the subject site drains from the north to the south towards Lake Ontario and existing drainage is directed to Lake Ontario through a series of swales. Two large external drainage areas flow through the site as shown on Figure 3. The Cawthra subcatchment is approximately 36.24 ha. Drainage from the Cawthra subcatchment includes: the minor system flows (up to the 10-year storm event), which are captured in a storm sewer system and are piped to Lake Ontario via Lakefront Promenade; and the major system flows, which flow overland to Lake Ontario via Lakefront Promenade. The Serson subcatchment is approximately 270 ha.

Serson Creek is located at the north-east corner of the subject site and continues along the eastern edge of the subject site. The low flow channel is piped under G.E. Booth Wastewater Treatment Facility. A small portion of the existing subject site drains to Serson Creek, in addition to the external catchment area. The creek is proposed to be realigned and naturalized and will be further discussed in Section 3.6.

The proposed drainage plan will be in accordance with the existing drainage pattern. The existing stormwater distribution infrastructure in the vicinity of the site includes:

- A Lakeshore Road storm sewer (900mm to 300mm) draining to Lakefront Promenade
- A Hydro Road storm sewer (450mm to 900mm) draining to Rangeview Road
- A 1050mm storm sewer on Rangeview Road east of Lakefront Promenade
- A 1200mm storm sewer on Rangeview Road west of Lakefront Promenade
- A storm sewer on Lakefront Promenade increasing in size from a 900mm at Lakeshore Road East to a 1800mm at the outfall
- An existing outfall west of the subject lands connected to the Lakefront Promenade storm sewer and discharging to Lake Ontario

Aerial View of Preliminary Site Construction in 2018

DEVELOPMENT CONCEPT

3

Rendering of Lakeview Square

Development Concept

3.1 DEVELOPMENT PHASING

Currently, the project is proposed to be developed in 3 phases with multiple sub-phases. Servicing infrastructure is designed to facilitate the proposed phasing and provide flexibility should the phasing be altered. The current phasing is based on the anticipated development schedule and may change through the approval process.

Refer to the attached Phasing Plan for details.

3.2 DRAFT PLAN

As shown on Figure 2 and the Draft Plan, the proposed 71.0 ha development consists of several public right-of-ways and private site plan blocks, including:

- Mixed use blocks
- High density residential blocks
- Commercial development block
- Park blocks / Open space
- Public ROWs

The proposed development will be advanced through both Draft Plan of Subdivision approval process and the Site Plan approval process for the individual private site plan blocks. The Subdivision components will consist of the public ROW areas, open space blocks, and services. Preliminary cross sections have been prepared and are included in Section 4.3. These cross sections have been developed to support the proposed surface treatment of the various right of ways. The cross sections will be further refined in consultation with the required approval agencies and utility companies, and in keeping with the developing master plan vision.

3.3 G.E. BOOTH WWTF

The G.E. Booth Wastewater Treatment Facility (WWTF) is situated immediately east of the site, with Lakeshore Park / Marie Curtis Park located further east. As a transition area between proposed residential neighbourhoods and the existing G.E. Booth Wastewater Treatment Facility, an employment and innovation corridor is integrated into the urban fabric of Lakeview Village with a synergistic relationship to Lakeview Square and the surrounding retail and cultural amenities. Serson Innovation Corridor is designed to support a mix of office, institutional, and innovation uses that will complement the planned residential, cultural, and retail uses.

Sanitary flows from the subject lands will be directed to the G.E. Booth Wastewater Treatment Facility (WWTF) via the existing 1650mm sanitary sewer on Lakeshore Road East.

3.4 SITE PLANS

Details related to site plan servicing will be determined at the site plan approval stage. The locations of the site plan service connections may change through detailed subdivision design. is designed to support a mix of office, institutional, and innovation uses that will complement the planned residential, cultural, and retail uses.

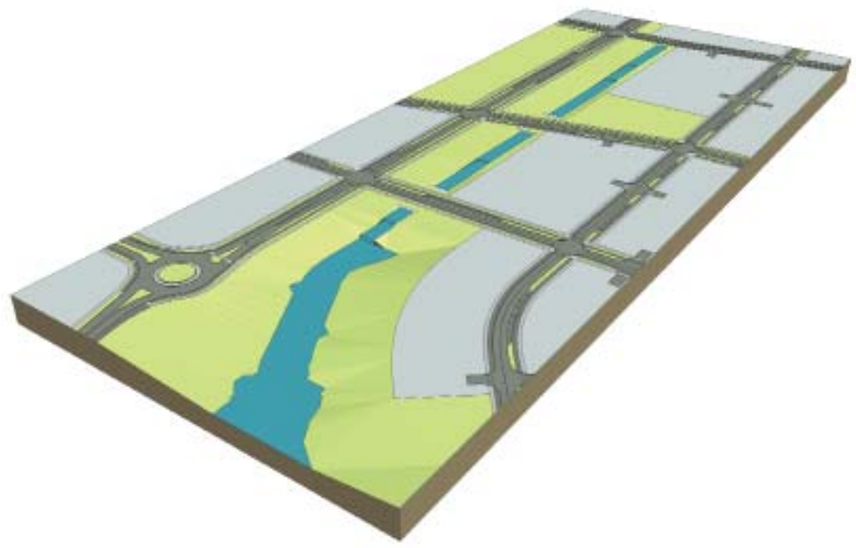
The purpose of this report is to demonstrate the feasibility of the proposed servicing strategy for the entirety of the subject lands. Site plan targets required to meet the design criteria related to stormwater quality and erosion control will be determined in future submissions.

3.5 WATERWAY COMMON

A key theme of the proposed development is highlighting access to the lake and other water features. The open space lands along Waterway Common will be a hub of various activities including ice skating, water play areas and other events. Due to it's unique location adjacent to the former outlet channel, an opportunity to introduce lake water into the open space area is available.

The easternmost section of Waterway Common will include features requiring potable water (splashpads, skating, etc.). As the linear features progress further east, dropping in elevation towards the lake, a pumping system can be introduced to draw lakewater into an isolated portion of Waterway Common and dishcharge it back to the lake, via a cascading series of weirs and natural drops (closer to the outfall). The feature itself can be designed as a flowing system with wetland components, in an effort to improve lake water quality in the outlet channel area via aeration.

Drawing PP-35 and the preliminary rendering by NAK illustrate the conceptual servicing and grading of the Waterway Common feature. A pump would be required to sustain flow in the lake-based section of the feature; this pump could be powered by the proposed microgrid / district energy system or other renewable initiatives proposed on site.



Rendering of of Townhomes at Aviator Park

Development Concept

3.6 SERSON CREEK RESTORATION

Serson Creek is located along the eastern property limit of the subject lands. Serson Creek has been modified and realigned since the 1950's and as part of the OPG plant works. This feature, in its current alignment directs low flows along the former rail corridor and north / east through the wooded area, to a pipe beneath the adjacent waste water treatment plan. There is a barrier to flow at the former rail corridor and frequent flows are not currently conveyed to the lake via the existing Serson Creek corridor downstream of the rail corridor. This flow diversion impacts ecological functions within the channel and the resulting lack of frequent flow in the downstream reaches to the lake restricts fish passage to the upper reaches of the system. With respect to high / infrequent flows, the floodplain associated with the 100-year and Regional events overtops the channel banks in several locations, particularly on the east interface with the wastewater treatment plan. The CVC Living by the Lake document identified the following objectives for improvements to Serson Creek, namely:

- Capacity improvements to eliminate spills
- Pocket wetlands within the creek corridor and improvement of instream and riparian habitat by increasing diversity of structures and bed form
- Improve / provide fish passage from Lake Ontario to upper reaches of Serson Creek
- Improve wildlife connectivity
- Maintain existing terrestrial connectivity between Serson Creek / G.E. Booth Woodland / Applewood Creek

Beacon Environmental and Urbantech Consulting have submitted a channel design (December 2019) that addresses the CVC objectives and seeks to restore the channel to a functioning NHS. Key design parameters have been included in this report to demonstrate that the block is sufficiently sized. Based on a fluvial assessment and hydraulic analysis, the following channel design parameters are proposed:

- Low flow channel approximately 0.5m deep and 3.0m top width, with 2:1 side slopes.
- Channel corridor bottom width of 9m to 14m
- Channel corridor depth of 1.8m (to floodplain)
- 3:1 side slopes

This channel geometry can convey the maximum design flow of 20.5m3/s associated with the Regional event. Since the proposed channel geometry is more efficient and has a wider bottom than the current channel, the flood elevations decrease and are contained within the channel block, thereby eliminating the spill onto the wastewater treatment plant. The low flow channel and proposed floodplain will provide opportunities for ecological enhancement. he proposed channel alignment will eliminate the flow diversion beneath the WWTP and allow for improved connectivity to the upper reaches of the creek.

The majority of the corridor will remain in its current alignment, however the reach between Lakeshore Boulevard and the former rail corridor will be realigned to position the channel along the future New Haig Boulevard, with a channel crossing through the existing Plaster Form Inc. lands for connection back to the existing channel alignment and connectivity to the existing woodland. It is recognized that the portion of the channel (and New Haig Boulevard) on the Plaster Form Inc. lands cannot be constructed until Plaster Form Inc. participates in the development. The channel construction could be phased based on participation. Refer to Drawing GR-9 for details.

3.7 LAKEFRONT PROMENADE / PARKS BUILDING RELOCATION

Lakefront Promenade is proposed to be enhanced and realigned to tie into the proposed development and future roundabout area. Grading and servicing plans for the realignment are included in Drawings GR-1, GR-2, GR-10 and PP-1 to PP-3.

The existing City Community Services (Parks) Building west of Lakefront Promenade will be impacted by the proposed realignment of Lakefront Promenade. Discussions have been held with the City and Region to relocate this facility to the Serson Innovation Corridor, east of the New Haig Boulevard and Street E intersection. This facility will be relocated to the proposed location at the cost of the landowners to facilitate the construction of Lakefront Promenade.

3.8 SUSTAINABILITY GOALS AND STRATEGIES

The Lakeview Sustainability Strategy report (December 2018), prepared by The Municipal Infrastructure Group with input from Bicol Consulting Inc., FVB Energy, Glen Schnarr & Assoc., and McMurray Environmental, outlined the sustainable development measures being considered for this community. As outlined in the report, a sustainability strategy for the Lakeview community was developed using the EcoDistricts Protocol and the applicable sustainability goals have been considered in this report.

Sustainability will be at the core of the Lakeview Village. Lakeview Village will help the City achieve their goal of creating "a model sustainable creative community on the waterfront, all built to world-leading standards for urban and green design". The following are the proposed Sustainability Goals for Lakeview Village:

- To become the City of Mississauga's first Master Planned Net Zero Energy Ready Community and strive to become a Net Zero Energy Community. This will assist in meeting the Government of Canada's goal "under the Paris Agreement, Canada has committed to reducing Greenhouse Gas (GHG) emissions by 30% below 2005 levels by 2030."
- To provide Climate Change leadership by minimizing Lakeview Village's dependence on fossil fuels.
- To support the City of Mississauga's Strategic Pillars for Change as outlined in the Strategic Plan: Our Future Mississauga (2009) and the City's Living Green Master Plan (2012) by establishing a sustainability strategy which builds upon the MOVE, CONNECT, and GREEN pillars.
- To support the City of Mississauga's Smart City Strategy by working closely with the City to implement key initiatives.
- To support the Region of Peel's goal of 75% diversion of solid waste by 2034 through an efficient waste management strategy which strives towards Net Zero Waste.
- To reduce consumption and to promote reuse of water (domestic, stormwater).

3.8 SUSTAINABILITY GOALS AND STRATEGIES

The Lakeview sustainability strategy is based on the EcoDistricts Protocol to achieve a rigorous, sustainable urban development for which it is people-centered, economically vibrant, planet-loving, neighborhood- and district-scale sustainable. The sustainable development measures examined focuses on the 6 priorities outlined in the Lakeview Sustainability Strategy report (September 2019): Place, Prosperity, Health and Wellbeing, Connectivity, Living Infrastructure, and Resource Regeneration. To achieve the 6 priories the following are considered for Lakeview Village:

ENERGY CONSERVATION AND DISTRICT ENERGY

Lakeview Village will strive towards being a Net-Zero Energy community. This will reduce greenhouse gas emissions to below national levels for this scale and type of community development. The types of technology proposed are net zero ready buildings, grid-connected microgrid and community district energy.

SMART TECHNOLOGIES

Smart City Technologies within Lakeview Village are anticipated to fall into one of two categories; Community Based and Building Based. The types of technology proposed are: Co-Working Hub for Mobile Employees, Connection Kiosk in Public Spaces, Free Wi-Fi in Public Spaces, Wi-Fi Connected Smart LED Streetlights, Fibre-Optic Broadband Spine Infrastructure, Smart City sensors for Public Parking Availability Assistance, Smart City Panic Buttons for public safety, Smart City sensors for notification to City staff regarding full public garbage receptacles within public spaces, Other Smart City sensors for traffic management, environmental monitoring, gunshot detection etc., and Smart Building Management System.

WASTE MANAGEMENT

Lakeview Village will model its waste planning and programs to achieve, at a minimum, the Region of Peel's waste diversion goals, outlined in the Region's 2015-2034 Strategic Plan document, which commits to achieving a 52% diversion (from landfill) target by 2019 and a longer-term goal of 75% diversion by 2034. The technologies considered are: Comprehensive Waste Management Plan Preparation and Implementation and Vacuum Waste Collection. Vacuum waste collection uses airflow to transport waste under the streets to a waste collection station located on the outskirts of a development. Instead of daily waste collections by multiple vehicles from various locations throughout the community, one waste collection vehicle collects a container of waste from a single location (Waste Terminal), when full, and takes the container to a recycling center, waste processing facility, or directly to landfill.

INTEGRATED LOW IMPACT DEVELOPMENT FEATURES

A comprehensive stormwater management strategy has been developed for Lakeview Village which is detailed in Section 5.3. The proposed stormwater management strategy includes incorporation of several Low Impact Development (LID) measures including: bioretention, bioswales, trees in soil cells, permeable pavement, rainwater harvesting, increased topsoil depth, and green roofs.

OTHER COMMUNITY TECHNOLOGIES/ FEATURES

The other community technologies considered includes: wind turbines, solar roof panels, building integrated PV glass panels within the public realm, smart LED streetlights, residential and office EV charging stations, communal EV charging stations, on-site car sharing hubs, on-site bike sharing hubs, on-site bike parking/storage, on-site shuttle to Lakeshore transit, and community gardens.

All of the technologies considered are subject to financial viability, feasibility of implementation, and approval from governing agencies.

Rendering of Waterway Common at Night

GRADING & ROWs

4

Rendering of Ogden Ground Level

Grading & ROWs

4

4.1 GRADING

The proposed conceptual grading for the development will be designed in accordance with City of Mississauga standards. Grading is generally governed by the existing boundary conditions. Site grading has also been designed to ensure that adequate cover over proposed services is maintained. No external grading works are proposed.

A preliminary grading concept plan has been prepared for the subject lands based on the following engineering constraints:

- Storm outlet elevations
- Major system drainage paths
- Provision of minimum cover over services
- Proposed road patterns and land use
- Elevations along boundary roads, property lines and waterfront trail
- Application of the City of Mississauga standards

The grading plans are consistent with the City standards. In general, grading of all proposed roads and site plan blocks adjacent to the surrounding development and roads matches the existing grades or the ultimate anticipated grades at the property line, as appropriate. As noted in the preceding section, a considerable amount of material will be removed from the lands as part of the demolition program. The site grading design minimizes the overall site earthworks program once the concrete and any impacted soils are removed and will continue to be refined to maximize the sustainable reuse of soils within the property. Additional grading information is provided on Drawing GR-1. Cross-sections are provided on Drawings GR-2 through GR-10 . Plan and profiles for all roads are included in Drawings PP-1 to PP-35.

Detailed grading of the open space lands will be coordinated with the City Open Space Department and will be based on the NAK & Sasaki concepts presented in the DMP. Currently, the open space grading is shown as simple / uniform slopes, but the open space blocks can eventually accommodate a variety of slopes for trails, lookouts, flat areas for structures and other uses.

4.2 EARTHWORKS

Currently, demolition works are underway and earthworks associated with transfer of concrete rubble material to the TRCA operations area (for construction of the Jim Tovey Conservation Area waterfront feature) are ongoing. Earthworks will be staged based on development timing. Site Plan earthworks, particularly underground parking excavation may be conducted separately from the overall subdivision earthworks.

4.3 RIGHT-OF-WAYS

Purpose and Context

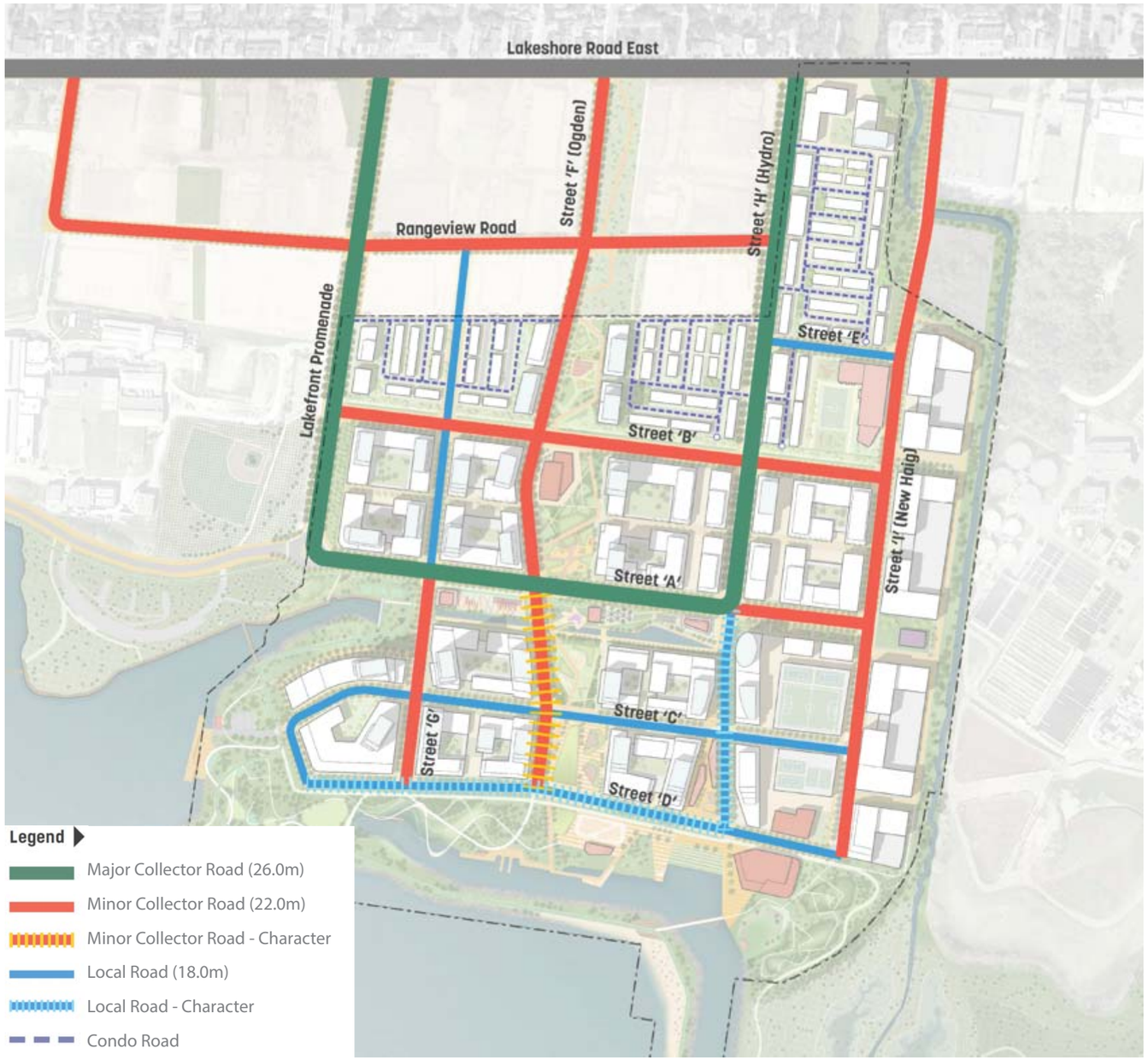
This section of the FSR incorporates TMIG's Right-of-Way study components to provide additional information on the proposed streets hierarchy and right-of-way configurations for Lakeview Village and to confirm feasibility and provide a basis for design. The street network for Lakeview Village is planned to achieve multiple objectives:

- Pedestrian, cyclist, transit and vehicular movement, with multiple linkage opportunities to reinforce active transportation;
- Streetscaping to complement the community's urban design vision and promote a healthy street tree canopy, integrated with functional water management and planting strategies;
- On-street and lay-by parking;
- Traditional underground storm, sanitary, and water networks to service the community;
- Utilities and street lighting that meets the principles of a connected community;
- Underground vacuum waste network with community-wide receptacles;
- Underground district heating and cooling network.

The key purpose of this evaluation is to describe the constraints and opportunities related to each feature, assess the proposed approaches relative to prevailing criteria, and establish a streets hierarchy and rights-of-way strategy that mitigates potential conflicts and meets the objectives of the community and stakeholders. At this stage in the planning and design process for the community, each ROW element is assumed to require the majority of the infrastructure components (e.g. including vacuum waste and district energy on most roadways), to ensure that any subsequent design refinements will not necessitate an increase in ROW width.

Balancing these objectives is critical to achieving a street network that is responsive to the design and technical requirements for delivering the Lakeview Village vision of a unique, innovative and exciting waterfront community.

Grading & ROWs



Street Hierarchy

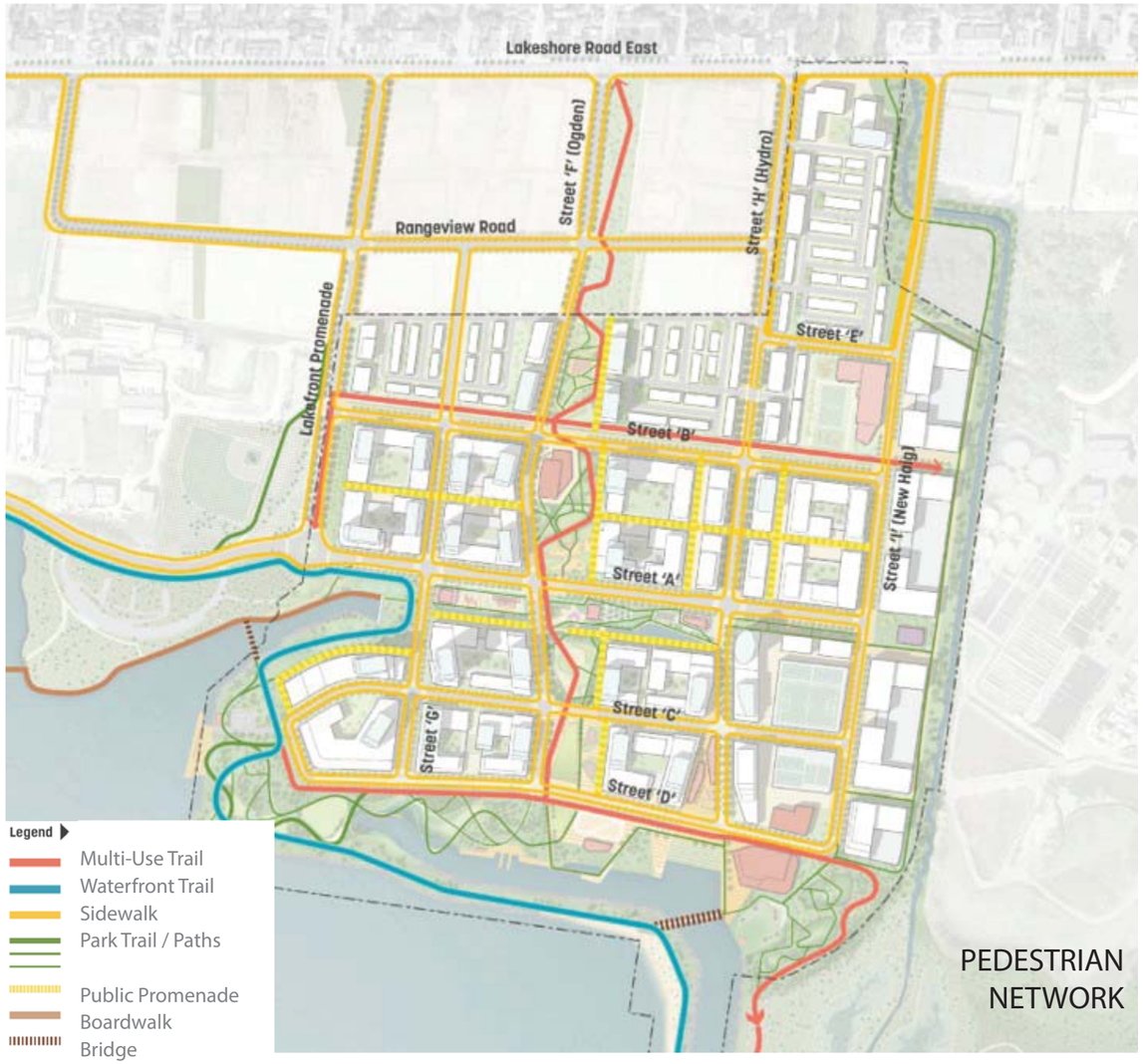
The principles for establishing safe, efficient and convenient movement of pedestrians, cyclists, transit riders and motorists has been reflected in the development of the proposed street hierarchy strategy consistent with the Lakeview Village community vision. Three (3) primary street categories have been defined, with further variations that consider local conditions and objectives.

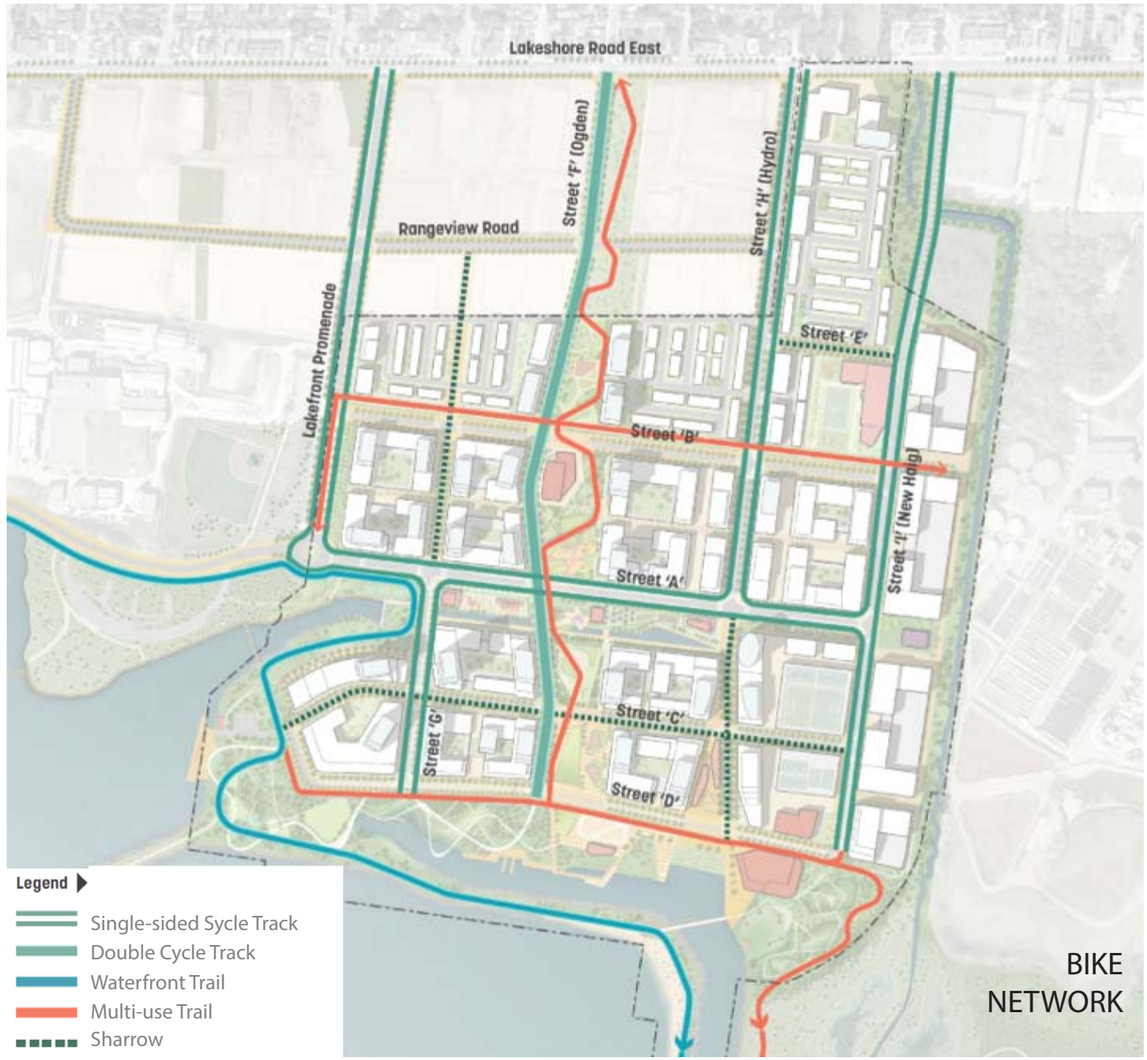
1. MAJOR COLLECTOR ROADS: Major collector roads provide primary connections between Lakeview Village districts and community functions, such as parks, recreation centres, and other facilities. They largely define the community structure, serve as the primary inter-district circulation routes, and accommodate transit. The proposed major collector road right-of-way width is 26.0 metres.
2. MINOR COLLECTOR ROADS: Minor collector roads also provide key connections between Lakeview Village districts. They further break down the community structure into smaller blocks and serve as key circulation routes. The proposed minor collector road right-of-way width is 22.0 metres. Additional variations on the typical configuration accommodate site specific and desired character conditions.
3. LOCAL ROADS: Local roads serve as the finer grain street network within Lakeview Village and are intended to provide a comfortable pedestrian experience with relatively low levels of local vehicular traffic. The local street's right-of-way width is 18.0 metres. Additional variations on the typical configuration accommodate site specific and desired character conditions.

Grading & ROWs

Pedestrians and Cyclists

Lakeview Village is designed to be a multi-modal district that is well-connected to the broader vehicular, pedestrian, transit, and bike network.

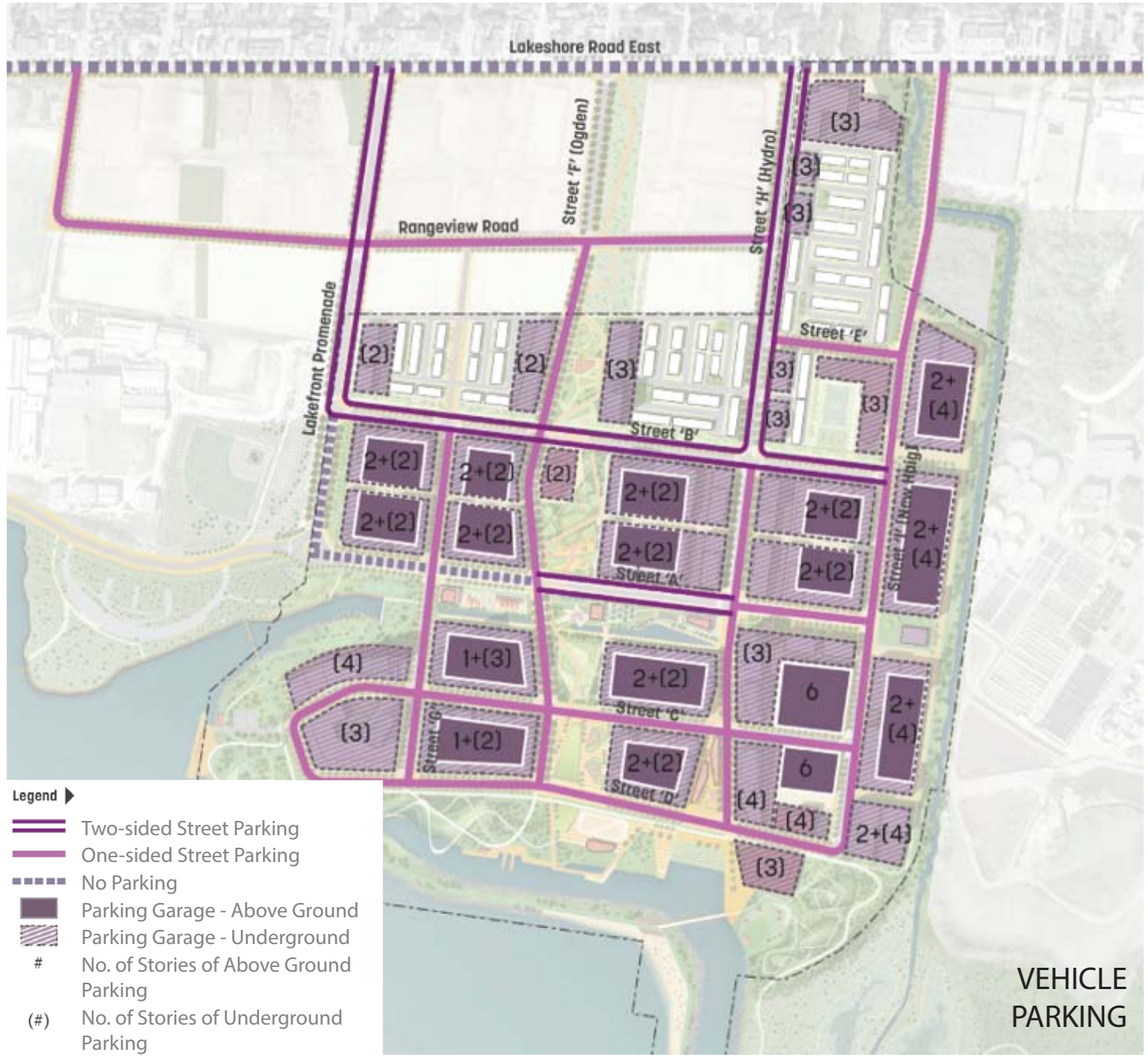




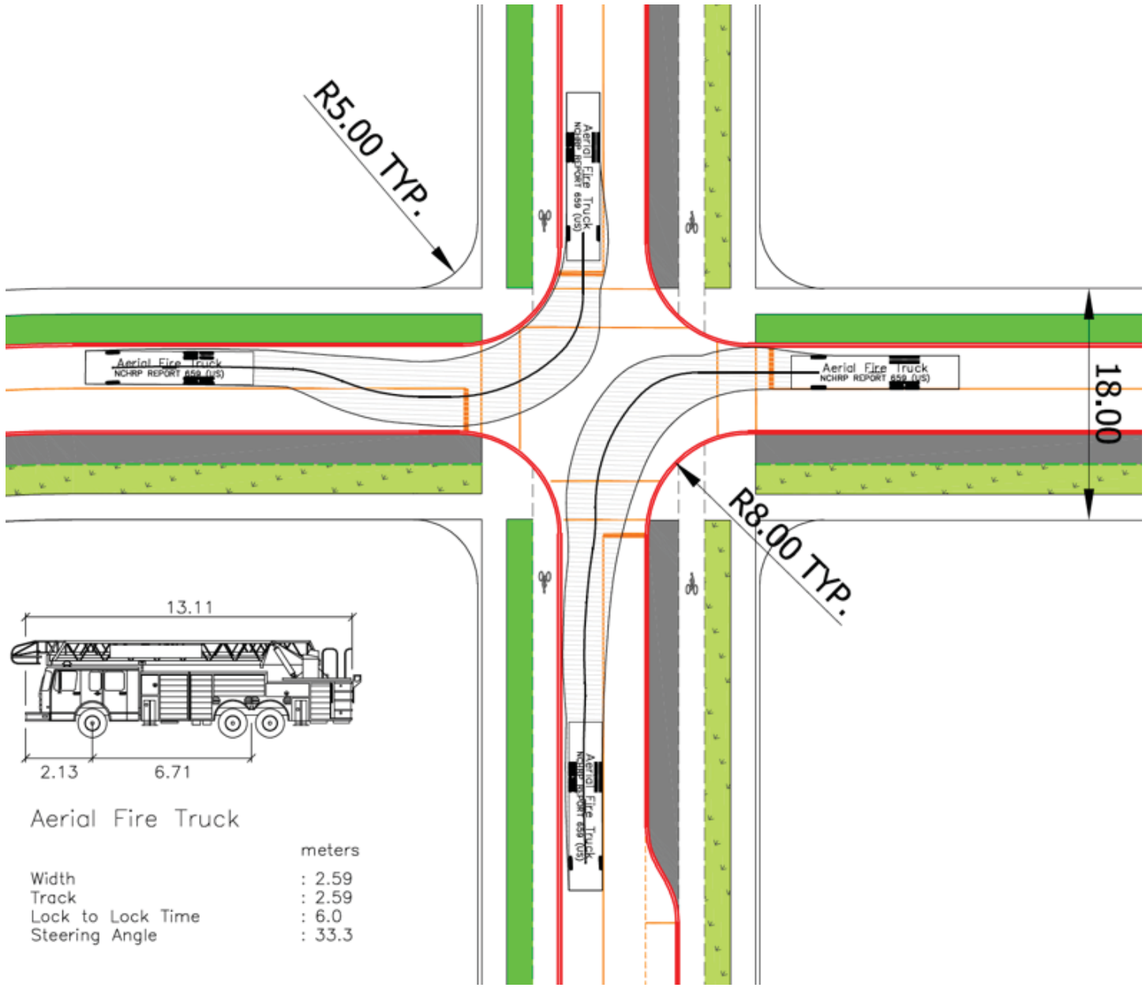
Grading

Transit and Vehicle Parking

A staged approach to transit considers both the interim and ultimate needs of the community, along with a variation that provides a dedicated transit lane to support the potential for an autonomous bus. A network of on street layby parking complements planned public and private parking facilities throughout the community. Both transit and on-street parking have been incorporated into the road cross-sections.



Grading & ROWs



Vehicular Movement

SUMMARY OF TRAFFIC INVESTIGATIONS

- One lane of traffic provided in each direction to support the anticipated needs of the community
- Daylighting provided at all intersections in compliance with TAC guidelines
- Vehicle swept path analyses confirm that a fire truck design vehicle will be able to easily access the development and negotiate the proposed internal roads as designed, with further detail provided in separate document.

Grading & ROWs

Streetscape Elements

Harmoniously designed streetscapes that appropriately integrate infrastructure requirements will contribute to the identity of Lakeview Village and each of its districts and neighbourhoods. A unique and inviting public realm experience for residents and visitors that appropriately responds to adjacent land uses can achieved through a carefully considered combination of streetscape features. Elements such as outdoor furniture, lighting and enhanced paving materials can reinforce the pedestrian priority and reinforce the unique character of the community and districts. The proposed streetscape treatment will be appropriate to the street designation and ensure the safety, comfort and accessibility of pedestrians, cyclists and motorists. Some of the streetscape elements to be considered include:

- Street trees - grass boulevards, tree grates, raised planters, soil cells;
- Street furniture - benches, bollards, bike racks (including bike sharing kiosks), wayfinding and information signage;
- Vacuum waste receptacles
- Street lights - street and pedestrian scale, pathway, light bollards, banners;
- WIFI hubs; and,
- Public art.

Grading & ROWs

4

Municipal Services

WATER: a network of watermains will connect the new community to existing trunk infrastructure. Pipe sizes are expected to range from 200mm to 400mm.

SANITARY: a network of sanitary sewers will convey wastewater from the community to the existing Regional network, with lower areas to be conveyed via a proposed pump station at the southeast corner of the neighbourhood. Sanitary sewers are expected to range from 250mm to 600mm.

STORM: Runoff throughout the community will be conveyed by a network of storm sewers, along with road surfaces and a range of stormwater management features on route to the outlets. Storm sewers are expected to range from 300mm to 1.2mx3.0m (box culvert).

Grading & ROWs

Utilities

The utility corridor will permeate the community and will require space within each right-of-way.

Street cross sections have assigned a utility corridor width of 1.0m throughout the neighbourhood, underneath the sidewalk corridor, with a separate accommodation for gas between the utility corridor and property lines.

The utility corridor will accommodate a conventional utility network, the enhanced connectivity elements under consideration for Lakeview Village, as well as the potential introduction of a 'microgrid' network to service the neighbourhood.

Grading & ROWs

4

Stormwater Management

The stormwater management strategy for Lakeview includes features within the street corridors that will provide water quality treatment for runoff generated by those streets.

In general, the strategy for the road network relies on bioretention features that intercept and treat runoff before conveyance to the storm drainage network. In some instances, consideration will be given to directing treated runoff to soil cells to support increased tree canopies while offering tertiary water quality treatment, with due design focus on sustained tree health. In areas where grading or other constraints limit the opportunity to treat runoff with bioretention features, oil-grit separators will be introduced. Refer to Drawing LID-1 and LID-2 for details.

The specific form of the bioretention features will be established as part of the streetscape design for each district to suitably integrate form and function.

TREE PITS WITH SOIL CELLS

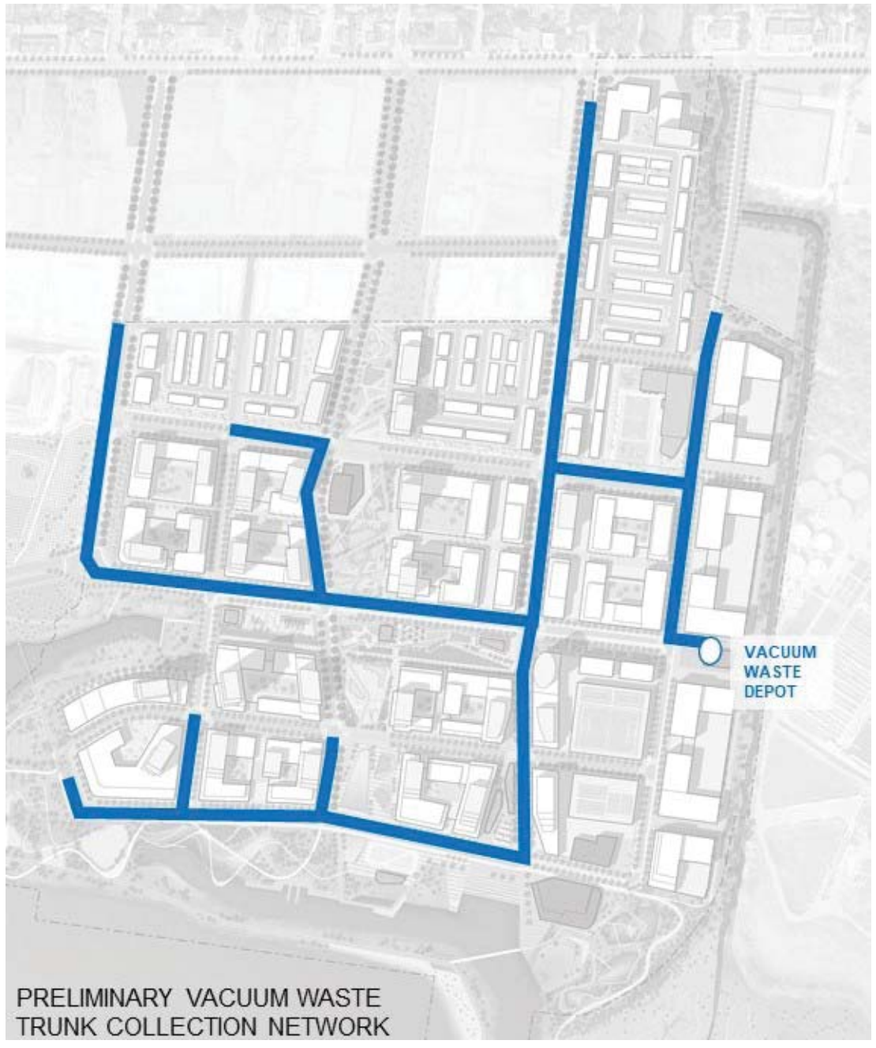
BIORETENTION BUMP-OUTS

BIORETENTION PLANTERS

BIOSWALES

Grading & ROWs

Vacuum Waste Collection



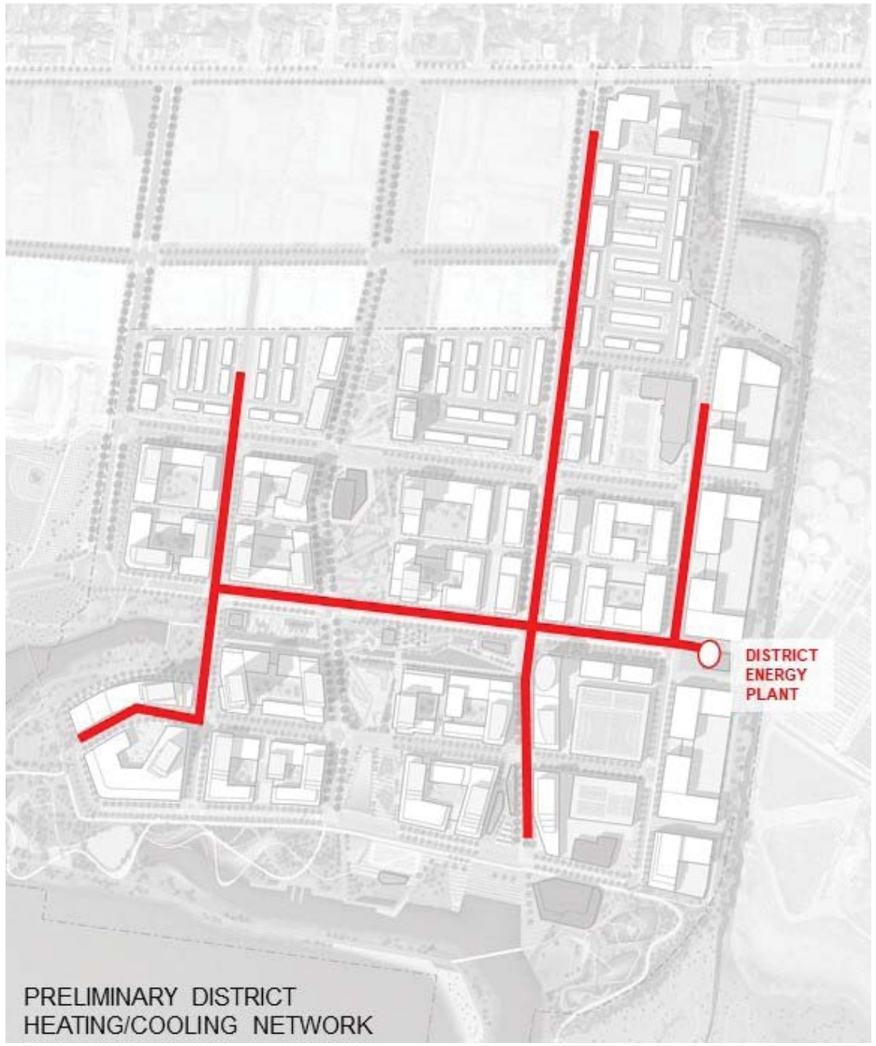
Vacuum waste collection is under consideration for Lakeview Village as an alternative to traditional waste management, due to the location and form of the new community. The technology is not new, and has the potential to elevate the level of service to the community by removing the nuisance and health hazards associated with waste storage and accumulation, and reducing the environmental impact of traditional waste collection.

A trunk network of vacuum tubes will provide connections to each development parcel, along with receptacles distributed throughout public spaces, all connected to a central waste depot from which the three waste streams can be collected daily.

The trunk network is comprised of a 500mm diameter steel pipe located within the right-of-way, which must be coordinated with and respect the other demands on the street corridor.

Grading & ROWs

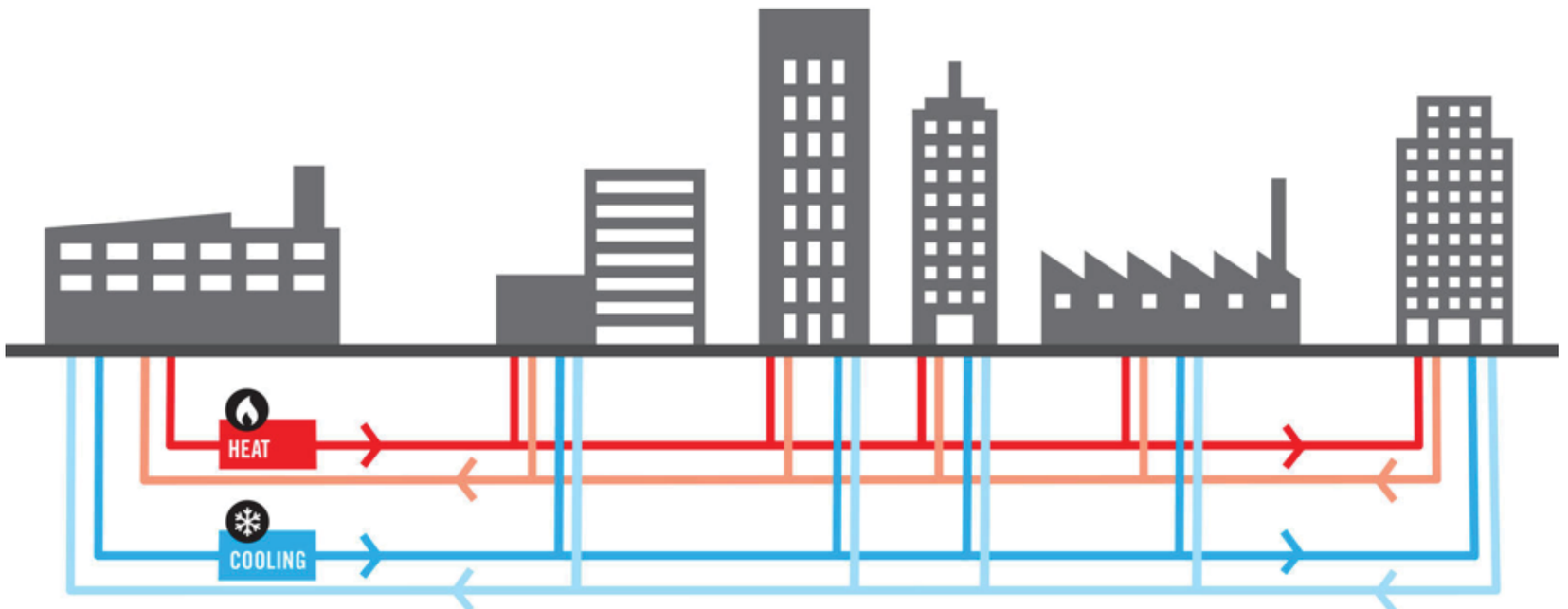
District Heating and Cooling



District heating and cooling provides a centralized plant that supplies hot and cold water to a series of pipes distributed throughout a community and used by individual buildings in lieu of traditional boilers and chillers.

For Lakeview, one option involves leveraging the waste heat available at the GE Booth Wastewater Treatment Facility to heat and cool water for distribution throughout the community.

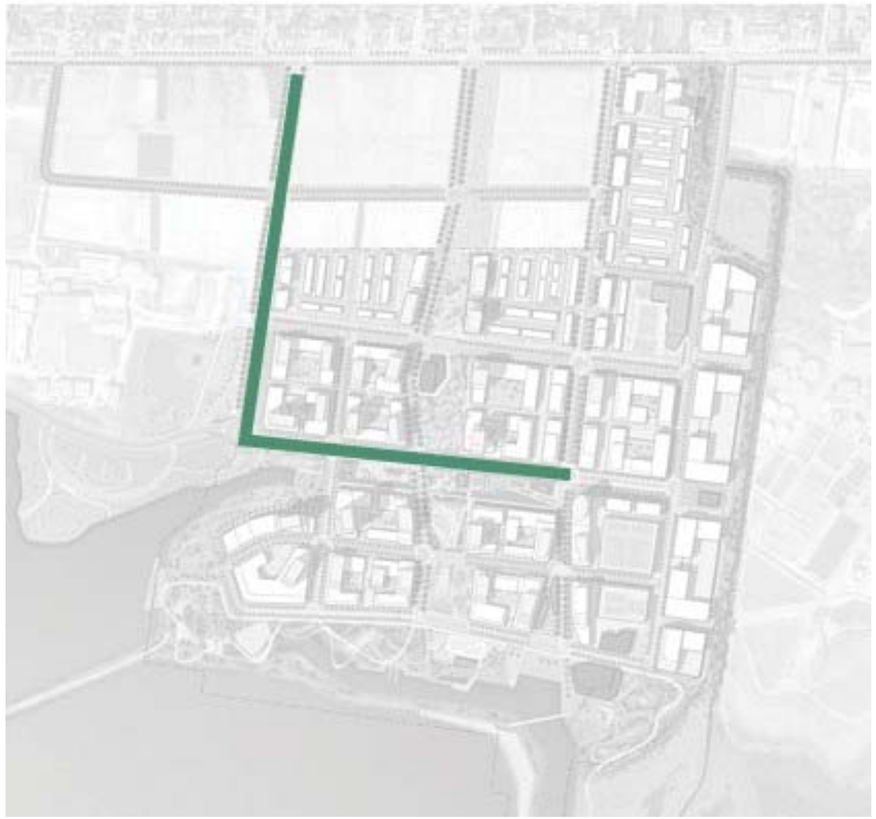
This requires a distributed network of pipes within the street corridors to service the community, which must be coordinated with and respect the other demands on the street corridor. The pipe network is typically comprised of a 4-pipe system ranging in diameter from 150mm to 500mm.



Grading & ROWs

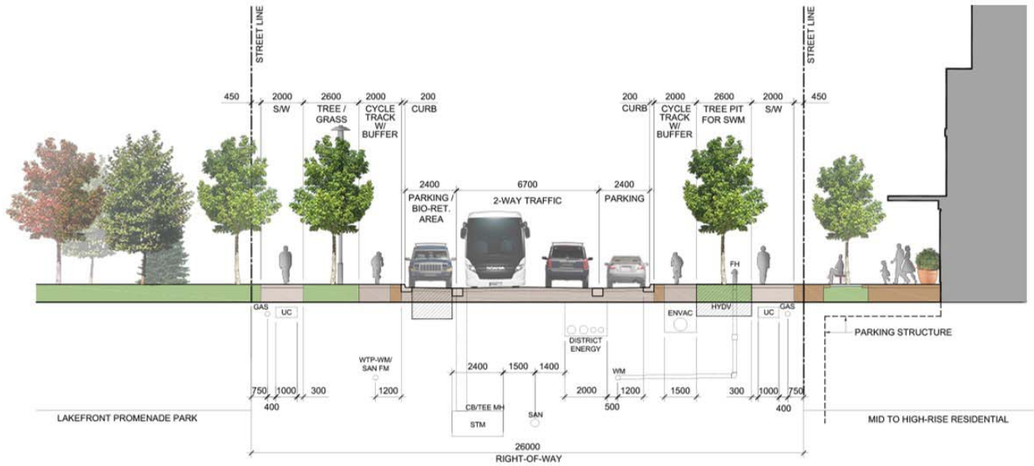
4

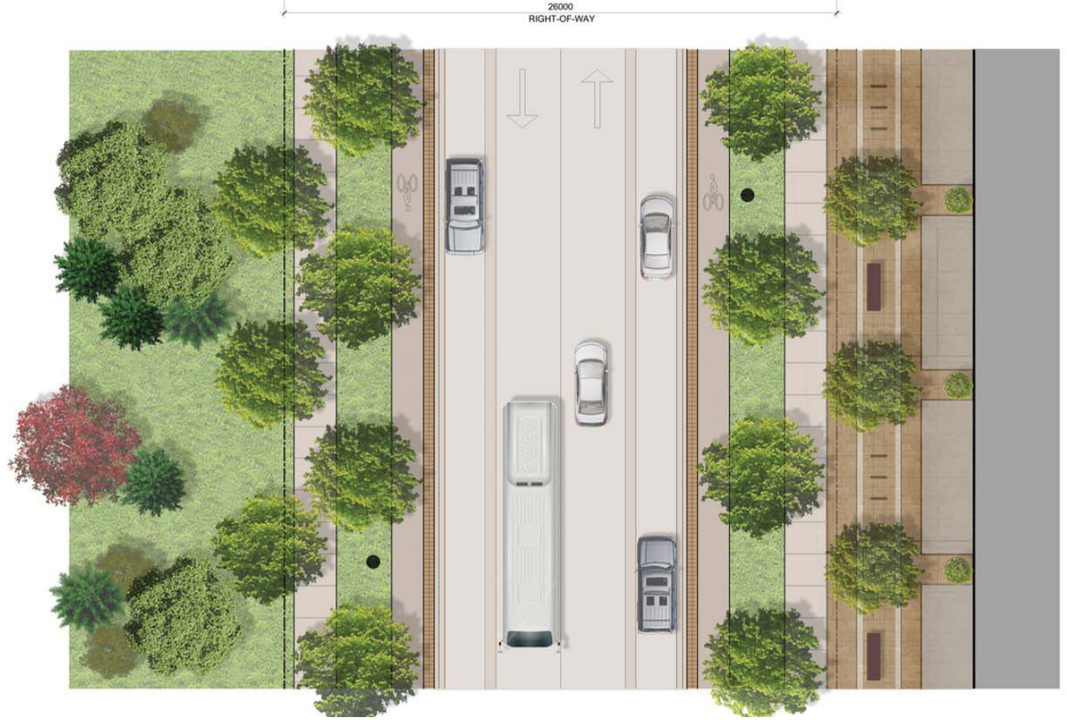
Major Collector



KEY FEATURES AND PRINCIPLES:

- 26.0m wide right-of-way
- Sidewalk on both sides
- 2 thru lanes
- On-street parking on both sides, alternated with bioretention features
- Cycle tracks on both sides
- Grass boulevard on one side
- Grass boulevard with tree pits and potential SWM function on other side

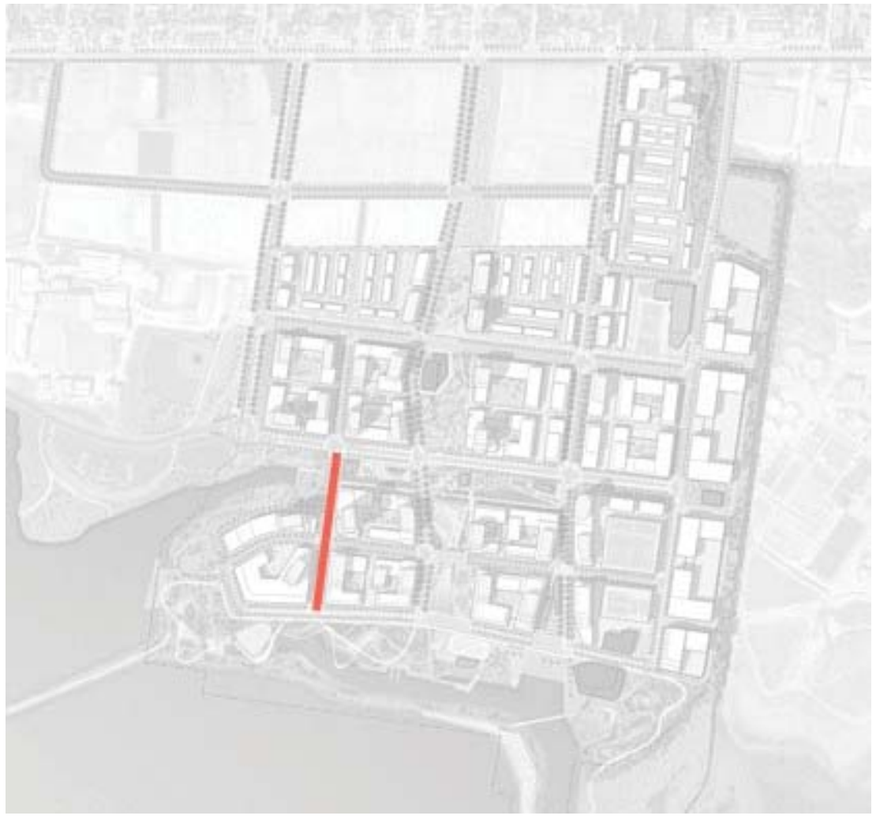




Grading & ROWs

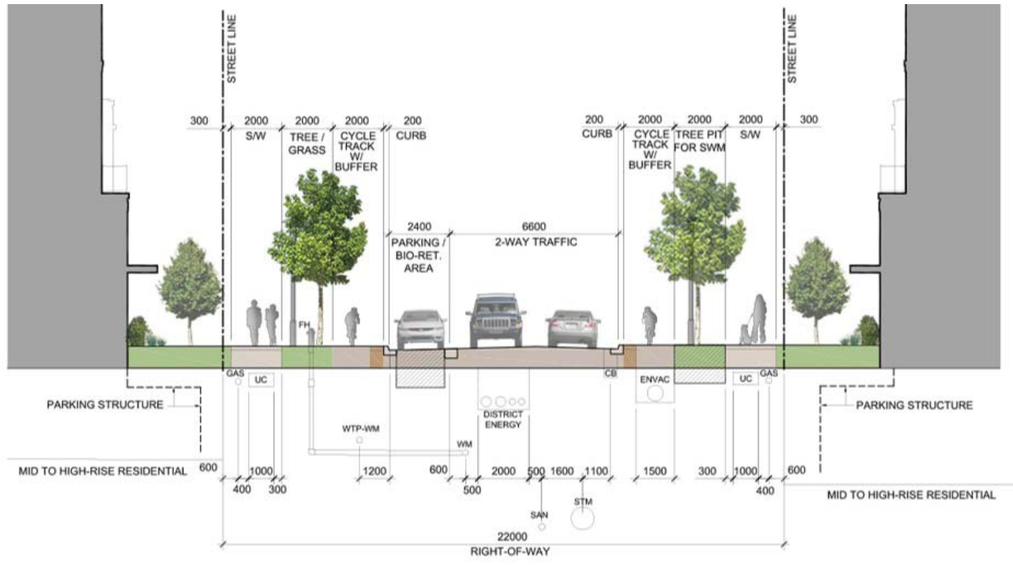
4

Minor Collector



KEY FEATURES AND PRINCIPLES:

- 22.0m wide right-of-way
- Sidewalk on both sides
- 2 thru lanes
- On-street parking on one side, alternated with bioretention features
- Cycle track on both sides
- Grass boulevard on one side
- Grass boulevard with tree pits and potential SWM function on other side



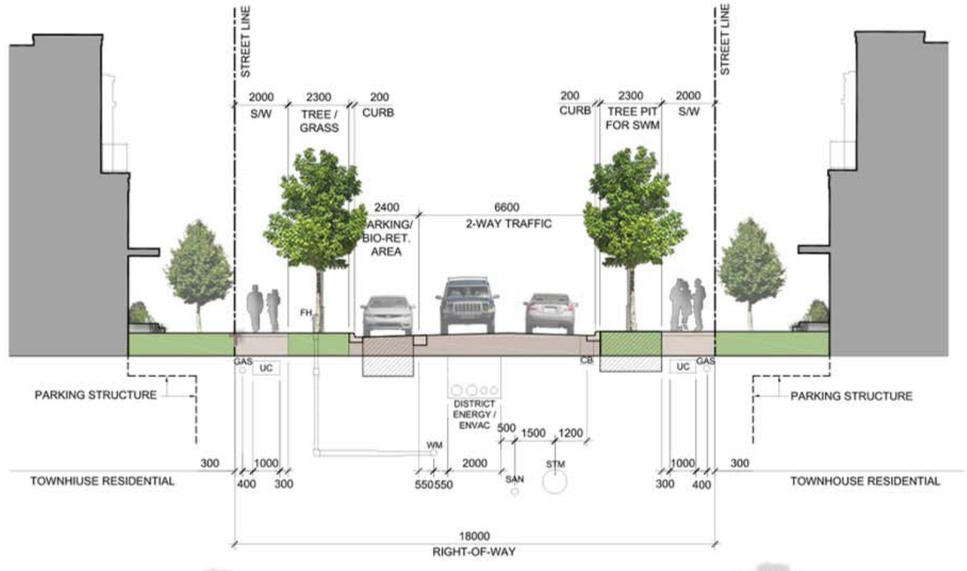
Grading & ROWs

4

Local Road

KEY FEATURES AND PRINCIPLES:

- 18.0m wide right-of-way
- Sidewalk on both sides
- 2 thru lanes with 'sharrow' markings to accommodate cyclists
- On-street parking on one side with bioretention features
- Grass boulevard on one side
- Grass boulevard with tree pits and potential SWM function on other side

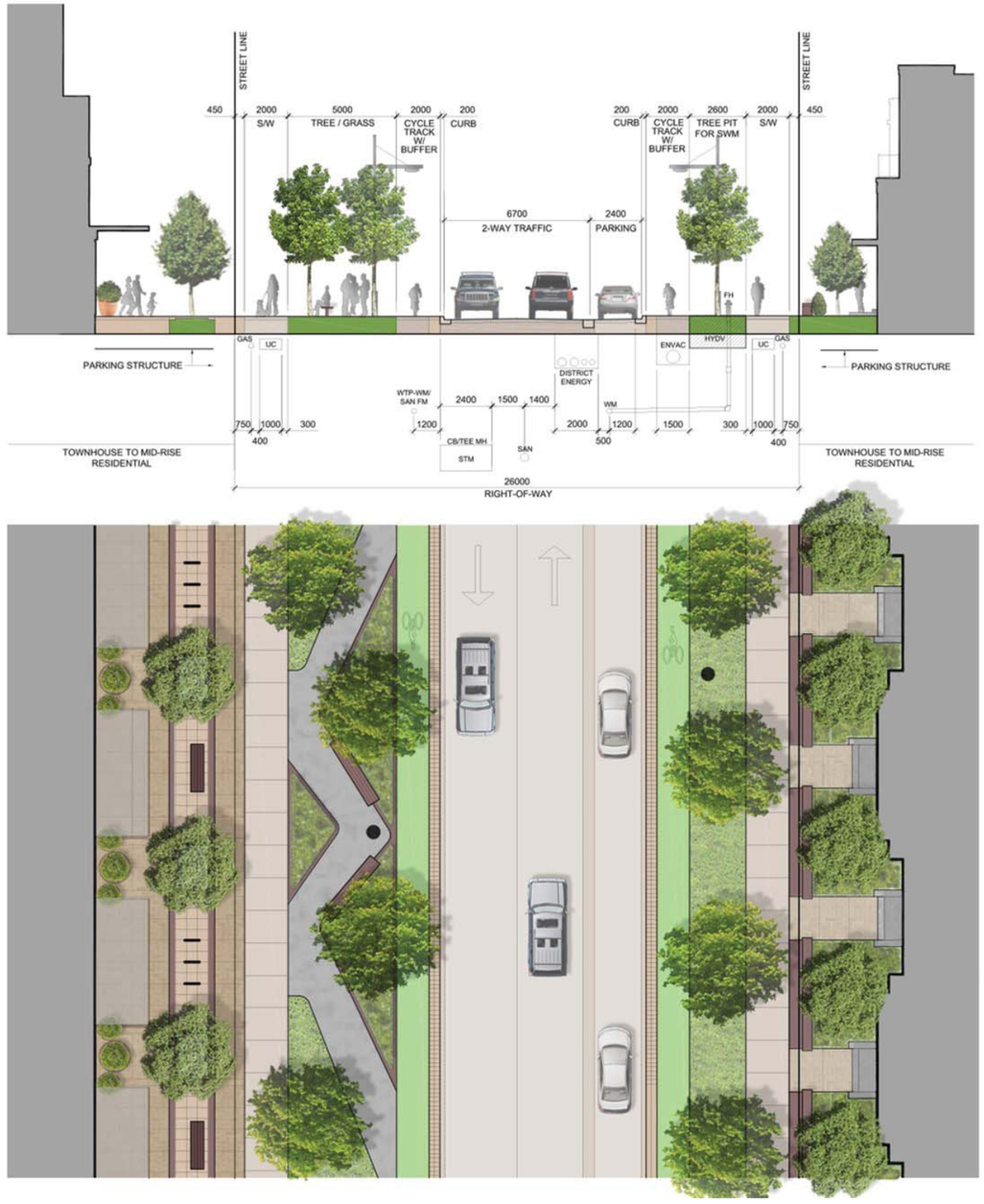


Grading

Major Collector Alternate A - Hydro Road

KEY FEATURES AND PRINCIPLES:

- 26.0m wide right-of-way
- Promenade with double-row of trees and potential for integrated bioretention elements
- Sidewalk on both sides
- 2 thru lanes
- On-street parking on one side, alternated with bioretention features
- Cycle tracks on both sides
- Distinctive pedestrian scale lighting

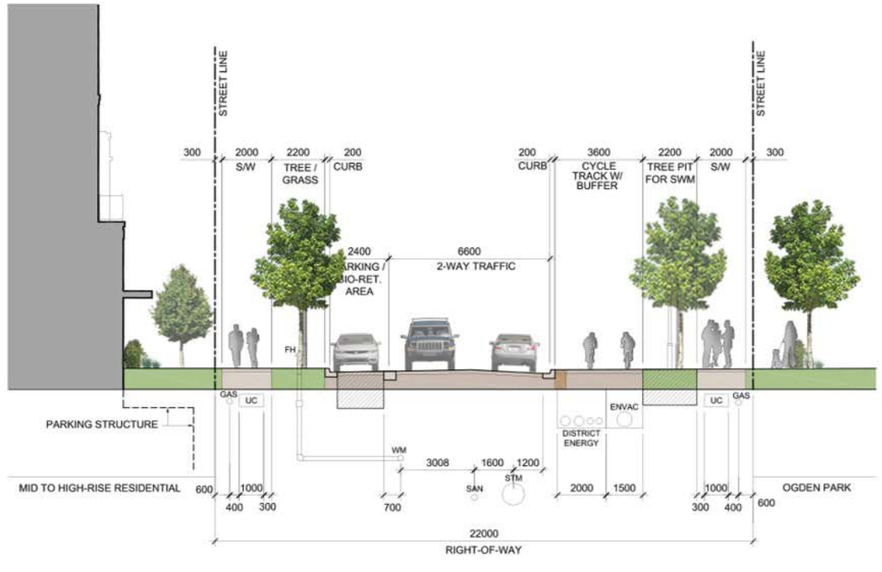


Grading & ROWs

Minor Collector Alternate A - Street 'F' (Ogden)

KEY FEATURES AND PRINCIPLES:

- 22.0m wide right-of-way
- Sidewalk on both sides
- 2 thru lanes
- On-street parking on one side, alternated with bioretention features
- Double cycle track on one side
- Grass boulevard on one side
- Grass boulevard with tree pits and potential SWM function on other side



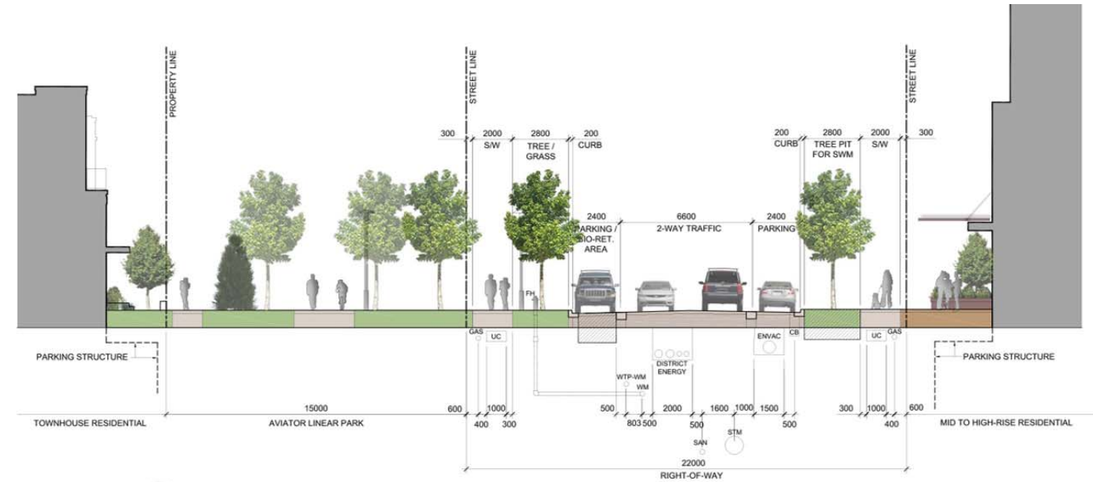
Grading & ROWs

4

Minor Collector Alternate B - Street 'B'

KEY FEATURES AND PRINCIPLES:

- 22.0m wide right-of-way
- Sidewalk on both sides
- 2 thru lanes
- On-street parking on one side, alternated with bioretention features
- Cycle track on both sides
- Grass boulevard on one side
- Grass boulevard with tree pits and potential SWM function on other side

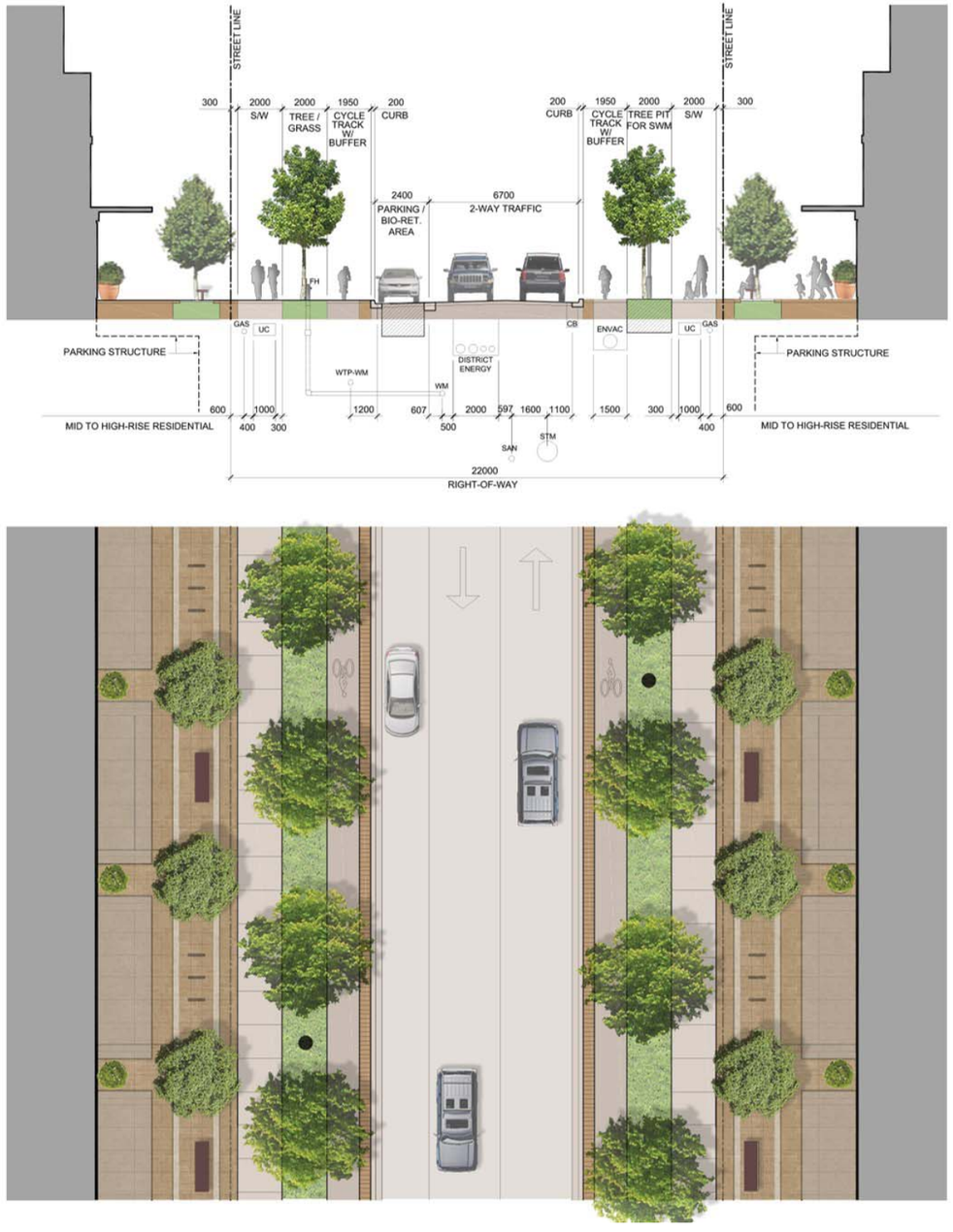


Grading & ROWs

Minor Collector Alternate C - Street 'I' and Street 'A'

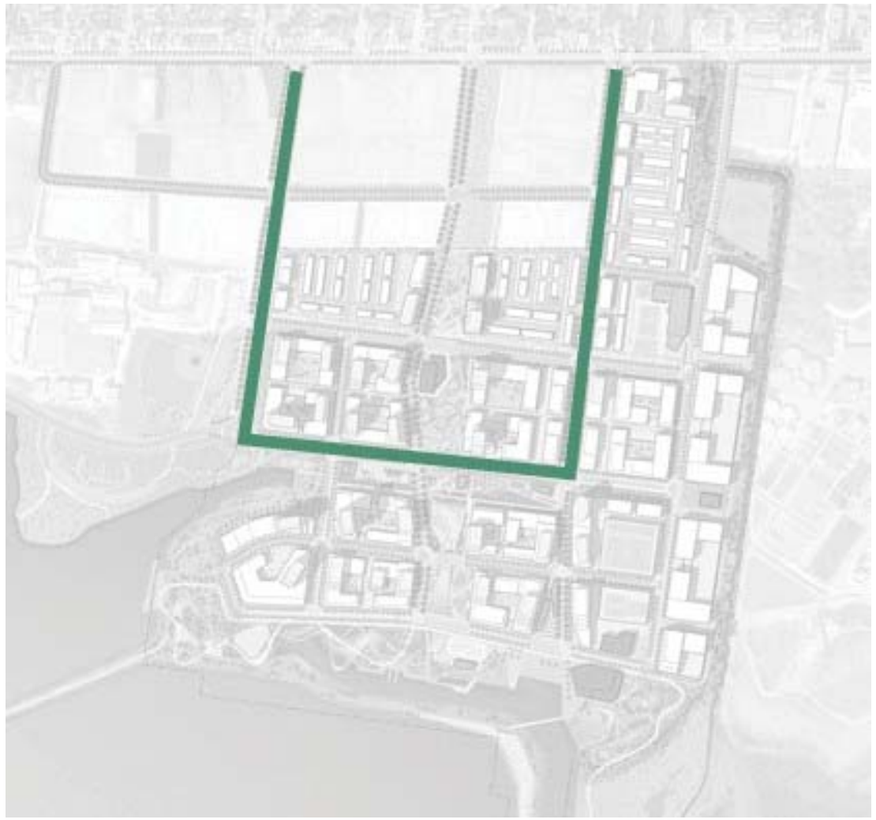
KEY FEATURES AND PRINCIPLES:

- 22.0m wide right-of-way
- Sidewalk on both sides
- 2-3.35m thru lanes (for transit)
- On-street parking on one side, alternated with bioretention features
- Grass boulevard on one side
- Grass boulevard with tree pits and potential SWM function on other side



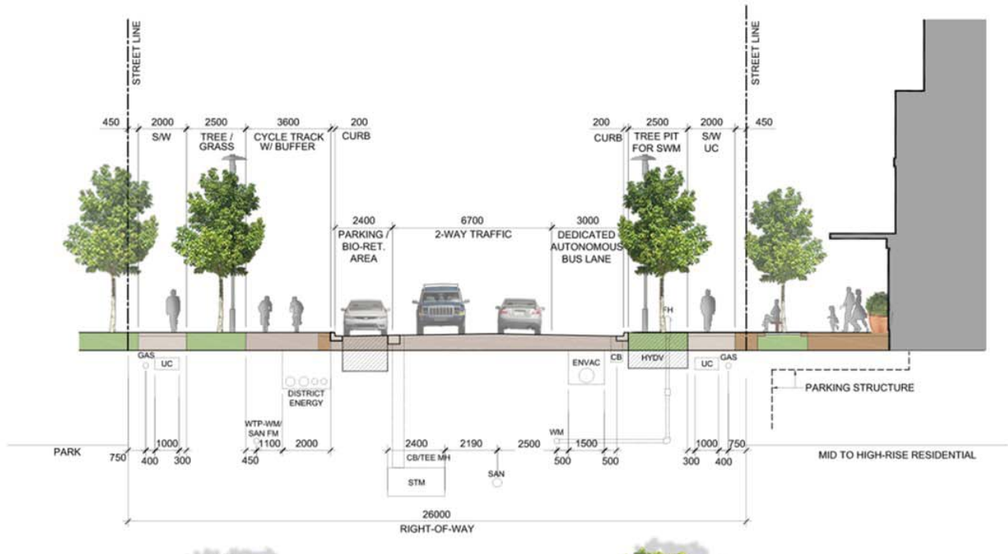
Grading & ROWs

Major Collector Alternate B (dedicated autonomous bus lane)



KEY FEATURES AND PRINCIPLES:

- 26m wide right-of-way
- Sidewalk on both sides
- 2 thru lanes
- On-street parking on one side, alternated with bioretention features
- Single direction dedicated autonomous bus lane
- Double cycle track with buffer on one side
- Grass boulevard on one side
- Grass boulevard with tree pits and potential SWM function on other side

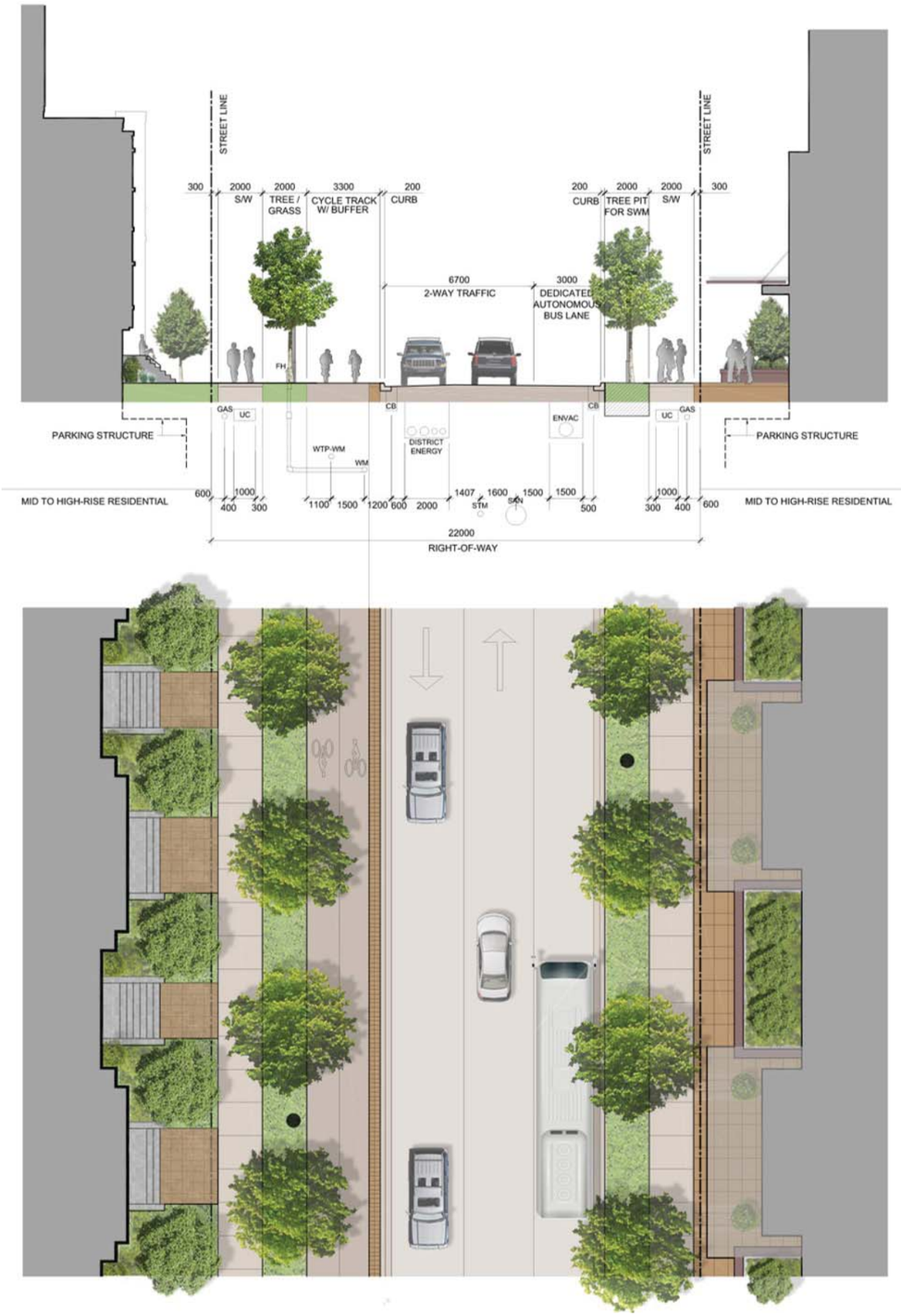


Grading & ROWs

Minor Collector Alternate D (dedicated autonomous bus lane)

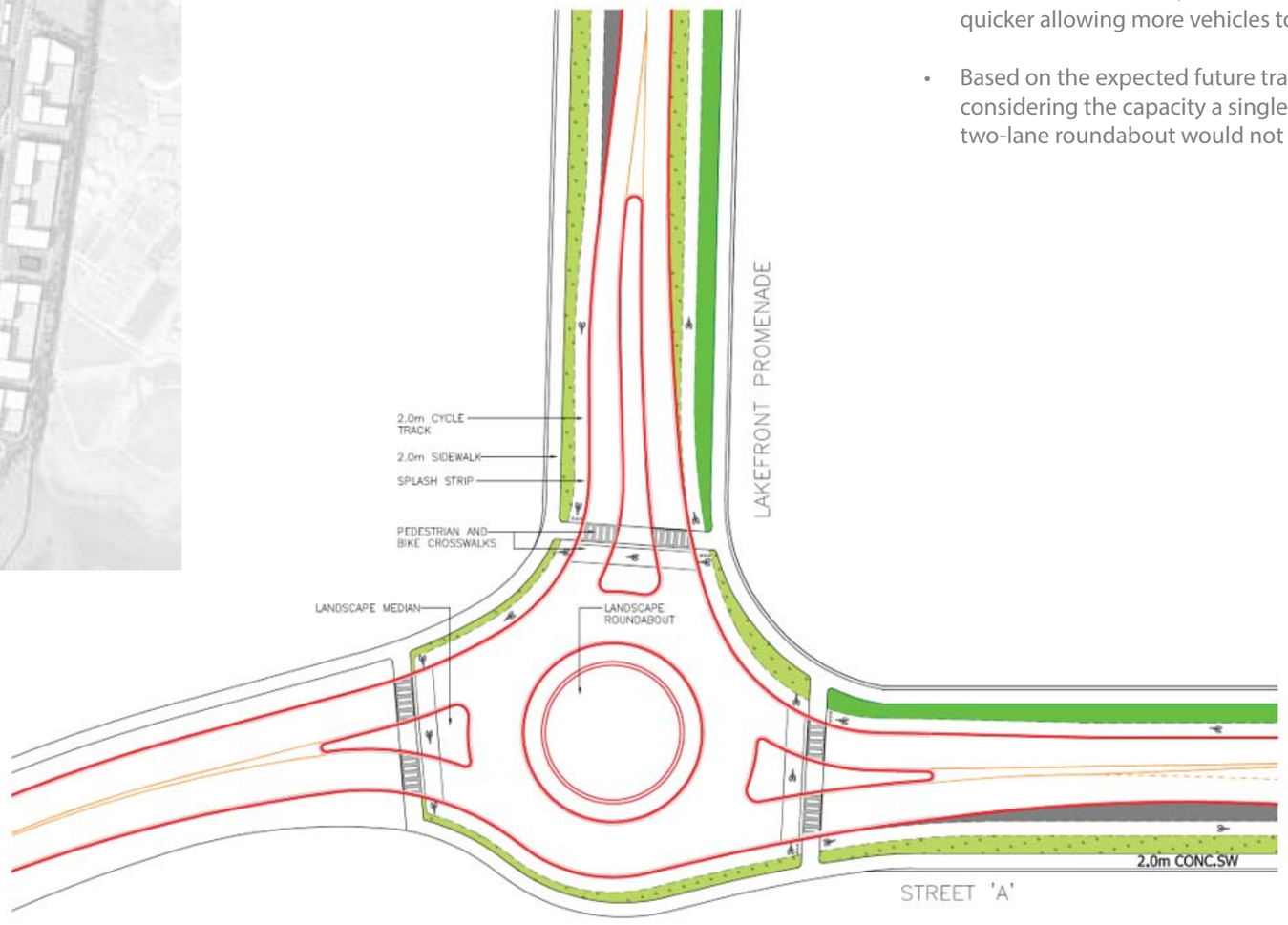
KEY FEATURES AND PRINCIPLES:

- 22.0m wide right-of-way
- Sidewalk on both sides
- 2 thru lanes
- Single direction dedicated autonomous bus lane
- Double cycle track on one side
- Grass boulevard on one side
- Grass boulevard with tree pits and potential SWM function on other side



Grading & ROWs

Roundabout



ROUNDABOUT CONCEPTUAL DESIGN PRINCIPLES

- The concept design is a 3-leg roundabout using a 40m Inscribed Circle Diameter (ICD).
- Proper deflection slows down speeding vehicles so they may safely enter the roundabout, and the flat exit enables vehicles to exit quicker allowing more vehicles to enter.
- Based on the expected future traffic volumes at the intersection, considering the capacity a single lane roundabout can handle, a two-lane roundabout would not be necessary.

Existing site conditions of Lakeview Village

SERVICING

5

View looking towards Lakeshore Retail

Sanitary Servicing

EXISTING SANITARY SERVICES

The nearest existing sanitary infrastructure to the subject property is a 250mm sewer on Rangeview Road which drains to the existing Beach Street sewage pumping station to the west. Presently, this pumping station has no additional planned capacity and cannot accommodate the proposed sanitary drainage from the subject lands. However, the existing 1650mm trunk sanitary sewer on Lakeshore Road to the north, which drains to the Lakeview Wastewater Treatment Plant just east of the subject property, does have available capacity to support the proposed development. Due to grading constraints, it is not possible to service the proposed development with gravity sewers draining to Lakeshore Road. Therefore, a new sanitary pumping station and forcemain are required.

Refer to Drawing SAN-1 and Appendix B for further details.

PROPOSED SANITARY SERVICES

In May 2018, the Region of Peel Public Works division issued a Draft Water and Wastewater Servicing Analysis for the overall Inspiration Lakeview study area, comprising of:

- The Lakeview Village lands (i.e., the former OPG lands, designated as the Ogden Village and Cultural Waterfront precincts, and the south portion of the Serson Place Innovation Corridor precinct)
- The Lakeview employment area (including the Rangeview Estates precinct and the north portion of the Serson Place Innovation Corridor precinct).

The Region's analysis utilized future population values (ranging from 29,256 – 32,853 people) based on the City of Mississauga's planning estimates and the Region of Peel's 2041 growth forecasts. The Region evaluated the capacity of the existing and planned infrastructure including the capacity of the Lakeview Water Treatment Facility (WTF) and the G.E. Booth Wastewater Treatment Facility (WWTF), located west and east of the subject lands, respectively. The G.E. Booth WWTP will be the ultimate sanitary outfall for the subject lands. The current projected population equivalent for the Lakeview Village lands only is 21,756 persons as shown on the design sheet included in Appendix B. Populations estimates were based on the DMP 4.0 unit count of 8050 and 1.94 ppu (apartment) and 2.85 ppu (townhouses). The capacity of the sanitary sewer system has also been assessed with higher unit counts (>10,000) to provide flexibility in the system to accommodate additional/future growth.

The Region's study informs, at a high level, the recommended servicing study for the subject lands with the understanding that input from the Master Plan consulting team may result in adjustments justified by detailed examination of the servicing design within the study area. The following table provides the Region of Peel's servicing study recommendations for sanitary drainage for the portion of the site that can be drained by gravity and the proposed Functional Servicing strategy.

Table 5.1-1: Gravity Based Sanitary Collection Network – Recommendations and Strategies

GRAVITY BASED SANITARY COLLECTION NETWORK	
Region of Peel Recommendation	Functional Servicing Strategy
Any additional flow added to the Rangeview Road sanitary sewer (250mm diameter) will trigger conveyance upgrades downstream to the Beach Street WWPS, and is not recommended.	As shown on Drawing SAN-1, no additional flow from the Lakeview Village (Ogden Village / Cultural Waterfront) lands or Innovation Corridor will be directed to the existing Rangeview Road 250mm sanitary sewer. The Rangeview Estates lands may continue to drain to the existing sewer; re-development / intensification of these lands may trigger upgrades to the sanitary sewer within Rangeview Road and further downstream.
Rangeview Road Sewer - The existing 250 mm local sanitary sewer on Rangeview Road will continue to convey flow from east to west and may require upsizing based on the final design.	
East Avenue Sewer - A new local collection sewer on East Avenue will be required to redirect flows that currently go to the Beach Street WWPS to the Beechwood WWPS.	These recommendations relate to future development within the Rangeview Estates precinct and are not required / do not influence servicing of the subject lands/Draft Plan area.
Lakeshore Road Sewer (West of Lakefront Promenade) - Properties fronting Lakeshore Road, west of Lakefront Promenade will drain to the existing 300 mm local collection sewer on Lakeshore Road. There is a potential need for this sewer to be upsized based on final design.	
Lakeshore Road Sewer to Beechwood WWPS - The existing 250 mm sanitary sewer on Lakeshore Road, west of East Avenue will need to be upsized to convey all flows from the Rangeview Road drainage area to the Beechwood WWPS.	
Lakeshore Road Sewer (West of Hydro Road) - The existing 300 mm local collection sewers on Lakeshore Road, between Lakefront Promenade and Hydro Road will need to be upsized to service the properties fronting on Lakeshore Road.	
Lakeshore Road Sewer (East of Hydro Road) - The existing 250 mm local collection sewers on Lakeshore Road, east of Haig Boulevard will need to be upsized to service the north Innovation Corridor lands.	This recommendation relates to future development within the north portion of the Serson Place Innovation Corridor, outside of subject lands. This upgrade is not required for servicing of the Master Plan area.
Local Collection Sewer Network - The local collection sewers within the development will range between 250 mm and 300 mm in diameter, and will be located along future road right of ways.	The size of the gravity collection sewers within the study area range from 250mm local sewers to a 600mm trunk (upstream of the WWPS) and have been sized according to the Region of Peel sanitary sewer design criteria. The sanitary sewer network will be situated within the future public road ROWs; private site plan blocks will have internal sanitary drainage systems with connections to the public collection system. The main trunk sanitary sewer through the subject lands will run west to east along Street A.
Trunk System - There will be one local trunk sewer collection sewer ranging between 375 mm and 450 mm used to convey flow from the local sanitary sewer network to the proposed WWPS. The preliminary servicing strategy shows this local trunk sewer along the proposed Lakefront Boulevard.	

Sanitary Servicing

Sanitary Pumping Station

As noted, the majority of the subject lands (Ogden Village, Cultural Waterfront, and the south portion of the Innovation Corridor precincts) cannot drain to the sanitary trunk sewers on Lakeshore Boulevard by gravity. Table 5.1-2 describes the Region of Peel's recommendations regarding the wastewater pumping station and forcemain and the current Functional Servicing strategy.

Table 5.1-2: Sanitary Pumping Station and Forcemain – Recommendations and Strategies

SEWAGE PUMPING STATION (SPS) AND FORCEMAIN	
REGION OF PEEL RECOMMENDATION	FUNCTIONAL SERVICING STRATEGY
The Region's preferred site for the WWPS is on the east side of the development. This site is preferred for reasons including proximity to the wastewater treatment facility and the opportunity to address odours through an integrated odour control strategy.	At the request of the Region for a connection to the sanitary trunk sewer at Hydro Road and Lakeshore, the WWPS has now been relocated to the eastern edge of the development. This changes also aligns with the anticipated phasing and potential early development of the Serson Innovation Corridor blocks. This change is reflected on Drawing SAN-1.
The proposed alignment of the forcemain would be along the future New Haig Road (connecting to the existing 1650mm sanitary trunk sewer on Lakeshore Road East), or along a modified / existing watermain easement along Serson Creek for connection to infrastructure adjacent to the G.E. Booth WWTF. Capacity analysis for the existing 1650mm sanitary trunk sewer is required.	
The size of the proposed WWPS will be confirmed at the detailed design stage; however, for the purposes of the Functional Servicing Report, the WWPS is estimated to require a firm capacity between 150 L/s and 170 L/s.	The proposed WWPS design / capacity has been established through the Lakeview Village FSR and will be refined through detailed design studies. However, based on preliminary estimates, the anticipated sanitary flow for the Lakeview Village study area is greater than 200 L/s based on the Region of Peel's design criteria and the anticipated employment and residential populations. Consideration of the future Rangeview Estates development population in the Region's analysis may have decrease the peaking factor and hence the total flows; however, the Rangeview Estates lands will not be directed to the WWPS based on the proposed servicing strategy.
To convey the above pumped flow, a 300 mm sanitary forcemain is considered sufficient but could be subject to changes based on the final detailed design.	A 300mm sanitary forcemain (twinned for maintenance redundancy) is currently proposed along Hydro Road and will be connected to the existing 1650mm sanitary trunk sewer at Lakeshore Road East.

It is anticipated that the peak sanitary flow rate generated by the proposed development will be 294.3 L/s. The Sanitary Sewer Design Criteria (Mar. 2017) specified a unit domestic sewage flow of 302.8 Litres per capita per day (Lpcd). However, the design basis for the SPS is based on Region's recommended / updated design flow of 290 Lpcd.

Sanitary Servicing

Sanitary Pumping Station Design Considerations

The SPS will be designed in accordance with the "Design Guidelines for Sewage Works, Ministry of the Environment, (2008) and "Wastewater Pumping Station Design Standards Version 7", Region of Peel (2012). The Peel Standards (2012) note that, for peak flows above 100 L/s, the pumping station should follow the Design Style III as outlined below:

- DESIGN STYLE: III - LARGE WWPS
- TYPICAL FLOW RANGE: Greater than 100 L/s
- FACILITY DESCRIPTION: Building, emergency generator and odour control.
- GENERAL LAYOUT: Submersible pumping station with separate building for controls, MCC, standby generator with a basement or vault to house valves so confined space entry not required.
- WET WELL STORAGE CAPACITY: Split wet well design. Minimum 1 hour (preferred 2 hour) wet well storage capacity based on peak flow
- NUMBER, SIZE & WEIGHT OF PUMPS: Three or more pumps, one lead, one lag and one standby. Shall be VFD or soft starters.
- GEN SET REQ'D: Yes – sized for all connected loads

Based on the design standards, the proposed SPS will be designed with the following salient features:

- Two-celled wet well, with a basket screen or channel grinder on the sanitary inlet, and related suction piping, interconnection valving, ventilation, odour control, lighting and instruments. All electrical equipment in the wet well will be explosion proof;
- Dry pit to house the four dry pit pumps (3 duty +1 standby), and related discharge piping, valving and instruments including flowmeters;
- Brick and block building enclosure with a floating roof, and architecturally designed to be aesthetically pleasing with the surrounding buildings;
- Service Entrance Breaker, ATS and MCC line-up;
- Standby (diesel/natural gas) generator (within the building);
- Primary and secondary electrical distribution;
- Heating, lighting and ventilation;
- Pumping station control panels and instruments;
- Communication of equipment status and alarms;
- Miscellaneous plumbing, room finishes, doors and louvers;
- Site fencing/gates, landscaping, access drive and parking area.

The flood level is the maximum acceptable elevation that the sewage can rise in the manholes and inlet pipes without risk of overflowing basements along the upstream sewers or damage to the pumping station infrastructure. Based on the information provided, there are no homes or commercial buildings with basements, however there are a few underground parking garages on the south-west side of the development. As such, the flood level is assigned as 78.0 masl, 1.5 m below the lowest ground elevation of 79.5 masl. An emergency storage tank has been designed at this facility for 2-hour storage of sewage at the ultimate peak design flow. The Flood Water Level may be adjusted during the detailed design stage.

WET WELL DIMENSIONS: Based on the Ministry of Environment Conservation and Parks (MECP) criteria and pump manufacturers guidelines, the wetwell should contain sufficient volume to allow for a maximum six (6) starts per hour per pump with each pump operating for a minimum of three (3) minutes whenever it starts. The pump cycle time is represented by the equation:

Volume (m3) $= \theta Q / 4$

θ = time of one pumping cycle = 10 min

Q = Pump capacity of the largest duty pump (m3/min)

The wet well is based on the minimum flowrate in the 300 mm diameter forcemains which is 57L/s (3.4m3/min). Accordingly, the minimum volume per wet well cell is calculated as 8.5 m3 at this stage. The proposed wet well will have two cells with a combined length of 10 m and a width of 4 m. The operating level within the wet well will be 1 m with a total wet well depth of about 15 m. with a combined length of 8.3 m and a width of 4 m. The operating level within the wet well will be 1 m with a total wet well depth of about 15 m.

Channel Grinder

(photo courtesy of JWC)

Sanitary Servicing

5

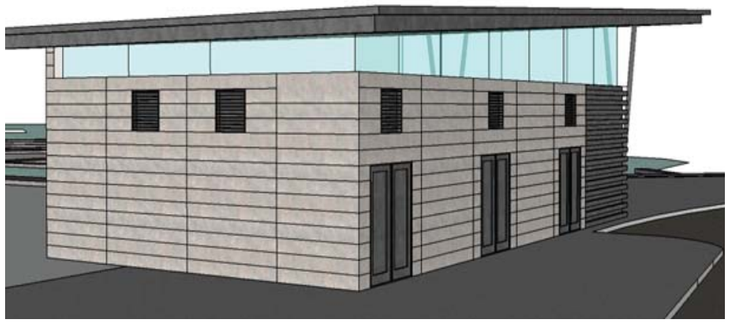
SCREENING: Provision of screening equipment should be considered to mitigate the potential for inorganic material clogging the pumping system. Screening may be a bar screen, a travelling screen, or a channel grinder. A channel grinder would require less operator attention than either the bar screen or the travelling screen which both could require operator attention.

Screening will protect the pumps, reduce pump maintenance and clogging, and reduce capacity loss from clogging in the forcemain, providing an overall better system for the operating authority.

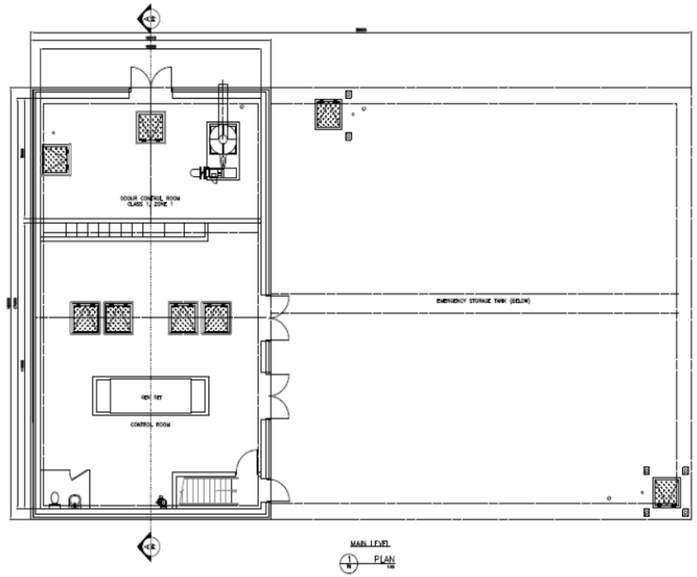
EMERGENCY STORAGE: Emergency storage is provided at SPSs as a redundant measure to protect the station infrastructure and to reduce the risk of basement flooding in the areas upstream of the SPS. It provides storage that enables system operators a definite period of time to fix the cause of the system outage before sewage spills overland or basement flooding occurs. Two-hour of emergency storage will be allocated for the SPS at this stage, based on the Peel Standard.

An emergency storage volume of about 2,000 m3 for 2 hour storage will be provided for this facility which includes 240 m3 of emergency storage in the wet well the rest in an emergency storage tank. This will be a below-grade tank, adjacent to the wet well which will have dimensions of 20 m x 18 m x 6 m. The top slab of the tank will be designed such that it can be used as parking space for the facility.

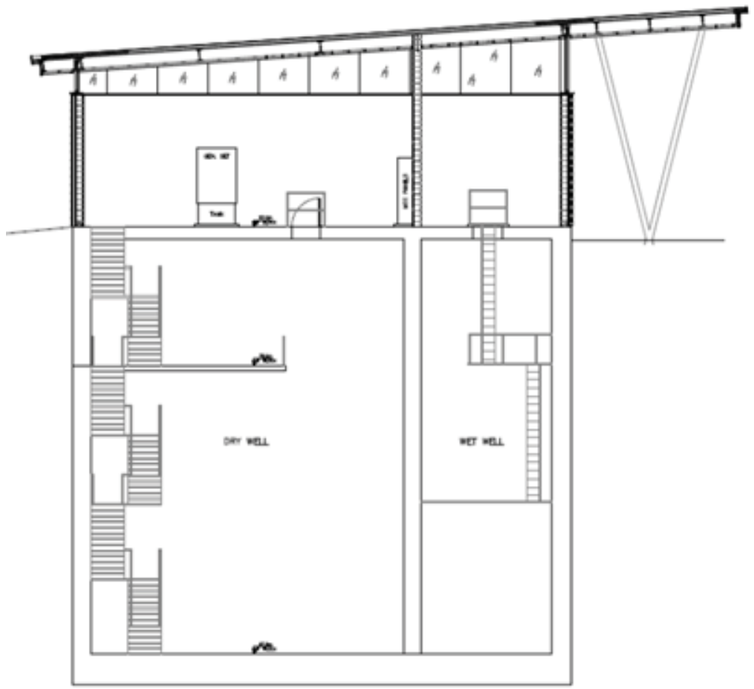
SITE AND BUILDING DIMENSIONS: The proposed SPS will have a building dimensions of approximately 15 m x10 m with an emergency storage dimension of 18 m x 15 m. The required property dimensions for the SPS will be about 40m x 25 m but could potentially be combined with other facilities such as the vacuum waste and district energy facilities.



Typical SPS Building Rendering



Typical SPS Floor Plan



Typical SPS Sectional View

Sanitary Servicing

Sanitary Pumping Station Design Considerations Continued

BELOW-GRADE STRUCTURE CONSTRUCTION: Since the location of the SPS is close to the Lake and below the lake surface water level, shoring will likely be required to mitigate dewatering operations during the construction of the SPS. Additionally, due to the typical nature of the soil close to the lake, it is anticipated that the station will need to be founded on piles. The excavation and construction methodology as well as shoring and foundation requirements will be finalized once the Geotechnical Investigation is complete to the site.

EMERGENCY OVERFLOW: An overflow pipeline at the top of the wetwell is proposed to be installed to provide protection to the pumping station and equipment in the event of station overflows. If power fails, the emergency generator will start, providing full power to the pumping station. If the emergency generator further fails to operate, the emergency storage will provide one hour of storage at peak flow. After this storage is consumed, the sewage will overflow from an emergency overflow located near the top of the wetwell to protect the pumping station. In accordance with MECP, the overflow will be metered through a meter appropriate for a partially submerged pipe, such as a Khrone Tidalflux magnetic flow meter, and shall include a valve, such as a flap gate, to reduce the potential for odour emissions during normal operations from the overflow location. The overflow location will need to be identified during the design phase of the project.

FORCEMAIN SIZE: In accordance with the MECP Guidelines and Peel Guidelines, the forcemains should be designed for flow velocities from 0.8 m/s to 3.0 m/s. Maintaining a minimum velocity is critical in a forcemain since lower velocities will result in settling of sediment within the lines. Based on the Sanitary Design (Drawing SAN-1), twin 300 mm forcemains are proposed. The forcemain is approximately 864 m long from the SPS to a sanitary manhole located upstream of the existing 1,650 mm diameter trunk sewer. This shorter length of forcemain is not be as susceptible to damage from water hammer pressures. However, the station will be equipped with protection against transient phenomena.

PHASES OF DEVELOPMENT: Since the Development is anticipated to be completed in phases, the SPS should be able to accommodate the needs. Based on the minimum velocity criteria (>0.8 m/s) for the forcemain, the minimum sewage flowrate in the forcemain should be 57 L/s which translates to a population of about 4,500 (approx. 600 units) of this development. The estimated sewage flowrates for each phase and corresponding pump sizes will be analyzed during the detailed design phase.

EMERGENCY GENERATOR: The Pumping Station will include an emergency generator with an Automatic Transfer Switch (ATS) that will automatically start in case of a power outage. The generator will be sized for all connected loads. The design of a new standby generator will be based on several pre-design tasks and design considerations as summarized below:

- Consideration of different fuel sources, such as diesel and natural gas, exhaust stack requirements to mitigate NOX emissions, combustion air intake dampers to be spring return fail open and monitored for status, and, depending on the noise assessment, consideration of a noise barrier wall to supplement noise attenuation measures.
- Spatial requirements for the generator enclosure, noise attenuation and proximity to property line (including noise and air pollution assessment), and interferences of the underground utilities.

The size of the standby generator will be determined during detailed design. The initial pumps selected are 40 kW each. At this stage, it is estimated that the generator will be at a maximum 250 kW to power all connected loads.

ODOUR CONTROL: Due to the close proximity of the station to adjacent households and businesses, and the propensity for sewage pumping stations to develop odourous gases such as methane and hydrogen sulfide, an odour control system is recommended.

Typical media based odour control units are packed-bed systems, which have higher capital costs and larger footprints but more operational advantages and drum scrubbers. Alternative technologies such as the Phoenix H2S Removal System will be evaluated, which may have more operational advantages over traditional media units. Considerations for the odour control unit will include:

- Noise and appearance
- Effectiveness in removing contaminants of concern
- Media life span
- Operational requirements for changing out media
- Capital costs

APPROVALS/PERMITS: The following approvals will be necessary for the construction of the pumping station;

- MECP Certificate of Approval – Sewage
- MECP Certificate of Approval – Air & Noise
- Conservation Authority Permit
- Building Permit and Site Plan Approval
- ESA Approval
- Permit to Take Water (if required for construction of the below-grade structure)

COST ESTIMATE: The preliminary capital cost estimate for the proposed SPS is approximately $12M which is in the range of -50% to +100% based on the industry standards. This cost does not includ the pile foundation. Detailed cost estimates will be provided during the detailed design stage.

Watermain Servicing

Existing Watermains Servicing The Site

The Lakeview Village lands are located within Pressure Zone 1 in the Region of Peel's water distri¬bution system, and are currently serviced via a 250/300 mm diameter watermain looped along East Avenue and Rangeview Road, which is connected to a recently installed 600 mm sub-trans¬mission main on Lakeshore Road East. The 600mm sub-transmission main can be connected to for the proposed development.

There are also other surrounding existing watermains but as indicated by the region no connections to these watermains are permissible. These watermains includes the following: The existing 400 mm local distribution feedermain crossing the site south of Rangeview Road, providing direct water supply from the Lakeview Water Treatment Facility to the G.E. Booth Wastewater Treatment Facility.

Two major distribution Zone 1 feedermains, 900 mm and 1500 mm in diameter, are located on East Avenue; and Zone 2 transmission main, 2400 mm in diameter that transfers supply from the Lakeview Water Treatment Facility to the Hanlan Reservoir via Lakefront Promenade.

Future Watermain Upgrades In Vicinity Of Subject Site

There are no planned water infrastructure in the vicinity of the subject to support the proposed development. However, based on the Region's latest population and employment projections, which includes the projected population of Lakeview Village, the existing trunk infrastructure in the area has sufficient capacity without future watermain upgrades.

Lakeview Water Treatment Facility Capacity And Upgrades

The Region has identified that Lakeview Water Treatment Facility has sufficient capacity for the proposed development and no upgrades are anticipated.

Proposed Water Distribution Network

The Region of Peel's study provided the following recommendations for water servicing of the subject lands:

Table 5.2-1: Water Servicing Recommendations and Strategies

WATER SERVICING	
REGION OF PEEL RECOMMENDATION	FUNCTIONAL SERVICING STRATEGY
Water will be primarily supplied to the development via the existing 600 mm sub-transmission main on Lakeshore Road.	Three water connections to the existing 600mm watermain on Lakeshore Road east are proposed at Lakefront Promenade, future Street 'F', and Hydro Road. Refer to Drawing WM-1 for details.
A secondary connection to the Lakeview Inspiration site consisting of a 400 mm watermain from the Lakeview WTP is recommended to ensure security of supply, should the 600 mm watermain on Lakeshore Road be out of service.	As shown on Drawing WM-1, a 400mm secondary feed is proposed to provide system security / redundancy to the Master Plan study area.
Water service to the buildings fronting Lakeshore Road will be provided off the existing 600 mm local distribution main on Lakeshore Road	These recommendations relate to future development within the Rangeview Estates precinct and are not required / do not directly influence servicing of the Master Plan area; however, the future connections of this development to the main will be considered in the water distribution modelling analysis.
There will be one primary 400 mm distribution watermain looped around the site via two connection points. The proposed local distribution main shown follows future proposed road right of ways, including Lakefront Promenade on the west, Lakefront Boulevard on the south, and New Haig Road on the east.	A 400mm loop is proposed through the subject lands, extending from Lakeshore Road East along Lakefront Promenade, along Street 'A', and up Hydro Road back to Lakeshore Road East as shown on Drawing WM-1. Placement of the watermain loop along Hydro Road is more favorable in terms of development phasing and avoids a pipe crossing / easement through Serson Creek. New Haig Road is partially situated on (currently) non-participating lands whereas Hydro Road is within the Lakeview Village lands.
There is an existing 400 mm local distribution main crossing the site south of Rangeview Road that supplies a dedicated water supply to the G.E. Booth Wastewater Treatment Facil¬ity. This watermain shall remain dedicated and shall not be used to supply water to the Inspiration Lakeview development.	Drawing WM-1 illustrates how the existing 400mm supply to the G.E. Booth WWTF will be maintained, albeit realigned through the subject lands along a public road (Street 'B'). No service connections to this watermain will be permitted. Based on the final land use design, the watermain will be relocated along a future road right of way so long as it remains a dedicated feed to the plant.

The proposed water distribution network is planned based on connection to the 600mm sub-transmission main on Lakeshore Road East only. Drawing WM-1 illustrates the preliminary water servicing concept.

In addition to the recommended 400mm distribution loop connected to the existing 600mm watermain on Lakeshore Road East, the new development is proposed to be serviced internally by a system of 300mm watermains to provide service connections to the future development blocks. As shown on Drawing WM-1, a 200mm watermain is proposed along the south side of the property (Streets 'I', 'G', 'F', 'J', and 'H') to provide fire protection and potable water along the shoreline. The individual site plan blocks encircled by the 200mm watermain will be serviced from the 300mm water¬main on Street 'C' as opposed to the 200mm watermain. All watermain sizes have been confirmed through the hydraulic modelling completed as part of this report.

Drawing WM-1 also illustrates how the existing 400mm supply to the G.E. Booth WWTF will be maintained, albeit realigned through the subject lands along a public road (Street 'B'). No service connections to this watermain will be permitted. Based on the final land use design, the watermain will be relocated along a future road right of way so long as it remains a dedicated feed to the plant.

Watermain Servicing

Water Demand Analysis

The Region of Peel produced the Inspiration Lakeview Water and Wastewater Servicing Analysis (May 2018) and the Region outlined the design criteria that apply to the proposed development:

- 265 Lpcd for average day water consumption
- A maximum day peaking factor of 1.8 for residential and 1.4 for employment growth
- A peak hour factor of 3.0
- Under Maximum Day demand, pipe velocity remains below 1.5 m/s
- Under Maximum Day demand, pressure in the system should not drop below 280 kPa (40 psi)
- Pressure in the system should not drop below 140 kPa (20 psi) under a maximum day plus fire condition

InfoWater has been selected for modelling the water distribution system for the study area and the water demands associated with the subject site and external lands are summarized in Table 5.2 2. The preliminary watermain layout was imported into the InfoWater model and nodes were generated using the Fill Connectivity tool in the InfoWater.

Table 5.2-2: Water Demand Analysis

PARAMETER	LAKEVIEW**	EXTERNAL*
Total Residential Population	16,321	5,707
Total Employment Population	5,621	2,196
Residential Avg Day Demand	50.06 L/s	17.50 L/s
Employment Avg Day Demand	17.24 L/s	6.73 L/s
Total Avg. Day Demand	67.30 L/s	24.24 L/s
Residential Max Day Demand	90.11 L/s	31.51 L/s
Employment Max Day Demand	24.14 L/s	9.43 L/s
Total Max Day Demand	114.24 L/s	40.93 L/s
Residential Peak Hour Demand	150.18 L/s	52.51 L.s
Employment Peak Hour Demand	51.72 L/s	20.20 L/s
Total Peak Hour Demand	201.90 L/s	72.71 L/s

Notes:
* based on Inspiration Lakeview Water and Wastewater Servicing Analysis prepared by the Region, dated May 2018
** based on latest draft plan of Lakeview Village

The average daily demands were calculated for each development block (internal and external) and were assigned to nodes adjacent to the respective parcels. The average day demand set is populated with the residential demands assigned to Demand 1 and employment demands assigned to Demand 2.

Based on the standards outlined in Inspiration Lakeview Water and Wastewater Servicing Analysis (May 2018) the peaking factor for the Maximum day is 1.8 for residential and 1.4 for employment. The peaking factor for Peak hour is 3 for both residential and employment. The average day demand set was multiplied with the respective peaking factors to create separate maximum day and Peak hour demand sets.

Fire demands based on the land use have been proposed to be minimum of 300 L/s. This is common for commercial properties, and high-rise residential development. The proposed development is located within Peel Region pressure zone PZ1. Since a local area from within a larger distribution network is being modelled, suitable boundary conditions were established at the study area limits (where the proposed internal network will connect to existing sub-transmission mains). The proposed connection locations are:
- To the 600 mm watermain along Lakeshore Road East, at Lakefront Promenade;
- To the 600 mm watermain along Lakeshore Road East, at Hydro Road;

Fixed head reservoirs were established at these two locations. The HGL elevations at these reservoirs were established through pressure logging data provided by Region of Peel. The details of the boundary conditions are in Table 5.2-3.

Table 5.2-3: HGL Elevations at boundary conditions

Boundary Location	HGL Elevation*
Lakeshore Road East, at Lakefront Promenade	142 m
Lakeshore Road East, at Hydro Road	142 m

Based on the modelling results, the minimum water system requirements can be met and the results are summarized in Table 5.2-4. The Watermain Methodology and Analysis memo is included in Appendix D.

Table 5.2-4: Water Servicing Recommendations and Strategies

Water Demand Modeling Scenario		
Average Day Demand	Recommended Normal Pressures within System: 275 kPa to 690 kPa (40 psi to 100 psi)	System Pressure = 510 kPa to 647 kPa (74 psi to 93 psi)
Maximum Day Demand	Recommended Normal Pressures within System: 275 kPa to 690 kPa (40 psi to 100 psi)	System Pressure = 507 kPa to 643 kPa (74 psi to 93 psi)
	Flow velocity remains below 1.5 m/s within the distribution network	Flow velocity within the distribution network is between 0.01 m/s to 0.65 m/s.
Peak Hour Demand	Recommended Normal Pressures within System: 275 kPa to 690 kPa (40 psi to 100 psi)	System Pressure = 498 kPa to 637 kPa (72 psi to 92 psi)
Maximum Day Demand plus Fire Flow	Required Fire Flow to be provided at a residual pressure of no less than 140 kPa	
Fire Flow Requirements	Fire flow requirements for the proposed development: Qf > 300 L/s	Available Fire Flow = 522 L/s to 2,745 L/s

Stormwater Management

BACKGROUND AND OBJECTIVES

The subject site is within the Lake Ontario Shoreline East Subwatershed in the Credit Valley Conservation (CVC) watershed. The existing storm drainage infrastructure was constructed in the absence of modern stormwater management practices, and the nature of the proposed redevelopment provides an opportunity to implement an accompanying stormwater management strategy.

Stormwater Management criteria are based on the Credit Valley Conservation (CVC) and the City of Mississauga Stormwater Management Criteria. However, given the site's proximity to Lake Ontario, the typical criteria have been altered and changes have been agreed upon through consultation with the City and CVC. Table 5.3-1 summarizes the stormwater management criteria for Lakeview Village along with the appropriate justification for exceptions.

STORM DRAINAGE OVERVIEW

As shown on Drawings STM-1 and STM-2, the majority of the subject site is proposed to discharge directly to Lake Ontario. Major storm flows will be conveyed overland through the road right-of-ways. Minor storm flows will be conveyed through the storm sewer system to three new headwalls located at the south-west corner of the subject site. Headwalls 1, 2 and 3 will outlet into the channel previously used for discharge from the coal plant. Future site plan areas located in the north-east corner of the subject site will discharge to Serson Creek via headwalls to be designed at the site plan stage. Prior to any runoff discharging into the receive water bodies, water treatment will be provided to satisfy the stormwater management criteria set out by CVC and the City.

The runoff coefficients were based on the proposed land use and the City standard runoff coefficients. The 100-year flows from the subject lands were calculated using the increased runoff coefficients (1.25 x C10-year) as per the City requirements. The storm sewers have been conservatively sized assuming no LID/stormwater management measures are in place. However, at the detailed design stage and in consultation with CVC and the City of Mississauga it may be possible to realize benefits from the LIDs and reduce the conservative pipe sizes based on the proposed reduced runoff coefficient summarized in Table 5.3-8.

Existing stormwater infrastructure in and around the subject lands is described in Section 2.4.

PROPOSED MINOR AND MAJOR SYSTEM DRAINAGE

Storm servicing conveyance for the development will conform to City of Mississauga standards. Storm sewers will be designed to convey minor system flows resulting from the 10-year storm event for ultimate discharge to Lake Ontario. The storm sewers have been conservatively sized assuming no low-impact development (LID) or stormwater management (SWM) measures are in place. However, at detailed design stage (and in consultation with CVC and City of Mississauga staff) it may be possible to realize benefits from the LID / SWM measures and reduce the conservative pipe sizes presented on Drawing STM-1 and STM-2. The site outlets are positioned at natural low points and generally conform to the existing site drainage patterns.

The proposed storm sewers within the subject lands will be designed to intercept the minor and some of the major system flows. The proposed invert of approximately 75.5m is expected to position the pipes well above the existing lake bottom and will reduce the likelihood of any sediment entering the pipes.

The proposed minor system drainage areas and services are shown on Drawing STM-1 and STM-2.

The proposed ROWs within the subject lands will provide conveyance capacity for the major system flows (evaluated as the 100-year less 10-year storm flows). The capacities of the proposed ROWs were determined using the AutoCAD extension Hydraflow Express. Modelling outputs are included in Appendix C. A table comparing the capacity of the proposed ROWs with the major system flow directed to each ROW is provided in Appendix C. The ROW geometry is based on the cross-sections shown in the TMIG ROW Study provided in Section 4.3.

The majority of the proposed development flows southwesterly towards the discharge channel to the west to Street 'A' with the largest contributing drainage area. Street 'A' is a major collector road with a ROW width of 26m. This road provides sufficient conveyance capacity for the overland flow, which is based on the remaining 100-year flow after the 10-year flow and 100-year capture area flows are deducted. The drainage areas going to each ROW outfall are shown on Drawing STM-2. These areas have been used to determine the major system drainage to the major collector roads.

OUTFALLS

Any outfalls beneath trails / developed areas will be sized for the greater of the 100-year or Regional storm flows. Emergency spillways we be provided at all outfall locations. Storm sewer outfall inverts connecting to Lake Ontario have been set at 75.50m, which is above the 10-year monthly mean water level as determined in the 2019 Shoreline Hazard Assessment from Baird. The design of the shoreline works including outfall protection will be undertaken by others and coordinated with future submissions.

Stormwater Drainage Strategy

Table 5.3-1: Stormwater Management Criteria

STORMWATER MANAGEMENT COMPONENT	GENERAL REQUIREMENT	APPLICABILITY TO THE STUDY AREA
Quantity Control	Reducing the impact of development on stormwater flow on downstream receivers to prevent flooding or exceedance of existing flows.	Due to the subject site's proximity to Lake Ontario, quantity control is not required according to City and CVC guidelines. Discharge of stormwater flows to Serson Creek (if determined to be useful for the site servicing) may require quantity control, subject to hydraulic modelling of the channel.
Quality Control	Reducing the impact of development on water quality, with a focus on total suspended solids.	Quality control is required for the subject lands. In accordance with the Ministry of the Environment stormwater management criteria for enhanced protection, a minimum water quality target of 80% TSS removal is required.
Erosion Control	Reducing the impact of development on the stability of downstream receiving systems.	Due to the subject site's proximity to Lake Ontario, erosion control is not required for areas discharging into Lake Ontario but will be considered for areas discharging to Serson Creek. However, 5mm of runoff per storm event for the overall site will be captured as part of the water balance requirement.
Water Balance	Maintaining / mimicking where possible the natural water cycle in terms of infiltration/groundwater recharge, runoff, and evapotranspiration.	5mm filtration / retention per storm event post-development is required for the overall site. LID measures may be used to address the water balance targets.
Thermal Mitigation	Stormwater runoff from urban areas is often warmer than pre-development runoff due to warm rooftops, pavement, and long-term retention in ponds. The warm stormwater has the potential to impact temperature-sensitive "cold-water" species.	Thermal mitigation is not required – Lake Ontario and Serson Creek are not considered to be receiving water bodies sensitive to temperature. However, the stormwater runoff from the site will generally be cool since underground conveyance / storage systems and LID measures will be employed and no end-of-pipe stormwater management facilities (i.e. ponds) are proposed.

PROPOSED STORMWATER MANAGEMENT STRATEGY

In accordance with the Ministry of the Environment, Conservation, and Parks, a minimum water quality target of 80% TSS removal is required. This requires that all runoff discharged to the lake or other receiver (e.g., Serson Creek) must be treated such that 80% of suspended solids are removed from the majority (typically 80%) of runoff events. In addition to TSS removal, the discharge of oil and other pollutants commonly encountered on roads is undesirable and is typically removed with measures such as oil/grit separators, pond forebays, polishing wetlands or other measures. CVC requires the use of a "treatment train" of water quality measures that include more than one treatment measure to ensure redundancy and better overall quality control.

The proposed stormwater management (SWM) strategy utilizes a treatment train approach to treat runoff, without the need for end-of-pipe facilities. A combination of storm sewers and overland flow routes in the right-of-ways will provide stormwater conveyance; and a suite of potential low impact development (LID) measures will provide water quality and water balance throughout the development. This approach has been created in adherence with the Mississauga Green Development Standards (October, 2012) which requires that "all site plan applications incorporate, where appropriate, technologies that maximize the natural infiltration and retention of stormwater through site development". The Standards recommend the use of a variety of low impact development (LID) features, which are included in the Lakeview Village SWM approach to achieve both water quality and water balance targets. Although LID features are typically designed to provide some form of infiltration, the soil and groundwater conditions may require the design to be modified. This will be verified at detailed design and, if required, the bottom and sides of the LID can be lined with an impermeable layer and/or a sub-drain can be provided for excess water conveyance.

Since impacts to Lake Ontario due to release of uncontrolled flood flows is not a concern, no quantity control measures are proposed. However, implementation of low impact development best management practices provides some degree of quantity control, which will be assessed at the detailed stage of the development process. Benefits of quantity control can be realized through reduced size of conveyance infrastructure, resulting in lower capital and eventual maintenance / replacement costs.

The stormwater management approach requires on-site controls within each of the individual residential/ commercial development blocks, as well as within the public realm spaces, which will be discussed further in the following sections. In general, on-site controls will include water quality control of 80% TSS removal and 5mm water retention for water balance for the entire subject site. Within the individual residential/ commercial development blocks a total water retention of 7.5mm is proposed for water balance, in addition to the 80% TSS removal target.

Stormwater Drainage Strategy

The stormwater Management strategy for the subject lands is summarized in Table 5.3-2 below:

Table 5.3-2: Stormwater Management Strategy

STORMWATER MANAGEMENT COMPONENT	GENERAL REQUIREMENT APPLICABILITY TO THE STUDY AREA	SPECIFIC REQUIREMENTS / PROPOSED STRATEGY
Conveyance	Moving / containing stormwater runoff safely to a suitable outlet Major (road system) and minor (storm sewer system) conveyance is required for the subject lands.	Storm servicing conveyance for the development will conform to City of Mississauga standards including the following: Storm sewers will be designed to convey minor system flows resulting from the 10-year storm event for ultimate discharge to Lake Ontario. The storm sewers have been conservatively sized assuming no low-impact development (LID) or stormwater management (SWM) measures are in place. However, at the detailed design stage and in consultation with CVC and the City of Mississauga it may be possible to realize benefits from the LIDs and reduce the conservative pipe sizes based on reduced runoff coefficients for the site plan blocks, as shown in Table 5.3-8 and in the runoff reduction calculation included in Appendix E. The site outlets are positioned at natural low points and generally conform to the existing site drainage patterns. The proposed storm sewers within the subject lands will be designed to intercept the minor and some of the major system flows. The proposed invert of approximately 75.5m is expected to position the pipes well above the existing lake bottom and will reduce the likelihood of any sediment entering the pipes. The proposed ROWs within the subject lands will provide conveyance capacity for the major system flows (evaluated as the 100-year less 10-year storm flows).
Runoff Coefficient	The runoff coefficients were based on the proposed land use and the City standard runoff coefficients.	The runoff coefficients were based on the proposed land use and the City standard runoff coefficients. The 100-year flows from the subject lands were calculated using the increased runoff coefficients (1.25 x C10-year) as per the City requirements. The storm sewers have been conservatively sized assuming no LID / stormwater management measures are in place. However, at the detailed design stage and in consultation with CVCA and City of Mississauga it may be possible to realize benefits from the LIDs and reduce the conservative pipe sizes included in this report
Quantity Control	Reducing the impact of development on stormwater flow on downstream receivers to prevent flooding or exceedance of existing flows Due to the subject site's proximity to Lake Ontario, quantity control is not required according to City and CVC guidelines.	Since impacts to Lake Ontario due to release of uncontrolled flood flows is not a concern, no quantity control measures are proposed. However, implementation of low impact development best management practices provides some degree of quantity control which will be assessed at the FSR and detailed stage of the development process. Benefits of quantity control can be realized through reduced size of conveyance infrastructure, resulting in lower capital and eventual maintenance / replacement costs. Discharge of stormwater flows to Serson Creek (if determined to be useful for the site servicing) may require quantity control, subject to hydraulic modelling of the channel.
Quality Control	Reducing the impact of development on water quality, with a focus on total suspended solids. Quality control is required for the subject lands.	In accordance with the Ministry of the Environment, Conservation, and Parks, a minimum water quality target of 80% TSS removal is required. This requires that all runoff discharged to the lake or other receiver (e.g., Serson Creek) must be treated such that 80% of suspended solids are removed from the majority (typically 80%) of runoff events. In addition to TSS removal, the discharge of oil and other pollutants commonly encountered on roads is undesirable and is typically removed with measures such as oil/grit separators, pond forebays, polishing wetlands or other measures. CVC requires the use of a "treatment train" of water quality measures that include more than one treatment measure to ensure redundancy and better overall quality control. Erosion control and low impact development (LID) measures also fall within the category of Quality Control and are described in the following sections.
Erosion Control / Erosion Protection	Reducing the impact of development on the stability of downstream receiving systems. Erosion protection is required at all drainage outlets	Conventional erosion control (i.e. extended detention of stormwater volume to manage exceedances of erosion thresholds and flow duration) is typically not required for non-fluvial systems (i.e. the lake) but will be considered for areas discharging to Serson Creek. Outfalls at the lake will be designed with erosion protection measures to ensure that the stability of the shoreline at the storm outfalls is not impaired. This could include the use of armouring / stone and geotextiles at the outfall locations but can also include vegetation as a protective measure. The use of LIDs and other SWM measures will reduce the overall risk of erosion.
Water Balance	Maintaining / mimicking where possible the natural water cycle in terms of infiltration/ groundwater recharge, runoff, and evapotranspiration. The City of Mississauga generally requires retention of the first 5mm of precipitation on site to address water balance.	While the City recommends retention of the first 5mm of precipitation, the target recharge volume will be confirmed through hydrogeological studies. Currently, 5mm filtration / retention per storm event is proposed for the overall site and 7.5 mm of runoff capture is recommended for the residential / commercial development. The use of potential LID measures will also address the water balance targets although it should be noted that opportunities for infiltration will be limited on the site plan areas due to underground parking structures and high groundwater table. However, due to the nature of the foundation and soil removal required for the subject lands, there may be unconventional flexibility to specify the new soil type/composition for the development in the open space or ROW areas.

Table 5.3-2 Continued: Stormwater Management Drainage Strategy

STORMWATER MANAGEMENT COMPONENT	GENERAL REQUIREMENT APPLICABILITY TO THE STUDY AREA	SPECIFIC REQUIREMENTS / PROPOSED STRATEGY
Low-Impact Development	The City of Mississauga and CVC encourage the use of LID measures which achieve stormwater management objectives with a distributed or passive application such as landscaping features. These measures are often required to address the CVC's requirement for a "treatment train" approach to water quality control, erosion control, and water balance. LID measures will be implemented on the subject lands to achieve the quality control (erosion control, TSS removal, water balance) and overall sustainability targets.	There is an opportunity to explore LID or other sustainable best management practices to provide water quality and erosion control since a conventional end-of-pipe facility is not required. A treatment train approach including possible LID measures and Oil/ Grit Separators (or other mechanical separators) will be provided to provide quality control. Since most LID practices are limited or defined by soil characteristics, slope, and contributing area/land use, there may be a wider range of practices available to achieve the stormwater management, water balance, and overall sustainability objectives for the site. Where possible, clean / treated runoff from the site plan areas or open space blocks should be separated from the municipal system to avoid the necessity for treating the stormwater runoff a second time. Potential LID measures are described in the following section.
Thermal Mitigation	Stormwater runoff from urban areas is often warmer than pre-development runoff due to warm rooftops, pavement, and long-term retention in ponds. The warm stormwater has the potential to impact temperature-sensitive "cold-water" species. Thermal mitigation is not required – Lake Ontario and Serson Creek are not considered to be receiving water bodies sensitive to temperature.	Although thermal mitigation is not required, the stormwater runoff from the site will generally be cool since underground conveyance / storage systems and LID measures will be employed, and no end-of-pipe stormwater management facilities (i.e. ponds) are proposed.
Shoreline Works and Stormwater Outfalls	The design of the shoreline works including outfall protection will be undertaken by others and coordinated with future submissions.	Any outfalls beneath trails / developed areas will be sized for the greater of the 100-year or Regional storm flows. Emergency spillways we be provided at all outfall locations. Storm sewer outfall inverts connecting to Lake Ontario have been set at 75.50m, which is above the 10-year monthly mean water level as determined in the 2019 Shoreline Hazard Assessment from Baird. The design of the shoreline works including outfall protection will be undertaken by others and coordinated with future submissions.
Sustainable Design	Sustainable design for stormwater involves utilizing rainfall / runoff as a resource integrated with other components of the development, rather than a waste product to reduce cost, energy use, and waste.	Sustainable stormwater management design for the subject lands will consider measures such as: • Use of existing structures / remnant components of the former OPG power plant for stormwater management • Use of treated stormwater for irrigation of landscaped areas and urban farm / community garden areas • Use of stormwater for cooling • Use of treated stormwater for recreational areas (splash pads, fountains, etc.) • Use of stormwater for car washes / non-potable water for condominium maintenance / cleaning. • Use of stormwater (as "grey water" for use in laundry, toilet flushing, etc.) • Use of stormwater for maintenance (water trucks, irrigation of ROW vegetation, street sweeping and dust control during construction. • Use of stormwater to feed end-of-pipe polishing features such as a recreational lake for canoeing, ice skating, etc. • Use of stormwater effluent at outlets to encourage circulation in the lake inlets / outlets • Integration of stormwater management measures such as LIDs and polishing wetlands as components of the landscaping / amenity areas • Introducing educational signage about stormwater management goals, practices, and benefits

SWM Controls for Various Land Uses

PUBLIC REALM SPACES

The stormwater management strategy considered for the public realm spaces are within the right-of-ways (ROWs) and parklands. A treatment train approach using a combination of LID features and oil-grit separators (OGS) is proposed to provide 80% TSS removal for water quality control and 5mm water retention for water balance where possible. The types of LIDs proposed within the ROWs and parklands are based on the space available and the suitability to integrate the LID into the surrounding land use. The 5mm water retention requirement will be achieved through the filtration / retention of the first 27 mm of runoff within the proposed LIDs.

Table 5.3-3: Examples of LID Features within Specific Street Types

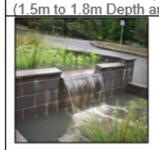
Types of LID	Suitable Street Types	Description
 **A. Tree Pits with Soil Cells** (1.5m to 1.8m Depth and full width of blvd 2.25m to 2.9m)	Major Collector Minor Collector	Soil cell systems can be used when street trees are desirable in locations where surface areas are limited. Soil cells are rigid modular systems that are used to increase the soil volume under paved surfaces in ultra-urban areas. They provide the structural integrity required to support vehicular load on paved surfaces while offering up to 92% porous space in order to accommodate underground services and utilities. Soil cells can be used under conventional concrete or unit pavers as well as under pervious interlocking concrete pavers. In addition, given their structural integrity, soil cells be used under vehicular load bearing sidewalks, parking lay-bys or cycling infrastructure to increase soil volumes. Paved surfaces should be designed to withstand loads from sidewalk ploughs and midsize service vehicles, therefore, structural soil can be used under paved areas to allow for roots to grow into adjacent soil volumes.
 **B. Bioretention Bump outs** (1.5m to 1.8m Depth and full width of parking 2.2m)	Major Collector, Minor Collector Special Character Street	Curb extensions and bump-outs provide another design variation of the bioretention practice. They can be located at intersections, mid-block areas and at transit stops within the Edge and Roadway Zones of various street types. In addition to stormwater management functions, curb extensions / bump-outs can also enhance biodiversity, offer visual appeal and provide traffic calming benefits.
 **C. Bioretention Planters** (1.5m to 1.8m Depth and full width of blvd 2.25m to 2.9m)	Major Collector Minor Collector Special Character Street Local Road	Bioretention planters are constructed with vertical walls, are often narrow and rectangular in shape and can be installed in close proximity to utilities, driveways, trees, light standards and other street features. Bioretention planters receive roadway runoff through curb inlets and by overland flows from the surrounding sidewalk and paved surfaces. They are well-suited for ultra-urban street types and can be adapted to fit within Furnishing Zones and Medians. As a result of their context, bioretention planters require hardy, aesthetically-pleasing plant materials that tolerate harsh urban conditions and winter maintenance protocols. Bioretention planters are often located in higher pedestrian traffic areas, therefore design solutions should consider planting, curb or railing options that will impede pedestrians from inadvertently stepping into a planter bed.
 **D. Bio Swales** (1.5m to 1.8m Depth and full width of blvd 2.25m to 2.9m)	Major Collector	Bioswales are linear and have a cross-sectional surface geometry similar to a traditional ditch, however their subsurface profile is more reflective of a bioretention cell, with filter media and/or a storage gallery. Bioswales can either be planted with grasses or finished with more elaborate combinations of plant and aggregate materials as shown in the image to the left. These additional components help to slow the velocity of runoff and assist in sedimentation, filtration and evapotranspiration.

Table 5.3-4: Suitable Location of each LID

STREET TYPE	Tree Pits with Soil Cells, Bio-Retention Planters, and Bio-Swales		Bio-Retention Bump Outs	
	1-side	2-sides	1-side	2-sides
1a. Major Collector	X		X	
1b. Major Collector	X			X
1c. Major Collector		X		X
1d. Major Collector				X
2a. Minor Collector		X		
2b. Minor Collector		X	X	
3a. Special Character Street	X			
3b. Special Character Street			X	
3c. Special Character Street			X	
4a. Local Street		X		
4b. Local Street		X		
4c. Local Street	X			
4d. Local Street		X		

RIGHT-OF-WAYS (ROWs)

Oil-grit separators (OGS) are proposed as part of the treatment-train-approach for stormwater management and will be sized according to the drainage area and imperviousness. Although OGS are usually sized to provide 80% TSS removal, CVC only recognizes OGS to provide 60% TSS removal. Therefore, to achieve the required 80% TSS removal, additional water quality treatment is required (such as LID features). The types of LID considered for the ROW are limited to the space available (i.e. the width of the ROW and boulevard). The proposed ROW cross-sections are discussed in the TMIG ROW Study provided in Section X.

Many utilities and services are proposed within the ROWs, which limits the location and the types of LIDs suitable within the ROWs. Layby parking requirements, turning lanes, and bus stops will also impact the available space for LIDs. This may impact the locations such that LIDs can only be located along one side of the road for some streets and along a certain section of road. Nonetheless, runoff from all of the proposed municipal ROWs will receive quality control through the treatment-train-approach (combinations of oil-grit separators and LID measures) and will be designed to provide a minimum of 80% TSS removal for the ROW area as per the target 'Enhanced' water quality criteria.

The LIDs will be sized to remove a minimum of 80% of the TSS and will provide 5mm of water retention through infiltration, evaporation and/or evapotranspiration.

RIGHT-OF-WAYS (ROWs) CONTINUED

All of the proposed LIDs in Table 5.3-3 depend on the storage capacity underground and water quality is achieved through filtration within the soil/ stone media under the surface vegetation. The width reserved for LIDs on the ROWs are generally 2.4m wide on each side of the road (with the exception of parking layby areas). Where necessary to achieve a conservative Drainage Area to LID ratio (less than 20:1; approximately 15:1 Impervious area to LID area), the parking layby areas have been revised. A preliminary layout of the possible locations for the LIDs is illustrated on Drawing LID-1 and typical details are included on Drawing LID-2.

Based on the Sustainable Technologies Evaluation Program (STEP), the minimum depth of the filter media should be 1m to support trees, 0.6m to support flowering perennial and decorative grasses and 0.3m to support turf grass. The LID will be sized to provide filtration for minimum the full 90th percentile event, which for the City of Mississauga is the 27mm storm event. Since the majority of the TSS is from the first flush of a major storm event, the performance for the LID is expected to exceed the 80% TSS removal target. A detailed PCSWMM LID sensitivity and performance analysis has been conducted for a hypothetical "worst case " Impervious Area to LID ratio to demonstrate that the required control of the 27mm event and 80% TSS removal can be achieved. Refer to Appendix E for details.

As recommended in the LID Design Guide prepared by CVC and TRCA dated 2011, the lifespan of the LID can be extended through pre-treatment, therefore pre-treatment will be provided where possible. Pre-treatments to be implemented will consist of filter strips and gravel diaphragms (i.e., a small trench filled with pea gravel, which is perpendicular to the flow path between the edge of the pavement and the bioretention practice to promote settling out of sediment). These measures will also acts as level spreaders, maintaining sheet flow into the LID. If the contributing drainage area is steep, then larger stone should be used in the diaphragm. A drop of 50-150 mm into the gravel diaphragm can be used to dissipate energy and promote settling.

Detailed sizing and modelling of the LID features will be provided during detailed design. Although LID features are typically designed to provide some form of infiltration, the soil and groundwater conditions may require the design to be modified. This will also be verified at detailed design and, if required, the bottom and sides of the LID can be lined with an impermeable layer and/or a sub-drain can be provided for excess water conveyance.

The performance of the proposed LID features within the ROW is expected to provide 80-90% TSS removal and the oil-grit separators are expected to provide 80% TSS removal, although only credited by the agencies for 60% TSS removal. Since most of the roads will include LID treatment with the exception of one location along Street A east of Hydro Road, the overall site is expected to provide an overall water quality control of greater than 80% TSS removal.

If during detailed design, it is determined that LIDs do not provide sufficient water quality treatment, OGS will be provided where required.

SWM Controls for Various Land Uses

5

PARKS

The proposed draft plan of subdivision includes various park blocks that will have varying programing and imperviousness. Some will be planned to provide an urban hardscape space and others are envisioned as green spaces with gardens, trees and trails. The park blocks are subject to the same SWM criteria as the entire subject site; however, are generally considered to generate "clean" runoff and will provide ample natural pathways for infiltration over the pervious areas to achieve the water balance target of SWM retention. Therefore, specific stormwater controls for park blocks are not proposed.

RESIDENTIAL/COMMERCIAL DEVELOPMENT

Low Impact Development (LID) Best Management Practices (BMPs) described in the CVC Grey to Green guidelines and the CVC / TRCA LID Design manual for private development were screened for potential feasibility based on the proposed land uses, site design, and grading constraints. Drainage from each block will receive as much water quality treatment as possible from oil grit separators and LIDs within the block prior to being discharged into the right-of-way storm sewers.

- The discharge requirements for each development block is as follows:
- Water Balance - 7.5mm water retention
- Water Quality - 80% TSS removal

The residential/ commercial blocks will be subject to individual site plan approvals and will be individually analyzed to provide the require SWM requirements. The proposed method for SWM treatment is through a treatment train approach of LIDs and OGS. The LIDs suitable for the site plan blocks, but not limit to, are identified in Table 5.3-9.

SWM Controls for Various Land Uses

RUNOFF COEFFICIENT REDUCTION

Since storm sewers are traditionally sized based on drainage area and runoff coefficients, an ancillary benefit to retaining 7.5mm of runoff is reduced runoff coefficients as shown in Table 5.3-8, which results in potential reduced storm sewer sizes for the individual blocks. For instance, a 10-year storm based on the City's IDF curve results in a runoff of 49.83mm for a block with a runoff coefficient of 0.9. If 7.5mm is captured within the block then the runoff is reduced to 42.33mm which results in a 15% reduction. When the same percent reduction is applied to the 0.9 runoff coefficient, then the resulting new runoff coefficient for the 10-year storm event is 0.76. The resulting reductions for the runoff coefficient of 0.9 and 0.65 are summarized in Table 5.3-8. Detailed calculations for the proposed on-site controls are provided in Appendix F.

To provide for more conservative storm sewer sizing in the storm sewer design sheets (Appendix C), a runoff coefficient of 0.9 was used for all site plan blocks to account for any future changes in land use.

Table 5.3-8: Example of Reduced Runoff Coefficient

Storm Event	Reduced Runoff Coefficient	
	Original Runoff Coefficient = 0.9	Original Runoff Coefficient = 0.65
25mm	0.60	0.35
2-Year	0.68	0.43
5-Year	0.73	0.48
10-Year	0.76	0.51
25-Year	0.78	0.53
50-Year	0.79	0.54
100-Year	0.81	0.56

MISSISSAUGA STORMWATER CREDIT PROGRAM

Multi residential and non-residential blocks will be eligible for the City's stormwater credit program by achieving the SWM criteria set out for the subject site. These blocks will be eligible to apply for a minimum of 17.5% credit, given that the block will provide 80% TSS removal and 7.5mm water retention for the entire block.

STORMWATER MANAGEMENT STRATEGY SUMMARY

The runoff from the subject site is anticipated to be treated and analyzed individually to satisfy the stormwater criteria. Therefore, the runoff from the entire subject site will satisfy the stormwater management objectives. A treatment-train approach is proposed to provide sufficient stormwater management for the residential/ commercial blocks. Opportunities such as LIDS within the ROW and site plan blocks and when combined with OGSs, will provide the required water quality and water balance requirement for the spaces.

SWM STRATEGY FOR SITE PLAN BLOCKS

The residential/ commercial blocks will be subject to individual site plan approvals and will be individually analyzed to provide the require SWM requirements. The proposed method for SWM treatment is through a treatment train approach of LIDs and OGS. The LIDs suitable for the site plan blocks, but not limit to, are identified in Table 5.3-9.

Table 5.3-9: Types of LIDs for Site Plans

TYPES OF LID	DESCRIPTION
GREEN ROOFS 	Green roof, also known as "living roofs" or "rooftop gardens", consist of a thin layer of vegetation and growing medium installed on top of a conventional flat or sloped roof. Green roofs areas should be allocated such that each roof will receive sunlight throughout the day. Only half of the available roof areas are typically allocated as green roofs due to the need for rooftop mechanical utilities. Green Roofs can consist of a variety of vegetative options that can provide benefits including stormwater controls, recreational spaces, heat dissipation, and air quality improvements.
PERMEABLE PAVEMENT 	Permeable Pavement is a variation on traditional pavement design that utilizes pervious paving material underlain by a uniformly graded stone reservoir. Permeable pavement areas could be allocated where vehicular traffic will be light to reduce compaction, clogging, and future maintenance costs. Pedestrian walk ways, urban amenity space and open space areas are suitable candidate sites. Permeable Pavements attenuate peak runoff flows by adsorbing and infiltrating surface runoff from the overlying and surrounding areas.
BIO-SWALES 	Bio-Swales are vegetated, open channels designed to convey, treat and attenuate runoff. Bio-swales are suitable for areas with long and uninterrupted stretches of green space. Due to this space requirement, the majority of bio-swales are located along right-of-ways or on blocks allocated as public park land. Bio-Swales also provide vegetative filtration by conveying drainage through swales constructed from an engineered vegetative media.
BIO-RETENTION 	Bio-Retention facilities collect drainage in depressions and use vegetation to filter out particulates and hydrocarbons before discharging the drainage into the storm sewer system or to another LID BMP. Bioretention areas can be integrated into a range of landscape areas including medians and cul-de-sac islands, parking lot medians and boulevards. A variety of planting and landscape treatments can be employed to integrate them into the character of the landscape.
RAINWATER HARVESTING 	Rainwater Harvesting is the process of intercepting, conveying and storing rainfall for future use. Rainwater Harvesting can be implemented by installing rainwater cisterns at underground parking structures to provide water for reuse such as car washes, irrigation, cooling, and other non-potable water uses.

Rendering of the Courtyard

IMPLEMENTATION

6

IMPLEMENTATION

6

6.1 EROSION & SEDIMENT CONTROL

Conventional erosion control (i.e. extended detention of stormwater volume to manage exceedances of erosion thresholds and flow duration) is typically not required for non-fluvial systems (i.e. the lake) but will be considered for areas discharging to Serson Creek. Outfalls at the lake will be designed with erosion protection measures to ensure that the stability of the shoreline at the storm outfalls is not impaired. This could include the use of armouring / stone and geotextiles at the outfall locations but can also include vegetation as a protective measure. The use of LIDs and other SWM measures will reduce the overall risk of erosion. The erosion and sediment control plan for the site servicing program of the subject lands will be designed, approved, and implemented in conformance with the City of Mississauga, Credit Valley Conservation and MOECC recommendations. Erosion and sediment control will be implemented for all construction activities including topsoil stripping, foundation excavation and stockpiling of materials. During construction, temporary sediment ponds may be required to treat pre-development drainage from stripped areas. The sediment control plan will be designed / coordinated with the soil remediation works.

The temporary ponds will be located at the low points of the site to detain sediment laden runoff and reduce peak flows and velocities prior to release into the receiving systems. The temporary silt ponds will maintain a permanent pool as per the MOE guidelines for temporary sediment control facilities. Forebay areas will be provided to enhance sediment removal.
The following erosion and sediment control measures will be installed and maintained during construction of the subdivision:

- A temporary sediment control fence will be placed prior to grading
- A construction plan will be implemented to limit the size of disturbed areas and to minimizing nonessential clearing
- Sediment traps will be provided
- Gravel mud mats will be provided at construction vehicle access points to minimize off-site tracking of sediments
- All temporary erosion and sediment control measures will be routinely inspected and repaired during construction. Temporary controls will not be removed until the areas they serve are restored and stable.

Recognizing that erosion and sediment control is a dynamic process, a detailed set of staging plans / construction sequencing will be required for the various stages of remediation, earthworks, servicing, site plan construction, and stabilization, coupled with the proposed development phasing.

6.2 PHASING / TIMING

Details related to phasing and construction timing will be provided with future submissions. The following items have been identified as key infrastructure to be completed to allow servicing of the first phase:

- Relocation of City Community Services (Parks) building from future Lakefront Promenade alignment
- Sanitary Pump Station and forcemain connection to Hydro Road / Lakeshore stub.
- Hydro Road construction
- Lakefront Promenade construction
- Watermain connections to Hydro Road and Lakefront Promenade
- Realign existing 400mm watermain feed from water treatment plant to wastewater treatment plant
- Secondary watermain connection to Lakefront Promenade from water treatment plant
- Storm outfalls – to be provided as determined by extent of phasing within proposed drainage boundaries

A preliminary phasing plan is included.

6.3 DEVELOPMENT CHARGE INFRASTRUCTURE

Based on discussions held with the City and Region, the following items are considered to be development charge infrastructure as they provide a community benefit for which DC credits can be claimed.

- Sanitary sewers with or exceeding 375mm diameter
- Sanitary pump station
- Watermains with or exceeding 400mm including dedicated feed to G.E. Booth WWTP
- Storm sewers with or exceeding 1500mm diameter or equivalent box pipe size
- LIDs in the public ROWs
- Public Realm blocks
- Serson Creek realignment and restoration, including future culvert crossings
- Lakefront Promenade Reconstruction and collector roads with public transit routes / infrastructure (Street A and Hydro Road)

View towards Lakeview Village and Mississauga shoreline from existing pier.

FIGURES

DRAWINGS

DRAWINGS CONTINUED

Drawing PP-24	Street A (Sta. 0+130.000 to Sta. 0+330.000)
Drawing PP-25	Street A (Sta. 0+330.000 to Sta. 0+550.000)
Drawing PP-26	Street A (Sta. 0+550.000 to Sta. 0+686.340)
Drawing PP-27	Street C (Sta. 0+000.000 to Sta. 0+190.000)
Drawing PP-28	Street C (Sta. 0+190.000 to Sta. 0+350.000)
Drawing PP-29	Street C (Sta. 0+350.000 to Sta. 0+533.223)
Drawing PP-30	Street J (Sta. 0+000.000 to Sta. 0+190.000)
Drawing PP-31	Street J (Sta. 0+190.000 to Sta. 0+347.721)
Drawing PP-32	Street D (Sta. 0+000.000 to Sta. 0+190.000)
Drawing PP-33	Street D (Sta. 0+190.000 to Sta. 0+370.000)
Drawing PP-34	Street D (Sta. 0+370.000 to Sta. 0+511.715)
Drawing PP-35	Waterway Common

Appendix A – Geotechnical Investigations

Geotechnical Investigations

LAKEVIEW
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Appendix B – Sanitary Sewer Design Calculations

Sanitary Sewer Design Sheet & Pumping Station Details

LAKEVIEW
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Appendix C – Storm Sewer Design Calculations

Storm Sewer Design Sheet

LAKEVIEW
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Appendix D – Water Distribution Report

Lakeview Community Water Modelling Methodology and Analysis Memo (TMIG, January 2020)

LAKEVIEW
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Appendix E – Stormwater Management Calculations

Right-of-Way LID Sizing Calculations

LAKEVIEW
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